IBM InfoSphere Master Data Management Server

InfoSphere Master Data Management Server Version 9.0 Developers Guide

Information Management software

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Note
Before using this information and the product it supports, read the general information under Appendix A, "Notices," on page 817.

Edition Notice

This edition applies to version 9.0.0 of IBM InfoSphere Master Data Management Server and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

Part 1. InfoSphere MDM Server platform

Chapter 1. InfoSphere MDM Server architectural overview

IBM® InfoSphere™ Master Data Management Server (InfoSphere MDM Server) is an enterprise application that provides a unified operational view of your customers, accounts, and products and an environment that processes updates to and from multiple channels.

It aligns these front office systems with multiple back office systems in real time, providing a single source of truth for master data. InfoSphere MDM Server uses a component-based Extensible Markup Language (XML) and Java™ 2 Enterprise Edition (J2EE) architecture to rapidly integrate with other systems and deliver flexibility and scalability.

InfoSphere MDM Server is an enterprise application that can either be used in its standard configuration, or modified through customization. You can customize InfoSphere MDM Server through a number of externalized features that control its operation.

The InfoSphere MDM Server Workbench can be used to create and extend InfoSphere MDM Server and associated Web-based user interfaces to aid with stewardship over the managed information. The Workbench provides a modeling, code generation, Java development environment, and testing environment.

The Workbench supports an iterative approach to development with full round-tripping support. The Workbench is integrated with IBM Rational® Software Architect to provide access to standard software development capabilities such as:

- Requirements management
- Source code control
- Asset management
- Deployment
- Testing

This documentation focuses on the InfoSphere MDM Server backend systems, especially from the system development and administration point of view. It also includes many method descriptions and code samples for developers. The major points of discussion relate to the externalized portions of the infrastructure components, the server-side tier components, and how both can be used to extend InfoSphere MDM Server functionality.

This section contains high-level information on the InfoSphere MDM Server architecture to help you understand how it can be customized to meet your needs.

InfoSphere MDM Server is a J2EE application conforming to the J2EE 1.4 standard. It is designed and built using a Service Oriented Architecture (SOA) and is composed of loosely coupled multiple infrastructure and business components. The InfoSphere MDM Server services tier is deployed on a J2EE application server and the database tier uses a relational database management system. For a complete list of supported application servers, databases, and other software, see the *IBM InfoSphere Master Data Management Server Installation Guide*.

The business services are made up of a collection of services provided with the product and any custom services built using the InfoSphere MDM Server

Workbench. In addition to the business services, the service tier also offers administration services and a Web-based business administration user interface.

You can interface with InfoSphere MDM Server using one of the supported interfaces including:

- RMI
- JMS
- Batch
- Web Services

InfoSphere MDM Server supports an XML based transaction interface. It comes with a request and a response schema, defined in XSD. All input XML files must conform to the request schema, while InfoSphere MDM Server always responds with an XML conforming to the response schema. The schemas define the structure of the business objects, which should be passed in or returned from InfoSphere MDM Server services. For a complete list of all the available services and the corresponding input and output business objects, refer to the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*. You can also interface with InfoSphere MDM Server using data formats other than XML.

Additionally, InfoSphere MDM Server also provides the ability to accept batch feeds for transactions.

Internally, InfoSphere MDM Server consists of two categories of modules, which are business modules and infrastructure modules.

In this section, you will learn:

Understanding components

The InfoSphere MDM Server blueprint describes the major components in the different tiers and layers of the InfoSphere MDM Server architecture.

The diagram visually represents the tiers and layers of InfoSphere MDM Server. The following sections describe these tiers and layers in more detail.

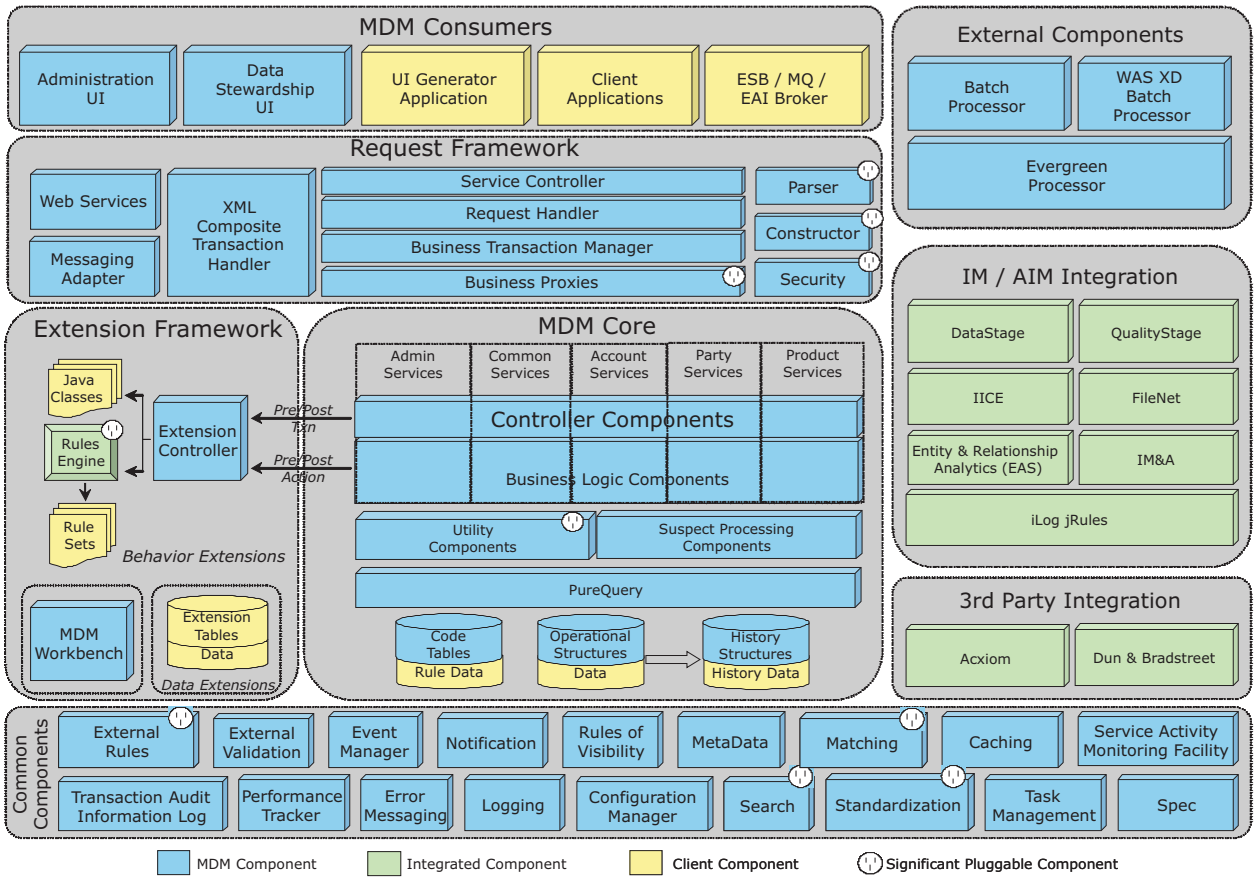


Figure 1. InfoSphere MDM Server components and architecture

The organization of this guide is based on the tiers and layers in this diagram.

Learning the core components layers

The InfoSphere MDM Server core components are the kernel of the product. The core is logically organized into a set of modules based on business function.

Each module of the core offers a set of cohesive services within its business function. The modules are:

- Administration services
- Business services
- Account services
- Party services
- Product services
- Contract services
- History services
- InfoSphere MDM Server Query Connect

Controller components

Each module is made up of controller components and business components. The controller components are facades that provide an object interface for the services

and aggregate underlying business components and provide a means for the business components to collaborate together to carry out services.

Controllers come in two types:

- Transaction Controllers, which are stateless session beans and contain services that are transactional in nature, for example, AddParty
- Finder Controllers, which are Java objects and contain inquiry services, for example SearchParty

Business logic components

Controller components delegate responsibility of service fulfillment to business components. The business components are coarse-grained Java objects with the following primary responsibilities:

- Processing business rules that are either encapsulated within the boundaries of the component or are externalized elsewhere
- Managing interactions with the database, such as persisting and inquiring on data
- Invoking the extension framework at predefined points.
- Using common components to carry out common infrastructure activities, such as logging and performance tracking.
- Using pureQuery to persist data and inquire data on the operational tables and use JDBC for inquiring on tables

Suspect processing components

The suspect processing components are business components that contain the logic to search, match, identify, and collapse suspect duplicate parties as part of normal transaction processing.

Utility components

Utility components are components that offer infrastructure services to the business and controller components. Examples of utility components include factories, service locators and resource file readers. Utility components can also be adapters that provide abstract interfaces to third party components to allow for pluggable capabilities.

Operational and history tables

The core application comes with two sets of tables. The operational tables contain the data for the hub based on the data model. The history tables are a mirror of the operational tables with additional attributes to support audit and full point in time inquiry on any master data. The history tables are populated through database triggers.

Code tables

The code tables provide you with the ability to store reference data such as relationship types, identification types, and others.

Understanding common components

InfoSphere MDM Server uses a set of common components that are not product or domain specific. The following sections explain these common components and details how InfoSphere MDM Server uses them.

- **External rules**—Provides the means for separating the specification of business rules from the implementation of them. In other words, it allows business rules to be implemented outside of InfoSphere MDM Server, so you can plug in your own customized version of the rule. External rules can run externalized rules implemented in Java or a rules engine.

  Business rules that may be client-specific and may need to be customized are implemented externally in Java or in the ILog JRules rules engine. While running a transaction, the External Rule component is invoked at these points. Also, the Event Manager component runs external rules to determine if an event has occurred. Examples include data survivorship rules when collapsing parties together, how to rank and sort search results and how to determine if a person has retired.
- **Event Manager**—The Event Manager is a common J2EE component that invokes client-defined business rules at predefined times to determine if an event has occurred based on a given business object graph, for example, if a customer has recently retired, this can trigger an event to transfer holdings into a retirement plan. Detected events are recorded and can be notified on.
- **External validations**—Provides table-driven validations of business objects and their attributes, and come prepackaged with a set of validators and supports plugging in new Java validators.

  External validations are used to validate all product and client-defined business objects that are provided as part of a transaction request. The Administration UI is used to maintain all external validations for both product and client-defined business objects. An example validation is `MINLENGTH Person.lastName < 30`
- **Notifications**—Publishes messages to destinations based on defined topics. It provides a mechanism that allows products and clients to define their own notifications with customized content.

  Notifications is used at specific points within InfoSphere MDM Server and is centered on suspect duplicate processing. For example, a notification is sent when InfoSphere MDM Server identifies two parties that may be a duplicate. It is used by the Event Manager to publish notifications when specified events are detected.
- **Configuration and Management**—Defines configurable features, possible configuration options and the best option for configuring InfoSphere MDM Server. Some InfoSphere MDM Server features can be configured dynamically across a clustered environment.

  The Configuration and Management component is used to control the global run time behavior of the product. You can use the Configuration console to select and deploy configuration options across a clustered environment.
- **Rules of Visibility**—Defines data-level entitlements and control who sees what, and who can change what in the data. The visibility rules determine what elements or instances of elements a user can see based on given constraints. The persistency entitlement rules determine what elements or instances of elements a user can add or update based on given constraints.
- **Performance Tracker**—The Performance Tracker is the ARM-compliant component that receives and tracks response times for distributed transactions, InfoSphere MDM Server transactions and sub-transactions.

The Performance Tracker is used to log performance statistics which includes the elapsed time of a transaction and the elapsed time of various parts of a transaction. Performance tracking and the level of tracking is a configuration option. Examples of levels include transaction response time only, database activities response time, client extensions response time, among others.

- **Error messaging**—Allows clients to use table-driven error messages. Services are used to retrieve and format messages according to a given locale.

  Error messaging is used to retrieve and format parameter-driven messages when an exception, a business or system error, is caught during processing of a transaction request. The Administration UI is used to maintain existing product messages and new client-defined messages.
- **Logging**—Writes messages to log files and offers Log4J and Java Platform logging implementations. It is used to write information, warning and error messages to separate logs.
- **Metadata**—Defines a schema of business objects and the relationships between them, mapping to relational database tables, the transactions and actions, which are internal transactions, and the definition of request and response messages. Metadata is used to define:
  - InfoSphere MDM Server business objects and attributes
  - InfoSphere MDM Server transactions and actions
  - Extended metadata
- **Transaction audit information log**—Used to track various transactions in the system for logging and audit purposes.
- **Matching**—Compares an inbound party object against a candidate list created by party search, in order to determine whether the party matches any parties that are already in the system. The matching matrices used in this process are configurable.
- **Caching**—Stores data temporarily in memory in order to speed up the operations of the system. It can be configured in a number of different ways and supports query refresh functionality and eviction policies.
- **Persistence**—Data Persistence and retrieval is handled by pureQuery, a database-neutral, object relational mapping product, from IBM. This is a significant change from previous releases, where data persistence was handled by Entity EJBs and retrievals were done by direct JDBC.
- **Search**—Performed as part of the suspect duplicate processing process to find possible match candidates within the system that resemble an incoming party object. The person and organization search component that can be configured to use various enhancements such as, among others, Common Search Exclusion, Pluggable Search SQL, Configurable Inquiry levels and Phonetic search.
- **Standardization**—Provides services to standardize various data elements including names and addresses.
- **Task Management**—Manages the task lifecycles, provide task management transactions to other components, and to provide a runtime execution environment for each task.

  As a common component, Task Management supports generic task-oriented design. It provides the following features to system administrators and end-users:
  - Administer task definitions
  - Manage the lifecycle of a task
- **External components**—InfoSphere MDM Server provides a framework for batch processing. The Batch Processor is a common J2SE component that supports

pluggable readers/writers, multiple instances and concurrent processing within an instance for high throughput. The Batch Processor invokes the Request Framework for each transaction read and therefore all InfoSphere MDM Server services and client-defined services and extensions can be processed in batch. There are two Batch processors included: one is based on WebSphere® XD; and one is a standalone Java Standard Edition (JSE) application.

The Evergreen Processor is an application of the Event Manager. It uses the Event Manager to monitor the InfoSphere MDM Server repository, and detect and notify when suspect duplicate parties are found.

Learning the extension framework layers

Because InfoSphere MDM Server source code is not accessible to clients, there are a number of extension and configuration mechanisms available to adapt the product to their environment. The extension framework is one of these mechanisms.

The two primary types of extensions are *data extensions* and *behavior extensions*. A data extension allows a client to add new data elements. A behavior extension allows a client to plug in new business rules or functionality. Also, InfoSphere MDM Server uses its own extension framework to plug in some modules, such as rules of visibility, in order to keep it loosely coupled and easily configurable to turn "on" or "off".

Chapter 2, "Customizing InfoSphere MDM Server," on page 17 discusses how to configure and customize features, using the InfoSphere MDM Server Extension Framework.

See also:

"Understanding behavior extensions"

"Understanding data extensions" on page 10

"Understanding new transactions" on page 10

"Creating entity models and extensions with Workbench tools" on page 10

Understanding behavior extensions

InfoSphere MDM Server provides a mechanism for extending the behavior of the product in an event-based way. The Pre/Post Transaction and Pre/Post Action points within the product can be extended to provide additional functionality.

A transaction equates to a published service, or Controller Component operation. An action equates to an operation on a business logic component. There may be other predefined points that can be extended and they are documented as part of the service specification. Clients can write extensions to InfoSphere MDM Server behavior as Java code or in a rules engine language. Extensions are organized into extension sets, which are similar to the rule sets within a rules engine. Examples include generic prospective client rules or line of business specific rules like life insurance client rules. The Extension Controller is the gateway from the core application to behavior extensions and is invoked at extension points listed above. It is provided with:

- Data about extension point that invoked it
- The transaction's object hierarchy
- The action's object hierarchy, in the case of an action extension point
- The transaction header that was provided in the original InfoSphere MDM Server request

The Extension Controller uses the parameters to determine if any extension sets must be further evaluated. Relevant extension sets are then interrogated and qualified extensions, either Java or rules sets, are invoked.

Understanding data extensions

InfoSphere MDM Server provides a mechanism for extending the data model.

Clients can add new attributes to existing tables as well as add new tables. Clients can add new attributes to existing tables as well as add new tables. Extended data elements can be persisted and retrieved as part of existing InfoSphere MDM Server transactions without the need to modify InfoSphere MDM Server code.

InfoSphere MDM Server has the following responsibilities when dealing with extended data:

- Parsing extended data as part of an XML service request and creating extended business objects
- Invoking validation routines on the extended business objects
- Populating the extended data elements as part of the InfoSphere MDM Server metadata so that features such as external validation rules can be used
- Invoking methods on the extended business object when required to persist or retrieve the extended data elements
- Constructing XML data as part of the service completion

Understanding new transactions

If new transactions, or services, are required, you can use the InfoSphere MDM Server application framework.

Clients can build transactions by constructing new controller/business components and using the existing request framework and common components.

Creating entity models and extensions with Workbench tools

InfoSphere MDM Server also comes with InfoSphere MDM Server Workbench, a development tool to help with the creation of a custom entity model and related data and behavior extensions.

The Workbench comes in the form of a plugin to Rational Software Architect. For more information, the chapter Chapter 2, “Customizing InfoSphere MDM Server,” on page 17 discusses how to configure and customize features using the InfoSphere MDM Server Extension Framework.

Learning the Request-Response processor

The InfoSphere MDM Server Request-Response processor provides a consistent entry point to InfoSphere MDM Server and is used to receive requests and issues responses in any format.

The request framework performs the following functions:

- Accepts and parses a request containing a single or composite transactions.
- Authorizes the request.
- Participates in a distributed transaction or initiates a new transaction if required.
- Invokes the requested service using the appropriate controller component.
- Constructs and returns the response.

The request framework provides the ability to receive requests and return responses in any format, for example, XML, flat file and named value pairs, and according to any schema, such as the predefined InfoSphere MDM Server schema, client-defined schema or industry-defined schema. It provides this flexibility through pluggable components.

Service Controller

The Service Controller is a common component that provides a simple and elegant entry point in to InfoSphere MDM Server. It is a thin, stateless session bean with a tx_required transactional property that delegates fulfillment of the request to the Request Handler.

Request Handler

The Request Handler orchestrates services from underlying components in order to fulfill the majority of responsibilities listed above. At a high level, it obtains and invokes a parser capable of parsing the request, authorizes the request, runs the parsed transaction through the Business Transaction Manager, obtains and invokes a constructor capable of assembling the response and then returns the result.

Parsers and constructor

The Request-Response processor provides the means for dynamic, pluggable parsing.InfoSphere MDM Server comes with an XML parser and constructor based on the InfoSphere MDM Server extensible schema. Pluggable parsing and construction allows you to plug in one or more parsers and constructors that adhere to their own standards or to industry standards such as ACORD, oLife and IFX. This feature provides for ease of integration since services are assembled using a familiar vocabulary.

Business proxies

A business proxy is the component that invokes transactions on the InfoSphere MDM Server core application. A transaction, also called a service, is an operation on a specific controller component. New business proxies can be plugged in to accommodate client-specific composite transactions. The Business Transaction Manager is responsible for obtaining the appropriate proxy based on criteria including the transaction type, for example, AddParty. You can write your own customized proxies to support product implementation requirements, such as the need for specialized composite transactions.

XML Composite Transaction framework

The XML Composite Transaction framework provides the ability execute multiple InfoSphere MDM Server transactions as part of a single XML request. The results from one transaction response can be used in a subsequent transaction request with conditional or looping logic if required.

Web services

InfoSphere MDM Server provides a Web services compliant interface that accepts the consumer's Web service SOAP and invokes the Service Controller in the request framework. Each InfoSphere MDM Server transaction is associated with a WSDL file.

Messaging Adapter

The request framework provides an synchronous interface by employing JMS. It provides a means to send InfoSphere MDM Server requests by means of messages over message-oriented middleware.

Understanding consumers layers

There are numerous methods for invoking InfoSphere MDM Server services. Some methods are part of the InfoSphere MDM Server product and others are components in a client's environment.

InfoSphere MDM Server user interfaces

InfoSphere MDM Server supports user interfaces to help manage stored information:

- The Business Administration Web application is used to configure InfoSphere MDM Server. For example, this UI is used for maintaining code tables, users, groups, external validations, and so on.
- The Data Stewardship Web application is used for general party maintenance, group and hierarchy maintenance and as part of suspect processing. The UI can be used to add and update party information, search for parties marked as suspects, collapse or split suspect parties, and so on.
- The User Interface Generator is a InfoSphere MDM Server Workbench tool that you can use to build user interfaces that surface information managed within a hub instance to users, based on their roles. The User Interface Generator generates Web-based user interfaces using industry standards such as UML and J2EE, helping you to reduce the skills gap involved in building robust Web applications as part of an InfoSphere MDM Server solution.

  The User Interface Generator is an Eclipse tool that takes a user model and generates a role-based user interface for a J2EE Web application. A user model is a UML model that describes a set of individuals and how they interact with an IT solution. From the user model, the User Interface Generator can generate a user interface that can then consume the InfoSphere MDM Server services.

Client interfaces

The way InfoSphere MDM Server is integrated in to a business environment is different for each implementation, as it depends on the system architecture, tools and technical limitations and constraints. Possible ways of invoking InfoSphere MDM Server services through the Request-Response processor include:

- An ESB, MQ broker or EAI broker
- Dashboard or portal user interfaces
- Client applications such as CRM and back-office administration systems

InfoSphere MDM Server components

InfoSphere MDM Server uses a set of common components that are not product or domain specific.

Understanding component interactions

The following diagram shows the interactions among the components in the architecture to carry out a basic transaction.

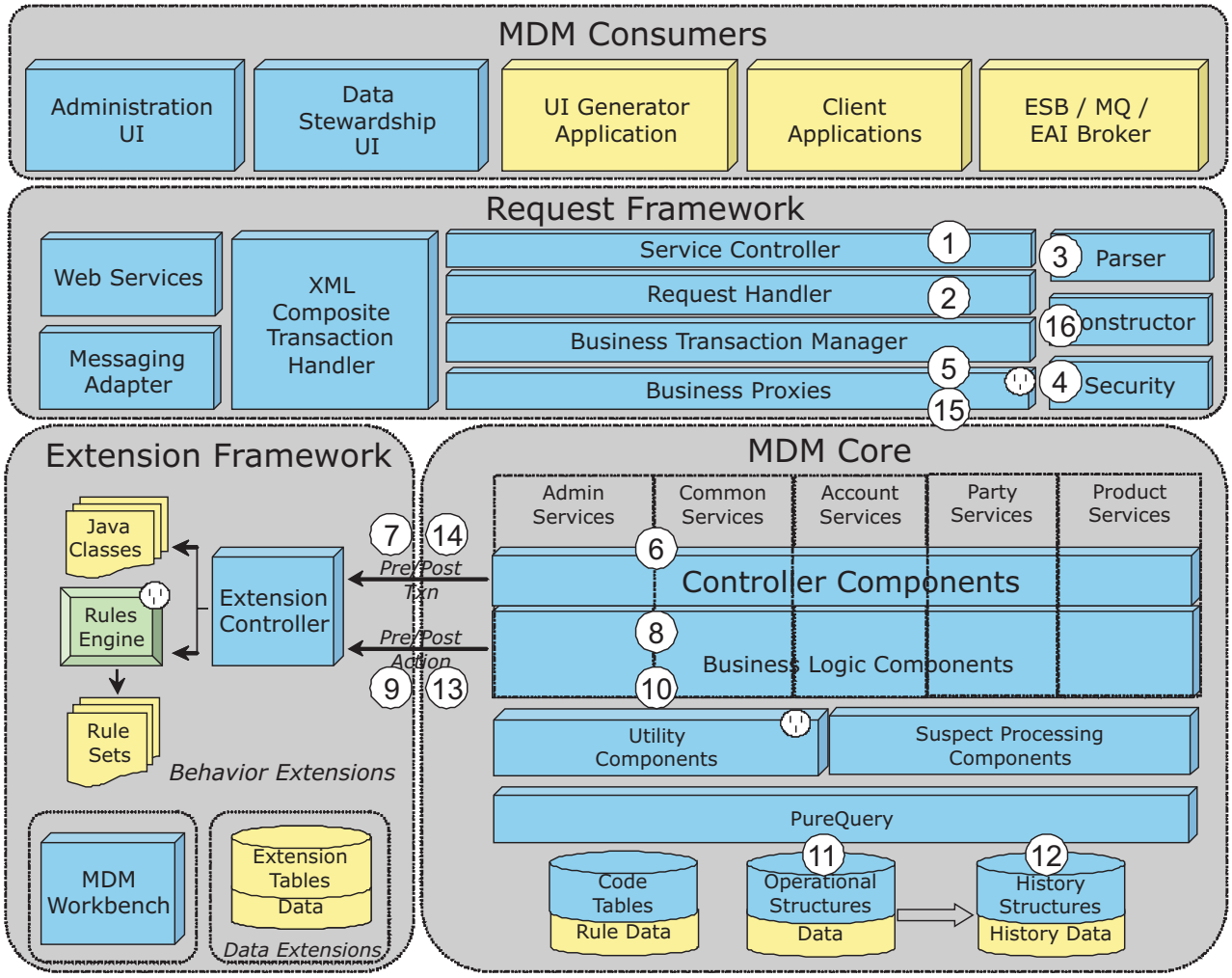


Figure 2. Understanding InfoSphere MDM Server component interactions

The diagram shows a transaction being processed by InfoSphere MDM Server, and the interaction of the InfoSphere MDM Server components. The component interactions are:

1. The service controller receives request from InfoSphere MDM Server consumer.
2. The request is delegated to Request Handler, which gets a parser from a factory.
3. The request parsed into business objects.
4. The security component used to authorize transaction.
5. The Business Transaction Manager (BTM) gets a business proxy capable of handling the request.
6. The business proxy invokes method on required controller component.

7. The controller component performs preprocessing, which includes invoking the external validation engine to validate incoming data, and invoking the extension controller to execute any ″pre-transaction″ extensions.
8. The controller component invokes required business logic component methods.
9. The business logic component performs preprocessing, which includes invoking the extension controller to run any “pre-action” extensions.
10. The business logic component runs business logic, including invoking external business rules component to run the externalized business logic.
11. The business logic component invokes the persistency layer to persist data in database.
12. The database triggers are used to create history data.
13. The business logic component performs post-processing, which includes invoking the extension controller to run any post action extensions.
14. The control returns to controller component, which may invoke other business logic component methods. Once this is complete, the control performs post-processing, which includes invoking extension controller to execute any post transaction extensions and invokes the Transaction Audit Information Log component to audit the transaction.
15. The Control returns to business proxy. The business proxy can run additional InfoSphere MDM Server transactions, using controller component methods.
16. The control is returned to the request handler which gets a response constructor from a factory. The business objects are de-serialized into XML and the response is returned to the InfoSphere MDM Server consumer.

Understanding business modules

The InfoSphere MDM Server business modules provide business services, including party, financial services, business services and others.

All business modules have a similar structure, consisting of a pair of a controller components and a set of underlying business components. All persistence transactions (the transactions that modify the data) are handled by a transaction controller, while all gets and searches are handled by a finder controller.

Each controller implements an interface that defines the transaction it can process. This interface is also the published API for client use. Transactions correspond to methods on the interface. The controllers act as a façade for each business module and aggregate underlying business components, providing a means for the business components to collaborate in providing services.

The business components implement the core business logic for each service. These components also work with the persistence layer to persist or to read the data. Additionally these components use various infrastructure modules to use the respective service.

Understanding infrastructure modules

These modules provide infrastructure and system services, and frameworks. Due to the variation in the type of services, the structure of these modules differs from module to module, however, all the modules use a similar service oriented architecture. In many cases the implementations are pluggable to allow clients to customize the behavior or to add their own completely different behavior.

Some of the significant infrastructure components shipped with InfoSphere MDM Server are:

- **Request and response framework**—Provides a consistent entry point and request and response processing for InfoSphere MDM Server applications along with pluggable parsers, constructors and business proxies.
- **Security**—Provides interfaces and implementation for authentication as well as transactional authorization. The default implementation of Security only provides transactional authorization.
- **Notification**—Provides the ability to send notification messages on certain events in the system.
- **Rule of visibility**—A highly complex and elaborate data authorization module to ensure requesting users have the appropriate read and write access to the data being inserted, updated or read.
- **Transaction audit information log**—A mechanism to log various transactions in the system for logging and audit purposes
- **Standardization**—Provides services to standardize various data elements including names and addresses.

Understanding customization restrictions

One of the prime objectives of InfoSphere MDM Server architecture is to support customization and extension of the core product. This is achieved by providing extension hooks for extending services, business rules as well as data. Most of the infrastructure components allow for pluggable implementations, allowing clients to customize the behavior by writing and configuring their own plug-ins.

All extensions, customizations and configurations to InfoSphere MDM Server are handled without impacting existing product assets. In order to preserve the ability to upgrade from release to release, do not alter the following assets from your InfoSphere MDM Server product:

- Core XML schemas (XSDs)

  Tip: Client extensions may be added to the XSDs.
- Properties files
- Data Definition Language (DDL) files
- Business objects
- Controller and business components
- Java implemented external rules and ILog JRule rule files

Important: Where required, skeleton extension files are provided for extension XSD and extension XML schema files, as well as for the extension properties file.

Chapter 2. Customizing InfoSphere MDM Server

InfoSphere MDM Server can be customized, allowing you to create additions, extensions and metadata specs.

Important: All custom names must be prefixed with a three letter abbreviation followed by underscore, for example `ABC_getItem`. These naming guidelines apply to all custom database tables, transaction names and any other customized elements.

In this section, you will learn:

"Creating a new pluggable business object query" on page 51
"Implementing SQLJ-based queries" on page 53
"Creating a pluggable persistence mechanism" on page 56

Understanding extensions

Extensions are customized code that provide additional functionality by extending data elements or extending the behavior of existing transactions. This expanded functionality is executed on top of the default InfoSphere MDM Server code.

There are two primary classifications of extensions within InfoSphere MDM Server:

- Extending data - adding additional attributes to existing database tables
- Extending behavior - adding new functionality to transactions, or underlying actions within transactions

You can add new data elements to existing business objects or to newly defined business objects. You can also add new behavior to existing business transactions and actions within transactions, or to newly defined business transactions.

Note: Extensions do not allow you to add completely new functions to InfoSphere MDM Server. To do this you must use an addition.

Understanding additions

Additions add new functions, using new code and database tables that are independent of existing code.

Any business objects introduced when you create an addition are completely independent of existing data elements and transactions, and add new functionality without affecting existing functions. An addition may:

- Add new transactions to existing modules. The new transactions can accept and return either existing InfoSphere MDM Server business objects, or new client-defined business objects.
- Add a new subject area or module. For example, adding a new physical body profile area that has its own set of transactions and related data elements.

  Note: You can extend common services that InfoSphere MDM Server uses. For example, you can extend Notifications to add new types of notifications.

Creating extensions and additions

The basic process for creating extensions and additions is:

	Procedure
High-Level Design	• Collect the business requirements. The business requirements help you determine whether you need to create external rules, an extension or an addition, and plan the work you need to do. • Depending on the business requirements, plan the changes that you need to make.
	• Decide whether you need to create external rules, an extension or an addition and the transactions you need to create.
	• Plan for the required new: – database fields, entity and business objects – for additions, controllers and components – data validation and error handling – class hierarchy – package and class organization • Based on the business requirements, you can plan the changes you will need to make.
Coding	• Code the classes, interfaces, and methods. Based on the plan you have created, use the Workbench to create the classes and interfaces. Finish implementing all the non-generated parts of the classes that are required. See the *InfoSphere MDM Server Workbench Users Guide* for more information. • Ensure that all custom names are prefixed with a three letter abbreviation followed by an underscore, for example, `ABC_getItem`. These naming guidelines apply to all custom business objects, database tables, and transaction names. • When Creating Extensions, new entity additions, new services and new code table values, please use value greater than 1,000,000 as primary key for database entities describing metadata. All values less than 1,000,000 are reserved for InfoSphere MDM Server as integer PK values. • When configuring new inquiry levels (tale INQLVL, column inqlvl), please use values 100 and up. Values range from 0 to 99 are reserved for InfoSphere MDM Server.
Deploy and Test	• Deploy the extension or addition • Ensure the InfoSphere MDM Server application can see the EJB project with the addition or extension.
	• Test the extension or addition.

Creating extensions and additions with InfoSphere MDM Server Workbench

This section outlines the concepts for the creation of additions and extensions using InfoSphere MDM Server Workbench.

Using InfoSphere MDM Server Workbench, you define, develop and deploy a set of related additions and extensions together as a single module. InfoSphere MDM Server Workbench stores information about each module in a file with the name `module.mdmxmi`. This is referred to as the module model.

Additions are defined in the module model as *entities* with *attributes* and *transactions*. Entities map directly to database tables and attributes to columns in the table. When you define a new entity, basic transactions are automatically added to the model to enable creation, retrieval and updates of entity instances.

Data extensions are defined in a similar way to additions, but do not have associated transactions because extension attributes are retrieved and modified using the transactions of the business object that is extended.

Behavior and query extensions may also be defined in the module model.

Once the additions and extensions have been defined, Java code, EJBs, Web services, SQL scripts and other required files are generated automatically from the module model. You must manually modify some of the generated files in order to complete the implementation: required and recommended customization points in the files are flagged with an `MDM_TODO` comment so that they can be easily located.

Once you have completed any required manual customization of the generated files, the modified InfoSphere MDM Server application, including the new module, is ready to deploy and test.

Understanding the extension handler component

InfoSphere MDM Server provides an extension handler component that manages extension plugins.

The extension handler component supplies:

- The ability to plug in client extension sets
- The ability to plug in new product modules while keeping them loosely coupled from the core of the product itself
- A mechanism for a push functionality as part of an integration strategy.

The extension handler responds to events within the product and then evaluates whether any extension sets need to be invoked. An extension set can be either a rule set or a Java class.

The product hooks into the extension handler at the pre/post of every method in controllers and components of a transaction and provides a set of parameters:

- The event within the transaction including transaction type/category, action type/category, trigger types, and so on
- Transaction data-object hierarchies and working object hierarchies
- Elements that came in as part of the XML header, such as line of business, company, user details.

The extension handler then interrogates the parameters and determines which extension sets to execute based on cached data defined within its tables.

The benefits of this mechanism are that it:

- Keeps extensions loosely coupled from the product, which allows InfoSphere MDM Server to be upgraded without affecting the extensions
- Allows extensions to be implemented in either the rule script or Java
- Manages the relationship to, and capitalizes on rules engines which are excellent at evaluating conditions and taking action by leveraging InfoSphere MDM Server business component services
- Provides a means to partition extension sets according to a client's needs.

If the database configuration settings have both ILR and Java rule extension sets, InfoSphere MDM Server uses the Java rule extension sets by default.

For more information on where the Java extension sets are used see:

- Information on com.dwl.tcrm.externalrule.TAILAdditionalDetail in Chapter 19, "Storing and retrieving the Transaction Audit Information Log," on page 225
- Operand Builder in "Setting Rules of Visibility" on page 392
- Party Summary Indicator Refresher in Chapter 47, "Customizing Summary Data Indicators," on page 641
- Skip Operation Rule in Chapter 12, "Configuring Smart Inquiries," on page 165
- Defaulted Source Value in Chapter 21, "Setting source values and data decay," on page 253
- EndDate Rule in next session, in "Creating event behavior extensions" on page 31
- `com.dwl.tcrm.externalrule.Notification`, in Chapter 40, "Implementing and configuring the Notification Framework," on page 531

The following table shows the extension sets provided with the product. InfoSphere MDM Server also supports the IRL external rule format. If an IRL JAR file is packaged within the provided `DWLCustomerILogRules.jar`, it will be searched by its classpath. Otherwise, it is searched by its physical path.

Note: All ILR files shown in this table are located in the directory `/com/dwl/tcrm/ilr/`.

ID	NAME	JAVACLASSNAME	RULESETNAME	INACTIVE_IND
9	ConsumerInsuranceRule	com.dwl.tcrm.externalrule.CustomerInsuranceRules	CustomerInsuranceRules.ilr	Y
11	DataEntitlementEngine	com.dwl.base.entitlement.PersistencyEntitlementsEngine		N
12	RuleOfVisibilityEngine	com.dwl.base.entitlement.VisibilityEntitlementsEngine		N
13	RuleOfVisibilityEngine for Txn	com.dwl.base.entitlement.VisibilityEntitlementsEngine		N
15	updatePartyNotification	com.dwl.tcrm.externalrule.Notification	notification.ilr	Y
16	EndDateAddContractPartyRole	com.dwl.tcrm.externalrule.EndDateRules	EndDateRules.ilr	N
17	EndDateUpdateContractPartyRole	com.dwl.tcrm.externalrule.EndDateRules	EndDateRules.ilr	N
18	EndDateAddContract	com.dwl.tcrm.externalrule.EndDateRules	EndDateRules.ilr	N
19	DefSrcValOrganizationExt	com.dwl.base.defaultSourceValue.component.DefaultedSourceValueComponent		Y
20	DefSrcValPersonExt	com.dwl.base.defaultSourceValue.component.DefaultedSourceValueComponent		Y
22	getDefSrcValOrganizationExt	com.dwl.base.defaultSourceValue.component.DefaultedSourceValueComponent		N
23	getDefSrcValPersonExt	com.dwl.base.defaultSourceValue.component.DefaultedSourceValueComponent		N
24	updDefSrcValPartyExt	com.dwl.base.defaultSourceValue.component.DefaultedSourceValueComponent		N
27	ROVSearchPerson	com.dwl.base.entitlement.PersistencyEntitlementsEngine		N
28	ROVSearchOrganization	com.dwl.base.entitlement.PersistencyEntitlementsEngine		N
29	ROVSearchContract	com.dwl.base.entitlement.PersistencyEntitlementsEngine		N
30	ROVSearchFSParty	com.dwl.base.entitlement.PersistencyEntitlementsEngine		N
31	EMMessenger	com.dwl.tcrm.em.TCRMEMMessenger		Y
32	AbiliTecLinkRefreshNotifier	com.dwl.tcrm.em.AbiliTecLinkRefreshActionNotifier		Y
33	UpdatePartyAlertIndForAddAlert	com.dwl.tcrm.externalrule.UpdatePartyAlertInd		Y
34	UpdatePartyAlertIndForUpdAlert	com.dwl.tcrm.externalrule.UpdatePartyAlertInd		Y
35	For transaction searchPerson	com.dwl.base.integration.DWLResponsePublisher		Y
36	For transaction getPerson	com.dwl.base.integration.DWLResponsePublisher		Y
37	For transaction addPerson	com.dwl.base.integration.DWLResponsePublisher		Y
38	For transaction getContract	com.dwl.base.integration.DWLResponsePublisher		Y

ID	NAME	JAVACLASSNAME	RULESETNAME	INACTIVE_IND
39	For transaction addContract	com.dwl.base.integration.DWLResponsePublisher		Y
40	For transaction updateContract	com.dwl.base.integration.DWLResponsePublisher		Y
41	SkipIdentifiersExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
42	SkipPartyLobRelationshipsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
43	SkipPartyPrivacyPreferencesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
44	SkipPartyAddressesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
45	SkipPartyContactMethodsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
46	SkipPartyRelationshipsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
47	SkipFinancialProfileExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
48	SkipgetAllPartyValuesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
49	SkipgetAllPartyAlertsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
50	SkipPersonAlertsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
51	SkipOrganizationAlertsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
52	SkipContractAlertsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
53	SkipContractAdminSysKeysExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
54	SkipContractComponentsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
55	SkipContractPartyRolesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
56	SkipContractPartyRoleAlertsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
57	SkipContractRoleLocationsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
58	SkipContrPtyRoleSituationsEx	com.dwl.tcrm.externalrule.SkipOperationRule		Y
59	SkipContrPtyRoleIdentifiersExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
60	SkipContractRelationshipsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
61	SkipIncomeSourcesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
62	SkipPartyBankAccountsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
63	SkipPartyChargeCardsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
64	SkipPartyPayrolldeductionsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
65	SkipPtyAddrPrivPreferencesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
66	SkipPtyContactMtdPrivPrefExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
67	SkipContactMethodExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
68	SkipContrPtyRlRelationshipsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
70	SkiptAddressExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
71	SkipAddressValuesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
72	SkipAddressNotesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
73	SkipPtyLocationPrivPrefExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
74	SkipPrivacyPreferencesExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
75	SkipContrPtyRolesByPartyExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
76	SkipContractsByPartyExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
77	SkipgetHoldingExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
78	SkipgetAllAlertsExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
82	AddPartyIdenInd	com.dwl.tcrm.externalrule.IdentifierSummaryIndicatorRefresher		N
83	UpdatePartyIdenInd	com.dwl.tcrm.externalrule.IdentifierSummaryIndicatorRefresher		N
84	AddPartyPrivPrefInd	com.dwl.tcrm.externalrule.PrivPrefSummaryIndicatorRefresher		N
85	UpdatePartyPrivPrefInd	com.dwl.tcrm.externalrule.PrivPrefSummaryIndicatorRefresher		N
86	AddPartyValueInd	com.dwl.tcrm.externalrule.PartyValueSummaryIndicatorRefresher		N
87	UpdatePartyValueInd	com.dwl.tcrm.externalrule.PartyValueSummaryIndicatorRefresher		N
88	AddPartyRelationshipInd	com.dwl.tcrm.externalrule.ContactRelSummaryIndicatorRefresher		N
89	UpdatePartyRelationshipInd	com.dwl.tcrm.externalrule.ContactRelSummaryIndicatorRefresher		N
90	AddPartyBankAccountInd	com.dwl.tcrm.externalrule.BankAccountSummaryIndicatorRefresher		N
91	UpdatePartyBankAccountInd	com.dwl.tcrm.externalrule.BankAccountSummaryIndicatorRefresher		N
92	AddPartyChargeCardInd	com.dwl.tcrm.externalrule.ChargeCardSummaryIndicatorRefresher		N
93	UpdatePartyChargeCardInd	com.dwl.tcrm.externalrule.ChargeCardSummaryIndicatorRefresher		N
94	AddPartyPayrollDeductInd	com.dwl.tcrm.externalrule.PayrollDeductSummaryIndicatorRefresher		N
95	UpdatePartyPayrollDeductInd	com.dwl.tcrm.externalrule.PayrollDeductSummaryIndicatorRefresher		N
96	AddPartyIncomeSourceInd	com.dwl.tcrm.externalrule.IncomeSourceSummaryIndicatorRefresher		N
97	UpdatePartyIncomeSourceInd	com.dwl.tcrm.externalrule.IncomeSourceSummaryIndicatorRefresher		N
98	AddPartyAlertInd	com.dwl.tcrm.externalrule.AlertSummaryIndicatorRefresher		N
99	UpdatePartyAlertInd	com.dwl.tcrm.externalrule.AlertSummaryIndicatorRefresher		N
100	AddContEquivInd	com.dwl.tcrm.externalrule.ContEquivSummaryIndicatorRefresher		N
101	UpdateContEquivInd	com.dwl.tcrm.externalrule.ContEquivSummaryIndicatorRefresher		N
102	AddPartyInteractionInd	com.dwl.tcrm.externalrule.InteractionSummaryIndicatorRefresher		N
103	UpdatePartyInteractionInd	com.dwl.tcrm.externalrule.InteractionSummaryIndicatorRefresher		N
104	AddPartyAddressInd	com.dwl.tcrm.externalrule.AddressSummaryIndicatorRefresher		N
105	UpdatePartyAddressInd	com.dwl.tcrm.externalrule.AddressSummaryIndicatorRefresher		N
106	AddPartyContactMethodInd	com.dwl.tcrm.externalrule.ContactMethodSummaryIndicatorRefresher		N
107	UpdatePartyContactMethodInd	com.dwl.tcrm.externalrule.ContactMethodSummaryIndicatorRefresher		N
108	AddPartyLobRelationshipInd	com.dwl.tcrm.externalrule.LobRelSummaryIndicatorRefresher		N
109	UpdatePartyLobRelationshipInd	com.dwl.tcrm.externalrule.LobRelSummaryIndicatorRefresher		N
110	AddPartyInd	com.dwl.tcrm.externalrule.PartySummaryIndicatorRefresher		N
111	UpdatePartyInd	com.dwl.tcrm.externalrule.PartySummaryIndicatorRefresher		N
112	SkipContractComponentValueExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y

ID	NAME	JAVACLASSNAME	RULESETNAME	INACTIVE_IND
113	SkipContractRoleLocPurposeExt	com.dwl.tcrm.externalrule.SkipOperationRule		Y
114	DefSrcValOrganizationExtFP	com.dwl.fp.base.defaultSourceValue.component.DefaultedSourceValueComponent		Y
115	DefSrcValPersonExtFP	com.dwl.fp.base.defaultSourceValue.component.DefaultedSourceValueComponent		Y
116	getDefSrcValOrganizationExtFP	com.dwl.fp.base.defaultSourceValue.component.DefaultedSourceValueComponent		N
117	getDefSrcValPersonExtFP	com.dwl.fp.base.defaultSourceValue.component.DefaultedSourceValueComponent		N
118	GetTAILAdditionalDetail	com.dwl.tcrm.externalrule.TAILAdditionalDetail		N
119	AccessTokenEnabler	com.dwl.base.accessToken.AccessTokenEnabler		Y
120	AccessTokenObfuscator	com.dwl.base.accessToken.AccessTokenObfuscator		Y
121	QualityStageAddPartyMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
122	QualityStageUpdatePartyMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
123	FeedInitiator	com.dwl.thirdparty.integration.eas.initiator.FeedInitiator		N
124	DeletePartyContextBuilder for deleteParty	com.dwl.thirdparty.integration.eas.contextbuilder.DeletePartyContextBuilder		N
125	InactivatePartyContextBuilder for inactivateParty	com.dwl.thirdparty.integration.eas.contextbuilder.InactivatePartyContextBuilder		N
126	NameContextBuilder for addOrganizationName	com.dwl.thirdparty.integration.eas.contextbuilder.NameContextBuilder		N
127	NameContextBuilder for updateOrganizationName	com.dwl.thirdparty.integration.eas.contextbuilder.NameContextBuilder		N
128	NameContextBuilder for addPersonName	com.dwl.thirdparty.integration.eas.contextbuilder.NameContextBuilder		N
129	NameContextBuilder for updatePersonName	com.dwl.thirdparty.integration.eas.contextbuilder.NameContextBuilder		N
130	EmailContextBuilder for addPartyContactMethod	com.dwl.thirdparty.integration.eas.contextbuilder.EmailContextBuilder		N
131	EmailContextBuilder for updatePartyContactMethod	com.dwl.thirdparty.integration.eas.contextbuilder.EmailContextBuilder		N
132	AddressContextBuilder for addPartyAddress	com.dwl.thirdparty.integration.eas.contextbuilder.AddressContextBuilder		N
133	AddressContextBuilder for updatePartyAddress	com.dwl.thirdparty.integration.eas.contextbuilder.AddressContextBuilder		N
134	NumberContextBuilder for addPartyChargeCard	com.dwl.thirdparty.integration.eas.contextbuilder.NumberContextBuilder		N
135	NumberContextBuilder for updatePartyChargeCard	com.dwl.thirdparty.integration.eas.contextbuilder.NumberContextBuilder		N
136	NumberContextBuilder for addPartyIdentification	com.dwl.thirdparty.integration.eas.contextbuilder.NumberContextBuilder		N
137	NumberContextBuilder for updatePartyIdentification	com.dwl.thirdparty.integration.eas.contextbuilder.NumberContextBuilder		N
138	NumberContextBuilder for addPartyContactMethod	com.dwl.thirdparty.integration.eas.contextbuilder.NumberContextBuilder		N
139	NumberContextBuilder for updatePartyContactMethod	com.dwl.thirdparty.integration.eas.contextbuilder.NumberContextBuilder		N
140	AttributeContextBuilder for addPerson	com.dwl.thirdparty.integration.eas.contextbuilder.AttributeContextBuilder		N
141	AttributeContextBuilder for updatePerson	com.dwl.thirdparty.integration.eas.contextbuilder.AttributeContextBuilder		N
142	AttributeContextBuilder for addPartyChargeCard	com.dwl.thirdparty.integration.eas.contextbuilder.AttributeContextBuilder		N
143	AttributeContextBuilder for updatePartyChargeCard	com.dwl.thirdparty.integration.eas.contextbuilder.AttributeContextBuilder		N
144	AttributeContextBuilder for addPartyContactMethod	com.dwl.thirdparty.integration.eas.contextbuilder.AttributeContextBuilder		N
145	AttributeContextBuilder for updatePartyContactMethod	com.dwl.thirdparty.integration.eas.contextbuilder.AttributeContextBuilder		N
146	QualityStageAddPartyAddessMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
147	QualityStageUpdatePartyAddressMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
148	QualityStageAddPartyIdentificationMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
149	QualityStageUpdatePartyIdentificationMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
150	QualityStageAddPersonNameMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
151	QualityStageUpdatePersonNameMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
152	QualityStageAddOrganizationNameMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y
153	QualityStageUpdateOrganizationNameMatch	com.dwl.tcrm.em.QualityStagePartyMatchingRule		Y

Creating extensions

Before you write your extensions, you must define and describe the extensions within the InfoSphere MDM Server database, along with the set of condition parameters that must be true for the extension to be run.

When creating an extension, all custom names must be prefixed with a three letter abbreviation followed by an underscore, for example, `ABC_getItem`. These naming guidelines apply to all custom business objects, database tables, and transaction names.

You define the extensions and their condition parameters from the **Data Extension** option within InfoSphere MDM Server Workbench . The process of defining the extension is documented in the *InfoSphere MDM Server Workbench Guide*.

InfoSphere MDM Server provides two approaches to data extension persistency. One approach is to persist extension attributes in an existing core database table. The alternative is to persist the extension attributes in a new extension database table.

The following table is a guideline to help developers decide which approach to use when implementing data extension:

	Create new table for data extension	**Alter core table for data extension**
Compatibility Issues	None	Changing core tables could lead to compatibility issues with future releases of the product.
DB I/O Performance	Inquiry transactions require two DB calls: one for the core table, and another one for the extension table.	When using the inquiry framework only one DB call is required for inquiry transactions.
Mapping Extension Attributes	Extension entity object is mapped to the extension table using pureQuery Java annotations. .	The extension entity object is mapped to the same table as the original entity object was mapped to, using pureQuery Java annotations.
Ability to Tune	Low	High
Data History	History for the extension columns is kept in its own history table	Two history records are created in the core history table for insert/update transactions.

Starting an extension

When you create an extended function, you must add additional attributes to existing database tables, and the associated business objects and views must be updated to perform with the extended function.

The InfoSphere MDM Server Workbench should be used to create your extension. See the *InfoSphere MDM Server Workbench User Guide* for more information.

Extending business objects

When you have extended a database table and introduced a new entity object, you need to map that to a new business object.

An inheritance technique is used-the business object of interest must be sub-typed and mapped to the extended entity object.

Note: The extended business object must implement `IExtension` or `IDWLExtension`, and the name must end with `Ext`. For example, `PersonExt`, `AddressExt` are valid names, while `PersonExtension`, `PersonEx`, `PersonEXT`, `ExtendedPerson` are invalid names.

See also:

"To extend business objects"

To extend business objects

1. Register the extended business objects by adding their class paths to the extension properties file.

   The extension business object can flow through existing transactions or newly defined transactions. You must register the extended business objects by adding

their class paths to the extension properties file. Also, the extension business object and its attributes must be defined as data in the group/element data tables and the Rules of Visibility tables.

See "To register extended and new business objects in the metadata repository" on page 36 for more information.

2. Provide transaction-level logic for the `addRecord()`, `updateRecord()`, and `getRecord()` functions.

   Each extension object inherits from the parent object. The extended business object should override all of these with transaction-level logic for the add, update and get functions.

   The `addRecord()` and `updateRecord()` method in the extension object provide persistence of the extended data when the base product data is persisted. In other words, the `addRecord()` method on the extension is invoked when the data contained within the product business object is persisted. Likewise for `updateRecord()`.

3. Provide extension data retrieval logic for the `getRecord()` method stub and update the `tcrm_extension.properties` file.

   The `getRecord()` method stub provides the inquiry transaction to retrieve client- extended business object values. To use the `getRecord()` method stub, override the `getRecord()` method stub with your extension data retrieval logic and add an entry to the `tcrm_extension.properties` file for the extended business object, in the format:

   ```
   baseBObjName_Extension=FullExtendedBObjClassName
   ```

   For example, `TCRMContractRoleLocationBObj_Extension=com.dwl.tcrm.samples.extension.component.RoleLocationBObjExt`.

4. Define the validations for the extended attributes using the external validations component, or define them internally within the extended business object.

   You can use the external validation component if you are creating a validation that is specific to your company, and use the external validation to define validations for the extended attributes such as `minlength`, `disallowed values`, and others. Or, if you are creating a validation that is specific to the InfoSphere MDM Server product, the validations can be defined internally within the extended business objects. There are two validate methods stubs that are called in a similar fashion to the add and update stubs, `validateAdd()` and `validateUpdate()`. The validate stubs are invoked as part of the validation process.

   Note: For an example, see the Contact sample that is available on the InfoSphere MDM Server Support site.

Extending database tables for new functions

InfoSphere MDM Server provides two approaches to extend the database.

To extend the database, you can either:

- Create a new extension database table.
- Alter an existing core product database table.

See also:

"To create a new extension database table for new functions" on page 26

"To alter an existing core product database table" on page 26

To create a new extension database table for new functions

1. Create a new database table that forms a one-to-one relationship with the existing table.
2. Copy the primary key from the table being extended.
3. If history is required on the extension table, create a history table with the appropriate database triggers.
4. Map the new extension table to the new entity object and business object.

To alter an existing core product database table

1. Make the alterations to the core database table.
2. If history is required on the extended columns, drop the existing triggers on the core database table, alter the corresponding core history table and create the appropriate database triggers.

Defining extended functions in the request and response framework XSD

The Request framework XSD is responsible for parsing the extended business objects (BObjs) on request, and converting them to XML on response. The business objects for the extended function need to be defined in the extension XSD, or, if the XML schema is used, the extension schema.

For an extension, you create a new business object as a child of the existing business object you are extending. For example, in the Contact table extension sample, the contact functionality is being extended, so the Person and Organization BObjs, which are related to that function, are extended. For an addition, you create a new business object in the Extension XSD.

When defining the addition or the extension business object in the request XSD, it is important to specify the correct attributes and their order.

See also:

"To define extended functions in the Request and Response framework XSD"

"To define functions in the Response XSD" on page 28

To define extended functions in the Request and Response framework XSD

- **If you want to define functions in the request XSD:**
  1. Define all attributes which can be passed into the request for the addition or the extension business object. For extension business objects, attributes from the super class do not need to be defined.
  2. Ensure that every attribute defined in the request XSD has a corresponding setter method in the addition or extended business object.
- **If you want to define extended business objects in the XSD:**

  The DWLExtension, TCRMExtension, and CommonExtensionBObj objects are defined as follows in `DWLCommonRequest_extension.xsd` and `DWLCommonResponse_extension.xsd`:

```
<xsd:element name="DWLExtension">
<xsd:complexType>
  <xsd:sequence>
   <xsd:element ref="ExtendedObject" minOccurs="0"/>
```

```
   <xsd:element ref="CommonExtensionBObj"
                  minOccurs="0"
                  maxOccurs="unbounded"/>
  </xsd:sequence>
 </xsd:complexType>
</xsd:element>

<xsd:element name="CommonExtensionBObj"
             abstract="true"
             type="CommonExtensionBObjType"/>
<xsd:complexType name="CommonExtensionBObjType"/>

<xsd:element name="TCRMExtension">
<xsd:complexType>
  <xsd:sequence>
   <xsd:element ref="ExtendedObject" minOccurs="0"/>
   <xsd:element ref="CommonExtensionBObj"
                  minOccurs="0"
                  maxOccurs="unbounded"/>
  </xsd:sequence>
 </xsd:complexType>
</xsd:element>

<xsd:element name="ExtendedObject" type="xsd:string"/>
```

1. If the object you are extending contains the DWLExtension element, add the extension object definition to `DWLCommonRequest_extension.xsd` and `DWLCommonResponse_extension.xsd`.

   For example, to add XDefaultSourceValueBObjExt to extend DWLDefaultedSourceValueBObj:

   ```
   <xsd:element name="XDefaultSourceValueBObjExt"
                substitutionGroup="CommonExtensionBObj"
                type="XDefaultSourceValueBObjExtType"/>

    <xsd:complexType name="XDefaultSourceValueBObjExtType">
    <xsd:complexContent>
     <xsd:extension base="CommonExtensionBObjType">
      <xsd:sequence>
       <xsd:element ref="ExtName" minOccurs="0" />
      </xsd:sequence>
     </xsd:extension>
    </xsd:complexContent>
   </xsd:complexType>
   <xsd:element name="ExtName" type="xsd:string"/>
   ```

2. If the object you are extending contains the TCRMExtension element, add the extension object definition to `tcrmRequest_extension.xsd` and `tcrmResponse_extension.xsd`.

   For example, to add XPersonBObj2Ext to extend TCRMPersonBObj:

   ```
   <xsd:element name="XPersonBObj2Ext"
                substitutionGroup="CommonExtensionBObj"
                type="XPersonBObj2ExtType"/>

    <xsd:complexType name="XPersonBObj2ExtType">
     <xsd:complexContent>
       <xsd:extension base="CommonExtensionBObjType">
      <xsd:sequence>
       <xsd:element ref="ObjectReferenceId" minOccurs="0" />

   <xsd:element ref="CreditRating" minOccurs="0" />

   <xsd:element ref="DWLDefaultedSourceValueBObj" minOccurs="0" />
      </xsd:sequence>
     </xsd:extension>
      </xsd:complexContent>
   ```

```
 </xsd:complexType>

<xsd:element name="CreditRating" type="xsd:string"/>
```

The following example snippit of the request XML contains both of the extended objects:

```
<TCRMPersonBObj>
......
<TCRMExtension>
<ExtendedObject>XPersonBObj2Ext</ExtendedObject>
 <XPersonBObj2Ext>
        <CreditRating>100</CreditRating>
   <DWLDefaultedSourceValueBObj>
            <DWLExtension>
             ...
               <ExtendedObject>
                 XDefaultSourceValueBObjExt
               </ExtendedObject>
     <XDefaultSourceValueBObjExt>
        <ExtName>2009-01-11</ExtName>
     </XDefaultSourceValueBObjExt>
  </DWLExtension>
   </DWLDefaultedSourceValueBObj>
 </XPersonBObj2Ext>
</TCRMExtension>
```

3. In the constructor, invoke the init() method, and initialize all the EObjs contained within this new business object
4. Insert all new fields in the init() method metaDataMap, following the InfoSphere MDM Server nullable field design, for example:

   ```
   metaDataMap.put("XXXFieldName", null);
   ```

5. If you are creating new transactions that provide addition functionality, add the transactions for new business objects to the CdBusinessTxTp table.
6. For the Security Module, create a record for the new transaction in the User Access and Group Access tables using the Extension Framework option in the System Maintenance menu of the InfoSphere MDM Server user interface.

   See the *InfoSphere MDM Server System Maintenance Guide* for more information.

To define functions in the Response XSD

1. Define all attributes that can be returned back from the system in its response. For extension business objects, only the attributes declared in the class itself should be defined in the XSD. Addition business objects must each contain their own attributes as well the following three attributes inherited from the super class:
   - `ComponentID`
   - `ObjectReferenceId`
   - `DWLStatus`

   See the definition of a core business object for some examples.
2. Each attribute defined in the XSD must have a corresponding getter method declared in the business object.

   The built-in XML constructor shipped with the system, which constructs the response XML for both core product business objects as well as addition and extended business objects, orders the attributes of each object following the rules described below:

   - All simple String-type attributes must be placed before complex attributes which return other business objects or vectors of business objects.

- The order of attributes within a simple or complex attribute depends on whether the attribute is an extension business object or an addition business object.
- The order also depends on the order of elements defined in the corresponding response XSD.

Understanding transaction context passing and the DWLControl object

The transaction context passing feature provides InfoSphere MDM Server with a consistent transaction context for each transaction.

- A single context instance is created for each transaction.
- This transaction context is available to all the code executing within the transaction.
- Transaction contexts can be customized, allowing you to add new attributes.
- Transaction context information can be written out for debugging and logging purposes.

See also:

"Instantiating and passing transaction contexts"

"Extending a transaction context"

"Logging transaction context information" on page 30

Instantiating and passing transaction contexts

InfoSphere MDM Server creates an instance of DWLControl at a central point before DWLControl is set to the business object (BObj) or entity object (EObj). Then the transaction context information in the DWLControl object is passed through the transaction in the BObj or EObj, or by using a method signature.

When adding a new feature or updating existing code, you should not create a new DWLControl object. Instead, use the existing transaction context in the BObj or EObj, or in a method signature, for consistent transaction context behavior.

Extending a transaction context

The transaction context passing feature provides you with the ability to add your own attributes to a transaction context.

The following sample XML snippet shows the DWLControl object with an extension:

```
<DWLControl>
            <requesterName>Security Only User</requesterName>
            <requesterLanguage>100</requesterLanguage>
            <userRole>UserAll1</userRole>
            <ControlExtensionProperty name= "associatedContexts">
testTransactionContext
</ControlExtensionProperty>
            <ControlExtensionProperty name="currentContext">
test
</ControlExtensionProperty>
</DWLControl>
```

Two new context attributes have been added to DWLControl in the sample:

```
name="associatedContexts" and value="testTransactionContext"
name="currentContext" and value="test"
```

You can extend the transaction context by using the recommended template:

```
<ControlExtensionProperty name="NewContextName">NewContextValue
</ControlExtensionProperty>
```

Fill in the `NewContextName` and `NewContextValue` with the preferred *name* and *value* pair in the template in the request XML. The request XML can provide multiple extension properties.

The transaction context is wrapped in the `ControlExtensionProperty` class, which has three fields: *name*, *value*, and *includedInResponse*.

The default value for the field `includedInResponse` in the `ControlExtensionProperty` class is *true*, meaning that this context extension will be returned in the response XML file. If you want to hide the context extension in response XML file, you must set the `includedInResponse` flag to *false* in the client code. See the sample code above for detail.

Sample code that retrieves the transaction context extension follows:

```
//context extension name
        String attName = null;
//context extension value
ControlExtensionProperty attValue = null;

Hashtable properties = new Hashtable();
DWLControl context =//get DWLControl instance from BObj/EObj or method signature;
Map extMap = (Map)context.getControlExtensionMap();
if(extMap != null && !extMap.isEmpty()){
   Iterator it = extMap.keySet().iterator();

   //loop through all the elements
   while (it.hasNext()) {
     //retrieve context extension from map:
     attName = (String)it.next();

     if(attName != null && attName.length() >0) {
       attValue = (ControlExtensionProperty)extMap.get(attName);

          //put the key/value pair to hashtable for later use:
  properties.put(attName, attValue. getValueAsString());

//if clients want to hide context extension in response,
//the includedInResponse flag must be set to false.
//E.g. attValue.setIncludeInResponse(false);
           ...
    }
 }
```

Logging transaction context information

InfoSphere MDM Server records transaction context information to the `Customer.log` file at the point after request parsing when the logger is set at the FINEST logging level.

The following is a sample of transaction context information as recorded in a `Customer.log` file:

```
...
2007-05-03 12:41:53,484 INFO      - DWLAdminXMLRequestParser : parseRequest :
total time in milliseconds 16
2007-05-03 12:41:53,484 DEBUG     - com.dwl.base.DWLControl: <DWLControl>
<requesterLanguage>100</requesterLanguage>
<requesterLocale>en</requesterLocale>
<requesterName>cusadmin</requesterName>
```

```
<requestID>5013000</requestID>
<ControlExtensionProperty name="associatedContexts">testTransactionContext</
ControlExtensionProperty>
<ControlExtensionProperty name="currentContext">test</ControlExtensionProperty>
</DWLControl>
...
```

Creating event behavior extensions

The previous section outlined extending a transaction to extend the controller component operations of InfoSphere MDM Server. This section discusses extending an action to extend the business component operations of InfoSphere MDM Server.

The InfoSphere MDM Server extension framework allows you to extend InfoSphere MDM Server behavior in an event-based way. The following points within the product can be extended to provide additional functionality:

- Pre-transaction-controller-level
- Post-transaction-controller-level
- Pre-action-component-level
- Post-action-component-level
- Predefined points.

There may be other predefined points within the business component operations of InfoSphere MDM Server features that can be extended-these are documented in the chapter for that feature.

As an example, assume the following new business rule needs to be implemented: when adding a person into the role of owner onto a contract, if that person is less than the age of 18, then an alert must be associated to the party role indicating a minority owner.

Logically, then, to implement this rule, you need to create an extension of the action of adding a person into a party role, or, more specifically, you need to write an external rule that is executed at the post of the `IContract.addContractPartyRole` controller method.

Extending functions through the rules engine

If you do not want to use Java to create extensions, you can use a rules engine to extend functions.

When you create an event behavior extension through the rules engine, the adapter asserts a rule fact which includes the extension parameters and the current business object; it then calls on the rule engine to activate the rules. The results of executing the rule, including any error status, are ultimately returned to the originating controller method.

For more information on rules and rule engines, see Chapter 10, “Configuring external business rules,” on page 153.

Implementing business rules by using a rules engine consists of developing the rule script, such as a JRules ilr file, and then registering that file with the extension handler and defining under what conditions to activate rules in that rule set. Depending on the business requirements, you must determine whether or not the full transaction, the working object hierarchy, or both, should be asserted to the

rule engine's working memory, or just into the root objects in the hierarchy. If you need complete information for a transaction, you need to pass the whole root object—if a rule execution requires complete data for a transaction, then the transaction-level business object must be passed to the rule engine.

For example, a rule set containing all insurance-specific rules can be created. This rule set is to be invoked whenever the line of business element in the XML header is ″Insurance″. The ″minority-aged owner″ rule as described above would look like:

```
When
  ExtParameter(getAction().equals("addContractPartyRole"));
  PartyRole(getRoleType().equals("Owner"); getParty().getAge() <=18)
Then
  var contractComponent = new (IContract)ContractComponent
  var alert = new Alert
  alert.setAlertType("Minority Aged Owner")
  ...
  contractComponent.addAlert(alert)
```

A rule-engine extension is a standard rule-engine file—an ilr file with the default ROV rules engine. The ruleExtensionSet adapter class asserts a rule fact that contains the parameters described above and the current working object as defined in the assert rule parameter.

```
assertFact(params);
assertFact(params.getTransactionObjectHierarchy());
```

Note: Since a rule-engine extension is defined as a rule file, it may contain multiple rules; in that case, each rule must determine internally whether it is the one to be executed this time or not.

For example:

```
when
{
  ExtensionParameters( getTriggerCategoryType().equalsIgnoreCase("Post
    Transaction");
  ?txn:getTransactionType();
  (txn.equalsIgnoreCase("AddContract")
}
then
{
}
```

The extension handler determines only which rule file is to be ″fired″ by the rule engine, not the specific rule within the file.

For more information on coding rules, see the sample iLog rules files provided with InfoSphere MDM Server.

Understanding Java behavior extensions

Java behavior extensions can be created by developers and are used by default to implement additional business rules, or when a new module needs to be invoked.

The new Java class module may be either:

- technical code that integrates to other systems
- code that does transformations on data
- code that hooks to engines such as a rules of visibility engine or a dynamic grouping engine.

For example, at the ″post of all inquiry transactions″ we may want to invoke the rules of visibility engine to filter out data the user is not entitled to view.

A Java extension is a class which extends `com.dwl.base.extensionFramework.ClientJavaExtensionSet`. It must provide an `execute(ExtensionParameters)` method.

See also:

"To extend transaction behavior using Java"

To extend transaction behavior using Java

1. Define the extension parameters passed to the `execute(ExtensionParameters)` method as follows:

```
public class ExtensionParameters {
    protected String transactionType;
    protected String transactionCategoryType;
    protected String actionType;
    protected String actionCategoryType;
    protected String triggerCategoryType;
    protected String lineOfBusiness;
    protected String geographicalRegion;
    protected String company;
    protected DWLControl control;
    protected Object workingObjectHierarchy;
    protected Object transactionObjectHierarchy;
    protected Object additionalDataMap;
    protected String[] inquiryParameters;
    protected DWLStatus extensionSetStatus;
```

2. The Java rule—a Java class—gets this extension parameter object, and can access information from it to execute the object's logic. A Java rule class can contains multiple rules. In this case, `ruleId` is used to determine which rule is run.

   For more information on coding Java rules, see the sample Java rules files provided with InfoSphere MDM Server.

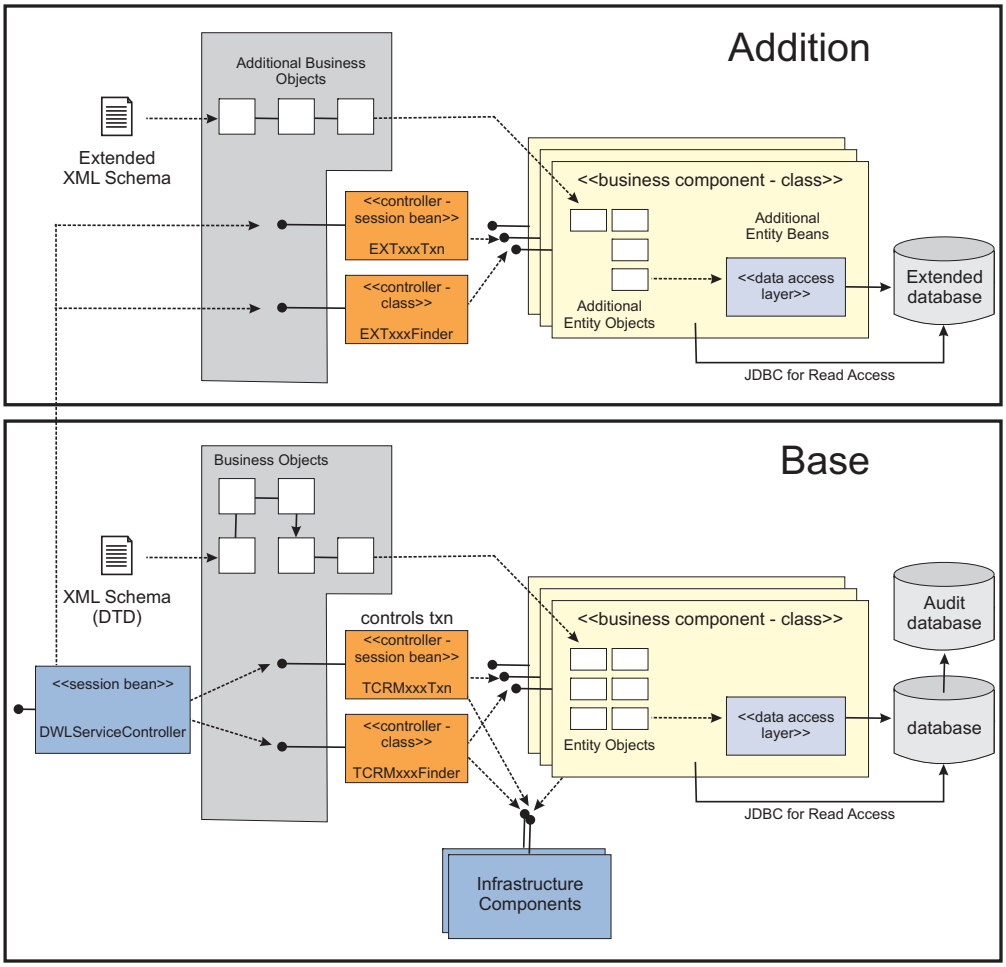
Creating additions to add new data and functionality

Additions are new code tables and database tables that are independent of existing code. They add new functionality without affecting existing functions.

An addition may:

- Add new transactions to existing modules. The new transactions can accept and return either existing InfoSphere MDM Server business objects, or new client-defined business objects.
- Add a new subject area or module. For example, adding a new physical body profile area that has its own set of transactions and related data elements.

In creating an addition, the same technical framework as the InfoSphere MDM Server architecture is used. This is illustrated in the figure below.



The steps to creating an addition are similar to creating an extension, and involve:

- Creating new database functional and code tables—this process is similar to the one for creating extensions
- Creating new entity objects—this process is similar to the one for creating extensions
- Business objects as data—this process is similar to the one for creating extensions existing business objects do not need to be extended
- Controller components to provide transactions
- Business components to provide services to the transactions
- in the Request framework, a new Business Proxy for the transaction. The InfoSphere MDM Server Request framework allows clients to plug in business proxies to control the flow of transactions or perform additional steps before calling InfoSphere MDM Server transactions—see the Request framework sample for more information

Important: When you add new transactions to existing modules, ensure that the transaction names are unique. Overloading transactions is not supported by InfoSphere MDM Server. With unique transaction names, InfoSphere MDM Server will be able to properly and uniquely identify transaction during run time and log a correct entry for it into the TAIL.

For specific information on performing these steps, refer to the Reminder Addition sample that is available on the InfoSphere MDM Server Support site.

See also:

"Creating client additions"

"To create new business objects"

Creating client additions

Client additions generally involve creating new database tables and new transactions, including add, update and get. These additions must be linked to the existing InfoSphere MDM Server functionality without actually modifying any existing code.

This linking is achieved through external elements, in particular:

- XSDs
- properties files

The InfoSphere MDM Server Workbench should be used to create client additions. See the *IBM InfoSphere Master Data Management Server Workbench User Guide* for more information.

To create new business objects

Following the technical architecture, entity objects map to business objects. When you have added a new database table and introduced a new entity object, you need to map the new entity object to a new business object.

Note: The new business object must implement `IExtension` or `IDWLExtension`, and the name must **not** end with `Ext`. For example, `Person` and `Phone` are valid name examples, while `PersonExt` and `PhoneExt` are invalid names.

1. Register the new business objects by adding their class paths to the extension properties file.

   The new business object can flow through newly defined transactions. You must register the new business objects by adding their class paths to the extension properties file. Also, the new business object and its attributes must be defined as data in the group/element data tables, and the Rules of Visibility tables.

   See "To register extended and new business objects in the metadata repository" on page 36 for more information.

2. Define the validations for the new attributes by either using the external validations component, or defining them internally within the new business object.

   If you are creating a validation that is specific to your company, use the external validation component to define validations for the extended attributes such as`minlength`, `disallowed values`, and others.

   If you are creating a validation that is specific to the InfoSphere MDM Server product, the validations can be defined internally within the new business objects. There are two validate methods stubs that are called in a similar fashion to the add and update stubs, `validateAdd`() and `validateUpdate`(). The validate stubs are invoked as part of the validation process.

   - Create two new Controllers—`TxnBean` and `Finder`—to service the business objects:
   - `TxnBean` controller is a session bean extending InfoSphere MDM Server base transaction controller. This controller provides services to add and update

new functionality. It also delegates persistence responsibility to new components. The TxnBean controllers must also have plug-ins for pre- and post-execute.

- Finder controller is a Java class extension InfoSphere MDM Server base finder controller. This component provides services for inquiry transactions. It also delegates inquiry logic to the business logic component created in the next step.

3. Create a component to perform the business logic for the new functionality. This component provides methods used by the various controllers and other components to service these new business objects. These components extend `IDWLCommonComponent`.

Registering extended and new business objects

Any addition or extension business object requires its metadata to be captured in the metadata repository. The metadata repository is a collection of database tables which capture information like Java class name, attributes of the class, the order in which they appear in, say an XML, response, if they are part of the business key or not, and so on. This metadata is used by various modules and must be kept in sync with the actual definition of the business object. Information for all core product business objects is already contained in the metadata repository and should not be modified.

The task in this section describes how to setup the metadata repository for the addition and extension business objects.

See also:

"To register extended and new business objects in the metadata repository"

To register extended and new business objects in the metadata repository

1. Insert the class information into the V_GROUP table. The value of the object_name column must be the fully-qualified Java class name of the business object.
2. Insert all elements of this class or group into the V_ELEMENT table. The list of these elements is determined by the following way:
   - Insert all elements of this class or group into the V_ELEMENT table. The list of these elements is determined by the following way:
   - List all public getter methods-methods that start with 'get' in the Java class and all super classes, excluding all methods with the get, getClass, getControl, getRecord, and getEObj
   - Insert one record into V_ELEMENT that corresponds to the remaining getter methods. The value of the attribute_name column should be the name of the getter method without the prefix "get". In other words, if there is a getter method called getAccountNumber, then the attribute name is AccountNumber.
   - As a convention, the value of the element_name should be the same as the attribute_name.
   - Set the value of the response_order column for all the elements records. The response_order must be an integer value, which must sort the elements (attributes) of the given object in the same order as they appear in the response DTD, as described in a previous section. As a guideline, give some space in between the order values to allow for future attributes to be inserted

in between the existing ones—for example use 10, 20, 30... as the response_order values. For extension business object, the response_order only need to be set for its own getter methods, that is, the getter methods declared in the class itself and not the ones declared in the super class.

Adding metadata to added or extended tables and columns

When you add or extend tables and columns in InfoSphere MDM Server, and add or update transactions, if you wish them to use metadata, you must populate the metadata tables or columns.

See also:

"To add metadata to added or extended tables and columns"

To add metadata to added or extended tables and columns

The following shows the ddl for the Reminder table sample provided with InfoSphere MDM Server:

```
CREATE TABLE REMINDER  (
          REMIND_ID BIGINT NOT NULL ,
          PRIORITY_TP_CD BIGINT ,
          CONT_ID BIGINT ,
          REMIND_RECORDED_BY VARCHAR(20) ,
          REMIND_DTM TIMESTAMP ,
          REMIND_DESC LONG VARCHAR NOT NULL ,
          REMIND_USER_ID VARCHAR(20) ,
          RECORDED_DTM TIMESTAMP ,
          LAST_UPDATE_DT TIMESTAMP NOT NULL WITH DEFAULT CURRENT TIMESTAMP,
          LAST_UPDATE_USER VARCHAR(20) )
         IN USERSPACE1 ;

ALTER TABLE REMINDER
    ADD PRIMARY KEY
        (REMIND_ID);

ALTER TABLE REMINDER
       ADD CONSTRAINT F_REM_CONTACT_ID FOREIGN KEY
            (CONT_ID)
        REFERENCES CONTACT (CONT_ID)
                           ON DELETE RESTRICT
                           ON UPDATE RESTRICT;
```

There are four transactions that must have metadata added to them:

- addReminder
- updateReminder
- getReminderByPartyId
- getReminderByReminderId

The following data must be populated for Metadata. It can be populated using the XML services provided with this feature.

To populate the metadata for a table, column or transaction.

1. Add a new record to the CDDWLTABLETP table of the REMINDER table:

   ```
   insert into cddwltabletp values (100000001, 'REMINDER', '', current timestamp,
       null, 'N', 1).
   ```

2. Add the following new records to the CDDWLCOLUMNTP table for columns:

```
insert into cddwlcolumntp values (100000001, 100000001, 'REMIND_ID', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000002, 100000001, 'PRIORITY_TP_CD', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000003, 100000001, 'CONT_ID', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000004, 100000001, 'REMIND_RECORDED_BY',
     null, current timestamp, '');
insert into cddwlcolumntp values (100000005, 100000001, 'REMIND_DTM', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000006, 100000001, 'REMIND_DESC', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000007, 100000001, 'REMIND_USER_ID', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000008, 100000001, 'RECORDED_DTM', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000009, 100000001, 'LAST_UPDATE_DT', null,
     current timestamp, '');
insert into cddwlcolumntp values (100000010, 100000001, 'LAST_UPDATE_USER',
     null, current timestamp, '');
```

3. Add the following transactions to the CDBUSINESSTXTP table

```
insert into cdbusinesstxtp values(100000001, 'addReminder', null, null,
     current timestamp, 'Y', 'P', null, 1);
insert into cdbusinesstxtp values(100000002, 'updateReminder', null, null,
     current timestamp, 'Y', 'P', null, 1);
insert into cdbusinesstxtp values(100000003, 'getReminderByPartyId', null, null,
     current timestamp, 'Y', 'I', null, 1);
insert into cdbusinesstxtp values(100000004, 'getReminderByReminderId', null,
     null, current timestamp, 'Y', 'I', null, 1);
```

4. Add the following Request and Response objects to the BUSINESSTXREQRESP table:

```
insert into businesstxreqresp values (100000001, 100000001, 'TCRM', 'Reminder',
     'I', null, null, null, 'cusadmin', current timestamp, null);
insert into businesstxreqresp values (100000002, 100000001, 'TCRM', 'Reminder',
     'O', null, null, null, 'cusadmin', current timestamp, 'N');
insert into businesstxreqresp values (100000003, 100000002, 'TCRM', 'Reminder',
     'I', null, null, null, 'cusadmin', current timestamp, null);
insert into businesstxreqresp values (100000004, 100000002, 'TCRM', 'Reminder',
     'O', null, null, null, 'cusadmin', current timestamp, 'N');
insert into businesstxreqresp values (100000005, 100000003, null, null, 'I', 2,
     'thePartyId', 1, 'cusadmin', current timestamp, null);
insert into businesstxreqresp values (100000006, 100000003, null, null, 'I', 5,
     'theTCRMControl', 2, 'cusadmin', current timestamp, null);
insert into businesstxreqresp values (100000007, 100000003, 'TCRM', 'Reminder',
     'O', null, null, null, 'cusadmin', current timestamp, 'Y');
insert into businesstxreqresp values (100000008, 100000004, null, null, 'I', 1,
     'theReminderIdPK', 1, 'cusadmin', current timestamp, null);
insert into businesstxreqresp values (100000009, 100000004, null, null, 'I', 5,
     'theTCRMControl', 2, 'cusadmin', current timestamp, null);
insert into businesstxreqresp values (100000010, 100000004, 'TCRM', 'Reminder',
     'O', null, null, null, 'cusadmin', current timestamp, 'N');
```

5. Add the following reminder object to the V_GROUP table:

```
INSERT INTO V_GROUP ( APPLICATION, GROUP_NAME, OBJECT_NAME, LAST_UPDATE_DT,
     CODE_TYPE_IND )
     VALUES ( 'TCRM', 'Reminder', 'com.dwl.tcrm.samples.addition.component.
          TCRMReminderBObj', CURRENT TIMESTAMP, 'N' );
```

6. Add the following record to the GROUPDWLTable table:

```
insert into groupdwltable values(100000001, 'TCRM', 'Reminder', 100000001,
     'cusadmin', current timestamp)
```

7. Add the following elements to the V_ELEMENT table:

```
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ComponentID', 'Reminder', 'TCRM', 'ComponentID', current
          timestamp, 10, 'TCRM', 'Reminder', null, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ObjectReferenceId', 'Reminder', 'TCRM', 'ObjectReferenceId',
          current timestamp, 20, 'TCRM', 'Reminder', null, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ReminderIdPK', 'Reminder', 'TCRM', 'ReminderIdPK', current
          timestamp, 30, 'TCRM', 'Reminder', 100000001, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('PriorityType', 'Reminder', 'TCRM', 'PriorityType', current
          timestamp, 40, 'TCRM', 'Reminder', 100000002, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('PriorityValue', 'Reminder', 'TCRM', 'PriorityValue', current
          timestamp, 50, 'TCRM', 'Reminder', null, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('PartyId', 'Reminder', 'TCRM', 'PartyId', current timestamp, 60,
          'TCRM', 'Reminder', 100000003, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('RecordedBy', 'Reminder', 'TCRM', 'RecordedBy', current timestamp,
          70, 'TCRM', 'Reminder', 100000004, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ReminderTime', 'Reminder', 'TCRM', 'ReminderTime', current
          timestamp, 80, 'TCRM', 'Reminder', 100000005, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ReminderDescription', 'Reminder', 'TCRM', 'ReminderDescription',
          current timestamp, 90, 'TCRM', 'Reminder', 100000006, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ReminderUserId', 'Reminder', 'TCRM', 'ReminderUserId', current
          timestamp, 100, 'TCRM', 'Reminder', 100000007, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('RecordedTime', 'Reminder', 'TCRM', 'RecordedTime', current
          timestamp, 110, 'TCRM', 'Reminder', 100000008, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ReminderLastUpdateDate', 'Reminder', 'TCRM',
          'ReminderLastUpdateDate', current timestamp, 120, 'TCRM', 'Reminder',
          100000009, null);
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('ReminderLastUpdateUser', 'Reminder', 'TCRM',
          'ReminderLastUpdateUser', current timestamp, 130, 'TCRM',
          'Reminder', 100000010, null);
```

```
INSERT INTO V_ELEMENT (ELEMENT_NAME, GROUP_NAME, APPLICATION, ATTRIBUTE_NAME,
     LAST_UPDATE_DT, RESPONSE_ORDER, ELEMENTAPPNAME, ELEMENTGROUPNAME,
     DWLCOLUMN_TP_CD, CARDINALITY_TP_CD)
     VALUES ('Status', 'Reminder', 'TCRM', 'Status', current timestamp, 140,
          'TCRM', 'Reminder', null, null);
```

To test an extension or addition

Test your new extensions or additions using the IBM InfoSphere Master Data Management Server testing mechanism.

1. Create sample transaction XML files as required to service your functionality.
2. Run standard test procedures.

Recognizing extensions and additions in InfoSphere MDM Server

Once you have created an extension, an addition or metadata specs in InfoSphere MDM Server, you must also revise the InfoSphere MDM Server features to recognize and work with the new modifications.

See also:

"To update product features to recognize extensions and additions"

To update product features to recognize extensions and additions

The InfoSphere MDM Server features that need to be updated are as follows:

- **Transaction Audit Log** - To integrate with the Transaction Audit Log, see "Setting up new transactions in the transaction audit information log" on page 233 and "Understanding database considerations for history inquiry" on page 215.
- **Rules of Visibility** - To integrate with RoV, you must register the business objects with the group and element table-see the information below-and create or update the data associations to include the new objects. You must also set up entitlements to grant users add/update/view rights for the data associations. See "Understanding Rules of Visibility permissions" on page 394.
- **Error logging** - You must populate IBM InfoSphere Master Data Management Server Error reporting database tables to make use of error handling within their added functionality.
- **Group element** - Register new and extended business objects with the Group and Element tables. Add a record to the Group table for a business object with its name and other required properties. Insert all fields of the business object as records in the Element table. Each record contains the name of the field, an indicator to show if its part of business key, and other information about the BObj. RoV, external validation and suspect processing reference this table for information on all business objects in the system.
- **Nullable fields** - See the Contract Table Extension sample for information on integrating nullable fields with an addition or extension.
- **Security** - See Chapter 32, "Setting and administering the security service," on page 383.

Accessing samples of extensions and additions

Samples to help you understand how to create and implement various types of extension and additions for InfoSphere MDM Server are available.

Samples are not installed with the product and can be found on the InfoSphere MDM Server distribution media.

Understanding InfoSphere MDM Server runtime metadata

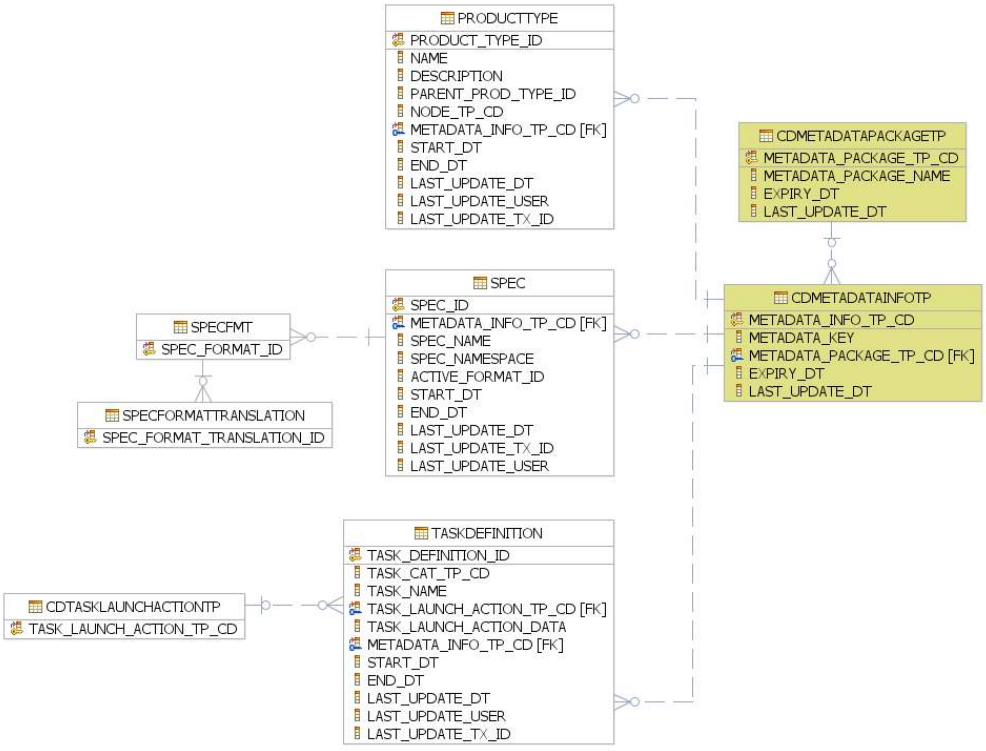
This section introduces the concept of runtime metadata.

Metadata is a generic name given to any information that describes the structure of data. It is often described as data about data.

The InfoSphere MDM Server runtime uses metadata to provide a flexible, lightweight mechanism for defining structures of data that have a range of uses. Some examples of business entities that use metadata in the runtime include:

- `PRODUCTTYPE` (for defining product type hierarchy). See also Chapter 60, "Configuring the product type hierarchy," on page 729.
- `SPEC` (for defining extension to class entities). See also Chapter 3, "Managing specs and spec values," on page 61.
- `TASKDEFINITION` (for defining task definition in Task Management). See also Chapter 37, "Customizing task management," on page 509.

The following is a partial data model showing how InfoSphere MDM Server runtime manages metadata for the above business entities.



The `CDMETADATAPACKAGETP` and `CDMETADATAINFOTP` tables provide a code table driven reference point to the metadata deployed on the InfoSphere MDM Server runtime. When the metadata are deployed to the InfoSphere MDM Server runtime using InfoSphere MDM Server services, the `CDMETADATAPACKAGETP` and `CDMETADATAINFOTP` tables are validated to ensure records are defined in these two code tables. Also, some services are provided with the code table as reference. For example, the

getSpecsByMetadataPackage service is provided to allow a user to retrieve all specs by metadata package that are deployed on the InfoSphere MDM Server runtime.

The actual metadata pertaining to a particular business entity is defined in the business entity or other entities related to it. For example, metadata for task definition is defined in the `TASKDEFINITION` and `CATASKLAUNCHACTIONTP` entities; metadata for specs is defined in the `SPEC`, `SPECFMT`, and `SPECFORMATTRANSLATION` entities.

Maintaining metadata with InfoSphere MDM Server Workbench

The development of some metadata, such as task definition, is relatively straight forward. It uses the concrete data model provided by InfoSphere MDM Server. A user (typically a business user) designs the data required by the data model and executes the appropriate services to populate the data.

On the other hand, the development of spec as metadata is more involved. Because of the nature of specs, users essentially create a dynamic data model using XML/XSD technology to extend the concrete data model. This requires planning and design from business users as well as technical users. Although services are provided to populate spec metadata, the InfoSphere MDM Server Workbench provides a set of tools to help you in the planning, design, and maintenance of spec metadata.

In addition to spec metadata, the InfoSphere MDM Server Workbench provides a set of wizards to help you to develop metadata for Product type hierarchy.

After you develop the metadata, the InfoSphere MDM Server Workbench provides deployment tools to help you to deploy the metadata to the InfoSphere MDM Server runtime.

For more information on developing metadata specs, see Chapter 3, “Managing specs and spec values,” on page 61.

Understanding component functions

Entity objects (EObj) - matches all the column names defined in a table and the related get/set method. The EObj is used to pass data between the data access layer and other components.

Business objects (BObj) are value objects in InfoSphere MDM Server. They encapsulate one or more EObjs. These objects contain getters and setters which in turn retrieve or set values in EObjs. Compared to an EObj, the getter/setters methods in a BObj perform data format conversions. To support the XML interface to InfoSphere MDM Server, the setter methods in BObjs only take string parameters as input. These strings parameters then need further data conversion to match the enclosing EObjs. For example, to set a timestamp field from string input data, the String must be converted to Timestamp. Further, these BObjs contain a get/set method pair to retrieve an EObj, and two special methods that are overridden from e superclass for internal validation: validateAdd(int, DWLStatus), validateUpdate(int, DWLStatus)

Data access layer represents a way of accessing a database table.

Data interface is a generated interface that provides select, insert, update and delete access to a database table.

InquiryData interface is an interface that provides additional select, insert, update and delete methods to access the database. .

pureQuery is an IBM data access layer implementation that is used by InfoSphere MDM Server.

InfoSphere MDM Server components are business components within InfoSphere MDM Server which contain methods to perform all the business logic. For example, a Party component has methods to add , update and retrieve party.

InfoSphere MDM Server controllers are used as functional entry points to InfoSphere MDM Server. There are two types of controllers: transactional; and non transactional. The methods within these controllers are all the transactions offered by InfoSphere MDM Server.

Transactional controllers are session beans that participate in an ongoing transaction or create a new transaction if there is none. They allow the add and update persistence transactions to run within a transactional context-for example, `TCRMCorePartyTxnBean` is a transactional controller with methods likes `addParty`, and `updateParty`

Non-transactional controllers are generic finder classes that service inquiry or search transactions. These are light weight classes that do not use transactional capabilities offered by the application serve-for example, `TCRMCorePartyFinder` is a finder controller with methods like `getParty`, `SearchParty` and others. These controllers delegate the transactions to business components-defined above-to perform business logic.

Common Services features are common modules that are necessary for performing certain nonfunctional operations. For example, the Extension framework contains all the classes to support the extension mechanism within InfoSphere MDM Server. Some of the other features with common service features are Rules of Visibility and Transaction Audit Log. All of these features have their own components to execute feature-specific logic.

Using the pureQuery data access layer

The pureQuery component is an IBM data access layer implementation that is used by InfoSphere MDM Server.

The pureQuery data access layer changes the way EObjs are added, updated and retrieved from the database. This changes the component level code for add, update and get. It also changes anywhere that the object is returned in the BObjQuery framework.

The EObj code is changed to include annotations which map the fields to columns in a database table.

EObj code examples

pureQuery Java annotations are used to map the EObj to its database table. For example:

```
@Table(name="XCONTACT")
public class EObjXContactextends EObjCommon{
```

All the fields on the EObj should be annotated to map the field to the database column. For example:

```
@Id
@Column(name="CONTIDPK")
public LongContIdPK;

@Column(name="RISKSCORE")
public StringRisk_Score;
```

New methods setPrimaryKey and getPrimaryKey methods are used internally when generating primary keys for the EObj. For example:

```
public void setPrimaryKey(ObjectaUniqueId){
 //set primary key field here
 this.setContIdPK((Long)aUniqueId);
}
public Object getPrimaryKey(){
 //return Primary Key in string format
 return this.getContIdPK();
}
```

Add any special processing required. If there is specialized processing that you require on this EObj before or after either an add or an update, you can add the following methods to your EObj:

- `beforeAddEx()`
- `afterAddEx()`
- `beforeUpdateEx()`
- `afterUpdateEx()`

For example:

```
protectedvoidbeforeAddEx(){
 if(getStartDt()==null){
  setStartDt(getCurrentTimestamp());
  }
}
```

See also:

"Using data interfaces to access the database"

"Using pureQuery utility classes" on page 45

"Understanding component level code" on page 45

Using data interfaces to access the database

The data interfaces are used to define the simple select, insert and update statements that are used to access the database.

The Workbench generates the data interface and its DataImpl implementation class. The implementation class is where the actual SQL execution logic is generated.

Example

```
import java.util.Iterator;
import java.sql.Timestamp;

import com.ibm.pdq.annotation.Select;
import com.ibm.pdq.annotation.Update;

public interface EObjXContactData {
```

```
  // Select XCONTACT by parameters
  @Select(sql="select CONTIDPK, RISKSCORE, RISKRECORDEDDT, LASTUPDATEDT, LASTUPDATEUSER,
       LASTUPDATETXID from XCONTACT where CONTIDPK = ? ")
  Iterator<EObjXContact> getEObjXContact(Long ContIdPK);

  // Create XCONTACT by EObjXContact Object
  @Update(sql="insert into XCONTACT (CONTIDPK, RISKSCORE, RISKRECORDEDDT, LASTUPDATEDT,
       LASTUPDATEUSER, LASTUPDATETXID) values( :ContIdPK, :Risk_Score, :Risk_Recorded_Dt,
       :lastUpdateDt, :lastUpdateUser, :lastUpdateTxId)")
  int createEObjXContact(EObjXContact e);

  // Update one XCONTACT by EObjXContact object
  @Update(sql="update XCONTACT set CONTIDPK = :ContIdPK, RISKSCORE = :Risk_Score,
       RISKRECORDEDDT = :Risk_Recorded_Dt, LASTUPDATEDT = :lastUpdateDt,
       LASTUPDATEUSER = :lastUpdateUser, LASTUPDATETXID = :lastUpdateTxId where CONTIDPK
       = :ContIdPK and LASTUPDATEDT = :oldLastUpdateDt")
  int updateEObjXContact(EObjXContact e);

  // Delete XCONTACT by parameters
  @Update(sql="delete from XCONTACT where CONTIDPK = ? ")
  int deleteEObjXContact(Long ContIdPK);

}
```

Note that the Workbench generates this code slightly differently using constants to define the actual SQL statements.

These `createEObjXContact` and `updateEObjXContact` methods are used in the component level methods to add and update the EObj.

Using pureQuery utility classes

There are three utility classes for working with pureQuery in the InfoSphere MDM Server project.

They are:

- `com.dwl.base.db.DataManager`
- `com.dwl.base.db.DataAccessFactory`
- `com.dwl.base.db.QueryConnection`

Examples

The DataManager is used to get QueryConnection instances as follows:

```
DataManager.getInstance().getQueryConnection()
```

The DataAccessFactory is used to create the Data implementation instance for the given Data interface and QueryConnection:

```
(EObjXContactData) DataAccessFactory.getQuery(EObjXContactData.class, queryConnection)
```

The QueryConnection is needed to create the Data implementation instance as shown above and to close the connection to the database:

```
try {
  queryConnection.close();
 } catch (Exception e) {}
```

Understanding component level code

When adding and updating entity objects, it is preferable to use the three utility classes for working with pureQuery as mentioned in "Using pureQuery utility classes." Once the Data implementation instance has been created we can use the generated create and update methods.

Example

EObjXContact Add Record example:

```
QueryConnection queryConnection = null;
try {
  queryConnection = DataManager.getInstance().getQueryConnection();
  EObjXContactData xContactData =
    (EObjXContactData) DataAccessFactory.getQuery(EObjXContactData.class, queryConnection);

  xContactData.createEObjXContact(getEObjXContact());

} finally {
  try {
    queryConnection.close();
  } catch (Exception e) {}
}
```

EObjXContact Update Record example:

```
QueryConnection queryConnection = null;
try {
  queryConnection = DataManager.getInstance().getQueryConnection();
  EObjXContactData xContactData =
    (EObjXContactData) DataAccessFactory.getQuery(EObjXContactData.class, queryConnection);

  xContactData.updateEObjXContact(getEObjXContact());

} finally {
  try {
    queryConnection.close();
  } catch (Exception e) {}
}
```

When accessing the database in custom transactions or external rules, you can use the generated method style queries to get the EObj much like you do for adding and updating entity objects:

```
QueryConnection queryConnection = null;
Iterator<EObjIdentifier> iterator = null;
try {
  queryConnection = DataManager.getInstance().getQueryConnection();
  EObjXContactData xContactData =
    (EObjXContactData) DataAccessFactory.getQuery(EObjXContactData.class, queryConnection);

  iterator = xContactData.getEObjXContact(contactId);

} finally {
  try {
    queryConnection.close();
  } catch (Exception e) {}
}
```

Creating pluggable business object queries

Pluggable business object queries encapsulate the logic that retrieves business objects from persistent storage. This enables you to customize database access for business objects and allows the extension framework to reduce the database access that is required for data extensions to the core product.

All inquiry transactions of the product have pluggable query support except for the following areas:

- `DWLCommonServices` Module Services (that is, TAIL, Default Source Value, Code Table Services)
- `DWLAdminServices` Module
- `CoreUtilities` Module (Code Table Services)

Implementing pluggable business object queries

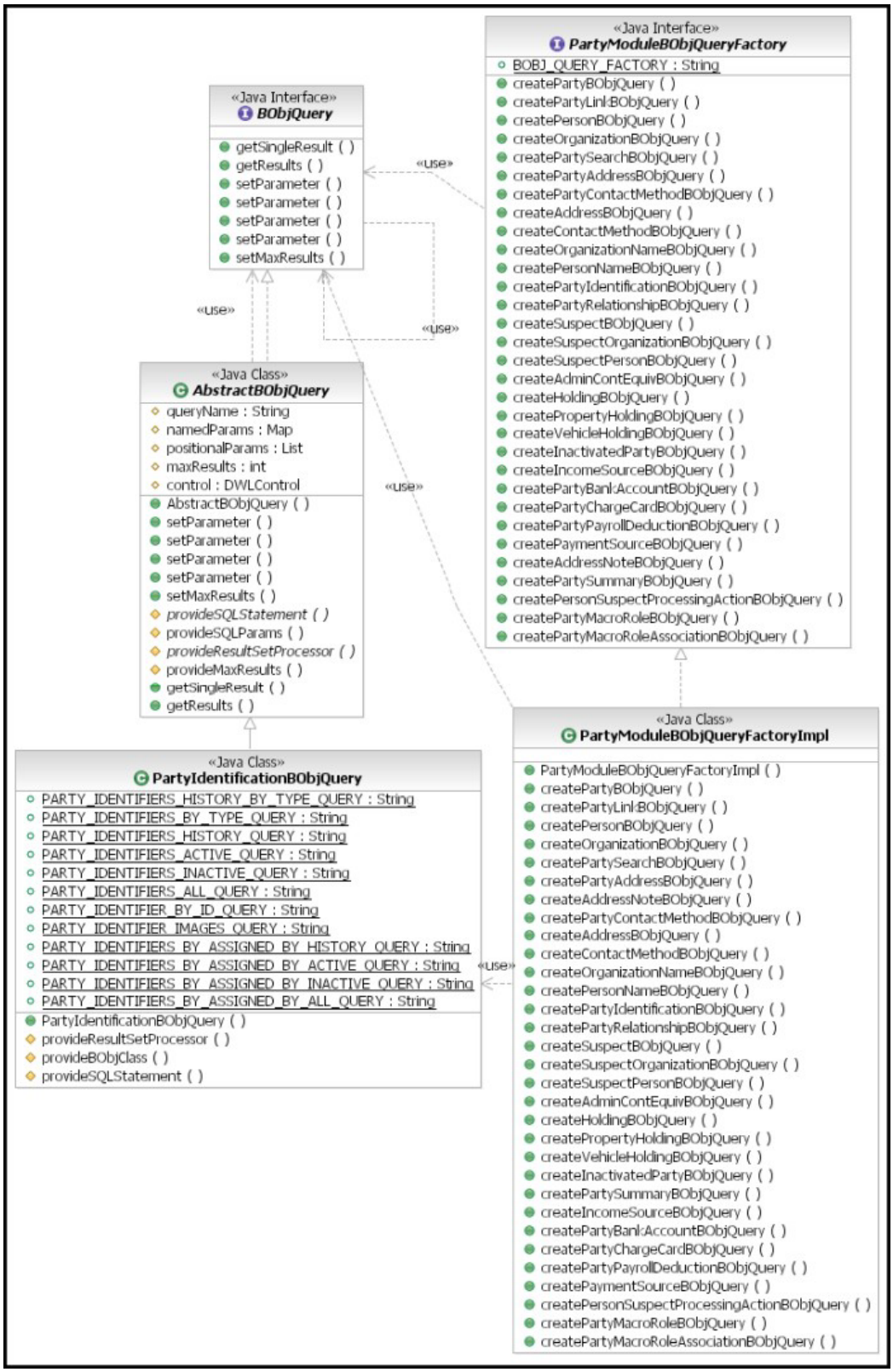
InfoSphere MDM Server business object query classes enable the encapsulation and easy customization of core database access functionality. The `BObjQuery` interface allows you to implement new query methodologies, other than the core implementation provided with the product, JDBC.

The `AbstractSQLBObjQuery` class provides the base pureQuery query implementation provided with the InfoSphere MDM Server product. This class contains the logic necessary to conduct pureQuery JDBC-driven queries. Each proprietary InfoSphere MDM Server business object (BObj) has its own `BObjQuery` class that extends from this `AbstractBObjQuery` class. When using the JDBC implementation of InfoSphere MDM Server, extending the `GenericBObjQuery` class (or one of its InfoSphere MDM Server `BObjQuery` subclasses) is the recommended approach for creating any new business object query classes. Extending a InfoSphere MDM Server `BObjQuery` subclass of `AbstractSQLBObjQuery` is only recommended when you are replacing the `BObjQuery` as the result of coding an EObj extension.

The `AbstractSQLJBObjQuery` class provides the base SQLJ query implementation. It contains the necessary logic to conduct SQLJ-based queries. When using the SQLJ implementation for new business object query classes, IBM recommends that you extend the `AbstractSQLJBObjQuery` class. For details about SQLJ-based queries, see "Implementing SQLJ-based queries" on page 53.

Each `BObjQuery` class is registered with a class factory corresponding to the module to which it belongs, and interfaces exist for each module of the InfoSphere MDM Server product. For example, `PartyModuleBObjQueryFactory` is the interface implemented by the factory implementation class, `PartyModuleBObjQueryFactoryImpl`. The implementation class is responsible for the retrieval of all `BObjQuery` classes configured for use by services in the Party module.

The class diagram below depicts the interfaces and abstract classes discussed in this section along with the implementation class pertaining to the Party module query factory example.


«Java Interface»
PartyModuleBObjQueryFactory
BOBJ_QUERY_FACTORY : String
createPartyBObjQuery ( )
createPartyLinkBObjQuery ( )
createPersonBObjQuery ( )
createOrganizationBObjQuery ( )
createPartySearchBObjQuery ( )
createPartyAddressBObjQuery ( )
createPartyContactMethodBObjQuery ( )
createAddressBObjQuery ( )
createContactMethodBObjQuery ( )
createOrganizationNameBObjQuery ( )
createPersonNameBObjQuery ( )
createPartyIdentificationBObjQuery ( )
createPartyRelationshipBObjQuery ( )
createSuspectBObjQuery ( )
createSuspectOrganizationBObjQuery ( )
createSuspectPersonBObjQuery ( )
createAdminContEquivBObjQuery ( )
createHoldingBObjQuery ( )
createPropertyHoldingBObjQuery ( )
createVehicleHoldingBObjQuery ( )
createInactivatedPartyBObjQuery ( )
createIncomeSourceBObjQuery ( )
createPartyBankAccountBObjQuery ( )
createPartyChargeCardBObjQuery ( )
createPartyPayrollDeductionBObjQuery ( )
createPaymentSourceBObjQuery ( )
createAddressNoteBObjQuery ( )
createPartySummaryBObjQuery ( )
createPersonSuspectProcessingActionBObjQuery ( )
createPartyMacroRoleBObjQuery ( )
createPartyMacroRoleAssociationBObjQuery ( )
«Java Interface»
BObjQuery
getSingleResult ( )
getResults ( )
setParameter ( )
setParameter ( )
setParameter ( )
setParameter ( )
setMaxResults ( )
«use»
«use»
«use»
«use»
«Java Class»
AbstractBObjQuery
queryName : String
namedParams : Map
positionalParams : List
maxResults : int
control : DWLControl
AbstractBObjQuery ( )
setParameter ( )
setParameter ( )
setParameter ( )
setParameter ( )
setMaxResults ( )
provideSQLStatement ( )
provideSQLParams ( )
provideResultSetProcessor ( )
provideMaxResults ( )
getSingleResult ( )
getResults ( )
«Java Class»
PartyModuleBObjQueryFactoryImpl
PartyModuleBObjQueryFactoryImpl ( )
createPartyBObjQuery ( )
createPartyLinkBObjQuery ( )
createPersonBObjQuery ( )
createOrganizationBObjQuery ( )
createPartySearchBObjQuery ( )
createPartyAddressBObjQuery ( )
createAddressNoteBObjQuery ( )
createPartyContactMethodBObjQuery ( )
createAddressBObjQuery ( )
createContactMethodBObjQuery ( )
createOrganizationNameBObjQuery ( )
createPersonNameBObjQuery ( )
createPartyIdentificationBObjQuery ( )
createPartyRelationshipBObjQuery ( )
createSuspectBObjQuery ( )
createSuspectOrganizationBObjQuery ( )
createSuspectPersonBObjQuery ( )
createAdminContEquivBObjQuery ( )
createHoldingBObjQuery ( )
createPropertyHoldingBObjQuery ( )
createVehicleHoldingBObjQuery ( )
createInactivatedPartyBObjQuery ( )
createPartySummaryBObjQuery ( )
createIncomeSourceBObjQuery ( )
createPartyBankAccountBObjQuery ( )
createPartyChargeCardBObjQuery ( )
createPartyPayrollDeductionBObjQuery ( )
createPaymentSourceBObjQuery ( )
createPersonSuspectProcessingActionBObjQuery ( )
createPartyMacroRoleBObjQuery ( )
createPartyMacroRoleAssociationBObjQuery ( )
«Java Class»
PartyIdentificationBObjQuery
PARTY_IDENTIFIERS_HISTORY_BY_TYPE_QUERY : String
PARTY_IDENTIFIERS_BY_TYPE_QUERY : String
PARTY_IDENTIFIERS_HISTORY_QUERY : String
PARTY_IDENTIFIERS_ACTIVE_QUERY : String
PARTY_IDENTIFIERS_INACTIVE_QUERY : String
PARTY_IDENTIFIERS_ALL_QUERY : String
PARTY_IDENTIFIER_BY_ID_QUERY : String
PARTY_IDENTIFIER_IMAGES_QUERY : String
PARTY_IDENTIFIERS_BY_ASSIGNED_BY_HISTORY_QUERY : String
PARTY_IDENTIFIERS_BY_ASSIGNED_BY_ACTIVE_QUERY : String
PARTY_IDENTIFIERS_BY_ASSIGNED_BY_INACTIVE_QUERY : String
PARTY_IDENTIFIERS_BY_ASSIGNED_BY_ALL_QUERY : String
PartyIdentificationBObjQuery ( )
provideResultSetProcessor ( )
provideBObjClass ( )
provideSQLStatement ( )
«use»

Customizing an existing pluggable business object query

You can extend a core business object's query implementation by either overriding an existing query or creating a new, customized query.

This requires that the particular class be subclassed and a new implementation supplied for the query to be customized. The factory class must also then be extended to pick up this new query class, and the extended factory itself must be registered with InfoSphere MDM Server.

Using pureQuery data access layer in pluggable business object queries

When using the pureQuery data access layer in your business object queries, you need provide the implementation of only two methods in most GenericBObjQuery subclasses.

The methods are as follows:

- protected Class `provideQueryInterfaceClass()`
- protected IGenericResultSetProcessor `provideResultSetProcessor()`

Understanding the structure of a constant

Each constant in the query class has been carefully defined.

The basic structure of each constant is:

Table 1. structure of a constant

Structure of name:					
<business object type>	S	BY	<criteria>	<filter>	QUERY
(mandatory)	*(optional)*	*(optional)*	*(optional)*	*(optional)*	*(mandatory)*
				• HISTORY • ACTIVE • INACTIVE • ALL • IMAGES	

Note: when no criteria are specified, a query by primary key is implied.

The following are some examples:

- **AlertBObjQuery**
  - ALERTS_IMAGES_QUERY
  - ALERT_HISTORY_QUERY
  - ALERT_QUERY
  - ALERTS_HISTORY_QUERY
  - ALERTS_ACTIVE_QUERY
  - ALERTS_INACTIVE_QUERY
  - ALERTS_ALL_QUERY

  - ALERT_OF_PARTY_HISTORY_QUERY
  - ALERT_OF_PARTY_QUERY
- **CampaignAssociationBObjQuery**
  - CAMPAIGN_ASSOCIATION_HISTORY_QUERY
  - CAMPAIGN_ASSOCIATION_QUERY
  - CAMPAIGN_ASSOCIATIONS_BY_CAMPAIGN_ID_HISTORY_QUERY
  - CAMPAIGN_ASSOCIATIONS_BY_CAMPAIGN_ID_ACTIVE_QUERY
  - CAMPAIGN_ASSOCIATIONS_BY_CAMPAIGN_ID_INACTIVE_QUERY
  - CAMPAIGN_ASSOCIATIONS_BY_CAMPAIGN_ID_ALL_QUERY
  - CAMPAIGN_ASSOCIATIONS_ACTIVE_QUERY

Extending the BObjQuery class

You can extend the query implementation of a core business object by either overriding an existing query or creating a new, customized query.

You may need to create a new query to add to an existing BObjQuery class in order to handle the introduction of new business functionality to the system.

See also:

"To extend the BObjQuery class"

"To override an existing query"

"To create a new query" on page 51

"To extend the BObjQueryFactory implementation class" on page 51

"To register a new factory implementation" on page 51

To extend the BObjQuery class

1. Complete one of the following tasks: "To override an existing query" or "To create a new query" on page 51
2. Complete this task: "To extend the BObjQueryFactory implementation class" on page 51
3. Complete this task: "To register a new factory implementation" on page 51

   Note: Pseudo-code snippets are used to provide a simplified illustration of the steps. Actual code samples are provided with the InfoSphere MDM Server Samples that are available for download from the Support site.

To override an existing query

1. Determine which constant represents the query you wish to customize. For the basic structure of each constant, see "Understanding the structure of a constant" on page 49.
2. Use the Workbench to generate a subclass of the BObjQuery that implements that query.
3. Modify the SQL statement in the InquiryData interface that was generated with your BObjQuery.
4. Determine the order and type of parameters the existing query requires. See your BObjQuery's superclass for more information. In cases where the parameters are not used in exactly the same order and number, you will need to implement the provideSQLParams() method to process the parameters you need for your new query in the order required by your new SQL statement.

Some queries require business object as input, for example, Party/Contract Search. As such, business objects are provided to the BObjQuery classes as named parameters—see the map namedParameters on the AbstractBObjQuery class—rather than in the positional parameters List.

Note: Customizing or modifying any one particular query constant changes the way this query constant is invoked anywhere it is currently used in the product.

To create a new query

Note: As mentioned in the previous scenario, the provideSQLStatement() method must be overridden to support the retrieval of the new SQL statement.

1. Add a new query constant in the GenericBObjQuery subclass.

```
public final static String REMINDER_QUERY =
"getReminderByPartyID (Object[])";
```

2. Provide an annotation for the select statement and a signature for the method:

```
@Select(sql="SELECTREMINDER.REMIND_ID,REMINDER.PRIORITY_TP_CD,
REMINDER.CONT_ID,REMINDER.REMIND_RECORDED_BY,REMINDER.REMIND_DTM,
REMINDER.REMIND_DESC,REMINDER.REMIND_USER_ID,REMINDER.RECORDED_DTM,
REMINDER.LAST_UPDATE_DT,REMINDER.LAST_UPDATE_USERFROMREMINDER
WHEREREMINDER.CONT_ID=?")
Iterator<ResultQueue1<EObjReminder>> getReminderByPartyID(Object[] parameters);
```

To extend the BObjQueryFactory implementation class

Extend the appropriate query factory to pick up the extended BObjQuery class. In this case, the PartyModuleBObjQueryFactoryImpl class is extended and the createPartyIdentificationBObjQuery() method is overridden.
Here is a sample code snippet:

```
public BObjQuery createPartyIdentificationBObjQuery(String queryName,
                                                    DWLControl dwlControl) {
  if ((queryName == null) || queryName.trim().equals(""))
    throw new IllegalArgumentException("Query Name cannot be empty or null.");
  return new PartyIdentificationBObjExtQuery(queryName, dwlControl);
}
```

To register a new factory implementation

Register your extended query factory implementation class with the product by modifying the appropriate properties file for the module. For the Party module, the factory implementation is configured in the TCRM.properties file – see the key `Party.BObjQueryFactory` – along with all other modules specific to InfoSphere MDM Server. Factory implementations for generic services, such as DWLBusinessServices, are likewise configured in the `DWLCommon.properties` file.
Sample modified property in TCRMCommon.properties:

```
Party.BObjQueryFactory=
     com.yourcompany.party.bobj.query.extension.PartyModuleBObjQueryFactoryImplExt
```

Creating a new pluggable business object query

The method for introducing a pluggable query support for a new business object is similar to the method for customizing one.

In order to understand the procedures here, you must read and be familiar with "Customizing an existing pluggable business object query" on page 49.

If you wish to create a SQLJ-based BObj query, see "Implementing SQLJ-based queries" on page 53.

There are three basic steps to creating a new pluggable BObj query:

- "To create a new BObjQuery class"
- "To extend and register the appropriate query factory"
- "Calling the query facility from the component inquiry method"

See also:

"To create a new BObjQuery class"

"To extend and register the appropriate query factory"

"Calling the query facility from the component inquiry method"

To create a new BObjQuery class

1. Create a new BObjQuery class, extending from GenericBObjQuery JDBC implementation.
2. Register your queryNames as constants in the class, and create a new InquiryData interface to annotate the queries.
3. Implement the abstract method provideQueryInterfaceClass().
4. Implement the abstract method provideResultSetProcessor() on the class to conditionally retrieve the appropriate result set processors for each query created.

To extend and register the appropriate query factory

1. Extend the appropriate existing query factory class and register it with the appropriate query factory class.
2. Create a new method to retrieve your query class.

Sample code snippet:

```
public BObjQuery createNewObjectBObjQuery(String queryName,DWLControl dwlControl) {
       if ((queryName == null) || queryName.trim().equals(""))
        throw new IllegalArgumentException(
             "Query Name cannot be empty or null.");
    return new NewObjectBObjQuery(queryName, dwlControl);
}
```

Note: If you are not using an existing InfoSphere MDM Server component, you must implement logic to retrieve the appropriate query factory for that module, which is configured in the `tcrm_extension.properties` file, in order to make use of the pluggable query facility. The getBObjQueryFactory() methods in each of the existing InfoSphere MDM Server components takes care of this.

Calling the query facility from the component inquiry method

The inquiry method needs to make calls to the query facility in order to pick up the appropriate query logic for the implementation and process the results retrieved from the database.

The following pseudo-code sample details this process:

```
//Retrieve the query factory for the component's module and create the appropriate
//BObjQuery class
BObjQuery bObjQuery = getBObjQueryFactory()
                    .createPartyIdentificationBObjQuery(
PartyIdentificationBObjQuery.PARTY_IDENTIFIER_BY_ID_QUERY,theTCRMControl);
```

```
//set any parameters to be resolved into the SQL (along with position) onto the
//query object
bObjQuery.setParameter(0, new Long(identifierId));
// retrieve type value from BObj.
TCRMPartyIdentificationBObj partyid = (TCRMPartyIdentificationBObj)
     bObjQuery.getSingleResult();
```

Implementing SQLJ-based queries

InfoSphere MDM Server includes an SQLJ query implementation class, AbstractSQLJBObjQuery, to support SQLJ-based queries.

The core query implementations provided with the InfoSphere MDM Server product are based on JDBC. If you choose to use SQLJ-based database access instead of or together with JDBC, you should still base your queries on the BObjQuery interface.

The SQLJ query implementation class AbstractSQLJBObjQuery supports SQLJ-based queries. Instead of implementing the BObjQuery interface directly, the AbstractSQLJBObjQuery class extends AbstractBObjQuery class implementation to reuse most of the implementation code.

The AbstractSQLJBObjQuery class provides the base SQLJ query implementation. It contains the necessary logic to conduct SQLJ-based queries.

Note: When using the SQLJ implementation for new business object query classes, IBM recommends that you extend the AbstractSQLJBObjQuery class.

The InfoSphere MDM Server SQLJ implementation includes the following supporting classes:

- SQLJCommand class
- ISQLJCommandFactory interface

SQLJCommand describes comprehensive information about a SQLJ executable statement. A SQLJCommand is executed by delegating the execution to its target, which is an ISQLJCommandFactory object. A unique name is used to identify each SQLJ executable statement in the ISQLJCommandFactory.

Each SQLJ statement should be defined in a method of its factory class that implements ISQLJCommandFactory. Upon request, the factory class is also responsible for executing each specific SQLJ statement. The result of an SQLJ statement is always converted to a ResultSet object. This enables the SQLJ implementation to reuse the same ResutSetProcessor classes to fetch query results as are used for JDBC.

Each SQLJ statement runs in a given connection context. If you are working in a multithreaded environment, do not use the default context; instead use the empty class, SQLJContext.

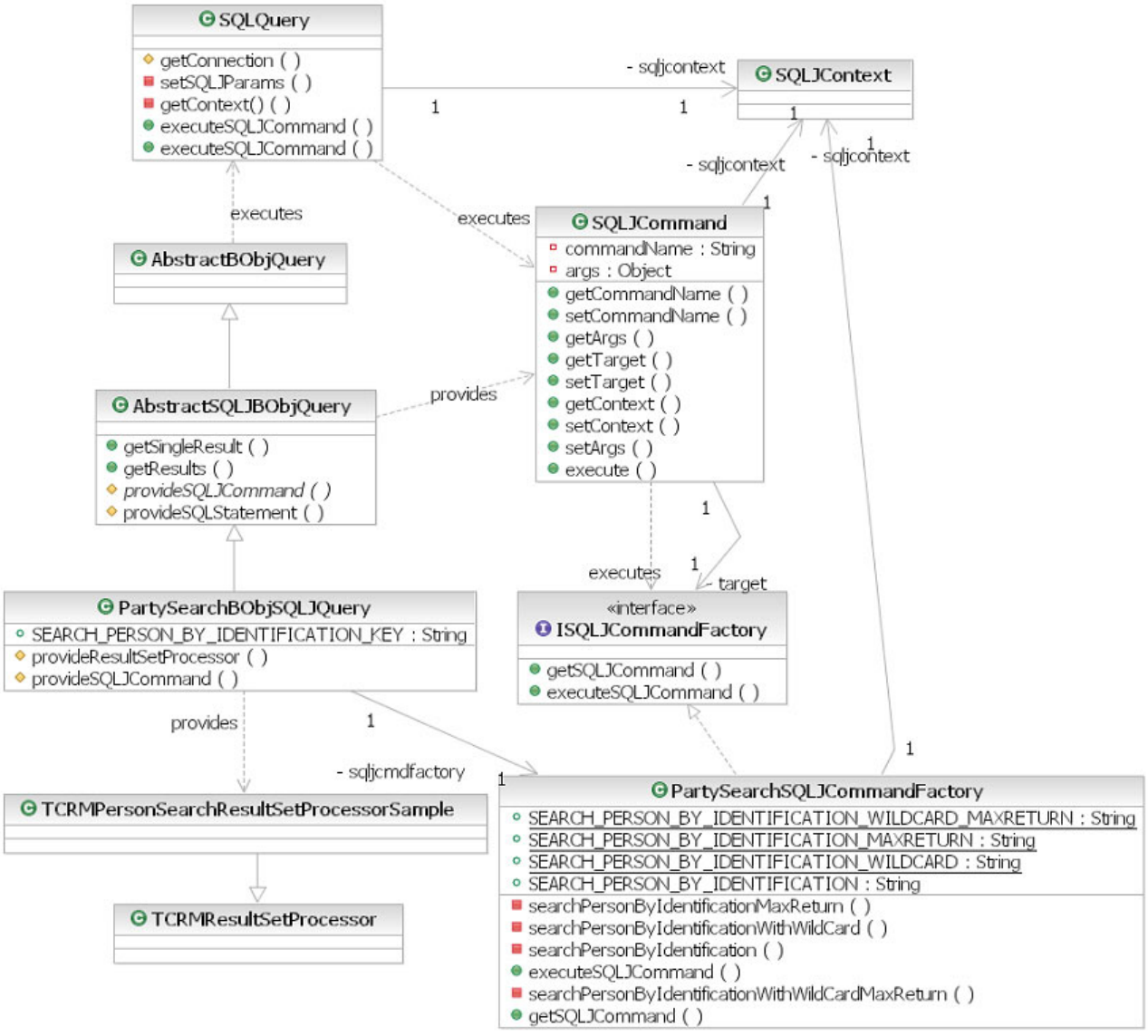
The class diagram below depicts the interfaces and abstract classes discussed in this topic, along with the implementation class that is used by the sampleMDM Query Connect transaction.

The method for introducing a SQLJ-based pluggable query is similar to creating a JDBC based business object query. Sample code is used in this section to provide a simplified illustration of the necessary steps. Actual code samples are provided

with the InfoSphere MDM Server Query Connect Samples that are available for download from the InfoSphere MDM Server Support site.

In order to fully understand the procedures described in this section, you must read and be familiar with "Creating a new pluggable business object query" on page 51.

Important: This class diagram includes no detailed information for the classes AbstractBObjQuery, TCRMPersonSearchResultSetProcessorSample, and TCRMResultSetProcessor. Only SQLJ-related information is presented in the SQLQuery class.



See also:

"To create a SQLJ-based pluggable business object query"

To create a SQLJ-based pluggable business object query

1. Create the ISQLJCommandFactory class.

a. Create a new class in a .sqlj file, implementing the ISQLJCommandFactory interface.

b. Register your sqljCommandNames as constants in the class, and affiliate the retrieval logic with each SQLJ statement.

c. Define an Iterator for each SQLJ statement.

```
#sql iterator PersonIdentificationIterator (String,String,String,String,
     String,Long,String,Timestamp,String,String,Long,Timestamp);
```

d. Implement each SQLJ statement in a method, converting the Iterator object as a ResultSet object to return it back.

```
private  ResultSet searchPersonByIdentification(Long idTp, String idNum)throws
     DWLBaseException,SQLException{

        PersonIdentificationIterator iter = null;
        Long nameUsageTp = getNameUsageType();

        //static sql that search person by its identification type +
        //identification number + name usage type
        #sql [ctx] iter = {SELECT PERSONNAME.GIVEN_NAME_ONE PNGIVENNAME1,
        PERSONNAME.GIVEN_NAME_TWO PNGIVENNAME2, PERSONNAME.GIVEN_NAME_THREE
        PNGIVENNAME3, PERSONNAME.GIVEN_NAME_FOUR PNGIVENNAME4,
        PERSONNAME.LAST_NAME PNLASTNAME, PERSONNAME.CONT_ID PNCONTID,
        PERSONNAME.SUFFIX_DESC PNSUFFIXDESC, PERSON.BIRTH_DT BIRTHDT,
        PERSON.GENDER_TP_CODE GENDERTPCODE,IDENTIFIER.REF_NUM IDREFNUM,
        IDENTIFIER.ID_TP_CD IDTPCD,CONTACT.INACTIVATED_DT INACTIVATEDDT
        FROM PERSONNAME, PERSON,IDENTIFIER,CONTACT WHERE IDENTIFIER.ID_TP_CD =
        :idTp AND IDENTIFIER.REF_NUM = :idNum AND IDENTIFIER.CONT_ID =
        PERSON.CONT_ID AND IDENTIFIER.CONT_ID = PERSONNAME.CONT_ID AND
        PERSONNAME.NAME_USAGE_TP_CD = :nameUsageTp AND PERSON.CONT_ID =
        CONTACT.CONT_ID ORDER BY
        PERSONNAME.LAST_NAME,PERSONNAME.GIVEN_NAME_ONE};

        return iter.getResultSet();
}
```

e. Implement the methods getSQLJCommand() and executeSQLJCommand().

```
public SQLJCommand getSQLJCommand(String commandName){
 SQLJCommand sqljCommand = new SQLJCommand();
 sqljCommand.setCommandName(commandName);
 sqljCommand.setTarget(this);
 return sqljCommand;
}

public ResultSet executeSQLJCommand(SQLJCommand sqljCmd)throws
      DWLBaseException, SQLException{

       //set the connection context, this connection context is shared by
       //SQLJ statement
       setContext(sqljCmd.getContext());

       //get the logic no of the SQLJCommond
       int commandNo = sqljCmd.getCommandNo();
       //get the parameters in object array
       Object[] args = sqljCmd.getArgs();

       ResultSet  rs = null;

       //call methods that contains SQLJ executable statement according
       //to the command number
       switch(commandNo){

   case SEARCH_PERSON_BY_IDENTIFICATION:
         if (args == null || args.length < 2){
     throw new TCRMException("Missing parameter for sqlj command
           [" + commandNo + "]");
        }
        rs =  searchPersonByIdentification((Long)args[0],(String)args[1]);
        break;

   case SEARCH_PERSON_BY_IDENTIFICATION_WILDCARD:
                            ......
        }
       return rs;
}
```

2. Create the BObjQuery class.
   a. Create a new BObjQuery class, extended from the AbstractSQLJBObjQuery SQLJ implementation.
   b. Associate the new ISQLJCommandfactory class that you created in step 1 with the new BObjQuery.
   c. Register your queryNames as constants in the class, and affiliate the retrieval logic with each — that is, the SQLJ command.
   d. Implement the abstract methods provideSQLJStatement() and provideResultSetProcessor() on the class to conditionally retrieve the appropriate SQLJ command and ResultSet processors for each created query.
3. Extend and register the appropriate query factory. For details, see "To extend and register the appropriate query factory" on page 52.
4. Call the query facility from the component inquiry method. For details, see "Calling the query facility from the component inquiry method" on page 52.

Creating a pluggable persistence mechanism

The business object query class enables the encapsulation and customization of persistence transactions.

All persistence transactions have pluggable persistence support **except** the following transactions:

1. **TCRMPartyAlertComponent (Party service)**: Migration is not done for deprecated methods
2. **TAILAdminServicesComponent (DWLCommonServices)**: The update method uses DataManager for persisting data, and not the pluggable query mechanism. As such, pluggable persistence is not available.
3. **DWLAdminServices**: These services do not use pluggable queries and therefore are not enabled to facilitate pluggable persistence mechanisms.
4. **TCRMHouseHoldBObj**: The persistence operation related to EObjLocationGroup has been retained in TCRMPartyComponent (updateHouseholdMember method)

See also:

"To replace the persistence mechanism"

"Using business object query objects for pluggable persistence" on page 57

"Customizing an existing pluggable persistence strategy" on page 58

"To customize a persistence strategy by including new columns and extension tables" on page 59

"To extend a persistence strategy" on page 60

To replace the persistence mechanism

The code from the EObjCommonHook has not been migrated to AbstractBObjQuery as it is specific to the pureQuery implementation. If you are replacing the persistence mechanism, you must perform the following steps.

1. Replace the implementation of the AbstractBObjQuery class.
2. Override the throwDuplicateKeyException. This exception indicates that the primaryKey supplied already exists.

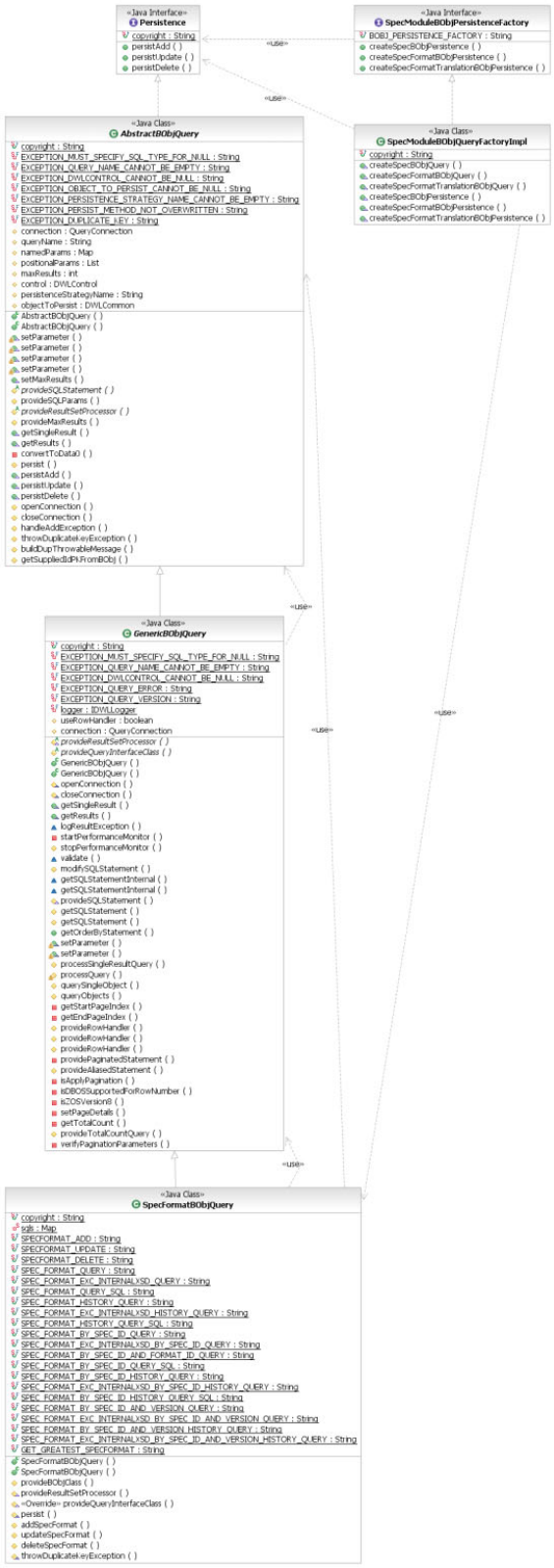
Using business object query objects for pluggable persistence

The InfoSphere MDM Server pluggable business object query classes enable the encapsulation and easy customization of core database access functionality. The new Persistence interface allows you to implement persistence strategies, other than the core implementation provided with the product.

The AbstractSQLJBObjQuery class provides the base pureQuery query implementation provided with the InfoSphere MDM Server product. This class contains the logic necessary to conduct pureQuery JDBC-driven queries as well as persistence transactions. Each proprietary business object (BObj) has its own BObjQuery class that extends from this AbstractBObjQuery class. These implementations take advantage of logic to open and close JDBC connection, and common logic that is run during any persistent transactions, that is, they retry logic on add transactions.

Business-specific implementations of the AbstractBObjQuery mechanism and the classes that extend it, such as PersonBObjQuery, contain *add*, *update* and *delete* methods to implement the relevant persistence logic. These classes also override the persist method of the AbstractBObjQuery to invoke the appropriate method. Class factory interfaces are also provided per module and as such, implementations of this interface allow for the creation of the appropriate implementation of the query and persistence mechanism (XYZBObjQuery).

The class diagram shows the interfaces and abstract classes discussed in this section:



Customizing an existing pluggable persistence strategy

You can extend a core business object's persistence implementation by overriding one or more of the add, update, or delete methods.

The factory implementation class must also be extended to pick up this new persistence BObjQuery class implementation, and the extended factory must be registered with the product (`tcrm_extension.properties` or `DLWCommon_extenions.properties`).

To customize a persistence strategy by including new columns and extension tables

1. Create a new class that extends from the base business object. For example, use `XContractBObjExt` to extend `TCRMContractBObj`.
2. Add a constructor that accepts persistenceStrategyName and DWLCommon. This new constructor invokes the super class's constructor, for example:

```
public XContractExtBObjQuery(String persistenceStrategyName,
                             DWLCommon objectToPersist) {
  super(persistenceStrategyName, objectToPersist);
}
```

3. Override the persist method. Invoke the base class implementation, if the objectToPersist, the variable that stores the BObj, is the same base class type. If it is not the same base class type, invoke the extended EObj class. For example:

```
protected void persist() throws Exception {
  if (!(objectToPersist instanceof XContractBObjExt)) {
    super.persist();
  } else

  if (persistenceStrategyName.equals(CONTRACT_ADD)) {
    addXContract();
  } else if (persistenceStrategyName.equals(CONTRACT_UPDATE)) {
    updateXContract();
  } else if (persistenceStrategyName.equals(CONTRACT_DELETE)) {
    deleteXContract();
  }
}
```

4. Modify the extended EObjExtData. The insert, update queries must have all the base table columns along with the new extended column. Here is example of how to assign values to the new column:

```
public static final String createEObjXContractExtSql = "insert into CONTRACT
            (CONTRACT_ID, CURRENCY_TP_CD, ..., Agreement_Score, ...) values
     (?1.contractIdPK, ?1.currencyTpCd, ...,?2.AgreementScore, ...)";

@Update(sql=createEObjXContractExtSql)
int createEObjXContractExt(EObjContract e1, EObjXContractExt e2);
```

   Note: The example shows how values can be extracted from multiple EObjs. The prefix qualification of the fields in the SQL indicates the object to be used., that is,

   a. contractIdPK indicates that the value of CONTRACT_ID is assigned from the e1 of type EObjContract and
   b. agreementScore indicates that the value of agreement_score is assigned from the e2 of type EObjXContractExt.

   See com.ibm.mdm.samples.extension.contract.entityObject.EObjXContractExtData for implementation information

5. Extend the appropriate existing query factory class and override persistence related create methods to retrieve your query class.
6. Register your extended query factory implementation class with the product by modifying the appropriate properties file for the module (either `DWLCommon_extension.properties` or `tcrm_extension.properties`).

7. Modify all the inquiry transactions to show the new column. See "Customizing an existing pluggable business object query".

You can use the initial `mdmxmi` file that was created for the first extended column to add additional columns to the extension.

To extend a persistence strategy

You can modify the existing persistence strategies to accommodate writing information to file in addition to the existing database tables, for example. The `com.ibm.mdm.samples.extension.persistence` in the samples package provides an example of this.

1. Create a class that extends the BObjQuery implementation class.
2. Add a constructor that accepts persistenceStrategyName and DWLCommon. This new constructor invokes the super class's constructor. For example:

```
public XSpecFormatExtBObjQuery(String persistenceStrategyName,
                               DWLCommon objectToPersist) {
  super(persistenceStrategyName, objectToPersist);
}
```

   Override the persistence method you wish to extend - either add, update or delete, for example:

```
//step 1:
protected void addSpecFormat() throws Exception{
super.addSpecFormat(); //Retained logic provided by SpecFormatBOBjQuery
//step2: add your custom logic here – the line below is an example only.
persistInternalXSD();
}
```

3. Create a class that extends the appropriate BObjQueryFactoryImpl to pick up the extended BObjQuery class. In this example, the SpecModuleBObjQueryFactoryImpl is extended and the createSpecFormatBObjPersistence method is overridden:

```
public Persistence createSpecFormatBObjPersistence(String persistenceStrategyName,
                                                    DWLCommon objectToPersist){
  return new SpecFormatBObjQueryExt(persistenceStrategyName, objectToPersist);
}
```

4. Register the extended query factory implementation class with the product by modifying the appropriate properties file for the module. For example, for the Spec service, the factory implementation is configured in the DWLCommon_extension.properties file. The factory implementation for TCRM services, such as Party, Product, Financial, are configured in the TCRM_Extension.properties, for example:

```
Spec.BObjPersistenceFactory =
  com.ibm.mdm.samples.extension.persistence.spec.bobj.query.SpecModuleBObjQueryFactoryImplExt
```

The persistence mechanism is now extended.

Chapter 3. Managing specs and spec values

InfoSphere MDM Server specs, referred to simply as *specs*, are a type of metadata used to define extensions to class entities within the InfoSphere MDM Server data model. It is important to note that the term *specs* in this context is not a shortened version of the word *specifications*.

Because a spec acts as an extension of the data model, you can use it to extend a class entity without the need to alter the physical definition of the database schema and without the usual need to restart the application server. An implementation incorporating specs would include the following:

- An XSD to define the structure of data you intend to use to extend a class entity.
- An XML document adhering to the XSD structure provides the data, known as *spec values* or *dynamic attributes*, that are used to extend the class entity.
- A business object, with an underlying class entity that supports specs, that associates to the XML document is a *spec value business object*.

Some examples of business objects and their underlying entities that support specs include:

- TCRMDemographicsSpecValueBObj (party demographics data)
- ProductSpecValueBObj (product spec values)
- ContractSpecValueBObj (contract spec values)

In this section, you will learn:

Understanding specs and the MDM metadata project

The InfoSphere MDM Server Workbench provides a project type, called the MDM metadata project, to represent a metadata package. After a metadata project is created, different types of metadata (such as specs) can be created within it. A metadata package represents a collection of metadata content of varying types. When you finish creating the metadata, the enclosing metadata package can be deployed to the InfoSphere MDM Server runtime using the InfoSphere MDM Server Workbench. Alternatively, you can also deploy the metadata package using the `MDMENV` command line deployment tool.

An optional set of locales is also associated with a metadata project. If these locales are provided to be used with the project, they are stored in the `mdm.locales` file, in the `locales` directory, in the project root. They provide a representation of the locales supported by the target deployment system and are defined as `<localemap:locale>` elements, specified by the InfoSphere MDM Server locale schema. For example:

```
<localemap:locale>
  <localemap:name>en</localemap:name>
  <localemap:description>English</localemap:description>
</localemap:locale>
```

A metadata project can reference other metadata projects to adopt their locale configuration. This process is cumulative, and the locale configuration is inherited though a project reference hierarchy. Project references are stored within the project file, in the project root. The references are defined as project elements as follows:

```
<projectDescription>
  ...
  <projects>
    <project>project1</project>
    <project>project2</project>
      ...
    <project>projectN</project>
    <project>root</project>
  </projects>
  ...
</projectDescription>
```

The project is a standard Eclipse file created by the InfoSphere MDM Server Workbench from information supplied when a new project is created. It contains additional information about the project, such as its name.

Using MDM specs in the metadata project

After you create a metadata project in the InfoSphere MDM Server Workbench, you can create a spec in the project to begin working on it. As described in "Understanding spec composition" on page 64, the core of a spec contains three

schemas: internal, external, and localized. When a spec is first created using the InfoSphere MDM Server Workbench, only the internal schema is created. This schema is to hold the dynamic data model that you want to create. Therefore this schema must be set up correctly by you to meet your business requirements.

After you finish creating the internal schema, you can use the InfoSphere MDM Server Workbench to generate the external schema and the localized schema. In addition it generates a `nlsTemplate.properties` file that can be used as the template of a translation properties file. See "Understanding the translation template file" on page 70 for more information.

Learning spec project structure

For specs, the InfoSphere MDM Server Workbench creates the following project structure. You extend this structure as required to provide updates to the spec definitions and new spec formats.

The logical file structure consists of the following folders and files. Note that not all these folders and files are required for any given spec definition.

```
<projectname> folder
  locales folder
    mdm.locales file
  specs folder
    <specname> folder
      <specname>.spec file
      <specformat> folder
         <specname>.internal.xsd file
         <specname>.external.xsd file
         <specname>.localized.xsd file
         nlsTemplate.properties file
         nls folder
           <specname>_<language>.properties file
```

The descriptions of these folders and files are:

<projectname> folder
This folder holds the metadata package. See "Understanding specs and the MDM metadata project" on page 62 for more information.

locales folder
This folder holds the `mdm.locales` file.

mdm.locales file
This optional file holds the set of locales supported by the target deployment system. See "Understanding default locales for the InfoSphere MDM Server Workbench" on page 71 for more information.

specs folder
This folder holds the spec definitions.

<specname> folder
This folder holds a particular spec definition.

<specname>.spec file
This file holds the information about the spec profile.

<specformat> folder
This folder holds the definition of a given spec format. Initially, InfoSphere MDM Server Workbench generates a single, default spec format, `0000001`. You can create additional spec formats as required. See "Understanding the spec format number" on page 65for more information.

<specname>.internal.xsd file
The internal schema holds the dynamic data model for you business requirements. You must implement this file.

<specname>.external.xsd file
The external schema is based on the internal schema and provides a less restrictive definition of the spec for use at runtime under certain configuration. This file is generated by the InfoSphere MDM Server Workbench.

<specname>.localized.xsd file
The localized schema is based on the internal schema and provides support for the localization of XML governed by the internal schema. This file is generated by the InfoSphere MDM Server Workbench.

nlsTemplate.properties file
The translation template file is automatically generated by the InfoSphere MDM Server Workbench.

<nls> folder
This folder holds an optional set of properties files which provide National Language Support for associated schemas. See "Learning national language support (NLS)" on page 69 for more information.

<specname>_<language>.properties file
Zero or more properties files can be added to provide alternate translations for the schemas.

Understanding spec composition

This section describes the various parts that make up a spec. As described in "Learning spec project structure" on page 63, the InfoSphere MDM Server Workbench creates several folders and files, some of which are maintained and generated by the InfoSphere MDM Server Workbench; some of which are maintained by the user.

A spec is composed of a profile, an internal schema, external schema, localized schema and national language support.

- The spec profile is a collection of properties associated with a spec.
- The internal schema is an XSD that defines the structure of the information needed to extend a class entity.
- The external schema is an XSD derived from the internal schema, but it has certain key restrictions removed to facilitate interface requirements that are not fulfilled by the internal schema (for example, Rules of Visibility).
- The localized schema is an XSD derived from the internal schema that contains only those elements requiring NLS support.
- The national language support (NLS) for specs allow for both of the following:
  - the translation of parts of the internal schema itself, and
  - the inclusion of translated content in an XML document governed by the internal schema

Understanding the spec format

Another important aspect of spec definition is the versioning of spec, also known as the *spec format*. The definitions of specs often evolve over time depending on business requirements. For example, additional elements may be required, or additional allowable values may be required if an element is validated against

some allowable values. In these cases, care must be taken to ensure that the new version of a spec does not break backward-compatibility with any spec values that were created based on an older version of a spec. An example of an incompatible spec update is adding a mandatory XML element to the XSD. This renders existing spec values incompatible because they were created without that XML element. The existing spec values will fail to validate against the XSD if these incompatible changes are introduced. See "Understanding internal schema validations" on page 77 for more information.

A spec format collects together the internal, external and localized schemas, along with associated translation properties file. Although a spec format is typically derived from a pre-existing spec format, the old and new spec formats are independent of each other.

In general, a spec contains one or more spec formats. This allows the development of specs where existing schemas require modification. All potential modifications to a spec fall into two categories; those that are compatible with the previous version of the spec, and those that are incompatible. When making incompatible modifications to a spec, the internal schema cannot be simply updated with the required changes, because this would cause existing spec values to fail validation. To provide continued support for existing spec values and allow for modifications to the schemas, both the old and new schemas must coexist. If modifications to a spec cause existing spec values already deployed in the InfoSphere MDM Server runtime to become incompatible, a new version of the spec can be captured in a new spec format. See "Understanding internal schema validations" on page 77 for more information.

Understanding the spec format number

Within an InfoSphere MDM Server metadata project, each spec format appears as a directory within the spec. These directories have numeric names such as `00000001`, which identify the spec format numbers. Spec format numbers are 8 digit decimal strings padded with leading zeros and are used to uniquely identify the spec format within the spec.

When a spec is created using the InfoSphere MDM Server Workbench, an initial spec format `00000001` is automatically created.

A new spec format is created by duplicating an existing spec format folder. You are responsible for allocating an appropriate spec format number and making the corresponding modifications to the new internal schema. The new spec format number must be one higher than the largest existing spec format number.

Understanding spec profiles

The spec profile is a collection of properties associated with a spec. It contains the InfoSphere MDM Server spec schema, spec name, spec namespace prefix, metadata key and optional start and end dates.

name The name of the spec. It must match the name of the spec folder and the internal schema.

namespace
The namespace of the spec.

metadataKey
A unique identifier of the spec made up of a simple Type-4 UUID,

conveyed in its string representation as hex digits. The metadata key is allocated when the spec is initially created and should not be changed. When a spec is successfully deployed to the InfoSphere MDM Server runtime, this value is stored in the METADATA_KEY column in the CDMETADATAINFOTP table.

startDate
The date at which the spec becomes active.

endDate
The date at which the spec expires.

You can modify the start and end dates of the spec to constrain its lifetime on the InfoSphere MDM Server runtime. Ensure that the start date is earlier than the end date.

The spec profile is defined within a .spec file named after the spec. This file can be modified using the Spec Model Editor in the InfoSphere MDM Server Workbench.

The structure of a sample .spec file is shown below:

```
<?xml version="1.0" encoding="UTF-8">
<spec:MDMSpec xmlns:spec="http://www.ibm.com/mdm/tools/metadata/spec">
  <spec:name>[specname]</spec:name>
  <spec:namespace>http://www.example.com/[specname]</spec:namespace>
  <spec:metadataKey>e7577b29-f4c2-4fc0-808d-1db39e2a532f</spec:metadataKey>
  <spec:startDate>2007-10-15T00:00:00.000+0100</spec:startDate>
  <spec:endDate>2010-10-15T00:00:00.000+0100</spec:endDate>
</spec:MDMSpec>
```

The date is represented as a string of the form YYYY-MM-DDThh:mm:ss.S+Z, where:

YYYY Represents the year

MM Represents the month

DD Represents the day

T Represents the start of the time field

hh Represents the hour

mm Represents the minute

ss Represents the seconds

S Represents the milliseconds expressed with 3 digits

Z The time zone expressed in 4 digits as offset of the GMT where the first two digits express hours; the last two digits are the minutes. So a +1 hour will be written 0100.

Understanding internal spec schemas

The internal schema defines the structure of the dynamic data model, which is the extension to class entities within the InfoSphere MDM Server data model, needed by the business requirement. The internal schema is an XSD document that is used at runtime to validate spec values, provided as an XML document at runtime. It also defines the sequence, the number of occurrences, and the data type of the XML elements in the XML document.

Although the internal schema is standard XSD, a number of constraints on the language specification must be adhered to. See "Understanding design considerations and constraints governing internal spec schemas" on page 71 for more information.

The default internal schema created by the wizard is shown below:

```
<?xml version='1.0' encoding='UTF-8'?>
<xsd:schema
  elementFormDefault='qualified'
  targetNamespace='http://www.ibm.com/mdm/data/specs/exampleSpec/internal/00000001'
  xmlns:xsd='http://www.w3.org/2001/XMLSchema'
  xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
  xmlns:exampleSpec='http://www.ibm.com/mdm/data/specs/exampleSpec/internal/00000001'>

  <!-- To enable references to the mdmspec schema uncomment the import element below -->
  <!-- To prevent a warning message, only do this if you make use of the imported types -->
  <!-- xsd:import namespace="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001"/ -->

  <xsd:element name="exampleSpec" type="exampleSpec:exampleSpecType" />
  <!-- ### Insert spec elements here ### -->
  <!-- ### Insert spec types here ### -->

  <xsd:complexType name="exampleSpecType">
    <xsd:sequence></xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```

The InfoSphere MDM Server Workbench creates this internal schema automatically with the appropriately configured content. If you create this internal schema manually, you must configure the following aspects according to the following specifications:

- `elementFormDefault='qualified'` must be specified.
- The targetNamespace must be configured with the spec namespace prefix and spec name.
- The xsd and mdmspec namespace prefixes must be declared. Use of alternate prefixes for these namespaces is prohibited.
- The spec name must be declared as a namespace prefix. Use of an alternate prefix for this namespace is prohibited.
- A root element with the same name as the spec must be declared.
- The introduction of other XML constructs such as simpleType, complexType, and others must conform the with spec schema constraints.
- The internal schema name must be in the form `<specName>.internal.xsd`.

Understanding external spec schemas

The external schema is a transformation of the internal schema that relaxes the rules for mandatory elements. The result is a schema where all elements are optional, even though some of these elements are otherwise defined as mandatory in the internal schema. This allows the Rules of Visibility feature or related concepts to be supported.

For example, when certain elements must be removed from a view of an XML document governed by the internal schema, such as restricted query results, if those elements are mandatory in the internal schema, the internal schema can no longer be used for validation. In such a case, the external schema is used instead.

The InfoSphere MDM Server Workbench generates the external schema when you build the metadata project in the InfoSphere MDM Server Workbench. If you create the external schema manually, you must configure the following aspects according to the following specifications:

- The target namespace for the external schema is the same as the internal schema except that the path `internal` is replaced by `external`. For example, if the namespace for a spec named `testSpec` appears in the internal schema as follows:

  ```
  http://www.ibm.com/mdm/data/specs/testSpec/internal/00000001
  ```

  The equivalent namespace for the external schema would be:

  ```
  http://www.ibm.com/mdm/data/specs/testSpec/external/00000001
  ```

- All elements within the external schema must be optional. If the internal schema does not use the `minOccurs='0'` attribute to make an element optional, this will be enforced in the external schema. Where a minOccurs attribute is provided, the original value is retained within an annotation. For example, the following complex type definition in the internal schema:

  ```
  <xsd:complexType name="exampleType">
    <xsd:sequence>
      <xsd:element ref="example:elementA"/>
      <xsd:element ref="example:elementB" minOccurs ="0"/>
      <xsd:element ref="example:elementC" minOccurs ="1"/>
    </xsd:sequence>
  </xsd:complexType>
  ```

  leads to the following complex type definition in the external schema:

  ```
  <xsd:complexType name="exampleType ">
    <xsd:sequence>
      <xsd:element ref="example:elementA" minOccurs="0"/>
      <xsd:element ref="example:elementB" minOccurs="0">
        <xsd:annotation>
          <xsd:appinfo>
            <mdmspec:elementInfo>
              <minOccurs>0</minOccurs>
            </mdmspec:elementInfo>
          </xsd:appinfo>
        </xsd:annotation>
      </xsd:element>
      <xsd:element ref="example:elementC" minOccurs="0">
        <xsd:annotation>
          <xsd:appinfo>
            <mdmspec:elementInfo>
              <minOccurs>1</minOccurs>
            </mdmspec:elementInfo>
          </xsd:appinfo>
        </xsd:annotation>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
  ```

- The external schema name must be in the form `<specName>.external.xsd`.

Understanding localized spec schemas

The external schema is a transformation of the internal schema that holds elements that require national language support (NLS). Such elements must be a type that inherits directly or indirectly from the localizedString complex type. This complex type is defined by the InfoSphere MDM Server schema for specs, which also contains the associated type and namespace definitions needed to create a complete document. The localized schema allows the validation of separate XML documents containing translated elements for instances of a spec. See "Using InfoSphere MDM Server schema for specs" on page 75 for more information on the localizedString complex type.

The localized schema name must be in the form `<specName>.localized.xsd`.

Learning national language support (NLS)

National language support for specs can be split into two categories with different target audiences. The first type of NLS allows the translation of parts of the internal schema itself, including the spec names, element names, and enumeration values. The second type of NLS allows the inclusion of translated content in an XML document governed by the internal schema.

Understanding national language support for schemas

The first type of NLS support for specs allows the translation of parts of the internal schema. The internal, external and localized schemas provide a way to validate associated XML documents that come from a runtime system. In addition, they can assist with providing a user interface to display the XML content.

Whether or not to use the schemas as part of a user interface depends on the nature of the information being exchanged. If the schema describes information that is relatively static, it may be appropriate to build a dedicated user interface in order to present the information. This user interface can make its own provision for NLS support. In this case, no reference to the schema is required to support the user interface and so translation of its content is not required.

If the information being exchanged is very dynamic and changing frequently, it may not be possible to build a dedicated user interface. Instead, you may have to provide a generic interface that exposes the XML content to the user, using the XSD schema as a framework for its presentation. This generic interface extracts information such as element names from the schema to populate the user interface. In this case, because the schema is referenced to support the user interface, the schema content must be translated.

NLS support for schemas consists of a set of one or more translation properties files, one per language, that are used to provide alternative translations to the following parts of the schema:

- Translations for the spec name
- Translations for element names
- Translations for enumeration values

Within an InfoSphere MDM Server metadata project, these files are in the `nls` folder, inside each spec format folder. They are associated with the spec format rather than the spec, as they can change between different versions of the spec. When making a compatible change to an internal schema, the corresponding NLS properties files can be updated directly as needed.

These properties files are named after the locale for which they contain translations. The form of the filename is:

```
<SPECNAME>_<LOCALECODE>.properties
<SPECNAME>_<LOCALECODE>_<COUNTRYCODE>.properties
```

Where `<LOCALECODE>` is the ISO 639-1 code for the locale and `<COUNTRYCODE>` is the ISO 3166-1-alpha-2 country code. For example:

```
exampleSpec_en.properties
exampleSpec_en_US.properties
```

The InfoSphere MDM Server Workbench generates a translation template file that you can use as a basis to implement these translation properties files.

For more information on ISO local and country codes, see:

- http://www.loc.gov/standards/
- http://www.iso.org/iso/country_codes/iso_3166_code_lists

Understanding the translation template file

The translation template file, `nlsTemplate.properties`, contains the required keys for the translation of elements contained in the internal schema. The template is automatically generated by the InfoSphere MDM Server Workbench and is updated every time a change is made to the internal schema. You can use the template as a basis for creating the properties files needed to contain the translated content. You cannot edit the template file directly; any changes made to the template file will be lost when the internal schema is updated.

An example of a simple template file is:

```
SPEC.NAME=
#SPEC.SHORT.DESC=
#SPEC.LONG.DESC=
ELEMENT.NAME.diameter=
#ELEMENT.SHORT.DESC.diameter=
#ELEMENT.LONG.DESC.diameter=
```

Understanding translations for spec names

Each properties file contains a mandatory translation for the spec name. Optionally, you can also provide short and long descriptions of the spec. The SPEC property prefix holds this information in the properties file:

```
SPEC.NAME=<TranslatedSpecName>
#SPEC.SHORT.DESC=<TranslatedSpecShortDescription>
#SPEC.LONG.DESC=<TranslatedSpecLongDescription>
```

Understanding translations for element names

Each properties file contains a mandatory translation for each element within the internal schema. Optionally, you can also provide short and long descriptions. The ELEMENT property prefix holds this information in the properties file:

```
ELEMENT.NAME.<ELEMENTNAME>=<TranslatedElementName>
#ELEMENT.SHORT.DESC.<ELEMENTNAME>=<TranslatedElementShortDescription>
#ELEMENT.LONG.DESC.<ELEMENTNAME>=<TranslatedElementLongDescription>
```

For example, given the following element definition:

```
<xsd:element name="color" type="xsd:string"/>
```

You provide the following mandatory and optional keys in the translation properties file:

```
ELEMENT.NAME.color=...
#ELEMENT.SHORT.DESC.color=...
#ELEMENT.LONG.DESC.color=...
```

Understanding translations for enumeration values

Each properties file contains a mandatory translation for each enumeration value within the internal schema. Optionally, you can also provide short and long descriptions. The ENUM.VALUE property prefix holds this information in the properties file:

```
ENUM.VALUE.<ENUMTYPE>.<ENUMVALUE>=<TranslatedEnumValue>
#ENUM.VALUE.SHORT.DESC.<ENUMTYPE>.<ENUMVALUE>=<TranslatedEnumValueShortDescription>
#ENUM.VALUE.LONG.DESC.<ENUMTYPE>.<ENUMVALUE>=<TranslatedEnumValueLongDescription>
```

For example, given the following simple type with enumeration values:

```
<xsd:simpleType name="SIZE">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="small"/>
    <xsd:enumeration value="medium"/>
    <xsd:enumeration value="large"/>
  </xsd:restriction >
</xsd:simpleType>
```

You provide the following mandatory and optional keys in the translation properties file:

```
ENUM.VALUE.SIZE.medium=...
ENUM.VALUE.SIZE.small=...
ENUM.VALUE.SIZE.large=...
#ENUM.VALUE.SHORT.DESC.SIZE.medium=...
#ENUM.VALUE.LONG.DESC.SIZE.medium=...
#ENUM.VALUE.SHORT.DESC.SIZE.small=...
#ENUM.VALUE.LONG.DESC.SIZE.small=...
#ENUM.VALUE.SHORT.DESC.SIZE.large=...
#ENUM.VALUE.LONG.DESC.SIZE.large=...
```

Understanding national language support for XML documents

The second type of NLS support for specs allows the inclusion of translated content in an XML document governed by the internal schema. In some situations, it may be necessary for XML documents governed by an internal schema to contain multiple values for an element, so that it can be described in more than one language.

Rather than explicitly binding this set of values into the single XML document, a set of additional XML documents is provided, one per language, to contain this information. These separate XML documents are governed by a localized schema. The localized schema is a subset of the internal schema containing only those elements that inherit directly or indirectly from the localizedString complex type. This complex type is defined by the InfoSphere MDM Server schema for specs, which also contains the associated type and namespace definitions needed to create a complete document. See “Understanding national language support for schemas” on page 69 for more information on the localizedString complex type.

Understanding default locales for the InfoSphere MDM Server Workbench

The configured set of locales defines the languages that translations of schemas can be provided for. The set of locales associated with a project must match the environment that the metadata is deployed to. You must modify the set of locales to match the required set.

Understanding design considerations and constraints governing internal spec schemas

The internal schema is the schema that you must implement to meet your business requirement.

In addition to being compliant with normal XSD specifications, the internal schema must adhere to a number of additional constraints. The InfoSphere MDM Server Workbench validates the internal schema against these constraints and generates the corresponding external and localized schemas.

- **Schema document encoding**—The spec schema must specify and use UTF-8 encoding. It must therefore start with the line `<?xml version='1.0' encoding='UTF-8'?>`. Other encoding that is normally allowed by the XSD specifications are not currently supported by specs.
- **Target namespace**—The target namespace for the internal schema must be in the form:

  ```
  <targetNamespacePrefix>/<specName>/internal/<specFormatNumber>
  ```

  The target namespace prefix is specified by the MDM Spec wizard. The spec format number defines the version level of the schema. On the file system, the name of the spec format folder where the internal schema is located, must match the spec format number in the target namespace.

  For example, when declaring a spec named MyExampleSpec, with a namespace prefix of `http://www.myCompany.com/mdm`, the namespace for the first spec format is:

  ```
  <?xml version='1.0' encoding='UTF-8'?>
  <xsd:schema
    elementFormDefault='qualified'
    targetNamespace='http://www.myCompany.com/mdm/MyExampleSpec/internal/00000001'
    xmlns:xsd='http://www.w3.org/2001/XMLSchema'
    xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
    xmlns:MyExampleSpec='http://www.myCompany.com/mdm/MyExampleSpec/internal/00000001'>
  ```

  In addition, an xmlns prefix for the target namespace must match be declared and must match the name of the spec. See the last line of the schema snippet above.
- **The elementFormDefault constraint**—A default namespace cannot be used within the internal schema, and the schema must include the XSD schema attribute elementFormDefault in the form `elementFormDefault="qualified"`.

  References within the internal schema must be fully-qualified using the standard XSD `<prefix>:<elementName>` format. For example, the following element declaration is supported:

  ```
  <xsd:element name="MyExampleSpec" type="MyExampleSpec:MyExampleSpecType"/>
  ```

  The following element declaration is not supported:

  ```
  <xsd:element name="MyExampleSpec" type="MyExampleSpecType"/>
  ```
- **Allowable primitive types**—Only a limited set of the primitive types made available in the XML standard are permitted within the internal schema. They are:
  - `xsd:boolean`
  - `xsd:long`
  - `xsd:string`
  - `xsd:datetime`
  - `xsd:decimal`
  - `xsd:date`
  - `xsd:time`
  - `mdmspec:localizedString` (see "Using InfoSphere MDM Server schema for specs" on page 75)

For example, `<element name="myElement" type="xsd:int" />` is in not allowed because it uses a non-supported primitive type.

- **Type contraints**—The following constraints are available for the following data types:
  - String: Minimum Length, Maximum Length, Pattern, Enumeration, Look Up Reference, Minimum Occurrence, and Maximum Occurrence
  - Boolean: Pattern, Minimum Occurrence, and Maximum Occurrence
  - Long, Date, Time, DateTime: Minimum Value, Maximum Value, Pattern, Enumeration, Look Up Reference, Minimum Occurrence, and Maximum Occurrence
  - Decimal: Total Digits, Fraction Digits, Pattern, Enumeration, Look Up Reference, Minimum Value, Maximum Value, Minimum Occurrence, and Maximum Occurrence
- **References to other XSD schemas**—Because spec schemas must not refer to other XSD documents, any required element, simple type or complex type definitions must appear within the spec schema that uses them.

  There are two exceptions to this rule:
  - The internal schema must include a namespace prefix declaration for the InfoSphere MDM Server schema for specs. This schema, which must always be allocated the namespace prefix mdmspec, is defined as:

    `http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001`
  - The internal schema must include a namespace prefix declaration for the XSD schema itself. The XSD schema, which must always be allocated the namespace prefix `xsd`, is defined as:

    `http://www.w3.org/2001/XMLSchema`

  Therefore, the following namespace prefix declarations must always appear within the internal schema:

  ```
  xmlns:xsd='http://www.w3.org/2001/XMLSchema'
  xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
  ```

  In addition, to allow the internal schema to make use of types such as `mdmspec:localizedString`, the InfoSphere MDM Server schema for specs must be imported as shown below. This statement should only be included if such references are contained within the internal schema. Adding this statement without including such references will result in a warning:

  ```
  <xsd:import namespace="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001"/>
  ```
- **Using global elements**—All elements within the internal schema must be defined as global elements.

  Element definitions must not appear within a complex type definition. For example, the following is not permitted:

  ```
  <xsd:complexType name="Part">
    <xsd:sequence>
      <xsd:element name="partName" type="xsd:string"/>
      <xsd:element name="partDescription" type="xsd:string"/>
    </xsd:sequence>
  </xsd:complexType>
  ```

  Complex types can contain `<xsd:element>` tags if they use the `"ref="` attribute instead of the `"name="` attribute to refer to elements defined globally. So, the above example can be correctly represented as follows:

  ```
  <xsd:element name="partName" type="xsd:string"/>
  <xsd:element name="partDescription" type="xsd:string"/>
  <xsd:complexType name="Part">
  ```

```
  <xsd:sequence>
    <xsd:element ref="MyExampleSpec:partName"/>
    <xsd:element ref="MyExampleSpec:partDescription"/>
  </xsd:sequence>
</xsd:complexType>
```

- **Identifying the root element**—Because all elements are global elements, there must be a convention to define the root element within the internal schema. For the internal schema to be valid, it must have a global element with the same name as the spec.

  For example, a spec named MyExampleSpec would include a root element definition as follows:

```
<?xml version='1.0' encoding='UTF-8'?>
<xsd:schema
  elementFormDefault='qualified'
  targetNamespace='http://www.myCompany.com/mdm/MyExampleSpec/internal/00000001'
  xmlns:xsd='http://www.w3.org/2001/XMLSchema'
  xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
  xmlns:MyExampleSpec='http://www.myCompany.com/mdm/MyExampleSpec/internal/00000001'>

  <xsd:element name="MyExampleSpec" type="MyExampleSpec:MyExampleSpecType"/>

  <xsd:complexType name="MyExampleSpecType">
    <xsd:sequence>
      ...
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```

  The type of the root element is always a complex type defined in the same internal schema.

- **Valid and invalid definitions of types**—Enumerations can only be defined on simple types. They cannot be defined anonymously on elements. Simple and complex types must be defined explicitly, as global elements, not anonymously within other XSD elements.

  For example, the following enumeration definition is permitted:

```
<xsd:element name="ink" type="MyExampleSpec:inkColor"/>
<xsd:simpleType name="inkColor">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="red"/>
    <xsd:enumeration value="blue"/>
  </xsd:restriction>
</xsd:simpleType>
```

  This enumeration is not permitted:

```
<xsd:element name="ink">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="red"/>
      <xsd:enumeration value="blue"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
```

- **Permitted constructs**—The following constructs are permitted within an internal schema:
  - schema
  - annotation
  - complexType
  - simpleType
  - restriction

  - sequence
  - element
  - enumeration
  - enumeration value

  Attributes are not permitted in internal schemas.

- **Elements that reference code tables**—Internal schemas can contain elements that refer to records within an InfoSphere MDM Server code table. In order to support this, the InfoSphere MDM Server schema for specs provides two pre-defined types, codeTableEnum and ElementInfo. See "Using InfoSphere MDM Server schema for specs" for more information.

  For example, to define an element called `myCodeTableReference` that refers to a code table called `MYCODETABLE`, you must include the `codeTableEnum` and `ElementInfo` types in the element definition as follows:

```
<xsd:element name="myCodeTableReference" type="mdmspec:codeTableEnum">
  <xsd:annotation>
    <xsd:appinfo>
      <xsd:elementInfo>
        <mdmspec:codeTableEnum codeTableRef="MYCODETABLE" />
      </xsd:elementInfo>
    </xsd:appinfo>
  </xsd:annotation>
</xsd:element>
```

- **Elements of the type localizedString**—Internal schemas can contain elements of type localizedString. Notice in the definition of an element of this type, the `id` attribute is mandatory. The reason is that the value of this attribute is what links the value within the internal schema with that of the localized schema. This is especially important because:
  - The element name alone is not enough to determine the translation of a multi-occurring element.
  - The runtime depends on this correspondence when performing localized searches.
- **Elements marked as searchable**—Internal schemas can contain elements that are identified as searchable by specifying a value of *true* for the searchable element within an annotation.

  This can be achieved in the following way:

```
<xsd:element name="someSimpleElement" type="xsd:decimal">
  <xsd:annotation>
    <xsd:appinfo>
      <xsd:elementInfo>
        <mdmspec:searchable>true</mdmspec:searchable>
      </xsd:elementInfo>
    </xsd:appinfo>
  </xsd:annotation>
</xsd:element>
```

Using InfoSphere MDM Server schema for specs

The InfoSphere MDM Server schema for specs defines several data types that handle locale sensitive data and InfoSphere MDM Server code table data. If you define a spec that requires these two types of support, you only need to import this schema into your internal schema:

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema
  targetNamespace="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001"
  elementFormDefault="qualified"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" version="1.0"
```

```
xmlns:mdmspec="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001">

<xsd:element name="elementInfo" type="mdmspec:elementInfo"/>

<xsd:complexType name="elementInfo">
  <xsd:sequence>
    <xsd:element name="minOccurs" minOccurs="0" maxOccurs="1" type="xsd:int" />
    <xsd:element name="codeTableEnum" minOccurs="0"  maxOccurs="1">
      <xsd:complexType>
        <xsd:attribute name="codeTableRef" type="xsd:string" use="required"/>
      </xsd:complexType>
      <xsd:element name="searchable" minOccurs="0" maxOccurs="1" type="xsd:boolean" />
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="localizedString">
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="id" type="xsd:ID" use="required"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="codeTableEnum">
  <xsd:restriction base="xsd:long">
    <xsd:minInclusive value="0"></xsd:minInclusive>
  </xsd:restriction>
</xsd:simpleType>

</xsd:schema>
```

- The localizedString type is used to assist the provision of translated material within XML documents governed by the internal schema.
- The codeTableEnum type is used to refer to a code table.
- The ElementInfo type is used within annotations defined under element name definitions only (not references) in the schemas for the following reasons:
  - To create a record in the external schema of an element's original minOccurs attribute value within the corresponding internal schema.
  - To allow element definitions to identify an associated code table to which they refer.
  - To identify if the values associated with an element definition are to be searchable within the runtime. *Element name definitions only* means that the following usage is currently permitted:

    ```
    <xsd:element name="someSimpleElement" type="xsd:decimal">
      <xsd:annotation>
        <xsd:appinfo>
          <xsd:elementInfo>
            <mdmspec:searchable>true</mdmspec:searchable>
          </xsd:elementInfo>
        </xsd:appinfo>
      </xsd:annotation>
    </xsd:element>
    ```

    However, the following usage is not permitted:

    ```
    <xsd:element name="someSimpleElement" type="xsd:decimal">
    <xsd:element ref="someSpec:someSimpleElement">
      <xsd:annotation>
        <xsd:appinfo>
          <xsd:elementInfo>
            <mdmspec:searchable>true</mdmspec:searchable>
    ```

```
          </xsd:elementInfo>
        </xsd:appinfo>
      </xsd:annotation>
    </xsd:element>
```

Using InfoSphere MDM Server schema for locales

The InfoSphere MDM Server schema for locales provides support for introducing translatable content into internal schemas.

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
            targetNamespace="http://www.ibm.com/mdm/data/system/localemap/00000001"
            xmlns:localemap="http://www.ibm.com/mdm/data/system/localemap/00000001"
            elementFormDefault="qualified">

  <xsd:element name="localeMap">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="locale" minOccurs="0" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="name" type="xsd:string" minOccurs="1" maxOccurs="1"/>
              <xsd:element name="description" type="xsd:string" minOccurs="0" maxOccurs="1" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
</xsd:schema>
```

Understanding internal schema validations

A spec is validated during the development process when you use the InfoSphere MDM Server Workbench. The spec is also validated by the deployment tools and by the InfoSphere MDM Server runtime.

The nature of validation is dependent on the environment, but key validation criteria include:

- The hierarchical file structure of the InfoSphere MDM Server metadata project is validated to ensure the correct structure and necessary folders are present.
- The schemas are validated against the XML schema syntax to ensure that they are well formed.
- The internal schema is validated against the spec constraints that govern the development of spec.
- The NLS files match the internal schema.
- The NLS files represent supported locales.

Understanding compatible and incompatible changes to spec schemas

Incompatible changes to a spec are any kind of modification to the spec schema that may cause validation to fail when the schema is applied to an existing XML document on the system.

For example, raising the minimum allowable value for an XML element from 0 to 1 may cause an XML document that was already created to contain a value of 0 to become invalid.

Examples of incompatible changes include:

- Adding a mandatory data element

- Lowering the maximum allowable value
- Removing an enumeration value from a restricted type
- Changing the data type of an element

Examples of compatible changes include:

- Adding an optional data element
- Raising the maximum allowable value
- Adding an enumeration value to a restricted type
- Defining a new simple or complex data type
- Identifying an attribute as searchable

Deploying specs to the runtime

InfoSphere MDM Server provides several services to handle the maintenance and retrieval of specs. For example, a user can use the addSpec service to deploy a spec to the InfoSphere MDM Server runtime, provided that:

- The proper `CDMETADATAPACKAGETP` and `CDMETADATAINFOTP` records are set up.
- The three schemas are well-formed and comply with InfoSphere MDM Server metadata specifications for specs.
- Updates to a spec is backward-compatible with previous versions.

These considerations make the maintenance of spec using InfoSphere MDM Server services a non-trivial task.

Instead of using services, the InfoSphere MDM Server Workbench provides a set of tools to help you to develop, deploy and maintain specs. The tools automate many of the non-trivial tasks, such as generating the external schema and the localized schema, validating the schemas, deploying the specs to the InfoSphere MDM Server runtime, and maintaining versioning of the specs. Using the InfoSphere MDM Server Workbench, you can focus on implementing the internal schema, which is essential to meeting your business requirements.

If the specs are searchable, after deployment some additional administrative steps must be performed to ensure that search is optimally configured to achieve response time expectations with minimal resource usage. In the case of no native XML support in the database, as with DB2 z/OS 8, some additional administrative steps must be performed to ensure that search is functional. These administrative steps are detailed in the *IBM InfoSphere Master Data Management Server System Management Guide*.

For system requirements for the InfoSphere MDM Server Workbench, see the *InfoSphere MDM Server Workbench User Guide*.

Using spec values in the runtime

During runtime, the InfoSphere MDM Server uses the schemas to validate the spec values, which are received in the form of an XML document. When spec values are added or updated, they are validated against the internal schema before they are persisted. If the spec values fail to validate against the internal schema, an error is returned to the runtime environment.

This section uses the following spec to demonstrate how spec values can be added and updated in the InfoSphere MDM Server runtime. This spec defines the dynamic data model for a pen.

```
<?xml version="1.0" encoding="UTF-8"?>
  <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  xmlns:penSpec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
  xmlns:mdm="http://www.ibm.com/mdm/metadata/system/spec/annotations/00000001"
  xmlns:mdmspec="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001"
  targetNamespace="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">

  <xsd:import namespace="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001"/>

  <!--
  ************************************************************
  Definition of a "PenSpec". In order to comply with rules
  governing spec schema definitions, the elements are defined
  globally and referenced within the type definition.
  ************************************************************
  -->
  <xsd:element name="penSpec" type="penSpec:PenSpec"/>
  <xsd:element name="penId" type="xsd:string"/>
  <xsd:element name="penDescription" type="mdmspec:localizedString"/>
  <xsd:element name="penPhysicalDimensions" type="penSpec:PhysicalDimensions"/>
  <xsd:element name="penType" type="penSpec:PenType"/>

  <xsd:complexType name="PenSpec">
    <xsd:sequence>
      <xsd:element ref="penSpec:penId" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="penSpec:penDescription" minOccurs="0"/>
      <xsd:element ref="penSpec:penPhysicalDimensions" minOccurs="0" maxOccurs="1"/>
      <xsd:element ref="penSpec:penType" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>

  <!--
  ************************************************************
  Definition of "PhysicalDimensions". In order to comply with
  rules governing spec schema definitions, the elements are
  defined globally and referenced within the type definition.
  ************************************************************
  -->
  <xsd:element name="diameter" type="xsd:decimal"/>
  <xsd:element name="length" type="xsd:decimal"/>

  <xsd:complexType name="PhysicalDimensions">
    <xsd:sequence>
      <xsd:element ref="penSpec:diameter" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="penSpec:length" minOccurs="1"  maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>

  <!--
  ************************************************************
  Enumeration provided to provide a classifcation of base
  pen type. All pens in this model fix into one of these
  categories.
  ************************************************************
  -->
  <xsd:simpleType name="PenType">
    <xsd:restriction base="xsd:string">
       <xsd:enumeration value="Ballpoint"/>
       <xsd:enumeration value="Fountain"/>
       <xsd:enumeration value="Rollerpen"/>
       <xsd:enumeration value="DryMarker"/>
       <xsd:enumeration value="Permanent"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:schema>
```

Adding spec values

A request that is intended to add spec values requires the use of the `AttributeValueBObj` object and CDATA section.

The following request snippet shows the spec values in an add request in a product. The `AttributeValueBObj` object is wrapped in a `ProductSpecValueBObj` object along with the optional `ProductSpecValueNLSBObj`, which provides translations for the localized strings and complies with the localized XSD file. This

internal spec value can be successfully validated against the spec (the internal XSD) as illustrated in "Using spec values in the runtime" on page 78. Note that the localized XSD is not provided.

```
<ProductSpecValueBObj>
    ...
    <ProductSpecValueNLSBObj>
        <Locale>fr</Locale>
        <Value><![CDATA[
          <penspec:penSpec
xmlns="http://www.ibm.com/mdm/data/specs/penSpec /localized/00000001"
xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/localized/00000001">
            <penDescription id="1">Elégant et stylé.</penDescription>
          </ penspec:penSpec >
          ]]>
        </Value>
      </ProductSpecValueNLSBObj>
    ...
  <AttributeValueBObj>
    <Value>
      <![CDATA[
        <penspec:penSpec xmlns="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
         xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">
          <penId>1</penId>
          <penDescription id="1">Sleek and stylish.</penDescription>
          <penPhysicalDimensions>
            <diameter>10</diameter>
            <length>100</length>
          </penPhysicalDimensions>
          <penType>Ballpoint</penType>
        </penspec:penSpec>
      ]]&gt;
    </Value>
  </AttributeValueBObj>
</ProductSpecValueBObj>
```

Updating spec values

A request that is intended to update spec values requires the use of one or more `AttributeValueBObj` objects, and the `<Action>`, `<Path>`, and `<Value>` elements inside the `AttributeValueBObj` object.

The following request snippet shows the spec values in an update request in a product. The `AttributeValueBObj` object is wrapped in a `ProductSpecValueBObj` object. The spec values can be successfully validated against the spec shown in "Using spec values in the runtime" on page 78.

```
<ProductSpecValueBObj>
    ...
  <AttributeValueBObj>
    <Action>update</Action>
    <Path>/penSpec/penDescription</Path>
    <Value>Sleek, stylish and easy to write with.</Value>
  </AttributeValueBObj>

  <AttributeValueBObj>
    <Action>update</Action>
    <Path>/penSpec/penPhysicalDimensions</Path>
    <Value><![CDATA[
      <penPhysicalDimensions>
        <diameter>8</diameter>
      </penPhysicalDimensions>
      ]]>
    </Value>
  </AttributeValueBObj>
</ProductSpecValueBObj>
```

For this example, two updates are performed:

- the value of the `penDescription` spec value is changed

- the entire penPhysicalDimensions spec value is updated

When this update is applied to the spec values added in "Adding spec values" on page 79, the updated spec values are:

```
<penspec:penSpec xmlns="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
            xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">
  <penId>1</penId>
  <penDescription id="1">Sleek, stylish and easy to write with.</penDescription>
  <penPhysicalDimensions>
    <diameter>8</diameter>
    <length>100</length>
  </penPhysicalDimensions>
  <penType>Ballpoint</penType>
</penspec:penSpec>
```

Note: Spec values do not prevent redundant updates. Specifically, if an update transaction results in any change to the XML document, even if it results in the exact same XML document, that change will be persisted to the database even though it is redundant.

For an example of an entire runtime request and response that manipulates spec values, see the *InfoSphere MDM Server Transaction Reference Guide*.

Manipulating spec values

You can manipulate the spec values corresponding to a spec using the AttributeValueBObj object associated with the business object. The AttributeValueBObj object is made up of the following three prescribed elements:

- **Action**—Supports the values of add, update, replace, and remove.
- **Path**—A simple XPath expression that identifies the target element of the Action element.
- **Value**—The value provided for the Action element.

In an add request, only one AttributeValueBObj object should be provided. If the Path and Action elements within it are provided, they are ignored.

In an update request, zero or more AttributeValueBObj objects can be provided. The update request operates on each of the AttributeValueBObj objects based on the information in the Path, Value, and Action elements.

The Path, Value, and Action elements are described in detail:

- "Using AttributeValueBObj path elements"
- "Using AttributeValueBObj value elements" on page 82
- "Using AttributeValueBObj action elements" on page 82

Using AttributeValueBObj path elements

The Path element in AttributeValueBObj references an element in the XML document. It uses an XPath expression to reference the element in the XML document.

In the example provided in "Updating spec values" on page 80, the simple penType element can be referenced as /penSpec/penType.

The more complex element that specifies the many dimensions of a pen can be referenced as /penSpec/penPhysicalDimensions.

If multiple pen descriptions are allowed by the spec, then a second pen description can be referenced as `/penSpec/penDescription[2]`.

To index the first element, the value `1` is used. Indexing with the number `0`, or a number greater than the maximum number of occurrences allowed by the internal schema results in an error.

Lastly, all of these pen descriptions can be referenced as `/penSpec/penDescription`.

Using AttributeValueBObj value elements

The Value element in AttributeValueBObj represents the value that the action is to apply to the XML document.

In the example provided in "Updating spec values" on page 80, the first update is for the simple value:

```
<Value>Sleek, stylish and easy to write with.</Value>
```

The second update is for the complex value. A CDATA section is used so that the special XML characters do not need to be escaped:

```
<Value><![CDATA[
  <penPhysicalDimensions>
    <diameter>8</diameter>
  </penPhysicalDimensions>
  ]]>
</Value>
```

Using AttributeValueBObj action elements

The Action element in AttributeValueBObj tells the runtime what to do with the XML document.

The allowable values for the Action element are: add, update, replace, and remove.

Understanding the add action for the AttributeValueBObj element

The `add` action adds elements to the XML document under the element specified by the `Path` element. If the elements are multi-occurring, they are appended at the end of the list of existing child elements.

- **Action**—The String `add`.
- **Path**—Mandatory. This is a reference to an existing element that can have one or more child elements.
- **Value**—Mandatory. This specifies either a simple value (i.e. no XML) or complex value (i.e. XML fragment), whose root element corresponds to the element identified by the `Path` element.
- **Example**—Assuming multiple occurrences of the pen description are allowed by the spec, the following `add` action:

  ```
  <AttributeValueBObj>
    <Action>add</Action>
    <Path>/penSpec/penDescription</Path>
    <Value>Comfortable grip.</Value>
  </AttributeValueBObj>
  ```

  changes the XML document shown in "Adding spec values" on page 79 to:

```
<penspec:penSpec
   xmlns="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
   xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">
  <penId>1</penId>
  <penDescription id="1">Sleek and stylish.</penDescription>
  <penDescription id="2">Comfortable grip.</penDescription>
  <penPhysicalDimensions>
    <diameter>10</diameter>
    <length>100</length>
  </penPhysicalDimensions>
  <penType>Ballpoint</penType>
</penspec:penSpec>
```

Notice that the added element appears after the existing pen description.

Understanding the update action for the AttributeValueBObj element

The `update` action updates elements in the XML document under the element specified by the `Path` element. If a simple value is supplied in the `Value` element, the old value under the element is replaced entirely with that value. If a complex value in the form of an XML fragment is supplied, the XML fragment is merged with the existing XML document. If there are new child elements provided, they are added to the document as a result of the merge.

- **Action**—The String `update`.
- **Path**—Mandatory. This is a reference to an existing element.
- **Value**—Mandatory. This specifies either a simple value (i.e. no XML) or complex value (i.e. XML fragment), whose root element corresponds to the element identified by the `Path` element.
- **Example**—The following `update` action, which includes an update of a simple value and a complex value:

```
<AttributeValueBObj>
  <Action>update</Action>
  <Path>/penSpec/penDescription</Path>
  <Value>Sleek, stylish and easy to write with.</Value>
</AttributeValueBObj>

<AttributeValueBObj>
  <Action>update</Action>
  <Path>/penSpec/penPhysicalDimensions</Path>
  <Value><![CDATA[
    <penPhysicalDimensions>
      <diameter>8</diameter>
    </penPhysicalDimensions>]]>
  </Value>
</AttributeValueBObj>
```

changes the XML document shown in “Adding spec values” on page 79 to:

```
<penspec:penSpec
   xmlns="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
   xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">
  <penId>1</penId>
  <penDescription id="1">Sleek, stylish and easy to write with.
  </penDescription>
  <penPhysicalDimensions>
    <diameter>8</diameter>
    <length>100</length>
  </penPhysicalDimensions>
  <penType>Ballpoint</penType>
</penspec:penSpec>
```

Notice that the `length` element remains as `100`, illustrating that the update resulted in a merge with the original XML document.

Understanding the replace action for the AttributeValueBObj element

The replace action replaces an existing XML fragment in the XML document with the provided complex value. No merge occurs in the replace action, which may result in the removal of child elements.

- **Action**—The String replace.
- **Path**—Mandatory. This is a reference to an existing element.
- **Value**—Mandatory. The value provided will be used to replace the existing value.
- **Example**—The following replace action:

```
<AttributeValueBObj>
  <Action>replace</Action>
  <Path>/penSpec/penPhysicalDimensions</Path>
  <Value><![CDATA[
    <penPhysicalDimensions>
      <length>90</length>
    </penPhysicalDimensions>
    ]]>
  </Value>
</AttributeValueBObj>
```

changes the XML document shown in "Adding spec values" on page 79 to:

```
<penspec:penSpec
   xmlns="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
   xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">
  <penId>1</penId>
  <penDescription id="1">Sleek and stylish.</penDescription>
  <penPhysicalDimensions>
    <length>90</length>
  </penPhysicalDimensions>
  <penType>Ballpoint</penType>
</penspec:penSpec>
```

Notice that the diameter element is removed from the XML document. If the diameter element is a mandatory element, validation would fail.

Understanding the remove action for the AttributeValueBObj element

The remove action removes the elements indicated by the Path element. If multiple elements are referenced by the Path element, all those elements are removed. You can use an index to reference a specific element for removal. For example, if multiple pen descriptions are allowed in the example spec, you can use /penSpec/penDescription[2] to refer to the second pen description.

- **Action**—The String remove.
- **Path**—Mandatory. This is a reference to an existing element. It cannot be a reference to the root element of the XML document.
- **Value**—Not applicable. If this element is provided, it is ignored.
- **Example**—The following remove action:

```
<AttributeValueBObj>
  <Action>remove</Action>
  <Path>/penSpec/penDescription</Path>
</AttributeValueBObj>
```

changes the XML document shown in "Adding spec values" on page 79 to:

```
<penspec:penSpec
   xmlns="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001"
   xmlns:penspec="http://www.ibm.com/mdm/data/specs/penSpec/internal/00000001">
```

```
  <penId>1</penId>
  <penPhysicalDimensions>
    <diameter>10</diameter>
    <length>100</length>
  </penPhysicalDimensions>
  <penType>Ballpoint</penType>
</penspec:penSpec>
```

Understanding spec value searches

For supported entities with a searchable spec use, attributes that have been marked as searchable on the spec definition can be searched upon within the runtime.

In the context of a search service, this soft criteria is identified using a simple XPath expression, in addition to 0 or more values depending on the operator chosen. This section discusses considerations that need to be made when marking attributes as *searchable*, what must be done when deploying these searchable attributes to the runtime, and how search is used in the runtime.

Understanding spec design considerations for searchable attributes

The supported InfoSphere MDM Server databases vary significantly in their ability to facilitate querying XML documents, spec values, ranging from no native XML support on DB2 z/OS 8, to full native support on Oracle 11g, DB2 V9.7 and DB2 V9.5 on Linux Unix and Windows, and DB2 z/OS 9.

As a result, there are two solutions that support searching spec values across all platforms: one that takes advantage of the native XML capabilities of the underlying database, and the other that maintains a simple index internal to the application to facilitate search.

The following must be taken into consideration before taking advantage of the spec search feature:

- Determine if you want to, and can, support case-insensitive searches and set the configuration item accordingly.
- Determine if you can afford to have the runtime dynamically derive the effective dates of spec values matched on search. Out of the box, these values are not maintained when dependent entities are updated (i.e., entity spec use). The alternative is to have a regularly scheduled batch process run at off-peak hours to update the spec value effective dates. This behavior is configurable through the `/IBM/DWLCommonServices/SpecValueSearch/Recursive/enabled` configuration point and is disabled by default.
- Searching against localized spec values requires that the IDs of an internal spec correlate with a localized spec. This is described in detail in "Understanding localized spec schemas" on page 68.
- On DB2® z/OS® V8, limitations are imposed on the indexable values. For example, `xsd:string` or `mdmspec:localizedString` values that exceed 255 will have a truncated index value, and `xsd:long` values that have too many digits can not be indexed at all due to the constraints of the underlying relational data type in the index table required for this platform.
- The database operating system, version and type must be correctly specified (according to your environment) using the following configuration items:
  - `/IBM/DWLCommonServices/DataBase/OS`
  - `/IBM/DWLCommonServices/DataBase/type`
  - `/IBM/DWLCommonServices/DataBase/version`

- The spec values must conform to the structure defined in the spec, otherwise the spec value search will not work. As a result, the external validation 'Variable Type Data Validation', described in Chapter 35, "Validating data," on page 475, must be enabled in the runtime.
- Time and date related XML schema types are considered UTC if no timezone was declared.
- DB2 z/OS v9 does not have support for casting to `xs:date`, `xs:time`, or `xs:dateTime`, the DB2 Version 9.1 for z/OS Date and Time Data Types. Because of this, the comparisons for these data types will be string based. The string comparison may not give the correct result for time and date or Time data with time zone components. For example, here are how two times could be ordered incorrectly: 13:20:00-04:00, 13:21:00-05:00 (9:20, 8:21). For the same reason, the two dateTimes could be also be ordered incorrectly. Maintaining a consistent time zone across all spec values and searches may suffice. For more information, you can search the DB2 Version 9.1 for z/OS information center for *"Casts between XML schema data types"*.

Following the 'PenSpec' example introduced in the section "Using spec values in the runtime" on page 78, if we wished to make the penDescription searchable, we would simply add a searchable annotation to the element of the active spec format. So the original penDescription element

```
<xsd:element name="penDescription" type="mdmspec:localizedString"/>
```

would be modified as follows

```
<xsd:element name="penDescription" type="mdmspec:localizedString"/>
 <xsd:annotation>
  <xsd:appinfo>
   <mdmspec:elementInfo>
    <mdmspec:searchable>true</mdmspec:searchable>
   </mdmspec:elementInfo>
  </xsd:appinfo>
 </xsd:annotation>
</xsd:element>
```

After updating this compatible change to the runtime, the penDescription can be searched upon using the searchProductInstance service. It should also be noted that even though the searchability of a spec is defined on the active spec format, spec values that correspond to older spec formats can also be matched on.

When a spec is reused between multiple entities, it is expected that only a subset of the entities will require searchability. To ensure that spec value indexes are not redundantly maintained and that consuming applications of InfoSphere MDM Server understand that spec values of the other entities are not intended for search, a flag on the spec use is provided. If a spec is reused, requires searchability from both entities, but the searchability requirements vary, the creation of 2 independent specs should be strongly considered.

It is the active internal schema that dictates which attributes are searchable. Thus, if a data type has changed on a searchable attribute in an incompatible way (i.e., from `xsd:string` to `xsd:int`), then all corresponding values should be migrated to comply to the new spec because of the data comparison requirements of this query.

Also, care must be taken when choosing searchable attributes as there are indexing considerations depending on the database configured with InfoSphere MDM Server.

For databases that have native XML support, Oracle 11g, DB2 V9.7 and DB2 V9.5 on Linux Unix and Windows, and DB2 z/OS 9, the following must be considered when indexing:

- Search performance can be influenced by the structure of your spec. Guidelines for creating indexes over XML data and how to use the indexes effectively can be found by searching for the following items on the developerWorks® site, http://www.ibm.com/developerworks/:
  - ″Best Practice Managing XML Data″
  - ″Exploit XML indexes for XML Query performance in DB2 9″
- Some platforms only support the indexing of a subset of data types. Refer to each database's technical documentation for specifics describing what is supported. Here are a few suggestions:
  - DB2 v9.5 Data Types associated with index XML pattern expressions. See the DB2 v9.5 information center for details.
  - DB2 v9.5 Create Index Statement. See the DB2 v9.5 information center for details.
  - DB2 Version 9.1 for z/OS Data types associated with pattern expressions. See the DB2 v9.1 for z/OS information center for details.
- Index support may be limited for case-insensitive searches. Some platforms don't support function-based XML indexes. As a result, case-insensitive searches can have corresponding indices because they depend on `fn:contains` and `fn:upper-case`. Case-insensitive searching can be disabled using the following configuration item: `/IBM/Product/SpecValueSearch/CaseSensitive/enabled`, and wildcard searches can be disabled by filtering out the *contains* type code to disallow its use.
- Case-insensitive searching can be disabled using the following configuration item: `/IBM/Product/SpecValueSearch/CaseSensitive/enabled`.
- Where `fn:upper-case` indices are supported, case-insensitive search still may not perform at the levels required. In this case, it may be preferable to maintain an upper-cased version of the attribute on the spec value. For example, if there is a string attribute named *description* on the spec that you would like to support case-insensitive search, you could do the following:
  - create an attribute called *description_upper* on the spec
  - mark both *description* and *description_upper* as *searchable* on the spec
  - add a behavior extension that will derive the *description_upper* attribute any time it changes – for example, extend addProductSpecValue, updateProductSpecValue, so that any value for *description* that is passed in, for example, *Stylish*, a corresponding upper-cased version is stored in description_upper: *STYLISH*.
  - add a behavior extension that converts description search criteria into description_upper criteria.

Understanding deployment considerations for spec searchable attributes

Use the deploy tool described in the *IBM InfoSphere Master Data Management Server Workbench Users Guide*, Deploying metadata spec components to an InfoSphere MDM Server runtime system.

Using spec searchable attributes in the runtime

Following the example in "Using spec values in the runtime" on page 78, you can search for all products that have a pen description of *Sleek and stylish* by providing the following:

- the specId for the spec containing the attribute you want to search on.
- the path to the attribute you want to search upon. This is a simple XPath expression which corresponds to the internal XSD.
- the code type for the operation you want to perform.
- the value to be used in the search.

A sample request for this type of search is as follows:

```
<TCRMTx>
 <TCRMTxType>searchProductInstance</TCRMTxType>
 <TCRMTxObject>ProductSearchBObj</TCRMTxObject>
 <TCRMObject>
  <ProductSearchBObj>
   <SpecValueSearchBObj>
    <Path>/penSpec/penDescription</Path>
    <SpecId>1</SpecId>
    <SpecValueSearchCriteriaBObj>
     <OperatorType>1</OperatorType>
     <Value>Sleek and stylish</Value>
    </SpecValueSearchCriteriaBObj>
   </SpecValueSearchBObj>
  </ProductSearchBObj>
 </TCRMObject>
</TCRMTx>
```

For consumers dynamically forming a search request, it is expected that they will construct the request using spec XSD files previously retrieved from InfoSphere MDM Server. Specifically, the path will be derived from the path to the searchable attribute within the schema corresponding to the active spec format, and the operators and allowable values, where they are required, are derived from the data type of the searchable attribute. For more information on allowable values, see "Validating searches" on page 89. It should also be noted that for all platforms, the indexes are automatically kept up-to-date because the spec values change within the runtime and always reflect the data within the spec values, unless otherwise noted.

Understanding localized searches

If localized content is to be searched, the path corresponding to the internal XSD, not to the localized XSD, must be used.

For example, a localized search request for the French equivalent of *Sleek and stylish* would be as follows:

```
<requesterLanguage>200</requesterLanguage>
 ...
<TCRMTx>
 <TCRMTxType>searchProductInstance</TCRMTxType>
 <TCRMTxObject>ProductSearchBObj</TCRMTxObject>
 <TCRMObject>
  <ProductSearchBObj>
   <SpecValueSearchBObj>
    <Path>/penSpec/penDescription</Path>
    <SpecId>1</SpecId>
    <SpecValueSearchCriteriaBObj>
     <OperatorType>1</OperatorType>
```

```
     <Value>Elégant et raffiné</Value>
    </SpecValueSearchCriteriaBObj>
   </SpecValueSearchBObj>
  </ProductSearchBObj>
 </TCRMObject>
</TCRMTx>
```

Understanding multiple criteria search semantics

In accord with our existing search semantics, all criteria provided for the same attribute, or path, are *OR*ed with each other and all different attributes, or paths, and their corresponding criteria can be thought of as *AND*ed with each other.

The following request, assuming penType is also identified as searchable, can be interpreted as a search for all fountain pens with descriptions of *stylish* or *chic*:

```
<TCRMTx>
 <TCRMTxType>searchProductInstance</TCRMTxType>
 <TCRMTxObject>ProductSearchBObj</TCRMTxObject>
 <TCRMObject>
  <ProductSearchBObj>
   <SpecValueSearchBObj>
    <Path>/penSpec/penDescription</Path>
    <SpecId>1</SpecId>
    <SpecValueSearchCriteriaBObj>
     <OperatorType>1</OperatorType>
     <Value>stylish</Value>
    </SpecValueSearchCriteriaBObj>
    <SpecValueSearchCriteriaBObj>
     <OperatorType>1</OperatorType>
     <Value>chic</Value>
    </SpecValueSearchCriteriaBObj>
   </SpecValueSearchBObj>
   <SpecValueSearchBObj>
    <Path>/penSpec/penType</Path>
    <SpecId>1</SpecId>
    <SpecValueSearchCriteriaBObj>
     <OperatorType>1</OperatorType>
     <Value>Fountain</Value>
    </SpecValueSearchCriteriaBObj>
   </SpecValueSearchBObj>
  </ProductSearchBObj>
 </TCRMObject>
</TCRMTx>
```

Validating searches

When a search is performed against spec values, there are a number of validations performed by the runtime against the provided criteria.

If any of these validations fail, the transaction fails with an aggregate of the errors found, where possible. These validations include:

SpecValueSearchBObj

- Allowable number of SpecValueSearchBObjs can not be exceeded. The maximum number of these objects allowed is defined by the `/IBM/Product/SpecValueSearch/MaxSpecValueSearchBObjs` configuration item and defaulted to 5. Note that this limit is in place because of the performance implications of the resulting query as the number of SpecValueSearchBObjs increase.

- The path must correspond to the searchable attribute. For example, if `/penSpec/penId` were passed in as the path, an error would result because penId is not identified as searchable within the spec definition.
- The path does not contain namespace prefixes. For example, if `/penSpec1:penSpec/penSpec1:penDescription` were passed in as the path, an error results.
- Both path and specId are mandatory. If the optional SpecValueSearchBObj is provided in a search transaction, the values for the path and specId attributes must be provided.
- The path and specId cannot be repeated. That is, the same path and specId can not appear in multiple SpecValueSearchBObjs provided within the same search transaction.
- SpecValueSearchCriteriaBObj is mandatory. At least one SpecValueSearchCriteriaBObj object must be provided with every SpecValueSearchBObj.

SpecValueSearchCriteriaBObj

- The allowable number of SpecValueSearchCriteriaBObj must not exceeded. The maximum number of these objects is defined by the `/IBM/Product/SpecValueSearch/MaxSpecValueSearchCriteriaBObjs` configuration item and is defaulted to 20.
- An operator is mandatory and must correspond to the supported type. All supported operators are defined within the CDXMLCOMPOPTP table and can be further customized as described in the chapter Chapter 13, “Customizing search SQL queries,” on page 169.
- The number of values corresponds to the operator. For example, the *between* operator requires exactly 2 values, whereas *equals* requires exactly 1.
- The values correspond to the given operator. For example, an operator of *less than* cannot be used on a data type of `xsd:boolean`.
- Values must correspond to the XML schema data type. For example, assuming that length were identified as searchable, if the provided value for a search on `/penSpec/penPhysicalDimensions/length` does not correspond to `xsd:decimal` as defined in the internal XSD, an error results.
- Search criteria must not exceed configured length restrictions. Length restrictions are identified by the following configuration items with their default values indicated in brackets:

  `/IBM/DWLCommonServices/SpecValueSearch/MaxLongTotalDigitsSize (19)`

  `/IBM/DWLCommonServices/SpecValueSearch/MaxDecimalTotalDigitsSize (31)`

  `/IBM/DWLCommonServices/SpecValueSearch/MaxDecimalFractionDigitsSize (19)`

  `/IBM/DWLCommonServices/SpecValueSearch/MaxStringValueSize (255)`

Understanding data type specific considerations

- **Date/Time/DateTime:**—The usage of time zones is assumed to be consistent between the stored spec values and the searches performed upon them. For example, if time zones are not specified in the spec values, then they should not be stored in the spec values. Similarly, if they are specified in the spec values,

then the timezone should be specified within the search criteria. In all cases, if a time related spec value attribute is missing a time zone, it is assumed to be Universal Time Clock (UTC).

- **String:**—Whether the search is case sensitive or not is configurable.

Understanding database specific considerations

For databases that have native XML support, Oracle 11g, DB2 V9.7 and DB2 V9.5 on Linux Unix and Windows, and DB2 z/OS 9:

- The values of the configured search criteria length restrictions can be made much larger than the default values because in many cases there are fewer restrictions on the size of these data types for databases that have good support for SQL and XML and native XML support.
- Search is typically constrained by the level of indexing support that the underlying database provides. Examples of such limitations include searches that are case-insensitive and limitations to supported data types. Please refer to "Understanding design considerations and constraints governing internal spec schemas" on page 71 for further details.

For databases with no native XML support, DB2 z/OS 8:

- Transactions that result in the manipulation of the spec value will update the index table or tables within the same transaction. In the example above, this corresponds to the PRODUCTVALINDEX and PRODUCTVALNLSINDEX tables. This can be disabled using the following configuration item (i.e., in the case of initial load): `/IBM/DWLCommonServices/SpecValueSearch/IndexTable/MaintainValues/enabled`.
- The values of the configured search criteria length restrictions mentioned above should correspond to the underlying data type lengths within the database. For example, `/IBM/DWLCommonServices/SpecValueSearch/MaxStringValueSize` should be set to 255 to correspond with the length of the STRING_VALUE column in the PRODUCTVALINDEX table. The default configuration corresponds to the default data type lengths of the index table.
  - Strings are truncated to the value defined by the `/IBM/DWLCommonServices/SpecValueSearch/MaxStringValueSize` configuration item when indexed.
  - If a string of a spec value exceeds this constraint, then a truncated version is stored in the index table, and for all other values, a warning is logged and the index is not stored.
  - If the maximum string value size configuration item `/IBM/DWLCommonServices/SpecValueSearch/MaxStringValueSize` is changed, then the indexes must be rebuilt.

