Services Standard Build User Guide

SSB/SSD v3, February 2017

This document is intended to be a user-friendly guide explaining how to set-up the Services Standard Build, as well as its applications.

Document Revision History

Revision Date	Written/Edited By	Comments
February 2013	Blake Bowen	Initial Creation (Current IdentityIQ version: 6.0)
March 2013	Tina Timmerman	1st Revision
April 2013	Brendon Jones	2nd Revision
June 2013	Blake Bowen	Final Revision for SSB 1.2, posted to Compass
August 2013	Blake Bowen	Updated Compass links to new Compass
January 2015	Blake Bowen	Updated with version 1.5 features, new Compass links, and further clarification.
June 2016	Blake Bowen	Updated Compass link to point to SSD get started page
September 2016	Paul Wheeler	Updated with new features added in v2.
October 2016	Paul Wheeler	Minor corrections for revision 2.0.1.
December 2016	Paul Wheeler	Example custom script file names modified so that they do not execute unless renamed.
January 2017	Paul Wheeler	Support for environment-specific build.properties files clarified.
February 2017	Paul Wheeler	Minor restructure and updates for SSD/SSB v3 release

Table of Contents

Services Standard Build Overview

A build process is critical to the smooth deployment to production of a configured IdentityIQ environment. A build process helps streamline the process of promoting an IdentityIQ installation's configuration objects through the development, test and production environments so that all three contain the same custom objects like applications, rules, task definitions and identity mappings. It also allows for new custom objects and custom java code to be integrated into IdentityIQ with a simple, manageable set of commands that can be easily automated.

The Services Standard Build (SSB) is a set of artifacts developed by the SailPoint Services team to support the build process for IdentityIQ deployments. These tools were designed with the following goals in mind:

- Automate effort of generating deployments for various environments such as development, testing, UAT, and production.
- Reduce time frame for new team members to become familiar with project structure and customizations.
- Reduce likelihood of errors due to improper deployment of patches, efixes, and configurations.
- Accelerate the software development process with useful methods and tools that make configuring IdentityIQ more efficient.
- Enable the SailPoint support team to quickly replicate IdentityIQ environments.
- Provide a build structure that is familiar to J2EE and servlet application developers that appeals to a broad audience.

The SSB tools should be configured directly after installing IdentityIQ in the first development environment for a project.

The SSB is a subset of what is known as the Services Standard Deployment (SSD). The SSB can be downloaded as a standalone build tool, but downloading the SSD will incorporate all elements of the SSB with some additional artifacts to help with deployment, known as the Services Standard Frameworks (SSF), Services Standard Test (SST) and Services Standard Performance (SSP). Configuration and use of the larger SSD and these other components is available on Compass but is outside the scope of this document.

Process Overview

Before beginning, please ensure you have the following:

1. Access to SailPoint's Compass website. https://community.sailpoint.com/
2. Command line access to your development and/or test servers. These are the servers where IdentityIQ's servlet container (web application server) runs. This may be JBoss, Tomcat, WebSphere, or WebLogic depending on the environment. Command line access to your production servers is only necessary if you will be installing IdentityIQ and migrating custom code to your production servers.

3. Ability to create a directory in the WEB-INF/bin folder of your Identity IQ installation directory on your development server.
4. Ability to stop and start your web application server (Tomcat, JBoss, WebLogic, WebSphere, etc.).
5. Ability to copy a directory from your development server to your test and/or production server.

The steps you will perform to complete this process are as follows:

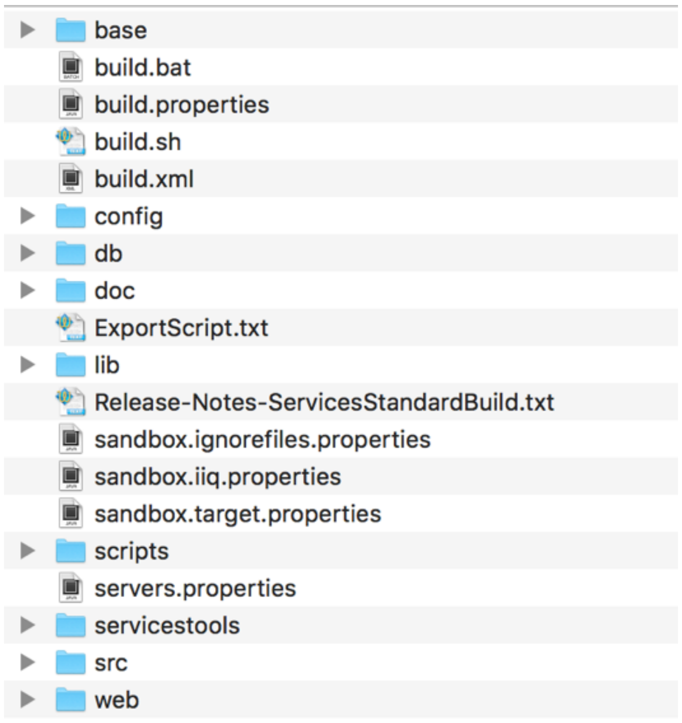
1. Download the Services Standard Build from Compass.
2. Export the custom objects from your development environment.
3. Set-up the directory structure of the build.
4. Configure the build.
5. Run the build command.

Downloading the Services Standard Build

First, download the latest version of the standalone Services Standard Build or the full Services Standard Deployment from Compass.

Download the Zip file with the latest version and unzip it into a file directory accessible to the development environment. This will create the base build structure. Make note of the directory where you have un-zipped the services standard build files; this directory will be called the "SSB Install Directory" throughout the remainder of this guide, and you will return to it repeatedly throughout the build process.

Folder Structure



```
base
build.bat
build.properties
build.sh
build.xml
config
db
doc
ExportScript.txt
lib
Release-Notes-ServicesStandardBuild.txt
sandbox.ignorefiles.properties
sandbox.iiq.properties
sandbox.target.properties
scripts
servers.properties
servicestools
src
web
```

This is the high-level folder structure of the build. The top level directories should not be modified, though objects will be placed into these folders, either directly or in subfolders, to be used in the build process.

- **base -** Contains binaries distributed by SailPoint. You can download these from community.sailpoint.com
  - **efix -** Contains any efix archives sorted by directory name where the directory name follows the naming convention <version><patchlevel>. If there is no patch level it will just have the version number. Because efix solutions only work with the specific product version they were designed for, you must make a unique directory for each version and patch level you want to build against. If a properly named efix directory is not found, the build will generate one. Efix files in .jar and .zip formats are supported.
  - **ga -** Contains the SailPoint GA release binary. You can have as many GA release binaries as you want to build against and the appropriate one will be selected using the values you set in the build.properties file.

    Example: /base/ga/identityiq-7.1.zip

  - **patch -** Contains the SailPoint patch binaries. You can have as many patch binaries as you want to build against and the appropriate patch will be selected using the values you set in the build.properties file.

    Example:/base/patch/identityiq-7.1p1.jar

- **config -** Contains all of your custom XML configuration objects sorted by folders where each sub directory is named by the type of top level SailPoint object it holds. In the provided example Application, Rule, TaskDefinition and TaskSchedule directories are shown. In general, as you customize more object types, you should add a directory to contain that object. While writing code, try to make the separation of object types as granular as possible such that it is easy to view all objects of a particular type. For example, instead of inserting a rule directly into a TaskDefinition, a reference to that rule should be created and the Rule itself would live in its own file in the Rule directory. Separate and encapsulate.

