

SAS[®] Model Manager 12.1

Tutorials



The correct bibliographic citation for this manual is as follows: SAS Institute Inc. 2012. *SAS® Model Manager 12.1: Tutorials*. Cary, NC: SAS Institute Inc.

SAS® Model Manager 12.1: Tutorials

Copyright © 2012, SAS Institute Inc., Cary, NC, USA

All rights reserved. Produced in the United States of America.

For a hardcopy book: No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without the prior written permission of the publisher, SAS Institute Inc.

For a Web download or e-book: Your use of this publication shall be governed by the terms established by the vendor at the time you acquire this publication.

The scanning, uploading, and distribution of this book via the Internet or any other means without the permission of the publisher is illegal and punishable by law. Please purchase only authorized electronic editions and do not participate in or encourage electronic piracy of copyrighted materials. Your support of others' rights is appreciated.

U.S. Government Restricted Rights Notice: Use, duplication, or disclosure of this software and related documentation by the U.S. government is subject to the Agreement with SAS Institute and the restrictions set forth in FAR 52.227–19 Commercial Computer Software-Restricted Rights (June 1987).

SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513.

Electronic book 1, October 2012

SAS® Publishing provides a complete selection of books and electronic products to help customers use SAS software to its fullest potential. For more information about our e-books, e-learning products, CDs, and hard-copy books, visit the SAS Publishing Web site at support.sas.com/publishing or call 1-800-727-3228.

SAS® and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are registered trademarks or trademarks of their respective companies.

Contents

<i>About These Tutorials</i>	<i>v</i>
Chapter 1 • SAS Model Manager Tutorials	1
About SAS Model Manager	1
About SAS Model Manager Tutorials	2
Install and Register the Tutorial Files	3
Prepare for Using SAS Workflow	18
Chapter 2 • Tutorial 1: Create a Life Cycle Template	25
Overview of Life Cycle Templates and Roles	25
Create Groups for Use with the SAS Model Manager Tutorial	26
Create a Life Cycle Template	29
Upload the Life Cycle Template	38
Chapter 3 • Tutorial 2: Performing Basic SAS Model Manager Tasks	41
Overview of SAS Model Manager Basics	42
Prerequisites	42
Organize the Model Hierarchy	43
Import Models	51
Create Model Comparison Reports	57
Using the Annotations View	62
Scoring Models	65
Declare a Champion Model	70
Query for the Remaining Project Tasks to Complete	72
Chapter 4 • Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports	75
Overview of Importing Models, Scheduling Scoring Tasks, and Creating Reports	76
Prerequisites	76
Organize the Model Hierarchy	77
Import Models	85
Create Model Comparison and Summary Reports	91
Scoring Models	99
Declare a Champion Model	105
Chapter 5 • Tutorial 4: Publishing Models	109
Overview of Publishing Models	109
Prerequisites	110
Publish Models	110
Publish Models to a Database	116
Update Life Cycle or Workflow	126
Chapter 6 • Tutorial 5: Creating Performance Monitoring Reports and Using Dashboard Reports	129
Overview of Performance Monitoring Reports	129
Prerequisites	130
Create the Champion Model Performance Data Sets for a Classification Project	130
Create the Challenger Model Performance Data Sets	135
Create the Champion Model Performance Data Sets for a Prediction Project	140

View Performance Charts	145
Creating Output Formats for Performance Monitoring Reports	152
Using Dashboard Reports	156
Chapter 7 • Tutorial 6: Creating Basel II Reports	165
Overview of Basel II Reports	165
Prerequisites	166
Organize the Model Hierarchy	167
Import Models	171
Create Basel II Reports	174
Chapter 8 • Tutorial 7: Using Advanced Reporting	181
Overview of Advanced Reporting	181
Prerequisites	182
Create a Simple Ad Hoc Report	182
Create an Ad Hoc Score Range Report	183
Install a User-defined Score Range Report	185
Combining Multiple Reports	187
Chapter 9 • Tutorial 8: Using Advanced SAS Model Manager Features	191
Overview of Using Advanced Features	191
Example Scope	191
Prerequisites	192
Organize the Model Hierarchy	192
Create and Upload a Model Template	195
Import a Model	199
Create an Ad Hoc Variable Importance Report	203
Chapter 10 • Tutorial 9: Retraining Models	207
Overview of Retraining Models	207
Prerequisites	208
Define a Model Retrain Task	208
Execute a Model Retrain Task	214
Viewing Retrained Models and Model Comparison Reports	215
Chapter 11 • Tutorial 10: Using Workflow Console	221
Overview of Workflow Console	221
Prerequisites	222
Organize the Model Hierarchy	223
Working with Workflow Activities	226
Using Model Management Components with a Workflow Activity	230
Managing the Workflow Process	247
Chapter 12 • Tutorial 11: Scoring a SAS Model Manager Model Using SAS Data Integration Studio	257
Overview of Using Published Models in SAS Data Integration Studio	257
Prerequisites	258
Publish a Project Champion Model from SAS Model Manager	258
Score a Model Using a SAS Data Integration Studio Job	259
Declare and Publish a New Champion Model in SAS Model Manager	263
Update the Job to Use the Latest Champion Model	263

About These Tutorials

Audience

SAS Model Manager is designed for the following users:

- those who are responsible for developing analytical models
- those who are responsible for modeling project management
- those who are responsible for model validation and performance testing
- scoring officers
- analysts
- SAS administrators and SAS Model Manager administrators

Conventions Used in This Document

The following typographical conventions are used for all text in this document except for syntax:

bold

identifies an item in the SAS Model Manager window, a menu item, or a computer pathname.

bold monospace

identifies text that you enter in a SAS Model Manager window.

italics

identifies a book title or a value that is supplied by the user.

monospace

identifies SAS code.

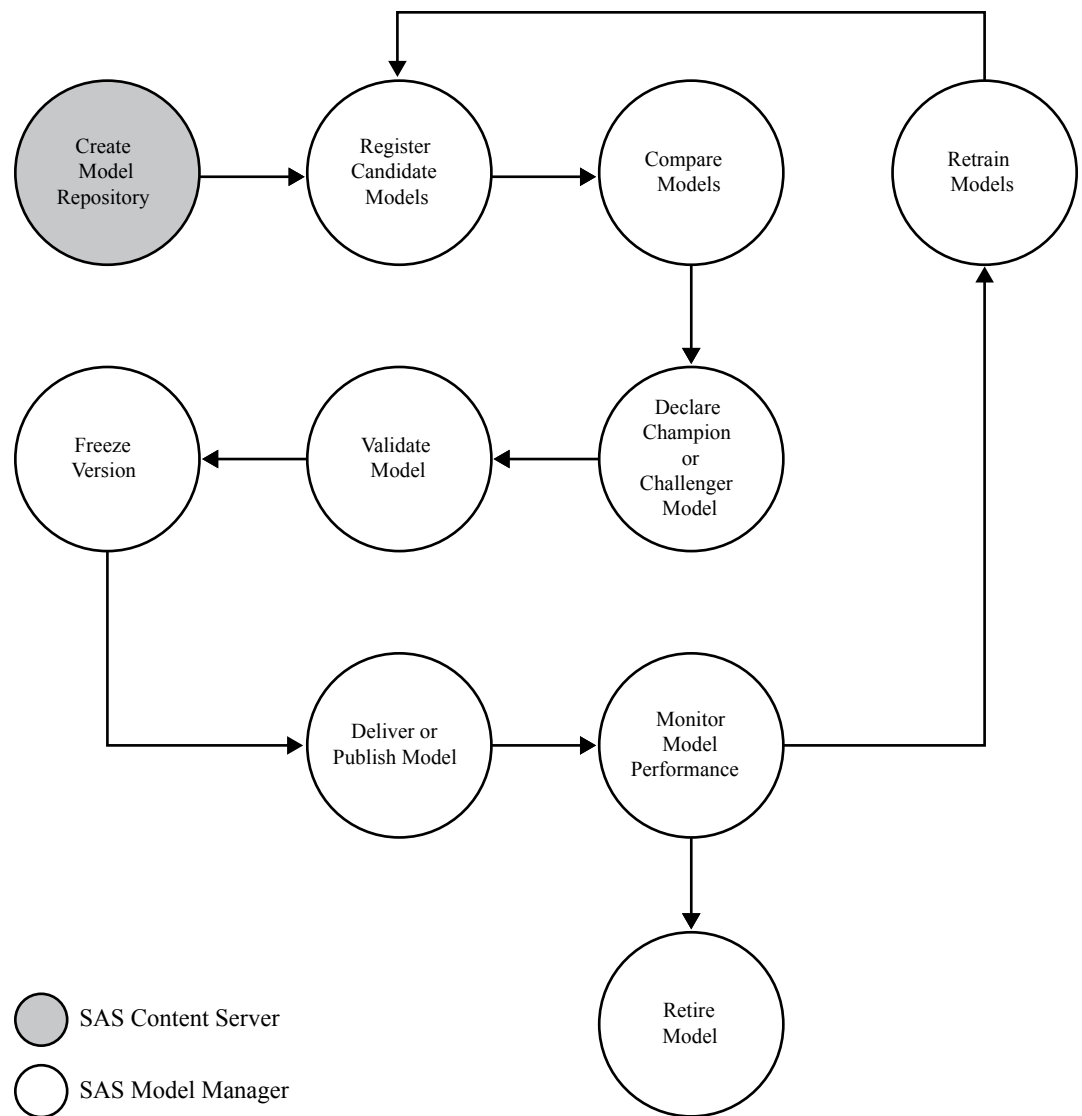
Chapter 1

SAS Model Manager Tutorials

About SAS Model Manager	1
About SAS Model Manager Tutorials	2
Install and Register the Tutorial Files	3
About Installing and Registering the Tutorial Files	3
Download the Tutorial Files	3
Prepare Tutorial 2 Data Sets and Models	4
Prepare Tutorial 3 Data Sets and Models	8
Prepare Tutorial 5 Data Sets and Models	9
Prepare Tutorial 6 Data Sets and Models	10
Prepare Tutorial 8 Data Sets and Models	13
Prepare Tutorial 11 Data Sets and Models	14
Using Tables from a Local or Network Drive	15
Prepare for Using SAS Workflow	18
Overview	18
Configure Alert Notifications	18
Make the Workflow Process Definitions Available	20

About SAS Model Manager

SAS Model Manager is a flexible model repository and model management environment for predictive and analytical models. A centralized repository and procedural templates make it easy to manage models and metadata across organizational areas and throughout a model's life cycle. Accountability metrics and validation of analytical steps, from creation to deployment in real time or batch scoring systems, continue until a model is retired. Storing the models in a secure, centralized repository enables you to easily manage life cycle milestones, such as development, test, production, and retirement. The following figure illustrates the model management process that you use in SAS Model Manager:

Figure 1.1 An Example of the Model Management Process

The goal of a modeling project is to identify a champion model that a scoring application uses to predict an outcome. SAS Model Manager provides tools to evaluate candidate models, declare a project champion model, and inform your scoring officer that a predictive or analytical model is ready for validation or production. You can perform scoring tests for champion and challenger model assessment as well as publish and share the model life cycle and performance data over established reporting channels. You can also run comparative performance benchmarks for the models in your production environment.

About SAS Model Manager Tutorials

The tutorials for SAS Model Manager cover basic and advanced tasks that are related to model management within an enterprise computing environment. Tutorial folders are created by extracting files from the tutorial ZIP file. You use these data files to become familiar with the following basic tasks that are involved in model management:

- define user groups for assigning and approving life cycle tasks
- define and create the components of the model hierarchy
- import models
- run model reports
- monitor event logging
- register models
- select a champion model and challenger models
- update life cycle milestones or workflow process activities
- run model scoring code in SAS Model Manager
- publish models
- retrain models

Install and Register the Tutorial Files

About Installing and Registering the Tutorial Files

You can either define a data library and register the tables in the SAS Metadata Repository using SAS Management Console, or you can use the Edit Start-up Code feature of SAS Model Manager to make tables from the local SAS Workspace Server or network drive available. The tutorials are designed to use the SAS Metadata Repository, but you can also use the Edit Start-up Code feature. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

Before you use tables in the SAS Metadata Repository, the tutorial data sets and models must be installed and registered using SAS Management Console by an administrator who has Write access to the SAS Application Server. A valid SASApp user ID and password are required to install and register the tutorial files.

Some tutorials require files other than data sets and models, such as score code and templates. These files do not need to be registered in the SAS Metadata Repository. The drive where you extract the tutorial ZIP file must be accessible to the SAS Metadata Repository and to tutorial users. Tutorial users can also extract tutorial ZIP files to their local computers in order to access the other files.

Download the Tutorial Files

The ZIP file SMM121Tutorial.zip contains the tutorials' data sets, models, and score code, and it is available from <http://support.sas.com/documentation/onlinedoc/modelmgr/>. Before you begin any of the tutorials, extract the tutorial files to a computer that is accessible to the SAS Metadata Server and to the SAS Model Manager users. Follow the steps for using WinZip to extract the files. If you are using a different extraction program, follow that program's instructions for extracting the files.

1. Create a folder on your local computer to store the tutorial files. The instructions refer to this folder as **<drive>**.
2. From <http://support.sas.com/documentation/onlinedoc/modelmgr/>, save SMM121Tutorial.zip to **<drive>**.

3. Open Windows Explorer to <drive>. Right-click **SMM121Tutorial.zip** and select **Open with WinZip**.
4. Click the arrow on the **Unzip** button to open the Unzip from WinZip File Folder window.

Note: If you are using a previous release of Windows, from the WinZip window, click the **Extract** button. The Extract dialog box appears.

5. Select <drive> from the Unzip from WinZip File Folder window.

Note: If you are using a previous release of Windows, in the **Extract to** box, select <drive> and click **Extract**.

You can find the files for each tutorial in the respective tutorial folder (for example, <drive>\SMM121Tutorial\Tutorial2 or <drive>\SMM121Tutorial\Tutorial3).

UNIX Specifics

To complete the tutorials in a UNIX environment, first locate the CPORT files. Files that you use to import the data sets into UNIX are located in the SMM121_UNIX_cport_files.zip file that is available from <http://support.sas.com/documentation/onlinedoc/modelmgr/>. Instructions, as well as the sample code for performing an import, are provided in the Readme.txt file.

Prepare Tutorial 2 Data Sets and Models

The Required Tutorial Files

Tutorial 2 requires the following files and folders in the <drive>\SMM121Tutorial\Tutorial2\Samples folder:


- delinquency_project_input.sas7bdat
- delinquency_project_output.sas7bdat
- delinquency_scoring_input.sas7bdat
- delinquency_scoring_output.sas7bdat
- delinquency_test.sas7bdat
- delinquency_train.sas7bdat
- The **model1** folder contains these model files:
 - modelin1.sas7bdat
 - modelout1.sas7bdat
 - om.sas7bdat
 - result1.sas7bdat
 - score1.sas
 - target1.sas7bdat
- The **model2** folder contains these model files:
 - modelin2.sas7bdat
 - modelout2.sas7bdat
 - ot.sas7bdat

- result2.sas7bdat
- score2.sas
- target2.sas7bdat
- The **model3** folder contains these model files:
 - modelin3.sas7bdat
 - modelout3.sas7bdat
 - result3.sas7bdat
 - score3.sas7bdat
 - target3.sas7bdat

Register the Tutorial 2 Files in SAS Management Console

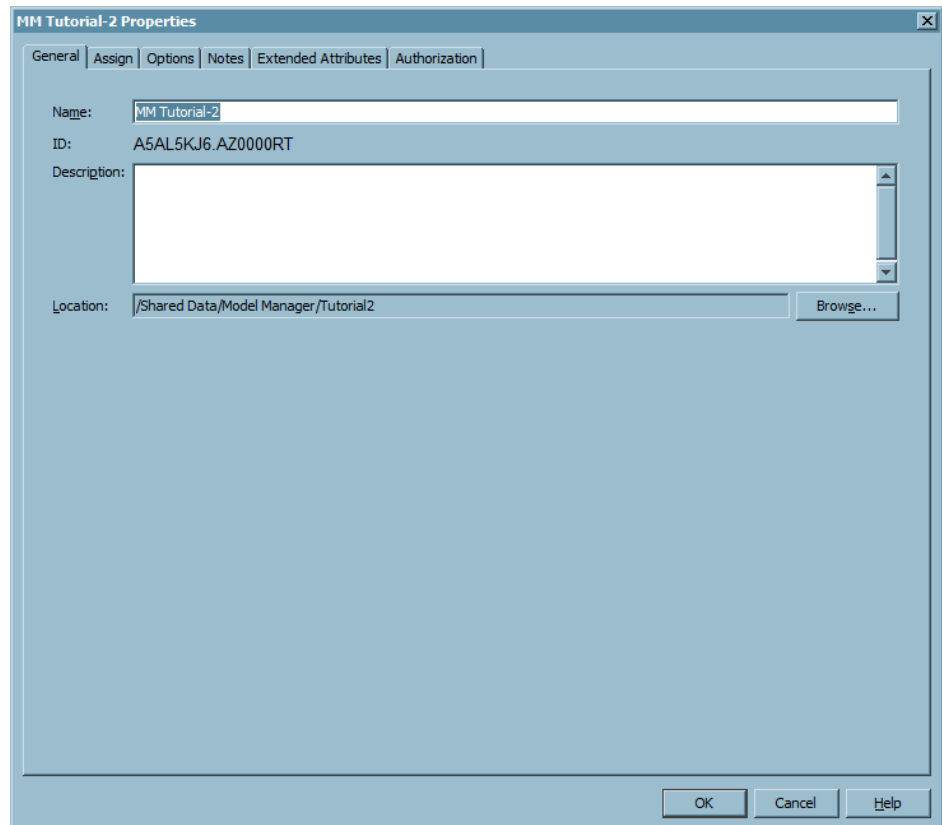
You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:

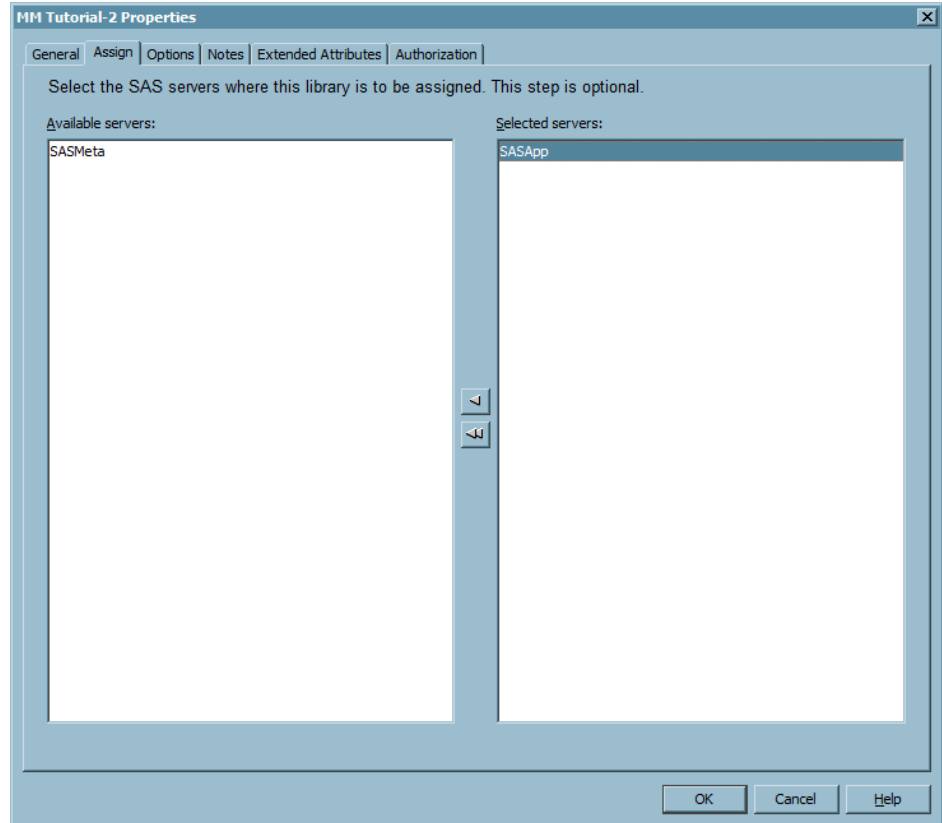
1. Start and log on to SAS Management Console as a SAS Administrator with the role **Metadata Server: Operation or Metadata Server: Unrestricted**.
2. Open the New Library Wizard to define the data library. Expand **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
Select **SAS BASE Library** and click **Next**.
 - b. Specify **MM Tutorial-2** in the **Name** field and click **Browse**. In the Select a Location dialog box, double-click **Model Manager** and then click the **New folder** icon. Create the folder **Tutorial2** and make **Tutorial2** the active folder. Click **OK**. Click **Next**.
 - c. Select **SASApp** from the **Available servers** box and click  to move the server name to the **Selected servers** list. Click **Next**.
 - d. Specify **smm12t2** for the libref and click **New**.
 - e. Specify the server folder that you previously created, **<drive>\SMM121Tutorial\Tutorial2\Samples**, for the path specification and click **OK** twice.
Note: If prompted, you must enter the user ID and password of a SAS Model Manager administrator for server authentication.
 - f. Click **Next**.
 - g. Click **Finish**. Verify that the library MM Tutorial-2 is a library in the **Libraries** folder.
4. Register the data tables in the metadata repository.
 - a. Right-click **MM Tutorial-2** under the **Libraries** folder, select **Register Tables** from the pop-up menu, and click **Next**.

- b. If prompted, specify a user ID and password that has access to the metadata server and click **OK**.
 - c. Click **Select All Tables**, click **Next**, and click **Finish**.
5. Verify that table metadata was created and close SAS Management Console. Right-click **MM Tutorial-2** and select **Properties**.

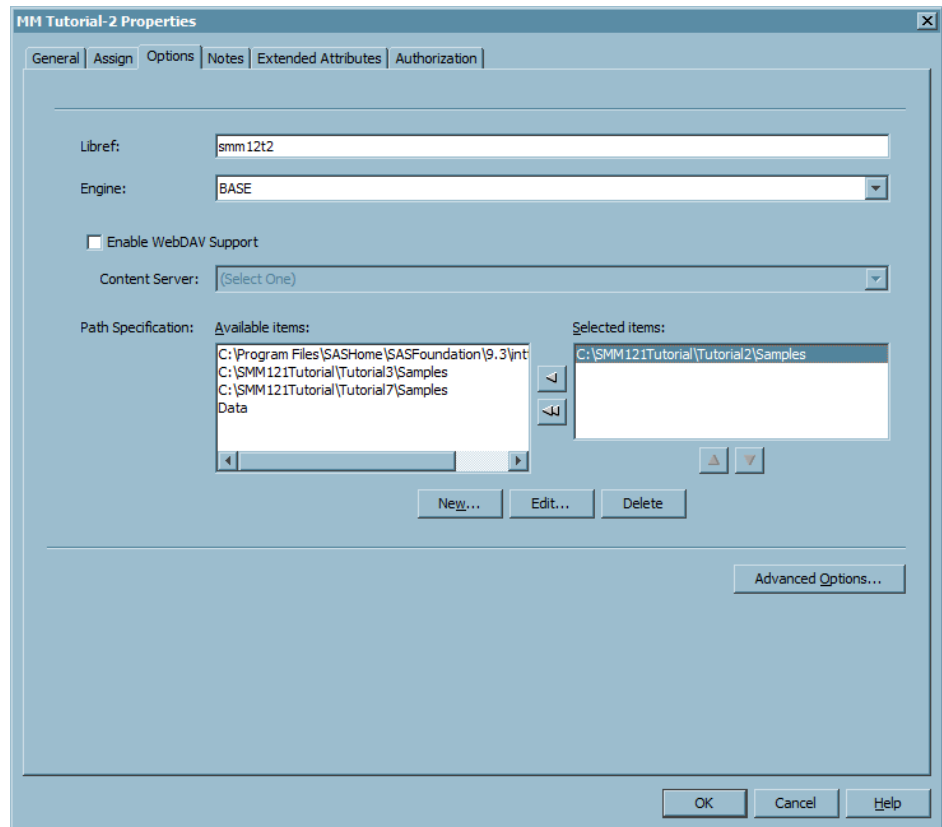
Verify the tutorial name and location.



Click the **Assign** tab. Verify that the appropriate server is in the **Selected servers** list.



Click the **Options** tab. Verify the libref, the engine, and the path specification in the **Selected items** box.



Prepare Tutorial 3 Data Sets and Models

The Required Tutorial 3 Files

The SAS data sets and models that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files”](#) on page 3.

This tutorial requires the following files and folders in the **<drive>** **\SMM121Tutorial\Tutorial3\Samples** folder:

- hmeq_project_input.sas7bdat
- hmeq_project_output.sas7bdat
- hmeq_score_input.sas7bdat
- hmeq_score_output.sas7bdat
- hmeq_test.sas7bdat
- hmeq_train.sas7bdat
- \HMEQ_STAT_Item\HMEQItem.spk
- \Neural\Neural.xml
- \Reg1\miningResult.spk
- \Reg1_Interval\miningResult.spk
- \Tree1\miningResult.spk

Register the Tutorial 3 Files in SAS Management Console

You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:

1. Open SAS Management Console and log on to the SAS Metadata Server. Your user ID must be authorized to modify libraries in the metadata server.
2. Open the New Library Wizard to define the data library. Expand **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
 - b. Select **SAS BASE Library** and click **Next**.
 - c. Specify **MM Tutorial-3** in the **Name** field and click **Next**.
 - d. (Optional) If more than one server exists, select a server. Click **Next**.
 - e. Specify **smm12t3** for the libref and click **New**.
 - f. Specify the server folder that you previously created, **<drive>\SMM121Tutorial\Tutorial3\Samples**, for the path specification and click **OK** twice.
 - g. Click **Next** and **Finish**.
4. Register the data tables in the metadata repository.
 - a. Right-click **MM Tutorial-3** under the **Libraries** node, select **Register Tables** from the pop-up menu, and click **Next**.
 - b. If prompted, specify the metadata server, test the server connection, and click **OK**. Click **Next**.
 - c. Click **Select All Tables**, click **Next**, and click **Finish**.
5. Verify that table metadata was created and close SAS Management Console. Select **MM Tutorial-3** under the **Libraries** node and examine the right pane.

Prepare Tutorial 5 Data Sets and Models

The Required Tutorial 5 Files

The SAS data sets that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files” on page 3](#).


This tutorial requires the following files and folders in the **<drive>\SMM121Tutorial\Tutorial5\Samples** folder:

- hmeq_2011q2.sas7bdat
- hmeq_2011q3.sas7bdat
- hmeq_2011q4.sas7bdat
- hmeq_2012q1.sas7bdat

Register the Tutorial 5 Files in SAS Management Console

You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:

1. Open SAS Management Console and log on to the SAS Metadata Server. Your user ID must be authorized to modify libraries in the metadata server.
2. Open the New Library Wizard to define the data library. Click **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
Select **SAS BASE Library** and click **Next**.
 - b. Specify **MM Tutorial-5** in the **Name** box.
 - c. From the **Location** box, click **Browse**. Navigate to the **Model Manager** folder. Click the **New folder** icon and enter **Tutorial15**. Click the dialog box edges, click **Tutorial15**, and click **OK**.
 - d. (Optional) If more than one server exists, select a server in the **Available servers** list and click  to move the server name to the **Selected servers** list.
 - e. Specify **smm12t5** for the libref and click **New**.
 - f. Specify the server folder that you previously created, **<drive>\SMM121Tutorial\Tutorial15\Samples**, for the path specification and click **OK** twice.
 - g. Click **Next** and **Finish**.
4. Register the data tables in the metadata repository.
 - a. Right-click **MM Tutorial-5** under the **Libraries** node, select **Register Tables** from the pop-up menu, and click **Next**.
 - b. If prompted, specify the user ID and password to the metadata server and click **OK**. Then click **Next**.
 - c. Click **Select All Tables** and click **Next**.
 - d. Click **Finish**.
5. Verify that table metadata was created. Select **MM Tutorial-5** under the **Libraries** node and examine the right pane.

Prepare Tutorial 6 Data Sets and Models

The Required Tutorial 6 Files

The SAS data sets that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files” on page 3](#).

This tutorial requires the following files and folders in the <drive>
 \SMM121Tutorial\Tutorial6\Samples folder:

LGD data sets:

- \LGD\lgd_model_est.sas7bdat
- \LGD\lgd_model_input.sas7bdat
- \LGD\lgd_model_output.sas7bdat
- \LGD\lgd_model_target.sas7bdat
- \LGD\lgd_proj_input.sas7bdat
- \LGD\lgd_proj_output.sas7bdat
- \LGD\lgd_score_input.sas7bdat
- \LGD\lgd_score_output.sas7bdat


PD data sets:

- \PD\hmeq_project_input.sas7bdat
- \PD\hmeq_project_output.sas7bdat
- \PD\hmeq_test.sas7bdat
- \PD\hmeq_train.sas7bdat
- \PD\pd_scoring_input.sas7bdat
- \PD\pd_scoring_output.sas7bdat

Register the Tutorial 6 PD Files in SAS Management Console

You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:


1. Open SAS Management Console and log on to the SAS Metadata Server. Your user ID must be authorized to modify libraries in the metadata server.
2. Open the New Library Wizard to define the data library. Click **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
 Select **SAS BASE Library** and click **Next**.
 - b. Specify **SMMT6PD** in the **Name** box.
 - c. From the **Location** box, click **Browse**. Navigate to the **Model Manager** folder. Click the **New folder** icon and enter **Tutorial6**. Double-click the **Tutorial6** folder and click the **New folder** icon and enter **PD**. Click the dialog box edges, click **PD**, and click **OK**.
 - d. (Optional) If more than one server exists, select a server in the **Available servers** list and click  to move the server name to the **Selected servers** list.
 - e. Specify **smmt6pd** for the libref and click **New**.

- f. Specify the server folder that you previously created, `<drive>\SMM121Tutorial\Tutorial6\Samples\PD`, for the path specification and click **OK** twice.
Note: If prompted, you must enter the user ID and password of a SAS Model Manager administrator for server authentication.
 - g. Click **Next** and **Finish**.
4. Register the data tables in the metadata repository.
 - a. Right-click **SMMT6PD** under the **Libraries** node, select **Register Tables** from the pop-up menu, and click **Next**.
 - b. If prompted, specify the user ID and password to the metadata server and click **OK**. Then click **Next**.
 - c. Click **Select All Tables** and click **Next**.
 - d. Click **Finish**.
 5. Verify that table metadata was created. Select **SMMT6PD** under the **Libraries** node and examine the right pane.

Register the Tutorial 6 LGD Files in SAS Management Console

You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:

1. Open SAS Management Console and log on to the SAS Metadata Server. Your user ID must be authorized to modify libraries in the metadata server.
2. Open the New Library Wizard to define the data library. Click **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
Select **SAS BASE Library** and click **Next**.
 - b. Specify **SMMT6LGD** in the **Name** box.
 - c. From the **Location** box, click **Browse**. Navigate to the **Model Manager** folder. Click the **New folder** icon and enter **Tutorial6**. Double-click the **Tutorial6** folder and click the **New folder** icon and enter **LGD**. Click the dialog box edges, click **PD**, and click **OK**.
 - d. (Optional) If more than one server exists, select a server in the **Available servers** list and click  to move the server name to the **Selected servers** list.
 - e. Specify **smmt6lgd** for the libref and click **New**.
 - f. Specify the server folder that you previously created, `<drive>\SMM121Tutorial\Tutorial6\Samples\LGD`, for the path specification and click **OK** twice.

Note: If prompted, you must enter the user ID and password of a SAS Model Manager administrator for server authentication.

- g. Click **Next** and **Finish**.
4. Register the data tables in the metadata repository.
 - a. Right-click **SMMT6LGD** under the **Libraries** node, select **Register Tables** from the pop-up menu, and click **Next**.
 - b. If prompted, specify the user ID and password to the metadata server and click **OK**. Then click **Next**.
 - c. Click **Select All Tables** and click **Next**.
 - d. Click **Finish**.
5. Verify that table metadata was created. Select **SMMT6LGD** under the **Libraries** node and examine the right pane.

Prepare Tutorial 8 Data Sets and Models

The Required Tutorial 8 Files

The SAS data sets and models that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files” on page 3](#).


This tutorial requires the following files and folders in the <drive>
\SMM121Tutorial\Tutorial8\Samples folder:

- hmeq_project_input.sas7bdat
- hmeq_project_output.sas7bdat
- hmeq_score_input.sas7bdat
- hmeq_score_output.sas7bdat
- hmeq_test.sas7bdat
- hmeq_train.sas7bdat
- VarImportance.sas
- \Model8\importance8.sas7bdat
- \Model8\modelinput8.sas7bdat
- \Model8\modeloutput8.sas7bdat
- \Model8\nodestat8.sas7bdat
- \Model8\path8.sas7bdat
- \Model8\rules8.sas7bdat
- \Model8\score8.sas
- \Model8\target8.sas7bdat

Register the Tutorial 8 Files in SAS Management Console

You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:

1. Open SAS Management Console and log on to the SAS Metadata Server. Your user ID must be authorized to modify libraries in the metadata server.
2. Open the New Library Wizard to define the data library. Click **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
Select **SAS BASE Library** and click **Next**.
 - b. Specify **MM Tutorial-8** in the **Name** field.
 - c. From the **Location** box, click **Browse**. Navigate to the **Model Manager** folder. Click the **New folder** icon and enter **Tutorial8**. Click the dialog box edges, click **Tutorial8**, and click **OK**.
 - d. (Optional) If more than one server exists, select a server in the **Available servers** list and click  to move the server name to the **Selected servers** list.
 - e. Specify **smm12t8** for the libref and click **New**.
 - f. Specify the server folder that you previously created, **drive\SMM12Tutorial\Tutorial8\Samples**, for the path specification and click **OK** twice.
 - g. Click **Next** and **Finish**.
4. Register the data tables in the metadata repository.
 - a. Right-click **MM Tutorial-8** under the **Libraries** node, select **Register Tables** from the pop-up menu, and click **Next**.
 - b. If prompted, specify the user ID and password for the server and click **OK**. Then click **Next**.
 - c. Click **Select All Tables**, click **Next**, and click **Finish**.
5. Verify that table metadata was created and close SAS Management Console. Select **MM Tutorial-8** under the **Libraries** node and examine the right pane.

Prepare Tutorial 11 Data Sets and Models

The Required Tutorial 11 Files

The SAS data sets and models that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files” on page 3](#).


This tutorial requires the following files and folders in the **<drive>\SMM121Tutorial\Tutorial11\Samples** folder:

- score_input.sas7bdat
- score_output.sas7bdat

Register the Tutorial 11 Files in SAS Management Console

You can either define a data library and register the tables in SAS Management Console, or use the Edit Start-up Code feature of SAS Model Manager to use tables from the local SAS Workspace Server or network drive. For more information, see [“Using Tables from a Local or Network Drive” on page 15](#).

To use SAS Management Console to define a data library and register the tables, follow these steps:

1. Open SAS Management Console and log on to the SAS Metadata Server. Your user ID must be authorized to modify libraries in the metadata server.
2. Open the New Library Wizard to define the data library. Click **Environment Management** ⇒ **Data Library Manager** on the **Plug-ins** tab. Right-click **Libraries** and select **New Library** from the pop-up menu.
3. In the New Library Wizard, create a SAS library.
 - a. Navigate to **Resource Templates** ⇒ **Libraries** ⇒ **SAS Data**.
Select **SAS BASE Library** and click **Next**.
 - b. Specify **MM Tutorial-11** in the **Name** box.
 - c. From the **Location** box, click **Browse**. Navigate to the **Model Manager** folder. Click the **New folder** icon and enter **Tutorial111**. Double-click **Tutorial111**. Click **OK**.
 - d. (Optional) If more than one server exists, select a server in the **Available servers** list and click  to move the server name to the **Selected servers** list.
 - e. Specify **smm12t11** for the libref and click **New**.
 - f. Specify the server folder that you previously created, **drive\SMM121Tutorial\Tutorial111\Samples**, for the path specification and click **OK** twice.
 - g. Click **Next** and **Finish**.
4. Register the data tables in the metadata repository.
 - a. Right-click **MM Tutorial-11** under the **Libraries** node, select **Register Tables** from the pop-up menu, and click **Next**.
 - b. If prompted, specify the user ID and password to the metadata server and click **OK**. Then click **Next**.
 - c. Click **Select All Tables** and click **Next**.
 - d. Click **Finish**.
5. Verify that table metadata was created. Select **MM Tutorial-11** under the **Libraries** node and examine the right pane.

Using Tables from a Local or Network Drive

Overview

You can use tables from the local SAS Workspace Server or network drive to complete these SAS Model Manager tasks:

- Create a project
- Modify a project definition

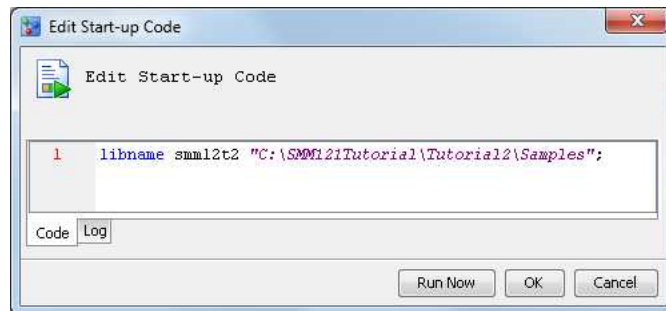
- Create a scoring task
- Create a model retrain task
- Create reports
- Create a performance monitoring task

To use tables from the local or network drive, you must submit a LIBNAME statement to define a libref for the drive before you execute the SAS Model Manager task. You submit LIBNAME statements using the Edit Start-up Code window.

Create a Libref for a Local or Network Drive

To submit the LIBNAME statement, follow these steps:

1. Ensure that the path to the library that you want to create exists and that your SAS Model Manager user ID has access to the library.
2. Select **Tools** ⇒ **Edit Start-up Code**. The Edit Start-up Code window appears.



3. Enter the LIBNAME statement. For example,

```
libname smm12t2 "C:\SMM121Tutorial\Tutorial2\Samples";
```

Here are examples of the LIBNAME and librefs that you can use for each tutorial:

Tutorial #	Libref	Library Path Examples
Tutorial 2	smm12t2	C:\SMM121Tutorial\Tutorial2\Samples
Tutorial 3	smm12t3	C:\SMM121Tutorial\Tutorial3\Samples
Tutorial 5	smm12t5	C:\SMM121Tutorial\Tutorial5\Samples
Tutorial 6	lgd pd	C:\SMM121Tutorial\Tutorial6\Samples\lgd C:\SMM121Tutorial\Tutorial6\Samples\pd
Tutorial 8	smm12t8	C:\SMM121Tutorial\Tutorial8\Samples
Tutorial 11	smm12t11	C:\SMM121Tutorial\Tutorial11\Samples

4. Click **Run Now**.

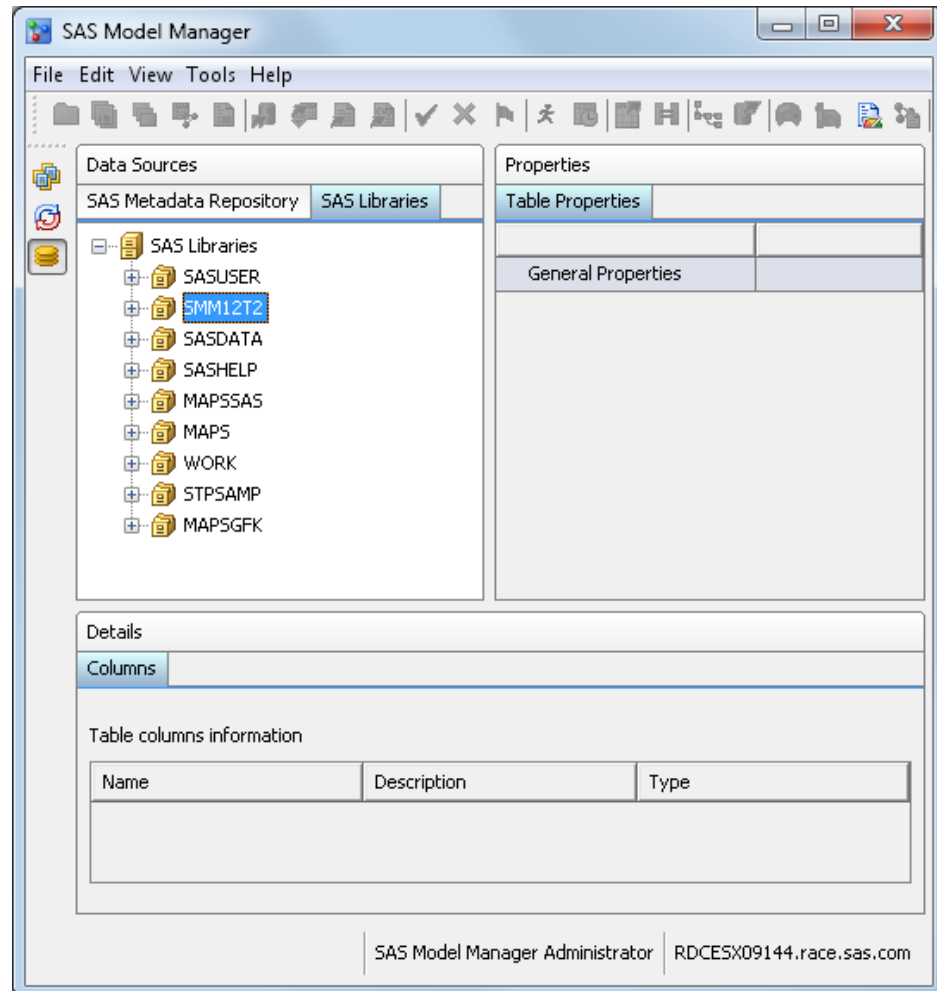
A message indicates whether the libref was created. Click the **Log** tab to see the SAS log.

- Click **OK**. The LIBNAME statement is saved in the Edit Start-up Code window.

Note: If you save the code without running it by clicking **OK**, the code automatically runs the next time the middle-tier server starts.

If multiple LIBNAME statements are submitted for the same libref, the last LIBNAME statement defines the libref.

The librefs that you create can be viewed in the Data Sources category view. Select the **SAS Libraries** tab to view the list:



Delete a Libref

You delete a libref using the Edit Start-up Code window.

- Select **Tools** ⇒ **Edit Start-up Code**
- Enter the following code in the Edit Start-up Code window:

```
LIBNAME libref_name CLEAR;
```

- Click **Run Now**.
- Click **OK**.

Prepare for Using 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 process definitions. The SAS middle tier hosts the workflow engine and the workflow services as part of the SAS Web Infrastructure Platform. The SAS Model Manager Workflow Console is used to manage the workflow processes that are associated with modeling projects and versions.

From the SAS Model Manager client application, you can view a workflow, create a new workflow for a version, and view your workflow inbox to work with activities, depending on the user permissions. The option that is selected and the user permissions determine the category view and content that are displayed when Workflow Console is launched. SAS Model Manager administrators can view the Workflow Definitions, Workflows, and Activities category views of Workflow Console. SAS Model Manager users and advanced users can view only the Activities category view. For more information about user permissions, see “Configuring Users, Groups, and Roles” in Chapter 4 of *SAS Model Manager: Administrator's Guide*.

To use SAS Workflow with SAS Model Manager tutorials, you must satisfy the following prerequisites:

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 the e-mail notifications for a tutorial workflow process, you must configure alert notifications using SAS Management Console. For more information, see [“Configure Alert Notifications” on page 18](#).
3. Workflow process definitions must be made available using SAS Workflow Studio. For more information, see [“Make the Workflow Process Definitions Available” on page 20](#).

Configure Alert Notifications

About Alert Notifications

To enable workflow participants to receive alert notifications from SAS Workflow when performing the tutorials, 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 process activities 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 (e-mail or portlets).

Global Alert Notifications

To enable the e-mail notification type for all users, follow these steps:


1. Log on to SAS Management Console as a SAS 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 from the **Available** list and click the right-arrow to add the selected notification type.
7. Click **OK**.
8. To apply this setting and make it available, restart the SAS Web Infrastructure Platform Services and applications that use the changed property, such as SAS Model Manager Workflow Console and SAS Workflow.


Individual User Alert Notifications

You can use SAS Preferences Manager to override the default notification delivery type for your user account. SAS Preferences Manager is a Web application that provides a central facility for users to manage their preferences and settings. The default notification type after the deployment of SAS 9.3 is the alerts portlet.

To modify your notification delivery preference, follow these steps:

Note: For the SAS Model Manager tutorials, you need only the e-mail notification delivery type.

1. Enter the URL **http://host-name:port/SASPreferences** in your browser window to launch the SAS Preferences Manager. Replace the values for host-name and port based on the location of the configured SAS Web Infrastructure Platform.
2. Enter the user ID and password for the user account that you use to access SAS Web applications and SAS Model Manager.
3. Select **General** ⇒ **Notifications**.
4. Select a format type for the E-mail notifications. The options are **HTML-formatted e-mail** and **Plain-text e-mail**.
5. Select the notification types from the **Available** list and click  to add the selected notification types. The available options are the following:
 - Via e-mail
 - My alerts portlet
 - Via SMS text message
 - Via digested e-mail

TIP To remove a notification type, select the type from the list and click  to remove the selected item.

6. Click **Apply** to update the notification settings and click **OK** to save the changes.

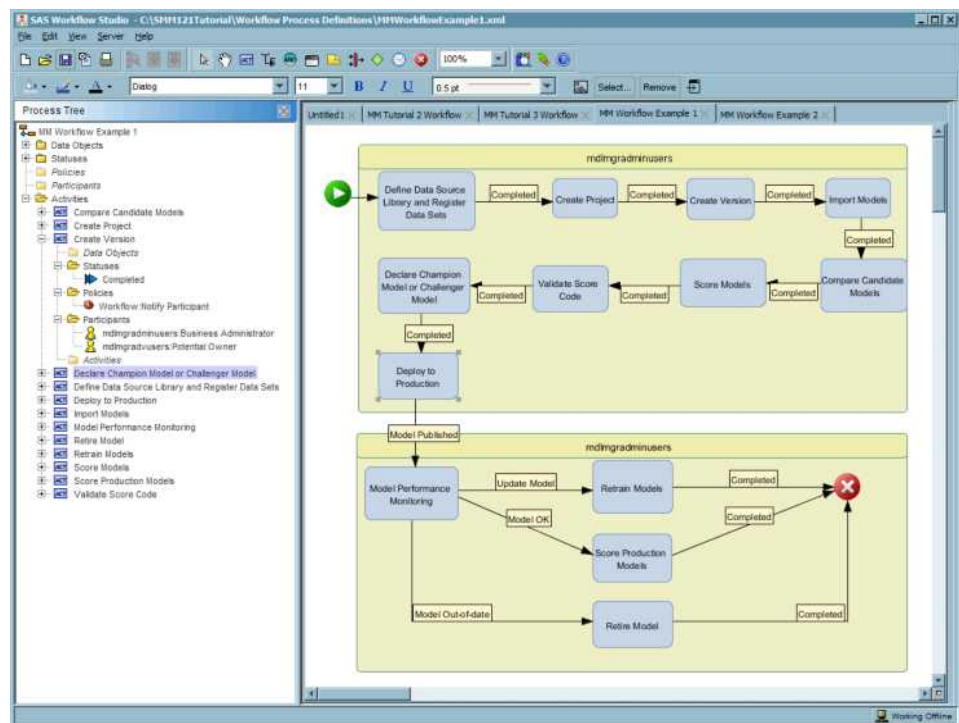
Make the Workflow Process Definitions Available

Overview

To use SAS Workflow with tutorials, you must make the process definitions available to SAS Model Manager. After the process definitions are made available, the SAS Model Manager administrator can use Workflow Console to create workflows to be used with SAS Model Manager.

To save the tutorial workflow process definitions to the Workflow repository, follow these steps:

1. From SAS Workflow Studio, select **File** ⇒ **Open** and navigate to the location where you extracted the tutorial files (for example, `C:\SMM121Tutorial\`). Open the subfolder **Workflow Process Definitions** and select the file (for example, `MMWorkflowExample1.xml`).



2. Log on to the server as a SAS administrator or SAS Model Manager administrator.
3. Add the tag attribute of `mmapi` to the process definition file properties.
4. Upload the process definition.
5. Repeat steps 1 through 4 for each workflow process definition. There are workflow process definitions for tutorial 2, tutorial 3, tutorial 10 and some additional examples.
6. Verify that the process definitions appear in the Process Definitions category view of SAS Model Manager Workflow Console.

For more information, see “Deploying and Maintaining Processes” in the *SAS Workflow Studio 1.2: User’s Guide* available at <http://support.sas.com/documentation/onlinedoc/workflow/>.

Log On to the Server

With SAS Workflow Studio, you can manage only locally stored workflow templates on your system until you have logged on to the server. After you are connected, you can access additional process templates that are stored in the SAS Content Server.

To log on to the server, follow these steps:

1. From the **Server** menu, select **Logon**.
2. In the Log On window, select the host-name from the **SAS environment** drop-down list.
3. Enter a user ID and password, and click **Log On**.

Note: The available host parameters are configured in the environments.xml file.

```
<environment name="localhost" default="false">
  <desc>SAS Environment: localhost</desc>
  <service-registry>
    http://localhost:8080/SASWIPClientAccess/remote/ServiceRegistry
  </service-registry>
  <service-registry interface-type="soap">
    http://localhost:8080/SASWIPSoapServices/services/ServiceRegistry
  </service-registry>
</environment>
```

For details about this configuration, see *SAS Intelligence Platform: Web Application Administration Guide*.

Add Tag Attributes to a Process Definition

Only the process definitions in the Workflow repository that have the **mmapi** tag attribute that is specified in the file properties are available to SAS Model Manager Workflow Console. The Workflow repository is located on the SAS Content Server.

To add a tag attribute to the file properties of a process definition template in SAS Workflow Studio, follow these steps:

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.

Process Properties

Process Name: MM Workflow Example 1 ...

Description: This is an example of a process definition for a workflow process to be used with the SAS Model Manager. ...

Version:

Attributes

Key	Value
-----	-------

Add... Remove

Tags

☒ mmapi

Add...

Created by: mdlmgadmin Language: English
 Created date: April 13, 2011 12:00:00 PM Country: United States
 Modified by: demoscnxc Variant:
 Modified date: September 05, 2012 02:12:40 PM

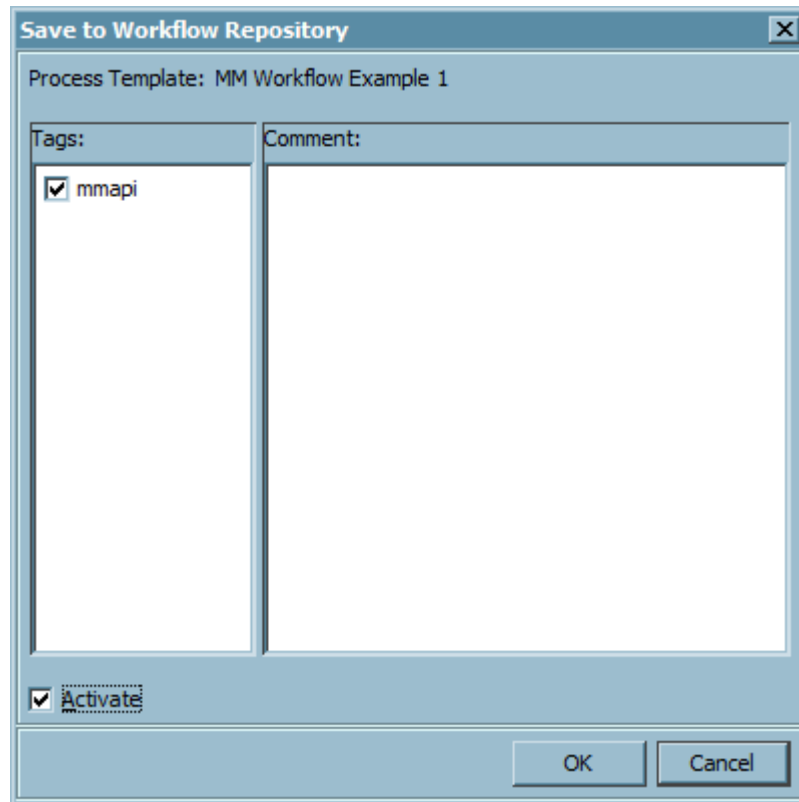
OK Cancel

3. Click **OK** twice.

Upload a Process Definition

To upload a process, follow these steps:

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 process definition.
3. Select the **Activate** option if you want to make the current version of the workflow process definition available for use in the Workflow repository by applications, such as SAS Model Manager Workflow Console.



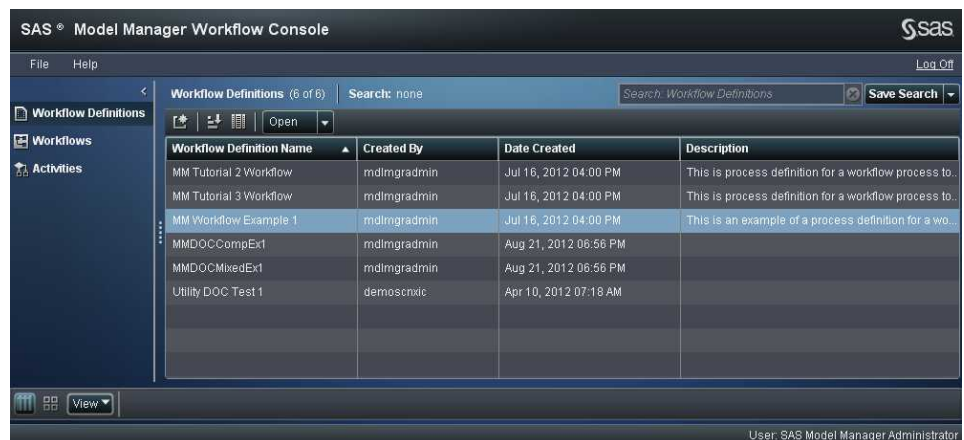
The dialog box is titled "Save to Workflow Repository". It contains a label "Process Template: MM Workflow Example 1". Below this, there are two main sections: "Tags:" and "Comment:". The "Tags:" section has a list box containing a single item "mmapi" which is checked. The "Comment:" section is an empty text area. At the bottom left, there is a checkbox labeled "Activate" which is also checked. At the bottom right, there are "OK" and "Cancel" buttons.

4. Click **OK**.

Verify That the Process Definitions Are Available in the Workflow Console

To verify that the workflow process definitions are available in the Workflow Console, follow these steps:

1. Enter the URL **`http://host-name:port/SASModelManagerWorkflow`** in your Web browser.
2. Enter the user ID and password for a SAS Model Manager administrator.
3. Verify that the uploaded process definition appears in the Process Definitions category view.



The screenshot shows the SAS Model Manager Workflow Console interface. The title bar says "SAS Model Manager Workflow Console". The top menu bar has "File" and "Help". On the right, there is a "Log Off" button. The left sidebar has a tree view with "Workflow Definitions" selected. The main area shows a table of workflow definitions. The table has columns: "Workflow Definition Name", "Created By", "Date Created", and "Description". There are 6 definitions listed. The first three are "MM Tutorial 2 Workflow", "MM Tutorial 3 Workflow", and "MM Workflow Example 1", all created by "mdlmggradmin" on "Jul 16, 2012 04:00 PM". The next two are "MMDOCCompExt1" and "MMDOCMixedExt1", created by "mdlmggradmin" on "Aug 21, 2012 06:56 PM". The last one is "Utility DOC Test 1", created by "demo@ncic" on "Apr 10, 2012 07:18 AM".

Workflow Definition Name	Created By	Date Created	Description
MM Tutorial 2 Workflow	mdlmggradmin	Jul 16, 2012 04:00 PM	This is process definition for a workflow process to...
MM Tutorial 3 Workflow	mdlmggradmin	Jul 16, 2012 04:00 PM	This is process definition for a workflow process to...
MM Workflow Example 1	mdlmggradmin	Jul 16, 2012 04:00 PM	This is an example of a process definition for a wo...
MMDOCCompExt1	mdlmggradmin	Aug 21, 2012 06:56 PM	
MMDOCMixedExt1	mdlmggradmin	Aug 21, 2012 06:56 PM	
Utility DOC Test 1	demo@ncic	Apr 10, 2012 07:18 AM	

At the bottom right, it says "User: SAS Model Manager Administrator".

Chapter 2

Tutorial 1: Create a Life Cycle Template

Overview of Life Cycle Templates and Roles	25
Create Groups for Use with the SAS Model Manager Tutorial	26
Create a SAS Model Manager Assignee Group	26
Create a SAS Model Manager Approver Group	27
Create a Life Cycle Template	29
Start SAS Model Manager	29
Create a New Life Cycle Template	30
Add a Milestone to the User-defined Template	31
Add Tasks to the Life Cycle Template Milestones	32
Add Task Dependencies	34
Complete Task Properties	37
Upload the Life Cycle Template	38

Overview of Life Cycle Templates and Roles

A SAS Model Manager project consists of one or more versions. A version is a time-based container for SAS Model Manager projects. For example, you might have versions for both 2011 and 2012. The 2011 version contains the champion home equity model and the 2012 version contains the resources for developing a new home equity model.

Each version has a life cycle that is associated with it to track the progress of selecting a champion model and monitoring the model's performance. The life cycle contains milestones such as development, test, and production. Associated with each milestone are tasks that you perform to complete a milestone. When you create a version, you select a life cycle template that you want to use for the version life cycle. The life cycle template for your version must be available to SAS Model Manager before you create a version.

You use the SAS Model Manager Template Editor to create a life cycle template with milestones and tasks that are specific to your modeling project. You can create a new life cycle template or start with a sample life cycle template and modify the template. SAS Model Manager provides several sample life cycle templates. After the template is complete, you can use the template in SAS Model Manager by uploading the template to the SAS Content Server. You can save a backup copy of the template to a local or network location.

In SAS Model Manager, you can view life cycle templates from the Life Cycle category view. Any user-defined template in the Life Cycle category view can be used as a life cycle when you create a version.

Any users or groups who need to update the version life cycle status must be assigned the appropriate life cycle roles using the SAS Management Console User Manager plug-in:

- Model Manager: Life Cycle Participant Usage (participant)
- Model Manager: Life Cycle Assignee Usage (assignee)
- Model Manager: Life Cycle Approval Usage (approver)

A best practice is to assign these roles only to groups and not to users. Assigning roles to groups provides flexibility when you need to add or remove users who are responsible for life cycle tasks. However, it is possible to assign these roles to users as well as groups.



When you open the SAS Model Manager Template Editor, users or groups that are assigned to the participant role appear in the **Participants** list. Only those users and groups in the **Participants** list can be considered to be assignees or approvers. When the template is selected as the life cycle for a version, only those users or groups can update the milestone and task properties.

This tutorial creates a Model Manager Tutorial Users group by using SAS Management Console. After you create the Model Manager Tutorial Users group, you create a life cycle template that can be used for the SAS Model Manager tutorials.

Create Groups for Use with the SAS Model Manager Tutorial

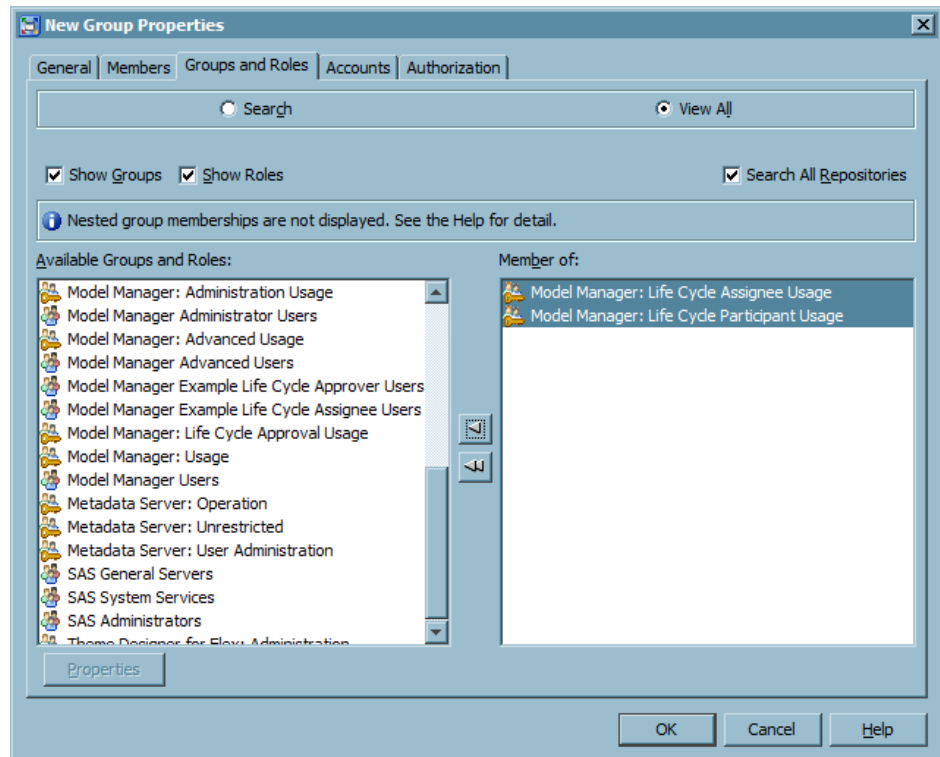
Create a SAS Model Manager Assignee Group

In this exercise, a SAS administrator creates a group in SAS Management Console for SAS Model Manager assignees. Any member of this group is able to update the status of a life cycle task if that group is specified as a value for the task **Assignee** property.

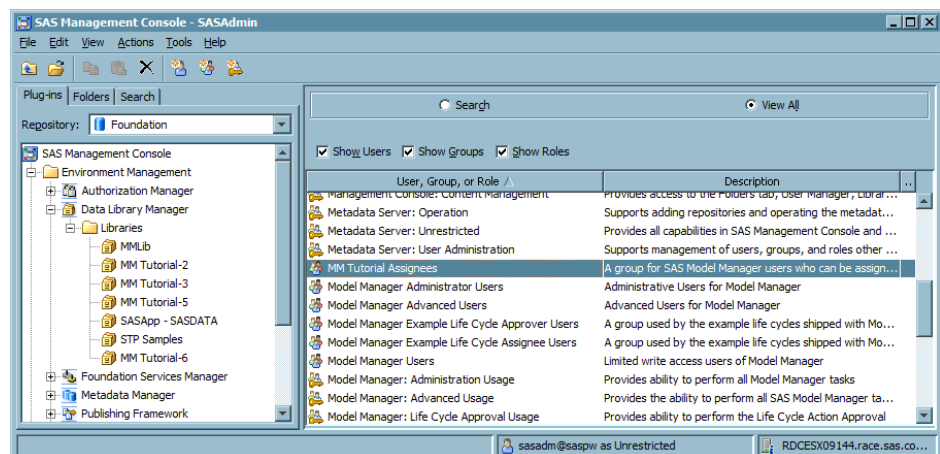
1. Start and log on to SAS Management Console as a SAS Administrator whose role enables you to update the metadata server user administration.
2. On the **Plug-ins** tab, right-click **User Manager** and select **New** ⇌ **Group**. The New Group Properties window appears with the **General** tab.
3. In the **Name** field, type **MM Tutorial Assignees**.
4. In the **Display Name** field, type **MM Tutorial Assignees**.
5. In the **Description** field, type **A group for SAS Model Manager users who can be assigned to complete tasks**.
6. Click the **Members** tab.
7. From the **Available Identities** list, select **Model Manager Advanced Users**, **Model Manager Administrator Users**, and **Model Manager Users** to add to this group. For each user who needs to be assigned to the group, select the user and click  to move the user to the **Current Members** list.
8. Click the **Groups and Roles** tab. Ensure that the **Show Roles** box is checked. Select the following roles and click  to move the roles to the **Member of** list:
 - **Model Manager: Life Cycle Participant Usage**

- **Model Manager: Life Cycle Assignee Usage**

Here is an example of the **Groups and Roles** tab.





9. Click **OK**. Here is an example of the group **MM Tutorial Assignees** listed as a group in SAS Management Console.



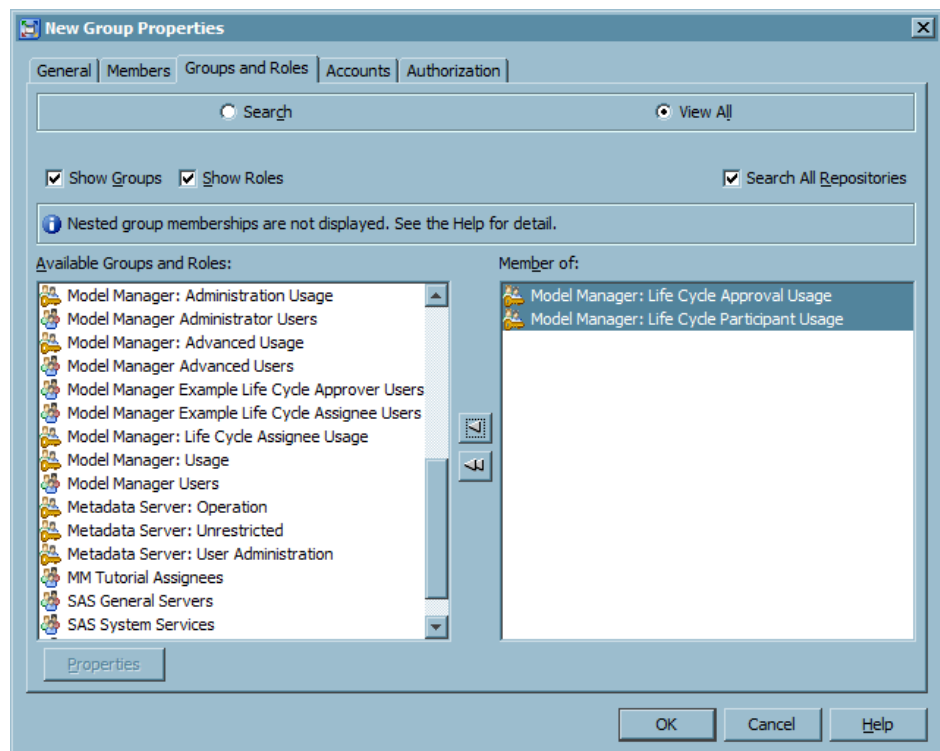
Create a SAS Model Manager Approver Group

In this exercise, a SAS administrator creates a group in SAS Management Console for SAS Model Manager approvers. Any member of this group is able to update the **Approved** status of a life cycle task if that group is specified as a value for the task **Approver** property.

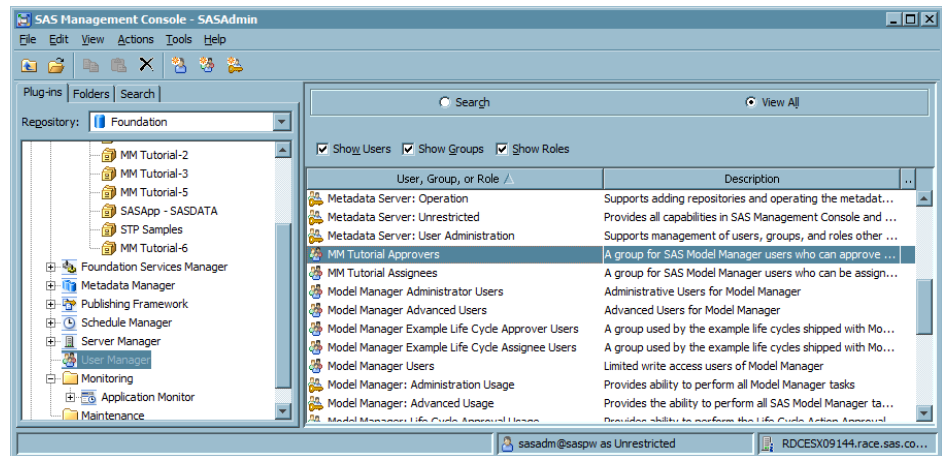
1. Start and log on to SAS Management Console as a SAS Administrator whose role enables you to update the metadata server user administration.

2. On the **Plug-ins** tab, right-click **User Manager** and select **New** ⇒ **Group**. The New Group Properties window appears with the **General** tab.
3. In the **Name** field, type **MM Tutorial Approvers**.
4. In the **Display Name** field, type **MM Tutorial Approvers**.
5. In the **Description** field, type **A group for SAS Model Manager users who can approve that a task is complete.**
6. Click the **Members** tab.
7. From the **Available Identities** list, select **Model Manager Advanced Users** and **Model Manager Administrator Users** to add to this group. For each user who needs to be assigned to the group, select the user and click  to move the user to the **Current Members** list.
8. Click the **Groups and Roles** tab. Ensure that the **Show Roles** box is checked. Select the following roles and click  to move the roles to the **Member of** list:
 - **Model Manager: Life Cycle Participant Usage**
 - **Model Manager: Life Cycle Approval Usage**

Here is an example of the **Groups and Roles** tab.



9. Click **OK**. Here is an example of the group **MM Tutorial Approvers** listed as a group in SAS Management Console.



Create a Life Cycle Template

In this exercise, you use the SAS Model Manager Template Editor to create a user-defined life cycle template from a sample template. SAS Model Manager provides sample templates that you can use to start your user-defined template. This tutorial uses the Basic.xml template.

Start SAS Model Manager

To run SAS Model Manager, follow these steps:

1. On your client machine, start the SAS Model Manager client.
2. Log on to SAS Model Manager as a member of the **Model Manager Advanced Users** group or **Model Manager Administrator Users** group.



Create a New Life Cycle Template

This task uses the Basic.xml sample template that is provided by SAS Model Manager and modifies it to create a new life cycle template.

1. Open the SAS Model Manager Template Editor (Template Editor). Select **Tools** ⇒ **Manage Templates** in the SAS Model Manager window.
2. In the Template Editor, open the Basic.xml sample life cycle template. Select **File** ⇒ **Browse** ⇒ **Browse Templates** ⇒ **Basic.xml** and click **Open**.
3. Modify the template properties. Specify the following properties:

Name

Replace the name with **Tutorial Life Cycle**.

Description

Replace the description with **A life cycle for the tutorial**.

Version

Replace the existing value with **1**.

4. Save the template to your local computer by selecting **File** ⇒ **Save As**. In the Save dialog box, select the location on your local computer. Enter **TutorialLifeCycle.xml** as the filename and click **Save**.
5. Using a text editor, open the life cycle template XML file that you just saved. If the version attribute on the <LifeCycleTemplate> does not have a value of **1** enclosed in

quotation marks, replace the value with the value **1** enclosed in quotation marks. Here is the <LifeCycleTemplate> element:

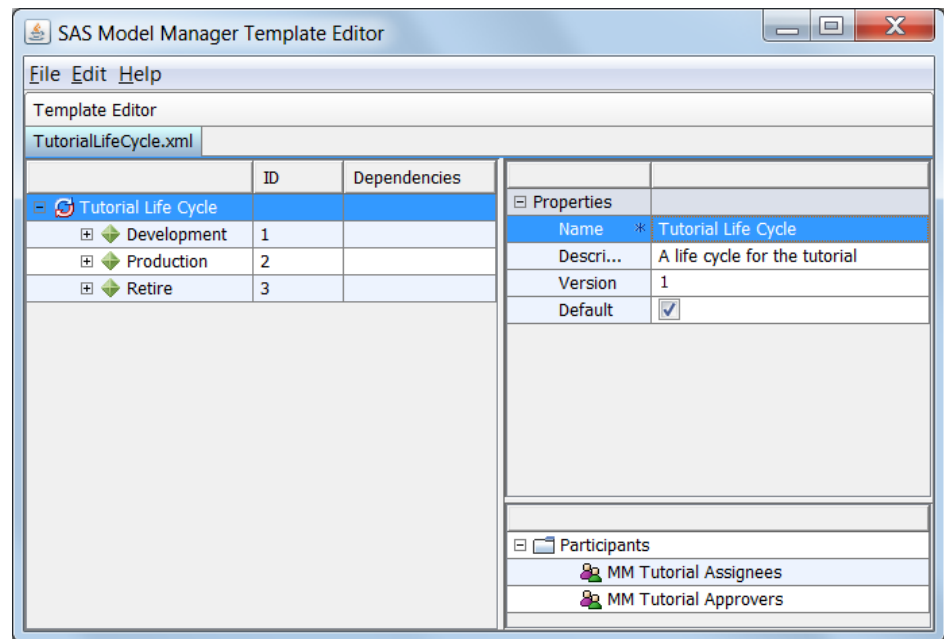
```
<LifecycleTemplate name="Tutorial Life Cycle"
  description="A life cycle for the tutorial" version="1"
  isDefault="True">
```

Rename the **mdlmgrexampleassignees** and **mdlmgrexampleapprovers** participants to **MM Tutorial Assignees** and **MM Tutorial Approvers**. The participants are enclosed in <Participants> </Participants> tags. Here are the final participants in the XML file:

```
<Participants>
  <Participant id="1" name="MM Tutorial Assignees"></Participant>
  <Participant id="2" name="MM Tutorial Approvers"></Participant>
</Participants>
```

Save the file.

6. In the SAS Model Manager Template Editor, select **File** ⇒ **Open**. In the Open dialog box, select the template and click **OK**. The **Participants** list displays only **MM Tutorial Assignees** and **MM Tutorial Approvers**.



Note: After the correct participants have been added to the template, it is not necessary to save the template to a local computer. You can upload the template from the SAS Model Manager Template Editor. This tutorial saves the template periodically to a local computer to create a backup of the template.

Add a Milestone to the User-defined Template

This exercise adds the milestone Test to the life cycle template.

1. Right-click **Tutorial Life Cycle** and select **New Milestone**. In the New Milestone window, complete the **Name** and **Type** fields and click **OK**.

Name

enter **Test**.