Illustrating an end-to-end scenario of a spec and its usage

This topic illustrates the process involved in designing and creating the spec, deploying it to the InfoSphere MDM Server runtime, and using it with a business entity, using a ProductSpecValueBObj. Note that the principles illustrated here are applicable for other spec value business objects, such as ContractSpecValueBObj. This process is illustrated using a business requirement to add a rental deposit box to a service product. The goal is to create a dynamic data model associated with a service product. The following examples illustrate the requirements and the roles involved.

See also:

Example: Identifying the required spec attributes in simple business terms

The first step of designing a spec is to capture the business requirements in simple business terms.

Based on the business requirements for a rental deposit box, you must identify the following attributes:

- Box size
- Box dimension
- Replacement fee for lost key
- Annual rental fee

You must also identify that the rental deposit box should be available for market on Jan. 02, 2007.

After you have defined the attributes for the spec in simple business terms, provide the details of the attributes, taking data types and constraints into consideration.
Based on the business requirements, the attribute details should be the following:

Box size

Look Up Ref=CDPURPOSETP
Min Occurrence = 0

Box dimension

Simple Type / String
Maximum Value=30
Minimum Occurrence = 0

Replacement fee for lost key

Derived Type / Amount Derived Type
Minimum Occurrence = 0

Annual rental fee

Derived Type / Amount Derived Type
Minimum Occurrence = 0

Amount Derived Type
Simple Type / Decimal

Min Inclusive Value=0.0
Max Inclusive Value=10,000,000.00
Fraction Digits=2

Example: Creating a spec using the InfoSphere MDM Server Workbench

After defining the details of the attributes, you can use the InfoSphere MDM Server Workbench to create the schema to implement the spec.

1. In the InfoSphere MDM Server Workbench, select the `MDM Metadata Project wizard` to create a new metadata project. Name the project `MySpecMetadata`.

   A `locales` folder and a `specs` folder are created.

2. Select the `MDM Spec wizard` to create a spec in the metadata project. Name the spec `RentalDepositBox`.

   A `RentalDepositBox` folder is created under the `specs` folder. The initial spec format ID `00000001` is created as a folder under the `RentalDepositBox` folder.

   The initial internal schema, `RentalDepositBox.internal.xsd`, is opened in an XSD editor in the workspace. The source view of the internal schema looks like the following:

```
<?xml version='1.0' encoding='UTF-8'?>
<xsd:schema elementFormDefault='qualified'
  targetNamespace='http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001'
  xmlns:xsd='http://www.w3.org/2001/XMLSchema'
  xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
  xmlns:RentalDepositBox='http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001'>

  <!-- To enable references to the mdmspec schema uncomment the import element below -->
  <!-- To prevent a warning message, only do this if you make use of the imported types -->
  <!-- xsd:import namespace="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001"/ -->

  <xsd:element name="RentalDepositBox" type="RentalDepositBox:RentalDepositBoxType" />
  <!-- ### Insert spec elements here ### -->
  <!-- ### Insert spec types here ### -->

  <xsd:complexType name="RentalDepositBoxType">
    <xsd:sequence></xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```

3. Edit the internal schema to implement the spec according to the attribute details you define in "Example: Identifying the required spec attributes in simple business terms" on page 92.

   The final internal schema looks like the following:

```
<?xml version='1.0' encoding='UTF-8'?>
<xsd:schema elementFormDefault='qualified'
  targetNamespace='http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001'
  xmlns:xsd='http://www.w3.org/2001/XMLSchema'
  xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
  xmlns:RentalDepositBox='http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001'>
  <xsd:import namespace="http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001" />

  <!-- To enable references to the mdmspec schema uncomment the import element below -->
  <xsd:element name="RentalDepositBox" type="RentalDepositBox:RentalDepositBoxType" />

  <xsd:complexType name="RentalDepositBoxType">
    <xsd:sequence>
      <xsd:element ref="RentalDepositBox:BoxSizeTpCd" maxOccurs="1"
                                                      minOccurs="0"></xsd:element>
      <xsd:element ref="RentalDepositBox:BoxDimensions" maxOccurs="1"
                                                        minOccurs="0"></xsd:element>
      <xsd:element ref="RentalDepositBox:LostKeyReplacementFee" maxOccurs="1"
                                                                minOccurs="0"></xsd:element>
      <xsd:element ref="RentalDepositBox:AnnualRentalFee" maxOccurs="1"
                                                          minOccurs="0"></xsd:element>
    </xsd:sequence>
  </xsd:complexType>

  <xsd:simpleType name="AmountDerivedType">
    <xsd:restriction base="xsd:decimal">
      <xsd:minInclusive value="0.0"></xsd:minInclusive>
```

```
      <xsd:maxInclusive value="10000000.00"></xsd:maxInclusive>
      <xsd:fractionDigits value="2"></xsd:fractionDigits>
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:element name="BoxSizeTpCd" type="mdmspec:codeTableEnum">
    <xsd:annotation>
      <xsd:appinfo>
        <mdmspec:elementInfo>
          <mdmspec:codeTableEnum codeTableRef="CDPURPOSETP" />
        </mdmspec:elementInfo>
      </xsd:appinfo>
    </xsd:annotation>
  </xsd:element>

  <xsd:element name="BoxDimensions" type="xsd:string"></xsd:element>
  <xsd:element name="LostKeyReplacementFee"
               type="RentalDepositBox:AmountDerivedType"></xsd:element>
  <xsd:element name="AnnualRentalFee"
               type="RentalDepositBox:AmountDerivedType"></xsd:element>

  <xsd:simpleType name="BoxDimensionsType">
    <xsd:restriction base="xsd:string">
      <xsd:maxLength value="30"></xsd:maxLength>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:schema>
```

4. Open the spec profile, `RentalDepositBox.spec`, and specify the start date of Jan. 02, 2007 for this spec.

   Note that a metadata key is generated in the profile.

5. Build the `MySpecMetadata` project in the workspace.

   After the project is built successfully, the external schema, `RentalDepositBox.external.xsd`, and the translation template file, `nlsTemplate.properties`, are created.

At this point, the design of the spec is completed.

Note: No localized schema is generated for this example because the internal schema does not use the `localizedString` data type.

Example: Deploying the metadata package for a spec to the InfoSphere MDM Server runtime

After the design of the spec is completed, you must deploy the spec to an InfoSphere MDM Server runtime so that it can be used by other business entities.

1. In the InfoSphere MDM Server Workbench, export the `MySpecMetadata` project and select **Export MDM metadata to an MDM Server** to deploy the spec to the runtime. You must provide the InfoSphere MDM Server connection information in order for the InfoSphere MDM Server Workbench to connect to the runtime.

   During deployment, the InfoSphere MDM Server Workbench sends a number of MDM services to deploy the spec, including:

   - addCodeType services to add the project name `MySpecMetadata` to the CDMETADATAPACKAGETP table; and the metadata key in the spec profile to the CDMETADATAINFOTP table.
   - addSpec service to add the spec and spec format to the SPEC and SPECFORMAT table.

   When the spec is successfully deployed, the following messages are displayed in the Console in your workspace:

```
Info: Connecting to MDM Server..
Info: MDM Server connection successful
Info: Started deploying metadata package MySpecMetadata.
Info: Metadata package MySpecMetadata deployed successfully.
Info: Validation of spec RentalDepositBox from metadata package MySpecMetadata is successful.
```

```
Info: The spec RentalDepositBox from metadata package MySpecMetadata will be deployed now.
Info: The spec RentalDepositBox from metadata package MySpecMetadata deployed successfully.
Info: Deploying metadata package MySpecMetadata finished. 1 specs deployed, 0 specs updated,
      0 specs deleted and 0 specs failed.
```

2. Optionally, you can run the getSpecByName service, using the spec name RentalDepositBox and the spec namespace from the spec profile, to verify that the spec is deployed successfully.

```
<DWLInquiry>
    <InquiryType>getSpecByName</InquiryType>
    <InquiryParam>
      <methodParam name="SpecName">RentalDepositBox</methodParam>
      <methodParam name="SpecNamespace">http://www.myCompany.com/mdm</methodParam>
      <methodParam name="inquiryLevel">0</methodParam>
      <methodParam name="status">ALL</methodParam>
      <methodParam name="locales">ALL</methodParam>
    </InquiryParam>
  </DWLInquiry>
```

The deployed spec is returned in the response as follows:

```
<TxResponse>
        <RequestType>getSpecByName</RequestType>
        <TxResult>
            <ResultCode>SUCCESS</ResultCode>
        </TxResult>
        <ResponseObject>
            <SpecBObj>
                <ComponentID>4098</ComponentID>
                <SpecId>516122047189304657</SpecId>
                <SpecName>RentalDepositBox</SpecName>
                <SpecNamespace>http://www.myCompany.com/mdm</SpecNamespace>
                <MetadataInfoTpCd>1220471890687</MetadataInfoTpCd>
                <MetadataKey>78095571-d1d3-4210-945e-c18db14c0b3e</MetadataKey>
                <MetadataPackageTpCd>1220471888625</MetadataPackageTpCd>
                <MetadataPackageName>MySpecMetadata</MetadataPackageName>
                <ActiveFormatId>860122047189323435</ActiveFormatId>
                <StartDt>2007-01-02 00:00:00.000</StartDt>
                <SpecLastUpdateDate>2008-09-03 15:58:13.25</SpecLastUpdateDate>
                <SpecLastUpdateUser>cusadmin</SpecLastUpdateUser>
                <SpecLastUpdateTxId>690122047189089076</SpecLastUpdateTxId>
                <DWLStatus>
                    <Status>0</Status>
                </DWLStatus>
            </SpecBObj>
        </ResponseObject>
    </TxResponse>
```

Note that the deployment captures some of the metadata project properties as follows:

- <MetadataPackageName>—the metadata project name
- <MetadataKey>>—the metadata key in the spec profile
- <SpecName>>—the name of the spec
- <StartDt>>—the start date of the spec

Example: Associating a spec with a product

After the spec is deployed, you must make this spec available for use with the intended business entity. In the Party Domain, the TCRMDemographicsSpecValueBObj object (party demographic data) can use the spec directly. In the Product Domain and Account Domain, most entities must have an ENTITYSPECUSE association with the spec before the spec can be used.

This step assumes you are using the spec in the Product Domain.

Based on the default service product type, execute an addEntitySpecUse service to create the example rental deposit box spec:

```
<DWLTx>
        <DWLTxType>addEntitySpecUse</DWLTxType>
        <DWLTxObject>EntitySpecUseBObj</DWLTxObject>
```

```
        <DWLObject>
            <EntitySpecUseBObj>
                <EntitySpecUseId/>
                <EntityName>PRODUCTTYPE</EntityName>
                <InstancePK>5</InstancePK> <!-- Assuming an existing
                                                service product type -->
                <SpecId>516122047189304657</SpecId> <!-- spec ID generated by the
                                                        deployment -->
                <SpecUseType>1</SpecUseType>
                <SpecUseValue>Govern product common attribute values</SpecUseValue>
                <SpecUseCascadeType>2</SpecUseCascadeType>
                <SpecUseCascadeValue>Not cascaded to descendents</SpecUseCascadeValue>
                <ExplicitDefInd>Y</ExplicitDefInd>
                <MetadataInfoType>1220471888625</MetadataInfoType> <!-- metatdata info
                                                                        generated by the deployment -->
                <MetadataInfoValue>78095571-d1d3-4210-945e-c18db14c0b3e</MetadataInfoValue>
                <StartDate>2007-08-01</StartDate>
                <EndDate>2017-08-01</EndDate>
                <EntitySpecUseLastUpdateTxId/>
                <EntitySpecUseLastUpdateUser/>
                <EntitySpecUseLastUpdateDate/>
            </EntitySpecUseBObj>
        </DWLObject>
    </DWLTx>
```

When the association is added successfully, the response is returned as follows:

```
<TxResponse>
        <RequestType>addEntitySpecUse</RequestType>
        <TxResult>
            <ResultCode>SUCCESS</ResultCode>
        </TxResult>
        <ResponseObject>
            <EntitySpecUseBObj>
                <EntitySpecUseId>984122047514862573</EntitySpecUseId>
                <EntityName>PRODUCTTYPE</EntityName>
                <InstancePK>5</InstancePK>
                <SpecId>516122047189304657</SpecId>
                <SpecUseType>1</SpecUseType>
                <SpecUseValue>Govern product common attribute values</SpecUseValue>
                <SpecUseCascadeType>2</SpecUseCascadeType>
                <SpecUseCascadeValue>Not cascaded to descendents</SpecUseCascadeValue>
                <ExplicitDefInd>Y</ExplicitDefInd>
                <MetadataInfoType>1220471890687</MetadataInfoType>
                <MetadataInfoValue>78095571-d1d3-4210-945e-c18db14c0b3e</MetadataInfoValue>
                <DestinationEntityName>PRODUCT</DestinationEntityName>
                <StartDate>2007-08-01 00:00:00.0</StartDate>
                <EndDate>2017-08-01 00:00:00.0</EndDate>
                <EntitySpecUseLastUpdateTxId>305122047501575094</EntitySpecUseLastUpdateTxId>
                <EntitySpecUseLastUpdateUser>cusadmin</EntitySpecUseLastUpdateUser>
                <EntitySpecUseLastUpdateDate>2008-09-03 16:52:28.625</EntitySpecUseLastUpdateDate>
                <DWLStatus>
                    <Status>0</Status>
                </DWLStatus>
            </EntitySpecUseBObj>
        </ResponseObject>
    </TxResponse>
```

Example: Adding a product with values corresponding to a new spec

After a spec is successfully associated for use with a business entity, you can create instances of a business entity and provide spec values that confirm to the spec. When you took the steps “Example: Associating a spec with a product” on page 95, you associated the rental deposit box spec for use with a service product type. You can now create a product based on the service product type and specify spec values for the rental deposit box.

To create the product, execute the addProductInstance service as follows:

```
<TCRMTx>
    <TCRMTxType>addProductInstance</TCRMTxType>
    <TCRMTxObject>ServiceProductBObj</TCRMTxObject>
    <TCRMObject>
```

```
      <ServiceProductBObj>
        <ProductId />
        <ProductTypeId>5</ProductTypeId>
        <Name>Medium Deposit Box</Name>
        <ProductStructureType>1</ProductStructureType>
        <ProductStructureValue>Standalone</ProductStructureValue>
        <ProductLastUpdateDate />
        <ProductLastUpdateUser />
        <ProductLastUpdateTxId />
        <ProductSpecValueBObj>
          <SpecFormatId>860122047189323435</SpecFormatId>  <!-- spec format ID generated
                                                               by the deployment -->
          <StartDate />
          <EndDate>2015-01-01</EndDate>
          <AttributeValueBObj>
            <Value>
              <![CDATA[
              <prodspec:RentalDepositBox
        xmlns="http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001"
        xmlns:prodspec="http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001">
                <BoxSizeTpCd>1</BoxSizeTpCd>
                <BoxDimensions>4x6</BoxDimensions>
                <LostKeyReplacementFee>200.00</LostKeyReplacementFee>
                <AnnualRentalFee>120.00</AnnualRentalFee>
              </prodspec:RentalDepositBox>
              ]]&gt;
            </Value>
          </AttributeValueBObj>
        </ProductSpecValueBObj>
        <ServiceProductLastUpdateDate />
      </ServiceProductBObj>
    </TCRMObject>
  </TCRMTx>
```

When the product instance is successfully added, the response, including the spec values for the deposit box, is returned as follows:

```
<TxResponse>
    <RequestType>addProductInstance</RequestType>
    <TxResult>
      <ResultCode>SUCCESS</ResultCode>
    </TxResult>
    <ResponseObject>
      <ServiceProductBObj>
        <ComponentID>4129</ComponentID>
        <ProductId>872122047803262505</ProductId>
        <ProductTypeId>5</ProductTypeId>
        <Name>Medium Deposit Box</Name>
        <ProductStructureType>1</ProductStructureType>
        <ProductStructureValue>Standalone</ProductStructureValue>
        <ProductLastUpdateDate>2008-09-03 17:40:32.625</ProductLastUpdateDate>
        <ProductLastUpdateUser>cusadmin</ProductLastUpdateUser>
        <ProductLastUpdateTxId>141220477975406109</ProductLastUpdateTxId>
        <ServiceProductLastUpdateDate>2008-09-03 17:40:33.468</ServiceProductLastUpdateDate>
        <DWLStatus>
          <Status>0</Status>
        </DWLStatus>
        <ProductSpecValueBObj>
          <ComponentID>4117</ComponentID>
          <ProductSpecValueId>897122047803279637</ProductSpecValueId>
          <SpecId>516122047189304657</SpecId>
          <SpecFormatId>860122047189323435</SpecFormatId>
          <ProductId>872122047803262505</ProductId>
          <StartDate>2008-09-03 17:39:35.406</StartDate>
          <EndDate>2015-01-01 00:00:00.0</EndDate>
          <ProductSpecValueLastUpdateDate>2008-09-03 17:40:32.796</ProductSpecValueLastUpdateDate>
          <ProductSpecValueLastUpdateUser>cusadmin</ProductSpecValueLastUpdateUser>
          <ProductSpecValueLastUpdateTxId>141220477975406109</ProductSpecValueLastUpdateTxId>
          <AttributeValueBObj>
            <Value>
              <prodspec:RentalDepositBox
              xmlns="http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001"
              xmlns:prodspec="http://www.myCompany.com/mdm/RentalDepositBox/internal/00000001"&gt;
              <BoxSizeTpCd&gt;1</BoxSizeTpCd&gt;
              <BoxDimensions&gt;4x6</BoxDimensions&gt;
              <LostKeyReplacementFee&gt;200.00</LostKeyReplacementFee&gt;
              <AnnualRentalFee&gt;120.00</AnnualRentalFee&gt;
              </prodspec:RentalDepositBox&gt;
            </Value>
```

```
        </AttributeValueBObj>
        <DWLStatus>
          <Status>0</Status>
        </DWLStatus>
      </ProductSpecValueBObj>
    </ServiceProductBObj>
  </ResponseObject>
</TxResponse>
```

Note: The spec values in the response are enclosed in `<Value>` tags, and the < and > characters in the XML are escaped with the `&lt;` and `&gt;` entities.

Example: Searching for a product with specific spec values

This set of product values that you added when you learned how "Example: Adding a product with values corresponding to a new spec" on page 96 can now be searched for and matched on a spec value search.

To a search for all products with an annual rental fee <= $120, use the following:

```
<TCRMTx>
  <TCRMTxType>searchProductInstance</TCRMTxType>
  <TCRMTxObject>ProductSearchBObj</TCRMTxObject>
  <TCRMObject>
    <ProductSearchBObj>
      <SpecValueSearchBObj>
        <Path>/RentalDepositBox/AnnualRentalFee</Path>
        <SpecId>516122047189304657</SpecId>
        <SpecValueSearchCriteriaBObj>
          <OperatorType>3</OperatorType>
          <Value>120.00</Value>
        </SpecValueSearchCriteriaBObj>
      </SpecValueSearchBObj>
    </ProductSearchBObj>
  </TCRMObject>
</TCRMTx>
```

Running this search returns at least the newly added item in the response.

Chapter 4. Understanding InfoSphere MDM Server common code type framework

The common code type framework provides consistent and easy use of code table functions.

The InfoSphere MDM Server common code type framework includes two different sets of APIs:

- *admin code type service APIs* are designed to provide administrators with the ability to store code table data directly to database and to inquire code table data directly from database.
- *operational code type service APIs*, provide the operational service consumers the ability to inquire code table data, which uses the data caching mechanism.

Code types are divided into three different categories based on how they are used in InfoSphere MDM Server:

- **Category 1 (C1)**—Represents the restricted design-time code types. InfoSphere MDM Server design and runtime are based on the existence of a pre-populated and fixed set of records on these code types. Category 1 code types are considered fixed system code types. Some examples of these code types are: `CdAcessorKey`, `CdAccessorTp`, `CdAttributeTp`, and `CdErrTypeTp`.
- **Category 2 (C2)**—Represents the general design-time code types. The default InfoSphere MDM Server setup is based on the existence of a pre-populated set of records on these code types. Category 2 code types are considered non-fixed system code types. You can add your own code types which will be used by your software components. Some examples of these code types are: `CdOperatorTp`, `CdBusinessTxTp`, and `CdSuspectTp`.
- **Category 3 (C3)**—Represents the domain operational code types. You can modify these code types at your discretion. There is no hard coded logic in InfoSphere MDM Server that relies on a specific record in these code types. Some examples of these code types are: `CdHierarchyTp`, `CdHoldingTp`, `CdRelTp`, and `CdContractRelTp`.

These two set of code type service APIs share some common characteristics, and they also have some differences.

Table 2. Common and differing characteristics for admin and operational code type APIs.

Characteristics that are common to both code type service APIs:	Characteristics that differ for both code type service APIs:
• Both admin and operational code type services support inquiring on all C2 and C3 code types and return corresponding code type business objects. • Both admin and operational code type services support web services – all admin code type transactions and operational code type transactions are web service supported.	• Only admin code type service APIs support persistence transactions addAdminCodeType and updateAdminCodeType, which apply to C2 and C3 code types. No persistent transactions are available for operational code type service APIs. • Admin code type service APIs support inquiring on all C1, C2, and C3 code types. Operational code type service APIs only support inquiring C2 and C3 code types. • Only admin code type service APIs support point-in-time (PIT) transactions. Operational code type service APIs do not support PIT transactions. • Admin code type service APIs directly access code type tables and do not use the cache mechanism. Operational code type services APIs use the cache mechanism. • Admin code type service APIs do not support the fallback feature. Operational code type service APIs do support the fallback feature.

The following are admin code type service APIs; refer to the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for details on using them:

- addAdminCodeType
- updateAdminCodeType
- getAdminCodeType
- getAllAdminCodeTypes
- getAllAdminCodeTypesByLangId
- getAllAdminCodeTypesByLocale
- getCodeTypeMetadata
- getAllCodeTypeMetadata

The following are operational code type service APIs:

- getOperationalCodeType
- getAllOperationalCodeTypes
- getAllOperationalCodeTypesByLangId
- getAllOperationalCodeTypesByLocale
- reloadAllOperationalCodeTypes

Additionally, the framework offers the following APIs, defined in CodeTypeComponentHelper, to validate the integrity of the code, to validate the value of a referenced code type entry in the context of other entities, or both:

- isCodeValid
- getCodeTypeByCode
- getCodeTypeByValue

- isCodeValuePairValid

Migrating to InfoSphere MDM Server common code type framework

In order to simplify the process of migrating to the common code type framework when you are using custom implementations for your code tables, begin by implementing them based on the InfoSphere MDM Server common code type framework – as outlined above.

"Understanding Code type additions and extensions"

"Understanding assets generated by the workbench when adding or extending code types"

"Understanding Web services enablement for code types" on page 102

"InfoSphere MDM Server code type categories" on page 103

Understanding Code type additions and extensions

Code type additions differ from most InfoSphere MDM Server additions. When working with code type additions, you are not required to create controller and component classes, nor are you required to create the corresponding persistent or inquiry services. Instead, code type additions are able to use the existing admin and operational code type APIs, but you must still create the corresponding Java classes and metadata information.

For more information on InfoSphere MDM Server extensions and additions, see Chapter 2, "Customizing InfoSphere MDM Server," on page 17.

Code type addition and extension are supported in both admin code type APIs and operational code type APIs in Common Code Type Framework.

InfoSphere MDM Server workbench can create the necessary Java classes and property file changes, including the metadata SQL statements and XSD changes, for the new code type additions or code type extensions. See the *IBM InfoSphere Master Data Management Server Workbench User Guide* for instructions on how to create code type additions and extensions.

Understanding assets generated by the workbench when adding or extending code types

InfoSphere MDM Server workbench can create the necessary Java classes and property file changes, including the metadata SQLs and XSD changes, when you create new code type additions or you modify existing code type extensions. See the *IBM InfoSphere Master Data Management Server Workbench User Guide* for specific instructions on how to create new code type additions or modify existing code type extensions.

The following sections provide you with some additional details on the assets generated by the workbench when adding or extending code types.

Understanding the process for adding new code types

When the InfoSphere MDM Server workbench generates a new asset for a new code type, it categorizes the code table as a C3 code type by default, which is

reflected in the Java class <CodeTypeName>TypeMetadataBObj. Say, for example, you are creating a new code table cdSampleTp using workbench. The following resources will be generated:

- SampleTypeBObj.java – the new code type BObj class.
- SampleTypeMetadataBObj.java – defines the code type category code and all table column names for the new code type, each column's nullable characteristics, as well as foreign key table names of the code type if there are any.
- SampleTypeBObj = com.customerCompany.common.codetype.obj is generated. You must manually append it to the tcrm_extension.properties file.
- SampleTypeBObj = com. customerCompany.common.codetype.obj is generated. You must manually append it to the DWLAdminService_extension.properties file.
- codetype.metadata.cdsampletp.classname = com. customerCompany.common.codetype.obj.SampleTypeMetadataBObj is generated. You must manually append it to the codetable.properties file.
- Generated XSD files – Workbench will generate the new code type (e.g. CdSampleTp) related XSD element definitions, which you must manually add to DWLAdminRequest_extension.xsd, DWLAdminResponse_extension.xsd, and tcrmResponse_extension.xsd using an XSD editor.
- Generated metadata SQL statements for SampleTypeBObj. These SQL statements must be manually executed on the application database server to register the newly created code type objects with InfoSphere MDM Server.

Understanding the process for changing existing code types

Creating extension of an existing code type business object is very similar to creating extension of a regular business object, because all InfoSphere MDM Server code types are implemented as business objects in the InfoSphere MDM Server Common code type framework. The following list is a summary of the code type extension variations compared to the standard extension mechanism.

- Properties files – Similarly to the process for adding a new code type, all the required definitions in the properties files for the extended code type must be manually added to the corresponding properties file.
- XSD definitions – Workbench will generate the XSD definition for the extended code type, which you must then manually incorporate in the following files:
  - DWLAdminRequest_extension.xsd, containing the request object definition for the extended code type business object.
  - DWLAdminResponse_extension.xsd and tcrmResponse_extension.xsd, containing the response object definition for the extended code type business object.
- Generated metadata SQL statements – Similarly to the process for adding a new code type, these generated SQL statements must be manually executed on the application database server to register the newly created code type objects with InfoSphere MDM Server.

Understanding Web services enablement for code types

Web services for code type framework is available for all InfoSphere MDM Server code types, including any that are added or extended.

In order to enable web services for a custom code type, follow the general guidelines in Chapter 29, "Using and configuring Web Services," on page 323.

The InfoSphere MDM Server common code type framework uses a generic data converter, BaseCodeTypeBObjConverter, which is a template class that encapsulates conversion logic for the code type's business objects to and from their transfer objects. The concrete converter class for any new code type can extend BaseCodeTypeBObjConverter. If you want to reuse a web services implementation in an existing framework, you can create your own converter by extending the BaseCodeTypeBObjConverter (which is shipped with the code type framework) and implement the method `init()` to call as many method `addMapEntry()` as the number of attributes in the code type object.

"Example: Extending the BaseCodeTypeBObjConverter"

Example: Extending the BaseCodeTypeBObjConverter

```
public class SampleTypeBObjConverter extends BaseCodeTypeBObjconverter {
 public SampleTypeBObjConverter () {
  init();
 }
 // addMapEntry(String transferObjectXPath, String businessObjectXPath,
  // Class transferObjectDataType, int transferObjectType)
 protected void init() {
  addMapEntry("TypeCode/Code/_value", "tp_cd/name", TypeCode.class,
PRIMARY_KEY_CODE_TYPE);
  addMapEntry("Language/Code/_value", "lang_tp_cd/lang_tp_value", LanguageType.class,
CODE_TYPE);
  addMapEntry("Description", "description", String.class, STRING_TYPE);
  ...
 }
...
}
```

InfoSphere MDM Server code type categories

The following tables shows the major C1, C2 and C3 code types in InfoSphere MDM Server. An updated list of code tables can be obtained by invoking the `getAllCodeTypeMetadata` service.

Table 3. C1 code types

Code type names	Category type
CDACCESSORKEYTP	C1
CDACCESSORTP	C1
CDASSERTRULETP	C1
CDATTRIBUTETP	C1
CDCARDINALITYTP	C1
CDCOMPOPTP	C1
CDCONSTRAINTTP	C1
CDCONDITIONTP	C1
CDDATAACTIONTP	C1
CDDWLCOLUMNTP	C1
CDDWLPRODUCTTP	C1
CDDWLTABLETP	C1
CDELEMENTTP	C1
CDERRTYPETP	C1
CDFAILACTIONTP	C1
CDINQLVLQUERYTP	C1
CDOPERANDTP	C1
CDPERMISSIONTP	C1

Table 3. C1 code types (continued)

Code type names	Category type
CDSTNDOPERANDTP	C1
CDSTNDOPERATORTP	C1
CDSUSPECTSOURCETP	C1
CDSPECCASCADETP	C1
PARAM_TYPE	C1

Table 4. C2 code types

Code type name	Category type
CDBUSINESSTXTP	C2
CDCONDITIONVALTP	C2
CDEVENTCAT	C2
CDEVENTDEFTP	C2
CDINTERNALTXNTP	C2
CDMETADATAINFOTP	C2
CDMETADATAPACKAGETP	C2
CDNODETP	C2
CDOPERATORTP	C2
CDPROTOCOLTP	C2
CDREPOSITORYTP	C2
CDRESOLUTIONTP	C2
CDSUSPECTTP	C2
CDTASKLAUNCHACTIONTP	C2
CDTXPARAMTP	C2
CDXMLCOMPOPTP	C2
COMPONENTTYPE	C2

Table 5. C3 code types

Code type name	Category type
CDACCETOCOMPTP	C3
CDACCOUNTREQUIREDTP	C3
CDACCOUNTTP	C3
CDACTIONADJREASTP	C3
CDADDRUSAGETP	C3
CDADMINFLDNMTP	C3
CDADMINSYSTP	C3
CDAGEVERDOCTP	C3
CDAGREEMENTSTTP	C3
CDAGREEMENTTP	C3
CDALERTCAT	C3
CDALERTSEVTP	C3
CDALERTTP	C3
CDARRANGEMENTTP	C3
CDAVAILABILITYTP	C3
CDBILLINGSTTP	C3
CDBILLTP	C3

Table 5. C3 code types (continued)

Code type name	Category type
CDBUYSELLAGREETP	C3
CDCAMPAIGNTP	C3
CDCDCREJREASONTP	C3
CDCDCSTTP	C3
CDCHARGECARDTP	C3
CDCLAIMROLETP	C3
CDCLAIMSTATUSTP	C3
CDCLAIMTP	C3
CDCLIENTIMPTP	C3
CDCLIENTPOTENTP	C3
CDCLIENTSTTP	C3
CDCOMPLCATTP	C3
CDCOMPLDOCTP	C3
CDCOMPLIANCETP	C3
CDCOMPLTARGETTP	C3
CDCONDITIONATTRIBUTETP	C3
CDCONDITIONOWNERTP	C3
CDCONDITIONUSAGETP	C3
CDCONTMETHCAT	C3
CDCONTMETHTP	C3
CDCONTRACTRELSTTP	C3
CDCONTRACTRELTP	C3
CDCONTRACTROLETP	C3
CDCONTRACTSTTP	C3
CDCONTRCOMPTP	C3
CDCOUNTRYTP	C3
CDCURRENCYTP	C3
CDDATADEPTHTP	C3
CDDEMOGRAPHICSTP	C3
CDDOMAINTP	C3
CDDOMAINVALUETP	C3
CDENDREASONTP	C3
CDENUMANSWERCATTP	C3
CDENUMANSWERTP	C3
CDERRMESSAGETP	C3
CDERRSEVERITYTP	C3
CDEVALUATIONCONTEXTTP	C3
CDEVALUATIONSTATUSTP	C3
CDFREQMODETP	C3
CDGENERATIONTP	C3
CDGROUPINGCATTP	C3
CDGROUPINGTP	C3
CDHIERARCHYCATTP	C3
CDHIERARCHYTP	C3
CDHIGHESTEDUTP	C3

Table 5. C3 code types (continued)

Code type name	Category type
CDHOLDINGTP	C3
CDIDSTATUSTP	C3
CDIDTP	C3
CDINACTREASONTP	C3
CDINCOMESRCTP	C3
CDINDUSTRYTP	C3
CDINTERACTIONCAT	C3
CDINTERACTIONTP	C3
CDINTERACTPTTP	C3
CDINTERACTRESPTP	C3
CDINTERACTSTTP	C3
CDINTERACTRELTP	C3
CDLANGTP	C3
CDLASTUSEDPURPOSETP	C3
CDLINKREASONTP	C3
CDLOBRELTP	C3
CDLOBTP	C3
CDMARITALSTTP	C3
CDMATCHENGINETP	C3
CDMATCHRELEVTP	C3
CDMETHODSTATUSTP	C3
CDMISCVALUEATTRTP	C3
CDMISCVALUECAT	C3
CDMISCVALUETP	C3
CDNAMEUSAGETP	C3
CDNODEDESIGTP	C3
CDORGNAMETP	C3
CDORGTP	C3
CDORIGINATIONTP	C3
CDPAYMENTMETHODTP	C3
CDPPREFSEGTP	C3
CDPPREFTP	C3
CDPREFIXNAMETP	C3
CDPRIMARYTARGETMARKETTP	C3
CDPRIORITYCATTP	C3
CDPRIORITYTP	C3
CDPRODCONTRACTRELTP	C3
CDPRODRELATIONTP	C3
CDPRODRELTP	C3
CDPRODSTRUCTURETP	C3
CDPRODTP	C3
CDPRODUCTIDENTIFIERTP	C3
CDPURPOSETP	C3
CDPPREFACTIONTP	C3
CDPPREFCAT	C3

Table 5. C3 code types (continued)

Code type name	Category type
CDPPREFREASONTP	C3
CDPRODUCTSTATUSTP	C3
CDPROVSTATETP	C3
CDQUESTIONCATTP	C3
CDQUESTIONNAIRETP	C3
CDQUESTIONTP	C3
CDRELASSIGNTP	C3
CDRELTP	C3
CDRESIDENCETP	C3
CDROLECATTP	C3
CDROLETP	C3
CDRPTINGFREQTP	C3
CDRULEUSAGETP	C3
CDSERVICELEVELTP	C3
CDSHAREDISTTP	C3
CDSOURCEIDENTTP	C3
CDSPECUSETP	C3
CDSTANDARDIZATIONSRCTP	C3
CDSTANDARDIZATIONSTATUSTP	C3
CDSTATUSREASONTP	C3
CDSTEWARDSHIPSTATUSTP	C3
CDSUSPECTREASONTP	C3
CDSUSPECTSTATUSTP	C3
CDTASKACTIONTP	C3
CDTASKCATTP	C3
CDTASKSTATUSTP	C3
CDTAXPOSITIONTP	C3
CDTERMINATIONREASONTP	C3
CDUNDELREASONTP	C3
CDUSERROLETP	C3
CDVALFREQTP	C3

Chapter 5. Understanding InfoSphere MDM Server common features

InfoSphere MDM Server has a collection of common features. The common features are generic in nature and support generic entity types that are associated with them. Common features use EntityName and InstancePK to identify associated entities. The following features are the common features:

- Access Date value
- Alert
- Campaign
- Content reference
- Default source value
- Entity role
- Entity spec use
- Event manager
- Grouping
- Hierarchy
- Line of business
- Macro role
- Miscellaneous value
- Party compliance
- Party critical data change
- Privacy preferences
- Questionnaire
- Task management
- Terms and condition
- Interactions

There are two main ways in which the combination of EntityName and InstancePK are used by the common features:

- Many of the common features validate an entity's existence based on the supplied EntityName and InstancePK combination before they associate the entity with them.
- Many of the common features use the supplied EntityName and InstancePK combination to load the business objects of the associated entity, and then return the business object.

In previous releases, InfoSphere MDM Server used `EntityNameInstancePK.properties` and `Ext_EntityNameInstancePK.properties` to store the information related to validate an entity existence or load an entity. InfoSphere MDM Server now uses the updated Transaction and Object Metadata stored in the database.

In this section, you will learn:

"Adding or extending a data entity" on page 110

"Populating additional metadata for entries made in Ext_EntityNameInstancePK.properties" on page 111

"Understanding the external validators that support additional metadata" on page 111

Adding or extending a data entity

To use extended or newly defined business objects with common features, additional metadata needs to be populated.

If you used InfoSphere MDM Server Workbench to add or extend data, then the Workbench adds required additional metadata. Otherwise, you need to add the metadata manually.

See also:

"Example: To add or extend a data entity"

Example: To add or extend a data entity

If the Reminder business object is created as outlined in the following table, you must also follow steps below to populate additional metadata:

Table 6. Information for creating a reminder business object

COLUMN NAME	TABLE NAME	COLUMN VALUE	EXPLANATION
GROUP_NAME	V_GROUP	TCRMReminderBObj	A new entry to be added to V_GROUP table for business object
NAME	CDINTERNALTXTP	getReminder	Transaction which takes Primary Key and returns Business Object
COMPONENT_TYPE_VALUE	COMPONENTTYPE	ReminderComponent	An entry for the new component added

1. Populate the ALIAS_NAME column in the V_GROUP table by setting the REMINDER value as the ALIAS_NAME for the entry which has a GROUP_NAME with a value of TCRMReminderBObj. In the case of data extensions, the parent business object's ALIAS_NAME should be reused while setting the ALIAS_NAME for the extended entity.
2. Ensure that an entry is made in the V_ELEMENTATTRIBUTE table for the Primary Key of Reminder business object.
3. Ensure com.ibm.mdm.reminder.component.ReminderComponent is the COMPONENT_CLASS value for the COMPONENTTYPE table entry which has ReminderComponent as the COMPON_TYPE_VALUE.
4. Ensure the entry for getReminder in CDINTERNALTXNTP has a COMPONENT_TYPE_ID referencing COMPONENTTYPE.COMPONENT_TYPE_ID, which has COMPON_TYPE_VALUE of ReminderComponent.

These are the sample SQL statements generated by the Workbench for the scenario described above:

```
INSERT INTO V_GROUP ( APPLICATION, GROUP_NAME, OBJECT_NAME, LAST_UPDATE_DT, CODE_TYPE_IND,ALIAS_NAME ) VALUES
( 'TCRM', 'Reminder', 'com.dwl.tcrm.samples.addition.component',' TCRMReminderBObj', CURRENT TIMESTAMP, 'N','REMINDER' );
insert into GROUPTXMAP (ENTITY_TX_MAP_ID, GROUP_NAME,BUSINESS_TX_TP_CD,APPLICATION, LAST_UPDATE_TX_ID,LAST_UPDATE_USER,LAST_UPDATE_DT) VALUES
(10001,'Reminder',100000004,'TCRM',null,CURRENT_TIMESTAMP);
insert into COMPONENTTYPE( COMPONENT_TYPE_ID,DWL_PROD_TP_CD,COMPON_TYPE_VALUE,COMPON_LONG_DESC,LAST_UPDATE_DT,COMPONENT_CLASS)
```

```
VALUES (100001,1,'TCRMReminderComponent',null,CURRENT_TIMESTAMP,'com.dwl.tcrm.samples.addition.TCRMReminderComponent');

insert into CDINTERNALTXNTP(INTERNAL_BUS_TX_TP,NAME,DESCRIPTION,EXPIRY_DT,LAST_UPDATE_DT,COMPONENT_TYPE_ID ) VALUES

(1000001,'getReminderByReminderId',null,null,CURRENT_TIMESTAMP,100001);

insert into BUSINTERNALTXN VALUES(BUS_INTERN_TXN_ID,BUSINESS_TX_TP_CD,INTERNAL_BUS_TX_TP,INT_TX_LOG_IND,LAST_UPDATE_DT) VALUES

(100000001,100000004,1000001,'Y',CURRENT_TIMESTAMP);
```

Populating additional metadata for entries made in Ext_EntityNameInstancePK.properties

InfoSphere MDM Server provides a utility to populate additional metadata for the entries added in `Ext_EntityNameInstancePK.properties`.

Running the EntityNameInstancePKMigration script

The entityNameInstancePKMigration utility is a J2SE utility and you can run from the command line. The execution script `runMigrationUtility.sh` is located in the `<MDM_INSTALL_LOCATION>/utils/entityNameInstancePKMigration/scripts` directory. You can customize the script to suit your environment.

A `Readme.txt` file is also provided in the `<MDM_INSTALL_LOCATION>/utils/entityNameInstancePKMigration/scripts` directory with instructions for this utility.

Executing generated SQL statements in your environment

Running the `runMigrationUtility.sh` script results in an SQL file generated with the name in the format `generated_updateMetaData_XXXXX.sql`. This SQL file is in the same directory where you ran the script You must run the SQL commands mentioned in the generated SQL file manually against the database to populate additional metadata.

A sample properties file called `Ext_EntityNameInstancePK.properties` and a generated SQL file called `generated_updateMetaData_1236345780819.sql` are available in the `<MDM_INSTALL_LOCATION>/utils/entityNameInstancePKMigration/samples` directory for your reference.

Understanding the external validators that support additional metadata

InfoSphere MDM Server includes external validation rules to make additional metadata fields mandatory for Add type transactions.

These external validators affect the following elements:

Table 7. Elements affected by external validators

Group name	Element name
DWLVGroup	AliasName
AdminEObjCdInternalTxnTp	component_type_id
DWLInternalTxn	ComponentTypeId
AdminEObjComponentType	component_class
InternalTransactionTypeBObj	component_type_id
ComponentTypeBObj	component_class

You can turn off these validators and pass null values for the mentioned elements; however, these additional metadata elements must be populated for the new or extended business objects which will be used by common features.

See also:

"To turn on an external validator"

To turn on an external validator

Run the following DB2 scripts to enable the external validators related to Common EntityName/InstancePK.

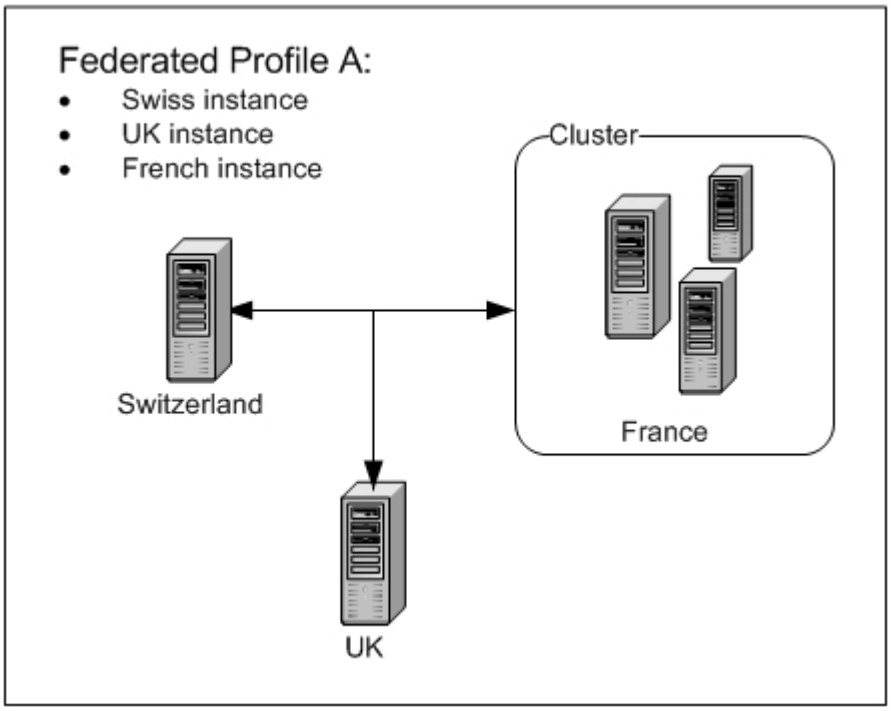
```
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38308 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38309 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38310 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38311 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38312 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38313 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38314 ;
update V_ELEMENT_VAL set EXPIRY_DT=null last_update_dt=CURRENT_TIMESTAMP where VALIDATION_CODE=38315 ;
```

Chapter 6. Configuring Multi-Instance Federated Deployment

The multi-instance federated deployment framework provides services for inquiry and search transactions to communicate across multiple geographically-distributed InfoSphere MDM Server instances.

The multi-instance federated deployment model contains complete application instances from a data-model and services perspective. Each application instance contains a subset of data that is based on a particular criteria, such as LOB or country. An example of this deployment model would be three party domain application instances, one located in Switzerland, one in France (a cluster node) and another in the UK:

- Users in Switzerland can view Swiss, French and UK data.
- Users in the UK and France can view UK and French data, but are not allowed to see Swiss data for legal reasons.



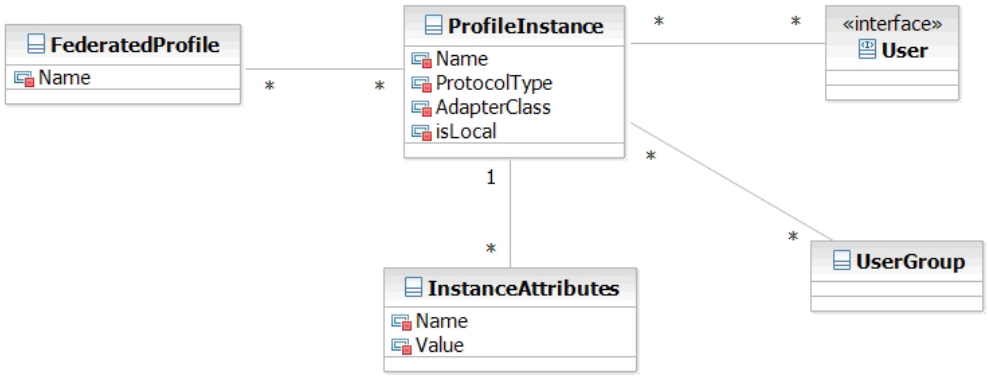
The federated deployment framework uses metadata to describe the physical topology of federated deployment. Metadata consists of federated profiles that contain a collection of federated instances, each with groups of instance attributes.

The multi-instance federated deployment feature provides federation at the services layer. This means that when the federated party search is performed across all the instances in the profile, each individual instance executes party search service. Each party search service includes all the business behavior configured on the service, such as Rules of visibility, behavior and data extensions, and so on.

In this section, you will learn:

Understanding federated deployment metadata configurations

Each federated instance has its own copy of the metadata that is created or updated by Administration Services transactions. Metadata should be kept synchronized between instances of a federated profile.



A federated instance definition contains the following information:

- Logical name of the instance
- Type of communication protocol to be used to communicate with the instance
- Fully-qualified Java name of the adapter class that is used to issue the remote transaction request, using the specified communication protocol
- Indication if it is a local instance
- List of instance attributes describing the communication protocol details, such as port number and host name

The Federated Deployment framework provides an RMI adapter to enable RMI communication between instances. The RMI adapter requires mandatory host and port instance attributes and an optional prefix attribute for the WebLogic application server.

The following table contains examples of instance attributes for the RMI protocol.

Table 8. Examples of instance attributes for the RMI protocol

Name	Value
host	hostname.acmi.com
port	9811
prefix	corbaloc:iiop: (default)

Each federated instance definition has a list of Users or Groups or both that are permitted to access the federated instance. The Federated Deployment framework will not send a transaction to the federated instance if the User sending the transaction does not have access rights to that instance.

A federated profile definition contains the following information:

- Logical name of the profile
- List of federated instances contained in the profile

Understanding federated transaction behaviors

There are three transactions supported with the Federated Deployment framework.

They are:

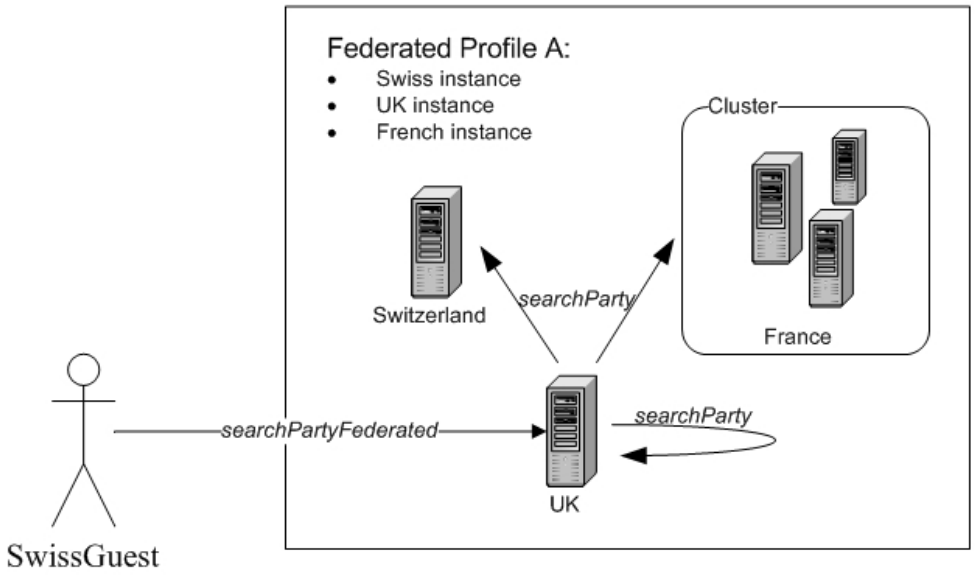
- searchPartyFederated
- getPartyFederated
- getPartyWithContractsFederated

The multi-instance federated deployment framework can be configured to support additional services for inquiry and search transactions to communicate across multiple geographically-distributed InfoSphere MDM Server instances. See "Customizing the federated deployment framework" on page 117 for more details.

Using the example of a multi-instance federated deployment with one instance located in Switzerland, one in France (a cluster node) and another in the UK that was discussed in Chapter 6, "Configuring Multi-Instance Federated Deployment," on page 113, consider a scenario in which two different users both issue a searchPartyFederated transaction on the local instance UK with the intent to search parties in federated profile A.

- The first user, SwissGuest, has access to the UK, Switzerland and France instances in profile A. When SwissGuest issues a searchPartyFederated transaction on the local UK instance, the result is that a local searchParty transactions is issued to the local UK instance and remote searchParty transactions are sent to the Switzerland and France instances.
- The second user, FrenchGuest, has access only to the UK and France instances. Consequently, when FrenchGuest issues a searchPartyFederated transaction on the local UK instance, the result is that a local searchParty transactions is issued to the local UK instance, but a remote searchParty transaction is sent *only* to the France instance. The Switzerland instance is not searched.

The transaction is considered to be successful if a search result is returned from at least one federated instance.



The federated `get` transactions take an additional input parameter for the federated instance name. The federated instance name is used to send transactions to a specific federated instance. Consider a scenario in which the user SwissGuest issues a getPartyFederated transaction on instance UK with the intent to query party from instance Switzerland. Since SwissGuest has access to instance Switzerland, the remote getParty transaction is issued to the federated instance Switzerland.

The Federated Deployment framework has logic that enables it to paginate across combined records in all instances in a federated profile. The federated pagination algorithm uses `<pageStartIndex>` and `<pageStartIndex>` values in the federated request to determine which federated instances contain records in the requested range.

If the pagination parameters `<pageStartIndex>` and `<pageEndIndex>` are provided in the federated transaction request, the response contains the following:

- `<availableResultsCount>` element in `<DWLControl>` to describe the total number of available records across the entire federated profile
- `<AvailableResultsCount>` element under each `<TCRMFederatedInstanceResultBObj>` to describe number of available records under that particular instance.

See also:

"Sample: searchPartyFederated response messages"

Sample: searchPartyFederated response messages

The following is an example of the searchPartyFederated response message. The Response contains <TCRMFederatedProfileResultBObj>, which includes multiple <TCRMFederatedInstanceResultBObj> elements, one for each federated instance in the profile.

```
<TCRMService>
  <ResponseControl>
    <ResultCode>SUCCESS</ResultCode>
    <DWLControl>
```

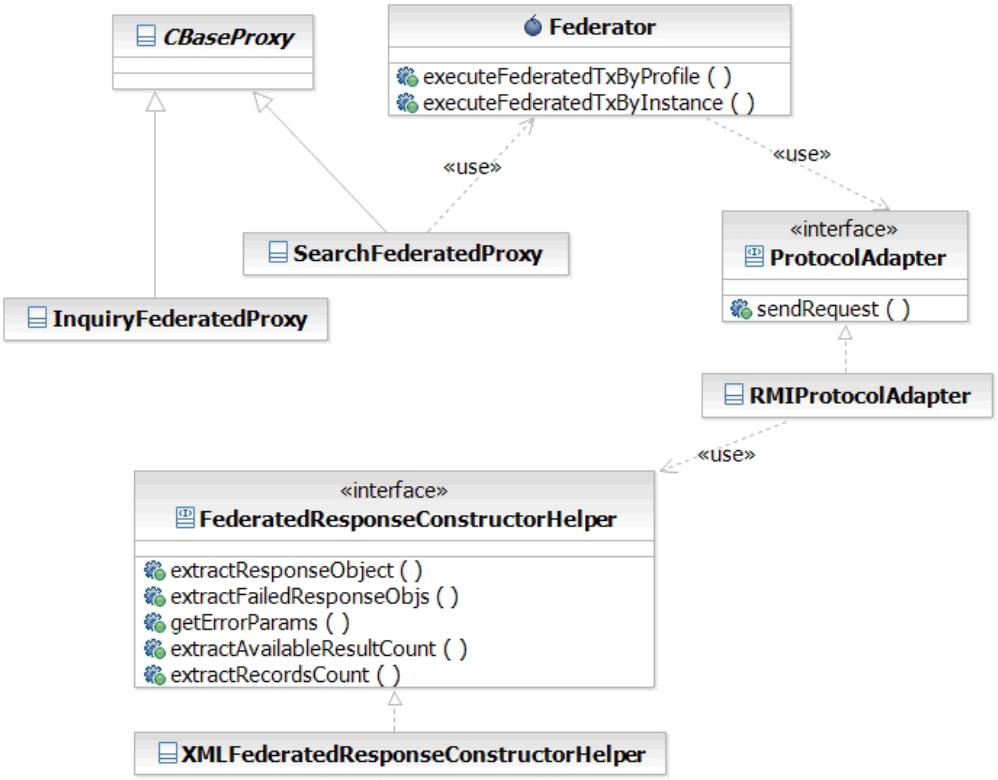
```
      <pageStartIndex>4</pageStartIndex>
      <pageEndIndex>5</pageEndIndex>
      <returnAvailableResultCount>true</returnAvailableResultCount>
      <availableResultsCount>8</availableResultsCount>
    </DWLControl>
  </ResponseControl>
  <TxResponse>
    <RequestType>searchPartyFederated</RequestType>
    <TxResult>
      <ResultCode>SUCCESS</ResultCode>
    </TxResult>
    <ResponseObject>
      <TCRMFederatedProfileResultBObj>
        <DWLStatus>
          <Status>0</Status>
        </DWLStatus>
        <TCRMFederatedInstanceResultBObj>
          <InstanceName>UK</InstanceName>
          <AvailableResultsCount>4</AvailableResultsCount>
          <DWLStatus>
            <Status>0</Status>
          </DWLStatus>
          <TCRMPersonSearchResultBObj>
            ...
          </TCRMPersonSearchResultBObj>
        </TCRMFederatedInstanceResultBObj>
        <TCRMFederatedInstanceResultBObj>
          <InstanceName>Switzerland</InstanceName>
          <AvailableResultsCount>4</AvailableResultsCount>
          <TCRMPersonSearchResultBObj>
            ...
          </TCRMPersonSearchResultBObj>
        </TCRMFederatedInstanceResultBObj>
        <TCRMFederatedInstanceResultBObj>
          <InstanceName>France</InstanceName>
          <AvailableResultsCount>0</AvailableResultsCount>
          <DWLStatus>
            <Status>9</Status>
            <DWLError>
              <ComponentType>10003</ComponentType>
              <ErrorMessage>Server Communication Error</ErrorMessage>
              <ErrorType>READERR</ErrorType>
              <LanguageCode>100</LanguageCode>
              <ReasonCode>200003</ReasonCode>
              <Severity>0</Severity>
            </DWLError>
          </DWLStatus>
        </TCRMFederatedInstanceResultBObj>
      </TCRMFederatedProfileResultBObj>
    </ResponseObject>
  </TxResponse>
</TCRMService>
```

Customizing the federated deployment framework

Federated transactions have special federated proxies that convert the federated transaction names (such as getPartyFederated) to actual transaction names (such as getParty) and then send the transactions to the Federator module.

The Federator module retrieves federated profile or instance metadata, checks user access rights, and sends transaction requests to the appropriate federated instance.

The Federated Deployment framework provides the RMIProtocolAdapter class to enable RMI communication between instances. In order to support other communication protocols, new protocol adapters can be written and configured in Federated Deployment metadata.



All protocol adapters must implement the ProtocolAdapter interface. The sendRequest() method takes DWLTransaction as the input parameter and returns DWLFederatedInstanceResultBObj. RMIProtocolAdapter sends transaction requests to remote instances using the standard MDM request XML format (parser=TCRMService). The response is returned from remote instance in the same format that you specify in the Constructor context property in the federated transaction request. RMIProtocolAdapter uses XMLFederatedResponseConstructorHelper to extract the response object from the remote transaction response and places it in the finalResponse field of the DWLCommon object returned as part of DWLFederatedInstanceResultBObj. The standard MDM Server response constructor, XMLResponseConstructor, retrieves the formatted response message from the finalResponse field and adds it to the federated transaction response message unmodified.

If you write custom message constructors and you want to use the Federated Response framework, you need to write a custom constructor helper class. The helper class must implement the FederatedResponseConstructorHelper interface and be configured in the DWLCommon_extension.properties file using `Constructor.tcrm.FederatedDeployment.[constructor]` as a key.

For example

```
Constructor.tcrm.FederatedDeployment.TCRMService=
com.ibm.mdm.common.federated.deployment.XMLFederatedResponseConstructorHelper
```

Chapter 7. Subtyping entities

The entity subtyping feature provides a mechanism for redirecting service calls to appropriately process business objects having an inheritance relationship.

This feature can be implemented only with new subtype entity additions, not with subtype entities that are currently a part of the InfoSphere MDM Server product.

This section provides an overview of how to effectively configure and write new entities to enable the processing of their subtypes.

In this section, you will learn:

Knowing when to use entity subtypes

Entity subtypes are useful when the business meaning of an entity changes due to the addition of another set of attributes.

When this happens, a new set of services and business logic must be provided to uniquely process the core set of attributes along with the new ones. Business keys, validations and rules of visibility, for example, would be configured uniquely for a business object that is a subtype of another. Again, entities that exist as part of an InfoSphere MDM Server domain cannot participate in this feature.

Knowing when to use data extensions

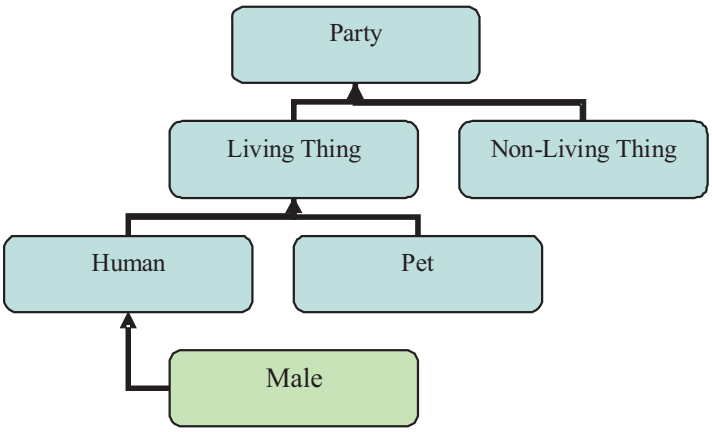
Data extensions are extensions to existing entities.

They are useful when the existing services for a business object are sufficient to process the additional attributes that are being added to an entity. That is, no new business logic, unique business key configurations, validations or rules of visibility, for example, are needed to meet the requirement of processing the business object.

Note: For information about how to create data extensions, see Chapter 2, "Customizing InfoSphere MDM Server," on page 17.

Creating entity subtypes

Entity subtypes are created through the introduction of new data structures in the database to store the groupings of additional attributes required by each subtype.



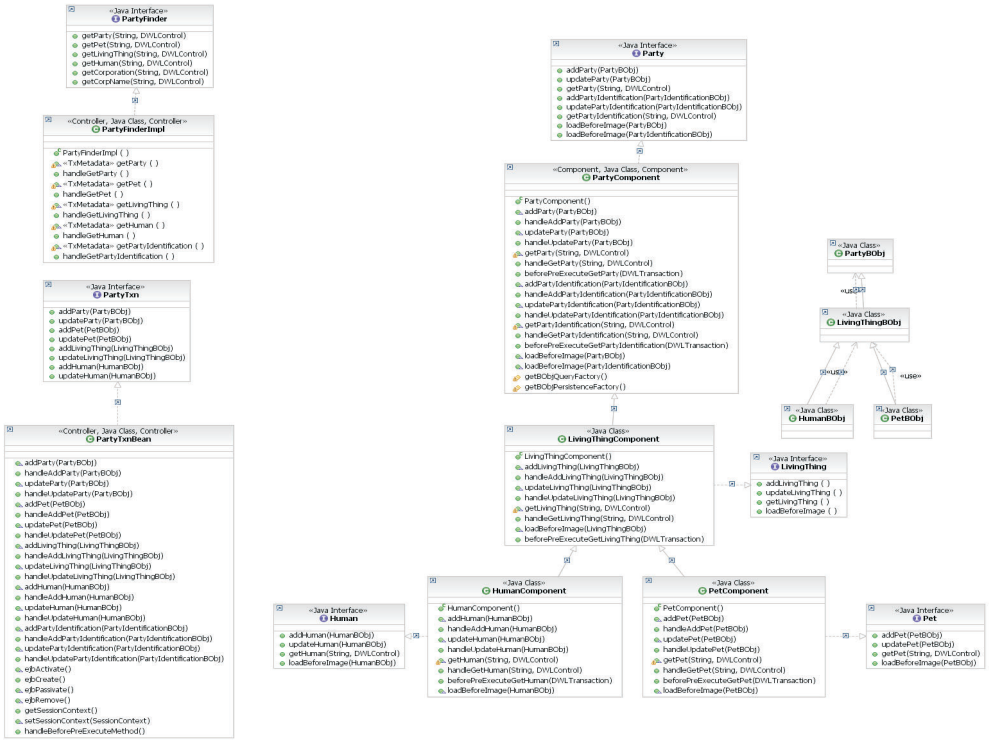
With the introduction of each new subtype, new granular services (such as add, update and get) may be created for it. The existing parent services for each of these corresponding services will be able to process the entity subtypes by sensing and redirecting the service call to the appropriate implementation for that entity type.

For features such as Transaction Logging or TAIL, invoking a parent method and processing a subtype will be logged as a service call having been made to the subtype itself.

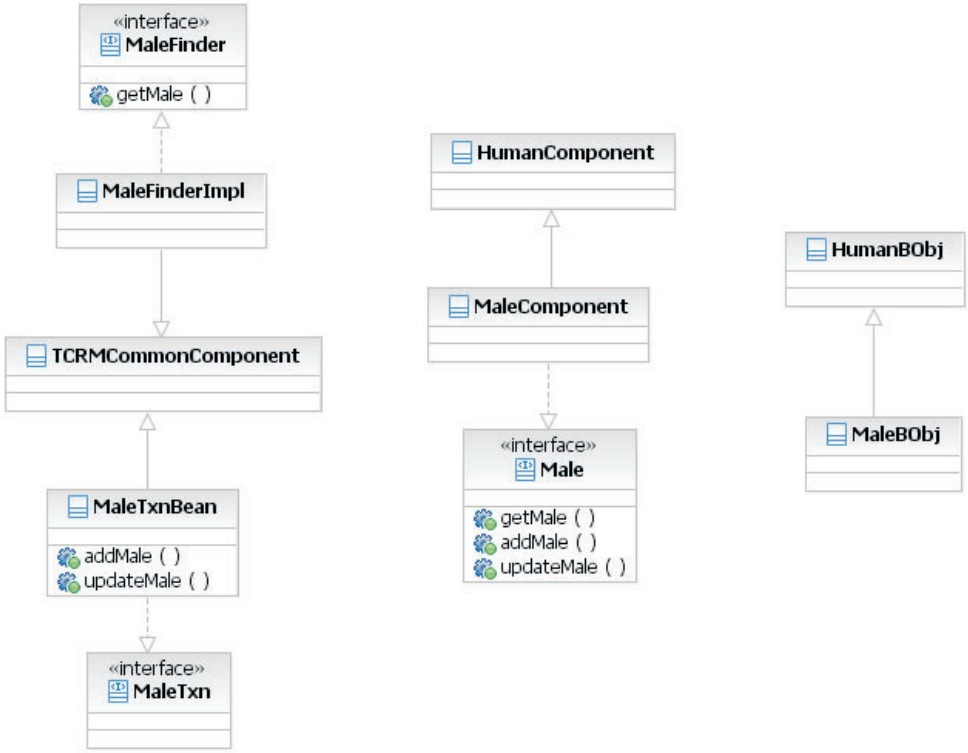
For example: addLivingThing(Pet myPet) would be logged as having executed addPet(Pet my Pet).

Configurations for business keys, rules of visibility and validations are unique for each subtype. Failing to provide these configurations will not result in any default to the configuration of a supertype of the entity.

A business object that participates in an entity subtype hierarchy may only be extended to be further subtyped if it results in the creation of a leaf node for the new subtype. For example, Living Thing may be subtyped further to create a subtype/sibling type to Human (i.e., Pet), but no new supertype to Living Thing may be introduced.



The following diagram depicts a further subtype Male.



See also:

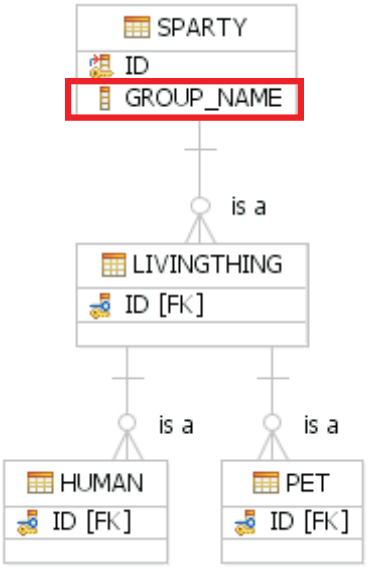
"To create an extension subtype to a leaf entity of a subtype hierarchy" on page 122

To create an extension subtype to a leaf entity of a subtype hierarchy

1. Follow the data addition guidelines to define the new subtype as a data addition entity.
2. 2. Make the new type component extend from its supertype component.
3. 3. Follow the same development and configuration guideline in this chapter to enable the type hierarchy support for the new entity.

Supporting subtyped entities in database tables

There may be only one root type in the type hierarchy. This root type must have a column specified to track the group_name (see v_group.group_name), or entity type for the data being persisted with those attributes. This information must be persisted during the addition of the entity and is critical when it comes to resolving the entity type during an inquiry transaction when only a primary key, for example, is provided.



Configuring entity subtypes

An entity and any of its services that are intended to participate in the type sensing and redirection of processing of this feature must be configured in the V_GROUP, CDBUSINESSTXTP, and CDINTERNALTXTP database tables in the system. The metadata supporting the detection and redirection of a service is cached.

The parent_grp_name column in the V_GROUP table has been introduced to indicate the supertype of a business object. Every business object participating in an entity subtype hierarchy must be configured to indicate the parent type. There may be only one root type in the type hierarchy.

Note: The root type database table must also have a column specified to track the group_name, or entity type for the data being persisted with those attributes. This information is critical when it comes to resolving the entity type during an inquiry transaction when only a primary key, for example, is provided.

For example, the entries for the above conceptualized business objects might be:

Table 9. V_GROUP

group_name	application	object_name	parent_grp_name
Party	TCRM	com.newdomain.component. PartyBObj	
NonLivingThing	TCRM	com.newdomain.component. NonLivingThingBObj	Party
LivingThing	TCRM	com.newdomain.component. LivingThingBObj	Party
Human	TCRM	com.newdomain.component. HumanBObj	LivingThing
Pet	TCRM	com. newdomain.component. PetBObj	LivingThing
Male	TCRM	com.extension.component. MaleBObj	Human

Additionally, every service where the entity should be recognized in order to redirect its processing should be configured to indicate the appropriate parent type. Again, there may be only one root transaction in each transaction hierarchy. The transaction hierarchies for external (cdbusinesstxntp) and internal (cdinternaltxntp) transactions, should be nearly the same or identical.

For example, the entries a set of services for the above conceptualized business objects might be:

Table 10. CDBUSINESSTXTP

business_tx_tp_cd	name	dwl_prod_tp_cd	parent_business_tx_tp_cd
1000000	addParty	1	
1000001	addLivingThing	1	1000000
1000002	addNonLivingThing	1	1000000
1000003	addHuman	1	1000001
1000004	addPet	1	1000001
9000001	addMale	1	1000003
1000005	updateParty	1	
1000006	updateLivingThing	1	1000005
1000007	updateNonLivingThing	1	1000005
1000008	updateHuman	1	1000006
	updatePet	1	1000006
9000002	updateMale	1	1000008
1000009	getParty	1	
1000010	getLivingThing	1	1000009
1000011	getNonLivingThing	1	1000009
1000012	getHuman	1	1000010
1000013	getPet	1	1000010
9000003	getMale	1	1000012

Table 11. CDINTERNALTXTP

internal_bus_tx_tp	name	component_type_id	parent_internal_bus_tx_tp
2000000	addParty	1	
2000001	addLivingThing	2	2000000
2000002	addNonLivingThing	3	2000000
2000003	addHuman	4	2000001
2000004	addPet	5	2000001
8000001	addMale	9	2000003

Table 11. CDINTERNALTXTP (continued)

internal_bus_tx_tp	name	component_type_id	parent_internal_bus_tx_tp
2000005	updateParty	1	
2000006	updateLivingThing	2	2000004
2000007	updateNonLivingThing	3	2000005
2000008	updateHuman	4	2000006
2000009	updatePet	5	2000007
8000002	updateMale	9	2000008
2000010	getParty	1	
2000011	getLivingThing	2	2000010
2000012	getNonLivingThing	3	2000010
2000013	getHuman	4	2000011
2000014	getPet	5	2000011
8000003	getMale	9	2000013

The value for component_type_id indicates the business component upon which the transaction or service resides. For example:

Table 12. componenttype

component_type_id	dwl_prod_tp_cd	compon_type_value	Component_class
1	1	PartyComponent	com.newdomain.component. PartyComponent
2	1	LivingThingComponent	com.newdomain.component. LivingThingComponent
3	1	NonLivingThingComponent	com.newdomain.component. NonLivingThingComponent
4	1	HumanComponent	com.newdomain.component. HumanComponent
5	1	PetComponent	com.newdomain.component. PetComponent
9	1	MaleComponent	com.newdomain.component. MaleComponent

Understanding transactions that service subtypes

Transactions servicing subtyped entities do so by identifying that a business object is a subtype and then redirecting the type to the more specific transaction for that identified entity by using the prescribed metadata in the tables just described. The identification of a subtype or a transaction that services subtyped entities occurs prior to any pre-processing at either the controller or component level, or both.

The redirection of the service call takes place as part of the executeTx() implementation at both the controller and component level. That is, subtypes may be detected during a call to either a service on the controller or component.

Note: As a rule, overloading transaction and services is not a recommended practice when creating new transactions.

Processing child objects

The Party may also have a number of Addresses associated with it, so the PartyBObj may also contain one or more PartyAddressBObj, for example. It may be desirable to customize the logic around the storage and/or retrieval of these child objects.

An approach to override the implementation/retrieval of these business objects has been provided in the getChildFor<BusinessObjectName>methods. There are two steps to implement this approach:

Step 1: In parent type component, make the child object retrieval or persist logic pluggable by defining it in a separate protected method. For example in PartyComponent:

Example:

```
   public DWLResponse handleGetParty(String thePartyId, DWLControl control)
throws Exception {
         ......   //retrieve party object partyBObj

        getChildForPartyBObj(partyBObj,control);

        ......  //prepare response and return
}

    protected void getChildForPartyBObj(PartyBObj partyBObj, DWLControl control)
throws DWLBaseException{
        Vector vecPartyIdentification = (Vector)
((this.getAllIdentifiers(partyBObj.getPartyId(), control)).getData());
        if (vecPartyIdentification!=null && vecPartyIdentification.size()>0){
     for (int i=0; i<vecPartyIdentification.size(); i++){
)));
         }
        }
    }
```

Step 2: In the subtyped component, overwrite the child object retrieval or persistence method. For example in LivingThingComponent:

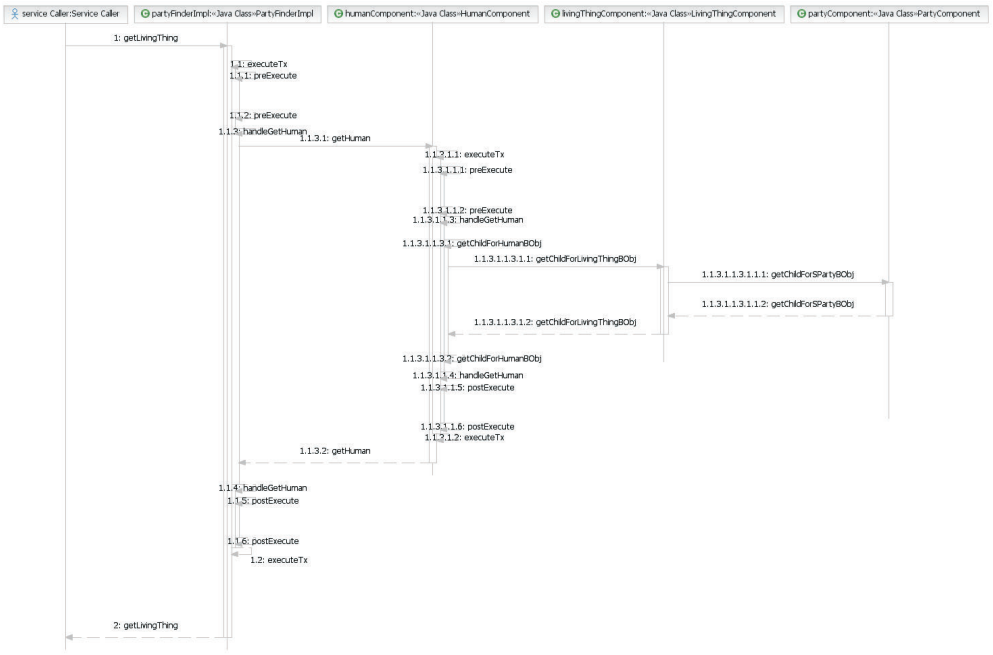
```
    public DWLResponse handleGetLivingThing(String thePkId, DWLControl control)
throws Exception {
        ......   //retrieve LivingThing object linvingThingBObj
        if (livingThingBObj!=null){
         getChildForLivingThingBObj(livingThingBObj,control);
        }

        ......  //prepare response and return
    }

 protected void getChildForLivingThingBObj(LivingThingBObj livingThingBObj,
DWLControl control) throws DWLBaseException{

           //get child defined in super entity
     getChildForPartyBObj(livingThingBObj, control);

     //get child for current entity
            ......
    }

    //overwrite child object retrieve logic here
    protected void getChildForPartyBObj(PartyBObj partyBObj, DWLControl control)
 throws DWLBaseException{
 //overwrite the default implementation expected
            ......
    }
```

Understanding inquiry transactions

For inquiry transactions, a single call to the database is made to return the data elements for the business object, joining all tables underlying that subtyped entity.

The database table representing the root entity type must always store a value for the group_name of each record when persisted in the repository. As such, when designing hardened entity subtypes it is important to model new entities carefully as increasing the number of underlying database tables does impact query performance. Child business objects for the type and any supertype business objects are then resolved.

The following example flow diagram depicts the getLivingThing(String humanId, DWLControl) transaction:



Understanding persistence transactions

For persistence transactions it is possible to quickly determine the appropriate transaction to redirect to by inquiring on the configuration of the business object to determine its supertype, if any.

The following example flow diagram depicts the addLivingThing(Human ahuman) transaction:

Chapter 8. Understanding entity suspects management and entity data stewardship frameworks

The entity suspect management and entity data stewardship framework provides a mechanism for a domain specific entity, such as Product, to implement the suspect processing capabilities easily.

The two frameworks discussed are the *entity suspect management framework* and the *entity data stewardship framework*.

The purpose of these frameworks is to provide users with the following:

- A reuseable suspect processing pattern to support specialized domains.
- Support for the creation of entity duplicate suspect and maintain it through its life cycle.
- Search and inquiry of entity suspect records.
- Support for resolving entity duplicate records by collapsing suspects.
- Support for splitting one entity into two and identifying the two new entities as suspects.
- A comparative preview of entity duplicate suspects before collapsing them.
- Traceability of entity duplicate suspects resolution (collapse, and split).

The implementation of the framework is generic and free from any domain specific attributes or functionalities. The framework codes exist in project BusinessServices.

- The entity suspect management framework helps implement suspect management services, and is detailed below following InfoSphere MDM Server architecture.
- The entity data stewardship framework helps implement data stewardship services, and is detailed below following InfoSphere MDM Server architecture.

In this section, you will learn:

Understanding the entity suspect management data model

The entity suspect management framework assumes that the a suspect table and suspect match result table are used to store suspect data.

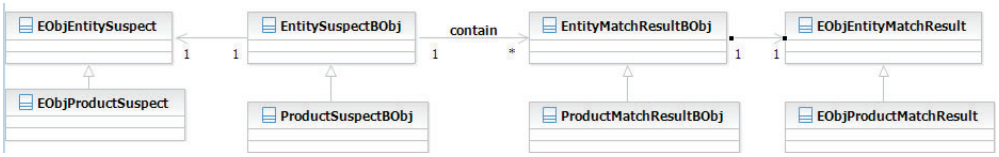
The suspect table has a one-to-many relationship with the suspect match result table. For each specific implementation, only table name difference is expected and same table columns are expected. However each implementation can have additional columns.

See Chapter 67, "Managing product suspects and product data stewardship," on page 763 for the data model example.

Understanding entity suspect management base classes for EObj and BObj

The object diagram below shows the entity suspect generic base classes for EObj and BObj, and as an example, the product domain specific implementing classes.

All table columns to Java attributes mapping has been defined in EObjEntitySuspect and EObjEntityMatchResult. If no additional table column is defined for the domain, domain specific EObj doesn't need any new attribute and mapping, and no new attribute for EntitySuspectBObj and EntityMatchResultEObj too.



Learning entity suspect management BObjQuery, QueryFactory, and ResultSetProcessor classes

Following InfoSphere MDM Server query framework, all query classes extend GenericBObjQuery.

Common entity level query classes, such as EntitySuspectBObjQuery and EntityMatchResultBObjQuery, are defined to hold all constants. Specific domain implementation occurs at the domain query class level, such as product domain query classes as illustrated below.

Two factory interfaces are defined to create query implementation and persistence implementation:

- EntitySuspectModuleBObjPersistenceFactory
- EntitySuspectModuleBObjQueryFactory

All domain specific BObjQuery and QueryFactory must extend and, or, implement the above classes and interfaces. The following diagrams show the BObjQuery and QueryFactory and the Product domain implementation classes as examples.

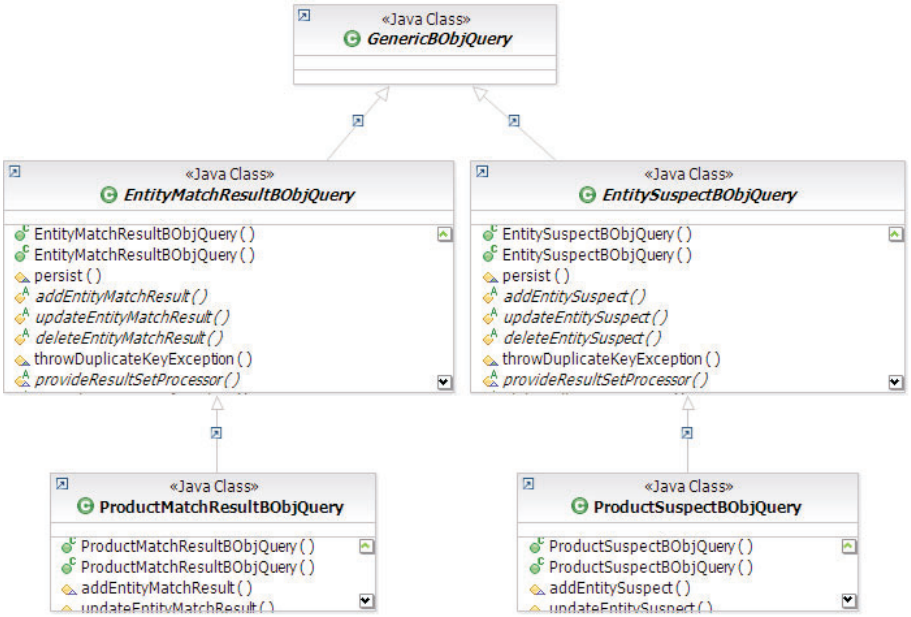
See also:

"Example: EntitySuspectBObjQuery and EntityMatchResultBObjQuery class diagram"

"Example: EntitySuspectModuleBObjPersistenceFactory and EntitySuspectModuleBObjQueryFactory class diagram" on page 132

"Example: Entity suspect management GenericResultSetProcessor class diagrams" on page 132

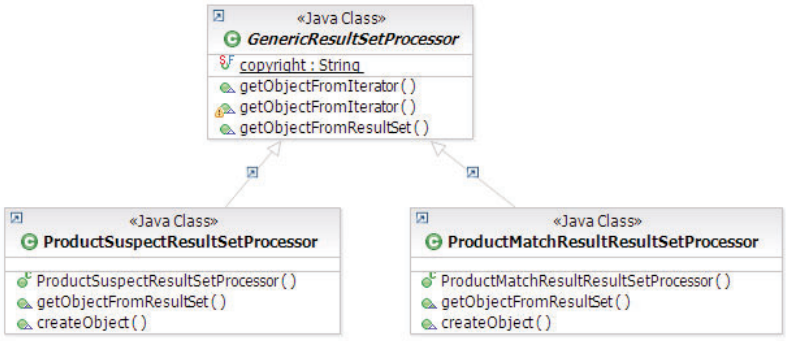
Example: EntitySuspectBObjQuery and EntityMatchResultBObjQuery class diagram

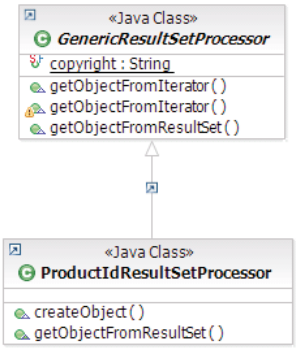


Example: EntitySuspectModuleBObjPersistenceFactory and EntitySuspectModuleBObjQueryFactory class diagram

Example: Entity suspect management GenericResultSetProcessor class diagrams

Important: The resultset processors for entity suspect management are all implemented in domain specific project only. They extend the GenericResultSetProcessor as shown in the diagrams of the Product domain below:





Note: All the pureQuery classes for suspect data are implemented in domain specific way.

Understanding EntitySuspectComponent input and output objects

The table below summarizes the input and output objects of the component level methods implemented in EntitySuspectComponent. These methods are invoked by the controller level transactions.

Table 13. EntitySuspectComponent input and output objects

Method Name	Input	Output
addEntitySuspects	EntitySuspectListBObj	EntitySuspectListBObj
updateEntitySuspects	EntitySuspectListBObj	EntitySuspectListBObj
deleteAllEntitySuspects	EntitySuspectListBObj	EntitySuspectListBObj
refreshEntitySuspects	EntitySuspectListBObj	EntitySuspectListBObj
deleteEntitySuspect	EntitySuspectBObj	EntitySuspectBObj
getAllEntitySuspects	EntitySuspectRequestBObj	Vector of EntitySuspectBObj
getEntitySuspect	EntitySuspectRequestBObj	EntitySuspectBObj
searchEntitySuspect	EntitySuspectSearchBObj	Vector of domain specific entity object (for example, ProductBObj)

All the base classes listed above provide default attributes and behaviors of entity suspect. Domain specific implementation must extend these classes. The diagrams below show the Product domain implementation classes as examples.

See also:

"Example: EntitySuspectListBObj containing multiple instances of EntitySuspectBObjs" on page 134

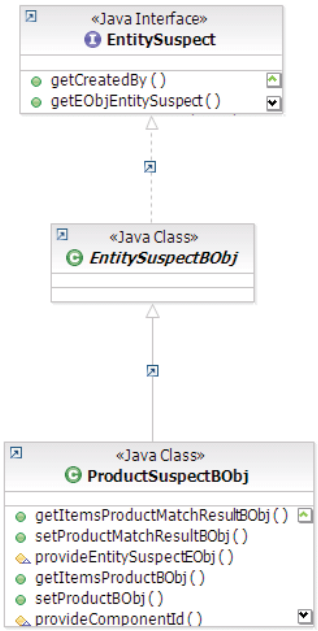
"Example: EntitySuspectBObj containing multiple instances of EntityMatchResultBObjs" on page 134

"Example: EntityMatchResultBObj containing suspect match result information" on page 135

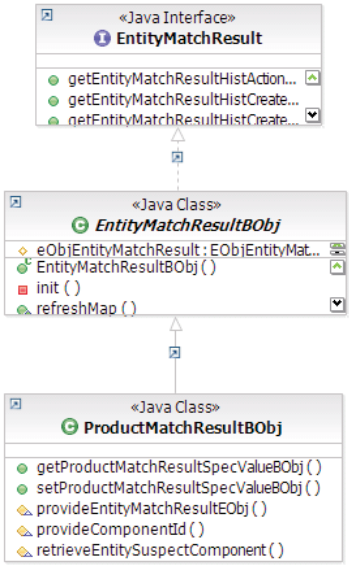
"Example: EntitySuspectSearchBObj containing search suspect transaction parameters and an optional domain specific request object" on page 135

Example: EntitySuspectListBObj containing multiple instances of EntitySuspectBObjs

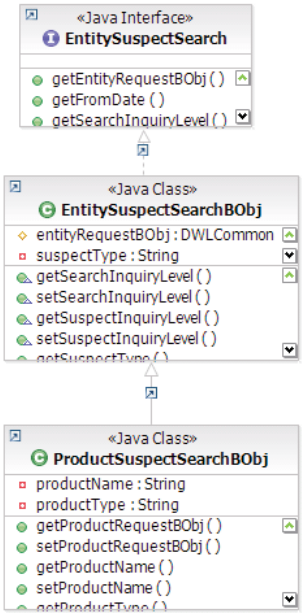
Example: EntitySuspectBObj containing multiple instances of EntityMatchResultBObjs



Example: EntityMatchResultBObj containing suspect match result information



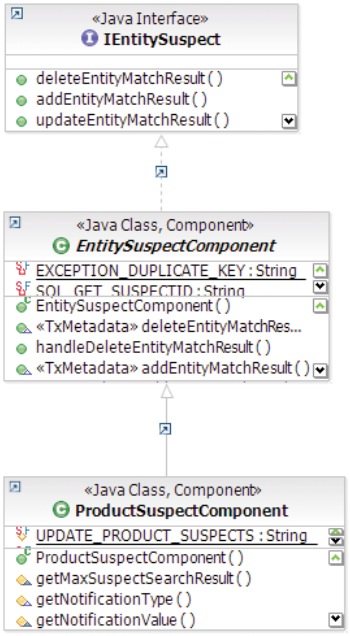
Example: EntitySuspectSearchBObj containing search suspect transaction parameters and an optional domain specific request object



Understanding entity suspect management business component level methods

The component level methods provide generic functionalities of the entity suspect transactions.

Domain specific entities must have their own components to handle additional requirements. The following diagram illustrates the business component implementation for the Product domain:



Understanding entity suspect management controllers

All entity suspect transactions are to be defined in the domain specific controllers, such as ProductTxnBean and ProductFinderImpl of the Product domain. The names of the transaction should indicate the type of the entity, and the controller level transaction should invoke its corresponding component level method.

For example, the transaction addProductSuspects in controller ProductTxnBean invokes the method addEntitySuspects in ProductSuspectCompoment.

Learning entity suspect management code types

Entity suspect management is categorized by types, which are described by code tables.

The following code tables categorize entity suspect management:

- **cdsuspectsourcetp**—Suspect source type
- **cdsuspectstatustp**—Suspect status type
- **cdsuspecttp**—Suspect type
- **cdmatchenginetp**—Match engine type

Full suspect processing capability, that is the ability to identify, match, persist and access entity suspect records, can be achieved with the combination of the provided services and an external matching engine such as InfoSphere MDM Server QualityStage.

Because of this, suspect record match results must be provided by the service user, and the entity match result should be the defining factor of the suspect type.

The following tables define the specific *suspect types* and *suspect status types* to be used to categorize entity suspects.

Table 14. Default suspect types

Suspect Type	Name	Description
11	Exact Match	The suspect is identified as a duplicate.
12	Close Match	The suspect has a high possibility of being a duplicate.
13	Possible Match	The suspect has a low possibility of being a duplicate.
14	Not Match	The suspect is not a duplicate.

Table 15. Default suspect status types

Suspect Status Type	Name	Description
21	Entities are Suspect Duplicates	Under Investigation - Entity and Suspect are Duplicates.
22	Entity Pending Critical Change	Under Investigation - Critical data change for the entity is pending.
23	Entities are not Duplicates	Investigated - Entities are not Duplicates.
24	Entities are Duplicates	Investigated - Entities are Duplicates.
25	Critical Change Resolved	Investigated - Critical Data Change Resolved.
26	Entities Suspect Duplicated - Collapse Not Permitted	Under Investigation - Entities Suspect Duplicates - Do Not Collapse.

A single suspect record can be matched by multiple match engines, and therefore may have multiple match result records. The final suspect type should be determined externally. The suspect records and their matching results are to be persisted in domain specific tables: <ENTITY_NAME>SUSPECT and <ENTITY_NAME>MATCHRESULT, where <*ENTITY_NAME*> is the name of the entity domain. For example, *PRODUCT*. For a Data Model of the Product domain, see Chapter 67, “Managing product suspects and product data stewardship,” on page 763.

The entity suspect match result detail description is in an XML format and can vary between different match engines. The specs of the match engines are to be configured within the InfoSphere MDM Server spec framework. InfoSphere MDM Server provides a default spec as shown below for any match engine which does not have its own spec:

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:mdmspec='http://www.ibm.com/mdm/system/specs/mdmspec/internal/00000001'
    xmlns:EntitySuspect='http://www.ibm.com/mdm/data/specs/EntitySuspect/internal/00000001'
targetNamespace="http://www.ibm.com/mdm/data/specs/EntitySuspect/internal/00000001"
elementFormDefault="qualified">

<xsd:element name="EntitySuspect"
type="EntitySuspect:EntitySuspect"/>
<xsd:element name="MatchDetail" type="xsd:string"/>

<xsd:complexType name="EntitySuspect">
        <xsd:sequence>
            <xsd:element ref="EntitySuspect:MatchDetail"/>
        </xsd:sequence>
     </xsd:complexType>

 </xsd:schema>
```

Understanding notifications for entity suspect persistence transactions

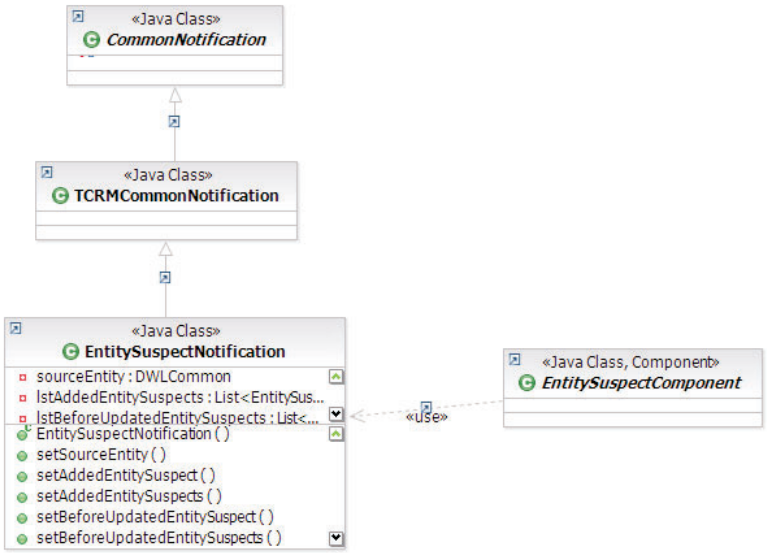
Notification messages containing data relevant to the persistence transactions of the entity suspects will be generated if the feature is enabled. Three types of notification are defined for entity suspects during transactions: *add*, *update*, and *delete*. Refer to Chapter 38 “Configuring and implementing notifications” for configuration details. Notification messages are constructed in a generic EntitySuspectNotification component, as shown in the class diagram below, based on the type of the entity suspect persistence services.

The notification message is in XML format generated by the getXML() method, which constructs the message header using getNotificationHeaderXML(), and the message body using getNotificationBodyXML().

See also:

“Example: Notification for an entity suspect persistence transaction”

Example: Notification for an entity suspect persistence transaction



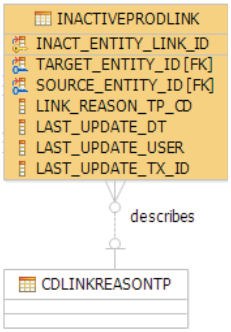
Understanding the entity data stewardship data model

The framework assumes that an entity link table is used to store the history of entity duplicate resolution actions, such as collapsing and splitting. This link table has none domain specific field name in the expectation that only table name will be different based on domain entity. However each implementation can have additional columns. See the data model diagram below using the Product domain as an example.

See also:

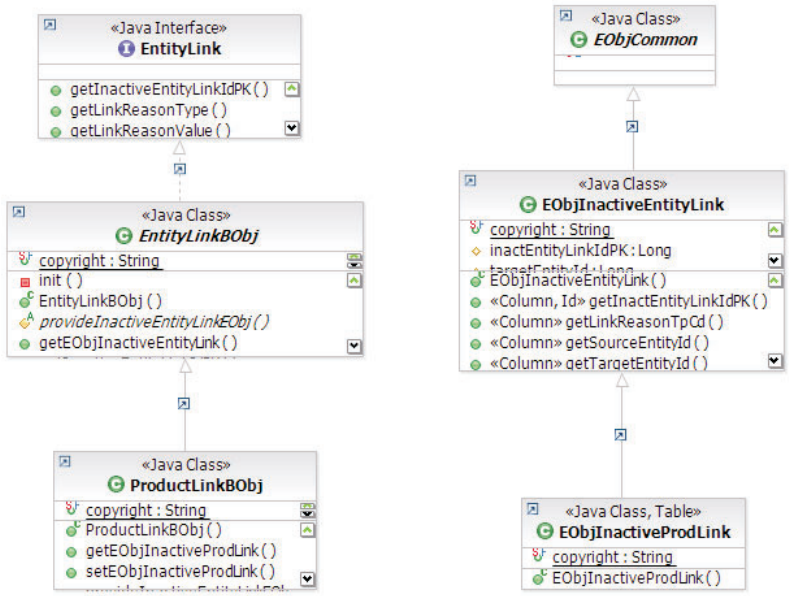
"Example: Data stewardship data model class diagram"

Example: Data stewardship data model class diagram



Understanding data stewardship base classes for EObj and BObj

The object diagram below shows the entity link generic base classes for data stewardship EObj and BObj, and as an example, the product domain specific implementation classes:



The common EObj is based on the data model assumption that all of the defined fields are common across different entities. Any specific domain entity can introduce its own fields as required. EObjInactiveProdLink only has table name difference and no specific field. For example:

```
@Table (name="INACTIVEPRODLINK")
```

The common BObj is also based on the data model assumption that all of the defined fields are common across different entities. Any specific domain entity can introduce its own fields as required. ProductLinkBObj has no specific fields.

Learning data stewardship BObjQuery, QueryFactory, and ResultSetProcessor classes

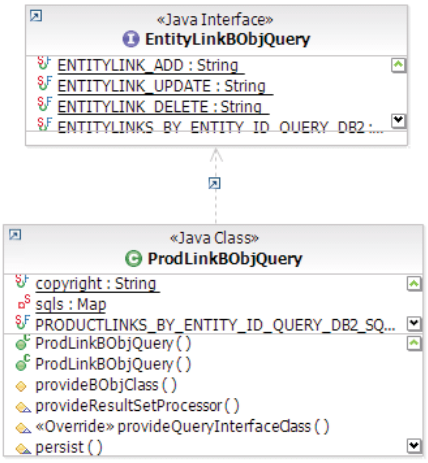
Following the InfoSphere MDM Server query framework, all query classes extend GenericBObjQuery.

However, the EntityLinkBObjQuery interface is introduced for this framework to hold all the constants. Specific domain implementation is at domain query class level, as in the ProductLinkBObjQuery class in the example below. Query factory implementation is domain specific. The following diagrams show the BObjQuery and QueryFactory and the Product domain implementation classes as examples.

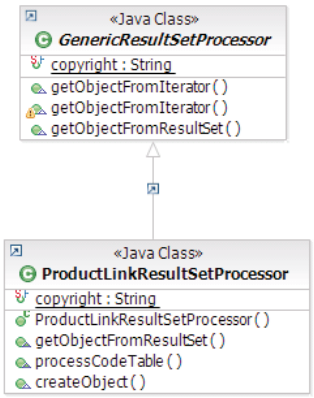
See also:

"Example: Data stewardship BObjQuery, QueryFactory, and ResultProcessor class diagrams"

Example: Data stewardship BObjQuery, QueryFactory, and ResultProcessor class diagrams



The entity link resultset processor for entity data stewardship management is implemented in domain specific project only. It extends directly the GenericResultSetProcessor as shown in the following diagram of the Product domain:



Note: All pureQuery classes for suspect data are implemented in domain specific way.

Understanding EntityDataStewardComponent input and output objects

The following table summarizes the input and output objects of the component level implemented in the EntityDataStewardComponent. These methods are invoked by the controller level transactions.

Table 16. EntityDataStewardComponent input and output objects

Method Name	Input	Output
collapseMultipleEntities	ConsolidatedEntityBObj	ConsolidatedEntityBObj
splitEntity	SplitEntityRequestBObj	EntityListBObj
getLinkedEntities	LinkedEntitiesRequestBObj	MultipleEntityLinksBObj

All the base classes listed above provide common attributes for entity data stewardship. Domain specific implementation should extend these classes. The following diagrams below show the Product domain implementing classes as examples.

See also:

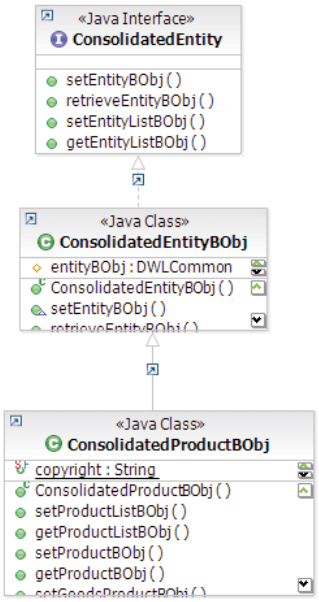
"Example: ConsolidatedEntityBObj containing an option target entity object and one or more entity objects to be collapsed" on page 142

"Example: SplitEntityRequestBObj containing an entity id and an entity request object - ProductId and ProductRequestBObj" on page 142

"Example: EntityListBObj containing a list of domain specific entities" on page 143

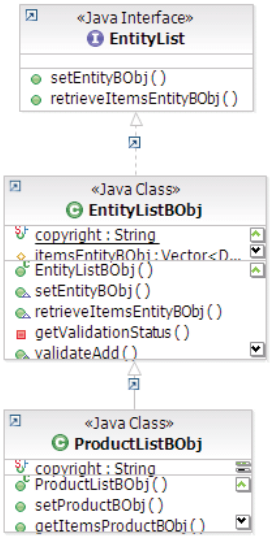
"Example: LinkedEntitiesRequestBObj containing an entity id and an entity request object - ProductId and ProductRequestBObj" on page 143

Example: ConsolidatedEntityBObj containing an option target entity object and one or more entity objects to be collapsed

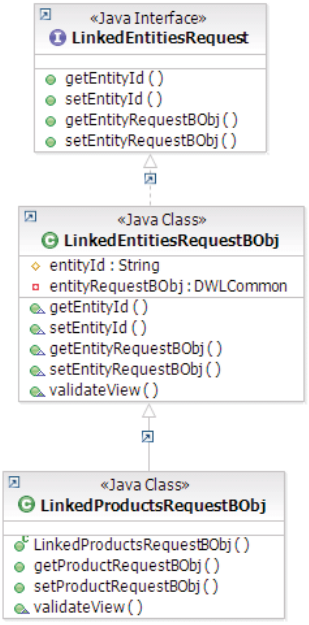


Example: SplitEntityRequestBObj containing an entity id and an entity request object - ProductId and ProductRequestBObj

Example: EntityListBObj containing a list of domain specific entities

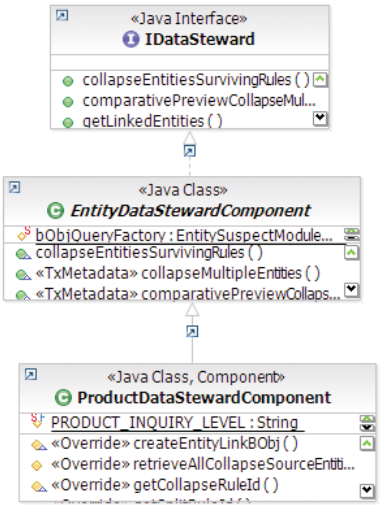


Example: LinkedEntitiesRequestBObj containing an entity id and an entity request object - ProductId and ProductRequestBObj



Understanding entity data stewardship business component level methods

The component level methods provide generic functionalities of the entity data stewardship transactions. Domain specific entity must have their own components to handle additional requirements. The diagram below shows the implementation component of the Product domain.



Understanding entity data stewardship controllers

All entity data stewardship transactions are to be defined in the domain specific controllers, for example, ProductTxnBean and ProductFinderImpl of the Product domain. The names of the transaction should indicate the entity type. The controller level transaction should invoke its corresponding component level method.

As an example, the transaction collapseMultipleProducts in controller ProductTxnBean invokes the method collapseMultipleEntities in ProductDataStewardCompoment.

Understanding soft delete

A default implementation for data stewardship is to validate the status of the entities to ensure they are active before the collapse or split operations. The IEntityResolution interface, as shown below, achieves this purpose. Any entity that implements the interface and returns `false` for the isEntityActive method call will be considered *soft deleted*.

If an entity is soft deleted, no further changes are allowed to the entity or its child object. The state of the entity is considered frozen, and it retains all of its existing data as-is after the soft delete. Any domain specific entity object to be enabled for data stewardship should implement this interface to indicate whether its status is active.

```
public interface IEntityResolution extends IDWLComponent {
 public boolean isEntityActive();
}
```

The code table CdResolutionTp is introduced for the purpose of indicating the reason why an entity is inactivated.

Table 17. CdResolutionTp code table

Resolution Type	Name	Description
1	Consolidated	Resolution through collapse/merge operation
2	Split	Resolution through split operation

Learning the generic entity suspect processing and data stewardship configuration elements

Entity suspect processing and data stewardship features are configured using the Configuration and Management component.

For information about generic entity suspect processing and data stewardship configuration elements, see "Understanding configuration elements in the Configuration and Management component" on page 419.

Chapter 9. Configuring logging and error handling

InfoSphere MDM Server handles application and system messages by capturing the problem or condition and reporting back to the caller with a meaningful message. For certain validation failures, the response can contain multiple messages if the request has multiple valid inputs.

At run time, InfoSphere MDM Server tracks various messages to a log destination. These messages can be used to troubleshoot, diagnose, and debug the runtime problems.

The message text reported to the caller is external to the InfoSphere MDM Server application code so that developers can change or add messages without modifying the application code.

In this section, you will learn:

Understanding InfoSphere MDM Server messages

InfoSphere MDM Server messages are stored in a database. For more information on the database schema used to store the messages, refer to the Data Model `ErrorHandling.pdf`, which shows the error handling subject area of the data model.

The InfoSphere MDM Server code uniquely identifies each message, using four parameters and four tables that detail the parameters:

- **Component ID**—Uniquely identifies the component or subject matter of the message. This is defined in the COMPONENTTYPE table.
- **Error type code**—Identifies the type of problem or situation (such as a user error versus a warning). This is defined in the CDERRTYPETP table.
- **Error code**—Identifies the reason for the message. This is defined in the CDERRORMESSAGETP table.
- **Language**—Identifies the language in which the message displays. This is defined in the CDLANGTP table. The application code uses the value passed in the control header as the language to use for retrieving the error message.

For more information on each of these parameters and their associated tables, consult the data dictionary for the corresponding database table in the *IBM InfoSphere Master Data Management Server Data Dictionary*.

You can use a combination of the component ID, error type code, and error code to point to the same error message text stored in the CDERRMESSAGETP table. This allows you to identify each error message, and to reuse the error message text for multiple error situations in the application.

The Rules of Visibility and external validation features also use the error handling mechanism. Error codes used by Rules of Visibility are specified in the ERR_MESSAGE_ID field in the ENTITLECONSTRAINT table and the ones used by external validation are specified in the ERROR_CODE field in the V_ELEMENT_VAL and V_GROUP_VAL tables. Both ERR_MESSAGE_ID and ERROR_CODE represent ERR_REASON_TP_CD in the ERRREASON table.

You can set error severity levels to level five (warnings) in the ERRREASON table. If all errors encountered by the application are warnings, the transaction goes through successfully, and the warnings are reported back to the caller in the object which caused the warning. Modifying the severity of an error message can change the behavior of the transaction: certain errors that have their severity changed from a severity level of ″error″ to ″warning″ may still fail, but at a later stage in processing. For example, if the error resulting from a missing or empty mandatory field is changed to a warning, the transaction will still fail if the field is not nullable in the database.

All messages are cached within the InfoSphere MDM Server application. If you make any changes to the messages, you must restart the enterprise application before the changes are available.

Understanding unique identifiers for system log messages

To simplify troubleshooting, InfoSphere MDM Server has a serviceability feature that assigns every system log error or warning message with a unique, ten character message prefix.

Having unique message identifiers for every system log message is useful because they enable administrators and IBM Support personnel to:

- Easily identify the component from which the message originated.
- Track additional information to help to more quickly resolve the reported issue.

The format used for these unique message identifiers is `CDK<SS><NNNN><T>`, where:

- **CDK** identifies the message as being from the InfoSphere MDM Server product.
- **<SS>** is a two character code that identifies the InfoSphere MDM Server component that logged the message, such as `MA` for the Management Agent.
- **<NNNN>** is a four digit, unique numeric identifier.
- **<T>** is a one character code identifying the severity type of the message:
  - `W` – warning message
  - `E` – error, exception, or fatal message

For example, `CDKMA2036E` identifies an error message logged by the InfoSphere MDM Server Management Agent.

Note: If you are developing a custom application to work with InfoSphere MDM Server, you may wish to identify your messages with a unique ID that enables you to distinguish the custom application messages from the core InfoSphere MDM Server messages. IBM recommends that you use `CDKUS` as your message ID prefix.

Understanding severity levels

The severity of a message refers to how severe the problems is. All InfoSphere MDM Server messages are associated with a severity level.

Error codes severity levels are defined in the CDERRSEVERITYTP table. By default most problems defined for a customer do not have an explicit severity; instead, this is interpreted by the application as a fatal severity level. If the application encounters one or more errors with a severity level of fatal while executing a persistence transaction, it rolls back the transaction and returns the errors in the response.

The com.dwl.base.logging.IDWLLogger interface introduces logging severity levels. The following table shows how IDWLLogger levels are mapped to Log4J and Java logger levels:

Levels in IDWLLogger	Associated level in Log4j logger	Associated level in Java logger
OFF	OFF	OFF
FATAL	FATAL	SEVERE
ERROR	ERROR	SEVERE
WARN	WARN	WARNING
INFO	INFO	INFO
CONFIG	INFO	CONFIG
FINE	DEBUG	FINE
FINER	DEBUG	FINER
FINEST	DEBUG	FINEST
ALL	ALL	ALL

Although there are 13 levels shown in the table, InfoSphere MDM Server only uses six levels. Developers building their own extensions, additions, or external rules should follow the same guidelines when logging their messages.

- **ERROR**—Indicates severe error events that lead the application to abort. Here are some typical examples:
  - A system level error is caused by a throwable object
  - Any system failure is due to a programming error such as null pointer exception, or missing mandatory configuration
- **WARN**—Indicates potentially harmful situations, but the application continues to run. These situations are of interest to end-users or system managers
- **INFO**—Indicates informational messages that are understandable to end-users and system administrators, such as information about the execution flow through major controller- and component-level methods (for example, in preExecute and postExecute methods, and also in the entry and exit points of external rules).
- **CONFIG**—Indicates messages that provide a variety of static configuration information to assist in debugging problems that may be associated with particular configurations (for example, information on the application version, properties versions, database type and version, and others).
- **FINE**—Indicates fine-grained information events that are most useful to debug the application, and are broadly interesting to developers who do not have a specialized interest in the specific subsystem; for example, logging SQL

statements, high-level Rules of Visibility messages, external rules, business validations that are client's error, and others.

- **FINER**—Indicates very granular informational events. In general, Finer should be used for detailed tracing messages, such as showing low-level Rules of Visibility messages, any logging within loops, and similar items.

Each logging API allows the level to be configured for run time to control the level of detail in the log destination. This level can be set at any level within the logger hierarchy ranging from root; that is, the global or application level, to any package, sub-package, or class level. See the respective API documentation for more information on how to do set the levels.

It is important that the level is set to an appropriate value based on the runtime environment. If the level is more granular, the level provides more detail but slows the application performance. On the other hand, only capturing the error level logs, reduces, or even eliminates, most messages with the exception of errors, making the application faster but more difficult to debug. The default level setting is an error, and the following are guidelines for runtime environment messages:

- For development environment messages, use FINER to CONFIG.
- For testing environment messages, use:
  - ERROR for faster performance but less information about the error.
  - INFO or WARNING for more information about the error but slower performance.
- For production environment messages, use ERROR.

Logging InfoSphere MDM Server messages

Use InfoSphere MDM Server messages to troubleshoot, diagnose, and debug runtime problems. They can include fatal or warning messages. In general errors are logged at the error log level, with the exception of request validation errors, which are logged at the information level.

The InfoSphere MDM Server logging feature is highly configurable, and uses one of the two available logging APIs:

- Java Development Kit (JDK) logging
- Log4J logging

Each API offers comparable logging features, which are fully employed in InfoSphere MDM Server logging. There are three configuration files used to configure the logging behavior:

- **DWLLog.properties**—Contains the underlying logging API used; that is, this file sets the value for LoggerFactory property. You can use either:
  - com.dwl.base.logging.DWLJDKLoggerFactory for JDK logging
  - com.dwl.base.logging.DWLLog4jLoggerFactory for Log4J logging
- **JDKLog.properties**—Configures JDK logging; this is required only if JDK logging is being used. See Java 2 platform's core logging specifications for more information on various configuration options available.
- **Log4j.properties**—Configures Log4J logging; this is required only if Log4J logging is being used. See Log4J documentation for more information on various configuration options available.

The exact location of the log messages is configurable in JDK as well as Log4J. See the configuration files for the current log destination.

InfoSphere MDM Server uses the fully-qualified class name to create a logger for each class that needs logging. This creates a logger hierarchy at the class level and enables the developer or operator to filter log messages based on class, sub-package or package level. Both JDK and Log4J provide configuration to define such filters.

Adding or extending messages

Developers can customize messages by adding new ones or extending existing messages. Use the com.dwl.tcrm.utilities.TCRMExceptionUtils class to handle error, status, and exception classes and scenarios. See the API documentation in the class for more information.

The following code shows an example use of this class:

```
public class TheClass {
  private IDWLErrorMessage errHandler = null;
  public TheClass() {
     errHandler = TCRMClassFactory.getErrorHandler();
  }
  ...
  void public theMethod() throws TCRMException {
    try {
    ...
    } catch (TheException ex) {
     TCRMExceptionUtils.throwTCRMException(ex, ....., errHandler);
    }
  }
  ...
}
```

Type and error codes for new components must be defined in the database tables in order to be used with extensions and additions.

In addition, use the InfoSphere MDM Server common logging API in additions, extensions, and external rules. The com.dwl.base.logging.IDWLLogger instance can be obtained by calling the com.dwl.base.logging.DWLLoggerManager.getLogger method. The IDWLLogger interface defines various log methods and logging severity levels. Use the appropriate severity level for each logged message, as described above.

This code snippet shows an example of the recommended method for using the logging API:

```
public class TheClass {
  private static IDWLLogger logger=DWLLoggerManager.getLogger(TheClass.class);
  ...
  void public theMethod() {
    logger.fine("Entereing TheClass.theMethod()");
    ...
    logger.fine("Exiting TheClass.theMethod()");
  }
  ...
}
```

Note: See the API documentation for more information about adding or extending messages for each class and interface.

Chapter 10. Configuring external business rules

External business rules are pieces of business logic that have been externalized in order to permit customizations to the logic to be incorporated into InfoSphere MDM Server transaction processing. While every configuration option, validation requirement, or property file entry could be considered an external rule, this section discusses rules that embody the more complex business logic processing and decision-making.

There are two methods of configuring external business rules:

- Using the Extension Framework
- Using the External Rules Framework

In this section, you will learn:

Using the extension framework

The Extension Framework provides a mechanism for modifying the behavior of a service or transaction at predefined points in the application framework.

Using the Extension Framework is detailed in Chapter 2, "Customizing InfoSphere MDM Server," on page 17. In addition, configuring extensions using the Extension framework is described in the Defining Extensions section of the *IBM InfoSphere Master Data Management Server System Management Guide*.

Using the external rule framework

In contrast to the Extension Framework, which provides predefined points (that is, pre- and post-execution) for the modification of behavior of every transaction, the *External Rule Framework* allows for the customization of core business logic for specific product features.

The *External Rule Framework* is leveraged in a number of product features serving to externalize key logic that is likely to require customization to meet the needs of the specific business. The survivorship rules for merging two parties into one, for example, is something that is likely to differ from business to business. The remainder of this chapter describes how to use the External Rule Framework and the InfoSphere MDM Server external rules.

You can develop external business rules as Java classes or as rules to be executed within an external rule engine, such as JRules from ILOG, an IBM company. The majority of rules that are delivered with the product are Java rules. There is a small subset of rules that have been implemented for execution within the JRules

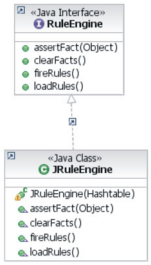
rule engine. However not every Java rule that has been provided has a corresponding rules engine implementation.

Rules of both types, Java classes or rule engine rules, may be written and configured to coexist as desired. To determine which method to use for each rule, keep the following considerations in mind:

- What is the purpose of the rule you are about to implement?
  - Rules that contain business knowledge (eligibility rules, product bundling rules) perform business judgment (suspect processing rules) or produce business event (party lifestyle management, business data corruption detection) may be implemented as either rule engine (that is, ILog JRules - .ilr rules) rules or as Java rules.
  - Rules that provide the ability to customize transaction processing logic and do not represent business policy or regulation, but are used as a plug-in point should be implemented as Java rules.
- What is the life cycle of the rule?
  - Rules that have a short life cycle or that change frequently should be developed to be executed by a rules engine.
- Does the rule need to be accessible to other programs?
  - The rules and data (such as enumerations) executed within a rules engine are not accessible to other programs (for example, consuming Java code). If the rule must be accessible this way, write a Java rule.
- Consider the type and volume of data that the application would potentially be providing to the rules engine and volume of data the will be provided to the rules within the Rules Engine.
- What is the skill set of the developers?
  - Developing rules for use by a rules engine requires a different skill set than writing pure Java rules. For example, rules written for the JRules rule engine require the creation of a Business Object Model (BOM) in Rules Studio. The BOM is an abstraction of the execution object model (XOM) of the application (for example, InfoSphere MDM Server) and it must be created using your own vocabulary, terms and needs.

Understanding the default rules engine

The rule engine that ships with the product is JRules from ILOG, an IBM company.



The External Rules Framework interacts with the JRules engine through a standardized interface, com.dwl.base.rules.RuleEngine. The JRules engine itself is ″wrapped″ in the JRuleEngine adapter class, and it is this class that is specified in the database as the rule engine type for each rule-engine rule.

The rule engine implementation used by the External Rules Framework may be replaced if desired. That is, the JRules engine may be replaced with another rules engine as long as an adapter class for the replacement rules engine is created and implements the generalized Rules Engine interface.

See also:

"To change the rule engine"

To change the rule engine

1. Create a new adapter class and implement the RulesEngine interface.
2. Update the RULEENGINEIMPL table to configure the new rule engine for the appropriate external rules.

   The fully qualified class name of the new adapter class should be configured in the RULE_ENGINE_TYPE column for the rules it will get used for.

Understanding considerations in using a Rules Engine

While InfoSphere MDM Server provides the flexibility of developing business rules as Java classes or as rules within external Rule Engine, some considerations should be given when making this choice.

- Consider the purpose of the rule you are about to implement:
  - Rules that contain business knowledge (Eligibility Rules, Product Bundling Rules), perform business judgment (Suspect processing rules) or produce business event (Party lifestyle management, business data corruption detection) can be implemented as ILog rules or as Java rules.
  - Rules that provide the ability to customize transaction processing logic and do not represent business policy or regulation, but are used mostly as a plug-in point should be implemented as Java rules.
- Consider life-cycle of the rule. Rules that have frequent and short change cycle belong in rules engine.
- Keep in mind that the rules and data (such as enumerations) within a rules engine aren't accessible to other programs such as external java code.
- Take into consideration the data and volume of data the will be provided to the rules within Rules Engine.
- Developing rules in a rules engine requires a different skill set than Java development and still requires rigor and diligence of a development process.
- Rules should be written using a Business Object Model (BOM):
  - BOM is created in Rules Studio as an abstraction of the InfoSphere MDM Server Execution Object Model (XOM).
  - BOM must be created using your vocabulary, terms and needs.

Understanding rule engine methods

The rule engine interface defines a standard set of methods that the rules engine is expected to implement.

Those methods are:

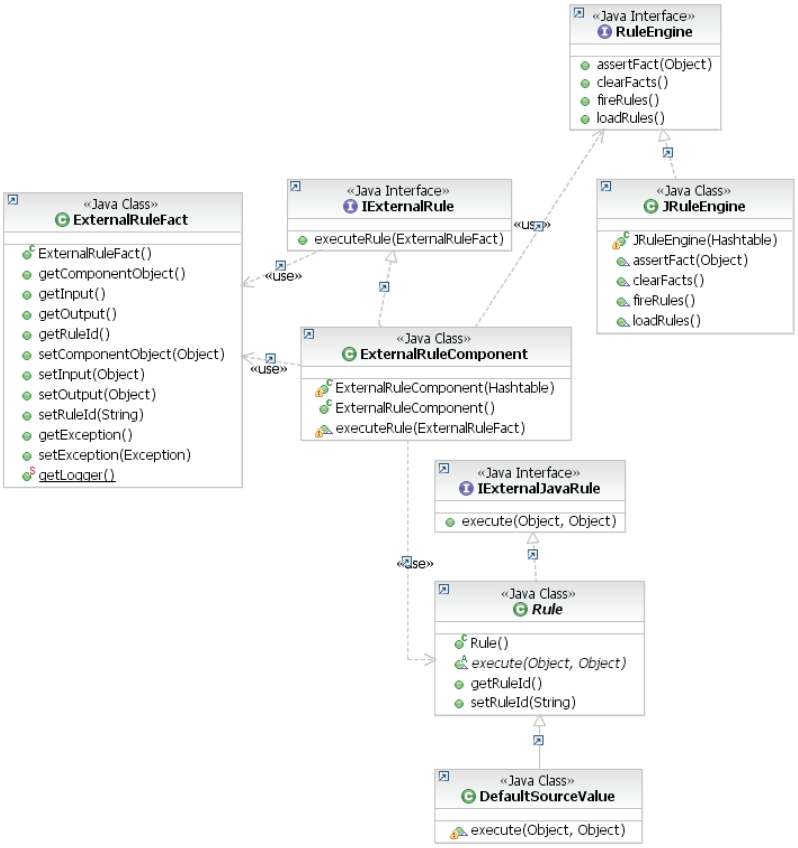
- loadRules()
- assertFact()

- fireRules()
- clearFacts()

These are a subset of the operations offered by a typical commercial rules engine, but they are the ones used by the External Rule Component.

Understanding external rules

Executing an external rule involves passing an *ExternalRuleFact* to an *ExternalRuleComponent* via the *ExternalRule interface*. The ExternalRuleComponent uses rule implementation information stored in the database to either execute a Java class or activate a rule engine to perform the rule processing. The ExternalRuleFact, ExternalRuleComponent, and ExternalRule interface are all part of the core API for the product's external rule implementation.



The ExternalRuleFact is an object defined in the dwl.base.externalrule.ExternalRuleFact class. It contains a rule ID, an input *object* and an *output object*, as well as an optional *component object* on which the rule can execute methods during processing if necessary. These objects generally also come with all their associated business objects.

Setting up the dwl.base.externalrule.ExternalRuleFact involves providing the rule ID, an input object and optionally a component object on which the rule can execute methods during processing if necessary. The ExternalRuleComponent is then invoked (executeRule()) passing this ExternalRuleFact.

"Example: The matchParty transaction configured to run in the JRules rule engine" on page 157

Example: The matchParty transaction configured to run in the JRules rule engine

This is what the component-level code of the matchParty transaction looks like in order to execute the rule configured to run in the JRules rule engine. It is implemented in `com.dwl.base.externalrule.partymatch.ilr`.

```
//set input
aExternalRuleFact.setInput(input);
//set rule id
aExternalRuleFact.setRuleId("1");
// call external rule
aExternalRuleComponent.executeRule(aExternalRuleFact);
```

The component-level code of the searchParty transaction contains similar code in order to run rule 9, which is implemented as a Java class:

```
// set input
aExternalRuleFact.setInput(input);
//set rule id
aExternalRuleFact.setRuleId("9");
//set TCRMPartyComponent as component object
aExternalRuleFact.setComponentObject(this);
//call external rule
aExternalRuleComponent.executeRule(aExternalRuleFact);
```

In this case, the component object (TCRMPartyComponent itself) is also passed within the rule fact.

Assigning the rule ID

Each rule that has been implemented is listed in the EXTRULE table, completely independent of its implementation. This table assigns the rule ID.

sauron - db2inst1 - CUST_QA - NUCLEUS - EXTRULE

RULE_ID	RULE_DESCRIPTION	INPUT_PARAM...	OUTPUT_...	COMP_OB...	CREATE
1	Rule for matching two persons				Dec 20, 2
2	Rule for matching two organizations				Dec 20, 2
3	Rule for searching suspect duplicate parties				Dec 20, 2
4	Rule for ranking person search results				Dec 20, 2
5	Rule for ranking organization search results				Dec 20, 2
6	Rule for updating party data as part of adding party				Dec 20, 2
7	Rule to determine if critical data is added				Dec 20, 2
8	Rule to determine if critical data is changed				Dec 20, 2
9	Rule for search party				Dec 20, 2

The rule ID is then mapped to a specific implementation in the EXTRULEIMPLEM table. This table maps the rule ID to an external rule implementation ID, specifies whether the rule is currently in force (active), and whether it is a rules engine (R) or Java (J) implementation. The rule location—a JRules ruleset file, for example—and the rule engine type together specify how the rule is to be executed.

EXT_RUL...	RUL...	EXT_RULE_TP_CODE	RULE_IN_...	IMPL_O...	LAST_UPDATE_DT	LAST_UPDATE_USE
1005	6	J	Y	1	Dec 19, 2001 6:21:0...	
1009	10	J	Y	1	Dec 19, 2001 6:21:5...	
1011	11	J	Y	1	Jun 9, 2002 12:00:00...	
1012	12	J	Y	1	Jun 9, 2002 12:00:00...	
1032	35	J	Y	1	Jun 10, 2004 11:49:0...	
1033	32	J	Y	1	Jun 10, 2004 11:49:0...	
1034	33	J	Y	1	Jun 10, 2004 11:49:0...	
1035	34	J	Y	1	Jun 10, 2004 11:49:0...	
1036	36	J	Y	1	Jun 10, 2004 11:49:0...	

The rule type and external rule implementation ID point to the required rule, either in the JAVAIMPL:

EXT_RULE...	JAVA_CLASSNAME	LAST_UPD...	LAST_UPD...
1,008	com.dwl.tcrm.externalrule.PartySearchExtRule	Dec 20, 20...	

or the RULEENGINEIMPL table:

sauron - db2inst1 - CUST_QA - NUCLEUS - RULEENGINEIMPL

EXT_...	RULE_SET_NAME	RULE_LOCATION	RULE_ENGINE_TYPE	S_RULE_LOCA
1,000	Match Persons	/DWL/tcrm2/tcrm/properties/partymatch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partymatch.ilr
1,001	Match Organizations	/DWL/tcrm2/tcrm/properties/partymatch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partymatch.ilr
1,002	Search Suspect Duplicate	/DWL/tcrm2/tcrm/properties/partysearch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partysearch.ilr
1,003	Rank Person Search Result	/DWL/tcrm2/tcrm/properties/partymatch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partymatch.ilr
1,004	Rank Org Search Result	/DWL/tcrm2/tcrm/properties/partymatch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partymatch.ilr
1,005	Update Party as Part of Add	/DWL/tcrm2/tcrm/properties/partyupdate.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partyupdate.ilr
1,006	Critical Data Added	/DWL/tcrm2/tcrm/properties/partymatch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partymatch.ilr
1,007	Critical Data Changed	/DWL/tcrm2/tcrm/properties/partymatch.ilr	com.dwl.base.rules.engine.JRuleEngine	d:\partymatch.ilr

Important:

- Records in RULEENGINEIMPL table, are not run if EXTRULEIMPLEM has the implementation changed to Java rules.
- Similarly, rules implemented in Java do not require any configuration in the RULEENGINEIMPL table because these do not make use of a rules engine.

Chapter 11. Configuring pluggable keys

Pluggable keys provide a single point of entry for defining the primary key for a record into a database table. You can use your own implementation to create the primary key on specific tables or on all tables

Each record in the InfoSphere MDM Server database for operational data such as contact, product, and address, is identified by a single primary key. The primary key can be generated by one of three methods:

- By using the default key generator that comes with InfoSphere MDM Server
- By plugging in a custom key generator
- By passing a primary key with the object in the service request, known as a pluggable primary key

InfoSphere MDM Server also provides a framework to generate various types of keys such as party identifiers; this is known as the key generation framework.

In this section, you will learn:

Creating keys using the default key generator

The default key generator provides a convenient way to generate random, numeric values that can be used as primary keys. The default key generator is specified in the `DWLCommon.properties` file by the following property:

```
id_factory = com.dwl.base.util.DWLIDFactory
```

This default generator generates numeric keys in the format:

```
rrrrrrrrrrii
```

where:

- r = random number
- i = an optional instance identifier

The instance identifier is a value you can configure. The instance identifier can be used in a clustered environment to eliminate the possibility of key collisions with multiple server instances. To configure the instance identifier on each server, specify a value for the following configuration element: `/IBM/DWLCommonServices/KeyGeneration/instancePKIdentifier`

Understanding the custom key generator

If you want to generate primary keys in another format, you can write your own key generate class and configure InfoSphere MDM Server to use it. For example, you could prefix a primary key with a company code followed by some random number.

You can also write different key generator classes for use with different business entities. For example, you could generate a primary key of 15 digits for questionnaires and 18 digits for questions.

See also:

"To use your customized key generator class"

"To use different key generator classes for different business entities"

To use your customized key generator class

1. Write your own Java class to generate primary keys based on your requirements.

   This Java class must implement the `com.dwl.base.util.IDWLIDFactory` interface. The primary key that is generated must be an integer and in accordance to the BIGINT data type used for the primary keys in the database.
2. Configure your key generator class in the `DWLCommon_extension.properties` file.

   For example:

   ```
   id_factory = com.mycompany.MyIDFactory
   ```

To use different key generator classes for different business entities

1. Write your own Java classes to generate primary keys of different formats based on your requirements.

   These Java classes must implement the `com.dwl.base.util.IDWLIDFactory` interface. The primary key that is generated must be an integer and in accordance to the BIGINT data type used for the primary keys in the database.
2. Configure your key generator classes in the `DWLCommon_extension.properties` file.

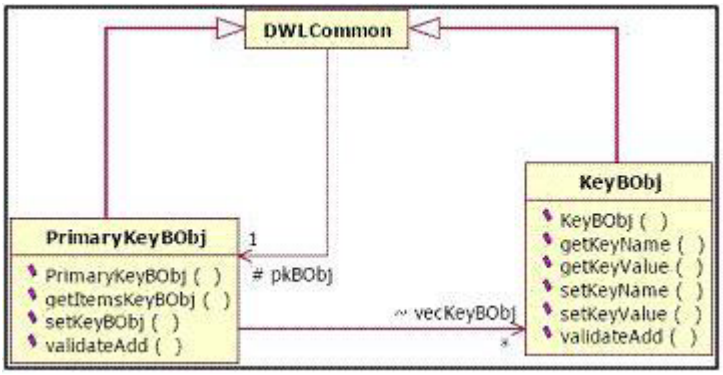
   To use an specific generator class for a business entity, append the table name in lowercase that corrresponds to the business entity, to an id_factory property. For example:

   ```
   id_factory_questionnaire = com.mycompany.MyQuestionnaireIDFactory
   id_factory_question = com.mycompany.MyQuestionIDFactory
   id_factory = com.mycompany.MyIDFactory
   ```

Understanding pluggable primary keys

The pluggable primary key feature allows you to provide explicit primary keys to use when creating business entities in InfoSphere MDM Server. For example, an external system is integrating with InfoSphere MDM Server and you want InfoSphere MDM Server to create a primary key that is the same as the primary key on the external system.

The pluggable primary key feature is available with any Add transaction in which one or more business objects are supplied. This also includes composite update-type transactions in which a new child business object is being added as part of the composite update transaction.



See also:

"To use pluggable primary keys"

To use pluggable primary keys

Specify a child `PrimaryKeyBObj` object with the primary key value, under the business object.
When you supply the `PrimaryKeyBObj` object, the key generator is bypassed. For example, the following XML representation shows a pluggable primary key for a campaign business object.

```
<TCRMCampaignBObj>
    <CampaignIdPK/>
    <CampaignName>Mortgage Promotion</CampaignName>
    <CampaignDescription>This is Mortgage Promotion
    </CampaignDescription>
    <CampaignSource>RichBank</CampaignSource>
    <CampaignType>1</CampaignType>
    <CampaignPriorityType>1</CampaignPriorityType>
    <CreatedDate>2001-05-08</CreatedDate>
    <StartDate>2001-05-08</StartDate>
    <PrimaryKeyBObj>
        <ObjectReferenceId>100</ObjectReferenceId>
        <KeyBObj>
            <KeyName> CampaignIdPK</KeyName>
            <KeyValue>5014000</KeyValue>
        </KeyBObj>
    </PrimaryKeyBObj>
</TCRMCampaignBObj>
```

Understanding unique and persistent ID generation framework

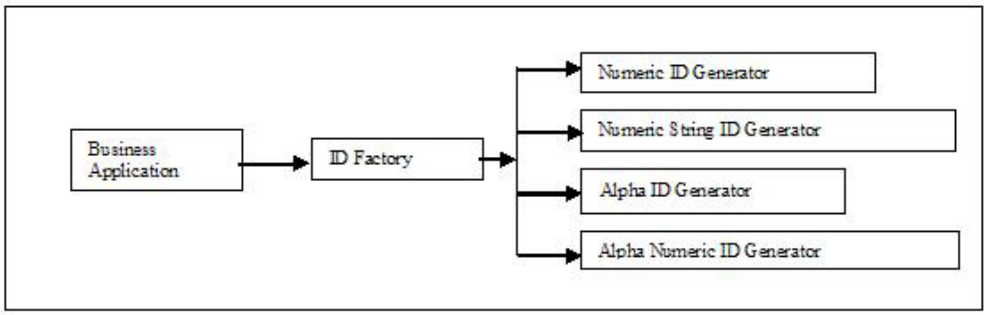
The unique and persistent ID generation framework provides the ability to:

- Generate different types of identifiers such as numeric, alphanumeric, numeric string and alphabetic
- Generate different types of identifiers of variable length
- Return a set of identifiers instead of a single identifier
- Ability to plug custom ID generators
- Ability to configure validation rules for checking the generated identifiers

An example use of the framework is to generate party identifiers that become persistent identifies that live across collapse party transactions.

You can use the unique and persistent ID generation framework to add domain specific identifier generators and plug any custom generators by following the programming model prescribed by the framework. The enhancement to the framework is implemented as asset of interfaces and the default implementation. The framework also exposes configuration properties that can be used for hooking custom generators.

The framework provides default implementations for generating generic identifiers and party identifiers. This implementation can be invoked by business applications to obtain an identifier that can be used as a primary or candidate key.



The unique and persistent ID generation framework defines the following interfaces and implementations:

- `com.dwl.base.IDWLIDFactory`
- `com.dwl.base.MDMIDGenerator`
- `com.dwl.base.MDMDomainIDValidator`

The framework also provides the default implementations of the above interfaces through the following classes:

- `com.dwl.base.util.DWLIDFactory`
- `com.ibm.base.util.MDMDomainIDFactory`
- `com.dwl.tcrm.utilities.PartyIdentifierFactory`
- `com.dwl.base.uril.NumericIDGenerator`
- `com.dwl.base.uril.NumericStringIDGenerator`
- `com.dwl.base.uril.AlphaIDGenerator`
- `com.dwl.base.uril.AlphaNumericIDGenerator`
- `com.dwl.tcrm.utilities.PartyIdentifierValidator`

For details of the classes and interface, refer to the Java API documentation. The unique and persistent ID generation framework uses the following configuration elements:

- `/IBM/DWLCommonServices/IDGeneration/NumericIDGenerator/className`
- `/IBM/DWLCommonServices/IDGeneration/NumericStringIDGenerator/className`
- `/IBM/DWLCommonServices/IDGeneration/AlphaIDGenerator/className`
- `/IBM/DWLCommonServices/IDGeneration/AlphaNumericIDGenerator/className`

In addition to the above properties that are applicable at the InfoSphere MDM Server platform level, the framework also provides the following elements specific to Party domain.

- `/IBM/Party/IdentifierGeneration/Factory/className`

- /IBM/Party/IdentifierGeneration/Validator/className
- /IBM/Party/IdentifierGeneration/Validation/enabled

See the "Understanding configuration elements in the Configuration and Management component" on page 419 topic for details about these configuration elements.

Chapter 12. Configuring Smart Inquiries

The InfoSphere MDM Server implementation only uses part of its data model, while the rest of the model, related to unused features and tables, is not used. You can configure your implementation to completely turn off parts of the data model related to unused features and tables.

When these parts of the model are turned off, the core product does not issue any database I/O request against unused tables, and does not affect any functionality around the used parts of the model. These Smart Inquiries improve processing efficiency.

For related information, see Chapter 47, "Customizing Summary Data Indicators," on page 641.

In this section, you will learn:

How disabling unused features and tables affects transactions

Disabling parts of the data model for Smart Inquiries is done by using the extension framework and the component-level, preExecute extension method. When the extension framework is invoked, it sets the skipExecutionFlag to true and the action does not continue to do DB I/O calls and return null/empty results.

The skip rule affects operational actions only when they are executed in composite inquiry transaction. The rule does not affect the granular transaction itself.

For example, if the disabling extension for getAllPartyRelationships action is activated, there are no DB I/O calls for party relationship when you run the getParty transaction. That is because the getAllPartyRelationships action is executed within the getParty transaction. However, there are DB I/O calls when you directly run the getAllPartyRelationships transaction because the action is executed as a granular transaction.

Note: Disabling a part of the data model does not affect the add and update transactions related to that part of the model.

The following table shows the operational action transactions and the related function area. When you turn off the operational action on the left, DB I/O for the related function area on the right are not performed if the action is executed as a part of a composite inquiry transaction.

Table 18. Operational actions and related function areas

Operational actions	Function area NOT performed
getAddress	Address
getAllAddressNotes	Address note
getAllAddressValues	Address Value
getAllContractAdminSysKeys	Contract Admin System Key

Table 18. Operational actions and related function areas (continued)

Operational actions	Function area NOT performed
getAllContractAlerts	Contract Alert
getAllContractComponents	Contract Component
getAllContractComponentValues	Contract Component Value
getAllContractPartyRoleAlerts	Contract Party Role Alert
getAllContractPartyRoleIdentifierByContractRoleId	Contract Party Role Identifier
getAllContractPartyRoleRelationships	Contract Party Role Relationship
getAllContractPartyRoles	Contract Party Role
getAllContractPartyRolesByParty	Contract Party Role
getAllContractPartyRoleSituations	Contract Party Role Situation
getAllContractRelationships	Contract Relationship
getAllContractRoleLocationPurposes	Contract Role Location Purposes
getAllContractRoleLocations	Contract Role Location
getAllContractsByParty	Contract
getAllContractSpecValues	Contract Spec Value
getAllIncomeSources	Income Source
getAllOrganizationAlerts	Organization Alert
getAllPartyAddresses	Party Address group
getAllPartyAddressPrivacyPreferences	Party Address privacy preference
getAllPartyAlerts	Party Alert
getAllPartyBankAccounts	Bank Account
getAllPartyChargeCards	Charge Card
getAllPartyContactMethodPrivacyPreferences	Party contact method privacy preference
getAllPartyContactMethods	Party contact method group
getAllPartyIdentifications	Identifier
getAllPartyLobRelationships	Party line of business relationship
getAllPartyLocationPrivacyPreferences	Location group privacy preference
getAllPartyPayrollDeductions	Payroll Deduction
getAllPartyPrivacyPreferences	Party privacy preference
getAllPartyRelationships	Contact Relationship
getAllPartyValues	Party Value
getAllPersonAlerts	Person Alert
getAllPrivacyPreferences	Privacy preference
getAllProductAdminSysKeys	Product Admin System Key
getAllProductCategoryAssociations	Product Category Association
getAllProductIdentifiers	Product Identifier
getAllProductInstanceRelationships	Product Instance Relationship
getAllProductSpecValues	Product Spec Value
getContactMethod	Contact method
getFinancialProfile	Financial Profile

Table 18. Operational actions and related function areas (continued)

Operational actions	Function area NOT performed
getHolding	Holding

Disabling unused features and tables for Smart Inquiries

The extensions for disabling parts of the data model are inactivated in the gold data.

These extensions must be activated to disable the related part of the data model.

To disable part of the data model for smart inquiries:

- Activate the extension, using the SQL statement:

  ```
  update extensionset set inactive_ind = 'N' where extension_set_id =?
  ```

  Where ? is the extension set ID for the specified extension for that disabling model.

  For example, to disable the FinancialProfile function area, which has the extension set ID number 47, activate the disabling extension, by executing the following SQL:

  ```
  update extensionset set inactive_ind = 'N' where extension_set_id =47
  ```

See also:

"Administering Smart Inquiries"

Administering Smart Inquiries

Smart Inquiries does not require any special administration.

Chapter 13. Customizing search SQL queries

InfoSphere MDM Server allows clients to either write their own SQL queries to execute customized searches, or to use the existing search methods.

You will learn the terminology used throughout this section, followed by an overview of the search framework, and finally, you will learn how InfoSphere MDM Server implements the framework to provide this point of customization in the product, and how the addition of custom operators for spec value searches are allowed for.

Learning search terminology

The following terms are used when discussing customizing SQL for searches:

- **Pre-written SQL**—Specifies a complete and valid SQL statement that can be executed against a database. A collection of pre-written SQL statements can be initialized at the startup, and an appropriate SQL can be selected based on the search request input parameters.
- **SearchBy<predefined criteria> methods**—Specifies the search methods defined in the component. These methods implement most of the search logic including the construction of SQL statement, determination of which input parameters to include or exclude from the search and which fields to return in the search as well as input parameter standardization. Examples of these methods include searchPersonByName, searchPersonByIdentification, searchOrganizationByName etc.
- **Criterion**—Defines a single field, which is being searched on. The ordered collection of all criterions, as they appear in the SQL, defines the SQL criteria.
- **Comparison Operator**—Defines the comparison being performed for each criterion field. Examples include ″=″, ″LIKE″ etc.
- **Search Input Parameters**—Specifies the field values passed in a request as the search business object attributes and the primary fields to be searched on.
- **Supplementary Search Parameters**—Specifies any additional parameters required to execute the search transaction. Those additional parameters are referred to as supplementary search parameters. The values for such parameters are not included in the search business object, instead are accessed from system configuration, for example, a properties file or the request header.

In this section, you will learn:

Understanding the Search framework

The Search framework is a lightweight framework designed as an InfoSphere MDM Server common service. Interfaces and classes, which constitute the search framework, can be classified into two main categories: SQL definition classes; and SQL execution classes.

Learning SQL definition classes

The SQL definition classes and interfaces define the structure of a search SQL statement.

Using these classes, the clients can create new search SQL statements, fetch SQL statements, and pass these to the framework's execution classes to perform the search. The following list shows the classes that are included in this category.

- **SearchSql**—Represents the SQL to be executed for the search transaction. This SQL can either be selected from a library of pre-written SQL statements or dynamically constructed using the search input class. In addition to the SQL statement, it also captures the input and output for the SQL statement. The input is represented by an ordered collection of CriterionElement objects while the output is captured by an instance of an implementation of IResultSetProcessor, which is initialized with an ordered list of fields returned by the SQL statement.
- **SearchField**—Defines a search related field. It can be a field used in the search criteria or a field included in the search results. The attributes of this class include name and type of the search field.
- **ComparisonOperator**—Represents a comparison operator, which is applied to a search field in the SQL. Examples include ″=″ or ″LIKE″. Since there is a known finite list of operators, the class provides instances of each of these operators and is not extensible and cannot be instantiated by any other class.
- **CriterionElement**—Represents an individual criterion element. Each element is composed of a field name as well as the comparison operator for that field. If the same field can be provided multiple times as search criteria (for example, CategoryName in searchProductInstance), an additional sequence number can be provided to uniquely identify each criterion. If the same field can be provided multiple times as search criteria (for example, CategoryName in searchProductInstance), an additional sequence number can be provided to uniquely identify each criterion. Finally, criterion elements are discriminated whether they are supplementary, or not.
- **ISearchInput**—Defines the interface to be implemented by any search input class. A search input class wraps the existing SearchBObj class. One search input class is needed for each SearchBObj class. The interface provides methods to extract and standardize input parameters.
- **SearchInput**—SearchInput is abstract class that implements the ISearchInput interface and provides some common implementation logic for search input concrete classes. The SearchInput classes map the attributes of their respective search business object to the corresponding search field. These classes also implement logic to provide values for the supplementary search fields. A hierarchy similar to the one used for the search business object classes is used to model these search input classes. As a general rule, there should be one search input class for each search business object class. Each search business object results in exactly one search result set business object. The same is true of search input and the corresponding search result set processor class.

Learning SQL execution classes

The SQL execution classes provide services to execute a search SQL statement and process its results. The following list shows the classes that are included in this category.

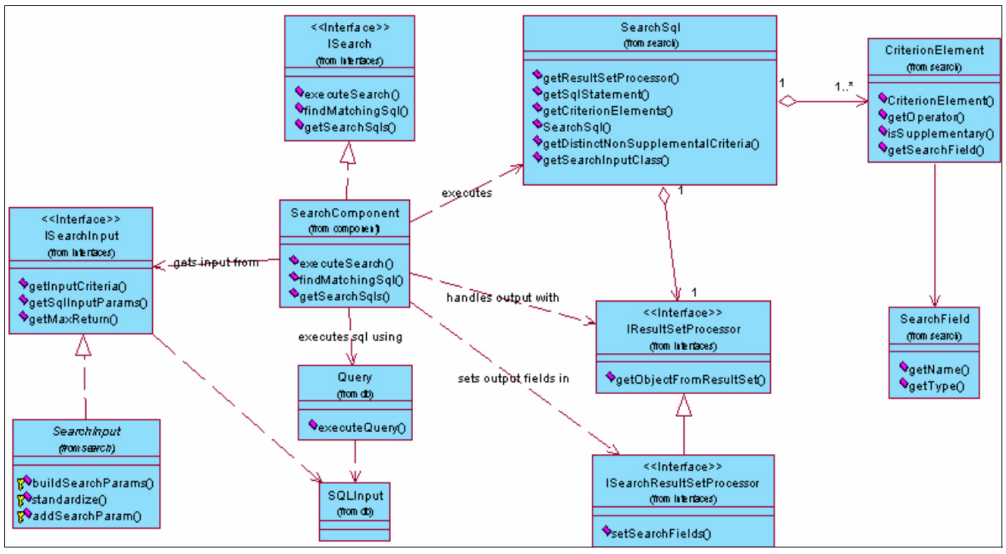
- **ISearch**—Specifies an interface that defines the search component interface to provide different search related services, including fetching pre-written SQL statements, finding a matching pre-written SQL, and executing a search SQL.
- **SearchComponent**—Specifies a concrete implementation of the ISearch interface.
- **IResultSetProcessor**—Specifies an interface that defines the contract that should be implemented by any search result processor classes.

The implementing class processes the results of a search query. These classes are initialized with an ordered list of fields returned by the search query. This list is then used by the class to extract the data from the query results and set the data in the corresponding search result business object class. Given that the search result business objects do not inherit from other search result business objects, the search result processor classes do not follow the inheritance structure either. As a general rule, there should be one search result processor class for each search result business object.

Note: Query and SQLInput classes are not part of the search framework but are used by the framework for executing SQL statements.

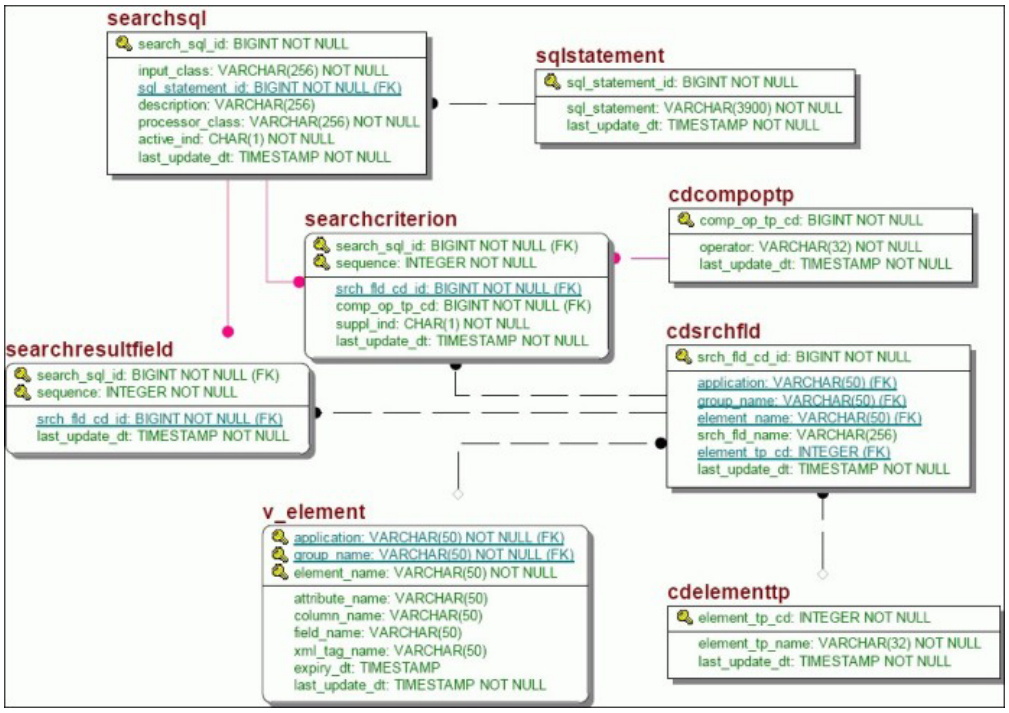
Learning search framework classes

The search framework class diagram shows the main classes and their associations that make up the search framework:



Learning stored SQL statements

These SQL statements are fetched and cached in the application. The following diagram shows the tables and their relationships, which contain the SQL statements.



The following provides a brief description of these tables:

- **searchsql**—Contains pre-written SQL statements.
- **searchcriterion**—Contains an ordered list of criterion fields for the given pre-written SQL.
- **searchresultfield**—Contains an ordered list of search result fields for the given pre-written SQL.
- **sqlstatement**—Contains the actual SQL statement that will be executed.
- **cdcompoptp**—Contains the available comparison operators.
- **cdsrchfld**—A code table which represents individual search fields that take part in the search transactions. These can be search input (criterion) or output (result) fields. If a search field is mapped directly to an attribute of a business object (search or search result), it will be defined using the foreign key (application, group and element) to the v_element table. All other search fields will be defined using the srch_fld_name column. Each search field has a type as defined by the cdelementtp table.
- **cdelementtp**—Defines all available search field types.
- **v_element**—An existing table which defines all attributes of the business objects.

See also:

"Sample: Searching with SQL queries"

Sample: Searching with SQL queries

The following examples illustrate how the search framework classes define the structure of a SQL statement.

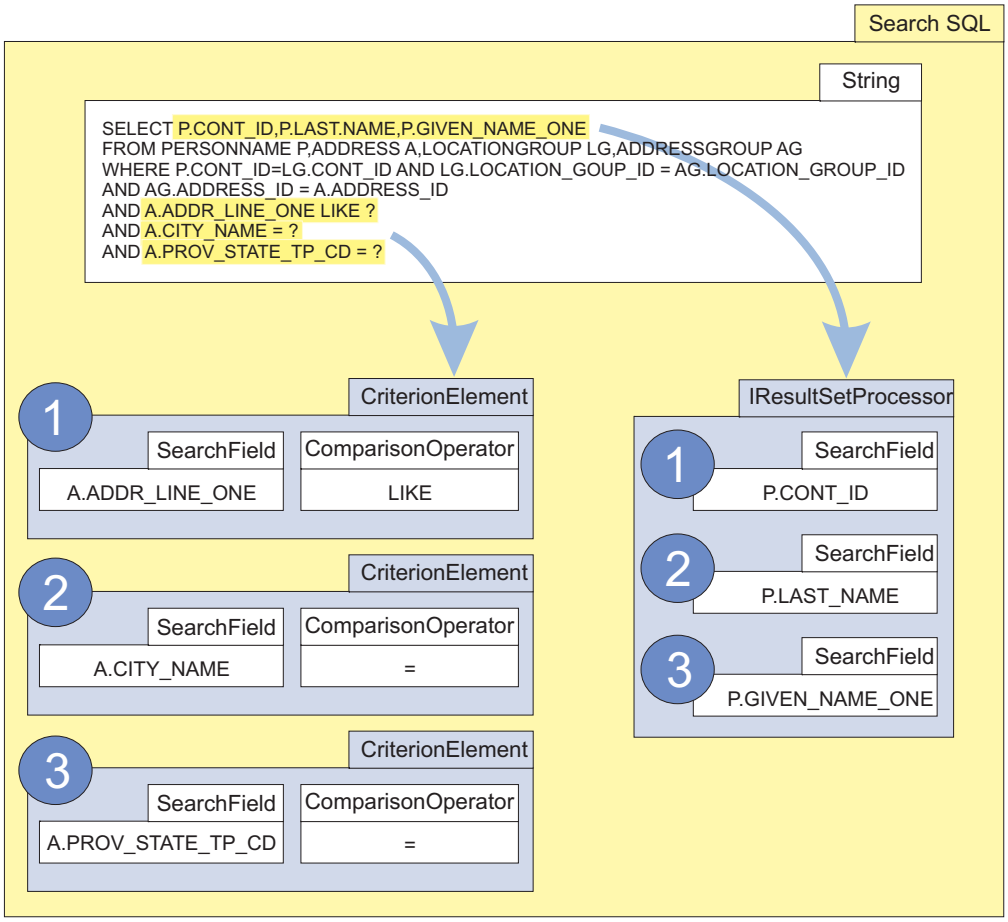
Simple example

In this example, InfoSphere MDM Server is searching for a person's last name, given name one and party ID, using parts of the person's address information: the address line 1, city name and the province code.

The following SQL statement can be used to perform this search transaction.

```
SELECT P.CONT_ID, P.LAST_NAME, P.GIVEN_NAME_ONE
FROM PERSONNAME P, ADDRESS A, LOCATIONGROUP LG, ADDRESSGROUP AG
WHERE P.CONT_ID = LG.CONT_ID
AND LG.LOCATION_GROUP_ID = AG.LOCATION_GROUP_ID
AND AG.ADDRESS_ID = A.ADDRESS_ID
AND A.ADDR_LINE_ONE LIKE ?
AND A.CITY_NAME = ?
AND A.PROV_STATE_TP_CD = ?
```

The following diagram shows how the above SQL can be represented using the classes provided by the search framework.



Complex example

In the following example, the search framework is set up to search for products given a product type id and several category names. There are two ways in which multi-occurring search criteria can be specified in the predefined SQL. One is to explicitly identify each repeated element, as in the following example SQL:

```
SELECT PROD.NAME, PROD.PRODUCT_TYPE_ID,  PROD.SHORT_DESCRIPTION,
PROD.PROD_STRUC_TP_CD, PROD.STATUS_TP_CD, PROD.PRODUCT_ID
FROM PRODUCT PROD, CATEGORY CAT, PRODUCTCATEGORYASSOC PCASS
WHERE PROD.PRODUCT_ID = PCASS.PRODUCT_ID
AND CAT.CATEGORY_ID = PCASS.CATEGORY_ID
AND PROD.PRODUCT_TYPE_ID = ?
AND (CAT.NAME = ? OR CAT.NAME = ?)
```

This SQL statement would be matched on only when exactly 2 categories were specified as search criteria, and requires that the SAME_CRITERION_SEQ value of the category name search criterion be specified (and unique – starting from 1, incremented by 1).

If, however, you wish for the multi-occurring attribute (also known as repeatable criteria) to be of an unspecified number and simply wish for them to be ORed with each other (as is typically the default behavior for multi-occurring fields), use the "/*<" and ">*/" place holders in the prewritten SQL. This SQL will be reconstructed using what is specified within these placeholders. So if the following SQL is configured:

```
SELECT PROD.NAME, PROD.PRODUCT_TYPE_ID, PROD.SHORT_DESCRIPTION,
PROD.PROD_STRUC_TP_CD, PROD.STATUS_TP_CD, PROD.PRODUCT_ID
FROM PRODUCT PROD, CATEGORY CAT, PRODUCTCATEGORYASSOC PCASS
WHERE PROD.PRODUCT_ID = PCASS.PRODUCT_ID
AND CAT.CATEGORY_ID = PCASS.CATEGORY_ID
AND PROD.PRODUCT_TYPE_ID = ?
AND /*<CAT.NAME=?>*/
```

If four category names are present as search criteria, then the following SQL would result before the query is executed:

```
SELECT PROD.NAME, PROD.PRODUCT_TYPE_ID,  PROD.SHORT_DESCRIPTION,
PROD.PROD_STRUC_TP_CD, PROD.STATUS_TP_CD, PROD.PRODUCT_ID
FROM PRODUCT PROD, CATEGORY CAT, PRODUCTCATEGORYASSOC PCASS
WHERE PROD.PRODUCT_ID = PCASS.PRODUCT_ID
AND CAT.CATEGORY_ID = PCASS.CATEGORY_ID
AND PROD.PRODUCT_TYPE_ID = ?
AND (CAT.NAME = ? OR CAT.NAME = ? OR CAT.NAME = ? OR CAT.NAME = ?)
```

This requires a single CRITERIONELEMENT to be specified with a SAME_CRITERION_SEQ value of null or 1 to be specified.

Note: Errors will result in the application if you try to mix the above two variations for the same criteria name. That is, for example, the two independent strings, "CAT.NAME = " and /*<CAT.NAME=?>*/, must never appear within the same SQL statement and the category name criterion elements must be set up for only one or the other type.

Understanding InfoSphere MDM Server Search implementation

Many search implementations in InfoSphere MDM ServerI use this search framework, including Product, Party and Contract.

Typically, for those services that tap into the search framework, a search rule is called.

The search rule is an external and customizable logic, which can be implemented as a regular Java class or as ILog JRule. Regardless of which implementation is used, it performs the same logic and since the client implementation has the ability to override the default implementation, it offers the maximum flexibility to modify the search behavior. The default implementation of the search rule provides the following functionality:

- You can call the SearchComponent to execute the search using a pre-written SQL, which can handle the current input parameters.
- If no pre-written SQL is found, you can carry out the search transaction by invoking the appropriate searchBy<predefined criteria> methods.
- You can apply inquiry level to fetch additional details.

In this section, you will learn:

Comparing search methods

The following table provides a comparison of different search methods available to implement a search transaction.

Factor	Pros	Cons	When to use
Pre-written SQL	• Customizable by client • Easier SQL optimization • Advanced SQL features • SQL may be pre-compiled for better performance • Ease of use for all existing search types	• One pre-written SQL can only handle one combination of input parameters. Overuse of this method may result in an excessive number of pre-written SQL statements.	• No predefined criteria method is available for the input parameter combination. • A predefined criteria method is available, however its implementation is not as per specific search transaction requirements (functional or nonfunctional, e.g. performance). • Advanced SQL features or an SQL specific to the DBMS is to be used to perform the search.
searchBy <pre-defined criteria>	• Ease of use for all predefined search criteria • Additional and specialized logic possible for each predefined criteria	• Criteria are predefined by the InfoSphere MDM Server product so clients cannot customize it. • Current® implementation requires multiple SQL calls to fetch the required search result.	• A predefined criteria method is available for the input parameter combination and its implementation is as per the specific requirements for the search transaction.
Dynamic SQL construction	• Customizable by client • Slight variations in search criteria can be handled with generic code without having to write SQL for each	• A generic implementation to handle SQL construction for various combinations of input parameters can be complex • Optimizing the resulting SQL will require the construction code to be modified which may not be practical.	• Similar to pre-written SQL, but is preferable if there is a slight variation in certain group input search parameters and the number of combinations are too many to be coded as pre-written SQL for each combination.

Understanding requirements for adding and editing SQL statements

Keep the following points in mind when adding or editing search SQL statements:

- The SQL statement must be valid SQL for the current RDBMS. Using standard SQL syntax is recommended as this helps to port the application to other databases without modifying the SQL. Only use RDBMS-specific features if the standard SQL syntax does not meet your needs.
- The SQL statement must be a SELECT statement.
- The SQL must have placeholders for each field-the criterion elements-being searched on.
- Each criterion element included in the SQL must map to an attribute in the search business object or be marked as a supplementary parameter.
- The columns included in the select list must map to the attributes of the search result business object. It can be a direct one-to-one, one-to-many, many-to-one, or a transformation mapping. It is up to the search result processor class to implement this mapping.
- There are minimum column requirements for each type of search. This is to ensure that the resulting search result business object meets the minimum data requirement. For example, for party, person and organization search, the partyId field must be included in the select list to uniquely identify the party.

Customizing search features

InfoSphere MDM Server clients have the flexibility to extend and customize search logic while using the search framework to provide the lower level services.

When customizing the Search feature, you can add to the default collection of pre-written SQL statements, or to update an existing SQL statement to meet your specific needs. This is be done by adding to or updating the pre-written SQL statement data.

Note: In order to customize the search function, you must understand SQL, and have an in-depth understanding of the InfoSphere MDM Server data model.

See also:

"To add prewritten SQL queries"

"To edit prewritten SQL queries" on page 177

To add prewritten SQL queries

1. Determine which search method should be used in the search statement.

   A search statement is defined by its input criteria and the entity being searched, for example, Person vs. Organization.

   Note: Adding or updating a prewritten SQL statement which handles the same combination of input parameters as an existing searchBy<predefined criteria> method hides the original searchBy<predefined criteria> method. Ensure that the SQL search statement you are creating is unique, unless you intend to override an existing search statement.
2. Write an SQL statement for the search.
3. Identify the search input class that this pre-written SQL statement belongs to. See "Adding new search input and output" on page 180 for a list of search

input and output classes and the search fields available in each class, as well as information on how the class is mapped to the database.

4. Identify both input search criteria and output search fields for the given prewritten SQL in the CDSRCHFLD table.
5. Insert the data in the following tables for the given SQL:
   - SQLSTATEMENT
   - SEARCHSQL
   - SEARCHCRITERION
   - SEARCHRESULTFIELD

   The following is an example SQL script to insert data into these tables.

   Note: Please note that the insert into SQLSTATEMENT table for DB2 on z/OS does not work properly if the SQL statement column value is greater than 256 chars. In this case, you must import the data into the SQLSTATEMENT table instead of inserting it.

```
INSERT INTO SQLSTATEMENT VALUES
   (3,
    'SELECT PS.GIVEN_NAME_ONE, PS.GIVEN_NAME_TWO, ...',
    CURRENT TIMESTAMP);


INSERT INTO SEARCHSQL VALUES
   (3,
    'com.dwl.tcrm.coreParty.search.TCRMPersonSearchInput',
    3,
    'Search Party by field1, field2, field3, ...',
    'com.dwl.tcrm.coreParty.component.TCRMPersonSearchResultSetProcessor',
    'Y',
    CURRENT TIMESTAMP);


INSERT INTO SEARCHCRITERION VALUES (3, 1, 47, 2, 'N', CURRENT TIMESTAMP);
INSERT INTO SEARCHCRITERION VALUES (3, 2, 48, 1, 'N', CURRENT TIMESTAMP);
INSERT INTO SEARCHCRITERION VALUES (3, 3, 34, 1, 'N', CURRENT TIMESTAMP);
INSERT INTO SEARCHCRITERION VALUES (3, 4, 35, 1, 'N', CURRENT TIMESTAMP);


INSERT INTO SEARCHRESULTFIELD VALUES (3, 1, 51, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 2, 52, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 3, 53, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 4, 54, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 5, 55, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 6, 43, CURRENT TIMESTAMP);
COMMIT;
```

6. Restart the application servers to allow for the changes to take effect.
7. Test the new search SQL statement by running a search transaction with a set of input parameters, which match the SQL statement criteria.

To edit prewritten SQL queries

1. Determine which search method should be used in the search statement.

   A search statement is defined by its input criteria and the entity being searched, for example, Person vs. Organization.

   Note: Adding or updating a prewritten SQL statement which handles the same combination of input parameters as an existing searchBy<predefined criteria> method hides the original searchBy<predefined criteria> method. Ensure that the SQL search statement you are creating is unique, unless you intend to override an existing search statement.
2. Write an SQL statement for the search.

3. Identify the search input class this prewritten SQL statement belongs to. See "Adding new search input and output" on page 180 for a list of search input and output classes and the search fields available in each class, as well as information on how the class is mapped to the database.
4. Identify both input search criteria and output search fields for the given prewritten SQL statement in the CDSRCHFLD table.
5. Edit the data in the following tables for the given SQL:
   - SQLSTATEMENT
   - SEARCHSQL
   - SEARCHCRITERION
   - SEARCHRESULTFIELD

   The following is an example SQL script to insert data into these tables.

   Note: The insert into SQLSTATEMENT table for DB2 on z/OS does not work properly if the SQL statement column value is greater than 256 chars. In this case, you must import the data into the SQLSTATEMENT table instead of inserting it.

```
INSERT INTO SQLSTATEMENT VALUES
   (3,
    'SELECT PS.GIVEN_NAME_ONE, PS.GIVEN_NAME_TWO, ...',
    CURRENT TIMESTAMP);


INSERT INTO SEARCHSQL VALUES
   (3,
    'com.dwl.tcrm.coreParty.search.TCRMPersonSearchInput',
    3,
    'Search Party by field1, field2, field3, ...',
    'com.dwl.tcrm.coreParty.component.TCRMPersonSearchResultSetProcessor',
    'Y',
    CURRENT TIMESTAMP);


INSERT INTO SEARCHCRITERION VALUES (3, 1, 47, 2, 'N', CURRENT TIMESTAMP);
INSERT INTO SEARCHCRITERION VALUES (3, 2, 48, 1, 'N', CURRENT TIMESTAMP);
INSERT INTO SEARCHCRITERION VALUES (3, 3, 34, 1, 'N', CURRENT TIMESTAMP);
INSERT INTO SEARCHCRITERION VALUES (3, 4, 35, 1, 'N', CURRENT TIMESTAMP);


INSERT INTO SEARCHRESULTFIELD VALUES (3, 1, 51, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 2, 52, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 3, 53, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 4, 54, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 5, 55, CURRENT TIMESTAMP);
INSERT INTO SEARCHRESULTFIELD VALUES (3, 6, 43, CURRENT TIMESTAMP);
COMMIT;
```

6. Restart the application servers to allow for the changes to take effect.
7. Test the new search SQL statement by running a search transaction with a set of input parameters, which match the SQL criteria.

Understanding SQL lookup constraints

In order for the pre-written SQL statement to be successfully fetched in the FETCH algorithm, there are a number of points to keep in mind while designing the search SQL statements. They are:

- The SQL lookup algorithm only considers the search input parameters passed into the search business object to perform the lookup.

- A pre-written SQL will only be selected if each non-null and non-blank input parameter passed into the request has a corresponding criterion element in the SQL criteria and the SQL does not contain any additional non-supplementary criterion elements.
- A criterion element may appear multiple times in the SQL. The algorithm only uses the unique collection of criterion elements to look up the SQL and ignores the duplicate instances of the same criterion element. The same input parameter is used while executing the query as a value for all instances of that criterion element.
- Lookup only considers the criterion element including the name and the comparison operator. Other elements of the SQL criteria are not considered. For example, the combination operator (AND, OR), and the order of criterion elements are not considered during the lookup.
- If there are multiple SQL statements with the same collection of criterion elements, InfoSphere MDM Server selects the first one in the list, and ignores the other SQL statements. This scenario should be avoided.

The following table provides examples of the algorithm results for different combinations of search input parameters and the SQL criteria.

#	Input Parameters	SQL Criteria	Match	Comments
1	[A,=] -see note [B,=]	[B,=] [A,=]	Yes	Order of elements is not relevant.
2	[A,LIKE] [B,=]	[B,=] [A,=]	No	A's comparison operator is different
3	[A,=] [B,=]	[B,=] [C,=] [A,=]	No	C is a non-supplementary criterion whose input parameter is not provided
4	[A,=] [B,=]	[B,=] [C,=,supplementary] [A,=]	Yes	All non-supplementary elements are provided.
5	[A,=] [B,=] [C,=]	[C,=] [A,=]	No	B does not have a criterion element.
6	[A,=] [B,=]	[A,=] [B,=] [B,=]	Yes	B is duplicate but the unique collection of criterion elements has a complete match.

Note: Where A is the search field name, for example, last name or address line or date of birth, and "=" is the comparison operator.
Please note that these constraints are only valid if the SQL is included in the pre-written SQL collection. If the SQL is being dynamically constructed based on the input parameters, the above constraints do not apply.

Constructing dynamic SQL statements

The search framework supports the dynamic creation of an SQL statement, based on the search business object.

This can be accomplished by editing the appropriate search rule to add logic to construct the SQL query to be used for the current search transaction.

The best place to customize the search to add dynamic construction of SQL would be the search rule.

See also:

"To construct dynamic SQL statements"

To construct dynamic SQL statements

1. Create an SQL string to use for the current search. Construct the WHERE clause of the SQL statement from the search business object's non-null and non-blank attributes. The SELECT column list may or may not depend on the input parameters.
2. Create an ordered collection of CriterionElements, which represent the SQL criteria.
3. Create an instance of the appropriate search result set processor class to handle the list of columns being selected.
4. Create an instance of SearchSQL, using the SQL statement, criterion elements and the search result set processor.
5. Create an instance of the appropriate search input class by passing in the search business object.
6. Execute the search using the search component by passing the search SQL statement and the search input class.

Adding new search input and output

Clients may require searching on or searching for additional fields not provided by the existing implementation.

See also:

"To add search input and output"

To add search input and output

1. Define new classes by extending the existing search business objects.
2. Define new search input classes to handle the new search business object extensions and overwrite methods to build search input parameters.
3. Write new search result set processor, if new fields are being searched for, by implementing the IResultSetProcessor interface.
4. Determine the search method to be used for this search request; the two options are prewritten SQL statement or dynamic SQL statement construction.

Understanding business object inheritance

All search-related fields for IBM InfoSphere Master Data Management Server are added to the CDSRCHFLD table.

Currently the v_element table contains all the attributes of all search and search result business objects. However, since some of these classes have an inheritance relationship, all the parent attributes are repeated for the child object as well. For instance, the group PersonSearch contains all PartySearch attributes, in addition to its own attributes.

In the object model however, parent attributes exist only once in the TCRMPartySearchBObj, and then the TCRMPersonSearchBObj inherits them. Since a search field is identified by a unique name, duplicate rows in the v_element table for essentially the same attribute would break the unique constraint on the search field. To avoid this problem, the object model uses the attribute that belongs to the highest class—or group as it is called in the v_element table—in the hierarchy. For instance, all TCRMPartySearchBObj attributes are mapped to elements belonging to the PartySearch group in the v_element table; the same attributes belonging to the PersonSearch group are ignored.

Adding new comparison operators

This section describes how support for a custom operator can be added to the spec value search capabilities of InfoSphere MDM Server.

To add a custom operator, the following must be done:

- a new type code must be added to the CDXMLCOMPOPTP table
- a method must be overridden at the search query construction level of the application, and
- the class containing this method must be defined in configuration in order to be instantiated instead of the default class

The standard code table services can be used to add the custom type code (and its translated values) to the CDXMLCOMPOPTP code table. See the *IBM InfoSphere Master Data Management Server Common Data Dictionary* for details. There are primarily two attributes for this new type code: the type code itself and the name.

Depending on the database platform configured to work with InfoSphere MDM Server, the corresponding spec value search query class should be subtyped:

Table 19. Query class name subtypes by database platform

Database	**Query Class Name (in com.ibm.mdm.common.spec.search.sql)**
DB2 V9.5 for Linux, Unix, and Windows	NativeDBSpecValueSearchSQLDB2
DB2 V9.7 for Linux, Unix, and Windows	NativeDBSpecValueSearchSQLDB2
Oracle 11g	NativeDBSpecValueSearchSQLOracle
DB2 V9 for z/OS	NativeDBSpecValueSearchSQLDB2v90z
DB2 V8 for z/OS	EntityIndexTableSpecValueSearchSQL

The fully qualified name of the custom class should then be stored in the `/IBM/Product/SpecValueSearch/SpecValueSearchSQL/className` configuration item. Note that there is a default value for the class, configured dynamically by InfoSphere MDM Server at runtime; however, you can define a static class if you know which database you are using.

Finally, the processCustomizeOperation method should be implemented to handle the custom operator type. It should include validations specific to this operator, handle the construction of the query snippet given the requirements of the new operator.

See also:

"Sample: Adding the custom operator type code"

Sample: Adding the custom operator type code

Because searching for elements in a set of specified values is not supported, this guide will illustrate this using a simple example of adding an *in* operator to the searchProductInstance service.

For our example, we assume that our new entry has a type code of 1000001 and name of *in* and that you are running on DB2 V9.5 for Linux, Unix, and Windows, the custom class can be represented as follows:

```
class MySpecValueSearchSQL extends NativeDBSpecValueSearchSQLDB2 {

  protected String processCustomizeOperation(
      SpecValueSearchCriteriaBObj svsc, String path, String datatype,
      boolean isLocaleSpecific, boolean isCaseSensitive
      )throws Exception {

   //e.g. return fn:upper-case(.) = (fn:upper-case("a"),fn:upper-case("b"))
   StringBuffer sqlSnippet=new StringBuffer();
   if("1000001".equals(svsc.getOperatorType())){
     //1000001 is in
     //do some validations base on criteriaBObj, throw business exception if needed
     sqlSnippet.append(provideSelfAxis(datatype,isCaseSensitive)+" = (");

     for(int i=0;i<svsc.getItemsValue().size();i++){
       if(i>0){
         sqlSnippet.append(",");
       }
       sqlSnippet.append(convertXQueryDatatype(datatype,
                  svsc.getItemsValue().elementAt(i),isCaseSensitive));
     }
     sqlSnippet.append(")");
     }else{
       super.processCustomizeOperation(svsc, path, datatype,
             isLocaleSpecific, isCaseSensitive);
     }
     return sqlSnippet.toString();
  }
}
```

For DB2 V8 for z/OS, the class can be represented slightly differently, because the internal index table is used:

```
class MySpecValueSearchSQL extends EntityIndexTableSpecValueSearchSQL {

  protected String processCustomizeOperation(
      SpecValueSearchCriteriaBObj svsc, String path, String datatype,
      boolean isLocaleSpecific, boolean isCaseSensitive
      )throws Exception {

   //e.g. return UPPER(svi.string_value) in ( ? , ? )
   StringBuffer sqlSnippet=new StringBuffer();
   if("1000001".equals(svsc.getOperatorType())){
     //1000001 is in
     //do some validations base on criteriaBObj, throw business exception if needed
     String columnName=SpecValueSearchConstant.datatypeDBFieldMap.get(datatype);
     String columnAlais="svi."+columnName+" ";
     if(datatype.equalsIgnoreCase("mdmspec:localizedString")
                  || datatype.equalsIgnoreCase("xsd:string")){
      if(!isCaseSensitive)
        columnAlais="UPPER(svi."+columnName+") ";
      }
```

```
            sqlSnippet.append(columnAlais+" in (");
            for(int i=0;i<svsc.getItemsValue().size();i++){
               if(i>0){
                 sqlSnippet.append(",");
               }
               sqlSnippet.append(" ? ");
             }
             //additional space needed at tail
             sqlSnippet.append(") ");
           }else{
             super.processCustomizeOperation(svsc, path, datatype,
                   isLocaleSpecific, isCaseSensitive);
           }
           return sqlSnippet.toString();
       }
     }
```

Chapter 14. Configuring the service activity monitoring facility

The service activity monitoring facility provides a way to capture the system information generated by the InfoSphere MDM Server product.

The data provided by the service activity monitoring facility could be used to produce system reports for capacity planning and identifying areas of optimization, and can demonstrate how InfoSphere MDM Server services and transactions are being used in a given installation.

The service activity monitoring facility provides information about every transaction request processed by InfoSphere MDM Server. The following information is made available through a JMX notification mechanism:

- transaction name
- start time
- size of the request and response
- transaction duration
- transaction outcome

Optionally, this data can also be captured in a log file.

In this section, you will learn:

Understanding service activity monitoring facility information

This table describes the InfoSphere MDM Server data provided by the Service Activity Monitoring facility.

Table 20. Data captured by the Service Activity Monitoring facility

Element name	Type	Data origin
transactionName	java.lang.String	DWLTransaction.getTxnType() **Important:** For composite transactions, the `thransactionName` value is constructed as the combination of all the transaction names inside the composite transaction, separated by slashes, prefixed with `CompositeTx`. For example: `CompositeTx/searchParty/addParty/updateParty`.
requestName	java.lang.String	DWLControl.getRequestName()
requesterName	java.lang.String	DWLControl.getRequesterName()
requesterLanguage	java.lang.String	DWLControl.getRequesterLanguage()
requesterLocale	java.lang.String	DWLControl.getRequesterLocale()
lineOfBusiness	java.lang.String	DWLControl.getLineOfBusiness()
company	java.lang.String	DWLControl.getCompany()
geographicalRegion	java.lang.String	DWLControl.getGeographicalRegion()
transactionCorrelatorId	java.lang.String	DWLControl.getTransactionCorrelatorId()
externalCorrelationId	java.lang.String	DWLControl.getExternalCorrelationId()
clientTransactionName	java.lang.String	DWLControl.getClientTransactionName()
clientSystemName	java.lang.String	DWLControl.getClientSystemName()
sessionId	java.lang.String	DWLControl.getSessionId()

Table 20. Data captured by the Service Activity Monitoring facility (continued)

Element name	Type	Data origin
requestOrigin	java.lang.String	DWLControl.getRequestOrigin()
transactionId	java.lang.String	DWLControl.getTxnId()
customerDeployedVersion	java.lang.String	DWLControl.getCustomerDeployedVersion()
customerEnvironment	java.lang.String	DWLControl.getCustomerEnvironment()
customerRequestVersion	java.lang.String	DWLControl.getCustomerRequestVersion()
inquireAsOfDate	java.lang.String	DWLControl.getInquireAsOfDate()
inquireFromDate	java.lang.String	DWLControl.getInquireFromDate()
inquireToDate	java.lang.String	DWLControl.getInquireToDate()
requestID	java.lang.Long	DWLControl.getRequestID()
requestSize	java.lang.Integer	The size of the request message in bytes.
responseSize	java.lang.Integer	The size of the response message in bytes.
transactionStatus	java.lang.String	DWLStatus.getStatus()
startDateTime	java.sql.Timestamp	Timestamp at the begging of the transaction.
endDateTime	java.sql.Timestamp	Timestamp at the end of the transaction.
executionTime	java.lang.Long	Duration of transaction in milliseconds.
osName	java.lang.String	System.getProperty('os.name') + System.getProperty('os.version')
applicationName	java.lang.String	Application Name as configured in Configuration and Management.
applicationVersion	java.lang.String	Application Version as configured in Configuration and Management.
applicationDeploymentName	java.lang.String	Deployment Name as configured in Configuration and Management.
applicationInstanceName	java.lang.String	Instance Name as configured in Configuration and Management.
federatedInstanceName	java.lang.String	DWLControl.getfederatedInstanceName
requestTime	java.lang.String	DWLControl.getRequestTime
updateMethodCode	java.lang.String	DWLControl.getUpdateMethodCode
inquiryLanguage	java.util.Vector	DWLControl.getItemsInquiryLanguage
returnResponse	java.lang.String	DWLControl.getReturnResponse
pageStartIndex	java.lang.String	DWLControl.getPageStartIndex
pageEndIndex	java.lang.String	DWLControl.getPageEndIndex
returnAvailableResultCount	java.lang.String	DWLControl.getReturnAvailableResultCount
availableResultsCount	java.lang.String	DWLControl.getAvailableResultsCount

Obtaining data from the service activity monitoring facility

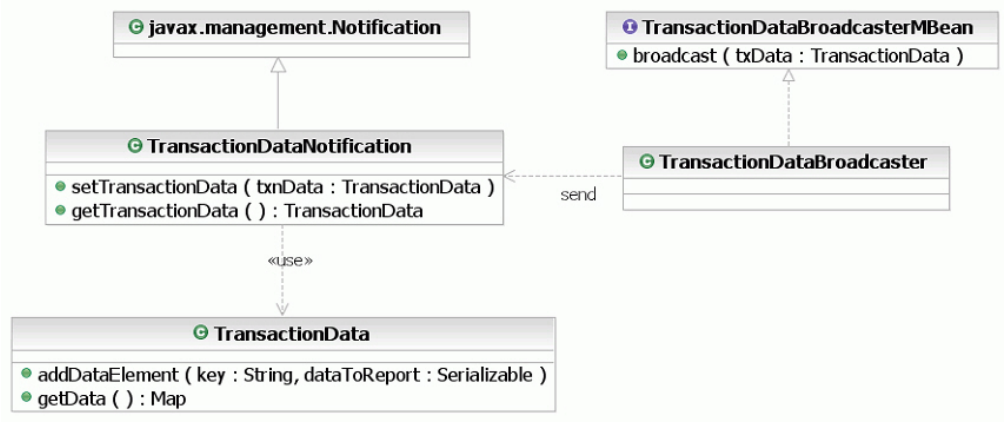
You can obtain the data produced by the service activity monitoring facility through JMX notification. Optionally, you can use a Log4J log file to capture these JMX notifications.

JMX notification

When enabled, the service activity monitoring facility provides activity information about every transaction in the form of a JMX notification.

Note: See "To activate the service activity monitoring facility" on page 188 for details about how to enable the service activity monitoring facility.

The following class diagram provides an example of the JMX notification process.



1. The notification com.dwl.base.report.mbean.TransactionDataNotification is sent from the MBean com.dwl.base.report.mbean.TransactionDataBroadcasterMBean.
2. The notification containing the com.dwl.base.report.TransactionData object can be obtained by calling the getTransactionData() method on the TransactionDataNotification class.

Each TransactionData object contains the map with information regarding a single InfoSphere MDM Server transaction. The names and type of the objects in the map are provided in Chapter 14, “Configuring the service activity monitoring facility,” on page 185.

In order to capture the JMX notification, InfoSphere MDM Server registers the listener with the MBean Server, providing the object name of the MBean that issued the notification. The object name is platform-specific and partially depends on the values of the installation parameters configured during installation of InfoSphere MDM Server.

Below is an example of an object name for TransactionDataBroadcasterMBean in InfoSphere MDM Server:

```
DWL:type=com.dwl.base.report.mbean.TransactionDataBroadcasterMBean,
deployment=deployment1,J2EEApplication=deployment1,process=server1,
cell=userNode01Cell,node=userNode01
```

Log4J log file

The service activity monitoring facility provides activity information about every transaction in the form of JMX notification. InfoSphere MDM Server supplies an implementation of JMX listener to capture these JMX notifications and send it to the Log4J log file for output.

The class name of the InfoSphere MDM Server JMX listener is configured in the `Report.Listener.MBean.Impl.className` property in the `DWLCommon.properties` file. When the `/IBM/DWLCommonServices/Report/Listener/enabled` configuration setting is set to `true`, InfoSphere MDM Server registers the listener with the local MBean server.

When the listener receives the JMX notification, it captures activity information in the `transactiondata.log` file located on the same host. The file name, location, and Log4J settings can be modified by changing the values of several `log4j.appender.transactionData_file` properties in the `Log4J.properties` file.

By default, the Log4J log file is configured to use the `org.apache.log4j.DailyRollingFileAppender` class as an appender. With `DailyRollingFileAppender`, the output is written to the log files.

The files roll over at user-defined time interval that can be configured in the `DatePattern` property in the `Log4J.properties` file. For example, if you choose to have the files roll over at the midnight each day ('.'yyyy-MM-dd), the output is written into the `transactiondata.log` during the day and at midnight the file will be copied to `transactiondata.log.2006-06-19` and logging continues to the `transactiondata.log` over the course of the next day.

Service activity data are printed into the log file in a comma-separated format to make it easier to import the data into database or a spreadsheet, which could be used to make a report about system activities.

Each line in the log file corresponds to one transaction. The data in the comma-separated line is arranged in the same order as in the table above, *Data captured by the service activity monitoring facility*. Depending on the transaction type, not all the fields have values; for example, the `inquireAsOfDate` field for persistent transactions is empty. Null fields are rendered in the log as empty strings `""`.

To activate the service activity monitoring facility

1. Use the Configuration and Management module of InfoSphere MDM Server to change the value of the `/IBM/DWLCommonServices/Report/Broadcaster/enabled` property to `true`.

   This configuration setting is dynamic, so when the value changes, the application server applies the change without requiring a restart.

   Note: For information about using the Configuration and Management module, see Chapter 34, "Using the Configuration and Management components," on page 405.
2. To enable the service activity monitoring facility to capture the activity data in a log file, use the Configuration and Management module of InfoSphere MDM Server to change the value of the `/IBM/DWLCommonServices/Report/Listener/enabled` property to `true`.

   When enabled, this configuration setting registers the listener with the MBean Server, providing the object name of the MBean that issued the notification.

   This configuration setting is static, so when the value changes, you must restart the application server to apply the change.

See the "Understanding configuration elements in the Configuration and Management component" on page 419 topic for details about these configurations.

Chapter 15. Customizing the language and locale in InfoSphere MDM Server

You can define the language and locale for your implementation of InfoSphere MDM Server which enables the application to be deployed and used across various geographies.

Some of the highlights include:

- A single executable code that is used for all supported locales
- A single deployment that can support multiple locales simultaneously. The installation allows the installer to select additional languages to be deployed, in addition to the default English language.
- In addition to the default English language, translations for locale-sensitive strings are provided for the following languages:
  - French
  - German
  - Greek
  - Italian
  - Spanish
  - Portuguese
  - Polish
  - Simplified Chinese
  - Traditional Chinese
  - Korean
  - Japanese
- Operational data can be provided in any language in transactions, not just the languages listed above. InfoSphere MDM Server uses UNICODE, which enables data to flow through the system without any loss or corruption.

In this section, you will learn:

Defining the supported languages

The supported languages are defined in the CDLANGTP table in the database. If you need to support other languages you must define them in this table. The following are some sample records from this table:

Table 21. Sample Records in the CDLANGTP Table

LANG_TP_CD	NAME	LOCALE
100	English	en
200	French	fr
300	Spanish	es
400	Chinese (Simplified)	zh
500	Chinese (Traditional)	zh_TW

The LANG_TP_CD values are used internally by InfoSphere MDM Server. The LOCALE values follow commonly used Java locale values.

Support for errors and code table data

InfoSphere MDM Server provides support for errors and code table data at both the application level and at the operational data level.

At the application level, business error messages and system error messages are provided in the selected language. Business error messages are stored in the database and they are retrieved using the InfoSphere MDM Server error handling component. See Chapter 9, "Configuring logging and error handling," on page 147 for more information.

An example of a business error message is "`The following is required: PartyId`", indicating some mandatory data is required. This type of message is specific to the individual requests; it is returned in the response based on the language or locale specified in the request. See "Understanding how InfoSphere MDM Server handles the user locale" on page 191 for more information.

System error messages are stored in InfoSphere MDM Server as resource bundles and they are retrieved using the Java API. An example of a system error message is "`The property is not defined in the properties file`", indicating some configuration error condition. This type of message applies to the entire application. It is returned in the response based on the locale configured for the application runtime environment.

System error messages are generally accompanied by user-friendly messages that are also translated to the local language of the user. See "Understanding how InfoSphere MDM Server handles the application locale" on page 195 for more information.

At the operational data level, code table data is set up using the code table service, and when a request requires a code type, the corresponding code value is returned in the response based on the language specified in the request. See "Setting up code table data" on page 195 for more information.

Understanding how InfoSphere MDM Server handles the user locale

A request sent to InfoSphere MDM Server includes operational data and other transaction control information used to handle the user locale.

In the XML representation of the request, the transaction control information is represented by the <DWLControl> element. The <DWLControl> element contains two child elements that the user of the request can use to specify the user's language. They are <requesterLanguage> and <requesterLocale>. The user can use either one of these elements, or both. These values are specific to the request, and therefore specific to the user of the request. They are used for the following purposes:

- Retrieving code table values that are defined in the database, based on the language.
- Retrieving error messages that are defined in the database, based on the language.

The following is a snippet of the XML representation of an addParty request:

```
<TCRMService>
  <RequestControl>
    <requestID>5014017</requestID>
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLocale>fr</requesterLocale>

          ...

    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>addParty</TCRMTxType>
    <TCRMTxObject>TCRMPartyBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMPartyBObj>
        <PartyId/>

              ...

        <TCRMPartyNameBObj>
          <TCRMPartyNameIdPK/>
          <PrefixType>2</PrefixType>
          <GivenNameOne>Tomás</GivenNameOne>
          <LastName>Sáenz</LastName>

              ...

        </TCRMPartyNameBObj>
      </TCRMPartyBObj>
    </TCRMObject>
  </TCRMTx>
</TCRMService>
```

In this request, the user requesting this transaction indicates the language of his choice is French. He is adding person with a Spanish family name Sáenz and first name Tomás, and a specific <PrefixType>.

When the transaction is successfully processed, the response is returned as shown in this snippet of the XML representation of an addParty response:

```
<TCRMService>
  <ResponseControl>
    <ResultCode>SUCCESS</ResultCode>
```

```
    <ServiceTime>43579</ServiceTime>
    <DWLControl>

              ...

      <requesterLanguage>200</requesterLanguage>
      <requesterLocale>fr</requesterLocale>

              ...

    </DWLControl>
  </ResponseControl>
  <TxResponse>
    <RequestType>addParty</RequestType>
    <TxResult>
      <ResultCode>SUCCESS</ResultCode>
    </TxResult>
    <ResponseObject>
      <TCRMPartyBObj>

              ...

        <PartyId>5331138746277062</EntityId>

              ...

        <TCRMPartyNameBObj>
          <GivenNameOne>Tomás</GivenNameOne>
          <LastName>Sáenz</LastName>

              ...

          <PrefixType>2</PrefixType>
          <PrefixValue>Docteur</PrefixValue>

              ...

          <DWLStatus>
            <Status>0</Status>
          </DWLStatus>
        </TCRMPartyNameBObj>
      </TCRMPartyBObj>
    </ResponseObject>
  </TxResponse>
</TCRMService>
```

Since the family name and first name are textual information, the names are stored as-is. The <PrefixType> of 2 returns the corresponding <PrefixValue> in the language specified in the <requesterLanguage> element, in which case is French.

Specifying the locale

InfoSphere MDM Server provides several ways to specify the language and the locale.

InfoSphere MDM Server provides two values to use to specify the language. They are <requesterLanguage> and <requesterLocale> in the <DWLControl> element. These two values correspond to one of the records in the CDLANGTP table. However, some client applications may not be able to provide both values. One such example is a Web application. Typically, a Web application can only provide the locale.

Given that a request may provide <requestLanguage> or <requesterLocale>, or both, InfoSphere MDM Server needs to ensure that these values are acceptable. It does so by calling the DWLControl.resolve() API after it parses the request. This API attempts to derive the fallback values which are the best match between the values provided in the request and the values defined in the CDLANGTP table.

The following sections describe how this API resolves the language and the locale.

See also:

- "Specifying the locale when neither language or locale is provided"
- "Specifying the locale when only the language value is provided"
- "Specifying the locale when only the locale value is provided"
- "Specifying the locale when both the language and the locale are provided" on page 195

Specifying the locale when neither language or locale is provided

If neither <requestLanguage> nor <requesterLocale> is provided in the <DWLControl> element, the request fails because InfoSphere MDM Server cannot determine the language of the user.

Specifying the locale when only the language value is provided

If only the <requestLanguage> value is provided in the <DWLControl> element, the value must exist as one of the LANG_TP_CD values in the CDLANGTP table.

The corresponding LOCALE value in the table is then set as the <requesterLocale> value in the <DWLControl> element. The following example shows the <DWLControl> element providing only the <requesterLanguage>:

```
<DWLControl>
  ...
  <requesterLanguage>200</requesterLanguage>
  ...
</DWLControl>
```

Based on the sample records shown in the CDLANDTP table, the <DWLControl> element become as follows:

```
<DWLControl>
  ...
  <requesterLanguage>200</requesterLanguage>
  <requesterLocale>fr</requesterLocale>
  ...
</DWLControl>
```

If the <requestLanguage> value provided is not in the CDLANGTP table, the request will fail.

Specifying the locale when only the locale value is provided

If only the <requestLocale> value is provided in the <DWLControl> element, the value, or one of its derivations, must exist as one of the LOCALE values in the CDLANGTP table.

If the value, or one of its derivations, does not exist in the CDLANGTP table, the locale en, for English, is used. The corresponding LANG_TP_CD value in the table is then set as the <requesterLanguage> value in the <DWLControl> element. The derivation of the locale is based on the Locale fallback logic in Java.

Example 1

If the <requesterLocale> provided is es:

```
<DWLControl>
  ...
  <requesterLocale>es</requesterLocale>
  ...
</DWLControl>
```

Based on the sample records shown in the CDLANDTP table, the <DWLControl> element is updated to Spanish:

```
<DWLControl>
  ...
  <requesterLanguage>300</requesterLanguage>
  <requesterLocale>es</requesterLocale>
  ...
</DWLControl>
```

Example 2

If the <requesterLocale> provided is fr_FR:

```
<DWLControl>
  ...
  <requesterLocale>fr_FR</requesterLocale>
  ...
</DWLControl>
```

Based on the sample records shown in the CDLANDTP table, the fallback locale for fr_FR, which is fr, and the <DWLControl> element is updated to French:

```
<DWLControl>
  ...
  <requesterLanguage>200</requesterLanguage>
  <requesterLocale>fr</requesterLocale>
  ...
</DWLControl>
```

Example 3

If the <requesterLocale> provided is ru:

```
<DWLControl>
  ...
  <requesterLocale>ru</requesterLocale>
  ...
</DWLControl>
```

Based on the sample records shown in the CDLANDTP table, the fallback locale for ru, which is en is found, and the <DWLControl> element is updated to English:

```
<DWLControl>
  ...
  <requesterLanguage>100</requesterLanguage>
  <requesterLocale>en</requesterLocale>
  ...
</DWLControl>
```

Specifying the locale when both the language and the locale are provided

If both the <requestLanguage> and <requestLocale> values are provided in the <DWLControl> element, the combination of these values must be an exact match of one of the records in the CDLANGTP table. Otherwise, the request fails.

Understanding how InfoSphere MDM Server handles the application locale

The application locale refers to the locale used by the system administrator to manage the application.

This is the locale that determines the language for assets such as:

- Log messages that have a severity level of `FATAL` to `WARN`—see the `com.dwl.base.logging.IDWLLogger` API.
- Runtime exception messages for exceptions that are raised at the application level.
- Other runtime exception messages in situations where the <DWLControl> element is not available, for example, exceptions that occur before the request is successfully parsed.
- Messages resulting from asynchronous processing in InfoSphere MDM Server, for example, Event Manager in InfoSphere MDM Server.

The application is determined by the system's properties in the Java runtime environment in which the InfoSphere MDM Server application starts up in the application server. From the Java perspective, these properties are defined as `user.language` and `user.country` in the JVM. There are various ways to specify these properties: they can be specified explicitly; or they can be defaulted from the operating system. These settings are outside of the scope of InfoSphere MDM Server. Refer to the documentation from the application server and the operating system for information on setting these values.

Setting up code table data

InfoSphere MDM Server is shipped with code table values and error messages translated in each of the available languages. The code table values and error messages are stored in various database tables.

These tables can be classified as one of two types:

- Language independent code table
- Language dependent code table

A language independent code table holds data in only one language. The data is used mainly to configure the application and ideally should be in the language that best suits the language of the system administrators. At installation time, the installer must select one language to populate these tables with. An example of such a table is COMPONENTTYPE. This table stores the Java objects that InfoSphere MDM Server supports, and the descriptions of these records are in the language that is intended for the system administrator.

A language dependent code table holds data in one or more languages. The data is used to provide translated values in the language of the end user. By default, English data is always populated in these tables. At installation time, the installer

can select one or more languages that the installation base expects to support. An example of such a table is CDADDRUSAGETP. This table stores the address usage types that InfoSphere MDM Server supports and they should include the various languages corresponding to the end users.

For the language dependent code tables, they have `lang_tp_cd` which maps to `lang_tp_cd` column in the `CDLANGTP` table. Fallback logic is applied when caching these code table records.

The caching mechanism relies on the language and locale to build a language and locale hierarchy. This hierarchy contains all the records in the `CDLANGTP` table that have a null `expiry_dt` or if the `expiry_dt` is in the future and `CODE_TABLE_TRANSLATION` has value as 'Y'.

The language dependent code table records are cached for the languages in the hierarchy. For example, for `CDIDTP`, the records are cached for supported languages that have `CODE_TABLE_TRANSLATION` flag set to 'Y' in CDLANGTP. For the other languages that have `CODE_TABLE_TRANSLATION` flag set to 'N', you can add a record to CDIDTP, but they are not in cache and cannot be retrieved. In order to use them, you must set the `CODE_TABLE_TRANSLATION` flag to 'Y' for that language.

See also:

"Adding additional code table data"

"Understanding InfoSphere MDM Server behavior when retrieving code table data" on page 197

"Understanding InfoSphere MDM Server behavior when validating code table data in transactions" on page 200

"Adding currency codes" on page 203

Adding additional code table data

Code table data for additional languages and additional type codes can be added to InfoSphere MDM Server.

Typically, there are two reasons for adding additional code table data:

- You must add support for a language other than those provided in the base product. In this case, you must first add a record for the language in the CDLANGTP table. Then refer to the data model to populate the code table data and error messages for the language.
- You must add additional type codes for existing tables. In this case, you must add additional records in the tables for the type codes and all the translated values.

In either case, you must ensure that the English set of code types and code values is the complete set. InfoSphere MDM Server uses English as the default language if the language or locale provided by the user do not produce a match in the CDLANGTP table—see "Specifying the locale" on page 192 for information on specifying the locale. Therefore, it is important that the English set of any code tables and error messages is the complete set. In addition, InfoSphere MDM Server provides a flexible way of populating code table data, which relies on the English set of data as the baseline.

Flexibility in populating code table data

For all the code tables, InfoSphere MDM Server only requires that the English set of data—`LANG_TP_CD=100` and `LOCALE=en`—be the complete set. All other languages are not required to be the complete set. When InfoSphere MDM Server retrieves a code type for a language and that combination of code type and language is not defined in the code table, InfoSphere MDM Server attempts to find the fallback values based on the <requesterLocale> value in the <DWLControl> element. When no match is found, InfoSphere MDM Server ultimately returns the English code type.

This flexibility is particularly advantageous when there are only slight variations in the languages. One such example is the difference between American English and British English, where there are occasional spelling variations between these two languages. If you want to add support for British English in InfoSphere MDM Server, you only need to add records to the code tables where the British English spelling is different. You do not need to add the entire set of records.

Understanding InfoSphere MDM Server behavior when retrieving code table data

InfoSphere MDM Server provides several distinct transactions for administrator and operational service consumers to maintain code table data.

Note: For detailed information and a complete list of these services, see Chapter 4, "Understanding InfoSphere MDM Server common code type framework," on page 99, the *IBM InfoSphere Master Data Management Server Common Services Transaction Reference Guide*, and the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.

The transactions that InfoSphere MDM Server provides to enable operational service consumers to retrieve code table data are:

- getAllOperationalCodeTypes
- getAllOperationalCodeTypesByLocale
- getAllOperationalCodeTypesByLangId
- getOperationalCodeType

Because of the flexibility to populate data, as described in "Flexibility in populating code table data," these transactions return code table data that best match the condition. To illustrate the behaviors of these transactions, assume the following data in the CDLANGTP table.

Table 22. Sample Records in the CDLANGTP Table

LANG_TP_CD	NAME	LOCALE
100	English	en
200	French	fr
300	Spanish	es

Assume the following data in the CDADDRUSAGETP table:

Table 23. Sample Records in the CDADDRUSAGETP Table

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
100	1	Primary Residence

Table 23. Sample Records in the CDADDRUSAGETP Table (continued)

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
100	2	Other Residence
100	3	Business
100	4	Mailing
200	1	Résidence principale
200	2	Autre résidence
200	4	Envoi
300	2	Otra residencia
300	3	Empresa

Transaction — getAllOperationalCodeTypes

If the getAllOperationalCodeTypes transaction is submitted for the CDADDRUSAGETP table, based on the data in the sample records tables, the following records are returned.

Table 24. Sample Records in the CDADDRUSAGETP Table

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
100	1	Primary Residence
100	2	Other Residence
100	3	Business
100	4	Mailing
200	1	Résidence principale
200	2	Autre résidence
200	4	Envoi
300	2	Otra residencia
300	3	Empresa

This transaction returns all the records defined in the table.

Transaction — getAllOperationalCodeTypesByLocale

This transaction returns all code types for the given locale. The number of records returned for each locale is always the same as that in the base locale, `en`. In other words, if a record is not defined for a non-English locale, the record based on the fallback rules is returned.

Important: The set of data for the base locale `en` must be a complete set.

Example 1

If the getAllOperationalCodeTypesByLocale transaction is submitted for the CDADDRUSAGETP table and locale `en`, based on the data in the sample records tables, the following records are returned.

Table 25. Results of the getAllOperationalCodeTypesByLocale Transaction

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
100	1	Primary Residence
100	2	Other Residence
100	3	Business
100	4	Mailing

Example 2

If the getAllOperationalCodeTypesByLocale transaction is submitted for the CDADDRUSAGETP table and locale `es`, based on the data in the sample records tables, the following records are returned.

Table 26. Results of the getAllOperationalCodeTypesByLocale Transaction

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
100	1	Primary Residence
300	2	Otra residencia
300	3	Empresa
100	4	Mailing

Example 3

If the getAllOperationalCodeTypesByLocale transaction is submitted for the CDADDRUSAGETP table and locale `fr_FR`, based on the data in the sample records tables, the following records are returned.

Table 27. Results of the getAllOperationalCodeTypesByLocale Transaction

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
200	1	Résidence principale
200	2	Autre résidence
100	3	Business
200	4	Envoi

Transaction — getAllOperationalCodeTypesByLangId

The behavior of this transaction is similar to that of the getAllOperationalCodeTypesByLocale transaction. This transaction returns exactly the number of records defined in the complete set of data for the base language type code `100`. However, if a record is not defined for the locale, the fallback record is returned.

Example 1

If the getAllOperationalCodeTypesByLangId transaction is submitted for the CDADDRUSAGETP table and `LANG_TP_CD 200`, based on the data in the sample records tables, the following records are returned.

Table 28. Results of the getAllOperationalCodeTypesByLangId Transaction

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
200	1	Résidence principale
200	2	Autre résidence
100	3	Empresa
200	4	Envoi

Transaction — getOperationalCodeType

This transaction returns the exact match if the record exists. If no exact match exists, the fallback record based on the locale corresponding to the language type code is returned.

Example 1

If the getOperationalCodeType transaction is submitted for the CDADDRUSAGETP table, `LANG_TP_CD 200`, and `ADDR_USAGE_TP_CD 1`, based on the data in the sample records tables, the following record is returned.

Table 29. Results of the getOperationalCodeType Transaction

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
200	1	Résidence principale

Example 2

If the getOperationalCodeType transaction is submitted for the CDADDRUSAGETP table, `LANG_TP_CD 300`, and `ADDR_USAGE_TP_CD 1`, based on the data in the sample records tables, the following record is returned.

Table 30. Results of the getOperationalCodeType Transaction

LANG_TP_CD	ADDR_USAGE_TP_CD	NAME
100	1	Primary Residence

Understanding InfoSphere MDM Server behavior when validating code table data in transactions

InfoSphere MDM Server allows users to specify the type code, value, or both in the request. It validates these values to ensure that they are acceptable values, and uses a fallback approach to validate these values.

Much of the data that users submit in the requests are based on code table values. For example in the snippet of the XML representation of an addParty response, the type code is set for the <PrefixType> element in the request. When InfoSphere MDM Server produces the response for this request, InfoSphere MDM Server looks up the corresponding value in the user's <requesterLanguage> and sets it in the <PrefixValue> element.

InfoSphere MDM Server allows the user to specify the type code, or the value, or both in the request. It validates these values to ensure that they are acceptable values. It also uses a fallback approach that is similar to the approach described in

"Understanding InfoSphere MDM Server behavior when retrieving code table data" on page 197 to validates these values.

Providing type code only

Example 1

This example shows the request and the response when the <requesterLocale> is `fr`.

Request for <requesterLocale> = fr	Response for <requesterLocale> = fr
<TCRMService> <RequestControl> ... <DWLControl> ... <requesterLocale>fr</requesterLocale> ... </DWLControl> </RequestControl> <TCRMTx> ... <TCRMObject> <TCRMPartyAddressBObj> ... <AddressUsageType>1</AddressUsageType> ... </TCRMPartyAddressBObj> </TCRMObject> </TCRMTx> </TCRMService>	<TCRMService> <ResponseControl> ... <DWLControl> ... <requesterLanguage>200</requesterLanguage> <requesterLocale>fr</requesterLocale> ... </DWLControl> </ResponseControl> <TxResponse> ... <ResponseObject> <TCRMPartyAddressBObj> ... <AddressUsageType>1</AddressUsageType> <AddressUsageValue>Résidence principale </AddressUsageValue> ... </TCRMPartyAddressBObj> </ResponseObject> </TxResponse> </TCRMService>

Based on the data in the sample records tables, an exact match of the address usage type code 1 and locale `fr` exists in the CDADDRUSAGETP table.