  - **Note:** While we recommend there just be objects in directories named for that object type (Application, Bundle, etc), there is nothing special about the directory names under the '/config/' directory. All files under '/config/' whose names end with a '.xml' suffix will be transformed through the build and tokenization and prepared for import into Identity IQ. Files with other kinds of name extensions (.txt, .old, etc.) under '/config/' are ignored by the build process.

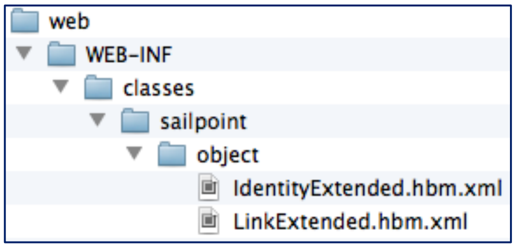
- **db -** Contains customized database scripts.
- **lib -** Contains libraries used by the build process. It contains java code the ant build script uses, but it does not get added to your installation of IdentityIQ. Do not put additional jars here. Put them in the web/WEB-INF/lib directory.
- **scripts -** With the exception of the master build.xml file in the root directory, all other build files are contained in this directory. Shipped and supported build files are read-only and follow the name convention build.*.xml. If you customize the build process you must declare your customizations in build files that follow the naming convention build.custom.*.xml.
  - Two example scripts are provided illustrate how to extend the build process with site-specific custom scripts.
    - scripts/example.build.custom.Extend-idAttrs.xml
    - scripts/example.build.custom.Modify-WEB-XML.xml
  - Custom Ant scripts can inject their own site-specific logic in one of three places:
    - The "clean" target, which allows the custom ant script take whatever actions are necessary when resetting the builds to a clean or blank state.
    - The "post.expansion.hook" target, which allows the custom ant script to implement site-specific logic after the build has expanded the stock IdentityIQ war file into the "/build/extract" directory. This is an opportunity to transform files or alter what will end up in the finished .war file.
    - The "post.war.hook" target, which allows the custom script to take any action after the war file has been zipped together into a single file. This is commonly used for automated copying or deployment of the war file to a file server or repository.
  - The example scripts provide guidance in their comments for readers interested in using them as templates to create their own site-specific build script functionality. They will not execute during the build process unless their names are changed to the build.custom.*.xml format.
  - Readers interested in learning more about how Ant works are encouraged to review Apache documentation: (http://ant.apache.org/manual/).
- **servicestools -** Contains the source code and an ANT project to build the services-tools.jar which is placed in the lib directory of the build. Code compiled and placed into the services-tools.jar is responsible for creating sp.init-custom.xml. Calling "import sp.init-custom.xml" from

the iiq console is an additional way to push custom objects from your <SSB Install Directory>/config folder into your IdentityIQ database.

- **src -** Contains all of your custom java files. Note this java will be compiled and placed in a jar file, which will be placed in the main IdentityIQ installation's WEB-INF/lib directory. It will be named based on the "customer" property in build.properties. The jar will become identityiqCustomizations.*customer*.jar. You should NOT "clone and own" SailPoint shipped classes in this area. Since they will be placed in the classpath at the same level as the shipped classes you may get behavior you do not expect. If you absolutely must modify a core class you will have to define a build.custom.*.xml file to handle layout of these files as you are effectively defining your own efix. By default the build will not play nice with this practice, and it is discouraged.
- **web -** Contains content that will be directly overlaid on the IIQ folder structure. Examples include custom graphics/branding, xhtml, jsp, custom message catalogs, and additional jar libraries. Under web you will need to create the folder structure for the location where these files are normally stored. For information on custom branding for your enterprise, go here: https://community.sailpoint.com/docs/DOC-7952.

  Example: to include custom changes to the Hibernate XML configuration file for identity extended attributes, put your customized version of IdentityExtended.hbm.xml in this directory nested in the full directory path:.

  `web/WEB-INF/classes/sailpoint/object/IdentityExtended.hbm.xml`



Exporting Custom Objects

This section assumes that IdentityIQ has been successfully installed into a development environment and that object definitions (e.g., applications, rules) have been created. If IdentityIQ has not been installed in at least your development environment, please do this first. If there are no custom object definitions to export at this time, skip this step and add them to the build's `<SSB install directory>\config` folder as they are created. No out of the box objects need to be added to your build directory; they are all added to the IIQ database when running "import init.xml", and if implementing the Lifecycle Manager functionality of IIQ, "import init-lcm.xml". However, if you change an out of the box object (ObjectConfig-"Identity" is an example of a common out of the box object that changes when configuring identity mappings), this *does* need to be added to your build's config folder. This will ensure those changes migrate from environment to environment.

For further information on the object types that should be managed in your build, see the "**Best Practices: Deployment, Migration, Upgrade, and Artifact Management**" document on Compass here: https://community.sailpoint.com/docs/DOC-2264.

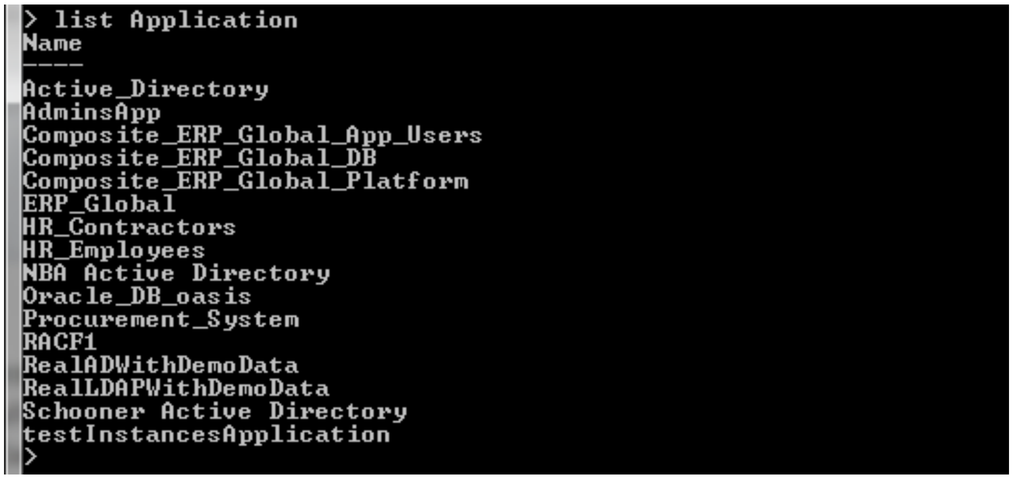
Note that there are several ways to export XML objects to the filesystem. The SailPoint Services team now recommends using the Object Exporter task (available in the SSD or separately on Compass) and/or the IdentityIQ Deployment Accelerator (also on Compass). However, the information below covers the Export Script, an older method of exporting XML objects which is detailed here for reference.

Running the Export Script

The SSB includes an export script (called Export Script.txt), which tells IdentityIQ to export some of the most common object classes. It exports all objects of each object type into a separate file per object type. For example, one line of the export script is "export -clean exports/CurrentApplicationExported.xml Application". This line exports all of the Application objects into a file called "CurrentApplicationExported.xml". These objects must be exported from the development environment and included in the build directory tree to be included in the build process. (Note: The "-clean" argument will tell the exporter to strip the object of all hibernate-generated ids. This is important for moving objects from environment to environment.)

