

# What's New in SAS<sup>®</sup> 9.3 and SAS<sup>®</sup> Analytical Products 12.1



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**What's New in SAS® 9.3 and SAS® Analytical Products 12.1**

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# Contents

<i>Using This Book</i> .....	vii
<i>Recommended Reading</i> .....	ix
<b>Chapter 1 / Documentation Enhancements</b> .....	<b>1</b>
Documentation Enhancements .....	1
<b>Chapter 2 / New Output Defaults for SAS 9.3</b> .....	<b>5</b>
New Output Defaults in SAS 9.3 .....	5
<b>Chapter 3 / Base SAS</b> .....	<b>9</b>
Overview of New Features in Base SAS 9.3 .....	13
What's New in Base SAS 9.3 Help .....	22
What's New in Base SAS 9.3 Procedures .....	23
What's New in the Base SAS 9.3 Statistical Procedures .....	27
What's New in the Base SAS 9.3 Language Reference: Concepts .....	30
What's New in SAS 9.3 Data Set Options .....	33
What's New in SAS 9.3 Formats and Informats .....	34
What's New in SAS 9.3 Functions and CALL Routines .....	35
What's New in SAS 9.3 Statements .....	38
What's New in SAS 9.3 System Options .....	39
What's New in SAS 9.3 Component Objects .....	44
What's New in Base SAS 9.3 Utilities .....	44
What's New in the Output Delivery System .....	45
What's New in SAS ODS Graphics Procedures 9.3 .....	50
What's New in the SAS 9.3 Graph Template Language .....	56
What's New in SAS 9.3 ODS Graphics Designer .....	64
What's New in the SAS 9.3 ODS Graphics Editor .....	66
What's New in the INFOMAPS Procedure and the Information Maps LIBNAME Engine for SAS 9.3 .....	67
What's New in Encryption in SAS 9.3 .....	69
What's New in Moving and Accessing SAS 9.3 Files .....	70
What's New in the SAS 9.3 Language Interfaces to Metadata .....	70
What's New in the SAS 9.3 Logging Facility .....	72
What's New in the SAS 9.3 Macro Language Facility .....	74
What's New in the SAS 9.3 National Language Support .....	76
What's New in SAS 9.3 Scalable Performance Data Engine .....	78
What's New in the SAS 9.3 SQL Procedure .....	78
What's New in the SAS 9.3 XML LIBNAME Engine .....	80
What's New in the SAS 9.3 Companion for UNIX Environments .....	81
What's New in the SAS 9.3 Windows Companion .....	83
What's New in SAS 9.3 Companion for z/OS .....	84
What's New in SAS 9.3 VSAM Processing for z/OS .....	89
<b>Chapter 4 / SAS/ACCESS</b> .....	<b>91</b>
What's New in SAS/ACCESS 9.3 for Relational Databases .....	91
What's New in SAS/ACCESS 9.3 Interface to PC Files .....	93
<b>Chapter 5 / SAS Add-In for Microsoft Office</b> .....	<b>95</b>

What's New in the SAS Add-In 4.3 for Microsoft Office .....	95
What's New in the SAS Add-In 5.1 for Microsoft Office .....	99
<b>Chapter 6 / SAS BI Dashboard .....</b>	<b>103</b>
What's New in SAS BI Dashboard 4.31 .....	103
<b>Chapter 7 / SAS Concept Creation for SAS Text Miner .....</b>	<b>107</b>
New Products: SAS Concept Creation for SAS Text Miner .....	107
<b>Chapter 8 / SAS/CONNECT .....</b>	<b>109</b>
What's New in SAS/CONNECT 9.3 .....	109
What's New in Communications Access Methods for SAS/ CONNECT 9.3 and SAS/SHARE 9.3 .....	111
<b>Chapter 9 / SAS Content Categorization .....</b>	<b>113</b>
What's New in SAS Content Categorization 5.2 .....	113
What's New in SAS Content Categorization 12.1 .....	115
<b>Chapter 10 / SAS Data Integration Studio .....</b>	<b>119</b>
What's New in SAS Data Integration Studio 4.3 .....	120
What's New in SAS Data Integration Studio 4.4 .....	123
What's New in SAS Data Integration Studio 4.5 .....	125
What's New in SAS Data Integration Studio 4.6 .....	128
<b>Chapter 11 / SAS Data Surveyor for PeopleSoft .....</b>	<b>129</b>
What's New in SAS Data Surveyor for PeopleSoft .....	129
<b>Chapter 12 / SAS Data Quality Server .....</b>	<b>131</b>
What's New in SAS 9.3 Data Quality Server .....	131
<b>Chapter 13 / SAS Drivers .....</b>	<b>135</b>
What's New for the SAS 9.3 Drivers for JDBC .....	135
What's New in SAS Drivers for ODBC 9.3 .....	136
<b>Chapter 14 / SAS Enterprise Guide .....</b>	<b>139</b>
What's New in SAS Enterprise Guide 4.3 .....	139
What's New in SAS Enterprise Guide 5.1 .....	143
<b>Chapter 15 / SAS Enterprise Miner .....</b>	<b>147</b>
What's New in SAS Enterprise Miner 7.1 .....	148
What's New in SAS Enterprise Miner 7.1 M1 .....	153
What's New in SAS Enterprise Miner 12.1 .....	155
What's New in SAS Text Miner 5.1 .....	157
What's New in SAS Text Miner 12.1 .....	159
<b>Chapter 16 / SAS/ETS .....</b>	<b>161</b>
What's New in SAS/ETS 9.3 .....	162
What's New in SAS/ETS 12.1 .....	169
<b>Chapter 17 / SAS/Genetics .....</b>	<b>177</b>
What's New in SAS/Genetics 9.3 .....	177
What's New in SAS/Genetics 12.1 .....	177
<b>Chapter 18 / SAS/GRAPH .....</b>	<b>179</b>
What's New in SAS/GRAPH 9.3 .....	179

<b>Chapter 19 / SAS Grid Manager</b> .....	<b>189</b>
What's New in SAS Grid Manager 9.3 .....	189
<b>Chapter 20 / SAS High-Performance Forecasting</b> .....	<b>191</b>
What's New in SAS High-Performance Forecasting 4.1 .....	191
What's New in SAS High-Performance Forecasting 12.1 .....	193
<b>Chapter 21 / SAS/IML</b> .....	<b>195</b>
What's New in SAS/IML 9.3 .....	195
What's New in SAS/IML 12.1 .....	198
<b>Chapter 22 / SAS In-Database Products</b> .....	<b>201</b>
What's New in SAS 9.3 In-Database Products .....	201
<b>Chapter 23 / SAS Information Delivery Portal</b> .....	<b>207</b>
What's New in SAS Information Delivery Portal 4.31 .....	207
<b>Chapter 24 / SAS Information Map Studio</b> .....	<b>209</b>
What's New in SAS Information Map Studio 4.31 .....	209
<b>Chapter 25 / SAS Information Retrieval Studio</b> .....	<b>215</b>
What's New in SAS Information Retrieval Studio 1.3 .....	215
What's New in SAS Information Retrieval Studio 12.1 .....	216
<b>Chapter 26 / SAS Integration Technologies</b> .....	<b>217</b>
What's New in SAS 9.3 Integration Technologies .....	218
What's New in SAS 9.3 Stored Processes .....	219
What's New in SAS 9.3 BI Web Services .....	221
What's New in SAS 9.3 Publishing Framework .....	222
What's New in Integration Technologies Java Client Development .....	223
What's New in SAS 9.3 Foundation Services .....	223
What's New in Application Messaging with SAS 9.3 .....	224
<b>Chapter 27 / SAS Intelligence Platform</b> .....	<b>225</b>
What's New in Application Server Administration for the SAS 9.3 Intelligence Platform .....	227
What's New in Desktop Application Administration for the SAS 9.3 Intelligence Platform .....	228
What's New in Data Administration for the SAS 9.3 Intelligence Platform .....	230
What's New in Installation and Configuration for the SAS 9.3 Intelligence Platform .....	232
What's New in Middle-Tier Administration for the SAS 9.3 Intelligence Platform .....	234
What's New in Migration for the SAS 9.3 Intelligence Platform .....	237
What's New in System Administration for the SAS 9.3 Intelligence Platform .....	238
What's New in Security Administration in SAS 9.3 .....	242
What's New in Web Application Administration for the SAS 9.3 Intelligence Platform .....	245
<b>Chapter 28 / SAS Inventory Optimization</b> .....	<b>253</b>
What's New in SAS Inventory Optimization 2.1 .....	253
<b>Chapter 29 / SAS/IntrNet</b> .....	<b>255</b>
What's New in SAS/IntrNet 9.3 .....	255
What's New in SAS/IntrNet 9.3 Application Dispatcher .....	255
<b>Chapter 30 / SAS Management Console</b> .....	<b>257</b>

What's New in SAS Management Console 9.3	257
<b>Chapter 31 / SAS Model Manager</b>	<b>261</b>
What's New in SAS Model Manager 12.1	261
<b>Chapter 32 / SAS National Language Support</b>	<b>265</b>
What's New in the SAS 9.3 National Language Support	265
<b>Chapter 33 / SAS OLAP Server</b>	<b>269</b>
What's New in the SAS 9.3 OLAP Server	269
<b>Chapter 34 / SAS Ontology Management</b>	<b>273</b>
What's New in SAS Ontology Management Studio 12.1	273
<b>Chapter 35 / SAS Open Metadata Architecture</b>	<b>275</b>
What's New in SAS Open Metadata Interface: Reference and Usage	275
What's New in the SAS 9.3 Java Metadata Interface	279
What's New in SAS 9.3 Metadata Model: Reference	279
<b>Chapter 36 / SAS/OR</b>	<b>281</b>
What's New in SAS/OR 9.3	281
What's New in SAS/OR 12.1	286
<b>Chapter 37 / SAS Providers for OLE DB</b>	<b>295</b>
What's New in the SAS 9.3 Providers for OLE DB	295
<b>Chapter 38 / SAS/QC</b>	<b>297</b>
What's New in SAS/QC 9.3	297
What's New in SAS/QC 12.1	299
<b>Chapter 39 / SAS Sentiment Analysis</b>	<b>303</b>
What's New in SAS Sentiment Analysis 1.3	303
What's New in SAS Sentiment Analysis 12.1	305
<b>Chapter 40 / SAS/SHARE</b>	<b>307</b>
What's New in SAS/SHARE 9.3	307
What's New in Communications Access Methods for SAS/ CONNECT 9.3 and SAS/SHARE 9.3	308
<b>Chapter 41 / SAS Simulation Studio</b>	<b>309</b>
What's New in SAS Simulation Studio 1.6	309
What's New in SAS Simulation Studio 12.1	312
<b>Chapter 42 / SAS/STAT</b>	<b>315</b>
What's New in SAS/STAT 9.3	315
What's New in SAS/STAT 12.1	322
<b>Chapter 43 / SAS Visual Analytics</b>	<b>333</b>
What's New in SAS Visual Analytics 5.2	333
What's New in SAS Visual Analytics 6.1	335
What's New in SAS Visual Analytics 6.1 Administration	339
<b>Chapter 44 / SAS Web Report Studio</b>	<b>345</b>
What's New in SAS Web Report Studio 4.31	345

# Using This Book

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## Audience

The What's New documentation gives you a quick, convenient overview of new functionality, enhanced features, and new products that you might use in SAS 9.3. This document is a compilation of all the What's New topics for products that ship with a SAS release. It also contains What's New topics for several SAS products that ship on top of SAS 9.3. This document does not contain What's New topics for SAS products that have secure documentation. For more information about those SAS products, contact your SAS consultant.

The What's New documentation is cumulative and is updated whenever there is an update of a SAS product, so you should review the What's New topics for your products whenever you receive a product update. In general, the What's New topic for each product contains all of the features and enhancements in the SAS 9.3 release. For example, the "What's New in SAS 9.3 Procedures" topic contains features and enhancements for SAS 9.3.

Some SAS products (such as SAS Enterprise Guide) use their own product release numbers. For these products, What's New topics for all product releases that shipped on top of SAS 9.3 are included in What's New in SAS 9.3. For example, this document contains the What's New topics for the SAS Add-In 4.3 for Microsoft Office and SAS Enterprise Guide 4.3.

To view the What's New documentation for previous releases of SAS, see <http://support.sas.com/documentation/whatsnew>.





## Recommended Reading

All of the What's New topics in *What's New in SAS 9.3 and SAS Analytical Products 12.1* are also available in the product documentation. For more information about a specific new feature or enhancement, see the product documentation in the following locations:

- the product documentation page at <http://support.sas.com/documentation>
- the Help that is available within the product

**Note:** Your site might not license all of the products that are listed in the What's New. Therefore, you might not be able to access the Help for all SAS products.

The recommending reading list from SAS Press includes the following titles:

- *Data Preparation for Analytics Using SAS* at <https://support.sas.com/pubscat/bookdetails.jsp?catid=1&pc=60502>
- *Output Delivery System: The Basics and Beyond* at <https://support.sas.com/pubscat/bookdetails.jsp?catid=1&pc=61686>
- *Statistical Programming in SAS* at <https://support.sas.com/pubscat/bookdetails.jsp?catid=1&pc=61251>
- *Survival Analysis Using SAS: A Practical Guide, Second Edition* at <https://support.sas.com/pubscat/bookdetails.jsp?catid=1&pc=61339>
- *The Little SAS Book for Enterprise Guide 4.2* at <https://support.sas.com/pubscat/bookdetails.jsp?catid=1&pc=61861>
- *The Little SAS Book: A Primer, Fourth Edition* at <https://support.sas.com/pubscat/bookdetails.jsp?catid=1&pc=61860>

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**x** *Recommended Reading*

## 1

# Documentation Enhancements

<b>Documentation Enhancements</b> .....	<b>1</b>
Overview .....	1
December 2012 (SAS 9.3, Rev. 930_12w50) .....	1
August 2012 (SAS 9.3, Rev. 930_12w35) .....	1
June 2012 (SAS 9.3, Rev. 930_12w23) .....	3
April 2012 (SAS 9.3, Rev. 930_12w16) .....	3
March 2012 (SAS 9.3, Rev. 930_12w10) .....	3
February 2012 (SAS 9.3, Rev. 930_12w06) .....	3
December 2011 (SAS 9.3, Rev. 930_11w50) .....	3
October 2011 (SAS 9.3, Rev. 930_11w41) .....	4

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## Documentation Enhancements

### Overview

The What's New documentation is cumulative and is updated whenever there is an update of a SAS product. The following topics will help you determine what changes were made after the initial release of SAS 9.3, which shipped in July 2011.

### December 2012 (SAS 9.3, Rev. 930\_12w50)

These topics were added because of a new product release:

- [SAS Data Integration Studio 4.6 on page 128](#)
- [SAS Visual Analytics 6.1 on page 335](#)
- [SAS Visual Analytics 6.1 Administration on page 339](#)

The In-Database products were updated. For more information, see [What's New in SAS 9.3 In-Database Products on page 201](#).

### August 2012 (SAS 9.3, Rev. 930\_12w35)

These topics were updated for the second maintenance release of SAS 9.3:

- Base SAS
  - [What's New in Base SAS 9.3 Procedures on page 23](#)
  - [What's New in the Base SAS 9.3 Statistical Procedures on page 27](#)

- What's New in the Base SAS 9.3 Language Reference: Concepts on page 30
- What's New in SAS 9.3 Functions and CALL Routines on page 35
- What's New in SAS 9.3 Statements on page 38
- What's New in SAS 9.3 System Options on page 39
- What's New in the Output Delivery System on page 45
- What's New in SAS ODS Graphics Procedures 9.3 on page 50
- What's New in the SAS 9.3 Graph Template Language on page 56
- What's New in Encryption in SAS 9.3 on page 69
- What's New in the SAS 9.3 SQL Procedure on page 78
- What's New in the SAS 9.3 XML LIBNAME Engine on page 80
- What's New in the SAS 9.3 Companion for UNIX Environments on page 81
- What's New in the SAS 9.3 Windows Companion on page 83
- What's New in SAS 9.3 Companion for z/OS on page 84
- What's New in SAS/ACCESS 9.3 for Relational Databases on page 91
- What's New in Application Messaging with SAS 9.3 on page 224
- What's New in Communications Access Methods for SAS/CONNECT 9.3 and SAS/SHARE 9.3 on page 111
- What's New in SAS/GRAPH 9.3 on page 179
- SAS Intelligence Platform
  - What's New in Data Administration for the SAS 9.3 Intelligence Platform on page 230
  - What's New in Installation and Configuration for the SAS 9.3 Intelligence Platform on page 232
  - What's New in Middle-Tier Administration for the SAS 9.3 Intelligence Platform on page 234
  - What's New in System Administration for the SAS 9.3 Intelligence Platform on page 238
  - What's New in Web Application Administration for the SAS 9.3 Intelligence Platform on page 245

These topics were added because of a new product release that shipped in August 2012:

- What's New in SAS Content Categorization 12.1 on page 115
- What's New in SAS Data Integration Studio 4.5 on page 125
- What's New in SAS Enterprise Miner 12.1 on page 155
- What's New in SAS/ETS 12.1 on page 169
- What's New in SAS/Genetics 12.1 on page 177
- What's New in SAS High-Performance Forecasting 12.1 on page 193
- What's New in SAS/IML 12.1 on page 198
- What's New in SAS Information Retrieval Studio 12.1 on page 216

- [What's New in SAS Ontology Management Studio 12.1 on page 273](#)
- [What's New in SAS/OR 12.1 on page 286](#)
- [What's New in SAS/QC 12.1 on page 299](#)
- [What's New in SAS Sentiment Analysis 12.1 on page 305](#)
- [What's New in SAS Simulation Studio 12.1 on page 312](#)
- [What's New in SAS/STAT 12.1 on page 322](#)
- [What's New in SAS Text Miner 12.1 on page 159](#)

These topics were updated because of a product maintenance release that shipped in August 2012:

- [What's New in SAS BI Dashboard 4.31 on page 103](#)
- [What's New in SAS 9.3 In-Database Products on page 201](#)

## June 2012 (SAS 9.3, Rev. 930\_12w23)

SAS Visual Analytics 5.2 shipped in June 2012. For more information, see [What's New in SAS Visual Analytics 5.2 on page 333](#).

## April 2012 (SAS 9.3, Rev. 930\_12w16)

The first maintenance release of SAS Model Manager 3.1 adds the ability to publish scoring functions to a Greenplum database. For more information, see [What's New in SAS Model Manager 12.1 on page 261](#).

## March 2012 (SAS 9.3, Rev. 930\_12w10)

A new topic was added to describe the new features and enhancements for SAS Data Integration Studio 4.4. For more information, see [What's New in SAS Data Integration Studio 4.4 on page 123](#).

Support has been added in SAS Enterprise Guide 5.1 and the SAS Add-In 5.1 for Microsoft Office to automatically run jobs on a grid. New options have been added to SAS Grid Manager Client Utility, including the ability to stage files into and out of the grid. For more information, see [What's New in SAS Grid Manager 9.3 on page 189](#).

## February 2012 (SAS 9.3, Rev. 930\_12w06)

These topics were added to the *What's New in SAS 9.3* document:

- [What's New in the SAS Add-In 5.1 for Microsoft Office on page 99](#)
- [What's New in SAS Enterprise Guide 5.1 on page 143](#)

For information about the new administrative features in the SAS Add-In 5.1 for Microsoft Office and SAS Enterprise Guide 5.1, see [What's New in Desktop Application Administration for the SAS 9.3 Intelligence Platform on page 228](#).