Example 2

This example shows the request and the response when the <requesterLocale> is `es`.

Request for <requesterLocale> = es	Response for <requesterLocale> = es
<TCRMService> <RequestControl> ... <DWLControl> ... <requesterLocale>es</requesterLocale> ... </DWLControl> </RequestControl> <TCRMTx> ... <TCRMObject> <TCRMPartyAddressBObj> ... <AddressUsageType>1</AddressUsageType> ... </TCRMPartyAddressBObj> </TCRMObject> </TCRMTx> </TCRMService>	<TCRMService> <ResponseControl> ... <DWLControl> ... <requesterLanguage>300</requesterLanguage> <requesterLocale>es</requesterLocale> ... </DWLControl> </ResponseControl> <TxResponse> ... <ResponseObject> <TCRMPartyAddressBObj> ... <AddressUsageType>1</AddressUsageType> <AddressUsageValue>Primary Residence </AddressUsageValue> ... </TCRMPartyAddressBObj> </ResponseObject> </TxResponse> </TCRMService>

Based on the sample data, no exact match of the address usage type code 1 and locale `es` exists in the CDADDRUSAGETP table. Therefore, the fallback is derived as follows:

- The fallback for locale es is en
- The language type code for en is 100
- The record for address usage type code 1 and address usage value Primary Residence is returned

Providing type value only

Example 1

This example shows the request and the response when the <requesterLocale> is fr_FR.

Request for <requesterLocale> = fr_FR	Response for <requesterLocale> = fr_FR
<TCRMService> <RequestControl> ... <DWLControl> ... <requesterLocale>fr_FR</requesterLocale> ... </DWLControl> </RequestControl> <TCRMTx> ... <TCRMObject> <TCRMPartyAddressBObj> ... <AddressUsageValue>Envoi </AddressUsageValue> ... </TCRMPartyAddressBObj> </TCRMObject> </TCRMTx> </TCRMService>	<TCRMService> <ResponseControl> ... <DWLControl> ... <requesterLanguage>200</requesterLanguage> <requesterLocale>fr</requesterLocale> ... </DWLControl> </ResponseControl> <TxResponse> ... <ResponseObject> <TCRMPartyAddressBObj> ... <AddressUsageType>4</AddressUsageType> <AddressUsageValue>Envoi </AddressUsageValue> ... </TCRMPartyAddressBObj> </ResponseObject> </TxResponse> </TCRMService>

Based on the sample data, no exact match of the address usage type value Envoi and locale fr_FR exists in the CDADDRUSAGETP table. Therefore, the fallback is derived as follows:

- The fallback for locale fr_FR is fr
- The language type code for fr is 200
- The record for address usage value Envoi and <requesterLanguage> 200 is returned

Providing both type code and type value

Example 1

This example shows the request and the response when the <requesterLocale> is es.

Request for <requesterLocale> = es	Response for <requesterLocale> = es
<TCRMService> <RequestControl> ... <DWLControl> ... <requesterLocale>es</requesterLocale> ... </DWLControl> </RequestControl> <TCRMTx> ... <TCRMObject> <TCRMPartyAddressBObj> ... <AddressUsageType>1</AddressUsageType> <AddressUsageValue>Primary Residence </AddressUsageValue> ... </TCRMPartyAddressBObj> </TCRMObject> </TCRMTx> </TCRMService>	<TCRMService> <ResponseControl> ... <DWLControl> ... <requesterLanguage>300</requesterLanguage> <requesterLocale>es</requesterLocale> ... </DWLControl> </ResponseControl> <TxResponse> ... <ResponseObject> <TCRMPartyAddressBObj> ... <AddressUsageType>1</AddressUsageType> <AddressUsageValue>Primary Residence </AddressUsageValue> ... </TCRMPartyAddressBObj> </ResponseObject> </TxResponse> </TCRMService>

Based on the sample data, no exact match of the address usage type code 1, type value `Primary Residence` and locale `es` exists in the CDADDRUSAGETP table. Therefore, the fallback is derived as follows:

- The fallback for locale `es` is `en`
- The language type code for `en` is `100`
- The record for address usage type code `1`, address usage value `Primary Residence`, and language type code `100` exists. Therefore, this is a valid record.

Adding currency codes

InfoSphere MDM Server stores each amount value with an associated currency type. The currency types are defined in the CDCURRENCYTP table.

When you add new currency code types, you must populate the CURRENCY_CODE column with the correct three letter currency code as assigned by ISO standards. For more information, see http://www.iso.org/iso/en/prods-services/popstds/currencycodeslist.html. This ensures that appropriate formatting rules are applied when displaying the corresponding currency amounts. In the database, the amount value is stored with 3 decimal places, allowing for currencies that require 3 decimal places, such as Bahraini Dinar (BHD).

The currency type is associated with the amount value, and an external validation is available to ensure that if a currency type is provided, that an amount is also provided.

Currently, InfoSphere MDM Server has the following database tables that contain one or more currency amount columns, which are affected by globalization:

- INCOMESOURCE
- CONTRACT
- CONTRACTCOMPONENT
- CLAIM
- HOLDING
- BILLINGSUMMARY

Customizing the database

The InfoSphere MDM Server database can be customized for text data and for database collation.

InfoSphere MDM Server supports the following databases:

- DB2 UDB
- DB2 for z/OS
- Oracle

The installation creates a database that uses the UTF-8 encoding for all character data types. Using UNICODE encoding ensures that characters from any language can be persisted.

See also:

"Customizing column size for text data"

"Collating the database" on page 205

Customizing column size for text data

InfoSphere MDM Server stores text data in the database using the `CHAR` or `VARCHAR` data type.

The column size for this data is measured in number of bytes. Because of the nature of UTF-8 encoding, one text character may be encoded by as many as 4 bytes.

In the worst case scenario, the column size created by the installation can only accommodate number of text characters that is ¼ of the column size. Therefore, after the database is installed, you should analyze the type of data you expect to store in the database and adjust the column size accordingly. You should do this on a case by case basis and do this according to the business requirement.

For example, the `LAST_NAME` column in the `PARTYAME` table is used to store a person's family name. By default, the column size for this field is 30. Therefore, in the worst case scenario, only 7 text characters can be stored. In order to store 30 text characters, you will need to increase this column size by 4 times. However, the default column size is more than enough if you only plan to store persons with ethnic Han Chinese family names, since ethnic Han Chinese family names are limited to 2 text characters in length.

If you expect to store non-ASCII characters in InfoSphere MDM Server, you should increase the length of some derived fields.

Note: Typically, derived fields are prefixed with `U`, and are defined in the file named `Insensitive_search_enabled.sql`.

When non-case-sensitive searches are enabled for DB2 LUW, all searchable fields, such as `SERVICE_ORG_NAME`, have a corresponding derived field, such as `USERVICE_ORG_NAME`, where the value is stored in upper case to facilitate searches. By default, the original and derived fields are of the same length.

However, variable-length character encoding, such as UTF-8 case mappings, can produce strings of different lengths than the original. For example, a value stored in the searchable field, such as "Eßen," may take up more bytes than the original

when converted to upper case, such as ″ESSEN.″ As a result, the length of these derived fields must be increased if they will contain non-ASCII characters.

Collating the database

Database collation settings affect the matching and ordering of results fetched from the database.

Use the following collation settings for the supported databases:

Table 31. database collation settings

Database	Collation settings
DB2	UCA400_NO
DB2 for z/OS	Unicode
Oracle	Use the `NLS_SORT` monolingual linguistic setup, if the tables contain data in only one language. Monolingual linguistic setup uses less memory and performs better than multilingual linguistic sort setup. If the tables contain more than one language, multilingual linguistic setup is necessary. If you are using this sorting setup, consider: • Adding additional memory to compensate for the memory usage • Adding a linguistic index to enhance query performance

Chapter 16. Defining inquiry levels

Inquiry levels are parameters that define the level of detail for objects being returned in a search, or inquiry, transaction.

Inquiry levels can be defined, allowing new combinations of objects to be returned. The core product business objects supported for inquiry-level customization are Person, Organization, and Contract.

InfoSphere MDM Server offers a variety of inquiry transactions that accept one or more inquiry levels as parameters. InfoSphere MDM Server uses these parameters to select the correct objects to return as a part of the transaction.

In this section, you will learn:

"Objects and transactions that child objects can be retrieved for"

"Modifying inquiry levels"

Objects and transactions that child objects can be retrieved for

Child objects can be selectively retrieved for the following transactions:

- getParty
- getPerson
- getOrganization
- getContract
- getProductInstance

Object access path modifications occur if the configuration of these objects is changed:

- Person
- Organization
- Contract
- Product

Modifying inquiry levels

You can customize, extend, and modify the inquiry levels used in your InfoSphere MDM Server implementation

See also:

"Configuring new inquiry levels"

"Configuring a new child for a parent business object" on page 209

"Extending inquiry levels" on page 210

"Administering inquiry levels" on page 210

Configuring new inquiry levels

To configure a new inquiry level:

Use the Administration Services to add or update an inquiry level configuration. Be aware of the following points when configuring new inquiry levels:

- **Allowed and Reserved Ranges**—The permitted numeric range of integers for new inquiry levels is from 100 and up. Levels 99 and under are reserved for internal use by the IBM InfoSphere Master Data Management Server product .

  Note: Do not use or change the existing configurations of any of the reserved ranges.

  – **Expiring Inquiry Level and Child Groups**—The inquiry level for an object and the child objects they retrieve for an object may be expired using the expiry_dt field. If an Inquiry Level is expired, that record is not made available to the system for further processing. Only active Inquiry Levels are retrieved by the system for use.
  – **Cumulative Inquiry Levels**—Inquiry levels may be cumulative. This means that particular level includes ALL objects configured for every inquiry level below it, regardless of whether or not any of the lower levels are cumulative . For example, if level 120 has cumulative_ind = 'Y' or is cumulative, all groups configured for level 120 down to level 100 are returned as the set of child objects to return for that particular object. In sum, levels are not skipped when one is defined as cumulative.

  Note: Client-defined inquiry levels—level 100 and above—are not cumulative to include product-defined inquiry levels (0-99).

  – **Configure only the child Groups to be returned for the parent Group**—There is no need to configure the Group for the Person, Organization or Contract object as a child of the inquiry level for itself. By definition, inquiry level objects are child objects so, at a minimum, the parent object itself is always be returned. For example, there is no need to configure Contract level 1 to contain child Contract, to ensure its return.
  – **Configuration Warning Messages**—It is possible to configure an inquiry level incorrectly. When this happens, Status 5 warning messages indicate which objects for the inquiry level are in error. For example, if an inquiry level is defined for Person, say 101, that returns child objects PersonName, PartyIdentification, and IncomeSource, when running a getParty() transaction (level 101), a configuration warning is returned, stating that the parent of the IncomeSource object is configured incorrectly. IncomeSource requires the FinancialProfile to be configured for Party as well, because IncomeSource, PartyChargeCard, PartyBankAccount, and TCRMPartyPayrollDeductionBObj are within the processing of FinancialProfile. These dependencies are noted in the charts supplied detailing the current configuration of the IBM InfoSphere Master Data Management Server objects (Contract, Organization, Person) and their inquiry levels. The following is an example of the warning message:

```
<DWLStatus>
  <Status>5</Status>
  <DWLError>
    <ComponentType>10</ComponentType>
    <ComponentTypeValue>DWLErrorMessageComponent</ComponentTypeValue>
    <Detail>Parent object of ContractPartyRoleIdentifier was not configured
      properly for inquiry level. Add record for parent object of
      ContractPartyRoleIdentifier in table INQLVLGRP.</Detail>
    <ErrorMessage>Some objects may not be returned due to inquiry level
      configuration errors in table INQLVLGRP</ErrorMessage>
    <LanguageCode>0</LanguageCode>
    <ReasonCode>15204</ReasonCode>
    <Severity>5</Severity>
  </DWLError>
</DWLStatus>
```

– **Use the Transaction Reference Guide**: See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for out-of-the-box details on the objects returned for inquiry levels for getParty (getPerson (Person object), getOrganization (Organization object) and getContract (Contract object).

Configuring a new child for a parent business object

There are two cases where you can configure a new child object for a parent business object:

- New child objects are added to the Person, Organization or Contract objects to accommodate client requirements for an addition or extension to the IBM InfoSphere Master Data Management Server product.
- An existing child business object of Person, Organization or Contract is not currently being returned through its composite inquiry transaction (that is, through getPerson, Organization, or Contract) for any of the product-defined inquiry levels, the extension framework may used to retrieve it as an extension. The parent object can also be configured to return this child object for new inquiry levels.

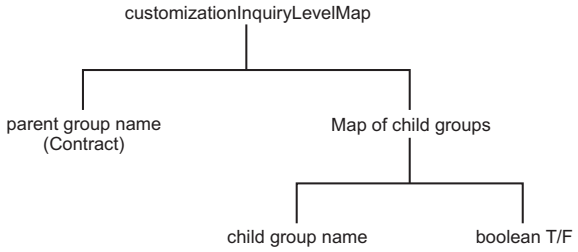
For both of these cases, see Chapter 2, "Customizing InfoSphere MDM Server," on page 17 for details on incorporating new objects, using the extension framework.

To make the new child object configurable with new inquiry levels:

1. Ensure the child object has an entry in the `V_GROUP` table and is registered for the 'TCRM' application.
2. Create an entry in the `INQLVLGRP` table to affiliate the object with a particular parent object's inquiry level, either Contract, Person, or Organization.

   Note: At any extension point in existing `getPerson`, `getOrganization` or `getContract` transactions, the DWLControl object holds a Map of inquiry level information for the objects returned by the transaction. The structure of this Map is shown below:

   Structure of Map:

3. If the name of the new child group exists in the child group map:
   - Execute your inquiry logic
   - Set the boolean value for the child group name to true.

   Note: If this value is not set, an invalid configuration warning message surfaces when the transaction is completed.

   Example code snippet:

```
//retrieve the parent groups for the current transaction
Map parentGroups  = null;
groupMap          = dwlControl.getCustomizationInquiryLevelMap();
```

```
//retrieve the map of the child groups for the parent group needed
//(i.e., Contract)
Map childGroups = null;
childGroups     =  groupMap.get(TCRMFinancialGroupNames.CONTRACT);

//if the child group is in the map configured for the parent group,
//execute the inquiry transaction for this child group - otherwise do
//nothing.

if (childGroups != null && childGroups.containsKey
     (TCRMFinancialGroupNames.CONTRACT_ALERT){

Vector contractAlerts = getAllContractAlerts(contractId,
     TCRMRecordFilter.ACTIVE, dwlControl);

childGroups.put(TCRMFinancialGroupNames.CONTRACT_ALERT, new
     Boolean(true));

//continue here with any logic to be executed on the returned vector
//of ContractAlert objects
}
```

Extending inquiry levels

See Chapter 2, “Customizing InfoSphere MDM Server,” on page 17 for details on incorporating new objects, using the extension framework.

Administering inquiry levels

Inquiry Levels do not require special administration.

Chapter 17. Retrieving audit history

InfoSphere MDM Server has an audit, or history, database.

The audit database is a duplicate of the operational database, with the exception of the code and rule tables, along with additional audit attributes. The audit tables are populated at the time of execution of any InfoSphere MDM Server transaction, via the default set of triggers for the InfoSphere MDM Server product. These tables store the actual data that has been added or updated in the transaction. InfoSphere MDM Server allows any inquiry transaction (get***) to return either current or point-in-time data. If a valid <inquireAsOf> element occurs in the request control, the "get" transaction takes its data from the audit tables rather than the operational ones.

In this section, you will learn:

Understanding criteria for history inquiry transactions

The retrieval of audit data from these tables brings back records according to the following criteria. The records:

- Have a last update date in the past that is earlier than and closest to the date entered by the client.
- Have an end date, if relevant, that is NULL—that is, only one copy of the record can be active at any point in time

The format for the DWLControl <inquireAsOf> element must:

- Have at least a date portion that complies with the date format specified in the `/IBM/CoreUtilities/DateValidation/dateFormat` configuration. See "Understanding configuration elements in the Configuration and Management component" on page 419 for more information.
- Use a space to separate the date and time portion if a time portion is entered; a time portion is optional; if a time portion is not entered the default time is set to **23:59:59.0**, for Oracle, or **23:59:59.000**, for DB2
- Specify time (24hr) in hours and minutes separated by a colon, for example 11:14; seconds are not considered

The following <inquireAsOfDate> element is valid assuming the value of /IBM/CoreUitlities/DateValidation/dateFormat resolves to the following format:

```
YYYY_MM_DD
```

where _ represents the configured separator, -, in the /IBM/CoreUtilities/DateValidation/dateSeparator configuration::

```
<inquireAsOfDate>2002-06-13 11:14</inquireAsOfDate>
```

Note that <inquireAsOfDate>2002-06-13</inquireAsOfDate> would also be valid, with the time assumed to be the default.

The /IBM/DWLCommonServices/DateValidation/dateFormat record specifies the format for the year, month, and date portion of the date field.

See also:

"Sample: History inquiry transactions"

"Understanding the audit history tables" on page 213

Sample: History inquiry transactions

The XML transactions for both a point-in-time request and the resulting response are shown below.

Note that the inquireAsOfDate in the request control is 2002-10-23. The record returned has an IncomeSourceHistCreateDate of 2002-09-27.

Request: getIncomeSource

```
<TCRMService>
  <RequestControl>
    <requestID>20010</requestID>
    <DWLControl>
      <requesterName>DWL Customer</requesterName>
      <requesterLanguage>100</requesterLanguage>
      <requestTime>07-07-2002 10:00:00</requestTime>
      <customerRequestVersion>66</customerRequestVersion>
      <customerEnvironment>
        Integration Environment
      </customerEnvironment>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <company>DWL Inc.</company>
      <geographicalRegion>North America</geographicalRegion>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
      <clientTransactionName>Integration001</clientTransactionName>
      <clientSystemName>XML Tester</clientSystemName>
      <inquireAsOfDate>2002-10-23 11:14:54.0</inquireAsOfDate>
      <sessionId>007008009</sessionId>
      <userPassword>DWL Customer</userPassword>
      <securityToken>001002003004005</securityToken>
      <encryptionType>1</encryptionType>
      <userRole>DWL Customer Team</userRole>
    </DWLControl>
  </RequestControl>
    <TCRMInquiry>
      <InquiryType>getIncomeSource</InquiryType>
      <InquiryParam>
        <tcrmParam name="IncomeSourceId">
          4721033184131194
        </tcrmParam>
      </InquiryParam>
    </TCRMInquiry>
</TCRMService>
```

Response: getIncomeSource

```
<TCRMService>
  <ResponseControl>
    <ResultCode>SUCCESS</ResultCode>
    <ServiceTime>40869</ServiceTime>
    <DWLControl>
      <clientSystemName>XML Tester</clientSystemName>
      <clientTransactionName>Integration001</clientTransactionName>
      <company>DWL Inc.</company>
      <customerEnvironment>
        Integration Environment
```

```
      </customerEnvironment>
      <customerRequestVersion>66</customerRequestVersion>
      <geographicalRegion>North America</geographicalRegion>
      <inquireAsOfDate>2002-10-23 11:14:54.0</inquireAsOfDate>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <requesterLanguage>100</requesterLanguage>
      <requesterName>DWL Customer</requesterName>
      <requestTime>07-07-2002 10:00:00</requestTime>
      <sessionId>007008009</sessionId>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
    </DWLControl>
  </ResponseControl>
  <TxResponse>
    <RequestType>getIncomeSource</RequestType>
  <TxResult>
    <ResultCode>SUCCESS</ResultCode>
  </TxResult>
  <ResponseObject>
    <TCRMIncomeSourceBObj>
      <ComponentID>1024</ComponentID>
      <AnnualAmount>108880.00</AnnualAmount>
      <CurrencyType>2</CurrencyType>
      <CurrencyValue>CDN$</CurrencyValue>
      <IncomeSourceHistActionCode>U</IncomeSourceHistActionCode>
      <IncomeSourceHistCreateDate>
        2002-09-27 22:35:35.684889
      </IncomeSourceHistCreateDate>
      <IncomeSourceHistCreatedBy>DBCLIENT</IncomeSourceHistCreatedBy>
      <IncomeSourceHistoryIdPK>
        2092722353526795
      </IncomeSourceHistoryIdPK>
      <IncomeSourceIdPK>4721033184131194</IncomeSourceIdPK>
      <IncomeSourceLastUpdateDate>
        2002-09-27 22:35:31.195
      </IncomeSourceLastUpdateDate>
      <IncomeSourceLastUpdateUser>Adriano</IncomeSourceLastUpdateUser>
      <IncomeSourceType>1</IncomeSourceType>
      <IncomeSourceValue>Annual Salary</IncomeSourceValue>
      <InformationObtainedDate>
        2002-09-27 22:35:31.195
      </InformationObtainedDate>
      <InvestmentExperienceYears>5</InvestmentExperienceYears>
      <PartyId>5891033184130452</PartyId>
      </TCRMIncomeSourceBObj>
    </ResponseObject>
  </TxResponse>
</TCRMService>
```

Understanding the audit history tables

The audit tables have a structure identical to the operational tables with the exception of five additional audit attributes, which are italicized and are described below the table. Operational tables for code tables and rules do not have corresponding audit tables. By conducting an inquiry using audit attributes, it is possible to see exactly what the operation record looked like for any given point in time. The table below shows the comparable contact and h_contact tables.

Table 32. comparable contact and h_contact tables

contact	**h_contact**
	h_contact_id: BIGINT NOT NULL (PK)
	h_action_code: CHAR(1) NOT NULL
	h_created_by: VARCHAR(10) NOT NULL
	h_create_dt: TIMESTAMP NOT NULL (PK)

Table 32. comparable contact and h_contact tables (continued)

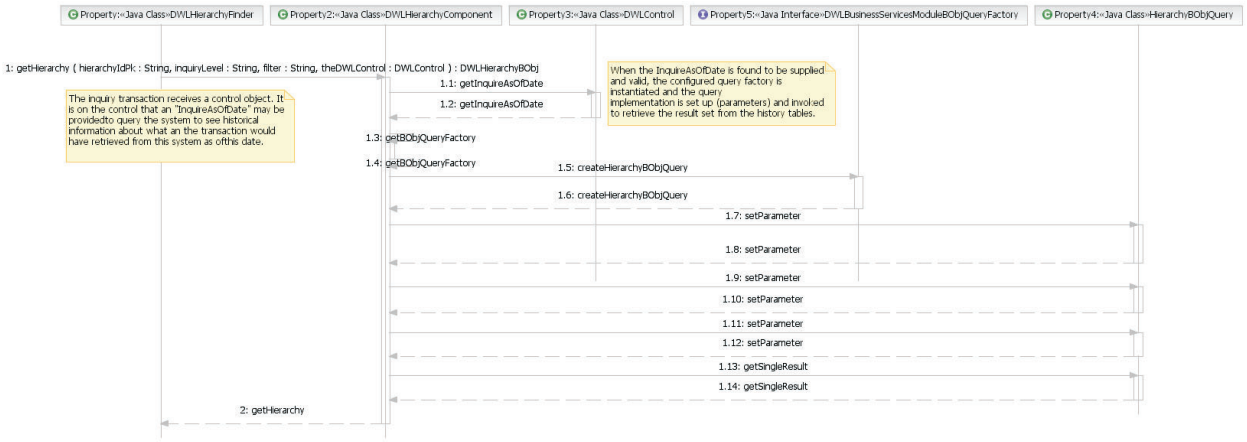
contact	h_contact
	h_end_dt: TIMESTAMP
cont_id: BIGINT NOTNULL (PK)	cont_id: BIGINT NOTNULL
acce_comp_tp_cd: BIGINT (FK)	acce_comp_tp_cd: BIGINT (FK)
pref_lang_cd: BIGINT (FK)	pref_lang_cd: BIGINT (FK)
created_dt:TIMESTAMP NOT NULL	created_dt:TIMESTAMP NOT NULL
inactivated_dt: TIMESTAMP	inactivated_dt: TIMESTAMP
contact_name: VARCHAR(255)	contact_name: VARCHAR(255)
person_org_code: CHAR(1) NOT NULL	person_org_code: CHAR(1) NOT NULL
solicit_ind: CHAR(1)	solicit_ind: CHAR(1)
confidential_ind: CHAR(1)	confidential_ind: CHAR(1)
client_imp_tp: BIGINT (FK)	client_imp_tp: BIGINT (FK)
client_st_tp: BIGINT (FK)	client_st_tp: BIGINT (FK)
client_potent_tp_cd: BIGINT (FK)	client_potent_tp_cd: BIGINT (FK)
rpting_freq_tp_cd: BIGINT (FK)	rpting_freq_tp_cd: BIGINT (FK)
last_statement_dt: TIMESTAMP	last_statement_dt: TIMESTAMP
alert_ind: CHAR(1)	alert_ind: CHAR(1)
last_update_dt: TIMESTAMP NOT NULL	last_update_dt: TIMESTAMP NOT NULL
provided_by_cont: BIGINT(FK)	provided_by_cont: BIGINT(FK)
last_update_user VARCHAR(20)(FK)	last_update_user VARCHAR(20)(FK)
and other fields...	

The additional attributes are:

- **h_cont_id**—The history record key; one of the composite primary key values (PK)
- **h_action_code**—Insert (Add) or Update
- **h_created_by**—The requesterName element in the Control portion of the add/update transaction that generated the history record
- **h_create_dt**—When created, one of the composite primary key values (PK)
- **h_end_dt**—Where relevant, for expired attributes such as identification

Understanding point-in-time history inquiries

The sequence diagram shown below outlines the steps in the process flow of a getHierarchy service executed for a particular point in time.



Understanding database considerations for history inquiry

This section provides more information on the database triggers that ship with IBM InfoSphere Master Data Management Server. The history inquiry function of IBM InfoSphere Master Data Management Server relies on a set of triggers to populate the product's audit tables. These tables are all prefixed with "H_" and otherwise generally share the same name as the operational table it stores audit information for, with a few exceptions due to table name length restrictions.

With each add or update, the triggers write a historical record of the record updated or added to the audit tables for the operational tables affected during the transaction. As such, the triggers that come with the IBM InfoSphere Master Data Management Server product allow the audit tables to store *both* historical and current client information. A record in a audit or history table is considered current when the HIST_END_DATE has no value. In other words, the historical record has not yet been ended.

Note: If the triggers shipped with the IBM InfoSphere Master Data Management Server product are modified or dropped, there can a be significant impact on both history inquiry functions and the retrieval of the transaction audit log.

IBM InfoSphere Master Data Management Server provides two sets of triggers with the database installation:

- A set of compound triggers—CreateTriggers_compound.sql
- A set of simple triggers—CreateTriggers_simple.sql

If the compound triggers are installed, each of the operational tables within the IBM InfoSphere Master Data Management Server product database has two active triggers.

The active triggers work with the IBM InfoSphere Master Data Management Server operational tables-all non-code tables in the database; for example, the CONTACT table is an operational table, but CDLANGTP is not. A number of admin services tables also include related history tables and triggers. Any insertion or update from the table activates one of the triggers. This trigger then populates the current image of the business object to the corresponding audit table as a new record. Each audit record has a HIST_ACTION_CODE column that shows the type of trigger

that was activated to cause the audit record to be created—either a ″I″ value for insert, or ″U″ value for update. Each audit record also populates a HIST_CREATE_DT, which stores the actual date/time of the trigger activation.

The audit records also contain a HIST_END_DT column, which is populated depending on the trigger type. For an insert, HIST_END_DT is simply set as NULL. For an update, the new audit record has the HIST_END_DT set to NULL, and the update trigger finds the last audit image of the same operational record and sets HIST_END_DT to the current trigger activation time, subtracting one microsecond. Subtracting one microsecond ensures that the timeline of the audit records are synchronized.

IBM InfoSphere Master Data Management Server uses these audit records to compare how a business object has changed between two points in time. It can also retrieve a specific image of the business object for a given point in the past.

If simple triggers are installed, each of the operational tables within the IBM InfoSphere Master Data Management Server product database has only one trigger for update actions. A number of admin services tables also have related history tables and triggers included. When new records are inserted into any operational table, no audit histories are recorded. When records are updated, the update trigger is activated and audit records are created. The HIST_CREATE_DT column is populated by the LAST_UPDATE_DT column of the operational record. The LAST_UPDATE_DT is retrieved from the previous image of the updating operational record. The new image of the LAST_UPDATE_DT in the operational record is set as the HIST_END_DT and 1 microsecond is subtracted from the HIST_END_DT to ensure the history timeline is synchronized.

Optionally, delete triggers may be installed into IBM InfoSphere Master Data Management Server product database. The scripts to install either simple delete triggers and one for compound delete triggers are available with the database installation scripts. Installing the delete triggers is optional and must be run manually. Once the delete triggers are installed, all delete actions are recorded in the audit tables.

Chapter 18. Retrieving historical information for party or contract images within a range of dates

Historical queries show how data has changed over a defined period of time.

More specifically, Point In Time (PIT) history is retrieved for each change that has occurred to a set, of predefined business objects, also known as view drivers, within a particular date range.

In this section, you will learn:

Configuring view instances and view drivers

Date range images allows you to see what the client file looked like at particular points in time, and to view certain types of changes, the object-level drivers that trigger the creation of an image, that have occurred to the client file between two given dates.

A view instance is a set of drivers that may be configured for use with one of the above mentioned inquiry transactions. A driver is a business object. In order to effectively configure and use a view instance, you must ensure that only supported drivers are used to create the instance, and that an appropriate view instance is supplied with the images transactions.

Any number of view instance configurations may be created. The supported drivers supplied with InfoSphere MDM Server are listed for each transaction below:

Table 33. Available supported drivers

Transaction	Supported drivers
getImagesByFSParty	ContractPartyRole
getImagesByContract	ContractAlert, ContractComponent, ContractRelationship, ContractPartyRoleIdentifier, ContractPartyRoleSituation, ContractRoleLocation, ContractPartyRole
getImagesByParty	Alert, IncomeSource, Organization, OrganizationName, PartyAddress, PartyContactMethod, PartyIdentification, PartyRelationship, Person, PersonName, Suspect

If an Alert or Suspect driver is triggered, these specific objects are not returned as part of the out-of-the-box getParty.

History inquiry date range images transactions

- getImagesByFSParty
- getImagesByContract
- getImagesByParty

Developer example

This feature is accessible to the end user via the InfoSphere MDM Server XML interface. As such, an XML request/response structure has been defined.

See also:

"Sample request"

"Sample response" on page 219

Sample request

```
<?xml version="1.0"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                            xsi:noNamespaceSchemaLocation="myTCRM.xsd">
  <RequestControl>
    <requestID>10015</requestID>
    <DWLControl>
      <requesterName>DWL Customer</requesterName>
      <requesterLanguage>100</requesterLanguage>
      <requestTime>07-07-2002 10:00:00</requestTime>
      <customerRequestVersion>66</customerRequestVersion>
      <customerEnvironment>Integration</customerEnvironment>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <company>DWL Inc.</company>
      <geographicalRegion>North America</geographicalRegion>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
      <clientTransactionName>Integration001</clientTransactionName>
      <clientSystemName>XML Tester</clientSystemName>
      <inquireFromDate>2003-04-01</inquireFromDate>
      <inquireToDate>2005-11-15</inquireToDate>
      <sessionId>007008009</sessionId>
      <userPassword>DWL Customer</userPassword>
      <securityToken>001002003004005</securityToken>
      <encryptionType>1</encryptionType>
      <userRole>DWL Customer Team</userRole>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>getImagesByParty</TCRMTxType>
    <TCRMTxObject>TCRMImageRequestBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMImageRequestBObj>
      <TAILTransactionLogInd>Y
      <TAILTransactionLogInd>
      <ImageInstanceType>11</ImageInstanceType>
      <ImageInstanceValue>partyhistory</ImageInstanceValue>
      <TCRMImageRequestParamBObj>
      <InquiryRequestType>PartyId</InquiryRequestType>
      <InquiryRequestValue>6901056406278879O1</InquiryRequestValue>
      <ImageInquiryLevel>1</ImageInquiryLevel>
      </TCRMImageRequestParamBObj>
      </TCRMImageRequestBObj>
    </TCRMObject>
  </TCRMTx>
</TCRMService>
```

Attribute description

- **TAILTransactionLogInfo**:Value may be Y/N. If not included default is that no transaction log information is returned. In order to use this flag, the Transaction Logging feature for all transactions relating to the configured view drivers transactions must be turned ON.
- **ImageInstanceType**:Value from the `viewinstance` table - the specific image configuration type code.
- **ImageInstanceValue**:Value from the `viewinstance` table - the specific image configuration type name; for example, FullParty.
- **InquiryRequestType**:The type of inquiry parameter being used to conduct this inquiry transaction; for example, use partyId when retrieving historical images of a party.
- **InquiryRequestValue**:The actual value of the inquiry parameter; for example, the partyId or contractId.
- **ImageInquiryLevel**:The inquiry level requested forservices invoked to provide the response images. As each image response is the result of a Point In Time getParty, getFSParty, or getContract, history inquiry transaction, the user may specify the level of detail that they would like to see in the image. See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for inquiry level information for these transaction.

Sample response

Images are returned in a first in, first out order (FIFO). The first instance of an image without affiliated transaction logging information is provided to show what the record looked like directly before the first change was made to it within the requested date range, specified in the DWLControl as the inquireFromDate and inquireToDate.

```
<?xml version="1.0"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                          xsi:noNamespaceSchemaLocation="tCRMResponse.xsd">
  <ResponseControl>
    <ResultCode>SUCCESS</ResultCode>
    <ServiceTime>83980</ServiceTime>
    <DWLControl>
      <clientSystemName>XML Tester</clientSystemName>
      <clientTransactionName>Integration001</clientTransactionName>
      <company>DWL Inc.</company>
      <customerEnvironment>
        Integration Environment
      </customerEnvironment>
      <customerRequestVersion>66</customerRequestVersion>
      <geographicalRegion>North America</geographicalRegion>
      <inquireFromDate>2003-04-01</inquireFromDate>
      <inquireToDate>2005-11-15</inquireToDate>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <requesterLanguage>100</requesterLanguage>
      <requesterName>DWL Customer</requesterName>
      <requestTime>07-07-2002 10:00:00</requestTime>
      <sessionId>007008009</sessionId>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
      <userRole>DWL Customer Team</userRole>
    </DWLControl>
  </ResponseControl>
  <TxResponse>
    <RequestType>getImagesByParty</RequestType>
      <TxResult>
        <ResultCode>SUCCESS</ResultCode>
      </TxResult>
      <ResponseObject>
        <TCRMImageListBObj>
          <DWLStatus>
            <Status>0</Status>
          </DWLStatus>
          <TCRMImageBObj>
            <TCRMPersonBObj>
              <ComponentID>1012</ComponentID>
```

```
<AlertIndicator>N</AlertIndicator>
<ClientImportanceType>4</ClientImportanceType>
<ClientImportanceValue>Medium</ClientImportanceValue>
<ClientPotentialType>1</ClientPotentialType>
<ClientPotentialValue>Client</ClientPotentialValue>
<ClientStatusType>1</ClientStatusType>
<ClientStatusValue>Active</ClientStatusValue>
<ComputerAccessType>1</ComputerAccessType>
<ComputerAccessValue>14.4K Baud</ComputerAccessValue>
<ConfidentialIndicator>N</ConfidentialIndicator>
<CreatedDate>2003-08-11 15:48:59.033</CreatedDate>
<DisplayName>Party Way</DisplayName>
<PartyActiveIndicator>Y</PartyActiveIndicator>
<PartyId>265106063133929501</PartyId>
<PartyLastUpdateDate>2003-08-11 15:48:59.295</PartyLastUpdateDate>
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<PersonLastUpdateTxId>460106063133900301</PersonLastUpdateTxId>
<PersonLastUpdateUser>cusadmin</PersonLastUpdateUser>
<PersonPartyId>265106063133929501</PersonPartyId>
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    2005-08-11 23:59:59.0
  </IdentificationExpiryDate>
  <IdentificationIdPK>877106063133931201</IdentificationIdPK>
  <IdentificationNumber>482000001</IdentificationNumber>
  <IdentificationStatusType>2</IdentificationStatusType>
  <IdentificationStatusValue>Active</IdentificationStatusValue>
  <IdentificationType>1</IdentificationType>
  <IdentificationValue>SSN</IdentificationValue>
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  <PartyIdentificationLastUpdateDate>
    2003-08-11 15:48:59.312
  </PartyIdentificationLastUpdateDate>
  <PartyIdentificationLastUpdateTxId>
    460106063133900301
  </PartyIdentificationLastUpdateTxId>
  <PartyIdentificationLastUpdateUser>
    cusadmin
  </PartyIdentificationLastUpdateUser>
  <StartDate>2000-08-11 00:00:00.0</StartDate>
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<TCRMPersonNameBObj>
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  <LastName>Way</LastName>
  <LastUpdatedBy>cusadmin</LastUpdatedBy>
  <LastUpdatedDate>2003-08-11 15:48:59.361</LastUpdatedDate>
  <NameUsageType>1</NameUsageType>
  <NameUsageValue>Legal</NameUsageValue>
  <PersonNameIdPK>336106063133936101</PersonNameIdPK>
  <PersonNameLastUpdateDate>
    2003-08-11 15:48:59.361
  </PersonNameLastUpdateDate>
  <PersonNameLastUpdateTxId>460106063133900301</PersonNameLastUpdateTxId>
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  <PersonPartyId>265106063133929501</PersonPartyId>
  <PrefixDescription>Mr</PrefixDescription>
```

```
    <PrefixType>14</PrefixType>
    <PrefixValue>Mr.</PrefixValue>
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    <StdLastName>WAY</StdLastName>
    </TCRMPersonNameBObj>
  </TCRMPersonBObj>
</TCRMImageBObj>
<TCRMImageBObj>
  <TAILTransactionLogBObj>
    <BusinessTransactionType>76</BusinessTransactionType>
    <BusinessTransactionValue>addContract</BusinessTransactionValue>
    <ClientSystemName>XML Tester</ClientSystemName>
    <ClientTransactionName>Integration001</ClientTransactionName>
    <CompanyName>DWL Inc.</CompanyName>
    <CreatedDate>2003-06-22 18:11:19.369</CreatedDate>
    <GeographRegion>North America</GeographRegion>
    <LineOfBusiness>Product Development</LineOfBusiness>
    <ProductVersion>66</ProductVersion>
    <RequestDate>07-07-2002 10:00:00</RequestDate>
    <RequesterLanguage>100</RequesterLanguage>
    <requesterName>cusadmin</requesterName>
    <SessionId>007008009</SessionId>
    <TransactionLogIdPK>12345678901234</TransactionLogIdPK>
    <UserRole>DWL Customer Team</UserRole>
  </TAILTransactionLogBObj>
  <TCRMPersonBObj>
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    <AlertIndicator>N</AlertIndicator>
    <ClientImportanceType>4</ClientImportanceType>
    <ClientImportanceValue>Medium</ClientImportanceValue>
    <ClientPotentialType>1</ClientPotentialType>
    <ClientPotentialValue>Client</ClientPotentialValue>
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    <ClientStatusValue>Active</ClientStatusValue>
    <ComputerAccessType>1</ComputerAccessType>
    <ComputerAccessValue>14.4K Baud</ComputerAccessValue>
    <ConfidentialIndicator>N</ConfidentialIndicator>
    <CreatedDate>2003-08-10 15:48:59.033</CreatedDate>
    <DisplayName>Party Way</DisplayName>
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    <PartyId>265106063133929501</PartyId>
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    <PartyLastUpdateUser>cusadmin</PartyLastUpdateUser>
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    <PreferredLanguageValue>English</PreferredLanguageValue>
    <SolicitationIndicator>N</SolicitationIndicator>
    <StatementFrequencyType>1</StatementFrequencyType>
    <StatementFrequencyValue>Annually</StatementFrequencyValue>
    <AgeVerifiedWithType>2</AgeVerifiedWithType>
    <AgeVerifiedWithValue>Passport</AgeVerifiedWithValue>
    <BirthDate>1988-07-23 00:00:00.0</BirthDate>
    <BirthPlaceType>1</BirthPlaceType>
    <BirthPlaceValue>Afghanistan</BirthPlaceValue>
    <CitizenshipType>1</CitizenshipType>
    <CitizenshipValue>Afghanistan</CitizenshipValue>
    <GenderType>M</GenderType>
    <HighestEducationType>3</HighestEducationType>
    <HighestEducationValue>College</HighestEducationValue>
    <MaritalStatusType>2</MaritalStatusType>
    <MaritalStatusValue>Single</MaritalStatusValue>
    <NumberOfChildren>2</NumberOfChildren>
    <PersonLastUpdateDate>2003-08-11 15:48:59.3</PersonLastUpdateDate>
    <PersonLastUpdateTxId>12345678901234</PersonLastUpdateTxId>
    <PersonLastUpdateUser>cusadmin</PersonLastUpdateUser>
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    <UserIndicator>N</UserIndicator>
    <TCRMPartyIdentificationBObj>
    <ComponentID>1010</ComponentID>
    <IdentificationExpiryDate>
      2005-08-11 23:59:59.0
    </IdentificationExpiryDate>
    <IdentificationIdPK>877106063133931201</IdentificationIdPK>
    <IdentificationNumber>482000001</IdentificationNumber>
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    <IdentificationStatusValue>Active</IdentificationStatusValue>
    <IdentificationType>1</IdentificationType>
    <IdentificationValue>SSN</IdentificationValue>
```

```
            <PartyId>265106063133929501</PartyId>
            <PartyIdentificationLastUpdateDate>
              2003-08-11 15:48:59.312
            </PartyIdentificationLastUpdateDate>
            <PartyIdentificationLastUpdateTxId>
              12345678901234
            </PartyIdentificationLastUpdateTxId>
            <PartyIdentificationLastUpdateUser>
              cusadmin
            </PartyIdentificationLastUpdateUser>
            <StartDate>2000-08-11 00:00:00.0</StartDate>
          </TCRMPartyIdentificationBObj>
          <TCRMPersonNameBObj>
            <ComponentID>1013</ComponentID>
            <GivenNameOne>Party</GivenNameOne>
            <LastName>Way</LastName>
            <LastUpdatedBy>cusadmin</LastUpdatedBy>
            <LastUpdatedDate>2003-08-11 15:48:59.361</LastUpdatedDate>
            <NameUsageType>1</NameUsageType>
            <NameUsageValue>Legal</NameUsageValue>
            <PersonNameIdPK>336106063133936101</PersonNameIdPK>
            <PersonNameLastUpdateDate>
              2003-08-11 15:48:59.361
            </PersonNameLastUpdateDate>
            <PersonNameLastUpdateTxId>12345678901234</PersonNameLastUpdateTxId>
            <PersonNameLastUpdateUser>cusadmin</PersonNameLastUpdateUser>
            <PersonPartyId>265106063133929501</PersonPartyId>
            <PrefixDescription>Mr</PrefixDescription>
            <PrefixType>14</PrefixType>
            <PrefixValue>Mr.</PrefixValue>
            <StartDate>2002-05-02 00:00:00.0</StartDate>
            <StdGivenNameOne>PARTY</StdGivenNameOne>
            <StdLastName>WAY</StdLastName>
          </TCRMPersonNameBObj>
          <TCRMPersonNameBObj>
            <ComponentID>1013</ComponentID>
            <GivenNameOne>Party</GivenNameOne>
            <LastName>Jones</LastName>
            <LastUpdatedBy>cusadmin</LastUpdatedBy>
            <LastUpdatedDate>2003-08-11 15:48:59.361</LastUpdatedDate>
            <NameUsageType>8</NameUsageType>
            <NameUsageValue>Previous</NameUsageValue>
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            <PersonNameLastUpdateDate>
              2003-08-10 15:48:59.361
            </PersonNameLastUpdateDate>
            <PersonNameLastUpdateTxId>12345678901234</PersonNameLastUpdateTxId>
            <PersonNameLastUpdateUser>cusadmin</PersonNameLastUpdateUser>
            <PersonPartyId>265106063133929501</PersonPartyId>
            <PrefixDescription>Mr</PrefixDescription>
            <PrefixType>14</PrefixType>
            <PrefixValue>Mr.</PrefixValue>
            <StartDate>2002-05-02 00:00:00.0</StartDate>
            <StdGivenNameOne>PARTY</StdGivenNameOne>
            <StdLastName>JONES</StdLastName>
          </TCRMPersonNameBObj>
        </TCRMPersonBObj>
      </TCRMImageBObj>
    </TCRMImageListBObj>
  </ResponseObject>
 </TxResponse>
</TCRMService>
```

Code interactions

Code interactions for History Inquiry Date Range Images include errors.

See also:

"Possible errors"

Possible errors

Errors that may be thrown by History Inquiry Date Range Images include:

- Component—`TCRMHistoryComponent`

- Method—`getImagesByParty, getImagesByFSParty, getImagesByContract`

Errors that this method throws include:

- Party does not exist
- To date must be after from date
- From date must be supplied
- Invalid date format
- No records found
- Component—PartyHistoryComponent or ContractHistoryComponent or AlertHistoryComponent
- Methods—all

  This methods throws errors for the existing history methods; however, new component numbers will be surfaced.

Configuring transaction logging to function with history inquiry date range images

To retrieve system information about what triggered a change, transaction logging must be configured to use Configuration and Management components.

For each driver object you are configuring, ensure that the relevant internal and external transactions have been enabled for logging.

See also:

"Packaging and deployment"

Packaging and deployment

Class	Project	Package	Physical Unit for Deployment (jar, ejb jar, ear)
TCRMHistoryController	ProductServices	com.dwl.tcrm.history	ProductServices.jar
TCRMHistoryComponent	ProductServices	com.dwl.tcrm.history	ProductServices.jar
TCRMImageListBObj	ProductServices	com.dwl.tcrm.history	ProductServices.jar
TCRMImageBObj	ProductServices	com.dwl.tcrm.history	ProductServices.jar
TCRMImageRequestBObj	ProductServices	com.dwl.tcrm.history	ProductServices.jar
TCRMImageRequestParamBObj	ProductServices	com.dwl.tcrm.history	ProductServices.jar
TCRMPartyHistoryComponent	Party	com.dwl.tcrm.party.component	Party.jar (ejb jar)
TCRMAlertHistoryComponent	DataServices	com.dwl.tcrm.dataservices. component	DataServices.jar (ejb jar)
TCRMContractHistoryComponent	FinancialServices	com.dwl.tcrm.financial. component	Financial.jar (ejb jar)

Chapter 19. Storing and retrieving the Transaction Audit Information Log

The Transaction Audit Information Log (TAIL) module provides services for the storage and retrieval of transaction log information for the InfoSphere MDM Server product.

You can log the following:

- External/business transactions
- Associated internal transactions
- Key elements associated with the external transactions, such as the party ID
- Key elements associated with the internal transactions, such as the party ID
- Successful transactions, failed transactions, or both

The Transaction Audit Information Log feature has mainly database-driven configuration options. TAIL may be configured to log any persistent or inquiry-based business transactions, as well as some or all of their associated internal transactions. Both successful and failed transactions can be logged. The execution of search services may not be logged.

Transaction audit information can be logged to the database either synchronously, as part of the transaction, or asynchronously.

An InfoSphere MDM Server transaction can consist of a number of internal transactions (or actions) that are executed as a part of the larger external transaction. For example, when TAIL logs an external transaction, also called a business transaction, it can be configured to also log all, some, or none of its internal transactions. When an audit transaction is retrieved, any of the internal transactions that have been logged are also retrieved.

In this section, you will learn:

Understanding transaction audit information log information

For each given business transaction, several pieces of information can be logged in the transaction audit information log.

The following information can be logged to the TAIL database tables for a business transaction:

- TRANSACTIONLOG table—Logs an entry for the external/business transaction type being executed. It also logs items from the DWLControl object from the initial transaction request. If a business transaction is configured to be logged, there will always be a record created in this table.
- TRANSACTIONLOGGER table—Logs an entry for the transactions executed that resulted in failure.
- INTERNALLOG table—Logs all of the internal transactions executed within the context of the external transaction. For example, an addIncomeSource transaction may be an internal transaction to an external addPerson transaction. Only the internal transactions that have been configured to be logged will have entries created in this table for a given business transaction.
- INTERNALLOGTXNKEY table—Creates entries for each transaction key and its corresponding values for each internal transaction executed. The INTERNALTXNKEY database table is preconfigured/prepopulated with information on which keys are logged for a particular internal transaction. These keys are typically top-level specified elements (in the V_ELEMENT table) of the business object (see the V_GROUP table) for a particular transaction. For example, for an IncomeSource business object, the PartyId will be logged along with its actual value (element_value).
- EXTERNALLOGTXNKEY table—Creates entries for each transaction key and its corresponding value for a particular external transaction executed. The EXTERNALTXNKEY database table is similar to the INTERNALTXNKEY table in that it is preconfigured and prepopulated with information on which keys are logged for a particular transaction. Internal transaction information is stored in the INTERNALTXNKEY table, and external transaction information is stored in the EXTERNALTXNKEY table. For example, for an addPerson transaction the PartyId and PersonPartyId from the return object PersonBObj are logged along with its actual value (element_value).

Configuring transaction audit information logs

You can perform a number of transaction audit information log configuration tasks.

See also:

"To turn TAIL on or off globally"

"To configure TAIL logging to use in synchronous or asynchronous mode" on page 227

"To turn TAIL on for redundant updates" on page 227

"To turn TAIL logging on or off for a particular external transaction" on page 227

"To turn TAIL logging on or off for a particular internal transaction" on page 227

To turn TAIL on or off globally

- To turn TAIL logging on, in the Configuration and Management component, set `/IBM/DWLCommonServices/TAIL/enabled` to `true`.
- To turn TAIL logging off, in the Configuration and Management component, set `/IBM/DWLCommonServices/TAIL/enabled` to `false`. TAIL logging is turned off by default.

To configure TAIL logging to use in synchronous or asynchronous mode

- To configure TAIL logging to use asynchronous mode, in the Configuration and Management component, set `/IBM/DWLCommonServices/TAIL/Asynchronous/enabled` to `true`.
- To configure TAIL logging to use synchronous mode, in the Configuration and Management component, set `/IBM/DWLCommonServices/TAIL/Asynchronous/enabled` to `false`. By default TAIL logging uses synchronous mode.

To turn TAIL on for redundant updates

- To turn TAIL logging on, in the Configuration and Management component, set `/IBM/DWLCommonServices/TAIL/RedundantUpdate/enabled` to `true`.
- To turn TAIL logging off, in the Configuration and Management component, set `/IBM/DWLCommonServices/TAIL/RedundantUpdate/enabled` to `false`. This is the default setting, which means by default TAIL logs are not created for update transactions that do a redundant update.

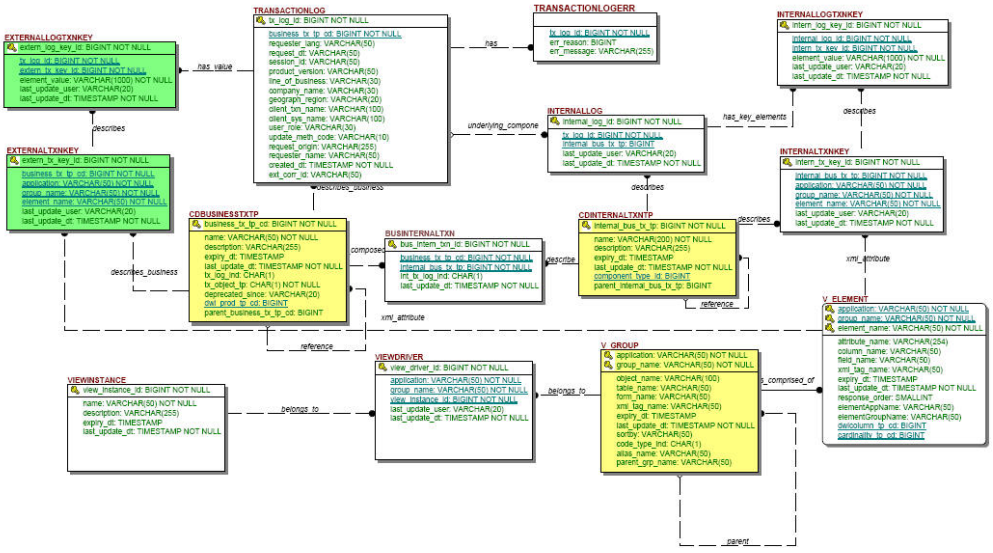
To turn TAIL logging on or off for a particular external transaction

- To turn TAIL logging on for a particular external transaction, in the CDBUSINESSTXTP table set the value in the TX_LOG_IND column for the particular component to `Y`.
- To turn TAIL logging on for a particular external transaction, in the CDBUSINESSTXTP table set the value in the TX_LOG_IND column for the particular component to `N`.

To turn TAIL logging on or off for a particular internal transaction

- To turn TAIL logging on for a particular internal transaction, in the BUSINTERNALTXN table set the value in the INT_TX_LOG_IND column for the particular component to `Y`.
- To turn TAIL logging on for a particular internal transaction, in the BUSINTERNALTXN table set the value in the INT_TX_LOG_IND column for the particular component to `N`.

Understanding transaction audit information log data tables



The data tables with default values that must be deployed with the TAIL module include:

- **CDBUSINESSTXTP**—This table holds the external, or callable, transaction code types, names, and transaction log indicator required to configure a particular transaction for logging by TAIL; the terms *callable* and *external* refer to transactions that exist at the controller-level. Default data is supplied in this table for use with InfoSphere MDM Server. By default, all external transactions are logged if `/IBM/DWLCommonServices/TAIL/enabled` is set "true" in the Configuration and Management component.
- **CDINTERNALTXNTP**—This table holds all of the internal transaction code types and names so that internal transactions may be logged during a particular external transaction-the term *internal* refers to transactions or methods that exist at the component-level.
- **BUSINTERNALTXN**—This table holds values for external transactions and their internal transactions, as well as an indicator for whether each internal transaction within a external transaction is to be logged. See Chapter 34, "Using the Configuration and Management components," on page 405 for more information on configuring these options. By default, all internal transactions are logged when `/IBM/DWLCommonServices/TAIL/enabled` is set to `false` for Transaction Logging in the Configuration and Management component.
- **INTERNALTXNKEY**—This table holds all values necessary for a particular internal transaction to log particular keys that in turn may be used for log retrieval. All of the following fields will be configured as keys (element_name) for a business object: `PartyId`, `ContractId`, `ContractIdPK`, `PersonPartyId`, `OrganizationPartyId`. If the business object does not contain any of the aforementioned fields, then only the primary key of the business object is stored as a key.
- **EXTERNALTXNKEY** —This table holds all the values necessary for a particular external transaction to log its corresponding transaction keys that in turn may be used for log retrieval.
- **V_GROUP**—This table contains metadata about all of the business objects.
- **V_ELEMENT**—This table stores information about all elements of a business object.

Understanding transaction audit information logging

TAIL logging, as a global setting, can be turned on or off using the Configuration and Management components.

Note: For more information, see Chapter 34, "Using the Configuration and Management components," on page 405.

Logging to TAIL occurs seamlessly within InfoSphere MDM Server, as long as the business transaction has been configured for logging.

TAIL can also be configured to log particular external transaction alone and for some or all of its internal transactions. For example, it can be used to flag the transaction log indicator for a particular transaction listed in the CDBUSINESSTXTP table to Y. This mainly impacts the CDBUSINESSTXTP and BUSINTERNALTXN database tables in InfoSphere MDM Server. You can turn logging on and off at the transaction level, using the System Maintenance Transaction Audit Log screen.

For more information, see the *IBM InfoSphere Master Data Management Server System Management Guide*.

Retrieving transaction audit information log information

The `getTransactionLog` transaction allows InfoSphere MDM Server common components to use TAIL. This transaction can be used for TCRM applications or `DWLAdminService` applications.

This transaction works the same way as the deprecated `getTAIL` transaction when used for TCRM application (InfoSphere MDM Server domains),, however, the request/response wrappers are different; the transaction `getTAIL` uses `TCRMTAILRequestBObj` and `TCRMTAILResponseBObj`, while `getTransactionLog` uses `DWLTAILRequestBObj` and `DWLTAILResponseBObj`. The `getTransactionLog` transaction uses an external rule to retrieve additional detail.

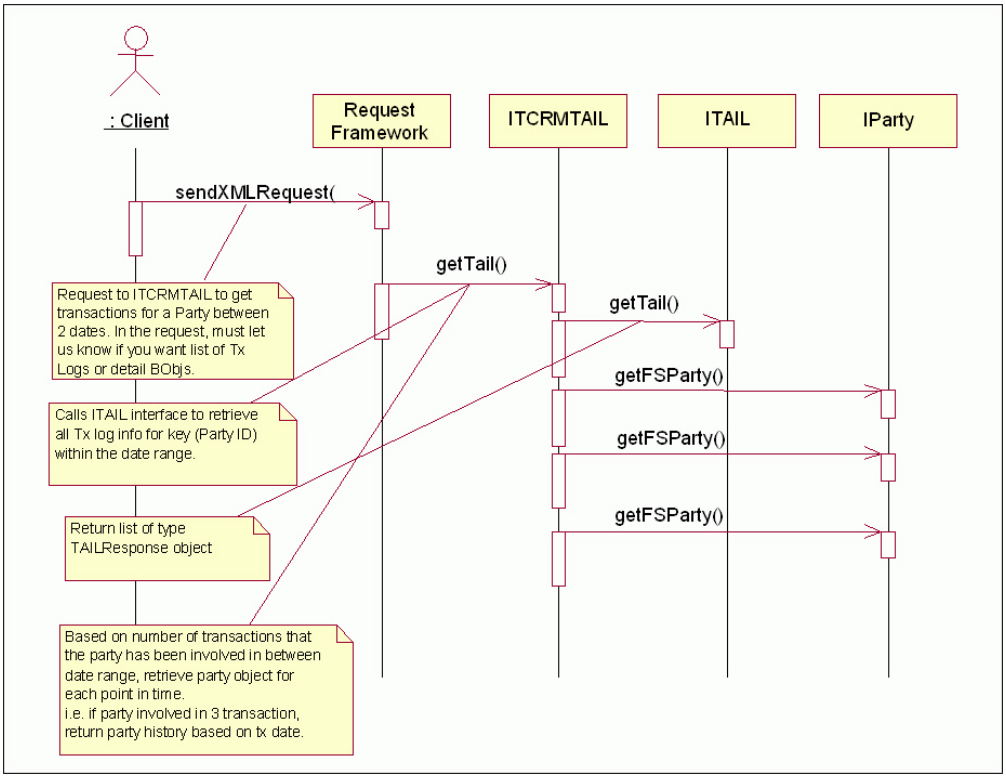
To keep backward compatibility, the deprecated `getTAIL` transaction in `ITCRMTAILController` can still be used. It takes `TCRMTAILRequestBObj` as input and the `TCRMResponse` it returns contains `TCRMTAILResponseBObj`.

The transaction `getTransactionLog` in `IDWLTAILController` takes `DWLTAILRequestBObj` as input and the `DWLResponse` it returns contains `DWLTAILResponseBObj`.

TAIL information can be retrieved through the `getTransactionLog` request transaction. The more parameters you add to a TAIL request, the more specific the results of the request will be, in other words, the more parameters supplied, the narrower the result set is. For example, if a `PartyId` and a business transaction type are specified, the transaction logs returned in the result set area are only those that satisfy both conditions.

Understanding getTransactionLog transactions

The following is a high-level sequence diagram of the getTransactionLog transaction.



Understanding inquiry levels

TAIL inquiry levels determine the type and extent of information that is returned.

There are two different levels of inquiry that may be specified when executing a getTransactionLog transaction:

- Level 0 retrieves only transaction log objects and external log transaction key objects from TAIL database tables.
- Level 1 Level 0 details plus the internal log and internal log transaction key objects from the TAIL database tables.

Most InfoSphere MDM Server inquiry transactions may be executed against the audit database tables to retrieve historical data for a particular point in time in the past. TAIL reuses this history inquiry logic when retrieving additional information with its transaction log, for example, in a Level 1 getTransactionLog request. In order to bring back this information, a special additional details indicator must set. The additional details indicator can be set to ″Y″ or ″N″ to include the point in time history when retrieving the log. Retrieving additional details in getTransactionLog is implemented in the external rule class `com.dwl.tcrm.externalrule.TAILAdditionalDetail`. AdditionalDetailIndicator is not applicable to DWLAdminService by default.

The point in time history retrieved for the transaction logs include either the results of a InfoSphere MDM Server `getFSParty` or a getContract transaction (level 3). These transactions are executed by using either the PartyId, PersonPartyId, OrganizationPartyId, ContractIdPK, or ContractId taken from the element values of the external log transaction key object for external transactions and internal log transaction key object. In addition, the history inquiry is executed for the point in time at which the original transaction was logged-the transaction log created date. To clarify, the date used as the `inquireAsOfDate` (see Chapter 17, "Retrieving audit history," on page 211 for a full explanation) is the created date_created_dt of the transaction log object. One minute is added to this time, because the history inquiry functionality ignores seconds values. In addition, the time at which for the history inquiry transaction gets taken from the date at which the transaction log was created. See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for more information on the getFSParty and getContract transactions.

The transaction runs to retrieve these additional details depends on the transaction keys indicated for that transaction in the pre-populated EXTERNALTXNKEY and INTERNALTXNKEY database table for external and internal transactions, respectively. Keys include PartyId, ContractId, PersonPartyId, OrganizationPartyId, ContractIdPK for the business objects of a transaction. If the key is a ContractId or ContractIdPK, a getContract transaction is executed, otherwise, a getFSParty is executed if one of the party keys exists.

See also:

"Sample: Transaction audit information log requests"

Sample: Transaction audit information log requests

Below is a sample getTransactionLog request.

```
<?xml version="1.0"? encoding="UTF-8"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
     xsi:noNamespaceSchemaLocation="myTCRM.xsd">
  <RequestControl>
    <requestID>10015</requestID>
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLanguage>100</requesterLanguage>
      <requestTime>07-07-2002 10:00:00</requestTime>
      <customerRequestVersion>66</customerRequestVersion>
      <customerEnvironment>Integration Environment</customerEnvironment>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <company>DWL Inc.</company>
      <geographicalRegion>North America</geographicalRegion>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
      <clientTransactionName>Integration001</clientTransactionName>
      <clientSystemName>XML Tester</clientSystemName>
      <inquireFromDate>2002-11-05</inquireFromDate>
      <inquireToDate>2002-11-06</inquireToDate>
      <sessionId>007008009</sessionId>
      <userPassword>WebSphere Customer Center</userPassword>
      <securityToken>001002003004005</securityToken>
      <encryptionType>1</encryptionType>
      <userRole>Superuser</userRole>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>getTAIL</TCRMTxType>
    <TCRMTxObject>TCRMTAILRequestBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMTAILRequestBObj>
        <AdditionalDetailIndicator>Y</AdditionalDetailIndicator>
        <TAILRequestBObj>
          <InquiryLevel>1</InquiryLevel>
          <BusinessTransactionType>7</BusinessTransactionType>
          <BusinessTransactionValue>PartyAddress</BusinessTransactionValue>
```

```
          <UserId>Trainee</UserId>
          <TAILRequestParamBObj>
            <RequestType>PartyId</RequestType>
            <RequestValue>2751033184712380</RequestValue>
          </TAILRequestParamBObj>
        </TAILRequestBObj>
      </TCRMTAILRequestBObj>
    </TCRMObject>
  </TCRMTx>
</TCRMService>
```

TAIL Example – getTransactionLog Request for tcrm application

```
<?xml version="1.0" encoding="UTF-8"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
     xsi:noNamespaceSchemaLocation="myTCRM.xsd">
  <RequestControl>
    <requestID>552424999</requestID>
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLanguage>100</requesterLanguage>
      <requestTime>07-07-2002 10:00:00</requestTime>
      <customerRequestVersion>77</customerRequestVersion>
      <customerEnvironment>Integration Environment</customerEnvironment>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <company>DWL Inc.</company>
      <geographicalRegion>North America</geographicalRegion>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
      <clientTransactionName>Integration001</clientTransactionName>
      <clientSystemName>XML Tester</clientSystemName>
      <inquireFromDate>2006-04-27 23:55:38.984</inquireFromDate>
      <inquireToDate/>
      <sessionId>007008009</sessionId>
      <updateMethodCode>Tail test</updateMethodCode>
      <requestOrigin>DWL QA</requestOrigin>
      <userPassword>customer</userPassword>
      <securityToken>001002003004005</securityToken>
      <encryptionType>1</encryptionType>
      <userRole/>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>getTransactionLog</TCRMTxType>
    <TCRMTxObject>DWLTAILRequestBObj</TCRMTxObject>
    <TCRMObject>
      <DWLTAILRequestBObj>
        <AdditionalDetailIndicator>Y</AdditionalDetailIndicator>
        <TAILRequestBObj>
          <InquiryLevel>1</InquiryLevel>
          <BusinessTransactionType/>
          <BusinessTransactionValue>addContract</BusinessTransactionValue>
          <TAILRequestParamBObj>
            <RequestType>ContractIdPK</RequestType>
            <RequestValue>3603601</RequestValue>
          </TAILRequestParamBObj>
        </TAILRequestBObj>
      </DWLTAILRequestBObj>
    </TCRMObject>
  </TCRMTx>
</TCRMService>
```

TAIL example – getTransactionLog Request for DWLAdminService application

```
<?xml version="1.0" encoding="UTF-8"?>
<DWLAdminService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
     xsi:noNamespaceSchemaLocation="DWLAdminService.xsd">
  <RequestControl>
    <requestID>50097</requestID>
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLanguage>100</requesterLanguage>
      <customerRequestVersion>66</customerRequestVersion>
      <customerEnvironment>Integration Environment</customerEnvironment>
      <lineOfBusiness>Product Development</lineOfBusiness>
      <company>DWL Inc.</company>
      <geographicalRegion>North America</geographicalRegion>
      <transactionCorrelatorId>1234567890</transactionCorrelatorId>
      <clientTransactionName>Integration001</clientTransactionName>
```

```
      <clientSystemName>XML Tester</clientSystemName>
      <inquireFromDate>2002-01-01</inquireFromDate>
      <inquireToDate>2015-01-01</inquireToDate>
      <sessionId>007008009</sessionId>
      <userPassword>customer</userPassword>
      <securityToken>001002003004005</securityToken>
      <encryptionType>1</encryptionType>
      <userRole>SuperUser</userRole>
    </DWLControl>
  </RequestControl>
  <DWLTx>
    <DWLTxType>getTransaction</DWLTxType>
    <DWLTxObject>DWLTAILRequestBObj</DWLTxObject>
    <DWLObject>
      <DWLTAILRequestBObj>
        <AdditionalDetailIndicator>Y</AdditionalDetailIndicator>
        <TAILRequestBObj>
          <InquiryLevel>1</InquiryLevel>
          <BusinessTransactionType>377</BusinessTransactionType>
          <UserId>cusadmin</UserId>
          <TAILRequestParamBObj>
            <RequestType>tp_cd</RequestType>
            <RequestValue>1000000</RequestValue>
          </TAILRequestParamBObj>
        </TAILRequestBObj>
      </DWLTAILRequestBObj>
    </DWLObject>
  </DWLTx>
</DWLAdminService>
```

Setting up new transactions in the transaction audit information log

To set up a new transaction in the InfoSphere MDM Server for transaction logging, several tables must be updated.

See also:

"To update the CDBUSINESSTXTP table"

"To update the CDINTERNALTXNTP table" on page 234

"To update the BUSINTERNALTXN table" on page 235

"To update the INTERNALTXNKEY table" on page 235

"To update the EXTERNALTXNKEY table" on page 236

To update the CDBUSINESSTXTP table

Enter values for the new transaction in the CDBUSINESSTXTP table.

The value of the `tx_log_ind` field in this table governs whether the transaction is logged or not. This table is also used for security purposes, however it is discussed only in the context of transaction logging in this section.

BUSINESS_TX_TP_CD
: the numeric code for the transaction name. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

NAME
: transaction name. This must be identical to the method name on the controller class/bean

DESCRIPTION
: transaction description.

EXPIRY_DT
: the date at which the transaction expires.

LAST_UPDATE_DT
the date at which this record was last modified.

TX_LOG_IND
configured to Y/N for logging the external (controller-level) transaction to the transaction audit/information log. Y- means log the transaction, N- means do not log the transaction

TX_OBJECT_TP
transaction object type-whether the transaction is an inquiry (I), persistent (P) or search (S) transaction is indicated here.

If the transaction is not registered in this table, it fails, with a message indicating that the transaction is not registered.

For example:

```
<TxResult>
  <ResultCode>FATAL</ResultCode>
  <DWLError>
    <ComponentType>106</ComponentType>
    <ComponentTypeValue></ComponentTypeValue>
    <Detail></Detail>
    <ErrorMessage>Parser DWLTransaction Failed</ErrorMessage>
    <ErrorType>READERR</ErrorType>
    <ErrorTypeValue></ErrorTypeValue>
    <HelpId></HelpId>
    <LanguageCode>0</LanguageCode>
    <ReasonCode>4928</ReasonCode>
    <Severity>0</Severity>
    <SeverityValue></SeverityValue>
    <Throwable>
      com.dwl.base.requestHandler.exception.RequestParserException: transaction
      getAlert is not registered
    </Throwable>
  </DWLError>
</TxResult>
```

To update the CDINTERNALTXNTP table

Enter records for all potential internal, component-level transactions in the CDINTERNALTXNTP table.

INTERNAL_BUS_TX_TP
The numeric code for the internal transaction. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

NAME
Internal transaction name This must be identical to the method name on the component class/bean

DESCRIPTION
Internal transaction description

EXPIRY_DT
The date at which the transaction expires

LAST_UPDATE_DT
The date at which this record was last modified

COMPONENT_TYPE_ID
It references to COMPONENT_TYPE_ID in COMPONENTTYPE table.

To update the BUSINTERNALTXN table

Enter records for all potential combinations of external/internal transaction execution in the BUSINTERNALTXN table. For example, an addContract transaction may contain an internal transaction for addOrganizationName. Similarly, an addOrganization may contain an internal transaction for addOrganizationName. The mapping of external to internal transactions is stored in this table. Each external transaction has its own logging configuration for its internal transactions, also stored in this table.

BUS_INTERN_TXN_ID
The numeric code for the external/internal transaction configuration record. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

BUSINESS_TX_TP_CD
The numeric code for the transaction name. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

INTERNAL_BUS_TX_TP
The numeric code for the internal transaction. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

INT_TX_LOG_IND
Configured to Y/N for logging the internal (component-level) transaction to the transaction audit/information log. Y means log the internal transaction, N means do not log the internal transaction.

LAST_UPDATE_DT
The date at which this record was last modified.

To update the INTERNALTXNKEY table

Enter the records into the INTERNALTXNKEY table to log the appropriate business object keys to be logged when the internal transaction is executed. By default, keys that render additional details from InfoSphere MDM Server include only the following keys: PartyId, ContractId, ContractIdPK, PersonPartyId, OrganizationPartyId.

The primary key of each business object is also stored for the internal transaction. The entries in this table depend on values existing in the V_GROUP and V_ELEMENT tables. Therefore, if any transaction contains a new business object, the group and the elements for this new business object must be registered in those tables accordingly before the INTERNALTXNKEY table may be populated.

INTERN_TX_KEY_ID
The numeric code for the key configuration record. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

INTERNAL_BUS_TX_TP
The numeric code for the internal transaction. IBM InfoSphere Master Data Management Server reserves all numeric codes up to 1,000,000,000.

APPLICATION
Application name (TCRM)

GROUP_NAME
Business term for the type of business object registered in the v_group table.

ELEMENT_NAME
The name of the attribute or key that will have its value stored during transaction logging - this must match the business object field name.

LAST_UPDATE_USER
The ID of the last user to update this record

LAST_UPDATE_DT
The date when this record was last modified

To update the EXTERNALTXNKEY table

Enter the records into the EXTERNALTXNKEY table to log the appropriate business object's Transaction keys to be logged when the external transaction is executed. By default, keys that render additional details from InfoSphere MDM Server include only the following keys: PartyId, ContractId, ContractIdPK, PersonPartyId, OrganizationPartyId.

The primary key of each business object is also stored for the external transaction. The entries in this table depend on values existing in the V_GROUP and V_ELEMENT tables. Therefore, if any transaction contains a new business object, the group and the elements for this new business object must be registered in those tables accordingly before the EXTERNALTXNKEY table may be populated.

EXTERN_TX_KEY_ID
The numeric code for the key configuration record. InfoSphere MDM Server reserves all numeric codes up to 1,000,000,000.

BUSINESS_TX_TP_CD
The numeric code for the external transaction. InfoSphere MDM Server reserves all numeric codes up to 1,000,000,000.

APPLICATION
Application name (TCRM, DWLADMINSERVICE).

GROUP_NAME
Business term for the type of business object registered in the V_GROUP table.

ELEMENT_NAME
The name of the attribute or key that will have its value stored during transaction logging. This must match the business object field name defined in the V_ELEMENT table.

LAST_UPDATE_USER
The ID of the last user to update this record.

LAST_UPDATE_DT
The date when this record was last modified.

Understanding getTransactionLog elements and attributes

The following describes the elements and attributes used in the previous example:

inquireFromDate
The start date, or the date from which you retrieve the transaction log. This mandatory field is supplied to provide the day at which the user wants to start retrieving the transaction log information. If only this parameter is supplied, the transaction log is retrieved only for

00:00:00.0.000 to 23:59:59.0.000. If it is the current day, transactions will be retrieved up to the current time that day.

inquireToDate
The end date, or the date to which you retrieve your log. This is not a mandatory field.

Regarding entering specific times with dates
Time portions are accepted but not required for the dates. The date and time must be of a format configured in the `/IBM/DWLCommonServices/DateValidation/dateFormat` configuration. If a time is not entered for an inquireToDate, the default time is 23:59:59:0.000. If a time is not entered for an inquireFromDate, the time is defaulted to 0:00:00:00. Times that are entered through the XML request are accurate to the minute, to allow for the way that the database InfoSphere MDM Server is using-either DB2 or Oracle-handles time.

Note: If you enter an inquireFromDate *only*, you retrieve transactions for that day only. Any time entered is ignored and the log is retrieved for that day between 0:00:00.0 am and 23:59:59.0 pm.

TCRMTxType
The name of the transaction-for example, getTransactionLog

TCRMTxObject
The Name Of The Transactional Object-for example, DWLTAILRequestBObj

DWLTxType (when use for DWLAdminService)
The name of the transaction—for example, getTransactionLog

DWLTxObject (when use for DWLAdminService)
The name of the transactional object—for example, DWLTAILRequestBObj

AdditionalDetailIndicator
Either **Y** or **N**. This tag indicates whether additional information should be returned from InfoSphere MDM Server as a part of the transaction log. The AdditionalDetailIndicator is used only by InfoSphere MDM Server and has no meaning to the TAIL Service itself. For this release, only the results of a getFSParty or getContract are retrieved-inquiry levels for these audit transactions are defaulted to 3 for both. For example, if a PartyId or ContractId or both are placed into the TAILStackBObj as a key for the transaction being logged, these keys are used to spawn a getFSParty or getContract transaction.

BusinessTransactionValue
The transaction name filter. Results may be filtered by either name or type code; if both are entered they must match.

BusinessTransactionType
The transaction type code filter. Results may be filtered by either name or type code; if both are entered they must match.

ClientSystemName
An alphanumeric field to filter the returned TAIL objects by a specific client's system name which have issued the subject InfoSphere MDM Server transactions

ClientTransactionName
An alphanumeric field to filter the returned TAIL objects by a specific client's transaction name

ExternalCorrelationId

An alphanumeric field to filter the returned TAIL objects by a specific external correlation identifier. `ExternalCorrelationId` is a field used for transaction traceability, that is, it is used to identify all InfoSphere MDM Server transactions which have been executed within the scope of a larger business process driven by another enterprise application. The enterprise applications can specify their own `ExternalCorrelationId`, via `DWLControl` in single transactions and via `GlobalFields` in Composite Transactions. `ExternalCorrelationId` is stored in TAIL tables for later audit inquiries.

InquiryLevel

Valid values are 0 or 1.

- **An inquiry level of 0:** Retrieves the TAILTransactionLogBObjs (data from the TransactionLog database table) and TAILExternalLogTxnKeyBObjs (data from the ExternalLogTxnKey table). A sample request and response for getTransactionLog inquiry level 0 may be found in this chapter.
- **An inquiry level of 1:** Retrieves the TAILTransactionLogBObjs and its associated Bobjs. For example, TAILExternalLogTxnKeyBObjs, TAILInternalLogBObjs, TAILInternalLogTxnKeyBObjs, and a point-in-time history response for either a getParty or getContract transaction, depending on whether a partyId or contractId had been logged for the transaction now being retrieved. A sample request and response for getTAIL inquiry level 1 may be found in this chapter.

UserID

This value entered for this filter is based on the value of the requester name in DWLControl object and allows for the filtering of transaction logs for the specific user that executed them.

TAILRequestParamBObj

Houses the request type and value required as filters for the TAIL retrieval.

RequestType

The element name that will be used as a filter parameter. PartyId, ContractId and ContractIdPK are examples of these. Other allowable values are pre-populated in the internalTxnKey table of the TAIL database.

RequestValue

Specifies the actual PartyId or ContractId value itself, for example, 1234567890.

Chapter 20. Running parallel tasks using the Concurrent Execution Infrastructure (CEI)

The Concurrent Execution Infrastructure, or CEI, provides the ability to perform party or contract searches for operations that execute concurrently within the managed environment of an EJB container.

The CEI can be used for other operations that are independent and suited to be performed in parallel.

There are no IBM InfoSphere Master Data Management Server transactions related to CEI. It is used to support the implementation of transactions.

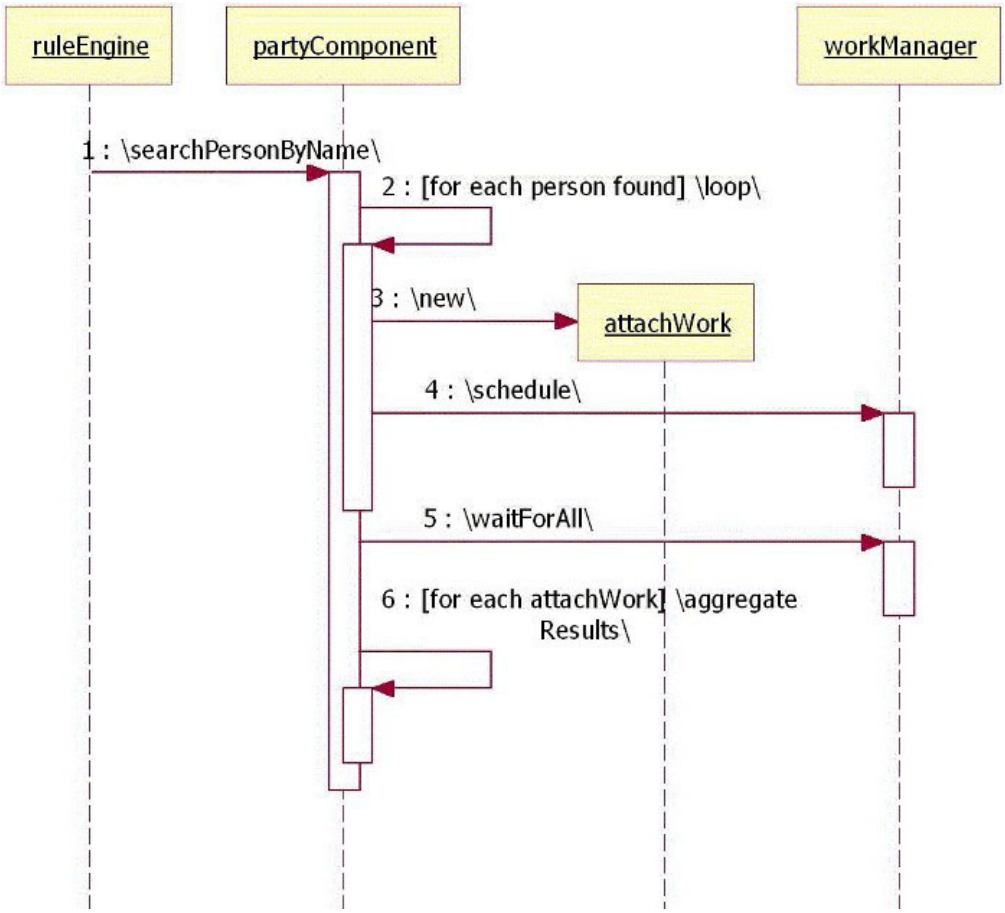
CEI supports two implementations: queue-based and sequential.

In this section, you will learn:

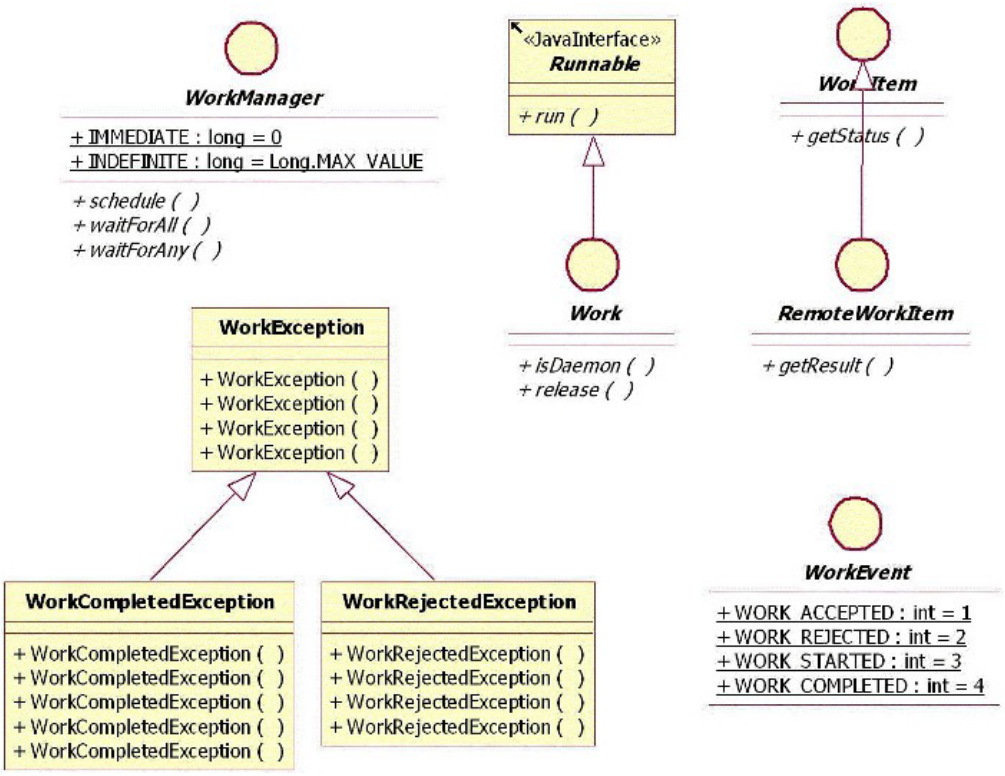
Understanding the CEI design

The CEI supports executing attach methods in parallel in the EJB container by refactoring the attach methods into classes that implement the Work interface and using them to schedule work with the CEI WorkManager. There is one work class for each attach method.

The following diagram describes this relationship:



The following diagram represents the interfaces and classes that make up the CEI API:



Learning the CEI API interfaces

The CEI API consists of several components, or interfaces: WorkManager, Work, WorkItem and RemoteWorkItem, WorkEvent, and WorkException, WorkCompletedException and WorkRejectedException.

- **WorkManager**—WorkManager is the main interface for scheduling and waiting on work completion. The client creates work instances and schedules them one by one by calling the WorkManager's schedule method.

  The WorkManager can, although it is not required to, begin the work immediately after it has been scheduled. The client need not make any additional calls for the work to start. In response to scheduling work, a client receives an instance of a work item.

  After the client has completed scheduling all work instances, it can wait for completion either as a whole or on an individual work instance basis, by calling the waitForAll or waitForAny methods, respectively. When waiting for work completion, the client can either set a timeout or it can wait indefinitely.
- **Work**—Work is the contract that must be implemented by client specific work classes. The work class must expose a run method, which is enforced by the fact that Work extends Runnable.

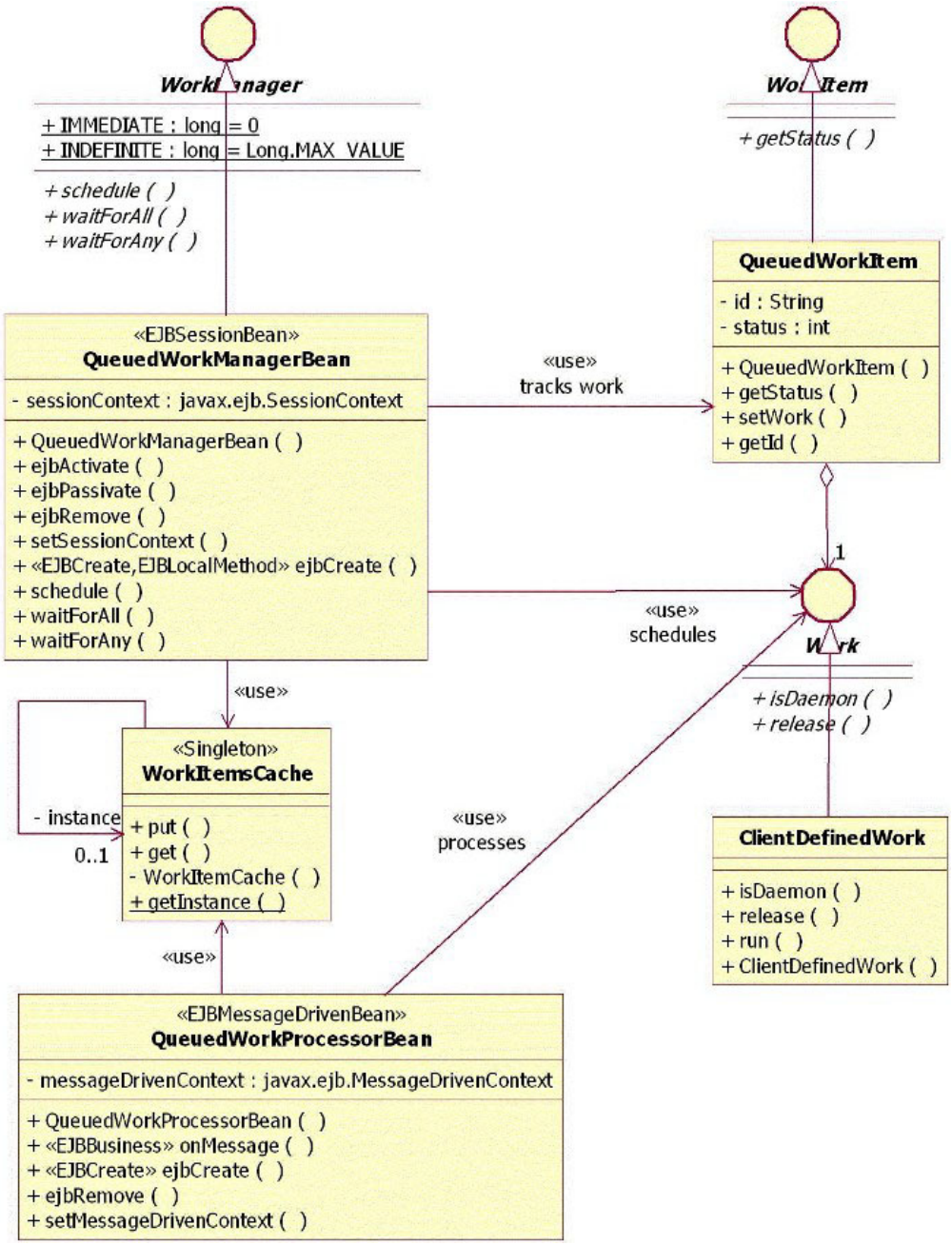
  All client specific work classes must extend the abstract class com.dwl.base.work.WorkBase and provide DWLControl and DWLStatus objects using the setter method. WorkManager will use the transaction ID from the DWLControl object to correlate concurrent work.
- **WorkItem**—Upon scheduling work, the WorkManager returns instances of classes that implement WorkItem. This interface allows clients to check on the status of work being executed by the container.

- **WorkEvent**—The WorkEvent interface only provides an enumeration of possible values of the work status.
- **WorkException, WorkCompletedException, and WorkRejectedException**—WorkException is the generic exception type thrown by the classes of the concurrent execution infrastructure. More specific exceptions are thrown when work cannot be started (WorkRejectedException) or completes with an exception (WorkCompletedException).

Understanding the CEI queue-based implementation

The CEI supports a queue-based implementation. This implementation, as well as the API, are interim solutions that offer a way to execute work concurrently in an EJB container, while still remaining compliant with the J2EE specification.

The implementation uses message queues and the classes that support it are presented in the following diagram:



Queue-based implementation for CEI consists of several components: QueuedWorkManagerBean, QueueWorkProcessorBean, WorkItemsCache, QueuedWorkItem, and QueuedWork.

- **QueuedWorkManagerBean**—A session enterprise bean that implements a local WorkManager interface.

  The WorkManager schedules work by placing messages into the scheduled work queue. It determines the completion of work by listening to the completed work queue for the corresponding response messages. Listening is synchronous; that is, the wait calls are blocked, unless a timeout is specified.

  The QueuedWorkManagerBean needs to have intimate knowledge of the work items is creates. Therefore it is dependent on the actual class that implements WorkItem or QueuedWorkItem. Because the work instance will execute in exactly the same EJB container as the work manager, the message placed in the

queue by the work manager only needs to contain enough information to allow the work processor bean to relate it back to the work item in the work item cache. This reduces the volume of data that travels through the queue, thus improving performance. The WorkManager is also responsible for updating the status of the work item.

WorkManager will use the transaction ID obtained from the DWLControl object to correlate concurrent work submited by the same transaction. The DWLControl object must be set on the Work instance using setter methods from the abstract com.dwl.base.work.WorkBase class before placing Work in the queue.

- **QueuedWorkProcessorBean**—A message driven enterprise bean that is set to listen to the scheduled work queue. Each message in this queue represents work items scheduled by the work manager, which the queued work processor bean identifies in the work items cache and executes.

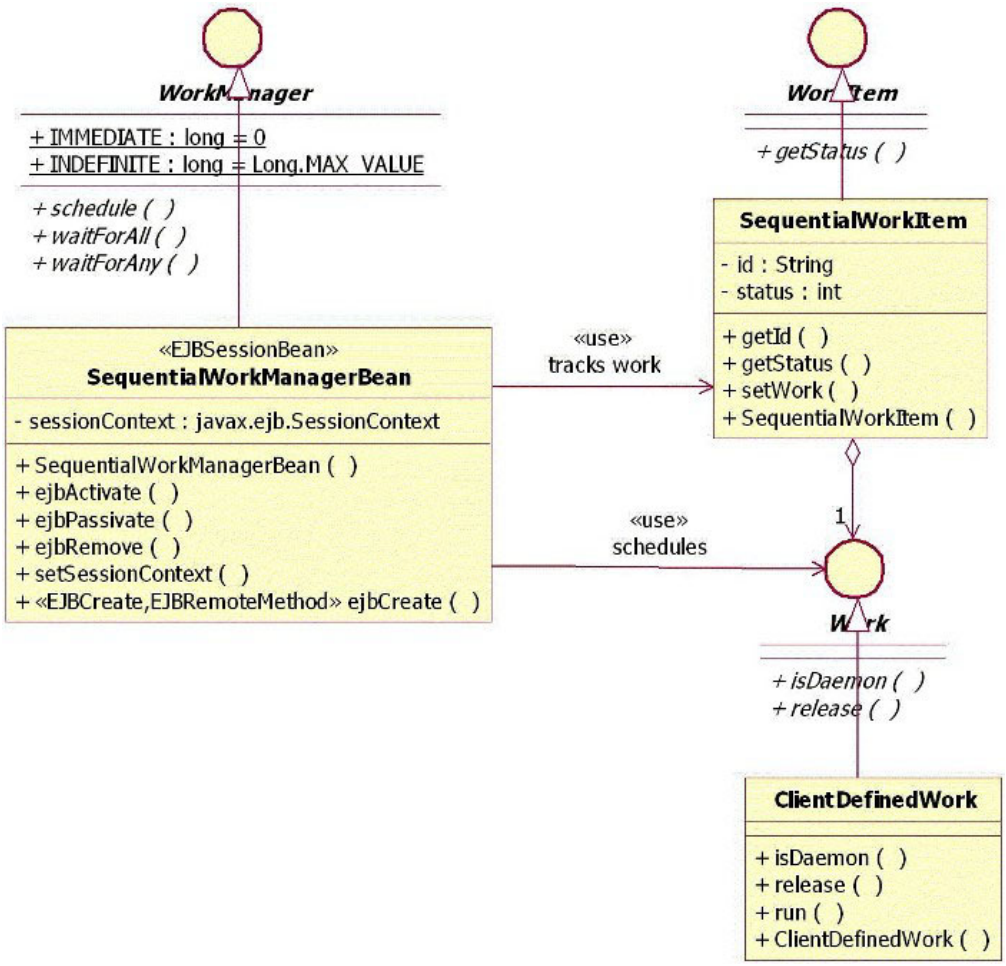
  Following the execution, a message is placed back into the completed work queue using the message correlation ID to support the work manager in matching results back to their corresponding work. Because the work instance executes in the same EJB container in which it originates, there is no need for the results to travel back through the queue. Only a token that identifies the work item in the work items cache is required.

  The WorkManager is also responsible for updating the status of the work item. As the work manager also updates the status, access to the status field must be synchronized.
- **WorkItemsCache**—There is one work item cache instance per EJB container and it contains all work items currently scheduled by the work manager. This cache is used jointly by the work manager and the work processor and access to it has to consequently be synchronized.
- **QueuedWorkItem**—A plain Java class that encapsulates the state of work submitted by a client. Its status property reflects the stage at which the work is in its execution. In the case of this queue-based implementation, work items always implement the WorkItem interface as work items and work instances never leave the EJB Container.
- **QueuedWork**—Asn abstract class representing the work to be executed and it is provided only as an example. Clients should provide their own class that implements the Work interface, to avoid dependencies on the CEI implementation classes.

Understanding the CEI sequential implementation

The CEI provides an alternative implementation which uses a sequential approach to execute work. This approach is a fallback mechanism which helps debug Work implementations. The choice between concurrent and sequential implementation is configuration-driven.

The class diagram below shows the classes that are required to support an implementation of the CEI API that launches the work instances sequentially:



The SequentialWorkManagerBean plays both the roles of the work manager and work processor. Schedule calls only create work item instances and the wait calls use the collection of work items passed in to run the work instances one by one in a loop.

Selecting queue-based versus sequential CEI implementation

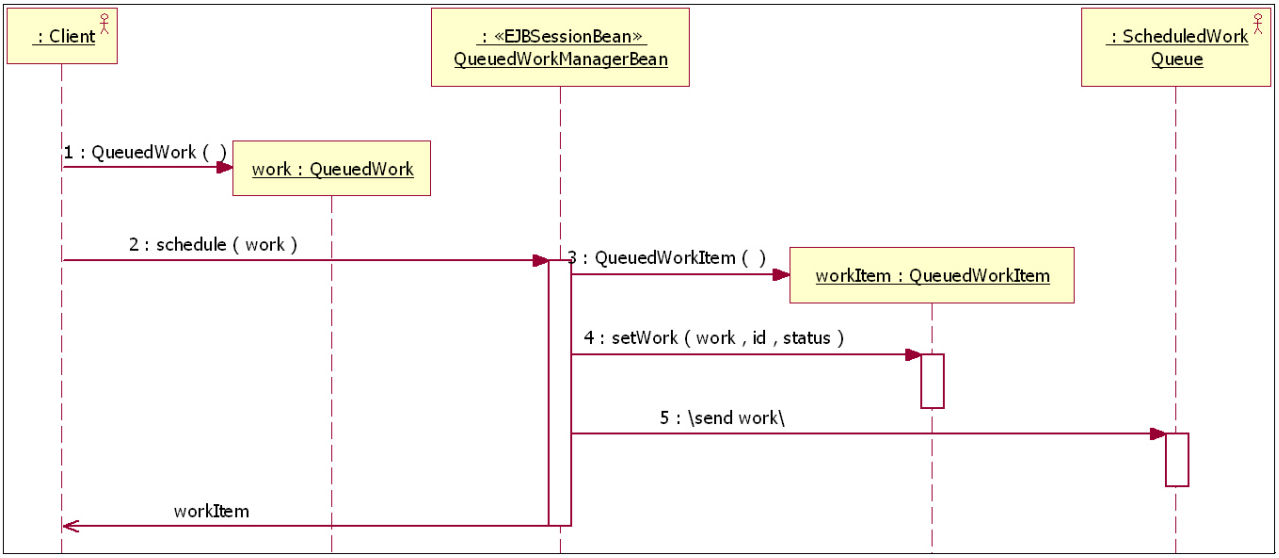
When the CEI implements a queue-based versus sequential-based implementation, there is only one direct dependency on the client. When obtaining the home of the work manager bean, the client needs to do an explicit narrow to the class of the bean by passing either QueuedWorkManagerLocalHome or SequentialWorkManagerLocalHome to PortableRemoteObject.narrow.

To eliminate this dependency and to easily switch between concurrent and sequential execution implementations, the client should use configuration information to determine both the name of the home reference and the name of the home class. Determine the local home and cast it to its base type, EJBLocalHome. The local bean obtained through the create call should be cast to its base type, WorkManager.

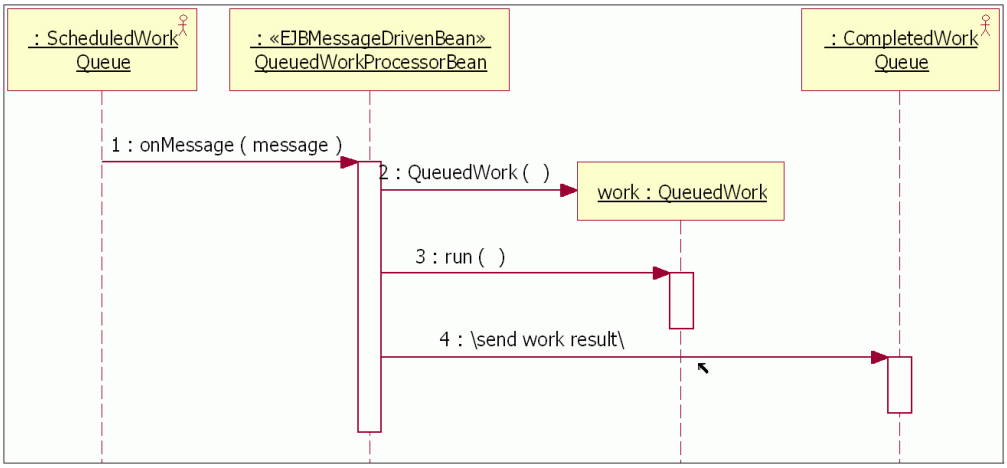
Understanding CEI workflow

The CEI workflow is threefold: scheduling work for processing, processing the work, and waiting for and retrieving results of processed work.

- **Schedule work for processing**—This interaction happens for each work that the client requires executed concurrently. The QueuedWork classifier role is played by classes that represent the actual work to be processed. No further action is required by the client to initiate the work. To check on the status of the work, the client can use the work item returned by the work manager. Upon scheduling, the status of the work can become either accepted or rejected. The following flow diagram illustrates the schedule work for processing workflow:



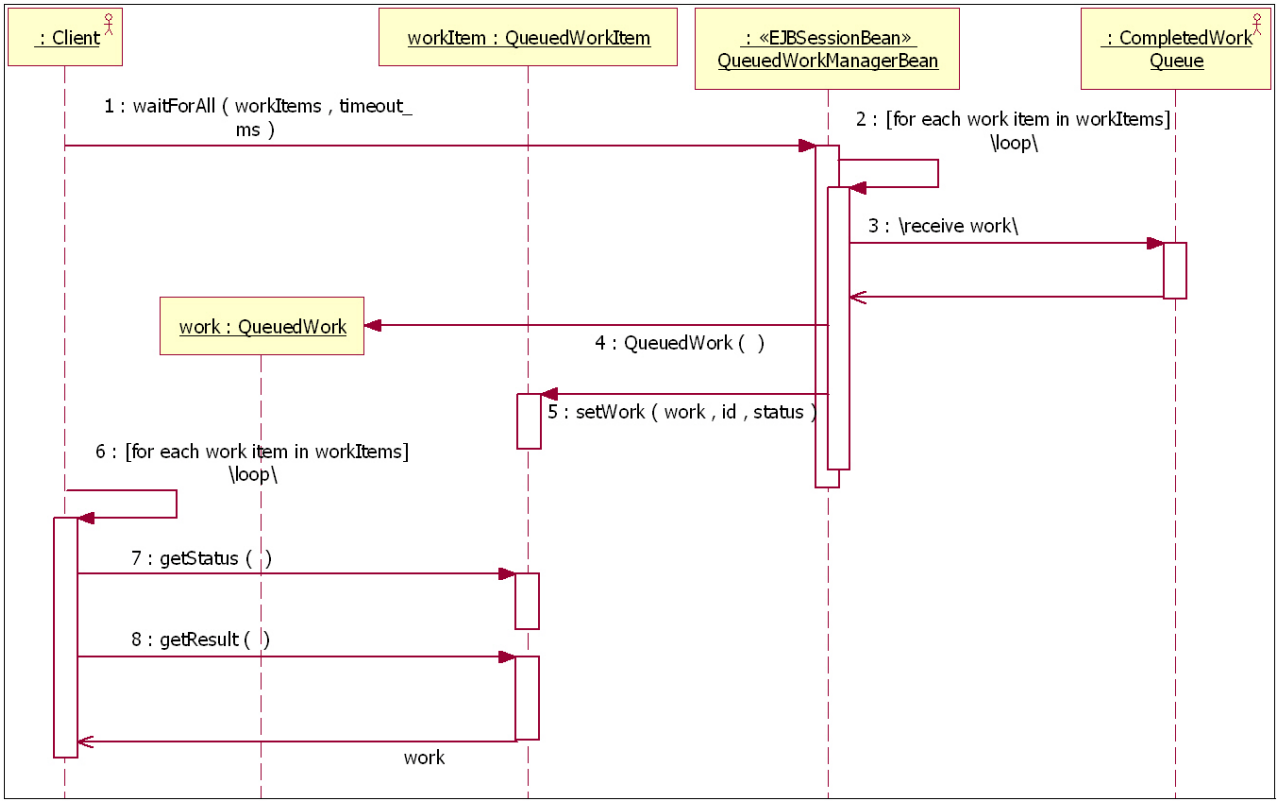
- **Processing work**—This interaction takes place once for each individual work for which there is a message in the scheduled work queue. The work processor retrieves the message from the scheduled work queue, de-serializes the work from it, and invokes its run method. It then serializes the work again and puts it in a message in the completed work queue. The following flow diagram illustrates the processing work workflow:



Multiple instances of the QueuedWorkProcessorBean take part in this interaction simultaneously. The actual number of instances is determined by the configuration of the EJB container's message listener ports.

- **Wait for and retrieve results of processed work**—In this interaction, the client, after scheduling all the work to be executed concurrently with the work manager, waits until all the work is completed. The waitForAll call is blocking

and returns only when all work has completed. The work processor is responsible for synchronizing on the completion of all work.

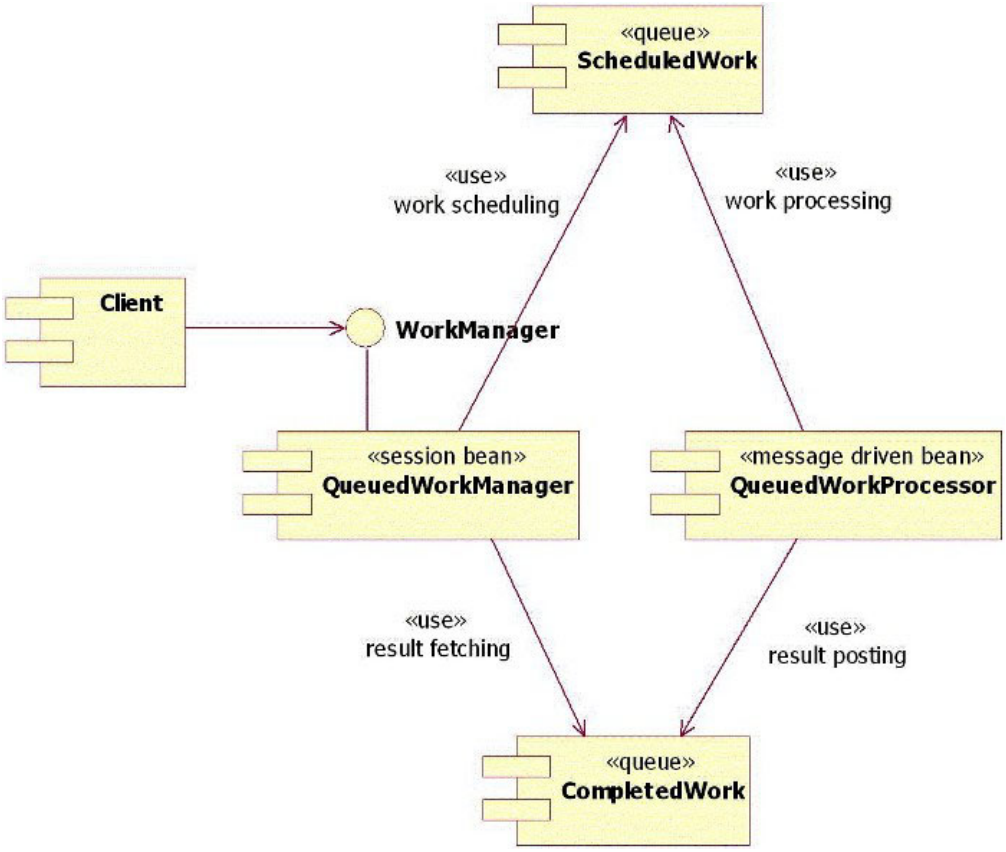


Understanding CEI models

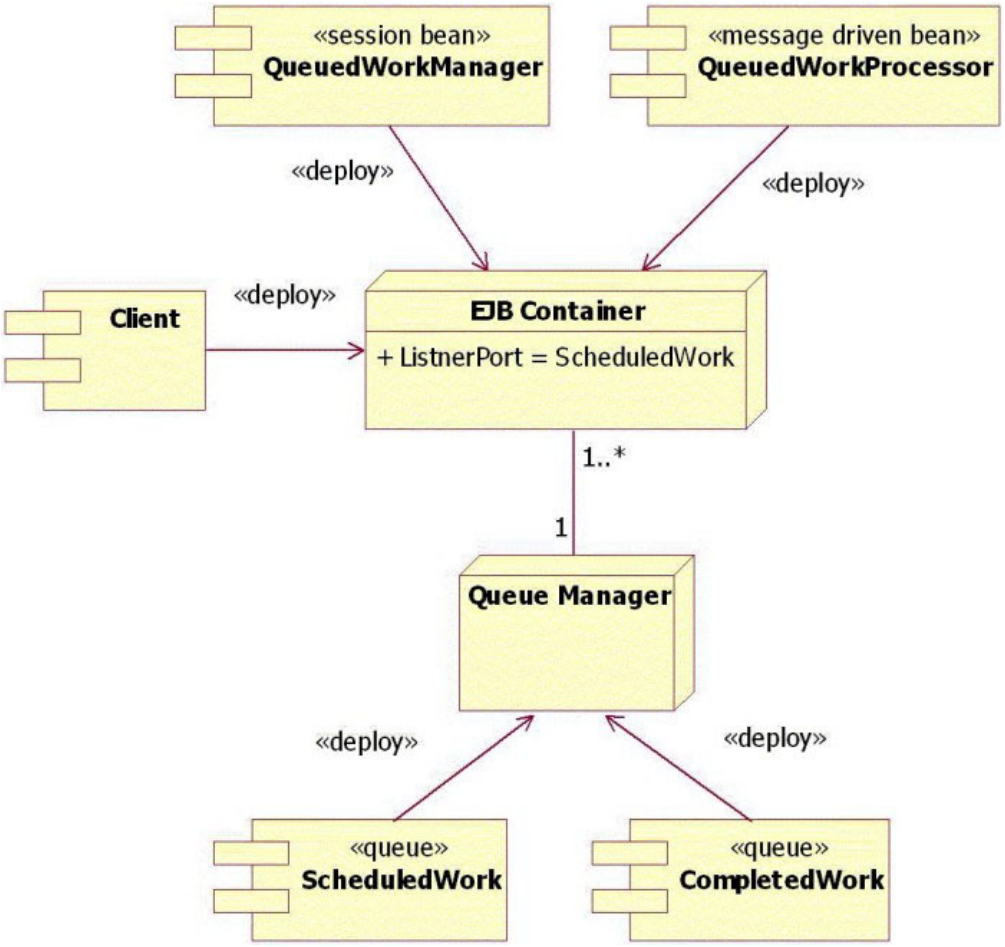
The CEI supports two models: component and deployment

- **CEI component model**—In this model, several components support the CEI with dependencies that exist among them, as described in the diagram that follows. The client is only dependent on the CEI interfaces and is completely separated from their implementation. This allows for the implementation to change at a latter date without affecting the client.

  The QueuedWorkManager interacts with both the ScheduledWork queue and the CompletedWorkQueue directly. The QueuedWorkProcessor receives messages form the ScheduledWork queue via the EJB container but places messages in the CompletedWork queue directly.



- **CEI deployment model**—In this model, the CEI is deployed in every EJB container where there is a client requiring it, as shown in the following diagram. Each EJB container in clustered environments must be set up with its own pair of ScheduledWork and CompletedWork to guarantee that the responses return to the EJB container that produced the request message.



The queues are set up as transient; that is, in case of failure, all scheduled items are lost. For this reason clients should use the timeout to avoid deadlocks.

Most importantly, the listener port must be configured to allow for more than one message driven bean instance to process messages simultaneously. The larger this number, the higher the degree of concurrency, although a number that is too large will produce trashing. Typically, the longer the average duration of the work execution is, the higher the degree of concurrency.

Configuring the CEI

The CEI must be configured before you can use it. It cannot be extended and does not require any special administration.

Before you configure the CEI, be familiar with the CEI components. The CEI is delivered as part of the DWLCommonServices EJB module within the InfoSphere MDM Server Enterprise Application. The components of the CEI are Enterprise JavaBeans, Java classes, and message queues.

- **Enterprise JavaBeans (EJBs)**—The CEI consists of three EJBs:
  - **QueuedWorkManager**—A stateless session bean used to schedule and synchronize on the completion of concurrent jobs.
  - **QueuedWorkProcessor**—A message driven bean used to concurrently execute jobs.
  - **SequentialWorkManager**—A stateless session bean used to execute jobs sequentially while still exposing the same concurrent execution API.

- **Java classes**—The WorkManagerHelper class is provided as a more convenient way to use the concurrent execution API. Although this class does not impose any deployment requirements, it does expose one configurable property.
- **Message queues**—Two message queues are required for the CEI to function:
  - **ScheduledWork**—Holds messages that represent jobs to be processed.
  - **CompletedWork**—Holds messages that represent processed jobs.

The CEI has the same infrastructure requirements as InfoSphere MDM Server. To enable the CEI, you must configure the following components:

- **WebSphere MQ Server**—Configure WebSphere MQ when you install the InfoSphere MDM Server product. The install script automatically configures WebSphere MQ Server with these required objects:
  - The queue manager, using the default name CUSTOMER.QUEUE.MANAGER. You can also change the name of the queue manager during the installation. The install script also starts the queue manager.
  - The server communication channel, using the default name CUSTOMER.CHL.SVRCON. You can also change the name of the channel during the installation.
  - The queue listener on a port that you must enter during the installation. The default port number is 1414. The install script also starts the queue listener.
  - Two queues named CUSTOMER.SCHEDULED.WORK and CUSTOMER.COMPLETED.WORK.
- **WebSphere Application Server**—The InfoSphere MDM Server install script creates the WebSphere MQ JMS provider and application server MDB listener port within WebSphere Application Server.
- **CEI properties**—The runtime properties for CEI are defined in the following configurations:
  - /IBM/DWLCommonServices/ConcurrentExecution/enabled
  - /IBM/DWLCommonServices/ConcurrentExecution/defaultWaitTimeout
  - /IBM/DWLCommonServices/ConcurrentExecution/Cache/purgeFrequency
  - /IBM/DWLCommonServices/ConcurrentExecution/Cache/timeToLive

  For more information on these, see "Understanding configuration elements in the Configuration and Management component" on page 419.

See also:

"To configure the WebSphere MQ JMS provider for WebSphere Application Server"

"To configure the application server MDB listener port" on page 252

To configure the WebSphere MQ JMS provider for WebSphere Application Server

1. Set the queue connection factory with the following configuration:

Option	Description
Name	Specify `QueueConnectionFactory`.
JNDI Name	Specify `com/dwl/base/work/queued/QueueConnectionFactory`
Container	Specify `managed Authentication Alias-MQUser`

Option	Description
Queue Manager	Specify `CUSTOMER.QUEUE.MANAGER`
Host	Specify your WebSphere MQ Server host name (the name of the computer on which WebSphere MQ Server is running).
Port	Specify `1414`
Channel	Specify `CUSTOMER.CHL.SVRCONN`
Transport Type	Specify `Client`
XA-Enabled	Specify `No`

2. Set the queue destination with the following configuration:

Option	Description
Name	Specify `CUSTOMER.SCHEDULED.WORK`
JNDI Name	Specify `com/dwl/base/work/queued/ScheduledWorkQueue`
Persistence	Specify `Non-Persistent`
Expiry	Specify `Unlimited`
Base Queue Name	Specify `CUSTOMER.SCHEDULED.WORK`
Base Queue Manager Name	Specify `CUSTOMER.QUEUE.MANAGER`
Queue Manager Host	Specify your WebSphere MQ Server host name (the name of the computer on which WebSphere MQ Server is running).
Queue Manager Port	Specify `1414`
Server Connection Channel	Specify `CUSTOMER.CHL.SVRCONN`

3. Set the queue destination with the following configuration:

Option	Description
Name	Specify `CUSTOMER.COMPLETED.WORK`
JNDI Name	Specify `com/dwl/base/work/queued/ScheduledWorkQueue`
Persistence	Specify `Non-Persistent`
Expiry	Specify `Unlimited`
Base Queue Name	Specify `CUSTOMER.SCHEDULED.WORK`
Base Queue Manager Name	Specify `CUSTOMER.QUEUE.MANAGER`
Queue Manager Host	Specify your WebSphere MQ Server host name (the name of the computer on which WebSphere MQ Server is running).
Queue Manager Port	Specify `1414`
Server Connection Channel	Specify `CUSTOMER.CHL.SVRCONN`

To configure the application server MDB listener port

Set the message listener port with the following configuration:

Option	Description
Name	Specify `ScheduledWork`
Initial State	Specify `Started`
Connection Factory JNDI	Specify `com/dwl/base/work/queued/QueueConnectionFactory`
Destination JNDI Name	Specify `com/dwl/base/work/queued/ScheduledWorkQueue`
Maximum Sessions	Specify `10`. **Note:** The number of maximum sessions determines how many jobs will be processed concurrently. Setting this to a very large value results in lower overall application performance.

Chapter 21. Setting source values and data decay

The purpose of source values is to establish a standardized approach to store and retrieve information, or values, that come from an external sources when the attributes of those values do not fit the structure of InfoSphere MDM Server products.

Source values allow you to identify the system, application, or user that provided the value. It also stores the date the value was collected, as well as a history of the source that provided the value and the date when that value changes.

The source value system must add, update and get the following type of information within InfoSphere MDM Server:

- Record the source system, application or user that provided the specified function details, for example privacy preference, campaign, and others
- Record the date when the information is collected
- Keep a history of the source and source date.

The source value system is in several areas within InfoSphere MDM Server. The source value system works with any entity. It is also included in the specific function transaction. For example, when a change is made to a party's privacy preference, source value system is a part of the function transaction. The source value system is required in the following function areas:

- Privacy Preference
- Campaigns
- Source System is also included in seven entities in core Party Module. These entities are:
  - Person
  - Organization
  - Person Name
  - Org Name
  - Party Identification
  - Party ContactMethod
  - Party Address

All data and service-level extension points are available to extend source values and data decay.

Note: Source values and data decay do not require special administration.

In this section, you will learn:

Understanding interface specifications

There are no controller level services specifically defined for source values.

The existing services can be extended to support source values through the implementation of IDefaultedSourceValue interface. The methods of this interface are explained below.

Learning addDefaultedSourceValue

The addDefaultedSourceValue() method adds a single instance of the defaulted source value object to the database.

Inputs:

- DWLDefaultedSourceValueBObj with no associations

Returns:

- DWLDefaultedSourceValueBObj with no associations

Mandatory Fields:

- entityName
- instancePK
- attributeName
- forcedValue

Note: This is to be implemented as an extension. For example, a client passes InfoSphere MDM Server a TCRMOrganizationObject that contains an extension object, TCRMOrganizationExtBObj. The extension object contains a list of DWLDefaultedSourceValueBObj. Loop through this vector to call the add method, and add the record.

Exceptions:

- entityName not supplied
- entityName not valid
- attributeName not supplied
- attributeName not valid
- forcedValue not supplied
- duplicate business key—entityName, instancePKP, attributeName

Learning updateDefaultedSourceValue

The updateDefaultedSourceValue() method updates a single instance of defaulted source value object to database for the given key, which is DefaultedSourceValueId.

Inputs:

- DWLDefaultedSourceValueBObj with no associations.

Returns:

- DWLDefaultedSourceValueBObj with no associations.

Mandatory Fields:

- entityName

- instancePK
- attributeName
- forcedValue

Note: For example, a client passes InfoSphere MDM Server a TCRMOrganizationObject that contains an extension object, TCRMOrganizationExtBObj. The extension object contains a list of DWLDefaultedSourceValueBObj. Loop through this vector to call this method, and update the record.

Exceptions:

- entityName not supplied
- entityName not valid
- attributeName not supplied
- attributeName not valid
- forcedValue not supplied
- entityName and instancePK not valid
- duplicate business key—entityName, instancePKP, attributeName

Learning getDefaultedSourceValue()

The getDefaultedSourceValue() method retrieves a list of the defaulted source value objects to the client.

Inputs:

- entityName, instancePK

Returns:

- List of DWLDefaultedSourceValueBObj with no associations.

Mandatory Fields:

- entityName
- instancePK

Note: This is to be implemented as an extension. For example, a client passes InfoSphere MDM Server a TCRMOrganizationObject that contains an extension object, TCRMOrganizationExtBObj. The extension object returns a list of DWLDefaultedSourceValueBObj.

Exceptions:

- Entity Name and InstancePK do not exist.

Learning deleteDefaultedSourceValue

The method deleteDefaultedSourceValue() deletes an existing defaultedSourceValue.

Inputs:

- DWLDefaultedSourceValueBObj with no associations.

Returns:

- DWLDefaultedSourceValueBObj that was deleted.

Mandatory Fields:

- defaultedSourceValueId

See also:

"To enable defaulted source values for an existing business object"

To enable defaulted source values for an existing business object

1. Create a new business object, with a name ending in .ext, that extends the original business object and implements IDefaultedSourceValueParent and IExtenstion.

   For example:

   ```
   public class TCRMOrganizationBObjExt
   extends TCRMOrganizationBObj
   implements IDefaultedSourceValueParent, IExtension
   ```

2. Add and implement a copy constructor method to the above business object.

   For example:

   ```
   public TCRMOrganizationBObjExt(TCRMOrganizationBObj  BObj)
   ```

3. Implement code for the methods defined in IDefaultedSourceValueParent, that is getItemsDWLDefaultedSourceValueBObj, setDWLDefaultedSourceValueBObj, instancePK and entityName. Please note thatinstancePK() should usually return the IdPK for the business object, however it can return null too. The entityName()also returns a hard coded string value.

4. Define the required entries in tcrm_extension.properties.

   For example:

   ```
   TCRMOrganizationBObjExt = com.dwl.tcrm.externalrule
   ObjectNavigator.com.dwl.tcrm.externalrule.TCRMOrganizationBObj
   Ext = getItemsDWLDefaultedSourceValueBObj,#ObjectNavigator.com.dwl.tcrm.
        coreParty.component.TCRMOrganizationBObj
   ```

5. Modify the DefautlSourceValue.ilr file, specifically rule DefaultSourceValueSelector by adding an "else if" to check if the passing object is instance of the corresponding business object and to instantiate an extended object form it.

   For example:

   ```
    // ...
   else if (?bObj instanceof TCRMOrganizationBObj)
   {
   ?bObj = new TCRMOrganizationBObjExt((TCRMOrganizationBObj)?bObj);
   }
   // ...
   ```

6. Define the information of the new business object in tcrmRequest_extension.xsd and tcrmResponse_extension.xsd.
7. Add information of the new business object into the V_GROUP and V_ELEMENT tables.
8. Implement the rules in the corresponding tables (EXTRULE and EXTRULEIMPLEM) in order to trigger defaulted source value rules for a desired criteria.

Testing source values

InfoSphere MDM Server includes two sample extensions implementing the Source Values: one for TCRMOrganizationBObj.established_dt and one for TCRMPersonBObj.birth_dt.

Use the extensibility model to extend the business object (TCRMOrganizationBObj) to include a list of source values for the BObj.

See also:

"Sample: Testing source values"

Sample: Testing source values

The following is a part of a sample XML request in order to add or update the defaulted source values passed in TCRMOrganizationBObj:

```
<TCRMOrganizationBObj>
  <PartyId>100</PartyId>
  <NewPartyIdReference></NewPartyIdReference>
  <DisplayName>Test Corp.</DisplayName>
  <PreferredLanguageType>100</PreferredLanguageType>
    ...
  <IndustryType>9</IndustryType>
  <OrganizationLastUpdateDate/>
  <OrganizationLastUpdateUser/>
  <TCRMExtension>
    <ExtendedObject>TCRMOrganizationBObjExt</ExtendedObject>
    <TCRMOrganizationBObjExt>
      <ObjectReferenceId>1</ObjectReferenceId>
      <DWLDefaultedSourceValueBObj>
        <DefaultSrcValId/>
        <EntityName>org</EntityName>
        <InstancePK/>
        <ColumnName>established_dt</ColumnName>
        <SourceValue>Jan 2002</SourceValue>
        <DefaultValue>Jan 25, 2002</DefaultValue>
        <Description>Default date value for January</Description>
      </DWLDefaultedSourceValueBObj>
      <DWLDefaultedSourceValueBObj>
        <DefaultSrcValId/>
        <EntityName>org</EntityName>
        <InstancePK/>
        <ColumnName>established_dt</ColumnName>
        <SourceValue></SourceValue>
        <DefaultValue>Dec 10, 2002</DefaultValue>
        <Description>Default date value for null</Description>
      </DWLDefaultedSourceValueBObj>
    </TCRMOrganizationBObjExt>
  </TCRMExtension>
```

Learning data decay transactions

The following transactions are relevant to data decay:

- public DWLAccessDateValueBObj addAccessDateValue(DWLAccessDateValueBObj dateValue) throws DWLBaseException;
- public DWLAccessDateValueBObj updateAccessDateValue(DWLAccessDateValueBObj dateValue) throws DWLBaseException;

- public DWLAccessDateValueBObj getAccessDateValue(String dateAccessValId, DWLControl control) throws DWLBaseException;
- public Vector getAllAccessDateValuesByAttrib(String entityName, String instancePK, DWLControl control) throws DWLBaseException;
- public DWLAccessDateValueBObj deleteAccessDateValue(DWLAccessDateValueBObj dateValue) throws DWLBaseException;

Understanding attributes related to data decay

There are three fields associated with data decay:

- last_used_dt (TIMESTAMP)
- last_verified_dt (TIMESTAMP)
- source_ident_tp_cd

These fields have been added to the following tables:

- Contact
- Personname
- Orgname
- Locationgroup
- Identifier

Configuring data decay

The transactions getPerson, getPersonName, getAllPersonName, getOrganization, getOrgName, getAllOrgName can be configured to return DWLAccessDateValueBObj which supplies the data decay information.

See also:

"To configure transactions to return data decay information"

To configure transactions to return data decay information

In the DWLCommon.properties file, under the key, set the value of attrib_access_date_value to `true`. The default setting is `false`.

Chapter 22. Understanding performance tracking

InfoSphere MDM Server provides the ability to capture performance statistics for transactions within components of the architecture. Performance tracking levels are configurable, allowing you maximal flexibility in choosing the statistics you require. This allows the user a full range of detail, from having performance tracking turned off altogether, to having all instrumented components gather statistics. The performance data is captured by the Logging component or by an ARM 4.0 implementation identified through configuration.

Application Response Measurement (ARM) is a standard under The Open Group (http://www.opengroup.org/management/arm/) for measuring the availability and performance of transactions. The fact that InfoSphere MDM Server uses ARM 4.0 allows for integration with such products as the IBM Tivoli® Composite Application Manager for Response Time Tracking (ITCAM for RTT).

Important: ARM 3.0 performance tracker has been deprecated. The previous implementation of the performance tracker that worked with ARM 3.0 has been deprecated due to a lack of adoption of the ARM 3.0 API in the industry. The code for the old performance tracker is still provided, but because no InfoSphere MDM Server code uses it, the resulting performance log file contains only the logs associated with client instrumentation. As a result, it is highly recommended that you upgrade to the new tracker, and discontinue the use of the old tracker. Instrumentation for client extensions is now provided within InfoSphere MDM Server minimizing, if not eliminating, the need for client instrumentation. Lastly, the ARM 3.0 library, `arm.jar`, is also deprecated and you should no longer use it. However, the classes within this library have not been deprecated. To upgrade the client code, you must remove the `arm.jar` from the development environment, rebuild the workspace and fix the resulting errors.

See the Performance Tracking section of the *IBM InfoSphere Master Data Management Server System Management Guide* for more information.

In this section, you will learn:

Understanding performance tracking statistics

InfoSphere MDM Server tracks performance from several specific points in the instrumentation.

At each point of instrumentation within InfoSphere MDM Server, the following information is provided: request ID, request name (end-to-end transaction name), transaction name, parent correlator ID, correlator ID and a context specific note. The duration of the transaction is calculated by the mechanism that captures the performance information.

Learning instrumentation points

The instrumentation points within InfoSphere MDM Server include:

- `ComponentLayer`
- `ComponentLayerExtension`
- `ComponentLayerPrePost`
- `ControllerLayer`
- `ControllerLayerExtension`
- `ControllerLayerPrePost`
- `DatabaseDetails`
- `DatabaseQuery`
- `ExecuteTx`
- `ExternalBusinessRules`
- `ExternalValidation`
- `InternalValidation`
- `Notification`
- `PartyMatcher`
- `RequestHandler`
- `RequestParser`
- `ResponseConstructor`
- `SecurityAuthorization`
- `Standardization`
- `SuspectProcessing`
- `ThirdPartyExtension`
- `TransactionManager`

Where applicable, client extensions are also monitored. For example, if a custom `RequestParser` is used, performance statistics can be captured for it using the `RequestParser` instrumentation.

Learning levels of tracking

When performance tracking is turned on, the Performance Monitor captures elapsed times for the following categories of a transaction depending on the level chosen:

- **OFF**: No tracking
- **Level 1**: Measures the overall transaction time from the time the thread enters the application controller
- **Level 2**: Measures components transaction time, validation, external components, such as Trillium and client extensions, as well as level 1 measurements
- **Level 3**: Measures the amount of time for DWLRequestHandler, XMLRequestParser and XMLResponseConstructor component to parse incoming XML and to prepare XML response, as well as level 2 measurements.

For example, if performance logging at Level 2 is turned on, elapsed times to perform an operation on a business component such as addParty() as well as a breakdown of that operation—validations, database access, extension, and external services elapsed times—are captured. This breakdown is made possible through the use of transaction correlators.

Learning performance tracking levels

Several different levels of performance tracking are available for InfoSphere MDM Server.

A range of performance tracking levels are supported within InfoSphere MDM Server, with more data being captured as the tracking level increases. A special performance tracking level of -1 is provided to allow you the maximum flexibility in configuring performance tracking. All configuration is done through the Configuration and Management components and requires the application to be restarted for the change to take effect. Performance tracking is turned off by default.

Learning tracking level descriptions

The performance tracking levels and the data they provide are:

- **Level -1**—Custom performance tracking. When this level is set, all user-enabled instrumentation points are used. To enable performance logging at the `ExternalBusinessRule` instrumentation point, for example, set the `/IBM/DWLCommonServices/PerformanceTracking/ExternalBusinessRules/enabled` configuration property to true. If you want to log only performance statistics for external business rules, set all other configuration properties to false.
- **Level 0**—Performance tracking is disabled. This is the default level.
- **Level 1**—Measures the overall transaction time from the time the thread enters the application controller.
- **Level 2**—Measures components transaction time, validation, external components, such as client extensions, as well as level 1 measurements.
- **Level 3**—Measures the amount of time for Request Handler, Request Parser and Response Constructor components to parse incoming XML and to prepare XML response, as well as level 2 measurements.

See also:

"Example: Performance tracking"

Example: Performance tracking

If performance logging at Level 2 is enabled, elapsed times to perform an operation on a business component such as addParty() as well as a breakdown of that operation—validations, database access, extension, and external services elapsed times—are captured. This breakdown is made possible through the use of transaction correlators. Custom logging levels, when `/IBM/DWLCommonServices/PerformanceTracking/ExternalBusinessRules/enabled` is configured, only come in to play when the tracking level is set to -1.

Understanding performance statistics capturing

Performance statistics can be captured by the InfoSphere MDM Server Logging component and by an ARM agent.

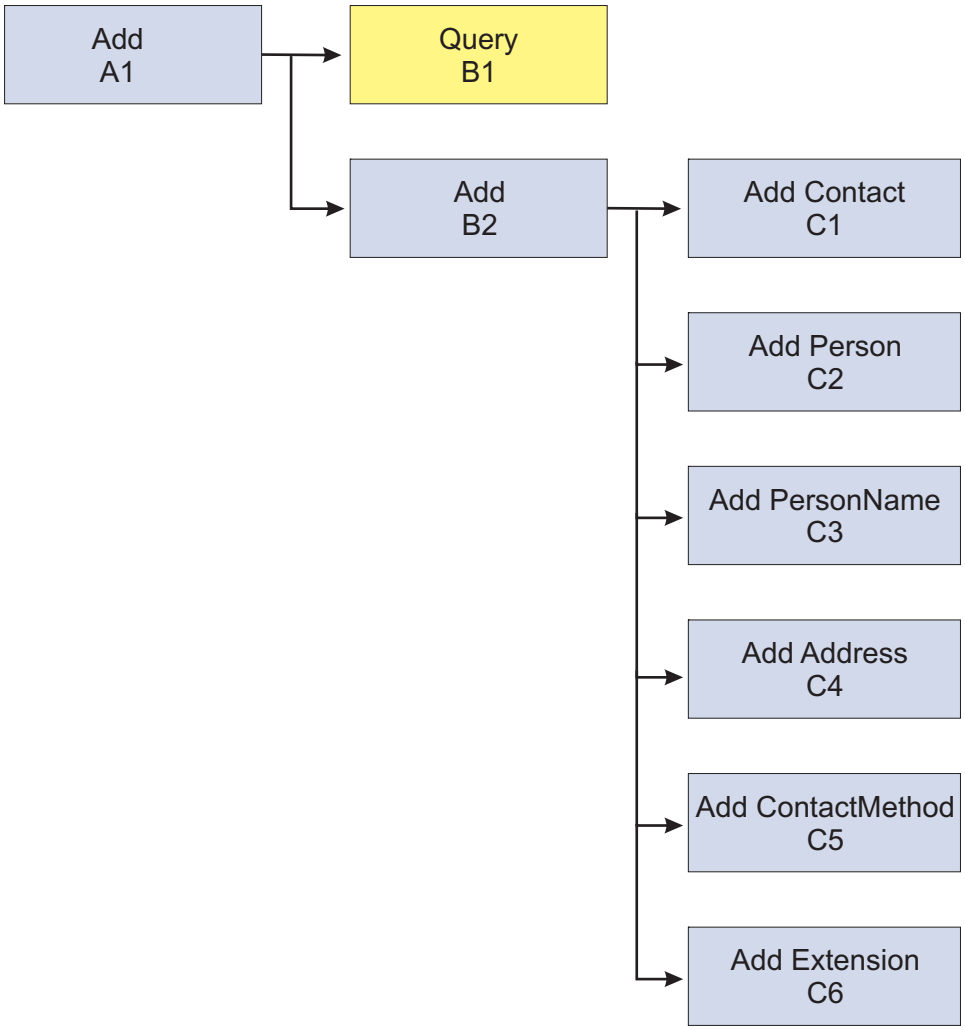
Performance statistics can be captured in 2 ways in InfoSphere MDM Server: by the InfoSphere MDM Server Logging component and by an ARM 4.0 agent.

Learning the logging component

By default, if the tracking level is set to a value other than 0, the performance statistics are sent to the InfoSphere MDM Server Logging component. This is because the `/IBM/DWLCommonServices/PerformanceTracking/ARM40TransactionFactory/className` configuration property is set to the value of 'None'. In addition to containing all performance statistics described in "Learning performance tracking levels" on page 261, based on the chosen tracking level, for readability, the logs are indented according to the parent/child relationships of the correlator IDs.

About Transaction Correlators

A transaction is a defined unit of end-user work. A transaction may consist of other transactions, called sub-transactions that it initiates as a part of its processing. For example, an addParty transaction checks first that the party exists, and then adds the party and all its attributes through sub-transactions, as shown in the diagram below.



A unique token, called a correlator is assigned to each instance of each transaction and sub-transaction. By putting two correlators together—parent transaction correlator, sub-transaction correlator—a performance agent or management

application can trace the full calling hierarchy of the transaction. In the sample above we have correlator pairs: (A1, B1); (A1, B2); (B2, C1); (B2, C2); and so on. These parent-child correlator pairs are logged with the performance data and help *correlate* the log entries that belong to a particular transaction group, allowing a graph like the one above to be recreated from a series of log entries for any given transaction.

Sample Log File Output

Because the performance statistics are captured by the Logging component, the performance statistic output can be configured based on what their logger of choice has to offer. For example, with Log4j, all performance logs can be redirected to a separate file named `performancemonitor.log` with the following configuration:

```
log4j.appender.performanceLog=org.apache.log4j.RollingFileAppender
log4j.appender.performanceLog.Encoding=UTF-8
log4j.appender.performanceLog.Threshold=ALL
log4j.appender.performanceLog.layout.ConversionPattern=%d : %m%n
log4j.appender.performanceLog.layout=org.apache.log4j.PatternLayout
log4j.appender.performanceLog.File=/IBM/MDM/logs/performancemonitor.log
log4j.logger.com.dwl.base.performance.PerformanceMonitorLog=INFO,performanceLog
```

In the ConversionPattern above, Log4j is providing the time and data, via %d, corresponding to when each performance log message was printed: `2006-10-10 12:02:02,213`

See the Logging component documentation for more details on how to configure your logs.

The following is a sampling of log messages you may see under the following conditions:

- The tracking level is set to -1 and the only instrumentation enabled is Component level
- An addContract transaction was submitted to InfoSphere MDM Server
- The above Log4j configuration was chosen

Attention: The Correlation IDs were manually shortened for the purposes of this example

```
2006-10-10 12:02:02,213 :
504000 addContract : addParty_COMPONENT : 0 : 448115 : 0 :  : SUCCESS
504000  addContract : addPartySimple_COMPONENT : 448115 : 523115 : 0 :  : SUCCESS
504000   addContract : addPerson_COMPONENT : 523115 : 561159 : 0 :  : SUCCESS
504000    addContract : addPersonName_COMPONENT : 561159 : 851115 : 16 :  : SUCCESS
504000     addContract : getAllPersonNames_COMPONENT : 851115 : 106115 : 0 :  : SUCCESS
504000    addContract : addPersonName_COMPONENT : 561159 : 218115 : 16 :  : SUCCESS
504000     addContract : getAllPersonNames_COMPONENT : 218115 : 711599 : 0 :  : SUCCESS
504000    addContract : addDefaultedSourceValue_COMPONENT : 561159 : 436115 : 0 :  : SUCCESS
504000   addContract : addPartyIdentification_COMPONENT : 523115 : 794115 : 15 :  : SUCCESS
504000    addContract : getAllPartyIdentifications_COMPONENT : 794115 : 703115 : 15 :  : SUCCESS
```

Notice that only 'COMPONENT' transactions are logged. If other instrumentation points were enabled, then you would see their performance statistics interlaced with the ones above, with the appropriate tabbing and context. Also, each entry in the log file is of the following format:

```
<requestId> [spaces based on sub-transaction depth]<endToEndTransactionName> : <transactionName> :
     <parentCorrelatorId> : <correlatorId> : <durationInNanoseconds> : <contextNote> : <status>
```

Using the ARM 4.0 agent

The ARM 4.0 agent offers powerful performance tracking capabilities in InfoSphere MDM Server.

Using a third party application like the IBM ITCAM for RTT to track the application performance and transaction availability via ARM 4.0 is a much more powerful way of tracking performance within InfoSphere MDM Server, allowing for powerful reporting and alert capabilities among other options.

See also:

"To enable ARM 4.0 performance tracking"

"To disable ARM 4.0 performance tracking"

To enable ARM 4.0 performance tracking

Enable ARM Agent by setting the `/IBM/DWLCommonServices/PerformanceTracking/ARM40TransactionFactory/className` configuration property to anything other than *None*.
This causes the InfoSphere MDM Server Performance Tracker to try to instantiate a class with the given name as the implementation of the `org.opengroup.arm40.transaction.ArmTransactionFactory` interface. See the documentation of the ARM agent that you are using to determine how to install it for InfoSphere MDM Server. At a minimum, the `className` of the `ArmTransactionFactory` must be provided, and this class and all supporting classes must be available within the classpath of InfoSphere MDM Server.

To disable ARM 4.0 performance tracking

Disable ARM 4.0 performance tracking by setting the `/IBM/DWLCommonServices/PerformanceTracking/ARM40TransactionFactory/className` configuration property to *None*.
This reverts the performance tracker back to using the Logging component.

Chapter 23. Aliasing transactions

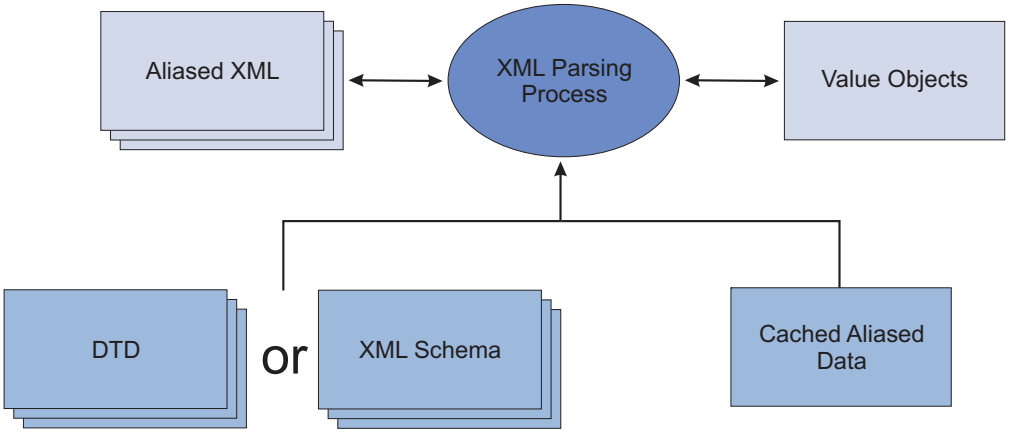
The Aliasing feature allows you to change the terminology of transactions to match your line of business.

Although InfoSphere MDM Server is designed to support different lines of business such as banking, its terminology may not always be used in a particular line of business (for example, in banking, accounts are represented as contracts) and it may be difficult for some users to understand terminology that is not what they are accustomed to.

The InfoSphere MDM Server Aliasing service and the pluggable parser/constructor features of the Request framework (discussed in Chapter 24, "Configuring the Request and Response Framework," on page 269) enable the InfoSphere MDM Server installation to be customized to use terminology that is familiar to the users. The line of business terminology is usually reflected in the XML request sent to the application. With the aliasing service, InfoSphere MDM Server is able to process these two different XML requests as if they are the same request.

The aliasing process is done during the InfoSphere MDM Server default XML parsing and XML constructing, as shown in the diagram below. The default XML parser component accepts the alias XML, and validates the alias XML against the appropriate XSD or schema. For each line of business there will be one set of XSD and schema.

After the validation process is done, the default XML parser component calls the alias service to get the original element name. When the default XML parser gets the original names, it constructs the business objects and calls the controller to execute the transaction. During the construction period, the default constructor component returns the alias name, based on the type of XML response XSD/Schema that is expected.



In this section, you will learn:

Sample: Transaction Aliasing

InfoSphere MDM Server, with an XML client interface, accepts different XML files with aliased element names as its transaction request.

The example below shows two XML Request Files, one with original element names and the other with alias element names.

TCRMTx structure is the payload of the request. It states the type of business transaction to execute (TCRMTxType), the type of top level object involved in the transaction (TCRMTxObject), and the value of the object (any embedded objects). There can only be one top level object.

Important: *myTCRM.xsd* refers to the request XSD, and *RequestControl* structure is the header of the request.

XML Request file with original element names

```
<?xml version="1.0" encoding="UTF-8"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                            xsi:noNamespaceSchemaLocation="myTCRM.xsd">
  <RequestControl>
    <requestID>400011</requestID>
    <DWLControl>
      <requesterName>Tester</requesterName>
      <requesterLanguage>100</requesterLanguage>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>addContract</TCRMTxType>
    <TCRMTxObject>TCRMContractBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMContractBObj>
        <ContractIdPK/>
        <ContractLangType/>
        <LineOfBusiness/>
        <CurrencyType>1</CurrencyType>
        <FrequencyModeType>1</FrequencyModeType>
        <BillingType>5</BillingType>
        <ReplacedByContract/>
        <PremiumAmount>200</PremiumAmount>
        <NextBillingDate>2001-01-01</NextBillingDate>
        <CurrentCashValueAmount>300.00</CurrentCashValueAmount>
        <ServiceProvId>54</ServiceProvId>
        <ContractLastUpdateDate/>
        <ContractLastUpdateUser/>
        <TCRMContractComponentBObj>
     ...................
```

XML Request file with Alias element names

```
<?xml version="1.0" encoding="UTF-8"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                            xsi:noNamespaceSchemaLocation="banking.xsd">
  <RequestControl>
    <requestID>400011</requestID>
    <DWLControl>
      <requesterName>Tester</requesterName>
      <requesterLanguage>100</requesterLanguage>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>addAgreement</TCRMTxType>
    <TCRMTxObject>AgreementBObj</TCRMTxObject>
    <TCRMObject>
```

```
<AgreementBObj>
  <AgreementIdPK/>
  <AgreementLangType/>
  <LineOfBusiness/>
  <CurrencyType>1</CurrencyType>
  <FrequencyModeType>1</FrequencyModeType>
  <BillingType>5</BillingType>
  <ReplacedByAgreement/>
  <AvailableBalance>200</AvailableBalance>
  <NextBillingDate>2001-01-01</NextBillingDate>
  <CurrentBalance>300.00</CurrentBalance>
  <ServiceProvId>54</ServiceProvId>
  <AgreementLastUpdateDate/>
  <AgreementLastUpdateUser/>
  <AgreementComponentBObj>
    <AgreementComponentIdPK/>
    <AgreementId/>
...................
```

To run aliasing transactions

1. In the request/response XMLs, use the banking XSDs or DTDs.
2. Populate the following tables:
   - GROUPALIAS
   - DATAOWNER
   - TRANSACTIONALIAS
   - ELEMENTALIAS
3. In the `tcrm_extension` properties file, uncomment the following items:
   - `DataOwner.banking`
   - `DataOwner.tCRMResponse_banking`
   - `ResponseRootElement.tCRMResponse_banking`
   - `ResponseRootSchema.banking.dtd` or `ResponseRootSchema.banking.xsd`

Chapter 24. Configuring the Request and Response Framework

The Request and Response Framework provides a consistent entry point into InfoSphere MDM Server enterprise applications.

It offers common infrastructure services such as authorization checking, transaction demarcation, and others for all incoming transactions. It provides a number of configuration options and extension points to customize it.

In this section, you will learn:

Understanding the Request and Response Framework

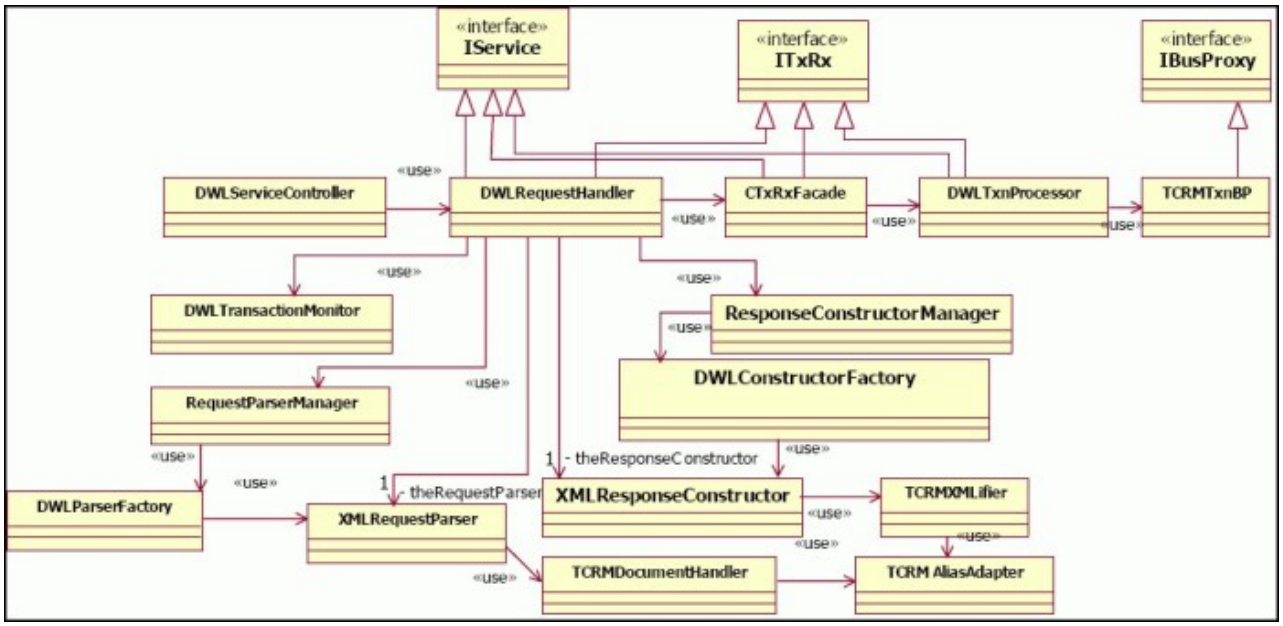
The Request and Response Framework perform various functions using several components that make up the framework.

The request framework performs the following functions:

- Accepts and parses a request containing a single or composite transactions.
- Authorizes the request.
- Participates in a distributed transaction or initiates a new transaction if required.
- Invokes the requested service using the appropriate controller component.
- Constructs and returns the response

The class diagram below shows the various Request and Response Framework components. The request parser factory, parser, response constructor factory, and constructor are all independent components; you can also plug in your own customized components in place of any of these. The request handler is a component that interacts with these underlying components to carry out the request.

The DWLRequestHandler, DWLParserFactory and DWLConstructorFactory manage various request formats, such as the default XML format (which uses XMLRequestParser and XMLResponseConstructor) and batch sample flat files fixed format (which use batch sample parsers and constructors pairs). Custom parsers, parser factories, constructors and constructor factories can be plugged in to manage client-defined request formats.



Understanding transaction flow

As the Request and Response Framework receives a transaction request, it takes it through a series of predefined steps designed to process a request and generate a transaction response.

The following flow illustrates these actions. This request and response workflow uses the InfoSphere MDM Server default XML format as an example.

1. DWLServiceController receives the request from the client application and dispatches it to the appropriate request handler (in this case, DWLRequestHandler). DWLServiceController uses the RequestType parameter to determine which request handler to use. See "Understanding DWLServiceController" on page 271.
2. DWLRequestHandler interacts with underlying components to carry out the request. See "Understanding RequestHandler" on page 274.
3. RequestParserManager determines the type of parser factory to use (in this case, DWLParserFactory). RequestParserManager uses the same RequestType parameter as DWLServiceController to determine the request parser factory to use.
4. DWLParserFactory creates a request parser based on the value of the parser key in the HashMap:context (in this case, default XMLRequestParser). The parser is returned to RequestParserManager and then returned to DWLRequestHandler.
5. XMLRequestParser parses out the DWLTransaction object. In the object, DWLControl and transaction type are set.
6. HashMap:context contains an optional key: OperationType. If the OperationType has a value of parse, DWLRequestHandler class returns the result of parsing, which is the DWLTransaction object, to the caller. If the OperationType has a value of process, DWLRequestHandler passes the DWLTransaction object on to the business proxy for further processing. OperationType is optional; if it is not set, or if it is set with a value of all,

DWLRequestHandler retrieves a parser first, then uses the parser to parse out a DWLTransaction object, followed by business processing through business proxy.

7. DWLTxnProcessor uses business proxies to invoke the InfoSphere MDM Server business services layer.
8. ResponseConstructorManager determines the type of response constructor factory to use, based on the ResponseType parameter, in this case DWLConstructorFactory.
9. DWLConstructorFactory creates one ResponseConstructor based on the ConstructorParam in context (in this case, it uses the default, XMLResponseConstructor).
10. Constructor provides a response object and sends the object back to client application.

Understanding DWLServiceController

DWLServiceController is the entry point for InfoSphere MDM Server. It is a stateless session bean that the client application uses to access the service remotely and enable distributed transaction management.

DWLServiceController provides the following method:

```
public Serializable processRequest(HashMap context, Serializable request)
```

The method throws a DWLResponseException error, if the exception occurs because of underlying components.

The first input parameter, `HashMap context`, contains a name-value pair of context properties which are used by the Request and Response Framework to handle the request appropriately. Depending on the values contained in `HashMap context`, a different request handler, parser factory, parser, and constructor factory construction are used. The following properties are used by the system:

- **TargetApplication**—Specifies the application to which this request is sent. The only value supported is tcrm, which signifies InfoSphere MDM Server as the target application.
- **RequestType**—Drives the selection of a request handler and parser factory. To use the standard request handler and parser factory that comes with the core product, use the value standard.
- **Parser**–-Selects the parser for the current request. To use the standard XML parser to parse InfoSphere MDM Server XML requests, use the value TCRMService.
- **ResponseType**—Selects the type of constructor factory. To use the standard factory that comes with the core product, use the value standard.
- **Constructor**—Selects the constructor to use for the response. To use the standard constructor that returns the InfoSphere MDM Server response XML, use the value TCRMService .
- **OperationType**—An optional property that is used by the standard request handler to perform the specific operation instead of the full processing. Possible values include Parse, Process, and All. The default value is All. Using the Parse property, the request handler only performs the parsing step, using the Process property it skips parsing but performs the processing and construction, and using the All property, it completes all the steps.

Using the Parser and Constructor keys in `HashMap context`, the client application can determine which parser is to be invoked and which constructor to use to construct the expected response. For example, the client can send a request in TCRMService XML format and expect a response in an ACORD XML format.

These properties work in conjunction with the Request and Response Framework configuration, so ensure that the properties passed in are mapped in the DWLCommon.properties configuration file. All standard plug-ins are defined in the configuration. If you require values other than the standard ones, then make the appropriate changes to the configuration. Also, to support sending additional properties, you must configure a custom request handler, parser, or constructors depending upon individual property.

The second processRequest() input parameter, `Serializable request`, represents the request data to be processed. Any object that implements the Serializable interface can be passed as request data. It is up to the parser to parse this object and create data structures for the target application. For example, XML can be passed in this parameter as a String and the appropriate XML parser parses the XML and creates Java objects to be used as input data.

The return value from the method is also any object that implements a Serializable interface. For example, in the case of an XML, it can be a String containing the XML response. The following sample of the DWLCommon.properties configuration file shows how the above property values are mapped to the appropriate types:

```
############################
# Default value for TargetApplication if one is not supplied.
TargetApplication=tcrm

############################
# RequestType
#
# RequestType.<TargetApplication property value>.<RequestType property value>
#
# The key without the RequestType property value can be used to define
# the default value if nothing was supplied.
#
RequestType.tcrm.standard=com.dwl.base.requestHandler.DWLRequestHandler
RequestType.tcrm=com.dwl.base.requestHandler.DWLRequestHandler

############################
# Parser Factory is internal and is not passed through the context
#
# ParserFactor.<TargetApplication property value>.<RequestType property value>
#
ParserFactory.tcrm.standard=com.dwl.base.requestHandler.DWLParserFactory
ParserFactory.tcrm=com.dwl.base.requestHandler.DWLParserFactory

############################
# Parser
#
# Parser.<TargetApplication property value>.<Parser property value>
#
# The key without the Parser property value can be used to define
# the default value if nothing was supplied.
#
Parser.tcrm.TCRMService=com.dwl.tcrm.coreParty.xmlHandler.XMLRequestParser
Parser.tcrm=com.dwl.tcrm.coreParty.xmlHandler.XMLRequestParser

############################
# ResponseType
#
# ConstructorFactory.<TargetApplication property value>.<ResponseType property value>
#
# The key without the ResponseType property value can be used to define
# the default value if nothing was supplied.
#
ConstructorFactory.tcrm.standard=com.dwl.base.requestHandler.DWLConstructorFactory
ConstructorFactory.tcrm=com.dwl.base.requestHandler.DWLConstructorFactory

############################
# Constructor
#
# Constructor.<TargetApplication property value>.<Constructor property value>
#
# The key without the Constructor property value can be used to define
# the default value if nothing was supplied.
#
Constructor.tcrm.TCRMService=com.dwl.tcrm.coreParty.xmlHandler.XMLResponseConstructor
Constructor.tcrm=com.dwl.tcrm.coreParty.xmlHandler.XMLResponseConstructor
```

The method throws a DWLResponseException error, if the exception occurs because of underlying components.

Understanding RequestHandler

RequestHandler acts as the main dispatcher class for handling the request. It is responsible for interacting with the parser, constructor and indirectly with the business proxy for parsing, response construction and business processing of the request.

The InfoSphere MDM Server default request handler, DWLRequestHandler, implements the default request handling logic.

Understanding parser components

The parser is responsible for parsing the request and constructing business objects that contain the data sent in the request. These business objects are returned back to the request handler for subsequent business processing through the business proxy layer.

The Request and Response Framework allows callers to select the parser for every incoming request. Multiple parsers can be configured in the same deployment. The framework comes packaged with multiple parsers to handle different request formats, including the InfoSphere MDM Server default XML request format and the composite XML parser.

You can build your own parsers to handle a specific request format. A parser must implement the com.dwl.base.requestHandler.interfaces.IRequestParser interface. You must configure the new parser in the DWLCommon_extension.properties file to make it available to the Request and Response Framework. Refer to the Javadoc for more information on the interface and the methods that should be implemented.

The parser implementation class is created using a factory class. This factory class is also pluggable. A default parser factory class, com.dwl.base.requestHandler.RequestParserFactory is provided to create the parser based on the Parser value in the incoming context parameter. You may decide to create a new parser factory implantation and configuring it in the DWLCommon_extension.properties file. The new class must implement the com.dwl.base.requestHandler.interfaces.IRequestParserFactory interface. See the Javadoc for more information on this interface. The selection for the parser factory is accomplished by using the RequestType parameter passed into the context.

Understanding the InfoSphere MDM Server XML parser

InfoSphere MDM Server provides an XML parser for parsing InfoSphere MDM Server XML as defined by myTCRM.xsd. The implementation class for this parser is com.dwl.tcrm.coreParty.xmlHandler.XMLRequestParser.

See also:

"To use the InfoSphere MDM Server XML parser"

To use the InfoSphere MDM Server XML parser

1. Declare all transactions in the CDBUSINESSTXTP table.

   The TX_OBJECT_TP column in this table defines the corresponding transaction object type. Possible values are as follows:

   - **P**—Persistence

- **I**—Inquiry
- **S**—Search

For example, if TX_OBJECT_TP is set to P, DWLTransactionPersistent is parsed out.

2. If you do not want to use XML validation, turn off XML validation as a standard SAXParser feature by changing the value of /IBM/DWLCommonServices/XML/useValidatingParser to false.

   See Chapter 34, "Using the Configuration and Management components," on page 405 for more information.

   The default value for this flag is true. By changing it to false, the default XML request parser shipped with InfoSphere MDM Server globally turns off validation for all incoming request XML files.

   Note: Turning off the validation causes unpredictable results if the incoming XML is invalid according to the published XML schema. Avoid turning off the validation. Turning off the validation may be desirable in a production environment, to save the time that would be spent on validation, and where validations can be run after testing and verifying all the various combinations of request XML files. However, leave validation on if the validation time is acceptable or the request XML structure cannot be predicted.

Understanding constructor components

A constructor within the Request and Response Framework is responsible for constructing the response that is returned to the caller. Each incoming transaction request can select its own constructor by passing it the appropriate value for the Constructor parameter in the context: HashMap input parameter for the DWLServiceController.

You can build your own constructors if you need to handle a specific response format. A constructor must implement the com.dwl.base.requestHandler.interfaces.IResponseConstructor interface. Refer to the Javadoc for more information on this interface and the methods that should be implemented. The new constructor should be configured in the `DWLCommon_extension.properties` file to make it available to Request and Response Framework.

The constructor implementation class is created using a factory class. This factory class is also pluggable. A default constructor factory class, com.dwl.base.requestHandler.ResponseConstructorFactory is provided, which creates the constructor based on the Constructor value in the incoming context parameter. You can create a new constructor factory implantation and configure it in the `DWLCommon_extension.properties` file. The new class must implement the com.dwl.base.requestHandler.interfaces.IResponseConstructorFactory interface. See the Javadoc for more information a bout this interface. The selection for the parser factory is done by using the ResponseType parameter passed into the context.

Understanding the InfoSphere MDM Server XML constructor

InfoSphere MDM Server provides a response constructor to build an XML response as defined by tcrm_response.xsd. The implementation class for this parser is com.dwl.tcrm.coreParty.xmlHandler.XMLResponseConstructor.

Understanding the business proxy

The business proxy acts as a bridge between the Request and Response Framework and InfoSphere MDM Server.

A default business proxy is provided to interface with InfoSphere MDM Server. The implementation class for this business proxy is com.dwl.base.requesthandler.DWLTxnBP. It delegates each incoming call to the appropriate InfoSphere MDM Server controller by looking it up in the customer configuration files. The incoming transaction name is used as the key to find the controller name. The response from InfoSphere MDM Server is returned back to the request handler.

See "Using best practices to develop customized business proxies" on page 277 for information on creating customized business proxies.

Chapter 25. Creating composite transactions using customized business proxies

Composite transactions allow you to group related business transactions that you want executed as one unit of work. There are two methods for creating composite transactions:

- Using *customized business proxies*—Discussed in this chapter.
- Using *XML*—Discussed in Chapter 26, "Creating composite XML transactions," on page 285

The default `com.dwl.base.requestHandler.DWLTxnBP` *business proxy* handles the three types of IBM InfoSphere Master Data Management Server transactions: *Search*, *Inquiry*, and *Persistent*. The business proxy's main function is to delegate the transaction to the appropriate controller to execute in the Request framework, based on the transaction name. This business proxy has very little business logic except to detect the type of transaction.

Customized business proxies can be implemented to handle addition business logic before delegating the transaction to the controller. This section describes customizing a business proxy so that multiple transactions are triggered at the business proxy level to fulfill a business requirement. For best practices information, see "Building custom batch jobs for the InfoSphere MDM Server WebSphere Extended Deployment batch processor" on page 321.

In this section, you will learn:

"Using best practices to develop customized business proxies"

"Implementing customized business proxies" on page 280

Using best practices to develop customized business proxies

You can write custom business proxies to support specific logic. Most often, the requirement is to build composite transaction logic within a custom business proxy. This type of business proxy is called a composite business proxy. Non-composite custom transactions may also be supported using custom business proxy.

Being able to compose new transactions by using existing InfoSphere MDM Server transactions is a very powerful mechanism offered within the Request and Response Framework. Since business proxies are Java classes, they can manage any custom logic no matter how complex it is. Additionally because they use existing InfoSphere MDM Server transactions, they do not need to duplicate that logic; instead the business proxy should only contain the composite business logic.

With the flexibility and power offered by custom business proxy comes the risk that less than optimal code may be written affecting the performance and scalability of the system. Developers must keep in mind the performance implications during the design and implementation of their business proxies.

See also:

"Choosing an appropriate InfoSphere MDM Server transaction" on page 278

"Choosing an appropriate InfoSphere MDM Server transaction parameter" on page 278

Choosing an appropriate InfoSphere MDM Server transaction

If you are using an existing InfoSphere MDM Server transaction for a business proxy, choose the transaction that meets both your functional and your performance requirements.

Often, there is more than one transaction that can be used to fulfill the functional requirement, with different performance characteristics. These performance differences are because of the amount of data being managed and the validations performed on that transaction. An example of choosing an incorrect transaction is using an InfoSphere MDM Server composite transaction to update a granular object (for example, using the updateParty composite transaction to update only the party identification and not the parent party object). In this case, because the request contains the parent object, the system has to handle it in addition to handling the child object. This results in extra processing and slower performance. A better transaction to choose is the updateIdentification transaction, a granular transaction.

Another example is the use of composite inquiry transactions which return the parent object along with a number of child objects. In certain scenarios it may be desirable to use the granular transaction to get the child objects directly instead of getting them through the composite transaction. You can also accomplish this by creating a custom inquiry level and passing it into a composite transaction.

In some cases, InfoSphere MDM Server might have transactions that fulfill your functional requirements but that do not meet your performance requirements. For example, an InfoSphere MDM Server transaction that returns large volume of data as per its requirements, where you may require only a small part of that data. Using the InfoSphere MDM Server transaction would result in redundant data being returned and then discarded. If the amount of redundant data returned outweighs the useful data, using this transaction is not acceptable. If there are no existing transactions that meet both your functional and performance needs, consider writing an customized transaction for such scenarios to return only the data you need.

Choosing an appropriate InfoSphere MDM Server transaction parameter

After choosing the best transactions for your requirements, it is equally important to choose the right parameters for those transactions. This is especially true for search and inquiry transactions and their parameters, which control the amount of data returned from such transactions.

Using a value that returns too much redundant data will slow down performance. Two parameters to consider are the inquiry level and the filter. Inquiry levels define the level of detail to return for the object, and filters determine whether to return active, inactive or all records.

Choosing the right inquiry level means selecting a value, which returns the necessary level of detail, without also returning too much redundant data. InfoSphere MDM Server offers predefined inquiry levels and the corresponding list

of child objects which are returned. You should use the lowest inquiry level which will return the desired objects required by the caller. If the inquiry level which returns the desired objects also brings back too many redundant objects, you can define a custom inquiry level and configure it to return only the desired objects.

For the filter, using a value of active will work in most cases. Using the value all returns active and inactive records. Do not use this value unless you specifically want to return inactive records and active records.

Minimizing redundant data returns

In addition to selecting the right transactions and their parameters, it is also important to understand the various scenarios the code must handle, based on the input request, in order to minimize the amount of unnecessary data that is returned.

In some scenarios particular data set may be required, but the same data may be redundant for a different scenario. For example a business proxy may be written to handle different combinations of input objects to add or update them. If the request does not contain an object, the code should not make a call to fetch the corresponding data.

Additionally, delay returning the data as much as possible. For instance, validate the input request before starting to return the data. This ensures that data is not returned for cases when the input request was invalid.

Caching read-only data

InfoSphere MDM Server internally caches read-only data, for example, code table and other configuration items.

If the business proxy has custom logic which works for read-only data that is not managed by InfoSphere MDM Server, cache these values and do not return them for every transaction.

Using base business proxies

Extend the com.dwl.base.requesthandler.DWLTxnBP business proxy and use its methods for interfacing with InfoSphere MDM Server controllers.

This method uses less code for the new business proxy, and can take advantage of any current and future performance features while connecting with InfoSphere MDM Server controllers.

Developing stateless transactions

InfoSphere MDM Server offers stateless transactions, and the business proxies should do the same. Do not return the same data more than once.

Do not accumulate the state for the incoming transactions either. Doing so potentially takes up all the available JVM memory and can bring down the server process.

Implementing customized business proxies

The following sections describe how to implement customized business proxies, step-by-step.

See also:

"Example: Step 1 – Determining the Request structure"

"Example: Step 2 – Registering the transaction in the database" on page 281

"Example: Step 3 – Adding the transaction name to the properties file" on page 281

"Example: Step 4 – Implementing the business proxy" on page 282

"Example: Step 5 – Deploying the business proxy with InfoSphere MDM Server" on page 283

"To run the customized business proxy example" on page 283

Example: Step 1 – Determining the Request structure

Begin this customization by deciding on the request for this transaction. Assign a name for this transaction—for example, `updatePartyAddressCompositeSample`. Evidently, this request must contain data about the address. It should also contain data about the party's identification in order to use this information as search criteria for the party.

Understanding criteria for searching the party

One way to perform a searchParty transaction is to search by the identification type and identification number, and whether the search is for a person or organization. For example, search for the person with the driver licence number xyz.

For the context of this transaction, the searchParty result is valid only if exactly one party is returned by the searchParty transaction.

Understanding criteria for matching the address

When a party is returned, the response must also bring back the address or addresses for that party, so that the business proxy can try to match the addresses with the address in the request.

For the context of this transaction, the business proxy tries to match the address based on the AddressUsageType. For example, given a mailing address in the request:

- if a mailing address already exists in the party information, update the address
- if a mailing address does not exist, add the mailing address to the party information

Using InfoSphere MDM Server data elements

The data elements required for this transaction can be easily described by the TCRMPartyBObj, TCRMPartyAddressBObj and TCRMPartyIdentificationBObj objects. A sample request for this transaction looks like the following:

```
<TCRMService>
  <RequestControl>
    <requestID>100013</requestID>
```

```
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLanguage>100</requesterLanguage>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>updatePartyAddressCompositeSample</TCRMTxType>
    <TCRMTxObject>TCRMPartyBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMPartyBObj>
        <PartyType>O</PartyType>
        <TCRMPartyAddressBObj>
          <AddressUsageType>1</AddressUsageType>
          <TCRMAddressBObj>
            <ResidenceType>3</ResidenceType>
            <AddressLineOne>Main Street</AddressLineOne>
            <City>Atlanta</City>
            <ZipPostalCode>30346</ZipPostalCode>
            <ProvinceStateType>108</ProvinceStateType>
          </TCRMAddressBObj>
        </TCRMPartyAddressBObj>
        <TCRMPartyIdentificationBObj>
          <IdentificationType>1</IdentificationType>
          <IdentificationNumber>482000001</IdentificationNumber>
        </TCRMPartyIdentificationBObj>
      </TCRMPartyBObj>
    </TCRMObject>
  </TCRMTx>
</TCRMService>
```

Note: Data elements shown in red above indicate mandatory elements for this transaction.

Using non-IBM InfoSphere Master Data Management Server data elements

If this transaction contains data elements that are not in the InfoSphere MDM Server data model, you must implement an extension or addition. This step is essential in order for the parser in the Request framework to validate transaction requests in XML format. For more information on creating extensions and additions, see Chapter 2, "Customizing InfoSphere MDM Server," on page 17.

Example: Step 2 – Registering the transaction in the database

Add the transaction name for this transaction (`updatePartyAddressCompositeSample`) to the `CDBUSINESSTXTP` table with a `TX_OBJECT_TP` value of "P", for "persistent" transaction type. The DWLTxnProcessor in the Request framework looks up allowable transaction names in the database that are registered with IBM InfoSphere Master Data Management Server.

BUSINESS_TX_TP_CD	NAME	TX_OBJECT_TP	...	...	...	...
414	updatePartyAddressCompositeSample	P			...	Y

See "Using best practices to develop customized business proxies" on page 277 for more information.

Example: Step 3 – Adding the transaction name to the properties file

Add this transaction name to the `DWLCommon_extension.properties` file. The `DWLTxnProcessor` class looks up this properties file to send the transaction to the appropriate business proxy based on transaction name.

```
...
BusinessProxy.tcrm.updatePartyAddressCompositeSample=
com.dwl.tcrm.samples.compositeTxn.DWLSampleUpdatePartyAddressCompositeTxnBP
...
```

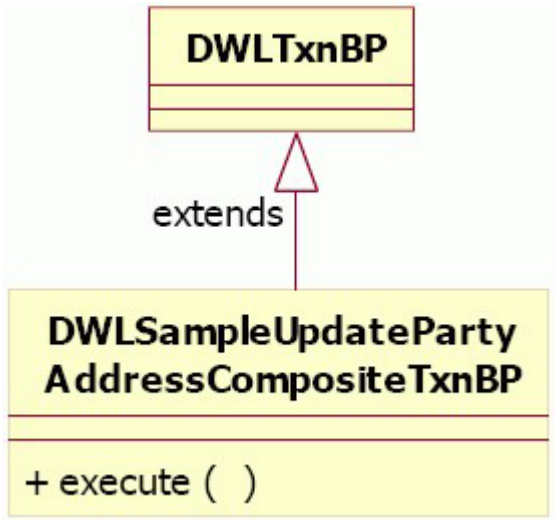
The above property specifies the specific business proxy implementation class to use for the transaction name ″updatePartyAddressCompositeSample″.

See “Using best practices to develop customized business proxies” on page 277 for more information.

Example: Step 4 – Implementing the business proxy

Implement a business proxy (for example, `DWLSampleUpdatePartyAddressCompositeTxnBP`) that extends the `DWLTxnBP` class. This business proxy contains the business logic to perform the party search and address matching, whereas the base `DWLTxnBP` class provides the built-in logic to ultimately call the controller bean to update or add the address.

The class diagram for the extension:



The following code snippet shows the `execute()` method in this business proxy:

```
public class DWLSampleUpdatePartyAddressCompositeTxnBP extends DWLTxnBP {
    ...
    ...
  public Object execute(Object theObj) throws BusinessProxyException {
    long beginTime = System.currentTimeMillis();
    Object theResponseObject;

    try {
      // assuming that the updatePartyAddressCompositeSample
      // transaction is set up as type P (persistent
      // transaction) in the CDBUSINESSTXTP table
      DWLTransactionPersistent theDWLTxnObj = (DWLTransactionPersistent) theObj;

      // create either an add or update address transaction
      //based on the business requirement
      DWLTransactionPersistent theDWLAddressTxnObj =
                              createAddOrUpdateAddressTransaction(theDWLTxnObj);

      // now that we have the correct transaction,
      // defer to the base class to call the controller to
      // execute the add or update transaction
      theResponseObject = super.execute(theDWLAddressTxnObj);
    } finally {
      long endTime = System.currentTimeMillis();
```

```
      DWLTraceLog.printMessage("DWLSampleUpdatePartyAddressCompositeTxnBP : execute :
        total time in milliseconds " + (endTime - beginTime));
    }
    return theResponseObject;
  }
    ...
    ...
}
```

In the code snippet above, the private `createAddOrUpdateAddressTransaction()` method implements the business logic to determine whether an add or update address transaction is required. Once this transaction is determined, it calls the `execute()` method in the superclass to find the appropriate controller bean. The following flowchart shows the business logic implemented by this method:

Example: Step 5 – Deploying the business proxy with InfoSphere MDM Server

In general, if you have any customized business proxies and they are packaged as part of an EJB Jar file, you need to add the EJB Jar file to the `MDM.ear` file.

If your customized business proxies are packaged as part of a regular Jar file, add the regular Jar file as a dependent JAR file referenced by the `MDM.ear`. In addition, add a reference to this Jar file in the manifest file of the `BTMEJBsForCustomer.jar`.

To run the customized business proxy example

1. Run one of the following scripts in the `DB/ddl` folder in the `CustomerSamples.jar`, depending on your database:
   - **for DB2**—`SetupCompositeTxn.sql` or `SetupCompositeTxn_zos.sql`
   - **for Oracle**—`SetupCompositeTxn_ora.sql`.

     Note: For Oracle, you must also add a user access-related SQL statement to assign the user the right to run the sample transaction.

     This SQL script adds the transaction name `updatePartyAddressCompositeSample` to the BUSINESSTXTP table.
2. Add the following property to the DWLCommon_extension.properties file:

   ```
   BusinessProxy.tcrm.updatePartyAddressCompositeSample=
   com.dwl.tcrm.samples.compositeTxn.DWLSampleUpdatePartyAddressCompositeTxnBP
   ```
3. Submit the addPerson transaction to add a person using the `AddPerson.xml` provided in the `test/updatePartyAddressCompositeTxnBP` folder in the `Customer CenterSamples.jar`.

   This transaction sets up the person to test the business proxy in the next few steps.
4. Submit the updatePartyAddressCompositeSample transaction using the `UpdatePartyAddress_Composite_Person_NewAddress.xml` provided in the`test/updatePartyAddressCompositeTxnBP` folder in the `Customer CenterSamples.jar`. Ensure that the user has permission to execute new composite transactions.

   This XML contains a address that has no match on an existing address usage type. Hence a new address is added to the person.
5. Submit the updatePartyAddressCompositeSample transaction using the `UpdatePartyAddress_Composite_Person_UpdateAddress.xml` provided in the`test/updatePartyAddressCompositeTxnBP` folder in the `Customer CenterSamples.jar`.

This XML contains a address that has a match on an existing address usage type, and so the address is updated.

Chapter 26. Creating composite XML transactions

InfoSphere MDM Server includes a Composite Transaction Framework to support composite XML requests.

Composite transactions allow you to group related business transactions that you want executed as one unit of work. There are two methods for creating composite transactions:

- Using *customized business proxies*—Discussed in Chapter 25, "Creating composite transactions using customized business proxies," on page 277
- Using *XML*—Discussed in this chapter.

A *composite XML transaction* is a grouping of single transactions that are processed together as one unit of work. If all transactions within the composite are successfully executed, all the transactions will be committed. If any one transaction in the composite fails, any transactions that have been executed will be rolled back.

In the most basic form, a composite transaction contains a series of single transactions. The transactions are executed one after another. For example, an addCompleteParty composite transaction may contain three single transactions: addParty, addPartyInteraction and addPartyGroupingAssociation. These three transactions are processed as one unit of work. During processing, the composite transaction can substitute any required items in a request before sending it to be processed. In the composite above, the addPartyInteraction transaction needs to refer to the PartyId from the party created in the first addParty transaction. You can use the syntax provide by the Composite Transaction Framework to substitute the InteractionParty value in the addPartyInteraction request with the PartyId in the addParty response.

Note: See "Example: Substituting values from another Request or Response" on page 289 for details on substitution.

Understanding conditional logic for composite XML transactions

Another usage of composite transactions is to implement conditional logic. The Composite Transaction Framework provides implementation of two kinds of conditional logic:

- *if-then-else*—Allows you to choose which transactions in the composite to execute based on the response of some previous transaction in the composite. For example, a searchPersonAddOrUpdate composite transaction may contain three single transactions: searchPerson, addPerson, and updatePerson. If the searchPerson transaction does not return any party, then the addPerson transaction will be executed. On the other hand, if the searchPerson transaction returns a match, then the updatePerson transaction will be executed. For information on implementing the "if-then-else" condition, see "Creating composite transactions with if-then-else logic" on page 295.
- *looping*—Allows you to iterate through a collection of objects in the response and perform another transaction on each of the object. For example, a searchPersonUpdateEachPerson composite transaction may contain two single transactions: searchPerson and updatePerson. After the searchPerson transaction returns a collection of matched parties, the updatePerson transaction will be

executed for each of the parties found. For information on implementing the looping condition, see “Creating composite transactions with looping logic” on page 297.

Understanding when to use composite XML transactions

You can consider using a Composite XML transaction to group related business transactions that you want executed in one unit of work. Also if you plan to implement simple ″if-then-else″ or ″looping″ logic among these transactions, a Composite XML transaction is also a good candidate. The Composite Transaction Framework provides syntax in XML format that you can use to create composite transactions easily to fulfill these requirements.

However, since single transactions in a composite are executed in one unit of work, you should refrain from grouping too many single transactions in one composite. The more single transactions there are in the composite, the longer it takes to complete the unit of work, hence you are likely to face transaction timeout problems. It is recommended you have no more than four single transactions in a composite. The following sections demonstrate how to create composite transaction requests, configure InfoSphere MDM Server to enable composite transactions and to submit the requests to InfoSphere MDM Server.

In this section, you will learn:

Understanding composite XML transaction syntax

This section helps you to learn the XML data structure and syntax defined by the framework, which you can use to create composite XML transactions.

The following sections describe how to create different types of composite XML transactions that are supported by the product, which include:

- Basic composite transactions, which is a series of single transactions that get executed sequentially
- Composite transactions with decision making, or *if-then-else*, logic
- Composite transactions with looping logic

Note: A composite transaction can contain only <TCRMService> transactions or <DWLAdminService> transactions, but not a mixture of both in the same composite. However, the data structure and syntax that you would use to create a composite are the same, regardless whether the single transactions are

<TCRMService> or <DWLAdminService>. These sections use <TCRMService> as examples in the discussion. You can replace <TCRMService> with <DWLAdminService>.

Understanding basic composite transactions

A basic composite transaction is a series of single transactions. As such, the main body of a basic composite transaction contains two or more <TCRMService/> (or <DWLAdminService/>) XML requests. To hold these individual XML requests, you use the root tag <DWLCompositeServiceRequest>, followed by the optional <GlobalFields/> XML data. The composite XML document references the corresponding CompositeTransactionRequest.xsd for XML validation. For example:

```
<?xml version="1.0" encoding="UTF-8"?>
<DWLCompositeServiceRequest xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xsi:noNamespaceSchemaLocation="CompositeAdminTransactionRequest.xsd">
  <GlobalFields>
      ...
      ...
  </GlobalFields>
  <TCRMService>
      ...
      ...
  </TCRMService>
      ...
      ...
  <TCRMService>
      ...
      ...
  </TCRMService>
</DWLCompositeServiceRequest>
```

Note: If the transactions are <DWLAdminService>, you use the CompositeAdminTransactionRequest.xsd.

See also:

"Example: Reusing DWLControl values with GlobalFields"

"Example: Correlating the transactions in the composite" on page 288

"Example: Substituting values from another Request or Response" on page 289

"Example: Qualifying an object name with criteria" on page 291

"Example: Comparing strings" on page 292

"Example: Comparing numeric values" on page 292

"Example: Comparing dates" on page 293

"Examples of substitution" on page 293

Example: Reusing DWLControl values with GlobalFields

The optional <GlobalFields/> XML data after the root tag contains the DWLControl values that you can apply to any of the <DWLControl> in the <TCRMService> XML request that follows. For example:

```
<DWLCompositeServiceRequest>
  <!-- <GlobalFields> contains values that can be used
       in other <DWLControl> tag. -->
  <GlobalFields>
    <requesterName>cusadmin</requesterName>
    <requesterLanguage>100</requesterLanguage>
        ...
        ...
  </GlobalFields>
```

```
  <TCRMService>
    <RequestControl>
      <requestID>100181</requestID>
      <!-- The <DWLControl> in this <TCRMService> uses the elements
           defined in the <GlobalFields>. -->
      <DWLControl>
        <requesterName>{ GlobalFields.requesterName }</requesterName>
        <requesterLanguage>{ GlobalFields.requesterLanguage }</requesterLanguage>
            ...
            ...
      </DWLControl>
    </RequestControl>
        ...
        ...
  </TCRMService>
      ...
      ...
  <TCRMService>
    <RequestControl>
      <requestID>100190</requestID>
      <!-- The <DWLControl> in this <TCRMService> uses explicit values. -->
      <DWLControl>
        <requesterName>User1</requesterName>
        <requesterLanguage>200</requesterLanguage>
            ...
            ...
      </DWLControl>
    </RequestControl>
        ...
        ...
  </TCRMService>
</DWLCompositeServiceRequest>
```

In general, you define all the <DWLControl> values in the <GlobalFields> and reuse these values in every single transaction. The above example illustrates how you can also explicitly specify these values in any individual transaction.

To reuse the <GlobalFields> values, use the format { GlobalFields.xxx }, where xxx is the corresponding tag name within the <DWLControl> tag.

Example: Correlating the transactions in the composite

Correlating the transactions refers to the mechanism with which to label a particular single transaction in the unit of work. The reason for correlating the transactions is obvious-it is to enable you to do things such as ″I want my third request to use some values based on the first response″, for example.

To correlate the transactions in the composite, you specify a unique numeric ID with the <transactionCorrelatorId> element in <DWLControl>, as follows:

```
<DWLCompositeServiceRequest>
  <GlobalFields>
    <requesterName>Cusadmin</requesterName>
    <requesterLanguage>100</requesterLanguage>
  </GlobalFields>
  <TCRMService>
    <RequestControl>
      <requestID>100181</requestID>
      <DWLControl>
        <requesterName>{ GlobalFields.requesterName }</requesterName>
        <requesterLanguage>{ GlobalFields.requesterLanguage }</requesterLanguage>
        <!-- This is the correlator ID for this <TCRMService>. -->
        <transactionCorrelatorId>111</transactionCorrelatorId>
      </DWLControl>
```

```
    </RequestControl>
        ...
        ...
  </TCRMService>

  <TCRMService>
    <RequestControl>
      <requestID>100190</requestID>
      <DWLControl>
        <requesterName>{ GlobalFields.requesterName }</requesterName>
        <requesterLanguage>{ GlobalFields.requesterLanguage }</requesterLanguage>
        <!-- This is the correlator ID for this <TCRMService>. -->
        <transactionCorrelatorId>555</transactionCorrelatorId>
      </DWLControl>
    </RequestControl>
        ...
        ...
  </TCRMService>
</DWLCompositeServiceRequest>
```

You will learn how to use the correlator ID to refer to different parts of the composite transaction in "Example: Substituting values from another Request or Response."

Example: Substituting values from another Request or Response

Composite transactions use substitution expressions to substitute values in the single request or requests at transaction time. That is, some values are not known at the time of submitting the composite transaction, and are only known when the values are resolved after the requests in the composite have been executed. A substitution expression contains a backward reference to an attribute value. A backward reference is defined as a reference to a part of a request or response in a composite transaction. Substitution expressions enable you to replace attribute values dynamically in any request during transaction time.

The syntax for specifying substitution expression is as follows:

```
{id.ref_num.ref_nature.[object_name_ref.]+attrib_name_ref}
```

Note: Substitution expressions can only include a backward reference to an attribute of a business object; it cannot include a backward reference to a business object.

The following list shows each symbol used in the syntax and its definition.

Symbol: {

The start of the substitution expression.

Value: This must be the { character.

Symbol: `id`

Constant string.

Value: This must be `id`.

For backwards compatibility, you can also use the constant strings `Id`, `transactionCorrelatorId` or `TransactionCorrelatorId`.

Symbol: `ref_num`

The value must be one of the numeric correlator IDs that is specified in one of the `<transactionCorrelatorId>` tags in the composite.

Value: A numeric value.

Symbol: `ref_nature`

This value must be `request` or `response`. If this value is `request`, the backward reference refers to the request object corresponding to the correlator ID specified above; if this value is `response`, it refers to the response object.

If this value is not specified, the response object is assumed.

Value: This must be `request` or `response`, or it can be left blank.

Symbol: `object_name_ref`

One or more business object names in the request or response. If more than one name is specified, the reference will narrow to the last specified object in the business object hierarchy.

If the object that you want to refer to in the object hierarchy is returned in a collection, you must qualify the object name. You can do it in one of two ways: (i) by index, or (ii) by evaluating criteria.

To qualify the object name by index, use the form `[i]`, where `i` is the 0-based index. Use this form if you know the order in which the instances are returned in the collection. However, if the desired position is not present at runtime, an exception will be thrown.

To qualify the object name by evaluating criteria, use the form `[where criteria]`. To learn how to use criteria to qualify an instance, see "Example: Qualifying an object name with criteria" on page 291 and "Examples of substitution" on page 293.

In general, qualifying an instance with criteria is more practical, since you do not have control over the order in which InfoSphere MDM Server returns objects.

Note: If an object name is defined as a collection in the object hierarchy but the object name is not qualified in the substitution expression, an exception will be thrown at transaction time. Conversely, If an object name is defined as a single instance in the object hierarchy but the object name is qualified, an exception will be thrown

Value: This must be a name in the request or response that resolves to a business object.

Symbol: `attrib_name_ref`

This is mandatory as it refers to the attribute whose return value you want substituted in new request object.

Value: This must be a name in the request or response that resolves to an attribute in a business object.

Symbol: }

The end of the substitution expression.

Value: This must be the } character.

The following is a sample composite XML request that illustrates the use of substitution.

```
<DWLCompositeServiceRequest>
  <GlobalFields>
      ...
      ...
  </GlobalFields>
  <TCRMService>
    <RequestControl>
```

```
      <requestID>100181</requestID>
      <DWLControl>
          ...
          ...
        <!-- The correlator ID for the addPerson transaction
             in this composite is 111. -->
        <transactionCorrelatorId>111</transactionCorrelatorId>
      </DWLControl>
    </RequestControl>
    <TCRMTx>
      <TCRMTxType>addPerson</TCRMTxType>
      <TCRMTxObject>TCRMPersonBObj</TCRMTxObject>
          ...
          ...
    </TCRMTx>
  </TCRMService>
      ...
      ...
  <TCRMService>
    <RequestControl>
      <requestID>100190</requestID>
      <DWLControl>
          ...
          ...
        <transactionCorrelatorId>555</transactionCorrelatorId>
      </DWLControl>
    </RequestControl>
    <TCRMTx>
      <TCRMTxType>addPartyInteraction</TCRMTxType>
      <TCRMTxObject>TCRMInteractionBObj</TCRMTxObject>
      <TCRMObject>
        <TCRMInteractionBObj>
          <InteractionIdPK/>
          <InteractionDate>2002-07-29</InteractionDate>
              ...
              ...
          <!-- Before the addPartyInteraction transaction is executed,
               the InteractionParty value will be substituted with the PartyId value
               under the TCRMPersonBObj object, from the addPerson
               (i.e. correlator ID 111) response. -->
          <InteractionParty>
            {id.111.response.TCRMPersonBObj.PartyId}
          </InteractionParty>
              ...
              ...
        </TCRMInteractionBObj>
      </TCRMObject>
    </TCRMTx>
  </TCRMService>
</DWLCompositeServiceRequest>
```

Example: Qualifying an object name with criteria

When a child object of a parent object is defined as a collection, you can qualify which instance in the collection you want to refer to with criteria. To do so, use the form after an object name:

```
object_name[where criteria]
```

The most basic form of criteria is:

```
left_operand    comparison_operator    right_operand
```

The `left_operand` must be an attribute name belonging to the object name being qualified. The `right_operand` must resolve to a value or a keyword—see "Understanding supported keywords" on page 301. The `comparison_operator` must one of the following operators:

- **=** (equal to)
- **!=** (not equal to)
- **<** (less than)
- **<=** (less than or equal to)
- **>** (greater than)
- **>=** (greater or equal to)

When you use one of these operators to compare an attribute with a value, you should take into account of the data type of the attribute. There are specific requirements when comparing: strings, numeric values, and dates.

Similar to most programming languages, you can create more complex criteria using boolean operators, which include:

- **( )** (grouping)
- **and** (logical 'and')
- **or** (logical 'or')

There are a number of examples in "Examples of substitution" on page 293 that illustrate the uses of criteria.

Example: Comparing strings

When you compare an attribute with a string value, the string value must be enclosed with quotation marks. The following example shows the correct way to compare the `LastName` attribute in a substitution expression.

```
{id.123.response.TCRMPersonBObj.TCRMPersonNameBObj[where LastName !=
     'Smith'].PersonNameIdPK}
```

The following example shows an incorrect way to compare the `LastName` attribute in a substitution expression.

```
{id.123.response.TCRMPersonBObj.TCRMPersonNameBObj[where LastName !=
     Smith].PersonNameIdPK}
```

If the word `Smith` is not enclosed with quotation marks, the expression will throw an exception at runtime time.

Currently, the only comparison operators that are valid for comparing strings are `=` (equal to) and `!=` (not equal to). The operators `<`, `<=`, `>` and `>=` are not valid for string comparison. If you use one of these four operators, an exception will be thrown.

Example: Comparing numeric values

When you compare an attribute with a numeric value, the numeric value must appear in the expression as is. The following example shows the correct way to compare the `NameUsageType` attribute in a substitution expression.

```
{id.123.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType &gt; 2].
     PersonNameIdPK}
```

The following example shows an incorrect way to compare the `NameUsageType` attribute in a substitution expression.

```
{id.123.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType &gt; '2'].
     PersonNameIdPK}
```

When you compare numeric values, you can use any one of the six comparison operators.

Example: Comparing dates

When you compare an attribute with a date value, the date value must be wrapped in the `date` function—see "Understanding supported functions" on page 300. The `date` function is required to explicitly indicate that the value is a date.

The following example shows the correct way to compare the `LastUpdateDate` attribute in a substitution expression.

```
{id.123.response.TCRMPersonBObj.TCRMPersonNameBObj[where LastUpdateDate &gt;
     date('2005-05-17 16:48:11.047')].
PersonNameIdPK}
```

The following example shows an incorrect way to compare the `NameUsageType` attribute in a substitution expression.

```
{id.123.response.TCRMPersonBObj.TCRMPersonNameBObj[where LastUpdateDate &gt;
     '2005-05-17 16:48:11.047'].PersonNameIdPK}
```

If you do not wrap the date value with the `date` function, the framework assumes that the value is a string and may not be able to compare the values correctly.

When you compare date values, you can use any one of the six comparison operators.

Examples of substitution

The following examples show valid syntax that can be used in substitution expressions.

- **Example 1:**

  ```
  {id.123.response.TCRMPersonBObj.PartyId}
  ```

  Gets the PartyId from the TCRMPersonBObj object. The TCRMPersonBObj object comes from the response that has a correlator ID 123.

- **Example 2:** This example shows the most basic form of substitution expression.

  ```
  {id.222.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].
       PersonNameIdPK}
  ```

  Gets the PersonNameIdPK from the TCRMPersonNameBObj object where the NameUsageType equals 1. The TCRMPersonBObj object comes from the response that has a correlator ID 222.

- **Example 3:** This example shows the use of criteria to compare a numeric value.

  ```
  {transactionCorrelatorId.222.TCRMPersonBObj.TCRMPersonNameBObj
  [where LastName = 'Smith'].PersonNameIdPK}
  ```

  Similar to above. When the ".response" symbol is omitted, the response object is assumed. Also, you can use transactionCorrelatorId instead of id. The symbol transactionCorrelatorId is retained for backwards compatibility purposes.

- **Example 4:** This example shows the use of criteria to compare a string value.

  ```
  {id.111.request.TCRMPersonBObj.TCRMPartyAddressBObj[2].StartDate}
  ```

  Gets the StartDate from the third TCRMPartyAddressBObj object. The TCRMPersonBObj object comes from the request that has a correlator ID 111.

- **Example 5:** This example shows the use of criteria by index.

```
{id.333.response.TCRMPersonBObj.TCRMPartyContactMethodBObj[where
     PartyContactMethodIdPK = 9900].TCRMPartyContactMethodPrivPrefBObj
[where EndDate = date('2005-12-31 12:00:00.000')].StartDate}
```

Gets the StartDate from the TCRMPartyContactMethodPrivPrefBObj object whose end date is equal to the date specified. The TCRMPartyContactMethodPrivPrefBObj object belongs to the TCRMPartyContactMethodBObj object whose PartyContactMethodIdPK equals 9900. The TCRMPersonBObj object comes from the response that has a correlator ID 333.

- **Example 6:** This example shows the use of criteria in more than one object in the object hierarchy. It also shows the use of criteria to compare a date value.

```
{id.444.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType != 1 and
     PrefixType = 12].LastName}
```

Gets the LastName from the TCRMPersonNameBObj object where the NameUsageType does not equal 1 and PrefixType equals 12. The TCRMPersonBObj object comes from the response that has a correlator ID 444.

- **Example 7:** This example shows the use of boolean and comparison operators to create more complex criteria.

```
{id.555.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType =
     id.200.request.TCRMPersonBObj.TCRMPersonNameBObj.NameUsageType].LastName}
```

Gets the LastName from the TCRMPersonNameBObj object where the NameUsageType equals the NameUsageType from the TCRMPersonNameBObj object in the request that has a correlator ID 200. The TCRMPersonNameBObj is a part of the TCRMPersonBObj object from the response that has a correlator ID 555.

This example shows that the right-hand side of a comparison operator can be a fully qualified name that refers to another part of the composite transaction. In previous examples, the right-hand side value is a constant.

- **Examples 8-12:** The following are some examples of invalid substitution, which will cause exception to be thrown either during parsing or transaction.

```
{id.555.response.TCRMPersonBObj.TCRMPersonNameBObj[where
     id.200.request.TCRMPersonBObj.TCRMPersonNameBObj.NameUsageType =
     NameUsageType].LastName}
```

This example is similar to the last valid example given above, except that the left-hand side and right-hand side values of the comparison operator are reversed. The syntax requires that the left-hand side value be an attribute of the object being qualified. By definition, an attribute name cannot contain any period, hence an exception will be thrown during parsing time.

```
{id.234.response.TCRMPersonBObj.TCRMPartyAddressBObj[2]}
```

This example is syntactically incorrect because the last symbol in the substitution cannot be qualified with an index. An exception will be thrown during parsing time.

```
{id.234.response.TCRMPersonBObj.TCRMFinancialProfileBObj}
```

This example is syntactically correct and can be parsed successfully. However, this substitution does not evaluate to a value since TCRMFinancialProfileBObj is a business object. The backward reference used in the substitution expression must resolve to an attribute. This example will throw an exception at transaction time.

```
{id.234.response.TCRMPersonBObj.TCRMPersonNameBObj[where LastName = Smith].
     PersonNameIdPK}
```

This example is syntactically incorrect because the string value being compared is not enclosed with quotation marks. An exception will be thrown during parsing time.

```
{id.234.response.TCRMPersonSearchResultBObj.PartyId}
```

This example is syntactically correct and can be parsed successfully. However, if the request producing this response is an searchPerson transaction, the transaction will return zero or more instances of the TCRMPersonSearchResultBObj objects in a collection. By not qualifying which TCRMPersonSearchResultBObj object you want to refer to, this example will throw an exception at transaction time.

Creating composite transactions with if-then-else logic

A composite transaction with ″if-then-else″ logic allows you to select which single requests to execute based on some condition. It is an extension of the basic composite transaction. Refer to “Understanding basic composite transactions” on page 287 before continuing with this section.

The XML construct for the ″if-then-else″ logic in the composite XML transaction is very similar to the XSLT <xsl:choose> syntax. To include ″if-then-else″ logic in a composite XML, use this syntax:

```
<choose>
  <when test="boolean-expression">
    <!-- One or more <TCRMService/> (or <DWLAdminService/>)
         or another <choose/> -->
      ...
      ...
  </when>
  <when test="boolean-expression">
    <!-- One or more <TCRMService/> (or <DWLAdminService/>)
         or another <choose/> -->
      ...
      ...
  </when>
      ...
      ...
  <otherwise>
    <!-- One or more <TCRMService/> (or <DWLAdminService/>)
         or another <choose/> -->
      ...
      ...
  </otherwise>
</choose>
```

The <choose> XML must contain one or more <when> XML, and zero or one <otherwise> XML. Each <when> XML corresponds to the ″if″ or ″else-if″ condition, and the <otherwise> XML corresponds to the ″else″ condition. Only one of these condition will be met.

Between the <when> and </when> XML tags, you can include one or more <TCRMService> (or <DWLAdminService>) XML requests. When the boolean expression for that <when> condition is evaluated to true, each of the requests will be executed.

You can also include another <choose> XML between the <when> and </when> XML tags. This in effect allows you do nest ″if-then-else″ logic.

Similar to the <when> condition, between the <otherwise> and </otherwise> XML tags, you can include one or more <TCRMService> (or <DWLAdminService>) XML requests, or another <choose> XML to create nesting logic. The <otherwise> condition is met only if none of the <when> conditions has the boolean expression evaluated to true. Another XML data that you can include is the <message> XML.

The <message> XML provides a way to provide a meaningful business error message when the <otherwise> condition is met. The <message> XML is explained in "Providing error messages using the error handling service" on page 299.

The following is an sample composite XML transaction with ″if-then-else″ logic.

There are two requests in this composite: searchPerson and getPerson. The ″if-then-else″ logic is as follows:

1. Do a searchPerson transaction.
2. If the searchPerson transaction returns exactly 1 match, do a getPerson transaction of inquiry level 1 to get all details about the person. Otherwise, produce a business error message.

```
<DWLCompositeServiceRequest>
  <GlobalFields>
      ...
      ...
  </GlobalFields>
  <TCRMService>
    <RequestControl>
      <requestID>100181</requestID>
      <DWLControl>
          ...
          ...
        <transactionCorrelatorId>111</transactionCorrelatorId>
      </DWLControl>
    </RequestControl>
    <TCRMTx>
      <TCRMTxType>searchPerson</TCRMTxType>
      <TCRMTxObject>TCRMPersonSearchBObj</TCRMTxObject>
          ...
          ...
    </TCRMTx>
  </TCRMService>
  <choose>
    <when test="count(id.111.response.TCRMPersonSearchResultBObj) = 1">
      <TCRMService>
        <RequestControl>
          <requestID>100190</requestID>
          <DWLControl>
              ...
              ...
            <transactionCorrelatorId>555</transactionCorrelatorId>
          </DWLControl>
        </RequestControl>
        <TCRMInquiry>
          <InquiryType>getPerson</InquiryType>
          <InquiryParam>
            <tcrmParam name="PartyId">
              { id.111.response.TCRMPersonSearchResultBObj.PartyId }
            </tcrmParam>
            <tcrmParam name="InquiryLevel">1</tcrmParam>
          </InquiryParam>
        </TCRMInquiry>
      </TCRMService>
    </when>
    <otherwise>
      <!-- Expected only 1 match, but failed -->
      <message errorId="1234" lang="100"></message>
    </otherwise>
  </choose>
</DWLCompositeServiceRequest>
```

The correlator ID for the searchPerson transaction in this composite is 111. One or more <TCRMService/> (or <DWLAdminService/>), another <choose/> or <message/>.

Creating composite transactions with looping logic

A composite transaction with looping logic allows you to iterate through a collection of objects and executes other requests based on each object. It is an extension of the basic composite transaction. (Refer to "Understanding basic composite transactions" on page 287 before continuing with this section.)

The XML construct for the looping logic in the composite XML transaction is very similar to the XSLT <xsl:for-each> syntax. To include looping logic in a composite XML, use this syntax:

```
<for-each select="object-set-expression" var="varName">
  <!-- One or more <TCRMService/> (or <DWLAdminService/>) or <choose/> -->
    ...
    ...
</for-each>
```

The <for-each> XML tag contains a mandatory select attribute and a var attribute. The select attribute points to an object-set-expression, which is the kind of expression that will be evaluated to a collection of objects at runtime. The var attribute is a reference name that you can give in order to associate it with each object in the collection when the collection is iterated through. When the reference name is used in the rest of the composite, the reference name must be prefixed with a $ character.

Between the <for-each> and </for-each> XML tags, you can include one or more <TCRMService> (or <DWLAdminService>) XML requests. When the object-set expression is evaluated to return a collection of objects, each of the requests will be executed as many times as there are objects in the collection. You can also include another <choose> XML between the <for-each> and </for-each> XML tags. This in effect allows you do further qualify the loop with "if-then-else" logic.

The following is a sample composite XML transaction with looping logic. There are two requests in this composite: getPerson and updatePartyAddress. The looping logic is as follows:

1. Do a getPerson transaction for party ID 3004000123.
2. For each of the TCRMPartyAddressBObj objects returned from the TCRMPersonBObj:
   - If the EndDate has not been set, update the StartDate.
   - Otherwise, just produce an error message.

```
<DWLCompositeServiceRequest>
  <GlobalFields>
      ...
      ...
  </GlobalFields>
  <TCRMService>
    <RequestControl>
      <requestID>100181</requestID>
      <DWLControl>
          ...
          ...
        <!-- The correlator ID for the getPerson transaction in this
             composite is 111. -->
        <transactionCorrelatorId>111</transactionCorrelatorId>
      </DWLControl>
    </RequestControl>
    <TCRMInquiry>
      <InquiryType>getPerson</InquiryType>
```

```
      <InquiryParam>
        <tcrmParam name="PartyId">3004000123</tcrmParam>
        <tcrmParam name="InquiryLevel">3/tcrmParam>
            ...
            ...
      </InquiryParam>
    </TCRMInquiry>
  </TCRMService>

  <!-- The object-set expression in this <for-each> gets the collection
       of TCRMPartAddressBObj from the getPerson response. The anAddress variable
       is a reference to each TCRMPartAddressBObj in the collection, which will be
       used in the rest of the composite. -->
  <for-each select="id.111.response.TCRMPersonBObj.TCRMPartyAddressBObj"
            var="anAddress">
    <choose>
      <!-- The boolean expression in this <when> tests if the EndDate in a
           TCRMPartAddressBObj has not been set. Note the use of the $anAddress
           variable to refer to each TCRMPartAddressBObj in the collection. -->
      <when test="$anAddress.EndDate = null">
        <TCRMService>
          <RequestControl>
            <requestID>100190</requestID>
            <DWLControl>
                ...
                ...
              <transactionCorrelatorId>555</transactionCorrelatorId>
            </DWLControl>
          </RequestControl>
          <TCRMTx>
            <TCRMTxType>updatePartyAddress</TCRMTxType>
            <TCRMTxObject>TCRMPartyAddressBObj</TCRMTxObject>
            <TCRMObject>
              <TCRMPartyAddressBObj>
                <!-- Substitute all the necessary fields from the getPerson
                     response and the new StartDate to update the party address.
                     Note the use of the $anAddress variable to refer to each
                     TCRMPartAddressBObj in the collection. -->
                <PartyAddressIdPK>
                  {$anAddress.PartyAddressIdPK}
                </PartyAddressIdPK>
                <PartyId>{$anAddress.PartyId}</PartyId>
                <StartDate>2000-01-31</StartDate>
                    ...
                    ...
              </TCRMPartyAddressBObj>
            </TCRMObject>
          </TCRMTx>
        </TCRMService>
      </when>
      <!-- If the EndDate has been set, just produce an error message. -->
      <otherwise>
        <message errorId="6000" lang="100">Address already expired</message>
      </otherwise>
    </choose>
  </for-each>
</DWLCompositeServiceRequest>
```

For more information on object-set expressions, see “Creating object-set expressions” on page 302.

For more information on boolean expressions, see “Creating boolean expressions” on page 299.

For more information on substitution expressions, see “Example: Substituting values from another Request or Response” on page 289.

For more information on looking up error messages, see “Providing error messages using the error handling service” on page 299.

Providing error messages using the error handling service

In a lot of the cases, when the <otherwise> condition is met after all the expected conditions fail — that is, if none of the <when> conditions is met — you would like to provide a meaningful message in the response describing the situation. You can use the <message> XML tag provided by the Composite Transaction Framework to retrieve the message from the database.