Use the iiq console command line utility to see the configuration objects your environment has by type:

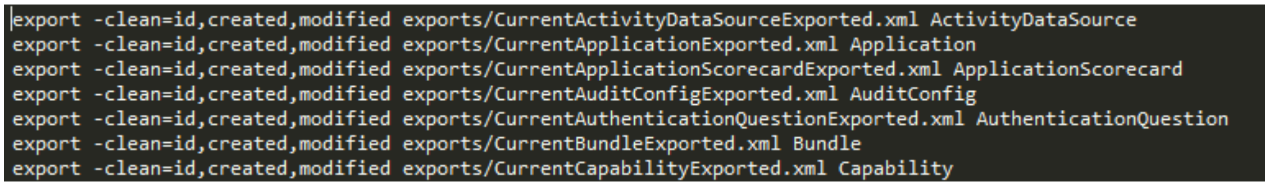
1. Navigate to the WEB-INF\bin folder within your IdentityIQ installation directory from a command prompt. Enter the command "`iiq console`" once inside this directory.
2. Enter the command "list" to see all of the object types or "Classes".
3. Enter "`list` *`objectType`*" to see all of the objects of that type in your environment.



```
> list Application
Name
----
Active_Directory
AdminsApp
Composite_ERP_Global_App_Users
Composite_ERP_Global_DB
Composite_ERP_Global_Platform
ERP_Global
HR_Contractors
HR_Employees
NBA Active Directory
Oracle_DB_oasis
Procurement_System
RACF1
RealADWithDemoData
RealLDAPWithDemoData
Schooner Active Directory
testInstancesApplication
>
```

If your environment has configuration object types not covered in the object classes listed in the export script, edit the file to add more export commands, following the syntax of the provided lines:

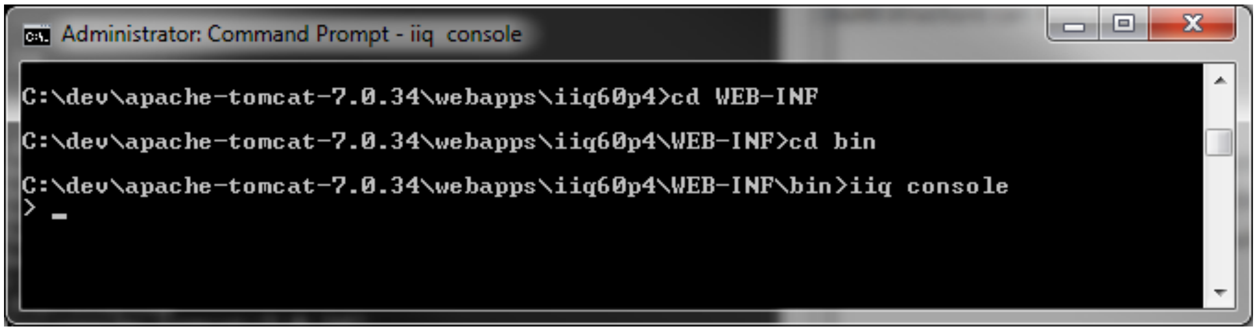
```
export -clean exports/CurrentObjectClassNameExported.xml ObjectClassName
```



```
export -clean=id,created,modified exports/CurrentActivityDataSourceExported.xml ActivityDataSource
export -clean=id,created,modified exports/CurrentApplicationExported.xml Application
export -clean=id,created,modified exports/CurrentApplicationScorecardExported.xml ApplicationScorecard
export -clean=id,created,modified exports/CurrentAuditConfigExported.xml AuditConfig
export -clean=id,created,modified exports/CurrentAuthenticationQuestionExported.xml AuthenticationQuestion
export -clean=id,created,modified exports/CurrentBundleExported.xml Bundle
export -clean=id,created,modified exports/CurrentCapabilityExported.xml Capability
```

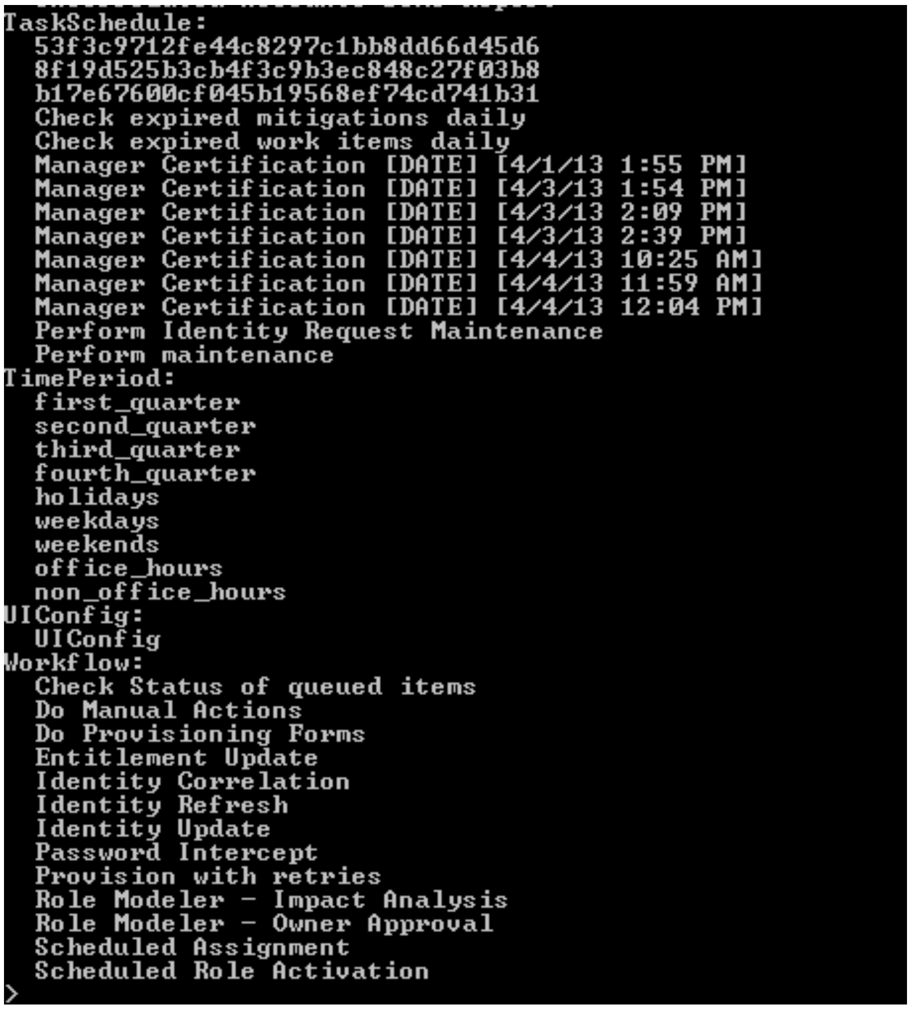
Copy the "ExportScript.txt" from the `<SSB install directory>` directory you unzipped earlier. Paste this text file into the WEB-INF\bin folder of your IdentityIQ installation directory. Also, create a folder called "exports" in the WEB-INF\bin folder.