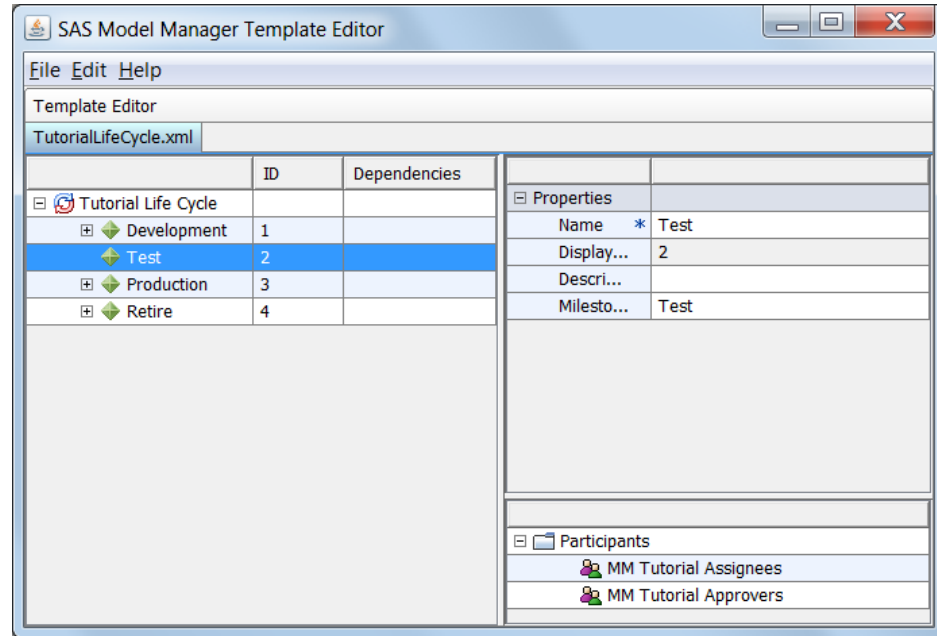
Type

click the **Type** box and select **Test**.

After you click **OK**, the **Test** milestone has an ID of 4.

2. Right-click **Test** and select **Move Up**. Move the **Test** milestone once more, which places it after **Development**. It now has an ID of 2.
3. Select **File** ⇒ **Save** to save the template. Click **OK** when the Warning dialog box appears.

Here is the template at the end of this exercise:



Add Tasks to the Life Cycle Template Milestones

This exercise adds tasks to each milestone.

1. Add tasks to the **Development** milestone.

For each task, right-click the **Development** milestone and select **New Task**. In the New Task window, complete the **Name** field and **Type** field using the following table. Click **OK**. The task names are descriptive. Therefore, a description is not necessary.

Task Name	Task Type
Define library in SAS Management Console	User-defined
Register data sets	User-defined
Set up the project in the Project Tree	User-defined
Import models	User-defined
Create comparison reports	User-defined

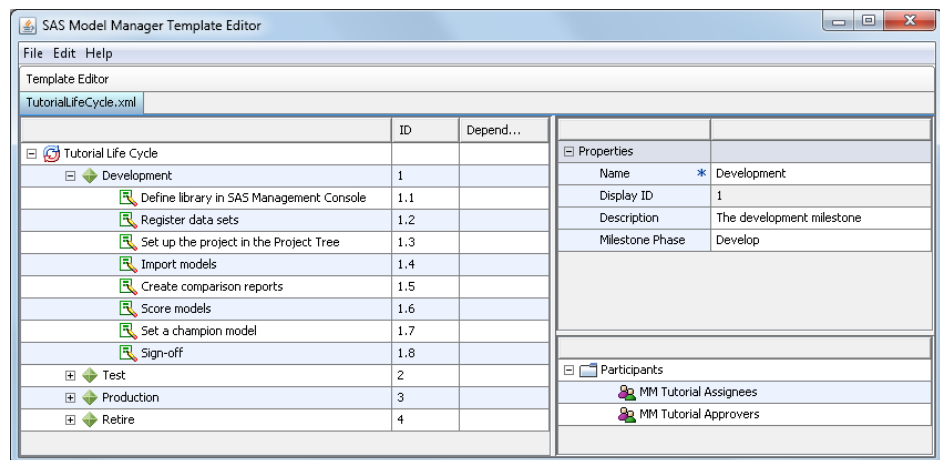
Task Name	Task Type
Score models	User-defined
Sign-off	Sign-off

The task **Select Champion** existed in the Basic.xml sample life cycle template. Rename the task and move it after the **Score models** task:

- In the **Name** field, change the task name to **Set a champion model**.
- In the **Task Type** field, change the task type to **Set Champion**.
- Right-click **Set a champion model** and select **Move Down**. Repeat this until the task comes after **Score models**.

Expand the **Development** milestone. Each task has an ID in the form **milestone.task**. The first number in the ID is the milestone ID. The second number in the ID identifies the specific task.

Here is the template after adding the tasks for the **Development** milestone:



- Add tasks to the **Test** milestone.

For each task, right-click the **Test** milestone and select **New Task**. In the New Task window, complete the **Name** field and **Type** field using the following table. Click **OK**. The task names are descriptive. Therefore, a description is not necessary.

Task Name	Task Type
Validate score input data	User-defined
Validate score output data	User-defined
Test scoring	User-defined
Sign-off	Sign-off

- Add tasks to the **Production** milestone.

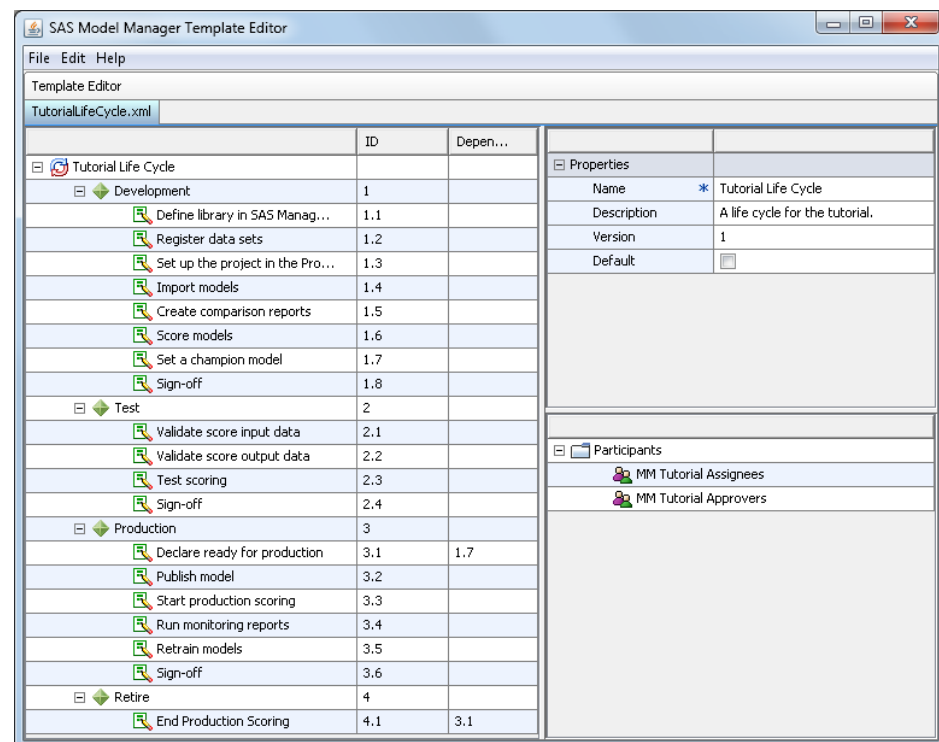
For each task listed below, right-click the **Production** milestone and select **New Task**. In the **New Task** window, complete the **Name** field and **Type** field using the

following table. Click **OK**. The task names are descriptive. Therefore, a description is not necessary.

Task Name	Task Type
Publish model	User-defined
Start production scoring	User-defined
Run monitoring reports	User-defined
Retrain models	User-defined
Sign-off	Sign-off

- The **Declare Ready For Production** task was provided in the Basic.xml sample template. In the **Name** field, rename the task to **Declare ready for production**.
- Select **File** ⇒ **Save** to save the template. Click **OK** if the Warning dialog box appears.

Here is the template after all milestone tasks have been defined:



Add Task Dependencies

About Dependencies

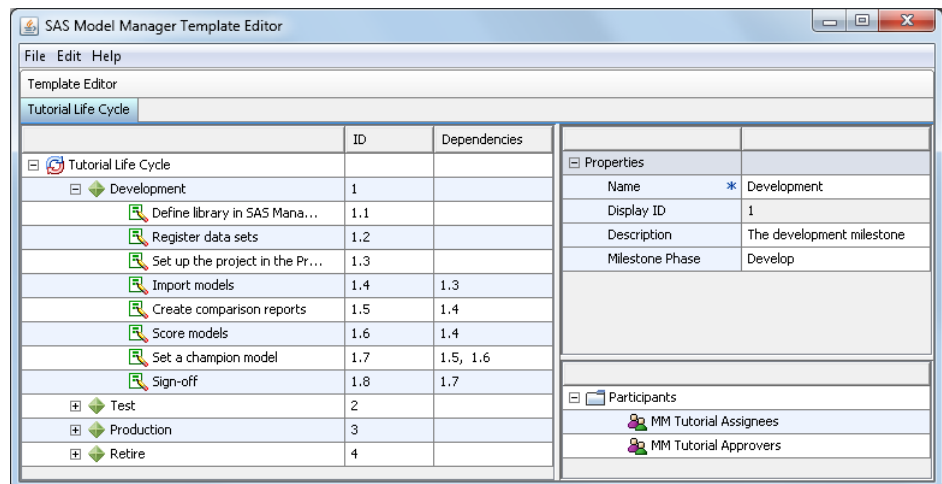
Your model development process might require an order to complete some tasks. To each task, you can assign dependencies that indicate that one or more tasks must be

completed before another one can be marked complete. You specify dependencies in the **Dependencies** property for a task.

This exercise assigns dependencies to milestone tasks.

Add Dependencies for the Development Milestone Tasks

1. Select the **Import models** task. Click the **Dependencies** property value field and then click the ellipsis button. Select the box for **Set up the project in the Project Tree**. Click **OK**. The **Import models** task now has a dependency on task 1.3, **Set up project in the Project Tree**.
2. Select the **Create comparison reports** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Import models**. Click **OK**. The **Create comparison reports** task now has a dependency on task 1.4, **Import models**.
3. Select the **Score models** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Import models**. Click **OK**. The **Score models** task now has a dependency on task 1.4, **Import models**.
4. Select the **Set a champion model** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Create comparison reports** and **Score models**. Click **OK**. The **Set a champion model** task now has a dependency on task 1.5, **Create comparison reports** and task 1.6, **Score models**.
5. Select the **Sign-off** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Set a champion model**. Click **OK**. The **Sign-off** task now has a dependency on task 1.7, **Set a champion model**.
6. Here is the template after the **Development** milestone task dependencies have been assigned:

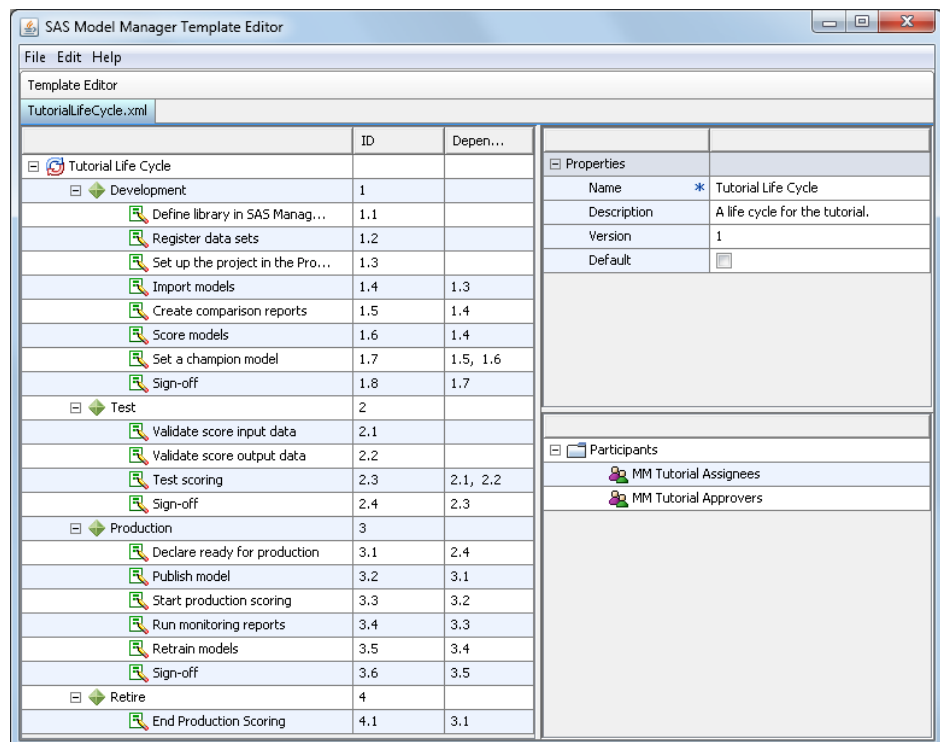


Add Dependencies for the Test Milestone Tasks

1. Select the **Test scoring** task. Click the **Dependencies** property value field and then click the ellipsis button. Select the box for **Validate score input data** and **Validate score output data**. Click **OK**. The **Test scoring** task now has a dependency on task 2.1, **Validate score input data**, and task 2.2, **Validate score output data**.
2. Select the **Sign-off** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Test scoring**. Click **OK**. The **Sign-off** task now has a dependency on task 2.3, **Test scoring**.

Add Dependencies for the Production Milestone Tasks

1. Select the **Declare ready for production** task. Click the **Dependencies** property value field and then click the ellipsis button. Select the box for **Sign-off** for ID 2.4. Click **OK**.
2. Select the **Publish model** task. Click the **Dependencies** property value field and then click the ellipsis button. Select the box for **Declare ready for production**. Click **OK**. The **Publish model** task now has a dependency on task 3.1, **Declare ready for production**.
3. Select the **Start production scoring** task. Click the **Dependencies** property value field and then click the ellipsis button. Select the box for **Publish model**. Click **OK**. The **Start production scoring** task now has a dependency on task 3.2, **Publish model**.
4. Select the **Run monitoring reports** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Start production scoring**. Click **OK**. The **Run monitoring reports** task now has a dependency on task 3.3, **Start production scoring**.
5. Select the **Retrain models** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Run monitoring reports**. Click **OK**. The **Retrain models** task now has a dependency on task 3.4, **Run monitoring reports**.
6. Select the **Sign-off** task. Click the **Dependencies** property and then click the ellipsis button. Select the box for **Retrain models**. Click **OK**. The **Sign-off** task now has a dependency on task 3.5, **Retrain models**.
7. Here is the template after all dependencies have been assigned:



8. To save the template to your local computer, select **File** ⇒ **Save**.

Complete Task Properties

Complete the Development Task Properties

In this exercise, you complete the **Development** task properties.

Select each task and enter property values using the values in the following table.

To assign property values for the **Assignees** and **Approvers** properties, click the ellipsis button to open the Select Participants window. Select the box for the assignee or approver and click **OK**.

Task	Assignees Property	Approvers Property	Weight Property	Duration Property
Define library in SAS Management Console	MM Tutorial Assignees	MM Tutorial Approvers	10	1
Register data sets	MM Tutorial Assignees	MM Tutorial Approvers	10	1
Set up the project in the Project Tree	MM Tutorial Assignees	MM Tutorial Approvers	10	1
Import models	MM Tutorial Assignees	MM Tutorial Approvers	10	1
Create comparison reports	MM Tutorial Assignees	MM Tutorial Approvers	10	2
Score models	MM Tutorial Assignees	MM Tutorial Approvers	10	2
Set a champion model	MM Tutorial Assignees	MM Tutorial Approvers	30	4
Sign-off	MM Tutorial Assignees	MM Tutorial Approvers	10	1

Save the template.

Complete the Test Task Properties

In this exercise, you complete the **Test** task properties.

Select each task and enter property values using the values in the following table.

To assign property values for the **Assignees** and **Approvers** properties, click the ellipsis button to open the Select Participants window. Select the box for the assignee or approver and click **OK**.

Task	Assignees Property	Approvers Property	Weight Property	Duration Property
Validate score input table	MM Tutorial Assignees	MM Tutorial Approvers	25	1
Validate score output table	MM Tutorial Assignees	MM Tutorial Approvers	25	1
Test scoring	MM Tutorial Assignees	MM Tutorial Approvers	40	5
Sign-off	MM Tutorial Assignees	MM Tutorial Approvers	10	1

Save the template.

Complete the Production Task Properties

In this exercise, you complete the **Production** task properties.

Select each task and enter property values using the values in the following table.

To assign property values for the **Assignees** and **Approvers** properties, click the ellipsis button to open the Select Participants window. Select the box for the assignee or approver and click **OK**.

Task	Assignees Property	Approvers Property	Weight Property	Duration Property
Declare ready for production	MM Tutorial Assignees	MM Tutorial Approvers	10	1
Publish model	MM Tutorial Assignees	MM Tutorial Approvers	15	1
Start production scoring	MM Tutorial Assignees	MM Tutorial Approvers	20	2
Run monitoring reports	MM Tutorial Assignees	MM Tutorial Approvers	25	1
Retrain models	MM Tutorial Assignees	MM Tutorial Approvers	15	3
Sign-off	MM Tutorial Assignees	MM Tutorial Approvers	15	1


Save the template.

Upload the Life Cycle Template

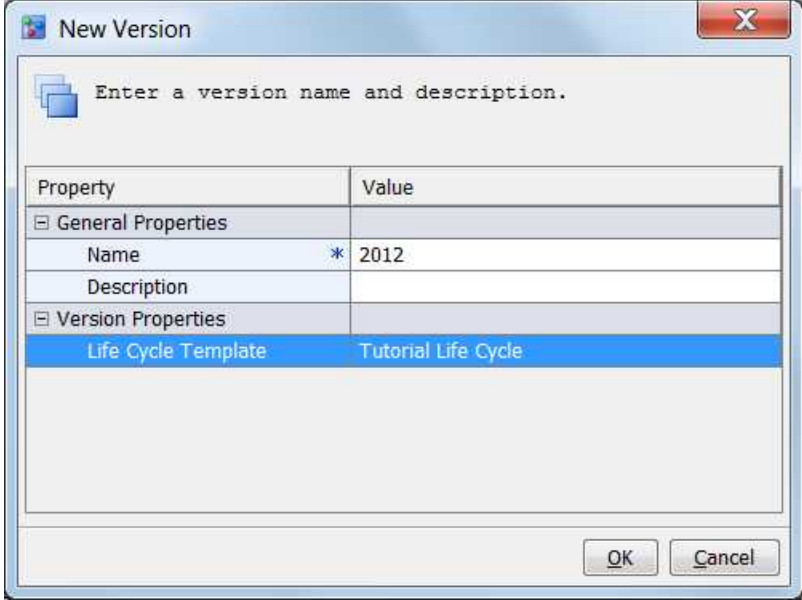
In this exercise, you upload the new life cycle template to the SAS Content Server. Only SAS Model Manager administrators can upload templates to the SAS Content Server.

1. Log on as a SAS Model Manager administrator.
2. From the SAS Model Manager windows, select **Tools** ⇒ **Manage Templates**.
3. In the SAS Model Manager Template Editor, select **File** ⇒ **Open**. In the Open window, select TutorialLifeCycle.xml and click **OK**.
4. Select **File** ⇒ **Upload File**. Verify the filename in the Upload File window and click **OK**. A message box appears when the file was uploaded successfully.
5. You can now view this life cycle template in the Browse Templates window and in the Life Cycle perspective.

To view the template in the Browse Templates window, select **File** ⇒ **Browse** ⇒ **Browse Templates** ⇒ **TutorialLifeCycle.xml** and click **Open**.

To view the template in the Life Cycle perspective, in the SAS Model Manager window, select the Life Cycle perspective button .

Tutorial Life Cycle can now be specified as a life cycle template, as shown in the New Version window, when you create a version in subsequent tutorials:



Property	Value
General Properties	
Name *	2012
Description	
Version Properties	
Life Cycle Template	Tutorial Life Cycle

Chapter 3

Tutorial 2: Performing Basic SAS Model Manager Tasks

Overview of SAS Model Manager Basics	42
Prerequisites	42
Tutorial 2 Models and Data Sets	42
Verify Your User ID as a Member of Model Manager User Groups	42
Organize the Model Hierarchy	43
Create a Folder	44
Create a New Project	44
Define the Project Properties	45
Create a Version	47
Create a Workflow (Optional)	48
Update the Life Cycle (Optional)	49
Update the Workflow Process (Optional)	50
Import Models	51
About Tutorial 2 Models	51
Import SAS Code Models	52
Set Model Properties	54
Map Model Variables to Project Variables	54
Update the Life Cycle (Optional)	55
Update the Workflow Process (Optional)	56
Create Model Comparison Reports	57
Create a Model Profile Report	57
Create a Delta Report	58
Create a Dynamic Lift Report	59
View a Model Comparison Report	60
Update the Life Cycle (Optional)	60
Update the Workflow Process (Optional)	61
Using the Annotations View	62
View History	62
View Notes	63
View the Summary Information	64
Scoring Models	65
Create a Scoring Task	66
Execute a Scoring Task	67
Update the Life Cycle (Optional)	68
Update the Workflow Process (Optional)	69
Declare a Champion Model	70
Set the Champion Model	70
Update the Life Cycle (Optional)	70

Update the Workflow Process (Optional)	71
Query for the Remaining Project Tasks to Complete	72

Overview of SAS Model Manager Basics

After an administrator has defined your user ID in SAS Management Console and you have a life cycle template, you are ready to work in SAS Model Manager. This tutorial guides you through a simple modeling project process.

To enable you to track the progress of the modeling project, each task has instructions to update the version life cycle status.

Prerequisites

Tutorial 2 Models and Data Sets

The exercises in this tutorial require that the Tutorial 2 data sets and models from SMM121Tutorial.zip be extracted and registered in SAS Management Console. If they have not been extracted and registered, see [“Prepare Tutorial 2 Data Sets and Models” on page 4](#) to extract and register the files. You must have access from the SAS Model Manager client to the tutorial files.

Verify Your User ID as a Member of Model Manager User Groups

This exercise ensures that your user ID is a member of the **MM Tutorial Assignees** group and the **Model Manager Advanced Users** group.

1. Open SAS Management Console and log on to the SAS Metadata Server.
2. On the **Plug-ins** tab, select **User Manager**.
3. In the right pane, double-click the **MM Tutorial Assignees** group and click the **Members** tab.
4. Review the **Current Members** list, and locate your user ID or a group that your user ID is a member of. If your user ID or group is not a member of the **MM Tutorial Assignees** group, ask your administrator to add you to this group. Close the properties window.
5. Find and double-click your user ID in the right pane of SAS Management Console.
6. Click the **Groups and Roles** tab. Review the **Member of** pane and locate the group **Model Manager Advanced Users**. If your user ID is not a member of this group, ask your administrator to add you to this group. Close the properties window.
7. Close SAS Management Console.

See Also

[“Create Groups for Use with the SAS Model Manager Tutorial” on page 26](#)

Organize the Model Hierarchy

In this exercise, you learn to use the Project Tree to create a modeling project.

Create a Folder

To provide an organizational folder to manage your modeling projects, follow these steps:

1. Right-click **MMRoot** in the Project Tree. Select **New** ⇒ **New Folder**. The New Folder window appears.
2. Specify values for the following folder properties and click **OK**.

Name

enter **Tutorial12** for the folder name.

Description

enter an optional folder description.

The new folder appears in the Project Tree.

Create a New Project

To create a project and define the model function, follow these steps:

1. Right-click **Tutorial12** and select ⇒ **New** ⇒ **New Project**. The New Project wizard appears.
2. Specify the following general and project properties and click **Next**:

Name

enter **Delinquency** for the project name.

Description

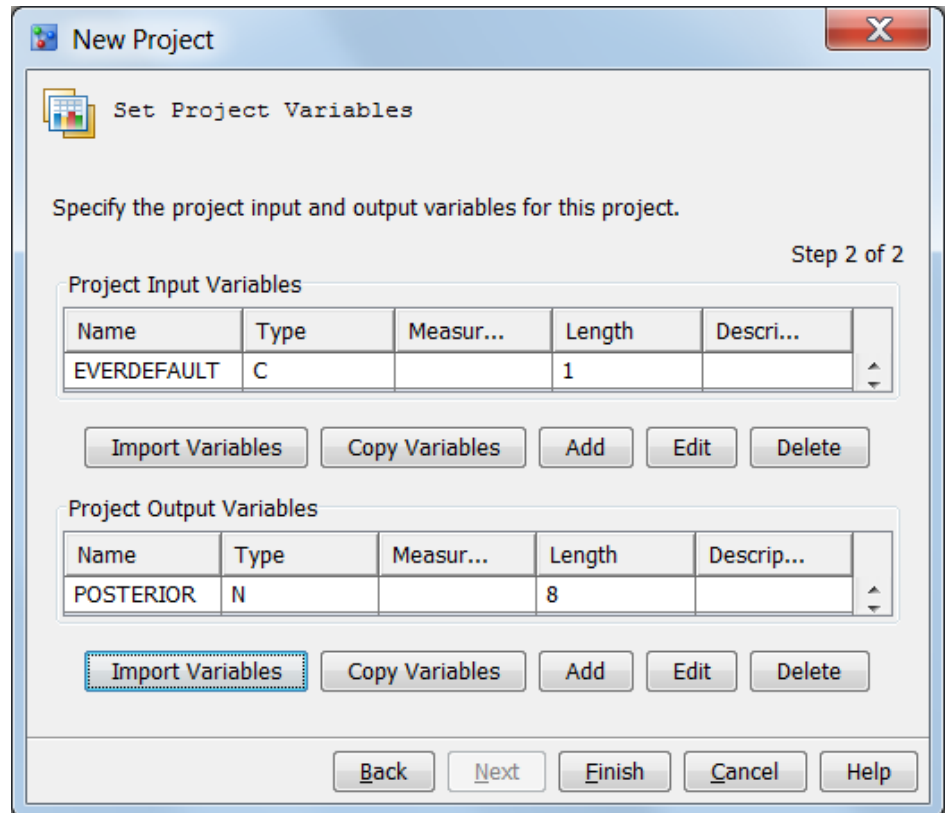
enter an optional description.

Model Function

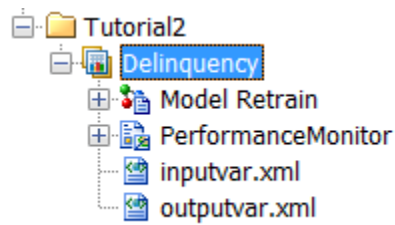
select **Classification**.

3. Specify the project input variables:
 - a. Below the **Project Input Variables** table, click **Import Variables**. The Import Variables from Table window appears.
 - b. On the **SAS Metadata Repository** tab, click the **Look in** box and navigate to the path **Shared Data** ⇒ **Model Manager** ⇒ **Tutorial12**.
 - c. Select **DELINQUENCY_PROJECT_INPUT** and click **OK**.
4. Specify the project output variables:
 - a. Below the **Project Output Variables** table, click **Import Variables**. The Import Variables from Table window appears.
 - b. Select **DELINQUENCY_PROJECT_OUTPUT**, click **OK**, and click **Finish**.

Here is the New Project wizard Step 2 of 2 after the project variables have been set.



- Examine the **Tutorial2** folder to verify that it contains the **Delinquency** project.



Define the Project Properties

To define the properties that SAS Model Manager uses to create reports and score models, follow these steps:

- Select the **Delinquency** project in the **Tutorial2** folder and expand **Specific Properties** on the **Properties** tab.
- Enter values for these properties:

Default Test Table

Click the property value field and click **Browse**. In the Select Table window, select the table **DELINQUENCY_TEST** from the SAS Metadata Repository tab.

Default Scoring Task Input Table

Click the property value field and click **Browse**. In the Select Table window, select the table **DELINQUENCY_SCORING_INPUT** from the SAS Metadata Repository tab.

Default Scoring Task Output Table

Click the property value field and click **Browse**. In the Select Table window, select the table **DELINQUENCY_SCORING_OUTPUT** from the SAS Metadata Repository tab.

Default Train Table

Click the property value field and click **Browse**. In the Select Table window, select the table **DELINQUENCY_TRAIN** from the SAS Metadata Repository tab.

Training Target Variable

Enter **bad**.

Target Event Value

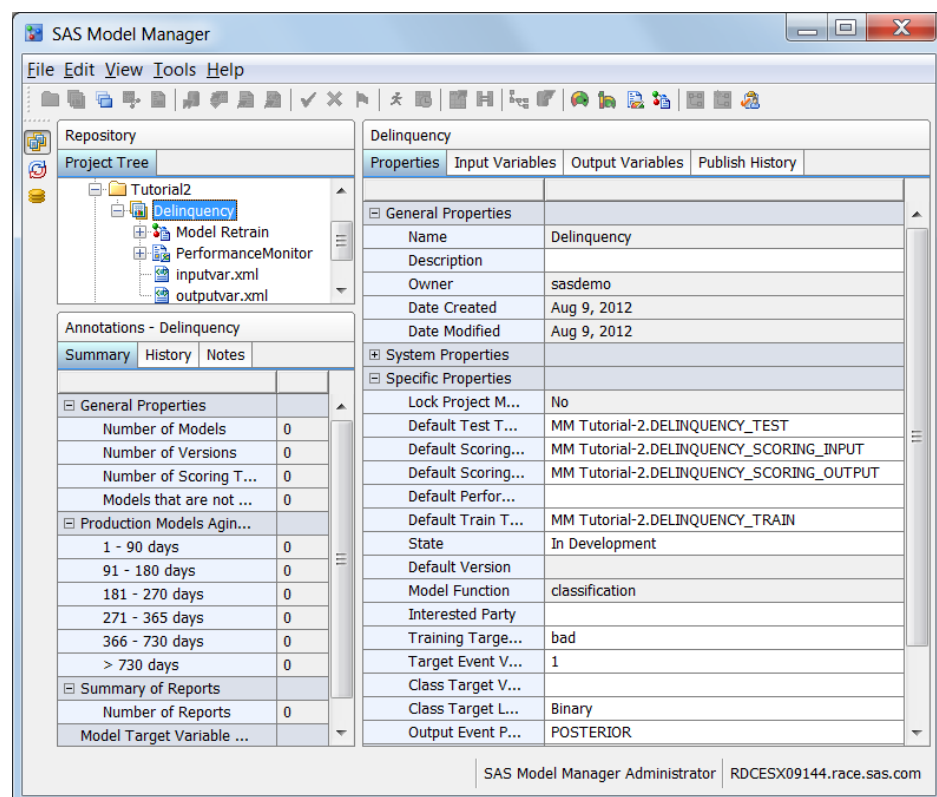
Enter **1**.

Class Target Level

Click the property value field and select **Binary**.

Output Event Probability Variable

Click the property value field and select **POSTERIOR**.



Create a Version

Create a version for the project. The version folder contains life cycle information, auxiliary version documents, candidate model files, model comparison reports, resource files, scoring tasks, and model performance reports. To create a new version, follow these steps:

1. Right-click the **Delinquency** project and select **New** ⇒ **New Version**. The New Version dialog box appears.
2. Specify the following version properties and click **OK**.

Name

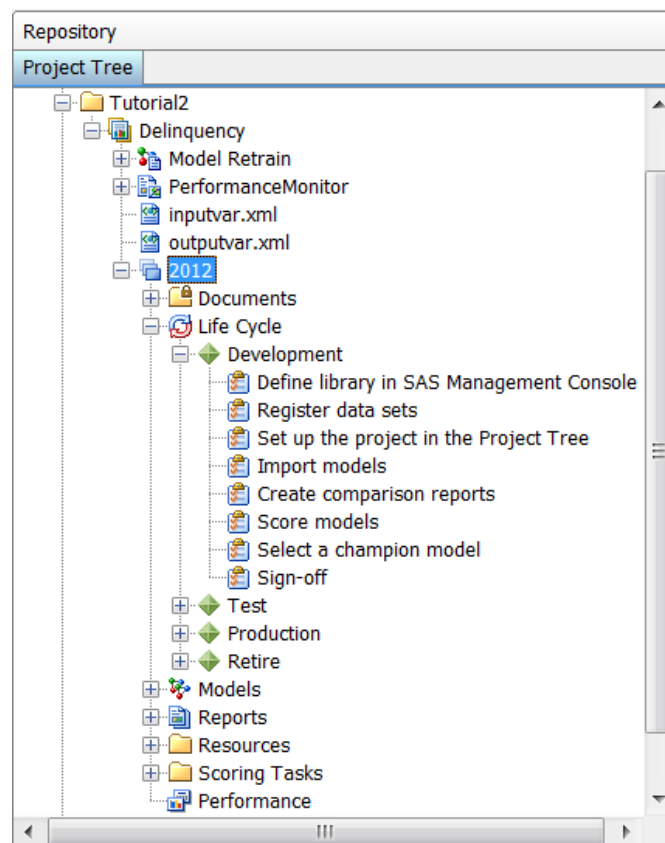
Enter **2012** for the version name.

Life Cycle Template

select the user-defined template **Tutorial Life Cycle**.

Note: If you are using a workflow process to track the progress of your project or version, you can select any life cycle template. You can then skip all tasks to update the life cycle.

3. Examine the **Delinquency** project to verify that it contains one version called **2012**. Select **Life Cycle**. Verify that the **Name** property is **Tutorial Life Cycle**.



Note: If you want to use a workflow process to track the progress of your version, send a request to a SAS Model Manager administrator and ask the administrator to create a workflow to use for the tutorials. Include the name and UUID of the version with which you want the workflow to be associated.

Create a Workflow (Optional)

Overview


A *workflow* is a copy of a workflow process definition. Only a SAS Model Manager administrator can create a new workflow. Each workflow consists of activities. Activities can contain properties and comments so that you can share information with other users, or make notes. The status that you select when completing an activity determines the next activity in the workflow process.

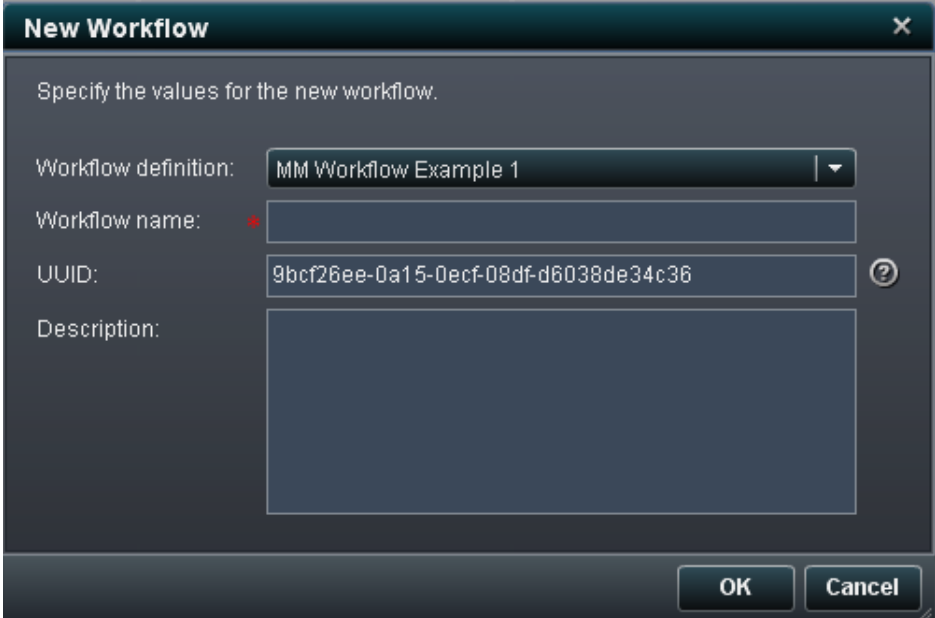
Prerequisites

The exercises in this tutorial require that you have made the workflow process definition available to SAS Model Manager. For more information, see [“Prepare for Using SAS Workflow” on page 18](#).

Create a New Workflow

1. Log on to SAS Model Manager as a member of the **Model Manager Administrator Users** group.
2. From the SAS Model Manager main window, right-click a version and select **New Workflow**. Workflow Console is launched in a Web browser and displays the New Workflow window.

Note: If you are already logged on to Workflow Console, from the Workflow Definitions category view, select a process definition and click .

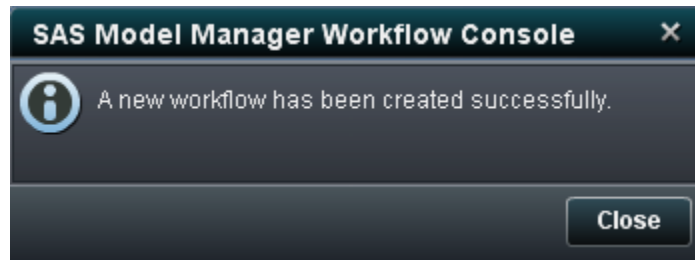


3. Select the workflow definition that is associated with this tutorial (if you accessed the New Workflow window from the SAS Model Manager main window).
4. Enter a name for the workflow.
5. The UUID of the selected version is already populated.

Note: If the UUID is not already populated, you can copy the UUID system property value for a version from the Properties view in the SAS Model Manager main

window. The field label and other characters that precede the UUID value must be removed.

6. (Optional) Enter a description for the workflow.
7. Click **OK**. A message appears, indicating that the workflow has been successfully created.



8. Click **Close**. The new workflow is now available in the Workflows category view.
9. To view the new workflow, click Workflows. The Workflows category view appears. Select the workflow to view information that is associated with the new workflow.



The workflow process definitions that have been provided for the tutorials already have participants assigned. For information about how to assign additional participants to a workflow, see “Working with Workflow Participants” in Chapter 21 of *SAS Model Manager: User's Guide*. You can also see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221 to learn how to manage workflows and work with activities.

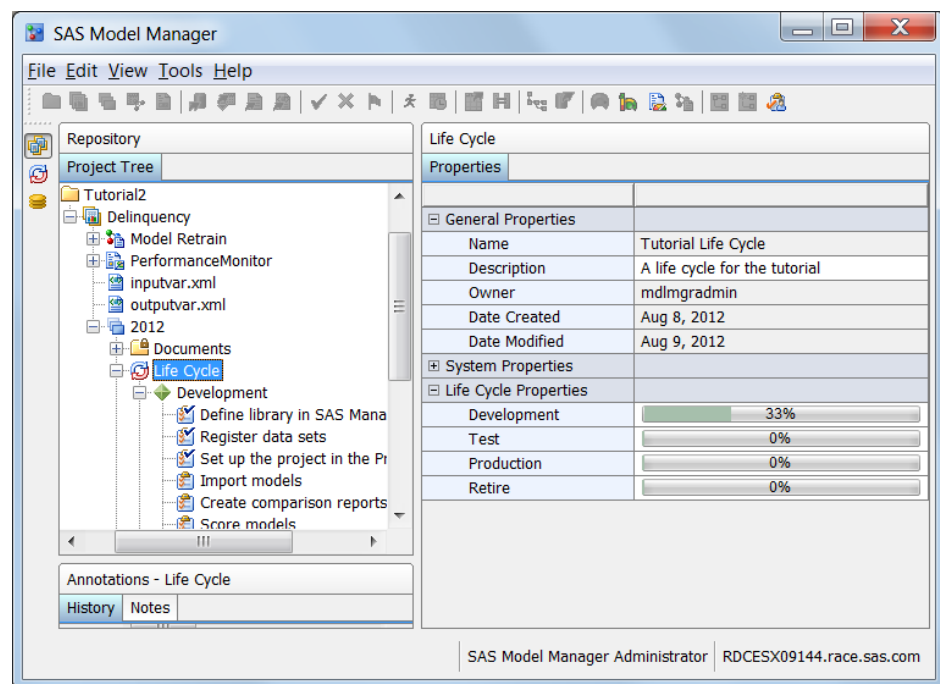
Update the Life Cycle (Optional)

To complete the milestone task of adding data sources and setting up the project in the Project Tree, follow these steps:

1. In the **Delinquency** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Define library in SAS Management Console** task and examine the task properties. The **To Be Completed By** property, assigned in the life cycle template, determines which users or user groups from the Participants list are responsible for


this milestone task. Because you are a member of the **MM Tutorial Assignees** group, you are authorized to update the task status.

3. Click the **Status** box and select **Completed**.
4. Select the **Register data sets** task and examine the task properties. Click the **Status** box and select **Completed**.
5. Select the **Set up project in the Project Tree** task. Click the **Status** box and select **Completed**.
6. Select all of the tasks whose status you updated and examine the properties. Verify that the value of the **Date Completed** property is today and that the value of the **Completed By** property is your user ID.
7. Select the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

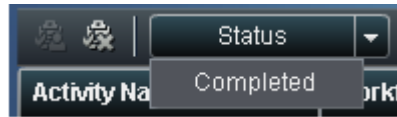
1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

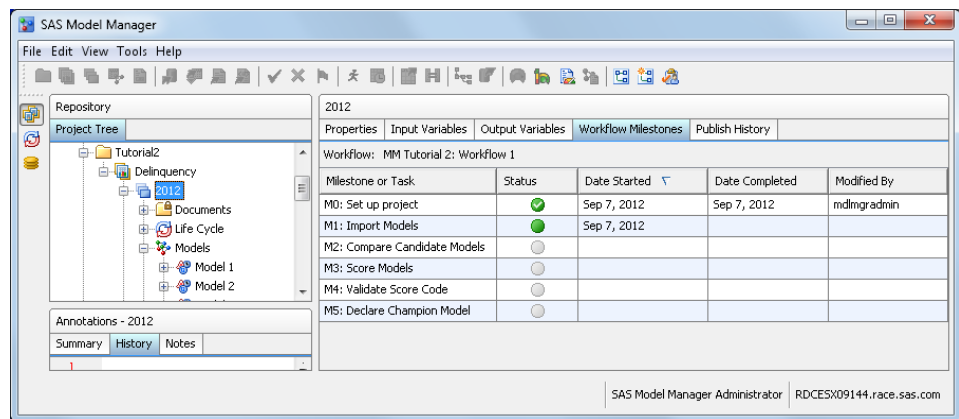
Note: You can select an activity name and click  to release an activity that you had previously claimed.

3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Import Models

In this exercise you import models into SAS Model Manager, set model properties, and map the model variables.

About Tutorial 2 Models

The imported models are SAS code models. SAS code models are models that were not created and exported from SAS Enterprise Miner. SAS code models consist of the SAS code and the model component files (metadata) that is used to process a model in SAS Model Manager.

The SAS code for the first model is the LOGISTICS procedure, whereas the SAS code for the second and third models consists of DATA step fragments. To import a SAS code file, at least three component files are required: the model score code, the model input file, and the model output file. For prediction or classification models, you also must prepare model target files.

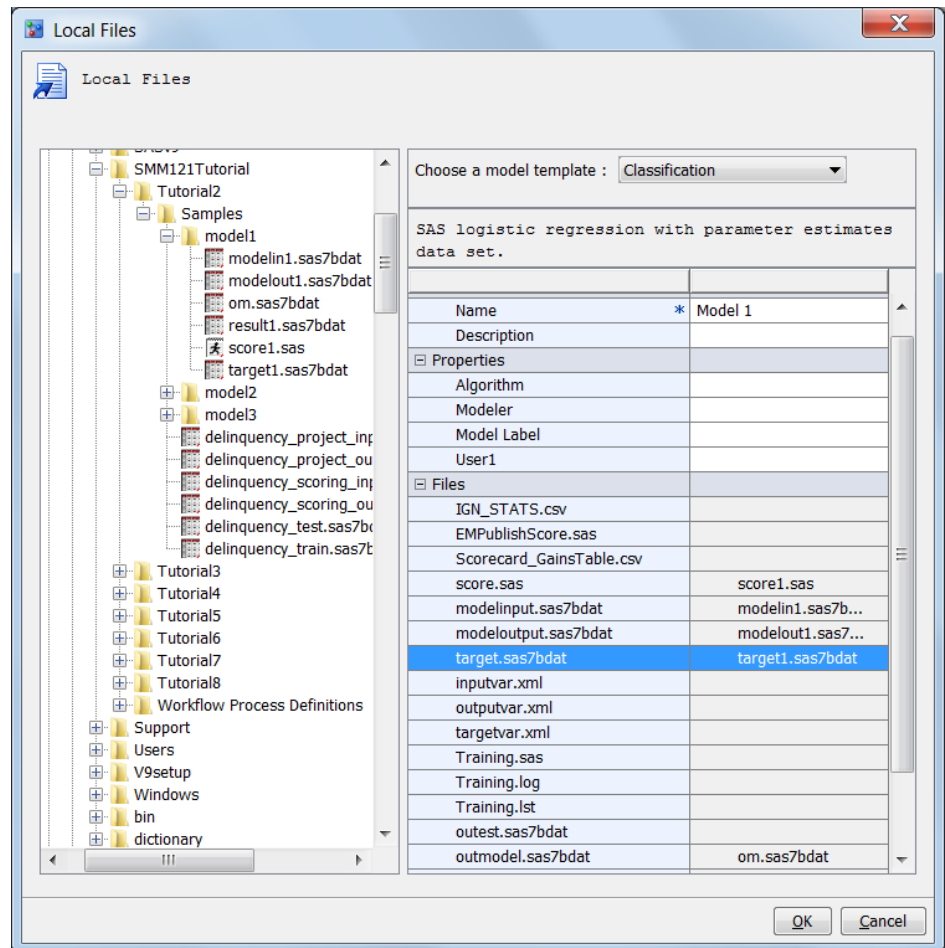
Note: This document imports two models that use the LOGISTICS procedure. In Tutorial 2, the model is a SAS code model, which is made up of individual model component files. In Tutorial 3, the model component files were created by the LOGISTICS procedure and bundled as a model package file (.spk). SAS code models and model package files use different model import methods.

Import SAS Code Models

1. Expand the **2012** version in the **Delinquency** project and right-click **Models**. Then select **Import from** ⇒ **Local Files**. The Local Files window appears.
2. Import Model 1.
 - a. In the left pane, expand the **Desktop** folder and select `<drive>:\Tutorial12\Samples\model11`.
 - b. In the **Choose a model template** box, select **Classification**.
 - c. Type **Model 1** in the **Name** box. For each filename in the Object column, click the filename and drag it to the corresponding option box. This action maps the tutorial model component filenames to the SAS Model Manager model component filenames.

Object	Option
modelin1.sas7bdat	modelinput.sas7bdat
modelout1.sas7bdat	modeloutput.sas7bdat
om.sas7bdat	outmodel.sas7bdat
score1.sas	score.sas
target1.sas7bdat	target.sas7bdat

Here is the Local Files window after the files have been mapped.



- d. Click **OK**.
3. Import Model 2.
 - a. Open the Local Files window. In the left pane, expand the **Desktop** folder and select **<drive>:\Tutorial12\Samples\model12**.
 - b. In the **Choose a model template** box, select **Classification**.
 - c. Type **Model 2** in the **Name** box. For each filename in the Object column, click the filename and drag it to the corresponding option box. This action maps the tutorial model component filenames to the SAS Model Manager model component filenames.

Object	Option
modelin2.sas7bdat	modelinput.sas7bdat
modelout2.sas7bdat	modeloutput.sas7bdat
ot.sas7bdat	outmodel.sas7bdat
score2.sas	score.sas
target2.sas7bdat	target.sas7bdat

- d. Click **OK**.

4. Import Model 3.
 - a. Open the Local Files window. In the left pane, expand the **Desktop** folder and select `<drive>:\Tutorial2\Samples\model3`.
 - b. Type **Model 3** in the **Name** box. For each filename in the Object column, click the filename and drag it to the corresponding option box. This action maps the tutorial model component filenames to the SAS Model Manager model component filenames.

Object	Option
modelin3.sas7bdat	modelinput.sas7bdat
modelout3.sas7bdat	modeloutput.sas7bdat
score3.sas	score.sas
target3.sas7bdat	target.sas7bdat

- c. Click **OK**.
5. Examine the **Models** folder to verify that it contains the three models. Right-click the folder and select **Expand All** to examine the model files.

Set Model Properties

Set the properties for the model. SAS Model Manager requires that the **Score Code Type** be set to **DATA step** if the score code is a DATA step fragment, or be set to **SAS Program** if the score code is a SAS procedure. Follow these steps.

1. Select **Model 1**. Click the **Description** field and enter `first model for tutorial 2`.
2. Select **Model 2**. Click the **Score Code Type** box and select **DATA step**.
3. Select **Model 3**. Click the **Score Code Type** box and select **DATA step**.

Map Model Variables to Project Variables

When the names of the model output variable are not identical to the names of the project output variables, you must map the variables. To map model output variables to project output variables, follow these steps:

1. Map model variables for the first model. Right-click **Model 1** in the **Models** folder and then select **Set Model Output Mapping**. Ensure that the following model variables are mapped to their respective project variables. To map a model variable to a project variable, click in the box in the **Model Variables** column, select a variable, and click **OK**.

Project Variables	Model Variables
POSTERIOR	P_1
PREDICTION	I_BAD

- Map model variables for the second model. Select **Model 2** in the **Models** folder and then click the **Model Mapping** tab in the right pane. Click **Edit**. Ensure that the following model variables are mapped to their respective project variables. To map a model variable to a project variable, click the box in the **Model Variables** column and select a variable. Click **OK** when you are finished.

Project Variables	Model Variables
POSTERIOR	PROB2
PREDICTION	PREDICTION

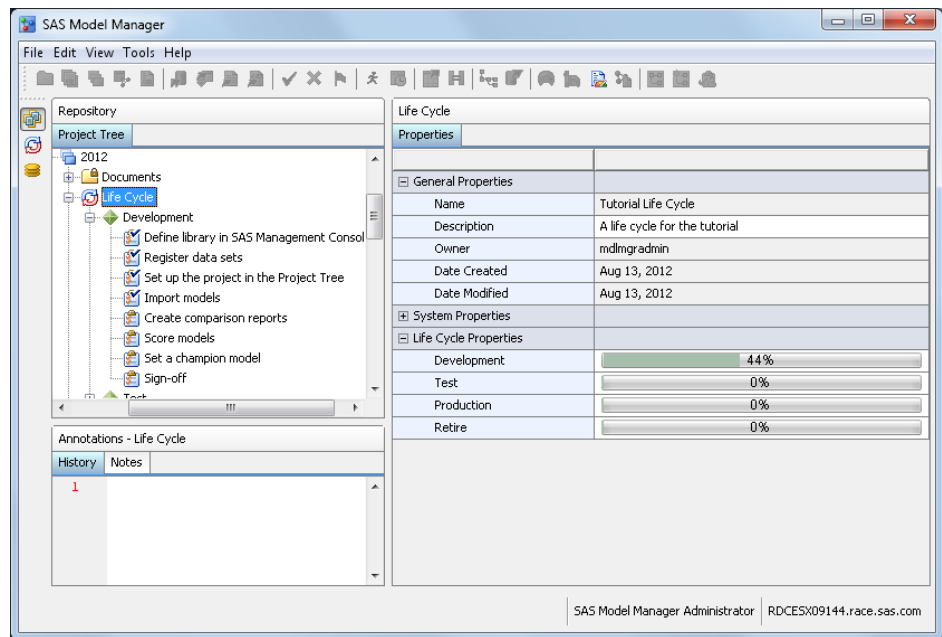
- Map model variables for the third model. Select **Model 3** in the **Models** folder and then click the **Model Mapping** tab in the right pane. Click **Edit**. Ensure that the following model variables are mapped to their respective project variables. To map a model variable to a project variable, click the box in the **Model Variables** column and select a variable. Click **OK** when you are finished.

Project Variables	Model Variables
POSTERIOR	P_BAD1
PREDICTION	PREDICTION

Update the Life Cycle (Optional)


To update the Development milestone, follow these steps:

- In the **Delinquency** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
- Select the **Import models** task. Click the **Status** box and select **Completed**.
- Select the **Development** milestone to refresh the property values. Select **Import models**. The **Date Completed** and **Completed By** fields have been updated with today's date and your user ID.
- Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Develop** property displays a bar chart that shows the percentage of completed tasks for this milestone.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

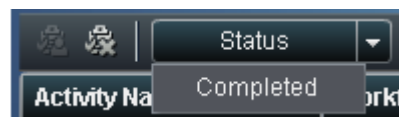
1. Select **Tools** ⇨ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

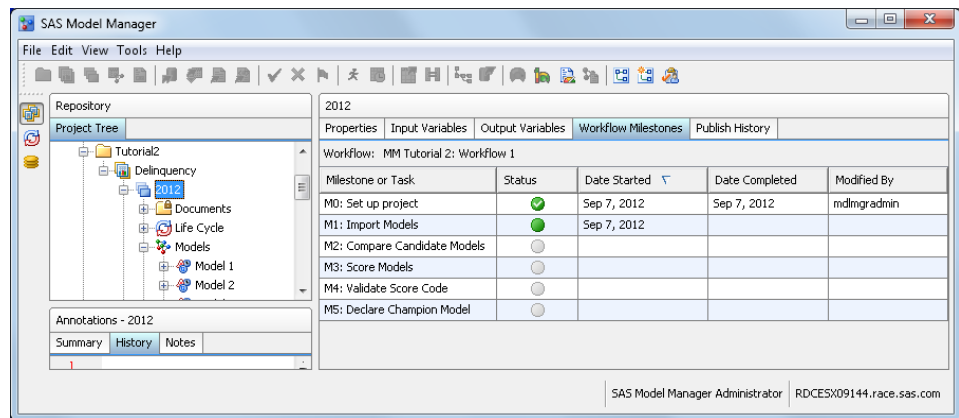
Note: You can select an activity name and click  to release an activity that you had previously claimed.

3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Create Model Comparison Reports

In this exercise, you create several model comparison reports that are used in the selection and approval of a champion model. After you create the reports, you view the reports in the **Reports** folder. The reports enable you to evaluate candidate models in a version or across versions by assessing the structure, performance, and resilience of your models.

Create a Model Profile Report

The Model Profile report creates three tables to display the profile data that is associated with the model input variables, output variables, and target variables. To create this report, follow these steps:

1. Expand the **2012** version in the **Delinquency** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
2. In the New Report window, use the specified values for these fields and click **OK**:

Type

select **Model Profile Report**.

Format

select **PDF**. **PDF** is the default value, and it might already be the value for **Format**.

Style

select **Seaside**. **SAS default** is the default style for the SAS format that is selected. For example, the default style for the HTML format is HTMLBLUE.

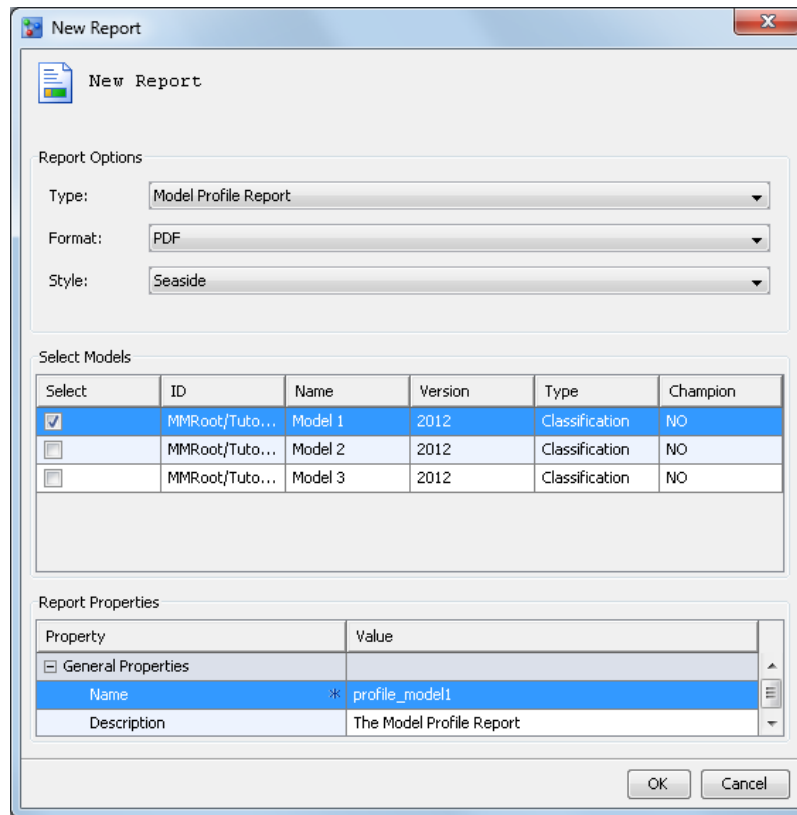
Select Models

select the box for **Model 1**.

Report Properties

replace the default report name with the report name **profile_model1** in the **Name** field.

Here is the New Report window at this point in the process. Click **OK** when you are finished.



3. When the information dialog box confirms that the report was created successfully, click **Close**.

Create a Delta Report

The Delta report compares the profile data for two models and notes the differences. To create this report, follow these steps:

1. Expand the **2012** version in the **Delinquency** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
2. In the New Report window, use the specified values for these fields and click **OK**:

Type

select **Delta Report**.

Format

select **HTML**.

Style

select **SAS default**. **SAS default** is the default style for the SAS format that is selected. For example, the default style for the HTML format is HTMLBLUE.

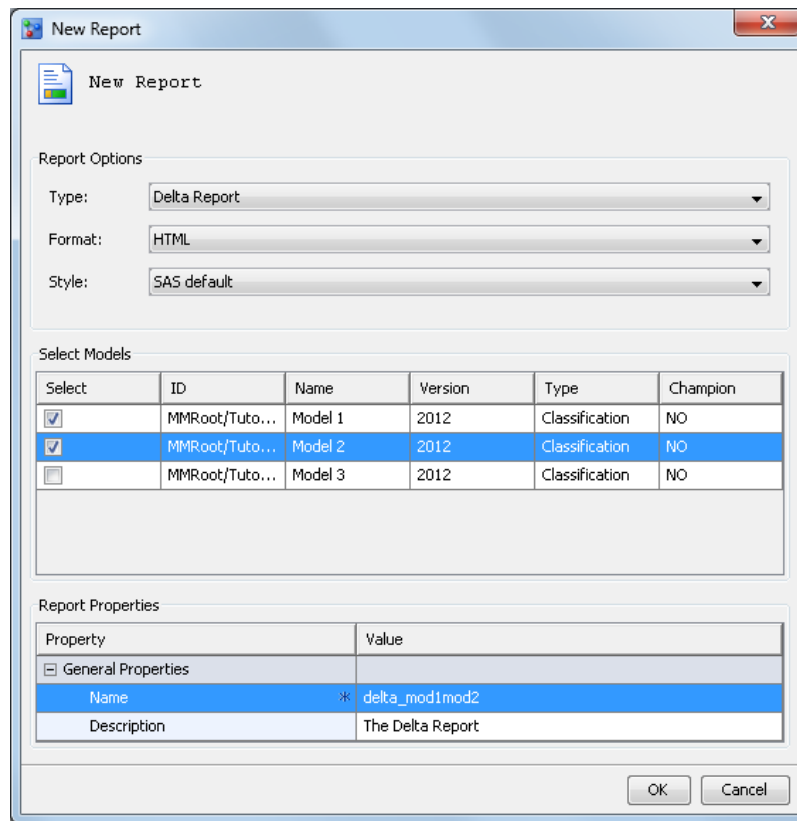
Select Models

select the boxes for **Model 1** and **Model 2**.

Report Properties

replace the default report name with the report name **delta_mod1mod2** in the **Name** field.

Here is the New Report window at this point in the process. Click **OK** when you are finished.



3. When the information dialog box confirms that the report was created successfully, click **Close**.

Create a Dynamic Lift Report

The Dynamic Lift report provides visual summaries of the performance of one or more models for predicting a binary outcome variable performance. To create this report, follow these steps:

1. Expand the **2012** version in the **Delinquency** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
2. In the New Report window, specify the following options and click **OK**:

Type

select **Dynamic Lift Report**.

Format

select **PDF**.

Style

select **Seaside**. **SAS default** is the default style for the SAS format that is selected.

Select Models

select the boxes for **Model 1** and **Model 3**.

Report Properties

replace the default report name with the report name **lift_mod1mod3** in the **Name** field.

Here is the New Report Wizard at this point in the process. Click **OK** when you are finished.

Report Options

Type: Dynamic Lift Report

Format: PDF

Style: Seaside

Select Models

Select	ID	Name	Version	Type	Champion
<input checked="" type="checkbox"/>	MMRoot/Tuto...	Model 1	2012	Classification	NO
<input type="checkbox"/>	MMRoot/Tuto...	Model 2	2012	Classification	NO
<input checked="" type="checkbox"/>	MMRoot/Tuto...	Model 3	2012	Classification	NO

Report Properties

Property	Value
General Properties	
Name	lift_mod1mod3
Description	The Dynamic Lift Report

OK Cancel

- When the information dialog box confirms that the report was created successfully, click **Close**.

View a Model Comparison Report

To view a model comparison report, follow these steps:

- Expand the version folder **2012** and the **Reports** folder.
- Right-click the report name and select **View Report**.

Note: If user credentials are required, then specify a user ID and password that have permission to access the SAS Content Server.

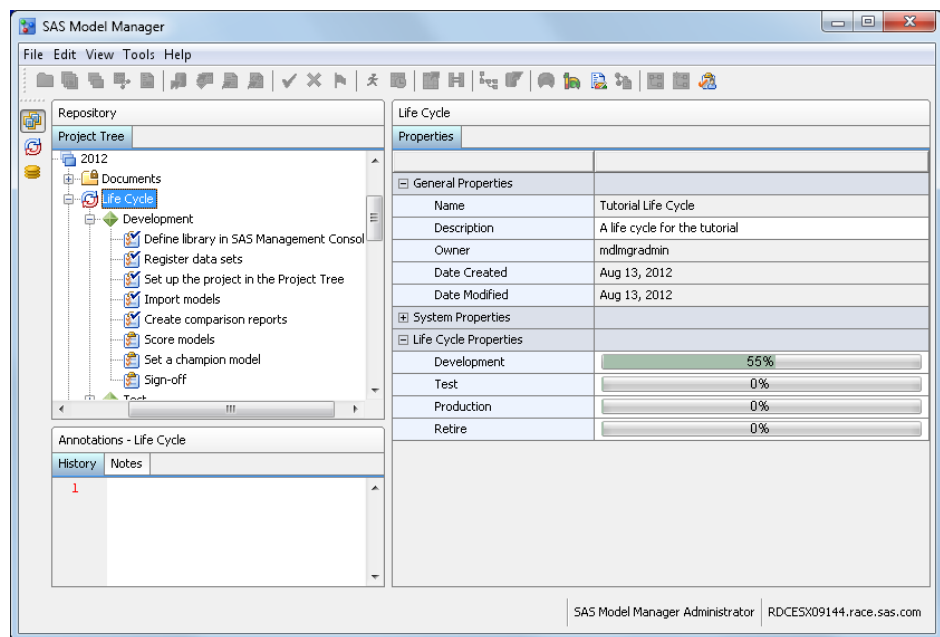
- Use the PDF viewer to distribute or print a copy of the report.
- Close the PDF Viewer.

For a detailed description of the model comparison reports, see the *SAS Model Manager: User's Guide*.

Update the Life Cycle (Optional)


To update the Development milestone, follow these steps:

1. In the **Delinquency** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Create comparison reports** task. Select the **Status** box and select **Completed**.
3. Select **Create comparison reports**. The **Completed Date** and **Completed By** fields have been updated with today's date and your user ID.
4. Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

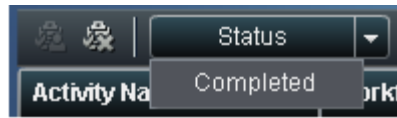
1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

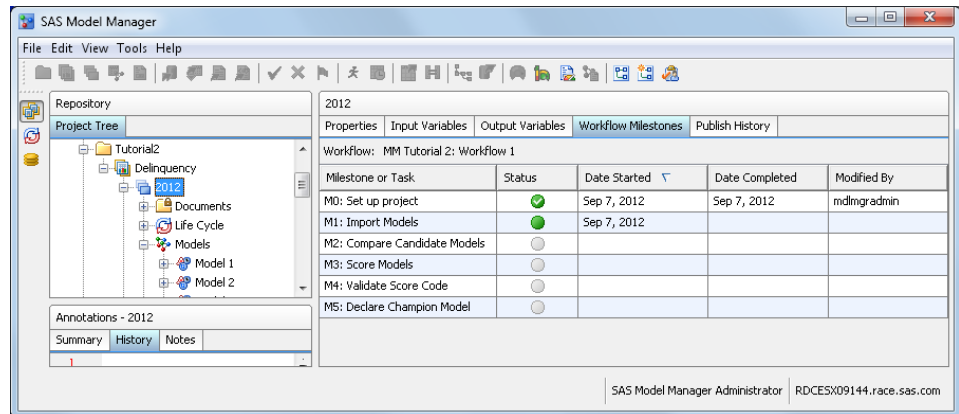
Note: You can select an activity name and click  to release an activity that you had previously claimed.

3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Using the Annotations View

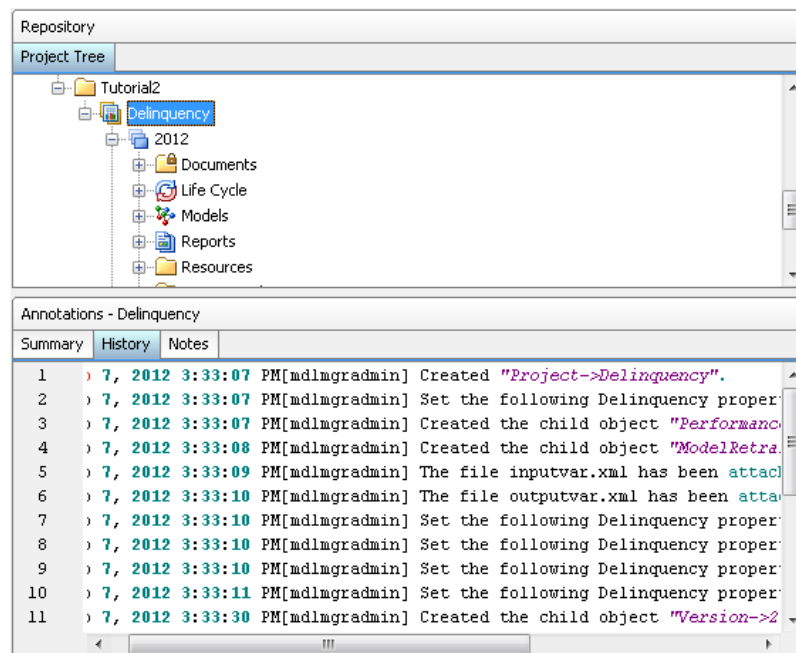
In this exercise, you use the **Annotations** view to examine the time-stamped event log, add text information to a model component, and examine the synopsis of the project and model reports. The Annotations view is the lower left pane of the SAS Model Manager window.

View History

To view the event log for the different components of a project, follow these steps:

1. Select the **Delinquency** project.
2. In the **Annotations** view, click the **History** tab. This tab displays a time-stamped entry each time you create, modify, import, publish, export, or delete a component. SAS Model Manager records the following information:
 - The date and time that the action occurred
 - The user ID that performed the action
 - The action that was performed

Here is an example of the **History** in the **Annotations** view:

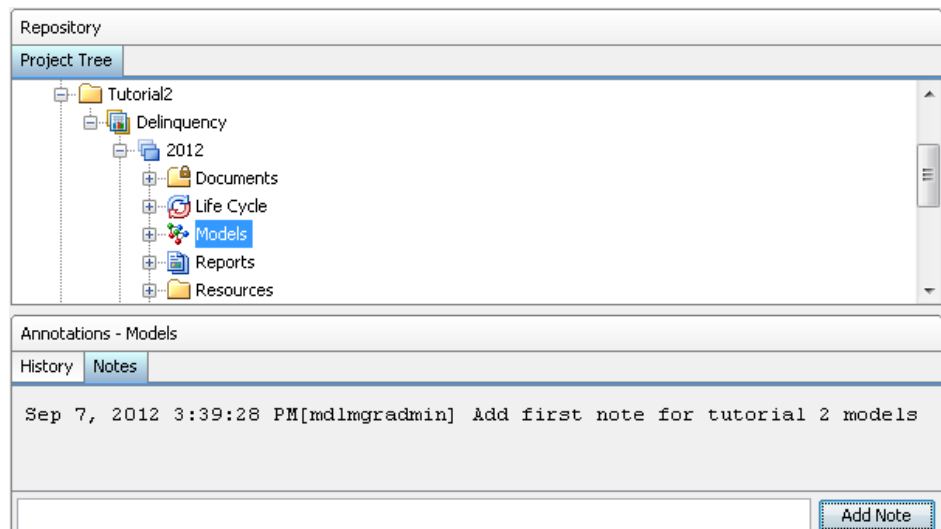


View Notes

To create persistent annotations that are associated with the different components of a project, follow these steps:

1. Expand the **2012** version in the **Delinquency** project and select the **Models** folder.
2. In the **Annotations** view, click the **Notes** tab.
3. In the **Add Notes** field, enter **Add first note for tutorial 2 models** and click **Add Notes**.

Here is the Delinquency project note in the **Annotations** view:



View the Summary Information

The Summary contains information about the components that are contained in the selected folder.

To view summary information, follow these steps:

1. In the Project Tree, click the **Tutorial2** folder.
2. In the **Annotations** view, click the **Summary** tab.
3. Examine the information on this tab. SAS Model Manager includes general property information about the components that are part of this folder, aging information, number of reports, target information, and input information about the project.

Here is the **Summary** information for **Tutorial2**:

Repository	
Project Tree	
Annotations - Tutorial2	
Summary	History
Notes	
[-] General Properties	
Number of Models	3
Number of Versions	1
Number of Scoring Tasks	0
Models that are not currently in production	3
[-] Production Models Aging Report	
1 - 90 days	0
91 - 180 days	0
181 - 270 days	0
271 - 365 days	0
366 - 730 days	0
> 730 days	0
[-] Summary of Reports	
Number of Reports	3
[-] Model Target Variable Report	
BAD	3
[-] Model Input Variable Report	
AGE	3
NUMCARDS	2

The information on the **Summary** tab dynamically reflects the contents of the selected node and its subnodes in the Project Tree. If you select **MMRoot**, you see summary information for all nodes in the Project Tree. If you select a project, the summary information reflects the project and all nodes within that project.

Scoring Models

In this exercise, you create a scoring task that is used to run the score code of a model and produce scoring results. You use the results to determine the scoring accuracy and to analyze the model performance. The scoring task uses data from a scoring task input table, and then generates the results in a scoring task output table.

Create a Scoring Task

1. Expand the **2012** version, right-click the **Scoring Tasks** folder and select **New Scoring Task**. The New Scoring Task wizard appears.
2. Specify the following options and click **Next**:

Name

enter **M1** for the scoring task name.

Description

enter **test1**.

Model

select **Model 1**. This model controls the available values for the input and output tables.

Scoring task type

select **Test**.

TIP A best practice is to start all scoring tasks with **Test** selected. When a scoring task is run as type **Test**, the results are not overwritten. You can change the type to **Production** after you are satisfied with the scoring task results and when the model is ready for production.

3. Verify that the output variables are mapped to the model variables. The variable mapping is as follows:


Output Variable	Model Variable
AGE	AGE
CUSTKEY	CUSTKEY
EVERDEFAULT	EVERDEFAULT
GENDER	GENDER

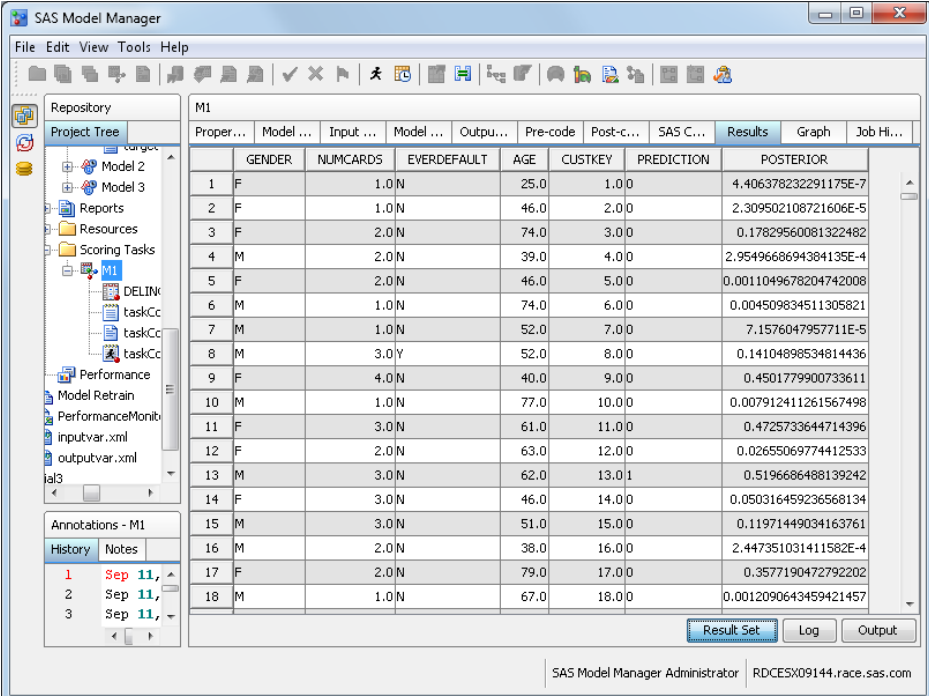
Output Variable	Model Variable
NUMCARDS	NUMCARDS
POSTERIOR	P_1
PREDICTION	I_BAD

Click **Finish**.

4. Select the **M1** scoring task to examine its properties. The value for **Date Modified** is today's date. To change the scoring task name or model input and output tables, you must create a new scoring task.

Execute a Scoring Task

1. Verify that you have mapped the model output variables to the scoring task output variables. For more information, see [“Map Model Variables to Project Variables”](#) on page 54.
2. Validate the input variables. Expand the **Scoring Tasks** folder, select the **M1** scoring task and click the  toolbar button. Examine the results of **Quick Check**, and then click **OK**.
3. Right-click the **M1** scoring task and select **Execute**.
4. When the information dialog box confirms that the report was created successfully, click **Close**. To view the results, click the **Results** tab and click **Result Set**.



The screenshot shows the SAS Model Manager window with the **M1** scoring task selected. The **Results** tab is active, displaying a table of results. The table has columns for GENDER, NUMCARDS, EVERDEFAULT, AGE, CUSTKEY, PREDICTION, and POSTERIOR. The results are organized into a grid with 18 rows and 7 columns. The bottom of the window shows the **Result Set** button, **Log** button, and **Output** button. The status bar at the bottom indicates the user is the SAS Model Manager Administrator and the session ID is RDCESX09144.race.sas.com.

