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Enterprise Decision Management Systems

Enterprise decision management systems can transform the way businesses make decisions. They enable businesses to use the information they already have to make better decisions—decisions that are based on predictive analytics rather than on past history. Decision management systems automate the process of making decisions, particularly day-to-day operational decisions. They improve the speed, efficiency, and accuracy of routine business processes, in part by reducing the need for human intervention. By automating decisions, organizations in every industry can improve interactions with customers, partners, suppliers, and employees. In addition, organizations that are highly regulated, such as financial services, health care, and insurance, can more easily achieve compliance as a result of repeatable, traceable decisions.

About SAS Business Rules Manager

About Managing Business Rules

Business rules capture the logic of business decisions and are one of the core components of decision management systems. Business rules make the decision-making process transparent and adaptable, allowing organizations to respond quickly to new information about customers and markets. They allow organizations to identify and deal with fraud, avoid unnecessary risk, and find opportunities hidden in customer data.

You can use SAS Business Rules Manager to create a database of business rules, connect those rules together into rules flows, and publish the rule flows for use by other applications. SAS Business Rules Manager provides the following capabilities:

business rule authoring

A business rule specifies conditions to be evaluated and action to be taken if those conditions are satisfied. For example, you can create a rule that determines whether a customer has a mortgage. That same rule can
then add the outstanding balance of the mortgage to a running total of the customer’s debt. With SAS Business Rules Manager, you define the conditions and actions for each rule. You can use the Equation Editor to create the expressions for the rule.

The rule authoring features of SAS Business Rules Manager make creating rules easier and more accurate. For example, the list of allowable values for a term help avoid incorrect rules. The lists of allowable values can be updated as needed, and the lists do not prevent you from providing new values manually.

data management
You can manage your list of data tables from within the application. You can add and remove tables from a SAS library defined in a SAS Metadata server. You can view table data and metadata, create and delete table summaries, and associate attachments and comments with tables. The application uses these data tables whenever it needs to access data, such as for rule discovery and rule flow testing.

lookup table
A lookup table is a table of key-value pairs. You can use a specific lookup key to retrieve the associated data value. For example, you can retrieve a part name based on a part number or retrieve the full name of a country based on its abbreviation. You can import data into a lookup table from a comma-separated-values (CSV) file. In a rule set, you can retrieve data from a lookup table by using the LOOKUP and LOOKUPVALUE functions.

rule flow authoring and publishing
A rule flow is a logical collection of rule sets. A rule flow defines a set of rule sets and the order in which they will be executed. A single rule flow frequently corresponds to a single decision. For example, a rule flow can initially execute the rule set that determines a customer’s asset balance. Next, the rule set that determine a customer’s debt level is executed. Finally, the rule set that assigns a customer’s loan application status is executed.

SAS Business Rules Manager makes it easy to combine rules sets into a rule flow and to publish those rule flows to the metadata server. After a rule flow has been published, it is available for use by other applications.

rule set management
A rule set is a logical collection of rules. A single rule set can have many rules. For example, you might have a rule set that determines a customer’s asset balance and another rule set that determines a customer’s debt level. SAS Business Rules Manager displays rules sets as lists of rules with each entry defining conditions and actions for one rule. By using SAS Business Rules Manager, you can easily create new rule sets, reorder the rules in a rule set, add new rules to existing rule sets, and more.

You can also manage rule flows. When a rule flow is published, the versioning features of SAS Business Rules Manager create a static version of the rule flow. This static version helps you to enforce integrity and governance over the rule sets and rule flows that are put into production.

vocabulary management
A business vocabulary defines entities and terms. An entity is an object in a business domain, and it contains terms. A term is an attribute of an entity. Terms are the building blocks that you use to construct business rules. SAS Business Rules Manager enables you to easily create and edit entities and terms. For individual terms, you can create a list of allowable values, which makes creating rules even easier.

The SAS Intelligence Platform and SAS Business Rules Manager
The SAS Intelligence Platform architecture is a comprehensive, end-to-end infrastructure for creating, managing, and distributing enterprise intelligence. This architecture consists of the following tiers:
client tier
provides users with desktop access to data and functionality through an easy-to-use interface. With SAS Business Rules Manager, users author rule sets and rule flows through the SAS Business Rules Manager client.

middle tier
provides an environment in which the SAS Business Rules Manager web application can execute. The middle tier passes analysis and processing requests to the SAS servers.

server tier
provides SAS servers that process data and handle client requests. For SAS Business Rules Manager, the server tier provides the SAS Business Rules Engine.

data tier
stores your data. The SAS Decision Manager database contains all of the data that the user enters through the SAS Business Rules Manager application.

The following figure shows how SAS Business Rules Manager is deployed on the SAS Intelligence Platform.

**Figure 1.1**  *SAS Intelligence Platform Architecture and SAS Business Rules Manager*

SAS Business Rules Manager
SAS Business Rules Manager is the key software through which business users author, manage, and deploy vocabularies, rule sets, and rule flows. Users can also import lookup tables and reference them from rules.

SAS Decision Manager
manages requests to SAS Business Rules Manager and provides general SAS Decision Manager functions such as data source and workflow management.

SAS Web Infrastructure Platform
provides common SAS infrastructure services that SAS Business Rules Manager uses to authenticate users and to access services within the SAS platform.

SAS Business Rules Manager on the middle tier
manages communication with the SAS Decision Manager database and initiates the process of saving rule flows to the content repository.

SAS Web Infrastructure Platform Data Server
serves as transactional storage for SAS middle-tier software and some SAS solutions software.

SAS Servers
SAS application servers that execute SAS code that is submitted from the middle-tier applications.
SAS Decision Manager Common Data Server contains all of the data that users enter through the SAS Business Rules Manager client.

Metadata server contains the BusinessRuleFlow public metadata objects that are created when a rule flow is published. These objects are used by the integrated SAS applications to execute rule flows.

## Process for Publishing Rule Flows

When a user publishes a rule flow, SAS Business Rules Manager creates an XML file and a BusinessRuleFlow metadata object. The XML file is stored in the content repository, and the metadata object is stored on the metadata server.

The following figure illustrates the process of publishing rule flows.

*Figure 1.2  Process for Publishing Rule Flows*

1. SAS Business Rules Manager reads the rule flow data in the SAS Decision Manager database.
3. The metadata object stores the XML file in the content repository.
Performing Pre-installation Tasks

Before you install SAS Business Rules Manager, be sure to review the Pre-installation Checklist that is provided with your deployment plan. This checklist provides a detailed list of the pre-installation requirements. It also enables you to record important information that you need when you are installing the software.

Perform the following steps before you install SAS Business Rules Manager:

1. Verify that your system meets the minimum requirements. See the system requirements documentation on support.sas.com.

2. Determine the database that you want to use.
   
   Note: The SAS Decision Manager Common Data Server is always configured. Even if you use Oracle for the SAS Business Rules Manager database, you will be prompted for information for the SAS Decision Manager Common Data Server. After your system is configured and running, you can stop the SAS Decision Manager Common Data Server.

3. Determine the time zone requirements. You might need to synchronize the time zones that are specified in all of your operating environments.

4. Complete the pre-installation steps for your database. See “Pre-installation Tasks for SAS Decision Manager Common Data Server” on page 6 or “Pre-installation Tasks for an Oracle Database” on page 7.

5. (Optional) If you plan to configure the SAS Decision Manager Common Data Server for high availability, gather information about the high-availability cluster. For information, see the technical paper Managing SAS® Web Infrastructure Platform Data Server High-Availability Clusters on UNIX.
Determine the Database to Use

You can use either Oracle or the SAS Decision Manager Common Data Server for the SAS Decision Manager database.

The SAS Decision Manager Common Data Server is based on PostgreSQL 9.5. For more information, see “SAS Web Infrastructure Platform Data Server” in SAS Intelligence Platform: Middle-Tier Administration Guide at http://support.sas.com/documentation/intellplatform/index.html. Ensure that you have the information that is recorded in “Pre-installation Tasks for SAS Decision Manager Common Data Server” on page 6.

SAS Business Rules Manager supports Oracle 11g and Oracle 12c for the SAS Decision Manager database. For Oracle, complete the tasks described in “Pre-installation Tasks for an Oracle Database” on page 7.

Determine Time Zone Requirements

All of your operating environments (on all tiers in a multi-tier environment) must be set to the same time zone only if your site meets both of these conditions:

- You will deploy rule flows by using SAS Real-Time Decision Manager.
- Those rule flows use terms of type Date or Datetime.

SAS Real-Time Decision Manager uses a custom data type that accounts for differences between time zones when it performs calculations. If the time zones do not match across all of your environments, you should not use Date or Datetime data types in rule flows.

Pre-installation Tasks for SAS Decision Manager Common Data Server

During the installation and configuration of SAS Business Rules Manager, the SAS Deployment Wizard requires information about the database that SAS Business Rules Manager uses. The SAS Decision Manager Common Data Server (based on PostgreSQL 9.5) is always configured when you run the SAS Deployment Wizard. You need the information in the following table in order to complete the steps in the SAS Deployment Wizard.

Table 2.1 SAS Deployment Wizard Information for SAS Decision Manager Common Data Server

<table>
<thead>
<tr>
<th>Property</th>
<th>Record Information Here</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Type</td>
<td></td>
<td>Specifies the database type to use for the SAS Decision Manager database.</td>
</tr>
<tr>
<td>Database Name</td>
<td></td>
<td>Specifies the database name. The default name for the database is dcmdb.</td>
</tr>
<tr>
<td>Property</td>
<td>Record Information Here</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Database User</td>
<td></td>
<td>Specifies the user name for the database administrator. This user owns the database and has superuser privileges. The default user name is dcmdowner.</td>
</tr>
<tr>
<td>Database Password</td>
<td></td>
<td>Specifies a password for the user ID that is associated with the database account.</td>
</tr>
<tr>
<td>Port</td>
<td></td>
<td>Specifies the port that is used by the database. The default port for SAS Decision Manager Common Data Server is 10482.</td>
</tr>
<tr>
<td>Host Name</td>
<td></td>
<td>Specifies the fully qualified host name of the server on which the database is installed.</td>
</tr>
<tr>
<td>User ID</td>
<td></td>
<td>Specifies the user name for the user whose credentials are to be used to access the SAS Decision Manager Common Data Server database. The default user name is dcmdb.</td>
</tr>
</tbody>
</table>

For database-specific information about configuring a database, see SAS Intelligence Platform: Installation and Configuration Guide.

---

**Pre-installation Tasks for an Oracle Database**

**Oracle Pre-installation Tasks**

When you use Oracle for your SAS Decision Manager database, perform the following steps before you install SAS Business Rules Manager:

1. Verify that you have the correct JDBC drivers.
2. Verify that you have a tnsnames.ora file for your Oracle client that corresponds to your database.
3. Determine the required database information.
   - **Note:** The SAS Decision Manager Common Data Server is always configured. Even if you use Oracle for the SAS Business Rules Manager database, you will be prompted for information for the SAS Decision Manager Common Data Server. See “Pre-installation Tasks for SAS Decision Manager Common Data Server” on page 6 for more information.
4. Specify the required database privileges.
5. Test the connection to your database.

**Verify JDBC Drivers for Oracle**

Verify that you have the correct JDBC drivers. To ensure proper installation of SAS Business Rules Manager, the drivers must be on each middle-tier server, and they must be in a directory that does not contain any other files.

Determine the Information Required for the Oracle Database

During the installation and configuration of SAS Business Rules Manager, the SAS Deployment Wizard requires information about the Oracle database that SAS Business Rules Manager uses. Record the information in the following table.

You enter this information in the SAS Decision Manager Database Properties and SAS Decision Manager Database JDBC Properties windows.