Navigate back to the WEB-INF\bin folder within your IdentityIQ installation directory from a command prompt. Launch the console by entering the command "`iiq console`".



```
C:\dev\apache-tomcat-7.0.34\webapps\iiq60p4>cd WEB-INF

C:\dev\apache-tomcat-7.0.34\webapps\iiq60p4\WEB-INF>cd bin

C:\dev\apache-tomcat-7.0.34\webapps\iiq60p4\WEB-INF\bin>iiq console
> _
```

When you see the ">" prompt, enter the command "source ExportScript.txt". This will run the export script and export all of your environment's configuration objects into the exports folder you just created.



```
TaskSchedule:
  53f3c9712fe44c8297c1bb8dd66d45d6
  8f19d525b3cb4f3c9b3ec848c27f03b8
  b17e67600cf045b19568ef74cd741b31
  Check expired mitigations daily
  Check expired work items daily
  Manager Certification [DATE] [4/1/13 1:55 PM]
  Manager Certification [DATE] [4/3/13 1:54 PM]
  Manager Certification [DATE] [4/3/13 2:09 PM]
  Manager Certification [DATE] [4/3/13 2:39 PM]
  Manager Certification [DATE] [4/4/13 10:25 AM]
  Manager Certification [DATE] [4/4/13 11:59 AM]
  Manager Certification [DATE] [4/4/13 12:04 PM]
  Perform Identity Request Maintenance
  Perform maintenance
TimePeriod:
  first_quarter
  second_quarter
  third_quarter
  fourth_quarter
  holidays
  weekdays
  weekends
  office_hours
  non_office_hours
UIConfig:
  UIConfig
Workflow:
  Check Status of queued items
  Do Manual Actions
  Do Provisioning Forms
  Entitlement Update
  Identity Correlation
  Identity Refresh
  Identity Update
  Password Intercept
  Provision with retries
  Role Modeler - Impact Analysis
  Role Modeler - Owner Approval
  Scheduled Assignment
  Scheduled Role Activation
>
```

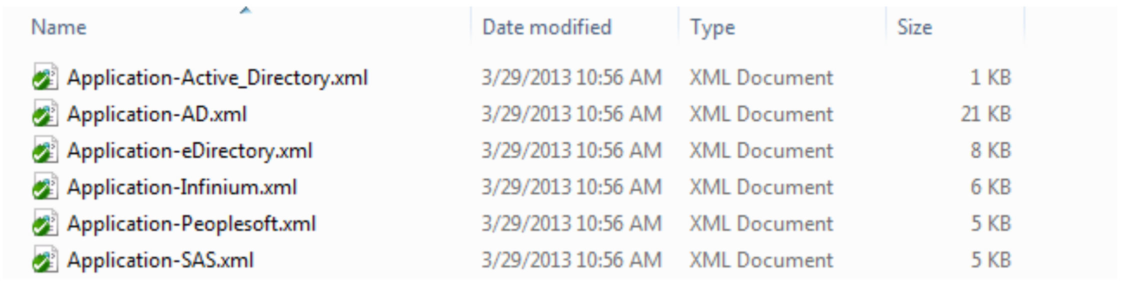
Many installations choose to split the export files into multiple files, storing each individual object in its own XML file. This practice is recommended, but not required. This makes it easier in the future to track exactly which objects have been changed between releases.

There is a Perl script on Compass that will perform the object separation. It is located here: https://community.sailpoint.com/docs/DOC-2103.

To split the objects up manually, copy an object's entire definition into a separate file, wrapped in the following header, opening, and closing tags:

```
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE sailpoint PUBLIC "sailpoint.dtd" "sailpoint.dtd">
<sailpoint>
<Put Object Definition Here>
</sailpoint>
```

Place each xml object into its respective class folder. The recommended naming convention for each of these object files is *ObjectType-Name.xml*. For example, CurrentApplicationExported.xml would be split into Application-ActiveDirectory.xml and Application-MicrosoftExchange.xml, etc.



Name	Date modified	Type	Size
Application-Active_Directory.xml	3/29/2013 10:56 AM	XML Document	1 KB
Application-AD.xml	3/29/2013 10:56 AM	XML Document	21 KB
Application-eDirectory.xml	3/29/2013 10:56 AM	XML Document	8 KB
Application-Infinium.xml	3/29/2013 10:56 AM	XML Document	6 KB
Application-Peoplesoft.xml	3/29/2013 10:56 AM	XML Document	5 KB
Application-SAS.xml	3/29/2013 10:56 AM	XML Document	5 KB

Build Structure Set-up

Configuration Objects

For the build process, all your environment's configuration objects should be placed into the `<SSB install directory>config` directory. Inside of this config folder, create a folder for every object class you exported. Folders for some objects -- Application, LocalizedAttribute, Rule, TaskDefinition, and TaskSchedule already exist as examples.

Place your exported xml files into their respective folders. For example, place the exported Application files into the `<SSB install directory>\config\Application` folder.

IdentityIQ Product Files

The build process will rebuild IdentityIQ for deployment into the target environment, merging the product zip files, patch jar files, and your custom artifacts. So next, you must put the desired product version zip files and patch jar files into the build directory tree.

Copy the zip file for the IdentityIQ version you are using into the `<SSB install directory>\base\ga` folder. Zip files can be downloaded from Compass if needed. **NOTE**: Multiple IdentityIQ zip files can coexist in this directory; a variable in the build.properties file for each environment determines which .zip file the build process will use.

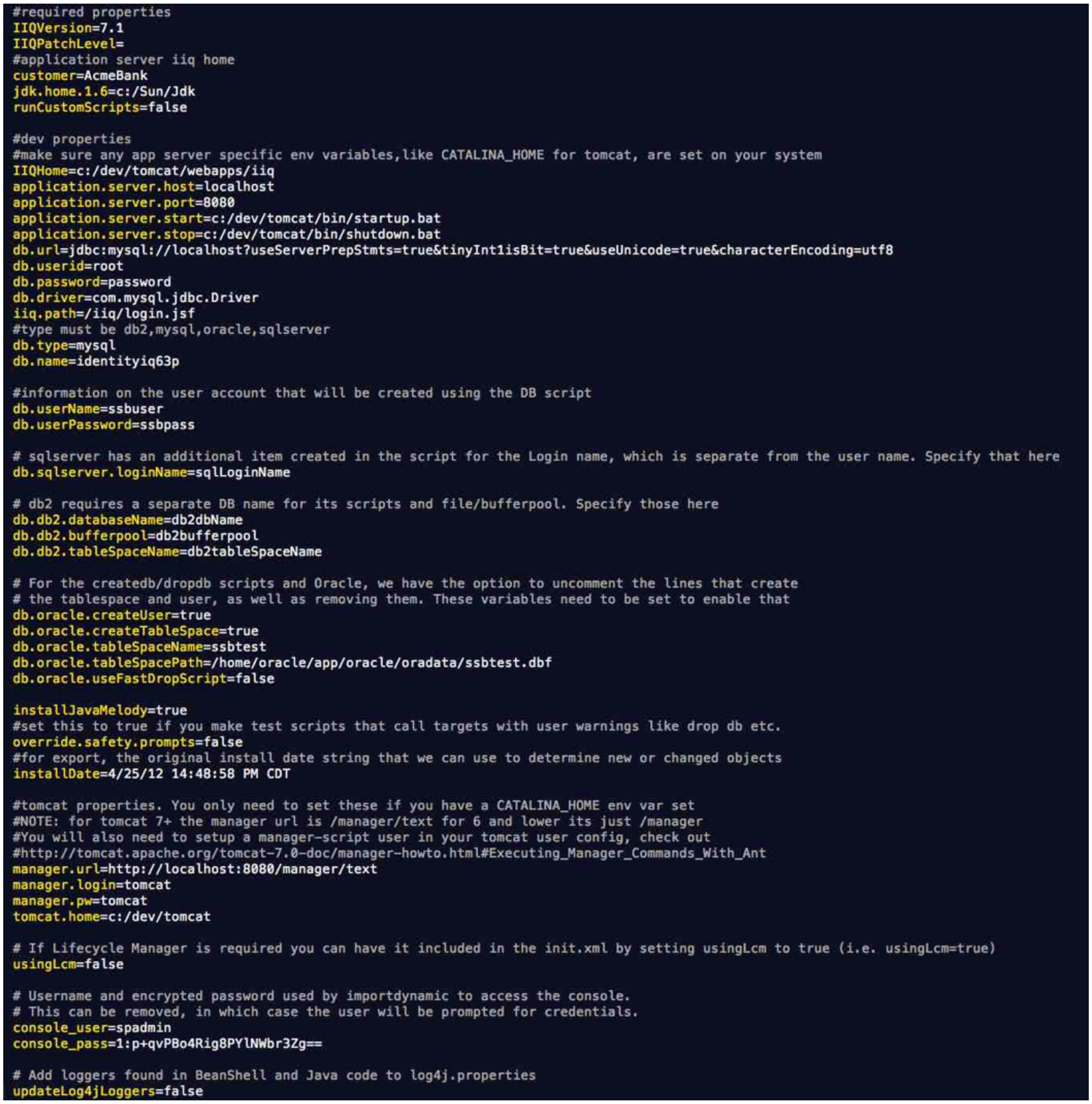
If you are running a patched version of IdentityIQ, place the patch .jar file for your installation into the `<SSB install directory>\base\patch` folder. Again, multiple patch jar files can coexist in this directory and the build.properties file specifies which to use in the build (with the IIQPatchLevel variable). All patch .jar files can be downloaded from Compass as well.

