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Wallstreet Suite
TRM
System Administration Guide

Version 7.3.14

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This edition applies to Wallstreet Suite version 7.3.14 and to all later releases and versions until indicated in new editions or Wall Street Systems communications. Make sure you are using the latest edition for the release level of the Wall Street Systems product.

Contents

Preface

This guide describes the system administration tasks required for Transaction and Risk Module (TRM).

The guide aims to:

- Provide guidelines for the system administration of TRM
- Provide documentation on scripts and procedures

This guide is intended for system administrators who maintain and administer TRM. Administrators should have experience with the following:

- Common Object Request Broker Architecture (CORBA)
- Perl and Python scripts

The database used with TRM is a customer asset and its operation, maintenance, and administration should be under the control of a qualified DBA. It is the DBA's responsibility to ensure that the maintenance of the database used with TRM reflects customer policies and procedures.

Associated documents

- TRM User Guide
- comKIT API Reference provided in TRM installation: `FK_HOME\support\comKIT\doc\idl\html\index.html` (Windows platform only)
- Wallstreet Suite Installation Guide
- Wallstreet Suite System Admin Guide
- Wallstreet Suite Database Setup Guide

Chapter 1 System processes

1.1 TRM clients

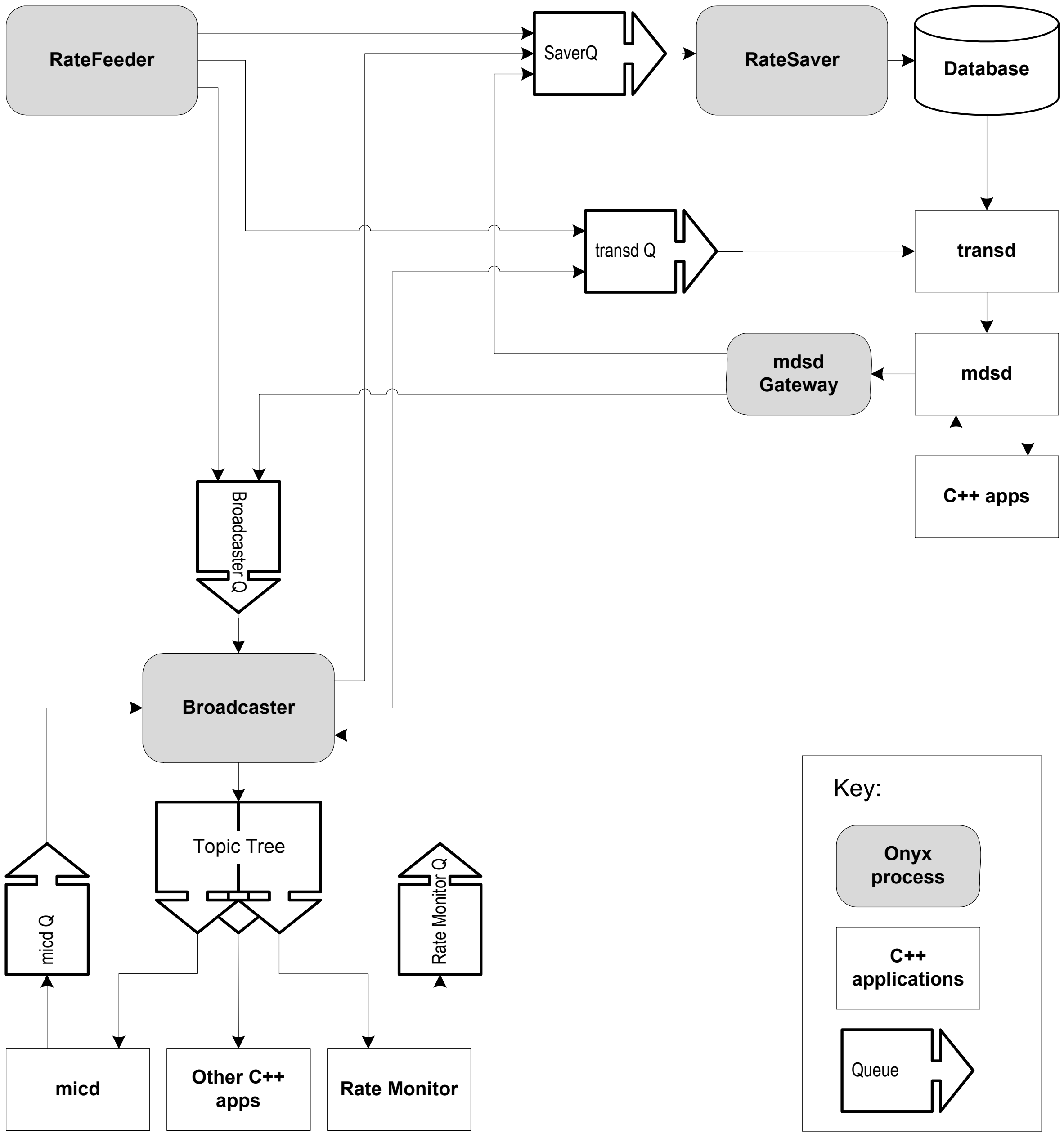
The TRM clients can be divided into **server processes** that take care of the underlying information flow between all TRM processes and **user processes** (for example monitors and editors).

1.1.1 Server processes

The server processes are as follows:

Process	Description
ActiveMQ	Message bus
omniNames	CORBA name server
mdsd	Message Delivery System daemon (central point for all real-time traffic)
transd	Deal transfer daemon for TRM
micd	Market Information Calculation daemon (produces derived rates)
limitd	Limit daemon
activityd	Activity-launching daemon
tmd	Treasury Monitor daemon
comkitd	comkit daemon
reportd	Generates reports on demand for TRMWeb.
serviced	Service deamons, load CORBA modules to process and deliver data through particular business logic.
sessiond	Session deamons, deliver data to the end user through persistent connections (sessions) that can be distributed among several instances.
TRM - Onyx Rate Interfaces	Rate Feeder, Rate Saver, MDSD Gateway and Rate Broadcaster

More details about these processes, see *Chapter 2 Managing server processes* on page 21.



The server processes, which may run on their own dedicated server computers, use CORBA for inter-operability. The name server connects to all the processes and allows the server processes as well as the user processes to locate each other. The following is a summary of how this works:

- The ORB (Object Request Broker) is configured with a naming service with a dedicated port for requests.
- When an application connects to the mdsd, it uses the naming server to locate it. It then registers a callback-object with the server. The server connects to this object whenever it needs to send updates to the client.
- A timeout parameter to the server defines how long the connection is alive, and the connection is restored on an as-needed basis if it has timed-out.

1.1.2 Onyx

Onyx is a simple Java application server. It is complementary to ServiceD, which is used to run services written in Python or c++.

1.1.2.1 Starting Onyx

Onyx is started by the following command:

On Windows

```
    > onyx.bat
```

On Unix

```
    > rc.onyx
```

It takes a space-separated list of services as arguments. For example, to start Onyx with the services `trmstaticdata` and `esiadapter`, enter:

```
    > rc.onyx trmstaticdata esiadapter
```

1.1.2.2 Configuring property files

Configuration files for Onyx and Onyx services are located under `$FK_HOME/etc/onyx/configuration/context/properties`. This directory contains files with the extension '`.properties`'. Each service has a configuration file named '`<service-name>.properties`' (for example `esiadapter.properties`).

Some property files are used by all services (`jdbc.properties, jms.properties, ssl.properties, dbkit.properties, appserver.properties`). You need to configure only the property files required by the services you want to run. See the documentation of each service for more information.

1.1.2.3 Configuring number of service instances

Each service in Onyx can be run in a specified number of instances. To change the number of instances, edit the file `$FK_HOME/etc/onyx/configuration/services/<service-name>-bootstrap.xml`.

Do not change anything in the content of the file except of number of instances, as in this example:

```
<bean id="esiadapterInitializer" class="biz.wss.onyx.server.ServiceInitializer">

    <property name="provider" value="esiadapterClientRequest"/>

    <property name="instances" value="1"/>

</bean>
```

1.1.2.4 Onyx log files

By default, Onyx and all its services create log files in the `$FK_HOME/var/log` structure (`onyx_trmswift.log` in `$FK_HOME/var/log/trmswift, onyx_basics.log` in `$FK_HOME/var/log/trm`). To change the level of logging detail, edit the file `$FK_HOME/etc/onyx/configuration/context/log4j.xml`.

For logging, Onyx uses the Java open source library Log4J.

1.1.3 User processes

The main TRM user processes are:

- Transaction Managers (for example **Deal Capture**)
- Monitors (for example **Treasury Monitor**)
- Editors (for example **Instrument Editor**)
- Reports. Reports are generated on demand (TRMWeb only).

They all connect to the database when they are started, to read in their configuration data.

1.2 Network bandwidth

The network bandwidth required for TRM depends totally on the usage of the system. Entering a deal in **Deal Capture**, for example, initiates a stored procedure (SQL insert to the database server) and a real-time update to the mdsd. The network traffic for this kind of operation would be very limited. An entry made with one of the editors, for example **Client Editor**, would also cause very limited traffic.

There are two main traffic types: traffic between TRM applications and the TRM server processes, and traffic between TRM applications and the TRM database.

The network traffic that is generated by receiving market information (for example, Reuters or Telerate) will basically depend on the instruments configured in the system and the rate that they are receiving updates from the information source.

It is also highly dependent on how the system is used. **F**or example, **Limit Monitor** generates different network traffic depending on the data used when started. This makes it very difficult to predict how much network traffic will be generated.

The factor that has the most impact on network traffic is the update rate on the market information. The update rate may be different from various providers.

The network traffic generated when the users request reports will depend on the parameters that are given as well as the size and contents of the database. Reports or Treasury Monitor can cause a lot of network traffic.

Chapter 2 Managing server processes

The TRM server processes use a CORBA-based messaging technique for inter-process communication. Two processes, **mdsd** and **limitd**, are contacted by other processes and applications.

2.1 omniNames

The CORBA Names server must be running before any of the TRM server processes can function.

2.2 Onyx rate interface

The Onyx Rate Interface consists of the following Onyx processes:

Process	Description
Rate Feeder	Rate Feeder is responsible for retrieving the native rate format and converting it to the standard message format used in Wallstreet Suite. Currently, the Reuters API in version 7.3 is based on the Reuters Foundation API for Java (RFAJ) 6.3. It Reuters' latest and strategic API for connecting to RMDS servers. This API introduces a new message format and a more efficient binary communication protocol.
Rate Saver	Rate Saver is responsible for storing real time or calculated rates into the database. Special filtering logic can be applied in order to tune the frequency of stored real time and calculated rates.
MDSD Gateway	MDSD Gateway itransfers rate messages from the ActiveMQ platform to the CORBA platform in order to distribute rates via MDSD.
Rate Broadcaster	Rate Broadcaster distributes rates over the system and it takes over this role from mdsd. Applications subscribe to the Rate Broadcaster to obtain new rate messages.

2.3 Automatic start of server processes

All server processes, including the market information links, can be automatically restarted during boot by:

- On UNIX: running the `setup.fk` script as follows:

  ```
  cd $FK_HOME/etc
  ```

  ```
  ./setup.fk
  ```

  Running the script puts the system passwords into memory.

- On Windows: In **Start - Control Panel - Administrative Tools - Services**, ensure that the **Startup Type** of all Wallstreet Suite services is `Automatic`.

Note: When running Telerate, the **tipd** process should be started as the Telerate user `aws`. If not, it will not start up properly.

Refer also to the description of Process Monitor daemons in the *WSS System Admin Guide*.

2.4 mdsd

The **mdsd** (Message Delivery System Daemon) is the hub of all real-time information flow. It is essential for the real-time components of TRM. All activities requiring real-time updates must indicate this by creating a connection with the **mdsd**.

The **mdsd** is a message exchange service. It allows for the arrival of correctly formatted messages that are then broadcast to the processes that have indicated an interest in that particular message. When a client (process) connects to **mdsd**, it requires a response to indicate that its request has been accepted.

All applications (user and server processes) connect to **mdsd**. Some only receive information, like Treasury Monitor and FX Forward Pricing; others send information, like Editors and Transaction Manager.

Option/Argument	Description
`--log-directory arg`	Directory for log files
`--service-name arg`	Service name to register with CosNaming
`--max-queue-size arg`	Maximum allowed queue length for clients
`--timeout-interval arg`	Timeout for non-responsive clients

2.5 transd

The **transd** real-time process is used to send information to the real-time server about updates of prices and transactions that are imported or changed in a way that is not otherwise notified to the **mdsd**.

Note: This is a required process for the Limit Monitor.

The *PushPendingPrices* and *PushPendingTransactions* procedures are used to update the *PendingPrices* and *PendingTransactions* tables which are being read by the **transd** process.

Option/Argument	Description

`-I arg`
`--interval arg`
	Interval in milliseconds to check (default 70000)

-T arg --topic arg	Topic to listen to

2.6 micd

The **micd** real-time process calculates yield curves and derived rates. This process logs in to the database as user `batch`.

Option/Argument	Description

`-i arg`
`--include arg`
	Include given rates (default all)

`-e arg`
`--exclude arg`
	Exclude given rates

`-s arg`
`--init-scenario arg`
	List of scenarios to initialize by default

`-d arg`
`--init-date arg`
	List of dates to initialize by default

`-n` `--dont-send`	Inhibit sending of quotes, useful for debugging
`-b` `--batch`	Batch mode, finish immediately after startup
`--interval arg`	Interval in milliseconds to check.
`--source-name arg`	Source name (default MICD)

2.7 reportd

The reportd program generate reports on demand. It is launched by TRMWeb, retrieves the report data, supplies them to TRMWeb and terminates.

Option/Argument	Description

`-l arg`
`--layout arg`
	Report layout

`-t arg`
`--type arg`
	Report type

`-f arg`
`--format arg (=bin)`
	Output format (`bin|xml|xml3|html|txt|csv`)

`-p arg`
`--param arg`
	Report list of report parameters (`-p name1=value1 -p name2=value2` etc.)

2.8 Limit Server

The TRM limit deamon monitors updates of transactions and market information changes. It accepts connections from TRM applications and sends out information about the usage of current limits. The limit servers watch the limits that are set up.

The limit deamon exists in two versions:

- limitd: the CORBA service, which only computes limits and serves data to applications

- sessiond: the distributed limit service, which monitors limits, processes limit violations, and serves data to the end user using persistent connections via the message bus.

2.8.1 Start-up script

On Unix systems, the script `$FK_HOME/etc/rc/rc.limitd -e <environment>` starts the limit daemon for the specified environment.

The limit daemon can be run in a periodic mode in the same way as Treasury Monitor, for example, is run (both Start Date and End Date are used as a selection criteria when starting up the server).

2.8.2 Applying periodic stop/loss limits

The period against which the limit daemon is run is critical in applying periodic stop/loss limits. The Period End Date is currently always the current date. The generation of Period Start Date is made based on three start-up options for the limit daemon described in the following tables:

Option/Argument	Sessiond option	Description
`--use-business-days arg`	-s "use-business-days=arg"	Use business days, affects how period-method operates.
`--start-date-value arg`	-s "start-date-value=arg"	The number of days offset from end-date (start-date = end-date - offset)
`--period-method arg`	-s "period-method=arg"	Specify period method, NUMBER-OF-DAYS, CURRENT-WEEK, or CURRENT-MONTH

- Period Method = `NUMBER-OF-DAYS`

  This method can be used as a default if no `Period Method` has been given and the server is run in a periodic mode.

If `--use-business-days` is set to `No` (Default)	If `NUMBER-OF-DAYS` is used as Period Method and the parameter `--use-business-days` is set to `No`, the preferred length of the period has to be given as the number of days in parameter `--start-date-value`. The Start Date for the limit daemon is then selected as: Current Date - Start Date Value +1 where: "1" in Start Date Value would result in the limit daemon being run with Start Date = End Date (i.e. the current method). If nothing is given in `--Start-date-value`, "1" should be used as default.
If `--use-business-days` is set to `Yes`	If the parameter `--use-business- days` is set to `Yes`, the preferred length of the period has to be given as number of business days in parameter `--start-date-value`. The Start Date for the limit daemon is then selected as: Current Date - Start Date Value +1 where: Start Date Value is interpreted as business days validated against the calendar of the base currency of the Portfolio ID used as a start up criteria for the limit daemon. "1" in Start Date Value would result in the limit daemon being run with Start Date = End Date unless the previous day was a non-banking day. In this case, the Start Date would be selected as one day after the previous business day.

- Period Method = `CURRENT-WEEK`

If `--use-business-days` is set to `No` (Default)	If `CURRENT-WEEK` is used as Period Method and the parameter `--use-business-days` is set to `No`, the Start Date for the limit daemon is selected as: The closest past date for which the number of weekday was the same as the value given in the parameter `--start-date-value` (1-7). End Date is used as Start Date if the number of weekday of End Date (i.e. current date) is the same as the value given in the parameter `--start-date-value`.
If `--use-business-days` is set to `Yes`	If `CURRENT-WEEK` is used as Period Method and the parameter `--use-business-days` is set to `Yes`, the Start Date for the limit daemon is selected by: Adding one day to the last business day preceding the closest past date for which the number of weekday was the same as the value given in the parameter `--start-date-value` (1-7). For example, "1" (referring to Monday) is given as `--start-date-value` and the server is started up on Wednesday. The Start Date is selected by first going back to the previous Monday, then further to last business day preceding Monday (normally Friday) and by adding one day to it (i.e. ending up with Saturday). End Date is used as a preliminary Start Date (i.e. before business day adjustment) if the number of weekday of End Date (i.e. current date) is the same as the value given in the parameter `--start-date-value`. For example, in the previous example, the previous Saturday would be selected as Start Date even when the server was started up on Monday.

- Period Method = `CURRENT-MONTH`

If `--use-business-days` is set to `No` (Default)	If `CURRENT-MONTH` is used as Period Method and the parameter `--use-business-days` is set to `No`, the Start Date for the limit daemon is selected as: The closest past date for which the number of day of month was the same as the value given in the parameter `--start-date-value` (1-31). End Date is used as Start Date if the number of day of month of End Date (i.e. current date) is the same as the value given in the parameter `--start-date-value`.
If `--use-business-days` is set to `Yes`	If `CURRENT-MONTH` is used as Period Method and the parameter `--use-business-days` is set to `Yes`, the Start Date for the limit daemon is selected by: Adding one day to the last business day preceding the closest past date for which the number of day of month was the same as the value given in the parameter `--start-date-value` (1-31). For example, "1" is given as Start Date Value and the server is started up on 10th. The Start Date is selected by first going back to first of month, then further back to the last business day preceding the 1st day and then by adding one day to it. End Date is used as a preliminary Start Date (i.e. before the business day adjustment) if the number of day of month of End Date (i.e. current date) is the same as the value given in the parameter `--start-date-value`.

2.8.3 Setting up the limit daemon

The environment variable `$FK_LIMITD_SETUP` is used to supply options to the `rc.limitd` script. On UNIX, run `$FK_HOME/sbin/limitd --help` to list the available options; on Windows, run `%FK_HOME%\bin\limitd --help`.

The following table outlines some of the typical definitions:

Option/Argument	Description
`--batch limits`	Run only once to compute and log the limits.
`--category-warning-thresholds arg`	To generate a warning message when the threshold level, expressed as a percentage, is reached for the corresponding category. For example, if the categories CREDIT and SETTLEMENT have been specified with the `--limit-categories` parameter, then `--category-warning-threshold 75 80` specifies a threshold of 75% for CREDIT and 80% for SETTLEMENT. (Available categories are shown in the Limit Editor.)
`--contexts arg`	The result contexts to include.
`--end-date arg`	Period end-date, defaults to today.
`--exclude-limit-categories arg`	Do not update specified limit categories.
`--exclude-limits arg`	Do not update specified limits.
`--exclude-limits-match arg`	Do not update limits matching.
`--interval arg`	The update interval in milliseconds.
`--limit-categories arg`	Update only specified limit categories.
`--limits arg`	Update only specified limits.
`--limits-match arg`	Update only limits matching.
`--log-interval arg`	The logging interval in milliseconds.
`--mark-all`	Pass all transactions through no-violation-action even if no limit rule matches.
`--min-log-interval arg`	The minimum logging interval.
`--mode arg`	the valuation mode (default=0).

`--no-violation-action arg`	This start-up parameter can be given the following values and behavior:
	`--no-violation-action 0`
	When a transaction update results in a new limit violation, or an old limit violation worsens, the server calls the transaction action LIMIT VIOLATION that, by default, sets the status LIMIT VIOLATION for the transaction. Any other types of transaction actions can also be configured under the action_id LIMIT VIOLATION.
	`--no-violation-action 1`
	The server behaves the same way as “0.” In addition, the server calls the transaction action LIMIT VIOLATION CLEAR that, by default, clears the LIMIT VIOLATION status when no limits are violated as a result of a transaction update. (In other words, the server automatically clears the previously set LIMIT VIOLATION status when, following a new update, no limits are violated by that transaction anymore.) Any other type of transaction action can also be configured under the action_id LIMIT VIOLATION CLEAR.
	`--no-violation-action 2`
	When value "2" is assigned, the server calls either the LIMIT VIOLATION or NO LIMIT VIOLATION transaction action once for the entire transaction, regardless of the number of limits that might be affected.

Option/Argument	Description
`--only-outstanding`	Include only outstanding transactions.
`--pending-on-value-date`	Pre-Settlement Expression is used when value date = start date.
`--period-method arg`	Period method, NUMBER-OF-DAYS, CURRENT-WEEK, or CURRENT-MONTH. See *2.8.2 Applying periodic stop/loss limits on page 24*.
`--portfolio-id arg`	The top portfolio to start up.
`--realized-end`	Period behavior Realized End.
`--scenario-id arg`	The scenario to use.
`--server-type arg`	Specify server type, either FINAL (default) or SIMULATION
`--service-name arg`	The limit server name in Naming Service. Default is `limit-monitor`.
`--start-by-transaction`	When the limit server starts up, read transactions into limitd by transaction number order, calculate limit utilizations and call limit operations separately for every transaction.
`--start-date-value arg`	The number of days offset from end-date (start-date = end-date - offset). See *2.8.2 Applying periodic stop/loss limits on page 24*.
`--state-context arg`	The state contexts to include.
`--state-id arg`	The initial state to use.
`--use-business-days`	Use business days, affects how period-method operates. See *2.8.2 Applying periodic stop/loss limits on page 24*.
`--use-todays-fx-rate`	Limit daemon command line option `--use-todays-fx-rate` now accepts optional arguments to support the calculation of FX rates using the same methods as in the valuation. • If the option is not used, FX rates are calculated using the FX method 'Spot Rate'. • If the option is used with no arguments or with argument '=1', FX rates are calculated using the FX method 'Today's Rate (Forward points)'. • If the option is used with argument '=2', FX rates are calculated using the FX method 'Today's Rate (IR Difference)'.
`--valuation-method arg`	Valuation method: 0 = Portfolio (default) 1 = Normal 2 = Zero Coupon 3 = Benchmark 4 = Zero Spot
`--var-confidence-level arg`	The Value-at-Risk confidence level to use
`--var-horizon-id arg`	The Value-at-Risk horizon id to use.
`--var-scenario-id arg`	The Value-at-Risk scenario to use

Option/Argument	Description
`--warning-threshold arg`	To generate a warning message when the threshold level n, expressed as a percentage, is reached. This parameter can provide the means for generating a global warning level for all limits.

2.8.3.1 Standard setup

```
$ENV{FK_LIMITD_SETUP} = "
            --contexts 3
            --portfolio-id LIMIT
            --state-id OPEN
            --interval 300000
            --min-log-interval 300000
            --log-interval 3600000
";
```

This limit daemon will recalculate the limits every five minutes for all limits defined for the portfolio tree where the LIMIT is the top portfolio. It will log the usage every 60 minutes.

2.8.3.2 Setup with frozen rates

```
$ENV{FK_LIMITD_SETUP} = "
            --contexts 3
            --portfolio-id LIMIT
            --state-id OPEN
            --interval 300000
            --min-log-interval 300000
            --log-interval 3600000
            --scenario-id FREEZE
";
```

This limit daemon will work just like the previous one, but it will use frozen rather than default rates to calculate the limits.

2.8.4 Checking the limit daemon

The program `lm-status` will show the id’s of the limits for the limit daemon. If limit users are defined the switch `-limit-user <USERNAME>` should be used.

Sample output from `lm-status`:

```
ID                                           Name
----------------------------------------------------------
FX-LIMIT                                   Forex Limit
IR-LIMIT              Limits on Interest Rate products
IR-LIMIT-2      Second Limit on Interest Rate products
VAR LIMIT                                     VaR Limit
```

2.9 activityd

The **activityd** process launches activities as soon as they are submitted from Activity Manager.

Option/Argument	Description

`-n arg`
`--pool-size arg`
	The number of parallel handlers (default from database)

Option/Argument	Description

`-t arg`
`--poll-time arg`
	The maximum time to recheck (default from database)

`-l arg`
`--log-program arg`
	The program to run at the end

`-e arg`
`--external-program arg`
	The program to handle external commands.

`--hostname arg`	The name activityd will use as hostname to filter activity types. Note: To use the `hostname` parameter you need to set the `Check activity host name` parameter to `true` in the configuration table.

2.10 tmd

The Treasury Monitor daemon provides position monitoring on the server and is used by comKIT’s Position service. It can also be be used to take CPU and memory usage from the client machines running Treasury Monitor.

tmd takes the following command line options:

Option/Argument	Description

`-s arg`
`--service-name arg`
	Service name in Naming Service: default is treasury-monitor

`-c arg`
`--tmd-config-file arg`
	XML configuration file

`-p arg`
`--param arg`
	List of xml parameters

To use tmd from Treasury Monitor give it a service name:

```
tmd.exe --tmd-config-file tmpos.xml --service-name tmdtest
```

and set Treasury Monitor to connect to the specified service name:

```
FKTreasuryMonitor.exe --service tmdtest
```

2.10.1 Configuring views and books for Treasury Monitor

To limit CPU and memory usage, run tmd in preconfigured mode by providing a configuration file. You must configure the position and portfolio views you want in the configuration file, create the books based on that configuration, then launch Treasury Monitor to re-use those books. To do this:

1. Open Treasury Monitor from Application Manager with the startup parameters you would like to see.
2. Configure the columns and pages you would like to see in the application.
3. Select **File - Save Position and Pages as XML**. This saves all data to a single XML file.

   If you want to save the position and perhaps a particular page or pages then:

   a. Select **File - Save Position as XML** (this will save the startup parameters), e.g. `tmpos.xml`.

   b. For each Page in TM, select **Page - Save Page as XML**, e.g `tmpage1.xml`, `tmpage2.xml` etc.

   c. In an XML editor, open the above files (the position file as well as the page files).

d. Insert the page information in the position file after the `<position name="tmpos”` line. Here is an example:

```
<?xml version="1.0" encoding="utf-8"?>
<treasury-monitor>
  <position name="tmpos" type="normal" portfolio="TOP TEST">
    <view-configuration name="tmpage1">
      <axis type="x">
        <!-- Horizontal axis grouping definitions. -->
        <!-- Note that the order is important here.-->
        <axis-by-figure>
          <!-- Selected figures and their modes. -->
          <!-- The figures are shown in the order -->
          <!-- in which they appear here.-->
          <key-figure mode="normal" figure="market_value"/>
          <key-figure mode="normal" figure="nominal_amount"/>
          <key-figure mode="normal" figure="amount"/>
          <key-figure mode="normal" figure="result_realized"/>
          <key-figure mode="normal" figure="result_total"/>
          <key-figure mode="normal" figure="result_unrealized"/>
        </axis-by-figure>
      </axis>
      <axis type="y">
        <!-- Vertical axis grouping definitions. -->
        <!-- Note that the order is important here.-->
        <axis-by-currency totals-after="yes"/>
      </axis>
      <selection>
        <!-- No restrictive selection. -->
      </selection>
    </view-configuration>
  <view-configuration name="tmpage2">
    <axis type="x">
      <!-- Horizontal axis grouping definitions. -->
      <!-- Note that the order is important here.-->
      <axis-by-figure>
        <!-- Selected figures and their modes. -->
        <!-- The figures are shown in the order -->
        <!-- in which they appear here.-->
        <key-figure mode="normal" figure="market_value"/>
        <key-figure mode="normal" figure="nominal_amount"/>
      </axis-by-figure>
    </axis>
    <axis type="y">
      <!-- Vertical axis grouping definitions. -->
      <!-- Note that the order is important here.-->
      <axis-by-currency totals-after="yes"/>
    </axis>
    <selection>
      <!-- No restrictive selection. -->
    </selection>
  </view-configuration>
    <date-to date="2004-11-05" behavior="open"/>
    <date-from date="2003-11-05"/>
    <currency id="EUR"/>
    <start-scenario id=""/>
    <end-scenario id=""/>
    <var-scenario id="1"/>
    <minimum-state id="OPEN"/>
    <state-context id="0"/>
  </position>
</treasury-monitor>
```

4. By default, tmd goes to the `$FK_HOME/etc` directory to find this configuration file. If you wish to place it somewhere else, then ensure that `$FK_CONFIG_HOME` is set, and that its value is the path to this configuration file.
5. This XML configuration file must be placed in the `$FK_HOME/etc` folder. Otherwise its location must be explicitly defined as `FK_CONFIG_HOME`.

   Unix:

   ```
   export FK_CONFIG_HOME=/home/user/xml
   ```

   Windows:

   ```
   set FK_CONFIG_HOME=c:\home\user\xml
   ```
6. Start the **tmd** (from shell, from script…)

   ```
   tmd.exe --tmd-config-file tmpos.xml –service-name tmdtest
   ```
7. Start the Treasury Monitor (from shell, from script…) on Windows

   ```
   FKTreasuryMonitor.exe --service tmdtest
   ```
8. Select the position in the Position startup parameter (tmpos), and click **OK**.
9. Select **Page - New Grid Page**. Check that you can select the pages that you saved in the XML Page files mentioned above. Click OK, and open the next Page, and so on.

   From this point, you can rename the pages to something more meaningful, and then select **Save Book As...**

2.11 Configuring Monitor page templates

The Monitor page template is a file that contains preconfigured axis information for use as a starting point in creating a new Monitor page. The Monitor application comes with a number of page templates, each of which contains a different selection of axes (or same axes set up differently).

A Monitor configuration file contains information about the page templates available for a particular mode of operation. Currently there are two configuration files, RM.XML and CM.XML, that correspond to the two supported modes of operation (Rate Monitor and Calibration Monitor). The toolbar button configuration is defined in external page template files (*.page) and cannot be modified from Rate Monitor.

Monitor application must be launched with an appropriate configuration file specified on the command line using the -c switch. The application uses page template information found in the configuration file to build a hierarchical menu, allowing users to create a new page based on a certain template simply by clicking on the appropriate menu item.

2.12 Deal mirroring module (DMM)

Deal mirroring is provided by the Mirror Loop real-time process, which uses comKIT to access TRM.

You can set DMM related variables including user name and password, and location of logs in this script: `%FK_HOME%\share\environments\mirror_config.bat` (Windows) or `$FK_HOME/share/environments/mirror_config.sh` (Unix).

Hint: Under Unix, instead of keeping the password in the `mirror_config.sh` file, you can have the password written into shared memory. See *C.1.1 TRM Server Passwords* on page 245 which describes how do this. DMM first checks the value of the environment variable `DMM_SERVER_PASSWORD` and if it finds nothing, it tries to read it from shared memory.

The configuration file is evaluated under Unix by running the `eval` command.

Under Windows, before launching DMM, open an evaluated shell and enter:

```
set DMM_CONFIG=%FK_HOME%\share\environments\mirror_config.bat
```

Deal mirroring can be launched by `%FK_HOME%\mirror_loop.bat` (process under Windows) or `$FK_HOME/bin/rc.mirror` (Unix). Otherwise, see the section on Process Monitor in the *WSS System Administration Guide*.

Chapter 3 Interfaces with other tools

3.1 Bloomberg Interface

The Bloomberg interface consists of several activities. You can import and update instruments, import corporate actions, update information in the Client Editor, or request new prices based on information sent by Bloomberg. Each item is implemented by a dedicated activity which is described in the *TRM User Guide*. Technical communication is the same for all of these activities. First, the request is created, then it is sent via FTP communication to the Bloomberg site, the response file is retrieved after a preset interval, and obtained data are processed based on their nature in the Wallstreet Suite structures, instruments, clients or prices.

3.1.1 Environment variables

The following environment variables affect the behavior of all Bloomberg activities:

Name	Comment	Default
FK_BLOOMBERG_FTP_REMOTE_DIR	This environment variable should point to the directory where the request and reply files should be stored, otherwise the default will be /tmp.	`/tmp`
FK_BLOOMBERG_FTP_HOST	IP address of the primary FTP server, delivered by Bloomberg.	bfmdr.bloomberg.com
FK_BLOOMBERG_FTP_SEC_HOST	IP address of the secondary FTP server, delivered by Bloomberg.	
FK_BLOOMBERG_FTP_USER	Login ID (user ID) for the Bloomberg FTP server, delivered by Bloomberg.	
FK_BLOOMBERG_FTP_PASS	Login Password (user Password) for the Bloomberg FTP server, delivered by Bloomberg.	
FK_BLOOMBERG_FTP_DES_PASS	Password that is used to decrypt the incoming file from Bloomberg. The encryption/decryption method used is DES.	
FK_BLOOMBERG_FTP_TRIES	Maximum number of attempts to download the response file.	10
FK_BLOOMBERG_FTP_POLL_TIME	Specifies the number of seconds in total to wait for the reply file to appear on the FTP server.	15
FK_BLOOMBERG_FTP_SERIALNUMBER	Serial number setup, delivered by Bloomberg.	
FK_BLOOMBERG_FTP_USERNUMBER	User number setup, delivered by Bloomberg.	
FK_BLOOMBERG_FTP_WORKSTATION	Workstation setup, delivered by Bloomberg.	
FK_BLOOMBERG_FTP_LOCAL_DIR	Local directory used for FTP communication - generated request files are stored here.	TS_ENV_HOME/var/tmp/
FK_BLOOMBERG_FTP_SCRIPT	Shell script that will take care of FTP communication with Bloomberg instead of the built-in implementation.	

Name	Comment	Default
FK_BLOOMBERG_REQUEST_SYSTEM	Specifies how request files are processed. Possible values: FTP or DATA. DATA should be used only if the request files will be communicated as Send File via the BLOOMBERG PROFESSIONAL service.	
FK_BLOOMBERG_COMPRESS	Specifies whether the request file should be compressed. Possible values: YES or NO.	
FK_BLOOMBERG_ENCRYPTION_UTILITY	Utility to be used to encrypt and decrypt request and response files. Possible values: OPENSSL and DES. OPENSSL means that the openssl utility delivered with WSS is used. If DES is used, then it is necessary to specify a path to the DES utility provided.	
FK_MDI_BLOOMBERG_PROVIDER_NAME	Name of the provider.	
FK_MDI_FILE_IMPORT_DIR	Directory where the output files for the Data License Output Processing activity are searched.	TS_ENV_HOME/var/import/
FK_MDI_FILE_ARCHIVE	Archive response files if successfully processed.	true
FK_MDI_FILE_ARCHIVE_DIR	Dir where response files are archived.	TS_ENV_HOME/var/archive/
FK_MDI_FILE_ARCHIVE_DIR	Pattern used to search file in FK_MDI_FILE_IMPORT_DIR	'*.*'
FK_MDI_CHECK_INSTRUMENT_EXISTS	Specifies whether duplicity instruments can be created. Possible values: True, False If set to true, then before each import of a specific security (for example ISIN) a check is made to establish whether an instrument with the same security ID already exists. If yes, an error is reported and the security is skipped. If set to false, no validation of whether the security id exists is performed and the security is always imported. If the name that should be used for the new instrument already exists, then the counter is added at the end.	
FK_MDI_UPDATE_CLIENT_TO_STATE	The maximum state to which the client will be accepted after an update (valid only if SDM is installed) Example: The client is in state FINAL before update. If the value of the property is FINAL, the client is accepted to state FINAL. If the value of the property is VERIFY, the client is accepted only to state VERIFY.	FINAL
FK_MDI_SCRIPT_PACKAGE	The default package to be used when searching for the scripts. The package should contain the following subdirectories: • field_mapping • entity • mapped_value	
FK_MDI_SCRIPT_DIR	The location of the scripts root if it is different from the default location.	tasks.instrument.imp.script

3.1.2 CSD possibility

You can adjust the behavior of the majority of Bloomberg actions according to your specific needs. You can attach specific python scripts at various points (i.e. when inserting new instruments or updating individual entities) to implement any necessary changes.

You need to store this python script as a python module with the extension .py in the folder `FK_MDI_SCRIPT_DIR/ FK_MDI_SCRIPT_PACKAGE/entity`. Then, the name of this script (without the .py extension) is attached to the appropriate Request or Mapping Rule Editor. Pre-save scripts are executed before the entity is saved; Post-save scripts are executed after the entity is saved.

3.1.2.1 Entity script

You need to store the python entity script as a python module with the .py extension in the folder `FK_MDI_SCRIPT_DIR/ FK_MDI_SCRIPT_PACKAGE/entity`. Then, the name of this script (without the .py extension) is attached to the appropriate Request Editor (Instrument, Security, Corporate Action or Client). Pre-save scripts are executed before the entity is saved; Post-save scripts are executed after the entity is saved.

This script adjusts the entity that is supplied as the starting parameter. The 'process' function then returns the modified entity, which will be used in further processing.

The following provides an example of the script that is used to adjust the name of the Client entity.

```
def process(entity, providerData):

    """

        This is a sample script to show how the entity (mapping for Client in this
        case) can be processed and updated

    """

    entity.setFieldValue('name', providerData['LONG_COMP_NAME'] + '__' +
    providerData['ID_BB_COMPANY'])

    return entity
```

The following provides an example of the script that is used to adjust the id of the Instrument entity.

```
import re

def process(entity, providerData):

    """

        use pattern ${COUNTRY}G${MATURITY}_${CPN}

        but take only YYYYMM of MATURITY and remove trailing zeros from coupon rate

    """

    newID = providerData['COUNTRY'] + 'G'

    # take only year and month from maturity date

    newID = newID +  providerData['MATURITY'][:-2]

    # remove trailing zeros from coupon rate

    newID = newID + '_' + re.sub('\.{0,1}0*$','',providerData['CPN'])

    entity.setFieldValue('id',newID)

    return entity
```

3.1.2.2 Value Mapping Editor script

You need to store the python script that is used in the Value Mapping Editor as a python module with the .py extension in the folder `FK_MDI_SCRIPT_DIR/ FK_MDI_SCRIPT_PACKAGE/ mapped_value`. Then, the name of this script (without the .py extension) will be populated in the **Script** field in the Value Mapping Editor.

This script will adjust the value in the **Destination** field. This value is copied to the sourceValue parameter. The ’process’ function will then return the modified value of the **Destination** field, which will then be used in further processing.

Note: In general, all values from the 'process' function can be returned as strings except the 'date' fields. These fields should be returned after conversion by the DateTranslator.

3.1.2.3 Security Mapping Set Editor

You need to store the python script used in the Security Mapping Set Editor as a python module with the .py extension in the folder `FK_MDI_SCRIPT_DIR/ FK_MDI_SCRIPT_PACKAGE/ field_mapping`. Then, the name of this script (without the .py extension) will be populated in the **Script** field in the Security Mapping Set Editor.

This script will adjust the value in the **Provider Field**. This value is copied to the sourceValue parameter. The process function will then return the modified value, which will be used in further processing and inserted in the defined field in the Instrument Editor.

Please note, that **Script** in this editor has a higher priority than **Value Mapping**, and only **Script** will be used if **Script** is populated. This means that **Script** in the Value Mapping Editor will not be used if **Script** is populated in the Security Mapping Editor.

Note: In general, all values from the 'process' function can be returned as strings except the 'date' fields. These fields should be returned after conversion by the DateTranslator.

The following provides an example of the script that is used to add a defined number of days to the maturity date.

```
from tasks.instrument.imp.datatype import DateTranslator

import datetime

def process(sourceValue, localParsedEntity, localMapping):

    year =  int(localParsedEntity['FUT_LAST_TRADE_DT'][0:4])

    month =  int(localParsedEntity['FUT_LAST_TRADE_DT'][4:6])

    days = int(localParsedEntity['FUT_LAST_TRADE_DT'][6:8])

    print year, month, days

    FUT_LAST_TRADE_DT = datetime.date(year, month, days)

    print FUT_LAST_TRADE_DT

    print localParsedEntity['DAYS_TDY_TO_NOTNL_MTY']

    print int(localParsedEntity['DAYS_TDY_TO_NOTNL_MTY'])

    DAYS_TDY_TO_NOTNL_MTY =
    datetime.timedelta(int(localParsedEntity['DAYS_TDY_TO_NOTNL_MTY']))

    print DAYS_TDY_TO_NOTNL_MTY

    t = FUT_LAST_TRADE_DT + DAYS_TDY_TO_NOTNL_MTY
```

```
print t

maturity_date_1 = t.strftime("%Y%m%d")

return  DateTranslator().translate(maturity_date_1)
```

Note: In general, all values from the 'process' function can be returned as strings except the 'date' fields. These fields should be returned after conversion by the DateTranslator.

3.1.3 Data License Prices activity process

The following steps are performed during the Data License Prices activity process:

1. According to the query parameters in the activity, the appropriate Market Info definitions are searched and a list of required quotations (represented by a unique identification item) is evaluated.
2. A request for the file (in format `bb-date-numberX.req`) is generated and stored in the specified folder `FK_BLOOMBERG_FTP_REMOTE_DIR`. If the value of the variable is not specified, the request file will be stored in the `tmp` folder in the root directory (`/tmp` on UNIX, drive`:\tmp` on Windows where the drive is the drive letter of the Wallstreet Suite installation).
3. A connection to the Data License FTP server is established based on the activity's connection parameters.
4. The activity waits for a reply file (in format `bb-date-numberX.out`) from Data License, to be stored in `FK_BLOOMBERG_FTP_REMOTE_DIR`.
5. The reply file is decrypted and unzipped.
6. For every quotation (represented by a unique identification item), the market info definition valid for the date in question (either the current date or the historical rate, based on the transaction parameters) is searched.
7. The price message containing all the necessary data such as price, scenario, and subscenario is created. Typically, a price message consists of:

type_id	Type of instrument, for example IR-RATE, FX-RATE as defined in the MarketInfoSource table.
period_id	Price periods, as defined in the MarketInfoSource table.
period_1_id	
period_2_id	
source	Source name, as defined in the MarketInfoSource table.
scenario	Specified in the activity parameters or Market Info.
subscenario	Specified in the activity parameters or Market Info.

8. The price is stored in the database by calling the `PushMarketInfo` stored procedure.
9. The price is propagated to the message delivery system by marking the price as pending using the `PushPendingPrice` stored procedure.

3.1.4 Two step activity processing

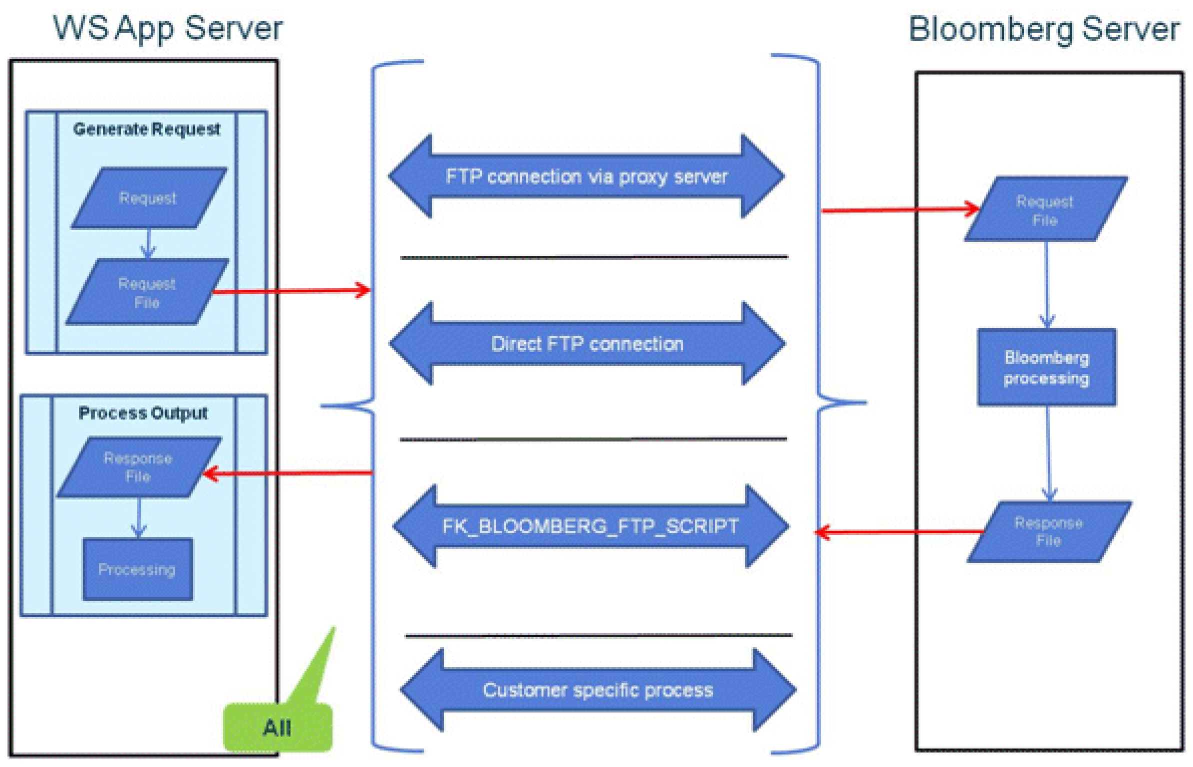
Bloomberg activities can be run either in one go, when the whole interface process is complete (request generation, FTP communication and output processing), or you can split the process into two executions:

1. Request generation
2. Output processing

FTP processing is defined by user specific needs in a dedicated custom script. FTP communication can be done asynchronously. This approach should be used in cases where there are security limitations and direct FTP communication from the Wallstreet Suite servers is not allowed.

Both ways (all in one go and or two separate executions) are managed by the Bloomberg activities Processing Type parameter. You need to select one of the following values:

- All,
- Generate Request, or
- Process Output.



3.2 Reuters Dealing 3000 Link

3.2.1 Overview

The Dealing 3000 Link is used to convey foreign exchange and money market deals from the Reuters Dealing 3000 system and its ticket output feed to TRM.

The link is run as a background process and is transparent to the user. It consists of a communications module and a data conversion and storage module.

- The communications module monitors the Dealing 3000 port and when new deals become available it requests the deal details and passes them on to the data conversion and storage module.
- The data conversion and storage module maps the Dealing 3000 deal details into TRM transaction fields and stores the transactions into the database.

Transaction details that are required by TRM but cannot be extracted from Dealing 3000 output can be defined in a special configuration file. Such transaction details are for example the portfolio and initial state of the transaction.

All deal conversions, errors and other events in either module are logged in a file.

3.2.2 Scripts

The executable Python scripts are `config.py`, `D3000.py` and `CreateTransactions.py` (which is called by `D3000.py`).

1. Configure `config.py`
2. Evaluate your environment (this requires access to FK.Cache and Corba)
3. Use a command like the following:

   ```
   python D3000.py > D3000.log 2>&1
   ```

3.2.3 Log file

Debug mode is enabled by default. All the received data from D3000 server is by default saved in `.\D3000Response.dat` with datetime. The debug is verbose, so the file size should be monitored.

By default, the interface ignores real-time messages and polls the server every 30 seconds.

3.2.4 Implementation

D3000.py can be used standalone for testing purposes. Just comment out the `transaction_maker` call in `_processDeal`, line 297. If configured, it saves the received data into a file which can be used with CreateTransactions standalone. `CreateTransactions.py` can also be called standalone with a file as parameter. This file will be read line by line to create transactions.

If the feed still needs to be serial, the old read-feed perl version can be used with `CreateTransactions.py`. but the python main script needs to be adapted slightly to read from STDIN instead of a file.

In addition, in Client Editor, a property `DEALING-3000-ID` should be defined for all Dealing 3000 counterparts. This property is the Dealing 3000 tcid.

3.3 Value-at-Risk Interface

This section describes how to install the Value-at-Risk (VaR) data in TRM via the VaR interface.

The aim of the VaR interface is to update the TRM database with the volatility and correlation data from RiskMetrics for the currencies, yield curves and equities defined in the system. These variables are used in VaR analysis within Treasury Monitor and also in performance calculations and risk reports.

3.3.1 Default VaR scenario

The default VaR scenario is created at the first installation of TRM. VaR configuration is part of the standard build procedure. The default VaR scenario does not have any mapping or data set associated at initiation, and is the default scenario used by the import scripts.

3.3.2 VaR Mapping Types

The standard configuration has two mapping types, GOVT and SWAP. These are in the table `VaRMappingType`, where they can be modified and new types added.

3.3.3 Default mapping

A default mapping between TRM data (currencies and interest rates) and the corresponding RiskMetrics variables is built automatically. You may need to make some changes to this default mapping. To view or edit the default mapping, open VaR Mapping Editor and choose mapping RISKMETRICS.

The following changes may be required:

1. TRM currencies are mapped to their RiskMetrics counterparts. Not all TRM currencies are provided by RiskMetrics.
2. All TRM yield curves are mapped to the corresponding RiskMetrics swap curves. Re-mapping TRM yield curves to different RiskMetrics curves (for example zero-coupon GBond curves may need to be mapped to the RiskMetrics equivalent) must be carried out manually. For more information on using different RiskMetrics IR mappings, see the *TRM User Guide*.

3.3.4 Importing RiskMetrics data to TRM

The RiskMetrics Group publishes their data on the Web (and ftp) in the form of compressed files (zip or tar) for both the UNIX and Windows environments. The RiskMetrics data files for correlation and volatility are as follows:

RiskMetrics Data Files	Description
<date>.dvf <date>.dcf	Volatility data for 1 day horizon Correlation data for 1 day horizon
<date>.mvf <date>.mcf	Volatility data for 30 day horizon Correlation data for 30 day horizon

More information about these data sets is in the RiskMetrics *Technical Document*, available from the RiskMetrics Web site http://www.riskmetrics.com.

3.3.4.1 Fetching the risk files

There are two ways of getting the risk files:

- From their Web site, http://www.riskmetrics.com: Choose regular risk files, monthly and daily, and copy them to the directory `$FK_HOME/com/risk-metrics`
- From their FTP site. TRM provides a script to get the files from their ftp site:

```
$FK_HOME/share/risk-metrics/fetch-from-riskmetrics
```

Note: Getting the risk files is a step that can be run automatically by the import script. See below for additional details.

3.3.4.2 Running the import script

The program $FK_HOME/share/risk-metrics/import-from-riskmetrics is the main tool to import RiskMetrics data in TRM. It first fetches data from the RiskMetrics FTP site, evaluates the TRM environment and then imports the volatility and correlation data in the corresponding VaR scenario (by default, the default VaR scenario).

The following options are recognized by the program:

Option	Description
-h <directory>	TRM home directory
-i, I, e, f <>	Usual TRM environment arguments
-s	Skips fetching of data via FTP

Option	Description
-u,p,l,d <>	Arguments for connection to FTP site (see below)
-y	Imports yield volatility for IR market (default is price volatility for all market data)
-U <user>	Database login
-P <passwd>	Database password
-c <scenario>	Scenario name
-z <type>	Data file type: • ""tarZ" : use RMD.tar.Z and RMM.tar.Z • ""zip" : uses RMD.zip and RMM.zip • "If -z is not used, then it imports from *.dvf, *.dcf, *.mvf, and *.mcf.
-r	Removes all data files after the import process
-v	Verbose

Examples:

Importing data (from RMM.zip and RMD.zip) in the default VaR scenario:

```
$FK_HOME/share/risk-metrics/import-from-riskmetrics -h /usr/wss/v7 -e fk7_1_env
-s -v -z zip
```

Importing data (from <date>.dvf, etc…) in the default VaR scenario:

```
$FK_HOME/share/risk-metrics/import-from-riskmetrics -h /usr/wss/v7 -e dev1 -s -v
```

Importing data (from RMM.tar.Z and RMD.tar.Z) in a user specific scenario:

```
$FK_HOME/share/risk-metrics/import-from-riskmetrics -h /usr/wss/v7 -e dev1 -s -v
-U user -P passwd -c "TEST SCENARIO" -z tarZ
```

Notes:

- The import of RiskMetrics data in TRM is a lengthy process: about 20-30 minutes for a typical data set (volatility and correlation, 1-day and 1-month horizon).
- Once ran, check that the correlation and volatility date exist in VaR Data Board.

3.3.5 Importing FEA data to TRM

The FEA (Financial Engineering associates) http://www.fea.com/ publishes data on the Web in the form of compressed files (zip or tar) for both UNIX and Windows environments.

Program 'import-from-fea' is the main tool to import FEA data in TRM. It expects data to be present either as *.zip or *.txt, and then imports the data in TRM. The program takes the following arguments:

Option	Description
-h <directory>	TRM home directory
-i,I,e,f <>	Usual TRM environment arguments
-y	imports yield volatility (default is price vol.)
-U <user>	Database login
-P <passwd>	Database password
-c <scenario>	Scenario name
-z <type>	Datafile type ("zip"). If -z is not used then it imports from *.txt

Option	Description
-r	removes all data files after import process
-R	removes data files and compressed file after import process
-m	only import data for which a mapping exists in given scenario
-v	Verbose

Examples:

Importing data from text file in the default scenario:

```
$FK_HOME/share/risk-metrics/import-from-fea -h /usr/wss/v7 -e test -r -y -v
```

Importing data from a zip file in a user specific scenario:

```
$FK_HOME/share/risk-metrics/import-from-fea -h /usr/wss/v7 -e test -r -y -v -c "TEST
SCENARIO"
```

3.3.6 VaR horizon

To set up a horizon other than the default horizons (1 day and 1 month), use the procedure *CommitVaRHorizon*. For example, to set up a horizon of 10 days which interpolates between 1 and 30 days, run:

```
CommitVaRHorizon @id = 10,
@scenario_id=1,
@id_1 = 1,
@id_2 = 30,
@name = "10 Day VaR Horizon"
```

3.3.7 Other scripts

The scripts described in this section are mainly for illustration purposes. They should not be run if the main import script was run:

```
   $FK_HOME/share/risk-metrics/import-from-riskmetrics.
```

These scripts are actually called by the main import script.

3.3.7.1 Fetching RM data via FTP

The program `$FK_HOME/share/risk-metrics/fetch-from-riskmetrics` fetches the RiskMetrics data via FTP. The arguments of this program are as follows:

Option	Description
-h <site>	FTP site (ftp.riskmetrics.com by default)
-u <user>	FTP site user login
-p <passwd>	FTP site user password
-l <directory>	Remote directory on FTP site
-a	Passive mode
-d	Debug mode
-v	Verbose
<filename1><filename2>	List of files to fetch

Example:

```
$FK_HOME/share/risk-metrics/fetch-from-riskmetrics -h datomatic.com -u trema -p
pass12 RMD.zip RMM.zip
```

3.3.7.2 Importing volatility and correlations routine

The programs `$FK_HOME/share/risk-metrics/import-volatilities` and `$FK_HOME/share/risk-metrics/import-correlation` are used by the main import script. These programs can be run separately and both programs have the following arguments:

Option	Description
-u <user>	Owner of scenario
-h <horizon>	The time horizon, '1' for the daily data and '30' for the monthly data.
-y	Imports daily volatility (price vol by default)
-d <date>	Date, if different from what is in the file.
-s <scenario>	Scenario ID.
-r	Fetches data for mapped variables only.
-v	Gives some feedback of the process.
<filename>	RiskMetrics data file to import.

The data is read from the files in command line, or from the standard input.

Note: If no scenario is specified, data are imported in the default VaR scenario. When a scenario is specified, only the owner of the scenario can import data.

Examples:

Importing 1-day volatility data in default VaR scenario:

```
$FK_HOME/share/risk-metrics/import-volatilities -h 1 -v 20011231.dvf
```

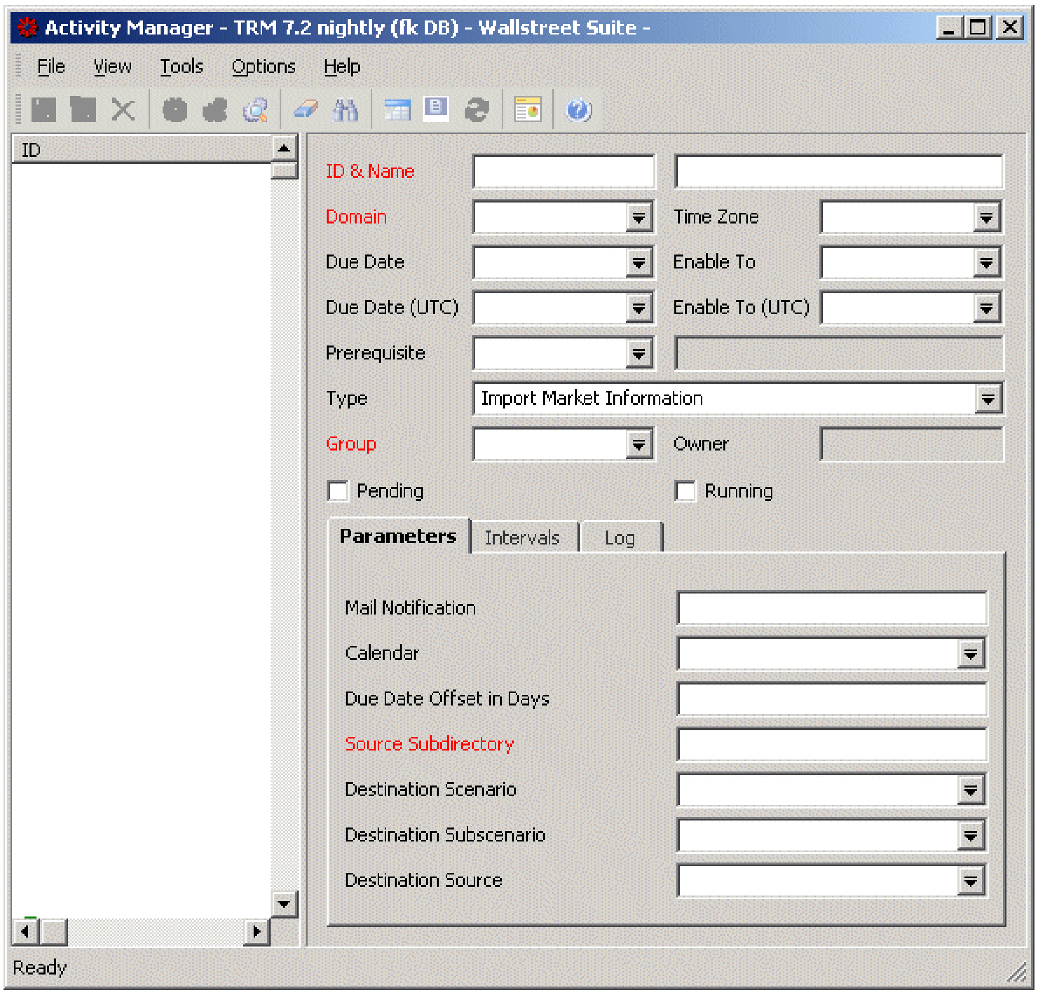
Importing 1-month volatility data (yield volatility) in user "trema" specific VaR scenario, "TEST SCENARIO":

```
$FK_HOME/share/risk-metrics/import-volatilities -u trema -y -h 30 -s "TEST
SCENARIO" -v 20011231.mvf
```

3.4 Prices import - Import Market Information Activity

The TRM activity Import Market Information allows you to import rates from generic CSV files. This section describes how to set it up.

You access the Import Market Information activity from the Activity Manager application (from TRM Application Manager) as shown below:


Activity Manager - TRM 7.2 nightly (fk DB) - Wallstreet Suite -
File
View
Tools
Options
Help
ID
Parameters
Intervals
Log
Ready

ID & Name			
Domain		Time Zone	
Due Date		Enable To	
Due Date (UTC)		Enable To (UTC)	
Prerequisite			
Type	Import Market Information		
Group		Owner	
Pending	☐	Running	☐

Mail Notification	
Calendar	
Due Date Offset in Days	
Source Subdirectory	
Destination Scenario	
Destination Subscenario	
Destination Source	

The fields are explained in the *TRM User Guide* (search on Activity Parameters).

3.4.1 Import process

Consists of:

1. Identifying the list of files to be imported
2. Validating the files
3. Parsing the files.

3.4.1.1 Import files list

The list of import files is based on the contents of the **Source Subdirectory** field and the environment variables `FK_IMPORT_PRICES_DIR` and `FK_IMPORT_PRICES_PATTERN`. The final path is constructed as follows:

`[FK_IMPORT_PRICES_DIR]` **Source Subdirectory** `[FK_IMPORT_PRICES_PATTERN]`

If the **Source Subdirectory** field contains the full path from the root, then `FK_IMPORT_PRICES_DIR` is ignored.