	GENDER	NUMCARDS	EVERDEFAULT	AGE	CUSTKEY	PREDICTION	POSTERIOR
1	F	1.0	N	25.0	1.0		4.406378232291175E-7
2	F	1.0	N	46.0	2.0		2.309502108721606E-5
3	F	2.0	N	74.0	3.0		0.17829560081322482
4	M	2.0	N	39.0	4.0		2.9549668694384135E-4
5	F	2.0	N	46.0	5.0		0.0011049678204742008
6	M	1.0	N	74.0	6.0		0.004509834511305821
7	M	1.0	N	52.0	7.0		7.1576047957711E-5
8	M	3.0	Y	52.0	8.0		0.14104898534814436
9	F	4.0	N	40.0	9.0		0.4501779900733611
10	M	1.0	N	77.0	10.0		0.007912411261567498
11	F	3.0	N	61.0	11.0		0.4725733644714396
12	F	2.0	N	63.0	12.0		0.02655069774412533
13	M	3.0	N	62.0	13.0	1	0.5196686488139242
14	F	3.0	N	46.0	14.0		0.050316459236568134
15	M	3.0	N	51.0	15.0		0.11971449034163761
16	M	2.0	N	38.0	16.0		2.447351031411582E-4
17	F	2.0	N	79.0	17.0		0.3577190472792202
18	M	1.0	N	67.0	18.0		0.0012090643459421457

If the scoring task was not successful, then review the **Log** tab for error messages.

5. Click the **Graph** tab to graph the results.

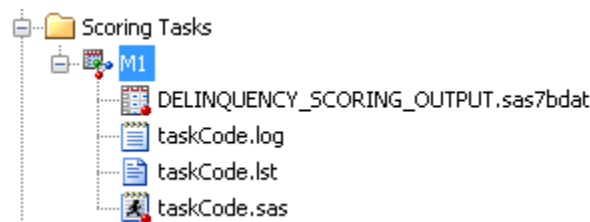
- a. Click **Graph Wizard**, select **Histogram**, and then click **Next**.
- b. In the upper right corner, click **Use default assignments** and then click **Next**.
- c. Click the **Column name box** and select **AGE**.
- d. Click the **Operator** box and select **Greater than**.
- e. In the **Value** field, enter **50**. Click **Next**.
- f. In the **Title** field of the Chart Titles page, type **M1 Age**. Click **Next** and then click **Finish**.

Here is the histogram on the **Results** tab:



6. Expand the **M1** scoring task to verify that four content files were saved and that the value for **Date Modified** is today's date.

Here is the **Scoring Tasks** folder and the files for the **M1** scoring task:

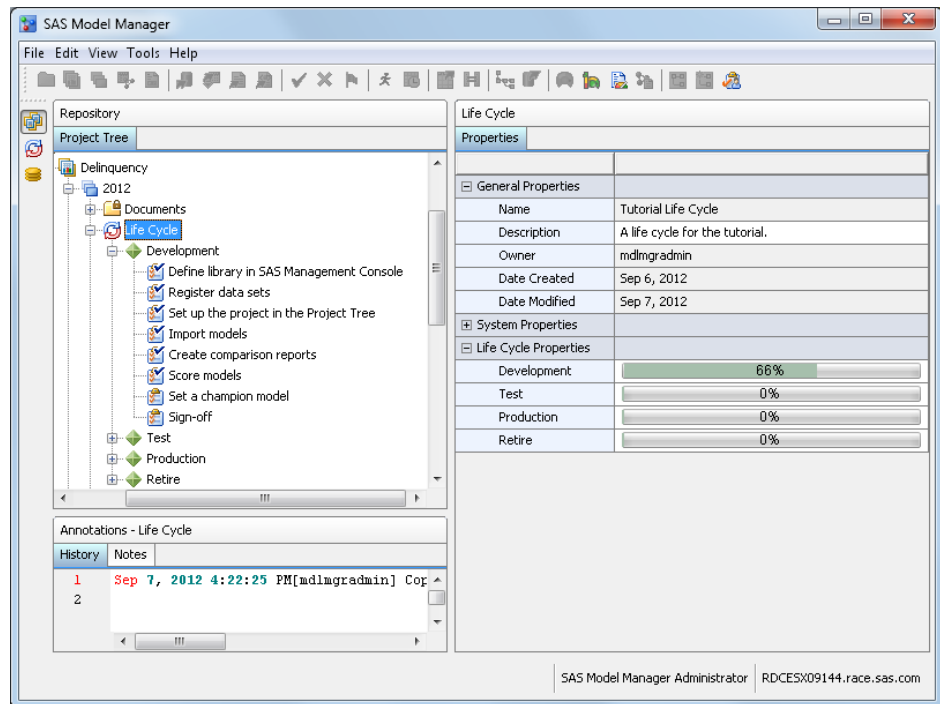


Update the Life Cycle (Optional)

To update the Development milestone, follow these steps:


1. In the **Delinquency** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Score models** task. Click the **Status** box and select **Completed**.
3. Select **Score models**. The **Completed Date** and **Completed By** fields have been updated with today's date and your user ID.

- Click the **Life Cycle** node to examine its properties. The value for **Modification Date** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

- Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

- From the Activities category view, select an activity name, and click .

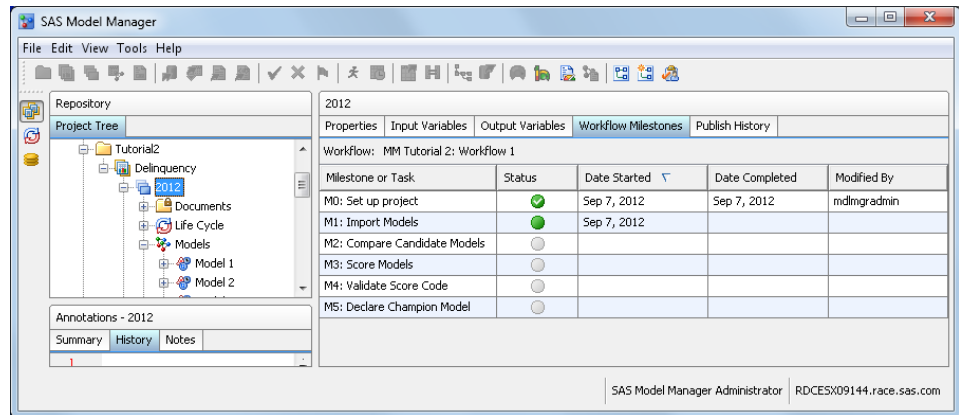
Note: You can select an activity name and click  to release an activity that you had previously claimed.

- (Optional) Enter a property value or change an existing property value in the Properties pane.
- (Optional) Add a comment to the activity using the Comments pane.
- Select a status value to complete the activity. The workflow process continues to the next activity.



- Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Declare a Champion Model

In this exercise you declare a champion model.

Set the Champion Model

To set a champion model, follow these steps:

1. Expand the **Models** folder in the **2012** version. Right-click **Model 1**, select **Set as Champion**, and click **Yes** to confirm.
2. Verify that the ✓ icon appears next to the champion model and the version.
3. Select the version folder to examine its properties. The value for **Date Modified** is today's date. The value for the **Champion Model ID** is the champion model's UUID.

TIP To document the reasons or assumptions for your selection of the champion model, use the version **Notes** tab. SAS Model Manager automatically annotates the History tab. For more information, see [“Using the Annotations View”](#) on page 62.

Update the Life Cycle (Optional)

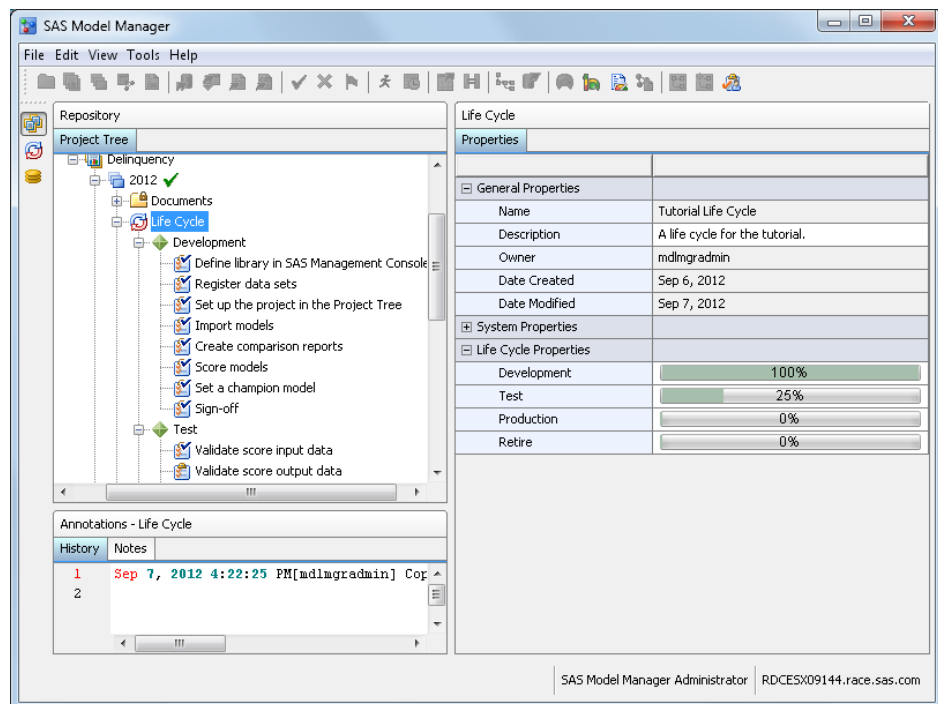
To update the Development milestone, follow these steps:

1. In the **Delinquency** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Set a champion model** task. Click the **Status** box and select **Completed**.
3. Select the **Sign-off** task to indicate that all of the **Development** milestone tasks are complete. Click the **Status** box and select **Completed**.

4. Select the **Set a champion model** and **Sign-off** tasks. The **Date Completed** and **Completed By** fields have been updated with today's date and your user ID.
5. Expand the **Test** milestone. Select the **Validate score input data** task. Click the **Status** box and select **Completed**.


Note: The **Set a champion model** task must have been completed before you can complete this task.

6. Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** and **Test** properties display a bar chart that shows the percentage of completed tasks for this milestone.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

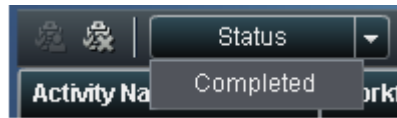
Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

Note: You can select an activity name and click  to release an activity that you had previously claimed.

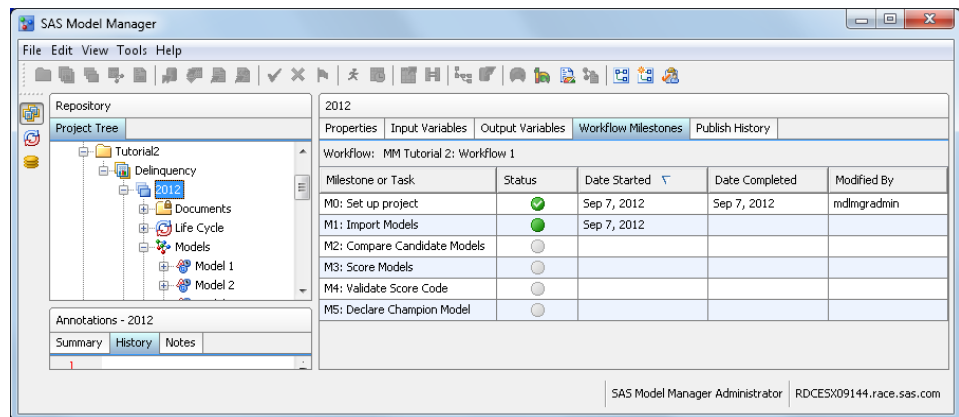
3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.

5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Query for the Remaining Project Tasks to Complete

In this example, you search for the status of life cycle tasks by using the Query utility.

To search for the status of life cycle tasks, follow these steps:

1. Right-click the **Tutorial2** folder and select **Query**. The Query window appears.
2. Click the **Life Cycle** tab. Select the **User** box, select **MM Tutorial Assignees**, and then click **Find**.
3. Examine the status of the associated milestones and click **OK**. The search results display tasks in the **Assignee** list that are assigned to the user and tasks in the **Approver** list that the user is assigned to approve. The **Assignee** query results return only the tasks that have a status of **Started** or **Not Started**. Results that have a status of **Complete** or **Approved** are omitted.

Query

Specify values to use for the query.

Model | Component | Life Cycle

User: MM Tutorial Assignees

Assignee:

Name	Project	Version	Milestone	Status	Path
End Production Scoring	Delinquency	2012	Retire	Not Started	http://RDCE5X09...
Declare ready for production	Delinquency	2012	Production	Not Started	http://RDCE5X09...

Approver:

Name	Project	Version	Milestone	Status	Path
------	---------	---------	-----------	--------	------

Find

OK Cancel

Chapter 4

Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports

Overview of Importing Models, Scheduling Scoring Tasks, and Creating Reports	76
Prerequisites	76
Tutorial 3 Models and Data Sets	76
Verify Your User ID as a Member of SAS Model Manager User Groups	76
Organize the Model Hierarchy	77
Create a Folder	77
Create a New Project	77
Define the Project Properties	79
Create a Version	80
Create a Workflow (Optional)	81
Update the Life Cycle (Optional)	83
Update the Workflow Process (Optional)	84
Import Models	85
Import Models from a SAS Metadata Repository	85
Import PMML Models	86
Import Model Package Files	87
Map Model Variables to Project Variables	88
Update the Model Life Cycle (Optional)	89
Update the Workflow Process (Optional)	90
Create Model Comparison and Summary Reports	91
Create a Model Profile Report	91
Create a Delta Report	92
Create a Dynamic Lift Report	93
Create an Interval Target Variable Report	94
Training Summary Data Set Report (Optional)	95
View a Model Comparison and Summary Reports	97
Update the Life Cycle (Optional)	98
Update the Workflow Process (Optional)	98
Scoring Models	99
Create a Scoring Task	99
Schedule a Scoring Task	100
View and Graph Scoring Results	102
Update the Life Cycle (Optional)	103
Update the Workflow Process (Optional)	104
Declare a Champion Model	105
Set the Champion Model	105
Set the Challenger Model	106

Update the Life Cycle (Optional)	106
Update the Workflow Process (Optional)	107

Overview of Importing Models, Scheduling Scoring Tasks, and Creating Reports

SAS Model Manager provides several methods to import SAS models into a project version. You can import your models into a project version from the SAS Metadata Repository, SAS Enterprise Miner or SAS/STAT model package files, SAS code, R models, and PMML models. SAS macros are also available so that you can use SAS code to import or register SAS models into your project version.

SAS Model Manager provides several model comparison reports that are used in the selection and approval of a champion model. After you create the reports, you view the reports in the **Reports** folder. The reports enable you to evaluate candidate models in a version or across versions by assessing the structure, performance, and resilience of your models.

Instead of executing a scoring task from the SAS Model Manager Project Tree, you can schedule a scoring task to run on a particular date and time. You can also schedule how often you want the scoring task to run. Advanced settings enable you to set the scheduling server, the batch server to run the scoring task, and the location of the scoring job definition in the SAS Metadata Repository.

The tutorial provides examples and step-by-step directions for performing these tasks.

Prerequisites

Tutorial 3 Models and Data Sets

The exercises in this tutorial require that the Tutorial 3 data sets and models from SMM121Tutorial.zip be extracted and registered in SAS Management Console. If they have not been extracted and registered, see [“Prepare Tutorial 3 Data Sets and Models” on page 8](#) to extract and register the files.

Importing models requires that you know where the SAS Model Manager administrator installed the Tutorial 3 models. If you do not know the location of the models, contact your SAS Model Manager administrator.

Verify Your User ID as a Member of SAS Model Manager User Groups

This exercise ensures that your user ID is a member of the **MM Tutorial Assignees** group and the **Model Manager Advanced Users** group.

1. Open SAS Management Console and log on to the SAS Metadata Server.
2. On the **Plug-ins** tab, select **User Manager**.
3. In the right pane, double-click the **MM Tutorial Assignees** group and click the **Members** tab.

4. Review the **Current Members** list, and locate your user ID or a group that your user ID is a member of. If your user ID or group is not a member of the **MM Tutorial Assignees** group, ask your administrator to add you to this group. Close the properties window.
5. Find and double-click your user ID in the right pane of SAS Management Console.
6. Click the **Groups and Roles** tab. Review the **Member of** pane and locate the group **Model Manager Advanced Users**. If your user ID is not a member of this group, ask your administrator to add you to this group. Close the properties window.
7. Close SAS Management Console.

Organize the Model Hierarchy

In this exercise, you create an organizational folder, a project, and a version for the modeling project.

Create a Folder

To provide an organizational folder to manage your modeling projects, follow these steps:

1. Right-click the **MMRoot** node in the Project Tree and select **New** ⇒ **New Folder**. The New Folder dialog box appears.
2. Specify the following folder properties and click **OK**.

Name

enter **Tutorial3**.

Description

enter an optional folder description.

The new folder appears in the Project Tree.

Create a New Project

To create a project that is associated with the classification model function, follow these steps:

1. Right-click the **Tutorial3** folder and select ⇒ **New** ⇒ **New Project**. The New Project Wizard appears.
2. Specify the following project properties and click **Next**:

Name

enter **Loan** for the project name.

Description

enter an optional description.

Model Function

select **Classification**.

3. In Step 2 of the New Project Wizard, specify the project variables:

- a. Click the **Import Variables** button for the **Project Input Variables** table. Double-click **Shared Data** ⇒ **Model Manager** ⇒ **Tutorial3**. Select **HMEQ_PROJECT_INPUT** and click **OK**.
 - b. For the **Loan** classification project, click the **Import Variables** button for the **Project Output Variables** table. Select **HMEQ_PROJECT_OUTPUT** and click **OK**.
 - c. Click **Finish**.
4. Examine the **Tutorial3** folder to verify that it contains the projects.

To create a project that is associated with the prediction model function, follow these steps:

1. Right-click the **Tutorial3** folder and select ⇒ **New** ⇒ **New Project**. The New Project Wizard appears.
2. Specify the following project properties and click **Next**.

Name

enter **HMEQ-Interval** for the project name.

Description

enter an optional description.

Model Function

select **Prediction**.

3. In Step 2 of the New Project Wizard, specify the project variables:
 - a. Click the **Import Variables** button for the **Project Input Variables** table. Double-click **Shared Data** ⇒ **Model Manager** ⇒ **Tutorial3**. Select **HMEQ_PROJECT_INPUT** and click **OK**.
 - b. For the **HMEQ-Interval** prediction project, click the **Add** button for the **Project Output Variables** table. Enter the following project variable properties and click **OK**.

Name

enter **P_DEBTINC**

Description

enter an optional description.

Type

select **N**.

Measurement

enter **INTERVAL**.

Measurement

enter **8**.

- c. Click **Finish**.
4. Examine the **Tutorial3** folder to verify that it contains the projects.

Define the Project Properties

To define the properties that SAS Model Manager uses to create reports and score models, follow these steps:

1. Select the project in the **Tutorial3** folder and expand **Specific Properties** in the right pane.
2. Specify the default data tables and model variables for the project:

Default Test Table

select **HMEQ_TEST**.

Default Train Table

select **HMEQ_TRAIN**.

Training Target Variable

enter **BAD** for the **Loan** project that has a model function type of classification.

enter **DEBTINC** for the **HMEQ-Interval** project that has a model function type of prediction.

Target Event Value

enter 1 for the **Loan** project that has a model function type of classification.

Class Target Level

select **Binary** for the **Loan** project that has a model function type of classification.

select **Interval** for the **HMEQ-Interval** project that has a model function type of prediction.

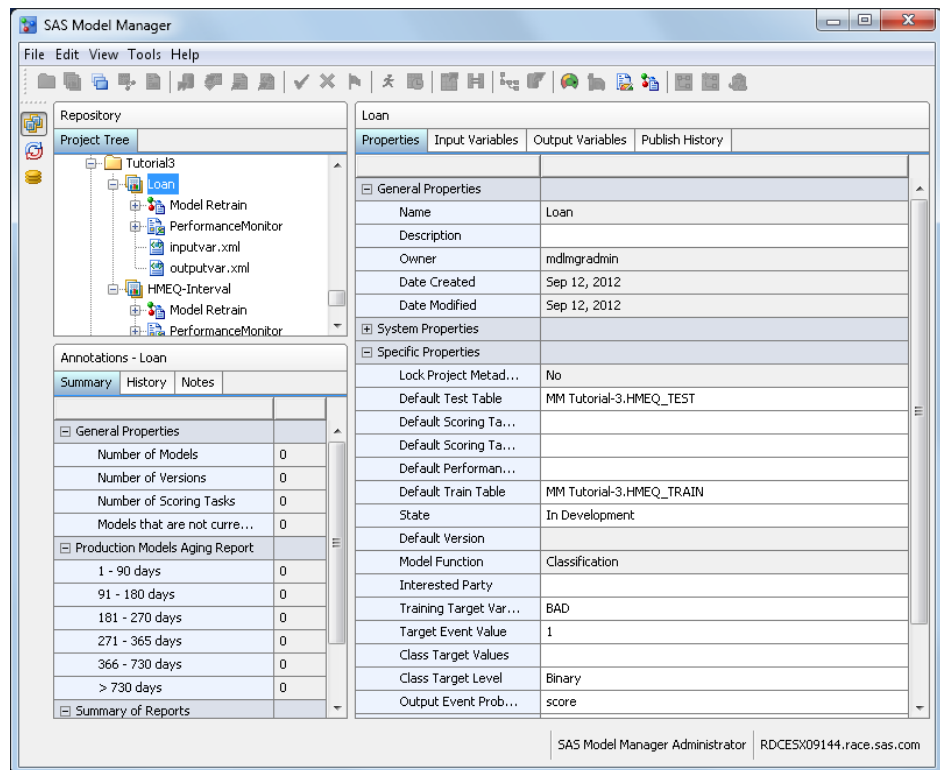
Output Event Probability Variable

select **score** for the **Loan** project that has a model function type of classification.

Output Prediction Variable

select **P_DEBTINC** for the **HMEQ-Interval** project that has a model function type of prediction.

Here is an example of the **Loan** project properties:



Create a Version

Create a version for the project. The version folder contains life cycle information, auxiliary version documents, candidate model files, model comparison reports, resource files, scoring tasks, and model performance reports.

To create a new version, follow these steps:

1. Right-click the **Loan** project and select **New** ⇒ **New Version**. The New Version dialog box appears.
2. Specify the following version properties and click **OK**.

Name

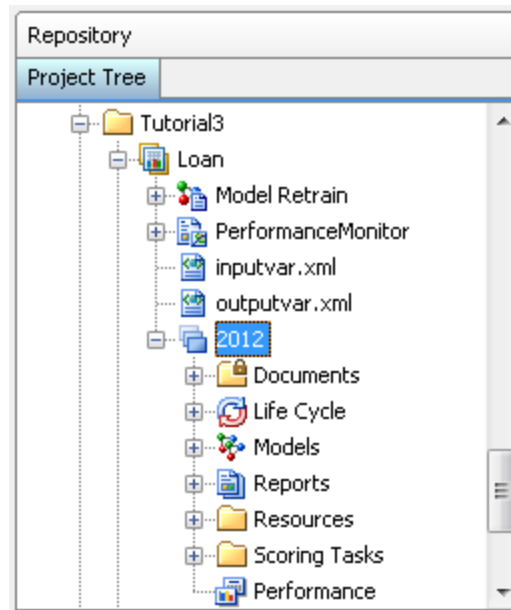
enter **2012**.

Life Cycle Template

select the user-defined template **Tutorial Life Cycle** that you created in the first tutorial. For more information, see [“Create a Life Cycle Template” on page 29](#).

Note: If you are using a workflow process to track the progress of your project or version, you can select any life cycle template. You can then skip all tasks to update the life cycle.

3. Examine the **Loan** project to verify that it contains one version called **2012**. Select **Life Cycle**. Verify that the **Name** property is Tutorial Life Cycle.



4. Repeat steps 1 through 3 for the **HMEQ-Interval** project.

Note: To use a workflow process to track the progress of your version, send a request to a SAS Model Manager administrator to create a workflow to use for the tutorials. Include the name and UUID of the version with which you want the workflow to be associated.

Create a Workflow (Optional)

Overview


A *workflow* is a copy of a workflow process definition. Only a SAS Model Manager administrator can create a new workflow. Each workflow consists of activities. Activities can contain properties and comments so that you can share information with other users, or make notes. The status that you select when completing an activity determines the next activity in the workflow process.

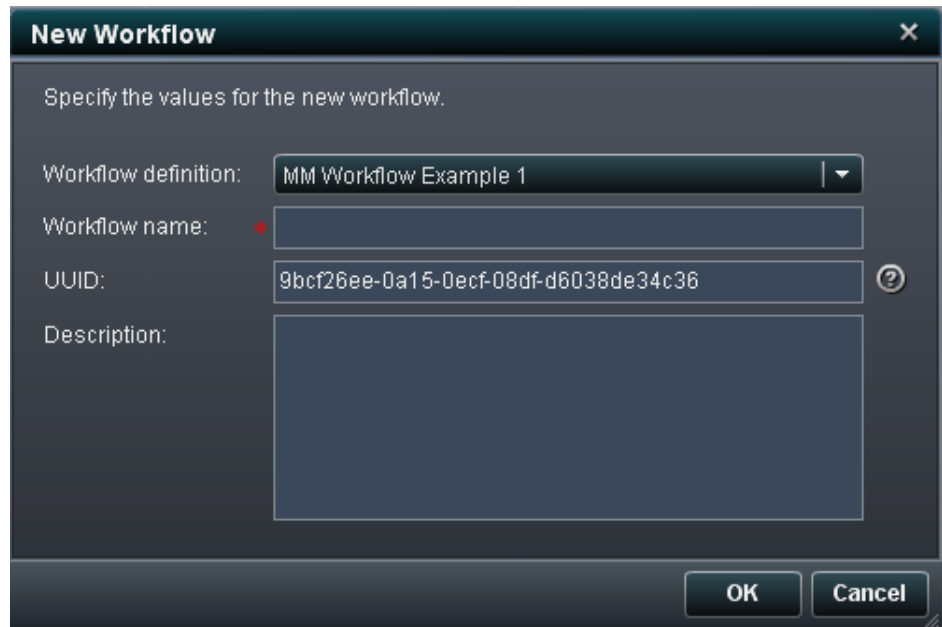
Prerequisites

The exercises in this tutorial require that you have made the workflow process definition available to SAS Model Manager. For more information, see [“Prepare for Using SAS Workflow” on page 18](#).

Create a New Workflow

1. Log on to SAS Model Manager as a member of the **Model Manager Administrator Users** group.
2. From the SAS Model Manager main window, right-click a version and select **New Workflow**. Workflow Console is launched in a Web browser and displays the New Workflow window.

Note: If you are already logged on to Workflow Console, from the Workflow Definitions category view, select a process definition and click .



New Workflow [X]

Specify the values for the new workflow.

Workflow definition: MM Workflow Example 1 [v]

Workflow name: []

UUID: 9bcf26ee-0a15-0ecf-08df-d6038de34c36 [?]

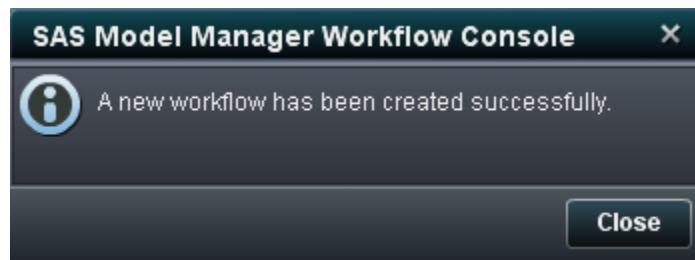
Description: []

[OK] [Cancel]

3. Select the workflow definition that is associated with this tutorial (if you accessed the New Workflow window from the SAS Model Manager main window).
4. Enter a name for the workflow.
5. The UUID of the selected version is already populated.

Note: If the UUID is not already populated, you can copy the UUID system property value for a version from the Properties view in the SAS Model Manager main window. The field label and other characters that precede the UUID value must be removed.

6. (Optional) Enter a description for the workflow.
7. Click **OK**. A message appears, indicating that the workflow has been successfully created.



8. Click **Close**. The new workflow is now available in the Workflows category view.
9. To view the new workflow, click [icon] Workflows. The Workflows category view appears. Select the workflow to view information that is associated with the new workflow.

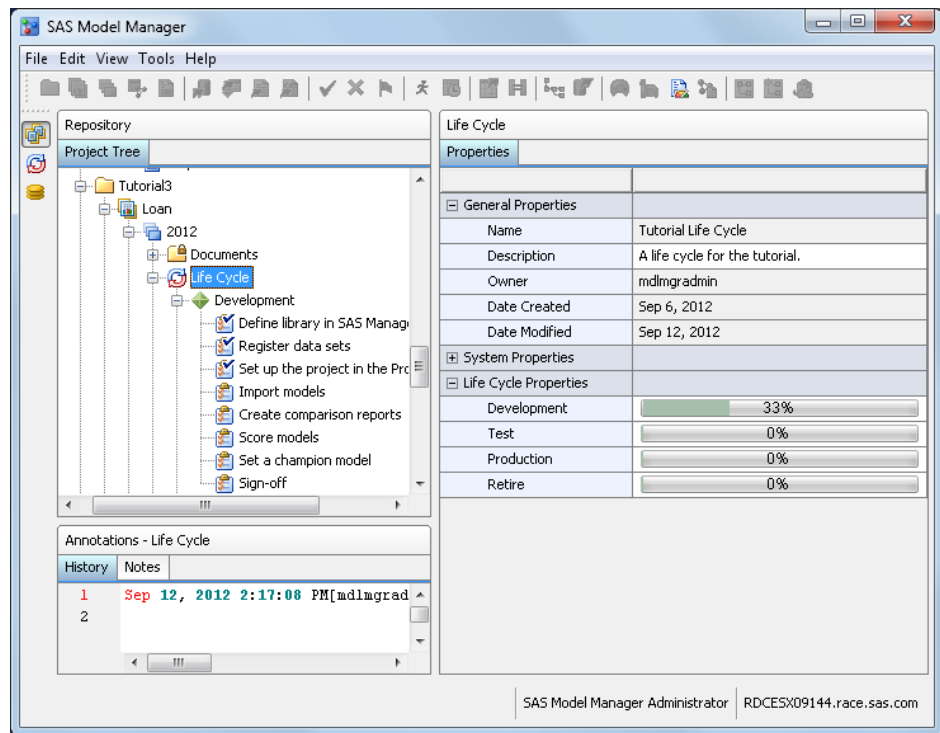


The workflow process definitions that have been provided for the tutorials already have participants assigned. For information about how to assign additional participants to a workflow, see “Working with Workflow Participants” in Chapter 21 of *SAS Model Manager: User's Guide*. You can also see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221 to learn how to manage workflows and work with activities.

Update the Life Cycle (Optional)

To complete the milestone task of adding data sources and setting up the project in the Project Tree, follow these steps:


1. In the **Loan** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Define library in SAS Management Console** task and examine the task properties. The **To Be Completed By** property, assigned in the life cycle template, determines which users or user groups from the Participants list are responsible for this milestone task. Because you are a member of the **MM Tutorial Assignees** group, you are authorized to update the task status.
3. Click the **Status** field and select **Completed**.
4. Select the **Register data sets** task and examine the task properties. Click the **Status** field and select **Completed**.
5. Select the **Set up project in the Project Tree** task. Click the **Status** box and select **Completed**.
6. Select all of the tasks whose status you updated and examine the properties. Verify that the value of the **Date Completed** property is today and that the value of the **Completed By** property is your user ID.
7. Select the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.





8. (Optional) Repeat steps 1 through 7 for the **HMEQ-Interval** project.

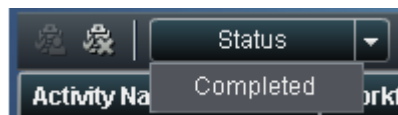
Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.
2. From the Activities category view, select an activity name, and click .

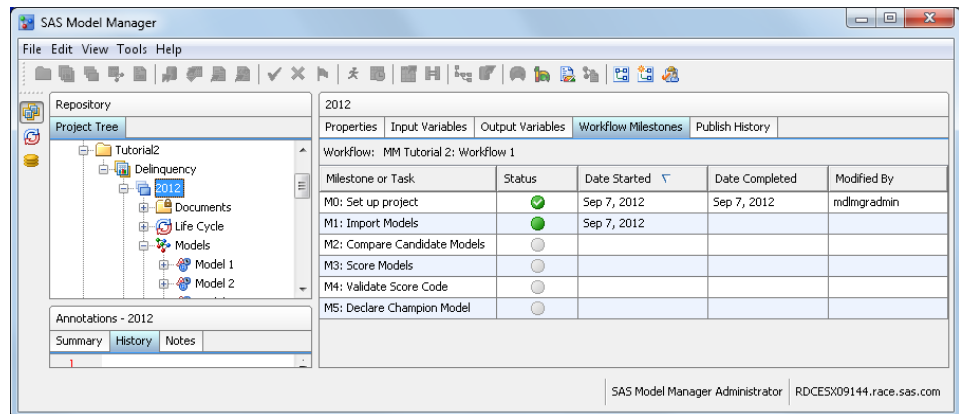
Note: You can select an activity name and click  to release an activity that you had previously claimed.
3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow

Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Import Models

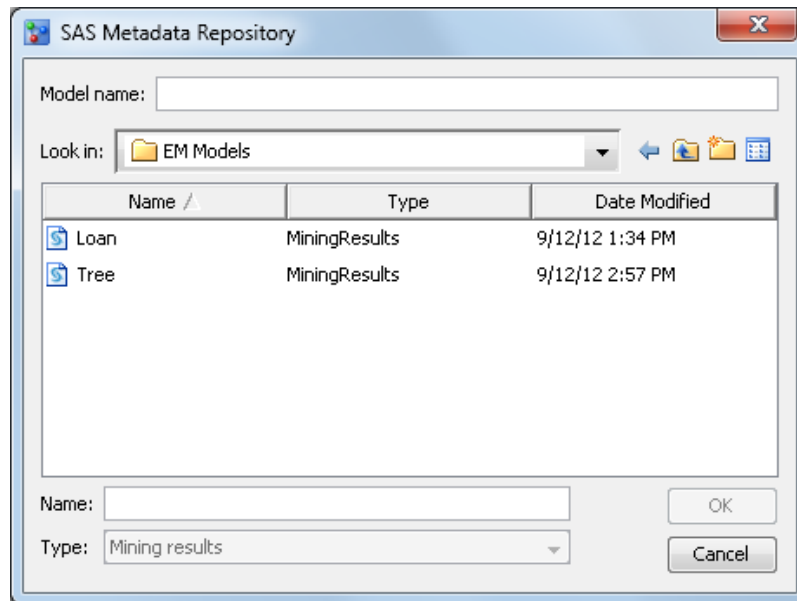
In this exercise you import models into SAS Model Manager from the SAS Metadata Repository, a PMML model file, and a SAS model package file. Then you map the model variables. Before you import the model, verify that the model type is identical to the value of the project **Model Function** property, classification, or prediction. For more information, see [“Create a New Project”](#) on page 77.

Import Models from a SAS Metadata Repository

If your SAS Enterprise Miner 5.3 (or later) model files are registered in the SAS Metadata Repository, then you can use SAS Model Manager to import the files.

To import a model that is registered with SAS Enterprise Miner, follow these steps to understand the process:

1. Expand the **2012** version in the **Loan** project and right-click the **Models** folder. Then select **Import from** ⇒ **SAS Metadata Repository**. The SAS Metadata Repository dialog box appears.
2. Navigate to the location of the folder that contains the SAS Enterprise Miner models. Select a model from the folder.



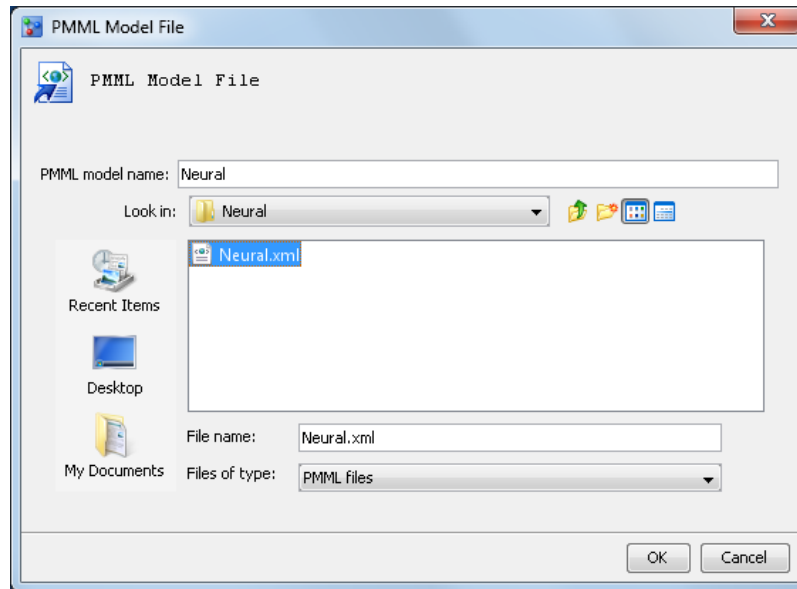
3. Click **OK**. After SAS Model Manager processes the request to import the model, the new model appears in the **Models** folder of your project's version.

Import PMML Models

PMML (Predictive Modeling Markup Language) is an XML-based standard for representing data mining results. PMML is designed to enable the sharing and deployment of data mining results between vendor applications and across data management systems. You can use SAS Model Manager to import PMML 3.1 (or later) models that are produced by another software application, such as SAS Enterprise Miner. PMML 4.0 (or later) is supported by SAS Model Manager for creating DATA step score code when importing models. This enables a PMML model to be included in scoring tasks, reporting, and performance monitoring.

To import a PMML model, follow these steps:

1. Expand the **2012** version in the **Loan** project and right-click the **Models** folder. Then select **Import From** ⇒ **PMML Model File**. The PMML Model File dialog box appears.
2. In the **PMML model name** field, enter **Neural**.
3. Navigate to the location of the folder that contains the PMML files. For this example, use `<drive:>\Tutorial13\Samples\Neural\` that was installed by the SAS Model Manager administrator. For more information, see [“Prepare Tutorial 3 Data Sets and Models” on page 8](#).
4. Select the **Neural.xml** file and click **OK**.



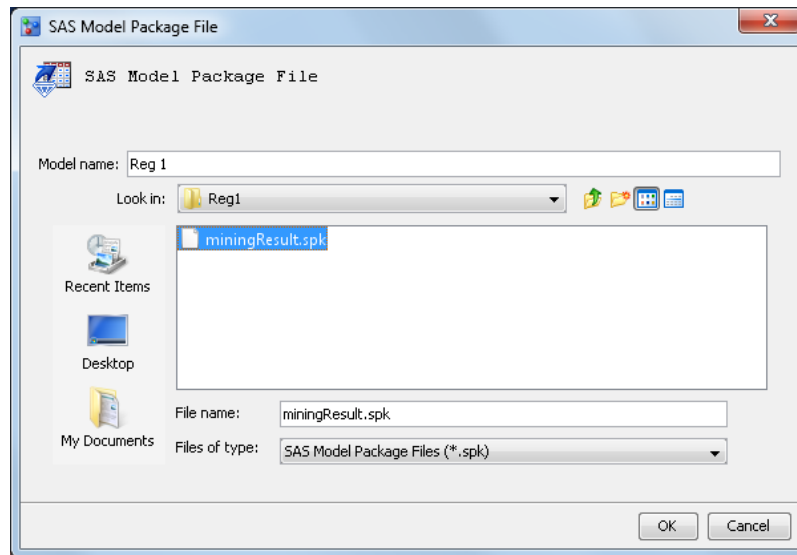
5. Examine the **Models** folder to verify that it contains the models. Right-click the folder and select **Expand All** to examine the model file.

Import Model Package Files

SAS Enterprise Miner and SAS/STAT linear model package files, or SPK files, contain complete model information. You can import SAS Enterprise Miner and SAS/STAT models even if they are not registered in the SAS Metadata Repository. For information about how to create a package file, see the *SAS Model Manager: User's Guide*.

To import a model that was saved as a SAS package file, follow these steps:

1. Expand the **2012** version in the **Loan** project and right-click the **Models** folder. Then select **Import From** ⇒ **SAS Model Package File**. The SAS Model Package File dialog box appears.
2. In the **Model Name** field, enter **Reg 1**.
3. Navigate to the location of the folder that contains the SAS model package files. For this example, use `<drive:>\Tutorial3\Samples\Reg1` that was installed by the SAS Model Manager administrator. For more information, see [“Prepare Tutorial 3 Data Sets and Models” on page 8](#).
4. Select the `miningResult.spk` file and click **OK**.



5. Repeat steps 2 through 4 to import a second package file that is located in `<drive:>\Tutorial3\Samples\Tree1`. Name the model **Tree 1**.
6. (Optional) Repeat steps 2 through 4 to import a third package file that is located in `<drive:>\Tutorial3\Samples\HMEQ_STAT_Item`. Name the model **HMEQ_STAT_Item**.
7. Repeat steps 2 through 4 in the **2012** version of the **HMEQ-Interval** project to import a prediction model with an interval target. The package file is located in `<drive:>\Tutorial3\Samples\Reg1_Interval`. Name the model **Reg1_Interval**.
8. Examine the **Models** folder to verify that it contains the models. Right-click the folder and select **Expand All** to examine the model files.

Map Model Variables to Project Variables

When the names for the model output variable are not identical to the names for the project output variables, you must map the variables.

To map model output variables to project output variables, follow these steps:

1. Map model variables for the first model. Select **Neural** in the **Models** folder, click the **Model Mapping** tab in the right pane, and click **Edit**. Set the following mapping and click **OK**:

Project Variables	Model Variables
score	P_BAD1

2. Map model variables for the second model. Select **Reg 1** in the **Models** folder, click the **Model Mapping** tab in the right pane, and click **Edit**. Set the following mapping and click **OK**:

Project Variables	Model Variables
score	EM_EVENTPROBABILITY

3. Map model variables for the third model. Right-click **Tree 1** in the **Models** folder, and select **Set Model Output Mapping**. Set the following mapping and click **OK**:

Project Variables	Model Variables
score	EM_EVENTPROBABILITY

4. Map model variables for the fourth model. Select **HMEQ_STAT_Item** in the **Models** folder, click the **Model Mapping** tab in the right pane, and click **Edit**. Set the following mapping and click **OK**:

Project Variables	Model Variables
score	P_BAD1

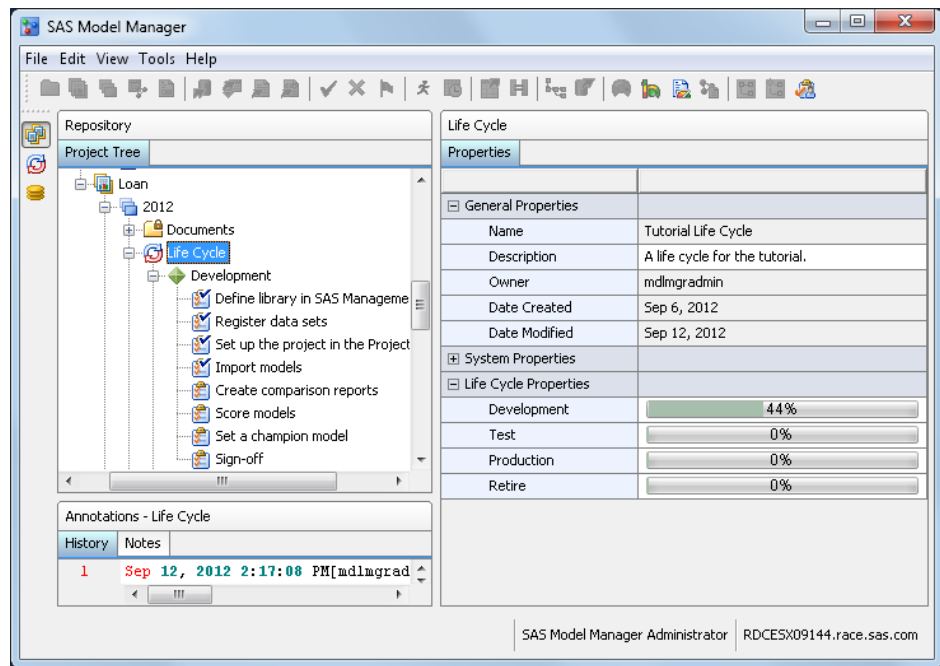
5. Map model variables for the fifth model. Right-click **Reg1_Interval** in the **Models** folder of the **2012** version in the **HMEQ-Interval** project, and select **Set Model Output Mapping**. Set the following mapping and click **OK**:

Project Variables	Model Variables
P_DEBTINC	P_DEBTINC

Update the Model Life Cycle (Optional)

To complete the milestone task for adding the models, follow these steps:

1. In the **Loan** project, expand **2012** ⇒ **Life Cycle** ⇒ **Develop**.
2. Select the **Import models** task. Select the **Status** box and select **Completed**. The **Date Completed** and **Completed By** fields have been updated with today's date and your user ID.
3. Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.

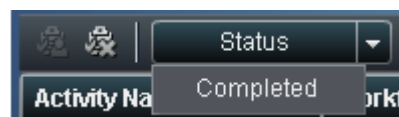


- (Optional) Repeat steps 1 through 3 for the **HMEQ-Interval** project.

Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

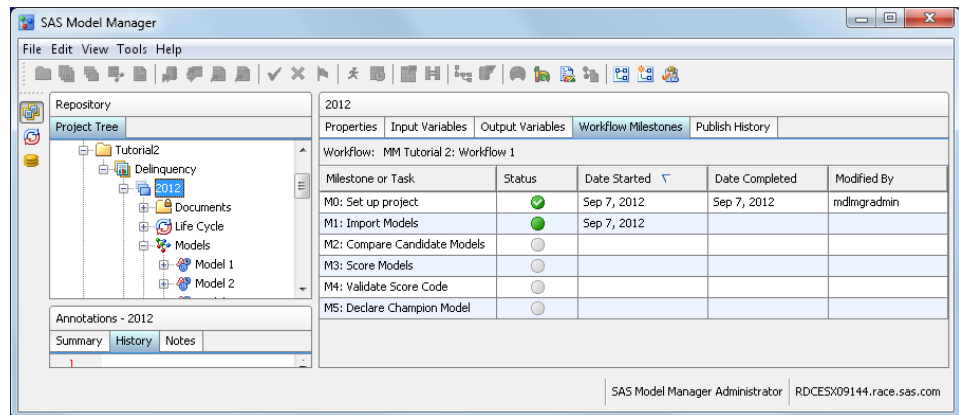
- Select **Tools** ⇒ **My Workflow Inbox** or click from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.
Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.
- From the Activities category view, select an activity name, and click .
Note: You can select an activity name and click to release an activity that you had previously claimed.
- (Optional) Enter a property value or change an existing property value in the Properties pane.
- (Optional) Add a comment to the activity using the Comments pane.
- Select a status value to complete the activity. The workflow process continues to the next activity.



- Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application.

From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Create Model Comparison and Summary Reports

In this exercise, you create several model comparison reports that are used in the selection and approval of a champion model. The Model Profile report can be created for any type of model. The Interval Target Variable report can be created only for a prediction model. After you create the reports, you view them in the **Reports** folder. The reports enable you to evaluate candidate models in a version or across versions by assessing the structure, performance, and resilience of your models.

Create a Model Profile Report

The Model Profile report creates three tables to display the profile data that is associated with the model input variables, output variables, and target variables. To create this report, follow these steps:

1. Expand the **2012** version in the **Loan** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
2. In the New Report window, use the specified values for these fields and click **OK**:

Type

select **Model Profile Report**.

Format

select **PDF**. **PDF** is the default value, and it might already be the value for **Format**.

Style

select **Seaside**. **SAS default** is the default style for the selected SAS format.

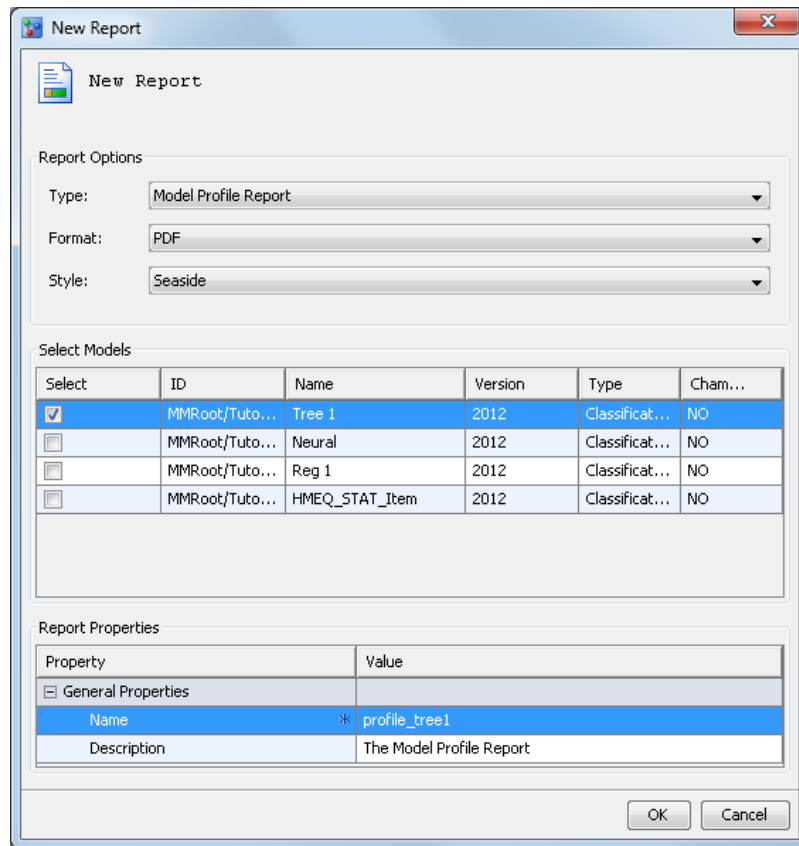
Select Models

select the box for **Tree 1**.

Report Properties

replace the default report name with the report name **profile_tree1** in the **Name** field.

Here is the New Report window at this point in the process. Click **OK** when you are finished.



- When the information dialog box confirms that the report was created successfully, click **Close**.

Create a Delta Report

The Delta report compares the profile data for two models and notes the differences. To create this report, follow these steps:

- Expand the **2012** version in the **Loan** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
- In the New Report window, use the specified values for these fields and click **OK**:

Type

select **Delta Report**.

Format

select **HTML**.

Style

select **SAS default**. **SAS default** is the default style for the selected SAS format. For example, the default SAS style for the HTML format is HTMLBLUE.

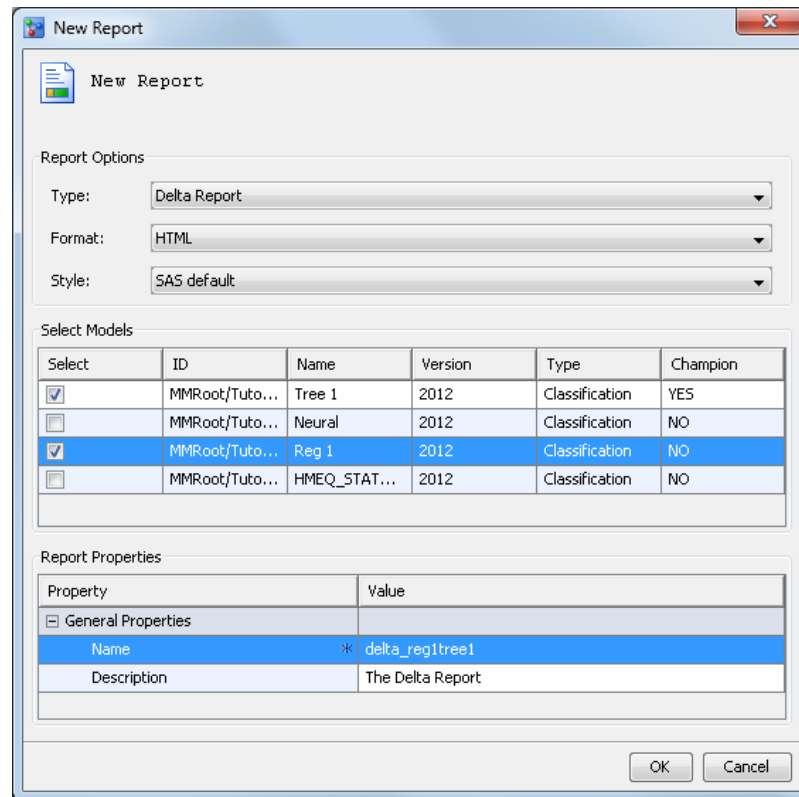
Select Models

select the boxes for **Reg 1** and **Tree 1**.

Report Properties

replace the default report name with the report name **delta_reg1tree1** in the **Name** field.

Here is the New Report window at this point in the process. Click **OK** when you are finished.



- When the information dialog box confirms that the report was created successfully, click **Close**.

Create a Dynamic Lift Report

The Dynamic Lift report provides visual summaries of the performance of one or more models for predicting a binary outcome variable performance. To create this report, follow these steps:

- Expand the **2012** version in the **Loan** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
- In the New Report window, specify the following options and click **OK**:

Type

select **Dynamic Lift Report**.

Format

select **HTML**.

Style

select **Seaside**. **SAS default** is the default style for the selected SAS format.

Select Models

select the boxes for **Reg 1** and **Tree 1**.

Report Properties

replace the default report name with the report name **lift_reg1tree1** in the **Name** field.

Here is the New Report Wizard at this point in the process. Click **OK** when you are finished.

New Report

Report Options

Type: **Dynamic Lift Report**

Format: **HTML**

Style: **Seaside**

Select Models

Select	ID	Name	Version	Type	Champion
<input checked="" type="checkbox"/>	MMRoot/Tuto...	Tree 1	2012	Classification	NO
<input type="checkbox"/>	MMRoot/Tuto...	Neural	2012	Classification	NO
<input checked="" type="checkbox"/>	MMRoot/Tuto...	Reg 1	2012	Classification	NO
<input type="checkbox"/>	MMRoot/Tuto...	HMEQ_STAT...	2012	Classification	NO

Report Properties

Property	Value
General Properties	
Name	* lift_reg1tree1
Description	The Dynamic Lift Report

OK Cancel

- When the information dialog box confirms that the report was created successfully, click **Close**.

Create an Interval Target Variable Report

The Interval Target Variable report creates two plots for you to view the actual versus predicted values for a model and the actual versus residual values for a model. This report can be created only for prediction models.

Note: This report is created based on the sample data of the default test table. By default, the sample size is 1000 and the sample seed is 12345. When the sample size is less than or equal to 5000, the chart that is created in the report is a scatter plot. When the sample size is greater than 5000, the chart that is created in the report is a heat map. If you are using your own data sets and want to create an Interval Target Variable Report that contains a heat map, contact your SAS Administrator to request that the **Sample size for models with an interval target** configuration setting be changed to greater than 5000.

To create this report, follow these steps:

- Expand the **2012** version in the **HMEQ-Interval** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
- In the New Report window, specify the following options and click **OK**:

Type

select **Interval Target Variable Report**.

Format

select **PDF**.

Style

select **Seaside**. **SAS default** is the default style for the selected SAS format.

Select Models

select the box for **Reg1_Interval**.

Report Properties

replace the default report name with the report name **reg1_interval** in the **Name** field.

Here is the New Report Wizard at this point in the process. Click **OK** when you are finished.

New Report

Report Options

Type: Interval Target Variable Report

Format: PDF

Style: Seaside

Select Models

Select	ID	Name	Version	Type	Champion
<input checked="" type="checkbox"/>	MMRoot/Tuto...	Reg1_Interval	2012	Prediction	YES

Report Properties

Property	Value
General Properties	
Name	reg1_interval
Description	The Interval Target Variable Report

OK Cancel

- When the information dialog box confirms that the report was created successfully, click **Close**.

Training Summary Data Set Report (Optional)

About

A Training Summary Data Set report creates frequency and distribution charts that summarize the train table variables. Using the default train table, SAS Model Manager generates data sets in the Resources folder that contain numeric and character variable summaries, and variable distributions. These data sets are used to create the summary

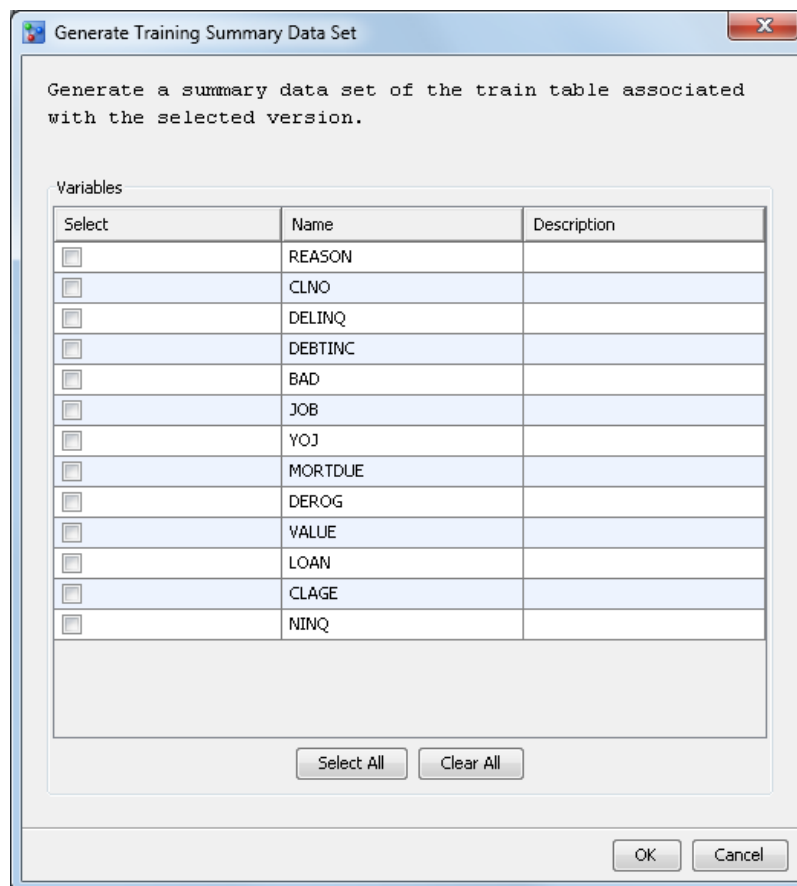
report. Before you can create the report, you must generate the training summary data sets.

In this exercise, you generate the training summary data sets and create a Training Summary Data Set report.

Generate Training Summary Data Sets

To generate the training summary data sets, follow these steps:

1. Expand the **2012** version in the **Loan** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
2. Select the **2012** version in the **Loan** project and verify that the **Default Train Table** property contains the train table for the report.
3. Right-click the **2012** version and select **Generate Training Summary Data Set**. The Generate Training Summary Data Set window appears.



4. Click **Select All** to select all variables. To only select a few variables for the report, select the box that is next to each variable in the **Select** column.
5. Click **OK**. SAS Model Manager creates data sets in the **Resources** folder.

Create a Training Summary Data Set Report

To generate a Training Summary Data Set report for a version, follow these steps:

1. Expand the **2012** version in the **Loan** project and right-click the **Reports** folder. Then select **Reports** ⇒ **New Report**. The New Report window appears.
2. In the New Report window, specify the following options and click **OK**:

Type

select **Training Summary Data Set Report**.

Format

select **HTML**.

Style

select **Seaside**. **SAS default** is the default style for the SAS format that is selected.

Select Models

Not applicable.

Report Properties

replace the default report name with the report name

TrainingSummaryDataSet_Loan2012 in the **Name** field.

Here is the New Report Wizard at this point in the process. Click **OK** when you are finished.

New Report

Report Options

Type: Training Summary Data Set Report

Format: HTML

Style: Seaside

Select Models

Select	ID	Name	Version	Type	Champion

Report Properties

Property	Value
General Properties	
Name	* TrainingSummaryDataSet_Loan2012
Description	The Training Summary Data Set Report

OK Cancel

- When the information dialog box confirms that the report was created successfully, click **Close**.

View a Model Comparison and Summary Reports

To view a model comparison report, follow these steps:

- Expand the version folder **2012** and the **Reports** folder.
- Right-click the report name and select **View Report**.

Note: If user credentials are required, then specify a user ID and password that have permission to access the SAS Content Server.

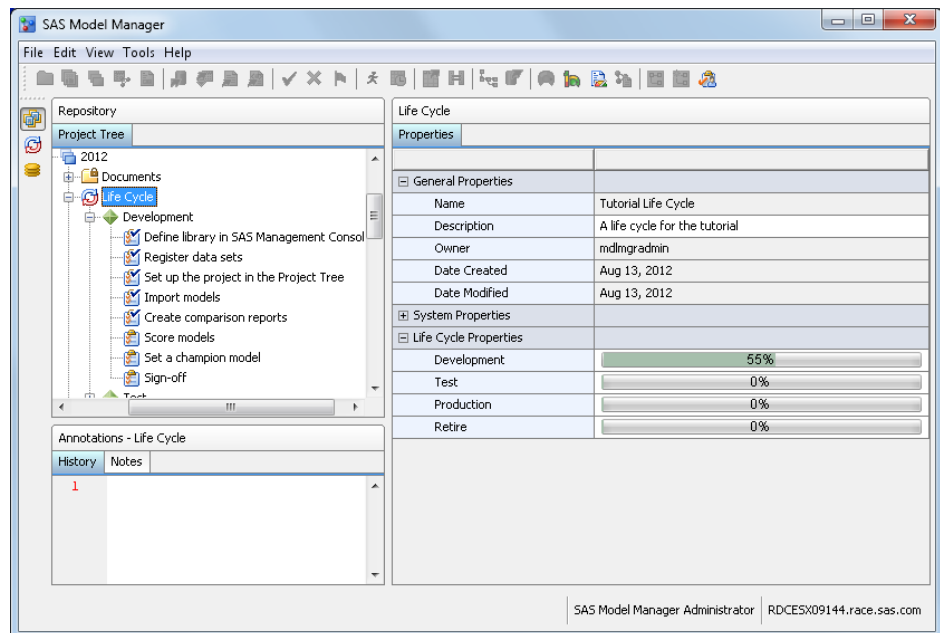
3. Use the PDF or HTML viewer to distribute or print a copy of the report.
4. Close the PDF or HTML viewer.

For a detailed description of the model comparison reports, see the *SAS Model Manager: User's Guide*.

Update the Life Cycle (Optional)

To update the Development milestone, follow these steps:


1. In the **Loan** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Create comparison reports** task. Select the **Status** box and select **Completed**.
3. Select **Create comparison reports**. The **Completed Date** and **Completed By** fields have been updated with today's date and your user ID.
4. Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.




5. (Optional) Repeat steps 1 through 4 for the **HMEQ-Interval** project.


Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

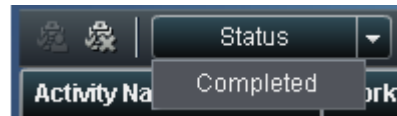
1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

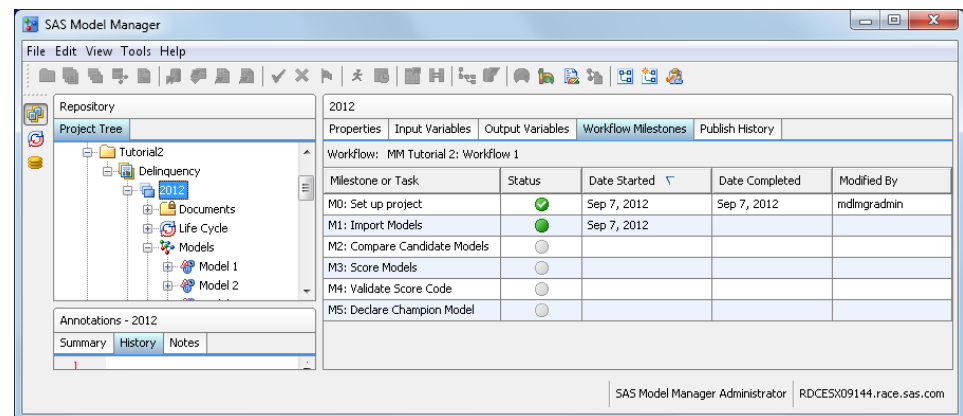
Note: You can select an activity name and click  to release an activity that you had previously claimed.

3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Scoring Models

In this exercise, you create a scoring task that is used to run the score code of a model and produce scoring results. Then you schedule the scoring task to run on a particular date and time. You can also schedule how often you want the scoring task to run. You use the results to determine the scoring accuracy and to analyze the model performance. The scoring task uses data from a scoring task input table, and then generates the results in a scoring task output table.

Create a Scoring Task

1. Expand the **2012** version of the **Loan** project, right-click the **Scoring Tasks** folder and select **New Scoring Task**. The New Scoring Task wizard appears.
2. Specify the following options:

Name

enter **Tree1** for the scoring task name.

Description

enter **test1**.

Model

select **Tree 1**. This model controls the available values for the input and output tables.

Scoring task type

select **Test**.

TIP A best practice is to start all scoring tasks with **Test** selected. When a scoring task is run as type **Test**, the results are not overwritten. You can change the type to **Production** after you are satisfied with the scoring task results and when the model is ready for production.

3. To select the scoring input table, click **Browse**. In the Select Table window, select **HMEQ_SCORE_INPUT** from the **SAS Metadata Repository** tab.
4. To select the scoring output table, click **Browse**. In the Select Table window, select **HMEQ_SCORE_OUTPUT** from the **SAS Metadata Repository** tab.

New Scoring Task

Set Scoring Task Properties

Specify values for the scoring task properties.

Step 1 of 2

General Properties

Name: Tree1

Description: test1

Model: Tree 1

Scoring task type: ☒ Test ☐ Production

Select Scoring Task Tables


Input table: MM Tutorial-3.HMEQ_SCORE_INPUT

Output table: MM Tutorial-3.HMEQ_SCORE_OUTPUT

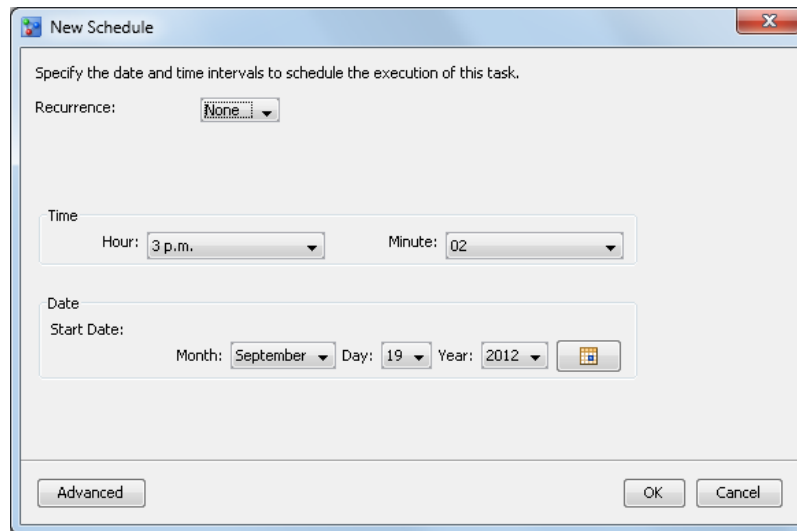
Back Next Finish Cancel Help

5. Verify that the output variables are mapped to the model variables and click **Finish**.
6. Select the **Tree1** scoring task to examine its properties. The value for **Date Modified** is today's date. To change the scoring task name or model input and output tables, you must create a new scoring task.

Schedule a Scoring Task

1. Validate the input variables. Expand the **Scoring Tasks** folder, select the **Tree1** scoring task and click the  toolbar button. Examine the results of **Quick Check**, and then click **OK**.


2. Right-click the **Tree1** scoring task and select **New Schedule**. The New Schedule window appears.

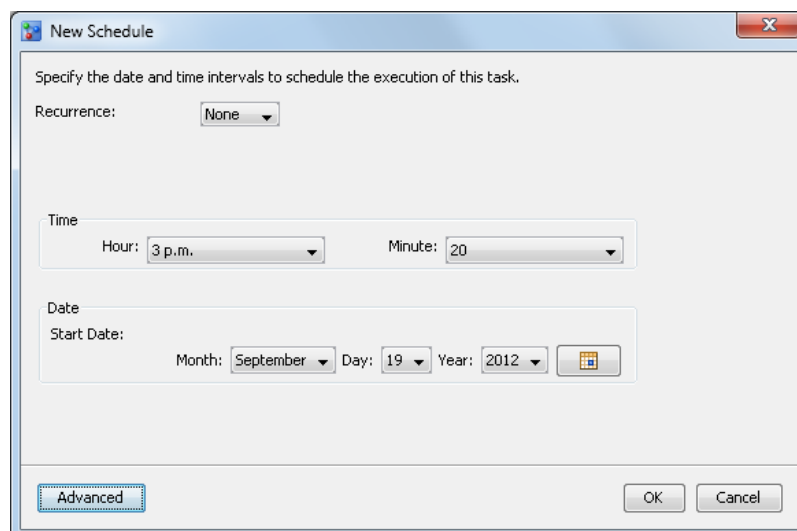


The 'New Schedule' dialog box is shown. It has a title bar with a close button. The main area contains the following fields:

- Recurrence:** A dropdown menu set to 'None'.
- Time:** Two dropdown menus. 'Hour' is set to '3 p.m.' and 'Minute' is set to '02'.
- Date:** A section with 'Start Date:' followed by three dropdown menus: 'Month' (set to 'September'), 'Day' (set to '19'), and 'Year' (set to '2012'). To the right of these is a small calendar icon.

At the bottom, there are three buttons: 'Advanced' on the left, and 'OK' and 'Cancel' on the right.

3. To set how often to run the scoring task, select a time interval from the **Recurrence** list box. The default is None.
4. To set the time to run the job, select an hour from the **Hour** list box and select a minute from the **Minute** list box. Note the time that you used for this tutorial. It is recommended to schedule it 5 minutes out, so that you have time to complete the next couple of steps.
5. To set the start date, click the calendar  and select a start date. The default is today's date. Instead of using the calendar, you can select a month from the Month list box, select a day from the Day list box, and select a year from the Year list box.
6. (Optional) Click **Advanced**. Select the server that schedules the job from the **Scheduling server** list box. Select the batch server that runs the job from the **Batch server** list box. Click **Browse** to select a location for the scoring job definition in the SAS Metadata Repository. Click **OK**.



This is the same 'New Schedule' dialog box as above, but with the 'Advanced' button highlighted with a dashed blue border. The other settings remain the same: Recurrence is 'None', Time is '3 p.m.' and '20' minutes, and the Start Date is 'September 19, 2012'.

7. Click **OK**. A dialog box message confirms that the schedule was created. Click **Close**.

View and Graph Scoring Results

To view the scoring task results, follow these steps:

1. Expand the **Scoring Tasks** folder, select the **Tree1** scoring task.
2. Select the **Job History** tab to verify that the scheduled job for the **Tree1** scoring task has completed.

Note: If the scheduled time has passed, and the scheduled job is not shown as completed on the **Job History** tab, a SAS Model Manager administrator can refresh the content. To refresh, right-click the **Tree1** scoring task, and select **Update Job History**.

Here is an example of two jobs that were executed for the same scoring task. The first completed successfully with warnings, and the second job completed successfully.

Tree1								
Properties	Model Input Variables	Input Table	Model Output Variables	Output Table	Pre-code	Post-code	SAS Code	Results
Job Name	Job Status	Execution Status	Date Started	Date Completed	Log	Output	SAS Code	
Tree1	Completed		Sep 19, 2012 3:35:13 PM	Sep 19, 2012 3:35:16 PM	1.2	1.2	1.2	
Tree1	Completed		Sep 19, 2012 3:20:38 PM	Sep 19, 2012 3:20:48 PM	1.1	1.1	1.1	

If the job completed with warnings or errors, view the taskCode.log file in the **Tree1** scoring task folder before executing or scheduling the scoring task again.

Note: To delete a schedule for a scoring task, right-click the scoring task and select **Delete Schedule**. To modify a schedule for a scoring task, you must delete the existing schedule and create a new schedule.

