What's New in SAS® Model Manager

2020.1 - 2023.08*

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What's New in SAS® Model Manager

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Contents

Chapter 1 / *Long-Term Support Releases* . . . **1**
LTS 2023.03 (May 2023) . . . 2
LTS 2022.09 (November 2022) . . . 3
LTS 2022.1 (May 2022) . . . 5
LTS 2021.2 (November 2021) . . . 6
LTS 2021.1 (May 2021) . . . 10
LTS 2020.1 (November 2020) . . . 13

Chapter 2 / *Stable Releases* . . . **19**
2023.08 (August 2023) . . . 21
2023.07 (July 2023) . . . 21
2023.06 (June 2023) . . . 21
2023.04 (April 2023) . . . 22
2023.03 (March 2023) . . . 22
2022.12 (December 2022) . . . 23
2022.11 (November 2022) . . . 23
2022.10 (October 2022) . . . 24
2022.09 (September 2022) . . . 24
2022.1.4 (August 2022) . . . 25
2022.1.3 (July 2022) . . . 25
2022.1.2 (June 2022) . . . 25
2022.1.1 (May 2022) . . . 26
2021.2.6 (April 2022) . . . 26
2021.2.5 (March 2022) . . . 27
2021.2.4 (February 2022) . . . 27
2021.2.3 (January 2022) . . . 28
2021.2.2 (December 2021) . . . 29
2021.2.1 (November 2021) . . . 29
2021.1.6 (October 2021) . . . 29
2021.1.5 (September 2021) . . . 30
2021.1.4 (August 2021) . . . 31
2021.1.3 (July 2021) . . . 31
2021.1.2 (June 2021) . . . 32
2021.1.1 (May 2021) . . . 33
2020.1.5 (April 2021) . . . 34
2020.1.4 (March 2021) . . . 35
2020.1.3 (February 2021) . . . 35
2020.1.2 (January 2021) . . . 37
2020.1.1 (December 2020) . . . 37

1

Long-Term Support Releases

LTS 2023.03 (May 2023) . . . **2**
- Create Container Images in an OpenShift Environment . . . 2
- Share Links to Deployments and Home Page Content . . . 2
- Container Tools . . . 3
- CLI Examples for Creating Publishing Destinations . . . 3
- General Enhancements . . . 3

LTS 2022.09 (November 2022) . . . **3**
- Deployments . . . 3
- Performance Monitoring . . . 4
- Create Google Cloud Platform (GCP) Publishing Destinations . . . 4
- General Enhancements . . . 4

LTS 2022.1 (May 2022) . . . **5**
- Contents of 2022.1 . . . 5
- Associate a Git Repository with a Container Destination . . . 5
- Publishing Models to Google Cloud Platform (GCP) . . . 5
- Support for Multinomial Classification Models . . . 5
- Multi-Tenancy Configuration . . . 5
- Category View Enhancements . . . 6
- General Enhancements . . . 6

LTS 2021.2 (November 2021) . . . **6**
- Contents of 2021.2 . . . 6
- SAS Model Manager Home . . . 7
- Integration with SAS Model Risk Management . . . 7
- Key Performance Indicators (KPIs) . . . 7
- Macro Enhancements . . . 8
- New Progressive Web App Functionality . . . 8
- Performance Monitoring . . . 9
- Publishing Models . . . 9
- Sharing Links to Content . . . 9
- Tracking Deployments . . . 10
- Claiming Workflow Tasks with Prompts . . . 10

LTS 2021.1 (May 2021) . . . **10**
- Contents of 2021.1 . . . 10
- Creating Projects . . . 10
- Filtering the List of Models and Projects . . . 10

SAS Model Manager Home . . . 11
Performance Monitoring . . . 11
Publishing Models . . . 12
General Enhancements . . . 13

LTS 2020.1 (November 2020) . . . **13**
Critical Impacts . . . 13
Dashboard . . . 14
Performance Monitoring . . . 14
Publishing Open-Source Models to Azure . . . 14
Scoring and Validating Python Models . . . 15
Command-Line Interfaces . . . 15
Model Management Macros . . . 15
General Enhancements . . . 16

LTS 2023.03 (May 2023)

Create Container Images in an OpenShift Environment

SAS Viya platform uses Kaniko to create container images for models and decisions when they are published to a container publishing destination. Because Kaniko requires root access to run, container images cannot be created when the SAS Viya platform is deployed in a Red Hat OpenShift environment. In order to create container images within an OpenShift environment you must instead publish your models and decisions to a Git destination and then use Docker to create the container images.

For more information, see the OpenShiftContainerImages.md example that is available in the Model Management Resources repository on GitHub. This example is applicable for SAS Viya 2022.12 and later releases.

Share Links to Deployments and Home Page Content

- You can share links to SAS Model Manager content from the Deployments category with other users within your organization by copying the link to the clipboard or by sharing the link to Microsoft Teams.
- In addition to being able to copy links to objects that appear in the **Recent Items** section of the SAS Model Manager Home page, you can now share links to Microsoft Teams.

Container Tools

A container promotion sample template has been provided on GitHub that enables you to validate and promote a SAS container through testing and production. After initial configuration of the template and environments, a SAS container can move through the CI/CD process with just a few button clicks.

For more information, see the Easily Promote and Use Containerized Model Deployments article in SAS Communities and the Container Promotion Template sample in the Model Management Resouces GitHub repository.

CLI Examples for Creating Publishing Destinations

The Jupyter notebook examples that were previously available for creating container publishing destinations in the Model Management Resources repository on GitHub have been replaced with SAS Viya CLI examples. The CLI examples are available in the `configuration/destinations` directory within the GitHub repository. The associated SAS Viya administration documentation has also been updated to reference the CLI examples.

For more information about creating publishing destinations, see *SAS Viya Platform: Publishing Destinations* and *SAS Viya Platform: Models Command-Line Interface*.

General Enhancements

- In the Advanced Search window that is avaiable from the Projects and Models category views, the calendar selector is now available when searching for user-defined properties if the data type is set to date or datetime.

LTS 2022.09 (November 2022)

The 2022.09 long-term support release includes all features in the stable releases 2021.2.6 through 2022.09.