The benefits of using the <message> XML are:

- The <message> XML syntax is short and easy to remember.
- All messages are centralized in the database and retrievable through the error handling service.
- Messages can be language specific.

The syntax for the <message> XML tag is:

```
<message errorId="xxxx" lang="yyyy">default_description</message>
```

The errorId and lang attributes correspond to the key fields needed to query the database for the error message. The default_description value is the String that will be used if the error message cannot be retrieved from the database.

Adding error messages to the database

If you want to add an error message to the database for the <message> XML to retrieve, you must add a record to the ERRREASON table and one to the CDERRMESSAGETP table. For example, if you want to add the error message ?Default error message for composite transaction? for errorId 200000 and lang 100 (assuming that the lang value 100 is already in the CDLANGTP table), you must add these records in the two tables:

- ERRREASON
- CDERRMESSAGETP

Note: In the ERRREASON table, the ERR_REASONTP_CD and ERR_MESSAGE_TP_CD values are the errorId and must be the same in the record.

Creating boolean expressions

A boolean expression is used in the test attribute of the <when> XML tag. The boolean expression should evaluate to true or false. When the expression evaluates to true, the corresponding <when> condition is met, the content between the <when> and </when> XML tags will be executed.

The most basic form of a boolean expression is:

```
left_operand operator right_operand
```

where operator is one of the logical or comparison operators. Similar to most programming languages, you can use a combination of operators to operate on a number of operands, to create more complex boolean expressions.

For example, the following boolean expression will test whether the person's last name is ″Smith″:

```
id.222.response.TCRMPersonNameBObj.LastName = 'Smith'
```

Note: In the above example, the left operand is very similar to the backward reference format used in substitution expressions. If you are not familiar with substitution expression and backward reference, refer to "Example: Substituting values from another Request or Response" on page 289 before continuing with this section.

A slightly more complex boolean expression is:

```
id.222.response.TCRMPersonNameBObj.LastName = 'Smith' and
id.222.response.TCRMPersonNameBObj.GivenNameOne = 'John'
```

This boolean expression will test whether the person's last name is "Smith" and first name is "John".

Understanding the position of the operand

In some programming languages, there is no restriction on whether an operand appears on the left-hand side or right-hand side of the operator. For example, the expression LastName = 'Smith' and the expression 'Smith' = LastName are both allowed. This is, however, not the case with boolean expressions used in composite XML transaction.

In composite XML transaction, the left-hand side operand in a boolean expression can only be one of the following:

- A backward reference to an attribute value
- The count function—see "Understanding supported functions"

The right-hand side operand can only be one of the following:

- A backward reference to an attribute value
- A keyword—see "Understanding supported keywords" on page 301
- A constant value—for example, 'John Smith', 'Y', 1234
- The date function—see "Understanding supported functions"

If the wrong type of operand appears in the boolean expression, an exception will be thrown at parsing time.

Understanding supported functions

The framework supports two functions that can be used in expressions:

- count
- date

The format of the count function is count(argument), where argument is a backward reference to a business object. The count function returns a numeric value that equals to the number of occurrences of the specified business object.

For example, to test if there is no TCRMPersonSearchResultBObj returned in a response:

```
count(id.111.response.TCRMPersonSearchResultBObj) = 0
```

Note: The count function can only be used in the left operand in an expression.

The count function is intended to test the number of occurrences in a collection, hence the argument is expected to resolve to a collection at runtime. If the argument resolves to a single instance, the count function will throw an exception.

The format of the date function is date(argument), where argument is the string representation of a date. The date function ensures that the string argument can be converted into a date object.

For example, to test if the LastUpdateDate is equal to a specific date:

```
id.111.response.TCRMPartyBObj.PartyLastUpdateDate = date('2005-12-31 12:00:00.000')
```

Note: The date function can only be used in the right operand in an expression.

Understanding supported keywords

The only supported keyword is *null*. Use the null keyword with another backward reference to test whether that reference exists or not.

For example, to test if the person's alert indicator has not been set:

```
id.111.response.TCRMPersonBObj.AlertIndicator = null
```

To test if the person has no financial profile:

```
id.111.response.TCRMPersonBObj.TCRMFinancialProfileBObj = null
```

Note: Note: The null keyword is intended to be used with a backward reference that resolves to a single instance. If the backward reference resolves to a collection, an exception will be thrown.

See also:

"Examples of boolean expressions"

Examples of boolean expressions

The following examples show valid syntax that can be used in boolean expressions:

- `id.234.response.TCRMPersonBObj.PartyId = 454809`

  Tests if the PartyId of the TCRMPersonBObj object equals 454809. The TCRMPersonBObj object comes from the response that has a correlator ID 234.

- `id.444.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].LastName = 'Smith'`

  Tests if the LastName equals ″Smith″. The LastName is from the TCRMPersonNameBObj object where the NameUsageType equals 1. The TCRMPersonBObj object comes from the response that has a correlator ID 444.

- `id.900.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].GivenNameTwo = null`

  Tests if the TCRMPersonNameBObj object where the NameUsageType is 1 has no GivenNameTwo. The TCRMPersonBObj object comes from the response that has a correlator ID 900.

- `id.333.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].LastName = 'Smith' or id.444.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].LastName = 'Smith'`

  Tests if the LastName equals ″Smith″ in either of the TCRMPersonNameBObj objects, one coming from the response that has a correlator ID 333 and the other that has a correlator ID 444.

- `id.333.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].LastName = id.444.response.TCRMPersonBObj. TCRMPersonNameBObj[where NameUsageType = 1].LastName`

  Tests if the LastName from the TCRMPersonNameBObj object with the correlator ID 333 equals the LastName from the TCRMPersonNameBObj object with the correlator ID 444.
- `count(id.042.response.TCRMPersonBObj.TCRMPartyAddressBObj) > 1`

  Tests if the number of TCRMPartyAddressBObj object is greater than 1. The TCRMPersonBObj object comes from the response that has a correlator ID 042.

The following are some examples of invalid boolean expression, which will cause exception to be thrown either during parsing or transaction.

- `454809 = id.234.response.TCRMPersonBObj.PartyId`

  This example is syntactically incorrect because the left operand cannot be a literal. An exception will be thrown during parsing time.
- `id.333.response.TCRMPersonBObj.TCRMPersonNameBObj[where NameUsageType = 1].LastName = 'Smith' and GivenNameOne = 'John'`

  You may attempt to write such an expression to perform a logical ″and″ on the LastName and GivenNameOne of the same TCRMPersonNameBObj object. However, this example is syntactically incorrect because GivenNameOne is not qualified. An exception will be thrown during parsing time. If you do want to write such an expression, the GivenNameOne attribute name must be prefixed like the LastName attribute name.
- `id.234.response.TCRMPersonBObj.PartyId = TCRMPartyAddressBObj[where AddressUsageType = 1].PartyId`

  You may attempt to write such an expression to compare an attribute of a parent object — that is, TCRMPersonBObj.PartyId — with another attribute of a child object of the same parent object — that is, TCRMPersonBObj.TCRMPartyAddressBObj[where AddressUsageType = 1].PartyId. However, this example is syntactically incorrect because the right operand does not conform to the backward reference syntax. An exception will be thrown during parsing time. If you do want to write such an expression, the right operand must be prefixed with id.234.response.TCRMPersonBObj.
- `id.900.response.TCRMPersonBObj.TCRMPersonNameBObj = null`

  This example is syntactically correct and can be parsed successfully. However, the TCRMPersonBObj object returns zero or many instances of the TCRMPersonNameBObj objects, in a collection. At runtime, the collection cannot be operated on with the null keyword. Therefore, this example will throw an exception at transaction time. If you do want to test if no TCRMPersonNameBObj object is returned, you would write:
  `count(id.900.response.TCRMPersonBObj.TCRMPersonNameBObj) = 0`

Creating object-set expressions

An object-set expression is used in the `select` attribute of the `<for-each>` XML tag. The object-set expression should evaluate to a collection of objects. When the collection is returned, the content between the `<for-each>` and `</for-each>` XML tags will be iterated through as many times as there are objects in the collection.

The following object-set expression returns all the `TCRMPartyAddressBObj` objects in the `TCRMPersonBObj` object:

```
id.222.response.TCRMPersonBObj.TCRMPartyAddressBObj
```

The object-set expression is very similar to the backward reference format used in substitution expressions. The only difference is that the backward reference in an object-set expression must resolve to an object, and not an attribute of an object. If you are not familiar with substitution expression and backward reference, refer to "Example: Substituting values from another Request or Response" on page 289 before continuing with this section.

See also:

"Examples of object-set expression"

Examples of object-set expression

The following examples show valid syntax that can be used in object-set expressions:

- `id.222.response.TCRMPersonSearchResultBObj`

  Loops through all the `TCRMPersonSearchResultBObj` objects from the response that has a correlator ID `222`.

- `id.333.TCRMPersonBObj.TCRMPartyAddressBObj[where AddressUsageType = 1].TCRMPartyLocationPrivPrefBObj`

  Loops through all the `TCRMPartyLocationPrivPrefBObj` objects from the `TCRMPartyAddressBObj` object where the `AddressUsageType` is `1`. The `TCRMPersonBObj` object comes from the response that has a correlator ID `333`.

- `id.111.request.TCRMPersonBObj.TCRMPartyAddressBObj[2].TCRMPartyLocationPrivPrefBObj`

  Loops through all the `TCRMPartyLocationPrivPrefBObj` objects from the third `TCRMPartyAddressBObj` object. The `TCRMPersonBObj` object comes from the response that has a correlator ID `111`.

- `id.111.request.TCRMPersonBObj.TCRMPartyAddressBObj.TCRMPartyLocationPrivPrefBObj`

  Loops through all the `TCRMPartyLocationPrivPrefBObj` objects from all the `TCRMPartyAddressBObj` objects in the `TCRMPersonBObj` object. The `TCRMPersonBObj` object comes from the response that has a correlator ID `111`.

The following are some examples of invalid object-set expression, which will cause exception to be thrown either during parsing or transaction:

- `id.234.response.TCRMPersonBObj.PartyId`

  This example is syntactically correct and can be parsed successfully. However, this expression resolves to an attribute name, and not an object. Therefore, this example will throw an exception at transaction time.

- `id.333.response.TCRMPersonBObj.TCRMPersonNameBObj[2]`

  This example is syntactically incorrect because an object-set expression cannot end with an index. This example will throw an exception at parsing time.

- `id.234.response.TCRMPersonBObj.TCRMFinancialProfileBObj`

  This example is syntactically correct and can be parsed successfully. However, the `TCRMPersonBObj` object can have zero or one instance of `TCRMFinancialProfileBObj` object; the `TCRMFinancialProfileBObj` does not exist as a collection under the `TCRMPersonBObj` object. Therefore, this example will throw an exception at transaction time.

Configuring the composite XML transaction

As you see in "Understanding composite XML transaction syntax" on page 286, a composite request and response adhere to a predefined format, which can be considered as a grouping of TCRMService requests/responses or DWLAdminService requests/responses. Following the Request Framework (see Chapter 24, "Configuring the Request and Response Framework," on page 269), you need to configure a parser that knows how to parse the composite request and a constructor that knows how to construct a composite response. You also need to configure the BTM (Business Transaction Manager) to handle the composite transaction object after parsing in order for the BTM to forward the object to IBM InfoSphere Master Data Management Server for execution. These configurations are already set up for you in the product, but it is worth mentioning in this section for your reference.

Understanding the parser and constructor configuration

The parser and constructor for composite transactions are set up in the `DWLCommon_extension.properties` file.

- `CompositeParser.tcrm.DWLService=com.dwl.tcrm.coreParty.composite.impl.XMLCompositeParserImpl`

  This property points to the composite parser that the Request Framework uses to parse composite XML request for TCRMService (where the target application is `tcrm`).
- `CompositeConstructor.tcrm.DWLService=com.dwl.tcrm.coreParty.composite.impl.XMLCompositeResponseConstructorImpl`

  This property points to the composite response constructor that the Request Framework uses to construct composite XML response for TCRMService (where the target application is `tcrm`).
- `CompositeParser.DWLAdminService.DWLService=com.dwl.base.admin.xml.composite.DWLAdminXMLCompositeParserImpl`

  This property points to the composite parser that the Request Framework uses to parse composite XML request for DWLAdminService (where the target application is `DWLAdminService`).
- `CompositeConstructor.DWLAdminService.DWLService=com.dwl.base.admin.xml.composite.DWLAdminXMLCompositeResponseConstructorImpl`

  This property points to the composite response constructor that the Request Framework uses to construct composite XML response for DWLAdminService, where the target application is `DWLAdminServic`).
- The values for these properties refer to the implementation parsers and constructors that are provided with the product. Refer to the javadoc for additional details about these implementation classes.

Understanding the Business Transaction Manager configuration

The Business Transaction Manager (BTM) handlers that handle the composite transaction object are set up in the `TxManager.properties` file.

- `com.dwl.base.requestHandler.composite.IDWLRequestBObj=com.dwl.base.composite.txn.CompositeHandlerImpl`

  The property name is the type name of the object that is created after parsing. In this case, it is the interface name of the composite request object. The value of this property points to the BTM request handler implementation class provided with the product.

- `com.dwl.base.requestHandler.composite.IDWLRequestBObj_response= com.dwl.base.composite.txn.CompositeResponseHandlerImpl`

  The property name is the type name of the object that is created after parsing, followed by "`_response`". The "`_response`" suffix indicates the use of a response handler in the BTM. The response handler allows you to iterate through two or more single transactions, within the same unit of work. The value of this property points to the BTM response handler implementation class provided with the product.

The use of a response handler is configured in conjunction with a delegate lookup. The delegate lookup in the BTM provides the mechanism for "chaining" the responses, within the same unit of work. The delegate lookup is set up in the `DelegateLookup.properties` file.

- `CompositeTxn=com.dwl.base.composite.txn.CompositeDelegateImpl`

  The property name is the transaction name to which the response handler applies. In the Composite Transaction framework, a generic transaction name `CompositeTxn` is used to indicate all composite transactions. The value of this property points to the implementation class for the delegate lookup provided with the product.

Refer to the Javadoc for additional details about these implementation classes.

Understanding requirements for submitting composite XML transactions

Submitting a composite XML transaction is no different than submitting any single transaction in InfoSphere MDM Server through the `processRequest()` method in the `DWLServiceController` session bean:

```
processRequest(HashMap context, Serializable request)
```

In order to have InfoSphere MDM Server look up the correct parser and constructor as described in Chapter 24, "Configuring the Request and Response Framework," on page 269, you need to use key/value pairs that are specific to composite transactions in the context argument. For example:

```
HashMap context = new HashMap();
context.put("TargetApplication", "tcrm");
context.put("RequestType", "standard");
context.put("ResponseType", "standard");
context.put("CompositeTxn", "yes");
context.put("CompositeParser", "DWLService");
context.put("CompositeConstructor", "DWLService");
context.put("OperationType", "all");
context.put("requesterName", "cusadmin");
context.put("requesterLanguage", "100");
```

The key/value pairs that are essential for submitting a composite transaction are as follows:

- The `TargetApplication` key must have a value of `tcrm` or `DWLAdminService`, depending on the application.
- The `CompositeTxn` key must have a value of `yes`. If this value is set to `no` or this key is missing, the transaction is not processed as a composite transaction.
- The `CompositeParser` key has a value of `DWLService`, in order to look up the parser implementation class defined by the `CompositeParser.<TargetApplication>.DWLService` property in the `DWLCommon_extension.properties` file.

- The CompositeConstructor key has a value of DWLService, in order to look up the constructor implementation class defined by the CompositeConstructor.<TargetApplication>.DWLService property in the DWLCommon_extension.properties file.

Understanding requirements for customizing the composite response

The product provides two response constructors, one for application tcrm and the other for DWLAdminService; see Chapter 24, "Configuring the Request and Response Framework," on page 269. These constructors append every single response in the composite XML response and put them under a root tag.

These two constructors extend the AbstractCompositeResponseConstructor class. If you want to customize your own response constructor, you should create your constructor by extending the AbstractCompositeResponseConstructor class. You may consider customizing your own response constructor if you want to use a different root tag for the individual response or the composite response, or if you want to validate the composite response against another DTD or schema.

The AbstractCompositeResponseConstructor class contains several abstract methods that you need to override:

- setApplicationName()—Calls the setApplicationName(String) method to override the application name of the individual response.
- setTxnResponseRoot()—Calls the setTxnResponseRoot(String) method to override the root tag of the individual response.
- modifyXMLHeader(XMLHeader)—Calls the setter methods of the XMLHeader argument to override attributes—for example, the root tag, DTD/schema—of the XMLHeader argument. The XMLHeader object provides callback methods for the AbstractCompositeResponseConstructor class to call when constructing the composite response.

To use your customized constructor, follow the instructions in Chapter 24, "Configuring the Request and Response Framework," on page 269 to add a property in the DWLCommon_extension.properties file, and the instructions in "Understanding requirements for submitting composite XML transactions" on page 305 to set the CompositeConstructor key in the context when submitting the composite request.

Chapter 27. Understanding the response publisher

The InfoSphere MDM Server response publisher component integrates with other enterprise applications or integration products such as WebSphere Business Integration. The Request and Response Framework can publish a transaction response to a JMS queue before returning it to the caller.

In this section, you will learn:

"Understanding the response publisher and extension framework"

Understanding the response publisher and extension framework

The response publisher functionality is implemented using the extension framework. The extension can be configured to execute on various conditions; these conditions are driven by the input context parameters passed in with the transaction. By default this extension is turned off.

See also:

"To enable the extension framework for the response publisher transaction"

"To publish a transaction" on page 308

To enable the extension framework for the response publisher transaction

1. Run the following SQL statement:

   ```
   UPDATE EXTENSIONSET SET INACTIVE_IND = 'N'
   ```

   where `JAVA_CLASS_NAME = 'com.dwl.base.integration.DWLResponsePublisher'`

   This SQL enables the response publisher Java extension for the following predefined transactions:

   - addContract
   - addPerson
   - getContract,
   - getPerson
   - searchPerson
   - updateContract

   Note: The response publisher is not restricted to the six predefined transactions. You can enable another transaction to be published.

2. Restart the application server where InfoSphere MDM Server is deployed, so that the SQL update takes effect.

   Once activated the Java extension publishes the response based on the following conditions in the context parameters:

   - Transaction_Type with a value of P. Possible values for transaction type can be P (Persistant transactions), I (Inquiry transactions), S (Search transactions).
   - Transaction_Name with a value of addContract, or any of the defined transactions in the database.
   - TargetApplication with a value of tcrm.
   - Constructor with a value of TCRMService.

These conditions can be customized to meet your requirements. For example, it is possible to configure the extension to publish all transactions based on only the value of TargetApplication. See Chapter 2, “Customizing InfoSphere MDM Server,” on page 17 for more details on how to configure extensions.

3. Ensure that a queue is configured within your JMS provider and that the queue is bound to the default JNDI name before using the response publisher.

   By default, the Java extension publishes the response to a JMS queue. The default JNDI names used by the Java extension are as follows:

   - Queue Connection Factory=com/dwl/integration/QueueConnectionFactory
   - Queue=com/dwl/integration/IntegrationQueue

To publish a transaction

1. Modify and run the following SQL statements accordingly:

```
INSERT INTO CDCONDITIONVALTP VALUES (<VAL_TP_PK1>,9,<P,I,or S>,'transaction type',
     CURRENT TIMESTAMP);
INSERT INTO CDCONDITIONVALTP VALUES (<VAL_TP_PK2 >,15,'<transaction_name>',
     'transaction name',CURRENT TIMESTAMP);
INSERT INTO CDCONDITIONVALTP VALUES (<VAL_TP_PK3 >,13,'tcrm','application name',
     CURRENT TIMESTAMP);
INSERT INTO CDCONDITIONVALTP VALUES (<VAL_TP_PK3 >,14,'TCRMService','reponse
     constructor name',CURRENT TIMESTAMP);
INSERT INTO EXTENSIONSET VALUES (<EXTENSIONSET_PK>,'for transaction
     <transaction_name>','extension to publish response objects',
     'com.dwl.base.integration.DWLResponsePublisher',null,1,'Y',4,'N',1,CURRENT
     TIMESTAMP,'user defined');
INSERT INTO EXTSETCONDVAL VALUES (<CONDVAL_PK1>,< VAL_TP_PK1>,<EXTENSIONSET_PK>,
     CURRENT TIMESTAMP,null);
INSERT INTO EXTSETCONDVAL VALUES (<CONDVAL_PK2>,< VAL_TP_PK2>,<EXTENSIONSET_PK>,
     CURRENT TIMESTAMP,null);
INSERT INTO EXTSETCONDVAL VALUES (<CONDVAL_PK3>,< VAL_TP_PK3>,<EXTENSIONSET_PK>,
     CURRENT TIMESTAMP,null);
INSERT INTO EXTSETCONDVAL VALUES (<CONDVAL_PK4>,< VAL_TP_PK4>,<EXTENSIONSET_PK>,
     CURRENT TIMESTAMP,null);
```

2. Write extensions to perform other operations if necessary.

Chapter 28. Understanding batch transaction processing

There are two ways to perform batch transaction processing.

Based on your implementation, you can use either InfoSphere MDM Server J2SE Batch processor framework, or the InfoSphere MDM Server WebSphere Extended Deployment batch framework, if you use WebSphere Application Server. The InfoSphere MDM Server WebSphere Extended Deployment batch framework is a feature in InfoSphere MDM Server.

The J2SE Batch processor framework is a J2SE client application. You can use this framework to run transactions in a batch mode or to build custom batch jobs.

The InfoSphere MDM Server WebSphere Extended Deployment batch framework includes a Long Running Execution Environment (LREE) and a batch application framework. The batch application runs within the LREE, which itself is a J2EE enterprise application. You can use this framework to run batch jobs.

InfoSphere MDM Server J2SE Batch Processor framework

- The InfoSphere MDM Server J2SE batch processor framework reads the batch input, delegates the call to the service interface for server-side processing, and writes the response to the batch output.
- Using this application, you can run transactions in a batch mode for default formatted input and output file and data, for example, line-delimited XML requests and responses. Using batch framework for this purpose involves preparing batch input and configuring various batch framework parameters.

InfoSphere MDM Server WebSphere Extended Deployment Batch framework

- Using the InfoSphere MDM Server WebSphere Extended Deployment Batch framework you can run existing transactions in a batch mode for ready-to-use input and output file and data formats; for example, line-delimited XML requests and responses. To run existing transactions in batch mode, you must prepare the batch input and the batch job, and configure various XJCL batch job parameters.
- You can also build custom batch jobs to run custom transactions, and to support custom input and output files and data formats. Custom transactions can use your additions or the composite transactions built using composite business proxies which run transactions internally. To build custom batch jobs, you need to write and deploy one or more Java plug-ins, in addition to preparing the batch input and batch job, and configuring various batch job parameters.

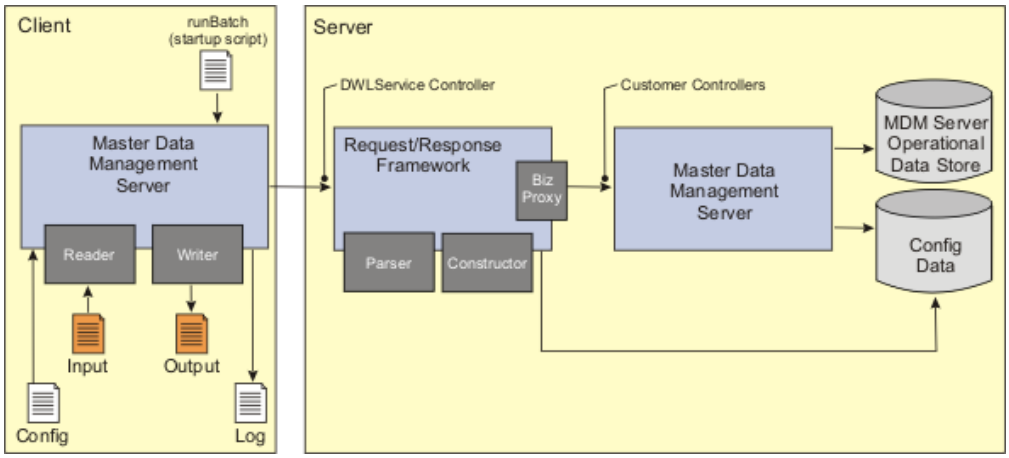
In this section, you will learn:

Understanding the InfoSphere MDM Server J2SE batch processor architecture

The batch processor is a multithreaded, long-running application that can process large volumes of batch data.

It can process multiple records from the same batch input simultaneously, and increase the throughput. Additionally, you can run multiple instances of the batch processor simultaneously, each one processing a separate batch input and pointing to the same server, or a different server.

The batch processor architecture diagram shows a high-level view of the batch processor application.



Each batch record in the batch input flows through the batch processor in the following sequence:

1. The reader consumer reads the record from the batch input. A pluggable reader is used to read each record. The reader distinguishes each record in the batch input. The reader does not dissect the record into fields; that is done by the parser. See the section on building custom batch jobs for information about developing a custom reader.
2. Once the record is read, the submitter consumer sends it to the Request/Response framework for parsing and processing. Selecting the parser is based on the values passed in the context parameter of the server request. The parser transforms the input request into one or more business objects. After passing through business proxy, business processing and persistence logic are applied to the business objects. The application responses are sent to the

constructor in order to construct the desired batch output response. Similar to the parser, selecting the constructor is based on the values passed in the context parameter of the server request. The constructed response is returned to the batch processor.

3. The pluggable writer consumer returns the response to the batch output destination.

The batch processor handles each record in its unit of work. In other words, it supports a checkpoint of one. You can define a threshold value to set the maximum number of allowed exceptions. If the number of exceptions reaches this threshold, the batch processor stops further processing of the current batch input and logs runtime messages to a log destination. These logs are useful for diagnosing and debugging issues. A number of runtime parameters are available for configuration. Properties files are used for this configuration. For more information on configuration option, see the section on running batch jobs.

Designing J2SE batch input and output

The batch processor application is not dependent on any specific batch input or output source or data format. Instead, it has externalized the components that perform reading, parsing, response construction, and writing tasks.

The batch processor is shipped with some pre-built readers and writers that can be used as is; these tools are described later in this section. The Request/Response framework also contains some parsers and constructors that can be used for a given batch job.

If the batch input and output structures can be handled by a combination of the pre-built readers, writers, parsers, and constructors, then you do not need to do develop any external components. For example, if the batch input is an XML data format where each line contains one XML request data and the expected output is also XML with each line containing one XML response data, then you can use the pre-built components to handle this input and output. However, if either the input or output structure, or both, cannot be handled with the available components, new pluggable components must be written. For more information, see the section on building custom batch jobs for more information.

The available reader and writers are:

- **File line reader**—This can be used to read the batch input from a file where each line in the file represents one record. This reader is implemented by the com.dwl.batchframework.queue.FileReaderQueue class.
- **File line writer**—This writer writes the output to an output file with each batch record on a separate line. This writer is implemented by the com.dwl.batchframework.queue.FileWriterQueue class.
- **Chained file writer**—This writer writes the output to one or more output files. The number of output files to write to is configured using the `Writer.properties` file. The writer is implemented by the com.dwl.batchframework.queue.WriterChainedQueue class.
- **Extended file reader**—This reader is able to read a variety of XML requests that conform to the platform service request schemas such as TCRMService, DWLAdminService, DWLCompositeServiceRequest, or any XML request that is configurable via the properties file. In the process, the parser populates all configuration properties that are necessary to inform the server for the request parser, response constructor or target application. This reader is implemented by the com.ibm.mdm.batchframework.queue.XFileReaderQueue class. To use this

reader, in addition to the usual property definitions, a property TxTokens with the value of the top level element of the XML request (that is, TCRMService, DWLAdminService, or DWLCompositeServiceRequest) must be included in the `batch_extension.properties` file. Here is an example: `ParseAndExecConfiguration.TxTokens=TCRMService`. The value of the TxTokens field can not be used anywhere in the body of the request XML. Default namespace XML files are supported, but DTD files are not.

For more information on available parsers and constructors, see the section on configuring the Request/Response framework.

Running J2SE Batch Processor batch jobs

A batch startup script is provided within the Batch Processor distribution. The script is named `runbatch.sh` within the `bin` folder. Depending on where the application server files are installed, some script variables must be set—see the script for more details.

The following parameters are passed to the `runbatch` script. These are positional parameters and must be passed in this sequence:

- **Input URL**—Mandatory parameter. The Input URL points to the batch input source. For file-based input, this is the absolute or relative path along with file name of the input file.
- **Output URL**—Mandatory parameter. The Output URL points to the batch output destination. For file-based input, this is absolute or relative path along with file name of the output file.
- **Batch Extension Properties file**—Optional parameter. Name of the extension batch properties file, which contains additional batch configurations.

Once started, the Batch Processor starts processing the batch records by reading them from the specified input, dispatching them for server-side processing and then writing the response into the specified output.

Note: If multiple instances of processors are used, the sequence in which records are processed is not guaranteed, and the output records may not be in the same order as the input records. If batch records must be processed in the order specified by the batch input, you must set the number of consumer instances to 1 for all consumers.

Once the Batch Processor has read all of the input records and has written their corresponding results to the output, the Batch Processor terminates. On termination, the status displays the number of records processed, and the time it took to process the batch is shown in milliseconds

Configuring the J2SE batch processor

You must configure the batch processor on both the client-side and server-side.

On the client-side, there are configuration options for readers, writer, server connectivity, throughput control, logging and others. On the server-side you must configure the parsers, constructors, business proxy, and other settings.

The following properties files are used to configure the batch processor's client-side.

Batch.properties

Contains some of the core configuration options for the batch processor.

```
#---------------------------------------------------------
# Application setting
# Maximum number of business application exceptions allowed
# Examples are party not found or parser error.
# Value of -1 implies ignore any exceptions
#---------------------------------------------------------
MaxExceptionsAllowed = -1

#---------------------------------------------------------
# Memory monitoring configuration
# Application monitors memory and suspends reading from
# input if free memory drops too low.
# suspendReadOnMemory is percentage of JVM memory such that
# when free memory falls below this percentage, reader is suspended.
# resumeReadOnMemory is percentage of JVM memory such that a
# suspended reader is resumed once free memory exceeds this limit.
# suspendDuration is time in ms to nap when low memory detected.
# After this time, memory is checked again and we either
# resume or sleep again.
#---------------------------------------------------------
suspendDuration = 200
suspendReadOnMemory = 10
resumeReadOnMemory = 15

#---------------------------------------------------------
# If deadlocks are occuring, this value may be used to randomize
# the order that records from the input are passed on for
# processing. Each block of 'x' records are read from input
# as a group, then passed on in random order. Only blocks
# of records are randomized on the assumption that all 'x'
# records will be completed before starting to process the
# next record. Set to 0 or less to disable randomization.
#---------------------------------------------------------
randomizedWindowSize = 0

#---------------------------------------------------------
# deadlockRetryErrorCodes contains a comma-separated list of
# error codes that should be considered as indicative of a
# deadlock situation on the server. If any of these errors
# are returned from the server, retry the request. The maximum
# number of retries are set by deadlockMaxRetries. Set the
# list to an empty list or retries to 0 or less to disable
# retries.
# When specify the error codes in deadlockRetryErrorCodes,
# they should be unique strings of indication for the errors
# happened in the transaction.
# In some cases where possible, wrap the error codes with
# XML Tags as whole strings.
#
#---------------------------------------------------------
deadlockRetryErrorCodes =
deadlockMaxRetries = 0

#---------------------------------------------------------
# Settings to automatically adjust consumer counts to maintain
# a desired throughput, or to periodically report the
# throughput.
# To use either auto-adjust or reporting, you must set
# throughputSampleTime. This is a time (in seconds). Once
# every x seconds (x=throughputSampleTime), various measurements
# are taken of the application performance.
# Auto-adjust:
# maximumThroughput set desired maxium processing records number per minute, only advance user
# is encouraged to set it a positive value:
# set -1 to disable auto adjust
# set 0 to let the auto adjust process to reach maxium throughput within system's capacity
# set positive value N: if N < maxium throughput then auto adjust process will
# try to reach throughput N but not beyond it; if N >= maxium throughput then auto adjust process
# will try to reach maxium throughput.
#  Auto-adjust also requires that the 'Processors'
# setting below has exactly 3 entries: a reader, a submitter,
# and a writer. The number of 'submitter' consumers is adjusted
# to affect throughput. Throughput is averaged over a sliding
# time scale, looking at average performance over the period
# of time in throughputWindowSize (minutes).
# throughputWindowSize*15 must be greater than the value
# of throughputSampleTime (eg, throughputSampleTime=2 (s) and
# throughputWindowSize=2 (min) would be fine). This is
# required so that there are enough performance samples taken
# to get a reasonable average throughput.
# Reporting:
# throughputReportingPeriod is the time in minutes between
# reporting average throughput. Throughput is reported in
# records per minute, averaged over the reporting period.
# Reporting does not depend on the number of entries in
# 'Processors'. Set to -1 to disable reporting.
# The auto-adjust feature does not require reporting in order
# to function, and reporting does not require auto-adjust to
# be enabled.
#---------------------------------------------------------
maximumThroughput = -1
throughputSampleTime = -1
throughputWindowSize = -1
throughputReportingPeriod = -1

#---------------------------------------------------------
# Server setting
```

```
# timeout is in seconds, 0 is infinite, default is 5 minutes
#-------------------------------------------------------------
ServerConfiguration.provider_url = <PROVIDER_URL>
ServerConfiguration.jndi_prefix =
ServerConfiguration.timeout = 0
#ServerConfiguration.context_factory = com.ibm.websphere.naming.WsnInitialContextFactory
ServerConfiguration.context_factory = <CTX_FACTORY>



#-------------------------------------------------------------
# If remote call fails (i.e RemoteException) specify below
# number of maximum number of retries to attempt and the time interval
# between. This exception is considered critical and will
# halt further processing
# Typical values:
#   MaxTries = 1
#   RetryDelay = 5000 ms (i.e 5 seconds)
#-------------------------------------------------------------
ServerConfiguration.MaxTries = 1
ServerConfiguration.RetryDelay = 5000

#-------------------------------------------------------------
# MULTI INSTANCE NAME (JNDI)
#
# This sepcifies the Customer instance name to reference to.
# Default values:
#   instance_name =
# - configure next line (if nec)
#-------------------------------------------------------------
ServerConfiguration.instance_name =

#Queue setting
ReaderQueue = com.dwl.batchframework.queue.FileReaderQueue
#ReaderQueue = com.ibm.mdm.batchframework.queue.XFileReaderQueue
#WriterQueue = com.dwl.batchframework.queue.FileWriterQueue
WriterQueue = com.dwl.batchframework.queue.WriterChainedQueue
TransitQueue = com.dwl.batchframework.queue.FIFOQueue

#Processor setting

#-------------------------------------------------------------
# Processor settings
#
# Processors - list of processors to create
#
# number - number of consumers to create for this processor
# classname - full classname of consumer for this processor
# prime - number of records required in in-queue
# startout - start out in ms. If less than one, will start out
# depending on prime setting only.
# processors are started either by prime or timeout setting,
# hence whichever comes first.
#-------------------------------------------------------------
Processors = Reader,Submitter,Writer

Reader.number = 1
Reader.classname = com.dwl.batchframework.consumers.ReaderConsumer

# Initial consumer number for submitter processor. Advanced user can make change,
# but number should not be greater than 100.
Submitter.number = 5
Submitter.classname = com.dwl.batchframework.consumers.ParseAndExecuteConsumer


Writer.number = 1
Writer.classname = com.dwl.batchframework.consumers.WriterConsumer

#-----------------------------------
#Input/Output Data file encoding
#-----------------------------------
com.dwl.batchframework.queue.FileReaderQueue.encoding=UTF-8
com.dwl.batchframework.queue.FileWriterChainedQueue.encoding = UTF-8
com.dwl.batchframework.queue.FileWriterQueue.encoding = UTF-8
com.dwl.batchframework.queue.QAWriter.encoding = UTF-8
com.ibm.mdm.batchframework.queue.XFileReaderQueue = UTF-8

##############################################################################################
#BatchProcessor's SuccessWriter ignores MDM success response and just print out BatchMessage
#messageID. It is unnecessary to set MDM success response to Writer Queue. It can cause
#MemoryUsage increase and memory leak.
##############################################################################################
setMDMSuccessResponseToQueue=false

##############################################################################################
#Use BatchProcessor to load multiple input data files.
#Define sif input data location,sif input data file names,and log file location
#Execute runbatch.sh without any argument
# e.g.
#SIF_INPUT_PATH=/usr/IBM/MDM/BAR_MDM850_12032008_1210_DB2_BE01/BatchProcessor/
#SIF_INPUT_FILE_NAMES=Party.sif,Contract.sif
#SIF_OUTPUT_PATH=/usr/IBM/MDM/BAR_MDM850_12032008_1210_DB2_BE01/BatchProcessor/logs
##############################################################################################
SIF_INPUT_PATH=<INPUT_DATA_FILE_LOCATION>
SIF_OUTPUT_PATH=<OUTPUT_LOG_FILE_LOCATION>
SIF_INPUT_FILE_NAMES=<DATA_FILE_NAMES>
```

Configuration options contained in this file belong to one of the following categories:

- Server connectivity parameters, the server URL, connection timeout and others
- Reader/Writer classes, the reader and writer classes to use for this batch job and the encoding scheme to use to read and write the files
- Throughput control parameters, which can be controlled by following properties:
  - Number of consumer instances, which controls the number of consumer thread to create for concurrent processing of the respective processing step
  - Memory monitoring configuration, which monitors memory and suspends reading from input if free memory drops too low, after free memory exceeds the setting limit, the reader is resumed.
  - Throughput auto adjustment, which controls the throughput in a range
  - Throughput reporting, which controls the reporting throughput
- Deadlocks Control configuration, which allows the user to specify a number of records to be read as a group, then passed on for processing in a random order. Also allows identifying deadlock-related error codes and a retry count. If server-side processing results in an error with one of the specified error codes, the transaction is retried up to the specified limit.
- Error threshold — Maximum number of errors allowed for a given batch run

batch_extension.properties
Contains parameters used by the batch processor to construct server-side context before calling the DWLService controller. These context parameters define the parser and constructor to be used for that request, among other settings.

log.propertiesDWLLog.properties, JDKLog.properties, and Log4J.properties
Configuration items to manage log destination and level of detail

For details on these options, see the properties file. For server-side configuration information, see the section on Chapter 24, "Configuring the Request and Response Framework," on page 269.

Managing J2SE batch throughput

Batch operators have a number of different options to increase their batch throughput. If a bottleneck occurs on the client side, use one or both of the following strategies:

- **Multiple Batch Processor application runtime instances**—This involves running two more Batch Processor applications simultaneously. Each application instance must work with a separate batch input and output; however they can share the same server-side application instance or operate against a dedicated instance.
- **Concurrent processing within a Batch Processor instance**— As mentioned before, Batch Processor is a multithreaded application that supports concurrent processing of batch records. The number of threads—consumer processes—can be configured in the Batch Processor configuration. In general, a higher number of threads yields a higher throughput up to a certain limit. This limit is usually defined by a number of factors including physical resources—such as CPU, disk and memory on the client—or the server-side machine—complexity and size of the request being processed and so on. Batch developers and operators should

test and tune throughput parameters to suite their environment to optimize throughput. Since different consumer processes take different processing times, the pacing option is available. Pacing enables you to slow down the upstream processes if the downstream processes take too long to finish. This way, the intermediate queues to hold the records do not fill-up and cause memory or other runtime exceptions.

If the bottleneck is on the server-side, then servers can be scaled to meet the throughput requirements. You can either:

- Increase the physical resources for the given server instance
- Add more server instances to create a cluster.

Reviewing J2SE errors and logs

If the server application returns an error, it is recorded in the batch output. If the number of errors exceeds the maximum number of allowed errors, the batch run is terminated.

Additionally diagnostic and debugging messages are logged into the log destination. This is configured in the `log.propertiesDWLLog.properties`, `JDKLog.properties`, and `Log4J.properties` files.

Building custom batch jobs for the J2SE Batch Processor framework

You can build custom batch jobs, in conjunction with the Request/Response and Extension framework.

Building custom batch jobs are a good option when:

- The required batch input or output is not supported by the default components. You can build one, all, or a combination of reader, writer, parser and constructor components. Depending on your requirements, some pre-built components can be used with the ones you develop for your requirements. For more information see the sections on:
  - Configuring the Request/Response Framework for information on developing a custom parser and constructor
  - Developing custom reader components
  - Developing custom writer components
- The available transactions do not meet the requirements for the batch transaction, The batch processor does not prescribe or depend on any specific back-end transaction. If the back-end does not support the transaction required by the batch job, you can develop a custom transaction. You can either:
  - Write an addition transaction using the extension framework provided in DWL common services
  - Write a custom business proxy, a composite business proxy
  - Write both, using existing back-end transactions internally

Each of these extension mechanisms are defined in their respective section of the Developers Guide.

Developing custom reader components

The reader component of the batch processor reads the batch input and returns it one record at a time. The batch processor does not depend on any specific batch

input; instead it relies on the reader to read the input by passing it the input URL as passed from the command line arguments.

Any reader running within the batch processor implements the com.dwl.batchframework.interfaces.IQueue interface. For more information on this interface and its methods, see the Javadoc API.

Once the reader has been initialized, the batch processor invokes the Remove method on the reader to remove one message from the read queue (the batch input) and return it for subsequent processing.

The new reader implementation class must be configured into the batch processor by setting the ReaderQueue property in the `Batch.properties` file.

Developing custom writer components

Similar to the way it uses a reader component, the batch processor delegates the call to a writer component for writing the batch output. New writers can be developed by implementing the com.dwl.batchframework.interfaces.IQueue interface and setting the implementation class name as the value for WriterQueue property in the `Batch.properties` file.

The IQueue interface, implemented by the reader and writer classes uses com.dwl.batchframework.interfaces.IMessage interface to represent individual record data. A default implementation of the IMessage interface (com.dwl.batchframework.queue.BatchMessage) is provided in the batch processor. You can use this default implementation in your custom reader and writer classes or you can build a new IMessage implementation.

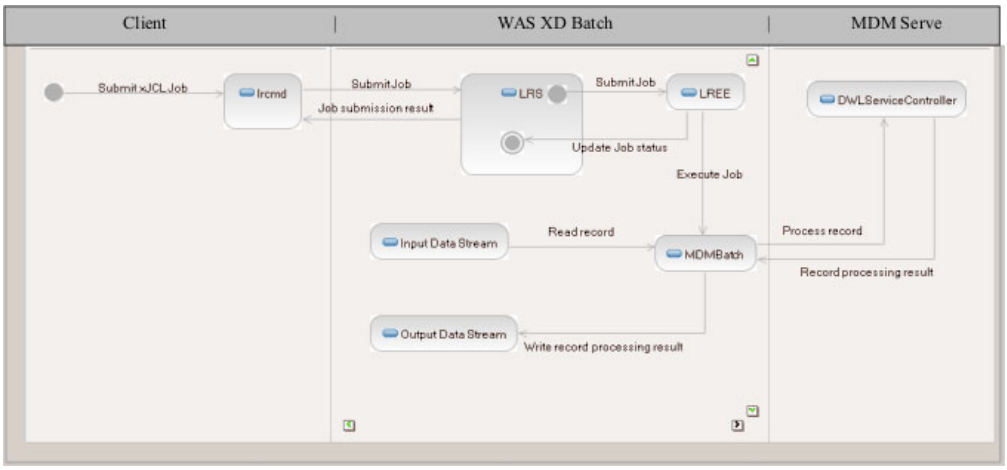
Understanding the InfoSphere MDM Server WebSphere Extended Deployment Batch architecture

WebSphere Extended Deployment Batch is a long-running batch application that can process large volumes of batch data. Because it can process multiple batch jobs, it is able to process multiple records from multiple batch inputs simultaneously, increasing the throughput.

InfoSphere MDM Server WebSphere Extended Deployment Batch is a J2EE client application that:

- Runs within the InfoSphere MDM Server WebSphere Extended Deployment batch framework
- Reads the batch input
- Delegates calls to the Request/Response framework for server-side processing
- Writes the response to the batch output

The InfoSphere MDM Server WebSphere Extended Deployment Batch architecture diagram shows a high-level view of the InfoSphere MDM Server WebSphere Extended Deployment Batch application.



Each batch record in the batch input flows through InfoSphere MDM Server WebSphere Extended Deployment Batch in the following sequence:

1. Submit the XJCL job to InfoSphere MDM Server WebSphere Extended Deployment. This can be done using the Compute Grid Job management console through a web browser or using the `lrcmd` command line tool. Refer to the InfoSphere MDM Server WebSphere Extended Deployment product documentation for more information.
2. Each record from the batch input is read by the stream implemented within the InfoSphere MDM Server WebSphere Extended Deployment Batch application. The stream distinguishes each record in the batch input, then loads and processes the records in the InfoSphere MDM Server WebSphere Extended Deployment Batch sequentially.
3. The InfoSphere MDM Server WebSphere Extended Deployment Batch application then submits the records for business processing. After the business and persistence logic is applied, the InfoSphere MDM Server WebSphere Extended Deployment Batch application receives the response.
4. Finally, the response is written to the batch output destination by the output batch data stream.

The InfoSphere MDM Server WebSphere Extended Deployment Batch application handles each record in its unit of work. If an exception occurs during the processing of a record, InfoSphere MDM Server WebSphere Extended Deployment Batch stops further processing of the current batch input and logs runtime messages to a log destination. The logs can be used for diagnosing and debugging issues. At this point, the XJCL job fails; you can restart the job after you have fixed the problem that caused the failure to occur.

A number of runtime parameters are available for configuration. XJCL files are used for this configuration. See the section on “Creating XJCL for batch jobs” for more details on configuration options.

Creating XJCL for batch jobs

The InfoSphere MDM Server WebSphere Extended Deployment Batch application is driven by an XJCL batch job that defines the unit of work that has to be processed by the application. It specifies input, output and log batch data stream parameters.

The following is a template for the XJCL batch job. It can be used as the basis for creating a new XJCL batch job.

```
<?xml version="1.0" encoding="UTF-8"?>
<job name="MDMBatch" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
 <jndi-name>ejb/BatchJobStepController</jndi-name>
 <step-scheduling-criteria>
    <scheduling-mode>sequential</scheduling-mode>
 </step-scheduling-criteria>
 <checkpoint-algorithm name="recordbased">
      <classname>com.ibm.wsspi.batch.checkpointalgorithms.recordbased</classname>
      <props>
     <prop name="recordcount" value="<CHECKPOINT_RECORD_COUNT>" />
     <prop name="TransactionTimeOut" value="120" />
      </props>
 </checkpoint-algorithm>
 <job-step name="MDMBatchStep">
    <jndi-name>ejb/BatchJobStepProcessor</jndi-name>
    <checkpoint-algorithm-ref name="recordbased" />
    <batch-data-streams>
      <bds>
  <logical-name>input</logical-name>
  <impl-class>com.ibm.mdm.ws.batch.LineReaderBatchDataStream</impl-class>
  <props>
     <prop name="fileName" value="<INPUT_FILE_NAME>"/>
   <prop name="encoding" value="<INPUT_FILE_ENCODING>"/>
  </props>
      </bds>
      <bds>
  <logical-name>output</logical-name>
  <impl-class>com.ibm.mdm.ws.batch.LineWriterBatchDataStream</impl-class>
  <props>
     <prop name="fileName" value="<OUTPUT_FILE_NAME>"/>
     <prop name="encoding" value="<OUTPUT_FILE_ENCODING>"/>
  </props>
      </bds>
      <bds>
  <logical-name>log</logical-name>
  <impl-class>com.ibm.mdm.ws.batch.LogWriterBatchDataStream</impl-class>
  <props>
     <prop name="LoggerFactory" value="com.dwl.base.logging.DWLLog4jLoggerFactory"/>
     <prop name="log4j.appender.file.File" value="<LOG_FILE_NAME>"/>
     <prop name="log4j.appender.stdout" value="org.apache.log4j.ConsoleAppender"/>
     <prop name="log4j.appender.stdout.Threshold" value="<LOG_LEVEL>"/>
     <prop name="log4j.appender.stdout.layout" value="org.apache.log4j.PatternLayout"/>
     <prop name="log4j.appender.stdout.layout.ConversionPattern" value="%-5p %3x - %m%n"/>
     <prop name="log4j.appender.file" value="org.apache.log4j.RollingFileAppender"/>
     <prop name="log4j.appender.file.Encoding" value="<LOG_FILE_ENCODING>"/>
     <prop name="log4j.appender.file.Threshold" value="<LOG_LEVEL>"/>
     <prop name="log4j.appender.file.layout.ConversionPattern" value="%d %-5p %3x - %m%n"/>
     <prop name="log4j.appender.file.layout" value="org.apache.log4j.PatternLayout"/>
     <prop name="log4j.rootLogger" value="<LOG_LEVEL>, file, stdout"/>
  </props>
      </bds>
    </batch-data-streams>
    <props>
       <prop name="provider_url" value="iiop://<HOST_NAME>:<PORT>"/>
       <prop name="context_factory" value="com.ibm.websphere.naming.WsnInitialContextFactory"/>
       <prop name="userId" value="<USER_ID>"/>
       <prop name="password" value="<PASSWORD>"/>
       <prop name="Context.OperationType" value="All"/>
       <prop name="Context.requesterName" value="<REQUESTER_NAME>"/>
       <prop name="Context.requesterLanguage" value="<REQUESTER_LANGUAGE>"/>
       <prop name="Context.Parser" value="TCRMService"/>
       <prop name="Context.Constructor" value="TCRMService"/>
    </props>
 </job-step>
</job>
```

You need to replace all values enclosed in angle brackets, <>, with values that reflect your environment.

Another file reader can be used for enabling parsing of input files with transactions that contain line feeds in them. To use the reader, change the corresponding portion of the file above. The property `TxTokens` must specify the

top level element for the XML request, TCRMService, DWLAdminService, or DWLCompositeServiceRequest, as the case may be.

```
<bds>
 <logical-name>input</logical-name>
 <impl-class>com.ibm.mdm.ws.batch.MultiLineReaderBatchDataStream</impl-class>
 <props>
  <prop name="fileName" value="<INPUT_FILE_NAME>"/>
  <prop name="encoding" value="<INPUT_FILE_ENCODING>"/>
  <prop name="TxTokens" value="TCRMService"/>
 </props>
</bds>
```

Table 34. Parameters for XJCL batch job

Value	Description	Example
<CHECKPOINT_RECORD_COUNT>	Specifies the number of records that are processed before the checkpoint algorithm performs global transaction commit. In case of failure, the transaction will be rolled back until the last committed checkpoint.	1
<INPUT_FILE_NAME>	Location and name of the input file, containing records for processing.	C:/InputFolder/InputFile
<INPUT_FILE_ENCODING>	Character encoding of the input file.	UTF-8
<OUTPUT_FILE_NAME>	Location and name of the output file that will contain results of processing.	C:/OutputFolder/OutputFile
<OUTPUT_FILE_ENCODING>	Character encoding of the output file.	UTF-8
<LOG_FILE_NAME>	Location and name of the log file that will contain the log for the MDMBatch application.	C:/LogFolder/LogFile
<LOG_LEVEL>	MDMBatch application logging detail level.	WARN
<LOG_FILE_ENCODING>	Character encoding of the log file.	UTF-8
<HOST_NAME>	Host name of the server running InfoSphere MDM Server.	host.domain.com
<PORT>	Port number on which InfoSphere MDM Server is listening for requests.	2809
<USER_ID>	User ID for the secure connection to WebSphere Application Server if security is enabled. If security is not enabled on WebSphere Application Server, leave this value empty.	wasuser
<PASSWORD>	User password for the secure connection to WebSphere Application Server if security is enabled. If security is not enabled on WebSphere Application Server, leave this value empty.	wasuserpassword
<REQUESTER_NAME>	The user ID of the requester. The requester name is validated by the security service, and recorded when audit information, such as last update information, is captured.	cusadmin
<REQUESTER_LANGUAGE>	The MDM code identifier for the local of the requester; this locale is used for NLS.	100

A template for creating batch jobs can be found in *<MDM_INSTALL_HOME>*/MDMBatch/MDMBatch_template_xjcl.xml, where *<MDM_INSTALL_HOME>* is the location where InfoSphere MDM Server is installed.

For more details on XJCL batch jobs see the WebSphere Extended Deployment product documentation.

For more details on InfoSphere MDM Server, see the related InfoSphere MDM Server product documentation.

Running XJCL batch jobs

Once an XJCL batch job is created, along with its corresponding input file, it can be submitted to the Long Running Job Scheduler using either the Compute Grid Job Management Console or using the `lrcmd` command line tool.

For more information on the Compute Grid Job Management Console or the `lrcmd` command, refer to the WebSphere Extended Deployment product documentation.

Reviewing XJCL errors and logs

If the server returns an error while processing a record, the error is recorded in the batch output and the batch job is terminated.

The Long Running Execution Environment will indicate that the batch job failed and it will change the batch job's state to restartable. At this point, you can inspect the job logs to determine the reason for the failure. Once problem corrected, you can restart the batch job, continuing execution from the last committed checkpoint.

Building custom batch jobs for the InfoSphere MDM Server WebSphere Extended Deployment batch processor

The InfoSphere MDM Server WebSphere Extended Deployment batch processor framework supports custom batch job development, in conjunction with the Request/Response and Extension framework.

Two reasons to consider custom development are:

- **The required batch input or output is not supported by out-of-the-box components**.

  The solution to this scenario requires building one, all, or a combination of input batch data stream, output batch data stream, parser and constructor components. Depending on your requirements, some prebuilt components can be used with ones you develop for your requirements.

  See Chapter 24, "Configuring the Request and Response Framework," on page 269 for information on developing a custom parser and constructor.

- **The available transactions do not meet the requirements for the batch transaction**

  The InfoSphere MDM Server WebSphere Extended Deployment batch processor does not prescribe or depend on any specific back-end transaction. If the back-end does not support the transaction required by the batch job, to solve this scenario you must develop a custom transaction. This is done in one of two ways:

  – Write an addition transaction using the extension framework provided in the common services

  – Write a custom business proxy, a composite business proxy, or both, which use existing back-end transactions internally.

  Each of these extension mechanisms are defined in their respective sections in this guide. See Chapter 2, "Customizing InfoSphere MDM Server," on page 17 and Chapter 26, "Creating composite XML transactions," on page 285.

Chapter 29. Using and configuring Web Services

This section describes the use and configuration of the InfoSphere MDM Server Web Services.

The InfoSphere MDM Server Web Services feature exposes InfoSphere MDM Server functions through WS-I Basic Profile 1.0 compliant Web services. This is important in a diverse enterprise IT landscape because it allows for improved interoperability with other applications. In addition to that benefit, the extensive tools support for Web services allows developers to generate client code for a large number of platforms and languages based on the WSDL files that describe the Web services.

In this section, you will learn:

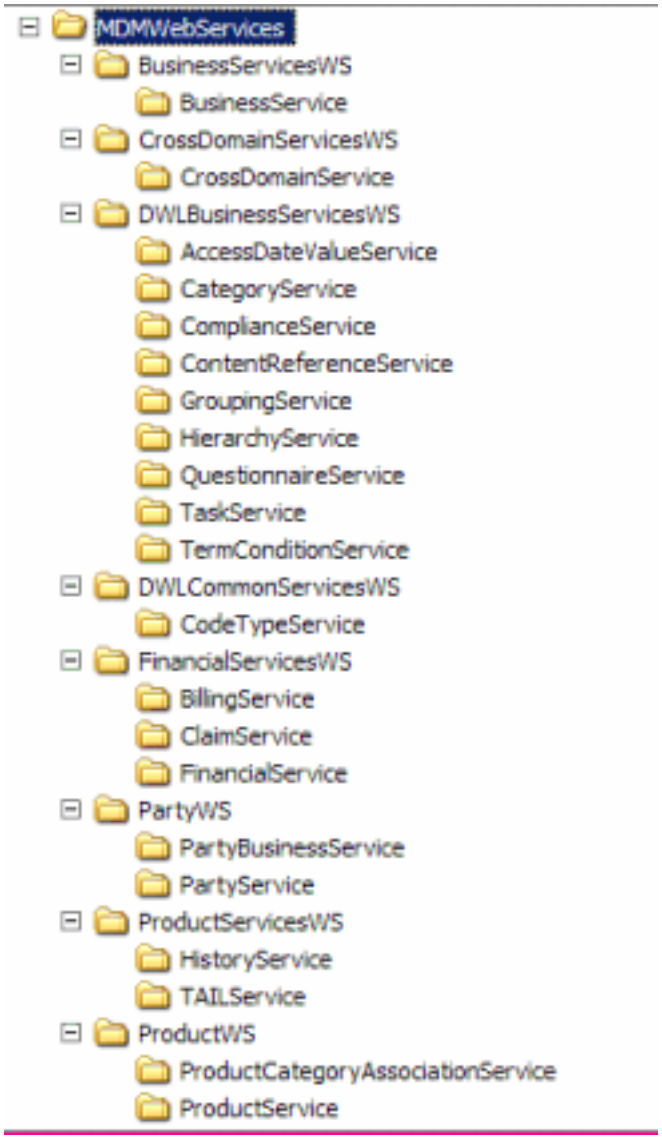
Understanding Web Services

InfoSphere MDM Server Web Services can be directly invoked by sending SOAP requests over HTTP(S) to the application server on which the enterprise application is deployed and running.

The structure of the SOAP requests and responses and that of the services themselves is described in WSDL files. These WSDL files can be obtained from the application server as soon as the enterprise application is deployed. WSDL files are also available in the EAR file in the `META-INF/wsdl` directories of the Web services EJB modules and in the samples package. These modules can be recognized by their names, which have a `WS` suffix. The WSDL files are also available in the sample package for convenience.

The WSDL files can be used to generate client code to access the Web Services programmatically. Depending on the type of client code that is generated, the caller may not even need to be aware of any SOAP or HTTP details; instead, it may only have to deal with constructs that are specific to the platform and language that the client code has been generated for.

Business functionality is made available through 21 Web services. These services' implementation is supported through eight EJB modules. All administrative services are not available through the Web services. The partitioning of the Web services in the EJB modules is shown in the diagram below:



The function on each Web service corresponds to a particular controller component and a finder component. For example, the function of the `PartyService` Web service matches directly the combined functions of `TCRMCorePartyTxn` and `TCRMCorePartyFinder`.

Understanding WSDL file structures

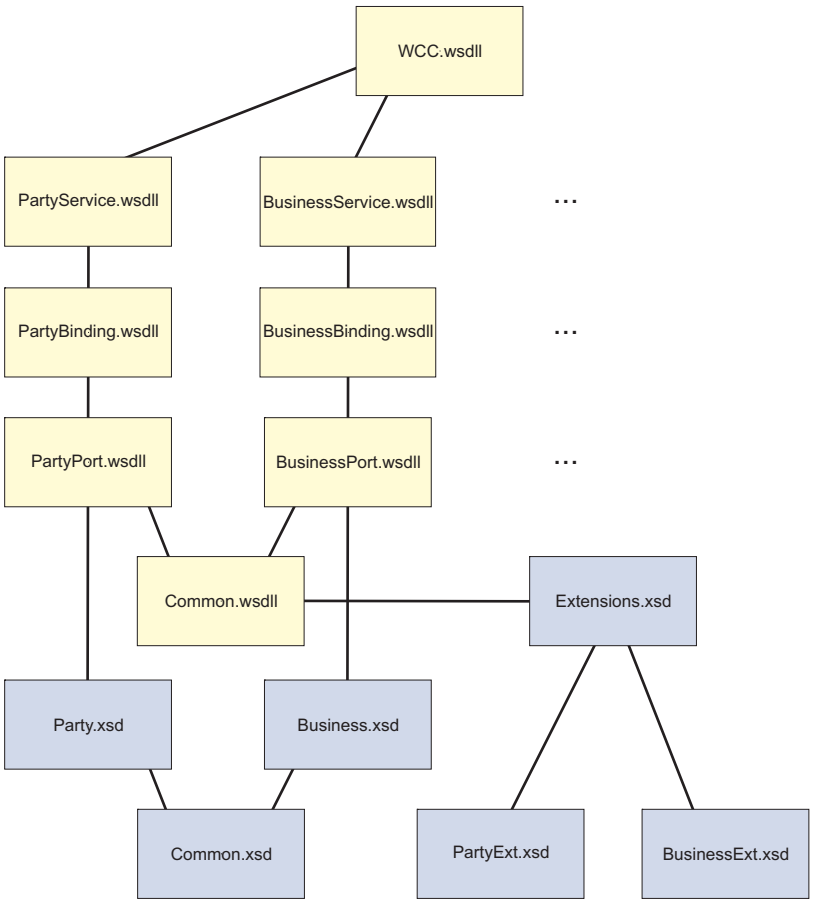
InfoSphere MDM Server Web Services are described by a series of WSDL and XSD files. The WSDL elements that describe the services are separated into various files based on their level of abstraction. Data type definitions are separated from service descriptions and placed into XSD files.

The files contain the following kinds of descriptions and definitions:

- <ServiceName>Service.wsdl contains the service endpoint address for the service named <ServiceName>. The WSDL files obtained from the application server reflect the actual endpoint address where the service is deployed.
- <ServiceName>Binding.wsdl contains the bindings of the service port to a particular messaging and transport protocol. For InfoSphere MDM Server, the default bindings are SOAP and HTTP(S). Other bindings (such as SOAP over JMS) use different file names. This file also describes the style and encoding of the service (which, in the case of InfoSphere MDM Server, is document-literal wrapped).
- <ServiceName>Port.wsdl contains the descriptions for the service's port in terms of its operations and their corresponding input/output messages.
- Common.wsdl contains descriptions of Web Service elements that are common and shared by multiple port descriptions,such as the base service fault.
- <ServiceName>.xsd contains the Data Transfer Object (TO) type definitions that are used in the description of the service's operations and messages.
- <ServiceName>Intf.xsd contains type definitions other than TOs, used in the description of the service's operations and messages.
- CommonIntf.xsd contains types that are commonly used by service interfaces, such as the Control type).
- Common.xsd contains types that are commonly used by the other types that are specific to particular services.
- xtensions.xsd used as an indirection mechanism to allow for schema definitions from different, solution-specific, namespaces to be used
- <ExtensionServiceName>.xsd (not delivered with the product) contains the type definitions that extend the data used by InfoSphere MDM Server or custom operations and messages. These are provided by solution implementations and they extend existing InfoSphere MDM Server types.

WSDL file relationships

The diagram below shows the relationships between the various files used to describe the Web Services.



The `Extensions.xsd` file as delivered contains no type definitions. InfoSphere MDM Server solution implementations can modify this file to import their particular data types (contained in XSD files). No type definitions should be placed directly inside `Extensions.xsd`. The diagram above shows an example of a solution that extends the data types used by both the Party and Business services.

InfoSphere MDM Server solution implementations must not modify any of the WSDL and XSD files provided with the product, except for the `Extensions.xsd` file.

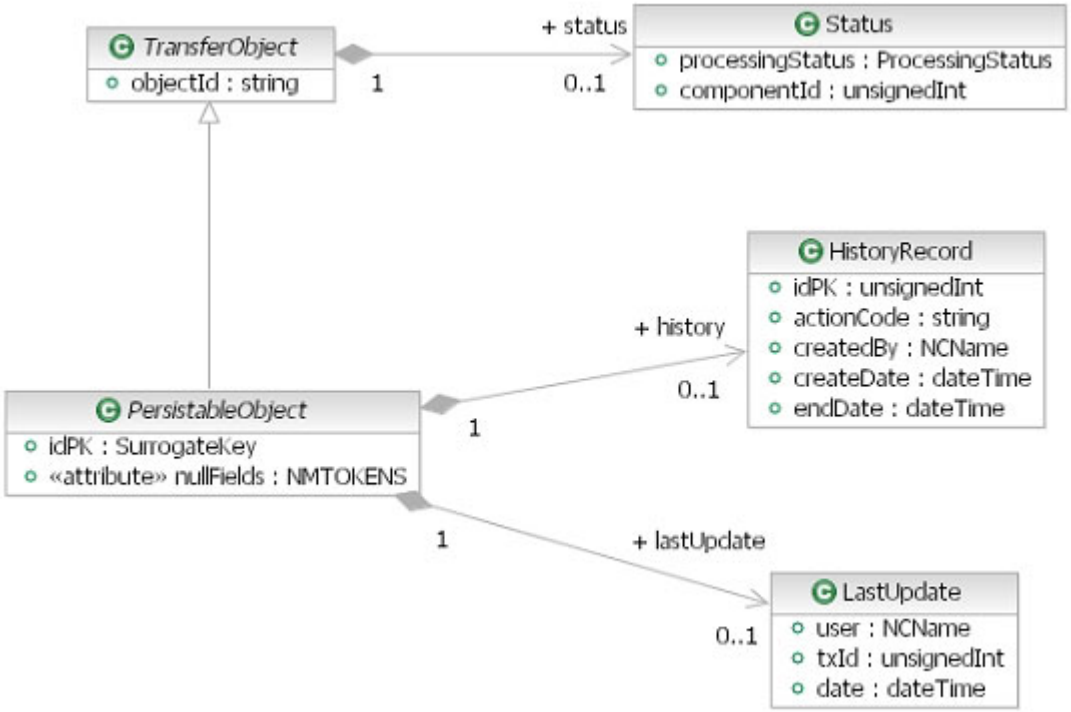
Understanding Web Services operations and data types

At the Web service operation level, there is typically a one-to-one equivalence between web services operations and native InfoSphere MDM Server transactions.

The names of web services operations and their parameters match those of InfoSphere MDM Server transactions. For more details on how web services relate to transactions, see the web services section of the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.

Web services data types are realized by both SOAP XML elements, in SOAP requests and responses, and by Java objects.

The diagram below shows some of the basic types used to describe the web services data types, the `TransferObject` and `PersistableObject`.



TransferObject

`TransferObject` is the base type of all the objects that are identifiable by means of a string value (objectId) in a request or response.

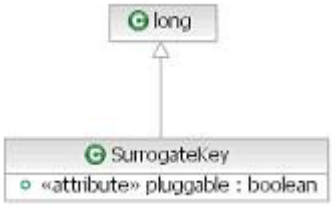
PersistableObject

All of the types that carry persistent data are subtypes of `PersistableObject`. Some of the features of `PersistableObject` are:

- Surrogate key to identify the entity and support the Pluggable Key feature.
- List of null fields to support the Nullable Fields feature.
- Last update date information related to user, transaction and date/time.
- Historical information regarding changes made to the entity.

The idPK element of type `SurrogateKey` is used to identify a persistent entity and also to provide support for the Pluggable Key feature. The idPK element contains the following information:

- A numeric value that is the surrogate primary key of the entity.
- A boolean flag that indicates whether the key is system-generated or provided by a third party system, also referred to as pluggable.



For example, when used with a pluggable key, the idPK element of a PersistableObject would be represented in a SOAP message as follows:

```
<idPK pluggable="true">12345678</idPK>
```

The nullFields element is a list of element names used to support the Nullable Fields feature. It lists those elements in the PersistableObject that must be nulled. It is considered an error if an element of a PersistableObject is listed as a null field in nullFields and at the same time appears in the PersistableObject.

For example, when used with a Person type to null the displayName, alertIndicator, and lastStatementDate fields in an updateParty SOAP message, it would be represented like this:

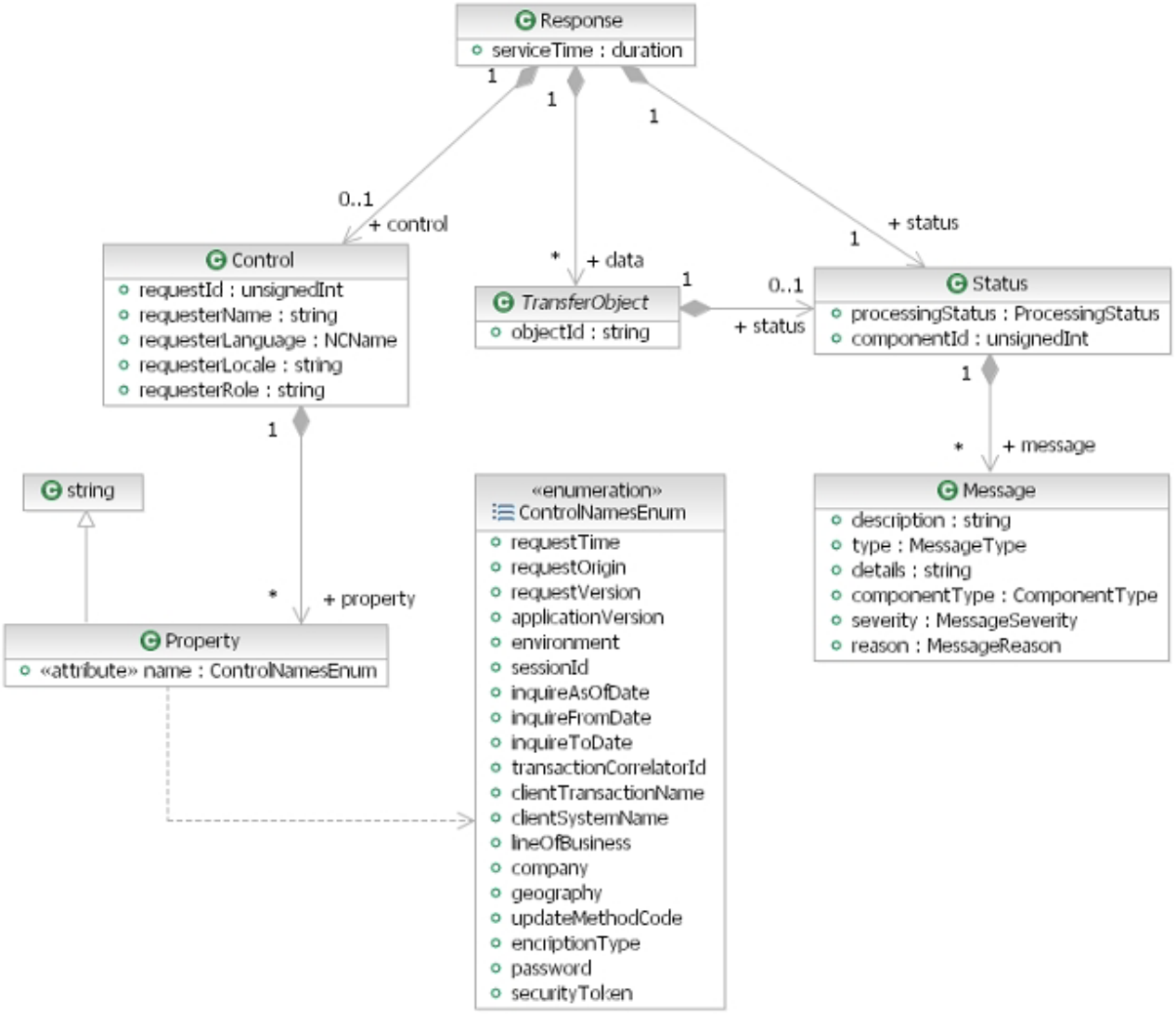
```
<party xsi:type="Person" nullFields="displayName alertIndicator lastStatementDate">
    ...
</party>
```

PersistableObjectWithTimeline

This is the base type for all types that carry persistent data and active within a specific time interval, as indicated by the startDate and endDate.

Response

The output from a web service invocation is wrapped in a response data type. As shown in the figure below, a response contains an instance of control, and an instance of status. The response type is an abstract type. Concrete types of response are defined depending on the actual data content. For example a PersonResponse type is defined as a subtype of response and contains one instance of person.



Control

The `Control` data type encapsulates transaction context information. It contains a set of built-in elements and can be extended to carry any user-specific information that is required as part of the transaction context. The `Property` data type can carry any name value pair. The predefined names are enumerated in `ControlNamesEnum`, which can be extended with user specific names.

The fragment below shows an example of an element of type `Control` with built-in elements and generic properties:

```
<control>
     <requestId>12345678</requestId>
     <requesterName>cusadmin</requesterName>
     <requesterLanguage>100</requesterLanguage>
     ...
     <property name="requestTime">2006-03-12T14:23:45Z</property>
     <property name="sessionId">AB-2132-90</property>
</control>
```

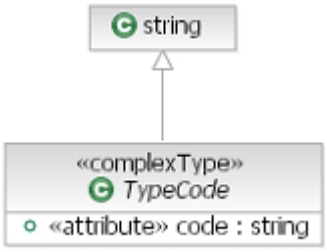
Status Either the response, or specific objects contained in the response can contain application processing status information. This information is

contained in the Status data type and it consists of a type code that indicates the status, the component that produced the status and any number of message instances.

Subtypes of TransferObject that have an associated status that is more specific than the Status type, use a subtype of Status as their status field. For example, the Party type has a status of type PartyStatus.

TypeCode

All type codes are represented as subtypes of the TypeCode type. Any type code data type consists of a string value and a string code.

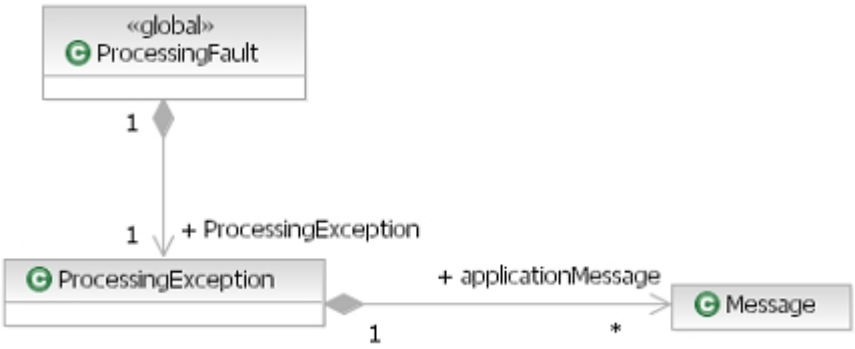


For example, the preferredLanguage element of the Party type is a type code of the type Language, and would be represented in a SOAP message as follows:

```
<preferredLanguage code="100">English</preferredLanguage>
```

ProcessingException

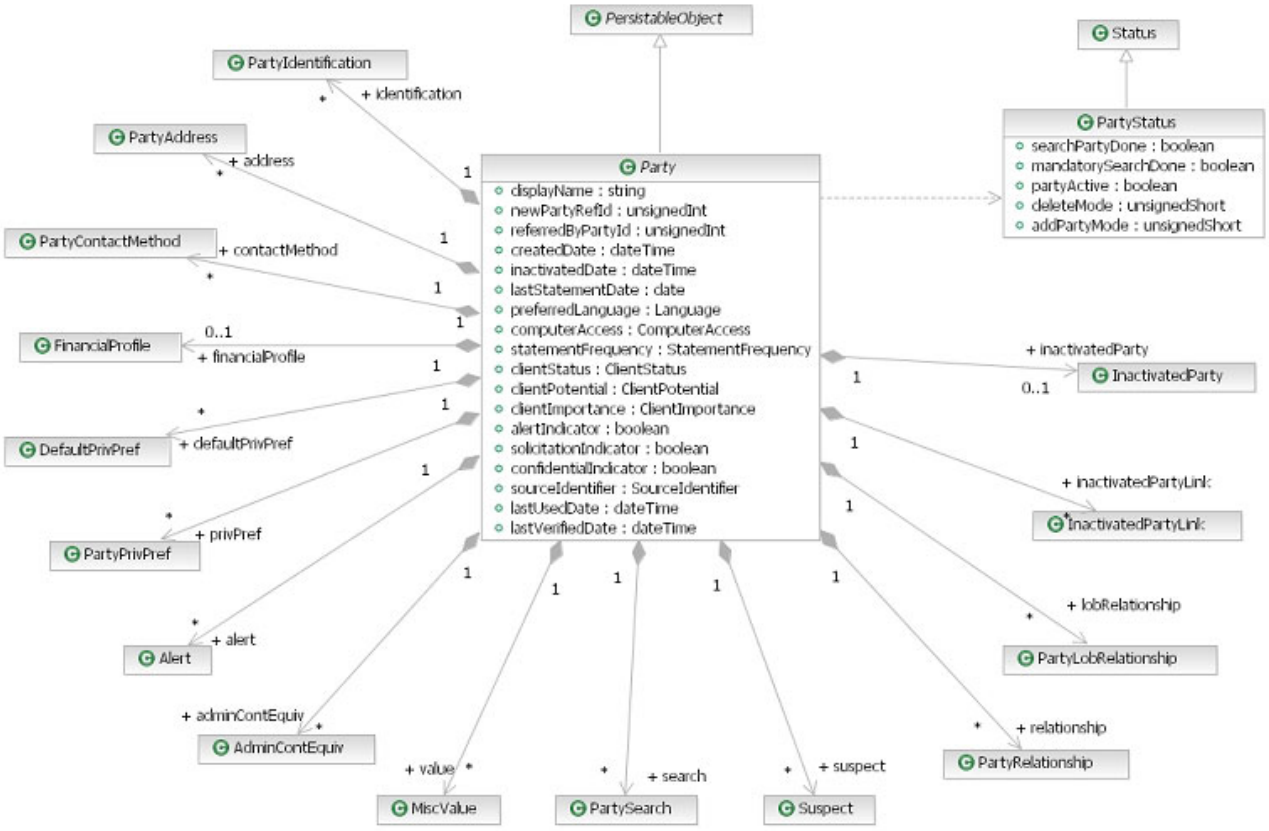
System and application errors result in a SOAP response that contains a ProcessingFault.



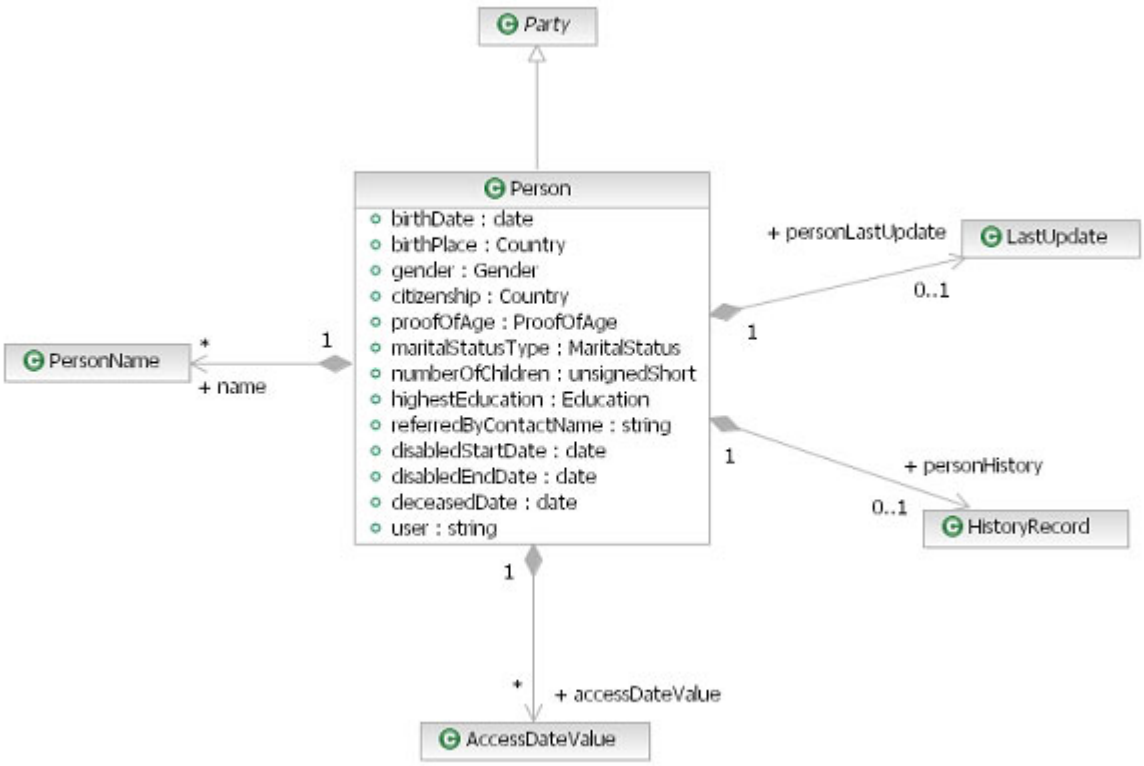
Party and Person

This is an example of how two of the web services data types are described in the XSD files and implemented in Java as data transfer objects.

Party is an abstract type and, therefore, no instances are possible. This is different from the XML, where instances of its equivalent type TCRMPartyBObj are possible.



The `Party` type only contains data that is related to the party entity. Information about processing of the party entity is separated into the status object associated with the entity's `TransferObject` base type.

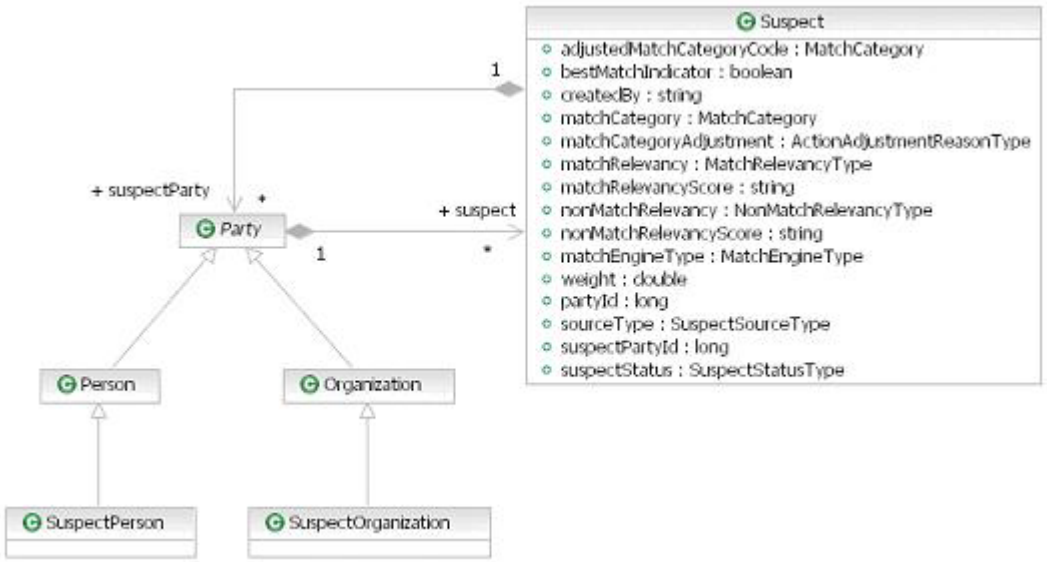


`Person` is a concrete type that is a subclass of Party. Subclassing is used in web services in contrast with the XML, where subtypes are represented using aggregation.

Each element contained by both Party and Person is of a specific type, unlike their XML counterparts which are all of type string. The type of the contained elements are either XML schema data types (such as `xd:string`, `xsd:unsignedInt`, or `xsd:boolean`) or other types defined in the web services description (such as a subtype of `TypeCode`, `LastUpdate`, `HistoryRecord`, `PartyIdentification`, or `PersonName`).

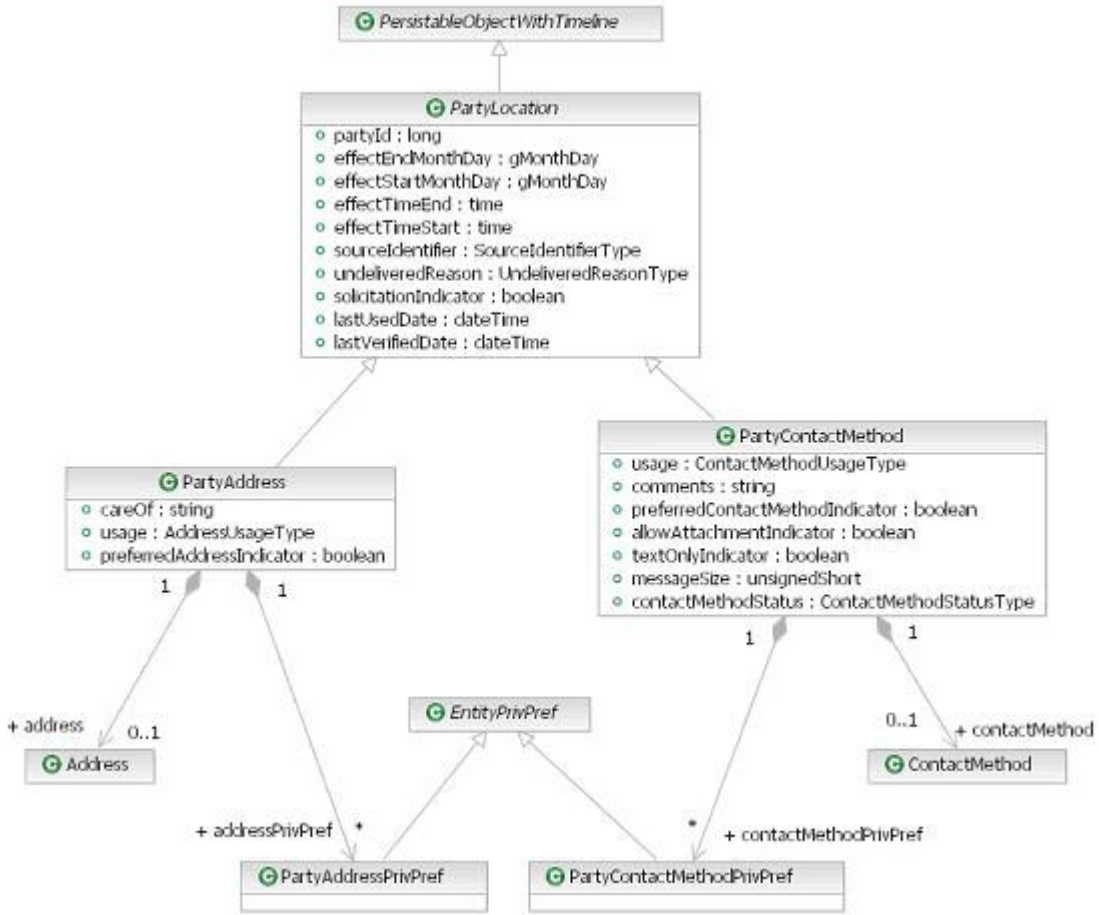
Suspect

The Suspect type is aggregated by the Party type and on its turn contains a collection of Party. The actual instances in this collection are of type `SuspectPerson` or `SuspectOrganization`.



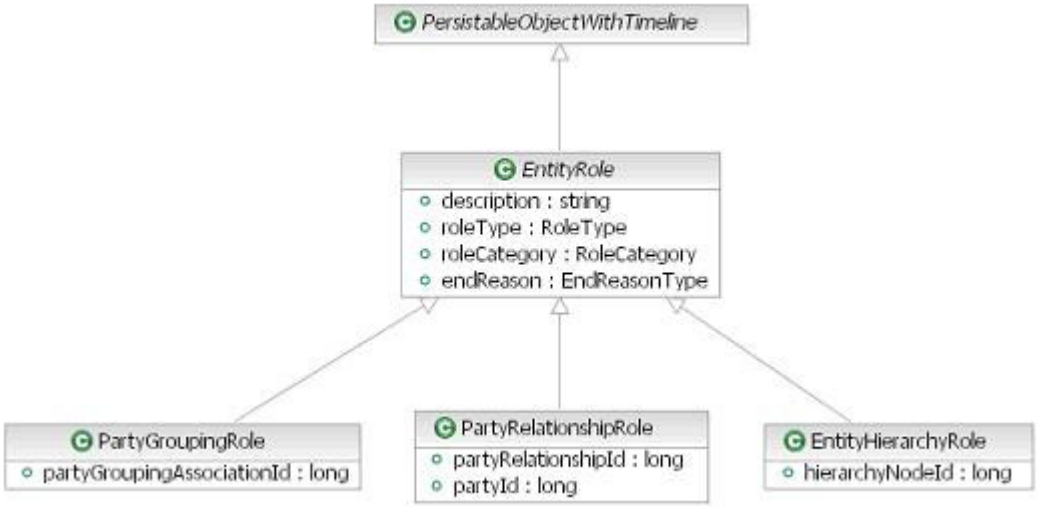
PartyLocation

`PartyLocation` is an abstract type that is used as the base type for both `PartyAddress` and `PartyContactMethod`.



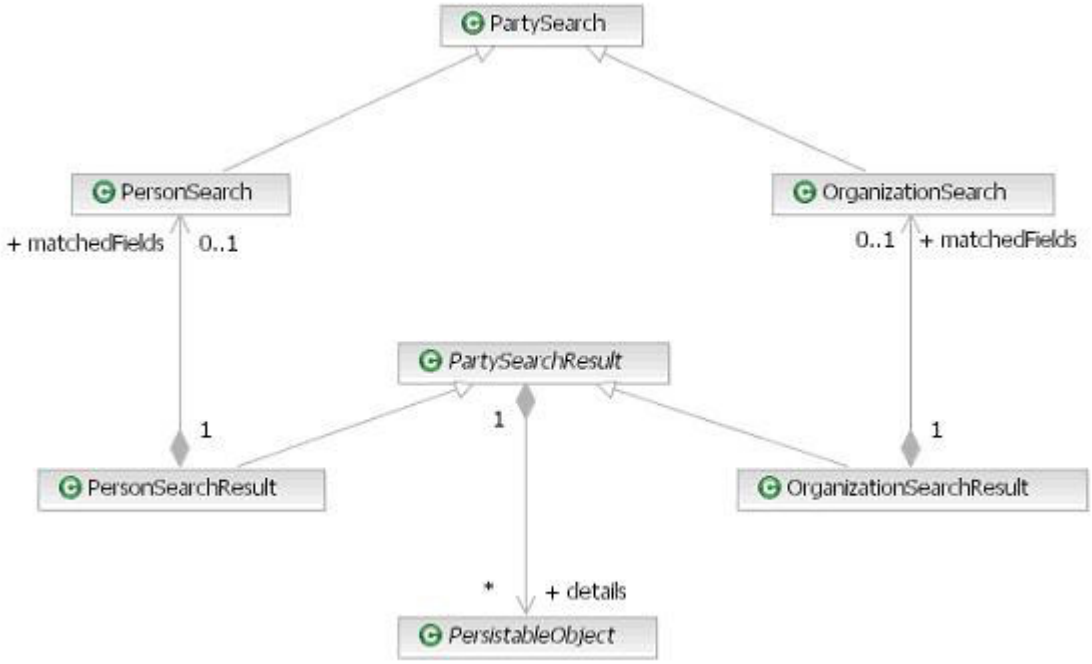
EntityRole

`EntityRole` is an abstract type that is used as the base type for `PartyGroupingRole`, `PartyRelationshipRole` and `EntityHierarchyRole`.



PartySearch

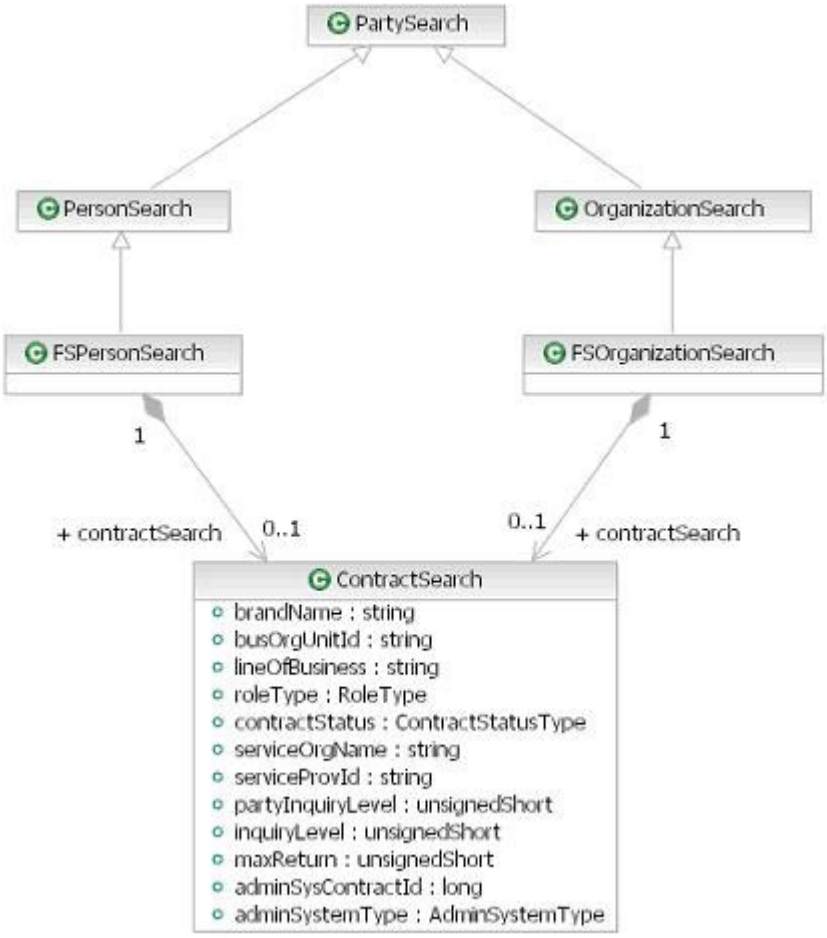
The `PartySeach` and `PartySearchResult` types are related as shown in the diagram below. There are specific search types for person and organization as there are specific result types. The result types `PersonSearchResult` and `OrganizationSearchResult` contain the search criteria in the form of a `PersonSearch` and `OrganizationSearch` respectively.



ContractSearch

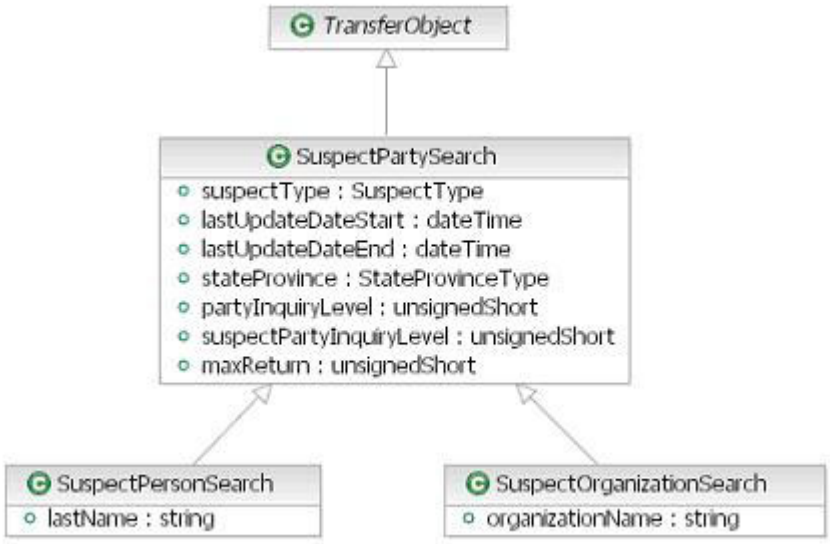
There are also more specific types of search `FSPersonSearch` and `FSOrganizationSearch` which are subtype of `PersonSearch` and

OrganizationSearch respectively. Each of these contains a ContractSearch.



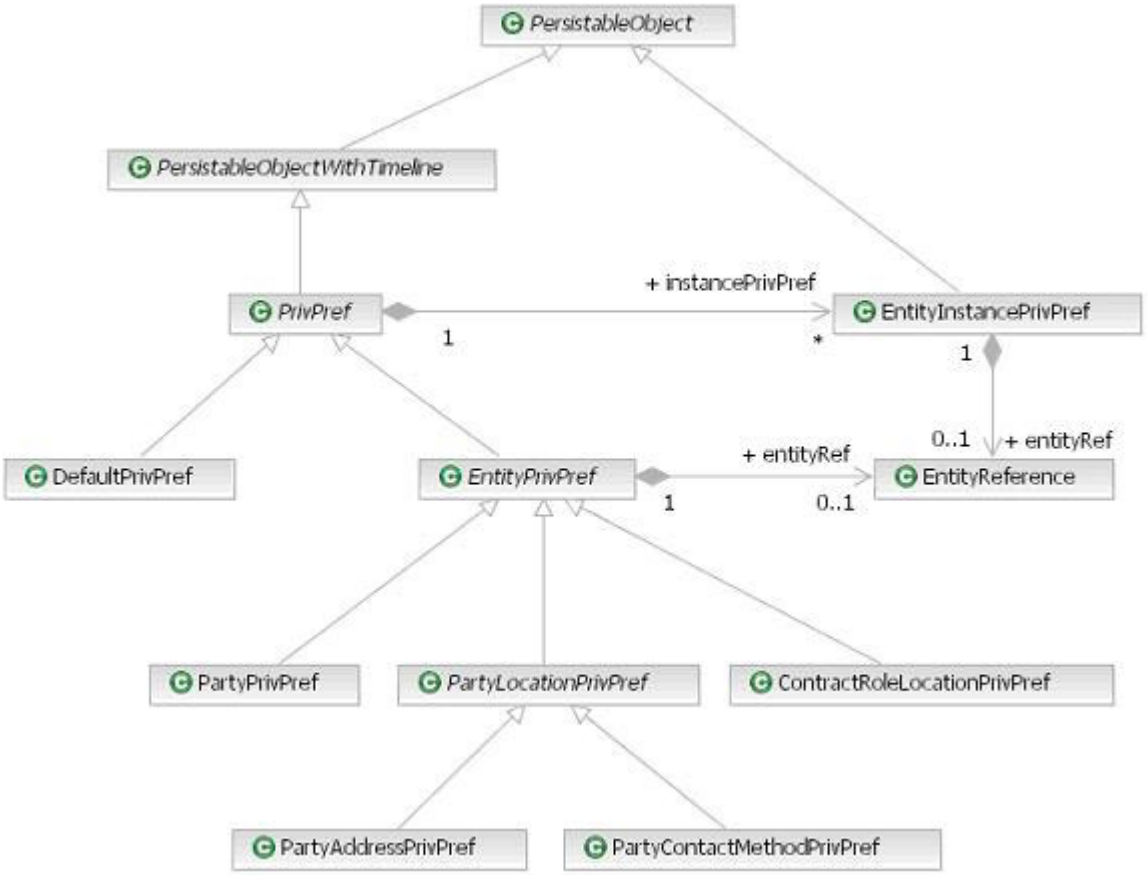
SuspectPartySearch

The SuspectPartySearch type has two subtypes SuspectPersonSearch and SuspectOrganizationSearch



PrivPref

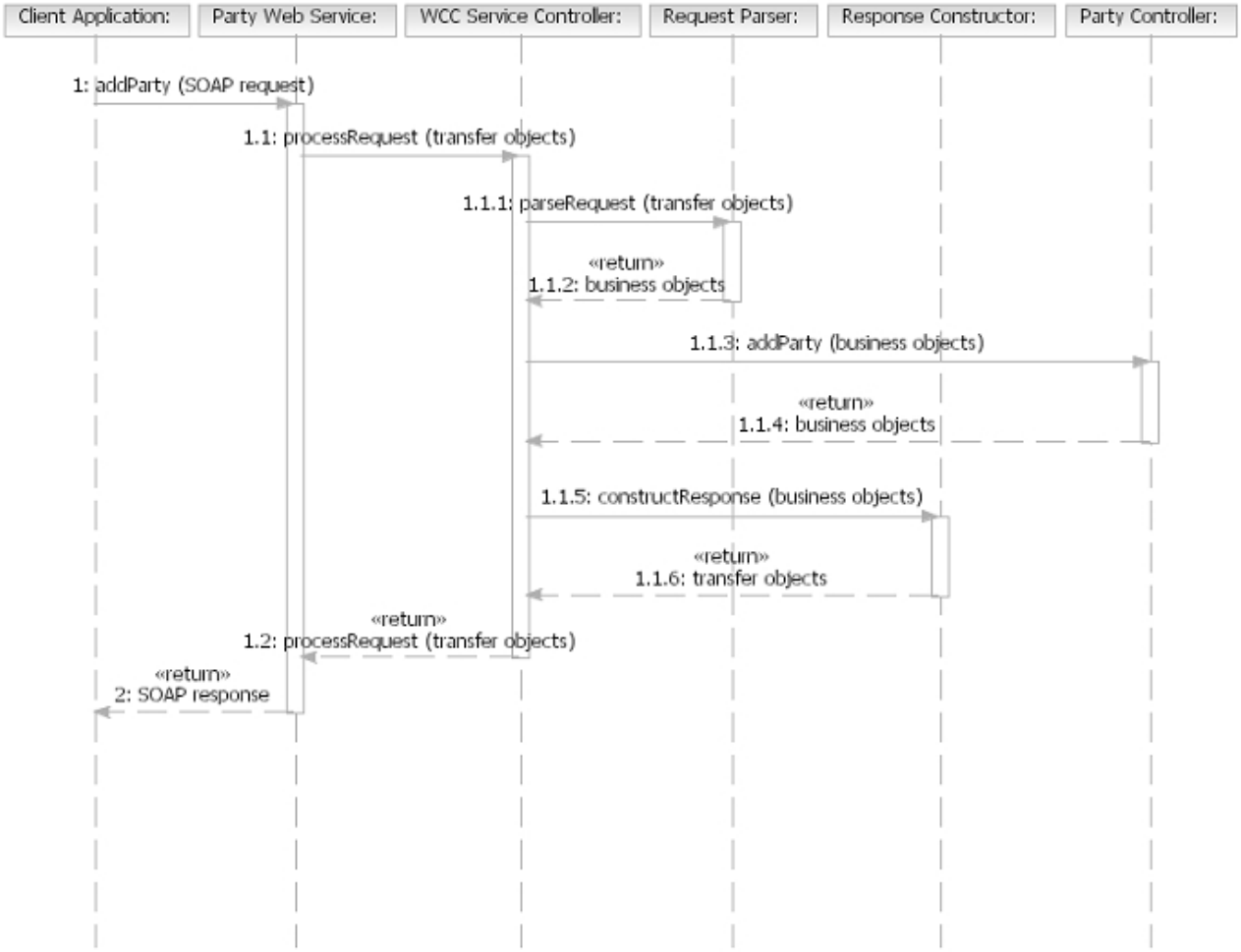
The `PrivPref` and `EntityPrivPref` and their concrete subtype are related as shown in the diagram below.



Understanding Web Services invocation

This section describes how the Web Services requests are serviced internally by the controller components.

Some aspects of this processing are customizable to allow client extensions and additions to the functionality provided by InfoSphere MDM Server.



1 addparty (SOAP request)

A client application submits a Web services SOAP request, either directly as an HTTP(S) request or using a tool-generated client. The application server JAX-RPC runtime deserializes the SOAP XML request into Java objects and passes them to the appropriate Web services endpoint, which then prepares a transaction request and invokes the Service Controller.

1.1 processRequest (transfer objects)

The Service Controller selects a request parser that can parse the incoming requests containing transfer objects into a request containing business objects. This is based on configuration from the properties files.

1.1.1 parseRequest (transfer objects)

The supplied parser transforms the Web services transfer objects into

business objects. The parser provides hooks into the conversion process that enable extensions to provide their own transfer object and business object pairs.

1.1.3 addParty (business objects)
The appropriate controller processes the transaction.

1.1.5 constructResponse (business objects)
Similar to the parsing process but in the opposite direction, the result business objects are converted into their equivalent transfer objects. This enables the extensions to provide their own transfer object and business object pairs.

2 SOAP response
The JAX-RPC runtime serializes the transfer objects into a SOAP XML response and returns it to the client application.

Making data extensions available through Web Services

After developing a InfoSphere MDM Server extension, you can make it available through Web services.

The task in this section outline the two main steps required to make a newly developed extension available through InfoSphere MDM Server Web services.

See also:

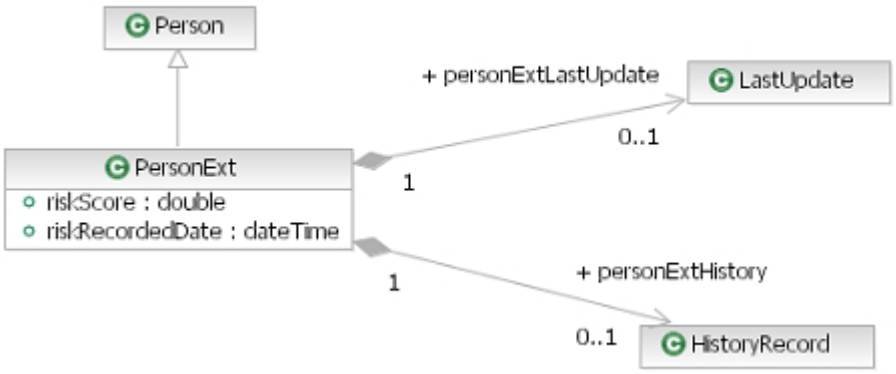
"To make data extensions available through Web Services"

To make data extensions available through Web Services

1. Define the XML data types corresponding to the extensions developed.
2. Write the 'transfer object-to-business object' converters.

Understanding data type definitions

The task in this section uses an example that assumes that the data extension, called PersonExt, adds some fields to the Person InfoSphere MDM Server data type, as shown in the following class diagram.



See the task in the following section to add the extension data types.

See also:

"To add extension data types"

To add extension data types

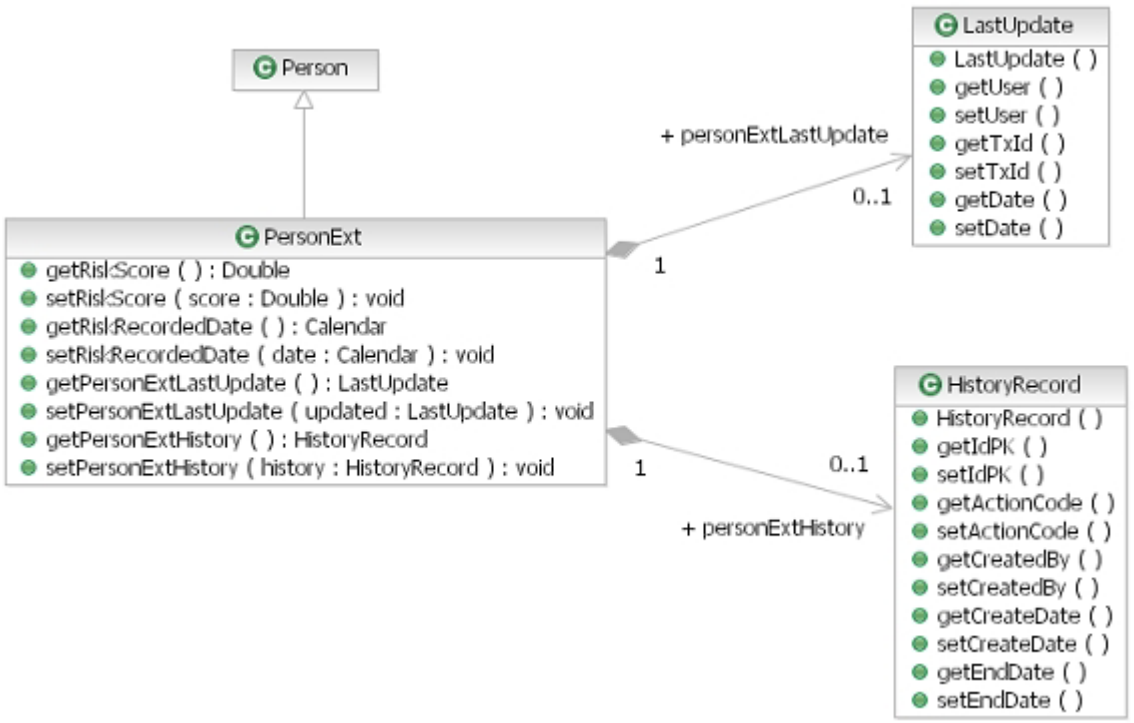
1. Change the Extensions.xsd file to import your XSD file that contains the type definition.
2. Add an import element as follows:

```
<xsd:import
   namespace="http://www.company.com/wcc-solution/party/schema"
   schemaLocation="PartyExtensions.xsd"/>
```

3. The Extension.xsd that you must change is located in the META-INF/wsdl directory of the web services EJB Module whose types you are extending. For this example, the EJB module is contained in the PartyWSEJB.jar.
4. In the example in this task, the PartyExtensions.xsd file contains the actual definition of the PersonExt type. The Extensions.xsd file only serves as an indirection mechanism. The PersonExt type can be represented in the PartyExtensions.xsd file as follows:

```
<xsd:complexType name="PersonExt">
   <xsd:complexContent>
      <xsd:extension base="party:Person">
         <xsd:sequence>
            <xsd:element name="riskScore"
                 type="xsd:double" minOccurs="0"/>
            <xsd:element name="riskRecordedDate"
                 type="xsd:dateTime" minOccurs="0"/>
            <xsd:element name="personExtLastUpdate"
                 type="commone:LastUpdate" minOccurs="0"/>
            <xsd:element name="personExtHistory"
                 type="common:HistoryRecord" minOccurs="0"/>
         </xsd:sequence>
      </xsd:extension>
   </xsd:complexContent>
</xsd:complexType>
```

5. Use the WSDL2Java emitter to generate the corresponding Java class for any XML schema data type that you have created. The diagram below shows the PersonExt class generated for the PersonExt XML schema data type defined above.



Important: You must ensure that the `WSDL2Java` emitter does not generate code that overrides the data types provided with InfoSphere MDM Server. One way to ensure that is to provide the emitter with a class path that includes the existing InfoSphere MDM Server transfer object Java classes.

Understanding business object converters

After defining the Web Services data types, and their corresponding Java transfer objects have been generated, you must ensure that InfoSphere MDM Server can convert back and forth between them and their equivalent InfoSphere MDM Server extension business objects.

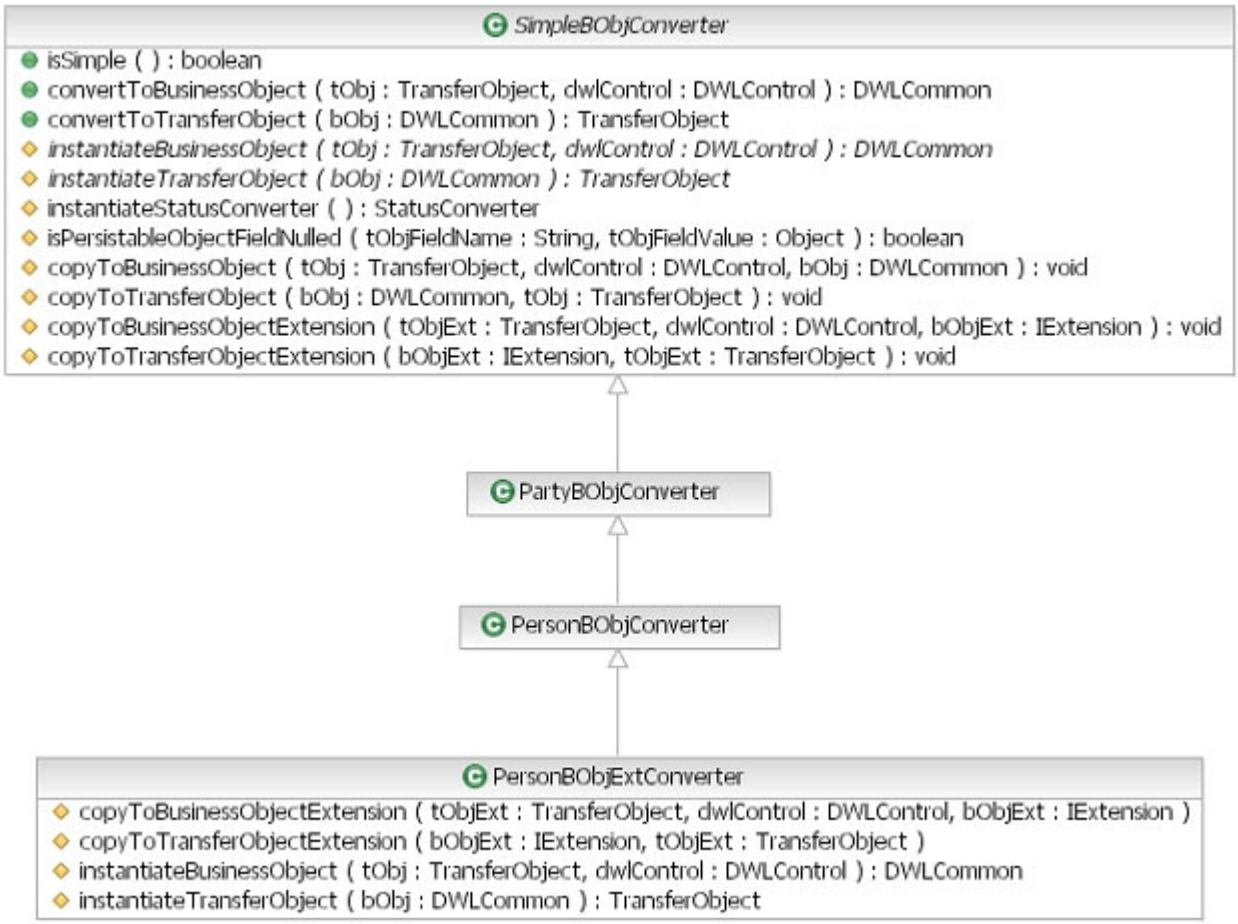
The task in this section uses the example of an extension business object called `PersonBObjExt`.

See also:

"To extend business object converters"

To extend business object converters

1. To ensure that conversion between Java extension transfer objects and InfoSphere MDM Server extension business objects works properly, you must create a converter Java class called `PersonBObjExtConverter` that extends the `PersonBObjConverter` class from the `com.ibm.wcc.party.service.to.convert` package.



2. PersonBObjExtConverter only needs to implement the following four methods:

```
void copyToBusinessObjectExtension(IExtension bObjExt, TransferObject tObjExt)
void copyToTransferObjectExtension(TransferObject to, DWLControl dwlControl)
DWLCommon instantiateBusinessObject(TransferObject to, DWLControl dwlControl)
TransferObject instantiateTransferObject(DWLCommonbObj)
```

3. The `copyTo*` methods must copy each individual field from the business object to the transfer object and back, according to their name.
4. The `instantiate*` methods must create instances of your extension's business object or transfer object class, also according to their name.
5. To enable InfoSphere MDM Server to pick up the appropriate converter for your extension data types, the following configuration must be added to the tcrm_extension.properties file:

```
services.endpoints.message.converter.com.company.solution.party.PersonBObjExt =
     com.company.solution.to.convert.PersonExtBObjConverter
services.endpoints.message.converter.com.company.solution.to.PersonExt =
     com.company.solution.to.convert.PersonExtBObjConverter
```

The general format of the converters configuration should be as follows:

```
services.endpoints.message.converter.<business object extension> = <converter>
services.endpoints.message.converter.<transfer object extension> = <converter>
```

Making additions available through Web Services

Unlike the InfoSphere MDM Server Service Controller, which handles new transactions based only on a configuration stored in a properties file, the Web Services interface into InfoSphere MDM Server requires that all Web Services and their operations and data types are described by WSDL files before they can be used.

If you modified InfoSphere MDM Server to support new transactions, either through additions or through new business proxies (see Chapter 2, "Customizing InfoSphere MDM Server," on page 17), and you want to make them available through Web Services, you need to describe, implement and add your new Web Services to the InfoSphere MDM Server enterprise application. InfoSphere MDM Server provides supporting classes to help you implement Web Services as EJB endpoints.

It is possible for a single Web Service that you have created to group more than just one transaction. Typically, you should group all the transactions that you support through a controller/finder pair in a single Web Service.

See also:

"Describing Web Service WSDL and XSD files"

Describing Web Service WSDL and XSD files

To describe your service you need to create a set of WSDL and XSD files.

You can describe the service in just one file, but to make it simpler you can follow the approach taken in InfoSphere MDM Server and split the description across multiple files. Splitting the description makes it easier to reuse it in other Web services or with different bindings for the same web services (such as SOAP over JMS).

For example, a Web service called AdditionServices would require the following files:

- `AdditionServices.wsdl` – describes the address at which the service is available and which is appropriate for the transport binding chosen.
- `AdditionBinding.wsdl` – describes the transport and messaging protocol bindings for the service (HTTP and SOAP respectively).
- `AdditionPort.wsdl` – describes the interface of the service in terms of its operations and messages.
- `Addition.xsd` – describes the data types used in the messages.

You can follow the pattern in the existing Web services WSDL and XSD files. For each new transaction that you create, you must add the following:

- A Web service operation.
- One input, one output, and between zero and many fault messages.
- One part per message only (required when the service style and encoding are document literal wrapped).
- One element per part. The types used to describe the element are defined in the XSD files (either Additions.xsd or other XSD files).
- For the fault message, you can reuse the ProcessingFault element defined in Common.wsdl.

Implementing Web Services

Once you have your new Web Service and its data types described, you need to create an implementation to support it.

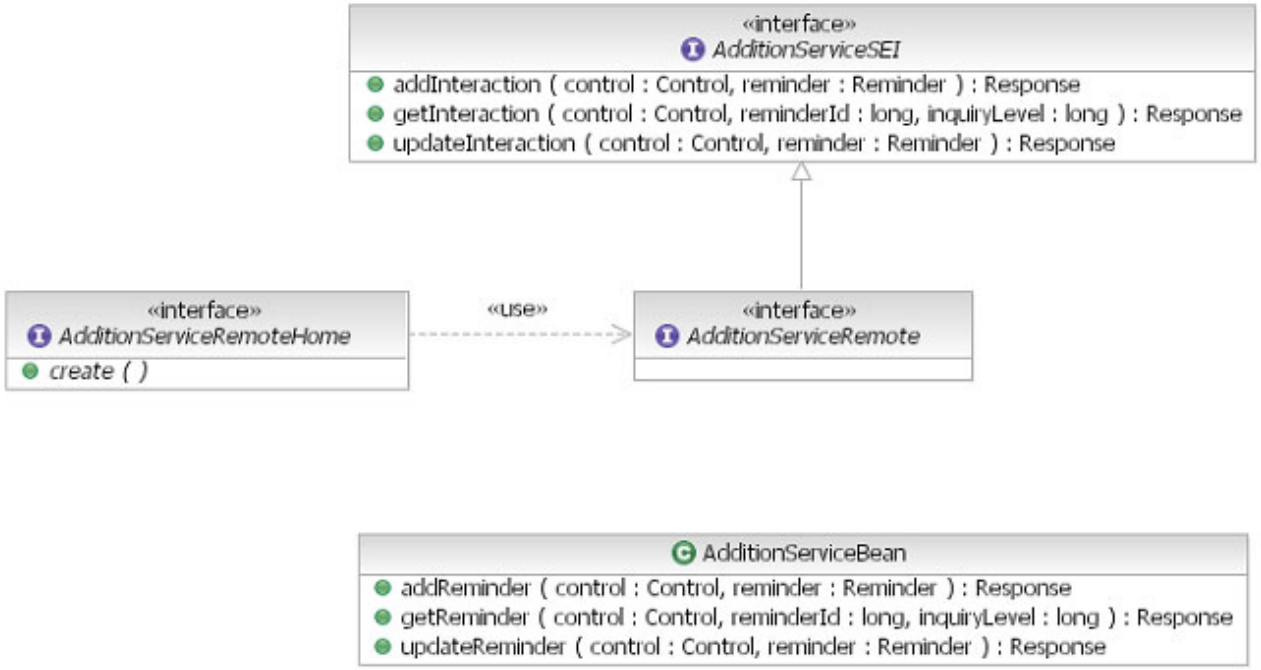
InfoSphere MDM Server uses the EJB endpoint, which is recommended because it provides a simpler threading model that, in turn, makes the implementation simpler.

See also:

"To implement Web Services"

To implement Web Services

1. You can either write the implementation yourself or use a `WSDL2Java` emitter to generate it. An example implementation is shown in the figure below.



2. To enable your Web Service to be invoked through HTTP(S):
   a. Create a servlet mapping in the `WebServicesRouter` project.
   b. Add a new servlet called `AdditionPort`.
   c. Use the Web Service enabler class provided by the application server's JAX-RPC runtime.

   For example, with WebSphere Application Server, the class is `com.ibm.ws.webservices.engine.transport.http.WebServicesServlet`.
3. Start writing the implementation for your service endpoint EJB AdditionServiceBean. Change this bean to extend the InfoSphere MDM Server abstract class `com.ibm.wcc.service.BaseServiceBean`.
4. In your bean class, you will find methods that correspond to the operations you defined in the WSDL file. Implement the methods as follows:

```
public ResponseaddReminder(Control control, Reminder reminder)
                          throws com.ibm.wcc.to.ProcessingException {
  return performServiceOperation(new Request("addReminder",
                                control, reminder));
}
```

5. Override the same method as in the previous step for the BaseServiceBean, as shown:

```
protected HashMap instantiateWccTransactionContext(Control control,
                                                   String serviceName) {
  HashMap context = new HashMap();
  context.put(ReqRespTypeHelper.PARSER_STRING, "<AdditionService>");
  context.put(ReqRespTypeHelper.CONSTRUCTOR_STRING, "<AdditionService>");
  context.put(ReqRespTypeHelper.REQUEST_TYPE_STRING, "standard");
  context.put(ReqRespTypeHelper.RESPONSE_TYPE_STRING, "standard");
  context.put(ReqRespTypeHelper.OPERATION_TYPE_STRING, "All");
  context.put(ReqRespTypeHelper.TARGET_APPLICATION_STRING, "tcrm");
  return context;
}
```

   In this method, you must provide values for the Control object, which maps to the DWLControl object. These allow your web Service to invoke your additions through the service controller, using the appropriate parser and constructor.

6. Set the physical class for the parser and constructor.

   The customized parser and constructor can be configured in the DWLCommon_extension.properties file:

```
################################
# webServices Parser and Constructor
################################
Parser.tcrm.<AdditionService>=com.company.<AdditionServiceRequestParser>
Constructor.tcrm.<AdditionService>=com.company.<AdditionServiceResponseConstruct>
```

7. Implement your parser by extending abstract parser and implement method as shown:

```
public class AdditionServiceRequestParser extends
                     com.ibm.wcc.service.to.convert.ServiceRequestParser {

  private IDWLProperty properties = new TCRMProperties();

  public AdditionServiceRequestParser() throws RequestParserException {
    super();
  }

  /**
   * This is a call back method to instantiate an instance of
   * SimpleBObjConverter for the given parameter
   *
   * @param tObj an instance of Transfer Object
   * @return an instance of SimpleBObjConverter
   * @throws RequestParserException
   * @see com.ibm.wcc.to.convert.ServiceRequestParser
   *             #getSimpleBObjConverterInstance(com.ibm.wcc.to.TransferObject)
   */
  protected SimpleBObjConverter getSimpleBObjConverterInstance(
                          TransferObject tObj) throws RequestParserException {
    return ConversionUtil.instantiateSimpleBObjConverter(tObj, properties);
  }

  /**
   * This is a call back method to instantiate an instance of
   * WrapperBObjConverter for the given parameter
   *
   * @param tObjs an array of Transfer Object
   * @return an instance of WrapperBObjConverter
   * @throws RequestParserException
   * @see com.ibm.wcc.to.convert.ServiceRequestParser
   *          #getWrapperBObjConverterInstance(com.ibm.wcc.to.TransferObject[])
   */
  protected WrapperBObjConverter getWrapperBObjConverterInstance(
                       TransferObject[] tObjs) throws RequestParserException {
    if (tObjs != null && tObjs.length > 0) {
      return ConversionUtil.instantiateWrapperBObjConverter(tObjs[0],
                                                            properties);
    } else {
      throw new RequestParserException(ResourceBundleHelper.resolve(
```

```
        ResourceBundleNames.WEB_SERVICES_STRINGS, NO_DATA_IN_REQUEST_MSG));
    }
  }
}
```

8. Implement your constructor by extending abstract parser and implement method as shown:

```
public class AdditionServiceResponseConstructor extends
                    com.ibm.wcc.service.to.convert.ServiceResponseConstructor {

  public AdditionServiceResponseConstructor() {
    super();
  }

  private IDWLProperty properties = new TCRMProperties();

  /**
   * This is a call back method to instantiate an instance of
   * SimpleBObjConverter for the given parameter
   *
   * @param bObj an instance of business object
   * @return an instance of SimpleBObjConverter
   * @throws ResponseConstructorException
   * @see com.ibm.wcc.to.convert.ServiceResponseConstructor
   *                    #getSimpleBObjConverterInstance(com.dwl.base.DWLCommon)
   */
  protected SimpleBObjConverter getSimpleBObjConverterInstance(DWLCommon bObj)
                                          throws ResponseConstructorException {
    return ConversionUtil.instantiateSimpleBObjConverter(bObj, properties);
  }

  /**
   * This is a call back method to instantiate an instance of
   * WrapperBObjConverter for the given parameter
   *
   * @param bObj an instance of business object
   * @return an instance of WrapperBObjConverter
   * @throws ResponseConstructorException
   * @see com.ibm.wcc.to.convert.ServiceResponseConstructor
   *                    #getWrapperBObjConverterInstance(com.dwl.base.DWLCommon)
   */
  protected WrapperBObjConverter getWrapperBObjConverterInstance(DWLCommon bObj)
                                          throws ResponseConstructorException {
    return ConversionUtil.instantiateWrapperBObjConverter(bObj, properties);
  }

  /*
   * (non-Javadoc)
   *
   * @see com.ibm.wcc.service.to.convert.ServiceResponseConstructor
   *                                       #instantiateServiceResponseFactory()
   */
  protected ServiceResponseFactory instantiateServiceResponseFactory()
                                          throws ResponseConstructorException {
    return AdditionServiceResponseFactory.getInstance();
  }
}
```

9. Implement response factory by extending service response interface as shown:

```
public class AdditionServiceResponseFactory implements ServiceResponseFactory {
  protected AdditionServiceResponseFactory() {
    super();
  }

  /**
   * @return the instance of PartyServiceResponseFactory
   */
  public static ServiceResponseFactory getInstance() {
    if (theInstance == null) {
      theInstance = new AdditionServiceResponseFactory();
    }
    return theInstance;
  }

  /**
   * create and populate the response instance
   *
   * @param transactionName the transaction name
   * @param tos the transfer object array containing data
   */
  public Response createResponseInstance(String transactionName,
                    TransferObject[] tos) throws ResponseConstructorException {
    Response response = null;
```

```
    try {
      response = new ReminderResponse();
        if (tos != null && tos.length > 0) {
          //assuming addReminder/updateReminder/getReminder returns a reminder
          ((ReminderResponse) response).setReminder((Reminder) tos[0]);
        }
    } catch (Exception e) {
      if (e instanceof ResponseConstructorException) {
        throw (ResponseConstructorException) e;
      }
      ResponseConstructorException ex = new ResponseConstructorException(
                                                    e.getLocalizedMessage());
      ex.setCauseObject(e);
      throw ex;
    }
    return response;
  }
}
```

10. If your Web services extends an existing business objects or creates a new business object, you must also implement the supporting converters to allow the conversion of the types defined in the XSD into the extension business objects and back. For more information on implementing the converters, see "Making data extensions available through Web Services" on page 338

Invoking Web Services

There are four ways to invoke JAX-RPC-based Web Services depending on the requirements of your implementation.

You can invoke JAX-RPC-based Web Services using one of the following four methods:

- "To invoke Web Services using JAX-RPC" on page 347
- "To invoke Web Services with atomic transactions" on page 349
- "To invoke Web Services with WS-Security" on page 350
- "To invoke Web Services with atomic transactions and WS-Security" on page 352

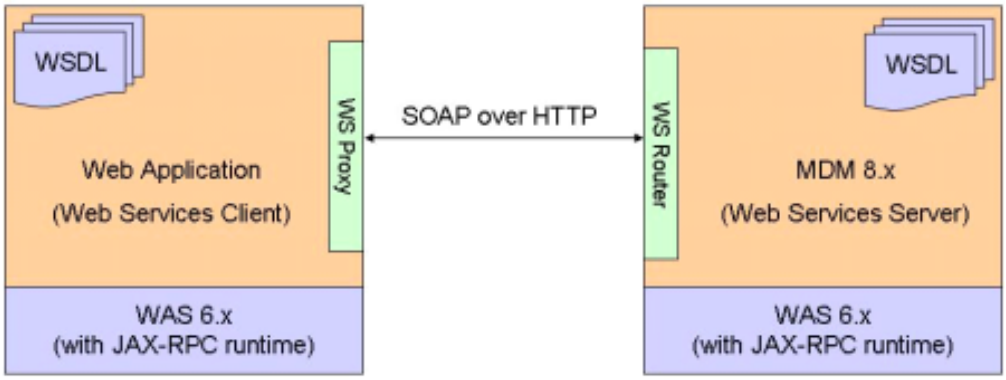
Be aware that security and transactional capabilities add overhead to the processing of Web services.

Invoking Web Services using JAX-RPC

You can invoke web services using Java API for XML-based remote procedure calls from a web application. JAX-RPC simplifies the process of building web services with familiar method-call paradigm to those programming on a Java platform.

WebSphere Application Server contains an implementation of JAX-RPC. You can generate a Web services proxy from a WSDL file for the client using IBM JAX-RPC runtime. On the server side, a Web services router is used to intercept the SOAP calls.

The following figure shows a simple JAX-RPCC call.



See also:

"To invoke Web Services using JAX-RPC"

To invoke Web Services using JAX-RPC

1. Program the Web service client. In the example, the Web service client is programmed to add a person with just a name, and to get the person with a name. In the example, **PartyServiceProxy** is a generated proxy class.
   - Setup Web Service Objects

```
protected Control getControl() {
 ......
 //set control object
 control.setRequestId(12345);
 control.setRequesterName("cusadmin");
 control.setRequesterLanguage(new Integer(100));
 ......
}

protected PersonName getName() {
 ......
 NameUsageType nameType = new NameUsageType();
 nameType.set_value("Legal");
 name.setNameUsage(nameType);
 ......
}
protected Person getPerson() {
 ......
 getPerson().setName(new PersonName[]{getName()});
 ......
}
```

     Note: Control, **PersonName** and **Person** types are generated from the WSDL file. **RequestId** can be set to any number. **RequesterName** is set to **cusadmin** for default transaction authorization. **RequesterLanguage** is a mandatory field and set to 100 for *English*. **NameUsageType** is hard coded to *Legal* for simplicity. **Name** and **Person** are linked together.

   - Invoke Web Service

```
public String doAddPerson() {
 ......
 //set the server and port for endpoint of web service
 getPartyServiceProxy().setEndpoint(getRequestScope().get("endPoint") +
    "/PartyWS_HTTPRouter/services/PartyPort");
 //invoke add person web service on proxy
 PersonResponse personResponse = getPartyServiceProxy().addPerson(
    getControl(), getPerson());
 //echo the id for the person added in message
 getFacesContext().addMessage("addPerson", new FacesMessage(
    "Person added with IdPk: " + personResponse.getPerson().getIdPK().get_value()));
 ......
}
public String doGetPerson() {
 ......
 //set the server and port for endpoint of web service
 getPartyServiceProxy().setEndpoint(getRequestScope().get("endPoint") +
```

```
    "/PartyWS_HTTPRouter/services/PartyPort");
  //invoke get person web service on proxy
  PersonResponse personResponse = getPartyServiceProxy().getPerson(
    getControl(), id.longValue(), 1);
  //set page bean for display
  setPersonName(personResponse.getPerson().getName(0));
  ......
 }
```

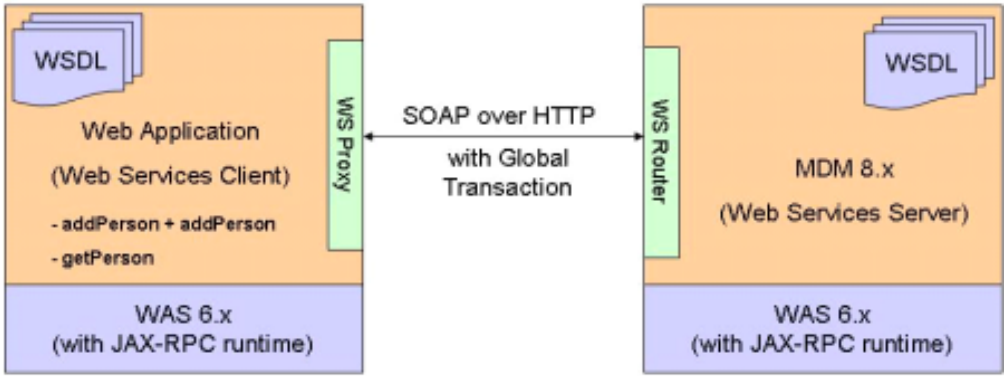
2. Prepare InfoSphere MDM Server for none secured mode, and ensure that you have disabled WebSphere Application Server Global Security.
3. Prepare InfoSphere MDM Server for none secured Web services:
   - Disable security configurations in `ibm-webservices-bnd.xmi` and `ibm-webservices-ext.xmi` for all `xxxWSEJB.jar` EJB modules under **META-INF** folder.
   - Comment all <serverServiceConfig >...</serverServiceConfig> tagged content in `ibm-webservices-ext.xmi` file
   - Comment all of <securityRequestConsumerBindingConfig>...< /securityRequestConsumerBindingConfig> tagged content in `ibm-webservices-bnd.xmi` file.

Refer to "To enable Web Services security for WebSphere Application Server" on page 353 for details.

Invoking Web Services with atomic transactions

The WebSphere Application Server JAX-RPC implementation supports Web Services global transaction.

Global transaction information is added to the SOAP message header, and the server must initiate SOAP calls back to the client for transaction coordination. The figure shows a SOAP message call with Global Transaction information:



Enabling transaction context between Web Service calls:

WebSphere Application Server supports OASIS standard for Web Services Atomic Transaction 1.0 (WS-AT 1.0). WS-AT supports global transactions through the two-phased commit protocol. The transaction participants and resources are held until confirmed during the second phase of the two-phased commit. It is used to distribute an atomic transaction context between multiple application components so that any resources used by those components is coordinated by WebSphere Application Server (using XA) to an atomic outcome.

The relation of WS-AT to web services is conceptually similar to a Java transaction service and EJBs and Web modules. If the transaction is container managed, you do not need any coding.

No changes to the Web service provider are required. All Web services providers are EJB modules and already have a default container transaction type of Required, so no changes are required. The providers interpret incoming Web services requests with WS-AT transaction context and convert them into a JTA transaction context.

You must enable transaction context on the Web service consumer side. The process is different depending on whether the consumer is an EJB module or a Web module.

The task in this section illustrates how to enable the transaction context between Web service calls.

See also:

"To invoke Web Services with atomic transactions"

To invoke Web Services with atomic transactions

1. Double-click the deployment descriptor of one of the following:
   - If the client is in an EJB Module, double-click the deployment descriptor of the EJB module and click the EJB bean that contains the Web services client.
   - If the client is in a Web module, double-click the deployment descriptor of the Web module and click the servlet which contains the Web services client.
2. From **WebSphere Extensions**, under **Global Transaction**, click **Send Web Services Atomic Transaction on outbound requests**. This ensures any transaction context is propagated with the Web service requests issued from this module. The JTA transaction context is converted to a WS-AT transaction context.
3. Wrap the Web service call with a global transaction. This example shows two addPerson transactions wrapped by UserTransaction within a Web module.

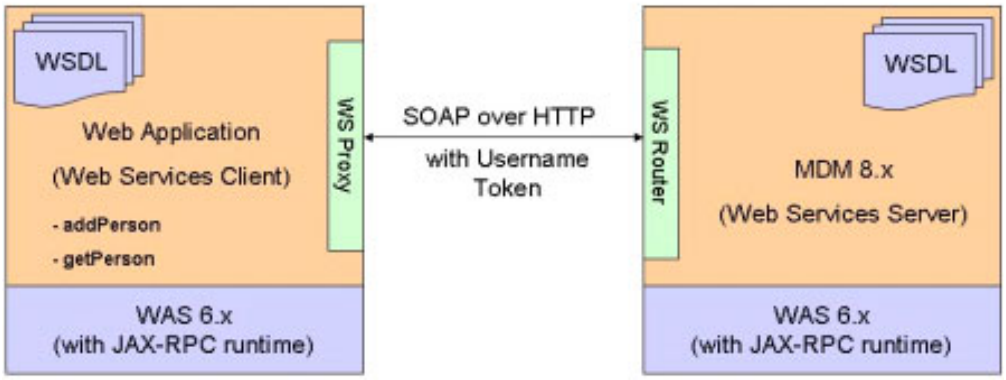
```
public String doAddPersons() {
   ......
   InitialContext initCtx = new InitialContext();
   UserTransaction userTran =
      UserTransaction)initCtx.lookup("java:comp/UserTransaction");
   userTran.begin ();
   //add person 1
   PersonResponse personResponse = getPartyServiceProxy().
      addPerson(getControl(), getPerson1());
   getFacesContext().addMessage("addPerson", new FacesMessage(
      "Person1 added with IdPk: " + personResponse.getPerson().getIdPK().get_value()));
   //add person 2
   personResponse = getPartyServiceProxy().addPerson(getControl(), getPerson2());
   getFacesContext().addMessage("addPerson", new FacesMessage(
      "Person2 added with IdPk: " + personResponse.getPerson().getIdPK().get_value()));
   userTran.commit();
   ......
}
```

Invoking Web Services with WS-Security

You can invoke Web Services using a secured JAX-RPC call from a web application.

The default setting is to use UsernameToken for web service authentication. The user name token is embedded in the SOAP message header and checked by the Web service provider for authentication and authorization.

The WebSphere Application Server JAX-RPC implementation supports UsernameToken Profile from OASIS standard WS-Security 1.0. The figure shows a secured SOAP message with UsernameToken:



See also:

"To invoke Web Services with WS-Security"

To invoke Web Services with WS-Security

1. Open the Web module deployment descriptor, click **WS Extension** → **Request Generator Configuration** → **Security Token**, and click **Add**.
2. At **Name**, type `WCCToken`, and at **Token type**, select *Username Token*. The **local name** field is automatically populated. Click **OK** to finish.
3. On the WS Binding tab click **Security Request Generator Binding Configuration** → **Token Generator** → **Add**.
4. At **Token generator name**, type `WCCTokenGenerator` and at **Security token**, select *WCCToken*. The remaining fields like **Token generator class**, **Value type** and **Local name** are automatically populated.
5. At **Callback handler**, enter the custom call back handler you want to use. For example:

   ```
   com.your_company.callback.YourCompanyCallbackHandler
   ```

6. Click **OK**. This callback handler is created to pickup the username/password user entered on UI.

   Note: If the Web service client has a fixed identity, use *com.ibm.wsspi.wssecurity.auth.callback.NonPromptCallbackHandler*, the callback handler that comes with the JAX-RPC runtime, and enter your fixed identity username and password. See the custom callback handler sample code at the end of the procedure for more information.
7. Enable WebSphere Application Server Global Security. You may use Local OS as the user registry while enabling security in the application server. By default, there are two security roles: **ServiceConsumer** and **ServiceProvider**.
   - The **ServiceConsumer** role maps to all authenticated users. This role is associated with all entry point modules. All Web service modules are considered as entry points. The Entry point module can accept outside calls. When you send user tokens in a SOAP request to a Web services module, the user must exist in the WebSphere Application Server user registry.
   - The **ServiceProvider** role maps to one default user: `mdm`. This role is associated with all modules that are not considered entry points. These modules are not to be exposed to outside calls and are only called by entry

point modules, therefore the user `mdm` must not be exposed to the outside. If it is exposed, a caller from the outside maybe able to directly call a non-entry module using the `mdm` identity.

8. Ensure that the security configurations are enabled in `ibm-webservices-bnd.xmi` and `ibm-webservices-ext.xmi` for all `xxxWSEJB.jar` ejb modules under **META-INF** folder, by uncommenting all of the following:
   - the <serverServiceConfig >...</serverServiceConfig> tag content in `ibm-Webservices-ext.xmi` file
   - the <securityRequestConsumerBindingConfig>...< /securityRequestConsumerBindingConfig> tag content in `ibm-Webservices-bnd.xmi` file.

   Refer to "To enable Web Services security for WebSphere Application Server" on page 353 for more information.

The custom callback handler sample code is shown here:

```
import javax.security.auth.callback.CallbackHandler;
......
public class YourCompanyCallbackHandler implements CallbackHandler {
    private String username;
    private char[] password;
......
    public void handle(Callback[] callbacks) throws IOException,
        UnsupportedCallbackException {
        int i = 0;
        if(callbacks == null || (i = callbacks.length) == 0)
            return;

        username = getUserNameFromWebClient();
        password = getPasswordFromWebClient();

        for(int j = 0; j < i; j++)
        {
            Callback callback = callbacks[j];
            if(callback instanceof NameCallback)
            {
                ((NameCallback)callback).setName(username);
                continue;
            }
            if(callback instanceof PasswordCallback)
            {
                ((PasswordCallback)callback).setPassword(password);
                continue;
            }
        }
    }
}
```

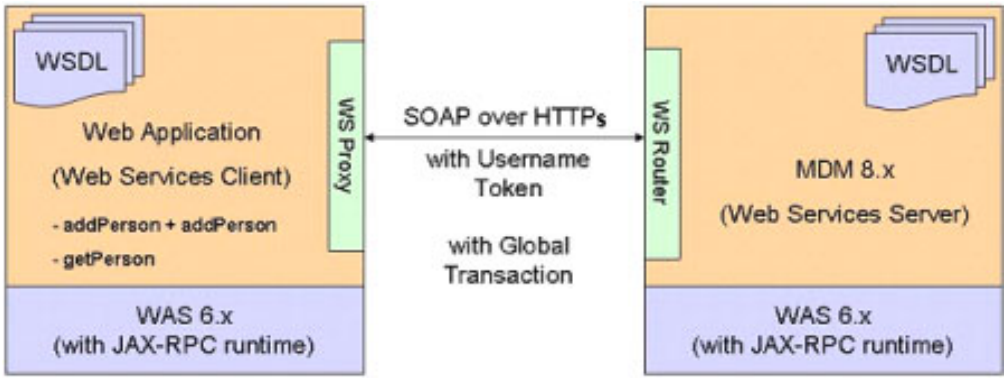
Invoking Web Services with atomic transactions and WS-Security

You can invoke Web Services with both atomic transactions and WS-Security.

When the application server initiates transaction coordination SOAP calls, it always uses the secured HTTPS channel. Using Web Services with atomic transactions and WS-Security needs support for the HTTPS protocol for Web Services because global transaction co-ordination SOAP calls use this protocol.

The user name token and transactional information are both embedded in SOAP message header.

The figure shows a SOAP message with Username Token and Global Transaction information sent through HTTPS:



See also:

"To invoke Web Services with atomic transactions and WS-Security"

To invoke Web Services with atomic transactions and WS-Security

1. Ensure that the Web service client is deployed on the server.
2. Enable HTTP SSL for your InfoSphere MDM Server Web Services client application by navigating to **Enterprise Applications** → **[YourEnterpriseApplication]** → **Web module** → **[YourWebApplication].war** → **Web Services: Client security bindings** → **HTTP SSL configuration** and selecting the checkbox next to **HTTP SSL enabled** under General Properties. The two WebSphere Application Server instances must use the default setting for SSL in order to recognize each other's certificate. If they do not use the default SSL setting, the client may have trouble identifying the server's SSL certificate. For more information, see the section on the *Import Signer Certificate* in the WebSphere Application Server Information Center.

Configuring Web Services security for WebSphere Application Server

WebSphere Application Server security and Web Services security must both be either enabled or disabled in order for Web Services transactions to run. You can configure your Web Services security setting to match your application server security setting.

During installation, the Web Services security is automatically configured to be the same as the WebSphere Application Server security setting. If the application server security is either enabled or disabled after installing InfoSphere MDM Server, you must manually update the Web Services security settings

There are two files used by WebSphere Application Server for the Web Services security configuration:

- `ibm-webservices-ext.xmi`
- `ibm-webservices.bnd.xmi`

These files are located in each `xxxWSEJB` project under the META-INF folder. There are two additional sets of sample files in the META-INF folder, with the security

setting enabled and disabled. Use these files are a guide for configuring the settings. When you are merging content with sample XM files, ensure that you do overwrite your custom configurations.

See also:

"To enable Web Services security for WebSphere Application Server"

"To disable Web Services security for WebSphere Application Server"

To enable Web Services security for WebSphere Application Server

To enable Web Services security, merge:

- `ibm-webservices-ext.xmi` with content from `ibm-webservices-ext.xmi.securityEnabled`
- `ibm-webservices-bnd.xmi` with content from `ibm-webservices-bnd.xmi.securityEnabled`

Remember: Because WebLogic security is always enabled, it is not necessary to perform these steps for WebLogic.

To disable Web Services security for WebSphere Application Server

To disable Web services security, merge:

- `ibm-webservices-ext.xmi` with content from `ibm-webservices-ext.xmi.securityDisabled`
- `ibm-webservices-bnd.xmi` with content from `ibm-webservices-bnd.xmi.securityDisabled`

Remember: Because WebLogic security is always enabled, it is not necessary to perform these steps for WebLogic.

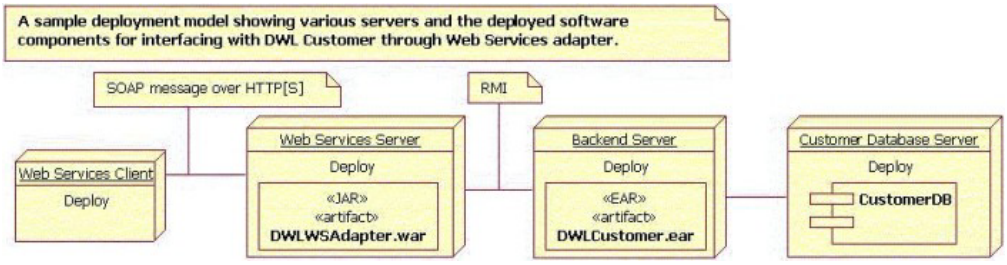
Chapter 30. Using the external Web Services Adapter

The InfoSphere MDM Server Web Services adapter provides a Web Services interface to the InfoSphere MDM Server Service Controller.

Important: Please note as of InfoSphere MDM Server version 8.0, the external Web Services adapter is no longer recommended and has been deprecated. The recommended web services invocation should use the native web services.

In addition to the Web Services described in the previous chapter, which are natively supported through the IBM InfoSphere Master Data Management Server enterprise application, an external Web Services Adapter allows for InfoSphere MDM Server XML requests and responses to be tunnelled through SOAP messages.

InfoSphere MDM Server Web Services adapter provides a Web Services interface to the InfoSphere MDM Server Service Controller. It is a protocol adapter that converts a Web service SOAP request over HTTP or HTTPS into a Java RMI call to DWLServiceController session EJB. It is packaged as a Web application and can be deployed independently of the back end, IBM InfoSphere Master Data Management Server. It can also be deployed together with the back end.



In this section, you will learn:

Installing the Web Services Adapter

The InfoSphere MDM Server Web Services adapter is packaged as a J2EE web application and it is not automatically installed when the back end is installed. This application must be manually installed. The `.war` file used for its installation is located at `legacyAdapters/WebServicesAdapter/WCCWSAdapter.war`

Install this web application using the installation tools available for the application server, such as the Administration Console for WebSphere application server.

Note the values of web application's context root and the server's HTTP, or HTTPS, port number. These are part of the end point used by the web services clients to invoke this service.

Use the sample web services client shipped with the distribution to verify installation or review the sample code. See the *IBM InfoSphere Master Data Management Server Developers Guide* for more information.

Configuring the Web Services Adapter

InfoSphere MDM Server Web Services adapter configuration is available in the `webservices.properties` file, which is included as part of the web application. It is available in the WEB-INF/classes folder inside the web application.

The following lists some of the key configuration items, along with their description. Consult the properties file for more information.

```
######################################################################
# Location of servers running WCC Back End, like WebSphere Customer Center
# ie: corbaloc:iiop:serverName:port
#
providerUrl=corbaloc:iiop:<serverName>:<Port>
######################################################################
# Default WebSphere Customer Center Context
# If other WCC application is invoked, set the values appropriately.
#
targetApplication=tcrm
requestType=standard
parser=TCRMService
responseType=standard
constructor=TCRMService
operationType=All
```

See also:

"Web Services interface"

"Deprecated Web Services interface" on page 357

Web Services interface

WsDWLServiceControllerAdpater.wsdl describes the web service exposed by the InfoSphere MDM Server Web Services adapter. This file is available in the web application in the `wsdl/com/dwl/base/webservices/`.

The following shows an extract of the Javadoc from the web service interface.

```
/**
 * This is the entry point for WCC enterprise web application.
 *
 * According to the parameter contained in context, different WCC applications would
 * be invoked by RMI.
 * For example, WebSphere Customer Center or WCC Admin Service etc.
 *
 */
public class WsDWLServiceControllerAdapter {

    /**
     *
     * The main entry point into the system through web service interface.
     * Each call is a stateless call
     *
     * @param strRequest represents the request data to be processed.
     *        For example, it can be the request XML.
     *
     * @param targetApplication target application to which this request should be
     * sent to.
     *
     * @param requestType drives the selection of a request handler and parser
     * factory.
     *        A value of <code>standard</code> will select the standard request
     *        handler.
     *
```

```
     * @param parser used to select the parser for this request.
     *        A value of <code>TCRMService</code> will select the WCC XML parser.
     *
     * @param responseType used to select the constructor factory.
     *        A value of <code>standard</code> will select the standard factory.
     *
     * @param constructor used to select the constructor to build the response.
     *        A value of <code>TCRMService</code> will select the WCC XML response
     *        constructor.
     *
     * @param operationType used to specify the operation to be executed for this
     *        request by the standard request handler. The only value available
     *        through the web service interface is <code>ALL</code>, which will
     *        perform all operations.
     *
     * @return String response from WCC Application Back End
     *
     */
    public String process(String strRequest,
                          String targetApplication,
                          String requestType,
                          String parser,
                          String responseType,
                          String constructor,
                          String operationType) {

        ...
    }
}
```

Deprecated Web Services interface

Previous versions of the InfoSphere MDM Server Web Services interface supported a slightly different WSDL, called WsDWLServiceControllerProxy.wsdl, which was deprecated as of WebSphere Customer Center v5.5. It is still available in the DWLWSAdapter.war and is installed along with the latest web service. It is recommended that any existing clients using this interface switch over to using the new interface.

Following is a list of the services exposed in the deprecated interface and how to accomplish the same using new interface.

- **configureHandler**—Sets the providerUrl and the jndiPrefix properties. These are available in the webservice.properties file and the web service clients do not need to set this configuration before sending the request.
- **getConfiguration**—Returns the values set by the configureHandler method. Again there is no need for the web service client to know about the providerUrl and jndiPrefix for the backend application, so it should not be used.
- **testRequest**—The new process service replaces this service and has the same interface with the exception of the name.

Chapter 31. Customizing Event Manager

Event Manager is a component that detects events and activities. You can customize it for your business needs.

The Evergreen application is an application used in conjunction with Event Manager to ensure that InfoSphere MDM Server data is current. For information about the Evergreen application, refer to "Managing the Evergreen application" on page 569.

In this section, you will learn:

Understanding Event Manager business rules

Business rules are used to detect an event that occurs after the passage of time, or when an event is the result of a transaction, *unless* the event is explicitly recorded as a result of a customer interaction.

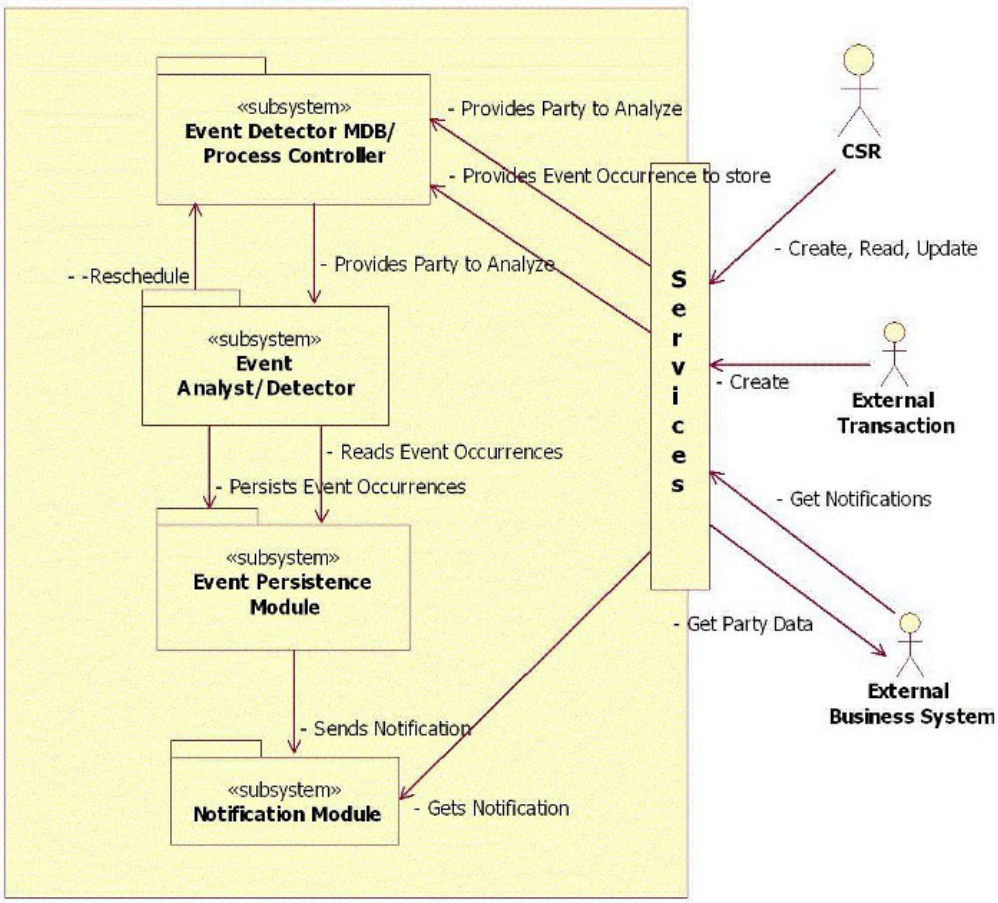
Event Manager business rules are conditional; that is, they detect an event only when certain conditions are satisfied. Consequently, you may have many rules for a single business event. For example, a retirement event may be detected as a result of multiple rules: the party has turned 65 and the party rolled over their retirement savings plan to an retirement fund.

You can add, update, or end (cancel) the business rules at any time. The rules can be implemented as Java classes or using any third party rules engine.

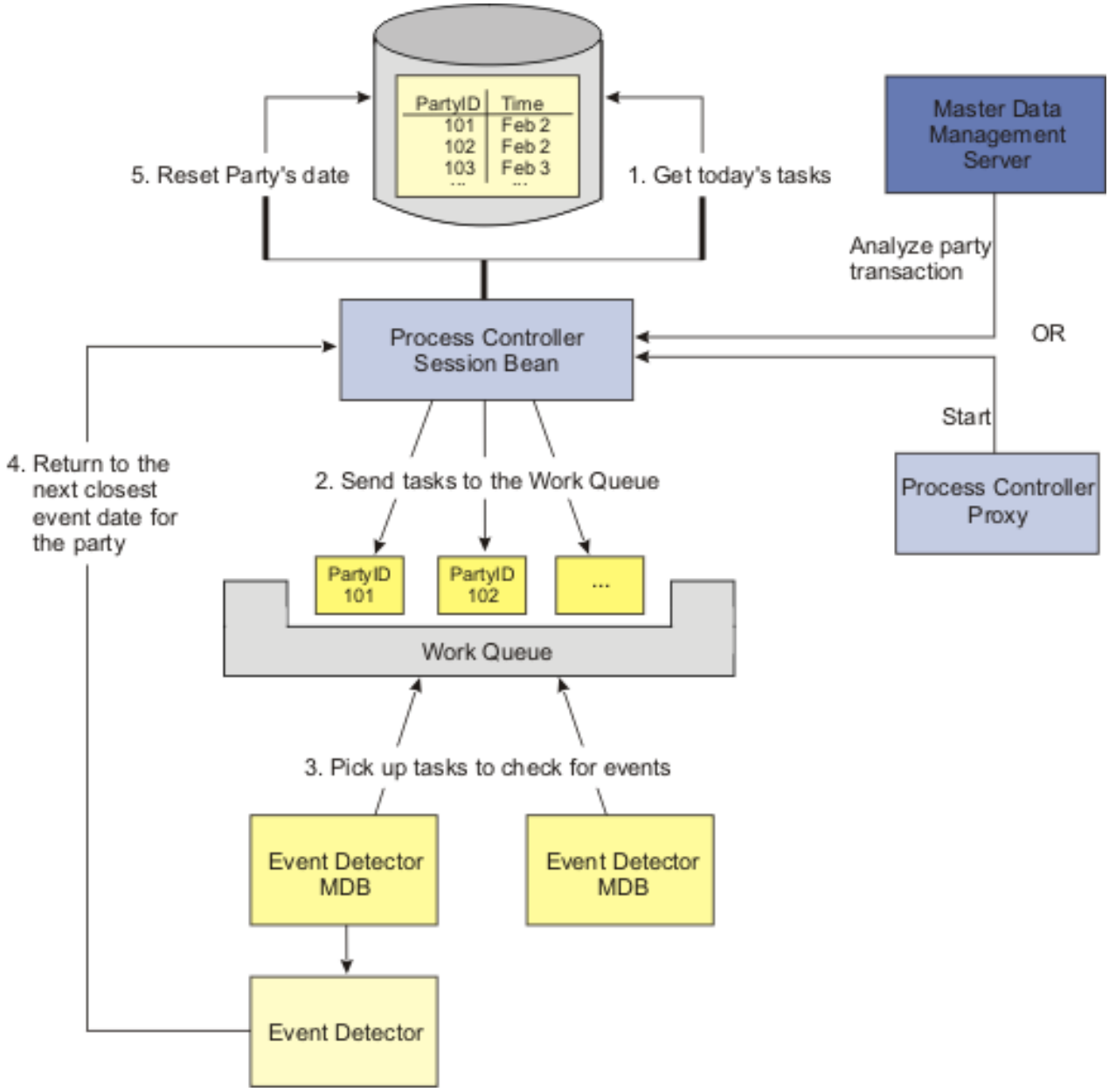
Understanding the Event Manager design overview

The InfoSphere MDM Server Event Manager consists of five major subsystems: services layer, event detector message-driven bean (MDB) with process controller, event analyst or detector, event persistence module, and notification module.

The following diagram describes these subsystems:



- **Services layer**—Provides a business interface to Event Manager users. This interface consists of the ProcessController and EventService session beans. The business system can call the ProcessController session bean to inform Event Manager about a transaction performed against a particular business object. The ProcessController bean then sends this business object for processing to the event analyst or detector. This step is asynchronous, ensuring that the business transaction is not delayed by event processing.



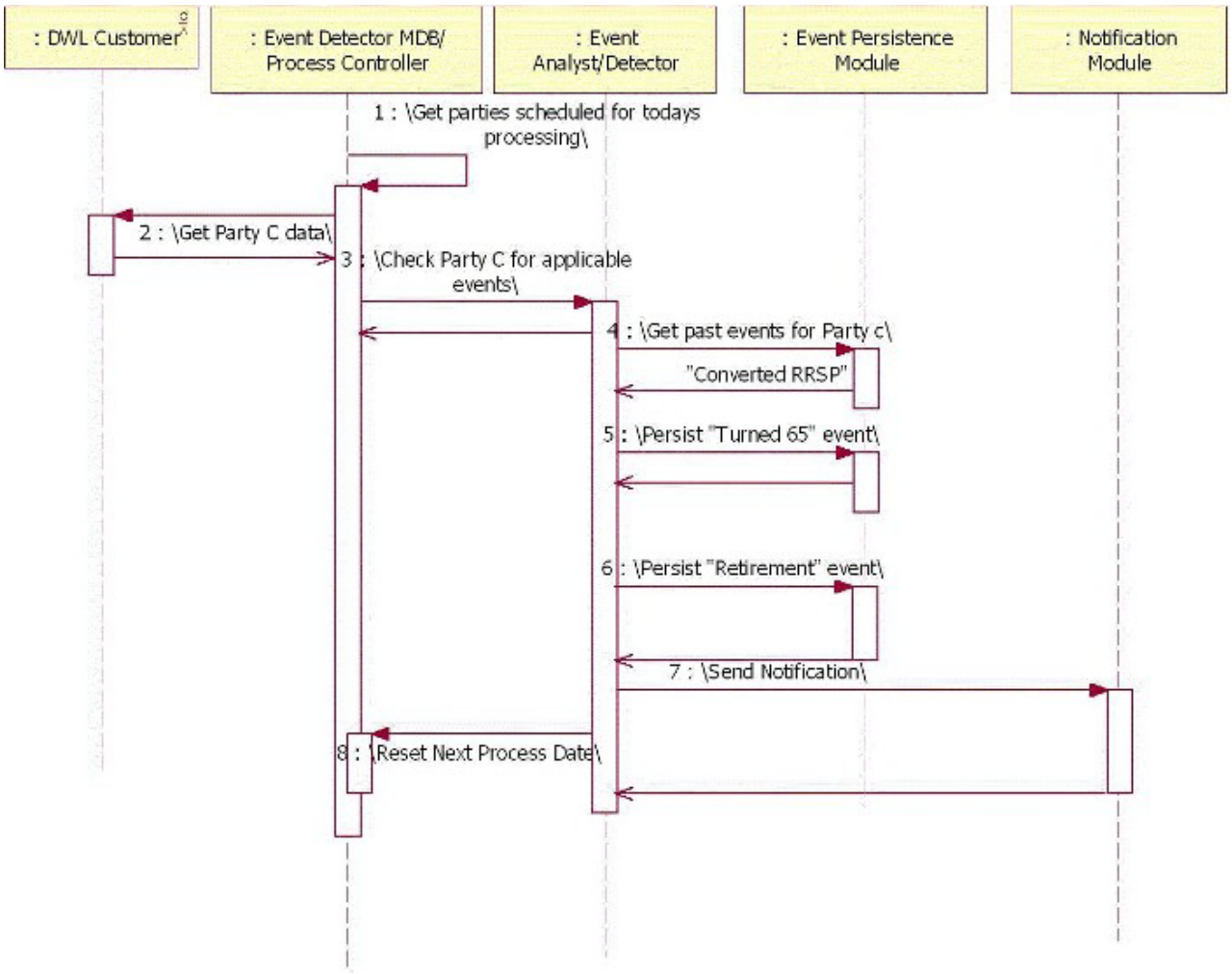
- **ProcessController bean with Event Detector MDB**—Ensures that business objects are sent to the event analyst or detector module for processing. The EventDetectionsScheduleController invokes the ProcessController bean according to the setting. The ProcessController bean checks for any business objects that are due for processing within a certain time and sends them to the event analyst or event detector.
- **Event analyst or detector**—Executes event rules to determine the list of the current event occurrences and the list of the future potential event occurrences, for a given business object.
- **Event persistence module**—Persists the information about events that have taken place.
- **Notification Module**—Sends notifications to other business systems.

Understanding events detected by the passage of time

When using the time-based detection process, Event Manager selects all business objects with a next process date that is set to the current date or earlier.

As part of processing the business object, Event Detector returns two items:

- A list of events that have occurred.s
- The date of the next closest possible event. This date is persisted and is called the *next process date*.



Event Manager executes the business rules to determine the events have happened and the ones that are pending. Events that are currently due are processed, and events that are pending are used to determine the next process date. If there are no events pending, a date in the future is selected, based on the system settings. This date is called the *event horizon*. You can control how often the business rules are re-evaluated by changing the value of the event horizon. The next process date is stored in the PROCESSACTION table.

The PROCESSACTION table contains the records for business objects that Event Manager monitors, by types of event categories. For example, for a business object, there may be one PROCESSACTION record corresponding to the life events

category and another record corresponding to the monthly events category. Other information about the business object, such as the unique identifier, is stored in the PROCESSCONTROL table.

The EventDetectionScheduleController invokes the ProcessControllerInternal bean to check if there are any business objects in the PROCESSACTION table that are due for processing. The ProcessControllerInternal bean picks up all the records from the PROCESSACTION table with a next process date of today or earlier and a status of 3 (which indicates that the record is done), or status of 2 (which indciates dead records that have passed certain time), for the type of event category that the EventDetectionScheduleController is invoking. If the record has a status of 2, it is considered to be in process, meaning some other thread is already executing business rules for it. If the record has a status of 5, it is considered to be excluded from processing.

The ProcessControllerInternal bean does not do actual event detection. Rather, it places a task object into the JMS queue. The EventDetectorMDB (the message-driven bean) picks up the tasks from the queue and starts processing. Processing the task includes these actions:

- Calling the business system using an adapter to retrieve the most recent data on the business object
- Invoking business rules to analyze the data
- Persisting occurred events
- Sending notification
- Resetting the next process date in the PROCESSACTION table.

The new next process date value depends on the result of the business rules. If the rules detect that the business object will have a new event occurring in the near future, one that occurs between now and event horizon, then the new next process date is set to the date of the upcoming event. If multiple events are detected by the rules as future pending events, the date with the nearest future event is selected. If no new events are planned, next process date is set to the event horizon. This way, the future events are never pre-scheduled; rather, the processing of all business rules are rescheduled for the next process date, presuming the future event is going to happen. If the rule is deleted or changed, you do not have to delete pre-scheduled occurrences; that is, no additional maintenance actions are necessary. If the rule has changed or a new rule is added, and there is a possibility that some business objects should be processed sooner than scheduled, the next process date should be reset to today's date to trigger the processing of the newly changed rule.

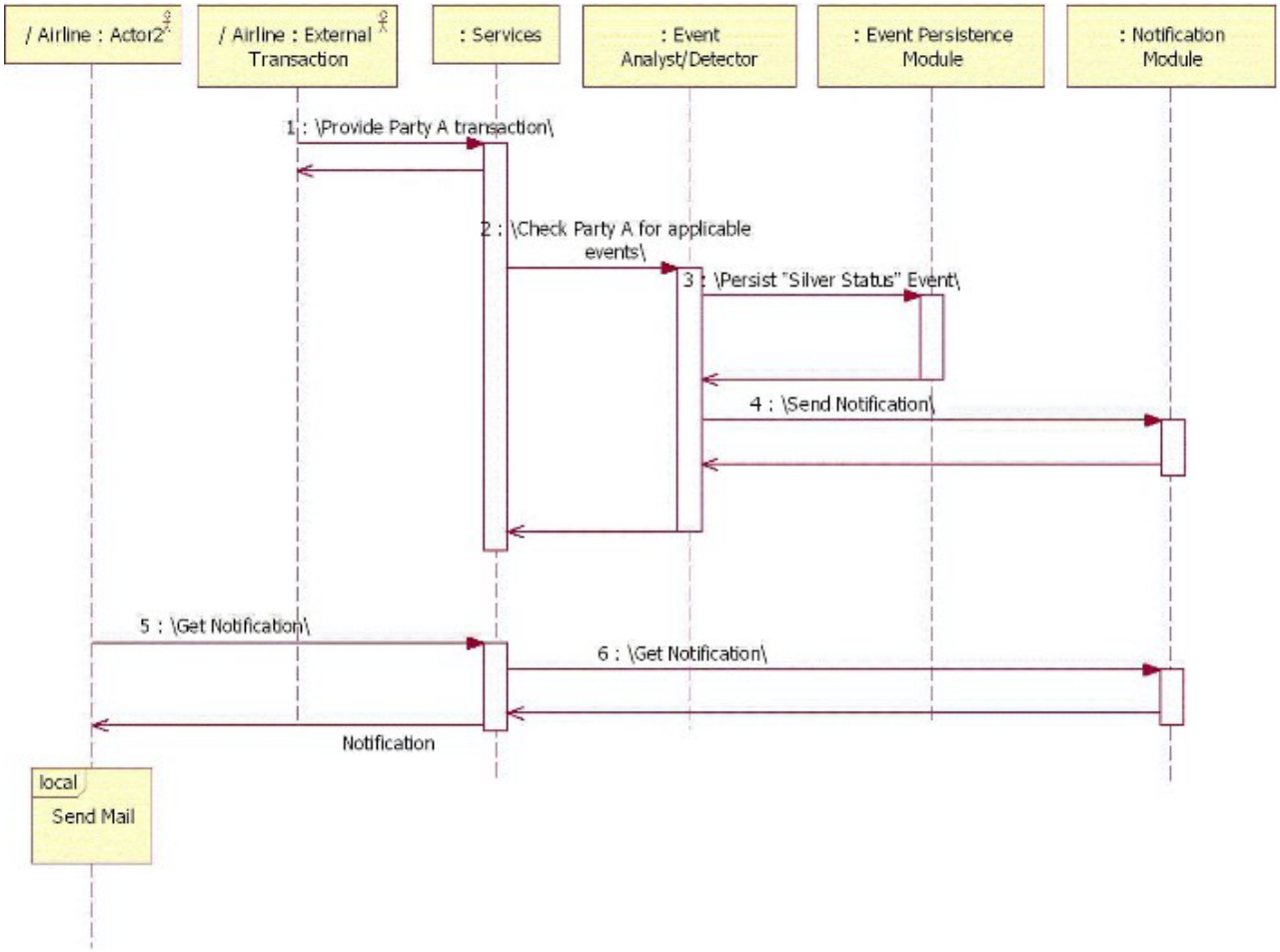
Understanding events triggered by a transaction

When InfoSphere MDM Server performs a transaction that modifies data related to the business object, it needs to inform Event Manager about the data change. Event Manager re-executes all the business rules to see if there are new occurred or pending events.

The business system can inform Event Manager about the data change by calling the ProcessController bean. The ProcessController bean places the request in a JMS queue and returns back to the caller. This way, the performance of original business transaction is not significantly impacted by the overhead of calling Event Manager.

The task, placed in the queue by the ProcessController bean, is processed in the same fashion as scheduled processing. All business rules are executed and the next

process date is reset in the PROCESSACTION table.



Understanding explicit events

Event Manager can persist information about explicit events.

Explicit events are events that are considered important and need to be captured, but cannot be derived from the business data or transaction data. For example, if the client has won the lottery and informed their Client Service Representative (CSR) about this event, the CSR can capture this information in Event Manager.

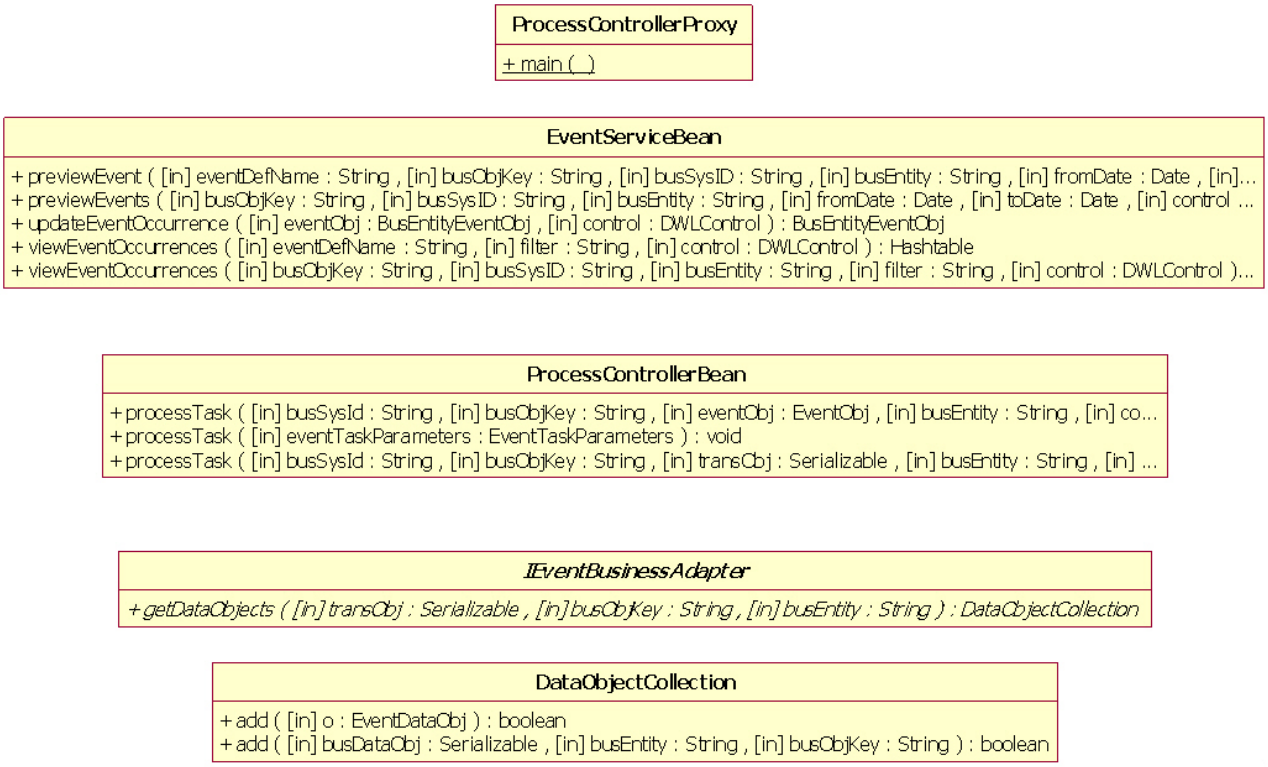
Using Event Manager with InfoSphere MDM Server

The Event Manager services layer consists of two InfoSphere MDM Server stateless session beans: ProcessController bean and EventService bean.

The ProcessController bean provides operational interfaces for business systems to call Event Manager at the end of business transactions. It also offers a local interface to be used by the business system transaction when it is deployed together with Event Manager to improve performance.

The EventService bean provides operational interfaces for customer service representative front-end tools to persist explicit events.

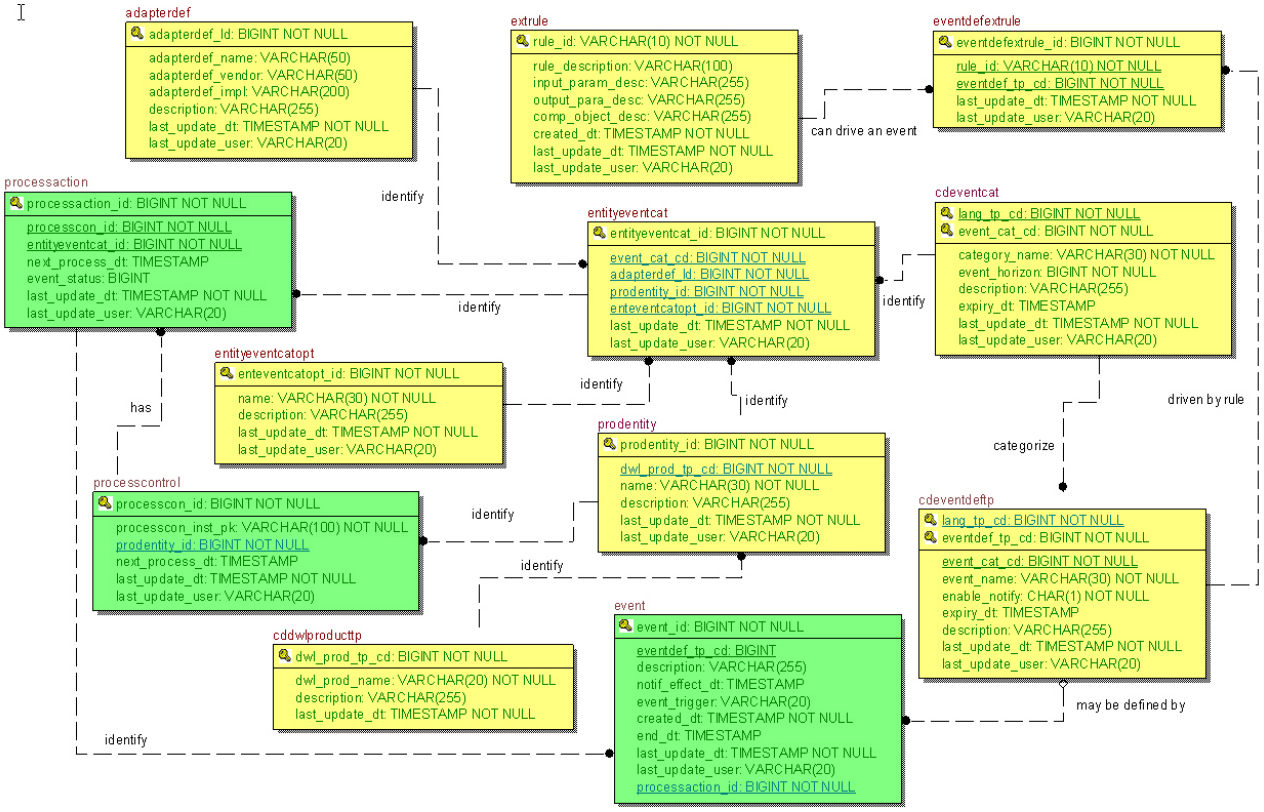
Event Manager queries the business system for business data prior to executing the business rules. During the integration phase, the new business adapter class implementing IEventBusinessAdapter interface needs to be written. The following class diagram outlines this relationship:



Understanding the Event Manager data model

Event Manager data is managed by a set of database tables.

The following diagram shows the data model of Event Manager:



Notes:

- The Event Manager data model consists of three operational tables: PROCESSCONTROL; PROCESSACTION; and EVENT. These tables hold data pertaining to business objects and events that is added by Event Manager when it detects the related event. The other tables are definition tables.
- Your integration team must set up proper data for these tables before using Event Manager.

Setting up definition tables for Event Manager

Before using Event Manager, your integration team must set up the definition tables in the Event Manager database. The tables describe the following information:

- The business system with which Event Manager integrates.
- The types of business objects that Event Manager monitors.
- The business adapter used to retrieve information about a business object from the business system.
- The types of event definitions.
- Grouping of event definitions.
- Business rules to execute for the event definitions.
- Processing options in Event Manager.

See also:

Setting up business systems and business entities

You must determine which business system and which business entities (that is, the types of business objects from that business system) for which Event Manager should be detecting events.

For every business system integrated with Event Manager, there must be one record in the CDDWLPRODUCTTP table. For each business entity in that business system, there must be one record in the PRODENTITY table.

For information on how the business system calls Event Manager, see "Calling Event Manager from the business system" on page 377.

See also:

"To set up a business system and business entity for Event Manager"

To set up a business system and business entity for Event Manager

1. Add a record to the CDDWLPRODUCTTP table to register the business system.
2. Add a record to the PRODENTITY table for each business entity for which you want Event Manager to detect events.

Setting up event definitions and categories

Every type of event that you want Event Manager to monitor is determined by an event definition. For example, to monitor whether a business entity is turning 65 years old, you create an event definition (such as Turning65) in the CDEVENTDEFTP table. Since you can monitor more than one type of event for the same business entity, you can define other event definitions (such as Turning70, RRSP, and CreateSuspects).

In theory, you can detect all types of events at the same time. In practice, however, you can expect certain types of events to happen more frequently than others (for example, turning 65 happens only once in a life time; creating suspects happens every week). By grouping event definitions based on the frequency you expect the events to occur, you can schedule event detection at different intervals.

Grouping of event definitions is set up using the CDEVENTCAT table. The event horizon specifies how frequently, in number of days, that the event definitions belonging to that event category is detected by default. For example, the following records are provided in the sample data in the CDEVENTCAT and CDEVENTDEFTP tables:


Open Table - CDEVENTCAT

LANG_TP_CD	EVENT_CAT_CD	CATEGORY_NAME	EVENT_HORIZON	DESCRIPTION
100	1	LifeEvents	3650	Grouping for life events
100	2	AbiliTec	30	AbiliTec Link
100	3	CreateSuspects	7	Create suspects
100	4	CollapseParties	7	Collapse parties
100	5	SuspectAugmentation	7	Suspect Augmentation Event Categor

Open Table - CDEVENTDEFTP

LANG_TP_CD	EVENTDEF_TP_CD	EVENT_CAT_CD	EVENT_NAME	ENABLE_NOTIFY	EXPI
100	1	1	RRSP	Y	
100	2	1	Turning70	Y	
100	3	1	Turning65	Y	
100	4	1	Retirement	Y	
100	5	1	TestJavaRule	Y	Sep
100	6	1	LOB1	Y	
100	7	1	LOB2	Y	
100	8	3	CreateSuspects	N	
100	9	4	CollapsePartiesW...	N	
100	10	2	refreshPartyExtId...	N	
100	11	1	EventManagerRules	Y	
100	14	5	SuspectAugment...	Y	

In the example data, the LifeEvents category groups seven event definitions (from RRSP to LOB2), and the CreateSuspects category contains only one event definition (CreateSuspects). The LifeEvents event horizon is 3650 days and the CreateSuspects horizon is seven days.

When the LifeEvents category is run, all the business rules associated with the event definitions, provided that the definition has not expired, belonging to that category are executed to detect event occurrences. For more information on setting up business rules, see "Setting up business rules for the event definitions."

See also:

"To set up event definitions and categories for Event Manager"

To set up event definitions and categories for Event Manager

1. Add a record to the CDEVENTCAT table to register the name of the event category, taking into account the frequency at which events are likely to happen.
2. Define one or more event definitions in the CDEVENTDEFTP table for each category defined above. Each event definition corresponds to the type of event you want to detect.

Setting up business rules for the event definitions

Events are detected by executing business rules. For example, to detect whether an entity is over 65 years old, a rule can compare the entity's birth date with the current date. If the difference is over 65 years, the Turning65 event has occurred.

Business rules can be implemented using Java or external rules engine. Use the EVENTDEFEXTRULE, EXTRULE, EXTRULEIMPLEM, and JAVAIMPL tables to associate business rules with event definitions. For example, the following records in the EVENTDEFEXTRULE and EXTRULE tables provided in the sample data associate business rules with event definitions:

- CreateSuspects
- LifeEvents

Sample Contents - EVENTDEFEXTRULE

EVENTDEFEXTRULE_ID	RULE_ID	EVENTDEF_TP_CD	LAST_UP...	LAST_UP...
111112	20001	1	Sep 30, 20...	
111113	20001	2	Sep 30, 20...	
111114	20001	3	Sep 30, 20...	
111115	20001	4	Sep 30, 20...	
111116	20002	5	Sep 30, 20...	
111117	20001	6	Sep 30, 20...	
111118	20001	7	Sep 30, 20...	
111119	20003	8	Sep 30, 20...	
111120	20004	9	Sep 30, 20...	
111121	20005	10	Sep 30, 20...	

Open Table - EXTRULE

RULE_ID	RULE_DESCRIPTION	INPUT_PARAM_DESC	OUTPUT_PARA
20001	Event Manager Rules		
20002	java rule		
20003	Evergreen java rule for CreateSuspects		
20004	Evergreen java rule for CollapseParties		
20005	Evergreen Java rule for Abilitec		
20006	Suspect Augmentation EM Rule		

Notice that although the LifeEvents category groups seven different event definitions, one rule can be shared by one or more definitions. Therefore, this subset of event definitions can be evaluated using one rule implementation. On the other hand, different event definitions can use different business rules. For example, record 5 uses a different rule than the rest of the event definitions in the LifeEvents category.

Finally, you define the rules' implementation in the EXTRULEIMPLEM and JAVAIMPL tables, as shown in the sample data below:

Open Table - EXTRULEIMPLEM

EXT_RULE_IMPL_ID	RULE_ID	EXT_RULE_TP_CODE	RULE_IN_FORCE_IND	IMPL_ORDER
20001	20001	J	Y	
20002	20002	J	Y	
20003	20003	J	Y	
20004	20004	J	Y	
20005	20005	J	Y	
20006	20006	J	Y	

Open Table - JAVAIMPL

EXT_RULE_IMPL_ID	JAVA_CLASSNAME	LAST_UPD
20001	com.dwl.commoncomponents.eventmanager.externalrule.EventManagerRules	Apr 27, 200
20002	com.dwl.commoncomponents.eventmanager.test.TestRules	Sep 30, 20
20003	com.dwl.commoncomponents.eventmanager.tcrm.EvergreenRule	Sep 30, 20
20004	com.dwl.commoncomponents.eventmanager.tcrm.EvergreenCollapsePartiesWithRules	Sep 30, 20
20005	com.dwl.commoncomponents.eventmanager.tcrm.EverGreenAbilitecRule	Sep 30, 20
20006	com.dwl.commoncomponents.eventmanager.externalrule.QualityStagePartyMatchingEMRule	Sep 25, 20

In the EXTRULEIMPLEM table, you define whether the business rules are implemented using Java by specifying EXT_RULE_TP_CODE = J. You then define the name of the Java class in the JAVAIMPL table.

To determine how to implement business rules, see "Writing business rules" on page 374.

See also:

"To define a business rule for an event definition for Event Manager"

To define a business rule for an event definition for Event Manager

1. Add a record to the EVENTDEFEXTRULE and EXTRULE table to establish the relationship between the event definition and the business rule definition.
2. Add a record in the EXTRULEIMPLEM table to indicate whether the rule is implemented using a Java class or an external rules engine.
3. If the rule is implemented using a Java class, add a record to the JAVAIMPL table, indicating the name of the Java class implementing the business rules.

Setting up the processing option for event detection

When the business system calls Event Manager to detect events, Event Manager checks the PROCESSCONTROL and PROCESSACTION operational tables, calls the business adapter to get the business object, executes the business rules, and finally updates the EVENT table if the event is successfully detected.

The role of the PROCESSCONTROL table is to record the business object that is passed to Event Manager by the business system. A record corresponding to the business object is created once, when the business object is passed to Event Manager for the first time. At the same time, Event Manager also determines whether or not it needs to create any PROCESSACTION records. The role of the PROCESSACTION table is to record what types of event categories Event Manager has to monitor for the business object. Records in the PROCESSACTION tables are created based on the definitions in the ENTITYEVENTCATOPT and ENTITYEVENTCAT tables. Business adapter used to retrieve the business object is defined in the ADAPTERDEF table.

For example, the following records are provided in the sample data in the ENTITYEVENTCATOPT, ENTITYEVENTCAT and ADAPTERDEF tables:

- CONTACT Business entity
- CreateSuspects
- LifeEvents

Sample Contents - ENTITYEVENTCATOPT

ENTEVENTCATOPT_ID	NAME	DESCRIPTION
0	NoCreate_NoDetect	Do not create ProcessAction; do not detect event
1	Create_NoDetect	Create ProcessAction, do not detect event
2	Create_Detect	Create ProcessAction, detect event

Open Table - ENTITYEVENTCAT

ENTITYEVENTCAT_ID	PRODENTITY_ID	ADAPTERDEF_ID	EVENT_CAT_CD	ENTEVENTCATOPT_ID
6001	10	2	1	2
6002	10	2	2	2
6003	10	3	3	0
6004	10	3	4	0
6005	10	2	5	1

Sample Contents - ADAPTERDEF

ADAPTERDEF_ID	ADAPTERDEF_NAME	ADAPTERDEF_IMPL
2	DWL Customer	com.dwl.commoncomponents.eventmanager.tcrm.CustomerBusinessAdapter
3	Evergreen	com.dwl.commoncomponents.eventmanager.tcrm.EvergreenBusinessAdapter

The ENTITYEVENTCATOPT table contains three processing options for creating PROCESSACTION records. The Create_Detect option instructs Event Manager to create a PROCESSACTION record for the business object and detect the event immediately. The Create_NoDetect option instructs Event Manager to create a PROCESSACTION record, but not detect the event at this time. This sets up the PROCESSACTION record for the business object so that event detection can be scheduled at a later time. To learn more about scheduling event detection, see “Starting time-based event detection” on page 380.

The NoCreate_NoDetect option instructs Event Manager to bypass creating the PROCESSACTION record and event detection. If you want to schedule event detection for the business object in the future, you need to create the PROCESSACTION record manually.

One of these three processing options must be used in the ENTITYEVENTCAT record to indicate to Event Manager how PROCESSACTION record and event detection are handled. In the above sample data, the record for the LifeEvents event category contains an ENTEVENTCATOPT_ID of 2, which instructs Event Manager to create the PROCESSACTION record and run the business rules for this event category immediately. The record for the CreateSuspects event category contains an ENTEVENTCATOPT_ID of 0, which instructs Event Manager to bypass creating the PROCESSACTION record and event detection.

The ADAPTERDEF_ID in the ENTITYEVENTCAT record refers to the record defined in the ADAPTERDEF table. The ADAPTERDEF record contains the class name of the adapter implementation. Note that in the ENTITYEVENTCAT sample data above, all four records refer to the CONTACT business entity (PRODENTITY_ID = 10), but they can refer to different business adapter based on the event category. To find out more information about business adapter, see “Writing the business adapter” on page 376.

See also:

"To define the processing option for an event category forEvent Manager"

To define the processing option for an event category forEvent Manager

1. Add a record to the ADAPTERDEF table to register the business adapter that you want to use for retrieving business data from the business system.
2. Add a record to the ENTITYEVENTCAT table, indicating the business entity, the adapter you want to use, and one of the three predefined ENTITYEVENTCAT_ID values.

Maintaining operational data manually

You can maintain the PROCESSCONTROL and PROCESSACTION records using SQL statements. This method is useful when you want to maintain a large volume of records, such as during the initial loading of operational data.

Maintaining operational tables

Three operational tables hold the data pertaining to the business objects and their occurred events as the events are being detected by Event Manager.

The role of these tables are as follows:

- **PROCESSCONTROL**—A record in this table holds the ID uniquely identifying a business object in the business system.
- **PROCESSACTION**—A record in this table corresponds to an event category that Event Manager monitors for the business object. For each event category to be monitored, a separate record is required. This record also holds the next process date, which is used by time-based event detection to determine when an event has to be reevaluated.
- **EVENT**—A record in this table corresponds to an occurred event.

When InfoSphere MDM Server calls into Event Manager at the end of a transaction, these records are created and updated automatically by Event Manager on an ongoing basis. However, if you intend to roll out Event Manager to process a predefined set of business objects, you may find it useful to manually add records to these tables and schedule event detection on these objects.

Maintaining the PROCESSCONTROL table

The PROCESSCONTROL table contains a reference to each business object in InfoSphere MDM Server. It has a foreign key relationship with PRODENTITY table, which contains information about the business entity of that business object.

The PROCESSCONTROL table can be pre-populated with references to the business objects within InfoSphere MDM Server during the integration phase. For example, the PROCESSCONTROL table may be populated with the party's primary keys.

The following is some fictitious data populated in the PROCESSCONTROL table:

Sample Contents - PROCESSCONTROL

PROCESSCON_ID	PROCESSCON_INST_PK	PRODENTITY_ID	NEXT_PROCESS_DT	LAST_UPDATE_DT
10000000	2061100773018594	10		Jan 1, 2004 12:00:...
10000001	2084294574543503	10		Jan 1, 2004 12:00:...
10000002	2098573285072052	10		Jan 1, 2004 12:00:...
.				
.				
.				
10999998	3085023742757235	10		Jan 1, 2004 12:00:...
10999999	2052937597534953	10		Jan 1, 2004 12:00:...
11000000	2082023742937492	10		Jan 1, 2004 12:00:...

In the above sample data, the PROCESSCON_INST_PK column stores the party's primary keys. The NEXT_PROCESS_DT in the PROCESSCONTROL table contains no processing and can be left as null.

Maintaining the PROCESSACTION table

After you populate the PROCESSCONTROL table, for each type of event category you want to monitor for the business object, you need to create a PROCESSACTION record. The PROCESSACTION table has a foreign key relationship with the ENTITYEVENTCAT table, which refers to the event category to be monitored, and a foreign key relationship with the PROCESSCONTROL table, which refers to the business object.

During the lifetime of the system, new business entities can be added to the business system. In this case, when the business system calls Event Manager at the end of transaction, new or missing business object records are added to the PROCESSACTION table prior to executing the rules. After the rules are run, the NEXT_PROCESS_DT for the record is set to the appropriate value.

If processing of the record fails for any reason, the NEXT_PROCESS_DT is set to today. This allows the same record to be picked up the next day by the EventDetectionScheduleController again.

Business objects are processed individually. Once the EventDetector module receives a record from the PROCESSACTION table, Event Manager updates the EVENT_STATUS field in the PROCESSACTION record with a value of 2. This is done to ensure that scheduled Event Manager processing does not select the same record while it is already being processed by another thread. At the end of the processing, the EVENT_STATUS field is re-set to a value of 3.

If you must exclude some of the business objects from processing for business reasons, set the EVENT_STATUS field to 5. The EventDetectionScheduleController does not pick up the records with this status, and if there is transaction-triggered processing, the request is ignored.

The following is some example data populated in the PROCESSACTION table:

- Next process dates are staggered
- CreateSuspects
- LifeEvents

Sample Contents - PROCESSACTION

PROCESSACTION_ID	PROCESSCON_ID	ENTITYEVENTCAT_ID	NEXT_PROCESS_DT	EVENT_S...	LAST_UP...
20000000	10000000	6001	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000001	10000000	6003	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000002	10000001	6001	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000003	10000001	6003	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000004	10000002	6001	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000005	10000002	6003	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000006	10000003	6001	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
20000007	10000003	6003	Dec 1, 2004 12:00:00...	3	Jan 1, 200...
.					
.					
.					
21999996	10999998	6001	Dec 15, 2004 12:00:0...	3	Jan 1, 200...
21999997	10999998	6003	Dec 15, 2004 12:00:0...	3	Jan 1, 200...
21999998	10999999	6001	Dec 15, 2004 12:00:0...	3	Jan 1, 200...
21999999	10999999	6003	Dec 15, 2004 12:00:0...	3	Jan 1, 200...
22000000	11000000	6001	Dec 15, 2004 12:00:0...	3	Jan 1, 200...
22000001	11000000	6003	Dec 15, 2004 12:00:0...	3	Jan 1, 200...

In the sample data, two PROCESSACTION records are created for each PROCESSCONTROL record created in "Maintaining the PROCESSCONTROL table" on page 372:

- One for the LifeEvents category
- One for the CreateSuspects category

This allows these two event categories to be scheduled for detection independently.

Maintaining operational data using transactions

You can use various transactions to maintain the PROCESSCONTROL and PROCESSACTION records.

These transactions are as follows:

- addProcessControl
- addProcessAction
- updateProcessAction
- getProcessControl
- getProcessAction
- getAllProcessActions

See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for more information about these transactions.

Writing business rules

Business rules are responsible for detecting the occurrence of events and predicting the time future events may occur. Event Manager uses the externalized rules component to configure the business rules.

The externalized rules component offers the following features:

- Rules can be externalized into a rules engine.
- Different rules engine products can be accommodated.
- Different rules can be implemented in different rules engine products.

- Rules can be externalized as Java code.
- A rule can change implementation types (for example, rules engine implementation to Java code implementation and vice versa), without affecting the core product. In other words, a rule can have multiple implementations
- A rule can receive input data and can return data in the form of objects

Most events must be predefined in the CDEVENTDEFTP table, except for events that are user explicit. When a business rule reports the occurrence of an event to Event Manager, a new record is created in the event table with a reference to the event definition. See "To set up event definitions and categories for Event Manager" on page 368 for details on how to set up the CDEVENTDEFTP table.

There is no direct relationship between events and rules. Events are detected by rules, and rules are executed because there are events defined in CDEVENTDEFTP table. The choice of rules engine can determine how many rules are needed to implement a single event. See "Setting up business rules for the event definitions" on page 368 for information on how to associate business rules with event definitions.

Note: Rules are configured in tables related to the externalized rules component. Rules and event definitions are linked via EVENTDEFEXTRULE table, which references both the CDEVENTDEFTP table and the EXTRULE table. This means each event definition can have its own rule, if necessary. However, typically a single Java business rule can handle multiple event definitions. Similarly, a single rule set, configured as a single rule in the EXTRULE table, can handle all events defined in the CDEVENTDEFTP table. In this case, you must specify the same rule for all the event definitions it covers. Event Manager ensures the rule is executed only once, even if it is registered for multiple event definitions.

Implementing rules using Java

To implement business rules as Java code, write the class that implements the com.dwl.base.externalrule.Rule interface. Event Manager provides an abstract Java class that already implements the rule interface; therefore, when writing Java business rules for Event Manager, simply extend com.dwl.commoncomponents.eventmanager.test.BaseRule class.

To implement a custom Java business rule, extend BaseRule class, providing implementation for the following method:

```
public abstract void executeRules(EventTaskObject task)
```

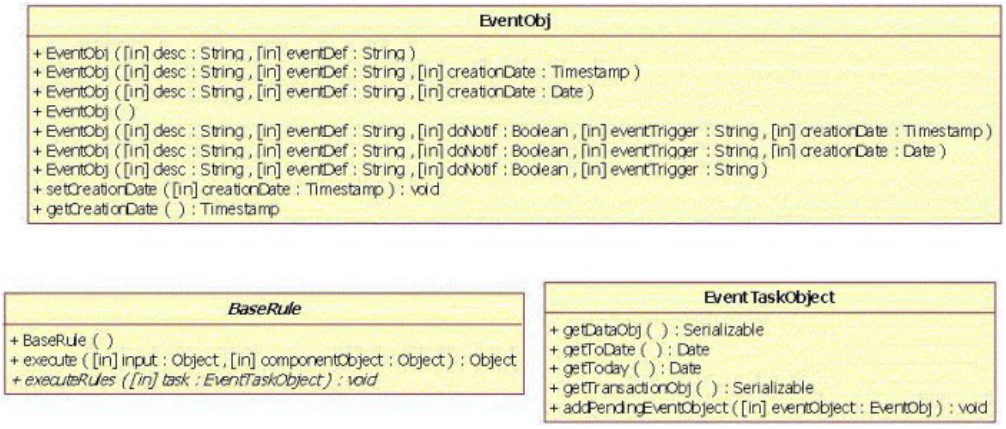
Java business rules can obtain all necessary information from the EventTaskObject, passed as an input parameter of the executeRules() method. EventTaskObject contains information about the business entity itself, events that have already occurred for this business entity and additional information such as today's date, event horizon, and others (see the figure below).

To obtain list of the occurred events, use the getOccurredEvents() method, which returns a vector of EventObj objects. Each EventObj object contains information such as the name of predefined events if the event is not user explicit, date when the event occurred, and others.

To obtain the business data object or transaction object, use methods getDataObj() and getTransactionObj(), respectively.

EventTaskObject can provide today's date when getToday() method is called. Also, to write the rules designed to determine future data of the event occurrence, it is important to know how far in the future the rule is supposed to look. The getToDate() method returns today's date increased by the number of days specified as the event horizon in the CDEVENTCAT table. For example, if today is May 10, and the value of the EVENT_HORIZON field in CDEVENTCAT table is 365, the getToDate() method returns the date of May 10 next year. This date can then be used to determine the time of the occurrence of events in the future.

When current or future events are detected by the rule, it is important to communicate that information to Event Manager. Rules must add the newly-detected events to the list of the pending events on the EventTaskObject using the addPendingEventObject(EventObj eventObject) method. If the event is a current occurred event, then the creation date of the EventObj should be set to the time this event is going to occur in the future. For tracking purposes, the events created by rules should have the event trigger property set to EventTriggered. Use the constant EventManagerConstants.TRIGGER_EVENT_TRIGGERED to set this value.



Writing the business adapter

The business adapter implements the IEventBusinessAdapter interface.

This interface prescribes one method as follows.

```
public DataObjectCollection getDataObjects(Serializable transObj, String busObjKey,
     String busEntity)
```

The method requires the following input parameters:

- **Serializable transObj**—Contains the business object passed to ProcessController bean during the call from the business system. Typically, it contains the business object participating in the business transaction or the transaction object itself. If the Event Manager processing is not triggered by a transaction, this parameter is empty.
- **String busObjKey**—Contains the primary key of the business object within the business system. If processing is triggered by calling the ProcessController bean, this value is set to the value passed into processTask() method. If the EventDetectionScheduleController triggers the processing, this value is retrieved from the PROCESSCON_INST_PK field in the PROCESSCONTROL table.
- **String busEntity**—Contains a logical name of the business object within business system. If processing is triggered by calling the ProcessController bean,

this value is set to the value passed into processTask() method. If the EventDetectionScheduleController triggers the processing, this value is retrieved from the NAME field in the PRODENTITY table, by looking up the PRODENTITY_ID field in the PROCESSCONTROL table.

This method must return the DataObjectCollection object or null. This return type allows the adapter to return multiple business objects.

In the case, where the EventDetectionScheduleController triggered the processing, the adapter typically returns only one object. The adapter retrieves the business object from the business system, creates the new DataObjectCollection object, adds one business object to the DataObjectCollection object and then returns it.

In the case where a transaction triggered the processing, the adapter can use the information in the transObj, passed as an input parameter, to decide which type of objects should be retrieved from the business system. Each object must be added as EventDataObj to the DataObjectCollection with the appropriate busEntity and busObjKey information. For example, if the business transaction is ContractUpdate, the adapter may want to retrieve information for all the parties modified during the transaction. Each party data object, together with the party primary key and entity name, should be added as EventDataObj to DataObjectCollection and returned to the caller. If the adapter is not retrieving any data object and simply needs to pass transaction object transObj to the rule, it still should be added to DataObjectCollection as EventDataObj. If the adapter returns with an empty DataObjectCollection, Event Manager will not be able to proceed.

To add business object information to the DataObjectCollection, use the following method:

```
public boolean add(Serializable busDataObj, String busEntity, String busObjKey)
```

Once the adapter is implemented, it needs to be registered with Event Manager in the ADAPTERDEF table, which contains information about the adapter implementation, such as vendor information and the fully qualified name of the adapter class. The ID of the adapter should then be added to the ENTITYEVENTCAT record as a foreign key to the entity event category that uses this adapter. The value from the DWL_PROD_TP_CD field of the PRODENTITY table, which corresponds to the PRODENTITY_ID of that entity event category, should be used as the busSysID input parameter when calling the ProcessController bean. To find out more about calling the ProcessController bean, see “Calling Event Manager from the business system.”

Calling Event Manager from the business system

To notify Event Manager about business transactions, the business system can call one of the processTask() methods of the ProcessController bean. The ProcessController bean is a stateless session bean and is registered under the JNDI name ProcessController.

Once the processTask() method is invoked, Event Manager places one or more EventTaskObjects with all information from the input parameters in the JMS work queue. After the task object is put in the work queue, the call to the processTask() method returns to the business system. Asynchronously, the EventDetectorMDB then picks up the task object from the queue, calls the business adapter to retrieve that business object, and calls the EventDetectorHelperBean to detect the event.

Depending on which processTask() method to call, Event Manager either detects events for all event categories configured in the ENTITYEVENTCAT table for the business system or business entity combination, or detects events for event categories that are explicitly passed to Event Manager

Detecting events for all configured event categories

To detect events for all the configured event categories for the business system or business entity combination, use the following processTask() method.

Execute the processTask() method as follows:

```
void processTask(String busSysID, String busObjKey, Serializable transObj,
     String busEntity)
```

Method processTask() requires the following as input parameters:

- **String busSysID**—Provides the value from the DWL_PROD_TP_CD field of the record in CDDWLPRODTP table, containing the business system information. This should also be the DWL_PROD_TP_CD field in the PRODENTITY record, which corresponds to the business system/business entity combination.
- **String busObjKey**—Provides the actual primary key of the business object within the business system.

This processTask() method uses the busSysID ad BusEntity values to look up the PRODENTITY_ID from the PRODENTITY table. It then looks up the ENTITYEVENTCAT table to find all the event categories that are configured for the PRODENTITY_ID.

For example, the sample data provided for Event Manager contains this data:

Sample Contents - CDDWLPRODUCTTP

DWL_PROD_TP_CD	DWL_PROD_NAME	DESCRIPTION	LAST_UPDA...
1	TCRM	DWL Customer	Sep 30, 2004...

