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Chapter 1
Introduction

Overview

SAS Model Manager provides a set of macros that you can use in your SAS programs to manage models that are within projects and folders. These macros are useful for handling many aspects of the model life cycle as well. You can create repositories, add folders, projects, and versions, and you can also import models into the SAS Model Manager common model repository. As part of the model life cycle, you can monitor performance and publish models to CAS, Hadoop, Teradata, or SAS Micro Analytic Service.

Here are the types of macros that are available for use:

• Model management macros
• Performance monitoring macros
• Publish destination macros

Prerequisites for Using Macros

The SAS Workspace Server does not automatically retrieve the authorization token when you call a macro in SAS Studio 4.4. You must specify the authorization token with the %MM_GET_TOKEN macro and the TOKEN= argument to call all macros in SAS Studio 4.4. You do not need to specify the authorization token or argument for SAS Studio 5.1 and later. For more information, see “%MM_GET_TOKEN” on page 4.

Note: Users must also have the appropriate permissions to run the SAS Model Manager macros. For more information, see “Managing Permissions” in SAS Model Manager: Administrator’s Guide.
Overview of Model Management Macros

Use these macros in a SAS program to create repositories, folders, projects, and versions, as well as import models within the SAS Model Manager common model repository. You can import models into a repository, folder, or project that you have permissions to. You can also use these macros to retrieve objects by UUID or delete objects from the common model repository. You can use SAS Studio to run these macros.

Important: When a user’s SAS environment is in the locked-down state with limited file system access, all access validation to the host file system is done through the lockdown path list. In order to run macros such as %MM_IMPORT_MODEL, %MM_IMPORT_ASTORE_MODEL, and %MM_PUBLISH_MODEL that require access to the file system, your system administrator must add access for the HTTP access method to the lockdown whitelist. For more information, see “LOCKDOWN Statement” in SAS Viya Administration: Programming Run-Time Servers.
Note: Make sure that your user ID can be authenticated through the SAS Logon
Manager and Identities Service and that you have the appropriate permissions for
using these macros. If you cannot generate an authorization token, contact your SAS
application administrator. If you are using SAS Studio 4.4, see “Prerequisites for
Using Macros” on page 1.

Tip When passing UUIDs in as arguments, it is a good practice to wrap %STR() around
the UUID values or macro variables. The reason is that in the SAS language,
a stand-alone string (for example, A1B2C3D4-E5F6-A7B8-C9D0-12345678) that
contains a hyphen (-) can be interpreted by the parser as a mathematical operation.

Dictionary

%MM_GET_TOKEN
Generates an authorization token to be used with the SAS Model Manager publish destination and model
management macros.

Syntax

%MM_GET_TOKEN (  
   BASEURL=host-name:<port>,  
   USER=user-ID,  
   PW=password,  
   TOKENNAME=authorization-token-name  
);

Required Arguments

BASEURL=host-name <:port>
specifies the URL where SAS Model Manager is running. It includes the host name
and port for the application server. The default port is 80.

USER=user-ID
specifies a user ID that has permission to access database content.

PW=password
specifies the password for the user ID that is entered with the USER= parameter.

TOKENNAME=authorization-token-name
specifies the name of the generated token that is used for a secure connection when
executing the macros. The value must be a valid SAS name. This authorization token
name can be specified with the TOKEN= argument for the publish destination and
model management macros.

Note: You must specify the authorization token name with the
%MM_GET_TOKEN macro and the TOKEN= argument to call all macros in
SAS Studio 4.4.
Example

Example Code 1  Set Macro Variables

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;
```

Example Code 2  Get Authorization Token

```sas
%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);
```

%MM_CREATE_REPOSITORY Macro

Adds a repository folder to the common model repository.

**Note:** Only SAS Administrators and other authorized users can create a repository. When a repository is created using this macro, an associated folder is created for it within the Folders service. However, the repository folder exists only in order to store metadata about the repository and should not be used for user content. It is recommended, that you create a subfolder within the repository folder to store content. This can be done using the %MM_CREATE_FOLDER macro.

**Syntax**

```
%MM_CREATE_REPOSITORY (
    REPOSITORYNM =repository-name, 
    SERVERNM =host-name:<port>, 
    <REPOSITORYDESC =repository-description>, 
    <REPOSFOLDERID =repository-folder-ID>, 
    <TOKEN =authorization-token>, 
    <REPOSID =repository-ID>, 
);
```

**Required Arguments**

- **REPOSITORYNM =repository-name** specifies the name of the repository.
- **SERVERNM=host-name <port>** specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

**Optional Arguments**

- **REPOSITORYDESC =repository-description** specifies the name of the repository.
REPOSFOLDERID =repository-folder-ID-macro-variable
specifies the macro variable to assign to the repository folder ID. A repository folder ID is assigned by the Folders service when this macro is successfully run. If this argument is not included, the default macro variable name that is created is “_reposFolderID”.

REPOSID =repository-ID-macro-variable
specifies the macro variable to assign to the ID for the repository. The repository ID is assigned when this macro is successfully run. If this argument is not included, the default macro variable name that is created is “_reposID”.

TOKEN=%authorization-token
specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%m_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);

%m_create_repository(
    repositorynm   = MyRepository,
    repositorydesc = Description of MyRepository,
    reposfolderID  = repFolderID,
    servernm       = &servernm,
    token          = %myTokenName,
    reposID        = repID
);

%MM_CREATE_FOLDER Macro

Adds a folder to a repository.

Syntax

%MM_CREATE_FOLDER ( 
    FOLDERNM =folder-name, 
    REPOSFOLDERID =repository-folder-ID, 
    SERVERNM =host-name:<port>, 
    TOKEN =%authorization-token>, 
    <FOLDERID =folder-ID-macro-variable>, 
);
Required Arguments

FOLDERNM = folder-name
specifies the name of the folder.

REPOSFOLDERID = repository-folder-ID
specifies the folder ID for the repository. This is the UUID assigned by the Folders service

SERVERNM= host-name <; port>
specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

Optional Arguments

TOKEN=%authorization-token
specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

FOLDERID = folder-ID-macro-variable
specifies the macro variable to assign to the folder ID. A folder ID is assigned by the Folders service when this macro is successfully run. If this argument is not included, the default macro variable name that is created is “_folderID”.

Example

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);

%mm_create_folder(
    foldernm   = MyFolder,
    reposfolderID  = %str(&repFolderID),
    servernm   = &servernm,
    token      = %myTokenName,
    folderID   = folderID
);
```

%MM_CREATE_PROJECT Macro

Creates a project within a folder.

Syntax

```sas
%MM_CREATE_PROJECT ( 
```
PROJECTNM = *project-name*,
FOLDERID = *folder-ID*,
<FUNCTION = *model-function-name*>,
SERVERNM = *host-name:*<port>,
<PROJECTID = *project-ID-macro-variable*>,
<PROJECTVERSIONID = *project-version-ID-macro-variable*>,
<TOKEN = *authorization-token*>
);

**Required Arguments**

**PROJECTNM = *project-name***

specifies the name of the folder.

**FOLDERID = *folder-ID***

specifies the ID for the folder where the new project is to be created. This is the UUID assigned by the Folders service.

**SERVERNM = *host-name:*<port>***

specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

**Optional Arguments**

**PROJECTID = *project-ID***

specifies the macro variable to assign to the project ID that is created. A UUID assigned by the Model Repository service. If this argument is not included, the default macro variable name that is created is "_projectID".

**PROJECTVERSIONID = *project-version-ID***

specifies the macro variable to assign to the project version ID that is created. A UUID assigned by the Model Repository service. If this argument is not included, the default macro variable name that is created is "_projectVersionID".

**FUNCTION = *function***

specifies the name of the model function for the project. For more information, see “Types of Model Functions” in SAS Model Manager: User’s Guide.

**TOKEN = *authorization-token***

specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

**Note:** You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

**Example**

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;
%mm_get_token(
  baseURL=&servernm,
  user=&userID,
  pw=&password,
  tokenname=myTokenName
)```

Chapter 2 • Model Management Macros
%MM_CREATE_PROJECTVERSION Macro

Creates a version within a project.

Syntax

%MM_CREATE_PROJECTVERSION (  
PROJECTID =project-ID,  
<PROJECTVERSIONNM =project-version-name>,  
<PROJECTVERSIONDESC =project-version-description>,  
SERVERNM =host-name:<port>,  
<TOKEN =%authorization-token>,  
<PROJECTVERSIONID =project-version-ID-macro-variable>  
);

Required Arguments

PROJECTID =project-ID
specifies the project ID of the project where the project version is to be created.