Deployments

- The Score code type field in the Advanced Search for Deployed Models window has been changed to enable you to select or enter a value.

- You can search for tags that are assigned to published models using the advanced search in the Deployments category view.

For more information, see Tracking Deployments in the *SAS Model Manager: User's Guide*.

Performance Monitoring

- You can define and run performance monitoring for text categories modelsand view the results within the performance charts.
- The model performance rank sort order has changed from descending to ascending order for the misclassification KPI when running performance for a classification project.
- You can define and run performance monitoring for multinomial classification models charts and view the results within the performance charts.

  See also: Easy Deployment and Monitoring for Multinomial Classification Models article in SAS Communities

Create Google Cloud Platform (GCP) Publishing Destinations

You can create Google Cloud Platform (GCP) publishing destinations using SAS Environment Manager. Read more

General Enhancements

- The model evaulation properties for a classification project with a nominal target have changed. The predicted target variable is now shown instead of the output event probability variable.
- Additional model evaulation properties have been added for a text categories project. These properties are used for performance monitoring.
- An endpoint was added to the Model Management API to enable you to create a workflow process and then create an association between the started workflow process and a model repository object.
- Request and response examples were added to the Model Management API documentation for working with workflow process variables..
- The *SAS Models CLI* has been updated to enable you to create and update publishing destinations.
- References to the term "keyword" were changes to "tag" within the Projects category view, the New Project window, and the project properties.

LTS 2022.1 (May 2022)

Contents of 2022.1

The 2022.1 long-term support release is based on the 2021.2.5 stable release. It includes all features in the stable releases 2021.2.1 through 2021.2.5.

Associate a Git Repository with a Container Destination

You can create a container publishing destination and associate it with a Git repository. This enables you to push SAS Container Runtime artifacts to the associated Git repository when publishing objects to container destinations. Read more

Publishing Models to Google Cloud Platform (GCP)

Models can be published to a Google Cloud Platform (GCP) container publishing destination. Read more

Support for Multinomial Classification Models

Broader support for multinomial classification models has been added. This includes metadata for target event values for multinomial classification models. The project properties in SAS Model Manager lists the possible event values for multinomial models and can automatically find those values. Read more

Multi-Tenancy Configuration

In a multi-tenant environment, the analytic store (ASTORE) and resource files are stored in subdirectories that are specific to each tenant and they are secured. Changes in how SAS Micro Analytic Service handles those files require changes to the configuration of those files during deployment of SAS Model Manager on SAS Viya.

For more information, see "Multi-tenancy and SAS Micro Analytic Service ASTORE and Resource Files" in *SAS Viya Platform: Deployment Notes*.

Category View Enhancements

- The graphic design of the dashboard tiles in the Models category and Projects category views has changed.
- The dashboard tiles in the Models category view have been moved from the top of the page to the left of the page.
- The label of the **Hide dashboard** button has been changed to **Hide tiles** in both the Models and Projects category views..
- The **Tags** column has been added to the table in the Models category view to display automated system tags that are related to the life cycle of a model.

For more information, see View Dashboard and Filter Models and View Dashboard and Filter Projects in *SAS Model Manager: User's Guide*.

General Enhancements

- When you publish models, you can add tags to the published models within the destination.
- You can configure custom prompts and attributes for the Start element of a workflow, which appear in the Start Workflow window within SAS Model Manager.
- The %MM_GET_FILEURI macro has been updated. The MODELUUID argument has been renamed to MODELID to be consistent with the other model management macros.
- When publishing models to a container publishing destination, Azure Machine Learning, or Git, if a published model with the same name already exists within the destination a sequential number is added as a tag to indicate the version of the published model.

LTS 2021.2 (November 2021)

Contents of 2021.2

The 2021.2 long-term support release is based on the 2021.1.6 stable release. It includes all features in the stable releases 2021.1.1 through 2021.1.6.

SAS Model Manager Home

- You can view recent items on the Home page using a list view, in addition to the tile view.
- The links in the How To and What's New sections of the Home page are dynamically populated using the feed from SAS Communities.
- You can copy links to objects that appear in the **Recent Items** section of the SAS Model Manager Home page.

For more information, see SAS Model Manager Home in *SAS Model Manager: User's Guide*.

Integration with SAS Model Risk Management

You can establish relationships between model objects in SAS Model Manager and SAS Model Risk Management, and then view the model risk card content and metadata within the respective applications. This integration enables you to make information available to stakeholders so that they can evaluate the model's risk.

For more information, see Establish Model Relationships in *SAS Model Manager: User's Guide* and the Integration with SAS Model Risk Management article in SAS Communities.

Key Performance Indicators (KPIs)

A KPI is a computed value that is derived from a project's performance definition or from a user's own data and code within the SAS Model Manager web application. You can also use the MMKPI macro and action set in SAS Studio to compute KPIs. KPIs help users track model performance over time using common statistical measures. SAS Model Manager enables users to define and compute standard and custom KPIs, which can then be used to set alerts. Here are the enhancements that were made with this release:

- The Standard KPI Trend chart is now available as part of the model performance results. It shows the selected standard KPI that is calculated over a period of time.
- You can add KPI rules in the **Model Evaluation** section of the **Properties** tab of a project. The list of assessment indicators that are available depends on the model function that is specified for the project.
- You can add custom KPI code files to a project. You can also run standard and custom KPI code files.

Read the Generate standard and custom KPIs article on SAS Communities to see how KPIs are integrated in a new out-of-the-box workflow-based email notification when model performance exceeds the project's model assessment criteria threshold value.

Macro Enhancements

MMKPI Macro and Action Set

The %MM_KPI_ACTIONSET macro and MMKPI CASL action set have been added. These enable you to generate standard and custom KPIs, as well as run user-provided KPI code to specify custom KPI columns and data values, which can then be added to the standard KPI table. The KPIs help users track model performance over time using common statistical measures.

For more information, see MKPI Macro and Action Set in *SAS Model Manager: Macro Reference* and Generate standard and custom KPIs article on SAS Communities.

Model Management Macros

- The %MM_GET_FILEURI macro has been added to enable users to retrieve the URI that is associated with a specific model file.
- The %MM_GET_MODEL_ID macro has been updated to include additional arguments that enable users to indicate the specific location of a model that they are looking for, rather than returning all models with the specified name.