3. To view the results, click the **Results** tab and click **Result Set**.

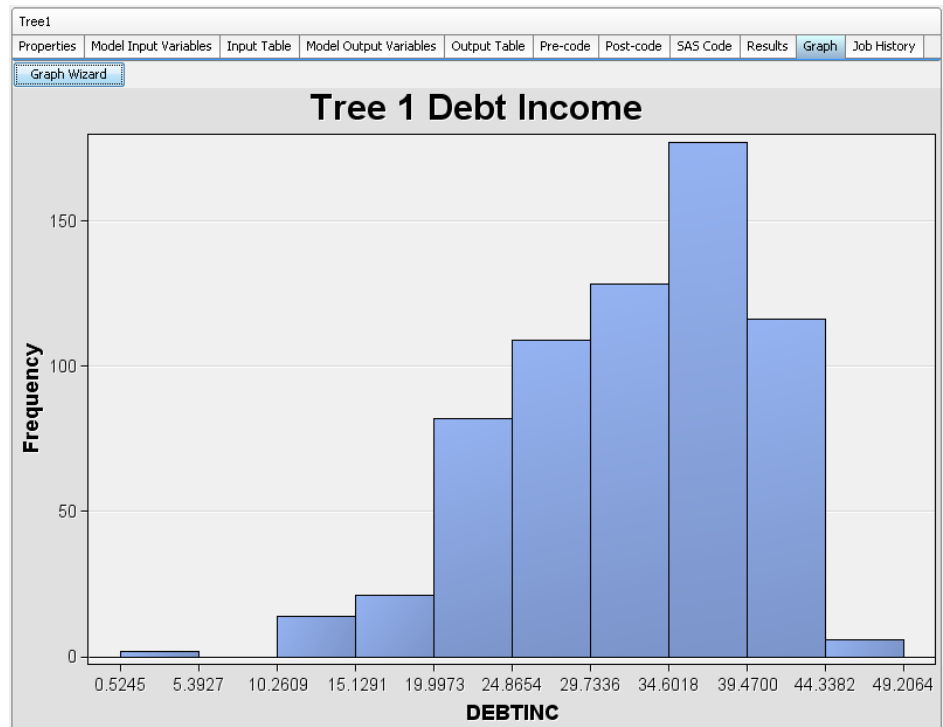
Tree1														
Properties	Model Input Variables	Input Table	Model Output Variables	Output Table	Pre-code	Post-code	SAS Code	Results	Graph	Job History				
1	customer_id	BAD	LOAN	MORTDUE	VALUE	REASON	JOB	YOJ	DEROG	DELINQ	CLAGE	NINQ	CLI	
2	118-296-340	1.0	1100.0	25860.0	39025.0	HomeImp	Other	10.5	0.0	0.0	94.36666666666666	1.0		
3	126-291-396	1.0	1300.0	70053.0	68400.0	HomeImp	Other	7.0	0.0	2.0	121.83333333333333	0.0		
4	154-253-305	1.0	1500.0	13500.0	16700.0	HomeImp	Other	4.0	0.0	0.0	149.46666666666667	1.0		
5	107-281-352	1.0	1500.0											
6	184-207-395	0.0	1700.0	97800.0	112000.0	HomeImp	Office	3.0	0.0	0.0	93.33333333333333	0.0		
7	129-227-368	1.0	1700.0	30548.0	40320.0	HomeImp	Other	9.0	0.0	0.0	101.46600191058894	1.0		
8	197-222-368	1.0	1800.0	48649.0	57037.0	HomeImp	Other	5.0	3.0	2.0	77.1	1.0		
9	141-255-328	1.0	1800.0	28502.0	43034.0	HomeImp	Other	11.0	0.0	0.0	88.76602987890995	0.0		
10	147-284-363	1.0	2000.0	32700.0	46740.0	HomeImp	Other	3.0	0.0	2.0	216.93333333333334	1.0		
11	158-258-337	1.0	2000.0		62250.0	HomeImp	Sales	16.0	0.0	0.0	115.8	0.0		
12	172-250-392	1.0	2000.0	22608.0				18.0						
13	192-258-329	1.0	2000.0	20627.0	29800.0	HomeImp	Office	11.0	0.0	1.0	122.53333333333333	1.0		
14	139-247-367	1.0	2000.0	45000.0	55000.0	HomeImp	Other	3.0	0.0	0.0	86.06666666666666	2.0		
15	117-216-386	0.0	2000.0	64536.0	87400.0		Mgr	2.5	0.0	0.0	147.13333333333333	0.0		
16	130-293-389	1.0	2100.0	71000.0	83850.0	HomeImp	Other	8.0	0.0	1.0	123.0	0.0		
17	156-205-313	1.0	2200.0	24280.0	34687.0	HomeImp	Other		0.0	1.0	300.86666666666667	0.0		
18	151-243-317	1.0	2200.0	90957.0	102600.0	HomeImp	Mgr	7.0	2.0	6.0	122.9	1.0		
19	166-240-312	1.0	2200.0	23030.0				19.0						
20	145-220-357	1.0	2300.0	28192.0	40150.0	HomeImp	Other	4.5	0.0	0.0		54.6	1.0	
21	173-244-305	0.0	2300.0	102370.0	120953.0	HomeImp	Office	2.0	0.0	0.0	90.99253346733862	0.0		
22	152-234-302	1.0	2300.0	37626.0	46200.0	HomeImp	Other	3.0	0.0	1.0	122.26666666666667	1.0		
23	171-293-344	1.0	2400.0	50000.0	73395.0	HomeImp	ProfExe	5.0	1.0	0.0		1.0		
24	194-271-310	1.0	2400.0	28000.0	40800.0	HomeImp	Mgr	12.0	0.0	0.0		67.2	2.0	
25	117-227-361	1.0	2400.0	18000.0			Mgr	22.0		2.0	121.73333333333333	0.0		

If the scoring task was not successful, then review the **Log** tab for error messages.

4. Click the **Graph** tab to graph the results.

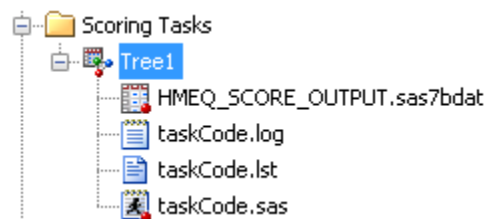
- Click **Graph Wizard**, select **Histogram**, and then click **Next**.
- Select **X** from the **Role** column for the **DEBTINC** variable and then click **Next**.
- Click the **Column name box** and select **DEBTINC**.
- Click the **Operator** box and select **Less than**.
- In the **Value** field, enter **50**. Click **Next**.
- In the **Title** field of the Chart Titles page, type **Tree 1 Debt Income**. Click **Next** and then click **Finish**.

Here is the histogram on the **Results** tab:



- Expand the **Tree1** scoring task to verify that four content files were saved and that the value for **Date Modified** is today's date.

Here is the **Scoring Tasks** folder and the files for the **Tree1** scoring task:

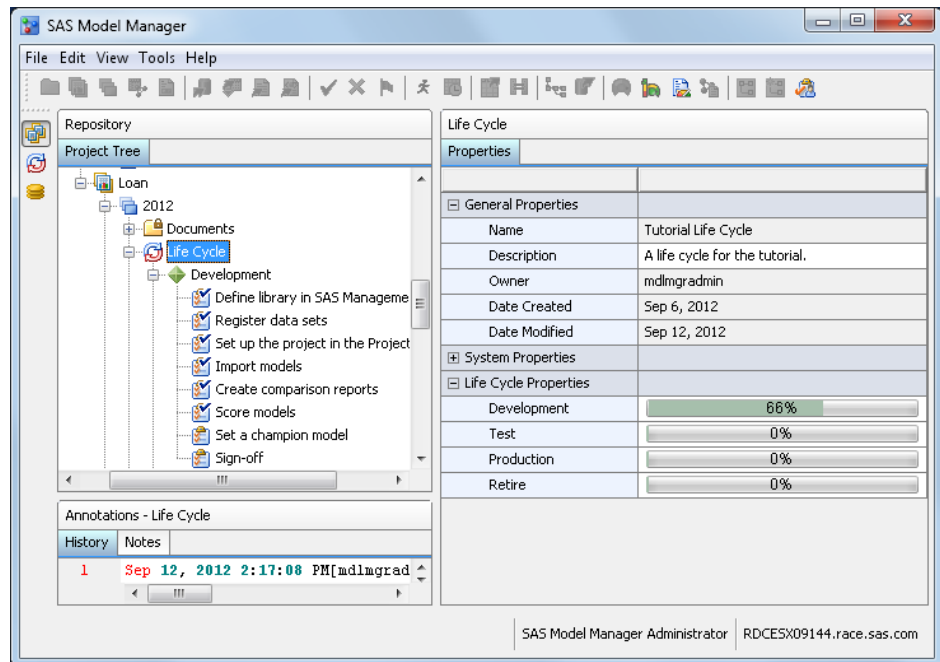


Update the Life Cycle (Optional)

To update the Development milestone, follow these steps:

- In the **Loan** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
- Select the **Score models** task. Click the **Status** box and select **Completed**.




3. Select **Score models**. The **Completed Date** and **Completed By** fields have been updated with today's date and your user ID.
4. Click the **Life Cycle** node to examine its properties. The value for **Modification Date** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.

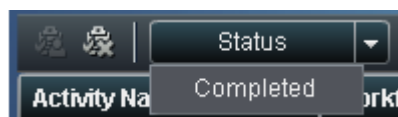


5. (Optional) Repeat steps 1 through 4 for the **HMEQ-Interval** project.

Update the Workflow Process (Optional)

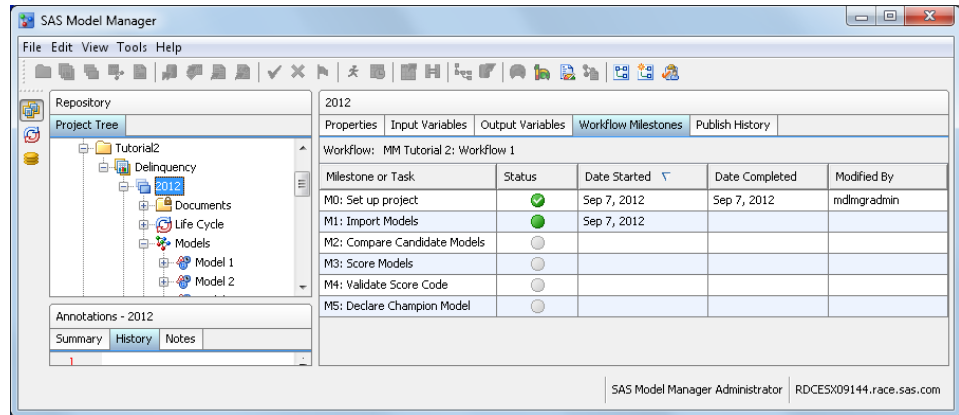
To complete the activities in the associated workflow process, follow these steps:

1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.
- Note:* The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.
2. From the Activities category view, select an activity name, and click .
- Note:* You can select an activity name and click  to release an activity that you had previously claimed.
3. (Optional) Enter a property value or change an existing property value in the Properties pane.
 4. (Optional) Add a comment to the activity using the Comments pane.
 5. Select a status value to complete the activity. The workflow process continues to the next activity.



- Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Declare a Champion Model

In this exercise, you declare a champion model for each project.


Set the Champion Model

To assign a champion model, follow these steps:

- Expand the **Models** folder in the **2012** version of the **Loan** project. Right-click **Tree 1**, select **Set as Champion**, and click **Yes** to confirm.
- Expand the **Models** folder in the **2012** version of the **HMEQ-Interval** project. Right-click **Reg1_Interval**, select **Set as Champion**, and click **Yes** to confirm.
- If there are model input variables that are not defined as project input variables, you are prompted to add the input variables. Click **Yes** to confirm. The model input variables are copied to the project input variables.
- If project output variables are not defined, then the Select Project Output Variables window appears for you to select the output variables. After you select the output variables, click **OK**.
- If the project output variable has not been mapped to the model output variable, the Set Model Output Mapping window appears. For each project variable, click the **Model Variables** field and select the model output variable. Click **OK**.
- Verify that the ✓ icon appears next to the champion model and next to the **2012** version for each project.

Set the Challenger Model

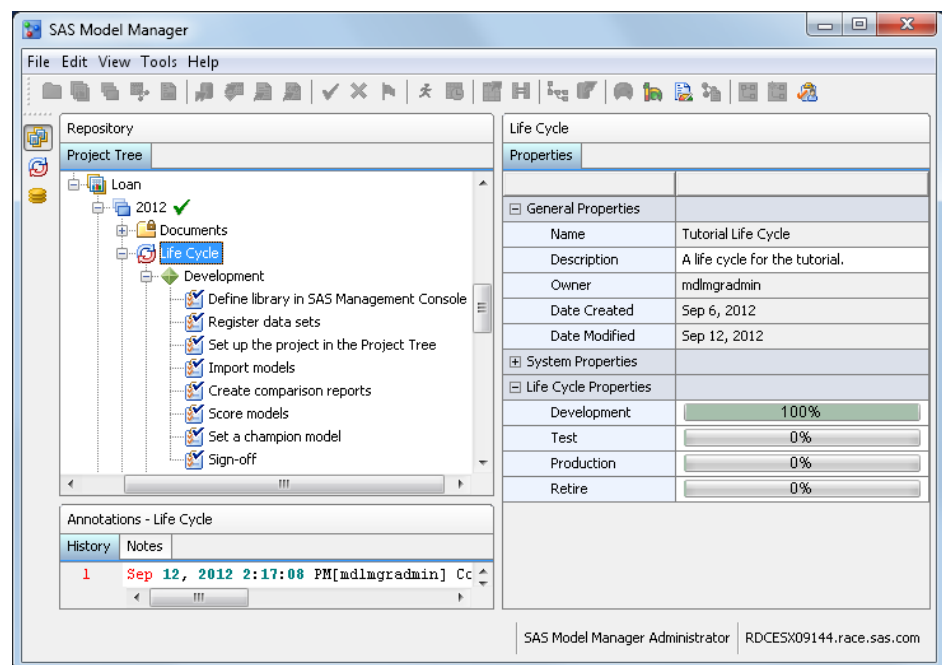
You can set a challenger model after the champion model has been set. To set a challenger model, follow these steps:

1. Expand the **Models** folder in the **2012** version. Right-click **Reg 1**, select **Flag as Challenger**, and click **Yes** to confirm.
2. If there are model input variables that are not defined as project input variables, you are prompted to add the input variables. Click **Yes** to confirm. The model input variables are copied to the project input variables.
3. If the project output variable has not been mapped to the model output variable, the Set Model Output Mapping window appears. For each project variable, click the **Model Variables** field and select the model output variable. Click **OK**.
4. Verify that the  icon appears next to the version folder.

Update the Life Cycle (Optional)


To update the life cycle milestones, follow these steps:

1. In the **Loan** project, expand **2012** ⇒ **Life Cycle** ⇒ **Development**.
2. Select the **Set a champion model** task. Click the **Status** box and select **Completed**.
3. Select the **Sign-off** task. Click the **Status** box and select **Completed**.
4. Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Development** property displays a bar chart that shows the percentage of completed tasks for this milestone.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

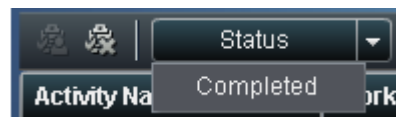
1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

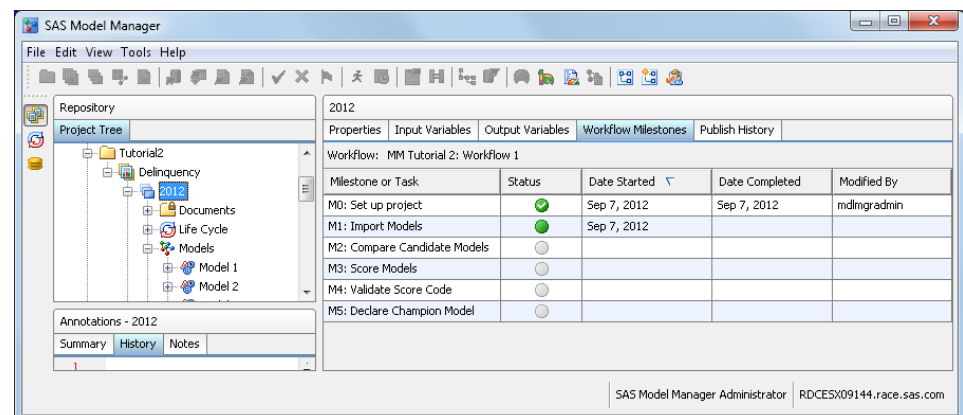
Note: You can select an activity name and click  to release an activity that you had previously claimed.

3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Chapter 5

Tutorial 4: Publishing Models

Overview of Publishing Models	109
Prerequisites	110
Models Used in Tutorial 3	110
Prepare a Database for Use with SAS Model Manager	110
Publish Models	110
Publish a Model to the SAS Metadata Repository	110
Verify the Published Model	111
Publish the Champion Model to the SAS Metadata Repository	113
Publish Models to a SAS Channel	114
Publish Models to a Database	116
Overview	116
Publish a Model Using the SAS Embedded Process Publish Method	117
Publish a Model Using the Scoring Function Publish Method	121
Update Life Cycle or Workflow	126
Update the Life Cycle (Optional)	126
Update the Workflow Process (Optional)	127

Overview of Publishing Models

SAS Model Manager provides a comprehensive publishing environment for model delivery that supports sharing model and performance data. SAS Model Manager publishes models to different channels, and to the SAS Metadata Repository. SAS Model Manager can also publish classification, prediction, and segmentation (cluster) models to a database, if the model has a score code type of SAS DATA step. SAS Model Manager cannot publish PMML models to a database. Application software, such as SAS Data Integration Studio or SAS Enterprise Guide, enables you to access models through the SAS Metadata Server and to submit on-demand and batch scoring jobs.

SAS Model Manager publishes models to defined publication channels. Authorized users who subscribe to a channel can choose to receive e-mail notifications when updated models are ready to deploy to testing or production scoring servers, and are published to a publication channel. From a publication channel, you can extract and validate the scoring logic, deploy models to a production environment, and monitor the performance of your models.

The tutorial provides examples and step-by-step directions for performing these tasks.

Prerequisites

Models Used in Tutorial 3

The exercises in this tutorial depend on some of the properties of the specific models that were added in [Chapter 4, “Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports,”](#) on page 75. Use the projects, versions, or models that are specified here. This tutorial is designed to follow Tutorial 3.

Prepare a Database for Use with SAS Model Manager

To publish a model to a database from the SAS Model Manager, the Database Administrator (DBA) needs to prepare the database.

The SQL scripts for Teradata that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files”](#) on page 3.

Note: Contact your system administrator if you do not have the appropriate permissions to the installation and configuration directories on the SAS Model Manager server.

Note: For more information, see “Preparing a Database for Use with SAS Model Manager” in Chapter 8 of *SAS In-Database Products: Administrator's Guide*.

Publish Models

In this exercise, you use the comprehensive publishing environment for model delivery to share models. Model delivery most often includes model score code and its associated input and output metadata. You publish a model and the champion model for a project to the SAS Metadata Repository and publish a model to a publish channel. In the next exercise you publish a champion or challenger model to a database. Application software, such as SAS Data Integration Studio or SAS Enterprise Guide, can access the MiningResult object through the SAS Metadata Server and submit on-demand or batch scoring jobs.

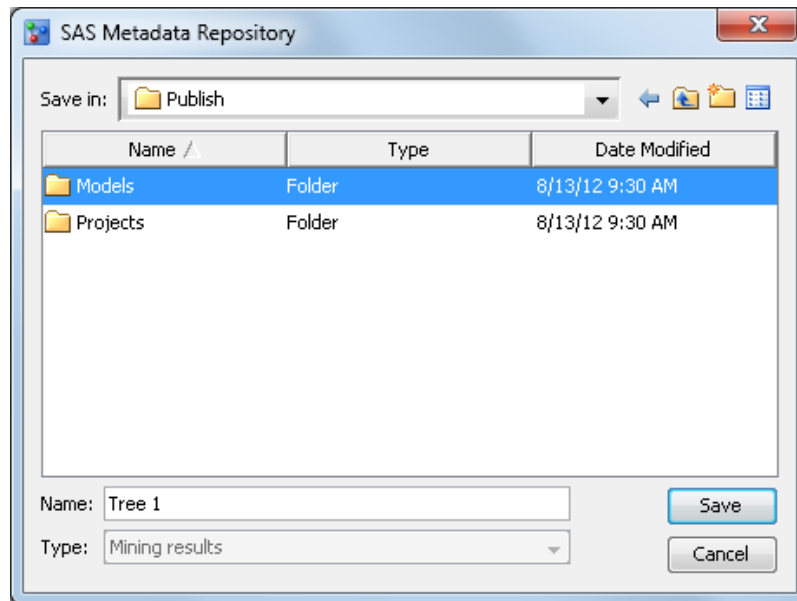
Publish a Model to the SAS Metadata Repository

SAS Model Manager uses the SAS Folder view to publish the model to any folder that is accessible to the user. You can publish a model to folders in the SAS Foundation repository or to folders in custom repositories that are created in SAS Management Console to reflect the structure of your business organization.

Note: SAS Model Manager cannot publish R models.

To publish a model to a SAS Metadata Repository, follow these steps:

1. Expand **Loan** ⇒ **2012** ⇒ **Models** and right-click the **Tree 1** model. Then select **Publish Model**. The SAS Metadata Repository dialog box appears.
2. Navigate to the folder where you want to store the model.



3. Enter **Tree 1** as the name and click **Save**. If a MiningResult object exists in the same folder and has the same name or model UUID, then you are prompted to decide whether to overwrite the metadata for this stored object.

CAUTION:

Do not overwrite an existing MiningResult object unless you are certain that the model is from the same project in SAS Model Manager.

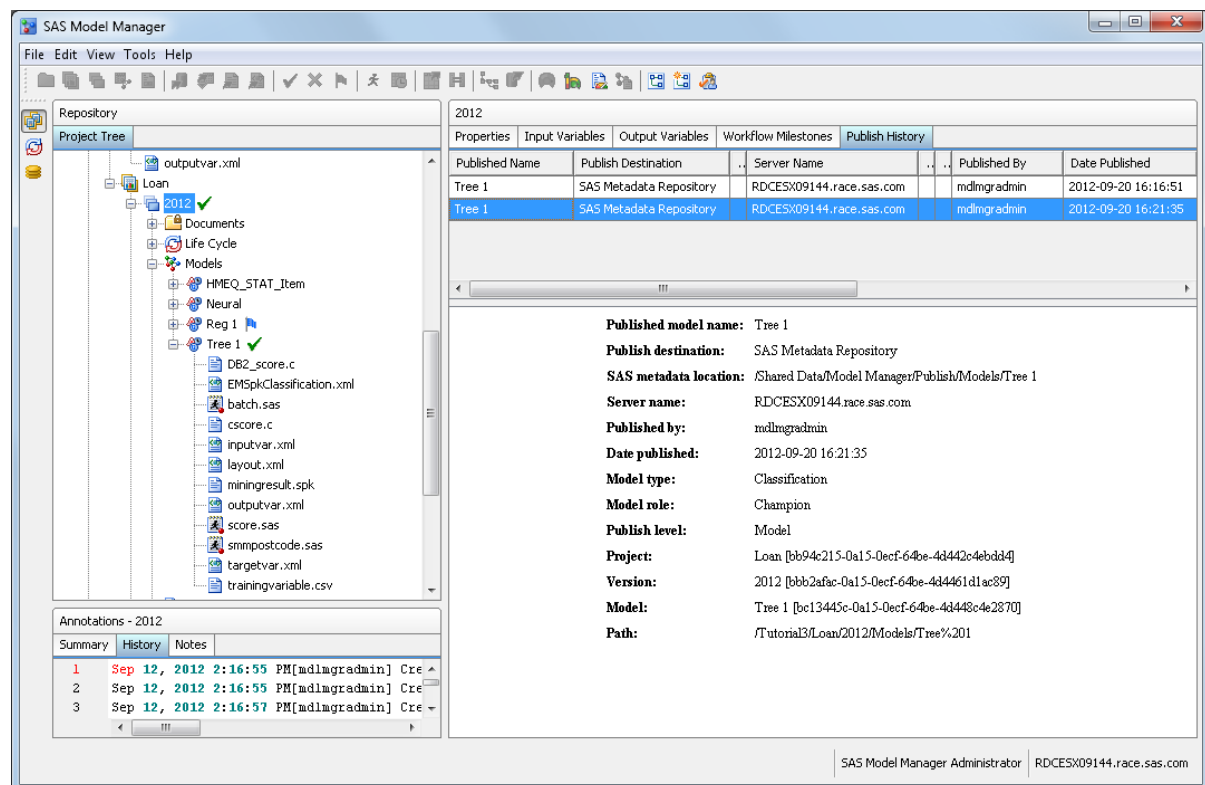
Note: If you change the score code for the model, then publish the model again to ensure that your score application uses the current scoring code.

4. In the Publish Model message box, click **Close**.

Verify the Published Model

View Publish History

After you have published a model to the SAS Metadata Repository, to a SAS channel, or to a database, you can view the publish history in the version, project, **MMRoot** node details pane. To view the publish history, select the **2012** version in the **Loan** project, and select the Publish History tab. Select an item from the list to view the publish details.

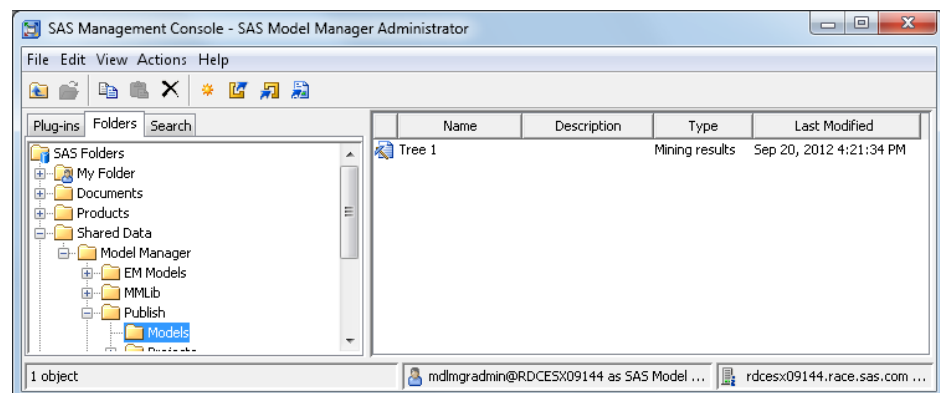


View a Published Model in the SAS Metadata Repository

To verify that SAS Model Manager successfully created the MiningResult object in the SAS Metadata Repository for a published model, use SAS Management Console. To view the contents of the published model or project, you can use SAS Data Integration Studio. You can also use SAS Management Console to export the MiningResult object to a SAS package.

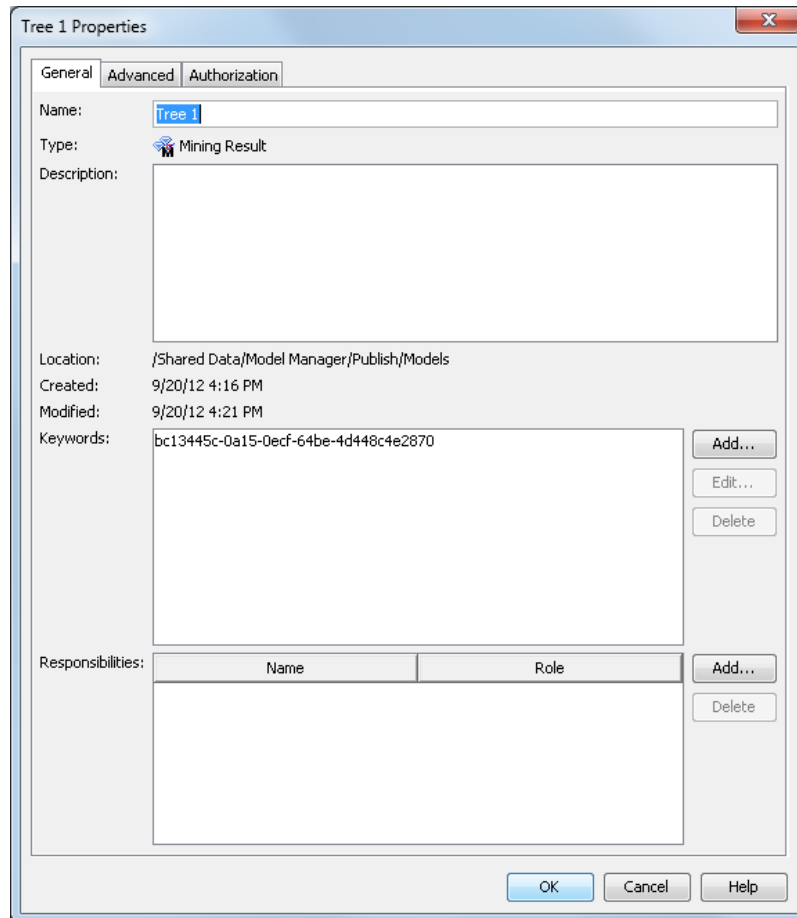
To view a MiningResult object in the metadata repository, follow these steps:

1. Open SAS Management Console and log on to the SAS Metadata Server using the same user ID that you use to log on to SAS Model Manager.
2. Click the **Folders** tab and expand the folders to locate the model that you exported. When you select the folder, the right pane lists the MiningResult objects for the exported models.



3. Right-click the **Tree 1** MiningResult object and select **Properties** from the pop-up menu. The Properties window appears.

- Examine the **Keywords** box on the **General** tab to verify that the MiningResult object contains the universal unique identifier (UUID) of the exported model. The UUID is a system property that SAS Model Manager automatically assigns to each model. To view a system property in SAS Model Manager, click the + icon beside the **System Properties** heading to expand the section.



TIP You can use the UUID to conduct filtered searches and query the published models. For more information, see the *SAS Model Manager: User's Guide*.

- Examine the metadata on the **Advanced** tab to determine when the MiningResult object was created or most recently updated.
- Click **OK**.

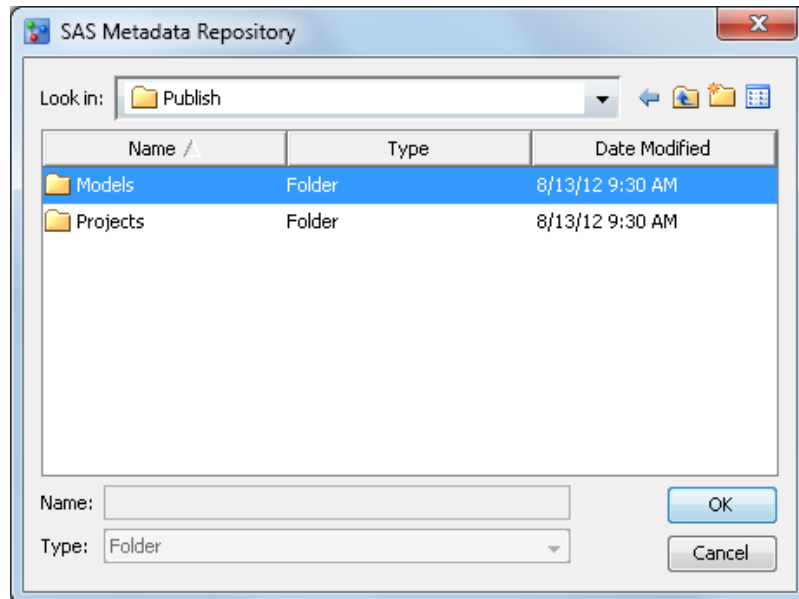
Publish the Champion Model to the SAS Metadata Repository

To publish the champion model, you must have already assigned the champion model for the project. SAS Model Manager examines the project and always publishes the champion model for the project. When the champion model for a project changes and you publish the model again at the project level, the scoring application automatically uses the latest score code.

To publish the champion model for a project, follow these steps:

- Verify that the project has a default version assigned. Select the **Loan** project folder to examine its properties. The **Default Version** property contains the name of the default version.

2. Right-click the **Loan** project and select **Publish Model** ⇒ **to SAS Metadata Repository** from the pop-up menu. Click **Yes** for the information message that the project is unlocked. The SAS Metadata Repository dialog box appears.
3. Navigate to the folder where you want to store the model.



4. Select the folder and click **OK**. If a MiningResult object that is in the repository has the same name or UUID, then you are prompted to decide whether to overwrite the metadata for this stored object.

CAUTION:

Do not overwrite an existing MiningResult object unless you are certain that the model is from the same project in SAS Model Manager.

5. In the information message box, click **Close**.
6. To view the publish history, select the **Loan** project, and select the **Publish History** tab. Select an item from the list to view the publish details.

Publish Models to a SAS Channel

SAS Model Manager uses SAS Publishing Framework to publish models to defined channels. SAS Model Manager creates a SAS Package file (SPK) for the model in a publication channel. Authorized users who subscribe to the channel can choose to receive e-mail notifications when updated models are ready to deploy to testing or production scoring servers and when the SPK file is published to a publication channel. Then you can extract and validate the scoring logic, deploy champion models to a production environment, and monitor the performance of your models.

To publish a model to a channel, follow these steps:

1. Expand **Loan** ⇒ **2012** and right-click the **Models** folder. Then select **Publish to a SAS Channel**. The Publish to a SAS Channel window appears.

TIP You can publish models from the organization, project, version, or **Models** folder in the Project Tree.

2. Select a publication channel from the **Channel** list.

Note: The channel values for **Description**, **Subject**, and **Subscribers** are defined in the SAS Metadata Repository with SAS Management Console.

3. Select **Tree 1** as the model to publish in the **Select Entries to Publish** table. SAS Model Manager lists all of the models in the version folder. To view the entire folder name, expand the ID column heading. Click **Next**.

Channel: MMChannel

Description: The Model Manager channel

Subject: Model Manager

Subscribers:

Select Entries to Publish:

Select	ID	Name	Version	Type	Champion
<input checked="" type="radio"/>	MMRoot/Tutorial...	Tree 1	2012	Classification	YES
<input type="radio"/>	MMRoot/Tutorial...	Neural	2012	Classification	NO
<input type="radio"/>	MMRoot/Tutorial...	Reg 1	2012	Classification	NO
<input type="radio"/>	MMRoot/Tutorial...	HMEQ_STAT_Item	2012	Classification	NO

Back Next Finish Cancel

4. Specify an optional subject line for the e-mail message in the **Message Subject** box. For this example, enter **Publish champion model**. By default, SAS Model Manager uses the value that is defined in the publication channel. If you omit the subject line, then the name of the published model is used.
5. In the **Notes** box include information about the model that might be useful to other users who are involved with the project. For this example, enter **Loan project for 2012**.

Publish Models to a SAS Channel

Publish to a SAS Channel

Message Subject: Publish Champion Model

Notes: Loan project for 2012

Add User-Defined Property:

Name	Value

Back Next Finish Cancel

6. Click **Finish**. The information dialog box appears and provides information about whether SAS Model Manager successfully published the model. Click **Details** to display a log of the publication process and any messages.
7. Click **Close**.
8. To view the publish history, select the **2012** version in the **Loan** project, and select the Publish History tab. Select an item from the list to view the publish details.

The SAS package that is sent to the publication channel contains the model input, model output, SAS code, and its properties. You can submit a SAS DATA step program that calls the SAS Publish API (Application Programming Interface) to extract and deploy the model to a testing or scoring server. SAS Model Manager also provides a SAS macro program, called MM_GetModels, that extracts the SAS code and metadata to score the model. Typically, extracted files are placed on a local drive of the scoring server that is used to deploy the published model. For more information, see the *SAS Model Manager: User's Guide*.

Publish Models to a Database

Overview

SAS Model Manager enables you to publish the project champion model and challenger models that are associated with the **DATA Step** score code type to a configured database. Publishing PMML models to a database is not supported. SAS Model Manager uses the SAS Scoring Accelerator and SAS/ACCESS interface to the database to publish models to the database. The Scoring Accelerator takes the models from SAS Model Manager and translates them into scoring files or functions that can be deployed inside the database. After the scoring functions are published using the SAS/ACCESS interface to the database, the functions extend the database's SQL language and can be used in

SQL statements such as other database functions. After the scoring files are published, they are used by the SAS Embedded Process to run the scoring model.

The SAS administrator can enable the **Publish Scoring Options** setting in SAS Management Console to indicate that the metadata tables be populated in the target database when publishing a scoring function. If this setting is enabled and the scoring function publish method is chosen, the scoring metadata tables in the database are populated with information about the project and pointers to the scoring function. This feature enables users to review descriptions and definitions of the published model. The audit logs track the history of the model's usage and any changes that are made to the scoring project.

For more information, see “Publishing Models to a Database” in Chapter 12 of *SAS Model Manager: User's Guide*.

This tutorial shows you the tasks that are involved in publishing a project champion model or challenger model to a database. It contains examples and step-by-step directions about preparing a database for use with SAS Model Manager and publishing a model.

Note: The examples that are used in this tutorial use the Teradata database type for publishing a model to a database. You can also use this tutorial to publish a model to a DB2, Greenplum, Oracle, or Netezza database.

Publish a Model Using the SAS Embedded Process Publish Method

In this exercise, you publish a project's champion model to a database using the SAS Embedded Process publish method.

To publish a model to a database, follow these steps:

1. Verify that you have set the project champion model. For more information, see [“Set the Champion Model” on page 105](#).
2. Right-click the **Loan** project and select **Publish Models** ⇨ **to a Database** from the pop-up menu. The Publish Models to a Database window appears.

Publish Models to a Database

Database type: Teradata

Publish Options

Publish method: ☒ SAS Embedded Process ☐ Scoring function

Select the models to publish, and specify a publish name for each model.

	Model Name	Role	Version	Model Type	Publish Name	Date Published
<input type="checkbox"/>	Tree 1	Champion	2012	Classification	Tree 1	Sep 20, 2012 5:45:45 PM
<input type="checkbox"/>	Reg 1	Challenger	2012	Classification	Reg_1_Loan	

☐ Replace scoring files that have the same publish name

Teradata Settings

Database server:

Database:

User ID: Password:

3. Select a database type and select the **SAS Embedded Process** for the publish method. The type of database and the publish method that you choose determine which database settings and options are required. The default publish method is SAS Embedded Process.

Operating Environment Information

The Netezza database type for the SAS Embedded Process publish method is not supported in the second maintenance release of SAS 9.3. When the SAS Embedded process publish method is supported for Netezza, the SAS Administrator can enable Netezza support for SAS Model Manager so that the Netezza database type appears. For more information, see the *SAS Model Manager: Administrator's Guide*.

4. Select the check box next to the **Tree 1** champion model in the list.
5. Enter a publish name for the champion model that you selected to publish or accept the default value. The SAS Embedded Process publish method uses only the **publish name** to publish the model files to the database.

Here are the naming convention requirements:

- The user-defined value is case insensitive. The maximum length of alphanumeric characters is determined by the database type and publish method that is selected. No spaces are allowed. An underscore is the only special character that can be included in the publish name.
- The recommended maximum length of the publish name for the SAS Embedded Process publish method is 30 alphanumeric characters for all database types. The database types that are currently supported by SAS Model Manager are Teradata, Oracle, Greenplum, and DB2.

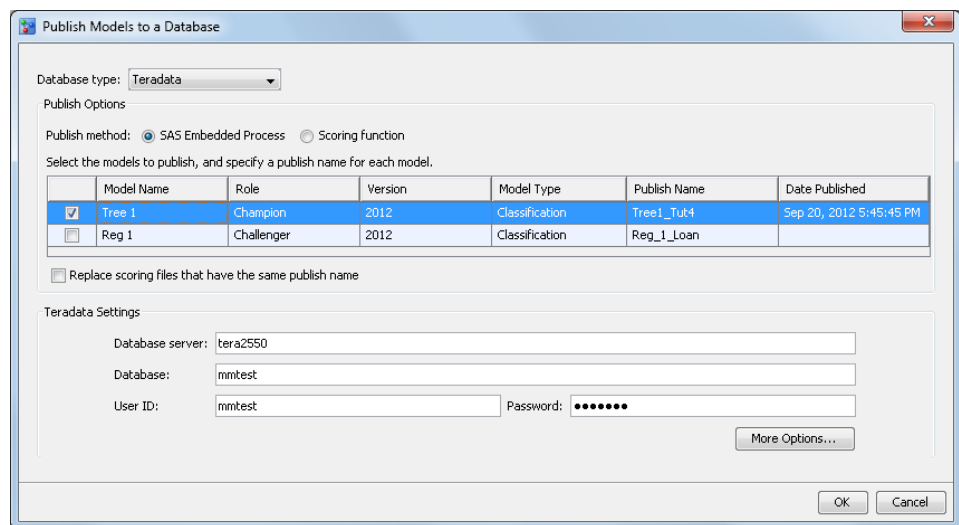
Note: The publish name for each model is reserved by default for subsequent use of the publishing models for a project.

6. Enter a value for the database settings that appear for the selected database type and publish method.

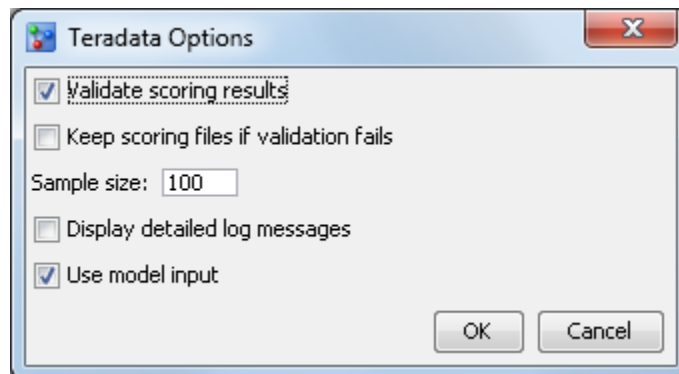
Here are the available database settings according to the database type:

Database Settings	Database Type
Database server	<ul style="list-style-type: none"> • Teradata • Oracle • Netezza • Greenplum • DB2
Database	<ul style="list-style-type: none"> • Teradata • Oracle • Netezza • Greenplum • DB2
User ID	<ul style="list-style-type: none"> • Teradata • Oracle • Netezza • Greenplum • DB2

Database Settings	Database Type
Password	<ul style="list-style-type: none"> • Teradata • Oracle • Netezza • Greenplum • DB2
Schema	<ul style="list-style-type: none"> • Oracle • Greenplum • DB2



7. Click **More Options**. The <Database-type> Options window appears.

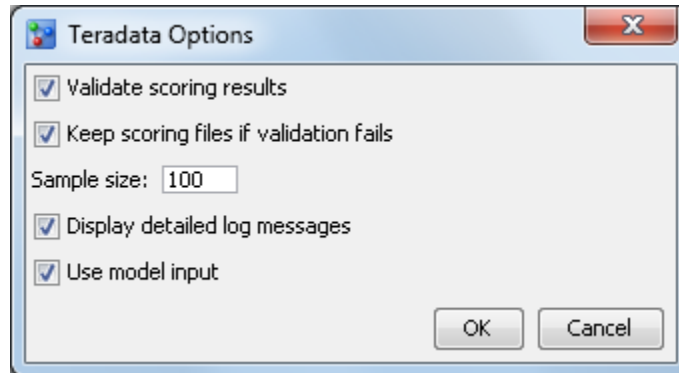


Select the check box for the desired validation options that appear for the selected database type:

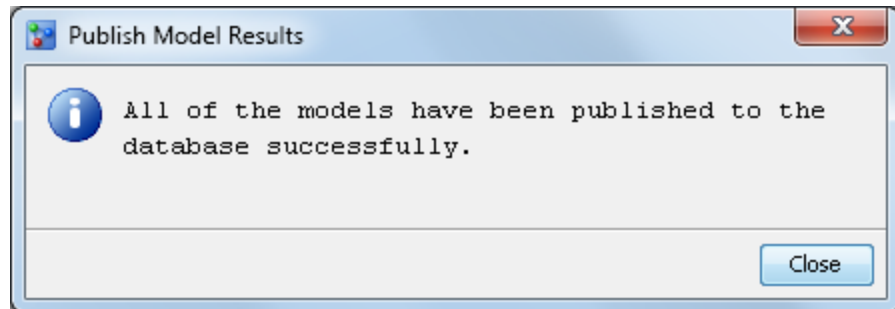
- **Validate scoring results**
- **Keep scoring files if validation fails**
- **Display detailed log messages**
- **Use model input**

Note: By default, the **Validate scoring results** and **Use model input** options are selected.

8. Enter a numeric value for **Sample Size**. The default value for sample size is 100 if the value is null or zero. The maximum number of digits that are allowed is 8.



9. Click **OK**. A message is displayed to indicate whether the models were published to the database successfully or not.



Note: The value of the publish name is validated against the target database, when the option **Replace scoring files that have the same publish name** is not selected for the SAS Embedded Process publish method. If the publish name is not unique, an error message is displayed.

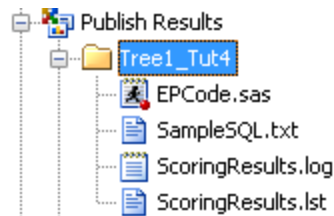
10. Click **Close** to complete the publishing process. The SAS code, scoring results log, and output for the SAS Embedded Process are placed in the **Publish Results** ⇒ **<publish-model-name>** folder in the project file list, and the **ModelNameForEP** user-defined project property is populated.

User-Defined Properties	
BusinessContext	
DbmsTable	
ModelNameForEP	Tree1_Tut4

11. The actions that are performed during the publishing process are displayed in the history. To view the history of the project, select the project name and then click the **History** tab in the **Annotations - Loan** pane.
12. To view the publish history, select the **Loan** project, and select the **Publish History** tab. Select an item from the list to view the publish details

Note: After you have completed the publishing process, you can view the log file. The **Publish Results** folder in the Project Tree contains a folder for each model that was published. The publish name is used to create a folder for each model that is published. That folder contains the ScoringResults.log file. The time that the process

started, details about who initiated the process, and the time when the project was published are recorded. Error messages are also recorded in the log file. The log file provides an audit trail of all relevant actions in the publishing process.



Publish a Model Using the Scoring Function Publish Method

In this exercise, you publish a project's champion model to a database using the scoring function publish method.

To publish a model, follow these steps:

1. Verify that you have set the project champion model in Tutorial 3. For more information, see [“Set the Champion Model” on page 105](#).
2. (Optional) Select the **Loan** project folder and enter a value for the **DbmsTable** user-defined property. This value is the scoring input table that the DBA might have created in the database to be used with a scoring application.

Note: If you plan to use scoring application or SQL code to score this project, you must first set the **DbmsTable** property to the name of input table in your database that you want to use for scoring the champion or challenger model. When you publish a scoring function, the information that is associated with the input table in the database is updated to contain the value of the **DbmsTable** property. The scoring application or SQL code can then query the database for the input table name to use as the scoring input table.

User-Defined Properties	
BusinessContext	
DbmsTable	hmqid
ModelNameForEP	

3. Right-click the **Loan** project in the Project Tree and select **Publish Models** ⇒ **to a Database**. The Publish Models to a Database window appears.

Database type: **Teradata**

Publish Options

Publish method: ☒ SAS Embedded Process ☐ Scoring function

Select the models to publish, and specify a publish name for each model.

	Model Name	Role	Version	Model Type	Publish Name	Date Published
<input type="checkbox"/>	Tree 1	Champion	2012	Classification	Tree 1	Sep 20, 2012 5:45:45 PM
<input type="checkbox"/>	Reg 1	Challenger	2012	Classification	Reg_1_Loan	

☐ Replace scoring files that have the same publish name

Teradata Settings

Database server:

Database:

User ID: Password:

More Options...

OK Cancel

4. Select a database type and select the **scoring function** for the publish method. The type of database and the publish method that you choose determine which database settings and options are required.

Database type: **Teradata**

Publish Options

Publish method: ☐ SAS Embedded Process ☒ Scoring function

Select the models to publish, and specify a publish name for each model.

	Model...	Role	Version	Model Type	Prefix	Publish Name	Date Published
<input type="checkbox"/>	Tree 1	Champion	2012	Classification	Y120924042_	Tree 1	Sep 21, 2012 4:18:46 PM
<input type="checkbox"/>	Reg 1	Challenger	2012	Classification	Y120924043_	Reg 1	

Teradata Settings

Database server:

Database:

User ID: Password:

More Options...

OK Cancel

5. Select the check box next to the **Reg 1** challenger model in the list.

TIP If you have not published the champion model yet, select the champion model **Tree 1** as well.

6. Enter a publish name for each model that you selected to publish. The scoring function publish method has a system-generated **prefix** and a **publish name**. These are used to publish the model scoring function. The publish name is a user-defined value that can be modified.

Here are the naming convention requirements:

- The user-defined value is case insensitive. The maximum length of alphanumeric characters is determined by the database type and publish method that is selected. No spaces are allowed. An underscore is the only special character that can be included in the publish name.
- The recommended maximum lengths of the publish names for the scoring function publish method are the following:

- 19 alphanumeric characters for Teradata
- 30 alphanumeric characters for Netezza, Greenplum, and DB2

UNIX Specifics

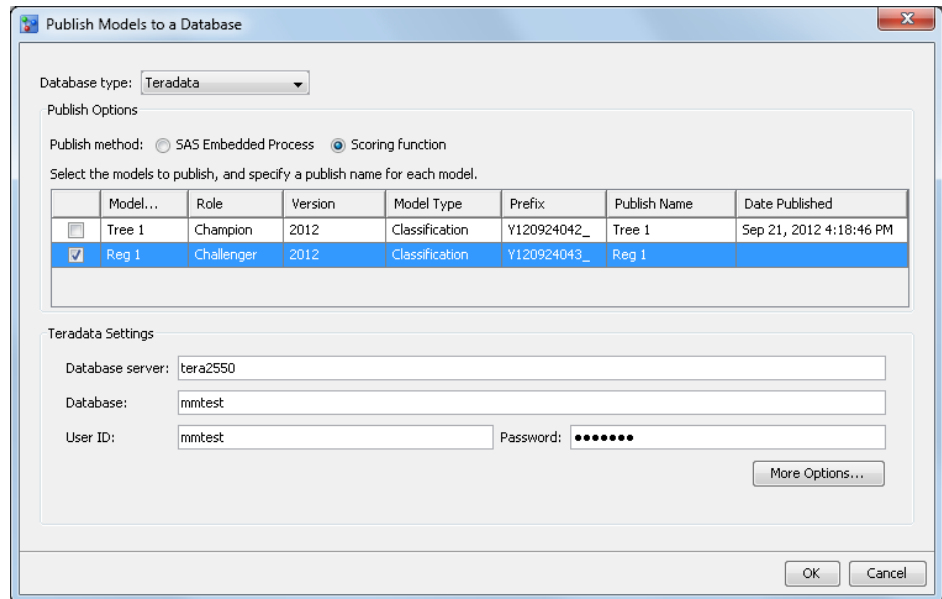
The publish name (user-defined) portion of the function name in an AIX environment has a maximum length of 16 alphanumeric characters for Teradata.

Note: The publish name for each model is reserved by default for subsequent use of the publishing models for a project.

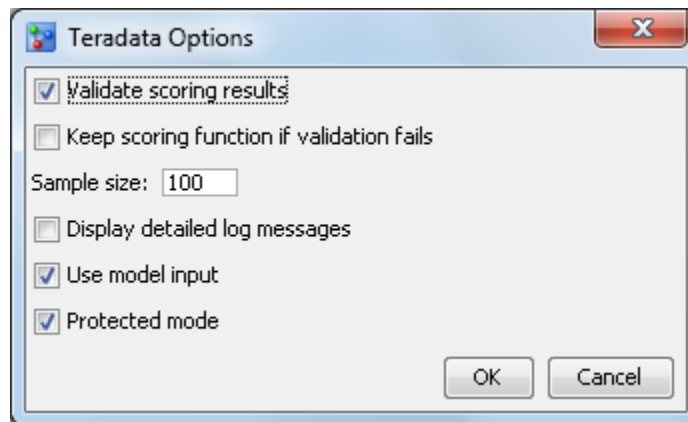
7. Enter a value for the database settings that appear for the selected database type and publish method.

Here are the available database settings according to the database type:

Database Settings	Database Type
Database server	<ul style="list-style-type: none"> • Teradata • Netezza • Greenplum • DB2
Database	<ul style="list-style-type: none"> • Teradata • Netezza • Greenplum • DB2
User ID	<ul style="list-style-type: none"> • Teradata • Netezza • Greenplum • DB2
Password	<ul style="list-style-type: none"> • Teradata • Netezza • Greenplum • DB2
Server user ID	DB2
Compile database	Netezza
Jazlib database	Netezza
Schema	<ul style="list-style-type: none"> • Greenplum • DB2
Initial wait time (in seconds)	DB2
FTP time out (in seconds)	DB2



8. Click **More Options**. The <Database-type> Options window appears.

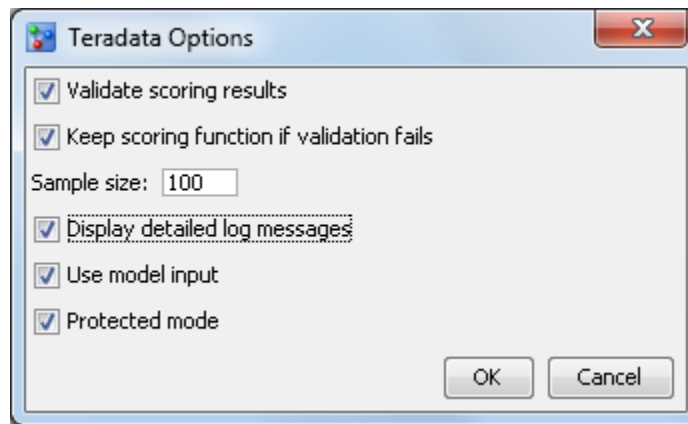


Select the check box for the desired validation options that appear for the selected database type:

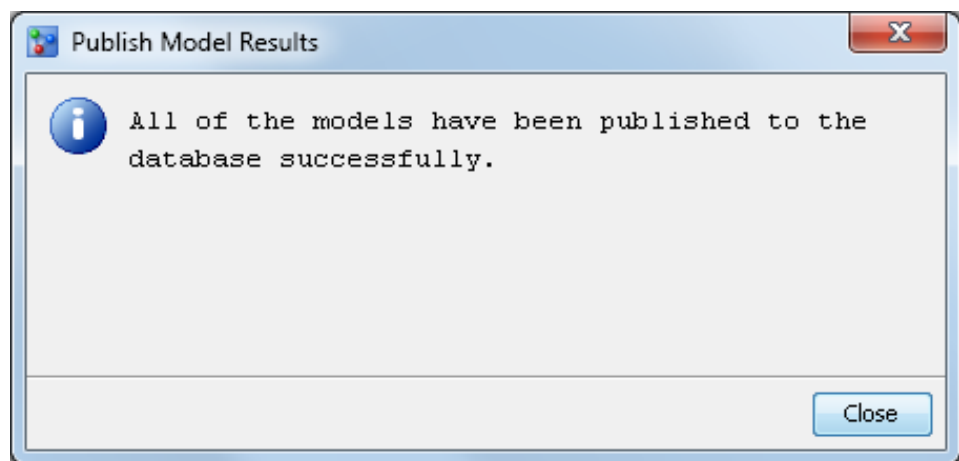
- **Validate scoring results**
- **Keep scoring function if validation fails**
- **Display detailed log messages**
- **Use model input**
- **Protected mode** (Teradata scoring function option) or **Fenced mode** (DB2 and Netezza scoring function option)

Note: By default, the **Validate scoring results** and **Use model input** options are selected for both publish methods. The **Protected mode** or the **Fenced mode** options are selected by default for the scoring function publish method.

9. Enter a numeric value for **Sample Size**. The default value for sample size is 100 if the value is null or zero. The maximum number of digits that are allowed is 8.



10. Click **OK**. A message is displayed to indicate whether the models were published to the database successfully or not.



Note: The publish name portion of the **Function Name** is validated against the target database. The scoring function with the same publish name is replaced automatically.

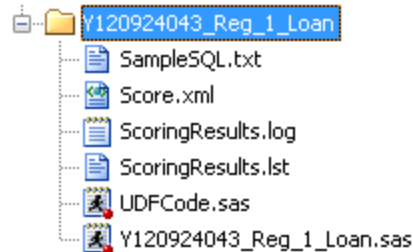
11. Click **Close** to complete the publishing process.

The SAS score code (for example, **Y120924043_Reg_1_Loan.sas**), the scoring results log, and output for the scoring function are placed in the **Publish Results** ⇒ **<prefix_publish-model-name_project-name>** folder in the project file list, and the **ScoringFunctionName** and **ScoringFunctionPrefix** user-defined project properties are populated.

User-Defined Properties	
ScoringFunctionPrefix	Y120924043_
BusinessContext	
DbmsTable	hmqjd
ModelNameForEP	
ScoringFunctionName	Reg_1_Loan

12. The actions that are performed during the publishing process are displayed in the history. To view the history of the project, select the project name and then click the **History** tab in the **Annotations - Loan** pane.
13. To view the publish history, select the **Loan** project, and select the **Publish History** tab. Select an item from the list to view the publish details

Note: After you have completed the publishing process, you can view the log file. The **Publish Results** folder in the Project Tree contains a folder for each model that was published. The publish name is used to create a folder for each model that is published. That folder contains the `ScoringResults.log` file. The time that the process started, details about who initiated the process, and the time when the project was published are recorded. Error messages are also recorded in the log file. The log file provides an audit trail of all relevant actions in the publishing process.

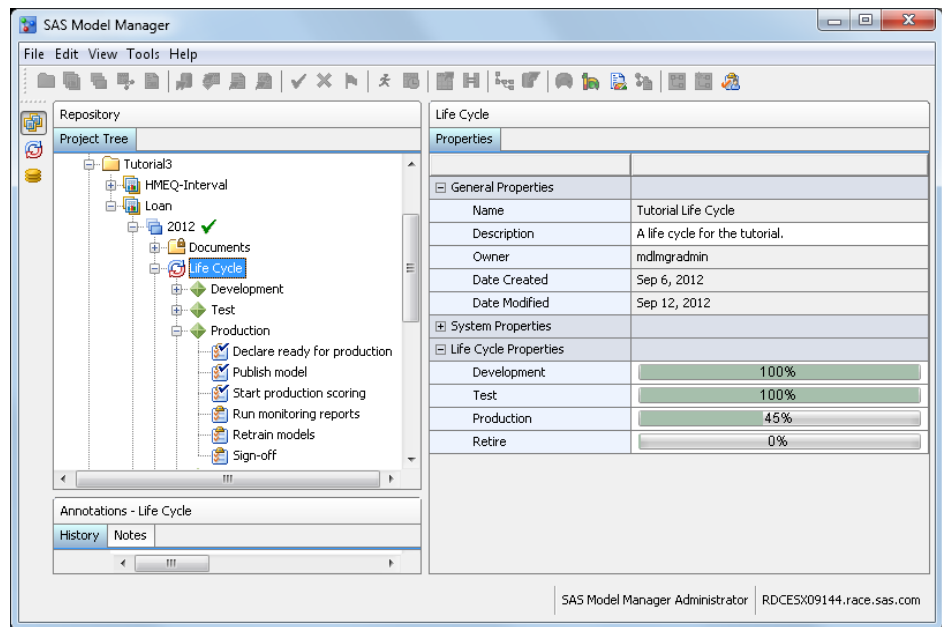


Update Life Cycle or Workflow

Update the Life Cycle (Optional)


To update the life cycle milestones, follow these steps:

1. In the **Loan** project, expand **2012** ⇒ **Life Cycle** ⇒ **Test**.
2. Select each milestone task for **Test**. Click the **Status** box and select **Completed**.
Note: Although this task is not part of this exercise, dependencies in the life cycle require you to mark this task complete.
3. Expand the **Production** milestone. Select the **Declare ready for production** task. Click the **Status** box and select **Completed**.
4. Select the **Publish model** task. Click the **Status** box and select **Completed**.
5. Select the **Start production scoring** task. Click the **Status** box and select **Completed**.
6. Click the **Life Cycle** node to examine its properties. The value for **Date Modified** is today's date. The **Test** and **Production** properties display bar charts that show the percentage of completed tasks for these milestones.





Update the Workflow Process (Optional)

To complete the activities in the associated workflow process, follow these steps:

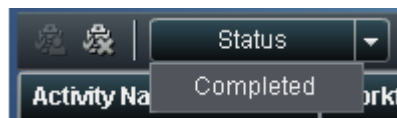
1. Select **Tools** ⇒ **My Workflow Inbox** or click  from the SAS Model Manager main window to view the workflow process activities in your workflow inbox. Workflow Console is launched in a Web browser, and displays the Activities category view.

Note: The list displays only the activities for which you are the actual owner or are assigned as a potential owner, and that have the state of **Started**.

2. From the Activities category view, select an activity name, and click .

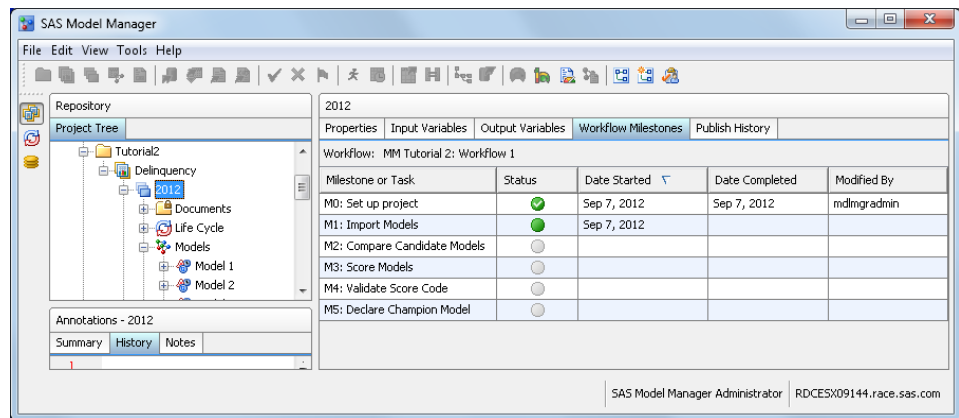
Note: You can select an activity name and click  to release an activity that you had previously claimed.

3. (Optional) Enter a property value or change an existing property value in the Properties pane.
4. (Optional) Add a comment to the activity using the Comments pane.
5. Select a status value to complete the activity. The workflow process continues to the next activity.



6. Repeat steps 2 through 5 for the activities that you completed during this tutorial.

Note: A workflow can be configured to display the activities that are associated with a milestone or task on the **Workflow Milestones** tab and in the Workflow Milestones report for a version in the SAS Model Manager client application. From the **Workflow Milestones** tab you can view the status of milestones or tasks that are associated with activities in the workflow.



Note: For more information, see [Chapter 11, “Tutorial 10: Using Workflow Console,”](#) on page 221.

Chapter 6

Tutorial 5: Creating Performance Monitoring Reports and Using Dashboard Reports

Overview of Performance Monitoring Reports	129
Prerequisites	130
Create the Champion Model Performance Data Sets for a Classification Project	130
Ensure the Project and Model Properties Are Set	130
Run the Define Performance Task Wizard	131
Create the Challenger Model Performance Data Sets	135
Ensure the Project and Model Properties Are Set	135
Run the Define Performance Task Wizard	136
Create the Champion Model Performance Data Sets for a Prediction Project	140
Ensure the Project and Model Properties Are Set	140
Run the Define Performance Task Wizard	140
View Performance Charts	145
View the Training Distribution Chart	145
View the Characteristic and Stability Charts	146
View the Lift Chart	147
View the Gini (ROC and Trend) Charts	150
View the Kolmogorov-Smirnov (KS) Chart	150
View the Mean Squared Error (MSE) Chart	151
Creating Output Formats for Performance Monitoring Reports	152
Create Monitoring Reports	152
Create Champion and Challenger Performance Reports	154
Using Dashboard Reports	156
Overview	156
Prerequisites	156
Prepare to Use Dashboard Reports	157
Create a Dashboard Report Definition	158
Generate Dashboard Reports	162
View the Dashboard Reports	163

Overview of Performance Monitoring Reports

SAS Model Manager performance monitoring reports enable you to monitor and evaluate model performance. Model performance can sometimes be improved by tuning or refitting the model, or by using a new champion model.

To create performance monitoring reports, you create a performance task by using the Define Performance Task wizard. Then, you execute the performance task. The output from executing a performance task includes several charts, including Characteristic, Stability, Lift, Gini (ROC and Trend), Kolmogorov-Smirnov (KS), and Mean Squared Error (MSE) charts. The New Report wizard enables you to create a Monitoring report and a Champion and Challenger Performance report that uses the performance data as input. You can view these charts in SAS Model Manager or you can create monitoring reports in PDF, HTML, RTF, or Excel output formats.

Prerequisites

The exercises in this tutorial depend on some of the properties of the specific models that were added in [Chapter 4, “Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports,”](#) on page 75.

The performance data sets from SMM121Tutorial.zip must be extracted and registered in SAS Management Console. If the data sets have not been extracted and registered, see [“Prepare Tutorial 5 Data Sets and Models”](#) on page 9 to extract and register the files.

The `<drive>\Tutorial15\Samples` folder contains these performance data sets that are used in this tutorial:

- hmeq_2011q2.sas7bdat
- hmeq_2011q3.sas7bdat
- hmeq_2011q4.sas7bdat
- hmeq_2012q1.sas7bdat

Create the Champion Model Performance Data Sets for a Classification Project

In this exercise, you run the Define Performance Task wizard for the **Loan** classification modeling project to create performance monitoring task for the champion model, **Tree 1**. The performance monitoring task uses the information that you supply in the Define Performance Task wizard to create SAS programs. You then execute the SAS programs to create the performance monitoring data sets.

Ensure the Project and Model Properties Are Set

The Define Performance Task wizard requires that specific project properties be set before you can run the wizard.

1. Expand the **Tutorial3** folder.
2. Select the **Loan** project and ensure that the following project properties are set:

Project Property	Value
Training Target Variable	BAD
Target Event Value	1

Project Property	Value
Class Target Level	Binary
Output Event Probability Variable	score

- Expand the **2012** version and **Models** folder. Select the champion model and verify that the value of the **Score Code Type** property is set to **DATA step**.

Run the Define Performance Task Wizard

To run the Define Performance Task wizard, follow these steps:

- Expand the **Tutorial3** organizational folder, right-click **Loan**, and select **Define Performance Task** from the pop-up menu. The Define Performance Task wizard appears.

Define Performance Task

Input and Output Variables

Select one or more input and output variables for analysis.

Step 1 of 4

Output Variables for Stability Analysis

Select	Keep Variables	Description
<input checked="" type="checkbox"/>	score	

Select All Clear All

Input Variables for Characteristic Analysis

Select	Keep Variables	Description
<input type="checkbox"/>	YOJ	
<input type="checkbox"/>	MORTDUE	
<input type="checkbox"/>	REASON	
<input type="checkbox"/>	DEROG	
<input type="checkbox"/>	VALUE	
<input type="checkbox"/>	CLNO	
<input type="checkbox"/>	LOAN	
<input type="checkbox"/>	CLAGE	
<input type="checkbox"/>	DELINQ	
<input type="checkbox"/>	DEBTINC	

Select All Clear All

Back Next Cancel Help

- In the **Output Variables for Stability Analysis** table, select the box for the **score** variable.
- In the **Input Variables for Characteristic Analysis** table, click **Select All**. Click **Next**.
- On the **Warning and Alert Conditions** page, accept the default alert and warning conditions by clicking **Next**. The **Data and Model Specifications** page appears.

Define Performance Task (Step 3 of 4)

Data and Model Specifications

Select the data processing method, specify the performance data options and select a model.

Data Processing Method

☒ Standard configuration
 ☐ High performance configuration

☒ Run scoring task

Performance Data Options

Performance data source:

Data collection date:

Date label:

Models

Select	Model Name	Role	Version	Model Type
<input checked="" type="radio"/>	Tree 1	Champion	2012	Classification
<input type="radio"/>	Reg 1	Challenger	2012	Classification

Buttons: Back, Next, Cancel, Help

- Accept the default process method of **Standard configuration** with the **Run scoring task** option selected.

Here are the available data processing method options:

- To run a standard environment, select **Standard configuration**. When this data processing method is selected you can select **Run scoring task** to run the scoring task code in the performance monitor job. If **Run scoring task** is not selected, then the performance data source must contain the project output variables and model scoring results.
- To run the performance monitoring task in a High Performance Analytic environment, select **High performance configuration**. When this option is selected, the **Run scoring task** check box is not available. The performance data source must contain the project output variables and model scoring results.

Note: To use the high performance configuration, you must license the High Performance Analytics server product. Teradata and Greenplum currently support the High-Performance Analytics configuration.

- Click **Browse** to select a **Performance data source**. Navigate to the location of the **Tutorial5** library folder and select **HMEQ_2011Q2**. Click **OK**.
- Click **Validate** to validate the performance data set. Click **Close** when the successful validation message is displayed.
- Click the calendar button to select a **Data collection date** and select **June 30, 2011** using the calendar. Click **OK**.

Note: The date can be any date within the second quarter of 2011.

9. In the **Date label** box, enter 2011Q2.

Note: The label is used to identify the performance data in the performance monitoring charts. When you view the charts by using the Performance node in the Project Tree, SAS Model Manager uses the label **baseline** for the first set of performance data that is created for a champion model. SAS Model Manager does not use the text that you entered in the **Date label** box.

10. Select the **Tree 1** champion model from the **Models** list. If challenger models have been flagged, the challenger modes are listed in the **Models** table.
11. Click **Next**. The **Optional E-mail Notifications** page of the wizard appears.

Define Performance Task

Optional E-mail Notifications

Specify when to receive e-mail notifications.

Step 4 of 4

E-mail Address	Send Alert Warning	Send Job Status
----------------	--------------------	-----------------

Add Delete

Back Next Finish Cancel Help

12. Click **Add**. The Add Contact dialog box appears.

Add Contact

E-mail Address	Send Alert Warning	Send Job Status
	Yes	Yes

OK Cancel

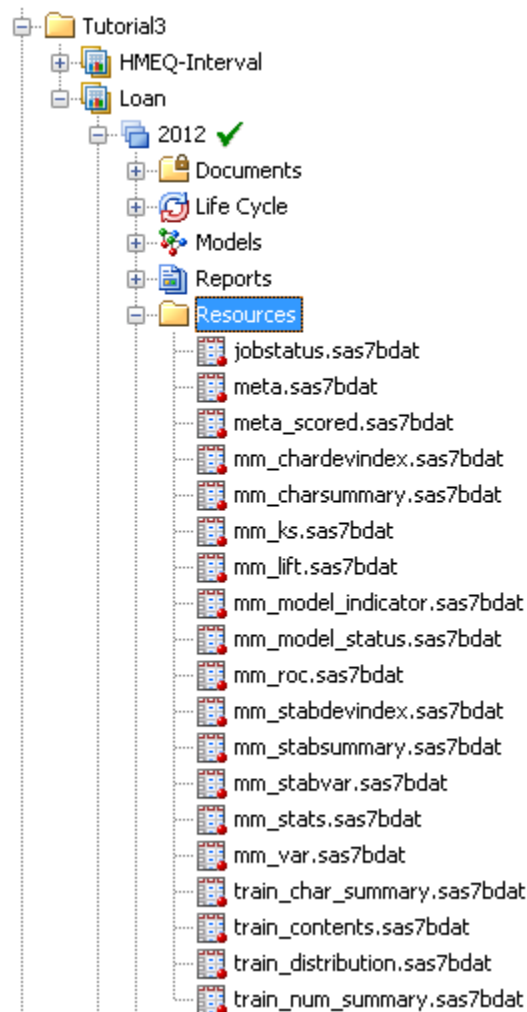
Enter your e-mail address, and click **OK**.

13. Click **Finish**. The wizard creates the SAS code that can be run to create the performance monitoring data sets.
14. Execute the SAS program. Under the **Loan** project, right-click **PerformanceMonitor** and select **Execute**. SAS Model Manager executes the

performance monitoring program. When the program execution is complete, an information message indicates whether the program ran successfully. Click **Close**.

15. Expand **PerformanceMonitor**. Here you can see the SAS program that created the performance monitoring data sets and the resulting SAS log. Click both files to see the file contents in the **Content** pane.
16. Expand the **Resources** folder under the default version **2012**. The **Resources** folder contains the data sets that are created by executing the performance task. When a performance task is executed the first time for a given champion model, the performance task creates the initial data sets that are used for plotting the model performance charts. In executing subsequent performance tasks that use new performance data for the given champion model, SAS Model Manager appends the resulting data sets to the existing data sets. All of the data in the model performance data sets for a given champion model is used to plot the model performance charts.

Click on any file to see the contents of that file in the **Content** pane.



17. Select **Performance**. The Performance node displays the champion model performance data as a graph and as a data set.

Note: To view at least one line segment in Characteristic and Stability graphs, SAS Model Manager requires performance data sets from three performance task executions, at a minimum.

18. Define a performance task and execute the SAS program for the remaining three Tutorial 5 performance data sources. Complete steps 1 through 14 for each performance data source.

On the Define Performance Task wizard, page 1, select all input and output variables if they are not already selected.

On page 2, use the default alert and warning conditions. No changes are necessary.

On page 3, use these values for the **Performance data source**, **Data collection date**, and **Date label** boxes:

Performance data source	Data collection date	Date label
HMEQ_2011Q3	September 30, 2011	2011Q3
HMEQ_2011Q4	December 31, 2011	2011Q4
HMEQ_2012Q1	March 31, 2012	2012Q1

Create the Challenger Model Performance Data Sets

In this exercise, you run the Define Performance Task wizard to create a performance monitoring task for the challenger model, **Reg 1**. The performance monitoring task uses the information that you supply in the Define Performance Task wizard to create SAS programs. You then execute the SAS programs to create the performance monitoring data sets that are then used to create the Champion and Challenger Performance report.

Ensure the Project and Model Properties Are Set

The Define Performance Task wizard requires that specific project properties be set before you can run the wizard.

Note: You can skip these steps if you already performed them when creating the performance data sets for the champion model.

1. Expand the **Tutorial3** folder.
2. Select the **Loan** project and ensure that the following project properties are set:

Project Property	Value
Training Target Variable	BAD
Target Event Value	1
Class Target Level	Binary
Output Event Probability Variable	score

3. Expand the **2012** version and **Models** folder. Select the champion model and verify that the value of the **Score Code Type** property is set to **DATA step**.

Run the Define Performance Task Wizard

To run the Define Performance Task wizard, follow these steps:

1. Expand the **Tutorial3** organizational folder, right-click **Loan**, and select **Define Performance Task** from the pop-up menu. The Define Performance Task wizard appears.

Define Performance Task

Input and Output Variables

Select one or more input and output variables for analysis.

Step 1 of 4

Output Variables for Stability Analysis

Select	Keep Variables	Description
<input checked="" type="checkbox"/>	score	

Select All Clear All

Input Variables for Characteristic Analysis

Select	Keep Variables	Description
<input checked="" type="checkbox"/>	YOJ	
<input checked="" type="checkbox"/>	MORTDUE	
<input checked="" type="checkbox"/>	REASON	
<input checked="" type="checkbox"/>	DEROG	
<input checked="" type="checkbox"/>	VALUE	
<input checked="" type="checkbox"/>	CLNO	
<input checked="" type="checkbox"/>	LOAN	
<input checked="" type="checkbox"/>	CLAGE	
<input checked="" type="checkbox"/>	DELINQ	
<input checked="" type="checkbox"/>	DEBTINC	

Select All Clear All

Back Next Cancel Help

2. In the **Output Variables for Stability Analysis** table, select the box for the **score** variable.
3. In the **Input Variables for Characteristic Analysis** table, click **Select All**. Click **Next**.
4. On the **Warning and Alert Conditions** page, accept the default alert and warning conditions by clicking **Next**. The **Data and Model Specifications** page appears.

The performance data options are populated with the values from the last performance task that was defined for the champion model.

Define Performance Task (Step 3 of 4)

Select the data processing method, specify the performance data options and select a model.

Data Processing Method

☒ Standard configuration ☐ High performance configuration

☒ Run scoring task

Performance Data Options

Performance data source: MM Tutorial-5.HMEQ_2012Q1 [Browse...] [Validate]

Data collection date: Mar 31, 2012 [Calendar]

Date label: 2012Q1

Models

Select	Model Name	Role	Version	Model Type
<input checked="" type="radio"/>	Tree 1	Champion	2012	Classification
<input type="radio"/>	Reg 1	Challenger	2012	Classification

[Back] [Next] [Cancel] [Help]

- Accept the default process method of **Standard configuration** with the **Run scoring task** option selected.