Table 2.2 SAS Deployment Wizard Information for Oracle

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Record Information Here</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Name</td>
<td>Specifies the fully qualified host name of the server on which the database is installed.</td>
</tr>
<tr>
<td>Port</td>
<td>Specifies the port number that is used by the database. The default port for Oracle is 1521.</td>
</tr>
<tr>
<td>Directory containing JDBC driver jars</td>
<td>Specifies the location of the database vendor’s JDBC JAR file. This file must be available on the middle tier and on any machine on which you are deploying SAS Business Rules Manager in order to configure SAS Decision Manager database. See “Verify JDBC Drivers for Oracle” on page 7 for more information.</td>
</tr>
<tr>
<td>Database SID or Service Name</td>
<td>Specifies the Oracle database name. The database name must match either the service name or the Oracle site identifier (SID), both of which can be found in the tnsnames.ora file. For example: (CONNECT_DATA = (SERVICE_NAME = mydb)) (CONNECT_DATA = (SID = mydb)) You can also find the Oracle SID by running the following query using a database user ID on your Oracle instance: select instance from v$thread Note: If you select Use Oracle database name as a Service Name, then you must enter the service name that is specified in the tnsnames.ora file. For information about naming methods for Oracle databases, see the Oracle documentation for your database at <a href="https://docs.oracle.com/en/database/oracle/oracle-database/index.html">https://docs.oracle.com/en/database/oracle/oracle-database/index.html</a>.</td>
</tr>
<tr>
<td>User ID</td>
<td>Specifies the user ID of the database user whose credentials are used to access SAS Business Rules Manager data on the server.</td>
</tr>
<tr>
<td>Password</td>
<td>Specifies the password of the user ID whose credentials are used to access SAS Business Rules Manager data on the server.</td>
</tr>
<tr>
<td>Prompt</td>
<td>Record Information Here</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Schema Pattern</td>
<td></td>
</tr>
</tbody>
</table>

### Specify the Required Database Privileges for Oracle

Ensure that the users of your database have the required database privileges. Here are the required privileges for Oracle databases:

- CONNECT
- CREATE SESSION
- RESOURCE
- CREATE TABLE
- CREATE VIEW
- CREATE SEQUENCE
- CREATE TRIGGER
- UNLIMITED TABLESPACE

**Note:** The UNLIMITED TABLESPACE privilege is automatically granted for Oracle Database 11g but not for Oracle Database 12c.

### Test the Connection to Your Oracle Database

Execute a command from the terminal to verify that your Oracle database is set up. For example, execute the following command using SQL*Plus:

```sql
sqlplus USER/PASSWORD@ORACLE_SID
```

You must be able to execute this command from any directory. If you are able to execute a database command such as this only from the database installation directory, then verify that the PATH variable is set up correctly. The database client application must be installed and available on the path specified by the PATH variable.
Installing SAS Business Rules Manager

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  Select the SAS Application Server ......................................................... 11
  Configure the Database ........................................................................ 12
  Create and Load Tables through the SAS Deployment Wizard .............. 12

Products Installed with SAS Business Rules Manager

Your deployment plan for SAS Business Rules Manager includes additional SAS products that support and complement SAS Business Rules Manager functionality. See the software order email or the ordersummary.html file that is in your SAS Software Depot at software_depot/install_doc/order_number/ordersummary.html. The SAS Deployment Wizard prompts you to install and configure each of the products in your deployment plan.

Running the SAS Deployment Wizard

About Running the SAS Deployment Wizard

To run the SAS Deployment Wizard, follow the instructions in “Install and Configure SAS Interactively” in SAS Intelligence Platform: Installation and Configuration Guide.

Note: You can run the wizard on operating systems that do not use a windowing environment. For more information, see SAS Deployment Wizard and SAS Deployment Manager: User’s Guide at http://support.sas.com/documentation/installcenter/94/index.html.

The type and number of configuration-related pages that you see depend on certain things. Namely, the prompt level that you choose, the SAS tier that you are currently deploying, and the contents of your SAS 9.4 custom order. The following topics provide information for prompts that are specific to SAS Business Rules Manager. For additional information about any of the SAS Deployment Wizard prompts, see the online Help for the wizard page in question.

Select the SAS Application Server

In this case you are installing SAS Business Rules Manager as an add-on product and have already defined other SAS application servers. The SAS Deployment Wizard asks you to select which application server you want to use. Select an application server other than SASMETA.
Configure the Database

During deployment of SAS Business Rules Manager on SAS 9.4, the SAS Deployment Wizard creates and configures the database tables in the SAS Decision Manager Common Data Server database by default. This database uses the PostgresSQL database management system.

You can use a third-party database server with SAS 9.4. In SAS 9.4, Oracle is the only other third-party database management system that is supported for the SAS Decision Manager database. For information about which versions of the alternative databases are supported, see “Reviewing Third-Party Database Requirements” in SAS Intelligence Platform: Installation and Configuration Guide.

The SAS Deployment Wizard prompts you to enter the information that you gathered when you completed the pre-installation tasks for your database. See “Pre-installation Tasks for SAS Decision Manager Common Data Server” on page 6 and “Pre-installation Tasks for an Oracle Database” on page 7 for more information.

For database-specific information about configuring a database, see SAS Intelligence Platform: Installation and Configuration Guide.

Create and Load Tables through the SAS Deployment Wizard

If you select SAS Decision Manager Common Data Server as the database type, the database tables are automatically created and loaded during the installation and configuration process for the SAS Decision Manager Common Data Server. The default name for the database is dcmdb.

If you select Oracle as the database type, the Automatically create tables and load data check box in SAS Deployment Wizard is enabled. If you want the Oracle database tables to be created and loaded automatically, leave this box selected. If you want to create the tables yourself, then clear the check box, and submit the necessary SQL statements after the wizard finishes running. See “Create Oracle Database Tables” on page 18 for more information.
Performing Post-installation Tasks

Post-installation Configuration and Verification Steps

Create Users and Assign Permissions

Creating Operating System Accounts for Product Administrators and Users

- About the User Accounts for SAS Business Rules Manager
- Using Operating System Groups to Assign Permissions
- Create Windows Operating System Accounts and Groups for Users
- Create UNIX Operating System Accounts and Groups for Users

Create Oracle Database Synonyms

Create Oracle Database Tables

Verify the Certificate

Review Application Properties in SAS Management Console

- Review Properties
- Business Rules Manager Web Settings
- Business Rules Manager Web Advanced Properties
- Decision Manager Advanced Properties

Modify Log File Settings

- Log4j Configuration File
- Logging Priority Levels
- Log Files
- Turn on SQL Logging

Manage Directories for Business Rules Content

Post-installation Configuration and Verification Steps

After you install SAS Business Rules Manager using SAS Software Depot, you must perform additional configuration steps before you can use SAS Business Rules Manager.

1 Verify that all installation and configuration steps in the Instructions.html file have been completed. The Instructions.html file is located in \SAS-configuration-directory\Lev\Documents\. Follow the instructions that are provided in this file.

2 Create application users and assign permissions.

3 (Optional) If you are using the SAS Decision Manager Common Data Server for the SAS Decision Manager database, you can configure the data server for high availability. For instructions, see the technical paper Managing SAS Web Infrastructure Platform Data Server High-Availability Clusters on UNIX.
4 (Optional) Run the scripts to create Oracle synonyms in the database if you do not want to use the default Oracle schema.

5 If you cleared the **Automatically create tables and load data** check box during installation, then you must manually create and load the Oracle database tables for business rules data. For more information, see “Create Oracle Database Tables” on page 18.

6 Verify that the Certificate Authority certificate is available.

7 (Optional) Add the Visual Analytics: Data Building and Data Management: Lineage roles to the Decision Manager Users group. See “Administering Group and Role Membership” on page 41 for more information. These roles enable users to run SAS Visual Data Builder and view lineage information for rule flows.

8 (Optional) **Configure SAS Workflow**.

9 **Review application properties** in SAS Management Console.

10 (Optional) **Modify log file settings**.

11 (Optional) If you are using Oracle for the SAS Decision Manager database, you can choose to stop the SAS Decision Manager Common Data Server.

12 Create libraries and register tables in SAS Management Console.

For more information about post-installation tasks, see *SAS Intelligence Platform: Installation and Configuration Guide*.

---

**Create Users and Assign Permissions**

The SAS Deployment Wizard does not create application users by default. The SAS Administrator must create users in SAS Management Console with the appropriate group and role permissions. Make sure that all users are granted the appropriate permissions to the SAS Workspace Server. For more information, see “Administering SAS Identities for Users” on page 38.

In a Windows environment, each user or group must be granted permission to the **Log on as a batch job** local security policy. This permission is required in order to access functionality in the Data category. For more information, see “Create Windows Operating System Accounts and Groups for Users” on page 15.

In a UNIX environment, all SAS Business Rules Manager users must be part of a group that has the appropriate group permissions. For more information, see “Create UNIX Operating System Accounts and Groups for Users” on page 16.

---

**Creating Operating System Accounts for Product Administrators and Users**

**About the User Accounts for SAS Business Rules Manager**

SAS Business Rules Manager provides two types of user accounts:

**Product administrator**

A SAS Business Rules Manager administrative user is specific to SAS Business Rules Manager. A product administrator account is not the same as a general administrator account, such as the SAS Administrator...
Users of SAS Business Rules Manager

These users must have a valid host operating system account, and you must associate that account with a metadata user through SAS Management Console.

You must create the operating system account for the administrator and for regular user accounts as a post-installation task. For more information, see the following topics:

- “Create Windows Operating System Accounts and Groups for Users”
- “Create UNIX Operating System Accounts and Groups for Users”
- “Administering SAS Identities for Users”

Using Operating System Groups to Assign Permissions

Users have different operating system privileges on the SAS Workspace Server. By defining a user group for SAS Business Rules Manager, you can assign all users to the same group and grant the same permissions to all users at one time. All SAS Business Rules Manager users must have Read, Write, and Execute permissions for each environment directory that a user is permitted to use. Users also need permissions to all of the files and directories in an environment directory. The operating system must be configured to grant these permissions when new files and directories are created. The steps that you follow to do this depend on which operating system groups are defined and your site’s security policies.

Create Windows Operating System Accounts and Groups for Users

On the SAS Workspace Server, create an operating system account for the administrator of SAS Business Rules Manager and all SAS Business Rules Manager users.

If the SAS Workspace Server is running in the Windows operating environment and you are using an LDAP server to manage your users, define the user. An example is domain\username on the Active Directory server.

If the SAS Workspace Server is running in the Windows operating environment and you are working on a local machine, complete these steps to create this user account:

1. Right-click the Computer icon on your desktop and select Manage. The Computer Management window appears.
   
   Note: If you are creating users on a server, you can use the Server Manager.

2. In the left navigation pane, expand the Local Users and Groups node. The Users and Groups nodes appear.

3. Right-click the Users node and select New User. The New User window appears.

4. In the New User window, complete these tasks:
   
   - Specify a user name and password.
     
     Note: In Windows, you cannot enter <domain>\username (you enter the user name only). In the SAS Deployment Wizard and SAS Management Console, you must enter <domain>\username.
   
   - Clear the User must change password at next logon check box.
   
   - Select the User cannot change password check box.
   
   - Select the Password never expires check box.

   Click Create.
Click Close to close the New User dialog box.

If you want to add the users that you created to a group, perform the following steps:

a. Right-click the Groups node in the Computer Management window, and select New Group.
b. Click Add. Enter the user names, separated by semicolons, and click Check Names.
c. Click OK.

Assign the security policy of Log on as batch job for each user or group.

b. From the Local Security Policy window, expand the Local Policies node and select User Rights Assignment. Then double-click the Log on as batch job policy.
c. Click Add user or Group. Enter the user names or group names, separated by semicolons, and click Check Names.
d. Click OK.