## December 2011 (SAS 9.3, Rev. 930\_11w50)

Here are the documentation changes for this release:

- an explanation of when Cross-Environment Data Access (CEDA) processing is not invoked. For more information, see [Overview of New Features in Base SAS 9.3 on page 13](#) and [What's New in the Base SAS 9.3 Language Reference: Concepts on page 30](#).
- a clarification that the SGDESIGN, SGPANEL, SGPLOT, SGRENDER, and SGSCATTER procedures are now part of Base SAS. For more information, see [What's New in SAS ODS Graphics Procedures 9.3 on page 50](#).
- updates to SAS Drivers for ODBC for the first maintenance release of SAS 9.3. These changes include a new 64-bit driver and simultaneous support for the Userid/Password Override feature and the SAS/SHARE server password. For more information, see [What's New in SAS Drivers for ODBC 9.3 on page 136](#).
- a description of the changes in the first maintenance release for SAS Information Delivery Portal 4.31. For more information, see [What's New in Web Application Administration for the SAS 9.3 Intelligence Platform on page 245](#).
- enhanced map attributes for the RANGE statement and deprecated option statements. For more information, see [What's New in the SAS 9.3 Graph Template Language on page 56](#).
- These topics were added to the *What's New in SAS 9.3* document:
  - [Documentation Enhancements on page 1](#)
  - [What's New in SAS Enterprise Miner 7.1 M1 on page 153](#)
  - [What's New in SAS 9.3 In-Database Products on page 201](#)

## October 2011 (SAS 9.3, Rev. 930\_11w41)

Here are the documentation changes for this release:

- When you migrate to SAS 9.3, you can remap ports and use the enhanced migration utility analysis report. For more information, see [What's New in Migration for the SAS 9.3 Intelligence Platform on page 237](#).
- These topics were added to the *What's New in SAS 9.3* document:
  - [What's New in SAS Content Categorization 5.2 on page 113](#)
  - [What's New in SAS Information Retrieval Studio 1.3 on page 215](#)
  - [What's New in SAS Sentiment Analysis 1.3 on page 303](#)

## 2

## New Output Defaults for SAS 9.3

<i>New Output Defaults in SAS 9.3</i> .....	5
Overview .....	5
HTML Output in the SAS Windowing Environment .....	5
LISTING Output in the SAS Windowing Environment .....	6

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### New Output Defaults in SAS 9.3

#### Overview

In SAS 9.3, output in the SAS windowing environment is created by default in HTML. In addition, ODS Graphics is enabled by default. The following sections explain the advantages of these new defaults and how to change the defaults to match those of previous releases:

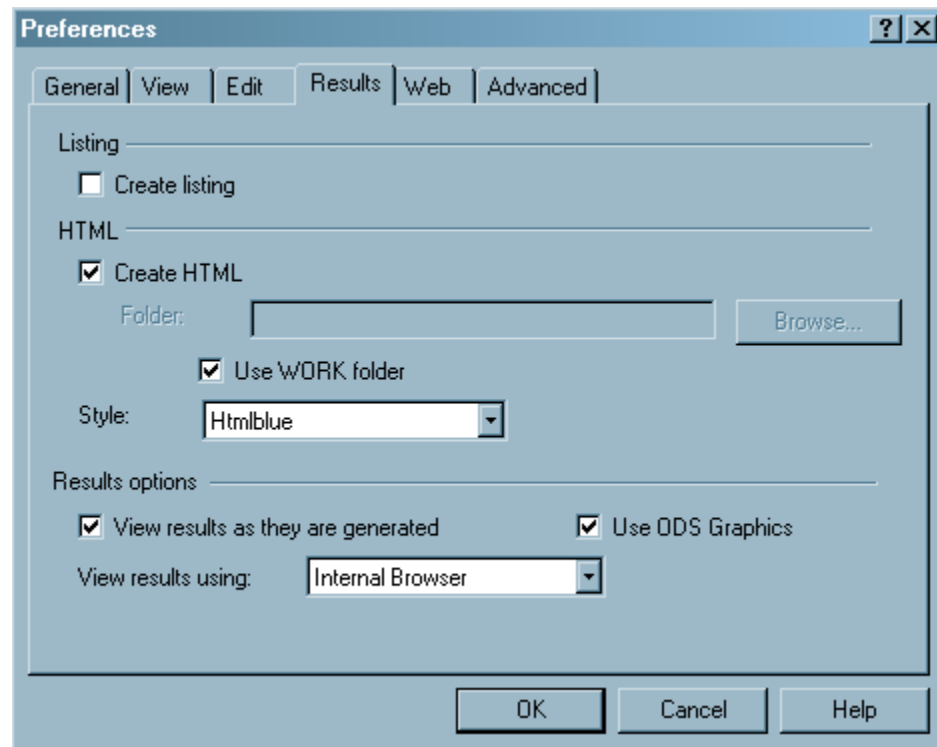
- [HTML Output in the SAS Windowing Environment on page 5](#)
- [LISTING Output in the SAS Windowing Environment on page 6](#)

LISTING output is the default in previous releases and when you run SAS in batch mode in SAS 9.3. HTML output in the SAS windowing environment is the default in SAS 9.3 for Microsoft Windows and UNIX, but not for other operating systems. Your actual defaults might be different because of your registry or configuration file settings.

#### HTML Output in the SAS Windowing Environment

In SAS 9.3, the default destination in the SAS windowing environment is HTML, and ODS Graphics is enabled by default. These new defaults have several advantages. Graphs are integrated with tables, and all output is displayed in the same HTML file using a new style. This new style, HTMLBlue, is an all-color style that is designed to integrate tables and modern statistical graphics.

You can view and modify the default settings by selecting **Tools** ► **Options** ► **Preferences** from the menu at the top of the main SAS window. Then open the Results tab. You can remember this sequence using the mnemonic TOPR (pronounced “topper”). The following display shows the SAS **Results** tab with the new default settings specified:



The default settings in the **Results** tab are as follows:

- The **Create listing** check box is not selected, so LISTING output is not created.
- The **Create HTML** check box is selected, so HTML output is created.
- The **Use WORK folder** check box is selected, so both HTML and graph image files are saved in the WORK folder (and not your current directory).
- The default style, HTMLBlue, is selected from the **Style** drop-down list.
- The **Use ODS Graphics** check box is selected, so ODS Graphics is enabled.
- **Internal browser** is selected from the **View results using:** drop-down list, so results are viewed in an internal SAS browser.

In many cases, graphs are an integral part of a data analysis. However, when you run large computational programs (such as when you use procedures with many BY groups) you might not want to create graphs. In those cases, you should disable ODS Graphics, which will improve the performance of your program. You can disable and re-enable ODS Graphics in your SAS programs with the ODS GRAPHICS OFF and ODS GRAPHICS ON statements. You can also change the ODS Graphics default in the **Results** tab.

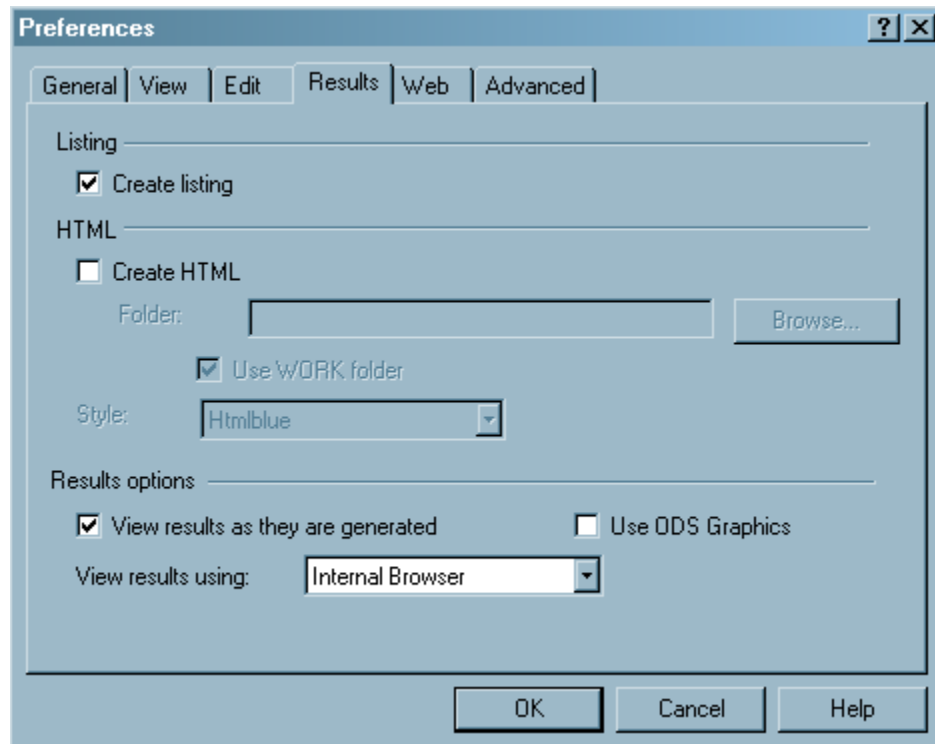
## LISTING Output in the SAS Windowing Environment

Before SAS 9.3, SAS output in the SAS windowing environment was created by default in the LISTING destination. In the LISTING destination, tables are displayed in monospace, and graphs are not integrated with tables.

You can create LISTING output by selecting **Tools** ► **Options** ► **Preferences** from the menu at the top of the main SAS window. Then open the **Results** tab. Select the **Create listing** check box, and do not select the **Create HTML** check box.



Before SAS 9.3, ODS Graphics was disabled by default. You can enable or disable ODS Graphics by default by using the check box, and you can use the ODS GRAPHICS ON and ODS GRAPHICS OFF statements to enable and disable ODS Graphics in your SAS programs. The following display shows the SAS **Results** tab with the old default settings specified:





## 3

## Base SAS

<b>Overview of New Features in Base SAS 9.3</b> .....	<b>13</b>
Additional Information .....	13
Support for Hadoop Data .....	14
ODS .....	14
ODS Graphics .....	15
Encryption .....	15
SAS Engines .....	15
Cross-Environment Data Access (CEDA) .....	16
Running SAS in Batch .....	16
Universal Printing .....	16
SAS Logging Facility .....	16
National Language Support .....	17
SAS Language Interface to Metadata .....	17
Performance .....	17
Moving and Accessing Files .....	17
E-mail Using the FILENAME Statement .....	18
Procedures .....	18
Language Elements .....	20
SAS under UNIX .....	21
SAS under Windows .....	21
SAS under z/OS .....	21
<b>What's New in Base SAS 9.3 Help</b> .....	<b>22</b>
Overview .....	22
New Features .....	22
Documentation Enhancements .....	22
<b>What's New in Base SAS 9.3 Procedures</b> .....	<b>23</b>
Overview .....	23
New Base SAS Procedures .....	23
Enhanced Base SAS Procedures .....	23
Documentation Enhancements .....	27
<b>What's New in the Base SAS 9.3 Statistical Procedures</b> .....	<b>27</b>
Enhancements .....	27
What's Changed .....	30
References .....	30
<b>What's New in the Base SAS 9.3 Language Reference: Concepts</b> .....	<b>30</b>
Overview .....	30
ODS Graphics in Base SAS .....	31
SAS System Features .....	31
<b>What's New in SAS 9.3 Data Set Options</b> .....	<b>33</b>

Overview .....	33
Changes to SAS Language Reference: Dictionary .....	33
New SAS Data Set Option .....	33
<b>What's New in SAS 9.3 Formats and Informats .....</b>	<b>34</b>
Overview .....	34
New SAS Informats .....	34
Changes to SAS Language Reference: Dictionary .....	34
<b>What's New in SAS 9.3 Functions and CALL Routines .....</b>	<b>35</b>
Overview .....	35
New Functions and CALL Routines .....	35
Enhancements to Existing Functions .....	36
Documentation for Existing Functions and Concepts .....	37
Changes to SAS Language Reference: Dictionary .....	37
<b>What's New in SAS 9.3 Statements .....</b>	<b>38</b>
Overview .....	38
New SAS Statements .....	38
Enhanced SAS Statements .....	38
Changes to SAS Language Reference: Dictionary .....	39
<b>What's New in SAS 9.3 System Options .....</b>	<b>39</b>
Overview .....	39
Use Checkpoint Mode and Restart Mode for Labeled Code Sections .....	40
Reset System Options to Their Start-up or Default Values .....	40
Create a Directory That Is Named in a LIBNAME Statement .....	41
Use Expanded Rules for Naming SAS Data Sets, SAS Data Views, and Item Store Names .....	41
Change the Orientation of Pages within a File Using ODS PRINTER .....	41
Control Autocorrection of SAS Names .....	41
Specify the UTC Offset in E-mail .....	41
Specify the Encoding for the URLENCODE and URLDECODE Functions .....	41
Specify the Size of the View Buffer .....	41
Specify an Event Data Set .....	41
Enhancements to the GETOPTION Function .....	42
Enhancements to SAS System Options .....	42
Enhancements to the OPTIONS Procedure .....	42
System Options That Have Moved to Other Documentation .....	43
Changes to SAS Language Reference: Dictionary .....	43
<b>What's New in SAS 9.3 Component Objects .....</b>	<b>44</b>
Changes to SAS Language Reference: Dictionary .....	44
<b>What's New in Base SAS 9.3 Utilities .....</b>	<b>44</b>
Changes to SAS Language Reference: Dictionary .....	44
<b>What's New in the Output Delivery System .....</b>	<b>45</b>
Overview .....	45
Changes to Default Output in the SAS Windowing Environment for UNIX and Windows .....	45
Selected SAS/GRAPH Products Included with Base SAS Software .....	47
Changes to PRINTER Registry Settings .....	47
DOCUMENT Procedure Enhancements .....	48
Template Procedure Enhancements .....	49
ODS Statements Enhancements .....	49
New System Options .....	50

<b>What's New in SAS ODS Graphics Procedures 9.3</b> .....	<b>50</b>
Overview .....	50
ODS Graphics Procedures Are Included with Base SAS .....	51
Changes to the Default ODS Output .....	51
New Plot Statements for the SGPLOT and SGPANEL Procedures .....	51
Updates to the PROC SGPLOT, PROC SGPANEL, and PROC SGSCATTER Statements .....	52
Updates to Plot Statements in the SGPLOT and SGPANEL Procedures .....	52
Axis Updates for the SGPANEL and SGPLOT Procedures .....	54
Updates to the SGRENDER Procedure .....	55
Updates to the SGDESIGN Procedure .....	55
New Attribute Mapping Feature .....	55
New Annotation Feature .....	55
<b>What's New in the SAS 9.3 Graph Template Language</b> .....	<b>56</b>
Overview .....	56
New Layout Statements .....	56
New Plot Statements .....	56
New Legend Statements .....	57
New Features for General Use .....	57
Enhancements to SAS 9.2 Statements .....	59
<b>What's New in SAS 9.3 ODS Graphics Designer</b> .....	<b>64</b>
Overview .....	64
Designer Included with Base SAS .....	64
ODS Style Enhancements and Changes .....	64
Enhanced Way to Start the Designer .....	65
More Options for Saving a Graph .....	65
Enhanced Data Assignment Options .....	65
Enhanced Plot Properties .....	65
<b>What's New in the SAS 9.3 ODS Graphics Editor</b> .....	<b>66</b>
Overview .....	66
Editor Is Included with Base SAS .....	66
Stand-Alone Editor Is No Longer Required .....	66
ODS Changes and Enhancements .....	66
Enhancements for Editing a Graph .....	67
Additional Rendering Option for SGE Files .....	67
<b>What's New in the INFOMAPS Procedure and the Information Maps LIBNAME Engine for SAS 9.3</b> .....	<b>67</b>
Overview .....	67
INFOMAPS Procedure Features .....	68
Information Maps LIBNAME Engine Features .....	69
<b>What's New in Encryption in SAS 9.3</b> .....	<b>69</b>
Overview .....	69
General Enhancements .....	69
<b>What's New in Moving and Accessing SAS 9.3 Files</b> .....	<b>70</b>
Overview .....	70
Documentation Enhancements .....	70
<b>What's New in the SAS 9.3 Language Interfaces to Metadata</b> .....	<b>70</b>
Overview .....	70
Procedures .....	71
System Options .....	72

Documentation Enhancements .....	72
<b>What's New in the SAS 9.3 Logging Facility .....</b>	<b>72</b>
Overview .....	72
Support for Modifying and Replacing the Logging Configuration File .....	73
Restrict Modification of the Logging Configuration .....	73
Logging Configuration File Error Messages .....	73
New Appenders .....	73
Audit the Access to SAS Libraries .....	73
Conversion Pattern Enhancements .....	73
Filter Enhancements .....	74
<b>What's New in the SAS 9.3 Macro Language Facility .....</b>	<b>74</b>
Overview .....	74
Automatic Macro Variables .....	74
Macro Functions .....	75
Macro Statements .....	75
Macro System Options .....	75
<b>What's New in the SAS 9.3 National Language Support .....</b>	<b>76</b>
Overview .....	76
General Enhancements .....	76
Additional Encodings .....	76
Formats .....	76
Functions .....	77
System Options .....	77
<b>What's New in SAS 9.3 Scalable Performance Data Engine .....</b>	<b>78</b>
Overview .....	78
SPD Engine System Options .....	78
<b>What's New in the SAS 9.3 SQL Procedure .....</b>	<b>78</b>
Overview .....	78
Ability to Optimize the PUT Function .....	79
Ability to Reuse the LIBNAME Statement Database Connection .....	79
Additional PROC SQL Statement Options .....	79
Additional Macro Variable Specifications for the INTO Clause .....	79
Additional Dictionary Table .....	79
Additional System Macro Variable .....	79
Updated Output Examples .....	79
Modified the Default Value for the SQLGENERATION= Option .....	80
Added Security for Password-Protected SAS Views .....	80
<b>What's New in the SAS 9.3 XML LIBNAME Engine .....</b>	<b>80</b>
Overview .....	80
Enhanced LIBNAME Statement .....	80
Updated XMLMap Functionality .....	80
<b>What's New in the SAS 9.3 Companion for UNIX Environments .....</b>	<b>81</b>
Overview .....	81
Concatenating Files in autoexec.sas .....	81
Deprecated Option .....	81
Documentation Enhancements .....	82
Encoding for Pathnames on Disk .....	82
Identifying Where the Value of a SAS System Option Is Set .....	82
SAS Output .....	82
Processing Files on Tape .....	82

SAS Statement Option .....	82
SAS System Options .....	82
SAS Window Enhancement .....	83
Converting a UNIX Datetime Value to a SAS Datetime Value .....	83
<b>What's New in the SAS 9.3 Windows Companion .....</b>	<b>83</b>
Overview .....	83
General Enhancements .....	83
System Options .....	84
<b>What's New in SAS 9.3 Companion for z/OS .....</b>	<b>84</b>
Overview .....	84
SAS Software Enhancements .....	85
Enhanced SAS Data Set Options .....	86
Enhanced SAS Procedures .....	86
Enhanced SAS Statements .....	87
Enhanced SAS System Options .....	87
New SAS System Options .....	88
Deprecated SAS System Options .....	88
Documentation Enhancements .....	89
<b>What's New in SAS 9.3 VSAM Processing for z/OS .....</b>	<b>89</b>
Overview .....	89
New VSAM Options for the FILE and INFILE Statements .....	89

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## Overview of New Features in Base SAS 9.3

### Additional Information

For more information about new features, see the What's New information for Base SAS in these documents:

- *Base SAS Guide to Information Maps*
- *Base SAS Procedures Guide*
- *Base SAS Procedures Guide: Statistical Procedures*
- *Base SAS Utilities: Reference*
- *Encryption in SAS*
- *Moving and Accessing SAS Files*
- *SAS CDISC Procedure: User's Guide*
- *SAS Companion for UNIX Environments*
- *SAS Companion for Windows*
- *SAS Companion for z/OS*
- *SAS Component Objects: Reference*
- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Graph Template Language: Reference*

- *SAS Graph Template Language: User's Guide*
- *SAS Language Reference: Concepts*
- *SAS Language Interfaces to Metadata*
- In the second maintenance release for SAS 9.3, the *SAS LIBNAME Engine for DataFlux Federation Server* is new.
- *SAS Logging: Configuration and Programming Reference*
- *SAS Macro Language: Reference*
- *SAS National Language Support (NLS): Reference Guide*
- *SAS ODS Graphics Designer: User's Guide*
- *SAS ODS Graphics Editor: User's Guide*
- *SAS ODS Graphics: Procedures Guide*
- *SAS Output Delivery System: User's Guide*
- *SAS Scalable Performance Data Engine: Reference*
- *SAS SQL Procedure User's Guide*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS XML LIBNAME Engine: User's Guide*

## Support for Hadoop Data

In the second maintenance release for SAS 9.3, Base SAS has these language interfaces to Hadoop data:

- The HADOOP procedure enables SAS to run Apache Hadoop code against Hadoop data. Using PROC HADOOP, you can submit HDFS (Hadoop Distributed File System) commands, MapReduce programs, and Pig language code against Hadoop data.
- The FILENAME Statement, Hadoop Access Method enables you to access files on an HDFS.

## ODS

The default destination is HTML when you run SAS in the windowing environment on Microsoft Windows and UNIX. ODS Graphics is enabled by default and the default style is a new style, HTMLBlue. The default destination is LISTING when you run SAS in batch mode or under z/OS, and ODS Graphics is not enabled by default. New system options can restore output behavior to SAS 9.2 behavior.

The HTML destination now supports the BMP image type. The PRINTER statement now supports titles and footnotes by using SAS/GRAPH options.

New event tagsets support measured tagsets. You can now specify the number of levels in a table of contents and whether to include version control information.

The DOCUMENT procedure enhancements now fully support the PRINT procedure. The WHERE option applies to output objects as well as directories, and the WHERE option now has new subsetting variables. Text files can be imported into an ODS



document, which can be replayed to open ODS destinations. Table output objects can be written to active destinations.

The TEMPLATE procedure enhancements enable the use of RGBA (red, green, blue, transparency) and CMYK (cyan, magenta, yellow, black) colors. New statements for tabular output can now have default values for dynamic variables. New style elements control white space in a table and the position of the background of tables, cells, or graphs.

You can now edit existing style templates by using the EDIT statement. New style attributes control white space, borders, and background position.

In the second maintenance release for SAS 9.3, the ODS PREFERENCES statement can revert the ODS settings to the default behavior. Enhancements to the ODS TAGSETS.RTF statement enable you to add a watermark to an RTF document and to add a continue tag when a table breaks across a page.

## ODS Graphics

ODS Graphics has moved to Base SAS. For information about ODS Graphics, see the following documents:

- *SAS ODS Graphics Designer: User's Guide*
- *SAS ODS Graphics Editor: User's Guide*
- *SAS ODS Graphics: Procedures Guide*
- *SAS Graph Template Language: Reference*
- *SAS Graph Template Language: User's Guide*

There are several significant changes that affect ODS Graphics. Most notably, in the SAS windowing environment under Microsoft Windows or UNIX, ODS Graphics is enabled by default and output is sent to the Work folder instead of the current directory. ODS graphics are now on by default.

For a complete list of all changes and enhancements for ODS graphics, see the What's New topics in the individual documents.

## Encryption

SAS now supports FIPS 140-2 encryption in SAS/SECURE and Secure Sockets Layer (SSL).