Sample Contents - PRODENTITY

PRODENTITY_ID	DWL_PROD_TP_CD	NAME	DESCRIPTION
10	1	CONTACT	DWL Customer Person Business Object for Customer

Open Table - ENTITYEVENTCAT

ENTITYEVENTCAT_ID	PRODENTITY_ID	ADAPTERDEF_ID	EVENT_CAT_CD	ENTEVENTCATOPT_ID
6001	10	2	1	2
6002	10	2	2	2
6003	10	3	3	0
6004	10	3	4	0
6005	10	2	5	1

If the busSysID 1 and busEntity CONTACT are passed into this processTask() method as arguments (which yields the lookup of PRODENTITY_ID of 10), all four event categories could be triggered for event detection. However, since the ENTEVENTCATOPT_ID=2is for the first two event categories, only these two categories are triggered for event detection. See “Setting up the processing option for event detection” on page 370 for the use of the ENTEVENTCATOPT_ID.

Depending on the implementation of the business adapter, some of the input parameters in processTask() method may be optional. For example, if the transObj input parameter has the primary key and entity name of the business object, then the busObjKey and busEntity input parameters can be omitted. If the transObj input parameter is not present, then values for the busObjKey and busEntity parameter must be provided. See "Writing the business adapter" on page 376 for more information.

Detecting events for explicit event categories

To detect events for event categories that you want to specify explicitly, use the following processTask() method.

Execute the processTask() method as follows:

```
void processTask(EventTaskParameters eventTaskParameters)
```

The EventTaskParameters object allows you to specify one or more event categories. The following code snippet shows how to construct a EventTaskParameters object that can be used as argument to the processTask() method:

```
...
// first argument for busSysID = 1
// transSerObj = transaction object
EventTaskParameters parameters =
 new EventTaskParameters("1", null, null,
             transSerObj);
// EventCategorySelection object associates
// business entity with one or many event categories
// busEntity = "CONTACT"
EventCategorySelection eventCatSelection =
 new EventCategorySelection("CONTACT");
// associates "LifeEvents"
eventCatSelection.addCategoryType(new Long(1));
// associates "CreateSuspects"
eventCatSelection.addCategoryType(new Long(3));
parameters.addEventCategorySelection(eventCatSelection);
...
```

The code snippet above creates the parameters to detect only two types of event categories: LifeEvents and CreateSuspects for the business system and business entity combination 1 and CONTACT. Note that although two categories are specified explicitly, Event Manager still looks up the ENTITYEVENTCAT table to ensure that the event category is valid for the PRODENTITY_ID configured for the business system/business entity combination, and to determine the ENTITYEVENTCATOPT_ID configured. Since LifeEvents is the only event category that has the ENTITYEVENTCATOPT_ID field set to 2, only LifeEvents is detected.

Creating user explicit events

To add a user explicit event, call the processTask() method of ProcessControllerBean.

Execute the processTask() method of ProcessControllerBean as follows:

```
void processTask(String busSysID, String busObjKey, EventObj eventObj, String
     busEntity)
```

This method takes the same input parameters as the processTask() method described in “Detecting events for all configured event categories” on page 378, except for EventObj eventObj, which provides the EventObj containing information about the user explicit event.

You do not have to provide event definitions, as user-explicit events are not predefined. If the user-explicit event is set to trigger a notification, set the notification flag to true on the EventObj, using the method setDoNotification (Boolean doNotification).

Starting time-based event detection

When the PROCESSCONTROL and PROCESSACTION tables are set up properly, either automatically as a result of the business system calling into Event Manager or by manually adding records to these tables. Events can be re-evaluated by starting the EventDetectionScheduleController.

The EventDetectionScheduleController is a Java class. Its main() method opens a socket on the server where it is run. After the socket is opened, you issue an EventDetectionCommand to tell the EventDetectionScheduleController how to interact with Event Manager on the server. You can issue an EventDetectionCommand to do one of four things:

- Start processing an event category, specifying an event category ID
- Cancel processing an event category, specifying an event category ID
- Get status on the EventDetectionScheduleController (for example, which event categories are currently being processed)
- Shut down the EventDetectionScheduleController

Using the EventDetectionScheduleController, you can detect events of different categories concurrently

Five cripts are provided to process time-based event detection:

- startScheduleController.sh
- runEventDetection.sh
- cancelEventDetection.sh
- statusScheduleController.sh
- shutdownScheduleController.sh

Here is some example usages for the scripts:

- To begin processing events for LifeEvents and CreateSuspects categories, run the following scripts:
  - startScheduleController.sh
  - runEventDetection.sh
  - runEventDetection.sh
- To stop processing event for LifeEvents while continuing with other scheduled event detections, run the script cancelEventDetection.sh.
- To stop processing all scheduled event detections and shut down the scheduler, run the script shutdownScheduleController.sh.

Configuring the EventDetectionScheduleController

The EventDetectionScheduleController class calls the ProcessControllerInternal session bean. The location of the bean is configured in the EventManagerClient.properties file in the property ProcessControllerInternal.PROVIDER_URL.

After an event detection is started, the EventDetectionScheduleController keeps sending requests to the application server to process due events. If the server is restarted, the EventDetectionScheduleController must also be restarted. The following properties can be changed in EventManagerClient.properties to fine tune the behavior of the process capacity of the EventDetectionScheduleController:

- **EventDetectionScheduleControllerHost**—Indicates the host server on which EventDetectionScheduleController runs. The EventDetectionCommand that you invoke tries to communicate with the EventDetectionScheduleController on this server.
- **EventDetectionScheduleControllerPort**—Specifies the port number where you want the EventDetectionScheduleController to open a connection. The EventDetectionScheduleController uses this port to listen for EventDetectionCommand.
- **EventDetectionJobDefaultCycle**—Specifies the cycle (in milliseconds), or the interval at which a job runs. Since you may run different jobs on the server, consider running different jobs at different intervals, depending on the priority of the job. In this case, override the default cycle by specifying a `-cycle` argument when you run the runEventDetection.sh script.
- **EventDetectionMaximumTasksInQueueOverride**—Specifies an estimated maximum number of tasks that can be put on the queue among all the jobs that are scheduled to run on the server. If this value is omitted or is zero, the max_messages_in_tasks_queue property in the EventManager.properties file on the server is used.

Configuring the notification topic

Event Manager uses the notification component to send XML messages to the topic, which is a publish-subscribe type of JMS destination. Notification is issued for each event if that event's definition is configured in the CDEVENTDEFTP table with the ENABLE_NOTIFY field set to Y.

For the user explicit events, notification can be turned on or off for each event individually.

The topic must be registered with the JMS provider and the topic name must be configured in the database. To use the topic with Event Manager, set the topic name in the `/IBM/EventManager/Notification/topic` configuration in Configuration and Management.

Below is the sample of the XML notification sent for TCRMPartyBObj with primary key 6500019390515 on the occurrence of a retirement event:

```
<EventNotification>
    <EventDefName>Retirement</EventDefName>
    <BusSysID>2</BusSysID>
    <EntityName>TCRMPartyBObj</EntityName>
    <BusinessObjKey>6500019390515</BusinessObjKey>
```

```
    <EventDescription>Retirement</EventDescription>
    <EventTrigger>TimeTriggered</EventTrigger>
    <EventCreateDate>2004-05-16 14:37:59.558</EventCreateDate>
</EventNotification>
```

Chapter 32. Setting and administering the security service

Access to InfoSphere MDM Server data and functionality is controlled both at the application server level and at the application level.

The InfoSphere MDM Server Security Service refers to business transaction access control. For data access control, see Chapter 33, "Controlling the visibility and accessibility of data," on page 391.

Application Server Security

At the application server level, InfoSphere MDM Server enterprise beans and web services port components are configured for each method to only grant access to users in particular roles. InfoSphere MDM Server relies on the application server to perform user authentication. The identities being authenticated are those of the systems consuming the functionality of InfoSphere MDM Server.

InfoSphere MDM Server defines two security roles: ServiceConsumer; and ServiceProvider. All user identities that are authenticated by the application server are placed in the ServiceConsumer role. The methods of the enterprise beans that constitute entry points for other applications (the ServiceController bean, the ProcessControlInternal bean and the web services beans) are configured to grant access to the ServiceConsumer role. Also, these beans use the ServiceProvider role as RunAs security role. All the other enterprise beans, which are not meant to be accessed directly by other applications, have their methods configured.

The ServiceProvider RunAs security role must be bound at deployment time to an actual user identity in the user registry used by the application server. By default, InfoSphere MDM Server binds this role to the InfoSphere MDM Server user identity. You can either create an InfoSphere MDM Server identity in you user registry or bind the role to a different user identity. This identity should not be used for any other purposes and should be reserved for the use of InfoSphere MDM Server enterprise application.

Application Security

InfoSphere MDM Server relies on the application server to establish a trust relationship with the systems consuming its functionality. Once the identity of the outside system invoking a transaction has been authenticated by the application server, it is implicitly trusted by the InfoSphere MDM Server application. InfoSphere MDM Server requires that a user identity be passed in the requests in one of the following forms within the Control object:

- RequesterName and UserRoles properties as clear text values
- Authentication assertion about the identity and its attributes (roles). By default SAML 1.1 assertions are supported

In both these forms the user and role information is about the end-user on behalf of which the request was made. This information is used by the InfoSphere MDM Server application to make access policy decisions and to enforce them.

The security service provides a framework for externalizing access policy decisions. The framework defines the interfaces that a transaction authorization provider must implement to provide the InfoSphere MDM Server application with access

policy decisions on business transactions. InfoSphere MDM Server comes with a default transaction authorization provider which uses a relational database to store information about security policy. In addition to that a transaction authorization provide is provided that uses an LDAP directory to store security access policy information.

The security service also provides a framework for formatting of the authentication assertions. The framework defines the interface required to parse authentication assertion included in the transaction requests. InfoSphere MDM Server comes with a default authentication assertion parser that supports the use of SAML (Security Assertion Markup Language).

In this section, you will learn:

Configuring the security service

The security service provides various configuration options. The security service framework options are defined in configurations with names beginning with `/IBM/DWLCommonServices/Security`.

The default authentication assertion options are defined in configurations with names beginning with `/IBM/DWLCommonServices/Security/SAML`.

See to the "Understanding configuration elements in the Configuration and Management component" on page 419 topic for details about these configurations.

By default InfoSphere MDM Server does not validate the incoming SAML XML with the corresponding XSD based on the configuration above. If the validation is turned on, you must package the SAML1.1 XSD into InfoSphere MDM Server EAR file. This XSD can be downloaded from the OASIS consortium web site. If you do not include the SAML1.1 XSD, the transaction will fail. A log message warning users of the missing XSD is also logged in the InfoSphere MDM Server log.

Additionally, transaction authorization provider-specific configuration may be needed and is discussed in the section for the respective transaction authorization providers.

For information on configuring web services security, see "To enable Web Services security for WebSphere Application Server" on page 353

Understanding the Security Data Manager

The Security Service comes with a Security Data Manager to administer the authorization data for the default transaction authorization provider. As mentioned earlier, the default transaction authorization provider performs the authorization check against a relational database, and the Security Data Manager provides

services to manage the data in these database tables. For more information on the table structure, see “Understanding the default transaction authorization provider” on page 387.

The Security Data Manager consists of a server-side component, which provides the API for data management as well as a web-based administration GUI. Some of the services provided by this manager include:

- Add or update a user profile
- Add or update a group profile
- Add a transaction authorization for a user
- Add a transaction authorization for a group

This interface should be used to add or update authorization data for all out of the box as well as client specific extended transactions. These transactions must first be registered in the CDBUSINESSTXNTP database table. Such extended transactions must be given a primary key greater than 1,000,000. All values less than 1,000,000 are reserved for InfoSphere MDM Server provided transactions.

To retrieve authorization information from the transaction authorization provider during run time, see “Configuring the user management run time API.”

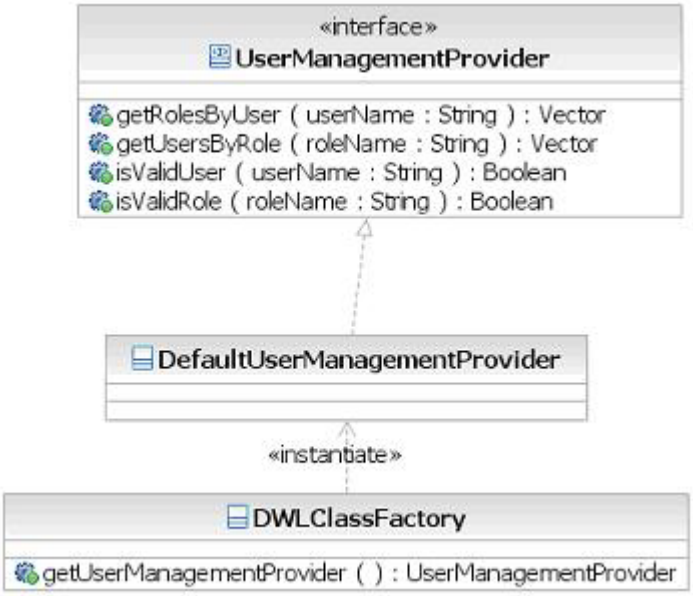
Configuring the user management run time API

You can configure the user management run time API in order to retrieve authorization information from the transaction authorization provider.

The user management run time API is responsible for obtaining the authorization information during run time from transaction authorization provider. The API provides a level of indirection between transaction authorization provider running in InfoSphere MDM Server run time and consumers of user management information, allowing clients to plug in alternative API implementations in order to retrieve users and roles information from external transaction authorization provider.

The UserManagementProvider interface defines the methods for obtaining users and roles information, as shown in class diagram below.

This interface must be implemented by a concrete user management provider class that is responsible for retrieving user and roles information in InfoSphere MDM Server run time. The user management provider class must be registered with InfoSphere MDM Server run time by providing a fully-classified class name as a value for the Configuration Management property /IBM/DWLCommonServices/UserManagement/user_management_provider_class_name.



InfoSphere MDM Server provides a default implementation class (DefaultUserManagementProvider) to retrieve data from the default transaction authorization provider, where authorization information is stored in relational database, with the user represented by a record in USERPROFILE table and the role represented by a record in GROUPPROFILE table:

- **getRolesByUser**—Returns the vector of the role names. The role name is a string containing the value from GROUPPROFILE.group_name field.
- **getUsersByRole**—Returns the vector of the user names. The user name is a string containing the value from the USERPROFILE.user_id field.
- **isValidUser**—Determines if the user is valid, based on whether the user name is present in USERPROFILE.user_id field.
- **isValidRole**—Determines if the role is valid, based on whether the role name is present in GROUPPROFILE.group_name field.

For more details on how to add or update user information for default authentication provider, see "Understanding the Security Data Manager" on page 384.

Understanding the runtime security service

The InfoSphere MDM Server security service provides an interface for performing runtime authorization checks. The Request/Response Framework uses this interface to ensure that each incoming transaction is authorized before processing the transaction. The process of the runtime security check is as follows:

1. An incoming request identifies the user, the user's group name, or both, representing the end user requesting the transaction. For example, for a InfoSphere MDM Server XML transaction, the user and group information can be passed in the DWLControl element of the incoming request. The following is an excerpt of the DWLControl definition in the request XSD showing the attributes relevant to security.

```
<xsd:element name="DWLControl">
  <xsd:complexType>
    <xsd:sequence minOccurs="1" maxOccurs="1">
```

```
      <xsd:element ref="requesterName" minOccurs="0" maxOccurs="1"/>
    ...
      <xsd:element ref="userRole" minOccurs="0" maxOccurs="unbounded"/>
    ...
     </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

requesterName represents the user while userRole contains the group to which the user belongs. Multiple roles can be passed for the given user and the runtime check is performed for all roles.

The information about the end user's identity and roles can be also passed in as SAML 1.1 authentication assertions. The assertions are passed as unparsed character data in the authData element of the DWLControl group.

2. In addition to the user and group information, the input request also contains the name of the transaction to be executed. For the InfoSphere MDM Server XML transaction, this is contained in the TCRMTxType element.

```
<xsd:element name="TCRMTx">
  <xsd:complexType>
    <xsd:sequence minOccurs="1" maxOccurs="1">
      <xsd:element ref="TCRMTxType" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="TCRMTxObject" minOccurs="0" maxOccurs="1"/>
      <xsd:element ref="TCRMObject" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

3. On receiving the request, the Request/Response Framework invokes the security service to perform the authorization check, passing it the user, group and transaction name information.
4. The security service invokes the currently configured transaction authorization providers to check whether the user, one of the groups, or both, are authorized to perform that transaction. If multiple transaction authorization providers are configured, all of them are invoked.
5. If none of the transaction authorization providers respond with authorization, Request/Response Framework returns with a security exception.
6. If at least one of the transaction authorization providers returns with authorization, Request/Response Framework proceeds with the request processing.

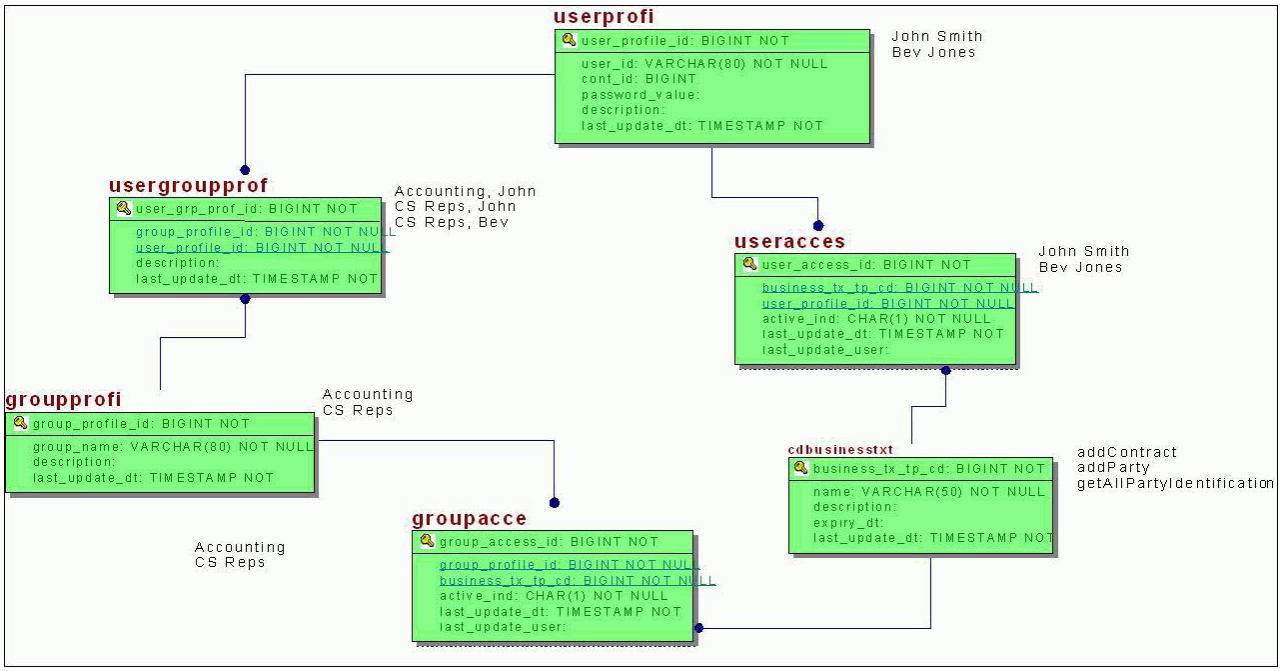
Transaction authorization providers make up the significant part of the runtime security services. The following sections describe the two transaction authorization providers that are included in the security service.

Understanding the default transaction authorization provider

The security service includes a default transaction authorization provider. This provider performs transaction authorization against security data stored in a relational database. The authorization data associates users and groups to the transactions for which they are authorized.

The class name that implements this transaction authorization provides is com.dwl.base.security.provider.DefaultTransactionAuthorizationProvider. In order to use this provider, it should be configured in the configuration repository as described above.

Following data model shows the table structure used for authorization.



The transaction authorization provider and the database are designed so that only the authorization grants are considered. In other words, there is no explicit authorization revoke. Instead, the absence of a user or group authorization for a transaction implies that they don't have access to execute the transaction. Once the security is turned on, authorization data must be configured for the requests to succeed in the authorization check.

Configuring LDAP transaction authorization providers

The LDAP transaction authorization provider implements the transaction authorization check against an LDAP repository. It uses JNDI to connect to the LDAP server and uses the LDAP search functionality to query the directory for a relationship between the transaction and the group or user.

In other words, the LDAP transaction authorization provider is independent of the LDAP server and the directory structure used to store the authorization data. However, following constraints must be considered before using this provider for a specific LDAP server:

- The LDAP server must be accessible using the JNDI interface
- The server must conform to LDAP v2 specifications or later, including the LDAP search filter specifications
- The directory structure containing the group to transaction or user to transaction association must be searchable using search filters. This search filter must result in one or more records, only if the group or user is authorized for that transaction. If the group or user is not authorized for that transaction, the search filter must return 0 records

Given the generic nature of the LDAP transaction authorization provider's implementation, it is expected to work with any LDAP server, if the conditions above are met. However, it has only been tested, and is only supported on:

- IBM Tivoli Directory Server 5.2
- Netscape Directory Server version 4.1

The LDAP transaction authorization provider does not provide any caching feature for the authorized data. Also, the transaction authorization provider does not provide any administration or management of the authorization data in the directory server, as these functions are outside the scope of the provider.

See also:

"To configure the LDAP transaction authorization provider"

To configure the LDAP transaction authorization provider

1. Specify the LDAP transaction authorization provider as the runtime transaction authorization provider in the Configuration and Management repository as follows:
   - `/IBM/DWLCommonServices/Security/enabled = true`
   - `/IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1=com.dwl.base.security.provider.LdapTransactionAuthorizationProvider`
2. Specify the following configurations to indicate the LDAP server and how the LDAP directory tree is implemented:
   - `/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/jndiFactoryClass`
   - `/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/jndiProviderUrl`
   - `/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/base`
   - `/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/Filter/user`
   - `/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/Filter/group`

Refer to "Understanding configuration elements in the Configuration and Management component" on page 419 for details about these configurations.

Configuring a custom transaction authorization provider

Custom transaction authorization providers can be plugged into InfoSphere MDM Server security service and used for runtime security authorization checks.

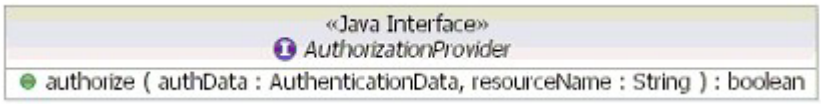
See also:

"To configure a custom transaction authorization provider"

To configure a custom transaction authorization provider

1. Write a transaction authorization provider class to implement the AuthorizationProvider interface.

   This interface is in the com.dwl.base.security.interface package inside the DWLCommonServices. The class specification for this interface is:



   Internally the class can implement the logic directly or by calling into other third party transaction authorization providers such as SiteMinder, ClearTrust and others. It should return true only if the user or the group is authorized for the passed in resource and false otherwise.

2. Configure the new transaction authorization provider class by specifying its name in the configuration repository as shown in the Security Configuration section above.
3. Package the new class in a separate jar, and list this jar in the classpath section of the DWLCommonServices jar's manifest file-this makes the class available in the classpath at runtime.

Using a custom authentication assertions parser

You can create a customized authentication assertions parser for InfoSphere MDM Server to use in parsing the raw authentication assertions.

Authentication assertions can be passed into the InfoSphere MDM Server application to assert the identity of the end user that initiated the business transactions. The assertions must be passed as the authData element of the DWLContol group within a request. The content of the authData element must not be parsed by the request parser. Rather, it should be stored as is. The DWLControl object uses configuration to determine the parser to use in parsing the raw authentication assertions.

See also:

"To use a custom authentication assertion parser"

To use a custom authentication assertion parser

1. Create a class that implements the ISecurityData parser interface.
2. Configure the item /IBM/DWLCommonServices/Security/SAML/security_data_parser in the configuration repository with the name of this class
3. Ensure that the authentication assertions are passed in the request in a form that will not be parsed by the request parser. For example in an InfoSphere MDM Server XML request, the content of the authData element is placed in a CDATA section `<![CDATA[ ... ]]>`.

   The XML response returns the same CDATA section in the response by setting the Control property authData tag name as a value of the configuration element /IBM/DWLCommonServices/XML/Character_only_tags.

Chapter 33. Controlling the visibility and accessibility of data

You can control who sees what and who can add persistent data using data level entitlements, set though the Rules of Visibility and access tokens.

Data level entitlements are rules that dictate whether or not a user can view or persist certain sets of data. InfoSphere MDM Server defines two categories of Data Level Entitlements:

- Rules of Visibility, which control the data that a user is allowed to view, based on the defined rules and constraints
- Persistency entitlements, which control the data that a user is allowed to add or update, based on the defined rules and constraints

This is sometimes referred to as "row and column level security" as both the instance of data and the type of data is considered. An example of controlled instance of data would be where one financial advisor user is not allowed to view a specific party because that party is managed by a different financial advisor user. An example of controlled type of data would be where a given user is not given permission to view addresses and social security numbers for all parties.

InfoSphere MDM Server processes entitlements at two levels:

- At the database level, which is referred to as Accessibility. For Rules of Visibility, this provides database-level filtering of data based on access tokens.
- In the data-level entitlements engine. For Rules of Visibility, this provides post-inquiry filtering of data based on more complex rules and constraints; for persistency entitlements this ensures that the user is entitled to make adds or updates to that party, prior to invoking calls on the database.

These two levels, or mechanisms, should be considered together when deriving a strategy around data level entitlements. For example, the Accessibility mechanism can provide a coarse-grained filtering of data that a user has access to in a high performing manner, followed by additional filtering by the Rules of Visibility engine, which applies a more complex logic that is not suited or possible to contain in database queries.

These mechanisms are described in:

- "Setting Rules of Visibility" on page 392
- "Protecting operational resources" on page 399

In this section, you will learn:

Setting Rules of Visibility

In InfoSphere MDM Server, entitlements refer to users' ability to see information and perform tasks according to the constrains for the user and the group the user belongs to. Setting the data level entitlements—which include both Data Persistency entitlements and Rules of Visibility—are the main subjects of this chapter.

Execution of the Rules of Visibility (RoV) engine and the Persistency Entitlements engine is controlled through the Extension Handler component. Enabling and disabling RoV or Persistency Entitlements requires activating or deactivating the RoV and Persistency Entitlements extension sets—Rules #11 and #12 in the EXTENSIONSET table. Furthermore, complex external constraint evaluation rules may be defined as Java classes or Rule-sets extensions.

For more information about defining RoV, see *IBM InfoSphere Master Data Management Server System Management Guide*.

See also:

"Understanding Data Persistency entitlements"
"Understanding Rules of Visibility permissions" on page 394
"Understanding Rules of Visibility data rules" on page 394
"Understanding the Data Entitlement object model" on page 395

Understanding Data Persistency entitlements

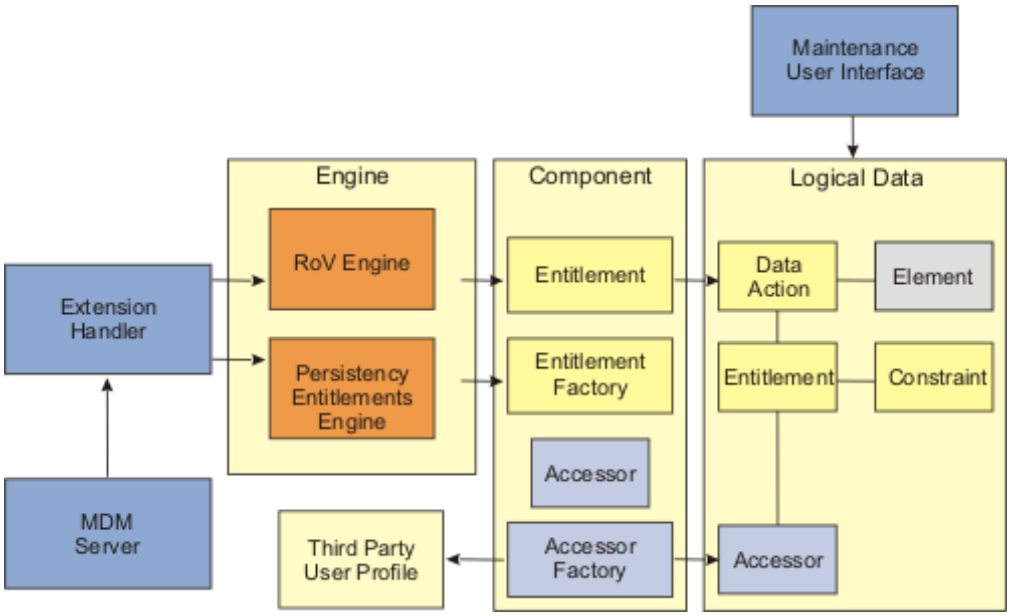
The module contains runtime engines that evaluate data level entitlements, and a user interface and maintenance services that maintain entitlement rules that are stored in the underlying database.

An Accessor, which may be a user or a user group, is entitled to take an Action, for example adding, updating, or viewing, on Elements, for example, the party address, conditional on a set of Constraints.

When you assign data entitlements, note the following points about accessors:

- Entitlements can only be assigned to user types Users and Usergroups
- User ID and user groups are only obtained from the DWLControl object. There is no interface to third party applications to determine who the user is.
- Accessor profile data, for example the user's line of business, are only obtained from the DWLControl object. There is no interface to third party applications to get user data.

"All Users" is supported. Rules that are assigned apply to all users of the system.



Extension Handler

Provides a means to extend the InfoSphere MDM Server product by using an event-based model. The extension handler is configured to respond to certain events, and then evaluate whether any extension sets need to be invoked. An extension set can be either a rule set, such as a JRules ilr file, or a Java class. The Extension Handler is used to plug in product modules such as Rules of Visibility as well as plugging in client extensions-extended elements, new client-defined extensions, and new client-defined transactions.

With regard to data level entitlements, the Extension Handler:

- Invokes the RoV engine at the *post* of all inquiry and persistence transactions
- Invokes the Persistency Entitlements engine at the *pre* of all persistency transactions by entering the required data in the Extension Handler tables to execute those engines under prescribed conditions.

RoV Engine

The responsibility of the RoV Engine is to, when given an object hierarchy, determine which objects and attributes the user is entitled to view. It also eliminates or filters the objects and attributes that the user is not entitled to view.

The RoV Engine collaborates with:

- Accessor Factory to determine who the user is from the list of Accessors
- Entitlement Factory to obtain a list of entitlements for the Accessors
- Entitlement Component to evaluate constraints.

Persistency Entitlements Engine

The responsibilities of the Persistency Entitlements Engine is to, when given an object hierarchy, determine which objects and attributes the user is entitled to persist.

The Persistency Entitlements Engine collaborates with:

- Accessor Factory to figure out who the user is from the list of Accessors
- Entitlement Factory to obtain a list of entitlements for the Accessors

- Entitlement Component to evaluate constraints.

Accessor Factory
The responsibility of the Accessor Factory is to, when given the DWLControl object, determine the user's ID, user groups, party, and the groups the party is in. The Accessor Factory reads user information from the DWLControl object

Accessor Component
The responsibility of the Accessor Component is to provide details of a given accessor, including the user profile details, agent hierarchy details and other information.

Entitlement Factory
The responsibility of the Entitlement Factory is to, when given a list of accessors and an element (object) provide a list of Entitlements.

Entitlement Component
The responsibility of the Entitlement Component is to:

- Evaluate entitlement constraints
- Provide details of elements within an entitlement.

Understanding Rules of Visibility permissions

Permissions include the following:

- When Rules of Visibility and Persistency Data-Level Entitlements is configured On, the default is that users—or generally, an accessor—have no access unless access is explicitly granted
- Permissions can only be granted, not restricted
- Users are entitled to take action on data if there is at least one entitlement rule granting that access, where all the constraints within the rule pass. A union approach is assumed, in other words, OR is assumed between entitlement rules. An example of a union approach—a user who belongs to two user groups wants to access specific data. One of the groups the user belongs to is not allowed to see that data, the other group is allowed to see the data. Because the user belongs to at least one group that is allowed to see the data, the user is allowed to see the data.
- Given the above points, no conflict resolution is required

Understanding Rules of Visibility data rules

Within a transaction, if an accessor does not have access to a given object, then the accessor does not have access to any of the object's children—in other words, an accessor has to be able to see or update a parent object in order to see or update any child objects.

The runtime engines use code table values. The values for each code table are:

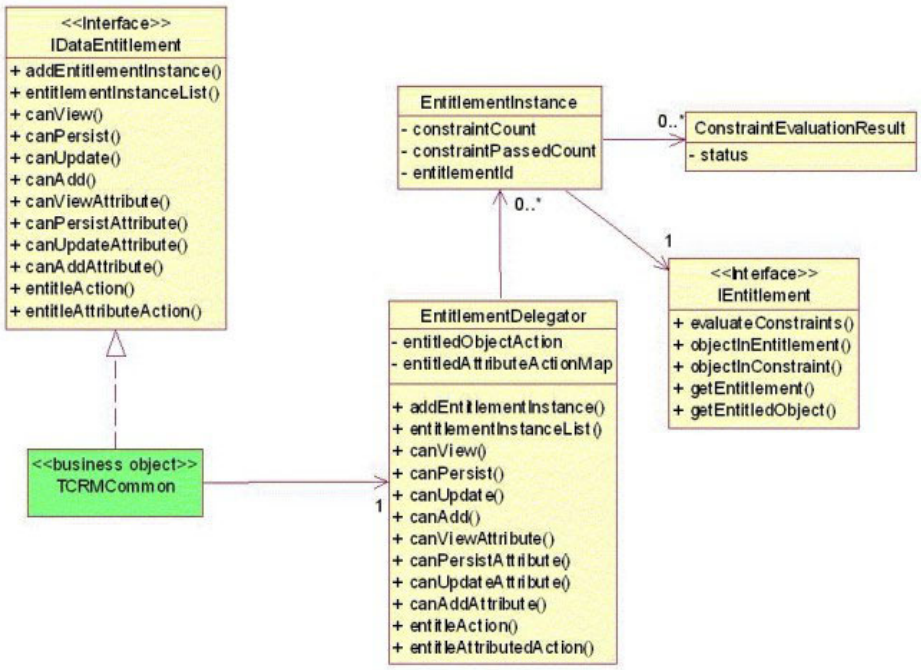
Table.Attribute	In Scope Values	Out Scope Values
Entitlement.accessor_key_tp_cd	User_id	Party_id
	User_group_name	Party_group_id
Entitlement.accessor_tp_cd	User	Party
	Usergroup	Partygroup
	All Users	All Parties

Table.Attribute	In Scope Values	Out Scope Values
DataAction.associated_data_tp_cd	Data_association	Object Attribute
DataAction.data_action_tp_cd	View & Add View & Update View Persist (Add/Update) All	
OperatorType.evaluation_tp_cd	Base_engine	Java_plugin
EntitlementConstraint.operator_tp_cd	Equals Not equals Less than Less than or equal to Greater than Greater than or equal to Can change to In set	
EntitlementConstraint.constraint_tp_cd	EntitlementLevel AttributeLevel (or blank/null)	ObjectLevel
DataAction.permission_tp_cd	Grant	Restrict
EntitlementCondition.rhs_operand_tp_cd	Static Value(s) System Date DWLControl Element Any DateArithmetic	Logical Expression Accessor Data Externally Obtained Object.Attribute value System Timestamp System Time

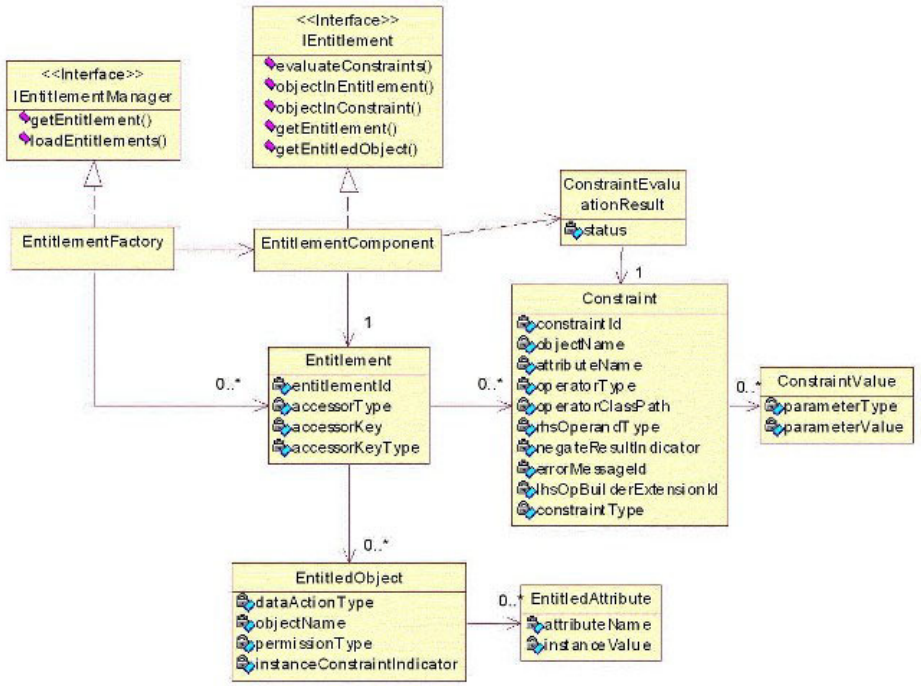
Understanding the Data Entitlement object model

After you create a rule, you can add constraints to further refine the rule.

If there are multiple constraints in a single rule, every constraint must evaluate to true in order for the accessor to be entitled to take action on the data contained in the rule—"and" is assumed between constraints on entitlement.



The object model above shows how the InfoSphere MDM Server business objects are given additional data elements and behavior that are related to Data Entitlement functionality.



This object model shows how the Entitlement Rules defined in the database are represented in objects and their associations with the Entitlement Engine processing components.

Creating and refining a rule

After you create a rule, you can add constraints to further refine the rule.

If there are multiple constraints in a single rule, every constraint must evaluate to true in order for the accessor to be entitled to take action on the data contained in the rule—"and" is assumed between constraints on entitlement.

When there is more than one constraint within an entitlement rule that involves the same type of object, or class, then all constraints for a given object must pass. For example, if "a given user group can view contracts that are within their line of business *and* have a current cash value of less than 1 million dollars", then there are two constraints on the contract object and both constraints must evaluate to true for a given instance of a contract.

See also:

"Setting rule parameters or constraints"

"Implementing simple and complex constraint types"

Setting rule parameters or constraints

As described in *IBM InfoSphere Master Data Management Server System Management Guide*, users define the structure of the constraint in terms of element, operator, operand, and value that the constraint applies to.

A constraint is essentially a logical expression of the left-hand side element, the operator, and the right-hand side operand type/value. For example:

Left side (element)	**Operator**	**Right side (Operand type/value)**
Partyaddress.Undeliverable.ReasonCode	Equals	Static Value / 9
Address.AddressLastUpdateDate	Cannot change to	Any (value)/-

These expressions must evaluate to "true" to take effect.

Implementing simple and complex constraint types

Constraints may be simple or complex, depending on the left side of the expression.

If it refers to an element found within a business object contained in the transaction, and is thus directly available for evaluation, it is a simple constraint. However, if the left-side data element not directly available, evaluating the constraint is a much more complex process, involving additional database reads.

There are two kinds of complex constraints: *attribute level,* and *entitlement level*. An attribute level complex constraint applies to a particular data element contained in a business object within the transaction. An entitlement level complex constraint applies to all areas the user is entitled to access.

Complex constraints are implemented by overriding the LHS value with the value produced by the external Operand Builder from the InfoSphere MDM Server

Extension Framework Java classes or Rule-sets. The Operand Builders are custom programs that have to be written in conjunction to the constraint definition. See the `OperandBuilder.ilr` for an example.

Note: Do not change the `DWLStatus.status` value in OperandBuilder.

Using the Date Arithmetic operand type

The Date Arithmetic operand type can be used for evaluating the date element of a data object against a predefined date arithmetic expression that is based on current system date.

Valid expressions are: `SystemDate; n Year; n Month; n Day; +`; and`-`. The expression must begin with SystemDate.

For example:

```
(LHS) ContractComponent.IssueDate > (RHS) SystemDate - 1 Year + 15 Days
```

Understanding how database tables are affected by Rules of Visibility

There are several database tables that are involved in the three aspects of RoV.

Rules Rules are updated using a combination of the ENTITLEMENT, ENTITLEMENTCONTRAINT, CONSTRAINTPARAM and DATAACTION tables.

Data Groups
Data Groups are set up in the DATAASSOCIATION, ASSOCIATEDOBJECT, and ASSOCIATEDATTRIB tables.

User to Rule Associations
Users to Rule Associations are updated in the ACCESSORENTITILE table.

Sample: Using RoV rules

Below are some sample rules for RoV.

Rule	Data Action	Entitlement Conditions
User can update party information but is not allowed to set the undelivered reason code to 9-harassment	Permission_tp_cd = grant Data_action_tp_cd = all Element_group = data group 1, 2, ...	Attribute = PartyAddress.undeliveredReasonType Operator_tp_cd = cannot change to Rhs_operand_tp_cd = static values Negate_result_ind = No Parameter_value = 9 - harassment
All users are only allowed to view the city/state/zip of foreign addresses that have not been standardized	Permission_tp_cd = restrict Data_action_tp_cd = view Element_group = data group x AccessorType = all users	Attribute = Address.standardFormattingInd Operator_tp_cd = Equals Rhs_operand_tp_cd = static values Negate_result_ind = No Parameter_value = ″N″

Protecting operational resources

InfoSphere MDM Server can be used to protect party and contract information by defining access to that information.

In InfoSphere MDM Server, resources can be protected so that only users who have authorization can operate on the resources. Resources can be any operational assets in the application, such as files, database records, and so on. A resource is protected by assigning it an access token value. A user, or the groups to which the user belongs, may be associated with zero or many access token values. When the user has an associated access token value that matches the access token value on the resource, the user is authorized to operate on the resource.

For example, contracts on the system can be assigned different access token values based on some criteria, such as the line of business to which the contracts belong. If a financial advisor servicing a particular line of business searches on the contracts on the system, the advisor can only view the contracts belonging to that line of business.

Currently, resources that can be protected include CONTACT and CONTRACT records in the database. In other words, InfoSphere MDM Server can be deployed to protect party and contract information.

To enable protected resources, you must:

- Implement authorization for users and groups
- Understand how resources are operated on when this feature is enabled
- Customize access to protected resources, if you have created any extension for InfoSphere MDM Server

See also:

"Enabling protected resources"

"Implementing authorization"

"Understanding operations on protected resources" on page 400

"Setting up access tokens for users and groups" on page 400

"Customizing access to protected resources" on page 403

Enabling protected resources

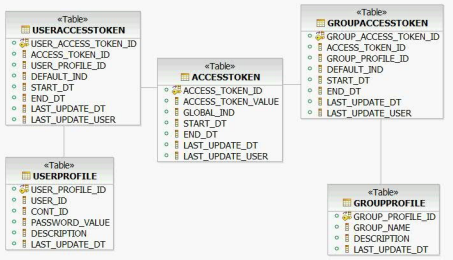
To enable protected resources, set the `INACTIVE_IND` value to N on records 119 and 120 in the EXTENSIONSET table. By default, the values are Y, which means this feature is disabled.

Implementing authorization

Authorization is implemented using access tokens, which must be set.

A user, or the groups to which the user belongs to, can be associated with zero to many access token values. The access token values are set on the `DWLControl` object so that the values are accessible during the transaction.

InfoSphere MDM Server provides a data model to support a default access token authorization.



The `com.dwl.base.accessToken.DefaultAccessTokenAccessor` class is used to retrieve the collection of access tokens associated with the user and group. It then sets this collection to the `DWLControl` object. The collection of access tokens can be retrieved using the `DWLControl.getAccessTokenCollection()` method during the transaction. The collection can be queried using the methods provided by the `com.dwl.base.accessToken.AccessTokenCollection` class.

Implementing another access token accessor

You do not have to manage access tokens with the default data model. If you have a different data model, or an external authorization system that you want to integrate with InfoSphere MDM Server, you may want to use those instead of the default data model.

To override the default access token accessor, set the `CONFIGELEMENT` record `/IBM/DWLCommonServices/AccessToken/AccessTokenAccessor/className` to a value that corresponds to another accessor class implementation. The accessor class must implement the `com.dwl.base.accessToken.AccessTokenAccessor` interface.

Understanding operations on protected resources

Before you begin to define access for users, you must understand how users with different levels of access will be able to work with protected resources.

Currently CONTACT and CONTRACT records can be protected. These two tables contain an `ACCESS_TOKEN_VALUE` column.

If this column on a record contains null, that record is not protected. That is, any user or group can operate on that record. If this column on a record contains a value, that record is protected. Only users that are associated with an access token value that matches the value in that column can operate on that record.

Default access token
: The default access token allows a resource to be created and protected with a specific access token value.

Global access token
: The global access token gives a user authorization to any protected resource, even if the user is not associated with an access token value that matches the access token value assigned to the resource. For example, an administrator can be associated with a global access token.

Setting up access tokens for users and groups

Setting up access tokens for users and groups requires planning based on business needs.

For example, you can set up access tokens based on lines of business, by department, or use other criteria. It is generally more manageable to set up access tokens for groups, and then assign the group to different users.

The following tables show sample records that set up access tokens for users and groups.

Table 35. Sample data for USERPROFILE table

USER_PROFILE_ID	USER_ID
1	GUEST
2	USER
3	ADMINISTRATOR

Table 36. Sample data for GROUPPROFILE table

GROUP_PROFILE_ID	GROUP_NAME
1	CORPORATE
2	INVESTMENT

Table 37. Sample data for ACCESSTOKEN table

ACCESS_TOKEN_ID	ACCESS_TOKEN_VALUE	GLOBAL_IND
1	1000	Y
2	2000	N
3	3000	N
4	4000	N

Table 38. Sample data for USERACCESSTOKEN table

USER_ACCESS_TOKEN_ID	ACCESS_ TOKEN_ID	USER_PROFILE _ID	DEFAULT_IND
1	1	3	N
2	3	2	N

Table 39. Sample data for GROUPACCESSTOKEN table

GROUP_ACCESS _TOKEN_ID	ACCESS_TOKEN _ID	GROUP_PROFILE _ID	DEFAULT_IND
1	2	1	N
2	4	2	Y

The collection of access tokens are based on the `<requesterName>` element, which is the user's name, and `<userRole>` element, which are the groups the user belongs to, in the `<DWLControl>` element in the request.

Suppose the system contains 4 contracts as follows:

Table 40. Example access token values

CONTRACT_ID	...	ACCESS_TOKEN_VALUE
10000000		
20000000		3000
30000000		4000

Table 40. Example access token values (continued)

CONTRACT_ID	...	ACCESS_TOKEN_VALUE
40000000		1000

The following examples illustrate how these 4 contracts can be operated on.

Example 1

Request:

```
<DWLControl>
 <requesterName>GUEST</requesterName>
 <requesterLanguage>100</requesterLanguage>
</DWLControl>
```

Associated access token values: None

Operations

- If this request is to add a contract, the contract is added with an ACCESS_TOKEN_VALUE of null
- If this request is to update contract 20000000, this request is not allowed as this contract has an access token value of 3000
- If this request is to search contracts, this request returns contract 10000000 as this contract has an access token value of null

Example 2

Request:

```
<DWLControl>
 <requesterName>USER</requesterName>
 <requesterLanguage>100</requesterLanguage>
</DWLControl>
```

Associated access token values: 3000

Operations

- If this request is to add a contract, the contract is added with an ACCESS_TOKEN_VALUE of null
- If this request is to update contract 20000000, this request is allowed as this contract has an access token value of 3000
- If this request is to update contract 30000000, this request is not allowed as this contract has an access token value of 4000
- If this request is to search contracts, this request returns contract 10000000 and contract 20000000

Example 3

Request:

```
<DWLControl>
 <requesterName>USER</requesterName>
 <requesterLanguage>100</requesterLanguage>
 <userRole>INVESTMENT</userRole>
</DWLControl>
```

Associated access token values: 3000, 4000 (default)

Operations

- If this request is to add a contract, the contract is added with an ACCESS_TOKEN_VALUE of 4000.
- If this request is to update contract 30000000, this request is allowed as this contract has an access token value of 4000
- If this request is to update contract 40000000, this request is not allowed as this contract has an access token value of 1000
- If this request is to search contracts, this request returns contract 10000000, contract 20000000 and contract 30000000

Example 4

Request:

```
<DWLControl>
 <requesterName>ADMINISTRATOR</requesterName>
 <requesterLanguage>100</requesterLanguage>
 <userRole>CORPORATE</userRole>
</DWLControl>
```

Associated access token values: 1000 (global), 2000

Operations

- If this request is to add a contract, the contract is added with an ACCESS_TOKEN_VALUE of null
- If this request is to update contract 30000000, this request is allowed as this user has a global access token
- If this request is to search contracts, this request returns all 4 contracts

Customizing access to protected resources

You can customize the access to protected resources using access tokens.

Currently, the CONTACT and CONTRACT tables are protected by assigning a value in the `ACCESS_TOKEN_VALUE` column. When extending the `BObjQuery` class for these two tables, append a specially marked SQL segment to search for possibly zero to many access token values that are associated with the user. At run time, InfoSphere MDM Server resolves the collection of access token values.

The specially-marked SQL segment is shown below.

For selecting from the CONTACT table:

```
<< AND (CONTACT.ACCESS_TOKEN_VALUE IS NULL OR CONTACT.ACCESS_TOKEN_VALUE IN (<ACCESS_TOKEN_COLLECTION>))>>
```

For selecting from the CONTRACT table:

```
<< AND (CONTRACT.ACCESS_TOKEN_VALUE IS NULL OR CONTRACT.ACCESS_TOKEN_VALUE IN (<ACCESS_TOKEN_COLLECTION>))>>
```

This segment should be appended to an SQL statement where selecting from the CONTACT or CONTRACT table is required. For example:

```
SELECT CONTACT.CONT_ID AS CONTACT_CONT_ID, CONTACT.ACCE_COMP_TP_CD
AS ACCECOMPTPCD24, CONTACT.PREF_LANG_TP_CD AS PREFLANGTPCD24,
CONTACT.CREATED_DT AS CONTACT_CREATED_DT, CONTACT.SINCE_DT AS SINCE_DT,
CONTACT.LEFT_DT AS LEFT_DT,  CONTACT.INACTIVATED_DT AS INACTIVATEDDT24,
CONTACT.CONTACT_NAME AS CONTACTNAME24, CONTACT.PERSON_ORG_CODE AS PERSONORGCODE24,
CONTACT.SOLICIT_IND AS SOLICITIND24, CONTACT.CONFIDENTIAL_IND AS CONFIDENTIALIND24,
CONTACT.CLIENT_IMP_TP_CD AS CLIENTIMPTPCD24, CONTACT.CLIENT_ST_TP_CD AS CLIENTSTTPCD24,
CONTACT.CLIENT_POTEN_TP_CD AS CLIENTPOTENTPCD24, CONTACT.RPTING_FREQ_TP_CD AS RPTINGFREQTPCD24,
CONTACT.LAST_STATEMENT_DT AS LASTSTATEMENTDT24, CONTACT.PROVIDED_BY_CONT AS PROVIDEDBYCONT24,
 CONTACT.LAST_UPDATE_DT AS LASTUPDATEDT24, CONTACT.LAST_UPDATE_USER AS LASTUPDATEUSER24,
CONTACT.ALERT_IND AS CONTACT_ALERT_IND, CONTACT.LAST_UPDATE_TX_ID AS LASTUPDATETXID24,
```

```
DO_NOT_DELETE_IND DO_NOT_DELETE_IND, CONTACT.LAST_USED_DT AS LASTUSEDDT,
CONTACT.LAST_VERIFIED_DT AS LASTVERIFIEDDT, CONTACT.SOURCE_IDENT_TP_CD AS SOURCEIDENTTPCD,
CONTACT.DO_NOT_DELETE_IND DO_NOT_DELETE_IND, CONTACT.ACCESS_TOKEN_VALUE AS ACCESS_TOKEN_VALUE,
CONTACT.PENDING_CDC_IND AS PENDING_CDC_IND FROM CONTACT WHERE ( CONTACT.CONT_ID = ? )
<< AND (CONTACT.ACCESS_TOKEN_VALUE IS NULL OR CONTACT.ACCESS_TOKEN_VALUE IN (<ACCESS_TOKEN_COLLECTION>))>>
```

Chapter 34. Using the Configuration and Management components

The Configuration and Management components support the operational configuration and management of applications. They enable administrative users to deploy, fine-tune, and manage applications within their runtime environment.

The Configuration and Management components allow you to configure and manage both standalone and enterprise applications. Currently, these components are only available for InfoSphere MDM Server and InfoSphere MDM Server Event Manager enterprise applications, not for the InfoSphere MDM Server Batch Controller application.

For details on using the Management Agent and Management Console, see the Using the Configuration and Management Components section of the *IBM InfoSphere Master Data Management Server System Management Guide*. This guide also includes a section with information about performing bootstrap configuration for the Configuration and Management components.

In this section, you will learn:

Understanding configuration

To recognize the different sets of requirements that apply to application configuration before and after the application has been deployed in the operational environment, configuration is divided up into two categories: static and dynamic.

- **Static**—Usually new code or resources can be added as a result of changing static configuration. Consequently, the application would have to be rebuilt,

retested, and redeployed. Static configuration setting can be changed through the Configuration and Management system, but changed values will only take effect after you restart the application server.

- **Dynamic**—Configuration that controls the behavior of the application while operational is considered to be dynamic. The application observes and reacts to changes in its dynamic configuration without having to be rebuilt, retested, or redeployed. Changes in dynamic configuration do not result in application resources having to be added, changed, or removed.

Learning the Configuration and Management architectural overview

The focal point of the Configuration and Management components is the Configuration and Management database that stores the application configuration. Applications read their configuration from the Configuration and Management database through the application configuration client. Administrators use the Management Console to view and change the configuration stored in the Configuration and Management database through the Management Agent.

There are three basic topologies that are relevant for the understanding of how the Configuration and Management components interact. These topologies are based on the types of managed applications:

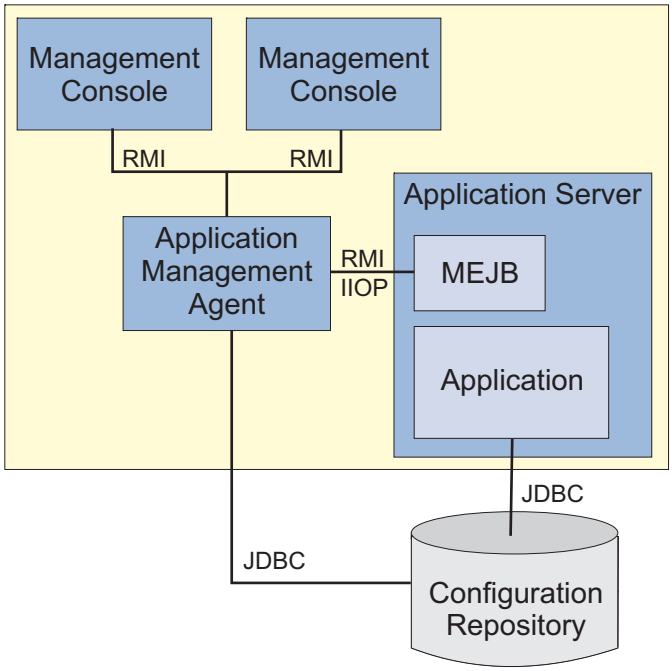
- Stand-alone enterprise application
- J2EE clustered enterprise application
- Custom clustered enterprise application

In all of these topologies, the Configuration and Management database is available either locally or remotely to both the Management Agent and the application. The Management Console and the Management Agent are always located on the same computer. The main differences between these topologies are found in the ways in which the Management Agent communicates with the application to inform it about changes to configuration.

Understanding the stand-alone enterprise application

In this topology, the Management Agent communicates with the management EJB (MEJB) running on the same application server on which the application runs.

The Management Agent uses the management EJB to locate the JMX MBean of the application and to invoke commands on it.



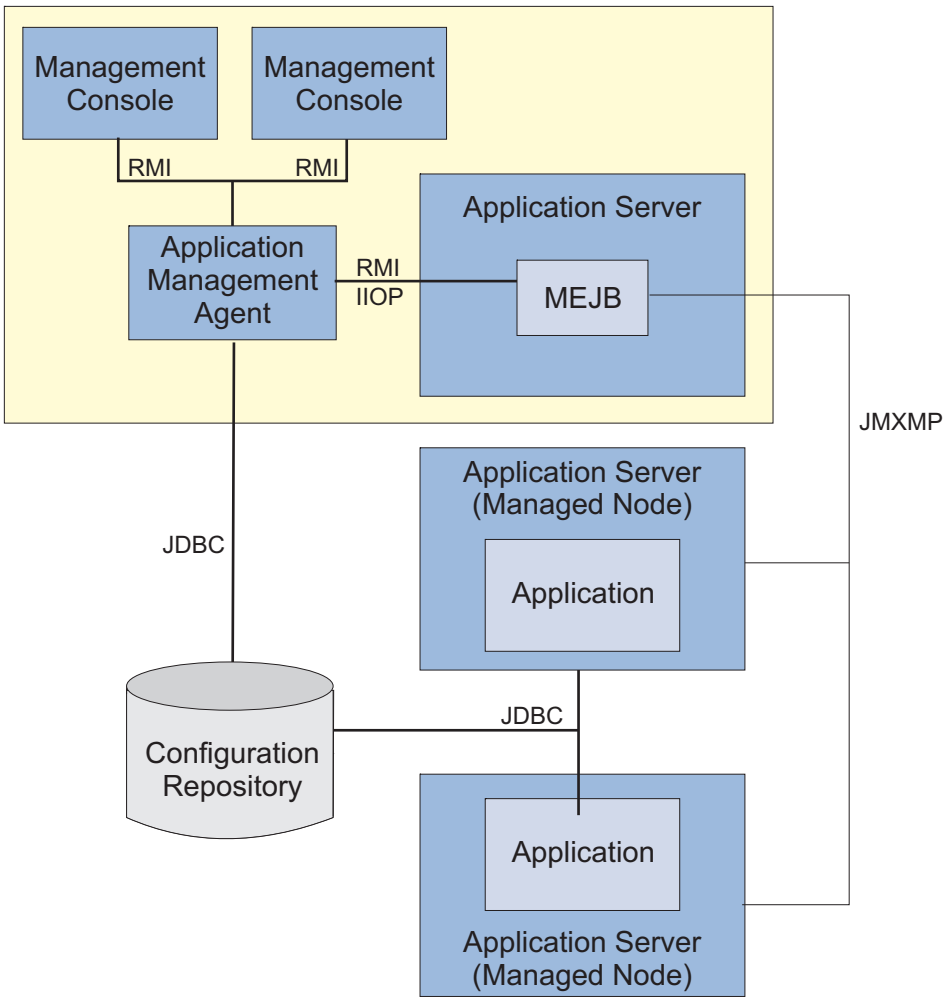
When changes to the dynamic configuration settings are committed to the Configuration and Management database, the Management Agent notifies the application's MBean about these changes so that the application dynamically reloads the configuration.

In this configuration, the Management Agent and the Management Console are located on the same computer as the application server.

Understanding J2EE clustered enterprise application

In this topology, the application is clustered using the clustering capabilities of the J2EE application server. The Management Agent communicates with the management EJB on the managing node of the application server; that is, the deployment manager for WebSphere Application Server Network Deployment Edition.

The Management Agent uses the management EJB to locate particular deployments and instances of the application in the clustered environment or, more precisely, the management beans that control these deployments and instances. This is required so that the Management Agent can inform the application about configuration changes.



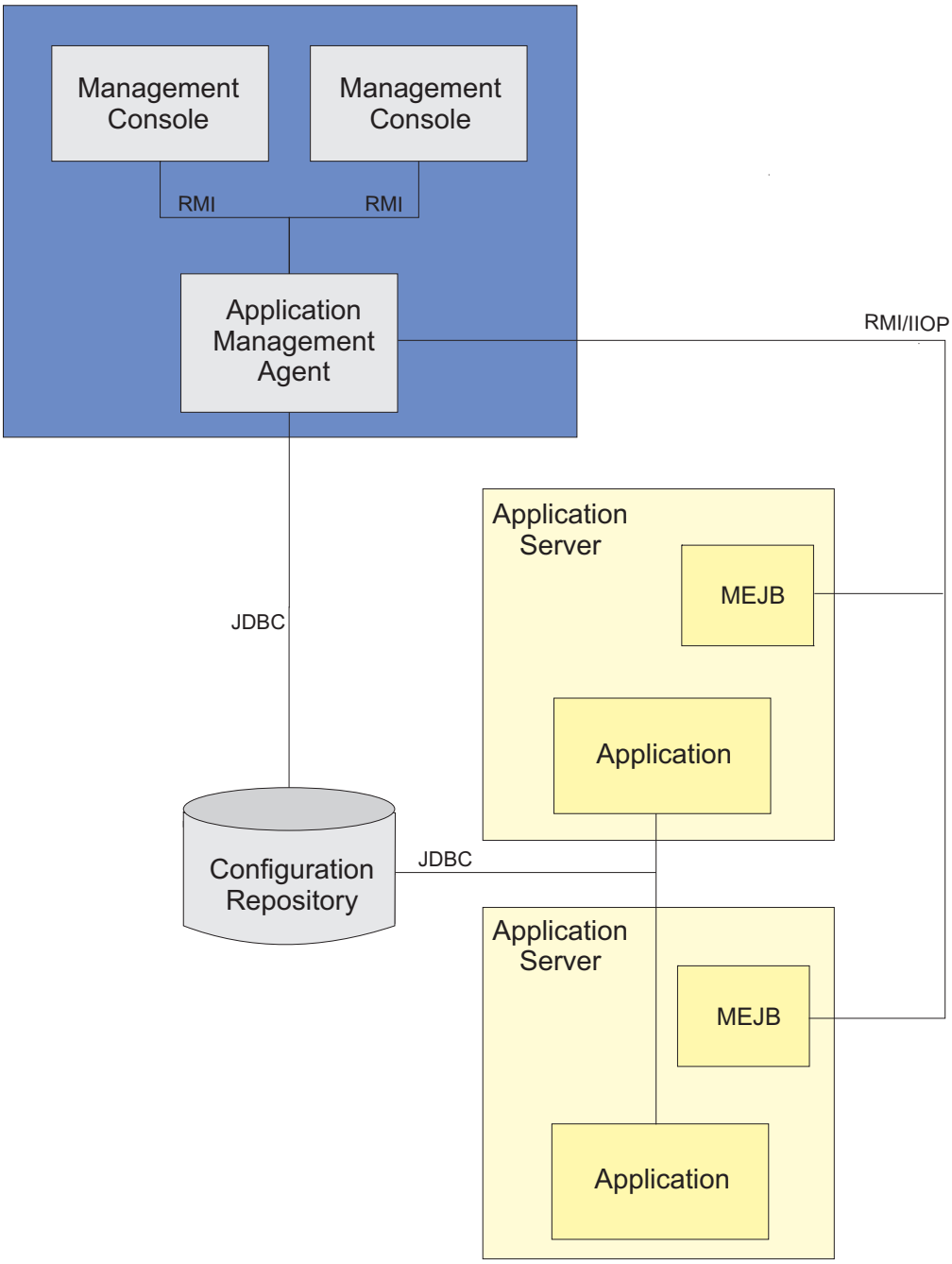
In this configuration, the Management Agent and Management Console are located on the same computer as the managing node of the application server, but not necessarily the same computer as the application itself.

There are no additional administrative actions to be taken whenever the structure of the cluster and the mapping of the application to the cluster changes. The Management Agent automatically discovers the topology of the cluster through the management EJB.

Understanding custom clustered enterprise application

In this topology, the application is clustered in custom ways. The enterprise application is deployed multiple times and it does not appear as a clustered application to the J2EE application server.

The Management Agent communicates with each of the management EJBs on each of the application servers on which the clustered applications are deployed. The Management Agent must be configured to know about each individual node in the custom cluster so that it can inform each application instance about configuration changes.



In this configuration, the Management Agent and Management Console are not collocated on the same computer with any particular application Server.

When there is a change in the structure of the custom cluster, the bootstrap configuration of the Management Agent needs to be updated to reflect the change in structure. For details, see the Management Agent bootstrap configuration section in the *IBM InfoSphere Master Data Management Server System Management Guide*.

Understanding configuration definitions and schemas

Configuration definitions are XML documents that contain all the configuration items and their values, as defined during the development process.

These definitions are packaged in the application archive. They can be modified during the application assembly phase and repackaged with the application. At deployment, the configuration definitions are used to establish the initial configuration in the configuration repository. They can also be used as the vehicle for replicating existing configuration.

Configuration definitions can contain both static and dynamic configuration. For an operational application, the Management Console allows administrators to change both dynamic configuration items and static configuration items, but will give warnings before changing static configuration items.

The configuration definition distributed with the application is considered to contain the factory defaults for the configuration. Any changes to this configuration can potentially be overwritten by upgrades to subsequent versions of the application. If you want to change your configuration while retaining factory defaults, you should do so from the Management Console after the application (and its configuration) is deployed.

The configuration is structured hierarchically and is therefore well-suited to be represented in an XML document. Configuration consists of nodes and items. Nodes are containers for other nodes and items while items represent the actual configurable values. In the XML document the nodes correspond to XML entities while the items correspond to entity attributes.

The root node of the application XML document is the application name in which any spaces have been replaced with hyphens (″-″). If the application consists of modules (for example, an enterprise application that contains EJB and Web modules), the root's immediate child nodes correspond to those modules. If the name of root node of a module's XML documents are same, then all child nodes are put under the same root node. The name of the root node of all modules is IBM. The rest of the nodes are used to structure the configuration logically according to the functional areas within the application or within each module.

The following is an example of application configuration XML:

```
<?xmlversion="1.0"?>
<MDMMergedConfiguration xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                        xsi:noNamespaceSchemaLocation="dwl-config.xsd">
  <IBM>
    <DWLCommonServices>
      <Notifications enabled="false" defaultLanguage="100"/>
      <PerformanceTracking level="0"/>
      <Security enabled="false"/>
      <TAIL enabled="false" maxRecords="100"/>

      <Validation>
        <External enabled="true"/>
      </Validation>
      <XML useValidatingParser="true"/>
      <ExtensionFramework enabled="true"/>
      <RedundantUpdate enabled="false"/>
    </DWLCommonServices>

    <FinancialServices>
      <Contract>
        <Search maxResults="100"/>
      </Contract>
    </FinancialServices>

    <Party>
      <Search maxResults="100"/>

      <Standardizer>
        <Address className="com.dwl.tcrm.coreParty.component.TCRMAddressStandardizer"/>
        <Name className="com.dwl.tcrm.coreParty.component.TCRMPartyStandardizer"/>
      </Standardizer>
```

```
      <SuspectProcessing enabled="true">
        <AddParty returnSuspect="true"/>
      </SuspectProcessing>
    </Party>
  </IBM>
</MDMMergedConfiguration>
```

When the application consists of modules, the final configuration definition is compiled at deployment time by combining together all the configuration definitions, the dwl-config.xml files, found inside the modules into a master configuration definition.

The location of the configuration definitions in the packaged application depends on the managed application type:

- **J2SE Application**—There is only one configuration definition per application. The name of the XML document is dwl-config.xml and it can be found in the META-INF directory of the application JAR.
- **J2EE Application**—There is one configuration definition document for each EJB or Web module and one for the application. All configuration definitions are contained in XML documents named dwl-config.xml that are located in the META-INF directory of the EJB module JAR, Web module WAR, or enterprise application EAR. At deployment time, all the configuration definitions of the EJB and Web modules contained in an enterprise application are merged into the configuration definition found in the enterprise application EAR file. Items in the EAR's configuration definition override items in the module-specific definitions.

Each configuration definition has an XML schema associated with it. This schema is called the configuration definition schema and it is contained in a file named dwl-config.xsd that is packaged together with the corresponding configuration definition document in the EJB, web or application archive. The application's schema references the EJB and Web modules schemas. The schema serves as the metadata to validate the configuration. It can provide information about the cardinalities of the configuration items relative to each other, types of data, and possible values for enumerated items. Configuration definition schemas are deployed in the Configuration and Management database at the same time that the application configuration is deployed.

Configuration definition schemas of InfoSphere MDM Server modules use only local element to avoid name conflict while merging modules' configuration schemas. Use the same method for configuring the definition schemas of client modules. Similar to the way in which the configuration definitions of the modules are compiled into a master configuration definition for the application, the configuration definition schemas for the modules (dwl-config.xsd files) are combined into a master configuration definition schema for the application.

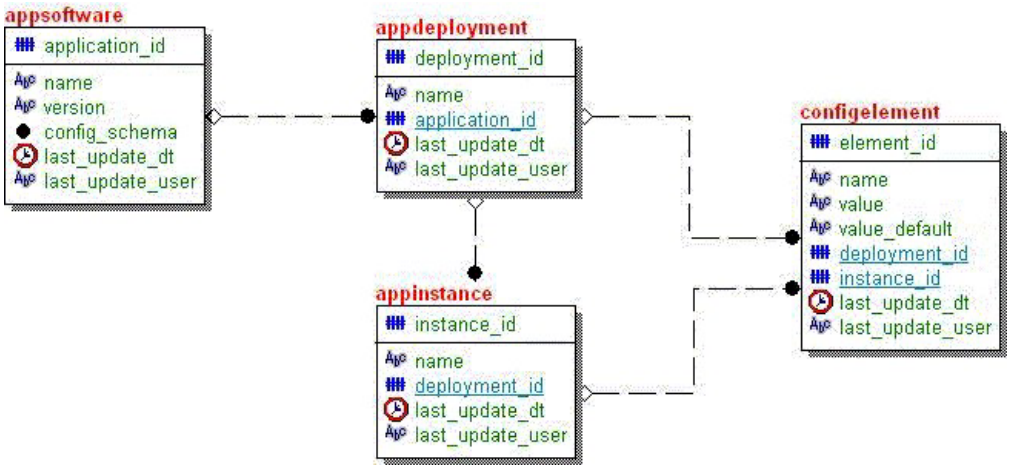
Understanding Configuration and Management database structure

The application configuration is represented in two ways: as an XML hierarchical structure; and as a flat map structure.

- **XML hierarchical structure**—Consists of nodes and items. Each node can contain other nodes and items. Items contain the actual configuration values and the default values. There is only one node that is the root of the configuration tree. The XML hierarchical structure is used when you update a configuration value, or add or delete a configuration node or item.
- **Flat map structure**—Consists of key value pairs, whose key is the canonical name of a specific configuration setting, and whose value is the value of a

specific configuration setting. For performance reasons the map structure is used when reading the configuration value, export configuration settings.

The Configuration and Management database uses a database to store both static and dynamic configuration. Multiple applications can use the same database to store their configurations.



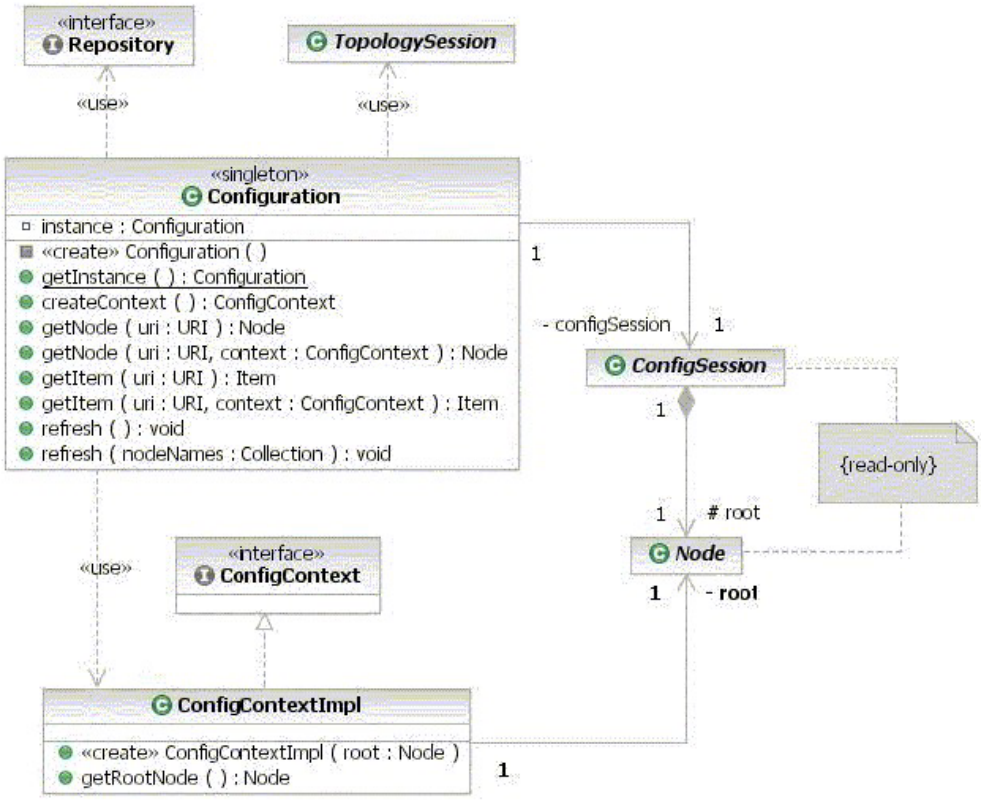
- **appsoftware entity**—Represents a software application whose configuration has been deployed. This entity contains configuration and management information that is specific to a particular application version. The natural key for this entity is the name and version pair.
  - **application_id**—Specifies anumeric artificial key used to uniquely identify an application. This is used instead of the composite natural key to help reduce the size of the key.
  - **name**—Specifies the name of the application. This name corresponds to the application or J2EEApplication key properties found in the object name of the application management bean.
  - **version**—Specifies a string that represents the version of the application. The format of this string is ##.##.##.### representing the major version, minor version, fix pack and hot fix numbers.
  - **config_schema**—Specifies an XML schema representing the configuration definition schema used by this application version. This attribute is a CLOB.
  - **Config_XML**—Specifies XML schema representing the configuration definition used by this application version. This attribute is a CLOB.
  - **last_update_dt**—Specifies the date and time of the last update operated on this entity. If not provided, this attribute defaults to the date and time of the access.
  - **last_update_user**—Specifies the user account name of the user that initiated the update.
- **appdeployment entity**—Corresponds to an installation (deployment) of the application in the operational environment. Each deployment is uniquely identified by its name across all applications of the same kind and version. The deployment name and the application key form the natural key for this entity.
  - **deployment_id**—Specifies an artificial numeric key used to uniquely identify a deployment of a particular application version. This is used instead of the composite natural key to help reduce the size of the key.

  - **name**—Specifies the name of the deployment. This name must be unique across all deployments of an application version. The name is also the natural key of this entity.
  - **last_update_dt**—Specifies the date and time of the last update operated on this entity. If not provided, this attribute defaults to the date and time of the access.
  - **last_update_user**—Specifies the user account name of the user that initiated the update.
- **appinstance entity**—Corresponds to a runtime instance of an application. It is used to identify application instances that need to override configuration items. If no application instance is defined for an application deployment, then all instances of that deployment use exactly the same configuration.
  - **instance_id**—Specifies aa artificial numeric key used to uniquely identify an instance of a particular application version. This is used instead of the composite natural key to help reduce the size of the key.
  - **name**—Specifies the name of the instance. This name must be unique across all instances of a deployment. The name is also the natural key of this entity.
  - **deployment_id**—Specifies an artificial numeric key used to uniquely identify a deployment of a particular application version. This is used instead of the composite natural key to help reduce the size of the key.
  - **last_update_dt**—Specifies the date and time of the last update operated on this entity. If not provided, this attribute defaults to the date and time of the access.
  - **last_update_user**—Specifies the user account name of the user that initiated the update.
- **configelement entity**—Corresponds to one configuration element. An element can be either a node or an item. A node contains other elements. An item contains a value. The natural key of this entity is name of the configuration element.
  - **element_id**—Specifies an artificial numeric key used to uniquely identify a configuration element within a deployment or application instance. This is used instead of the composite natural key to help reduce the size of the key.
  - **name**—Specifies a hierarchical name that uniquely identifies a configuration item within the scope of a deployment or application instance. This is also the natural key of this entity.
  - **value**—Specifies the currently-assigned value of the configuration item in its string representation. If this field is null, then the value from the value_default field is used. If this element is a node, the value is always null.
  - **value_default**—Specifies the factory default value of the configuration item in its string representation. If this element is a node, the value_default is always null.
  - **deployment_id**—Specifies an artificial numeric key used to uniquely identify a deployment of a particular application version. This is used instead of the composite natural key to help reduce the size of the key.
  - **instance_id**—Specifies an artificial numeric key used to uniquely identify an instance of a particular application version. This is used instead of the composite natural key to help reduce the size of the key.
  - **last_update_dt**—Specifies the date and time of the last update operated on this entity. If not provided, this attribute defaults to the date and time of the access.
  - **last_update_user**—Specifies the user account name of the user that initiated the update.

Using the Application Configuration Client

Applications can use the Application Configuration Client to access the configuration at runtime. This client provides read-only access to the Configuration and Management database using a configuration repository adapter. The adapter itself is pluggable and can be replaced to access different types of configuration repositories. InfoSphere MDM Server provides a database-based Configuration and Management database and its corresponding repository adapter.

The Application Configuration Client provides programmatic read-only access to the application's configuration. The Configuration class and the ConfigContext interface are the main elements of the Application Configuration Client:



Understanding the Configuration class

The Configuration class provides applications with read-only access to the Configuration and Management database. The Configuration class is a singleton whose sole instance can be obtained through the getConfiguration() method.

Attention: In J2EE applications, a singleton does not span multiple JVM instances. Therefore, the semantics of the Configuration singleton are only maintained while in the same JVM instance as the calling code.

You can browse the Configuration and Management database with the Configuration object using one of two modes:

- **Context-free access**—Allows the calling code to see the latest values in the Configuration and Management database. One effect of context-free access is that multiple queries on a given configuration item can yield different values if

an administrator has changed that item outside of the application. This might be an undesired effect (for example, when an application is processing a business transaction that requires a consistent view of the configuration).

Context-based access—Ensures that, within the scope of an established context, an application can query a configuration item any number of times and it will still yield the same result, regardless of whether that item has been modified outside of the application.

For context-based access, it must be noted that the context is valid only within the process (JVM) in which it was created. If an application needs to ensure a consistent view of the configuration across multiple processes, it must itself ensure that the configuration is passed in remote calls from process to process. Another option is the use of a distributed cache for the Configuration singleton.

In addition to providing access to the Configuration and Management database, the Configuration class provides information about the application's name and version. These are retrieved from the manifest file in the application's archive (JAR, WAR, or EAR). The class that triggers the Configuration class to load must itself be loaded from an archive. This archive must contain a manifest file (META-INF/MANIFEST.MF) that, within its main attributes, contains two attributes: Application-Name and Application-Version.

Understanding configuration methods

The Configuration and Management components support several configuration methods.

- **public synchronized static Configuration getConfiguration()**—Provides the caller with the sole instance of the Configuration singleton.
- **public ConfigContext createContext()**—Obtains a context to access the Configuration and Management database. This context can then be used with other methods that are capable of context-based access to the Configuration and Management database.
- **public Node getNode(String canonicalName)**—Retrieves a configuration node based on its canonical name, in a context-free manner.

  A canonical node name consists of the names of all the node's ancestors' names up to the root of the configuration tree, separated by the forward slash character (/). The root is designated by a forward-slash character.

  An example of a canonical node name is `IBM/Party/Search`.
- **public Node getNode(String canonicalName, ConfigContext context)**—Retrieves a configuration node based on its canonical name, in a context-based manner.
- **public Item getConfigItem(String canonicalName)**—Retrieves a configuration item based on its canonical name, in a context-free manner.

  A canonical item name consists of the names of all the node's ancestors' names up to the root of the configuration tree, separated by the forward slash character (/). The root is designated by a forward-slash character.

  An example of a canonical item name is `/IBM/Party/Search/maxSearches`

  Attention: Item getItem(String canonicalName) is deprecated
- **public Item getItem(String canonicalName, ConfigContext context)**—Retrieves a configuration item based on its canonical name, in a context-based manner.
- **public synchronized void refresh()**—Triggers a refresh of the configuration to ensure that the latest changes to the dynamic config settings made in the Configuration and Management database are visible to the application.

The refresh operation only applies to context-free configuration. Context-based configuration access is unaffected and the application continues to see the same values for the configuration items as when the context was created.

When the refresh operation is invoked, the configuration may reload immediately, but it is not guaranteed. The configuration is reloaded, at the latest, at the time of the first access after a refresh operation was invoked. That means that more changes can occur in the interval between when the refresh operation was invoked and the first configuration access.

Applications should not rely on the timing of these operations to synchronize themselves with changes in the Configuration and Management database.

Attention: getItem(String canonicalName, ConfigContext context) is deprecated.

- **public synchronized void refresh(Collection canonicalNodeNames)**—Triggers a refresh of the configuration. This is similar to refresh(), except that it refreshes particular nodes that are passed as parameters to the call.

  The refresh applies to the nodes passed as parameters and all their configuration sub-trees.
- **public static String getApplicationName()**—Returns the name of the application as recorded in the manifest of the application archive under the Application-Name attribute.
- **public static String getApplicationVersion()**—Returns the version of the application as recorded in the manifest of the application archive under the Application-Version attribute.

Understanding the ConfigContext class and public Node getConfigItemsMap() method

Be familiar with the class and method for the Configuration and Management components. The method retrieves information from the context.

The ConfigContext class is used to establish a read-only configuration context in which the configuration is guaranteed not to change for as long as the context is maintained. This is useful for clients that need to ensure that all the code executing under the same transaction will have a consistent view of the configuration, independent of changes to the configuration external to the transaction.

Note: The context only applies within the same process (JVM) in which it was created.

For transactions that execute across many processes, the client is responsible for ensuring a consistent view of the configuration, possibly by passing those configuration values through all the method calls in the transaction.

The public Node getConfigItemsMap() method retrieves the map of the configuration corresponding to the context.

Adding configuration nodes and items

New configuration nodes and items can be added as part of the development process. All configuration items can also be customized as part of the application assembly process.

See also:

"To add configuration nodes and items"

To add configuration nodes and items

1. Add the new configuration nodes and items to the configuration definition, which is located in the dwl-config.xml file.

   If you are extending the base InfoSphere MDM Server product with your own configuration definition, put this definition file in the META-INF directory of the extension module's JAR file.
2. Add the new configuration nodes and items to the configuration definition schema, which is located in the dwl-config.xsd file.

   If you are extending the base InfoSphere MDM Server product with your own configuration definition schema, put this definition file in the META-INF directory of the extension module's JAR file.

   When the system manager changes the value of the configuration setting through Management Console, it validates the value against the configuration schema. Therefore, put constraints on making changes to those values.

Broadcasting configuation changes

The JMX notification model is used to broadcast configuration data changes when there is a refresh change to a dynamic configuration item. If the broadcast change occurs before a refresh, put the change in preRefresh; if the broadcast change occurs after the refresh, put the change in postRefresh.

See also:

"To broadcasting configuration data changes"

To broadcasting configuration data changes

1. Register JMX listeners to receive and handle configuration data change notification. The name of JMX listener is configured in the bootstrap.properties file.

   Here is an example of how to update the bootstrap.properties file:

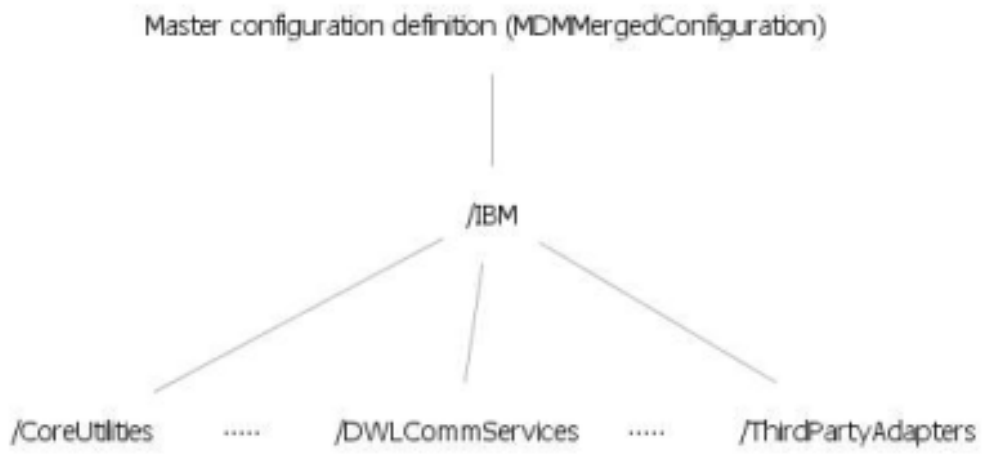
   ```
   JMXListeners.className.1= com.dwl.management.config.client.mbean.listeners.LoggingChangeListenerMBean
   JMXListeners.className.2=<other listener mbean>
   ```
2. Use the implementation of the LoggingChangeListenerMBean to dynamically change logging level and file path setting.

Working with configuration data

The individual dwl-config.xml files at the module level are combined into a master configuration definition file at deployment time. Similarly, the dwl-config.xsd files are combined into a master configuration definition schema file. Once deployed, use Management Console to change the value of any of the configuration elements.

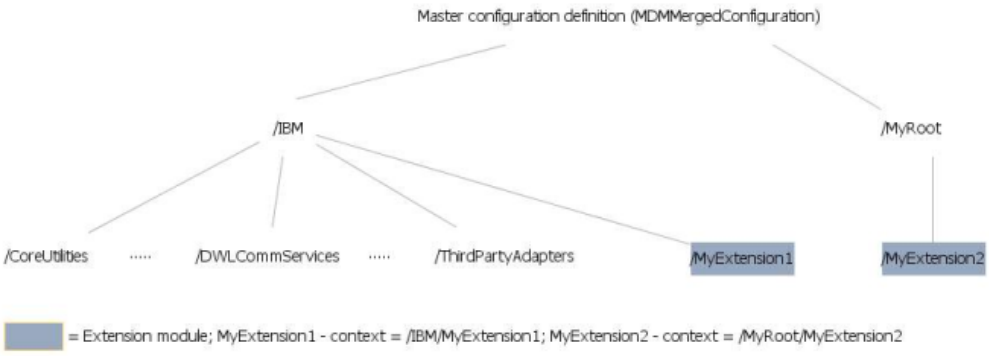
This is described in the topic on "Understanding configuration definitions and schemas" on page 409.

The following diagram shows the deployment for the base InfoSphere MDM Server modules:



If you create your own module to extend InfoSphere MDM Server, including your own `dwl-config.xml` and `dwl-config.xsd` files, deploy them so that they are combined into the master configuration definition file and master configuration definition schema file.

The following diagram shows an example of deployment with extensions:



InfoSphere MDM Server provides several options to deploy and remove the configuration data. You can use the Management Console to perform any of these options:

- **Deploying the application configuration**—Uses the EAR file as the input and combines the dwl-config.xml and dwl-config.xsd in each of the modules found in the EAR file. This option uses the default value for each of the configuration element. Use this option if you want to load the entire master configuration definition with the default values.
- **Removing the application configuration**—Removes the entire deployed master configuration definition. Use this option if you want to remove the entire deployment.

  Note: Any value that you have specified for any configuration elements will be lost.
- **Partially deploy the application configuration**—Uses a JAR file (that is, a module) as the input and adds nodes to the deployed master configuration

definition based on the way the context is defined in the dwl-config.xml and dwl-config.xsd in the JAR file. If you have specified any values for configuration elements in any existing nodes, the values will not be affected. Use this option if you want to add to the master configuration definition.

To use this option, you must also ensure that the META-INF/MANIFEST.MF inside the JAR file contains the following entries:

```
Manifest-Version: 1.0
Created-By: MDM (IBM Corporation)
Application-Name: <SameAsDefinedInTableAppSoftware>
Application-Version: <SameAsDefinedInTableAppSoftware>
```

Note: You must restart the server to make this option take effect.

- **Partial remove the application configuration**—Uses the JAR file (that is, a module) as the input and removes the configuration elements under the module from the deployed master configuration definition. If you have specified any values for configuration elements in the remaining nodes, the values will not be affected. Use this option if you want to remove portion of the master configuration definition.

  To use this option, you must also ensure that the META-INF/MANIFEST.MF inside the JAR file contains the following entries:

```
Manifest-Version: 1.0
Created-By: MDM (IBM Corporation)
Application-Name: <SameAsDefinedInTableAppSoftware>
Application-Version: <SameAsDefinedInTableAppSoftware>
```

Understanding configuration elements in the Configuration and Management component

The Configuration and Management component manages several properties.

/IBM/BusinessServices/EntitySuspectProcessing/collapsedEntitiesNumberLimit

- **Description**—Specifies the maximum number of A1 suspects returned by the FindAllSuspectMatchRules external rule. If this value is 0, this rule returns all A1 matches found.
- **Default value**—15
- **Dynamic**—true

/IBM/BusinessServices/EntitySuspectProcessing/EntityLinkReasonType/collapse

- **Description**—Specifies the type code indicating that the entity is linked to another entity because the entity was collapsed. This value should be one of the LINK_REASON_TP_CD values in the CDLINKREASONTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/EntityLinkReasonType/split

- **Description**—Specifies the type code indicating that the entity is linked to another entity because the entity was split. This value should be one of the LINK_REASON_TP_CD values in the CDLINKREASONTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/InactiveReasonType/collapse

- **Description**—Specifies the type code indicating that the entity is inactive because the entity was collapsed. This value should be one of the INACT_REASON_TP_CD values in the CDINACTREASONTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/InactiveReasonType/split

- **Description**—Specifies the type code indicating that the entity is inactive because the entity was split. This value should be one of the INACT_REASON_TP_CD values in the CDINACTREASONTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/ProcessingDepth/LinkDepthNumberLimit

- **Description**—Specifies the maximum number of times to retrieve products recursively in the getLinkedProducts transaction.
- **Default value**—15
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectReasonType/systemMarked

- **Description**—Specifies the type code indicating that the suspect is marked by the system. This value should be one of the SUSP_SOURCE_TP_CD values in the CDSUSPECTSOURCETP table.
- **Default value**—2
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectReasonType/userMarked

- **Description**—Specifies the type code indicating that the suspect is marked by a user. This value should be one of the SUSP_SOURCE_TP_CDvalues in the CDSUSPECTSOURCETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectStatusType/criticalChangeResolved

- **Description**—Specifies the type code indicating that the suspect was investigated, and the critical data change was resolved. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—25
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectStatusType/duplicateEntity

- **Description**—Specifies the type code indicating that the suspect was investigated, and the entities are duplicates. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—24
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectStatusType/duplicateEntityDoNotCollapse

- **Description**—Specifies the type code indicating that the suspect is under investigation, the entities are suspect duplicates, and should not be collapsed. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—26
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectStatusType/notDuplicate

- **Description**—Specifies the type code indicating that the suspect was investigated, and the entities are not duplicates. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—23
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectStatusType/pending

- **Description**—Specifies the type code indicating that the suspect is under investigation, and the critical data change for the entity is pending. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—22
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectStatusType/suspectDuplicate

- **Description**—Specifies the type code indicating that the suspect is under investigation, and the entity and the suspect are duplicates. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—21
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectType/closeMatch

- **Description**—Specifies the type code indicating the close match suspect. This value should be one of the SUSPECT_TP_CD values in the CDSUSPECTTP table.
- **Default value**—12
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectType/exactMatch

- **Description**—The type code indicating the exact match suspect. This value should be one of the SUSPECT_TP_CD values in the CDSUSPECTTP table.
- **Default value**—11
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectType/notMatch

- **Description**—Specifies the type code indicating suspects do not match. This value should be one of the SUSPECT_TP_CD values in the CDSUSPECTTP table.
- **Default value**—14
- **Dynamic**—false

/IBM/BusinessServices/EntitySuspectProcessing/SuspectType/possibleMatch

- **Description**—The type code indicating the possible match suspect. This value should be one of the SUSPECT_TP_CD values in the CDSUSPECTTP table.
- **Default value**—13
- **Dynamic**—false

/IBM/CoreUtilities/DateValidation/dateFormat

- **Description**—Specifies the format with which to represent a date in a date field. A date field contains the year (YYYY), month (MM) and day (DD), which can be represented in one of the following formats:
  - 1 = YYYY-MM-DD
  - 4 = YYYY-DD-MM
  - 13 = MM-DD-YYYY
  - 16 = DD-MM-YYYY

  The separator between the year, month, and date is defined in the /IBM/CoreUtilities/DateValidation/dateSeparator configuration element.
- **Default value**—1
- **Dynamic**—false

/IBM/CoreUtilities/DateValidation/dateSeparator

- **Description**—Specifies the separator used to separate the year, month, and day in a date format. The separator can be one of the following characters:
  - -
  - /
  - .
- **Default value**—A hyphen (-)
- **Dynamic**—false

/IBM/CoreUtilities/EventManager/busiEntities

- **Description**—Specifies the business entities that Event Manager monitors. This value corresponds to a list of comma delimited GROUP_NAME values in the V_GROUP table. By default, it is empty.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/CoreUtilities/EventManager/businessSystemId

- **Description**—Specifies the system that Event Manager monitors. This value corresponds to a DWL_PROD_TP_CD value in the CDDWLPRODUCTTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/CoreUtilities/EventManager/businessSystemId

- **Description**—Specifies the system that Event Manager monitors. This value corresponds to a DWL_PROD_TP_CD value in the CDDWLPRODUCTTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/CoreUtilities/EventManager/EventCategoryForBusiEntities

- **Description**—Species the event categories for the business entities that Event Manager monitors. This value corresponds to a list of comma delimited EVENT_CAT_CD values in the CDEVENTCAT table. By default, it is empty.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/CoreUtilities/KeyGeneration/instancePKIdentifier

- **Description**—Specifies a numeric value that can be appended to each generated ID. This provides a way to generate IDs for database clustering and replication. To enable this feature, each instance of this configuration element should have a unique numeric value.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/CoreUtilities/Response/OrderSort/enabled

This configuration element is not supported.

/IBM/CoreUtilities/SynchronizeTransactionTime/enabled

- **Description**—Determines whether all sub-transactions in a transaction use the same transaction time. This configuration element only applies to entity beans.
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLAdminServices/InternalValidation/enabled

- **Description**—Determines whether or not internal date values in DWLAdminService requests are validated.
- **Default value**—`true`
- **Dynamic**—false

/IBM/DWLAdminServices/Response/dtd

- **Description**—Specifies the schema against which DWLAdminService responses are validated.
- **Default value**—DWLAdminResponse.xsd
- **Dynamic**—false

/IBM/DWLAdminServices/Response/xsd

- **Description**—Specifies the schema against which DWLAdminService responses are validated.
- **Default value**—DWLAdminResponse.xsd
- **Dynamic**—false

/IBM/DWLBusinessServices/Category/Search/maxResults

- **Description**—Specifies the maximum number of records returned from a searchCategory and searchCategoryHierarchy transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/DWLBusinessServices/Task/priorityCatType

- **Description**—Specifies the type code indicating the priority category type that is used in Task Management. This value should be one of the PRIORITY_CAT_TP_CD values in the CDPRIORITYTP table.
- **Default value**—1
- **Dynamic**—true

/IBM/DWLBusinessServices/Task/Search/maxResults

- **Description**—Specifies the maximum number of records returned from a searchTask transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/DWLBusinessServices/Task/Search/sortOrder

- **Description**—Specifies a comma delimited string listing the attributes in the TaskSearchResultBObj object, in the order in which the TaskSearchResultBObj records are returned in a searchTask transaction.
- **Default value**—DueDate, Priority, CreationDate
- **Dynamic**—true

/IBM/DWLBusinessServices/WorkbasketEntity/Search/maxResults

- **Description**—Specifies the maximum number of WorkbasketEntityBObj records in each TaskBObj object that is returned as part of each TaskSearchResultBObj record in a searchTask transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/DWLCommonServices/AccessToken/AccessTokenAccessor/className

- **Description**—Specifies the class used to retrieve the collection of access tokens associated with users and groups. The class must implement the com.dwl.base.accessToken.AccessTokenAccessor interface.
- **Default value**—com.dwl.base.accessToken.DefaultAccessTokenAccessor
- **Dynamic**—true

/IBM/DWLCommonServices/BaseTableExtension/updateCheckIgnoreList

- **Description**—Specifies a comma delimited string of fully-qualified entity object names that ignore the last update date check. If you add an entity object name in this configuration element, that entity object can be updated even if the last update date of the entity object does not match the last update date of the record in the database.

  This configuration element is useful if you use base table extensions, and you use an entity bean to update an entity object in which the extended entity object does not have logic to handle the last update date being modified by the base object.
- **Default value**—A blank (that is a blank value)
- **Dynamic**—true

/IBM/DWLCommonServices/ConcurrentExecution/defaultWaitTimeout

- **Description**—Specifies the time, in milliseconds, that a concurrent execution waits until all work items are completed. Set a value to avoid waiting indefinitely in case of an issue such as a deadlock.
- **Default value**—3600000
- **Dynamic**—false

/IBM/DWLCommonServices/ConcurrentExecution/enabled

- **Description**—Determines whether concurrent execution infrastructure is enabled. The product provides several several components that can be executed concurrently when this configuration element is enabled. Examples of these components are as follows:
  - Searching for party addresses under a parent object
  - Searching for party identification under a parent object
  - Transactions that are supported by the federated deployment framework
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLCommonServices/ConcurrentExecution/Cache/purgeFrequency

- **Description**—Specifies the time interval, in milliseconds, between two consecutive cache purges.
- **Default value**—604800000
- **Dynamic**—false

/IBM/DWLCommonServices/ConcurrentExecution/Cache/timeToLive

- **Description**—Specifies the time, in milliseconds, after which a cached work item is removed from the cache.
- **Default value**—604800000
- **Dynamic**—false

/IBM/DWLCommonServices/DataBase/OS

- **Description**—Specifies the operating system of the database server.
- **Default value**—This value is set upon installation of the operating system.

- **Dynamic**—false

/IBM/DWLCommonServices/DataBase/type

- **Description**—Specifies the supported database product name. Supported databases are DB2 and Oracle.
- **Default value**—This value is set upon installation of the database.
- **Dynamic**—false

/IBM/DWLCommonServices/DataBase/TimeStampPrecisionIndicator/enabled

- **Description**—Determines whether the nanosecond part of a timestamp is set to 0 to match the database timestamp precision.
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLCommonServices/DateValidation/dateFormat

- **Description**—Specifies the format with which to represent a date in a date field. A date field contains the year (YYYY), month (MM) and day (DD), which can be represented in one of the following formats:
  - 1 = YYYY-MM-DD
  - 4 = YYYY-DD-MM
  - 13 = MM-DD-YYYY
  - 16 = DD-MM-YYYY

  The separator between the year, month, and date is defined in the /IBM/DWLCommonServices/DateValidation/dateSeparator configuration element.
- **Default value**—1
- **Dynamic**—false

/IBM/DWLCommonServices/DateValidation/dateSeparator

- **Description**—Specifies the separator used to separate the year, month, and day in a date format. The separator can be one of the following characters:
  - -
  - /
  - .
- **Default value**—A hyphen (-)
- **Dynamic**—false

/IBM/DWLCommonServices/EntitySpecUse/SpecCascadeType

- **Description**—Specifies the spec cascade type code value used in EntitySpecUseBObj to indicate whether the EntitySpecUseBObj can be inherited by the descendents of the category. It is used in recursive SQL scripts to return the EntitySpecUseBObj objects from ancestors.
- **Default value**—1
- **Dynamic**—false

/IBM/DWLCommonServices/EntitySpecUse/CategoryHierarchy/RecursiveSQL/Limit

- **Description**—Specifies the recursion limit used in recursive SQL scripts. Some database provider allows recursive SQL scripts to execute infinitely. This value

provides the maximum number of recursion that a recursive SQL is allowed to execute. If an SQL recurs above this value, an exception is thrown.

For example, recursive SQL scripts are used to retrieve EntitySpecUseBObj objects inherited from ancestor category nodes.

- **Default value**—20
- **Dynamic**—false

/IBM/DWLCommonServices/ExtensionFramework/enabled

- **Description**—Determines whether the extension framework is enabled.
- **Default value**—`true`
- **Dynamic**—true

/IBM/DWLCommonServices/ExternalRule/Ilog/AutoReload/enabled

- **Description**—Determines whether the rule set manager is aware of any ILR modification at runtime and consequently reloads and re-parses the ILR files.
- **Default value**—`true`
- **Dynamic**—false

/IBM/DWLCommonServices/ExternalRule/Ilog/IncludeAllJars/enabled

- **Description**—Determines whether the jrulesall.jar is available at runtime.
- **Default value**—`true`
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/constructor

- **Description**—Specifies the value corresponding to the Constructor value of the context argument for the DWLServiceController class.
- **Default value**—TCRMService
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/targetApplication

- **Description**—Specifies the value corresponding to the TargetApplication value of the context argument for the DWLServiceController class.
- **Default value**—tcrm
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/Request/encoding

- **Description**—Specifies the encoding of the request message. Before sending String request as byte stream, MDM Query Connect converts the String to bytes using this encoding.
- **Default value**—UTF-16BE
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/Response/encoding

- **Description**—Specifies the encoding of the response message.
- **Default value**—UTF-16BE
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/Response/maxMessageChunk

- **Description**—Specifies the maximum size of the response message in bytes. The recommended value for CICS® is 24576. The theoretical upper limit is 32K. To be safe, this value should not exceed 24KB.

  The recommended value for MQ is 4000000.
- **Default value**—500000
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/Response/type

- **Description**—Specifies the value corresponding to the ResponseType value of the context argument for the DWLServiceController class.
- **Default value**—standard
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/Response/Size/enabled

- **Description**—Determines whether the response is split into smaller chunks of data. Each chunk of data has a 12 character header containing the following information:
  - First character is an end of message indicator. If it is N, more message chunks will follow; if it is Y, it is the last chunk.
  - Next three characters contain the chunk order number (for example, 001)
  - Next eight characters contain the message size in bytes (for example, 00005000 if the message size is 5000 bytes).
- **Default value**—`true`
- **Dynamic**—false

/IBM/DWLCommonServices/FastTrack/SetJmsMessageId/enabled

- **Description**—Determines whether the response message ID is set to the value of request message ID.
- **Default value**—`true`
- **Dynamic**—false

/IBM/DWLCommonServices/IDGeneration/AlphaIDGenerator/className

- **Description**—Specifies the class of an ID generator that generates an alpha ID.
- **Default value**—com.dwl.base.util.AlphaIDGenerator
- **Dynamic**—true

/IBM/DWLCommonServices/IDGeneration/AlphaNumericIDGenerator/className

- **Description**—Specifies the class of an ID generator that generates an alphanumeric ID.
- **Default value**—com.dwl.base.util.AlphaNumericIDGenerator
- **Dynamic**—true

/IBM/DWLCommonServices/IDGeneration/NumericIDGenerator/className

- **Description**—Specifies the class of an ID generator that generates a numeric ID.
- **Default value**—com.dwl.base.util.NumericIDGenerator

- **Dynamic**—true

/IBM/DWLCommonServices/IDGeneration/NumericStringIDGenerator/className

- **Description**—Specifies the class of an ID generator that generates a numeric string ID.
- **Default value**—com.dwl.base.util.NumericStringIDGenerator
- **Dynamic**—true

/IBM/DWLCommonServices/InternalValidation/enabled

- **Description**—Determines whether internal validation is enabled.
- **Default value**—`true`
- **Dynamic**—true

/IBM/DWLCommonServices/Jndi/contextFactory

- **Description**—Specifies the JNDI context factory class. If this value is not specified, the JNDI context factory class provided by the application server is used.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/DWLCommonServices/KeyGeneration/instancePKIdentifier

- **Description**—Specifies a numeric value that can be appended to each generated ID. This provides a way to generate IDs for the purpose of database clustering and replication. To enable this, each instance of this configuration element should have a unique numeric value.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/base

- **Description**—Specifies the base object at which to start the search. This configuration element only applies if the value of the /IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1 configuration element is com.dwl.base.security.provider.LdapTransactionAuthorizationProvider.
- **Default value**—Airius.com
- **Dynamic**—false

/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/jndiFactoryClass

- **Description**—Specifies the JNDI factory class to look up the LDAP server. This configuration element only applies if the value of the /IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1 configuration element is com.dwl.base.security.provider.LdapTransactionAuthorizationProvider.
- **Default value**—com.sun.jndi.ldap.LdapCtxFactory
- **Dynamic**—false

/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/jndiProviderUrl

- **Description**—Specifies the URL pointing to the LDAP server. This configuration element only applies if the value of the /IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1 configuration element is com.dwl.base.security.provider.LdapTransactionAuthorizationProvider.
- **Default value**—ldap://localhost
- **Dynamic**—false

/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/Filter/group

- **Description**—Specifies the search filter to apply to an LDAP server to search for transactions authorized for the group (user role). This configuration element only applies if the value of the /IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1 configuration element is com.dwl.base.security.provider.LdapTransactionAuthorizationProvider.
- **Default value**—(&(objectClass=groupofuniquenames)(cn=%t)(uniquemember=cn=%g,*))
- **Dynamic**—false

/IBM/DWLCommonServices/LdapSecurityProvider/LdapSearch/Filter/user

- **Description**—Specifies the search filter to apply to an LDAP server to search for transactions authorized for the user. This configuration element only applies if the value of the /IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1 configuration element is com.dwl.base.security.provider.LdapTransactionAuthorizationProvider.
- **Default value**—(&(objectClass=groupofuniquenames)(cn=%t)(uniquemember=uid=%u,*))
- **Dynamic**—false

/IBM/DWLCommonServices/Locale/languageId

- **Description**—Specifies the default language ID for the application. This language ID is used to look up code table values.
- **Default value**—100
- **Dynamic**—false

/IBM/DWLCommonServices/Logging/configurationOverride

- **Description**—Overrides the logging level and logging file at the application level.

  For example, to override these values if you use Log4J.properties, specify:
  `log4j.appender.file.File=/MDM.log\nlog4j.logger.com=WARN, file`

  Likewise, to override these values if you use JDKLog.properties, specify
  `java.util.logging.FileHandler.pattern=`*`$a_valid_path`*`/MDM.log\`
  `ncom.level=WARNING, file`
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—true

/IBM/DWLCommonServices/MultiTimeZoneDeployment/defaultTimeZone

- **Description**—Specifies the default time zone to use to convert date values from common time zone (UTC) format if no requesterTimeZone is specified in a request.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/DWLCommonServices/MultiTimeZoneDeployment/enabled

- **Description**—Determines whether multi-timezone deployment is enabled. When multi-timezone deployment is enabled, date values will be stored in the database using common time zone (UTC) format.
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLCommonServices/NLS/system_Default_Data_Locale

- **Description**—Specifies the default locale used for spec values NLS objects.
- **Default value**—en
- **Dynamic**—false

/IBM/DWLCommonServices/Notifications/defaultLanguage

- **Description**—Specifies the language ID used in notification. For example, this language ID is used to look up code table values in a particular language if code tables are used in the notification message. The language ID corresponds to the LANG_TP_CD value in the CDLANGTP table.
- **Default value**—100
- **Dynamic**—true

/IBM/DWLCommonServices/Notifications/enabled

- **Description**—Determines whether notification is enabled at the application level.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Notifications/ExplicitCommit/enabled

- **Description**—Controls how notifications are sent to multiple topics in a single-phase commit (XA disabled) and two-phase commit (XA enabled). If the transaction is XA enabled, set this value to false. If the transaction is XA disabled, set this value to true so that a notification can be sent to more than one topic.
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLCommonServices/Notifications/NotificationManagerThrowException/enabled

- **Description**—Determines whether the Notification component throws exceptions if errors occur upon initializing the component. Typically, such errors occur if the notification metadata is not configured correctly.
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLCommonServices/PerformanceTracking/enabled

- **Description**—Determines whether performance tracking is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/level

- **Description**—Specifies the level of performance statistics to track.
- **Default value**—0
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ ARM40TransactionFactory/className

- **Description**—Specifies the class used to enable ARM 4.0 performance tracking on the application. The class must implement the org.opengroup.arm40.transaction.ArmTransactionFactory interface. If this value is set to `None`, the performance tracking will use the logging component and the performance statistics will be logged to a file.
- **Default value**—None
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ ComponentLayer/enabled

- **Description**—Determines whether performance tracking is enabled at the component level.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ ComponentLayerExtension/enabled

- **Description**—Determines whether performance tracking is enabled at the component level extension.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ ComponentLayerPrePost/enabled

- **Description**—Determines whether performance tracking is enabled at the component level pre or post processing.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ ControllerLayer/enabled

- **Description**—Determines whether performance tracking is enabled at the controller level.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ControllerLayerExtension/enabled

- **Description**—Determines whether performance tracking is enabled at the controller level extension.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ControllerLayerPrePost/enabled

- **Description**—Determines whether performance tracking is enabled at the controller level pre/post processing.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/DatabaseDetails/enabled

- **Description**—Determines whether performance tracking is enabled at the database connection level.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/DatabaseQuery/enabled

- **Description**—Determines whether performance tracking is enabled at the database query.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ExecuteTx/enabled

- **Description**—Determines whether performance tracking is enabled at the business proxy.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ExternalBusinessRules/enabled

- **Description**—Determines whether performance tracking is enabled at the external business rule component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ExternalValidation/enabled

- **Description**—Determines whether performance tracking is enabled at the external validation component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/InternalValidation/enabled

- **Description**—Determines whether performance tracking is enabled at the internal validation component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/Notification/enabled

- **Description**—Determines whether performance tracking is enabled at the notification component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/PartyMatcher/enabled

- **Description**—Determines whether performance tracking is enabled at the party matching component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/RequestHandler/enabled

- **Description**—Determines whether performance tracking is enabled at the request handler.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/RequestParser/enabled

- **Description**—Determines whether performance tracking is enabled at the request parser.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ResponseConstructor/enabled

- **Description**—Determines whether performance tracking is enabled at the response constructor.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/SecurityAuthorization/enabled

- **Description**—Determines whether performance tracking is enabled at the security authorization component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/Standardization/enabled

- **Description**—Determines whether performance tracking is enabled at the standardization component.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/SuspectProcessing/enabled

- **Description**—Determines whether performance tracking is enabled at the suspect processing.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/ThirdPartyExtension/enabled

- **Description**—Determines whether performance tracking is enabled at the third party extension.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PerformanceTracking/TransactionManager/enabled

- **Description**—Determines whether performance tracking is enabled at the business transaction manager.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/PhoneticSearch/extensionElementId

- **Description**—Specifies the extensionElementId parameter used by the PhoneticKeyManager class to obtain specified PhoneticKeyGenerator implementation.
- **Default value**—SoundexExtension
- **Dynamic**—true

/IBM/DWLCommonServices/PhoneticSearch/extensionId

- **Description**—Specifies the extensionId parameter used by the PhoneticKeyManager class to get specified PhoneticKeyGenerator implementation.
- **Default value**—com.ibm.imc.phonetics.PhoneticKeyProviders
- **Dynamic**—true

/IBM/DWLCommonServices/RedundantUpdate/enabled

- **Description**—Determines whether allowing redundant update is enabled. If this value is set to `false`, redundant update is not allowed. If the business object to be updated contains the same values as the values on the system, an error message is thrown.

  If this value is true, redundant update is allowed. If the business object to be updated contains the same values as the values on the system, the values are updated on the system.
- **Default value**—`false`

- **Dynamic**—true

/IBM/DWLCommonServices/Report/Broadcaster/enabled

- **Description**—Determines whether service activity monitoring is enabled. If it is enabled, JMX notification is issued for each transaction.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Report/Listener/enabled

- **Description**—Determines whether transaction activity data is logged in a log file. This configuration element is applicable only if service activity monitoring is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Response/UseMetadataOrder/enabled

This configuration element is not supported.

/IBM/DWLCommonServices/Runtime/application

- **Description**—Specifies the run time of the InfoSphere MDM Server instance. Possible values are WCC and FastTrack.
- **Default value**—WCC
- **Dynamic**—false

/IBM/DWLCommonServices/Search/caseSensitive

- **Description**—Determines whether searches are case sensitive. When searches are not case sensitive, additional table columns and indexes will be used to store case insensitive values.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Security/enabled

- **Description**—Determines whether security is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Security/ number_of_transaction_authorization_providers

- **Description**—Specifies the number of transaction authorization providers.
- **Default value**—1
- **Dynamic**—true

/IBM/DWLCommonServices/Security/SAML/ SAML_userRoles_Attribute_AttributeName

- **Description**—Specifies the element in the SAML input indicating the userRoles attribute name.
- **Default value**—urn:wcc:dir:attribute-def:userRoles
- **Dynamic**—true

/IBM/DWLCommonServices/Security/SAML/SAML_userRoles_Attribute_AttributeNamespace

- **Description**—Specifies the element in the SAML input indicating the userRoles attribute namespace.
- **Default value**—urn:wcc:attributeNamespace:uri
- **Dynamic**—true

/IBM/DWLCommonServices/Security/SAML/security_data_parser

- **Description**—Specifies the class of a customized authentication assertions parser. The assertions must be passed as the <authData> element of the DWLContol group within a request. The class must implement the com.dwl.base.ISecurityDataParser interface.
- **Default value**—com.dwl.base.SAML11Parser
- **Dynamic**—true

/IBM/DWLCommonServices/Security/SAML/SAML_XML_Validation/enabled

- **Description**—Determines whether the SAML XML is validated.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Security/transaction_authorization_provider_class_name_1

- **Description**—Specifies the class of the transaction authorization provider. The class must implement the com.dwl.base.security.AuthorizationProvider interface.
- **Default value**—com.dwl.base.security.provider.DefaultTransactionAuthorizationProvider
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/DefaultStatus

- **Description**—Spcecifies the initial index status of searchable spec attribute.
- **Default value**—1
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/IndexTable/MaintainValues/enabled

- **Description**—Determines whether index value maintenance is enabled.
- **Default value**—`true`
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/IndexTable/ScheduleSpecValueIndexProcess/ImpactedSpecValueSize/medium

- **Description**—Determines spec value indexing strategy based on impacted spec value size.
- **Default value**—10000
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/IndexTable/ScheduleSpecValueIndexProcess/ImpactedSpecValueSize/small

- **Description**—Determines spec value indexing strategy based on impacted spec value size.
- **Default value**—500
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/MaxDecimalFractionDigitsSize

- **Description**—Specifies the scaled value size of the DECIMAL_VALUE column in the PRODUCTVALINDEX table. If the scaled value size of a searchable attribute of decimal data type is greater than that of the column, the value will not to be stored in system.
- **Default value**—19
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/MaxDecimalTotalDigitsSize

- **Description**—Specifies the non-scaled value size of the DECIMAL_VALUE column in the PRODUCTVALINDEX table. If the non-scaled value size of a searchable attribute of decimal data type is greater than that of the column, the value will not to be stored in system.
- **Default value**—31
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/MaxLongTotalDigitsSize

- **Description**—Specifies the scaled value size of the LONG_VALUE column in the PRODUCTVALINDEX table. If the scaled value size of a searchable attribute of long data type is greater than that of the column, the searchable attribute value will not to be stored in system.
- **Default value**—19
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/MaxStringValueSize

- **Description**—Specifies the size of the STRING_VALUE column in the PRODUCTVALINDEX table. If the size of a searchable attribute of string data type is greater than that of the column, the searchable attribute value will be truncated to be stored in system.
- **Default value**—255
- **Dynamic**—true

/IBM/DWLCommonServices/SpecValueSearch/Recursive/enabled

- **Description**—Determines whether recursive SQL is used internally to search for spec values.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/Standardization/enabled

- **Description**—Determines whether standardization is enabled.
- **Default value**—`false`

- **Dynamic**—true

/IBM/DWLCommonServices/Standardization/StandardizationManager/className

- **Description**—Specifies the fully qualified name of the standardization manager class. This class gets the standardizers from the metadata based on business objects passed in and invokes the corresponding standardizers.
- **Default value**—com.ibm.mdm.common.standardization.DefaultStandardizationManager
- **Dynamic**—true

/IBM/DWLCommonServices/SynchronizeTransactionTime/enabled

- **Description**—Determines whether the timestamps of the transaction and all its sub-transactions are synchronized.
- **Default value**—`false`
- **Dynamic**—false

/IBM/DWLCommonServices/TAIL/enabled

- **Description**—Determines whether TAIL is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/TAIL/maxRecords

- **Description**—Specifies the maximum number of records returned from a getTAIL transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/DWLCommonServices/TAIL/Asynchronous/enabled

- **Description**—Determines whether TAIL is logged asynchronously from the transaction context of an InfoSphere MDM Server transaction.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/TAIL/LogNegativeCompositeTransaction/enabled

- **Description**—Determines whether TAIL is logged for negative transactions.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/TAIL/RedundantUpdate/enabled

- **Description**—Determines whether TAIL is logged for update transactions that contain redundant update data.
- **Default value**—`false`
- **Dynamic**—true

/IBM/DWLCommonServices/UserManagement/user_management_provider_class_name

- **Description**—Specifies the class of user management provider used. The class must implement the com.ibm.mdm.usermanagement.AuthorizationProvider interface.
- **Default value**—com.ibm.mdm.usermanagement.DefaultUserManagementProvider
- **Dynamic**—false

/IBM/DWLCommonServices/Validation/BusinessKeyValidation/ExcludeList/groupNames

- **Description**—Specifies acomma delimited string listing the group names for which validation using the business key validator class is disabled.
- **Default value**—ContractRoleLocationPrivPref, Address, ContactMethod, FinancialProfile, IncomeSource, OrganizationName, PartyAddressPrivPref, PartyContactMethodPrivPref, PartyLobRelationship, PartyLocationPrivPref, PartyPrivPref, PartyAddressPrivPref, PartyContactMethodPrivPref, AccessDateValue, AdminContEquiv, EntityInstancePrivPref, ProductSpecValueBObj
- **Dynamic**—true

/IBM/DWLCommonServices/Validation/BusinessKeyValidation/Validator/className

- **Description**—The fully qualified name of the generic business key validator class.
- **Default value**—com.ibm.mdm.common.validator.MDMBusinessKeyValidator
- **Dynamic**—false

/IBM/DWLCommonServices/Validation/External/enabled

- **Description**—Determines whether external validation is enabled.
- **Default value**—`true`
- **Dynamic**—true

/IBM/DWLCommonServices/XML/Character_only_tags

- **Description**—Specifies a comma delimited string indicating the XML elements whose values are enclosed by a CDATA XML element in an XML response.
- **Default value**—authData
- **Dynamic**—true

/IBM/DWLCommonServices/XML/useValidatingParser

- **Description**—Determines whether XML request is validated against its corresponding XML schema.
- **Default value**—`true`
- **Dynamic**—true

/IBM/DWLCommonServices/XmlRequestParse/UseGrammaPool/enabled

- **Description**—Determines whether grammar-pooling is enabled for the XML request parser.
- **Default value**—`true`
- **Dynamic**—false

/IBM/EventManager/Integration/WebSphereMQ/MQEnvironment/channel

- **Description**—Specifies the channel used for connection to the WebSphere MQ queue manager.

  This configuration element only applies if you use the com.dwl.commoncomponents.eventmanager.integration.MQQueueExplorer class for the /IBM/EventManager/QueueExplorer/className configuration element. This configuration element should match the queue manager channel as defined on the application server.
- **Default value**—yourMQChannel
- **Dynamic**—true

/IBM/EventManager/Integration/WebSphereMQ/MQEnvironment/hostName

- **Description**—Specifies the host name on which the WebSphere MQ queue manager.

  This configuration element only applies if you use the com.dwl.commoncomponents.eventmanager.integration.MQQueueExplorer class for the /IBM/EventManager/QueueExplorer/className configuration element. This configuration element should match the queue manager host name as defined on the application server.
- **Default value**—yourMQHostName
- **Dynamic**—true

/IBM/EventManager/Integration/WebSphereMQ/MQEnvironment/port

- **Description**—Specifies the TCP/IP port number used for connection to the WebSphere MQ queue manager.

  This configuration element only applies if you use the com.dwl.commoncomponents.eventmanager.integration.MQQueueExplorer class for the /IBM/EventManager/QueueExplorer/className configuration element. This configuration element should match the queue manager TCP/IP port as defined on the application server.
- **Default value**—yourMQListeningPort
- **Dynamic**—true

/IBM/EventManager/Integration/WebSphereMQ/MQQueue/name

- **Description**—Specifies the name of the WebSphere MQ queue.

  This configuration element only applies if you use the com.dwl.commoncomponents.eventmanager.integration.MQQueueExplorer class for the /IBM/EventManager/QueueExplorer/className configuration element. This configuration element should match the queue name as defined on the application server.
- **Default value**—yourMQQueueName
- **Dynamic**—true

/IBM/EventManager/Integration/WebSphereMQ/MQQueueManager/name

- **Description**—Specifies the name of the WebSphere MQ queue manager.

  This configuration element only applies if you use the com.dwl.commoncomponents.eventmanager.integration.MQQueueExplorer class

for the /IBM/EventManager/QueueExplorer/className configuration element. This configuration element should match the queue manager name as defined on the application server.

- **Default value**—yourMQQueueManagerName
- **Dynamic**—true

/IBM/EventManager/MemoryCache/timeToLive

- **Description**—Specifies the time, in milliseconds, for which Event Manager database configurations are cached. After this time expires, the database configurations are reloaded. If this value is 0, the configurations are kept in cache until the server is stopped.
- **Default value**—200000
- **Dynamic**—false

/IBM/EventManager/MessageSender/queue

- **Description**—Specifies the resource environment reference name defined in the deployment descriptor corresponding to the queue used by Event Manager.
- **Default value**—jms/EMQueue
- **Dynamic**—false

/IBM/EventManager/MessageSender/queueConnectionFactory

- **Description**—Specifies the resource reference name defined in the deployment descriptor corresponding to the queue connection factory used by Event Manager.
- **Default value**—jms/EMQCF
- **Dynamic**—false

/IBM/EventManager/MessagesInQueue/max

- **Description**—Specifies the maximum number of PROCESSACTION records to select to create tasks per cycle in time-based event detection. The configuration element only applies if you use the com.dwl.commoncomponents.eventmanager.client.ProcessControllerProxy class to start time-based event detection.
- **Default value**—500
- **Dynamic**—false

/IBM/EventManager/Notification/topic

- **Description**—Specifies the resource environment reference name defined in the deployment descriptor corresponding to the topic to which Event Manager notifications are posted. If you want to route notifications to another topic, you can set the new topic name in this configuration element, add the new resource environment reference name in the deployment descriptor, and configure the new topic in the InfoSphere MDM Server notification data model.
- **Default value**—jms/EMTopic
- **Dynamic**—false

/IBM/EventManager/ProcessTime/max

- **Description**—Specifies the maximum processing time, in milliseconds, that a task can stay in progress. Event Manager uses this time to retry a task that has been in progress for too long. Event Manager creates tasks using the following criteria:

  - It tries to select PROCESSACTION records that have the EVENT_STATUS with a value of 3 and changes the value to 2, marking them in progress. It then creates tasks based on these records.
  - If no PROCESSACTION records with a status of 3 exist, it tries to select records that have a value of 2 only if their LAST_UPDATE_DT value is earlier than the current time minus the maximum processing time. In this case, Event Manager retries these tasks that were previously marked as in progress but did not finish processing.
- **Default value**—3600000
- **Dynamic**—false

/IBM/EventManager/QueueExplorer/className

- **Description**—Specifies the class used to query the queue used by Event Manager. This class must implement the com.dwl.commoncomponents.eventmanager.IQueueExplorer interface.

  In time-based event detection that is started the com.dwl.commoncomponents.eventmanager.client.EventDetectionScheduleController class, the class in this configuration element queries the depth of the queue in order to estimate a desirable number of tasks to put on the queue per cycle in the event detection.

  Two implementation classes are provided:

  - com.dwl.commoncomponents.eventmanager.DefaultQueueExplorer
  - com.dwl.commoncomponents.eventmanager.integration.MQQueueExplorer

  The DefaultQueueExplorer class used JMS API to implement the interface. The MQQueueExplorer class uses WebSphere MQ API to implement the interface.
- **Default value**—com.dwl.commoncomponents.eventmanager.DefaultQueueExplorer
- **Dynamic**—true

/IBM/FinancialServices/Contract/Search/maxResults

- **Description**—Specifies the maximum number of records returned from a searchContract transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/FinancialServices/Contract/ContractPartyRole/partyInquiryLevel

- **Description**—Specifies the party inquiry level used in the addContractPartyRole and updateContractPartyRole transactions. The inquiry level determines whether the TCRMPartyBObj object will be returned in these transactions, and what kinds of children objects will be returned under the TCRMPartyBObj object.
- **Default value**—4
- **Dynamic**—true

/IBM/FinancialServices/ExtendedAdminContractIdSearch/enabled

- **Description**—Determines whether the AdminContractIdFieldType and AdminContractId attributes in a TCRMPartialSysAdminKeyBObj object provided in a searchContract transaction are taken in account as search criteria. When this configuration element is set to `true`, and a TCRMPartialSysAdminKeyBObj object is included in the TCRMContractSearchBObj object in the request, the

AdminContractIdFieldType and AdminContractId attributes provided in the TCRMPartialSysAdminKeyBObj are used to search for any matched records in the NATIVEKEY table.

- **Default value**—`false`
- **Dynamic**—false

/IBM/MessagingAdapter/Exeption/xmlTagName

- **Description**—Specifies the element tag to use to wrap an exception message in order to ensure a well-formed XML.
- **Default value**—DWLMessagingAdapterException
- **Dynamic**—false

/IBM/MessagingAdapter/Exeption/CommitOnSendFail/enabled

- **Description**—Determines whether the transaction is committed if the response fails to be sent to the response queue.
- **Default value**—`true`
- **Dynamic**—false

/IBM/MessagingAdapter/Exeption/JmsMsgToOutboundQueue/enabled

- **Description**—Determines whether exceptions raised by the application are sent to the outbound queue as JMS TextMessage.
- **Default value**—`false`
- **Dynamic**—false

/IBM/MessagingAdapter/Exeption/NonXmlToOutboundQueue/enabled

- **Description**—Determines if any exceptions are sent to the outbound queue as JMS TextMessage. To ensure the exception is formatted as a well-formed XML, the exception message is wrapped in an element tag specified by the /IBM/MessagingAdapter/Exeption/xmlTagName configuration element.
- **Default value**—`false`
- **Dynamic**—false

/IBM/MessagingAdapter/JMSQueue/activeQueueGroup

- **Description**—Specifies a group of outbound queues. This configuration element is not currently supported.
- **Default value**—DWLCustomerQueue1
- **Dynamic**—false

/IBM/MessagingAdapter/JMSQueue/JMSMessageHeaderCopy/enabled

- **Description**—Determines whether the JMS Message Header from the inbound message is copied to the outbound message.
- **Default value**—`true`
- **Dynamic**—true

/IBM/MessagingAdapter/JMSQueue/JMSMessageMsgIdToCorrId/enabled

- **Description**—Determines whether the JMS MessageId from the inbound message is mapped to the JMS CorrelationId of the outbound message.

- **Default value**—`false`
- **Dynamic**—false

/IBM/MessagingAdapter/JMSQueue/SendResponseToOUTBOUND/enabled

- **Description**—Determines whether the response is sent to an outbound queue.
- **Default value**—`true`
- **Dynamic**—false

/IBM/MessagingAdapter/Request/encoding

- **Description**—Specifies the encoding to use to encode the request if the JMS request is a ByteMessage.
- **Default value**—UTF-16BE
- **Dynamic**—false

/IBM/MessagingAdapter/RequestHeader/constructor

- **Description**—Specifies the value corresponding to the Constructor value of the context argument for the DWLServiceController class.
- **Default value**—TCRMService
- **Dynamic**—false

/IBM/MessagingAdapter/RequestHeader/operationType

- **Description**—Specifies the value corresponding to the OperationType value of the context argument for the DWLServiceController class.
- **Default value**—All
- **Dynamic**—false

/IBM/MessagingAdapter/RequestHeader/parser

- **Description**—Specifies the value corresponding to the Parser value of the context argument for the DWLServiceController class.
- **Default value**—TCRMService
- **Dynamic**—false

/IBM/MessagingAdapter/RequestHeader/requestType

- **Description**—Specifies the value corresponding to the RequestType value of the context argument for the DWLServiceController class.
- **Default value**—standard
- **Dynamic**—false

/IBM/MessagingAdapter/RequestHeader/responseType

- **Description**—Specifies the value corresponding to the ResponseType value of the context argument for the DWLServiceController class
- **Default value**—standard
- **Dynamic**—false

/IBM/MessagingAdapter/RequestHeader/targetApplication

- **Description**—Specifies the value corresponding to the TargetApplication value of the context argument for the DWLServiceController class.
- **Default value**—tcrm
- **Dynamic**—false

/IBM/MessagingAdapter/Response/encoding

- **Description**—Specifies the encoding to use to encode the response if the JMS response is a ByteMessage.
- **Default value**—UTF-16BE
- **Dynamic**—false

/IBM/Party/AbiliTecLink/addressUsageType1

- **Description**—Specifies the type code indicating an address that is used to generate an AbiliTec Address. This value should be one of the ADDR_USAGE_TP_CD values in the CDADDRUSAGETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/AbiliTecLink/IdType

- **Description**—Specifies the type code indicating an AbiliTecLink ID. This value should be one of the ID_TP_CD values in the CDIDTP table.
- **Default value**—11
- **Dynamic**—false

/IBM/Party/AbiliTecLink/orgNameUsageType1

- **Description**—Specifies the type code indicating an organization name that is used to generate an AbiliTec commercial name. This value should be one of the NAME_USAGE_TP_CD values in the CDNAMEUSAGETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/AbiliTecLink/personNameUsageType1

- **Description**—Specifies the type code indicating a person name that is used to generate an AbiliTec consumer name. This value should be one of the NAME_USAGE_TP_CD values in the CDNAMEUSAGETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/Acxiom/AbiliTecPersonRequestURL

- **Description**—Specifies the person link of the Acxiom server.
- **Default value**—https://idtest.acxiom.com/abilitec-consumer/1.0
- **Dynamic**—false

/IBM/Party/Acxiom/AbiliTecOrganizationRequestURL

- **Description**—Specifies the organization link of the Acxiom server.
- **Default value**—https://idtest.acxiom.com/abilitec-business/1.0
- **Dynamic**—false

/IBM/Party/Acxiom/AbiliTecRequestURL

- **Description**—Specifies the URL of the Acxiom server.
- **Default value**—https://interactivetest.acxiom.com/httpgateway
- **Dynamic**—false

/IBM/Party/Acxiom/abiliTecSupportedCountries

- **Description**—Specifies the country supported by Acxiom. Currently, only USA is supported. The configuration element value is the country type code for USA in the application. This value should be one of the COUNTRY_TP_CD values in the CDCOUNTRYTP table.
- **Default value**—185
- **Dynamic**—false

/IBM/Party/Acxiom/applicationId

- **Description**—Specifies the Acxiom application ID.
- **Default value**—test
- **Dynamic**—false

/IBM/Party/Acxiom/password

- **Description**—Specifies the Acxiom user password.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/Party/Acxiom/userId

- **Description**—Specifies the Acxiom user ID.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/Party/Acxiom/Return_Derived_Link/enabled

- **Description**—Determines whether Acxiom returns a derived link when no maintained link is found.
- **Default value**—`true`
- **Dynamic**—false

/IBM/Party/CollapseMutipleParties/collapsedPartiesNumberLimit

- **Description**—Used by the default external rule FindAllSuspectMatchRules to specify the maximum number of A1 matches found. If this value is 0, this rule returns all A1 matches found.
- **Default value**—0
- **Dynamic**—true

/IBM/Party/CollapseMutipleParties/InactiveReasonType/collapse

- **Description**—Specifies the type code indicating that the party is inactive because the party was collapsed. This value should be one of the INACT_REASON_TP_CD values in the CDINACTREASONTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/Party/CollapseMutipleParties/InactiveReasonType/split

- **Description**—Specifies the type code indicating that the party is inactive because the party was split. This value should be one of the INACT_REASON_TP_CD values in the CDINACTREASONTP table.
- **Default value**—4
- **Dynamic**—false

/IBM/Party/CollapseMutipleParties/PartyLinkReasonType/collapse

- **Description**—Specifies the type code indicating that the party is linked to another party because the party was collapsed. This value should be one of the LINK_REASON_TP_CD values in the CDLINKREASONTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/CollapseMutipleParties/PartyLinkReasonType/split

- **Description**—Specifies the type code indicating that the party is linked to another party because the party was split. This value should be one of the LINK_REASON_TP_CD values in the CDLINKREASONTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/Party/ContactMethod/PhoneCategoryType

- **Description**—Specifies the type code indicating the contact method category type for the party phone number details. This value is used by the phone number normalization rule and should be one of the CONT_METH_CAT_CD values in the CDCONTMETHCAT table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/CriticalDataChangeProcessing/enabled

- **Description**—Determines whether critical data change processing is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Party/DUNSNumber/ConfidenceCode/Threshold

- **Description**—Used by the default external rule DnBMatchConfidenceRule to specify the threshold for the confidence code.
- **Default value**—7
- **Dynamic**—true

/IBM/Party/ExcludePartyNameStandardization/enabled

- **Description**—Determines whether name standardization is excluded.
- **Default value**—`false`
- **Dynamic**—false

/IBM/Party/IdentifierGeneration/Factory/className

- **Description**—Specifies the factory class name of the ID generator.
- **Default value**—com.dwl.tcrm.utilities.MDMPartyIdentifierFactory
- **Dynamic**—true

/IBM/Party/IdentifierGeneration/Validation/enabled

- **Description**—Determines whether generated IDs require validation.
- **Default value**—`false`
- **Dynamic**—false

/IBM/Party/IdentifierGeneration/Validator/className

- **Description**—Specifies the class to validate generated IDs.
- **Default value**—com.dwl.tcrm.utilities.MDMPartyIdentifierValidator
- **Dynamic**—true

/IBM/Party/InternalValidation/lastUpdateUserType

- **Description**—If this configuration element value is userpartyid, the system treats the requesterName value in the DWLControl object as a party ID and validates that the party ID exists.
- **Default value**—userid
- **Dynamic**—false

/IBM/Party/LocationNormalization/enabled

- **Description**—Determines whether location normalization is enabled. For example, address line 1 is normalized into street number, street name, and street type.
- **Default value**—`false`
- **Dynamic**—false

/IBM/Party/PartyMatch/PartyIdentification/organizationTax

- **Description**—Specifies the type code indicating an organization's corporate tax identification number. This value should be one of the ID_TP_CD values in the CDIDTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/Party/PartyMatch/PartyIdentification/personSin

- **Description**—Specifies the type code indicating a person's social insurance number (SIN). This value should be one of the ID_TP_CD values in the CDIDTP table.
- **Default value**—10
- **Dynamic**—false

/IBM/Party/PartyMatch/PartyIdentification/personTax

- **Description**—Specifies the type code indicating a person's social security number (SSN). This value should be one of the ID_TP_CD values in the CDIDTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/PhoneticSearch/threshHold

- **Description**—Specifies the number of exact matches returned by a search transaction that is sufficient to warrant not adding phonetic search results to the result set.
- **Default value**—0
- **Dynamic**—true

/IBM/Party/PhoneticSearch/AddressSearch/enabled

- **Description**—Determines whether phonetic search on address is enabled.
- **Default value**—`false`

- **Dynamic**—true

/IBM/Party/PhoneticSearch/AddressSearch/maxLength

- **Description**—Specifies the maximum length of the phonetic keys generated for an address.
- **Default value**—4
- **Dynamic**—true

/IBM/Party/PhoneticSearch/HierarchyOrganizationSearch/enabled

- **Description**—Determines whether phonetic search on organization name is enabled on the searchNodeInOrganizationHierarchy transaction.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Party/PhoneticSearch/HierarchyPersonSearch/enabled

- **Description**—Determines whether phonetic search on person name is enabled on the searchNodeInPersonHierarchy transaction.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Party/PhoneticSearch/OrganizationNameSearch/enabled

- **Description**—Determines whether phonetic search on organization name is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Party/PhoneticSearch/OrganizationNameSearch/maxLength

- **Description**—Specifies the maximum length of the phonetic keys generated for an organization name.
- **Default value**—4
- **Dynamic**—true

/IBM/Party/PhoneticSearch/PersonNameSearch/enabled

- **Description**—Determines whether phonetic search on person name is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Party/PhoneticSearch/PersonNameSearch/maxLength

- **Description**—Specifies the maximum length of the phonetic keys generated for a person name.
- **Default value**—4
- **Dynamic**—true

/IBM/Party/PrivacyPreference/ ValidateProductEntityWithProductDomain/enabled

- **Description**—Determines whether to use the product domain to validate a product that is associated with a TCRMEntityInstancePrivPrefBObj object. If this value is set to `false`, the product is validated against the CDPRODTP code table. Otherwise, the product is validated using the data model in the product domain.
- **Default value**—`false`

- **Dynamic**—false

/IBM/Party/Search/maxResults

- **Description**—Specifies the maximum number of records returned from a searchParty, searchPerson, or searchOrganization transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/Party/Search/ReturnValue/organizationAddressUsageType

- **Description**—Specifies the organization address usage type to return in the response as part of the search summary. This value should be one of the ADDR_USAGE_TP_CD values in the CDADDRUSAGETP table.
- **Default value**—3
- **Dynamic**—false

/IBM/Party/Search/ReturnValue/organizationIdentificationType

- **Description**—Specifies the organization identification type to return in the response as part of the search summary. This value should be one of the ID_TP_CD values in the CDIDTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/Party/Search/ReturnValue/organizationNameUsageType

- **Description**—Specifies the organization name usage type to return in the response as part of the search summary. This value should be one of the NAME_USAGE_TP_CD values in the CDNAMEUSAGETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/Search/ReturnValue/personAddressUsageType

- **Description**—Specifies the person address usage type to return in the response as part of the search summary. This value should be one of the ADDR_USAGE_TP_CD values in the CDADDRUSAGETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/Search/ReturnValue/personIdentificationType

- **Description**—Specifies the person identification type to return in the response as part of the search summary. This value should be one of the ID_TP_CD values in the CDIDTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/Search/ReturnValue/personNameUsageType

- **Description**—Specifies the person name usage type to return in the response as part of the search summary. This value should be one of the NAME_USAGE_TP_CD values in the CDNAMEUSAGETP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Party/Standardizer/Address/className

- **Description**—Specifies the address standardizer class.
- **Default value**—com.dwl.tcrm.coreParty.component.TCRMAddressStandardizer
- **Dynamic**—true

/IBM/Party/Standardizer/Name/className

- **Description**—Specifies the name standardizer class.
- **Default value**—com.dwl.tcrm.coreParty.component.TCRMPartyStandardizer
- **Dynamic**—true

/IBM/Party/SummaryIndicator/enabled

- **Description**—Determines whether the Summary Data Indicator feature is enabled.
- **Default value**—off
- **Dynamic**—false

/IBM/Party/SuspectProcessing/enabled

- **Description**—Determines whether Suspect Processing is enabled.
- **Default value**—`true`
- **Dynamic**—true

/IBM/Party/SuspectProcessing/AddParty/returnSuspect

- **Description**—Controls how A2 suspects are returned in an addParty transaction. This configuration element is used in conjunction with the <MandatorySearchDone> element of an addParty transaction. If the <MandatorySearchDone> element is set to `No` on the request and this configuration element is enabled, and if A2 parties are found and no A1 parties, then the A2 parties are returned in the response and no new party is added. The transaction is essentially halted.
- **Default value**—`true`
- **Dynamic**—true

/IBM/Party/SuspectProcessing/PersistDuplicateParties/enabled

- **Description**—Determines whether a duplicate A1 party is persisted based on some predefined criteria.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Party/SuspectProcessing/SuspectReasonType/systemMarked

- **Description**—Specifies the type code indicating that the suspect is marked by the system. This value should be one of the SUSP_SOURCE_TP_CD values in the CDSUSPECTSOURCETP table.
- **Default value**—2
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectReasonType/userMarked

- **Description**—Specifies the type code indicating that the suspect is marked by a user. This value should be one of the SUSP_SOURCE_TP_CD values in the CDSUSPECTSOURCETP table.

- **Default value**—1
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectStatusType/criticalChangeResolved

- **Description**—Specifies the type code indicating that the suspect was investigated, and the critical data change was resolved. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—5
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectStatusType/duplicateParty

- **Description**—Specifies the type code indicating that the suspect was investigated, and the parties are duplicates. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—4
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectStatusType/duplicatePartyDoNotCollapse

- **Description**—Specifies the type code indicating that the suspect is under investigation, the parties are suspect duplicates, and should not be collapsed. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—6
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectStatusType/notDuplicate

- **Description**—Specifies the type code indicating that the suspect was investigated, and the parties are not duplicates. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—3
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectStatusType/pending

- **Description**—Specifies the type code indicating that the suspect is under investigation, and the critical data change for the party is pending. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—2
- **Dynamic**—false

/IBM/Party/SuspectProcessing/SuspectStatusType/suspectDuplicate

- **Description**—Specifies the type code indicating that the suspect is under investigation, and the party and the suspect are duplicates. This value should be one of the SUSP_ST_TP_CD values in the CDSUSPECTSTATUSTP table.
- **Default value**—1
- **Dynamic**—false

/IBM/Product/ProductStructureStrategy/Variant

- **Description**—Specifies the rule ID of the configured VariantStrategy product structure strategy.
- **Default value**—A blank (that is, a blank value).
- **Dynamic**—false

/IBM/Product/ProductSuspectProcessing/ProcessingDepth/categoryInquiryLevel

- **Description**—Specifies the product category inquiry level used in the collapseMultipleProducts and splitProduct transactions.
- **Default value**—1
- **Dynamic**—false

/IBM/Product/ProductSuspectProcessing/ProcessingDepth/productInquiryLevel

- **Description**—Specifies the product inquiry level used in the collapseMultipleProducts and splitProduct transactions.
- **Default value**—4
- **Dynamic**—false

/IBM/Product/ProductSuspectProcessing/ProcessingDepth/relatedProductInquiryLevel

- **Description**—Specifies the related product inquiry level used in the collapseMultipleProducts and splitProduct transactions.
- **Default value**—1
- **Dynamic**—false

/IBM/Product/Search/MaxReturn

- **Description**—Specifies the maximum number of records returned from a searchProductInstance transaction.
- **Default value**—100
- **Dynamic**—true

/IBM/Product/SpecValueSearch/CaseSensitive/enabled

- **Description**—Determines whether case sensitive search for string value is enabled.
- **Default value**—`false`
- **Dynamic**—true

/IBM/Product/SpecValueSearch/MaxSpecValueSearchBObjs

- **Description**—Specifies the maximum number of spec value search business objects in the searchProductInstance transaction.
- **Default value**—5
- **Dynamic**—false

/IBM/Product/SpecValueSearch/MaxSpecValueSearchCriteriaBObjs

- **Description**—Specifies the maximum number of spec value search criteria business objects in the searchProductInstance transaction.
- **Default value**—20

- **Dynamic**—false

/IBM/Product/SpecValueSearch/SpecValueSearchSQL/className

- **Description**—Specifies the class to construct search SQL snippet.
- **Default value**—defaulted
- **Dynamic**—true

/IBM/Product/SuspectSearch/maxResults

- **Description**—Specifies the maximum number of records returned from a searchProductSuspect transaction
- **Default value**—100
- **Dynamic**—true

/IBM/ProductServices/RevisionHistory/DateRange/maxYears

- **Description**—Specifies the maximum number of years to limit the date range that can be used in the getRevisionHistory transaction.
- **Default value**—1
- **Dynamic**—false

/IBM/ThirdPartyAdapters/Address/Formatter

- **Description**—Specifies a pattern that is used to format address information. The pattern must adhere to the vendor's address standardization specifications.
- **Default value**—AddressLineOne=DelDesignator+DelId+StreetNumber+PreDirectional+StreetName+StreetSuffix+PostDirectional;AddressLineTwo=BoxDesignator+BoxId+StnInfo+StnId;AddressLineThree=BuildingName+Region+DelInfo
- **Dynamic**—true

/IBM/ThirdPartyAdapters/EAS/addressUsageTypeMap

- **Description**—Specifies the mapping between the InfoSphere MDM Server CDADDRUSAGETP code table values and the EAS ADDR_TYPE values.

  The InfoSphere MDM Server CDADDRUSAGETP code table values are as follows:

  – 1 - Primary residence
  – 2 - Other residence
  – 3 - Business
  – 4 - Mailing
  – 5 - Summer residence
  – 6 - Temporary residence
  – 7 - Secondary residence

  The EAS ADDR_TYPE values are as follows:

  – H - Home Address
  – B - Business Address
  – O - Other Address

  The ADDR_TYPE values are the same for both IBM DB2 Relationship Resolution and IBM DB2 Anonymous Resolution Anonymizer.
- **Default value**—(1-H),(2-O),(3-B),(4-O),(5-O),(6-O),(7-O)
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/chargeCardTypeMap

- **Description**—Specifies the mapping between the InfoSphere MDM Server CDCHARGECARDTP code table values and the EAS NUM_TYPE or ATTR_TYPE values, depending on the concrete EAS integration.

  The InfoSphere MDM Server CDCHARGECARDTP code table values are as follows:

  – 1 - Visa
  – 2 - Mastercard
  – 3 - American Express®
  – 4 - Diner's Club

  For IBM DB2 Relationship Resolution, the NUM_TYPE value is `CC - Credit Card Number`.

  For IBM DB2 Anonymous Resolution Anonymizer, the ATTR_TYPE value is `CC - Credit Card Number`.
- **Default value**—(1-CC),(2-CC),(3-CC)
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/contactMethodTypeMap

- **Description**—Specifies the mapping between the InfoSphere MDM Server CDCONTMETHTP code table values and the EAS NUM_TYPE, ADDR_TYPE, or ATTR_TYPE values, depending on the concrete EAS integration.

  The InfoSphere MDM Server CDCONTMETHTP code table values are as follows:

  – 1 - Home telephone
  – 2 - Business telephone
  – 3 - Facsimile
  – 4 - Pager
  – 5 - Cellular
  – 6 - Business e-mail
  – 7 - Personal e-mail
  – 8 - Mobile telephone

  For IBM DB2 Relationship Resolution, the NUM_TYPE value is `PH - Phone`

  The ADDR_TYPE values are as follows:

  – H - Home address
  – B - Business address
  – O - Other address

  For IBM DB2 Anonymous Resolution Anonymizer, the NUM_TYPE value is: `PHONE - Phone Number`.

  The ATTR_TYPE value is:`EMAIL - e-mail`
- **Default value**—(1-PH),(2-PH),(3-PH),(4-PH),(5-PH),(6-B),(7-H),(8-PH)
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/correctionAction

- **Description**—Specifies the action for before image in an update transaction. Valid values are as follows:

  – D - Delete
  – F - Forced hard-delete
  – N - Do not delete

- **Default value**—D
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/dsrcCode

- **Description**—Specifies the unique data source code that EAS uses to identify InfoSphere MDM Server.
- **Default value**—<DSRC_CODE>
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/exclusiveSourceSystem

- **Description**—Specifies a comma delimited string listing the client system IDs that are feeder systems to InfoSphere MDM Server and feeder systems to EAS at the same time.
- **Default value**—<EXCLUSIVE_CIENT_SYSTEMS>
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/idStatusTypeMap

- **Description**—Specifies the mapping between the InfoSphere MDM Server CDIDSTATUSTP code table values and the EAS NUM_STAT values.

  The InfoSphere MDM Server CDIDSTATUSTP code table values are as follows:

  – 1 - Applied for identification
  – 2 - Active
  – 3 - Inactive
  – 4 - Expired
  – 5 - Certified
  – 6 - Temporary residence
  – 7 - Not certified

  The EAS NUM_STAT values are as follows:

  – V - Valid
  – I - Invalid
  – U - Unknown

  The NUM_STAT values only applies to IBM DB2 Relationship Resolution.
- **Default value**—(1-I),(2-V),(3-I),(4-I),(5-V),(6-I)
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/idTypeMap

- **Description**—Specifies the mapping between the InfoSphere MDM Server CDIDTP code table values and the EAS NUM_TYPE values, depending on the concrete EAS integration.

  The InfoSphere MDM Server CDIDTP code table values are as follows:

  – 1 - Social security number
  – 2 - Corporate tax identification
  – 3 - Driver's license
  – 4 - Birth certificate
  – 5 - Mother's maiden name
  – 6 - Tax identification number
  – 7 - Tax registration number
  – 8 - Passport Nnumber

  - 9 - Health Card
  - 10 - Social insurance number
  - 11 - ABILITECLINK

  For IBM DB2 Relationship Resolution, the NUM_TYPE values are as follows:
  - DL - Driver's license
  - PP - Passport number
  - SSN - Social security number

  For IBM DB2 Anonymous Resolution Anonymizer, the NUM_TYPE values are as follows:
  - DL - Driver's license
  - SSN - Social security number
- **Default value**—(1-SSN),(3-DL), (8-PP)
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/nameUsageTypeMap

- **Description**—Specifies the mapping between the InfoSphere MDM Server CDNAMEUSAGETP code table values and the EAS NAME_TYPE values.

  The InfoSphere MDM Server CDNAMEUSAGETP code table values are as follows:
  - 1 - Legal
  - 2 - Business
  - 3 - Nickname
  - 4 - Also known as
  - 5 - Maiden
  - 6 - Alias
  - 7 - Preferred
  - 8 - Previous

  The EAS NAME_TYPE values are as follows:
  - M - Main name
  - A - Also known as

  The NAME_TYPE values are the same for both IBM DB2 Relationship Resolution and IBM DB2 Anonymous Resolution Anonymizer.
- **Default value**—(1-M),(2-M),(3-A),(4-A),(5-A),(6-A),(7-A),(8-A)
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/queue

- **Description**—Specifies the queue defined for the JMS provider, which is used when InfoSphere MDM Server sends UMF message to EAS.
- **Default value**—jms/EASQueue
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/queueConnectionFactory

- **Description**—Specifies the queue connection factory defined for the JMS provider, which is used when InfoSphere MDM Server sends UMF message to EAS.
- **Default value**—jms/EASQCF
- **Dynamic**—false

/IBM/ThirdPartyAdapters/EAS/resolutionType

- **Description**—Specifies the concrete EAS integration. Valid values are as follows:
  - NONE - No EAS integration with InfoSphere MDM Server
  - RR - InfoSphere MDM Server is integrated with a IBM DB2 Relationship Resolution instance
  - AR - InfoSphere MDM Server is integrated with a IBM DB2 Anonymous Resolution Anonymizer
- **Default value**—NONE
- **Dynamic**—false

/IBM/ThirdPartyAdapters/IIS/defaultCountry

- **Description**—Specifies the type code indicating that default country when a country is not provided in the data. This value should be one of the COUNTRY_TP_CD values in the CDCOUNTRYTP table. This configuration element is used by integration with the IIS Server.
- **Default value**—185
- **Dynamic**—false

/IBM/ThirdPartyAdapters/IIS/initialContextFactory

- **Description**—Specifies the JNDI context factory class used to look up the IIS Server. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.websphere.naming.WsnInitialContextFactory
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/providerURL

- **Description**—Specifies the URL pointing to the IIS server. This configuration element is used by integration with the IIS Server.
- **Default value**—iiop://iishost:2809
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/operationName

- **Description**—Specifies the method on the IBM WebSphere DataStage® service that the adapter class calls in matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—match
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the IBM InfoSphere DataStage data format used in matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—
  com.ibm.mdm.thirdparty.integration.iis8.converter.
  MatchOrganizationInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/DesiredTypes/addressUsage

- **Description**—Specifies the address usage type of an organization to consider when matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—An asterisk (*).
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/DesiredTypes/identification

- **Description**—Specifies the identification type of an organization to consider when matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—2
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/DesiredTypes/nameUsage

- **Description**—Specifies the name usage type of an organization to consider when matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—An asterisk (*).
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/Input/dataType

- **Description**—Specifies the name of the IBM WebSphere DataStage input data class used in matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—MatchInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/Output/dataType

- **Description**—Specifies the name of the IBM WebSphere DataStage output data class used in matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—MatchOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the IBM WebSphere DataStage service that the adapter class uses in matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/Service/jndi

- **Description**—Specifies the remote JNDI name of the IBM WebSphere DataStage service that the adapter class uses in matching organizations. This configuration element is used by integration with the IIS Server.

- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchOrganization/Service/name

- **Description**—Specifies the name of the remote home interface of the IBM WebSphere DataStage service that the adapter class uses in matching organizations. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/operationName

- **Description**—Specifies the method on the IBM WebSphere DataStage service that the adapter class calls in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—match
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the IBM WebSphere DataStage data format used in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—
com.ibm.mdm.thirdparty.integration.iis8.converter.MatchPersonInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/DesiredTypes/addressUsage

- **Description**—Specifies the address usage type of a person to consider when matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—An asterisk (*).
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/DesiredTypes/identification

- **Description**—Specifies the identification type of a person to consider when matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—1
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/DesiredTypes/nameUsage

- **Description**—Specifies the name usage type of a person to consider when matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—An asterisk (*).
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/Input/dataType

- **Description**—Specifies the name of the IBM WebSphere DataStage input data class used in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—MatchInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/Output/dataType

- **Description**—Specifies the name of the IBM WebSphere DataStage output data class used in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—MatchOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the IBM WebSphere DataStage service that the adapter class uses in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/Service/jndi

- **Description**—Specifies the remote JNDI name of the IBM WebSphere DataStage service that the adapter class uses in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/MatchPerson/Service/name

- **Description**—Specifies the name of the remote home interface of the IBM WebSphere DataStage service that the adapter class uses in matching persons. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/operationName

- **Description**—Specifies the method on the Quality Stage service that the adapter class calls in normalizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—standardizeAddress
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/AttributesMap/Input/dataType

- **Description**—Specifies the name of the Quality Stage input data class used in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—AddressInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/AttributesMap/Input/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage input format used in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—
  addresslineone=ResidenceNumber+AddressLineOne;
  addresslinetwo=AddressLineTwo;
  addresslinethree=AddressLineThree;city=City;state=ProvinceStateValue;
  postalcode=ZipPostalCode;country=CountryValue
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/AttributesMap/Output/dataType

- **Description**—Specifies the name of the Quality Stage output data class used in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—AddressOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/AttributesMap/Output/failureIndicators

- **Description**—Specifies a semicolon delimited string indicating the methods on the output data class to call to return unnormalized values in an address. This configuration element is used by integration with the IIS Server.
- **Default value**—
  unhandledaddresstext_mns;nonprocesseddata_mns;unhandleddata_mnpost
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/AttributesMap/Output/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage output format used in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—
  ResidenceNumber=unittype_mnpost+unitvalue_mnpost;
  AddressLineOne=addresslineone_formatted;
  AddressLineTwo=addresslinetwo_formatted;
  City=cityname_mns;
  ProvinceStateValue=stateabbreviation_mns;
  ZipPostalCode=fullpostalcode_mns;
  BuildingName=buildingname_mns;
  StreetNumber=housenumber_mns;
  StreetName=streetname_mns;
  StreetSuffix=streetsuffixtype_mns;
  PreDirectional=streetprefixdirection_mns;
  PostDirectional=streetsuffixdirection_mns;
  BoxDesignator=boxtype_mns;
  BoxId=boxvalue_mns;
  StnInfo=stationinformation;
  StnId=stationidentifier;
  Region=region;
  DelDesignator=deliverydesignator;

DelId=deliveryidentifier;
DelInfo=addtldeliveryinfo;
ZipPostalBarCode=postalbarcode;
PhoneticCity=nysiisofcityname_mns;
PhoneticStreetName=nysiisofstreetnamerootword_mns

- **Dynamic**—true
- **Note**—Clients may have extra address information, for example, floor number, and need extra mapping to catch it. The extra address information may be lost using the above default may have extra address information, for example, floor number, and need extra mapping to catch it. The extra address information may be lost using the above default mapping. An extra mapping value, `AddressLineThree=addresslinethree_formatted`, must be added to the mapping.

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the Quality Stage data format used in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the Quality Stage service that the adapter class uses in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/Service/jndi

- **Description**—Specifies the remote JNDI name of the Quality Stage service that the adapter class uses in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/NormalizeAddress/Service/name

- **Description**—Specifies the name of the remote home interface of the Quality Stage service that the adapter class uses in normalizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/operationName

- **Description**—Specifies the method on the Quality Stage service that the adapter class calls in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—standardizeAddress
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/AttributesMap/Input/dataType

- **Description**—Specifies the name of the Quality Stage input data class used in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—AddressInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/AttributesMap/Input/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage input format used in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—
  addresslineone=ResidenceNumber+AddressLineOne;
  addresslinetwo=AddressLineTwo;
  addresslinethree=AddressLineThree;city=City;state=ProvinceStateValue;
  postalcode=ZipPostalCode;
  country=CountryValue
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/AttributesMap/Output/dataType

- **Description**—Specifies the name of the Quality Stage output data class used in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—AddressOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/AttributesMap/Output/failureIndicators

- **Description**—Specifies a semicolon delimited string indicating the methods on the output data class to call to return non-standardized values in an address. This configuration element is used by integration with the IIS Server.
- **Default value**—
  unhandledaddresstext_mns;nonprocesseddata_mns;unhandleddata_mnpost
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/AttributesMap/Output/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage output format used in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—
  ResidenceNumber=unittype_mnpost+unitvalue_mnpost;
  AddressLineOne=addresslineone_formatted;
  AddressLineTwo=addresslinetwo_formatted;
  AddressLineThree=;
  City=cityname_mns;
  ProvinceStateValue=stateabbreviation_mns;
  ZipPostalCode=fullpostalcode_mns;
  BuildingName=;

StreetNumber=;
StreetName=;
StreetSuffix=;
PreDirectional=;
PostDirectional=;
BoxDesignator=;
BoxId=;
StnInfo=;
StnId=;
Region=;
DelDesignator=;
DelId=;
DelInfo=

- **Dynamic**—true
- **Note**—Clients may have extra address information, for example, floor number, and need extra mapping to catch it. The extra address information may be lost using the above default mapping. An extra mapping value, `AddressLineThree=addresslinethree_formatted`, must be added to the mapping.

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the Quality Stage data format used in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/Service/jndi

- **Description**—Specifies the remote JNDI name of the Quality Stage service that the adapter class uses in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/Service/name

- **Description**—Specifies the name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing addresses. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeAddress/StandardFormattingIndicator/enabled

- **Description**—SDetermines whether the address standardization indicator is enabled. If this value is true, after successful address standardization, the StandardFormattingIndicator is set to `Y` and is persisted in the database. Otherwise, the StandardFormattingIndicator will retain its input value.
- **Default value**—`true`
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/operationName

- **Description**—Specifies the method on the Quality Stage service that the adapter class calls in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—standardizeOrgName
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/Input/dataType

- **Description**—Specifies the name of the Quality Stage input data class used in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—OrgNameInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/Input/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage input format used in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**— organizationname=OrganizationName
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/Output/dataType

- **Description**—Specifies the name of the Quality Stage output data class used in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—OrgNameOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/Output/failureIndicators

- **Description**—Specifies a semicolon delimited string indicating the methods on the output data class to call to return non-standardized values in an organization name. This configuration element is used by integration with the IIS Server.
- **Default value**—unhandleddata_mnname;exceptiondata_mnname
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/Output/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage output format used in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—SOrganizationName=primaryname_mnname+namesuffix_mnname; PhoneticOrgName=matchprimarywordonenysiis_mnname
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the Quality Stage data format used in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Service/jndi

- **Description**—Specifies the remote JNDI name of the Quality Stage service that the adapter class uses in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Service/name

- **Description**—Specifies the name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing organization names. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/operationName

- **Description**—Specifies the method on the Quality Stage service that the adapter class calls in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—standardizePersonName

- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/AttributesMap/Input/dataType

- **Description**—Specifies the name of the Quality Stage input data class used in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—PersonNameInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/AttributesMap/Input/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage input format in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—personnameprefix=PrefixValue;persongivennameone=GivenNameOne; persongivennametwo=GivenNameTwo;personfamilyname=LastName
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/AttributesMap/Output/dataType

- **Description**—Specifies the name of the Quality Stage output data class used in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—PersonNameOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/AttributesMap/Output/failureIndicators

- **Description**—Specifies a semicolon delimited string indicating the methods on the output data class to call to return non-standardized values in a person name. This configuration element is used by integration with the IIS Server.
- **Default value**—unhandleddata_mnname;exceptiondata_mnname
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/AttributesMap/Output/map

- **Description**—Specifies a semicolon delimited string indicating the Quality Stage output format in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—StdGivenNameOne=matchfirstname_mnname; StdGivenNameTwo=middlename_mnname; StdLastName=matchprimaryname_mnname; PhoneticLastName=matchprimarywordonenysiis_mnname; PhoneticGivenNameOne=matchfirstnamenysiis_mnname
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the Quality Stage data format used in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/Service/jndi

- **Description**—Specifies the remote JNDI name of the Quality Stage service that the adapter class uses in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/Service/name

- **Description**—Specifies the name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing person names. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/operationName

- **Description**—Specifies the method on the Quality Stage service that the adapter class calls in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—standardizePhoneNumber
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/AttributesMap/Input/dataType

- **Description**—Specifies the name of the Quality Stage input data class used in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—PhoneNumberInput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/AttributesMap/Output/dataType

- **Description**—Specifies the name of the Quality Stage output data class used in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—PhoneNumberOutput
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Converter/className

- **Description**—Specifies the class used to convert the data between the InfoSphere MDM Server data format and the Quality Stage data format used in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.mdm.thirdparty.integration.iis8.converter.PhoneNumberInfoServerConverter
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Service/basicPackageName

- **Description**—Specifies the basic package name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—com.ibm.isd.MDMQS.MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Service/jndi

- **Description**—Specifies the remote JNDI name of the Quality Stage service that the adapter class uses in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—ejb/MDMQS/MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Service/name

- **Description**—Specifies the name of the remote home interface of the Quality Stage service that the adapter class uses in standardizing phone numbers. This configuration element is used by integration with the IIS Server.
- **Default value**—MDMQSService
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/StandardFormattingIndicator/enabled

- **Description**—Determines whether the contact method standardization indicator is used. If this value is true, after successful phone number standardization, the StandardFormattingIndicator is set to `Y` and is persisted in the database. Otherwise, the StandardFormattingIndicator will retain its input value.
- **Default value**—`true`
- **Dynamic**—true

/IBM/ThirdPartyAdapters/IIS/StubSetter/className

- **Description**—Specifies the class to configure web service client stub properties.
- **Default value**—defaulted
- **Dynamic**—false

/IBM/ThirdPartyAdapters/IIS/StubSetter/enabled

- **Description**—Determines whether stub setter is enabled.
- **Default value**—`false`
- **Dynamic**—false

/IBM/ThirdPartyAdapters/PhoneNumber/Formatter

- **Description**—Specifies a pattern that is used to format phone number information. The pattern must adhere to the vendor's phone number standardization specifications.
- **Default value**—
  ReferenceNumber=PhoneCountryCode+PhoneAreaCode+
  PhoneExchange+PhoneNumber+PhoneExtension
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/serverName

- **Description**—Specifies the server ID that the Trillium Director uses to recognize the Cleanser Server.
- **Default value**—Cleanser
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/systemId

- **Description**—Specifies the system ID that the Trillium Director uses to recognize the Cleanser Server.
- **Default value**—G
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/Address/inputFormat

- **Description**—Specifies a semicolon delimited string indicating the input format of an address standardization used by the com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter class.
- **Default value**—Line3;Line9
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/Address/outputFormat

- **Description**—Specifies a semicolon delimited string indicating the output format of an address standardization used by the com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter class.
- **Default value**—
  dr_address;pr_rte_name;pr_rte_nbr;pr_box_name;pr_box_nbr;
  pr_pr_st_dir;pr_gin_str_suffix;pr_sc_st_dir;dr_house_number;pr_st_tl;
  dr_city_name;dr_st_prov_cty_name;dr_postal_code;gm_latitude;
  gm_longitude;pr_gout_fail_level
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/Address/AttributesMap/Input/map

- **Description**—Specifies a semicolon delimited string further dividing each individual field for each component in the input format as defined by the /IBM/ThirdPartyAdapters/Trillium/Address/AttributesMap/Input/map configuration element.
- **Default value**—Line3=AddressLineOne;
  Line9=City+ProvinceStateValue+ZipPostalCode;
  Line10=CountryValue
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/Address/AttributesMap/Output/map

- **Description**—Specifies a semicolon delimited string further dividing each individual field for each component in the output format as defined by the /IBM/ThirdPartyAdapters/Trillium/Address/AttributesMap/Output/map configuration element.
- **Default value**—AddressLineOne=dr_address;
  StreetNumber=dr_house_number;
  StreetName=pr_st_tl;
  PreDirectional=pr_pr_st_dir;
  StreetSuffix=pr_gin_str_suffix;
  PostDirectional=pr_sc_st_dir;
  BoxDesignator=pr_box_name;
  BoxId=pr_box_nbr;
  DelDesignator=pr_rte_name;
  DelId=pr_rte_nbr;
  City=dr_city_name;
  ProvinceStateValue=dr_st_prov_cty_name;
  ZipPostalCode=dr_postal_code;
  LatitudeDegrees=gm_latitude;
  LongitudeDegrees=gm_longitude;
  StandardFormatingIndicator=pr_gout_fail_level
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/OrganizationName/inputFormat

- **Description**—Specifies a semicolon delimited string indicating the input format of an organization name standardization used by the com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter class.
- **Default value**—Line2
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/OrganizationName/outputFormat

- **Description**—Specifies a semicolon delimited string indicating the output format of an organization name standardization used by the com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter class.
- **Default value**—nil;pr_busname_01
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/PersonName/inputFormat

- **Description**—Specifies a semicolon delimited string indicating the input format of a person name standardization used by the com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter class.

- **Default value**—Line1
- **Dynamic**—true

/IBM/ThirdPartyAdapters/Trillium/PersonName/outputFormat

- **Description**—Specifies a semicolon delimited string indicating the output format of a person name standardization used by the com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter class.
- **Default value**—nil;pr_first_01;pr_middle1_01;pr_middle2_01;pr_middle3_01;pr_last_01
- **Dynamic**—true

/IBM/XMLServices/Response/dtd

- **Description**—Specifies the schema against which TCRMService responses are validated.
- **Default value**—tCRMResponse.xsd
- **Dynamic**—false

/IBM/XMLServices/Response/xsd

- **Description**—Specifies the schema against which TCRMService responses are validated.
- **Default value**—tCRMResponse.xsd
- **Dynamic**—false

Chapter 35. Validating data

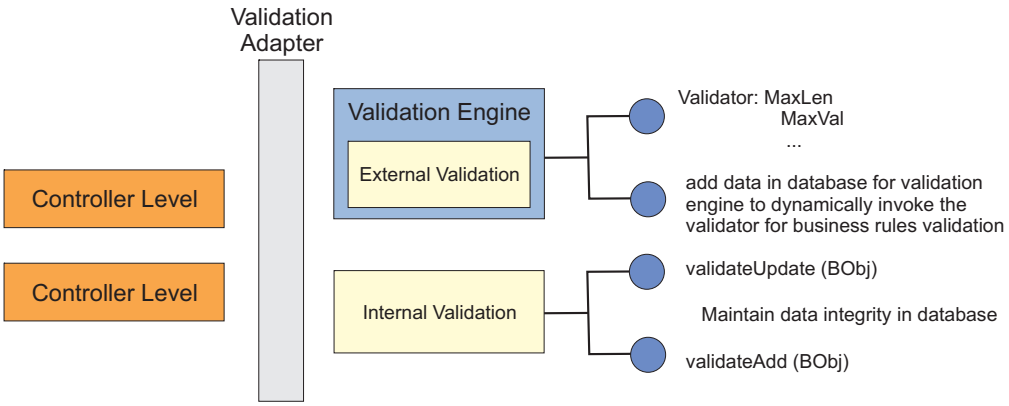
To ensure that data satisfies certain requirements expressed in validation rules, InfoSphere MDM Server validates data on all data submitted through InfoSphere MDM Server transactions.

Data can be validated by levels (for controller or business components), and by types (for internal or external types).

InfoSphere MDM Server validates data by two levels:

- **Controller**—Used for various reasons:
  - Used to process as many validations as possible at the pre-transaction stage. Most validations are performed at the controller level as opposed to the business component level.
  - Important for performance reasons.
  - Used for accumulating and returning as many error messages at pre-transaction to improve performance for users who will then not have to cope with as many validations during their session.
- **Business component**—Used for validating transactions as they are carried out; for example, when an add party is suspected to be a duplicate, the system completes additional business component validations.

InfoSphere MDM Server validates data by two types: internal or external. Sometimes, data is validated by both internal and external types. The following diagrams depicts this relationship:



- **Internal**—Intended to maintain database integrity at both the controller level and the business component level. This code is generally not accessible to developers and administrators.
- **External**—Validates content and uses information that is accessible and modifiable by developers and administrators at the controller level only.

For more information on data validation, see the configuring external validations topic in the *IBM InfoSphere Master Data Management Server System Management Guide*.

In this section, you will learn:

Understanding the Validate() method process

Each add and update operation invokes a preExecute() method before it performs any business logic. This preExecute() method further instantiates a validation adapter and passes a business object and operation name (add or update) to its validate method.

The following example code illustrates this process:

```
DWLValidationAdapter adapter = new DWLValidationAdapter();
theStatus1 = adapter.validate(
                IDWLValidation.CONTROLLER_LEVEL_VALIDATION,
    theDWLPrePostObject.getCurrentObject(),
    theDWLPrePostObject.getActionCategoryString(),
"");
```

The validate method then invokes an external validation method, and then an internal validation method. Each of these methods checks the appropriate configuration property in the configuration manager (`/IBM/DWLCommonServices/Validation/External/enabled` or `/IBM/DWLCommonServices/InternalValidation/enabled`), to determine whether or not to proceed. As a result, an operation could be validated by either of the methods or by both. The resulting status reflects all the validations performed on the data.

Understanding external validation

External validation uses a declarative approach to describe a validation rule. The definition metadata is stored in database tables. The definition metadata is retrieved at runtime by validation engines for execution.

Learning external validation types

There are three categories of external validation: fixed type data validation, variable type data validation, and context only validation.

- **Fixed type data validation**—Targets data of a typed Java class (for example, party object of party Java class). The data type is not changeable at deployment time or runtime, so it is called fixed type data.

  Fixed type validation can be applied using element (field) validation, which applies validation on a single field of an object; or group (cross field) validation, which applies validation on multiple fields of an object graph.

- **Variable type data validation**—Targets data of a typed XML schema. For example, provide party demographics where a given demographic type is described in an XSD (defined within a spec) and store the actual demographic data for a party as XML. Another example is product data that is stored as XML based on specs described in the product's type. The data type is changeable at deployment or runtime, so it is called variable type data. For more information on specs, see Chapter 3, "Managing specs and spec values," on page 61.

  Variable type validation can be applied using:

  – **XSD schema validation**—This schema validation is not context sensitive. It is either executed or not executed and is equivalent to setting context to GENERAL. It can only apply to an XML leaf node and does not handle any cross node validation. XSD schema validation supports the following type constraints:

XML type	Possible type constraints
String	length, minLength, maxLength, pattern, enumeration, whiteSpace
Boolean	pattern, whiteSpace
Decimal	totalDigits, fractionDigits, pattern, whiteSpace, enumeration, maxInclusive, maxExclusive, minInclusive, minExclusive
DateTime	pattern, enumeration, whiteSpace, maxInclusive, maxExclusive, minInclusive, minExclusive

  – **Spec validation**—This spec validation uses metadata defined for a spec schema to validate both single XML node and cross XML nodes. It can have user defined functions. This spec validation can be defined as context sensitive; for example, it is executed when it is a CREATE transaction.

- **Context only validation**—Does not support a group or element specification (which is in contrast to fixed type data validation method, where you must specify a group or element, such as a business object or attribute, to validate). Instead, you specify a transaction type and therefore it is expected the validator already knows the type of data that requires validation. For example, if the validation context is specific (such as the add party transaction), then the validator already knows the target data is a party business object.

Understanding external validation execution sequence

Context only, fixed type, and variable type data validation are executed in sequence: first, data (along with execution context) flows through the validations; then, if data and context match, the validation is executed.

The data can contain both fixed type data and variable typed data. All three validation types can be applied to data depending on configuration.

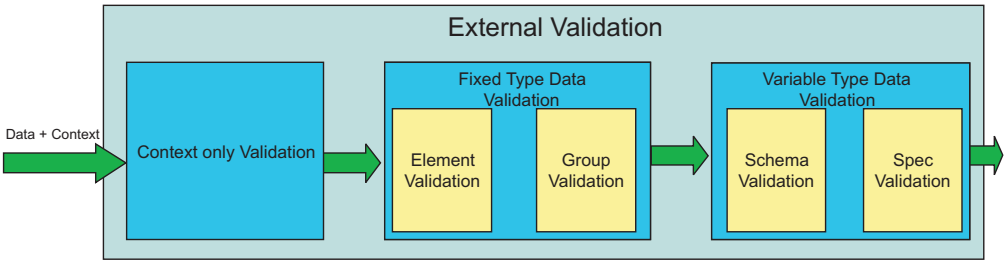
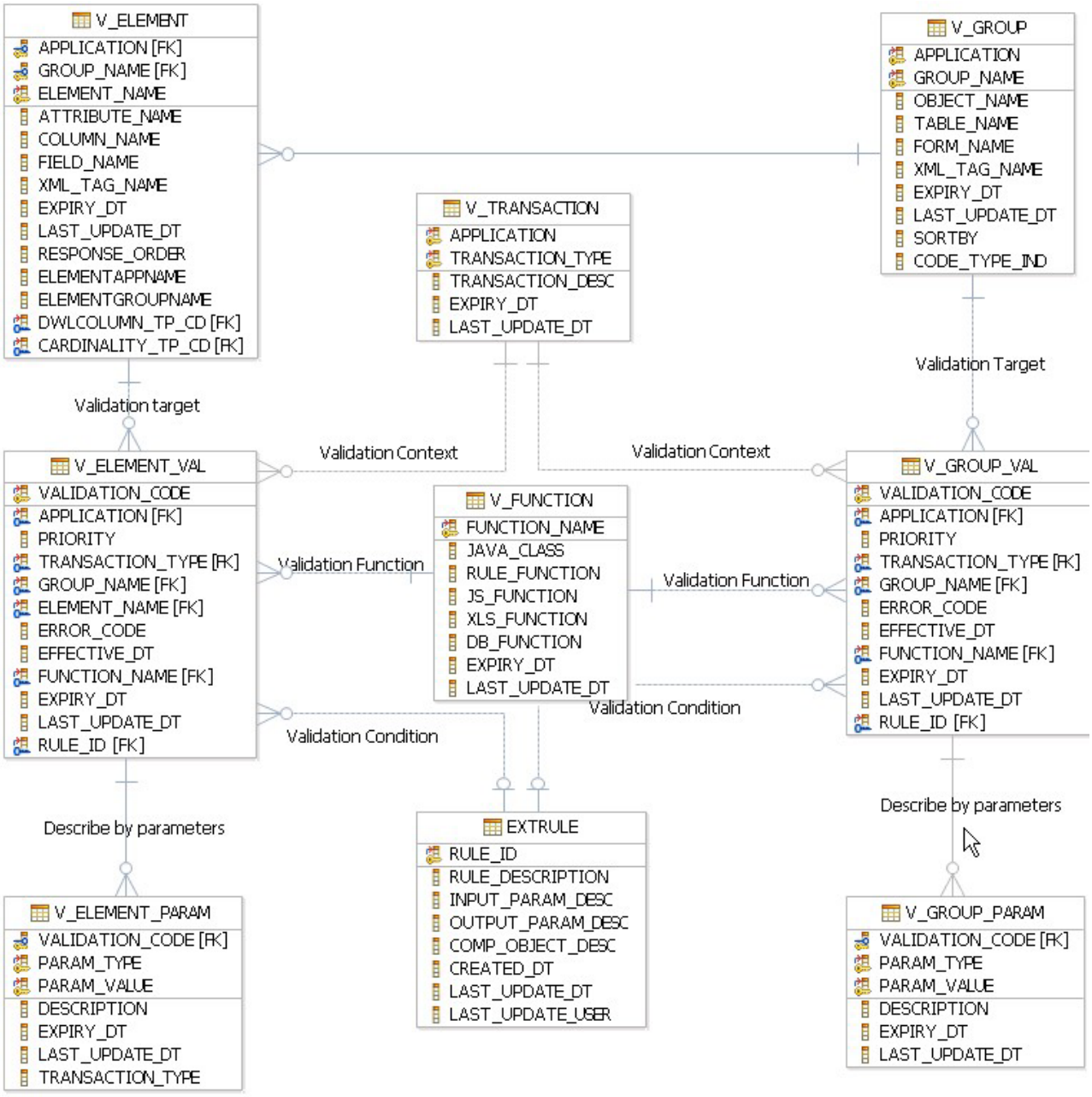


Figure 3. External validation execution sequence

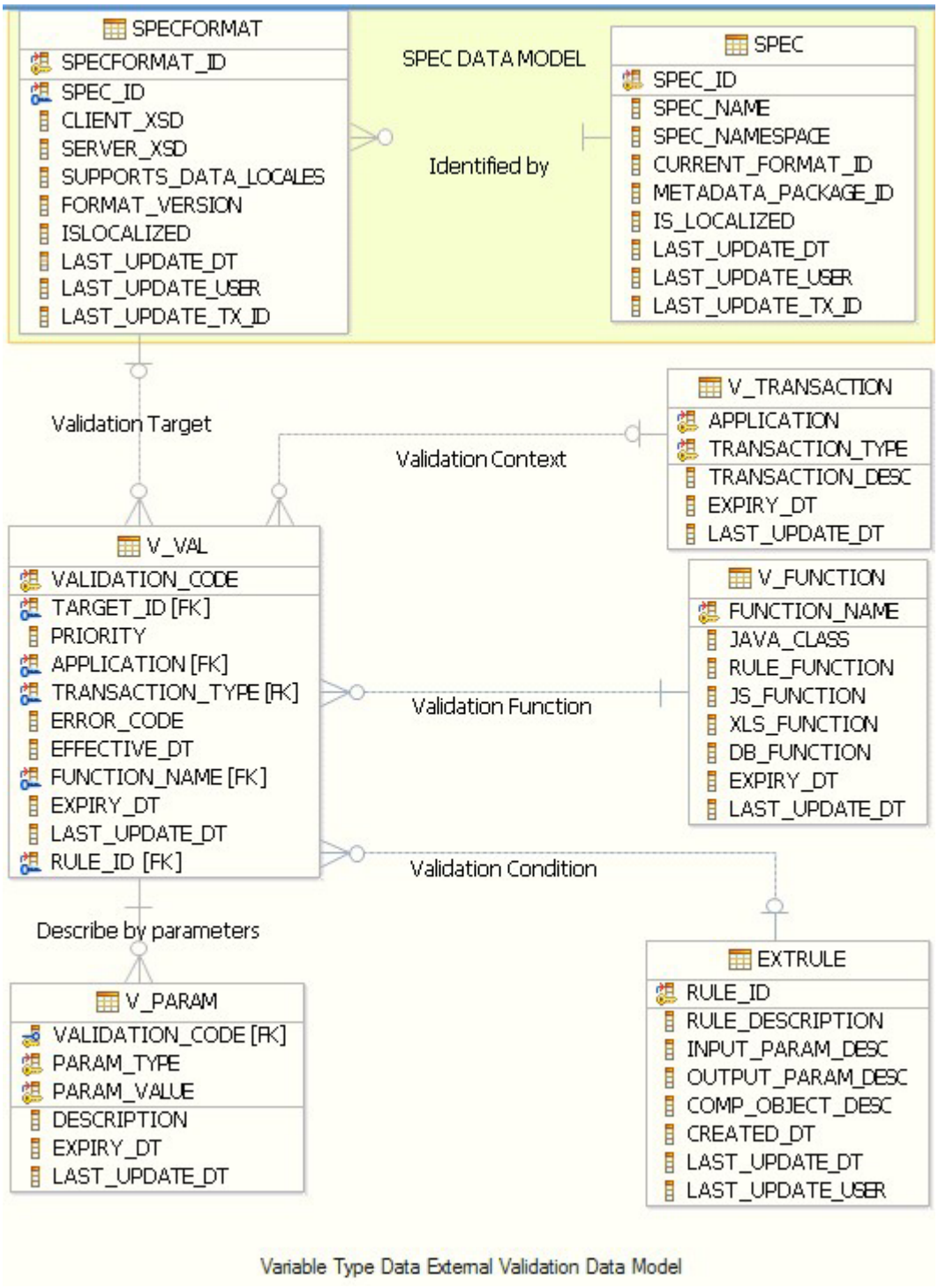
Understanding validation database tables

The InfoSphere MDM Server Administrative user interface provides the means to view and modify validation tables directly through its user interface. When the Administrative UI is not used, the tables must be maintained externally through user-created SQL.

The diagrams below show the relationships among the database tables that hold the information used for external validation.



Fixed Type Data External Validation Data Model



Understanding external validation rules

External validation rules are a set of requirements used to validate the content of data being submitted in InfoSphere MDM Server transactions.

An external validation rule consists of following several validation parts: the target, context, condition, function, parameters, and definition.

- **Validation target**—Specifies the target data where the validation rule will be applied. There are three categories of validation based on different validation target:
  - **Context only validation**—There is no need to specify validation target. This type of validation has a specific validation context associated with a pre-known target data.
  - **Fixed type data validation**—The type metadata is stored in V_GROUP and V_ELEMENT tables for class and attribute information.

    Groups are defined in the V_GROUP table which associates a group name with an object within a specific application.

GROUP_NAME	APPLICATION	OBJECT_NAME
Address	TCRM	com.dwl.tcrm.coreParty.component.TCRMAddressBObj
AdminContEquiv	TCRM	com.dwl.tcrm.coreParty.component.TCRMAdminContEquivBObj
AdminNativeKey	TCRM	com.dwl.tcrm.financial.component.TCRMAdminNativeKeyBObj
Alert	TCRM	com.dwl.tcrm.businessServices.component.TCRMAlertBObj
ContactMethod	TCRM	com.dwl.tcrm.coreParty.component.TCRMContactMethodBObj
Contract	TCRM	com.dwl.tcrm.financial.component.TCRMContractBObj
ContractAlert	TCRM	com.dwl.tcrm.financial.component.TCRMContractAlertBObj
ContractComponent	TCRM	com.dwl.tcrm.financial.component.TCRMContractComponentBObj
ContractPartyRole	TCRM	com.dwl.tcrm.financial.component.TCRMContractPartyRoleBObj
ContractRoleLocation	TCRM	com.dwl.tcrm.financial.component.TCRMContractRoleLocationBObj

Figure 4. V_GROUP table

The V_ELEMENT table defines all the fields or attributes that make up an object (group), and associates them with element names.

APPLICATION	GROUP_NAME	ELEMENT_NAME	ATTRIBUTE_NAME
TCRM	Address	AddressHistActionCode	AddressHistActionCode
TCRM	Address	AddressHistCreateDate	AddressHistCreateDate
TCRM	Address	AddressHistCreatedBy	AddressHistCreatedBy
TCRM	Address	AddressHistEndDate	AddressHistEndDate
TCRM	Address	AddressHistoryIdPK	AddressHistoryIdPK
TCRM	Address	AddressIdPK	AddressIdPK
TCRM	Address	AddressLastUpdateDate	AddressLastUpdateDate
TCRM	Address	AddressLastUpdateTxId	AddressLastUpdateTxId
TCRM	Address	AddressLastUpdateUser	AddressLastUpdateUser
TCRM	Address	AddressLineOne	AddressLineOne
TCRM	Address	AddressLineThree	AddressLineThree
TCRM	Address	AddressLineTwo	AddressLineTwo
TCRM	Address	BadAddressIndicator	BadAddressIndicator
TCRM	Address	BoxDesignator	BoxDesignator
TCRM	Address	BuildingName	BuildingName
TCRM	Address	City	City
TCRM	Address	ComponentID	ComponentID
TCRM	Address	CountryType	CountryType
TCRM	Address	CountryValue	CountryValue

Figure 5. V_ELEMENT table

  - **Variable type data validation**—The type metadata is stored in SPECFMT table containing XSD schema information for external and internal XSD files.

SPEC_FORMAT_ID	SPEC_...	EXTERNAL_XSD	INTERNAL_XSD	FORMAT_VERSION	LAST_UPDATE_DT	LAST_UPDATE_TX_ID	LAST_UPDATE_USER
12345	30001			12345	Sep 17, 2007 3:00:00 ...	35791468	cusadmin

Figure 6. SPECFMT table

- **Validation context**—Specifies the context under which the validation will be executed. The context has two parts: application and transaction type. The V_TRANSACTION table is used to store the context definition.

TRANSACTION_TYPE	APPLICATION	TRANSACTION_DESC	EXPIRY_DT	LAST_UPDATE_DT
CREATE	TCRM	TCRM GENERAL TRANSACTION		Jan 1, 2000 12:00:00 AM ...
DELETE	TCRM	TCRM GENERAL TRANSACTION		Jan 1, 2000 12:00:00 AM ...
GENERAL	TCRM	TCRM GENERAL TRANSACTION		Jan 1, 2000 12:00:00 AM ...
UPDATE	TCRM	TCRM GENERAL TRANSACTION		Jan 1, 2000 12:00:00 AM ...

  The application and transaction types group a set of related validation rules. For example, a delete operation can require different values in a field than an update operation. Most data validation rules apply across all transactions, and are assigned to a general transaction type.

  IBM InfoSphere Master Data Management Server offers four generic predefined transaction types: create, delete, general, and update. Any validation defined with transaction type of GENERAL will also apply to a transaction type of CREATE or DELETE or UPDATE. Fixed type validation and variable type validation only supports the four predefined transaction types.

  Context only data validation requires you to specify a detailed transaction name as transaction type. In this case, validation defined for this transaction type only applies to this specific transaction. For example, if you define a context only validation, you can define the context as an application of TCRM and a transaction type of addParty for a specific transaction.
- **Validation condition**—Decides if the validation should be executed. The validation condition points to an external rule to be evaluated. The EXTRULE table is used to store any external rules. For details about external rules, refer to Chapter 10, “Configuring external business rules,” on page 153 The validation condition is optional.
- **Validation function**—Requires the V_FUNCTION table to store function information. It is pointing to a Java class created by the user or packaged with the InfoSphere MDM Server. This Java class has to extend abstract class ValidatorCommon for the validation engine to process it. It must implement the abstract method validateObject for validation logic and override the setValidatorParameter method for any parameter initialization.

FUNCTION_NAME	JAVA_CLASS
TaskDueDate	com.dwl.tcrm.validation.validator.TaskDueDate
ProhibitCollapseParties	com.dwl.tcrm.validation.validator.ProhibitCollapseParties
ProhibitSplitParty	com.dwl.tcrm.validation.validator.ProhibitSplitParty
Allowed Value	com.dwl.tcrm.validation.validator.AllowedValue
Before Date	com.dwl.tcrm.validation.validator.BeforeDate
Default Value	com.dwl.tcrm.validation.validator.DefaultValue
Disallowed Value	com.dwl.tcrm.validation.validator.DisallowedValue
Fixed Length	com.dwl.tcrm.validation.validator.FixedLength
Identification	com.dwl.tcrm.validation.validator.Identification
IdentificationDisallowedPattern	com.dwl.tcrm.validation.validator.IdentificationDisallowedPattern
InvalidateInteractionValidator	com.dwl.tcrm.validation.validator.InvalidateInteractionValidator

Figure 7. V_FUNCTION table

- **Validation parameters**—Makes the function more flexible so that it can be reused. For example, a range check function can use two parameters to specify its upper bound and lower bound value. Validation parameters are associated with a specific validation rule definition and have many to one relationship. It is part of the validation definition.

  You can use a ParameterType and ParameterValue to describe a parameter. You can have multiple parameters. You can have many parameters with same ParameterType and different ParameterValue.
- **Validation definition**—Defines what should be validated. A full external validation definition links validation target, validation context, validation condition, validation function, and validation parameters together. It also contains an error code to be used in case validation fails. For details about error handling, refer to Chapter 9, "Configuring logging and error handling," on page 147.

  There are three categories of validation definitions, one for each of the validation types:
  - **Definitions for fixed type data validation**—Element or attribute validation definition is stored in V_ELEMENT_VAL and V_ELEMENT_PARAM tables.

VALIDATION_CODE	APPLICATION	TRANSACTION_TYPE	GROUP_NAME	ELEMENT_NAME	FUNCTION_NAME	ERROR_CODE	RULE_ID	PRIORITY	LAST_UPDATE_DT
36527	TCRM	GENERAL	Address	AddressLineOne	Maximum Length	9001		1	Jul 31, 2002 12:22:10 ...
36529	TCRM	GENERAL	Address	AddressLineTwo	Maximum Length	9002		1	Jul 31, 2002 12:22:10 ...
36530	TCRM	GENERAL	Address	City	Maximum Length	9003		1	Jul 31, 2002 12:22:10 ...
36534	TCRM	GENERAL	Address	ProvinceStateType	Mandatory	9004	30	1	Jul 31, 2002 12:22:10 ...
36540	TCRM	GENERAL	Address	ZipPostalCode	Mandatory	9005	30	1	Jul 31, 2002 12:22:10 ...
36541	TCRM	GENERAL	Address	ZipPostalCode	Maximum Length	9006		1	Jul 31, 2002 12:22:10 ...
36542	TCRM	GENERAL	Address	City	Mandatory	9007	30	1	Jul 31, 2002 12:22:10 ...
36543	TCRM	GENERAL	Address	ZipPostalCode	Minimum Length	9008		1	Jul 31, 2002 12:22:10 ...
36773	TCRM	GENERAL	Address	CountyCode	Maximum Length	9572		1	Jun 27, 2006 4:16:24 ...

Figure 8. V_ELEMENT_VAL table

VALIDATION_CODE	PARAM_TYPE	PARAM_VALUE	DESCRIPTION	EXPIRY_DT	LAST_UPDATE_DT
36527	MaxLength	40			Jul 31, 2002 12:22:10 ...
36529	MaxLength	40			Jul 31, 2002 12:22:10 ...
36530	MaxLength	40			Jul 31, 2002 12:22:10 ...
36541	MaxLength	10			Jul 31, 2002 12:22:10 ...
36543	MinLength	4			Jul 31, 2002 12:22:10 ...
36544	MaxValue	250000			Jul 31, 2002 12:22:10 ...
36545	MinValue	100			Jul 31, 2002 12:22:10 ...

Figure 9. V_ELEMENT_PARAM table

Group or cross attribute validation definition is stored in the V_GROUP_VAL and V_GROUP_PARAM tables.

VALIDATION_CODE	APPLICATION	TRANSACTION_TYPE	GROUP_NAME	FUNCTION_NAME	ERROR_CODE	RULE_ID	LAST_UPDA
38000	TCRM	GENERAL	ContractPartyRole	Party Role	9500		May 6, 2002
38001	TCRM	GENERAL	PartyIdentification	Identification	9501		May 6, 2002
38002	TCRM	GENERAL	PartyAddress	Reject Undel Addr	9526		May 6, 2002
38003	TCRM	GENERAL	PartyAddress	Reject Addr End	9527		May 6, 2002
38004	TCRM	GENERAL	Interaction	InteractionValidator	9548		May 21, 200
38005	TCRM	UPDATE	Interaction	InteractionValidator	9531		May 21, 200
38006	TCRM	GENERAL	Contract	Org Party Role	9502		May 27, 200
38007	TCRM	GENERAL	PartyList	ProhibitCollapseParties	9540		Jun 24, 200
38008	TCRM	UPDATE	Party	ProhibitSplitParty	9541		Jun 24, 200

Figure 10. V_GROUP_VAL table

VALIDATION_CODE	PARAM_TYPE	PARAM_VALUE	DESCRIPTION	EXPIRY_DT	LAST_UPDATE_DT
38000	4	Name			Mar 28, 2002 12:30:02...
38000	4	BirthDate			Mar 28, 2002 12:30:02...
38000	6	Name			Mar 28, 2002 12:30:02...
38000	6	BirthDate			Mar 28, 2002 12:30:02...
38000	6	TaxID			Mar 28, 2002 12:30:02...
38000	6	Address			Mar 28, 2002 12:30:02...
38000	4	TaxID			Mar 28, 2002 12:30:02...
38000	8	Name			Mar 28, 2002 12:30:02...
38000	8	BirthDate			Mar 28, 2002 12:30:02...
38000	8	Address			Mar 28, 2002 12:30:02...

Figure 11. V_GROUP_PARAM table

– **Definitions for variable type data validation**—Variable data validation definition is stored in V_VAL and V_PARAM tables.

VALIDATION_CODE	TARGET_ID	APPLICATION	TRANSACTION_TYPE	ERROR_CODE	FUNCTION_NAME	EXPIRY_DT	LAST_UPDATE_DT
38003		TCRM	addProduct	10003	AddProductCheck		Sep 17, 2007 3:00:00 ...

Figure 12. V_VAL table

VALIDATION_CODE	PARAM_TYPE	PARAM_VALUE	DESCRIPTION	EXPIRY_DT	LAST_UPDATE_DT
38001	PATH	/Product/GTIN	Path to GTIN Attr...		Sep 17, 2007 3:00:00 ...

Figure 13. V_PARAM table

– **Definitions for context only validation**—Validation definition is stored in V_VAL and V_PARAM tables. It has no target data. The TARGET_ID column will be null.

VALIDATION_CODE	TARGET_ID	APPLICATION	TRANSACTION_TYPE	ERROR_CODE	FUNCTION_NAME	EXPIRY_DT	LAST_UPDATE_DT
38003		TCRM	addProduct	10003	AddProductCheck		Sep 17, 2007 3:00:00 ...

Figure 14. V_VAL table

Understanding recursive validation against an object graph

Recursive validation is a pre-defined function that applies only to fixed type data.

Recursive validation, which is defined in the V_FUNCTION table, can be used to traverse through a tree structure object graph.

FUNCTION_NAME	JAVA_CLASS	LAST_UPDATE_DT
Recursive	com.dwl.tcrm.validation.validator.RecursiveValidator	Mar 18, 2002 2:30:49 ...

Assuming that the PartyAddress object contains an address child object, the following show the V_ELEMENT table description for this relationship. PartyAddress contains several elements. One element is named as TCRMAddressBObj, which is an address type object. The other elements are simple elements of type string. The address object contains its own elements as well.

ELEMENT_NAME	APPLICATION	GROUP_NAME	ATTRIBUTE_NAME
AddressUsageValue	TCRM	PartyAddress	AddressUsageValue
TCRMAddressBObj	TCRM	PartyAddress	TCRMAddressBObj

ELEMENT_NAME	APPLICATION	GROUP_NAME	ATTRIBUTE_NAME
CountryValue	TCRM	Address	CountryValue
ProvinceStateValue	TCRM	Address	ProvinceStateValue
ResidenceValue	TCRM	Address	ResidenceValue

When the PartyAddress is processed by the validation engine, the validation engine loops through each element of the PartyAddress object and looks for any element validation defined for these elements. However the validation engine does not loop through the elements of any child objects within PartyAddress for element validation, nor does it check the group validation definition for the child object.

If you want to validate a child object within PartyAddress, or check the group validation definition for a child object, you must make the validation definition recursive, as shown in the following V_ELEMENT_VAL table. Then validation engine will then loop through the elements of this child object for element validations and check group validation for the child object.

VALIDATION_CODE	APPLICATION	TRANSACTION_TYPE	GROUP_NAME	ELEMENT_NAME	ERROR_CODE	FUNCTION_NAME	EXPIRY_DT	LAST_UPDATE_DT
36668	TCRM	GENERAL	PartyAddress	TCRMAddressBObj		Recursive		May 6, 2002 3:01:59 P...

Be careful not to define recursive validation for an element unless it is necessary. If recursive validation is used in too many elements in an object graph, it can impede performance.

Excluding validation for a specific transaction

Performing excluded validation for a specific transactions is part of the context only validation feature. It allows you to fine tune the validation behavior for a specific transaction.

Validation defined for a group of transactions such as create, update, delete, and general transactions can be overridden for a specific transaction to exclude certain validation. The following shows a set of pre-defined excluded functions in the V_FUNCTION table:

FUNCTION_NAME	JAVA_CLASS	LAST_UPDATE_DT
EXCLUDED_CROSS_FIELD_VALIDATION		Sep 21, 2007 3:03:48 ...
EXCLUDED_FIELD_VALIDATION		Sep 21, 2007 3:03:48 ...
EXCLUDED_SCHEMA_VALIDATION		Sep 21, 2007 3:01:04 ...
EXCLUDED_SPEC_VALIDATION		Sep 21, 2007 3:03:48 ...

The following shows an example of excluded validation defined for a specific transaction in the V_VAL table:

VALIDATION_CODE	TARGET_ID	APPLICATION	TRANSACTION_TYPE	ERROR_CODE	FUNCTION_NAME	EXPIRY_DT	LAST_UPDATE_DT	RULE_ID	PRIORITY	EFFECTIVE_DT
38004		TCRM	addProduct		EXCLUDED_CROSS...		Sep 17, 2007 3:00:00 ...			

- The functions in the above examples are as follows:
  - **EXCLUDED_SCHEMA_VALIDATION**—Excludes execution of the schema validation for a specific transaction if the data has variable type data.
  - **EXCLUDED_SPEC_VALIDATION**—Excludes execution of the spec validation for a specific transaction if the data has variable type data.
  - **EXCLUDED_FIELD_VALIDATION**—Excludes execution of the element or field validation for a specific transaction if the data has fixed type data.
  - **EXCLUDED_CROSS_FIELD_VALIDATION**—Excludes execution of the cross element or field (group) validation for a specific transaction if the data has fixed type data.

Example: Using external validations

Business scenario

In this scenario, a product needs to be validated for an add transaction. The product has both variable type data and fixed type data. The fixed type data of Java type-product has two fields: Description and ShortDescription. The variable type data has following schema:

```
<xsd:schema xmlns:product="http://www.ibm.com/xmlns/prod/websphere/mdm/product/schema"
 xmlns:xsd= "http://www.w3.org/2001/XMLSchema"
 targetNamespace="http://www.ibm.com/xmlns/prod/websphere/mdm/product/schema">
 <xsd:complexType name="ProductPrice">
      <xsd:sequence>
        <xsd:element name="normal" type="xsd:decimal"/>
        <xsd:element name="discount" type="xsd:decimal" minOccurs="0"/>
  </xsd:sequence>
 </xsd:element>
 <xsd:element name="Product">
    <xsd:complexType>
           <xsd:sequence>
             <xsd:element name="GTIN" type="xsd:integer"/>
             <xsd:element name="description" type="xsd:string" minOccurs="0"/>
             <xsd:element name="Price" type="product:ProductPrice"/>
        </xsd:sequence>
    </xsd:complexType>
 </xsd:element>
</xsd:schema>
```

An instance of this schema as below:

```
<Product>
 <GTIN>1853729163851</GTIN>
 <description>Example</description>
 <Price>
    <normal>188.00</normal>
    <discount>94.00</discount>
 </Price>
</Product>
```

The validation rule requirements are as follows:

1. Description can have a maximum length of 100. This applies to all transaction types and is of transaction type GENERAL.
2. The ShortDescription can have a maximum length of 50. This applies to all transaction types and is of transaction type GENERAL.
3. The Description and ShortDescription fields cannot both be blank; at least one of them must be assigned a value. This applies only to a CREATE transaction type.
4. The GTIN element for variable data has to match a complex GTIN rule. See http://www.gs1.org/productssolutions/barcodes/support/check_digit_calculator.html#how

   This applies to all transaction types and it is of transaction type GENERAL.
5. The normal price must be more than the discount price in variable type data. This applies only to a CREATE transaction type.

Solution in external validation

Fixed type validation is used to solve the first three validation requirements. Variable type validation is used to solve the last two validation requirements.

1. Element Validation

   Target
   - ELEMENT: Description
   - GROUP: Product

   Context
   - APPLICATION: TCRM
   - TRANSACTION_TYPE: GENERAL

   Function
   JAVA_CLASS: com.ibm.mdm.validation.MaxLen

   Condition
   Optional. No condition.

   Parameters
   - PARAM_TYPE: MAXLENGTH

     PARAM: 100
2. Element Validation

   Target
   - ELEMENT: ShortDescription
   - GROUP: Product

   Context
   - APPLICATION: TCRM
   - TRANSACTION_TYPE: GENERAL

   Function
   JAVA_CLASS: com.ibm.mdm.validation.MaxLen

   Condition
   Optional. No condition.

   Parameters
   - PARAM_TYPE: MAXLENGTH

PARAM: 50

3. Group Validation

   Target GROUP: Product

   Context
   - APPLICATION: TCRM
   - TRANSACTION_TYPE: CREATE

   Function
   JAVA_CLASS: com.ibm.mdm.validation.DescBlankCheck

   Condition
   Optional. No condition.

   Parameters
   None

4. Spec Validation

   Target TARGET_ID: 12345

   Assuming spec format id is 12345 for the schema

   Context
   - APPLICATION: TCRM
   - TRANSACTION_TYPE: GENERAL

   Function
   JAVA_CLASS: com.ibm.mdm.validation.GTINCheck

   Condition
   Optional. No condition.

   Parameters
   - PARAM_TYPE: PATH
     PARAM: /Product/GTIN

5. Spec validation

   Target TARGET_ID: 12345

   Assuming spec format id is 12345 for the schema

   Context
   - APPLICATION: TCRM
   - TRANSACTION_TYPE: CREATE

   Function
   JAVA_CLASS: com.ibm.mdm.validation.GreaterCheck

   Condition
   Optional. No condition.

   Parameters
   - PARAM_TYPE: BIG
     PARAM: /Product/Price/normal
   - PARAM_TYPE: SMALL
     PARAM: /Product/Price/discount

Sample Java validation function

A Java class that extends ValidatorCommon and contains greater than logic is used as the validation function. The following is the sample code.

```
public class GreaterCheck extends ValidatorCommon {

    public final static String BIG = "BIG";
    public final static String SMALL = "SMALL";
    public final static String SPECNAME = "SPECNAME";
    public final static String NAMESPACE = "NAMESPACE";
    private String big;
    private String small;
    private String specName;
    private String nameSpace;

    public PriceCheck() {
        super();
    }

    protected void setValidatorParameter(Map param) throws ValidationException
  {
        List list = null;

        try {
            list = (List) param.get(BIG);
            big = (String) list.get(0);
            list = (List) param.get(SMALL);
            small= (String) list.get(0);
            list = (List) param.get(SPECNAME);
            specName = (String) list.get(0);
            list = (List) param.get(NAMESPACE);
            nameSpace = (String) list.get(0);
        } catch (Exception e) {
            throw new ValidationException("Set ParamType: " + BIG + " and "+
   SMALL + " failed. " + e);
        }
    }

  protected DWLStatus validateObject(Object obj, DWLStatus status, Object env) throws ValidationException{
        try {

       //cast to dynamic object
       DynamicEntity dn = (DynamicEntity) obj;

      //get SpecValueBObj
     SpecValueBObj sv = dn.retrieveSpecValueBObj(specName, nameSpace);

      //get big and small value
      float aBig = Float.parseFloat(sv.retrieveLeafAttributeText(big));
        float aSmall = Float.parseFloat(sv.retrieveLeafAttributeText(small));

      //check value
      if (aBig <= aSmall)    {
                this.setErrorStatus(status);
      }
        } catch (Exception e) {
            throw new ValidationException(e);
        }

        return status;
  }
}
```

Understanding internal validation process

Internal validation uses validateAdd and validateUpdate methods defined (or inherited) for each business object. These methods normally check that such required values as foreign keys and party-IDs exist in the business object.