Create UNIX Operating System Accounts and Groups for Users

Conditions for the User Group

If you are working in a UNIX operating environment, the following conditions must be met:

- A group of users is created for the UNIX operating environment. The logon IDs for each user must be in this group. The group must also include any user who might run code that is created by SAS Business Rules Manager in a SAS session.
- Users can be members of multiple groups, but the SAS Business Rules Manager group is the primary group for each user.
- The SAS scripts are updated to grant permissions to the SAS Business Rules Manager users on the SAS Workspace Server. For more information, see "Update the SAS Scripts to Grant Permissions to the User Group" on page 16.
- Each environment directory has the correct ownership, and the user group has Read, Write, and Execute permissions.

Update the SAS Scripts to Grant Permissions to the User Group

Using the umask option, you can grant permissions to users on a conditional basis if the user is part of the SAS Business Rules Manager user group.

Note: This example might require changes to fit your server configuration. In particular, this example could result in changed permissions on other SAS files, such as OLAP cubes. You might be working with multiple UNIX groups and have a SAS OLAP Server. In this case you must ensure that the account under which the SAS OLAP Server runs has Read and Execute permissions to OLAP files.

To set these permissions:


2. Enter the configuration information for your operating environment. Here is the general format of this code:
Note: The following code uses grave accents and not quotation marks.

```bash
CMD=`your-operating-system-path`
CURR_GID=`eval $CMD -g`
GID=<solution-group-id>
if [ $CURR_GID -eq $GID ]; then umask 002 fi
```

a In the `CMD=<your-operating-system-path>`, specify the full path on your server where the ID command is stored. You can get this information by entering a `which id` or `whence id` command on your console.

b In the `GID=<solution-group-id>`, specify the group ID. Type `id` on your console to get the GID and UID information.

c A value of 002 is recommended for the `umask` option.

Here are code examples for each UNIX environment where SAS Business Rules Manager is supported:

<table>
<thead>
<tr>
<th>Operating Environment</th>
<th>Sample Code</th>
</tr>
</thead>
</table>
| AIX                   | CMD=/usr/bin/id
                       | CURR_GID='eval $CMD -g'
                       | GID=201
                       | if [ $CURR_GID -eq $GID ]; then umask 002 fi |
| H64I (HP-Itanium)     | CMD=/usr/bin/id
                       | CURR_GID='eval $CMD -g'
                       | GID=201 if [ $CURR_GID -eq $GID ]; then umask 002 fi |
| S64 (Solaris)         | CMD=/usr/xpg4/bin/id
                       | CURR_GID='eval $CMD -g'
                       | GID=201 if [ $CURR_GID -eq $GID ]; then umask 002 fi |
| SAX (Solaris for X64) | CMD=/usr/xpg4/bin/id
                       | CURR_GID='eval $CMD -g'
                       | GID=201
                       | if [ $CURR_GID -eq $GID ]; then umask 002 fi |
| LNX (Linux)           | #!/bin/bash
                       | CMD=/usr/bin/id
                       | CURR_GID='eval $CMD -g'
                       | GID=500
                       | if [ "$CURR_GID" -eq "$GID" ]; then umask 002 fi |

Create Oracle Database Synonyms

When you use Oracle for your SAS Decision Manager database, you might not want to use the default schema. In this case, you can run two SQL scripts to create synonyms for the database tables. These scripts are in `SASHome\SASDecisionManagerCommonDataServer\3.3\Config\Deployment\dbscript\Oracle\optional`. Use your preferred Oracle tool to run these scripts. One of these scripts,
brm_grant_priv_synonym.sql, uses substitution variables. If your Oracle tool does not support substitution variables, then you need to manually replace the variable with its value, as described in Step 2.

To run these scripts:

1. In the script named brm_grant_priv_synonym.sql, find the following line:
   ```sql
   def usernm='YOUR_USER_NAME';
   ```
   Replace `YOUR_USER_NAME` with the user ID that you are using to access the SAS Decision Manager database.

2. (Optional) If your Oracle tool does not support substitution variables, replace all occurrences of `&usernm` in the script named brm_grant_priv_synonym.sql with the user ID that you are using to access the database.

3. Run the script named brm_create_synonym.sql using your preferred Oracle tool. This script does not require substitution variables.

4. Run brm_grant_priv_synonym.sql using your preferred Oracle tool.

---

**Create Oracle Database Tables**

When you ran the SAS Deployment Wizard, the *Automatically create tables and load data* check box was selected by default for the SAS Decision Manager database. (See “Create and Load Tables through the SAS Deployment Wizard” on page 12.) If you cleared the *Automatically create tables and load data* check box and you do not have an existing database instance, you must run the SQL scripts to create and load the tables.

Run the following scripts to create the business rules tables with a compatible database client for your installation. These scripts are located in `SASHome/SASDecisionManagerCommonDataServer/3.3/Config/Deployment/dbscript/oracle`.

Before you run these scripts, replace `@schema.name@` in each file with the schema name for your database.

1. `brm_create_table.sql`
2. `brm_create_sequence.sql`
3. `brm_create_constraint.sql`
4. `brm_create_view.sql`
5. `brm_required_inserts.sql`
6. `edm_workflow_interface_create_table.sql`
7. `edm_workflow_interface_create_sequence.sql`
8. `edm_workflow_interface_create_constraint.sql`
9. `edm_workflow_interface_create_trigger.sql`
10. `edm_workflow_interface_required_inserts.sql`
11. `edm_create_table.sql`
12. `edm_create_constraint.sql`
13. `edm_create_sequence.sql`
14. `edm_required_inserts.sql`
15. `dcb_create_table.sql`
16. `dcb_create_constraint.sql`
Verify the Certificate

During installation and configuration of SAS 9.4, the SAS Deployment Wizard enables you to configure the SAS Web Server to use HTTPS and Secure Sockets Layer (SSL) certificates automatically. Verify that the Certificate Authority certificate is available to the truststore for the browser and Java clients such as SAS Workflow Studio and SAS Management Console. For more information, see the Instructions.html file in the directory \SAS-configuration-directory\Lev\Documents, and “Validate the Secured Middle-Tier Environment” in SAS Intelligence Platform: Middle-Tier Administration Guide.

If you did not use the SAS Deployment Wizard to configure the SAS Web Server to use HTTPS and SSL certificates, you can configure it manually. For more information, see “Configure SAS Web Server Manually for HTTPS” in SAS Intelligence Platform: Middle-Tier Administration Guide.

The communication path between SAS Web Server and SAS Web Application Server uses HTTP by default. You might have configured the SAS Web Server to use HTTPS by using the SAS Deployment Wizard. In this case you must complete additional steps in order to use HTTPS between SAS Web Server and SAS Web Application Server. For more information, see “Configure SAS Web Application Server for HTTPS” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Review Application Properties in SAS Management Console

Review Properties

Review the application properties in SAS Management Console to ensure that the values are appropriate for your environment. Complete the following steps:

1. In SAS Management Console, select the Plugin tab.
2. Select Application Management ➔ Configuration Manager ➔ SAS Application Infrastructure ➔ Enterprise Decision Manager 3.3.
4. Click the Settings tab. Review the properties listed in “Business Rules Manager Web Settings” on page 20. Click to enable editing for a property.
5. Click the Advanced tab. Review the properties listed in “Business Rules Manager Web Advanced Properties” on page 21. Following an upgrade, verify all non-default, SAS Business Rules Manager Web advanced property values against the list that you recorded prior to the upgrade.
6. Click OK to close the Business Rules Manager Web 3.3 Properties dialog box.
7. Right-click Decision Manager 3.3 and select Properties. The Decision Manager 3.3 Properties dialog box appears.
8. Click the Advanced tab. Review the properties listed in “Decision Manager Advanced Properties” on page 22.
9 Click OK to close the Decision Manager 3.3 Properties dialog box.

10 Right-click Decision Manager Common Mid 3.3 and select Properties. The Decision Manager Common Mid 3.3 Properties dialog box appears.

11 Click the Advanced tab, and review the setting of the edm.datasource.summary.maxrowcount property. This property specifies the maximum number of rows for data table summaries.

12 Click OK to close the Decision Manager Common Mid 3.3 Properties dialog box.

13 Restart SASServer7. You must restart the server in order for changes to configuration properties to take effect.

**Business Rules Manager Web Settings**

**Location of Code generation macro**
the location of the macro that generates the SAS code for rule sets and rule flows. This property is used only by rule flows that were published using the first maintenance release of SAS Business Rules Manager 1.2. It is not used by rule flows published with later versions.

**Max row count per table**
the maximum number of rows per rule flow test table. This property applies only to the first maintenance release of SAS Business Rules Manager 1.2, to SAS Business Rules Manager 2.1, and to SAS Decision Manager 2.1. It is not used by later versions.

**Temporary test code generation directory**
applies only to SAS Business Rules Manager 1.2 and the first maintenance release of SAS Business Rules Manager 1.2. This directory is not used by later versions.

**Largest allowed uploaded lookup table row count**
the maximum number of rows that can be uploaded for a lookup table. The default is 5000. This value should not exceed 10,000.

**Maximum Testing Log Length (in lines) of SAS log displayed within User Interface**
the maximum number of lines from the SAS log that are displayed on the SAS log section on the Results tab for the rule flow.

**Support macros in rule expressions**
determines whether macros are allowed in rule expressions.

*Note:* Macros are not supported in decision flows that are deployed by SAS Real-Time Decision Manager or in decisions that are published and run in the SAS Micro Analytic Service.

**Temporary Location used in Rule Generation**
a temporary directory that SAS Business Rules Manager uses while it generates the SAS code for vocabularies, rule sets, and rule flows. A best practice is to specify a directory that is outside of the SAS configuration directory.

**Test Library Root File System Directory**
the directory where rule flow tests and test results are saved. As users create additional rule flow tests, administrators might need to delete old test results, or ask users to delete old test cases. A best practice is to specify a directory that is outside of the SAS configuration directory.

*Note:* You might be running tests that use data sources that are in a distributed environment such as the Hadoop Distributed File System (HDFS). In this case, ensure that the SAS Server file system has enough space to accommodate output data in the form of SAS data sets. If sufficient space is not available, you might need to create subsets of the input data to use for testing.

**Test Metadata Library Root Directory**
the folder in which metadata for rule flow tests is stored.
Business Rules Manager Web Advanced Properties

**brm.csvfile.separator**
the character that is used as a separator in CSV files that are used to create lookup tables through the SAS Business Rules Manager interface.

**brm.datagrid.type.enabled**
enables the use of data grid variables and functions in rule flows. Contact SAS Technical Support for more information.

**brm.folder.config.enabled**
enables you to control access to folders. When this property is set to `true`, you can define a role for a business rules folder administrator. Users assigned to this role control which user group has access to a folder.

Setting **brm.folder.config.enabled** to `true` disables the ability to import and export business rules content from the SAS Decision Manager database. Business rules content includes business rules folders, vocabularies, terms, lookup tables, rule sets, and rule flows. See “Enable Business Rules Folder Administration” on page 44 for more information.

You can enable the role of folder administrator and still allow content to be imported and exported by setting **brm.import.restriction.override** to `true`.

**brm.import.restriction.override**
specifies whether business rules content can be imported to and exported from the SAS Decision Manager database when the **brm.folder.config.enabled** property is set to `true`.

**brm.lookup.file.upload.encoding**
the character encoding for files that contain lookup tables that will be imported through the user interface. The default encoding is UTF-8. The supported encodings are listed in Oracle Java SE documentation at https://docs.oracle.com/javase/7/docs/technotes/guides/intl/encoding.doc.html.