SERVERNM=host-name <:port>
specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

Optional Arguments

PROJECTVERSIONNM =project-version-name
specifies the name of the project version.

PROJECTVERSIONDESC =project-version-description
specifies the description of the project version.

PROJECTVERSIONID =project-version-ID-macro-variable
specifies the macro variable to assign to the project version ID that is created. A UUID assigned by the Model Repository service. If this argument is not included, the default macro variable name that is created is "_projectVersionID".

TOKEN=%authorization-token
specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.
Example

```plaintext
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
  baseURL=&servernm,
  user=&userID,
  pw=&password,
  tokenname=myTokenName
);

%mm_create_projectVersion(
  projectID        = %str(&projID),
  projectversionnm = myProjVerName,
  projectversiondesc = Description of myProjVerName,
  servernm         = &servernm,
  token            = %myTokenName,
  projectversionID = newProjVerID
);
```

%MM_IMPORT_MODEL Macro

Imports a model into a project version or folder.

Syntax

```plaintext
%MM_IMPORT_MODEL (  
  MODELNM=model-name,  
  MODELLOC=model-location,  
  <MODELID=model-ID-macro-variable>,  
  <MODELDESC=model-description>,  
  <MODELFUNC=model-function-name>,  
  <FILETYPE=ZIP | SPK | PMML | SASAST>,  
  <FILESIZEOVERRIDE=filesize-override-flag>,  
  <PROJECTID=project-ID>,  
  <PROJECTVERSIONID=project-version-ID>,  
  <FOLDERID=folder-ID>,  
  IMPORTINTO=import-into-object,  
  SERVERNM=host-name:<port>,  
  <TOKEN=%authorization-token>
);
```

Required Arguments

**MODELNM=model-name**

specifies the name of the model.
MODELLOC=\texttt{model-location}
\hspace{1em} specifies the location from which the model is to be imported. The location is a physical location on your local file system that SAS Studio can access when running the macro.

IMPORTINTO=\texttt{import-into-object}
\hspace{1em} specifies the location to which the model is to be imported into. The default is the project version when importing models into a project. Valid values are “project”, “folder”, or “projectVersion”. The values are not case sensitive.

SERVERNM=\texttt{host-name <:port>}
\hspace{1em} specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

\textbf{Optional Arguments}

Either the folderID, projectID, or projectID and projectversionID arguments must be provided. If just projectID is specified, the model is imported into the latest project version.

MODELDESC =\texttt{model-description}
\hspace{1em} specifies the description of the model.

MODELID =\texttt{model-ID-macro-variable}
\hspace{1em} specifies the macro variable to assign to the model ID that is created. A UUID assigned by the Folders service. If this argument is not included, the default macro variable name that is created is "\_modelID".

MODELFUNC=\texttt{model-function-name}
\hspace{1em} specifies the name of the function for the model. For more information, see “\textit{Types of Model Functions}” in \textit{SAS Model Manager: User’ s Guide}.

FILETYPE=ZIP | SPK | PMML | SASAST
\hspace{1em} specifies the file type that contains the model content to be imported.

FILESIZEOVERRIDE=\texttt{filesize-override-flag}
\hspace{1em} specifies whether to override the file size limitation for analytic store files when importing a model. Valid values are Y and N.

The FILESIZEOVERRIDE argument is used only when importing locally stored SASAST files. The on-disk byte count is checked, and if it is more than 5MB (5242880 bytes), the import is canceled and a message is given to the user about the size of the file. The user can, however re-issue the same import, adding the FILESIZEOVERRIDE=Y argument to the invocation, and the import of the analytic store file proceeds as usual.

\texttt{Default N}

PROJECTID =\texttt{project-ID}
\hspace{1em} specifies the project ID for the project to import the model into.

PROJECTVERSIONID =\texttt{project-version-ID}
\hspace{1em} specifies the ID for the project version where the model is to be imported into.

\texttt{Default LATEST}

FOLDERID =\texttt{folder-ID}
\hspace{1em} specifies the ID for the folder where the model is to be imported into.

TOKEN=%\texttt{authorization-token}
\hspace{1em} specifies the authorization token that was generated with the \%MM\_GET\_TOKEN macro.
Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Examples

Example 1: Import a SAS Enterprise Miner SPK Model File into a Project
Either the folderID or projectID arguments must be provided. When using the projectID argument, you can also specify the projectversionID. If only the projectID is specified, the model is imported into the latest project version.

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%let model1= /home/models/model1/miningResult.spk;
%let type=SPK;
%mm_import_model(
   modelnm          = MyModel&type,
   modeldesc        = Description of MyModel&type,
   modelfunc        = Classification,
   modelloc         = &model1,
   filesizeoverride = N,
   projectID        = %str(&projID),
   importinto       = project,
   servernm         = &serverNm,
   token            = %myTokenName,
   modelID          = myModelID
);
```

Example 2: Import a Model within a ZIP File into a Project

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%let model2 = /home/models/model2/MyModel.zip;
%let type=ZIP;
%mm_import_model(
   modelnm          = MyModel&type,
   modeldesc        = Description of MyModel&type,
   modelfunc        = Classification,
   modelloc         = &model2,
   filesizeoverride = N,
   projectID        = %str(&projID),
   importinto       = project,
   servernm         = &serverNm,
   token            = %myTokenName,
   modelID          = myModelID
);
Example 3: Import a PMML XML File into a Project

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%let model3 = /home/models/model3/neural.xml;
%mm_import_model(
   modelnm = Neural,
   modeldesc = PMML model,
   modelfunc = Classification,
   modelloc = &model3,
   projectID = %str(&projID),
   importinto = project,
   servernm = &servernm,
   token = %myTokenName,
   modelID = myModelID
);

Example 4: Import an Analytic Store File into a Project

Note: When importing an analytic store file, the file is copied to the Files service. The
FILESIZEOVERRIDE argument is used for handling large files. For more
information, see FILESIZEOVERRIDE on page 11.

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%let model4 = /home/models/model4/hmeq_svm_output.sasast;
%mm_import_model(
   modelnm = HMEQ SVM Analytic Store,
   modeldesc = Analytic store model,
   modelfunc = ,
   modelloc = &model4,
   filesizeoverride = N,
   projectID = %str(&projID),
%MM_IMPORT_ASTORE_MODEL Macro

Imports a single analytic store model into a project or folder.

Interaction: Users must have Read and Write permissions to the source file system directory path for the ModelStore caslib. For more information, see “Configuring Model Data Libraries” in SAS Viya Administration: Models.

Note: This macro performs the same import function as the %MM_IMPORT_MODEL macro, except that the analytic store file is copied to a CAS library by using the RSTORE argument, instead of by using the Files service.

Syntax

%MM_IMPORT_ASTORE_MODEL (  
   LOCATIONID =location-ID,  
   MODELNAME =model-name,  
   RSTORE =astore-cas-table,  
   <BASEURL=%str(host-name:<port>),  
   <MODELDESC =model-description>,  
   <TARGET =target-variable>,  
   <TARGETLEVEL =target-level>,  
   <MINNINGFUNCTION =model-function-name>,  
   <MINNINGALGORITHM =mining-algorithm>,  
   <PROJECTVERSION =project-version>,  
   <TOKEN =authorization-token>  
);  

Required Arguments

LOCATIONID=location-ID  
specifies the project ID or folder ID to which the model is to be imported into. The default is the latest project version when importing models into a project.

MODELNAME =model-name  
specifies the name of the model.

RSTORE=astore-cas-table  
specifies a two-level SAS name for the analytic store CAS table.

Optional Arguments

BASEURL=%str(host-name <:port> )  
specifies the host name and port for the application server.

MODELDESC =model-description  
specifies the description of the model.
TARGET = target-variable
specifies the target variable of the model.

TARGETLEVEL = target-level
specifies the target level of the model. Valid values are binary, interval, nominal, and ordinal.

MININGFUNCTION = model-function-name
specifies the name of the function for the model. For more information, see “Types of Model Functions” in SAS Model Manager: User’s Guide.

MININGALGORITHM = mining-algorithm
specifies the name of the function for the model.

PROJECTVERSION = project-version
specifies the project version where the model is to be imported into. Valid values are NEW and LATEST.

Default LATEST

TOKEN = %authorization-token
specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example: Import a Forest Analytic Store Model into a New Project Version

```sas
%mm_loadData2CAS(sasData= local.hmeqperf_1_q1, outcaslib=public, options=replace);