Here are the available data processing method options:

- To run a standard environment, select **Standard configuration**. When this data processing method is selected, you can select **Run scoring task** to run the scoring task code in the performance monitor job. If **Run scoring task** is not selected, then the performance data source must contain the project output variables and model scoring results.
- To run the performance monitoring task in a High Performance Analytic environment, select **High performance configuration**. When this option is selected, the **Run scoring task** check box is not available. The performance data source must contain the project output variables and model scoring results.

Note: To use the high performance configuration, you must license the High Performance Analytics server product. Teradata and Greenplum currently support the High-Performance Analytics configuration.

- Click **Browse** to select a **Performance data source**. Navigate to the location of the **Tutorial5** library folder and select **HMEQ_2011Q2**. Click **OK**.
- Click **Validate** to validate the performance data set. Click **Close** when the successful validation message is displayed.
- Click the calendar button to select a **Data collection date** and select **June 30, 2011**, using the calendar. Click **OK**.

Note: The date can be any date within the second quarter of 2011, but must be the same as the date used when creating a performance task for the champion model.

9. In the **Date label** box, enter **2011Q2**.

Note: The label is used to identify the performance data in the performance monitoring charts. When you view the charts by using the Performance node in the Project Tree, SAS Model Manager uses the label **baseline** for the first set of performance data that is created for a champion model. SAS Model Manager does not use the text that you entered in the **Date label** box. The date label should be the same as the date label that was used when creating a performance task for the champion model.

10. Select the **Reg 1** challenger model from the **Models** list.

Define Performance Task

Data and Model Specifications

Select the data processing method, specify the performance data options and select a model. Step 3 of 4

Data Processing Method

☒ Standard configuration ☐ High performance configuration

☒ Run scoring task

Performance Data Options

Performance data source: MM Tutorial-5.HMEQ_2011Q2 Browse... Validate

Data collection date: Jun 30, 2011 Calendar icon

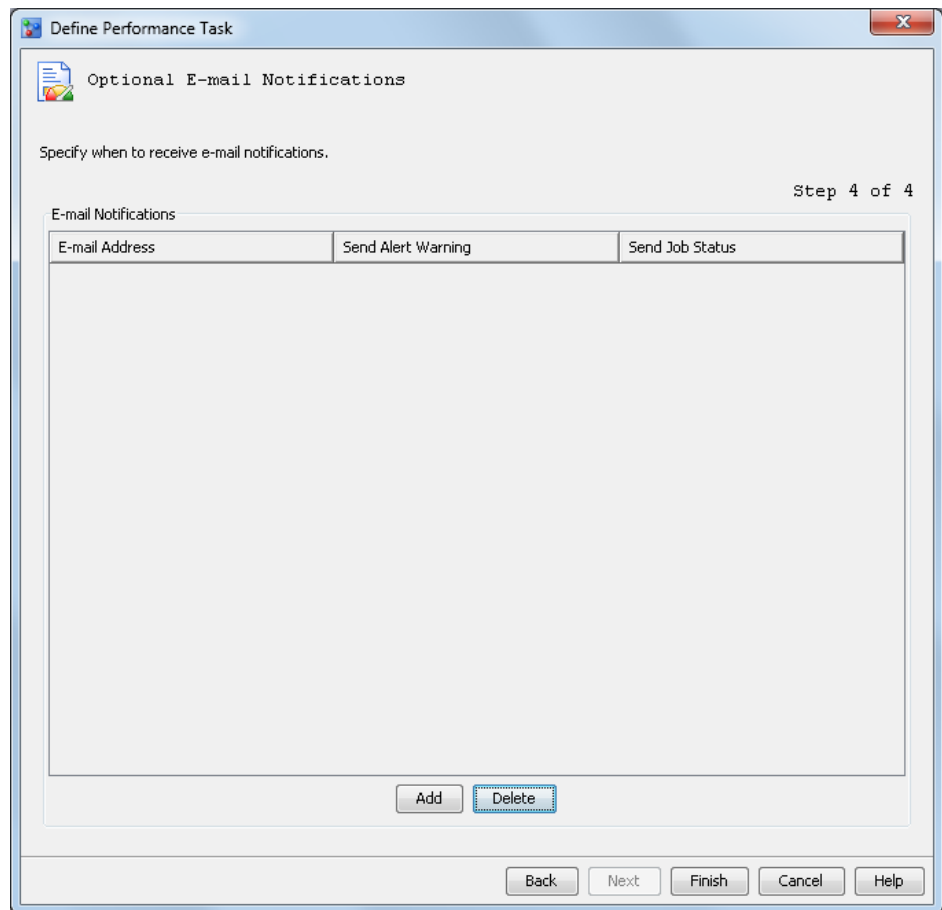
Date label: 2011Q2

Models

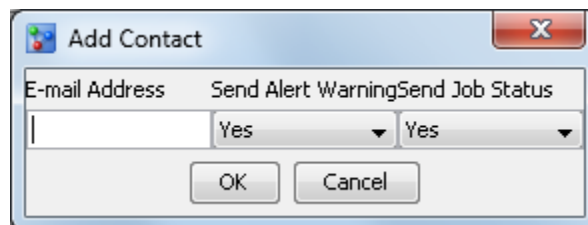
Select	Model Name	Role	Version	Model Type
<input type="radio"/>	Tree 1	Champion	2012	Classification
<input checked="" type="radio"/>	Reg 1	Challenger	2012	Classification

Back Next Cancel Help

11. Click **Next**. The **Optional E-mail Notifications** page of the wizard appears.



12. Click **Add**. The Add Contact dialog box appears.



Enter your e-mail address, and click **OK**.

13. Click **Finish**. The wizard creates the SAS code that can be run to create the performance monitoring data sets.
14. Execute the SAS program. Under the **Loan** project, right-click **PerformanceMonitor** and select **Execute**. SAS Model Manager executes the performance monitoring program. When the program execution is complete, an information message indicates whether the program ran successfully. Click **Close**.
15. Define a performance task and execute the SAS program for the remaining three Tutorial 5 performance data sources. Complete steps 1 through 14 for each performance data source.

In the Define Performance Task wizard, page 1, select all input and output variables if they are not already selected.

On page 2, use the default alert and warning conditions. No changes are necessary.

On page 3, use these values for the **Performance data source**, **Data collection date**, and **Date label** boxes:

Performance data source	Data collection date	Date label
HMEQ_2011Q3	September 30, 2011	2011Q3
HMEQ_2011Q4	December 31, 2011	2011Q4
HMEQ_2012Q1	March 31, 2012	2012Q1

Create the Champion Model Performance Data Sets for a Prediction Project

In this exercise, you run the Define Performance Task wizard for the **HMEQ-Interval** prediction modeling project to create a performance monitoring task for the champion model, **Reg1_Interval**. The performance monitoring task uses the information that you supply in the Define Performance Task wizard to create SAS programs. You then execute the SAS programs to create the performance monitoring data sets.

Ensure the Project and Model Properties Are Set

The Define Performance Task wizard requires that specific project properties be set before you can run the wizard.

1. Expand the **Tutorial3** folder.
2. Select the **HMEQ-Interval** project and ensure that the following project properties are set:

Project Property	Value
Training Target Variable	DEBTINC
Class Target Level	Interval
Output Prediction Variable	P_DEBTINC

3. Expand the **2012** version and **Models** folder. Select the champion model and verify that the value of the **Score Code Type** property is set to **DATA step**.

Run the Define Performance Task Wizard

To run the Define Performance Task wizard, follow these steps:

1. Expand the **Tutorial3** organizational folder, right-click **HMEQ-Interval**, and select **Define Performance Task** from the pop-up menu. The Define Performance Task wizard appears.

Define Performance Task

Input and Output Variables

Select one or more input and output variables for analysis.

Step 1 of 4

Output Variables for Stability Analysis

Select	Keep Variables	Description
<input type="checkbox"/>	P_DEBTINC	

Select All Clear All

Input Variables for Characteristic Analysis

Select	Keep Variables	Description
<input type="checkbox"/>	REASON	
<input type="checkbox"/>	CLNO	
<input type="checkbox"/>	DELINQ	
<input type="checkbox"/>	DEBTINC	
<input type="checkbox"/>	JOB	
<input type="checkbox"/>	BAD	
<input type="checkbox"/>	YOJ	
<input type="checkbox"/>	MORTDUE	
<input type="checkbox"/>	DEROG	
<input type="checkbox"/>	VALUE	

Select All Clear All

Back Next Cancel Help

- In the **Output Variables for Stability Analysis** table, select the box for the **P_DEBTINC** variable.
- In the **Input Variables for Characteristic Analysis** table, click **Select All**. Click **Next**.
- On the **Warning and Alert Conditions** page, accept the default alert and warning conditions by clicking **Next**. The **Data and Model Specifications** page appears.

Define Performance Task

Data and Model Specifications

Select the data processing method, specify the performance data options and select a model. Step 3 of 4

Data Processing Method

☒ Standard configuration
 ☐ High performance configuration

☒ Run scoring task

Performance Data Options

Performance data source:

Data collection date:

Date label:

Models

Select	Model Name	Role	Version	Model Type
<input checked="" type="radio"/>	Reg1_Interval	Champion	2012	Prediction

5. Accept the default process method of **Standard configuration** with the **Run scoring task** option selected.

Here are the available data processing method options:

- To run a standard environment, select **Standard configuration**. When this data processing method is selected, you can select **Run scoring task** to run the scoring task code in the performance monitor job. If **Run scoring task** is not selected, then the performance data source must contain the project output variables and model scoring results.
- To run the performance monitoring task in a High Performance Analytic environment, select **High performance configuration**. When this option is selected, the **Run scoring task** check box is not available. The performance data source must contain the project output variables and model scoring results.

Note: To use the high performance configuration, the High Performance Analytics server product must be licensed. Teradata and Greenplum currently support the High-Performance Analytics configuration.

6. Click **Browse** to select a **Performance data source**. Navigate to the location of the **Tutorial5** library folder and select **HMEQ_2011Q2**. Click **OK**.
7. Click **Validate** to validate the performance data set. Click **Close** when the successful validation message is displayed.
8. Click the calendar button to select a **Data collection date** and select **June 30, 2011**, using the calendar. Click **OK**.

Note: The date can be any date within the second quarter of 2011.

9. In the **Date label** box, enter 2011Q2.

Note: The label is used to identify the performance data in the performance monitoring charts. When you view the charts by using the Performance node in the Project Tree, SAS Model Manager uses the label **baseline** for the first set of performance data that is created for a champion model. SAS Model Manager does not use the text that you entered in the **Date label** box.

10. Select the **Reg1_Interval** champion model from the **Models** list. If challenger models have been flagged, the challenger models are listed in the **Models** table.
11. Click **Next**. The **Optional E-mail Notifications** page of the wizard appears.

12. Click **Add**. The Add Contact dialog box appears.

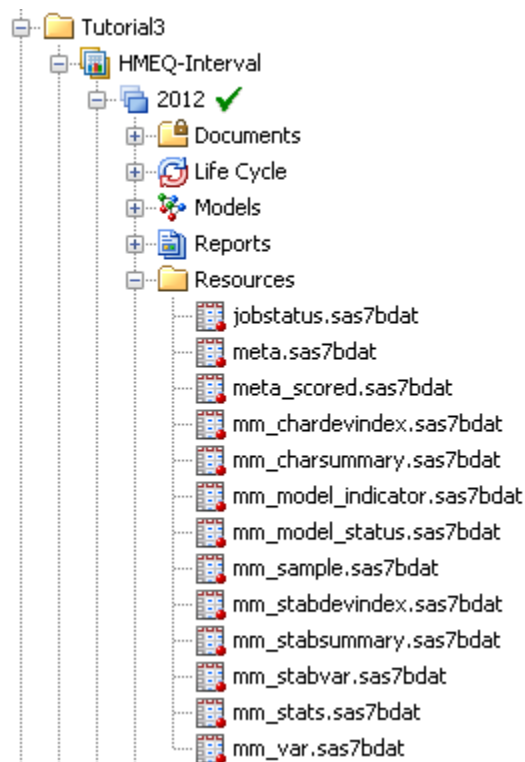
Enter your e-mail address, and click **OK**.

13. Click **Finish**. The wizard creates the SAS code that can be run to create the performance monitoring data sets.
14. Execute the SAS program. Under the **HMEQ-Interval** project, right-click **PerformanceMonitor** and select **Execute**. SAS Model Manager executes the

performance monitoring program. When the program execution is complete, an information message indicates whether the program ran successfully. Click **Close**.

15. Expand **PerformanceMonitor**. Here you can see the SAS program that created the performance monitoring data sets and the resulting SAS log. Click both files to see the file contents in the **Content** pane.
16. Expand the **Resources** folder under the default version **2012**. The **Resources** folder contains the data sets that are created by executing the performance task. When a performance task is executed the first time for a given champion model, the performance task creates the initial data sets that are used for plotting the model performance charts. In executing subsequent performance tasks that use new performance data for the given champion model, SAS Model Manager appends the resulting data sets to the existing data sets. All of the data in the model performance data sets for a given champion model is used to plot the model performance charts.

Click on any file to see the contents of that file in the **Content** pane.



17. Select **Performance**. The Performance node displays the champion model performance data as a graph and as a data set.

Note: Before you can view at least one line segment in Characteristic and Stability graphs, SAS Model Manager requires performance data sets from three performance task executions, at a minimum.

18. Define a performance task and execute the SAS program for the remaining three Tutorial 5 performance data sources. Complete steps 1 through 14 for each performance data source.

On the Define Performance Task wizard, page 1, select all input and output variables if they are not already selected.

On page 2, use the default alert and warning conditions. No changes are necessary.

On page 3, use these values for the **Performance data source**, **Data collection date**, and **Date label** boxes:

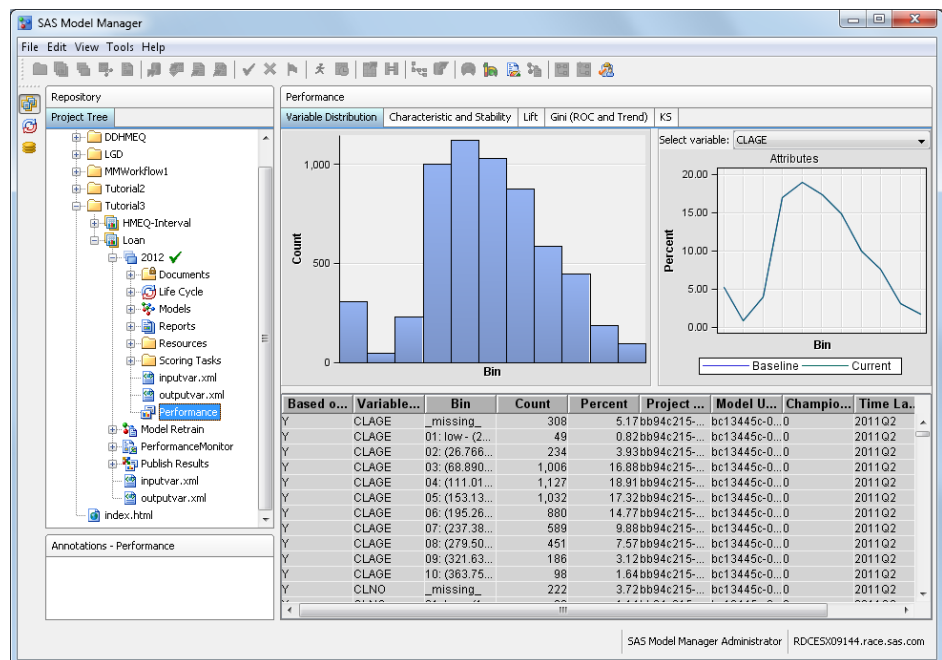
Performance data source	Data collection date	Date label
HMEQ_2011Q3	September 30, 2011	2011Q3
HMEQ_2011Q4	December 31, 2011	2011Q4
HMEQ_2012Q1	March 31, 2012	2012Q1

View Performance Charts

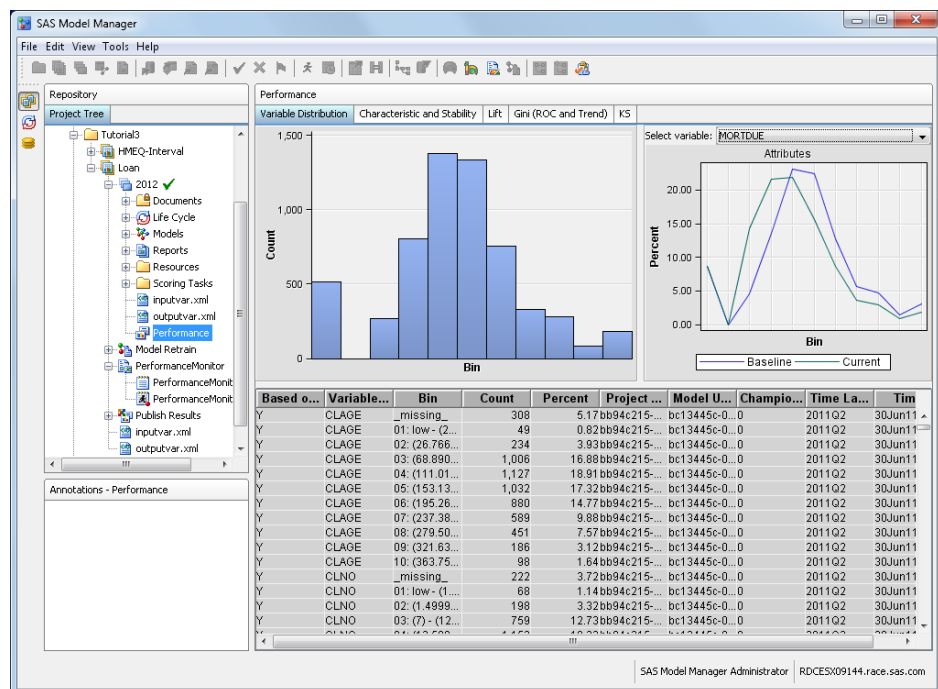
View the Training Distribution Chart

To demonstrate the Variable Distribution chart features, follow these steps:

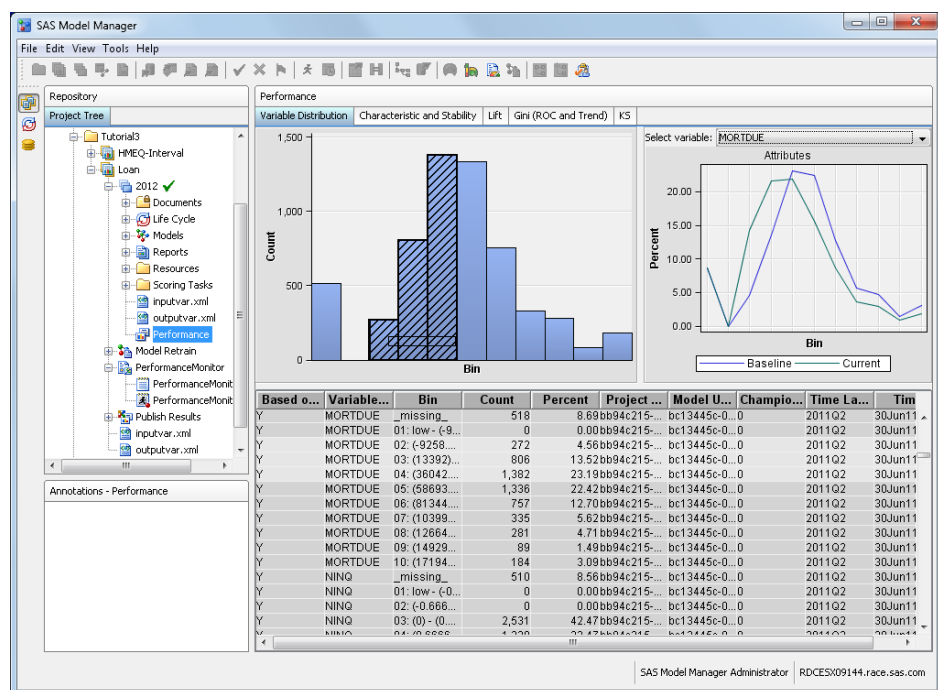
1. In the SAS Model Manager Project Tree, expand **Tutorial3**, expand **Loan**, and expand **2012**.
2. Select the **Performance** node to display the Performance charts.



3. On the **Variable Distribution** tab, click the **Select variable** box and select **MORTDUE**. The training distribution data and charts display the data for the MORTDUE variable.



4. Click on a bar to highlight the corresponding entry in the table. If necessary, move the scroll bar to locate the highlighted entry in the table.
5. In the table, click the highlighted row and drag the mouse to select multiple rows. The associated bars in the chart are highlighted as you select the associated rows.

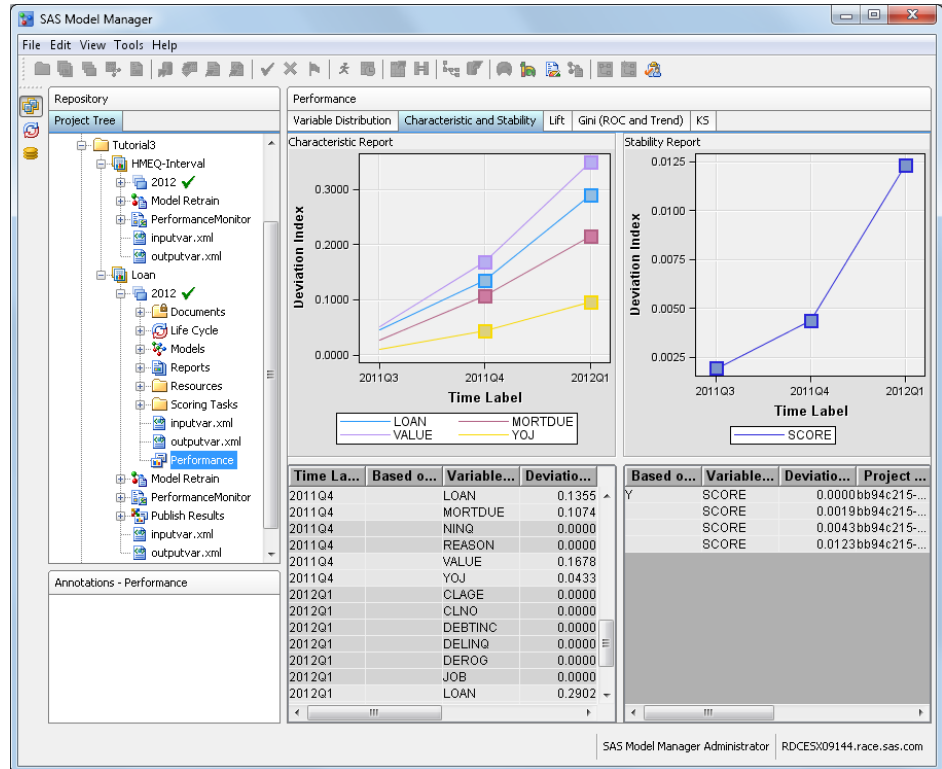


View the Characteristic and Stability Charts

To demonstrate the Characteristic and Stability chart features, follow these steps:

1. Select the **Characteristic and Stability** tab.

2. Select table entries to highlight the corresponding chart points.

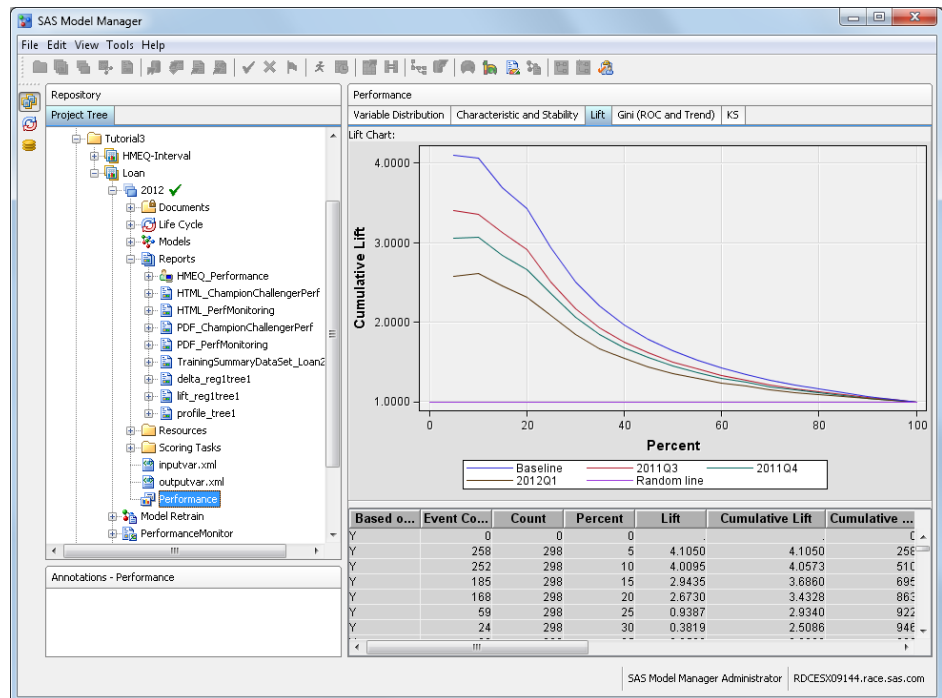


View the Lift Chart

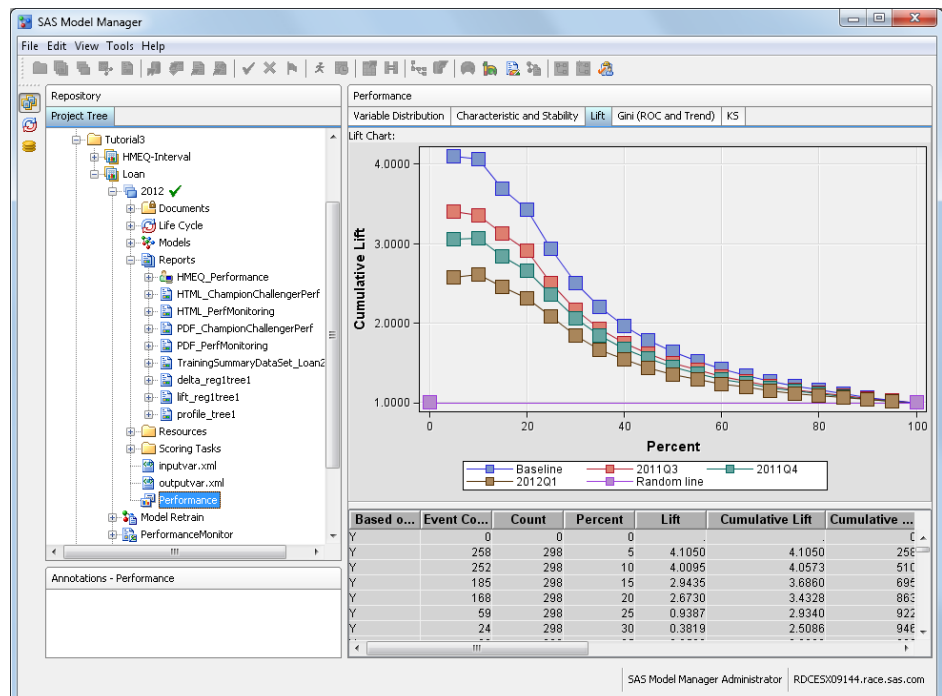
To demonstrate the Lift chart features, follow these steps:

Note: This chart is not displayed for prediction models with an interval target.

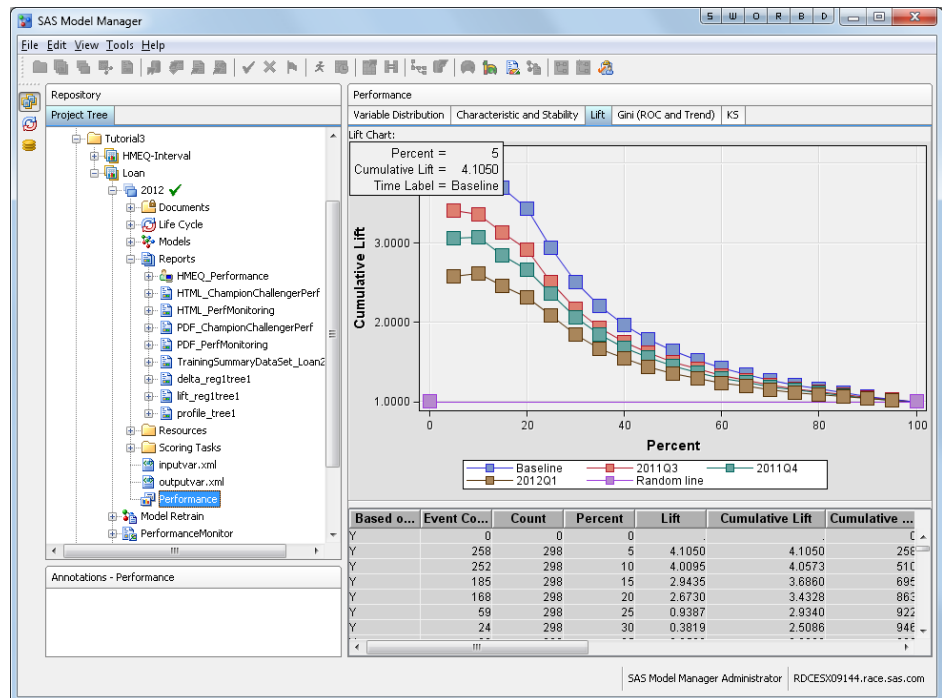
1. Select the **Lift** tab.



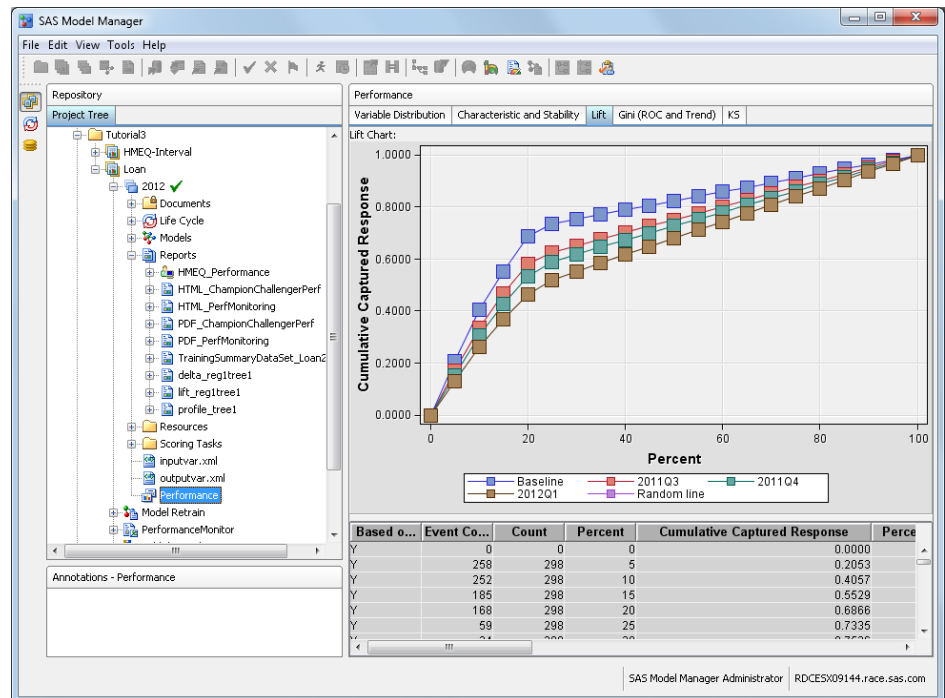
2. To change the chart to show markers, follow these steps:
 - a. Right-click the chart and select **Graph Properties**.
 - b. In the Properties window, select **Line** from the left-side menu.
 - c. Click the **Markers** tab, and select the **Show Markers** check box.
 - d. Click **Apply** to save the changes, and then click **OK** to close the window.



3. Move the pointer along one lift marker. You should see a pop-up box when the pointer is resting on a data point or is close to a data point.



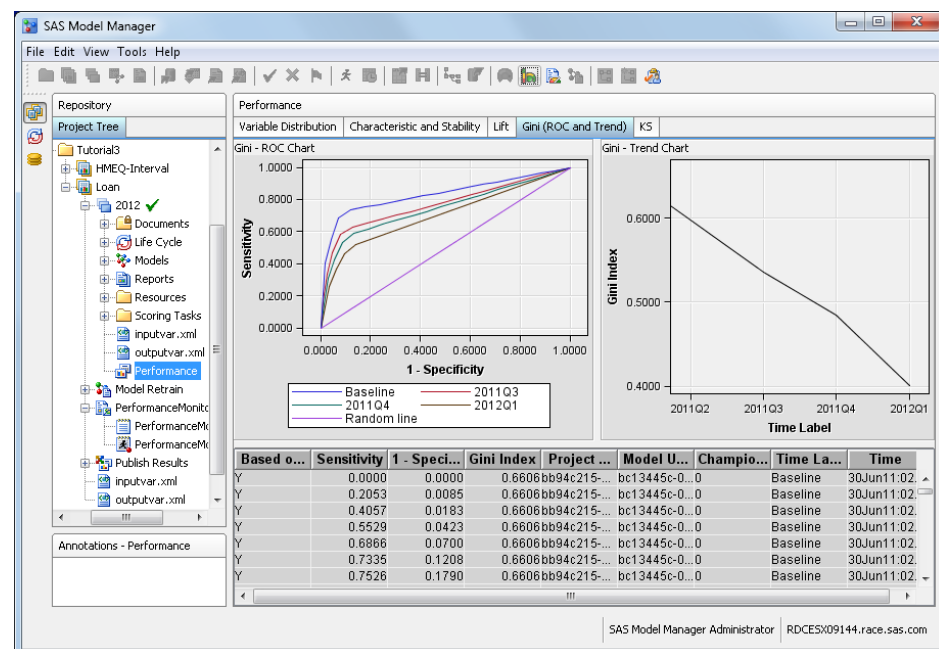
4. To chart the cumulative captured response:
 - a. Right-click the chart area.
 - b. Select **Data Options**. The Data Options Dialog window appears.
 - c. Click the **Roles** tab if it is not already displayed. Select **Y** from the **Roles** drop-down list.
 - d. Select the variable **cuCapturedResp** from the **Available Variables** list box and click the right-arrow to move it to the **Assigned Variables** list box.
 - e. Select the **cuLift** variable and click the left-arrow to remove it from the **Assigned Variables** list box. The only variable in the **Assigned Variables** box should be **cuCapturedResp**.
 - f. Click **OK**.



View the Gini (ROC and Trend) Charts

To view the ROC and Gini charts, select the **GINI (ROC and Trend)** tab.

Note: This chart is not displayed for prediction models with an interval target.

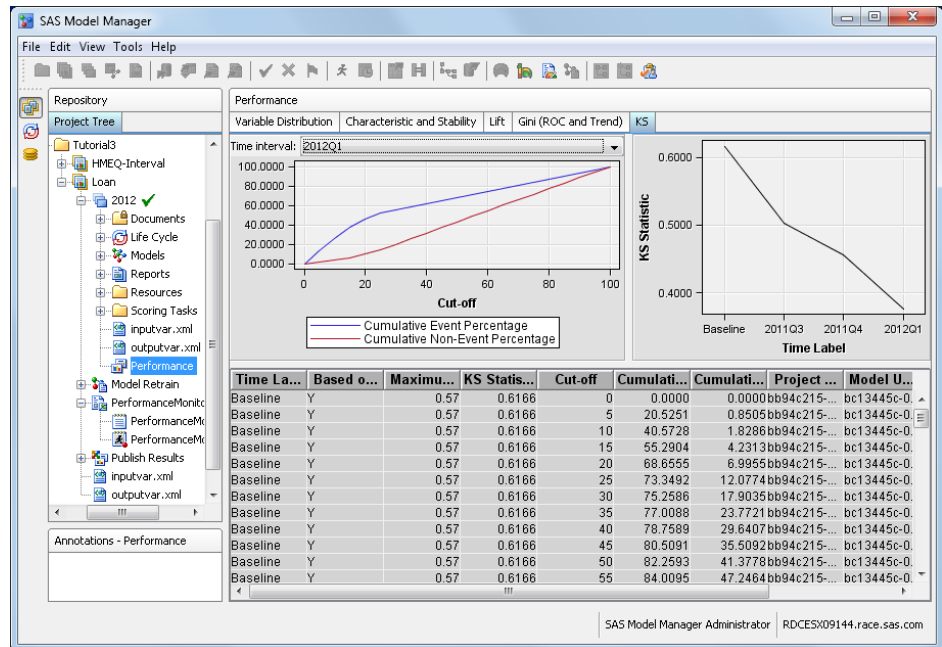


View the Kolmogorov-Smirnov (KS) Chart

To view the KS chart from the SAS Model Manager user interface, follow these steps:

Note: This chart is not displayed for prediction models with an interval target.

1. Select the **KS** tab.



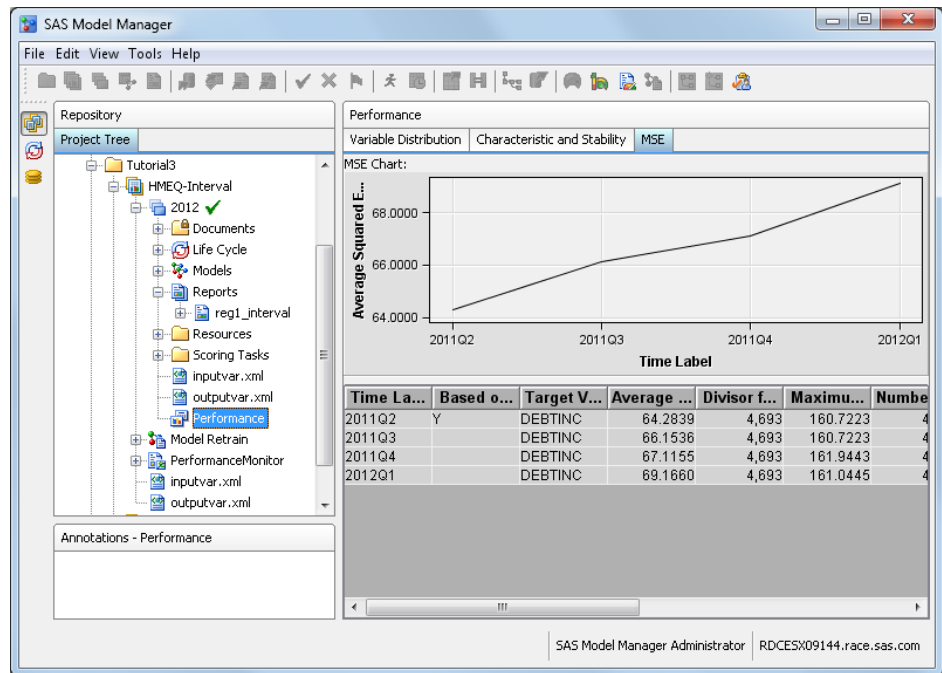
2. Select a different time point from the drop-down list of the **Time Interval** field.

View the Mean Squared Error (MSE) Chart

To view the MSE chart from the SAS Model Manager user interface, follow these steps:

Note: This chart is displayed only for prediction models with an interval target.

1. In the SAS Model Manager Project Tree, expand **Tutorial3**, expand **HMEQ-Interval**, and expand **2012**.
2. Select the **Performance** node to display the Performance charts.
3. Select the **MSE** tab.



Creating Output Formats for Performance Monitoring Reports

Create Monitoring Reports

In this exercise, you use the New Report wizard to create the monitoring reports in PDF and HTML output formats.

1. In the Project Tree, expand **Tutorial3**, the **Loan** project, and the version **2012**.
2. Right-click **Reports** and select **Reports** ⇒ **New Report**.
 - a. Select **Monitoring Report** from the **Type** drop-down list.
 - b. Select **PDF** from the **Format** drop-down list. The default value is **PDF**.
 - c. Select **Seaside** from the **Style** drop-down list. The default value is **SAS default**.
 - d. In the **Name** box of **General Properties**, enter **PDF_PerfMonitoring**.

New Report

Report Options

Type: Monitoring Report

Format: PDF

Style: Seaside

Select Models

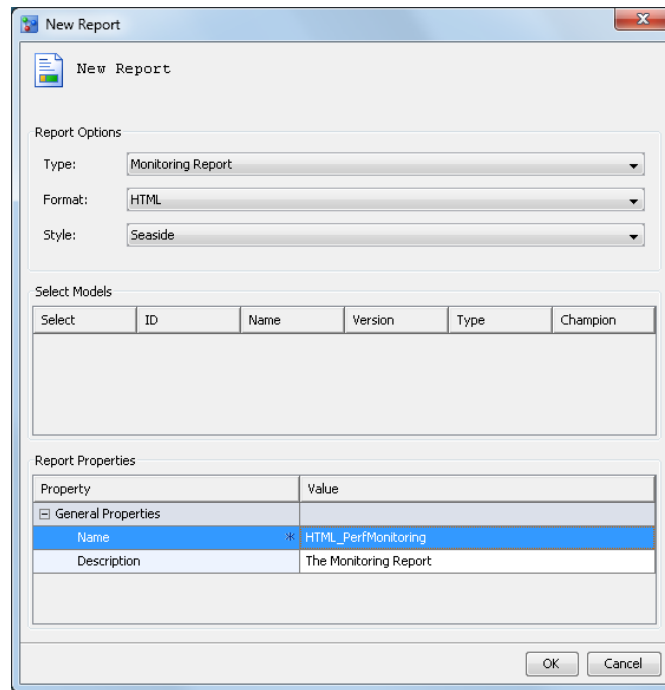
Select	ID	Name	Version	Type	Champion

Report Properties

Property	Value
General Properties	
Name	* PDF_PerfMonitoring
Description	The Monitoring Report

OK Cancel

- e. Click **OK**. An information message indicates whether the report creation was successful. Click **Close** to close the message box.
 - f. View the PDF performance monitoring report. Expand the **Reports** folder. Right-click **PDF_PerfMonitoring** and select **Reports** ⇒ **View Report**. Scroll through the report or click a link in the table of contents to view various parts of the report.
3. Create the same report in HTML.
- Right-click **Reports** and select **Reports** ⇒ **New Report**.
- a. Click the **Type** box and select **Monitoring Report**.
 - b. Select **HTML** from the **Format** drop-down list. The default value is **PDF**.
 - c. Select **Seaside** from the **Style** drop-down list. The default value is **SAS default**.
 - d. In the **Name** box of the **General Properties**, enter **HTML_PerfMonitoring**.



- e. Click **OK**. An information message indicates whether the report creation was successful. Click **Close** to close the message box.
- f. View the HTML performance monitoring report. Expand the **Reports** folder. Right-click **HTML_PerfMonitoring** and select **Reports** ⇒ **View Report**. All charts and data appear on a single HTML page. Scroll through the report to view various parts of the report.

Create Champion and Challenger Performance Reports

In this exercise, you use the New Report wizard to create champion and challenger performance reports in PDF and HTML output formats.

1. In the Project Tree, expand **Tutorial3**, the **Loan** project, and the version **2012**.
2. Right-click **Reports** and select **Reports** ⇒ **New Report**.
 - a. Select **Champion and Challenger Performance Report** from the **Type** drop-down list.
 - b. Select **PDF** from the **Format** drop-down list. The default value is **PDF**.
 - c. Select **Seaside** from the **Style** drop-down list. The default value is **SAS default**.
 - d. In the **Name** box of **General Properties**, enter **PDF_ChampionChallengerPerf**.

New Report

Report Options

Type: Champion and Challenger Performance Report

Format: PDF

Style: Seaside

Select Models

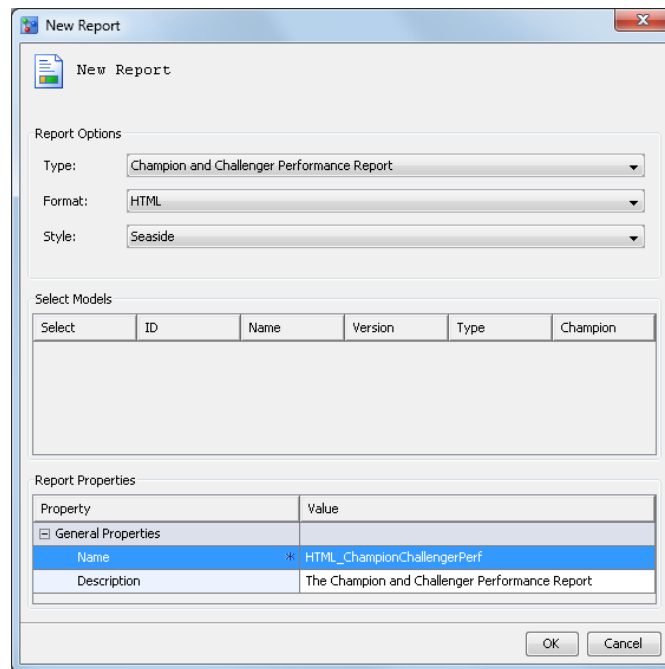
Select	ID	Name	Version	Type	Champion

Report Properties

Property	Value
General Properties	
Name	PDF_ChampionChallengerPerf
Description	The Champion and Challenger Performance Report

OK Cancel

- e. Click **OK**. An information message indicates whether the report creation was successful. Click **Close** to close the message box.
 - f. View the PDF performance monitoring report. Expand the **Reports** folder. Right-click **PDF_ChampionChallengerPerf** and select **Reports** ⇒ **View Report**. Scroll through the report or click a link in the table of contents to view various parts of the report.
3. Create the same report in HTML.
- Right-click **Reports** and select **Reports** ⇒ **New Report**.
- a. Click the **Type** box and select **Champion and Challenger Performance Report**.
 - b. Select **HTML** from the **Format** drop-down list. The default value is **PDF**.
 - c. Select **Seaside** from the **Style** drop-down list. The default value is **SAS default**.
 - d. In the **Name** box of the **General Properties**, enter **HTML_ChampionChallengerPerf**.



- e. Click **OK**. An information message indicates whether the report creation was successful. Click **Close** to close the message box.
- f. View the HTML performance monitoring report. Expand the **Reports** folder. Right-click **HTML_ChampionChallengerPerf** and select **Reports** ⇒ **View Report**. All charts and data appear on a single HTML page. Scroll through the report to view various parts of the report.

Using Dashboard Reports

Overview

The SAS Model Manager Dashboard can provide reports that show the overall state of all projects that are being monitored. The dashboard reports are produced from existing performance monitoring data sets. For each project, a user can define dashboard report indicators that are then used to create the dashboard reports. You view the dashboard reports through the SAS Model Manager **Tools** menu. These reports are generated in HTML by SAS Model Manager.

Note: The dashboard reports can be defined and generated only by SAS Model Manager administrators and advanced users.

In this exercise, you create a dashboard report definition, generate the dashboard reports, and view the dashboard reports.

Prerequisites

Models Used in Tutorial 3

The exercises in this tutorial depend on some of the properties of the specific models that were added in Tutorial 3. Use the projects, versions, or models that are specified here.

This tutorial is designed to follow [Chapter 4, “Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports,”](#) on page 75.

The Required Tutorial Files

The exercises in this tutorial depend on the performance task data sets that were created using the tutorial files in [“Create the Champion Model Performance Data Sets for a Classification Project”](#) on page 130.

Prepare to Use Dashboard Reports

The dashboard report directory is configured during the installation of SAS Model Manager. The default directory is `\SASConfigDir\Lev#\AppData\SASModelManager12.1\Dashboard`.

To configure a different directory to store the SAS Model Manager dashboard reports, follow these steps:

1. Connect to the SAS Workspace Server.
2. Create a new directory (for example, `C:\Dashboard`).

Note: The directory must be located on a SAS Workspace Server or a network drive that is accessible by the SAS Workspace Server. Do not include special characters or spaces in the name of the directory.

3. Grant user permissions for the new directory. For example, perform the following tasks:
 - Grant Full Control permission to users who need to create subdirectories, write content, or delete content. This type of user includes a user who you add (using SAS Management Console) to the Model Manager Administrator Users group or a user who is a SAS administrator. This type of user includes users that are in Model Manager Administrator Users group or a user who is a SAS administrator that you added using SAS Management Console.
 - Grant Read, Write, and Execute permissions to users who need to create performance indicators and execute dashboard reports. This type of user includes users that are in Model Manager Advanced Users group that you added using SAS Management Console.
 - Grant Read and Execute permissions to users who need only to view the dashboard reports. This type of user includes users that are in Model Manager Users group that you added using SAS Management Console.

UNIX Specifics

In a UNIX environment, all SAS Model Manager users must be part of a group that has the appropriate group permissions. For more information, see “Creating Operating System Accounts in UNIX Environments” in Chapter 3 of *SAS Model Manager: Administrator's Guide* and “Configuring Users, Groups, and Roles” in Chapter 4 of *SAS Model Manager: Administrator's Guide*.

Note:

4. From SAS Management Console, expand the **Application Management** node on the **Plug-ins** tab.
5. Select and expand **Configuration Manager** ⇒ **SAS Application Infrastructure**.
6. Right-click **Model Manager JavaSvcs 12.1** and select **Properties**.
7. (optional) Click the **Settings** tab and then select **Report Options**. Use this setting to specify the styles that are available when a user generates dashboard reports, and to

enable the indicator override option for defining dashboard report indicators. When the indicator override configuration is enabled, indicators with conditions are available when you add dashboard report indicators using the SAS Model Manager Client.

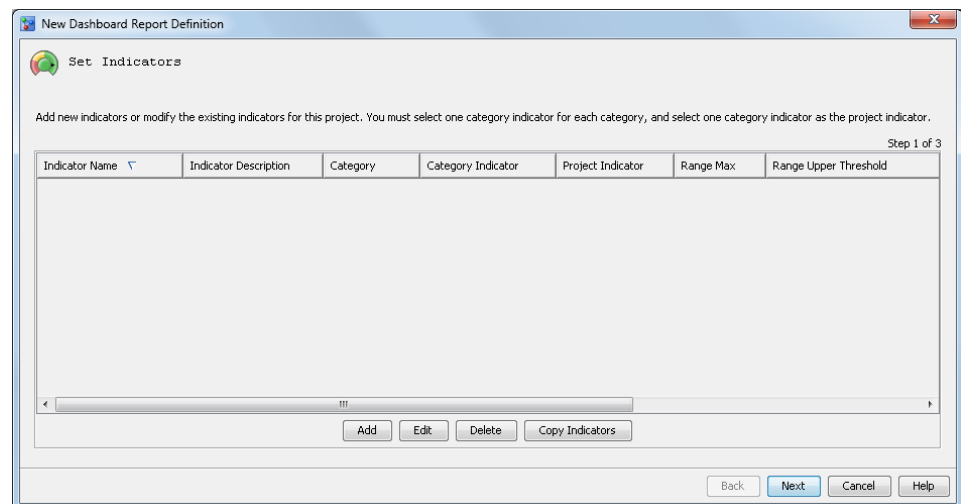
8. Click the **Advanced** tab to modify the application dashboard directory. Change the property value for **App.DashboardDir** to the directory path that was configured.
9. Click **OK**.

Create a Dashboard Report Definition

To create a dashboard report definition, follow these steps:

1. You must have at least one project that contains performance data before you continue to the next step. For more information, see [“Create the Champion Model Performance Data Sets for a Classification Project”](#) on page 130.
2. Right-click the project folder in the Project Tree, and select **Dashboard Report Definition** ⇒ **New** from the pop-up menu. The New Dashboard Report Definition window appears.

Note: If a dashboard report definition already exists for a project, you can select **Edit** from the pop-up menu. If you want to delete an existing dashboard report definition, you can select **Delete** from the pop-up menu.



3. Click **Add**. The Add Indicator window appears.

Note: If you want to copy indicators from an existing project, click **Copy Indicators** instead of **Add**, follow the prompts, and then skip to step 5.

Add Indicator

Template: CHAR_P1 Detail

Name:

Description:

Condition:

Range Definition

Normal: ●

Warning: ▲

Alert: ■

OK Cancel

- a. Select a template from the **Template** drop-down list.

Note: Click **Detail** to view information about the selected indicator template.

- b. Enter values for the **Normal**, **Warning**, and **Alert** range definitions.

Table 6.1 Example Performance Indicator Values

Indicator Name	Category	Normal	Warning	Alert
CHAR_P1	Characteristic	0 – 1	1 – 2	2 – 3
GINIDECAY	Model Assessment	0 – 0.2	0.2 – 0.4	0.4 – 0.6
STAB_P1	Stability	0 – 1	1 – 2	2 – 3

- c. Click **OK**. The New Dashboard Report Definition window appears with information about the new indicator.

Step 1 of 3

Indicator Name	Indicator Description	Category	Category Indicator	Project Indicator	Range Max	Range Upper Threshold	Range Lower Threshold	Range Min
CHAR_P1	Number of predictors wi...	Characteristic	<input type="radio"/>	<input type="radio"/>	3	2	1	0

Buttons: Add, Edit, Delete, Copy Indicators, Back, Next, Cancel, Help

- Repeat step 3 for each indicator that you want to add. To edit an existing indicator, select the indicator, and click **Edit**.
- Select one category indicator for each category, and then select one indicator as the project indicator.

Note: The indicator that you select as a project indicator must also be a category indicator.

Step 1 of 3

Indicator Name	Indicator Description	Category	Category Indicator	Project Indicator	Range Max	Range Upper Threshold	Range Lower Threshold	Range Min
CHAR_P1	Number of predictors wi...	Characteristic	<input checked="" type="radio"/>	<input checked="" type="radio"/>	3	2	1	0
GINIDECAY	Gini index decay	Model Assessment	<input checked="" type="radio"/>	<input checked="" type="radio"/>	0.6	0.4	0.2	0
STAB_P1	Number of outputs with ...	Stability	<input checked="" type="radio"/>	<input checked="" type="radio"/>	3	2	1	0

Buttons: Add, Edit, Delete, Copy Indicators, Back, Next, Cancel, Help

- Click **Next**. The New Dashboard Report Definition window appears with information about setting up e-mail notifications.

New Dashboard Report Definition

Set E-mail Notifications

Specify an e-mail address for each recipient who you want to send an e-mail notification about the project status.

Step 2 of 3

Status	E-mail Address
--------	----------------

Project status: Normal E-mail address:

Add Delete

Back Next Cancel Help

7. Select a value from the **Project status** drop-down list, enter a value for **E-mail address**, and click **Add**. Repeat this step for each recipient who you want to send an e-mail notification to about a status. If you want an individual recipient to receive an e-mail notification for each status, you must repeat this step for each status. To delete an e-mail notification, select a project status, and click **Delete**.
8. Click **Next**. The New Dashboard Report Definition window appears with information about setting report types.

New Dashboard Report Definition

Set Report Types

Modify the report type selections or use the default selections to include in the dashboard reports.

Step 3 of 3

Report Description
KPI Trend Dashboard Report
KPI Detail Report
Monitoring Report
Index of Project Reports
KPI Dashboard Report
Index of Time Period Reports

Report type: KPI Trend Dashboard Re...

Add Delete

Back Next Finish Cancel Help

9. By default, all of the report types are selected. To change report types, follow these steps:
 - a. To add a report type, select a value from the **Report type** drop-down list, and click **Add**.
 - b. To delete a report type, select a value from the **Report Description** list, and click **Delete**.
10. Click **Finish**. An informational message is displayed indicating that the dashboard report definition were created successfully.

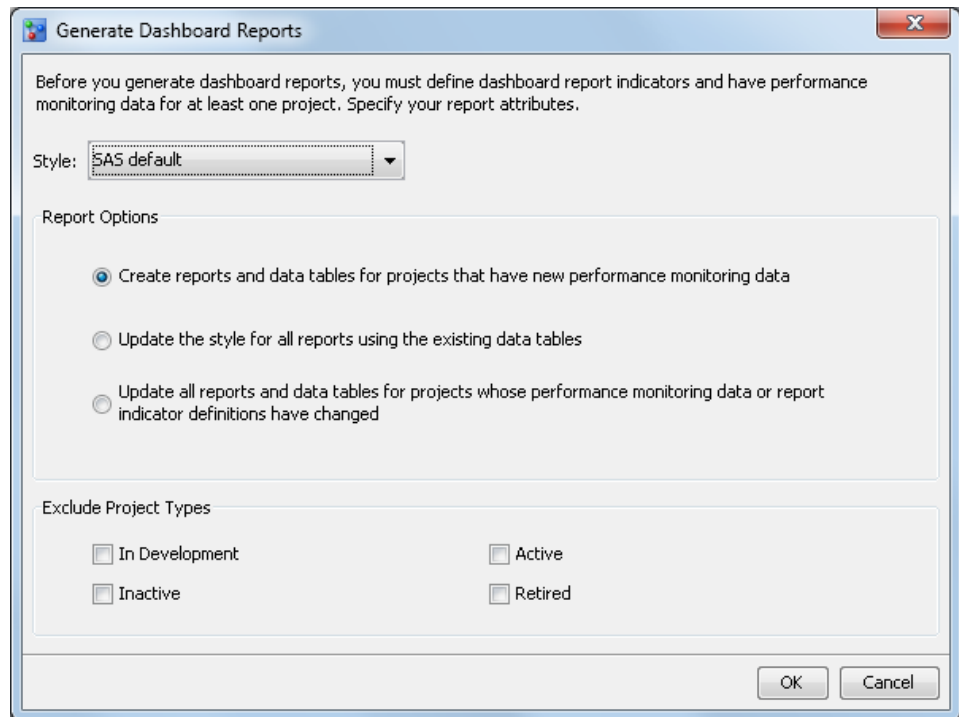
Note: You must define dashboard report indicators for all projects that you want to include in your dashboard reports.

Generate Dashboard Reports

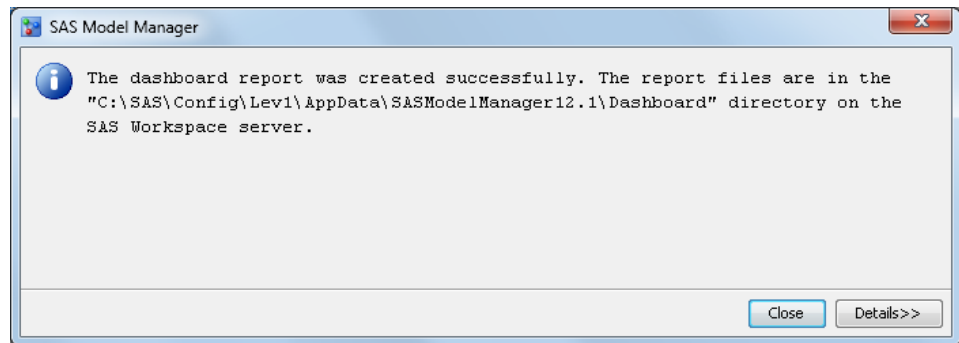
To generate the dashboard reports, follow these steps:

Note: Before you generate dashboard reports, you must have at least one project that contains performance data. That project must have at least one dashboard report indicator that has been defined.

1. Select **Tools** ⇒ **Generate Dashboard Reports** from the menu. The Generate Dashboard Reports window appears.



2. Select a style for the report from the **Style** drop-down list.
3. Select a report option:
 - Create reports and data tables for projects that have new performance monitoring data
 - Update the style for all reports, using the existing data tables
 - Update all reports and data tables for projects whose performance monitoring data or report indicator definitions have changed
4. (Optional) Select one or more project types that you want to exclude from the dashboard reports.
5. Click **OK**. You can view the progress of the dashboard reports in the status bar. A message appears that indicates whether the report was created successfully. The message also displays the location of the dashboard reports on the SAS Workspace Server. Here is an example: `C:\SAS\Config\Levl\AppData\SASModelManager12.1\Dashboard`.



Note: SAS Model Manager administrators can configure a different location for the dashboard reports directory. If you set up notifications when you defined the dashboard indicators, the recipients receive e-mail notifications for the configured statuses.

For more information about executing dashboard reports, see the *SAS Model Manager: User's Guide*.

View the Dashboard Reports

To view the dashboard reports, follow these steps:

1. Select **Tools** ⇒ **View Dashboard Reports**

A web page displays a table with dashboard reports for each project that has a dashboard definition.

All projects

Project Name	Current Status	Owner	Model Age (days)
/MMRoot/Tutorial3/HMEQ-Interval	2012Q1	mdlmgadmin	19
/MMRoot/Tutorial3/Loan	2012Q1	mdlmgadmin	19





History Status

Project Name	Current	Current - 1	Current - 2	Current - 3
/MMRoot/Tutorial3/HMEQ-Interval	2012Q1	2011Q4	2011Q3	2011Q2
/MMRoot/Tutorial3/Loan	2012Q1	2011Q4	2011Q3	2011Q2

2. Select a **Project Name** or status link to view the associated dashboard reports. The **Project Reports Index** appears in a new window. If you select a status, only the dashboard reports for that time frame are displayed.










Note: You can also view the report by opening the index.html file directly in the Workspace Server dashboard reports location (for example, `c:\SAS\Config\Lev1\AppData\SASModelManager12.1\Dashboard\report`).

Project Reports Index

Time	Status	Project Indicator	Report
2012Q1		Number of predictors with deviation index exceeding 0.1	KPI Dashboard Report
			KPI Detail Report
			KPI Trend Dashboard Report
			Monitoring Report
2011Q4		Number of predictors with deviation index exceeding 0.1	KPI Dashboard Report
			KPI Detail Report
			KPI Trend Dashboard Report
			Monitoring Report
2011Q3		Number of predictors with deviation index exceeding 0.1	KPI Dashboard Report
			KPI Detail Report
			KPI Trend Dashboard Report
			Monitoring Report
2011Q2		Number of predictors with deviation index exceeding 0.1	KPI Dashboard Report
			KPI Detail Report
			KPI Trend Dashboard Report
			Monitoring Report

3. Select a link from the **Report** column to view the report details.

KPI Detail Report
2012Q1

Category	Category Status	Category Indicator	Indicator	Indicator Status	Value
Characteristic			Number of predictors with deviation index exceeding 0.1		4.0000
Model Assessment			Gini index decay		0.4332
Stability			Number of outputs with deviation index exceeding 0.1		1.0000

Note: To return to the Project Reports Index, select the browser's back button. To return to the All Projects dashboard, select the first tab in the browser window.

For more information about dashboard reports, see the *SAS Model Manager: User's Guide*.

Chapter 7

Tutorial 6: Creating Basel II Reports

Overview of Basel II Reports	165
Prerequisites	166
Organize the Model Hierarchy	167
Create a Folder	167
Create a New Project	167
Define the Project Properties	168
Create a Version	170
Import Models	171
Import Model Package Files	171
Import SAS Code Models	172
Map Model Variables to Project Variables	173
Create Basel II Reports	174
Create a Probability of Default (PD) Report	174
Create a Loss Given Default (LGD) Report	177
View Basel II Reports	179

Overview of Basel II Reports

Basel II reports in SAS Model Manager provide several statistical measures and tests to validate stability, performance, and calibration using Loss Given Default (LGD) and Probability of Default (PD) models.

Model stability measures

The model stability measures track the change in distribution of the modeling data and the scoring data.

Model performance measures

The model performance measures report this information:

- The model's ability to discriminate between accounts that have defaulted and those that have not defaulted. The score difference between the accounts that default and those that do not helps determine the cut-off score, which is used to predict whether a credit exposure is a default.
- The relationship between the actual default probability and the predicted probability. This information is used to understand a model's performance over a period of time.

Model calibration measures

The model calibration measures check the accuracy of the LGD and PD models by comparing the correct quantification of the risk components with the available standards.

For a description of the statistical measures, see Appendix 7, “Statistical Measures Used in Basel II Reports,” in *SAS Model Manager: User's Guide*.

The tutorial provides examples and step-by-step directions for importing LGD and PD models and creating Basel II reports.

Prerequisites

The exercises in this tutorial require that the Tutorial 6 data sets and models from SMM121Tutorial.zip be extracted and registered in SAS Management Console. If they have not been extracted and registered, see [“Prepare Tutorial 6 Data Sets and Models” on page 10](#) to extract and register the files.

Importing models requires that you know where the SAS Model Manager administrator installed the Tutorial 6 models. If you do not know the location of the models, contact your SAS Model Manager administrator.

The data sets for the traffic light benchmarks and validation grade default thresholds that are used to create the Basel II reports are located in the directory `\\<server-name>\<install-directory>\Program Files\SASHome\SASFoundation\9.3\mmcore\sashelp`. This tutorial uses the default thresholds in the data sets that are located in the sashelp directory. It is not recommended to directly modify the data sets in the sashelp directory. Use one of the following methods if you want to change the default values before creating the Basel II reports.

- Copy the data sets from the sashelp directory to the location of the input table that is used when creating the Basel II reports. Examples of the input table directory location are `C:\SMM121Tutorial\Tutorial6\Samples\LGD` and `C:\SMM121Tutorial\Tutorial6\Samples\PD`.

Here are the default Basel II data sets and index that are located in the sashelp directory:

- traffic_light_benchmarks.sas7bdat
- validation_grade.sas7bdat
- validation_grade.sas7bndx
- Assign the MMBASEL library reference (libref) using SAS Management Console, or create a libref for a local or network drive using the SAS start-up code feature of SAS Model Manager. The library name must also be MMBASEL if you use SAS Management Console to define the library. Copy the data sets and index from the sashelp directory to the new MMBASEL library location.
- The search order for the data sets is the following:
 1. The library where the input table is located.
 2. The MMBASEL library, if it exists.
 3. The sashelp directory located on the server that SAS was installed.

For more information about modifying the default thresholds in the data sets for the Basel II reports, see the SAS Model Manager product documentation page on support.sas.com.

Organize the Model Hierarchy

In this exercise, you create an organizational folder, a project, and a version for the modeling project.

Create a Folder

To provide an organizational folder to manage your modeling projects, follow these steps:

1. Right-click the **MMRoot** node in the Project Tree and select **New** ⇒ **New Folder**. The New Folder dialog box appears.
2. Specify the following folder properties and click **OK**.

Name

enter **Tutorial6**.

Description

enter an optional folder description. For example, enter **Basel II Reports Tutorial**.

The new folder appears in the Project Tree.

Create a New Project

To create a project that is associated with the classification model function, follow these steps:

1. Right-click the **Tutorial6** folder and select ⇒ **New** ⇒ **New Project**. The New Project Wizard appears.
2. Specify the following project properties and click **Next**:

Name

enter **PD** for the project name.

Description

enter an optional description.

Model Function

select **Classification**.

3. In Step 2 of the New Project Wizard, specify the project variables:
 - a. Click the **Import Variables** button for the **Project Input Variables** table. Double-click **Shared Data** ⇒ **Model Manager** ⇒ **Tutorial6** ⇒ **PD**. Select **HMEQ_PROJECT_INPUT** and click **OK**.
 - b. For the **PD** classification project, click the **Import Variables** button for the **Project Output Variables** table. Select **HMEQ_PROJECT_OUTPUT** and click **OK**.
 - c. Click **Finish**.
4. Examine the **Tutorial6** folder to verify that it contains the project.

To create a project that is associated with the prediction model function, follow these steps:

1. Right-click the **Tutorial6** folder and select ⇒ **New** ⇒ **New Project**. The New Project Wizard appears.
2. Specify the following project properties and click **Next**.

Name
enter **LGD-Interval** for the project name.

Description
enter an optional description.

Model Function
select **Prediction**.
3. In Step 2 of the New Project Wizard, specify the project variables:
 - a. Click the **Import Variables** button for the **Project Input Variables** table. Double-click **Shared Data** ⇒ **Model Manager** ⇒ **Tutorial6** ⇒ **LGD**. Select **LGD_PROJ_INPUT** and click **OK**.
 - b. Click the **Import Variables** button for the **Project Output Variables** table. Double-click **Shared Data** ⇒ **Model Manager** ⇒ **Tutorial6** ⇒ **LGD**. Select **LGD_PROJ_OUTPUT** and click **OK**.
 - c. Click **Finish**.
4. Examine the **Tutorial6** folder to verify that it contains the project.

Define the Project Properties

To define the properties that SAS Model Manager uses to create reports and score models, follow these steps:

1. Select the **PD** project in the **Tutorial6** folder and expand **Specific Properties** in the right pane.

Specify the default data tables and model variables for the **PD** project:

Default Test Table

select **HMEQ_TEST**.

Default Scoring Task Input Table

select **PD_SCORE_INPUT**.

Default Scoring Task Output Table

select **PD_SCORE_OUTPUT**.

Default Train Table

select **HMEQ_TRAIN**.

Training Target Variable

enter **BAD** for the **PD** project that has a model function type of classification.

Target Event Value

enter **1** for the **PD** project that has a model function type of classification.

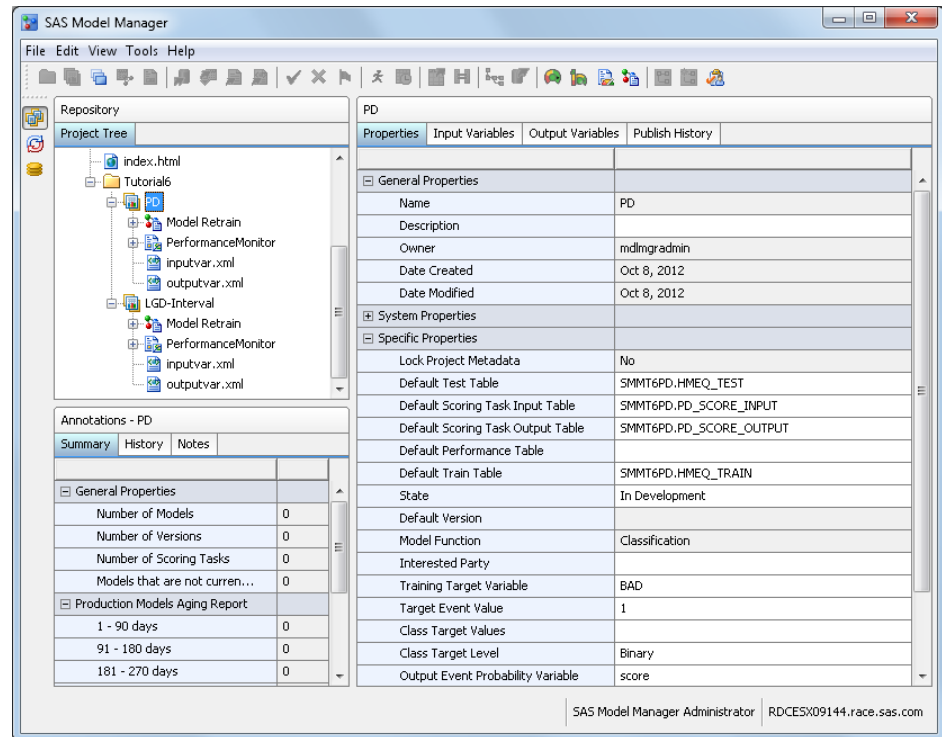
Class Target Level

select **Binary** for the **PD** project that has a model function type of classification.

Output Event Probability Variable

select **score** for the **PD** project that has a model function type of classification.

Here is an example of the **PD** project properties:



2. Select the **LGD-Interval** project in the **Tutorial6** folder and expand **Specific Properties** in the right pane.

Specify the default data tables and model variables for the **LGD-Interval** project:

Default Scoring Task Input Table

select **LGD_SCORE_INPUT**.

Default Scoring Task Output Table

select **LGD_SCORE_OUTPUT**.

Training Target Variable

enter **lgd** for the **LGD-Interval** project that has a model function type of prediction.

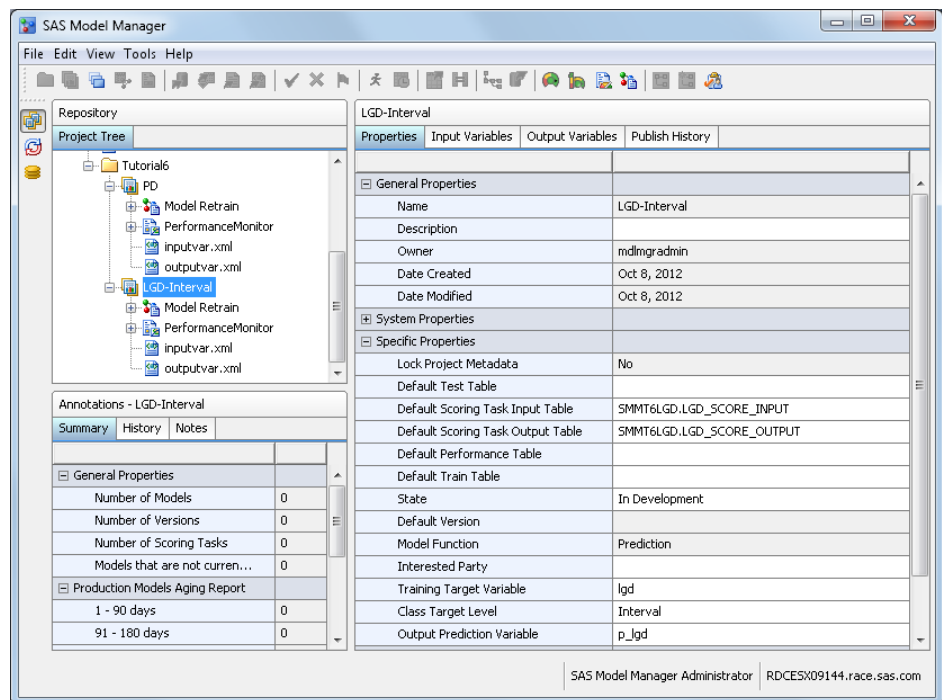
Class Target Level

select **Interval** for the **LGD-Interval** project that has a model function type of prediction.

Output Prediction Variable

select **p_lgd** for the **LGD-Interval** project that has a model function type of prediction.

Here is an example of the **LGD-Interval** project properties:



Create a Version

Create a version for each project. The version folder contains life cycle information, auxiliary version documents, candidate model files, reports, resource files, scoring tasks, and model performance reports.

To create a new version, follow these steps:

1. Right-click the **PD** project and select **New** ⇒ **New Version**. The New Version dialog box appears.
2. Specify the following version properties and click **OK**.