FCI Macros

The InCASLibRef and OutCASLibRef arguments have been renamed to InCASLib and OutCASLib. This change has been made to the %Compute_FCI_IntPred macro and the %Compute_FCI_NomPred macro.

New Progressive Web App Functionality

SAS Model Manager can now be installed as a Progressive Web App (PWA), enabling you to use the product as a desktop app instead of in a web browser. Only Chromium-based browsers support PWA.

For more information, see Installing SAS Model Manager as a Progressive Web App in *SAS Model Manager: User's Guide*.

Performance Monitoring

The **Performance** tab of a project has been enhanced to provide the following types of information:

- Summary information about a project's performance. This includes model assessment criteria, scoring observations, high-level details of the performance definition, and the performance rank of models within the containing project.
- Performance results for each model that was specified in the performance definition. These can now be viewed on separate pages within the **Performance** tab.
- Content that was specified in the performance definition. This appears in the **Definition Details** pane, which is collapsed by default.

For more information, see Run Performance and View Results in *SAS Model Manager: User's Guide*.

Publishing Models

- When creating a Git publishing destination, the default Git branch name is now "main", instead of "master".
- You can publish SAS models to a container destination and then validate them within the destination. The validation is performed using SAS Container Runtime, which is a lightweight OCI (Open Container Initiative) compliant container that scores SAS models.
- You can publish SAS models to an Azure Machine Learning publishing destination and then validate them within the destination.
- After you publish a model from SAS Model Manager to an Azure Machine Learning publishing destination, you can deploy the published model to Azure Kubernetes Service (AKS).

Sharing Links to Content

You can share links to SAS Model Manager content with other users within your organization by copying the link to the clipboard or by sharing the link to Microsoft Teams.

Tracking Deployments

The Deployments category view is now available. It enables you to access all of your model deployments in one place, view key metrics about your organization's model deployments, and track their status.

For more information, see Tracking Deployments in the *SAS Model Manager: User's Guide*.

Claiming Workflow Tasks with Prompts

Prompts within a workflow user task are disabled until you claim the task.

LTS 2021.1 (May 2021)

Contents of 2021.1

The 2021.1 long-term support release is based on the 2020.1.4 stable release. It includes all features in the stable releases 2020.1.1 through 2020.1.4.

Creating Projects

- A new wizard guides users through creating a new project. You can save a new project after specifying only some of the requested information. This information includes descriptive content about a project, such as its model function, model comparison and assessment criteria, input and output variables, user-defined properties, and keywords.
- The types of model functions that are available when creating a project have been expanded to include model functions for computer vision models and SAS Visual Text Analytics models at both the project level and model level.

Filtering the List of Models and Projects

In the dashboard of the Models and Projects category views, you can click various sections of the different charts to filter the list of models or projects within the

respective category views. You can then use the advanced search feature to specify additional information to further filter the list. The filters that are applied using the charts are reflected in the advanced search criteria, which results in an integrated search for models or projects.

For more information, see View Dashboard and Filter Projects and View Dashboard and Filter Models in *SAS Model Manager: User's Guide*.

SAS Model Manager Home

When you sign in to the SAS Model Manager web application, a Home page is now available, and it contains the following information:

- the most recent items that you opened with the date on which they were last modified
- links to the most recent how-to videos and What's New articles on SAS Communities
- links to the What's New, overview, and user documentation for SAS Model Manager
- buttons that enable you to create a new project and add models to a folder

For more information, see "SAS Model Manager Home" in *SAS Model Manager: User's Guide*.

Performance Monitoring

- You can edit the layout of the performance results on the **Performance** tab of a project. This enables you to perform these tasks:
  - Select which charts to display.
  - Rearrange the order in which you want the charts to appear.
  - Add custom charts that link to report objects that were created using SAS Visual Analytics.
- The clear all feature that enables you to clear all of the performance results and delete the data tables from the CAS output library has been moved to the **Actions** menu.
- The system can score R models while running a performance definition, when the model score code contains a scoring function in the correct format.
- New charts have been added to the **Performance** tab of a project. These charts enhance the monitoring of performance for prediction models with an interval target. Concepts from the statistical process control (SPC) that are implemented with the SHEWHART procedure are used to monitor the mean, the standard deviation, and the proportion of values for the predicted interval target over time.
- After you create a performance definition, you can schedule performance monitoring jobs to run daily, weekly, monthly, or quarterly.

- When you create and run a performance definition for a prediction model with an interval target, you can use performance charts to monitor the proportion of the predicted interval target values that are above the specified thresholds.
- The %MM_PERFORMANCE_MONITOR macro has been updated to include new macro variables. These can be used to generate additional performance results for prediction models with an interval target.

For more information, see "Concepts: Performance Monitoring" in *SAS Model Manager: User's Guide* and "Monitoring Performance" in *SAS Model Manager: User's Guide*.

Publishing Models

- You can define a publishing destination for a Git repository and publish your models from SAS Model Manager to the Git publishing destination. You can use a Git repository to share models with users outside your department or to archive models for future reference. SAS Model Manager does not support importing or updating models from a Git repository into the common model repository.
- When the R model score code contains a scoring function in the correct format, you can run on-demand tests for R models and publish them to CAS and SAS Micro Analytic Service publishing destinations, in addition to container destinations. You can also run a publishing validation test to validate R models within a publishing destination.
- Using SAS Environment Manager, you can configure publishing destinations for a Git repository, an Azure Machine Learning cloud-based provider, and container destinations (Amazon Web Services, Azure, and Private Docker).
- You can use single sign-on authentication when publishing Python models to an Azure Machine Learning publishing destination from the SAS Model Manager web application or by submitting a request to the Model Publish API.
- When you open a model that is located within a project version, you can now publish it from the object toolbar. Models that are located directly within a folder cannot be published.
- Text categories and Text concepts models that you register from Model Studio into the common model repository can now be published to CAS and SAS Micro Analytic Service publishing destinations. You can also test the models within SAS Model Manager and validate them within the publishing destination.
- A model published event is recorded in the history of a SAS Model Manager project when you publish SAS Visual Data Mining and Machine Learning models and SAS Visual Text Analytics (Text categories and Text concepts) models from Model Studio or SAS Model Manager. The event entry appears in the project history only if the models were registered from Model Studio in the common model repository before they were published.