%mm_import_astore_model(locationID=e62ea618-5911-4949-bd6e-18c6cf903f79, modelname=%nrstr(Forest Astore),
modeldesc=Forest, projectVersion=%str(new), rstore=public.state,
miningAlgorithm=%nrstr(forest), miningFunction=classification);
```

%MM_GET_REPOSITORY_ID

Retrieves the repository ID and repository folder ID for the specified repository name.

Syntax

```sas
%MM_GET_REPOSITORY_ID (   REPOSITORYNM =repository-name,   IDVAR=repository-ID-macro-variable,   SERVERNM =host-name:<port>,   <FLDRIDVAR =repository-folder-ID-macro-variable>,   <TOKEN =%authorization-token>, );
```

Required Arguments

**REPOSITORYNM =repository-name**

specifies the name of the repository. The macro search for the name is not case sensitive.

**IDVAR =repository-ID-macro-variable**

specifies the macro variable to assign to the ID for the repository.

**SERVERNM=host-name <:port>**

specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

Optional Arguments

**FLDRIDVAR =repository-folder-ID-macro-variable**

specifies the macro variable to assign to the repository folder ID. If this argument is not included, the default macro variable name that is created is "_fldrID".

**TOKEN=%authorization-token**

specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

*Note:* You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);
```
%mm_get_repository_id(  
  repositorynm=MyRepository,  
  idvar=myRepID,  
  fldridvar=myRepFldrID,  
  servernm=&servernm,  
  token=%myTokenName  
);

%MM_GET_FOLDER_ID

Retrieves the folder ID for the specified folder name.

Syntax

%MM_GET_FOLDER_ID (  
  FOLDERNM =folder-name,  
  IDVAR=folder-ID-macro-variable,  
  SERVERNM =host-name:<port>,  
  <TOKEN =%authorization-token>  
);

Required Arguments

FOLDERNM =folder-name
  specifies the name of the folder. The macro search for the name is not case sensitive.

IDVAR =folder-ID-macro-variable
  specifies the macro variable to assign to the folder ID.

SERVERNM=host-name <:port>
  specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

Optional Argument

TOKEN=%authorization-token
  specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

%let servernm=http://myserver.com;  
%let userID=myUserID;  
%let password=myPassword;  
%mm_get_token(  
  baseURL=&servernm,  
  user=&userID,  
  pw=&password,  
  tokenname=myTokenName  
);
%MM_GET_PROJECT_ID
Retrieves the project ID for the specified project name.

## Syntax

```sas
%MM_GET_PROJECT_ID (  
    PROJECTNM = project-name,  
    IDVAR = project-ID-macro-variable,  
    SERVERNM = host-name:<port>,  
    <TOKEN = %authorization-token>,  
    );
```

### Required Arguments

**PROJECTNM = project-name**
- specifies the name of the project. The macro search for the name is not case sensitive.

**IDVAR = project-ID-macro-variable**
- specifies the macro variable to assign to the project ID.

**SERVERNM = host-name:<port>**
- specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

### Optional Argument

**TOKEN = %authorization-token**
- specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

**Note:** You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

## Example

```sas
%mm_get_project_id(  
    projectnm=MyProject,  
    idvar=myProjID,  
    servernm=&servernm,  
    token=&myTokenName  
    );
```
%MM_GET_PROJECTVERSION_ID

Retrieves the project version ID for the specified project version name.

Syntax

%MM_GET_PROJECTVERSION_ID (  
   PROJECTID = project-ID,  
   <PROJECTVERSIONNM = project-version-name>,  
   IDVAR = project-version-ID-macro-variable,  
   SERVERNM = host-name:<port>,  
   <TOKEN = %authorization-token>  
 );

Required Arguments

PROJECTID = project-ID
   specifies the project ID for the project where the project version is located.

IDVAR = project-version-ID-macro-variable
   specifies the macro variable to assign to the project version ID.

SERVERNM = host-name:<port>
   specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

Optional Arguments

PROJECTVERSIONNM = project-version-name
   specifies the name of the project version. If a value is not specified, the name of the latest version is the default. The macro search for the name is not case sensitive.

TOKEN = %authorization-token
   specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

   %let servernm=http://myserver.com;  
   %let userID=myUserID;  
   %let password=myPassword;  
   %mm_get_token(  
       baseURL=&servernm,  
       user=&userID,  
       pw=&password,  
       tokenname=myTokenName  
   );
%MM_GET_PROJECT_VERSION_ID

Retrieves the project version that is associated with the specified project ID.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4
%MM_DELETE_REPOSITORY

Deletes the repository that is associated with the specified repository name or ID.

**Note:** Only SAS Administrators and other authorized users can delete a repository.

---

**Syntax**

%MM_DELETE_REPOSITORY (  
   REPOSITORYNM = repository-name,  
   REPOSITORYID = repository-ID,  
   SERVERNM = host-name:<port>,  
   <TOKEN = %authorization-token>  
);

**Required Arguments**

**REPOSITORYNM = repository-name**  
specifies the name of the repository. Either the REPOSITORYNM argument or the REPOSITORYID argument are required, but not both. If both are provided, the REPOSITORYNM argument takes precedence.

**REPOSITORYID = repository-ID**  
specifies the ID for the repository. Either the REPOSITORYNM argument or the REPOSITORYID argument are required, but not both. If both are provided, the REPOSITORYID argument takes precedence.

**SERVERNM = host-name:<port>**  
specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

**Optional Argument**

**TOKEN = %authorization-token**  
specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

**Note:** You must specify this argument to call all macros in SAS Studio 4.4.

See [“%MM_GET_TOKEN” on page 4](#)
Example

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%mm_delete_repository(
   repositorynm=MyRepository,
   servernm=&servernm,
   token=%myTokenName
);

%MM_DELETE_FOLDER

Deletes the folder that is associated with the specified folder name or ID.

Syntax

%MM_DELETE_FOLDER (  
   FOLDERNM =folder-name,  
   FOLDERID=folder-ID,  
   SERVERNM =host-name:<port>,  
   <TOKEN =authorization-token>  
);

Required Arguments

FOLDERNM =folder-name  
   specifies the name of the folder. Either the FOLDERNM argument or the  
   FOLDERID argument are required, but not both. If both are provided, the  
   FOLDERNM argument takes precedence.

FOLDERID =folder-ID  
   specifies the ID for the folder. Either the FOLDERNM argument or the FOLDERID  
   argument are required, but not both. If both are provided, the FOLDERNM argument  
   takes precedence.

SERVERNM=host-name <:port>  
   specifies the URL where SAS Model Manager is running. It includes the host name  
   and port for the application server. The default port is 80.

Optional Argument

TOKEN=authorization-token  
   specifies the authorization token that was generated with the %MM_GET_TOKEN  
   macro.
You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%mm_delete_folder(
   /* Either foldernm or folderID can be used. */
   foldernm=MyFolder,
   /* folderID=&myFldrID, */
   servernm=&servernm,
   token=%myTokenName
);

%MM_DELETE_PROJECT

Deletes the project that is associated with the specified project name or ID.

Syntax

%MM_DELETE_PROJECT (  
   PROJECTNM =project-name,
   PROJECTID=project-ID,
   SERVERNM =host-name:<port>,
   <TOKEN =%authorization-token>
);

Required Arguments

PROJECTNM =project-name  
specifies the name of the project. Either the PROJECTNM argument or the
PROJECTID argument are required, but not both. If both are provided, the
PROJECTNM argument takes precedence.

PROJECTID =project-ID  
specifies the ID for the project. Either the PROJECTNM argument or the
PROJECTID argument are required, but not both. If both are provided, the
PROJECTNM argument takes precedence.

SERVERNM=host-name <port>  
specifies the URL where SAS Model Manager is running. It includes the host name
and port for the application server. The default port is 80.
Optional Argument

TOKEN=%%authorization-token

specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);  

%mm_delete_project(
   /* Either projectnm or projectID can be used.*/
   projectnm=MyProject,
   /* projectID=%str(&projID), */
   servernm=&servernm,
   token=%myTokenName
);  

%MM_DELETE_PROJECTVERSION

Deletes the project version that is associated with the specified project version name or ID. If only one project version exists, it is not deleted.

Syntax

%MM_DELETE_PROJECTVERSION (
   PROJECTID =project-ID,
   SERVERNM =host-name:<port>,
   <PROJECTVERSIONNM =project-version-name>,
   <PROJECTVERSIONID =project-version-ID-macro-variable>,
   <TOKEN =%%authorization-token>
);

Required Arguments

PROJECTID =project-ID

specifies the project ID of the project where the project version is to be created.