For example, the TCRMPersonBObj component has a validateUpdate() method that contains a number of validation checks, such as the following code that verifies that the last update date field is not null:

```
if(eObjPerson.getLastUpdateDt() == null) {
  DWLError error_u3 = new DWLError();
  error_u3.setComponentType(new Long(TCRMCoreComponentID.PERSON_OBJECT).
       longValue());
  error_u3.setReasonCode(new Long(TCRMCoreErrorReasonCode.LAST_UPDATED_DATE_NULL)
       .longValue()); error_u3.setErrorType(TCRMErrorCode.FIELD_VALIDATION_ERROR);
  status.addError(error_u3);
```

Understanding business key validation

InfoSphere MDM Server defines and validates business keys for various groups. Validation is performed when users add or update records corresponding to a group.

The business key of a given entity is made up of one or more attributes of the entity that uniquely identifies the entity at the business level. Each entity's business key is defined in the V_ELEMENTATTRIBUTE metadata table. InfoSphere MDM Server defines business keys for a predefined set of groups that require unique identification.

InfoSphere MDM Server validates the uniqueness of business keys to ensure that they remain unique among all existing active instances of the same business object. During add and update transactions, InfoSphere MDM Server determines entity duplicates based on the business key values.

InfoSphere MDM Server uses business key definitions in the following scenarios:

- **Maintaining entity uniqueness from a business perspective** – One of the goals of business key validation is to ensure that duplicate records do not get inserted. If two records share the same values for their business key attributes, then they are considered to be duplicates. Since the business requirements drive the definition of duplicates, this validation is done at the application level.
- **Validating data survivorship** – Data survivorship rules determine what data should ultimately survive when merging or collapsing parties. The default rule uses business key attributes for each business object to identify whether the corresponding business objects of the entities being merged or collapsed match. If the business key values for two entities match, then either both business objects survive or the business object that is most recent survives.

In addition to the existing, predefined business keys, InfoSphere MDM Server also provides a mechanism to enable you to define new business keys and enforce group validation against the new business keys. The business key validation framework helps you to customize business key validation for different groups.

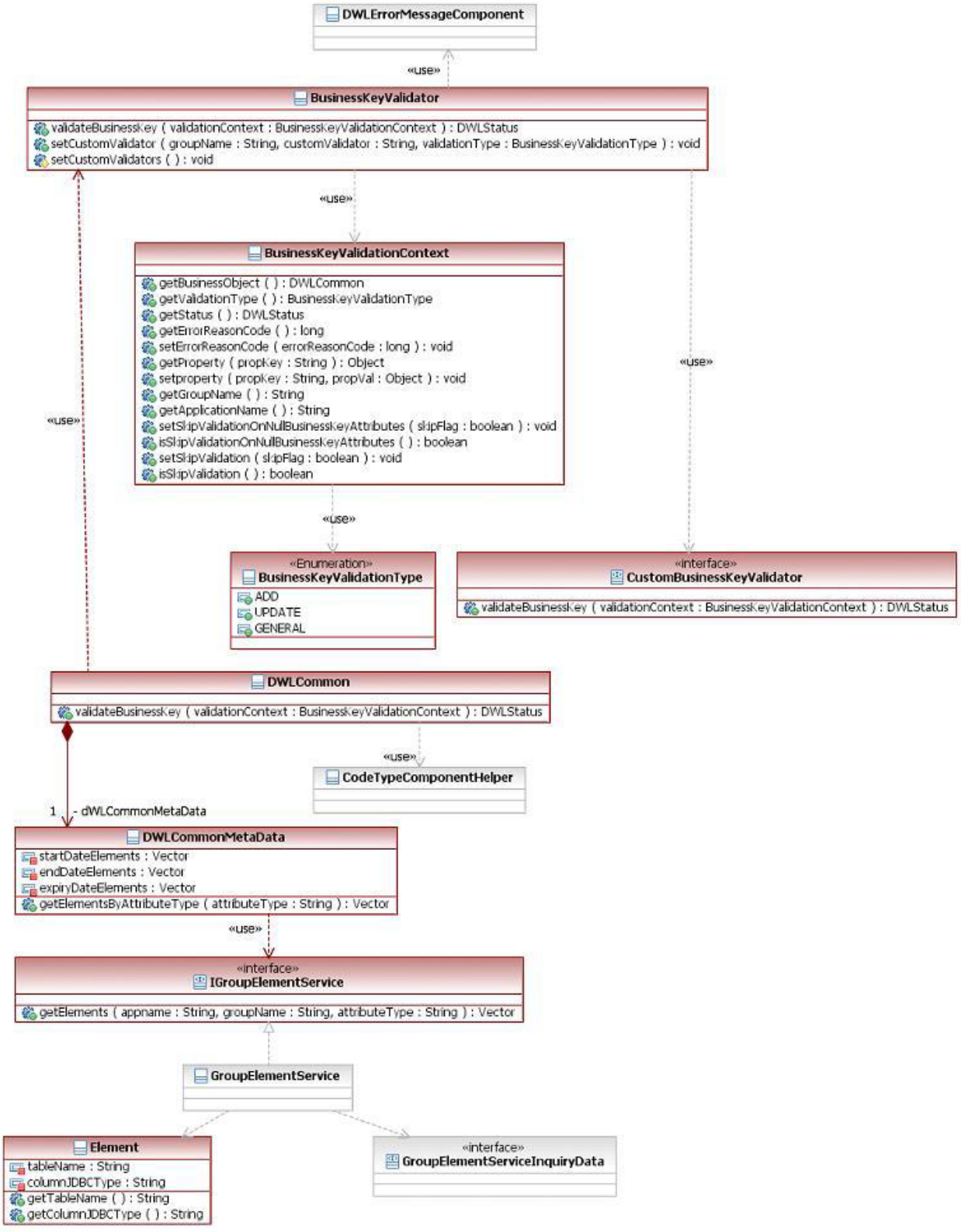
See also:

"Learning business key validation framework components"
"Learning business key validation configuration elements" on page 495
"Learning business key validation attribute types" on page 496
"Learning business key validation rules" on page 496

Learning business key validation framework components

A number of framework components are bundled with InfoSphere MDM Server. These components can help you to customize business key validation for different groups.

The following class diagram shows the classes that make up the business key validation framework.



com.ibm.mdm.common.validator.CustomBusinessKeyValidator
This interface provides the methods required to create a custom business key validator:

- **validateBusinessKey()** – This method encodes the logic that validates business keys based on the type of validation (add or update).
  - Parameters:

    com.ibm.mdm.common.validator.BusinessKeyValidationContext – This context object contains all of the necessary details to validate a business key.
  - Return type: DWLStatus

com.ibm.mdm.common.validator.BusinessKeyValidator

This class encodes the logic for constructing the dynamic SQL to verify duplicates of business keys. The methods in this class are used during add or update transactions:

- **validateBusinessKey()** – This method encodes the logic that validates business keys based on the type of validation (add or update).
  - Parameters:

    com.ibm.mdm.common.validator.BusinessKeyValidationContext – This context object contains all of the necessary details to validate a business key.
  - Return type: DWLStatus
- **setCustomValidator()** – Use this method to add custom validators to alter validation for any groups.
  - Parameters:

    appName (String) – The name of the application for which the business key validation will be customized.

    groupName (String) – The name of the group for which the business key validation will be customized.

    validationType (String) – The type of validation for which the custom validation should be applied.

    customValidator (String) – The fully qualified name of the class that implements the custom validation code. This class should implement the CustomBusinessKeyValidator interface.
  - Return type: void
- **setCustomValidators()** – Override this method to set custom validators for the groups that require custom validation..
  - Return type: void

com.ibm.mdm.common.validator.BusinessKeyValidationContext

This class holds all the necessary details for validating a business key. This class also provides a facility to hold any additional information that will be required for custom validations, as name/value pairs. This class contains the following methods:

- **getBusinessObject()** – This method returns an instance of DWLCommon for the business object that is being validated.
  - Return type: DWLCommon
- **getValidationType()** – This method returns the type of validation performed on the business object. The type of validation indicates whether the business key validation will be done for add or update transactions. The types are defined as enumeration in BusinessKeyValidationType.
  - Return type: BusinessKeyValidationType
- **getStatus()** – This method returns the DWLStatus object. This object holds error details in case of validation failure.

  - Return type: DWLStatus
- **getErrorReasonCode()** – This method enables you to get the error reason code that will be used in case of validation failure.
  - Return type: long
- **setErrorReasonCode()** – This method enables you to set the error reason code that will be used in case of validation failure.
  - Parameters:

    errorReasonCode (Long) – A valid error reason code. If there is no entry in the ERRORREASON table corresponding to this code, InfoSphere MDM Server will use the default error reason code for business key validation.
  - Return type: void
- **setProperty()** – This method enables you to set any object into the context. This method should be used in custom validations where additional details are required.
  - Parameters:

    propKey (String) – The key to the property being set into context.

    propVal (Object) – The value of the property being set into context.
  - Return type: DWLStatus
- **getProperty()** – This method returns the value of a given property. If there is no property matching the key, the return is null.
  - Parameters:

    propKey (String) – The key to the property.
  - Return type: – The value of the property (Object),
- **getGroupName()** – This method returns the name of the group for which the validation is being performed.
  - Return type: The name of the group (String).
- **getApplicationName()** – This method returns the name of the application corresponding to the group for which the validation is being performed.
  - Return type: The name of the application (String).
- **setSkipValidation()** – This method sets the context property to indicate that the validation can be skipped.
  - Parameters:

    skipValidationFlag (Boolean) – The value of the skip validation flag.
  - Return type: void
- **isSkipValidation()** – This method returns the value of the property that indicates whether the validation can be skipped.
  - Return type: The value of the skip validation flag (Boolean).
- **setSkipValidationOnNullBusinessKeyAttributes()** – This method sets the context property to indicate whether validation can be skipped if the business key attributes are null or empty.
  - Parameters:

    skipValidationFlag (Boolean) – The value of the skip validation flag.
  - Return type: void
- **isSkipValidationOnNullBusinessKeyAttributes()** – This method returns the value of the property that indicates whether the validation can be skipped if the business key attributes are null or empty.

– Return type: The value of the skip validation flag (Boolean).

com.ibm.mdm.common.validator.BusinessKeyValidatorFactory
This class is a factory implementation to provide an instance of BusinessKeyValidator. This class contains the following method:

- **static getInstance()** – This method returns an object of the BusinessKeyValidator that is configured through the related InfoSphere MDM Server configuration element.

  Note: For information on configuring business key validation, see "Learning business key validation configuration elements" on page 495.

  – Return type: BusinessKeyValidator

com.ibm.mdm.common.validator.BusinessKeyValidationType
This class is an enumeration that provides the following validation types:

- ADD – Indicates that business key validation should be done for add transactions.
- UPDATE – Indicates that business key validation should be done for update transactions.
- GENERAL – Indicates that common business key validation should be done for both add and update transactions.

com.ibm.mdm.annotations.BusinessKeyValidationErrorReasonCodes
This class is an annotation applicable to the business object classes. This annotation specifies the error reason codes used by the business key validation framework.

Note: If a business object does not have this annotation, then it will use the default error reason codes in case of a business key validation failure.

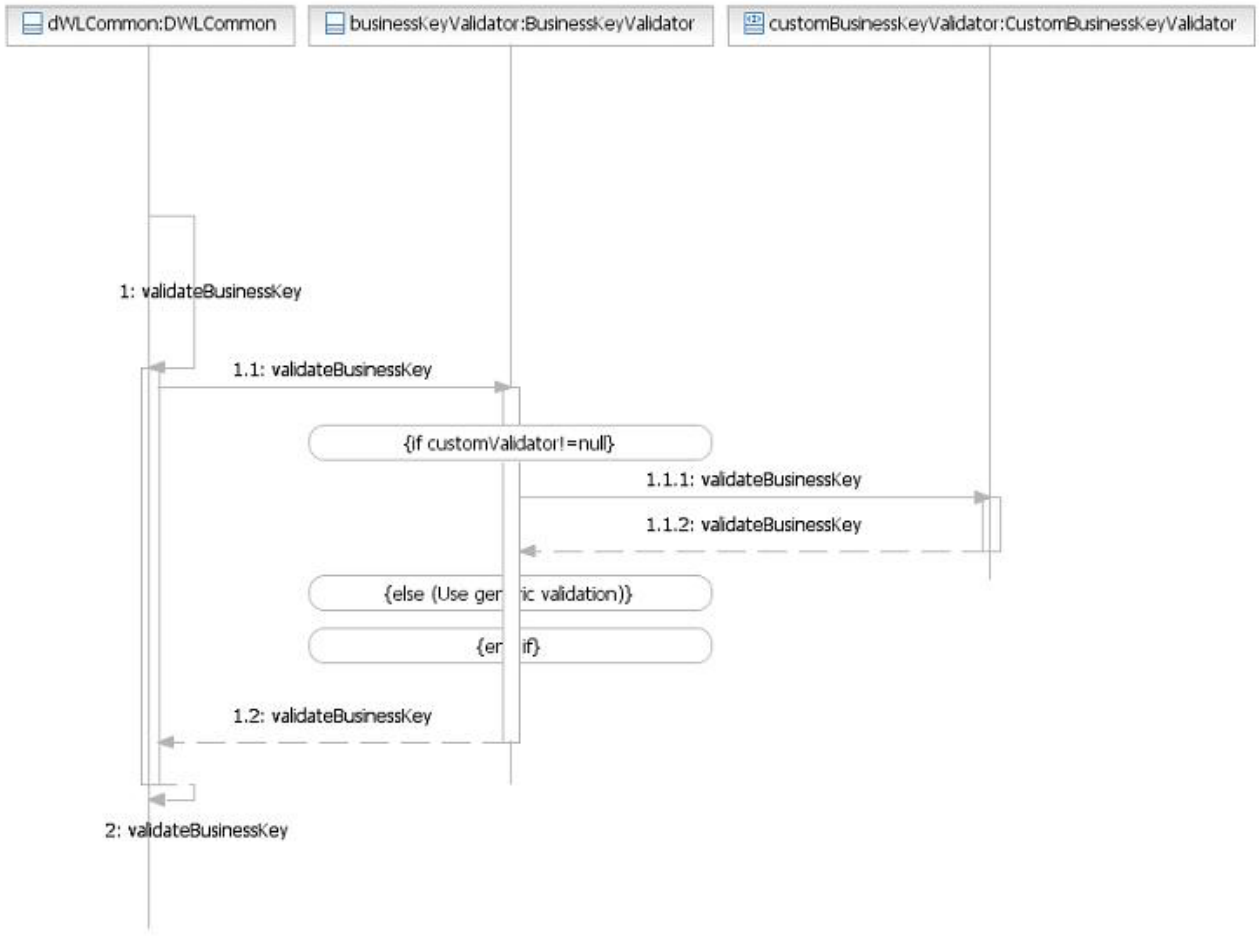
This annotation has the following attributes:

- AddValidation – Indicates the error reason code that will be used in case of business key validation errors during an Add transaction.
- UpdateValidation – Indicates the error reason code that will be used in case of business key validation errors during an Update transaction.

For example:

```
@BusinessKeyValidationErrorReasonCodes(AddValidation = 1234, UpdateValidation = 5678)
```

The following sequence diagram shows the control flow during business key validation:



Learning business key validation configuration elements

A number of configuration elements are involved in configuring the business key validation feature.

- **/IBM/DWLCommonServices/Validation/BusinessKeyValidation/Validator/className** – This property configures the business key validator used for the InfoSphere MDM Server system. This element is configured to the MDMBusinessKeyValidator class. This is a subclass of BusinessKeyValidator.
- **/IBM/DWLCommonServices/Validation/BusinessKeyValidation/ExcludeList/groupNames** – This property turns off business key validation for groups. This property holds a comma-separated list of group names for which validation is disabled.

  The following list of groups shows the business objects that currently have no predefined validation, but whose business keys are defined in metadata tables. These groups are, therefore, in the 'exclude' list:

  ContractRoleLocationPrivPref

  Address

  ContactMethod

  FinancialProfile

  IncomeSource

  OrganizationName

PartyAddressPrivPref
PartContactMethodPrivPref
PartyLobRelationship
PartyLocationPrivPref
PartyPrivPref
PartyAddressPrivPref
PartyContactMethodPrivPref
AccessDateValue
AdminContEquiv
EntityInstancePrivPref
ProductSpecValueBObj

Learning business key validation attribute types

The business key validation framework validates groups for business keys using metadata defined in the V_ELEMENTATTRIBUTE table.

The following attribute types define metadata in the V_ELEMENTATTRIBUTE table for business key validation. These attribute types are defined in the CDATTRIBUTETP table.

Table 41. Business key validation attribute types

Attribute type (ATTRIBUTE_TP_CD)	**Description**
1	Business key – The field or combination of fields that makes an object unique from a business perspective.
2	Business key child – The business key of the parent object depends on the keys of its child.
6	Implicit business key – The field or combination of fields that defines the scope of an object's business key uniqueness.
7	Expiry date attribute – The field that defines the expiry date of an entity.
8	Start date attribute – The field that defines the date on which an entity becomes valid.
9	End date attribute – The field that defines the date on which the validity of the entity ends.

Learning business key validation rules

InfoSphere MDM Server uses a number of rules to determine how it validates business keys.

By default, InfoSphere MDM Server validates entities during add and update transactions. The default rules of business key validation are as follows:

- During **add** transactions, an entity instance with the same business key as an existing instance of the same entity will not be added.
- During **update** transactions, entity instance business key attributes will not be modified.

Validation rule exceptions

For various business reasons, some existing InfoSphere MDM Server groups implement custom validations that do not strictly follow the default business key validation rules. Instead, these groups implement complex logic for validation.

The following DWLADMINSERVICE groups do not follow the default validation rules:

- ComplianceRequirementBObj
- DWLAdminJavaImpl
- DWLAdminRuleEngineImpl
- DWLAssociatedObject
- DWLBusinessTxn
- DWLBusinessTxnRequest
- DWLBusinessTxnResponse
- DWLInternalTxn
- DWLUserProfileBObj
- EntitySpecUseBObj
- ProcessAction
- ProcessControl
- ProductTypeBObj
- Validation
- ValParameter

The following TCRM groups do not follow the default validation rules:

- CommonAlert
- Answer
- AnswerSet
- BillingSummary
- BillingSummaryMiscValue
- Category
- ContractPartyRoleRelationship
- ContractPartyRoleSituation
- DefaultPrivPref
- DWLDefaultedSourceValue
- DWLGroupingAssociationBObj
- EntityConditionRelBObj
- EnumeratedAnswer
- FinancialProductBObj
- GoodsProductBObj
- InsuranceProductBObj
- InteractionRelationship
- LobRelationship
- MultipleProductCategoriesBObj
- PartyAddress
- PartyContactMethod
- PartyRelationship

- PartyRelationshipRole
- ProductBObj
- ProductAdminSysKeyBObj
- ProductCategoryAssociationBObj
- ProductIdentifierBObj
- ProductRelationshipBObj
- ServiceProductBObj
- SuspectAugmentation
- TaskBObj
- TCRMAddressNoteBObj
- TCRMAddressValueBObj
- TCRMCampaignAssociationBObj
- TCRMContractValue
- TCRMPartyComplianceBObj
- TCRMPartyGroupingValue
- TCRMPartyMacroRole
- TCRMPartyMacroRoleAssociation
- TCRMPartyPayrollDeductionBObj
- TCRMPartyValue
- WorkbasketEntityBObj

Customizing business key validation

You can use the business key validation framework to customize the validation that takes place for groups during add and update transactions.

See also:

"To define business keys and validation"

"To override business key validation logic for a group" on page 500

"To disable business key validation" on page 501

To define business keys and validation

Business keys for groups are defined by metadata entries in the V_ELEMENTATTRIBUTE table, and supported by corresponding metadata entries in the V_GROUP, V_ELEMENT, CDDWLTABLETP, CDDWLCOLUMNTP, and GROUPDWLTABLE tables. The business key attributes and the supporting metadata in these tables are already defined for the groups that require business key validations.

Important: To modify the business keys for groups that do not follow the default business key validation rules, such as those listed as exceptions in "Learning business key validation rules" on page 496, you must implement a custom validator. For information on implementing custom validators, see "To override business key validation logic for a group" on page 500.

1. To change the business key attributes of a group or define additional attributes as business keys, use SQL to populate the V_ELEMENTATTRIBUTE table with appropriate values for the business key attributes of a group. The SQL should take the following form:

```
INSERT INTO DB2ADMIN.V_ELEMENTATTRIBUTE (V_ELEMENT_ATTRB_ID, ATTRIBUTE_TP_CD,
APPLICATION, GROUP_NAME, ELEMENT_NAME, EXPIRY_DT, LAST_UPDATE_DT)
VALUES (<Primary key value>,<Attribute type>,<Application Name>,
<Group name>,<Element name>,null, current_timestamp);
```

2. If applicable, define the primary key, child business keys, and implicit business keys with the correct attribute type. If the business key should be validated only among active entity instances, you must also define the EndDate and ExpiryDate attributes.

   Note: Choose attribute type values carefully. For more information, see "Learning business key validation attribute types" on page 496.

3. Ensure that all required supporting metadata is available in the related metadata tables:
   a. In the V_GROUP table, ensure that the group for which the business keys are defined has an entry.
   b. In the CDDWLTABLETP table, ensure that InfoSphere MDM Server data tables corresponding to the group requiring business key validation are defined.
   c. In the GROUPDWLTABLE table, ensure that the group is correctly mapped to one or more InfoSphere MDM Server data tables through metadata defined in V_GROUP and CDDWLTABLE.
   d. In the V_ELEMENT table, ensure that the business key, primary key, child business keys, implicit business key, EndDate, and ExpiryDate attributes have correct element definitions.
   e. In the V_ELEMENT table, ensure that the elements are correctly mapped to the respective columns of the InfoSphere MDM Server data tables through DWLCOLUMN_TP_CD.
   f. In the CDDWLCOLUMNTP table, ensure that the columns corresponding to business key, primary key, child business keys, implicit business key, EndDate, and ExpiryDate attributes are defined.
   g. In the CDDWLCOLUMNTP table, ensure that the JDBC_TYPE is set correctly. The following table provides a mapping for database types to the JDBC types:

Table 42. Mapping database types to JDBC types

DB2	Oracle	JDBC type (code type)
BIGINT	NUMBER(19,0)	BIGINT
VARCHAR	VARCHAR2	VARCHAR
TIMESTAMP	TIMESTAMP	TIMESTAMP
CHARACTER	CHAR	CHAR
INTEGER	INTEGER	INTEGER
SMALLINT	SMALLINT	SMALLINT
DECIMAL	NUMBER(17,3)	DECIMAL
CLOB	CLOB	CLOB
XML	XMLTYPE	VARCHAR
DATE	DATE	DATE
DOUBLE	DOUBLE PRECISION	DECIMAL
REAL	REAL	DECIMAL

To override business key validation logic for a group

1. Create a custom validator by implementing the com.ibm.mdm.common.validator.CustomBusinessKeyValidator interface.
2. Edit the com.ibm.mdm.common.validator.MDMBusinessKeyValidator class to map the custom validator to the group names you wish to customize.

For example, if you need to customize the business key validation for the PersonName group while adding and updating a new person name:

1. **Step 1:**

```
package com.ibm.mdm.validator.sample;

import com.dwl.base.error.DWLStatus;
import com.dwl.base.exception.DWLBaseException;
import com.ibm.mdm.common.validator.BusinessKeyValidationContext;
import com.ibm.mdm.common.validator.CustomBusinessKeyValidator;


public class PersonNameCustomBusinessKeyValidator implements
  CustomBusinessKeyValidator {

/* (non-Javadoc)
 * @see com.ibm.mdm.common.validator.CustomBusinessKeyValidator#
   validateBusinessKey(com.ibm.mdm.common.validator.BusinessKeyValidationContext)
*/
public DWLStatus validateBusinessKey(BusinessKeyValidationContext
   validationContext)throws DWLBaseException, Exception {

  switch (validationContext.getValidationType())
  {
   case ADD:
    //TODO: Implement custom validation code
//during add transaction for
    //PersonName group (TCRMPersonnameBObj).

    break;
   case UPDATE:
    //TODO: Implement custom validation code
//during update transaction for
    //PersonName group (TCRMPersonnameBObj).

    break;
  }
  return validationContext.getStatus();
 }
}
```

2. **Step 2:** Edit the com.ibm.mdm.common.validator.MDMBusinessKeyValidator class to map the custom validator as follows, without modifying any of the existing mappings.

```
package com.ibm.mdm.common.validator;

import com.dwl.base.exception.DWLBaseException;
import com.ibm.mdm.common.validator.BusinessKeyValidationType;
import com.ibm.mdm.common.validator.BusinessKeyValidator;


public class MDMBusinessKeyValidator extends BusinessKeyValidator {

 /* (non-Javadoc)
  * @see com.ibm.mdm.common.validator.BusinessKeyValidator#setCustomValidators()
  */
 @Override
 protected void setCustomValidators() throws DWLBaseException {
  super.setCustomValidators();

// Customer's Custom Validations to be added below.

  setCustomValidator("TCRM", "PersonName",
      "com.ibm.mdm.validator.sample.PersonNameCustomBusinessKeyValidator",
    BusinessKeyValidationType.ADD);

  setCustomValidator("TCRM", "PersonName",
      "com.ibm.mdm.validator.sample.PersonNameCustomBusinessKeyValidator",
```

```
        BusinessKeyValidationType.UPDATE);
    }

}
```

As a result of the above procedure, the customized business key validation will be invoked for the PersonName group during add and update transactions. For other entities, the standard, predefined InfoSphere MDM Server validation will be invoked.

To disable business key validation

To disable business key validation for a given group, add the corresponding group name to the /IBM/DWLCommonServices/Validation/BusinessKeyValidation/ExcludeList/groupNames configuration element.

Chapter 36. Paginating search results

The Pagination search results feature improves the performance and usability of the getAll and Search transactions by allowing multiple pages of results to be returned. Pagination requires no special administration.

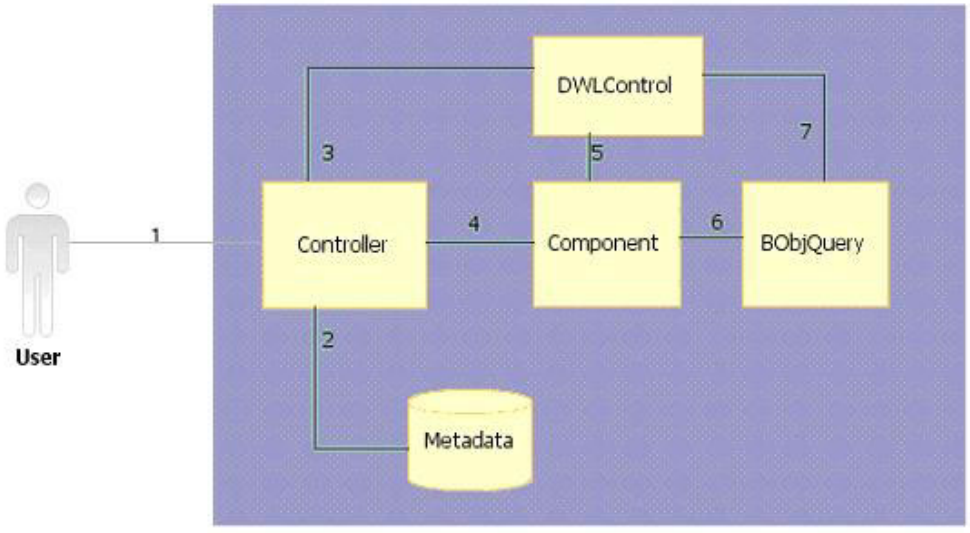
Pagination provides a generic framework that can be used to provide paginated returns for newly-developed search or getAll transactions. Support for maximum count exists for the search type of transactions.

In general, pagination is available for most get and search transactions. See the *InfoSphere MDM Server Transaction Reference Guide* for more information on specific transactions.

In this section, you will learn:

Understanding the primary activities of the pagination feature

The following section provides an overview of the primary activities of the pagination feature.



1. The user sends a request XML for getAll or Search transactions with pagination parameters. Pagination parameters are explained in the "Understanding pagination parameters" section.
2. When the control reaches the Controller class handling the request, the Metadata of the transaction is checked to find the response BObj names for the transaction.
3. The Controller sets the vector of response BObj names on the DWLControl object.
4. The Controller then calls the corresponding service method on the Component class.
5. The Component passes the response BObj name to PaginationUtils.considerForPagination() method to find out if pagination is to be considered for the BObj. Along with other checks, the passed BObj name is matched against the list of BObj names set in the DWLControl object by the Controller (as mentioned in step 3).
6. If PaginationUtils.considerForPagination() returns true then the component calls the setConsiderForPagination() method on DWLControl to enable pagination.
7. The Component then calls the getResults() method on the corresponding BObjQuery object
8. In the getResults() method, the BObjQuery checks some conditions for pagination. If all the conditions are satisfied, logic is applied on the query fetching the results and the paginated result set is returned.

Pagination can only be done on the first level of search results; child level objects cannot be paginated using the pagination framework. For example, if a transaction returns PersonBObjs and PersonBObj has AddressBObjs as a contained object, then the pagination of the results will only be done for PersonBObjs. There will be no pagination for AddressBObjs within the PersonBObj.

Important: If any filtering is done post RoV, the pagination returns may not be what the user is expecting. The pagination framework processes the result set prior to RoV, therefore the paginated returns may be changed if there is any RoV filtering.

Understanding pagination parameters

This section details the elements that were added to support pagination.

Elements in DWLControl

The following elements were added as child elements in DWLControl to support pagination. These elements can be passed in the request to paginate the results.

Table 43. Elements added as child elements in DWLControl

Name	Description	Value
pageStartIndex	Indicates the start index of the batch results	Numeric
pageEndIndex	Indicates the end index of the batch result	Numeric
returnAvailableReturnCount	Indicates total available records	True/false

When the value of returnAvailableResultCount is true in the request, the total number of records will be returned in the response XML. The XML element that holds this value is availableResultsCount.

The details of the above mentioned elements can be found in the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.

Pagination example:

This XML sample shows the pagination parameters in a request:

```
<DWLControl>
  <requesterName>cusadmin</requesterName>
  <requesterLanguage>100</requesterLanguage>
  <pageStartIndex>1</pageStartIndex>
  <pageEndIndex>2</pageEndIndex>
  <returnAvailableResultCount>true</returnAvailableResultCount>
</DWLControl>
```

This XML sample showing the response to the pagination request:

```
<DWLControl>
  <requesterLanguage>100</requesterLanguage>
  <requesterLocale>en</requesterLocale>
  <requesterName>cusadmin</requesterName>
  <requestID>10026111</requestID>
  <pageStartIndex>1</pageStartIndex>
  <pageEndIndex>2</pageEndIndex>
  <returnAvailableResultCount>true</returnAvailableResultCount>
  <availableResultsCount>3</availableResultsCount>
</DWLControl>
```

In pagination getAll transactions, pageStartIndex and pageEndIndex are both required in the request. However for search transactions, because there is a provision for setting the maximum records, if either pageStartIndex or pageEndIndex is supplied, the other value can be calculated.

The following matrix shows the values entered by the user and the expected return values

Values Passed			Expected values	
Start Index (SI)	End Index (EI)	Max Results Limit ML=(Min of MC and MR)	Start Index (SI)	End Index (EI)
SI=0	EI	ML > (EI - SI)	SI=1	EI
SI	EI	ML > (EI - SI)	SI	EI
SI	EI	(EI - SI) >= ML	SI	EI = (SI + ML) -1
SI	EI	ML= 0	SI	EI
SI	-	ML=0	Exception	Exception
SI=0	-	ML > 0	SI=1	EI = (SI + ML) -1
SI	-	ML > 0	SI	EI = (SI + ML) -1
-	EI	ML=0	SI=1	EI
-	EI	ML > 0	SI = Max((EI-ML+1), 1)	EI
-	-		No Pagination	No Pagination
SI > EI	EI	ML	Exception	Exception
Note :-				
1) Max Results limit (ML) is the minimum of the system defined MaxResults(MR) and the user defined MaxCount(MC) which is passed by user in the request XML.				
2) For getAll** transactions the value of MaxResults will always be taken as 0 by the pagination framework.				
3) If SI, EI or MC are passed as negative or as not a number then an exception would be thrown.				

Configuring pagination

The pagination feature does not require any special configuration, but uses the following existing configurations:

/IBM/FinancialServices/Contract/Search/maxResults
The value set in the maxResults object is used to restrict the size of the result set returned by a search transaction. Pagination uses this value to calculate the start or end index when one of the indices is not provided.

/IBM/DWLCommonServices/DataBase/type
The value set in this configuration element is used by pagination to decide the type of the database. The Pagination framework applies the appropriate query logic depending on the type of database.

Extending pagination

This section details the implementation of pagination for a new service, and pagination in special scenarios.

See also:

"To implement pagination for a new service"

"To implement pagination for new search transactions using pre-written queries" on page 507

To implement pagination for a new service

1. Identify the BObj class name of the response objects that are returned from the transaction. For example the getAllPartyAddresses() transaction returns TCRMPartyAddressBObj objects in the response.
2. Add the following set of lines in the transaction method of the Component class:

```
boolean considerForPagination = PaginationUtils.considerForPagintion(
      "xxx.xxx.xxxBObj", control);
control.setConsiderForPagintionFlag(considerForPagination);
```

For a getAllPartyAddresses transaction add the following lines of code in the TCRMPartyAddressComponent:

```
boolean considerForPagination = PaginationUtils.considerForPagintion(
TCRMPartyAddressBObj.class.getName(),control);
control.setConsiderForPagintionFlag(considerForPagination);
```

Note: These lines of code have to be added just before calling the getResults method of the corresponding BObjQuery object.

To implement pagination for new search transactions using pre-written queries

If you are implementing a new search transaction that uses pre-written queries, implement the GenericSearchResultSetProcessor interface and the ResultSetProcessor class for the search.
The interface defines the method provideBObjClass(), which returns the class name of the BObj. The provideBObjClass() method is called in the SearchComponent class. SearchComponent uses the name of the BObj to enable pagination for the transaction.

Handling pagination - special scenarios

Pagination must be handled differently if the Component is delegating the request to another Component to fetch data from the database. In this scenario the delegated Component returns BObjs which are different from the BObj that are set in DWLControl by the Controller.

The task section describes how to handle pagination when the component class is delegating the request to another component.

See also:

"To handle pagination when the Component class is delegating the request to another Component"

To handle pagination when the Component class is delegating the request to another Component

1. Invoke the following method in the delegating Component before the delegation to the second component. This is required to reset the BObj name in DWLControl to the BObj returned by the delegated component so that BObjQuery framework when invoked by delegated component returns data accordingly.

   ```
   PaginationUtils.checkAndResetPaginationBObjName(DWLControl control,
   String currentBObjName, String delegatedBObjName);
   ```

   In the TCRMContractComponent for the getAllContractValues() transaction, the following steps take place:

   - The request is delegated to DWLValueComponent
   - The BObjs created by this component is "DWLValueBObj" but the BObj created by TCRMContractComponent is "TCRMContractValueBObj"
   - The Controller sets the value to "TCRMContractValueBObj" on the DWLControl object because it is the primary request

- The value needs to be reset to "DWLValueBObj" by the TCRMContractComponent before calling the DWLValueComponent.

2. The following lines of code were added to TCRMContractComponent to reset the BObj name:

```
PaginationUtils.checkAndResetPaginationBObjName(control,
TCRMContractValueBObj.class.getName(), DWLValueBObj.class.getName());
```

Chapter 37. Customizing task management

The task management feature manages the tasks lifecycle, provides task management transactions to other components, and provides a runtime environment for each task.

As a common component, task management supports generic task-oriented design. It lets system administrators and end-users administer task definitions and manage the lifecycle of a task.

In this section, you will learn:

Understanding task management transactions

Task management transactions are transactions used by the InfoSphere MDM Server task management feature.

The following transactions are used by task management.

- **Task instance transactions**—Includes base transactions for a creating, updating, or working with tasks:
  - addTask
  - updateTask
  - updateMultipleTasks
  - searchTask
  - launchTask
  - getTaskHistory
  - getTask

  For more information on the task instance transactions, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*
- **Task comment transactions**—Includes transactions for comments to tasks:
  - addTaskComment
  - updateTaskComment
  - getAllTaskCommentsByEntity
  - getAllTaskCommentsByEntityAndCreator

  For more information on the task comment transactions, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.
- **Task definition transactions for administration services**—Includes transactions for defining tasks:
  - addTaskDefinition
  - updateTaskDefinition
  - getTaskDefinition
  - getAllTaskDefinitions
  - getAllTaskDefinitionsByTaskCat

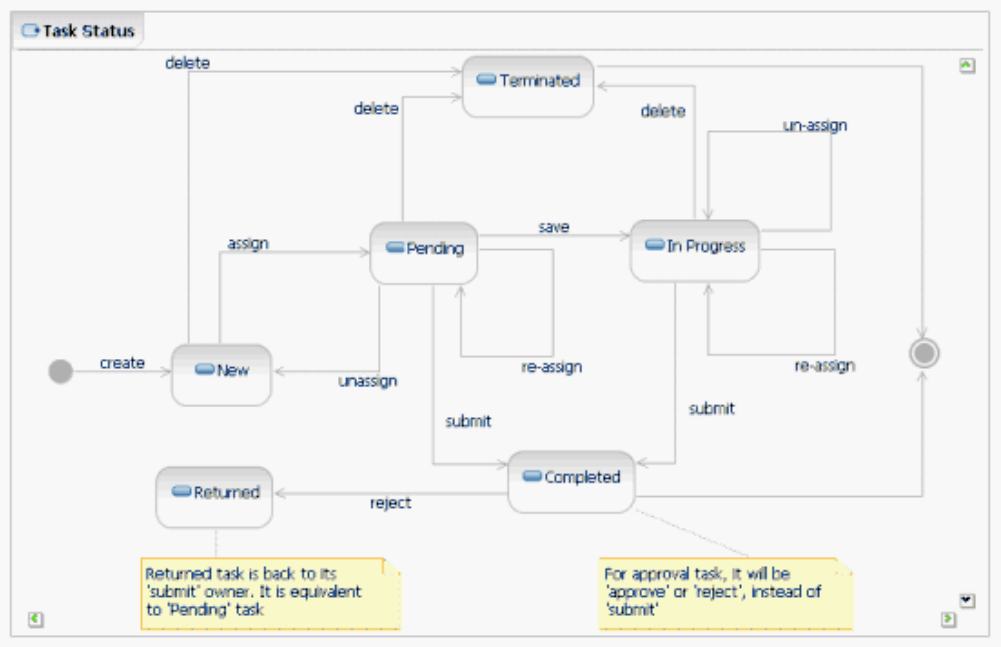
- getAllTaskDefinitionsByMetadataPackage
- addTaskRoleAssociation
- updateTaskRoleAssociation
- getTaskRoleAssociation

For more information on the Task definition transactions, see the *IBM InfoSphere Master Data Management Server Common Services Transaction Reference Guide*.

Understanding task management activity flow

The task management feature provides the generic transactions to create and maintain the lifecycle of a task, and to manage the task list in the system.

To maintain the lifecycle of a task, be familiar with status process. The following task status transition diagram shows the task status process:



The activities related to task management are as follows:

- **create**—Calls the addTask transaction to create a task.
- **assign**—Calls the updateTask transaction with an assign action to set the owner in a task.
- **unassign**—Calls the updateTask transaction with an unassign action to empty the owner in a task.
- **reassign**—Calls the updateTask transaction with an reassign action to set a different owner in a task.
- **save**—Calls the updateTask transaction with a save action to save data changes in a task.
- **submit**—Calls the updateTask transaction with a submit action to complete a task.
- **approve**—Calls the updateTask transaction with a approve action to complete an approval task.

- **reject**—Calls the updateTask transaction with a reject action to complete an approval task. The previous task is returned to the previous task owner with a status of returned.
- **delete**—Calls the updateTask transaction with a delete action to inactivate a task.

In addition to the task lifecycle operations, users can also update other information associated with a task, including process ID, task priority, task due date, task owner, task owner role, and entities associated with the task using the following transactions:

- **updateTask**—Calls the updateTask transaction to update the task information, including the following:
  - Task priority
  - Task due date
  - Task owner
  - Task owner role
  - Process ID
  - Associated entities
- **updateMultipleTasks**—Calls the updateMultipleTasks transaction with a list of tasks to update
- **addTaskComment**—Calls the addTaskComment transaction to add a comment regarding a task.
- **updateTaskComment**—Calls the updateTaskComment transaction to update a comment regarding a task.

Task management provides the following transactions to retrieve task information in the system:

- **getTask**–Calls the getTask transaction to get the task info at the given inquiry level:
  - **0**—Indicates the basic task information, plus information in the associated workbasket which contains the entity list
  - **1**—Indicates level 0 information plus all associated task comments
- **searchTask**—Calls the searchTask transaction to retrieve a list of tasks at the given inquiry level that match the give search criteria, which can be one or more of the following attributes:
  - Task name
  - Task owner
  - Task status (zero or more)
  - Task category type
  - Task due date (including the start and end dates)
  - Maximum results

  This transaction supports pagination.
- **getAllTaskCommentsByEntity**—Calls the getAllTaskCommentsByEntity to retrieve all task comments associated with tasks that include the given entity. This transaction supports pagination.
- **getAllTaskCommentsByEntityAndCreator**—Calls the getAllTaskCommentsByEntityAndCreator to retrieve all task comments created by the given creator and associated with tasks that include the given entity. This transaction supports pagination.

Modifying task management

You can configure, extend, and administer task management.

Task management requires three configurations:

- /IBM/DWLBusinessServices/Task/Search/maxResults
- /IBM/DWLBusinessServices/WorkbasketEntity/Search/maxResults
- /IBM/DWLBusinessServices/Task/Search/sortOrder

See "Understanding configuration elements in the Configuration and Management component" on page 419 for details about these configurations.

All data and transaction-level extension points are available to extend task management. See "Understanding task management transactions" on page 509 for more information.

You can also administer task management. Task management allows you to do the following:

- **Update the task transition state machine**—Call transactions to update existing task status and action, and provide new external rule to update task transition rules:
  - **Update task status**–Call standard transactions to update code table CDTASKSTATUSTP.

    Important: The following active task statuses cannot be removed:
    - New
    - Pending
    - In progress
    - Returned

    The following inactive task statuses cannot be removed:
    - Completed
    - Terminated
  - **Update task action**—Call standard transactions to update code table CDTASKACTIONTP.

    Important: the following task actions cannot be removed:
    - Create
    - Assign
    - Unassign
    - Reassign
    - Save
    - Submit
    - Approve
    - Reject
    - Delete
  - **Update task transition rule**—Modify the com.ibm.mdm.task.externalrule.TaskStatusRule task transition rule to add

more business logic to reflect the changes on task statuses and task actions; however, the rule must include the predefined rules for the required task statuses and actions listed above:

- **Update task priority**—Call standard transactions to update code tables CDPRIORITYTP and CDPRIORITYCATTP. Existing priority names can be modified or new priorities can be added under Task category, as defined by the CDPRIORITYCATTP table.

  Important: The PRIORITY_CAT_TP_CD for a priority category task cannot be changed, and the record cannot be removed.
- **Customize the logic to delete workbasket information in inactive task priority**—Modify the com.ibm.mdm.task.externalrule.InactiveTaskRule inactive task rule to customize the business logic for inactive task:
- **Deploy new task definitions**—In general, the solution team provides a set of task definitions before clients can use task management to create new task instances. Task definitions can be deployed from a metadata server or from an administration tool. Task definition transactions listed above are used to complete the following tasks:
  - **addTaskDefinition**—Creates a new task definition.
  - **updateTaskDefinition**—Updates or deletes a task definition.
  - **getTaskDefinition**—Retrieves the details of a task definition.
  - **getAllTaskDefinitions**—Retrieves all task definitions in the runtime system.
  - **getAllTaskDefinitionsByTaskCat**—Retrieves all task definitions for the given task category (for example, approval).
  - **getAllTaskDefinitionsByMetadataPackage**—Retrieves all task definitions in the given metadata package.
  - **addTaskRoleAssociation**—Adds new task owner role to the given task definition.
  - **updateTaskRoleAssociation**—Updates or deletes a task owner role from the given task definition.
  - **getTaskRoleAssociation**—Gets the details of a task definition and task owner role association.

For more information on task definition transactions, see the *IBM InfoSphere Master Data Management Server Common Services Transaction Reference Guide*

Chapter 38. Understanding Multi time zone deployment

The InfoSphere MDM Server multi time zone deployment feature enables you to handle several issues related to multi server deployment and daylight savings time scenarios.

In InfoSphere MDM Server deployments with either many application servers, geographically dispersed, or a single application server configured with databases in different time zones, there is the potential for data corruption and operational inconsistencies. To overcome the common problems associated with multi server deployments, the multi time zone deployment feature ensures that all time zone sensitive timestamp fields are operated and stored in Universal Time Code (UTC).

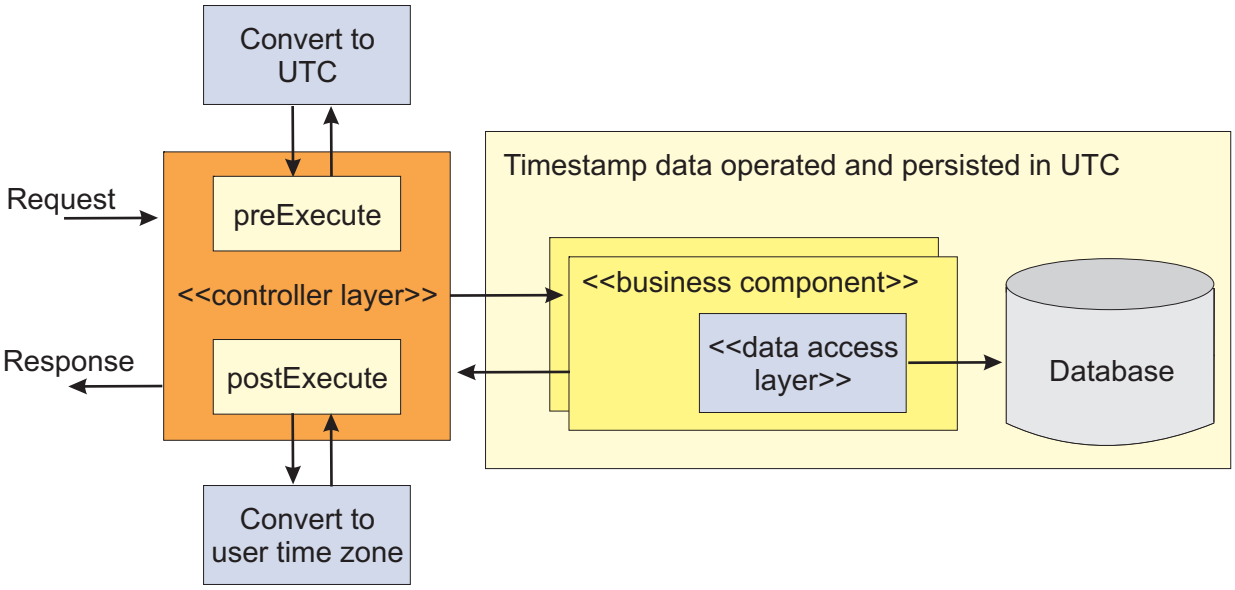
Note: Not all timestamp fields are time zone sensitive. For example, fields storing information such as date of birth remain unchanged regardless of time zone. Time zone sensitive fields include timestamp data that require conversion to UTC in the business logic, such as start dates and end dates.

Multi time zone deployment is an optional feature, and can be enabled during installation.

Attention: Once enabled, you should not disable multi time zone deployment feature using the configuration parameter. Doing so can result in data corruption. In order to safely disable this feature, you must first migrate your operational data accordingly. The InfoSphere MDM Server product does not include data migration tools, but if you take responsibility for migrating the operational data, then you can safely disable this feature using the configuration parameter.

When multi time zone deployment is enabled:

- In preExecute logic of the Controller, all time zone sensitive timestamp fields in the business objects are converted to UTC format.
- All operations on the timestamp fields will be in UTC, and these fields will also be persisted in UTC.
- In the postExecute logic of the Controller, all of the time zone sensitive fields will be converted back to the appropriate user time zone.



In this section, you will learn:

To configure the multi time zone deployment feature

1. Access the InfoSphere MDM Server Configuration and Management component.

   Note: For information on using the Configuration and Management component, see Chapter 34, "Using the Configuration and Management components," on page 405.
2. Configure the following configuration parameters of the multi time zone deployment feature:
   - **/IBM/DWLCommonServices/MultiTimeZoneDeployment/enabled** – The value set in this configuration element (`true` or `false`) determines whether the multi time zone deployment feature is enabled.

     Attention: Once enabled, you should not disable multi time zone deployment feature using the configuration parameter. Doing so can result in data corruption. In order to safely disable this feature, you must first migrate your operational date accordingly. The InfoSphere MDM Server product does not include data migration tools, but if you take responsibility for migrating the operational data, then you can safely disable this feature using the configuration parameter.
   - **/IBM/DWLCommonServices/MultiTimeZoneDeployment/defaultTimeZone** – If the multi time zone deployment feature is enabled, the value set in this configuration element is used as the default time zone for conversions.

     Note: Users can override this default setting by passing the requesterTimeZone parameter in the request header.

Understanding the requesterTimeZone element

When the multi time zone deployment feature is enabled, users can employ the requesterTimeZone element within the request and response framework to define the time zone from which a request originates.

The requesterTimeZone parameter is a child element in the DWLControl business object. Users can pass this element in transaction requests to indicate the time zone from which the request originates. The value of this element is a valid time zone code. requesterTimeZone is an optional element.

You can set default requester time zone value in the configuration parameters for this feature (for details, see "To configure the multi time zone deployment feature" on page 516). Even if this default value is set, any value included in the requesterTimeZone element overrides it. If no value for requesterTimeZone is included in a request, then the default value will be used. If neither the default value nor the requesterTimeZone value is set, then the application uses the application server time zone. The following matrix illustrates the precedence:

Table 44. Precedence of time zone values

requesterTimeZone element	Default time zone	Application server time zone	Time zone value used by the application
Included in request	Not configured	Configured	requesterTimeZone
Included in request	Configured	Configured	requesterTimeZone
Not included in request	Configured	Configured	Default time zone
Not included in request	Not configured	Configured	Application server time zone

Sample request and response XML

The following XML sample shows the requesterTimeZone element in a pagination request:

```
<DWLControl>
   <requesterName>cusadmin</requesterName>
   <requesterLanguage>100</requesterLanguage>
   <requesterTimeZone>EST</requesterTimeZone>
</DWLControl>
```

The following XML sample shows the response to the above request:

```
<DWLControl>
   <requesterLanguage>100</requesterLanguage>
   <requesterLocale>en</requesterLocale>
   <requesterName>cusadmin</requesterName>
   <requestID>10026111</requestID>
   <requesterTimeZone>EST</requesterTimeZone>
   <availableResultsCount>3</availableResultsCount>
</DWLControl>
```

See also:

"To define the requesterTimeZone value"

To define the requesterTimeZone value

1. Set the value of the requesterTimeZone element in the XML request header:

- If you know the exact time zone difference from UTC and the time zone does not observe Daylight Savings Time (DST), use the format *GMT<+/-><hh>:<mm>*. For example:

  ```
  requesterTimeZone = GMT+5:00
  ```

- If the time zone observes DST, use the appropriate time zone code (TimeZoneID). Using the correct time zone code enables the API to automatically process the one hour difference between standard time and daylight savings time. For example:

  ```
  requesterTimeZone = EST5EDT
  ```

  Note: To determine all of the time zones codes supported by the current InfoSphere MDM Server runtime instance, use the getMDMServerProfile transaction. For information about using getMDMServerProfile, see the *IBM InfoSphere Master Data Management Server Common Services Transaction Reference Guide*.

- If you wish to use the default time zone value, leave the requesterTimeZone element empty.

2. Complete and submit the request XML.

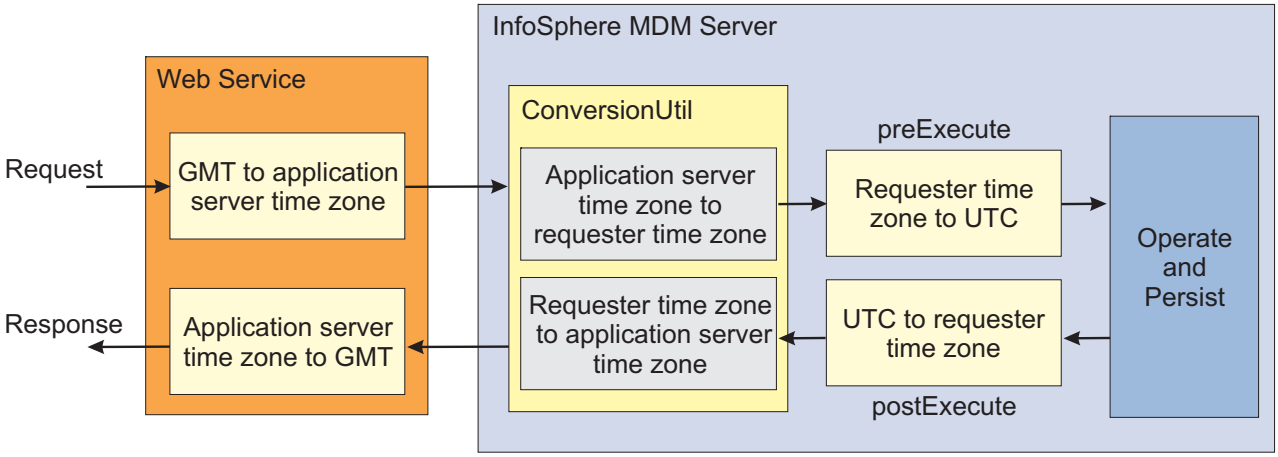
Understanding time zone changes for Web Services

The multi time zone deployment feature includes the facility to enable Web Services to handle situations when the application server is deployed in multiple time zones.

In the JAX-RPC layer of the Web Services, timestamp fields are converted from GMT to the application server time zone in the request flow, and then are converted back to GMT in the response flow. Without the multi time zone deployment feature enabled, this process causes an issue when the application server is deployed in multiple time zones.

To resolve this issue, the multi time zone deployments feature introduces two APIs in the *ConversionUtil* class. These APIs are called when the transfer object is converted to a business object in a request, and again when the business object is converted back to a transfer object in a response:

- **ConversionUtil.convertToString(Calendar cal, DWLControl control)** – This API is called in the request flow when a transfer object is converted to a business object. This method converts a calendar object to a string. As part of the conversion, this method converts the timestamp value from the application sever time zone to the requesterTimeZone.
- **ConversionUtil.convertToCalendar(String stringVal, DWLControl control)** – This API is called in the response flow when the business object is converted to a transfer object. This method converts the string object to a calendar object. As part of the conversion, this method converts the timestamp value from the requesterTimeZone element to the application server time zone.



Implementing the multi time zone deployment feature

While the multi time zone deployment feature is implemented in the core InfoSphere MDM Server framework, developers who are creating additions and extensions to make use of this feature must include some special considerations in their code.

See also:

"Adding new business objects"
"Getting the current system time" on page 520
"Formatting end dates and expiry dates" on page 521
"Using timestamp data from the request header" on page 521

Adding new business objects

The multi time zone deployment feature is metadata driven, so all of the information regarding time zone sensitive fields must be included in the V_ELEMENTATTRIBUTE table. When adding a new business object, developers must identify all of the time zone sensitive fields in that object.

If the business object has a containment relationship with another business object, information about its child objects must be included in the V_ELEMENTATTRIBUTE table.

LANG_TP_CD	ATTRIBUTE_TP_CD	Name	Description
100	100	NonTimeZoneSensitive	Non time zone sensitive fields for each business object.
100	101	TimeZoneSensitive	Time zone sensitive fields for each business object.
100	102	BusinessObjectField	Child business object for each business object.

Note: In the case of a data extension, ensure that the time zone sensitive field's information is included.

Sample child object 1:

```
INSERT INTO V_ELEMENTATTRIBUTE
(V_ELEMENT_ATTRB_ID,ATTRIBUTE_TP_CD,APPLICATION,GROUP_NAME,ELEMENT_NAME,LAST_UPDATE_DT)
VALUES (738,102,'TCRM','Person','ItemsTCRMPersonNameBObj',CURRENT_TIMESTAMP);
```

Sample child object 2:

```
INSERT INTO V_ELEMENTATTRIBUTE
(V_ELEMENT_ATTRB_ID,ATTRIBUTE_TP_CD,APPLICATION,GROUP_NAME,ELEMENT_NAME,LAST_UPDATE_DT)
VALUES (739,102,'TCRM','Person','ItemsTCRMPartyIdentificationBObj',CURRENT_TIMESTAMP);
```

Sample time zone sensitive field 1:

```
INSERT INTO V_ELEMENTATTRIBUTE
(V_ELEMENT_ATTRB_ID,ATTRIBUTE_TP_CD,APPLICATION,GROUP_NAME,ELEMENT_NAME,LAST_UPDATE_DT)
VALUES (1004,101,'TCRM','Person','PersonLastUpdateDate',CURRENT_TIMESTAMP);
```

Sample time zone sensitive field 2:

```
INSERT INTO V_ELEMENTATTRIBUTE
(V_ELEMENT_ATTRB_ID,ATTRIBUTE_TP_CD,APPLICATION,GROUP_NAME,ELEMENT_NAME,LAST_UPDATE_DT)
VALUES (1005,101,'TCRM','Person','PersonHistCreateDate',CURRENT_TIMESTAMP);
```

Getting the current system time

When the multi time zone deployment feature is enabled, all of the time zone sensitive fields are operated in UTC within the frame of preExecute and postExecute. Instead of using *System.currentTimeMillis()* to return the current system time, developers should instead use one of the following methods:

- **DWLDateTimeUtilities.getCurrentSystemTime** – Returns the current system time in UTC when the multi time zone deployment feature is enabled. When the feature is not enabled, the method returns the current time in the application server's time zone. Use this method when there is a requirement to work with the current time within the frame of preExecute and postExecute.
- **DWLDateTimeUtilities.getCurrentSystemTimeInUserTimeZone** – Returns the current time in the requester's time zone when the multi time zone deployment feature is enabled. When the feature is not enabled, the method returns the current time in the application server's time zone. Use this method when there is a requirement to work with the current time outside of the frame of preExecute and postExecute (either before preExecute or after postExecute).

Note on behavior extensions that use the current system time (inside the pre/post frame): For extensions in which you are writing additional logic to customize or enhance the behavior of a transaction, the calls to the behavior extension will take place in the preExecute or postExecute parts of the transaction. In preExecute, UTC conversions are completed before the extensions are handled. Similarly, data is converted back to the requester time zone in postExecute after the extensions are handled. Consequently, within the behavior extensions, all of the time zone sensitive fields will be in UTC, so if there is a requirement to work with the current time, use *DWLDateTimeUtilities.getCurrentSystemTime* instead of *System.currentTimeMillis()*.

Note on composite transactions that use the current system time (outside of the pre/post frame): For composite transactions, you can group together related transactions and run them as a single unit of work using a business proxy. In this situation, if there is business logic outside of the preExecute and postExecute frame that compares the business object's timestamp to the current system time, use *DWLDateTimeUtilities.getCurrentSystemTimeInUserTimeZone* instead of *System.currentTimeMillis()*.

Formatting end dates and expiry dates

In business objects, you should use *setFormatedExpiryOrEndDate* instead of directly calling *DWLDateFormatter.getEndDateTimestamp*.

Normally, business objects call *DWLDateFormatter.getEndDateTimestamp* to format expiry dates or end dates. This method changes the timestamp to the end of the day (23:59:59) or, if the date is the current date, it sets the value to the current time.

When the multi time zone deployment feature is enabled, then the method has to consider the requester's time zone (if outside of the preExecute/postExecute frame) or the UTC time zone (if within the preExecute/postExecute frame). This logic is handled by the *setFormatedExpiryOrEndDate* method of DWLCommon. Use *setFormatedExpiryOrEndDate* instead of *DWLDateFormatter.getEndDateTimestamp* from the setter method of a business object.

Using timestamp data from the request header

Several timestamp fields, such as InquiryAsOfDate, InquiryToDate, and InquiryFromDate, are passed in the request header (DWLControl object). These timestamp fields are normally used in PIT queries, and are passed as string objects before being reformatted and converted to timestamps.

Based on the way they are used, InquiryAsOfDate and InquiryToDate are normally formatted to the end of the day (23:59:59) and InquiryFromDate is formatted to the beginning of the day (00:00:00). These fields cannot be converted to UTC in the DWLControl object, and must instead be converted to UTC after the formatting has been completed.

Since values for H_CREATE_DT, LAST_UPDATE_DT, and H_END_DT are saved in UTC, you need to convert the header timestamp fields to UTC using PIT queries.

Avoid using the fields directly from the DWLControl object. Instead, use the following methods in the *DWLCommonControl* class to retrieve these fields in the corresponding component classes:

- **getPITHistoryDate** – This method first formats the date fields to the end of the day and then, if multi time zone deployment is enabled, the method converts the date field to UTC format. Use this method to format InquiryAsOfDate and InquiryToDate.
- **getPITHistoryFromDate** – This method first formats the date fields to the beginning of the day and then, if multi time zone deployment is enabled, the method converts the date field to UTC format. Use this method to format InquiryFromDate.
- **getPITHistoryDateField** – This method does not format the date field, but if multi time zone deployment is enabled, it will convert the date field to UTC format.

Note: Most often, the timestamp fields in the request header are used in PIT queries at the component layer. If these fields being used outside of the component, ensure that it is converted to UTC before being used in any business logic. You can use the utility method available in *DWLDateTimeUtilities* to convert timestamp fields to UTC.

Chapter 39. Implementing the Entity Standardization framework

The InfoSphere MDM Server Entity Standardization framework enables your organization to use plugin standardizers for any business object, whether the business object is out-of-the-box, extended, or new.

You can plug standardizers into InfoSphere MDM Server either as Java rules or as adapters to a product such as IBM InfoSphere Information Server QualityStage.

Note: For information about standardizing Party domain information such as names, addresses, and phone numbers, see Chapter 46, "Standardizing name, address, and phone number information," on page 623.

In this section, you will learn:

Understanding the Entity Standardization framework

Entities can invoke standardization conditionally based on rules or preconditions defined in the metadata repository.

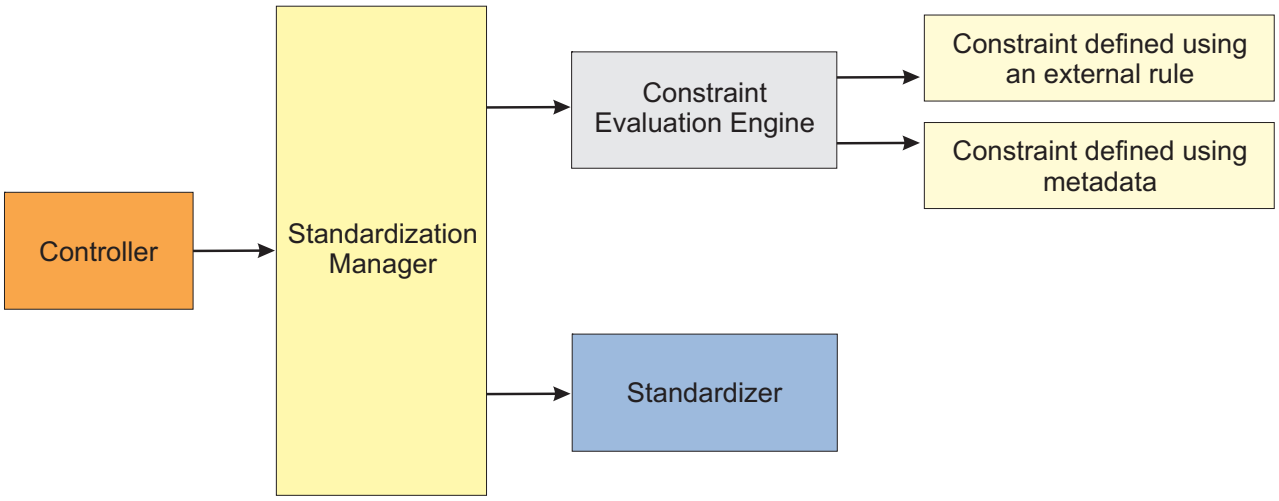
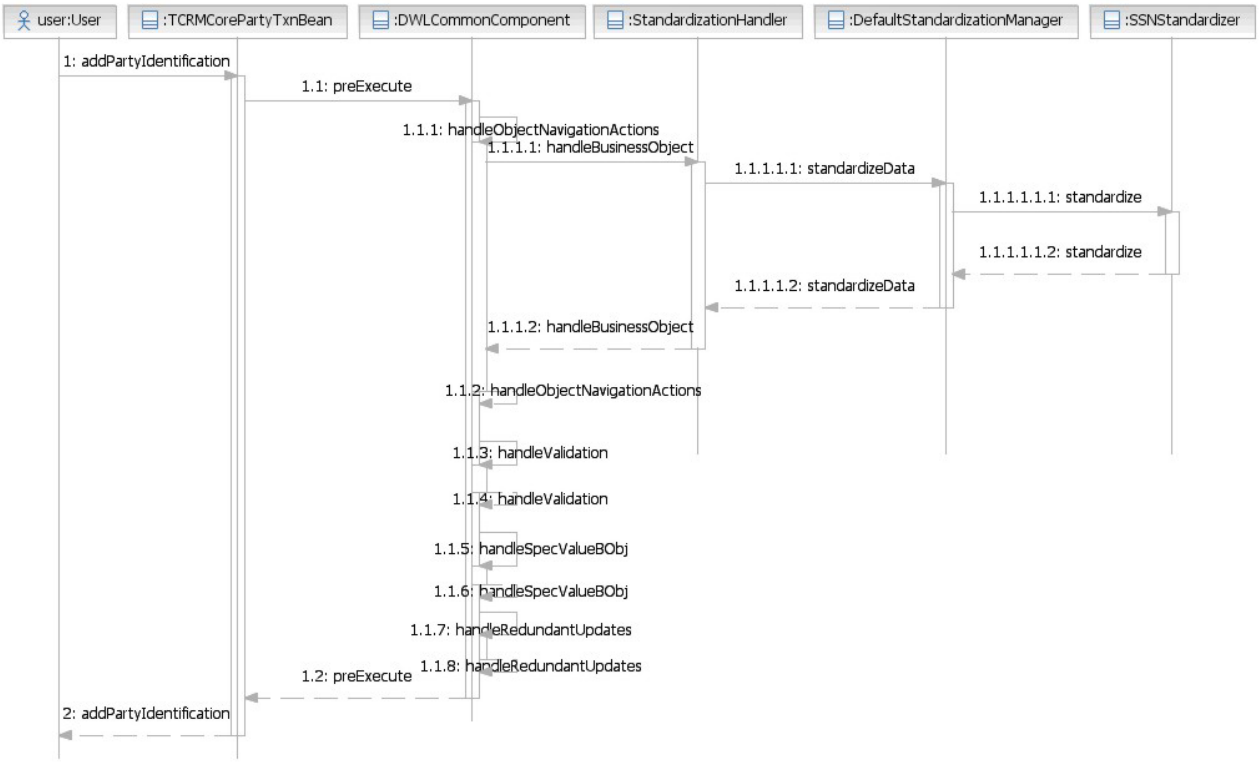


Figure 15. Overview of the Entity Standardization framework

When the Entity Standardization framework is enabled, InfoSphere MDM Server invokes the Standardization Manager at the controller level at the beginning of a business transaction. The Standardization Manager navigates the entire business object graph and checks metadata to locate standardizers that have been configured for the business objects passed in the request.

If the Standardization Manager finds any standardizers, then it checks for associated constraints and calls the Constraint Evaluation engine to evaluate these constraints. If the constraints associated with the business objects and standardizer combination passes, then InfoSphere MDM Server invokes the standardizer to perform the required data standardization task.

The following sequence diagram provides an overview of how the Standardization Manager invocation fits into the request/response framework's preExecute stage. The Standardization Manager tasks are performed before the image is populated with data from the repository, but before external validation is invoked.



See also:

"To enable and disable the Entity Standardization framework"

"Learning about standardization database tables" on page 525

To enable and disable the Entity Standardization framework

1. Open the InfoSphere MDM Server Configuration and Management component.
2. Edit the following configuration item to either enable or disable the Entity Standardization framework:

   `/IBM/DWLCommonServices/Standardization/enabled`

   Note: This is a dynamic configuration item. If the value is modified using the Configuration and Management component, the configuration can be refreshed without restarting InfoSphere MDM Server.

Note: The `/IBM/DWLCommonServices/Standardization/enabled` configuration item does not control the standardization of Party names, addresses, or phone numbers.

For information about configuring that feature, see Chapter 46, "Standardizing name, address, and phone number information," on page 623.

Learning about standardization database tables

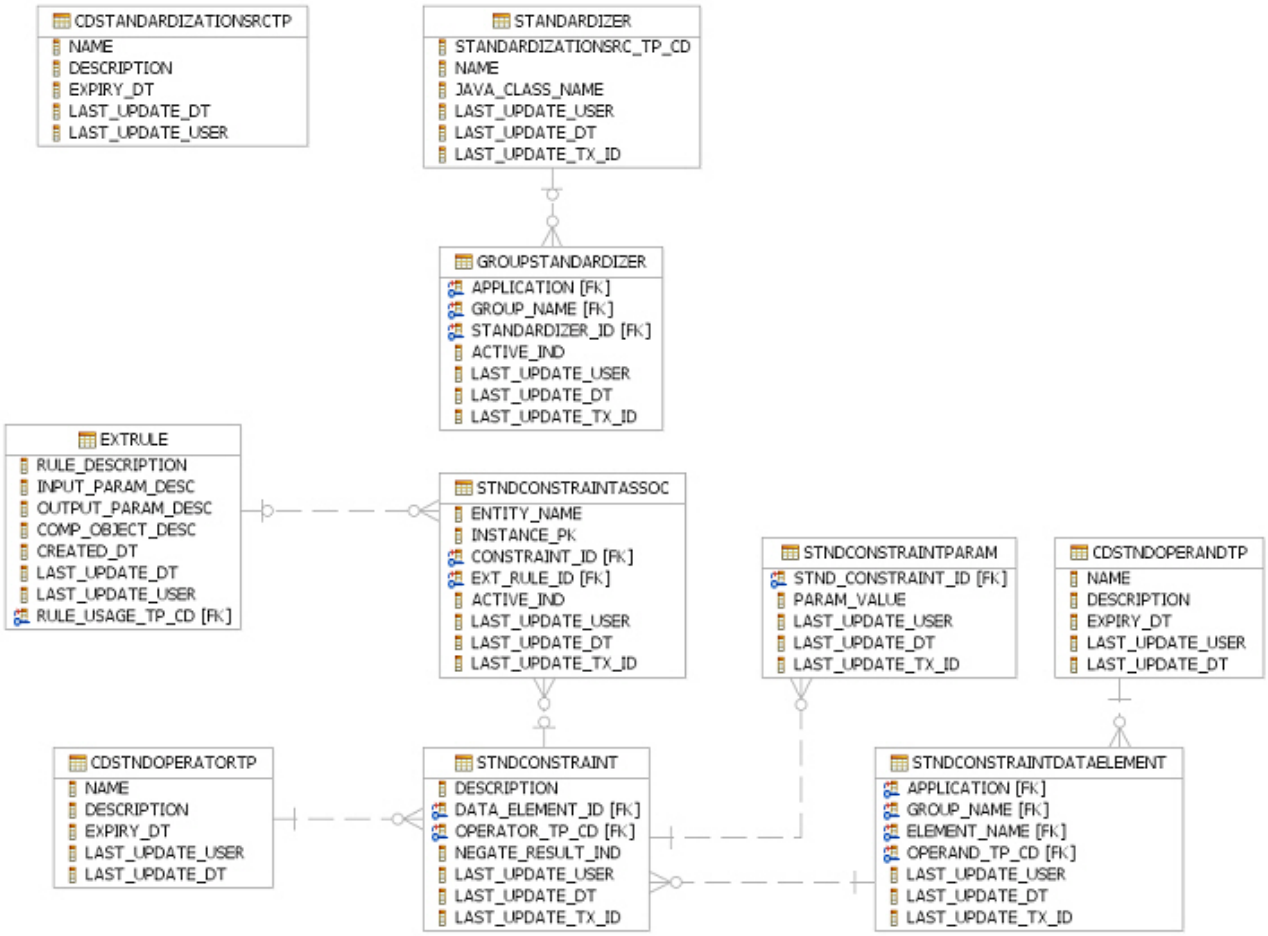
A number of database tables contain information used by the Entity Standardization framework.

The following database tables include information used for standardization:

- CDSTANDARDIZATIONSRCTP
- CDSTNDOPERANDTP
- CDSTNDOPERATORTP
- EXTRULE
- GROUPSTANDARDIZER
- STANDARDIZER
- STNDCONSTRAINT
- STNDCONSTRAINTASSOC
- STNDCONSTRAINTDATAELEMENT
- STNDCONSTRAINTPARAM

These tables must be maintained externally through user-created SQL.

The following diagram shows the relationship among the database tables that hold standardization information.



Note: For more information about these and other database tables, see the *IBM InfoSphere Master Data Management Server Data Dictionary*.

Configuring data standardization for business objects

If required by your implementation of InfoSphere MDM Server, you can write custom code to standardize business objects.

You can use the InfoSphere MDM Server Workbench tools to generate template code for business object standardization.

Note: For information about the Workbench, see the *IBM InfoSphere Master Data Management Server Workbench User Guide*.

See also:

"To configure standardization for business objects"

To configure standardization for business objects

1. Use the InfoSphere MDM Server Workbench tools to generate template code for business object standardization.

   The Workbench-generated template code implements the `Standardizer` interface.

Note: For information about the Workbench, see the *IBM InfoSphere Master Data Management Server Workbench User Guide*.

2. Customize the generated code to standardize business object data as required.
3. Save and name your custom standardizer.
4. Define your new standardizer as a new row in the STANDARDIZER table.
5. Edit the GROUPSTANDARDIZER table to add your customized standardizer to the business object for which you wish to standardize data:
   a. Specify the APPLICATION and GROUP_NAME values to represent the target business object.

      These attributes reference the V_GROUP table.
   b. Edit the ACTIVE_IND value to activate or inactivate the new standardizer.

      A value of `Y` enables the standardizer, and any value other than `Y` disables the standardizer.

Understanding standardization constraints

The Entity Standardization framework uses constraints associated with standardizers to determine whether the standardizers should be applied during a transaction.

You can associate one or more constraints to a given standardizer. The Standardization Manager evaluates the constraints, and will only call the associated standardizer if all of the constraints pass the evaluation.

There are two types of constraints:

- **Internal constraints** are defined in InfoSphere MDM Server metadata tables.
- **External constraints** are customized constraints that you can create as new external rules.

Constraints use operators to compare and evaluate business object attributes. The operators are defined in the CDSTNDOPERATORTP table.

STND_OPERATOR_TP_CD	NAME	DESCRIPTION	EXPIRY_DT	LAST_UPDATE_USER	LAST_UPDATE_DT
1	EQUALS	Equals to			Aug 7, 2009 3:43:18 P...
2	NOT_EQUALS	Not Equals to			Aug 7, 2009 3:43:18 P...
3	LESS_THAN	Less than			Aug 7, 2009 3:43:18 P...
4	LESS_THAN_OR_EQUAL_TO	Less than or equ...			Aug 7, 2009 3:43:18 P...
5	GREATER_THAN	Greater than			Aug 7, 2009 3:43:18 P...
6	GREATER_THAN_OR_EQUAL_TO	Greater than or e...			Aug 7, 2009 3:43:18 P...
7	SAME_AS_BEFORE_IMAGE	Same as before i...			Aug 7, 2009 3:43:18 P...
8	CONTAINS	contains			Aug 7, 2009 3:43:18 P...
9	EXISTS_IN_SET	exists in set			Aug 7, 2009 3:43:18 P...
10	NOT_NULL	not null			Aug 7, 2009 3:43:18 P...

The following matrix shows the valid operand and operator combinations for any constraint, where:

- Y is a valid combination
- N is not a valid combination

Table 45. Valid constraint operands and operators

	String	Number	Date	System date
Equal	Y	Y	Y	Y
Not equal	Y	Y	Y	Y

Table 45. Valid constraint operands and operators (continued)

	String	Number	Date	System date
Less than	N	Y	Y	Y
Less than or equal	N	Y	Y	Y
Greater than	N	Y	Y	Y
Greater than or equal	N	Y	Y	Y
Same as before	Y	Y	Y	N
Contains	Y	N	N	N
Exists in set	Y	Y	Y	N
Not null	Y	Y	Y	N

See also:

"To define internal constraints through metadata"

"To define external constraints" on page 529

"To associate constraints with a standardizer" on page 529

To define internal constraints through metadata

1. For each business object attribute that you wish to use to define constraints, add a row in the STNDCONSTRAINTDATAELEMENT table to define:
   - APPLICATION – the application where the business object is found.
   - GROUP_NAME – the business object name.
   - ELEMENT_NAME – the name of the business object attribute.
   - OPERAND_TP_CD – the type code of the operand to be used in the constraint. Operand type codes are defined in the CDSTNOPERANDTP table.

STND_CONSTRAINT_DATA_ELE_ID	APPLICATION	GROUP_NAME	ELEMENT_NAME	OPERAND_TP_CD	LAST_UPDATE_USER	LAST_UPDATE_DT
1	TCRM	PartyIdentification	IdentificationValue	1	cusadmin	Sep 7, 2009 3:47:53 P...

Figure 16. The STNDCONSTRAINTDATAELEMENT table

STND_OPERAND_TP_CD	NAME	DESCRIPTION	EXPIRY_DT	LAST_UPDATE_USER	LAST_UPDATE_DT
1	STRING_VALUE	static fields for string data types			Aug 7, 2009 3:43:58 P...
2	NUMBER_VALUE	Static fields for Numeric data types			Aug 7, 2009 3:43:58 P...
3	DATE_ONLY_VALUE	LHS is compared with Date (time part is excluded)			Aug 7, 2009 3:43:58 P...
4	SYSTEM_DATE_VALUE	LHS is compared with current System date			Aug 7, 2009 3:43:58 P...

Figure 17. The CDSTNDOPERANDTP table

Note: For information about valid operand/operator combinations, see "Understanding standardization constraints" on page 527.

2. For each standardizer constraint, add a row in the STNDCONSTRAINT table to define:
   - DATA_ELEMENT_ID – the ID of the business object attribute to be considered for constraint evaluation. This value is defined in the STNDCONSTRAINTDATAELEMENT table, and maps to the STND_CONSTRAINT_DATA_ELE_ID value.
   - OPERATOR_TP_CD – the ID of the operator to be used in the constraint. Operator type codes are defined in the CDSTNOPERATORTP table.

- NEGATE_RESULT_IND – whether the result of the constraint is negated (Y) or not.

STANDARDIZER_CONSTRAINT_ID	DESCRIPTION	DATA_ELEMENT_ID	OPERATOR_TP_CD	NEGATE_RESULT_IND	LAST_UPDATE_USER	LAST_UPDA
1		1	1	N	CUSADMIN	Sep 7, 2009

Figure 18. The STNDCONSTRAINT table

3. For each value that the constraint will use as a basis to compare the business object attributes against, add a row in the STNDCONSTRAINTPARAM table to define:
   - STND_CONSTRAINT_ID – the standardizer constraint to use with this value. STND_CONSTRAINT_ID values are defined in the STNDCONSTRAINT table.
   - PARAM_VALUE – the value that the constraint will use as a basis for comparison.

   Note: The PARAM_VALUE must match the operand type set in the STNDCONSTRAINTDATAELEMENT table. For example, if the operand is set to NUMBER_VALUE and the PARAM_VALUE is set to String, the transaction will fail and return an error message.

STND_CONSTRAINT_PARAM_ID	STND_CONSTRAINT_ID	PARAM_VALUE	LAST_UPDATE_USER	LAST_UPDATE_DT	LAST_UPDATE_TX_ID
1	1	1	CUSADMIN	Sep 7, 2009 3:47:55 P...	

Figure 19. The STNDCONSTRAINTPARAM table

To define external constraints

Create your customized constraint as an external rule.
External constraint rules receive the following input and output parameters:

- **Input:** The current business object to be standardized.
- **Output:** A string with a value of either `true` or `false`.

  Note: Any value other than `true` is treated as false.

Note: For information about creating external rules, see Chapter 10, "Configuring external business rules," on page 153.

To associate constraints with a standardizer

1. Edit the STNDCONTRAINTASSOC table to associate your standardizer with one or more constraints.

   Note: If you specify both internal and external constraints in a single table row, then only the external constraint will be considered.
2. Edit the ENTITY_NAME and INSTANCE_PK columns to identify the standardizer. To associate constraints with standardizer entries in the GROUPSTANDARDIZER table:
   a. Set the ENTITY_NAME value to `GROUPSTANDARDIZER`.
   b. Set the INSTANCE_PK value to be the same as the GROUP_STANDARDIZER_ID in the GROUPSTANDARDIZER table.
3. Edit the ACTIVE_IND column to activate or inactivate each constraint in the table:

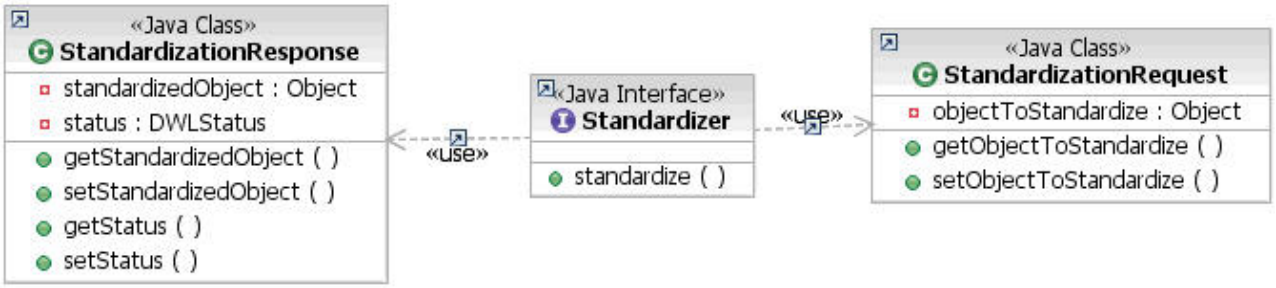
- Set ACTIVE_IND to `Y` to activate a constraint.
- Set ACTIVE_IND to any value other than `Y` to inactivate a constraint.

Creating custom standardizers

You can use the InfoSphere MDM Server Workbench tools to generate template code for a custom standardizer.

Note: For information about the Workbench, see the *IBM InfoSphere Master Data Management Server Workbench User Guide*.

All standardizers must implement the `Standardizer` interface. The `standardize()` method uses the class `StandardizationRequest` as input and returns the class `StandardizationResponse`.



- The `StandardizationRequest` class contains the current object to be standardized.
- The `StandardizationResponse` class contains the standardized object and status.

You can use the DWLStatus object in your custom standardizer to return the third party error reasons:

- If DWLStatus is set to FATAL, the transaction aborts with the error message set in the status object.
- If DWLStatus is set to WARNING, the transaction continues, but the response contains the warning message.

You can use the `Standardizer` interface to call third party tools like IBM InfoSphere QualityStage or Trillium.

Chapter 40. Implementing and configuring the Notification Framework

Notifications are messages passed across the enterprise that can be used by one or more applications or consumers. The InfoSphere MDM Server Notification Framework provides a foundation that enables you to define and send entity data to multiple applications that have an interest in those entities.

Notifications have the following characteristics:

- Notifications are outbound application-to-application messages.
- Notifications support publish-subscribe and point-to-point protocols.
- Notifications are nonpersistent, meaning that, by default, they are not stored in the database.
- Notifications are part of the unit of work of a transaction.

Example uses of the Notification Framework include:

- Notifying downstream applications of changes to an entity. Used in this way, the Notification framework can distribute data to support data synchronization with other applications.
- Notifying data stewards about entities that are suspect duplicates of each other.
- Notifying interested consumers about entities that have been merged or split.
- Notifying interested consumers about a business event that has occurred.

In this section, you will learn:

Understanding the Notification Framework

The InfoSphere MDM Server Notification Framework uses the common Java Message Service (JMS) API to enable publish-subscribe and point-to-point domains to send messages to listener applications or middleware. The framework provides a mechanism that enables you to define your own notifications with customized content.

Notifications are made up of many parts. To define a custom notification within the InfoSphere MDM Server Notification Framework, you must define each part:

- **Notification type** – The notification type holds high level information, including a name and description of the notification and its purpose.
- **Notification object** – For each notification type, you must define a notification object to hold the notification information.
- **Notification channels** – Each notification type must be associated with a set of notification channels that define how to send the notification message to its destination. Each notification channel is associated with a destination, and captures the required information about how to send the message to its destination, such as the JNDI of the Queue or Topic for JMSChannel.

The Notification Framework includes a set of tables to capture information about notification types, objects, and channels.

There are two kinds of destinations for notification messages:

- **Predefined destinations** are those destinations that are defined in the notification channels.
- **Preferred destinations** are optional, and enable you to change the predefined destinations programmatically by providing the destinations.

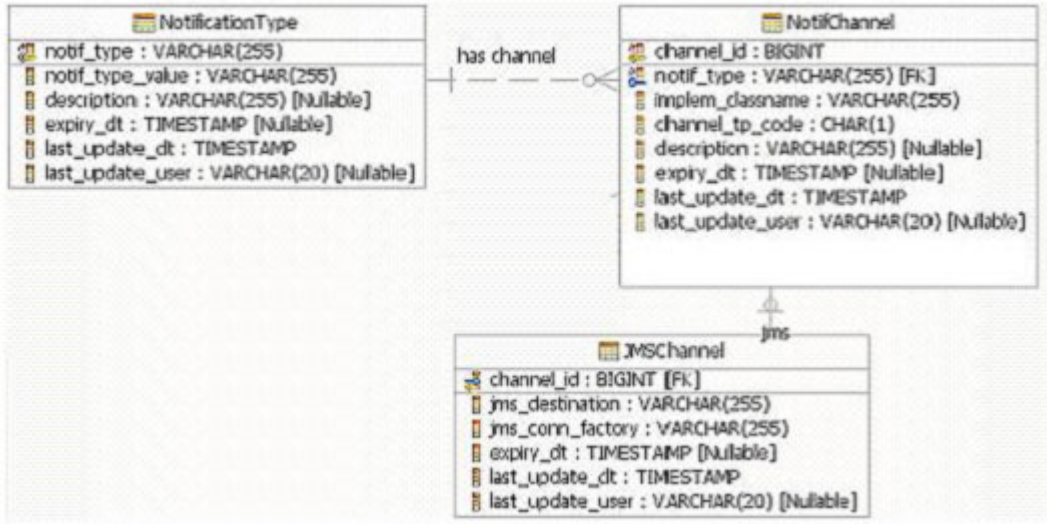
See also:

"Learning the Notification Framework data model"

"Understanding notification types and contents" on page 533

Learning the Notification Framework data model

The data model for the InfoSphere MDM Server Common Notification Framework contains three tables: NOTIFICATIONTYPE, NOTIFCHANNEL, JMSCHANNEL.



NOTIFICATIONTYPE

Each notification type must be registered in the NOTIFICATIONTYPE table. This table captures the notification type code, notification type value, and expiry date for the notification.

NOTIFCHANNEL

The NOTIFCHANNEL table captures the notification channel for a given notification type configuration. There can be more than one notification channel for a given notification type. The NOTIFCHANNEL table also captures the fully qualified implementation class that sends the created notification messages.

JMSCHANNEL

The JMSCHANNEL table captures the JMS destination for a given notification channel. You must configure only one JMS Channel for each notification channel. This table must include:

- The resource reference for the JMS destination (Topic or Queue).
- The resource reference for the connection factory (TopicConnectionFactory or QueueConnectionFactory).

The destination configured in the JMSCHANNEL table is known as the predefined destination.

Understanding notification types and contents

Notification messages are constructed based on the notification type. A number of notification types are provided with InfoSphere MDM Server out-of-the-box.

The existing notification business object class names are specified in the notification classes section of the `TCRM.properties` file:

```
############################
# NOTIFICATION CLASSES     #
############################
nt1=com.dwl.tcrm.coreParty.notification.A1PartySelectedNotification
nt2=com.dwl.tcrm.coreParty.notification.SuspectIdentificationNotification
nt3=com.dwl.tcrm.coreParty.notification.AutoSuspectReIdentificationNotification
nt4=com.dwl.tcrm.coreParty.notification.ManualSuspectEntryAdjustmentNotification
nt5=com.dwl.tcrm.coreParty.notification.ElementChangeNotification
nt6=com.dwl.tcrm.coreParty.notification.DeletePartyHistoryNotification
nt7=com.dwl.tcrm.coreParty.notification.PendingCDCRequestNotification
nt9=com.ibm.mdm.suspect.notification.EntitySuspectNotification
nt10=com.ibm.mdm.suspect.notification.EntitySuspectNotification
nt11=com.ibm.mdm.suspect.notification.EntitySuspectNotification
```

The following table shows the information included within each type of notification object:

Notification Type	Notification Value	Information Included
nt1	A1 Party Selected	Details of original source party passed to Add Party transaction
		Details of A1 matched party selected
		List of other A1 matched parties found (exceptional case)
nt2	Suspect Identification	Source party
		Suspects marked to source party
nt3	Auto Suspect Re-identification	Reason for Re-Identification (critical data change | critical data add | collapse parties | split party)
		Before/After image if critical data change
		Image if critical data add
		Source party
		New suspects to source party created
		Existing suspects to source party updated
		Deleted suspects
nt4	Manual Suspect Entry Adjustment	Source/Target Parties
		Before Status
		After Status
nt5	Element Change	Element Name
		Element Identifier
		Before and After Images of Element's Value.

Notification Type	Notification Value	Information Included
nt6	Delete Party History	Note of 'Party history has been deleted for this party'.
		PartyId
		Additional Information
nt7	Pending Critical Data Change Request	Element name
		before update
		After update
nt9	Update Product Suspects	Source product
		List of suspects before update
		List of suspects after update
nt10	Delete Product Suspects	Source product
		List of deleted suspects
nt11	Add Product Suspects	Source product
		List of added suspects
ntem	Event Manager to the Topic	Notification message for the happened Event

Configuring notifications

You can configure the InfoSphere MDM Server Notification Framework to be enabled or disabled at various levels.

Notifications can be enabled and disabled at the following levels:

- **Application scope** – You can globally enable or disable common notification processing.
- **Notification type scope** – You can enable or disable notifications at the notification type level. This scope enables the Notification Framework to decide whether to process the notification based on the notification type.
- **Notification channel scope** – You can enable or disable notifications at the notification channel level. In this scope, notifications are processed, but the Notification Framework only delivers notification messages to those channels that are enabled.

See also:

"To enable notifications at the application level"

"To enable notifications at the type level" on page 535

"To enable notifications at the channel level" on page 535

"To disable notifications at the application level" on page 535

"To disable notifications at the type level" on page 535

"To disable notifications at the channel level" on page 535

To enable notifications at the application level

1. Access the InfoSphere MDM Server Configuration and Management component.

Note: For information on the Configuration and Management component, see Chapter 34, "Using the Configuration and Management components," on page 405.

2. Update the `/IBM/DWLCommonServices/Notifications/enabled` dynamic configuration item to `true`.

To enable notifications at the type level

1. Connect to the InfoSphere MDM Server database.
2. Run the following SQL command, replacing the placeholder `<notification_type>` with the actual notification type name:

```
update notificationtype set expiry_dt=null, last_update_dt=current timestamp
where notif_type='<notification_type>'
```

Note: You can set the expiry date (`expiry_dt`) value to a future date.

To enable notifications at the channel level

1. Connect to the InfoSphere MDM Server database.
2. Run the following SQL command, replacing the placeholder `<channel_type>` with the actual notification channel name:

```
update notifchannel set expiry_dt=null, last_update_dt=current timestamp where
channel_id = <channel_id>
```

Note: You can set the expiry date (`expiry_dt`) value to a future date.

To disable notifications at the application level

1. Access the InfoSphere MDM Server Configuration and Management component.

Note: For information on the Configuration and Management component, see Chapter 34, "Using the Configuration and Management components," on page 405.

2. Update the `/IBM/DWLCommonServices/Notifications/enabled` dynamic configuration item to `false`.

To disable notifications at the type level

1. Connect to the InfoSphere MDM Server database.
2. Run the following SQL command, replacing the placeholder `<notification_type>` with the actual notification type name:

```
update notificationtype set expiry_dt=current_timestamp,
   last_update_dt=current timestamp where notif_type='<notification_type>'
```

To disable notifications at the channel level

1. Connect to the InfoSphere MDM Server database.
2. Run the following SQL command, replacing the placeholder `<channel_type>` with the actual notification channel name:

```
update notifchannel set expiry_dt=current_timestamp,
   last_update_dt=current timestamp where channel_id = <channel_id>
```

Creating notifications for data distribution

You can use the InfoSphere MDM Server Notification Framework to create custom notifications that handle data distribution when an entity changes. In this way, data changes can be ″trickle fed″ to consuming applications.

Data distribution notifications can be used to manage and transfer data from its source to a destination where the data can be used. When you create a custom data distribution notification, you must define:

- What data must be distributed to the downstream system.
- When the data should be distributed: scheduled, real-time, or user driven.
- What mechanism should be used to distribute the data: batch or trickle feed.

See also:

"To create data distribution notifications"

To create data distribution notifications

1. Define a new notification type:
   a. Create a new notification business object.

      The notification business object will hold the information that will be distributed through notifications.
   b. Develop an implementation of how the information will be distributed.

      For JMS destinations, you can use com.dwl.base.notification.JMSChannel, which is available out-of-the-box from InfoSphere MDM Server.
   c. Define and configure the notification channels and destination for the new notification type.
2. Decide what mechanism will be used to trigger the notification:
   - Using a behavioral extension that determines when the notification will be sent based on the execution of an existing out-of-the-box transaction.
   - Using a custom transaction that triggers the notification mechanism directly from the service at the required point.
   - Using a Java business proxy of a composite service.
   - Using the InfoSphere MDM Server Event Manager. This is sometimes a good option when working with a larger set of data.
3. Implement the mechanism that triggers the notification.

   Depending on the triggering mechanism being used, the corresponding code must incorporate the invocation of the notification mechanism:
   - If you are using the behavioral extension option to trigger the notification, then you must define the behavioral extension configuration in the ExtensionSet related tables for the existing transaction.
   - If you are using the Event Manager to trigger the notification, then you must:
     a. Manage the notification triggers using the Event Manager's Process Control table.
     b. Develop an Event Manager rule to invoke the notification mechanism.

     For more information, see Chapter 31, "Customizing Event Manager," on page 359.

To see a sample implementation of a custom data distribution notification, see "Implementing notifications" on page 537.

Implementing notifications

To implement a custom notification, you must build a notification business object and then invoke it.

You can build custom notifications by creating a notification business object, and you can send a notification message using one of the triggering options described in "To create data distribution notifications" on page 536.

The InfoSphere MDM Server platform includes a session bean component that takes responsibility for sending notifications to the appropriate destinations.

During transaction processing, when a situation occurs where a notification must be sent, the Notification Framework code first checks the notification configuration option to determine whether notification processing is enabled at the application level. For information on configuring the Notification Framework, see "Configuring notifications" on page 534. For information on the Configuration and Management component, see Chapter 34, "Using the Configuration and Management components," on page 405.

See also:

"To build notification business objects"

"Sample notification business object"

"To invoke the notification mechanism to send messages" on page 538

"Sample notification implementation" on page 539

To build notification business objects

1. Plan your custom notification implementation. Consider the following decisions:
   - What information will the notification message contain?
   - What will be the format of the notification message? XML?
   - Depending on the message content, what instance variable fields will be required to hold the notification data?
2. Create a notification business object that extends CommonNotification.
3. Edit the business object to include the required fields to hold the notification message content.
4. Edit the business object to include accessor methods for the notification message content.
5. Create a 'no argument' constructor and populate the notification type and notification type values for this notification.
6. Implement the getMessage method.

   The getMessage method generates the notification message content based on the fields defined in the business object.

Sample notification business object

```
//1. Extending CommonNotification
public class SINNumberChangeNotification extends CommonNotification {

    //2. Defining fields that are needed to construct the message
    //content
    /**  */
    private String elementName;
```

```
    /**  */
    private String elementBeforeImage;



    //3. Providing default constructor that populates the
    //notificationType, notificationTypeValue
    /**
     * ElementChangeNotification constructor.
     *
     */
    public SINNumberChangeNotification() {
        super();
        notificationType = "nt101";
        notificationTypeValue = "SIN Number Change";
        strPrimaryKey = strEmpty;
        elementBeforeImage = strEmpty;
        elementAfterImage = strEmpty;
    }

    //Providing accessor methods for the fields
    /**
     * Assign primary key with this object
     *
      * @param strKey
     *            java.lang.String
     */
    public void setPrimaryKey(java.lang.String strKey) {
        this.strPrimaryKey = strKey;
    }

    /**
     * Returns primary key associated with this object For example:
     * TCRMPersonBObj.getPersonPartyId()
     *
     * @author John Coutinho tCRM35 Creation date: (3/13/02 2:33:21 PM)
     * @return java.lang.String
     */
    public java.lang.String getPrimaryKey() {

        return strPrimaryKey;
    }

.
.
.


    //4. Construct the message from the instance variables by
    public String getMessage(){
 String messageContent = "";
 //use the fields to construct the message content
     return messageContent;
    }
}
```

To invoke the notification mechanism to send messages

1. Ensure that the Notification Framework is enabled at the application level.

   For details on enabling notifications at the application level, see “To enable notifications at the application level” on page 534.
2. Instantiate the notification object.
3. Populate the required fields in the notification object by calling the corresponding setter methods.
4. Optionally, set the preferred destination by invoking the notification object’s addJMSDestination method.
5. Create a remote object of the NotificationBean session bean.

6. Invoke the Notify method of the NotificationBean by passing the notification object.

Sample notification implementation

```
//Getting the global configuration for notification type.
boolean coDoNotfication = Configuration.getConfiguration()
  .getConfigItem(NOTIFICATION_ENABLED,
    params.getControl().retrieveConfigContext())
  .getBooleanValue();

if (coDoNotfication) {
 //1. Instantiating the notification object
 SINNumberChangeNotification scNotification = new SINNumberChangeNotification();

 DWLControl control = params.getControl();

 //2.Setting the needed information to the notification object
 scNotification.setTxnType((String) control
   .get(DWLControl.REQUEST_NAME));
 scNotification.setTxnTime(new Timestamp(System
   .currentTimeMillis()));
 scNotification.setRequestId(control.get(
  DWLControl.REQUEST_ID).toString());
 scNotification.setUserId((String) control
   .get(TCRMControlKeys.USER_NAME));
 scNotification.setPrimaryKey(identificationBObj.getIdentificationIdPK());

 scNotification.setElementName("IdentificationNumber");

 scNotification.setElementAfterImage(identificationBObj
   .getIdentificationNumber());

 TCRMPartyIdentificationBObj beforeIdentificationBObj = (TCRMPartyIdentificationBObj) (identificationBObj
   .BeforeImage());

 if (beforeIdentificationBObj != null) {
  String identificationNumberBefore = ((TCRMPartyIdentificationBObj) (identificationBObj
    .BeforeImage())).getIdentificationNumber();

  scNotification.setElementBeforeImage(identificationNumberBefore);
 }

 //3. Set the preferred destination. This is an optional step.
 scNotification.addJMSDestination(ELEMENT_CHANGE_TOPIC);

 scNotification.setControl(control);
            //5. Invoke the sendNotification method. Which intern invokes
//  the appropriate notify method.
 sendNotification(scNotification);
}
```

```
    /**
     *
     * Gets local home object of the NotificationTxn bean.
     * <p>
     *
     * @return Local home object of the NotificationTxn bean.
     * @throws Exception
     *             If lookup of the bean reference fails.
     * @since 6.0
     */
    protected final static NotificationLocalHome getNotificationLocalHome()
            throws Exception {

        ServiceLocator serviceLocator = ServiceLocator.getInstance();
        NotificationLocalHome home = (NotificationLocalHome) serviceLocator
                .getLocalHome("ejb/com/dwl/base/notification/NotificationLocal");

        return home;

    }

    /**
     * Sends notification to common notification framework
     *
     * @param theCommonNotification object
     * @throws TCRMException
     */
    public void sendNotification(CommonNotification theCommonNotification)
                        throws TCRMException {
     PerformanceMonitorFactory performanceMonitorFactory = PerformanceMonitorConfig
        .getInstance().getPerformanceMonitorFactory();
  PerformanceMonitor performanceMonitor = performanceMonitorFactory
          .newCustomerNotificationMonitor();
  boolean success = false;
```

```
performanceMonitor.start(theCommonNotification.getControl(), MONITOR_TRANS_SEND_NOTIFICATION, getClass());

try {
    NotificationLocal theNotificationBean = getNotificationLocalHome()
            .create();

    theNotificationBean.notify(theCommonNotification);

    success = true;
} catch (TCRMException ex) {
    throw ex;
} catch (Exception ex) {
 if(logger.isErrorEnabled())
  logger.error(ex.getLocalizedMessage());
    TCRMException tcrmEx = new TCRMException(ex.getMessage());
    throw tcrmEx;
} finally {
    performanceMonitor.stop(success);
}
  }
```

Chapter 41. Understanding the PIMDataTransformer module

The PIMDataTransformer module is one of the key components in the overall solution of InfoSphere MDM Server for PIM and InfoSphere MDM Server integration.

This module converts the InfoSphere MDM Server for PIM Data Change Log (DCL) export data into InfoSphere MDM Server transactions.

The PIMDataTransformer module supports the transformation features that allow you to:

- Add, update, or delete products, with or without the specs attached. The product data can also contain the category product attributes. Product types, specs, and entity spec uses are assumed to already exist in InfoSphere MDM Server.
- Add, update, or delete product category relationships.
- Add, update, or delete product relationships.
- Add, update, or delete categories. The category hierarchy, along with the root category, is assumed to already exist in InfoSphere MDM Server. Category spec data imported from InfoSphere MDM Server for PIM is not synchronized to categories in InfoSphere MDM Server because categories do not yet support specs.
- Add, update, or delete category parent associations.
- Handle National Language Support (NLS) data for product and category data. NLS data can be in any language that meets the following conditions:
  - It is not the default language of the InfoSphere MDM Server
  - It is one of the languages supported by InfoSphere MDM Server
- Synchronize lookup table entries. All lookup table entries coming in from InfoSphere MDM Server for PIM are created as new product instances in InfoSphere MDM Server.

XML exports of items in InfoSphere MDM Server for PIM are converted into InfoSphere MDM Server product transaction XML snippets. XML exports of category data from InfoSphere MDM Server for PIM are converted into category transaction XML snippets data in InfoSphere MDM Server. The exports from InfoSphere MDM Server for PIM are created using the Delta Change Logging Component.

In this section, you will learn:

Understanding PIMDataTransformer module methods

The PIMDataTransformer module exposes methods that you can invoke to perform the transformations.

These methods come in a few variants such as:

- **Method**—transformFile()
  Parameters—mdm4pimFilePath
  Result—Creates a file under landing directory containing InfoSphere MDM Server transactions. The landing directory is a pre-configured directory in the IBM Information Server machine where the exported files from InfoSphere MDM Server for PIM are copied into using FTP.
- **Method**—transformXmlString()
  Parameters—A string representing the InfoSphere MDM Server for PIM export data
  Result—Creates a string containing the transformed InfoSphere MDM Server transactions.
- **Method**—transformXmlNodeString()
  Parameters—A node representing the InfoSphere MDM Server for PIM export data
  Result—A string containing the transformed InfoSphere MDM Server transactions.

The DeltaLoad class exposes methods that can accept a file path, XML string, or an XML node string as an argument. The transformFile() method creates a file that contains the InfoSphere MDM Server transactions. The other methods return a string representation of the transformed data.

Understanding how the PIMDataTransformer module uses metadata

The PIMDataTransformer module needs metadata to generate the required InfoSphere MDM Server transactional files.

The metadata helps the transformer component to determine the mapping between InfoSphere MDM Server for PIM entities and the corresponding InfoSphere MDM Server entities.

Understanding the PIMDataTransformer module export format

The PIMDataTransformer module understands the format in which InfoSphere MDM Server for PIM exports data.

The module reads all the data in the standard format that is agreed upon by InfoSphere MDM Server for PIM and the PIMDataTransformer module, processes the data based on the mapping, and generates InfoSphere MDM Server transactions. The InfoSphere MDM Server transactions adhere to the maintenance transactions format of InfoSphere MDM Server. The PIMDataTransformer module uses the maintenance transactions template for generating the correct transactions.

Using the PIMDataTransformer module with ETL tools

The PIMDataTransformer module can be used in IBM Information Server, as well as InfoSphere MDM Server for PIM or any other ETL tool.

The module must be integrated with the original batch processor (non XD platform), so that transactions that were previously generated will run and so that data is populated in the InfoSphere MDM Server database.

For more information, refer to the *IBM InfoSphere Master Data Management Server Samples Guide*.

Using the PIMDataTransformer module

The PIMDataTransformer module can be used in a variety of ways.

The following are typical example of how the module can be used:

- **IBM InfoSphere DataStage**—The PIMDataTransformer module contains an InfoSphere DataStage job that needs to be imported into IBM Information Server. It also contains a JAR file called PIMDataTransformer.jar that needs to be copied onto the IBM Information Server. Once this InfoSphere DataStage job is configured appropriately, it can be used to transform InfoSphere MDM Server for PIM data into InfoSphere MDM Server transactions. For more details on configuring this module, refer to the MDM Samples Guide

  When InfoSphere MDM Server for PIM exports the data in XML format into the InfoSphere DataStage machine and invokes the dataStage job, the transformations happen and a new file which contains the InfoSphere MDM Server transactions is generated. The datastage job then invokes the batch processor and the data gets populated into InfoSphere MDM Server.
- **DCL report**—The PIMDataTransformer module exposes various methods as described earlier. Some of those methods can take the string representations of the entire InfoSphere MDM Server for PIM propagation group or string representation of a particular container. These methods do the transformations on the input strings and return a string representation of the transformed InfoSphere MDM Server data.

  These methods can be used directly from the InfoSphere MDM Server for PIM DCL reports. This way, InfoSphere MDM Server for PIM need not invoke InfoSphere DataStage jobs to transform. After InfoSphere MDM Server for PIM invokes these methods on all the entities that were added or modified, it can invoke the batch processor to update data on InfoSphere MDM Server.
- **Real-time integration**—The PIMDataTransformer module is directly invoked directly from the InfoSphere MDM Server for PIM.

By following any of the above approaches, you can move the data from InfoSphere MDM Server for PIM to InfoSphere MDM Server for operational usage.

The PIMDataTransformer module is packaged in a directory called `PIMDataTransformer`, located in the InfoSphere MDM Server samples package.

For more information more details about this module, including how to set up, configure, and us it, refer to the *IBM InfoSphere Master Data Management Server Samples Guide*.

Chapter 42. External rules for the Platform domain

This section describes the business rules that are externalized from InfoSphere MDM Server and are configured using the External Rule Component.

Note: Only external rules that are common across the domain or are around administrative data is presented here. See the Party, Product, and Account domain sections for their respective rules.

Rule ID	Rule Description	Java Class Name
17	Rule for DefaultSourceValue	com.dwl.tcrm.externalrule.DefaultSourceValue
19	Rule for Campaign business key validation	com.ibm.mdm.common.coreexternalrule.BusinessKeyValidation
20	Rule for Campaign Association business key validation	com.ibm.mdm.common.coreexternalrule.BusinessKeyValidation
21	Rule for Product Relationship	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
22	Rule for getting default privacy preferences	com.ibm.mdm.common.coreexternalrule.DefaultPrivacyPreference
23	Rule for get CampaignAssociatedObject	com.dwl.tcrm.externalrule.CampaignAssociatedDetailRule
24	Rule to validate an update of a business key for Grouping	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
25	Rule for Grouping duplicate business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
26	Rule for Grouping Association update business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
28	Rule for get Grouping Associated object	com.dwl.tcrm.externalrule.GroupingAssociatedDetail
42	Rule to validate a duplicate business key for ErrorReason	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
43	Rule for Default Privacy Preference duplicate business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
45	Rule for Admin Code table	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
46	Rule for update VGroup	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
47	Rule for update VElement	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
48	Rule for update VElementAttribute	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
49	Rule for update VGroupValidation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
50	Rule for update VElementValidation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
51	Rule for update VGroupParameter	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
52	Rule for update VElementParameter	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
53	Rule to validate an update business key for GroupAccess	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
54	Rule for User Access update business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
55	Rule for Group Profile update business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
56	Rule for User Group Profile update business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
57	Rule for User Profile update business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
58	External rule business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
59	Rule engine implementation business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
60	Java rule implementation business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation

Rule ID	Rule Description	Java Class Name
61	Rule to validate an update of a business key for DefaultPrivacyPreference	com.dwl.tcrm.externalrule.BusinessKeyValidation
72	Business transaction business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
73	Businternaltxn business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
74	Inquiry level business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
75	Inquiry level group business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
76	Group table business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
77	Business Transaction request to validate business key	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
78	Business transaction response business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
85	Entity hierarchy role business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
109	Process Action business key validation	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
115	Rule for Grouping and Grouping Association Expiry	com.dwl.tcrm.externalrule.GroupExpiryExtRule
139	Rule for Compliance Requirement duplicate business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
140	Rule to validate an update of a business key for Compliance Requirement	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
141	Rule for evaluating conditions attached to Compliance Target in Compliance Requirement	com.ibm.mdm.common.coreexternalrule.ExtValidation
142	Rule for evaluating conditions attached to Compliance Document in Compliance Target	com.ibm.mdm.common.coreexternalrule.ExtValidation
145	Rule to validate an update of a business key for EnumeratedAnswer	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
146	Rule to validate an update of a business key for AnswerSet	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
147	Rule to validate an update of a business key for Answer	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
148	Rule for EnumeratedAnswer duplicate business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
149	Rule for AnswerSet duplicate business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
150	Rule for Answer duplicate business key validation	com.ibm.mdm.common.coreexternalrule.DWLBusinessKeyValidation
151	Rule to validate AnswerSet	com.dwl.tcrm.externalrule.AnswerSetValidationRule
152	Rule to validate the type of the answer	com.ibm.mdm.common.coreexternalrule.AnswerValidation
158	Rule to generate Concatenated key for CategoryAdminSysKeyBObj	com.ibm.mdm.common.coreexternalrule.CategoryRules
159	Rule to validate time period of CategoryHierarchy	com.ibm.mdm.common.coreexternalrule.CategoryRules
160	Rule to validate CategoryCode for CategoryBObj	com.ibm.mdm.common.coreexternalrule.CategoryRules
164	Rule to validate category association	com.ibm.mdm.common.coreexternalrule.CategoryRules
165	Rule for getting the next status of a task	com.ibm.mdm.common.coreexternalrule.TaskStatusRule
168	Rule for searchCategoryHierarchy	com.ibm.mdm.common.coreexternalrule.SearchCategoryRules
169	Rule for searchCategory	com.ibm.mdm.common.coreexternalrule.SearchCategoryRules
173	Rule to validate endDate of Category	com.ibm.mdm.common.externalrule.CategoryRules
175	Rule to validate associationIndicator of Category	com.ibm.mdm.common.externalrule.CategoryRules
176	Rule for validating Validation Parameter business key	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation

Rule ID	Rule Description	Java Class Name
177	Rule for validating Validation business key	com.ibm.mdm.common.coreexternalrule.DWLAdminBusinessKeyValidation
181	Rule to validate the timeframe with respect to EntitySpecUse	com.ibm.mdm.externalrule.EntitySpecUseEntityTimeframeRule
182	Rule for EntitySpecUse Timeframe Validation	com.ibm.mdm.common.externalrule.CategoryRules
183	Rule for EntitySpecUse Not Updatable Fields	com.ibm.mdm.common.coreexternalrule.EntitySpecUseNotUpdatableFields
185	Rule for getting category timeframe	com.ibm.mdm.externalrule.EntitySpecUseTimeFrameVal
187	Rule for Spec and EntitySpecUse TimeFrame Validation	com.ibm.mdm.common.coreexternalrule.EntitySpecUseTimeFrameVal
196	Validate TermCondition associating to an inactive product	com.ibm.mdm.product.externalrule.ValidateTermConditionWithProduct

Chapter 43. Learning the platform domain configuration elements

Platform domain configurations have names beginning with the following:

- /IBM/CoreUtilities
- /IBM/BusinessServices
- /IBM/DWLAdminServices
- /IBM/DWLBusinessServices
- /IBM/DWLCommonServices
- /IBM/EventManager
- /IBM/MessagingAdapter
- /IBM/ProductServices
- /IBM/XMLServices

See the "Understanding configuration elements in the Configuration and Management component" on page 419 topic for details about these configurations.

Part 2. Introduction to the Party domain

The Party domain manages the entirety of data related to parties such as customers, vendors and suppliers, and maintains a single, consistent version of this data.

The following are the features particular to the Party domain:

Party types

A party is either a person or an organization. The only information maintained that is specific to persons and organizations is name information. The majority of the party model is based on the party supertype. Therefore, almost all of the features within the Party domain apply to both persons and organizations.

Party names

Names can be captured for both person and organization parties. Names can be of any client-defined type and can be standardized by third party standardizers.

Party relationships

Parties can be related together for any number of reasons. Examples include: employment relationships, family relationships and business relationships.

You are provided with the ability to create relationship types. This is a simple code that identifies the type of relationship that is being created between parties.

Party equivalencies

A party that is managed within the Party domain can also exist in another system. A party equivalence key provides you with the ability to identify how the party is known in other systems; in other words, the party's identifier in the other system.

Party identifiers

This feature enables you to store known identifiers of a party such as tax identifiers, driver license numbers and passport numbers.

Party demographics

Party demographics enables you to define different types of demographics, such as occupational, military, employment and education demographics. A metadata spec can be associated with a demographic type, allowing you greater flexibility when defining the type of data to capture with each type of demographic. For more information, see Chapter 51, "Configuring Party Demographics," on page 653 and the *IBM InfoSphere Master Data Management Server Samples Guide*.

Party location

Addresses and contact methods can be associated with parties. Contact methods include client-defined types such as home telephone numbers, fax numbers, cellular telephone numbers and e-mail addresses.

Addresses can be shared across many parties. If you are adding or updating a party's address an existing address can be associated with it if the address refers to the same physical location; otherwise, a new address is created. A party can use an address of any client-defined type, such as home address or work address.

Addresses can be standardized and validated by third party standardizers.

Party Roles

A given party can play different types of roles in different contexts. Supported roles include roles on contracts, roles in claims and macro roles. Roles serve as the mechanism that relates parties to other structures, thereby providing a complete view of the party.

The Party module provides services to capture and manage one or more macro roles that a party plays in the system. The Party module also provides services that manage party roles in party grouping and party relationships. The common business services module provides services for capturing and managing entity roles within a hierarchy.

As a part of playing the macro role, some of the existing party data can be associated with a macro role to create a view for the given party in a role. For example, a party may have the role of "prospect", and an e-mail address is collected with this role, thus linking the party macro role with this contact method.

In general, InfoSphere MDM Server enables you to manage the following roles:

- Contract party roles

- Claim party roles
- Party macro roles
- Entity roles

Contract party roles and claim party roles provide services to capture and manage the various roles that a party plays in the system with regard to contracts and claims. That is, these roles only exist within the context of the contracts or claims that they are associated with.

Party entity roles are similar to contract and claim roles, in that these roles only exist within the context of the entities that they are associated with. In this case, however, the entities are party-centric party relationships, party groups, and party hierarchies.

Party macro roles, in contrast, provide the context in which to view the associations. That is, in a given party role, a given set of associations are valid.

This section concentrates on the specifics of these new party-centric macro and entity roles.

Party financial profile

Financial profile is a collection of details for a party, including income source and all payment source entities. Payment source is the super type of charge card, bank account, and payroll deduction.

Party privacy preferences

Party privacy incorporates privacy legislation and a party's specific privacy preferences to ensure that the party is only contacted when permission has been given, and the party's information is only shared in an agreed-upon manner. Specifically, Party Privacy ensures institutions comply with the different privacy regulations from all levels of government and with the individual's wishes for privacy regarding their personal information.

Party campaigns

The InfoSphere MDM Server Campaigns feature stores and retrieves information regarding marketing campaigns. A marketing campaign promotes awareness of something—products, information, parties—and its target audience can be a person or an organization. Marketing campaign information about products and other business functions—such as fee changes—can be associated with one or more parties.

Party Suspect Duplicate Processing

The goal of customer data integration is to provide a single view of the customer. The Suspect Duplicate Processing (SDP) feature is provided by InfoSphere MDM Server to achieve this goal. See Chapter 44, "Configuring Suspect Duplicate Processing," on page 557 for more details.

Party Line of Business

The line of business (LoB) relationship feature can be used to associate parties to specific lines of business. You can manage individual party-to-LoB relationships as

well as adding, updating and getting these relationships as part of party-level composite transactions—for example, addParty, updateParty and getParty transactions.

Party life events

Event Manager triggers event detection using three different types of criteria:

- Time-based
- Transaction-based
- Explicit event creation

While the detection of time-based and explicit event creation events is handled by Event Manager directly, transaction-based event detection must be initiated byInfoSphere MDM Server. This is done by sending a data change message from InfoSphere MDM Server to the Event Manager, whenever data is modified in InfoSphere MDM Server. These transactions that modify data are called persistent transactions.

For more information see Chapter 52, “Customizing Party Life Events,” on page 655

Party interactions

This feature provides the ability to capture details related to interactions a party has had with the enterprise, including the following:

- the type of interaction
- the subject of the interaction
- notes about the interaction
- the relationship of the interaction to other interactions

Party compliance

The Party compliance feature addresses regulatory requirements. It provides institutions with a consolidated enterprise-wide view of all the compliance requirements the party meets. The compliance requirements are one or more target documents to be validated, and documents that are used to validate the targets. Party compliance records contain information about how a party has met a given compliance requirement, such as details about the documents provided to verify compliance.

Party questionnaire

The questionnaire features provides the ability to define a set of questionnaires, each with a set of questions and possible answers. Any given party’s results of completing a particular questionnaire can be captured.

Party grouping

The grouping feature identifies a collection of items with a common thread.

Grouping allows you to:

- Capture and manage groupings of entities within the InfoSphere MDM Server product
- Associate miscellaneous values, addresses and contact methods to a grouping

- Refine retrieving addresses and contact methods by searching for a particular grouping, for example, only those of a particular role or type

Party hierarchy

The hierarchy feature provides services to manage generic hierarchies in the system. These services allow users to search for, create hierarchies, update them, add and update individual nodes in the hierarchy as well as hierarchy relationships. Additionally services allow inquiring for the whole hierarchy or just a section.

Party hierarchy links a generic hierarchy with parties, and party domain provides services to retrieve hierarchy information with the party information, and to search for a party within a party hierarchy.

IBM QualityStage integration

InfoSphere MDM Server can be configured to use QualityStage's standardization and matching capabilities.

AbiliTec integration

InfoSphere MDM Server can be configured to integrate with Acxiom AbiliTec to provide the ability to:

- Return and persist a party's AbiliTec link, when the party is added to the system in a near real-time fashion
- Regularly refresh the link until a maintained link is found from Acxiom
- Force the refresh of party's AbiliTec link
- Adjust match categories based on matching or nonmatching AbiliTec links during its suspect processing
- Maintain AbiliTec link using party identification services

The AbiliTec link is modeled as party identification in InfoSphere MDM Server.

Dun and Bradstreet integration

As delivered, InfoSphere MDM Server integrates with Dun & Bradstreet from a matching perspective in order to store the D-U-N-S Number as party identifier for organizations. Additionally, InfoSphere MDM Server provides sample code to demonstrate how InfoSphere MDM Server data can be enriched with business intelligence from the Dun & Bradstreet global database.

IBM EAS integration

InfoSphere MDM Server provides the ability to integrate to the IBM Entity Analytic Solutions (EAS) products, which are a set of cross-platform, cross-database products that answer the following questions from multiple data sources in near real-time:

- "Who is who?" (DB2 Identify Resolution)
- "Who knows Who?" (DB2 Relationship Resolution)
- "Who knows who anonymously" (DB2 Anonymous Resolution)

InfoSphere MDM Server integrates with both DB2 Relationship Resolution and DB2 Anonymous Resolution as a source system, with a one-way feed from InfoSphere MDM Server to EAS.

In this section, you will learn:

Chapter 44. Configuring Suspect Duplicate Processing

The goal of customer data integration is to provide a single view of the customer. Suspect Duplicate Processing (SDP) is the feature provided by InfoSphere MDM Server to achieve this goal.

SDP is used when a party is added by invoking a InfoSphere MDM Server service. InfoSphere MDM Server then determines whether that party already exists in the database and based on configuration either adds a new party or updates an existing party. You can configure and customize the set of rules provided by the SDP feature out-of-the-box.

When SDP is configured *on*, it is invoked when

- Adding a new party
- Updating particular elements or critical data of an existing party

  Note: When inactivating a party, SDP is not invoked. That is, any suspect records that were created for that party remain in the repository

If SDP finds a suspect duplicate party, you may need to use the Data Stewardship feature functionality to:

- Search and inquire for parties marked as suspect duplicates
- Collapse parties together
- Split parties apart
- Mark or unmark parties as suspect duplicates

Internally within InfoSphere MDM Server, SDP is made up of several operations with customization and configuration points. This set of operations includes:

- Detecting the need to trigger SDP
- Searching for suspect duplicate parties
- Matching suspect duplicate parties
- Marking parties that are suspect duplicates
- Unmarking parties that are no longer suspect duplicates
- Notifying the user of SDP findings
- Allowing for the persistence of suspect duplicate parties during SDP: for example suspect duplicate parties that are in different lines of business.

This chapter provides the following information:

- Descriptions of the configuration points with details on how to configure Suspect Duplicate Processing
- Details of the default implementation of the external rules used within Suspect Duplicate Processing
- The party matching matrices

For the definitions of terms used when discussing Suspect Duplicate Processing, see the topic *Definition of terms related to Suspect Duplicate Processing* in the *IBM InfoSphere Master Data Management Server Understanding and Planning Guide*.

In this section, you will learn:

"Suspect category names and descriptions" on page 558

"Suspect Duplicate Processing configuration points"
"Configuring external rules for SDP" on page 582
"InfoSphere MDM Server party matching matrices for suspect duplicate processing" on page 590
"Configuring Critical Data Change processing" on page 591

Suspect category names and descriptions

Default suspect categories in the product are defined as follows:

Suspect Category	Name	Category Description
1	A1	Match and non-match relevancy scores indicate that a definite duplicate party has been found. A type 1 suspect category is guaranteed to be a duplicate, with 100% confidence that the parties are the same.
2	A2	Match and non-match relevancy scores indicate that the suspect party found has a high probability of being a duplicate. A type 2 suspect category indicates that it is reasonably likely that two parties are the same.
3	B	Match and non-match relevancy scores indicate that the suspect party found might be a duplicate. A type 3 suspect category indicates that it is fairly unlikely that the two parties are the same.
4	C	Match and non-match relevancy scores indicate that the suspect party found is not a duplicate. A type 4 suspect category indicates that it is definite that two parties are not the same.

Suspect Duplicate Processing configuration points

The table that follows lists the configuration points for suspect duplicate processing and the mechanism for configuring that point. Each configuration point is discussed in more detail in the related sections.

Table 46. Configuration points and mechanisms for Suspect Duplicate Processing

Configuration Point	Configuration Mechanism
Configure SDP on or off	Configuration and Management
Configure Persist Duplicate Parties on or off	Configuration and Management
Customize critical data elements • Has critical data been added • Has critical data been changed	External Rules
Configure match and non-match relevancies of the matching matrices	Database Tables
Customize match categories of the suspect types	External Rules
Customize searching and matching • Suspect Duplicate Party Search • Party Match	External Rules
Customize adjustments to party matching	External Rules
Customize actions to take for suspect duplicate parties	External Rules

Table 46. Configuration points and mechanisms for Suspect Duplicate Processing (continued)

Configuration Point	Configuration Mechanism
Customize criteria for persisting duplicate parties	External Rules
Configure notification topics and create new notification types	Notification Mechanism
Realtime or offline Evergreening of data	Event Manager and External Rules
Acxiom AbiliTec integration	Various
IBM Information Server Quality Stage integration	Various
Wholly replace suspect duplicate processing implementation	Pluggable Component

See also:

"Configuring SDP on or off"

"Configuring Persist Duplicate Parties on or off"

"Customizing critical data elements" on page 560

"Customizing matching matrices" on page 561

"Customizing searching and matching" on page 563

"Customizing adjustments to Party Matching" on page 564

"Customizing the action to take when suspect duplicates are found" on page 564

"Configuring SDP notifications" on page 566

"Configuring real-time and offline SDP using InfoSphere MDM Server Evergreening" on page 568

"Configuring Acxiom AbiliTec integration with SDP" on page 574

"Configuring IBM Information Server QualityStage integration for SDP" on page 574

"Wholly replacing the Suspect Duplicate Processing implementation" on page 580

Configuring SDP on or off

You can configure SDP to run, or not, during the add or update party transaction.

A property in the Configuration Manager controls whether or not Suspect Duplicate Processing is run when processing the add or update party transaction. To enable Suspect Duplicate Processing, set `/IBM/Party/SuspectProcessing/enabled` to "true".

Configuring Persist Duplicate Parties on or off

Set the PersistDuplicateParties property in the configuration manager to control whether or not a guaranteed duplicate party (A1) will get persisted based on a particular predefined criterion

The product default criterion is the related line of business type (LOB) of the duplicate party. That is, if duplicate parties have different related lines of business they will be stored as separate records in the system. These records will not participate in any collapse functionality as the result of any system-identified

suspects. If a data steward explicitly provides these parties to a collapse service, however, the collapsing of these parties will be done. The following configuration can be toggled *Y* or *N*:

```
/IBM/Party/SuspectProcessing/PersistDuplicateParties/enabled
```

Customizing critical data elements

You can customize which data elements are used as part of Suspect Duplicate Processing.

InfoSphere MDM Server uses critical data elements in the following processes:

- Party matching, to determine the match and non-match relevancies which in turn are used to derive a match category
- Adjusting match categories
- Determining whether to run suspect duplicate processing when a party is updated. Because critical data elements are used in party matching, suspect duplicate processing should be run when critical data has either been changed or added for an existing party. If suspect duplicate processing is configured on, then it is always run as part of adding a party
- Determining whether or not party information to be updated contains critical data. If it does and Critical Data Change Processing is configured on, these updates are not allowed in real-time.

The following are the default critical data elements:

- Person critical data elements
  - Last name
  - Given name one
  - Date of birth
  - Address
  - Social security number
  - Gender
- Organization Critical Data Elements
  - Organization name
  - Address
  - Corporate tax ID

These elements are used in Party Matching to derive match categories. If Acxiom AbiliTec is used, the AbiliTec key is also defined as critical data as it is used to adjust match categories.

The determination of whether or not critical data elements have changed or have been added for an existing party is implemented as External Rule 8.

To define your own critical data elements:

1. Analyze which critical data elements are used in matching versus adjusting match categories and develop matching tables. For more information, see "Customizing matching matrices" on page 561.
2. Provide a new implementation for External Rule 8 which receives an object and must determine:
   - If the object is a critical data element
   - Whether the object has changed (by comparing before and after images) or is a new instance.

The default implementation of this rule can be found in `com.dwl.tcrm.externalrule.PartyMatch`

Much of the Suspect Duplicate Processing stems from the definition of critical data elements, so other areas require customization as well, and are discussed in this section. They include:

- Loading the match and non-match relevancy code tables (CDMATCHRELEVTP and CDSUSPECTREASONTP). For more information, see "Customizing matching matrices."
- Defining the matching matrices based on the critical data elements. For more information, see "Customizing matching matrices."
- Customizing the Suspect Duplicate Party Search and Party Match rules. For more information, see "Customizing searching and matching" on page 563.

Customizing matching matrices

You can customize the matching matrices so that they produce matches that meet your needs.

The matching matrices are tables that defines a match category for each unique combination of match relevancy and non-match relevancy. One matching matrix is required for person parties. One matching matrix is required for each type of organization.

Table 47. Location in the database of matching matrix information

Critical Data Element	Description of Critical Data	TableName.ColumnName
All Elements Matched	All Elements Match	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
A1	Quality Stage probabilistic match: A1	• CDMATCHRELEVTP.NAME
A2	Quality Stage probabilistic match: A2	• CDMATCHRELEVTP.NAME
B	Quality Stage probabilistic match: B	• CDMATCHRELEVTP.NAME
C	Quality Stage probabilistic match: C	• CDMATCHRELEVTP.NAME
NA	Non-match score not applicable: Quality Stage probabilistic match score used.	• CDSUSPECTREASONTP.NAME
Person Critical Data Elements		
G1Name	Given Name One	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
SName	Surname	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
DOB	Date of Birth	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
SSN	Social Security Number	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME

Table 47. Location in the database of matching matrix information (continued)

Critical Data Element	Description of Critical Data	TableName.ColumnName
Addr	Person's Address	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
G	Gender	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
Organization Critical Data Elements		
TIN	Tax Identification Number	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
Address	Organization's Address	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME
Name	Organization Name	• CDMATCHRELEVTP.NAME • CDSUSPECTREASONTP.NAME

For more details on the structure and rules that must be followed for constructing the matching matrices, see "InfoSphere MDM Server party matching matrices for suspect duplicate processing" on page 590. The party matching matrices section also provides the InfoSphere MDM Server default matrices, which are helpful in providing examples for steps below.

To customize the matching matrices:

1. Populate the match relevancy CDMATCHRELEVTP code table. A given row in this code table defines a combination of elements that match, and shows what the score is for such a combination. Following the pattern in the InfoSphere MDM Server default implementation for suspect duplicate processing, each score for a combination should be unique and the default is to assign scores by the power of 2 to each of the critical data elements. For example, SSN is 16, Address is 8, Date of Birth is 4, Last Name is 2, Given Name One is 1. An example of rows in this code table are:
   - SSN Matches
   - Score: 16
   - SSN and Address Matches
   - Score: 24
2. Populate the non-match relevancy CDSUSPECTREASONTP code table. Entries in this table should follow the same pattern as the match relevancy code table. The InfoSphere MDM Server default implementation is to use negative powers of 2. Example rows in this code table are:
   - SSN Does not Match. Score: -16
   - SSN and Date of Birth Don't Match. Score: -20
3. Populate the match matrix ADDACTIONTYPE code table. This table combines a match relevancy and non-match relevancy into a match category. This one code table hosts the matrices for person and organization party types. Example rows in this code table are:
   - Match Relevancy 19 (SSN, Last Name, Given Name One), Non-Match Relevancy -8 (Address), Suspect Type Code: 2, Match Category: A2. Note that based on the combination, it can be determined that one or both of the two parties does not have a date of birth.

- Match Relevancy 3 (Last Name, Given Name One), Non-Match Relevancy -12 (Address, Date of Birth). Match Category: C

When making these customizations to the matching matrices, be aware that any suspect duplicate party that is found and does not resolve to a row in the ADDACTIONTYPE table match matrix is assumed to have a Match Category of ″C″/Suspect Type 4..

Customizing searching and matching

You can customize how InfoSphere MDM Server searches for and matches suspect duplicates.

Two of the most critical steps in suspect duplicate processing are searching for suspected duplicate candidates and matching them to existing parties. The suspect duplicate party search queries a list of candidate parties, or suspect pool, from the database that are then fed to party matching to fully qualify the results, based on the appropriate matching matrix.

Careful consideration must be given to the implementation of suspect duplicate party search as it is the first level of matching based on the matching matrix. It is important to analyze the data and understand its characteristics in order to effectively and efficiently process it using SDP. Understanding how often critical data field values are defaulted to the same values, or perhaps empty, for example, will impact the size of the suspect pool created during the suspect duplicate party search. The criteria used for searching for suspect duplicate parties should not be broader than the match criteria used to provide further information on each suspect retrieved into the suspect pool. Also, typically, the suspect duplicate party search will likely result in multiple lower level searches with different types of search criteria to accumulate a good candidate list of parties so performance impact must be understood.

Default Suspect Duplicate Party Search Implementation: The default implementation of the InfoSphere MDM Server suspect duplicate party search for persons builds a candidate list by running two lower level party searches. The first search is by tax identifier (SSN) and the second search is by address. This will result in a candidate list that is capable of producing all A1 and A2 matches based on the default matching matrix. The suspect duplicate party search is implemented as external rule 1 (com.dwl.tcrm.externalrule.PartySuspectSearchRule). The rule can be customized by providing a new implementation and configuring this new rule appropriately. For more details about the specification of this rule, see “Configuring external rules for SDP” on page 582.

Default Suspect Party Matching Implementation: The default implementation of theInfoSphere MDM Server for party matching uses a deterministic matching approach. Each critical data element is checked for equivalence and scored appropriately, based on scores assigned to each critical data element (16 for SSN, 8 for Address and so on). The result is a match score and non-match score that is then used to determine the match category. Party matching is implemented as external rule 3 (com.dwl.tcrm.externalrule.PartyMatch). The rule can be customized by providing a new implementation and configuring this new rule appropriately. The new party matching rule implementation can match in a deterministic or probabilistic way and either can consider fuzzy matching such as phonetic matching, transpositions and so on. For more details about the specification of this rule, see “Configuring external rules for SDP” on page 582.

Customizing adjustments to Party Matching

You can adjust how a party is assigned a match category, based on external rules.

Once a match category has been obtained from Party Matching, there is an opportunity to further adjust the match category either up or down based on additional business rules. These business rules are implemented in external rule 10 (`com.dwl.tcrm.externalrule.PartyMatchCategoryExtRule`).

To customize how and when match categories are adjusted:

1. Add any new reasons for adjusting match categories into the CDACTIONADJREASTP code table.
2. Modify the `PartyMatchCategoryExtRule` with your own business logic implementation, or provide a completely new implementation of the rule.
3. In the external rule, set the adjusted match category code and the related suspect type from the CDSUSPECTTP code table. For example:

```
suspect.setAdjustedMatchCategoryCode("A2");
suspect.setMatchCategoryAdjustmentType("1");
supect.setMatchCategoryAdjustmentValue("Down – Deceased Dates mismatch")
```

The default implementation of this rule also governs which suspects are returned to the calling method. As such it must be noted that the `retrieveReturnAllSuspectsIndicator` business object is used by the AddParty core implementation. The core product sets this indicator to "N" to allow for the filtering of suspects to happen in the external rule for this transaction as necessary. This indicator may be used with custom filtering logic if desired.

Customizing the action to take when suspect duplicates are found

This section discusses when to create suspect duplicate entries and notifications and whether to turn a request to create a new party.

There are two types of actions that are described in this section. The first action determines when to create suspect entries and notifications. The second action determines whether or not to turn a request to create a new party into an update of an existing party in the system.

Creating suspect duplicates and notifications

When suspect duplicate parties of an existing party are discovered, it must be decided whether or not to create a suspect duplicate entry and whether to notify on them. This is done at the match category, or suspect type, level so there can be different decisions made based on the category of match. For example, the decision could be made to create suspect entries and notify on A1 and A2 matches but not B matches. This logic is implemented in external rules and there is one external rule per match category. These suspect action rules are executed when suspects are identified for parties that are being added to the system. This same set of action rules is not executed on suspect re-identification. These rules are executed in a dynamic fashion based on the definition of the match category in the CDSUSPECTTP code table. More specifically, the rule ID for each match category points to the external rule for that match category.

To create a new implementation of one of these rules:

1. 1. Create rules where the input and output of the rule complies with the specification, so, ensure that the input - a vector with the source party object in

element 0 and a vector of suspect objects (`TCRMSuspectBObj`) in element 1, and Output – null. The core product does not look for output from these rules for any sort of processing.

2. Ensure that the implementation only deals with the creation of suspect entries, notifications or both. Parties should not be added to the database from this rule.
3. If you do not want the suspect objects (`TCRMSuspectBObj`) returned in the XML response of the transaction, remove the vector of `TCRMSuspectBObj` objects from the source party object.

Turning an addParty into an update

When InfoSphere MDM Server is requested to add a new party, that add transaction can be turned into an update, if suspect duplicate parties are found that match defined conditions. This logic is implemented in two external rules:

- Rule 35 – SuspectAddPartyRule makes the decision whether to add a new party or to update an existing party
- Rule 6 – `PartyUpdateExtRule` updates elements of the existing party with elements from the source party that was originally sent to InfoSphere MDM Server to be added. This rule is invoked from the updatePartyDetails services (see IParty interface for details).

The SuspectAddPartyRule makes a decision to add or update an existing party based on the following scheme:

- **Only one A1 suspect**
  - If the A1 suspect has pending critical data change, then the A1 suspect is not considered and a new party is added (AddPartyStatus 11).
  - If the PersistDuplicateParties configuration is off, then it is selected for update and a new party is not added (AddPartyStatus 3)
  - If the PersistDuplicateParties configuration is on and the source party is in a different line of business (lobrel) than the suspect party, then a new party is added (AddPartyStatus 10)
  - If the PersistDuplicateParties configuration is on and the source party is in the same line of business (RelatedLOBType) as the suspect party, then it is selected for update and a new party is not added (AddPartyStatus 3)
- **Two or more A1 suspects**
  - Any A1 suspects that have pending critical data change are not considered. If all the A1 suspects have pending critical data change, then a new party is added (AddPartyStatus 11)
  - If the PersistDuplicateParties configuration is off, then the best matched A1 (highest match and lowest non-match scores) is selected for update and a new party is not added (AddPartyStatus 8).
  - If the PersistDuplicateParties configuration is on and the source party is in a different line of business (RelatedLOBType) than all the A1 suspects parties, then a new party is added (AddPartyStatus 10). To change the filtering out of the best A1 suspect in this case, modifications may be made to the BestFilteredSuspectsRule. The default implementation of this rule does the following:
    - Parties having an LOB Relationships types the same as the source party are ranked for the best matching suspect to be returned
    - If there are no LOB Relationship types that are the same for any of the suspects, null is returned

  - If the PersistDuplicateParties configuration is on, then the best matched A1 (highest match and lowest non-match scores) with the same RelatedLOBType is selected for update and a new party is not added (AddPartyStatus 8).
  - If there are no A1 suspect parties in the same line of business (RelatedLOBType) then a new party is added (AddPartyStatus 10).
- **No A1 suspects but one or more A2 suspects**
  - If the `/IBM/Party/SuspectProcessing/AddParty/returnSuspect` configuration option is set on and the MandatorySearchDone indicator on the party business object is not "Y" then no new party is added and the AddPartyStatus is set to 7 to halt the transaction and return the A2 suspects back to the user. See the MandatorySearchDone control attribute in the Terms section for more details.
  - If an existing party was provided in the request (the party ID refers to an existing party in the database) then a new party is added with a suspect entry to that existing party (AddPartyStatus 6). The scenario where this happens is when a list of A2 suspects are returned to the user (see MandatorySearchDone control attribute in the Terms section) and the user selected an existing A2.
  - If the above two conditions don't apply, then a new party is added (AddPartyStatus 6). Also, the MandatorySearchDone flag is set to Y if the `/IBM/Party/SuspectProcessing/AddParty/returnSuspect` configuration option is set on.
- **No A1 suspects or A2 suspects but one or more B suspects**
  - The party is added (AddPartyStatus 2)
- **No suspect found or only C suspects found**
  - The party is added (AddPartyStatus 1)

Note: The values for the AddPartyStatus attribute are not stored in a lookup, or code table in the product repository.

The default implementation of the PartyUpdateExtRule provides rules for the case where a party already exists in the system. The child objects are evaluated to determine whether each should be added or updated for the existing party. The rule checks the business keys defined for each child business object and where there is a match, the incoming, or new object is set for update. For more information on how business keys are defined for business objects, see the chapter Chapter 35, "Validating data," on page 475. This is done generally by setting the fields mandatory for update on each incoming object. Each object has a method that handles this merging. When overriding or creating new merge methods in this rule, ensure that at a minimum, the appropriate primary key, last update date, and last update transaction id are provided on the source party when setting the object for updating. Please note that some business objects require additional mandatory fields to be supplied. Refer to the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for more information on the mandatory fields required for conducting updates on each business object.

Configuring SDP notifications

You can customize the notifications that Suspect Duplicate Processing sends out.

For information about configuring notifications, see Chapter 40, "Implementing and configuring the Notification Framework," on page 531.

"Suspect duplicate notification types by transaction" on page 567

Suspect duplicate notification types by transaction

The following list summarizes the suspect duplicate notification types generated at particular points in the processing of particular transactions. It also shows the Before and After (B/A) suspect status of the party through the following codes:

- **1** - Under Investigation - Party and suspect are duplicates
- **2** - Under Investigation - Critical data change for the party is pending
- **3** - Investigated - Parties are not duplicates
- **4** - Investigated - Parties are duplicates
- **5** - Investigated - Critical data change resolved

See also:

"Notification types generated"

Notification types generated:

Transaction	Circumstance	State		Notification Type
		B	A	
Add Party	A1 party selected	-	-	A1 Party Selected
	B level suspect duplicates marked	-	1	Suspect Identification
	A2 pending critical data change suspect duplicate marked	-	42	Suspect Identification
Update Person Update Organization Update Party Address Update Party Contact Method Update Party Identification Update Party Relationship Update Person Name Update Organization Name Add Party Address Add Party Contact Method Add Party Identification Add Party Relationship Add Person Name Add Organization Name	New suspects found due to critical data change/add	-	1	Auto Suspect Re-identification
	Existing suspect duplicates removed because match/non-match scores too weak. For example, was B suspect prior to critical data change/add and is now a C suspect.	1	-	Auto Suspect Re-identification
	Existing suspect duplicates updated due to match/non-match scores changing	1	1	Auto Suspect Re-identification
	B category match upgraded to	-	1	Auto Suspect Re-identification
	Suspect party found that is eligible for collapse; see the Collapse Parties transaction			
Mark Suspect Duplicates	Mark two parties as suspect duplicates	-	1	Suspect Identification
Update Suspect Entry (UnMark Suspect Duplicates)	Mark two parties that were suspect as not duplicate	1	3	Manual Suspect Entry Adjustment
	Delete a suspect duplicate entry created in error	1	-	Manual Suspect Entry Adjustment
	Mark two parties that were pending critical data change as not duplicate	4	3	Manual Suspect Entry Adjustment

Transaction	Circumstance	State		Notification Type
		B	A	
Collapse Parties	Update suspect duplicate entry between the source and target party where the suspect duplicate entry is "1—Under Investigation - Party and suspect are duplicates" to "4—Investigated - Parties are duplicates"	1	2	Auto Suspect Re-identification
	Update suspect duplicate entry between the source and target party where the suspect duplicate entry is "2—Under Investigation - Critical data change for the party is pending" to "5—Investigated - Critical data change resolved"	4	5	
	Delete all other suspect duplicate entries for the inactivated source parties where the status is "1—Under Investigation - Party and suspect are duplicates"	1	-	
	Create new suspect duplicates for the newly created target party	-	1	
	Copy suspect duplicate entries from the source party to the target party where the status is "3—Investigated - Parties are not duplicates"	-	3	
	Copy suspect duplicate entries from the source party to the target party where the status is "2—Under Investigation - Critical data change for the party is pending"	-	4	
Split Party	Delete all suspect duplicate entries or the inactivate source parties where the status is "1—Under Investigation - Party and suspect are duplicates".	1	-	
	Create new suspect duplicate entry between the two inactivated source parties in status of "3—Investigated - Parties are not duplicates"	-	3	
	Create new suspect duplicates for the newly created target party	-	1	Auto Suspect Re-identification

Configuring real-time and offline SDP using InfoSphere MDM Server Evergreening

You can configure SDP to run in real-time, to run offline or to use a combination of both.

There are three options for running SDP:

- It can be run in real-time, and check for suspected duplicates if critical data is changed or added when adding parties and updating parties.
- It can be run offline, which is known as *Evergreening*. The Evergreen application uses Event Manager, and SDP must be configured off to use this option, because is only the online transactions that check this configuration to determine whether or not it should be run.
- It can be run in a combination of real-time and offline. Simpler searching and matching that requires less time and CPU use can be performed in real-time, while more complex searching and matching can be performed offline, using Evergreening. The externalized rules that implement searching, matching, and so on are shared across the real-time and offline environments and need to observe

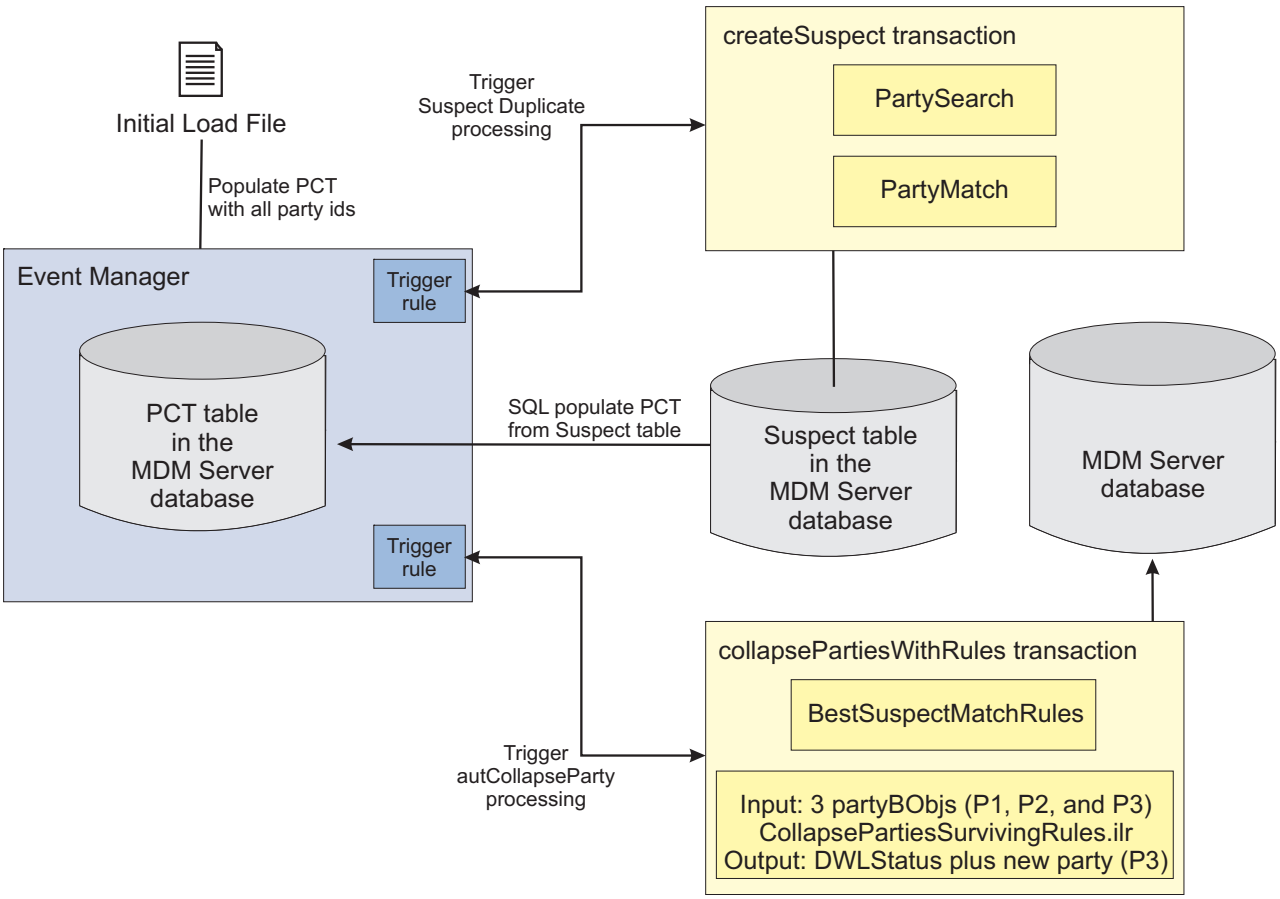
which mode SDP is running in. For example, particular `DWLControl` attributes can be used for this, such as the client system name.

See also:

"Managing the Evergreen application"

Managing the Evergreen application

The Evergreen application uses Event Manager as a triggering engine that executes an Evergreening action—either Suspect Duplicate Processing, using the CreateSuspect transaction, or Collapsing suspects, using the CollapsePartiesWithRules transaction—for the parties identified in the Event Manager's PROCESSCONTROL table and action identified in the Event Manager's PROCESSACTION table. Event Manager monitors the PROCESSACTION table and triggers the Evergreening process for all of the parties scheduled to be processed on that day. Event Manager runs the Evergreening business rule for each party, which calls the IBM InfoSphere Master Data Management Server back-end instance with instructions to start suspect duplicate processing for a particular party. Once the processing is done, Event Manager stores the history record in the EVENT table. Event Manager is started using an operating system command line.



Event Manager comes with two default rules for executing Evergreen transactions:

- com.dwl.commoncomponents.eventmanager.tcrm.EvergreenRule (`createSuspects` is the underlying service)
- com.dwl.commoncomponents.eventmanager.tcrm.EvergreenCollapsePartiesWithRules

Both of these rules correspond to different event categories in Event Manager.

A typical process for using the Evergreen application during an initial load is:

1. Load all party IDs from InfoSphere MDM Server to the PROCESSCONTROL table and add a corresponding record, for each added party_id, in the PROCESSACTION table.

   This record in the PROCESSACTION table describes three things:

   - The event category that has to be associated with this party, in this case create Suspects or ENTITYEVENT_CAT_ID = 6003.
   - The next processing date of this party for this event. Set it to current date for immediate scheduling.
   - The status of the party, in this case = 3 , indicating that they are ready to be processed.
2. Run the runEventDetection.sh —this is explained in the next section—for event category create Suspects.
3. Once the parties have been processed, the SUSPECT table in IBM InfoSphere Master Data Management Server is populated with all suspect matching data.
4. Load the PROCESSACTION table again with new records that link to records in the PROCESSCONTROL table that represent unique source parties from the SUSPECT table that you wish to have processed by the CollapsePartyWithRules transaction. Do not load the PROCESSCONTROL table, as it already has party_ids from previous load. The Event category in PROCESSACTION table for these records would be collapsePartiesWithRules or EVENTENTITY_CAT_ID = 6004 and schedule them to be processed immediately.
5. Run the runEventDetection.sh for event category collapsePartiesWithRules.
6. Once all the parties have been processed, duplicate parties that conform to the best suspect match conditions are collapsed into a new party.

Currently, the Evergreen application does not allow for automated population and execution of the Evergreen rules through Event Manager. Parties must be manually loaded into PROCESSCONTROL table and PROCESSACTION table.

See also:

"Evergreen transactions"
"Evergreen data information"
"CreateSuspects sequence diagram" on page 571
"CollapsePartyWithRules sequence diagram" on page 571
"Installing the Evergreen application with Event Manager" on page 572
"Configuring the Evergreen application on Event Manager" on page 572
"Running the Evergreen application" on page 573
"Configuring the Evergreen application" on page 574
"Extending the Evergreen application" on page 574
"Administering the Evergreen application" on page 574

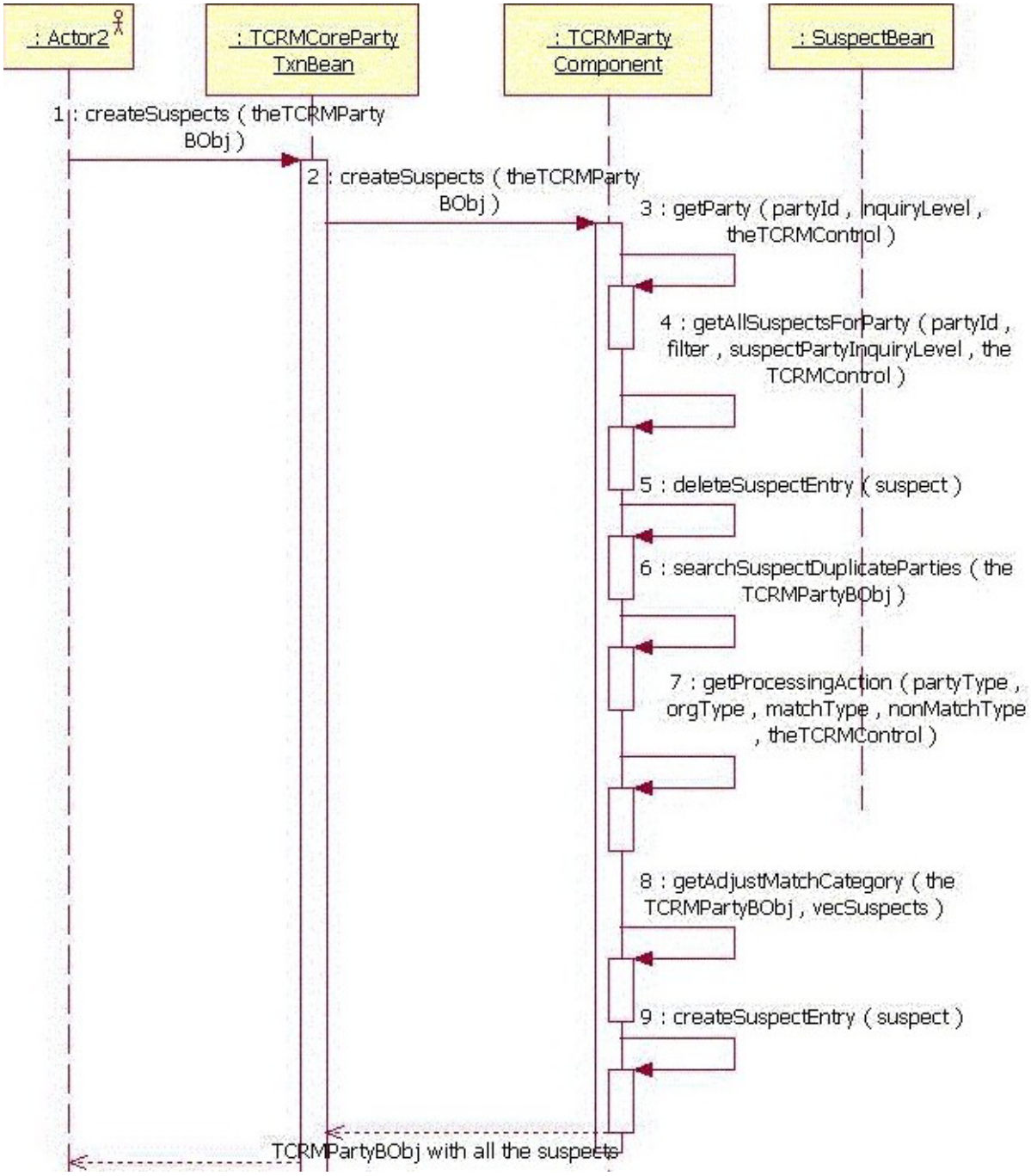
Evergreen transactions: The Evergreen application uses the following IBM InfoSphere Master Data Management Server transactions:

- CreateSuspects
- CollapsePartyWithRules

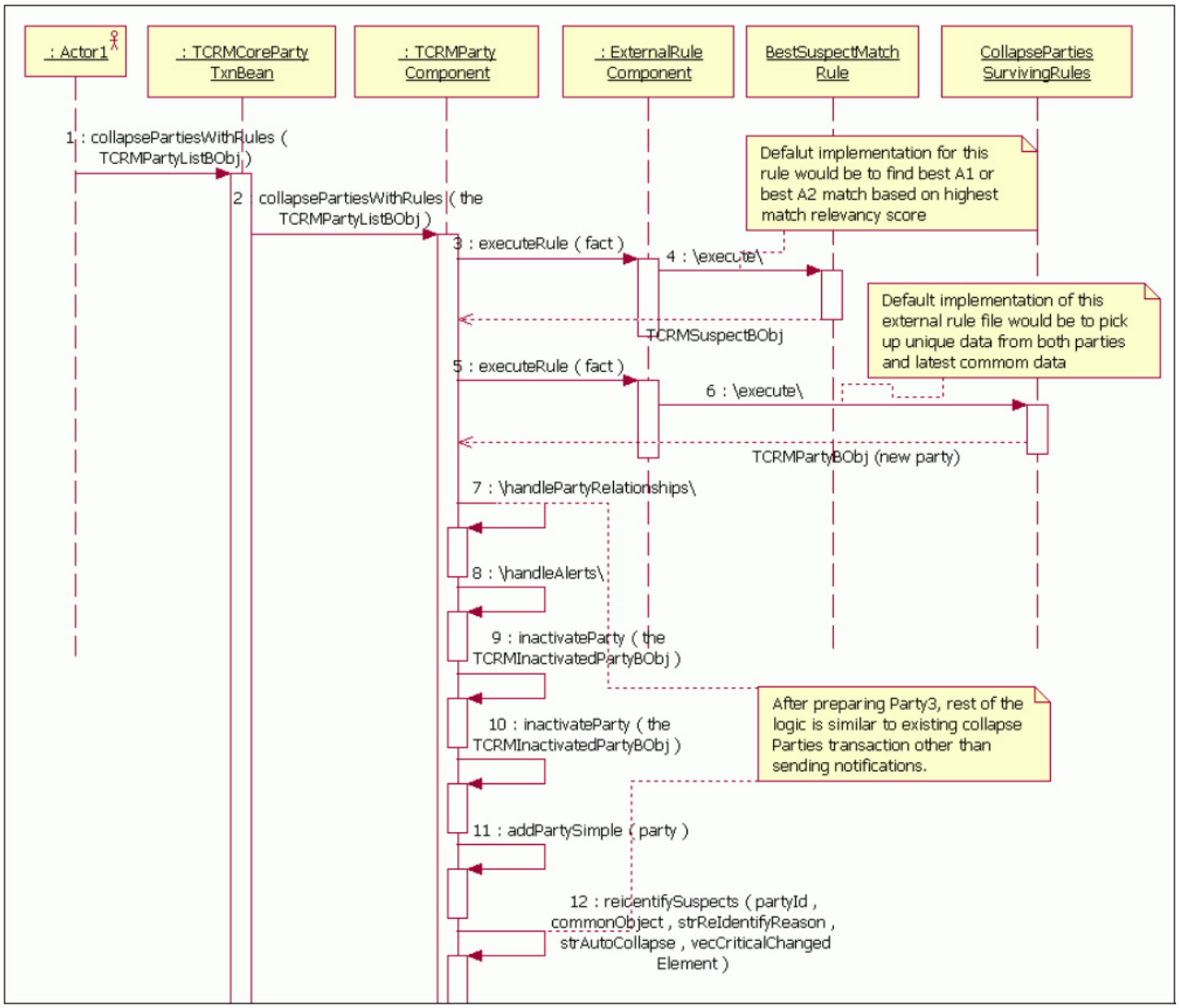
Evergreen data information: See the following sequence diagrams:

- "CreateSuspects sequence diagram"
- "CollapsePartyWithRules sequence diagram"

CreateSuspects sequence diagram:



CollapsePartyWithRules sequence diagram:



Installing the Evergreen application with Event Manager: Event Manager must have the Evergreen application installed on it in order to be able to call Suspect Duplicate Processing in the IBM InfoSphere Master Data Management Server instance.

Configuring the Evergreen application on Event Manager:

Prerequisite: In order to run the Evergreen application, you must have an Event Manager server installed.

The Evergreen application components consist of business rule and business adapter classes. The Event Manager enterprise application contains the Evergreen components packaged inside, and Evergreen data is included in the database by default.

To configure the Evergreen application:

Modify the settings in the `EventManager.properties` file that are used to control throughput of Event Manager process.

Running the Evergreen application:

In order to test the Evergreen application you need to insert at least one party record to the PROCESSCONTROL table and corresponding party—eventCategory record to the PROCESSACTION table in the Event Manager database—only the primary key for the party needs to be present in the table. Shown below is a sample of the content from PROCESSCONTROL table and PROCESSACTION table:

PROCESSCONTROL

PROCESSCON_ID	PROCESSCON_INST_PK	PRODENTITY_ID	NEXT_PROCESS_...	LAST_UPDAT...	LAST_UPDA
112	test_id_pk_001	9		Sep 30, 2004 1...	tester
1	111111	10		Nov 29, 2004 3...	
2	222222	10		Nov 29, 2004 3...	
3	333333	10		Nov 29, 2004 3...	
4	444444	10		Nov 29, 2004 3...	
5	555555	10		Nov 29, 2004 3...	
6	666666	10		Nov 29, 2004 3...	
7	777777	10		Nov 29, 2004 3...	
8	888888	10		Nov 29, 2004 3...	

PROCESSACTION

PROCESSACTION_ID	PROCESSCON_ID	ENTITYEVENTCAT_ID	NEXT_PROCES...	EVENT_STATUS	LAST_UPDATE_...	LA
70000	112	6000	Sep 30, 2004 12:...	3	Sep 30, 2004 12:...	tes
700001	1	6003	Nov 29, 2004 4:3...	3	Nov 29, 2004 4:3...	
700002	2	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	
700003	3	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	
700004	4	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	
700005	5	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	
700006	6	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	
700007	7	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	
700008	8	6003	Nov 29, 2004 4:4...	3	Nov 29, 2004 4:4...	

To run the Evergreen application:

1. Insert a record into `PROCESSCONTROL` table by executing the following SQL statement:

   ```
   INSERT INTO PROCESSCONTROL (PROCESSCON_ID, PROCESSCON_INST_PK,
   PRODENTITY_ID, LAST_UPDATE_DT) VALUES (1, '111111', 9, current
   timestamp)
   ```

   Where:

   - `PROCESSCON_ID` is the unique ID of the record in the table
   - `PROCESSCON_INST_PK` is the same party ID as in the InfoSphere MDM Server back-end
   - `PRODENTITY_ID` is the foreign key from product entity table that represents a business entity. In this case it is equal to 10, which represents `CONTACT` entity in `DWLCustomer`.
   - `NEXT_PROCESS_DT` is the earliest date when this party is ready to be serviced again for at least one of the event category

2. Insert a record into `PROCESSACTION` table by executing the following SQL statement

   ```
   INSERT INTO.PROCESSACTION (PROCESSACTION_ID, PROCESSCON_ID, ENTITYEVENTCAT_ID,
       EVENT_STATUS, NEXT_PROCESS_DT, LAST_UPDATE_DT) VALUES (700001, 111111, 6003,
       3, current timestamp , current timestamp)
   ```

   Where:

   - `PROCESSACTION_ID` is the unique ID of the record in the table
   - `PROCESSCON_ID` is the foreign key from `PROCESSCONTROL` table

- ENTITYEVENT_CAT_ID is the foreign key from the CDENTITYEVENTCAT table representing the event category (action) for which the party would be serviced
- EVENT_STATUS represents the status of the process
- NEXT_PROCESS_DT is the day and time you want the record to execute

Note: To repeat the test, set NEXT_PROCESS_DT of the party record to today's date and EVENT_STATUS to 3:

```
UPDATE PROCESSACTION SET NEXT_PROCESS_DT=CURRENT TIMESTAMP, EVENT_STATUS = 3
     WHERE PROCESSACTION_ID= 700001
```

3. Ensure that the Evergreen rules in CDEVENTDEFTP table are enabled.
4. 4 Run the startScheduleController.sh and runScheduleController.sh script, with an argument 3 (for CreateSuspects), or with an argument 4 (for CollapseParties).

Configuring the Evergreen application:

The Evergreen application is configured through the Event Manager: see "Using Event Manager with InfoSphere MDM Server" on page 364 for more information.

Extending the Evergreen application:

The Evergreen application can be extended by one of the following ways:

- Customize the external rules that call IBM InfoSphere Master Data Management Server. These rules reside in the CustomerEMExternalRules.jar.
- Customize the external rules called from IBM InfoSphere Master Data Management Server transactions to customize the transaction behavior. For instance, CollapsePartiesWithRules can be customized to implement party data survival rules.

Administering the Evergreen application:

The Evergreen application is administered through Event Manager: see Chapter 31, "Customizing Event Manager," on page 359 for more information.

Configuring Acxiom AbiliTec integration with SDP

Acxiom AbiliTec can be used as part of SDP, to adjust match results.

For details on how the Acxiom AbiliTec Key can be used in SDP for adjusting matching results up or down, see Chapter 55, "Integrating AbiliTec with InfoSphere MDM Server," on page 675.

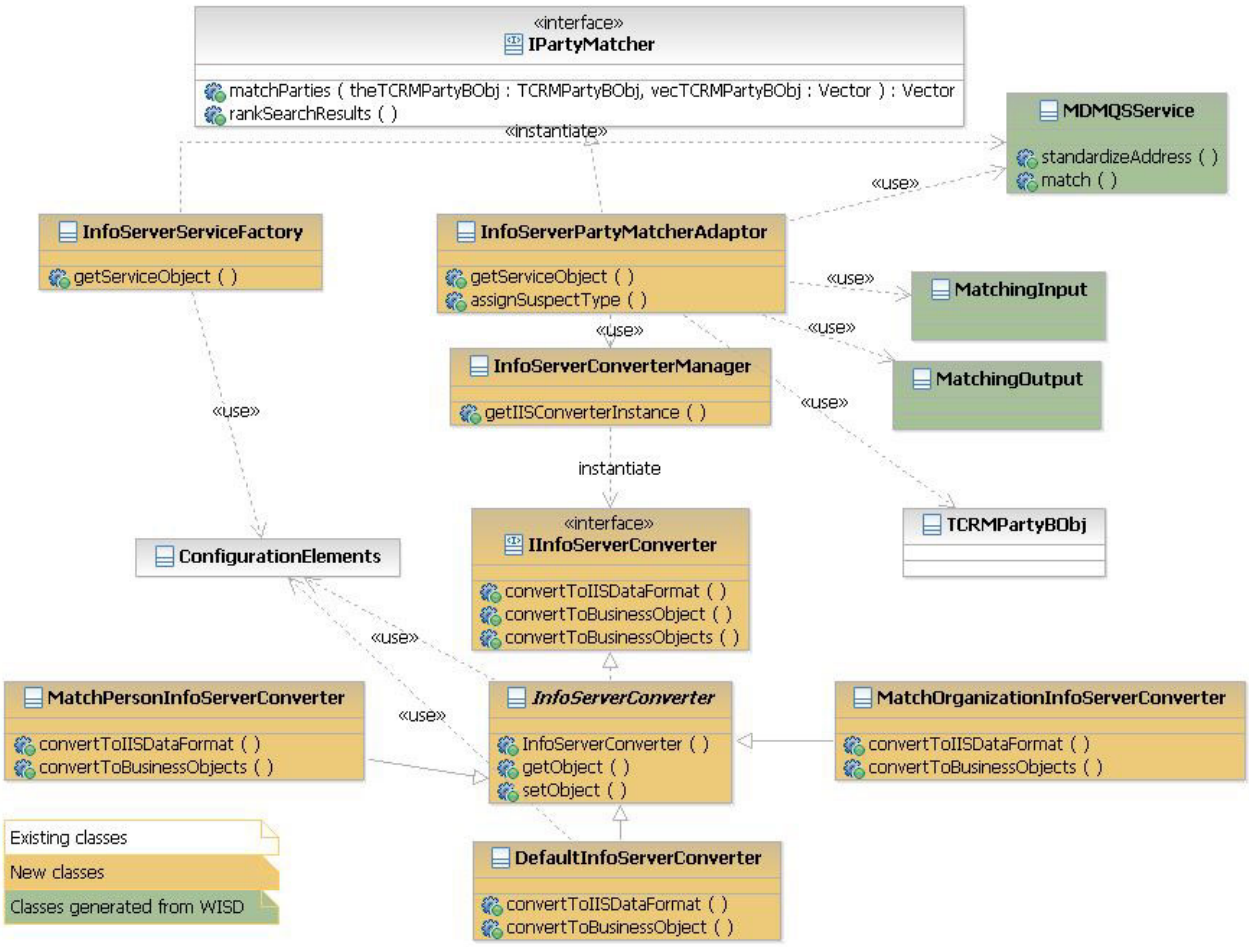
Configuring IBM Information Server QualityStage integration for SDP

You can use IBM Information Server QualityStage (QS) as part of SDP to adjust match scores.

With InfoSphere MDM Server, conventional party matching uses a deterministic approach that produces match and non-match relevancy scores. In contrast, QualityStage matching offers a probabilistic matching approach and calculates only one composite weight. This is a result of a probabilistic calculation of the agreement/disagreement weights for the individual compared fields.

To plug in a new QualityStage matching adapter into InfoSphere MDM Server, the suspect augmentation feature is used so that suspect records can be built with the contribution of multiple matching engines. A QS entry exists in the CDMATCHENGINETP code table.

The following class diagram shows how the SDP interfaces are implemented to realize the QualityStage integration for party matching:



com.ibm.mdm.thirdparty.integration.iis8.adapter.InfoServerPartyMatcherAdapter is the InfoSphere MDM Server default implementation for QS party matching. As is with QS name and address standardization, the com.ibm.mdm.thirdparty.integration.iis8.converter.InfoServerConverterManager class is required to get a function name to uniquely identify the matching function. These function names are the prefix for the InfoSphere MDM Server configuration elements associated with each matching function and can be one the following:

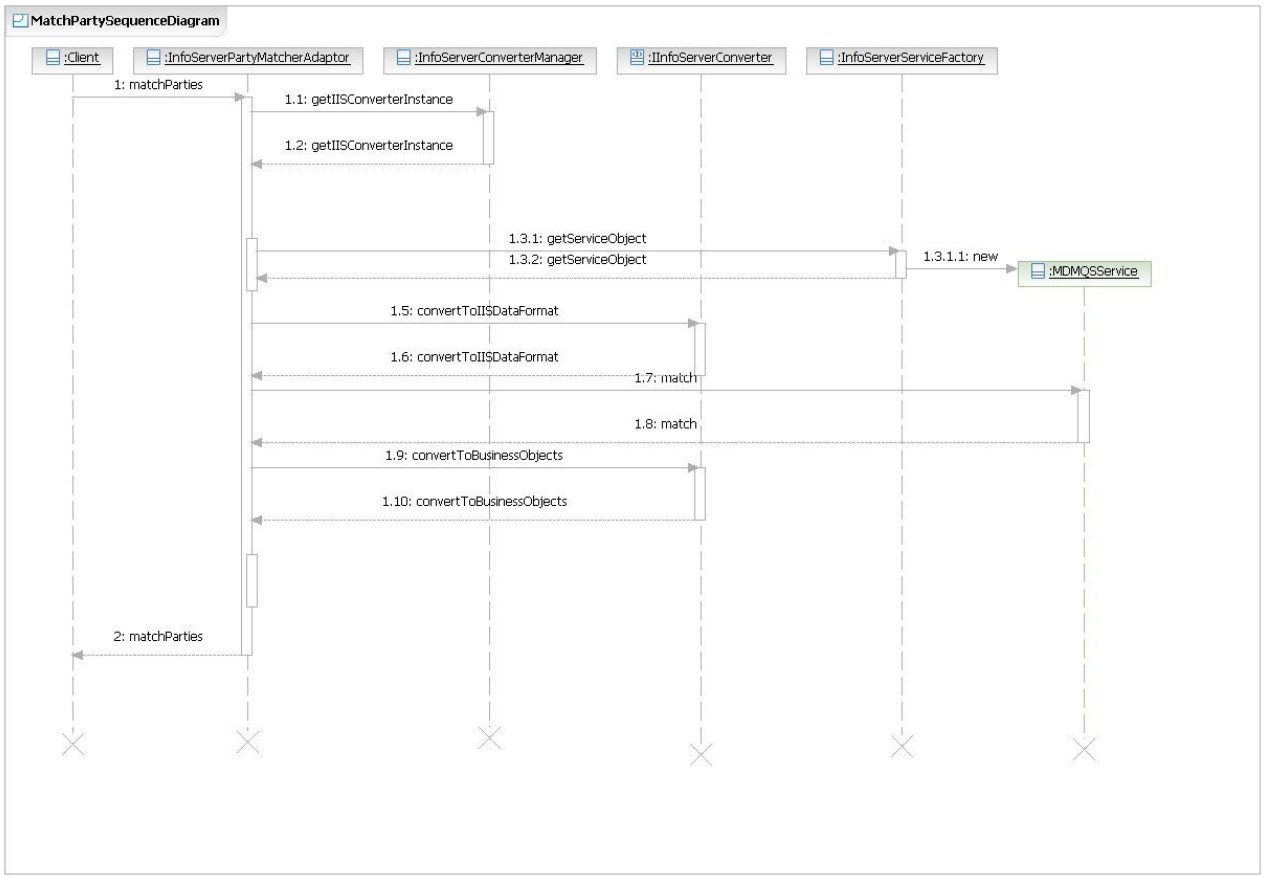
- For person matching `/IBM/ThirdPartyAdapters/IIS/MatchPerson`
- For organization matching `/IBM/ThirdPartyAdapters/IIS/MatchOrganization`

com.ibm.mdm.thirdparty.integration.iis8.converter.MatchPersonInfoServerConverter and com.ibm.mdm.thirdparty.integration.iis8.converter.MatchOrganizationInfoServerConverter are two converter implementations for person matching and organization

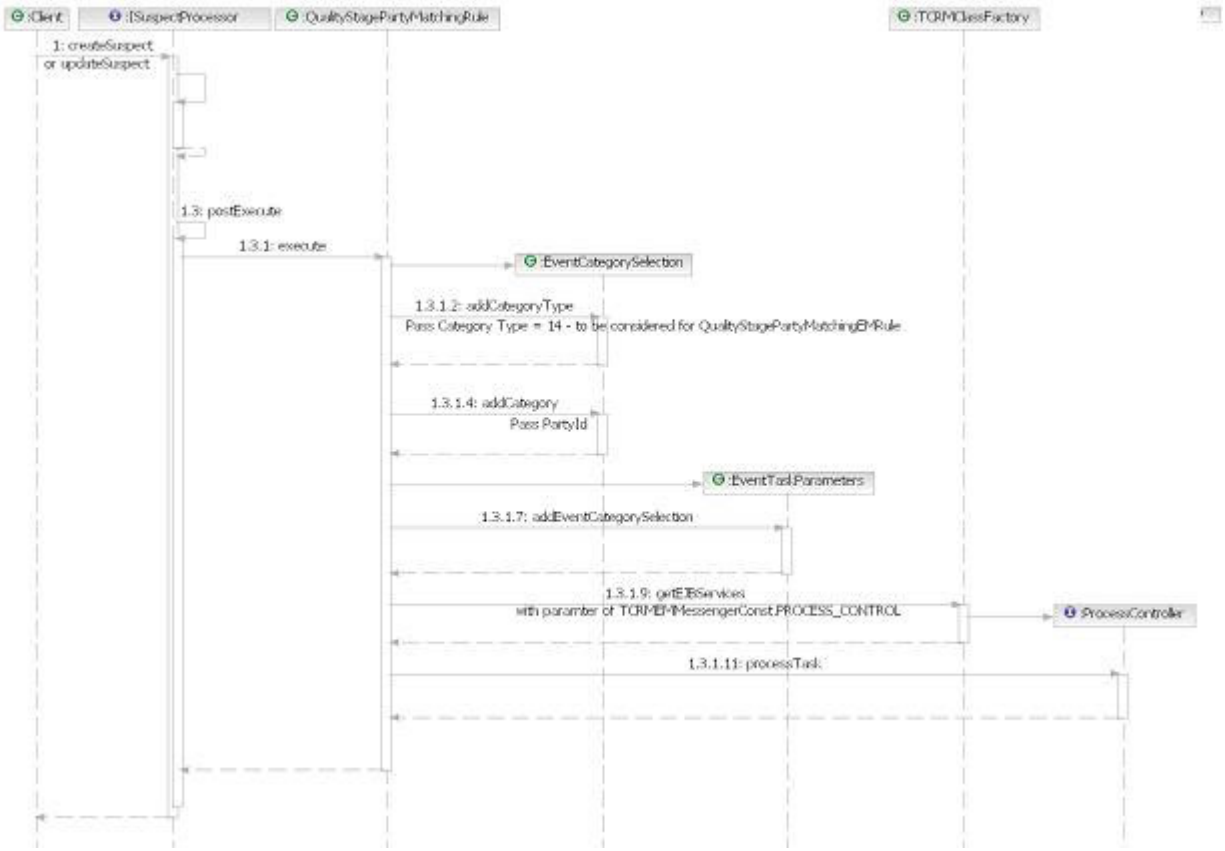
matching. The purpose of these two classes are to convert some content from the party object hierarchy to a flat text format, used by the matching jobs of QS, and vice versa.

The InfoSphere MDM Server QS party matching can operate in two different modes: real-time, or near-real-time.

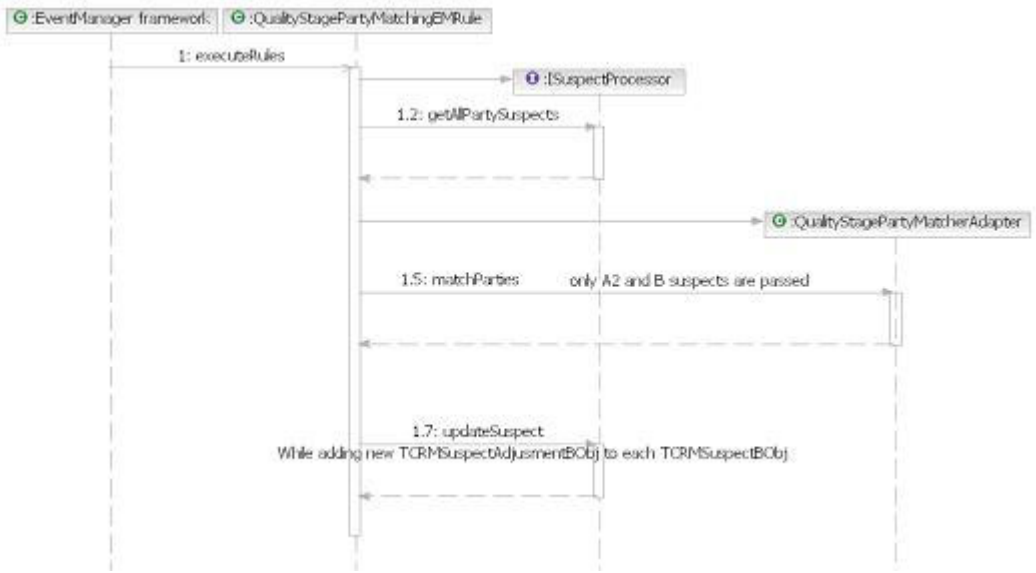
QS real-time mode of operation—This mode is functional when the QS matching engine is selected as the default party matcher. The following diagram shows the sequence of the actions for PersonMatcher in the real-time mode:



Near Real-time mode of operation—In near real-time mode of operation, InfoSphere MDM Server deterministic matching engine is selected by default while an asynchronous event is triggered to upgrade/downgrade the suspect records of 'A2' and 'B' categories by using QS probabilistic matching engine. InfoSphere MDM Server uses its Event Manager to perform this operation. The following sequence diagram shows the first phase of near real-time mode of operation:



When this event is received by Event Manager asynchronously, the following sequence of actions takes place:



See also:

"Configuring QualityStage with SDP" on page 578

Configuring QualityStage with SDP

If you choose to use IBM InfoSphere Information Server QualityStage with SDP, you must configure it.

By default, IBM InfoSphere Information Server QualityStage matching is not selected for InfoSphere MDM Server. To set QualityStage to either:

- Realtime mode, set `party_matcher` to com.ibm.mdm.thirdparty.integration.iis8.adapter.InfoServerPartyPartyMatcherAdapter in the `tcrm_extension.properties` file
- Near realtime mode, activate
  - Extension set IDs 121, 122, 146, 147, 148, 149, 150, 151, 152, 153
  - External rule ID 10130
  - Event Manager rule number 20006

These extension sets and rule are implemented in com.dwl.tcrm.em.QualityStagePartyMatchingRule Java class.

The following tables show the default configuration items for each type of matching.

Table 48. Person matching default configuration

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/ operationName	match
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/Service/ name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/Service/ basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/Converter/ className	com.ibm.mdm.thirdparty.integration.iis8.converter.MatchPersonInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/ DesiredTypes/addressUsage This config item can hold a comma separated code type of `CdAddrUsageTp` or '*' for all types	*
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/ DesiredTypes/nameUsage This config item can hold a comma separated code type of `CdNameUsageTp` or '*' for all types	*
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/ DesiredTypes/identification This config item can hold a comma separated code type of `CdIdTp` or '*' for all types	1
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/Input/ dataType	MatchInput
/IBM/ThirdPartyAdapters/IIS/ MatchPerson/Output/ dataType	MatchOutput

Table 49. Organization matching default configuration

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ operationName	match

Table 49. Organization matching default configuration (continued)

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ Service/name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ Service/basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ Converter/className	com.ibm.mdm.thirdparty.integration.iis8.converter.MatchOrganizationInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ DesiredTypes/addressUsage This config item can hold a comma separated code type of `CdAddrUsageTp` or '*' for all types	*
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ DesiredTypes/nameUsage This config item can hold a comma separated code type of `CdNameUsageTp` or '*' for all types	*
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ DesiredTypes/identification This config item can hold a comma separated code type of `CdIdTp` or '*' for all types	2
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ Input/dataType	MatchInput
/IBM/ThirdPartyAdapters/IIS/ MatchOrganization/ Output/dataType	MatchOutput

Using QualityStage, cached jobs also can be configured for InfoSphere MDM Server. For more information, see Chapter 54, "Integrating IBM InfoSphere Information Server QualityStage with InfoSphere MDM Server," on page 665

The method `assignSuspectType` in `InfoServerPartyMatcherAdapter` is a callback method to assign a suspect type to each suspect object. The default behavior of this method is to do nothing, that is, it consumes the match categorization returned by QualityStage matching jobs. This method can be overwritten by the clients to enable them to easily customize this default logic.

Clients are able to define which address usage types, name usage types and identification types are to be considered in matching, these are the config items of */DesiredTypes/* . The default configuration is to consider all address usage types, all name usage types and only SSN for persons, or TaxId, for organizations in matching parties.

Clients are also able to change the behavior of `com.dwl.tcrm.em.QualityStagePartyMatchingRule` and `com.dwl.commoncomponents.eventmanager.externalrule.QualityStagePartyMatchingEMRule` rules by extending these classes.

To change the QualityStage matching jobs in order to include or exclude some attributes:

1. Extend `MatchPersonInfoServerConverter`.
2. Extend `InfoServerPartyMatcherAdapter`, or `MatchOrganizationInfoServerConverter` or both.
3. Update the values of configuration items ending with Converter/className.

4. Update the values assigned for `party_matcher` in `tcrm_extension.properties` file.

Wholly replacing the Suspect Duplicate Processing implementation

If the SDP does not meet your needs, you can replace it completely with another method.

The SDP framework in InfoSphere MDM Server is customizable at well-defined points, which include the externalized rules and configuration options. The framework is also provides customizable at a broader level and allows for completely new SDP implementations to be created.

See also:

"Suspect duplicate processing interface model"

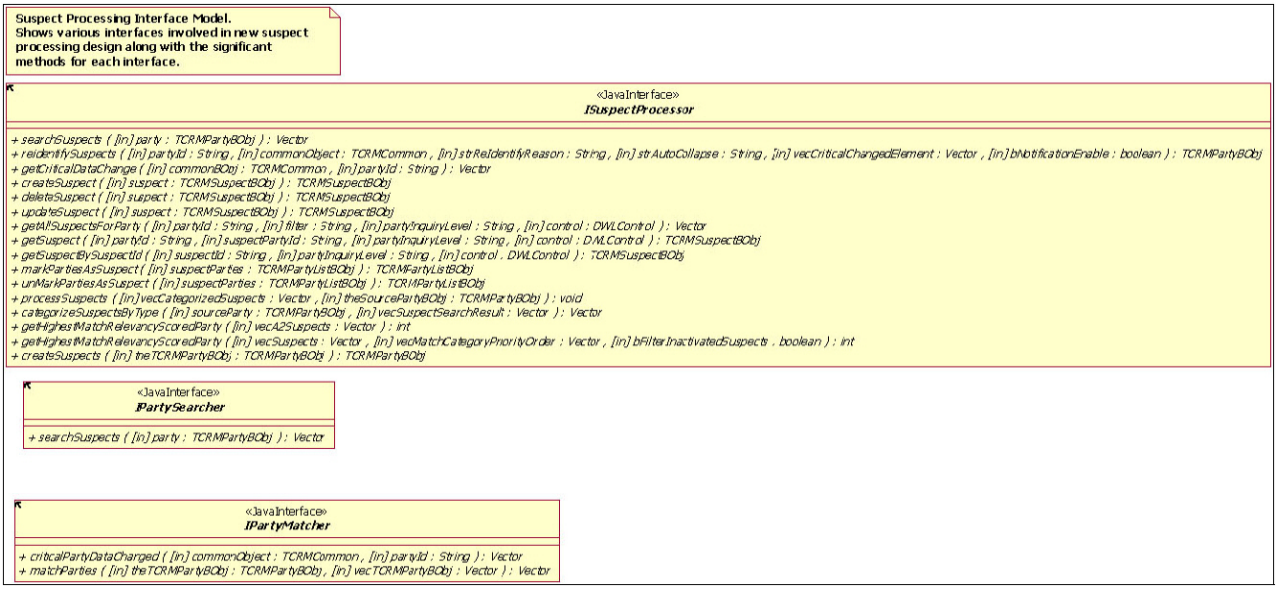
"Add party sequence diagram"

"Searching and matching sequence diagram" on page 581

"Update party sequence diagram" on page 581

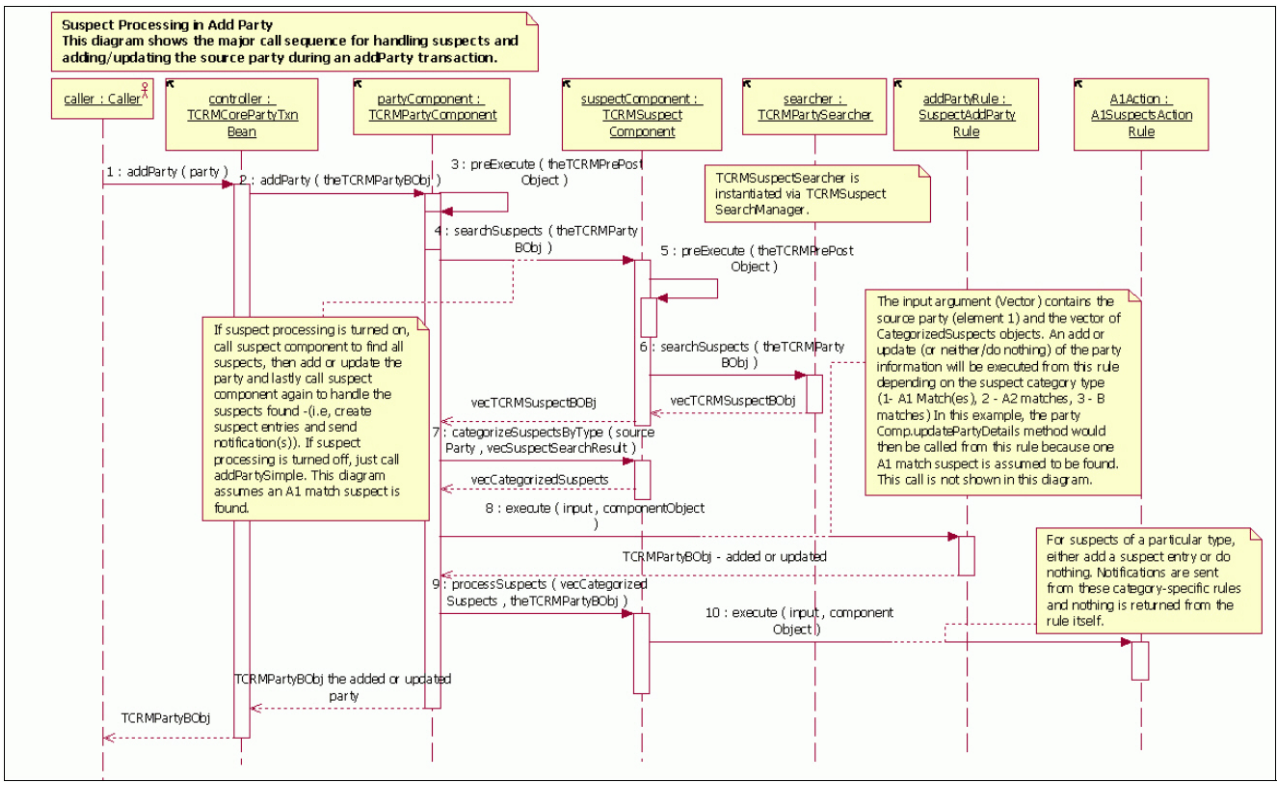
Suspect duplicate processing interface model

This section describes the operational interfaces required to implement the suspect duplicate processing feature.

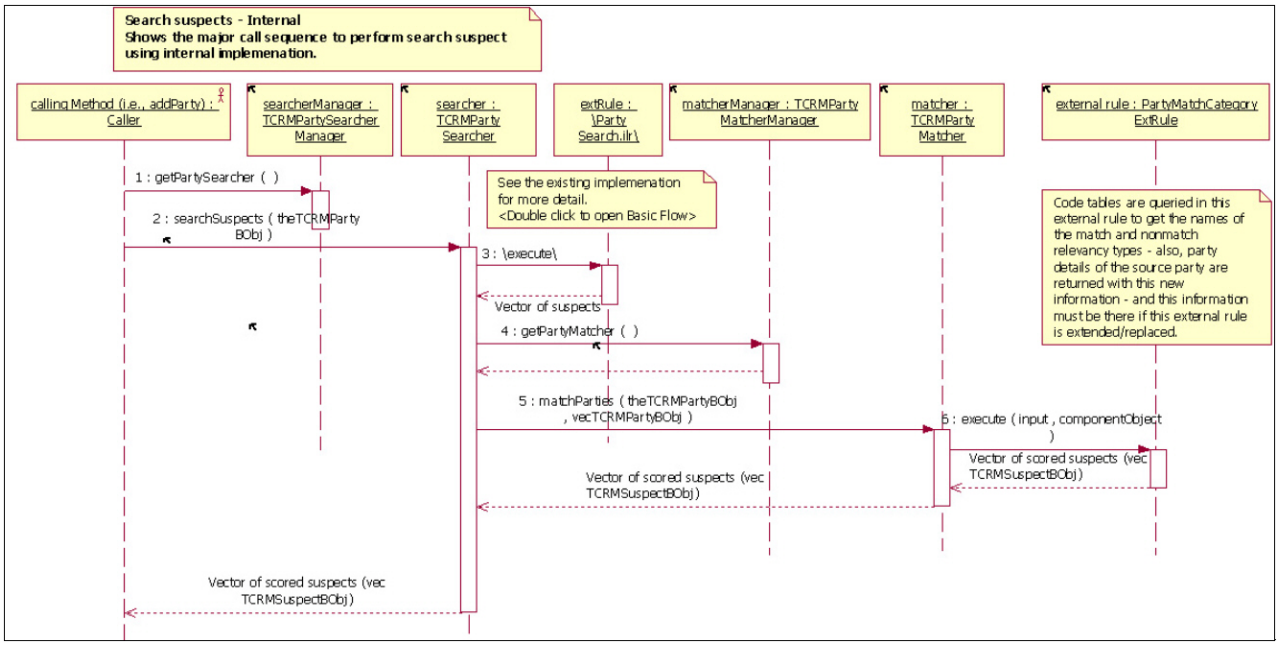


More information on these interfaces is shown in the JavaDoc provided with the product.

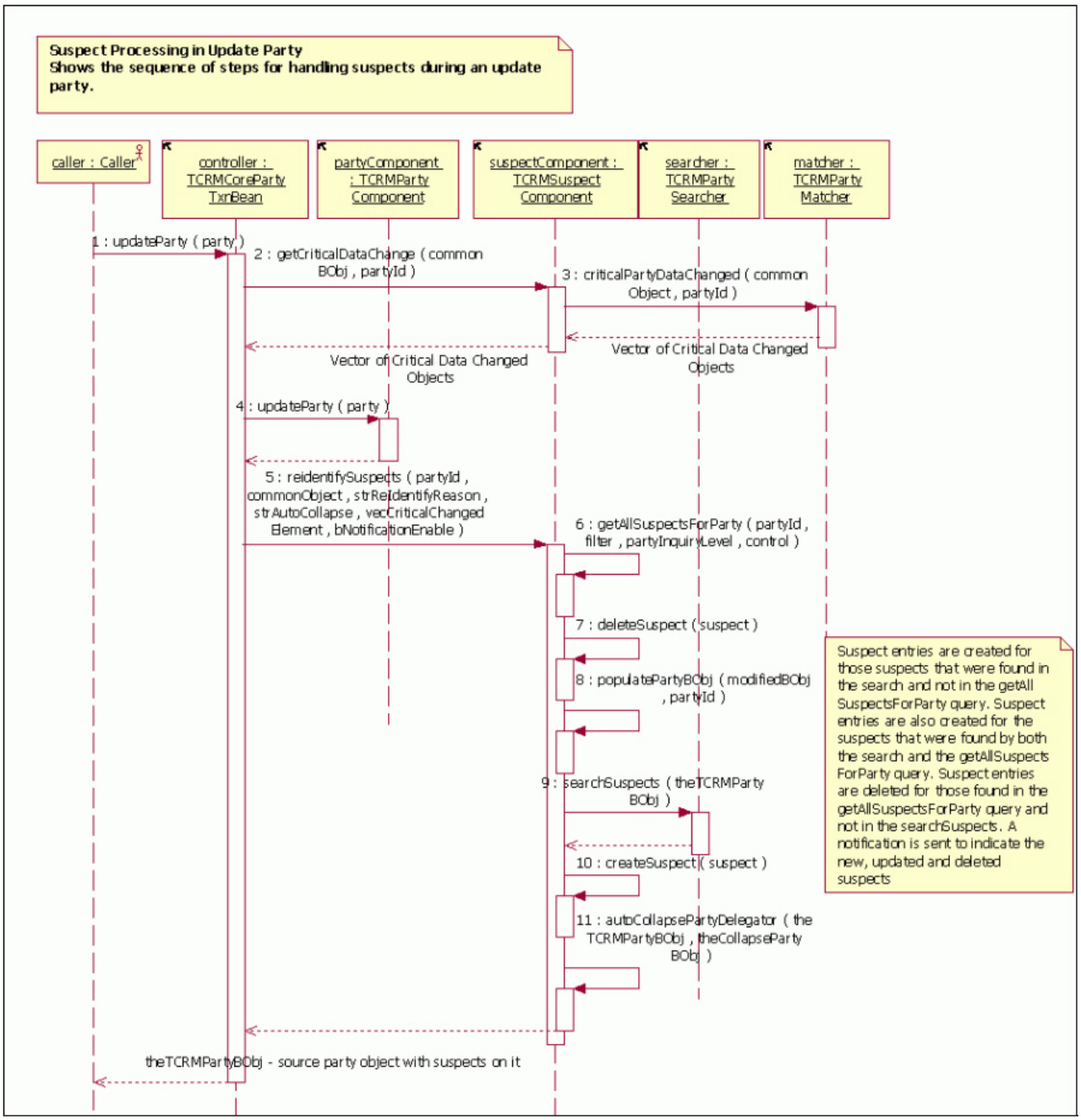
Add party sequence diagram



Searching and matching sequence diagram



Update party sequence diagram



Configuring external rules for SDP

You can configure external rules to work with SDP.

A number of functions have been externalized to permit client customization of the Suspect Duplicate Processing feature. The External Rules Framework is being used to externalize business rules for the suspect duplicate processing framework.

Table 50. Configuring external SDP rules

External Rule Name	Rule Type	Role/Function
PartySuspectSearchRule	Java	Executes search logic and performs logic to determine if the parties match on critical data defined here. • Rule input required—TCRMPartyBObj sourceParty • Rule returns—vector of TCRMPartyBObj, representing the suspect party, and their party ID and control attributes set • Default implementation—returns only active parties. Critical data considered includes identification, address, name: – Search for Persons involves first finding suspects by "tax id" (i.e., SSN/SIN). The value for this is configured in the configuration item: /IBM/Party/PartyMatch/PartyIdentification/personTax and – Search for Persons then involves finding suspects by address. All provided addresses for the person are considered. • Search for Organizations involves first finding suspects by "tax id" /IBM/Party/PartyMatch/PartyIdentification/organizationTax. • Search for Organizations then involves finding suspects by name. All provided names for the organization are provided. Name search is not conducted for Persons. • Search for Organizations then involves finding suspects by address. All provided addresses for the person are considered. • The rule returns only active parties.
PartyMatch	Java	This Java file is comprised of more than one rule. • **Rule 1**—matchPerson compares two person business objects with critical data and return a suspect business object with match relevancy and non-match relevancy scores.

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
		• **Rule 2**—matchOrganization compares two organization business objects with critical data and return a suspect business object with match relevancy and non-match relevancy scores. For Rule 1 and 2, the rule input required-input vector containing two TCRMPersonBObj or TCRMOrganizationBObj business objects (element 0 and element 1). – Rule input required—TCRMPartyComponent – Rule output—TCRMSuspectBObj with match and non-match relevancy scores set – Default implementation: - Elements matched (Person): • Gender • Birth Date • First Name • Last Name • SSN • Address • Weightings assigned for an exact match: – Gender-32 – Birth Date-4 – First Name-1 – Last Name-2 – SSN-16 – Address-8 • Weightings assigned for a non-match: – Gender-32 – Birth Date-8 – First Name-1 – Last Name-2 – SSN-16 – Address-4 • Elements matched (Organization): – Name – Address – TaxId **Note:** A score between two elements are provided only if both elements are present. Otherwise, a score of 0 is assigned. • **Rule 4**—rankPersonSearchResults—given search criteria and a list of search results, this rule scores each search result against the criteria. – Input required—A vector holding a list instance of TCRMPersonSearchBObj; the first element is the search criteria bobj; the rest are the ones that will be compared with the criteria bobj (the first element), the component object parameter is not required. – Returned from this rule is a vector of TCRMPersonSearchResultBObj; the sequence of which will ascending order by score. • **Rule 5**—rankOrganizationSearchResults—given search criteria and a list of search results, this rule scores each search result against the criteria. – Input required—A vector holding a list instance of TCRMOrganizationSearchBObj; the first element is the search criteria bobj; the rest are the ones that will be compared with the criteria bobj (the first element). The component object parameter is not required. – Returned from this rule is a vector of TCRMOrganizationSearchResultBObj; the sequence of which will ascending order by score.

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
		• **Rule 8**—hasCriticalDataChanged—checks if the critical data has been changed for the given party by comparing the decendants of an object of type TCRMCommon with the data that exists for it in the database. – Rule input required—input vector containing a TCRMCommon business object (element 0) and a partyId of the party being updated (element 1). – Rule output—Vector of TCRMCommon business objects that have critical data changed. – Default implementation—The TCRMCommon object is checked to determine which critical data object is being passed in, and then comparisons are drawn to determine if these objects have been changed by the update transaction The product default critical data elements and objects are described in this chapter. There are no exceptions made to these; each is compared for changes on an update.
PartyMatch Category ExtRule	Java	Executes logic to adjust the suspect duplicate type of a particular suspect based on the business logic implemented in this class. This external rule may also be used to filter suspects of particular categories to return only suspects of one or more particular types, and not others. • Rule input required—vector input requires the source party object to be element 0, all elements that follow are the TCRMSuspectBObj objects. • Rule returns—vector of adjusted suspects (TCRMSuspectBObj). • Default implementation-adjusts suspects under the following circumstance: • If the match category is A1 (cdsuspecttp = 1) and sourceParty.deceasedDate != suspectParty.deceasedDate then downgrade the match to an A2 (cdsuspecttp = 2) • If both the parties have maintained AbiliTec links, which match, the match category will be upgraded as follows. – A1 > A1 – A2 > A1 – B > A2 – C > A2 • If both the parties have maintained AbiliTec links, which do not match, the match category will be downgraded as follows. – A1 > A2 – A2 > B – B > C – C > C • If either or both parties do not have a maintained link, no adjustment is applied. Returns suspects of type 1, 2, 3, 4 (See cdsuspecttp table) if retrieveReturnAllSuspectsIndicator is set to anything other than N. This indicator is defaulted to Y on the TCRMPartyBObj and must be explicitly set to N to invoke the filtering described below. Otherwise returns only suspects of the following types in this priority: • 1—if any suspects of this type are found. No other suspects returned • 2 and 3—this assumes no type 1 suspects have been found. If any suspects of type 2 are found and any suspects of type 3 exist as well. If no suspects of type 3 exist, only type 2s are returned. **Note:** No suspects of type 3 are returned if they are the only suspects found. There is no suspect duplicate processing action required for suspects of type 3 in the default implementation.

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
SuspectAddParty Rule	Java	This external rule makes the decision to add, update or do nothing with the source party. • Rule input required—vector input requires the source party object to be element 0, and the Vector of CategorizedSuspects objects to be element 1. • Rule returns—TCRMPartyBObj • Default implementation—considers each CategorizedSuspect object in the following way: CategorizedSuspects of type 1 (A1) **Case 1:** For only 1 suspect found, call IParty.updatePartyDetails(). The party status on the returned party is set to 3 to indicate the type of suspect duplicate processing the party has undergone (3 means one suspect of type 1 was found). updatePartyDetails method calls an external rule—PartyUpdateExtRule: • Rule input required—vector input requires the source party object to be element 0, and target party object to be element 1. The target party is also known as the pre-existing matching party. • Rule returns—TCRMPartyBObj (modified source party object to submit for update) • Default implementation—goes through each object and child object of the TCRMPartyBObj, and does a comparison with what currently exists for that party. If the business keys on each child object match, that child object is set to be updated—that is, the idpk, lastupdatedt, lastupdatetxid, and any other fields mandatory to update the child object are populated. This logic is done in each ″merge″ method of the external rule. **Case 2:** For more than one suspect found of type 1, Get the A1 Matched Suspect that most closely matches the source party (ISuspectProcessor.getHighestMatchRelevancyScoredParty()) and update this one using the same call as above. The party status on the returned party is set to 8 to indicate the type of suspect duplicate processing the party has undergone. CategorizedSuspects of type 2 (A2) **Case 1:** If MandatorySearchDone attribute on the source party object is set to null or is not set to ″Y″ and the database configuration for `/IBM/Party/SuspectProcessing/AddParty/returnSuspect` is set to TRUE the party is NOT added—in fact no adding of the party takes place at all in this case. The party status on the returned party is set to 7 to indicate the type of suspect duplicate processing the party has undergone. **Case 2:** Otherwise, the source party is added using IParty.addPartySimple().The party status on the returned party is set to 6 to indicate the type of suspect duplicate processing the party has undergone. CategorizedSuspects of type 3 (B) - the source party is always added using IParty.addPartySimple().The party status on the returned party is set to 2 to indicate the type of suspect duplicate processing the party has undergone. And the MandatorySearchDone flag is then set to Y if it isn't already. For any other unrecognized CategorizedSuspects objects that may get to this point, the party is added using the IParty.addPartySimple(). The party status on the returned party is set to 1 and the vector of suspects are removed from the source party object. **Note:** This does not happen in the default implementation as the default implementation of PartyMatchCategoryExtRule does not return unrecognized suspects and therefore does not allow for this to happen.