Name

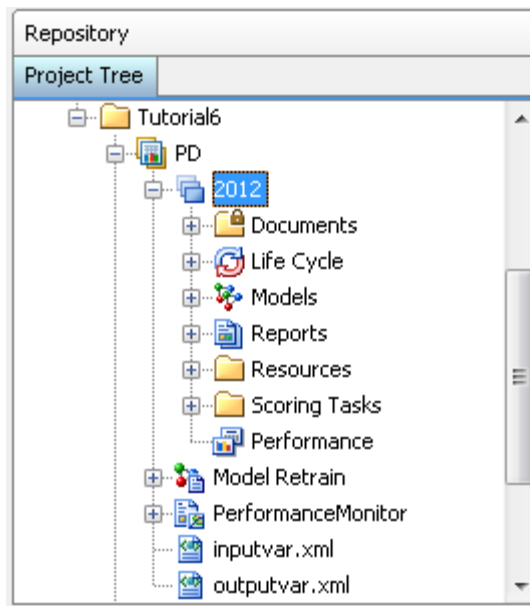
enter **2012**.

Life Cycle Template

select the user-defined template **Tutorial Life Cycle** that you created in the first tutorial. For more information, see [“Create a Life Cycle Template” on page 29](#).

Note: If you are using a workflow process to track the progress of your version, you can select any life cycle template. You can then skip all tasks to update the life cycle.

3. Examine the **PD** project to verify that it contains one version called **2012**. Select **Life Cycle**. Verify that the **Name** property is Tutorial Life Cycle.



4. Repeat steps 1 through 3 for the **LGD-Interval** project.

Note: To use a workflow process to track the progress of your version, send a request to a SAS Model Manager administrator to create a workflow to use for the tutorials. Include the name and UUID of the version with which you want the workflow to be associated.

Import Models

In this exercise you import models into SAS Model Manager from a SAS model package file, and you also import a SAS code model from local files. Then you map the model variables. SAS code models consist of the SAS code and the model component files (metadata) that are used to process a model in SAS Model Manager. To import a SAS code model, at least three component files are required: the model score code, the model input file, and the model output file. For prediction or classification models, you also must prepare model target files.

Import Model Package Files

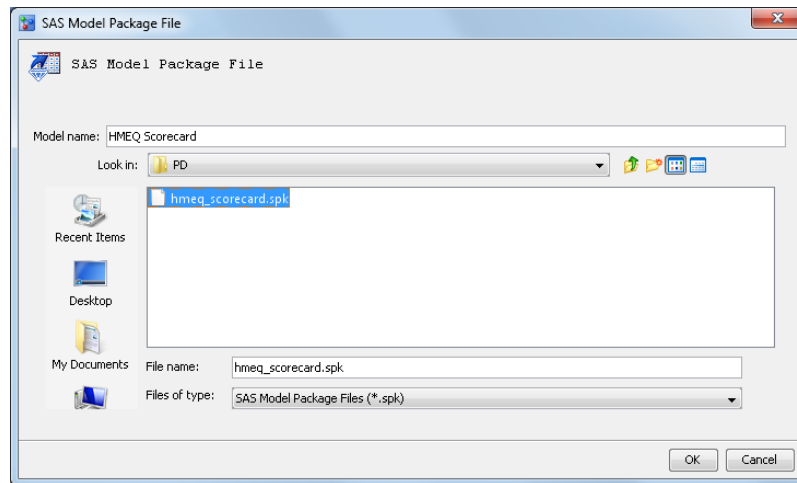
SAS Enterprise Miner and SAS/STAT linear model package files, or SPK files, contain complete model information. You can import SAS Enterprise Miner and SAS/STAT models even if they are not registered in the SAS Metadata Repository. For information about how to create a package file, see the *SAS Model Manager: User's Guide*.

To import a model that was saved as a package file, follow these steps:

1. Expand the **2012** version in the **PD** project and right-click the **Models** folder. Then select **Import From** ⇒ **SAS Model Package File**. The SAS Model Package File dialog box appears.
2. In the **Model Name** field, enter **HMEQ Scorecard**.
3. Navigate to the location of the folder that contains the SAS package files. For this example, use **<drive:>\Tutorial6\Samples\PD** that was installed by the SAS

Model Manager administrator. For more information, see “[Prepare Tutorial 6 Data Sets and Models](#)” on page 10.

4. Select the **hmeq_scorecard.spk** file and click **OK**.



5. Examine the **Models** folder to verify that it contains the models. Right-click the folder and select **Expand All** to examine the model files.

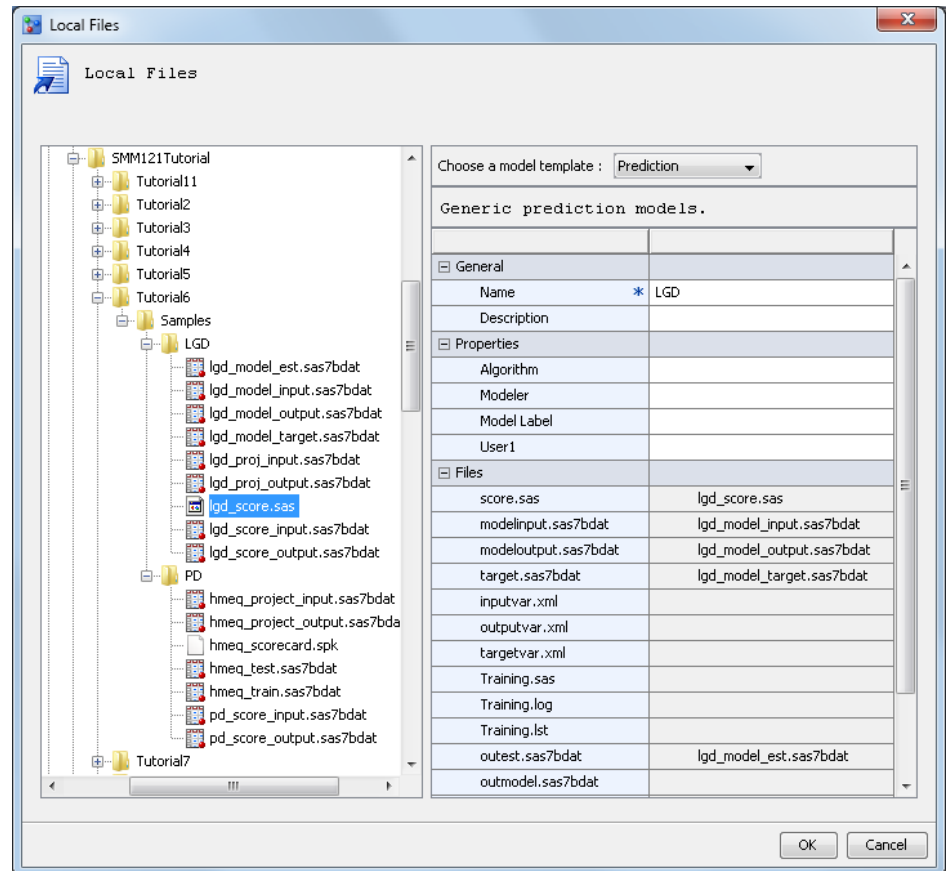
Import SAS Code Models

1. Expand the **2012** version in the **LGD-Interval** project and right-click **Models**. Then select **Import from** ⇒ **Local Files**. The Local Files window appears.
2. Import an LGD model.
 - a. In the left pane, expand the **Desktop** folder and select **<drive>:\Tutorial6\Samples\LGD**.
 - b. In the **Choose a model template** box, select **Prediction**.
 - c. Type **LGD** in the **Name** box. For each filename in the Object column, click the filename and drag it to the corresponding option box. This action maps the tutorial model component filenames to the SAS Model Manager model component filenames.

Object	Option
lgd_model_input.sas7bdat	modelinput.sas7bdat
lgd_model_output.sas7bdat	modeloutput.sas7bdat
lgd_model_est.sas7bdat	outest.sas7bdat
lgd_score.sas	score.sas
lgd_model_target.sas7bdat	target.sas7bdat
lgd_training.sas	Training.sas

Note: This file is needed only if you want to retrain the model.

Here is the Local Files window after the files have been mapped.



d. Click **OK**.

3. Examine the **Models** folder to verify that it contains the model. Right-click the folder and select **Expand All** to examine the model files.

Map Model Variables to Project Variables

When the names for the model output variable are not identical to the names for the project output variables, you must map the variables.

To map model output variables to project output variables, follow these steps:

1. Map model variables for the first model. Select **HMEQ Scorecard** in the **Models** folder, click the **Model Mapping** tab in the right pane, and click **Edit**. Set the following mapping and click **OK**:

Project Variables	Model Variables
score	P_BAD1

2. Map model variables for the LGD model. Right-click **LGD** in the **Models** folder of the **2012** version in the **LGD-Interval** project, and select **Set Model Output Mapping**. Set the following mapping and click **OK**:

Project Variables	Model Variables
p_lgd	p_lgd

Create Basel II Reports

In this exercise, you create the Basel II reports that are used to validate models. The Probability of Default (PD) report can be created for a classification model. The Loss Given Default (LGD) report can be created only for a prediction model. After you create the reports, you view them in the **Reports** folder. The reports enable you to validate candidate models in a version or across versions.

Create a Probability of Default (PD) Report

To create a PD report, follow these steps:

1. Expand the **2012** version folder in the **PD** project.
2. Right-click the **Reports** node and select **Reports** ⇒ **New Report**. The New Report window appears.
3. Select **Probability of Default Model Validation Report** from the **Type** box.

New Report

Report Options

Type: Probability of Default Model Validation Report

Format: PDF

Style: SAS default

Select Models

Select	ID	Name	Version	Type	Champion
<input checked="" type="checkbox"/>	MMRoot/Tuto...	HMEQ Scorec...	2012	Classification	NO

Report Properties

Property	Value
General Properties	
Name	* PD_D2012-10-08T17.15
Description	The Probability of Default Model Validation Report
Input Table	*
Run Scoring Task	* No
Time Period Variable	* period
Time Label Variable	
Scorecard Bin Variable	* scorecard_bin
Scorecard Points Variable	* scorecard_points
Cut-off Value	* 100

OK Cancel

4. For the type of output that you want to create, accept the default value of **PDF** in the **Format** box. The other format that is available is **RTF**.
5. Select the **HMEQ Scorecard** model from the **Select Models** list.
6. Complete the **Report Properties**:
 - Enter a report name if you do not want to use the default value for the **Name** property. For example, enter **Tutorial-6 PD**.
 - (Optional) Enter a report description.
 - For the **Input Table** property, click the **Browse** button and select the **PD_SCORE_INPUT** table from the **SAS Metadata Repository** tab or from the **SAS Libraries** tab. The table can contain only input variables or it can contain input and output variables.
 - If the input table contains only input variables, set **Run Scoring Task** to **Yes**. If the input table contains input and output variables, set **Run Scoring Task** to **No**. For this exercise set **Run Scoring Task** to **Yes**, since the **PD_SCORE_INPUT** table contains only input variables.
 - The **Time Period Variable** specifies the variable from the input table whose value is a number that represents the development period. This value is numeric. The time period for PD reports begins with 1. Accept the default value of **period**.

- (Optional) In the **Time Label Variable** field, enter the variable from the input table that is used for time period labels. When you specify the time label variable, the report appendix shows the mapping of the time period to the time label. Enter a value of **timelabel** to include the appendix in the report.
- **Scorecard Bin Variable** is the variable from the input table that contains the scorecard bins. If the scoring job for the PD report is run outside SAS Model Manager, the scorecard bin variable must be a variable in the input table. If scoring is done within SAS Model Manager, do not include the variable in the input table. Accept the default value of **scorecard_bin**.
- **Scorecard Points Variable** is the variable that contains the scorecard points. If the scoring job for the PD report is run outside SAS Model Manager, the scorecard points variable must be a variable in the input table. If scoring is done within SAS Model Manager, do not include the variable in the input table. Accept the default of **scorecard_points**.
- **Cut-off Value** is the maximum value that can be used to derive the predicted event and to further compute accuracy, sensitivity, specificity, precision, and error rate. Accept the default of **100**.

New Report

Report Options

Type: Probability of Default Model Validation Report

Format: PDF

Style: SAS default

Select Models

Select	ID	Name	Version	Type	Champion
<input checked="" type="checkbox"/>	MMRoot/Tuto...	HMEQ Scorecard	2012	Classification	NO

Report Properties

Property	Value
General Properties	
Name	* Tutorial-6 PD
Description	The Probability of Default Model Validation Report
Input Table	* SMMT6PD.PD_SCORE_INPUT
Run Scoring Task	* Yes
Time Period Variable	* period
Time Label Variable	timelabel
Scorecard Bin Variable	* scorecard_bin
Scorecard Points Variable	* scorecard_points
Cut-off Value	* 100

OK Cancel

Note: The variable names that you specify can be user-defined variables. A variable mapping feature maps the user-defined variables to required variables.

- Click **OK**. A dialog box message confirms that the report was created successfully.

Create a Loss Given Default (LGD) Report

To create an LGD report, follow these steps:

- Expand the **2012** version folder in the **LGD-Interval** project.
- Right-click the **Reports** node and select **Reports** ⇒ **New Report**. The New Report window appears.
- Select **Loss Given Default Report** from the **Type** box.

New Report

Report Options

Type: **Loss Given Default Report**

Format: **PDF**

Style: **SAS default**

Select Models

Select	ID	Name	Version	Type	Champion
<input type="checkbox"/>	MMRoot/Tuto...	LGD	2012	Prediction	NO

Report Properties

Property	Value
General Properties	
Name	* LGD_D2012-10-08T18.00
Description	The Loss Given Default Report
Input Table	*
Run Scoring Task	* No
Time Period Variable	* period
Time Label Variable	
Actual Variable	* lgd
Predicted Variable	* p_lgd
Pool Variable	* pool_id

OK Cancel

- For the type of output that you want to create, accept the default value of **PDF** in the **Format** box. The other format option that is available is **RTF**.
- Select the **LGD** model from the **Select Models** list.
- Complete the **Report Properties**:
 - Enter a report name if you do not want to use the default value for the **Name** property. For example, enter **Tutorial-6 LGD**.
 - (Optional) Enter a report description.
 - For the **Input Table** property, click the **Browse** button and select the **LGD_SCORE_INPUT** table from the **SAS Metadata Repository** tab or from the **SAS Libraries** tab that is used for scoring during the creation of the LGD report. The table can contain only input variables or it can contain input and output variables.

- If the input table that is specified in the **Input Table** property contains only input variables, set **Run Scoring Task** to **Yes**. If the input table contains input and output variables, set **Run Scoring Task** to **No**. For this exercise set **Run Scoring Task** to **Yes**, since the **LGD_SCORE_INPUT** table only contains input variables.
- The **Time Period Variable** specifies the variable from the input table whose value is a number that represents the development period. This value is numeric. Accept the default value of **period**.
- (Optional) In the **Time Label Variable** field, enter the variable from the input table that is used for time period labels. When you specify the time label variable, the report appendix shows the mapping of the time period to the time label. Enter a value of **timelabel** to include the appendix in the report.
- **Actual Variable** is the actual LGD variable. Accept the default value of **lgd**.
- **Predicted Variable** is the project scoring output variable. If the scoring for the LGD report is performed outside SAS Model Manager, the input data set must include this variable. If the scoring for the LGD report is done by SAS Model Manager, the input data set should not include this variable. Accept the default value of **p_lgd**.
- **Pool Variable** is the variable from the input table that is used to identify a two-character pool identifier. Accept the default of **pool_id**.

New Report

Report Options

Type: Loss Given Default Report

Format: PDF

Style: SAS default

Select Models

Select	ID	Name	Version	Type	Champion
<input checked="" type="checkbox"/>	MMRoot/Tuto...	LGD	2012	Prediction	NO

Report Properties

Property	Value
[-] General Properties	
Name	* LGD_D2012-10-09T16.25
Description	The Loss Given Default Report
Input Table	* SMMT6LGD.LGD_SCORE_INPUT
Run Scoring Task	* Yes
Time Period Variable	* period
Time Label Variable	timelabel
Actual Variable	* lgd
Predicted Variable	* p_lgd
Pool Variable	* pool_id

OK Cancel

Note: The variable names that you specify can be user-defined variables. A variable mapping feature maps the user-defined variables to required variables.

- Click **OK**. A dialog box message confirms that the report was created successfully.

View Basel II Reports

To view a Basel II report, follow these steps:

- Expand the version folder **2012** and the **Reports** folder.
- Right-click the report name and select **View Report**.

Note: If user credentials are required, then specify a user ID and password that have permission to access the SAS Content Server.

- Use the PDF or RTF viewer to distribute or print a copy of the report.
- Close the PDF or RTF viewer.

For a detailed description of the Basel II reports, see Appendix 7, “Statistical Measures Used in Basel II Reports,” in *SAS Model Manager: User's Guide*.

Chapter 8

Tutorial 7: Using Advanced Reporting

Overview of Advanced Reporting	181
Prerequisites	182
Models Used in Tutorial 2	182
The Required Tutorial Files	182
Create a Simple Ad Hoc Report	182
Create an Ad Hoc Score Range Report	183
Install a User-defined Score Range Report	185
Install a User-defined Report	185
Run the New User-defined Report	186
Combining Multiple Reports	187
About Combining Multiple Reports	187
Create an Aggregated Report	188
Edit an Aggregated Report (Optional)	189

Overview of Advanced Reporting

The advanced reporting capability of SAS Model Manager enables you to create three different types of reports.

- User-defined reports enable your company to add enterprise-specific reports to the existing list of reports that are available via the New Report dialog box.
- Ad hoc reports enable you to create one-of-a-kind reports as you need them.
- Aggregated reports enable you to combine multiple reports that you can distribute to company stakeholders.

To make it easy to create these reports, SAS Model Manager provides a number of SAS macro variables and SAS macro programs. These macros can be used to gain access to model-specific information as well as to more general folder and user information.

This tutorial shows you the basic tasks that are involved in creating new SAS Model Manager reports. It contains examples and step-by-step directions about setting up and running ad hoc and user-defined reports. It also shows you how to combine multiple reports by creating an aggregated report.

Prerequisites

Models Used in Tutorial 2

The exercises in this tutorial depend on some of the properties of the specific models that were added in Tutorial 2. Use the projects, versions, or models that are specified here. This tutorial is designed to follow [Chapter 3, “Tutorial 2: Performing Basic SAS Model Manager Tasks,”](#) on page 41.

The Required Tutorial Files

The SAS programs that are required for this tutorial are on your local computer after you extract them from the ZIP file SMM121Tutorial.zip. If you have not extracted the tutorial files, see [“Install and Register the Tutorial Files”](#) on page 3.

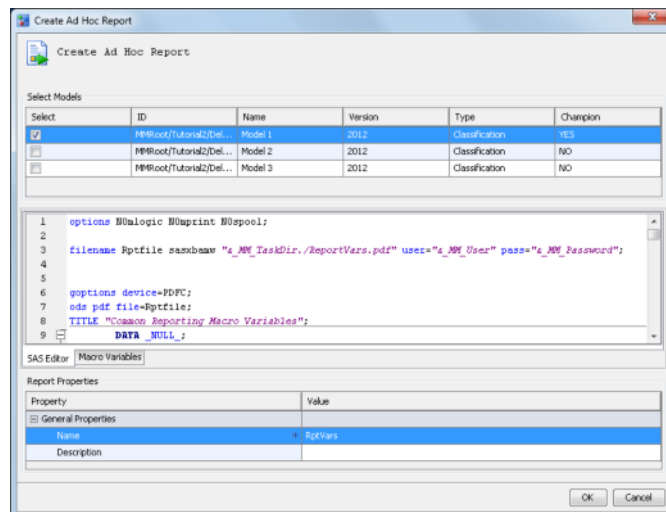
This tutorial requires the following files in the `<drive>\Tutorial7\Samples` folder:

- RptVars.sas
- ScoreRange.sas
- ScoreRangeMacro.sas
- ScoreRangeTemplate.xml

Create a Simple Ad Hoc Report

In this exercise, you create a PDF file to display the macro variables that are available in the SAS Model Manager reporting environment:

1. In the `<drive>\Tutorial7\Samples` folder, open the tutorial example report RptVars.sas in a text editor.
2. Copy the code from RptVars.sas.
3. Log on to SAS Model Manager.
4. Open the Create Ad Hoc Report window:
 - a. Expand the **Tutorial2** folder, the **Delinquency** project, and the **2012** version.
 - b. Right-click the **Reports** folder and select **Reports** ⇒ **Create Ad Hoc Report**.
5. In the Create Ad Hoc Report window, select **Model 1** in the **Select Models** table.
6. In the **SAS Editor**, paste the code that you copied in Step 2.
7. In the **Name** field of the **Report Properties** table, enter **RptVars**.



- Click **OK**. SAS Model Manager creates the report. Click **Close** in the information message. SAS Model Manager then highlights and expands the **Reports** folder.
- To view the report, expand the new report **RptVars**, right-click **RptVars.pdf**, and select **Open**.

Here is page 2 of the PDF report output:

MM_ModelLabel	MM_TargetVar	MM_PosteriorVar	MM_TargetEvent	MM_ScoreCodeType
Model 1	BAD	P_1	1	SAS Program

_MM_ModelLib	_MM_Input	_MM_Output	_MM_Target	_MM_Score	_MM_OutModel	_MM_InputLib
SMMModel	SMMInput	SMMOutput	SMMTarget	SMMScore	SMMOutMo	smm12t2

_MM_InputDS	_MM_OutputLib	_MM_OutputDS
smm12t2.DELINQUENCY_SCORING_INPUT	smm12t2	smm12t2.DELINQUENCY_SCORING_OUTPUT

MM_PerformanceLib	MM_PerformanceDS	MM_TestLib	MM_TestDS	MM_TrainLib
		smm12t2	smm12t2.DELINQUENCY_TEST	smm12t2

_MM_TrainDS
smm12t2.DELINQUENCY_TRAIN

Create an Ad Hoc Score Range Report

In this exercise, you create an ad hoc report to categorically display score ranges in an HTML report. To create output in HTML from an ad hoc report, ensure that the report code is enclosed by a SAS Model Manager formatting macro. To do this, follow these steps:

- In the `<drive>/Tutorial17/Samples` folder, open the example report `ScoreRange.sas` and copy the code.
- If necessary, log on to SAS Model Manager.
- In the Project Tree, expand the **Tutorial12** folder, the **Delinquency** project, and the **2012** version.

4. Right-click the **Reports** folder and select **Reports** ⇒ **Create Ad Hoc Report**.
5. In the Create Ad Hoc Report window, select **Model 1** in the **Select Models** table.
6. In the **SAS Editor**, paste the code that you copied in Step 1.
7. Modify the Score Range code to format the report in HTML, and set the report style.

The ScoreRange.sas program uses the SAS Model Manager formatting macros, which enable user reports to be formatted in PDF, HTML, RTF, and Excel. A beginning formatting macro code precedes the report code. The ending formatting macro must be the last line of code in the report program.

- a. Add the arguments **reportFormat=html** and **reportStyle=Seaside** to the %MM_ExportReportsBegin macro argument list. Here is the modified macro:

```
%MM_ExportReportsBegin(reportFormat=html, reportStyle=Seaside, fileName=ScoreRange);
```

- b. Add the argument **reportFormat=html** to the %MM_ExportReportsEnd macro argument list. Here is the modified macro:

```
%MM_ExportReportsEnd(reportFormat=html);
```

8. In the **Name** field of the **Report Properties** table, enter **ScoreRange**.
9. Click **OK**. SAS Model Manager runs the report and creates the **ScoreRange** folder under the **Reports** folder.
10. To view the **ScoreRange** report, expand the **ScoreRange** folder, right-click **ScoreRange.html**, and select **Open**.

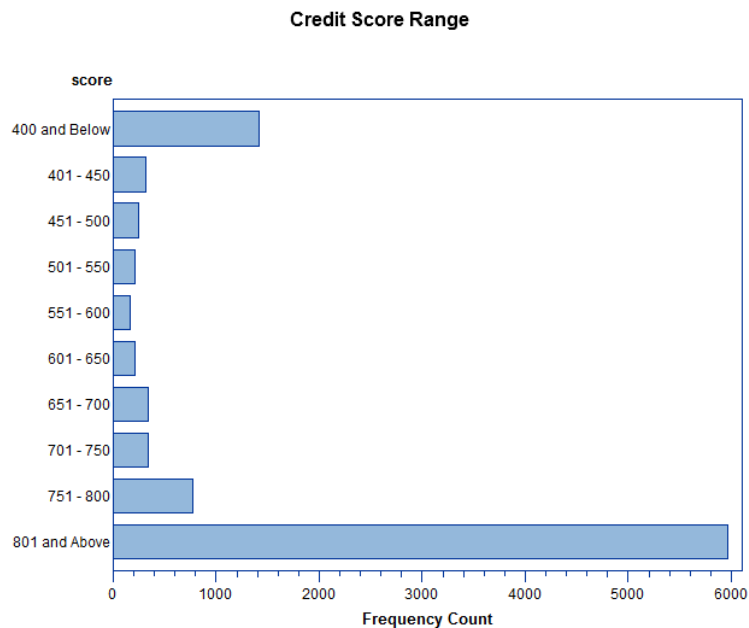
Here is the output from the FREQ procedure as a table and as a graph:

Display 8.1 The Score Range Report Table

Credit Score Range

The FREQ Procedure

score	Frequency	Percent	Cumulative Frequency	Cumulative Percent
400 and Below	1419	14.19	1419	14.19
401 - 450	322	3.22	1741	17.41
451 - 500	249	2.49	1990	19.90
501 - 550	206	2.06	2196	21.96
551 - 600	161	1.61	2357	23.57
601 - 650	213	2.13	2570	25.70
651 - 700	340	3.40	2910	29.10
701 - 750	344	3.44	3254	32.54
751 - 800	777	7.77	4031	40.31
801 and Above	5969	59.69	10000	100.00

Display 8.2 The Score Range Report Graph

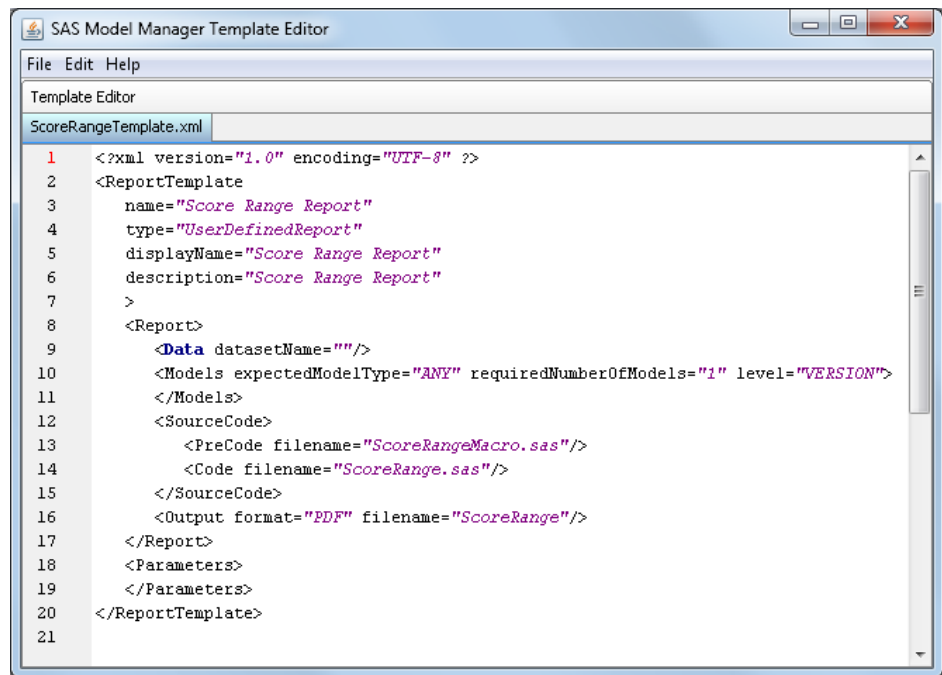
Install a User-defined Score Range Report

In this exercise, you upload the Score Range report to SAS Content Server. After the template is uploaded, you can run the Score Range report from the New Reports wizard. This exercise has two parts. In the first exercise, you upload the report files to the SAS Content Server. In the second exercise, you create a Score Range report from the New Reports wizard. To upload a report XML file or SAS file, you must have a user ID that is in the Model Manager Administrator Users group.

Install a User-defined Report

To upload the Score Range report to the New Reports wizard, follow these steps:

1. From the SAS Model Manager window, select **Tools** ⇒ **Manage Templates**. The SAS Model Manager Template Editor appears.
2. Select **File** ⇒ **Open** and navigate to `<drive>\Tutorial17\Samples`. In the **Files of type** box, select **SAS files (*.sas)**. Select **ScoreRange.sas** and click **OK**. The template opens in the Template Editor.
3. Select **File** ⇒ **Upload File**, verify the file information in the Upload File window, and click **OK**. When a confirmation message appears, click **Close**.
4. Select **File** ⇒ **Open** and navigate to `<drive>\Tutorial17\Samples`. In the **Files of type** box, select **SAS files (*.sas)**. Select **ScoreRangeMacro.sas** and click **OK**. The template opens in the Template Editor.
5. Select **File** ⇒ **Upload File**, verify the file information in the Upload File window, and click **OK**. When a confirmation message appears, click **Close**.
6. Select **File** ⇒ **Open** and navigate to `<drive>\Tutorial17\Samples` and select **ScoreRangeTemplate.xml**. Click **OK**. The template opens in the Template Editor.

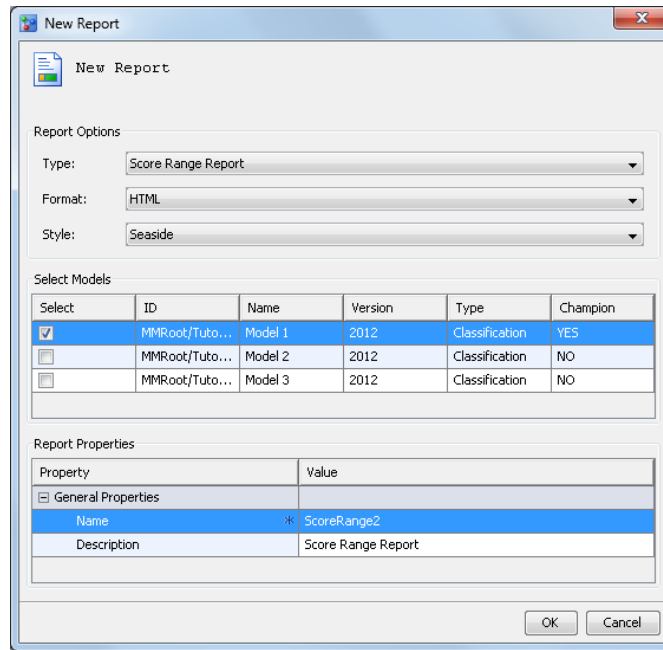


7. Select **File** ⇒ **Upload File**, verify the file information in the Upload File window, and click **OK**. When a confirmation message appears, click **Close**.

Run the New User-defined Report

To execute the installed score range report, follow these steps:

1. Log on to SAS Model Manager.
2. Expand the **Tutorial2** folder, the **Delinquency** project, and the **2012** version.
3. Right-click the **Reports** folder and select **Reports** ⇒ **New Report**. The New Report wizard appears.
4. In the **Type** box, select **Score Range Report**.
5. In the **Format** box, select **HTML**.
6. In the **Style** box, select **Seaside**.
7. In the **Select Model** table, select **Model 1**.
8. If a ScoreRange report exists in the Reports folder from the previous exercise, you can name the report using the default filename or **ScoreRange2** in the **Name** box of the **General Properties** table.



9. Click **OK**.
10. Click **Close** in the information message.
11. To view the new report, expand the new score range report, right-click **ScoreRange.html**, and select **Open**. To view the report output, see [Display 8.1 on page 184](#) and [Display 8.2 on page 185](#).

For more information about this task, see the *SAS Model Manager: User's Guide*.

Combining Multiple Reports

About Combining Multiple Reports

You can combine multiple reports from the **Reports** node to create a single, aggregated report. SAS Model Manager administrators and advanced users can create an aggregated report in two steps. First, you open the Define Aggregated Report window from an organizational folder, a project, or a version. Using reports that reside in the **Reports** folder, you select those that you want in your aggregated report to create an *aggregated report definition*. Next, you generate the aggregated report using the aggregated report definition. The format of the report can be PDF, HTML, or RTF. Aggregated reports are stored in the **Documents** folder within the node from which you selected the **Define Aggregated Report** pop-up menu option.

The reports that are selected are rerun to create the aggregated report. If the data set content that the selected reports use has changed since the last time you ran the report, the results might be different from the original reports. Ad hoc reports, LGD reports, and PD reports cannot be added to an aggregated report.

In this exercise, you combine multiple reports to create an aggregated report.

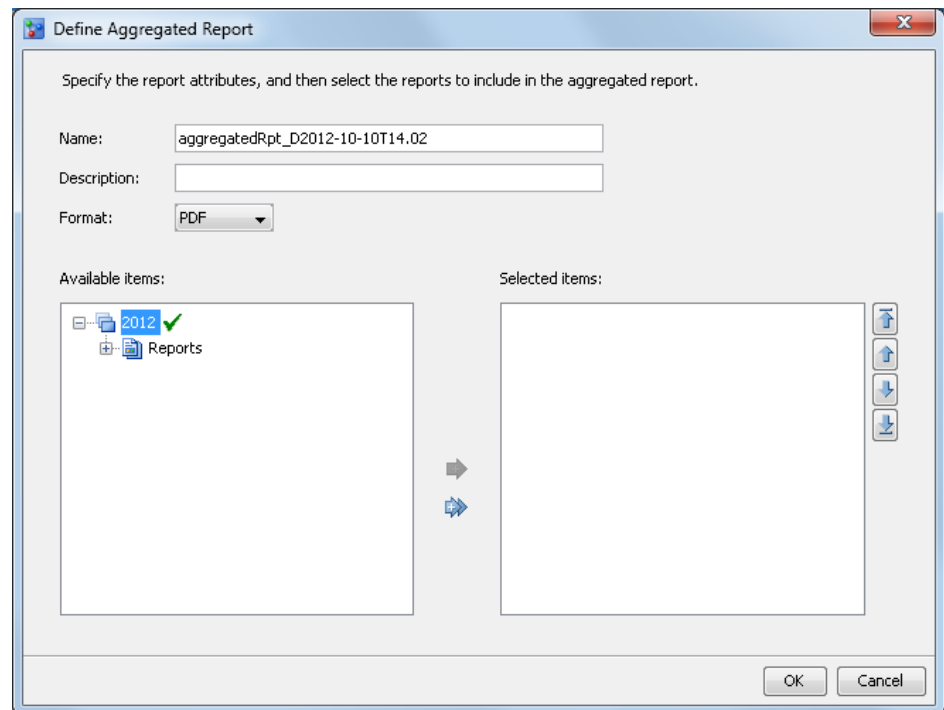
Create an Aggregated Report

To create an aggregated report, you must have two or more existing reports in the **Reports** node in the **2012** version. You first create an aggregated report definition, and then generate the report.

To create an aggregated report, follow these steps:

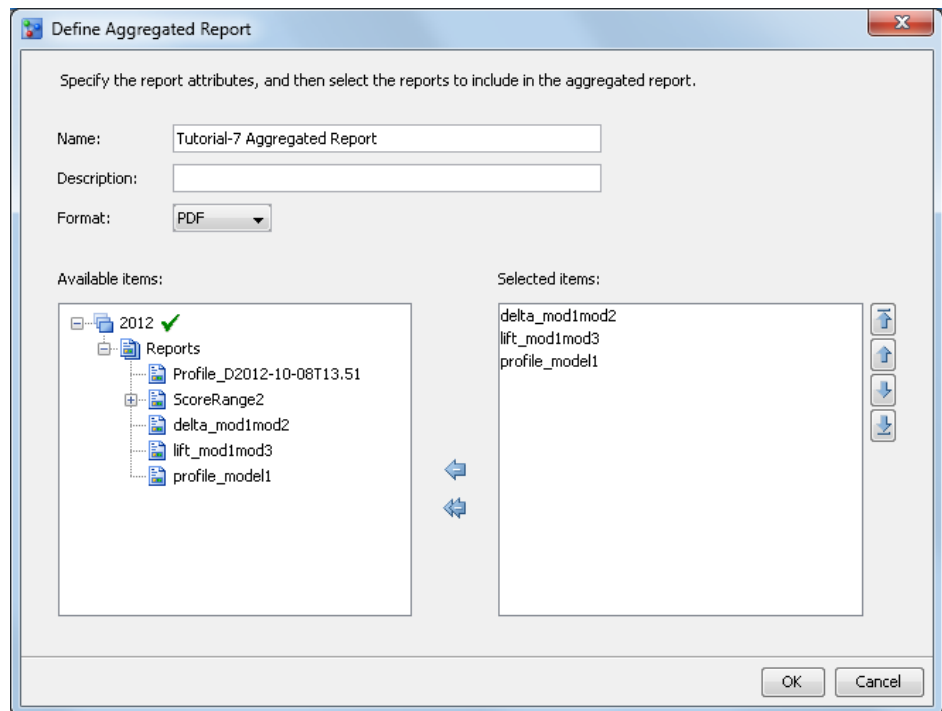
1. Right-click the **2012** version folder in the **Tutorial2** project, and select **Define Aggregated Report**. The Define Aggregated Report window appears.

Note: The **Define Aggregated Report** pop-up menu item is available only to SAS Model Manager administrators and advanced users.

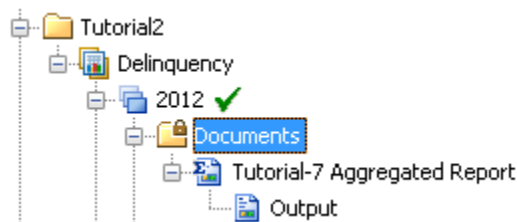


2. In the **Name** field, enter **Tutorial-7 Aggregated Report** for the name of the report.
3. (Optional) In the **Description** field, enter a description for the report.
4. Accept the default value of PDF in the **Format** list box. The other available output formats are HTML and RTF.
5. Expand the **Reports** node of the **2012** version in the **Available items** box. Select the Delta, Dynamic Lift, and Model Profile reports that you created in Tutorial 2 from the **Available items** box, and click the single right arrow. The reports appear in the **Selected items** box.

Note: To add all reports in the **Reports** node, click the double right arrow. To remove reports from the **Selected items** box, select the report and click the single left arrow to remove one report, or click the double right arrow to remove all reports.



6. (Optional) To order the reports, select a report, and use the up and down arrows.
7. When all of the reports are in the **Selected items** box and in the correct order, click **OK**. An object for the aggregated report definition and an **Output** node appear in the **Documents** folder within the **2012** version.
8. Expand the **Documents** folder.

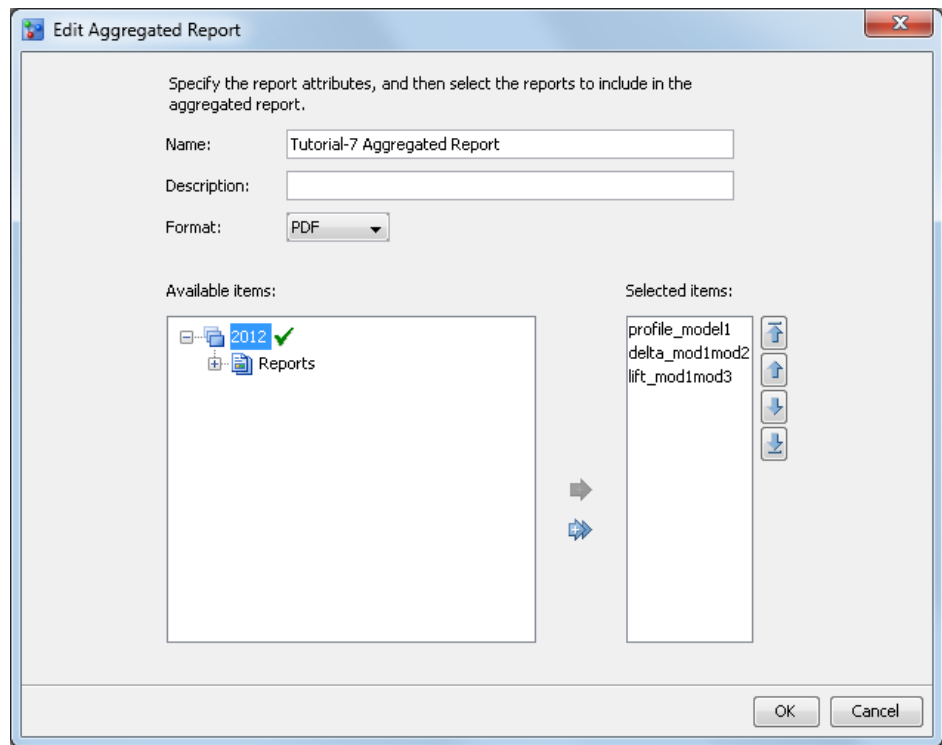


9. Right-click the aggregated report definition name and select **Generate Aggregated Report**. A message appears to indicate whether the report was generated. If it was successful, click **Close**. If it was not successful, click **Details** to view the SAS log.
10. To view the report, expand the **Output** folder for the aggregated report, right-click the report, and select **Open**. If prompted, enter your user ID and password.

Edit an Aggregated Report (Optional)

To edit an aggregated report, follow these steps:

1. Expand the **Documents** folder in the **2012** version. Right-click the aggregated report and select **Edit Aggregated Report**. The Edit Aggregated Report window appears.



2. Modify the report definition:
 - a. In the **Name** field, modify the name.
 - b. In the **Description** field, enter a description for the report.
 - c. Click the **Format** list box and select an output format. The default is PDF.
 - d. To add reports to the report definition, select the report in the **Available items** box and click the single right arrow.
 - e. To remove reports from the report definition, select the report from the **Selected items** box and click the single left arrow.
 - f. To order the reports, select a report and use the up and down arrows.
 - g. Click **OK**.
3. Right-click the aggregated report name and select **Generate Aggregated Report**. A message appears to indicate whether the report was generated. If it was successful, click **Close**. If it was not successful, click **Details** to view the SAS log.
4. To view the modified report, expand the **Output** folder for the aggregated report, right-click the report, and select **Open**. If prompted, enter your user ID and password.

Note: To delete an aggregated report, right-click the report node in the **Documents** folder, and select **Delete**. Click **Yes** to confirm. The aggregated report definition and **Output** folder are deleted.

Chapter 9

Tutorial 8: Using Advanced SAS Model Manager Features

Overview of Using Advanced Features	191
Example Scope	191
Prerequisites	192
Organize the Model Hierarchy	192
Create a Folder	192
Create a New Project	192
Define the Project Properties	193
Create a Version	194
Create and Upload a Model Template	195
Import a Model	199
Import a Model	199
Verify Model Properties	201
Map Model Output Variables to Project Output Variables	202
Create an Ad Hoc Variable Importance Report	203

Overview of Using Advanced Features

This tutorial is designed to enable a user who is already familiar with the administrative and the basic functions of SAS Model Manager to perform the following tasks:

- create a new model template using the SAS Model Manager Template Editor
- upload the new model template to the SAS Content Server
- import a model that is described by the template
- generate a report on the model

The tutorial contains examples and step-by-step directions for performing these tasks.

Example Scope

The model used in this tutorial is based on the ARBORETUM procedure, which is a SAS Enterprise Miner procedure.

Prerequisites

The exercises in this tutorial require that the Tutorial 8 data sets and models from SMM121Tutorial.zip be extracted and registered in SAS Management Console. If they have not been extracted and registered, see [“Prepare Tutorial 8 Data Sets and Models” on page 13](#) to extract and register the files.

The `<drive>\Tutorial18\Samples\Model18` folder contains these model template files that are used in this tutorial:

- importance8.sas7bdat
- modelinput8.sas7bdat
- modeloutput8.sas7bdat
- nodestat8.sas7bdat
- path8.sas7bdat
- rules8.sas7bdat
- score8.sas
- target8.sas7bdat

Organize the Model Hierarchy

In this exercise, you use the Project Tree to create a modeling project.

Create a Folder

To provide an organizational folder to manage your modeling projects, follow these steps:

1. Right-click the **MMRoot** node in the Project Tree and select **New** ⇒ **New Folder**. The New Folder dialog box appears.
2. Specify the following folder properties and click **OK**.

Name

enter **Tutorial18**.

Description

enter an optional folder description.

Create a New Project

To create a project and define the model function, follow these steps:

1. Right-click **Tutorial18** and select ⇒ **New** ⇒ **New Project**. The New Project dialog box appears.
2. Specify the following project properties and click **Next**:

Name

enter **HmeqVars**.

Description

enter an optional description.

Model Function

select **Classification**.

3. Below the **Project Input Variables** table, click **Import Variables** and navigate to the **Tutorial8** folder in the SAS Metadata Repository. Select **HMEQ_PROJECT_INPUT** and click **OK**.
4. Below the **Project Output Variables** table, click **Import Variables** and navigate to the **Tutorial8** folder in the SAS Metadata Repository. Select **HMEQ_PROJECT_OUTPUT** and click **OK**.
5. Click **Finish**.

Define the Project Properties

To define the properties that SAS Model Manager uses to create reports and model scores, follow these steps:

1. Select the **HmeqVars** project in the **Tutorial8** folder and expand **Specific Properties** in the right pane.
2. Specify the default data tables and model variables for the project:

Default Test Table

select **HMEQ_TEST**.

Default Scoring Task Input Table

select **HMEQ_SCORE_INPUT**.

Default Scoring Task Output Table

select **HMEQ_SCORE_OUTPUT**.

Default Train Table

select **HMEQ_TRAIN**.

Training Target Variable

enter **bad**.

Training Event Value

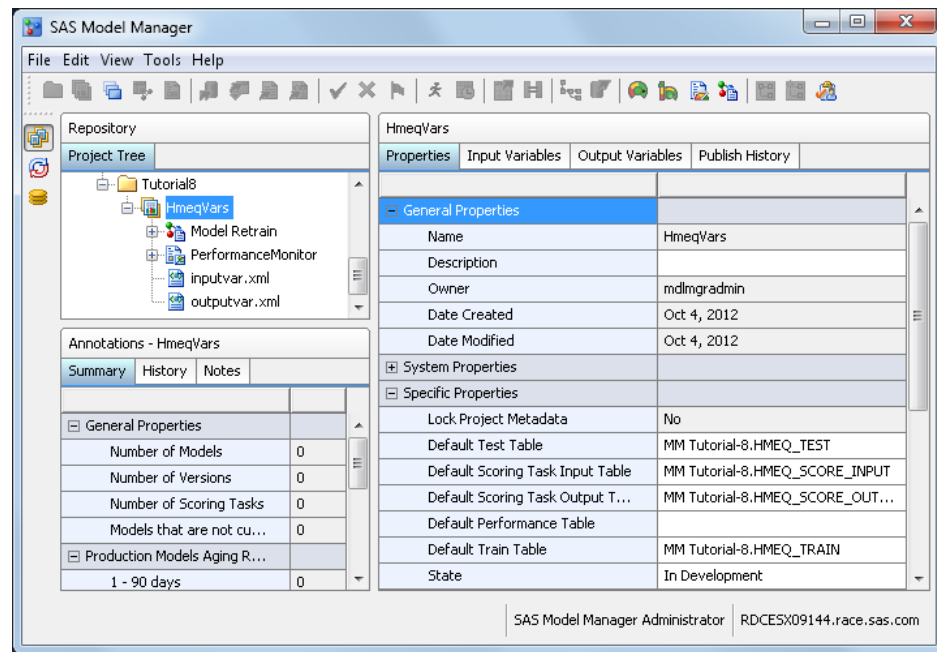
enter **1**.

Class Target Level

select **Binary**.

Output Event Probability Variable

select **score**.



Create a Version

Create the version for the project. The version folder contains life cycle information, auxiliary version documents, candidate model files, model comparison reports, resource files, scoring tasks, and model performance reports. To create a new version, follow these steps:

1. Right-click the **HmeqVars** project and select **New** ⇒ **New Version**. The New Version dialog box appears.
2. Specify the following version properties and click **OK**.

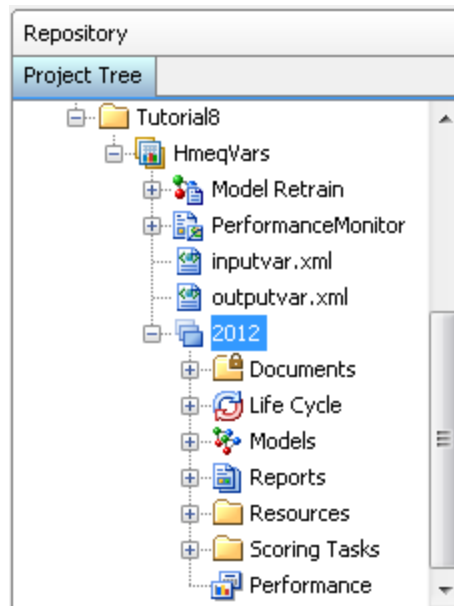
Name

enter **2012**.

Life Cycle Template

select the user-defined template **Tutorial Life Cycle** that you created in the first tutorial. For more information, see [“Create a Life Cycle Template” on page 29](#). If **Tutorial Life Cycle** is not a selection in the list, select any life cycle template.

3. Examine the **HmeqVars** project to verify that it contains one version, **2012**.



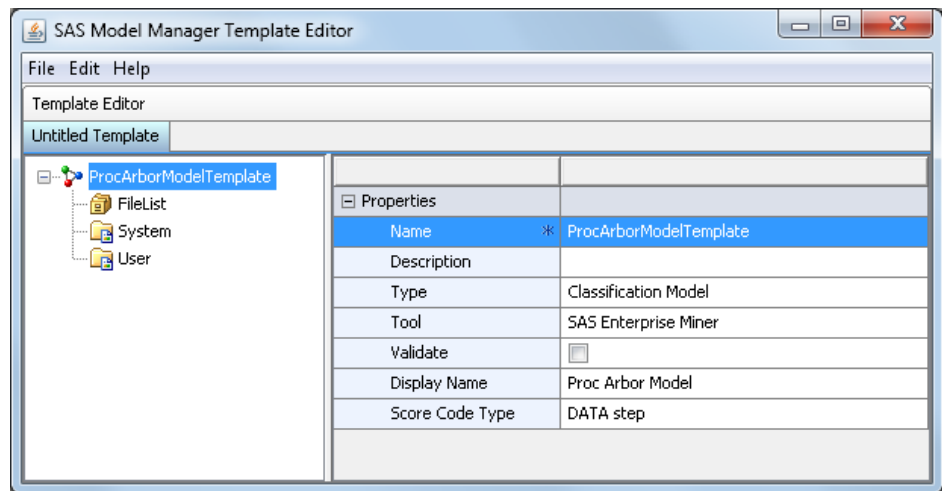
Create and Upload a Model Template

In this exercise, you create a new model template using the SAS Model Manager Template Editor. For information about creating a model template, see the *SAS Model Manager: User's Guide*.

To create a model template, follow these steps:

1. Open the SAS Model Manager Template Editor. Select **Tools** ⇒ **Manage Templates**.
2. Open an empty model template in the template editor. Select **File** ⇒ **New Model Template**. An empty, untitled model template opens.
3. Specify the model template properties.
 - a. In the **Name** field, replace **Untitled Template** with **ProcArborModelTemplate**.
 - b. Click the **Type** box and select **Classification Model**.
 - c. In the **Tool** field, enter **SAS Enterprise Miner**.
 - d. In the **Display Name** field, enter **Proc Arbor Model**.
 - e. Click the **Score Code Type** box and select **DATA step**.

Here is the template editor after this step has been completed:



4. Add the model component files and the model component file properties.

The following table lists the model component files that comprise the model, and the properties for each file. For each model component file, add an entry under **FileList**. Then, select the file under **FileList** and enter the properties for that file. A value of **none** indicates that you do not need to set a value for that property.

To add the model component files, right-click **FileList** and select **New File Item**. In the **Name** field, enter the name from the table and click **OK**.

Here is the template after adding the file `score.code` as a model component file:

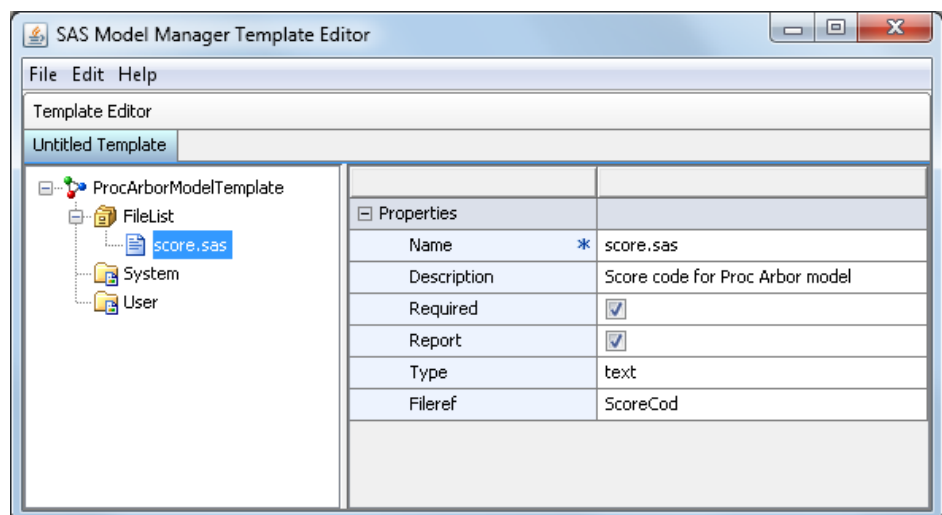


Table 9.1 ProcArborModelTemplate Component Files and Component File Properties

Filename	Description	Required	Report	Type	Fileref
score.sas	Score code for Proc Arbor model	select the box	select the box	text	ScoreCod
modelinput.sas7bdat	Model input table	none	select the box	binary	none
modeloutput.sas7bdat	Model output table	none	select the box	binary	none

Filename	Description	Required	Report	Type	Fileref
inputvar.xml	Input variable XML file	none	select the box	text	Input
outputvar.xml	Output variable XML file	none	select the box	text	Output
target.sas7bdat	Target variable table	select the box	select the box	binary	Target
importance.sas7bdat	Variable relative importance	none	select the box	binary	none
path.sas7bdat	Path information	none	select the box	binary	none
rules.sas7bdat	Node rules	none	select the box	binary	none
nodestat.sas7bdat	Node statistics	none	select the box	binary	none

5. Add a system property.

- In the left pane, right-click **System** and select **New Property**. In the **Name** field, enter **Modeler** and click **OK**.
- Select **Modeler** and enter the following property values:

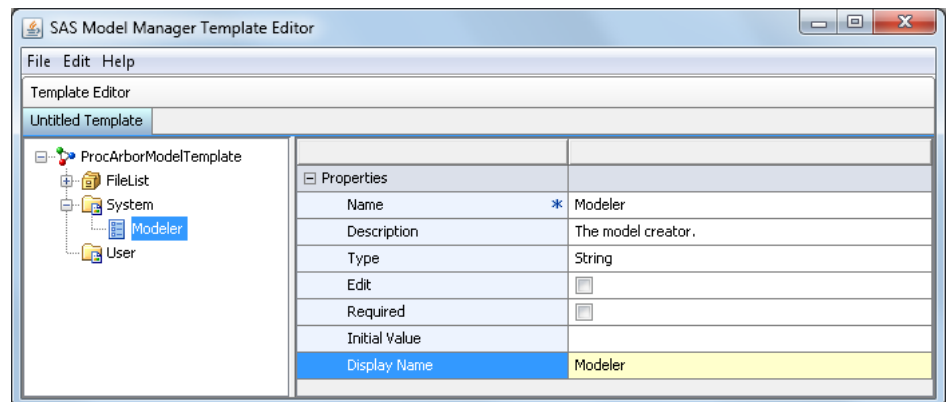
Description

The model creator.

Display Name

Modeler

Default values are used for all other property values. Here is the template after the system property has been added:



6. Add user properties.

The following table lists user properties for the model template and the properties of each user property. For each user property, add an entry under **User**. Then, select the property under **User** and enter the properties for the user property. A value of none indicates that you do not need to set a value for that property.

To add a user property, right-click **User** and select **New Property**. In the **Name** field, enter the name from the table and click **OK**.

Here is the template after the user property **Citi1** has been added:

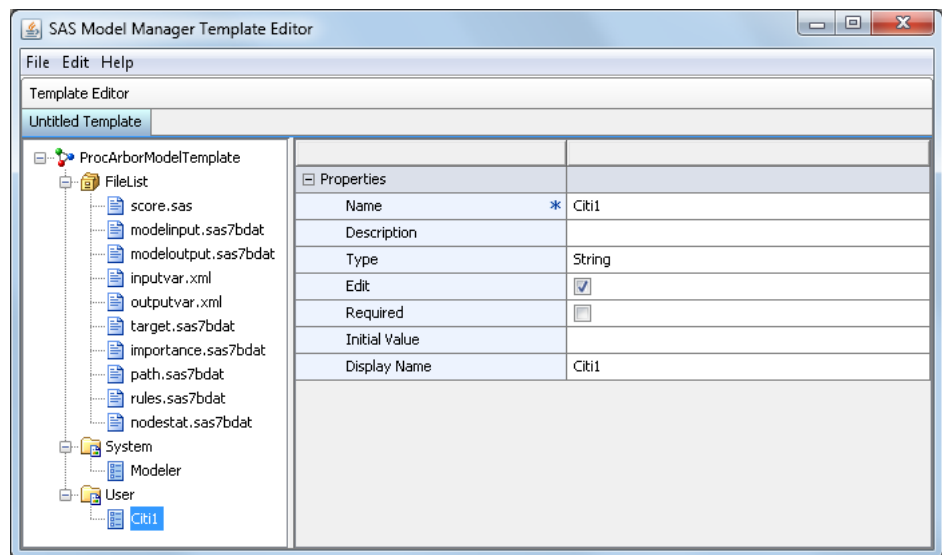
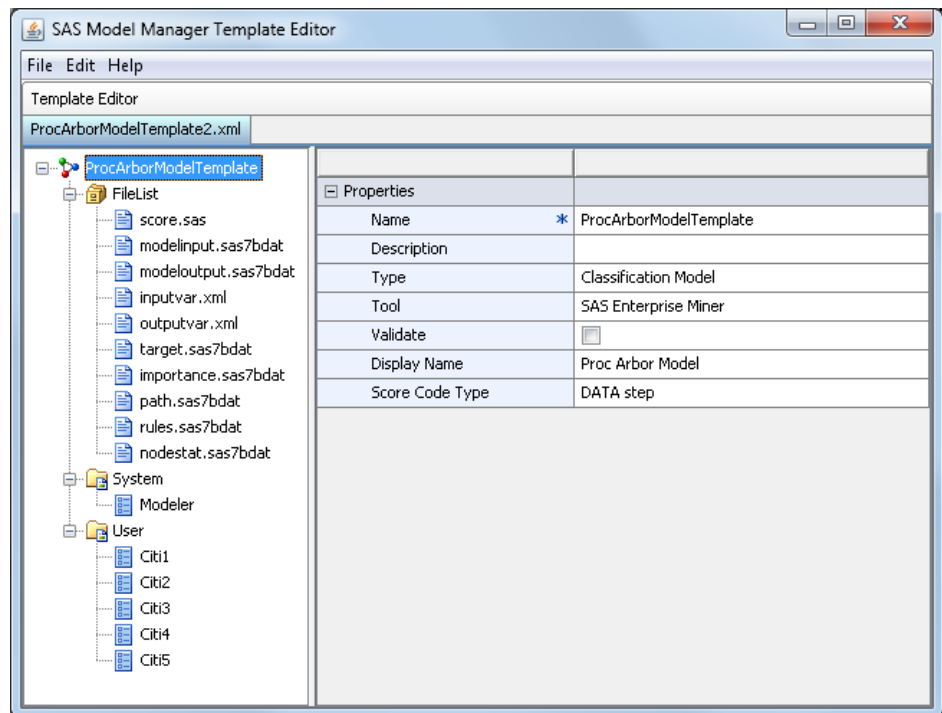


Table 9.2 *ProcArborModelTemplate User Properties and User Property Properties*

Filename	Description	Type	Edit	Required	Initial Value	Display Name
Citi1	none	String	select the box	none	none	Citi1
Citi2	none	String	select the box	none	none	Citi2
Citi3	none	String	select the box	none	none	Citi3
Citi4	none	String	select the box	none	none	Citi4
Citi5	none	String	select the box	none	none	Citi5

- Save the template. Saving the template creates a backup of the template. Select **File** ⇒ **Save As** and enter **ProcArborModelTemplate2.xml** in the **File name** field. Click **OK**.

Here is the model template after all files and properties have been added to the template:



8. Select **File** ⇒ **Upload File** to upload the template to the SAS Content Server. In the Upload File window, verify the information and click **OK**.

Note: If the template filename already exists and is reserved by SAS Model Manager, you receive an error message indicating to enter a unique filename for the template.

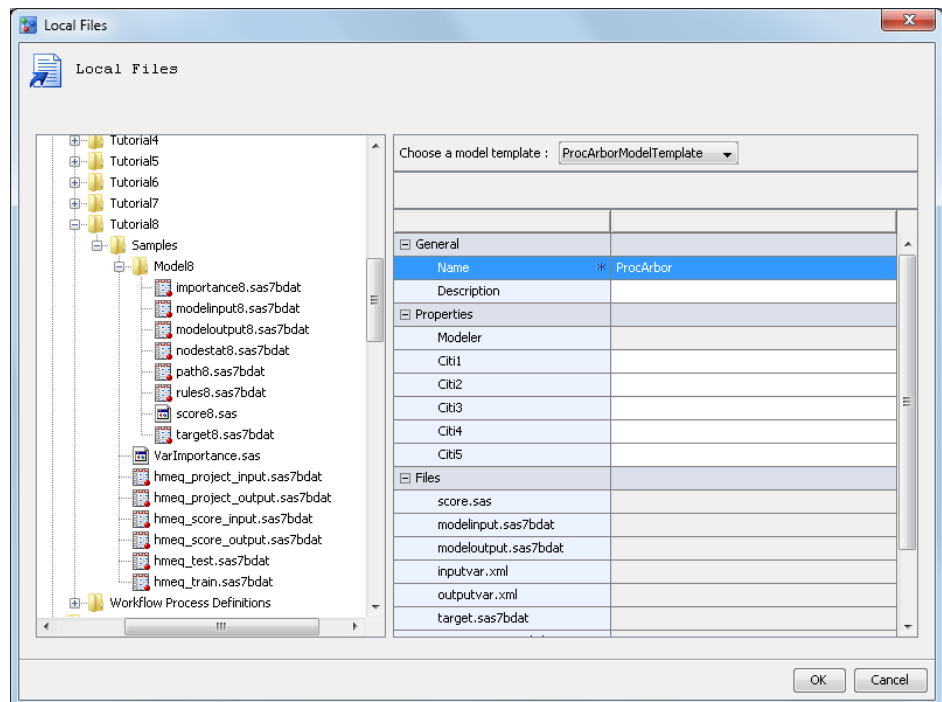
9. Select **File** ⇒ **Exit** to close the SAS Model Manager Template Editor.

Import a Model

Import a Model

In this exercise, you import a model using the user model template:

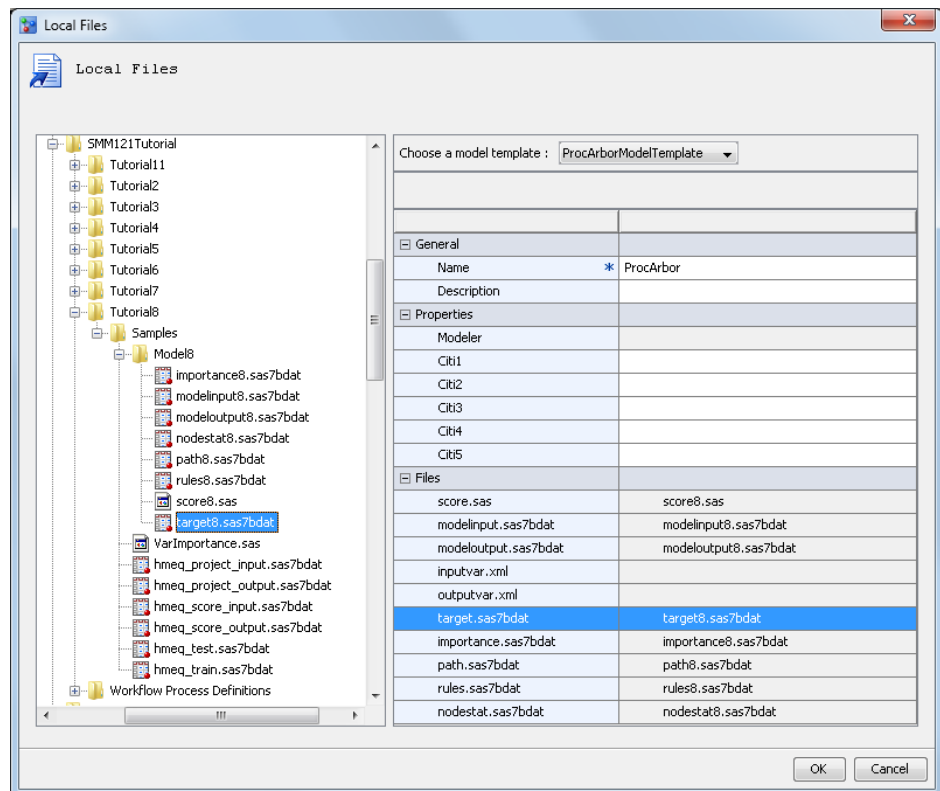
1. Log on to SAS Model Manager.
2. In the **2012** version of the **HmeqVars** project, right-click **Models** and select **Import from** ⇒ **Local Files**.
3. From the **Choose a model template** box, select **ProcArborModelTemplate**. The custom properties and files appear in the right pane.
4. In the Name field, enter **ProcArbor**.
5. In the left pane, expand **Desktop** to **<drive>:\Tutorial18\Samples\Model18**. The Local Files dialog box displays the template in the right pane and the files to import in the left pane:



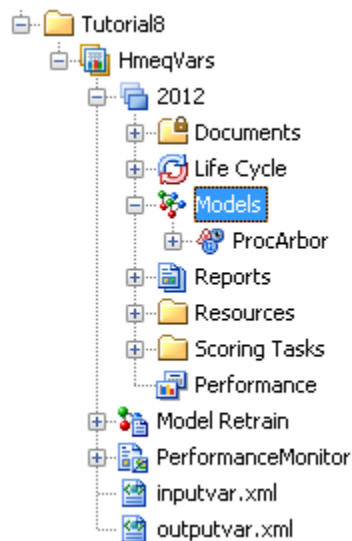
6. From the left pane, drag the following files to the corresponding fields in the model template:

Filename	Template Field Name
importance8.sas7bdat	importance.sas7bdat
modelinput8.sas7bdat	modelinput.sas7bdat
modeloutput8.sas7bdat	modeloutput.sas7bdat
nodestat8.sas7bdat	nodestat.sas7bdat
path8.sas7bdat	path.sas7bdat
rules8.sas7bdat	rules.sas7bdat
score8.sas	score.sas
target8.sas7bdat	target.sas7bdat

Here is the Local Files dialog box after the files have been assigned:



7. Click **OK**. The **ProcArbor** model appears under the **Models** folder.

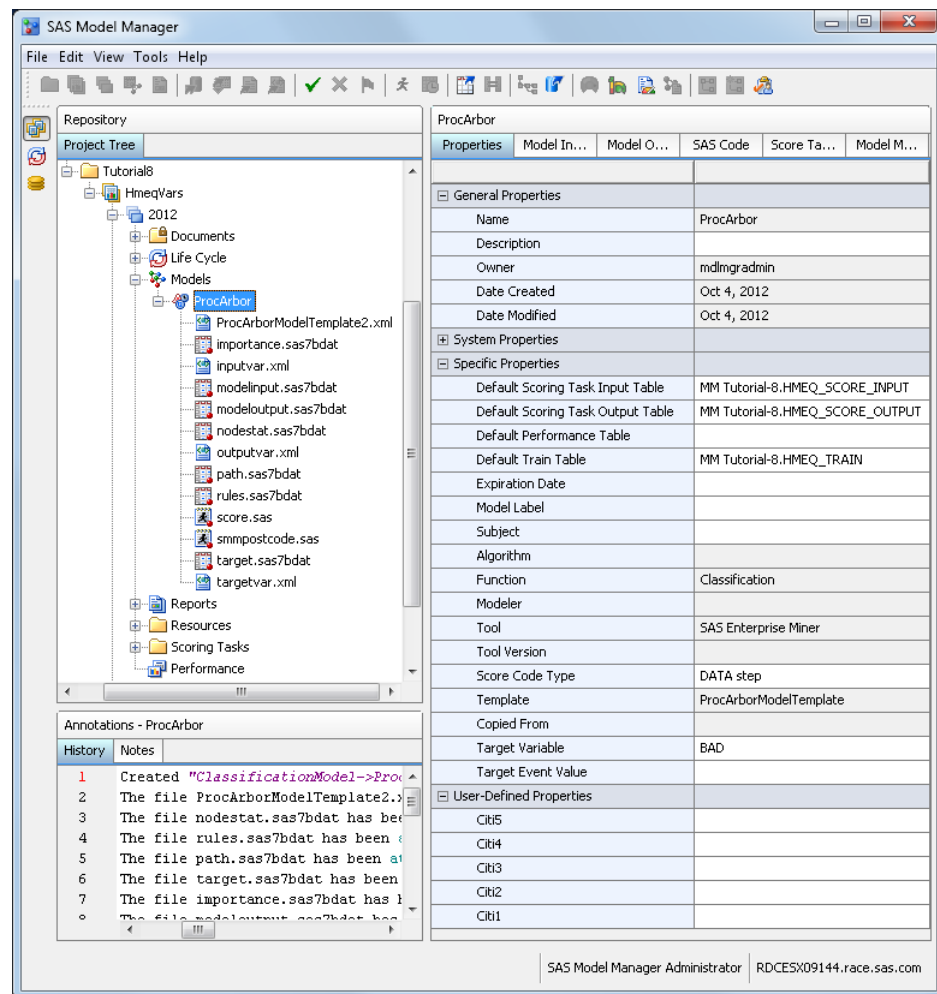


Verify Model Properties

Verify some model properties:

1. In the Project Tree, expand the **Models** folder and select **ProcArbor**.
2. In the Properties View, verify **BAD** as the value of the **Target Variable** property.
3. Verify that the **Score Code Type** property is **DATA step**.

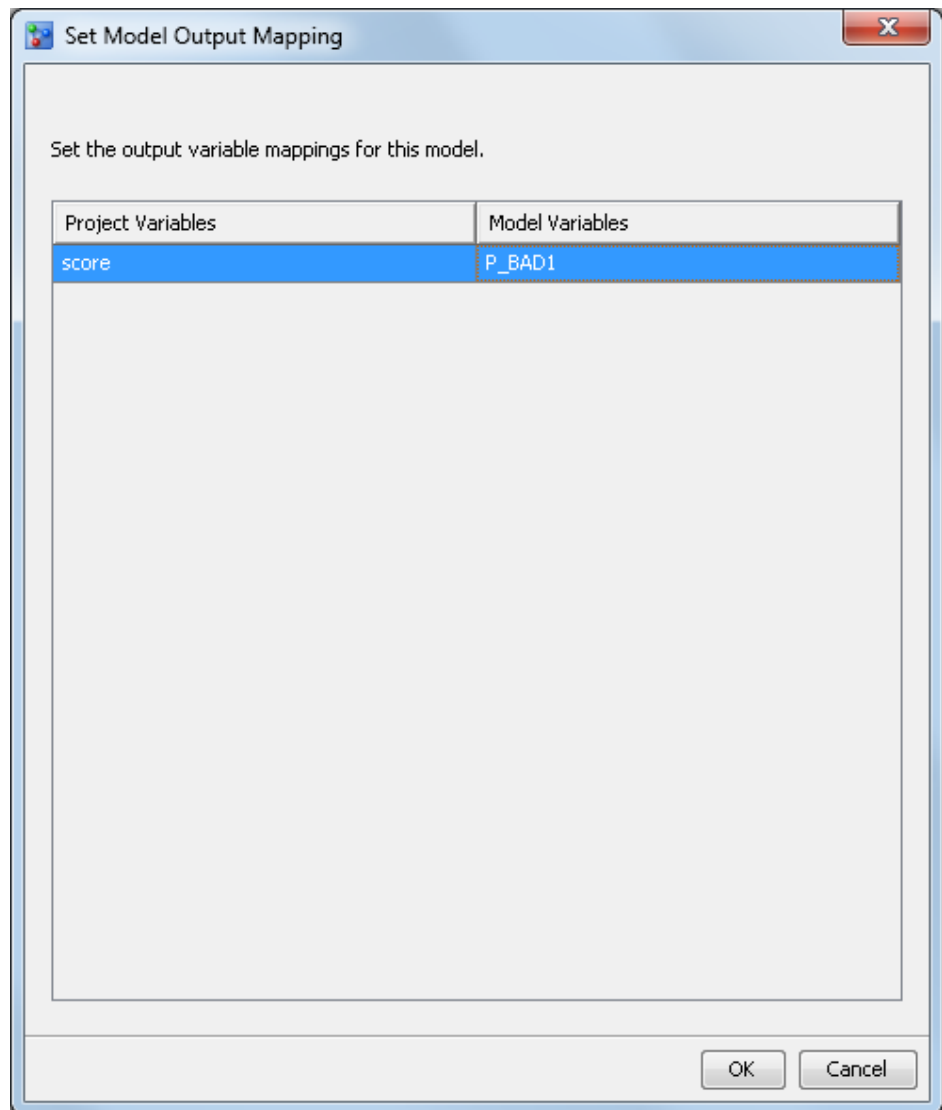
Here is the ProcArbor model in the SAS Model Manager window:



Map Model Output Variables to Project Output Variables

Because the project output variable name is not the same as the model output variable name, the output variables must be mapped. To map the variables, follow these steps:

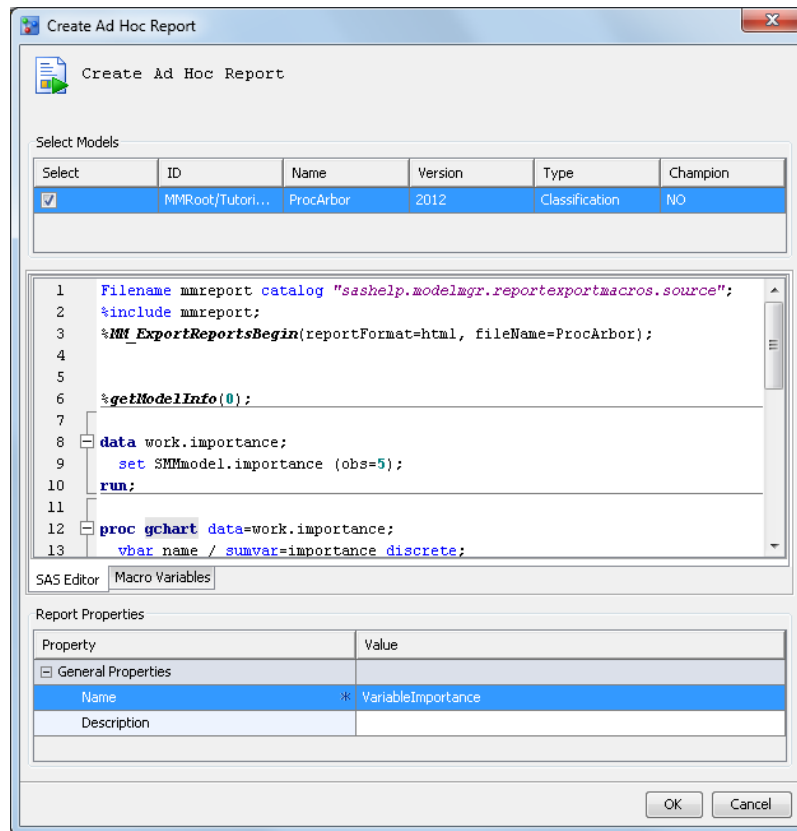
1. Right-click the model name, **ProcArbor**.
2. Select the **Set Model Output Mapping** option to open the Set Model Output Mapping window.
3. Click the **Model Variables** column for score, select **P_BAD1**, and click **OK**.