SERVERNM=host-name <port>

specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.
Optional Arguments

PROJECTVERSIONNM =*project-version-name*

specifies the name of the project version. Either the PROJECTVERSIONNM argument or the PROJECTVERSIONID argument are required, but not both. If both are provided, the PROJECTVERSIONNM argument takes precedence.

PROJECTVERSIONID =*project-version-ID-macro-variable*

specifies the project version ID. Either the PROJECTVERSIONNM argument or the PROJECTVERSIONID argument are required, but not both. If both are provided, the PROJECTVERSIONNM argument takes precedence.

TOKEN=*

authorization-token*

specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

*Note:* You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);

%mm_delete_projectversion(
    projectID=%str(&projID.),
    /* If the projectversionnm argument is omitted, */
    /* the LATEST version name is the default. */
    /* Either projectversionnm or projectversionID can be used. */
    projectversionnm=myProjVerName,
    /* projectversionID=%str(&projVerID), */
    servernm=&servernm,
    token=&myTokenName
);
```

%MM_DELETE_MODEL

Deletes a model from the common model repository.

*Note:* If one or more models are found with the same name, a listing that contains all of the model names is returned. No models are deleted.

**Syntax**

```sas
%MM_DELETE_MODEL ( 
    MODELNM =model-name, 
    MODELID=model-ID, 
)```
SERVERNM =<host-name>:<port>,
<TOKEN =%authorization-token>
);

**Required Arguments**

MODELNM =model-name
specifies the name of the model. Either the MODELNM argument or the MODELID argument are required, but not both. If both are provided, the MODELNM argument takes precedence.

MODELID=model-ID
specifies the model ID. Either the MODELNM argument or the MODELID argument are required, but not both. If both are provided, the MODELNM argument takes precedence.

SERVERNM=<host-name <:port>
specifies the URL where SAS Model Manager is running. It includes the host name and port for the application server. The default port is 80.

**Optional Argument**

TOKEN=%authorization-token
specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

*Note:* You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

**Example**

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%mm_delete_model(
   /* Either projectversionnm or projectversionID can be used.*/
   modelnm=MyModel,
   /* modelID=%str(&myModelID), */
   serverNm=&servernm,
   token=%myTokenName
);
```

**%MM_PUBLISH_MODEL**

Publishes a model to CAS, Hadoop, SAS Micro Analytic Service, or Teradata.
Interaction: If a value is specified for both the MODELNM and MODELID arguments, then the publish request is based on the model that is found with the specified ID, not the model name.

Syntax

```%MM_PUBLISH_MODEL (  
    MODELNM =model-name,  
    MODELID=model-ID,  
    <MODELNOTES=model-publish-notes>,  
    <MODELINFOFILEREF=model-info-fileref>,  
    <PUBLISHNM=published-model-name>,  
    SCORECODETYPE=model-score-code-type,  
    <SCORECODE=score-code>,  
    <SCORECODEFILEREF=score-code-fileref>,  
    PUBLISHDESTINATION =publish-destination-name,  
    SERVERNM =host-name:<port>,  
    <TOKEN =%authorization-token>  
);```

Required Arguments

**MODELNM =model-name**

specifies the name of the model. Either the MODELNM argument or the MODELINFOFILEREF argument are required, but not both.

**MODELID=model-ID**

specifies the model ID. If your score code is already included as part of the model in SAS Model Manager, provide the model ID and the macro retrieves the score code from the Files service.

*Note:* A value for this argument is required only if publishing a model that is registered in the SAS Model Manager common model repository. When this argument is specified, if you provide a value for the SCORECODE or SCORECODEFILEREF arguments, they are ignored by the macro. If you are publishing a model that is not in the SAS Model Manager common model repository, this argument is not required. However, if this argument is not specified, you must provide a location for the score code in the SCORECODEFILEREF argument, or inline code within the SCORECODE argument.

**SCORECODETYPE =model-score-code-type**

specifies the score code type for the model. A value must be specified for this argument, unless a value is provided for the MODELINFOFILEREF argument.

Valid values are ds2EmbeddedProcess, ds2Package, sasProgram, pmml, dataStep, and analyticStore.

**PUBLISHDESTINATION= publish-destination-name**

specifies the name of the publish destination. You can use the `%MM_PRINTPUBLISHDESTINATION` macro to retrieve a list of the publish destination names.
SERVERNM=host-name <port>
specifies the URL where SAS Model Manager is running. It includes the host name
and port for the application server. The default port is 80.

Optional Arguments

MODELNOTES=model-publish-notes
specifies the publish notes for a model.

Tip: If there are any special characters in the description value, such as commas,
ampersands, or quotes you must enclose the value in %NRSTR().

MODELINFOFILEREF=model-info-fileref
specifies the pre-defined fileref that contains the user-defined publish information
JSON content.

Note: When this argument is specified, if you provide a value for the SCORECODE,
SCORECODEFILEREF, or MODELID arguments, they are ignored by the
macro.

PUBLISHNM=published-model-name
specifies the published name for the model. The default value is the model name
(MODELNM), if not specified.

SCORECODE=model-score-code
specifies inline score code. A value must be specified for this argument, unless a
value is provided for the MODELINFOFILEREF argument.

Tip: If there are any commas, you must enclose the value in %STR().

SCORECODEFILEREF=model-score-code-fileref
specifies a predefined SAS fileref that points to your locally store score code. If a
value is specified for this argument, the SCORECODE argument is ignored by the
macro.

Tip: If there are any commas, you must enclose the value in %STR().

TOKEN=%authorization-token
specifies the authorization token that was generated with the %MM_GET_TOKEN
macro.

Note: You must specify this argument to call all macros in SAS Studio 4.4.

See “%MM_GET_TOKEN” on page 4

Example

Note: To get a list of the publish destinations, see “Example 2: Print Multiple Publish
Destinations” on page 54.

%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
); 

%let pubdest=%str(CAS);
%mm_publish_model(
    modelnm=myModelName,
    modelnotes=%nrstr(Published model notes),
    scorecodetype=dataStep,
    publishnm=myPublishedModelName,
    modelID=%str(&myModelID),
    publishdestination=&pubdest,
    servernm=&servernm,
    token=%myTokenName
);

Chapter 3
Performance Monitoring Macros

Overview of Performance Monitoring Macros

The performance monitor macro uses performance measurement thresholds to benchmark and gauge the performance of a predictive model. When one of the performance measurements exceeds one or more specified indexes or thresholds, warning and alert events occur. It monitors the performance of a model from three categories.

Here are the three categories:

**Characteristic Analysis**

The performance indexes CHAR_P1 and CHAR_P25 represent the count of input variables with deviation index scores exceeding 0.1 and 0.25, respectively.

**Stability Analysis**

The output deviation index scores represent the deviation levels in the distribution of the model’s scored output variables.

**Model Assessment**

The Lift, Gini (ROC and Trend), and Kolmogorov-Smirnov (KS) reports, include the following decay statistics.

- **lift5Decay**
  - is the lift performance decay based on the top 5% of the target population of interest from time A to time B.

- **lift10Decay**
  - is the lift performance decay based on the top 10% of the target population of interest from time A to time B.

- **lift15Decay**
  - is the lift performance decay based on the top 15% of the target population of interest from time A to time B.
lift20Decay
is the lift performance decay based on the top 20% of the target population of interest from time A to time B.

giniDecay
is the performance decay of the Gini index from time A to time B.

ksDecay
is the performance decay of the KS statistic from time A to time B.

See Also


Macro Variables

It is helpful to set up macro variables for repetitive code. SAS Model Manager provides macro variables that can be used by the performance monitoring macros to create reports.