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
A1SuspectsAction Rule	Java	This external rule makes the decision to create a suspect duplicate entry for the suspects found for the source party or not. It also makes decisions around whether or not to send notifications for the suspects found. • Rule input required—vector input requires the source party object to be element 0, requires the Vector of TCRMSuspectBObj objects to be element 1. It is assumed that these TCRMSuspectBObj objects are all of type 1. • Rule Returns—Nothing (null). Only suspect duplicate entries created and notifications sent. • Default Implementation: • **Case1:** There is more than one suspect of type 1 found. Suspect duplicate processing action: for the suspect duplicate that most closely matches the source party, Do not add a suspect duplicate record as this was the party updated in the AddSuspectActionRule (default behaviour). The ObjectReferenceId and DWLControl is set on this suspect from the source party object before the notification is sent. If notification is configured to be on, it sets up and sends the A1PartySelectedNotification for the best matching suspect of type 1. The SuspectStatusType is set to suspected duplicate and the sourceType is set to System Marked. Please refer to the chapter on Notification for developer notes on this feature. It then runs the IPartyMatcher.matchParties using the best matched suspect of type 1 as the source party and all other suspects found as the suspects to find any suspect relationships between these parties. The ObjectReferenceId and DWLControl is set on this suspect from the best matched suspect of type 1. Suspect entries are then added for each remaining suspect by calling ISuspectProcessor.createSuspect() method. If notification is configured to be on, it sets up and sends the SuspectIdentificationNotification for these remaining suspects, setting the source party as the best matching suspect of type 1. Please see Chapter 39, "Implementing the Entity Standardization framework," on page 523 for developer notes on this feature. • **Case 2:** Only one suspect of type 1 found. No suspect entry created. The ObjectReferenceId and DWLControl is set on this suspect from the source party object before the notification is sent. If notification is configured to be on, it sets up and sends the A1PartySelectedNotification for the best matching suspect of type 1. Please see Chapter 39, "Implementing the Entity Standardization framework," on page 523 for developer notes on this feature. **Note:** For both cases, the suspect vector is then removed from the source party object.
A2SuspectsAction Rule	Java	This external rule makes the decision to either create a suspect entry for the suspects found for the source party or not. It also makes decisions around whether or not to send notifications for the suspects found. • Rule input required—vector input requires the source party object to be element 0, requires the Vector of TCRMSuspectBObj objects to be element 1. It is assumed that these TCRMSuspectBObj objects are all of type 2. • Rule returns—nothing (null). Only suspect entries created and notifications sent. • Default implementation: • **Case 1:** if MandatorySearchDone attribute on the source party object is set to null or is not set to "Y" and the database configuration for `/IBM/Party/SuspectProcessing/AddParty/returnSuspect` is set to TRUE, no suspect entries are created and no notifications are sent. • **Case 2:** otherwise, find the best suspect of type 2 in the vector of suspects using ISuspectProcessor.getHighestMatchRelevancyScoredParty(). For the highest matching suspect of type 2, a suspect entries is created. The SuspectIdentificationNotification is set up, classifying the suspect to have a SuspectStatusType of Pending and SourceType as System Marked. **Note:** For Case 1, the vector of suspects is not removed from the source party object. For Case 2, the vector of suspect objects is removed from the source party object.

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
BSuspectsAction Rule	Java	This external rule makes the decision to either create a suspect entry for the suspects found for the source party or not. It also makes decisions around whether or not to send notifications for the suspects found. • Rule input required—vector input requires the source party object to be element 0, requires the Vector of TCRMSuspectBObj objects to be element 1. It is assumed that these TCRMSuspectBObj objects are all of type 3. • Rule returns—nothing. Only suspect entries created and notifications sent. • Default implementation—suspect entries are created for all suspects of type 3, and SuspectIdentificationNotification is set up and sent.
CSuspectsAction Rule	Java	This external rule makes the decision to either create a suspect entry for the suspects found for the source party or not. It also makes decisions around whether or not to send notifications for the suspects found. • Rule input required—vector input requires the source party object to be element 0, requires the Vector of TCRMSuspectBObj objects to be element 1. It is assumed that these TCRMSuspectBObj objects are all of type 4. • Rule returns—nothing. • Default implementation—does nothing. No notifications sent, no suspect entries created. By default, this external rule will never be invoked from addParty transaction. The addParty transaction sets the retrieveReturnAllSuspectsIndicator to N. **Note:** The default implementation of the PartyMatchCategoryExtRule does not return suspects of type 3 when retrieveReturnAllSuspectsIndicator is set to anything other than N.
CurrentSuspectCategory Rule	Java	There are two attributes on the suspect database table that describe what the current matching category (or suspect category) is considering results from all matching engines that contributed to the matching results, which are stored in the SUSPECTAUGMENT table. This rule externalizes the default logic of determining and setting the current match category. This rule is invoked prior to persisting the suspect record. • Rule input required – TCRMSuspectBObj and all child TCRMSuspectAugmentationBObj objects • Rule returns – TCRMSuspectBObj with the currentMatchEngineType and currentSuspectCategoryType attributes set The default implementation is that the current match category is set based on the desired priority of results from supported matching engines.

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
BestSuspectMatch Rule	Java	Given a list of suspects for a party, this rule finds the best-matched suspect. This rule is invoked by CollapsePartiesWithRules when only one source party is provided. • Rule input required – Vector of TCRMSuspectBObj objects • Rule returns – Vector where the first element is the status (DWLStatus) and the second element is the best matched suspect (TCRMSuspectBObj) The default implementation is to choose the best suspect based on a prioritized sequence of match categories (suspect types) and match engines. It uses the following logic: Return best AbiliTEC Adjusted A1 is present. Otherwise return best Quality Stage Adjusted A1 if present. Otherwise return best InfoSphere MDM Server Adjusted A1 if present. Otherwise return best InfoSphere MDM Server A1 if present. Otherwise return best AbiliTEC Adjusted A2 if present. Otherwise return best Quality Stage Adjusted A2 if present. Otherwise return best InfoSphere MDM Server Adjusted A2 if present. Otherwise return best InfoSphere MDM Server A2 if present. This rules calls a chooseBestMatch method on the TCRMSuspectComponent. The implementation of chooseBestMatch is first to look for the elements of suspect duplicate types in order (for example, "A1" and if not found then "A2", and so on) and then it narrows down this subset by looking for the elements of matching engine types in order (for example, AbiliTEC and if not found then Quality Stage, and so on). Finally, if more than one record is left in the final subset, it chooses the best match base on one of the following approaches • The suspect with the highest Weight • The suspect with the highest MatchRelevancyScore and lowest NonMatchRelevancy Score
BestFilteredSuspectsRule	Java	The default implementation of this rule (111) does the following: • Returns the highest ranked suspect for a filtered set of the matched suspects found; if nothing meets the condition for filtering, null will be returned. The default implementation of this method filters suspects to rank in the following way: – Parties having a related LOB types the same as the source party will be ranked for the best matching suspect to be returned. If there are no LOB Relationship types that are the same for any of the suspects, null will be returned. – Rule input required—Vector input requires the source party object (TCRMPartyBObj) to be element 0, requires the Vector of suspect objects (TCRMSuspectBObj) to be element 1. The component object is not a required parameter.
AggregatedParty GenerationRule	Java	The aggregation rule works in conjunction with the persist duplicates functionality. The default implementation of this rule (113) aggregates a set of parties into a single view using the following survivorship rules: • Each participating business object type is compared using its business key elements. • If the business keys for a business object match, the business object having the most recent LastUpdateDate field is survived in the resulting party (aggregate).

Table 50. Configuring external SDP rules (continued)

External Rule Name	Rule Type	Role/Function
AdjustSuspectStatusRule	Java	The createSuspects and reidentifySuspects methods will execute this rule if the PersistDuplicateParties feature is configured to be enabled (/IBM/Party/SuspectProcessing/PersistDuplicateParties/enabled). • The default implementation of this rule will adjust the suspect status type to 6 (Duplicate Parties - Do Not Collapse) under the following conditions: – If the suspect is an A1 Match or an A2 match upgraded to A1, and if the incoming/source party has different LOB relationships defined than those of the suspect (each has different relatedLOBType). – If the incoming/source party has a LOB relationship defined and the suspect does not. – If the incoming/source party does not have a LOB relationship defined and the suspect does. • It will change the suspect status type 6 (Duplicate Parties - Do Not Collapse) to suspect status type 1 (Under Investigation - Parties are Suspect Duplicates) under the following condition: – If an A1 match having suspect status type 6 has been downgraded to an A2 match. • It will do nothing to the status under the following conditions: – If the incoming suspect is not an A1 match (or downgraded A1) or an A2 match that has been upgraded to A1. – If neither the incoming party nor the suspect has an LOB relationship object. • Rule input required—An instance of vector with an instance of TCRMPartyBObj (sourceParty) in element 0, which the suspect is being compared to; and an instance of TCRMSuspectBObj (suspect) in element 1. These objects may or may not be an A1 (guaranteed) match.

InfoSphere MDM Server party matching matrices for suspect duplicate processing

There are two default party matching matrices delivered with IBM InfoSphere Master Data Management Server:

- Party matching for individuals
- Party matching for organizations

The matrices for individual and organization party matching may have different mandatory data elements, but the process of matching and evaluating elements is the same. Each data element has been assigned a weighted value, and this value is shown in the row under the name of the data element.

- **Positive Value** - Data element is present in both the new and existing records, and the data element matches
- **Negative Value** - Data element is present in both the new and existing records, and the data element does not match
- **Zero Value** - Data element is not present in either or both the new and existing records

The quality of the match of the new and existing records is measured by its match relevancy value. On any given combination row of data elements, the match relevancy value is calculated simply by adding up the positive values for the data elements in that combination. Since more than one combination can have the same match relevancy value, we also add up the negative values of the data elements in each combination. The negative values are called the non-match relevancy values. Taken together, the match relevancy value and the non-match relevancy value ensure that the measure of the quality of each combination of data elements is unique.

See also:

"Match relevancy"

"Reading the party matching matrix"

Match relevancy

Once the match relevancy and non-match relevancy values are calculated, the matrix is sorted on those two columns in descending order. This presents the combinations of data in a logical order, and facilitates the decision on what the processing action should be taken on each combination.

Individual		
Critical Data	**Match Relevancy Score**	**Non-Match Relevancy Score**
First Name	1	1
Last Name	2	2
Date of Birth	4	8
Address	8	4
Social Security Number	16	16
Gender	32	32

Organization		
Critical Data	**Match Relevancy Score**	**Non-Match Relevancy Score**
Organization Name	8	8
Address	4	4
Corporate Tax ID	16	16

Reading the party matching matrix

This example section of the matrix shows a match value calculation that finds a match on the two parties' gender, first name, last name, address and social security number—these elements have their full weighted value for a total relevance value of 59. Because the date of birth was included in the party record of the two parties but did not match, that element receives a non-match relevancy score of -8. This calculation produces an A2 match, which means that it is reasonably certain that the two parties are the same. See "Suspect category names and descriptions" on page 558 for more information on match types and processing action.

Gender weighted value=32	**SSN weighted value=16**	**Address weighted value=8**	**DOB weighted value=4**	**Last Name weighted value=2**	**First Name weighted value=1**	**Relevancy Value (match)**	**Non-match Relevancy Value**	**Matching Data**	**Processing Action**
32	16	8	-8	2	1	59	8	Gender, First Name, Last Name, Address, SSN	A2

Configuring Critical Data Change processing

Updates to critical data can be updated and any party suspects identified in real-time, or those changes can be held until a data steward accepts or rejects the change.

InfoSphere MDM Server provides various transactions to update party information in real-time, such as updateParty, updatePersonName, and others. When the transactions involve updating the party's critical data—such as name and address—the critical data is updated, party suspects are re-identified based on the presence of critical data change, and notification is generated indicating critical data has changed. All this processing can happen in real-time.

InfoSphere MDM Server also provides a feature for suspending critical data change in real-time. Instead, the critical data change remains pending until such time when a data steward either accepts or rejects the change. When a change is rejected, the existing party information is unchanged. When a change is accepted, the existing party information is updated with the critical data. Subsequently, party suspects are re-identified and notification is generated.

Suspending critical data change in real-time is called critical data change (CDC) processing.

An example where CDC processing would be used is when a customer representative uses the updateParty transaction to change the party's information. If CDC processing is configured on, and the change contains critical data, the critical data change is held as pending. A data steward then verifies the validity of the data, and uses the updatePartyPendingCDCRequest transaction to accept the pending critical data change. The party's information is then updated.

Definitions of terms used when discussing Critical Data Changes

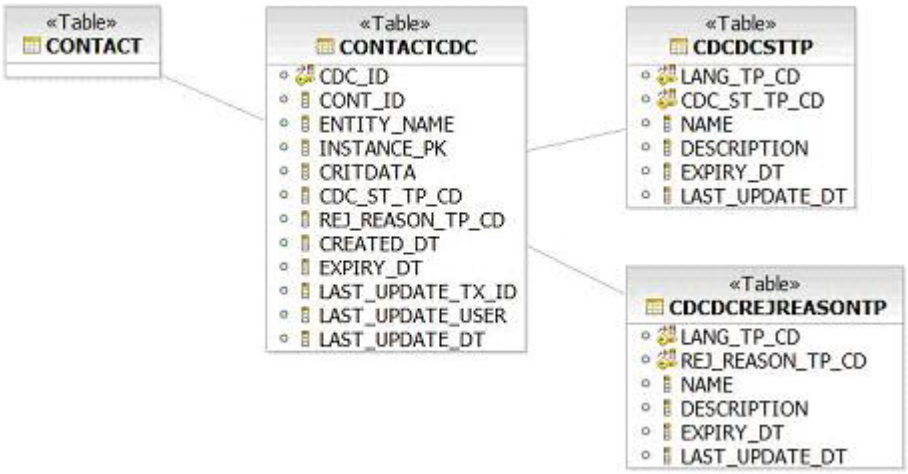
Terms that are used when discussing Critical Data Changes are:

Critical Data Change (CDC)
: Changes that are made to the critical data of a party. In the context of CDC processing, a critical data change is encapsulated at a business object level. For example, changes to the person's last name and first name are contained in a single TCRMPersonNameBObj object.

CDC Request
: An update transaction can produce one or more critical data changes. For example, an updatePersonName transaction may produce one critical data change of the party's name information. An updateParty transaction may produce several critical data changes, such as the party's name, address, and identification. A party's CDC request must be either accepted or rejected before another CDC request can be made for that party.

Data model for Critical Data Changes

The following data map illustrates how Critical Data Changes works.



See also:

"CDC configuration points"

"Configure CDC processing on or off" on page 594

"Customizing critical data elements" on page 594

"Bypassing CDC processing" on page 594

"Customizing the types of critical data changes allowed in a CDC request" on page 595

"Determining which business objects have pending critical data changes" on page 595

"Defining which business objects always use CDC" on page 595

"Defining which business objects are updated when pending changes are accepted" on page 596

"Define how suspects are re-identified when pending changes are accepted" on page 596

CDC configuration points

CDC can be configured through Configuration and Management and through external rules.

The following table shows the configuration points for critical data change processing. Each configuration point is discussed in more detail in the related sections.

Table 51. CDC configuration points and where that action is configured

Configuration Point	Mechanism
Configure CDC processing on or off	Configuration Manager
Customize which elements are processed as critical data	External Rules
Determine whether critical data been changed	External Rules
Bypass CDC processing	External Rules
Customize types of critical data changes allowed in a CDC request	External Rules

Table 51. CDC configuration points and where that action is configured (continued)

Configuration Point	Mechanism
Determine which business objects have pending critical data changes	External Rules
Customize which business objects are not allowed real-time updates	External Rules
Customize which business objects to update when pending changes are accepted	External Rules
Customize how suspects are reidentified when pending changes are accepted	External Rules

Configure CDC processing on or off

CDC processing can be entirely turned on or off.

A property in the configuration manager controls whether or not critical data change processing gets executed. You can turn CDC on or off by setting the following configuration to ″true″ or ″false″:

`/IBM/Party/CriticalDataChangeProcessing/enabled`

Customizing critical data elements

If CDC is configured on, you can define which elements are considered critical.

The rule to customize critical data elements in critical data processing is the same `PartyMatch` class used in suspect duplicate processing.

Currently, the `PartyMatch` class detects critical data elements for the following business objects:

- `TCRMPersonBObj` for date of birth and gender
- `TCRMPersonNameBObj` for last name and given name one
- TCRMOrganizationNameBObj for organization name
- `TCRMPartyAddressBObj` for the party's address
- `TCRMPartyIdentificationBObj` Social Security Number for person or corporate tax ID for organization

For example, if contact method is considered critical data, the PartyMatch class should be extended to support the TCRMPartyContactMethodBObj.

Remember: Customizing the `PartyMatch` rule has an impact on the rest of the external rules supported by the CDC processing feature. These external rules should also be customized if the `PartyMatch` rule is changed.

Bypassing CDC processing

You can select critical data changes to be processed in real-time, even if CDC is configured on.

The `IParty.isCDCAllowed(TCRMCommon)` method determines whether critical data changes are allowed in real-time even though CDC processing is configured on. For example, you can override this rule to bypass critical data processing if the business object belongs to a particular line of business.

This method provides an extension point to bypass CDC processing even when critical data change is detected. It calls the external rule `com.dwl.tcrm.externalrule.CDCAllowRule` (rule 124). By default, this rule is set to false, and bypassing CDC is not allowed.

Customizing the types of critical data changes allowed in a CDC request

You must change the external rule to create pending critical data changes that match the critical data elements.

The `IParty.createMultipleCDC(TCRMCommon, Vector)` method creates zero or more pending critical data changes, based on the critical change elements determined by the `PartyMatch` rule. For example, if you change the `PartyMatch` rule to include the `TCRMPartyContactMethodBObj` as critical data elements, you should override `CDCCreateMultiplePartyCDCRule` also.

This method provides an extension point to create the corresponding pending critical data changes matching the critical change elements. It calls the external rule `com.dwl.tcrm.externalrule.CDCCreateMultiplePartyCDCRule (rule 125)`. By default, this rule creates critical data changes for the business objects described in "Customizing critical data elements" on page 594.

Determining which business objects have pending critical data changes

If you use CDC, you must change the method that determines whether there are active pending critical data changes.

The `IParty.containsActiveCDC(TCRMCommon)` method determines whether the instance of the business object and any of its child object instances have active CONTACTCDC records.

This method provides an extension point to match the critical change elements supported by the `PartyMatch` rule. It calls the external rule `com.dwl.tcrm.externalrule.CDCActiveRule` (rule 126). By default, this rule determines whether or not the business objects described in "Customizing critical data elements" on page 594 have active CONTACTCDC records.

For example, if you change the `PartyMatch` rule to include the `TCRMPartyContactMethodBObj` as critical data elements, you must override `CDCActiveRule` also.

Defining which business objects always use CDC

You can define which objects will always use CDC processing, and not be updated in real-time.

The IParty.filterCriticalData(TCRMPartyBObj, Vector) method filters out the critical data in the party. This method is to allow non-critical data to remain in the party so that non-critical data can be committed in real-time. For example, an `updateParty` transaction may update party address (critical data) and contact method (non-critical data). By filtering out the party address information from the party, the party address update stays pending while the contact method is updated in real-time.

This method provides an extension point to match the critical change elements supported by the PartyMatch rule. It calls the external rule com.dwl.tcrm.externalrule.CDCFilterCriticalDataRule (rule 127). By default, this rule filters the business objects described in "Customizing critical data elements" on page 594, from the party to be updated. For example, if you change the PartyMatch rule to include the TCRMPartyContactMethodBObj as critical data elements, clients must override theCDCFilterCriticalDataRule .

Defining which business objects are updated when pending changes are accepted

You can define which business objects are updated when a pending change is accepted.

The IParty.updatePartyPendingCDCRequest(TCRMMultiplePartyCDCBObj) method updates one or more critical data changes, and is used to accept or reject the changes. If a change is accepted, the updated data is applied to the party. For example, a party has pending changes to the party address, party identification, and person name. The data steward uses the updatePartyPendingCDCRequest transaction to accept the change to the party address and party identification, but reject the change to the person name. When the data steward accepts the two changes, this method updates the party address and party identification on the party. This method provides an extension point to match the critical change elements supported by the PartyMatch rule. It calls the external rule com.dwl.tcrm.externalrule.CDCAcceptChangesRule (rule 128). By default, this rule can apply the updates on the business objects described in "Customizing critical data elements" on page 594, upon accepting pending critical data changes. For example, if you change the PartyMatch rule to include the TCRMPartyContactMethodBObj as critical data elements, you must override CDCAcceptChangesRule also.

Define how suspects are re-identified when pending changes are accepted

You can define how Suspect Duplicate Processing re-identifies suspects once a party has been updated with pending changes.

The IParty.updatePartyPendingCDCRequest(TCRMMultiplePartyCDCBObj) method updates one or more critical data changes. When the data steward accepts the changes, this method also sends the updated information in order to re-identify suspects. This method provides an extension point to match the critical change elements supported by the PartyMatch rule. It calls the external rule com.dwl.tcrm.externalrule.CDCReidentifySuspectsRule (rule 129). By default, this rule supports the business objects described in "Customizing critical data elements" on page 594, in order to re-identify suspects.

For example, if you change the PartyMatch rule to include the TCRMPartyContactMethodBObj as critical data elements, you must override CDCReidentifySuspectsRule also.

Chapter 45. Configuring Party Search

InfoSphere MDM Server provides a set of transactions you can use to search for persons and organizations. These transactions can be configured and, when required, extended to meet your specific needs.

If you are searching for persons or organizations when only party-related search criteria are known, you can use the following transactions:

- SearchPerson
- SearchOrganization
- SearchParty

If you are searching for persons or organizations when a mixture of party and contract search criteria is known, you can use the SearchFSParty transaction .

For more details on these transactions including information on available search criteria, wildcard and look-alike searching and general transaction behavior, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*. For more details on the various features of Search, see the *IBM InfoSphere Master Data Management Server Understanding and Planning Guide*.

In this section, you will learn:

Party search features

Party search has several features to enhance search capabilities.

The following features are available as part of Party Search:

Common Search Exclusion
Prevents poor quality and poor performing searches from executing.

Maximum Search Result Limit
Sets the maximum number of records to return in the search.

Customizable Search Strategy
Determines how to search using the supplied search criteria.

Internal Search Operations
Exposes different methods of searching for parties.

Pluggable Search SQL
Allows customized plug-in SQL to be executed when a particular combination of search criteria is provided.

Search Result Ranking and Sorting
Configures the scoring of search results against the search criteria and sort the results.

Configurable Inquiry Levels
Dictates the level of details returned with the search results.

Standardized, or "nickname" search
Finds parties with names that are a standardized or nickname equivalent of the names supplied in the search criteria. For example, searching for "William" will find "Bill" as well as "William" records.

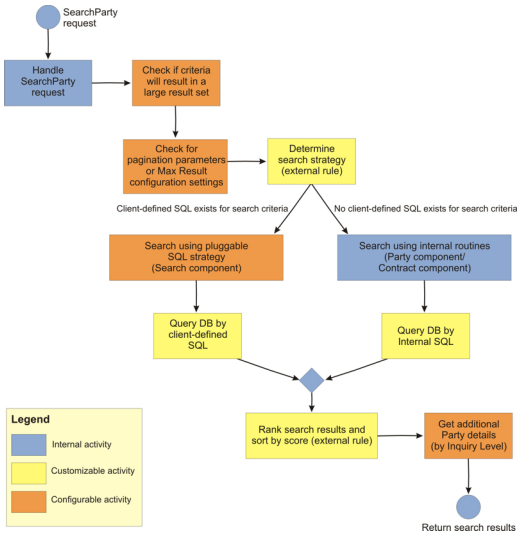
Phonetic Search
Finds parties with names that are phonetically equivalent, or sound like, to the names supplied in the search criteria. For example, searching for "Smith" will find "Smyth" as well as "Smith" records.

Minimum Wildcard Length Validation
Validates that there is a required number of non-wildcard characters, which are characters other than % and ?, for a given search field.

Pagination
Improves performance and usability by allowing for multiple pages to be returned. For information on configuring pagination, see Chapter 36, "Paginating search results," on page 503.

Party search activity flow

The following diagram provides an overview of the primary activities in party search. These tasks are described in the table below.



This table describes the tasks performed as part of search, and describes what you can configure them to do.

Table 52. Search tasks and configurations

Task	Configuration and customization
Validate a search request to determine whether the provided search criteria will yield a reasonable result set size when it is run against the database.	Common Search Exclusion is configurable • Configurable on and off at the global level • Overrides global configuration at transaction level • Exclusion sets are "Last Name", "Last Name and Given Name One", "Last Name and City"

Table 52. Search tasks and configurations (continued)

Task	Configuration and customization
Retrieve the maximum number of search results to return.	Maximum Search Result Limit is configurable • Configurable on and off at the global level • Overrides global configuration at transaction level, which must be less than global level Pagination elements are also configurable. See the chapter on paginating search results for more information.
Determine how to search with the provided search criteria.	Customizable Search Strategy is customizable . The default implementation of Customizable Search Strategy is provided as an external rule.
If no custom SQL for the combination of provided search criteria exists, invoke the required methods on the party or contract components are invoked as per the search strategy. Pagination will be applied automatically if pagination parameters are provided in request.	Internal activity invoked from external rule. Search operations on these components are available for external consumption
If custom SQL for the combination of provided search criteria exists, run that SQL. The party or contract component search methods are not invoked. Pagination will be applied automatically if pagination parameters are provided in request.	Pluggable Search SQL is configurable Enter custom SQL into Pluggable Search SQL table structure.
Score and sort Search results against the original search criteria .	Party Search Result Ranking and Sorting is customizable. Default implementation provided as an external rule.
Get Additional Party Details and specified by inquiry level information on search request.	Configurable Inquiry Levels is configurable at the transaction level.

Configuring and customizing Party Search features

InfoSphere MDM Server provides several different ways to configure search, in order to return the best quality results.

The ways to customize party search are:

- "Configuring Common Search Exclusion" on page 600
- "Configuring the Maximum Search Result Limit" on page 601
- "Customizing the InfoSphere MDM Server search strategy" on page 601
- "Configuring internal search operations" on page 602
- "Configuring SQL searches in InfoSphere MDM Server" on page 602
- "Configuring search result sorting and ranking" on page 610
- "Excluding name standardization during search" on page 611
- "Configuring the standardized or nickname search" on page 612
- "Customizing phonetic searches" on page 612

"Configuring Common Search Exclusion" on page 600

Configuring Common Search Exclusion

InfoSphere MDM Server provides the ability to prevent searches from running against the database where the result set would be too large to be useful.

Searches that return large result sets, for example over 1,000 results, can be considered poor performing and poor quality as users typically do not scroll through hundreds of search results. When this feature is configured on, the search exclusions are based on data within a client's database. Thresholds can be set that are used to determine which searches are allowed to run, and which searches are prevented.

You can use search exclusions on the following types of searches:

- Last Name
- Last Name and City
- Last Name and Given Name One

The primary components of this feature are:

- External Validation Validator, `com.dwl.tcrm.validation.validator.DisallowedSearch`
- Search Exclusion Rule database table, which is cached in memory on the application server

Before you start, you should decide

- Whether or not to use name standardization, in other words, whether the PERSONSEARCH table is used.
- The types of exclusions you want to enable, for example, "Last Name", "Last Name and Given Name One" and "Last Name and City"

To configure this feature on:

1. Activate the external validation for the TCRMPartySearchBObj. Once this is configured on, it is possible to bypass running this feature at a transaction level.
2. determine which database scripts you are going to use to populate the SEARCHEXCLRULE table:
   - If you want to use Name Standardization, run the script to enable the exclusion you want to use:

  - To exclude just the poor last name only searches, run `build_Standardized_searchExclRule_by_LastName.sql`
  - To exclude the poor last name and given name searches, run `build_Standardized_searchExclRule_by_LastAndGivenName.sql`
  - To exclude the poor last name and city searches, run `build_Standardized_searchExclRule_by_City.sql`
- If you do not want to use Name Standardization , run the script to enable the exclusion you want to use:
  - To exclude just the poor last name only searches, run build_nonStandardized_searchExclRule_by_LastName.sql
  - To exclude the poor last name and given name searches, run build_nonStandardized_searchExclRule_by_LastAndGivenName.sql
  - To exclude the poor last name and city searches, run build_nonStandardized_searchExclRule_by_City.sql

3. Replace the <THRESHOLD> placeholder in the scripts that you are going to use. Each scripts has a <THRESHOLD> placeholder for the exclusion threshold that must be modified before running. This is the threshold that determines if a search should be prevented. For example, if a last name occurs more than 1000 times when the user searches by that last name, and provides no other criteria, then the search is prevented.
4. Run the database scripts to populate the SEARCHEXCLRULE table

This example shows the `build_nonStandardized_searchExclRule_by_LastName.sql` script:

```
DELETE FROM SEARCHEXCLRULE WHERE GIVEN_NAME_ONE = '' AND CITY_NAME = '';

INSERT INTO SEARCHEXCLRULE (LAST_NAME, P_LAST_NAME, GIVEN_NAME_ONE,
       P_GIVEN_NAME_ONE, CITY_NAME, P_CITY_NAME, FREQUENCY) SELECT
       DISTINCT LAST_NAME, '', '', '', '', '', COUNT(LAST_NAME)
       FROM PERSONSEARCH GROUP BY LAST_NAME
       HAVING COUNT(LAST_NAME) >= <THRESHOLD>;
```

Configuring the Maximum Search Result Limit

You can configure the maximum number of results that are returned by a search.

That maximum number of results returned in a `SearchParty`, `SearchPerson` and `SearchOrganization` transaction is configurable at a global level. The configuration can be overridden at a transaction level as long as the transaction maximum search result limit is less than the global setting.

The default global setting is 100 returns.

To change the default number, change the `/IBM/Party/Search/maxResults` configuration element in the Configuration Manager.

Customizing the InfoSphere MDM Server search strategy

You can customize how InfoSphere MDM Server performs searches, based on the submitted search criteria.

InfoSphere MDM Server can be customized to search in a specific way,, based on the submitted search criteria. This allows you to:

- Determine which internal search operations to execute and with what priority, depending on the submitted search criteria

- Run client-defined, pre-written, SQL as opposed to executing internal search operations
- Run client-defined operations based on product or extended search criteria
- Set conditions on what type of details are returned, based on the search results. For example, if only one party is found in the search, you can define whether only summary data is returned, or if full details about that party are provided.

The search strategy can be customized by providing an alternate implementation for External Rule 9 – Search Party.

Configuring internal search operations

You can configure the InfoSphere MDM Server internal search operations to refine your search results.

InfoSphere MDM Server provides a set of internal search operations, which are also known as the "SearchBy<predefined criteria> methods". These operations are provided by the Party and Contract components and are used in External Rule 9 - Search Party. See "Customizing search features" on page 176 for more information. These operations can be used in a customized version of External Rule 9 or elsewhere within a client implementation, such as within a customized business proxy.

The internal search operations:

- Execute SQL against the database to retrieve the search result set
- Obtain summary details for each party in the search result set, including a name, identifier and address. The summary details are returned in the `TCRMPersonSearchResultBObj` and `TCRMOrganizationSearchResultBObj` business objects

To configure the type of name, identifier and address that is returned as party of the summary details, use the following configurations:

- /IBM/Party/Search/ReturnValue/organizationAddressUsageType
- /IBM/Party/Search/ReturnValue/organizationIdentificationType
- /IBM/Party/Search/ReturnValue/organizationNameUsageType
- /IBM/Party/Search/ReturnValue/personAddressUsageType
- /IBM/Party/Search/ReturnValue/personIdentificationType
- /IBM/Party/Search/ReturnValue/personNameUsageType

Refer to "Understanding configuration elements in the Configuration and Management component" on page 419 for descriptions of these configurations.

Configuring SQL searches in InfoSphere MDM Server

There are several search modules in InfoSphere MDM Server, including Party and Contract. Party Search is also divided into person or organization search.

For general details on how to customize search SQL, see Chapter 13, "Customizing search SQL queries," on page 169.

Additionally, persons and organizations can be searched for using their contracts. The following sections present the search implementation and search classes for party and its subtypes, person and organization.

See also:

"Party component"

"Search input classes"

"Search result set processors"

"Party search fields interface"

"Party Search class diagram" on page 604

"Search input and output classes" on page 604

Party component

This is the existing party business component, which implements the party business logic. It is the entry point for the search transaction, and it also provides ″searchBy<predefined criteria>″ methods.

Search input classes

The classes that fall in this category include:

- TCRMPartySearchInput
- TCRMPersonSearchInput
- TCRMOrganizationSearchInput

These classes represent the collection of search input parameters, are concrete implementations of the ISearchInput interface, and wrap the corresponding search business object (SearchBObj) class.

Search result set processors

The classes that fall in this category include:

- TCRMPartySearchResultSetProcessor
- TCRMPersonSearchResultSetProcessor
- TCRMOrganizationSearchResultSetProcessor

As the name implies, these classes process the results of a search query and implement the IResultSetProcessor interface.

Only result set processors that extend the abstract com.dwl.tcrm.common.GenericResultSetProcessor class will be able to take advantage of the pagination feature.

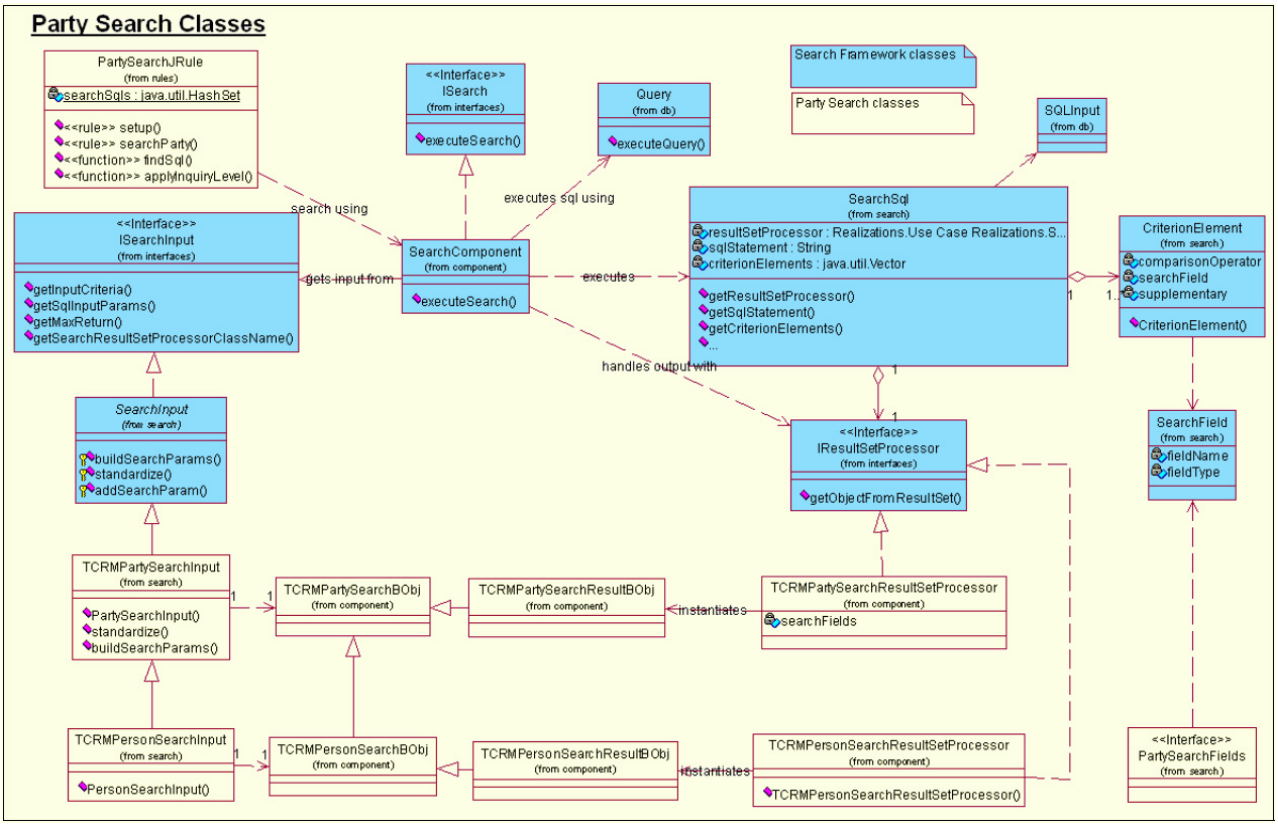
Party search fields interface

PartySearchFields is an interface that defines static instances of SearchField class, from search framework, to be used for all party search fields.

These fields represent the database column name, which maps to an attribute in the search or search result business object in the party module. See the Javadoc for this class for a list of these constants and the database column that these represent. Additionally some of the party search fields are used as supplementary parameters if their value can be retrieved from configuration or the request header. See the Javadoc for the respective search input class and its getSupplementaryInputParam method to get a list of these supplementary parameters as supported in the party module.

Party Search class diagram

The following class diagram shows the relevant party search classes in relation to the search framework. Please note only the Party and Person search and their related classes are shown. Organization search classes follow a structure equivalent to person and are not shown here for clarity.



Search input and output classes

The following tables list the search input and output classes, the search fields available, as well as their mapping to the database fields for Party and Contract search transactions.

The tables in the following sections that provide mappings of search fields are only a subset of all search fields. Because new search fields are often added with a release, you should refer to the CDSRCHFLD database table for a complete list of fields.

See also:

- "Party search input" on page 605
- "Party search fields interface" on page 603
- "Person search input" on page 605
- "Person search fields" on page 605
- "Organization search input" on page 606
- "Organization search fields" on page 606
- "Contract search input" on page 607
- "Contract search fields" on page 607

Party search input:

- Input class name - com.dwl.tcrm.coreParty.search.TCRMPartySearchInput
- Search business object - TCRMPartySearchBObj

Party search fields interface:

PartySearchFields is an interface that defines static instances of SearchField class, from search framework, to be used for all party search fields.

These fields represent the database column name, which maps to an attribute in the search or search result business object in the party module. See the Javadoc for this class for a list of these constants and the database column that these represent. Additionally some of the party search fields are used as supplementary parameters if their value can be retrieved from configuration or the request header. See the Javadoc for the respective search input class and its getSupplementaryInputParam method to get a list of these supplementary parameters as supported in the party module.

Person search input:

- Input class name - com.dwl.tcrm.coreParty.search.TCRMPersonSearchInput
- Search business object - TCRMPersonSearchBObj

Person search fields:

Person search extends party search so the search fields available for party are also available for person.

Note: See "Party search input" for the complete list.

The following mapping is for the search fields specific to person.

Table 53. Person Search Fields

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	TCRMPersonSearch Business Object Attribute
TCRM.PersonSearch. GivenNameOne	personsearch	given_name_one	givenNameOne
TCRM.PersonSearch. GivenNameTwo	personsearch	given_name_two	givenNameTwo

Table 53. Person Search Fields (continued)

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	TCRMPersonSearch Business Object Attribute
TCRM.PersonSearch. GivenNameThree	personsearch	given_name_three	givenNameThree
TCRM.PersonSearch. GivenNameFour	personsearch	given_name_four	givenNameFour
TCRM.PersonSearch.LastName	personsearch	last_name	lastName
TCRM.PersonSearch.DateOfBirth	person	birth_dt	dateOfBirth

The following supplementary search fields are available for person search. Please note that all party level supplementary search fields are also available for person search.

Table 54. Person Search Fields: supplementary

Cdsrchfld (Application.Group.Element or Srch_fld_name)	Database Field - Table	Database Field - Column	Source
TCRM.PartySearch.IdentificationType	identifier	id_tp_cd	/IBM/Party/Search/ ReturnValue/ personIdentificationType
ADDRESSGROUP.ADDR_USAGE_ TP_CD	addressgroup	addr_usage_tp_cd	/IBM/Party/Search/ ReturnValue/ personAddressUsageType

Organization search input:

- Input class name - com.dwl.tcrm.coreParty.search.TCRMOrganizationSearchInput
- Search business object - TCRMOrganizationSearchBObj

Organization search fields:

Organization search extends party search so the search fields available for party are also available for an organization.

Note: See "Party search input" on page 605 for the complete list.

The following mapping is for the search fields specific to organization.

Table 55. Organization Search Fields

Cdsrchfld (Application.Group.Element)	Database Field (table: column)	TCRMOrganizationSearch Business Object Attribute
TCRM.OrganizationSearch.OrganizationName	orgname: org_name	organizationName
TCRM.OrganizationSearch.EstablishedDate	org: established_dt	establishedDate

The following supplementary search fields are available for organization search. Please note that all party level supplementary search fields are also available for organization search.

Table 56. Organization Search Fields: supplementary

Cdsrchfld (Application.Group.Element or Srch_fld_name)	Database Field (table: column)	Source
TCRM.PartySearch.IdentificationType	identifier: id_tp_cd	/IBM/Party/Search/ ReturnValue/ organizationIdentificationType
ADDRESSGROUP.ADDR_USAGE_TP_CD	addressgroup: addr_usage_tp_cd	/IBM/Party/Search/ ReturnValue/ organizationAddressUsageType
ORGNAME.ORG_NAME_TP_CD	orgname: org_name_tp_cd	/IBM/Party/Search/ ReturnValue/ organizationNameUsageType

Contract search input:

- Input class name - com.dwl.tcrm.financial.search.TCRMContractSearchInput
- Search business object - TCRMContractSearchBObj

Contract search fields:

This topic describes the search fields available for a contract search.

The following mapping is for the search fields specific to contract.

Table 57. Contract Search Fields

Cdsrchfld (Application.Group.Element or srch_fld_name)	Database Field (table: column)	TCRMOrganizationSearch Business Object Attribute
TCRM.ContractSearch.LineOfBusiness	contract: line_of_business	lineOfBusiness
TCRM.ContractSearch.BrandName	contract: brand_name	brandName
TCRM.ContractSearch.ServiceOrgName	contract: service_org_name	serviceOrganization Name
TCRM.ContractSearch.BusOrgunitId	contract: bus_orgunit_id	businessOrganization UnitId
TCRM.ContractSearch.ServiceProvId	contract: service_prov_id	serviceProviderId
TCRM.ContractSearch.ContractStatusType	contract component: contract_st_tp_cd	contractStatusType
TCRM.ContractSearch.RoleType	contractrole: contr_role_tp	PartyRoleType
ADMINCONTRACTID_<n> **Note:** <n> is a placeholder for a digit from 0 through 9. The actual field names are: ADMINCONTRACTID_0; ADMINCONTRACTID_1; through to ADMINCONTRACTID_9. These are mapped to the index of the TCRMPartialSysAdminKeyBObj instance as contained in the collection inside the TCRMContractSearchBObj. Up to 10 keys can be searched on in one query.	nativekey: admin_contract_id	vecTCRMPartialSys AdminKeyBObj<n>. adminContractId
ADMINCONTRACTIDFIELDTYPE_<n> **Note:** <n> is a placeholder for a digit from 0 through 9.	cdadminfldnmtp: name	vecTCRMPartialSys AdminKeyBObj<n>. adminContractIdFieldType

FS Person search input:

- Input class name - com.dwl.tcrm.financial.search.TCRMFSPersonSearchInput
- Search business object - TCRMFSPersonSearchBObj

FS Person search fields:

The set of search fields available for FS person search is the combination of all the search fields in person and contract search input. Please refer to "Person search input" on page 605, and "Contract search input" on page 607 for a complete list.

FS Organization search input:

- Input class name - com.dwl.tcrm.financial.search.TCRMFSOrganizationSearchInput
- Search business object - TCRMFSOrganizationSearchBObj

Search fields:

The set of search fields available for FS organization search is the combination of all the search fields in organization and contract search input. Refer to "Organization search input" on page 606, and "Contract search input" on page 607 for a complete list.

Person search output:

- Processor class name - com.dwl.tcrm.coreParty.component.TCRMPersonSearchResultProcessor
- Search result business object - TCRMPersonSearchResultBObj

Person search fields:

Table 58. Person Search Fields

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	TCRMPersonSearch Business Object Attribute
TCRM.PartySearch.ContactMethod ReferenceNumber	contactmethod	ref_num	contactMethod ReferenceNumber
TCRM.PartySearch. ContactMethodType	contactmethodgroup	cont_meth_ tp_cd	contactMethodType
TCRM.PartySearch.AddressId	address	addrss_id	addressId
TCRM.PartySearch.AddrLineOne	address	addr_line_one	addrLineOne
TCRM.PartySearch.AddrLineTwo	address	addr_line_two	addrLineTwo
TCRM.PartySearch.AddrLineThree	address	addr_line_three	addrLineThree
TCRM.PartySearch.CityName	address	city_name	cityName
TCRM.PartySearch.ProvStateType	address	prov_state_tp_cd	provStateType
TCRM.PartySearch.ZipPostalCode	address	postal_code	zipPostalCode
TCRM.PartySearch.CountryType	address	country_tp_cd	countryType
TCRM.PartySearch.IdentificationType	identifier	id_tp_cd	identificationType
TCRM.PartySearch.IdentificationNum	identifier	ref_num	identificationNum
TCRM.PartySearch.AdminClientNum			adminClientNum
TCRM.PartySearch.ContractNum			contractNum
TCRM.PartySearch.PartyId	contact	cont_id	PartyId
TCRM.PersonSearch.GivenNameOne	personsearch	given_name_one	givenNameOne
TCRM.PersonSearch.GivenNameTwo	personsearch	given_name_two	givenNameTwo
TCRM.PersonSearch. GivenNameThree	personsearch	given_name_three	givenNameThree
TCRM.PersonSearch.GivenNameFour	personsearch	given_name_four	givenNameFour
TCRM.PersonSearch.LastName	personsearch	last_name	lastName
TCRM.PersonSearch.DateOfBirth	person	birth_dt	dateOfBirth
TCRM.PersonSearch.Gender	person	gender_tp_cd	gender
TCRM.PersonSearchResult.PnGiven NameOne	personname	given_name_one	pnGivenNameOne
TCRM.PersonSearchResult.PnGiven NameTwo	personname	given_name_two	pnGivenNameTwo

Table 58. Person Search Fields (continued)

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	TCRMPersonSearch Business Object Attribute
TCRM.PersonSearchResult.PnGiven NameThree	personname	given_name_three	pnGivenNameThree
TCRM.PersonSearchResult.PnGiven NameFour	personname	given_name_four	pnGivenNameFour
TCRM.PersonSearchResult.PnLast Name	personname	last_name	pnLastName
CONTACT.INACTIVATED_DT	contact	inactivated_dt	partyActiveIndicator (“Y” if date is > current date else “N”)

Organization search output:

- Processor class name - com.dwl.tcrm.coreParty.component.TCRMOrganizationSearchResultProcessor
- Search result business object - TCRMOrganizationSearchResultBObj

Organization search fields:

Table 59. Organization Search Fields

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	TCRMPersonSearch Business Object Attribute
TCRM.PartySearch.ContactMethod ReferenceNumber	contactmethod	ref_num	contactMethodReference Number
TCRM.PartySearch.ContactMethod Type	contactmethod group	cont_meth_tp_cd	contactMethodType
TCRM.PartySearch.AddressId	address	address_id	addressId
TCRM.PartySearch.AddrLineOne	address	addr_line_one	addrLineOne
TCRM.PartySearch.AddrLineTwo	address	addr_line_two	addrLineTwo
TCRM.PartySearch.AddrLineThree	address	addr_line_three	addrLineThree
TCRM.PartySearch.CityName	address	city_name	cityName
TCRM.PartySearch.ProvStateType	address	prov_state_tp_cd	provStateType
TCRM.PartySearch.ZipPostalCode	address	postal_code	zipPostalCode
TCRM.PartySearch.CountryType	address	country_tp_cd	countryType
TCRM.PartySearch.Identification Type	identifier	id_tp_cd	identificationType
TCRM.PartySearch.IdentificationNum	identifier	ref_num	identificationNum
TCRM.PartySearch.AdminClientNum			adminClientNum
TCRM.PartySearch.ContractNum			contractNum
TCRM.PartySearch.PrtyId	contact	cont_id	partyId
TCRM.OrganizationSearch. OrganizationName	orgname	org_name	sOrganizationName
TCRM.OrganizationSearch. EstablishedDate	org	established_dt	establishedDate
TCRM.OrganizationSearchResult. SOrganizationName	orgname	s_org_name	organizationName
TCRM.OrganizationSearchResult. OrganizationType	org	org_tp_cd	organizationType
CONTACT.INACTIVATED_DT	contact	inactivated_dt	partyActiveIndicator (″Y″ if date is > current date else ″N″)

Contract search output:

- Processor class name - com.dwl.tcrm.financial.component.TCRMContractSearchResultProcessor
- Search result business object - Not applicable

Contract search fields:
Only contractId is supported as the SQL output.

FS Person search output:

FS person search output is the same as person search output.

FS Organization search output:

FS organization search output is the same as organization search output.

Configuring search result sorting and ranking

You can configure InfoSphere MDM Server to sort and rank search results.

InfoSphere MDM Server provides the ability to rank and sort the search results after they have been retrieved from the database. This allows you to:

- Assign a score to each search result to show how closely the result matched the original criteria
- Sort the results using different approaches, for example, by sorting alphabetically, by highest to lowest score or not doing any post-sorting and using the sorted results from the database query.
- Number each search result in sequence

This feature is implemented as external rules. External Rule 4 – Rank Person Search Results is used for `TCRMPersonSearchBObj` , the person party search. External Rule 5 – Rank Organization Search Results is used for `TCRMOrganizationSearchBObj`, the organization party search. Both external rules are implemented in the `com.dwl.tcrm.externalRule.PartyMatch` class.

The default implementation for each external rule is to interrogate each search result and score the search result based on how closely it matches the original search criteria. The results are then sorted from highest to lowest total scores. The following table shows how the results of a person search are scored, and the transaction used to get those results.

Table 60. Person match scores using the `TCRMPersonSearchResultBObj`

Matching Element	Score	Business Object / Attribute
Last Name	Exact: 100 Phonetic: 75	`TCRMPersonSearchResultBObj.lastName`
Given Name One	Exact: 100 Phonetic: 75	`TCRMPersonSearchResultBObj.givenNameOne`
Given Name Two	Exact: 100 Phonetic: 75	`TCRMPersonSearchResultBObj.givenNameTwo`
Given Name Three	Exact: 100 Phonetic: 75	`TCRMPersonSearchResultBObj.givenNameThree`
Given Name Four	Exact: 100 Phonetic: 75	`TCRMPersonSearchResultBObj.givenNameFour`
Birth Date	50	`TCRMPersonSearchResultBObj.dateOfBirth`
Address Line One	100	`TCRMPersonSearchResultBObj.addrLineOne`

Table 60. Person match scores using the TCRMPersonSearchResultBObj (continued)

Matching Element	Score	Business Object / Attribute
City	Exact: 50 Phonetic: 25	TCRMPersonSearchResultBObj.cityName
Postal / Zip Code	100	TCRMPersonSearchResultBObj.zipPostalCode
Province / State	25	TCRMPersonSearchResultBObj.provState
Identification	150	TCRMPersonSearchResultBObj.identificationType
Contact Method	100	TCRMPersonSearchResultBObj.contactMethodType

This table shows how the results of a organization search are scored, and the transaction used to get the results

Table 61. Organization match scores using the TCRMOrganizationSearchResultBObj

Matching Element	Score	Business Object / Attribute
Organization Name	Exact: 100 Phonetic: 75	TCRMOrganizationSearchResultBObj.organizationName
Established Date	50	TCRMOrganizationSearchResultBObj.establishedDate
Address Line One	100	TCRMOrganizationSearchResultBObj.addrLineOne
City	Exact: 50 Phonetic: 25	TCRMOrganizationSearchResultBObj.cityName
Postal / Zip Code	100	TCRMOrganizationSearchResultBObj.zipPostalCode
Province / State	25	TCRMOrganizationSearchResultBObj.provState
Identification	150	TCRMOrganizationSearchResultBObj.identificationType
Contact Method	100	TCRMOrganizationSearchResultBObj.contactMethodType

Excluding name standardization during search

In IBM InfoSphere Master Data Management Server, any persistence, search or inquiry transaction around the PERSONNAME table involves access to the PERSONSEARCH Table. This table contains standardized name record for each name record in PERSONNAME Table. PersonNameIdPK is the foreign key used in PERSONSEARCH Table to establish one to one mapping with PERSONNAME table.

The ORGNAME table does not have a separate table for search; instead it has a search field within the ORGNAME table called the the s_org_name field. This field holds the standardized organization Name.

In all search transactions, name-related input is first standardized and then the standardized input is used to search against PERSONSEARCH table or ORGNAME table.

However, if you have no business requirement to standardize names for parties and therefore no need for additional table access, you can set IBM InfoSphere Master Data Management Server to ignore name standardization during add, update, and get transactions around Person Name and Organization Names. Also during search transaction, the Person Search table can be ignored as IBM InfoSphere Master Data Management Server does not assume that there are standardized field in this table. Suspect processing also ignores name standardization while looking for suspects.

To exclude name standardization from transactions, set the `/IBM/Party/ExcludePartyNameStandardization/enabled` configuration to *true*.

Configuring the standardized or nickname search

You can configure InfoSphere MDM Server to use standardized, or nickname, names when searching for parties with name criteria.

This searches for a standardized name by:

- Storing standardized names along with the non-standardized version of the name when a person or organization party are added to InfoSphere MDM Server
- Standardizing the name criteria when a name is used in a search

InfoSphere MDM Server relies on third party products, such as Quality Stage, to standardize names. Adapters to these third party products are used and they implement an abstract interface.

To plug in a new adapter to an unsupported standardization product:

1. Provide a new implementation for the `com.dwl.tcrm.coreParty.interfaces.IPartyStandardizer` interface. There are two operations on the interface to implement: `standardizePersonName` and `standardizeOrganizationName`.
2. Set the classpath of the new standardizer in the `/IBM/Party/Standardizer/Name/className` configuration using the Configuration and Management component.

See Chapter 46, "Standardizing name, address, and phone number information," on page 623 for more information on supported standardization products and how to implement them.

Customizing phonetic searches

You can configure InfoSphere MDM Server to consider phonetic variations of names and city names when searching for parties.

InfoSphere MDM Server searches for a phonetic variation of a name by:

- Generating and storing phonetic keys for each component of a given name (for example, the last name, given name one, given name two, given name three, given name four) when a name for a person or organization is added or updated
- Generating phonetic keys for the name criteria used in a search for a person or organization

If you choose to use phonetic capabilities in a name search, this can greatly increase the search result set size. Because of this, InfoSphere MDM Server first finds all exact name matches and then augments that with phonetic name matches. Also, given the default implementation of how the search results are ranked and sorted, exact matches will likely score higher than phonetic matches and therefore be at the top of the search result set in the response.

There are a number of configuration and customization points for phonetic search:

1. Plug in a new phonetic key generator component, that is replace the default implementation

2. Turn phonetic searching on or off at a global level for each of person name, organization name and city
3. Override the global setting at a transaction level
4. Set the maximum length for the phonetic key for each of person name, organization name and city
5. Set a threshold that is the number of exact matches found that is sufficient to warrant not adding phonetic search results to the result set

If you wish to use methods 2,3 or 4 to configure this search feature, see "Applying configuration settings for phonetic search" on page 617.

Customizing phonetic key generation

You can customize the generation of phonetic keys for supported languages.

InfoSphere MDM Server supports the Nysiis and Soundex phonetic generators. The default phonetic key generator component uses the industry standard Soundex algorithm. Given the nature of phonetics and the default phonetic key generator component, only certain languages are supported. Unsupported language sets will likely yield poor quality phonetic searching, and we do not recommend using them with our default phonetic key generator component.

The supported languages are:

- Western European languages
- Eastern European languages
- Slavic languages

Languages that are not supported are:

- Cyrillic
- CVKJ (Chinese, Vietnamese, Korean, Japanese)
- Middle Eastern languages

Phonetic key generators are based on Eclipse OSGi bundle technology, which are Eclipse plug-ins, and must be packaged according to the instructions contained within this guide.

To provide a new phonetic key generator plugin:

1. Provide a new Phonetic key implementation or wrapper class
2. Configure the new implementations in a `plug-in.xml` file, which is used to define the mapping between the logical name, used to refer to the generator at runtime, and the phonetic key implementation class.
3. Configure the `feature.xml` file used to define the names and versions of the included plug-ins.
4. Using the Configuration and Management component, configure `extensionId` and `extensionElementId` to use the new notification.

The phonetic key implementation, `plug-in.xml` and `feature.xml` files are packaged into a `.jar` file with the structure shown below. In this example, we assume that the phonetic key implementation class is at version level 1.0.0 and resides within the `com.corp.product` Java package:

```
Sampleplug-in.jar
  com/
    corp/
      product/
```

```
        sampleGenerator.java
        .
        .
  com.corp.product_1.0.0/
    plug-in.xml

  imc-features/
    feature.xml
```

The com/corp/product directory hierarchy and its enclosed classes contain the code that forms the plug-in. One of these classes must provide the implementation logic as described below. The com.corp.product_1.0.0 directory and its enclosed plug-in.xml file represent an OSGi plug-in. This name is formed from a combination of the main Java package name and the plugin version number. The imc-features directory and its enclosed feature.xml file represent an OSGi feature used to list the included plug-ins.

Use the Java -jar command or WinZip tool to package the plugin project class files, plugin.xml and feature.xml. If you get the error:

```
java.lang.RuntimeException: Could not find plugin metadata folder for plugin:
com.corp.product_1.0.0 thrown if packaging above plugin project improperly.
Exporting plugin project as jar file using RSA may cause the RuntimeException
because of the directory information can not be recognize at runtime
```

Repackage the plugin project using the Java -jar command or WinZip tool.

New Phonetic Key Generator Implementation or Wrapper Class

The assembled package must include a class that implements the interface com.ibm.imc.phonetics.IPhoneticKeyGenerator. This class provides support for the following activities:

- Generation of phonetic keys
- Generation of alternate phonetic keys, an optional method that allows an alternate encoding to be provided by the same implementation; this is not currently used
- Comparison of two phonetic keys to determine their relative similarity; this is not currently used

If you are working with an existing implementation, rather than developing a phonetic key generator from scratch, you can introduce a phonetic key generator to an existing implementations by developing a wrapper layer within the implementation class. Solutions such as the Apache Jakarta Commons Codec, Double Metaphone can easily be introduced. More information on this algorithm can be found on the Apache web site at the following URL: http://jakarta.apache.org/commons/codec/

Implementing IPhoneticKeyGenerator

The operations for the IPhoneticKeyGenerator interface are:

public void setMaximumKeyLength(int maxLength)
: Establishes the maximum number of phonetic components that can be incorporated into the generated keys. Increasing the maximum size allows more accurate keys to be generated, but this increases the key length.

public String createPhoneticKey(String word)
: Generates the primary phonetic key for the supplied word and returns it encoded within a string. The primary key represents the standard

encoding, or way of pronouncing the supplied word. All underlying implementations are required to provide a primary encoding.

Equality testing may be used to determine if the result matches that returned from a separate call to this method. Do not compare primary and secondary keys as they may not be the same for the same word.

public String createAlternatePhoneticKey(String word)
Currently not used . Generates a secondary phonetic key from the supplied word and returns it encoded within a String. The secondary key represents an alternate encoding, or way of pronouncing the supplied word. In many cases, there may be no alternate pronunciation, so the secondary key is identical to the primary key obtained from createPhoneticKey.

Although the default implementation provides support for secondary keys, others are not required to do so. Implementations that do not provide this support return the primary key through this method. Equality testing may be used to determine if the result matches that returned from a separate call to this method. Do not compare primary and secondary keys as they may not be the same for the same word.

public void createPhoneticKeys(String word,String[] keys)
Generates primary and secondary phonetic keys from the supplied word and returns them in the first two elements of the supplied String array. The array must be pre-initialized by the caller as follows:

```
String[] keys = new String[2];
```

Although the default implementation provides support for secondary keys, others are not required to do so. Implementations that do not provide this support should simply return the primary key in both array elements.

public int comparePhoneticKeys(String key1, String key2)
Currently not used. Compares two phonetic keys to determine how similar they are based on the number of matching phonetic components. The integer value returned is the similarity "score" such that 0 represents no similarity and 100 represents an exact match.

Do not compare primary with a secondary key as they may not be the same for the same word.

public int[] rankPhoneticKeys(String target, String[] keys)
Currently not used Compares an array of phonetic keys against a specified target and ranks them according to similarity based on the number of matching phonetic components. The integer array returned contains the similarity scores for each key, where 0 represents no similarity and 100 represents an exact match.

Do not compare primary and secondary keys as they may not be the same for the same word.

See also:

"Creating the feature.xml file"

"Creating the plugin.xml file" on page 616

Creating the feature.xml file

You must create a `feature.xml` file that identifies the new plugins in the .jar archive.

The `feature.xml` file is an OSGi artefact that identifies the plug-ins enclosed within the `.jar` archive. The runtime framework refers to this file to locate the phonetic

key generator plugin.xml file. An example feature.xml file is provided below. Its important to ensure the plugin ID com.corp.product and version number 1.0.0 match both the directory names within the .jar file and the references within the associated plugin.xml file. Only those parts of the file highlighted in bold need to be modified when developing an implementation:

```
<?xml version="1.0" encoding="UTF-8"?>

<feature id="com.corp.product"
         label="com.corp.product"
         version="1.0.0"
         provider-name="SampleCorporation">

<plugin id="com.corp.product" version="1.0.0"/>

</feature>
```

Creating the plugin.xml file

You must create a plugin.xml file to provide the mappings that resolve the generator and the implementation class.

The plugin.xml defines the phonetic key generator plug-in and provides the mappings between the runtime name used to resolve the generator and the implementation class. The runtime framework uses the feature.xml to determine the name of the directory this file resides in. An example plugin.xml is provided below, where the name of the directory plugin.xml resides in the com.corp.product_1.0.0 directory:

```
<?xml version="1.0" encoding="UTF-8"?>
<?eclipse version="3.0"?>
<plugin
   id="com.corp.product"
   name="Sample Phonetic Key Generator Plugin"
   version="1.0.0"
   provider-name="SampleCorporation">

   <requires>
      <import plugin="com.ibm.imc.phonetics"/>
   </requires>

   <extension
       id="sampleExtension"
       name="A sample phonetic key generator"
       point="com.ibm.imc.phonetics.PhoneticKeyGenerator">

       <PhoneticKeyGeneratorDescription
            class="com.corp.product.SampleGenerator"
            id="sampleGenerator"/>

   </extension>

</plugin>
```

The following explanation of this XML file highlights the key parts of the document. In practice, only those parts highlighted in bold need to be modified when developing an implementation.

Standard XML headers:

```
<?xml version="1.0" encoding="UTF-8"?>
<?eclipse version="3.0"?>
```

Plug-in definition identifying the properties of the plugin. Ensure that the ID and version match those defined within the `feature.xml` file and the .jar directory structure:

```
<plugin
   id="com.corp.product"
   name="Sample Phonetic Key Generator Plugin"
   version="1.0.0"
   provider-name="SampleCorporation">
```

Required reference to the associated InfoSphere MDM Server OSGi extension:

```
<requires>
      <import plugin="com.ibm.imc.phonetics"/>
   </requires>
```

Extension definition that introduces the implementation class as a phonetic key generator. This part of the document specifies the ID fields used to refer to the generator at runtime and defines the implementation class that these names refer to.

```
   <extension
       id="sampleExtension"
       name="A sample phonetic key generator"
       point="com.ibm.imc.phonetics.PhoneticKeyGenerator">

       <PhoneticKeyGeneratorDescription
            class="com.corp.product.SampleGenerator"
            id="sampleGenerator"/>

   </extension>
</plugin>
```

Applying configuration settings for phonetic search

This section shows the configuration setting to use for phonetic search.

The following table lists the configuration settings that apply to phonetic search. Use the Configuration and Management application to apply the necessary setting for your implementation of phonetic search.

Table 62. Configuration and Management options for phonetic search

Configuration and Management option	Description
PhoneticSearch/PersonNameSearch/enabled (Phonetic Person Name Search)	Options: TRUE or FALSE. Default Value: FALSE, for backwards compatibility This configuration can be overridden at the transaction level.
PhoneticSearch/OrganizationNameSearch/enabled (Phonetic Organization Name Search)	
PhoneticSearch/AddressSearch/enabled (Phonetic Address Elements Search)	
PhoneticSearch/PersonNameSearch/maxLength (Person Name Phonetic Key Length)	Options: Implementation dependent. Default implementation requires between 1-13. Default Value: 4 Maximum length of the phonetic keys generated for address elements.
PhoneticSearch/OrganizationNameSearch/ maxLength (Org Name Phonetic Key Length)	
PhoneticSearch/AddressSearch/maxLength (Address Elements Phonetic Key Length)	
PhoneticSearch/threshold	Default value: 100 This is the number of exact matches found by a search transaction that is sufficient to warrant not adding phonetic search results to the result set.
PhoneticSearch/extensionId	Default value for Soundex: com.ibm.imc.phonetics.PhoneticKeyProviders

Table 62. Configuration and Management options for phonetic search (continued)

Configuration and Management option	Description
PhoneticSearch/extensionElementId	Default value: DoubleMetaphoneExtension

The value of the Configuration and Management option PhoneticSearch/extensionId, is the concatenation of plugin ID and plugin extension ID in plug-in.xml,for example, `com.corp.product.sampleExtension`.

The value of the PhoneticSearch/extensionElementId is the plugin extension PhoneticKeyGeneratorDescription ID in plug-in.xml, for example, sampleGenerator.

Populating the phonetic key with a batch utility

InfoSphere MDM Server provides a batch utility to populate existing databases with phonetic keys.

InfoSphere MDM Server provides a batch utility to populate phonetic keys for existing databases that do not contain phonetic keys. When discussing using a batch utility to populate the phonetic key, the following terminology is used:

- **keysource** refers to the specific value used to generate the phonetic key from. For example, if standardization is on, the keysource will be William, even though the name is Bill.
- **keyfor** refers to the value that a phonetic key is being generated for. In the above example, the keyfor is Bill. When standardization is off, keyfor == keysource.

The basic steps to populate or overwrite phonetic keys for an existing database are:

1. Export the required tables (ORGNAME, PERSONNAME, PERSONSEARCH, ADDRESS) to delimited files.
2. Configure the settings for running the batch phonetic key populator.
3. Run the batch phonetic key populator.
4. Import tables back into the database.

Requirements for exporting data

If standardization is on, the tables, PERSONNAME, ORGNAME, ADDRESS and PERSONSEARCH, are exported from the database to separate files that conform to following requirements.

Remember: these requirements are outlined in the 'Delimited ASCII (DEL) File Format' page of the DB2 Information Centre

When the tables are exported:

- All data is exported except the phonetic key columns
- Each column, or value, is delimited by a single character, and the batch phonetic key populator is configured to use the same value delimiter
- The character delimiter is a single character, and the appearance of the character delimiter within a text value is followed directly by another character delimiter. For example, if [some ″quoted text″ here] appears in the delimited file as [″some ″″quoted text″″ here″].
- The first value of every line must be the primary key
- If standardization is on:

- If the standardized names are in a separate table, as is the case for PERSONNAME, the exported comma-delimited file must contain the primary key, followed by all keysources and nothing else, in the same order that the keyfor values were exported. Also, the ordering of the rows for both files must be exact same. That is, the first value, or primary key, of each row of the input should be the exact same as the first value of each row of the standardized names file.
- If the standardized names are in the same table,as is the case for address, the keysource must appear before the keyfor column and be identified in the configuration..

Requirements for importing data

After the process is run against the files, the resulting file has the phonetic key values as values directly following the values that they apply to. This means that the load must order the columns appropriately. The columns are otherwise kept in the same order they were exported in, except there are added values for each of the phonetic keys generated.

Configuring phonetic key populating properties

The `default.properties` file located in the path `utils/phoneticKeyPopulator` contains a list of properties that must be modified.

To configure the properties,

1. Copy the default properties file to `override.properties`.
2. Enter the required property values, as shown in the table below.

Table 63. Property values

Property	Description
phoneticKeyLength	Value from 1 - 13 (defaulted to 4) corresponding to the value configured in the target application.
inputDataFile	Name of the file to be processed. The `inputFileEncoding` property defines the encoding used.
outputDataFile	Name of the file to generate with updated phonetic keys. The `outputFileEncoding` property defines the encoding used.
keyForIndices	A comma-separated list of value indices, or column number, corresponding to the values that the phonetic keys are generated for. Index values start at 1, corresponding to the first value of the line, and can have a maximum value corresponding to the number of values on a line. If standardization is off , that is, if `isStandardizationFeatureOn==false`, then the `keyForIndices` are used as the `keysource` indices. • Only applicable when name standardization is on.

Table 63. Property values (continued)

Property	Description
standardizedNamesFileName	If this value is set, the `keySourceIndex` property should **not** be specified. This value represents the location of the file to be used as inputs for standardized names. The only values in this file should be the primary key, followed by each of the `keysources` corresponding to the values specified in the `keyForIndices` property, and in the **same** order. If InfoSphere MDM Server name standardization is used, then both the PERSONNAME and PERSONSEARCH tables must be exported. This property points to the PERSONSEARCH file.
isStandardizationFeatureOn	Values include “true” or “false”. If set to “true” then phonetic keys for person names are generated from the standardized version of the name, which is obtained from the file pointed to by the `standardizedNamesFileName` property.
keySourceIndex	Only applicable when name standardization is on. If this value is set, the `standardizedNamesFileName` property should **not** be specified. Represents the index of the column to be used as the `keysource` in the same file as the `inputDataFile`.
valueDelimiter	Default delimiter is , (a comma)
characterStringDelimiter	Default delimiter is “ (double quotation marks)
elementId	Default value is `com.ibm.imc.phonetics.PhoneticKeyProviders`
extensionElementId	Default value is `DoubleMetaphoneExtension`

Example showing generating phonetic keys for city names

The following is an example for generating phonetic keys for city names from the address table

Properties:

```
inputDataFile=test/files/integration/address/address_export.del
outputDataFile=bin/address_out.del
isStandardizationFeatureOn=true
keyForIndices=11 (city_name is the 11'th column)
phoneticKeyLength=4
```

Input File

```
866114720754372 2,31,2,108,"269 Puma Dr",,,,,,"Toronto","M5A1P4","N","N","14","1  ",,,"2006-05-09-16.45.43.722000","cusadmin",1147207528724709,
```

Output File

```
866114720754372 2,31,2,108,"269 Puma Dr",,,,,,"Toronto","TRNT","M5A1P4","N","N","14","1  ",,,"2006-05-09-16.45.43.722000","cusadmin",1147207528724709,
```

Running the Phonetic Key Population Script

The phonetic key population utility is a J2SE utility and can be run from the command line. A sample script `runBatchKeyGen.ksh` is provided and is located under `WCC/utils/phoneticKeyPopulator` and can be customized according to the required environment.

Sample Files

A set of samples exist for address and person name runs. They can be found under `WCC/utils/phoneticKeyPopulator/samples`. For each, a sample export file, `override.properties` file, and import file are included.

Configuring minimum wildcard search length validation

You can define the number of non-wildcard characters in a search in order to improve the quality of the results.

A number of search criteria fields support the use of wildcard (“%”) and lookalike (“?”) characters. However a search that contains too many wildcard or lookalike characters can return a poor quality result, for example a search on the last name “S%” would return too many results to be useful.

To avoid this you can use a External Validation validator to define and enforce a minimum number non-wildchard characters in a search.

The validator `com.dwl.tcrm.validation.validator.MinWildcardSearchLen` can be applied against any element on the `TCRMPersonSearchBObj`, `TCRMOrganizationSearchBObj` and `TCRMFSPartySearchBObj` groups. The parameter that specifies the minimum number of non-wildcard characters (“%” and “?”) is `MinWildcardSearchLen`.

Chapter 46. Standardizing name, address, and phone number information

You can use a standardizer to ensure that names, addresses and phone numbers are stored in InfoSphere MDM Server using the same format. Depending on configuration, the standardizer will also normalize address and phone number information. You can use the default standardization that comes with InfoSphere MDM Server, or you can use standardizers from IBM InfoSphere Information Server QualityStage or Trillium.

Note: For information about the generic Entity Standardization Framework that can be used to standardize data for any business object, see Chapter 39, "Implementing the Entity Standardization framework," on page 523.

InfoSphere MDM Server offers the ability to store party names and addresses in a standardized form. Address standardization does the following:

- Corrects and completes missing elements of an address.
- Supports address searching without requiring the address to use a particular format. For example, you can search for ″123 Main St." and "123 Main Street" will also be returned.
- Minimizes or eliminates duplicate addresses in the address table.
- Stores addresses separately from parties and shares them between parties, so two different parties who are at the same address—for example, a husband and wife—can share the same address information.

This chapter describes when standardization is used in InfoSphere MDM Server, how standardization and normalization works within the product, and how to use the different standardization implementations that are available for configuration including the Default Standardizer, QualityStage Standardizer and Trillium Standardizer.

In this section, you will learn:

When InfoSphere MDM Server uses standardization

InfoSphere MDM Server uses name, address, and phone number standardization whenever this information is added or updated for a person or organization. Name and address standardization is also used in searching, and name standardization is used in suspect processing.

The following list shows transactions that use standardization:

- addAddress
- addOrganization
- addOrganizationName

- addParty
- addPartyAddress
- addPerson
- addPersonName
- correctAddress
- correctPartyAddress
- searchFSParty
- searchOrganization
- searchNodeInPartyHierarchy
- searchNodeInPersonHiearchy
- searchNodeInOrganizationHierarchy
- searchParty
- searchPerson
- searchSuspectOrganizations
- searchSuspectParties
- searchSuspectPersons
- standardizeAddress
- updateAddress
- updateAllPartyAddresses
- updateOrganization
- updateOrganizationName
- updateParty
- updatePartyAddress
- updatePerson
- updatePersonName

InfoSphere MDM Server standardization overview

With InfoSphere MDM Server, when data is received, it can be standardized using one of three standardizers: Default, QualityStage or Trillium.

For both the QualityStage and Trillium Standardizers, you have the additional option of allowing for normalization of the data. *Normalization* involves taking a set of data that is provided in a single field, and parsing it out into its individual elements so that they can be stored separately. For example, if `555 Acme Rd.` is received in line 1 of the address, then, with either QualityStage or Trillium Standardizer configured, InfoSphere MDM Server can store `555` as the street number, `Acme` as the street name and `ROAD` as the street type. The *unnormalized data* is the address line 1, and the *normalized data* is the separately stored street number, street name and street type.

Normalization is enabled by setting the */IBM/Party/LocationNormalization/enabled* configuration item to `true` (it is `false` by default). This configuration item turns normalization on or off for both addresses and phone numbers.

In such a case, the following occurs:

1. Internal to InfoSphere MDM Server, an external rule called CheckAddressNormalization is called first to derive unnormalized data (addressLineOne) by the formatter defined in the CONFIGELEMENT table.

2. The unnormalized data is then sent to the standardizer to either standardize or normalize, or both.
3. Finally, the returned normalized items from the standardizer are used to derive unnormalized data by the formatter.

Phone number normalization works a similar way.

The following two external rules are introduced for normalization:

CheckAddressNormalizedRule
This rule is used to derive unnormalized data (AddressLineOne, AddressLineTwo of TCRMAddressBObj) if both unnormalized data and normalized data (such as normalized address items that are separately stored) are provided in the request. The rule that determines how the unnormalized address data is derived is defined in the Address Standardization and Normalization table. This rule uses CM option /IBM/Party/ContactMethod/PhoneCategoryType to determine the Contact Method Category Type for the phone number.

CheckContactMethodNormalizedRule
This rule is used to derive unnormalized data (ReferenceNumber of TCRMContactMethodBObj) if both unnormalized data, such as ReferenceNumber, and normalized data , such as normalized TCRMPhoneNumberBObj items that are separately stored, are provided in the request. The rule that determines how to derive the unnormalized phone number data is derived is defined in the Phone Number Standardization and Normalization table.

Given the level of configuration and the types of data and transactions that are possible with standardizations, there are many different scenarios that are supported. However, only a few of the scenarios are expected to be used by most customers. The scenarios that we expect customers to use most often are indicated in the following tables, which describe the detailed behavior for all scenarios possible for both Address and Phone Number standardization and normalization. Generally, when normalization is on, updates are expected to send both normalized (N) and unnormalized (U) data in the request, since both types of data would be returned from the previously invoked transaction, but only one type of data would change, either U or N. Add transactions are expected to just use one type of data.

Table 64. Address Standardization and Normalization

Standardization/ Normalization	Just Unnormalized Data <U>	Just Normalized Data <N>	Both Types of Data <U, N>
On, Off • No pre-formatting occurs • No post-formatting occurs	1. AddressLineOne, AddressLineTwo, AddressLineThree are standardized and saved 2. After standardization, normalized address items are ignored 3. No pre- or post-formatting occurs This scenario is expected to be used more often.	Exception thrown due to missing mandatory field	For both add and update transactions: • N is not saved • The standardization of U is saved • Pre- and post-formatting are not executed • Normalized data returned from the standardizer is ignored.

Table 64. Address Standardization and Normalization (continued)

Standardization/ Normalization	Just Unnormalized Data <U>	Just Normalized Data <N>	Both Types of Data <U, N>
Off, On Pre-formatting occurs for N	Saves U as it is.	Pre-formats U. No post-formatting occurs	For both add and update transactions: • N and U are saved as they are • Pre- and post-formatting are not executed **Note:** This configuration may cause N and U to be inconsistent.
Off, Off • No pre-formatting occurs • No post-formatting occurs	Saves U as it is. This scenario is expected to be used more often.	Exception thrown due to missing mandatory field	For both add and update transactions: • N is not saved • U is saved as it is • Pre- and post-formatting are not executed **Note:** This configuration may cause N and U to be inconsistent.
On, On • Pre-formatting occurs • Post-formatting occurs	Post-format addressLineOne, addressLineTwo, addressLineThree. Formatter is defined in CONFIGELEMENT table. After standardization, normalized address items will be persisted	Pre- and post-formatted by InfoSphere MDM Server This scenario is expected to be used more often.	For add transactions: • U is sent to the standardizer • N is ignored. No preformatting is executed • Normalized data is populated with data received from the standardizer • Post-formatting is executed For update transactions, the behavior depends on what has changed, which you can determine by comparing the incoming data with the before image: • If nothing has changed or if only U has changed, InfoSphere MDM Server uses U as default data sent to standardizer. No pre-formatting is executed. • If only N has changed, U (addrLine2 and addrLine3, if defined in the pre-formatter) is pre-formatted by N. • If both N and U have changed, then InfoSphere MDM Server uses U as the data to send to the standardizer • Post-formatting is executed This scenario is expected to be used more often.

Table 65. Phone Number Standardization and Normalization

Standardization/ Normalization	**Just Unnormalized Data <U>**	**Just Normalized Data <N>**	**Both Types of Data <U, N>**
On, Off • No pre-formatting occurs • No post-formatting occurs	1. Ref_num is standardized and saved 2. After standardization, normalized address items are ignored This scenario is expected to be used more often.	Exception thrown due to missing mandatory field	For both add and update transactions: • N is not saved • The standardization of U is saved • Pre- and post-formatting are not executed • Normalized data returned from the standardizer is ignored.
Off, On • Pre-formatting occurs • No post-formatting occurs	Saves U as it is.	Pre-formats ref_num.NN	For both add and update transactions: • N and U are saved as they are • Pre- and post-formatting are not executed **Note:** This configuration may cause N and U to be inconsistent.
Off, Off • No pre-formatting occurs • No post-formatting occurs	Saves U as it is. This scenario is expected to be used more often.	Exception thrown due to missing mandatory field	For both add and update transactions: • N is not saved • U is saved as it is • Pre- and post-formatting are not executed **Note:** This configuration may cause N and U to be inconsistent.

Table 65. Phone Number Standardization and Normalization (continued)

Standardization/ Normalization	Just Unnormalized Data <U>	Just Normalized Data <N>	Both Types of Data <U, N>
On, On • Pre-formatting occurs • Post-formatting occurs	Post-format ref_num. Formatter is defined in CONFIGELEMENT table. After standardization, normalized phone number items will be persisted	Pre- and post-formatted by InfoSphere MDM Server This scenario is expected to be used more often.	For add transactions: • U is sent to the standardizer • N is ignored. No preformatting is executed • Normalized data is populated with data received from the standardizer • Post-formatting is executed For update transactions, the behavior depends on what has changed, which you can determine by comparing the incoming data with the before image: • If nothing has changed or if only U has changed, InfoSphere MDM Server uses U as default data sent to standardizer. No pre-formatting is executed. • If only N has changed, U is pre-formatted by N. • If both N and U have changed, then InfoSphere MDM Server uses U as the data to send to the standardizer • Post-formatting is executed This scenario is expected to be used more often.

Standardizers

There are three standardizers available with InfoSphere MDM Server: the Default Standardizer, QualityStage and Trillium.

For a given installation of the product, only one standardizer can be configured. Although each standardizer comes with its own points for customization, defining which standardizer you want to use requires configuring the following two properties:

- `/IBM/Party/Standardizer/Name/className`
- `/IBM/Party/Standardizer/Address/className`

The values these properties should have, and how to customize each particular standardizer is described below. By default InfoSphere MDM Server uses the Default Standardizer, which is included with InfoSphere MDM Server.

See also:

"Using the Default standardizer" on page 629

"Using QualityStage for standardization" on page 629

"Using Trillium for standardization" on page 634

Using the Default standardizer

InfoSphere MDM Server provides a set of standardizers that is used as the default standardizers for names and addresses.

The default name standardizer does the following:

- standardizes last names by converting them to uppercase and stripping out any spaces. For instance, when the name `Mac Donald` is entered, it is standardized to `MACDONALD`.
- standardizes organization names by changing all letters to uppercase.

The default address and contact method standardizers store elements in the same form in which they are entered.

To enable the Default Standardizer, configure the following:

Table 66. Default standardizer

Configuration Name	Value
/IBM/Party/Standardizer/Name/className	com.dwl.tcrm.coreParty.component.TCRMPartyStandardizer
/IBM/Party/Standardizer/Address/className	com.dwl.tcrm.coreParty.component.TCRMAddressStandardizer

The default standardizer is not able to normalize data, so configuring the default standardizer effectively turns normalization off.

Using QualityStage for standardization

IBM InfoSphere Information Server QualityStage provides a very flexible, rule-based framework for standardization, and can be used as the standardizer in InfoSphere MDM Server.

Geographical information for the data can be specified in QualityStage jobs by using QualityStage Designer so that at design time, a designer can create a rule to standardize U.S. addresses a particular way, and another rule to standardize Canadian addresses in a different way. Similar flexibility is available for standardizing names.

The default shipped QualityStage address standardization job is a Multi National Standardization (MNS) job. This means that the country information must be supplied to QualityStage job in order to apply the country-specific rules when it standardizes the data. However if you want to design locale-specific jobs, InfoSphere MDM Server has provided the configuration option and interface which allow you to call specific rules that you have created.

For more information on QualityStage, see: http://www-306.ibm.com/software/data/integration/qualitystage/.

To enable the QualityStage Standardizer, configure the following:

Table 67. QualityStage standardizer

Configuration Name	Value
/IBM/Party/Standardizer/Name/className	com.ibm.mdm.thirdparty.integration.iis8.adapter.InfoServerStandarizerAdapterr
/IBM/Party/Standardizer/Address/className	com.ibm.mdm.thirdparty.integration.iis8.adapter.InfoServerStandarizerAdapter

See also:

"Configuring the QualityStage standardizer" on page 630

Configuring the QualityStage standardizer

QualityStage standardization must be plugged in before you can use it with InfoSphere MDM Server.

The DefaultInfoServerConverter is a generic converter that can transform the immediate attributes of a business object to a flat binary format used by QualityStage and it requires input and output maps. The assigned values for these maps can contain many semicolon-delimited assignments. In the input map, the right side attributes are the business object attributes and the left side attributes are the ones in QualityStage data object. The right side of each assignment can accept the + sign to concatenate the content from the source object, which are the business object attributes. This is opposite to the order of the output map, where the left side attribute is business object attribute and the right side of each assignment can hold concatenation of multiple columns in the corresponding QualityStage job.

The failure indicators are the fields that the InfoSphere MDM Server default QualityStage jobs populate in the output object if QualityStage jobs encounter a fault when standardizing the data. In that case, the InfoSphere MDM Server default standardization classes, TCRMAddressStandardizerand TCRMPartyStandardizer, are used as the fallback scenario.

You can modify the standardization functionality without changing any code by modifying the QualityStage Standardization rules and updating the mapping information of the attributes.

InfoSphere MDM Server is shipped with four default QualityStage jobs. The job names, input data type and output data type of each job are shown in the following table.

Table 68. Default QualityStage jobs

Standardization	Job name	Input data type	Output data type
Address	ISD_MDMQS_Address_Standardization	AddressInput	AddressOutput
Person Name	ISD_MDMQS_Person_Standardization	PersonNameInput	PersonNameOutput
Organization Name	IDS_MDMQS_Organization_Standardization	OrgNameInput	OrgNameOutput
Contact Method	ISD_MDMQS_Phone_Standardization	PhoneNumberInput	PhoneNumberOutput

These input and output data type layouts are detailed in the following tables.

Table 69. PersonNameInput

Field name	Business Object equivalent field	Format
PersonNamePrefix	TCRMPersonNameBObj.PrefixValue	String(20)
PersonGivenNameOne	TCRMPersonNameBObj.GivenNameOne	String(25)
PersonGivenNameTwo	TCRMPersonNameBObj.GivenNameTwo	String(25)
PersonGivenNameThree	None	String(25)
PersonGivenNameFour	None	String(25)
PersonFamilyName	TCRMPersonNameBObj.LastName	String(30)
PersonNameSuffix	TCRMPersonNameBObj.GenerationValue	String(20)

Table 70. PersonNameOutput

Field name	Business Object equivalent field	Format
MatchFirstName_MNNAME	TCRMPersonNameBObj.StdGivenNameOne	String(25)
MiddleName_MNNAME	TCRMPersonNameBObj.StdGivenNameTwo	String(25)
MatchPrimaryName_MNNAME	TCRMPersonNameBObj.StdLastName	String(50)
NameGeneration_MNNAME	TCRMPersonNameBObj.GenerationValue GenerationType needs to be set according to GenerationValue	String(10)

Table 70. PersonNameOutput (continued)

Failure Indicators	Behavior on failure
UnhandledData_MNNAME/ ExceptionData_MNNAME	Use default person name standardization and log a warning message for the details.

Table 71. OrgNameInput

Field name	Business Object equivalent field	Format
OrganizationName	TCRMOrganiztionNameBObj.OrganizationName	String(255)

Table 72. OrgNameOutput

Field name	Business Object equivalent field	Format
PrimaryName_MNNAME + NameSuffix_MNNAME	TCRMOrganiztionNameBObj. SOrganizationName	String (50)
Failure Indicators: UnhandledData_MNNAME/ ExceptionData_MNNAME	**Behavior on failure:** Use default UPPERCASE organization name standardization + Log a warning message for the details	

Table 73. AddressInput

Field name	Business Object equivalent field	Format
AddressLineOne	TCRMAddressBobj.ResidenceNumber+ TCRMAddressBobj.AddressLineOne	String(60)
AddressLineTwo	TCRMAddressBobj.AddressLineTwo	String(50)
AddressLineThree	TCRMAddressBobj.AddressLineThree	String(50)
CITY	TCRMAddressBobj.City	String(50)
STATE	TCRMAddressBobj.ProvinceStateValue	String(120)
PostalCode	TCRMAddressBobj.ZipPostalCode	String(20)
COUNTRY	TCRMAddressBobj.CountyValue Country is not a mandatory field in InfoSphere MDM Server, but is a mandatory column for QualityStage MNS jobs. If the country code is not supplied in the input data, a default country code—which is a property item in Configuration Management—is passed with the supplied address to QualityStage. Do not persist this default country in the InfoSphere MDM Server database.	String(120)

Table 74. AddressOutput

Field name	Business Object equivalent field	Format
AddressLineOne_Formatted	TCRMAddressBObj.AddressLineOne	String(50)
AddressLineTwo_Formatted	TCRMAddressBObj.AddressLineTwo	String(50)
AddressLineThree_Formatted	TCRMAddressBObj.AddressLineThree	String(50)
CityName_MNS	TCRMAddressBObj.City	String(28)
StateAbbreviation_MNS	TCRMAddressBObj.ProvinceStateValue1	String(3)
FullPostalCode_MNS	TCRMAddressBObj.ZipPostalCode	String(10)
SecondaryAddressInfo_MNS	TCRMAddressBObj.ResidenceNumber	String(50)
BuildingName_MNS	TCRMAddressBObj.BuildingName	String(30)
HouseNumber_MNS	TCRMAddressBObj.StreetNumber	String(15)
StreetName_MNS	TCRMAddressBObj.StreetName	String(35)
StreetSuffixType_MNS	TCRMAddressBObj.StreetSuffix	String(15)

Table 74. AddressOutput (continued)

Field name	Business Object equivalent field	Format
StreetPrefixDirection_MNS	TCRMAddressBObj.PreDirectional	String(3)
StreetSuffixDirection_MNS	TCRMAddressBObj.PostDirectional	String(3)
BoxType_MNS	TCRMAddressBObj.BoxDesignator	String(15)
BoxValue_MNS	TCRMAddressBObj.BoxId	String(10)
StationInformation	TCRMAddressBObj.StnInfo	String(16)
StationIdentifier	TCRMAddressBObj.StnId	String(16)
Region	TCRMAddressBObj.Region	String(16)
DeliveryDesignator	TCRMAddressBObj.DelDesignator	String(16)
DeliveryIdentifier	TCRMAddressBObj.DelId	String(16)
AddtlDeliveryInfo	TCRMAddressBObj.DelInfo	String(50)
LatitudeDegrees	TCRMAddressBObj.LatitudeDegrees	String(10)
LongitudeDegrees	TCRMAddressBObj.LongitudeDegrees	String(10)
PostalBarcode	TCRMAddressBObj.ZipPostalBarCode	String(30)
Failure Indicators: UnhandledAddressText_MNS / NonProcessedData_MNS	**Behavior on failure:** Use default UPPERCASE address standardization + Set TCRMAddressBObj.StandardFormatingIndicator to 'N' + Log a warning message for the details	

Table 75. PhoneNumberInput

Field name	Business Object equivalent field	Format
ReferenceNumber	TCRMContactMethod.ReferenceNumber	String(255)

Table 76. PhoneNumberOutput

Field name	Business Object equivalent field	Format
PhoneFormatted_MNPHONE	TCRMContactMethod.ReferenceNumber	String(255)
CountryCode_MNPHONE	TCRMPhoneNumberBObj.PhoneCountryCode	String(4)
AreaCode_MNPHONE	TCRMPhoneNumberBObj.PhoneAreaCode	String(6)
Exchange_MNPHONE	TCRMPhoneNumberBObj.PhoneExchange	String(6)
Number_MNPHONE	TCRMPhoneNumberBObj.PhoneNumber	String(20)
Extension_MNPHONE	TCRMPhoneNumberBObj.PhoneExtension	String(8)
Failure Indicators: UnhandledData_MNPHONE/ ExceptionData_MNPHONE	**Behavior on failure:** Use default Contact Method standardization + Log a warning message for the details	

You can use either the default jobs as delivered with InfoSphere MDM Server, or develop a customized one. The following tables show the default configuration for the InfoSphere MDM Server QualityStage Standardization Adapter when it is using the default QualityStage jobs.

Table 77. Person Name Standardization

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/ operationName	standardizePersonName
/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/ Service/name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService

Table 77. Person Name Standardization (continued)

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/ Service/basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/ Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ StandardizePersonName/ Converter/ className	com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/ AttributesMap/Input/dataType	PersonNameInput
/IBM/ThirdPartyAdapters/IIS/ StandardizePersonName/ AttributesMap/Input/map	personnameprefix=PrefixValue;persongivennameone=GivenNameOne;persongivennametwo= GivenNameTwo;personfamilyname=LastName
/IBM/ThirdPartyAdapters/IIS/StandardizePersonName/ AttributesMap/Output/dataType	PersonNameOutput
/IBM/ThirdPartyAdapters/IIS / StandardizePersonName/ AttributesMap/Output/map	StdGivenNameOne=matchfirstname_mnname;StdGivenNameTwo=middlename_mnname;StdLastName= matchprimaryname_mnname
/IBM/ThirdPartyAdapters/IIS/ StandardizePersonName/ AttributesMap/Output/ failureIndicators	unhandleddata_mnname; exceptiondata_mnname

Table 78. Organization Name Standardization

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/operationName	standardizeOrgName
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Service/name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Service/ basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/ Converter/className	com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/ Input/dataType	OrgNameInput
/ IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/ AttributesMap/Input/map	organizationname =OrganizationName
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/ Output/dataType	OrgNameOutput
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/ Output/map	SOrganizationName= primaryname_mnname+namesuffix_mnname
/IBM/ThirdPartyAdapters/IIS/StandardizeOrganizationName/AttributesMap/ Output/failureIndicator	unhandleddata_mnname; exceptiondata_mnname

Table 79. Address Standardization

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/ operationName	standardizeAddress
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/Service/name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/Service/basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/ Converter/className	com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/ AttributesMap/Input/ dataType	AddressInput
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/AttributesMap/Input/map	addresslineone=ResidenceNumber+AddressLineOne;addresslinetwo=AddressLineTwo;addresslinethree= AddressLineThree;city=City;state=ProvinceStateValue;postalcode=ZipPostalCode;country=CountryValue
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/ AttributesMap/Output/ dataType	AddressOutput

Table 79. Address Standardization (continued)

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/ AttributesMap/Output/map	ResidenceNumber=secondaryaddressinfo_mns;AddressLineOne=addresslineone_formatted;AddressLineTwo= addresslinetwo_formatted;AddressLineThree=addresslinethree_formatted;City=cityname_mns;ProvinceStateValue= stateabbreviation_mns;ZipPostalCode=fullpostalcode_mns
/IBM/ThirdPartyAdapters/IIS/ StandardizeAddress/ AttributesMap/Output/ failureIndicators	unhandledaddresstext_mns;nonprocesseddata_mns;unhandleddata_mnpost

Table 80. Address Normalization

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/operationName	standardizeAddress
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/Service/name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/Service/basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/Converter/className	com.ibm.mdm.thirdparty.integration.iis8.converter.DefaultInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/AttributesMap/Input/dataType	AddressInput
/IBM/ThirdPartyAdapters/IIS/NormalizeAddress / AttributesMap/Input/map	addresslineone=ResidenceNumber+AddressLineOne;addresslinetwo=AddressLineTwo;addresslinethree= AddressLineThree;city=City;state=ProvinceStateValue;postalcode=ZipPostalCode;country=CountryValue
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/AttributesMap/Output/ dataType	AddressOutput
/IBM/ThirdPartyAdapters/IIS/NormalizeAddress /AttributesMap/Output/map	ResidenceNumber=secondaryaddressinfo_mns;AddressLineOne=addresslineone_formatted;AddressLineTwo= addresslinetwo_formatted;AddressLineThree=addresslinethree_formatted;City=cityname_mns;ProvinceStateValue= stateabbreviation_mns;ZipPostalCode=fullpostalcode_mns;BuildingName=buildingName_mns;StreetNumber= houseNumber_mns;StreetName=streetname_mns;streetsuffix=streetsuffixtype_mns;PreDirectional= streetprefixdirection_mns;PostDirectional=streetsuffixdirection_mns;BoxDesignator=boxtype_mns;BoxId= boxvalue_mns;StnInfo=stationinformation;StnId=stationidentifier;Region=region;DelDesignator= deliverydesignator;DelId=deliveryidentifier;DelInfo=addtldeliveryinfo;LatitudeDegrees= latitudedegrees;LongitudeDegrees=longitudedegrees;ZipPostalBarCode=postalbarcode
/IBM/ThirdPartyAdapters/IIS/ NormalizeAddress/AttributesMap/Output/ failureIndicators	nhandledaddresstext_mns;nonprocesseddata_mns;unhandleddata_mnpost

Table 81. PhoneNumber Standardization

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/operationName	standardizePhoneNumber
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Service/name	*For RMI/IIOP EJB:* MDMQSService *For SOAP over HTTP (Web Services):* MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Service/ basicPackageName	*For RMI/IIOP EJB:* com.ibm.isd.MDMQS.MDMQSService *For SOAP over HTTP (Web Services):*com.ibm.isd.mdmqsws.mdmqswsservice
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Service/jndi	*For RMI/IIOP EJB:* ejb/MDMQS/MDMQSService *For SOAP over HTTP (Web Services):* wisd/MDMQSWS/MDMQSWSService
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/Converter/className	com.ibm.mdm.thirdparty.integration.iis8.converter.PhoneNumberInfoServerConverter
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/AttributesMap/Input/ dataType	PhoneNumberInput
/IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/AttributesMap/Output/ dataType	PhoneNumberOutput

Using Trillium for standardization

The Trillium Software® Director architecture is a scalable, network-based implementation of the Trillium Software System.

The Director manages the Director Servers deployed across the network. One type of Director Server is the Cleanser Server. It enables the Trillium Software Universal

Cleansing Adapter (UCA), Window Key Generator and the Converter. InfoSphere MDM Server provides an adapter to integrate with the Cleanser Server to perform name and address standardization.

For more information on the Trillium Software System, see http://www.trilliumsoft.com.

To enable the Trillium standardizer, configure the following:

Table 82. Trillium configuration options

Configuration Name	Value
/IBM/Party/Standardizer/Name/className	com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter
/IBM/Party/Standardizer/Address/className	com.dwl.thirdparty.integration.trillium.TrilliumDirectorAdapter
/IBM/ThirdPartyAdapters/Trillium/systemId	The system ID that the Trillium Director uses to recognize the Cleanser Server.
/IBM/ThirdPartyAdapters/Trillium/serverName	The server ID that the Trillium Director uses to recognize the Cleanser Server. Default is Cleanser.

See also:

"Configuring the Trillium standardizer"

Configuring the Trillium standardizer

Default input and output formats for Trillium name and address standardization are provided as the default values in the CONFIGELEMENT table, as shown below. The values separated by the delimiter ";" are the input or output field, with "nil" represent an empty string. For more information, refer to Trillium documentation.

Table 83. Trillium input/output formats

Name	Default Value
/IBM/ThirdPartyAdapters/Trillium/PersonName/ inputFormat	Line1
/IBM/ThirdPartyAdapters/Trillium/PersonName/outputFormat	nil;pr_first_01;pr_middle1_01; pr_middle2_01; pr_middle3_01; pr_last_01
/IBM/ThirdPartyAdapters/Trillium/OrganizationName/inputFormat	Line2
/IBM/ThirdPartyAdapters/Trillium/OrganizationName/outputFormat	nil;pr_busname_01 Line3;Line9
/IBM/ThirdPartyAdapters/Trillium/Address/inputFormat	Line3;Line9
/IBM/ThirdPartyAdapters/Trillium/Address/outputFormat	nil;nil;dr_house_number; dr_street_name;dr_city_name; dr_st_prov_cty_name; dr_postal_code;gm_latitude; gm_longitude;pr_gout_fail_level

Overriding the standardization for business objects

You can skip standardization for objects if they are already standardized, or if there is a need to leave an object unstandardized.

Some source systems may already have addresses in a standardized form, in which case there is no need to invoke standardization when those address are send to InfoSphere MDM Server. Sometimes the standardization needs to be skipped for particular address object unconditionally even if address is not formatted.

See also:

"To override standardization on an address object" on page 636

"Settings and results for StandardFormatingIndicator and StandardFormatingOverride"

"Settings and results for StandardFormattingIndicator" on page 637

To override standardization on an address object

1. If the source systems has addresses in a standardized form, in the input request message set the StandardFormatingIndicator attribute of the TCRMAddressBObj to `Y`. This indicates that the address is already in a standard form, and the attribute values is stored in the ADDRESS table.
2. If the address is not formatted but the standardization needs to be skipped, in the input request message set the StandardFormatingOverride attribute of the TCRMAddressBObj to `Y`. This skips all formatting.

   If both StandardFormatingOverride and StandardFormatingIndicator attributes are set to N or not provided, InfoSphere MDM Server attempts to standardize the address object. standardization as successful, the StandardFormatingIndicator attribute is stored as Y in the ADDRESS table to indicate that address is in standard form.

Settings and results for StandardFormatingIndicator and StandardFormatingOverride

The following table summarizes the results for the combinations of StandardFormatingIndicator and StandardFormatingOverride in TCRMAddressBObj input and ADDR_STANDARD_IND and OVERRIDE_IND columns in the ADDRESS table:

Table 84. Standardization attribute combinations

Standard FormatingIndicator	Standard FormatingOverride	ADDR_ STANDARD_ IND	OVERRIDE_ IND	Result
Y	Y	Y	Y	Address has been standardized outside InfoSphere MDM Server and standardization is overridden
Y	N	Y	N	Address has been standardized outside InfoSphere MDM Server and standardization was not overridden
N	Y	N	Y	Address is not in standard form and standardization was overridden
N	N	N	N	Standardization failed.
		Y	N	Address is in standard form. InfoSphere MDM Server standardization was not overridden
Y	NULL	Y	NULL	Address is in standard form InfoSphere MDM Server standardization was not overridden.
N	NULL	N	NULL	Address standardization failed.
		Y	NULL	Address is in standard form and standardization is not overridden
NULL	Y	N	Y	InfoSphere MDM Server skips standardization.
NULL	N	N	N	Address standardization failed.
		Y	N	Address is in standard form and standardization is not overridden
NULL	NULL	N	NULL	Address standardization failed.
		Y	NULL	Address is in standard form and standardization is not overridden

Settings and results for StandardFormattingIndicator

When the attribute /IBM/ThirdPartyAdapters/IIS/StandardizeAddress/StandardFormattingIndicator/enabled, is set to:

- `True` the StandardFormatingIndicator attribute of TCRMAddressBObj is set to Y in the ADDRESS table to indicate that standardization for this address was successful. This is the default setting
- `False` the StandardFormatingIndicator attribute of TCRMAddressBObj is not set to Y.

When the attribute /IBM/ThirdPartyAdapters/IIS/StandardizePhoneNumber/StandardFormattingIndicator/enabled is set to:

- `True` the StandardFormatingIndicator attribute of TCRMContactMethodBObj is set to Y in the CONTACTMETHOD table to indicate that standardization for this object was successful. This is the default setting.
- `False` the StandardFormatingIndicator attribute of TCRMContactMethodBObj is not set to Y.

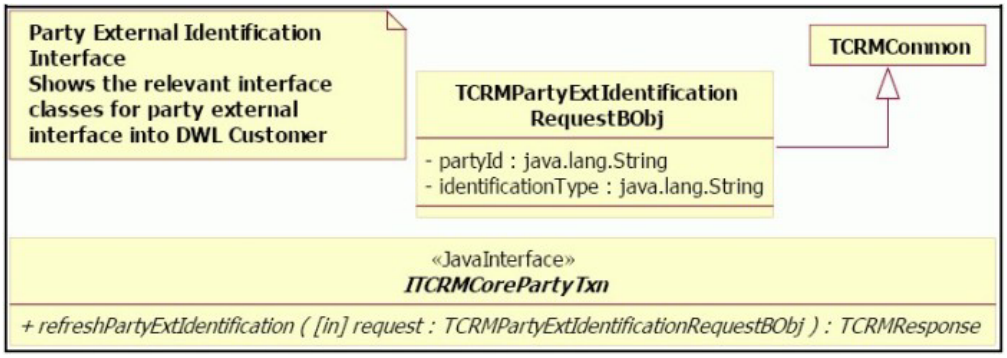
The following table summarizes the results of setting the StandardFormatingIndicator for TCRMAddressBObj and TCRMContactMethodBObj:

Note: The N* in the table suggests the address or phone number standardization failed, but it may have succeeded. In order to keep backward compatibility, after standardization, the input value is not changed to the correct Y value. Clients using InfoSphere MDM Server v9.0 and above should have the configelement flags set to true.

Configelement tags	Standard Formating Indicator in request in TCRMAddressBObj or TCRMContactMethodBObj	Standard Formating Indicator in Response in TCRMAddressBObj or TCRMContactMethodBObj	ADDR_STANDARD_IND in Address table and CONT_METH_STD_IND in Contactmethod table	Result
FALSE	Y	Y	Y	Skip standardization
	N	N*	N*	Standardization succeeded, but indicator is not set to Y for backwards compatibility reasons
		N	N	Standardization failed
	<Standard Formating Indicator/> (Empty Tag)	Does not exist	NULL in the database table column	Standardization succeeded, but indicator is not set to Y for backwards compatibility reasons
		N	N	Standardization failed
	Does not exist	Does not exist	NULL in the database table column	Standardization succeeded, but indicator is not set to Y for backwards compatibility reasons
		N	N	Standardization failed
TRUE	Y	Y	Y	Skip standardization
	N	Y	Y	Standardization succeeded
		N	N	Standardization failed
	<Standard Formating Indicator/> (Empty Tag)	Y	Y	Standardization succeeded
		N	N	Standardization failed
	Does not exist	Y	Y	Standardization succeeded
		N	N	Standardization failed

About the Refresh AbiliTec link

InfoSphere MDM Server provides a transaction, called `refreshPartyExternalIdentifier`, to return a party's AbiliTec link from Acxiom's AbiliTec linking module and persist it as party identification. This transaction is available through the party transactional controller as shown in the following class diagram.



Some additional details related to the refresh transaction:

- The actual module responsible for returning the external identifier is modeled as a pluggable module, which implements the `IPartyExternalIdentificationAccessor` interface. An implementation class is selected from the configuration using the identification type passed as input into the refresh transaction. This allows for the system to have an accessor for each type of external identification.
- InfoSphere MDM Server provides a default accessor, called `AbiliTecLinkAccessorUpgradeV10`, for fetching AbiliTec link by making a threeSixty request to AbiliTec linking module hosted at Acxiom. The steps performed in the `AbiliTecLinkAccessorUpgradeV10` are:
  - Runs a `getParty` transaction with inquiry level 1 to obtain the party information
  - Extracts party name and address information from the incoming party. InfoSphere MDM Server supports multiple names and addresses, however only one name and address pair is sent in the AbiliTec link request. The name and address to use in the request is configurable. The rule names are:
    - `AbiliTecLinkCommercialNameRule` for organization name rule
    - `AbiliTecLinkConsumerNameRule` for person name rule
    - `AbiliTecLinkAddressRule` for address rule
  - Runs external business rules to perform minimum data checks and map name and address fields to AbiliTec link request fields.
  - Creates an AbiliTec link Web Service request.
  - Calls Acxiom using an https request.
  - Parses the response from Acxiom and extract the consumer or business link, and any error messages.
  - Runs an external business rule, `AbilitecLinksMappingRule`, to map the AbiliTec link to the party identification.
  - Returns the party identification.
  - The newly-returned party identification is added or updated in the InfoSphere MDM Server database. The decision to add or update is driven by

the mapping rule `AbilitecLinksMappingRule` by providing the last update for the party identification, if an existing one has to be updated.

– Suspect re-identification is then executed to refresh the list of suspects for the current party.

For more information about the Refresh Link XML, see "Refresh AbiliTec link sample XML" on page 684.

Chapter 47. Customizing Summary Data Indicators

Summary Data Indicators are used to dynamically avoid reading the database for parts of the model that are not relevant to the current base entity being read.

By denormalizing the model and providing summary data indicators at the base table level, the system can decide whether it needs to read data from the child tables or not. This summary indicator must be updated whenever a relevant change is made to the data whose summary is being tracked.

For example, an implementation of InfoSphere MDM Server may use the party relationship subject area, but relationships may not be present for all parties. When you use Summary Data Indicators, while doing a getParty transaction for a party with no relationships the system does not issue the unnecessary SQL to read from the relationship record.

For information on Smart Inquiries and turning off unused parts of the data model, see Chapter 12, "Configuring Smart Inquiries," on page 165.

In this section, you will learn:

Summary Data Indicator transactions

The `refreshPartySummary` transaction in `(TCRMPartyBObj : TCRMPartyBObj ) : TCRMPartySummaryBObj` is used to refresh the summary data information related to Party.

How Summary Data Indicators affect transactions

The child object summary data indicators in the CONTSUMMARY table shows whether individual child objects are currently present. These summary data indicators must be updated and maintained whenever the child objects are updated.

The rules to calculate the summary data are external to the core product. Two types of external rules are implemented for this feature. `PartySummaryIndicatorRefresherRule` gets the current image of summary data indicator for the party; it is configured using External Rule Component. Other rules are configured using the extension framework. They are executed in post execution. Rules for granular transactions are invoked at the controller level; the rules for composite transactions are invoked at the component level.

The data type for the indicator is SMALLINT. In the default rule, the data type is set to 0 if there is no child object, and set to 1 if there are any active child objects for the party. You can also choose to implement a more complex logic to calculate the indicators.

The following table shows how these rules apply to specific transactions. For example, the rule for Party Relationship is `ContactRelSummaryIndicatorRefresher`, and it is invoked at the controller level, post execution of `addPartyRelationship` and`updatePartyRelationship` transactions.

Rule Class	Invoked by	Level and Execution
PrivPrefSummaryIndicatorRefresher	addPartyPrivacyPreference	Controller level postExecute()
	updatePartyPrivacyPreference	
PartyValueSummaryIndicatorRefresher	addPartyValue	Controller level postExecute()
	updatePartyValue	
ContactRelSummaryIndicatorRefresher	addPartyRelationship	Controller level postExecute()
	updatePartyRelationship	
BankAccountSummaryIndicatorRefresher	addPartyBankAccount	Controller level postExecute()
	updatePartyBankAccount	
ChargeCardSummaryIndicatorRefresher	addPartyChargeCard	Controller level postExecute()
	updatePartyChargeCard	
PayrollDeductSummaryIndicatorRefresher	addPartyPayrollDeduction	Controller level postExecute()
	updatePartyPayrollDeduction	
IncomeSourceSummaryIndicatorRefresher	addIncomeSource	Controller level postExecute()
	updateIncomeSource	
IdentifierSummaryIndicatorRefresher	addPartyIdentification	Controller level postExecute()
	updatePartyIdentification	
AlertSummaryIndicatorRefresher	addPartyAlert	Controller level postExecute()
	updatePartyAlert	
ContEquivSummaryIndicatorRefresher	addPartyAdminSysKey	Controller level postExecute()
	updatePartyAdminSysKey	
InteractionSummaryIndicatorRefresher	addPartyInteraction	Controller level postExecute()
	updatePartyInteraction	
AddressSummaryIndicatorRefresher	addPartyAddress	Controller level postExecute()
	updatePartyAddress	
ContactMethodSummaryIndicatorRefresher	addPartyContactMethod	Controller level postExecute()
	updatePartyContactMethod	
LobRelSummaryIndicatorRefresher	addPartyLobRelationship	Controller level postExecute()
	updatePartyLobRelationship	
PartySummaryIndicatorRefresher	addPartySimple	Component level postExecute()
	updateParty	
PartySummaryIndicatorRefresherRule	refreshPartySummary	Component level action

Note: IncomeSource, AdminContEquiv and Interaction have no endDt in the data model, therefore, the update transaction has no effect on the specific indicator, and the Indicator stays at 1.

Configuring Summary Data Indicators

To turn Summary Data Indicators on, set the `/IBM/Party/SummaryIndicator/enabled` configuration to *true*.

Extending Summary Data Indicators

All data and service-level extension points are available to extend this summary data indicator.

See Chapter 2, "Customizing InfoSphere MDM Server," on page 17 for more information.

Administering Summary Data Indicators

Summary Data Indicator does not require special administration.

Chapter 48. Customizing Party Privacy

Party Privacy incorporates privacy legislation and a party's specific privacy preferences to ensure that the party is only contacted when permission has been given, and the party's information is only shared in an agreed-upon manner. S

pecifically, Party Privacy ensures institutions comply with the different privacy regulations from all levels of government and with the individual's wishes for privacy regarding their personal information.

In this section, you will learn:

Customizing Party Privacy preferences

The transactions relevant to Party Privacy are:

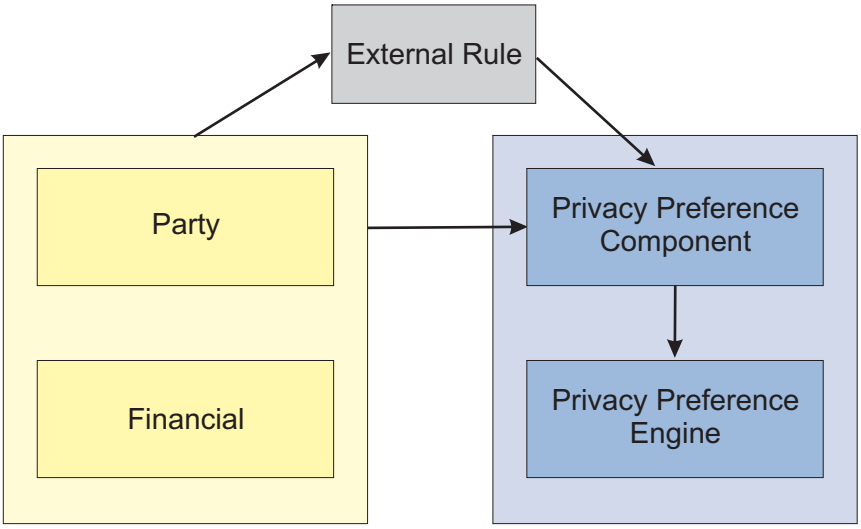
- Party Party Privacy Add Service
- Party Party Privacy Update Service
- Party Party Privacy Get Service
- ContractRoleLocation Party Privacy Add Service
- ContractRoleLocation Party Privacy Update Service
- ContractRoleLocation Party Privacy Get Service

Add/Update/Get Party Privacy Services are invoked as part of following composite transactions:

- addContract
- addContractComponent
- addParty
- addPartyAddress
- addPartyAddressPrivacyPreference
- addPartyContactMethod
- addPartyContactMethodPrivacyPreference
- addPartyLocationPrivacyPreference
- updateContract
- update ContractComposite
- updateContractRoleLocation
- updateParty
- updatePartyAddress
- updatePartyAddressPrivacyPreference
- updatePartyContactMethod
- updatePartyContactMethodPrivacyPreference
- updatePartyLocationPrivacyPreference
- getContract
- getContractComponent
- getParty

- getPartyAddress
- getPartyAddressPrivacyPreference
- getPartyContactMethod
- getPartyContactMethodPrivacyPreference
- getPartyLocationPrivacyPreference
- getAllPartyAddressPrivacyPreference
- getAllPartyContactMethodPrivacyPreference
- getAllPartyLocationPrivacyPreference

Code Interactions design overview



The Preference Engine is used to load the defaults during start up and to assist in retrieving default preferences. Retrieving default preferences can be customized using an external rule.

Chapter 49. Customizing Campaigns

IBM InfoSphere Master Data Management Server Campaigns feature stores and retrieve information regarding marketing campaigns. A marketing campaign promotes awareness of something—products, information, parties—and its target audience can be a person or an organization. Marketing campaign information about products and other business functions—such as fee changes—can be associated with one or more parties.

Campaign implementation resides behind an interface that provides business services to add, update and retrieve campaign details.

In this section, you will learn:

"Customizing Campaign business key validation rules"

"Modifying retrieve campaign-associated details rules"

Customizing Campaign business key validation rules

You can modify Business key validation rules.

The example below shows the business key validation for Campaign. Currently, the campaign name business key cannot be changed in an update transaction. You can change this rule to implement a customized rule.

In `BusinessKeyValidation.java`:

```
CampaignBusinessKeyValidation: Rule Id 19
```

The example below shows the business key validation for Campaign Association. For campaign association, currently the entity name, `instancePK`, and `campaignId` are business keys that cannot be changed in an update transaction. You can change this rule to implement a customized rule.

In `BusinessKeyValidation.java`:

```
CampaignAssociationBusinessKeyValidation: Rule Id 20
```

Modifying retrieve campaign-associated details rules

If necessary, you can modify the rules for retrieving campaign associated detail objects.

The example below shows the rule for retrieving campaign-associated detail objects. You can modify this rule can to retrieve other inquiry levels. For example, a get grouping inquiry level 0 on the entityName as GROUPING would return the detail object GROUPING. Currently, both `getCampaign` and `getCampaignAssociation` use this rule file. These inquiries get the detail information for the associated object based on its entity name, like CONTACT for party, CDPRODTP for product, GROUPING for grouping. For getCampaign, inquiry level 0 is used. For getCampaignAssociation , inquiry level 1 is used. This rule can be changed to use other inquiry levels and return more information.

```
In CampaignAssociatedDetail.java
CampaignAssociatedDetail: Rule Id 23
```

Chapter 50. Configuring the Know Your Customer compliance feature

The Know Your Customer compliance feature allows InfoSphere MDM Server to store, update, and retrieve compliance requirements.

There are two types of compliance requirement documents for knowing your customer: target documents to be validated, and the documents that are used to validate the target documents. Target documents must exist in InfoSphere MDM Server. Documents used to validate target documents, however, can exist outside the InfoSphere MDM Server system.

The know your customer compliance feature also allows you to persist information to a server system regarding a party's adherence to compliance rules.

In this section, you will learn:

Understanding Know Your Customer compliance transactions

InfoSphere MDM Server provides a set of metadata compliance transactions and specialized party compliance transactions.

See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for more details about these transactions.

Extending the Know Your Customer compliance feature

All data-level and transaction-level extension points are available to extend the know your customer compliance feature.

The Know Your Customer compliance feature has one compliance extension that is configurable: addPartycompliance, with the following criteria:

- **Extension set ID**—154
- **Extension set name**—PartyComplianceEMNotifier

During an addPartyCompliance transaction, an extension runs in the post-execute of the transaction that activates the PartyComplianceEMNotifier. This extension creates an event during the transaction that sends a notification at the next-verification date of the party compliance, if the party compliance needs to be

verified again. If a next-verification date was not specified, the extension tries to find a validation frequency set in the compliance. If a validation frequency is found, the extension sets the next verification date based on the validation frequency of the compliance.

Configuring Know Your Customer compliance external validation rules

There are several external validations rules for the know your customer compliance feature. Be familiar with them before you configure them.

The external validations supported for the Know Your Customer compliance feature are as follows:

- **Rule 141**—This rule ensures that at least one compliance target business object is attached to the compliance requirement being created during the creation of the compliance requirement.
  - **External rule ID**—141
  - **External rule class**—ExtValidation
  - **Table in which the external validation can be configured**—This external validation is configured in the V_GROUP_VAL table validation code 38308.
- **Rule 142**—This rule ensures that at least one compliance document business object that is a child object of the compliance requirement being added is attached to the compliance target during the creation of the compliance requirement.
  - **External rule ID**—142
  - **External rule class**—ExtValidation
  - **Table in which the external validation can be configured**—This external validation is configured in the V_GROUP_VAL table validation code 38309.
- **Rule 144**—This rule is used to populate the party compliance next verification date if a next verification date was not provided. The next verification date is populated using the validation frequency table of the compliance by extracting the number of days from the name column of CDVALFREQTP table (for example, the number 30 in the name ″30 days (monthly)″). If the next verification date was provided, that date will be used.
  - **External Rule ID**—144
  - **External Rule Class**—ExtValidation
  - **Table in which the external validation can be configured**—This external validation is configured in the V_ELEMENT_VAL table validation code 36777.

Configuring Know Your Customer compliance business logic external rules

The Know Your Customer compliance feature business logic external rule validates that the instance primary key exists in the system.

This business logic external rule has the following criteria:

- **External rule ID**—143
- **External rule class**—PartyComplianceTargetInstanceRule

This rule validates that the instance primary key specified on the party compliance target business object actually exists in the system. If it exists in the system, the rule validates that the instance primary key belongs to the party ID that was passed in with this party compliance target business object's parent business object.

Configuring Know Your Customer compliance business key validations

The Know Your Customer compliance feature supports business key validation carried out against the target business object and the compliance document.

The business key of the compliance target business object is both the compliance target type and compliance requirement ID. These business keys are defined in the V_ELEMENTATTRIBUTE table. Compliance target business key validations use the common business key mechanism.

The following two rules are used to validate that the party compliance business keys are correct and not updated after they are entered into the system:

- **Rule 137**—Used to validate the business key of the party compliance. Party compliance can be uniquely identified by its PartyId and ComplianceRequirementId. This rule ensures that during an add transaction, party compliances that have duplicate business keys are not added. The ID and class for this rule are as follows:
  - **External rule ID**—137
  - **External rule class**—DWLBusinessKeyValidation
- **Rule 138**—Validates the business key for the party compliance. A party compliance can be uniquely identified by its PartyId and ComplianceRequirementId. This rule ensures that during an update that business key fields are not updated. The ID and class for this rule are as follows:
  - **External rule ID**—138
  - **External rule class**—DWLBusinessKeyValidation

The following two rules are used to validate that the compliance requirement business keys are correct and not updated after entered into the system:

- **Rule 139**—Validates the business key of the compliance requirement. A compliance requirement can be uniquely identified by its compliance type and the type of the compliance target. This rule ensures that during an add operation, compliance requirements with duplicate business keys are not added. The ID and class for this rule are as follows:
  - External Rule Id = 139
  - External Rule Class = DWLBusinessKeyValidation
- **Rule 140**—Ensures that during an update, the business keys are not updated. The ID and class for this rule are as follows:
  - External Rule Id = 140
  - External Rule Class = DWLBusinessKeyValidation

Configuring Event Manager for Know Your Customer compliance

Configuring Event Manager for the Know Your Customer compliance feature establishes the compliance verification dates for processed events.

The external rule for Event Manager governs the Event Manager logic and applies the next-verify-date logic. It also verifies when the compliance has ended.

The Event Manager external rule is as follows:

- **External rule ID**—20007
- **External rule class**—PartyComplianceNextVerifyDateRule

This rule governs the event manager logic and applies the next-verify-date logic. It also verifies when the compliance has ended. If the next-verify-date is in the future, the rule sets a task with a next-process-date that is equal to the next-verify-date and send this task to the scheduler. If the next-verification date is in the past, the rule sends a notification, and creates a new next-process-date based on the validation frequency of the compliance by extracting the number of days from the name column of CDVALFREQTP table (for example, the number 30 in the name ″30 days (monthly)″).

The rule also updates the party compliance with the new next-verification-date. If the validation frequency is not available, the rule does not repopulate the next-process-date once it has passed.

The ComplianceEntityAdapter is a new Event Manager adapter created to handle entity compliance objects. This adapter retrieves entity compliance business objects based on the key that is retrieved from processed events.

Understanding compliance requirements for deleting parties

When you delete a party, the compliance requirements and business keys for that party are deleted as well. This feature uses the existing delete party module to handle delete party compliance.

The Know Your Customer compliance feature treats party compliance as an associated object to party, not a party child object. The delete capability feature does not delete the history data for associated entities, or any actions for party compliance history data.

Chapter 51. Configuring Party Demographics

The Party domain provides the ability to define party demographic types and to capture party demographics data with them.

The Party Demographics information varies between different industries, and is also different for each InfoSphere MDM Server client. Party Demographics allows you to define the structure of the demographic data during the design phase and provides transactions to manipulate the data during run time.

Each Party Demographics type is associated with metadata spec to define the data to be captured when creating demographics data of that type. For more information about metadata specs, see Chapter 3, "Managing specs and spec values," on page 61.

Each party demographics record consists of both soft attributes, which are attributes defined within a Spec, and hard attributes, which are attributes defined within database tables. Hard attributes for party demographics are:

- Reference to a party
- Demographics type
- Metadata spec format ID
- Start and end date

The metadata spec can have multiple versions of the data definitions files, called spec formats, to allow for changes in the format of the data. A new Party Demographics record is validated against the most recent version of the spec format for demographics spec. This version of spec format is stored in the `SpecFormatId` field of the Party Demographics record. The same version of the spec format is used to validate data during Party Demographics record updates. The `SpecFormatId` field can be updated to upgrade the demographics record to the newer version of the spec format.

The CONTACTDEMOGRAPHICS table contains start and end date fields for creating a business history of the demographics data. While demographics metadata spec can be defined to contain start and end date as part of XML data, it may be more practical to use hardened start and data attributes to maintain historical data, especially if the business history must be maintained for a long period of time. Metadata spec for party demographics must be created and deployed in the InfoSphere MDM Server operational database before creating the party demographic types.

About the party demographic samples

Three sample party demographics types are provided with the InfoSphere MDM Server samples: occupational; educational; and organizational.

Metadata specs for sample Party Demographics specs are included in the InfoSphere MDM Server samples and are not part of InfoSphere MDM Server distribution package. The Party Demographics specs are described in greater detail in the chapter on Party Demographics specs in the *IBM InfoSphere Master Data Management Server Samples Guide*. The sample metadata specs must be installed on InfoSphere MDM Server before using any Party Demographics transactions.

Chapter 52. Customizing Party Life Events

The Party Life Events feature allows you to manage life event information related to a party, by providing services to add, update or get party life events, as well as automatically detecting events when party data is modified or when events occur with the passage of time.

Party Life Events uses the Event Manager for all events related logic. For the explicit event services, it uses a InfoSphere MDM Server controller as a façade to provide the same service-level interface as the other services, and uses the Event Manager as persistent layer. For more details on Event Manager, see Chapter 31, "Customizing Event Manager," on page 359. This chapter discusses how InfoSphere MDM Server uses the Event Manager to handle party life events.

In this section, you will learn:

Party data for event detection rules

Before Event Manager can fire the event detection rules, it must fetch all the related party data and make the data available to the rules. Based on the trigger that caused the event detection and the type of the system entity being processed, a party is selected to be returned for detailed data inquiry and for passing to the rules. For instance, when responding to a time-based trigger, Event Manager selects a party ID from its process control list, and calls IBM InfoSphere Master Data Management Server to get details about this party. If the event detection was triggered by a persistent transaction in IBM InfoSphere Master Data Management Server, as described above, the top-level object determines which party detail data to fetch. Currently only the top-level objects listed below are supported. In other words, the persistent transactions that return one of these objects can result in event detection rules being fired.

- TCRMPartyBObj
- TCRMPartyAddressBObj
- TCRMPartyContactMethodBObj
- TCRMPartyIdentificationBObj
- TCRMContractPartyRoleBObj
- TCRMIncomeSourceBObj
- TCRMPartyPrivPrefBObj
- TCRMAdminContEquivBObj
- TCRMPartyChargeCardBObj
- TCRMPartyBankAccountBObj
- TCRMPartyGroupingAssociationBObj
- TCRMPartyValueBObj
- TCRMPartyLobRelationshipBObj

- TCRMPersonBObj
- TCRMPersonNameBObj
- TCRMSuspectPersonBObj
- TCRMOrganizationNameBObj
- TCRMOrganizationBObj
- TCRMSuspectOrganizationBObj

Note: A future release of IBM InfoSphere Master Data Management Server will incorporate the rest of the top-level objects.

Event Manager inquires on IBM InfoSphere Master Data Management Server for related party detail data by issuing a getParty transaction with an inquiry level of 2. This inquiry transaction returns the TCRMPersonBObj along with a number of child objects containing the detail information—for example, party addresses, contact methods, names, identifications and others.

For more information on this transaction, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.

Event detection rules

InfoSphere MDM Server Event Manager uses external rules for event detection. These external rules can be written as regular Java classes or as iLog rules using any of its supported rule languages: IRL, TRL, or BAL.

The input for these external rules is the party detail data gathered from IBM InfoSphere Master Data Management Server. Additionally, if an IBM InfoSphere Master Data Management Server persistent transaction triggered the event detection, the top-level business object is available for the rules and could be asserted into the working memory. The complete structure of the data available in the working memory, and how to reference it in the external rules is available in the documentation for InfoSphere MDM Server Event Manager.

If a business rule detects an event, it must add the event object—EventObj—to the list of pending events, stored in event task object—EventTaskObj. All the changes to EventTaskObj, done by the rule, are available to Event Manager after the rules are finished. See the documentation for InfoSphere MDM Server Event Manager for more information.

After the rules are written, they must be configured in the external rule repository. See Chapter 10, “Configuring external business rules,” on page 153 for more information.

Party Event transactions

The following transactions are used to create, update and get explicit party events as well as to find potential party events:

- addPartyEvent
- updatePartyEvent
- getPartyOccurredEvent
- getAllPartyOccurredEvents
- getAllPartyPotentialEvents

Configuring InfoSphere MDM Server and Event Manager to use Party Life Events

To configure party life events:

1. Activate the EM Messenger extension to send data change message to the Event Manager. This can be done by executing the following SQL statement:

   ```
   UPDATE EXTENSIONSET SET INACTIVE_IND = 'N' WHERE EXT_SET_NAME = 'EMMessenger'
   ```

   Optionally, the extension can be further configured so that it is only fired on certain persistent transactions and not all of them. Refer to Chapter 2, "Customizing InfoSphere MDM Server," on page 17 for more information on how to write rules for an extension invocation.

2. Edit the `TCRM.properties` file and set the appropriate values for the following properties:

   ```
   ##################################################
   # EventManager related EJBs
   #
   # In the following section, xxxx.yyyy represents the property key of a
   # particular EJB. E.g. 'EventManager.event_service'. The xxxx is the name
   # of a logical group of EJBs. The group of EJBs are usually provided by one
   # application server, so these EJBs may share the same setting of some
   # properties, e.g. 'provider_url' or 'context_factory'. The yyyy is the unique
   # name of the EJBs in the group.
   #
   # For each EJB, the following property keys will be searched (in specified
   # order) to get the correct setting to connect to the EJB (JNDI Name, Provider
   # URL, Context Factory):
   #
   #   1. JNDI Name
   #      A. xxxx.yyyy.jndi (Must be provided)
   #
   # For instance, the following property keys will be searched (in specified
   # order) to get the parameters for connecting to EventService session bean
   # of EventManager:
   #
   #   1. JNDI Name
   #      A. EventManager.event_service.jndi (Must be provided)
   #
   #   2. Provider URL
   #      A. EventManager.event_service.provider_url
   #      B. EventManager.provider_url (if A is not prvided)
   ##################################################
   EventManager.event_service.jndi = EventService
   EventManager.process_controller.jndi = ProcessController
   ```

3. Restart the IBM InfoSphere Master Data Management Server application for the changes to take effect.

   The call to Event Manager session bean is happening during the post-execute step of a persistent controller level transaction.

Chapter 53. Deleting party information from InfoSphere MDM Server

InfoSphere MDM Server has the ability to delete a party, and its related child objects and associated entities, from ODS and the history tables.

In this section, you will learn:

Transactions affected by the Delete Capability

The following transactions are relevant to Delete Capability feature:

- deleteParty(TCRMPartyBObj theTCRMPartyBObj) throws TCRMException: TCRMDeletedPartyBObj
- deletePartyHistory(TCRMPartyBObj theTCRMPartyBObj) throws TCRMException: TCRMDeletedPartyHistoryBObj
- deletePartyWithHistory(TCRMPartyBObj theTCRMPartyBObj) throws TCRMException: TCRMDeletedPartyWithHistoryBObj

The services around deleting party history are only provided for party children objects, and are not provided for the association objects.

Note: Before deleting histories, make a backup of the history, as there is no data about the deleted history returned in the response; only a notification that the history has been deleted is sent.

The following are the list that shows component level interface for delete party children and party associations.

- **IParty**
  - public TCRMInactivatedPartyBObj deleteInactivatedParty(TCRMInactivatedPartyBObj theTCRMInactivatedPartyBObj) throws TCRMException;
  - public TCRMPartyAddressBObj deletePartyAddress(TCRMPartyAddressBObj theTCRMPartyAddressBObj) throws TCRMException;
  - public TCRMAdminContEquivBObj deletePartyAdminSysKey(TCRMAdminContEquivBObj theTCRMAdminContEquivBObj) throws TCRMException;
  - public TCRMAlertBObj deletePartyAlert(TCRMAlertBObj alertBObj) throws TCRMException;
  - public TCRMPartyContactMethodBObj deletePartyContactMethod(TCRMPartyContactMethodBObj theTCRMPartyContactMethodBObj) throws TCRMException;
  - public TCRMPartyIdentificationBObj deletePartyIdentification(TCRMPartyIdentificationBObj theTCRMPartyIdentificationBObj) throws TCRMException;
  - public TCRMPartyRelationshipBObj deletePartyRelationship(TCRMPartyRelationshipBObj theTCRMPartyRelationshipBObj) throws TCRMException;

  - public TCRMPartySummaryBObj deletePartySummaryIndicator(TCRMPartySummaryBObj theTCRMPartySummaryBObj) throws TCRMException;
  - public TCRMMultiplePartyCDCBObj deleteMultiplePartyCDC(TCRMMultiplePartyCDCBObj multipleCDCs) throws TCRMException;
- **IPerson**
  - public TCRMPersonBObj deletePerson(TCRMPersonBObj theTCRMPersonBObj) throws TCRMException;
  - public TCRMPersonNameBObj deletePersonName(TCRMPersonNameBObj theTCRMPersonNameBObj) throws TCRMException;
- **IOrganization**
  - public TCRMOrganizationBObj deleteOrganization(TCRMOrganizationBObj theTCRMOrganizationBObj) throws TCRMException;
  - public TCRMOrganizationNameBObj deleteOrganizationName(TCRMOrganizationNameBObj theTCRMOrganizationNameBObj) throws TCRMException;
- **IAddress**
  - public TCRMAddressBObj deleteAddress(TCRMAddressBObj theTCRMAddressBObj) throws TCRMException;
  - public TCRMAddressNoteBObj deleteAddressNote(TCRMAddressNoteBObj theTCRMAddressNoteBObj) throws TCRMException;
  - public TCRMAddressValueBObj deleteAddressValue(TCRMAddressValueBObj theTCRMAddressValueBObj) throws TCRMException;
- **IContactMethod**
  - public TCRMContactMethodBObj deleteContactMethod(TCRMContactMethodBObj theTCRMContactMethodBObj) throws TCRMException;
- **IFinancialProfile**
  - public TCRMFinancialProfileBObj deleteFinancialProfile(TCRMFinancialProfileBObj theTCRMFinancialProfileBObj) throws TCRMException;
  - public TCRMIncomeSourceBObj deleteIncomeSource(TCRMIncomeSourceBObj theTCRMIncomeSourceBObj) throws TCRMException;
  - public TCRMPartyBankAccountBObj deletePartyBankAccount(TCRMPartyBankAccountBObj theTCRMPartyBandAccountBObj) throws TCRMException;
  - public TCRMPartyChargeCardBObj deletePartyChargeCard(TCRMPartyChargeCardBObj theTCRMPartyChargeCardBObj) throws TCRMException;
  - public TCRMPartyPayrollDeductionBObj deletePartyPayrollDeduction(TCRMPartyPayrollDeductionBObj theTCRMPartyPayrollDeductionBObj) throws TCRMException;
- **ISuspectProcessor**
  - public TCRMSuspectBObj deleteSuspect(TCRMSuspectBObj suspect) throws TCRMException ;
- **IPartyBusinessServices**
  - public TCRMPartyAddressPrivPrefBObj deletePartyAddressPrivacyPreference(TCRMPartyAddressPrivPrefBObj theTCRMPartyAddressPrivPrefBObj) throws TCRMException;

- public TCRMPartyContactMethodPrivPrefBObj deletePartyContactMethodPrivacyPreference (TCRMPartyContactMethodPrivPrefBObj theTCRMPartyContactMethodPrivPrefBObj) throws TCRMException;
- public TCRMPartyGroupingAssociationBObj deletePartyGroupingAssociation(TCRMPartyGroupingAssociationBObj theTCRMPartyGroupingAssociationBObj) throws TCRMException;
- public TCRMPartyGroupingRoleBObj deletePartyGroupingRole(TCRMPartyGroupingRoleBObj theTCRMPartyGroupingRoleBObj) throws TCRMException;
- public TCRMPartyLobRelationshipBObj deletePartyLobRelationship(TCRMPartyLobRelationshipBObj theTCRMPartyLobRelationshipBObj) throws TCRMException;
- public TCRMPartyMacroRoleBObj deletePartyMacroRole(TCRMPartyMacroRoleBObj partyMacroRoleBObj) throws TCRMException;
- public TCRMPartyMacroRoleAssociationBObj deletePartyMacroRoleAssociation(TCRMPartyMacroRoleAssociationBObj theTCRMPartyMacroRoleAssociationBObj) throws TCRMException;
- public TCRMPartyPrivPrefBObj deletePartyPrivacyPreference(TCRMPartyPrivPrefBObj theTCRMPartyPrivPrefBObj) throws TCRMException;
- public TCRMPartyRelationshipRoleBObj deletePartyRelationshipRole(TCRMPartyRelationshipRoleBObj theTCRMPartyRelationshipRoleBObj) throws TCRMException;
- public TCRMPartyValueBObj deletePartyValue(TCRMPartyValueBObj theTCRMPartyValueBObj) throws TCRMException;

IClaim

- public TCRMClaimPartyRoleBObj deleteClaimDetailPartyRole(TCRMClaimPartyRoleBObj theTCRMClaimPartyRoleBObj) throws TCRMException;

IContract

- public TCRMContractPartyRoleBObj deleteContractPartyRole(TCRMContractPartyRoleBObj theTCRMContractPartyRoleBObj) throws TCRMException;
- public TCRMAlertBObj deleteContractRoleAlert(TCRMAlertBObj theTCRMAlertBObj) throws TCRMException;
- public TCRMContractPartyRoleIdentifierBObj deleteContractRoleIdentifier(TCRMContractPartyRoleIdentifierBObj theTCRMContractPartyRoleIdentifierBObj) throws TCRMException;
- public TCRMContractRoleLocationBObj deleteContractRoleLocation(TCRMContractRoleLocationBObj theTCRMContractRoleLocationBObj) throws TCRMException;
- public TCRMContractRoleLocationPurposeBObj deleteContractRoleLocationPurpose(TCRMContractRoleLocationPurposeBObj theTCRMContractRoleLocationPurposeBObj) throws TCRMException;
- public TCRMContractPartyRoleRelationshipBObj deleteContractRoleRelationship(TCRMContractPartyRoleRelationshipBObj theTCRMContractPartyRoleRelationshipBObj) throws TCRMException;

  - public TCRMContractPartyRoleSituationBObj deleteContractRoleSituation(TCRMContractPartyRoleSituationBObj theTCRMContractPartyRoleSituationBObj) throws TCRMException;
- **IAlert**
  - public TCRMAlertBObj deleteAlert(TCRMAlertBObj theTCRMAlertBObj) throws TCRMException;
- **ICampaign**
  - public TCRMCampaignAssociationBObj deleteCampaignAssociation(TCRMCampaignAssociationBObj theTCRMCampaignAssociationBObj) throws TCRMException;
- **IInteraction**
  - public TCRMInteractionBObj deleteInteraction(TCRMInteractionBObj theTCRMInteractionBObj) throws DWLBaseException;
- **ILobRelationship**
  - public TCRMEntityLobRelationshipBObj deleteEntityLobRelationship(TCRMEntityLobRelationshipBObj eTCRMEntityLobRelationshipBObj) throws TCRMException;
- **IPrivacyPreference**
  - public TCRMPrivPrefBObj deleteEntityPrivacyPreference(TCRMEntityPrivPrefBObj theTCRMEntityPrivPrefBObj) throws TCRMException;
- **IEntityRole**
  - public DWLEntityRoleBObj deleteEntityRole(DWLEntityRoleBObj entityRoleBObj) throws DWLBaseException;
- **IGrouping**
  - public DWLGroupingAssociationBObj deleteGroupingAssociation(DWLGroupingAssociationBObj theDWLGroupingAssociationBObj) throws DWLBaseException;
- **IValue**
  - public DWLValueBObj deleteValue(DWLValueBObj theDWLValueBObj) throws DWLBaseException;
- **IDWLHierarchy**
  - public DWLEntityHierarchyRoleBObj deleteEntityHierarchyRole(DWLEntityHierarchyRoleBObj theEntityHierarchyRoleBObj) throws DWLBaseException;
  - public DWLHierarchyNodeBObj deleteHierarchyNode(DWLHierarchyNodeBObj theDWLHierarchyNodeBObj) throws DWLBaseException;
  - public DWLHierarchyRelationshipBObj deleteHierarchyRelationship(DWLHierarchyRelationshipBObj theDWLHierarchyRelationshipBObj) throws DWLBaseException;
  - public DWLHierarchyUltimateParentBObj deleteHierarchyUltimateParent(DWLHierarchyUltimateParentBObj theDWLHierarchyUltimateParentBObj) throws DWLBaseException;
- **IDefaultedSourceValue**
  - public DWLDefaultedSourceValueBObj deleteDefaultedSourceValue(DWLDefaultedSourceValueBObj theDWLDefaultedSourceValueBObj) throws DWLBaseException;
- **DWLAccessDateValue**

  - public DWLAccessDateValueBObj deleteAccessDateValue(DWLAccessDateValueBObj dateValue) throws DWLBaseException;
- **EntityCompliance**
  - public DWLResponse deleteEntityCompliance(EntityComplianceBObj entityComplianceBObj) throws DWLBaseException;
  - public DWLResponse deleteEntityComplianceDoc(EntityComplianceDocBObj entityComplianceDocBObj) throws DWLBaseException;
  - public DWLResponse deleteEntityComplianceTarget(EntityComplianceTargetBObj complianceTarBObj) throws DWLBaseException;

Extending the Delete capability

All data and service-level extension points are available to extend this Delete Capability.

See Chapter 2, "Customizing InfoSphere MDM Server," on page 17 for more information.

To configure the external validations for Delete Capability:

Modify the external validation `com.dwl.tcrm.validation.validator.PartyDeleteValidations`. The external validator contains party and children deletion rules. There are five external rules that are provided in the delete capability feature:

- RuleId:89—`com.dwl.tcrm.externalrule.RetrieveAllPartyDetailsRule`

  This external rule is invoked by deleteParty and deletePartyWithHistory transactions. It retrieves all party and children objects information to validate and then delete.
- RuleId: 90—`com.dwl.tcrm.externalrule.DeletePartyValidationExternalRule`

  This external rule is invoked by party and children object at component level delete validation. The rule has no business logic implementation by default.
- RuleId: 91—`com.dwl.tcrm.externalrule.DeletePartyAssociationsRule`

  The external rule to retrieve all the party associations and checks for deletion rules around each of party associations with respect to the party. After the checks, invoke component delete operation for the party association.
- RuleId: 92—`com.dwl.tcrm.externalrule.ValidatePartyRoleChildrenDeleteRule`

  This external rule is invoked by ContractPartyRole at the component-level delete validation. It contains business delete rules for party role children object.
- RuleId: 93—`com.dwl.tcrm.externalrule.DeletePartyHistoryRule`

  The external rule is invoked by delete transactions, it would delete party and children object history information.

Chapter 54. Integrating IBM InfoSphere Information Server QualityStage with InfoSphere MDM Server

InfoSphere MDM Server can be configured to use QualityStage's standardization and matching capabilities.

IBM InfoSphere Information Server QualityStage is a comprehensive development environment for building applications to re-engineer data. It provides a set of integrated modules for accomplishing data re-engineering tasks such as Conditioning (Standardization), Matching, Searching, and others. InfoSphere MDM Server can be configured to use QualityStage's standardization and matching capabilities.

Definitions, acronyms, and abbreviations used when discussing QualityStage integration

The following terms are used when discussing QualityStage integration:

QualityStage Designer
Provides a client interface for defining and customizing data re-engineering jobs. It runs on a Windows® workstation.

QualityStage Server
Accesses the source data, defined by the Designer, and processes them into the target re-engineered data. It can run on Windows or UNIX®.

QualityStage Stage
A data re-engineering operation such as Investigate, Standardize, Match, and Survive. InfoSphere MDM Server only uses Standardize and Match stages. Clients can use out of the box stages or create their own stage and attach available rule sets to them.

QualityStage Job
Incorporates a number of data re-engineering stages. QualityStage uses jobs to process data, creating various intermediate and final stages of re-engineered data. The processing criteria are determined by rule sets that you specify for a job. Once Jobs are built using Designer they need to be deployed on the QualityStage server.

WebSphere Information Services Director (WISD)
Acts as a layer between the IBM InfoSphere Information Server client and the InfoSphere Information Server server. It provides a unified mechanism for publishing and managing shared Service Oriented Architecture (SOA) services across data quality, data transformation, and federation functions, which allows information specialists to easily deploy services for any information integration task and consistently manage them. WISD enables developers to take data integration logic built using InfoSphere Information Server and publish it as an ″always on″ service.

InfoSphere MDM Server distribution components for QualityStage

The following components are required for integrating QualityStage with InfoSphere MDM Server. You can find these components under `\<MDM_INSTALL_DIR>\Integrations\QualityStage`:

Table 85. Distribution components

Component Name	Description
MDMQS.dsx	DataStage/QualityStage job export. Contains source code to be imported into your environment through the DataStage/QualityStage Designer Client.
MDMQS_ISDProject.xml (for the RIM interface)	WISD project export. Contains service definitions to be imported into your environment through the InfoSphere Information Server Console.
MDMQSWS.xml (for the Web Services interface)	WISD project export. Contains service definitions to be imported into your environment through the InfoSphere Information Server Console.
*.csv	Test data used to test the batch version of the jobs.

Where to find more QualityStage information

For more information, see the IBM InfoSphere Information Server – Bookshelf documentation, including:

- *IBM InfoSphere Information Server QualityStage User's Guide*
- *IBM InfoSphere Information Server Planning, Installation, and Configuration Guide*

In this section, you will learn:

Prerequisites for activating QualityStage features in InfoSphere MDM Server

There are a number of prerequisites that must be completed before you can activate QualityStage features in InfoSphere MDM Server.

The prerequisites are:

- The following products must be installed on your system:
  - IBM InfoSphere Information Server QualityStage Server
  - DataStage Server and QualityStage Designer

  During installation you must enable National Language Support (NLS) for both IBM InfoSphere Information Server QualityStage Server and DataStage Server.

  For details on how to install these products, refer to the *IBM InfoSphere Information Server Information Center* at http://publib.boulder.ibm.com/infocenter/iisinfsv/v8r0/index.jsp.
- The Designer environment must be set up before you can use the QualityStage features in InfoSphere MDM Server. The `Integrations/QualityStage` folder holds all of the default QualityStage jobs that are used by InfoSphere MDM Server.

- The Information Service Connection must be configured in the IBM InfoSphere Information Server console. For more information, see the IBM InfoSphere Information Server documentation.
- If global security is enabled on the WebSphere Application Server running IBM InfoSphere Information Server, the transaction protocol security on that server must be disabled. You must add a custom property with the following attributes:

  NAME
  DISABLE_PROTOCOL_SECURITY

  VALUE
  TRUE

  For details on the custom property DISABLE_PROTOCOL_SECURITY, refer to information on interoperating transactionally between application servers in the *WebSphere Application Server Information Center* at http://publib.boulder.ibm.com/infocenter/wasinfo/v6r0/index.jsp.
- Optionally, if WebSphere Application Server application security is turned on for InfoSphere MDM Server, the Lightweight Third Party Authentication (LTPA) keys need to be shared between the InfoSphere MDM Server WebSphere Application Server cell and the IBM InfoSphere Information Server WebSphere Application Server cell. For more information, refer to the *WebSphere Application Server Information Center* and also see "Configuring security enabled servers" on page 672.

Activating QualityStage features in InfoSphere MDM Server

To activate IBM InfoSphere Information Server QualityStage features in InfoSphere MDM Server, after you install and configure the InfoSphere MDM Server application, you must import the `MDMQS.dsx` component to IBM InfoSphere Information Server DataStage and QualityStage Designer. You must install the component, then configure and deploy all of its associated ISD services or jobs to the Information Server. To do this, you need to perform the following tasks:

1. "Installing DataStage and QualityStage jobs"
2. "Deploying services for the RMI interface using WISD" on page 668

For additional information, refer to the *IBM InfoSphere Information Server Information Center* at http://publib.boulder.ibm.com/infocenter/iisinfsv/v8r0/index.jsp.

See also:

"Installing DataStage and QualityStage jobs"
"Deploying services for the RMI interface using WISD" on page 668
"Configuring client QualityStage integration" on page 669
"Deploying services for Web Services using WISD" on page 670

Installing DataStage and QualityStage jobs

Before you begin, refer to "Prerequisites for activating QualityStage features in InfoSphere MDM Server" on page 666

1. Launch the DataStage Administrator client and create a project for the InfoSphere MDM Server QS Jobs. Name the project 'MDMQS'.
2. Log into the MDMQS project through DataStage and QualityStage Designer and import the MDMQS.dsx component file.

3. Provision all the following rulesets to the Designer client so that jobs that use them can be compiled.
   - MDMQS\Standardization Rules\MDMCanada\CAADDR\MDMCAADDR
   - MDMQS\Standardization Rules\MDMCanada\CAAREA\MDMCAAREA
   - MDMQS\Standardization Rules\MDMUSA\USADDR\MDMUSADDR
   - MDMQS\Standardization Rules\MDMUSA\USAREA\MDMUSAREA
   - MDMQS\Standardization Rules\MNNAME\MNNAME
   - MDMQS\Standardization Rules\MNPHONE\MNPHONE
   - MDMQS\Standardization Rules\MNSPOST\MNSPOST

   For information on how to do this, refer to information on provisioning imported rule sets in the *IBM Information Server Information Center* at http://publib.boulder.ibm.com/infocenter/iisinfsv/v8r0/index.jsp.
4. Prepare test data and configure parameters.
   a. Copy the provided test data (*.csv files) into a directory on your IIS system.
   b. Open the parameter set MDMQS_Environment_Variables under the `MDMQS\Parameter Sets` folder. The Default Value for parameter **APT_CONFIG_FILE** is set to the default for UNIX. If your IIS installation is on a different system, update the default value.
   c. Open the parameter set MDMQS_Data_Directory under the `MDMQS\Parameter Sets` folder. Set the default value of the parameter **DATADIR** to the directory path into which you just copied the test data.
   d. Open the shared container MDMQSPartySuspectReferenceMatch under the `MDMQS\Shared Containers` folder. Set the file paths of data set stages **Data_Frequency** and **Reference_Frequency** to the same path that you provided for **MDMQS_Data_Directory.DATADIR** to in the previous step.
5. Compile all the jobs inside the `MDMQS\Jobs` folder and its sub-folders.

   Note: WISD versions of these jobs can be found in the `MDMQS\Jobs\ISD` folder. Batch version of jobs can be found in the `MDMQS\Jobs` folder.
6. Run the job MDMQS\Jobs\MDMQS_Match_Frequency_Generation to generate the match frequency data.
7. Run the following batch jobs to test that they execute successfully on your system before you use the WISD jobs.
   - All jobs in the MDMQS\Standardization Testing folder
   - MDMQS\Match Testing\MDMQS_Party_Suspect_Reference_Match

   After running the jobs, view the output Sequential file to check the result.

After you complete this task, continue to the next task required to integrate Quality Stage with InfoSphere MDM Server, "Deploying services for the RMI interface using WISD."

Deploying services for the RMI interface using WISD

Before you begin this task, you must complete the task "Installing DataStage and QualityStage jobs" on page 667.

1. Log on to the IBM InfoSphere Information Server Console and import the Information Service Project file, `MDMQS_ISDProject.xml`.
2. Keep all the default settings and click **Import**.
3. Open and edit the Information Service Application (MDMQS) contained in the imported project.

4. In the Select a View panel, click **Services** → **MDMQSService** → **Operations** and then double-click the operations one at a time.
5. Edit the operations as follows:
   a. Ensure that each operation has the **Group Arguments into Structure** option enabled for inputs.
   b. Supply the information for each operation as listed in the table below:

Operation	Job Name (Prefixed by \MDMQS\Jobs\ISD\)	Inputs Accept Array	Input Data Type	Ouputs Return Array	Output Data Type
standardizeAddress	ISD_MDMQS_Address_Standardization	No	AddressInput	No	AddressOutput
standardizePersonName	ISD_MDMQS_Person_Standardization	No	PersonNameInput	No	PersonNameOutput
standardizeOrgName	ISD_MDMQS_Organization_Standardization	No	OrgNameInput	No	OrgNameOutput
Match	ISD_MDMQS_Party_Suspect_Reference_Match	Yes	MatchInput	Yes	MatchOutput
standardizePhoneNumber	ISD_MDMQS_Phone_Standardization	No	PhoneNumberInput	No	PhoneNumberOutput

6. Save and close the application.
7. Deploy the application.
8. Generate a new RMI client Jar, if necessary:

   Important: If you have changed the Data Type names or the input/output operation argument names, a new RMI client Jar file must be regenerated. If you have followed the previous steps, you do not need to regenerate the RMI client Jar file.
   a. Select **Operate**.
   b. Click **Deployed Information Services Applications**.
   c. Expand the MDMQS project.
   d. Click **MDMQSService**.
   e. Click **View Service in Catalog** in the right pane
      A new internet browser window launches.
   f. In the new browser, select **Bindings**.
   g. Click **EJB**.
   h. Select the **Download Client Jar File** link.
   i. Save the client Jar file to your local machine.

After you complete this task, you must complete the "Configuring client QualityStage integration" tasks to finish integrating QualityStage with InfoSphere MDM Server.

Configuring client QualityStage integration

InfoSphere MDM Server enables you to use out-of-the-box QualityStage jobs with IBM InfoSphere Information Server v8.0.1 or IBM InfoSphere Information Server v8.1.

If QualityStage will be invoked using the RMI interface, then you must package the client JAR file of appropriate IBM InfoSphere Information Server version in the InfoSphere MDM Server enterprise application.

The client JAR files are delivered with InfoSphere MDM Server:

- For IBM InfoSphere Information Server v8.0.1: `MDMQS_client801.jar`
- For IBM InfoSphere Information Server v8.1: `MDMQS_client81.jar`

See also:

"To configure IBM InfoSphere Information Server v8.1 clients with no changes to Input/Output arguments"

"To configure IBM InfoSphere Information Server v8.0.1 clients with no changes to Input/Output arguments"

"To configure IBM InfoSphere Information Server clients with changes to Input/Output arguments"

To configure IBM InfoSphere Information Server v8.1 clients with no changes to Input/Output arguments

No configuration action is required. The IBM InfoSphere Information Server client is packaged in the InfoSphere MDM Server EAR application.

To configure IBM InfoSphere Information Server v8.0.1 clients with no changes to Input/Output arguments

1. Extract the `MDM.ear` file.
2. Remove `MDMQS_client81.jar` from `MDM.ear`.
3. Add `MDMQS_client801.jar` to `MDM.ear`.
4. Extract `ThirdPartyAdapters.jar` and `DWLCommonServicesEJB.jar` from `MDM.ear`.
5. Modify the `META-INF/MANIFEST.MF` file in `ThirdPartyAdapters.jar` and `DWLCommonServicesEJB.jar` to refer to `MDMQS_client801.jar` instead of `MDMQS_client81.jar`.
6. Repackage the `MDM.ear` file.
7. Redeploy the `MDM.ear` file.

To configure IBM InfoSphere Information Server clients with changes to Input/Output arguments

1. Rename the downloaded client JAR file, dependent on the version of IBM InfoSphere Information Server that you are using:
   - For IBM InfoSphere Information Server v8.0.1, rename the JAR to `MDMQS_client801.jar`.
   - For IBM InfoSphere Information Server v8.1, rename the JAR to `MDMQS_client81.jar`.
2. Extract the `MDM.ear` file.
3. Remove `MDMQS_client81.jar` from `MDM.ear`.
4. Add the downloaded and renamed JAR file from step 1 to the `MDM.ear`.
5. For IBM InfoSphere Information Server v8.0.1, make the following changes:
   a. Extract `ThirdPartyAdapters.jar` and `DWLCommonServicesEJB.jar` from `MDM.ear`.
   b. Modify the `META-INF/MANIFEST.MF` file in `ThirdPartyAdapters.jar` and `DWLCommonServicesEJB.jar` to refer to `MDMQS_client801.jar` instead of `MDMQS_client81.jar`.
6. Repackage the `MDM.ear` file.
7. Redeploy the `MDM.ear` file.

Deploying services for Web Services using WISD

Before you begin this task, you must complete the task "Installing DataStage and QualityStage jobs" on page 667.

1. Log on to the IBM InfoSphere Information Server Console and import the Information Service Project file, MDMQS_ISDProject.xml.

2. Keep all the default settings and click **Import**.
3. Open and edit the Information Service Application (MDMQS) contained in the imported project.
4. In the Select a View panel, click **Services** → **MDMQSWSService** → **Operations** and then double-click the operations one at a time.
5. Edit the operations as follows:
   a. Ensure that each operation has the **Group Arguments into Structure** option enabled for inputs.
   b. Supply the information for each operation as listed in the table below:

      Note: After you import the MDMQSWS project, all of the predefined settings below must be re-edited in the InfoSphere Information Server Console before they can take effect.

Operation	Job Name (Prefixed by \MDMQS\Jobs\ISD\)	Inputs Accept Array	Input Data Type	Ouputs Return Array	Output Data Type
standardizeAddress	ISD_MDMQS_Address_Standardization	No	AddressInput	No	AddressOutput
standardizePersonName	ISD_MDMQS_Person_Standardization	No	PersonNameInput	No	PersonNameOutput
standardizeOrgName	ISD_MDMQS_Organization_Standardization	No	OrgNameInput	No	OrgNameOutput
Match	ISD_MDMQS_Party_Suspect_Reference_Match	Yes	MatchInput	Yes	MatchOutput
standardizePhoneNumber	ISD_MDMQS_Phone_Standardization	No	PhoneNumberInput	No	PhoneNumberOutput

6. Save and close the application.
7. Deploy the application.
8. View the generated WSDL:
   a. Select **Operate** and click on **Deployed Information Services Applications**.
   b. Expand the MDMQSWS project.
   c. Click **MDMQSWSService**.
   d. Click **View Service in Catalog** in the right pane.
      A new internet browser window is launched.
   e. Select **Bindings** in the new browser window.
   f. Click **SOAP over HTTP**.
   g. Click the Open WSDL Document link.
9. If you have changed the Data Type names or the input/output operation argument names, modify the MDMQSWS_Client.jar in accordance with the regenerated WSDL.

Configuration settings for QualityStage and InfoSphere MDM Server

The following configuration values must be set in order to properly communicate with IBM InfoSphere Information Server QualityStage.

Table 86. Configuration settings

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/defaultCountry	185
/IBM/ThirdPartyAdapters/IIS/initalContect	This configuration element is used in conjunction with the provider URL to use JNDI registry initial context. A typical value for this element is com.ibm.websphere.naming.WsnInitialContextFactory

Table 86. Configuration settings (continued)

Configuration Name	Default Value
/IBM/ThirdPartyAdapters/IIS/providerURL	*For the RMI interface:* <your QualityStage server port : typically 6010> The location , host name and port number, of the JNDI registry for the service EJB. Typical value is iiop://<your QualityStage server>:<your QualityStage server port : typically 2809>
	For Web Services: http://<your_iis_host>:<port> For example: http://iishost:9080
/IBM/Party/Standardizer/Name/className	com.ibm.mdm.thirdparty.integration.iis8.adapter.InfoServerStandardizerAdapter
/IBM/Party/Standardizer/Address/className	com.ibm.mdm.thirdparty.integration.iis8.adapter.InfoServerStandardizerAdapter

Configuring security enabled servers

If J2EE security is enabled on both the IBM InfoSphere Information Server and InfoSphere MDM Server sides, then some special configuration is required.

This section assumes a scenario where J2EE security is enabled for both servers, and each server has its own user registry.

See also:

"To share LTPA between InfoSphere MDM Server and IBM InfoSphere Information Server"

"To enable security attribute propagation" on page 673

To share LTPA between InfoSphere MDM Server and IBM InfoSphere Information Server

1. Export the Lightweight Third Party Authentication (LTPA) key from IBM InfoSphere Information Server:
   a. Log in to the WebSphere Application Server administration console on the IBM InfoSphere Information Server machine.
   b. Navigate to the **Global securityLTPA** panel.
   c. In the Password and Confirm password fields, type your password.
   d. In the Key file name field, type the file path and name of the LTPA key.
   e. Click **Export Keys**.
   f. Copy the exported key file to the InfoSphere MDM Server machine.
   g. Click **OK**.
2. Import the LTPA key to InfoSphere MDM Server:
   a. Log in to the WebSphere Application Server administration console on the InfoSphere MDM Server machine.
   b. Navigate to the **Security → Secure administration, applications, and infrastructure** panel.
   c. Under Authentication, click **Authentication mechanisms and expiration**.
   d. In the Password and Confirm password fields, type the password for the IBM InfoSphere Information Server LTPA key.
   e. In the Fully qualified key file name field, type the file path and name of the key file that you exported from IBM InfoSphere Information Server.

f. Click **Import keys**.
g. Click **OK**.

To enable security attribute propagation

1. Log in to the InfoSphere MDM Server WebSphere Application Server administration console.
2. Navigate to **SecuritySecure administration, applications, and infrastructure**.
3. Under Authentication, expand **RMI/IIOP securityCS1v2 outbound authentication**.
4. Select the Security attribute propagation check box.
5. In the Trusted target realms field, type the address of a trusted security realm.

   This address should be the user repository server address for the WebSphere Application Server where IBM InfoSphere Information Server is deployed. IBM recommends that you use an LDAP user repository for IBM InfoSphere Information Server. For example, use the LDAP server address `<ldap_server_name>:389`.
6. Click **OK** to save the settings.
7. Restart InfoSphere MDM Server.

QualityStage name and address standardization in InfoSphere MDM Server

You can use QualityStage to standardize names and addresses that are entered into InfoSphere MDM Server.

See Chapter 46, "Standardizing name, address, and phone number information," on page 623 for more information on using QualityStage with name and address standardization.

Using QualityStage in Suspect Duplicate Processing

QualityStage can be used with the InfoSphere MDM Server Suspect Duplicate Processing feature.

See "Configuring IBM Information Server QualityStage integration for SDP" on page 574 for more information on using QualityStage with SDP.

Customizing services that use InfoSphere Information Server Web services

There are a number of considerations when you are customizing services that use IBM InfoSphere Information Server QualityStage Web services.

- **Service references** – Customized session beans or message beans that directly require standardization and matching Web services should include service references. InfoSphere MDM Server enables service references in the following modules:
  - PartyEJB
  - FinancialServicesEJB
  - DWLCommonServicesEJB
  - EventManagerEJB

The following sample code shows how to include service references in session beans or message beans:

```
<service-ref>
    <service-ref-name>service/MDMQSWSService</service-ref-name>
    <service-interface>
     com.ibm.isd.mdmqsws.mdmqswsservice.server.MDMQSWSService_Service
    </service-interface>
    <wsdl-file>META-INF/wsdl/MDMQSWSService.wsdl</wsdl-file>
    <jaxrpc-mapping-file>
       META-INF/wsdl/MDMQSWSService_mapping.xml
    </jaxrpc-mapping-file>
    <service-qname xmlns:soap="http://MDMQSWSService.MDMQSWS.isd.ibm.com/soapoverhttp/">
         soap:MDMQSWSService
    </service-qname>
    <port-component-ref>
   <service-endpoint-interface>
         com.ibm.isd.mdmqsws.mdmqswsservice.server.MDMQSWSService_PortType
   </service-endpoint-interface>
    </port-component-ref>
  </service-ref>
```

- **WSDL and mapping files** – `MDMQSWSService.wsdl` and `MDMQSWSService_mapping.xml` should be presented within corresponding EJB projects.
- **Web service security** – InfoSphere MDM Server is released without IBM InfoSphere Information Server Web service security enabled. However, the security mechanism of InfoSphere MDM Server should match that of the IBM InfoSphere Information Server, if required in your deployment environment.

  You can further customize the Web service client stub for the IBM InfoSphere Information Server adapter using the customized properties through a stub setter. Provide and configure customized stub setters that implement the IServiceStubSetter interface using the following configuration items:

  – `/IBM/ThirdPartyAdapters/IIS/StubSetter/enabled` – Determines whether or not the stub setter is enabled. The default value for this item is `false`.
  – `/IBM/ThirdPartyAdapters/IIS/StubSetter/className` – Defines the stub setter's full class name to the client implementation class. The default value is `defaulted`, which means that this item should be bypassed.
- **Standardization and matching services** – Standardization and matching services do not impact InfoSphere MDM Server core transactions regardless of whether IBM InfoSphere Information Server Web services support the transaction context. Any customized deployment environment should follow the platform-specific implementation, and also depend on IBM InfoSphere Information Server configuration.

Chapter 55. Integrating AbiliTec with InfoSphere MDM Server

Acxiom AbiliTec provides InfoSphere MDM Server and information management solutions that blend data, technology and services to provide the most advanced master data management information infrastructure available in the marketplace today.

AbiliTec is InfoSphere MDM Server Data Integration software from Acxiom that includes patented linking technology to help clients create a single view of their customers. At the core of this linking technology are the AbiliTec links, which uniquely identify various clients. The technology and the source of information used by Acxiom to create these links are proprietary to Acxiom. There are various types of AbiliTec links—the two relevant to InfoSphere MDM Server are consumer and business links, used to uniquely identify a person and an organization type parties, respectively.

Integration with Acxiom in InfoSphere MDM Server uses the AbiliTec linking module to retrieve the appropriate link, persist it as part of the party golden data and use it for its suspect duplicate processing. The InfoSphere MDM Server use of party AbiliTec link means it can take advantage of the linking technology used to generate that unique link. This in turn means higher confidence level for matching and nonmatching results for its suspect duplicate processing.

InfoSphere MDM Server provides the ability to:

- Return and persist a party's AbiliTec link, when the party is added to the system in a near real-time fashion
- Regularly refresh the link until a maintained link is found from Acxiom
- Force the refresh of party's AbiliTec link
- Adjust match categories based on matching or nonmatching AbiliTec links during its suspect duplicate processing
- Maintain AbiliTec link using party identification services

AbiliTec link is modeled as party identification in InfoSphere MDM Server.

In this section, you will learn:

Definitions of terms used when discussing AbiliTec integration

The following terms are used in this section:

- **Maintained Link** - If the AbiliTec link returned by Acxiom is based on the information maintained within Acxiom repository, it is identified as a maintained link.
- **Derived Link** - If Acxiom cannot identify the client (party) whose AbiliTec link is requested, it will return a derived AbiliTec link. This link is derived from the input data elements.
- **End of Time** - It is a date value far away in the future to logically mark the end of time. December 31st 9999 is selected as the end of time. It is used to mark records in the process control table, which should never be automatically processed again.

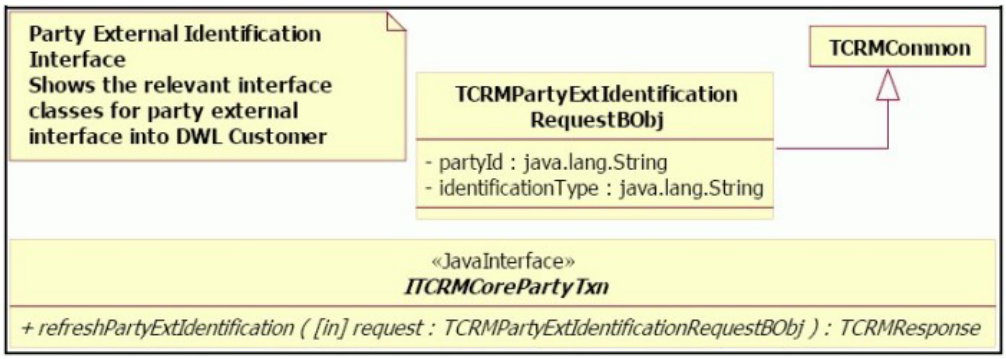
References for more AbiliTec information

You may find these additional sources of information helpful:

- **IBM InfoSphere Master Data Management Server Javadoc** - Java documentation for various interfaces and classes.
- **AbiliTec WebHelp** - documentation provided by Acxiom for AbiliTec that describes the various AbiliTec links.
- **Programmer's Guide** - Acxiom documentation, covering various topics including request, response structure, connectivity, links structure, and other information.

About the Refresh AbiliTec link

InfoSphere MDM Server provides a transaction, called `refreshPartyExternalIdentifier`, to return a party's AbiliTec link from Acxiom's AbiliTec linking module and persist it as party identification. This transaction is available through the party transactional controller as shown in the following class diagram.



Some additional details related to the refresh transaction:

- The actual module responsible for returning the external identifier is modeled as a pluggable module, which implements the `IPartyExternalIdentificationAccessor` interface. An implementation class is selected from the configuration using the identification type passed as input into the refresh transaction. This allows for the system to have an accessor for each type of external identification.

- InfoSphere MDM Server provides a default accessor, called `AbiliTecLinkAccessorUpgradeV10`, for fetching AbiliTec link by making a threeSixty request to AbiliTec linking module hosted at Acxiom. The steps performed in the `AbiliTecLinkAccessorUpgradeV10` are:
  - Runs a `getParty` transaction with inquiry level 1 to obtain the party information
  - Extracts party name and address information from the incoming party. InfoSphere MDM Server supports multiple names and addresses, however only one name and address pair is sent in the AbiliTec link request. The name and address to use in the request is configurable. The rule names are:
    - `AbiliTecLinkCommercialNameRule` for organization name rule
    - `AbiliTecLinkConsumerNameRule` for person name rule
    - `AbiliTecLinkAddressRule` for address rule
  - Runs external business rules to perform minimum data checks and map name and address fields to AbiliTec link request fields.
  - Creates an AbiliTec link Web Service request.
  - Calls Acxiom using an https request.
  - Parses the response from Acxiom and extract the consumer or business link, and any error messages.
  - Runs an external business rule, `AbilitecLinksMappingRule`, to map the AbiliTec link to the party identification.
  - Returns the party identification.
  - The newly-returned party identification is added or updated in the InfoSphere MDM Server database. The decision to add or update is driven by the mapping rule `AbilitecLinksMappingRule` by providing the last update for the party identification, if an existing one has to be updated.
  - Suspect re-identification is then executed to refresh the list of suspects for the current party.

For more information about the Refresh Link XML, see "Refresh AbiliTec link sample XML" on page 684.

Configuring AbiliTec in InfoSphere MDM Server

The following items are available in the configelement table for AbiliTec link-related transactions in InfoSphere MDM Server.

Name	Value	Explanation
`/IBM/Party/AbiliTecLink/IdType`	11	The code type in CdIdTp table to specify the identification code type for AbiliTecLink.
`/IBM/Party/AbiliTecLink/orgNameUsageType1`	1	The organization name type for the organization name which used to generate AbiliTec Commercial Name.
`/IBM/Party/AbiliTecLink/personNameUsageType1`	1	The person name type for the person name which used to generate AbiliTec Consumer Name.
`/IBM/Party/AbiliTecLink/addressUsageType1`	1	The address usage type for the address which used to generate AbiliTecAddress.
`/IBM/Party/Acxiom/userId`		The user Id assigned by Acxiom.
`/IBM/Party/Acxiom/password`		The password assigned by Acxiom.
`/IBM/Party/Acxiom/applicationId`		The application ID assigned by Acxiom.
`/IBM/Party/Acxiom/Return_Derived_Link/enabled`	True	Notifies Acxiom whether to return derived link or not if no maintained link found.

Name	Value	Explanation
/IBM/Party/Acxiom/ abiliTecSupportedCountries	185	The countries supported by Acxiom. Currently only USA is supported. 185 is the country code for USA in InfoSphere MDM Server cdcountrytp. If other non-supported country codes are supplied in request address business object, AbiliTec Link Address Rule validation will generate an error.
/IBM/Party/Acxiom/ AbiliTecOrgRequestURL	https://idtest.acxiom.com/ abilitec-business/1.0	The URL used to send requests to Acxiom for Organizations. The value provided by the default is the Acxiom test bed URL. This value must be replaced with the production URL for the production deployment.
/IBM/Party/Acxiom/ AbiliTecPersonRequestURL	https://idtest.acxiom.com/ abilitec-consumer/1.0	The URL used to send requests to Acxiom for Parties. The value provided by the default is the Acxiom test bed URL. This value must be replaced with the production URL for the production deployment.

The following property is available in the `TCRM.properties` file:

```
PartyExternalIdentificationAccessorClass.11=com.dwl.tcrm.coreParty.acxiom.AbiliTecLinkAccessorUpgradeV10
```

This property is used to look up the implementation accessor class for Abilitec link identification type.

Customizing and extending the AbiliTec link in InfoSphere MDM Server

Customizing the Refresh AbiliTec link transaction means doing one or both of the following:

- Customizing the external mapping rules that implement minimum data check and mapping logic both for the AbiliTec link request and response objects.
- Replacing the default implementation of `IPartyExternalIdentificationAccessor` with a different one.

See also:

"Customizing the external mapping rules"

"New AbiliTec link accessor" on page 681

Customizing the external mapping rules

External rules are used to implement logic for performing minimum data check as well as mapping the InfoSphere MDM Server objects and their fields to AbiliTec request object and their fields.

If any of these rules return an error, no AbiliTec link request is made. Similarly the AbiliTec response is mapped to InfoSphere MDM Server object using a different mapping rule. The following sections describe these rules in more detail.

See also:

"Commercial Name rule"

"Consumer Name rule" on page 679

"Address rule" on page 680

"Response Mapping rule" on page 680

Commercial Name rule

- **Rule ID**—68
- **Rule type**—Java class

- **Name**—com.dwl.tcrm.externalrule.AbiliTecLinkCommercialNameRule
- **Input**:
  - TCRMOrganizationBObj
  - DWLStatus
- **Output**:
  - AbiliTecLinkRequestCommercialName
  - DWLStatus
- **Description**—This rule is executed before making the AbiliTec request, while handling an organization type party. The rule:
  - Extracts the organization name from the passed in organization. Uses the `/IBM/Party/AbiliTecLink/orgNameUsageType1` configuration to identify the name to be used for AbiliTec link request.
  - If the name is not found, adds an error to the passed in status then return the status, and returns null for AbiliTecLinkRequestCommercialName.
  - Otherwise, it creates an AbiliTecLinkRequestCommercialName object and maps the organization name as follows:

InfoSphere MDM Server (TCRMOrganizationNameBObj)	AbiliTec (AbiliTecLinkRequestCommercialName)	Mandatory
SOrganizationName	PrimaryNameLine	Yes

Consumer Name rule

- **Rule ID**—67
- **Rule type**—Java class
- **Name**—com.dwl.tcrm.externalrule.AbiliTecLinkConsumerNameRule
- **Input:**
  - TCRMPersonBObj
  - DWLStatus
- **Output:**
  - AbiliTecLinkRequestConsumerName
  - DWLStatus
- **Description**—This rule is executed before making the AbiliTec request, while handling a person type party. The rule:
  - Extracts the person name from the passed in person. Uses the `/IBM/Party/AbiliTecLink/personNameUsageType1` configuration to identify the name to be used for AbiliTec link request.
  - If the name is not found, adds an error to the passed in status then return the status, and returns null for AbiliTecLinkRequestConsumerName.
  - Else creates an AbiliTecLinkRequestConsumerName object and maps the person name as follows. If the mandatory check fails, add an error to the passed in status.

InfoSphere MDM Server (TCRMPersonNameBObj)	AbiliTec (AbiliTecLinkRequestConsumerName)	Mandatory
PrefixValue	Prefix	No
StdGivenNameOne	First	Yes
StdGivenNameTwo	Middle	No
StdLastName	Last	Yes
Suffix	Suffix	No

Address rule

- **Rule ID**—69
- **Rule type**—Java class
- **Name**—com.dwl.tcrm.externalrule.AbiliTecLinkAddressRule
- Input:
  - TCRMPartyBObj
  - DWLStatus
  - Supported Country codes
- **Output:**
  - AbiliTecLinkRequestAddress
  - DWLStatus
- **Description**—This rule is executed before making the AbiliTec request, while handling a party. The rule:
  - Extracts the party address from the passed in party. Uses the /IBM/Party/AbiliTecLink/addressUsageType1 configuration to identify the party address, then get the address in the party address to be used for AbiliTec link request.
  - If the address is not found, adds an error to the passed in status then return the status, and returns null for AbiliTecLinkRequestAddress.
  - Else creates an AbiliTecLinkRequestAddress object and maps the address as follows. If supported country codes or the mandatory check fails, add errors to the passed in status.

InfoSphere MDM Server (TCRMAddressBObj)	**AbiliTec (AbiliTecLinkRequestAddress)**	**Mandatory**
ResidenceNumber	Unit	No
ResidenceValue	UnitDescription	No
City	City	Yes
ProvinceStateValue	State	Yes
ZipPostalCode	PostalCode	Yes
AddressLineOne	AddressLines	Yes
AddressLineTwo		No
AddressLineThree		No

  - AddressLineTwo, if not empty, is attached to AddressLineOne with a delimited space.
  - AddressLineThree, if not empty, is attached to AddressLineOne after AddressLineTwo with a delimited space.

Response Mapping rule

- **Rule ID**—70
- **Rule type**—Java class
- **Name**—com.dwl.tcrm.externalrule.AbiliTecLinksMappingRule
- **Input:**
  - TCRMPartyBObj
  - IdentificationType in TCRMPartyExtIdentificationRequestBObj
  - AbiliTec Link

  - DWLStatus
- **Output:** TCRMPartyIdentificationBObj
- **Description**—This rule is executed after making the AbiliTec request, while the AbiliTec link is available. The rule:
  - Extracts the party identification from the passed in party. Uses the `/IBM/Party/AbiliTecLink/IdType` configuration to identify the party identification.
  - If the party identification is found, updates the party identification with the AbiliTec Link obtained.
  - Else creates a TCRMPartyIdentificationBObj object using the IdentificationType and AbiliTec Link passed in.
  - Set the passed in DWLStatus in the party identification.

New AbiliTec link accessor

In most scenarios, the default AbiliTec link accessor is acceptable. However, if required, a different concrete implementation of the `IPartyExternalIdentificationAccessor` interface can be used to return the AbiliTec link—see the `IPartyExternalIdentificationAccessor` javadoc for the interface specifications. The custom accessor is configured in the system by setting the `PartyExternalIdentificationAccessorClass.11` property—see "Configuring the AbiliTec link" on page 682 for more information.

In InfoSphere MDM Server 7.0 the `IPartyExtIdentificationAccessor` interface was replaced with the `IPartyExternalIdentificationAccessor` interface . If you have a concrete implementation of previous interface, you can still use it by configuring the accessor class in the `TCRM.properties` file, using the property `PartyExternalIdentificationAccessor.11`

Evergreening the Abilitec link

InfoSphere MDM Server uses Event Manager to provide Evergreening for the AbiliTec link for parties added to InfoSphere MDM Server. This is done by notifying Event Manager about the new party whenever one is added. Event Manager in turn adds the new party into the process control table and registers it for AbiliTec refresh action. Additionally Event Manager executes the Evergreening rules, which in turn call the InfoSphere MDM Server `refreshPartyExternalIdentification` transaction to fetch and store the AbiliTec link. These Evergreening rules also determine the next processing date that the link for that party should be refreshed. Like InfoSphere MDM Server rules, the Evergreening rules in Event Manager are external rules and can be customized.

For continuous Evergreening of the link, Event Manager should be invoked through its proxy interface to execute the AbiliTec link action. This can be done either by a scheduler application, which invokes the proxy on regular basis or by calling the proxy directly on per-need basis. The type of the scheduler to use or the frequency of the invocation is outside the scope of this document.

For more general information on Event Manager, see Chapter 31, "Customizing Event Manager," on page 359.

Configuring the AbiliTec link

By default, notification sent from InfoSphere MDM Server to Event Manager instructing it to Evergreen a party's AbiliTec link is turned off. Activate the notification by setting the extension that sends the notification:

```
UPDATE EXTENSIONSET SET INACTIVE_IND='N' WHERE EXTENSION_SET_ID=32
```

Note: Remember to restart the server after the executing the SQL.

Modifying the Evergreening rules

Customizing the AbiliTec link Evergreening means customizing the rules that implement the Evergreening logic. These rules are responsible for determining when to refresh a party's AbiliTec link. These rules are executed for the first time when the party is added to the process control table. Subsequently these rules are executed when Event Manager is invoked through its proxy interface by a scheduler application for AbiliTec link. In addition to conditionally calling the refresh transaction to get the AbiliTec link from Acxiom, these rules always determine the next processing date for AbiliTec link refresh action for the current party.

Following are some more details about these rules.

- **Rule ID**—20005
- **Name**—com.dwl.commoncomponents.eventmanager.tcrm.EverGreenAbilitecRule
- **Type**—Java class
- **Default logic:**
  - If the party is inactivated, set the next processing date to end of time.
  - Else if party has an active AbiliTec maintained link, set the next processing date for the AbiliTec link refresh action to end of time.
  - Else if party has an AbiliTec derived link, schedule the action based on event horizon.
  - Else call the InfoSphere MDM Server refresh party external identification transaction
  - If the transaction returns a maintained link, set the next processing date for the AbiliTec link refresh action to end of time.
  - If the transaction returns a derived link, set the next processing date for the AbiliTec link refresh action based on event horizon.
  - If the transaction fails, schedule the action based on event horizon.

Modifying InfoSphere MDM Server extensions for Evergreening

The addParty transaction notifies Event Manager about the new party using a behavior extension. Once this extension is activated, as described in the configuration section, its default behavior is as follows:

- Retrieve the top level object PartyBObj.
- Check whether the party is not an existing one; if it is a existing party, InfoSphere MDM Server does not notify Event Manager; otherwise, continue the following logic.
- Check whether the party object has a maintained link or not; if there is a maintained link, InfoSphere MDM Server does not call Event Manager; otherwise, continue the following logic.
- Call Event Manager, passing in the party ID with an 'AbiliTec'.

The AbiliTec link in Suspect Processing

InfoSphere MDM Server uses the AbiliTec link during its suspect duplicate processing to adjust the match category as well as reidentify suspects when the maintained link is modified.

See also:

"Match category adjustment"

"Reidentify suspects"

Match category adjustment

InfoSphere MDM Server provides an external business rule to perform any adjustment for the suspects found in the system. AbiliTec link is used in this adjustment rule to upgrade or downgrade the match category. Generally, a matching link results in the match being upgraded and a mismatch results in it being downgraded.

This external rule is implemented as PartyMatchCategoryExtRule. This rule along with its default adjustment logic is explained in detail in Chapter 44, "Configuring Suspect Duplicate Processing," on page 557.

Reidentify suspects

By including the AbiliTec link as part of the critical data, the system triggers a suspect re-identification of the suspects whenever the maintained link is modified in InfoSphere MDM Server.

An external rule, `HasCriticalDataChange`, in suspect duplicate processing determines whether a data element is considered critical or not. For more details on the re-identification process and the critical data change rule, consult Chapter 44, "Configuring Suspect Duplicate Processing," on page 557.

Manual AbiliTec link management

Because the AbiliTec link is modeled as a party identification, all existing transactions available for managing party identifications can be used to manage the AbiliTec link as well.

Examples of such transactions include:

- addPartyIdentification
- updatePartyIdentification
- getPartyIdentification
- addParty
- updateParty
- addContract
- updateContract

This allows the clients to fetch the AbiliTec link outside of InfoSphere MDM Server but still use it for their suspect duplicate processing logic.

See also:

"External validation of the AbiliTec link" on page 684

External validation of the AbiliTec link

Acxiom provided two types of AbiliTec Links: a 13-byte link and 16-byte encoded link. InfoSphere MDM Server processes the encoded link by default. The example of 13-byte link is like `2540123456789`; and example of the encoded link is `XYZ8US01251489PZ`.

An external validation is used to ensure that the AbiliTec link being persisted is a maintained or derived link. This is done by configuring a conditional external validator called AbiliTecLinkType for RefNum attribute in TCRMPartyIdentification object. The validator is only executed if the identification type is an AbiliTec link type. The validation logic checks to ensure that the seventh character in the link is 0 or 1.

Refresh AbiliTec link sample XML

The following XML samples show the request and response for the AbiliTec link.

See also:

"Request XML"

"Response XML"

Request XML

```
<?xml version="1.0" encoding="UTF-8"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="myTCRM.xsd">
 <RequestControl>
  <requestID>10015</requestID>
   <DWLControl>
   <requesterName>cusadmin</requesterName>
   <requesterLanguage>100</requesterLanguage>
  </DWLControl>
  </RequestControl>
  <TCRMTx>
   <TCRMTxType>refreshPartyExtIdentification</TCRMTxType>
  <TCRMTxObject>TCRMPartyExtIdentificationRequestBObj</TCRMTxObject>
  <TCRMObject>
        <TCRMPartyExtIdentificationRequestBObj>
        <PartyId>386123615195425016</PartyId>
        <IdentificationType>11</IdentificationType>
        </TCRMPartyExtIdentificationRequestBObj>
  </TCRMObject>
 </TCRMTx>
</TCRMService>
```

Response XML

```
<?xml version="1.0" encoding="UTF-8"?>
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="tCRMResponse.xsd">
    <ResponseControl>
        <ResultCode>SUCCESS</ResultCode>
        <ServiceTime>31750</ServiceTime>
        <DWLControl>
            <requesterLanguage>100</requesterLanguage>
            <requesterLocale>en</requesterLocale>
            <requesterName>cusadmin</requesterName>
            <requestID>10015</requestID>
        </DWLControl>
    </ResponseControl>
    <TxResponse>
        <RequestType>refreshPartyExtIdentification</RequestType>
        <TxResult>
            <ResultCode>SUCCESS</ResultCode>
        </TxResult>
        <ResponseObject>
            <TCRMPartyIdentificationBObj>
                <IdentificationIdPK>697123615195507877</IdentificationIdPK>
                <IdentificationNumber>02CHUS15PFXJS38Q</IdentificationNumber>
                <IdentificationStatusType>2</IdentificationStatusType>
                <IdentificationStatusValue>Active</IdentificationStatusValue>
                <IdentificationType>11</IdentificationType>
                <IdentificationValue>ABILITECLINK</IdentificationValue>
                <PartyId>386123615195425016</PartyId>
```

```
                <PartyIdentificationLastUpdateDate>2009-03-05 16:12:34.359</PartyIdentificationLastUpdateDate>
                <PartyIdentificationLastUpdateTxId>477123624973256255</PartyIdentificationLastUpdateTxId>
                <PartyIdentificationLastUpdateUser>cusadmin</PartyIdentificationLastUpdateUser>
                <StartDate>2002-04-04 00:00:00.0</StartDate>
                <DWLStatus>
                    <Status>0</Status>
                </DWLStatus>
            </TCRMPartyIdentificationBObj>
        </ResponseObject>
    </TxResponse>
</TCRMService>
```

Chapter 56. Integrating Dun & Bradstreet with InfoSphere MDM Server

Dun and Bradstreet's D-U-N-S® Number can be used as a party identifier in InfoSphere MDM Server.

Dun and Bradstreet's (D&B) aspiration is to be the most trusted source of commercial insight, so its customers can decide with confidence. Every business in the D&B database is uniquely identified by a nine digit number, called the D-U-N-S Number. The D-U-N-S Number is widely used for keeping track of the world's businesses. Many major corporations and governments require their suppliers and contractors to have a D-U-N-S Number.

As delivered, InfoSphere MDM Server integrates with D&B from a matching perspective in order to store the D-U-N-S Number as party identifier for organizations. Additionally, InfoSphere MDM Server provides sample code to demonstrate how InfoSphere MDM Server data can be enriched with business intelligence from the D&B global database.

InfoSphere MDM Server clients must have a license agreement with D&B in order to take advantage of the D&B integration offered by InfoSphere MDM Server. If InfoSphere MDM Server clients do not renew their license agreement with D&B, it is the client's responsibility to remove D&B-licensed information from the InfoSphere MDM Server database if necessary.

InfoSphere MDM Server integrates with D&B using FTP, which allows customers to electronically and securely send batches of data to D&B for matching and enrichment.

InfoSphere MDM Server-to-D&B integration is a two stage process, which processes two types of requests:

- Matching, which is integration with InfoSphere MDM Server in order to store an organization's D-U-N-S Number
- Data Enrichment, which is integration with InfoSphere MDM Server in order to enrich an organization's party record with information from D&B, such as demographic data, legal hierarchy and other information. This process is implemented as a sample.

To get and use the D-U-N-S Number, a list of InfoSphere MDM Server organizations and matching data elements is extracted and sent to D&B. D&B follows its patented Entity Matching process to match the organizations from the InfoSphere MDM Server batch feed with organizations in D&B's global database. A corresponding list of organizations with D-U-N-S Number and match result data is returned to InfoSphere MDM Server in the Match Result file. InfoSphere MDM Server uses Batch Framework to facilitate the processing of the inbound batch file and persists the D-U-N-S Number as party identification if the match Confidence Code is high enough. The logic of analyzing match Confidence Codes is externalized as InfoSphere MDM Server external business rules.

To get D&B's business information for parties, a list of InfoSphere MDM Server organizations identified by D-U-N-S Numbers is extracted and sent to D&B for enrichment purposes. A corresponding list of organizations, along with D-U-N-S

Number identification, name, address, demographic, and hierarchical data is returned. This information can be used by an InfoSphere MDM Server customer to populate the InfoSphere MDM Server database with enriched party information. See *InfoSphere MDM Server Samples Document* for more details.

Both Matching and Data Enrichment integration scenarios use tab-delimited batch files to exchange information between D&B and InfoSphere MDM Server. InfoSphere MDM Server provides parsers to parse the delimited batch data and produce transaction request Java objects. InfoSphere MDM Server customers can reach an agreement with D&B to use different batch file formats, for example, fixed width format. If a different file format is chosen, InfoSphere MDM Server customers can implement new parsers and re-configure InfoSphere MDM Server batch process to use them instead of the parsers provided with the product. See "Customizing matching profiles and parsers" on page 694 for more details .

D&B's batch process can support international languages using the UTF-8 character set. InfoSphere MDM Server customers requiring support for international languages should make sure D&B is aware of this requirement for their batch process.

In this section, you will learn:

D&B matching integration scenario

You can configure InfoSphere MDM Server to use D&B's Entity Matching process to match the organizations from InfoSphere MDM Server with organizations in D&B's global database.

To enable the D&B Matching integration scenario, you must implement the following business and operational processes:

1. Construct a matching request file to send to D&B by extracting a list of InfoSphere MDM Server organizations based on query result set of active organizations without D-U-N-S Numbers. Data Stage stages or a simple database export mechanism can be used to produce the matching outbound batch file. Fields required by D and B for matching include: Company Name, Physical Address Line 1, Physical City, Physical State/Province, Physical ZIP/Postal Code, Country, Telephone Number, Party ID.
2. Deliver the matching request file to D&B using FTP. InfoSphere MDM Server does not provide a mechanism to deliver the file to D&B.

   D&B follows its patented Entity Matching process to match the organizations from the InfoSphere MDM Server matching request file with organizations in the D&B global database. D&B generates a match results file and makes it available on the FTP site. A confirmation email is issued to notify clients about the file being available for pickup.

3. Pick up the D&B match results file from FTP site. Note that D and B File Transfer Services allows for the file to be pushed to the clients FTP site if necessary.
4. Start the InfoSphere MDM Server batch matching process, using the match results file as the input.

   The InfoSphere MDM Server batch matching process reads the match results file, parses the input and runs the `refreshPartyExtIdentification` InfoSphere MDM Server transaction to store D-U-N-S Number as party identification.

For details about the content and layout of the batch files, see "Matching profiles and file layouts for D&B integration."

For details about the behavior of the `refreshPartyExtIdentification` transaction, see "Customizing the behavior of the refreshPartyExtIdentification transaction for D&B integration" on page 696.

For details about customizing the batch matching process to support different batch file layouts see "Running the InfoSphere MDM Server batch matching process" on page 693.

Matching profiles and file layouts for D&B integration

As part of integration planning, InfoSphere MDM Server and D&B have worked together to define the data integration batch profiles describing the layout of the batch files used to send the information between InfoSphere MDM Server and D&B.

When InfoSphere MDM Server customers enter into a license agreement with D&B, they can continue to use the profiles provided with InfoSphere MDM Server or alternatively, can work with D&B to define their own profiles with custom file layouts that better satisfy their requirements. If your InfoSphere MDM Server layout definitions have been changed, you must follow the customization steps described in the section "Customizing matching file layouts".

InfoSphere MDM Server provides the following D&B data integration batch profiles for matching:

- Profile ID 111 for matching: D&B reads organization data from the Match Request file <filename> .111 and attempt to find the matching organization in the D&B global database
- Profile ID 222 for cleansing and matching US organizations: D&B reads organization data from the Match Request file <filename> .222, first cleansing the address and business name according to US cleansing algorithms and then attempt to find the matching organization in the D&B global database
- Profile ID 221 for cleansing and matching non-US organization: D&B reads organization data from the Match Request file <filename> .221, first cleansing the address and business name according to non-US cleansing algorithms and then attempt to find the matching organization in the D&B global business database

Each DI batch profile has corresponding outbound (out of InfoSphere MDM Server into D&B) and inbound (into InfoSphere MDM Server from D&B) file layouts.

Outbound file layout

The outbound (out of InfoSphere MDM Server into D&B) file layout is the same for all three DI Batch profiles (111, 222 and 221). It contains the following data described in the following table. The Start, Stop and Length columns are provided for reference only in case the InfoSphere MDM Server client decides to use fixed width format for D&B data.

Outbound file layout for DI Batch profiles 111, 222 and 221

Field order	Field Name	Start	Stop	Length	Description
1	PartyID	1	19	19	InfoSphere MDM Server internal party ID used as identifier for the organization
2	OrganizationName	20	274	255	The name of the organization
3	AddressLineOne	275	324	50	Address Line One
4	AddressLineTwo	325	374	50	Address Line Two
5	City	375	424	50	Full name of the City
6	State/Province	425	544	120	Two character abbreviation for the State or Province
7	ZipPostalCode	545	564	20	Zip or Postal Code
8	Country	565	684	120	Full name of the Country
9	Telephone	685	939	255	Telephone

InfoSphere MDM Server provides sample DB2 export script to generate the outbound matching files. The scripts execution instructions are provided with the D&B sample code. The scripts are only an example of how the file could be generated and they do not take into account the issues such as size of the output file and performance impact of the script on the operational database.

Inbound file layouts

The inbound (into InfoSphere MDM Server from D&B) file layout for DI Batch profile 111 (no cleansing) is described in the following table. The first nine fields are the same as in the outbound message.

Table 87. Inbound file layout for matching profile 111

Field order	Field Name	Start	Stop	Length
1	PartyID	1	19	19
2	OrganizationName	20	274	255
3	AddressLineOne	275	324	50
4	AddressLineTwo	325	374	50
5	City	375	424	50
6	State/Province	425	544	120
7	ZipPostalCode	545	564	20
8	Country	565	684	120
9	Telephone	685	939	255
10	D&B Sequence Number	940	946	7
11	Match Code	953	954	1
12	DUNS number	955	964	9
13	Matchgrade	973	980	7
14	Confidence Code	987	989	2
15	Match percentage	991	995	4

Table 87. Inbound file layout for matching profile 111 (continued)

Field order	Field Name	Start	Stop	Length
16	Match Data profile	999	1013	14

The inbound (into InfoSphere MDM Server from D&B) file layout for DI Batch profile 222, with US cleansing, is described in the table below. The first nine fields are the same as in the outbound message.

Table 88. Inbound layout for profile 222

Field order	Field Name	Start	Stop	Length
1	PartyID	1	19	19
2	OrganizationName	20	274	255
3	AddressLineOne	275	324	50
4	AddressLineTwo	325	374	50
5	City	375	424	50
6	State/Province	425	544	120
7	ZipPostalCode	545	564	20
8	Country	565	684	120
9	Telephone	685	939	255
10	Sequence number	940	946	7
11	NCOA_Move Effective Date	947	952	6
12	filler	953	953	1
13	filler	954	954	1
14	LACS_Conversion Date	955	961	6
15	NCOA_Nixie Code_A	962	962	1
16	NCOA_Nixie Code_B	963	963	1
17	NCOA_Nixie Code_C	964	964	1
18	filler	965	986	22
19	Best Primary_Number	987	996	10
20	Best Pre_Directional	997	998	2
21	Best Street_Name	999	1026	28
22	Best Street_Suffix	1027	1030	4
23	Best Post_Directional	1031	1032	2
24	Best Unit_Designator	1033	1036	4
25	Best Secondary_Number	1037	1044	8
26	Best City	1045	1072	28
27	Best State	1073	1074	2
28	Best ZIP_Code	1075	1079	5
29	Best ZIP_4_Code	1080	1083	4
30	Best Delivery_Point_Code	1084	1086	3
31	Best Carrier_Route_Code	1087	1090	4
32	Best Line_Of_Travel_Code	1091	1095	5

Table 88. Inbound layout for profile 222 (continued)

Field order	Field Name	Start	Stop	Length
33	Best AA_Match_Flag	1096	1096	1
34	Best DSF_Match_Flag	1097	1097	1
35	Best Sort_Instruction_Code	1098	1098	1
36	Best Deliverability_Indicator	1099	1099	1
37	Best Delivery_Type	1200	1200	1
38	Best Vacancy_Indicator	1201	1202	1
39	Best Seasonal_Indicator	1203	1203	1
40	Best Drop_Point_Indicator	1204	1204	1
41	D&B Sequence Number	1205	1211	7
42	Match Code	1212	1212	1
43	DUNS number	1213	1221	9
44	Matchgrade	1222	1228	7
45	Confidence Code	1229	1230	2
46	Match percentage	1231	1234	4
47	Match Data profile	1235	1248	14

The inbound (into InfoSphere MDM Server from D&B) file layout for DI Batch profile 221, with non-US cleansing, is described in the table below. The first nine fields are the same as in the outbound message.

Table 89. Inbound file layout for matching profile 221 (with cleansing of non US data)

Field order	Field Name	Start	Stop	Length
1	PartyID	1	19	19
2	OrganizationName	20	274	255
3	AddressLineOne	275	324	50
4	AddressLineTwo	325	374	50
5	City	375	424	50
6	State/Province	425	544	120
7	ZipPostalCode	545	564	20
8	Country	565	684	120
9	Telephone	685	939	255
10	Sequence	940	946	7
11	Address 1	947	986	40
12	Address 2	987	1026	40
13	Address 3	1027	1066	40
14	Address 4	1067	1106	40
15	CityLine	1107	1146	40
16	CountryName	1147	1176	30
17	County/Provence	1177	1196	20
18	City	1197	1236	40
19	State	1237	1239	3

Table 89. Inbound file layout for matching profile 221 (with cleansing of non US data) (continued)

Field order	Field Name	Start	Stop	Length
20	Postal Code	1240	1249	10
21	Process Code*	1250	1250	1
22	D&B Sequence Number	1251	1257	7
23	Match Code	1258	1258	1
24	DUNS number	1259	1267	9
25	Matchgrade	1268	1274	7
26	Confidence Code	1275	1276	2
27	Match percentage	1277	1280	4
28	Match Data profile	1281	1294	14

Running the InfoSphere MDM Server batch matching process

Once you can a file from D&B with D-U-N-S Numbers, you can use the batch matching process to load the information into the InfoSphere MDM Server database.

InfoSphere MDM Server batch matching process uses the InfoSphere MDM Server Batch Framework. The Batch Framework reads the matching inbound batch file, which contain the results of the matching process, parses the input and runs the refreshPartyExtIdentification transaction to store the D-U-N-S Numbers as party identification.

The batch job is started using batch startup script. The script used several input parameters as an input. Please review the Running batch jobs section of the Batch Processor documentation.

In order to start the batch job for the D&B Matching Process you must provide the URL of the inbound layout file and the customized version of the batch extension properties file that matches the layout file. There are three different versions of batch extension properties files, each customized for particular D&B profile layout:

- `DnBMatch_extention.properties` is used with profile 111
- `DnBMatchUSCleansing_extention.properties` file is used with profile 222
- `DnBMatchNonUSCleansing_extention.properties` file is used with profile 221

Each of these properties files contains the information that is used by Batch Processor to control what kind of parser to use to parse the inbound batch file. For example, for the profile 111 the Batch Controller sets the InfoSphere MDM Server Parser context value to `DnBMatchBatch` to invoke the parser that understands the inbound layout of the profile 111. This value comes from `ParserConfiguration.Parser` property in the `DnBMatch_extention.properties` file.

All D&B matching parsers regardless of the profile produce the same transaction object to run the refreshPartyExtIdentification transaction. The Batch Processor sends this transaction object to InfoSphere MDM Server for processing. The transaction response is constructed as XML and returned to the Batch Processor. You can change the format of the response by modifying the `ProcessConfiguration.Constructor` property in D&B-specific batch extension properties files.

See also:

"Customizing matching profiles and parsers"

Customizing matching profiles and parsers

There are three D&B-specific matching parsers:

- `com.dwl.tcrm.coreParty.dnb.DnBMatchingBatchParser` is used with inbound batch file for profile 111
- `com.dwl.tcrm.coreParty.dnb.DnBMatchingUSCleansingBatchParser` extends `DnBMatchingBatchParser` and is used with inbound batch file for profile 222
- `com.dwl.tcrm.coreParty.dnb.DnBMatchingNonUSCleansingBatchParser` extends `DnBMatchingBatchParser` and is used with inbound batch file for profile 221

All three parsers construct the same persistent `refreshPartyExtIdentification` transaction containing the `com.dwl.tcrm.coreParty.dnb.DnBMatchingRequestBObj` request object. The `DnBMatchingRequestBObj` request object contains all the common fields from the inbound layouts for profiles 111, 222 and 221. The remaining fields are ignored.

Parsers use the [key].metadata property from the `TCRM.property` file to describe the content of the inbound message string. The key to use depends on the parser:

- Parser `DnBMatchingBatchParser` uses the key `DnBMatchInboundFeed`
- Parser `DnBMatchingUSCleansingBatchParser` uses the key `DnBMatchingUSCleansingInboundFeed`
- Parser `DnBMatchingNonUSCleansingBatchParser` uses the key `DnBMatchingNonUSCleansingInboundFeed`

For example, for the `DnBMatchingBatchParser` the property used is `DnBMatchInboundFeed.metadata` and it contains comma-separated string of data elements in the inbound request string. Data elements must be in the same order as in the layout of the batch file.

Parsers use the [key].dataobject property from `TCRM.property` file to get the name of the request object to create. For all the parsers this property is set to `com.dwl.tcrm.coreParty.dnb.DnBMatchingRequestBObj`. For every data element from the [key].metadata property there should be an equivalent setter method on the request object.

Parsers use the [key].delimiter property from `TCRM.property` file to determine the delimiter for the input string. By default this value contains regular expression for the TAB delimiter. If the inbound batch files are delimited using character different then TAB, change the value of this property to modify the parser behavior.

If you need to use a different layout from the InfoSphere MDM Server layout, depending on those differences, the parser needs different levels of customization.

See also:

"Customizing the parser for a delimited file format"

"Customizing the parser for file format other than delimited" on page 695

Customizing the parser for a delimited file format

If the file layout is still formatted as delimited string, then existing parsers can be customized to support the new layout.