**brm.rulegen.mba.maxrowcount**
the maximum number of rows for output tables that are generated by the Market Baskets discovery technique.

**brm.rulegen.rfm.maxrowcount**
the maximum number of rows for output tables that are generated by the Recency Frequency Monetary discovery technique.

**brm.rulegen.scorecard.maxrowcount**
the maximum number of rows for output tables that are generated by the Scorecard discovery technique.

**brm.rulegen.tree.maxrowcount**
the maximum number of rows for output tables that are generated by the Decision Tree discovery technique.

**brm.runtime.codetype**
determines whether SAS Business Rules Manager generates DS2 code or DATA step (DS1) code for rule flows. In many cases, you will get better performance by specifying DS1. However, consider specifying DS2 if your input data is in Teradata, Greenplum, or Hadoop, and you have installed the SAS Code Accelerator. In addition, the LIKE operator is not supported for DS1.

**Note:** If you are migrating or upgrading from SAS Business Rules Manager 3.1 or earlier, this property is not defined. You can add it as a new property. This property exists starting with SAS Business Rules Manager 3.2.

**brm.testing.char.length.override**
the maximum number of characters for action terms that are defined as character variables and that are not mapped to input variables. This value is used when rule flows are tested in SAS Business Rules Manager.
brm.default.application.server.context.override
the default application server for rule flow testing. You can specify the short logical name such as SASApp. If a value is not specified for this property, SAS Business Rules Manager looks for a server context named SASApp. If that server context does not exist, SAS Business Rules Manager uses the last one returned from the metadata server.

Note: This property is not predefined. You can add it as a new property.

brm.publish.add.all.rulefired.columns
specifies whether the rulesfiredforrecordcount, _recordCorrelationKey, ENTITY_PRIMARY_KEY, and TRANSACTION_DTTM columns are added to the output tables created by rule sets. To use these columns as outputs of a Business Rules transformation in SAS Data Integration Studio, set this property to true. The rulesfiredforrecordcount column is the number of rules that fired for each record. For descriptions of the _recordCorrelationKey, TRANSACTION_DTTM, and ENTITY_PRIMARY_KEY columns, see "Columns in the Rule-Fired Details Table" in SAS Business Rules Manager: Macro Guide. For more information, see "Using a Business Rule Flow in a Job" in SAS Data Integration Studio: User’s Guide.

Note: This property is not predefined. You can add it as a new property.

Decision Manager Advanced Properties

Logon.Style
the default theme used by the SAS Business Rules Manager interface.

dcb.default.application.server.context.override
the default application server for decision testing. You can specify the short logical name such as SASApp. If a value is not specified for this property, SAS Business Rules Manager looks for a server context named SASApp. If that server context does not exist, SAS Business Rules Manager uses the last one returned from the server service.

Note: This property is not automatically added for migrations or upgrades.

services.rootscsfolder
the root folder for the SAS Content Server. Do not change this value.

Modify Log File Settings

Log4j Configuration File
SAS Business Rules Manager uses log4j to perform logging. When SAS Business Rules Manager starts, the log4j configuration file for the web application is read from SAS-configuration-directory\Lev\Web\Common\LogConfig\SASBusinessRulesManagerWeb-log4j.xml. This file is a standard log4j configuration file.

You should not change the existing categories or root logger in a configuration file unless you are instructed to do so by SAS Technical Support.

Note: If you make any changes to the log4j configuration file, you must restart SASServer7 for the changes to take effect.

Logging Priority Levels
You can change the logging priority levels in a log configuration file if needed.
Table 4.1 Logging Priority Levels

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUG</td>
<td>The most verbose logging level. This level displays information that is most useful for debugging an application. SAS Business Rules Manager should run under this priority only for capturing additional log information. This priority level is not an acceptable priority level for the day-to-day operation of SAS Business Rules Manager.</td>
</tr>
<tr>
<td>INFO</td>
<td>Verbose logging level. This level displays messages that highlight the progress of an application. SAS Business Rules Manager should run under this priority only for capturing additional log information. This priority level is not an acceptable priority level for the day-to-day operation of SAS Business Rules Manager.</td>
</tr>
<tr>
<td>WARN</td>
<td>Restrictive logging. This level displays information about potentially harmful situations and is an acceptable priority for the day-to-day operation of SAS Business Rules Manager.</td>
</tr>
<tr>
<td>ERROR</td>
<td>The most restrictive logging level. This level displays error events and is an acceptable priority for the day-to-day operation of SAS Business Rules Manager.</td>
</tr>
</tbody>
</table>

Log Files

SAS Business Rules Manager writes information to the following log files:

- SASBusinessRulesManagerWeb3.3.log contains messages from SAS Business Rules Manager
- SASDecMgrCommon3.3.log contains messages from the Workflow and Data plug-ins
- SASDecMgrShell3.3.log contains general messages from the Shell

By default, SAS Business Rules Manager writes log files to \SAS-configuration-directory\Levnl\Web\Logs\SASServer7_1\. You can change the location of these log files in the configuration file. Changes to the configuration file take effect when the middle-tier application server is restarted. See "Administer Logging for SAS Web Applications" in SAS Intelligence Platform: Middle-Tier Administration Guide for more information about this configuration file.

SAS Business Rules Manager creates new log files each day. For information about logging configurations, see "Modifying Your Server Logging Configurations" in SAS Intelligence Platform: System Administration Guide.

Turn on SQL Logging

To turn on SQL logging and write SQL parameter values for each query to the log file, add the following categories to the log4j.xml configuration file:

```xml
<category additivity="false" name="org.hibernate.type">
    <priority value="TRACE"/>
    <appender-ref ref="SAS_FILE"/>
</category>

<category additivity="false" name="org.hibernate.SQL">
    <priority value="DEBUG"/>
    <appender-ref ref="SAS_FILE"/>
</category>
```
Manage Directories for Business Rules Content

SAS Business Rules Manager creates two directories for business rules metadata: **Products** and **/System/Applications**.

SAS Business Rules Manager creates a location for published XML files, **sas dav/Products**. The BusinessRuleFlow metadata object does not delete the XML documents stored in this location in order to ensure that an audit trail is maintained.

Before you delete any XML content from **sas dav/Products**, you should do the following:

1. Back up all versions of the content. The easiest way to back up the content is to use SAS Management Console to export the BusinessRuleFlow object that refers to the content.

2. Ensure that no BusinessRuleFlow objects refer to the content.

For content that was published with an earlier release of SAS Business Rules Manager, the current release of SAS Business Rules Manager continues to use the original publish location. Do not delete directories created by earlier releases of SAS Business Rules Manager.
Performing Migration Tasks

About the Migration Process

You can migrate from any release of SAS Business Rules Manager to SAS Business Rules Manager 3.3.

The SAS Business Rules Manager migration process supports migrating to a database from the same vendor as the database that you are currently using. Migrating from a database based on Oracle to a database based on PostgreSQL, or vice versa, is not supported.

If you are using Oracle for your database, the migration process assumes that the migrated environment uses the same instance of Oracle. The migration process does not support moving to a different Oracle database server.

Pre-migration Steps

For information about the pre-migration tasks that you must perform, see “Performing Pre-migration Tasks” in SAS Intelligence Platform: Migration Guide. Here are some important steps to help with your migration:

- Back up your SAS system, including servers and desktop clients.
- Back up the SAS Decision Manager database if you are migrating from SAS Business Rules Manager 2.1 or later to SAS Business Rules Manager 3.3 on a SAS 9.4 system.
- If you are moving to a new system, ensure that the required operating system user accounts that you use for SAS in your current operating system also exist in your new operating system.
- Before you migrate to SAS Business Rules Manager 3.3, you should record the database settings in your current environment. Verify that these settings are entered in the SAS Deployment Wizard when you run the migration.
  - If you are migrating from SAS Business Rules Manager 2.1 or later and you are using the SAS Web Infrastructure Platform Data Server for your database, record the database name and the user ID for the database. The default database name is brmdb.
You can find the database name in the `/SAS-configuration-directory/Levn/Web/WebAppServer/SASServer7_1/conf/server.xml` file on the middle-tier server. Find the resource with the name `sas/jdbc/dcmSharedDataSource`, and look for the value of the `url` attribute. The database name is the text after the final forward slash (`/`) in the URL. For example, if the attribute is `url="jdbc:postgresql://host:10482/brmdb"`, then the database name is `brmdb`.

- If you are migrating from SAS Business Rules Manager 2.2 or later, record the database name and the user ID for your SAS Decision Manager Common Data Server database. The default database name is `dcmdb`.

You can find the database name in the `/SAS-configuration-directory/Levn/Web/WebAppServer/SASServer7_1/conf/server.xml` file on the middle-tier server. Find the resource with the name `sas/jdbc/DecisionManagerDS`, and look for the value of the `url` attribute. The database name is the text after the final forward slash (`/`) in the URL. For example, if the attribute is `url="jdbc:postgresql://host:10482/dcmdb"`, then the database name is `dcmdb`.

- If you are using Oracle for your database, ensure that the Oracle client is installed on your server tier and that there is a matching `tnsnames.ora` file that corresponds to your database.

- If you are using Oracle for your database, record the information that is listed in the following table.

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Record Information Here</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Name</td>
<td>Specifies the fully qualified host name of the server on which the database is installed.</td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>Specifies the port number that is used by the database.</td>
<td></td>
</tr>
<tr>
<td>Directory containing JDBC driver jars</td>
<td>Specifies the location of the database vendor's JDBC JAR file. This file must be available on the middle tier and on any machine on which you are deploying SAS Business Rules Manager in order to configure SAS Decision Manager database. See &quot;Verify JDBC Drivers for Oracle&quot; on page 7 for more information.</td>
<td></td>
</tr>
<tr>
<td>Database SID or Service Name</td>
<td>Specifies the Oracle database name. The database name must match either the service name or the Oracle site identifier (SID), both of which can be found in the <code>tnsnames.ora</code> file. For example: <code>&lt;CONNECT_DATA = (SERVICE_NAME = mydb)&gt;</code>&lt;br&gt;<code>&lt;CONNECT_DATA = (SID = mydb)&gt;</code>&lt;br&gt;You can also find the Oracle SID by running the following query using a database user ID on your Oracle instance: <code>select instance from v$thread</code>&lt;br&gt;Note: If you select <strong>Use Oracle database name as a Service Name</strong>, then you must enter the service name that is specified in the <code>tnsnames.ora</code> file. For information about naming methods for Oracle databases, see the Oracle documentation for your database at <a href="https://docs.oracle.com/en/database/oracle/oracle-database/index.html">https://docs.oracle.com/en/database/oracle/oracle-database/index.html</a>.</td>
<td></td>
</tr>
</tbody>
</table>
**Prompt** | **Record Information Here** | **Description**
--- | --- | ---
User ID | Specifies the user ID of the database user whose credentials are used to access SAS Business Rules Manager data on the server. |
Password | Specifies the password of the user ID whose credentials are used to access SAS Business Rules Manager data on the server. |
Schema Pattern | Specifies the schema name for the database. The default schema name is the same as the user ID. |

- If you are using Oracle for your database, verify that you have the correct JDBC drivers. For more information, see “Verify JDBC Drivers for Oracle” on page 7.
- Use the SAS Migration Utility to create a migration package.
  
  For more information, see “SAS Migration Utility Reference” in SAS Intelligence Platform: Migration Guide.

---

**Post-migration Steps**

**Overview of Post-migration Steps**

After you have migrated to SAS Business Rules Manager 3.3 on the latest maintenance release of SAS 9.4, perform the following post-migration steps:

1. Copy or move the contents of the rule flow testing directories. See “Copying Rule Flow Test Results” on page 28 for more information.