<table>
<thead>
<tr>
<th>Macro Variable Name</th>
<th>Description</th>
<th>Example Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>_MM_PERFEXECUTOR</td>
<td>Indicates where the macro is to be executed. A value of 0 should be specified when running the macro using SAS Studio. If the value is set to 0, the Model Management API is called and a record is inserted into the Job History table. The Job History table is displayed on the Performance tab of a project in the SAS Model Manager web application. If the value is set to 1, a record is not inserted into the Job History table.</td>
<td>0</td>
</tr>
<tr>
<td>_MM_PROJECTUUID</td>
<td>The UUID for the project.</td>
<td>40853758-953e-4d18-92b1-90eeb3f80b08</td>
</tr>
<tr>
<td>_MM_MODELID</td>
<td>The UUID of the model.</td>
<td>7d91298d-03fc-4e50-9fd1-8abdc48436c9</td>
</tr>
<tr>
<td>Macro Variable Name</td>
<td>Description</td>
<td>Example Value</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
</tbody>
</table>
| _MM_MODELFLAG              | The flag that indicates whether the model is a champion model, challenger model, or a candidate model. Here are the values for the different types of model roles:  
  • 0 is for a champion model.  
  • 1 is for a challenger model.  
  • -1 is for a candidate model. | 0             |
| _MM_PredictedVar           | The predicted variable, when the model TARGET level is interval.             | P_PRICE       |
| _MM_EVENTProbVAR           | The posterior probability variable of the event, when the model TARGET level is binary. | P_BAD1        |
| _MM_NONEVENTProbVAR        | The non-event posterior probability variable, when the model TARGET level is binary. If a user does not specify a value, the macro determines its value based on the value of _MM_EVENTProbVAR. If an incorrect value is specified, the result table MM_FITSTAT is not generated. | P_BAD0        |
| _MM_TARGETNONEVENT         | The target non-event value, when the model TARGET level is binary. If a user does not specify a value, the macro determines its value based on the values of _MM_TargetVAR and _MM_TargetLEVEL. If an incorrect value is specified, the result table MM_FITSTAT is not generated.  
  Note: The value for this macro variable is case-sensitive. It must be the same as the value in the input data. | 0             |
<table>
<thead>
<tr>
<th>Macro Variable Name</th>
<th>Description</th>
<th>Example Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>_MM_SCORECODETYPE</td>
<td>The type of model score code. Valid values are DATASTEP, DS2EP, ANALYTICSTORE, and SASPROGRAM.</td>
<td>DATASTEP</td>
</tr>
<tr>
<td></td>
<td><em>Note:</em> The score code type should be set to ANALYTICSTORE if only one analytic store file exists within a model. The score code type should be set to DS2EP if the model contains DS2 embedded process code and one or more analytic store files.</td>
<td></td>
</tr>
<tr>
<td>_MM_PERFOUTCASLIB</td>
<td>The CASLIB and libref for the performance monitoring results.</td>
<td>ModelPerformanceData</td>
</tr>
<tr>
<td>_MM_PERINCASLIB</td>
<td>The global CASLIB and libref of performance monitor input data.</td>
<td>public</td>
</tr>
<tr>
<td>_MM_PERF_INTABLEPREFIX</td>
<td>The prefix of the performance input table name.</td>
<td>hmeqperf</td>
</tr>
<tr>
<td></td>
<td><em>Note:</em> The value for the prefix cannot contain underscores, and spaces are not recommended in the prefix name or the table name.</td>
<td></td>
</tr>
<tr>
<td>_MM_TABLENAMELEVEL</td>
<td>The format for the name of the data input table. See “Prepare Performance Data Sources”.</td>
<td>3</td>
</tr>
<tr>
<td>_MM_PERFSTATICTABLE</td>
<td>hmeqperf_1_q1</td>
<td></td>
</tr>
<tr>
<td>_MM_TARGETVAR</td>
<td>The model target variable. This value is case-sensitive. It must be as same as the value in the input data.</td>
<td>BAD</td>
</tr>
<tr>
<td>_MM_TARGETLEVEL</td>
<td>The level for the target variable.</td>
<td>INTERVAL or BINARY</td>
</tr>
<tr>
<td>_MM_TARGETEVENT</td>
<td>The target event value.</td>
<td>1</td>
</tr>
<tr>
<td>_MM_RUNSCORE</td>
<td>The flag that indicates whether scoring should be run or not. Y is for YES, and N is for NO. Set this value to N when the performance input table already contains the scoring output variables.</td>
<td>Y or N</td>
</tr>
<tr>
<td>Macro Variable Name</td>
<td>Description</td>
<td>Example Value</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td>_MM_MAX_BINS</td>
<td>The global number of bins for all binning variables for characteristic analysis. The valid range is 1 ~ 1000. The default value is 10. <strong>Important:</strong> It is recommended that you use the same value for this macro variable for each time period, when running the %MM_PERFORMANCE_MONITOR macro.</td>
<td>10</td>
</tr>
<tr>
<td>_MM_CAKEEPVARS</td>
<td>The input variables for characteristic analysis. The variables are separated by a blank space.</td>
<td>Value Loan Job</td>
</tr>
<tr>
<td>_MM_KEEPVARS</td>
<td>Input variables for stability analysis. The variables are separated by a blank space. The value is the same as the _MM_PREDICTEDVARS or _MM_EVENTPROBVARS macro variable.</td>
<td>P_BAD1</td>
</tr>
<tr>
<td>_MM_CHARACTERISTICALERT</td>
<td>The alert criterion for characteristic analysis. The default value is <strong>char_p1&gt;2</strong>. <strong>Important:</strong> It is recommended that you use the default value for this macro variable.</td>
<td>char_p1&gt;2</td>
</tr>
<tr>
<td>_MM_CHARACTERISTICWARNING</td>
<td>The warning criterion for characteristic analysis. The default value is <strong>char_p1&gt;5 or char_p25&gt;0</strong>. <strong>Important:</strong> It is recommended that you use the default value for this macro variable.</td>
<td>char_p1&gt;5 or char_p25&gt;0</td>
</tr>
<tr>
<td>_MM_STABILITYALERT</td>
<td>The alert criterion for stability analysis. The default value is <strong>stab_p1 &gt; 1</strong>. <strong>Important:</strong> It is recommended that you use the default value for this macro variable.</td>
<td>stab_p1 &gt; 1</td>
</tr>
<tr>
<td>Macro Variable Name</td>
<td>Description</td>
<td>Example Value</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td>_MM_STABILITYWARNING</td>
<td>The warning criterion for stability analysis. The default value is <code>stab_p1 &gt; 2</code>. Important: It is recommended that you use the default value for this macro variable.</td>
<td>stab_p1 &gt; 2</td>
</tr>
<tr>
<td>_MM_MODELASSESSMENTALERT</td>
<td>The alert criterion for model assessment. The default value is <code>(lift5Decay &gt; 0.15 and lift10Decay&gt;0.12) or (giniDecay &gt; 0.1 or ksDecay &gt; 0.1)</code>. Important: It is recommended that you use the default value for this macro variable.</td>
<td>(lift5Decay &gt; 0.15 and lift10Decay&gt;0.12) or (giniDecay &gt; 0.1 or ksDecay &gt; 0.1)</td>
</tr>
<tr>
<td>_MM_MODELASSESSMENTWARNING</td>
<td>The warning criterion for model assessment. The default value is <code>lift5Decay &gt; 0.05</code>. Important: It is recommended that you use the default value for this macro variable.</td>
<td>lift5Decay &gt; 0.05</td>
</tr>
<tr>
<td>_MM_TRACE</td>
<td>Indicates whether to write a trace log.</td>
<td>ON or OFF</td>
</tr>
<tr>
<td>_MM_SAVEPERFRESULT</td>
<td>Indicates whether to save the performance monitoring results as a data source in the CASLIB “&amp;_MM_PERFOUTCASLIB”.</td>
<td>N or Y</td>
</tr>
<tr>
<td>_MM_ASTORELOCATION</td>
<td>A string that indicates where the analytic store files are located. The file locations are separated by a blank space. In this example, two analytic store files <code>astore.sashdat</code> and <code>astore2.sashdat</code> are stored in the Caslib “caslib1”.</td>
<td>caslib1.astore caslib1.astore2</td>
</tr>
<tr>
<td>_MM_FORCERUNALLDATA</td>
<td>Indicates to force performance monitoring to run against all performance input tables. The default value is N. Important: It is recommended that you use the default value for this macro variable.</td>
<td>N or Y</td>
</tr>
<tr>
<td>Macro Variable Name</td>
<td>Description</td>
<td>Example Value</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>_MM_LOADPERFRESULT</td>
<td>Loads the performance monitoring results if the CAS server is restarted.</td>
<td>N or Y</td>
</tr>
<tr>
<td></td>
<td>The default value is N.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Make sure the performance monitor results are saved before setting the value to Y.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Important:</strong> It is recommended that you use the same value for this macro variable for each time period, when running the %MM_PERFORMANCE_MONITOR macro.</td>
<td></td>
</tr>
<tr>
<td>_MM_JOBID</td>
<td>The performance job ID. If not specified, the macro generates an ID automatically.</td>
<td>0cefee14-453b-409c-ac65-319032ef0936</td>
</tr>
<tr>
<td>_MM_MODELOUTPUTMAPPING</td>
<td>Indicates the model output variable that maps to a project output variable.</td>
<td>EM_EVENTPROBABILITY = P_BAD1</td>
</tr>
</tbody>
</table>

### Set Alert and Warning Conditions

The performance monitor macro uses performance measurement thresholds to benchmark and gauge the performance of a predictive model. It is recommended that you use the default values for the alert and warning conditions when running the %MM_PERFORMANCE_MONITOR macro. However, you can use the following assignment statements if you need to set the alert and warning conditions to different values.