To customize an existing parser:

- If some new fields were added to the existing layout, but they are not needed in the refreshPartyExtIdentification transaction, then you can continue using the DnBMatchingRequestBObj request object.
  1. Change the appropriate parser [key].metadata property from TCRM.property to represent the order of the fields in the layout
  2. Place additional commas inside the metadata string, where appropriate.
- If existing fields were removed from the existing layout and they are not needed in the refreshPartyExtIdentification transaction, then you can continue using the DnBMatchingRequestBObj request object.
  1. Change the appropriate parser [key].metadata property from TCRM.property to represent the order of the fields in the layout by removing the fields that are gone.
- If new fields were added to the exiting layout and they need to be passed into the refreshPartyExtIdentification transaction
  1. Create a new request object that extends the DnBMatchingRequestBObj object and introduce the setters and getters methods for new fields.
  2. Put the name of the new request object class into [key].dataobject property in TCRM.property file.
  3. Modify the [key].metadata property to add new fields to the metadata string in the correct order.
- If you are using a completely new layout, you must write a new parser that extends DnBMatchingBatchParser.
  1. Overwrite the method getFeedName() of the DnBMatchingBatchParser to return the value for the [key] that can uniquely identify the new parser in the TCRM.properties file.
  2. Add the properties [key].dataobject, [key].metadata and [key].delimiter into the TCRM.properties file with correct values.
  3. Configure the new parser in the DWLCommon.propertes file as
     ```
     Parser.tcrm.[parser logical name] = [full class path]
     ```
  4. Create a new extension properties file for batch, using DnBMatch_extention.properties file as an example, and
  5. Configure the [parser logical name] as a value of ParserConfiguration.Parse property.

Customizing the parser for file format other than delimited

If the new file layout is not in a delimited string format, then you must write the parser that can understand the format of the data.

To customize the parser.

1. Configure the new parser in the DWLCommon.propertes file as follows:
   ```
   Parser.tcrm.[parser logical name] = [full class path]
   ```
2. Create a new extension properties file for batch, using DnBMatch_extention.properties file as an example.
3. Configure the [parser logical name] as a value of ParserConfiguration.Parse property. The new parser must create a DWLTransactionPersistent transaction object for refreshPartyExtIdentification transaction.
4. Create a DnBMatchingRequestBObj request object, or any new object that extends it, and
5. Set the DnBMatchingRequestBObj as the top level object on the DWLTransactionPersistent object

Customizing the behavior of the refreshPartyExtIdentification transaction for D&B integration

The InfoSphere MDM Server batch matching process reads the matching inbound batch file, parses the input and executes refreshPartyExtIdentification InfoSphere MDM Server transaction to store the D-U-N-S Number as party identification.

The `refreshPartyExtIdentification` transaction has a dual purpose. It can be run to retrieve AbiliTec link from Acxiom and persist it as party identification. It can also be called by the batch matching process to persist a D-U-N-S Number as party identification. The actual module responsible for constructing, and in case of AbiliTec link, retrieving, the identifier is modeled as a pluggable module, which implements the `IPartyExternalIdentificationAccessor` interface. An implementation class is selected from the configuration using the identification type passed as input into the `refreshPartyExtIdentification` transaction. This allows for the system to have an accessor for each type of external identification. This section describes the behavior of the `refreshPartyExtIdentification` transaction from the D&B integration point of view. For details about transaction implementation for integration with AbiliTec, see Chapter 55, "Integrating AbiliTec with InfoSphere MDM Server," on page 675. InfoSphere MDM Server provides the `DUNSNumberAccessor` class which is the D&B specific implementation for the `IPartyExternalIdentificationAccessor` interface.

The `DUNSNumberAccessor` class use the following logic and sequence to store the D-U-N-S Number as party identification:

1. Cast the `TCRMPartyIdentificationBObj` request object to `DnBMatchingRequestBObj` to gain access to D&B specific fields.
2. Call the external business Java rule `DnBMatchConfidenceRule` which determines whether the match provided by D&B for this organization matched according to our satisfaction; that is, does it have a high enough Match Confidence Code.
3. If the rule `DnBMatchConfidenceRule` indicated that the match is not good, the accessor analyzes the `DWLStatus` object returned from the confidence rule.
   - If the status contains the `DWLError` object with a WARNING message, then the accessor returns an empty party identification object, containing a`DWLError` object with a WARNING message. the `DUNSNumberAccessor` also indicates to the `refreshPartyExtIdentification` transaction that the rest of the transaction logic should be skipped. This is the default behavior of the rule.

     The `refreshPartyExtIdentification` transaction returns an empty `TCRMPartyIdentificationBObj` object with a `DWLError` of the type WARNING as the transaction response. This logic can be customized, as described in "Customizing external business rules for D&B integration" on page 697 and "Customizing the D&B Accessor" on page 699.
   - If the status contains `DWLError` object with FATAL message, then the accessor throws the exception. The `refreshPartyExtIdentification` transaction fails with an exception.
4. If the rule `DnBMatchConfidenceRule` indicated that the match is good, the `DUNSNumberAccessor` invokes the `getPartyIdentification` method on party component to retrieve the existing D-U-N-S Number.
   - DUNSNumberAccessor calls a new external business Java rule DnBMatchMappingRule to externalize the following decision "Should the D-U-N-S Number be added or updated and how to map D&B information into TCRMPartyIdentificationBObj object". The rule returns

TCRMPartyIdentificationBObj object and indicates that refreshPartyExtIdentification transaction should persist this identifier.

- The refreshPartyExtIdentification transaction takes the newly-returned party identification object and performs either addPartyIdentification or updatePartyIdentification transaction to persist the identifier in the IBM InfoSphere Master Data Management Server database.
- If the critical data elements list has changed the suspect re-identification is executed to refresh the list of suspects for the current party. Note that D-U-N-S Number has not been added to the list of critical data elements so out of the box adding a D-U-N-S Number as party identification should not trigger suspect re-identification.

Customizing external business rules for D&B integration

The D&B match confidence external rule and D&B match mapping external rule are used to implement match analysis logic and for mapping D&B data into the party identification object.

D&B match confidence rule

The D&B match confidence rule externalizes the decision on whether the organization provided by D and B is a match to the submitted organization. This decision is based on the match code, confidence code and match grade values from `DnBMatchingRequestBObj` object. A good match has a match code of A, a confidence code of 7 or more, and a match grade value of A or B.

About this rule:

Rule ID
121

Rule type
Java class

Name `com.dwl.tcrm.externalrule.DnBMatchConfidenceRule`

Input `DnBMatchingRequestBObj`

`DWLStatus`

Output
for `DnBMatchingRequestBObj`, the output is a Boolean value indicating is match good

for `DWLStatus`, the output is an object that can contain the `DWLError` objects to influence the behavior of `refreshPartyExtIdentification` transaction if the match was not good

The rule uses configuration property `/IBM/Party/DUNSNumber/ConfidenceCode/Threshold` to determine the threshold for the confidence code. But default the value is set to 7. This is a dynamic configuration property and could be changed using Configuration and Management console without restarting the application.

The rule analyzes the values of the match grade from the `DnBMatchingRequestBObj`. Each letter in the match grade values corresponds to one of the values from outbound match file that was sent to D&B for matching. The InfoSphere MDM Server outbound match file is mapped to the match grade as shown in the table:

Table 90. Outbound file mapping to match grade

Outbound file field name	D&B matching	Mapping to D&B
Outbound match file field	D&B Matching component used with this field	Letter position in matching grade
Organization Name	D&B Business Name Matching component	First letter in matching grade
Address Line One	D&B Street Number and Street Name Matching component	Second and third letters in matching grade. If address was mapped, both will be set to the same value.
Address Line Two	D&B Street Number and Street Name Matching component	Second and third letters in matching grade. If address was mapped, both will be set to the same value.
City	D&B City Matching component	Forth letter in matching grade
State/Province	D&B State Matching component	Fifth letter in matching grade
ZipPostalCode	Used in matching but not mapped to the matching grade letter	
Country	Used in matching but not mapped to the matching grade letter	
Telephone	D&B Telephone component is used	Seventh letter in matching grade

The table below shows an example of two records from the outbound matching file and the corresponding match grade that was assigned to them after matching. The company name is "IBM Canada Ltd" and it is located at 3600 Steeles Avenue East, Markham, ON, Canada.

Name	Address Line One	Address Line Two	City	State Province	Zip/ Postal Code	Country	Phone	Confidence code	Match code	Match grade
IBM Canada Ltd	3600 Steeles Avenue East		Toronto	ON		Canada	(905) 316-5000	A	9	AAAFAZA
IBM		3600 Steeles Avenue East	Markham	ON	L3R 9Z7	Canada		A	8	BAAAAZZ

If the match was not good, the rule returns the `DWLStatus` object containing a `DWLError` object with the error code and error message. The error code number is externalized in the `PartyExternalIdentificationAccessorError.12` property in the `TCRM.properties` file and corresponds to the`ERR_REASON_TP_CD` field in `ERRREASON` table. By default the error code value is 9588 and has a severity type set to WARNING.

You can change the severity of this error by changing the `SEVERITY_TP_CD` field in ERRREASON table for the row with `ERR_REASON_TP_CD=9588`.

Alternatively, the new error code could be introduced and configured in the properties file instead of error 9588. The severity of the error impacts the behavior of the accessor and ultimately the outcome of the `refreshPartyExtIdentification` transaction, as described in "Customizing the behavior of the

refreshPartyExtIdentification transaction for D&B integration" on page 696.

D&B match mapping rule

The D&B match mapping rule externalizes the decision on whether the D-U-N-S Number should be added or updated, and how to map D&B information into the `TCRMPartyIdentificationBObj` object. If the D-U-N-S Number already exists as party identification, the new `TCRMPartyIdentificationBObj` has a value for the update date. Otherwise the `TCRMPartyIdentificationBObj` has the update date set to null. `TCRMPartyIdentificationBObj` should have the source identifier set to 10, which indicates that this data originated from D&B. If your code tables have been customized, check the CDSOURCEIDENTTP table for the appropriate source identifier code corresponding to the D and B record. the `DnBMatchMappingRule` rule reads the source identifier code value from the `DUNSNumber.source_ident_tp_cd` property in file.

About this rule:

Rule ID
122

Rule type
Java class

Name com.dwl.tcrm.externalrule.DnBMatchMappingRule

Input DnBMatchingRequestBObj

Vector of TCRMPartyIdentificationBObj objects

DWLStatus

Output
TCRMPartyIdentificationBObj object

DWLStatus

Customizing the D&B Accessor

You can customize the `refreshPartyExtIdentification` transaction logic by implementing a new accessor.

You can customize the `refreshPartyExtIdentification` transaction logic by customizing external business rules (see "Customizing external business rules for D&B integration" on page 697) or by implementing a new accessor. In most cases, the existing `DUNSNumberAccessor` accessor is sufficient, however, if required, the custom accessor can be written. A custom accessor must implement the `IPartyExternalIdentificationAccessor` interface. See the related Javadoc for the interface specifications. The custom accessor must configured in the system by setting the `PartyExternalIdentificationAccessorClass.12` property in the `TCRM.properties` file.

It is possible to customize the behavior of the `DUNSNumberAccessor` with regards to the situation when the good match was not found by changing the severity of the error returned from the `DnBMatchConfidenceRule`. When the rule indicates that the match is not good, the `DUNSNumberAccessor` analyzes the `DWLStatus` objects returned from the rule. Every error from the status object is analyzed to determine the final severity.

If rule status contains only errors with WARNING severity, then the final status is WARNING and the `DUNSNumberAccessor` returns an empty party identifier object with WARNING message. The `refreshPartyExtIdentification` transaction returns the successful transaction with empty identification object and WARNING error message.

If the rule status contains at least one error with FATAL severity, then the final status is FATAL and the `DUNSNumberAccessor` throws an exception. The `refreshPartyExtIdentification` transaction also throws an exception and fails.

Chapter 57. Integrating Entity Analytic Solutions products with InfoSphere MDM Server

InfoSphere MDM Server provides the ability to integrate to the IBM Entity Analytic Solutions (EAS) products, which are a set of cross-platform, cross-database products that answer ″Who is who?″(DB2 Identify Resolution), ″Who knows Who?″ (DB2 Relationship Resolution) and “Who knows who anonymously” (DB2 Anonymous Resolution) from multiple data sources in near real-time.

InfoSphere MDM Server integrates with both DB2 Relationship Resolution and DB2 Anonymous Resolution as a source system, with a one-way feed from InfoSphere MDM Server to EAS.

If InfoSphere MDM Server is integrated with EAS, a feed from InfoSphere MDM Server to EAS is produced when a party is:

- Added
- Updated with new details
- Collapsed into another party
- Split from another
- Inactivated
- Deleted

InfoSphere MDM Server is responsible for maintaining its database of customers, and EAS is responsible for maintaining its database of entities. Because the integration is a one-way feed from InfoSphere MDM Server to EAS, InfoSphere MDM Server does not store or maintain the EAS entity ID in the InfoSphere MDM Server database.

This documentation about the InfoSphere MDM Server integration with EAS assumes the audience is familiar with the EAS products.

Supported EAS versions

The following versions of EAS are supported by InfoSphere MDM Server:

- Relationship Resolution: 4.1.0
- Anonymous Resolution: 4.1.0

Relationship Resolution 4.1.0 and Anonymous Resolution 4.1.0 support IBM WebSphere MQ 7.0.0.1.

In this section, you will learn:

EAS extension and configuration points

Because both products provide extension and configuration mechanisms and because both products require some degree of extending and configuring as part of implementing them in a client environment, the integration between InfoSphere MDM Server and EAS is also extendible and configurable.

The following table shows the EAS integration extension and configuration points.

Table 91. EAS integration extension and configuration points, and a description of the extended or configured behavior.

Integration point	Configuration and extension descriptions
Integration On/Off	Configures the feed on or off
Data Map	An extension maps different or extended InfoSphere MDM Server data elements (business object attributes) to existing or extended EAS data elements (UMF segment tags). A configuration maps InfoSphere MDM Server code types to EAS code types. For example, TCRMPersonNameBObj.nameUsageType=1 to Name.nameType=M.
Action Map	Configuration defines which InfoSphere MDM Server behavior results in a feed to EAS.
Source System Types	Configures: • The InfoSphere MDM Server source system code (DSRC_CODE) as defined in the EAS implementation • Defines a list of exclusion source systems in InfoSphere MDM Server. When an InfoSphere MDM Server transaction is initiated by that source system, there is no feed to EAS, to prevent duplicate feeds across multiple systems.
Transport Mechanism	Extends plug-ins for different transport mechanism adapters to EAS including Web Services, HTTP, Database and File. InfoSphere MDM Server currently supports the queue (IBM MQ) transport mechanism to EAS.
UMF Message Details	Configures the contents of the UMF_ENTITY message when party details are updated or corrected. For example, when updating a person's name in InfoSphere MDM Server, the updated name is sent to EAS with a Change action. It is configurable if the name prior to being corrected should also be sent to EAS with a Delete or Force Hard Delete action

Definition, acronyms, and abbreviations used when discussing EAS integration

The following terms are used in this document:

EAS BM Entity Analytic Solutions

RR DB2 Relationship Resolution

AR DB2 Anonymous Resolution

UMF Universal Message Format

UMF Specification
Specification that describes segments and tags for the various XML document types supported by EAS

UMF Segment
Similar to an InfoSphere MDM Server Business Object. Examples include Name, Address. A group of tags makes up a given segment.

UMF Segment Tags
Similar to an attribute on an InfoSphere MDM Server Business object. Examples include LastName and FirstName for the Name segment

References for more EAS information

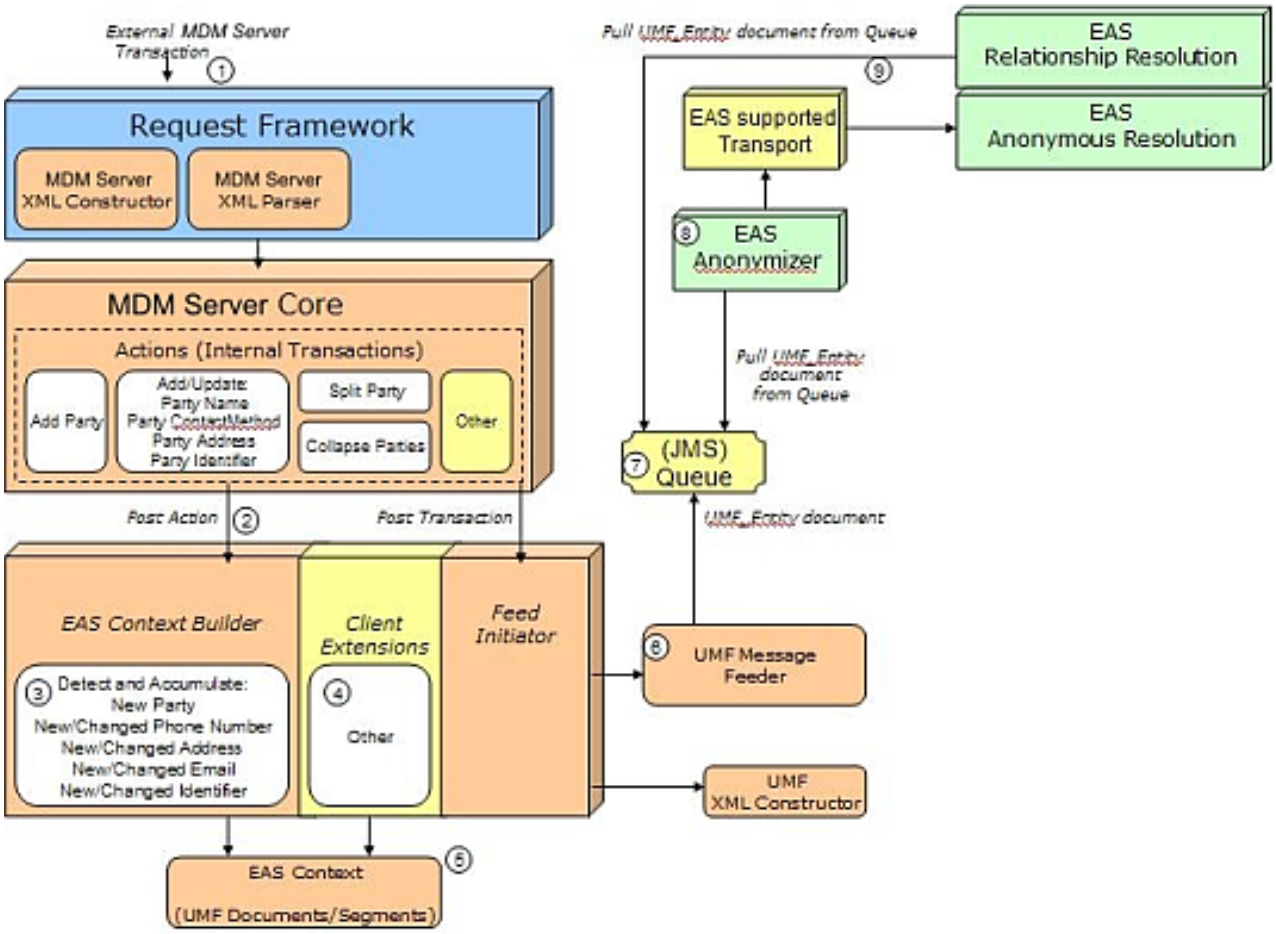
For more info on EAS integration, see:

- *IBM Relationship Resolution User Guide and Reference*
- *IBM Anonymous Resolution Anonymizer User Guide and Reference*

EAS integration design overview

This section discusses the EAS integration with InfoSphere MDM Server, and shows what happens when party information is sent to EAS from InfoSphere MDM Server.

The following diagram provides an overview of the integration design, showing how the major components interact for InfoSphere MDM Server to send a feed to InfoSphere MDM Server when a new party is added or an existing party is updated, collapsed, split, inactivated or deleted.



The integration diagram shows:

1. A transaction is submitted to InfoSphere MDM Server.
2. On the Post of required Actions, behavior extensions are run.
3. The behavior extensions compare before and after images of the business objects to detect additions and changes of interest that must be fed to EAS.
4. If a client extends the UMF specification, the same behavior extension approach can be used.
5. The behavior extensions convert InfoSphere MDM Server business objects to EAS segments and stores them in the EAS Context which is managed in DWLControl.
6. The Feed Initiator is run at the post of transactions and when the EAS Context contains documents to send to EAS, it invokes the UMF XML Constructor to build the messages and then uses the UMF Message Feeder to send, using the configured transport mechanism.
7. Default Transport Mechanism is a Queue.
8. When using Anonymous Resolution (AR), the Anonymizer component takes the UMF_Entity document off the queue and anonymizes it.
9. When using Relationship Resolution (RR), RR takes the UMF_Entity document off the queue and performs processing on it.

An EAS UMF Document is built throughout an InfoSphere MDM Server transaction in post action, or business component, extensions. The document is

built up in object form. At the end of the transaction, the XML representation of the UMF Document is created and then fed to EAS by using a pluggable UMF Message Feeder.

EAS data and transaction mappings

This section shows the mapping between EAS and InfoSphere MDM Server.

The following data map, transaction map and action map tables are based on the InfoSphere MDM Server unmodified mappings, however these mappings can be customized if required. There is a strong affinity between the InfoSphere MDM Server and EAS models and they map in a natural and logical way.

EAS data map

The following table shows the high level InfoSphere MDM Server business object to EAS UMF Segment mapping.

Table 92. InfoSphere MDM Server business object to EAS UMF Segment mapping

EAS Segment	InfoSphere MDM Server business object
Name	PersonName OrgName
Address	PartyAddress, Address
Email (RR only)	ContactMethod (of particular types)
Number	ContactMethod (of particular types) PartyIdentification PartyChargeCard
Attribute	Person.birthDate ContactMethod (of particular types, for AR) PartyChargeCard (for AR)
Client's New Segment	May be an InfoSphere MDM Server business object, Client's Extended Business Object or completely new unrelated Business Object.
Client's Extended Segment for example additional name tags	May be an InfoSphere MDM Server business object, Client's Extended Business Object or completely new unrelated Business Object

Detailed data map

The tables describe the mapping of an InfoSphere MDM Server business object Attribute to EAS Segment Tag in detail.

Table 93. Root Segment data mapping

Root Segment Tag	AR	InfoSphere MDM Server business object	Attribute
DSRC_CODE	Yes	Configurable Setting (client specific value that identifies InfoSphere MDM Server as a source system in EAS).	
DSRC_ACTION		Transactional (Add/Change/Delete/Force Hard Delete)	
DSRC_ACCT	Yes	TCRMPartyBObj	partyId

Table 93. Root Segment data mapping (continued)

Root Segment Tag	AR	InfoSphere MDM Server business object	Attribute
DSRC_REF DOC_REF	Yes	TCRMPartyBObj	partyId
SRC_CREATE_DT		Not required to be mapped	
SRC_LSTUPD_DT		Mapping dependent on transaction.	
SRC_LSTUPD_US		Mapping dependent on transaction.	
NUM_MERGED		Not required to be mapped; InfoSphere MDM Server does not force any merges of entities.	
MERGE_TYPE		Not required to be mapped; InfoSphere MDM Server does not force any merges of entities.	
UNDO		Not required to be mapped; InfoSphere MDM Server does not force any merges of entities.	

This table shows the mapping for a person name segment.

Table 94. Person name segment data mapping

Name Segment Tag	AR	InfoSphere MDM Server business object	Attribute
NAME_TYPE	Yes	TCRMPersonNameBObj	nameUsageType
FULL_NAME	Yes	Not mapped – individual name attributes mapped instead.	
NAME_PFX	Yes	TCRMPersonNameBObj	prefixType
LAST_NAME	Yes	TCRMPersonNameBObj	lastName
FIRST_NAME	Yes	TCRMPersonNameBObj	givenNameOne
MID_NAME	Yes	TCRMPersonNameBObj	givenNameTwo
NAME_SFX		TCRMPersonNameBObj	Suffix
NAME_GEN		TCRMPersonNameBObj	generationType
STD_LAST_NAME		Does not require mapping; populated during DQM process	
STD_FIRST_NAME		Does not require mapping; populated during DQM process	
STD_MID_NAME		Does not require mapping; populated during DQM process	
CULTURE		Not mapped	
VALID_FROM_DT		TCRMPersonNameBObj	startDate
VALID_THRU_DT		TCRMPersonNameBObj	endDate
LOAD_ACTION		Mapping depends on transaction	

This table shows the mapping for a organization name segment.

Table 95. Organization name data mapping

Name Segment Tag	AR	InfoSphere MDM Server business object	Attribute
NAME_TYPE	Yes	TCRMOrganizationNameBObj	nameUsageType
LAST_NAME	Yes	TCRMOrganizationNameBObj	orgName
STD_LAST_NAME		Does not require mapping; populated during DQM process	
STD_FIRST_NAME		Does not require mapping; populated during DQM process	
STD_MID_NAME		Does not require mapping; populated during DQM process	
CULTURE		COMPANY	
VALID_FROM_DT		TCRMOrganizationNameBObj	startDate
VALID_THRU_DT		TCRMOrganizationNameBObj	endDate
LOAD_ACTION		Mapping depends on transaction	

The following table shows the address segment data mapping.

Table 96. Address segment data mapping

Address Segment Tag	AR	InfoSphere MDM Server business object	Attribute
ADDR_TYPE	Yes	TCRMPartyAddressBObj	addressUsageType
COMPANY_NAME	Yes	Not mapped	
JOB_TITLE	Yes	Not mapped	
ADDR1	Yes	TCRMAddressBObj	addressLineOne
ADDR2	Yes	TCRMAddressBObj	addressLineTwo
ADDR3	Yes	TCRMAddressBObj	addressLineThree
CITY	Yes	TCRMAddressBObj	City
STATE	Yes	TCRMAddressBObj	provinceStateValue
POSTAL_CODE	Yes	TCRMAddressBObj	zipPostalCode
COUNTRY	Yes	TCRMAddressBObj	countryValue
CARE_OF		TCRMPartyAddressBObj	careOf
ADDR_LEFTOVRS		Not mapped	
DELIV_PROB		Not mapped	
BUILDING_NUM		Populated by EAS's address standardization process in DQM.	
PRE_DIRECTIONAL		Populated by EAS's address standardization process in DQM.	
STREET_NAME		Populated by EAS's address standardization process in DQM.	
STREET_SUFFIX		Populated by EAS's address standardization process in DQM.	
POST_DIRECTIONAL		Populated by EAS's address standardization process in DQM.	
SEC_UNIT_TYPE		Populated by EAS's address standardization process in DQM.	
SEC_UNIT_RANGE		Populated by EAS's address standardization process in DQM.	

Table 96. Address segment data mapping (continued)

Address Segment Tag	AR	InfoSphere MDM Server business object	Attribute
PO_BOX_NUM		Populated by EAS's address standardization process in DQM.	
RRHC_TYPE		Populated by EAS's address standardization process in DQM.	
RRHC_NUM		Populated by EAS's address standardization process in DQM.	
RRHC_BOX_NUM		Populated by EAS's address standardization process in DQM.	
STATE_CODE		Populated by EAS's address standardization process in DQM.	
COUNTRY_CODE		Populated by EAS's address standardization process in DQM.	
COUNTRY_CODE3		Populated by EAS's address standardization process in DQM.	
DPBC		Populated by EAS's address standardization process in DQM.	
CARRIER_ROUTE		Populated by EAS's address standardization process in DQM.	
LOT_CODE		Populated by EAS's address standardization process in DQM.	
ADDR_STAT		TCRMPartyAddressBObj	undeliveredReasonType
ADDR_STAT_DT		Not mapped	
LATITUDE		Populated by EAS's address standardization process	
LONGITUDE		Populated by EAS's address standardization process	
VALID_FROM_DT		TCRMPartyAddressBObj	startDate
VALID_THRU_DT		TCRMPartyAddressBObj	endDate
GEO_MILES		Populated by EAS's address standardization process	
CLEANSED_TYPE		Populated by EAS's address standardization process	
CLEANSED_STATUS		Populated by EAS's address standardization process	
LOAD_ACTION		Mapping depends on transaction	

This table shows the e-mail segment mapping for RR.

Table 97. E-mail segment mapping

Email Segment Tag	InfoSphere MDM Server business object	Attribute
ADDR_TYPE	TCRMPartyContactMethodBObj	contactMethodUsageType
EMAIL_ADDR	TCRMContactMethodBObj	referenceNumber
ADDR_STAT	TCRMPartyContactMethodBObj	undeliveredReasonType
ADDR_STAT_DT	Not mapped	
VALID_FROM_DT	TCRMPartyContactMethodBObj	startDate
VALID_THRU_DT	TCRMPartyContactMethodBObj	endDate
LOAD_ACTION	Mapping depends on transaction (see below)	

This table shows the number segment mapping with phone numbers.

Table 98. Number segment mapping with phone numbers

Number Segment Tag	AR	InfoSphere MDM Server business object	Attribute
contactMethodUsageType	Yes	TCRMPartyContactMethodBObj	contactMethodUsageType
referenceNumber	Yes	TCRMContactMethodBObj	referenceNumber
undeliveredReasonType		No equivalent attribute in InfoSphere MDM Server.	
Not mapped		TCRMPartyContactMethodBObj	undeliveredReasonType
startDate		Not mapped	
endDate		TCRMPartyContactMethodBObj	startDate
Attribute		TCRMPartyContactMethodBObj	endDate
contactMethodUsageType		Mapping depends on transaction	

The following table shows the number segment identifications mapping.

Table 99. Number segment identifications mapping

Number Segment Tag	AR	InfoSphere MDM Server business object
NUM_TYPE	Yes	TCRMPartyIdentificationBObj
NUM_VALUE	Yes	TCRMPartyIdentificationBObj
NUM_LOCATION		No equivalent attribute in InfoSphere MDM Server.
NUM_STAT		TCRMPartyIdentificationBObj
NUM_STAT_DT		Not mapped
VALID_FROM_DT		TCRMPartyIdentificationBObj
VALID_THRU_DT		TCRMPartyIdentificationBObj
LOAD_ACTION		Mapping depends on transaction (see below)

The following table shows the number segment charge card mapping for RR.

Table 100. Number segment charge card mapping

Number Segment Tag	InfoSphere MDM Server business object	Attribute
NUM_TYPE	TCRMPartyChargeCardBObj	chargeCardType
NUM_VALUE	TCRMPartyChargeCardBObj	cardNumber
NUM_LOCATION	Not mapped	
NUM_STAT	Not mapped	
NUM_STAT_DT	Not mapped	
VALID_FROM_DT	TCRMPartyChargeCardBObj	startDate
VALID_THRU_DT	TCRMPartyChargeCardBObj	endDate
LOAD_ACTION	Mapping depends on transaction	

The following table shows the attribute segment mapping.

Table 101. Attribute segment mapping

Attribute Segment Tag	AR	InfoSphere MDM Server business object
ATTR_TYPE	Yes	These mappings depend on the attribute types supported by EAS and their mapping to InfoSphere MDM Server attributes.
ATTR_VALUE	Yes	
VALID_FROM_DT		
VALID_THRU_DT		
LOAD_ACTION		

The following table shows the Relationship Resolution attribute mappings.

Table 102. Relationship Resolution attribute mappings

Attribute description	EAS value	InfoSphere MDM Server attribute
Date of Birth	DOB	TCRMPersonBObj.birthDate
Gender	GENDER	TCRMPersonBObj.genderValue
Date of Death	DOD	TCRMPersonBObj.deceasedDate
Marital Status	MARITAL	TCRMPersonBObj.maritalStatusValue
Place of Birth	POB	TCRMPersonBObj.birthPlaceValue
Citizenship	CIT	TCRMPersonBObj.citizenshipValue

This table shows the Anonymous Resolution attribute mappings.

Table 103. Anonymous Resolution attribute mappings

Attribute description	EAS value	InfoSphere MDM Server attribute
Date of Birth	DOB	TCRMPersonBObj.birthDate
Email Address	EMAIL	TCRMPartyContactMethod.referenceNumber
Credit Card	CC	TCRMPartyChargeCardBObj.CardNumber

EAS code value mappings

The Configuration and Management database contains a set of records to map the InfoSphere MDM Server code types to EAS.

They are:

/IBM/ThirdPartyAdapters/EAS/addressUsageTypeMap
/IBM/ThirdPartyAdapters/EAS/chargeCardTypeMap
/IBM/ThirdPartyAdapters/EAS/contactMethodTypeMap
/IBM/ThirdPartyAdapters/EAS/idStatusTypeMap
/IBM/ThirdPartyAdapters/EAS/idTypeMap
/IBM/ThirdPartyAdapters/EAS/nameUsageTypeMap

Refer to “Understanding configuration elements in the Configuration and Management component” on page 419 for descriptions of these configurations.

InfoSphere MDM Server transaction mapping to EAS

This section describes the mapping from InfoSphere MDM Server transactions and actions to EAS documents, as well as mappings to Relationship Resolution and Anonymous Resolution.

This section maps InfoSphere MDM Server transactions and actions to EAS documents. Separate mappings are shown to Relationship Resolution and to Anonymous Resolution.

The following tables provide a high level logical view of the mapping and is not intended to be precise as UMF documents are built in InfoSphere MDM Server in the Action, or business component, layer and not the Transaction, or controller component, layer. This topic is intended to provide a basic overview of how InfoSphere MDM Server transactions map to EAS documents. The Action map section below provides a detailed and precise mapping.

Table 104. Transaction mapping to EAS

InfoSphere MDM Server transaction	**EAS doc**	**Mapping overview**
Add Party Details	UMF_ENTITY	Whenever a new party or party details are added (such as a name, contact method, address and identifier), an UMF_ENTITY document is created with required segments with an Add load action. Example: Party “David Smith” added in InfoSphere MDM Server. This would result in a UMF_ENTITY document with a Name segment for “David Smith” with an Add load action.
Update Party Details	UMF_ENTITY	Correction Scenario: Whenever details of a party have changed (such as a name, contact method, address or identifier), an UMF_ENTITY document is created with the required segments with a Change load action. According to the correction action configuration, the previous image of the data might also be provided in the document with a Delete load action. Example: Given the “David Smith” party above, the user changes the first name to “Donald”. This would result in a UMF_ENTITY document with two Name segments. The first Name segment would contain “Donald Smith” with a Change load action. The second Name segment would contain “David Smith” with a Delete load action.
Update Party to Inactive Status	UMF_ENTITY	When a party is inactivated (for reasons other than a collapse or split), an UMF_ENTITY document is created with only a root segment with a Delete load action.
Hard Deletion of Party	UMF_ENTITY	When a party is inactivated (for reasons other than a collapse or split), an UMF_ENTITY document is created with only a root segment with a Delete/Forced Hard Delete load action based on the correction action configuration.

Table 104. Transaction mapping to EAS (continued)

InfoSphere MDM Server transaction	EAS doc	Mapping overview
Collapse Parties	UMF_ENTITY	When multiple parties are collapsed, multiple UMF_ENTITY documents are created. Given that each party to be collapsed is inactivated, an UMF_ENTITY document is created for each party with only a root segment with a Delete load action. An UMF_ENTITY document is created for the newly created party with the required segments (as in the Add Party transaction above).
Split Party	UMF_ENTITY	When a party is split into multiple parties, multiple UMF_ENTITY documents are created. Given the source party to split is being inactivated, an UMF_ENTITY document is created with only a root segment and a Delete load action. Two UMF_ENTITY documents are created for the two newly created parties with the required segments (as in the Add Party transaction above). Note that these two new parties will be identical.

Anonymous Resolution mapping

The following table shows the Anonymous Resolution mapping.

Table 105. Anonymous Resolution mapping

InfoSphere MDM Server transaction	EAS doc	Mapping overview
Add Party Details	UMF_ENTITY	Whenever a new party or party details are added (such as a name, contact method, address and identifier), an UMF_ENTITY document is created with required segments. Example: Party “David Smith” added in InfoSphere MDM Server. This would result in a UMF_ENTITY document with a Name segment for “David Smith”
Update Party Details	UMF_ENTITY	Correction Scenario: Whenever details of a party have changed (such as a name, contact method, address or identifier), an UMF_ENTITY document is created with the required segments. Example: Given the “David Smith” party above, the user changes the first name to “Donald”. This would result in a UMF_ENTITY document with one Name segment. The one Name segment would contain “Donald Smith”.
Update of Party to Inactive Status	UMF_ENTITY	When a party is inactivated (for reasons other than a collapse or split), no UMF_ENTITY document is created.
Hard Deletion of Party	UMF_ENTITY	When a party is inactivated, no UMF_ENTITY document is created.
Collapse Parties	UMF_ENTITY	An UMF_ENTITY document is created for the newly created party with the required segments (as in the Add Party transaction above).

Table 105. Anonymous Resolution mapping (continued)

InfoSphere MDM Server transaction	EAS doc	Mapping overview
Split Party	UMF_ENTITY	Two UMF_ENTITY documents are created for the two newly created parties with the required segments (as in the Add Party transaction above). Note that these two new parties will be identical.

Action mapping

InfoSphere MDM Server builds the required EAS UMF_ENTITY documents throughout an InfoSphere MDM Server transaction. More specifically, a given segment in the UMF_ENTITY document is built in the Post of a given Action (business component method).

The following table lists the Actions and the segments (behavior extensions) that are built when those Actions are run (regardless of the Transactions that invoked them). The numbers listed in the table are the EXTENSION_SET_IDs.

Remember: The DeleteParty and InactivateParty are not actual segments and instead map to the "root" segment with the Delete or Force Hard Delete load action.

Table 106. Action mapping

Transaction	Delete Party	Inactivate Party	Name	Email	Address	Number	Attribute
addOrganizationName			126				
addPartyAddress					132		
addPartyChargeCard						134	142
addPartyContactMethod				130		138	144
addPartyIdentification						136	
addPerson							140
addPersonName			128				
deleteParty	124						
inactivateParty		125					
updateOrganizationName			127				
updatePartyAddress					133		
updatePartyChargeCard						135	143
updatePartyContactMethod				131		139	145
updatePartyIdentification						137	
updatePerson							141
updatePersonName			129				

Configuring and extending the EAS integration

The following sections describe how to configure and extend the different areas of the integration.

Turning the integration on or off

The EAS integration is off by default. To turn on the integration:

1. Enable (unexpire) the required behavior extensions as per the Action Map above. The behavior extensions have an EXTENSION_SET_ID range from 123 to 145.

2. Set the /IBM/ThirdPartyAdapters/EAS/resolutionType Configuration and Management Database record.
3. Configure the JMS provider in your application container and set the following Configuration and Management Database records:

   /IBM/ThirdPartyAdapters/EAS/queueConnectionFactory

   /IBM/ThirdPartyAdapters/EAS/queue

   Attention: If you integrated InfoSphere MDM Server with EAS at installation, the MQ transport is already configured for InfoSphere MDM Server.

Extending the integration for new code types

This section discusses how to extend the integration when new code types are added in EAS or InfoSphere MDM Server and existing elements such as Name, Address, Number, Email of the new code type must be fed to EAS.

If new code types are added in EAS or InfoSphere MDM Server, the configuration must be updated to include a new mapping between the new EAS and InfoSphere MDM Server code types. For example, if a new number type "H" for "Health Card" is added in EAS and it is mapped to Identification type "Health Card" in InfoSphere MDM Server. Because the default integration maps InfoSphere MDM Server Identification to EAS, no code change is required and instead, the value of the `/IBM/ThirdPartyAdapters/EAS/idTypeMap` record in the Configuration and Management Database must be updated to `(1 - SSN),(3 - DL), (8-PP), (9-H)`.

See also:

"Extending the integration for EAS UMF or InfoSphere MDM Server business object extensions"

"Configuring source system types" on page 717

"Configuring the transport mechanism" on page 717

"Configuring UMF message details" on page 717

Extending the integration for EAS UMF or InfoSphere MDM Server business object extensions

This section discusses how to extend the integration when the EAS UMF is extended or InfoSphere MDM Server Business Objects are extended or added and must now be fed to EAS.

Given that EAS and InfoSphere MDM Server both have extendible data models, a mechanism within the InfoSphere MDM Server-EAS integration is provided to enable the feed of the extended elements from InfoSphere MDM Server to EAS. Some examples include:

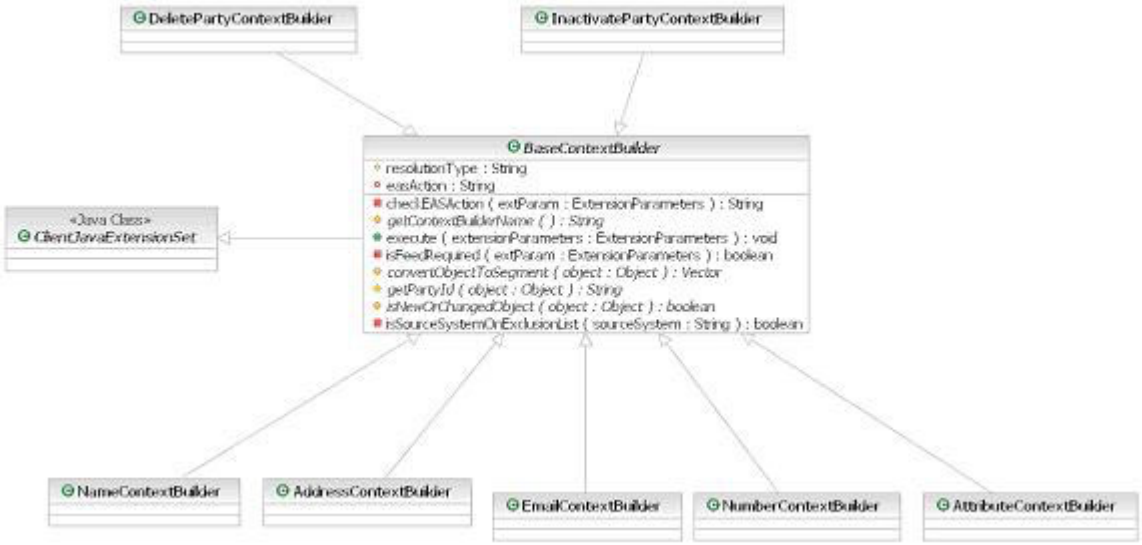
- New or extended InfoSphere MDM Server business objects or attributes must be fed to EAS
- Existing InfoSphere MDM Server business objects or attributes must be fed to an extended EAS

The following sections describe how to extend the integration when new segments are added to the EAS UMF and when new tags are added to existing segments in the EAS UMF.

Extending the integration for new EAS segments

The unmodified InfoSphere MDM Server provides a set of classes to support feeding name, address, number, email and attribute segments to EAS. If a new type of segment is added, or if new attribute types are added, then a new behavior extension must be built. InfoSphere MDM Server provides a `BaseContextBuilder` template that must be extended from to accomplish this.

The following diagram shows the default context builders:



The new behavior extension that extends from the `BaseContextBuilder` is invoked on the post of any action that manipulates the business object that maps to the new EAS segment or attribute, for example, during adds or updates. The behavior extension has the following responsibilities:

- Return the party ID from the business object
- Identify whether the business object is new or changed, that is whether it must be fed to EAS
- Convert the business object to the EAS Segment by instantiating a new `UMFSegment` object and adding the required tags. See the code sample below for an example of this use.

The following code samples are from the `AttributeContextBuilder` class. For more information on the `BaseContextBuilder` and supporting classes (such as `UMFSegment`), see the related javadocs.

```
protected boolean isNewOrChangedPerson(TCRMPersonBObj person) {

    TCRMPersonBObj beforeImage = (TCRMPersonBObj)person.BeforeImage());

    if (beforeImage == null) { //add transaction
 // the following attributes are on the Person object and are new

      isBirthdaychanged = true;
      if (resolutionType.equals(WCCEASProperties.EAS_RESOLUTION_RR)) {
      isDeceasedDateChanged = true;
    isMaritalStatusChanged = true;
    isBirthPlaceChanged = true;
    isCitizenshipChanged = true;
    isGenderChanged = true;
      }
      return true;
    }

    //check RR & AR common fields by comparing before and after images
    String birthDt = person.getBirthDate();
```

```
    String beforeBirthDt = beforeImage.getBirthDate();
    if ((birthDt != null && beforeBirthDt != null &&
         !birthDt.equals(beforeBirthDt))
   || (birthDt != null && beforeBirthDt == null))
    {
        isBirthdaychanged = true;
    }

    ......   //other code

    if (isBirthdaychanged || isDeceasedDateChanged
    || isMaritalStatusChanged || isBirthPlaceChanged
    || isCitizenshipChanged || isGenderChanged)
    {
      return true;
    }

    return false;
}

protected Vector convertObjectToSegment(Object object)throws WCCEASException {

    Vector segVec = null;

    if (object instanceof TCRMPersonBObj) {
         TCRMPersonBObj person = (TCRMPersonBObj)object;
        segVec = convertPersonToSegment(person);
    } ......  //other code

    return segVec;
}

protected Vector convertPersonToSegment(TCRMPersonBObj person) {

    Vector segVec = null;

    int count = 0;
    if (isBirthdaychanged)
 count++;
    if (isDeceasedDateChanged)
 count++;
    if (isMaritalStatusChanged)
 count++;
    if (isBirthPlaceChanged)
   count++;
    if (isCitizenshipChanged)
 count++;
    if (isGenderChanged)
 count++;

    if (count > 0) {
        segVec = new Vector(count);

        if (isBirthdaychanged) {

           String birthDt = person.getBirthDate();
           if (StringUtils.isNonBlank(birthDt)) {

           UMFSegment seg = new UMFSegment(
                UMFConstants.SEGMENT_ATTRIBUTE);

         seg.addTag(UMFConstants.ATTRIBUTE_ATTR_TYPE, UMFConstants.ATTRIBUTE_ATTR_TYPE_DATE_OF_BIRTH);
                seg.addTag(UMFConstants.ATTRIBUTE_ATTR_VALUE, birthDt);

         segVec.addElement(seg);
             }
      }
      ......  //other code
   }

   return segVec;
}
```

Extending the integration for new EAS segment tags

The following section describes how to extend the integration when new tags are added to existing segments in the UMF, for example, if a middle name two is added to the name segment.

Since InfoSphere MDM Server already provides classes to build segments in the default UMF, these classes can be simply extended to accommodate the new segment tags. For example, the `com.dwl.thirdparty.integration.eas.contextbuilder.NameContextBuilder` class can be extended to accommodate a new middle name two tag.

To extend for new EAS segment tags:

1. Define a new class which extends from the required context builder class.
2. Overwrite the `getContextBuilderName()` method to return back a new name that identifies the extended class.
3. Overwrite the `isNewOrChangedObject()` method. In the case of the `NameContextBuilder`, the `isNewOrChangedPersonName()` method can be overwritten. Invoke the supertype's method to reuse existing code so that duplicate code does not have to be written to check whether the attributes in the data map are new or have changed.
4. Overwrite the `convertObjectToSegment()` method. In the case of the `NameContextBuilder`, the `convertPersonNameToSegment()` method can be overwritten. The supertype's method should be invoked to reuse existing code so that duplicate code does not have to be written to populate tags within a segment based on the unmodified data map.
5. Configure the `EXTENSIONSET` table to invoke the new behavior extension at the Post of the required Actions. The behavior extension that was extended should also be expired.

Configuring source system types

The source system code for the integrated InfoSphere MDM Server instance is located the `/IBM/ThirdPartyAdapters/EAS/dsrcCode` record in the Configuration and Management Database and must be configured.

To prevent duplicate feeds across multiple systems, configure an exclusion source systems list in the `/IBM/ThirdPartyAdapters/EAS/exclusiveSourceSystem` record in the Configuration and Management Database. The source systems list is a comma delimited string of client system IDs.

Configuring the transport mechanism

You must configure the transport mechanism for the implementation.

The transport mechanism of the integration is pluggable. The implementation is required to implement interface `com.dwl.thirdparty.integration.eas.feeder.IUMFMessageFeeder.`

The InfoSphere MDM Server default implementation supports IBM Queue transport. To set the transport implementation, edit the `WCC_EAS.properties` file.

```
############################################################
# umf_message_feeder is the class that accepts an UMF message from WCC and
#    forward it to the integrated EAS instance
# Default feeding is implemented by sending the message though WebSphere MQ
# Plug your own implementation class for non-default feeding

umf_message_feeder= com.dwl.thirdparty.integration.eas.feeder.WCCUMFMessageFeeder
```

Configuring UMF message details

You can configure the UMF message to send the previous image of the data with the message.

Whenever details of a party have changed, such as a name, contact method, address or identifier, an UMF_ENTITY document is created with the required segments with a Change load action. According to the correction action configuration, the previous image of the data can also be provided in the document with a Delete load action.

Chapter 58. External rules for the Party domain

This section contains externalized rules specific to the Party domain.

Rule ID	Rule Description	Java Class Name
1	Rule for matching two persons	com.dwl.tcrm.externalrule.PartyMatch
2	Rule for matching two organizations	com.dwl.tcrm.externalrule.PartyMatch
3	Rule for searching suspect duplicate parties	com.dwl.tcrm.externalrule.PartySuspectSearchRule
4	Rule for ranking person search results	com.dwl.tcrm.externalrule.PartyMatch
5	Rule for ranking organization search results	com.dwl.tcrm.externalrule.PartyMatch
6	Rule for updating party data as part of adding party	com.dwl.tcrm.externalrule.PartyUpdateExtRule
8	Rule to determine if critical data is changed	com.dwl.tcrm.externalrule.PartyMatch
9	Rule for search party	com.dwl.tcrm.externalrule.SearchParty
10	Rule for match category	com.dwl.tcrm.externalrule.PartyMatchCategoryExtRule
11	Rule for auto collapse	com.dwl.tcrm.externalrule.AutoCollapsePartiesProductionExtRule
12	Rule for FS post collapse	com.dwl.tcrm.externalrule.FSCollapsePartiesExtRule
18	Rule for business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
29	Rule for Party Value business key validation	com.dwl.tcrm.externalrule.ValueBusinessKeyValidation
30	Rule for evaluating conditions attached to mandatory validator of external validation	com.dwl.tcrm.externalrule.ExtValidation
31	Rule for evaluating conditions with option codetable validation	com.dwl.tcrm.externalrule.ExtValidation
32	Rule for the A2 Suspect Processing Action	com.dwl.tcrm.externalrule.A2SuspectsActionRule
33	Rule for the B Suspect Processing Action	com.dwl.tcrm.externalrule.BSuspectsActionRule
34	Rule for the C Suspect Processing Action	com.dwl.tcrm.externalrule.CSuspectsActionRule
35	Rule for the add party suspect action	com.dwl.tcrm.externalrule.SuspectAddPartyRule
36	Rule for A1 Suspect Processing Action	com.dwl.tcrm.externalrule.A1SuspectsActionRule
37	Rule for Best Suspect Match	com.dwl.tcrm.externalrule.BestSuspectMatchRules
38	Rule for Collapse Parties	com.dwl.tcrm.externalrule.CollapsePartiesWithRules
39	Rule for Compare Address	com.dwl.tcrm.externalrule.CompareAddressRule
40	Rule for PartyAddress Preferred Indicator	com.dwl.tcrm.externalrule.TCRMInternalValidation
41	Rule for PartyContactMethod Preferred Indicator	com.dwl.tcrm.externalrule.TCRMInternalValidation
44	Rule for Default Privacy Preference Relationship duplicate business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
62	Rule for Default Privacy Preference Relationship update business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
63	Rule for Address note update business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
64	Rule for Address value business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
65	Rule to Determine Address Standardization	com.dwl.tcrm.externalrule.CheckForAddressStandardizationExtRule
66	Rule for evaluating conditions attached to AbiliTec link type validator	com.dwl.tcrm.externalrule.ExtValidation

Rule ID	Rule Description	Java Class Name
67	Abilitec links person name mapping rule	com.dwl.tcrm.externalrule.AbiliTecLinkConsumerNameRule
68	Abilitec links org mapping rule	com.dwl.tcrm.externalrule.AbiliTecLinkCommercialNameRule
69	Abilitec links address mapping rule	com.dwl.tcrm.externalrule.AbiliTecLinkAddressRule
70	Abilitec links mapping rule	com.dwl.tcrm.externalrule.AbilitecLinksMappingRule
71	Rule for refreshing party summary	com.dwl.tcrm.externalrule.PartySummaryIndicatorRefresherRule
83	Party macro role business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
84	Party macro association business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
86	Party relationship role business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
87	Party grouping role business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
88	Party grouping value business key validation	com.dwl.tcrm.externalrule.BusinessKeyValidation
89	Rule for Retrieve All Party Details	com.dwl.tcrm.externalrule.RetrieveAllPartyDetailsRule
90	DeletePartyValidationExternalRule	com.dwl.tcrm.externalrule.DeletePartyValidationExternalRule
91	DeletePartyAssociationsRule	com.dwl.tcrm.externalrule.DeletePartyAssociationsRule
92	ValidatePartyRoleChildrenDeleteRule	com.dwl.tcrm.externalrule.ValidatePartyRoleChildrenDeleteRule
93	Delete Party History Rule	com.dwl.tcrm.externalrule.DeletePartyHistoryRule
110	Rule for adjust suspect status	com.dwl.tcrm.externalrule.AdjustSuspectStatusRule
111	Rule for Best Filtered Suspects	com.dwl.tcrm.externalrule.BestFilteredSuspectsRule
112	Rule for populating party for update reIdentify process	com.dwl.tcrm.externalrule.PopulateParty
113	Rule for generating an aggregated party view	com.dwl.tcrm.externalrule.AggregatedPartyGenerationRule
114	Delete EventManager PCT record rule	com.dwl.tcrm.externalrule.DeleteEventManagerPCTRule
116	Rule for retrieving revision history for an object	com.dwl.tcrm.externalrule.RevisionHistoryRule
117	Rule for validating date range for revision history	com.dwl.tcrm.externalrule.RevisionHistoryDateRangeRule
118	Rule for Find All A1 Suspects	com.dwl.tcrm.externalrule.FindAllSuspectMatchRules
119	Rule for Collapse Multiple parties	com.dwl.tcrm.externalrule.CollapseMultiplePartiesRule
120	Rule for Financial Service Collapse Multiple parties	com.dwl.tcrm.externalrule.FSCollapseMultiplePartiesExtRule
121	Confidence rule for Dun & Bradstreet Matching feed	com.dwl.tcrm.externalrule.DnBMatchConfidenceRule
122	Mapping rule for Dun & Bradstreet Matching feed	com.dwl.tcrm.externalrule.DnBMatchMappingRule
123	Rule to set current suspect type for TCRMSuspectBObj	com.dwl.tcrm.externalrule.CurrentSuspectCategoryRule
124	Rule for allowing critical data change in real time	com.dwl.tcrm.externalrule.CDCAllowRule
125	Rule for creating the TCRMMultiplePartyCDCBObj object.	com.dwl.tcrm.externalrule.CDCCreateMultiplePartyCDCRule
126	Rule for determining whether a business object has a corresponding record in the CONTACTCDC table.	com.dwl.tcrm.externalrule.CDCActiveRule
127	Rule for removing objects containing critical data.	com.dwl.tcrm.externalrule.CDCFilterCriticalDataRule
128	Rule for updating the party information as a result of accepting the critical data change request.	com.dwl.tcrm.externalrule.CDCAcceptChangesRule
129	Rule for reidentifying suspects as a result of accepting the critical data change request.	com.dwl.tcrm.externalrule.CDCReidentifySuspectsRule
130	Rule for NearRealTime	com.dwl.tcrm.em.QualityStagePartyMatchingExtRule
131	Rule to validate address search criteria	com.dwl.tcrm.externalrule.SearchAddressValidationRule

Rule ID	Rule Description	Java Class Name
132	Rule for checking address duplication before update	com.dwl.tcrm.externalrule.CheckAddrForUpdateRule
133	Rule for Compare Contact Method (Phone Number)	com.dwl.tcrm.externalrule.CompareContactMethodExtRule
134	Rule for Determining whether to send contact Normalized/Unnormalized data to Standardizer	com.dwl.tcrm.externalrule.CheckContactMethodNormalizedRule
135	Rule for Determining whether to send address Normalized/Unnormalized data to Standardizer	com.dwl.tcrm.externalrule.CheckAddressNormalizedRule
136	Rule for adding address with extension	com.dwl.tcrm.externalrule.AddAddressExtensionRule
137	Rule for Party Compliance duplicate business key validation	com.dwl.tcrm.externalrule.DWLBusinessKeyValidation
138	Rule to validate an update of a business key for Party Compliance	com.dwl.tcrm.externalrule.DWLBusinessKeyValidation
143	PartyComplianceTargetInstanceRule	com.dwl.tcrm.externalrule.PartyComplianceTargetInstanceRule
144	Rule for evaluating conditions attached to the next verification date	com.dwl.tcrm.externalrule.ExtValidation
157	Rule for checking duplicate party address	com.dwl.tcrm.externalrule.CheckPartyAddressSame
163	Set status to PARTYEXIST	com.ibm.mdm.externalrule.PartyDomainStatusRule
167	Rule for handling transition of a task into inactive status	com.ibm.mdm.common.task.externalrule.InactiveTaskRule
178	Rank Hierarchy Node Organization SearchResults	com.ibm.mdm.externalrule.HierarchyNodePartyMatch
179	Rank Hierarchy Node Person SearchResults	com.ibm.mdm.externalrule.HierarchyNodePartyMatch
20001	Event Manager Rules	com.dwl.commoncomponents.eventmanager.externalrule.EventManagerRules
20002	Java rule	com.dwl.commoncomponents.eventmanager.test.TestRules
20003	Evergreen Java rule for CreateSuspects	com.dwl.commoncomponents.eventmanager.tcrm.EvergreenRule
20004	Evergreen Java rule for CollapseParties	com.dwl.commoncomponents.eventmanager.tcrm.EvergreenCollapsePartiesWithRules
20005	Evergreen Java rule for Abilitec	com.dwl.commoncomponents.eventmanager.tcrm.EverGreenAbilitecRule
20006	Suspect Augmentation EM Rule	com.dwl.commoncomponents.eventmanager.externalrule.QualityStagePartyMatchingEMRule
20007	Rule for Party Compliance	com.dwl.commoncomponents.eventmanager.externalrule.PartyComplianceNextVerifyDateRule

The following table lists several alternate rules for the Party domain.

Rule ID	Rule Description	Java Class Name
10	Rule for adjusting the suspect type of a particular suspect	com.dwl.tcrm.externalrule.PartyMatchCategoryProductionExtRule
22	Rule for retrieving default privacy preferences for a party	com.dwl.tcrm.externalrule.DefaultPrivacyPreferenceSample
119	Rule to retrieving the party admin sys key when collapsing parties	com.dwl.tcrm.externalrule.CollapseMultiplePartiesTestRule

Chapter 59. Party domain configuration elements

This topic describes the configuration elements for the Party domain.

Party domain configurations have names beginning with the following:

- /IBM/Party
- /IBM/ThirdPartyAdapters

Refer to "Understanding configuration elements in the Configuration and Management component" on page 419 for details about these configurations.

Part 3. Introduction to the Product domain

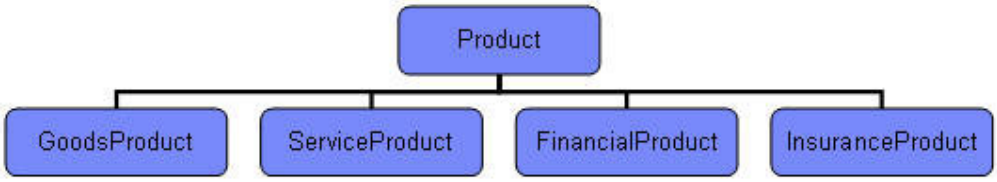
The Product domain is an operational-styled hub that manages the definition of products. Its collection of products makes up a product catalog that is accessible to other systems across the enterprise.

The following are the features particular to the Product domain:

Product type hierarchy

Different types of products have different types, or sets, of attributes associated with them. The Product domain allows you to define a hierarchy of product types and associate data to capture with each type.

The following product types are provided for you to use as is:



You can create products of any one of these five types. An associated data model and set of services exists for each of these product types. Examples of services include `AddServiceProduct` and `UpdateFinancialProduct`.

Any one of these five product types can be sub-typed further to create a custom product type hierarchy. For example, you can sub-type the `FinancialProduct` type to create `DepositAccountProduct` and `LoanProduct` types.

You can also attach specs to any product type in order to define what data needs to be captured when you create products of that type. The specs can be cascaded down to descendent types.

Product relationships

You can create relationships between products for a number of reasons. For example, you might want to relate products if you want to identify cross-sells, create product bundles, or identify product components.

The relationship type—for example, `accessory` or `cross-sell`—is a mandatory code value that identifies the type of relationship that exists between products. You are provided with the ability to create new relationship types using the code table services.

In addition to product relationships, products can be related to each other through the root-variant product structure. A root product typically represents a product line; a variant product is a closely-related product that is a variation of the root product.

Product equivalencies

A product that is defined within the Product domain might also exist in another system. A product equivalence key allows you to determine the product's identifier in the other system.

Since the product's identifier can be made up of a number of different parts, the product equivalence key allows you to store the identifier in its parts or as a concatenated string. See the Chapter 68, "External rules for the Product domain," on page 771 section for the externalized rules for building equivalence keys.

Product identifiers

This feature provides the ability to store known identifiers of the product that might be assigned by third parties. Examples include NSIN, CUSIP, ISIN in financial services and GTIN, barcodes, UPC in retail.

Product terms and conditions

Terms and conditions serve as an agreement between parties. You can create and relate terms and conditions to one or more products or product relationships. Examples of terms and conditions include *eligibility rules* and *disclosures.*

You can create a hierarchy of conditions by creating sub-conditions of conditions.

The static text of terms and conditions can be captured, as well as the parameters of conditions. For example, an eligibility rule for a particular product might have a condition stating that the customer must have an account in a valid status. The parameters of this condition would contain the valid status values.

Product category hierarchy

You can create multiple category hierarchies and group products together in order to create structures that can be navigated, such as product catalogs. For example, you can create a *web catalog* that contains products presented to external consumers.

You can attach specs to any category in the category hierarchy in order to define what data needs to be captured with product associated with that category. The specs can be cascaded down to descendent categories. See Chapter 64, "Configuring product category attributes," on page 755 for more information.

Categories can exist in other systems. The Category Equivalence feature supports this and provides for the storage of category equivalency keys in the same way as product equivalency keys are stored for the Product Equivalence feature. See the Chapter 68, "External rules for the Product domain," on page 771 section for the

externalized rules for building equivalency keys.

Product category attributes

Product category attributes are product attributes defined in a spec that can be associated with a category hierarchy. These attributes apply to any product associated with the category. Product category attributes are required in order to feed downstream systems and to support user maintenance of product data through the product UI.

Product data localization

Product data can be maintained, retrieved and searched on in multiple languages.

In this section, you will learn:

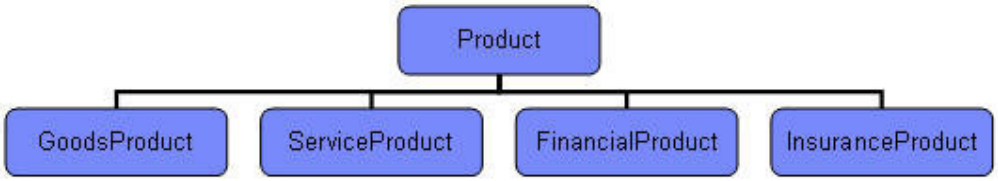
Chapter 60. Configuring the product type hierarchy

The product type hierarchy is described as *metadata*. It defines the types of products that can be created and the attributes that can be assigned values once a particular product is created.

You should be careful how you define the product type hierarchy. Once you create a product and assign it a particular product type, it is difficult to subsequently change the product type hierarchy.

Provided product types

The following product types are provided for you to use as is:



These five product types are declared as *hard types*. This means there is an associated data model and associated services provided to support them. For example, the `FinancialProduct` type is associated with the FINANCIALPRODUCT database table, and with the `AddFinancialProduct` and `UpdateFinancialProduct` services, which are used to maintain it.

You can sub-type any of the hard product types to create customized product *sub-types*. Furthermore, these customized product sub-types can also be sub-typed. The result is a product type hierarchy that represents all of the different types of products that can be created, as well as the data that can be captured for each product.

The *product type hierarchy* should not be confused with the *category hierarchy*. The product type hierarchy is metadata that describes the types of products that can be created and the attributes that they can and should have. The category hierarchy is used to group products into hierarchical structures.

In this section, you will learn:

Specifying required attributes for a product type

You can define the data that can be captured for products of a given type by attaching specs to a product type.

See Chapter 3, "Managing specs and spec values," on page 61 for an overview of specs and how to create Specs.

To specify required attributes for a product type:

1. Choose the product type for which you want to create attributes. The product type can be either a hard or soft type.
2. Attach one or more selected specs to the product type using the existing services, and identify if the specs are to be cascaded down to subtypes of the product type.

A Product type can have specs be associated with it either explicitly or cascaded from the product type hierarchy. EntitySpecUse timeframe at the ancestor node must overlap with the product type timeframe, so that the Product can add spec values for the spec.

Creating new product types

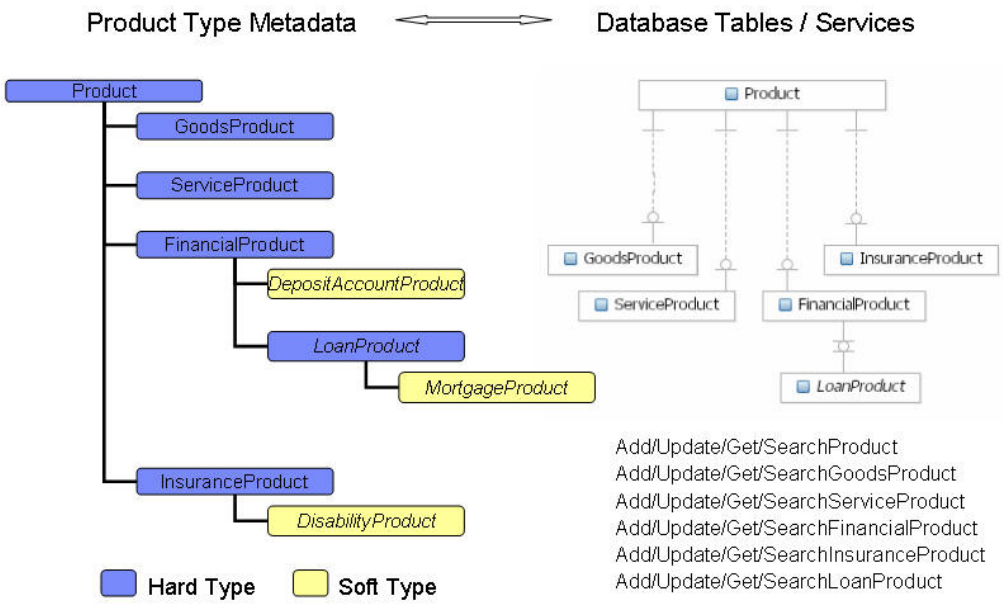
InfoSphere MDM Server provides services you can use to maintain the product type hierarchy and to create new product types

To create a new product type:

1. Choose an existing product type from which you want to derive a new subtype. Only one product type hierarchy is permitted.
2. Determine the node type of the new product type. Valid node types are *hard* and *soft*.
   a. A *hard* product type indicates that there is an associated database table and associated services for maintaining products of that type. See "Creating a hard product type" on page 732 for details on how to create these assets.
   b. A *soft* product type indicates the opposite; there is not an associated database table and there are no services for maintaining products of that type. Instead, data is stored in the first hard ancestor of the parent.
3. Add the new product type using the supplied services. See *The Transaction Reference Guide* for more details.

For details on how to decide if a new product should be hard or soft, see "When to create hard versus soft product types" on page 731.

The following example shows subtypes of the product types provided for you to use as is. The example also shows which products are hard and which ones are soft types.



In this example, `DepositAccountProduct`, `LoanProduct`, `MortgageProduct` and `DisabilityProduct` are product types that have been added.

The left hand side of the picture shows the metadata, which is maintained in the PRODUCTTYPE table. The right hand side shows the database tables and related services. The example indicates that `LoanProduct` is a hard type, which means that it has an associated database table and services. Conversely, the example indicates that `DepositAccountProduct` is a soft type, which means that it has no associated database table or services. To add a new deposit account product, you need to use the `AddProductInstance` or `AddFinancialProduct` service. The data associated with deposit account products is maintained in the `FinancialProduct` type and its associated database tables. See "Specifying required attributes for a product type" on page 729 for more details.

See also:

"When to create hard versus soft product types"

"Creating a hard product type" on page 732

When to create hard versus soft product types

In general, you should define a new product type as *soft* if you expect that you will need to make frequent changes to the product type, and define a new product type as *hard* if you expect it will not require many changes.

The following are some more specific criteria you can use to help you decide whether or not a new product type should be defined as hard or soft.

If any of the following criteria apply to the new product type, you should create a *hard* product type:

- Other systems access the database directly and do not support XML technologies. Attributes on the product would exist in actual database columns as opposed to XML columns
- You want to relate the product type to other hard structures and it is not appropriate to relate these structures to the product type's hard ancestor.

If any of the following criteria apply to the new product type, you should create a *soft* product type:

- You want to be able to modify the product type attributes without impacting existing products of that type. Over time, specs can change as new spec formats are applied. Any changes to the spec format apply to products created after the change takes place. Existing products are not impacted by spec format changes; they continue to use the spec format that they were associated with when they were created.
- You want to avoid having a deep product hierarchy because it would require you to create numerous database tables and join too many tables. For instance, a loan product might have term options of 1 year, 2 years, 3 years and 5 years. Given this one-to-many relationship, the loan product database table would break out into multiple tables.
- You want to take advantage of features inherent within specs, such as localization and element constraints.

Creating a hard product type

This topic provides an overview of the steps required to create a custom hard product type that represents a deposit product.

You can use these steps to create your own custom product type, replacing occurrences of `DEPOSITPRODUCT` and `DepositProduct` with input that reflects the name of the new custom type you are creating. A working example of this custom product type is provided. See the sample hard product type code included with InfoSphere MDM Server.

See also:

"Modifying the database"
"Modifying the persistence layer" on page 733
"Modifying the business logic layer" on page 734
"Modifying the controller layer" on page 735
"Modifying the configuration" on page 736

Modifying the database

You need to create a new table that will be used to contain the product instance data corresponding to your new type, along with the corresponding entity object, which will provide the object to relational mapping for InfoSphere MDM Server.

This is part of the larger task of "Creating a hard product type." To modify the database:

Create a new table.
In the case of the sample scenario, for creating a new product type called `DepositProduct`, you need to define a table called DEPOSITPRODUCT for the new hard product type. Ensure that the table has the following columns, as well as columns for any additional attributes that are specific to the new product type.

Table 107. New hard product type

Column name	Type name	Length	Nullable
PRODUCT_ID	BIGINT	8	No
LAST_UPDATE_DT	TIMESTAMP	10	No
LAST_UPDATE_USER	VARCHAR	20	Yes

Table 107. New hard product type (continued)

Column name	Type name	Length	Nullable
LAST_UPDATE_TX_ID	BIGINT	8	Yes

Now that you are done modifying the database, the next task you need to perform is "Modifying the persistence layer."

Modifying the persistence layer

To satisfy the requirements of our Persistence Layer, which uses pureQuery, you need to create a new entity object (EObj), business object (BObj) query, inquiry data and result processor class.

This is part of the larger task of "Creating a hard product type" on page 732.

For the deposit product example, the classes required are EObjDepositProduct, DepositProductBObjQuery, DepositProductInquiryData and DepositProductResultSetProcessor. After you create these classes and interfaces, the implementation must be generated with the pureQuery plugin.

1. Create the EObjDepositProduct class.

   This class:

   - subtypes EObjCommon
   - has a field called PRODUCT_ID, plus fields specific to deposit products, which are defined in the new DEPOSITPRODUCT table

     Note: The three LAST_UPDATE_* attributes in the table are already mapped to the table via the EObjCommon class, so you do not need to define them in the new entity object class.

2. Create the DepositProductBObjQuery class.

   This class:

   - subtypes GenericBObjQuery
   - implements all inherited abstract methods. The following is a sample implementation:

```
protected Class provideQueryInterfaceClass() throws BObjQueryException {
  return DepositProductInquiryData.class;
}

protected IResultSetProcessor provideResultSetProcessor()
   throws BObjQueryException {
return new DepositProductResultSetProcessor();
}

protected Class provideBObjClass() {
  return DepositProductBObj.class;
}
```

3. Define the DepositProductInquiryData interface.

   In defining this interface, ensure that the inquiry SQL statement joins all corresponding product tables in order to return the data for the newly defined product type. For example, new product type MyDepositProduct extends DepositProduct; DepositProduct extends FinancialProduct; and FinancialProduct extends Product, so the inquiry SQL statement needs to join tables MYDEPOSITPRODUCT, DEPOSITPRODUCT, FINANCIALPRODUCT and PRODUCT.

   Here is an example of what this interface will look like:

```
public interface DepositProductInquiryData {
 static final String tableAliasString = "tableAlias
(DepositProduct => com.ibm.samples.extension.product.deposite.entityObject.EObjDepositProduct,
FinancialProduct => com.ibm.mdm.product.entityObject.EObjFinancialProduct,
H_FinancialProduct => com.ibm.mdm.product.entityObject.EObjFinancialProduct,
PRODUCT => com.ibm.mdm.product.entityObject.EObjProduct,
H_PRODUCT => com.ibm.mdm.product.entityObject.EObjProduct)";

   @Select(sql="SELECT A.product_id, A.deposit,A.LAST_UPDATE_DT, A.LAST_UPDATE_USER,
A.LAST_UPDATE_TX_ID, B.product_id, B.Currency_TP_CD, B.Tax_Position_TP_CD,
B.ACCOUNT_REQUIRED_TP_CD, B.LAST_UPDATE_DT, B.LAST_UPDATE_USER, B.LAST_UPDATE_TX_ID,
C.PRODUCT_ID, C.PRODUCT_TYPE_ID, C.NAME, C.SHORT_DESCRIPTION, C.DESCRIPTION,
C.PROD_STRUC_TP_CD, C.STATUS_REASON_TP_CD, C.STATUS_TP_CD,C.AVAILABILITY_TP_CD,
C.PRIMARY_TARGET_MARKET_TP_CD,C.LAST_UPDATE_DT, C.LAST_UPDATE_TX_ID,
C.LAST_UPDATE_USER FROM DEPOSITPRODUCT A, FINANCIALPRODUCT B, PRODUCT C WHERE
A.product_id=B.product_id AND B.product_id = C.product_id AND B.product_id= ?",
pattern= tableAliasString)
   Iterator<ResultQueue3<EObjDepositProduct, EObjFinancialProduct,
EObjProduct>> getDepositProduct(Object[] parameters);
}
```

4. Create the DepositProductResultSetProcessor class.

   This class:

   - subtypes GenericResultSetProcessor
   - needs to retrieve all the fields defined in the inquiry SQL statement of DepositProductInquiryData. To enable it to do so, you need to define the method createObject in the ResultSetProcessor, as shown in the following example

   ```
   public Object createObject(Object eObjs) throws Exception {
     DepositProductBObj depositProductBObj =
           (DepositProductBObj)super.createBObj(DepositProductBObj.class);
    Queue eobjQueue= (Queue)eObjs;
     depositProductBObj.setEObjDepositProduct((EObjDepositProduct)eobjQueue.remove());
     depositProductBObj.setEObjFinancialProduct((EObjFinancialProduct)eobjQueue.remove());
     depositProductBObj.setEObjProduct((EObjProduct)eobjQueue.remove());

    return depositProductBObj;
   }
   ```

Now that you are done modifying the persistence layer, the next task you need to perform is “Modifying the business logic layer.”

Modifying the business logic layer

You need to define two classes in the business logic layer: the business object and the business component.

This is part of the larger task of “Creating a hard product type” on page 732.

For the deposit product example, the two classes you need to define are DepositProductBObj and CustomProductComponent.

1. Define the DepositProductBObj class

   The subtype depends on which product type you are extending. For the deposit product type, you would subtype FinancialProductBObj since the deposit product type is a type of financial product. Because it is a subtype, it does not have its own depositProductId; the productId of ProductBObj is used as the ID for all subtypes.

   New hard product types must always extend from existing hard types. InfoSphere MDM Server comes with five products that can be extended from: ProductBObj, GoodsProductBObj, FinancialProductBObj, ServiceProductBObj, and InsuranceProductBObj. After you define your own custom hard product types, you can also extend from them in the same way.

   Continuing with the DepositProduct scenario, you would first extend from the existing FinancialProductBObj as follows:

```
public class DepositProductBObj extends FinancialProductBObj {
 ....
 }
```

After you've created the DepositProductBObj business object, you can then extend it to create another new hard product type named MyDepositProductBObj, as follows:

```
public class MyDepositProductBObj extends DepositProductBObj {
 ....
}
```

2. Create a new class CustomProductComponent. Follow the existing coding pattern to create the class so that it that extends from the existing component file, ProductComponent, and adds new persistent methods (add or update) and an inquiry method (get). The following is the logic for an add transaction in the method handleAddDepositProduct:
   a. Retrieve and set the pluggable key.
   b. Retrieve the concrete product type of the product that is processing (for example, if MySoftFinancialProduct is a soft product type and its parent product type is FinancialProduct, which is the hard type, then the concrete product type for MySoftFinancialProduct is FinancialProduct (ProductTypeId=4). Validate that the concrete product type matches the newly defined product type.
   c. Define a new method, processDepositProduct, which takes the new product type BObj as an input signature and returns the same BObj.

Now that you are done modifying the business logic layer, the next task you need to perform is "Modifying the controller layer."

Modifying the controller layer

For all custom product types, the controller service methods are typically all defined on a single subtype of the product MDM controllers.

This is part of the larger task of "Creating a hard product type" on page 732.

In the examples included in this topic, all custom client controllers are prefixed with 'Custom', but you can use a different naming convention if you want. The controller level interfaces you need to modify are CustomProductTxnLocal—to support the add and update transactions—and CustomProductFinder—to support the inquiry transactions. You also need to modify their corresponding implementation classes, CustomProductTxnBean and CustomProductFinderImpl.

1. Modify CustomProductTxnLocal. This interface extends from ProductTxnLocal

   Add the add and update methods addDepositProduct and updateDepositProduct, each accepting a single DepositProductBObj as a parameter.
2. Modify CustomProductFinder. This interface extends from ProductFinder

   Add the new inquiry methods. For our example, this is getDepositProduct which accepts a ProductRequestBObj.
3. Modify CustomProductTxnBean.
   - This class implements the new CustomProductTxnLocal interface and extends from. It is a stateless session bean.
   - Since DepositProductBObj uses the productId derived from ProductBObj, the beforePreExecuteUpdateDepositProduct method must be registered in the metadata as the beforePreExecuteMethod of the updateDepositProduct method. The beforePreExecuteUpdateDepositProduct method is used to pass

the productId from ProductBObj to all of its descendent business objects. It also prevents the need for each product subtype from having its own ID (such as depositProductId).

- You need to provide an implementation for addCustomProductInstance that will route the request to the appropriate transaction, given a more abstract call. For example, you want to ensure that a call to addProductInstance with a DepositProductBObj will route to the addDepositProduct transaction. The following implementation will ensure this happens:

```
if (theProductBObj instanceof DepositProductBObj) {
        addDepositProduct(theProductBObj);
} else {
        super.addProductInstance(theProductBObj);
}
```

- The add and update transactions can be coded similar to any InfoSphere MDM Server addition. See "Creating extensions and additions with InfoSphere MDM Server Workbench" on page 19.

4. Modify CustomProductFinderImpl.
   - This class implements the new CustomProductFinder interface.
   - You can use the coding patterns for an addition to implement the inquiry transaction. See "Creating extensions and additions with InfoSphere MDM Server Workbench" on page 19.

Now that you are done modifying the business logic layer, the next task you need to perform is "Modifying the configuration."

Modifying the configuration

There are a number of configuration changes you need to make to complete the task of creating a hard product type.

This is part of the larger task of "Creating a hard product type" on page 732.

1. After created the controllers and implemented the transaction service methods, register the controller and transactions by modifying the tcrm_extension.properties file.
   a. Define the new entries for the new product type.

```
addProductInstance =
    com.company.mdm.product.controller.CustomProductTxnBean

addDepositProduct =
    com.company.mdm.product.controller.CustomProductTxnBean

updateDepositProduct =
    com.company.mdm.product.controller.CustomProductTxnBean

getDepositProduct =
    com.company.mdm.product.controller.CustomProductFinderImpl

DepositProductBObj =
    com.company.mdm.product.component
```

   b. Insert the following entry, so that the client-defined component class will be used.

```
custom_product_component =
   com.company.mdm.product.component.CustomProductComponent
```

2. Make changes to the metadata. As new business objects and new transactions are created, metadata data additions are required, as with any normal extension and they follow the same pattern. See "To register extended and new business objects in the metadata repository" on page 36.

3. Make changes to XML schema definition (XSD). Add corresponding entries in tcrmRequest_extension.xsd and tcrmResponse_extension.xsd for the newly defined product type. See "To define extended functions in the Request and Response framework XSD" on page 26.

This completes the task of "Creating a hard product type" on page 732.

Chapter 61. Configuring product structures and relationships

The InfoSphere MDM Server Product domain enables developers to maintain complex product structures and relationships.

The Product domain supports several types of complex products, and provides customization capabilities to support additional types as required. InfoSphere MDM Server supports the following complex product types:

- compositions, such as bundles and product offerings
- associations, such as cross-sell and up-sell
- roots and variants

The Product domain includes a number of product properties to enable you to describe complex products:

- product structure type
- inter-product relationships
- variant indicators

The Product domain also provides you with the ability to capture and retrieve product relationship information, including:

- relationship type
- cardinality
- optionality
- constraints of the target product

Another key feature of the Product domain is its ability to treat a group of related products as a single business entity. For example, the Product domain enables users to retrieve a product instance along with all of its related products that share a given type of relationship.

In this section, you will learn:

Understanding composition products and bundles

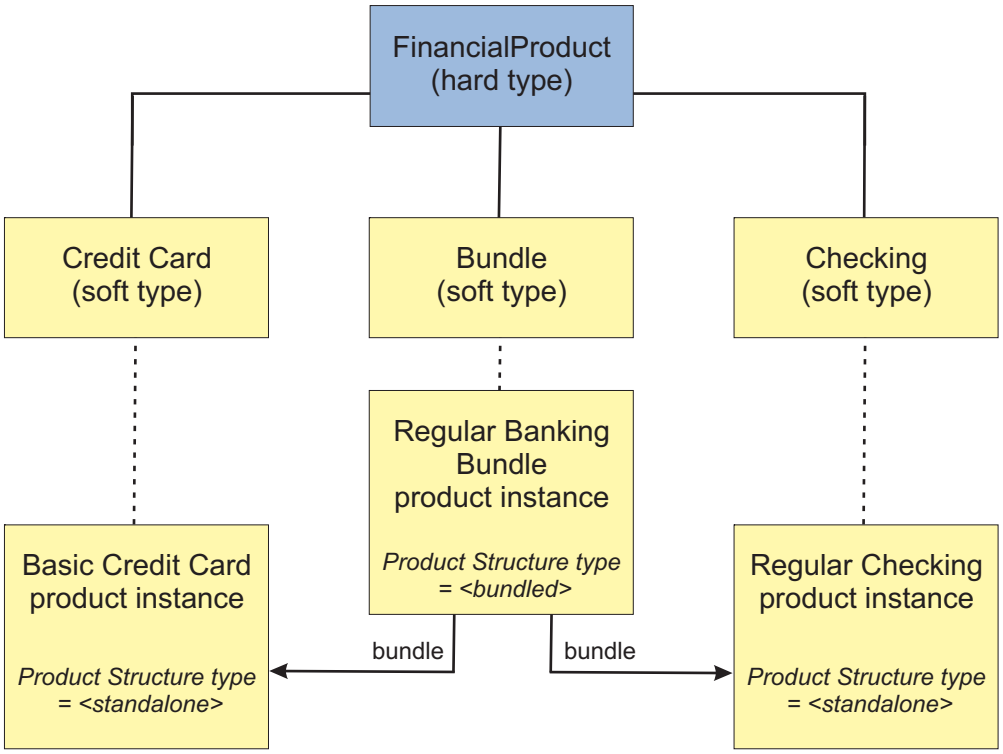
Composition products have strong aggregation relationships to their components or parts.

In some instances, product components can represent features that exist only as a part of the product. For example, a land line phone service is actually made up of a set of services that cannot be sold independently. The main service (the phone connection itself) can be associated with other services, such as call waiting, call forwarding, call display, and voice mail. Each of these sub-services is a product component of the land line phone composition product.

In other instances, a product component might be another product or service that can also sold and tracked independently. For example, a land line phone service might be combined in a bundle with other products such as cable television, wireless phone, and internet access to provide the customer with a single bill statement and discounted rates. In this example, each of the services would be a product component of a bundled product.

In the InfoSphere MDM Server Product domain, a bundled product is modeled as a product instance with a product structure type of 'Bundled'. The bundle components are related to the bundle product instance using a product relationship type value of '1' (Product 1 is the bundle to which Product 2 belongs; Product 2 is a bundle member of Product 1).

For example, consider the banking industry bundle depicted in the following figure. In this case, the product structure type "Bundled" on the product instance "Regular Banking Bundle" indicates that this product is a composition with the components "Basic Credit Card" and "Regular Checking".



The Product domain provides users with the capability to retrieve the details of a bundle together with its product components as part of the getProductInstance transaction by specifying a value for RelatedProductInquiryLevel in the transaction request. The transaction response returns the composition's product components nested within the bundle product.

For information about the getProductInstance transaction, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.

For information about customizing the retrieval logic for bundles, see "Understanding product structure strategies" on page 743.

Understanding association products

Association relationships define the relationship between two products that can exist independently from each other.

Associations are modeled using product relationship entity information. This enables you to specify relationship types, cardinality, and optionality. You can model association constraints as Terms and Conditions on the product relationship entity.

Types of association relationships include up-sell, cross-sell, accessory, replacement, and others.

For example, a retail store can configure an up-sell relationship between its Brand X Ink Jet Printer product and the associated Brand X Toner product. Customers who purchase the Ink Jet Printer product will be presented with the option to buy the Toner product at a 10% discounted rate. This up-sell relationship is configured to be available only between January 1st, 2010 and January 31st, 2010.

Understanding root and variant products

The InfoSphere MDM Server Product domain enables you to define root-variant relationships between products.

- **Root products** are basic products representing a line of products. Roots are typically closely related to one or more variant products. Depending on the industry and customer requirements, root products can be:
  - products or services that can be sold.
  - conceptual representations of a product line, and only its related variant products can be sold.
- **Variant products** are products that are variations of the root product. Variant products are typically closely related to only one root product. Typically, each variant is a separate product that can be sold.

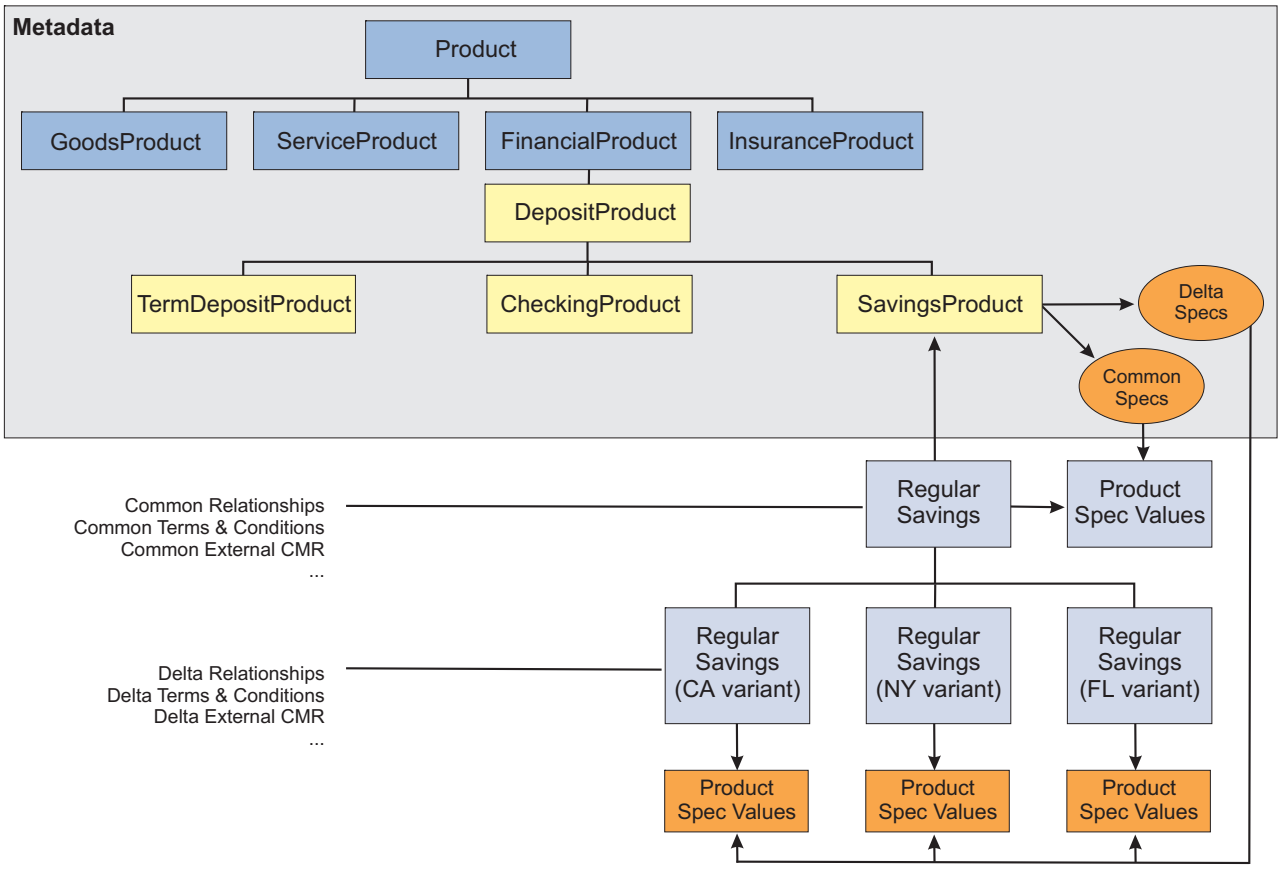
  Different variant products of the same root product can have different product relationships and be categorized into different categories in category hierarchies.

Restriction: Multi level variants are not supported. A given root product can only have one level of variants beneath it. A variant product cannot also act as a root product to another subset of products.

Generally, attributes that are common across all variants of a given root are defined at the root product level, and attributes that are specific to each variant are defined at the variant product level.

For example, banking product values can vary based on location. A given banking product can have different fees in different states. An example from the retail sector would be a T-Shirt product that is available in various colors and sizes.

The following figure depicts a banking industry example of a root product, ″Regular Saving″, and its three variant products for California (CA), New York (NY), and Florida (FL). All variant products share some of the same specification (spec) values from their root product as defined by the ″Common Specs″ spec. Each variant product also has its own set of spec values that vary by state. Variant attributes are defined by ″Delta Specs″.



Any InfoSphere MDM Server product instance can be defined as a root product, regardless of its product type or product structure type.

A product instance is considered a root product based on the value of its VariantAllowedInd attribute:

- This attribute indicates whether a product can have variant products.
- If the value of this attribute is `Y`, variant products can be created for this product.
- If the value of this attribute is `N`, the product can not have any variant products.
- If the value of the VariantAllowedInd is not set, then InfoSphere MDM Server treats the product as a potential root product, which means that variants can be created for this product.

A product instance is considered a variant product based on the value of its VariantOfProductId attribute:

- This attribute stores the product ID of the root product.
- If specified, this attribute must refer to a valid product ID.
- Products that have set the VariantOfProductId attribute can not have the VariantAllowedInd attribute set to `Y`. In other words, a product cannot be both a variant and a root at the same time.

The Product domain enables users to retrieve the details of a root product when inquiring on one of its variant products using the getProductInstance transaction. The transaction response returns the root product information nested within the variant product.

The Product domain also enables users to retrieve the details of all associated variant products when inquiring on a root product by specifying a value for the RelatedProductInquiryLevel parameter in a getProductInstance transaction request. The transaction response returns the variant product information nested within the root product.

For information about the getProductInstance transaction, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*.

For information about customizing the retrieval logic for variants, see "Understanding product structure strategies."

Understanding product structure strategies

InfoSphere MDM Server enables you to customize the behavior of the application while adding, updating, and retrieving products that have complex product structures.

The customizable behavior is known as the product structure strategy, and is implemented using external rules. The external rules for customizing product structure strategies are listed in Chapter 69, "Product domain configuration elements," on page 777.

Product structure strategies are applied for the following transactions:

- addProductInstance
- addFinancialProduct
- addGoodsProduct
- addInsuranceProduct
- addServiceProduct
- updateProductInstance
- updateFinancialProduct
- updateGoodsProduct
- updateInsuranceProduct
- updateServiceProduct
- getProductInstance
- getFinancialProduct
- getGoodsProduct
- getInsuranceProduct
- getServiceProduct
- getProductByAdminSysKey
- searchProductInstance

If necessary, you can apply more than one product structure strategy to a product. For example, a product bundle can have variants, meaning that the product instance representing the bundle is also a root product. In this case, the product would use both the bundle strategy external rule (BundleStrategy) and variant strategy external rule (VariantStrategy). To handle this situation, InfoSphere MDM Server includes an external rule, ResolveProductStrategy, that determines what strategy to apply to a given product instance based on:

- structure type
- variant indicators

- a combination of product properties

See also:

"Learning the ResolveProductStrategy rule"

"Learning the BundleStrategy rule"

"Learning the VariantStrategy rule"

"To create new product structure strategies" on page 745

Learning the ResolveProductStrategy rule

The ResolveProductStrategy rule is an external rule that determines what product structure strategy to use in situations where more than strategy applies.

The ResolveProductStrategy external rule implementation:

- Validates which product structure strategies will be applied, and in what sequence they will be applied. This rule also returns the list of strategy rules to be applied. For example, if there is a product that is a root product and is also a bundle, then the transaction returns both the VariantStrategy and BundleStrategy, in the sequence that they will be applied.
- Checks the Configuration and Management component entries for the rule ID of the strategy implementation. For details on implementing a custom strategy, see "To create new product structure strategies" on page 745.
- Examines the VariantAllowedInd and VariantOfProductId attributes of the requested product. If the product is a variant, root, or potential root, then the transaction returns the VariantStrategy that is configured in the Configuration and Management component option /IBM/Product/ProductStructureStrategy/Variant.
- Examines the product structure type of the requested product and attempts to find the appropriate strategy to handle the structure type. For example, to identify the strategy to be invoked for a product with a product structure type of 'Bundled', then the ResolveProductStrategy rule checks the value of the `strategy_rule_id` attribute of CDPRODSTRUCTURETP table for the product structure type 'Bundled'.

Learning the BundleStrategy rule

The BundleStrategy product structure strategy rule applies to products with a product structure type of 'Bundled'.

For inquiry transactions, the BundleStrategy implementation returns bundle component details based on the RelatedProductInquiryLevel provided in the transaction request. If no value is provided for RelatedProductInquiryLevel, no bundle components will be returned.

Products with a product relationship type of '1' are considered bundle components.

Learning the VariantStrategy rule

The VariantStrategy product structure strategy rule applies to products that are defined as variant, root, or potential root products.

The following matrix shows interpretations of different combinations of a product entity's VariantAllowedInd and VariantOfProductId attributes:

Table 108. Determining whether a product is a variant, root, or normal product

VariantAllowedInd	VariantOfProductId	Result
Y	null	Potential root product
N	null	Normal product
N	ProductID	Variant product
null	null	Potential root product

Important: By default, the VariantStrategy rule is not enabled because it would potentially be applicable to all products in the repository (as potential roots). IBM recommends that you enable this strategy only if variants are a required part of the business model in your implementation of InfoSphere MDM Server.

To enable the VariantStrategy rule, set the value of the Configuration and Management component entry /IBM/Product/ProductStructureStrategy/Variant to rule ID 193.

When enabled, the VariantStrategy implementation has the following effects:

- For inquiry transactions, the VariantStrategy implementation returns root or variant products:
  - If the requested product is a variant, the transaction retrieves the root product details using the same inquiry level as specified for the requested variant product.
  - If the requested product is a root or potential root, the transaction retrieves all of the root's variants according to the value of the RelatedProductInquiryLevel parameter provided in the transaction request. If no RelatedProductInquiryLevel value is provided in the request, the transaction does not return any variants.
- For add and update transactions, the VariantStrategy implementation performs validations to determine if the details of the transaction request are valid. For example, before adding a new variant product, the VariantStrategy rule validates whether the given root product exists.

To create new product structure strategies

If you define a new product structure type to model a complex product, you can create a new product structure strategy to handle validation of the product content during persistent transactions, and to manage the retrieval of product content during inquiry transactions.

1. Create a new external rule to be executed by the InfoSphere MDM Server External Rules framework. This new rule will be a strategy class.
2. Ensure that the new rule extends the existing abstract class ProductStructureStrategy.
3. Ensure that the new rule implements the following abstract methods:
   - applyInquiryStrategy – This method is called by inquiry (get and search) transactions.
   - applyPersistenceStrategy – This method is called by add and update transactions.
4. Configure the new product strategy rule by specifying its rule ID in the `strategy_rule_id` attribute of the CDPRODSTRUCTURETP table.

The following class diagram shows a sample product structure strategy class.

Chapter 62. Managing product data in multiple languages

Data for a product can be maintained, inquired on and searched for in multiple languages. For example, the name of a product can be captured in English, French and German.

Product data can be maintained in multiple languages for both *soft* attributes (that is, attributes defined within a spec) and *hard* attributes (that is, attributes defined within database tables).

Data for the system's default language is maintained in the base table or object. Data for all other required languages are maintained within child tables or objects. For example, if the system's default language is English, then the product database table contains the name and description of the product in English. The product_nls database table contains the name and description of the product in all other required languages and is keyed by language type.

The product data can be managed in multiple languages using services such as `addProductInstance` and `updateProductInstance`. Refer to the *InfoSphere MDM Server Transaction Reference Guide* for details on these services.

The following configuration option defines the system's default language:

```
/IBM/DWLCommonServices/NLS/system_Default_Data_Locale
```

The default value is **en** for English.

Chapter 63. Managing product terms and conditions

Terms and conditions can be associated with a product or a product relationship in order to describe the rules and details governing the product. Terms and conditions can also be associated with an agreement (or contract) business entity from the Account domain.

Examples of terms and conditions include the eligibility rules for selling a product to a customer or disclosures.

See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for the available services that maintain terms and conditions, which are also known as the TermCondition entity. The *IBM InfoSphere Master Data Management Server Transaction Reference Guide* describes how to add, update and inquire on terms and conditions and how to attach them to other entities such as products, product relationships and agreements.

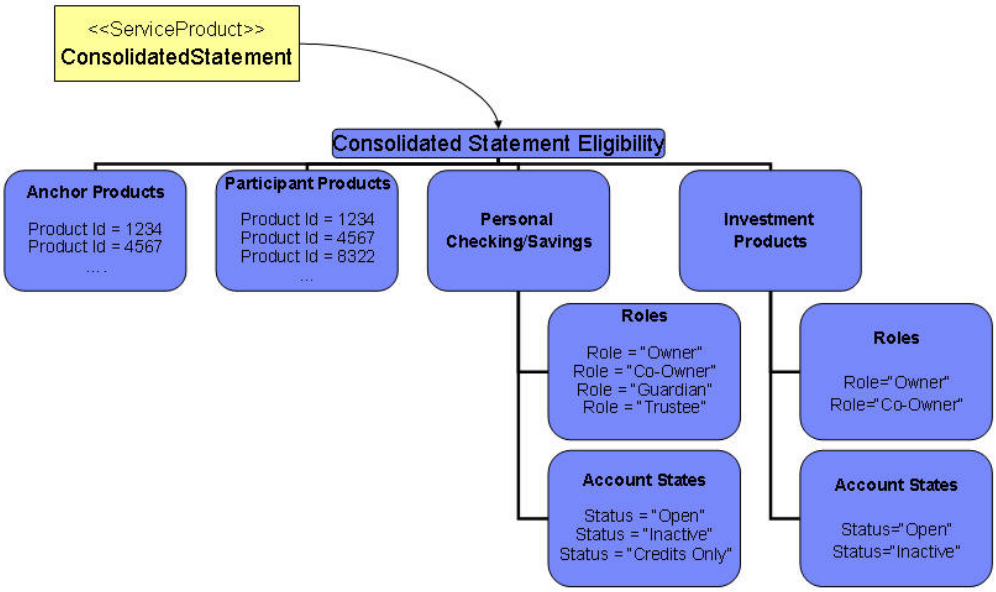
Note: It is possible to maintain a product or product relationship's terms and conditions by using the coarse grain addProductInstance, updateProductInstance and getProductInstance services.

The following describes the features that can be utilized in managing terms and conditions:

- The static text of terms and conditions can be captured in the description field of the TermCondition entity and can be maintained in multiple languages.
- TermCondition entities can be reused between different products. This can be achieved by associating the same TermCondition entity with multiple products or product relationships.
- Terms and conditions support a hierarchical structure. Each TermCondition entity can have multiple nested sub-conditions, also represented by the TermCondition entity. Each TermCondition entity can only have one parent. Only the top-most TermCondition entity can be associated with other business entities such as products and therefore sub-conditions cannot be directly related to business entities.
- Terms and conditions can be categorized by usage type to describe the purpose of the condition. Examples include Value Package Eligibility, Product Disclosures, and Rate.
- Terms and conditions can have attributes. Attributes can be used as parameters to external rules that govern terms and conditions. For example, an eligibility rule for a particular product might have a condition stating that the customer must have an account with a valid status. The attributes of this condition would contain the valid statuses.
- Terms and conditions can be overridden. For example, a TermCondition defined as part of a product can be overridden once an agreement has been captured as a result of selling the product to a customer. In order for a TermCondition to be overridden then the overrideIndicator must be set to yes. For more information about overriding terms and conditions, see Chapter 71, "Managing terms and conditions for agreements," on page 785.

The following example shows the simplified terms and conditions for a consolidated statement service. This service is defined as a product. Customers can

sign up for the service to receive a single statement that contains all of their selected accounts.



This example describes the conditions that must hold true for a customer to receive a consolidated statement. The conditions are:

- They must have a valid anchor product.
- In addition to having a valid anchor product, they can have additional participant products.
- For any Personal Checking or Savings products they want on the consolidated statement, they must be in a valid role on the account (owner, co-owner, guardian, or trustee) and the account must be in a valid status (open, inactive, or credits only).
- For any Investment products they want on the consolidated statement, they must be in a valid role on the account (owner or co-owner) and the account must be in a valid status (open or inactive).

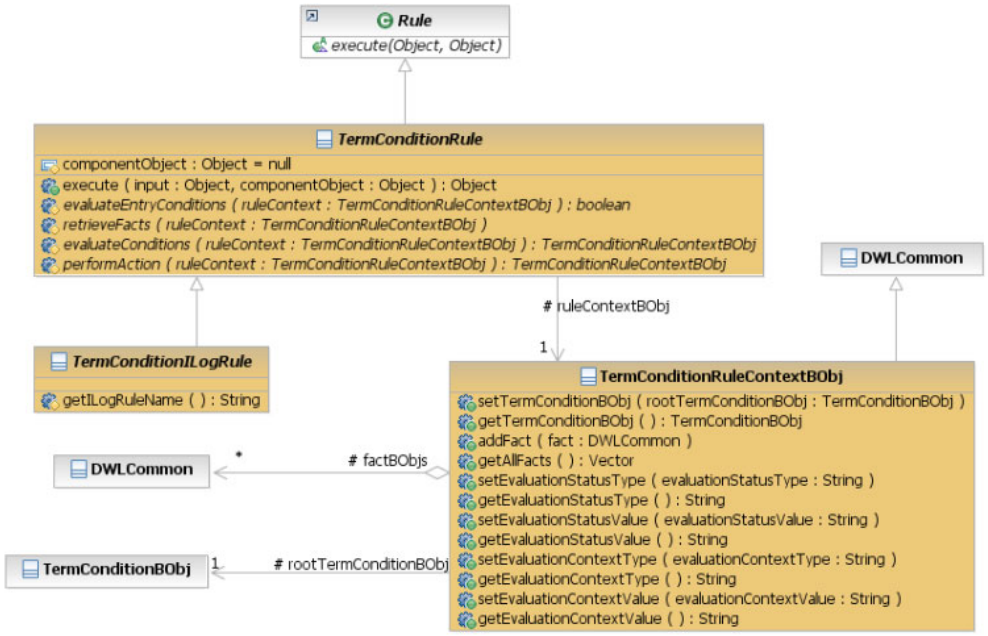
These conditions and their attributes can be used by an external process—or in this case, the Account domain—to govern the consolidated statement service sold to the customer. For example, the Account domain can be used to ensure the customer is in a valid role for each account on the consolidated statement. If at any point in time they are no longer in a valid role, then the Account domain can react accordingly.

In this section, you will learn:

Terms and Conditions rule framework

Terms and Conditions feature provides a framework to implement business rules to govern terms and conditions fulfillment for Contract, Product and ProductRelationship entities.

A class diagram of this framework is shown below:



This framework offers a template class (TermConditionRule) as the super type of all Terms and Conditions Rules. The execute(input, component) method in TermConditionRule expects the 'input' to be of type TermConditionRuleContextBObj, which by itself it must hold a reference to the root TermConditionBObj and also a collection of business object facts.

For a sub-type of TermCondtionRule, the following methods can be implemented:

- **evaluateEntryConditions(TermConditionRuleContextBObj) : boolean** - This method by default returns a value of true. The TermConditionRule implementation can override this method to include any customized logic required by the terms and conditions rule to check if the entry criteria are met. A usage example of this method might be to check if the contract's status is being changed, then return true (in order to continue the evaluation process), otherwise return false (to exit the rule).
- **retrieveFacts(TermConditionRuleContextBObj)** - This abstract method must be implemented to retrieve additional facts the given Terms and Conditions rule might require in its decision-making logic.
- **evaluateConditions(TermConditionRuleContextBObj)** - This abstract method must be implemented with the decision-making logic of the Terms and Conditions rule. A typical implementation of this method would check the retrieved data in the facts against the hierarchical structure of Terms and Conditions and their associated attributes. The outcome of such evaluations would be reflected in the TermConditionRuleContextBObj's EvaluationStatusType/Value.
- **performAction(TermConditionRuleContextBObj) : TermConditionRuleContextBObj** - This abstract method must be implemented in order to perform a desired action (such as firing a message, running a txn, raising an event, etc.) based on the evaluation status/context types and values. Using this method, you can implement your desired strategy in dealing with various scenarios. For instance, in a cross-sell scenario when conditions are not satisfied, you can implement logic to suggest other related products to

customers. Or if conditions are broken for an already applied discount, you can develop another desired action to automatically or manually set the stage to apply a compensation plan.

TermConditionILogRule is a sub-type of TermConditionRule which is designated to delegate the decision-making logic (evaluateCondition() method) to a desired ILog rule. The sub types of the TermConditionILogRule are not allowed to override the evaluateConditions() method, because this method is implemented as *final* in the TermConditionILogRule. Instead, the sub types implement the getILogRuleName() method to return the RuleName of the dedicated ILog rule for evaluating the conditions.

See also:

"How to use the Terms and Conditions rule"

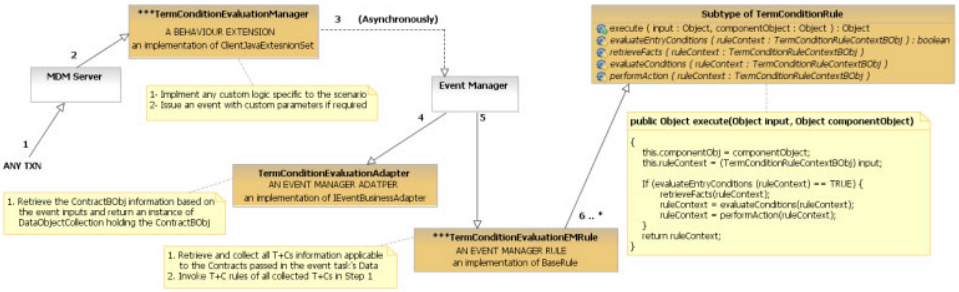
"Setting up a new Terms and Conditions rule"

How to use the Terms and Conditions rule

Terms and Conditions Rule framework allows various evaluation mechanisms.

This includes:

- **Automatic Evaluation** - This approach can be realized by use of the InfoSphere MDM Server behavior extension mechanism to automatically allow Terms and Condition Rule invocation when the operational data are changing. In order to minimize the effects on the application performance, EventManager can be used to asynchronously evaluate the Terms and Conditions, as shown below:



- **Manual Evaluation** - Manual evaluation of Terms and conditions can be done by using evaluateTermCondition Service. See the *IBM InfoSphere Master Data Management Server Transaction Reference Guide* for details.

Setting up a new Terms and Conditions rule

To set up a new Terms and Conditions rule, take the following steps:

1. Define your Terms and Conditions template (CdConditionUsgaeTp and CdConditionAttributeTp). Because the term condition rules are not defined yet, you will populate the rule_id later in step 11.
2. Develop the desired external rule Java class implementing TermConditionRule.
3. Develop a behavior extension in order to automate the TermConditionRule invocation. As an example, InfoSphere MDM Server is shipped with ManagedAgreementTermConditionEvaluationManager to instruct Event Manager to evaluate terms and conditions of the managed accounts at the post process of the addContract, updateContract, addMultipleContracts, and updateMultipleContracts actions.

4. Optionally develop a new event manager adapter in order to implement the logic to retrieve the required information for the evaluation of the terms and conditions. As an example, InfoSphere MDM Server is shipped with TermConditionEvaluationAdapter to retrieve managed accounts information at inquiry level of 4.
5. Optionally develop a new event manager rule in order to implement the logic to invoke of the terms and condition rule in the terms and conditions hierarchy. As an example, InfoSphere MDM Server is shipped with ManagedAgreementTermConditionEvaluationEMRule to invoke the terms and conditions rules associated to each contracts retrieved by the adapter.
6. Re-package `MDM.EAR` based on the new Java artifacts created in Step 2 to 5, and then deploy and start InfoSphere MDM Server.
7. Add the administrative data for the terms and conditions rules (external rules) you created in step 2.
8. Add the administrative data for the behavior extensions you created in step 3.
9. Add the administrative data for the Event Manager adapter that you created in step 4.
10. Add the administrative data for the Event Manager rule that you created in step 5.
11. Update the root CdConditionUsageTp record with the rule_id you added in step 7.
12. Add the Terms and Conditions definition based on the template you created in step 1 and associate values to the defined terms and conditions attributes.

    Note: only the root Terms and Conditions can be associated to an external rule.

Now the Terms and Conditions definition is ready to be associated to products, product relationships and agreements. To do so:

1. Invoke TermConditionEntityInstance service to associate the root terms and conditions to the entity instances from products, product relationships or agreements.
2. You also can override the value of any TermConditionAttribute that is identified as *overridable*, if desired.

External validations for terms and conditions

This section describes external validations for terms and conditions

External Validations available for terms and conditions

Users can switch the external validations on or off by changing the corresponding validation's expiry date in v_function table.

External Validations Currently available for terms and conditions are:

ConditionRelationAssociation
Ensures that there is at least one association for the terms and conditions.

ConditionRelEnitityAssociations
Validates the service addTermCondition:

- the condition with the owner type Contract can be associated to the Contract entity name

- the condition with owner type Product can associate to the Product or the Product Relationship entity name

ConditionRelEnitityNames
Validates the entity names Product, Contract or Product Relationship. ConditionRelEnitityNames is triggered for the service addTermConditionEntityAssociation.

ConditionRelEnitityAssociationsAdd
Validates the entity names Product, Contract or Product Relationship. TermConditionRelationEntityNames is triggered for the service addTermCondition.

ContractOverridesProduct
Ensures that only a contract can override a Product.

OverridingChildCondition
Restricts overriding Child term conditions.

TermConditionExpired
Checks for the term condition expiry before overriding.

TermConditionFromToDate
Checks for valid-from date and valid-to date if they are provided.

TermConditionIdUpdate
Overrides a non-updateable Term Condition ID.

TermConditionOverrideID
Checks the validity of the term condition override ID.

TermConditionOverrideIndicator
Checks whether the Override Indicator is set to Yes or No. If the Term Condition override indicator is set to 'N', the Term Condition cannot be overridden.

TermConditionOverrideInditcatorUpdate
Override indicator is not updatable.

TermConditionOwnerTypeMandatory
Performs a mandatory check for Owner type or Owner Value.

TermConditionUsageTypeMandatory
Performs a mandatory check for Usage type or Usage value.

Chapter 64. Configuring product category attributes

Product category attributes are dynamic product attributes that can be defined at the category level and apply to all products associated with the category and potentially its sub-categories. In other words, these are category-specific product attributes.

A product can have values for product category attributes when it is categorized into a category containing product category attributes specs.

These attributes apply to any product associated with the category. Product category attributes are required in order to feed downstream systems and to support user maintenance of product data through the product UI.

For example, a category called *Laptop* can have several product category attributes associated with it, such as dimensions, weight, screen size and CPU. This means that any product classified into the Laptop category will have these attributes as part of its product data and can provide values for them

Product can be categorized into multiple categories in multiple category hierarchies. A spec can be associated with these categories in different hierarchies. Therefore it is possible for a product to have access to the same spec from different categories. Also, the same spec can be made available from the product type hierarchy. However, the product can only have one active value for this spec during a certain time period. In other words, if there are more than one active product values conforming to the same spec, they must not have overlapping timeframes.

A category can access a spec defined at an ancestor node if all of the following conditions are met:

1. The category must have an *active category path* to the ancestor node, meaning that all the category relationships along the category path must be active (`relationship end date > current date`). These category relationships start and end dates may or may not overlap. These category relationships start dates may be in the future.
2. The category ancestor node is associated with the spec through EntitySpecUse table. The destination entity name for the association should be PRODUCT. The association should be active (`end date > current date`).
3. The timeframe of above association in EntitySpecUse must overlap with the category *timeframe* to allow products in that category to add spec values for the spec.

If a product is categorized into the category and spec values are added for the spec, then the following additional rules apply:

1. The Product Category Association timeframe has to be within the category timeframe.
2. Product Spec Value timeframe must be within *both* the Product Category Association timeframe and the entity spec use timeframe

A Product can be categorized into multiple categories in multiple category hierarchies. A spec can be associated with these categories in different hierarchies.

A Product type can have one or more specs associated with it through EntitySpecUse table, either explicitly or cascaded from the product type hierarchy. For the association from the ancestor product type node cascading down to descendent product type in product type hierarchy, the association's timeframe must overlap with the descendent product type timeframe, so that the product can add spec values for the spec.

Even though the same spec can be associated with both product category attribute spec uses and product type spec uses, a product can only have one active value for this spec in a certain time period. In other words, if there are more than one active product values conforming to the same spec, they must not have overlapping timeframe.

If use of the entity spec for product category attribute specs or product type specs is ended, and there is no other path for the product value to access the spec, then the spec value is obsolete. Those obsolete values can not be updated, and obsolete values are not returned when retrieving the product.

Chapter 65. External validators for products

Table 109. V_ELEMENT_VAL validators

GROUP_NAME	ELEMENT_NAME	FUNCTION_NAME
ProductTypeBObj	ParentProductTypeId	Mandatory
EntitySpecUseBObj	DestinationEntityName	EntityNameAllowedValues
CategoryHierarchySearchBObj	CategoryHierarchyName	MinWildcardSearchLen
CategorySearchBObj	CategoryName	MinWildcardSearchLen

Mandatory validator on ProductTypeBObj - A mandatory validator is configured to ensure that the parent product type ID is not null in the context of addProductType and updateProductType transactions.

EntityNameAllowedValues validation function on DestinationEntityName - This function validates DestinationEntityName on EntitySpecUseBObj to determine whether the provided value is valid. The allowed values are PRODUCT, CONTRACT and CONTACT. If not provided, it is set to PRODUCT by default.

MinWildcardSearchLen - This function validates that the length of non-wildcard characters of the element is greater than or equal to minimum length value assigned. By default the minimum is 1.

Table 110. V_GROUP_VAL validators

TRANSACTION_TYPE	GROUP_NAME	FUNCTION_NAME
GENERAL	ProductBObj	DefaultDataLocaleValidator
GENERAL	ProductTypeBObj	DefaultDataLocaleValidator
GENERAL	CategoryHierarchyBObj	DefaultDataLocaleValidator
GENERAL	Category	DefaultDataLocaleValidator
GENERAL	TermConditionBObj	DefaultDataLocaleValidator

DefaultDataLocaleValidator - This validator throws error if business entity (such as ProductBObj) contains NLSBObj object with the locale that matches default data locale. This situation is disallowed since the business entity already contains the content in the default data locale and duplicating it in NLS tables results in redundant data.

Chapter 66. Configuring Product Search

InfoSphere MDM Server provides a single transaction you can use to search for products: searchProductInstance. This transactions can be configured and, when required, extended to meet your specific needs.

This transaction can be used to search for products based on a variety of criteria, including name, type and category criteria to name a few.

For more details on these transactions including information on available search criteria, wildcard and look-alike searching and general transaction behavior, see the *IBM InfoSphere Master Data Management Server Transaction Reference Guide*. For more details on the various features of Search, see the *IBM InfoSphere Master Data Management Server Understanding and Planning Guide*.

In this section, you will learn:

"Product search features"

"Configuring and customizing Product Search features"

Product search features

Product search has several features to enhance search capabilities.

The following features are available as part of Product Search:

Customizable Search Strategy
Determines how to search using the supplied search criteria.

Pluggable Search SQL
Allows customized plug-in SQL to be executed when a particular combination of search criteria is provided.

Note: Dynamic Attributes are currently not supported by the Pluggable Search framework.

Configuring and customizing Product Search features

InfoSphere MDM Server provides several different ways to configure search in order to return the best quality results.

See also:

"Customizing the InfoSphere MDM Server search strategy"

"Configuring SQL searches in InfoSphere MDM Server" on page 760

Customizing the InfoSphere MDM Server search strategy

You can customize how InfoSphere MDM Server performs searches, based on the submitted search criteria.

InfoSphere MDM Server can be customized to search in a specific way, based on the submitted search criteria. This allows you to:

- Determine which internal search operations to execute and with what priority, depending on the submitted search criteria

- Run client-defined, pre-written, SQL as opposed to executing internal search operations
- Run client-defined operations based on product or extended search criteria
- Set conditions on what type of details are returned, based on the search results. For example, if only one product is found in the search, you can define whether only summary data is returned, or if full details about that party are provided.

The search strategy can be customized by providing an alternate implementation for External Rule 180 - Search Product.

Configuring SQL searches in InfoSphere MDM Server

The following sections present the search implementation and search classes for product.

See the Chapter 13, “Customizing search SQL queries,” on page 169 section for general details on how to customize the SQL.

Search input classes
ProductSearchInput represent the collection of search input parameters, is a concrete implementations of the ISearchInput interface, and wraps the corresponding search business object: ProductSearchBObj.

Search result set processors
ProductSearchResultSetProcessor processes the results of a search query and implement the IResultSetProcessor interface.

Product search fields
ProductSearchFields is an interface that defines static instances of SearchField class, from search framework, to be used for all product search fields. See the Javadoc for this class for a list of these constants and the database column that these represent.

Search input and output classes for Product

The following table lists the search input and output classes, the search fields available, as well as their mapping to the database fields for Product search transactions.

The tables in the following sections that provide mappings of search fields are only a subset. Because new search fields are often added with a release, refer to the CDSRCHFLD database table for a complete list of fields.

Product search input:

- Input class name - `com.ibm.mdm.product.search.ProductSearchInput`
- Search business object - **ProductSearchBObj**

Product search fields

Table 111. Product Search Fields

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	Business Object Attribute
TCRM.ProductSearchBObj.ProductName	product	name	productName
TCRM.ProductSearchBObj.ProductTypeId	product	product_type_id	productTypeId
TCRM.ProductSearchBObj.ProductShortDescription	product	short_description	productShortDescription
TCRM.ProductSearchBObj.ProductRelationshipType	productrel	product_rel_tp_cd	productRelationshipType
TCRM.ProductSearchBObj.AdminSysType	productequiv	admin_sys_tp_cd	adminSysType

Table 111. Product Search Fields (continued)

Cdsrchfld (Application.Group.Element)	Database Field - Table	Database Field - Column	Business Object Attribute
TCRM.ProductSearchBObj. ProductAdminSysKeyConcatenated	productequiv	product_equiv_key	productAdminSysKeyConcatenated
TCRM.ProductSearchBObj. ProductAdminSysKeyPartOne	productequiv	key_1	productAdminSysKeyPartOne
TCRM.ProductSearchBObj. ProductAdminSysKeyPartTwo	productequiv	key_2	productAdminSysKeyPartTwo
TCRM.ProductSearchBObj. ProductAdminSysKeyPartThree	productequiv	key_3	productAdminSysKeyPartThree
TCRM.ProductSearchBObj. ProductAdminSysKeyPartFour	productequiv	key_4	productAdminSysKeyPartFour
TCRM.ProductSearchBObj. ProductAdminSysKeyPartFive	productequiv	key_5	productAdminSysKeyPartFive
TCRM.ProductSearchBObj.SpecId	productval	spec_id	specIdV
TCRM.ProductSearchBObj.StatusType	product	status_tp_cd	statusType
TCRM.ProductSearchBObj.ProductIdentifierType	productidentifier	product_identifier_tp_cd	productIdentifierType
TCRM.ProductSearchBObj.ProductStructureType	product	prod_struc_tp_cd	productStructureType
TCRM.EntityCategorySearchBObj. CategoryHierarchyType	cathierarchy	hierarchy_tp_cd	vecCategoryHierarchyType
TCRM.EntityCategorySearchBObj. CategoryHierarchyName	cathierarchy	name	vecCategoryHierarchyName
TCRM.EntityCategorySearchBObj.CategoryHierarchyId	cathierarchy	cat_hierarchy_id	vecCategoryHierarchyId
TCRM.EntityCategorySearchBObj. CategoryHierarchyStartDate	cathierarchy	start_dt	categoryHierarchyStartDate
TCRM.EntityCategorySearchBObj. CategoryHierarchyEndDate	cathierarchy	end_dt	categoryHierarchyEndDate
TCRM.EntityCategorySearchBObj.CategoryCode	category	category_code	vecCategoryCode
TCRM.EntityCategorySearchBObj.CategoryName	category	name	vecCategoryName
TCRM.EntityCategorySearchBObj.CategoryId	category	category_id	vecCategoryId
TCRM.EntityCategorySearchBObj.CategoryStartDate	category	start_dt	categoryStartDate
TCRM.EntityCategorySearchBObj.CategoryEndDate	category	end_dt	categoryEndDate

Product search output:

- Processor class name - `com.ibm.mdm.product.component.ProductSearchResultSetProcessor`
- Search result business object - **ProductSearchResultBObj**

Chapter 67. Managing product suspects and product data stewardship

InfoSphere MDM Server provides a set of capabilities to enable suspect processing within the Product domain. These services fall into two categories: *managing product suspects* and *managing product data stewardship*.

In this section, you will learn:

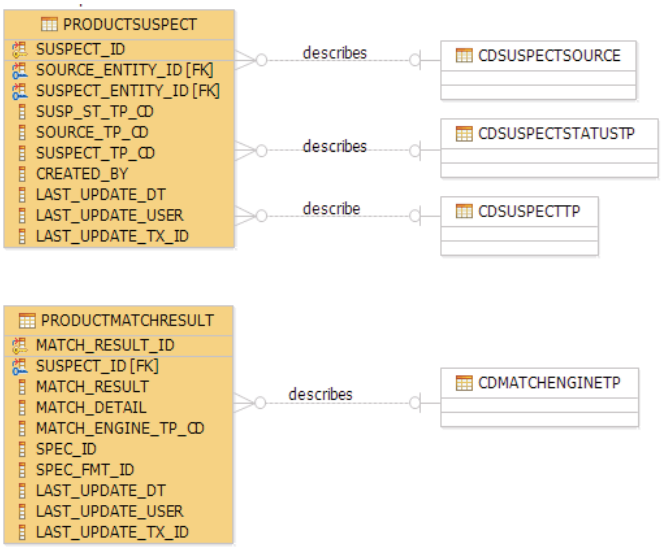
Managing product suspects

The following types of transactions support managing product suspects:

- *persistence transactions*, which includes:
  - addition, update and deletion of product suspect records
- *inquiry transactions*, which includes:
  - retrieval of a single suspect record based on the suspect id
  - retrieval of all suspects of a given product
  - search capability to identify product suspects with product information and suspect records that match the search criteria.

For details of categorization of product suspects, please see the "Entity Suspects Management and Data Stewardship framework" section.

Product suspect records and their matching result are persisted in the PRODUCTSUSPECT and PRODUCTMATCHRESULT tables, as shown in the following database model:



See also:

"Sample: Input sample of addProductSuspect"

Sample: Input sample of addProductSuspect

Below is an input sample of addProductSuspect. In this example, two suspect records are created for a product (id:1001). The first suspect is matched by two matching engines as defined in the two ProductMatchResultBObj business objects. The second suspect is not matched since it has no ProductMatchResultBObj as child object. It is allowed, and it indicates that the two products are suspect but its match result is to be determined.

```
<TCRMTx>
       <TCRMTxType>addProductSuspects</TCRMTxType>
      <TCRMTxObject>ProductSuspectListBObj</TCRMTxObject>
       <TCRMObject>
         <ProductSuspectListBObj>
         <SourceId>1001</SourceId>

         <!-- 1st product suspect  -->
             <ProductSuspectBObj>
                <SuspectId/>
                <SourceEntityId></SourceEntityId>
                <SuspectEntityId>1002</SuspectEntityId>
                <SuspectStatusType>22</SuspectStatusType>
                <SuspectStatusValue>
                  Entities Pending Critical Change
                </SuspectStatusValue>
                <SourceType>1</SourceType>
                <SourceValue>User marked</SourceValue>
                <SuspectType>12</SuspectType>
                <SuspectValue>Close Match</SuspectValue>
                <CreatedBy>cusadmin</CreatedBy>
                <SuspectLastUpdateDate/>
                <SuspectLastUpdateUser/>

                <!-- 1st ProductMatchResultBObj  -->
                <ProductMatchResultBObj>
                 <SuspectMatchId/>
                 <SuspectId/>
                 <MatchResult>150</MatchResult>
                 <MatchEngineType>2</MatchEngineType>
                 <MatchEngineValue>QualityStage</MatchEngineValue>
```

```
                    <ProductMatchResultSpecValueBObj>
                      <AttributeValueBObj>
                         <Action/>
                            <Path>/</Path>
                            <Value>
                           <![CDATA[     { Match detail in XML format }]]>
                            </Value>
                      </AttributeValueBObj>
                    </ProductMatchResultSpecValueBObj>
                  </ProductMatchResultBObj>
                  <!-- 2nd ProductMatchResultBObj  -->
                  <ProductMatchResultBObj>
                  </ProductMatchResultBObj>
               </ProductSuspectBObj>
          <!-- 2nd product suspect  -->
               <ProductSuspectBObj>
                 <SuspectId/>
                 <SourceEntityId></SourceEntityId>
                 <SuspectEntityId>1003</SuspectEntityId>
               </ProductSuspectBObj>
            </ProductSuspectListBObj>
        </TCRMObject>
    </TCRMTx>
</TCRMService>
```

Managing product data stewardship

Product data stewardship services provide capabilities to preview a proposed collapse between two or more products, a collapse of two or more products together, or splitting a product apart, all while maintaining full data lineage within InfoSphere MDM Server.

Rules such as CollapseMultipleProductsRule for collapse operations, and SplitProductRule rules for split operations, can be tailored to individual needs.

The following product data stewardship services transactions and their associated functions are summarized below:

- **collapseMultipleProducts**—Collapsing multiple products
- **splitProduct**—Splitting products
- **comparativePreviewCollapseMultipleProducts**—Previewing collapse multiple products
- **getLinkedProduct**—Getting linked products

Collapsing multiple products

The transaction collapseMultipleProducts takes a single ConsolidatedProductBObj provided as input containing an optional target ProductBObj, one or more ProductBObjs as held by ProductListBObj, and an optional ProductRequestBObj that indicates the amount of information returned for the target product.

If only one source ProductBObj is provided without a target ProductBObj, all of its *Exact Match* suspects will be retrieved as source products to be collapsed.

If all the source products are provided or retrieved from an exact match without a target ProductBObj, these source products will retrieve their data details based on the Configuration and Management element settings and their data are collapsed based on the survivorship rule, CollapseMultipleProductsRule.

If ProductRequestBObj is not provided in the request, the collapsed product will be returned as the result of collapsing the source products. Otherwise the new collapsed target product will return data detail based on the specification in ProductRequestBObj.

The Output produced is a ConsolidatedProductBObj containing the newly created target ProductBObj that the suspects were collapsed into. This either corresponds to the provided target ProductBObj, or to a ProductBObj created according to the survivorship rule, CollapseMultipleProductsRule. It also contains a list of all inactivated source products that were collapsed. These source products have their entire suspect entries deleted and are linked via inactivated links to the target product.

The following table summarizes the behavior of the collapse product services:

Table 112. Behavior of the collapse product services

Target Product	Source Products	Expected behavior	Additional information on expected behavior
0	0	An exception is thrown indicating no source product and no target product were provided.	
0	1	Only one source product is provided and there is no target product definition, only *Exact Match* suspects of the given product by getAllProductSuspects are found.	The CollapseMultipleProductsRule is executed, creating a target product based on the LastUpdateDt if either multiple source/suspect products are provided or if suspect products found by system according to survivorship rules defined in the new CollapseMultipleProductsRule. All source products are collapsed to the target product, and the target product is persisted by addProductInstnance. A new Resolution_Ind attribute is set on the source/suspect products to *Y*. The updateProductInstance transaction is executed to inactivate each source/suspect product, and a component level deleteAllProductSuspects transaction is performed for each source/suspect product. A new link entry to the new target product is created with a link reason of *Source Collapsed Into Target* (using the code type in the CDLINKREASONTP code table) for each source/suspect product: source_entity_id = source ProductId; target_entity_id = Target ProductId. The getProductInstance transaction is run to determine the target product based on the inquiry level defined in the request.
0	>1	If multiple suspects are provided, without a product definition, then a getProductInstance call is made to retrieve each of the suspect/source products, and a new product definition is created by system according to survivorship rules defined in the external rule CollapseMultipleProductsRule.	
1	0	An exception is thrown indicating no source product and no target product were provided.	

Table 112. Behavior of the collapse product services (continued)

Target Product	Source Products	Expected behavior	Additional information on expected behavior
1	1	If only one source product is provided along with product definition, only *Exact Match* suspects of the given entity are found.	The Resolution_ind attribute is set on each suspect/source product to *Y*, and the updateProduct transaction is run to update the suspect/source product. The target product is persisted as-is by addProductInstnance. A new link entry to the new target product is created with a link reason of *Source Collapsed Into Target* using the record in the CDLINKREASONTP code table for each source/suspect product.
1	>1	Multiple suspects are provided along with a new product definition.	Options: • Based on the inquiry level defined in the request, the corresponding BObjs is set to null if it is not supposed to be returned. • The getProductInstance transaction is run to determine the target product based on the inquiry level defined in the request.

Splitting products

The splitProduct transaction takes a SplitProductRequestBObj as input, along with the product ID.

The external rule SplitProductRule is invoked, creating two new products and inactivating the split product. The level of product information to be split depends on the configured element inquiry level, and the level of product information to be returned depends on the ProductInquiryLevel of the ProductRequestBObj defined in the request. If the ProductRequestBObj is not provided in the request, the split result will be as-is with details based on following configuration elements:

Table 113. SplitProduct configuration

CONFIGELEMENT NAME	VALUE-DEFAULT
/IBM/Product/ProductSuspectProcessing/ProcessingDepth/productInquiryLevel	4
/IBM/Product/ProductSuspectProcessing/ProcessingDepth/categoryInquiryLevel	1
/IBM/Product/ProductSuspectProcessing/ProcessingDepth/relatedProductInquiryLevel	1

These inquiry levels identify the depth to which the SplitProductRule will copy child objects. If, for example, a productInquiryLevel of 0 is configured, then no child objects will be copied on the split.

The Output is a ProductListBObj with an inactived ProductBObj representing the product that was split from, plus two active suspect products that are created by the SplitProductRule rule in the process of the split.

Previewing collapse multiple products

The input and output are identical to those of collapse multiple products. This is a non-persistent transaction, whose behavior is otherwise identical to collapseMultipleProducts.

Getting linked products

The transaction getLinkedProduct takes a product id as input.

The product links with all types—for example, split or collapse—are identified by the product id as either *direct* or *indirect* links. Product links are returned in a ProductLinkBObj that contains a list in descending order by last-update date. The SQL statement to retrieve the links runs recursively until a loop is detected or until the recursive level of the object is greater than the value configured for the LinkDepthNumberLimit configuration item.

The optional inquiry levels indicate the amount of product information to be returned by the request. If no inquiry level information is included, no ProductBObj objects are returned in the output. The inquiry levels are subject to the same validations as in getProductInstance when the ProductRequestBaseBObj is provided.

Understanding how product resolution impacts existing transaction behavior

When a Product is inactivated, two new columns are introduced in table PRODUCT: resolution_ind and resolution_tp_cd.

The resolution indicator attribute indicates whether the product is active or inactive:

- **resolution_ind =null**—Product is active
- **resolution_ind = 'N'**—Product is active
- **resolution_ind = 'Y'**—Product is inactive

The code table resolution_tp_cd indicates how the product is inactivated. Currently, a product is inactivated by being either collapsed or split.

The resolution_ind defaults to `Null` (meaning *active*) when the product is created. It is not allowed in the request (resolution_ind and resolution_tp_cd are not defined in `myTCRM.xsd`), but they are returned in response (resolution_ind and resolution_tp_cd are defined in `tCRMResponse.xsd`); resolution_ind and resolution_tp_cd can be updatable in component level update transaction.

As a general guideline, the following rules are applied in product related transactions:

- If a product is inactivated, it cannot be allowed to be added or updated.
- If a product is inactivated, none of its child objects are allowed to be added or updated.
- If a product is inactivated, any inquiry transactions that return ProductBObj should return the additional resolution_ind and resolution_tp_cd. All existing returned data remains the same.

Impact to persistent product transactions:

If a product is inactivated, it cannot be added or updated. For following add or update transactions, if variantOfProductId of the product is inactivated, this product is not allowed to be added or updated as the inactivated variant of a product:

- addProductInstance
- updateProductInstance
- addGoodsProduct
- updateGoodsProduct
- addFinancialProduct
- updateFinancialProduct
- addInsuranceProduct
- updateInsuranceProduct
- addServiceProduct
- updateServiceProduct

Impact to persistent product's child object transactions:

If a product is inactivated, its child objects cannot be added or updated:

- addProductInstanceRelationship
- updateProductInstanceRelationship
- addProductIdentifier
- updateProductIdentifier
- updateProductCategoryAssociation
- categorizeProduct
- recategorizeProduct
- addTermCondition
- updateTermCondition
- addEntityConditionAssociation
- updateEntityConditionAssociation
- addProductAdminSysKey
- updateProductAdminSysKey

Chapter 68. External rules for the Product domain

The following table describes the rules specific to the Product domain.

Table 114. External rules specific to the Product domain

Rule ID	Rule Description	Java Class Name
166	Generates the concatenated key for a ProductAdminSysKeyBObj. The concatenated key is a combination of the key parts with a "-" separator.	com.ibm.mdm.product.externalrule.ProductRules
172	On inquiry, determines how to return back the concatenated key on ProductAdminSysKeyBObj based on its existence and the existence of the key parts.	com.ibm.mdm.product.externalrule.ProductRules
158	Generates the concatenated key for a CategoryAdminSysKeyBObj. The concatenated key is a combination of the key parts with a "-" separator.	com.ibm.mdm.common.externalrule.CategoryRules
159	Validates start and end date values for Hierarchies, Categories and Category Relationships.	com.ibm.mdm.common.externalrule.CategoryRules
160	When provided, validates uniqueness of a given category code within its hierarchy.	com.ibm.mdm.common.externalrule.CategoryRules
161	Validates business key for the CategoryAdminSysKeyBObj.	com.ibm.mdm.common.externalrule.CategoryRules
164	Validates that a category can be inactivated by interrogating its contents and its sub-category's contents.	com.ibm.mdm.common.externalrule.CategoryRules
173	Validates that when a category is ended, the end date is not less than the end date of any product association.	com.ibm.mdm.common.externalrule.CategoryRules
175	Validates that when a category's association indicator is changed to "N" that there are no products associated with that category.	com.ibm.mdm.common.externalrule.CategoryRules
191	Validates whether the product requires any strategy to be applied based on the product structure type or combination of the VariantAllowedInd and VariantOfProductId attributes.	com.ibm.mdm.product.externalrule.ResolveProductStrategy
192	Takes appropriate action or validation for Bundle product types.	com.ibm.mdm.product.externalrule.BundleStrategy
193	Takes appropriate action or validation for Variant product types.	com.ibm.mdm.product.externalrule.VariantStrategy
194	Collapses multiple product entities into a single product entity.	com.ibm.mdm.product.externalrule.CollapseMultipleProductsRule

Table 114. External rules specific to the Product domain (continued)

Rule ID	Rule Description	Java Class Name
195	Splits the input ProductBObj into two entities. The depth of the child objects to be copied to the new product entities is determined by the productInquiryLevel defined in the Configuration and Management component.	com.ibm.mdm.product.externalrule.SplitProductRule
n/a	This is an abstract class from which product structure strategies are to extend. It handles common rule logic, providing customization points for inquiry and persistence logic. Examples of rules that extend from this class include the BundleStrategy and VariantStrategy.	com.ibm.mdm.product.externalrule.ProductStructureStrategy
196	Validates that the products associated with the given entity condition associations are active.	com.ibm.mdm.product.externalrule.ValidateTermConditionWithProduct

See also:

"External rules for product category attributes"

"Identifying products and categories by equivalencies" on page 775

External rules for product category attributes

Table 115. External rules for product category attributes

Rule ID	Java class name	Function
181	com.ibm.mdm.externalrule.EntitySpecUseEntityTimeframeRule	The rule is invoked in the persistent transaction for EntitySpecUseBObj. It checks the EntitySpecUse timeframe within the spec timeframe, also If EntityName is PRODUCTTYPE, check the EntitySpecUse timeframe within product type timeframe If EntityName is CATEGORY, check the EntitySpecUse timeframe within category timeframe If EntityName is CDAGREEMENTTP, check the EntitySpecUse timeframe within agreement type timeframe

Table 115. External rules for product category attributes (continued)

Rule ID	Java class name	Function
182	com.ibm.mdm.common.externalrule. CategoryRules	The rule is invoked when the category timeframe is updated. It checks when the category has been used by entity spec use and/or ProductCategoryAssociation, the EntitySpecUse timeframe and ProductCategoryAssociation timeframe are still within the category timeframe.
183	com.ibm.mdm.externalrule. EntitySpecUseNotUpdatableFields	The rule is invoked when EntitySpecUse is updated. It checks non business keys attributes in EntitySpecUse, like MetadataInfoType and ExplicitDefInd, are not updatable.
184	com.ibm.mdm.externalrule. ProductTypeTimeframeValidation	The rule is invoked when ProductType timeframe is updated. It checks when the ProductType timeframe changed, to see if related EntitySpecUse timeframes are still within the product type's timeframe.
185	com.ibm.mdm.externalrule. EntitySpecUseTimeFrameVal	The rule is invoked when inherited EntitySpecUse are retrieved. It checks for a given category/product type, whether its timeframe has overlapped with the timeframe of the inherited EntitySpecUse where the spec is associated to the ancestor's category/product type. If there is no overlap, the EntitySpecUse will filter out in the result.
186	com.ibm.mdm.externalrule. ProductCategoryAssociationRule	The rule is invoked when the ProductCategoryAssociation timeframe is updated. It checks when the ProductCategoryAssociation timeframe changed, to see whether related ProductValue timeframes are still within the association's timeframe. If not, and the values have no other path to access the spec, the transaction should fail. When the association is ended, if the values have no other path to access the spec, the values will be ended.

Table 115. External rules for product category attributes (continued)

Rule ID	Java class name	Function
187	com.ibm.mdm.externalrule. EntitySpecUseTimeFrameVal	The rule is invoked when the spec timeframe is updated. It checks when the spec timeframe changed, to see whether the timeframes of EntitySpecUses for this spec are still within the spec timeframe. If the spec is ended, and there are active EntitySpecUses for this spec, the transaction will fail.
190	com.ibm.mdm.externalrule. ProductSpecValueValidationRule	The rule is invoked when the product instance is added or updated . It checks to see whether the spec format id specified in the product spec value has been associated to the product, either through product type or product category association. The ProductSpecValue timeframe must be within BOTH the ProductCategoryAssociation timeframe AND the EntitySpecUse timeframe.
20009	com.ibm.mdm.specvaluesearch.em. externalrule.ScheduleSpecValueIndexProcess	This rule is responsible for taking the given spec and finding and scheduling all related spec values to have their indexes updated. Depending on the (configurable) number of spec values affected (small, medium, or large), the appropriate action is taken. For more information, see the *Administering Spec Indexes* section of the *IBM InfoSphere Master Data Management Server System Management Guide*.
N/A	com.ibm.mdm.specvaluesearch.em. externalrule.UpdateSpecValueIndex	This is an abstract class from which the different update rules for the spec value index table can extend. It handles common rule logic, providing customization points to custom rule implementations. UpdateProductSpecValueIndex is a rule that extends from this class.
20010	com.ibm.mdm.specvaluesearch.em. externalrule.UpdateProductSpecValueIndex	This rule takes a spec value and updates the index table according to the requirements specified by the status of the spec searchable attributes. When this rule executes, this is a sign that indexing is in progress.

Identifying products and categories by equivalencies

InfoSphere MDM Server stores alternative system keys—or equivalencies—to allow it to maintain product information that is stored and updated on external systems.

IBM's Master Data Management (MDM) system is not always the system of record for the information it stores. In particular, for the Product domain the system generally does not provide the gold copy of product definitions. It is customary to receive updates to product information from external systems that are the system of record for those products and their associated categories.

To facilitate this integration, IBM's MDM system allows for the alternative system keys or identifiers to be stored along with products, categories, or both. These identifiers, which are also called equivalences, have a set of operational services that allow for them to be added, updated and retrieved from the MDM system. Furthermore, MDM provides external rules that allow you to customize equivalencies—for example, you might concatenate particularly complex keys.

For categories, the java rule is contained in the `com.ibm.mdm.common.externalrule.CategoryRules` class (rule #158). For products, the java rule is contained in the `com.ibm.mdm.common.externalrule.ProductRules` class (rule #166).

Each of these rules, if activated, concatenates the values for each of the five keys and populates the CategoryAdminSysKeyConcatenated (or ProductAdminSysKeyConcatenated) field with the resulting value.

For example, if the following input is provided for a category equivalency:

```
CatAdminSysKeyPartOne = 123987
CatAdminSysKeyPartTwo = 456654
CatAdminSysKeyPartThree = 789321
CatAdminSysKeyPartFour = 987654
CatAdminSysKeyPartFive = 234234
```

The rule would produce the following result for the CategoryAdminSysKeyConcatenated field:

```
123987-456654-789321-987654-234234
```

You can modify the CategoryRules.adminSysKeyConcatenated() method if you want to customize its behavior by providing an alternative algorithm for generating or concatenating the full equivalency key. Similarly, you can modify the ProductRules.adminSysKeyConcatenated() method to make any customizations you require for creating a product equivalency key.

For more information on each available category and product equivalency service, see the Transaction Reference Guide.

Chapter 69. Product domain configuration elements

This topic describes the configuration elements for the Product domain.

Product domain configuration elements have names beginning with /IBM/Product.

In addition, the Product domain uses the following configuration elements:

- To handle the recursive nature of product structure and hierarchy:
  - /IBM/DWLCommonServices/EntitySpecUse/SpecCascadeType
  - /IBM/DWLCommonServices/EntitySpecUse/CategoryHierarchy/RecursiveSQL/Limit
- To wrap XML responses with CDATA:
  - /IBM/DWLCommonServices/XML/Character_only_tags

    Note: This element enables you to configure multiple tags using commas as separators. Use the tag hierarchy for uniqueness.

    For example, to wrap XML content under the Value tag with CDATA, add `AttributeValueBObj/Value` to the existing default value of `authData` using a comma separator: `authData,AttributeValueBObj/Value`
- To store the rule ID of the configured VariantStrategy product structure strategy:
  - /IBM/Product/ProductStructureStrategy/Variant

For details about these configuration elements, see “Understanding configuration elements in the Configuration and Management component” on page 419.

Part 4. Introduction to the Account domain

The Account domain is an operational-styled hub that manages account data.

The following are the features particular to the Account domain:

- "Managed and referenced accounts"
- "Agreement types"
- "Product relationships and the terms and conditions of an agreement" on page 780
- "Relationships between accounts" on page 780
- "Party relationships" on page 780
- "Billing" on page 780
- "Contract values" on page 781
- "Claims" on page 781
- "Holdings" on page 781

The Account domain provides the following business feature using managed accounts:

- "Value packages" on page 780

Managed and referenced accounts

An account can be either a managed account or a referenced account.

- A *managed account* is an account that is managed fully by the Account domain and is a system of record.
- A *referenced account* is an account that is managed in a different system, which can be either internal or external to the organization.

An account is made up of an agreement and set of accounting units.

- An *agreement* manages legally binding terms for a relationship between an institution and any party to which that institution has a legal relationship. It contains the legal terms that are required for financial transactions.
- An *accounting unit* tracks all debits and credits for a particular type of balance that must be managed for an agreement. The accounting unit entity is not provided in Account domain.

Agreement types

If you want you can categorize accounts by agreement types, such as the Value Package type or the Supply Agreement type.

Each agreement type can have different usage aspects with its unique set of rules that define external rules, behavior extensions, external validations, and so on, that are specific to a given aspect. The Account domain provides value package usage aspects, as described in "Managing value packages" on page 793.

Refer to "Sample terms and conditions for value packages" on page 800, which contains the diagram that describes how to represent sample value package terms and conditions using the TermCondition entity and how to override product terms and conditions.

If you configure an agreement type in the `ENTITYSPECUSE` table using the `addEntitySpecUse` transaction, accounts that are based on the agreement type can have dynamic attributes associated with them. Spec and dynamic attributes are common components in InfoSphere MDM Server. These components are used extensively in the Product domain. For more information on Specs and dynamic attributes, see Chapter 3, "Managing specs and spec values," on page 61.

Product relationships and the terms and conditions of an agreement

An account agreement may represent the physical instantiation of a product for sale. In other words, once the product is purchased by a customer, it is represented as an agreement.

An agreement can be based on only one product. It inherits the terms and conditions provided by the base product and can augment or override the terms and conditions for a product, if necessary. An agreement can also have multiple product relationships for the purpose of describing products as part of the supply agreement. Consequently, products that are connected to an agreement via product relationships do not have any impact on the terms and conditions of an agreement.

Relationships between accounts

You can create relationships between accounts. For example, the value package managed account can aggregate referenced accounts that are managed in other administration systems.

Party relationships

A party is a person or organization that plays various types of roles on an account and can transact against accounts. The Party entity is managed by the Party domain.

Value packages

A value package allows you to bundle two or more products to be sold to your customers. For example, a bank might sell a savings account product and a checking account product as a value package. When a customer purchases the bundle, the bundle itself is stored as a managed account; the savings account and the checking account are stored as two separate referenced accounts.

Billing

The billing feature provides services to manage billing summaries and their associated miscellaneous values in the system. This feature does not perform any billing related calculations, invoicing, or billing status tracking; it is not intended to replace any billing system.

Two terms that are used when discussing Billing are:

- Billing Summary—a summary bill for a contract or a contract component. There can be many billing summaries for a given contract or contract component.

- Billing Misc Value—any additional billing value not captured directly within the billing summary. Each value is associated with one a billing summary.

Contract values

The contract values business feature enables you to classify and store different values for contracts generated from external systems such as data warehouses, as well as values defined in an implementation.

Contract values are part of the contract object. Ten value attributes can be persisted for each value type, providing extra storage slots for additional information related to the contract.

Contract values can be retrieved by providing the contract ID and value category. As part of a contract value response, the category code and value are returned. This data helps determine the contract's value, and provides a more comprehensive view of the contract.

Claims

The claims feature provides institutions with a consolidated enterprise-wide view of all the claims for a party and the policy or contract to which the claim applies. This helps identify potential problems such as fraudulent claims. Claims to items or holdings are required to track the moneys issued against a particular personal belonging.

As part of the Claims design, holdings or items that may be called assets and liabilities are persisted and linked to a claim through the Agreement (Contract) component.

The Claims feature is dependent on the Financial and Party project packages. That is, the Claims feature is related to one or more policies and can involve one or more parties. Interfaces, classes and other elements of Claims are packaged into a project called Claims, which resides within the Financial project. Holdings are dependent on the Party project packages—a holding can exist without a link to a party in this design, but it is assumed that roles are associated to the holding. See "Holdings" for more information.

Holdings

The holdings feature provides institutions with a consolidated enterprise-wide view of all the holdings for a party and the policy or contract to which the claim applies. This helps identify potential problems such as fraudulent claims. As part of Claims, holdings or items that may be called assets and liabilities are persisted and linked to a claim through the Agreement (Contract) component. See "Claims" for more information.

In this section, you will learn:

Chapter 70. Entity model for the Account domain

The main business entity for the Account domain is represented by the CONTRACT entity.

This entity holds the base attributes for the account, such as its agreement type, base product ID, last transaction date, and so on. This entity is represented by the TCRMContractBObj business object.

Other attributes of an account—such as relationships among accounts, roles that are associated with the account, and so on—are presented by additional business entities. Refer to the data model for details.

The terms *Account*, *Agreement* and *Contract* are used in this document interchangeably and refer to the same business entity. Unless explicitly specified, they all refer to both managed and referenced account.

An account that is the system of record is referred to as a managed account. A managed account has the ManagedAccountIndicator value on the TCRMContractBObj business object set to Y. Accounts of this type are processed by the Account domain based on the business rules associated with them so that the integrity of the data is maintained. A Referenced account is not the system of record in the Account domain. The data of a referenced account is usually managed by other external systems. You can choose to use the business entities to store account data for reference purposes only, to be used in conjunction with other domains in the InfoSphere MDM Server platform.

A referenced account has the ManagedAccountIndicator value on the TCRMContractBObj business object set to null or N.

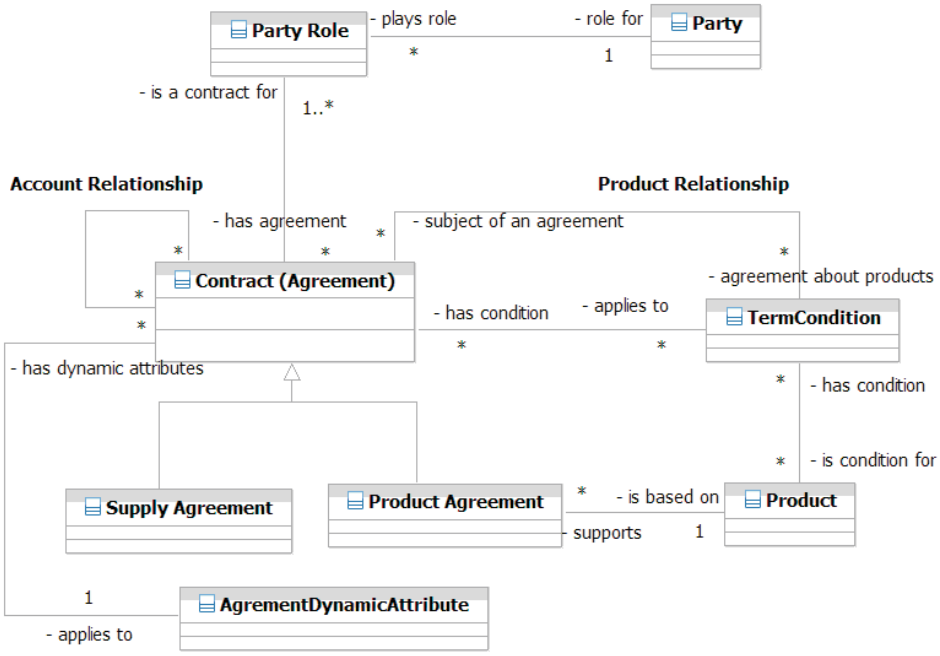
Since the ManagedAccountIndicator value is essential to the processing by the Account domain, the value cannot be changed once it is set.

Managed accounts can aggregate multiple referenced accounts together for the purpose of managing them. In such a case, the account relationship of the managed account to the referenced accounts should be of the special relationship type Managed Account. See section “Setting up a managed account to manage a value package” on page 794 for examples of managed to referenced account relationships.

Managed accounts can be based on the product, and subject to the agreement terms as outlined in product’s terms and conditions. If the product allows it, an account can override a product’s terms and conditions. Depending on the agreement, you can add new terms and conditions to an account.

An account can only be based on one product. The base product ID is stored in ProductId attribute on the TCRMContractBObj business object. An account can have multiple product relationships. For example, if a Value Package contains a set of core products and a set of optional products, when a party purchases a Value Package, the party’s selections from the optional group of products are represented as relationships between the account and the products. Products connected to the Account through product relationships do not have any impact on the account’s terms and conditions.

The agreement dynamic attributes entity provides the flexibility of extending the data model for agreements with dynamic attributes defined in the Specs attached to Agreement type. For more information on how to associate specifications with agreement types, refer to the managing specs and spec values section.



Note: Supply Agreement and Product Agreement types are shown in the entity diagram for illustration purposes, to highlight the fact that only some of the accounts will be based on the Product.

Note: The PartyRole entity is connected to contract via the ContractComponent entity, which is not depicted in this diagram. The ContractComponent entity is maintained in Account domain for compatibility with previous releases.

Chapter 71. Managing terms and conditions for agreements

Terms and conditions can be associated with a Product entity from the Product domain in order to define the rules and details governing the product.

Terms and conditions for the product are documented in Chapter 63, "Managing product terms and conditions," on page 749. Refer to the Product domain documentation first before reading the rest of this section. This section only describes the aspects of terms and conditions that are unique to the Account domain.

Terms and conditions can belong to one of two owner types: *PRODUCT* or *CONTRACT* . The TermCondition entity of owner type CONTRACT can be associated with the Agreement (Account) business entity from the Account domain.

Services exist to define terms and conditions by creating the TermCondition entity, either by using the generic addTermCondition service or as part of the Account domain services that create contracts.

Terms and conditions can be associated with any agreement. An agreement can be based on the Product (for example, the Value Package agreement type) in which case it inherits the terms and conditions provided by the base Product.

Sometimes an agreement needs to override the product's condition, for example, to give valuable client a special discount. Agreement's TermCondition entity can override product's TermCondition entity under certain rules:

- An agreements TermCondition entity can override the product TermCondition entity if the product entity has overrideIndicator set to **Y**.
- Only a TermCondition entity with owner type CONTRACT can override a TermCondition entity with owner type PRODUCT. No other combinations are allowed.
- Override TermCondition entity must be associated with Agreement entity from Account domain (entity name CONTRACT). It cannot be associated with product or product relationship.
- An agreement's TermCondition entity can only override the TermCondition entity that is attached to the product that this agreement is based on.

To override the product's TermCondition, create a new TermCondition with the OwnerType CONTRACT, set the OverridesConditionId field to contain the primary key of the product's TermCondition entity, and associate the new TermCondition with the agreement entity. When the agreement's terms and conditions are retrieved as part of the getContract transaction, the new override condition replaces the product condition in the list of conditions returned with agreement.

TermCondition entities can be reused between different agreements. This can be achieved by associating the same TermCondition entity with multiple account entities. However, it is not possible to reuse a TermCondition that overrides the Product TermCondition. In other words, override terms and conditions can only belong to one Agreement.

The section “Sample terms and conditions for value packages” on page 800 contains the diagram describing how to represent sample value package terms and conditions using TermCondition entity and how to override product terms and conditions.

Chapter 72. External validators for the Account domain

There are two main external validators for the Account domain.

In this section, you will learn:

External validators for the Contract business entity

The Account domain centers around the concept of a *managed account* provided by the Contract business entity. The platform also supports the concept of a *referenced account* provided by the same business entity.

Contract related validators

The business validations of a managed account can be different than those of a referenced account. As a result, a number of the validations are implemented as external validators. You can configure them to suit your business requirements.

The following are some validators related to Contract:

Table 116. V_ELEMENT_VAL Validators Related to Contract

GROUP	ELEMENT_NAME	FUNCTION	EXPIRY	RULE_ID
Contract	ItemsTCRMContractComponentBObj	Recursive		
Contract	ItemsTCRMAdminNativeKeyBObj	Recursive		
Contract	ItemsTCRMContractAlertBObj	Recursive		
Contract	ItemsTermConditionBObj	Recursive		
Contract	ItemsTCRMContractRelationshipBObj	Recursive		
Contract	IssueLocation	AttributeValidator		
Contract	PremiumAmount	Mandatory		96
Contract	CurrentCashValueAmount	Mandatory		97
Contract	AgreementName	Mandatory		162
Contract	SignedDate	Mandatory		162
Contract	ExecutedDate	Mandatory		162
Contract	ManagedAccountIndicator	Mandatory	16/12/ 2002	

Note: The ManagedAccountIndicator record is expired by default. The ManagedAccountIndicator element in the TCRMContractBObj object is not mandatory by default to preserve compatibility with previous versions. To enforce a value in this element to be used in the Account domain, unexpire this record.

Group validators related to Contract

Table 117. V_GROUP_VAL Validators Related to Contract

TRANSACTION_TYPE	GROUP_NAME	FUNCTION_NAME
GENERAL	Contract	Org Party Role

Table 117. V_GROUP_VAL Validators Related to Contract (continued)

TRANSACTION_TYPE	GROUP_NAME	FUNCTION_NAME
GENERAL	Contract	AdminContractId
GENERAL	Contract	AdminContractIdNativeKey
GENERAL	Contract	AgreementTypeMandatory
CREATE	Contract	ProductIdMandatory
UPDATE	Contract	ProductIdUpdate
GENERAL	Contract	PartyOwner
GENERAL	Contract	CurrencyValidation
GENERAL	Contract	ExecutedDateCheck
GENERAL	Contract	SignedDateCheck
UPDATE	Contract	ManagedAccountIndicatorUpdate
UPDATE.	Contract	AgreementTypeUpdate
UPDATE	Contract	SignedDateUpdate
CREATE	Contract	ProductIdValid
GENERAL	Contract	OverridingConditionValidator
CREATE	Contract	ProductIdStatusValid

External Validators for ContractComponent

Table 118. External validators related to contract components

Create	Contract	ProductValid
GENERAL	ContractComponent	ProductTypeValidation

The ProductTypeValidation validator allows a ContractComponent object to be created without any product assigned to it. This is necessary because of the ProductId field on Contract entity. This validation is an external validation class, and is configured OFF by default.

See also:

"Managed account validators"

"Value Package validators" on page 789

"Generic Account domain validators" on page 789

Managed account validators

The following validators are applicable to managed accounts only:

AgreementTypeMandatory
This validator checks for mandatory *agreement type* and *value fields* for managed accounts. These fields are not mandatory for referenced account.

ExecutedDateCheck
This validator checks whether the date provided for the ExecutedDate for managed accounts is valid. The date provided for ExecutedDate should not be before the date provided for SignedDate, or after the dates provided for EndDate or TerminationDate.

SignedDateCheck
This validator checks whether the date provided for the SignedDate for managed accounts is valid. The date provided for SignedDate should not be after the dates provided for ExecutedDate, EndDate or TerminationDate.

Value Package validators

ProductIdMandatory
This validator checks that ProductId is not null for a mandatory account with the agreement type of Value Package

ProductIdUpdate
This validator makes sure that ProductId is not updatable for an account with the agreement type of Value Package.

ProductIdValid
This validator makes sure that ProductId refers to a valid product from the Product domain. This validation is only applicable to managed accounts with the agreement type of Value Package.

PartyOwner
This validator makes sure that at least one RoleType of Owner is set for the account with the agreement type of Value Package.

ProductIdStatusValid
This validator makes sure that ProductId refers to a product with the valid status from Product domain. This validation is only applicable to managed accounts with the agreement type of Value Package. The validator reads the product status type list from the validation parameters. By default, the product should be of the status **Available** (product status type=1) in order for you to be able to create an account based on this product.

Generic Account domain validators

CurrencyValidation
This validator checks for mandatory *Currency Type* or *Value elements* for the account. This validation was internal in all the releases prior to InfoSphere MDM Server 8.0. It was moved to external validation because Currency Type or Value is no longer a mandatory element for an account. If you want to keep this field as mandatory, you should enable this external validator.

ManagedAccountIndicatorUpdate
This validator checks that the value of the ManagedAccountIndicator field is not changed during an update operation.

AgreementTypeUpdate
This validator checks that value of the AgreementType field is not changed during an update operation.

SignedDateUpdate
This validator checks that the value of the SignedDate field is not changed during an update operation.

Org Party Role
This validator checks for mandatory elements for the Contract entity related to an organization through a particular party role.

AdminContractId
This validator checks for the mandatory AdminContractId if the adminSystemType is provided.

AdminContractIdNativeKey
This function validates that if AdminSystemType or AdminSystemValue or AdminContractId is provided, then TCRMAdminNativeKeyBObj should not be part of the request message for TCRMContractBObj and TCRMContractComponentBObj objects for add or update transactions.

OverridingConditionValidator
This class validates whenever a contract's TermCondition overrides product TermCondition, the overridden TermCondition is related to the product of which the contract is an instance. In particular, the validator looks up all the TermCondition objects for the product with the ProductId from contract and checks that product has the TermCondition that matches OverridesConditionId from contract's TermCondition.

External validators for ContractRelationship

Table 119. V_GROUP_VAL Validators Related to ContractRelationship

TRANSACTION_TYPE	GROUP_NAME	FUNCTION_NAME
GENERAL	ContractRelationship	OrigContractIdCheck
GENERAL	ContractRelationship	DestContractIdCheck
CREATE	ContractRelationship	DuplicateCheck

OrigContractIdCheck
This validator makes sure that OrigContractId in the ContractRelationship is active by ensuring the following set of criteria, if it is a managed account.

- The value specified for ExecutedDate is before the current date.
- The value specified for TerminationDate is after the current date.
- The value specified for EndDate is after the current date.

DestContractIdCheck
This validator makes sure that DestContractId in the ContractRelationship is active by ensuring the following set of criteria, if it is a managed account.

- The value specified for ExecutedDate is before the current date.
- The value specified for TerminationDate is after the current date.
- The value specified for EndDate is after the current date.

DuplicateCheck
This validator makes sure that the ContractRelationship that is to be added is not a duplicate of an existing ContractRelationship. A ContractRelationship is considered as duplicate if the OrigContractId, DestContractId and RelationshipType values are found to be identical.

External validators for Account terms and conditions

There are a number of external validators for Account terms and conditions.

Table 120. V_ELEMENT_VAL Validators Related to TermConditionBObj

GROUP_NAME	ELEMENT_NAME	FUNCTION_NAME
TermConditionBObj	ItemsEntityConditionRels	Recursive

Table 121. External validation from V_GROUP_VAL table

TRANSACTION_TYPE	GROUP_NAME	FUNCTION_NAME
GENERAL	EntityConditionRelBObj	AddEntityRelation
GENERAL	EntityConditionRelBObj	EntityRelationNames
GENERAL	TermConditionBObj	ConditionRelEnitityAssociations
GENERAL	TermConditionBObj	ContractOverridesProduct
GENERAL	TermConditionBObj	TermConditionOwnerTypeCheck
GENERAL	TermConditionBObj	DefaultDataLocaleValidator

Note: Group name EntityConditionRelBObj corresponds to EntityConditionAssociationBObj object.

ConditionRelEnitityAssociations and AddEntityRelation

These validators check that the TermCondition is associated to appropriate the business entity, according to the condition owner type:

- TermCondition with owner type CONTRACT can only be associated with CONTRACT entity.
- TermCondition with owner type PRODUCT can be associated with PRODUCT or PRODUCTREL entities.

These validators also check that the business entity with InstancePk and EntityName provided in the EntityConditionRelBObj object actually exists.

EntityRelationNames

This validator checks the list of allowed entity names while adding the EntityConditionRelBObj object. The list of permitted entity names comes from the validator parameters provided in the V_GROUP_PARAM table.

ContractOverridesProduct

This validator makes sure that only a TermCondition entity with owner type CONTRACT can override a TermCondition entity with owner type PRODUCT.

DefaultDataLocaleValidator

This validator checks the list of incoming NLS objects to make sure that NLS objects do not have data in the default system data locale.

InstancePKEntityNameCheck

This validator checks that the business entity with InstancePk and EntityName provided in the EntityConditionRelBObj object actually exists.

TermConditionOwnerTypeCheck

This validator checks that the owner type is the one that is acceptable for the entity associated with it. For example, in a typical Gold-Data setup, Owner Type 2 is acceptable for the CONTRACT entity and Owner Type 1 is acceptable for the PRODUCT entity. The list of permitted Owner Types comes from the validator parameters provided in the V_GROUP_PARAM table

Chapter 73. Example of how to use managed accounts

One example of how managed accounts can be used is the management of value packages. The following topics provide information about managing value packages, as well as samples that demonstrate how you can use managed accounts to manage value packages.

In this section, you will learn:

Managing value packages

A value package allows a client to bundle two or more products to be sold to its customers.

For example, a bank might sell a savings account product and a checking account product as a value package. When a customer purchases the bundle, the bundle itself is stored as a managed account, but the savings account and the checking account are stored as two referenced accounts, respectively.

A value package is typically a means for a client to up-sell its products. That is, a value package is typically associated with some added business benefits, thus creating an incentive for customers to purchase more than one product. Using the example of the value package above, the bank may offer free overdraft protection as an added benefit if a customer opens a savings account and a checking account.

The value package is generally governed by some terms and conditions in order to maintain the validity of the value package. For example, the terms and conditions of the value package above stipulate that both the savings account and the checking account must stay open. If either one of the accounts is closed, the value package is no longer valid.

In summary, a value package is the governance of the products that are sold as a bundle, and the evaluation of the state of the purchased products against the stipulated terms and conditions, on an ongoing basis. For value package, the Account domain:

- Uses a managed account—the CONTRACT business entity—to manage the value package, and uses a contract relationship—the CONTRACTREL business entity—to manage the relationship between the value package and the associated referenced accounts. For a sample of this, see "Setting up a managed account to manage a value package" on page 794.
- Uses Event Manager to monitor significant changes to the associated referenced accounts. For a sample of this, see "Monitoring changes to the referenced accounts associated with a value package" on page 798.
- Executes associated business rules to evaluate the states of the referenced accounts against the terms and conditions governing the value package. For a sample of this, see "Evaluating value packages against terms and conditions" on page 799.

See also:

"Samples of managing value packages" on page 794

Samples of managing value packages

The following are samples of how to manage value packages.

"Setting up a managed account to manage a value package"

"Monitoring changes to the referenced accounts associated with a value package" on page 798

"Evaluating value packages against terms and conditions" on page 799

Setting up a managed account to manage a value package

A value package is set up using a managed account.

The following are the main transactions used to manage a value package:

- addContract
- getContract
- updateContract
- addMultipleContracts
- updateMultipleContracts

The following samples show how to use some of these transactions to manage a value package:

"Sample: Creating a value package for existing referenced accounts"

"Sample: Creating a value package and new referenced accounts" on page 795

Sample: Creating a value package for existing referenced accounts:

This sample describes creating a value package for an existing referenced account, using the example of a bank that offers a value package that rewards customers who have a savings account and a checking account, by offering free overdraft protection.

This banking example is described in more detail in "Managing value packages" on page 793.

Using this banking example, if a customer already has a savings account and a checking account open as referenced accounts in the Account domain, the **addContract** transaction can be used to create a managed account for this value package. The following is a sample request to add such a value package:

```
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:noNamespaceSchemaLocation="myTCRM.xsd">
  <RequestControl>
    <requestID>602004</requestID>
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLanguage>100</requesterLanguage>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>addContract</TCRMTxType>
    <TCRMTxObject>TCRMContractBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMContractBObj>
        <ObjectReferenceId>922</ObjectReferenceId>
        <ContractIdPK/>
            ...
            ...
```

```
        <ManagedAccountIndicator>Y</ManagedAccountIndicator>
                    <!-- Indicates a managed account -->
        <AgreementName>Savings and Chequeing Value Package</AgreementName>
        <AgreementNickName/>
        <SignedDate>2007-08-20</SignedDate>
        <ExecutedDate>2007-08-20</ExecutedDate>
            ...
            ...
        <AgreementType>1</AgreementType>
            ...
            ...
        <ProductId>123</ProductId> <!-- The product ID from the
                                        Product domain corresponding
                                         to the value package -->
        <TCRMContractComponentBObj>
          <ContractComponentIdPK/>
          <ContractId/>
            ...
            ...
          <TCRMContractPartyRoleBObj>
            <ContractRoleIdPK/>
            <PartyId>647118760907660971</PartyId>
                    <ContractComponentId/>
            <RoleType>1</RoleType>
            <RoleValue>Owner Primary</RoleValue>
            ...
            ...
            <ContractPartyRoleLastUpdateDate/>
            <ContractPartyRoleLastUpdateUser/>
          </TCRMContractPartyRoleBObj>
        </TCRMContractComponentBObj>
        <TCRMContractRelationshipBObj>
          <ContractRelIdPK/>
          <OrigContractId>922</OrigContractId>
          <DestContractId>9601187609080546</DestContractId> <!-- An
                                     existing savingsccount ID -->
          <RelationshipType>15</RelationshipType> <!-- The
                                relationship type between a managed
                              account and a referenced account -->
          <RelationshipValue>Managed Account</RelationshipValue>
            ...
            ...
          <ContractRelationshipLastUpdateDate/>
          <ContractRelationshipLastUpdateUser/>
          <ContractRelationshipLastUpdateTxId/>
        </TCRMContractRelationshipBObj>
        <TCRMContractRelationshipBObj>
          <ContractRelIdPK/>
          <OrigContractId>922</OrigContractId>
          <DestContractId>1871187609083828</DestContractId> <!-- An
                                    existing checking account ID -->
           <RelationshipType>15</RelationshipType> <!-- The
             relationship type between a managed account and
                                           a referenced account -->
           <RelationshipValue>Managed Account</RelationshipValue>
            ...
            ...
          <ContractRelationshipLastUpdateDate/>
          <ContractRelationshipLastUpdateUser/>
          <ContractRelationshipLastUpdateTxId/>
        </TCRMContractRelationshipBObj>
      </TCRMContractBObj>
    </TCRMObject>
  </TCRMTx>
</TCRMService>
```

Sample: Creating a value package and new referenced accounts:

This sample describes creating a value package for a new referenced account, using the example of a bank that offers a value package that rewards customers who have a savings account and a checking account, by offering free overdraft protection.

This banking example is described in more detail in "Managing value packages" on page 793.

Using this banking example, if a customer wants to purchase the value package by opening a savings account and a checking account, you can use the **addMultipleContracts** transaction to accomplish this. The following is a sample request to add such a value package:

```
<TCRMService xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="myTCRM.xsd">
  <RequestControl>
    <requestID>400011</requestID>
    <DWLControl>
      <requesterName>cusadmin</requesterName>
      <requesterLanguage>100</requesterLanguage>
    </DWLControl>
  </RequestControl>
  <TCRMTx>
    <TCRMTxType>addMultipleContracts</TCRMTxType>
    <TCRMTxObject>TCRMMultipleContractBObj</TCRMTxObject>
    <TCRMObject>
      <TCRMMultipleContractBObj>
        <TCRMContractBObj> <!-- A savings account to be created -->
          <ContractIdPK/>
          <ObjectReferenceId>216</ObjectReferenceId> <!-- A reference ID to the
                                                          savings account -->
              ...
              ...
          <ManagedAccountIndicator>N</ManagedAccountIndicator> <!-- The savings
                                                                    account is a
                                                                    reference account -->
              ...
              ...
          <TCRMContractComponentBObj>
            <ObjectReferenceId>216</ObjectReferenceId>
            <ContractComponentIdPK></ContractComponentIdPK>
                ...
                ...
            <TCRMContractPartyRoleBObj>
              <ContractRoleIdPK/>
              <PartyId>4385735204532045324</PartyId>
              <ContractComponentId/>
                  ...
                  ...
            </TCRMContractPartyRoleBObj>
          </TCRMContractComponentBObj>
        </TCRMContractBObj>
        <TCRMContractBObj> <!-- A chequeing account to be created -->
          <ContractIdPK/>
          <ObjectReferenceId>217</ObjectReferenceId> <!-- A reference ID to the
                                                          chequeing account -->
              ...
              ...
          <ManagedAccountIndicator>N</ManagedAccountIndicator> <!-- The chequeing
                                                                    account is a
                                                                    reference account -->
              ...
              ...
          <TCRMContractComponentBObj>
            <ObjectReferenceId>217</ObjectReferenceId>
            <ContractComponentIdPK></ContractComponentIdPK>
                ...
                ...
            <TCRMContractPartyRoleBObj>
```

```
      <ContractRoleIdPK/>
      <PartyId>4385735204532045324</PartyId>
      <ContractComponentId/>
          ...
          ...
    </TCRMContractPartyRoleBObj>
  </TCRMContractComponentBObj>
</TCRMContractBObj>
<TCRMContractBObj> <!-- A value package account to be created -->
  <ContractIdPK/>
  <ObjectReferenceId>218</ObjectReferenceId> <!-- A reference ID to the value
                                                  package account -->
      ...
      ...
  <ManagedAccountIndicator>Y</ManagedAccountIndicator> <!-- The value package
                                                            is a managed
                                                            account -->
  <AgreementName>Savings and Chequeing Value Package</AgreementName>
  <AgreementNickName/>
  <SignedDate>2106-07-07</SignedDate>
  <ExecutedDate>2206-07-07</ExecutedDate>
      ...
      ...
  <AgreementType>1</AgreementType> <!-- The type corresponding to a
                                       value package -->
      ...
      ...
  <ProductId>123</ProductId> <!-- The product ID from the Product domain
                                  corresponding to the value package -->
      ...
      ...
  <TCRMContractComponentBObj>
    <ContractComponentIdPK></ContractComponentIdPK>
        ...
        ...
    <TCRMContractPartyRoleBObj>
      <ContractRoleIdPK/>
      <PartyId>4385735204532045324</PartyId> <!-- The party ID owning this
                                                  value package -->
      <ContractComponentId/>
      <RoleType>1</RoleType>
      <RoleValue>Owner Primary</RoleValue>
          ...
          ...
    </TCRMContractPartyRoleBObj>
  </TCRMContractComponentBObj>
  <TCRMContractRelationshipBObj>
    <ContractRelIdPK/>
    <OrigContractId>218</OrigContractId> <!-- Object Reference ID to the
                                             managed account -->
    <DestContractId>216</DestContractId> <!-- Object Reference ID to the
                                             savings account -->
    <RelationshipType>15</RelationshipType> <!-- The relationship type between
                                                 a managed account and
                                                 a referenced account -->
    <RelationshipValue>Managed Account</RelationshipValue>
        ...
        ...
  </TCRMContractRelationshipBObj>
  <TCRMContractRelationshipBObj>
    <ContractRelIdPK/>
    <OrigContractId>218</OrigContractId> <!-- Object Reference ID to the
                                             managed account -->
    <DestContractId>217</DestContractId> <!-- Object Reference ID to the
                                             chequeing account -->
    <RelationshipType>15</RelationshipType> <!-- The relationship type between
                                                 a managed account and
                                                 a referenced account -->
    <RelationshipValue>Managed Account</RelationshipValue>
        ...
        ...
```

```
        </TCRMContractRelationshipBObj>
      </TCRMContractBObj>

    </TCRMMultipleContractBObj>
  </TCRMObject>
</TCRMTx>
```

Monitoring changes to the referenced accounts associated with a value package

A value package is typically a bundle of two or more referenced accounts. Any changes to any of the referenced accounts can potentially affect the validity of the value package.

The Account domain includes behavior extensions designed for the value package, so that Event Manager is triggered whenever an account is added or updated

These behavior extensions are configured in the EXTENSIONSET table, records 170 to 173.

Table 122. EXTENSIONSET Records Related to Value Package

ID	NAME	JAVA_CLASS_NAME
170	TermConditionEvaluation ValidationOnUpdateContract	com.ibm.mdm.account.termcondition. extensionset.ManagedAgreement TermConditionEvaluationManager
171	TermConditionEvaluation ValidationOnAddContract	com.ibm.mdm.account.termcondition. extensionset.ManagedAgreement TermConditionEvaluationManager
172	TermConditionEvaluation ValidationOnAddMultipleContracts	com.ibm.mdm.account.termcondition. extensionset.ManagedAgreement TermConditionEvaluationManager
173	TermConditionEvaluation ValidationOnUpdateMultipleContracts	com.ibm.mdm.account.termcondition. extensionset.ManagedAgreement TermConditionEvaluationManager

Note: The INACTIVE_IND for all the above is Y, meaning that these extensions are inactive. Extensions 170 to 173 are replacing deprecated extension records 155 to 158 for Java rule `com.ibm.mdm.account.em.notifier.ValuePackageEventNotifier`.

These extensions are associated with the post-transaction of the following transactions:

- `updateContract`
- `addContract`
- `addMultipleContracts`
- `updateMultipleContracts`

These extensions are inactive by default (INACTIVE_IND = Y). When these extensions are made active (INACTIVE_IND = N), the `com.ibm.mdm.account.em.notifier.ValuePackageEventNotifier` is invoked. The ValuePackageEventNotifier class processes the contract involved in the above four transactions as follows:

- It determines if the contract is a referenced account associated with a managed account (that is, if the contract has a <TCRMContractRelationshipBObj> with a <RelationshipType> of 15).

- If an associated managed account is found and its <TCRMContractBObj> has a <AgreementType> value of 1, indicating that it is a value package, a PROCESSCONTROL record and a PROCESSACTION record are created for the managed account. The PROCESSCONTROL record corresponds to the contract ID of the managed account and the PROCESSACTION record corresponds to the event category ValuePackageEvents (EVENT_CAT_CD = 8 in the CDEVENTCAT table). Event Manager then executes the business rule 188 associated with this event category to find and execute all business rules for the value package terms and conditions.

Evaluating value packages against terms and conditions

When you create a PROCESSCONTROL record and a PROCESSACTION record for the managed account for a value package, this enables the Event Manager to evaluate the value package against the terms and conditions.

The event category 8 uses the following records to associate a business rule for the evaluation.

Table 123. ADAPTERDEF Record Related to Value Package

ID	NAME	ADAPTERDEF_IMPL
6	TermConditionAdapter	com.ibm.mdm.common.termcondition.em.adapter. TermConditionEvaluationAdapter

Table 124. EXTRULE Record Related to Value Package

RULE_ID	RULE_DESCRIPTION
188	Update account rule when governed by evaluation terms and conditions

Table 125. JAVAIMPL Record Related to Value Package

EXT_RULE_IMPL_ID	JAVA_CLASSNAME
10188	com.ibm.mdm.account.termcondition.em. externalrule.ManagedAgreementTermConditionEvaluationEMRule

The `com.ibm.mdm.common.termcondition.em.adapter.TermConditionEvaluationAdapter` class executes a **getContract** transaction with an inquiry level 4 for the managed account.

This transaction returns the details of the managed account for the value package, including the terms and conditions governing the value package. It also executes **getContract** transactions for its associated referenced accounts to return the details of the referenced accounts.

The `com.ibm.mdm.common.termcondition.em.externalrule.ManagedAgreementTermConditionEvaluationEMRule` class is the generic rule that calls appropriate business rule for each TermCondition associated with managed account. Rules can be attached through the condition usage type or specified directly on the term condition.

Table 126. EXTRULE Record Related to Value Package

RULE_ID	RULE_DESCRIPTION
189	Value Package Rule using valuation terms and conditions

Table 127. JAVAIMPL Record Related to Value Package

EXT_RULE_IMPL_ID	JAVA_CLASSNAME
10189	com.ibm.mdm.termconditon.rules. ManagedAgreementTermConditionEvaluationRule

The `com.ibm.mdm.termconditon.rules.ManagedAgreementTermConditionEvaluationRule` class extends TermConditionRule and implements the appropriate abstract methods. For more details on TermCondtionRule see "Terms and Conditions rule framework" on page 750. This business rule compares the state of the value package against the terms and conditions. This class provides an implementation to evaluate some typical terms and conditions involving value packages.

- One of the referenced accounts must be the purchase of a predefined core product.
- A minimum number of referenced accounts must remain active (for example, the END_DT of the TCRMContractBObj of the referenced account must not be in the past).

If the above conditions are not met, the value package is broken. An EVENT record is created for that managed account, and a notification is triggered.

See also:

"Sample terms and conditions for value packages"

Sample terms and conditions for value packages:

One example of terms and conditions for a value package agreement might be the stipulation that core accounts (for example, RRSP and Mortgage in a banking context) must stay open and that a client must have accounts for three products in total in order to be eligible for the value package discount. If either one of the core accounts is closed or if the total number of accounts is less then 3, the value package is no longer valid.

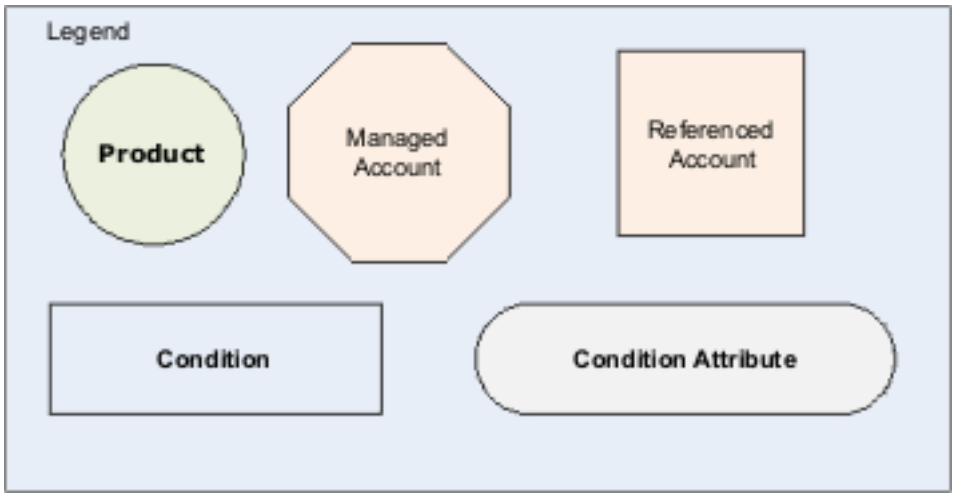
These terms and conditions are defined on the product *Super Bundle* with product id =333. The product contains conditions of the type Value Package Integrity. These conditions and their attributes are used by the Event Manager business rule to determine if the value package account is still valid. The Super Bundle product might contain other conditions of different types and without attributes; however they are ignored by the sample business rule implemented by `com.ibm.mdm.termconditon.rules.ManagedAgreementTermConditionEvaluationRule` class.

The product contains parent condition 99 with rule id of the business rule ManagedAgreementTermConditionEvaluationRule. The condition 99 has child conditions 100 and 101 to describe which core products are included in the product bundle. Each product condition has an attribute of the type Core Product ID, which contains the ProductId of the core products that participate in the bundle. The condition attributes Core Product ID are used by the business rule to determine if the managed account has the correct core referenced accounts open by comparing the value of the attribute with the ProductId field of the referenced account.

Note: Conditions 99, 100 and 101 cannot be overwritten.

The product contains condition 102, which states that the minimum number of referenced accounts must remain active. This product condition has two attributes:

- An attribute of the type Account Status, which contains the key word **active**. It is used by the business rule to determine if the managed account has the referenced accounts in the correct status. The status of the account is determined by checking the END_DT of the TCRMContractBObj of the referenced account to make sure it is not in the past
- An attribute of the type Minimum Number of Accounts which contains the number. It is used by the business rule in conjunction with the Account Status attribute type to count the number of the accounts in the required status



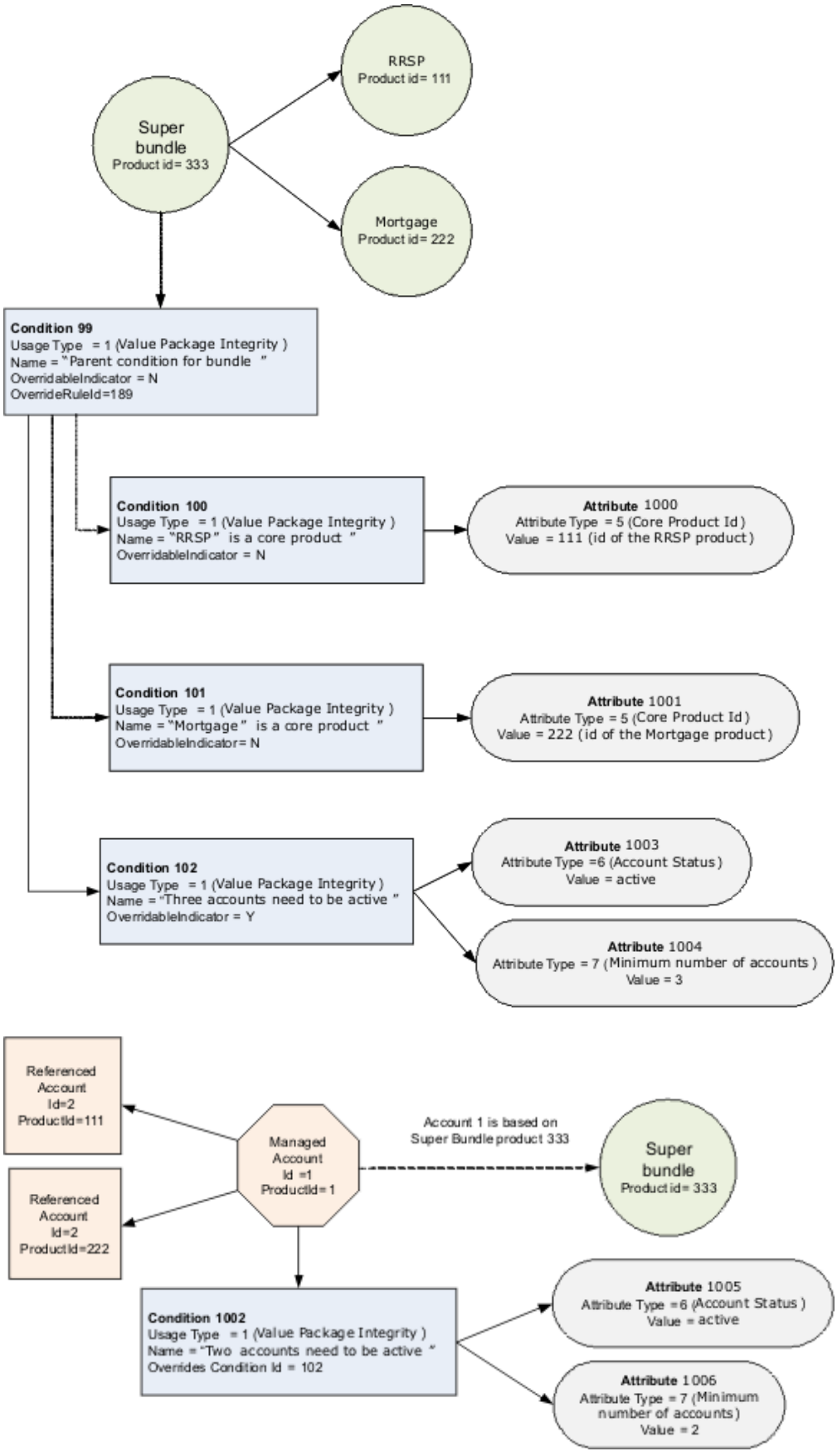

RRSP
Product id= 111
Super bundle
Product id= 333
Mortgage
Product id= 222
Condition 99
Usage Type = 1 (Value Package Integrity)
Name = "Parent condition for bundle "
OverridableIndicator = N
OverrideRuleId=189
Condition 100
Usage Type = 1 (Value Package Integrity)
Name = "RRSP" is a core product "
OverridableIndicator = N
Attribute 1000
Attribute Type = 5 (Core Product Id)
Value = 111 (id of the RRSP product)
Condition 101
Usage Type = 1 (Value Package Integrity)
Name = "Mortgage" is a core product "
OverridableIndicator= N
Attribute 1001
Attribute Type = 5 (Core Product Id)
Value = 222 (id of the Mortgage product)
Condition 102
Usage Type = 1 (Value Package Integrity)
Name = "Three accounts need to be active "
OverridableIndicator = Y
Attribute 1003
Attribute Type =6 (Account Status)
Value = active
Attribute 1004
Attribute Type = 7 (Minimum number of accounts)
Value = 3
Referenced Account Id=2 ProductId=111
Referenced Account Id=2 ProductId=222
Managed Account Id =1 ProductId= 1
Account 1 is based on Super Bundle product 333
Super bundle
Product id= 333
Condition 1002
Usage Type = 1 (Value Package Integrity)
Name = "Two accounts need to be active "
Overrides Condition Id = 102
Attribute 1005
Attribute Type =6 (Account Status)
Value = active
Attribute 1006
Attribute Type = 7 (Minimum number of accounts)
Value = 2

Figure above: Sample Agreement Terms and Conditions contains the diagram describing Super Bundle product and its terms and conditions. Diagram also contains the managed account with Condition containing OverrideRuleId set to 189.

Product condition 102 can be overridden, because its OverridableIndicator is set to **Y**. In this example, the condition 102 has been overridden by agreement condition 1002 to reduce the type minimum number of accounts that need to be open to two.

Extending a value package

The Account domain provides a sample implementation of a value package.

The value package uses the following InfoSphere MDM Server components:

- CONTRACT related business entities on the InfoSphere MDM Server platform
- Behavior extension
- Terms and Conditions rules framework
- Event Manager
- Business rule

The following are some extension points that you can use to implement a value package to meet your business requirements.

Replacing the ManagedAgreementTermConditionEvaluationManager class.

The ManagedAgreementTermConditionEvaluationManager class is invoked upon adding or updating of any TCRMContractBObj business object. It determines if any value package managed account associated with the TCRMContractBObj business object exists, and to invoke Event Manager to add a PROCESSCONTROL record and a PROCESSACTION record for the managed account, accordingly.

Clients can re-use this rule or provide their own implementation to invoke Event Manager differently. An example is to invoke Event Manager to add PROCESSCONTROL records and PROCESSACTION records for the referenced accounts as well.

Replacing the TermConditionEvaluationAdapter class.

The TermConditionEvaluationAdapter class is invoked by Event Manager before executing the business rule. It returns the managed account and its associated referenced accounts.

Clients can provide their own implementation to return different business objects that may be necessary for evaluating the terms and conditions.

Replacing the ManagedAgreementTermConditionEvaluationEMRule class.

The ManagedAgreementTermConditionEvaluationEMRule class is the rule invoked by Event Manager for event category 8. It looks at the all the terms and conditions for the given managed account and discovers the appropriate business rule that needs to be executed. RuleId could be associated with condition usage type or explicitly specified on TermCondition. Once rules are identified, ManagedAgreementTermConditionEvaluationEMRule class will invoke each rule, providing business data as the input. The example of business rule invoked by this class is ManagedAgreementTermConditionEvaluationRule described in the next

paragraph. Clients can re-use this rule or provide their own implementation if logic for retrieving business rule id needs to be customized.

Replacing the ManagedAgreementTermConditionEvaluationRule class.

The ManagedAgreementTermConditionEvaluationRule class is the sample business rule for value package invoked by ManagedAgreementTermConditionEvaluationEMRule class. It evaluates the state of the value package against the stipulated terms and conditions. The same rule would be invoked by evaluateTermCondition transaction to check the party eligibility for particular product.

This sample business rule covers the typical terms and conditions described in "Evaluating value packages against terms and conditions" on page 799.

With the Terms and Conditions rule framework it is quite easy to write new business rules and monitor Terms and Conditions on managed account.

- Write a new business rule extending class com.ibm.mdm.termcondition.rule.TermCondtionRule. An example of this rule is ManagedAgreementTermConditionEvaluationRule.
- Set the OverrideRuleId in TermCondition to point to newly created rule.

Chapter 74. Agreement business services

The agreement business services help you determine whether a client is eligible for purchasing a product or service offering.

The services are generic and, except for the Eligibility evaluation and What-If (Preview), they can be extended to incorporate other condition-based business scenarios which can be complex and hierarchical in nature and composition. These agreement services may be cross-domain and can interact with Account, Party and Product domains.

The agreement business services include:

- Services to retrieve eligibility criteria for an anonymous and existing users
- Services to perform operations that assist in:
  - Eligibility determination.
  - Preview determination, showing what will happen if the integrity of the bundle is compromised as changes to the managed account or party occur.

In this section, you will learn:

TermCondition Rules framework

The Agreement business services use the TermCondition Rules framework to determine eligibility and the effects of modifications to the account or agreement.

For more information see "Terms and Conditions rule framework" on page 750.

getAllTermsConditionsByEntityID

The getAllTermsConditionsByEntityId transaction returns terms and conditions that are specific to an entity and instance PK combination.

EvaluateTermConditions

The evaluateTermConditions transaction can be used two ways:

- To evaluate an existing party. In this scenario, the party and required information or the facts that are required for evaluation are identified.
- To evaluate a prospect or anonymous party with information that is supplied along with the request for evaluation. This service evaluates the criteria stored in terms and conditions and responds with the outcome of the evaluation.

The evaluateTermConditions transaction can be used to determine if a requestor is eligible for a product and also to determine the effects modifying an agreement without actually changing the agreement.

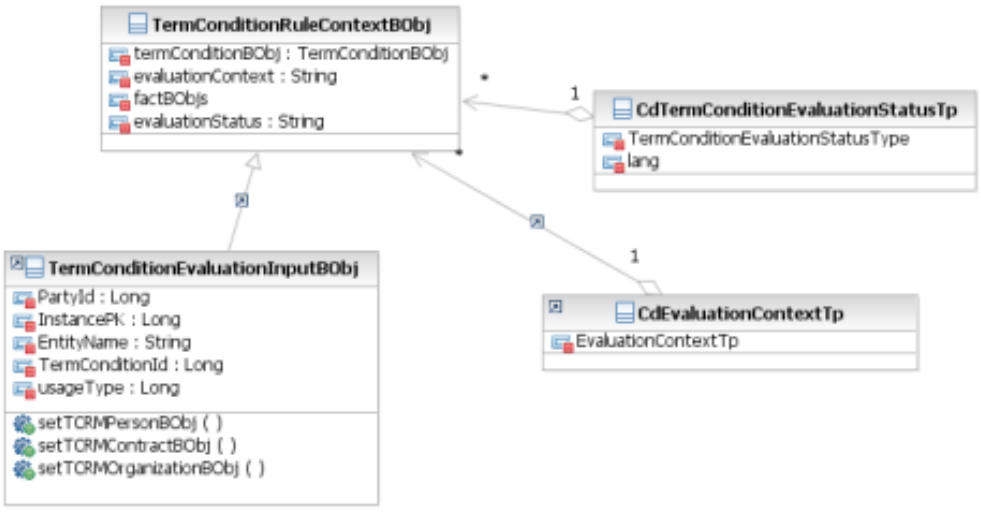
The main business entity for this service is represented by the TERMCONDITIONEVALUATIONINPUT entity. This entity holds the base attributes, or facts, that the user enters for performing an evaluation operation, such as the EntityName, for example PRODUCT or CONTRACT , the InstancePK, the primary key of the entity , the UsageType such as the eligibility criteria, value package integrity, and others, TermConditionId, PartyId and others. This entity is represented by the `<TermConditionEvaluationInputBObj>` business object.

There are two ways the facts required for evaluation can be supplied. For an existing user, the party information can be retrieved if the PartyId is supplied. For an anonymous user, the TERMCONDITIONEVALUATIONINPUT entity has a place holder for passing the person information using the `<TCRMPersonBObj>` business object.

An example use of the EvaluateTermConditions transaction allows you to determine the ramifications of closing a reference account that is part of a value package, by populating the `<TCRMContractBObj>` with the EndDate field set to a value in the past. The service understands the intent of the requestor and checks the terms and conditions associated with this closure and returns the response.

The DWLCommonBObjs are automatically added to the collection of facts in the RuleContext class.

The TermConditionEvaluationInput entity is a carrier of the user inputs to the rule and it is not persisted in the database.



EvaluationTermConditions – TermConditionRule Framework

The Terms and Conditions feature lets you define the terms and conditions associated with the agreements and products, and capture the description of the conditions along with the condition attributes. The TermCondition rule framework provides a general approach in setting up, enforcing and monitoring the terms and conditions rules.

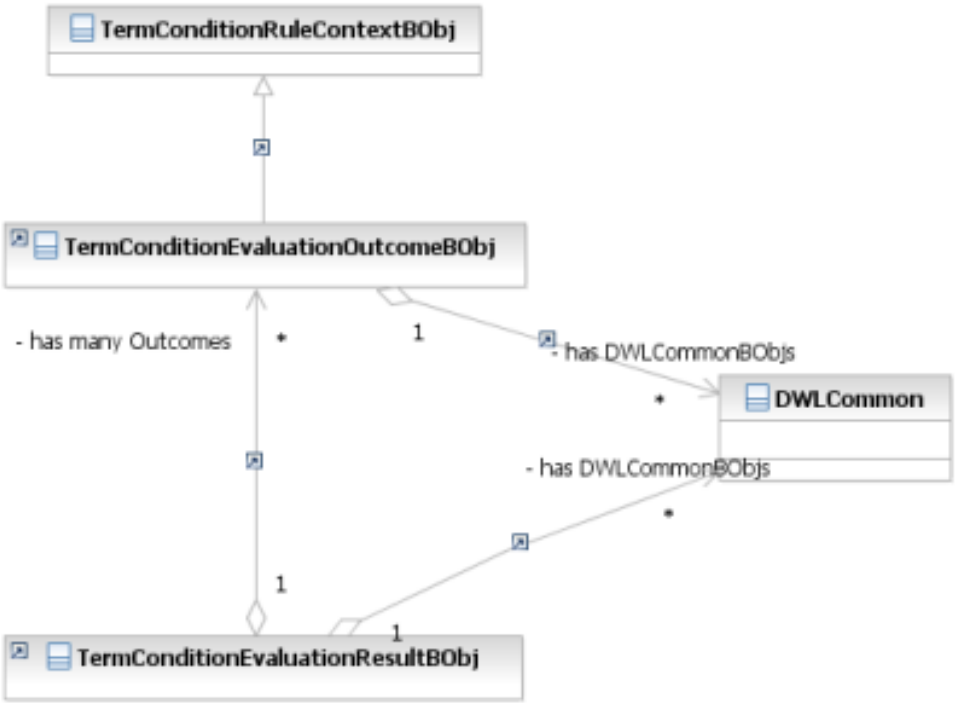
The rules are associated with the TermConditions as follows:

- A rule can be associated to the UsageType, through the code table **CdConditionUsageTp**.
- A rule can be associated directly to the TermCondition, through the `Override_rule_id` attribute.

If the Override_rule_id field is not null, it overrides the rule associated with usage type and it is run for that particular terms and condition. For details on the rule framework, see "Terms and Conditions rule framework" on page 750.

EvaluationTermConditions – Response

The TermConditionEvaluationResultBObj is the entity that displays the outcome of terms and condition evaluation.



1. The TermconditionEvaluationResultBObj has a collection of TermConditionEvaluationOutcomeBObjs, one for each TC Rule that was evaluated as part of this request.
2. A collection of DWLCommon entities in TermConditionEvaluationResultBObj is the input that was sent in the request to the evaluation system
3. The status type, in the code table CdEvaluationStatusTp captures the outcome of a particular rule, for example, eligible, not eligible, and the outcome of possible scenarios.
4. A collection of DWLCommon entities attached to each outcome shows the state of the entities after a particular rule was run.

For example, this collection can give a preview of the changes that will be made to an entity if particular rules are run.

Rules available in DefaultExternalRules

The following JAVA_CLASSNAME rule is available in the DefaultExternalRules JAR file:

- `com.ibm.mdm.account.externalrule.ConsolidatedStatementEligibilityRuleOne`

This rule checks the relevant terms and conditions for evaluating either eligibility or integrity. The `ConsolidatedStatementEligibilityRuleOne` rule determines whether the party is eligible for the consolidated statement product by checking whether he has requisite number of participant or anchor accounts, and if the party's address matches the one specified in the eligibility criteria.

Chapter 75. External rules for the Account domain

The following are externalized rules specific to the Account Domain.

Rule ID	Rule Description	Java Class Name
13	Rule for search contract	com.dwl.tcrm.externalrule.ContractSearchExtRule
96	Rule for evaluating conditions attached to PremiumAmount in Contract	com.dwl.tcrm.externalrule.ExtValidation
97	Rule for evaluating conditions attached to CurrencyCashValueAmount in Contract	com.dwl.tcrm.externalrule.ExtValidation
98	Rule for evaluating conditions attached to AccountBalance in Billing Summary	com.dwl.tcrm.externalrule.ExtValidation
99	Rule for evaluating conditions attached to MaximumPayment in Billing Summary	com.dwl.tcrm.externalrule.ExtValidation
100	Rule for evaluating conditions attached to MinimumPayment in Billing Summary	com.dwl.tcrm.externalrule.ExtValidation
101	Rule for evaluating conditions attached to LastPaymentAmount in Billing Summary	com.dwl.tcrm.externalrule.ExtValidation
102	Rule for evaluating conditions attached to PremiumAmount in ContractComponent	com.dwl.tcrm.externalrule.ExtValidation
103	Rule for evaluating conditions attached to CurrentCashValueAmount in ContractComponent	com.dwl.tcrm.externalrule.ExtValidation
104	Rule for evaluating conditions attached to BenefitClaimAmount in ClaimComponent	com.dwl.tcrm.externalrule.ExtValidation
105	Rule for evaluating conditions attached to ClaimDetailAmount in ClaimComponent	com.dwl.tcrm.externalrule.ExtValidation
106	Rule for evaluating conditions attached to ClaimPaidAmount in ClaimComponent	com.dwl.tcrm.externalrule.ExtValidation
107	Rule for evaluating conditions attached to OutstandingAmount in ClaimComponent	com.dwl.tcrm.externalrule.ExtValidation
108	Rule for evaluating conditions attached to HoldingValueAmount in Holding	com.dwl.tcrm.externalrule.ExtValidation
170	Rule for invoking suspect processing for Party entities provided as part of Contract object hierarchy during add and update Contract transactions.	com.ibm.mdm.externalrule.SearchContractPartySuspects
171	Rule for retrieving Terms and Conditions of contract. Resolves overridden Terms and Conditions.	com.ibm.mdm.account.externalrule.MergeProductTermConditions
189	You can find the rule ID, description and javaclass for this rule in “Evaluating value packages against terms and conditions” on page 799.	

Rule ID	Rule Description	Java Class Name
20008	Rule for determining whether a value package is broken	com.ibm.mdm.account.em.externalrule.ValuePackageRule

Chapter 76. Account domain configuration elements

This topic describes the configuration elements for the Account domain.

Account domain configurations have names beginning with the following:

- /IBM/FinancialServices

Refer to "Understanding configuration elements in the Configuration and Management component" on page 419 for details about these configurations.

Chapter 77. Product information and support

Information about InfoSphere MDM Server and support information can be obtained through the following methods.

On the Web

Go to http://www-306.ibm.com/software/data/infosphere/mdm_server/. This site contains the InfoSphere MDM Server library, news, and links to web resources.

By Telephone

If you are in North America, call 1-800-IBM-SERV (1-800-426-7378).

If you are outside of North America, check the web page http://www.ibm.com/planetwide/ for contact information for your area.

Part 5. Appendixes

Appendix A. Notices

This information was developed for products and services offered in the Canada.

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