If you have any efixes for your current patch, be certain to copy those to an appropriate efix directory and remember to check them into your revision control system if you are using one on your project.

Build Configuration

Configuring the build.properties file

The build.properties file is a crucial configuration file that specifies many important configuration arguments, like the version of IdentityIQ you are running, the Customer name, and the path to your IdentityIQ installation. Without this information the build cannot run successfully.
Now configure the build.properties file found in the <SSB install directory>. Use your favorite text editor to edit this file.



```
#required properties
IIQVersion=7.1
IIQPatchLevel=
#application server iiq home
customer=AcmeBank
jdk.home.1.6=c:/Sun/Jdk
runCustomScripts=false

#dev properties
#make sure any app server specific env variables,like CATALINA_HOME for tomcat, are set on your system
IIQHome=c:/dev/tomcat/webapps/iiq
application.server.host=localhost
application.server.port=8080
application.server.start=c:/dev/tomcat/bin/startup.bat
application.server.stop=c:/dev/tomcat/bin/shutdown.bat
db.url=jdbc:mysql://localhost?useServerPrepStmts=true&tinyInt1isBit=true&useUnicode=true&characterEncoding=utf8
db.userid=root
db.password=password
db.driver=com.mysql.jdbc.Driver
iiq.path=/iiq/login.jsf
#type must be db2,mysql,oracle,sqlserver
db.type=mysql
db.name=identityiq63p

#information on the user account that will be created using the DB script
db.userName=ssbuser
db.userPassword=ssbpass

# sqlserver has an additional item created in the script for the Login name, which is separate from the user name. Specify that here
db.sqlserver.loginName=sqlLoginName

# db2 requires a separate DB name for its scripts and file/bufferpool. Specify those here
db.db2.databaseName=db2dbName
db.db2.bufferpool=db2bufferpool
db.db2.tableSpaceName=db2tableSpaceName

# For the createdb/dropdb scripts and Oracle, we have the option to uncomment the lines that create
# the tablespace and user, as well as removing them. These variables need to be set to enable that
db.oracle.createUser=true
db.oracle.createTableSpace=true
db.oracle.tableSpaceName=ssbtest
db.oracle.tableSpacePath=/home/oracle/app/oracle/oradata/ssbtest.dbf
db.oracle.useFastDropScript=false

installJavaMelody=true
#set this to true if you make test scripts that call targets with user warnings like drop db etc.
override.safety.prompts=false
#for export, the original install date string that we can use to determine new or changed objects
installDate=4/25/12 14:48:58 PM CDT

#tomcat properties. You only need to set these if you have a CATALINA_HOME env var set
#NOTE: for tomcat 7+ the manager url is /manager/text for 6 and lower its just /manager
#You will also need to setup a manager-script user in your tomcat user config, check out
#http://tomcat.apache.org/tomcat-7.0-doc/manager-howto.html#Executing_Manager_Commands_With_Ant
manager.url=http://localhost:8080/manager/text
manager.login=tomcat
manager.pw=tomcat
tomcat.home=c:/dev/tomcat

# If Lifecycle Manager is required you can have it included in the init.xml by setting usingLcm to true (i.e. usingLcm=true)
usingLcm=false

# Username and encrypted password used by importdynamic to access the console.
# This can be removed, in which case the user will be prompted for credentials.
console_user=spadmin
console_pass=1:p+qvPBo4Rig8PYlNWbr3Zg==

# Add loggers found in BeanShell and Java code to log4j.properties
updateLog4jLoggers=false
```

Set properties in the build.properties as described in the table below.

Variable	Description	Required?
IIQVersion	Specify the base version of IdentityIQ that you are building, e.g. 6.0, 6.1, 6.2, 6.3, 6.4, 7.0, 7.1	Yes
IIQPatchLevel	If you want to deploy a patch version, specify what level with pX syntax, e.g.. p1 or p6. If you are deploying only the GA version, leave this blank.	No, only if deploying a patch version
IIQHome	The home directory of the IdentityIQ web application in your sandbox/development environment. When using the "deploy" build target, the IIQHome property tells the build where to deploy your custom IdentityIQ installation.	No, only when using "deploy" target
customer	The name of the client or project phase. The build will create a .jar file, compiling all .java code in the build's "src" folder and name that jar identityIqCustomizations.*Customer*.jar.	Yes
jdk.home	The path on your system to the Java Development Kit (jdk) you want to use to compile any custom Java code you may have developed as part of your IdentityIQ configuration. As with all system paths, if there are spaces in your jdk path, put the entire path in double quotes.	No
runCustomScripts	(true/false) The build is not meant to be modified. You will notice the core build files are set to be read only. The main build has two hook points after file layout and after war creation where you can execute customized build scripts. This flag indicates if these customizations should be executed.	Yes, leave as false if unsure
application.server.host	The IP address of your application server in your sandbox/development environment	No, only when using "cycle" or "importcycle" build targets
application.server.port	The port the application server is running on. For example, 8080 is the Tomcat default.	No, only when using "cycle" or "importcycle" build targets

application.server.start	Script to start the application server. Since there are so many different application servers we leave it to you to write a script that starts and stops the server, sets up JVM parameters etc. Many application servers already ship with these but you can specify which ones you want to use here. This script (and the stop script below) is used in development targets that include steps to cycle the application server for you.	No, only when using “cycle” or “importcycle” build targets
application.server.stop	Script to stop the application server.	No, only when using “cycle” or “importcycle” build targets
db.url	The JDBC URL to your local database.	No, only when using build targets “createdb” or “dropdb”
db.userid	Database user with create and drop schema privileges. Ex. root on MySql. **NOTE**: Supply these parameters only for the sandbox/development environment. Test and Production environments should be managed in a more secure fashion.	No, only when using build targets “createdb” or “dropdb”
db.password	The password for the root db user. **NOTE**: Supply these parameters only for the sandbox/development environment. Test and Production environments should be managed in a more secure fashion.	No, only when using build targets “createdb” or “dropdb”
db.driver	The class of the JDBC driver to use for SQL connections. This is the same value you would put in your iiq.properties file, as instructed in the IdentityIQ Installation Guide.	No, only when using build targets “createdb” or “dropdb”
iiq.path	The installation directory within the application server directory of the IdentityIQ application. Usually /iiq or /identityiq	Yes
db.type	One of these values: db2, mysql, oracle, sqlserver; used to pick which database scripts to run	No, only when using build targets “createdb” or “dropdb”
db.name	Name of the IdentityIQ database	No, only when using build targets “createdb” or “dropdb”
db.userName	Name of user account that will be created using the DB script	No, only when using build targets “createdb” or