Create an Ad Hoc Variable Importance Report

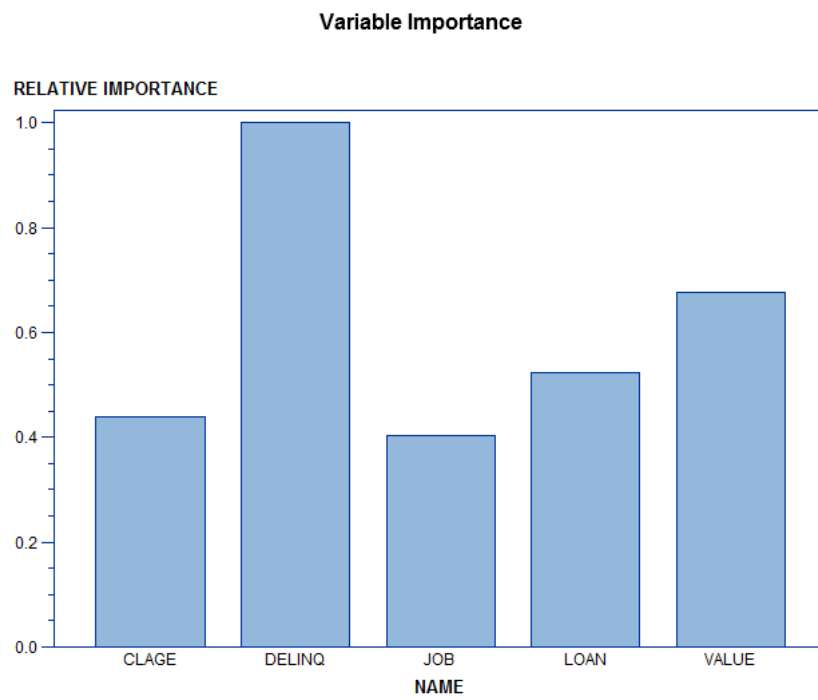
In this exercise, you create a report that is based on the model's PROC ARBORETUM importance data.

1. In the **<drive>:Tutorial8/Samples** folder, open the example report **VarImportance.sas** in a text editor and copy the code.
2. In the Project Tree, expand the **Tutorial8** folder and the project **HmeqVars**.
3. Under version **2012**, right-click the **Reports** folder and select **Reports** ⇒ **Create Ad Hoc Report**.
4. In the Create Ad Hoc Report dialog box, check the box for **ProcArbor** in the **Select Models** table.
5. In the SAS Editor, paste the code that you copied in Step 1.
6. In the **Name** field, enter **VariableImportance** and click **OK**. After the report is created successfully, click **Close** to close the information message.



7. View the report output.
 - a. Expand the new report, **VariableImportance**.
 - b. Right-click **ProcArbor.html** and select **Open**.
 - c. If prompted, enter your user ID and password.

Here is the Variable Importance report:



Chapter 10

Tutorial 9: Retraining Models

Overview of Retraining Models	207
Prerequisites	208
Define a Model Retrain Task	208
Execute a Model Retrain Task	214
Viewing Retrained Models and Model Comparison Reports	215
View Retrained Models	215
View Model Comparison Reports for Retrained Models	217

Overview of Retraining Models

Using SAS Model Manager, you can retrain models to respond to data and market changes. Retraining models enables you to update models and to improve model performance. When you define a model retrain task, you can select multiple models to be retrained at the same time. The definition of the model retrain task includes the destination version and training data source. The destination version is an existing version or new version that is associated with the selected project and that stores the retrained model information. The training data source contains new data for retraining the selected models.

The model retrain task enables you to specify a location to store comparison reports and retrain results. When you select the models to include in the comparison report, you can use the training data source or select a different data source to compare the performance of the new models. The model retrain task also enables you to specify the report options, including the name, format, and style of the comparison report. When you define e-mail notifications for a model retrain task, they are sent after you execute a model retrain task.

By default, the champion model for the selected project is retrained if a model is not selected. After you execute a model retrain task, if the **Register new trained model** option was selected, SAS Model Manager registers the new models to the destination version. The comparison report is stored in the **Model Retrain** folder, as well as in the report folder on the SAS Workspace Server that was specified when the model retrain task was defined.

Note: Only models that are created by using SAS Enterprise Miner, R models, or SAS/STAT linear models can be retrained.

In this tutorial, you perform the following tasks:

- define a model retrain task

- execute the model retrain task
- view the new retrained models and comparison report

Prerequisites

The exercises in this tutorial depend on some of the properties of the specific project, version, and models that were added in [Chapter 4, “Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports,”](#) on page 75 and [Chapter 6, “Tutorial 5: Creating Performance Monitoring Reports and Using Dashboard Reports,”](#) on page 129. The folder path in the Project Tree is **MMRoot** ⇒ **Tutorial3** ⇒ **Loan** ⇒ **2012**.

Before you define a model retrain task, complete the following tasks:

- If you want to retrain the project champion model, ensure that the champion model is set.
- Verify that the training data set that is used in Tutorial 3 has been registered in the SAS Metadata Repository using SAS Management Console, so that you use the same data set as the training data source.
- Verify that the appropriate project and model properties are set.

Here is a list of properties:

Classification Project Properties

- Training Target Variable: **BAD**
- Target Event Value: **1**
- Class Target Level: **Binary**
- Output Event Probability Variable: **score**

Prediction Project Properties

- Training Target Variable: **DEBTINC**
- Class Target Level: **Interval**
- Output Prediction Variable: **P_DEBTINC**

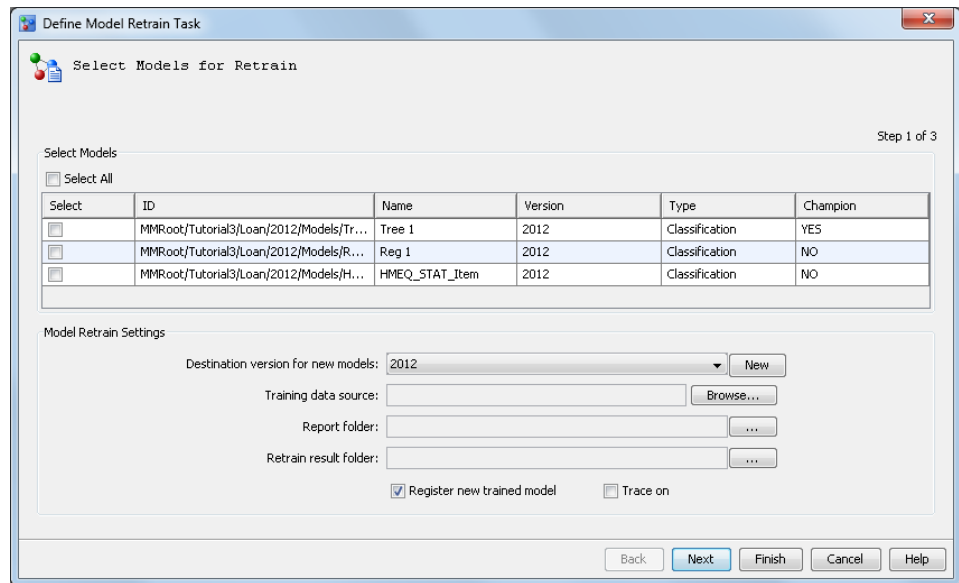
Model Properties

- Score Code Type: **DATA step**
- Verify that all of the project output variables are mapped to the corresponding model output variables.

Define a Model Retrain Task

To define a model retrain task, follow these steps:

1. Right-click the **Loan** project name and select **Define Model Retrain Task**. The Define Model Retrain Task wizard appears.



2. Select the **Reg 1** model to be retrained.

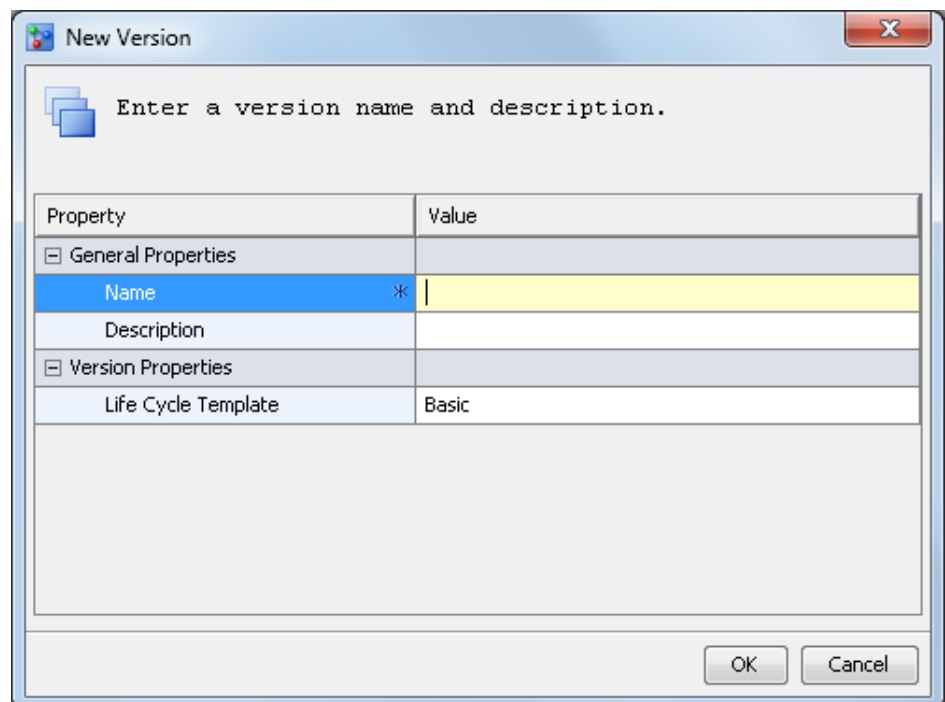
Note: To select all models, you can select the **Select All** check box. If you do not select a model, the champion model in the default version for the selected project is retrained.

3. Select **2012** as the destination version for new models.

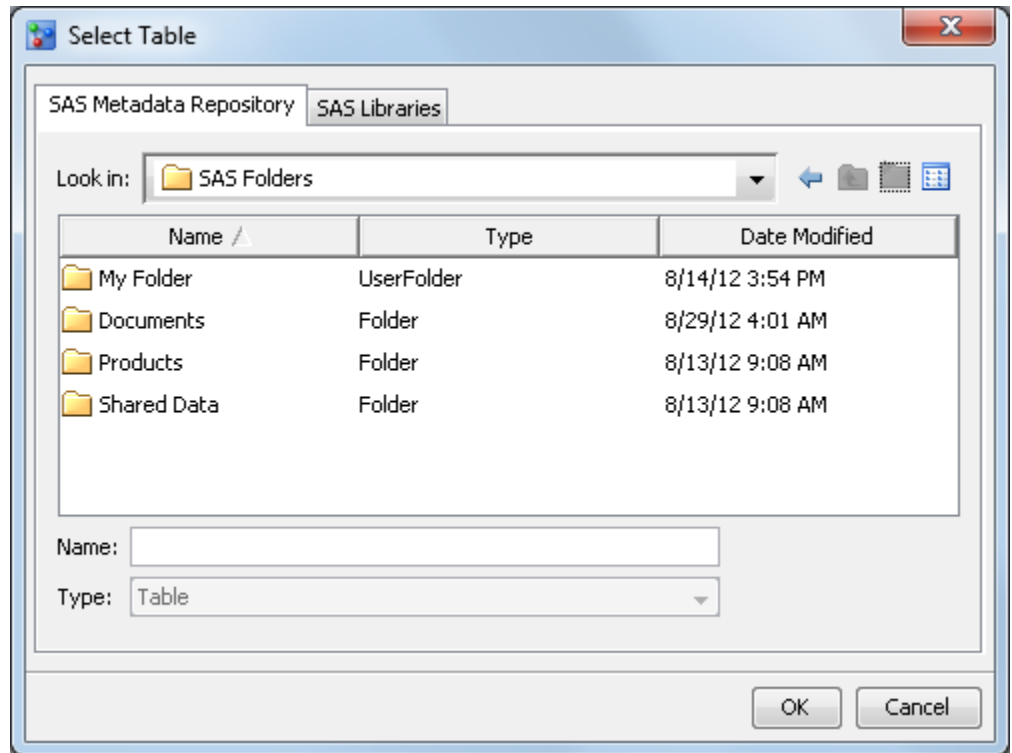
Note: If you do not select a destination version, the default location is used for the destination of the new retrained models.

(Optional) To create a new version to store the retrained models, follow these steps:

- a. From the Select Models for Retrain page of the wizard, click **New**. The New Version window appears.



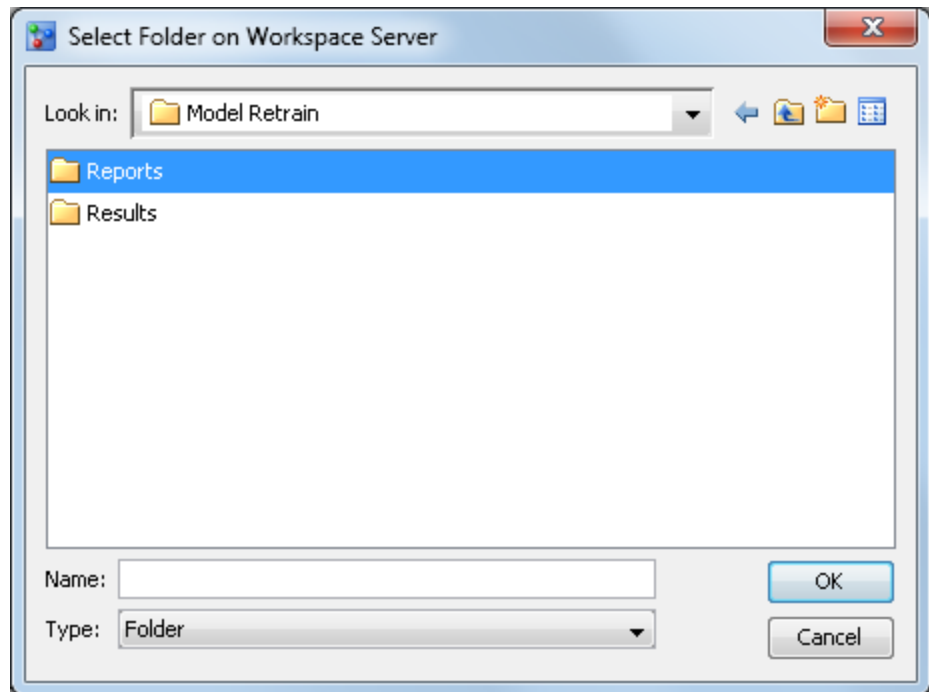
- b. Enter a name of the new version and select a life cycle template. Entering a description of the new version is optional.
 - c. Click **OK**. You are then returned to the Define Model Retrain Task wizard.
4. Click **Browse** to select a value for the **Training data source** field



Select the **HMEQ_TRAIN** data set that is located in the **\Shared Data\Model Manager\Tutorial3** directory of the SAS Metadata Repository. Click **OK**. You are then returned to the Define Model Retrain Task wizard.

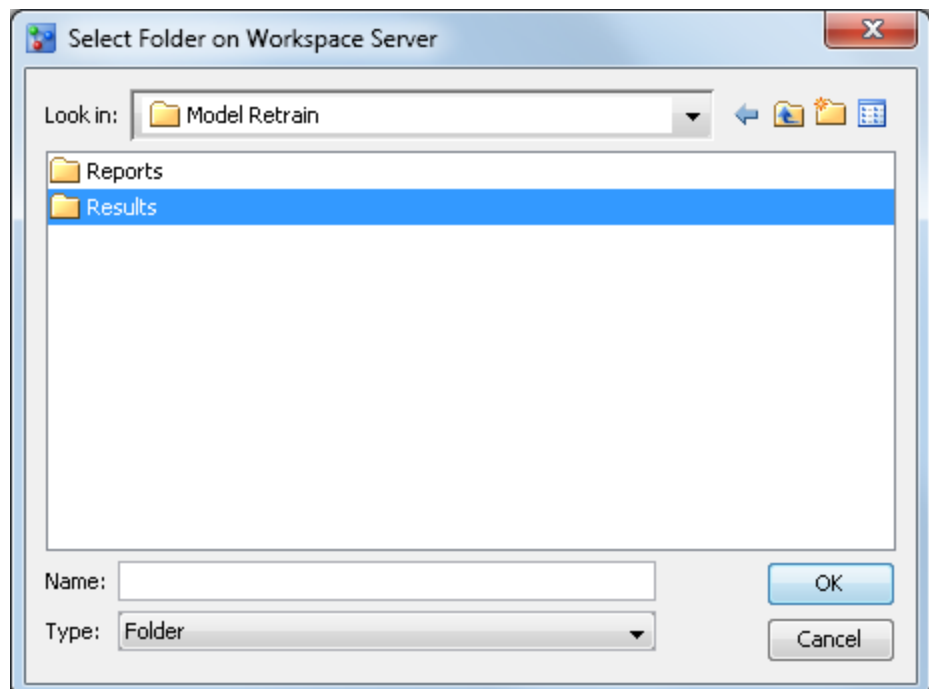
5. Click to select a value for the **Report folder**. This value is the location of the folder to store the comparison report.

Note: By default, the report is stored in the SAS session's working folder on the SAS Workspace Server. You can also create subfolders in which to store the report. The length of the directory path for the retrain report folder must be equal to or less than 100 bytes. Here is an example: **\\myserver.com\c:\Users\mmanalyst\Documents\My SAS Files\9.3\Model Retrain\Reports**



6. Click to select a value for the **Results** folder. This value is the location of the retrain results folder to store the model training results.

Note: This setting is for informational purposes only. The data sets and files that are created during model retraining are stored in this location. By default, the training results are stored in the SAS session's working folder on the SAS Workspace Server. You can also create subfolders in which to store the results. The length of the directory path for the retrain result folder must be equal to or less than 100 bytes. Here is an example: `\\myserver.com\c:\Users\mmanalyst\Documents\My SAS Files\9.3\Model Retrain\Results`



7. Select **Register new trained model** to register the new models. If this option is not selected, the new models are not registered in the destination version in the Project Tree, and they are not saved to the model repository on the SAS Content Server.

Define Model Retrain Task

Select Models for Retrain

Step 1 of 3

Select Models

☐ Select All

Select	ID	Name	Version	Type	Champion
<input type="checkbox"/>	MMRoot/Tutorial3/Loan/2012...	Tree 1	2012	Classification	YES
<input checked="" type="checkbox"/>	MMRoot/Tutorial3/Loan/2012...	Reg 1	2012	Classification	NO
<input type="checkbox"/>	MMRoot/Tutorial3/Loan/2012...	HMEQ_STAT_Item	2012	Classification	NO

Model Retrain Settings

Destination version for new models: 2012

Training data source: MM Tutorial-3.HMEQ_TRAIN

Report folder: nmanalyst\Documents\My SAS Files\9.3\Model Retrain\Reports

Retrain result folder: nmanalyst\Documents\My SAS Files\9.3\Model Retrain\Results

☒ Register new trained model ☐ Trace on

8. (Optional) Select **Trace On** to print trace information to the SAS log file.
9. Click **Next**. The **Select Models for Comparison** page appears.

Define Model Retrain Task

Select Models for Comparison

Step 2 of 3

Select Models

☐ Select All

Select	ID	Name	Version	Type	Champion
<input type="checkbox"/>	MMRoot/Tutorial3/Loan/2012/Mode...	Tree 1	2012	Classification	YES
<input checked="" type="checkbox"/>	MMRoot/Tutorial3/Loan/2012/Mode...	Reg 1	2012	Classification	NO
<input checked="" type="checkbox"/>	MMRoot/Tutorial3/Loan/2012/Mode...	HMEQ_STAT_Item	2012	Classification	NO

Model Retrain Settings

Select Comparison Data Source

☐ Use training data source

Partition percent: Random seed:

Comparison data source:

Report Options

Name: ModelRetrain

Format: RTF

Style: SAS default

10. Select the **Reg 1** and **HMEQ_STAT_Item** models to compare them to the retrained model.

Note: To select all models, you can click **Select All**. If you do not select a model, the champion model for the project is used to perform the comparison.

11. Select a comparison data source. Take one of the following steps:
 - Select **Use training data source** if you want to use **HMEQ_TRAIN** as the comparison data source. For this example the default values are used. However, you can either use the whole training data source to compare or you can partition it into two parts, based on partition percent and random seed. The percentage that is specified is the percentage of data that is used for model comparison; the other part of the data is used for training. The random seed value is used to generate the training data, based on the random sampling method.
 - Click **Browse** to select a value for the **Comparison data source** field to select a performance data set.
12. To specify the report options, follow these steps.
 - a. Enter a report name. Here is an example: **HMEQ Model Comparison**.
 - b. Select the **HTML** format for the report output. The default is **RTF**. The other available formats are **PDF**, **HTML**, and **Excel**.
 - c. Select a style for the report. The default selection is **SAS default**. The other available styles are **Seaside**, **Meadow**, and **Harvest**.

Note: SAS Model Manager administrators can configure the report formats and styles that are available using SAS Management Console.

Define Model Retrain Task

Select Models for Comparison

Step 2 of 3

Select Models

☐ Select All

Select	ID	Name	Version	Type	Champion
<input type="checkbox"/>	MMRoot/Tutorial3/Loan/2012/Mode...	Tree 1	2012	Classification	YES
<input checked="" type="checkbox"/>	MMRoot/Tutorial3/Loan/2012/Mode...	Reg 1	2012	Classification	NO
<input checked="" type="checkbox"/>	MMRoot/Tutorial3/Loan/2012/Mode...	HMEQ_STAT_Item	2012	Classification	NO

Model Retrain Settings

Select Comparison Data Source

☒ Use training data source

Partition percent: 30% Random seed: 12345

Comparison data source: Browse...

Report Options

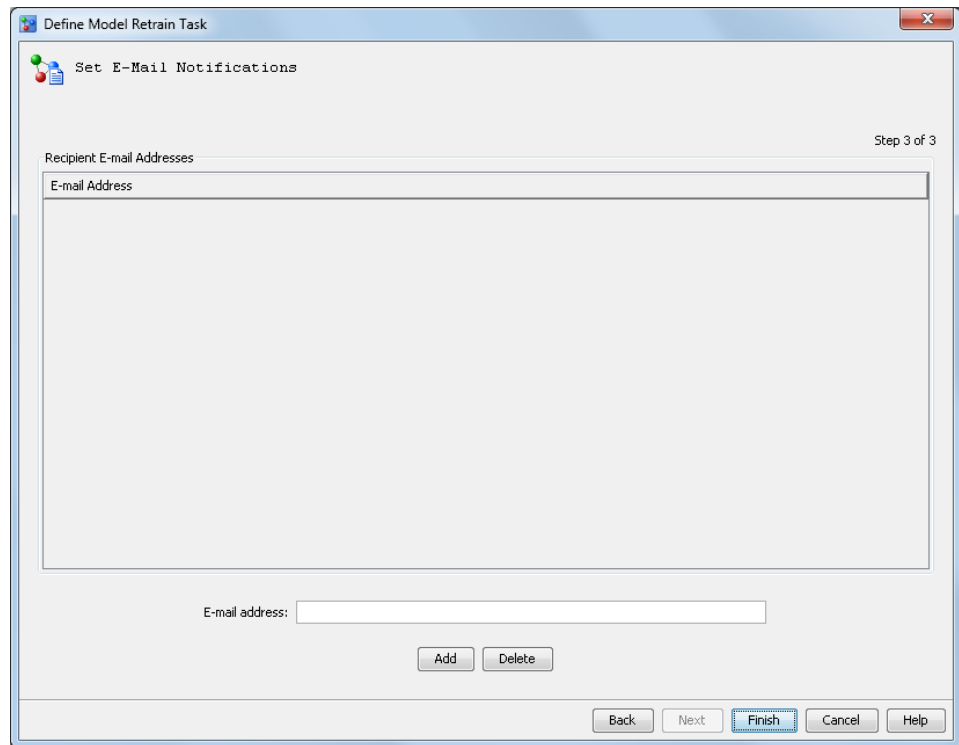
Name: HMEQ Model Comparison

Format: HTML

Style: Seaside

Back Next Finish Cancel Help

13. Click **Next**. The **Set E-Mail Notifications** page appears.



14. (Optional) To send the training results by e-mail, enter an e-mail address or multiple e-mail addresses that are separated by a comma or blank, and then click **Add**. To delete a recipient, select the recipient's e-mail address and click **Delete**.
15. Click **Finish**. The SAS code is generated and placed in the **Model Retrain** folder of the associated project.

Execute a Model Retrain Task

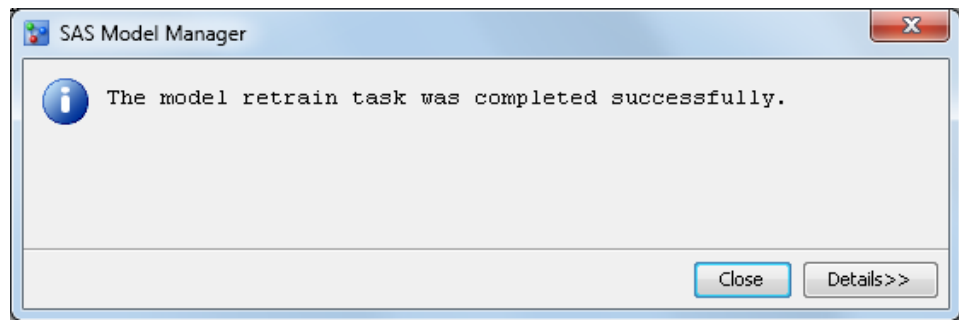
The prerequisites for retraining a model must be completed and a model retrain task must be defined before you can execute a model retrain task.

To execute a model retrain task, follow these steps:

1. Expand the project folder.
2. Right-click the **Model Retrain** folder, and then select **Execute** from the pop-up menu.

Note: The model retrain task is executed as a background process. You can view the progress of the model retrain task in the status bar at the bottom of the SAS Model Manager application window.

3. When the model retrain task has finished executing, a message appears. Click **Close**.



Note: In the previous exercise, you chose to register the retrained model. The retrained model is now available in the **Models** folder of the selected destination version in the Project Tree. If the model retrain task does not execute successfully, click **Details**, or look for error messages in the SAS log (**ModelRetrain.log**). You can find the SAS log and the retrained model comparison report in the new report folder that is located in the **Model Retrain** folder.

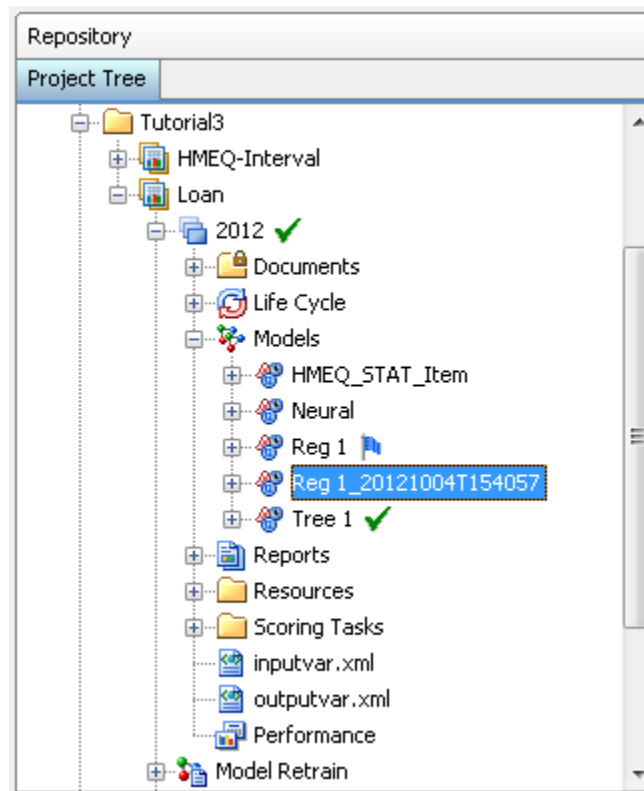
Viewing Retrained Models and Model Comparison Reports

After a model retrain task is executed, the new retrained models are available in the **Models** folder within the destination version. In addition, the retrained model comparison report is available in the new report folder that is located in the **Model Retrain** folder for the associated project.

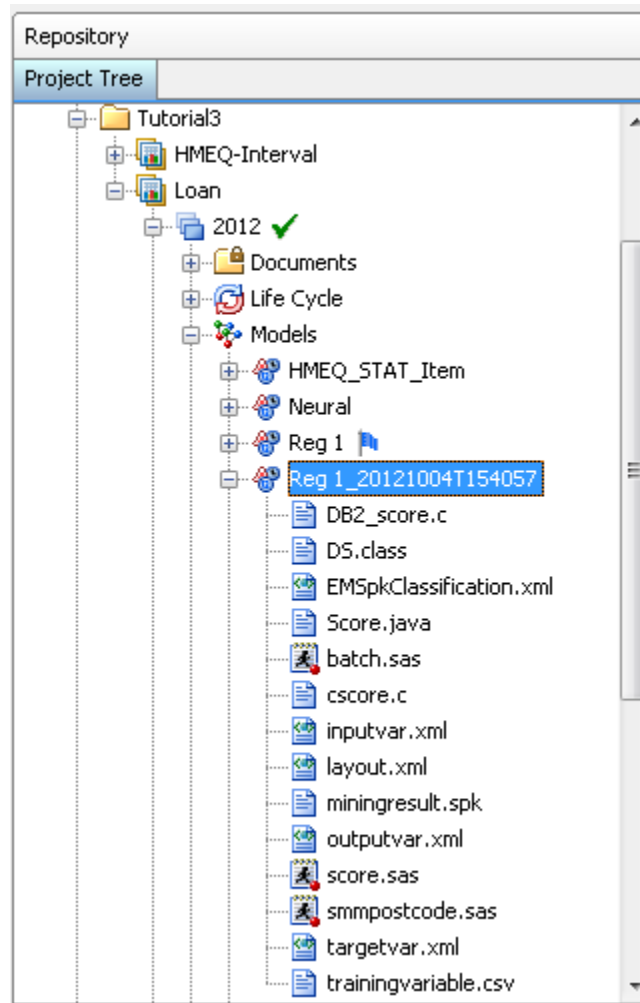
View Retrained Models

To view retrained models, follow these steps:

1. Expand the destination version node **2012** to see the new retrained model in the **Models** folder.



2. Expand the new retrained model folder to view its contents.

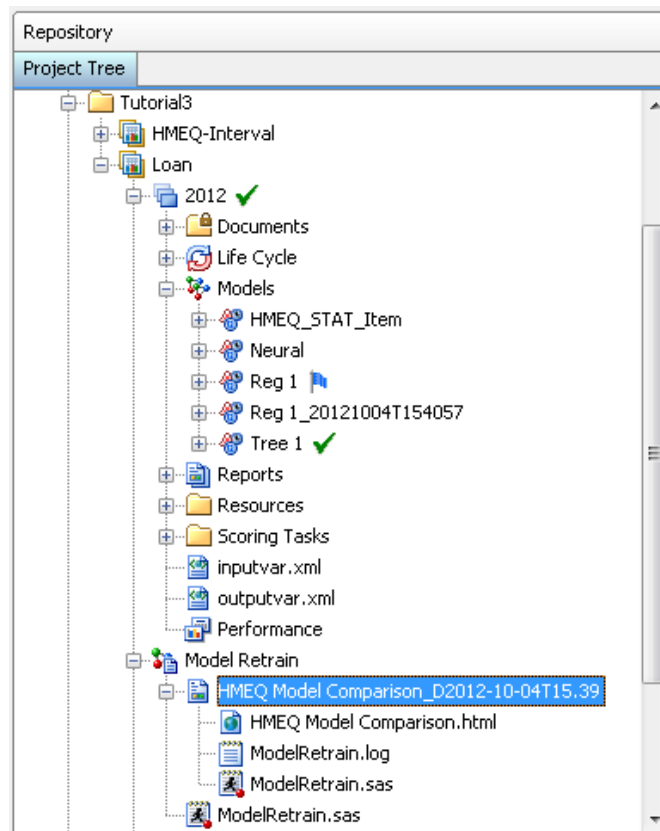


View Model Comparison Reports for Retrained Models

To view a model comparison report, follow these steps:

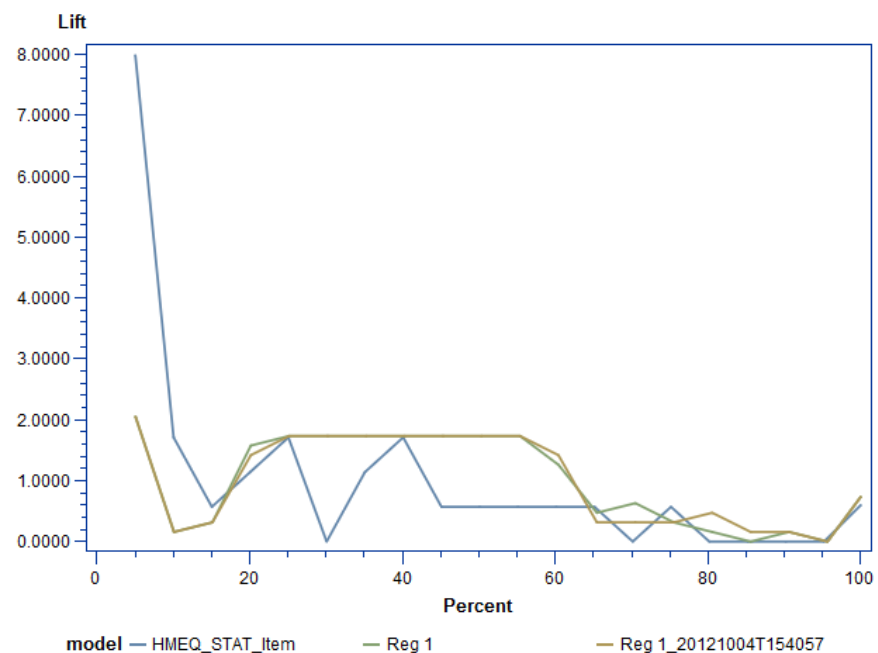
1. Expand the report folder that you specified when you defined the model retrain task (for example, *HMEQ Model Comparison* **DYYYY-MM-DDTMM:SS**). The report folder is located in the **Model Retrain** folder for the associated project.

Note: The name of the report folder also contains a timestamp in the format of **_DYYYY-MM-DDTMM:SS** that is supplied by the system when the report is created.



- Right-click the report output file, and select **Open** from the pop-up menu. Specify user credentials when you are prompted. The report appears in your browser window. Here is an example of a lift chart that is part of the model comparison report.

Lift Chart



Note:

You can also view the model retrain report in the following ways:

- Navigate to the report folder location on the SAS Workspace Server that you specified when defining the model retrain task. Here is an example: `\myserver.com\c:\Users\mmanalyst\Documents\My SAS Files\9.3\Model Retrain\Reports`
- Open the SPK file that was sent in the e-mail notification. This action is available only if you set a notification when you defined the model retrain task.

For an example of a comparison report in HTML format, see Appendix 8, “Model Retrain Comparison Report Example,” in *SAS Model Manager: User's Guide*.

Chapter 11

Tutorial 10: Using Workflow Console

Overview of Workflow Console	221
Prerequisites	222
Tutorial 3 Models and Data Sets	222
Verify Your User ID as a Member of SAS Model Manager User Groups	222
Organize the Model Hierarchy	223
Create a Version	223
Create a Workflow	224
Working with Workflow Activities	226
Using Model Management Components with a Workflow Activity	230
About Using Model Management Components in a Workflow Activity	230
Import Models	230
Compare Models	233
View Reports	237
Select a Champion or Challenger Models	238
Attach Documents	239
Publish Models	240
View Performance Results	243
Managing the Workflow Process	247
Overview	247
Prerequisites	247
Manage Workflows	247
Modify a Workflow	249
Terminate a Workflow Process	254
Search List Content	254

Overview of Workflow Console

The SAS Model Manager Workflow Console is an interface to SAS Workflow that you can use to track the progress of models in a project's version. A SAS Model Manager administrator or a SAS administrator uses SAS Workflow Studio to define process definitions and to make them available to SAS Model Manager for use. Process definitions contain the set of activities, participants, policies, statuses, and data objects that comprise a business task. After the workflow process definitions are made available, the SAS Model Manager administrator uses Workflow Console to create workflows to be used with SAS Model Manager. A *workflow* is a copy of a workflow process definition. Each workflow consists of activities. Activities can contain properties and

comments so that you can share information with other users, or make notes. The status that you select when completing an activity determines the next activity in the workflow process.

From the SAS Model Manager client application, you can launch the Workflow Console to create a new workflow or view the workflow for a version, manage all workflows, and view your workflow inbox to work with activities. The option that is selected and the user permissions determine the category views and content that are displayed when Workflow Console is launched. SAS Model Manager administrators can view the Workflow Definitions, Workflows, and Activities category views. Other SAS Model Manager users can view only the Activities category view. For more information about user permissions, see “Configuring Users, Groups, and Roles” in Chapter 4 of *SAS Model Manager: Administrator's Guide*.

See Also

- Chapter 21, “Using Workflow Console,” in *SAS Model Manager: User's Guide*
- “Configuring SAS Workflow for Use with SAS Model Manager” in Chapter 3 of *SAS Model Manager: Administrator's Guide*

Prerequisites

Tutorial 3 Models and Data Sets

The exercises in this tutorial require that the Tutorial 3 data sets and models from SMM121Tutorial.zip be extracted and registered in SAS Management Console. If they have not been extracted and registered, see [“Prepare Tutorial 3 Data Sets and Models” on page 8](#) to extract and register the files.

Importing models requires that you know where the SAS Model Manager administrator installed the Tutorial 3 models. If you do not know the location of the models, contact your SAS Model Manager administrator.

Verify Your User ID as a Member of SAS Model Manager User Groups

This exercise ensures that your user ID is a member of the **MM Tutorial Assignees** group and the **Model Manager Advanced Users** group.

1. Open SAS Management Console and log on to the SAS Metadata Server.
2. On the **Plug-ins** tab, select **User Manager**.
3. In the right pane, double-click the **MM Tutorial Assignees** group and click the **Members** tab.
4. Review the **Current Members** list, and locate your user ID or a group that your user ID is a member of. If your user ID or group is not a member of the **MM Tutorial Assignees** group, ask your administrator to add you to this group. Close the properties window.
5. Find and double-click your user ID in the right pane of SAS Management Console.

6. Click the **Groups and Roles** tab. Review the **Member of** pane and locate the group **Model Manager Advanced Users**. If your user ID is not a member of this group, ask your administrator to add you to this group. Close the properties window.
7. Close SAS Management Console.

Organize the Model Hierarchy

In this exercise, you create a version and a new workflow for the modeling project.

Create a Version

Create a new version in the **Loan** project in the **Tutorial3** organizational folder. The version folder contains life cycle information, auxiliary version documents, candidate model files, reports, resource files, scoring tasks, and model performance reports.

Note: If you did not complete Tutorial 3, you must create an organization folder and complete the project setup tasks for the **Loan** project in Tutorial 3 before performing the tasks in this tutorial. For more information, see [“Organize the Model Hierarchy” on page 77](#).

To create a new version, follow these steps:

1. Right-click the **Loan** project and select **New** ⇒ **New Version**. The New Version dialog box appears.
2. Specify the following version properties and click **OK**.

Name

enter **2013**.

Description

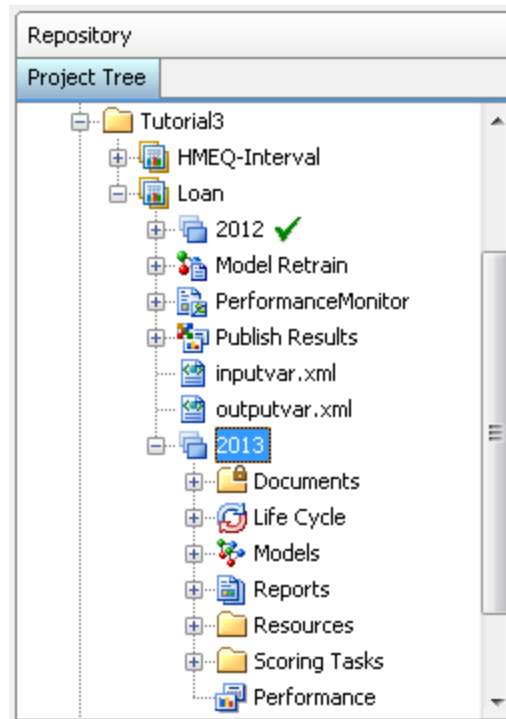
enter **Version for Tutorial 10**.

Life Cycle Template

select the Life Cycle template **Basic**.

Note: When using a workflow process to track the progress of your version, you can select any life cycle template. You can then skip all tasks to update the life cycle.

3. Examine the **Loan** project to verify that it contains a version called **2013**. Select and expand the **2013** version.



Note: If you are not a SAS Model Manager administrator, send a request to a SAS Model Manager administrator to create a workflow to use for the tutorials. Include the project name, version name, and UUID of the version with which you want the workflow to be associated. If you are a SAS Model Manager administrator you can perform the next exercise, Create a Workflow.

Create a Workflow

Overview


A *workflow* is a copy of a workflow process definition. Only a SAS Model Manager administrator can create a new workflow. Each workflow consists of activities. Activities can contain properties and comments so that you can share information with other users, or make notes. The status that you select when completing an activity determines the next activity in the workflow process.

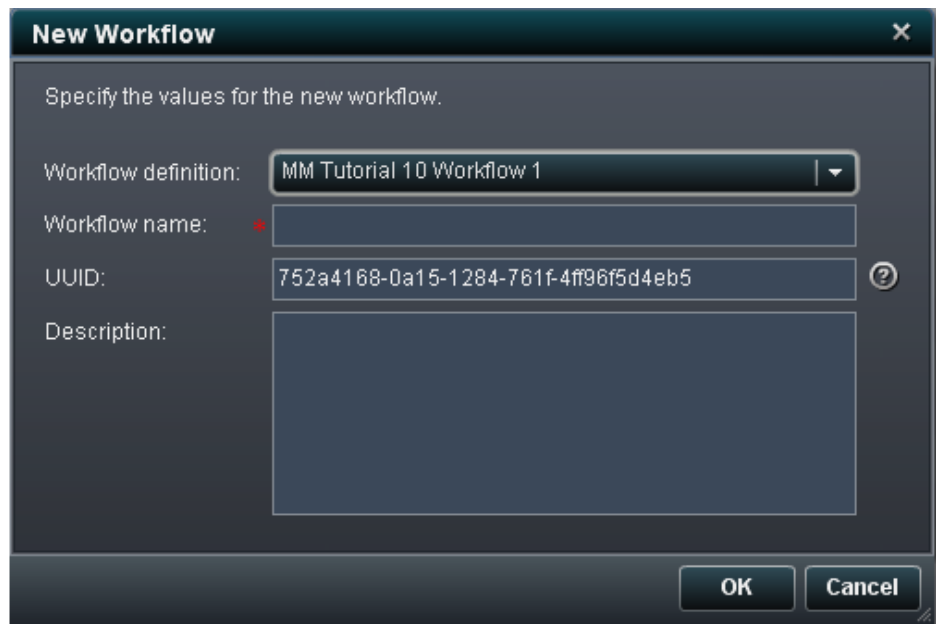
Prerequisites

The exercises in this tutorial require that you have made the workflow process definition available to SAS Model Manager. For more information, see [“Prepare for Using SAS Workflow” on page 18](#).

Create a New Workflow

1. Log on to SAS Model Manager as a member of the **Model Manager Administrator Users** group.
2. From the SAS Model Manager main window, right-click the **2013** version and select **New Workflow**. Workflow Console is launched in a Web browser and displays the New Workflow window.

Note: If you are already logged on to Workflow Console, from the Workflow Definitions category view, select a workflow definition and click .



New Workflow [X]

Specify the values for the new workflow.

Workflow definition: MM Tutorial 10 Workflow 1 [v]

Workflow name: []

UUID: 752a4168-0a15-1284-761f-4ff96f5d4eb5 [?]

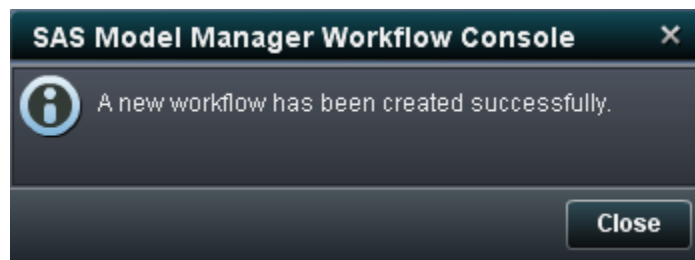
Description: []

[OK] [Cancel]

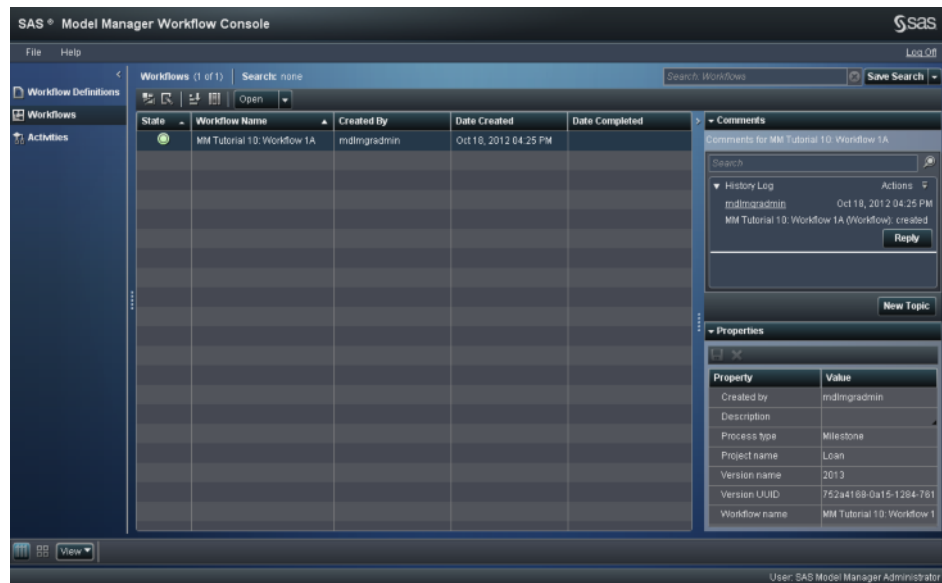
3. Select the workflow definition that is associated with this tutorial (if you accessed the New Workflow window from the SAS Model Manager main window).
4. Enter a name for the workflow.
5. The UUID of the selected version is already populated.

Note: If the UUID is not already populated, you can copy the UUID system property value for a version from the Properties details view in the SAS Model Manager main window. The field label and other characters that precede the UUID value must be removed.

6. (Optional) Enter a description for the workflow.
7. Click **OK**. A message appears, indicating that the workflow has been successfully created.



8. Click **Close**. The new workflow is now available in the Workflows category view.
9. To view the new workflow, click [icon] Workflows. The Workflows category view appears. Select the workflow to view information that is associated with the new workflow.




The workflow process definitions that have been provided for the tutorials already have participants assigned. The **Model Manager Administrator Users** group is assigned to the business administrator workflow participant role, and the **Model Manager Advanced Users** group is assigned to the potential owner workflow participant role. For information about how to assign additional participants to a workflow, see “Working with Workflow Participants” in Chapter 21 of *SAS Model Manager: User's Guide*. You can also perform the exercise, “[Managing the Workflow Process](#)” on page 247 to learn how to manage workflows.

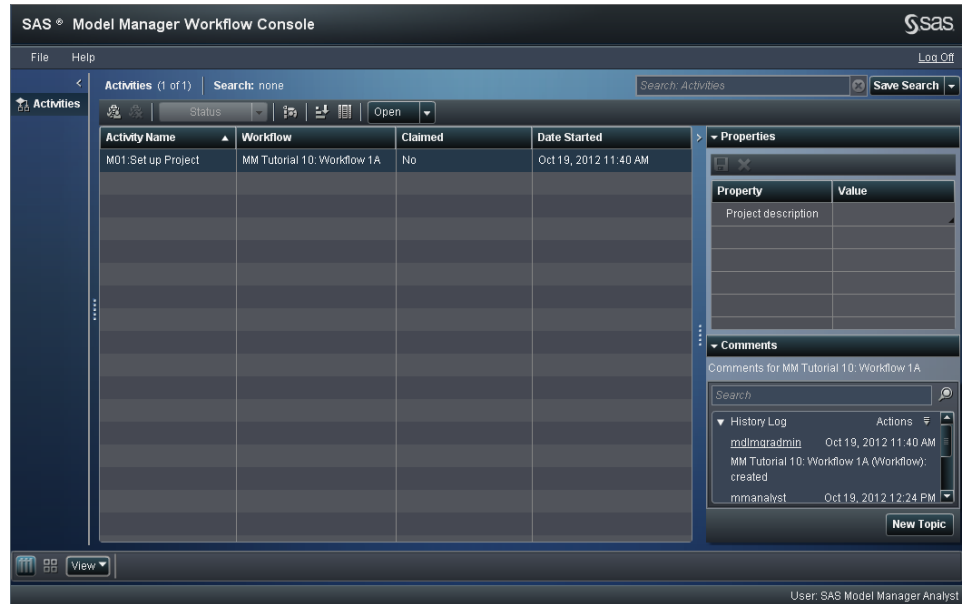
Working with Workflow Activities


The Activities category view of Workflow Console displays the activities that you have been assigned as potential owner, business administrator, or that you became the actual owner of by claiming the activity, and that have a state of **Started**. In this exercise, you claim activities, specify properties, perform model management tasks, add comments, and complete activities.


To complete an activity, follow these steps:

1. Log on to SAS Model Manager as a member of the **Model Manager Advanced Users** group or **Model Manager Administrator Users** group.
2. Select **Tools** ⇒ **My Workflow Inbox** or click . Workflow Console is launched in a Web browser and displays the Activities category view.

This is an example of the view for an advanced user.





3. Select an activity and click  to claim an activity.

Note: You can select an activity name and click  to release an activity that you had previously claimed. Only a SAS administrator or SAS Model Manager administrator can release an activity that has been claimed by another participant. For more information, see “Releasing an Activity” in Chapter 21 of *SAS Model Manager: User's Guide*.

4. (Optional) Click on a property value in the Properties pane of the Activities category view, and then enter a value or change the existing value.

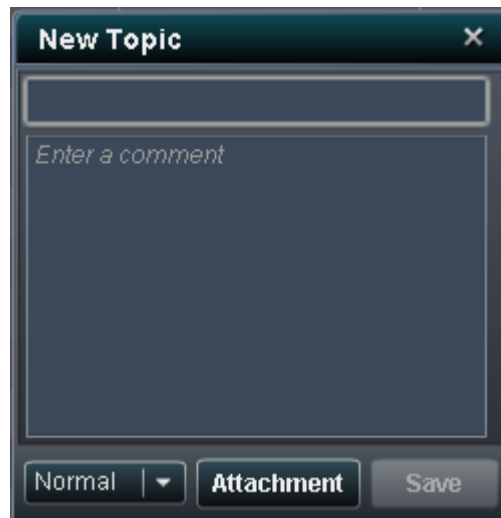
Note: Not all activities have user-defined properties.

To save the changes to the properties, click .

If you do not want to save the changes to the properties, click .

5. (Optional) Click **New Topic** to add a comment or click **Reply** to add to an existing comment using the **Comments** pane.

Example of the New Topic window:



Example of the Reply window:

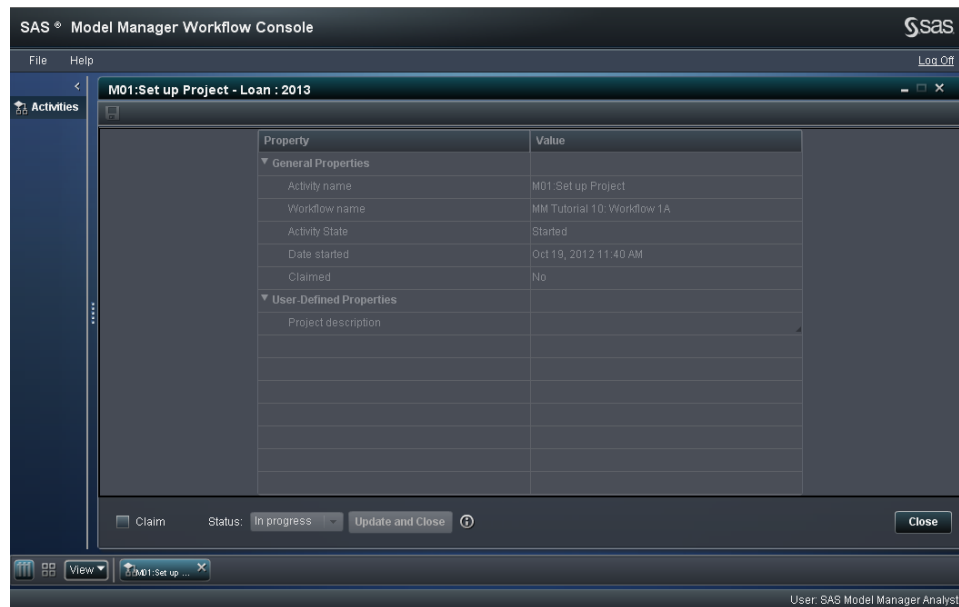
Click **Save**. The comments now appear in the **Comments** pane.

For information, see “Working with Comments” in Chapter 21 of *SAS Model Manager: User's Guide*.

6. Double-click an activity to view the activity details. From the activity details view you can perform the model management tasks that are associated with the activity. If the workflow is not associated with a version, or the activity is not configured to use a model management component, you can modify the activity properties.

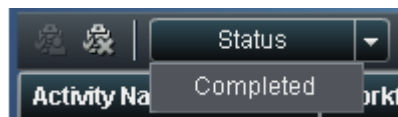
Note: If you did not claim the activity from the Activities category view, select the **Claim** check box in the activity status bar.

This is an example of an activity that has not been claimed, contains properties, and does not have a model management task associated with it.




The following actions can be performed from the activity status bar.

- Select the information button to view the description of the activity. The description window can contain a brief description of the activity or special instructions
 - If you have no other actions to perform for the activity, you can select a status to complete the activity, and click **Update and Close**. The workflow process continues to the next activity.
 - Click **Close** if you want to return to the Activities category view without updating the status of the activity.
7. If a model management component is associated with the activity, see the exercise [“Using Model Management Components with a Workflow Activity”](#) on page 230 for the tasks that can be performed.
 8. (Optional) If you did not select a status to complete the activity, select a status value from the Activities category view to complete the activity. The workflow process continues to the next activity. Here is an example of the **Set up project** activity that has only one status to choose from.



9. Repeat steps 3 through 7 until the workflow process has been completed.

Note: From the Activities category view you can also view the dashboard reports for all projects. Click  to view the dashboard reports in a browser window.

For more information, see “Working with Workflow Activities” in Chapter 21 of *SAS Model Manager: User's Guide*.

Using Model Management Components with a Workflow Activity

About Using Model Management Components in a Workflow Activity

SAS Model Manager enables you to integrate SAS Workflow with some of the model management tasks that are normally performed in the SAS Model Manager client. Workflow process definitions can be configured to use model management components with the workflow activities. When the workflow process definition is activated for use, the model management components are available through the object view for the associated activity in the SAS Model Manager Workflow Console.

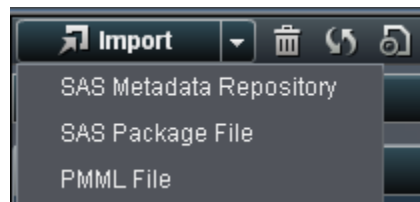
In this exercise, you perform the model management tasks that are a part of the workflow. The steps in this exercise follow the workflow that was created in the previous exercise using the workflow process definition that was provided for Tutorial 10 in the SMM121Tutorial.zip file.

Import Models

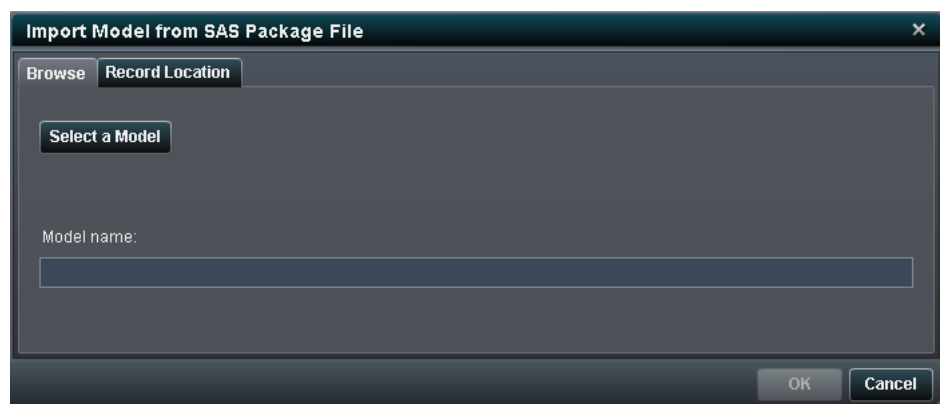
If the Import Models component is associated with an activity, you can import models into the model repository. You can import models from the SAS Metadata Repository, a SAS package file (.spk), or a PMML file (.xml) into the version that is associated with the workflow. In this exercise you import models from the SAS package files into the **2013** version.

To import a model, follow these steps:

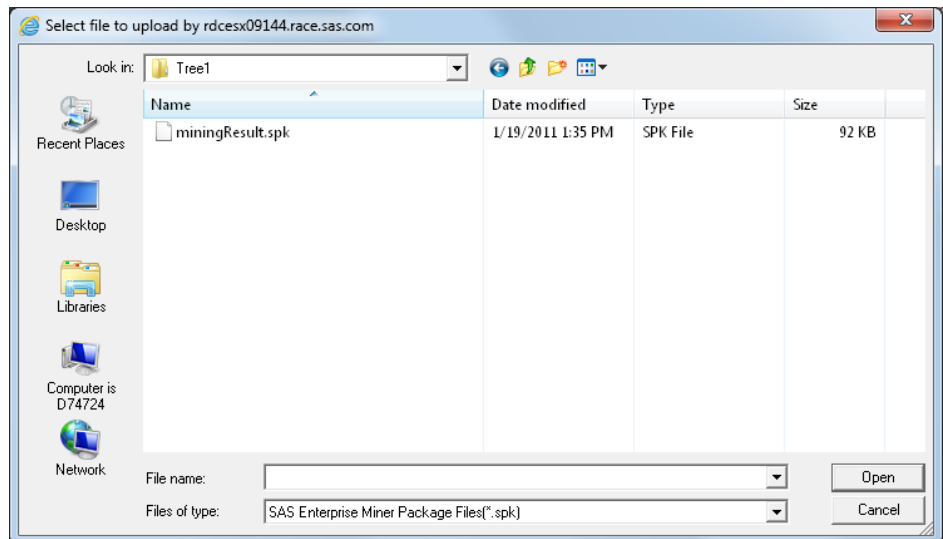
1. Select the SAS package file import method from the **Import** drop-down list.



Display 11.1 Example of Importing a Model from a SAS Package File



2. Navigate to the location where the tutorials were extracted and look in the \SMM121Tutorial\Tutorial3\Samples directory.
 - When importing a model from a SAS package file or from a PMML File, select **Open**.



- When importing a model from SAS Metadata Repository, you select the file and specify a name in the same window.



For this exercise, open the **Tree1** folder and select the **miningResult.spk** file to import. When importing a PMML model, you select an XML file.

3. Enter a name for the model and click **OK**.
4. Click **Close** in the success message.
5. Repeat steps 1 through 4 for the SAS package file located in the **Reg1** folder, and the PMML XML file located in **Neural** folder.

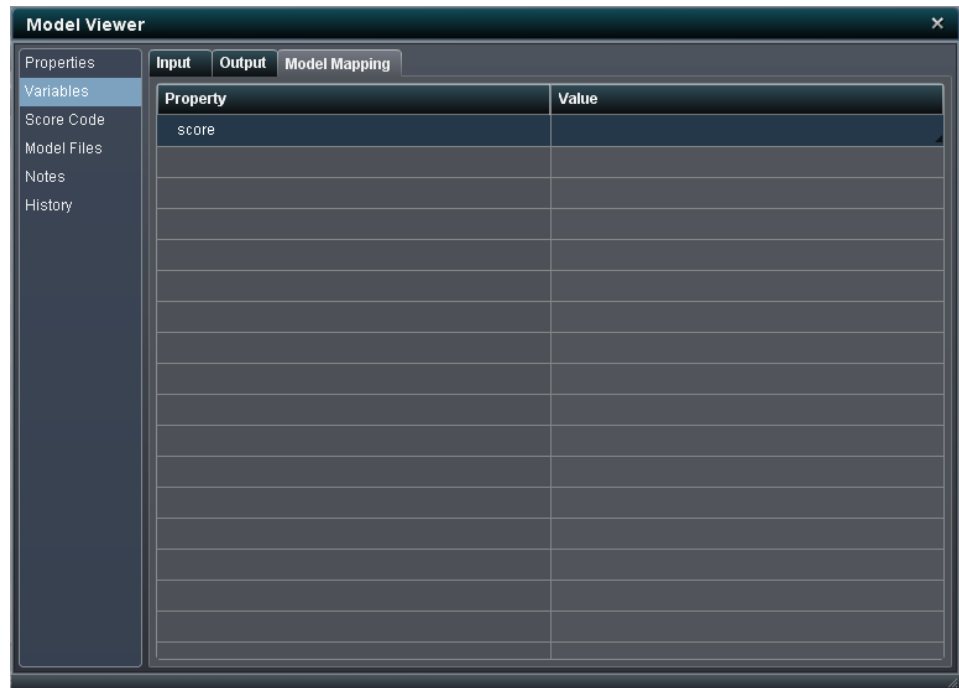
Display 11.2 Import Models Object Window After Models Are Imported

Name	Description	Model Type	Date Modified
Neural		Classification	Oct 19, 2012 04:28 PM
Reg 1		Classification	Oct 19, 2012 04:24 PM
Tree 1		Classification	Oct 19, 2012 04:20 PM

6. Select a model from the list, and click  to view the information for a model.

Property	Value
Name	Tree 1
Description	
Owner	rmanalyst
Date created	Oct 19, 2012 04:20 PM
Date modified	Oct 19, 2012 04:20 PM

7. Select **Variables** from the left menu and click the **Model Mapping** tab.



Map the model output variables to the project output variables.

Here are the model output variable mappings for the models that were imported:

Neural

Project Variables	Model Variables
score	P_BAD1

Reg 1

Project Variables	Model Variables
score	EM_EVENTPROBABILITY

Tree 1

Project Variables	Model Variables
score	EM_EVENTPROBABILITY

For more information about importing models using SAS Model Manager, see Chapter 7, “Importing Models,” in *SAS Model Manager: User's Guide*.

Compare Models

If the View Models component is associated with an activity, you can view a list of the models. You can also view model information such as properties, model variables, score code, model files, notes, and history. By default, the Model Viewer component is available from both the Import Models and also the Set Champion and Challenger components. The Model Viewer enables you to modify properties, map model output

variables, edit score code, and add notes for the selected model. You can also view the input variables, output variables, model files, and history of actions for the selected model.

The generic model viewer component can also be configured for an activity. This component displays a list of the models in the model repository that are associated with the version for which workflow process was created.

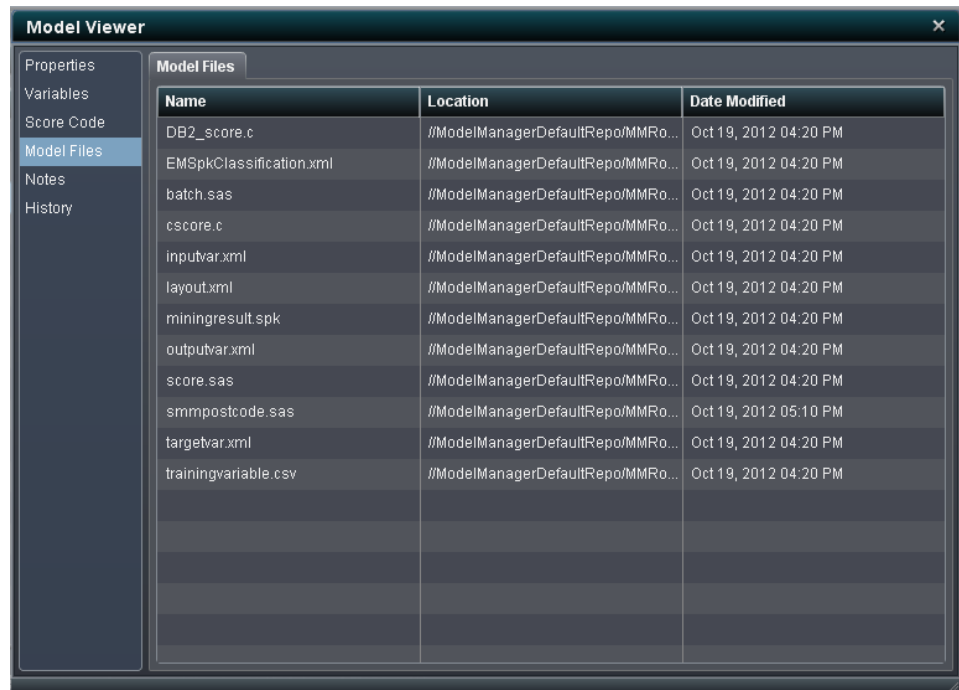
[illegible]

For this exercise, perform the following steps for each model:

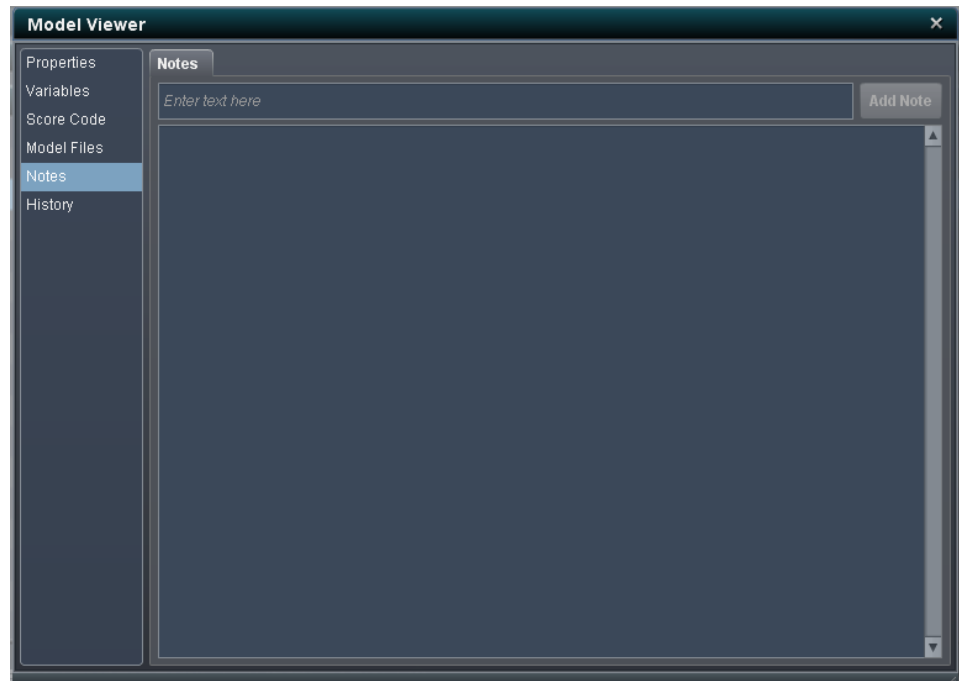
1. Select a model from the list, and click . The **Model Viewer** window appears.

[illegible]

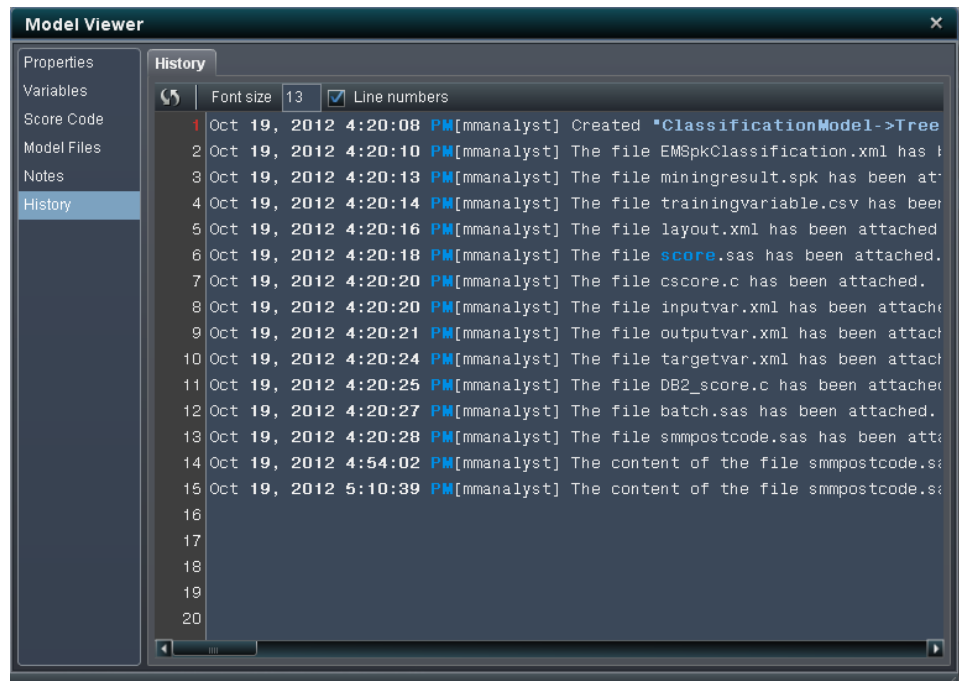
2. Select **Variables** from the left menu and click the **Model Mapping** tab. Verify that the model output variables are mapped.



5. (Optional) Select **Notes** from the left menu to add or view notes that are associated with the model.



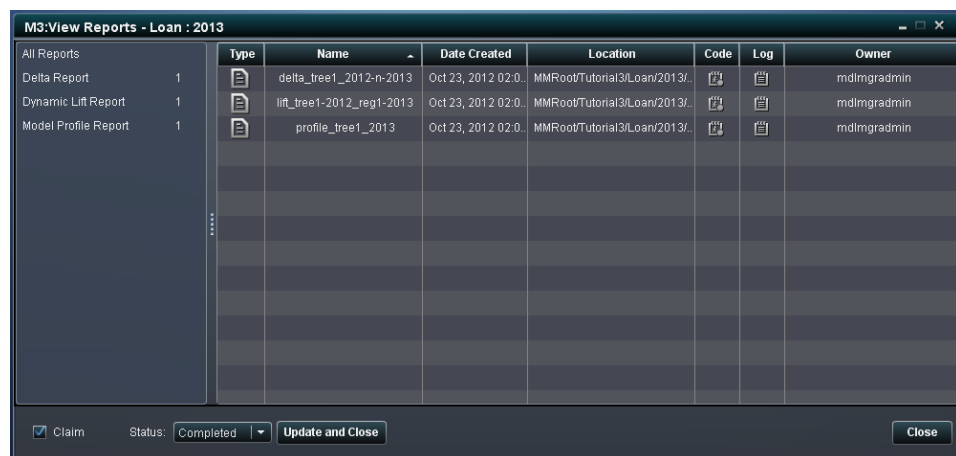
6. (Optional) Select **History** from the left menu to view the history of tasks that have been performed for the model.



View Reports

If the Reports Viewer component is associated with an activity, you can view reports that were created using the New Report wizard in the SAS Model Manager client application.

To view the reports, you must first create the reports for the **2013** version. You can follow the exercise “[Create Model Comparison and Summary Reports](#)” on page 91 in tutorial 3 to create the Delta, Dynamic Lift, and Model Profile reports. In this exercise you view reports for the **2013** version. Some reports such as the Delta report and Dynamic Lift report enable you to select models from the version that contains the current project champion model.



To view a report, follow these steps:

1. Select a type of report from the left navigation menu.
2. Right-click a report from the list and select **Open** to view the report.

Note: You can also view the SAS code and SAS log if the report is not displayed.

- (Optional) To view the SAS code or SAS log for a report, select a report from the list and click on the icon in the **Code** or **Log** column.

For more information, see Chapter 9, “Validating Models Using Reports,” in *SAS Model Manager: User's Guide*.

Select a Champion or Challenger Models

If the Set Champion and Challenger component is associated with an activity, you can set a project champion model and challenger models.

This is an example of the project champion that already exists in another version.