If the path ends with name of a file (with or without wildcards), then `FK_IMPORT_PRICES_PATTERN` is ignored.

Examples

`V:\WSS\var\import\prices\examples` contains three files: `a.csv`, `aa.csv`, and `b.csv`.

```
FK_IMPORT_PRICES_DIR=V:\ WSS\var\import\prices

FK_IMPORT_PRICES_PATTERN=*
```

If Source Subdirectory=	then files processed are:
`V:\ WSS\var\import\prices\examples\a.csv`	`a.csv`

`examples`	`a.csv`
	`aa.csv`
	`b.csv`

`examples\`	`a.csv`
	`aa.csv`
	`b.csv`

`examples\a*`	`a.csv` `aa.csv`

3.4.1.2 Validating the files

Before the files are parsed, they are first validated. If errors are found then the activity fails.

3.4.1.3 Parsing the files

The following steps are performed during the import prices process:

1. All scenarios and subscenarios are fetched in order to provide a means of translating names into system ids.
2. Before parsing every file, processes are verified if the `FK_IMPORT_PRICES_VERIFY_PROCESSES` environment variable is set (see *3.4.2 Environment variables* on page 46.
3. For each price (equivalent to a line in an input file):
   a. If any Market Info is cached for the specified name_id and date, then MarketInfos are loaded using **FetchMarketInfoData** for the specified date and name_id.
   b. If Market Info is not found, then possible reasons are searched and logged, using the stored procedure **FetchMarketInfoDetail**.
   c. Enrich the price with data from previously loaded MarketInfos:

      period_id, period_1_id, and period_2_id

      name_id, and type_id (e.g. EUR/USD, FX-RATE resp.)

      price type

      scenario_id, subscenario_id

   d. Enrich the price with the **Scenario**/**Subscenario** specified in the Activity parameters, if supplied.
   e. Set the period from/to, if not provided in the input file, to the date of the price.
   f. A CSD hook can be called to modify the price before storing it to database. See *3.4.5 CSD possibilities* on page 48.
   g. Store the price by calling **PushMarketInfo**.
   h. Mark the price as pending using **PushPendingPrice**.
4. Verify that none of the processes has been restarted meanwhile; if so, the activity fails.

5. Call CSD hooks if required.
6. File is archived, based on environment settings (see `FK_IMPORT_PRICES_ARCHIVE` below). Archiving moves the file to a subfolder with the name `batch_<activity_batch id>` and renames the file to `<start_date>_<existing_filename>`.

3.4.2 Environment variables

The following environment variables affect the behavior of the Import Market Information activity.

- `FK_IMPORT_PRICES_VERIFY_PROCESSES`

  Certain processes must be running during the import to ensure that the derived prices are automatically recomputed. The required processes are: mdsd, transd, and micd. The verification logic uses the `mdsd.get_status()` service to obtain a list of processes connected to the mdsd bus. If any of the mentioned processes is not connected to mdsd, the activity fails. Note that by default, the `FK_IMPORT_PRICES_VERIFY_PROCESSES` variable is set to `verify`.

  Default: `verify`

- `FK_IMPORT_PRICES_DIR`

  Defines the path to the root directory for source directory where import prices files are located.

  Default: `%FK_VAR_DIR%\import\prices`

- `FK_IMPORT_PRICES_BATCH_SIZE`

  The number of records (batch size) to be processed before the import price activity is suspended for a time interval equal to `FK_IMPORT_PRICES_SLEEP_MSECS`. Both values must be non-zero for the suspend mechanism to work. This helps to avoid overloading the mdsd and micd processes with huge amounts of direct and derived prices.

  Default: `0`

- `FK_IMPORT_PRICES_SLEEP_MSECS`

  Price import is suspended for a time interval in milliseconds after a certain number of records (batch size) specified in `FK_IMPORT_PRICES_BATCH_SIZE`. Both values must be non-zero for the suspend mechanism to work. This helps to avoid overloading the mdsd and micd processes with huge amounts of direct and derived prices.

  Default: `0`

- `FK_IMPORT_PRICES_PATTERN`

  Defines which import files are processed, unless overridden by the contents of the **Source Subdirectory** field. See *3.4.1 Import process* on page 44.

  Default: `*.*`

- `FK_IMPORT_PRICES_ARCHIVE`

  The import file is archived in a subdirectory after processing, and is deleted from the import directory. If `FK_IMPORT_PRICES_ARCHIVE` is not set, then archiving does not happen, and the import file is left in the source directory.

  Default: `True`

- `FK_IMPORT_PRICES_ALLOW_ERROR _LINES`

  'False' means that if there is an invalid datasource, no bid/ask quote, or no date of quote specified on the particular line in the csv file, a message with severity ERROR will be logged, and the file will not be archived.

  'True' means that in the case of an invalid datasource, no bid/ask quote, or no date of quote specified, only WARNING messages are logged and the file is archived as processed. A message with severity ERROR is logged and the file is not archived only in the case of 'technical' issues such as missing permissions, no connection/access to the database and other non-source data related issues that prevent saving the data to the database.

Default: False

3.4.3 Format of the import file

The format of each file in the import directory must conform to the CSV specification: the first line of the file must contain names of the properties and the remaining lines must contain the data. There are two types of properties that can be specified:

- Query properties
- Price data properties

3.4.3.1 Query properties

These are used to identify the Market Info record - the values are used to search for the appropriate MarketInfo record. One of `item` or `name_id` (or both) must be specified; other values are optional. Each row in the import file must uniquely identify exactly one record in `MarketInfo` table.

`item`	Identifier of the Market Info record. Mandatory if `name_id` is not provided.
`name_id`	Name of the instrument, currency pair, etc. Mandatory if `item` is not provided.
`type_id`	Type of instrument, for example IR-RATE, FX-RATE.
`period_id`, `period_1_id`, `period_2_id`	Price periods
`source`	Source name, as defined in the `MarketInfoSource` table, e.g. `FILE`, `ECB`, `REUTERS`.
`date`	The date (in MMDDYYYY format) to which the price applies.

3.4.3.2 Price data properties

These are the price details which would be stored in the database:

date	The date (in MMDDYYYY format) to which the price applies.
period_from, period_to	The date period (in MMDDYYYY format) to which the price applies.
price_1 … price_10	Price data.
bid (ask) …	Synonym for price_1 (price_2 etc.).

Note: All query properties must be properly filled. For example, empty columns are not ignored, but MarketInfo is searched for condition "column"="", which can then cause activity failure, because no MarketInfo record is found.

3.4.3.3 Example imports

Using Item:

Item	Source	Date	Bid	Ask
SAMPLE-BOND-GOVT-CA	FILE	01012000	20	21
USD1YD=	REUTERS	12312005	4.7	4.8
EURON=	REUTERS	11012008	0.8	0.9

Using name_id

Type_id	Name_id	Period _id	Source	Date	Bid	Ask
UM-PRICE	SAMPLE-BOND-GOVT-CA	SPOT	FILE	01012000	20	21
IR-RATE	USD-DEPO/SWAP	SPOT	REUTERS	12312005	4.7	4.8
FX-RATE	EUR/USD	O/N	REUTERS	11012008	0.8	0.9

Using unsupported format of FILE

Type_id	Name_id	Period _id	Item	Source	Date	Bid	Ask
UM-PRICE	SAMPLE-BOND-GOVT-CA	SPOT		FILE	01012000	20	21
IR-RATE	USD-DEPO/SWAP	SPOT			12312005	4.7	4.8
FX-RATE	EUR/USD	O/N			11012008	0.8	0.9

The special source `FILE` is used for identifying Market Info definitions created for import via activity. They can differ - for instance by scenario - from standard Market Info definition for source REUTERS. If there are multiple definitions of Market Info for the same price that differs by source, then it is necessary to distinguish between them using FILE, otherwise the activity could find two valid Market Info definitions and it would fail.

3.4.4 Permissions

The process verifies permissions for the user that scheduled the activity. The permission checked is for `object=UpdatePrices` and the permission verified is defined in the scenario or subscenario relevant to the activity (Scenario Editor, **Permission** field).

3.4.5 CSD possibilities

Some CSD hooks exist in order to allow modification of prices prior to calling `PushMarketInfo`, verification of processes, imported prices etc. All CSD hooks are located in `csd.py`. If an exception is thrown, the importing process is terminated and the activity fails.

CSD Class

Name	Comment
`__init__`	One instance of this class is created at the beginning of import. CSD logic can be implemented in either the constructor (initialization) or in the methods.
`preprocessPrice`	Called for every price after the price has been enriched by market info data. Price can be liberally modified in this hook.
`postprocessPricess`	Called at the end of importing of one file, after all prices has been successfully imported.
`verifyProcesses`	This function should return `True`, if processes (micd, mdsd, transd) should be verified (`FK_IMPORT_PRICES_VERIFY_PROCESSES` is set). If processes should not be verified (environment variable `FK_IMPORT_PRICES_VERIFY_PROCESSES` not set), it returns `True` without checking the processes. Business logic can be liberally changed here.

Name	**Comment**
`verifyProcessesBeforeImport`	Called at the beginning of processing before any file is read. The provided dictionary contains keys: transd, micd. The value under the key contains result of the `mdsd.get_status()` call, that is, info usually obtainable using the `md-status` utility, or `None` if no such process is running. The return value should be of type boolean: • Returning `True` means the processes are fine and default verification should be omitted. • Returning `False` (default) means default verification should take place. Throw whatever exception to terminate the process and fail the activity if the verification fails.
`verifyProcessesAfterImport`	Called at the end of processing after all files have been imported. The provided dictionary contains keys: transd, micd. The value under the key contains result of the `mdsd.get_status()` call, that is, info usually obtainable using the `md-status` utility, or `None` if no such process is running. The return value should be of type boolean: • Returning `True` means the processes are fine and default verification should be omitted. • Returning `False` (default) means default verification should take place.

3.4.6 Validation of Imported Prices

In a market datastream like the Reuters interface, prices are updated continuously, which means should a price be discarded for some reason, it is not critical since an update will soon be received.

In the price import activity, typically a price is only imported once it is critical that a price discard is reported. The procedure `FetchMarketInfoDetail` is used to acquire additional information when:

- There is no market information found for the `name_id` or `item` provided.
- There is market information found for `name_id` or `item` but other fields in the imported line do not match.

The activity then displays each candidate with the following additional information:

- Disabled Market Info
- Inactive Market Info
- Inactive Instrument Quote
- Inactive Currency Journal.

Also, the currently processed price and the import file line, along with the corresponding line number, are printed out when the following errors occur:

- Scheduling of price recalculation has failed.
- Calling `PushMarketInfo` returns a non-zero code.
- The user does not have object permission to `UpdatePrices`.
- Calling `GetMarketInfoId` returns a non-zero code or does not fetch any data.

3.4.6.1 CSD validation

It is not possible to identify following problems and a CSD must be used where necessary:

Error message if the date is not between issue_date and maturity_date

This must be handled in the CSD hook `preprocessPrice`. The Import Market Information activity detects this situation only if `valid_ from` and `valid_to` dates on the quote tab are properly set based on the maturity date and issue date of the instrument.

However, when a price is imported for an instrument after its maturity or before its `issue_date`, it does not cause any problems in the system and the price is not used.

Error message if the "Calculated price" related to imported price has not stored

There is no simple link between direct (imported) price and derived (calculated) price, and therefore the activity cannot verify that all possible derived prices are correctly calculated and stored. However, there are mechanisms in the activity to check running processes in several places, to slow down the importing of prices so that subsequent processes are not overloaded and can handle all recalculation and storing of prices. Also a user-specific check can be performed that specific prices were recalculated in the CSD hook `postprocessPricess`.

3.5 Using comKIT

3.5.1 Overview

Note: You can find HTML comKIT documentation in `FK_HOME\support\comKIT\doc`.

comKIT enables TRM to be run using an API instead of the traditional GUI. More specifically, comKIT is a programmable interface that hides the details of the implementation and offers support for high level objects (Business Objects) that make sense on the business side of TRM. CORBA is used to expose methods and data to the programmer via *interfaces* defined in IDL. JacORB is supported for Java interfaces. The IDL interfaces are the starting point for comKIT. These IDL files describe what can be done using comKIT. IDL compilers exist for the most common programming languages and these are used to generate classes.

comKIT makes importing transactions easier, since comKIT uses the same underlying software as the transaction manager GUI to enter transactions; the calls you make in comKIT map directly to the operations you would do in the Transaction Manager to enter a deal.

So, if a user with financial knowledge shows an interface programmer how a deal is entered in transaction manager, it is quite easy to program the same using comKIT. There are no workarounds and mappings to be implemented as with the cvt procedures.

Information on setting up comKIT is available in *Chapter 12 Setting up comKIT* on page 205.

3.5.2 comKIT services

The comKIT toolkit is made up of the following services:

- Settlement service
- Position service
- Static Data service
- Transaction service
- Performance service

Each service provides access to a area of TRM functionality. In most cases, each area corresponds to a TRM application: for example, the Position service provides access to the features you find in Treasury Monitor. There is a direct correspondence between the manner in which you work with a TRM application and the way you make programming calls to the relevant comKIT service. For this reason, it is highly recommended that you become familiar with the TRM application and interface for any service you plan to use.

Chapter 4 Using Import Export tool

4.1 Introduction

The Import Export Tool application aims to make a standard interface tool available which can be used as a base for all types of data transfers.

This tool provides:

- A consistent approach - making all interfaces look similar gives ease of use and maintenance.
- Reduced development time - many small issues are supported automatically.
- Ease of use - helps the developer to get at the available data more easily by having built-in extensible functionality.

Import Export tool has been developed as a shell using the Perl language. The advantages of this approach are:

- Rapid prototyping
- Inbuilt data conversions and pattern matching
- Existing TRM interfaces for database access
- Part of the standard TRM release
- Object-oriented approach for hierarchical design and extensibility for newer methods

4.2 Features

The basic shell of Import Export tool provides the following features:

- Formatting templates for data input (import) and output (export)
- Database interface that allows the calling of stored procedures for either export or import
- Data formatting including formats such as SWIFT Money
- Callback hooks for pre-processing of data and post-processing of output for export and import
- Automated unique file naming for file based output

4.3 Structure of the Import Export tool

When exporting data from TRM using Import Export tool, a stored procedure is used to extract the data from the database. Each row returned from the stored procedure contains directly or indirectly one data set for the output. This data set might contain all data to output, or it might be used for input to routines in the perl package, which calculate the data to output.

When importing data, the stored procedure takes data from the input file and enters the data into the TRM database.

When setting up the Import Export Tool for your specific data requirements, it is recommended to use additional stored procedures rather than modifying the Perl package (i.e., adding new Perl classes) if possible, for performance reasons. Please refer to your SQL reference for details on how to write stored procedures.

4.3.1 File organization and inheritance

Templates, formats, and variables are defined in a definition file with extension .def.

The Perl code is put into a Perl class file, a file with extension .pm. The base part of both file names must be the same. This name is the name of the import/export function.

If the interface is derived from another interface, a new subdirectory must be created, whose name is that of the parent interface. For example, an interface XYZ derived from an interface called "Payment", which itself is derived from an interface called MYINTERFACE must have the following file and directory structure:

```
MYINTERFACE.def
MYINTERFACE.pm
MYINTERFACE/
MYINTERFACE/Payment.def
MYINTERFACE/Payment.pm
MYINTERFACE/Payment/
MYINTERFACE/Payment/XYZ.def
MYINTERFACE/Payment/XYZ.pm
```

The corresponding Perl classes would be:

```
MYINTERFACE

MYINTERFACE::Payment

MYINTERFACE::Payment::XYZ
```

The Perl class files are not mandatory; if it is possible to define everything within the template/stored procedures framework then you can leave out some of the Perl files and only have the definition file. Template files are provided in the TRM package in $FK_HOME/share/interface.

4.4 Importing data

The basic principle of importing data is that the input data are compared on a row-by-row basis to the template (header, body, and trailer). When there is a match, the regular expression engine picks up the provided fields and puts them into an array of records. After all the records have been successfully read, stored procedure calls are constructed for each record. Finally, these stored procedure calls are executed.

The types of all fields must be defined because, at import time, the data types are not available from the database.

Regular expressions are generated automatically from the template and format definitions. It is possible, though, to override the default regular expression. This may be useful if performance is bad with the default expression.

Once the records have been parsed, the construction of the stored procedure calls is simple. For example, if one record has the fields `number` and `reference` with the values `766` and `'TII'` respectively, and the import procedure has the value `UpdateReference`, the procedure call would be:

For Microsoft SQL Server and Sybase:

```
exec UpdateReference
@number = 766,
@reference = ''TII''
```

For Oracle:

```
var r number
exec :r := HelpObjectPermission(pobject_id => 'aaa');
UpdateReference( Pnumber => 766,
Preference => 'TII');
```

Note that we must define the data type of the `number` field to be `integer` in the format section of the .def definition file. (See *4.5.4 Format* on page 59.) Otherwise, it will be interpreted as a string and thus enclosed in quotes.

4.5 Definition file (.def)

Definition files define the layout of the imported/exported data files with templates (header, body, and trailer) and the data structures used with formats and variables.

4.5.1 Templates

Templates are used to define the layout of the data file; the position of the actual data items relative to one another and to other parts of the data file.

There are three sections in each template: header, body and trailer. There can be many different definitions of each of these three types and it is possible to choose the correct one in the database query or in the Perl hook functions.

The header and trailer definitions are each evaluated once only in each data transfer, at the beginning and the end of the transfer, respectively. The body definition is evaluated for each row of data that comes from the export query. When files are imported, the template is used to construct regular expressions that will match into the input.

The header template sections are delimited by:

```
BEGIN HEADER [<NAME>]
     ....
END HEADER [<NAME>]

The body sections by:
BEGIN BODY [<NAME>]
     ....
END BODY [<NAME>]

The trailer sections:
BEGIN TRAILER [<NAME>]
     ....
END TRAILER [<NAME>]
```

where the optional `<NAME>` parameter specifies the name of the template if there are multiple header, body or trailer template sections.

4.5.2 Layout syntax of the template

The layout of the header, body or trailer is described by 'example': the data is written as it will appear in the imported/exported file, with all fill characters and line breaks, except that actual data is replaced by variables. Variables are marked by a variable name surrounded with curly brackets ('{, }').

A sample header definition looks like this:

```
BEGIN HEADER
Risk metrics data from {date}
END HEADER
```

where the header in the file looks like:

```
Risk metrics data from 1999-04-23
```

At import time, the header is parsed, and the variable date is matched to '1999-04-23'.

Note: Remove trailing white space everywhere in layout definitions for importing data. The sensitive matching process tries to match every single character in the template to the data in the file.

4.5.2.1 Header

If the data file has a header before the start of the actual data section, the layout of this header has to be defined. The header section of the template file defines the layout of this header. It is parsed and read/written once. If the data file has no header, the header part in the template file should be omitted.

There may be several layout definitions for the header. The correct template is chosen according to the value of the variable `template`. This variable can either be given on the command line, in the stored procedure, or it may be set in the Perl package. In the Perl package, it is the variable `$row->{template}` that is set accordingly. In the stored procedure, an additional column with the name `template` has to be returned (e.g. `select template = TemplateName`).

In the definition file, each of the headers would be defined with a specific name; for example:

```
BEGIN HEADER TemplateName

     ....header layout definition ....

END HEADER TemplateName
```

4.5.2.2 Body

The body section defines the layout of the main data in the data file which is to be imported or exported. It defines the layout of one data set, one row in the database. It will be parsed for every row.

There may be several layout definitions for the body. The template used is chosen according to the value of the variable `template`. As described for the header above, this variable can either be given on the command line, in the stored procedure, or it may be set in the Perl package. In the Perl package, it is the variable `$row->{template}` that is set accordingly. In the stored procedure, an additional column with the name `template` has to be returned (e.g. `select template = TemplateName`).

```
BEGIN BODY TemplateName

     ....body layout definition ....

END BODY TemplateName
```

4.5.2.3 Trailer

If the data file has a trailer after the actual data section, the layout of this trailer has to be defined. The trailer part of the template file defines this layout of the trailer. It is parsed and read/written once. If the data file has no trailer, the trailer section in the template file should be omitted.

As for both the header and body sections, there may be several layout definitions for the trailer. The template used is chosen according to the value of the variable `template`. This variable can either be given on the command line, in the stored procedure, or it may be set in the Perl package. In the Perl package, it is the variable `$row->{template}` that is set accordingly. In the stored procedure, an additional column with the name `template` has to be returned (e.g. `select template = TemplateName`).

```
BEGIN TRAILER TemplateName

     ....trailer layout definition ....
```

```
END TRAILER TemplateName
```

4.5.2.4 Body template

The following is an example of a body template (SWIFT MT210):

```
BEGIN EXPORT VARIABLES
procedure=ListBatch
END EXPORT VARIABLES

BEGIN HEADER HEAD1
REC-01 Table Batch {rundate}
END HEADER HEAD1

BEGIN BODY
REC-02 {id};{date};{type};{user_id};{comment}
END BODY

BEGIN TRAILER TRAIL1
REC-09 total records {count}
END TRAILER TRAIL1

BEGIN FORMAT

id {
  absolute:no
  type:integer
  length:10
  leading_zeros:yes
}

type {
  type:character
  length:50
  alignment:left
}

date.time_format:MM/DD/YYYY

user_id {
  type:character
  length:30
  alignment:right
}


step.type:integer

END FORMATedure=ListBatch
```

4.5.3 Variables

Two types of variables can have values assigned to them:

- Built-in variables like import/export file names and debug switches
- Parameters of the stored procedure calls can have values assigned to them.

A full list of the built-in variables available is given in *4.5.3.5 Built-in variables* on page 59.

Variable names can contain characters, digits and '_' ([a-zA-Z0-9_]). Parameters to stored procedure calls always start with an @ sign. There can be any amount of white space anywhere in variable assignments. If a variable is assigned more than once, then the last assignment is used.

4.5.3.1 Definition of variables

Variables can be assigned in the definition file and also on the command line. In addition, certain of these variables can have values stored in normal environment variables. If variables are defined in several places, the order of evaluation is as follows (from most dominant to least dominant):

- Command line variables
- Export/import variables in .def files
- Common variables in .def files (apply to both import and export)
- Environment variables

Variables can be assigned for export only, import only, or for both (common variables).

4.5.3.2 Command line variables

On the command line, variables are appended to the stored procedure command, separated by space, as the following example shows:

On UNIX:

```
./interface MYINTERFACE::Payment::XYZ export @flags=2 @portfolio_id=\'TOP\ '
```

On Windows:

```
perl Interface MYINTERFACE::Payment::XYZ export @flags=2
@portfolio_id=TOP
```

Note: On UNIX, quotation marks must be preceded with backslashes to prevent expansion by the shell.

4.5.3.3 Variables section in .def file

Variables or stored procedure parameters that are defined in the .def files exist in their own sections. Variables that apply for both import and export are delimited by

```
BEGIN VARIABLES
variable=value
variable=value ....
END VARIABLES
```

Variables that apply for import only:

```
BEGIN IMPORT VARIABLES
variable=value
variable=value ....
END IMPORT VARIABLES
```

Variables that apply for export only:

```
BEGIN EXPORT VARIABLES
variable=value
variable=value ....
END EXPORT VARIABLES
```

4.5.3.4 Syntax of environment variables

Environment variables are of the form $FK_IMPORT_`variable` and $FK_EXPORT_`variable` for import and export respectively. For example:

On UNIX (Bourne shell):

```
   set $FK_IMPORT_variable=value; \
   export $FK_IMPORT_variable
```

On UNIX (C shell):

```
   setenv $FK_IMPORT_variable value
```

On Windows:

```
   set FK_IMPORT_variable=value
```

If environment variables are used, the most appropriate location to set these variables is in the TRM system environments, which are defined in `$FK_HOME/share/environments`.

4.5.3.5 Built-in variables

There are several built-in variables, described in the following table:

Variable	Description
procedure	Name of the SQL stored procedure to use in export or import to extract or insert the data, respectively.
@parameter1, @parameter2	Possible default parameters for the stored procedure. They always start with @.
dir	Specifies the directory in which the export file is created or from which the import file is read.
file	Specifies the name of the export or import file. If the name is undef (the default), the filename is the current date plus a unique number 01..99 in the format: YYYYMMDDnn. For example, 1999101702, would be the second file created on 1999/10/17.
ext	Extension of input/output file name. Default is .exp for export files and .imp for import files. Can be with or without the dot, i.e. ".dat" and "dat" are both accepted and will result in ".dat" being appended.
filter	Name of the program used to post process the export output. Could be a printer command or xform, for example.
view_file	If set to 1, every row will be printed to STDOUT as well as to the file.
debug	If set to 1, every procedure call will be printed to STDOUT and nothing will be executed. Default is 0.
line_terminator	Character or string used to separate lines in the exported file. A typical use is to set line_terminator to CRLF (line_terminator = \r\n). To set line_terminator to an empty string (or remove linefeeds) use line_terminator = ''.
empty_output	Output file is opened and header and trailer are written even if no data is returned from the database query. Possible values yes and no.
my_own_variable	You can define your own command-line variables.

4.5.4 Format

The format part of the definition file defines the data types used in the Import Export Tool.

Note: It is very important to specify the data types of the variables used as exactly as possible. Import Export Tool internally generates regular expressions for each data type and matches these regular expressions to the imported and exported data respectively.

The format section is delimited by:

```
BEGIN FORMAT
     ....
END FORMAT
```

4.5.4.1 Data type definitions

Every variable used in the body section of the template file has to have a data type associated with it. This data type may be one of the pre-defined basic or built-in data types or may be defined by the user in the format section of the template file.

There are two ways to write format definitions: by using curly brackets to group keywords for a particular field/type or to use the field.keyword notation:

```
type_name {
type: value
format option: value
format_option: value
.....
}
```

or

```
variable_name.format_option: value
```

For example, to set the length and alignment of the field number, write:

```
number {
         length: 16
         alignment: left
}
or
number.length: 16
number.alignment: left
```

A user-defined data type may have any number of associated format options; user defined data types build on existing data types and inherit all the format options of the type they are building on. Any format option can however be overwritten by explicitly redefining it.

4.5.4.2 Predefined data types

There are a number of built-in and predefined data types. In the following table, these data types are described and the regular expression which is internally created is shown.

Data type	Regular expression
integer	(\d*?)
float, money	([\+\-\d$decimal_separator$fill_character]*?) (swift): ([\+\-\d,$fill_character]*?)
datetime	Any digit in the time_format string is matched with \d.
character	(.*?fill_character)

4.5.4.3 Format options of data types

The following format options can be used to describe the data types:

Formatting keywords	Description
absolute	Converts integer, float or money values to their absolute value. Possible values are yes and no.
alignment	Specifies whether the formatted value is shown in the left or right end of the field (left or right aligned), if the maximum field length exceeds the length of the formatted value. If omitted, no alignment occurs. Possible values are left and right.

Formatting keywords	Description
fill_character	Character used to fill fixed-length fields, if the maximum field length exceeds the length of the formatted value. To fill in spaces one has to enclose the space character in single quotes, i.e. ' '.
decimal_separator	Specifies the character (sequence) used as decimal separator for float and money types. To specify empty string one has to use single quotes, i.e. '', or use the undef keyword. If the swift_format option is yes this option will be overridden.
thousand_separator	Specifies the character (typically point, comma, or space) to separate adjacent 3 digit sequences in the integer part of a number, e.g. 1,000,000.00. To have spaces one has to enclose the space character in single quotes, i.e. ' '.
precision	Specifies the decimal precision of money and float types. Possible values are non-negative integers. If precision is zero, the decimal_separator will not be shown. If the swift_format option is yes this option will be overridden.
leading_zeros	Specifies whether zeros will be prepended to a number value if the maximum field length exceeds the length of the formatted value. This is equivalent to setting fill_character to 0 and alignment to right, but for negative numbers the output is different. For instance, -100 would be displayed as -0000100 using the leading_zeros approach and as 0000-100 using the fill_character approach.
swift_format	Specifies whether the money or float value will be displayed according to the SWIFT standard (numbers will be shown without sign, comma as the decimal separator and without thousand separators). Possible values are yes and no.
time_format	Specifies the format of dates and times for datetime types. Possible values are: YYYY - year in four digits YY - year in two digits MM - month in two digits (01, 02, 03, ... ,12) M - month in one or two digits (1, 2, 3, ..., 12) DD - day of the month in two digits (01, 02, 03, ..., 31) D - day of the month in one or two digits (1, 2, 3, ..., 31) hh - hours mm - minutes ss - seconds For example, to get a date/time like 1998/12/24 13:30, write YYYY/MM/DD hh:mm.
length	Specifies the maximum length of the field. If the formatted value is longer then the maximum field length, the value will be truncated. If it is shorter that the maximum field length, it gets padded with the fill character.
case	Specifies whether character type values should be shown in upper, lower or mixed case. Possible values are upper and lower. To get mixed case one must use undef.
type	Data type of the variable. This can be either one of the basic or built-in types (character, integer, float, datetime, money) or a customized data type.
key_of	Specifies the name of the database table which the field is a key of. This enables the use of the dot notation to access database table fields. Possible values are Client, Portfolio, Instrument and Equity.
regexp (import)	With this option you can specify the regular expression to be used for internal parsing. This option overrides the automatically created regexp. This option should be used as an exception, only when the internal regexp generation does not work sufficiently. Do not use, unless you know exactly what you are doing.

4.6 Perl functions (the Interface class)

The Interface class allows complex logic to be included in the interface. If the templates and formatting parameters are not expressive enough to create the specified output, additional logic using Perl functions can be written (for instance, if some part of the template should not be displayed depending on a certain condition in the input data).

The recommended approach to add this logic is to derive a new Perl class that inherits the TemplateInterface class. (See *4.11 TemplateInterface class* on page 67.) The TemplateInterface class is a subclass of the Interface class.

Note: For performance reasons, it is generally recommended to use stored procedures as much as possible rather than defining new classes.

The structure of a new subclass looks as follows:

```
package PACKAGENAME;
use TemplateInterface;

@ISA = qw (TemplateInterface);

sub new {
  my ($class, @templates) = @_;
  my $this = new TemplateInterface (@templates);
  bless $this, $class;
  return $this;
}
```

The new class can define so-called hook functions that can be called at certain stages in the process of file creation to manipulate the incoming and outgoing data before and after parsing. Basically, the hook functions can manipulate either the raw database input (`start` functions) or the formatted output (`finish` functions).

4.6.1 Export hook functions

4.6.1.1 Start functions

```
export_header_start ($row)
export_body_start ($row)
export_trailer_start ($row)
```

These functions are called before the database query row is evaluated against the template. The `$row` parameter is a reference to a hash containing name-value pairs that come from the query. It is possible to change the existing row values and set new ones by using normal assignment.

A special feature is that one can specify the template to be used by setting `$row->{template}` to the name of the required template. If, for some reason, the whole row should be excluded from further processing, this can be achieved by returning the string `‘skip’ (return ‘‘skip’’;)` from the function `export_body_start()`. Other return values are ignored.

Here is an example of a start hook function that sets the template and some other fields and ignores some rows.

```
sub export_body_start {

              my ($this, $row) = @_;

              if ($row->{layout} eq "MM") {
                  $row->{template} = "XYZ";
              } elsif ($row->{layout} eq "FX") {
                  $row->{template} = "ABC";
              } else {
                  return "skip";
              }

              $row->{count} = $count++;
          }
```

4.6.1.2 Finish functions

```
export_header_finish ($output)
export_body_finish ($output)
export_trailer_finish ($output)
```

These functions are called after the template has been evaluated. The `$output` parameter is a reference to the resulting output string. For instance, to remove new lines from the output one would write:

```
$output =~ s/\n//g;
```

4.6.2 Import hook functions

4.6.2.1 Start functions

```
import_header_start ($input)

import_body_start ($input)

import_trailer_start ($input)
```

These functions are called before the input is matched against the appropriate templates (header, body, trailer). The templates are tried in such an order that the one with least number of lines is first. Generally it is not possible to say how many times these functions are called, it might be only once or it might be as many times as there are templates.

If, for some reason, the whole row should be excluded from further processing, this can be achieved by returning the string `‘skip’ (return ‘‘skip’’;)`from the function `import_body_start()`. Other return values are ignored.

4.6.2.2 Finish functions

```
import_header_finish ($params)
import_body_finish ($params)
import_trailer_finish ($params)
```

These functions are called after the input has been matched against a template. If the match was successful, the `$params` variable contains a reference to the resulting name-value pairs. If the match was not successful, `$params` will be undef.

4.6.3 Overriding default functions

It is, of course, possible to override any of the functions defined in the Perl classes Interface and TemplateInterface (see *4.10 Interface class* on page 65 and *4.11 TemplateInterface class* on page 67).

4.7 External packages: predefined modules

Four predefined Perl modules are available for Import Export Tool. Each of the modules corresponds to a table in the TRM database with the same name.

First, the variable used in the body part of the template file contains an extra element, the name of the key used to index the external table, in addition to the variable name in that table.

```
BEGIN BODY
name_of_key.variable_name
END BODY
```

The first part is the name of the key used for indexing the respective table; the second part is the field name from that table.

Secondly, in the format part of the definition (.def) file, the key is associated as a key of a table by the following syntax:

```
BEGIN FORMAT
name_of_key.key_of: NameOfPredefinedModule
variable_name.type: type_name
END FORMAT
```

The variable itself must also be associated with a data type.

4.8 Running Import Export tool

4.8.1 Running from the command line

To run Import Export tool from the command line after an environment evaluation:

On UNIX:

```
cd $FK_HOME/share/interface/

interface <package> (import|export) [name=value ...] [@name=value ...]
```

On Windows:

```
cd %FK_HOME%\share\interface

perl Interface <package> (import|export) [name=value ...] [@name=value ...]
```

where:

- `<package>` is the interface you have set up
- `(import|export)` - choose the direction of the data transfer
- `[name=value ...]` - to specify one of the built-in variables. (See *4.5.3 Variables* on page 57.)
- `[@name=value ...]` - to specify a stored procedure parameter variable.

For example, to export MYINTERFACE XYZ payments, use the following:

On UNIX:

```
./interface MYINTERFACE::Payment::XYZ export @portfolio_id='TOP'
```

On Windows:

```
perl Interface MYINTERFACE:Payment::XYZ export @portfolio_id=TOP
```

To import fx-match statements you could use:

On UNIX:

```
./interface FXMATCH import @file='/tmp/fxmatch.txt'
```

On Windows:

```
perl Interface FXMATCH import @file=/tmp/fxmatch.txt
```

4.8.2 Methods of script execution

Running Import Export tool can be achieved in several different ways with TRM:

- Manually: on the command line as shown above.
- Repeatedly: via crontab (UNIX). For example every hour:

  ```
  10 * * * * ./interface FXMATCH import @file='/tmp/fxmatch.txt'
  ```

- From Money Transfer Method Editor in TRM:

Define a new method in **Money Transfer Method Editor**: give a unique id and method name in the *ID* and *Method* fields, and the required command in the *Command* field (for example the XYZ END FORMAT payments example shown above). The method can now be used automatically for exporting payments. The `batch_id` is appended as command-line variable and can thus be used in Import Export Tool to export the payments to a file and/or to screen.

4.9 Debugging

To debug an interface, use the following command:

- On UNIX: `fk-perl -d ./interface <PKGNAME> {import|export}`
- On Windows: `perl -d Interface <PKGNAME> {import|export}`

and then

```
c 52
```

to continue to line 52. From here, it is possible to set breakpoints in your own .pm file. For example:

```
b MYINTERFACE::Payment::XYZ::export_body_start
```

sets a breakpoint in the subroutine `export_body_start` in the XYZ class, which is a subclass of the MYINTERFACE class.

4.10 Interface class

An abstract class from which all import and export interfaces are derived. Defined in the file Interface.pm.

4.10.1 Interface class functions

Function	Description
init	Initialize.
find_package	Return the most specific class that is defined @param @packages list of packages. • Returns: the most specific one or `undef` if not found
package_split	Split package name to an array of package names. For example, `$this->package_split ("abc::def::ghi")` would return `("abc::def::ghi" "abc::def" "abc").` • Parameters: *package* - name of the package • Returns: list of packages
package_to_file	Construct Perl `.pm` file name from a package name. • Parameters: *package* - name of package • Returns: file name
file_exists	See if a file exists in the include path. • Parameters: *name* - name of the file • Returns: the full file name if found, otherwise `undef`
default_file_name	Return the default file name YYMMDDNN, where YY is the current year, MM is the current month and DD is the current day. NN is an increasing sequence number for files with the same date, 01 for the first file. • Parameters: *dir* - directory; *ext* - extension • Returns: file name (without directory and extension)
pad_right	Add pad characters to the right of a string or truncate it. • Parameters: *value* - input string, *width* - width of the output string, *pad* - pad character • Returns: result
pad_left	Add pad characters to the left of a string or truncate it. • Parameters: *value* - input string, *width* - width of the output string, *pad* - pad character • Returns: result
swift_amount	Format amount in SWIFT format. • Parameters: *amount* - unformatted amount • Returns: formatted amount

4.10.2 Interface member functions

Function	Description
new	Constructor.
process_args	Store command line arguments. Arguments of the type `foo=bar` are stored in a hash, referenced by `$this->{cmdline_variables}`. Arguments of the type `@foo=bar` are stored in an array, referenced by `$this->{cmdline_parameters}`.
export_file	Fetch records from the database and write them to a file.
import_file	Read records from a file and insert them to the database.

Function	Description
read_database	Fetch records from the database and store them in a hash, referenced by `$this->{export_rows}`. Store field types to the hash referenced by `$this->{export_types}`.
write_database	Insert records to the database.
write_file	Write records to a file.
read_file	Read records from a file.
write_file_body	Loop through rows to write the body of the file. Calls pure virtual method `write_row`.
sql_value	Format a field value for the database. • Parameters: *name* - field name, *value* - field value • Returns: formatted value
sybase_type	Default function for getting Sybase type for a field • Parameters: *name* - field name • Returns: Sybase type
db	Return the database handle.
procedure_ parameters	Return the array of parameters to the export or import stored procedure. • Parameters: *direction* - `import` or `export`
line_terminator	Return the default line terminator. The default line terminator is defined in the `VARIABLES` section of the `.def` file.
export_handle	Return the file handle to the export file.
import_handle	Return the file handle to the import file.
open_export_ file	Open the export file handle for writing. If file name is not defined, write to standard output.
close_export_file	Close the export file.
open_import_file	Open the import file handle for reading. If file name is not defined, read from standard input.
close_import_file	Close the import file.
file_name	Return the import or export file name. Uses the `dir`, `file` and `ext` variables. • Parameters: *direction* - `import` or `export` • Returns: filename or `undef` if export directory is undefined.
variable	Return a variable. Try in order: command line variable, import or export variable, common variable, environment variable (e.g. `FK_EXPORT_DIR`). • Parameters: *direction* - `import` or `export`, *variable* - name of the variable • Returns: variable value or `undef` if not defined

4.11 TemplateInterface class

A class for importing and exporting files using templates. Defined in the file `TemplateInterface.pm`.

4.11.1 TemplateInterface class functions

Function	Description
get_fields	Get field names from a template. • Parameters: *template* - name of the template • Returns: reference to an array of fields
read_lines	Read a specified number of lines from a file handle. • Parameters: *handle* - file handle, *count*- number of lines to read • Returns: the most specific one or `undef` if not found
line_count	Get the number of lines in a string. For example, `$this->package_split ("abc::def::ghi")` would return `("abc::def::ghi" "abc::def" "abc").` • Parameters: *string* - input string • Returns: number of lines
escape_meta	Escape regular expression metacharacters in a string. • Parameters: *string* - input string • Returns: result string
align	Do alignment, padding and truncation. • Parameters: *value* - input value, *length* - length, *fill_character* - fill character, *alignment* - alignment (`"left"` or `"right"`) • Returns: result
add_thousand_ separators	Add thousand separators to a number. • Parameters: *value* - input number, *thousand_separator* - thousand separator • Returns: result

4.11.2 TemplateInterface member functions

Function	Description
new	Constructor. • Parameters: *templates* - array of class names whose template files are read
read_def	Read templates and format definitions from the `.def` file. • Parameters: *class* - name of the class
write_file_header	Write file header.
write_row	Write one record to the export file.
write_file_trailer	Write file trailer.
read_file_header	Read file header.
read_file_body	Read file body and trailer.
template_parse	Parse input using template. • Parameters: *type* - template type (`HEADER/BODY/TRAILER`), *start_hook* - name of the function that is executed before parsing, *finish_hook* - name of the function that is executed after parsing, *input* - input lines • Returns: reference to the record hash
set_type	Set the type of a field. • Parameters: *field* - field name, *type* - field type

Function	Description
type	Get type of a field. • Parameters: *field* - field name • Returns: field type
select_template	Select current template. • Parameters: *type* - template type (`HEADER/BODY/TRAILER`), *name* - template name
template	Return a reference to the current or specified template. • Parameters: *type* - template type (`HEADER/BODY/TRAILER`), *name* - template name or `undef` • Returns: reference to the current (name is `undef`) or specified template
template_name	Return current template name.
template_type	Return the file handle to the import file.
export_header_ start	• Virtual method that is executed before the current header template is evaluated with the current header record. • Parameters: *row* - reference to the header record hash (initially empty)
export_header_finish	Virtual method that is executed after the current header template has been evaluated with the current header record. • Parameters: *output* - reference to the evaluated template
export_body_start	Virtual method that is executed before the current body template is evaluated with the current body record. • Parameters: *row* - reference to the body record hash
export_body_finish	Virtual method that is executed after the current body template has been evaluated with the current body record. • Parameters: *output* - reference to the evaluated template
export_trailer_start	Virtual method that is executed before the current trailer template is evaluated with the current trailer record. • Parameters: *row* - reference to the trailer record hash (initally empty)
export_trailer_finish	Virtual method that is executed after the current trailer template has been evaluated with the current trailer record. • Parameters: *output* - reference to the evaluated template
evaluate	Evaluate a template • Parameters: *row* - reference to the input record hash • Returns: evaluated template
expand_field	Expand a field of the form key1.key2. ... .field • Parameters: *field* - fully qualified field name, *data* - data record • Returns: base field name and field value
output	Output a string to the export file. • Parameters: *string* - output string
format	Format a value according to its type. • Parameters: *key* - field name, *value* - field value, *row* - rest of the record (optional), *sybtype* - Sybase type of the field (optional) • Returns: formatted value
parse	Parse header/body/trailer record • Parameters: *input* - input lines, *template* - template to be used for matching • Returns: reference to a hash containing key/value pairs, `undef` if template does not match with input

Function	Description
regexp	Construct a regular expression from a field definition. • Parameters: *key* - field name • Returns: regular expression
get_types	Get the type array for a field. Elementary type (character, integer, etc.) is the first element in the array, field name is the last one. • Parameters: *key* - field name, *sybtype* - Sybase type (optional) • Returns: reference to the array of types
sql_type	Get SQL type for a field name. • Parameters: *name* - field name • Returns: SQL type
get_format	Get a formatting option for a type array. • Parameters: *option* - name of the formatting option, *type_array* - the type array • Returns: value of the formatting option
cleanup	Clean up a parsed record. • Parameters: *name* - field name, *value* - field value • Returns: cleaned up value
import_header_start	Virtual method that is executed before the current header template has been evaluated with the current header record. • Parameters: input - reference to the header record hash
import_header_finish	Virtual method that is executed after the current header template has been evaluated with the current header record. • Parameters: params - reference to the evaluated template
import_body_start	Virtual method that is executed before the current body template has been evaluated with the current body record. • Parameters: input - reference to the body record hash
import_body_finish	Virtual method that is executed after the current body template hasbeen evaluated with the current body record. • Parameters: params - reference to the evaluated template
import_trailer_start	Virtual method that is executed before the current trailer template has been evaluated with the current trailer record. • Parameters: input - reference to the trailer record hash
import_trailer_finish	Virtual method that is executed after the current trailer template has been evaluated with the current trailer record. • Parameters: params - reference to the evaluated template
add_thousand_separators	Add thousands separators to a number. • Parameters: *value* - input number, *thousand_separator* - thousands separator • Returns: result
align	Do alignment, padding and truncation. • Parameters: *value* - input number, *length* - length, fill_character - fill character, alignment - left or right. • Returns: result
escape_meta	Escape regular expression metacharacters in a string. • Parameters: *string* - input string • Returns: result string

Function	Description
line_count	Get the number of lines in a string. • Parameters: *string* - input string • Returns: number of lines
read_lines	Read a specified number of lines from a file handle. • Parameters: *handle* - file handle, *count* - number of lines to read • Returns: lines read

4.12 Empty sample files

4.12.1 Definition file

```
BEGIN EXPORT VARIABLES
procedure =
@param =
dir =
file =
ext =
END EXPORT VARIABLES

BEGIN EXPORT HEADER
END EXPORT HEADER

BEGIN EXPORT BODY
END EXPORT BODY

BEGIN EXPORT TRAILER
END EXPORT TRAILER

BEGIN EXPORT FORMAT
END EXPORT FORMAT


BEGIN IMPORT VARIABLES
procedure =
@param =

dir =
file =
ext =
END IMPORT VARIABLES

BEGIN IMPORT HEADER

END IMPORT HEADER

BEGIN IMPORT BODY
END IMPORT BODY


BEGIN IMPORT TRAILER
END IMPORT TRAILER
```

```
BEGIN IMPORT FORMAT
END IMPORT FORMAT
```

4.12.2 Empty Perl module

Template for empty import export Perl module

```
package Empty;
use TemplateInterface;



@ISA = qw (TemplateInterface);


sub new {
    my ($class, @templates) = @_;


    my $this = new TemplateInterface (@templates);


    bless $this, $class;
    return $this;
}

sub export_header_start{
    my $this = shift;
    my ($row) = @_;
}

sub export_body_start{
    my $this = shift;
    my ($row) = @_;

}

sub export_trailer_start{
     my $this = shift;
     my ($row) = @_;

 }

sub export_header_finish{
    my $this = shift;
    my ($row) = @_;
}

sub export_body_finish{
    my $this = shift;
    my ($row) = @_;

}

sub export_trailer_finish{
     my $this = shift;
     my ($row) = @_;

 }
```

```
#### The import part


sub import_header_start{
    my $this = shift;
    my ($row) = @_;
}

sub import_body_start{
    my $this = shift;
    my ($row) = @_;

}

sub import_trailer_start{
     my $this = shift;
     my ($row) = @_;

 }

sub import_header_finish{
    my $this = shift;
    my ($row) = @_;
}

sub import_body_finish{
    my $this = shift;
    my ($row) = @_;

}

sub import_trailer_finish{
     my $this = shift;
     my ($row) = @_;
```

Chapter 5 Setting up message management

5.1 Overview

Message Manager generates documents based on information in Wallstreet Suite (Transactions, Schedule, Payment, Client). The documents can be printed, e-mailed or faxed. For information on message management for business users, refer to the *TRM User Guide*.

The creation of a document is usually triggered by the fact that a transaction or other entity is moved from one state to another in the process flow. If there are TransactionActions, a MessageRequest is created. Also, EntityActions support the creation of MessageRequests. The following entities are supported:

- Payment Allocation Report
- Payment Reminder
- Late Payment Reminder
- Drawdown Fixing
- FX Rate Notification
- Facility (using the flow in Facility Editor)
- Amount Event

Message Manager uses the serviced daemon (replacing messaged used in TRM 7.1). This daemon is usually started by Process Monitor, but for debugging purposes, it can also be started in a TRM environment as follows:

```
serviced document/document.xml
```

In general, serviced supports the same command line options as the other real-time services such as tracing. For details of serviced, see the *WSS System Administration Guide*.

The steps in producing a message are as follows (details are given in the rest of this chapter):

1. MessageRequest is created in the process flow and sent on the message bus. This step determines the MessageType.
2. Given a MessageRule, a MessageSubType is assigned.
3. Each MessageRule defines which MessageRuleInstance(s) to use. For example, a DRAWDOWN-NOTIFICATION implies that one document should be e-mailed to the counterparty and one other document should be faxed to the bank. There is a one-to-one mapping between the MessageRuleInstance and Message. In this case there will be two messages created since there are two MessageRuleInstances attached to the matching MessageRule.
4. The combination of MessageType, MessageSubType and MessageGroup is used to determine a ContactPerson (found in ClientEditor). A ContactPerson contains among other things the address such as fax number, e-mail address, language of the document etc.,
5. The combination of MessageType, MessageSubType, Language and TransferType is used to retrieve a MessageTemplate.
6. The serviced daemon loads the data associated with the underlying message object. The data to load is defined by the MessageType and the MessageSubType in MessageTypeEditor, using the tab MessageContent.
7. The document is created, based on the template to use.

8. The command in the TransferMethod is used to transmit the message.

In Loan Drawdown Fixing Manager, Payment Allocation Manager and Payment Reminder Manager, you can preview a message by right-clicking on the relevant line.

5.2 Transaction and Entity flow

MessageRequests can be created from both transaction flow and entity flow. An example of a TransactionAction is as follows:

```
# Trade tickets for TRM transactions
(state ('OPEN'), mask (0),
rule ('TFLO-MESSAGE_TRADE-TICKET'),
send_full ('document.transaction', message_type='TRADE-TICKET',
state_id='TO-BE-TRANSMITTED')),
```

The message request gets the message type given by `message_type`. The parameter `state_id` specifies the initial state_id in the message flow for the message request. By default, there are two possible states:

- `TO-BE-VALIDATED`: you are given the option to approve the message request in Message Manager
- `TO-BE-TRANSMITTED`: message transfer takes place immediately, without user intervention.

5.3 Message Manager and Message flow

The two main steps are creating messages (match rules and create message) and extracting data (retrieving the fields defined in MessageContent for the given MessageType/MessageSubType).

To control and overview the process, use Message Manager. Message Manager is an entity board application with a default message State ID flow is as follows:

1. TO-BE-VALIDATED typically allows the user to add comments. If the four-eyes principle is applied, a message request is typically validated here.
2. EXECUTE is normally used just for previews. MessageRequests in this state now show in Message Manager.
3. TO-BE-TRANSMITTED These message requests will be sent using the defined TransferMethod.
4. TRANSMITTED if external Message Manager successfully sends all subrequests, the message request will be moved to this state.

Three thresholds are defined in the message flow (see the database setup folder):

- If the MessageRequest is flagged Provisional, Message Manager will try to create messages and extract the underlying data. For example, the first provisional state is TO-BE-VALIDATED, so message creation and data extraction take place as soon as a MessageRequest is created.
- If the MessageRequest is in a state flagged Intermediate, serviced tries to carry out the action defined in the corresponding TransferMethod (e.g. send an e-mail, execute a script, fax or print). By default, TO-BE-TRANSMITTED is an intermediate state.
- If the MessageRequest is in a state flagged Final, no further processing takes place. For example, if a MessageRequest consists of three messages and all are sent successfully, the MessageRequest will be accepted into TRANSMITTED which is a state flagged as Final.

5.4 Examples of messages

A trade ticket should be printed immediately

The MessageRequest is created in a state which is defined as "to be transmitted immediately" (TO-BE-TRANSMITTED). Since this MessageRequest does not have any messages yet and it is in an intermediate state, the daemon instructs Message Manager to process the message. This processing results in:

- Rule matching, finding subtype since there is no structure yet
- Data extraction
- Upon successful data extraction the MessageRequest is accepted. If the next state is a transmission-enabled state (intermediate) the execution will be continued. This means that the document will be either printed immediately, or sent as an e-mail.

A MessageRequest is created in TO-BE-VALIDATED

Since the daemon discovers that this MessageRequest does not yet have any structure, serviced will create a structure (find subtype, match rules, messages according to the MessageRuleInstances). The user approving messages starts Message Manager and clicks ACCEPT on the MessageRequest. The MessageRequest will now be moved to state EXTRA-VERIFICATION (not defined by default). This allows another person to also accept the message into an intermediate state (where it will be transmitted). Any number of states can be created to reflect the work process.

Messages that need comments as well as approval

In this case, Message Manager allows editing of these remark fields before the message reaches a state that allows transmission. Initially this MessageRequest is created in a provisional state . The daemon will discover the non-existence of structure (Message), therefore it will be processed and Messages will be created. The user starts Message Manager and edits the MessageRequest remark fields. Then the user ACCEPTS the MessageRequest into state TO-BE-TRANSMITTED and everything proceeds as in the above cases.

5.5 Setting up Message Manager

Set up Message Manager as follows:

1. Edit the layouts using MS Word 2003 or 2007 and save them as XML.
2. Install the XML plugin described below. This is needed in order to mark the TRM specific fields to be replaced by real data.
3. If other type and subtype combinations than provided by the best practice package is needed, they need to be entered in Message Type Editor.
4. Upload the templates using the script `upload_documents.py`
5. Review the message rules in Message Rule Editor.
6. Check Transfer Type Editor and review transfer types.

5.6 Previews

There are two kinds of previews:

- **Transaction Manager**
  When the user selects preview action, the action scans all available TransactionActions for

possible MessageTypes and MessageSubTypes and presents a dialog box. When the user clicks OK, a hidden MessageRequest and Message(s) created. Only the Message where the corresponding MessageRuleInstace is flagged primary message will be displayed.

- **Message Manager**
  Right-click on a message. The message to preview is identified by its id.

5.7 Extracting data

Data extraction is based on the same modules as the GUI applications. For example, if a document is based on a Transaction, the available fields are the same as in the corresponding Transaction Manager view. If needed, additional static date fields can be included from static data editors.

For example, to display the name of a transaction currency:

1. Select Transaction.currency_id and Currency.name as fields in Message Type Editor. The Currency source will not appear in the list until the transaction field is chosen).
2. Use the placeholder Transaction.currency_id.name in the document.

For cases when the built-in extraction capabilities are not enough, Message Manager provides several ways to add and derive client-specific fields as follows:

1. Expressions (powered by python code)

- Single field
  - Declaration in Message Type Editor (valid only in selected source and message type)
  - Declaration in document-config.xml (available for all message types)
- Result set (many fields at a time)

In general, it is best to use expressions in Message Type Editor, because then the business user can directly edit and review how a certain field is calculated or retrieved.

Making declarations directly in document-config.xml makes the expression available for all message types. Expressions made in Message Type Editor are valid only in the selection message type.

Python code allows access to computed fields (same data as used by GUI applications) and is database-independent. The python code to write depends on whether there is a need to process only one field or many at a time.

2. SQL code in a stored procedure.

The stored procedure approach can be an easy method when migrating from earlier versions of TRM. (database structure is relevant here). Processing SQL on the server side and returning many fields in one call is normally efficient if performance is an issue.

5.7.1 Expressions

5.7.1.1 Single Field

Declare the expression directly in Message Type Editor. For each source, there is a special field named Calculated. If this field is selected, the property fields become editable. Examples of expressions that can be used in this field are:

```
logo='logo_wss.gif'
include_p=(cp_client_id != 'TP-CPTY')
transaction_sign_rev=if(sign_id == 'Buy','Sell','Buy')
sign_name=if(sign_id=='Buy', 'Receive', 'Pay')
date_basis1=if(type_subtype=='Netting',date_basis)
```

These expressions are driven by the same engine as in Transaction Manager. It is also possible to call previously defined python functions from the expressions in the Message Type Editor.

If you have a single field to compute, this will be coded in a python function: for example, code your "my_function" function in the python file my_functions.py (Make sure this file is in your python path):

```
def my_function (number):
# do some calculation here
   ...
return result
```

Declare the calculated field in document-config.xml:

```
<expression source="Transaction" script="my_functions">
    <field name="my_field" label="My Field"/>
        my_function (number)
    </field>
</expression>
```

It is possible to select the name of the owner or counterparty using the functions provided:

```
seller = if (sign_id == 'Sell', get_field ('Client',owner_id,'name'), get_field
('Client',cp_client_id,'name'))
```

For this to work, the following piece of python code must be saved in the python path, for example as:

```
C:\wss\v7\python\lib\Lib\site-packages\functions.py
```

This folder is usually used for python scripts. Save the following file as functions.py:

```
import FK.Core
from FK.ORB import from_value, to_value
import IDL.FK.Data_Context

from FK.Cache import Cache

cache = Cache ()

# Arguments are of type value
def get_field (o,k,f):
  obj = FK.ORB.from_value(o)
  # k should be of type value already
  key = to_value(k)
  field = FK.ORB.from_value(f)
  #  print "get_field",obj,key,field
  holder = cache.context ()
  try:
    umi = holder.get (obj, [key])
    (found, v) = umi.get_field (field, FK.ORB.to_value ())
    if found:
      return FK.ORB.from_value (v)
  except:
    return ""
  return ""
```

The file functions.py must be linked to the source to be used in document-config.xml:

```
<expression source="Transaction" script="functions"/>
```

This makes the get_field function available to all Transaction sources. It is also possible to define the field in document-config directly:

```
<expression source="Transaction" script="dc-values">
  <field name="test_name" label="Test name">
    get_field('Client',cp_client_id,'name')
  </field>
</expression>
```

The field test_name is now available for selection in Message Type Editor and it will always contain the name of the counterparty. It will be available for Transaction source only, but it will be available across all Message types. If it is needed in yet other source, just add it again, but change the source attribute.

5.7.1.2 Result set (multiple fields)

More complex processing may be required. There might be cases when the filter syntax is not enough to get a certain cashflow. If there is a need to compute values based on several cashflows and flags etc, the python code for this can be placed in the same python file as the above expressions.

In general, if many parameters need to be computed at the same time, they are interdependent or fetched altogether. Code a function called get_values in a python script, my_other_functions.py:

```
def get_values (ctx, values):
  # compute some values
  return values
```

The ctx parameter gives you the source you are considering (Transaction, Cashflow, UMI etc.), values is a dictionary with fetched fields - from the source. You have to complement this list with your own calculated information and return it. Finally link your script to Message Manager:

```
<service module="data/python@my_other_functions">
    <fields>
        <source name="Transaction">
            <field name="my_field_1" label="My first field">
                <dependency name="number"/>
                <dependency name="comment"/>
            </field>
            <field name="my_field_2" label="My second field">
                <dependency name="number"/>
            </field>
        </source>
    </fields>
</service>
```

Pay attention to the module attribute where you setup your python script name: module="data/python@my_other_functions"

A more detailed example of this:

```
<service module="data/python@myvalues">
    <fields>
        <source name="Transaction">
            <field name="receive_principal" label="Receive Principal">
                <dependency name="number"/>
            </field>
            <field name="pay_principal" label="Pay Principal">
                <dependency name="number"/>
            </field>
          <field name="first_interest_amount" label="First Interest Amount">
                <dependency name="number"/>
            </field>
        </source>
    </fields>
</service>
```

The file myvalues.py must be in your python path. For example:

```
C:\wss\v7\python\lib\Lib\site-packages\myvalues.py
```

If above declaration is made in document-config.xml, the function get_values will be called for every processed source (Transaction). A dictionary is passed as argument, so its contents can be changed in the get_values function and then returned at the end. For example:

```
import FK.Core
import FK.ORB
FK.ORB.use_idl ("Type")

from FK.Cache import Cache
from IDL.FK.Database import Action
from FK.Module.Transaction_Manager import *
from FK.Core import Money

cache = Cache ()


def get_receive_pay_flows (flows, category_id):
  receive_principal = Money (0)
  pay_principal = Money (0)
  for flow in flows:
    if flow.type_id == 1 and flow.category_id == category_id:
      amount = Money (flow.amount)
      if amount > 0:
        receive_principal += amount
      else:
        pay_principal += amount
  return (receive_principal, pay_principal)

def cmp (c1, c2):
  if c1.value_date == c2.value_date:
    return int ((c1.id - c2.id).as_long ())
  return c1.value_date - c2.value_date

def get_values (ctx, values):
  print "get_values"
  if values.has_key ('number'):
    number = FK.ORB.from_value (values['number'])
    container = Container ()
    action = cache.session ().create_action ()
    t = container.retrieve (action, number, True)

    if t != None:
     if values.has_key ('receive_principal') or values.has_key ('pay_principal'):
        (values['receive_principal'], values['pay_principal']) =
get_receive_pay_flows (t.cashflows(), 0) # category settlement
    if values.has_key ('receive_redemption') or values.has_key ('pay_redemption'):
        (values['receive_redemption'], values['pay_redemption']) =
get_receive_pay_flows (t.cashflows(), 1) # category payback

      if values.has_key ('first_interest_amount'):
        flows = t.cashflows ()
        flows.sort (cmp)
        for flow in flows:
          if flow.type_id == 2 and flow.category_id == 1:  # type interest, category
payback
            print '*' * 8, flow.value_date
            values['first_interest_amount'] = flow.amount
            break

    return values
```

Note that it is possible to call the already existing get_field (to avoid code duplication) function to lookup needed field in the TRM object hierarchy, for example. In the example below, depending on transaction sign, different bank names and swift codes are selected. For the moment, all functions are called with Type::Value arguments.

```
def get_field (o,k,f):
  obj = FK.ORB.from_value(o)
  # k should be of type value already
  key = k
  field = FK.ORB.from_value(f)
  print "get_field",obj,key,field
  holder = cache.context ()
  try:
    umi = holder.get (obj, [key])
    (found, v) = umi.get_field (field, FK.ORB.to_value ())
    if found:
      return FK.ORB.from_value (v)
  except:
    return ""
  return ""

def get_bond_beneficiary(t):
  flows = t.cashflows()
  for flow in flows:
    if flow.type_id == 1 and flow.sign != t.sign_id:
      # Found cashflow to use
      beneficiary_details = ()
      client_v = FK.ORB.to_value("Client")
      name_v = FK.ORB.to_value("name")
      swift_v = FK.ORB.to_value("swift_code")

      if t.sign_id > 0:
        beneficiary_details =
(get_field(client_v,FK.ORB.to_value(flow.local_client_id),name_v),

get_field(client_v,FK.ORB.to_value(flow.local_bank_id),name_v),
                               flow.local_account_id,

get_field(client_v,FK.ORB.to_value(flow.local_bank_id),swift_v),

get_field(client_v,FK.ORB.to_value(flow.local_corr_bank_id),swift_v))
      else:
        beneficiary_details =
(get_field(client_v,FK.ORB.to_value(flow.other_client_id),name_v),

get_field(client_v,FK.ORB.to_value(flow.other_bank_id),name_v),
                               flow.other_account_id,

get_field(client_v,FK.ORB.to_value(flow.other_bank_id),swift_v),

get_field(client_v,FK.ORB.to_value(flow.other_corr_bank_id),swift_v))
      return beneficiary_details
```

5.7.1.3 System functions

Message Manager also provides a set of predefined functions. Date handling is as follows:

Type	Parameter	Action
today	None	Gets the current date
year	Date	Extracts the year
month	Date	Extracts the month
day	Date	Extracts the date

Multiple entities manipulation is as follows. These functions operate on all entities of a source and return a single value. This unique value is then available on any of the source entities.