2. Run the appropriate migration script to migrate your database to SAS Business Rules Manager 3.3. See the following topics for additional information:
   - “Migrate to Version 3.3 for Oracle” on page 28
   - “Migrate to Version 3.3 for SAS Decision Manager Common Data Server” on page 28

  **Note:** If you are migrating from SAS Business Rules Manager 3.3 to 3.3 (hardware upgrade) and you are using Oracle for your database, you do not need to run a migration script.

3. Update your user group memberships, authorization, roles, and capabilities as needed. See “Updating Groups and Roles for SAS Business Rules Manager 3.3” on page 44 for more information.

4. (Optional) Add the Visual Analytics: Data Building and Data Management: Lineage roles to the Decision Manager Users group. See “Administering Group and Role Membership” on page 41 for more information. These roles enable users to run SAS Visual Data Builder and view lineage information for rule flows.

5. (Optional) Create a new top-level folder for SAS Business Rules Manager content if there are no existing top-level folders. See “%BRM_IMPORT_FOLDER” in SAS Business Rules Manager: Macro Guide for more information.

6. Review the configuration properties in SAS Management Console. Ensure that the values are appropriate for the new environment. See “Review Application Properties in SAS Management Console” on page 19 for more information.
7 (Optional) If you are migrating from SAS Business Rules Manager 2.1, perform post-installation configuration and verification steps for SAS Workflow. For more information, see “Configuring SAS Workflow for Use with SAS Business Rules Manager” on page 53.

Copying Rule Flow Test Results

Rule flow testing results are not automatically migrated. For any results that you want to access with SAS Business Rules Manager 3.3, complete the following steps:

1 Copy the test results from your old deployment to the new deployment. The directory path for rule flow test results is specified by the Business Rules Manager Web property Test Library Root File System Directory in SAS Management Console. You must use the same directory path in the new deployment. See “Review Application Properties in SAS Management Console” on page 19 for more information.

2 (Optional) If you are running in a UNIX operating environment and the user that needs to access the test results is different from the current user, use the chown -R command to change the ownership of the testing folders. For more information, refer to the UNIX man page for the chown command.

3 Update the relationship information for the test results so that users can view the test results and re-run the test cases. To update the relationship information, run the following REST service:

   http://host:port/SASBusinessRulesManagerWeb/rest/RuleflowTestLibMigrate

Migrate to Version 3.3 for Oracle

The scripts for migrating an Oracle database are located in the following directory:

SASHome/SASDecisionManagerCommonDataServer/3.3/Config/Deployment/dbscript/oracle/migration/

To migrate an Oracle database to SAS Business Rules Manager 3.3, run the migration_brm_version_to_brm_3.3.sql script for your current release of SAS Business Rules Manager.

For example, you can use SQL*Plus to run the script to migrate from SAS Business Rules Manager 2.2 to 3.3 as follows:

   sqlplus username@tnsname @/install/SASHome/SASDecisionManagerCommonDataServer/3.3/Config/Deployment/dbscript/oracle/migration/migration_brm_2.2_to_brm_3.3.sql schemaName

Migrate to Version 3.3 for SAS Decision Manager Common Data Server

If you are migrating from SAS Business Rules Manager 2.1 or later to 3.3 and you are using the SAS Decision Manager Common Data Server, you must run the database migration script for your operating environment. Run this script on the target middle-tier machine where the SAS Decision Manager Common Data Server is running.

1 Verify that the SAS Decision Manager Common Data Server is running on both the source and target machines.

2 Shut down all SAS Web Application Server processes.

3 Run the database migration script for your operating environment. The script for Windows platforms is named postgres-migration.bat, and the script for UNIX platforms is named postgres-migration.sh. They are located in the following directory:
SASHome/SASDecisionManagerCommonDataServer/3.3/Config/Deployment/Migration/

Note: This directory contains a README.TXT file that contains information about the parameters for these scripts.

When you run the migration script, substitute the correct values for the release that you are migrating from. This includes the server name, the port number, and the user ID for your database. The script prompts you to enter a password. The syntax for these scripts is as follows:

```
postgres-migration.[bat | sh] SASHome version
source_port source_host source_user source_db_name
target_port target_host target_admin target_user target_db_name
< target_exists >
```

*SASHome*
  specifies the SAS Home installation directory location. In Windows operating environments, it is recommended that you enclose this parameter in double quotation marks.

*version*
  specifies the version number of your current (source) database from which you are migrating content. Specify 2.1, 2.2, 3.1, 3.2, or 3.3.

*source_port*
  specifies the port number of the database from which you are migrating content.

*source_host*
  specifies the host name of the database from which you are migrating content.

*source_user*
  specify the user ID for Decision Manager Common Middle Tier. This value must be a user ID that has access to all of the database content that needs to be migrated. You can find the correct value for this parameter in the /SAS-configuration-directory/Lev1/Web/WebAppServer/SASServer7_1/conf/server.xml file on the middle-tier server for the source system. Specify the value of the user attribute of the resource with name `sas/jdbc/DecisionManagerDS`.

*source_db_name*
  specifies the name of the database from which you are migrating content. You can find the correct value for this parameter in the /SAS-configuration-directory/Lev1/Web/WebAppServer/SASServer7_1/conf/server.xml file on the middle-tier server for the source system. If you are migrating from SAS Business Rules Manager 2.1, find the resource with the name `sas/jdbc/dcmSharedDataSource`. If you are migrating from SAS Business Rules Manager 2.2 or later, find the resource with the name `sas/jdbc/DecisionManagerDS`. Look for the value of the `url` attribute. The database name is the text after the final forward slash (/) in the URL. For example, if the attribute is url="jdbc:postgresql://host:10482/dcmdb", then specify `dcmdb` for `source_db_name`.

*target_port*
  specifies the port number of the database to which you are migrating the content.

*target_host*
  specifies the host name of the database to which you are migrating the content.

*target_admin*
  specifies the user ID of the database administrator for the database to which you are migrating the content. This user ID is used to clean the target database and prepare it for the migrated content.

*target_user*
  specifies a database user ID for the database to which you are migrating the content. This user ID is assigned ownership of the migrated content.

*target_db_name*
  specifies the database name of the database to which you are migrating the content. The default target database name is `dcmdb`. 

Post-migration Steps

29
target_exists

specifies whether the target database exists. The default value is YES. If you have attempted to run this migration script but the migration failed, specify NO. Normally, the script creates a backup of the source database. If you specify NO, the script does not create an additional backup.

Note: This parameter is optional.
Performing Upgrade Tasks

About the Upgrade Process

You can upgrade from SAS Business Rules Manager 2.1 or 2.2 to SAS Business Rules Manager 3.3.

Note: Beginning with SAS Business Rules Manager 3.1, SAS Business Rules Manager is integrated with SAS Lineage. If you are upgrading from SAS Business Rules Manager 3.1 or 3.2 to 3.3, only one pass of the SAS Deployment Wizard is needed. If you are upgrading from SAS Business Rules Manager 2.1 or 2.2 to 3.3, two passes of the SAS Deployment Wizard installation and configuration process are required in order to complete the upgrade. During the first pass of the SAS Deployment Wizard, your existing deployment is upgraded. After the upgrade has completed successfully, you must run the SAS Deployment Wizard again to install the new product components and to complete the configuration.

The SAS Business Rules Manager upgrade process supports upgrading to a database from the same vendor as the database that you are currently using. Upgrading from a database based on Oracle to a database based on PostgreSQL, or vice versa, is not supported.

If you are using Oracle for your SAS Decision Manager database, the upgrade process assumes that the upgraded environment uses the same instance of Oracle. The upgrade process does not support moving to a different Oracle database server.

Pre-upgrade Steps

Before you upgrade to SAS Business Rules Manager 3.3, record the database settings in your current environment. You must enter this information in SAS Deployment Wizard. Before you upgrade, you must also record all non-default values for the SAS Business Rules Manager Web advanced properties.

- You can upgrade from SAS Business Rules Manager 2.1 while using the SAS Web Infrastructure Platform Data Server for your database. In this case, record the database name and the user ID for the database. The default database name is brmdb.

  You can find the database name in the SASCONFIG/Web/WebAppServer/SASServer7_1/conf/server.xml file on the middle-tier server. Find the resource with the name sas/jdbc/dcmSharedDataSource, and look for the value of the url attribute. The database name is the text after the
If you are upgrading from SAS Business Rules Manager 2.2 or later, record the database name and the user ID for your SAS Decision Manager Common Data Server database. The default database name is `dcmdb`.

You can find the database name in the `SASCONFIG/Web/WebAppServer/SASServer7_1/conf/server.xml` file on the middle-tier server. Find the resource with the name `sas/jdbc/DecisionManagerDS`, and look for the value of the `url` attribute. The database name is the text after the final forward slash (`/`) in the URL. For example, if the attribute is `url="jdbc:postgresql://host:10482/dcmdb"`, then the database name is `dcmdb`.

If you are using Oracle for your database, ensure that the Oracle client is installed on your server tier. Also ensure that there is a matching `tnsnames.ora` file that corresponds to your database. Record the information in the following table.

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Record Information Here</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Name</td>
<td></td>
<td>Specifies the fully qualified host name of the server on which the database is installed.</td>
</tr>
<tr>
<td>Port</td>
<td></td>
<td>Specifies the port number that is used by the database. The default port for Oracle is 1521.</td>
</tr>
<tr>
<td>Directory containing JDBC driver jars</td>
<td></td>
<td>Specifies the location of the database vendor’s JDBC JAR file. This file must be available on the middle tier and on any machine on which you are deploying SAS Business Rules Manager in order to configure SAS Decision Manager database. See “Verify JDBC Drivers for Oracle” on page 7 for more information.</td>
</tr>
</tbody>
</table>
| Database SID or Service Name    |                         | Specifies the Oracle database name. The database name must match either the service name or the Oracle site identifier (SID), both of which can be found in the `tnsnames.ora` file. For example:

```sql
(CONNECT_DATA = (SERVICE_NAME = mydb))
```

```sql
(CONNECT_DATA = (SID = mydb))
```

You can also find the Oracle SID by running the following query using a database user ID on your Oracle instance:

```sql
select instance from v$thread
```

Note: If you select **Use Oracle database name as a Service Name**, then you must enter the service name that is specified in the `tnsnames.ora` file.


| User ID                         |                         | Specifies the user ID of the database user whose credentials are used to access SAS Business Rules Manager data on the server. |

### Upgrade Steps for SAS Business Rules Manager

To determine the required steps to upgrade to the latest version of SAS Business Rules Manager, see the upgrade instructions in SAS Guide to Software Updates and Product Changes at http://support.sas.com/documentation/whatsnew/index.html#wn94.

Follow the instructions provided in “Add SAS Products That Require Configuration” in SAS Intelligence Platform: Installation and Configuration Guide to complete the installation and configuration process for an upgrade.

When you run the SAS Deployment Wizard the second time, complete these steps:

1. Verify that your plan file contains SAS Decision Manager Common products.

2. Verify that you are using the new SAS installation data (SID) file. The SID file for your software (your order) is located in the `sid_files` directory at the root of your SAS Software Depot. Or, if you have received media, the SID file is on the first disk of that installation media.

3. In the list of products to be installed, do not change the selections. If there are no product changes, then the deployment wizard does not re-install any pre-existing products.

When you run the SAS Deployment Wizard the second time, the SAS Lineage Mid-Tier is installed.

When you run the SAS Deployment Wizard the second time, the following products are installed:

- SAS Lineage Mid-Tier
- SAS Micro Analytic Service Java Interfaces
- SAS Micro Analytic Service Rest API

**Note:** In a multi-machine environment, the server products are typically installed on the SAS Application Server. The rest of the products are on the SAS Middle-Tier Server.

**Note:** If you are configuring multiple web application servers, `SASServer13` is added to the deployment for the additional products, so be aware of the need for additional ports.