For more information, see "About Publishing Models" in *SAS Model Manager: User's Guide*.

General Enhancements

- When you add keywords to a project, they are also added to a global list of keywords that is available to be added to other projects within the common model repository.
- The values for the **Operational status** project property have changed to “Prototype”, “Deployed”, “In production”, and “Deactivated”. The previous values are mapped to the new values during the SAS Viya migration process or when promoting content between SAS Viya environments.
- You can now import a SAS analytic store model using a file that has a .astore file extension in addition to a file that has a .sasast file extension.
- You can associate attributes with prompts within a workflow user task, which enables users to select a model or select potential owners from a list.
- The left navigation bar is expanded by default when you sign in for the first time. The navigation bar remains in the state that you left it in when you sign in the next time.
- You can register models from Model Studio and SAS Visual Analytics into any repository within the Model Repositories root content folder, as long as the user has Read and Write permissions to the repository. Users of SAS Model Manager and SAS Intelligent Decisioning can then access those models to perform different modeling or decisioning tasks.

> Key Idea
>
> For more information, see What’s New articles and how-to videos in SAS Communities.

LTS 2020.1 (November 2020)

Critical Impacts

- The default directory paths for the ModelStore and ModelPerformanceData caslibs have been changed for SAS Viya 2020.1, and the permissions have also changed to allow Write access for all authenticated users.

  For more information, see “Configuring Data Libraries” in *SAS Model Manager: Administrator’s Guide*.
- When you are promoting model content between SAS Viya 2020.1 environments, if a model contains references to analytic store files in the ModelStore caslib, then the analytic store files are transferred with the model.

For more information, see "Migrating Content" in *SAS Model Manager: Administrator's Guide*.

- When you are using the Model Repository API to set a model as the project champion model, the project must contain at least one project output variable. The Model Repository API does not have this requirement for SAS Viya 3.5.

  For more information, see Model Repository API documentation.

Dashboard

A dashboard panel has been added to the **Projects** category and **Models** category views. This enables you to view important model and project metrics such as the number of published models.

For more information, see View Projects Dashboard and View Models Dashboard in *SAS Model Manager: User's Guide*.

Performance Monitoring

- A new wizard guides users through creating and updating performance definitions. You can save a performance definition after specifying only some of the requested information. The input variables, output variables, and target properties that are specified in the performance definition determine which charts are displayed when the performance results are generated.
- The feature contribution index (FCI) chart has been added to the performance results that are displayed on the **Performance** tab of a project. The FCI measures the strength of the relationship between each input variable and the predicted numeric output variables.
- Data handling when running performance has been improved. If the data tables that were specified in the performance definition exist in a library, but are not loaded in a CAS session, they are loaded at run time.
- The naming requirements for the performance input data tables have been made more flexible and no longer require the UUID of the model when you are running performance with scored data.
- The model name, job name, and the date and time for when the performance results were last updated are displayed above the charts on the **Performance** tab of a project.

For more information, see "Monitoring Performance" in *SAS Model Manager: User's Guide*.

Publishing Open-Source Models to Azure

In addition to AWS and Private Docker container destinations, Azure has been added as a container publishing destination for open-source models. Container publishing destinations can be created using the Model Publish REST API.

For more information, see "Publishing Models" in *SAS Model Manager: User's Guide* and "Configuring Publishing Destinations" in *SAS Model Manager: Administrator's Guide*.

Scoring and Validating Python Models

The following enhancements have been made to improve the scoring and validation of Python open-source models:

- Code wrappers are automatically generated for Python models to ensure that the score code is in the correct format to publish, monitor, score, and validate Python models.

  For more information, see "Python Models" in *SAS Model Manager: User's Guide*.

- Python scoring resources are automatically copied to the resources directory when you are scoring a model within the user interface.

  For more information, see the Test Models and Validate Published Models topics in *SAS Model Manager: User's Guide*.

- Model score code is generated in the proper format when building a Python model using the Python ZIP Model Management (pzmm) module. The pzmm module has been merged with the python-sasctl package that is available on the SAS Software GitHub site. Demos and examples are also available for the pzmm module on GitHub.

  For more information, see pzmm module README.md in the python–sasctl package and the Model Management Resources for Open-Source Models repository on GitHub.

Command-Line Interfaces

The new SAS Viya Models command-line interface (CLI) has been added as a plug-in to the SAS Viya CLI. This CLI plug-in enables you to perform tasks such as creating projects, registering models, and managing models within a common model repository. It also enables you to retrieve a list of publishing destinations and published models, as well as information about a destination or published model from the command line.

For more information, see *SAS Viya Platform: Models Command-Line Interface*.

Model Management Macros

- The new %MM_MODEL_ADD_JSONFILES macro enables you to generate JSON files for the fit statistics, lift, and ROC assessment criteria for an existing model, using SAS Studio.
- The following enhancements have been made to the %MM_IMPORT_MODEL and %MM_IMPORT_ASTORE_MODEL model management macros:

- You can generate the JSON model comparison files for the fit statistics, lift, and ROC criteria and then add them to the model during the import process.
- When importing a model, you can specify additional model properties such as the modeler and score code type.
- The %MM_IMPORT_ASTORE_MODEL macro was modified to use the MODELFUNC and ALGORITHM arguments, in order to be consistent with the %MM_IMPORT_MODEL macro. The MININGFUNCTION and MININGALGORITHM arguments, which were previously used by SAS Model Manager on SAS Viya 3.5 and earlier, have been deprecated.

  Note: Although the deprecated arguments can still be used, it is recommended that you update your code to use the new arguments for SAS Viya.

For more information, see "Model Management Macros" in *SAS Model Manager: Macro Reference*.

General Enhancements

- Users can manage data from the Projects and Models category views.

  For more information, see "About Managing Data" in *SAS Model Manager: User's Guide*.
- The primary information about a model such as the score code type, the model role, and whether the model has been published is displayed in the **Model Summary** panel of an open model object.