Entity	Parameter	Action
min_value	Entity field	Gets the minimum value of the field in the set of entities
max_value	Entity field	Gets the maximum value
total	Amount field	Sums the amounts
average	Amount field	Averages the amounts
count	None	Counts the entities

5.7.2 SQL code in stored procedures

The stored procedure and the fields to use must be declared in document-config.xml as follows:

```
<service module="data/stored-procedure@stored-procedure">
<procs>
  <stored-procedure name="GetMyInfo" id-field="number" source="Transaction">
    <field name="myfield1" label="My field 1 label"/>
    <field name="myfield2" label="My field 2 label"/>
  </stored-procedure>
</procs>
</service>
```

When fields are extracted from a transaction, the number is passed as key to GetMyInfo. This procedure may return a lot of fields and record sets, but only myfield1 and myfield2 will be available in Message Type Editor. In the document, the following placeholders Transaction.myfield1 and Transaction.myfield2 can be used.

5.7.3 Filters

New sources can be configured in document-config.xml. The following example creates a new source which is a subset of the cashflows:

```
<filter name="PayCashflow" source="Cashflow">
  <and>
    <and>
      <eq field="#sign" type="INTEGER">1</eq>
      <eq field="type_id" type="INTEGER">6</eq>
    </and>
    <eq field="XXX" type="STRING">hot</eq>
  </and>
</filter>
```

5.8 Setting up Document Formatter

5.8.1 Prerequisites

Wallstreet Suite installation must contain the latest version of Apache FOP. There is nothing to install except to add into the path the folder where FOP is extracted to. Since FOP is Java-based, the Java runtime environment should also be present.

5.8.2 Settings

All document management settings are in this folder: `<Suite Install Folder>/etc/document` which contains the following subfolders:

- `images` - this is where reusable pictures are kept, for example logos and similar items.
- `interim` - temporary folder for intermediate files and final results (PDF files). This folder location can be customized during setup - if so, the directory to be used should be assigned to the environment variable named `FK_DOCUMENTS_INTERIM_DIRECTORY`.
- `processor` - contains XSLT code that translates WordML to FO (contains subfolders so that we can use several input and output formats. Read-only.

The main activity is logically splitting message templates by type, subtype, media and language, then uploading the document into the database. The name of the document is not the file name of the Word XML document: it is the logical name that you give to this template document, and defaults to "default".

For example, for type preview_type, subtype preview_subtype, medium email and language en-us, and the name of the document is not specified, the following command line should be used:

```
python upload_documents.py --document <template document>
[--input <doc_format(if empty then 'word')>]
[--name <save name(if empty then 'default')>]
--type <type>
--subtype <subtype>
--media <media>
--language <language>
--flags <flags> (1=Subdocument)
--output <output> 0=NONE,1=PDF,2=PS,3=FO-XML,4=TEXT
```

Option	Description
`--document`	The physical path to the MS Word XML file. If `--document` is `ALL`, all templates in the templates folder are uploaded.
`--input`	Defaults to MS Word. If the experimental upload of old FK XML Forms is used, put `fkf` here.
`--name`	The template document logical name. If left blank, this is `DEFAULT`. If a header is uploaded, for example `CLIENT_HEADER`, it would be the name of the document.
`--type`	The message type, for example `CONFIRMATION`. Type is determined by the folder name.
`--subtype`	The subtype of the document to upload, for example `FX-SWAP`. Subtype is determined by the name of the document file.
`--media`	The media for this document, for example `TRM-MESSAGE-EMAIL` or `TRM-MESSAGE-PRINTER`.
`--language`	Specifies the language of the document.
`--flags`	Set to `1` if the document is a subdocument, reusable component or header; for example `en_US` or `fr_FR`. This also controls the localization of the document.
`--output`	Specifies the email output type. In some cases, when creating email documents that contain an email body and a PDF attachment, the PDF type is determined by the TransferType, but we still need to force the email body to be text. In this case, set `--output` to `4` for the email body.

5.8.3 Authoring template documents

Template files are plain Word documents saved as XML (WordML format). Sample templates are provided in `FK_HOME/etc/document/templates`. Word 2003 or 2007 is required to edit these files. Word XML is a round-trip format, although a small amount of formatting might be lost compared to the native format.

Preparing Word 2003	Preparing Word 2007
• Go to the Microsoft website and download and install a free Add-in for Word 2003.	If you have Word 2007, then you already have XML capability, but may need to activate it as follows: • If the **Developer** tab is not visible in the Word Ribbon (toolbar): **a.** Click the Office button (big round button, top left of the Word screen). **b.** Click the **Word Options** button. **c.** In the Word Options dialog, switch on (check) the **Show Developer tab in the Ribbon** switch (checkbox).
• Ensure that the XML Structure task pane.	• Click **Structure** in the **XML** box of the **Developer** tab.
Before you can start entering data, Word needs to know about the format of the data (which XML tags to use). The format is defined in the XML schema file TremaData.xsd, provided in the same settings folder.	
• In the XML Structure task pane, click **Templates and Add-Ins**.	• Click **Schema** in the **Developer** tab.
This opens the Templates and Add-Ins dialog. From now one the instructions are similar for both Word 2003 and 2007.	

In the Templates and Add-Ins dialog:

1. Select the **XML Schema** tab.
2. Click **Add Schema**.
3. Navigate to `TremaData.xsd`.

Important: The next step should be done very carefully.

4. The URI in the dialog that will open must **precisely** match the following URI:
   `urn:trema.com:module-document-manager:data-tags`

   The alias is not important, but for consistency we suggest that the text "tdm" is entered. We recommend that you also check (switch on) the following options in the XML Options dialog and leaves all other options OFF (accessible from XML Structure task pane once at least one XML schema is associated with the document):

   – **Validate document against attached schemas**

   – **Hide namespace alias in XML Structure task pane**

   – **Show advanced XML error messages**

The editing process can now proceed normally. To enter a placeholder/marker for the transaction/cashflow data, it is enough to type the expression, like this:
`Transaction.portfolio_id.name`

Then select this text and click TremaData in the XML Structure task pane. The marker will be highlighted and easily distinguishable from the rest of the text. The XML Structure task pane will also show a list of all TremaData tags in the document for easy navigation from one to another. You can change the formatting of the placeholder text and it will be preserved.

Sometimes there will be multiple values in the output document even though the template document uses a simple marker. For example, if you specify `Cashflow.value_date`, there will be as many values as are cashflows for the given transaction. This kind of value must be put in the table with a single row for content and as many header rows as required. Values will be expanded to multiple rows as necessary on the fly. There are some limitations (mainly driven by restricted functionality of third party tools): the table has to be manually formatted (not using AutoFormat feature of Word) and the columns have to have fixed width (not automatic which is the default).

There is one special placeholder called Header, used for fields that are not directly data (transaction)-related: things like remarks, recipient and address are exposed through this placeholder. The syntax for the first remark is therefore `Header.remark_0`.

To insert a page break, add the following line:

```
<TremaData>pagebreak</TremaData>
```

5.8.4 Saving Word 2007 XML files

We recommend that you save templates like this: **Save As - Other Formats - Word 2003 XML Document**.

5.8.5 Authoring common placeholders

Besides from data from the Wallstreet Suite you may need other types of information dynamically evaluated during document construction.

Many documents have a placeholder for the date, to be replaced with the current date at the moment of document creation. This is done using the date field in Word: Insert->Field, choose category Date and Time and pick Field name->Date (date format is irrelevant and is ignored for the moment). The resulting field is evaluated as the current date of the document creation using the format of the language set for the document (set up as described in *5.8.2 Settings* on page 84).

A frequent use of images in documents is for logos. To avoid storing logos in every template document, users should always link to the picture and not embed it in the document. To insert a linked image, go to menu Insert->Picture->From File, then navigate to the image and instead of just clicking on Insert button, click on an arrow on the Insert button and choose Link to File.

In contrast, if image is linked, all that needs to be done is to replace the image on the hard drive. All linked images should be put in the images folder. During evaluation, Trema will patch the path to the image to point to the correct folder. You can press Alt+F9 to flip fields from their evaluated form into the formula form and back (this will help identify if a linked image has a broken path but the name of image itself is correct, or if the image linked to does not exist at all).

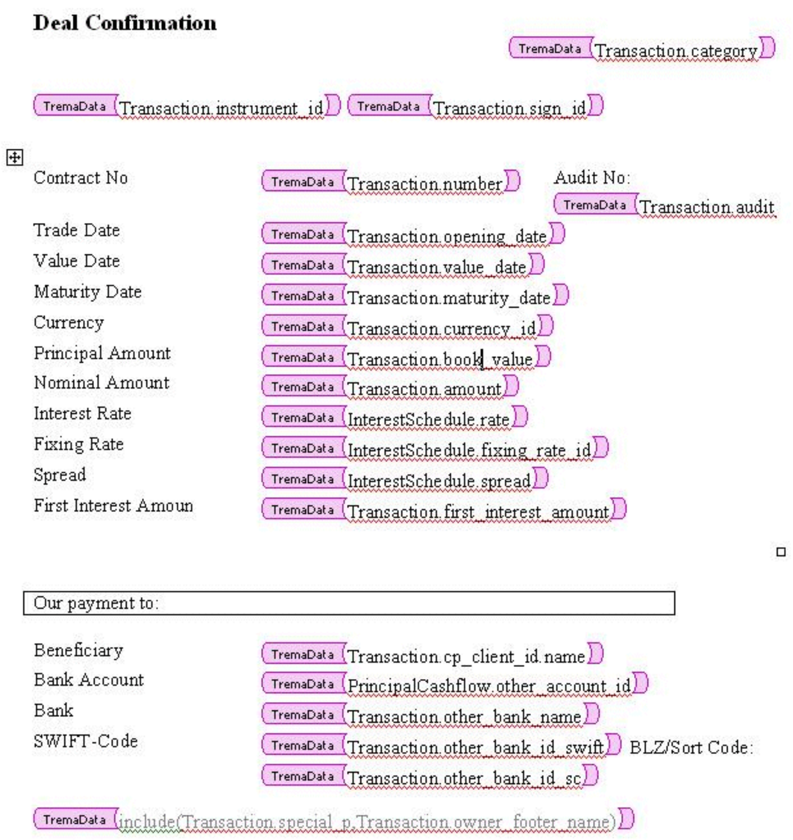
5.8.6 Including reusable text (subdocuments)

You can re-use existing sections in many documents. The inclusion of reusable text (a subdocument) is conditional: a section is included or excluded depending on a certain condition. The main reason for reusing text is to reduce the number of templates. Examples of conditions are:

- If the portfolio_id.owner is your own bank, more details are needed on the document. For example, if the confirmation is to be sent to a counterparty, two places for signatures are required. Note that addresses are written differently in the US and in Europe.
- If the confirmation is to be sent to a certain counterparty, two places are required for signatures.
- Addresses are written one way in US and one way in Europe

5.8.6.1 Writing and uploading templates

This example shows one main document and two subdocuments. The main document is as follows:



Deal Confirmation

TremaData (Transaction.category)

TremaData (Transaction.instrument_id) TremaData (Transaction.sign_id)

Contract No	TremaData (Transaction.number)	Audit No: TremaData (Transaction.audit
Trade Date	TremaData (Transaction.opening_date)	
Value Date	TremaData (Transaction.value_date)	
Maturity Date	TremaData (Transaction.maturity_date)	
Currency	TremaData (Transaction.currency_id)	
Principal Amount	TremaData (Transaction.book_value)	
Nominal Amount	TremaData (Transaction.amount)	
Interest Rate	TremaData (InterestSchedule.rate)	
Fixing Rate	TremaData (InterestSchedule.fixing_rate_id)	
Spread	TremaData (InterestSchedule.spread)	
First Interest Amoun	TremaData (Transaction.first_interest_amount)	

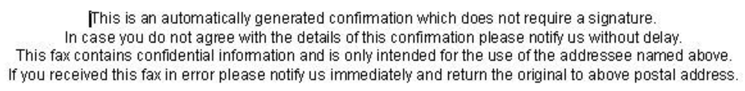
Our payment to:

Beneficiary	TremaData (Transaction.cp_client_id.name)	
Bank Account	TremaData (PrincipalCashflow.other_account_id)	
Bank	TremaData (Transaction.other_bank_name)	
SWIFT-Code	TremaData (Transaction.other_bank_id_swift)	BLZ/Sort Code:
	TremaData (Transaction.other_bank_id_sc)	

TremaData (include(Transaction.special_p,Transaction.owner_footer_name))

The subdocuments are as follows:

CompanyHeader



This is an automatically generated confirmation which does not require a signature.
In case you do not agree with the details of this confirmation please notify us without delay.
This fax contains confidential information and is only intended for the use of the addressee named above.
If you received this fax in error please notify us immediately and return the original to above postal address.

An Include function inside TremaData tags accepts two arguments: the first one is a True/False variable and the second refers to a document which is included if the first variable evaluates to True or to 1.

Subdocuments should be normal documents, where the text goes in the body. The include statements can be placed anywhere in the main document.

The subdocuments are loaded into the database in the same way as normal documents. To upload the above example in the database, execute the following batch file:

```
set DOCMAN_TEMPLATES=d:\work\etc\subdoc

set UPLOAD_SCRIPT=d:\wss\v7\share\python\upload_documents.py

python %UPLOAD_SCRIPT% --document %DOCMAN_TEMPLATES%\default.xml --type FH --subtype
DEFAULT --media TRM-MESSAGE-EMAIL --language en_US

python %UPLOAD_SCRIPT% --document %DOCMAN_TEMPLATES%\ownbank.xml --name OWNBANK
--type FH --subtype DEFAULT --media TRM-MESSAGE-EMAIL --language en_US --flags 1

python %UPLOAD_SCRIPT% --document %DOCMAN_TEMPLATES%\special.xml --name SPECIAL
--type FH --subtype DEFAULT --media TRM-MESSAGE-EMAIL --language en_US --flags 1
```

Note that all are coded with the same type, subtype, media and language. The name is used to label the subdocuments differently from the default one. To reuse the same subdocument for another message type, upload the same xml file with the new type, subtype, media and language.

5.8.6.2 Defining the expressions

In this example there is a condition for including the header: if the owner is ABC, the ABCHEADER subdocument should be included. This condition translates to the following expressions in the MessageTypeEditor:

```
include_p=(owner_id == 'ABC')
owner_header_name=’ABCHEADER"
```

The fields need not be from an expression. For example the `owner_header_name` could also come from a stored procedure: in this case, it is added as content, just like any other field.

Sometimes it is convenient to name the header and footer like the `owner_id`. In this case, this field can be used to name the subdocument to be loaded:

```
owner_header_name=owner_id+'HEADER'
```

If the owner is ABC, the subdocument named ABCHEADER will be loaded if the following include statement is used in the layout:

```
<TremaData>include(Transaction.include_p,Transaction.owner_header_name)</TremaDa
ta>
```

A dedicated header must be uploaded for each portfolio owner.

5.8.7 Customizing the e-mail body

Message Manager uses a default e-mail body (defined in transfer_manager.py), but you can write an e-mail body in MS Word and use it instead of the default. TRM tags are supported as for other documents.

The following example uses one main document which includes two subdocuments, and one body for the e-mail:

```
python upload_documents.py --document %DOCMAN_TEMPLATES%\default.xml --type
TRADE-TICKET --subtype DEFAULT --media TRM-MESSAGE-EMAIL --language en_US

python upload_documents.py --document %DOCMAN_TEMPLATES%\emailbody.xml --name
EMAILBODY --type TRADE-TICKET --subtype DEFAULT --media TRM-MESSAGE-EMAIL --language
en_US --output 4

python upload_documents.py --document %DOCMAN_TEMPLATES%\ownbank.xml --name OWNBANK
--type TRADE-TICKET --subtype DEFAULT --media TRM-MESSAGE-EMAIL --language en_US
--flags 1
```

```
python upload_documents.py --document %DOCMAN_TEMPLATES%\special.xml --name SPECIAL
--type TRADE-TICKET --subtype DEFAULT --media TRM-MESSAGE-EMAIL --language en_US
--flags 1
```

The resulting e-mail to be sent consists of one attached document (default.xml) and the e-mail body (emailbody.xml). The main document also uses two subdocuments (ownbank.xml and special.xml). Note that:

- The subdocuments must be flagged with bit 1 when uploading. Otherwise the formatter will process these documents in the same way as a normal document (this is not needed, as they will be included in the main document).
- The EMAILBODY must be named "EMAILBODY" and it must have output format 4 (i.e. text - see upload_documents.py --help). The exact name "EMAILBODY" is referenced in transfer_manager.py, so if this name is changed, transfer_manager.py must be changed accordingly.

5.8.8 Customizing rounding numbers and amounts

In most cases, all amount and number related fields use the same formatting as in Transaction Manager. If a number is not correctly formatted, check if the field can be changed when configuring Transaction Manager (using the view XML files).

In some cases, if you have customized fields it might still be necessary to fine-tune the number formatting. One way of doing this would be to code the formatting in python and add the fields in document-config.xml. For example, put the following functions in the python script. Numbers and money types are handled differently:

```
def floatround(a,d):
  return round(a,d)


def moneyround(a,d):
  return a.round(d)
```

and in document-config.xml:

```
<expression source="Transaction" script="myscript">
  <field name="rounded_deal_rate" label="Rounded deal rate">
      floatround (deal_rate, 2)
  </field>
  <field name="rounded_amount" label="Rounded amount">
    moneyround (amount, 2)
  </field>
</expression>
```

5.9 Message transfer

When the message is formatted, it exists on disk as a temporary file. The format is given by the TransferType (FO-XML, PDF or Postscript).

The next step is to transfer the file using the given TransferType. Usually, the way of transferring the document or message is very client specific. The message transfer offers built in e-mail support (sending e-mail document as attachment) and execution of scripts. If other processing is required, it needs to be developed as an CSD.

The code which executes the message transfer is scripted (can be customized on site) in python to allow for required flexibility. It can call any other script or executable (e.g. perl or fax client) with needed arguments and all extracted data is available through CORBA.

This script is available in the following locations:

NT:

```
FK_HOME\python\lib\Lib\site-packages\transfer_manager.py
```

UNIX:

```
FK_HOME/lib/python2.4/site-packages/transfer_manager.py
```

The daemon serviced will call a method called transfer with two arguments:

- the message reference. By calling different methods on this reference, you can both fetch data and pass information back to the caller. In the IDL, the following methods are available:

```
// message current status
boolean validate_field (in Type::String_Sequence field_path);

// message current status
void set_status (in Status_Type status);

// log a error message
void log_message (in string msg);

// retrieve the content of the message
Entity_Values_List get_content ()
  raises (Failed);
```

- The URL which is the path to the formatted document (FO-XML, Postscript or PDF).

5.9.1 E-mail example

The E-mail transfer type is available as an example in transfer_manager.py. It should work with only minor modifications. For example the SMTP server and "from" address needs to be changed to reflect your site. Edit line 207 in transfer_manager.py to a valid SMTP server and e-mail address. The default implementation does the following:

1. Fetch address and medium_id from the message reference
2. if the medium_id equals "E-MAIL", an e-mail is constructed directly in the python servant.
3. The subject field is constructed as message type /message subtype + transaction number (Optional)
4. The python smtplib is used to send the message.

5.9.2 Fax example 1

The client has an existing fax script:

```
perl send_fax.pl -n <phone_number> -u <postscript file>
```

To reuse this script we create a TransferType:

Method	FAX	
Address Type	Fax	This makes Message Manager look in the "fax" field in Contact Person tab in Client Editor
Command	perl send_fax.pl -n @address@ -u @url@	
Format	Postscript	Desired file format of the url

When the formatter finishes, a Postscript document is available at:

```
<FK_HOME>/etc/document/interim/tmp11467.ps
```

The address of the recipient is for example +12345, transfer_manager.py automatically translates the @address@ and @url@ so that the actual call to the script will be:

```
perl send_fax.pl -n +12345 -u <FK_HOME>/etc/document/interim/tmp11467.ps
```

5.9.3 Fax example 2

Some fax gateways works by putting the fax number in a certain e-mail address. For example: 12345@mycompany.com would send the attached file as fax to number 12345. In this example we need to modify the transfer_manager.py. First create a new TransferMethod as follows:

Method	FAX-GATEWAY	
Address Type	Fax	This makes Message Manager look in the "fax" field in ContactPerson tab
Command		
Format	PDF	Desired file format of the url

We choose to code this transfer inside the transfer_manager.py. Add the following code snippet just before the create_and_send_email in the transfer method:

```
to_address = content['address'] + "@mycompany.com"
if medium_id == "FAX-GATEWAY":
  self.create_and_send_email(url,to_address,content)
else if medium_id == "E-MAIL":
```

url	Path/url to the document to be faxed
to_address	The destination e-mail address
content	a python *dictionary* which contains all headers and extracted data

In short, we check the transfer method and then modify the address to work with the e-mail fax gateway.

5.9.4 Printer example

Most Postscript printers (UNIX and NT) accept commands like this:

```
lpr -S PRINTSERVER -P TRADE_TICKET_PRINTER file.ps
```

By default, transfer_manager.py calls the command given in the TransferType, so to support printing, the following transfer method is needed:

Method	MYPRINTER	
Address Type		
Command	lpr -S MYPRINTSERVER -P MYPRINTER @url@	
Format	PostScript	Desired file format of the url

5.10 Possible problems and solutions

5.10.1 Developing test cases

It is recommended to design well defined test cases for the documents to be created. A test case defines how to run the test as well as its expected result. For example:

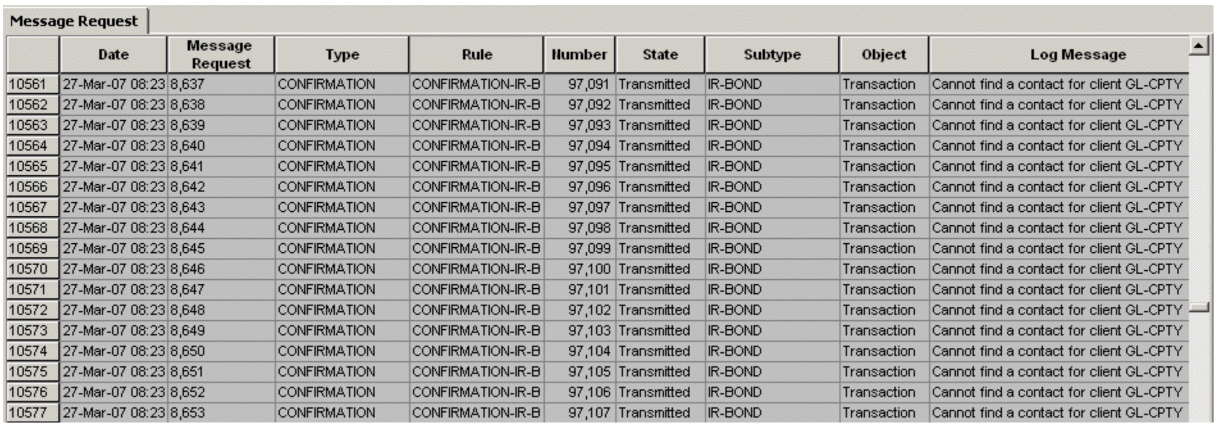
1. Duplicate transaction X
2. Commit transaction X in OPEN
3. Open MessageManager. Verify that there is a new line with message type Y and transaction X
4. After less than 20 sec., the message request should end up in state Transmitted
5. Verify that there is a PDF file created in folder Z
6. Open the PDF and verify the document itself.

If for example there is no PDF file created, there are some tools to find out why the message failed. See sections below. The results of the scripts test.py and callproc.py are useful.

Test cases like this are a good way of measuring progress (the ratio between passed test cases and the total number cases). They are also very valuable for CSS and R&D in case the a solution is not found on the client site (they can be put directly into a TREMS item).

5.10.2 Previewing transactions

Start MessageManager. It is possible to examine errors on both MessageRequest level and for each individual message.


Message Request

	Date	Message Request	Type	Rule	Number	State	Subtype	Object	Log Message
10561	27-Mar-07 08:23	8,637	CONFIRMATION	CONFIRMATION-IR-B	97,091	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10562	27-Mar-07 08:23	8,638	CONFIRMATION	CONFIRMATION-IR-B	97,092	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10563	27-Mar-07 08:23	8,639	CONFIRMATION	CONFIRMATION-IR-B	97,093	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10564	27-Mar-07 08:23	8,640	CONFIRMATION	CONFIRMATION-IR-B	97,094	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10565	27-Mar-07 08:23	8,641	CONFIRMATION	CONFIRMATION-IR-B	97,095	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10566	27-Mar-07 08:23	8,642	CONFIRMATION	CONFIRMATION-IR-B	97,096	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10567	27-Mar-07 08:23	8,643	CONFIRMATION	CONFIRMATION-IR-B	97,097	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10568	27-Mar-07 08:23	8,644	CONFIRMATION	CONFIRMATION-IR-B	97,098	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10569	27-Mar-07 08:23	8,645	CONFIRMATION	CONFIRMATION-IR-B	97,099	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10570	27-Mar-07 08:23	8,646	CONFIRMATION	CONFIRMATION-IR-B	97,100	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10571	27-Mar-07 08:23	8,647	CONFIRMATION	CONFIRMATION-IR-B	97,101	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10572	27-Mar-07 08:23	8,648	CONFIRMATION	CONFIRMATION-IR-B	97,102	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10573	27-Mar-07 08:23	8,649	CONFIRMATION	CONFIRMATION-IR-B	97,103	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10574	27-Mar-07 08:23	8,650	CONFIRMATION	CONFIRMATION-IR-B	97,104	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10575	27-Mar-07 08:23	8,651	CONFIRMATION	CONFIRMATION-IR-B	97,105	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10576	27-Mar-07 08:23	8,652	CONFIRMATION	CONFIRMATION-IR-B	97,106	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY
10577	27-Mar-07 08:23	8,653	CONFIRMATION	CONFIRMATION-IR-B	97,107	Transmitted	IR-BOND	Transaction	Cannot find a contact for client GL-CPTY

By default, previews are not displayed in MessageManager. If the preview fails, use SQL to select the MessageRequest like this:

```
select max(id) from MessageRequest
go
---------------
            1298
(1 row affected)
select log from MessageRequest where id=1298
go
  log

-------------------------------------------------------------------------------------
  Cannot find a matching message rule.
(1 row affected)
```

5.10.3 Test script for previewing transactions

The following is an example of a test script:

```
print "Initializing ..."

from FK.Core import Numeric
from FK.Cache import Cache;
from FK.ORB import Interface, to_value, from_value, get_reference

from IDL.FK.Document_Manager import Manager, Preview_Manager, Message_Manager
from IDL.FK.Document_Manager import Entity_Desc, Field_Name, Optional_Link, Link
from IDL.Type import Parameter


cache = Cache()

def test_preview (number,type):
  print "Txn #%u preview" % number
  manager = Interface (Preview_Manager, "document/manager", "preview-manager")
  res = manager.preview (number, "Transaction", type)
  print "Result in '%s'" % res


# test_preview(41,"CONFIRMATION")
# test_preview(3919,"CONFIRMATION")
test_preview(3361,"ISSUER-FAX-CONFIRMATION")
```

Run the script in a TRM shell like this:

```
set FK_TRACE_LEVEL=10
set DATABASE_DEBUG=1
python test.py > log.txt
```

The environment variables FK_TRACE_LEVEL and DATABASE_DEBUG are used to set the level of details in the logging.

5.10.4 CORBA error when previewing

This section is relevant to CORBA error or something like Xalan stream error.

In most client installations, the FK file tree is not writable. When the PDF is created, Message Manager needs a temporary folder to finish the processing. If FK_HOME\etc\document\interim is not writable, it is necessary to use the environment variable FK_DOCUMENTS_INTERIM_DIRECTORY which must point to an alternative location.

If TRM is launched on a Citrix server, there can be additional write problems. (no error, but file is still not altered/created). Make sure that the location you select is really writable.

5.10.5 E-mail problems on windows

Make sure that your virus program allows messaged to do outgoing connections on the SMTP port (25). The Wall Street virus program blocks this by default.

5.10.6 Error evaluating 'Source.field'

As a first step, check that the extraction was successful. All fields in the final document must be added to [Message Type Editor]. There is a stored procedure called ReadMessage. This procedure should return the Message and the extracted XML content. The message id can be found either in MessageManager or by a simple SQL query.

However, the most common reasons for this are:

- Forgot to declare the field in Message Type Editor

- Spelling mistake in the Word document

5.10.7 Checking the generated messages

The output of the stored procedure ReadMessage<tt> is useful when validating the extracted data. A script <tt>callproc.py simplifies the calling of this stored procedure (especially on Oracle).

```
select max(id) from Message
go

 ---------------
             587
```

Then use the script callproc.py which should work on all platforms. Example:

```
fkadmin3@s96td1p2:/trema/bcust/fk callproc.py
With /trema/bcust/fk/bin/callproc.py you call stored procedures interactively.
    type 'help' and hit [Enter] for instructions.
dbo> readmessage @id=587
address contact_name content date flags format_id id kind language_id last_date log
medium_id number recipient_id recipient_role_id request_id stamp status
0049-180-125-4100 GCM Domestic Customer Service Fr. Dewitz null 11/07/06  2:34 PM 0 1
587 1 en_US 11/07/06  2:50 PM Failed while merging the data and the layout. Xalan
error is XalanStdOutputStreamWriteException: Error writing to standard stream.The
error code is '24'. (, line -1, column -1) FILE-OUT null DEUT-DESTR 1 1755
c8035230424323541c 3
null null
<msg xmlns="www.trema.com">

  <e id="number" n="Transaction">
    <f U="Instrument Type" n="_instrument_type_id"/>
    <f U="Principal Settlement Amount" n="actual_amount"/>
    <f U="Nominal Amount" n="amount"/>
    <f U="Audit Number" n="audit_nu+ null null null 68839 null null null null null 0
null null 1755 c80352304243235164 null
null null mber"/>
    <f U="" n="beneficiary_account_id"/>
    <f U="" n="beneficiary_bank_name"/>
    <f U="" n="beneficiary_bank_sc"/>
    <f U="" n="beneficiary_bank_swift"/>
    <f U="" n="beneficiary_corr_bank_sc"/>
    <f U="" n="beneficiary_corr_bank_sw+ null null null 68840 null null null null
null 1 null null 1755 c803523042432352 null
null null ift"/>
    <f U="" n="beneficiary_name"/>
    <f U="Book Value" n="book_value"/>
    <f U="" n="buyer_name"/>
    <f U="Call Currency" n="call_ccy_id"/>
  snip
```

5.10.8 Filters do not work

Example: problem with filters in the document-config.xml file. The filters are as follows:

```
<filter name="PayCashflow" source="Cashflow">
                 <and>
                 <eq field="sign" type="INTEGER">-1</eq>
                  <eq field="type_id" type="INTEGER">5</eq>
                </and>
                 </filter>
                 <filter name="ReceiveCashflow" source="Cashflow">
                 <and>
                   <eq field="sign" type="INTEGER">1</eq>
```

```
                    <eq field="type_id" type="INTEGER">5</eq>
                </and>
                </filter>
```

Here the problem seems to be the sign. Apparently it matches what you see in the view. In TransactionManager you'll see "+" or "-". In FK_HOME\etc\transaction-view\Cashflow.xml you see:

```
<column name="sign" type="INTEGER" width="8">
<label>Sign</label>
<enumerated name="CashflowSign"/>
</column>
```

The enumerated name CashflowSign looks as this: (FK_HOME\etc\transaction-view\Views.xml)

```
    <enumerated name="CashflowSign">
      <enumeration value="0" visible-value="" visible="false"/>
      <enumeration value="1" visible-value="+"/>
      <enumeration value="-1" visible-value="-"/>
    </enumerated>
```

So, try the following in document-config.xml instead:

```
<filter name="ReceiveCashflow" source="Cashflow">
<and>
<eq field="sign" type="STRING">+</eq>
<eq field="type_id" type="INTEGER">5</eq>
</and>
</filter>
```

The type_id is the "Main Type" and it is an integer even in Cashflow view/Transaction Manager. You can also use the "#" sign to use the underlying type and value. This is a better long-term solution, in case the views are changed.

```
<filter name="PayCashflow" source="Cashflow">
              <and>
                  <eq field="#sign" type="INTEGER">1</eq>
                  <eq field="type_id" type="INTEGER">6</eq>
               </and>
            </filter>
```

Chapter 6 Managing static data

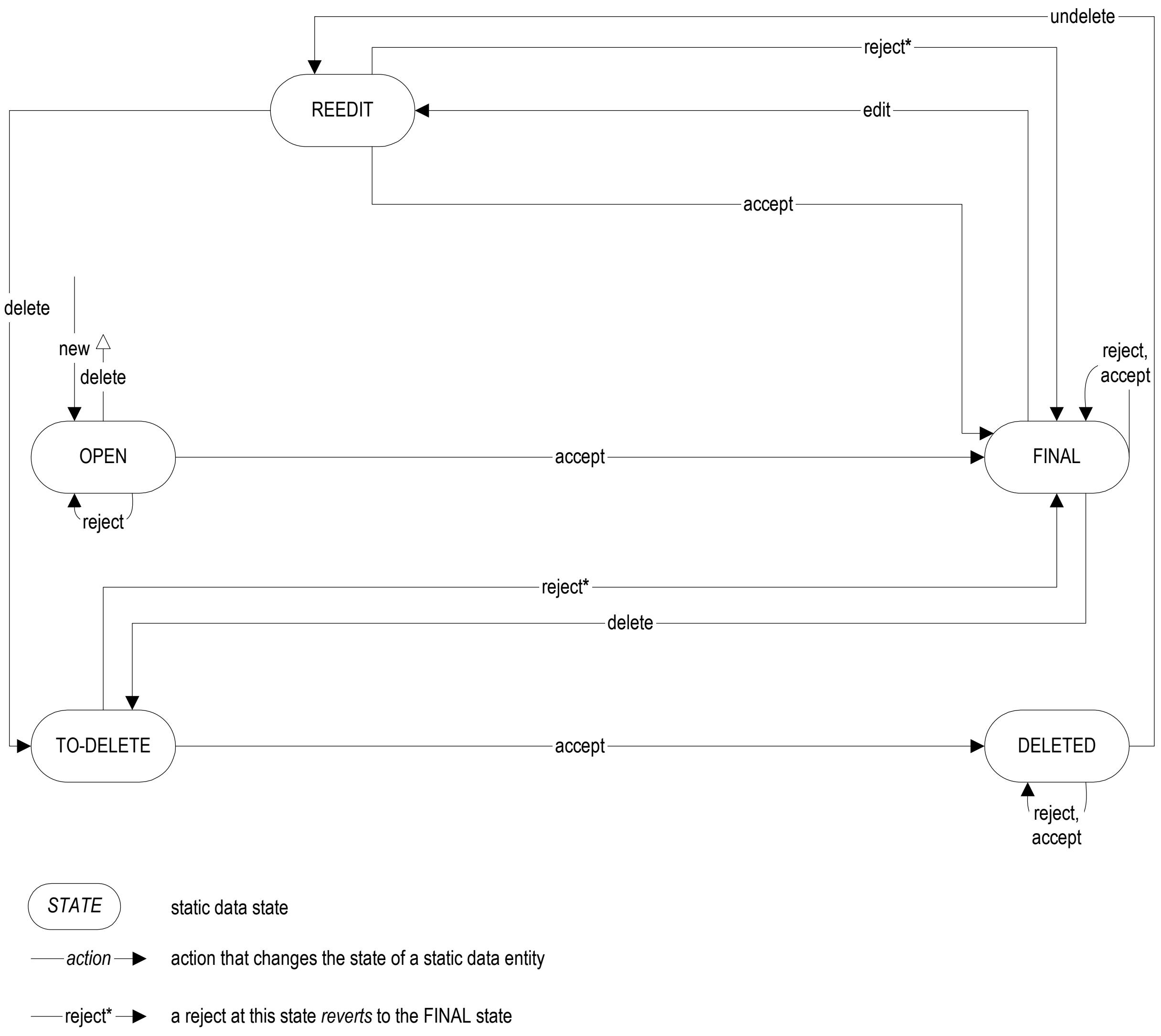
6.1 Introduction

Wallstreet Suite manages its static data within a workflow in order to provide:

- Controlled access to modifications
- 4-eyes verification
- Synchronization of static data shared between Wallstreet Suite modules.

6.1.1 Static data workflow

A static data "entity" (for example: client, currency, country, etc) has a state that determines its position in a workflow. An entity's state changes depending on the last action that was performed on the entity. The diagram below shows an example workflow of states and actions:



There are five main states for all static data entities:

- OPEN

  The state of an entity when it is first created, as a result of the action **new**. For example, a user creates a new currency in the Currency Editor.

  The Wallstreet Suite production system is not yet aware of this entity.

- FINAL

  The entity’s state after the action **accept** on an entity that has been created (OPEN) or modified (REEDIT). For example, a user has created a country entity modified an existing country entity in the Country Editor and accepts it.

  If this is a new entity, it is added to the production system. If this is a modified entity, its "live" version in the production system is updated.

- REEDIT

  The state of an existing entity that is being modified, as a result of an action such as **edit**. For example, a user opens the Client Editor, and selects a client entity for editing.

  In this state, two versions of the entity exist: the production system’s version, and the "being modified" version. The entity must pass to state FINAL before the production system is aware of changes to the entity.

- TO-DELETE

  The state of an existing entity that is about to be deleted, as a result of an action such as **delete**. For example, a user opens the Client Editor, and selects a client entity for editing.

  In this state, two versions of the entity exist: the production system’s version, and the "being modified" version. The entity must pass to state DELETED before it is deleted from the production system.

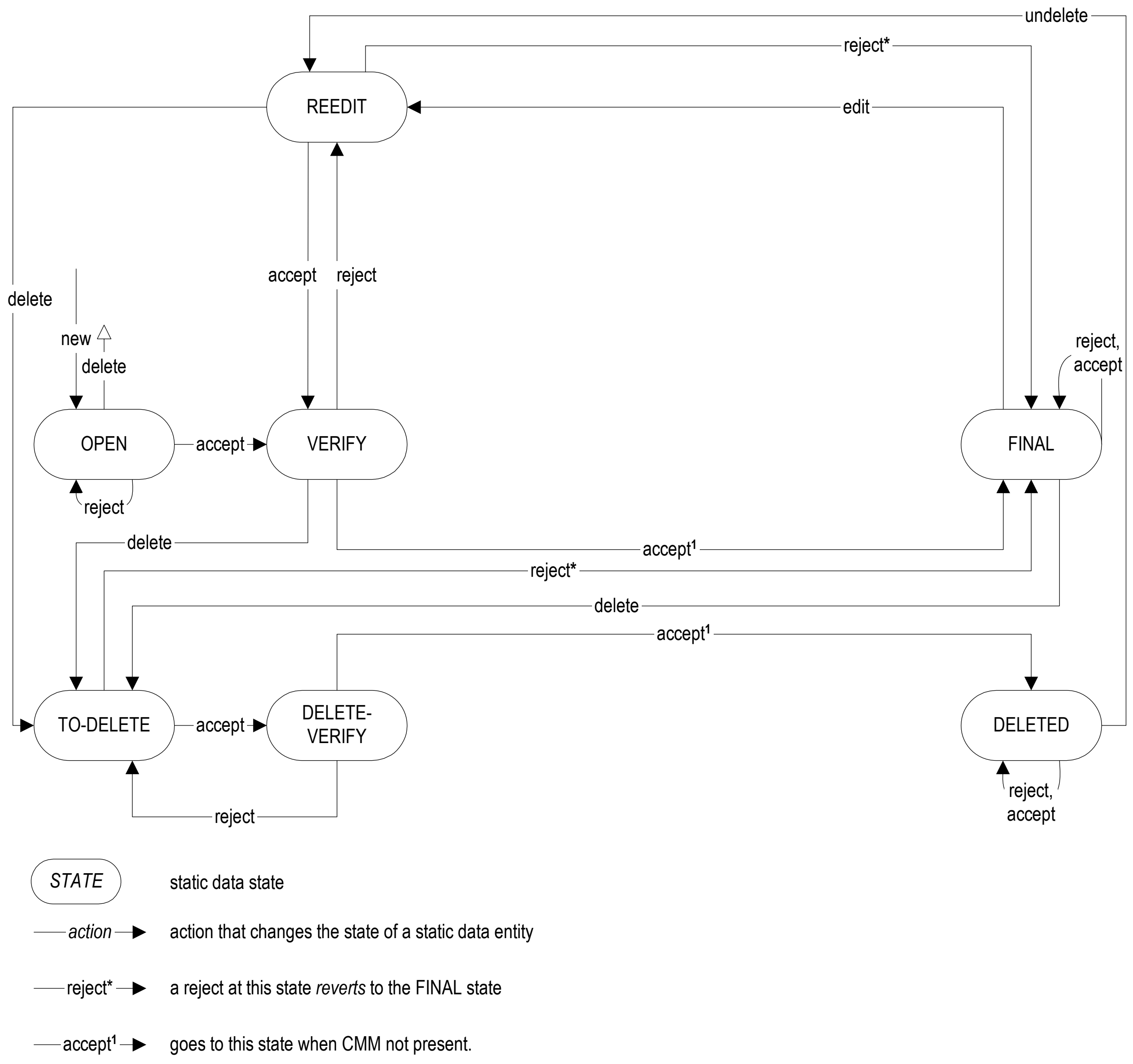
- DELETED

  The state of an existing entity that has been deleted as a result of the action **delete**.

  The entity is removed from the production system.

6.1.2 Static data workflow with 4-eyes verification

The next diagram shows an example of a Wallstreet Suite system with "4-eyes" verification. Two extra states - VERIFY and DELETE-VERIFY - have been inserted into the workflow:



The two new states:

- VERIFY

  The entity's state after the action **accept** on an entity that has been created (OPEN) or modified (REEDIT). The second pair of eyes must accept the entity's state again so that it can pass to state FINAL.

- DELETE-VERIFY

  The entity's state after the action **accept** on an entity in state TO-DELETE. The second pair of eyes must accept the entity's state again so that it can pass to state FINAL.

6.1.3 Static data workflow: CMM and TRM

If CMM is installed, static data management handles CMM-only static data entities and those shared by TRM and CMM. For more information, see the CMM documentation and *6.3 TRM with CMM - static data changes* on page 104.

6.2 Setting up static data management

Static data management applies to the following static data entities only:

Calendar

CalendarGroup

CMMBankAccountGroupMap

CMMInstrumentTypes

CMMRelationshipType

CommentRule

CommissionRule

Country

CreditRating

Currency

FINFormatRule

FINFormatRuleAction

Gapset

Limit

LimitCategory

LimitFactorSet

LimitItemClientQuery

LimitItemTemplate

MarketInfoSource

Portfolio

RateReasonabilityRule

ReferenceRate

Region

RulesHeader

SettlementAdviceMethod

SettlementRulesHeader

SettlementTransferMethod

SublimitTemplate

TaxRule

TraderLimit

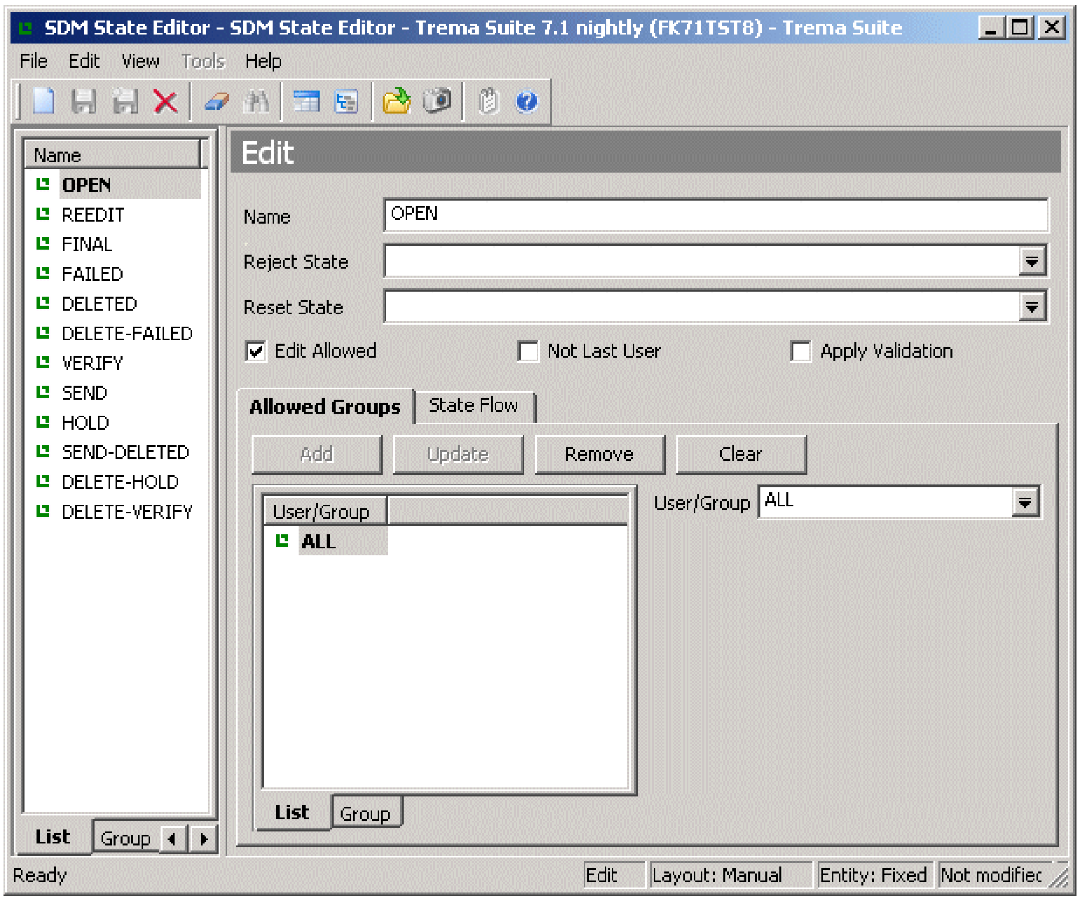
TransferType

The following applications are available from the Application Manager to enable you to set up and administer static data:

- SDM State Editor: set up states and state flow
- SDM Mode Editor: manage modes for applications, including static data Editors and the SDM Manager applications.

6.2.1 State and state flow setup

From the Application Manager, open the SDM State Editor.



Name: OPEN
Reject State:
Reset State:
[✓] Edit Allowed
[ ] Not Last User
[ ] Apply Validation
User/Group: ALL

On the left is a list of currently defined states.

A static data state has attributes that describe and determine what should happen when an action occurs. For example, what the next state should be if the entity receives a reject or accept action, if a user can verify his/her own changes, and so on. Use the SDM State Editor to set these attributes, and use the table below to help you.

The table below describes the controls in the top part of this editor:

Control	Description
Name	A descriptive name for the state.
Reject State	The entity changes from this (current) state to the state selected here after a **reject** action. Select or enter the next state. Leave blank to remain in the current state after a **reject** action.
Reset State	If a state is selected here, it does two things: • When an entity reaches the current state, and the **Reset State** is not blank, the production system is updated with this entity’s data. Normally this applies only to the FINAL and DELETED state. • When an entity in this state is to be edited (i.e. modified or deleted), it goes to the state selected in **Reset State**. Except fore the FINAL and DELETED states, you should normally leave this field blank.
Edit Allowed	Switch this on to allow modifications (other than accepting and rejecting) to an entity in this state.

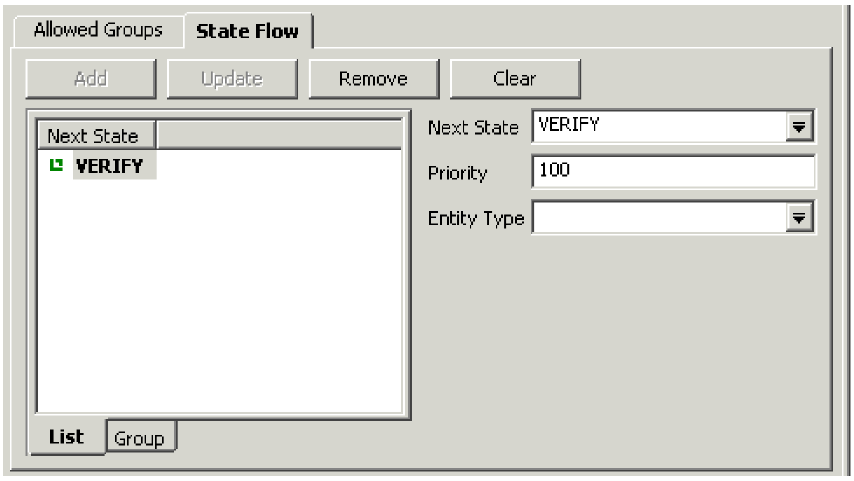
Control	Description
Not Last User	Check this to prevent a user from accepting the state change of an entity to this state if the same user was responsible for the state change.
Apply Validation	Switch this on to validate an entity before sending it to the next state. The validation process checks that all the entity's dependencies already exist in the production system. For example, for the entity type Client, validation would include ensuring that its defined Country and Currency entities already exist in the production system.

The **Allowed Groups** page of this editor enables you to determine which Wallstreet Suite users and user groups can access the currently selected state. If a user is not in a group that is defined for a state, then all entities in that state are invisible to that user.

6.2.1.1 Next state after an Accept action

The **State Flow** page enables you to configure the next state that an entity is sent to when an **accept** action is performed on the entity. You can define multiple "Next States, each with different conditions.

By setting a different priority number for each "Next State", you ensure that only one "Next State" will be chosen by the system.



Next State: VERIFY
Priority: 100
Entity Type:

There are three types of matching criteria:

- Always match

  By leaving the Entity Type undefined, all entities in the current state that receive an accept action will match the criteria for this "Next State".

  Creating a "Next State" with these criteria is very important where you have defined other "Next States with more selective conditions. By setting the **Priority** to a higher number than all other "Next States defined, you guarantee that if no other "Next State" match is found, this one will be used.

- Match on entity type

  You can use this to change the state flow for certain entity types.

  For example, for most entities in state REEDIT, you decide to send them to state VERIFY on an **accept** action. So for the REEDIT state, you define a "Next State" of VERIFY, with no conditions and a low priority. But you do not need verification for Calendar Group entities that are in the REEDIT state: once accepted, they can be sent directly to state FINAL. So you define a second "Next State" of FINAL, where you select Calendar Group as the **Entity Type**, and give this a higher priority than the VERIFY "Next State".

The table below describes the controls in the **State Flow** page of this editor:

Control	Description
Next State	The entity changes from this (current) state to the state selected here after an **accept** action, as long as any criteria defined are met.
Priority	If several "Next States are configured, and more than one match is found, the "Next State" with the highest priority (lowest number) wins.
Entity Type	If you want this "Next State" to apply to a single entity type only, select or enter an entity name.

6.2.1.2 Creating and deleting states

You cannot create or delete SDM states using the SDM State Editor. Instead, you should edit the file `$FK_HOME/share/<your_database_type>/data/sdm_state.pl`. If you want to create a state, then you should use the ID numbering convention that is recommended in the file.

When modified, the content of the file `sdm_state.pl` must be stored in the database using the command:

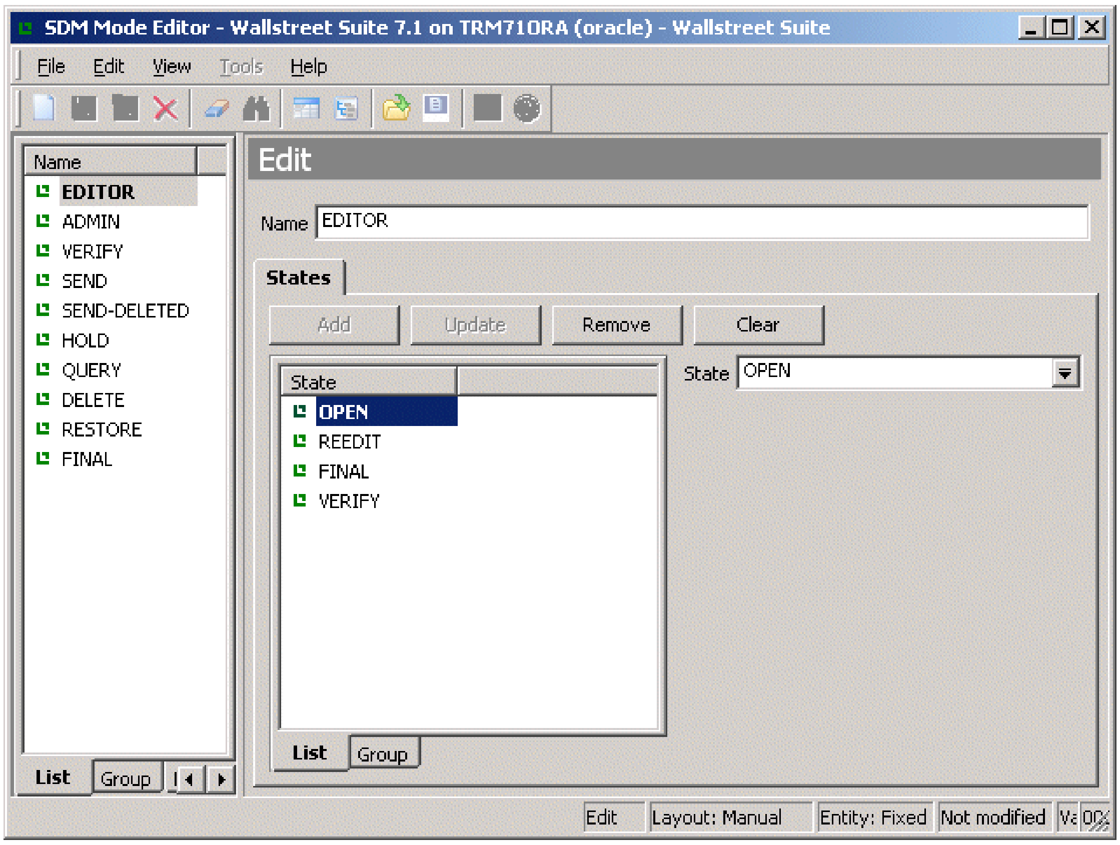
```
perl build.pl <connection_options> -t <sdm_state.pl>
```

Where `<connection_options>` means the database connection options as described in the *WSS Database Setup Guide* (see the Appendix about the `build` command).

Note: This command restores the table data as defined in this file, so any data in this table that has been modified via the SDM State Editor will be lost.

6.2.2 Mode setup

From the Application Manager, open the SDM Mode Editor.



Name: EDITOR
State: OPEN

On the left is a list of currently defined modes.

A static data mode is a collection of static data states. There are four system modes, and modes used as views and filters by the Static Data Manager applications - see *6.4.2 Using SDM Manager applications* on page 107.

6.2.2.1 The four system modes

These are:

1. EDITOR
   This is the mode used by all static data Editor applications. This mode should contain all states **except** the "system" states controlled by the TRM/CMM synchronization process (all states shown in the greyed area of the diagram under *Static data flow: TRM with CMM and 4-eyes verification* on page 105.

   The EDITOR mode determines how a static data Editor behaves when in its Edit mode. In Edit mode, an Editor displays entities in all states (except the "deletion" states - state names that begin with "DELETE..."), but it allows users to use **Tools - Accept/Reject** only on entities that are in states defined in the EDITOR mode.
2. SEND
   This defines the SDM Synchronizer mode for selecting entities to send to CMM.
3. SEND-DELETED
   This defines the SDM Synchronizer mode for selecting entities to be deleted, and sending them to CMM. This mode contains the DELETE-SEND state only.
4. HOLD
   This is an internal SDM Synchronizer mode which contains the HOLD and DELETE-HOLD states.

The last three modes are only relevant if you have CMM installed. for more information, see *6.3 TRM with CMM - static data changes* on page 104.

6.2.2.2 Creating and deleting modes

You cannot create or delete SDM modes using the SDM Mode Editor. Instead, you should edit the file `$FK_HOME/share/<your_database_type>/data/sdm_mode.pl`. If you want to create a mode, then you should use the ID numbering convention that is recommended in the file.

When modified, the content of the file `sdm_mode.pl` must be stored in the database using the command:

```
perl build.pl <connection_options> -t <sdm_mode.pl>
```

Where `<connection_options>` means the database connection options as described in the *WSS Database Setup Guide* (see the Appendix about the `build` command).

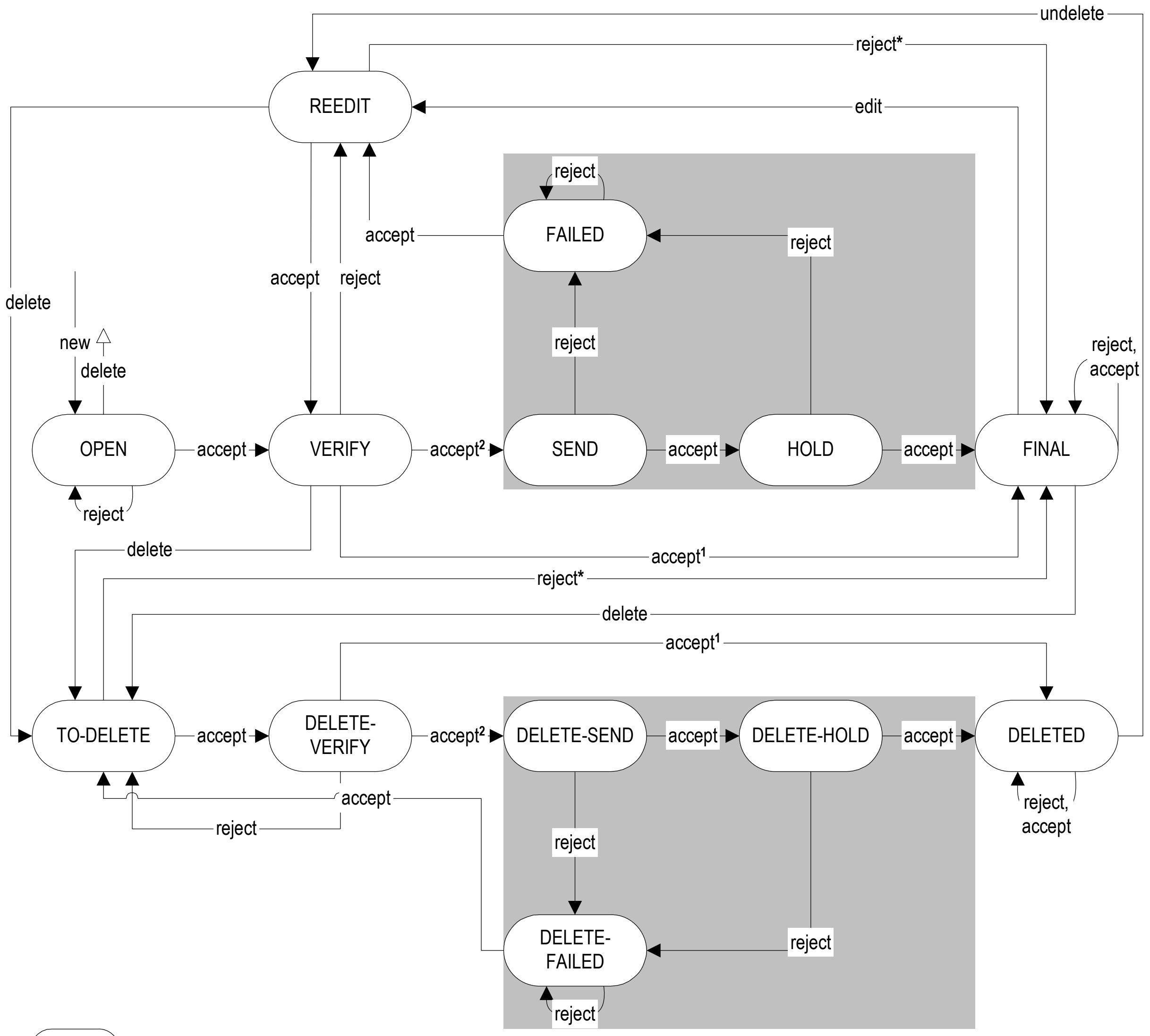
Note: This command restores the table data as defined in this file, so any data in this table that has been modified via the SDM Mode Editor will be lost.