4. Before the configuration stage begins, make sure that the following SAS Services are started:

- SAS Metadata Server
- SAS Web Infrastructure Platform Data Server
- SAS Decision Manager Common Data Server (if you are not using Oracle for your database)
- SAS Web Server (httpd - WebServer)
- SAS Object Spawner
Post-upgrade Steps

1 After you complete the upgrade process with the SAS Deployment Wizard, see the Instructions.html file. The Instructions.html file is located in \SAS-configuration-directory\Lev\Documents\. The default URL is http://host_name:port/SASDecisionManager.

2 If you are upgrading from SAS Business Rules Manager 2.1 to 3.3 and you are using the SAS Decision Manager Common Data Server for your database, use SAS Deployment Manager to remove the existing configuration for both Decision Manager Common Mid-Tier and Business Rules Web Manager Mid-Tier. See “Removing a SAS Configuration” in SAS Intelligence Platform: Installation and Configuration Guide for more information.

   Note: Do not remove the configurations if you are using Oracle for your database.

3 If you are upgrading from SAS Business Rules Manager 2.1 to 3.3 and you are using the SAS Decision Manager Common Data Server for your database, run the SAS Deployment Wizard a second time to reconfigure both Decision Manager Common Mid-tier and Business Rules Web Manager Mid-Tier.

   Note: Do not reconfigure these products if you are using Oracle.

4 If you are upgrading from SAS Business Rules Manager 2.1 and you are using the SAS Decision Manager Common Data Server, run the database migration script for your operating system. See "Migrate to Version 3.3 for SAS Decision Manager Common Data Server" on page 28 for more information. (You do not need to run a migration script if you are using Oracle or if you are upgrading from SAS Business Rules Manager 2.2 or later.)

5 Update your user group memberships, authorization, roles, and capabilities as needed. See “Updating Groups and Roles for SAS Business Rules Manager 3.3” on page 44 for more information.

6 (Optional) Create a new top-level folder for SAS Business Rules Manager content if there are no existing top-level folders. See “%BRM_IMPORT_FOLDER” in SAS Business Rules Manager: Macro Guide for more information.
7 (Optional) Add the Visual Analytics: Data Building and Data Management: Lineage roles to the Decision Manager Users group. See “Administering Group and Role Membership” on page 41 for more information. These roles enable users to run SAS Visual Data Builder and view lineage information for rule flows.

8 Review the configuration properties in SAS Management Console. Ensure that the values are appropriate for the new environment. See “Review Application Properties in SAS Management Console” on page 19 for more information. Verify the SAS Business Rules Manager Web advanced properties against the non-default values that you recorded before the upgrade.

9 (Optional) If you are upgrading from SAS Business Rules Manager 2.1 and are using SAS Workflow, perform the post-installation configuration and verification steps for SAS Workflow. For more information, see “Configuring SAS Workflow for Use with SAS Business Rules Manager” on page 53.
Security Administration Tasks for SAS Business Rules Manager

Administering SAS Identities for Users
- Overview of SAS Identities
- Creating SAS Identities

Groups and Group Membership
- About Groups
- Predefined User Groups in SAS Business Rules Manager

Roles and Capabilities
- About Roles and Capabilities
- Predefined Roles and Capabilities for SAS Business Rules Manager

Administering Group and Role Membership
- Viewing Roles and Capabilities in SAS Management Console
- Adding a User to a Group or Role
- Creating New Groups and Roles
- Modifying Roles

Updating Groups and Roles for SAS Business Rules Manager 3.3
- Enable Business Rules Folder Administration
- Update User Group Membership and Authorization
- Update Administrator Groups and Roles
- Configure the Ability to Import and Export Content

Security Administration Tasks for SAS Business Rules Manager

Security administration for SAS Business Rules Manager consists of the following tasks:
- administering SAS identities for your users by adding account information to the SAS Metadata Server
- administering groups of users in order to simplify the management of roles
- administering roles, which provide users with access to specific application features

The information included here is a brief introduction to the concepts of users, SAS identities, groups, roles, and capabilities. For complete information about security administration, see SAS Management Console: Guide to Users and Permissions and SAS Intelligence Platform: Security Administration Guide.
Administering SAS Identities for Users

Overview of SAS Identities

For each SAS Business Rules Manager user, you must create an individual SAS identity on the SAS Metadata Server. The SAS identity is a copy of the ID with which the user logs on to SAS applications. Based on this identity, the system can determine who can access which application and can audit individual actions in the metadata layer. The SAS identity consists of a name, user ID, and password for the user’s external account. This ID can be any type of account that is known to the metadata server’s host. Examples are an LDAP account, an Active Directory account, a host account, or another type of account.

When you are entering user IDs for Windows accounts, be sure to qualify the ID (for example, WIN\myID or myID@mycompany.com).

In a Windows environment, add new users to the Log on as a batch job local security policy on the machine that hosts the SAS Workspace Server.

Note: Users who log on to SAS Business Rules Manager using an internal account (a user ID that ends in @saspw) cannot access all of the features of the application. All users should be assigned external accounts.

The following users are created as part of the SAS Business Rules Manager installation process:

<table>
<thead>
<tr>
<th>User</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Administrator</td>
<td>This user has access to all SAS Management Console capabilities and metadata administrative tasks.</td>
</tr>
<tr>
<td>SAS Demo User</td>
<td>This user is optional. You can choose to create this user during installation. However, this user is not assigned to a group during installation.</td>
</tr>
</tbody>
</table>

Creating SAS Identities

To create SAS identities for your users, manually enter the information for each user through the User Manager plug-in in SAS Management Console. If you have a large number of users, then you can extract user and group information from one or more enterprise identity sources. You can then use SAS bulk-load macros to create the identity metadata from the extracted information.

For more information about creating and managing identities, see SAS Management Console: Guide to Users and Permissions. For information about the SAS bulk-load macros, see "User Import Macros" in SAS Intelligence Platform: Security Administration Guide.
Groups and Group Membership

About Groups

A group is a set of users. Groups enable you to grant multiple users membership in a role or permissions to metadata, thus simplifying security administration. You can create as many groups as are needed in order to manage your installation.

**TIP** A group's membership can include other groups as well as individual users. This enables you to create a nested group structure.

Predefined User Groups in SAS Business Rules Manager

**Table 7.2 Predefined User Groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>This group includes everyone who can access the metadata server, either directly or through a trust relationship. If a user is able to log on to a client application but does not have an individual SAS identity, the user is assumed to be in the public group. Because this group has implicit membership, you cannot explicitly add or remove users from this group.</td>
</tr>
<tr>
<td>SAS Users</td>
<td>This group includes everyone who can access the metadata server, either directly or through a trust relationship. If a user is able to log on to a client application but does not have an individual SAS identity, the user is assumed to be in the public group. Because this group has implicit membership, you cannot explicitly add or remove users from this group.</td>
</tr>
<tr>
<td>SAS Administrators</td>
<td>This is a standard group for metadata administrators. In a standard configuration, members are granted broad access and administrative capabilities, but are not unrestricted.</td>
</tr>
<tr>
<td>Decision Manager Common...</td>
<td>This group has administrative permissions. Membership in this group is required to administer workflows. In your initial installation, this group is a member of the following roles:</td>
</tr>
<tr>
<td></td>
<td>• Decision Manager Common: Administration</td>
</tr>
<tr>
<td></td>
<td>• Business Rules Manager: All Capabilities</td>
</tr>
</tbody>
</table>
Decision Manager Users

This group is created during the installation process. Members of this group have permission to read, add, or delete table summary information in the Data category.

During configuration, this group was associated with an identity that enables members to access the database during rule flow and table summary execution.

Note: This group is the only group that is granted permission to publish business rules content to the SAS Content Server by default.

Note: Unless you make configuration changes, users who do not have administrator permission must be members of this group. If you want these users to be members of a different group, you must grant the group permissions that enable members to do the following:

- access the database (using the necessary identity)
- publish content to the folders for SAS Business Rules Manager on the SAS Content Server

---

### Roles and Capabilities

#### About Roles and Capabilities

A role manages the availability of application features such as menu items and plug-ins. An application feature that is under role-based management is called a capability.

Certain actions are available only to users or groups that have a particular role. Any user or group who is a member of a role has all of that role’s capabilities.

Roles can contribute to one another. A role automatically includes all of the capabilities of a role that contributes to it.

Roles differ from permissions. In general, roles do not affect access to metadata or data.

#### Predefined Roles and Capabilities for SAS Business Rules Manager

Your installation includes several predefined roles for administrators and users of SAS Business Rules Manager. Depending on what software you have installed, you might have other predefined roles.

Note: The ability to access and update metadata is subject to permissions that are placed on that metadata. These roles do not affect permissions.

<table>
<thead>
<tr>
<th>Table 7.3 Predefined User Roles and Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
</tr>
<tr>
<td>Decision Manager Common: Administration</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Role</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Business Rules Manager: All Capabilities</td>
</tr>
<tr>
<td>Business Rules Manager: Rule Flow and Rule Set Designer</td>
</tr>
<tr>
<td>Business Rules Manager: Rule Flow and Rule Set Read-Only</td>
</tr>
<tr>
<td>Business Rules Manager: Vocabulary and Lookup Designer</td>
</tr>
<tr>
<td>Business Rules Manager: Vocabulary and Lookup Read-Only</td>
</tr>
<tr>
<td>Comments: Administrator</td>
</tr>
<tr>
<td>Data Management: Lineage</td>
</tr>
<tr>
<td>Visual Analytics: Data Building</td>
</tr>
</tbody>
</table>

**Administering Group and Role Membership**

To administer group and role membership, use the User Manager plug-in in SAS Management Console.

**Viewing Roles and Capabilities in SAS Management Console**

To view details about a role, open the User Manager plug-in in SAS Management Console, right-click the role, and select Properties. You can then view tabs that display the role’s members, capabilities, and contributing roles.

For example, the following display shows the capabilities for the Business Rules Manager: Rule Flow and Rule Set Designer role. These capabilities correspond to the description of this role in “Predefined Roles and Capabilities for SAS Business Rules Manager” on page 40.
Note: The preferred way to manage permissions for viewing vocabularies and lookup tables is by using capabilities under **Vocabulary/Entity/Term** and **Lookup**. The **Manage Vocabulary/Lookup definitions** capability is for compatibility with previous releases.

Note: Some roles have implicit capabilities that are not specified on the **Capabilities** tab.

The SAS Business Rules Manager capabilities control access to categories in the application. For example, the Rule Sets and Rule Flows categories do not appear when a user signs in to SAS Business Rules Manager if that user is not assigned to either of the following categories:

- Business Rules Manager: Rule Flow and Rule Set Designer
- Business Rules Manager: Rule Flow and Rule Set Read-Only

The Create or Update as well as the Delete capabilities control access to specific object types. You can combine the category capabilities with the object capabilities to control access at whatever level is needed. For example, if you want a user to be able to view and edit rule flows only, the user should have only the following capabilities:

- Manage Business Rule Flows and Rule Sets for the Business Rules Plug-in
- Create or Update as well as Delete capabilities for Rule Flow objects

The following table describes the icons used in the Properties window.
Adding a User to a Group or Role

In most cases, the best way to place a user in a role is to add the user to a group that belongs to the role. You can also add users directly to groups or roles.

To place a user in one of the predefined roles, you can add the user to one of the predefined groups. For example, to add a user to the Decision Manager Common: Administration role, add the user to the Decision Manager Common Administrators group.

For more information, see *SAS Management Console: Guide to Users and Permissions*.

Creating New Groups and Roles

The predefined groups and roles might be sufficient for many sites. Other sites might need to make application features available to users on either a broader or more granular basis than the predefined groups or roles allow.