  For more information, see "Manage Model Content and Versions" in *SAS Model Manager: User's Guide*.
- On the **Files** tab of a model object, the model files are grouped into a few primary categories based on their file role, file name, or file type.

  For more information, see "Managing Model Files" in *SAS Model Manager: User's Guide*.
- The advanced search option that was available within the actions menu of the toolbar in the Models and Projects category views has been moved. You can now access the advanced search option by clicking the , which is to the right of the search box.

  For more information, see Search for Models and Search for Projects in *SAS Model Manager: User's Guide*.
- Data handling when running scoring tests and publishing validation tests has been improved. If the input data table that was specified in the test definition exists in a library, but is not loaded in a CAS session, it is loaded at run time.

  For more information, see Test Models and Validate Published Models topics in *SAS Model Manager: User's Guide*.
- You can generate the JSON model comparison files for the fit statistics, lift, and ROC criteria and add them to a model when using the register task in SAS Studio.

For more information, see “SAS Viya: Register” in *SAS Studio: Task Reference Guide*.

2

Stable Releases

2023.08 (August 2023) **21**
General Enhancements 21

2023.07 (July 2023) **21**
Register SAS Model Step 21

2023.06 (June 2023) **21**
Model Tags 21
Project Automated Tags 22
Variable Binning 22

2023.04 (April 2023) **22**
CLI Command and Options for Setting Model Evaluation Properties 22

2023.03 (March 2023) **22**
Create Container Images in an OpenShift Environment 22

2022.12 (December 2022) **23**
CLI Examples for Creating Publishing Destinations 23

2022.11 (November 2022) **23**
Container Tools 23
Share Links to Deployments and Home Page Content 24

2022.10 (October 2022) **24**
General Enhancements 24

2022.09 (September 2022) **24**
Performance Monitoring of Text Categories Models 24
General Enhancements 24

2022.1.4 (August 2022) **25**

2022.1.3 (July 2022) **25**
General Enhancements 25

2022.1.2 (June 2022) **25**
General Enhancements 25

2022.1.1 (May 2022) **26**
General Enhancements 26

2021.2.6 (April 2022) **26**
Create Google Cloud Platform (GCP) Publishing Destinations 26

Performance Monitoring of Multinomial Classification Models . . . 26
Search for Tags Assigned to Published Models . . . 26

2021.2.5 (March 2022) . . . **27**
Associate a Git Repository with a Container Destination . . . 27
Support for Multinomial Classification Models . . . 27
Category View Enhancements . . . 27

2021.2.4 (February 2022) . . . **27**

2021.2.3 (January 2022) . . . **28**
Publishing Models to Google Cloud Platform (GCP) . . . 28
Multi-Tenancy Configuration . . . 28
Category View Enhancements . . . 28

2021.2.2 (December 2021) . . . **29**
General Enhancements . . . 29

2021.2.1 (November 2021) . . . **29**
General Enhancements . . . 29

2021.1.6 (October 2021) . . . **29**
Deployments . . . 29
General Enhancements . . . 30

2021.1.5 (September 2021) . . . **30**
Integration with SAS Model Risk Management . . . 30
General Enhancements . . . 30

2021.1.4 (August 2021) . . . **31**
Publishing Models . . . 31
General Enhancements . . . 31

2021.1.3 (July 2021) . . . **31**
Publishing Models . . . 31
Key Performance Indicators (KPIs) . . . 32
MMKPI Macro and Action Set . . . 32

2021.1.2 (June 2021) . . . **32**
New Progressive Web App Functionality . . . 32
Performance Monitoring . . . 33

2021.1.1 (May 2021) . . . **33**
SAS Model Manager Home . . . 33
MMKPI Macro and Action Set . . . 33

2020.1.5 (April 2021) . . . **34**
Publishing Models . . . 34
Performance Monitoring . . . 34
General Enhancements . . . 34

2020.1.4 (March 2021) . . . **35**
Publishing Models . . . 35
General Enhancements . . . 35

2020.1.3 (February 2021) . . . **35**
SAS Model Manager Home . . . 35
Performance Monitoring . . . 36
Publishing Models . . . 36

2020.1.2 (January 2021) . . . **37**
Performance Monitoring . . . 37

General Enhancements . . . 37
2020.1.1 (December 2020) . . . 37
Creating Projects . . . 37
Filtering the List of Models and Projects . . . 38
Performance Monitoring . . . 38
Publishing Models to a Git Repository . . . 38
Testing and Publishing R Models . . . 38
General Enhancements . . . 39

2023.08 (August 2023)

General Enhancements

- The maximum length for the published name when publishing models has been changed to 100 characters for all destinations.

2023.07 (July 2023)

Register SAS Model Step

The Register SAS Model step in SAS Studio enables users to import an analytic store or DATA step scoring model into the common model repository, which is accessible by SAS Model Manager. Read more

2023.06 (June 2023)

Model Tags

On the Properties tab of a model, you can add tags to the model. Automated tags are also applied to a model when specific actions are performed. Read more

The tags appear in the **Tags** column of the Models category view and on the **Models** tab of a project.

Project Automated Tags

Automated tags are applied to a project when specific actions are performed. Read more

The tags appear in the **Tags** column of the Projects category view.

Variable Binning

Use variable binning when monitoring the performance of a model. Read more

You can specify the method of binning to use for variable distribution when running a performance definition. Both the Adaptive and Quantile methods attempt to find an optimal way of binning a continuous variable. You can also customize the bins for an input variable.

2023.04 (April 2023)

CLI Command and Options for Setting Model Evaluation Properties

The `model-evaluation-properties` subcommand has been added to the `project` command of the models plug-in to the SAS Viya CLI. This new subcommand enables you to list and update the model evaluation properties for a project.

For more information, see *SAS Viya Platform: Models Command-Line Interface*.

2023.03 (March 2023)

Create Container Images in an OpenShift Environment

SAS Viya platform uses Kaniko to create container images for models and decisions when they are published to a container publishing destination. Because Kaniko

requires root access to run, container images cannot be created when the SAS Viya platform is deployed in a Red Hat OpenShift environment. In order to create container images within an OpenShift environment you must instead publish your models and decisions to a Git destination and then use Docker to create the container images.