6.3 TRM with CMM - static data changes

When CMM is installed, TRM handles the administration and editing of CMM-only static data entities as well as those entities shared by both modules.

The SDM Synchronizer is a software system that provides the bridge between static data entities in the TRM database and the CMM database, and provides the system states SEND, FAILED, HOLD, DELETE-SEND, DELETE-FAILED, and DELETE-HOLD that help manage the synchronization of static data between TRM and CMM. See the CMM documentation for installation details.

Static data flow: TRM with CMM and 4-eyes verification



STATE	static data state
—*action*→	action that changes the state of a static data entity
—reject*→	a reject at this state *reverts* to the FINAL state
—accept¹→	goes to this state when CMM not present.
—accept²→	goes to this state when CMM is present, and applies only to shared TRM/CMM entities and CMM-specific entities: Currencies, Countries...
▨	SDM - synchronizer flow for entity types that are shared between TRM and CMM, and entities that are CMM-only

6.3.1 Dependencies between entities

When an entity is sent from TRM to CMM, CMM fails the entity if its dependent entities do not exist. The table below shows the dependencies for SDM-enabled entities. CMM entities are indicated. Dependencies with further dependencies are marked "-->".

Entity	Dependency
CalendarGroup	CommissionRule Country (CMM) --> Currency (CMM) --> GapSet MarketInfo
Client (CMM)	Accounting AccountingClosingBook CMMBankAccountGroup (CMM) CommissionRule Limit LimitFactorSet LimitItemClientQuery Portfolio RulesHeader SettlementRulesHeader TaxRule
ClientAccount	CommissionRule
Country (CMM)	Client (CMM) --> LimitItemClientQuery
CreditRating	Client (CMM) -->
Currency (CMM)	AccountingClosingBook CMMBankAccountGroup (CMM) Client (CMM) --> CommissionRule Country (CMM) --> Limit LimitFactorSet Portfolio --> ReferenceRate (CMM) RulesHeader --> TraderLimit
GapSet	Currency (CMM) -->
LimitCategory	Limit
LimitItemClientQuery	Limit
LimitItemTemplate	Limit
Portfolio	Client (CMM) --> Limit LimitFactorSet Portfolio -->
Region (CMM)	Client (CMM) -->

Entity	Dependency
RulesHeader	Accounting Client (CMM) --> FINFormatRule
SettlementRulesHeader	FINFormatRule PaymentAdviceType
SublimitTemplate	Limit
TransferType	SettlementRulesHeader -->

6.4 Using SDM-managed entities

6.4.1 Using static data editors

When you open the Static Data Editor for an SDM-managed entity, the options in the **Tools** menu and editor main window are as follows:

Menu Option	Description
Swap View/Edit Mode	When the Editor is launched, it starts up in View mode and no changes can be made. Select **Swap View/Edit Mode** to launch a new instance of the editor in Edit mode.
Accept and Reject	In Edit mode, these options are available to users who have the right to accept or reject the entity in its current state. Accepting or rejecting an entity changes it to the state defined for that entity in the State Editor: see *6.2.1 State and state flow setup* on page 101.
SDM Read-only/SDM Edit	One of these views can be selected from a pull-down menu on the main toolbar. If **SDM Edit** is selected, the left and right arrow buttons can be used to specify SDM Accept or SDM Reject.

6.4.2 Using SDM Manager applications

There are three SDM Manager applications: SDM Query, SDM Admin, and SDM Verify.

6.4.2.1 SDM Query application

Use this to view the status of SDM-managed entities. The entity states that you may view here depends on the states selected for the QUERY mode in the SDM Mode Editor.

You can edit an entity by selecting one in the Query results and selecting the **Command - Edit** menu option.

6.4.2.2 SDM Verify application

Use this to view the status of SDM-managed entities, and accept or reject their current status. The entity states that you may view here depends on the states selected for the VERIFY mode in the SDM Mode Editor.

You can edit an entity by selecting one in the Query results and selecting the **Command - Edit** menu option.

6.4.2.3 SDM Admin application

Use this to view the status of SDM-managed entities, and accept or reject their current status. The entity states that you may view here depends on the states selected for the ADMIN mode in the SDM Mode Editor.

You can edit an entity by selecting one in the Query results and selecting the **Command - Edit** menu option.

6.5 Tables and processes used

Every aspect is defined and processed for a given entity type (Payment, PaymentAlloc…).

Table	Data
EntityState	States
[EntityRule]	Rules used to activate / inactivate specific work flow transitions (relates to EntityAction)
EntityAction	Work flow transitions
ModeColumn (shared with Transaction work flow)	Columns for a given view (Transaction, Cashflow, Schedule…) to be granted or not (relates to EntityMode) for a given mode
ModeAction (shared with Transaction work flow)	Menu, entity and sub-entity level action (New Transaction, Duplicate, Early-expire, Fix…) to be granted or not (relates to EntityMode) for a given mode
EntityMode	Modes, each of them operating on a set of states. Two granting aspects: • grant_p: relates to ModeColumn • action_grant_p: relates to ModeAction where: • 0 means all is granted but what is listed in underlying table • 1 means only what is listed in underlying table is granted

Setup Process	Action
SetupEntityState	Enables setup of EntityState
SetupEntityAction	Enables setup of EntityAction
SetupModeColumn (shared with Transaction work flow)	Enables setup of ModeColumn
SetupModeAction (shared with Transaction work flow)	Enables setup of ModeAction
SetupEntityMode	Enables setup of EntityMode
RenumberEntityStates	Enables renumbering of states with regular gaps

Action Process	Action
DoEntityAction	Enables the sequential processing of entity actions as a chain driven by order number and rule (uses MatchingEntityRule)

Action Process	Action
MatchingEntityRule	Enables entity rule matching (used by DoEntityAction, relates to EntityRule)
DoAmountEventSetState	Specific action proc to set state for AmountEvent entity type
DoPASetState	Specific action proc to set state for PaymentAlloc entity type
DoMessageRequestSetState	Specific action proc to set state for MessageRequest entity type
DoPSetState	Specific action proc to set state for Payment entity type
DoCancelEntityInput	Cancels entity event / accounting input
DoEntityInput	Creates entity event / accounting input

Setup Script	Action
amount_event_flow.sql	For Amount Event entity
message_flow.sql	For Message Request entity
payment_alloc_flow.sql	For Payment Allocation entity
payment_flow.sql	For Payment entity

Chapter 7 Setting up transaction and entity flow

7.1 Transaction flow and entity flow

The transaction flow describes the states through which a transaction moves, reflecting the workflow within the user organization. It can ensure that only specified functions can change a transaction, and can be used to specify who can process the transaction; for example, to specify that only Front Office staff can change the price of a transaction.

The entity flow describes the states through which various other entities (e.g. settlement or message) move in their respective workflows.

Flow functionality is implemented using transaction and entity broker services. These services provide a set of agents which execute tasks like those executed by Transaction and Entity Actions in previous versions, e.g. set transaction/entity state, set/clear transaction status and call stored procedures. They also support sending the transactions and entities to various queues for further processing, like creating message requests for confirmation processing or generating settlements from transactions. This chapter includes a description of how to migrate to a TRM 7.2-onwards transaction flow.

7.2 Loading default transaction flow

TRM has a default transaction flow setup. To load it, run the following setup scripts available in `$FK_HOME\share\<database>\setup` to load default definitions of the permissions, transaction status and transaction states to be used in the flow into the database:

```
permission.sql
status.sql
tag.sql
transaction_state.sql
```

Then execute the following command to build the default transaction flow:

```
   python -m flow.build
```

This command executes the following setup scripts as one logical step to build the entire transaction flow:

```
flow.py
commit.py
status.py
tag.py
limit.py
irp.py
```

These scripts can also be run individually from the directory `$FK_HOME\share\python\flow` (e.g. `python status.py`) but the recommendation is to always use the `python -m flow.build` command and build the whole flow in one step. The roles of the individual scripts are as follows:

- `flow.py` creates ACCEPT and REJECT operations, defining transitions between states as well as all other processing automatically triggered by accepting or rejecting transactions from their current states

- `commit.py` creates a COMMIT operation and a NOTIFY operation, defining all processing automatically triggered by applying a new or existing transaction.
- `status.py` creates SET/CLEAR operations for transaction status, defining all processing automatically triggered by manually setting or clearing the relevant status in a transaction.
- `tag.py` creates SET/CLEAR operations for transaction tags, defining all processing automatically triggered by manually setting or clearing the relevant tag in a transaction.
- `limit.py` creates operations used by the limit server in limit violation-related processing of transactions.
- `irp.py` creates the operations necessary for processing transactions from IR Pricing application. This script must not be modified.

7.3 Setting up transaction flow

Transaction flow consists of several logical components linked together in the setup of transaction broker operations by the script `flow.py`. These components and their modeling and setup are discussed below in more detail.

7.3.1 Setting permissions

Operations in transaction flow can be made conditional on the user having the correct permissions in the portfolio of the transaction. These permissions are referred to in `flow.py` and `status.py` and must exist in the database for the flow setup to work.

Permissions are set up using a script `permission.sql` found in `$FK_HOME\share\<database>\setup`. This script executes stored procedure *SetupPermission* to create permissions using the parameters given in the script e.g. as follows:

```
exec SetupPermission @id = "STATE-VERIFY",
      @name = "Verify",
      @comment = "accept/reject transactions from VERIFY states",
      @flags = 2 /* PORTFOLIO */
go
exec SetupPermission @id = "STATUS-LIMIT-VIOLATION",
      @name = "Set/Clear Limit Violation",
      @comment = "update (set/clear) status LIMIT VIOLATION",
      @flags = 2 /* PORTFOLIO */
go
```

Note that all permissions used in transaction flow must have flags set to value 2, identifying them as Portfolio permissions.

The fields of the *SetupPermission* procedure used in the script are given in the table below.

Parameter	Description
id	Permission ID (Create, Remove, Read, and other permissions)
name	Name of the permission
comment	Comment used for generic error messages
flags	Possible flag values are 1: editor; 2: portfolio; 4: market information; 8: payments; 16: domain; 32: custody; 64: archive.

7.3.2 Setting Transaction Status

Transaction Status is a bit value that identifies a specific characteristic in a transaction (e.g. 32 – 'Back Violation' is used to identify a transaction that has been captured with a historic opening date) and can be used in various ways inside the transaction flow setup:

- Transaction Status can be manually set or cleared via a specific operation set up in `status.py`
- Transaction Status can be automatically set or cleared inside another operation (e.g. ACCEPT or REJECT set up in `flow.py`)
- Operations (e.g. ACCEPT or REJECT) can be made conditional on the transaction having or not having a specified status

Setup of Transaction Status is done using the script `status.sql`, available in `$FK_HOME\share\<database>\setup`. This script executes the stored procedure *SetupStatus* to create status entries using the parameters given in the script as in this example:

```
exec SetupStatus @status = 16,
     @name = "Limit Violation"
go
```

The fields of the *SetupStatus* procedure used in the script are given in the table below.

Parameter	Description
status	The bit mask identifier: can have values 1,2,4,8,16... etc.
name	Name to be shown in the *Status* transaction column of transaction manager.

7.3.3 Setting transaction tags

Transaction Tags are very similar to transaction status and are also used identify a specific characteristic of a transaction in a binary manner, a transaction either has the tag or it does not. The main differences between transaction status and tags are technical:

- Tags are identified by strings of characters; statuses are numeric values.
- A transaction has no limitation in the number of its tags; there is a maximum of 31 statuses.
- Tags are stored independently from transactions (in the TransactionTag table) so that several processes can modify them at the same time without locking or modifying the attached transactions. This is important in some processing as it ensures secure concurrent access to transactions. For example, when the limit server is setting or clearing the tag 'Limit Violation' for a transaction being processed by a user in Transaction Manager)

Tags can be used in transaction flow setup in the same way as status. Because there is no limitation on the number of tags in the system and because there is no risk of the system taking over in later versions tag values that are currently available (as can happen with status), using tags is recommended as a primary means of modeling customer-specific characteristics of transactions.

Setup of Transaction Tags is done using the script `tags.sql`, available from `$FK_HOME\share\<database>\setup`. This script executes the stored procedure `CommitTag` to create tag entries using the parameters given in the script as in this example:

```
exec CommitTag @id = "LIMIT-VIOLATION",

     @name = "Limit Violation"

go
```

The fields of the CommitTag procedure used in the script are given in the table below.

Parameter	Description
id	Tag ID
name	Tag name

7.3.4 Setting Transaction States

Transaction States are the most important building blocks of transaction flow. States are configured using a script `transaction_state.sql` found in `$FK_HOME\share\<database>\setup`. This script executes the stored procedure *SetupState* to create state entries using the parameters given in the script, as in this example:

```
/* State for first verification of new committed transactions */
exec SetupState @id = "VERIFY",

        @name = "Verify",
        @after_state_id = "OPEN",
        @flags = 16 /* DEFAULT-P */

go
```

The fields of the *SetupState* procedure used in the script are given in the table below.

Parameter	Description
id	The ID of the state.
name	Name to be shown in the *Transaction State* transaction column of transaction manager.
flags	Flags which can be used to link various characteristics to transactions that have reached a state with the flag in transaction flow, for example Payable, Bookable.
context	A special meaning of this state matches an entry in the *TransactionStateContext* table.
category	Category of the state. This is currently only used as a parameter in SetupMode procedure to make it easier to set up Transaction Manager modes for specific subsets of transaction states (e.g. states in parallel flow used for processing CLM transactions in default transaction flow).
after_state_id	The order number of the state will be set to a higher number than this state.
before_state_id	The order number of the state will be set to a lower number than this state.
state_id	The order number of the new state will be set to the same as the order number of this state.

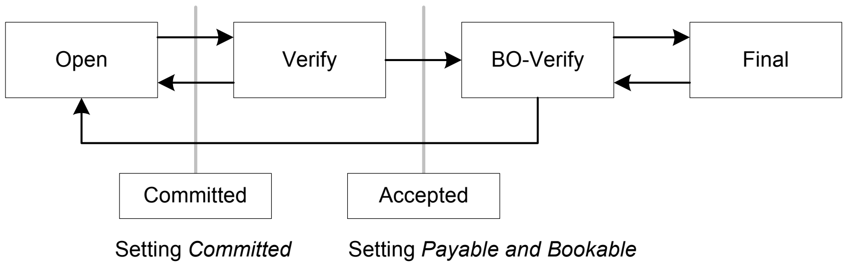
The logical order of states is important. A 'minimum state' type query condition ("transactions have to be at least in state xyz") is typically used when running reports or identifying transactions for specific processing (e.g. for generating settlements). This order is controlled by the content of the `transaction_state.sql` script. This script finishes by executing procedure *RenumberStates* and, when run, prints out the configured states in the order by number. This output is very useful for ensuring that the intended order of states was achieved by the setup

7.3.4.1 Transaction State flags

Flags in the *TransactionState* definition are used to set certain special characteristics to states. Typically, flags are used to dynamically link this characteristic to any transactions that have reached the first state with the flag in the transaction flow. For example, they can identify when a transaction becomes available to be paid and booked (flags *Payable* and *Bookable*).

For example, when using flag 'Payable' to identify transactions from which settlements may be generated, the query looks in the *TransactionState* table to find the first state ID (based on number of the state) with flag 'Payable'. It then compares that state's order number with the order number of the current state of the transaction. If the transaction's state order number is equal to or higher than the "payable state", settlements will be generated. (Flags apply to all states with order numbers equal to or higher than the order number of the state that set the flag.). Note, however, that these flags exist only in the *TransactionState* table. For example, you will never see a transaction that has the *Payable* flag set.

A common way to use this type of flag is to create "pseudo states," with no transitions leading to or from them in the flow, and to assign the flags to these states. They are present just to mark an invisible place in the flow: the *number* column in the *TransactionState* table (order number of states). These pseudo states are represented as states that are separate from the transaction flow. The following figure illustrates some pseudo states.



The other typical use of state flags is to identify the state as a default to be assigned to new transactions generated systematically (e.g. cost of carry balance transactions created by the system).

The table below lists the flag values that each Transaction state can have.

Value	Name	Description
1	SELLABLE	The transactions that have reached this state will be handled by the activity Sell Batch.
4	REALIZABLE	The realizing activities only handle transactions that are in this "realizable state".
16	DEFAULT	The default transaction state shown in start-up boxes, for example when starting a report.
32	HIDDEN	Not shown in selection lists.
128	COMMITTED	Transactions are considered committed, that is they are taken into account in custody balances.
256	CLOSABLE	Used by the *UpdateInventory* procedure, from *CancelTransaction* procedure.
512	BA-BALANCE	This "BA-balance state" is used for bank account balances if no transaction state is specified for the Bank Account Balances activity.
1024	CANCELED	This flag is used to give a "canceled state" to canceled transactions.
2048	COST-OF-CARRY	This "cost-of-carry state" is used for cost-of-carry transactions, if no transaction state is specified for the Cost-Of-Carry activity.
4096	AVG-BALANCE	This "average-balance state" is used for average cost balance transactions if no transaction state is specified for the Average Balances activity.
8192	DIVIDEND	This "dividend state" is used for dividend transactions if no transaction state is specified for the Dividend activity.
16384	DETACHMENT	This state is used for the detached transactions created by the Equity Detachment activity.
32768	CONVERSION	This state is used for the converted transaction by the Equity Conversion activity.
65536	FX-POSITION	This state is used for the FX position transactions created by the FX Position Roll-Over activity.
131072	INDEX	This state is used for the transactions created by the Index Portfolio Creation activity.
262144	SM-NOT-EDITABLE	The transactions in this state cannot be modified in Settlement Manager.

524288	PROVISIONAL	The threshold below which transactions are not even provisional (simulated or rejected), and above which they are provisional (to be possibly considered in position/risk, but not fully finalized). Mainly used in CLM.
1048576	FINAL	The threshold below which transactions are not finalized (are provisional or being enriched/verified), and above which they are fully finalized. Mainly used in CLM.
2097152	AUTOMATIC	This state is used for automatic processing by the system. This flag is primarily used to ignore any states in a "4-eyes" check in the transaction flow where the user who is accepting a transaction is validated against the user who made the previous accept for this transaction from any state without this flag.

7.3.4.2 Transaction State contexts

Contexts in the *TransactionState* definition are used to identify states used for special purposes. They are used to query transactions including or excluding those in states with specific contexts.

For example, it may be necessary to include or exclude certain transactions from reports or Treasury Monitor. A typical example is cost-of-carry transactions: to monitor the position either with cost-of-carry or without. This is possible if cost-of-carry transactions are always in a specific state (usually called COST-OF-CARRY) which is marked with a specific Cost-of-Carry *context*. In the startup window of Treasury Monitor we can choose to include or exclude the transactions that are in a state that has a specified context.

The table below lists the context values that each Transaction state can have.

Context	Name	Description
1	CANCELED	Context identifying state(s) where canceled transactions are stored
2	COST-OF-CARRY	Context identifying state(s) where cost of carry is calculated, normally the hidden state COST-OF-CARRY.
16	ORDER	Context identifying state(s) where order transactions are processed (used for order management).
32	SIMULATED	Context identifying state(s) where simulated transactions are processed (currently used for states in CLM flows only)

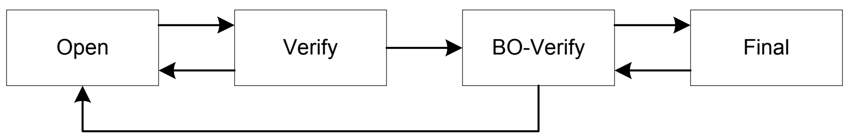
7.3.5 Setting up flow operations

Transaction flow describes the life cycle of a transaction with all possible variations. Each main step in that life-cycle is called a state. Moving between the states occurs via ACCEPT and REJECT operations. These operation are set up using a script `flow.py` found in *`$FK_HOME\share\python\flow`*.

The setup of the operation defines how the transaction is processed when the operation is executed (typically, when a user presses ‘Accept’ or ‘Reject’ button in a Transaction Manager application). The operation can for example, change the state or status of the transaction or send it to a message service to create a confirmation letter, when executed.

Each flow starts with the transaction in an initial entry state controlled by the Transaction Manager mode in which the transaction is created, and ends with the transaction in a state where everything in the transaction is checked and found correct and all processing of a new transaction has been done. All steps between these two states are definable in the operation.

The following figure shows a simplified transaction flow:



Technically, transaction flow is based on a transaction broker service providing a set of agents which support setup of operations, for example, to set state or status, save objects to the database, send ids or full objects to destination queues and call stored procedures. The setup is saved in the main tables *TransactionOp* and *TransactionOpAgent,* complemented by a set of agent-specific tables for storing the detailed setup supported for the specific agent in question (e.g. `AgentState` for storing setup of `set_state` agent).

`The script Flow.py` is a python script used to set up and create operations as in the following example:

```
##### Move forward in the flow
      define_op ("ACCEPT", "Accept Transaction", (
            ...
            ## from state CONFIRM
            (state ('CONFIRM'), not_mask (0), action_mask (0),
             set_state ('FINAL', 'Verify')),
            ...
       ))
```

To optimize performance, the setup of the operation should be structured so that necessary database transaction is opened as late as possible. Note, however, that any agent executing a stored procedure that updates the transaction in the database must be positioned inside the database transaction.

Each agent setup entry within the definition creates an entry to table TransactionOpAgent. The setup of such an agent consists of following components:

- Optional condition calls which validate whether the agent must be executed for the transaction, e.g. state CONFIRM in the above example to limit execution of the agent to transactions in states with order number equal to that of state CONFIRM)
- Optional setting of action mask for the case where all conditions are met, e.g. action_mask (0) in the above example to identify that an agent setting a new transaction state has been executed for the transaction
- Actual agent with relevant setup attributes (e.g. set_state (FINAL, Verify) in the above example to execute agent set_state with attributes FINAL (setting transaction state to FINAL) and Verify (displaying text 'Verify') in the button executing the ACCEPT operation in Transaction Manager applications)

The logic of this setup is discussed in more detail below.

7.3.5.1 Setting condition Calls

Condition calls are functions used to validate the transaction for which an operation is being executed against a specific condition to be met in order for the agent to be executed for the transaction.

The table below lists the condition calls that can be used in agent setup.

Condition call	Setup Attributes	Description
state ()	'state_id' (e.g. 'CONFIRM') exact_match = True	'Minimum State id' and 'Maximum State id' of the agent setup are both set to the given state and, consequently, the condition is met by transactions in any state where order number equals that of the given state exact match = True can be used to make the condition stricter and only be met by transactions in the identified state, i.e. not by transactions in other states with the same order number

Condition call	Setup Attributes	Description
state_at_least ()	‘state_id’ (e.g. ‘OPEN’) ‘bit number’ of state context (e.g. 1 for context with mask value 2, ‘Cost Of Carry’)	‘Minimum State id’ of the agent setup is set to the given state and, consequently, the condition is met by transactions in any state where order number is equal to or greater than that of the given state The condition can be limited to states with a specific state context by identifying the context as a second attribute
state_at_most ()	‘state_id’ (e.g. ‘PAYABLE’) ‘bit number’ of state context (e.g. 1 for context with mask value 2, ‘Cost Of Carry’)	‘Maximum State id’ of the agent setup is set to the given state and, consequently, the condition is met by transactions in any state where order number is equal to or less than that of the given state The condition can be limited to states with a specific state context by identifying the context as a second attribute
state_between ()	‘min_state_id’ (e.g. ‘OPEN’) ‘max_state_id’ (e.g. ‘VERIFY’) ‘bit number’ of state context (e.g. 1 for context with mask value 2, ‘Cost Of Carry’)	‘Minimum State id’ and ‘Maximum State id’ of the agent setup are set to the given states and, consequently, the condition is met by transactions in any state where order number is equal to or greater than that first given state and equal to or less than that of the second given state The condition can be limited to states with a specific state context by identifying the context as a second attribute
new_state ()	‘state_id’ (e.g. ‘VERIFY’) exact_match = True	‘Minimum New State id’ and ‘Maximum New State id’ of the agent setup are both set to the given state and, consequently, the condition is met by transactions moved to any new state where order number equals that of the given state exact match = True can be used to make the condition stricter and only be met by transactions moved to the identified state, i.e. not by transactions moved to other states with the same order number
new_state_at_least ()	‘state_id’ (e.g. ‘PAYABLE’)	‘Minimum New State id’ of the agent setup is set to the given state and, consequently, the condition is met by transactions moved to any new state where order number is equal to or greater than that of the given state
new_state_at_most ()	‘state_id’ (e.g. ‘PAYABLE’)	‘Maximum New State id’ of the agent setup is set to the given state and, consequently, the condition is met by transactions moved to any new state where order number is equal to or less than that of the given state
new_state_between ()	‘min_state_id’ (e.g. ‘VERIFY’) ‘max_state_id’ (e.g. ‘CONFIRM’)	‘Minimum New State id’ and ‘Maximum New State id’ of the agent setup are set to the given states and, consequently, the condition is met by transactions moved to any new state where order number is equal to or greater than that first given state and equal to or less than that of the second given state

Condition call	Setup Attributes	Description
status ()	‘bit number’ (e.g. 0 for status with mask value 1, ‘Confirm’ or 4 for status with mask value 16, ‘Limit Violation’)	‘Status’ of the agent setup is set to the mask value of the given status and consequently the condition is met by transactions with the status Note, that any number of status bits separated with commas can be listed (e.g. status (0,4,7) and the transaction must have all of them to meet the condition.
not_status ()	‘bit number’ of the status	‘Not Status’ of the agent setup is set to the mask value of the given status and consequently the condition is met by transactions without the status. Note, that any number of status bits separated with commas can be listed (e.g. status (0,4,7) and the transaction must not have any of them in order to meet the condition.
rule ()	‘rule_id’ (e.g. ‘TFLO-STATE-OPEN-TO-CONFIRM’)	‘Rule id’ of the agent setup is set to the given rule and, consequently, the condition is met by transactions matching the rule.
not_rule ()	‘rule_id’	‘Not Rule id’ of the agent setup is set to the given rule and consequently the condition is met by transactions not matching the rule
tag ()	'tag_id' (e.g. 'ACCOUNTING-INPUT')	'Tag' of the agent setup is set to the given tag and, consequently, the condition is met by transactions with the identified tag. Note: Any number of tags separated with commas can be listed (tag ('TAG1','TAG2', 'TAG3')) and the transaction must have all of them to meet the condition.
not_tag ()	’tag_id’	'Not Tag' of the agent setup is set to the given tag and, consequently, the condition is met by transactions without the identified tag. Note: Any number of tags separated with commas can be listed (tag ('TAG1','TAG2', 'TAG3')) and the transaction must not have any of them to meet the condition.
mask ()	‘bit number’ of mask	‘Mask’ of the agent setup is set to the mask value of the given mask and consequently the condition is met if the ‘current mask’ of the operation contains the given mask. Note, that any number of mask bits separated with commas can be listed (e.g. mask (1,2,8) and the current mask has to contain all of them in order to meet the condition. See *7.3.5.3 Using masks in agent setup* on page 125 for information on using masks in operations.
not_mask ()	‘bit number’ of mask	‘Not Mask’ of the agent setup is set to the mask value of the given mask and, consequently, the condition is met if the ‘current mask’ of the operation does not contain given mask Note, that any number of mask bits separated with commas can be listed (e.g. mask (1,2,8) and the current mask must not contain any of them in order to meet the condition.

7.3.5.2 Setting up agents

An agent is the actual sub-operation executed for a transaction when condition calls of the agent setup are met by the transaction. Some agents must be set up with specific attributes with which they are executed (e.g. set_state (‘FINAL’) whereas some others do not need any specific setup (e.g. txn_commit).

The table below lists agents that can be used in the setup.

Agent	Setup Attributes	Description
get_authorization	‘permission_id’	This agent is used to validate that current user executing the operation (e.g. ACCEPT or COMMIT) has the required permission given in the setup of the portfolio of the transaction. If no permission is given in the setup, permission CREATE is used by default for a new transaction being created and MODIFY for an old transaction being updated.
check_access	‘permission_id’	This agent has exactly the same functionality as get_authorization described above. The two agents coexist for historical reasons but get_authorization is recommended to be used in all new setup.
set_state	‘state_id’	Sets the transaction state of the transaction to the state given in the setup.
set_status	‘bit number’ of the status	Sets the status given in the setup for the transaction. Note that any number of statuses can be given in the setup and all identified statuses are set by the agent. Any comma-separated number of status bits can be listed (for example, set_status (0,4,7)).
clear_status	‘bit number’ of the status	Clears the status given in the setup for the transaction. Note that any number of status can be given in the setup and all identified statuses are cleared by the agent. Any comma-separated number of status bits can be listed (for example, clear_status (0,4,7)).
set_tag	'tag_id'	Sets the tag given in the setup for the transaction. Note that contrary to set_status, only a single tag can be set by the same execution of the agent.
clear_tag	'tag_id'	Clears the tag given in the setup for the transaction. Note that contrary to clear_status, only a single tag can be cleared by the same execution of the agent.
call_proc	‘procedure name’ ‘param0’ to ‘param9’ passed to the procedure as start-up parameters ‘Predicate’	call_proc agent is used to run a stored procedure for the transaction. The name of the procedure is given as an attribute to the agent together with any values passed to the procedure to be used as start-up parameters call_proc can be as a ‘Predicate’ to make later agents dependent on a specific check made by the procedure (see *7.3.5.3.2 Setting masks with ‘predicate’ agents* on page 125 for more details). This can be done by setting up call_proc to be executed with attribute ‘Predicate = True’ Note that if the procedure updates the transaction in the database, it must be positioned after the update_transaction agent within the database transaction. If the transaction is updated in the database by a call_proc agent before the update_transaction agent is executed, the whole operation will fail. It is also recommended that you place the refresh_transaction agent after any call_proc agents updating a transaction in the database (see refresh_transaction below for details).

Agent	Setup Attributes	Description
refresh_transaction	n/a	The refresh_transaction agent refreshes the memory version of the transaction during execution of the operation against the database. It is typically used after executing a call_proc agent resulting in an update of the transaction in the database to synchronize the memory version of the transaction with the updated database version. This has the following benefits: • refresh_transaction executed after a call_proc agent makes it possible to take updated values into account when evaluating condition calls (for example, via rule matching) of any later agents during the same execution of an operation. • refresh_transaction executed after a call_proc agent includes updated values in the real time notification sent from the operation. For example, if a specific transaction parameter field was updated by a call_proc agent as part of the operation, this value will be updated in all real time applications displaying the transaction.
call_op	'operation_id	A special agent used to execute an operation from inside another one. Typically, call_op is used to execute a NOTIFY operation sending real-time updates from COMMIT, ACCEPT or REJECT operations. Masks are not shared across operations, but when an external operation is called using the call_op agent, the new operation is started with an empty mask. Consequently, if mask or not_mask condition calls are used in the setup inside the new operation, the current mask of the original operation is ignored and a new one is started for the called operation.
new_audit_number	n/a	Assigns an owner-specific audit number to a transaction if that does not exist already
send_full	‘queue name’ ‘use_topic’	Sends the full transaction on the message bus to a specific queue for further processing (e.g. for a generic real time notification or to settlement generation) ‘use_topic’ can be set to ‘True’ or False’. If not given, it defaults to ‘False’ indicating that the message is sent to specific ‘listener’ (e.g. the service generating settlements) and that the message will be received even if the ‘listener’ is absent at the time of sending the message. Setting this attribute to ‘True’ implies that a message sent is a general real time message received by whoever is ‘listening’ at the time of sending the message. In some specific case, addition parameters can be used and given. When sending a message to document management using: send_full (‘document.transaction’) The following parameters can be used to specify additional information to be used by the receiving service: message type state_id e.g. send_full (‘document.transaction’, message_type = ‘CONFIRMATION’, state_id = ‘TO-BE-TRANSMITTED’) sends the message to ‘document.transaction’ for creating a ‘CONFIRMATION’ document into initial state ‘TO-BE-TRANSMITTED’

Agent	Setup Attributes	Description
send_number	‘queue name’ ‘use_topic’	Sends the transaction number on the message bus to a specific queue for further processing. This can be used instead of ‘send_full’ when the receiving service is going to reload the transaction data in any case based on the transaction number. Other parameters are as in send_full.
service	‘module name’ ‘table name’ ‘params’	‘service’ is a generic syntax for agents without a specialized keyword. For example ‘set_state’ agent could be configured using the service syntax: set_state('VERIFY', 'Verify') is equivalent to: service('service/transaction-broker@set-state', 'AgentState', state_id = 'VERIFY', name = 'Verify', flags = 0) Using specialized key words like ‘set_state’ is, however, more readable and is recommended when possible. Using the generic syntax can then be reserved for situations where such key word does not exist, i.e. for CSD agents. A python CSD would be hooked to the flow through this mechanism. For example service("common/python@CSD_agent") inserts the CSD_agent.py script in the agent chain. service("common/python@CSD_agent", "CSDAgent", value1="something", value2=10) will also save a record in the CSDAgent table with value1="something" and value2=10; when the hook is executed those values are passed back to it.
instrument	‘minimum_priority’ ‘maximum_priority’	Executes all ‘instrument’ handlers of features in the instrument of the transaction where the priority of these handlers (in UMFeatureEntry) is equal to or greater than ‘minimum_priority’ and equal to or less than ‘maximum_priority’
evaluate_trans_limit	n/a	This agent checks for potential transaction condition sets and evaluates the transaction conditions of all matching conditions against the transaction. The agent creates a separate entry for each evaluated condition (table 'TransTransLimit', Transaction Manager view 'Transaction Condition Set') and each individual limit condition in it (table 'TransTransLimitCond', Transaction Manager view 'Transaction Condition') and is used primarily in the COMMIT operation to activate transaction condition functionality every time a transaction is applied in the system.

Agent	Setup Attributes	Description

check_trans_limit	'action'
	'msg'
	'predicate_p'
	'error_p'
		This agent defines the consequences of transaction violating one or more transaction condition sets.
		'action' (e.g. 'Block on Accept') restricts the processing to transactions violating a transaction condition set with this action.
		'msg' (e.g. 'Transaction Condition Warning, Block on Accept') identifies the message to be displayed to the user in Transaction Manager.
		'predicate_p' controls whether the operation is disallowed altogether.. If set to 'True', a warning message is displayed but the operation is allowed. If set to 'False' (or not set at all), the operation is disallowed.
		'error_p' can be set to 'True' in order to force display of warning message even if Transaction Manager option 'Display Warnings' is not set. If it is set to 'False' (or not set at all), message is only displayed when 'Display Warnings' is set.
		Note that by using 'action_mask', any other processing can be linked to check_trans_limit. The following setup produces a message and sets status 'Transaction Condition Violation' if any limit with action 'Mark as Violation' is violated by the transaction:
		`check_trans_limit ('Mark as Violation', msg = 'Marking as Transaction Limit Violation', predicate_p = True, error_p = True), action_mask (14)),`
		`(mask (14), set_status (11)),`

check_events	‘event name’	Some TM actions trigger a business event – this is decided in some setup file – check_events is a predicate agent which activates other agents if the listed events are met.
clear_events	n/a	Resets the business events on the transaction.
get_extensions	‘extension name list’	Sometimes an agent may need information from specific transaction extensions for its process, if this is the case, get_extensions can be used to load them before the actual agent is executed. For example: if you load a swap in TM without displaying the legs, they are not loaded in memory; if you then commit the swap and the broker calls send_full in the COMMIT operation, in this scenario the message does not contain the legs. But if you place get_extensions("Leg") before send_full you make sure that the legs are in the message.
set_param	number, value	Assigns a value to parameter #*<number>*.
txn_begin	n/a	Opens a database transaction.
txn_prepare	n/a	Prepares 2nd phase of the db transaction.
txn_commit	n/a	Commits a database transaction.

Agent	Setup Attributes	Description
update_transaction	n/a	Updates the transaction in the database. Note that this is a special agent designed to update a very limited set of transaction fields (state_id and status) and does not require the user executing the operation to have create/modify permissions to the transaction. The agent cannot be used to store values in any other transaction field in the database. This agent is, typically, used in ACCEPT/REJECT operations. If a CSD agent setting values in any other transaction fields is developed and added into the agent chain in ACCEPT/REJECT operations, insert_transaction agent must also be added into the chain. Note, however, that this agent requires create/modify permission to the transaction from the user executing the operation.
update_metadata	n/a	Updates transaction tags of the transaction in the database. Note that this is a special agent designed for processing tag values only and does not update any other values of the transaction. Therefore, ACCEPT or REJECT operations must always use update_transaction agent, instead. This agent is meant to be used in any operation exclusively manipulating tag values. Primary benefit of using update_metadata versus update_transaction is that update_metadata can be processed concurrently without locking or modifying the transaction.
update_reference_serial	n/a	This agent operates on the result of a transaction action only (rollover, early expiration…). It checks that the deal has been created out of the correct version of the parent transaction.
cancel_transaction	n/a	Cancels the transaction
check_portfolio	n/a	Checks the right to apply the transaction in the portfolio (used in COMMIT operation)
new_transaction	n/a	Allocates a transaction number on new transactions (used in COMMIT operation)
insert_transaction	n/a	Inserts the transaction in database (used in COMMIT operation). Note that this agent does not update the transaction in the database at all if only state_id and/or status is updated. Consequently, in operation like ACCEPT and REJECT agent update_transaction must be always used.
check_4_eyes	’user_id’	’user_id’ can be a user’s ID or a user group. Prevents a user from performing the same operation twice. When used in the flow, this agent will stop the current operation if its previous execution was triggered by the same user. When the optional 'user_id' parameter is supplied, the validation is limited to this particular user or user group. When this parameter is absent, validation is performed for all users.
dmm_cleanup	n/a	Mirrored transactions: removes the "reserved" status that might have been left in a deal (for example, due to a database error or a comKIT error).
dmm_reject	n/a	Mirrored transactions: ensures that a child deal is canceled together with the parent deal and not canceled on its own.

7.3.5.3 Using masks in agent setup

The purpose of masks in agent setup is to enable dependencies of type 'execute this agent only if a specific other agent setup has already been executed'. The most typical use of this mechanism is to use a 'not_mask' condition call to ensure that once a transaction has been assigned to a new state, no further set_state agents are executed for the same transaction.

Masks used in agent setup are identified as specific 'bit numbers' corresponding to a mask values in a similar manner to e.g. a Transaction Status (e.g. 'bit number' 4 corresponds to mask value 16). The difference is that 'Mask' is not an attribute of the transaction but it is only set and used dynamically within the operation during its execution for a specific transaction

7.3.5.3.1 Setting the mask

Mask value is dynamically set, based on the following Agent setup attribute:

```
  action_mask ()
```

Any valid 'bit number' (0-31) can be given within the brackets in the setup. If the agent with this attribute is executed, the mask is set accordingly, kept in memory for the duration of current operation execution and used when condition calls of any subsequent agents are validated

As already discussed above, 'mask ()' and 'not_mask ()' can be used as condition calls for agents. For example, if an earlier agent has been executed with action_mask (4), then any later agents with condition call mask (4) can be executed. Similarly, no later agent with condition call not_mask () containing mask 4 (e.g. not_mask (2,4,9)) match the condition call and, consequently, cannot be executed

When this mechanism is used, order of agents in the setup script becomes very important as that is used as a basis when 'number' of the Agent is assigned in TransactionOpAgent. Agents are executed in the order given by this number and, for example, in case of set_state agent, transaction is assigned to a new state according to the first matching agent. After that, any subsequent agents fail to meet the conditions as they, typically, have condition call not_mask (0) in their setup:

```
           (state ('CONFIRM'), not_mask (0), action_mask (0),
   set_state ('FINAL', 'Verify')),
```

7.3.5.3.2 Setting masks with 'predicate' agents

The mask mechanism of implementing dependencies can also used for more complex condition checking using 'predicate' agents. The idea of a predicate agent is that instead of processing the transaction, it performs a check of some kind and, if the predicate is validated, sets action_mask() according to the agent setup. The following agents have this 'predicate' feature:

```
call_proc

instrument

service

check_events
```

A typical way to use this functionality is through a standard or customized stored procedure.

- If a 'call_proc' agent is run with attribute 'Predicate = True', the procedure is run only to find out whether it produces exceptions or not and to set, or not set, action_mask accordingly.
- If the procedure does not return an exception (return status = 0), predicate is validated and action_mask () is set. If it does return an exception (return status != 0), action_mask () is not set.
- By using the mask value which was set by the 'predicate' stored procedure in mask () and not_mask () condition calls of subsequent agents, their execution can be made dependent on whatever the stored procedure checked.

The following setup is an example of this mechanism used in the distributed CLM transaction flow to verify that no Funding Call transactions exist in some specific states before a drawdown transaction can be accepted to a final state. This verification is done in the stored procedure `CheckStateSync`, producing no exceptions when such transactions are found and the agent setting the new state to DD-FINAL is set up with a not_mask condition call accordingly.

```
## from state DD-CONFIRM
    # ... checking first if there is any reference Funding Call (kind 550) in
provisional state
    (state ('DD-CONFIRM'), not_mask (0), action_mask (1),
     call_proc ('CheckStateSync',
     param0 = 'DD-PROVISIONAL', # minimum state of reference transaction
     param1 = 'DD-PS-FINAL', # maximum state of reference transaction
     param2 = '550', # transaction kind of reference transaction
     predicate = True)),
    # ... to DD-FINAL if no reference Funding Call was found
    (state ('DD-CONFIRM'), not_mask (1), action_mask (0),
     set_state ('DD-FINAL', 'Confirm')),
```

A ‘predicate’ CSD could also be implement as a generic ‘service’ agent performing a test of some kind and triggering, for example, a status change or posting a message, depending on the outcome of that test, as follows:

```
(service('some_module@some_object'), action_mask(1)),
(mask(1), set_status(22)),
(not_mask(1), send_full("csd_queue")),
```

The above sequence of agents would set status 22 if the CSD predicate is verified, and post a message if it is not.

7.3.5.4 Setting up service queues

Agents ‘send_full’ and ‘send_number’ are used to send the transaction to be further processed by another service.

The table below lists service queues that are currently used in the setup.

Queue Name	Setup Attributes	Description
accounting-input.cancel	n/a	Cancels accounting inputs.
accounting-input.create	n/a	Creates accounting inputs.
accounting-input.update	n/a	Updates accounting inputs.
commitment-fee.accept	n/a	Updates a new commitment fee transaction with all existing drawdowns, equities, amount events, etc. affecting it.
commitment-fee.drawdown.accept	n/a	Updates an existing commitment fee transaction by adding the effect of a drawdown transaction. This service is normally used for drawdowns when they are accepted to a final state.
commitment-fee.drawdown.reject	n/a	Updates an existing commitment fee transaction by removing the effect of a drawdown transaction. This service is normally used for drawdowns when they are rejected from a final state.
document.facility-transaction	n/a	Creates a message request from a drawdown: • in the identified message type • into the identified message state.
document.transaction	‘message type id’ ‘message state id’	Creates a message request from the transaction: • in the identified message type • into the identified message state.

forecast.expire	n/a	Expires an existing forecast in CMM from all transactions in any portfolio under the top portfolio given in the configuration table parameter 'FORECAST-TOP-PORTFOLIO'.
forecast.generate	n/a	Creates new cashflow forecasts and modifies/expires an existing forecast in CMM from all transactions in any portfolio under the top portfolio given in the configuration table parameter 'FORECAST-TOP-PORTFOLIO'.
idm.do_op	‘operation id’	Executes a flow operation (ACCEPT/REJECT) for an IDM mirrored transaction if such exists. This service ensures that when one leg of a mirrored transaction pair is moved in the flow, the other leg is also automatically moved. This service queue is typically set up using an ‘instrument’ agent with priority 7000 (identifies instruments with feature IDM) as a predicate agent
idm.make	n/a	Creates/updates an IDM mirrored transaction from pre-agreed transaction, i.e. from one which has not reached IDM-AGREED state in the flow. This is used in the COMMIT operation with ‘instrument’ as predicate agent. Note: The transaction must have already reached the state IDM-MIRRORING.
idm.update	n/a	Updates an IDM mirrored transaction from an agreed transaction, i.e. from one which has already reached IDM-AGREED state in the flow This is used in the COMMIT operation with ‘instrument’ as predicate agent.
settlement.transaction.generate	n/a	Creates settlements from a transaction.
transaction	n/a	Sends a real-time notification from the transaction

7.3.5.5 Testing transaction flow

Transaction Admin (`FKTransactionManager.exe`) has a user interface called Discovery Console which displays, among other things, real-time transaction flow traces in a hierarchical and easy-to-read format. These traces include all the conditions that are both matched and unmatched, and the reasons why.

Note: This replaces any previous method of tracing and testing transaction flow.

To make Discovery Console available, start Transaction Manager with the `-d` or `--discovery` option.

Launch Discovery Console (**Options - Discovery Console**) before testing the transaction flow (Accept, Reject, Commit, and so on).

Test the flow by making a change, and notice that a trace appears in Discovery Console.

The hierarchical output and the **Filter** option in Discovery Console make it easy for you to quickly locate the part of the transaction flow that you are looking for.

7.3.5.6 Converting flow.py to CSV format

If an extensive re-engineering of distributed flow is necessary, it may be easier to use Excel to manipulate and maintain the flow setup. You can convert a `flow.py` script to a `flow.csv` file and vice versa. The process would normally be the following:

1. Convert distributed flow.py to CSV format
2. Read the CSV file to excel and manipulate the operation/agent setup in excel
3. Save the new setup as a CSV file
4. Convert the CSV file to a new version of flow.py
5. Load the setup to database by running the new version of flow.py
6. Convert from python to Excel with the following command:

   ```
   python flow.py –c > flow.csv
   ```

7. Convert from Excel to python with the following command:

   ```
   python -m agents.convert.csv flow.csv > flow_new.py
   ```

7.3.5.7 Migrating a transaction flow from a pre-7.2 version

The workflow setup from version 7.2 onwards is defined by a combination of SQL and python scripts. Tools are provided to facilitate migration from the old flow to the new one, but some manual intervention is required.

The migration process starts from a database populated with a correct old flow setup – the TransactionAction table must be complete. The new transaction flow setup script is built from this database using `migrate-flow.py`; the following command extracts the old-style transaction flow and generates the setup file `customer_flow.py`:

```
python migrate-flow.py -f <customer_flow>.py
```

When you migrate an old flow, you must also restrict the conversion to a subset of operations set up in `flow.py`. In practice, this means that only ACCEPT and REJECT actions from the database must be extracted. This can be done by identifying ACCEPT and REJECT as included action ids in the command, as follows:

```
python migrate-flow.py -f <customer_flow>.py ACCEPT REJECT
```

This extraction of the old flow into a `<customer_flow>.py` script as described above must be done in version 7.1 (or earlier) database. If the flow is not clean at the time of extraction, that is if the flow references nonexistent states or statuses), warnings are displayed by `migrate-flow.py`:

```
--- Warning --- unknown status 'dummy'
--- Warning --- unknown status 'dummy'
```

Once this script has been successfully created, proceed as follows:

1. Upgrade the database to a 7.2 or later version
2. Ensure that all status and states of the old flow are included in the corresponding sql scripts (`status.sql` and `transaction_state.sql`) used in the new version.
3. Ensure that the `status.py` script contains SET/CLEAR operations for all status of the old flow (if the old flow contains customer-specific status, SET/CLEAR operations for them must be added to `status.py`)
4. Merge manually `customer_flow.py` and distributed `flow.py` to a single python script by moving all customized elements of `customer_flow.py` to distributed `flow.py` containing setup supporting important system functionality.

To create the new setup, make sure that all flow-related python scripts reside in the same python `\flow` directory, and load the setup to the database:

```
cd %FK_HOME%\share\python
python -m flow
```

7.3.6 Setting up a COMMIT operation

The COMMIT operation is executed every time a new transaction is inserted into the database, or an existing one is updated. This operation is set up using a script `commit.py` found in `$FK_HOME\share\python\flow`.

The setup of the operation defines how the transaction is processed when it is inserted in or updated in the database. It is normally not necessary to modify the distributed setup of this operation, but some customized processing of transactions at the time of inserting or updating them may need to be added at the time of implementing the system. However, the setup in the script `commit.py` contains important system functionality and any such changes must be made with care.

7.3.7 Setting up status operations

SET/CLEAR status operations are executed every time **Set Status** or **Clear Status** buttons in Transaction Manager are used to set or clear a specific status in a transaction. These operations are set up using a script `status.py` found in `$FK_HOME\share\python\flow`. The script creates a separate SET and CLEAR operation for every status in the database as in the following example:

```
define_op('SET TRADE DATE BOOKING', 'Set Trade Date Booking', (
    check_access('STATUS-OTHER'),
    set_status(3),
    txn_begin(),
    update_transaction(),
    txn_commit(),
    call_op("NOTIFY")
  ))

define_op('CLEAR TRADE DATE BOOKING', 'Clear Trade Date Booking', (
    check_access('STATUS-OTHER'),
    clear_status(3),
    txn_begin(),
    update_transaction(),
    txn_commit(),
    call_op("NOTIFY")
  ))
```

It is normally not necessary to modify the distributed setup of this operation unless customized status are added with `status.sql`. If this is done, however, you must add corresponding SET/CLEAR operations for the new status in this script to enable manual setting or clearing of the status when that is required. Transaction Manager modes in which manual setting or clearing of the new status is to be enabled must also be modified accordingly.

7.3.8 Setting up limit operations

Limit server can be set up to run with various 'violation modes'. Depending on the mode, the server may execute one of the limit operations for a transaction which has been processed into the server. The following operations are used:

- LIMIT VIOLATION (executed for transaction causing a limit violation)
- LIMIT VIOLATION CLEAR (executed for a transaction not causing a limit violation when server is run with the parameter no_violation_action having value 1)
- NO LIMIT VIOLATION (executed for a transaction not causing a limit violation when server is run with the parameter no_violation_action having value 2)

These operations are set up using a script `limit.py` found in `$FK_HOME\share\python\flow`. The setup of the operations defines how the transaction is processed as a result of a limit violation being caused by the transaction (LIMIT VIOLATION) or as a result of no limit violation being caused by it (LIMIT VIOLATION CLEAR or NO LIMIT VIOLATION). The distributed setup sets the tag LIMIT-VIOLATION from operation LIMIT VIOLATION and clears the same tag from operation LIMIT

VIOLATION CLEAR. If other processing is needed (e.g. moving the transaction to a specific state as a result of violation), these modifications can be made in the `limit.py` script.

Note: If any of these operations are modified to updating anything else than tags (for, example, state or status), the update_metada agent must be replaced with update_transaction.

7.4 Using Transaction Manager modes

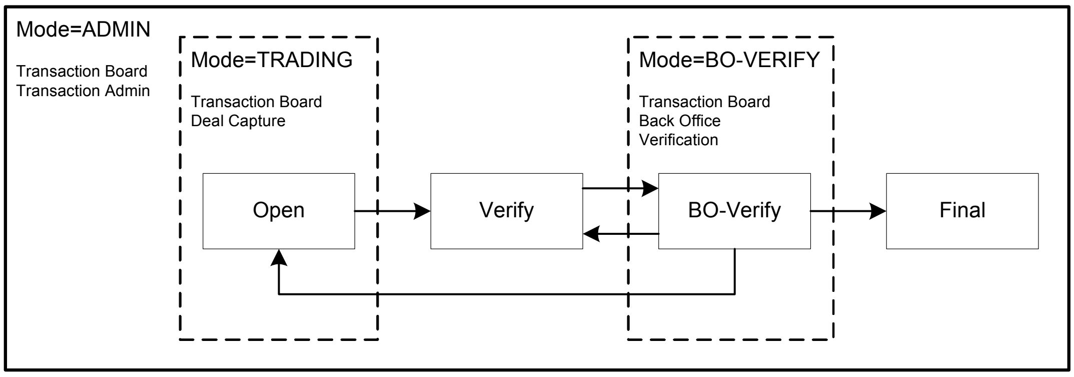
Transaction Manager applications are the primary means of manually executing any transaction processing, including flow-related operations like accepting or rejecting transactions.

A mode is a container used to describe a particular transaction manager. It is used to set up the criteria that transactions must meet to appear in that transaction manager. It is also used to define how these transactions can be processed in the application, for example, to enable or disable a user to execute specific operations (ACCEPT, REJECT, etc), specific actions (Rollover, Exercise, etc) or to edit specific transaction columns (e.g. the *comment4* column in the **Back Office Verification** transaction manager). Modes are defined in the following tables:

- Mode
- ModeColumn
- ModeAction

In the figure below showing a sample setup, three modes are described:

- TRADING, which contains only transactions in the state OPEN
- BO-VERIFY, which contains only transactions in the state BO-VERIFY. The cashflow column Amount can be updated by the Back Office user group.
- ADMIN, which contains all transactions, from minimum state OPEN to maximum state FINAL ("everything possible" mode).



Note the following about transactions and modes:

- A transaction is displayed if it matches the mode definition and at least one of its cashflows matches the mode.
- A transaction is displayed if it matches the mode definition and has no cashflows (this is rare)
- A transaction is not displayed if it matches neither the mode nor its cashflows.

7.4.1 Loading default modes

The system is released with default transaction manager mode setup. Use the following setup scripts found in `$FK_HOME/share/<database>/setup` to load default mode definitions into the database:

- `modes.sql` creates all mode definitions used in non-CLM transaction manager applications available from Application Manager.
- `loan_modes.sql` creates all mode definitions used in CLM transaction manager applications available from Application Manager.

All modes set up in these scripts are compatible with the default transaction states defined in `transaction_state.sql`.

7.4.2 Setting up modes

Modes are configured using a script `modes.sql` found in `$FK_HOME/share/<database>/setup`. This script executes the following stored procedures:

- SetupMode
- SetupModeColumn
- SetupModeAction

Create mode entries using the parameters given in the script as in the following example:

```
/* Mode for accepting/rejecting transactions from VERIFY states */
exec SetupMode @mode_id = "VERIFY",
             @state_id = "VERIFY",
             @context_mask = -1,
             @set_status = 64, /* DELIVERY VS PAYMENT */
             @clear_status = 64, /* DELIVERY VS PAYMENT */
             @grant_p = 1,
             @accept_p = 1,
             @reject_p = 1,
             @action_grant_p = 1,
             @columns = "Transaction/comment Transaction/dvp_settlement
Transaction/dvp_repayment Transaction/_figure_date
Transaction/_figure_valuation_date Transaction/_figure_currency_id"
go

/* Actions allowed in mode VERIFY */

exec SetupModeAction  @mode_id="VERIFY",
             @state_id="VERIFY",
             @action_id="preview runreport",
             @entity_type="Transaction",
             @revoke_p=0
go
```

The fields of the *SetupMode* procedure used in the script are given in the table below.

Parameter	**Description**
mode_id	The Mode ID to set up.
add_p	This parameter indicates whether information should be added to the Mode definition in the *Mode* and *ModeColumn* tables by overwriting the old data (=0) or adding the new data on to the old data (=1).
user_id	When defining a mode as accessible by certain users only, this parameter can be used to identify the user or user group ID.
state_id	The explicit transaction state of the mode. Note that a list of specific states separated with spaces can be given as a value for the parameter, for example: "OPEN VERIFY FINAL" If this parameter is used, a single mode entry is created by the procedure for each identified state.

Parameter	Description
minimum_state_id	When defining a mode for a range of transaction states, this is the state with the lowest order number. If this parameter is used, a separate mode entry is created by the procedure for each state where order number is equal to or greater than that of the identified state.
maximum_state_id	When defining a mode for a range of transaction states, this is the state with the highest order number. If this parameter is used, a separate mode entry is created by the procedure for each state where order number is equal to or less than that of the identified state.
state_context	When defining a mode for a range of transaction states, this parameter can be used to identify the context which matching transaction states must have. (See *7.3.4.2 Transaction State contexts* on page 116). If this parameter is used, a separate mode entry is created by the procedure for each state with the specified context.
state_category	When defining a mode for a range of transaction states, this parameter can be used to identify the category into which transaction states must belong. If this parameter is used, a separate mode entry is created by the procedure for each state in the specified category.
ignored_state_flags	When defining a mode for a range of transaction states, this parameter can be used to identify flags values of states to be ignored. If this parameter is used, mode entries are not made for any states which have the specified flags. Unless specified, state flag CANCELED_P is used.
context_group	If a mode must be limited to displaying transactions and cashflows in any specific context group, this parameter can be used to identify the context group in which matching transactions and cashflows must have at least one context. The mask value of the identified context group is set to both ‘mask’ and ‘contexts’ in table Mode.
context_mask	If a mode must be limited to displaying transactions and cashflows in any specific contexts, this parameter can be used to identify the contexts of which matching transactions and cashflows must have at least one context. If, for example, value 7 is given for this parameter, transactions and cashflows with at least one of contexts 1, 2 and 4 are displayed, This value is set to both ‘mask’ and ‘contexts’ in table Mode. Note, that value -1 can be used ensure that transactions and cashflows with any contexts are displayed.
contexts	Same as ‘context_mask’ above but the value is only set to field ‘contexts’ in table Mode.
not_contexts	If transactions and cashflows with specific contexts must be excluded from a mode, this parameter can be used to identify the contexts. If, for example, value 7 is given for this parameter, transactions with at least one of contexts 1, 2 and 4 are excluded.
status	If a mode must be limited to displaying transactions with specific status, this parameter can be used to identify the status which matching transactions must have. If, for example, value 7 is given for this parameter only transactions with all specified status (1, 2 and 4) are displayed.
not_status	If transactions with specific status must be excluded from a mode, this parameter can be used to identify the status. If, for example, value 7 is given for this parameter all transactions with at least one of status (1, 2 or 4) are excluded.

Parameter	Description
tag	If a mode is to be limited to displaying transactions with a specific tag, this parameter can be used to identify the tag that matching transactions must have. Unlike status: • It is possible to identify only a single tag for each state under the mode. If a separate mode must be set up for transactions having two different tags ('TAG1' and 'TAG2'), a third 'combined' tag ('TAG1/TAG2') must be set up in the system for this purpose and updated from associated operations (ACCEPT/REJECT/SET-TAG/CLEAR-TAG) accordingly (set combined tag when last 'composite' tag is set - and clear when first of them is cleared). • It is not possible to exclude transactions with specific tags from the mode. If a mode must be set up for transactions without a specific tag ('TAG1'), a separate 'negative' tag ('NOT-TAG1') must be set up in the system for this purpose and updated from associated operations (ACCEPT/REJECT/SET-TAG/CLEAR-TAG) accordingly (set for all transactions by default - clear when 'primary' tag is set - and set when 'primary' tag is cleared).
cashflow_status	If a mode must be limited to displaying cashflows with specific status, this parameter can be used to identify the status which matching cashflows must have. If, for example, value 7 is given for this parameter only cashflows with all specified status (1, 2 and 4) are displayed.
cashflow_not_status	If cashflows with specific status must be excluded from a mode, this parameter can be used to identify the status. If, for example, value 7 is given for this parameter all cashflows with at least one of status (1, 2 or 4) are excluded.
type_id	If a mode must be limited to displaying transactions with specific Transaction Type, this parameter can be used to identify the type which matching transactions must have.
kind_id	If a mode must be limited to displaying transactions with specific Transaction Kind, this parameter can be used to identify the kind which matching transactions must have.
own_p	If set to 1, the user can only access transactions that he or she has created.
new_state_id	A new transaction created from this mode will have this state.
new_kind_id	A new transaction created from this mode will have this kind id.
set_status	Specifies the available buttons for setting a status, for example, "Confirm" in the **Confirmations** transaction manager. The value is the logical OR of the numeric values of the statuses.
clear_status	Specifies the buttons available for clearing a status, for example, "Unconfirm" in the **Confirmations** transaction manager. The value is the logical OR of the numeric values of the statuses.
set_tags	Specifies the available buttons for setting a tag in Transaction Manager. Any number of available tags to set can be identified for the same mode by giving a list of ids separated by spaces as a value for this parameter (@set_tags = "TAG1 TAG2 TAG3").
clear_tags	Specifies the available buttons for clearing a tag in Transaction Manager. Any number of available tags to set can be identified for the same mode by giving a list of ids separated with spaces as a value for this parameter (@set_tags = "TAG1 TAG2 TAG3").
grant_p	If this field = 1, the transaction columns in the transaction manager of this mode cannot be edited unless they are specified in the *ModeColumn* table via the *columns* parameter of SetupMode or SetupModeColumn procedures. (See ModeColumn table).