You can use combinations of capabilities to create a new role. However, you can use only the capabilities that already appear in User Manager. You cannot create new capabilities.

For detailed information about roles and how to create them, see *SAS Management Console: Guide to Users and Permissions*.

Modifying Roles

The User Manager plug-in in SAS Management Console enables you to modify roles by selecting or deselecting different capabilities.

**CAUTION! No automated method can revert a role to its original set of capabilities.** Instead of adjusting the capabilities of a predefined role, consider creating a new role. This advice is especially important if you need to make major changes.

If you modify a role, then follow these best practices:

- Do not rename the predefined roles. Renaming the predefined roles makes it difficult for SAS Technical Support to help you resolve problems.
- Keep a record of the changes that you make.

When modifying a role, you can use only the capabilities that already appear in User Manager. You cannot create new capabilities.

For more information about roles and how to modify them, see *SAS Management Console: Guide to Users and Permissions*.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Icon 1]</td>
<td>None of the capabilities in this category have been specified for this role.</td>
</tr>
<tr>
<td>![Icon 2]</td>
<td>Some of the capabilities in this category have been specified for this role, either explicitly or through a contributing role.</td>
</tr>
<tr>
<td>![Icon 3]</td>
<td>All of the capabilities in this category have been specified for this role, either explicitly or through a contributing role.</td>
</tr>
</tbody>
</table>

Shaded check boxes indicate capabilities that come from contributing roles.
Updating Groups and Roles for SAS Business Rules Manager 3.3

When you perform a migration or an upgrade, the groups, roles, and capabilities defined in SAS Management Console are preserved in case they have been customized for your site. To take advantage of new roles and capabilities available in SAS Business Rules Manager, you might need to modify the settings in SAS Management Console.

Enable Business Rules Folder Administration

Note: This information applies to all new installations, upgrades, and migrations. Enabling folder administration is optional.

A business rules folder administrator specifies which groups have certain permissions. These permissions include the ability to create and update top-level business rules folders and to modify the location of tests and test data for those folders. See “Create New Top-Level Folders” in SAS Business Rules Manager: User’s Guide for more information. Only folder administrators can move folders and rename folders by using the Manage folders ➔ Rename menu option. All users can create subfolders, delete empty folders, and edit the names and descriptions of folders by using the Manage folders ➔ Edit top-level folder menu option.

Note: After you enable folder administration, you must assign a group to any pre-existing folders. Any folder that has not been assigned a group is visible only to folder administrators.

Follow these steps in SAS Management Console:

1. Set the brm.folder.config.enabled property to true. See “Review Application Properties in SAS Management Console” on page 19 for more information.

   Note: Setting brm.folder.config.enabled to true disables the ability to import and export business rules content. Business rules content includes business rules folders, vocabularies, terms, lookup tables, rule sets, and rule flows. You can override this restriction by setting brm.import.restriction.override to true.

2. Click the User Manager plug-in.


4. On the General tab, enter a name for the administrator role.

5. On the Capabilities tab, select Business Rules Manager Web 3.3 ➔ Administration ➔ Folder Administration.

6. On the Members tab, add the necessary identities to the role.

7. Click OK.
Update User Group Membership and Authorization

Note: This section applies only if you are upgrading or migrating from SAS Business Rules Manager 2.1 to 3.3.

In SAS Business Rules Manager 2.1, all users that needed access to the SAS Business Rules Manager database were assigned to the Business Rules Manager Users group. Beginning with SAS Business Rules Manager 2.2, users are assigned to the Decision Manager Users group. If you migrate or upgrade from SAS Business Rules Manager 2.1 to SAS Business Rules Manager 3.3, you might need to update the membership or authorization for the Business Rules Manager and Decision Manager User groups.

You can continue to use the Business Rules Manager Users group as your primary group, or you can start using the Decision Manager Users group. If you continue to use the Business Rules Manager Users group, you can preserve customized authorization settings.

To use the Decision Manager Users group as your primary group, in SAS Management Console, assign all users that need access to SAS Business Rules Manager to the Decision Manager Users group.

To continue to use the Business Rules Manager Users group:

1. Ensure that all users that need access to the SAS Business Rules Manager database are assigned to the Business Rules Manager Users group.

2. If you are using a different database instance in the migrated environment, update the authentication domains for migrated user groups. Complete the following steps in SAS Management Console:

   a. Remove the identity for the authentication domain `edm_db_auth` from the Decision Manager Users group.
      
      i. Select the User Manager plug-in.
      
      ii. Right-click Decision Manager Users and select Properties.
      
      iii. Click the Accounts tab. Record the user ID that is specified for the `edm_db_auth` authentication domain. This user ID is the user ID that you need to add to the Business Rules Manager Users group.
      
      iv. Select the row for `edm_db_auth` and click Delete.
      
      v. Click OK.

   b. Update the identity for the authentication domain `edm_db_auth` for the Business Rules Manager Users group. It must match the updated logon credential that was added to the Decision Manager Users group.
      
      i. Select the User Manager plug-in.
      
      ii. Right-click Business Rules Manager Users and select Properties.
      
      iii. Click the Accounts tab, and click New. The New Login Properties dialog box appears.
      
      iv. Enter the user ID that you recorded for the `edm_db_auth` domain and the password for this user ID. Select the `edm_db_auth` domain, and click OK.
Click OK to save the changes to the Business Rules Manager Users group.

**Update Administrator Groups and Roles**

*Note:* This information applies only if you are upgrading from SAS Decision Manager 2.1 to 3.3.

SAS Decision Manager 2.1 created the Decision Manager Common Administrator group and the Decision Manager Common: Administrator role. When you upgrade from SAS Decision Manager 2.1 to 3.3, the second pass of the SAS Deployment Wizard creates a new group named Decision Manager Common Administrators. It also creates a new role named Decision Manager Common: Administration.

Follow these steps in SAS Management Console:

1. Add the members of the Decision Manager Common Administrator group to the Decision Manager Common Administrators group.
2. Add the members of the Decision Manager Common Administrators role to the Decision Manager Common: Administration role.
3. Delete the old Decision Manager Common Administrator group and the old Decision Manager Common Administrators role.

See [Adjust Group or Role Membership](#) for more information.

**Configure the Ability to Import and Export Content**

SAS Business Rules Manager provides several macros for importing and exporting business rules content from the Decision Manager database. (Business rules content includes business rules folders, vocabularies, terms, lookup tables, rule sets, and rule flows.) You can limit the ability of users to run these macros by setting the correct properties and configuring identities in SAS Management Console. For more information, see "Macros Available with SAS Business Rules Manager" in *SAS Business Rules Manager: Macro Guide*.

**Control Access to the Import and Export Macros**

Perform the following steps in SAS Management Console:

1. Set the `brm.import.restriction.override` property to `true` if the `brm.folder.config.enabled` property is also set to `true`.

   *Note:* Setting `brm.folder.config.enabled` to `true` disables the ability to import and export business rules content. To override this restriction, set `brm.import.restriction.override` to `true`. See "Review Application Properties in SAS Management Console" on page 19 for more information.

2. Create a new group for users with full access. For example, create a new group named *Business Rules Admin Users*.
3. Add the new group as a member of the existing Decision Manager Users group. Members of the new group have the same access as members of the Decision Manager Users group. This access includes the ability to run the import and export macros and to update content through the user interface.
4. Create a second new group for users with limited access. For example, create a new group named *Business Rules NonAdmin Users*. Members of this group are able to update content through the user interface but are not able to run the import or export macros.
5. Create a run-time database user that has Read access to lookup tables only. This permission is the only one that is required to be able to run rules in SAS Business Rules Manager and in SAS Data Integration Studio. Follow the instructions for your database:

   - "Create a Run-time User for SAS Decision Manager Common Data Server" on page 47
“Create a Run-time User for Oracle” on page 48

6. Add a new logon credential for the run-time user to the second new group (Business Rules NonAdmin Users). Specify the user ID and password that were created in the previous step, and select the authentication domain edm_db_auth.

![Business Rules NonAdmin Users Properties](image)

7. Add any additional roles or capabilities that are needed by members of the new group.

Create a Run-time User for SAS Decision Manager Common Data Server

Run the createRuntimeUser script for your operating environment. This script creates an identity that has Read permission only for lookup tables.

The script for Windows platforms is named createRuntimeUser.bat, and the script for UNIX platforms is named createRuntimeUser.sh. They are located in the following directory:

SASHome/SASDecisionManagerCommonDataServer/3.3/Config.Deployment/createUser

Note: This directory contains a README.TXT file that contains information about the parameters for these scripts.

When you run the script, substitute the correct values for the port number, host name, and user ID for your database. The script prompts you to enter a password. The syntax for these scripts is as follows:

createRuntimeUser.[bat | sh] SASHome port host admin db_name user_ID

SASHome
   specifies the SAS Home installation directory location. In Windows operating environments, it is recommended that you enclose this parameter in double quotation marks.

port
   specifies the port number of your database.

host
   specifies the host name of the database.

admin
   specifies the user ID of the database administrator for the database. This user ID must have access to all of the database content. You can find the correct value for this parameter in SAS Management Console. In SAS Management Console, select the User Manager plug-in. Right-click the SAS Administrator user, and select Properties. The user ID of the database administrator is the user ID for the DecisionManagerComDataSvrCfg3.3Admin domain.

db_name
   specifies the name of the database. You can find the correct value for this parameter in the SASCONF/config/Server.xml file on the middle-tier server. The database name is the text after the final forward slash (/) in the URL. For example, if the attribute is url="jdbc:postgresql://host:10482/dcmdb", then specify dcmdb for db_name.

user_ID
   specifies a user ID for the new identity that will have Read permission only for lookup tables.
Create a Run-time User for Oracle

Ask your Oracle database administrator to perform the following tasks:

1. Create a new user and schema in Oracle and provide you with the new user ID and password.

2. Grant SELECT access to the following views for the new user in the SAS Business Rules Manager database.
   - DCM_LOOKUP_VIEW
   - DCM_SELECTED_LOOKUP_VIEW

3. Create synonyms in the new user’s default schema so that they can execute queries with unqualified references to those views.

   CREATE SYNONYM DCM_LOOKUP_VIEW FOR @brm.schema.name@.DCM_LOOKUP_VIEW;
   CREATE SYNONYM DCM_SELECTED_LOOKUP_VIEW FOR
   @brm.schema.name@.DCM_SELECTED_LOOKUP_VIEW;
Managing Tables with SAS Management Console

Access Data Tables from SAS Business Rules Manager

Create a SAS Library

Register Tables

Delete a Data Table

Access Data Tables from SAS Business Rules Manager

To access a data table from SAS Business Rules Manager, you must register the tables in the SAS Metadata Repository and add the tables as data sources in SAS Business Rules Manager. You use SAS Management Console to create libraries and register tables.

1. If the library where you want to register your data table does not already exist, complete the steps in “Create a SAS Library”.

2. Register tables. Registering tables imports table metadata into the SAS Metadata Repository and associates the tables with the newly created SAS library.

3. Add registered tables to the list of data sources in SAS Business Rules Manager. This makes the tables available to SAS Business Rules Manager.

Note: You can delete data tables from the SAS Metadata Repository only by using SAS Management Console. Data tables that are removed from SAS Business Rules Manager using the Data category view remain in the SAS Metadata Repository. For more information, see “Delete a Data Table” on page 51.

Create a SAS Library

To create a new SAS library in SAS Management Console:

1. Start SAS Management Console and connect to your preferred SAS Metadata Repository.

2. In the SAS Management Console tree, expand Environment Management ➔ Data Library Manager ➔ Libraries.

3. Right-click the Libraries folder, and select New Library.
In the folder display, ensure that the folders are expanded for **Resource Templates** ➔ **Libraries** ➔ **SAS Data**. Select **SAS BASE Library** and then click **Next**.