		“dropdb”
db.userPassword	Password of user account that will be created using the DB script	No, only when using build targets “createdb” or “dropdb”
db.sqlserver.loginName	SQL Server has an additional item created in the script for the Login name, which is separate from the user name. Specify that here.	No, only when using build targets “createdb” or “dropdb”
db.db2.databaseName **db.db2.bufferpool** **db.db2.tableSpaceName**	DB2 requires a separate database name and file/bufferpool for its scripts. Specify those values here.	No, only when using build targets “createdb” or “dropdb”
db.oracle.createUser **db.oracle.createTableSpace** **db.oracle.tableSpaceName** **db.oracle.tableSpacePath** **db.oracle.useFastDropScript**	For the createdb/dropdb scripts for Oracle, we have the option to uncomment the lines that create the tablespace and user, as well as removing them. These variables need to be set to enable that.	No, only when using build targets “createdb” or “dropdb”
installJavaMelody	If using JavaMelody, set this to true to gather SQL statistics in Oracle	No, only when using build targets “createdb” or “dropdb”
override.safety.prompts	Certain dangerous build targets like dropdb will prompt the user for confirmation before executing. If you are using the build to make test cases you may want to turn off these prompts.	Yes, leave as false if unsure
installDate	For the “export” target, the original install date string that we can use to determine new or changed objects.	No, only if using the “export” target
manager.url	URL to the tomcat manager script interface; Prior to Tomcat Version 6 the url is usually /manager but post Version 6 it is /manager/text.	Only if deploying using Tomcat application server
manager.login	A user who has the manager-script role in the Tomcat manager application. For information on how to set this up check out: http://tomcat.apache.org/tomcat-7.0-doc/manager-howto.html#Executing_Manager_Commands_With_Ant	Only if deploying using Tomcat application server
manager.pw	The password for the above account.	Only if deploying using Tomcat application server
tomcat.home	Set this to the value of CATALINA_HOME you want to use when starting and stopping Tomcat	Only if deploying using Tomcat application server
usingLcm	If your implementation includes Lifecycle Manager, you can ensure that it is included in	Yes

	your project build by setting the “usingLcm” property to “true”. This will insure that init-lcm.xml is called immediately after init.xml (which is renamed to init- default- org.xml by the Services Standard Build.) When not specified, users can still call “import init-lcm.xml” from the IIQ console to import the required LCM artifacts.	
console_user	Username used by importdynamic to access the console. For more information see the ‘importdynamic’ target in “Executing the build”.	Only if using importdynamic
console_pass	Encrypted password used by importdynamic to access the console. For more information see the ‘importdynamic’ target in “Executing the build”.	Only if using importdynamic
updateLog4jLoggers	If set to “true”, the log4j.properties file in WEB-INF/classes will be updated during the build process with a line for every logger that is found in BeanShell code in the XML files or in custom Java source code. These lines will be commented out. This helps during troubleshooting when a logger needs to be enabled but the name of the logger is not known without looking it up in the code. To enable a logger the appropriate line just needs to be uncommented in log4j.properties and set to the required log level before refreshing the logging configuration in IdentityIQ.	No

Note that there are also some variables in the build.properties file that start with “deploy”, such as deploySSF, deployGenericImporter and deployObjectExporter. These are only used in the full SSD to define which of the SSD components and tools should be deployed in the build. In the stand-alone SSB they are not used.

Supporting multiple platforms (Windows/Linux/Unix) for different environments

If your installation uses different operating systems for different stages of IdentityIQ development – for example, Windows for sandboxes and Linux for Test and Production servers – you must configure multiple “build.properties” files.

The generic “build.properties” file described above loads the defaults for the build with respect to the path to Java binaries, IdentityIQ version and other details. These can be overridden on a per-server or per-environment basis by specifying another properties file with properties that just apply to one server or one environment. Each server or environment used in development and testing can override the settings in “build.properties” by using its own “build.properties.<hostname>” or “build.properties.<environment>” file. For example, if your host is named “sailsandbox” then the properties file unique to that server would be called “build.properties.sailsandbox”. Or if your environment (SPTARGET) is called “dev” you could have “build.properties.dev”. The server or environment’s properties file has exactly the same format and fields as the “build.properties” file described in the previous section and only has to specify the fields that it wants to override with values that are different from the default build.properties file’s values. If you are running a build on a server that has its own server-specific version of build.properties for an environment that has its own environment-specific version, the server-specific values override the environment-specific values, which in turn override the generic build.properties file. If you have servers or environments with identical build.properties, do not create server-specific or environment-specific files. Put those values in “build.properties”. The build will recognize that there is no file specific to the server or environment, and will use “build.properties” as the default.

Setting up environment-specific properties files

The goal of the build process is to create a uniform Identity IQ distribution process for all environments (development, test, and production), but each environment will need a number of different parameters that are specific to that environment, such as login usernames, IP addresses, passwords, database connection strings etc. It is important that the build process can perform substitution of these values for each environment, as well as ensuring connection to the right IdentityIQ database and, where necessary, including or excluding files from an environment-specific build.

Configuring iiq.properties files

The iiq.properties file contains properties used by IdentityIQ for connecting to and interacting with its own database. Your build environment can specify different iiq.properties files for the build to use for deploying to each target environment. Create separate <environment>.iiq.properties files for each environment by copying and editing the product iiq.properties, and place them in the build directory (wherever you unzipped the SSB).

1. Download the product image
2. Expand the idenitityiq-<version>.zip
3. Expand the identityiq.war
4. Copy the iiq.properties to the SSB <environment>.iiq.properties files. For example Copy WEB-INF/classes/iiq.properties to sandbox.iiq.properties

For example, if your environments are sandbox, test, UAT and prod, you would have four files each containing the iiq.properties that know how to connect to the database server in that environment. This way you can support different properties for different environments, such as having a direct connection in sandbox and test while having a JNDI named connection in UAT and production. When creating these <environment>.iiq.properties files, use the iiq.properties file that ships with your IdentityIQ version’s .zip file and edit as appropriate for the environment.