Parameter	Description
columns	Columns listed here are exceptions to general grant_p setting as explained above. Note, that a list of columns separated with spaces can be given as a value for the parameter and that columns in several Transaction Manager Views can be identified here by adding the 'Entity Type' as a prefix to column definition e.g. as follows: "Transaction/deal_rate Leg/amount Schedule/start_date" If no entity type is specified (i.e. no prefix is given in the field), 'Transaction' is used as a default. Note, that for cashflow columns, it is also possible to use syntax 'cf_' as a prefix instead of 'Cashflow/'. For example, 'cf_amount' and 'Cashflow/amount' are interpreted in the same way by the procedure If entity type contains some spaces, spaces must be replaced by '_'. For example, setting column 'value' on entity type 'Transaction Comment' will be done by 'Transaction_Comment/value' Note also, the maximum length of the string given as a value for this parameter is 255 characters. When a large number of columns must be identified, it is also possible to use procedure SetupModeColumn which can be run any number of times for the same mode to create a large number of entries to ModeColumn.
action_grant_p	If this field = 1, actions (e.g. Rollover, Exercise) cannot be executed unless they are specified in the *ModeAction* table via the SetupModeAction procedure. If this field = 0, all actions can be executed except those specified in the *ModeAction* table.
big_p	Used to optimize query for larger result sets, typically used for ADMIN mode.

If a large number of columns in a transaction or in any of its extensions (Leg, Schedule, Guarantee, etc.) must be identified as exceptions to general grant_p setting, it may be necessary to use SetupModeColumn procedure instead of parameter 'columns' in SetupMode procedure. The maximum value of the parameter 'columns' is 255 characters and that is not always enough to describe all columns as required. SetupModeColumn can be executed any number of times for the same mode in the script and can, therefore, be used to identify an unlimited number of columns.

The fields of the *SetupModeColumn* procedure used in the script are given in the table below.

Parameter	Description
mode_id	The ID of the mode for which the column setup is added.
user_id	The user or user group ID that has edit permission granted / revoked on the transaction manager columns specified in the *columns* field.
state_id	The explicit transaction state of the mode in which setup of granted / revoked columns apply. Note, that a list of specific states separated with spaces can be given as a value for the parameter e.g. `OPEN VERIFY FINAL`
minimum_state_id	When defining the column setup for a range of transaction states, this is the state with the lowest order number. If this parameter is used, the column setup is made for each state where order number is equal to or greater than that of the identified state
maximum_state_id	When defining the column setup for a range of transaction states, this is the state with the highest order number. If this parameter is used, the column setup is made for each state where order number is equal to or less than that of the identified state
state_context	When defining the column setup for a range of transaction states, this parameter can be used to identify the context which matching transaction states must have. (see *7.3.4.2 Transaction State contexts* on page 116). If this parameter is used, the column setup is made for each state with the specified context
state_category	When defining the column setup for a range of transaction states, this parameter can be used to identify the category into which transaction states must belong. If this parameter is used, the column setup is made for each state in the specified category

Parameter	Description
ignored_state_flags	When defining the column setup for a range of transaction states, this parameter can be used to identify flags values of states to be ignored. If this parameter is used, the column setup is not made for any state which does have the specified flags. Unless specified, state flag CANCELED_P is used.
columns	Columns listed here are exceptions to general grant_p setting of the mode. Note, that a list of columns separated with spaces can be given as a value for the parameter and that columns in several Transaction Views can be identified here by adding the 'Entity Type' as a prefix to column definition e.g. as follows: `Transaction/deal_rate Leg/amount Schedule/start_date` If no entity type is specified (i.e. no prefix is given in the field), 'Transaction' is used as a default. Note, that for cashflow columns, it is also possible to use syntax 'cf_' as a prefix instead of 'Cashflow/'. For example, 'cf_amount' and 'Cashflow/amount' are interpreted in the same way by the procedure. Where a view/layer has a name that contains space characters, replace these with underscores. Example: the syntax for "Valuation Model" view and column start_date is: columns = "Valuation_Model/start_date". Note also, the maximum length of the string given as a value for this parameter is 255 characters. When a large number of columns must be identified, you may execute SetupModeColumn several times with different columns for the same mode.

In a similar manner to columns, access to various action executions (e.g. Rollover or Exercise of an existing transaction) is also controlled via the mode setup.

Parameter 'action_grant_p' of SetupMode procedure is used to define the default behavior of the mode in various transaction states. Value 0 (the default) makes the mode enable execution of all actions from transactions in the specific state and value 1 makes it disable execution.

Any exceptions to this main definition are defined using SetupModeAction procedure with corresponding value in parameter 'revoke_p' ('0' to enable exceptions, '1' disable exceptions). When 'action_grant_p' of the mode is set to 0, all actions identified in SetupModeAction with parameter 'revoke_p' set to value '1' are disabled as exceptions.

Similarly, when 'action_grant_p' of the mode is set to 0, all actions identified in the procedure with parameter 'revoke_p' set to value '0' are disabled as exceptions

The fields of the *SetupModeAction* procedure used in the script are given in the table below.

Parameter	Description
mode_id	The ID of the mode for which the action setup is added.
add_p	This parameter indicates whether information should be added to the ModeAction definition by overwriting the old data (=0) or adding the new data on to the old data (=1).
user_id	The user or user group ID that has execution permission granted / revoked on the actions specified in the *action_class_id* and *action_id* fields.
state_id	The explicit transaction state of the mode in which setup of granted / revoked actions apply. Note, that a list of specific states separated with spaces can be given as a value for the parameter, e.g. `OPEN VERIFY FINAL`
minimum_state_id	When defining the action setup for a range of transaction states, this is the state with the lowest order number. If this parameter is used, the action setup is made for each state where order number is equal to or greater than that of the identified state.
maximum_state_id	When defining the action setup for a range of transaction states, this is the state with the highest order number. If this parameter is used, the column setup is made for each state where order number is equal to or less than that of the identified state.

Parameter	Description
state_context	When defining the column setup for a range of transaction states, this parameter can be used to identify the context which matching transaction states must have. (see *7.3.4.2 Transaction State contexts* on page 116). If this parameter is used, the action setup is made for each state with the specified context.
state_category	When defining the action setup for a range of transaction states, this parameter can be used to identify the category into which transaction states must belong. If this parameter is used, the action setup is made for each state in the specified category.
ignored_state_flags	When defining the action setup for a range of transaction states, this parameter can be used to identify flags values of states to be ignored. If this parameter is used, the action setup is not made for any state which does have the specified flags. Unless specified, state flag CANCELED_P is used.
entity_type	Table ModeAction as well as procedure SetupModeAction are used both in Transaction- and Entity flows. This parameter is used to identify the entity for which action setup is made. When setting up transaction manager modes, the value must always be set to 'Transaction'.
action_id	Actions listed here are exceptions to general action_grant_p setting of the mode. Note, that a list of actions separated with spaces can be given as a value for the parameter e.g. `rollover exercise call`
action_class_id	Some actions are structured into 'action classes' containing several individual actions. In such cases, this parameter can be used to enable/disable all actions belonging to the same class. Note, that a list of action classes separated by spaces can be given as a value for the parameter e.g. `package charge`

Possible values for action_class_id are given in the table below:

action_class_id	Usage	Enabled by Feature
charge	Enables charges, such as fees and taxes, to be added manually to a transaction on the cashflow level.	MANUAL-CHARGES
create_schedule	Enables manual creation of schedules on any instruments using schedules.	None
package	Enables transactions packaging features: adding, updating, removing.	None

Possible values for action_id are given in the table below:

action_id	Functional area	Usage	Enabled by feature
~delete		Enables deletion of a schedule on long term loans and IR swaps.	GENERIC-LOAN, COMMERCIAL-LOAN
accept		Enables rate reasonability acceptance.	RATE-REASONABILITY-FX, RATE-REASONABILITY-FX-SWAP,RATE-REASONABILITY-LOAN, RATE-REASONABILITY-QUOTED, RATE-REASONABILITY-SWAP
account_transfer		Enables the management of transfers between the account where the gold is physically held and the custodian sight account.	ALLOW-SIGHT-ACCOUNT-TRANSFER
action-split		Enables to redo actions.	FX

action_id	Functional area	Usage	Enabled by feature
add_guarantee	Guarantee and Collateral	Allows adding guarantees on a guaranteed transaction (CLM specific).	ADD-FACILITY-GUARANTEES
addon-assignment		Allows entering a swap (IRS/CCIRS) purchased during its life, by entering the net amounts exchanged with the seller.	None
adhoc-settlements		Ad-Hoc Settlement Instructions.	None
allow-swap		Allows swapping action on bonds to create an asset swap.	ALLOW-SWAP
allow-weight-difference		Enables the management of any difference in the weight of gold that is delivered.	ALLOW-WEIGHT-DIFFERENCE
assignee		Enables assignment from assignee perspective.	ASSIGNMENT
assignment		Enables assignment of a loan from assignor perspective.	
assignment-swap		Enables assignment of a swap from assignor perspective.	SWAP
bond		Enables a call/put for a bond.	BOND, CONVERTIBLE-BOND, CREDIT-STEP-UP, INDEX-LINKED-BOND
bond_fixing		Enables cashflow price and rate fixing (related to Expression) for bonds.	ABS, BOND, CONVERTIBLE-BOND, CREDIT-STEP-UP, DENOMINATED-BOND, INDEX-LINKED-BOND, SCHULDSCHEIN, SWAP
bond-exercise		Enables option exercise.	BOND-OPTION
call	Structured IR	Allows executing a call event.	None
cfc_early_expiration		Enables transaction early-expiration for a cap floor collar.	CAP-FLOOR-COLLAR
classification		Enables manual classification of transactions in Transaction Manager.	ALLOW-MANUAL-CLASSIFICATION
collateral-margin-return		Enables to give back collateral already received from the other party (directly from the collateral).	MARGIN-MOVEMENT
collateral-open-margin-return		Enables to give back collaterals already received from the other party (directly from the collateral). The margin transaction will not have a maturity date.	MARGIN-MOVEMENT
collateral-quote-default		Enables automatic defaulting of the prices when dealing a collateral QUOTED instrument	COLLATERAL-QUOTE-DEFAULT

action_id	Functional area	Usage	Enabled by feature
competitive_quote		Enable the addition of new competitive quotes	COMPETITIVE-PRICE, COMPETITIVE-RATE, COMPETITIVE-PREMIUM
compound_exercise	FX	Allows exercise of a compound option	FX-OPTION-COMPOUND
conditional-remuneration	CLM	Allows entry of conditional remuneration.	CONDITIONAL-REMUNERATION
conversion		Enables execution of a conversion of a convertible bond to shares.	CONVERTIBLE-BOND, GENERIC-LOAN, SWAP
create-collateral	CLM	Allows creating Facility Collateral transactions for a selected Facility.	None
create-commitment-fee	CLM	Allows creating Commitment Fee transactions for a selected Facility.	None
create-drawdown	CLM	Allows creating drawdown (disbursement) transactions for a selected Facility and Tranche.	None
create-facility-fee	CLM	Allows creating Facility Fee transactions for a selected Facility.	None
create-new-equity-invest	CLM	Allows creating investment transactions on a selected equity for a selected Facility.	None
create-schedule-data	Irregular Values	Creates Irregular Value entries for a schedule.	GENERIC-LOAN, COMMERCIAL-LOAN
create-schedule-date	Schedules for loans	Creates a schedule.	GENERIC-LOAN, COMMERCIAL-LOAN
credit_event		Enables execution of a credit event on a CDS	CDS
credit-event		Enables exercising a credit event.	CDS
currency-conversion		Allows conversion of a coupon into a different currency.	CURRENCY-CONVERSION
custody_account_transfer		Defines the instrument as deliverable (handled by a Custodian) and enables the generation of a delivery cashflow.	DELIVERY
cut		Enables to undo security loan cut.	SECURITY-LOAN
deactivate-fixing		Enables to deactivate fixed cashflows.	ALLOW-DEACTIVATE-FIXING
default_guarantee	Guarantee and Collateral	Allows adding default guarantees on a guaranteed transaction (CLM specific).	INSERT-DEFAULT-GUARANTEES
deferment-commission	CLM	When a drawdown is "Deferred", the Lender can demand a Deferment Commission from the Borrower	DEFERMENT-COMMISSION

action_id	Functional area	Usage	Enabled by feature
delete_competitive		Enable deletion of competitive quotes	COMPETITIVE-PRICE, COMPETITIVE-RATE, COMPETITIVE-PREMIUM
delete-schedule-data	Irregular Values	Deletes Irregular Value entries for a schedule.	GENERIC-LOAN, COMMERCIAL-LOAN
deposit-early-expiration		Enables transaction early-expiration for short term loans.	SHORT-LOAN
discount-early-expiration		Enables transaction early-expiration for discount papers.	DISCOUNT, DISCOUNT-OTC
do_currency_conversion	Structured IR	Allows conversion of a coupon into a different currency.	CURRENCY-CONVERSION
do_netting		Allows netting of futures and options (except FX instruments: see FX-NETTING).	NETTING, YIELD-NETTING, SWEDISH-NETTING, FX-NETTED, TICKS-NETTING, FX-FUTURE-NETTING, BOND-NETTING
do_rainbow_coupon	Structured IR	Allows choice of coupon for rainbow structures.	CHOOSE-COUPON
drawdown-amendment	CLM	This feature allows the modification of a drawdown that has already been disbursed	DRAWDOWN-AMENDMENT
drawdown-cancellation	CLM	When the Lender does not wish to avail of the disbursal that has already been agreed upon, the user can "Cancel" the said drawdown	DRAWDOWN-CANCELLATION
drawdown-classification	CLM	When a Borrower's ability to pay either the Principal or the Interest (or Both) becomes doubtful, this feature allows the user to "Classify" the Amount	DRAWDOWN-CLASSIFICATION
drawdown-collateral	CLM	When a Borrower's ability to pay either the Principal or the Interest (or Both) becomes doubtful, this feature allows the user to "Classify" the Amount	DRAWDOWN-CLASSIFICATION
drawdown-fee	CLM	Allows creating a separate fee transaction covering situations where additional fees calculated outside the system must be entered into existing drawdowns in the system.	DRAWDOWN-FEE
drawdown-fixing	CLM	The Feature enables the Rate-setting functionality for a Floating Rate Drawdown	DRAWDOWN-FIXING
drawdown-prepayment	CLM	The feature handles the case where the Borrower wants to repay the borrowed amount in advance of their scheduled repayment dates	DRAWDOWN-PREPAYMENT

action_id	Functional area	Usage	Enabled by feature
drawdown-rescheduling	CLM	The Borrower may request the "Re-scheduling" of the Value Date of a drawdown before it is disbursed, or of a drawdown that has been "Deferred"	DRAWDOWN-RESCHEDULING
due-amount-carry-fwd	CLM	Allows carrying forward payable amount with or without indemnity.	DUE-AMOUNT-CARRY-FORWARD
duplicate		Enables transaction duplication.	None
early_expiration		Enables transaction early-expiration for long term loans, IR swaps etc.	GENERIC-LOAN, XAU-LOAN
edit-commitment-fee	CLM	This feature allows the user to Edit a Facility Commitment Fee Transaction	EDIT-COMMITMENT-FEE
edit-deferment-commission	CLM	When a drawdown is "Deferred", the Lender can demand a Deferment Commission from the Borrower	DEFERMENT-COMMISSION
edit-drawdown-amendment	CLM	This feature allows the modification of a drawdown that has already been disbursed	DRAWDOWN-AMENDMENT
edit-drawdown-classification	CLM	When a Borrower's ability to pay either the Principal or the Interest (or Both) becomes doubtful, this feature allows the user to "Classify" the Amount	DRAWDOWN-CLASSIFICATION
edit-drawdown-fee	CLM	Ad-hoc Fee on a Drawdown	DRAWDOWN-FEE
edit-drawdown-prepayment	CLM	The feature handles the case where the Borrower wants to repay the borrowed amount in advance of their scheduled repayment dates	DRAWDOWN-PREPAYMENT
edit-drawdown-rescheduling	CLM	The Borrower may request the "Re-scheduling" of the Value Date of a drawdown before it is disbursed, or of a drawdown that has been "Deferred"	DRAWDOWN-RESCHEDULING
edit-due-amount-carry-fwd	CLM	If the scheduled repayments from the Borrower are not received/made, the system permits the user to Carry-Forward such amounts to future dates	DUE-AMOUNT-CARRY-FORWARD
edit-guarantee-call	CLM	Processing of a demand of payment received from a Lender against an Issued Guarantee	GUARANTEE-CALL
edit-late-payment-penalty-realization	CLM	Processes the case when the Borrower has failed to make payment on time	LATE-PAYMENT-PENALTY
edit-rvc-divestment	CLM	Investment in Equities under a Lending Facility	RISK-VENTURE-CAPITAL

action_id	Functional area	Usage	Enabled by feature
equity-exercise		Enables option exercise.	EQUITY-OPTION
execute_option_barrier	FX	Allows execution of a barrier on an option	EXOTIC-STRUCTURE, SWAPTION
execute_trigger	Structured IR	Allows executing a trigger event.	None
fee		Enables to undo security loan fee.	SECURITY-LOAN
fixing		Enables cashflow price and rate fixing (related to Expression).	CAP-FLOOR-COLLAR, CDS, GENERIC-LOAN, SWAP, TRS, XAU-LOAN
fra-early-expiration		Enables transaction early-expiration for FRA.	FRA-DISCOUNT, FRA-DEPOSIT FX-TIME-OPTION
funding-call	CLM	Exclusively used when an institution is Lending External/Third Party Funds. Not needed for normal Commercial Lending	ALLOW-FUNDING-CALL
fx_early_expiration	FX	Allows EE on FX forward deals	FX, SWAP
fx-early-expiration-netting	FX	Enables transaction early-expiration of FX NDF.	FX-NETTED, FX-AVERAGE-RATE-FORWARD
fx_fixing	Structured IR	Allows fixing of the FX rate of a dual currency structure.	FX-FIXING
fx_option_early_expiration	FX	Enables FX option early-expiration.	FX-OPTION
fx_pair_shift		Allows you to enter an FX Pair Shift directly from Transaction Manager.	None
fx_roll_over-diff	FX	Allow Roll Over on FX forward with swap style.	ALLOW-FX-ROLL-OVER-SWAP-STYLE
fx-exercise		Enables option exercise.	FX-OPTION FX-OPTION_LISTED
fx-pair-shift		Allows an FX Pair shift action to be done on an existing FX deal.	ALLOW-FX-PAIR-SHIFT
fx-roll-over	FX	Allows Roll Over on FX forward.	ALLOW-FX-ROLL-OVER
fx-roll-over-diff-margin	FX	Add margin points on Roll Over FX forward with swap style.	ALLOW-FX-ROLL-OVER-SWAP-MARGIN
fx-roll-over-margin	FX	Add margin points on Roll Over FX forward.	ALLOW-FX-ROLL-OVER-MARGIN
fx-time-option-early_expiration		Enables transaction early-expiration for fx time option.	
guarantee_refund	CLM	Processes the demand for Funds from the Guarantor to the Borrower, against funds that the Guarantor has already paid to the original Lender	GUARANTEE-REFUND

action_id	Functional area	Usage	Enabled by feature
guarantee-call	CLM	Allows entry of a guarantee call transaction.	GUARANTEE-CALL
index-exercise		Enables option exercise.	INDEX-OPTION
late-payment-penalty	CLM	Allows creating a transaction for the purpose of calculating a penalty interest for a past due amount.	LATE-PAYMENT-PENALTY
late-payment-penalty-realization	CLM	Processes the case when the Borrower has failed to make payment on time	LATE-PAYMENT-PENALTY
loan-pricing	CLM	Allows pricing of Fixed Rate and Revisable Loans	LOAN-PRICING
margin-movement		Enables to add or remove collateral amounts.	REPO
margin-return		Enables to give back collaterals already received from the other party (from the transaction).	MARGIN-MOVEMENT
matching		Enables manual matching of selected transactions.	None
mm-future-exercise		Enables option exercise.	MM-FUTURE-OPTION
modify_si		Allows manual assignment of settlement instructions to an individual cashflow.	None
netting		Allows netting.	NETTING
new_collateral	Guarantee and Collateral	Allows adding collateral entries on a Collateralization transaction.	COLLATERAL-TRANSFER
new_repo	Guarantee and Collateral	Allows adding collateral- and repo entries on a repo transaction.	REPO, MARGIN-MOVEMENT, SUBSTITUTION
new-valuation-approach	Valuation	Creates a new "Valuation Approach" entry for a transaction. It allows choosing a valuation feature depending on the valuation mode and/or figure date.	TRANSACTION-METHOD
new-valuation-model	NumeriX Valuation	Creates a new "Valuation Model" entry for a transaction. It allows set-up of NumeriX valuation parameters at transaction level.	TRANSACTION-METHOD, NUMERIX-METHOD, NUMERIX-SWAP-METHOD, NUMERIX-SINGLE-SWAP-METHOD
open-margin-return		Enables to give back collaterals already received from the other party (from the transaction). The margin transaction will not have a maturity date.	MARGIN-MOVEMENT
option-barrier		Enables to execute an option barrier.	SWAPTION
option-early-expiration		Enables to execute an option early expiration.	SWAPTION

action_id	Functional area	Usage	Enabled by feature
preview		Enables preview of a document of a type selected by the user amongst the matching ones.	None
quote_default		Enables automatic defaulting of the prices when dealing a QUOTED instrument	QUOTE-DEFAULT
rainbow-coupon		Allows choice of coupon for rainbow structures.	CHOOSE-COUPON
regenerate_cashflows		Enables cashflow regeneration for a selected transaction from a specified Refresh Date onwards keeping manually changed fields.	None
repo_roll_over		Enables transaction roll-over for repos.	ALLOW-REPO-ROLL-OVER
reset_ssi		Allows resetting of manually-assigned settlement instructions of an individual cashflow.	None
revision		Enables execution of the revision event on Revisable long term loan.	ALLOW-REVISION
risk-venture-capital	CLM	Allows entry of equity investment.	RISK-VENTURE-CAPITAL
roll_over		Enables transaction roll-over.	ALLOW-ROLL-OVER
roll_over-dual		Enables transaction roll-over for gold deposits.	ALLOW-ROLL-OVER-DUAL
roll-over-one		Enables transaction roll-over for one payback.	ALLOW-ROLL-OVER-ONE
roll-over-swap		Enables transaction roll-over for swap.	ALLOW-ROLL-OVER-SWAP
runreport		Enables report generation.	None
rvc-divestment	CLM	Investment in Equities under a Lending Facility	RISK-VENTURE-CAPITAL
schedule		Enables a call/put for a loan.	CAP-FLOOR-COLLAR, COMMERCIAL-LOAN, SWAP, XAU-LOAN
set-base-fx-book-rate		Enables setting of base fx book rate.	BOND, DISCOUNT, EQUITY, GENERIC-LOAN, SHORT-LOAN, XAU-LOAN
signature_date		Enables defining and storing the signature date for a transaction (related to Accounting).	ALLOW_SIGNATURE_DATE
spot_forcing		Sets transaction type to spot.	None
subsidy_call	CLM	Exclusively used for Subsidized Lending by Multi-lateral Institutions. Not needed for normal Commercial Lending	ALLOW-SUBSIDY-CALL

action_id	Functional area	Usage	Enabled by feature
substitution		Enables substitution of collaterals by new collaterals having different instruments.	REPO, SUBSTITUTION
swap-early-expiration		Enables transaction early expiration of IR swaps.	SWAP
swap-exercise		Enables option exercise.	SWAPTION
transaction_conversion	Structured IR	Allows conversion of a transaction to another type of transaction.	TRANSACTION-CONVERSION
transfer		Enables to transfer a loan to another portfolio.	GENERIC-LOAN
transfer-swap		Enables to transfer a swap to another portfolio.	SWAP
trs_early_expiration	Structured IR	Enables early-expiration for Total Return Swaps.	TRS
trs_fixing	Structured IR	Allows fixing of DRS in order to compute settlement at maturity.	TRS
undo_currency_conversion	Structured IR	Allows conversion of a coupon into a different currency.	CURRENCY-CONVERSION
undo_fixing		Undoes fixing of cashflow price and rate.	
undo_netting		Enables undoing netting.	NETTING YIELD-NETTING SWEDISH-NETTING FX-NETTING TICKS-NETTING FX-FUTURE-NETTING BOND-NETTING
undo_option_barrier	FX	Allows undoing of an option barrier execution	EXOTIC-STRUCTURE, SWAPTION
undo_rainbow_coupon	Structured IR	Allows choice of coupon for rainbow structures.	CHOOSE-COUPON
undo_spot_forcing		Sets default transaction type.	None
undo_trigger	Structured IR	Allows undoing a trigger previously executed.	None
undo-adhoc-settlements		Undo Ad-Hoc Settlement Instructions.	None
undo-matching		Enables undoing matching.	None
write-off	CLM	Allows user to write off cashflow of drawdown.	WRITE-OFF
yield_to_maturity		Enables pricing of yield to maturity of bonds.	BOND-PRICING
yield-exercise		Enables option exercise.	FRA-OPTION
yield-netting		Allows netting for yield.	YIELD-NETTING

7.4.3 Example of mode setup

To add a new transaction manager for exercising option transactions, add a new mode to the script `$FK_HOME\share\<database>\setup\modes.sql` using the *SetupMode* and *SetupModeAction* procedures.

- Set a restriction so that we see only transactions with the status OPTION and in state FINAL.
- The user must be able to edit value in transaction columns *Fixing/Action Date* and *Comment4* on these transactions in the new transactions manager.
- The user must be able to create exercise transactions to state EVENT-OPEN by executing *Exercise* action on them and to accept created transactions forward in the flow or cancel them immediately. But the user must not be able to execute any other actions.

To accomplish this, the following add-on in the `modes.sql` file is needed:

```
Exec SetupMode @mode_id = ‘OPTION-EXERCISE’,
                @state_id = ‘FINAL’,
                @new_state_id = ‘EVENT-OPEN’,
                @status = 4, /* OPTION */
                @grant_p = 1,
                @action_grant_p = 1,
                @columns = ‘Transaction/_fixing_date Transaction/comment_4’
```

To enable seeing and processing new exercise transactions in the state EVENT-OPEN as well, a new SetupMode execution is needed:

```
Exec SetupMode @mode_id = ‘OPTION-EXERCISE’,
                @add_p = 1,
                @state_id = ‘EVENT-OPEN’,
                @grant_p = 0,
                @action_grant_p = 1,
                @accept_p = 1,
                @cancel_p = 1
```

Note the use of the `add_p` flag, which adds a new entry for the mode OPTION-EXERCISE in the *Mode* table without overwriting the old one. Without this flag, the original mode is overwritten.

The `grant_p` parameter with the value "1" in the first entry indicates that all columns on the existing option transactions in state FINAL should be locked except for those specified in `columns`. Conversely, `grant_p` value "0" in the second entry indicates that all columns, which are editable in option exercise transactions in general, can be edited in this mode as well.

The `action_grant_p` parameter with the value "1" in both entries indicates that no actions other than those specifically identified as exceptions in ModeAction table can be executed in this mode.

Finally, in order to enable action Exercise from existing option transactions in state FINAL, the following execution of SetupModeAction procedure is needed:

```
Exec SetupModeAction@mode_id = ‘OPTION-EXERCISE’,
        @state_id = ‘FINAL’,
        @action_id = ‘exercise’,
        @entity_type = ‘Transaction’,
        @revoke_p = 0
```

7.5 Database objects for transaction flow and modes

The following table summarizes the database objects which define the transaction flow and modes.

Object	Type	Description
permission.sql	Sql script	Creates permissions in the database by running stored procedure SetupPermission with parameters given in the script.
Permission	Table	Contains all permissions.
SetupPermission	Stored Procedure	Inserts information in the *Permission* table.
status.sql	Sql script	Creates transaction status in the database by running stored procedure SetupStatus with parameters given in the script.
Status	Table	Contains all transaction statuses.
SetupStatus	Stored Procedure	Inserts information in the *TransactionStatus* table.
transaction_state.sql	Sql script	Creates transaction states in the database by running stored procedure SetupState with parameters given in the script.
TransactionState	Table	Contains all transaction states.
SetupState	Stored Procedure	Inserts information in the *TransactionState* table.
modes.sql	Sql script	Creates transaction manager modes for processing non-CLM transactions in the database by running stored procedures SetupMode, SetupModeColumn and SetupAction with parameters given in the script.
loan_modes.sql	Sql script	Creates transaction manager modes for processing CLM transactions in the database by running stored procedures SetupMode, SetupModeColumn and SetupAction with parameters given in the script.
Mode	Table	Contains all Transaction Manager modes.
ModeColumn	Table	Keeps information about the edit permissions of Transaction Manager columns that are granted / revoked for a particular mode
ModeAction	Table	Keeps information about menu, entity and sub-entity level actions (New Transaction, Duplicate, Early-expire, Fixing…) to be granted / revoked for a particular mode.
SetupMode	Stored Procedure	Inserts information in the *Mode* and *ModeColumn* tables.
SetupModeColumn	Stored Procedure	Inserts information in the *ModeColumn* table.
SetupModeAction	Stored Procedure	Inserts information in the *ModeAction* tables.
flow.py	Python script	Creates ACCEPT and REJECT operations with agent setup given in the script.
commit.py	Python script	Creates COMMIT operation with agent setup given in the script.
status.py	Python script	Creates all SET/CLEAR status operations with agent setup given in the script.
TransactionOp	Table	Contains the header definition of transaction operations
TransactionOpAgent	Table	Contains the agent definition of all transaction operations.

Object	Type	Description
AgentAccess	Table	Contains the setup attributes of all check_access agents.
AgentEvent	Table	Contains the setup attributes of all check_event agents.
AgentExtension	Table	Contains the setup attributes of all get_extensions agents.
AgentExtensionEntry	Table	Contains extension details used in get_extensions agent setup
AgentInstrument	Table	Contains the setup attributes of all instrument agents.
AgentMessaging	Table	Contains the setup attributes of all send_full and send_number agents.
AgentMessagingProperty	Table	Contains additional setup parameters supported in some messages from send_full and send_number agents
AgentProcedure	Table	Contains the setup attributes of all call_proc agents.
AgentState	Table	Contains the setup attributes of all set_state agents.
AgentStatus	Table	Contains the setup attributes of all set_status and clear_status agents.
CashflowStatus	Table	Contains all cashflow statuses.
SetupCashflowStatus	Stored Procedure	Used for defining cashflow statuses.
CashflowAction	Table	Contains the definition of all cashflow actions.
SetupCashflowAction	Stored Procedure	Used for defining cashflow actions.

7.6 Loading default entity flows

In addition to transactions, many other transaction-like entities in the system are processed in a workflow. Transaction flow is a special case in its complexity and, consequently, implemented as a separate transaction-specific workflow model in the system, but the logic of process flow of most other entities is very similar and, instead of a separate workflow model for each of them, the system uses a single, generic entity flow for all entities requiring workflow processing.

Some CLM (Commercial Lending Module) entities are supported outside the main entity flow model by a separate action-based entity flow implementation described separately below. CMM cash record flow shares the setup as well as general logic with standard entity flow but the actual flow processing is implemented separately. Cash record flow setup is documented in this chapter. Also, special case of SDM (Static Data Module) workflow processing of static data is not described here.

7.6.1 Entity broker-based flow

Entity flow uses entity broker services similar to transaction broker services used in transaction flow and requires entity state setup to support the flow operations. The system is distributed with a separate sql script for each entity supported by the generic entity flow containing default setup of entity states and modes. In addition to this, a separate python script containing setup of entity broker operations and, in some cases, entity rules is distributed for each entity.

The scripts `facility.sql` and `facility.py` setup discussed below contain only the states and operations required by facility message management. Actual CLM facility flow is managed in separate action-based entity flow implementation.

To load default entity flows, run the following setup scripts available in `$FK_HOME\share\<database>\setup` containing default definitions of entity states and entity modes to be used in the flow into the database:

`amount_event_flow.sql`	amount event states, modes and rules
`call_money_account_flow.sql`	call money/account states and modes
`cash_record.sql`	cmm cash record states
`cashflow_action.sql`	cashflow actions for call money/account processing
`facility.sql`	facility states
`finmessage.sql`	finmessage states and modes
`fixing_flow.sql`	fixing states and modes
`fund_report_header`	nav report states and modes
`hedge_relation.sql`	hedge relation states, modes and rules
`message_flow.sql`	message request states and modes
`payment_flow.sql`	payment advice states and modes
`payment_alloc_flow.sql`	payment allocation states and modes
`payment_rem_flow.sql`	payment reminder states, modes and rules
`settlement.sql`	settlement states and modes

Note also that the following script, already used in loading default transaction flow, also contains setup of cashflow status referred to in entity flow processing of call money/account:

`status.sql`	cashflow status

Then execute the following command to build the default entity flow for all entities:

```
cd %FK_HOME\share\python
python -m entity-flow.build
```

This command executes the following setup scripts as one logical step to build the entire entity flow:

`amount_event.py`	amount event operations and rules
`call_money_account.py`	call money/account operations and rules
`cash_record.py`	cmm cash record operations
`facility.py`	facility operations and rules
`finmessage.py`	finmessage operations and rules
`fixing.py`	fixing operations and rules
`fund_report_header.py`	nav report operations and rules
`hedge_relation.py`	hedge relation operations and rules
`message_manager.py`	message request operations and rules
`payment_advice.py`	payment advice operations and rules
`payment_allocation.py`	payment allocation operations and rules
`payment_reminder.py`	payment reminder operations and rules
`settlement.py`	settlement operations and rules

These scripts can also be run individually from the directory `$FK_HOME\share\python\entity-flow` (e.g. `python amount_event.py`) but the recommendation is to always use the `python -m entity-flow.build` command, and to build the whole flow in one step.

7.6.2 CLM loan action-based flow

The following entities are still supported by CLM loan action-based entity flow implementation:

- Facility
- Mandate
- Approval

The setup of loan entity flow for all of the above entities is done in the following setup script:

- loan_entity_flow.sql (states, modes, loan entity actions)
- loan_validation_method.sql (loan validation methods)

To load default CLM entity flows, run the above setup scripts that are available in the directory `$FK_HOME\share\<database>\setup` into the database.

7.7 Setting up entity broker-based flow

7.7.1 Entity States

Entity states for each entity are configured using the sql setup scripts listed above and found in `$FK_HOME\share\<database>\setup.`

The same scripts are used for setting up both entity states and entity manager modes required for processing the respective entities. These scripts execute the stored procedure SetupEntityState to create state entries using the parameters given in the sample script as follows:

```
/* State for settlement to be processed by netting service */
exec SetupEntityState@entity_type= "Settlement",
                     @id = "TO-BE-NETTED",
                     @flags = 64, /* TO BE NETTED */
                     @name = "Waiting for Netting",
                     after_state_id = "GENERATED"
go
```

The fields of the *SetupEntity* procedure used in the script are given in the table below.

Parameter	Description
entity_type	Entity for which the state is to be used (e.g. “Settlement” or “FINMessage”)
id	The ID of the state.
name	Name to be shown in the *State* column of entity manager.
flags	Flags which can be used to link a characteristic to any entities in this state or, in some cases, to any entities in this or a later state in the flow
after_state_id	The order number of the state will be set to a higher number than this state.
before_state_id	The order number of the state will be set to a lower number than this state.
state_id	The order number of the new state will be set to the same as the order number of this state.

The table below lists the flag values that each entity state with entity type ‘Settlement’ can have.

Value	Name	Description
1	CANCELED	This flag is used to give a “canceled state” to canceled entities.
2	FINAL	The threshold before which entities are not finalized (are provisional or being enriched/verified), and after which they are fully finalized. Mainly used in CLM but also in Settlement to identify ‘released’ settlements. Only transactions with no associated settlements in FINAL settlement state(s) can be re-opened and modified in transaction flow
4	HIDDEN	Not shown in selection lists.
8	PROVISIONAL	The threshold before which entities are not even provisional (simulated or rejected), and after which they are provisional (to be possibly considered in position/risk, but not fully finalized) until they reach the threshold for final entities. Mainly used in CLM.
16	INTERMEDIATE	???
32	NOT-ACTIVE	???
64	SETTLEMENT-TO-BE-NETTED	Settlements in this state must be processed by settlement netting service. The flag is used to secure that all settlements in states with this flag will be processed in situations where the service is restarted following an earlier problem

7.7.2 Cashflow actions for Call Money / Account

In the special case of call money/account flow, the main flow handling is complemented by cashflow-level flow handling, which is used to process individual movement cashflows inside an existing call money/account transaction and primarily implemented as cashflow actions setting and clearing cashflow status. These are not used anywhere outside call money / call accounts in the system.

Cashflow actions perform similar tasks to entity agents but are executed on individual cashflows instead of the main entity (i.e. transaction). They are configured using the `cashflow_action.sql` script found in `$FK_HOME\share\<database>\setup`. This script executes the stored procedure *SetupCashflowAction* to create action entries using the parameters given in the sample script below:

```
/* Action setting status Final when accepted from Verify */
exec SetupCashflowAction @action_id = "ACCEPT",
                         @status = 131072, /* Verify */
                         @action = "DoCSetStatus",
                         @param0 = "Final"
go
```

The fields of the *SetupCashflowAction* procedure used in the script are given in the table below.

Parameter	Description
action_id	Identifier of the action, for example ACCEPT, REJECT.
order_number	Order number of entries belonging to one action.
rule_id	This entry is applied only to cashflows matching this rule. Note that this rule refers to ordinary rules, not to entity rules
not_rule_id	This entry is not applied to cashflows matching this rule.
contexts	This entry is applied only to transactions having this context.
not_contexts	This entry is applied only to transactions not having this context.

Parameter	Description
status	This entry is applied only to cashflows having this status (or statuses).
not_status	This entry is not applied only to cashflows having this status (or statuses).
mask	If 'mask' is given, the condition is met if the 'current mask' of the operation contains the given mask. Note, that is entity action setup, mask cannot be given as a 'bit number' but must always be given as mask value (e.g. bit number 4 corresponding to mask value 16 must always be given as '16').
not_mask	If 'not_mask' is given, the condition is met if the 'current mask' of the operation does not contain the given mask.
action_mask	If the conditions are met and the action entry is executed, the mask value given in this parameter is added to the 'current mask' of the action execution and can, consequently, be used as mask- or not_mask condition for the subsequent entries in the same action execution.
action	The stored procedure executed if all conditions were met.
param0...param9	Parameters for the stored procedure.
clear_p	When set to 1, all actions with the same action_id are removed before the new one is added.

The table below lists stored procedures available as 'actions' to be used in cashflow action setup.

Stored Procedure Name	Parameters	Description
DoCFBookAtTradeDate	n/a	Marks the cashflow to be booked on trade date.
DoCFBookAtValueDate	n/a	Marks the cashflow to be booked on value date.
DoCFCheckAccess	Param0 = 'permission_id	'Checks that current user executing the action (e.g. ACCEPT or REJECT) has the required permission, given in param0, in the portfolio of the transaction

DoCSetStatus	Param0 = 'status name'
	Param1 = 'display name
		'Sets the cashflow status given in param0. Note that the status is given as the name of the status in table CashflowStatus
		Text given in param1 is displayed in the corresponding action button in Entity Manager

DoCClearStatus.pl	Param0 = 'status name'
	Param1 = 'display name
		'Clears the cashflow status given in param0

7.7.3 Entity Rules

The Settlement entity has dedicated rules: Settlement Rules are configured in Settlement Rule Editor and Amount Rules are defined in Amount Rule Editor. These rules can be used as condition calls for executing entity agents in settlement flow operations. Other entities supported by entity broker do not have similar dedicated rules but generic entity rules can be used instead. There is no Entity Rule Editor in the system and, if rules are needed in Entity Actions, they must be set up as part of the python setup script used for entity flow operations (e.g. in `amount_event.py`) using the command `define_rule` as shown in this example:

```
define_rule ("AmountEvent", "NEW-SUBSIDY-EVENT", "NEW-SUBSIDY-EVENT",
(equal_to("event_type", "Subsidy Estimation"), equal_to("event_subtype", "New")))
```

The above rule has the following main attributes:

entity_type = `AmountEvent`

id = `NEW-SUBSIDY-EVENT`

name = `NEW-SUBSIDY-EVENT`

and validates if the amount event being matched against the rule has the following values:

event_type = `Subsidy Estimation`

event_subtype = `New`

Other comparison operators are `not_equal_to`, `rule.mask` and `rule.not_mask`. The two last operators define bit mask tests of a flag field in the entity.

For example the condition `rule.mask("flags", 1, 7, 16)` is true when bits 1, 7 and 16 are set in the flags field of the entity.

7.7.4 Entity broker operations

Entity broker operations for supported entities listed above are set up in python scripts. The logic of the entity broker-based flow setup is very similar to that of transaction flow. Operations (e.g. ACCEPT, REJECT) are entity-specific and consist of a series of agents set up with condition calls and parameters to achieve the required processing. Supported condition calls and agents are fewer than in transaction flow but the basic functionality is very similar. Some of the condition calls and agents are generic and applicable in setup of all entity flows and others are entity-specific.

7.7.4.1 Condition calls

Condition calls in entity broker operations are used as in transaction broker operations to validate the entity for which an operation is being executed against a specific condition to be met in order for the agent to executed.

The table below lists the condition calls that can be used in entity agent setup.

Entity Type	Condition call	Setup Attributes	Description
All	state ()	'state_id' (e.g. 'TO-BE-NETTED')	'Minimum State id' and 'Maximum State id' of the agent setup are both set to the given state and, consequently, the condition is met by entities in any state where order number equals that of the given state.
All	state_at_least ()	'state_id' (e.g. 'GENERATED')	'Minimum State id' of the agent setup is set to the given state and, consequently, the condition is met by entities in any state where order number is equal to or greater than that of the given state.
All	state_at_most ()	'state_id' (e.g. 'TO-BE-RELEASED')	'Maximum State id' of the agent setup is set to the given state and, consequently, the condition is met by entities in any state where order number is equal to or less than that of the given state.
All	state_between ()	'min_state_id' (e.g. 'TO-BE-NETTED') 'max_state_id' (e.g. 'TO-BE-SPLIT')	'Minimum State id' and 'Maximum State id' of the agent setup are set to the given states and, consequently, the condition is met by entities in any state where order number is equal to or greater than that first given state and equal to or less than that of the second given state.
All	mask ()	'bit number' of mask	'Mask' of the agent setup is set to the mask value of the given mask and, consequently, the condition is met if the 'current mask' of the operation contains given mask. Note, that any number of mask bits separated with commas can be listed (e.g. mask (1,2,8) and the current mask has to contain all of them in order to meet the condition.

Entity Type	Condition call	Setup Attributes	Description
All	not_mask ()	‘bit number’ of mask	‘Not Mask’ of the agent setup is set to the mask value of the given mask and, consequently, the condition is met if the ‘current mask’ of the operation does not contain given mask. Note that any number of mask bits separated with commas can be listed (e.g. mask (1,2,8) and the current mask must not contain any of them in order to meet the condition.
CallMoney Account	rule ()	'rule_id' 'rule service name'	'Rule id' of the agent setup is set to the given rule and, consequently, the condition is met by the FIN message that matches the rule. The rule service used to match the identified rule against the entity being processed must be given as a parameter for this condition call. It is identified as service/entity-broker/call-money@rule.
CallMoney Account	not_rule ()	'rule_id' 'rule service name'	'Not Rule id' of the agent setup is set to the given rule and, consequently, the condition is met by entities not matching the rule. The setup is the same as for 'rule ()'
CallMoney Account	status ()	'bit number' (e.g. 0 for status with mask value 1, 'Confirm' or 4 for status with mask value 16, 'Limit Violation')	'Status' of the agent setup is set to the mask value of the given status and consequently the condition is met by transactions with the status.
FINMessag e	rule ()	'rule_id' 'rule service name'	'Rule id' of the agent setup is set to the given rule and, consequently, the condition is met by the FIN message that matches the rule. The rule service used to match the identified rule against the entity being processed must be given as a parameter for this condition call. It is identified as service/entity-broker/finmesage@rule
FINMessag e	not_rule ()	'rule_id'	'Not Rule id' of the agent setup is set to the given rule and, consequently, the condition is met by entities not matching the rule. The setup is the same as for 'rule ()'

Settlement	rule ()	‘rule_id’ (e.g. ‘SFLO-NETTING’)
		‘rule service name’
			‘Rule id’ of the agent setup is set to the given rule and, consequently, the condition is met by transactions matching the rule.
			Since the same condition call is used for various entities, the rule service used to match the identified rule against the entity being processed must be given as a parameter for this condition call. It is identified as follows:
			`service/entity-broker/settlement@rule`
			for rules defined in Settlement Rule Editor, and:
			`service/entity-broker/settlement@amount-rule`
			for rules defined in Amount Rule Editor.

Settlement	not_rule ()	‘rule_id’	‘Not Rule id’ of the agent setup is set to the given rule and, consequently, the condition is met by entities not matching the rule The setup is the same as for ‘rule ()’

7.7.4.2 Agents

Agents in entity broker are used in the same way as in transaction broker, and executed when condition calls of the agent setup are met by the entity being processed.

The table below lists agents that can be used in the setup.

Entity Type	Agent	Setup Attributes	Description
All	set_state	'state_id'	Sets the entity state of the entity to the state given in the setup
All	send	'queue name' 'use_topic'	Sends the full entity on the message bus to a specific queue for further processing 'use_topic' can be set to 'True' or False'. If not given, it defaults to 'False' indicating that the message is sent to specific 'listener' (e.g. the service releasing settlements) and that the message will be received even if the 'listener' is absent at the time of sending the message. Setting this attribute to 'True' implies that a message sent is a general real time message received by whoever is 'listening' at the time of sending the message
All	send_id	'queue name' 'use_topic'	Sends the entity id on the message bus to a specific queue for further processing. This can be used, instead of 'send', when the receiving service is going to reload the entity data in any case based on the entity id Other parameters are same as in send
All	service	'module name' 'table name' 'params'	Similar to transaction broker, python CSD would be hooked to the flow through this mechanism. For example service("common/python@CSD_agent") inserts the `CSD_agent.py` script in the agent chain. service("common/python@CSD_agent", "CSDAgent", value1="something", value2=10) will also save a record in the CSDAgent table with value1="something" and value2=10; when the hook is executed those values are passed back to it.
All	call_proc	'procedure name' 'param0' to 'param9' passed to the procedure as start-up parameters	call_proc agent is used to run a stored procedure for the entity. The name of the procedure is given as an attribute to the agent together with any values passed to the procedure to be used as start-up parameters.
All	call_op	'operation_id'	A special agent used to execute an operation from inside another one. Masks are not shared across operations, but when an external operation is called using the call_op agent, the new operation is started with an empty mask. Consequently, if mask or not_mask condition calls are used in the setup inside the new operation, the current mask of the original operation is ignored, and a new one is started for the called operation.
All	txn_begin	n/a	Opens a database transaction

Entity Type	Agent	Setup Attributes	Description
All	txn_prepare	n/a	Prepares 2nd phase of the db transaction
All	txn_commit	n/a	Commits a database transaction
All	update_entity	n/a	Updates the transaction in the database
AmountEvent	service/entity-board/amount-event@save-amount-event	n/a	Saves the Amount Event in database
CallMoneyAccount	set_status	'bit number' of the status	Sets the status given in the setup for the call money/account transaction.
CallMoneyAccount	clear_status	'bit number' of the status	Clears the status given in the setup for the call money/account transaction.
CallMoneyAccount	refresh_call_transaction	n/a	The refresh_call_transaction agent refreshes the memory version of the transaction during execution of the operation against the database. It is typically used after executing a call_proc agent resulting in an update of the transaction in the database to synchronize the memory version of the transaction with the updated database version. This has the following benefits: • refresh_call_transaction executed after a call_proc agent makes it possible to take updated values into account when evaluating condition calls (for example, via rule matching) of any later agents during the same execution of an operation. • refresh_call_transaction executed after a call_proc agent includes updated values in the real time notification sent from the operation. For example, if a specific transaction parameter field was updated by a call_proc agent as part of the operation, this value will be updated in all real time applications displaying the transaction.
CallMoneyAccount	send_call_number	'queue name' 'use_topic'	Sends the call money/account transaction number on the message bus to a specific queue for further processing. For example, "settlement.transaction.generate" in order to generate settlements. This agent is a particular implementation of the general 'send_id' applied to the call money/account context. Other parameters are the same as in send.
CallMoneyAccount	service/entity-board/call-money@new-audit-number	n/a	Assigns an owner-specific audit number to a call money/account transaction if it does not exist already
CallMoneyAccount	service/entity-board/call-money @notify-transaction	n/a	Sends a real time notification of Call Money/Account transaction to transaction based applications like Transaction Manager and Treasury Monitor

Entity Type	Agent	Setup Attributes	Description
CallMoneyAccount	service/entity-board/call-money @update-transaction	n/a	Saves the Call Money/Account transaction in the database
CallMoneyAccount	check_4_eyes_call_transaction	'user_id'	'user_id' can be a user's ID or a user group. Prevents a user from performing the same transaction flow operation twice. This agent will stop the current operation if its previous execution was triggered by the same user. When the optional 'user_id' parameter is supplied, the validation is limited to this particular user or user group. When this parameter is absent, validation is performed for all users.
CallMoneyAccount	log_call_event	n/a	Enables logging of transaction flow events. Results are saved in the TransactionEvent table. This agent is a prerequisite for the 'check_4_eyes_call_transaction' agent.
CallMoneyAccountMovement	check_4_eyes_call_movement	'user_id'	This agent is similar to the 'check_4_eyes_call_transaction' but it applies to the movements flow instead of transactions.
CallMoneyAccountMovement	log_call_movement_event	n/a	Enables logging of call money/account movements flow events. Results are saved in the TransactionEvent table. This agent is a prerequisite for 'check_4_eyes_call_movement' agent.
CashRecord	com.wss.workflow.agents.setState.xml	'state_id'	Sets the state of the CMM cash record to the state given in the setup Note, that whereas cash record flow in CMM uses the generic entity flow setup, the actual processing is not done by entity broker but by corresponding functionality in CMM
FINMessage	service/entity-broker/finmessage@set_status	'bit number' of the status	Sets FINMessage status. Supported status are: 0 - 'SENDING' 1 - 'SENT' 2 - 'URGENT' 3 - 'STP'
FINMessage	service/entity-broker/finmessage@clear_status	'bit number' of the status	Clears FINMessage status ()
FINMessage	service/entity-broker/finmessage@save	n/a	Saves the FIN message in the database
FINMessage	service/entity-broker/finmessage@send-finmessage	'queue name' 'use_topic'	Sends the full FIN Message on the message bus to a specific queue for further processing Parameters are the same as in generic 'send' agent
Fixing	service/entity-board/fixing@save-fixing	n/a	Saves the Fixing in database
HedgeRelation	service/entity-board/hedge-manager@check-designation	n/a	Checks the total designation of all transactions being part of the hedge relation. Displays a warning message if the total designation exceeds 100%

Entity Type	Agent	Setup Attributes	Description
HedgeRelation	service/entity-board/hedge-manager@check-events	n/a	Checks the hedge events and displays a warning message if some of them are already processed
HedgeRelation	service/entity-board/hedge-manager@validate	n/a	checks that the hedge relation is valid (there is at least one hedge and one underlying transaction as well as hedge types specified for all defined risks). If the validation fails error message is displayed and hedge relation is not saved
HedgeRelation	service/entity-board/hedge-manager@save	n/a	Saves the Hedge Relation in database
MessageRequest	service/entity-board/message-manager@process-provisional	n/a	Processes and sends messages of message request. This service is used in message flow when message request is initially generated into a provisional state for manual validation to trigger the actual message processing when request is accepted to a post-provisional state
MessageRequest	service/entity-board/message-manager@save	n/a	Saves the Message Request in the database
PaymentAdvice	service/entity-board/payment@make-accounting-inputs	n/a	Creates accounting inputs from a payment advice
PaymentAdvice	service/entity-board/payment@cancel-accounting-inputs	n/a	Cancels accounting inputs from a payment advice
PaymentAdvice	service/entity-board/payment@save-payment-advice	n/a	Saves the Payment Advice in database
PaymentAlloc	service/entity-board/allocation@make-accounting-inputs	n/a	Creates accounting inputs from a payment allocation
PaymentAlloc	service/entity-board/allocation@cancel-accounting-inputs	n/a	Cancels accounting inputs from a payment allocation
PaymentAlloc	service/entity-board/allocation@cancel-lpr	n/a	Cancels all late payment penalty realization transactions affected by the payment allocation
PaymentAlloc	service/entity-board/allocation@reject-payment-alloc	n/a	Unallocates all cashflows and payments of the Payment Allocation
PaymentAlloc	service/entity-board/allocation@save-payment-alloc	n/a	Saves the Payment Allocation in database
PaymentRem	service/entity-board/payment-reminder@save-payment-reminder	n/a	Saves the Payment Reminder in database

Entity Type	Agent	Setup Attributes	Description
Settlement	check_4_eyes_accept_settlement ()	'user_id'	'user_id' can be a user's ID or a user group. Prevents a user from accepting the settlement twice. When used in the flow, this agent will stop the ACCEPT operation if its previous execution was triggered by the same user. When the optional 'user_id' parameter is supplied, the validation is skipped for this particular user or user group. When this parameter is absent, validation is performed for all users.
Settlement	reset_4_eyes_accept_settlement ()	n/a	This agent should be used in the flow for the REJECT operation. It resets the 4 eyes principal when the settlement is rejected so that the check is correctly done in the next ACCEPT operation by the agent 'check_4_eyes_accept_settlement ()'.
Settlement	set_settlement_state	‘state_id’	sets the state of the settlement to the state given in the setup
Settlement	service/entity-broker/settlement@cmm-accept	n/a	sends the settlement to CMM for further processing
Settlement	service/entity-broker/settlement@cmm-reject	n/a	rejects the existing CMM cash record created off the settlement
Settlement	service/entity-broker/settlement@save	n/a	Saves the settlement in database
Settlement	service/entity-broker/settlement@send-settlement	‘queue name’ ‘use_topic’	Sends the full settlement on the message bus to a specific queue for further processing Parameters are the same as in generic ‘send’ agent

7.7.4.3 Service queues

Various ‘send’ agents above are used to send the respective entities to be further processed by another service.

The table below lists service queues that are currently used in the setup.

Entity Type	Queue Name	Description
All	document.entity	Creates a message request from the entity: • in the identified message type • into the identified message state The same queue is used for all entity types for which message requests can be generated
AmountEvent	commitment-fee.amount-event.accept	Updates an existing commitment fee transaction by adding the effect of an amount event. This service is normally used for amount events when they are accepted to a final state
AmountEvent	commitment-fee.amount-event.reject	Updates an existing commitment fee transaction by removing the effect of an amount event. This service is normally used for amount events when they are rejected from a final state

Entity Type	Queue Name	Description
CallMoneyAccount	settlement.transaction.generate	Creates settlements from a call money/account transaction.
CallMoneyAccount	call-money-account.realtime	Sends a real-time notification from the call money/account to entity manager applications
FINMessage	finmessage.realtime	Sends a real-time notification from the FINMessage
FINMessage	finmessage.send	Sends messages to the SWIFT network
FINMessage	finmessage.to.trmswift	Imports a message to TRMSwift
FINMessage	match.checker	Updates the confirmation matching status of the transaction related to the FIN message placed on the queue. The confirmation matching status will be based on all relevant message for the transaction (i.e. if you haven't received the status for all messages for an FX Swap, then the transaction can't yet be considered matched)
HedgeRelation	hedge-relation.realtime	Sends a real-time notification from the hedge relation
MessageRequest	document.realtime	Sends a real-time notification from the message request
Settlement	settlement.realtime	Sends a real-time notification from the settlement
Settlement	settlement.released.id	Releases the settlement
Settlement	settlement.rule-netting.settlement.id	Processes netting for the settlement
Settlement	settlement.splitting.ids	Processes splitting for the settlement
Settlement	settlement.trmswift.cancel	Processes swift cancellation messages for the settlement
Settlement	settlement.trmswift.mt1	Processes swift MT100 series messages for the settlement
Settlement	settlement.trmswift.mt2	Processes swift MT200 series messages for the settlement
Settlement	settlement.trmswift.mt3	Processes swift MT300 series messages for the settlement
Settlement	settlement.trmswift.mt5	Processes swift MT500 series messages for the settlement
Settlement	settlement.trmswift.mt6	Processes swift MT600 series messages for the settlement
Settlement	settlement.trmswift.mt9	Processes swift MT900 series messages for the settlement

7.7.5 Entity Manager Modes

Entities processed in various entity flows are accessed and processed by the users in Entity Manager applications in a similar manner to transactions in Transaction Manager. As in Transaction Manager, modes are used to describe in more detail which entities can be accessed in the application and how they can be processed in it. Entity Modes are defined in the following tables:

- EntityMode
- ModeColumn
- ModeAction

Note that only the main mode table is specific for entity modes, whereas column- and action tables are shared with Transaction Manager Mode definitions

7.7.5.1 Loading default modes

The system is released with default entity manager mode setup for the various entities. There are no separate setup scripts for entity modes but all mode setup is distributed as part of the generic SQL script used for the entity. These scripts, listed above already, can be used to load both distributed entity state and entity mode setup used to for the respective entity.

7.7.5.2 Setting up modes

Modes are configured the generic entity setup scripts found in `$FK_HOME\share\<database>\setup`. These scripts execute the following stored procedures:

- SetupEntityMode
- SetupModeColumn
- SetupModeAction

To create mode entries using the parameters given in the script as e.g. follows:

```
/* Mode RELEASE for manual and automatic release of settlements */
exec SetupEntityMode @mode_id='RELEASE',
                     @minimum_state_id="MANUAL-RELEASE",
                     @maximum_state_id="TO-BE-RELEASED",
                     @new_state_id='',
                     @grant_p=1,
                     @action_grant_p=1,
                     @user_id='',
                     @entity_type='Settlement'
go
```

SetupModeColumn and *SetupModeAction* are already documented under Transaction Manager Mode.

The fields of the *SetupEntityMode* procedure used in the script are given in the table below.

Parameter	Description
entity_type	Entity for which the mode is to be used (e.g. “Settlement” or “FINMessage”)
mode_id	The Mode ID to setup.
add_p	This parameter indicates whether information should be added to the Mode definition in the *Mode* and *ModeColumn* tables by overwriting the old data (=0) or adding the new data on to the old data (=1).
user_id	When defining a mode for accessible by certain users only, this parameter can be used to identify a user or user group ID to whom permission to the mode is granted
state_id	The explicit entity state of the mode. Note, that a list of specific states separated with spaces can be given as a value for the parameter e.g. `VERIFY MANUAL-RELEASE` If this parameter is used, a single mode entry is created by the procedure for each identified state
minimum_state_id	When defining a mode for a range of transaction states, this is the state with the lowest order number. If this parameter is used, a separate mode entry is created by the procedure for each state where order number is equal to or greater than that of the identified state
maximum_state_id	When defining a mode for a range of transaction states, this is the state with the highest order number. If this parameter is used, a separate mode entry is created by the procedure for each state where order number is equal to or less than that of the identified state

Parameter	Description
ignored_state_flags	When defining a mode for a range of transaction states, this parameter can be used to identify flags values of states to be ignored. If this parameter is used, mode entries are not made for any states which have the specified flags. Unless specified, state flag CANCELED_P is used.
new_state_id	A new entity created from this mode will have this state.
grant_p	If this field = 1, columns in the entity manager of this mode cannot be edited unless they are specified in the *ModeColumn* table via the *columns* parameter of SetupEntityMode or SetupModeColumn procedures. (See ModeColumn table.)
columns	Columns listed here are exceptions to general grant_p setting as explained above. Note, that a list of columns separated with spaces can be given as a value for the parameter and that columns in several Entity Manager Views can be identified here by adding the 'Entity Type' as a prefix to column definition e.g. as follows: `Settlement/amount Settlement/local_account_1_id` If no entity type is specified (i.e. no prefix is given in the field), value given in parameter 'entity_type' is used as a default. If entity type contains some spaces, spaces must be replaced by '_'. For example, setting column 'param_0' on entity type 'Settlement Detail' will be done by 'Settlement_Detail/param_0' Note also, the maximum length of the string given as a value for this parameter is 255 characters. When a large number of columns must be identified, it is also possible to use procedure SetupModeColumn which can be run any number of times for the same mode to create a large number of entries to ModeColumn.
action_grant_p	If this field = 1, actions (e.g. Net Settlement, Undo Netting) cannot be executed unless they are specified in the *ModeAction* table via the SetupModeAction procedure. If this field = 0, all actions can be executed except those specified in the *ModeAction* table.