#### Characteristic Analysis

A user can configure the thresholds for the performance indexes CHAR_P1 and CHAR_P25. The CHAR and CHAR indexes represent the count of input variables with deviation index scores exceeding 0.1 and 0.25, respectively.

Here is an example of set alert and warning thresholds:

```plaintext
%let _MM_CharacteristicAlert = %nrstr(char_p1>5 or char_p25>0);
%let _MM_CharacteristicWarning = %nrstr(char_p1>2);
```

#### Stability Analysis

A user can configure output deviation index scores for a model's output variable. The output deviation index scores represent the deviation levels in the distribution of the model’s scored output variables.

Here is an example of set alert and warning thresholds:

```plaintext
%let _MM_StabilityAlert = %nrstr(stab_p1>1);
%let _MM_StabilityWarning = %nrstr(stab_p1>2);
```
Model Assessment reports

For the Lift, Gini (ROC and Trend), and Kolmogorov-Smirnov (KS) reports, a user can configure threshold values for the following decay statistics.

- **lift5Decay**: is the lift performance decay based on the top 5% of the target population of interest from time A to time B.
- **lift10Decay**: is the lift performance decay based on the top 10% of the target population of interest from time A to time B.
- **lift15Decay**: is the lift performance decay based on the top 15% of the target population of interest from time A to time B.
- **lift20Decay**: is the lift performance decay based on the top 20% of the target population of interest from time A to time B.
- **giniDecay**: is the performance decay of the Gini index from time A to time B.
- **ksDecay**: is the performance decay of the KS statistic from time A to time B.

Here is an example of alert and warning thresholds:

```nstr
%let _MM_ModelAssessmentAlert = %nrstr((lift5Decay>0.15 and lift10Decay>0.12)
or giniDecay>0.1 or ksDecay>0.1 );
%let _MM_ModelAssessmentWarning = %nrstr(lift5Decay>0.05);
```

---

**Dictionary**

### %MM_PERFORMANCE_MONITOR Macro

Defines and runs performance monitoring for a champion or challenger model.

**Syntax**

```nstr
%MM_PERFORMANCE_MONITOR (  
  PERFLIB=monitoring-input-caslib,
  PERFDATANAMEPREFIX=input-data-prefix,
  PERFDATASRCDS=single-input-cas-table,
  MM_MART=monitoring-output-caslib,
  ASTOREFREF=fileref-to-analytic-store-file,
  SCORECODEFILEREF=fileref-to-score-code-file,
  RUNSCORE=flag-for-scoring,
  SAVRESULT=flag-for-saving-performance-results
 );
```
**Required Arguments**

**PERFLIB=monitoring-input-caslib**
- specifies the CASLIB for the performance input data.
  
  `perfLib=mmlib`

**PERFDATANAMEPREFIX=input-data-prefix**
- specifies the prefix of the performance input table name. This argument should not be populated when there is a value specified for the PERFDATASRCDS argument.

**PERFDATASRCDS=input-cas-table**
- specifies the name of a CAS input table. This argument should not be populated when there is a value specified for the PERFDATANAMEPREFIX argument.

**MM_MART=monitoring-output-caslib**
- specifies the CASLIB for the performance monitor results.

**SCORECODEURI=score-code-file-URI**
- specifies the URI for the model score code file.

**ASTOREURI=analytic-store-score-code-file-URI**
- specifies the URL for the analytic store score code file.

**ASTOREFREF=fileref-to-analytic-store-file**
- specifies the fileref for the model analytic store file.

**SCORECODEFILEREF=fileref-to-score-code-file**
- specifies the fileref for the model score code file.

  `scoreCodeFref=ep`

When the DS2 embedded process code contains a reference to an analytic store file, you can create a fileref for the DS2 EP code. You can then pass the fileref to the `%MM_PERFORMANCE_MONITOR` macro.

  `filename ep '/r/ge.unx.sas.com/vol/vol120/u12/scnkuj/Models/forest_ep.sas';`

**RUNSCORE=flag-for-scoring**
- specifies the flag that indicates whether scoring should be run or not. The values are Y or N.

**SAVERESULT=flag-for-saving-performance-results**
- specifies to save the performance results out of CAS memory. The values are Y or N.

**Details**

**Prepare Performance Data Sources**

You can choose to provide your own scored input data sources or have the system score the data when running performance. If you choose to provide scored data sources, the data tables must contain the predicted values for the scored model. If you choose to have the system to score your data, the model score code is used to score the data before generating the performance results.

Use one of the following formats for the name of the data table that you use as a data source, or for the name of the data tables that are located in the performance input CAS library (caslib). Note that the value for the prefix cannot contain underscores, and spaces are not recommended in the prefix name or the table name. In addition, the sequence number and time label must be unique across all of the data table names.

- `prefix_sequenceNumber_timeLabel`

  `hmeqperf_1_q1`
• `prefix_sequenceNumber_timeLabel_uuid`
  hmeqPerfScored_1_q1_9d5b4c98-e9f5-4858-8913-07ce91885da0

• `prefix_sequenceNumber_timeLabel_uuid_champion`
  hmeqPerfScored_1_q1_9d5b4c98-e9f5-4858-8913-07ce91885da0_champion

Note: When you provide your own scored input data source and you indicate to use a library that contains tables with a specified prefix, your data table names must contain the UUID of the model.

**How to Run This Macro**

The `%MM_PERFORMANCE_MONITOR` macro can be run using SAS Studio. Here is the process to prepare for running the macro.

1. Connect to a SAS Server.
   ```
   options cashost='cas-server-hostname'
   casport=cas-port-number;
   cas _mmcas_;
   caslib _all_ assign;
   ```
   *Note: The OPTIONS statement is needed only if you are running the macro using a CAS server other than the default CAS server.*

2. Load performance data sources into a caslib. For more information, see “Making Data Available to CAS” in *SAS Data Explorer: User’s Guide.*

3. Upload the model score code to a directory path that is accessible from SAS Studio. Here is an example:
   ```
   ~/.scorecode/score.sas
   ```

4. Set the performance monitor predefined macro variables. The macro variables are used to pass model related properties and control how the performance monitor task is executed. For more information, see “Macro Variables” on page 32.
   ```
   %let _MM_ProjectUUID=%nrstr(40853758-953e-4d18-92b1-90eeb3f80b08);
   %let _MM_ModelID=%nrstr(7d91298d-03fc-4e50-9fd1-8abdc48436c9);
   %let _MM_ModelFlag = 0;
   %let _MM_TargetVar=BAD;
   %let _MM_ScoreCodeType = %str(DATASTEP);
   %let _MM_TargetEvent=1;
   %let _MM_EventProbVar=P_BAD1;
   %let _MM_TargetLevel=BINARY;
   %let _MM_PredictedVar=;
   %let _MM_KeepVars=P_BAD1;
   %let _MM_CAKeepVars=YOJ MORTDUE DEROG VALUE CLNO LOAN CLAGE DELINQ NINQ;
   %let _MM_Trace = OFF;
   %let _MM_Max_Bins = 10;
   %let _MM_PerfOutCaslib=ModelPerformanceData;
   %let _MM_PerfInCaslib=public;
   %let _MM_Perf_InTablePrefix=hmeqperf;
   %let _MM_TableNameLevel = 3;
   %let _MM_RunScore=Y;
   %let _MM_SAVEPERFRESULT=Y;
   ```
Examples

Example 1: Code Example for Running Performance Monitoring for a DATA Step Model

Use SAS Studio to run the code in this example on the default CAS server.

cas _mmcas_;
caslib _all_ assign;

%let _mm_projectuuid=%nrstr(40853758-953e-4d18-92b1-90eeb3f80b08);
%let _mm_modelid=%nrstr(7d91298d-03fc-4e50-9fd1-8abdc48436c9);
%let _mm_modelflag = 0;
%let _mm_targetvar=BAD;
%let _mm_scorecodetype = %str(DATASTEP);
%let _mm_targetevent=1;
%let _mm_eventprobvar=P_BAD1;
%let _mm_targetnonevent=0;
%let _mm_noneventprobvar=P_BAD0;

%let _mm_targetlevel=BINARY;
%let _mm_predictedvar=;
%let _mm_keepvars=P_BAD1;
%let _mm_cakeepvars=YOJ MORTDUE DEROG VALUE CLNO LOAN CLAGE DELINQ NINQ;
%let _mm_trace = ON;
%let _mm_max_bins = 10;
%let _mm_perfoutcaslib=ModelPerformanceData;
%let _mm_perfincaslib=public;
%let _mm_perf_intableprefix=hmeqperf;
%let _MM_TableNameLevel = 3;
%let _mm_runscore=Y;
%let _mm_saveperfresult=Y;