The algorithm for hashing passwords has changed from MD5 to SHA256.

## SAS Engines

In the second maintenance release for SAS 9.3, the FEDSVR LIBNAME engine provides a bridge from SAS data access services to the data access technology that is provided by the DataFlux Federation Server. From a Base SAS session, the engine enables a SAS application such as a SAS procedure or a SAS DATA step to process data by using DataFlux Federation Server 3.1 or later.

A new JMP engine enables you to quickly and easily read your JMP data tables into SAS.

Case-sensitive names for files and catalogs in SAS/ACCESS engine libraries are supported when you transport files by using the CPORT procedure.

The engine nickname to access the enhanced XML LIBNAME engine is XMLV2. XMLV2 functionality is preproduction under z/OS. XMLMap syntax for Version 2.1 now supports XML namespaces.

In the second maintenance release for SAS 9.3, the XMLV2 nickname can automatically generate an XMLMap file.

The new VALIDMEMNAME= system option performs differently in the SPD Engine than in the Base SAS engine.

## Cross-Environment Data Access (CEDA)

CEDA processing is not invoked when you process Windows 32-bit data files in a Windows 64-bit SAS 9.3 session. Likewise, CEDA processing is not invoked when you process Windows 64-bit data files in a Windows 32-bit SAS 9.3 session. If you use Windows data sets in either 32-bit or 64-bit operating environments, you do not need to do anything to benefit from this functionality other than to use SAS 9.3.

Catalogs are an exception. Catalogs are not compatible between 32-bit and 64-bit SAS for Windows.

## Running SAS in Batch

Checkpoint mode and restart mode now support labeled code sections.

When running SAS in any mode other than the windowing environment, SAS data set names, SAS view names, and SAS item store names can include some special characters and national characters.

## Universal Printing

Universal Printing now supports the Enhanced Metafile Format (EMF) printer and new SVG printers for animation, SVG documents without tooltips, and transparent SVG documents. RGBA (red, green, blue, transparency) and CMYK (cyan, magenta, yellow, black) colors are now supported.

Images in an SVG document are converted to PNG files that use base64 encoding and are included as part of the SVG file.

The orientation of individual pages in a document can be set to portrait or landscape. The orientation can also be set to control the top of the page relative to how the paper is inserted into the paper insert tray for printing preprinted or punched forms.

SAS now supports Adobe Type1 fonts.

The new QDEVICE procedure writes information about universal printers to the SAS log or to an output data set.

## SAS Logging Facility

Configuration files can be modified or replaced without restarting SAS, and modification of the logging configuration can be restricted.

Log events can now be written to third-party databases and Java classes.

Access to SAS libraries can be audited.

SAS now provides header and footer conversion patterns.

## National Language Support

SAS supports Open Edition encodings for the katakana, Korean, Chinese, and Japanese languages.

The SETLOCALE function can be used to change the SAS session locale setting, change the locale for a single locale element, such as the format of a year, or change the locale setting for a category of locale elements, such as money.

You can create a format catalog that corresponds to the current SAS locale, and specify to search for formats in the locale-specific catalog by using the FMTSEARCH= system option.

When running in batch, the VALIDMEMNAME= system option can enable national characters to be used in SAS data set names, SAS view names, and SAS item store names.

SAS session encoding or UTF-8 encoding can be specified for use with the URLENCODE and URLDECODE functions.

The automatic macro variable SYSSIZEOFUNICODE contains the length of a Unicode character.

New functions enable you to verify transcoding compatibility between two encodings, specify a valid encoding name, specify a message from a data set, and specify the locale keys for the current SAS locale. Aliases for the LOCALE= system option have been updated.

New formats NLDATMZ, NLDATMTZ, and NLDATMWZ format datetime values with time zones.

## SAS Language Interface to Metadata

In the second maintenance release for SAS 9.3, the Metadata LIBNAME Engine supports the DataFlux Federation Server by using the LIBNAME FEDSVR statement.

PROC METADATA can be used to obtain metadata server configuration information, backup information, and server statistics.

The PROC METAOPERATE commands support the new server backup facility.

The METAAUTORESOURCES system option assigns the LIBNAME engine based on a pre-assignment type setting in the library definition.

## Performance

Optimized WHERE conditions with an index have been improved.

## Moving and Accessing Files

UNIX File System libraries on z/OS support all CEDA data representations. SAS name literals that include embedded blanks can now be used with the CPORT and CIMPORT procedures. When the VALIDVARNAME and VALIDMEMNAME= system options are set to support enhanced names, the data set names or member names that are used in the CIMPORT and CPORT procedures can be up to 32 bytes in length. Names and member names can also be mixed case.

The CPORT procedure now supports case-sensitive names for files and catalogs in a SAS/ACCESS engine library and from the CPORT file.

## E-mail Using the FILENAME Statement

Recipient e-mail addresses can now be separated by commas. You can set an expiration date for an e-mail, specify to receive a delivery notification, and specify that a UTC offset is used in the e-mail Date header field.

## Procedures

Procedures that are enabled for processing inside the database generate more sophisticated queries that enable the aggregations and analytics to be run inside the database. The following Base SAS procedures have been enhanced for in-database processing inside the Aster *n*Cluster, DB2 under UNIX and PC Hosts, Greenplum, Netezza, and Teradata databases:

- `FREQ`
- `MEANS`
- `RANK`
- `REPORT`
- `SORT`
- `SUMMARY`
- `TABULATE`

The CIMPORT procedure supports case-sensitive names from the CPORT file and SAS name literals with embedded blanks. When used in batch mode, data set names and member names that are used with the CPORT procedure can be up to 32 bytes in length.

In the CORR procedure, you can specify one or more tip variables to identify observations in scatter plots and scatter plot matrices.

The CPORT procedure supports case-sensitive names for file and catalogs in a SAS/ACCESS engine library and SAS name literals with embedded blanks. When used in batch mode, data set names and member names that are used with the CPORT procedure can be up to 32 bytes in length.

In the second maintenance release for SAS 9.3, the PROC COPY statement and the COPY statement from the DATASETS procedure enable you to override output data set options that are copied from the input data set.

The FCMP procedure has new functions to compute the quantile and limited moment of any distributions for which a cumulative distribution function has been defined.

The FORMAT procedure supports creating a format catalog that corresponds to the current SAS locale, has several new directives, and can create a format that performs a function on a value. You can use SAS Explorer to view format and informat definitions.

The FREQ procedure now produces several types of plots by using ODS Graphics. New tests and limits are available for the binomial proportion, the proportional difference, and equal odds ratios.

The new GROOVY procedure can run GROOVY statements in your SAS code.

The OPTIONS procedure has two new options that list system options. The LISTINSERTAPPEND option lists the system options whose value can be modified by the INSERT and APPEND system options. The LISTRESTRICT option lists system options that can be restricted by your site administrator. You can now list information about one or more options. Valid values for an option now display in procedure output as well as the name of the configuration file that set an option.

The OPTLOAD, OPTSAVE, and OPTIONS procedures are also documented with system options in *SAS System Options: Reference*.

The PRINT procedure is fully integrated with the Output Delivery System. Each BY group is a separate table. Bylines can be up to 512 characters. In all destinations but the LISTING destination, the size of the column label does not have to be restricted.

If you use the PRINTTO procedure to write to a file or to a catalog entry, you must open the LISTING destination. In objectserver run mode, log messages are not routed to the log that is specified by the ALTLOG= system option.

The PWENCODE procedure uses the \_PWENCODE macro variable, which can be set by the OUT= fileref.

The new QDEVICE procedure creates reports about SAS devices and universal printers.

The REGISTRY procedure can follow links that are found when processing the LIST command and can display only keys.

The REPORT procedure supports multilabel formats for all ODS destinations, data sets, and the REPORT window.

In the second maintenance release for SAS 9.3, the SOAP procedure can call a SAS secured service without providing credentials.

The SCAPROC procedure can expand macro invocations into separate tasks and enhancements for grid-enabled jobs.

The SORT procedure can eliminate observations from an output data set and write these observations to another data set if the observations have a unique sort key or if the observations are adjacently unique.

New options for the PROC SQL statement help control the execution and the resulting output. The LIBNAME statement can be reused by the CONNECT statement when a connection has already been established. New macro variable specifications are available for the INTO clause of the SELECT statement. The new VIEW\_SOURCES dictionary table contains a list of tables that are referenced by SQL. The SQL procedure documentation and the system options that pertain to SQL have been moved to the *SAS SQL Procedure User's Guide*, placing all SQL information in one document.

The TABULATE procedure has an option to not merge data cells with other data cells in a table.

The UNIVARIATE procedure now produces graphs that conform to ODS styles and can create graphs by using ODS Graphics. New statements plot the observed cumulative distribution function of a variable and create a probability-probability plot.

In the second maintenance release for SAS 9.3, the XSL procedure uses the Saxon-EE 9.3 software application from Saxonica to transform the XML document. PROC XSL functionality is now production.

## Language Elements

Prior to SAS 9.3, SAS data set options, formats, functions, informats, statements, system options, component objects, the DATA step debugger, and the %DS2CSV macro were documented in *SAS Language Reference: Dictionary*. Starting with SAS 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference*
- *Base SAS Utilities: Reference*

### Data Set Options

The EXTENDOBSCOUNTER= data set option extends the maximum observation count in an output SAS data file.

### SAS Formats and Informats

New informats read time that is in the form hhmmss:ss, IBM date and times that include a century marker, and Java date and time values.

### Functions and CALL Routines

New functions call a Web service that use authentication, obtain interest rate data, validate character strings for use as a SAS member name, and verify the existence of an operating environment variable.

Existing functions have been enhanced to include the GENPOISSON and TWEEDIE distributions, to provide flexibility in working with dates and times, and to provide more information about SAS system options.

Several functions that previously were documented in the *SAS/ETS User's Guide* are now documented with the Base SAS functions in *SAS Functions and CALL Routines: Reference*.

### Statements

A new LIBNAME engine associates a libref with a JMP table and the RESETLINE statement resets the program line numbering in the SAS log to 1. A new LIBNAME option extends the maximum observation count in all output SAS data files in a SAS library.

The FILENAME statement for e-mail access can now accept commas to separate e-mail addresses, enable you to set an expiration date for an e-mail, and send a notification when the e-mail has been delivered. The FILENAME statement for FTP access can now attempt a passive mode FTP. The FILENAME statement for WebDAV access enables a login password prompt.

### System Options

New system options enable checkpoint mode and restart mode for labeled code sections.

System options can be reset to their start-up or default values. If a directory that is named in a LIBNAME statement does not exist, SAS can create the directory. Rules for naming SAS data sets, SAS data views, and SAS item store names have been expanded. In e-mail, the UTC offset can now be specified. The

encoding can be set for the URLENCODE and URLDECODE functions. The orientation of individual pages in a document can be set to portrait or landscape.

The new system options documentation, *SAS System Options: Reference*, contains the functions and the procedures that are related to system options, as well as links to all documents that have system options in them.

In the second maintenance release for SAS 9.3, the default value for the SQLGENERATION= system option includes Aster nCluster and Greenplum.

#### Macro Processing

New automatic macro variables contain sizes of a pointer, the length of a Unicode character, the length of a long integer, the number of observations read from the last data set that was closed by the previous step, and the number of bits of an address.

New macro functions indicate whether a macro is currently executing, whether a macro definition exists, the depth of nesting from the point of call, and the name of a macro that is executing at a nesting level.

New macro statements close stored compiled macros and delete a macro definition for the catalog.

New macro system options enable the display of the source location of autocall macros in the SAS log, enable adding the autocall source file pathname to the description field of a catalog entry, enable the generation of coverage analysis data, and specify the location of the coverage analysis data file.

## SAS under UNIX

The PATHENCODING environment variable provides an alternative encoding for external file and directory references.

Tape drives are no longer supported.

System options have been enhanced to support multiple AUTOEXEC files and to report additional statistical and option information in the SAS log.

## SAS under Windows

HTML is now the default for program output results.

SAS now supports Windows Server 2008 and Server 2008R2. Windows 2008 EPIC (Itanium) is no longer supported.

The !SASHOME environment variable specifies where SAS is installed.

User profile paths now include Server 2008 R2.

SAS now supports the INT64 return value type for the SASCBTBL Attribute Table ROUTINE statement.

Instructions to start the SAS Service Configuration Utility have changed.

The *SAS Companion for Windows* contains an appendix with information about troubleshooting the Java run-time environment.

## SAS under z/OS

A 64-bit SAS Metadata Server can now be run under z/OS.

SAS now supports symbolic references in SAS configuration files and SASRX configuration files.

SAS Data Location Assist for z/OS gathers attribute information for data sets that reside throughout your operating environment.

You can use the UNIX logger command to write error messages and trace output to the system console.

The USS Home Directory and z/OS data set nodes are new for the Explorer window. New commands open windows that display lists of native z/OS data set and UTS files.

z/OS Extended Addressability Volumes enables SAS to access extended address space to use for SAS libraries and files.

VSAM processing now supports RLS-eligible data sets.

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## What's New in Base SAS 9.3 Help

### Overview

Base SAS enables you to view online Help in your windowing environment. You can access Help for each window. Links in the documentation take you to related topics. You can also click the links in the table of contents to view topics of interest.

### New Features

The following new features are available:

- In the Preferences dialog box, the **Use ODS Graphics** check box was added to the **Results** tab. Selecting this box enables you to automatically generate graphs when running procedures that support ODS graphics.
- Display Format Attributes, which enables you to view the attributes of a format in a library, was added to the Explorer window documentation.

### Documentation Enhancements

The following enhancements were made to Base SAS Help for the windowing environment:

- The EXPROOT command, which opens the Explore From Here window, was added to the list of SAS commands.
- The WPGM command, which opens the Enhanced Editor, was added to the list of SAS commands. This command is available in the Windows operating environment only.



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## What's New in Base SAS 9.3 Procedures

### Overview

The following procedures are new:

- PROC GROOVY
- PROC QDEVICE

The following Base SAS procedures have been enhanced:

PROC CIMPORT	PROC PWENCODE
PROC CPORT	PROC RANK
PROC FCMP	PROC REGISTRY
PROC FORMAT	PROC SCAPROC
PROC OPTIONS	PROC SORT
PROC PRINT	PROC REPORT
PROC PRINTTO	PROC TABULATE

### New Base SAS Procedures

#### The GROOVY Procedure

The GROOVY procedure can run Groovy statements that are written as part of your SAS code, and it can run statements that are in files that you specify with PROC GROOVY commands.

#### The QDEVICE Procedure

The QDEVICE procedure creates reports about graphics devices and universal printers that summarizes information, including color support, default output sizes, margin sizes, resolution, supported fonts, hardware symbols, hardware fill types, hardware line styles, and device options. Output from this procedure can be sent to the SAS log or to an output SAS data set.

### Enhanced Base SAS Procedures

#### The CIMPORT Procedure

The following enhancements have been made to the CIMPORT procedure:

- New option UPCASE is added to the CIMPORT procedure. This option is supported only for Double-Byte Character Sets (DBCS).
- The CIMPORT SELECT and EXCLUDE statements will now support case sensitive names for files and catalogs in SAS/ACCESS engine libraries.

- The CIMPORT procedure now supports SAS name literals that include embedded blanks.
- When VALIDVARNAME=ANY or VALIDMEMNAME=EXTEND are specified, the data set names or member names used with the CIMPORT procedure can now be up to 32 bytes in length. Names and member names can also be mixed case.

### The CPORT Procedure

The following enhancements have been made to the CPORT procedure:

- The CPORT SELECT and EXCLUDE statements will now support case sensitive names for files and catalogs in SAS/ACCESS engine libraries.
- The CPORT procedure now supports SAS name literals that include embedded blanks.
- When VALIDVARNAME=ANY or VALIDMEMNAME=EXTEND are specified, the data set names or member names used with the CPORT procedure can now be up to 32 bytes in length. Names and member names can also be mixed case.

### The FCMP Procedure

The following functions have been added to the FCMP procedure:

#### INVCDF

This function computes the quantile from any distribution for which you have defined a cumulative distribution function (CDF).

#### LIMMOMENT

This function computes the limited moment of any distribution for which you have defined a cumulative distribution function (CDF).

### The FORMAT Procedure

The following enhancements have been made to the FORMAT procedure:

- You can create a format catalog that corresponds to the current SAS locale by specifying the LOCALE= option in the PROC FORMAT statement.
- A user-defined format or informat that defines a missing value supersedes a value specified by the MISSING system option.
- The maximum number of labels that can be used for the MULTILABEL option is 255.
- The PICTURE statement directive %n formats the number of days in a duration.
- The PICTURE statement directive %s formats fractional seconds.
- The PICTURE statement directive %z formats a UTC time-zone offset.
- The PICTURE statement directive %Z formats a time-zone name.
- Use the VALUE= statement to create a format that performs a function on a value.
- You can use SAS Explorer to view format and informat definitions.

### The OPTIONS Procedure

The following enhancements have been made to the OPTIONS procedure

- These PROC OPTIONS statement options are new:

**LISTINSERTAPPEND**

This option lists the system options whose value can be modified by the INSERT and APPEND system options.

**LISTRESTRICT**

This option lists the system options that can be restricted by your site administrator.

- These PROC OPTIONS statement options have been enhanced:

**DEFINE**

Valid values for an option now display in the SAS log when you specify the DEFINE option.

**OPTION=**

The OPTION= option now accepts one or more options.

**VALUE**

If the option was set by a configuration file, the name of the configuration file that set the option now displays in the SAS log when you specify the VALUE option.

**The PRINT Procedure**

The following enhancements have been made to the PRINT procedure:

- The PRINT procedure is now completely integrated with the Output Delivery System.
- Each BY group is a separate table and the observation counts is reset to zero at the beginning of each BY group.
- Bylines can be up to 512 characters.
- For all destinations other than the LISTING destination, if HEADING=V, the size of the column label is no longer restricted by the page size specified for the LISTING destination.
- For the LISTING destination, if HEADING=V, the variable name is used in place of a label if the column heading is too long for the page.
- ROWS= is valid only for the LISTING destination.
- If you specify a BY variable whose values are not sorted, SAS stops printing and writes a message to the log.
- If the PRINT procedure errors or terminates, output might be produced where previously there was none.

**The PRINTTO Procedure**

The following enhancements have been made to the PRINTTO procedure:

- If you use the PRINTTO procedure to write to a file or a catalog entry, you must open the LISTING destination.
- If SAS is started in objectserver mode, the PRINTTO procedure does not route log messages to the log specified by the ALTLOG= system option.

**The PWENCODE Procedure**

The following enhancements have been made to the PWENCODE procedure:

- The global macro variable

`_PWENCODE`

is set to the value that is written to the `OUT= fileref` or to the value that is displayed in the SAS log.

- If the `METHOD=` option is omitted, the default encoding method is used. When the FIPS 140-2 compliance option, `-encryptfips`, is specified, the encoding default method is `sas003`. For all other cases, encoding method `sas002` is the default method used.

### The RANK Procedure

The following enhancements have been made to the RANK procedure:

- There is now in-database support for the Netezza database management system.
- The `SQL_IP_TRACE` option shows the generated SQL that PROC RANK generates.
- The `PRESERVERAWBYVALUES` option preserves the raw values of the BY variable.

### The REGISTRY Procedure

The following two options are new:

#### FOLLOWLINKS

The FOLLOWLINKS option follows links that are found when processing the LIST command.

#### KEYSONLY

The KEYSONLY option limits the LIST, LISTUSER, LISTHELP, and LISTREG options output to display keys only.

### The REPORT Procedure

The MLF option has been added to the DEFINE statement in PROC REPORT.

### The SCAPROC Procedure

The RECORD statement has added support for the EXPANDMACROS, INHERITLIB, and NOOPTIMIZE arguments.

### The SORT Procedure

The following enhancements have been made to the SORT procedure:

- There is now in-database support for the NETEZZA database management system.
- The new `NOUNIQUEKEY` and `UNIQUEOUT=` options have been added.
- In the second maintenance release of SAS 9.3, these options were deprecated:
  - `NODUPRECS`
  - `NODUP`
  - `NOUNIREC`
  - `NOUNIRECS`

- NOUNIQUERECs

### The TABULATE Procedure

The NOCELLMERGE option has been added to the TABLE statement in PROC TABULATE.

## Documentation Enhancements

The following changes have been made to the *Base SAS Procedures Guide*:

- The section titled “Base SAS Procedures Documented in Other Publications” contains links to Base SAS procedures that are documented in publications other than the *Base SAS Procedures Guide*. These procedures previously appeared as separate entries in the Table of Contents of the *Base SAS(R) 9.2 Procedures Guide*.
- The SQL procedure documentation has been moved to the *SAS SQL Procedure User's Guide*.

---

## What's New in the Base SAS 9.3 Statistical Procedures

### Enhancements

The following are enhancements to the Base SAS statistical procedures for SAS 9.3.

#### CORR Procedure

The POLYSERIAL option has been added to the PROC CORR statement. The POLYSERIAL option requests a table of polyserial correlation coefficients. Polyserial correlation measures the correlation between two continuous variables that have a bivariate normal distribution, where only one variable is observed directly. Information about the unobserved variable is obtained through an observed ordinal variable that is derived from the unobserved variable by classifying its values into a finite set of discrete, ordered values.