7.7.6 Setup scripts and database objects

The following table summarizes the database objects which define the entity flow and modes. It does not include scripts or objects used for transaction flow setup.

Object	Type	Description
amount_event_flow.sql	Sql script	Creates entity states and entity modes for processing amount events in the database by running stored procedures SetupEntityState, SetupEntityMode, SetupModeColumn, and SetupModeAction with parameters given in the script.
amount_event.py	Python script	Creates entity broker operations and rules for processing amount events with agent setup given in the script.
call_money_account_flow.sql	Sql script	Creates entity states and entity modes for processing call money and call account transactions and movements in the database.
call_money_account.py	Python script	Creates entity broker operations for processing money and call account transactions and movements with agent setup given in the script.
cashflow_action.sql	Sql script	Creates cashflow actions used in processing call money and call account movements in the database.
status.sql	Sql script	Creates cashflow status used in processing call money and call account movements in the database. Note that the same script is used for creating transaction status for transaction processing.

Object	Type	Description
finmessage.sql	Sql script	Creates entity states and entity modes for processing FIN messages in the database.
finmessage.py	Python script	Creates entity broker operations for processing FIN messages with agent setup given in the script.
fixing_flow.sql	Sql script	Creates entity states, entity actions, entity rules and entity modes for processing fixing entities in the database.
fixing.py	Python script	Creates entity broker operations for processing fixing entities with agent setup given in the script.
hedge_relation.sql	Sql script	Creates entity states and entity modes for processing hedge relations in the database.
hedge_relation.py	Python script	Creates entity broker operations and rules for processing hedge relations with agent setup given in the script.
message_flow.sql	Sql script	Creates entity states and entity modes for processing message requests in the database.
message_manager.py	Python script	Creates entity broker operations for processing message requests with agent setup given in the script.
payment_alloc_flow.sql	Sql script	Creates entity states and entity modes for processing payment allocations in the database.
payment_allocation.py	Python script	Creates entity broker operations for processing payment allocations with agent setup given in the script.
payment_flow.sql	Sql script	Creates entity states and entity modes for processing payment advices in the database.
payment_advice.py	Python script	Creates entity broker operations for processing payment advices with agent setup given in the script.
payment_rem_flow.sql	Sql script	Creates entity states and entity modes for processing payment reminders in the database.
payment_reminder.py	Python script	Creates entity broker operations and rules for processing payment reminders with agent setup given in the script.
settlement.sql	Sql script	Creates entity states and entity modes for processing settlements in the database.
settlement.py	Python script	Creates entity broker operations for processing settlements with agent setup given in the script.
EntityState	Table	Contains all entity states.
SetupEntityState	Stored Procedure	Inserts information in the EntityState table.
EntityMode	Table	Contains all entity actions used in entity action based flows.
SetupEntityMode	Stored Procedure	Inserts information in the EntityState table.
EntityOp	Table	Contains the header definition of entity operations
EntityOpAgent	Table	Contains the agent definition of all entity operations.
EntityRulesHeader	Table	Contains the header definition of entity rules
EntityRule	Table	Contains the condition definition of all entity rules.
EntityModeAction	Table	Contains all entity mode action entries.
CommitEntityModeAction	Stored Procedure	Inserts information in the EntityModeAction table.

7.8 Setting up loan entity action-based flow

The main difference between entity broker-based flow and loan entity action-based flow is in the methodology used to execute operations like ACCEPT and REJECT. Instead of entity broker operations, these are modeled as actions executed in the database. The setup is also somewhat simpler because loan entities are processed in editor applications not connected to a mode.This modeling of the flow is used only for the following 'semi-static' CLM entities:

- Facility
- Approval
- Mandate

Setup for all these entities is done using the following scripts found in `$FK_HOME\share\<database>\setup`.

- `loan_entity_flow.sql`
- `loan_validation_method.sql`

`loan_entity_flow.sql` is used to manage the setup of the actual flow and loan_validation_method.sql is used to define transaction flow-dependent validation methods used in some Facility setup. A validation method is linked to a Drawdown Condition setup in a facility and controls at which point in the drawdown transaction flow the condition is validated against the drawdown.

7.8.1 Loan Entity States

Setup script loan_entity_flow.sql is used for setting up loan entity states, loan entity rules and loan entity actions required for processing the respective entities.The scripts executes stored procedure SetupLoanEntityState to create state entries using the parameters given in the script as e.g. follows:

```
exec SetupLoanEntityState
        @id = "PROVISIONAL",
        @name = "Provisional"
go
```

The fields of the *SetupLoanEntityState* procedure used in the script are given in the table below.

Parameter	Description
id	The ID of the state.
name	Name to be shown in the State field of respective editor.
flags	Flags which can be used to link a characteristic to any entities in this state or, in some cases, to any entities in this or a later state in the flow. Most typically flags are used to control which data of a facility entity can be edited in a particular state.

The table below lists the flag values available for loan entity states.

Value	Name	Description
1	PROVISIONAL	The threshold after which entities become provisional.
2	FINAL	The threshold after which entities become final.
4	AMEND-HEADER	Header setup of a facility in a state with this flag can be edited in Facility Editor.
8	AMEND-ALL	All setup of a facility in a state with this flag can be edited in Facility Editor.
16	AMEND-INSTRUMENTS	Instruments setup of a facility in a state with this flag can be edited in Facility Editor.

Value	Name	Description
32	AMEND-TRANSACTION-TEMPLATES	Transaction Templates setup of a facility in a state with this flag can be edited in Facility Editor.
64	AMEND- FUNDING-TYPES	Funding Types setup of a facility in a state with this flag can be edited in Facility Editor.
128	AMEND-DD-CONDITIONS	Drawdown Conditions setup of a facility in a state with this flag can be edited in Facility Editor.
256	AMEND- SUBLIMITS	Sublimits setup of a facility in a state with this flag can be edited in Facility Editor.
512	AMEND-TRANCHES	Tranches setup of a facility in a state with this flag can be edited in Facility Editor.
1024	AMEND-MANDATES	Mandates setup of a facility in a state with this flag can be edited in Facility Editor.
2048	AMEND-OWNERS	Owners setup of a facility in a state with this flag can be edited in Facility Editor.
4096	AMEND-COUNTERPARTIES	Counterparties setup of a facility in a state with this flag can be edited in Facility Editor.
8192	AMEND-BENEFICIARIES	Beneficiaries setup of a facility in a state with this flag can be edited in Facility Editor.
16384	AMEND-GUARANTORS	Guarantors setup of a facility in a state with this flag can be edited in Facility Editor.
32768	AMEND-LOCATIONS	Locations setup of a facility in a state with this flag can be edited in Facility Editor.
65536	AMEND-DD-CURRENCIES	Drawdown Currencies setup of a facility in a state with this flag can be edited in Facility Editor.
131072	AMEND-DD-PARATETERS	Drawdown parameters setup of a facility in a state with this flag can be edited in Facility Editor.
262144	NON-EDITABLE	Entity in a state with this flag cannot be edited.

7.8.2 Loan Entity Rules

Loan entity actions may use loan entity rules as conditions in loan action entries. There is no Entity Rule Editor in the system and, if rules are needed in Entity Actions, they must be set up as part of the setup script using the procedure *SetupLoanEntityRule* as shown in this example:

```
/* Rule validating presence of Signature Date in a Facility */
exec SetupLoanEntityRule
      @id = "SIGNATURE-DATE-MISSING",
      @entity_type = "Facility",
      @param0 = "signature_date",
      @value0 = null,
      @flags = 1 /* VALIDATE EMPTY AS NULL" */
go
```

The above rule validates whether the facility being processed has a value in field 'signature date'.

7.8.3 Loan Entity Actions

Loan entity actions for each entity are configured using the same setup scripts by executing the stored procedure *SetupLoanEntityAction* as shown in this example:

```
exec SetupLoanEntityAction
      @action_id = "ACCEPT",
      @entity_type = "Facility",
      @current_state_id = "PROVISIONAL",
      @not_mask = 1,
      @action_mask = 1,
      @action = "DoLoanEntitySetState",
      @param0 = "PENDING-SIGNATURE"
go
```

Loan entity actions are setup with conditions like 'state_id' used in a similar manner to condition calls in entity broker based flows and, when conditions are met, they execute stored procedures that perform the necessary processing of the transactions in the database. These stored procedures are used to accomplish similar things as agents do in entity broker-based flows.

The fields of the *SetupLoanEntityAction* procedure used in the script are given in the table below.

Parameter	Description
entity_type	Loan entity for which the action is to be used (e.g. 'Facility' or 'Mandate').
action_id	The Action ID of the setup (e.g. 'ACCEPT').
current_state_id	The loan entity state of the action (e.g. 'PROVISIONAL'). Action can only be executed for loan entities in this state.
rule_id	Loan entity rule which the entity must match as a condition for the action entry to be executed.
not_rule_id	Loan entity rule which the entity must not match as a condition for the action entry to be executed.
mask	When executing a chain of loan action entries in the same action id (e.g. 'ACCEPT'), current mask is maintained within the action in the same way it is maintained in an entity broker operation execution discussed earlier. The 'current mask' can be used as a condition for executing any actions. If 'mask' is given, the condition is met if the 'current mask' of the action execution contains the given mask. Note, that in loan entity action setup, mask cannot be given as a 'bit number' but must always be given as mask value (e.g. bit number 4 corresponding to mask value 16 must always be given as '16').
not_mask	If 'not_mask' is given, the condition is met if the 'current mask' of the action execution does not contain the given mask.
action_mask	If the conditions are met and the action entry is executed, the mask value given in this parameter is added to the 'current mask' of the action execution and can, consequently, be used as mask- or not_mask condition for the subsequent entries in the same action execution.
action	The stored procedure executed if all conditions were met.
param0	Parameter 0 passed on to the stored procedure when executing it.
Param1	Parameter 1 passed on to the stored procedure when executing it.

The table below lists stored procedures available as 'actions' to be used in entity action setup.

Stored Procedure Name	Parameters	Description
DoLoanEntityCheckAccess	Param0 = 'permission id	'Validates that current user executing the action (e.g. ACCEPT or REJECT) has the required permission given in Param0 in the portfolio of the loan entity.
DoLoanEntitySetState	Param0 = 'state_id	'Sets the state of the loan entity to one given in Param0.

7.8.4 Setup scripts and database objects

The following table summarizes the database objects which define the loan entity action-based flow. Note that it does not repeat scripts or objects used for transaction broker- or entity broker-based flow setup.

Object	Type	Description
loan_entity_flow.sql	Sql script	Creates loan entity states, loan entity actions and loan entity rules for processing facilities, mandates and approvals in the database by running stored procedures SetupLoanEntityState, SetupLoanEntityAction, and SetupLoanEntityRule with parameters given in the script.
loan_validation_method.sql	Sql script	Creates validation methods in the database by running stored procedure SetupValidationMethod
LoanEntityState	Table	Contains all loan entity states.
SetupLoanEntityState	Stored Procedure	Inserts information in the *LoanEntityState* table.
LoanEntityAction	Table	Contains all loan entity actions.
SetupLoanEntityAction	Stored Procedure	Inserts information in the *LoanEntityAction* table.
LoanEntityRule	Table	Contains all loan entity rules.
SetupLoanEntityRule	Stored Procedure	Inserts information in the *LoanEntityRule* table.
ValidationMethod	Table	Contains all validation methods.
SetupValidationMethod	Stored Procedure	Inserts information in the *ValidationMethod* table.

7.9 Setting up transaction and settlement comments

Transaction and/or settlement comments can be added automatically by the flow, using the transaction agent for transaction comments and the settlement agent for settlement comments. The agent is executed on a state transition (for example between OPEN and VERIFY).

To add comments directly, you can use one of the scripts in the following locations:

%FK_HOME%\share\python\entity-flow\settlement.py

%FK_HOME%\share\python\flow\commit.py

An example for commit.py:

```
(optional(),

service('service/comment@transaction-comment')),
```

An example for settlement.py: to execute the agent when ACCEPTING, put the following lines in the ACCEPT section.

```
(state ('GENERATED'),

service('service/comment@settlement-comment')),
```

By default it is not possible to edit the comments in Settlement Processing. Check the setting in EntityMode. If `grant_p` is 1, the setting in ModeColumn determines if a column is editable. If `grant_p` is set to 0, the setting in SettlementComment.xml determines this (set to False/True).

Example for SettlementComment.xml

```
<view name="Settlement Comment" entity-name="SettlementComment"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

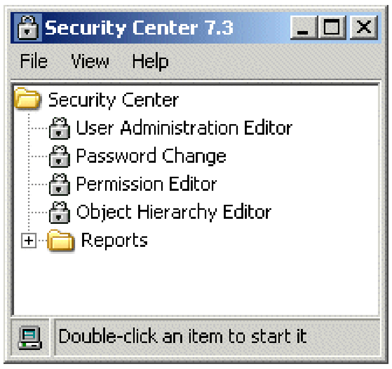
```
xsi:noNamespaceSchemaLocation="View.xsd">

   <column name="name_id" type="STRING" width="20" editable="false">

      <label>Id</label>

   </column>

   <column name="value" type="STRING" width="60" case-sensitive="true"

   editable="true">

      <label>Value</label>
```

For the XML configuration to take effect, the following SQL has to be executed. The state/mode/columns can be configured as part of the implementation.

```
fk_home/share/dbms/setup/settlements.sql:

DECLARE dummyRet NUMBER;BEGIN dummyRet := SetupEntityColumn(    Pmode_id =>'ADMIN',

   Pstate_id =>'GENERATED',

   Puser_id =>' ',

   Pentity_type =>'Settlement',

   Pcolumns => 'SettlementComment/value');

END;
```

Chapter 8 Controlling user access

This section explains the administration tasks required to control user access to the TRM database and also the user permissions on specific objects within that database. Most of these tasks can be performed using Security Center, which is available from Application Manager:



8.1 Managing TRM users

Most TRM user management can be done with the User Administration Editor in Security Center. See *8.7.1 User Administration Editor* on page 174.

The following tables are used for TRM users:

- `UserLoginInfo`: contains login information such as password expiry.
- `UserProfile`: contains user profile data, such as menu files.

8.1.1 Creating TRM user accounts

To create a TRM user, first create an operating system login for that user in the environment where the user logs in. Depending on your specific setup, this can be on a standalone Windows workstation or a Windows domain.

Each user must be created in the specific database that they will be using (normally the TRM production database) and assigned to a specific group. Use the User Administration Editor to do this, which also creates database server logins automatically.

The user ID is upper case on Oracle, on Sybase, and on MSSQL except for Trusted users, where it is case-sensitive.

8.1.2 Deleting a TRM user account

Users can be deleted from the TRM database in the User Administration Editor. This method automatically drops the user's database server login as well, as long as that login ID is not still in use in another database on the server.

When a user account is dropped, the transactions entered with that userid remain in the system. When a deleted is re-used for a different user, that user will see the transactions previously entered. To avoid this, you should lock unused user IDs.

8.1.3 Locking a TRM user account

It is possible to lock an account so that the user cannot log in. Use the User Administration Editor to do this, and select the "Locked" switch.

8.1.4 Setting the System Security Officer role

To manage other users, a user must have the System Security Officer role. This role allows unrestricted access.

- MSSQL

  The System Security Officer role is implemented with the database `securityadmin` and `sysadmin` roles. They are granted to a specified login with the following commands:

  ```
  exec sp_addsrvrolemember @rolename="securityadmin", @loginame="<login>"
  exec sp_addsrvrolemember @rolename="sysadmin", @loginame="<login>"
  ```

- Sybase

  The System Security Officer role is implemented with the database `sso_role` role. It is granted to a specified login with the following command:

  ```
  exec sp_role 'grant', 'sso_role', <login>
  ```

- Oracle

  The System Security Officer role is implemented with the database `sso_role` role. It is granted to a specified user with the following command:

  ```
  grant sso_role to <user>
  ```

8.2 User groups

Most TRM user group management can be done with the User Administration Editor in Security Center. See *8.7.1 User Administration Editor* on page 174. The following TRM tables are used for TRM groups:

- `UserProfile`: contains group data, such as menu files
- `UserGroupTree`: contains users, groups and groups dependencies.

8.2.1 Default user groups in TRM

The default groups in TRM and their permissions are given below.

The dealer group can:

- Put in new transactions
- Update market information.

The backoffice group can:

- Use most of the editors, except Portfolio Editor
- Freeze and update market information
- Do payments.

The admin group can do all operations.

Object permissions are granted to the default groups when the objects (tables or procedures) are being set up in the `build` program. The object permissions can be viewed and, if necessary, changed in Permission Editor (available from Security Center).

8.2.2 Assigning users to a group

Users are assigned to a group when the user IDs are created in the database. (See *8.1.1 Creating TRM user accounts* on page 169.) Each user can be assigned to several groups. Other groups are given in the Group page of the User Administration Editor.

8.3 Password expiry

To enable password expiry overall in TRM, the `password expiry` parameter in the Configuration table must be set. By default, this field contains a value of 0, which means that passwords will never expire. This table can be modified by using the Configuration Table Editor (available from Application Manager). For example, if you want user passwords to expire monthly, set this field to `30` (days).

When creating a user in User Administration Editor, it is possible to specify a different Expiry. If no expiry is explicitly given, it is defaulted to creation date plus the value of the `password expiry` parameter (zero means "never").

The `password expiry warning` parameter in the Configuration table is used to define the number of days before the password expires when a warning is issued to the user. The default value is 7 days.

The `minimum password change` parameter in the Configuration table sets the minimum number of days between password changes. For example, if it is set to 7 (days), and you change your password today, you have to wait one week until you can change it again. The default value is 0.

8.4 Domains

The purpose of domains is to restrict the data that each user can see or modify within the same database. Domains are mainly used for "static" information such as portfolios, clients and instrument definitions. For example, if an organization has one treasury center in the USA and another in Europe, you can set up two domains (USA and Europe) to prevent users in one domain from accessing data in another domain.

Users do not belong to domains but have domain permissions. They are not restricted to one domain, but can have permissions on several domains. These permissions can be defined in the User Administration Editor in Security Center.

You can add, modify or delete domains in the Domain Editor (available from Application Manager).

8.5 Permissions

All permissions that are allowed (for example CREATE or MODIFY) are defined in the *Permission* table. These permissions are used in the definition of access rights to database objects in the *ObjectPermission* table and also for the portfolio permissions for each user in the *PortfolioAccess* table (see the following section). This section describes how to configure the object permissions.

8.5.1 Setting up the object permissions

It is assumed that the users only access data through the TRM applications. Each time a user tries to access an object in the database, the procedure *HavePermission* is run which checks the entries in the *ObjectPermission* table. It verifies whether the user or the group has permissions on an object.

The access rights to database objects for users and/or groups can be set up in Permission Editor (in Security Center). User permissions have priority over group permissions; if the user has a different permission to the group then it is the user permission that is used.

The following stored procedures are useful for defining and verifying the user's permission:

- HelpObjectPermission
- GrantObjectPermission
- RemoveObjectPermission
- RevokeObjectPermission

Revoke disables the permission (permission is then inherited from the parents); *Remove* removes it from the table.

8.5.2 Domain permission

8.5.3 Portfolio access

Portfolio permissions for users are described in *7.3.1 Setting permissions* on page 106.

8.5.4 Mode permissions

It is possible to set mode permissions for users and groups.

8.5.5 Payment mode permissions

The permissions on the payment acceptance modes for Settlement Manager are set up in `share/<database>/setup/cash.sql`. We recommend that any changes you make to these permissions are made in this file, so that you will be able to keep track of the changes.

However, it is possible to modify these permissions with the following stored procedures:

- `CommitPaymentModePermission`
- `RemovePaymentModePermission`

8.6 Limiting access to activity types

Activity modes have the same basic principle as transaction manager modes: they can be used to limit access to certain activities. For example you may want only back-office people to be able to run certain accounting activities.

Activity modes can be set up for specific users or for domains.

The activity mode is included in the start-up of the Activity Manager in the same way as a transaction mode is used in the start-up of any transaction manager:

```
FKActivityManager.exe --mode <mode_name>
```

Activity modes are set up in Activity Mode Editor following this procedure:

1. From Application Manager, open Activity Mode Editor.
2. In the ID field, enter an ID for the activity mode. Remember that the ID must be unique to this activity mode.
3. If you are controlling access by domain rather than by user, select the domain in which this activity mode applies. (If you are controlling access for the user you are currently logged on as, leave this field blank.)

4. The following switches determine what the individual user or domain can do with the activity types added to the Type field:

Switch on…	For this result
Own	The user can only see/edit owned activities (activities created by that user).
Read Only	In this mode it is possible to see the activities but not modify (or activate) them.
Deny Types	The activity types listed in the Types page are changed from allowed activity types to denied activity types. For example, if the Types page contains 'Average Balances' and this switch is on, all activity types except 'Average Balances' are available.

5. In the Type page, select the desired activity type from the pull-down list, then click Add.
6. Save the whole activity mode definition using the Save button (or **File - Save**) or the Save As button (or **File - Save As New**).

8.7 Using Security Center

Security Center automates some of the security tasks required for TRM. It includes the following functionality:

- User Administration Editor

  This application handles the setup of users and user groups in TRM (all users must belong to a user group). You can define user groups and users, and add the users to groups. Users can also be modified or deleted from the database. In Permission Editor you can define who has access to User Administration Editor. The user administrator must have the System Security Officer role to access the User Administration editor.

  A TRM user can log into the application using a password. This user is directly linked to the database user (or database login). Security Center allows the administrator to grant rights on database objects and set password expiration, user locking and other technical security features.

Note: Neither Security Center nor Admin Center require a login if trusted connections are activated and the user is a trusted user. See the *WSS Suite Installer Guide*, search for FK_TRUSTED_CONNECTION.

  In User Administration Editor, the administrator can set up security at more functional levels:

  – Portfolio access permissions. Only portfolios in state FINAL are accessible in Security Center.
  – Domain access permission
  – Possibilities to set a specific menu file for a group of users.

  Access permissions are granted to user groups. Each user belongs to one or several user groups, and a group can belong to one or many other groups. If a group belongs to another group, it then inherits all of its permissions. Users have the permission granted to the group or inherited by the group.

- Password Change

  This application enables TRM users to change their passwords. The system administrator ('sa') and the database owner (generally defined as user ID 'fk') do not have access to this functionality. (Standard database tools can be used to change the passwords of these users.)

- Permission Editor

  Used to add, edit, and remove access rights to TRM applications and objects.

- Object Hierarchy Editor

  With this editor you can view and modify the hierarchy of the objects in TRM. It should generally not be necessary to modify the hierarchy once it had been set up in the implementation.

- Reports

  You can launch the following reports from Security Center: Portfolios which shows the portfolio permissions, Domains which shows domain permissions, Objects which shows object permissions, and User Hierarchy which shows user group dependencies.

Note: The Domain Editor is used for setting up domains for global operations, and is available from Application Manager.

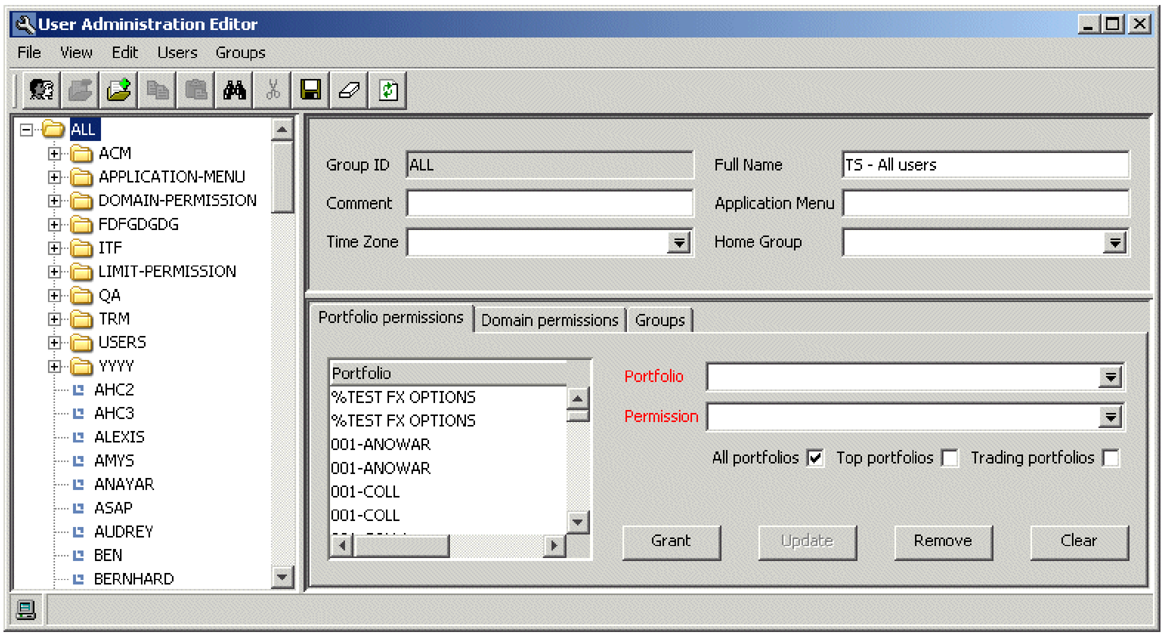
8.7.1 User Administration Editor

In this editor you control the issues related to users and user groups. Only users with the System Security Officer role can use the User Administration Editor.

8.7.1.1 Creating a new group

Since every user has to belong to a group, it is necessary to create the user groups before the users.

To create a new group, use the following procedure:



ALL
ACM
APPLICATION-MENU
DOMAIN-PERMISSION
FDFGDGDG
ITF
LIMIT-PERMISSION
QA
TRM
USERS
YYYY
AHC2
AHC3
ALEXIS
AMYS
ANAYAR
ASAP
AUDREY
BEN
BERNHARD

Group ID: ALL
Full Name: TS - All users
Comment:
Application Menu:
Time Zone:
Home Group:

Portfolio
%TEST FX OPTIONS
%TEST FX OPTIONS
001-ANOWAR
001-ANOWAR
001-COLL
001-COLL

Portfolio:
Permission:
All portfolios [✓] Top portfolios [ ] Trading portfolios [ ]

1. In the tree view on the left, select the parent group of the group you want to create.
2. Select **Groups - New** group.
3. Enter the main attributes for the new group:

Field	Enter or select
Group ID	Mandatory. The group ID must be a unique word.
Full Name	The full name of the new group.
Comment	Comments can be added if more information is required.
Application Menu	The name of the Application Manager menu file.
Time Zone	Select the appropriate time zone for the group (time zones are defined in the Time Zone Editor).

Field	Enter or select
Home Group	The ID of the primary group to which this group belongs. Like domains for instruments, home groups are used to enable or prevent access to data. A user is allowed to "see" only users/groups in his home group.

4. Select Groups/Save changes.

8.7.1.2 Modifying an existing group

To modify an existing group, use the following procedure:

1. Select the group you want to modify from the tree on the left-hand side of the editor.
2. Make the changes.
3. Select **Groups - Save changes**.

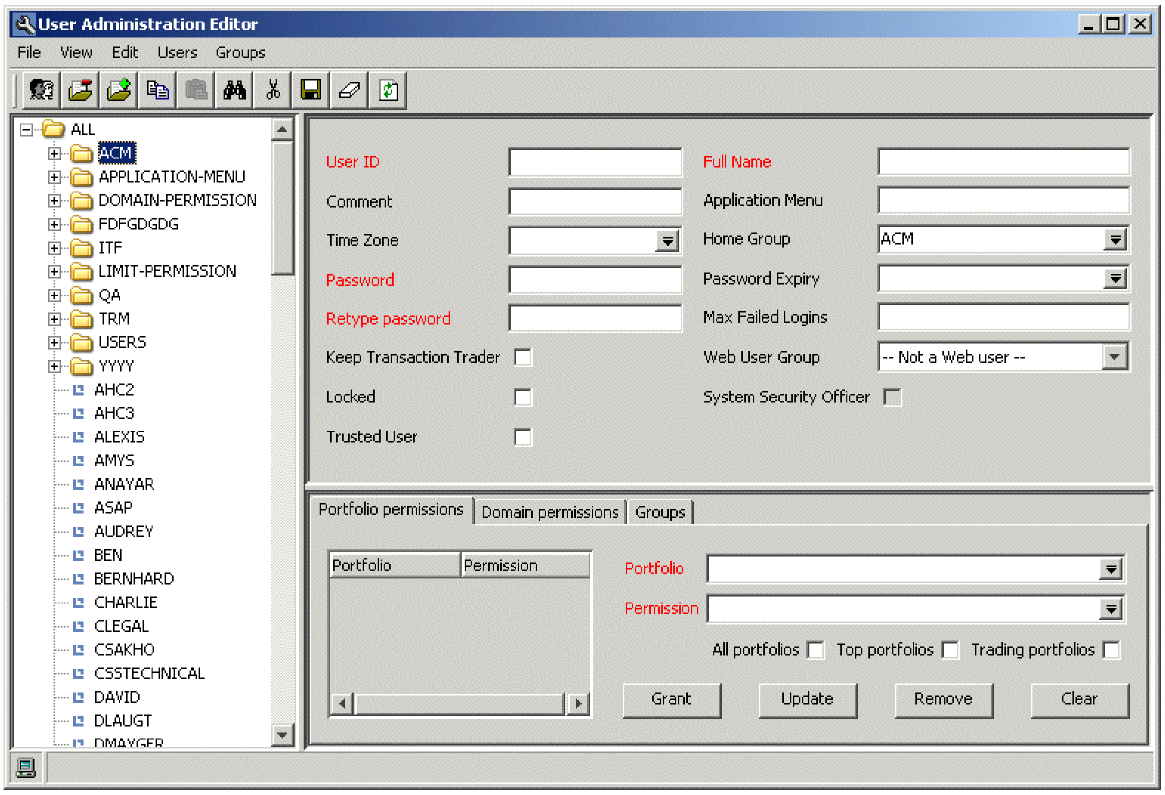
8.7.1.3 Deleting an existing group

The System Security Officer can delete an existing group as follows:

1. Select the group to delete from the tree on the left-hand side of the editor.
2. Select **Groups - Delete**, and click **Yes** in the confirmation box that appears.

8.7.1.4 Creating a new user

To create a new user, use the following procedure:



User ID
Full Name
Comment
Application Menu
Time Zone
Home Group: ACM
Password
Password Expiry
Retype password
Max Failed Logins
Keep Transaction Trader ☐
Web User Group: -- Not a Web user --
Locked ☐
System Security Officer ☐
Trusted User ☐
Portfolio
Permission
All portfolios ☐ Top portfolios ☐ Trading portfolios ☐

1. In the tree view on the left, select the parent group of the group you want to create.
2. Select **Users - New user**.

3. Enter the main attributes for the new user:

Field	Enter or select
User ID	Mandatory. The user ID must be a unique word. The standard in TRM is to use lowercase alphabetical names (no spaces, digits, underscores, or other symbols). If the login already exists on the database, the Full Name and Password fields are no longer mandatory.
Full Name	The full name of the new user.
Comment	Comments can be added if more information is required.
Application Menu	The name of the Application Manager menu file.
Time Zone	Select the appropriate time zone for the user (time zones are defined in Time Zone Editor). All dates and times are converted to this time zone when they are shown to this user.
Home Group	The ID of the home group. Optional. Defines the users and groups that can be seen by a specific user. If defined, the user can see users/groups in his home group only.
Password	Password for the new user.
Password Expiry	Date until which the password is valid. The format for entering the dates is based on the application setup; for example american MM/DD/YY. If no date is given, the password is valid according to the configuration, see *8.3 Password expiry* on page 171.
Locked	A locked user cannot log in to the database. The database will automatically lock a user if too many login attempts are made with an incorrect password.
Trusted User	MSSQL only. If this is switched on, then the user can act on behalf of another user, for example, he can enter a deal using someone else’s ID.
Max Failed Logins	The maximum number of login attempts allowed before the database locks out the user (not supported on MSSQL).

Web User Group	`-- Not a Web User --`
	User does not have access to TRMWeb.
	`ekit_admin`
	User can perform TRMWeb administration tasks.
	`ekit_synchro`
	User can perform TRMWeb administration tasks and synchronize data.
	`ekit_user`
	User has access to TRMWeb.

4. Select **User - Save changes**.

8.7.1.5 Modifying an existing user

The system manager can change a user password but cannot view it directly. The System Security Officer can modify an existing user as follows:

To do so, use the following procedure:

1. Select the user you want to modify from the tree on the left-hand side of the editor.

2. Make the changes.

3. Select **Users - Save changes**, and click **Yes** in the confirmation box that appears.

8.7.1.6 Deleting an existing user

The System Security Officer can delete an existing user as follows:

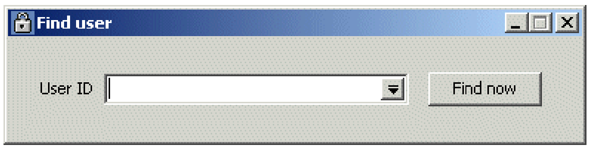
To do so, use the following procedure:

1. Select the user you want to delete from the tree on the left-hand side of the editor.
2. Select **Users - Delete**, and click **Yes** in the confirmation box that appears.

8.7.1.7 Searching for a user

You can search for a particular user. To do this:

1. Select **Edit - Find**:



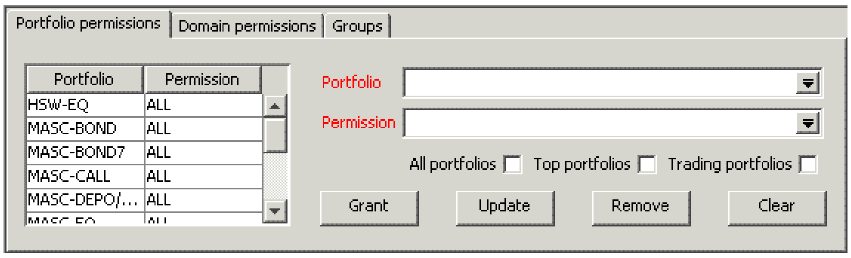
2. Fill in the **User ID** field and click on **Find Now**.

   The user information is displayed for that user.

8.7.1.8 Assigning portfolio permissions to users and user groups

You can define portfolio permissions for a user or a user group.

1. Select the user or user group from the tree in the left-hand side of User Administration Editor.
2. Go to the **Portfolio Permissions** page:



Portfolio	Permission
HSW-EQ	ALL
MASC-BOND	ALL
MASC-BOND7	ALL
MASC-CALL	ALL
MASC-DEPO/...	ALL

3. Select a portfolio. Only portfolios in state FINAL are accessible in Security Center.
4. Select a permission.
5. Click **Grant** to grant the permission.

   Click **Update** to update the permission.

   Click **Remove** to remove the permission.

   Click **Clear** to clear the fields.

Use the **All Portfolios** switch to quickly update basic portfolio permissions for all portfolios. This options also applies to all future portfolios created in the system. You can also assign different portfolio permissions to top portfolios and trading portfolios (which typically have different permissions) using the **Trading Portfolios** and **Top Portfolios** switches. A user running activities in this portfolio must also have ACTIVITY permission.

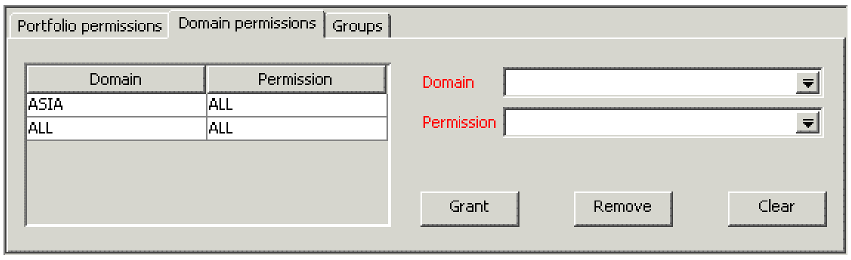
You can view all portfolio permissions that a user has inherited (for example, from another group) by selecting **View - Inherited Permissions**. The inherited portfolio permissions are displayed with the user or group that they belong to.

Note: Inheritance rules in TRM are straightforward. Users and other entities inherit the permissions from the supersets (such as groups) with which they are associated. To restrict a permission that is otherwise not restrictive, you must disassociate the user from the "permissive" superset and then associate a more restrictive one.

8.7.1.9 Assigning domain permissions to users and user groups

The System Security Officer can define domain permissions for a user or a user group.

1. Select the user or user group from the tree in the left-hand side of User Administration Editor.
2. Go to the **Domain Permissions** page:



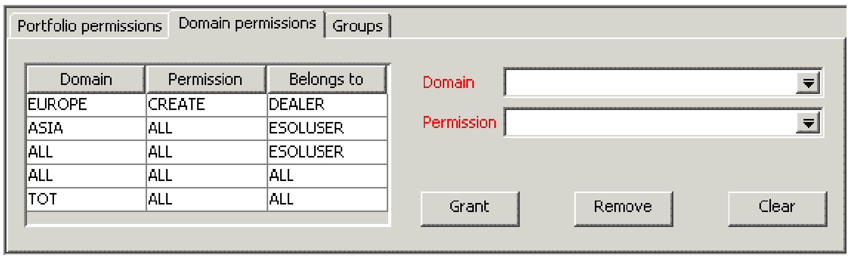
Domain	Permission
ASIA	ALL
ALL	ALL

3. Select a domain.
4. Select a permission.
5. Click **Grant** to grant the permission.

   Click **Remove** to remove the permission.

   Click **Clear** to clear the fields.

You can view all the domain permissions that a user has inherited by selecting **View - Inherited Permissions**. The inherited domain permissions are displayed along with the user or group that they belong to:



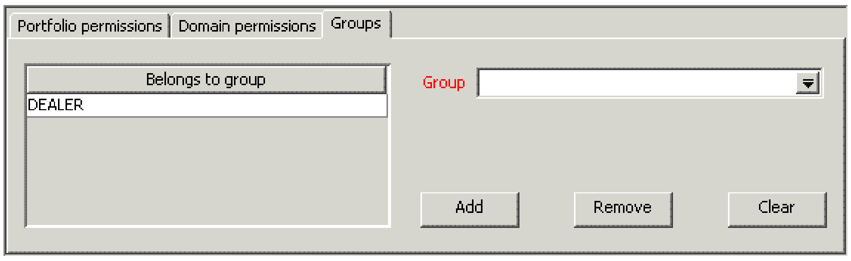
Domain	Permission	Belongs to
EUROPE	CREATE	DEALER
ASIA	ALL	ESOLUSER
ALL	ALL	ESOLUSER
ALL	ALL	ALL
TOT	ALL	ALL

Note: READ permission for the domain of a portfolio is enough to create and modify transactions in the portfolio, as long as the user has sufficient portfolio permissions.

8.7.1.10 Assigning multiple groups to users and user groups

You can assign users to multiple groups.

1. Select the user or user group from the tree in the left-hand side of User Administration Editor.
2. Go to the **Groups** page:



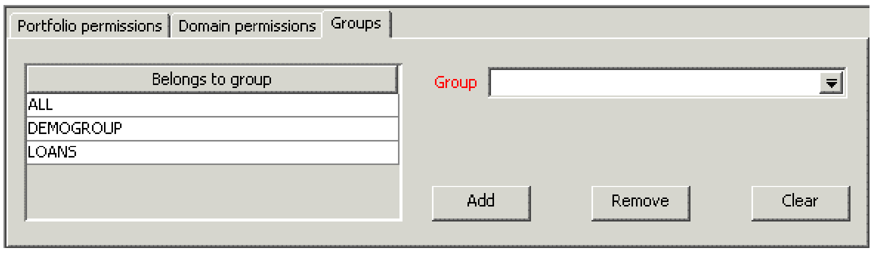
Belongs to group
DEALER

3. Select a group.
4. Click **Add** to add the group.

   Click **Remove** to remove the group.

Click **Clear** to clear the field.

You can view all the groups that a user has inherited by selecting **View - Inherited Groups**. The inherited groups are displayed along with the user or group that they belong to:

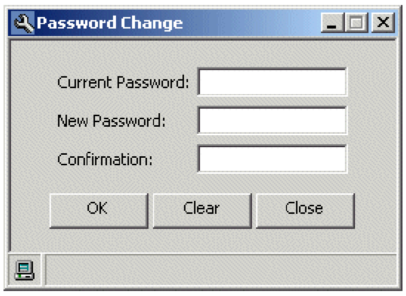


Belongs to group
ALL
DEMOGROUP
LOANS

8.7.2 Password Change

Password Change Editor enables users to change their passwords. The only users that cannot change their passwords in Password Change Editor are the system administrator ('sa') and the database owner (user ID 'fk' by default). You can change the passwords for 'sa' and 'fk', as well as modify user passwords, using standard database tools. No tool is provided to view or modify passwords online.

TRM warns you through a pop-up window that your password will expire in a certain number of days. From here, you can go directly to the Password Change application in Security Center.



To change your password, use the following procedure:

1. Enter the fields as described below:

Field	Enter
Current Password	Your existing TRM password.
New Password	Your new password. You will be notified by a dialog box if it is considered invalid. Note: The stored procedure specified in the password validation hook field in the Configuration Table Editor (see the following section), will determine whether the password is valid or not.
Confirmation	Enter your new password a second time.

2. Click Change to change the password.

   Click Clear to clear the text fields.

   Click Cancel to close the window.

8.7.2.1 Password expiry and validation

The following settings are in the *Configuration* table and can be edited via **Configuration Table Editor** (Admin Center). However they are relevant to password change so a description is also included here.

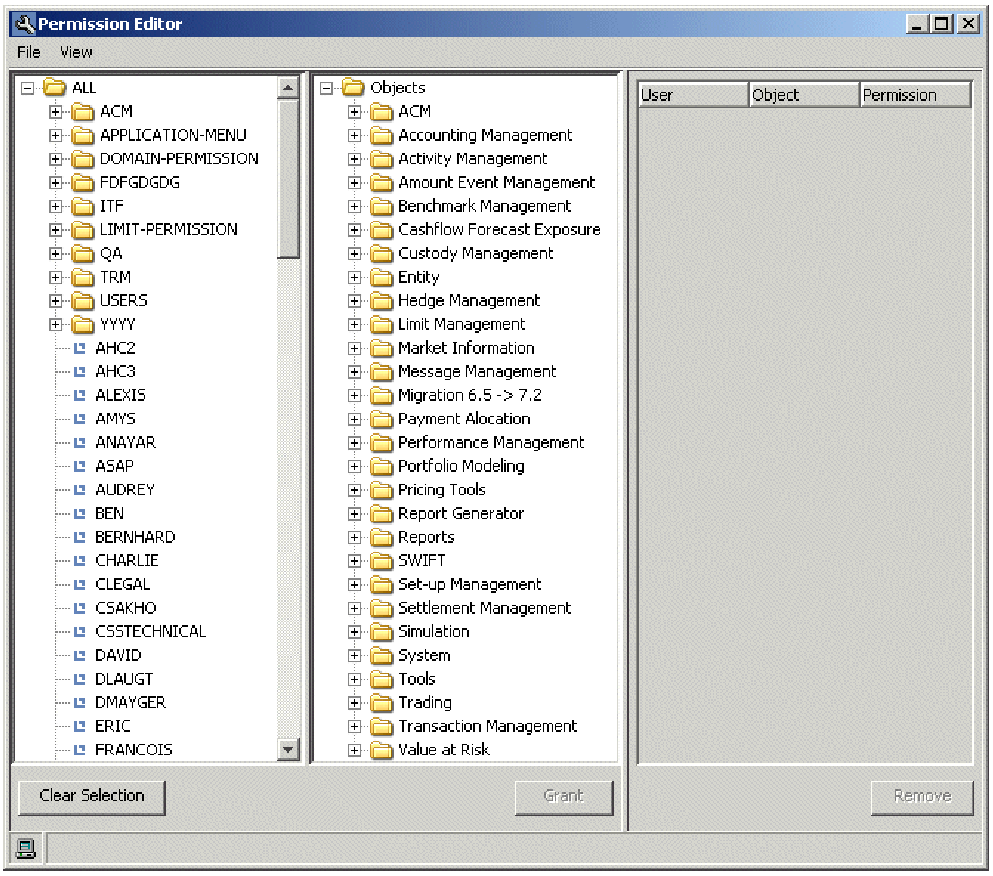
Field	Enter
password expiry	This field determines whether password expiry is enabled; and if it is enabled, how often passwords expire. If set to 0, password expiry is disabled and all passwords are valid indefinitely. If not set to 0, the figure entered here represents the number of days before a password expires. For example, if password expiry = 15, all users will have to change their passwords using the Password Change every 15 days.
password validation hook	This field determines which, if any, stored procedure (hook) is used to check the validity of a password. The default procedure, *ValidatePassword*, ensures that passwords are at least 6 characters long and contain alphanumeric characters. Customized validation schemes can be implemented by writing a custom procedure and selecting it in this field.
minimum password change	This field determines how often a user's password can be changed. If set to 0, this functionality is disabled. Any other value n indicates that a user can only change her password every n days, not more frequently.
password expiry warning	Number of days before password expires to issue warning. Default is 7 days.

8.7.3 Permission Editor

This application is used to grant and revoke access to TRM objects. Changes to the permissions are stored in the *ObjectPermission* table.

The leftmost panel displays the groups and users in the database, while the center panel shows all the objects in TRM, displayed in a hierarchical structure. Under Set-Up Management, for example, you will find a folder for Portfolio Editor. It is possible to give a user or a group access to Portfolio Editor and Permission Editor will then assign this access permission to every item in Portfolio Editor folder. This hierarchical format simplifies the task since you do not need to know which specific database objects are used by which editor. Finally, the rightmost panel is a table that lists the permissions currently set for the selected user or group and the corresponding TRM object and sub-objects.

User permissions have priority over group permissions; if the user has a different permission to the group then it is the user permission that is used.



8.7.3.1 Navigating through Permission Editor

The permission table remains empty until a user or group is selected. Only one group or user can be selected at one time. The permission table will then list every single object in TRM on which this group or user was given a permission.

By clicking on different objects or object folders, the data in the permission table is updated to display the appropriate subset of permissions. If the table is blank, it means that no permission was explicitly given on that particular object or sub-object for the group or user selected.

8.7.3.2 Granting a permission

To grant a permission, use the following procedure:

1. Select the user or group that the permission will be set for.
2. Select the object or object folder for which the permission is required.
3. From the pull-down menu in the bottom left corner, select the permission you wish to give to the user or group on the object or object folder.

Note: Permission type 'ALL' gives the user or group all permissions on the object (CREATE, MODIFY, REMOVE, READ, etc.).

4. Click Grant to grant the permission.

8.7.3.3 Removing an existing permission

Use the following procedure:

1. Select the user or group that the permission will be removed from.
2. Select the object or object folder for which the permission removal is required.
3. From the permission table on the right, select the permission you wish to remove. It should then become highlighted.
4. Click Remove to remove the permission.

8.7.3.4 Single-screen 4-eyes principle

Single-screen 4-eyes principle means that the creation, modification, or deletion of an entity in a static data editor must be authorized by a second person before it is saved. The verification is made on the same screen.

This extra security check can be added to all of the static data editors (except Limits). It is activated using Permission Editor in Security Center, as follows:

- The permission "Verify" allows the user to check data entry of other users before it is saved.
- The permission "Self-Verify" allows verification of the user's own data entry, and could be given to a super user or department manager.

The 4-eyes function would normally be used, for example, by back-office staff to approve the creation of an instrument, or a manager to approve changes to a client's details.

Configuration of the static data editors, which should use the 4-eyes principle, is done in the ObjectVerification table when TRM is being set up.

The single-screen 4-eyes principle works as follows:

1. New data is created or modified by a user with regular permissions for that static data entity.
2. When the changes are complete, the user clicks the **Save** button.
3. The system checks if the 4-eyes principle should be used for this type of static data entry.

   If so, the 4-eyes functionality is initiated and a verification dialog box appears.
4. The verifier must enter his user ID and password before the data can be saved in the TRM database.

Each verification made using the 4-eyes principle is recorded in a log.

Note: The data input and checks are made on the same computer screen.

8.7.3.5 Granting Deal Mirroring permissions

The special permission MIRROR is used in cases where a user does not have READ or CREATE permission for a portfolio but needs to create child transactions for it.

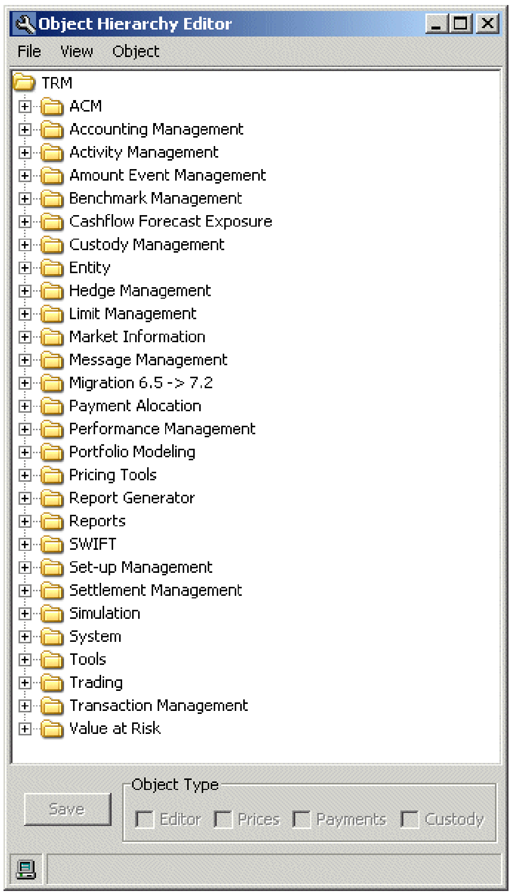
1. OpenPermission Editor.
2. Select ALL/DMM in the left pane. There are two folders: DMM-ADMINS for administrators, and DMM-USERS for end users.
3. Select the appropriate folder depending on the user type.
4. Select the user being granted the permissions.
5. Select Objects/Modules/Deal Mirroring in the middle pane. There are two objects to choose from here: DMM Configuration for both administrators and users, and DMM Operations for end users.
6. Select the appropriate object.
7. From the Permissions list, select the permission that you want to grant to the user for this object. Typical permissions would be: ALL on DMM Configuration for administrators, READ on DMM Configuration, and ALL on DMM Operations for end-users.

8. Click Grant.

   The user, object, and permission are displayed in the list in the right pane.

8.7.4 Object Hierarchy Editor

This editor can be used to define or modify the hierarchy of the objects in your implementation of TRM. In this way you can define the hierarchy to best suit your requirements.



TRM
- ACM
- Accounting Management
- Activity Management
- Amount Event Management
- Benchmark Management
- Cashflow Forecast Exposure
- Custody Management
- Entity
- Hedge Management
- Limit Management
- Market Information
- Message Management
- Migration 6.5 -> 7.2
- Payment Alocation
- Performance Management
- Portfolio Modeling
- Pricing Tools
- Report Generator
- Reports
- SWIFT
- Set-up Management
- Settlement Management
- Simulation
- System
- Tools
- Trading
- Transaction Management
- Value at Risk

8.7.4.1 Adding an object

To add an object, use the following procedure:

1. Select the folder within which you want to add an object.
2. Select **Object - New**.
3. Type in the name of the object required in the field provided.
4. Press Enter.

   The new object is now displayed in the hierarchy.
5. Define the type of the object.

8.7.4.2 Removing an object

To remove an object, use the following procedure:

1. Select the object that you want to remove.
2. Select **Object - Remove**.

   The object is immediately removed from the hierarchy.

8.7.4.3 Moving an object

To move an object from one position in the hierarchy to another, use the following procedure:

1. Select the object that you want to move.
2. Select **Object - Cut**.

   The object disappears from the hierarchy.
3. Select the folder that you want to move the object to.
4. Select **Object - Paste**.

   The object reappears in the hierarchy in the new position.

8.7.4.4 Renaming an object

To rename an object:

1. Select the object you require.
2. Press F2.

   A cursor appears at the end of the selected text.
3. Type in the name you want.
4. Press the Return key to add the text.
5. To restore the original text while editing, press the Esc key.

8.7.5 Reports

You can launch the following reports from Security Center:

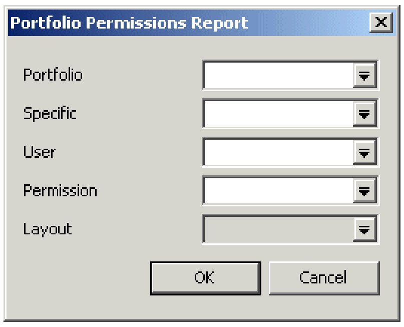
- Portfolios - shows the portfolio permissions
- Domains - shows the domain permissions
- Objects - shows the object permissions
- User Hierarchies - shows the user group dependencies

8.7.5.1 Portfolios Report

The Portfolios Report shows the permissions for a given portfolio.

1. To launch this report, either select Portfolio Permission Report from Security Center, or select File/New Report/Portfolio Permissions from Report Generator.

   The following dialog is displayed:



Portfolio Permissions Report

Portfolio	
Specific	
User	
Permission	
Layout	

2. Select the portfolio whose permissions you would like to see. Only portfolios in state FINAL are accessible in Security Center.
3. Select the specific user for this portfolio that you would like to see.
4. Click OK.

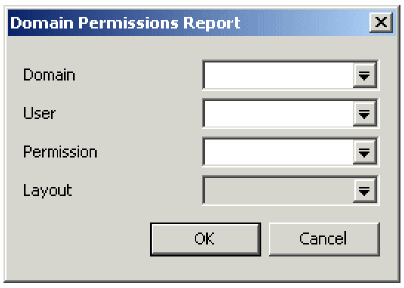
The corresponding report is displayed.

8.7.5.2 Domains Report

The Domains Report shows the permissions for a given domain.

1. To launch this report, either select Domain Permission Report from Security Center, or select File/New Report/Domain Permissions from Report Generator.

   The following dialog is displayed:



2. Select the domain whose permissions you would like to see.
3. Select the specific user for this domain that you would like to see.
4. Click OK.

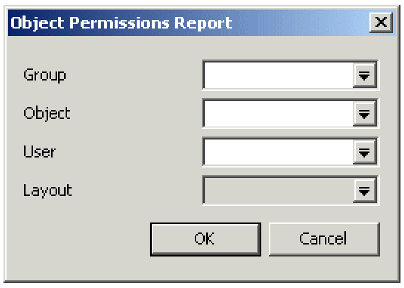
   The corresponding report is displayed.

8.7.5.3 Objects Report

The Objects Report shows the permissions for a given object.

1. To launch this report, select Object Permission Report from Security Center.

   The following dialog is displayed:



2. Select the group and object whose permissions you would like to see.
3. Select the specific user for this object that you would like to see.
4. Click OK.

   The corresponding report is displayed.

8.7.5.4 User Groups Report

The Groups Report shows the shows the user group dependencies.

- To launch this report, either select User Hierarchy Report from Security Center, or select **File - New Report - User Groups Dependencies** from Report Generator.

8.7.5.5 Users Information Report

This report shows detailed information on the user, including name, password expiry date and user group.

- To launch this report, either select Users Information Report from Security Center, or select **File - New Report - Users Information Report** from Report Generator.

8.8 Domain Editor

Use this editor to set up the domains required for global operations.

Domains restrict what data each user can see or modify, and are used primarily for static information such as portfolios, clients, and instrument definitions.

For example, assume that you have a treasury center in Europe, the US and in Asia. You would define domains "EUROPE", "US", "ASIA" and "ALL". European counterparties would belong to domain EUROPE, Asian counterparties to domain ASIA, etc. If there are counterparties that are shared by several treasury centers, they could belong to domain ALL.

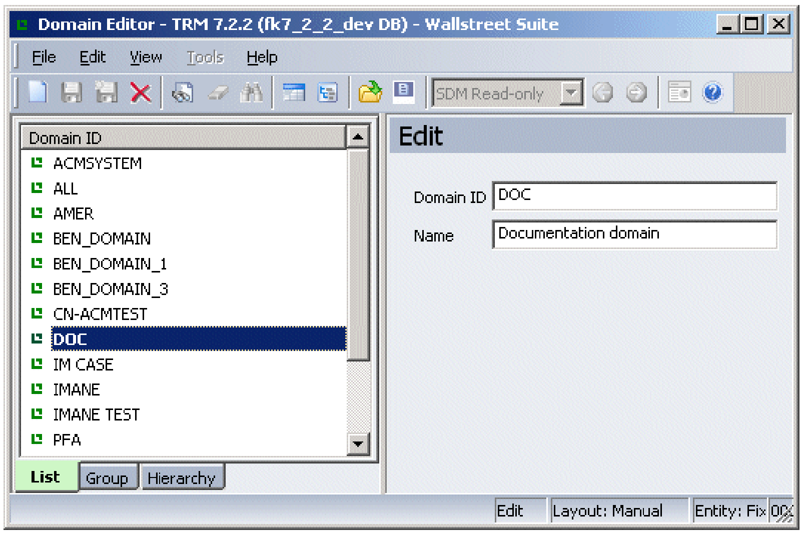
So, each client, portfolio, etc. belongs to a domain. This is defined in the **Domain** field in the respective editor. And that domain is used to determine who can update the information of this object. Some editors also contain a "Domains" subpart where you can define several domains. This information is used to determine who can view the information of this object.

Users do not belong to domains. Users have permissions to domains. And each user can have permissions to several domains. These permissions can be defined in the User Administration Editor in Security Center, see *8.7.1.9 Assigning domain permissions to users and user groups* on page 178.

You can add new domains and modify or delete the current domain.

8.8.1 Creating a new domain

1. From Application Manager, open Domain Editor.



Domain ID
ACMSYSTEM
ALL
AMER
BEN_DOMAIN
BEN_DOMAIN_1
BEN_DOMAIN_3
CN-ACMTEST
DOC
IM CASE
IMANE
IMANE TEST
PFA

Domain ID: DOC
Name: Documentation domain

2. Select **File - New**.
3. Enter the **Domain ID** and **Name**.
4. Select **File - Save As New**.

8.8.2 Modifying an existing domain

To modify an existing domain, use the following procedure:

1. Select the domain to modify from the list on the left-hand side of the editor.
2. Make the changes.

3. Select **File - Save**.

8.8.3 Deleting a domain

To delete a domain, use the following procedure:

1. Select the domain that you want to delete from the list on the left-hand side.
2. Select **File - Delete**.

Chapter 9 Configuration Table Editor and Admin Center

9.1 Introduction

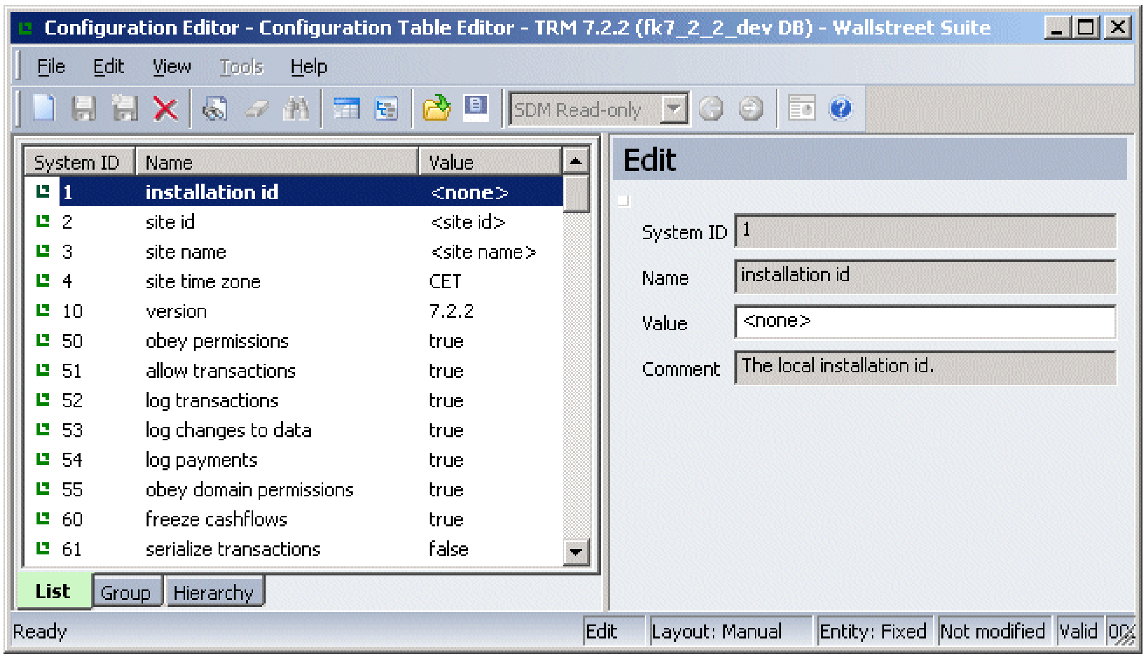
This section describes the Configuration Table Editor and Admin Center, which are used to automate some of the administration tasks required for TRM. This section is for system administrators.

9.2 Configuration Table Editor

The *Configuration* table contains a set of configurable parameters that are used throughout TRM.

Note: Only the database owner is allowed to view and modify this table.

Launch Configuration Table Editor from Application Manager:


Configuration Editor - Configuration Table Editor - TRM 7.2.2 (fk7_2_2_dev DB) - Wallstreet Suite

System ID	Name	Value
1	installation id	<none>
2	site id	<site id>
3	site name	<site name>
4	site time zone	CET
10	version	7.2.2
50	obey permissions	true
51	allow transactions	true
52	log transactions	true
53	log changes to data	true
54	log payments	true
55	obey domain permissions	true
60	freeze cashflows	true
61	serialize transactions	false

Edit

System ID: 1

Name: installation id

Value: <none>

Comment: The local installation id.

Ready | Edit | Layout: Manual | Entity: Fixed | Not modified | Valid | 0%

1. Select the value you to change by clicking the relevant row on the left.
2. Depending on whether the data-entry area for this value is a field or true/false switches, enter the new value or change the switch setting, and confirm it by saving.

The table below shows the available configuration parameters and their default values. The types are:

- S String
- B Boolean (true/false)
- I Integer
- M Float
- P Procedure.

ID	Name	Type	Default	Description
1	installation id	S	<none>	Local installation ID.
2	site id	S	<site id>	Local site client ID for the installation.
3	site name	S	<site name>	Local site client name for the installation.
4	site time zone	S	<time zone>	Local time zone for the installation, for example CET for Central European Time.
10	version	S	<db version no.>	Version of the database.
50	obey permissions	B	true	If true, permissions take effect in all operations. If false, no restrictions are applied.
51	allow transactions	B	true	If true, allow transactions to be created. If false, transactions cannot be entered in TRM. This is for exceptional circumstances such as shutdowns.
52	log transactions	B	true	If true, update transaction log and cashflow log.
53	log changes to data	B	true	If true, log changes to data.
54	log payments	B	true	If true, log any changes made to payments.
55	obey domain permissions	B	false	To use domain permissions, you must create the domain with the appropriate permissions and set the parameter to true. If you do not wish to use domain permissions, you must create a Domain ALL to grant all permissions to all objects (portfolios, instruments, and so on) which would effectively disable domain permissions. In this case, you may also set Obey Domain Permissions to false which would also improve performance.
60	freeze cashflows	B	true	If true, freeze cashflows when needed.
62	Log TRMSwift FINformat rules	B	false	If true, allow changes to TRMSwift FINFormat history log
100	print request	B	true	If true, allow confirmations and trade tickets to be printed.
140 141	transd ip address transd ip port	S S		The IP address and port of TRANSD (the deal transfer daemon). You only need to supply an address and port if your TRANSD is running on a server other than your TRM server.
190	var yield volatility	B	false	If true, VaR uses yield volatilities.
191	var square root of t scaling	B	false	If true, VaR uses the square root of t for scaling.

ID	Name	Type	Default	Description
230	settlement manager edit clients	B	true	If true, enable client editing in **Settlement Manager** via a menu option (client data can be modified from within the application).
270	keep quotes days	I	0	How many days TRM keeps quotes. Set this to a number other than zero for the changes to appear. It is usually set to 2.
271	booking period days	I	0	Default number of days for the bookkeeping period, which you specify when setting up an activity of type REPORT-BOOKKEEPING. 0 means that the start date of the bookkeeping batch is 1900-01-01, the earliest possible date recognized in TRM.
272	payment period days	I	0	The number of days into the past, counting backwards from either: • The payment due date, in the case of a Settlement Generation Activity Or • The system date in the case of automatic flow generation. Express as a positive number. 0 means no looking into the past.
273	balance period days	I	0	How many days backwards balances are recalculated. 0 means start date = end date.
274	balances from payments	B	false	If true, update balances from payments. If false, update balances from cashflows instead. When this is set to false, activities of type balances (for calculating bank account balances) can include transactions made in **Deal Capture** and **Enter Board**, even if the payments have not yet been generated in **Settlement Manager**, since the cashflows are available as a result of the deal.
275	capitalize cost of carry	B	false	If true, capitalize the cost-of-carry.
300	booking batches	B	true	If true, run activities of type SELLING automatically when you run activities of type REPORT-BOOKKEEPING.
301	selling batch	B	true	If true, automatically run Selling batch.
420	effectiveness threshold	M	1.00	Default hedge effectiveness threshold. Assumes hedge is 100% effective if both legs are inside threshold.
450	fx book rate proc	P	CrossFX RealizeRate	Procedure to calculate FX Book Rate.
451	fx position spot rate	S	deal-be-rate	Method for calculating FX Position spot rate.
452	fx position combine	B	true	If true, combine FX Position currency pairs.
453	fx prefer sell ccy	B	false	If true, prefer FX currency FX rate.
470	default scenario	S	freeze	Default rates scenario for activities, except bookkeeping (which is handled by the "booking scenario" below).
472	fixing scenario	S	freeze	Default scenario ID for freezing.

ID	Name	Type	Default	Description
501	hook form info	P	<none>	Hook procedure to return form information. Used by the *FormInformation* procedure.
510	insert transaction hook	P	<none>	Hook procedure for transaction insert. Used by the *InsertTransaction* procedure. If the applied transaction is "Transaction Kind" = Block Trade, the Counterparty of the parent transaction is copied.
511	insert cashflow hook	P	<none>	Hook procedure for cashflow insert. Used by the *InsertCashflow* procedure.
512	insert hedge relation hook	P	<none>	Hook procedure for hedge relation insert.
515	finish transaction hook	P	<none>	Hook procedure for transaction finish. Used by the *InsertTransactionFinish* procedure.
520	generate payment hook	P	<none>	Mode procedure for generating payments. Called before rule matching takes place.
530	accounting entry hook	P	<none>	Hook procedure for accounting entry.
550	password expiry	I	0	Number of days before a password expires. When the password expiry reaches 0, the password is invalid. The default value is 0 (password expiry disabled).
551	password validation hook	P	Validate Password	Hook procedure for password validation, used by Security Center.
552	minimum password change	I	0	Minimum number of days between password changes.
553	password expiry warning	I	7	Number of days before the password expires to issue a warning to the user.
554	allow dbo login	B	false	If true, the database owner is allowed to login to TRM.
701 702 703	tax percent 1 name tax percent 2 name tax percent 3 name	S	Tax % #1 Tax % #2 Tax % #3	Name that you want the tax percent to be displayed with in TRM.
704	max payment entry state	S	FINAL	Maximum state for transactions in Payment Entry.
780	insert payment hook	P	<none>	Mode procedure for inserting payments. Called just before the payment is inserted.
790	formvars rounding float	I	2	Number of decimals for floating point in forms.
791	formvars rounding money	I	4	Number of decimals for monetary values in forms.
800	check activity host name	B	false	true - activity will be launched from the specified host machine only.
801	activity queues	I	1	Number of activity queues. This must be '1'.
850	call movement hook	P	<none>	Hook procedure for Call Money/Account movement mirroring.
860	adhoc settlement mode	S	<none>	The mode in which ad hoc settlement instructions is active.
870	portfolio model hook	P		Hook procedure to verify if a portfolio model is valid

ID	Name	Type	Default	Description
880	default min effectiveness	M		Default minimum hedge effectiveness
881	default max effectiveness	M		Default maximum hedge effectiveness
890	mode for sys final DD	S		Mode in which system generated final drawdowns are created
891	mode for sys final DD event/fe	S		Mode in which system generated final drawdown events or fees are created
892	mode for sys pre-final DDEF	S		Mode in which system generated pre-final drawdown events or fees are created
895	mode for sys final PaymentA	S		Mode in which system generated final payment advices are created
896	mode for sys refunded PaymentA	S		Mode in which system-generated refunded payment advices are created
900	payment export state ID	S	OPEN	State for which Settlement Manager sends payments to CMM
1110	block tm actions	B	true	Block any further actions on settled transactions.
1113	IDENTIFY_SETTLEMENTS_ORIGIN	B	true	Indicates whether a settlement was created using the transaction flow-based agent or the activity. The settlement field **param_9** stores the string `TRANSACTION-FLOW` or `ACTIVITY` as a result.
1200	batch mode	S	ADMIN	Used by all actions that retrieve transactions.
1201	automatic reconcile batch mode	S	ADMIN	Used by automatic cash settlement reconciliation to create the offset transactions that are generated by the reconciliation differences. Thanks to the ADMIN mode setup, such transactions will be created in the OPEN state.
1202	manual reconcile batch mode	S	RECONCILE-ADMIN	Used by manual cash settlement reconciliation to create offset transactions that are generated by the reconciliation differences. Thanks to the RECONCILE-ADMIN mode setup, such transactions will be created in the FINAL state.
1300	default system cpty	S	NULL	The counterparty to be used by default in the FX Pair Shift action.
1400	pricing stateflow disabled		true or false	Disable/enable the **Commit** and **Re-Open** actions in the FX Pricing and IR Pricing tools.

9.3 Admin Center

Admin Center contains the following functionality:

- Renaming Tool

  Renaming Tool is used to rename portfolios and clients in TRM.

- Database Administration

  This application provides several database administration tools. You can:

  – Display the database statistics for your organization and the statistics on connected users (logs of connected users).

- Use the database consistency checker (dbcc) to check and fix the integrity of your database.
- Use the log truncation functionality to clear log tables that become too big.
- Shrink your database and remove old and unwanted transactions from the system using Database Cleanup.

9.3.1 Renaming Tool

The Renaming Tool is used to rename portfolios and clients in TRM. This may be necessary when TRM is installed in order to use terminology that corresponds to your organization. It is possible to rename any portfolio or any client. To open the renaming tool, double-click on the appropriate node (Rename Portfolio or Rename Client) under Renaming Tool folder in Admin Center.

Warning: The renaming process must not be done during business activity because it disables/enables the database triggers. First, triggers are disabled, then the rename process is run and finally the triggers are re-enabled.

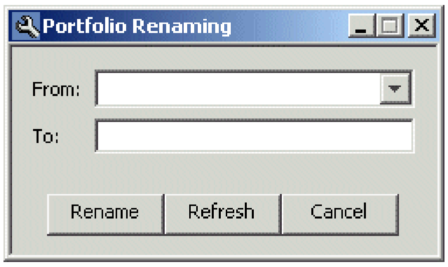
The interfaces for **Rename Portfolio** and **Rename Client** are identical. Two input fields allow you to select the current Client or Portfolio ID, and you can enter the new ID in the field below it.

Note: The Renaming Tool requires the user to have SSO permissions, otherwise the user receives an error message when confirming the renaming process in the Portfolio and Client Renaming dialogs (see below).

9.3.1.1 Renaming a portfolio ID

To rename a portfolio ID, use the following procedure:

1. Double-click the node **Rename Portfolio**.



2. Select the desired portfolio ID from the drop-down menu in the **From** field.
3. Once a Portfolio ID has been selected, enter its new ID name in the **To** field.
4. Click **Rename** to begin the renaming of the portfolio.

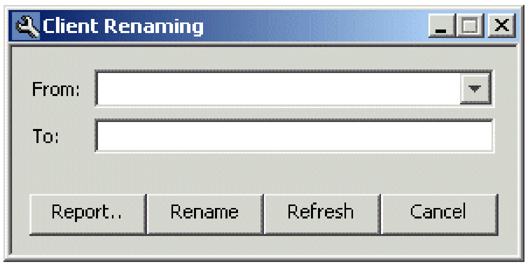
Warning: This task may take several minutes depending on the size of your database. DO NOT END THIS TASK WHILE IT IS IN PROGRESS. When the task has been completed, an information box is displayed to confirm this.

5. Click **Refresh** to refresh the portfolio list.

9.3.1.2 Renaming a client ID

To rename a client ID, use the following procedure:

1. Double-click the node **Rename Client**.



2. Select the desired client ID from the drop-down menu in the **From** field.
3. Once a client ID has been selected, enter its new ID name in the **To** field.
4. Click **Rename** to begin the renaming of the client.

Warning: Note that this task may take several minutes depending on the size of your database. DO NOT END THIS TASK WHILE IT IS IN PROGRESS. When the task has been completed, an information box is displayed to confirm this.

5. Click **Refresh** to refresh the client list.

Chapter 10 Customizing TRM user interfaces

10.1 Setting up menus

When a user opens TRM, the following logic is used to find the correct Application Manager menus for the user:

1. If the name of the menu file is defined in the "Menu name" field in the definition of the user in the Security Centerthe User Administration Editor, that name is used (the extension .xml is added automatically).
2. If no menu is defined for the user, but a menu is defined for one of the groups that the user belongs to, the menu name of the group is used.
3. If no menu name is defined for any groups that the user belongs to, the default menu name `FKApplicationManagerMenu.xml` is used.
4. If the location of the menu file is defined in the environment variable `FK_MENU_DIRECTORY`, that directory is used. Otherwise, the current directory is used.

10.2 Setting up title bars

For most TRM applications (excluding Security Center and Admin Center) the title bar contains the name of the application followed by the value of the `FK_TITLE` environment variable: see the TRM Installation Guide for your database type.

10.3 Deactivating splash screen

To save time with remote connections, you can deactivate the splash screen by setting the environment variable `FK_NO_SPLASH_SCREEN=1`.

10.4 Selecting a theme

You can select a theme that determines the appearance of TRM applications. This menu item becomes available when Application Manager is launched with the following start-up parameter:

```
-m [ --theme ]
```

This enables the Themes menu item in the application toolbar.

You can specify an extra title to appear in Security KIT or Admin KIT title bars. Below is the definition of Admin KIT and Security KIT in the menu file. Security KIT has been defined with an extra title, using the syntax: `-Dtrema.extra.title="text of the added title"`

```
<group name="Administration Tools">
  <application name="Admin KIT">
    <command>%FK_HOME%\jre\bin\javaw -cp %FK_CLASSPATH%
```

```
com.trema.adminkit.AdminKIT</command>
  </application>
  <application name="Security KIT">
    <command>%FK_HOME%\jre\bin\javaw -cp %FK_CLASSPATH% -Dtrema.extra.title="ADDED
TITLE" com.trema.adminkit.SecurityKIT</command>
  </application>
</group>
```

Changes you make here apply to the main application (Admin KIT or Security KIT) and all of its sub-dialogs.

Note: Certain special characters cannot be used in the xml files; the most important characters are '&', '<' and '>'. You have to use '&amp;', '&lt;' and '&gt;' instead. A sample TRM menu xml file is given below:

```
<?xml version="1.0" encoding="utf-8" ?>
-<application-manager-menu name="Trema Suite">
- <group name="Transaction and Risk Mgmt">
- <group name="Front Office">

      - <group name="Market Information Management">
        - <application name="Rate Monitor">
         <command>FKMonitor.exe</command>
         </application>
      -  <application name="Rate Report">
         <command>FKReport.exe --type prices</command>
         </application>
      -  <application name="Rate Log Report">
         <command>FKReport.exe --type prices-log</command>
         </application>
      -  <application name="Rate Comparison Report">
         <command>FKReport.exe --type price-diff</command>
         </application>
         </group>- <group name="Trading">
      -  <application name="Deal Capture">
         <command>FKTransactionManager.exe -c TM.xml --mode TRADING</command>
         </application>
      </group>
      </group>
      </application-manager-menu>
```

10.5 Customizing Transaction Manager

10.5.1 Transaction Manager default configuration

The data content of Transaction Manager is described by a set of XML files that are located in the directory `%FK_HOME%\etc\transaction-view`.

The XML files are used to configure the following in Transaction Manager: The fields in a view, field properties, some behavior, etc.

The directory contains subdirectories which allow you to activate some of these configurations.

By default, Transaction Manager reads the configuration from the directory `%FK_HOME%\etc\transaction-view`. You can set the configuration to be read from a subdirectory using the `--view` command line option of Transaction Manager. The default configuration is always read first. Then, the additional configuration (contained in the subdirectories) is added to the default configuration. The additional configuration only specifies any differences to the default configuration.

You can specify multiple subdirectories on the command line (see the Transaction Admin command line as an example).

10.5.2 Overriding the default configuration

The directory `%FK_HOME%\etc\site\transaction-view`, if present, is used to complement the default setup. You can define XML files as you would have done in a subdirectory of `%FK_HOME%\etc\transaction-view`. Transaction Manager always searches for this directory: you don't need additional command line parameters.

10.5.3 Adding custom parameters to Transaction Manager actions

It is possible to enrich the action dialog boxes and add custom parameters. These parameters will be used to populate some fields in the transaction that is a result of the action.

In `%FK_HOME%/etc/site/transaction-view` you create two files:

Views.xml to specify an action file:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>

<views actions="Actions"/>
```

Actions.xml the action file:

```
<?xml version="1.0" encoding="UTF-8"?>

<actions>

   <action name="fx_roll_over">

   <column name="comment" type="STRING" number="2" added="true"

   defaulted="true" case-sensitive="true">

      <label>Comment</label>

   </column>

   <column name="comment_2" type="STRING" number="0" added="true"
   case-sensitive="true">

      <label>Comment 2nd</label>

      <value type="STRING">Yes</value>

   </column>

</action>

</actions>
```

In the example above, two fields are added in the action `fx_roll_over`; the attribute `defaulted` tells you that the comment in the dialog box should be defaulted with the comment of the rolled-over transaction.

The tag `value` for `comment_2` specifies the default value when opening the dialog box.

The `number` attributes provide the position where the parameter should be added in the dialog box.

When the action is executed, `comment` and `comment_2` of the newly created rollover transaction will be populated with the values that were added in the action box. Only comments, counterparty trader, and parameters can be added to action dialog boxes.

10.5.4 Removing a toolbar button from the Transaction Manager

You can modify the toolbar behavior in the file `%FK_HOME%\etc\entity-manager\configuration\TM.xml` using the element toolbar-remove.

For example:

```
<toolbar-remove id="commit-transaction"/>
```

removes the **Apply** button from the toolbar.

10.6 Customizing Enter Board

10.6.1 Adding the entity definition

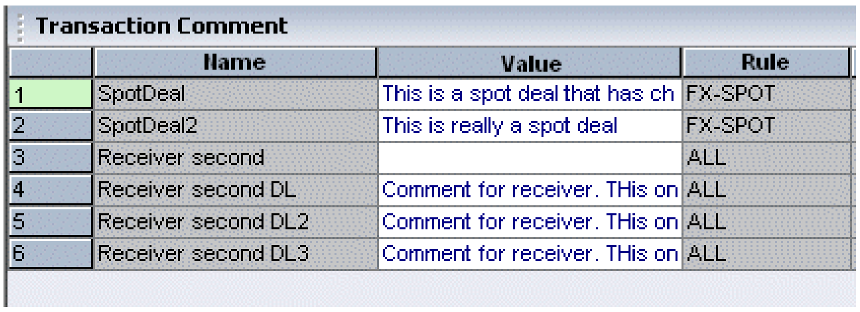
You can add columns to Enter Board and specify the source of the data in the column.

To add the definition of an entity to the board you want to use, you can either create a new board in `%FK_HOME%\etc\transaction-view\Boards.xml` or use the common board if the field is to be displayed in all boards. You can add an entity for the Spot Deal Comment coming from the Transaction Comment view with code such as the following:

```
<entity name="MyComment" view="Transaction Comment">
                <and>
                    <eq field="name_id" value="SpotDeal"/>
                </and>
            </entity>
```

where:

- `MyComment` renames the Transaction Comment view because it filters to only one row of the this view. You must rename it if you are filtering. The view is defined in a view file. The `view` value can be found in the related view file: the file `%FK_HOME%\etc\transaction-view\TransactionComment-view.xml` contains the line `<view name="Transaction Comment"..`).
- `<and>` or `<or>` can be used for filtering.
- The `<eq field=` line defines the condition (or part of it). `name_id` is the name of the field defined in the related view file (...`<column name="name_id" type="STRING" editable="false" width="20">`...). The value is the actual value displayed in that field. In the Transaction Manager's Transaction Comment view example shown here, the value **SpotDeal** in the **Name** column on the first row is filtered on:


Transaction Comment

	Name	Value	Rule
1	SpotDeal	This is a spot deal that has ch	FX-SPOT
2	SpotDeal2	This is really a spot deal	FX-SPOT
3	Receiver second		ALL
4	Receiver second DL	Comment for receiver. THis on	ALL
5	Receiver second DL2	Comment for receiver. THis on	ALL
6	Receiver second DL3	Comment for receiver. THis on	ALL

It is also possible to filter on multiple fields as follows:

```
                <and>
                    <eq field="name_id" value="SpotDeal"/>
                    <eq field="rule_id" value="FX-SPOT"/>
                </and>
```

This defines what is to be filtered and made available to the Enter Board so that it can display it.

10.6.2 Making fields accessible

In the `<board>` where the field is to be accessible, there is a `<fields>` element defining the visible fields from which the user can select a field to add when editing the layout of the enter board. To make the fields accessible from the row which has been filtered down to, add a new field there. For example:

```
...<fields>
<field name="spot_deal_comment" entity="MyComment" field="value">
                <label>Spot Deal Comment</label>
</field>...
```

where:

- `MyComment` is the name of the renamed entity as above.
- `spot_deal_comment` is the new name for this field.
- `value` is the name of the column that to display as `spot_deal_comment`: the value column from the filtered TransactionComment view is renamed to `spot_deal_comment`. This can also be looked up on the related view file (….`<column name="value"`….).
- `Spot Deal Comment` is a label.

The field's value ("value" in this case), can also be looked up on the related view file (….`<column name="value"`….).

When the filtered results include more than one row, multiple rows will probably be updated when you enter data in the Enter Board.

10.6.3 Making properties available

To make the transaction properties available in Enter Board, you can declare the properties as in the following example, instead of using Property Editor. Use only one method, as otherwise the columns will be duplicated.

```
<view name="Transaction" entity-name="Transaction"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="View.xsd">
  <!-- Column definitions for the transaction part. -->
  <column name="cp_client_id" type="STRING" width="12" default="true"
entity-name="Client">
    <label>JNS Counterparty</label>
    <enumerated name="Counterparty"/>
  </column>
  <column name="jns_custom" type="STRING" width="19" editable="true"
case-sensitive="true">
    <label>JNS Custom Property</label>
    <enumerated>
      <enumeration value="value-1" visible-value="Value 1"/>
      <enumeration value="value-2" visible-value="Value 2"/>
      <enumeration value="value-3" visible-value="Value 3"/>
    </enumerated>
  </column>
  <column name="jns_custom_2" type="STRING" width="19" editable="true"
case-sensitive="true">
    <label>JNS Custom Property 2</label>
    <enumerated>
      <enumeration value="value-21" visible-value="Value 21"/>
      <enumeration value="value-22" visible-value="Value 22"/>
      <enumeration value="value-23" visible-value="Value 23"/>
    </enumerated>
  </column>
</view>
```

You can customize the Enter Board as in the following example:

```
<boards>
    <board name="Common" description="Common Transaction Fields" visible="false">
        <entities>
            <entity name="Transaction" view="Transaction"/>
        </entities>
        <fields>
            <field name="jns_custom" entity="Transaction" field="jns_custom">
                <label>JNS Custom Property</label>
            </field>
        </fields>
    </board>
    <board name="CustomInclude" description="Custom Transaction Fields for Include"
visible="false">
        <entities>
            <entity name="Transaction" view="Transaction"/>
        </entities>
        <fields>
            <field name="jns_custom_2" entity="Transaction" field="jns_custom_2">
                <label>JNS Custom Property 2</label>
            </field>
        </fields>
    </board>
    <board name="Equity" description="Equity Enter Board">
        <include board="CustomInclude"/>
        <fields>
            <field name="premium_date" entity="Transaction" field="premium_date">
                <label>JNS Premium Date</label>
            </field>
        </fields>
    </board>
    <board name="Custom" description="Custom Transaction Fields" visible="true">
        <include board="CustomInclude"/>
        <entities>
            <entity name="Transaction" view="Transaction"/>
        </entities>
        <fields>
            <field name="portfolio_id" entity="Transaction" field="portfolio_id"/>
            <field name="jns_custom" entity="Transaction" field="jns_custom">
                <label>JNS Custom Property</label>
            </field>
        </fields>
    </board>
</boards>
```

Chapter 11 Managing activities

11.1 Overview

Activities can be actions performed at regular intervals or run only once.

The TRM Activity Manager application records activities to the database. The activity daemon (activityd), launches activities as soon as they are submitted from Activity Manager. Every time an activity is run, it is recorded to the Activity Log which can be viewed in Activity Manager.

The "Mail Notification" property can be defined for each activity in Activity Manager. This is the mail address that receives a notification every time the activity is run.

Depending on the configuration of your system, a prerequisite might be the execution of the `rc.login` script which creates the passwords in shared memory. In this case, `crontab` must be installed under the same user ID as the logins have been initialized for with the `rc.login` script.

A user setting up an activity must have ACTIVITY permission for the relevant portfolio.

11.2 ActivityType table

The available activity types are stored in the table ActivityType. This table contains the ID, name, handler procedure name, and the host server.

11.3 Generating Windows NT Reports

11.3.1 Starting the cron service

The `cron` process runs as a service on Windows NT.

1. Run the Windows `sc` command (used for creating and deleting services) with the following parameters and spacing:

   ```
   sc \\<Hostname> create wss.<SystemName>-cron type= own start= auto binpath=
   <FK_HOME>\sbin\srvany.exe displayname= "WSS NT crond" depend=
   wss.<SystemName>-names
   ```

2. Open the Windows Registry Editor (select **Start-Run** and then type `regedit`) and find the key:

   ```
   \\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\wss.<SystemName>-cron
   ```

3. Under this key, create a new key called `Parameters`, and add the following string values:

   ```
   Application=<FK_HOME>\bin\perl.exe
   AppDirectory=<FK_HOME>\sbin
   AppParameters=<FK_HOME>\sbin\cron.pl <FK_HOME>\etc\crontab
   ```

4. Change the login for the service to fkadmin (**Start-Control Panel-Services**, select **Startup**, then **This Account** in the Log On As window and enter the fkadmin login information).
5. Now you can start the service from **Start-Control Panel-Services**.

11.3.2 Scheduling NT Reports

`ProcessActivities.exe` is a binary file for execution at regular intervals on Windows NT. The most common usage is to schedule NT Reports and send the created report by e-mail. In this case, the `cron.pl` emulates `cron` on NT and initiates the query from the NT side. If an activity is due on the NT server, it will be executed and the results will be e-mailed, if it is configured to do so. The `cron` process `cron.pl` is normally installed as a NT service using the `sc` command.

In some setups, activityd runs on the UNIX side and handles the normal activities. On the NT side, `cron.pl` + ProcessActivities runs NT reports. Normally `cron.pl` calls the supplied batch file `Activity.bat` which in turn calls `ProcessActivities.exe`.

The NT reports must be scheduled to run on a NT server only (the activity type specifies the server name). Another criterion is that the corresponding stored procedure returns an `nt_report` column. This column specifies the report type to create. Examples of reports that support scheduling are:

- Balance Report
- Call Portfolio Report
- Call Transaction Report
- Cashflow Log Report
- Cashflow Report
- History Log Report
- Key Figure Report
- Limit Log Report
- Periodic PL Report
- Settlement Report
- Transaction Log Report
- Transaction Report

The NT report types are in *<FK_HOME>*`/share/reports/types`.

Chapter 12 Setting up comKIT

12.1 Introduction

comKIT is included in the TRM installation, but a separate licence is required to develop comKIT applications.

The API details are supplied in `FK_HOME\support\comKIT\doc\idl\html\index.html` (Windows platform only).

12.2 comKIT Components

comKIT is a client/server application, and consists of:

- a comKIT server
- a comKIT client
- the comKIT TRM interface compiled for Python and Java
- comKIT client support code for Python and Java

12.3 comKIT Server

A comKIT server runs a service which gives you access to TRM functionality through the comKIT API. The following specific comKIT services have been implemented:

- Transaction
- Static Data
- Position
- Performance

In addition there is the generic Entity Board service. It provides access to the TRM Transaction Manager run with one of the following views: amount-event; call-money; custody-entry; fin-message; hedge-manager; payment-advice; payment-allocation; settlement-processing; settlement-reconciliation.

12.3.1 Architecture

comKIT services behave like their equivalent TRM applications:

- TRM application=comKIT service
- Transaction Admin=Transaction
- Generic Editor=Static Data
- Treasury Monitor=Position
- Performance Monitor=Performance

Each comKIT service is composed of the same objects, some of which are analogous to GUI components:

- TRM application=comKIT service
- Service_Gate
- Service_Base
- ApplicationBusiness_Object_Factory
- Row in a board=Business_Object
- CellValue

12.3.1.1 Garbage collecting

Each comKIT object has a "time_to_live" with a default value of 1000 seconds. When this expires, the object is garbage-collected. The starting time_to_live can be configured using the command line parameter `timeout=<timeout in seconds>`.

comKIT objects form the hierarchy Service_Base - Business_Object_Factory - Business_Object

If a parent object in the hierarchy expires, it will first release all its children before it is itself garbage-collected.

12.3.1.2 TRM Naming Service

The TRM Naming Service is a white pages-style lookup server for CORBA objects. The comKIT server registers itself in the naming service.

Root context

finance-kit

<FK_IDENT>

<corba name>

12.3.1.3 comKIT Server Parameters

The mandatory parameters are as follows:

--module-name (-M), the shared library of the service or a shortcut

--corba-name (-C), typically <prefix>_<service-name>

For example: `comkitd -C server1_transaction  -M comkit/transaction --trace-level 10`

A complete list of comKIT parameters can be found by using the --help switch.

12.3.2 comKIT Server Configuration

12.3.2.1 Naming Service

The location of the naming service root context is configured in the omniORB configuration file, whose location is set by the OMNIORB_CONFIG environment variable.

```
InitRef = NameService=corbaname::<hostname>:<port>
```

The FK_IDENT environment variable describes the naming service context under which the comKIT server will register itself.

12.3.2.2 Firewall

Bidirectional GIOP must be enabled to traverse firewalls. Base your configuration on the supplied omniORB firewall configuration file (`<FK_HOME>/support/etc/orb.conf.firewall`).

Specific ports can be assigned to comKIT servers using a comKIT command line parameter like the following: `-ORBendPoint giop:tcp::12000`

12.3.2.3 SSL

The comKIT server is configured with the following environment variables:

`FK_SSL_CA_CERT_FILE`: Full path of the CA

`FK_SSL_CERT_FILE`: Full path of the application certificate

`FK_SSL_PASSWORD`: Application certificate private key password

12.3.2.4 omniORB

A sample omniORB configuration is supplied in `<FK_HOME>/support/etc/orb.conf`.

12.4 comKIT Client

The comKIT interface is described in the CORBA IDL. You can use a wide range of programming languages covered by the OMG IDL to language binding specifications. For convenience, the comKIT interface has been compiled for Python and Java. In addition, comKIT client support code exists for these languages.

In general comKIT services behave like their equivalent TRM applications. Use the same field order when setting values as you would in the TRM application. When problems arise in comKIT, try the same actions in the TRM application.

Refer to the comKIT API reference guide for more information on the comKIT interface (Windows only, on `<FK_HOME>\support\comkit\doc\idl\html\index.html`).

Refer to the Python and Java comKIT Helper Classes information (Windows only, on `<FK_HOME>\support\comkit\doc\python\index.html` and `<FK_HOME>\support\comkit\doc\javaDoc\index.html`).

12.4.1 Python

Please refer to the Python examples (Windows only, on `<FK_HOME>\support\comkit\examples`).

An interesting feature of Python and the TRM Python helper code is the 'in-process' client. Here the client and server are collocated: see the provided examples.

12.4.2 Java

Please refer to the Java examples (Windows only, on `<FK_HOME>\support\comkit\examples`). You must include the following sets of JAR files to build and run a Java comKIT client:

- The compiled comKIT TRM interface:
  - `%FK_HOME%\java\jupiter\lib\biz.wss.trm.lib.common.financekit.jar`
- The compiled comKIT helper classes:
  - `%FK_HOME%\java\jupiter\lib\biz.wss.trm.lib.common.comkit.jar`
  - `%FK_HOME%\java\jupiter\lib\biz.wss.lib.common.foundation.jar`
- The runtime classes:
  - `%FK_HOME%\java\jupiter\lib\avalon-framework_4.1.5\avalon-framework-4.1.5.jar;`
  - `%FK_HOME%\java\jupiter\lib\jacorb_2.3.0\jacorb-2.3.0.jar`
  - `%FK_HOME%\java\jupiter\lib\logkit_1.3\logkit-1.3.jar`
  - `%FK_HOME%\java\jupiter\lib\concurrent_1.3.4\concurrent-1.3.4.jar;`
  - `%FK_HOME%\java\jupiter\lib\log4j_1.2.14\log4j-1.2.14.jar;`

12.4.3 Exceptions

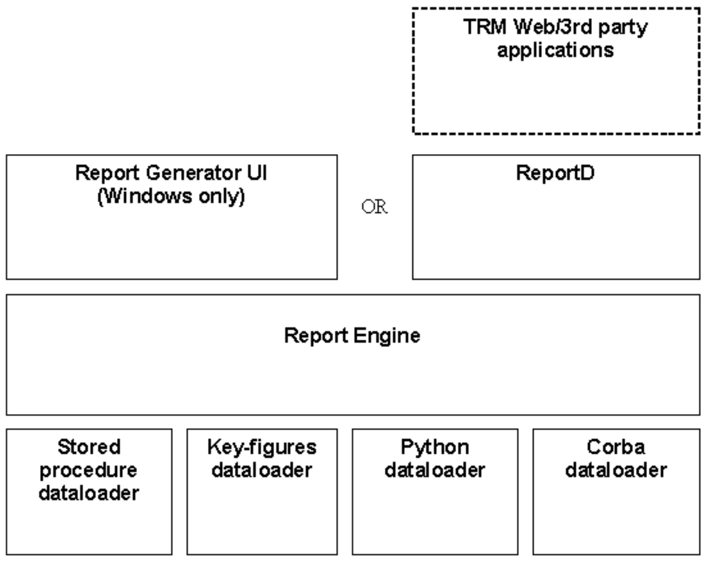
Most comKIT methods can raise an `FK::Comkit::Comkit_Exception` exception as a way of indicating a warning or error condition. Refer to the online comKIT API reference and examples.

Each method invocation can also raise CORBA system exceptions; see the CORBA specification.

Chapter 13 **Configuring and customizing reports**

13.1 Report Generator components

Reports are generated by the Report Generator tool. The architecture of Report Generator can be summarized as follows:


TRM Web/3rd party applications
Report Generator UI (Windows only)
OR
ReportD
Report Engine
Stored procedure dataloader
Key-figures dataloader
Python dataloader
Corba dataloader

Report Generator consists of the following components:

13.1.1 Dataloader modules

Dataloader modules provide the following report data to the report engine:

- Stored procedure: a stored procedure is invoked on the TRM database and the result set is fetched into the engine.
- Key-figure, periodic, collateral : transaction/cashflow reports on which the valuation modules are applied in the same way as in the transaction manager.
- Python: a python script is executed; a callback is available to insert arbitrary data into the engine.
- perl: a perl script that either provides all the data or manipulates each row using callback subroutines.

13.1.2 Report engine

The report engine computes report expressions and implements criteria. It groups and sorts the data. The full set of report data must be loaded into the engine before the user can start accessing it. However memory use is greatly reduced by a disk swap.

13.1.3 Report Generator UI

Reports generator UI handles the data grid windows, the query parameter dialogs and the drilldown functionality. It loads and saves the report layout files.

13.1.4 ReportD

ReportD is a shell application which invokes the report components with minimal overhead. It has two modes of operation.

- Command line: query parameters are passed on the command line as in any shell application; the results are sent as standard output using one of the available format (XML, CSV, TXT, HTML).
- POST CGI emulation: query parameters are sent to the standard input URL encoded; the result set is piped to the standard output using a binary format. Java libraries exist to decode the binary stream.

13.1.5 Cover pages, headers, and footers

There are two environment variables that control cover pages, headers, and footers: `FKREPORT_EXPORT_FORMAT_VERSION` and `FKREPORT_EXPORT_FORMAT`. Here are the options:

- No cover pages, headers, or footers:
  set `FKREPORT_EXPORT_FORMAT_VERSION` to a number less than 5.
- Cover pages and headers and footers:
  set `FKREPORT_EXPORT_FORMAT_VERSION` to a number equal to or greater than than 5.
- Cover pages and/or headers and/or footers:
  set `FKREPORT_EXPORT_FORMAT` to one or more of the following, separated by commas (this overrides `FKREPORT_EXPORT_FORMAT_VERSION`):
  - `COVER_PAGE`
  - `ROW_HEADER`
  - `ROW_PLAIN`
  - `ROW_FOOTER`

  For example, to add cover pages and footers to your reports, set `FKREPORT_EXPORT_FORMAT=COVER_PAGE,ROW_FOOTER`.

13.2 Applying report definitions

Report definitions are stored in external files. The environment variable `FK_REPORTS_TYPES` is used to specify the directory containing these files, for example `FK_REPORTS_TYPES=%FK_HOME%\share\reports\types`. The files have the extension .frd (TRM Report Definition).

You can add new reports to the list of available reports on-site by creating new definition files. The filename, without the .frd extension, should be descriptive of the type of the report; for example, `transactions-log.frd` is the definition file for a Transaction Log Report. All reports which have a definition file can be launched from an entry in the Application Manager.

The report definition file includes:

- Report type (the name of the file)

- Report name (title printed on the headers)
- Name of the stored procedure
- List of the parameters required at start-up of the report
- Definition of each of the parameters: parameter type (defines the list of accepted values), optional default value, and whether the parameter is mandatory
- Definition of drilldown fields
- Renaming and hiding of columns
- Filters to transform numerical results to text (via a database access).

13.3 Sample report definition file

```
[FK Report Definition]

[Main]
Type=transactions
Name=Transactions Report
Procedure=transactions-report
Parameters=portfolio_id,instrument_group,
instrument_id,cp_client_id,collateral_number,opening_date_from,opening_date_to,v
alue_date_from,value_date_to,state_id,number
HiddenParameters=number
ConvertToLocalTime=opening_time

[Parameter portfolio_id]
Name=Portfolio
Type=PORTFOLIO

[Parameter instrument_group]
Name=Instrument Group
Type=UM_INSTRUMENT_GROUP

[Parameter instrument_id]
Name=Instrument
Type=UM_INSTRUMENT

[Parameter cp_client_id]
Name=Counterparty
Type=COUNTERPARTY

[Parameter collateral_number]
Name=Collateral Number
Type=INT

[Parameter opening_date_from]
Name=Opening Date From
Type=DATE

[Parameter opening_date_to]
Name=Opening Date To
Type=DATE

[Parameter value_date_from]
Name=Value Date From
Type=DATE
```

```
[Parameter value_date_to]
Name=Value Date To
Type=DATE

[Parameter state_id]
Name=Transaction State
Type=TRANSACTIONSTATE
Default=TransactionStateDefault

[Parameter number]
Name=Number
Type=INT

[Rename]
Fields=mattr_4
mattr_4=FX Quote Amount

Params=1
[Filter]
Fields=type_id,premium_type,date_basis,sign_id,kind_id,status,rate_type,rate_typ
e_2
type_id=TransactionType
premium_type=ModuleInterface
date_basis=ModuleInterface
sign_id=TransactionSign
kind_id=TransactionKind
status=Status
rate_type=ModuleInterface
rate_type_2=ModuleInterface
```

13.3.1 Main section

The Type field contains the root of the file name.

The Procedure field uses TRM syntax, not database syntax: lower case, words separated by '-' instead of capital letters. The Report Generator will convert this name to the database stored procedure name.

The Ignore field is used to specify the columns you do not want displayed.

The Parameters field contains a list of the parameters that will appear in the start-up window for that report:

Parameters=start_date,end_date,custody_id,client_id

Subsequent sections contain definitions for each of these parameters. For example:

```
[Parameter end_date]
Name=End Date (the displayed name)
Type=DATE (see the list of accepted types)
Mandatory=0 (0 for non-mandatory, 1 for mandatory field)
Default= ('today' or TransactionStateDefault or EUR-Euro by default)
```

13.3.2 Rename section

In the Rename section you can specify any columns you want to rename, for example:

```
[Rename]
Fields=other_custody_id,custody_id
other_custody_id=Other Custodian
custody_id=Custodian
```

where

[Rename]	
Fields=col1,col2,...	The list of columns to rename
Col1=new col1 name	For Each column
Col2=new col2 name	For Each column
Branches=1	To rename branch#1..20
Params=1	To rename param#1..10

13.3.3 Filter section

The list of filters specified in this section will appear in a read me file in the distribution. Filters are used to translate numeric values to text values, for example cashflow subtype id to name.

[Filter]	
Fields=col1,col2,...	The list of columns to filter
Col1=filter1	For Each column
Col2=filter2	For Each column
Type=rate	To show the deal rate column in the same way as in Enter Board.
Type= GapSetInfoFilter	Activates gap-related columns in Report Generator.
row_filters=TransactionSignDataFilter, GapSetInfoDataFilter, BranchDataFilter	Supplies filters to each row. The row_filters (data filters) are more complex. They typically add more fields to the report. The following filters are shipped by default: TransactionSignDataFilter (adds columns based on labels in the instrument definition. Buy/Sell etc) GapSetInfoDataFilter (adds columns related to gap sets) BranchDataFilter (adds information given for branch codes)

You can also write your own datafilter in perl (see below). Support for datafilters written in python is not yet implemented.

13.4 Configuring New Report submenu

The `menu.fkm` file specifies the reports that appear in the File/New Report submenu of the Report Generator. This file does not affect the reports that can be launched directly from the Application Manager.

The environment variable `FK_REPORTS_MENU` is used to specify the path of the `menu.fkm` file, for example `FK_REPORTS_MENU=%FK_HOME%\share\reports\menu.fkm`.

This file contains a list of the reports that will be shown in the **File - New Report** submenu. The structure of this file is report type, report name and status line value. For example:

```
[activity-log]
DisplayName=Activity Log
StatusLine=New Activity Log Report
```

If this file is not available, the application will scan the `%FK_HOME%\share\reports\types` directory for `.frd` files and create a menu entry for each report type found. The report name shown in the menu will be taken from the Name field in the [Main] section of the definition file. The Key-Figure and Periodic P/L reports will be separated from the others by a separator line.

To place menu items in a submenu called My Reports, add the following line to each item:

```
Add SubMenu=My Reports
```

13.5 Setting up layout files

Layout files are defined by users within the Report Generator. All layout files are saved in the directory specified by the `FK_REPORTS_LAYOUTS` environment variable, for example `FK_REPORTS_LAYOUTS=%FK_HOME%\share\reports\layouts`. The files have the extension `.fkr` (TRM Report).

Layouts can now be selected in report start-up windows; only the layouts relevant to the type of report will be shown. If no layouts are defined, the layout selection field is grayed out.

13.6 Running related reports

The drilldown functionality allows you to execute other reports or programs using the data in the report as the argument. For example, by right-clicking on a transaction number you can launch a transaction log report for the associated transaction. You declare actions in .ini files and additional lines in the report type files.

13.6.1 drilldown.ini files

In the directory `share/reports/layouts/`, all *_drilldown.ini files are automatically read and their contents are merged (`acm_drilldown.ini, trm_drilldown.ini` etc). A *_drilldown.ini file contains a series of action declarations:

```
[my_action]
Type=report
Layout=Action Report
Parameters=param1,param2,param3,param4,param5
```

The following file declares the 'report' action as follows: launch a new report window with `Transactions.fkr` as a layout, portfolio_id will be assigned the 1st parameter and instrument_id the 2nd parameter.

```
[action_transaction_report]
Type=report
Layout=Transactions
Parameters=portfolio_id,instrument_id
```

It is also possible to launch an external command (an editor for example) as an action:

```
[action_transaction_board]
Type=command
Command=FKTransactionBoard.exe --layout=%1 --id=%2
```

13.6.2 .frd report types

This section declares a drilldown named 'my_drilldown' with 'Drilldown label' as a label:

```
[Drilldown my_drilldown]
Label=Drilldown label
Action=my_action(params.param1,row.colum1,'abc',123,null)
```

When this drilldown is executed launches the action 'my_action' (in the .ini file) with the following arguments:

- the report parameter 'param1'
- the value of the report column 'column1' for the line that the user clicked for this drilldown.
- the constants 'abc', 123 and null.

This section then does the mapping between report columns and drilldown:

```
[drilldown]
column1=my_drilldown,drilldown1,drilldown2
column2=drilldown3
```

This means that when you left-click on 'column1' the drilldown 'drilldown1' is executed. Right-click on 'column1' to see a context menu with the actions 'drilldown1' and 'drilldown2'.

This is useful to bind many drilldowns in a column, for example in the transaction id column, you could have 'edit transaction' to launch transaction board or 'show children' to start a new transaction report with the child transactions.

13.7 Customizing reports in python

Most TRM modules are already accessible through python, so this is a good way to implement customer-specific reports that would be otherwise difficult or impossible to do.

See `python.frd` and `python_test.py` in the `FK_HOME\share\reports\types` directory for information on creating python data sources.

13.8 Customizing reports in perl

Report Generator also offers two ways of using perl: data source and datafilter. The data source works like a stored procedure, but the data to be processed is prepared in perl instead of SQL (see `FK_HOME\share\reports\types\PerlSource.pl`).

The data filter offers a way to add additional information. For example it is possible to add new fields to an existing key-figure report. In this case you must implement a few hook subroutines in perl (see `FK_HOME\share\reports\types\balance.pl`). Report Generator runs the primary report and then calls subroutines in the perl file for each row to populate additional fields.

13.9 Printing reports from the command line (Windows only)

Reports can be created using command line arguments. The arguments required are specified in a `.frp` (TRM Report Parameters) arguments file which is given on the command line after all the options. The report can be printed using the `--print` option. Argument files are saved in the directory specified by the `FK_REPORTS_LAYOUTS` environment variable (`FK_REPORTS_LAYOUTS=%FK_HOME%\share\reports\layouts`). It is possible to generate or open argument files from inside the Report Generator.

These files must have the following structure:

```
[FK Report Parameters]

[Main]
Type=balance
Layout=balance.fkr

[Parameters]
```

```
Fields=from_date,to_date,minimum_state_id
from_date=07/20/00
to_date=07/21/00
minimum_state_id=FINAL
```

The first line must be `[FK Report Parameters]`. This is the signature.

13.9.1 Main section

The Type key is used to specify the report definition file required. Note that the file extension, `.frd`, is not included. This parameter can not be omitted. Without it the report will not be created (this file defines the type of the report).

The Layout key is used to specify the layout file required; this field is not mandatory. Note that the file extension, `.fkr`, is included in this field.

13.9.2 Parameters section

The Fields key lists the parameters defined in this file. The values must be separated by commas, without any spaces. The case used must match the case used in the .frd definition file.

The subsequent lines contain definitions for the parameters given in the Fields key. The parameter names in these lines can appear in lower, upper, or mixed case. The parameters defined as mandatory in the definition file must be included.

13.10 Executing reports from the command line

To execute a report from the command line (crontab, shell script), you can use reportd, a lightweight version of Report Generator, available on Unix and windows. The report data is returned on the standard output in the following format: csv, tab delimited text file, xml (two formats available) and html (only intended for tests).

Example: a transaction report on 'LIMIT' portfolio exported as XML.

```
set FK_REPORTS_TYPES=...
set FK_REPORTS_LAYOUTS=...
reportd -U dbo -P password -D mydb -t transactions --param portfolio_id=LIMIT -f
xml3 > report.xml
```

Chapter 14 Generating verification reports

The verification reports in this chapter are available in TRM Administration Tools. This chapter explains how to generate reports to verify the consistency of static data. In some cases you can repair corrupt data by setting the Repair parameter.

14.1 General System Auditing

14.1.1 Domain Map Verification report

This report checks for corruption in domain mapping. Enter the following parameters:

Parameter	Description
Table	Table name
Repair	Choose 0-No or 1-Yes
Layout	Choose a layout

The report displays the table name and any inconsistencies. For example:

Reason for inconsistency	Description
Corrupt domain permissions	Client is defined as modifiable on a specified domain, but the domain is not Read-accessible.
Obsolete domain permission	Displayed if you create a client with the ID of a client which was removed without an update of the corresponding domain.

The report allows you to find a setup where the domain specified in the top part of the editor is missing from the mapping table

14.1.2 Market Info Map Verification report

This report lists the incorrect info map rows. Enter the following parameters:

Parameter	Description
Instrument	Instrument to check
Repair unknown types	Choose 0-No or 1-Yes
Repair wrong type/name with no prices	Choose 0-No or 1-Yes

Parameter	Description
Repair wrong type/name with prices	Choose 0-No or 1-Yes
Layout	Choose a layout

The report displays the price type, instrument, integer reference used in the market info map, and reason for inconsistency.

14.1.3 Property Map Verification report

This report lists the properties that have an incorrect Type:

Parameter	Description
Object	Object to be scanned
Key	Key to be scanned
Property Type	Property type to be scanned
Repair	Choose 0-No or 1-Yes
Layout	Choose a layout

The report displays the name of the object, the object keys and the ID of the incorrect type.

14.1.4 Price Verification report

This report lists the market info map referencing objects that no longer exist. It checks that all prices are attached to a market info map ID, and checks prices that have an orphan yield curve-period:

.

Parameter	Description
Repair	Choose 0-No or 1-Yes
Layout	Choose a layout

Outputs are instrument ID, price type, period and integer reference used in MarketInfoMap. The following inconsistencies can be reported:

Reason for inconsistency	Description
MarketInfoMap entry with reference to objects that no longer exist	Prices that are not attached to any instrument
Price not attached to a MarketInfoMap	Prices that are not attached to any instrument
Yield curve price with incorrect period	Yield curve prices with incorrect period

14.2 Instrument auditing

14.2.1 Instrument Feature Verification report

This report displays any inconsistencies in feature allocation on the instrument:

Parameter	Description
Feature	Feature to be checked
Instrument Type	Instrument type to check
Instrument	Instrument to check
Repair	Choose 0-No or 1-Yes
Layout	Choose a layout

Outputs are feature, instrument and reason. Reasons are as follows:

- Invalid feature for the type
- Missing feature for the type
- Feature has to be mandatory for the type
- Invalid feature for the instrument

14.2.2 Instrument Result Verification report

This report displays inconsistencies in instrument setup.

Parameter	Description
Instrument	Instrument to check
Layout	Choose a layout

Outputs are instrument, result type and reason. Possible reasons are as follows:

- Instrument with missing classification configuration
- Result type with missing result configuration

14.3 Transaction Auditing

14.3.1 Transaction Classification Verification report

This report lists the inconsistencies at transaction level when the classification mechanism is used. The following parameters are available for checking this information:

Parameter	Description
Portfolio	Portfolio to be checked
Number	Number of transaction to check (for a single transaction)
Layout	Choose a layout

Possible sources of inconsistency are as follows:

- Owner with missing classification required
- No classification rule
- Result type with missing result
- Instrument with missing classification configuration

Static data are stored in tables: UMClass, UMClassFeature, UMFeatureEntry and UMFeature. Before launching this report, make sure that these static tables are up to date by rebuilding the tables using the build script with parameter -t.

14.4 Relationship auditing

14.4.1 Entity Relationship Verification report

Before enabling the SDM framework on top of TRM/CMM, check that the master-subentity relationships in the static data tables to be managed by SDM are consistent. The Entity Relationship Verification report provides this check. The following parameters are available:

Parameter	Description
Subset of tables	The subset to check (only SDM is available at present)
Layout	Choose a layout

The report shows the master entity, subentity and reason for inconsistency.

14.5 Client auditing

14.5.1 Client Accounts Verification Report

This report list the inconsistencies at Client level regarding account configuration.

Parameter	Description
Client	Client to be checked

Parameter	Description
Currency	Currency to be checked
Layout	Choose a layout

Possible sources of inconsistency are as follows:

- No settlement instructions rule is defined
- No account is attached to settlement instructions rule

Chapter 15 Routine system admin operations

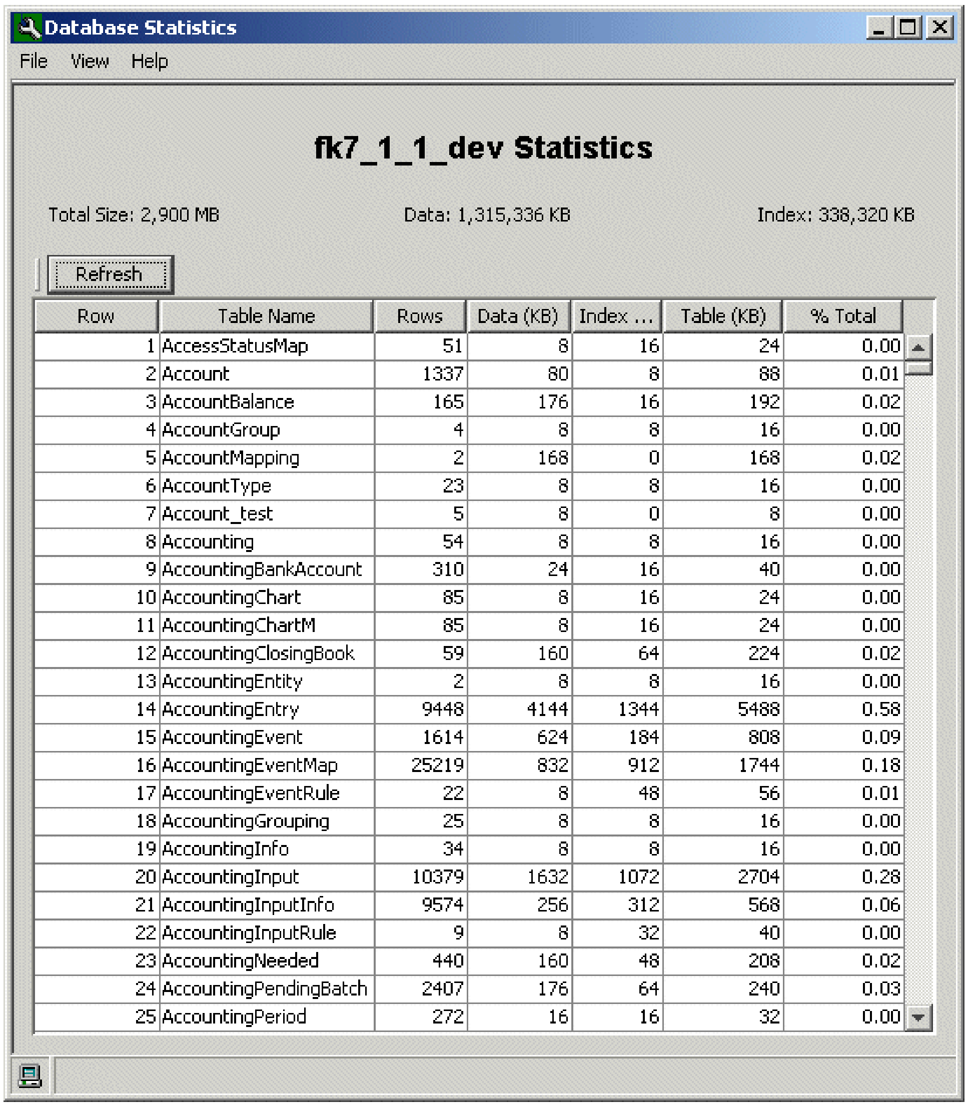
15.1 Database administration using Admin Center

15.1.1 Database statistics (TRM tables)

This application provides a report of the current state of your TRM database. Since it must query every table in the database, it can take a while for the information to appear. The statistics report will only appear when the all the queries are completed.

You can sort the tables ascending, by clicking on the displayed column headers. You can also export the selected table to a CSV (Comma Separated Values) file.

You open this application by double clicking on **Database Statistics** from the **Database Administration** folder.



fk7_1_1_dev Statistics

Total Size: 2,900 MB Data: 1,315,336 KB Index: 338,320 KB

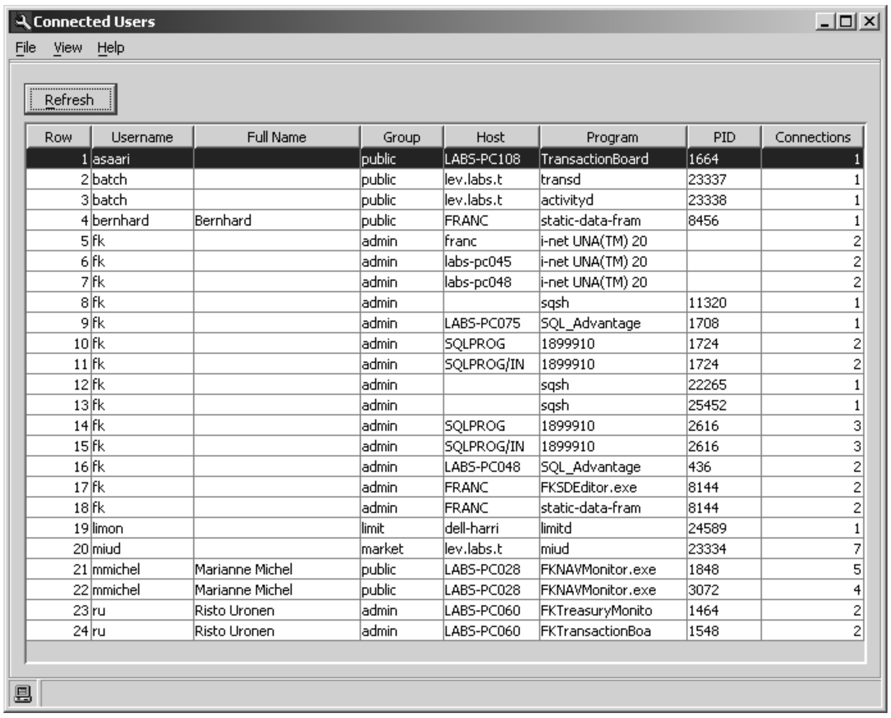
Row	Table Name	Rows	Data (KB)	Index ...	Table (KB)	% Total
1	AccessStatusMap	51	8	16	24	0.00
2	Account	1337	80	8	88	0.01
3	AccountBalance	165	176	16	192	0.02
4	AccountGroup	4	8	8	16	0.00
5	AccountMapping	2	168	0	168	0.02
6	AccountType	23	8	8	16	0.00
7	Account_test	5	8	0	8	0.00
8	Accounting	54	8	8	16	0.00
9	AccountingBankAccount	310	24	16	40	0.00
10	AccountingChart	85	8	16	24	0.00
11	AccountingChartM	85	8	16	24	0.00
12	AccountingClosingBook	59	160	64	224	0.02
13	AccountingEntity	2	8	8	16	0.00
14	AccountingEntry	9448	4144	1344	5488	0.58
15	AccountingEvent	1614	624	184	808	0.09
16	AccountingEventMap	25219	832	912	1744	0.18
17	AccountingEventRule	22	8	48	56	0.01
18	AccountingGrouping	25	8	8	16	0.00
19	AccountingInfo	34	8	8	16	0.00
20	AccountingInput	10379	1632	1072	2704	0.28
21	AccountingInputInfo	9574	256	312	568	0.06
22	AccountingInputRule	9	8	32	40	0.00
23	AccountingNeeded	440	160	48	208	0.02
24	AccountingPendingBatch	2407	176	64	240	0.03
25	AccountingPeriod	272	16	16	32	0.00

At the top of the window, the name of the database (simply 'fk' in the example above) along with the total size available on the device, the current size of the data, and the current size of the index are displayed. All of the database tables are listed alphabetically in the report table. For each table, you can view the number of rows and the data, index, and total space in KBs. The last column shows the percentage of the database space that is taken up by this table. If you notice that the log tables are getting too big, you can truncate them using the Log Truncation application (see *15.1.4 Log Truncation* on page 226).

15.1.2 Connected Users

Connected Users provides a report of the users currently connected to the TRM database. Note that it does not show all of the users connected to the database server, but only those users that are connected to the same TRM database as you. This functionality is convenient to track down problems or to view who is currently working so they can be notified in the event of a shutdown (the system administrator should always try to avoid shutdown with no wait).