M4:Select a champion model or challenger - Loan : 2013

✓ | | ✕ | ↺ | ↻

▼ **Current Project Champion Details**

Model: Tree 1 Project state: Active
 Version: 2012 Version state: Under Development
 Project: Loan Version frozen: no


▼ **2013**

Champion	Challenger	Name	Published
		Neural	
		Reg 1	
		Tree 1	

▼ **2012**

Champion	Challenger	Name	Published
✓		Tree 1	Oct 18, 2012 12:07 PM

☒ Claim Status: Completed ▼ **Update and Close** ⓘ **Close**

For this exercise, select the **Tree 1** model in the **2013** version and click  to flag it as a challenger. Click **Yes** for the confirmation message.

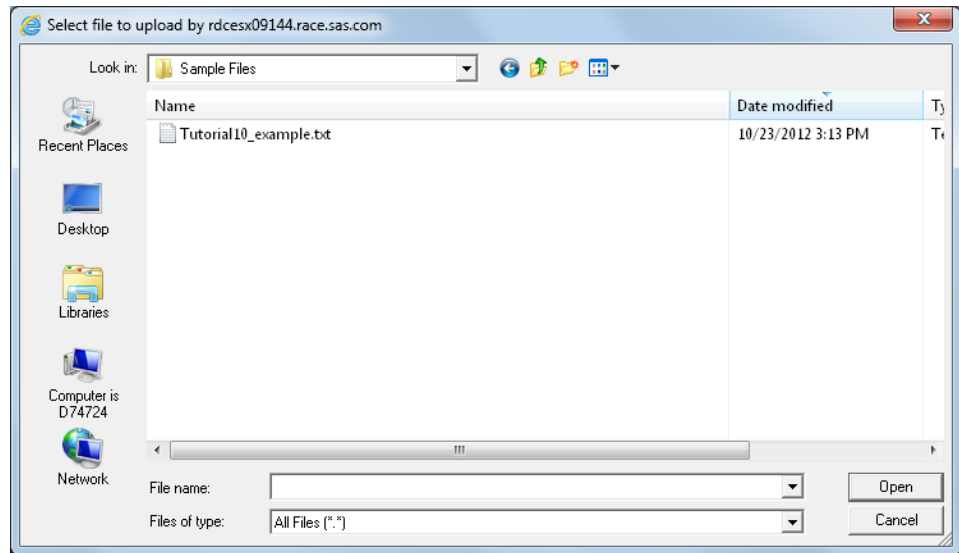
Here are the actions that you can perform using this component:



- Select a model from the list, and click  to set the model as the project champion model.

Note: You might receive warning messages indicating that you must complete required tasks before you can continue.

Here are the possible scenarios in which a message might appear:

- If there are model input variables that are not defined as project input variables, you are prompted to add the input variables. Click **Yes** to confirm. The model input variables are copied to the project input variables.
- If project output variables are not defined, the **Select Project Output Variables** window appears for you to select the output variables. After you select the output variables, click **OK**.
- The **Set Model Output Mapping** window appears if you have not mapped the model output variables to the project output variables.



2. Navigate to the location of the file, select the file, and click **Open**. The file appears in the list of documents.
3. Select the item in the list for the file that you attached in the previous step and click  or double-click the selected file to view the contents of the file.
4. (Optional) Select an item from the list and click  to delete the attachment.

Publish Models

You can publish champion and challenger models from the model repository to the SAS Metadata Repository or to a database. In this exercise, you publish a model to the SAS Metadata Repository and to a database.

To publish models to the SAS Metadata Repository, follow these steps:

1. Select **SAS Metadata Repository** for the publish destination.

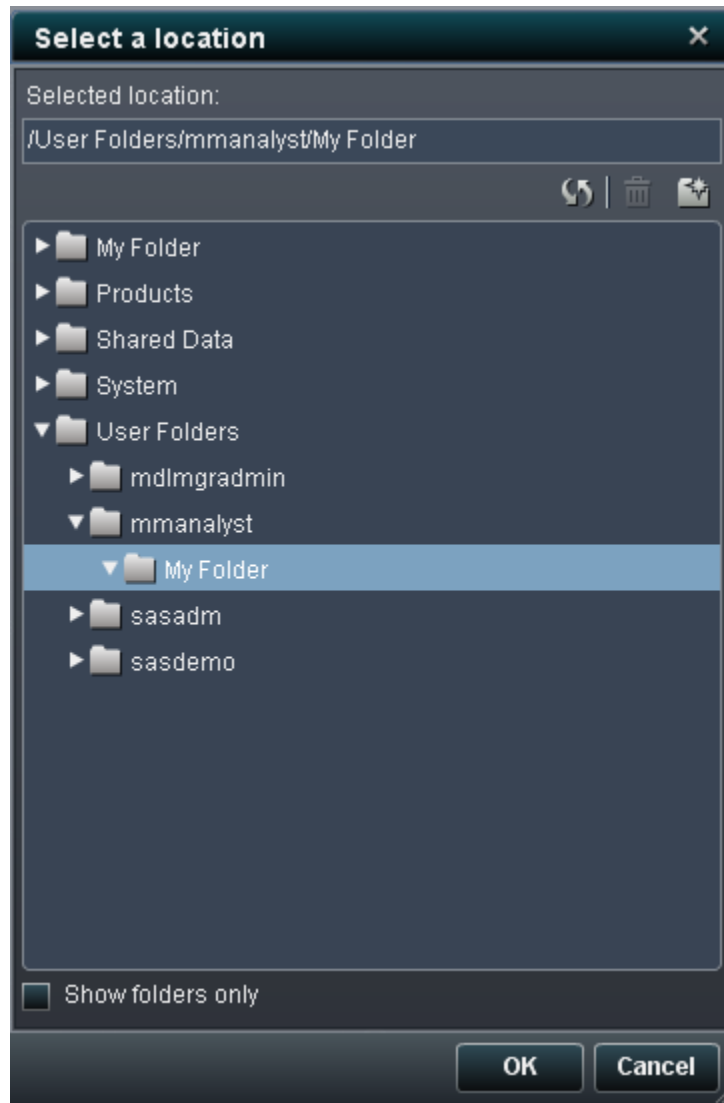


2. Select the champion model **Tree 1** in the **2012** version and the challenger model **Reg 1** in the **2012** version from the **Models** list.

3. Accept the default or specify a publish name for the challenger model. The champion model publish name is set as the project name.

Note: The default format of the publish name is configured by the SAS administrator. You cannot modify the publish name for a champion model.

4. Select the location in the SAS Metadata Repository to publish the models.



Click **OK**. The selected location appears in the **Location** box.

M6: Publish - Loan : 2013

Publish destination: SAS Metadata Repository Publish

Models
Select the models to publish, and specify a publish name for each model.

Select	Model Name	Role	Version	Model Type	Publish Name	Date Published
<input checked="" type="checkbox"/>	Tree 1	<input checked="" type="checkbox"/> Champion	2012	Classification	Loan	
<input type="checkbox"/>	Tree 1	<input type="checkbox"/> Challenger	2013	Classification	Tree 1	
<input checked="" type="checkbox"/>	Reg 1	<input type="checkbox"/> Challenger	2012	Classification	Reg 1	Oct 11, 2012 06:24 PM

SAS Metadata Repository Settings
Location Select a location

/User Folders/mmmanalyst/My Folder

☒ Claim Status: Completed Update and Close Close

5. Click **Publish**. Click **Close** for the confirmation success message.

To publish models to a database, follow these steps:

1. Select the type of database for the publish destination.

M6: Publish - Loan : 2013

Publish destination: Teradata Publish

Publish Options
Publish method: ☒ SAS Embedded Process ☐ Scoring function

Select the models to publish, and specify a publish name for each model.

Select	Model Name	Role	Version	Model Type	Publish Name	Date Published
<input type="checkbox"/>	Tree 1	<input checked="" type="checkbox"/> Champion	2012	Classification	Loan	Oct 23, 2012 03:33 PM
<input type="checkbox"/>	Tree 1	<input type="checkbox"/> Challenger	2013	Classification	Tree_1_Loan	
<input type="checkbox"/>	Reg 1	<input type="checkbox"/> Challenger	2012	Classification	Reg 1	Oct 23, 2012 03:33 PM

☐ Replace scoring files that have the same publish name

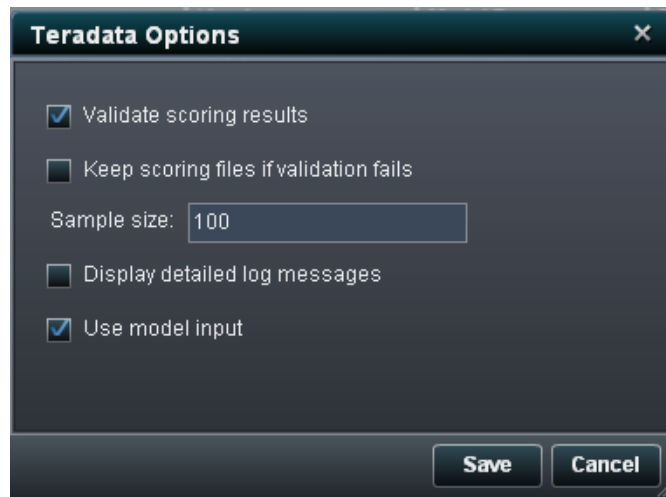
Database Settings
Database server:
Database:
User ID: Password: More options...

☒ Claim Status: Completed Update and Close Close

2. Select a publish method.
3. Select the models that you want to publish from the **Models** list.
Note: You can publish both the project champion model and its challenger models.
4. If you selected the **SAS Embedded Process** publish method, select the **Replace scoring files that have the same publish name** publish option.
5. Specify a publish name for each model.

Note: The default format of the publish name is configured by the SAS administrator.

- Specify the settings to connect to the database, and click **More Options** to specify the processing options that should be used when publishing the models.

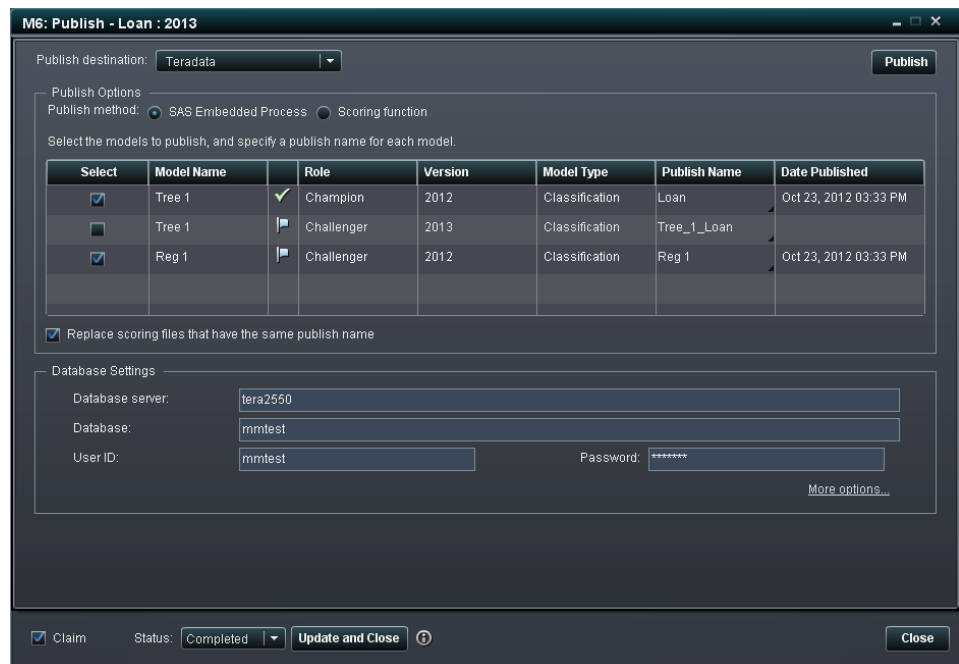


The **Teradata Options** dialog box contains the following settings:

- ☒ Validate scoring results
- ☐ Keep scoring files if validation fails
- Sample size: 100
- ☐ Display detailed log messages
- ☒ Use model input

Buttons: **Save**, **Cancel**

Select **Display detailed log messages** and click **Save**. You are returned to the Publish window.



The **M6: Publish - Loan : 2013** dialog box shows the following configuration:

- Publish destination:** Teradata
- Publish method:** SAS Embedded Process
- Select the models to publish, and specify a publish name for each model.**

Select	Model Name	Role	Version	Model Type	Publish Name	Date Published
<input checked="" type="checkbox"/>	Tree 1	Champion	2012	Classification	Loan	Oct 23, 2012 03:33 PM
<input type="checkbox"/>	Tree 1	Challenger	2013	Classification	Tree_1_Loan	
<input checked="" type="checkbox"/>	Reg 1	Challenger	2012	Classification	Reg 1	Oct 23, 2012 03:33 PM

- ☒ Replace scoring files that have the same publish name

Database Settings

Database server: tera2550
 Database: mmtest
 User ID: mmtest Password: *****

Buttons: **Publish**, **More options...**, **Claim**, **Status: Completed**, **Update and Close**, **Close**

- Click **Publish**. After the models are published to the database, you receive a success confirmation message. Click **Close**.

For more information about publishing models using SAS Model Manager, see Chapter 12, “Publishing Models,” in *SAS Model Manager: User's Guide*.

View Performance Results

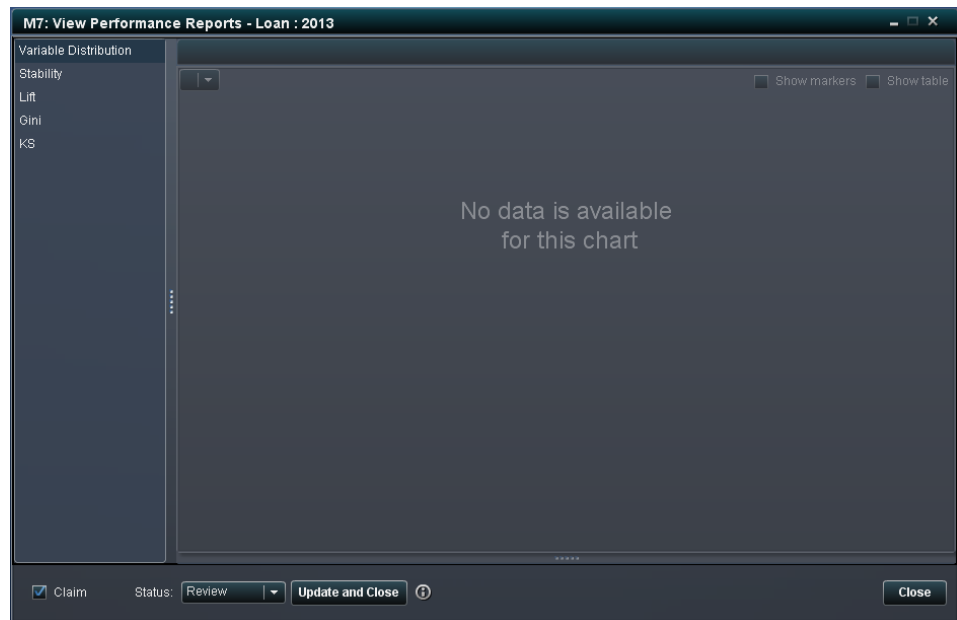
If the Model Performance Viewer component is associated with an activity, you can view the performance of the project champion model through a series of charts. The

performance charts are generated using performance tasks in the SAS Model Manager client application.

To view the performance reports you must set a model in the **2013** version as the project champion model. Then you must define and execute the performance tasks for the **2013** version in the SAS Model Manager client.

For this exercise, perform the following steps:

1. Open the **M7: View Performance Reports** activity window. The performance charts are currently not available because the project champion model is not located in the version that is associated with this workflow.

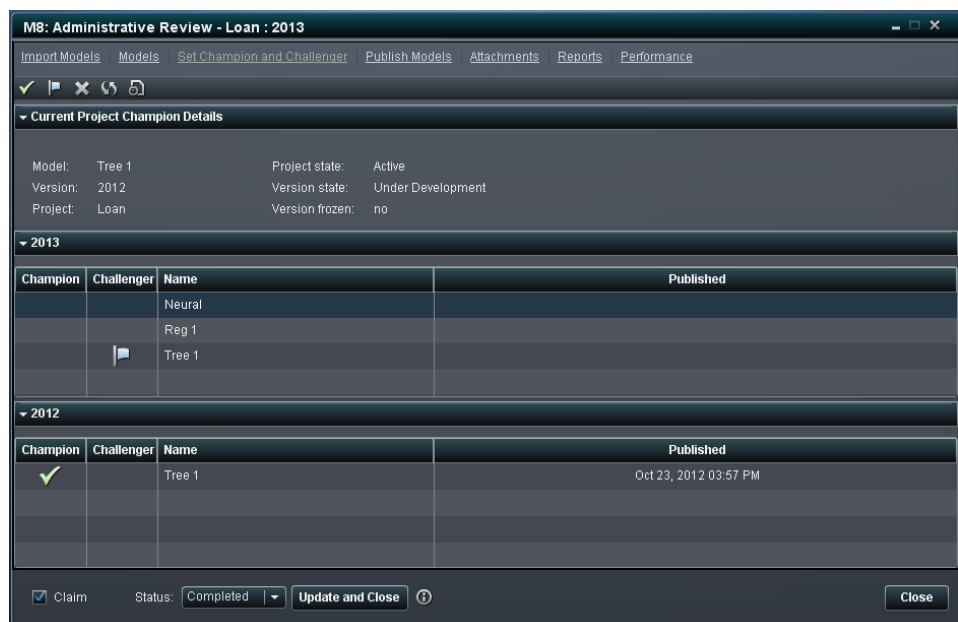


2. Select the **Review** status and click **Update and Close**. The workflow process continues to the next activity.
3. Open the **M8: Administrative Review** activity and select **Claim**. The Utility model management component appears in the activity window.

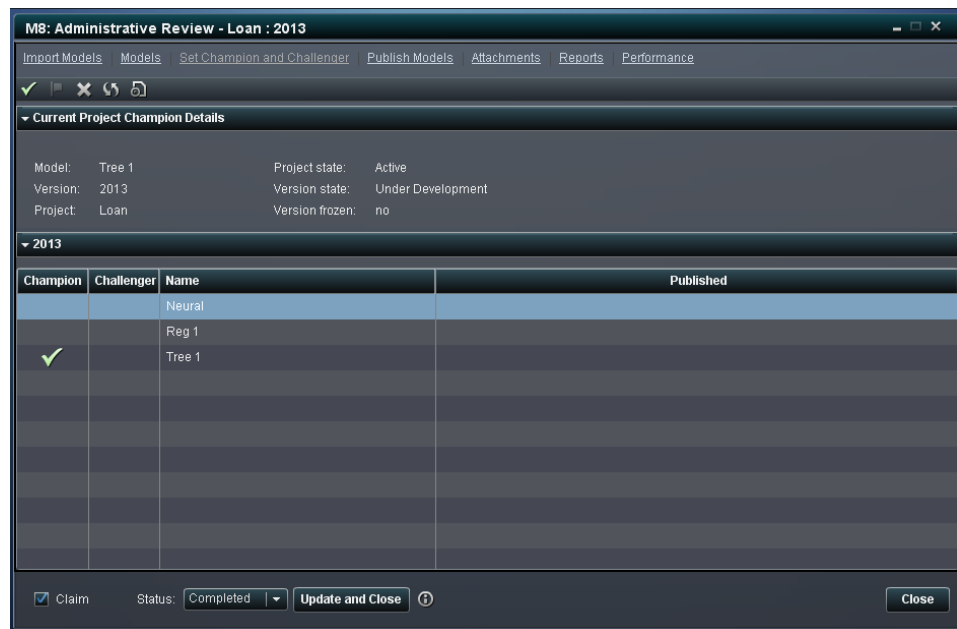
Note: The Utility component consists of all the model management components. You can associate the Utility component with an activity so that you can perform administrative tasks or review all of the content that is available for a workflow without having to complete multiple activities. To switch between the model management tasks select a link from the object window navigation bar.




4. Select **Set Champion and Challenger** from the object window navigation bar.



5. Select the **Tree 1** model from the **2013** version models list and click ✓ to set the model as the project champion model. Click **Yes** in both of the warning messages.



6. You must now define and execute the performance tasks in the SAS Model Manager client for the new project champion model. Follow the exercise [“Create the Champion Model Performance Data Sets for a Classification Project”](#) on page 130 in tutorial 5 to define and execute the performance tasks.
7. Return to the browser window where the SAS Model Manager Workflow Console is available and click  in the **M8: Administrative Review** activity object window.
8. Select **Performance** from the object window navigation bar.
9. Select a type of report from the left navigation menu to view the performance charts. You can select the check boxes in the upper right corner to show markers in the chart and to display the table of data.

Here is an example of the Gini charts.



For more information, see Chapter 14, “What is Performance Monitoring?,” in *SAS Model Manager: User's Guide*.

Managing the Workflow Process

Overview

SAS Model Manager Workflow Console can be used to manage workflow processes. A SAS Model Manager administrator can create new workflows, view workflow process definitions, and interact with activities that are associated with a workflow. If the SAS Model Manager administrator is assigned to the workflow role of business administrator, the administrator can influence the progress of an activity by actions such as assigning an activity, or releasing the activity that is claimed by another user.

In this exercise, you create a workflow, work with participants, customize category views, and terminate workflow processes.

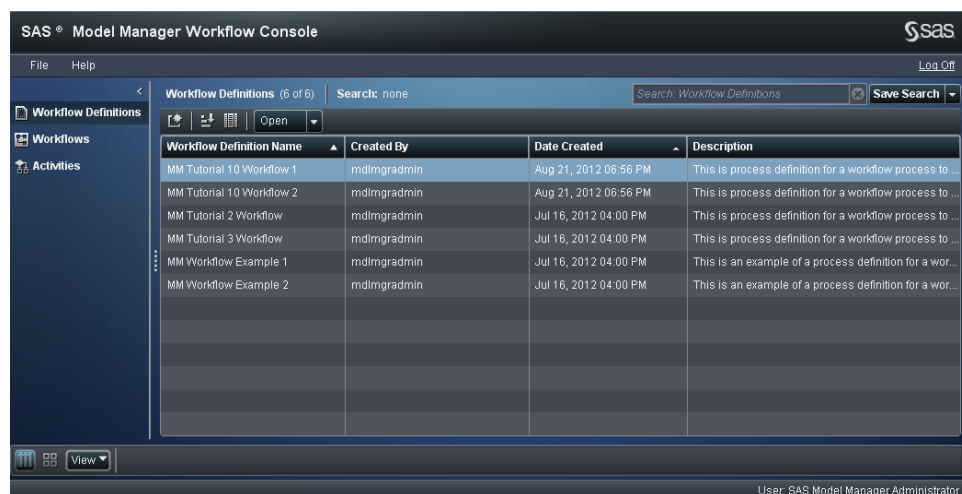
Prerequisites

The exercises in this tutorial require that you have made the workflow process definitions available to SAS Model Manager. For more information, see [“Prepare for Using SAS Workflow” on page 18](#).

Manage Workflows

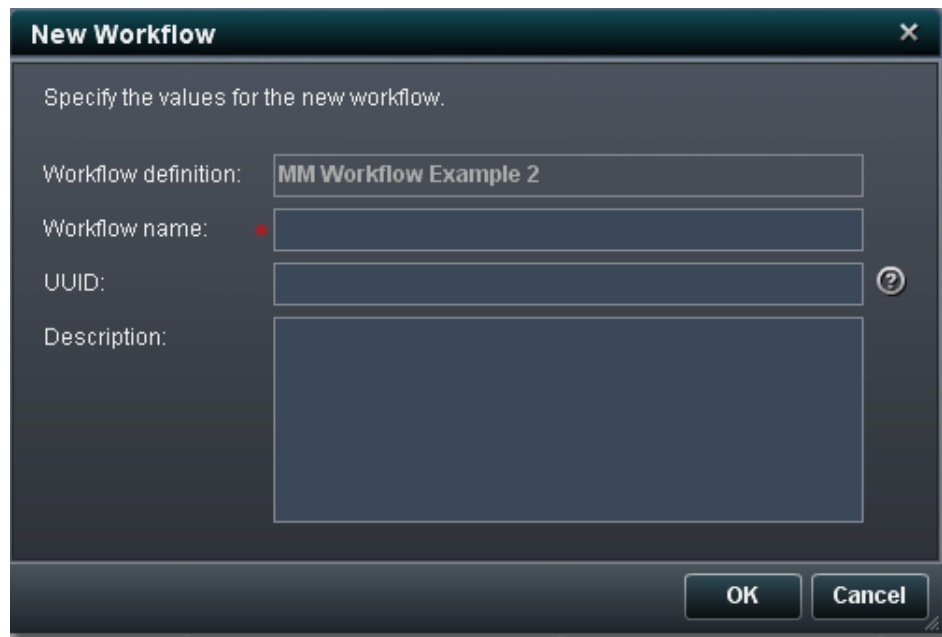
To manage workflows, follow these steps:

1. Log on to SAS Model Manager as a member of the **Model Manager Administrator Users** group.
2. Select **Tools** ⇒ **Manage Workflow**. Workflow Console is launched in a Web browser and displays the Workflow Definitions category view.



3. Select a workflow definition (for example, **MM Workflow Example 2**) and click . The New Workflow window appears.

Note: The workflow process definitions that have been provided for the tutorials already have participants assigned.



New Workflow [X]

Specify the values for the new workflow.

Workflow definition:

Workflow name:

UUID: ?

Description:

[OK] [Cancel]

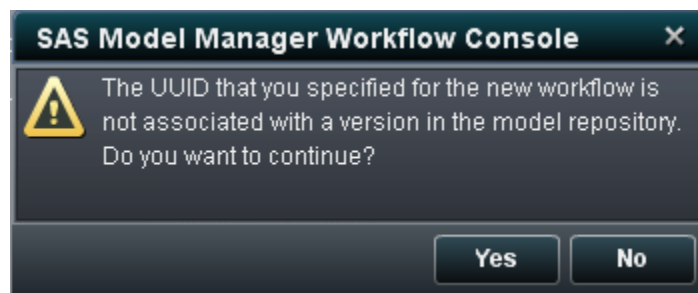
4. Enter a name for the workflow (for example, **MM Tutorial 10 Demo 1**).
5. For this tutorial, leave the UUID field blank. You can also copy the UUID system property value for a version from the Properties view in the SAS Model Manager main window.

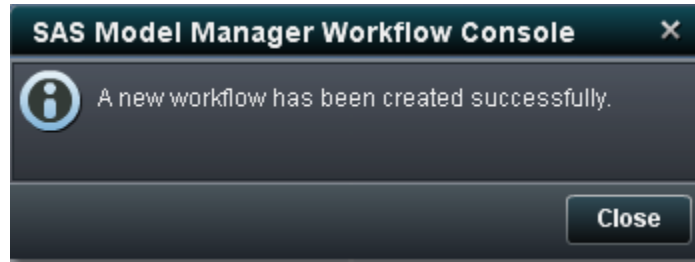
Note: The field label and other characters that precede the UUID value must be removed.


6. Enter a description for the workflow (for example, **Workflow for tutorial 10**).
7. Click **OK**. A message appears, indicating that the workflow has been successfully created.

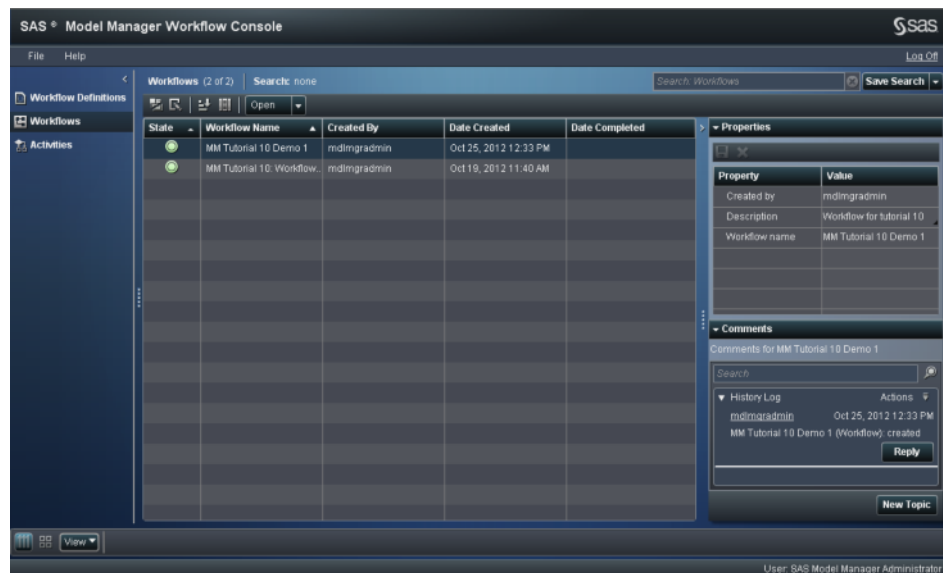
Note: If you left the UUID field blank, you receive a warning message. Click **Yes**, to continue.

Display 11.3 New Workflow – No UUID Specified



Display 11.4 New Workflow Success message

8. Click **Close**. The new workflow is now available in the Workflows category view.
9. Repeat steps 3 through 8 to create additional workflows and then continue to the next step.
10. To view the new workflows, click . The Workflows category view appears. Select the workflow to view information that is associated with the new workflow.



Modify a Workflow

About Modifying Workflows

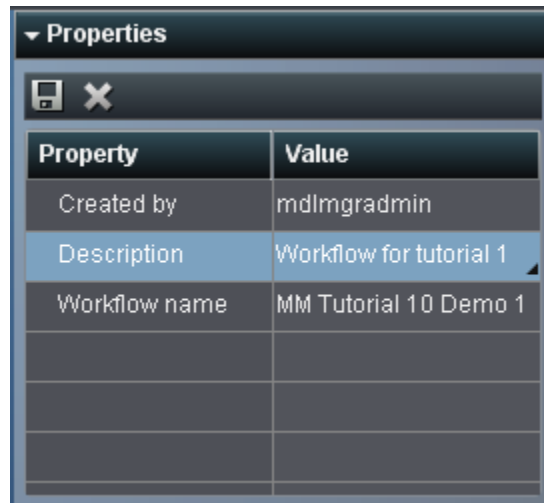
In this exercise, you modify the properties associated with a workflow, add comments to a workflow, and assign participants to activities.

Modify Workflow Properties

To modify the properties that are associated with a workflow, follow these steps:


1. From the Workflows category view, select a workflow that you created in the previous exercise.
2. In the **Properties** pane, click in the cell for a property and specify or modify a value.


Here is an example:



The screenshot shows a 'Properties' dialog box with a table of workflow details. The table has two columns: 'Property' and 'Value'. The 'Description' row is highlighted in blue.

Property	Value
Created by	mdlmgadmin
Description	Workflow for tutorial 1
Workflow name	MM Tutorial 10 Demo 1

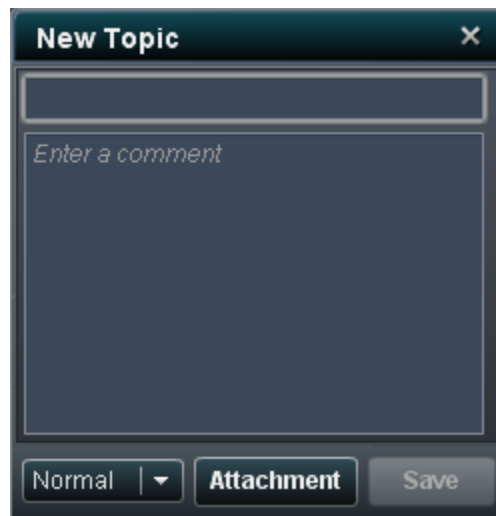
3. Click  to save the properties.

Note: You can click  to discard the changes and revert back to the previous value.

Add Comments

To add comments to the selected workflow, follow these steps:

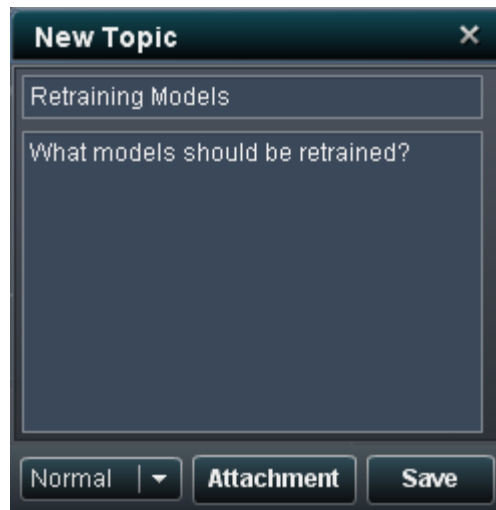
1. In the **Comments** pane, click **New Topic**. The New Topic window appears.



The screenshot shows a 'New Topic' dialog box. It has a title bar with 'New Topic' and a close button. Below the title bar is a text input field for the title. Below that is a large text area for the comment, with the placeholder text 'Enter a comment'. At the bottom, there are three buttons: 'Normal' with a dropdown arrow, 'Attachment', and 'Save'.

2. Enter a title and comment for the new topic.

Note: For information about adding attachments, see “Working with Comments” in Chapter 21 of *SAS Model Manager: User's Guide*.



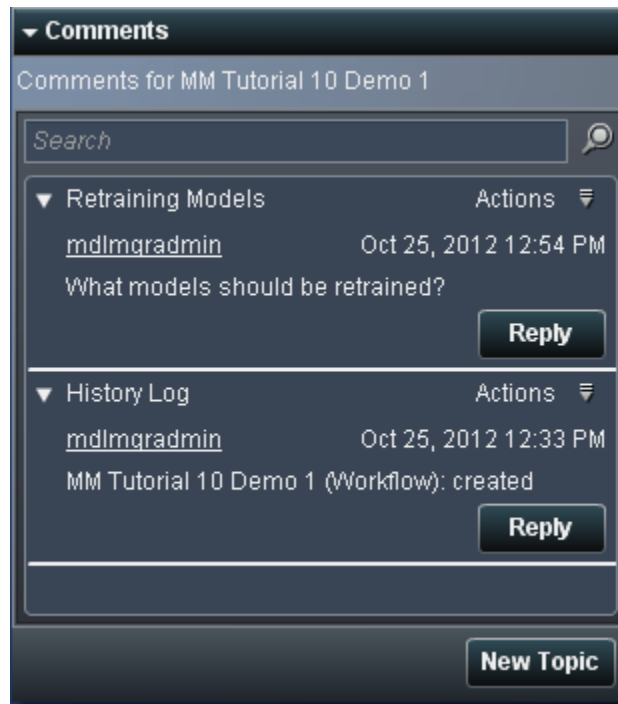
New Topic [X]

Retraining Models

What models should be retrained?

Normal [v] **Attachment** **Save**

3. Click **Save**. The new topic appears in the comments pane.



Comments

Comments for MM Tutorial 10 Demo 1

Search [icon]

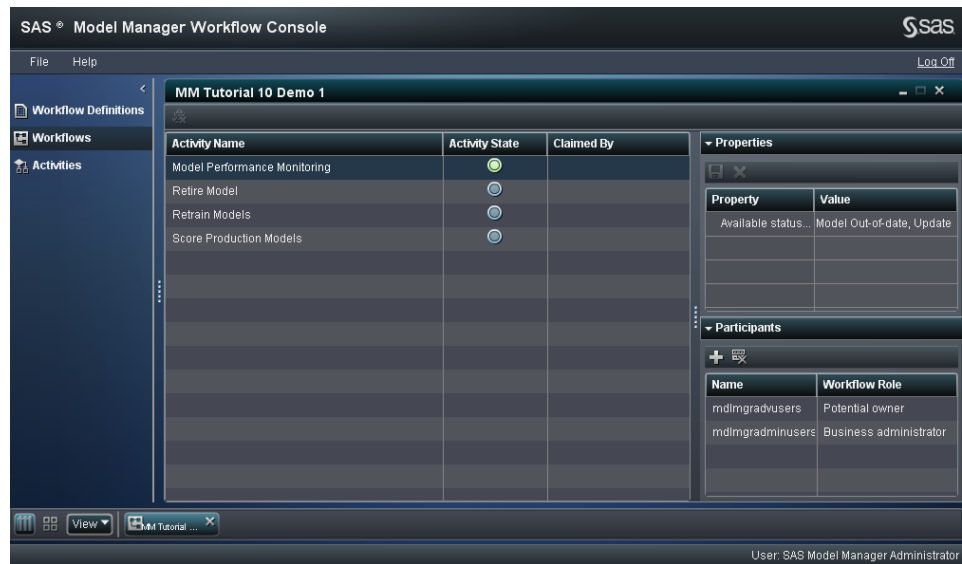
<p>▼ Retraining Models Actions [icon]</p> <p>mdlmgadmin Oct 25, 2012 12:54 PM</p> <p>What models should be retrained?</p> <p>Reply</p>
<p>▼ History Log Actions [icon]</p> <p>mdlmgadmin Oct 25, 2012 12:33 PM</p> <p>MM Tutorial 10 Demo 1 (Workflow): created</p> <p>Reply</p>

New Topic

Assign Participants

To assign an additional participant to an activity, follow these steps:

1. Double-click a workflow to view the Workflow details view, which contains a list of activities that are associated with the workflow.



2. Select the **Retrain Models** activity and click **+** in the **Participants** pane. The Assign a Participant window appears.

Specify the values for the participant that you want to assign to this activity.

Identity type:

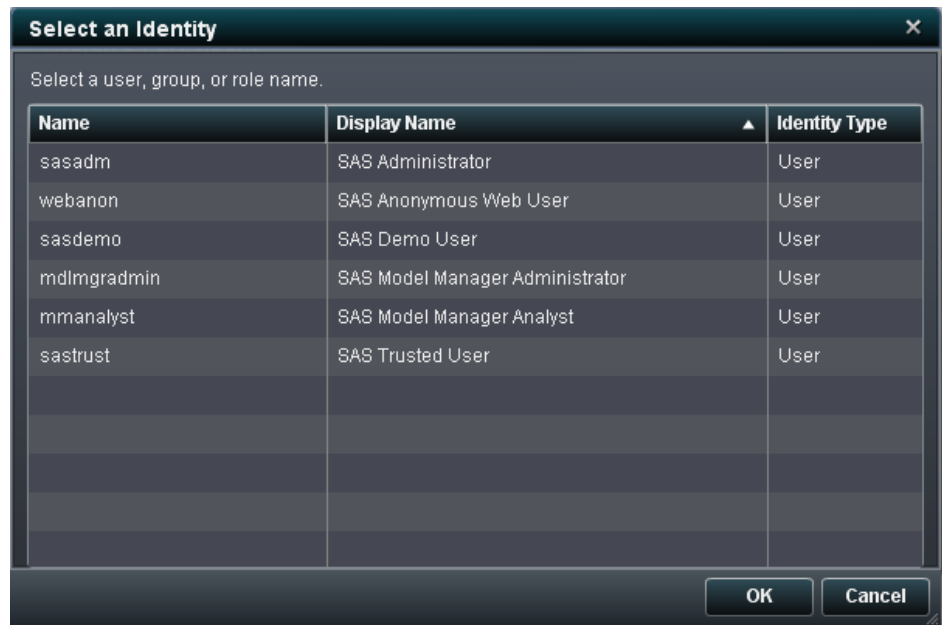
Name:

Workflow role:

OK **Cancel**

3. Select one of the identity types: user, group, or role. The SAS Model Manager user groups that were created by default during installation and configuration were assigned to each activity when the sample workflow process definition was created.
4. Enter part of the user, group, or role name. For example, you can enter the user name **sasdemo** or part of a user name that exists on the SAS Metadata Server. Then click .

Note: If you do not enter part of the name, all of the names for the selected identity type are displayed. In addition, if you manually enter a name value and do not click the search button, the name is verified against the SAS identity participant list when you click **OK**.



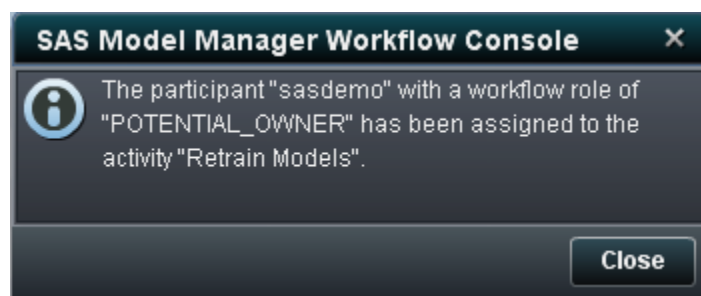
Select a name and click **OK**.

5. Select a workflow role for the participant.

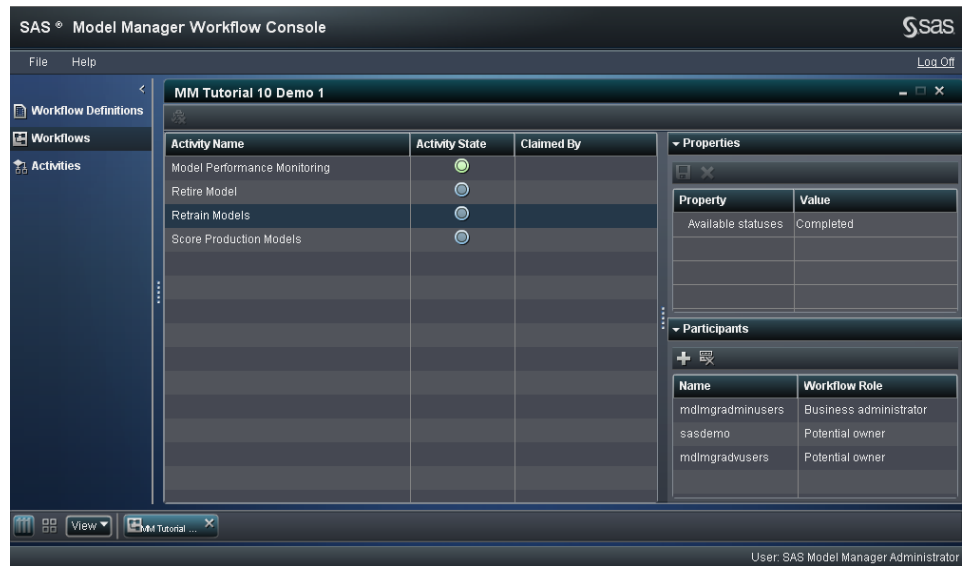
Here are the workflow roles that you can assign to participants for a workflow activity:

- **Business administrator:** a participant who can influence the progress of an activity by actions such as adding comments, assigning an activity, or releasing the activity claimed by another user.
- **Potential owner:** a participant who can claim an activity in a workflow process and who becomes the actual owner of an activity.

Click **OK**. A message appears, indicating whether the participant was successfully assigned to the activity. For example, the user **sasdemo** was assigned the workflow role of **potential owner**.



6. Click **Close**. Here is an example of the properties and participants that are associated with the **Retrain Models** activity.



Terminate a Workflow Process

When you terminate a workflow process, all activities that have not yet been completed in the workflow process are changed to a state of **Terminated**. After you terminate a workflow process, it cannot be restarted.

To terminate a workflow process, follow these steps:

1. From the Workflows category view, select one of the workflows that you created in the exercise “[Manage Workflows](#)” on page 247 , and click

Note: In order to continue with this tutorial, you need to keep at least one workflow active.

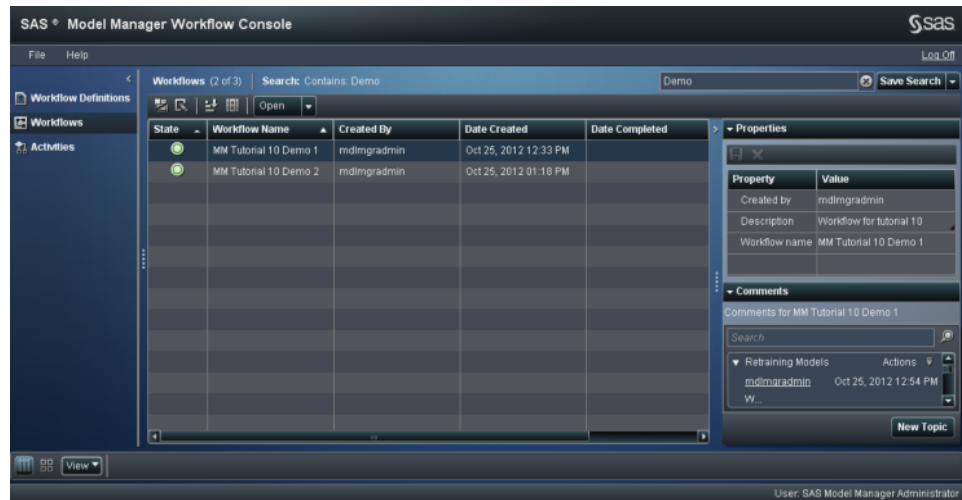
2. Click **Yes** to terminate the workflow process.
3. Click **Close** to return to the Workflows category view.

Search List Content

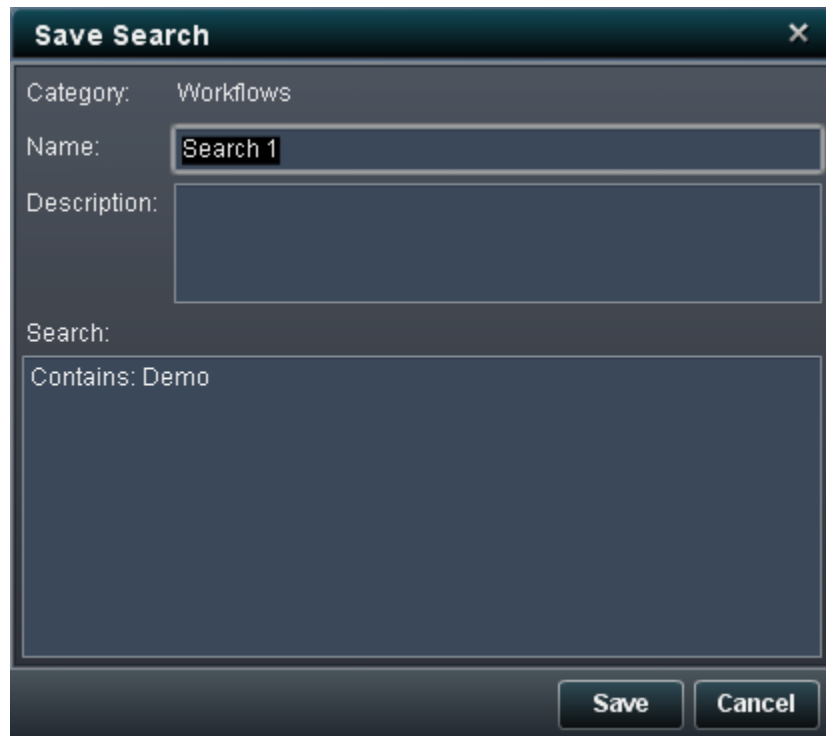
You can search the list in a category view to display only particular workflow definitions, workflows, or activities. For example, suppose you want to see only workflows in the Workflows category view that contain the text **Demo**.

To search the content that appears in the list, follow these steps:

1. On the search bar, specify the search criteria of **Demo** in the **Search** box. Here is an example of the list with the search criteria applied.



- To save the search, click **Save Search**. The Save Search window appears.



- In the Save Search window, specify a name for the search and an optional description. Click **OK**.

Note: The search name and description can be modified in the Manage Saved Searches window. The rule cannot be modified for an existing search. If you want to change the rule, you must create a search that has the same name to replace the existing search. For more information, see “Searching List Content” in Chapter 21 of *SAS Model Manager: User's Guide*.

Chapter 12

Tutorial 11: Scoring a SAS Model Manager Model Using SAS Data Integration Studio

Overview of Using Published Models in SAS Data Integration Studio	257
Prerequisites	258
Publish a Project Champion Model from SAS Model Manager	258
Score a Model Using a SAS Data Integration Studio Job	259
Open the SAS Data Integration Studio Desktop	259
Create a New Job	259
Run the SAS Data Integration Studio Scoring Job	261
Verify the Model Code Used in the Job	262
Declare and Publish a New Champion Model in SAS Model Manager	263
Update the Job to Use the Latest Champion Model	263

Overview of Using Published Models in SAS Data Integration Studio

The SAS Model Manager publish feature enables you to publish models to the SAS Metadata Repositories, making them available for other SAS products such as SAS Data Integration Studio and SAS Enterprise Guide. SAS Model Manager offers two publish methods:

- Publish a model
- Publish a project champion model

When you publish a SAS Model Manager project champion model to the metadata repository, the result is a mining results object that contains the champion model of the project's default version. In order for the mining results object in the SAS Metadata Repository to be updated with the new champion model, two conditions must be met: the champion model in the project's default version is changed and the model is published from the project level again to the same SAS metadata folder.

To illustrate an application that can use a published SAS Model Manager project champion model, this tutorial uses SAS Data Integration Studio to connect metadata objects (including a mining results object) to create a scoring job.

Prerequisites

The exercises in this tutorial depend on some of the properties of the specific models that were added in Tutorial 3. Use the projects, versions, or models that are specified here. This tutorial is designed to follow [Chapter 4, “Tutorial 3: Importing Models, Scheduling Scoring Tasks, and Creating Reports,”](#) on page 75.

The scoring input and output tables from SMM121Tutorial.zip must be extracted and registered in SAS Management Console. If the data sets have not been extracted and registered, see [“Prepare Tutorial 11 Data Sets and Models”](#) on page 14 to extract and register the files. The users must also have Write and Modify permissions to the `<server-name>\<drive>\SMM121Tutorial\Tutorial11\Samples` directory.

This exercise requires SAS Data Integration Studio. Use the SAS Deployment Wizard to install the SAS Data Integration Studio client.

Publish a Project Champion Model from SAS Model Manager

In this exercise, you publish a project champion model from SAS Model Manager in order for that model to be accessed and scored by SAS Data Integration Studio. When you publish from the project level, you publish the project champion model.

Note: This task requires that you use a user ID that is a member of the SAS Model Manager Advanced Users group or the SAS Model Manager Administrator Users group.

Note: If you create user-defined properties at the project level, these properties are published with the champion model. User-defined properties might be helpful for scoring applications that search mining result objects for specific name- value pairs. Each user-defined project property is stored in the SAS Metadata Repository as an Extension metadata object, which is a name-value pair.

1. In the Project Tree, expand the **Tutorial3** folder.
2. Right-click the **Loan** project and select **Publish Model** ⇒ **to the SAS Metadata Repository**. Click **Yes** for the information message that the project is unlocked. The SAS Metadata Repository dialog box appears.
3. Navigate to the folder where you want to store the model. For example, double-click **Shared Data** ⇒ **Model Manager** and then select the **Tutorial3** folder. Click **OK**. An information message indicates whether the champion model was successfully published. Click **Close**.

Score a Model Using a SAS Data Integration Studio Job

In this exercise, you create a SAS Data Integration Studio scoring job by using the **Loan** mining result from the SAS Metadata Repository. After you create the job, you run the job and view the output.

Open the SAS Data Integration Studio Desktop

To log on to SAS Data Integration Studio:

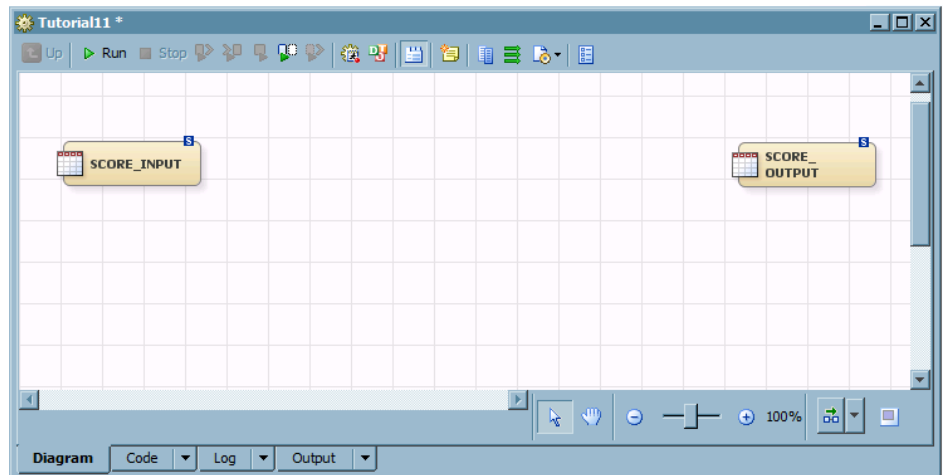
1. Launch SAS Data Integration Studio.
2. If prompted, create a SAS Metadata Profile for the SAS Metadata server.
3. Log on with the profile for SAS Metadata server.

Create a New Job

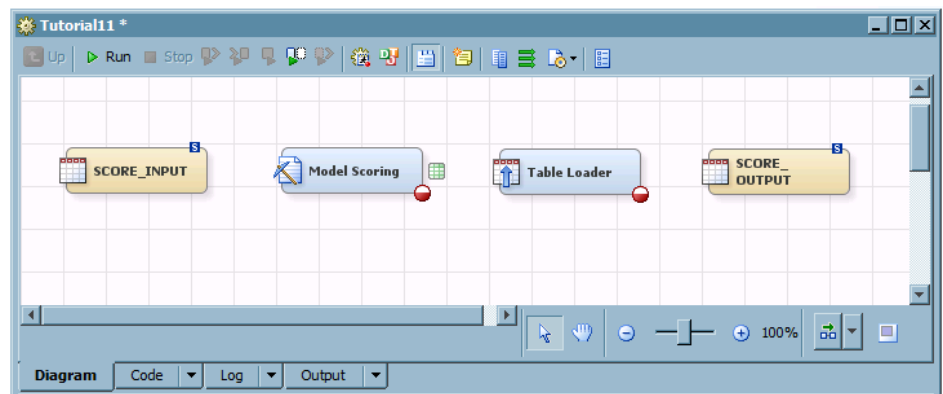
To create a new job, follow these steps:

1. Use the New Job Wizard to add the job:
 - a. From the SAS Data Integration Studio window, right-click **My Folder**. Then select **New** ⇒ **Job**. The New Job dialog box appears.
 - b. In the **Name** box, enter **Tutorial111** and click **OK**.

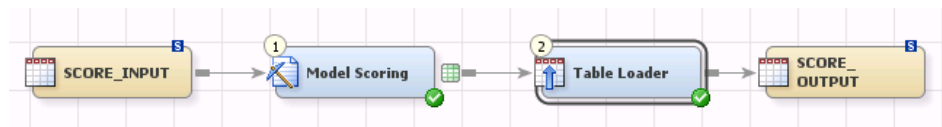
Note: If prompted to choose a default application server, select **SASApp**, click **Test Connection**, and click **OK** in the confirmation message. Then click **OK** in the Default Application Server window.
 - c. Click the **Inventory** tab, expand **Table**, and find the tables **SCORE_INPUT** and **SCORE_OUTPUT** that have the folder location for the Tutorial11 data sets. Here is an example: **/Shared Data/Model Manager/Tutorial111**.
 - d. Click and drag **SCORE_INPUT** to the **Diagram** tab. Click and drag **SCORE_OUTPUT** to the **Diagram** tab. Position the **SCORE_INPUT** node farthest to the left. Position the **SCORE_OUTPUT** node farthest to the right. These nodes are the beginning and ending nodes in the diagram. Leave enough space between them for two additional diagram nodes to occupy.



- e. Click the **Transformations** tab and expand **Access**. Select and drag **Table Loader** to the **Diagram** tab. Place the **Table Loader** node before the **HMEQ SCORE_OUTPUT** node.
- f. From the **Transformations** tab, expand **Data**. Select and drag **Model Scoring** to the **Diagram** tab. Place the **Model Scoring** node between the **HMEQ SCORE_INPUT** node and the **Table Loader** node. Here is the **Diagram** tab:



- g. Double-click the **Model Scoring** node. The Model Scoring Properties window appears. Click the **Models** tab, expand **Mining Results**, and select **Loan**. The UUID in the **Key** box is the UUID of the **Loan** project in SAS Model Manager.
2. Click the **Target Table Columns** tab. Expand **OutputTable**, select **score**, and click . Click **OK**.
3. Drag the output handle from the **SCORE_INPUT** node to the **Model Scoring** node. The half-filled circle on the **Model Scoring** node is changed to a check mark to indicate that the node requirements have been met.
4. Drag the output handle from the **Model Scoring** node to the **Table Loader** node.
5. Drag the output handle from the **Table Loader** node to the **SCORE_OUTPUT** node. The half-filled circle on the **Table Loader** node is changed to a check mark to indicate that the node requirements have been met. Here is the diagram:

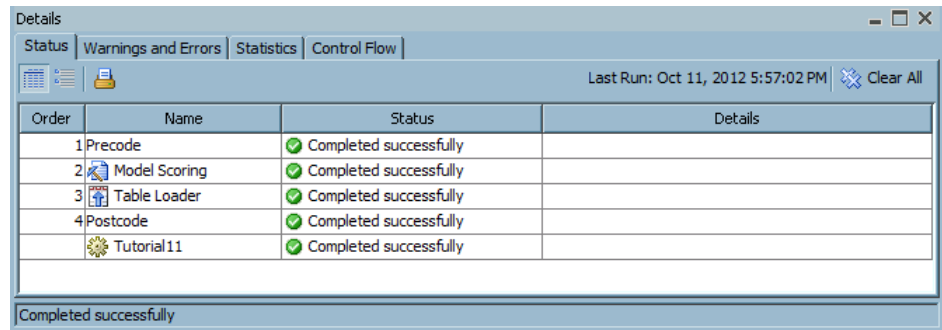


6. Save the job. Click **File** ⇒ **Save**.

Run the SAS Data Integration Studio Scoring Job

To run the job and view the output, follow these steps:

1. On the **Diagram** tab, click **Run**. The Tutorial11 job runs. Here is the job status:

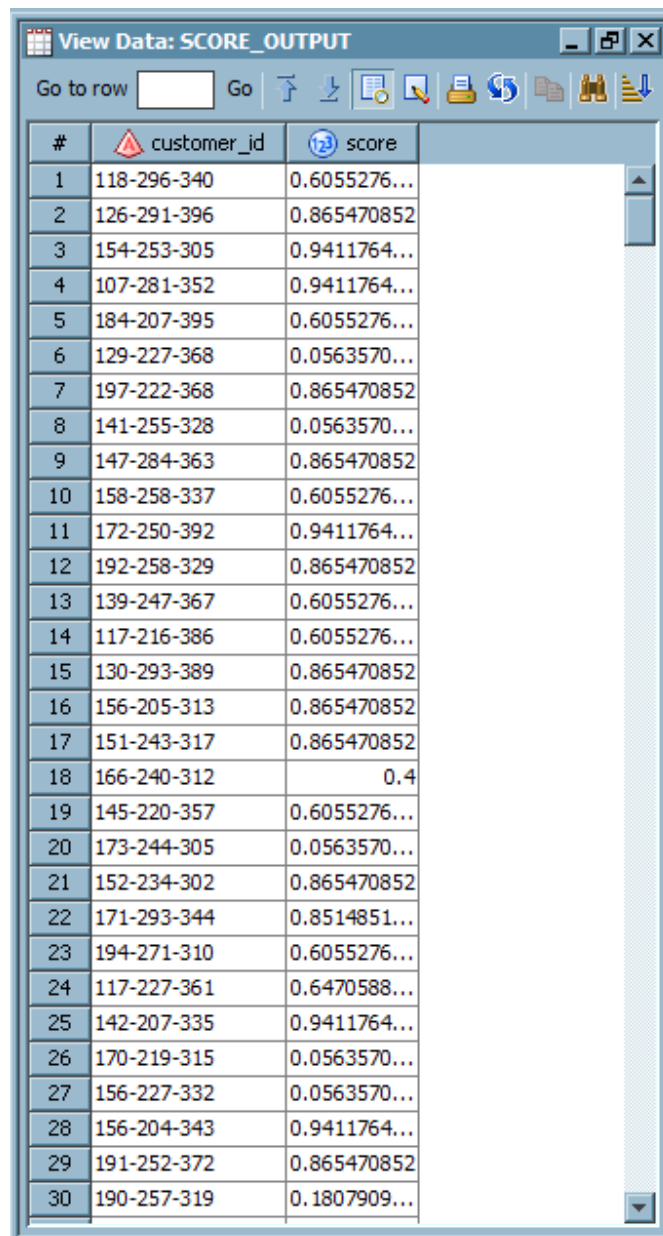


The screenshot shows the 'Details' window in SAS Data Integration Studio. It has tabs for 'Status', 'Warnings and Errors', 'Statistics', and 'Control Flow'. The 'Status' tab is active, showing a table of job steps. At the top right, it says 'Last Run: Oct 11, 2012 5:57:02 PM' and 'Clear All'. The table lists five steps: Precode, Model Scoring, Table Loader, Postcode, and Tutorial11, all with a status of 'Completed successfully'. A summary bar at the bottom indicates 'Completed successfully'.

Order	Name	Status	Details
1	Precode	Completed successfully	
2	Model Scoring	Completed successfully	
3	Table Loader	Completed successfully	
4	Postcode	Completed successfully	
	Tutorial11	Completed successfully	

Completed successfully

2. To view the output, right-click the **SCORE_OUTPUT** node and select **Open**. Here is the output:



#	customer_id	score
1	118-296-340	0.6055276...
2	126-291-396	0.865470852
3	154-253-305	0.9411764...
4	107-281-352	0.9411764...
5	184-207-395	0.6055276...
6	129-227-368	0.0563570...
7	197-222-368	0.865470852
8	141-255-328	0.0563570...
9	147-284-363	0.865470852
10	158-258-337	0.6055276...
11	172-250-392	0.9411764...
12	192-258-329	0.865470852
13	139-247-367	0.6055276...
14	117-216-386	0.6055276...
15	130-293-389	0.865470852
16	156-205-313	0.865470852
17	151-243-317	0.865470852
18	166-240-312	0.4
19	145-220-357	0.6055276...
20	173-244-305	0.0563570...
21	152-234-302	0.865470852
22	171-293-344	0.8514851...
23	194-271-310	0.6055276...
24	117-227-361	0.6470588...
25	142-207-335	0.9411764...
26	170-219-315	0.0563570...
27	156-227-332	0.0563570...
28	156-204-343	0.9411764...
29	191-252-372	0.865470852
30	190-257-319	0.1807909...

Verify the Model Code Used in the Job

To verify that you have used the correct model, view the model code that was used in the SAS Data Integration Studio job.

Click the **Code** tab and scroll down through the lines until you find the following comment block:

```

*-----*;
* TOOL: Score Node;
* TYPE: ASSESS;
* NODE: Score;
*-----*;
*-----*;
* EM SCORE CODE;
* VERSION: 7.1;

```



```

* GENERATED BY: mdlmgradmin;
* CREATED: 19JAN2011:14:19:11;
*-----*;
*-----*;
* TOOL: Input Data Source;
* TYPE: SAMPLE;
* NODE: Ids;
*-----*;
*-----*;
* TOOL: Decision Tree;
* TYPE: MODEL;
* NODE: Tree;
*-----*;
*****
*****          DECISION TREE SCORING CODE          *****
*****

```

The **NODE** value that is associated with **TYPE: MODEL** is the model name. In this case, the model name is **Tree**.

Declare and Publish a New Champion Model in SAS Model Manager

In this exercise, you declare a different model as the champion model after an initial project champion model has been published to the SAS Metadata Repository. You then publish the new project champion model to the metadata repository.

To declare and publish a new champion model, do the following:

1. In the SAS Model Manager Project Tree, expand the **Tutorial3** folder, the **Loan** project, the **2012** version, and the **Models** folder.
2. Right-click the **Reg 1** model and select **Set as Champion**.
3. When prompted to confirm the change, click **Yes**.
4. Right-click the **Loan** project and select **Publish Models** ⇒ **to the SAS Metadata Repository**. Click **Yes** in the message window. The SAS Metadata Repository window appears.
5. Double-click **Shared Data** ⇒ **Model Manager**, select **Tutorial3**, and click **OK**. Click **Yes** in the confirmation message box to replace the champion model.

An information message indicates whether the champion model was successfully published. Click **Close** to close the message box.

For more information about this task, see the *SAS Model Manager: User's Guide*.

Update the Job to Use the Latest Champion Model

This exercise demonstrates the steps to update the SAS Data Integration Studio job after you change the champion model in SAS Model Manager. After you publish the **Loan**

project from SAS Model Manager, SAS Data Integration Studio recognizes a new mining results object.

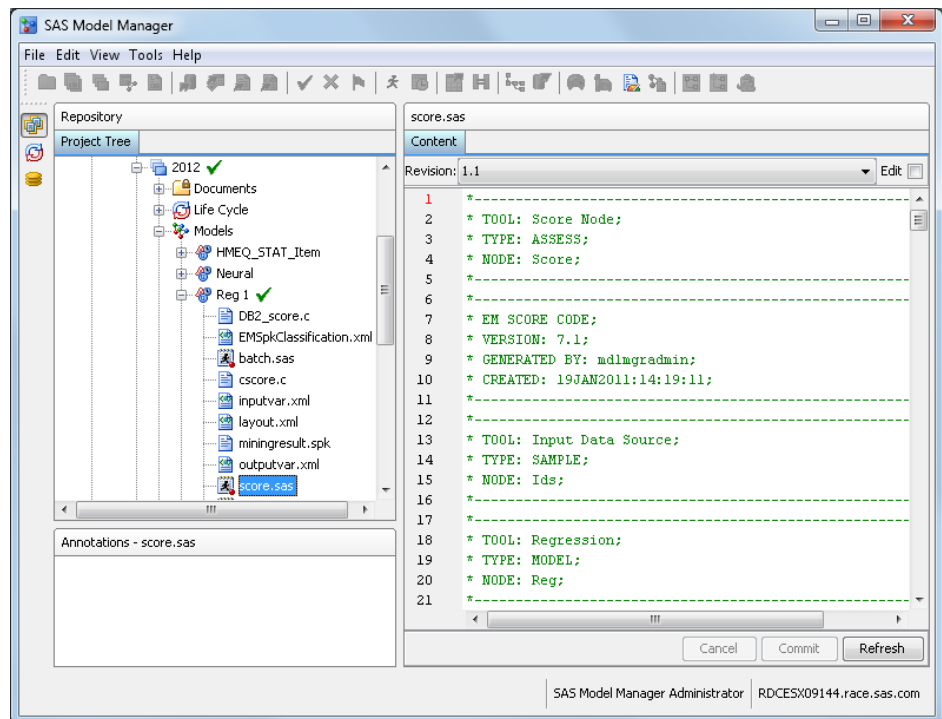
To update the job, follow these steps:

1. Close and reopen Tutorial11.
 - a. Click the Tutorial11 window and select **File** ⇒ **Close**.
 - b. Click the **Folders** tab and expand **My Folder**. Double-click **Tutorial11** to reopen the job. When the job reopens, it uses the new score code from the Mining Result object and regenerates the code that is associated with the job.
2. In the **Tutorial11** diagram, right-click the **Model Scoring** node and select **Properties**. The Model Scoring Properties window appears. Click the **Models** tab. The **Loan** mining result is highlighted. The **Algorithm** box shows that the model is a **Regression** model.
3. Click the **Model Attributes** tab. A message box might appear that warns of potential table changes if you change the mining result. Click **Yes**.
4. Click **View Source Code**. Scroll to the top of the window. Compare the text in the comment tags to the Reg 1 model code in SAS Model Manager. They are the same, as shown in the displays below.

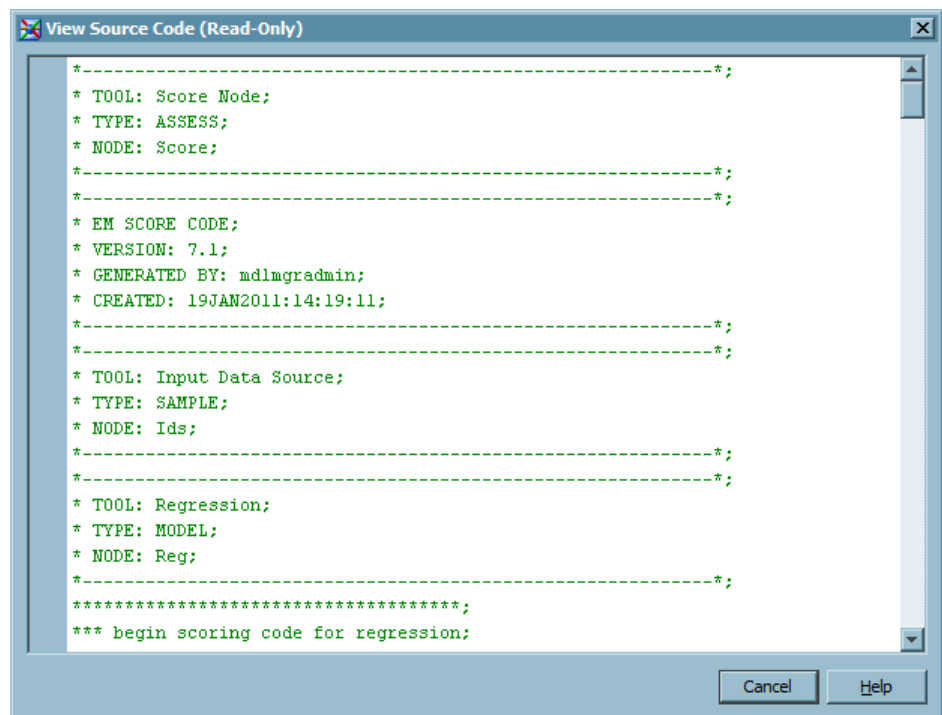
To view the model code in SAS Model Manager, follow these steps:


- a. Log on to SAS Model Manager and expand the following Project Tree nodes:
 - **Tutorial3** folder
 - **Loan** project
 - **2012** version
 - **Models** folder
 - **Reg 1** model
- b. In the **Reg 1** model, select **score.sas**. The model code appears in the **Content** view.


Here is the Reg 1 score code in SAS Model Manager.



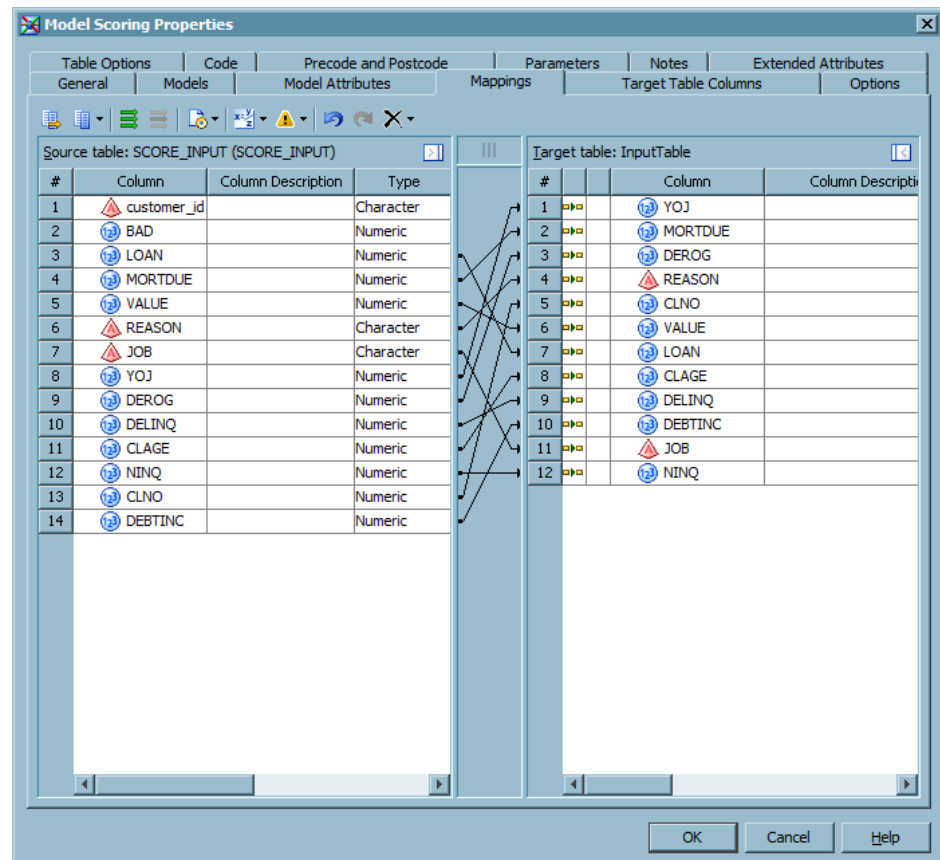
Here is the Reg 1 score code in SAS Data Integration Studio.



5. Click **Cancel** to close the View Source Code window.
6. Identify the variables to be used in the transform output. Click the **Target Table Columns** tab. If **score** and **customer_id** are not in the **Selected** list, follow these steps:
 - a. From the **Available** list, select **score** and click  to move the **score** variable to the **Selected** list.

- b. From the **Available** list, expand **SCORE_INPUT**, select **customer_id**, and click  to move the **customer_id** variable to the **Selected** list.

7. Click the **Mappings** tab. Right-click the space between the two lists of variables and select **Map All**. Here is the **Mappings** tab:



Click **OK**.

8. Double-click the **Table Loader** node and click the **Mappings** tab.
9. Right-click the space between the two lists of variables and select **Map All**. Click **OK**.
10. On the **Diagram** tab, and click **Run**. The **Tutorial11** job runs.
11. To view the output, right-click the **SCORE_OUTPUT** node and select **Open**. Here is a partial view of the output:

View Data: SCORE_OUTPUT		
Go to row <input type="text"/> Go		
#	customer_id	score
1	118-296-340	0.0891795...
2	126-291-396	0.0891795...
3	154-253-305	0.0891795...
4	107-281-352	0.0891795...
5	184-207-395	0.0891795...
6	129-227-368	0.1158766...
7	197-222-368	0.0891795...
8	141-255-328	0.1078593...
9	147-284-363	0.0891795...
10	158-258-337	0.0891795...
11	172-250-392	0.0891795...
12	192-258-329	0.0891795...
13	139-247-367	0.0891795...
14	117-216-386	0.0891795...
15	130-293-389	0.0891795...
16	156-205-313	0.0891795...
17	151-243-317	0.0891795...
18	166-240-312	0.0891795...
19	145-220-357	0.0891795...
20	173-244-305	0.0400147...
21	152-234-302	0.0891795...
22	171-293-344	0.0891795...
23	194-271-310	0.0891795...
24	117-227-361	0.0891795...
25	142-207-335	0.0891795...
26	170-219-315	0.1256677...
27	156-227-332	0.0319573...
28	156-204-343	0.0891795...
29	191-252-372	0.0891795...
30	190-257-319	0.0891795...