For more information, see the OpenShiftContainerImages.md example that is available in the Model Management Resources repository on GitHub. This example is applicable for SAS Viya 2022.12 and later releases.

2022.12 (December 2022)

CLI Examples for Creating Publishing Destinations

The Jupyter notebook examples that were previously available for creating container publishing destinations in the Model Management Resources repository on GitHub have been replaced with SAS Viya CLI examples. The CLI examples are available in the `configuration/destinations` directory within the GitHub repository. The associated SAS Viya administration documentation has also been updated to reference the CLI examples.

For more information about creating publishing destinations, see *SAS Viya Platform: Publishing Destinations* and *SAS Viya Platform: Models Command-Line Interface*.

2022.11 (November 2022)

Container Tools

A container promotion sample template has been provided on GitHub that enables you to validate and promote a SAS container through testing and production. After initial configuration of the template and environments, a SAS container can move through the CI/CD process with just a few button clicks.

For more information, see the Easily Promote and Use Containerized Model Deployments article in SAS Communities and the Container Promotion Template sample in the Model Management Resouces GitHub repository.

Share Links to Deployments and Home Page Content

- You can share links to SAS Model Manager content from the Deployments category with other users within your organization by copying the link to the clipboard or by sharing the link to Microsoft Teams.
- In addition to being able to copy links to objects that appear in the **Recent Items** section of the SAS Model Manager Home page, you can now share links to Microsoft Teams.

2022.10 (October 2022)

General Enhancements

- In the Advanced Search window that is avaiable from the Projects and Models category views, the calendar selector is now available when searching for user-defined properties if the data type is set to date or datetime.

2022.09 (September 2022)

Performance Monitoring of Text Categories Models

You can define and run performance monitoring for text categories models and view the results within the performance charts. Read more

General Enhancements

- The model evaulation properties for a classification project with a nominal target have changed. The predicted target variable is now shown instead of the output event probability variable.

- Additional model evaulation properties have been added for a text categories project. These properties are used for performance monitoring.

2022.1.4 (August 2022)

REST API and model management macro changes were made to support future SAS Model Manager user interface features.

2022.1.3 (July 2022)

General Enhancements

- The model performance rank sort order has changed from descending to ascending order for the misclassification KPI when running performance for a classification project.
- An endpoint was added to the Model Management API to enable you to create a workflow process and then create an association between the started workflow process and a model repository object.
- Request and response examples were added to the Model Management API documentation for working with workflow process variables..

2022.1.2 (June 2022)

General Enhancements

- The titles of the multinomial target metrics charts and some of the y-axis labels have been changed.
- The Score code type field in the Advanced Search for Deployed Models window has been changed to enable you to select or enter a value.
- The *SAS Models CLI* has been updated to enable you to create and update publishing destinations.

2022.1.1 (May 2022)

General Enhancements

- References to the term “keyword” were changes to “tag” within the Projects category view, the New Project window, and the project properties.
- The Output event probability variable project property was changed to Predicted target variable for a classification project with a nominal target.

For more information, see “Working with Projects” in *SAS Model Manager: User’s Guide*.

2021.2.6 (April 2022)

Create Google Cloud Platform (GCP) Publishing Destinations

You can create Google Cloud Platform (GCP) publishing destinations using SAS Environment Manager. Read more

Performance Monitoring of Multinomial Classification Models

You can define and run performance monitoring for multinomial classification models and view the results within the performance charts. Read more

For more information, see Easy Deployment and Monitoring for Multinomial Classification Models article in SAS Communities.

Search for Tags Assigned to Published Models

You can search for tags that are assigned to published models using the advanced search in the Deployments category view. Read more

2021.2.5 (March 2022)

Associate a Git Repository with a Container Destination

You can create a container publishing destination and associate it with a Git repository. This enables you to push SAS Container Runtime artifacts to the associated Git repository when publishing objects to container destinations. Read more

Support for Multinomial Classification Models

Broader support for multinomial classification models has been added. This includes metadata for target event values for multinomial classification models. The project properties in SAS Model Manager lists the possible event values for multinomial models and can automatically find those values. Read more

Category View Enhancements

The graphic design of the dashboard tiles in the Models category and Projects category views has changed.

For more information, see View Dashboard and Filter Models and View Dashboard and Filter Projects in *SAS Model Manager: User's Guide*.

2021.2.4 (February 2022)

REST API and model management macro changes were made to support future SAS Model Manager user interface features.

2021.2.3 (January 2022)

Publishing Models to Google Cloud Platform (GCP)

Models can be published to a Google Cloud Platform (GCP) container publishing destination. Read more

Multi-Tenancy Configuration

In a multi-tenant environment, the analytic store (ASTORE) and resource files are stored in subdirectories that are specific to each tenant and they are secured. Changes in how SAS Micro Analytic Service handles those files require changes to the configuration of those files during deployment of SAS Model Manager on SAS Viya.

For more information, see "Multi-tenancy and SAS Micro Analytic Service ASTORE and Resource Files" in *SAS Viya Platform: Deployment Notes*.

Category View Enhancements

- The dashboard tiles in the Models category view have been moved from the top of the page to the left of the page.
- The label of the **Hide dashboard** button has been changed to **Hide tiles** in both the Models and Projects category views..
- The **Tags** column has been added to the table in the Models category view to display automated system tags that are related to the life cycle of a model.

For more information, see View Dashboard and Filter Projects and View Dashboard and Filter Models in *SAS Model Manager: User's Guide*

2021.2.2 (December 2021)

General Enhancements

- When you publish models, you can add tags to the published models within the destination.
- You can configure custom prompts and attributes for the Start element of a workflow, which appear in the Start Workflow window within SAS Model Manager.

2021.2.1 (November 2021)

General Enhancements

- The %MM_GET_FILEURI macro has been updated. The MODELUUID argument has been renamed to MODELID to be consistent with the other model management macros.
- When publishing models to a container publishing destination, Azure Machine Learning, or Git, if a published model with the same name already exists within the destination a sequential number is added as a tag to indicate the version of the published model.

2021.1.6 (October 2021)

Deployments

The Deployments category view is now available. It enables you to access all of your model deployments in one place, view key metrics about your organization's model deployments, and track their status.