In the second maintenance release of SAS 9.3, the POLYCHORIC option has been added to the PROC CORR statement. The POLYCHORIC option requests a table of polychoric correlation coefficients. Polychoric correlation measures the correlation between two unobserved, continuous variables that have a bivariate normal distribution. Information about each unobserved variable is obtained through an observed ordinal variable that is derived from the unobserved variable by classifying its values into a finite set of discrete, ordered values (Olsson, 1979; Dragow, 1986).

#### FREQ Procedure

The FREQ procedure now produces agreement plots when the AGREE option is specified and ODS Graphics is enabled. It also offers alternative confidence limit types for the risk (proportion) difference, and it provides exact unconditional confidence limits for the risk difference and relative risk.

The following enhancements have been made to the FREQ procedure for the second maintenance release of SAS 9.3.

The new MAXLEVELS= option in the TABLES statement specifies the maximum number of variable levels to display in one-way frequency tables and one-way frequency plots.

The CROSSLIST(STDRES) option displays standardized residuals in the CROSSLIST table for two-way crossclassifications.

PROC FREQ now provides two additional confidence limit types for the risk (proportion) difference for  $2 \times 2$  tables. The CL=AGRESTICAFFO option provides Agresti-Caffo confidence limits for the risk difference. The CL=MN option provides Miettinen-Nurminen confidence limits for the risk difference.

The BARNARD option in the EXACT statement produces Barnard's exact unconditional test for the risk difference.

Continuity-corrected Wilson confidence limits are now available for the binomial proportion.

The new DF= option specifies or adjusts the degrees of freedom for chi-square tests. The TESTF= option now enables you to provide null frequencies for a one-way chi-square test by using a secondary input data set. Similarly, the TESTP= option now enables you to provide null proportions by using a secondary input data set.

The LRCHISQ option in the TABLES statement produces a likelihood ratio chi-square test for one-way tables. This test can be based on a null hypothesis of equal proportions, specified proportions, or specified frequencies. The LRCHISQ option in the EXACT statement produces an exact likelihood ratio chi-square test for one-way tables.

The PLCORR option in the TEST statement provides Wald and likelihood ratio tests for the polychoric correlation coefficient.

The PLOTS=MOSAICPLOT option provides mosaic plots for two-way tables when ODS Graphics is enabled.

You can now specify the confidence limit type to display in risk difference plots (PLOTS=RISKDIFFPLOT). In addition to Wald and exact unconditional confidence limits, available confidence limit types include the Agresti-Caffo, Hauck-Anderson, Miettinen-Nurminen, and Newcombe. Continuity-corrected Wald and Newcombe confidence limits are also available.

By default, the following plots now display the common (overall) statistic in addition to the stratum (two-way table) statistics: odds ratio plot, relative risk plot, kappa plot, and weighted kappa plot. The COMMON=NO plot option suppresses display of the common value.

The new TWOWAY=CLUSTER plot option provides a cluster layout for frequency plots that are displayed as bar charts (TYPE=BAR). The cluster layout first groups bars (table cells) by column variable level and then displays row variable levels as adjacent bars within each column-level group.

The new GROUPBY= plot option specifies the primary grouping of graph cells for two-way frequency plots. The default is GROUPBY=COLUMN, which first groups graph cells by column variable level and then displays row variable levels within column variable levels. You can specify the GROUPBY=ROW plot option to group first by row variable.

## UNIVARIATE Procedure

The UNIVARIATE procedure supports five new fitted distributions for SAS 9.3:

- Gumbel distribution
- inverse Gaussian distribution
- generalized Pareto distribution
- power function distribution
- Rayleigh distribution

These new distributions are available in the CDFPLOT, HISTOGRAM, PROBPLOT, PPLOT, and QQPLOT statements.

The following enhancements have been made to the UNIVARIATE procedure for the second maintenance release of SAS 9.3.

The PLOTS option in the PROC UNIVARIATE statement now produces ODS Graphics output when ODS Graphics is enabled.

The UNIVARIATE procedure supports several new options. The CDFPLOT, HISTOGRAM, PPLOT, PROBPLOT, and QQPLOT statements support the following new options for specifying titles and footnotes in graphs produced by using ODS Graphics:

- ODSFOOTNOTE= adds a footnote to the graph.
- ODSFOOTNOTE2= adds a secondary footnote to the graph.
- ODSSTITLE= specifies the graph title.
- ODSSTITLE2= specifies a secondary graph title.

You can use these options to specify your own graph titles and footnotes without modifying ODS graph templates or using the ODS Graphics Editor.

The CDFPLOT, HISTOGRAM, PROBPLOT, and QQPLOT statements support the following new options for displaying reference lines at the values of computed statistics:

- STATREF= specifies keywords that identify the statistics.
- CSTATREF= specifies the colors of the reference lines.
- LSTATREF= specifies the line types of the reference lines.
- STATREFLABELS= specifies labels for the reference lines.
- STATREFSUBCHAR= specifies a substitution character for incorporating statistic values into reference line labels.

For example, specifying STATREF=MEAN in a HISTOGRAM statement produces a histogram that has a vertical reference line at the mean of the data.

The HISTOGRAM statement supports the new CLIPCURVES option, which clips fitted distribution curves that extend above the highest histogram bar. This eliminates compression of the histogram bars caused by extremely high fitted curve peaks.

The OUTPUT statement supports the following new options:

- CIPCTLDF= computes distribution-free confidence limits for percentiles that you request by specifying the PCTLPTS= option.
- CIPCTLNORMAL= computes confidence limits that assume normality for percentiles that you request by specifying the PCTLPTS= option.

- PCTLGROUP= controls how variables that you request by specifying the PCTLPTS= option are grouped in the OUTPUT data set.

In addition, the CHREF=, CVREF=, LHREF=, and LVREF= options have been enhanced. These options now accept lists of values so that different reference lines in a single graph can be displayed using different colors and line types. They are available in the CDFPLOT, HISTOGRAM, PPLOT, PROBPLOT, and QQPLOT statements.

## What's Changed

What follows are changes in software behavior from SAS 9.2 to SAS 9.3.

### FREQ Procedure

Frequency plots and cumulative frequency plots are no longer produced by default when ODS Graphics is enabled. You can request these plots by using the PLOTS=FREQPLOT and PLOTS=CUMFREQPLOT options, respectively, in the TABLES statement.

## References

- Drasgow, F. (1986), "Polychoric and Polyserial Correlations," in S. Kotz and N. L. Johnson, eds., *Encyclopedia of Statistical Sciences*, volume 7, 68–74, New York: John Wiley & Sons.
- Olsson, U. (1979), "Maximum Likelihood Estimation of the Polychoric Correlation Coefficient," *Psychometrika*, 12, 443–460.

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## What's New in the Base SAS 9.3 Language

### Reference: Concepts

## Overview

The following features are new or enhanced for SAS 9.3:

- A SAS/GRAPH license is no longer required for ODS Graphics. The Graph Template Language (GTL), the ODS Graphics Procedures, the ODS Graphics Editor, and the ODS Graphics Designer are now all available with Base SAS software.
- HTML is now the default destination in the SAS windowing environment for Windows and UNIX operating environments.
- HTMLBlue is the new default HTML style when running SAS in windowing mode for the Windows and UNIX operating environments.
- Adobe Type1 fonts are now supported and can be added to the SAS registry.
- Rules for naming SAS data sets, SAS data views, and item stores have been expanded to allow special characters and national characters.



- The new data set option EXTENDOBSCOUNTER= creates an enhanced file format that counts observations beyond the 32-bit long integer maximum.
- Optimizing WHERE conditions with an index is improved with the enhanced SUBSTR (left of=) function.
- A new JMP engine enables you to quickly and easily read your JMP data tables into SAS.
- Enhancements to Universal Printing provide more ways for you to customize output and create higher quality results.
- Checkpoint mode and restart mode now support labeled code sections.

## ODS Graphics in Base SAS

### Selected SAS/GRAPH Products Included with Base SAS Software

A SAS/GRAPH license is no longer required for ODS Graphics. The Graph Template Language (GTL), the ODS Graphics Procedures, the ODS Graphics Editor, and the ODS Graphics Designer are now all available with Base SAS software. The documentation for these products is now included in the Base SAS node in the SAS 9.3 Help and Documentation. For more information about these applications, refer to the documentation below:

- *SAS ODS Graphics: Procedures Guide*
- *SAS Graph Template Language: User's Guide*
- *SAS Graph Template Language: Reference*
- *SAS ODS Graphics Designer: User's Guide*
- *SAS ODS Graphics Editor: User's Guide*

### New ODS Output Defaults

Beginning with SAS 9.3, the LISTING destination is turned off and the HTML destination is turned on by default when running SAS in windowing mode for the Windows and UNIX operating environments.

The new default HTML style is HTMLBlue when running SAS in windowing mode for the Windows and UNIX operating environments. This style enhances default output by offering a view that is optimized for display on a computer screen. The new all-color style is ideal for statistical graphics because it provides superior color coordination between graphs and tables, using colors to differentiate between groups.

## SAS System Features

### Security Enhancements for Password Protected Views and Programs

In the second maintenance release of SAS 9.3, security has been enhanced for password-protected SAS views and stored-compiled programs. Prior to the second maintenance release of SAS 9.3, read or write-protected SAS views or programs could be DESCRIBED without having to specify the password. Now, to DESCRIBE

any password-protected view or program, regardless of the level of protection that it was assigned, you must specify its password. If the view or program was created with more than one password, you must specify its most restrictive password when describing the view or program.

### Base SAS Indexing

Using an index for WHERE processing is enhanced for the SUBSTR (left of=) function in a WHERE condition.

### Observation Count Extension in a SAS Data File

The observation count in a SAS data file is the total number of observations (rows) that are currently in the file combined with the number of deleted observations. The maximum number of observations that can be counted for a file is determined by the long integer data type size for the operating environment. The new EXTENDOBSCOUNTER= option requests an extended file format for an output SAS data file that counts observations beyond the 32-bit long maximum.

### JMP Files

A new LIBNAME engine enables you to read and write JMP files in a Base SAS session.

### Expanded Rules for SAS Names

New rules for naming SAS data sets, SAS data views, and item stores accommodate special characters and national characters.

### Cross-Environment Data Access (CEDA)

CEDA processing is not invoked when you process Windows 32-bit data files in a Windows 64-bit SAS 9.3 session. Likewise, CEDA processing is not invoked when you process Windows 64-bit data files in a Windows 32-bit SAS 9.3 session. If you use Windows data sets in either 32-bit or 64-bit operating environments, you do not need to do anything to benefit from this functionality other than to use SAS 9.3.

Catalogs are an exception. Catalogs are not compatible between 32-bit and 64-bit SAS for Windows.

### Universal Printing and Font Support

- EMF (Enhanced Metafile) output is now supported by Universal Printing.
- SAS now supports Adobe PostScript Type1 fonts. You can add Type1 fonts to your SAS environment by registering them in the SAS registry.
- You can change the orientation of an individual page in a Universal Printing document to either portrait or landscape by setting the ORIENTATION= system option before the creation of a new page.
- To view the attributes of a universal printer, you can create a report using the QDEVICE procedure whose output goes to either the SAS log or to an output data set.
- Most universal printers now support 32-bit CMYK colors or 32-bit RGBA (transparency) colors.
- The SVGANIM printer produces SVG 1.1 animated documents.

- The control buttons for a multi-page SVG document are now positioned based on the size of the window.

### Checkpoint Mode and Restart Mode for Labeled Code Sections

Batch programs that terminate before completing can be resubmitted starting at labeled code sections if checkpoint mode and restart mode for labeled code sections is enabled.

If the CHKPTCLEAN system option is set and your batch program completes successfully, the contents of the Work library are erased.

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## What's New in SAS 9.3 Data Set Options

### Overview

The SAS data set options documentation is no longer part of *SAS Language Reference: Dictionary*. The SAS data set options that were previously documented in *SAS Language Reference: Dictionary* are now documented here, in *SAS 9.3 Data Set Options: Reference*.

### Changes to *SAS Language Reference: Dictionary*

Prior to SAS 9.3, this document was part of *SAS Language Reference: Dictionary*. Starting with SAS 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for the Hash Object and the Java Object)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

### New SAS Data Set Option

The following data set option is new:

**EXTENDOBSCOUNTER=**

extends the maximum observation count in an output SAS data file.

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## What's New in SAS 9.3 Formats and Informats

### Overview

The SAS formats and informats are now published as a separate document. They are no longer part of *SAS Language Reference: Dictionary*. For more information, see [Changes to SAS Language Reference: Dictionary on page 34](#).

For SAS 9.3, there are no new or enhanced formats.

New informats read IBM date and time values that include a century marker, read Java date and time values, and read hours, minutes, and seconds in the form *hhmmss* or *hh:mm:ss*.

### New SAS Informats

The following informats are new:

**B8601Clw.**

reads an IBM date and time value that includes a century marker, in the form *cyymmddhhmmss<fff>*.

**B8601DJw.**

reads a Java date and time value that is in the form *yyymmddhhmmssfffff*.

**HHMMSSw.**

reads hours, minutes, and seconds in the form *hhmmss* or *hh:mm:ss*.

### Changes to *SAS Language Reference: Dictionary*

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- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for the Hash Object and the Java Object)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

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## What's New in SAS 9.3 Functions and CALL Routines

### Overview

The SAS functions and CALL routines are now published as a separate document. They are no longer part of the *SAS Language Reference: Dictionary*. For more information, see [Changes to SAS Language Reference: Dictionary on page 37](#).

The ability to call Web services in the DATA step is a new feature. For this feature, six new SOAPxxx functions were added. In addition, several other new functions are new, and enhancements to existing functions were added.

### New Functions and CALL Routines

The following functions and CALL routines are new:

**CALL RANCOMB**

permutes the values of the arguments, and returns a random combination of  $k$  out of  $n$  values.

**EFFRATE**

returns the effective annual interest rate.

**MVALID**

checks the validity of a character string for use as a SAS member name.

**NOMRATE**

returns the nominal annual interest rate.

**SAVINGS**

returns the balance of periodic savings by using variable interest rates.

**SOAPWEB**

calls a Web service by using basic Web authentication; credentials are provided in the arguments.

**SOAPWEBMETA**

calls a Web service by using basic Web authentication; credentials for the authentication domain are retrieved from metadata.

**SOAPWIPSERVICE**

calls a SAS registered service by using WS-Security authentication; credentials are provided in the arguments.

**SOAPWIPSR**

calls a SAS registered Web service by using WS-Security authentication; credentials are provided in the arguments. The Registry Service is called directly to determine how to locate the Security Token Service.

**SOAPWS**

calls a Web service by using WS-Security authentication; credentials are provided in the arguments.

**SOAPWSMETA**

calls a Web service by using WS-Security authentication; credentials for the provided authentication domain are retrieved from metadata.

**SQUANTILE**

returns the quantile from a distribution when you specify the right probability (SDF).

**SYSEXIST**

returns an indication of the existence of an operating environment variable.

**TIMEVALUE**

returns the equivalent of a reference amount at a base date by using variable interest rates.

## Enhancements to Existing Functions

The following enhancements were made to existing functions:

- The GENPOISSON and TWEEDIE distributions were added to the following functions:
  - CDF
  - PDF
  - SDF
  - LOGCDF
  - LOGPDF
  - LOGSDF
  - QUANTILE
- A new argument, *seasonality*, was added to the INTCYCLE, INTINDEX, and INTSEAS functions. The *seasonality* argument enables you to have more flexibility in working with dates and time cycles.
- A new option that computes age was added to the YRDIF function.
- An explanation about SAS session encoding and UTF-8 encoding was added to the URLDECODE and URLENCODE functions.
- In the GETOPTION function, you can use the following options:
  - The DEFAULTVALUE option obtains the default shipped value for a system option. The value can be used to reset a system option to its default.
  - The HEXVALUE option returns a system option value as a hexadecimal value.
  - The LOGNUMBERFORMAT option returns a system option numeric value. The punctuation that is used is dependent on the language locale.
  - The STARTUPVALUE option returns the system option value that was used to start SAS either on the command line or in a configuration file.

## Documentation for Existing Functions and Concepts

The documentation for the following five functions was moved from the *SAS/ETS User's Guide* to *SAS Functions and CALL Routines: Reference*:

### CUMIPMT

returns the cumulative interest paid on a loan between the start and end period.

### CUMPRINC

returns the cumulative principal paid on a loan between the start and end period.

### IPMT

returns the interest payment for a given period for a constant payment loan or the periodic savings for a future balance.

### PMT

returns the periodic payment for a constant payment loan or the periodic savings for a future balance.

### PPMT

returns the principal payment for a given period for a constant payment loan or the periodic savings for a future balance.

In the second maintenance release for SAS 9.3, the following enhancements were made to the documentation:

- The FINANCE function now includes documentation for ISPMT, which calculates the interest that is paid during a specific period of investment.
- A section about using the DATA step with custom time intervals was added to the documentation. This section includes examples that use the INTNX and INTCK functions and the INTERVALDS system option.

## Changes to SAS Language Reference: Dictionary

Prior to 9.3, this document was part of *SAS Language Reference: Dictionary*. Starting with 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for hash, hash iterator, and Java objects)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

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## What's New in SAS 9.3 Statements

### Overview

The SAS statements documentation is no longer part of *SAS Language Reference: Dictionary*. See [Changes to SAS Language Reference: Dictionary on page 39](#). The SAS statements that were previously documented in *SAS Language Reference: Dictionary* are now documented here, in *SAS Statements: Reference*.

The following enhancements are made for the second maintenance release of SAS 9.3.

- A new FILENAME statement that enables you to access files on a Hadoop Distributed File System (HDFS).
- A new LIBNAME option that specifies whether an administrator can access a metadata-bound library for which corresponding metadata is corrupted, misconfigured, or missing.

### New SAS Statements

The following SAS statements are new:

FILENAME, Hadoop Access Method

enables you to access files on a Hadoop Distributed File System (HDFS) whose location is specified.

LIBNAME JMP

associates a libref with a JMP data table and enables you to read and write JMP data tables.

RESETLINE

restarts the program line numbering in the SAS log to 1.

### Enhanced SAS Statements

The following SAS statements have been enhanced:

ABORT

If you do not specify a value for  $n$ , the error code that is returned by SAS is ERROR. The value of ERROR depends on the operating system. The condition code  $n$  is returned to the operating system as the final SAS system exit code.

FILE

A new device type, JMS, has been added. This device type is supported on all host operating systems.

FILENAME

A new device type, JMS, has been added. This device type is supported on all host operating systems.

FILENAME, EMAIL Access Method

- E-mail addresses can be separated with a comma as well as a space.



- Two new e-mail options enable you to specify an expiration date for the e-mail message and specify that a notification be sent when the e-mail message is delivered to the recipient.

#### FILENAME, FTP Access Method

A new FTP option has been added that specifies that an attempt is made for passive mode FTP.

#### FILENAME, WebDAV Access Method

A new option has been added that enables you to prompt for a login password if necessary.

#### INFILE

A new device type, JMS, has been added. This device type is supported on all host operating systems.

#### LIBNAME

- The new option EXTENDOBSCOUNTER= enables you to extend the maximum observation count in all output SAS data files in the SAS library.
- In the second maintenance release of 9.3, the new option AUTHADMIN= specifies whether an administrator can access a metadata-bound library for which corresponding metadata is corrupted, misconfigured, or missing.

## Changes to *SAS Language Reference: Dictionary*

Prior to SAS 9.3, this document was part of *SAS Language Reference: Dictionary*. Starting with SAS 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for the hash, hash iterator, and Java objects)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

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## What's New in SAS 9.3 System Options

### Overview

The SAS system options documentation is no longer part of *SAS Language Reference: Dictionary*. See [Changes to SAS Language Reference: Dictionary on page 43](#). The SAS system options that were previously documented in *SAS Language Reference: Dictionary* are now documented here, in *SAS System Options: Reference*.

For easy access to all system options documentation, *SAS System Options: Reference* also contains the GETOPTION function, the system option procedures OPTIONS, OPTLOAD, and OPTSAVE, and links to system options that are documented in other publications.

New and enhanced features enable you to do the following:

- use checkpoint mode and restart mode for labeled code sections
- reset system options to their start-up or default values
- create a directory that is named in a LIBNAME statement
- use expanded rules for naming SAS data sets, SAS data views, and item store names
- change the page orientation (portrait or landscape) within a file using the ODS PRINTER destination
- control the autocorrection of SAS names
- specify the UTC offset in e-mail
- specify the encoding for the URLENCODE and URLDECODE functions
- use enhancements to the GETOPTION function, system options, and the OPTIONS procedure
- specify the size of the View buffer
- in the second maintenance release for SAS 9.3, the EVENTDS= option is new. The EVENTDS= option enables you to specify event data sets.

## Use Checkpoint Mode and Restart Mode for Labeled Code Sections

Batch programs that terminate before completing can be resubmitted starting at labeled code sections if checkpoint mode and restart mode for labeled code sections is enabled.

If the CHKPTCLEAN system option is set and your batch program completes successfully, the contents of the Work library are erased.

## Reset System Options to Their Start-up or Default Values

You can reset a system option to the default shipped value or to the start-up value by using the GETOPTION function.

You can use the DEFAULTVALUE option to obtain the default shipped value for a system option if you want to reset a system option to its default value.

You can use the STARTUPVALUE option to obtain the value of a system option that was used to start SAS either on the command line or in a configuration file.

## Create a Directory That Is Named in a LIBNAME Statement

When you specify the DLCREATEDIR system option, SAS creates a directory for the SAS library that is named in a LIBNAME statement if the directory does not exist.