*Note:* You might want to register tables from a database, especially for the SAS High-Performance Analytics procedures. You can select the Teradata Library or Greenplum Library, instead of the Base SAS Library. For more information about creating database tables, see the SAS Management Console Help.

5 Enter a name, description, and location for your new SAS library, and then click **Next**.

6 (Optional) Select the SAS server where the new library is to be assigned, and then click **Next**.

7 Enter a unique SAS library reference name (a libref) of eight characters or fewer. You use the SAS libref to access the table.

8 Use the arrows to choose a path from the **Path Specification Available items** box, or click **New** to specify a new path for your library. Afterward, your library path specification appears in the **Path Specification Selected Items** list. Click **Next**.

9 Review the summary of the information that you entered, and if it is correct, click **Finish**.

SAS Management Console adds the new library to the SAS Metadata Repository. You can now register new tables in this library by using SAS Management Console.

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**Register Tables**

The Register Tables wizard guides you through the process of importing and registering a SAS data table in the SAS Metadata Repository. Each library type has a different Register Tables wizard that is called from the Data Library Manager.

*Note:* The Register Tables wizard is not available on UNIX platforms.

To import and register a table into a SAS Management Console Data Library:

1 Copy the .sas7bdat file for your table into the directory path on the SAS Workspace Server that you provided in the **Path Specification** data field of the New Library Wizard.

2 Start SAS Management Console, and connect to the SAS Metadata Repository that contains your new SAS library.

3 In the SAS Management Console tree, expand the following folders:
   
   **Environment Management** ➔ **Data Library Manager** ➔ **Libraries**

4 Right-click the SAS library name that you want to import your table into, and then select **Register Tables** from the pop-up menu.

5 Verify that the information that is displayed in the **Select a SAS Library** page is correct, and then click **Next**.

6 If prompted, enter your SAS user ID and password to log on to your SAS server.

7 The Default Application Server dialog box might appear if the selected folder location is **User Folders** or if a default application server has not been previously selected. Select your SAS server, click **Test Connection** to verify that the connection to the server is successful, and then click **OK**.

8 The Define Tables and Select Folder Location page is displayed. Select the table or tables that you want to register, and then click **Next**.

9 Click **Finish**.
The metadata for the imported table is written into the SAS Metadata Repository and is associated with the selected SAS library.

**Note:** You must create folders with appropriate access permissions so that users can manage their models, create reports, and publish model updates. If a SAS Business Rules Manager user does not have the appropriate permissions to access a folder, then the tables and libraries cannot be viewed in the Data category of SAS Business Rules Manager. For more information about creating a folder and setting permissions, see the SAS Management Console Help.

You can add registered tables to the list of data sources in SAS Business Rules Manager. For more information, see “Add Registered Tables from Metadata” in *SAS Business Rules Manager: User’s Guide*.

**Note:** SAS Business Rules Manager does not provide a way to modify the structure of a data table. If a data table is modified externally (by using SAS Management Console, for example), then the existing jobs in SAS Business Rules Manager might stop functioning. For more information, see SAS Management Console Help or *SAS Intelligence Platform: System Administration Guide*.

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**Delete a Data Table**

Data tables can be deleted only from the SAS Metadata Repository using SAS Management Console. Data tables that are removed from SAS Business Rules Manager using the Data category view still remain in the SAS Metadata Repository. If the data table's metadata is deleted from the SAS Metadata Repository using SAS Management Console or the operating system, SAS Business Rules Manager cannot access the data table to view data or to perform any reporting or scoring tests. In this case, an error message appears.

**Note:** Only a SAS administrator or a user with Delete permission can delete data tables using SAS Management Console.

To delete a data table in SAS Management Console:

2. On the **Plug-ins** tab, expand **Environment Management** ➔ **Data Library Manager** ➔ **Libraries**.
3. Select the library that contains the data table that you want to delete.
4. Right-click the data table name in the right pane, and then select **Delete** from the pop-up menu.
5. Click **OK** to delete the data table. The data table is removed from the SAS Metadata Repository library, but it is not physically removed from the operating system.

For more information, see SAS Management Console Help or *SAS Intelligence Platform: System Administration Guide*.
Configuring SAS Workflow

Overview
SAS Workflow provides services that work together to model, automate, integrate, and streamline business processes. It provides a platform for more efficient and productive business solutions.

SAS Workflow is used by SAS solutions that benefit from business process management. SAS Workflow Studio is a desktop client application that is used to design and deploy workflow definitions. The SAS middle tier hosts the workflow engine and the workflow services as part of the SAS Web Infrastructure Platform. SAS Business Rules Manager is used to manage the workflows that are associated with versions. For more information about SAS Workflow, see “SAS Workflow” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Prerequisites for Using SAS Workflow
To use SAS Workflow with SAS Business Rules Manager, be sure the following prerequisites are met:

1. SAS Workflow Engine, SAS Workflow Services, and SAS Workflow Studio must be installed and configured. For more information, see SAS Intelligence Platform: Installation and Configuration Guide.

2. If you want to receive notifications for a workflow, you must configure alert notifications using SAS Management Console. For more information, see “Configure Alert Notifications for SAS Workflow” on page 57.

3. The Workflows category capability (under Decision Manager 3.3 ➔ Decision Manager Common) must be selected for the Decision Manager Common: Administration role. See “Administering Group and Role Membership” on page 41 for more information.
Users must be a member of the Decision Manager Common Administrators Group or of another user group that is associated with the Decision Manager Common: Administration role.

In SAS Web Administration Console, the users or groups must be assigned to a workflow template management role. For more information, see Deploying and Maintaining Workflows in SAS Workflow Studio: User’s Guide.

Workflow definitions must be created using SAS Workflow Studio. For more information about creating workflow definitions, see Defining Workflows with SAS Workflow Studio in SAS Workflow Studio: User’s Guide.

Guidelines for Creating Workflow Definitions

When you create workflow definitions in SAS Workflow Studio to use with SAS Business Rules Manager, follow these guidelines:

- Participants, and policies must be added to the task level. Statuses added at the task level and the default statuses at the workflow definition level can be used for a task status. Data objects can be added at the workflow definition level or task level. Users can see only the data objects defined at the task level from the Workflows category in SAS Business Rules Manager.

- Only the Potential Owner and Business Administrator workflow roles are used by SAS Business Rules Manager and they can be used in either a participant or swimlane definition. The Actual Owner workflow role should not be used as part of a workflow definition.

- In order to assign additional participants to tasks in SAS Business Rules Manager, the user must have or be in a group that is assigned the workflow role of Business Administrator. Also, in order to manage workflows and assign participants, the user must be in:
  - the Decision Manager Common Administrators group
  - in a group that is a member of the Decision Manager Common Administrators group
  - in a group that is associated with the Decision Manager Common Administration role in SAS Management Console.

The following groups are created at installation time:

- Decision Manager Common Administrators Group
- Decision Manager Users Group

For more information, see “Security Administration Tasks for SAS Business Rules Manager” on page 37.

- Only workflow definitions that are activated in the Workflow repository, that are associated with the mmapi tag attribute in the file properties, are available to SAS Business Rules Manager.

Add the Approval Attribute to a Status

The Approval attribute allows a workflow designer to signify that a specific task approves the associated version for a rule flow. This attribute then notifies the users of the version that a rule flow is approved. For business rules the Approval attribute must be set so that a workflow can be used to manage rule flows.

To add the Approval attribute to a status:

1. Expand the statuses folder in the Workflow Tree.

2. Right-click a status and select Edit.
3 Click **Attributes**.

4 Click **Add** and enter the following values for the new attribute.
   
   **Key**
   - **Key**: Approval
   - **Note**: This key is case-sensitive.

   **Value**
   - **Value**: true

5 Click **OK** twice to save.

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### Make Workflow Definitions Available to SAS Business Rules Manager

After you have created a workflow definition in the SAS Workflow Studio, you must make the workflow definition available to SAS Business Rules Manager.

To save the workflow definition to the Workflow repository:

1. Save the workflow definition to your local drive.
2. Log on to the server.
3. Add the tag attribute of `mmapi` to the workflow definition file properties.
4. Upload the workflow definition.
5. Verify that the workflow definition is available in the Workflows category.

For more information, see Deploying and Maintaining Workflows in *SAS Workflow Studio: User’s Guide*.

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### Log On to the Server

With SAS Workflow Studio, you are limited to managing locally stored workflow definitions on your system until you have logged on to the SAS Content Server. After you are connected, you can access additional workflow definitions that are stored in the SAS Content Server.

To log on to the server:

1. Select **Server** ➔ **Log On**.
2 In the Log On window, select the host-name from the SAS environment drop-down list.  
   Note: For more information, see “Configure the SAS Environment File” in SAS Intelligence Platform: Middle-Tier Administration Guide.

3 Enter a user ID and password, and click Log On.

4 Click OK if a confirmation message appears.

Add Tag Attributes to a Workflow Definition
Only those workflow definitions in the Workflow repository that contain the mmapi tag attribute in the file properties are available to SAS Business Rules Manager.

To add a tag attribute to the file properties of a workflow template in SAS Workflow Studio:

1 Select File ➾ Properties and click Add.

2 Enter the tag value of mmapi.
   Note: The file properties are case sensitive. This value must be lowercase.

3 Click OK twice.

Upload a Workflow Definition
To upload a workflow:

1 From the Server menu, select the Save to Repository menu option. The Save to Workflow Repository window appears.

2 (Optional) Enter relevant comments to associate with the workflow definition.

3 Select the Activate option if you want to activate the current version in the Workflow repository.

4 Click OK.

5 Click OK if confirmation messages appear.

Verify That the Workflow Definitions Are Available In SAS Business Rules Manager
To verify that the workflow definitions are available in the Workflows category view of SAS Business Rules Manager:

1 Enter the URL http://hostname:port/SASDecisionManager in your web browser.

2 Enter the user ID and password for a user that is in the Decision Manager Common Administrators Group or a user group that is associated with the Decision Manager Common: Administration role.

3 Verify that the uploaded workflow definition is available in the Workflows category view.
   a Click ➔ to navigate to the Workflows category view.
   b Click ➔ and select Set mappings. The Set Mappings window appears with a list of the available workflow definitions.

For more information, see “Set Mappings” in SAS Business Rules Manager: User’s Guide.
Configure Alert Notifications for SAS Workflow

To enable workflow participants to receive alert notifications from SAS Workflow, you must configure the E-mail notification type in SAS Management Console. After you have configured the alert notifications, you can then use the Notify Participant policy and other workflow notification policies for workflow tasks in SAS Workflow Studio. The notifications setting in SAS Management Console is a global setting. Preferences and notifications can also be configured for individual users.

The Send Notification By Data Object policy in SAS Workflow Studio integrates with the SAS Web Infrastructure Platform's Notification Service. Recipients are notified according to their preferences (email or portlets).

1. Log on to SAS Management Console as an administrator.
2. On the Plug-ins tab, navigate to Application Management ➔ Configuration Manager ➔ SAS Application Infrastructure.
3. Right-click SAS Application Infrastructure and select Properties.
4. Click the Settings tab.
5. Select Notifications in the left panel. Use the menus or text fields to set the property.
6. Select the E-mail notification type.
7. Click OK.
8. To apply this setting and make it available, restart the SAS Web Infrastructure Platform Services, SAS Shared Services, and applications using SAS Workflow.

For more information about the notification properties, see “Set Global Properties for SAS Applications” in SAS Intelligence Platform: Middle-Tier Administration Guide. For more information about setting the notification policies for SAS Workflow, see the SAS Workflow Studio Help or SAS Workflow Studio: User’s Guide.