For more information, see Tracking Deployments in the *SAS Model Manager: User's Guide*.

General Enhancements

- You can share links to SAS Model Manager content with other users within your organization by copying the link to the clipboard or by sharing the link to Microsoft Teams.
- You can copy links to objects that appear in the **Recent Items** section of the SAS Model Manager Home page.
- The %MM_GET_FILEURI macro has been added to enable users to retrieve the URI that is associated with a specific model file.
- The InCASLibRef and OutCASLibRef arguments have been renamed to InCASLib and OutCASLib. This change has been made to the %Compute_FCI_IntPred macro and the %Compute_FCI_NomPred macro.

2021.1.5 (September 2021)

Integration with SAS Model Risk Management

You can establish relationships between model objects in SAS Model Manager and SAS Model Risk Management, and then view the model risk card content and metadata within the respective applications. This integration enables you to make information available to stakeholders so that they can evaluate the model's risk.

For more information, see Establish Model Relationships in *SAS Model Manager: User's Guide* and the Integration with SAS Model Risk Management article in SAS Communities.

General Enhancements

- When creating a Git publishing destination, the default Git branch name is now "main", instead of "master".
- The %MM_GET_MODEL_ID macro has been updated to include additional arguments that enable users to indicate the specific location of a model that they are looking for.

2021.1.4 (August 2021)

Publishing Models

- The layout of the Publish Models window has been redesigned for ease of use and to better present the content.
- When publishing a model to a Git publishing destination, you can select a directory path within the Git repository in which to publish the selected items.

For more information, see "About Publishing Models" in *SAS Model Manager: User's Guide*.

General Enhancements

- When adding KPI rules to a project, the list of assessment indicators that are available depends on the model function that is specified for the project.
- The PROJECTVERSIONID optional argument has been added to the %MM_GET_MODEL_ID macro syntax and argument descriptions. This argument enables you to specify in which project version the model is located, rather than returning all models with the specified name.
- Prompts within a workflow user task are disabled until you claim the task.

2021.1.3 (July 2021)

Publishing Models

- You can publish SAS models to an Azure Machine Learning publishing destination and then validate them within the destination.
- You can publish SAS models to a container destination and then validate them within the destination. The validation is performed using SAS Container Runtime, which is a lightweight OCI (Open Container Initiative) compliant container that scores SAS models.
- After you publish a model from SAS Model Manager to an Azure Machine Learning publishing destination, you can deploy the published model to Azure Kubernetes Service (AKS).

Key Performance Indicators (KPIs)

A KPI is a computed value that is derived from a project's performance definition or from a user's own data and code within the SAS Model Manager web application. You can also use the MMKPI macro and action set in SAS Studio to compute KPIs. KPIs help users track model performance over time using common statistical measures. SAS Model Manager enables users to define and compute standard and custom KPIs, which can then be used to set alerts. Here are the enhancements that were made with this release:

- The Standard KPI Trend chart is now available as part of the model performance results. It shows the selected standard KPI that is calculated over a period of time.
- You can add KPI rules in the **Model Evaluation** section of the **Properties** tab of a project.
- You can add custom KPI code files to a project. You can also run standard and custom KPI code files.

Read the Generate standard and custom KPIs article on SAS Communities to see how KPIs are integrated in a new out-of-the-box workflow-based email notification when model performance exceeds the project's model assessment criteria threshold value.

MMKPI Macro and Action Set

- The deleteKPI action has been added to the MMKPI action set, which provides support for deleting KPI data.
- The standardKPITable parameter has been added to the addCustomKPI action that enables users to specify a user-defined caslib and standard KPI table.

For more information, see "MMKPI Macro and Action Set" in *SAS Model Manager: Macro Reference*.

2021.1.2 (June 2021)

New Progressive Web App Functionality

SAS Model Manager can now be installed as a Progressive Web App (PWA), enabling you to use the product as a desktop app instead of in a web browser. Only Chromium-based browsers support PWA.

For more information, see Installing SAS Model Manager as a Progressive Web App in *SAS Model Manager: User's Guide*.

Performance Monitoring

The **Performance** tab of a project has been enhanced to provide the following types of information:

- Summary information about a project's performance. This includes model assessment criteria, scoring observations, high-level details of the performance definition, and the performance rank of models within the containing project.
- Performance results for each model that was specified in the performance definition. These can now be viewed on separate pages within the **Performance** tab.
- Content that was specified in the performance definition. This appears in the **Definition Details** pane, which is collapsed by default.

For more information, see Run Performance and View Results in *SAS Model Manager: User's Guide*.

2021.1.1 (May 2021)

SAS Model Manager Home

- You can view recent items on the Home page using a list view, in addition to the tile view.
- The links in the How To and What's New sections of the Home page are dynamically populated using the feed from SAS Communities.

For more information, see SAS Model Manager Home in *SAS Model Manager: User's Guide*.

MMKPI Macro and Action Set

The %MM_KPI_ACTIONSET macro and MMKPI CASL action set have been added. These enable you to generate standard and custom KPIs, as well as run user-provided KPI code to specify custom KPI columns and data values, which can then be added to the standard KPI table. The KPIs help users track model performance over time using common statistical measures.

For more information, see MKPI Macro and Action Set in *SAS Model Manager: Macro Reference* and Generate standard and custom KPIs article on SAS Communities.

2020.1.5 (April 2021)

Publishing Models

Text sentiment and Text topics models that you register from Model Studio into the common model repository can now be published to CAS, Git, Hadoop, and SAS Micro Analytic Service publishing destinations. You can also test the models within SAS Model Manager and validate them within the publishing destination.

Performance Monitoring

The %MM_PERFORMANCE_MONITOR macro has been updated to include the new macro variable _MM_TARGET_SPECIFICATION. You can use this macro variable with existing macro variables to generate performance results. The _MM_TARGET_SPECIFICATION macro variable currently applies only to models with a nominal target. Using this macro variable enables you to generate charts to visualize the following types of information:

- Distribution of target categories (observed or predicted) in performance monitoring data.
- Misclassification rates of a model, along with the option to include observed target categories. Misclassification is determined by comparing observed and predicted target categories.
- Predicted probabilities for target categories in performance monitoring data over time.
- Goodness-of-fit statistics for a model over time, which includes the area under the curve (AUC), root average squared error, and misclassification metrics.