## Use Expanded Rules for Naming SAS Data Sets, SAS Data Views, and Item Store Names

When you run SAS in any execution mode other than the windowing environment, the rules for naming SAS data sets, data views, and item store names have been expanded to accommodate special and national characters.

## Change the Orientation of Pages within a File Using ODS PRINTER

The ODS PRINTER destination now supports using the ORIENTATION= system option to change the page orientation within a file. The page orientation can be changed to portrait or landscape.

## Control Autocorrection of SAS Names

Prior to SAS 9.3, SAS automatically attempted to correct misspelled procedure names, procedure keywords, and global statement names. You can use the NOAUTOCORRECT system option to specify that SAS is not to automatically correct these names.

## Specify the UTC Offset in E-mail

For e-mail that is sent using the FILENAME statement EMAIL (SMTP) access method, specifies a UTC offset that is used in the Date header field of the e-mail message.

## Specify the Encoding for the URLENCODE and URLDECODE Functions

Use the URLENCODING= system option to specify whether the argument to the URLENCODE function and to the URLDECODE function is interpreted using the SAS session encoding or UTF-8 encoding.

## Specify the Size of the View Buffer

Use the VBUFSIZE= system option to set a global value for the size of the view buffer based on the number of bytes.

## Specify an Event Data Set

In the second maintenance release for SAS 9.3, the EVENTDS= option is new. The EVENTDS= option enables you to specify event data sets.

## Enhancements to the GETOPTION Function

Use the HEXVALUE option to return a system option value as a hexadecimal value.

Use the LOGNUMBERFORMAT option to return a system option numeric value with the punctuation appropriate for a locale, such as a comma or a period.

## Enhancements to SAS System Options

The following system options have been enhanced:

### APPEND=

The APPEND= system option cannot be restricted. Also, you can now specify the AUTOEXEC= system option as a value to the APPEND= system option.

### DKRICOND=

### DKROCOND=

These options are now part of the Error handling system options group as well as the SAS Files group.

### FMTSEARCH=

If you specify the LOCALE option for a catalog specification, SAS searches the catalog that is associated with the current SAS locale.

### INSERT=

The INSERT= system option cannot be restricted. Also, you can now specify the AUTOEXEC= system option as a value to the INSERT= system option.

### ORIENTATION=

You can modify the page orientation for different documents in an output file whose destination is an ODS destination or a universal printer.

### VALIDVARNAME=

When VALIDVARNAME=V7 and the variable name is an n literal in a procedure step, the variable name is left-justified and trailing blanks are ignored.

### VARLENCHK=

The VARLENCHK= system option indicates that BY variables are not affected by this system option.

## Enhancements to the OPTIONS Procedure

These PROC OPTIONS statement options are new:

### LISTINSERTAPPEND

This option lists the system options whose value can be modified by the INSERT and APPEND system options.

### LISTRESTRICT

This option lists the system options that can be restricted by your site administrator.

These PROC OPTIONS statement options have been enhanced:

### DEFINE

Valid values for an option now display in the SAS log when you specify the DEFINE option.

**OPTION=**

The OPTION= option now accepts one or more options.

**VALUE**

If the option was set by a configuration file, the name of the configuration file that set the option now displays in the SAS log when you specify the VALUE option.

## System Options That Have Moved to Other Documentation

You can find the system options for the following SQL options in the *SAS SQL Query Window User's Guide*:

- SQLCONSTDATETIME
- SQLREDUCTPUT=
- SQLREDUCTPUTOBS=
- SQLREDUCTPUTVALUES=
- SQLREMERGE
- SQLUNDOPOLICY=

The UNIVERSALPRINT system option is now documented in the *SAS Companion for Windows*.

## Changes to SAS Language Reference: Dictionary

Prior to SAS 9.3, this document was part of *SAS Language Reference: Dictionary*. Starting with SAS 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for the Hash Object and the Java Object)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

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## What's New in SAS 9.3 Component Objects

### Changes to *SAS Language Reference: Dictionary*

Prior to SAS 9.3, this document was part of *SAS Language Reference: Dictionary*. Starting with SAS 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for the hash, hash iterator, and Java objects)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

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## What's New in Base SAS 9.3 Utilities

### Changes to *SAS Language Reference: Dictionary*

Prior to SAS 9.3, this document was part of *SAS Language Reference: Dictionary*. Starting with SAS 9.3, *SAS Language Reference: Dictionary* has been divided into seven documents:

- *SAS Data Set Options: Reference*
- *SAS Formats and Informats: Reference*
- *SAS Functions and CALL Routines: Reference*
- *SAS Statements: Reference*
- *SAS System Options: Reference*
- *SAS Component Objects: Reference* (contains the documentation for the Hash Object and the Java Object)
- *Base SAS Utilities: Reference* (contains the documentation for the SAS DATA step debugger and the SAS Utility macro %DS2CSV)

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## What's New in the Output Delivery System

### Overview

The following enhancements have been made to the Output Delivery System:

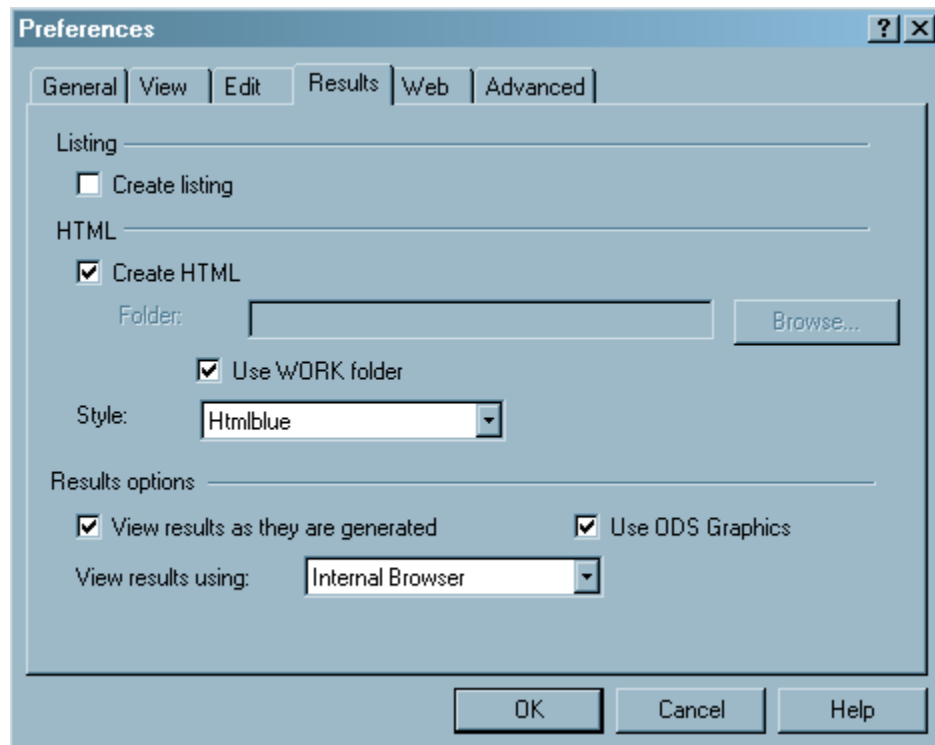
- In SAS 9.3, defaults for output in the SAS windowing environment for Microsoft Windows and UNIX have changed.
- The ODS Graphics Editor, the ODS Graphics Designer, and the ODS Graphics Procedures have moved from SAS/GRAPH to Base SAS.
- The Printer, PDF, PS, and PCL default printer values can now be changed in the SAS Registry.
- Enhancements have been made to the DOCUMENT procedure.
- Enhancements have been made to the TEMPLATE procedure.
- Enhancements have been made to the ODS statements.
- There are three new system options.
- In the second maintenance release for SAS 9.3, the ODS PREFERENCES statement has been added.

## Changes to Default Output in the SAS Windowing Environment for UNIX and Windows

### HTML Output in the SAS Windowing Environment

In SAS 9.3, the default destination in the SAS windowing environment is HTML, and ODS Graphics is enabled by default. These new defaults have several advantages. Graphs are integrated with tables, and all output is displayed in the same HTML file using a new style. This new style, HTMLBlue, is an all-color style that is designed to integrate tables and modern statistical graphics.

You can view and modify the default settings by selecting **Tools** ► **Options** ► **Preferences** from the menu at the top of the main SAS window. Then open the **Results** tab. You can remember this sequence using the mnemonic TOPR (pronounced “topper”). The following display shows the SAS **Results** tab with the new default settings specified:



The default settings in the **Results** tab are as follows:

- The **Create listing** check box is not selected, so LISTING output is not created.
- The **Create HTML** check box is selected, so HTML output is created.
- The **Use WORK folder** check box is selected, so both HTML and graph image files are saved in the WORK folder (and not your current directory).
- The default style, HTMLBlue, is selected from the **Style** drop-down list.
- The **Use ODS Graphics** check box is selected, so ODS Graphics is enabled.
- **Internal browser** is selected from the **View results using:** drop-down list, so results are viewed in the SAS Results Viewer.

In many cases, graphs are an integral part of a data analysis. However, when you run large computational programs (such as when you use procedures with many BY groups) you might not want to create graphs. In those cases, you should disable ODS Graphics, which will improve the performance of your program. You can disable and re-enable ODS Graphics in your SAS programs with the ODS GRAPHICS OFF and ODS GRAPHICS ON statements. You can also change the ODS Graphics default in the **Results** tab.

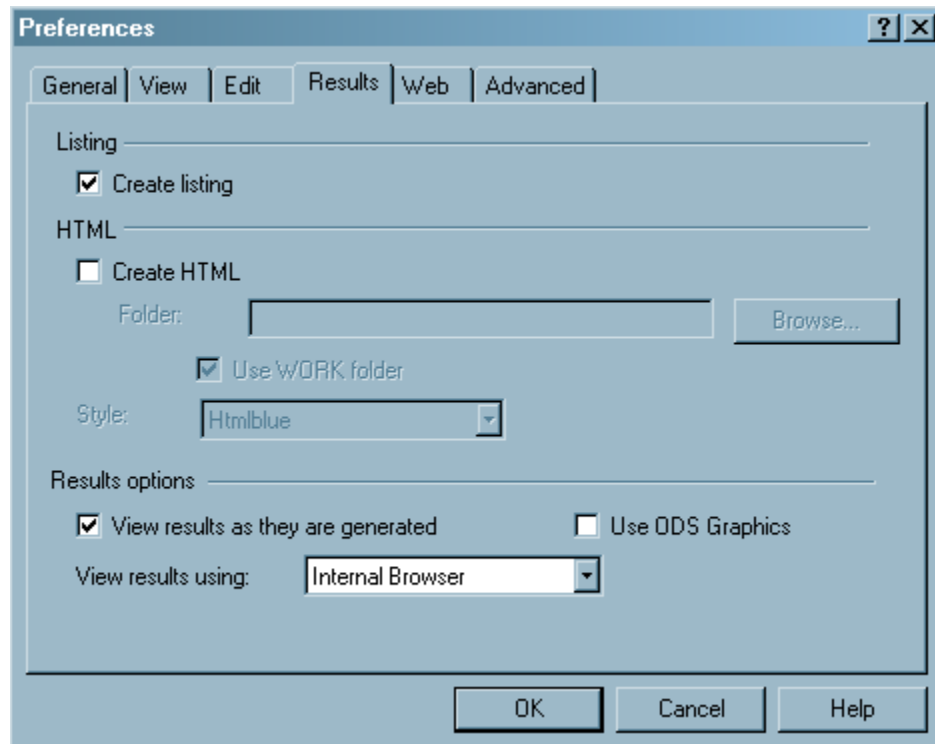
### LISTING Output in the SAS Windowing Environment

Before SAS 9.3, SAS output in the SAS windowing environment was created by default in the LISTING destination. In the LISTING destination, tables are displayed in monospace, and graphs are not integrated with tables.

You can create LISTING output by selecting **Tools** ► **Options** ► **Preferences** from the menu at the top of the main SAS window. Then open the **Results** tab. Select the **Create listing** check box, and if you do not want HTML output, then do not select the **Create HTML** check box.



Before SAS 9.3, ODS Graphics was disabled by default. You can enable or disable ODS Graphics by default by using the check box in the **Results** tab, and you can use the ODS GRAPHICS ON and ODS GRAPHICS OFF statements to enable and disable ODS Graphics in your SAS programs. The following display shows the SAS **Results** tab with the old default settings specified:



## Selected SAS/GRAPH Products Included with Base SAS Software

A SAS/GRAPH license is no longer required for ODS Graphics. The Graph Template Language (GTL), the ODS Graphics Procedures, the ODS Graphics Editor, and the ODS Graphics Designer are now all available with Base SAS software. The documentation for these products is now included in the Base SAS node in the SAS 9.3 Help and Documentation. For more information about these applications, see the following documentation:

- *SAS ODS Graphics: Procedures Guide*
- *SAS Graph Template Language: User's Guide*
- *SAS Graph Template Language: Reference*
- *SAS ODS Graphics Designer: User's Guide*
- *SAS ODS Graphics Editor: User's Guide*

## Changes to PRINTER Registry Settings

The Printer, PDF, PS, and PCL default printer values can now be changed in the SAS Registry.

## DOCUMENT Procedure Enhancements

The following enhancements have been made to the DOCUMENT procedure:

SAS/GRAPH external graph titles are now included in an ODS Document.

The PRINT procedure is now fully supported by the DOCUMENT procedure.

The WHERE option for the REPLAY statements now has the following enhancements:

New subsetting variables have been added to the WHERE option for the REPLAY statement.

`_MAX_`  
is the last observation.

`_MIN_`  
is the first observation.

`_OBS_`  
is the current observation number in an output object.

*observation-number*  
is the observation number to be replayed.

*observation-variable*  
is the name of an observation.

The WHERE option in the REPLAY statement now applies to output objects as well as directories.

The following options are new:

TEXTFILE= option  
in the IMPORT TO statement imports a text file into an ODS document that can be replayed to open ODS destinations.

BYGROUPS option  
in the LIST statement creates, in the entry list, columns for BY variables.

SHOW option  
in the OBANOTE statement specifies that a table containing the output object's after notes will be written to active destinations.

SHOW option  
in the OBNOTE statement specifies that a table containing the output object's before notes will be written to active destinations.

SHOW option  
in the OBFOOTN statement specifies that a table containing the output object's footnotes will be written to active destinations.

SHOW option  
in the OBSTITLE statement specifies that a table containing the output object's subtitles will be written to active destinations.

SHOW option  
in the OBTITLE statement specifies that a table containing the output object's titles will be written to active destinations.

## Template Procedure Enhancements

### Table Template Enhancements

Default values for dynamic variables can now be supplied in the DYNAMIC, MVAR, and NMVAR statements for tabular output.

### Style Template Enhancements

- The following style attributes are new.

**BACKGROUNDPOSITION**=*position*

specifies the position of the background of the tables, cells, or graphs.

**BORDERCOLLAPSE**= COLLAPSE | SEPARATE

specifies whether the border is collapsed or separated.

**PADDING**=*dimension* | *dimension*%

specifies the amount of white space between the content of the cell and the border.

**PADDINGBOTTOM**=*dimension* | *dimension*%

specifies the amount of white space on the bottom of the content of the cell in the table.

**PADDINGLEFT**=*dimension* | *dimension*%

specifies the amount of white space on the left side of the content of the cell in the table.

**PADDINGRIGHT**=*dimension* | *dimension*%

specifies the amount of white space on the right side of the content of the cell in the table.

**PADDINGTOP**=*dimension* | *dimension*%

specifies the amount of white space on the top of the content of the cell in the table.

**WHITESPACE**= NORMAL | NOWRAP | PRE | PRE\_LINE | PRE\_WRAP

specifies how a line of text wraps.

- You can now use RGBA (red green blue transparency) and CMYK (cyan magenta yellow black) colors with style attributes.

## ODS Statements Enhancements

- In the second maintenance release for SAS 9.3, the ODS PREFERENCES statement has been added.
- The HTML, PDF, PCL, and LISTING destinations now support Scalable Vector Graphics (SVG).
- The PDF and PCL destinations now create Scalable Vector Graphics (SVG) by default.
- The HTML destination now supports the BMP image type.
- The ODS PRINTER statement now supports the GTITLE option and the GFOOTNOTE option.
- The ODS TAGSETS.RTF statement has the following enhancements.

- The following new event tagsets have been added to support the measured tagset: TAGSETS.MEAS\_EVENT\_MAP, TAGSETS.MEAS\_SHORT\_MAP, and TAGSET.MEAS\_TEXT\_MAP.
- OPTIONS (DOC="changelog") provides version control information for the measured tagset. When specified, information is printed to the SAS Log.
- OPTIONS (TOC\_LEVEL= ) enables the user to set the number of levels that appear in the table of contents.
- OPTIONS (CONTINUE\_TAG= ) enables the user to add a continue tag to the RTF document when a table breaks and is continued to the next page.
- OPTIONS (WATERMARK= ) enables the user to add a watermark to an RTF document. Use the ODS TAGSETS.RTF statement option WATERMARK to assign the text that will be displayed diagonally across each page of the RTF document.

## New System Options

The following system options are new for ODS:

- The new system option ODSDEST= restores the SAS version 9.2 output behavior in the SAS windowing environment.
- The new system option ODSGRAPHICS= restores default 9.2 behavior in the Display Manager for ODS Graphics.
- The new system option ODSSTYLE= restores the default 9.2 HTML style.

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## What's New in SAS ODS Graphics Procedures 9.3

### Overview

The *SAS ODS Graphics: Procedures Guide* contains new information explaining how styles are applied to graphs that are grouped and non-grouped.

The second edition added a new introductory section. The new introduction includes a detailed description of a typical program and an example of each supported plot type.

In addition, the procedures have the following changes and enhancements for SAS 9.3:

- inclusion with Base SAS and name change
- changes to the default ODS output
- new plot statements are available for the SGPLOT and SGPANEL procedures.
- new options and enhancements are available for the PROC SGPLOT, PROC SGPANEL, and PROC SGSCATTER statements.
- new options and enhancements are available for the existing plot statements in the SGPLOT and SGPANEL procedures.

- new options and enhancements are available for the axis statements in the SGPLOT and SGPANEL procedures.
- new options and enhancements are available for the SGRENDER procedure.
- enhancements are available for the SGDESIGN procedure.
- a new attribute map feature provides a mechanism for controlling the visual attributes that are applied to specific group data values in your graphs.
- a new annotation feature provides a mechanism for adding shapes, images, and annotations to graph output.

## ODS Graphics Procedures Are Included with Base SAS

The ODS Graphics procedures, formerly called SAS/GRAPH Statistical Graphics procedures, are now available with Base SAS software. SAS/GRAPH software is not required in order to use the procedures.

**Note:** The ODS Graphics Designer, ODS Graphics Editor, and Graph Template Language have also moved to Base SAS.

## Changes to the Default ODS Output

In Windows and UNIX operating environments, when the ODS Graphics procedures are executed in the SAS Windowing environment, the default behavior has changed as follows:

- HTML is the default ODS destination. If you close this destination and do not open another destination, then no destinations are open.
- HTMLBlue is the default style for the HTML destination. You can change this default style in the SAS Preferences.
- Graphs are no longer saved in the SAS current directory by default. They are saved in the directory that corresponds to your SAS Work library. You can specify a different directory in the SAS Preferences.

These changes do not apply when the procedures are run in batch mode. In addition, the z/OS operating environment continues to use the ODS LISTING destination as the default destination.

To create LISTING output, do one of the following:

- Specify LISTING in the Results tab in the SAS Preferences.
- Add the ODS LISTING statement to your SAS program.

## New Plot Statements for the SGPLOT and SGPANEL Procedures

### BUBBLE Statement

A new BUBBLE statement creates a bubble plot in which two variables determine the location of the bubble centers and a third variable controls the size of the bubble.

### **HBARPARG and VBARPARG Statements**

New HBARPARG and VBARPARG statements create a horizontal or vertical bar chart based on a pre-summarized response value for each unique value of the category variable. You can also assign variables to the upper and lower limits.

### **HIGHLOW Statement**

A new HIGHLOW statement creates a display of floating vertical or horizontal lines or bars that represent high and low values. The statement also gives you the option to display open and close values as tick marks and to specify a variety of plot attributes.

### **LINEPARG Statement**

A new LINEPARG statement creates a straight line specified by a point and a slope. You can generate a single line by specifying a constant for each required argument. You can generate multiple lines by specifying a numeric variable for any or all required arguments.

### **WATERFALL Statement (SGPLOT Only, Preproduction)**

A new WATERFALL statement creates a waterfall chart computed from input data. In the chart, bars represent an initial value of Y and a series of intermediate values identified by X leading to a final value of Y.

## **Updates to the PROC SGPLOT, PROC SGPANEL, and PROC SGSCATTER Statements**

All three procedure statements include the following new options:

- The DATTRMAP= option specifies an SG attribute map data set.
- The SGANNO= option specifies an SG annotation data set.
- The PAD= option reserves space around the border of an annotated graph.

The UNIFORM= option in the SGPLOT procedure enables you to control axis scaling and legend marker attributes for the row and column axes independently.

## **Updates to Plot Statements in the SGPLOT and SGPANEL Procedures**

### **General Updates**

The following options and enhancements have been added to multiple plot statements:

- The ATTRID= option specifies the value of the ID variable in an attribute map data set. (This option is also used with the SGSCATTER procedure.)
- The CATEGORYORDER= option specifies the order in which the response values are arranged. This option affects bar charts, line plots, and dot plots.
- The CLIATTRS= and CLMATRS= options now enable you to specify line attributes and fill attributes for confidence limits.