Example file names:

```
sandbox.iiq.properties
```

```
test.iiq.properties
UAT.iiq.properties
prod.iiq.properties
```

Example test.iiq.properties file:

```
##### iiq.properties #####
#
# (c) Copyright 2008 SailPoint Technologies, Inc., All Rights Reserved.
#
# This file contains configuration settings for IdentityIQ.  For your unique
# environment, you will need to adjust the username and password properties on
# the dataSource below and uncomment the applicable database settings.
#

##### Data Source Properties #####
dataSource.maxWait=10000
dataSource.maxActive=50
dataSource.minIdle=5
#dataSource.minEvictableIdleTimeMillis=300000
#dataSource.maxOpenPreparedStatements=-1

dataSource.username=root
dataSource.password=root

##### MySQL 5 #####
## URL Format:
dataSource.url=jdbc:mysql://<host_name>:<port>/<dbname>?useServerPrepStmts=true&tinyIn
t1isBit=true&useUnicode=true&characterEncoding=utf8
dataSource.url=jdbc:mysql://localhost/identityiq?useServerPrepStmts=true&tinyInt1isBit
=true&useUnicode=true&characterEncoding=utf8
dataSource.driverClassName=com.mysql.jdbc.Driver
sessionFactory.hibernateProperties.hibernate.dialect=org.hibernate.dialect.MySQL5InnoD
BDialect
#
# Setting for the BSFManagerPool set on the ruleRunner
#
bsfManagerFactory.maxManagerReuse=100
bsfManagerPool.maxActive=30
bsfManagerPool.minEvictableIdleTimeMillis=900000
bsfManagerPool.timeBetweenEvictionRunsMillis=600000

##### Debug Settings #####

# Uncomment to send all SQL queries to std out. This provides a lot of output
# and slows down execution, so use it wisely.
#sessionFactory.hibernateProperties.hibernate.show_sql=true

# Hibernate Transaction Isolation Levels
# 1 = Read Uncommitted, 2 = Read Committed, 4 = Repeatable Read, 8 = Serializable
#sessionFactory.hibernateProperties.hibernate.connection.isolation=1
```

Configuring target.properties files

It is important to configure environment-specific properties files that the SSB can use to do token string replacements in the objects during the build process. The SSB will automatically look for tokenized strings in your custom configuration xml and substitute the appropriate values per environment. A target.properties file should be created for each environment, containing key/value pairs for token substitution during build time. The name of each target.properties file should be in the format <environment>.target.properties.

Examples:

```
      sandbox.target.properties
      test.target.properties
      UAT.target.properties
      prod.target.properties
```

Each file is just a list of key/value pairs. The build's convention is that the keys follow a %%KEYNAME%% pattern.

For example, you may have an Active Directory application configuration that looks like this:

```
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE sailpoint PUBLIC "sailpoint.dtd" "sailpoint.dtd">
<sailpoint>
<Application authoritative="true"
connector="sailpoint.connector.ADLDAPConnector"
featuresString="AUTHENTICATE, MANAGER_LOOKUP, SEARCH, UNSTRUCTURED_TARGETS"
name="AD" profileClass="" type="Active Directory">
  <Attributes>
    <Map>
      <entry key="password" value="mySuperSecrectProductionPassword"/>
      <entry key="managerCorrelationFilter">
        <value>
          <Filter operation="EQ" property="DN" value="manager"/>
        </value>
      </entry>
      <entry key="user" value="productionADuser"/>
      <entry key="groupHierarchyAttribute" value="memberOf"/>
      <entry key="port" value="3379"/>
      <entry key="authorizationType" value="simple"/>
...
```

To support deploying the same XML artifact to multiple environments, you would substitute passwords, ports, etc. with keys that will go in your <environment>.target.properties file, so your application configuration file instead looks like this:

```
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE sailpoint PUBLIC "sailpoint.dtd" "sailpoint.dtd">
<sailpoint>
<Application authoritative="true"
connector="sailpoint.connector.ADLDAPConnector"
featuresString="AUTHENTICATE, MANAGER_LOOKUP, SEARCH, UNSTRUCTURED_TARGETS"
name="AD" profileClass="" type="Active Directory">
  <Attributes>
    <Map>
      <entry key="password" value="%%AD_PROXY_PASSWORD%%"/>
      <entry key="managerCorrelationFilter">
        <value>
```

```
          <Filter operation="EQ" property="DN" value="manager"/>
        </value>
      </entry>
      <entry key="user" value="%%AD_PROXY_USER%%"/>
      <entry key="groupHierarchyAttribute" value="memberOf"/>
      <entry key="port" value="%%AD_PORT%%"/>
      <entry key="authorizationType" value="simple"/>
...
```

Then, for example, in the file “prod.target.properties” you would have:

```
#######################################################

# AD Connectors

#######################################################

%%AD_HOST%%=example.com

%%AD_PORT%%=3379

%%AD_PROXY_USER%%=productionADuser

%%AD_PROXY_PASSWORD%%=mySuperSecrectProductionPassword
```

… and so on for each of your environments. **Note: the password values should be encrypted using the iiq encrypt utility, and the encrypted strings should be recorded in these properties files.**

If a token exists in an XML artifact but there is no corresponding token in the target.properties file, the build process will prompt the user for the value that should replace the token. The token will then be created in the target.properties file and its value replaced in the resulting XML file during the build.

Configuring ignorefiles.properties files

The build process has the ability to define certain XML files that should be skipped during the import for a specific environment. Implement this by creating a text file for each environment where you want to skip the import of specific files. A sandbox example file is provided with the build. You can copy and paste this file for all your environments as a template to get started. See the provided file for an example of how to populate the list of files that can be ignored in each environment.

The file naming pattern is <environment>.ignorefiles.properties.

Common names of the ignore files are:

sandbox.ignorefiles.properties

dev.ignorefiles.properties

uat.ignorefiles.properties

staging.ignorefiles.properties

prod.ignorefiles.properties

This feature has multiple uses. It can be used to configure different Applications with the same name but containing different underlying XML and connector configurations in your development versus acceptance and production environments. For example, you could use a JDBC application to simulate Active Directory in your sandbox environment but use a proper Active Directory application in your UAT and production environments.

This feature also allows you to load temporary or testing applications in your sandbox or development environments and not load those applications in your UAT or production environments.

There are other, additional benefits from this: QuickLink objects can he loaded into certain environments and redacted from others. This allows for different dashboard configurations between different environments. The system configuration files can now be different across your environment with this feature by redacting different configuration files from each environment's build. Care should be taken when choosing which files to ignore in specific environments; a goal of the build is to synchronize as much as possible the configuration between development, UAT, and production installations of IdentityIQ.

Setting the environment name for a build

After configuration of the environment-specific properties files, the build process needs to be told which environment to build for. This can be done by the use of the SPTARGET environment variable or alternatively by using a mapping in the servers.properties files.

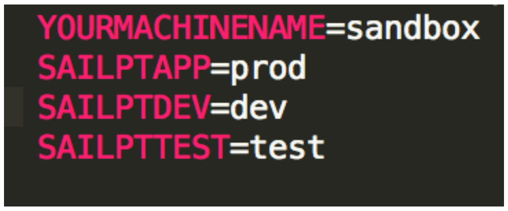
Using the SPTARGET environment variable to specify the build environemnt

The SPTARGET environment variable will dictate which <environment>.iiq.properties file, <environment>.target.properties file, <environment>.ignorefiles.properties and (where configured) build.properties.<environment> file to use. Here is an example of using the SPTARGET environment variable on a Linux system to create a dev, test, and prod war file. See the next section for more details on executing the build.

```
./build.sh clean

export SPTARGET=dev
./build.sh war
mv identityiq.war identityiq-dev.war

export SPTARGET=test
./build.sh war
mv identityiq.war identityiq-test.war

export SPTARGET=prod
./build.sh war
mv identityiq.war identityiq-prod.war
```

Setting the target variables by editing servers.properties

If the SPTARGET environment variable is not set, the build process will attempt to find the environment name by using the servers.properties file, mapping the host where the build is being executed to an environment name. It is common for deployments to specify each environment's hostnames in the servers.properties file to support running the build on every server in the environment. This tells the build which environment you want to use, which depends on the name of the server running the build. This is an example of a servers.properties file:



```
YOURMACHINENAME=sandbox
SAILPTAPP=prod
SAILPTDEV=dev
SAILPTTEST=test
```

Replace "YOURMACHINENAME" with your sandbox hostname, "SAILPTAPP" with your production hostname, etc. The build will detect the hostname of the machine on which you are running the build script, and apply sandbox.target.properties if you are running the build on your sandbox.