General Enhancements

- From SAS Model Manager Home, you can now view additional object properties for an item and remove an item from the **Recent Items** list.
- When creating a new project, you can specify a test condition and threshold as part of the model comparison and assessment criteria.
- The **Score Code Type** column was added to the table on the **Models** tab of a project in order to surface the score code type for each model in the list.
- The validation messages for Python and R score code have been improved to verify that the input and output variables within the scoring function match the variables that are defined within the associated model. These messages are

displayed when running a scoring test, publishing a model, or running performance for a model.

2020.1.4 (March 2021)

Publishing Models

- Text categories and Text concepts models that you register from Model Studio into the common model repository can now be published to CAS and SAS Micro Analytic Service publishing destinations. You can also test the models within SAS Model Manager and validate them within the publishing destination.
- A model published event is recorded in the history of a SAS Model Manager project when you publish SAS Visual Data Mining and Machine Learning models and SAS Visual Text Analytics (Text categories and Text concepts) models from Model Studio or SAS Model Manager. The event entry appears in the project history only if the models were registered from Model Studio in the common model repository before they were published.

General Enhancements

- The left navigation bar is expanded by default when you sign in for the first time. The navigation bar remains in the state that you left it in when you sign in the next time.
- You can register models from Model Studio and SAS Visual Analytics into any repository within the Model Repositories root content folder, as long as the user has Read and Write permissions to the repository. Users of SAS Model Manager and SAS Intelligent Decisioning can then access those models to perform different modeling or decisioning tasks.

2020.1.3 (February 2021)

SAS Model Manager Home

When you sign in to the SAS Model Manager web application, a Home page is now available, and it contains the following information:

- the most recent items that you opened with the date on which they were last modified
- links to the most recent how-to videos and What's New articles on SAS Communities
- links to the What's New, overview, and user documentation for SAS Model Manager
- buttons that enable you to create a new project and add models to a folder

For more information, see SAS Model Manager Home in *SAS Model Manager: User's Guide*, as well as What's New articles and how-to videos in SAS Communities.

Performance Monitoring

- After you create a performance definition, you can schedule performance monitoring jobs to run daily, weekly, monthly, or quarterly.
- When you create and run a performance definition for a prediction model with an interval target, you can use performance charts to monitor the proportion of the predicted interval target values that are above the specified thresholds.
- The %MM_PERFORMANCE_MONITOR macro has been updated to include new macro variables. These can be used to generate additional performance results for prediction models with an interval target.

For more information, see What's New articles and how-to videos in SAS Communities.

Publishing Models

- Using SAS Environment Manager, you can configure publishing destinations for a Git repository, an Azure Machine Learning cloud-based provider, and container destinations (Amazon Web Services, Azure, and Private Docker).
- You can use single sign-on authentication when publishing Python models to an Azure Machine Learning publishing destination from the SAS Model Manager web application or by submitting a request to the Model Publish API.
- When you open a model that is located within a project version, you can now publish it from the object toolbar. Models that are located directly within a folder cannot be published.

For more information, see What's New articles and how-to videos in SAS Communities.

2020.1.2 (January 2021)

Performance Monitoring

New charts have been added to the **Performance** tab of a project. These charts enhance the monitoring of performance for prediction models with an interval target. Concepts from the statistical process control (SPC) that are implemented with the SHEWHART procedure are used to monitor the mean, the standard deviation, and the proportion of values for the predicted interval target over time.

For more information, see "Concepts: Performance Monitoring" in *SAS Model Manager: User's Guide*.

General Enhancements

- The model function is no longer required when creating a new project.
- You can associate attributes with prompts within a workflow user task, which enables users to select a model or select potential owners from a list.

2020.1.1 (December 2020)

Creating Projects

- A new wizard guides users through creating a new project. You can save a new project after specifying only some of the requested information. This information includes descriptive content about a project, such as its model function, model comparison and assessment criteria, input and output variables, user-defined properties, and keywords.
- The types of model functions that are available when creating a project have been expanded to include model functions for computer vision models and SAS Visual Text Analytics models at both the project level and model level.

Filtering the List of Models and Projects

In the dashboard of the Models and Projects category views, you can click various sections of the different charts to filter the list of models or projects within the respective category views. You can then use the advanced search feature to specify additional information to further filter the list. The filters that are applied using the charts are reflected in the advanced search criteria, which results in an integrated search for models or projects.

For more information, see View Dashboard and Filter Projects and View Dashboard and Filter Models in *SAS Model Manager: User's Guide*.

Performance Monitoring

- You can edit the layout of the performance results on the **Performance** tab of a project. This enables you to perform these tasks:
  - Select which charts to display.
  - Rearrange the order in which you want the charts to appear.
  - Add custom charts that link to report objects that were created using SAS Visual Analytics.
- The clear all feature that enables you to clear all of the performance results and delete the data tables from the CAS output library has been moved to the **Actions** menu.
- The system can score R models while running a performance definition, when the model score code contains a scoring function in the correct format.

Publishing Models to a Git Repository

You can define a publishing destination for a Git repository and publish your models from SAS Model Manager to the Git publishing destination. You can use a Git repository to share models with users outside your department or to archive models for future reference. SAS Model Manager does not support importing or updating models from a Git repository into the common model repository.

For more information, see "About Publishing Models" in *SAS Model Manager: User's Guide*.

Testing and Publishing R Models

When the R model score code contains a scoring function in the correct format, you can run on-demand tests for R models and publish them to CAS and SAS Micro

Analytic Service publishing destinations, in addition to container destinations. You can also run a publishing validation test to validate R models within a publishing destination.

For more information, see “R Models” in *SAS Model Manager: User’s Guide*.

General Enhancements

- When you add keywords to a project, they are also added to a global list of keywords that is available to be added to other projects within the common model repository.
- The values for the **Operational status** project property have changed to “Prototype”, “Deployed”, “In production”, and “Deactivated”. The previous values are mapped to the new values during the SAS Viya migration process or when promoting content between SAS Viya environments.
- You can now import a SAS analytic store model using a file that has a .astore file extension in addition to a file that has a .sasast file extension.