- The CURVELABELATTRS= and DATALABELATTRS= options specify options for setting text attributes for plot curves and labels.
- The DISCRETEOFFSET= option specifies an amount to offset graph elements from the category midpoints or from the discrete axis tick marks. This option affects bar charts, box plots.
- The following are new options for grouped data (using the GROUP= option):
  - The CLUSTERWIDTH= option specifies the cluster width as a ratio of the midpoint spacing when a group is in effect. This option affects any plot that can have a discrete axis.
  - The GROUPDISPLAY= option specifies how to display grouped graphics elements. This option affects any plot that can have a discrete axis. (The option is not available for the HBARPARM and VBARPARM statements.)
  - The GROUPORDER= option specifies the ordering of graph elements within a group. This option affects any plot that can have a discrete axis.

### **BAND Statement**

The following options and enhancements are specific to the BAND statement:

- The CURVELABELLOWER= and CURVELABELUPPER= options specify labels for the plot's upper and lower limits.
- The TYPE= option specifies whether the data points for the band boundaries are connected as a series plot or as a step plot.

### **HBAR and VBAR Statements**

The following options and enhancements are specific to the HBAR and VBAR statements:

- The DATALABEL= option now enables you to specify a variable that contains values for the data labels.
- The DATASKIN= option specifies a special effect to be used on all filled bars.
- Some SAS styles display fill patterns for grouped bars.

**Note:** These options are also available with the new HBARPARM and VBARPARM statements. The DATALABEL and DATASKIN options are available with the new WATERFALL statement.

The VBAR and VBARPARM statements in the SGPLOT procedure have a DATALABELPOS= option, which specifies the location of the data label.

### **HBOX and VBOX Statements**

The following options and enhancements are specific to the HBOX and VBOX statements:

- The CAPSHAPE= option specifies the shape of the whisker cap lines.
- The CONNECT= option specifies that a connect line joins a statistic from box to box.
- Boxes can be grouped. In addition to the GROUP= option, the GROUPDISPLAY= and GROUPORDER= options are available.
- The NOTCHES option shows the notches.

- The NOMEAN option hides the mean symbol.
- The NOMEDIAN option hides the median line.
- The NOOUTLIERS option hides the outliers.
- You can specify appearance attributes for these elements:
  - connect lines
  - data labels
  - box fills and lines
  - mean markers, median lines, outlier markers, and whisker and cap lines

### **HISTOGRAM Statement**

The HISTOGRAM statement provides greater control over bins with the following options:

- BINSTART= specifies the X coordinate of the first bin.
- BINWIDTH= specifies the bin width.
- NBINS= specifies the number of bins.

### **INSET and KEYLEGEND Statements**

The INSET and KEYLEGEND statements enable you to change text attributes with the following options:

- The TITLEATTRS= and TEXTATTRS= options in the INSET statement. The INSET statement applies to the SGPLOT procedure only.
- The TITLEATTRS= and VALUEATTRS= options in the KEYLEGEND statement

### **VLINE Statement**

The VLINE statement in the SGPLOT procedure has a DATALABELPOS= option, which specifies the location of the data label.

## **Axis Updates for the SGPANEL and SGPLOT Procedures**

### **Axis Updates for the SGPLOT Procedure**

The XAXIS, X2AXIS, YAXIS, and Y2AXIS statements support several enhancements and new options:

- New LABELATTRS and VALUEATTRS options specify textual attributes for axis labels and axis tick value labels, respectively.
- A new REVERSE option specifies that the tick values are displayed in reverse (descending) order.
- New THRESHOLDMAX and THRESHOLDMIN options specify a threshold for displaying one more tick mark at the high end and the low end of the axis, respectively.



## Axis Updates for the SGPANEL Procedure

The COLAXIS and ROWAXIS statements support several enhancements and new options:

- The same updates are supported as listed in “Axis Updates for the SGPLOT Procedure”.
- The REFTICKS option enables you to specify whether labels and values are added to the tick marks. (This option adds tick marks to the side of the panel that is opposite from the specified axis.)

## Updates to the SGRENDER Procedure

You can use the SGRENDER procedure to render a graph from a SAS ODS Graphics Editor (SGE) file.

## Updates to the SGDESIGN Procedure

The SGDESIGN procedure is supported on z/OS systems. However, the following limitations apply:

- The procedure does not render SGD files that were generated with the previous release of the ODS Graphics Designer. You must open the SGD file in the 9.3 version of the ODS Graphics Designer (on a Windows or UNIX system). Then save the file in the 9.3 format.
- SGD files must be transferred to the HFS file system of UNIX System Services in order to be rendered.

## New Attribute Mapping Feature

A new attribute map feature provides a mechanism for controlling the visual attributes that are applied to specific group data values in your graphs. This feature uses SG attribute map data sets to associate data values with visual attributes. The data set uses reserved variable names for the attribute map identifier, the group value, and the attributes.

You can use attribute maps in the SGPLOT, SGPANEL, and SGSCATTER procedures. The procedure statement references the name of the SG attribute map data set, and plot statements specify the group and the attribute map identifier.

## New Annotation Feature

A new annotation feature provides a mechanism for adding shapes, images, and annotations to graph output. For example, you can add text labels, lines, circles, rectangles, polygons, and images. This feature uses SG attribute data sets, which contain the commands for creating the annotation elements. The data set uses reserved variable names for the draw function and the attributes that control how the function is performed.

You can use annotation in the SGPLOT, SGPANEL, and SGSCATTER procedures. The procedure statement references the name of the SG annotation data set.

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## What's New in the SAS 9.3 Graph Template Language

### Overview

New and enhanced statements for Graph Template Language (GTL) extend the versatility of the language and introduce a number of new plot types. The changes include the following:

- new layout statements
- new plot statements
- new legend statements
- new features for general use
- enhancements to SAS 9.2 statements

### New Layout Statements

The following layout statements are new:

- LAYOUT REGION provides a container for plots that do not use axes (for example, a pie chart).
- LAYOUT GLOBALLEGEND creates a compound legend containing multiple discrete legends.

### New Plot Statements

The following plot statements are new:

- BUBBLEPLOT creates a bubble plot of the input data, using X and Y columns to locate bubble centers and a SIZE column to control the bubble radius.
- DENDROGRAM creates a tree diagram that is typically used to display the results of a hierarchical clustering analysis.
- HEATMAPPARM creates a two-dimensional plot that represents the values of pre-binned, three-dimensional data.
- HIGHLOWPLOT creates floating vertical or horizontal lines or bars that connect the minimum and maximum response values for each value of a categorical variable. The vertical version is typically used in the financial industry to plot stock values over time. The horizontal version is typically used in the Health and Life Sciences industry to display over time the duration of adverse events or of adverse reactions to medication.
- PIECHART creates a pie chart that is computed from input data.
- WATERFALLCHART creates a waterfall chart that is computed from input data. A waterfall chart is typically used to show credit and debit transactions or successive changes to a given state.

In the second maintenance release of SAS 9.3, the MOSAICPLOTPARM statement is new. It creates a mosaic plot from pre-summarized categorical data.

## New Legend Statements

The following legend statements are new:

- LEGENDITEM creates the definition for a legend item that can be included in a legend. The item is independent of the data and enables you to customize the legend to enhance or replace a standard legend.
- MERGEDLEGEND consolidates legend entries when a graph displays grouped data for two plots.
- For discrete axes that might appear crowded with too many tick values, the new AXISLEGEND statement can clean up the clutter. AXISLEGEND generates consecutive integers for display as axis-tick values in the graph. It also creates a legend that correlates those integers with the actual tick values that they represent.

## New Features for General Use

### Attribute Maps

The GTL now provides discrete and range “attribute maps” that enable you to map visual attributes to input data values.

- Discrete attribute maps enable you to map discrete data to specific visual attributes (for example, color). This feature could be used to represent in the legend a data value with a specific visual attribute, regardless of the order of the values in the data or whether the value exists in the data. For example, when using gender as a grouping category for plots, you could set an attribute map for marker symbols. You could define the map so that all plots that are generated by a template use red circles to represent the values for females and blue diamonds to represent the values for males. Relevant statements: DISCRETEATTRMAP and DISCRETEATTRVAR.
- Range attribute maps enable you to control color assignment, regardless of the current data range for a plot. This feature could be used to make the color assignments independent of the actual data range for consistency. For example, for temperature data, you could set blue for 0 and red for 100, even if the values 0 and 100 are not in the data. Relevant statements: RANGEATTRMAP and RANGEATTRVAR.

### Draw Statements

A set of new draw statements enables you to draw lines, arrows, ovals, rectangles, and other shapes in your graph. You can also draw text and images. A global drawing space and drawing units for all of the draw statements is set in the BEGINGRAPH statement’s new DRAWSPACE= option. The individual draw statements provide options that enable you to set the drawing space and drawing units for that individual statement. The following draw statements are available:

- BEGINPOLYGON
- BEGINPOLYLINE
- DRAWARROW

- DRAWIMAGE
- DRAWLINE
- DRAWOVAL
- DRAWRECTANGLE
- DRAWTEXT

In the second maintenance release of SAS 9.3:

- DRAWRECTANGLE:
  - CORNERRADIUS= specifies the radius of the rectangle corners.

### General Enhancements Supported by Many of the Plots

The following new features that are supported by many of the plot statements are worth highlighting. The individual plot statements that support these features are identified in [Plot Enhancements on page 60](#).

- For plots that support a grouping variable:
  - A grouping variable can now display groups in clusters. To do so, use GROUP= (new for some of the plots) to specify the grouping variable and set the new GROUPDISPLAY= option to CLUSTER. The new INCLUDEMISSINGGROUP= option specifies whether missing values of the group variable are included in the plot. GROUPORDER= (new for some of the plots) specifies the order of the grouped plot elements (for example, bars) for each category value. The new CLUSTERWIDTH= option specifies the width of the group clusters as a fraction of the midpoint spacing on a discrete axis or a fraction of the minimum interval between adjacent data values on an interval axis.
  - In the first maintenance release of SAS 9.3:
    - New fill colors are generated automatically when the number of group values exceeds the number of GraphData1–GraphDataN style elements. The new fill colors are generated by repeating the GraphData1–GraphDataN colors and varying the shade of each original color on each cycle. The shade variations alternate between one shade lighter and one shade darker on each cycle.
    - The group value style attributes are now independent of group order and are always assigned in data order.
    - The attributes of the missing group value are now determined by the GraphMissing style element except when the MISSING= system option is used to specify a missing character other than the default, or a user-defined format is applied to the missing group value. In those cases, the attributes of the missing group value are determined by a GraphData1–GraphDataN style element instead of the GraphMissing style element.
- Data skins, which can be applied with the new DATASKIN= option, enhance the visual appearance of a graph. For example, a data skin can be used to apply a glossy, three-dimensional appearance to the filled bars of a bar chart or the filled slices of a pie chart. Data skins are available only for bars, pie slices, bubbles, and scatter plot markers.
- Transparency for the filled elements of some graph types can now be managed independently of the other transparent elements in the graph. For example, one transparency level can be set for the filled bars of a bar chart and a different

transparency level can be set for the bar outlines. As in SAS 9.2, `DATATRANSOPARENCY=` sets the transparency level for fills and lines. A different transparency level can now be set for area fills, using the new fill option `TRANSPARENCY=`. The new fill option is available in any option that sets area fills (for example, a `FILLATTRS=` option).

## General Enhancements to the Output Delivery System

The following enhancements have been made to the Output Delivery System (ODS):

- When running SAS in windowing mode for the Windows and UNIX operating environments, the default output destination has changed from LISTING to HTML.
- When running SAS in windowing mode for the Windows and UNIX operating environments and directing output to the HTML destination, the default style has changed from DEFAULT to HTMLBLUE. The new all-color HTMLBLUE style is ideal for ODS graphics because it provides superior color coordination between graphs and tables, using colors to differentiate between groups.
- The LISTING, HTML, and PRINTER destinations now support Scalable Vector Graphics (SVG).

For more information about these and other ODS enhancements, consult *SAS Language Reference: Concepts* and *SAS Output Delivery System: User's Guide*.

## Enhancements to SAS 9.2 Statements

### Layout Enhancements

LAYOUT DATALATTICE and LAYOUT DATAPANEL:

- These lattice-type layouts now support independent X2 (top) and Y2 (right) axes. In SAS 9.2, the X2 axis could mirror only the X axis, and the Y2 axis could mirror only the Y axis.
- `INCLUDEMISSINGCLASS=` specifies whether to include grid cells for crossings of the class variables that contain a missing value.
- `INSETOPTS=` now provides `TITLE=` for setting an inset title and `TITLEATTRS=` for setting the text attributes of that title.
- `SHRINKFONTS=` specifies whether fonts in the multi-cell layout are scaled when appropriate, depending on the nesting levels of the layouts that have `SHRINKFONTS=TRUE`.
- `SPACEFILL=` (in the `SIDEBAR` statement) specifies whether the sidebar's contents should expand to fill the entire sidebar area, up to its boundaries.

LAYOUT LATTICE:

- The LATTICE layout now supports independent X2 (top) and Y2 (right) axes. In SAS 9.2, the X2 axis could mirror only the X axis, and the Y2 axis could mirror only the Y axis.
- `SHRINKFONTS=` specifies whether fonts in a multi-cell layout are scaled when appropriate, depending on the nesting levels of the layouts that have `SHRINKFONTS=TRUE`.
- `SPACEFILL=` (in the `SIDEBAR` statement) specifies whether the sidebar's contents should expand to fill the entire sidebar area, up to its boundaries.

**LAYOUT GRIDDED:**

- SHRINKFONTS= specifies whether fonts in a multi-cell layout are scaled when appropriate, depending on the nesting levels of the layouts that have SHRINKFONTS=TRUE.

**LAYOUT OVERLAY:**

- The INNERMARGIN statement generates one or more “inner margins” within a LAYOUT OVERLAY container. An inner margin is a nested region at the top or bottom of the OVERLAY container.
- ASPECTRATIO= specifies the aspect ratio of the rectangle that forms the bounds of the plot wall.

**LAYOUT PROTOTYPE:**

- ASPECTRATIO= specifies the aspect ratio of the plot wall area.

**Plot Enhancements****BANDPLOT:**

- INCLUDEMISSINGGROUP= specifies whether missing values of the group variable are included in the plot.
- Transparency can be managed separately for the filled bands and the band outline. As in SAS 9.2, DATATRANSPARENCY= sets the transparency level for both the fills and the lines. The new FILLATTRS=(TRANSPARENCY=*number*) can set a different transparency level for just the band fill.

**BARCHART and BARCHARTPARM:**

- Both statements support the general plot enhancements that were listed previously. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#).
- FILLPATTERNATTRS= specifies the attributes for fill patterns, which are useful for displaying monochrome graphs (typically the black and white graphs that are printed in journal articles).
- BASELINEINTERCEPT= specifies the response axis intercept for the baseline.
- TARGET= specifies a numeric column that provides target values to display on the chart bars as a small triangle with a line extending from it across the bar.

**BLOCKPLOT:**

- BLOCKPLOT supports the general plot enhancements (excluding data skins) that were listed previously. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#).
- EXTENDBLOCKONMISSING= specifies whether a missing value in the BLOCK column starts a new block or reverts to the previous nonmissing value.
- INCLUDEMISSINGCLASS= specifies whether missing values of the class variable are included in the plot.

**BOXPLOT and BOXPLOTPARM:**

- Both statements now support the GROUP= option and clustered groups. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#). For overriding default grouping, the new INDEX= option can specify indices for mapping line and fill attributes (color and pattern) to one of the GraphData1–GraphDataN style elements.

- Box plots now support an independent, numeric axis. By default, box plot requests a discrete category axis. If your data corresponding to the independent axis is numeric (or time), you can set TYPE= to LINEAR, TIME, or LOG in the layout's axis options. With a numeric axis in effect, you can also use the new INTERVALBOXWIDTH= option to specify the box width.
- Box plots now support tooltips. The TIP= and OUTLIERTIP= options can be used to set the tips for the boxes and the outliers. The TIPFORMAT = and TIPLABEL= options can be used to format and label the tips. BOXPLOTPARM also supports the ROLENAME= option (not available for BOXPLOT), which specifies user-defined roles that can be used to display additional information in the tooltips.
- BOXPLOTPARM supports the DISPLAYSTATS= options (not available for BOXPLOT and horizontal BOXPLOTPARM), which specifies the statistics to be displayed for each box.
- In the second maintenance release for SAS 9.3, BOXPLOT supports the DISPLAYSTATS= option (not available for horizontal BOXPLOT), which specifies the statistics to be displayed for each box.

#### BUBBLEPLOT:

- In the second maintenance release for SAS 9.3:
  - RELATIVESCALETYPE= specifies the type of scaling that is to be applied to the SIZE= column values.
  - SIZETHRESHOLDMAX= specifies a SIZE= column value threshold at which bubble size is clamped to the BUBBLERADIUSMAX= option value.

#### ELLIPSE and ELLIPSEPARM:

- Transparency can be managed separately for the filled ellipse and the ellipse outline. DATATRANSPARENCY= sets the transparency level for both the fill and the line. FILLATTRS=(TRANSPARENCY=*number*) can set a different transparency level for just the fill.
- INCLUDEMISSINGGROUP= specifies whether missing values of the group variable are included in the plot. (This option is available for ELLIPSEPARM but not for ELLIPSE.)

#### FRINGEPLOT, LINEPARM, LOESSPLOT, PBSPLINEPLOT, and REGRESSIONPLOT:

- Each of these statements has a new INCLUDEMISSINGGROUP= options, which specifies whether missing values of the group variable are included in the plot.

#### HIGHLOWPLOT:

- In the second maintenance release for SAS 9.3:
  - ENDCAPDISPLAYPOLICY= specifies whether to display outlined colored regions or just colored regions.

#### HISTOGRAMPARM:

- In the second maintenance release for SAS 9.3:
  - DATALABEL= specifies a column for the bar labels.
  - DATALABELATTRS= specifies the color and font attributes of the bar labels.

#### NEEDLEPLOT:

- NEEDLEPLOT supports clustered groups. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#). It does not support the data skins or dual transparency levels.
- DATALABEPOSITION= specifies the location of the data labels relative to the needle lines and markers.
- DISCRETEOFFSET= specifies an amount to offset all needle lines and markers from discrete X values when graphing multiple response variables side by side on a common axis.

#### PIECHART:

- In the first maintenance release for SAS 9.3:
  - The STAT= option value PERCENT is changed to PCT in order to make it consistent with other plots.
  - The DATALABELCONTENT= option default is changed in order to reduce the information that is displayed by default and to customize the information for the STAT= option value. The new default depends on the STAT= option value as follows:
    - For STAT=PCT, the DATALABELCONTENT= default is (CATEGORY PERCENT).
    - For all other values of the STAT= option, the DATALABELCONTENT= default is STANDARD.

#### SCATTERPLOT:

- SCATTERPLOT supports clustered groups and data skins. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#).
- DATALABEPOSITION= specifies the location of the data labels relative to the markers.
- USEDISCRETESIZE= specifies that the marker size should be based on fraction of the midpoint spacing. DISCRETEMARKERSIZE= specifies the fractional size to use for that marker size.
- MARKERSIZERESPONSE= specifies a column to use for varying marker sizes with response values. MARKERSIZEMAX= and MARKERSIZEMIN= enable you to manage the range of the marker-size variation when MARKERSIZERESPONSE= is used.

#### SCATTERPLOTMATRIX:

- DATALABEPOSITION= specifies the location of the data labels relative to the markers.
- INCLUDEMISSINGGROUP= specifies whether missing values of the group variable are included in the plot.
- INSETOPTS= now provides TITLE= for setting an inset title and TITLEATTRS= for setting the text attributes of that title.

#### SERIESPLOT:

- SERIESPLOT supports clustered groups. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#).
- DATALABEPOSITION= specifies the location of the data labels relative to the series line and markers.



- SMOOTHCONNECT= specifies that the plot vertices be connected by a smooth line.

#### STEPLOT:

- STEPLOT supports clustered groups. For more information, see [General Enhancements Supported by Many of the Plots on page 58](#).
- DATALABEPOSITION= specifies the location of the data labels relative to the series line and markers.

#### VECTORPLOT:

- DATALABEPOSITION= specifies the location of the data labels relative to the vector lines and arrow heads.
- INCLUDEMISSINGGROUP= specifies whether missing values of the group variable are included in the plot.

## Axis Enhancements

#### LAYOUT OVERLAY:

- NAME= assigns a name to an axis for reference in other statements.
- DISCRETEOPTS= supports the following new features for discrete axes:
  - COLORBANDS= specifies the display of alternating wall-color bands corresponding to the discrete axis bins. COLORBANDSATTRS= specifies the appearance of the alternating wall-color band.
  - TICKTYPE= specifies the position of the axis tick mark.
  - TICKVALUEFITPOLICY= specifies a policy for avoiding tick value collision on an axis.

#### LAYOUT OVERLAYEQUATED:

- In the second maintenance release of SAS 9.3:
  - REVERSE= specifies whether the tick values on the X or Y axis should appear in the reverse order.

#### LAYOUT LATTICE:

- NAME= assigns a name to an axis for reference in an AXISLEGEND statement.
- REVERSE= specifies whether the axis origin should be reversed.
- DISCRETEOPTS= supports the following new features for discrete axes:
  - TICKTYPE= specifies the position of the axis tick mark.
  - TICKVALUEFITPOLICY= specifies a policy for avoiding tick value collision on an axis.