From Admin KIT's Database Administration folder, open **Connected Users**:



Row	Username	Full Name	Group	Host	Program	PID	Connections
1	asaari		public	LABS-PC108	TransactionBoard	1664	1
2	batch		public	lev.labs.t	transd	23337	1
3	batch		public	lev.labs.t	activityd	23338	1
4	bernhard	Bernhard	public	FRANC	static-data-fram	8456	1
5	fk		admin	franc	i-net UNA(TM) 20		2
6	fk		admin	labs-pc045	i-net UNA(TM) 20		2
7	fk		admin	labs-pc048	i-net UNA(TM) 20		2
8	fk		admin		sqsh	11320	1
9	fk		admin	LABS-PC075	SQL_Advantage	1708	1
10	fk		admin	SQLPROG	1899910	1724	2
11	fk		admin	SQLPROG/IN	1899910	1724	2
12	fk		admin		sqsh	22265	1
13	fk		admin		sqsh	25452	1
14	fk		admin	SQLPROG	1899910	2616	3
15	fk		admin	SQLPROG/IN	1899910	2616	3
16	fk		admin	LABS-PC048	SQL_Advantage	436	2
17	fk		admin	FRANC	FKSDEditor.exe	8144	2
18	fk		admin	FRANC	static-data-fram	8144	2
19	limon		limit	dell-harri	limitd	24589	1
20	miud		market	lev.labs.t	miud	23334	7
21	mmichel	Marianne Michel	public	LABS-PC028	FKNAVMonitor.exe	1848	5
22	mmichel	Marianne Michel	public	LABS-PC028	FKNAVMonitor.exe	3072	4
23	ru	Risto Uronen	admin	LABS-PC060	FKTreasuryMonito	1464	2
24	ru	Risto Uronen	admin	LABS-PC060	FKTransactionBoa	1548	2

15.1.3 Database consistency check (Microsoft SQL Server and Sybase only)

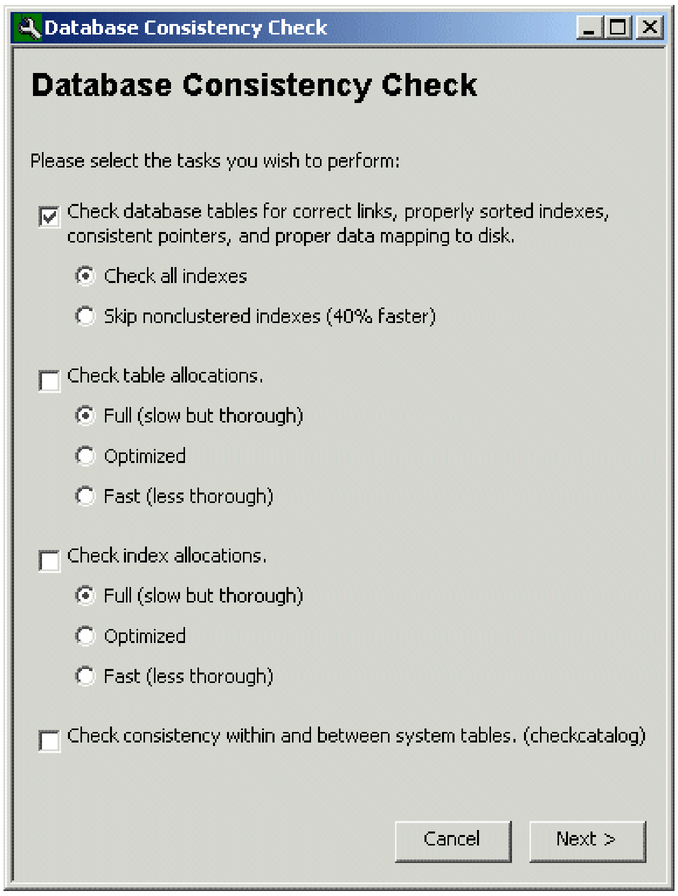
This application is a graphical interface to the dbcc program on the server, and is usually invoked through isql (or, for Sybase only, sqsh). Use this tool to diagnose and fix database problems. You can check database tables, check table allocations, check index allocations, and check the consistency within system tables. In addition, the table allocation and index allocation checks can be run in Fast mode (less thorough) or in Full mode (slow but thorough).

Note: Database consistency check tasks can be lengthy (several hours) and can have a negative impact on the performance of the other TRM applications. For this reason, it is a good idea to run it at the end of the business day so as not to disturb TRM users.

dbcc can be run on a separate server and database so as not to disturb the production environment (run it on a backup of the production database). It is also possible to set up a dbcc `checkstorage` routine that runs in the background. See http://techinfo.sybase.com/css/techinfo.nsf/DocId/ID=20266 for details.

To run the database consistency checker:

1. From the Admin KIT Database Administration folder, select Database Consistency Check:



Database Consistency Check

Please select the tasks you wish to perform:

[✓] Check database tables for correct links, properly sorted indexes, consistent pointers, and proper data mapping to disk.

- (●) Check all indexes
- ( ) Skip nonclustered indexes (40% faster)

[ ] Check table allocations.

- (●) Full (slow but thorough)
- ( ) Optimized
- ( ) Fast (less thorough)

[ ] Check index allocations.

- (●) Full (slow but thorough)
- ( ) Optimized
- ( ) Fast (less thorough)

[ ] Check consistency within and between system tables. (checkcatalog)

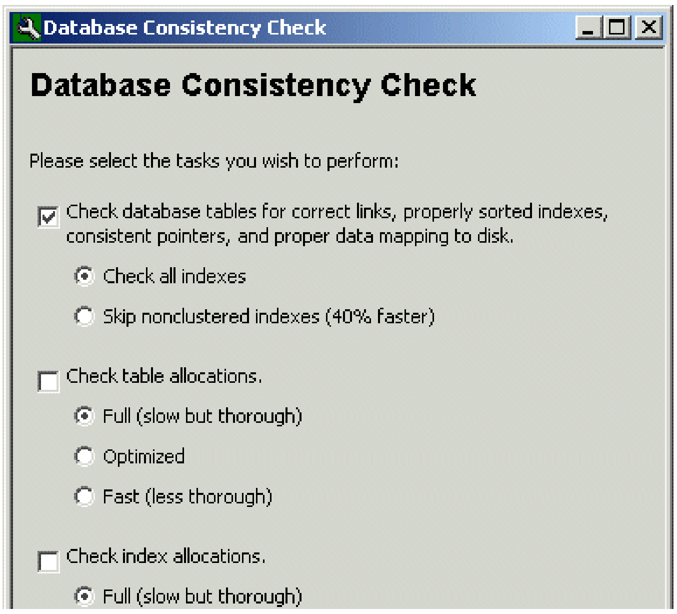
2. Your options are as follows:

Command	**What it does**
Check database tables	Checks that index and data pages are linked correctly, indexes are sorted properly, and all pointers are consistent. If you skip non-clustered indexes, you do not check the page linkage, pointers and sort order on non-clustered indexes. The linkage and pointers of clustered indexes and data pages are essential to the integrity of your tables. Others can easily be dropped and recreated, if necessary.
Check table allocations	Reports the amount of space allocated and used. For user tables, it fixes all of the allocation errors and can also fix pages that remain allocated to objects that have been dropped from the database. Errors found in system tables are reported but not fixed, since you must be in single-user mode to fix allocation errors in the system tables (usually performed by the system administrator).
Check index allocations	Provides integrity checks on all indexes in the database. For user indexes, it fixes all of the integrity problems it encounters, but it does not fix integrity errors on system indexes. These can be fixed by going into single-user mode (usually performed by the system administrator).

Command	What it does
Check catalog	Checks for consistency within and between the system tables found in a particular database. For example, it verifies that every type in *syscolumns* has a matching entry in *systypes*, every table and view in *sysobjects* has at least one column in *syscolumns*, and the last checkpoint in *syslogs* is valid.

3. Click **Next**.

   This displays the output page.



Database Consistency Check

Please select the tasks you wish to perform:

[✓] Check database tables for correct links, properly sorted indexes, consistent pointers, and proper data mapping to disk.

- [●] Check all indexes
- ○ Skip nonclustered indexes (40% faster)

☐ Check table allocations.

- [●] Full (slow but thorough)
- ○ Optimized
- ○ Fast (less thorough)

☐ Check index allocations.

- [●] Full (slow but thorough)

4. You can choose between receiving all output messages, which is quite verbose, or only receive messages about problems and whether or not these problems have been fixed.
5. You can also have the output sent to a file. This is convenient if you are running dbcc but are not the system administrator. The output file can then be e-mailed to the system administrator to resolve any problems you have encountered. To do so, ensure that the **None** switch is off, and use the Browse button to navigate to and name the output file.
6. Click **Begin** to start the tasks you requested.

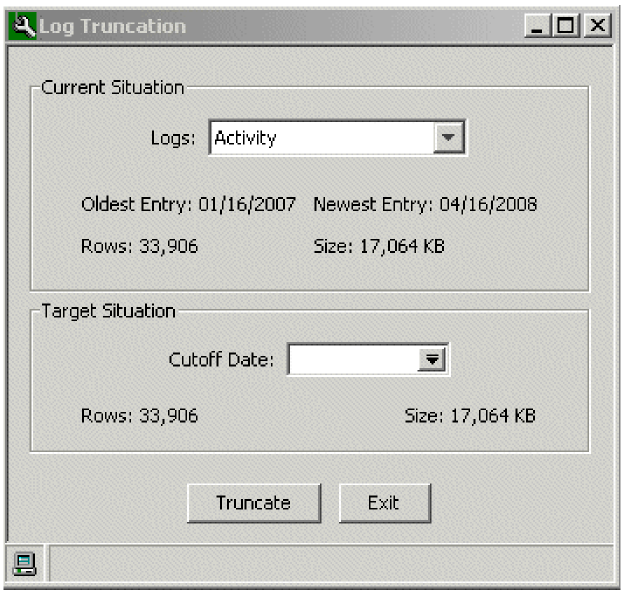
   An output console opens and a progress bar notifies you of how far dbcc has progressed in the check.

15.1.4 Log Truncation

Owing to the high number of transactions in the system, it will sometimes be necessary to truncate the log files in order to avoid using up all of the available space in your database.

Before running **Log Truncation**, you can check that this is necessary by running **Database Statistics** and checking the *ActivityLog*, *HistoryLog*, *CashflowLog*, and *TransactionsLog* tables. If you notice that some of them are getting too big, it may be time to truncate some or all of them.

1. From Admin Center's Database Administration folder, open Log Truncation:



Logs: Activity

Oldest Entry: 01/16/2007 Newest Entry: 04/16/2008

Rows: 33,906 Size: 17,064 KB

Cutoff Date:

Rows: 33,906 Size: 17,064 KB

2. In the **Logs** field, select the set of logs you want to truncate.
3. In the **Cutoff Date** field, select the date on which you want the logs to be truncated (meaning that all entries before this date will be removed from the log file).
4. If necessary, adjust the truncation date until you get an acceptable number of rows and size.
5. Click **Truncate**.

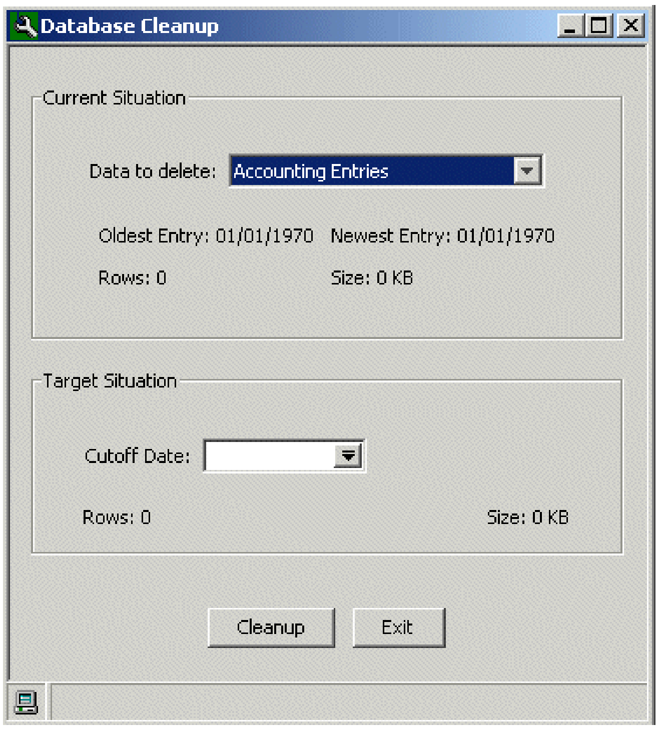
15.1.5 History Log

The start and stop of TRM application manager managed applications are logged to the History Log. The following fields are used:

Field	Description
object_id	Application
action	Start or Stop
key_1_string	Application tag where applicable
key_2_string	Application ID
key_3_string	Application CORBA IOR
key_4_string	Title of application
tag	Subset of application class. For internal TRM framework use
ID	Numeric identifier of application class. For internal TRM framework use.

15.1.6 Database Cleanup

This tool can be used to shrink your database and remove old and unwanted data from the system.



Data to delete: Accounting Entries

Oldest Entry: 01/01/1970 Newest Entry: 01/01/1970

Rows: 0 Size: 0 KB

Cutoff Date:

Rows: 0 Size: 0 KB

The selection list in the "Data to delete" field shows all the types of data that you can delete, for example custody balances, VaR data, transactions, and so on. If you select Transactions then extra fields will appear allowing you to specify a specific portfolio or market.

In the Cutoff Date field you specify the earliest date that you want this type of information stored for. When you then select the "Cleanup" button, any data before this date will be deleted.

15.2 Setting Application Manager timeout

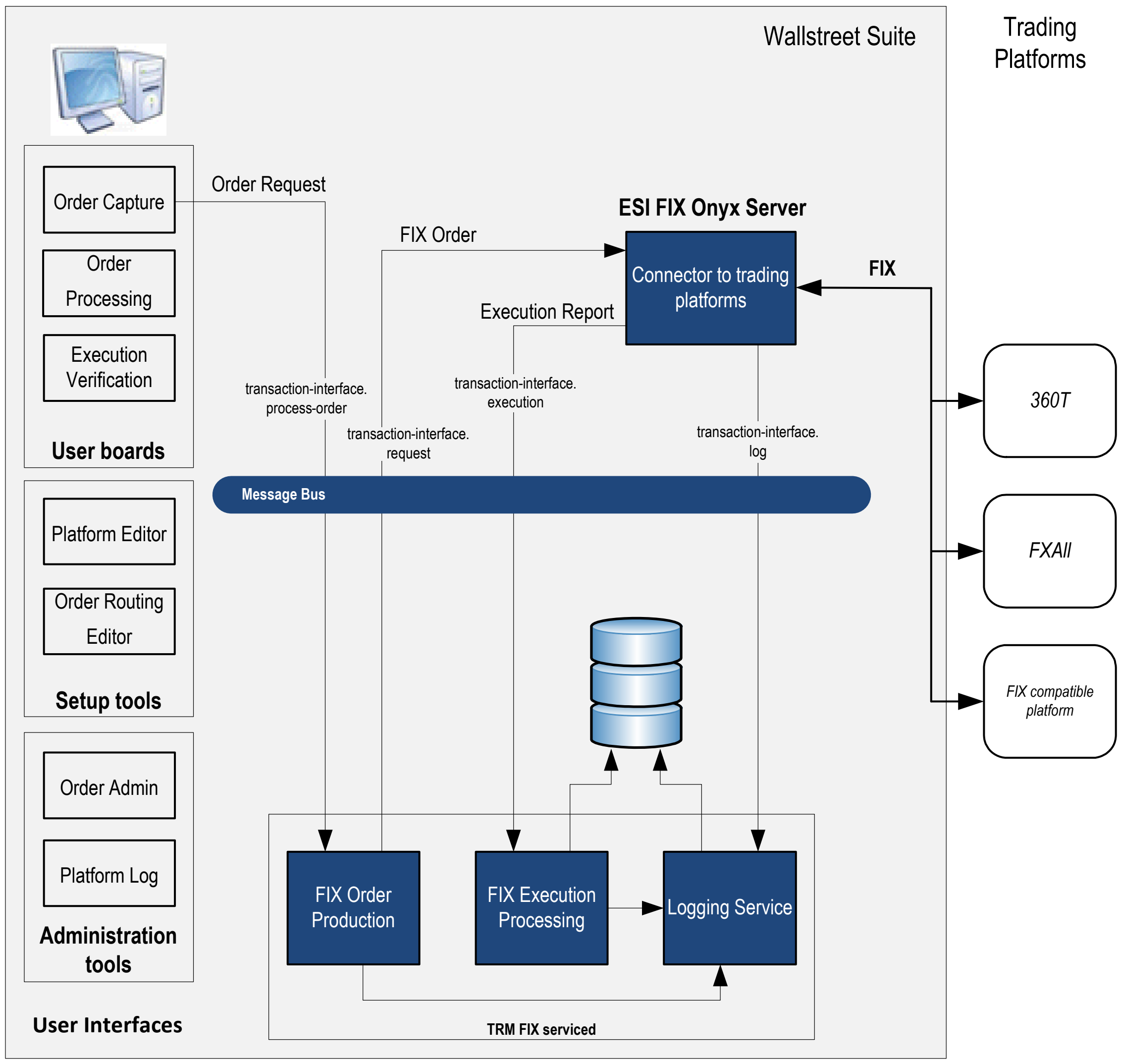
On slow systems, it could be helpful to increase the Application Manager timeout, which is the maximum time an application waits for another to respond. The default is 25 sec. The environment variable FK_APPLICATION_MANAGER_PARAMS fixes the command line parameters for Application Manager. A parameter --timeout can be set through this variable.

For example, to set the timeout to 50 seconds:

```
FK_APPLICATION_MANAGER_PARAMS=--timeout 50
```

Chapter 16 FIX trading platform interface

16.1 Components



The trading platform interface is a set of software components that process requests to and executions from external trading systems.

The client-side applications consist of:

- User boards:
  - Order Capture and Order Processing: to create and trigger the processing of outgoing orders
  - Execution Verification: to review the incoming trade executions
  - Setup applications: the Platform Editor and the Order Routing Editor.

- Administrative tools:
  - Order Admin: to manage exceptions in the order processing
  - Platform Log: to browse through the traces logged by all the components.

The server side components are:

- The order production engine
- The trade execution integration service
- The logging service
- The ESIFix connector to the external trading platforms.

16.2 Component interactions

The ESIFix Onyx server exchanges FIX messages with the trading platforms through specific APIs.

Communications between these components is through the message bus via a set of queues. This is how it works:

Queue	**Message content**	**Source**	**Consumer**	**Triggering event**	**Actions on reception**
`transaction-interface.process-order`	TRM transaction	Order Capture board	TRM Fix serviced	An order is accepted in the board.	An order is prepared for the trading platform
`transaction-interface.request`	Order	TRM Fix serviced	ESIFix server	Above mentioned message is received.	A FIX order is posted in the trading platform.
`transaction-interface.report`	Platform report	ESIFix server	TRM Fix serviced	Trading platform sends a report.	For an execution report, a TRM transaction is created. For a rejection report, the order is rejected. For an update report, the order is marked as uploaded in the platform.
`transaction-interface.process-cancel-request`	Cancellation request	Order Processing board	TRM Fix serviced	Order is cancelled in the board.	A cancellation request is prepared.
`transaction-interface.log`	Log entry	Any component	TRM Fix serviced	A component logs a processing event.	A log is saved in the database.

16.3 Workflow related to the trading platform

Both sets of client applications (order-related and execution-related boards) make use of a specific transaction flow.

The FIX serviced process also performs its tasks with the help of some flow operations.

All these operations are delivered with the standard transaction flow in the `order.py` setup file.

Here are the main operations in this workflow:

Operation	Caller	Result
COMMIT-ORDER	Order boards	Order is saved in the database.
ACCEPT-ORDER	Order boards	Order is send to TRM serviced.
CANCEL-ORDER	Order boards	Order is cancelled.
PLATFORM-FILL-ORDER	FIX serviced	Order is closed.
PLATFORM-REJECT-ORDER	FIX serviced	Order is rejected.
PLATFORM-CANCEL-ORDER	FIX serviced	Order is cancelled.
PLATFORM-COMMIT-EXECUTION	FIX serviced	Execution is created in TRM.
COMMIT-EXECUTION	Execution board	Execution is saved in the database.
ACCEPT-EXECUTION	Execution board	Execution is verified.
CANCEL-EXECUTION	Execution board	Execution is cancelled.

16.4 Site customization

The TRM Fix serviced process can be extended for specific client needs. For order processing and execution, you can add logic using a Python script.

A sample customization script called `processor.py` is delivered with the package in `%FK_HOME%\python\lib\Lib\site-packages` directory in the Windows distribution and in `$FK_HOME$/bin directory` in the other ones.

In this script a globally defined dictionary, processors, defines the mapping between the platforms and the Python processor classes.

A processing class may define three methods:

- `process_order`
- `process_execution_report`
- `process_cancel_request`.

These definitions are optional. If provided, they will be called when sending an order, receiving an execution, or sending a cancel request respectively.

16.4.1 process_order

An outgoing order structure is prepared by the Fix serviced process and passed to the `process_order` method before it is sent the ESIFIX Onyx server.

The signature of the method is:

```
def process_order(self, order_struct, order_txn)
```

Where:

- `order_struct` is the CORBA structure describing the order to send. Its type can be found in `%FK_HOME%\python\lib\Lib\site-packages\IDL\fix_types_idl.py`.
- `order_txn` is the TRM transaction object representing the order.

The method must return the structure when it modifies it. It may be omitted in the class definition.

16.4.2 process_execution_report

The signature of the method is:

```
def process_execution_report(self, report_struct, order_txn, exec_txn)
```

Where:

- `report_struct` is the CORBA structure describing the received execution. Its type can be found in `%FK_HOME%\python\lib\Lib\site-packages\IDL\fix_types_idl.py`.
- `order_txn` is the TRM transaction object representing the order if any.
- `exec_txn` is either empty or contains the execution as a TRM transaction.

This method is called twice upon reception of an execution:

- First with the execution structure and the order transaction. At this point, is it possible to enrich the execution structure.
- It is called again with the execution structure, the order transaction, and the execution transaction. At this point, the execution transaction may be complemented.

The method must return the structure when it modifies it. It may be omitted in the class definition.

16.4.3 process_cancel_request

The signature of the method is:

```
def process_cancel_request(self, request_struct, order_txn)
```

Where:

- `request_struct` is the CORBA structure describing the cancellation request to be sent.
- `order_txn` is the order transaction.

`process_cancel_request` is called before the request is passed to the ESIFIX Onyx server.

The method must return the structure when it modifies it. It may be omitted in the class definition.

Appendix A Utility programs and scripts

This appendix contains some of the utility programs and scripts used by TRM.

A.1 Scripts

The directory `$FK_HOME/sbin/<database>` contains some useful scripts for retrieving information from and manipulating information in the database. By default the scripts use normal TRM login information. If the user does not have a TRM login (on UNIX, `root` typically does not) it is better to use login parameters via `isql` or `psql`. (See *A.3 psql (Microsoft SQL Server and Sybase only)* on page 237.) Unless indicated, no special options apply.

The add-ons for each supported database type are as follows:

Script	Description	Sybase	Oracle	MSSQL
bcp	A bulk copy program for oracle		1	
copy-tables	Copies data between two tables.	1	1	
daily-maintenance	Delete old MarketQuotes data and updates statistics on tables	1	1	
drop-indexes	Drops all indexes from user tables	1	1	
drop-procedures	Drops all user-defined stored procedures	1	1	
drop-triggers	Drops all user-defined triggers	1	1	
extract-database	Extracts the sql code that builds the database	1		1
extract-flow	Extracts the sql code used for setting up the transaction flow	1	1	1
extract-menus	Extracts the sql code used for defining all user configurations of Transaction Manager, enter boards, etc.	1	1	1
extract-modes	Extracts the sql code used for setting up the transaction modes	1	1	1
nightly	Recreate indexes and rebuild procedures	1	1	
print-columns	Prints the definitions of all columns in all tables and views	1	1	
print-database	Prints the definitions of all database objects	1	1	

The scripts in `$FK_HOME/share/<database>/setup/` can also be used for manipulating the database.

A.2 Real-time diagnostic tools

Three executables can be used for checking the status of different parts of the real-time platform:

- `mb-status`
- `md-status`
- `md-trace`
- `lm-status`

They should be run in the appropriate Wallstreet Suite environment to produce correct results. They all run on both UNIX and Windows.

Use the `--verbose` (or `-v`) flag for more detailed output and `--help` (or `-h`) for the complete syntax.

A.2.1 Monitoring Message Bus status

Message Bus status can be monitored with `mb-status`.This uses the `FK_MQ_BROKER_JMX_URL` environment variable to connect to the Message Bus. Only ActiveMQ 4.1.1 is supported.

`mb-status` manipulates JMX data published by ActiveMQ, like jconsole. The main benefits of `mb-status` are:

- Absence of a graphical user interface (useful when only consoles are available).
- Combination of information on queue, topics and connection.

The scripts are as follows:

Windows:

```
%FK_HOME%\bin\mb-status.bat
```

Unix:

```
$FK_HOME/bin/mb-status.sh
```

Launch the script with the `-h` parameter to get the list of all possible options and their meanings.

An example of a command and resulting output is as follows:

```
mb-status -a -f v7syb
```

```
[fkadmin@atlas2 ~]$ mb-status

[NFO] Loading properties from file 'mbstatus.properties'

[NFO] Properties loaded:
```

#	NAME	VALUE
1	mbstatus.broker.name.id	org.apache.activemq:BrokerName=
2	mbstatus.default.broker.name	localhost
3	mbstatus.destination.name.id	,Destination=
4	mbstatus.object.type.id	,Type=
5	mbstatus.troubleshoot.destination.size.threshold	10
6	mbstatus.troubleshoot.memory.percent.usage.threshold	25
7	mbstatus.troubleshoot.refresh.period	60

```
[NFO] Passed options:
```

SWITCH	DESCRIPTION	VALUE
-s	JMX Unified Resource Locator (URL)	service:jmx:rmi:///jndi/rmi://dinar2.corp.trema.com:1899/jmxrmi
-x	JMS Unified Resource Locator (URL)	failover:tcp://dinar2.corp.trema.com:61816?wireFormat.tcpNoDelayEnabled=true

```
[NFO] Loading managed beans from URL
'service:jmx:rmi:///jndi/rmi://dinar2.corp.trema.com:1899/jmxrmi'

...
```

Note: Since version 7.3.0, browsing topics is now possible using the `-bt` parameter. The `-b` parameter (queue browsing) has been replaced by `-bq`. As topic browsing is based on subscription, it is now possible to visualize messages queued **before** `mb-status -bt` ... is launched. Only messages produced while `mb-status` runs are reported. This is more a message tracking feature than a real message browsing one.

A.2.1.1 Troubleshooting destinations

The `mb-status -t` switch allows you to detect destinations (queues or topics) that:

- Contain more than a certain number of pending messages (configurable via the `-Dmbstatus.troubleshoot.destination.size.threshold` property),
- Consume more than a certain percentage of memory (configurable via the `mbstatus.troubleshoot.memory.percent.usage.threshold` property)
- Contain at least one pending message that is not bound to any consumer.

A.2.2 md-status

This application shows all applications connected to the **mdsd**. It makes it possible to verify that all associated processes are up and running.

Sample output from `md-status`:

```
Message Delivery Service Status:
  Started at:              04/11/05 11:44 PM
  Total # of messages:     2815338
  Total # of connections:   80
  Current # of connections: 32

   ID  S      Host   Program   PID      User      In #     Out # Pending #
---------------------------------------------------------------------
    1    lev.labs. x-treasur  6710      tony         0    199397         0
    1    lev.labs. x-fx-pric  5776        tt         0         6         0
   74    lev.labs. x-fx-pric  5776        tt         0         6         0
   48    lev.labs. x-treasur  6710      tony         0    199397         0
    7    lev.labs.      misd 11814   fkadmin    860855         0         0
    2    lev.labs.    transd 15305   fkadmin        19        12         0
    4    lev.labs.      micd 15304   fkadmin   1633297    669027         0
    5    lev.labs.      ssld 15368   fkadmin     28902         0         0
    6    lev.labs.      misd 15427   fkadmin    292228         0         0
   12    lev.labs. x-transac  9006     risto         0     56942         0
   13     HP-RISTO FKApplica   322     risto         0         0         0
   22    lev.labs. x-transac 10639       guy         0     37609         0
   23    lev.labs. x-transac 10747      said         0      3948         0
   26    HP-RFEVRE FKApplica   257    rfevre         0         0         0
   27    HP-RFEVRE FKTransac   332    rfevre        14        32         0
   28    HP-RFEVRE FKPortfol   496    rfevre         2         5         0
   29    HP-RFEVRE FKReport.   384    rfevre         0         6         0
   30    LAPTOP-AS FKApplica   330      asap         0         0         0
   31    HP-RFEVRE FKAccount   345    rfevre         3         6         0
   32     HP-LYNNE FKApplica   268     lynne         0         0         0
   33     HP-TOMMY FKApplica   284        tt         0         0         0
   35        FRANC FKApplica  1458  dfraioli         0         0         0
   36        FRANC FKTransac   939  dfraioli         0        12         0
   39        FRANC FKReport.   955  dfraioli         0     12493         0
   40     HP-RISTO FKInstrum   626     risto         0        11         0
   42     HP-RISTO FKGapSetE   214     risto         6         0         0
   43     HP-RISTO FKReferen   484     risto         0         1         0
   44        HP-RU FKApplica   370        ru         0         0         0
   45        HP-RU FKClientE   327        ru         3         6         0
   46        HP-RU FKClientG   260        ru         2         0         0
   52    lev.labs. md-status 16222     lynne         0         0         0
```

A.2.3 md-trace

This application shows all updated quotes and transactions through the real-time platform.

Option	Description
`-v` `--verbose`	Show contents of the messages
`-a` `--show-all`	If verbose is on, show null fields
`-f` `--filter`	Filter messages as <type>&<source>&<subject>

Sample output from `md-trace`:

```
At 2005-04-12 09:06:24.553 from `MIS', subject `USD/TRL'
   type `IDL:trema.com/Finance_KIT/Market_Quote:1.0', size 824
At 2005-04-12 09:06:24.568 from `MIS', subject `DKK CIBOR'
   type `IDL:trema.com/Finance_KIT/Market_Quote:1.0', size 832
At 2005-04-12 09:06:24.569 from `MIS', subject `DKK YIELD'
   type `IDL:trema.com/Finance_KIT/Market_Quote:1.0', size 832
At 2005-04-12 09:06:24.576 from `Micd', subject `DKK ZERO'
   type `IDL:trema.com/Finance_KIT/Market_Quote:1.0', size 840
At 2005-04-12 09:06:24.616 from `ssld', subject `Market-Info'
   type `IDL:trema.com/Message_Delivery/Notification:1.0', size 740
At 2005-04-12 09:06:24.617 from `MIS', subject `USD ZERO MRKT'
   type `IDL:trema.com/Finance_KIT/Market_Quote:1.0', size 840
At 2005-04-12 09:06:24.621 from `ssld', subject `Market-Info'
   type `IDL:trema.com/Message_Delivery/Notification:1.0', size 740
At 2005-04-12 09:06:24.621 from `ssld', subject `Market-Info'
   type `IDL:trema.com/Message_Delivery/Notification:1.0', size 740
At 2005-04-12 09:06:24.622 from `ssld', subject `Market-Info'
   type `IDL:trema.com/Message_Delivery/Notification:1.0', size 716
At 2005-04-12 09:06:24.623 from `MIS', subject `JPY LIBOR'
   type `IDL:trema.com/Finance_KIT/Market_Quote:1.0', size 832
lm-status
```

This application shows all limits currently connected to the limit server.

Option	Description

`-s arg`
`--server arg`
	Limit server(s) to use

`-i arg`
`--id arg`
	Limit IDs to show

Run in the appropriate environment, the program `lm-status` will show the IDs of the limits for the limit server. If limit users are defined, the switch `-limit-user <USERNAME>` should be used.

Example output from `lm-status`:

```
ID                                                  Name
----------------------------------------------------------------------
FX-LIMIT                                                   Forex Limit
IR-LIMIT                           Limits on Interest Rate products
IR-LIMIT-2                   Second Limit on Interest Rate products
VAR LIMIT                                                    VaR Limit
```

A.3 psql (Microsoft SQL Server and Sybase only)

`psql` is an interactive SQL parser to send commands to the SQL Server and to display the results. It behaves very similarly to `isql` which is distributed with the Sybase SQL Server.

`psql` is written in the perl command language, and requires the `syperl` program, which contains a DB-Library interface to communicate with the SQL Server.

A.3.1 Options

The following options are recognized:

-e	Echo the command before sending it.
-n	Do not display any prompt in interactive mode.
-v	Just print versions of the software, and exit. The versions printed are the ones of **perl**, **syperl**, and **psql**.
-c *cmdend*	Set the command terminator to cmdend. The default is go. cmdend should not contain any SQL reserved words or characters that have special meaning to the operating system.
-h *headers*	The number of rows to print between column headings. The default is to print headings only once for each set of query results.
-w *columnwidth*	Set the screen width to columnwidth. The default is 80 characters.
-s *colseparator*	Set the character to show between the columns. The default is blank. Only the first character of colseparator is used.
-t *timeout*	The number of seconds before a command times out. If no timeout is specified, a command runs indefinitely; however, the default timeout for logging in to SQL Server is 60 seconds.
-m *errorlevel*	For errors of the severity level specified or higher only the message number, state, and error level are displayed. For errors of levels lower than errorlevel, nothing is displayed.
-H *hostname*	Specify the hostname to tell to the SQL Server. The default is whatever is returned by hostname(1) or equivalent command.
-U *username*	Log in as username rather than the system login name.

-P *password*	Specify the password. If not supplied, **psql** prompts for the password.
-Z	Allows login without password.
-I *interface*	Specify the name of the interfaces file. The default is to use system dependent interfaces file, which is typically **$<DATABASE>/interfaces**.
-S *server*	Specify the server name to connect to. The default is to use **$DSQUERY** environment variable, if set.
-D *database*	Specify the database name to connect to.
-p	Show name of current database as prompt.
-l *filename*	Use login information in **$HOME/.psql/filename**. The file format is *server/username/password/database*

A.3.2 Commands

When reading commands interactively, `psql` understands many commands to manipulate the SQL command buffer. When not in interactive mode, the only command that is understood is *cmdend*, which is "go" if nothing else is specified in the *-c* command line option. Commands are, in general, understood only if they are at the beginning of line. The only exception is *\g*, which is understood only at the end of a command line.

exit, or quit	Exit psql immediately.
read filename	Read the contents of filename to the SQL command buffer, and print it.
reset	Wipe out the SQL command buffer, and start again.
!! command	Execute command using the default shell.
vi	Edit the SQL command buffer with an editor, and reread the commands after editing. The editor to use is taken from environment variable EDITOR if set, or VISUAL if set, or use the default vi.
cmdend	Send the commands to the SQL Server and display the results.

A.4 Debugging

A.4.1 Tracing accesses to the database

You can trace accesses made by TRM end-user or real-time applications to the database.

To do this, first set the environment variable `DATABASE_DEBUG` to 1. See the examples below.

A.4.1.1 Tracing an end-user application (Windows)

1. Open a Windows Command Prompt session on the TRM Client server.
2. Set the environment variable:
```
set DATABASE_DEBUG=1
```
3. Change to the directory where the end-user applications reside:
```
cd %FK_HOME%\bin
```
4. Run the application you want to trace:
```
FKActivityManager.exe | more
```

The trace information is displayed in the Command Prompt session.

A.4.1.2 Tracing a real-time application (UNIX)

1. Change to the directory where the real-time applications reside:

   ```
   cd $FK_HOME/sbin
   ```

2. Use the eval command to set your environment (replacing the example values given below):

   ```
   eval `/usr/wss/v7/bin/environ -e fkprod_ora -h /usr/wss/v7 -f`
   ```

3. Set the environment variable:

   ```
   export DATABASE_DEBUG=1
   ```

4. Run the application you want to trace:

   ```
   ./mdsd
   ```

A.4.2 Tracing TRM messages (Windows)

You can trace TRM messages by launching a TRM end-user application with trace parameters or by setting environment variables. These specify the trace level to be used, and the path and name of the trace log file.

A.4.2.1 Setting the trace level and log file output

A.4.2.1.1 Setting the trace level

You can set the trace level in either of two ways:

- Use the `--trace-level <trace_level>` parameter, like this:

  ```
  <application>.exe --trace-level 1 <other options>
  ```

- Set the environment variable `FK_TRACE_LEVEL` before launching the application:

  ```
  set FK_TRACE_LEVEL=1
  ```

The available trace levels are as follows:

Trace level	Description
0	Exception or other error condition, such as invalid configuration
1	Often used to trace method entry/exit points
10	Used for more frequent information or debug information
20	Provides verbose debug information

A.4.2.1.2 Setting the trace output

You can specify the output log file generated by the trace in either of two ways:

- Use the `--trace-output <path_filename>` parameter, like this:

  ```
  <application>.exe --trace-output C:\temp\logs\editor_trace.log <other options>
  ```

- Set the environment variable `FK_TRACE_OUTPUT` before launching the application:

```
set FK_TRACE_OUTPUT=C:\temp\logs\editor_trace.log
```

Note: Either `--trace-level` or `FK_TRACE_LEVEL` should be set to ensure an output in the log file.

A.4.2.1.3 Example

You can trace the Client Editor as follows:

1. Open a shell from Application Manager.
2. Run the application:

```
FKSDEditor.exe --fixed-entity --layout Client\Client.xml --trace-level 10
--trace-output C:\temp\logs\editor_trace.log
```

A.4.2.2 Trace prefixes

You can trace a specific module by prefixing the module name. For example, to trace the comKIT Transaction service use:

```
--trace-level CK/Transaction=10 --trace-output C:\temp\logs\editor_trace.log
```

Trace prefixes used in TRM include the following:

A.4.2.2.1 TRM servers

TRM feature	Prefix
Activity Manager Daemon	Activity
Loan Monitor Daemon	LMD
Limit Daemon	LMSD
Message Delivery System Daemon	MDSD
Market Information Calculation Daemon	MICD
Treasury Monitor Daemon	TMD
Message Manager Daemon	messaged
Reuters Source Sink Library Daemon	ssld

A.4.2.2.2 TRM modules

General

TRM feature	Prefix
Call Money	CM
Message Manager	DM
Hedge Manager	HM
Loan Monitor	LM
Payment Allocation	PA
Price Manager	PM
Treasury Monitor	TM
Rate Monitor	FK::monitor::rate-board
Numerix	FK::Numerix
ODBC	FK::ODBC
Oracle	FK::Oracle
Python	FK::Python
Simulation	FK::simulation
Sybase	FK::Sybase

Pricing

TRM feature	Prefix
pricing/annuity/annuity	pricing/annuity
pricing/yield/yield	pricing/bond
pricing/goal-seeker	pricing/goal-seeker
Performance Monitor	service/performance-monitor
pricing/spread-solver	pricing/spread-solver
pricing/spread-to-benchmark	pricing/spread_to_benchmark

Financials

TRM feature	Prefix
Volatility Interpolation/Bond_Interpolation	financial/volatility-interpolation/bond
Volatility Interpolation/Cap_Interpolation	financial/volatility-interpolation/cap
Volatility Interpolation/Caplet_Interpolation	financial/volatility-interpolation/caplet
Caplet Stripper.cc	financial/volatility-surface/caplet-stripper
Volatility Interpolation/Swap_Interpolation	financial/volatility-interpolation/swap
Yield Interpolation	financial/yield-interpolation

Actions

TRM feature	Prefix
action/pricing/eq-option/eq_option	action/pricing/eq-option
action/pricing/fx-option/fx_option	action/pricing/fx-option
action/pricing/swap-option/swap_option	action/pricing/swap-option

Valuation

TRM feature	Prefix
valuation/dual-currency	dual_currency_values
valuation/bond-future-option	ir-option-pricer
valuation/ctd	valuation/ctd
valuation/expression	valuation/expression
valuation/ir-option/pricer	valuation/ir-option/pricer
valuation/option	valuation/option
valuation/option/pricer	valuation/option/pricer

ComKIT

TRM feature	Prefix
Payment Service	CK/Payment
Static Data Service	CK/Static-Data
Transaction Service	CK/Transaction

Appendix B Object permissions

This appendix contains details for the Permission Editor, used to grant and revoke access to TRM objects.

B.1 List of TRM permissions

The following table contains a complete list of all the permissions that can be set on objects in TRM:

Permission	Description
ACCEPT	By default, TRM is configured so that you must accept generated payments before they are transferred. This moves the state of the payment forward in the payment flow.
ACTIVITY	Run activities. Usually batch users only.
ALL	All permissions
CANCEL	Cancel payment allocations
CREATE	Permission to create entities
FIXING	Not used.
FREEZE	Permission to freeze cashflows
MATCH	Match transactions
MIRROR	Mirror new transactions
MODIFY	Permission to modify entities
NET	Payments which have the same payment date, currency and payment instructions can be combined into a single payment, thereby simplifying payment transfer. Combining payments in this way is known as 'netting'. It is also possible to separate previously netted payments into their original components. This process is known as 'unnetting'. During payment generation of payments, some payments are netted automatically according to the rules created in the Netting Rules page in the lower part of Client Editor, see Assigning Netting Rules in *Setting Up TRM*. However, it is also possible to net payments after payments have been generated. In order to be able to net payments, the payments must have the following data in common: • All counterparty fields • Currency • Value date • Bank account information.
PACKAGE	Package transactions
READ	Permission to read entities
RECONCILE	Permission to validate between balances and statements.
REJECT	This moves the state of the payment backwards in the payment flow allowing it to reappear in the Process mode.

Permission	Description
REJECT-2	Reject alternative payment advices.
REMOVE	Permission to remove entities.
REPORT-FINAL	Reject NACV reports from state FINAL.
SELF-VERIFY	Self-verify object modifications.
SPLIT	With TRM, you can split one generated payment into several physical settlements. There are several reasons for doing this: you may wish to break up a particularly large payment into smaller settlements, or the portfolio owner or counterparty wishes a single payment to be made in several different accounts. Split payments can be modified and moved backwards and forwards in the payment flow. However, the cashflow information is held within the cashflow of the original payment. Furthermore, you cannot net and unnet split payments.
STATE-FINAL	Accept/reject transactions from FINAL states.
STATE-OPEN	Accept/reject transactions from OPEN states.
STATE-REJECTED	Accept/reject transactions from REJECTED states.
STATE-VERIFY	Accept/reject transactions from VERIFY states.
STATUS-LIMIT-VIOLATI ON	Update (set/clear) LIMIT VIOLATION status.
STATUS-OTHER	Update (set/clear) other transaction status.
STATUS-RATE-REASON	Update (set/clear) RATE REASONABILITY status.
TRANSFER	When you transfer payments, TRM creates a payment file that can then be used to execute the transfer in SWIFT or in some other payment system.
UNNET	Payments which have the same payment date, currency and payment instructions can be combined into a single payment, thereby simplifying payment transfer. Combining payments in this way is known as ‘netting’. It is also possible to separate previously netted payments into their original components. This process is known as unnetting. During payment generation of payments, some payments are netted automatically according to the rules created in the Netting Rules page in the lower part of Client Editor, see Assigning Netting Rules in *Setting Up TRM*. However, it is also possible to net payments after payments have been generated. In order to be able to net payments, the payments must have the following data in common: • All counterparty fields • Currency • Value date • Bank account information.
UPDATE	Permission to update entities

Appendix C Unix operations

C.1 Unix operations

C.1.1 TRM Server Passwords

Since all TRM server (real-time) processes connect to the TRM database, each component must be able to supply both username and password when they connect. The most convenient way to do this is to use hard-coded passwords that are stored in a file.

The permissions on this file are Read-only for everyone except the `fkadmin` Unix ID. If permissions are incorrectly set, unauthorized users might be able to change the passwords: some sites have a policy against this kind of hard-coded passwords.

To overcome the problem, TRM can store the necessary passwords in shared memory. The basic concept of shared memory information is that an individual user's shared memory cannot be accessed by another user. This allows, for example, the user `fkadmin` to create a shared memory region with all necessary passwords that can be accessed later by the user `fkadmin`, but cannot be accessed by anyone else.

C.1.1.1 Passwords for server processes

To avoid using the hardcoded passwords in the `$FK_HOME/etc/rc` script, proceed as follows:

1. Set up the login names for the real-time processes as environment variables.
2. Write the passwords to shared memory.

C.1.1.1.1 Setting up the login names as environment variables

The `$FK_HOME/etc/rc` script checks whether the environment variables used for login names, for example `FK_MICD_LOGIN`, already exist when the script is executed. If the variable exists, it is assumed set to the correct login name and that the password can be retrieved from shared memory. If the variable does not exist, it will be set to the default `login/password` values as specified in the `$FK_HOME/etc/rc` script.

To set these environment variables, use the standard environment definition, that is the `default-site-env.pl` script. Definitions for the daemons are:

```
$ENV{FK_LIMITD_LOGIN} = "limon";

$ENV{FK_MICD_LOGIN} = "batch";

$ENV{FK_TRANSD_LOGIN} = "batch";

$ENV{FK_TICKET_LOGIN} = "ticket";

$ENV{FK_ACTIVITY_LOGIN} = "batch";
```

You can set these variables on only UNIX. On Windows, set the `FK_USER` variable from the Command Prompt.

C.1.1.1.2 Writing the password to shared memory

There are two main methods of writing the password information to shared memory, interactively or automatically:

Interactive method

Execute the script `$FK_HOME/etc/login` as the user for whom you want to create the shared memory passwords. It will prompt for the Sybase logins and passwords for the real-time processes (`limon`, `batch`, and `ticket`, as shown in the section above) and the `dbo` (`fk`) in order to create the shared memory information.

With this method you will not need to store the passwords in any file.

Note: Shared memory is cleared when the machine is rebooted, which requires you to redo this procedure after each reboot of the machine.

Automatic method

The `$FK_HOME/etc/rc.login` script will create the shared memory information after sourcing the passwords from a (normally hidden) file. There are four available filenames that can be used:

```
$FK_HOME/etc/.fk-login

$FK_HOME/etc/.fk-login.$FK_IDENT

/etc/opt/fk/fk*/.fk-login

/etc/opt/fk/fk*/.fk-login.$FK_IDENT
```

For best security, it is recommended to install a local `/etc/opt/fk/fk*/.fk-login` file on the computer where the server processes are running.

The file should be built up with four colon-separated columns with the syntax:

```
<SYBASE server name>:<database name>:<username>:<password>
```

- The first column is the Sybase SQL server name (SYBASE), or '*' if all servers.
- The second column is the database name, or '*' if all databases.
- The third column is the user name, or '*' if for any username.
- The fourth column is the password.

It is recommended that the Sybase SQL server name is specified, to avoid confusion if another server is installed. The server and database names are used only for lookups, so a specified name has higher precedence than '*'. The user name can be '*' if the file is used only by one user, and the user name has been specified somewhere else.

It is highly recommended to include the `$FK_HOME/etc/rc.login` script for the relevant environment in the automatic boot scripts of the server, so the shared memory passwords are always available. The script must be executed by the same user as the one that is to execute the server processes.

Make sure that the passwords are created before you attempt to start the real-time processes.

C.1.1.2 Sample .fk-login file

A sample `.fk-login` file can be found in the `/usr/trema/fk/etc` directory, with the file name `hardcoded-dot-fk-login`. It contains the following definitions

```
# For market information updates.
FKDB:*:miud:rBah898
# For printing trade tickets and confirmations.
FKDB:*:ticket:bDtXmo
# For most batches in the system, like activity manager.
FKDB:*:batch:TarHtM
# For the limit management server.
FKDB:*:limon:Lx1Lx2
# The nightly batch also needs the database owner password
# to update statistics and possibly to build procedures.
FKDB:*:fk:fkfkfk
```

and can be run by using the following command:

```
su - fkadmin -c /usr/trema/fk/etc/hardcoded-dot-fk-login
```

C.1.1.3 Checking shared memory

It is possible to check if the shared memory contains information with the `ipcs` command.

```
ipcs -m -a
```

This command prints information about shared memory.

To remove information from shared memory, use the `ipcrm` command:

```
ipcrm -mx
```

where `x` is the shared memory segment (ID) to be removed (found previously with the `ipcs -m -a` command).

C.1.2 Startup scripts

This section contains a description of the TRM startup scripts, located in the directory `$FK_HOME/etc/`.

Script	Description
`rc`	This script starts all the real-time processes. It is possible to specify which programs to start by giving names of programs after arguments. If nothing is given, the following list will be used: "`mdsd micd transd limitd site ssld`". To start, for example, the `miud` and `micd` in the environment `test`, enter: `$FK_HOME/etc/rc -e test miud micd`
`rc.limitd`	This script starts the limit server limitd only.
`rc.local.add`	This script runs `rc.sybase`, `rc.login` and `rc`.
`rc.login`	This script creates the shared memory information after sourcing the passwords from a (normally hidden) file.
`rc.mdsd`	This script starts the `mdsd` only.
`rc.sybase`	This script can be used to automatically start a Sybase SQL server.
`rc.names`	This script starts the CORBA name server, `names`. It cannot be run by `root`.
`rc.comkitd`	This script starts the comKIT process and you can specify the services to be started from: amount-event, transaction-position, performance, data, static-data, payment, call-money.
`rc.mirror`	Starts mirror loop.

C.1.3 Scheduled processes (crontab)

`Crontab` is a UNIX command that manages the `crontab` file. The `crontab` file is read by the `cron` process to execute programs in the background. There are separate `crontab` files for different users.

In TRM, the `fkadmin` user should execute all server and scheduled processes. The `crontab` file can be listed with `crontab -l` as user `fkadmin`.

The first five fields consist of asterisks or numbers. They are separated by spaces or tabs and represent:

- Minute (0-59)
- Hour (0-23)
- Day of the month (1-31)
- Month of the year (1-12)
- Day of the week (0-6 with 0=Sunday).

If an asterisk is given for a certain field, that means "every," for example every minute or hour.

Within each field, several values can be entered and grouped by commas or minus signs. A sample `crontab` file is shown below.

```
#
2,12,22,32,42,52 * * * * /usr/wss/v7/sbin/print-pending-requests
#
0 2 * * * /usr/wss/v7/sbin/sybase/nightly
#
5,20,35,50 * * * * /usr/wss/v7/sbin/ssl/reconfigure
```

- The `print-pending-requests` script

  ```
  2,12,22,32,42,52 * * * * /usr/wss/v7/sbin/print-pending-requests
  ```

  This script runs every 10 minutes. It checks if there are any trade-tickets or confirmations to print (or send).

- The `nightly` script

  ```
  0 2 * * * /usr/wss/v7/sbin/sybase/nightly
  ```

  This script carries out maintenance in the database every night at 2am.

- The `reconfigure` script

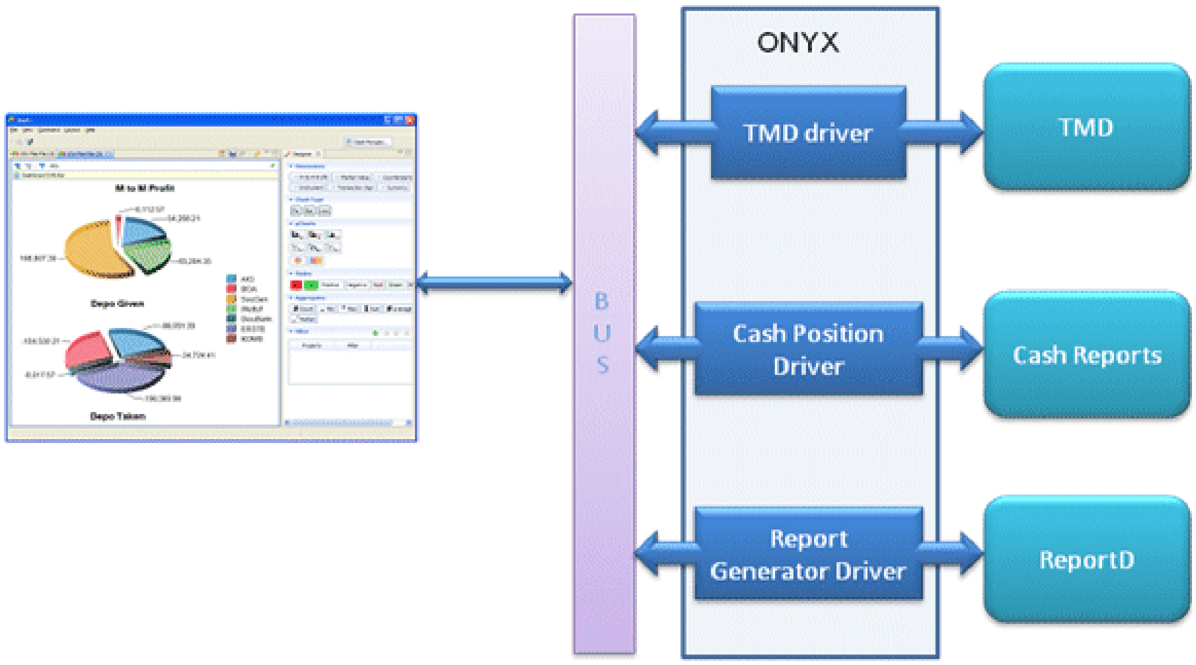
  ```
  5,20,35,50 * * * * /usr/wss/v7/sbin/ssl/reconfigure
  ```

  This script updates the configuration file for the market information links every 15 minutes.

Appendix D Configuring Dashboard

D.1 Introduction

The overall architecture of the Dashboard application is shown below.



The client application retrieves data from data source adapters provided as Onyx services. The adapters act as a translator between the Dashboard and the underlying data source. The adapters can be configured with number of properties specified in the `etc/onyx/properties/odabridge.properties` file.

The properties are assigned appropriate defaults when installed by Suite Installer.

Properties

```
#The queue name for the communication between client and the onyx data source
adapters

odabridge.queue=${wss.env.name}.trm.odabridge.service.queue
```

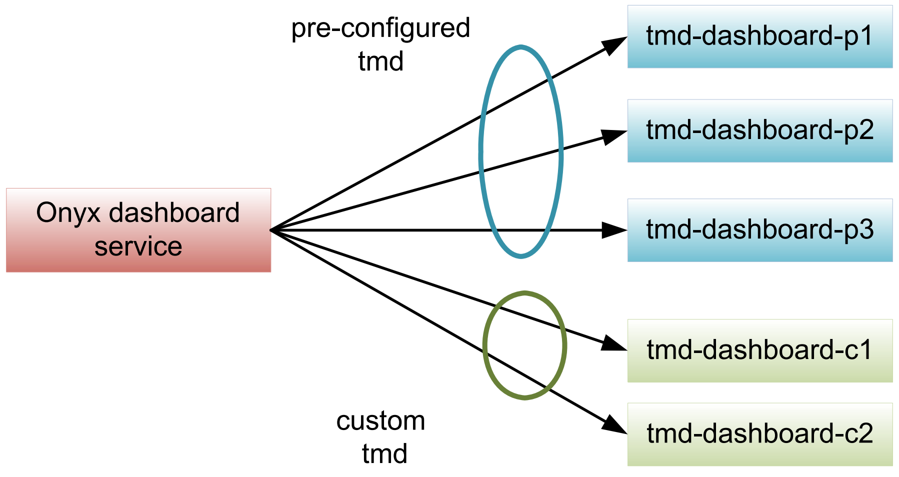
D.2 Data sources configuration

D.2.1 Treasury Position

Treasury position data is provided by a tmd process of which there are two types:

1. Pre-configured tmd which is started by specifying an XML configuration file that describes the existing treasury positions and pages.
2. Flexible tmd which allows you to access to all saved treasury positions and pages.

There can be multiple tmd processes of either type running, and, provided that their service names have a specific prefix, the Dashboard will automatically connect to them through the Onyx service. The prefix in the naming convention described above is specified in the `etc/onyx/properties/odabridge.properties` configuration file. An example of the tmd process configuration is shown below.



Properties

```
biz.wss.oda.tmd.orb_context=${FK_ORB_CONTEXT}

# CORBA object reference name - defaults to tmd-dashboard

biz.wss.oda.tmd.service_name=${suite.installer.biz.wss.oda.tmd.service_name}
```

D.2.2 Cash Management Reports

The Cash Management Reports adapter retrieves data from WebSuite's Cash Management module. The `odabridge.properties` file contains the URL to which the adapter connects.

Properties

```
biz.wss.oda.wsconector.end_point=${suite.installer.cmm.url}/iws/CaDashboardWebService
biz.wss.oda.wsconector.message_type=dashboard
```

D.2.3 Report Generator

The Report Generator adapter retrieves data by executing the reportd process. Only the layouts accessible from the Onyx service (server installation) in the folder specified by the property (see below) are available for Dashboard application.

Properties

```
biz.wss.oda.reportd.report_home=${FK_HOME}/bin

biz.wss.oda.reportd.types_home=${FK_HOME}/share/reports/types
biz.wss.oda.reportd.layout_home=${FK_HOME}/share/reports/layouts/Dashboard

biz.wss.oda.reportd.orb_context=${FK_ORB_CONTEXT}
```

D.2.4 Limits

The Limits adapter retrieves data by connecting to a standard limitd process.

Properties

```
biz.wss.oda.limitd.orb_context=${FK_ORB_CONTEXT}

biz.wss.oda.limitd.service_name=${suite.installer.biz.wss.oda.limitd.service_name}
```

D.2.5 Dashboard client application

The client application can be used with various data sources. It is possible to restrict the availability of a data source in the client application with the following variables (defaults provided):

```
biz.wss.dashboard.sources.tmd.TMDDashboardDataSource.visibility=true

biz.wss.dashboard.sources.cmm.CashPositionSource.visibility=true

biz.wss.dashboard.sources.csv.CSVDataSource.visibility=false

biz.wss.dashboard.sources.reportd.ReportDDashboardDataSource.visibility=true
```

These properties can be specified either as environment variables of the client installation or directly in the `${FK_HOME}/java/Jupiter/RCPSuite.bat` file (`-D` *<properties>*).

The client application can also be configured to start with a predefined layout. You can set the following property to the name of the layout to initialize the Dashboard when started:

```
rcp.rcpextension.usersetup.predefined-layout=My Dashboard 1
```

If the property is not specified, then the layout used last time the application was opened for the current user will be used. If the property is set to none, the Dashboard application will be opened with the initial layout (empty Dashboard and Designer views).

Appendix E Adding valuation modes

When configuring valuation, Wallstreet Suite provides three valuation modes: Default, Theoretical, and Benchmark. To find out how these are used, search for valuation mode in the other Wallstreet Suite documentation, starting with the *TRM Instruments: Processing and Calculations Guide*.

You can add a valuation mode by inserting a row in the `ValuationMode` table, or by adding the corresponding information to the data file. The standard data is as follows:

```
&insert ("id" => 0,
         "modes" => 1,
         "name" => 'Default',
         "DELETE" => [ "id" ]);
&insert ("id" => 1,
         "modes" => 2,
         "name" => 'Theoretical',
         "DELETE" => [ "id" ]);
&insert ("id" => 2,
         "modes" => 4,
         "name" => 'Benchmark',
         "DELETE" => [ "id" ]);
```

To add a new valuation mode, choose a `name`, an `id` number that is different from the currently defined ones, and a `modes` number (a power of 2, whose exponent must be smaller than 32) that is not already being used by another mode.

For example, to add a mode called "Standard" you could use:

```
&insert ("id" => 3,
         "modes" => 8,
         "name" => 'Standard',
         "DELETE" => [ "id" ]);
```

Appendix F External valuation

External Valuation is a valuation feature that can be used to replace the key-figures calculated by TRM valuation with key-figures calculated outside TRM.

Attaching the **External Valuation** feature to an instrument, and setting the **External Key-Figures** cashflow attribute (in a transaction with that instrument), triggers the following behavior when valuation is performed for the transaction:

- The main valuation feature (e.g. **Price Valuation** or **Generic IR Valuation**) calculates all key-figures as usual.
- The GetExternalFigures stored procedure is called with the valuation (figure) date and the cashflow ID of the cashflow having the attribute.
- The stored procedure returns new values for certain key-figures, which will replace the key-figure values calculated by the main valuation feature.

The GetExternalFigures stored procedure should be customized on site as required, in order to read the figures from a table to which externally-calculated figures are imported. The key-figures returned by the stored procedure need to be referred to using the system name of the key-figure. The file `FK_HOME\etc\fk-figures\key-figures.xml` names the key-figures that can be replaced.

Note: Only the key-figures provided directly by valuation can be replaced, and not the key-figures that are derived from other key-figures in the XML file. Derived key-figures will be impacted if the key-figures used in the calculation of the derived figures are replaced.

Also, the **Filtered Valuation** feature may be used together with the **External Valuation** feature should a whole group of TRM key-figures need to be silenced using the **No Position**, **No Valuation**, and **No Risk** cashflow attributes.

Filtered Valuation is imposed in the end of the valuation; this filtering affects key-figures coming from the main valuation feature as well as the **External Valuation** feature.