Note: The hostname used in servers.properties is case-sensitive.

Executing the build

Once you have performed all the steps in the previous sections you are ready to build. If you are using the servers.properties file to define the build environment name, copy your entire build structure and add it to your new environment. Otherwise, set the SPTARGET environment variable to the correct target environment name on the host that will run the build. This helps to ensure that environment-specific variables defined in <*environment*>.iiq.properties, <*environment*>.target.properties and <*environment*>.ignorefiles.properties will be added to your war file. Ensure your build.properties is configured to match the environment.

A common approach to copying the entire build to a new server is to check in the entire build (and all of the files, directories, and artifacts included with it) into a revision control system like SVN, CVS, Git or TFS. Tools like these can automate checking out the entire current copies of set of files onto new target servers. More basic installations sometimes simply "zip up" the entire set of artifacts and transfer one file to the new target server. As a best practice SailPoint recommends using a revision control system if one is available.

To create a custom, deployable IdentityIQ war file in the standard J2EE Web Application Archive that can be deployed to a web application server such as Tomcat, you can perform the following steps.

- Open a Terminal or Command Prompt window
- Navigate to `<SSB install directory>\`
- Enter `build war`
- This will generate a deployable war file in your `<SSB install directory>\deploy` folder and you will receive a confirmation message similar to the one below:

```
war:
      [war] Building war:
/home/workspace/SSB/build/deploy/identityiq.war
     [echo] A MD5 checksum was generated for this war file
and placed in the war file directory. Keep this checksum to
diagnose potential version issues

BUILD SUCCESSFUL
```

- Deploy this file to the target web application server. You may need to consult your application server's deployment guide for details. For Tomcat:
    - Copy this custom identityiq.war to a folder under `<Tomcat>/webapps` (e.g. `<Tomcat>/webapps/identityiq`)
    - Navigate to that directory and expand the war: `jar xvf identityiq.war`
    - Delete the war file once you have expanded it

If this is a new deployment or if the build is an upgrade of the IdentityIQ version running on that server, you will need to perform additional actions to create the IIQ database and tables or upgrade the system; consult the IdentityIQ Installation Guide for details as needed. Otherwise you are ready to use your customized IdentityIQ application.

If you wish to update any custom objects and redeploy them to IdentityIQ you can perform the following steps. Open a terminal or command prompt window,

- Navigate to the `<SSB install directory>\` folder and enter "`build importdynamic`". This command will import all of the custom xml from your config folder into IdentityIQ. It will utilize the db connection from <environment>.iiq.properties and push those xml objects into the IdentityIQ database. It will not cycle the application server, a step required if changes are made to any class files included in your SSB directory. An alternative to using "build importdynamic" is to import the sp.init-custom.xml file that was generated during the build, using the command "`import sp.init-custom.xml`" inside iiq console.
- Open IdentityIQ in a web browser and you will see the applications, rules, and other custom objects from your original environment in this new one.

Dev targets explained

Here are the other build targets and their uses.

No target (just entering "build" into a windows terminal or "./build.sh" into a Linux terminal)

Runs the entire build process, placing a fully expanded war file in the `<SSB install directory>\build\extract` folder, and all compiled, custom .class files in `<SSB install directory>\build\classes`

clean

Deletes everything in the `<SSB install directory>\build` directory.

createdb

Depends on the build.properties file having a database account setup that has schema creation privileges. The properties “db.url”, “db.password”, and “db.userid” in the build.properties file must be configured properly to use this build target. This will setup the IIQ schema and apply any patch updates.

cycle

Depends on the application.server.start and stop properties being set. This will cycle your application server and reload all web applications. If you are using Tomcat and you have the CATALINA_HOME environment variable set this target will just reload the IIQ application and not the entire server.

dropdb

Depends on the build.properties file having a database account setup that has drop privileges. The properties “db.url”, “db.password”, and “db.userid” in the build.properties file must be configured properly to use this build target. Drops the IIQ database.

dist

Copies the entire expanded war content to your application server webapps directory (wherever the “IIQHome” property points to).

deploy

Runs entire build process, and deploys the expanded war content to your application server webapps directory (wherever the “IIQHome” property points to). The equivalent of running the build with no target, plus running the “dist” target.

importcycle

Runs through the entire build process. Validates and imports all custom xml, compiled java and static web content. This command also cycles (restarts) the application server. Useful while developing custom java.

importdynamic

Imports all content that does not require an application reload: custom XML, static web content etc. Useful for developing rules, workflow and branding. Note that importdynamic calls the IdentityIQ console and requires a username and password. The default spadmin username and encrypted password are set using the ‘console_user’ and ‘console_pass’ properties in build.properties:

```
# Username and encrypted password used by importdynamic to access the console.
# This can be removed, in which case the user will be prompted for credentials.
console_user=spadmin
console_pass=1:p+qvPBo4Rig8PYlNWbr3Zg==
```

Use the console command ‘iiq encrypt <password>’ to get the encrypted value of your password to use here. Alternatively, the console_user and console_pass lines can be removed from build.properties, which will force the user to enter them each time importdynamic is run.

export

Exports objects specified within objectsToExport.properties (this will now be generated – edit Rule-OutputCustomObjectFile.xml in scripts if you need to add more objects to ignore or export – the variable name of ignored object classes is listOfIgnoredClasses) from your IIQHome repository to build/export so that you don't manually have to copy and paste xml from console-exported files to your build environment. Edit the property file to include all types of objects you want to export, as well as the names of the objects for each type.

document

Creates Javadoc-style documentation for the configuration of the XML objects in the 'custom' folder. Runs through the main build process first in order to create the objects in that folder, then writes out html files detailing the configuration of each object to the doc/TechnicalConfig folder in the resulting build. Open the index.html file in the TechnicalConfig folder to view the generated documentation.

The following object types are currently supported by the 'document' target:

Application, AuditConfig, Bundle, Capability, CertificationDefinition, CertificationGroup, Configuration, CorrelationConfig, Custom, DashboardContent, Dictionary, Dynamic Scope, EmailTemplate, Form, FullTextIndex, GroupDefinition, GroupFactory, Identity/Workgroup, IdentityTrigger, IntegrationConfig, LocalizedAttribute, ObjectConfig, PasswordPolicy, Policy, QuickLink, QuickLinkOptions, RequestDefinition, Rule, RuleRegistry, ServiceDefinition, SPRight, TargetSource, TaskSchedule, UIConfig, Workflow

When using this feature you should ensure that application passwords and other sensitive data are not being stored in clear text in the source files or in values substituted by tokens to avoid them being shown in the resulting document.