## Attribute Map Enhancements

#### RANGEATTRMAP:

- In the first maintenance release of SAS 9.3, for the RANGE statement:
  - RANGEALTCOLOR= specifies a single contrast color to represent the defined value range.
  - RANGEALTCOLORMODEL= specifies either a style element or a list of one or more specific contrast colors to represent the defined value range.

## Deprecated Statement Options

In the first maintenance release of SAS 9.3:

- The DRAWTEXT statement BACKGROUNDATTRS= option is deprecated.
- The LAYOUT GLOBALLEGEND statement BACKGROUNDATTRS= option is deprecated.

---

# What's New in SAS 9.3 ODS Graphics Designer

## Overview

The ODS Graphics Designer has the following changes and enhancements:

- inclusion with Base SAS
- ODS style changes
- ability to start the designer from the SAS menu bar
- more options for saving a graph
- enhanced data assignment options
- enhanced plot properties

## Designer Included with Base SAS

ODS Graphics Designer is now available with Base SAS software. SAS/GRAPH software is not required in order to use the designer.

**Note:** If you customized preferences, styles, or Graph Gallery files in the previous production release (the third maintenance release of 9.2) of ODS Graphics Designer, you must migrate your custom files to the designer's new 9.3 location. If you do not perform this one-time task, the 9.3 designer can not use your customized preferences, styles, or Graph Gallery files.

**Note:** ODS Graphics Designer does not support SGD files that were created before the third maintenance release of 9.2.

## ODS Style Enhancements and Changes

The designer supports a new ODS style: HTMLBlueCML (Color, Marker, Line). The default style is still Listing, although you can change that in the Preferences.

**Note:** SGD graphs that are rendered using the SGDESIGN procedure continue to honor the active style of the open ODS destination. In the SAS Windowing environment, HTML is now the default ODS destination, and HTMLBlue is the default style. Graphs that are output to the default ODS destination in SAS will look different from those that were created using the designer's default style.

## Enhanced Way to Start the Designer

In addition to using a SAS macro to start the designer, you can start the designer from the SAS menu bar.

## More Options for Saving a Graph

The Save As dialog box has the following changes and enhancements:

- ability to save a graph as a PDF file or an Enhanced Metafile (EMF)
- option to specify a resolution for graphs that are saved as JPG or PNG files
- option to specify a target for bar charts that are saved as HTML files when the chart has a URL role specified
- option to specify a name for the graph's template (you can also specify the name in the Graph Properties dialog box)

## Enhanced Data Assignment Options

The Assign Data dialog box has the following changes and enhancements:

- For some plots, group display options enable you to specify whether grouped plot elements are clustered, overlaid, or stacked (bar charts). Scatter plots, series plots, step plots, needle plots, box plots, and bar charts support this feature.
- The Discrete Offset option enables you to specify an amount to offset all plot elements from the discrete tick marks.
- You can specify the width of plot elements for box plots and bar charts. (This feature is also available as a plot property. You can also click and drag a plot element to change the width.)

## Enhanced Plot Properties

The following changes and enhancements apply to plot properties:

- enhanced bar skin options for bar charts
- scatter plot enhancements:
  - ability to select a position for the data label with respect to the marker
  - ability to hide markers by selecting 0 for the marker size

---

## What's New in the SAS 9.3 ODS Graphics Editor

### Overview

The ODS Graphics Editor has the following changes and enhancements:

- inclusion with Base SAS
- stand-alone editor is no longer required
- ODS enhancements
- enhancements for editing a graph
- additional rendering option for SGE files

### Editor Is Included with Base SAS

The ODS Graphics Editor is now available with Base SAS software. SAS/GRAPH software is not required in order to use the editor. The documentation has also moved to the Base SAS node in SAS Help and Documentation.

### Stand-Alone Editor Is No Longer Required

In previous releases on Windows and Linux operating systems, you had to install the stand-alone editor even when you invoked the editor from SAS. You could not open ODS Graphics Editor SGE files without the stand-alone editor.

Starting with the 9.3 release, the stand-alone editor is no longer required to open SGE files from SAS. However, the stand-alone editor is still available. You would install the stand-alone editor when you need to open SGE files but do not have SAS installed on the system.

### ODS Changes and Enhancements

The editor supports a new ODS style: HTMLBlueCML (Color, Marker, Line).

In Windows and UNIX operating environments, when editable graphs are created in the SAS Windowing environment, the default ODS behavior has changed as follows:

- HTML is the default ODS destination. If you close the HTML destination and do not open another destination, then no destinations are open.
- HTMLBlue is the default style for the ODS HTML destination. ODS Graphics Editor (SGE) files that were created with the HTML destination appear different from those that were created with the previous release of SAS.

The editor does not support the HTMLBlue style, but instead supports the similar HTMLBlueCML style. To produce the same output as HTMLBlue in the editor, specify the HTMLBlueCML style, and then change the line style or markers as appropriate.

- SAS procedures that support ODS produce ODS Graphics output by default. You do not need to add the `ods graphics on` statement to your code. See “Procedures That Support ODS Graphics” in *SAS/STAT 9.3 User’s Guide*.

## Enhancements for Editing a Graph

The following enhancements apply to editing a graph:

- You can edit any GTL annotations (DRAW statements) that are part of the graph as well as annotations that were created with the ODS Graphics procedures.
- As with single-cell graphs, the editor supports edits to secondary axes for graphs with a layout of DATALATTICE, DATAPANEL, and LATTICE. The secondary axes are now independent from the primary axes for these multi-cell graphs.
- You can select **File** ► **New** to create a blank page. You can then add annotations to the page.

## Additional Rendering Option for SGE Files

SGE files can be rendered to any ODS destination using the SGRENDER procedure. This enables you to render your edited and annotated graphs in a vector graphics format. You can render graphs on platforms, such as z/OS, that do not support running the editor. For more information, see *SAS ODS Graphics: Procedures Guide*.

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# What’s New in the INFOMAPS Procedure and the Information Maps LIBNAME Engine for SAS 9.3

## Overview

The INFOMAPS procedure in Base SAS software has the following changes and enhancements:

- Support for specifying data sources that are used in every query that is generated from an information map.
- Support for using an advanced model for the join strategy during query generation when the information map contains more than one measure data item derived from more than one data source.
- Support for assigning filters that are applied to data sources before they are used in the current information map, including assigning authorization-based filters for a specific user or group.
- Support for SAS identity properties that enable user-specific information to be evaluated in filters.
- Support for changing the access permissions of the information map.
- Support for localizing information map properties for multiple locales.

- Support for updating the information map currently in memory without reloading the information map definition from the metadata server and for closing the information map currently in memory without ending the procedure.
- Support for controlling whether information maps created by previous SAS releases are updated when saved.
- Support for halting the procedure when an error occurs during batch processing.

The Information Maps LIBNAME Engine in Base SAS software has been enhanced to recognize the access permissions of the information map when data is accessed using the engine.

## INFOMAPS Procedure Features

The following statements are new:

### CLOSE INFOMAP

enables you to close the current information map.

EXPORT LOCALIZABLE\_PROPERTIES and IMPORT LOCALIZED\_PROPERTIES support localizing information map properties for multiple locales.

### INSERT IDENTITY\_PROPERTY and DELETE IDENTITY\_PROPERTY

enable you to insert a SAS identity property into the current information map and to remove one or more SAS identity properties from the current information map.

### SET ASSIGNED\_FILTERS

enables you to assign filters that are applied to data sources before they are used in the current information map.

### UPDATE CURRENT\_INFOMAP

enables you to update the information map in memory without reloading the information map definition from the metadata server.

### UPDATE MAP\_PERMISSIONS

enables you to change the access permissions of the information map and to assign authorization-based filters for a specific user or group.

The following statements have been enhanced:

### PROC INFOMAPS

has a new ERRORSTOP option that enables you to control whether the procedure halts when an error occurs during batch processing.

### INSERT DATASOURCE and UPDATE DATASOURCE

have a new REQUIRED\_DATASOURCE= option that enables you to specify that the data source is used in every query that is generated from an information map.

### UPDATE INFOMAP

has a new REQUIRED\_DATASOURCES= option that enables you to manage the list of required data sources for an information map.

### INSERT FILTER and UPDATE FILTER

have a new HIDDEN= option that enables you to specify whether the filter is hidden from users of the information map.

### NEW INFOMAP and UPDATE INFOMAP

have a new JOIN\_MODEL= option that enables you to control whether a basic or advanced model is used for the join strategy during query generation.

**SAVE**

has new `ALLOW_MAJOR_VERSION_UPGRADE=` and `ALLOW_MINOR_VERSION_UPGRADE=` options that enable you to control the migration of information maps created by previous SAS releases.

## Information Maps LIBNAME Engine Features

The Information Maps LIBNAME Engine now honors the user's Read permission setting for the information map and its data sources. A user is not allowed to access data via the Information Maps engine if the user's Read permission for the information map or its data sources in the metadata server is DENY.

---

## What's New in Encryption in SAS 9.3

### Overview

Encryption in SAS is affected by the following changes and enhancements in SAS:

- FIPS 140-2 is a standard that defines the security requirements that must be satisfied by a cryptographic module used in a security system protecting unclassified information within IT systems. In SAS 9.3, enhancements have been made to support this standard of security. SAS/SECURE and SSL now comply with the FIPS 140-2 standard.
- In the second maintenance release for SAS 9.3, a hot fix is available that updates the UNIX and z/OS OpenSSL version for 0.9.8.
- In the second maintenance release for SAS 9.3, security hot fixes are available that introduce two new environment variables: `SAS_SSL_MIN_PROTOCOL`, supported on UNIX, Windows, and z/OS, and `SAS_SSL_CIPHER_LIST`, supported on UNIX and z/OS.

### General Enhancements

- SAS/SECURE now supports FIPS 140-2 encryption.
- Secure Sockets Layer (SSL) now supports FIPS 140-2 encryption.
- New option `ENCRYPTFIPS` specifies that encryption services are using FIPS 140-2 validated algorithms. When specified, a new INFO message is written at server start-up.
- The process for downloading SSL libraries has changed.
- If using the FIPS 140-2 standard for security, the algorithm used for hashing passwords is SHA-256. The MD5 algorithm continues to be used for all other security technologies.
- Encoded passwords are now supported for SAS data sets.
- In the second maintenance release for SAS 9.3, a hot fix is available that updates the OpenSSL 0.9.8 version on UNIX and z/OS.

In the second maintenance release for SAS 9.3, security hot fixes are available that introduce two new environment variables: SAS\_SSL\_MIN\_PROTOCOL, supported on UNIX, Windows, and z/OS, and SAS\_SSL\_CIPHER\_LIST, supported on UNIX and z/OS.

---

## What's New in Moving and Accessing SAS 9.3 Files

### Overview

This document has been updated to include information about the CEDA and the CPORT and CIMPORT procedures.

### Documentation Enhancements

The following enhancement relates to the Cross-Environment Data Access (CEDA) functionality:

- UNIX File System libraries on z/OS support all CEDA data representations. However, under z/OS, SAS bound libraries support only SAS data sets that have a CEDA data representation of MVS\_32.

The following enhancements relate to the CPORT and CIMPORT procedures:

- SAS name literals that include embedded blanks can now be used with the CPORT and CIMPORT procedures.
- When VALIDVARNAME=ANY or VALIDMEMNAME=EXTEND are specified, the data set names or member names used in the CIMPORT and CPORT procedures can now be up to 32 bytes in length. Names and member names can also be mixed case.
- The CPORT SELECT and EXCLUDE statements now support case sensitive names from the ACCESS Engine.
- The CIMPORT SELECT and EXCLUDE statements now support case sensitive names from the CPORT file.

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## What's New in the SAS 9.3 Language Interfaces to Metadata

### Overview

Changes and enhancements include the following:

- a new METHOD argument for PROC METADATA



- new options for PROC METAOPERATE ACTION=REFRESH in support of the new metadata server backup facility
- a new option for PROC METAOPERATE PAUSE and RESUME actions in support of the new metadata server backup facility
- a new option for PROC METAOPERATE ACTION=REFRESH to enable metadata server alert e-mail testing
- PROC METAOPERATE no longer requires the <SERVER/> option to be specified with ACTION=REFRESH
- the METAAUTORESOURCES system option now assigns the LIBNAME engine based on a pre-assignment type in the library definition
- a new SPN format for the METASPN system option
- documentation changes

## Procedures

The METADATA procedure is enhanced as follows:

- Depending on the value of a new METHOD= argument, DOREQUEST or STATUS, the METADATA procedure submits either a SAS Open Metadata Interface IOMI DoRequest or IServer Status method call to the SAS Metadata Server. Support for METHOD=STATUS is important because the DoRequest method (the legacy behavior) does not work when the SAS Metadata Server is paused. Using METHOD=STATUS, PROC METADATA can be used to get metadata server configuration, backup information, and various server statistics while the server is paused.

The METAOPERATE procedure is enhanced as follows:

- The REFRESH action has several new options in support of the new metadata server backup facility
  - <BACKUP *attribute(s)*>  
invokes an ad hoc backup of the SAS Metadata Server to the location indicated in the server's backup configuration.
  - <BACKUPCONFIGURATION *attribute(s)*>  
modifies the value of the specified backup configuration attribute. Backup configuration attributes are BackupLocation="*directory*", RunScheduledBackups="Y | N", and DaysToRetainBackups="*number*".
  - <RECOVER *options*>  
recovers the SAS Metadata Server from the specified backup, and can perform roll-forward recovery from the metadata server journal. The roll-forward feature recovers all journal transactions, or transactions up to a specified point in time.
  - <SCHEDULE EVENT="Backup" WEEKDAY $n$ ="*timeR*">  
sets or modifies the server backup schedule. SCHEDULE EVENT="Backup" specifies the event that will be scheduled. WEEKDAY $n$ ="*time*" specifies the backup schedule. The SAS Metadata Server supports daily backups, specified in a weekly schedule where the attribute WeekDay1= is Sunday, the attribute WeekDay7= is Saturday, and appropriately numbered WeekDay $n$ = attributes represent the other days of the week. Backup times are specified in four-digit values based on a 24-hour clock. For example, 0100 is 1 a.m.; 1300 is 1 p.m. To modify the schedule, specify the appropriate WeekDay $n$ =

attribute with the backup time. R can be used to specify that a REORG be performed with a backup.

<SCHEDULER/>

rebuilds or restarts the backup scheduler thread, depending on the XML subelement that is specified.

<OMA ALERTEMAILTEST="text"/>

sends a test alert e-mail message to the address configured in the <OMA ALERTEMAIL="email-address"/> option in the metadata server's omaconfig.xml configuration file. The option is provided for testing the metadata server's alert e-mail notification subsystem. The subsystem sends an alert e-mail message to configured recipients whenever a server backup or recover fails, or when the server itself fails.

- The PAUSE and RESUME actions support a new <FORCE/> option. <FORCE/> regains control of the SAS Metadata Server during the recovery process in the event that the recovery process stops responding. When used with RESUME, <FORCE/> returns the server to an online state. When used with PAUSE, you can include the <SERVER STATE="ADMIN"/> option to enable administrators to examine the recovered system before making the server available to clients.

## System Options

- The METAAUTORESOURCES system option now assigns the LIBNAME engine based on a pre-assignment type setting in the library definition. Libraries that are marked as being assigned by external configuration (AUTOEXEC file) are ignored by METAAUTORESOURCES. Libraries that are marked as being assigned by the native library engine are assigned by the library engine defined for that library in metadata. Libraries that are marked as being assigned by the metadata LIBNAME engine are assigned with the metadata LIBNAME engine (MLE).
- The SPN format for the METASPN system option has changed. The following formats are supported: SAS/machine-name, or SAS/machine-name.company.com.

## Documentation Enhancements

- A new chapter describes how SAS language elements that read and write metadata are affected by the SAS type dictionary.
- Additional examples have been added that show how to use SAS metadata DATA step functions to create reports that track the data libraries, servers, users, user group memberships, and logins defined in metadata.

---

## What's New in the SAS 9.3 Logging Facility

### Overview

The logging facility has the following changes and enhancements:

- support for modifying or replacing the logging configuration file without restarting SAS
- ability to restrict modification of the logging configuration using the SAS language
- new error messages for logging configuration file errors
- new appenders to write log events for third-party DBMS, Java classes, and Java Messaging Service (JMS)
- ability to audit access to SAS libraries
- new conversion patterns and new header and footer conversion patterns that SAS supplies
- filter enhancements

## Support for Modifying and Replacing the Logging Configuration File

You can now modify or replace the logging configuration file without restarting SAS.

## Restrict Modification of the Logging Configuration

The new logger attribute, IMMUTABILITY, can be set to restrict modification of the logging configuration by users who use the logging facility autocall macros, functions, and component objects in SAS programs. If IMMUTABILITY is set to FALSE, the SAS language can be used to modify the logger settings for additivity and level.

## Logging Configuration File Error Messages

When an appender or logger cannot be created or configured, SAS issues more specific messages.

## New Appenders

The following appenders have been added:

- DBAppender writes log events to a SAS table or to a table in a third-party DBMS.
- JavaAppender sends messages to a custom Java class.
- JMSAppender sends messages to a message queue by using the Java Message Service (JMS) interfaces.

## Audit the Access to SAS Libraries

When you use the new logger Audit.Data.Dataset.Open and the %E conversion character, log messages can include SAS library information such as the libref, the engine assigned to the library, the library member and member type, the mode the library was opened for, and the path to the library.

## Conversion Pattern Enhancements

The new uuid conversion character reports the unique identifier for the log event.

The new severity conversion character translates logging facility levels to Common Base Event (CBE) and Web Services Distributed Management Event Format (WEF) severity codes.

The %d conversion character can now be specified in HeaderPattern and FooterPattern layout parameters to capture date information.

The %E conversion character can be used to add audit data to an audit log.

You can now specify a default value for the %S conversion character. The default value is used as the value for %S when a specified key cannot be found.

SAS now provides several conversion patterns that you can specify as values for the HeaderPattern, FooterPattern, and ConversionPattern parameters in appender definitions. You specify the name of a SAS conversion pattern in place of a conversion pattern that you would normally specify.

## Filter Enhancements

The RepeatMatchFilter inhibits logging repeated messages if the immediate prior log message is identical to the current log message for an appender.

---

# What's New in the SAS 9.3 Macro Language Facility

## Overview

The Macro Language Facility has the following enhancements:

- new automatic macro variables that enable you to reduce the amount of text that is needed to perform common tasks
- new macro functions
- new macro statements
- new macro system options that enable you to define and redefine macros and to better control their execution

## Automatic Macro Variables

**SYSADDRBITS**

contains the number of bits of an address.

**SYSENDIAN**

contains an indication of the byte order of the current session. The possible values are LITTLE or BIG.

**SYSNOBS**

contains the number of observations read from the last data set that was closed by the previous procedure or DATA step.

**SYSODSESCAPECHAR**

displays the value of the ODS ESCAPECHAR= from within the program.

- SYSSIZEOFLONG**  
contains the length in bytes of a long integer in the current session.
- SYSSIZEOFPTR**  
contains the size in bytes of a pointer.
- SYSSIZEOFUNICODE**  
contains the length in bytes of a Unicode character in the current session.

## Macro Functions

- %SYSMACEXEC**  
indicates whether a macro is currently executing.
- %SYSMACEXIST**  
indicates whether there is a macro definition in the WORK.SASMACR catalog.
- %SYSMEXECDEPTH**  
returns the depth of nesting from the point of call.
- %SYSMEXECNAME**  
returns the name of the macro executing at a nesting level.

## Macro Statements

- %SYSMSTORECLEAR**  
closes stored compiled macros and clears the SASMSTORE= library.
- %SYSMACDELETE**  
deletes a macro definition from the WORK.SASMACR catalog.

## Macro System Options

- MAUTOCOMPLOC**  
displays in the SAS log the source location of the autocall macros when the autocall macro is compiled.
- MAUTOLOCINDES**  
specifies whether the macro processor prepends the full pathname of the autocall source file to the description field of the catalog entry of compiled autocall macro definition in the WORK.SASMACR catalog.
- MCOVERAGE**  
enables the generation of coverage analysis data.
- MCOVERAGELOC=**  
specifies the location of the coverage analysis data file.

---

## What's New in the SAS 9.3 National Language Support

### Overview

In this release, SAS has expanded the scope and capabilities of National Language Support (NLS). NLS is a set of features that enable a software product to function properly in every global market for which the product is targeted. SAS contains NLS features to ensure that you can write SAS applications that conform to local language conventions. Typically, software that is written in the English language works well for users who use the English language and data that is formatted using the conventions that are observed in the United States. However, without NLS, these products might not work as well for users in other regions of the world. NLS in SAS enables users in regions such as Asia and Europe to process data successfully in their native languages and environments.

### General Enhancements

The following enhancements are implemented for SAS 9.3:

- The aliases were updated in the LOCALE= System Option table.
- The European Currency Conversion section was updated with the new members that use the Euro.