/* Create a score code fileref if set _mm_runscore=Y */
filename scoreref '~/scorecode/score.sas';

%mm_performance_monitor
{
    perflib=&_MM_PerfInCaslib,
    perfdatanameprefix=&_MM_Perf_InTablePrefix,
    mm_mart=&_MM_PerfOutCaslib,
    scorecodefref=scoreref,
    runscore=&_MM_RunScore
};

%put SYSERR = &syserr.;
%put SYSCC = &syscc.;

/* View the performance monitoring results. */
libname mm_mart cas caslib="&_MM_PerfOutCaslib" tag="&_MM_ProjectUUID";

/* View a list of the MM_MART library tables. */
proc datasets lib=mm_mart;
run;
Example 2: Code Example for Running Performance Monitoring for a DATA Step Model with a Single Scored Data Source

Use SAS Studio to run the code in this example on the default CAS server.

```sas
%mm_performance_monitor
(  perflib=&_MM_PerfInCaslib,
  perfdatasrcds=&_MM_PerfStaticTable,
  mm_mart=&_MM_PerfOutCaslib,
  runscore=&_MM_RunScore
 );
```

Example 3: Code Example for Running Performance Monitoring for an Analytic Store Model

Use SAS Studio to run the code in this example on the default CAS server.
%let _MM_PerfExecutor = 0;
%let _MM_ProjectUUID = %nrstr(e60ae98e-b347-4b9b-b28c-023ba689dcaf);
%let _MM_TargetVar = bad;
%let _MM_TargetLevel = BINARY;
%let _MM_PredictedVar = ;
%let _MM_TargetEvent = 1;
%let _MM_EventProbVar = P_BAD1;
%let _MM_KeepVars = P_BAD1;
%let _MM_CAKeepVars = REASON VALUE YOJ CLAGE CLNO DEBTINC DELINQ DBROG JOB LOAN MORTDUE NINQ;
%let _MM_Trace = OFF;
%let _MM_Max_Bins = 10;
%let _MM_PerfOutCaslib = ModelPerformanceData;
%let _MM_PerfInCaslib = Public;
%let _MM_Perf_InTablePrefix = hmeqperf;
%let _MM_TableNameLevel = 4;
%let _MM_PerfStaticTable = ;
%let _MM_RunScore = N;
%let _MM_SAVEPERFRESULT = Y;
%let _MM_JobID = %nrstr(6e80398b-556c-4f9d-8373-80a45161a570);
%let _MM_ModelID = %nrstr(af764cfb-2c2c-45c9-9f98-3542ccac4f85);
%let _MM_ModelName = %nrstr(GB);
%let _MM_ModelFlag = 0;
%let _MM_ScoreCodeType = DS2EP;
%let _MM_ScoreCodeURI = ;
%let _MM_aStoreLocation=ModelStore._93034785EFAC7B4BFF6BA4E4E_AST;

%mm_performance_monitor
(  perfLib=&_MM_PerfInCaslib,
  perfDataNamePrefix=&_MM_Perf_InTablePrefix,
  mm_mart=&_MM_PerfOutCaslib,
  runScore=&_MM_RunScore,
  scorecodeURI=&_MM_ScoreCodeURI
);

%put &syserr;
%put &syscc;

/* View the performance monitoring results. */
libname mm_mart cas caslib="&_MM_PerfOutCaslib" tag="&_MM_ProjectUUID";

/* View a list of the MM_MART library tables. */
proc datasets lib=mm_mart;
run;
Overview of Publish Destination Macros

The publish destination macros enable you to define, delete, and update publish destinations, as well as print a list of published destinations that have already been defined. Before you can use these macros, you must first create a global caslib using SAS Environment Manager. For more information, see “Create a Global Caslib” in SAS Viya Administration: Publishing Destinations.

Note: You do not need a global caslib when you are configuring a publishing destination for SAS Micro Analytic Service.

Important: If you are using SAS Studio 4.4, see “Prerequisites for Using Macros” on page 1.

You can also manage publishing destinations using SAS Environment Manager. For more information, see SAS Viya Administration: Publishing Destinations

Dictionary

%MM_DEFINEPUBLISHDESTINATION Macro

Defines a publish destination for CAS, Hadoop, SAS Micro Analytic Service, or Teradata.

Note: The default SAS Micro Analytic Service destination is named maslocal. This default destination is configured automatically when SAS Model Manager is installed. If the default destination is deleted, you can use this macro to define a new publish destination for the SAS Micro Analytic service.
Syntax

%MM_DEFINEPUBLISHDESTINATION (  
  BASEURL=%str(host-name<:port>),  
  DEFINITIONNAME=definition-name,  
  EXTTYPE=HADOOP | MICROANALYTICSERVICE | TERADATA,  
  CASSERVERNAME=CAS-server-name,  
  <CASLIB=CAS-library>,  
  <MODELTABLE=model-table>,  
  <DATABASECASLIB=external-database-caslib>,  
  <HOST=Teradata-host-name>,  
  <PORT=Teradata-port-number>,  
  <SCHEMA=Teradata-schema>,  
  <AUTHDOMAIN=authentication-domain>,  
  <HDFSDIR=HDFS-directory>,  
  <CONFIGDIR=Hadoop-configuration-directory>,  
  <USER=user-name>,  
  <TOKEN=%authorization-token>  
);  

Required Arguments

BASEURL=%str(host-name<:port>)  
  specifies the host name and port for the application server.

DEFINITIONNAME=definition-name  
  specifies the name of the publish destination.

CASSERVERNAME=CAS-server-name  
  specifies the name of the CAS server.

Note Not required for defining a SAS Micro Analytic Service destination.

CASLIB=CAS-library  
  specifies the name of the CAS library.

Note Not required for defining a SAS Micro Analytic Service destination.

See “Create a Global Caslib” in SAS Viya Administration: Publishing Destinations

MODELTABLE=model-table  
  specifies the name of the CAS or Teradata model table.

Note Not required for defining a Hadoop or SAS Micro Analytic Service destination.

EXTTYPE=extant-database-type  
  specifies the name of the external database type (CAS, HADOOP, MICROANALYTICSERVICE, or TERADATA) for the publish destination.

See “%MM_GET_TOKEN” on page 4
**Optional Argument**

**TOKEN=**%authorization-token

specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

See “%MM_GET_TOKEN” on page 4

**Hadoop Arguments**

**AUTHDOMAIN=**authentication-domain

specifies the authentication domain that is used to retrieve the Hadoop credentials.

See “Create a New Domain” in *SAS Viya Administration: External Credentials*

**HDFSDIR=**HDFS-directory

specifies the root HDFS folder where the model directory is to be created.

See “Destination Type Settings” in *SAS Viya Administration: Publishing Destinations*

**CONFIGDIR=**configuration-directory

specifies the Hadoop configuration and JAR file directories. Separate the two directory pathnames with a colon (:). These names must match the names that you specified when creating the Hadoop global caslib.

Here is an example:

```
CONFIGDIR=/hadoopjars/cdh54/prod:/config/clusters/cdh54d3
```

**USER=**user-name

specifies the user name for Hadoop.

Interaction This argument is not required if an authentication domain was created using SAS Environment Manager and the AUTHDOMAIN argument is specified in the macro code.

**Teradata Arguments**

**DATABASECASLIB=**external-database-caslib

specifies the caslib that contains the external database options.

See “Create a Global Caslib” in *SAS Viya Administration: Publishing Destinations*

**HOST=**host-name

specifies the server name for the Teradata database.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

**PORT=**port-number

specifies the port number for the database.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.
SCHEMA=schema
specifies the connection option that names the Teradata database to use to qualify the Teradata tables.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

USER=user-name
specifies the user name for Teradata.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

AUTHDOMAIN=authentication-domain
specifies the authentication domain that is used to retrieve the Teradata database credentials.

Interaction This argument is not required if an authentication domain was created and specified as part of the global Teradata caslib using SAS Environment Manager.

See “Create a New Domain” in SAS Viya Administration: External Credentials

Examples

**Example 1: Define a Publish Destination for CAS**

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;
%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%let defname=myDestinationName;
%mm_definepublishdestination(
   baseURL=%str(&servernm),
   definitionname=&defName,
   casservername=cas-shared-default,
   caslib=casuser,
   modeltable=mm_model_table,
   exttype=cas,
   token=%myTokenName
);
```

**Example 2: Define a Publish Destination for Hadoop**

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;
%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);
```
%let userID = myUserID;
%let password = myPassword;
%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);
%let defname = myMAS;
%mm_definepublishdestination(
    baseURL=%str(&servernm),
    definitionname=&defName,
    exttype= microAnalyticService,
    token=%myTokenName
);

Example 4: Define a Publish Destination for Teradata

%let servernm = http://myserver.com;
%let userID = myUserID;
%let password = myPassword;
%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);
%let defname = myTeradata;
%mm_definepublishdestination(
    baseURL=%str(&servernm),
    definitionname=&defName,
    casservername=cas-shared-default,
    caslib=casuser,
%MM_UPDATEPUBLISHDESTINATION Macro

Updates the publish destination for CAS, Hadoop, or Teradata.

Restriction: Only the authorization token can be updated for a SAS Micro Analytic Service publish destination. You must delete the definition and define a new publish destination if you want to make changes to the other destination arguments.

Syntax

%MM_UPDATEPUBLISHDESTINATION (  
  BASEURL=%str(host-name:<port>),  
  DEFINITIONNAME=definition-name,  
  <TOKEN=%authorization-token>,  
  <CASSERVERNAME=CAS-server-name>,  
  <CASLIB=CAS-library>,  
  <MODELTABLE=model-table>,  
  <DATABASECASLIB=external-database-caslib>,  
  <HOST=Teradata-host-name>,  
  <PORT=Teradata-port-number>,  
  <SCHEMA=Teradata-schema>,  
  <AUTHDOMAIN=Teradata-authentication-domain>,  
  <HDFSDIR=HDFS-directory>,  
  <CONFIGDIR=Hadoop-configuration-directory>,  
  <USER=user-name>  
  );

Required Arguments

BASEURL=%str(host-name <port>) specifies the host name and port for the application server.

DEFINITIONNAME=definition-name specifies the name of the publish destination.

CASSERVERNAME=CAS-server-name specifies the name of the CAS server.

Note Not required for defining a SAS Micro Analytic Service destination.

CASLIB=CAS-library specifies the name of the CAS library.

Note Not required for defining a SAS Micro Analytic Service destination.
See “Create a Global Caslib” in *SAS Viya Administration: Publishing Destinations*

**MODELTABLE=** *model-table*

specifies the name of the CAS or Teradata model table.

**Note** Not required for defining a Hadoop or SAS Micro Analytic Service destination.

---

### Optional Argument

**TOKEN=** *%authorization-token*

specifies the authorization token that was generated with the `%MM_GET_TOKEN` macro.

See “%MM_GET_TOKEN” on page 4

---

### Hadoop Arguments

**AUTHDOMAIN=** *authentication-domain*

specifies the authentication domain that is used to retrieve the Hadoop credentials.

See “Create a New Domain” in *SAS Viya Administration: External Credentials*

**HDFSDIR=** *HDFS-directory*

specifies the root HDFS folder where the model directory is to be created.

See “Destination Type Settings ” in *SAS Viya Administration: Publishing Destinations*

**CONFIGDIR=** *configuration-directory*

specifies the Hadoop configuration and JAR file directories. Separate the two directory pathnames with a colon (:``). These names must match the names that you specified when creating the Hadoop global caslib.

Here is an example:

```
CONFIGDIR=/hadoopjars/cdh54/prod:/config/clusters/cdh54d3
```

**USER=** *user-name*

specifies the user name for Hadoop.

**Interaction** This argument is not required if an authentication domain was created using SAS Environment Manager and the AUTHDOMAIN argument is specified in the macro code.

See “Create a New Domain” in *SAS Viya Administration: External Credentials*

---

### Teradata Arguments

**DATABASECASLIB=** *external-database-caslib*

specifies the caslib that contains the external database options.

See “Create a Global Caslib” in *SAS Viya Administration: Publishing Destinations*
HOST=`host-name`
specifies the server name for the Teradata database.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

PORT=`port-number`
specifies the port number for the database.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

SCHEMA=`schema`
specifies the connection option that names the Teradata database to use to qualify the Teradata tables.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

USER=`user-name`
specifies the user name for Teradata.

Interaction This argument is not required if a DATABASECASLIB argument is specified in the macro code.

AUTHDOMAIN=`authentication-domain`
specifies the authentication domain that is used to retrieve the Teradata database credentials.

Interaction This argument is not required if an authentication domain was created and specified as part of the global Teradata caslib using SAS Environment Manager.

See “Create a New Domain” in *SAS Viya Administration: External Credentials*

---

**Examples**

**Example 1: Update the Definition for a CAS Publish Destination**

``` sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);

%let defName=myCASServer;
%mm_updatepublishdestination(
    baseURL=%str(&servernm),
    definitionname=&defName,
    casservername=newcas,
    caslib=casuser,
);```

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Example 2: Update the Definition for a Hadoop Publish Destination

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;
%mm_get_token(
  baseURL=&servernm,
  user=&userID,
  pw=&password,
  tokenname=myTokenName
);

%let defname=myHadoopServer;
%mm_updatepublishdestination(
  baseURL=%str(&servernm),
  definitionname=&defname,
  casservername=cas-shared-default,
  caslib=Public,
  hdfsdir=%str(/tmp/myHDFSdir),
  configdir=%str(/sasusr/u/hadoopcfg:
  /sasusr/u/hadoopjars),
  authdomain=myHadoopAuthDomain,
  token=%myTokenName
);
```

Example 3: Update the Definition for a Teradata Publish Destination

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;
%mm_get_token(
  baseURL=&servernm,
  user=&userID,
  pw=&password,
  tokenname=myTokenName
);

%let defname=myTeradata;
%mm_updatepublishdestination(
  baseURL=%str(&servernm),
  definitionname=&defname,
  casservername=cas-shared-default,
  caslib=casuser,
  modeltable=mm_model_table,
  databasecaslib=myTDLib,
  token=%myTokenName
);
```
Syntax

```plaintext
%MM_PRINTPUBLISHDESTINATION(
    BASEURL=%str(host-name:<:port>),
    DEFINITIONNAME=definition-name,
    LIMIT=limit
    <TOKEN=%authorization-token>
);
```

Required Arguments

- **BASEURL=%str(host-name::<:port>)** specifies the host name and port for the application server.
- **DEFINITIONNAME=definition-name** specifies the name of the publish destination.
- **LIMIT=limit** specifies how many destination definitions to return. If you do not specify a value for the DEFINITIONNAME argument, the macro returns file destination definitions by default.

Optional Argument

- **TOKEN=%authorization-token** specifies the authorization token that was generated with the %MM_GET_TOKEN macro.

See “%MM_GET_TOKEN” on page 4

Examples

**Example 1: Print One Publish Destination**

```plaintext
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);

%let defname=myDefinitionName;
%mm_printpublishdestination(
    baseURL=%str(&servernm),
    definitionname=%str(&defName),
    token=%myTokenName
);
```

**Example 2: Print Multiple Publish Destinations**

```plaintext
%let servernm=http://myserver.com;
```
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
   baseURL=&servernm,
   user=&userID,
   pw=&password,
   tokenname=myTokenName
);

%mm_printpublishdestination(
   baseURL=%str(&servernm),
   limit=8,
   token=%myTokenName,
   resp=pubsvrs,
   keepresp=Y
);

%mm_read_json(
   fref=pubsvrs,
   respType=GET_ITEMS,
   outds=dests,
   statusVar=_status
);

proc print data=dests noobs;
   var name destinationType destinationTable casServerName casLibrary;
run;

%MM_DELETEPUBLISHDESTINATION Macro

Deletes a publish destination definition.

Syntax

%MM_DELETEPUBLISHDESTINATION (  
   BASEURL=%str(host-name:<port>),
   DEFINITIONNAME=definition-name,
   <TOKEN=%authorization-token>
);

Required Arguments

BASEURL=%str(host-name:<port>)  
   specifies the host name and port for the application server.

DEFINITIONNAME=definition-name  
   specifies the name of the publish destination.

Optional Argument

TOKEN=%authorization-token  
   specifies the authorization token that was generated with the %MM_GET_TOKEN macro.
Example: Delete a Publish Destination Definition

```sas
%let servernm=http://myserver.com;
%let userID=myUserID;
%let password=myPassword;

%mm_get_token(
    baseURL=&servernm,
    user=&userID,
    pw=&password,
    tokenname=myTokenName
);

%let defname=myDefinitionName;
%mm_deletepublishdestination(
    baseURL=%str(&servernm),
    definitionname=%str(&defName),
    token=%myTokenName
);
```
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