### Additional Encodings

The following encodings are new:

Open Edition Katakana  
specifies the encoding for Open Edition Katakana

Open Edition Korean  
specifies the encoding for Open Edition Korean

Open Edition Simplified Chinese  
specifies the encoding for Open Edition Simplified Chinese

Open Edition Traditional Chinese  
specifies the encoding for Open Edition Traditional Chinese

Open Edition Japanese  
specifies the encoding for Open Edition Japanese

Open Edition Japanese-IBM-939E  
specifies the encoding for Open Edition Japanese-IBM-939E

### Formats

The following formats are new:

**NLDATMTZ**  
converts the time portion of the SAS date time of the locale to the time of day and time zone

**NLDATMWZ**  
converts SAS date values of the specified locale to the day of week, date time, and time zone

**NLDATMZ**  
converts the SAS date time values to the locale sensitive date time string as the time zone and date time

The following format has been updated:

**YEN**  
The default value has changed from 1 to 8.

## Functions

The following functions are new:

**ENCODCOMPAT**  
verifies the transcoding compatibility between two encodings

**ENCODISVALID**  
specifies a valid encoding name

**SASMSG**  
specifies a message from a data set. The returned message is based on the current locale and a specified key.

**SASMSGL**  
specifies a message from a specified data set. The specified message is based on a specified locale value and a specified key value.

**SETLOCALE**  
specifies the locale keys for the current SAS locale

## System Options

The following system options are new:

**URLENCODING**  
controls the percent encoding behavior of the URLENCODING and URLDECODE functions

**VALIDMEMNAME**  
specifies the rules for naming SAS data sets, views, and item stores

**VALIDVARNAME**  
specifies the rules for valid SAS variable names that can be created and processed during a SAS session

The following system option is enhanced:

**DFLANG**  
The DFLANG system option supports the locale option.

---

## What's New in SAS 9.3 Scalable Performance Data Engine

### Overview

The following are new or enhanced for 9.3:

- A new section was added for backing up SPD Engine files.

### SPD Engine System Options

VALIDMEMNAME=EXTEND and VALIDVARNAME= act differently in the SPD Engine than in the Base SAS engine.

---

## What's New in the SAS 9.3 SQL Procedure

### Overview

PROC SQL reference information from the *Base SAS Procedures Guide* and SAS SQL system options from the *SAS Language Reference: Dictionary* have been moved to this book, *SAS SQL Procedure User's Guide*. This enables our customers to access PROC SQL information in one location. The following are new features and enhancements:

- ability to optimize the PUT function
- ability to reuse the LIBNAME statement database connection
- additional PROC SQL statement options
- additional macro variable specifications for the INTO clause
- additional dictionary table
- additional system macro variable
- updated output examples

In the second maintenance release for SAS 9.3, the following enhancements have been made:

- modified the default value for the SQLGENERATION= option
- added security for password-protected SAS views



## Ability to Optimize the PUT Function

The following reduce PUT options and system options have been modified to optimize the PUT function:

- REDUCEPUTOBS=
- REDUCEPUTVALUES=
- SQLREDUCEPUTOBS=
- SQLREDUCEPUTVALUES=

## Ability to Reuse the LIBNAME Statement Database Connection

The database connection that is established with the LIBNAME statement can be reused in the CONNECT statement. The keyword USING has been added to implement this feature.

## Additional PROC SQL Statement Options

The following PROC SQL statement options have been added to help control execution and output of results:

- STOPONTRUNC
- WARNRECURS | NOWARNRECURS

## Additional Macro Variable Specifications for the INTO Clause

The following macro variable specifications have been added to the syntax for the INTO clause of the SELECT statement:

- TRIMMED option
- unbounded *macro-variable* range

## Additional Dictionary Table

The VIEW\_SOURCES dictionary table view has been added.

## Additional System Macro Variable

The SYS\_SQLSETLIMIT macro variable has been added for use with PROC SQL to improve database processing.

## Updated Output Examples

Where applicable, all of the LISTING output examples have been updated to show the new ODS HTML output. The new SAS 9.3 output defaults apply only to the SAS windowing environment under Microsoft Windows and UNIX.

## Modified the Default Value for the SQLGENERATION= Option

The default value for the SQLGENERATION= LIBNAME option and system option was modified to include Aster nCluster and Greenplum.

## Added Security for Password-Protected SAS Views

In the second maintenance release for SAS 9.3, security has been enhanced for password-protected SAS views. Before the second maintenance release for SAS 9.3, Read- or Write-protected SAS views could be defined using the DESCRIBE VIEW statement without having to specify a password. Now, to define any password-protected SAS view, regardless of the level of protection, you must specify a password. If the SAS view was created with more than one password, you must specify its most restrictive password if you want to access a definition of the view.

---

## What's New in the SAS 9.3 XML LIBNAME Engine

### Overview

In SAS 9.3, the engine nickname to access the enhanced XML LIBNAME engine functionality is **XMLV2**. The previous nickname—**XML92**—is supported as an alias.

In SAS 9.3, XMLV2 functionality is production, except in the z/OS environment, where it is preproduction.

In the second maintenance release for SAS 9.3, the LIBNAME statement for XMLV2 supports automatically generating an XMLMap file.

The XMLMap syntax for version 2.1 supports XML namespaces.

### Enhanced LIBNAME Statement

The LIBNAME statement for the **XMLV2** nickname no longer supports the WSDL markup type for the XMLTYPE= option. In the second maintenance release for SAS 9.3, the LIBNAME statement for the **XML** nickname no longer supports the EXPORT markup type for the XMLTYPE= option.

In the second maintenance release for SAS 9.3, the LIBNAME statement for XMLV2 supports the AUTOMAP= option to automatically generate an XMLMap file to import an XML document.

### Updated XMLMap Functionality

XMLMap syntax is updated to version 2.1 with the following enhancements:

- XMLV2 supports XML namespaces in an XMLMap. XML namespaces distinguish element and attribute names by qualifying them with Uniform Resource Identifier (URI) references.
- If an XML namespace is defined in the XMLMap, all elements that specify a location path support the XML namespace definition. Specify the type of syntax as XPathENR, include the identification number for the XML namespace in the location path preceding the appropriate element, and enclose the identification number in braces.
- For the COLUMN element, the ordinal= attribute, which determines whether the variable is a counter variable, is no longer supported. The functionality is provided with the class="ORDINAL" attribute.

---

## What's New in the SAS 9.3 Companion for UNIX Environments

### Overview

The following categories list the areas of change for SAS in UNIX environments:

- [Concatenating Files in autoexec.sas on page 81](#)
- [Deprecated Option on page 81](#)
- [Documentation Enhancements on page 82](#)
- [Encoding for Pathnames on Disk on page 82](#)
- [Identifying Where the Value of a SAS System Option Is Set on page 82](#)
- [SAS Output on page 82](#)
- [Processing Files on Tape on page 82](#)
- [SAS Statement Option on page 82](#)
- [SAS System Options on page 82](#)
- [SAS Window Enhancement on page 83](#)

In the second maintenance release for SAS 9.3, a section was added that shows how to convert a [UNIX datetime value to a SAS datetime value on page 83](#).

### Concatenating Files in autoexec.sas

You can concatenate your files in an autoexec.sas file by using the APPEND and INSERT system options with the AUTOEXEC system option.

### Deprecated Option

The PRODTOC option has been deprecated.

## Documentation Enhancements

- The error message in the SYSTASK statement has been updated to provide more information about the error.
- References to TAPE engines have been removed from the documentation, along with references to the FILECLOSE= data set option, which specifies how a tape is positioned when a SAS data set is closed.

## Encoding for Pathnames on Disk

SAS normally uses the default session encoding when referencing external files and directories. The PATHENCODING environment variable provides an alternative encoding for external file and directory references. PATHENCODING is valid only for files that are located on disk. When the PATHENCODING environment variable has a valid encoding value, SAS transcodes the pathname in the specified encoding.

## Identifying Where the Value of a SAS System Option Is Set

The VALUE option in the PROC OPTIONS statement enables you to identify how the option was set (for example, in a configuration file, on a command line, and so on).

## SAS Output

The following changes were made to SAS output:

- When you run SAS interactively, the LISTING destination is closed by default. The HTML destination is open by default, and HTMLBlue is the default style. Also, ODS Graphics is enabled by default.
- When you run SAS in batch mode, the LISTING destination is open and is the default. ODS Graphics is not enabled by default.

## Processing Files on Tape

If you have files on tape, use a staging directory so that files can be processed directly from disk. The use of tape drives on UNIX is no longer supported.

## SAS Statement Option

The following statement option has been enhanced:

### NOSETPERM

The NOSETPERM LIBNAME option affects assignments to a path. The option specifies that permission settings are not inherited from one library member to another library member when members are open with the same libref.

## SAS System Options

The following system options have been enhanced:

**ALTLOG**

The ALTLOG system option can use directives to enable you to control when log copies are open and closed, and how they are named, based on real-time events such as time, month, and day of week.

**AUTOEXEC**

The AUTOEXEC system option supports the use of multiple files. You can use the APPEND and INSERT options to concatenate multiple files in your autoexec.sas file.

**STIMEFMT**

The STIMEFMT system option enables you to customize the format of the output from the STIMER and FULLSTIMER system options.

**VERBOSE**

As in SAS 9.2, the output from the VERBOSE system option lists the options and their values. In 9.3, an additional list is created that identifies where the options were set. This list is first written to a journal file, and then it is written to the SAS log. If SAS fails to initialize, output is still available even though a SAS log was not created.

## SAS Window Enhancement

The **Results** tab in Preferences dialog box has a new check box, **Use ODS Graphics**. Checking this box enables you to automatically generate graphs when running procedures that support ODS graphics. **Use ODS Graphics** is turned on by default.

## Converting a UNIX Datetime Value to a SAS Datetime Value

A UNIX datetime value is stored as the number of seconds since January 1, 1970. A SAS datetime value is stored as the number of seconds since January 1, 1960. To convert a UNIX datetime value to a SAS datetime value, you must add 10 years in seconds to the UNIX datetime value.

---

## What's New in the SAS 9.3 Windows Companion

### Overview

SAS under Windows enables you to complete your data and computation tasks in SAS while integrating with the Windows applications that are already in place on your desktop and within your desktop and within your enterprise. SAS supports information sharing through Windows tools and techniques.

### General Enhancements

The following enhancements are implemented for 9.3:

- HTML is now the default for program output results. To view the output in a listing format, you select **Listing** on the **Results** tab of the Preferences dialog box.
- User profile paths now include Server 2008 R2.
- The INT64 return value type is now included in the RETURNS= attribute for the ROUTINE statement.
- Hard drive recommendations now include specific performance information.
- Information about running SAS in batch mode has been added.
- You can now choose a SASHOME directory in which to install SAS.
- Instructions to start the SAS Service Configuration Utility have changed.
- An appendix, Troubleshooting Java Runtime Environment has been added.
- In the second maintenance release for SAS 9.3, the appendix, Troubleshooting Java Runtime Environment Errors, was modified. The JRE 1.6.0\_23 was replaced with JRE 1.6.0\_24. A new note specifies that 32-bit JRE installs are required even when the operating system is 64-bit.
- Windows Server 2008 and Server 2008 R2 are now supported.
- Windows 2008 EPIC (Itanium) is no longer supported.

## System Options

The following system option is new:

### UNIVERSALPRINT

specifies whether to enable menus for Universal Printing and to set up printing defaults.

The following system options are enhanced:

### MEMSIZE

the new default value is 2G.

### SORTSIZE

the new default value is 256M.

### STIMEFMT

specifies the format that is used to display the time on FULLSTIMER and STIMER output.

### APPEND

APPEND now supports CMPLIB and AUTOEXEC.

### INSERT

INSERT now supports CMPLIB and AUTOEXEC.

---

## What's New in SAS 9.3 Companion for z/OS

### Overview

SAS for z/OS has added the following new and enhanced features:

- new support for symbolic references in SAS configuration files and SASRX configuration files
- new tree nodes and commands for the Explorer window
- new support for SAS Data Location Assist for z/OS
- new LOGGER switch option for SASRX
- new 64-Bit SAS Metadata Server
- enhanced support for z/OS Extended Addressability Volumes
- encoding for z/OS resource names

SAS for z/OS has enhanced the following language elements:

- FILECLOSE data set option
- Procedures
  - PRINT      LEAVE
  - RELEASE    SOURCE
- Statements
  - FILE        LIBNAME
  - FILENAME
- System Options
  - ALTLOG=     FONTRENDERING=
  - APPEND=     INSERT=
  - APPLETLOC=  MSGCASE
  - EMAILSYS=   UTILLOC=
  - FILESYNC=

SAS for z/OS has added the following new system options:

CLENTWORK    FILETEMPDIR  
 DLCREATEDIR  VALIDMEMNAME

## SAS Software Enhancements

The following software enhancements have been made to SAS for z/OS:

### Format of a Configuration File's Contents

has added information that option values in SAS configuration files can contain symbolic references.

### Explorer Window

has added the following features:

- USS Home Directory and z/OS Data Sets nodes on the tree view
- DSLIST and UDLIST commands to open windows that display lists of native z/OS data sets and UFS files.

### SAS Data Location Assist for z/OS

enables you to use the flexibility of the SAS DATA step to gather information about attributes for data sets that reside throughout your operating system.

**SASRX Switch Options**

has added the `LOGGER` option, which enables you to use the `UNIX logger` command to write error messages and output of the `TRACE` option to the system console.

**64-Bit SAS Metadata Server**

enables support for much larger amounts of metadata because of exploitation of the hardware's 64-bit memory addressing capability.

**Extended Addressability Volumes**

SAS support for z/OS Extended Addressability Volumes (EAV) enables the following functionality:

- Under z/OS V1R2, SAS can process direct access bound libraries that reside in the extended address space of an EAV.
- Under z/OS V1R11 and subsequent releases, SAS supports the `EATTR` option on the `FILENAME` and `LIBNAME` statements. This option enables SAS to create new files and library data sets with extended attributes so that they can reside in the extended address space of an EAV.

**SASRX Configuration File Options**

can contain symbolic references that can be resolved from values that are specified with the `SASRXSYSCFGPARMS` or `SASRXCFGPARMS` options.

**Encoding for z/OS Resource Names**

z/OS resource names such as z/OS data set names, UNIX file system paths, and so on, are processed without being converted to a different encoding.

## Enhanced SAS Data Set Options

The `FILECLOSE=` data set option is now supported on z/OS. `FILECLOSE=` supports the `V5TAPE`, `V6TAPE`, and `V9TAPE` engines. The default value for `FILECLOSE=` is the current setting of the `TAPECLOSE` system option, and you can specify the `FREE` value for `FILECLOSE=`.

## Enhanced SAS Procedures

The following SAS procedures have been enhanced:

**PROC PRINT**

has methods specific to z/OS for controlling the amount of memory that it uses.

**PROC RELEASE**

can be used only to release all unused space for extended format sequential data sets and data sets residing in Extended Addressing Space on Extended Address Volumes. No options can be specified on the `PROC RELEASE` invocation for these data set types.

**PROC SORT**

The `LEAVE` option of `PROC SORT` applies only if `SORTSIZE=SIZE` is specified.

**PROC SOURCE**

truncates records from an `INDD` if they are larger than the `OUTDD LRECL`. To avoid truncation, specify an `OUTDD LRECL` that is equal to or greater than the `INDD LRECL` value.



## Enhanced SAS Statements

The following SAS statements have been enhanced:

### FILE statement

has added the following standard host options:

- |          |  |
|----------|--|
| RLS      | specifies that a data set should be opened in RLS mode.  |
| RLSREAD  | specifies the Read integrity level to be applied to an RLS data set.   |
| VSMDEBUG | indicates that a message should be written to the SAS log that indicates the filename, function requested, return code, and reason code after each VSAM system request (for example, GET, POINT, PUT) until the number specified by <i>nnnn</i> is exceeded. |

### FILENAME statement

has the following enhancements:

- enables the specification of DATACLAS values that begin with national characters such as @, #, and \$.
- supports the AVGREC option, which can be used only when the unit of space subparameter of the SPACE option is a number, which indicates an average record length.
- supports the EATTR option, which specifies whether a sequential data set can have extended attribute DSCBs. The EATTR option can also specify whether a sequential data set can reside in extended addressing space (EAS).

### LIBNAME statement

has the following enhancements:

- enables the specification of DATACLAS values that begin with national characters such as @, #, and \$.
- supports the AVGREC option, which can be used only when the unit of space subparameter of the SPACE option is a number, which indicates an average record length.
- supports the EATTR option, which specifies whether a sequential data set can have extended attribute DSCBs. The EATTR option can also specify whether a sequential data set can reside in extended addressing space (EAS).

## Enhanced SAS System Options

The following SAS system options have been enhanced or changed:

### ALTLOG system option

enables you to control when log copies are opened and closed, and how they are named based on real-time events such as time, month, and day of the week.

### APPEND system option

has the following enhancements:

- valid in the OPTIONS statement and the OPTIONS window.

- supports inserting the AUTOEXEC and SET system options.

APPLETLOC system option

specifies the location of Java applets.

EMAILSYS system option

is valid in the OPTIONS statement and the OPTIONS window.

FILESYNC system option

has a new SAVE value, which specifies that the buffers are written to disk when the SAS file is saved.

FONTRENDERING system option

The HOST\_PIXEL argument of the FONTRENDERING option is not supported on z/OS. If HOST\_PIXELS is specified, SAS uses FREETYPE\_POINTS as the value for this option.

INSERT system option

has the following enhancements:

- valid in the OPTIONS statement and the OPTIONS window.
- supports inserting the AUTOEXEC system option.

MSGCASE system option

is supported in the national language support (NLS) formats.

UTILLOC system option

The `debug_utilloc` command can determine whether the syntax of the UTILLOC system option is valid.

## New SAS System Options

The following SAS system options are new:

CLIENTWORK system option

specifies dynamic allocation options for creating client work libraries in a SAS server environment.

DLCREATEDIR system option

creates a directory for a SAS library that is specified on a LIBNAME statement if the directory does not exist.

FILETEMPDIR system option

specifies the parent directory for FILENAME TEMPFILE.

VALIDMEMNAME system option

specifies the rules for naming SAS data sets, data views, and item stores.

## Deprecated SAS System Options

The following SAS system options have been deprecated:

- PRODTOC
- DB2PKCHK
- DLHFSCREATEDIR

## Documentation Enhancements

SAS Windows and Commands are now documented in the following three sections:

- Windows in z/OS Environments
- Host-Specific Windows of the FORM Subsystem
- Host-Specific Window Commands

---

## What's New in SAS 9.3 VSAM Processing for z/OS

### Overview

SAS 9.3 VSAM Processing for z/OS has enhancements for using record-level sharing (RLS).

### New VSAM Options for the FILE and INFILE Statements

- RLS | NORLS option specifies record-level sharing (RLS) to open an RLS-eligible data set.
- RLSREAD option enables you to specify the level of read integrity required for an RLS-eligible data set (INFILE only).



## 4

## SAS/ACCESS

<b><i>What's New in SAS/ACCESS 9.3 for Relational Databases</i></b> .....	<b>91</b>
Overview .....	91
Operating Environments Updates .....	92
New Nicknames .....	92
Second Maintenance Release for SAS 9.3: General Changes .....	92
SAS/ACCESS Interface to Aster nCluster .....	92
SAS/ACCESS Interface to Hadoop .....	92
SAS/ACCESS Interface to Oracle .....	93
SAS/ACCESS Interface to Teradata .....	93
Documentation Enhancements .....	93
<b><i>What's New in SAS/ACCESS 9.3 Interface to PC Files</i></b> .....	<b>93</b>
Overview .....	93
General Enhancements .....	94
LIBNAME Engines .....	94
Import and Export Procedures and Wizards .....	94
PC Files Server .....	94

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## What's New in SAS/ACCESS 9.3 for Relational Databases

### Overview

SAS/ACCESS 9.3 for Relational Databases has these new features and enhancements.

- new SAS/ACCESS Interface to Hadoop in March 2012
- updated operating environments for various SAS/ACCESS interfaces
- new nicknames
- new function and options for the Teradata interface
- documentation enhancements

## Operating Environments Updates

Operating environments for specific SAS/ACCESS interfaces have changed. See SAS/ACCESS Features by Host for the operating environments that your interface supports.

## New Nicknames

These interfaces have new nicknames.

- SAS/ACCESS Interface to Aster *n*Cluster: **aster**
- SAS/ACCESS Interface to Greenplum: **greenplm**
- SAS/ACCESS Interface to Sybase IQ: **sybaseiq**

## Second Maintenance Release for SAS 9.3: General Changes

In the second maintenance release for SAS 9.3, the default value for the SQLGENERATION= LIBNAME and system options includes Aster *n*Cluster and Greenplum.

## SAS/ACCESS Interface to Aster *n*Cluster

In the second maintenance release for SAS 9.3, the default PORT= number for the LIBNAME statement has changed.

## SAS/ACCESS Interface to Hadoop

In the March 2012 release for SAS 9.3, SAS/ACCESS Interface to Hadoop is a new database engine. It provides direct, transparent access to Apache Hadoop through LIBNAME statements and the SQL pass-through facility. You can use various LIBNAME statement options and data set options that the LIBNAME engine supports to control the data that is returned to SAS.

For details about SAS interfaces to Hadoop, see these topics or documents.

- SAS/ACCESS Interface to Hadoop
- SAS/ACCESS Interface to Hadoop: Supported Features
- PROC HADOOP in *Base SAS Procedures Guide*
- FILENAME statement (file access method) in *SAS Statements: Reference*

In the second maintenance release for SAS 9.3, these items are new or enhanced.

- You can specify a Hadoop configuration file in a CONNECTION statement or as a connection option in the LIBNAME statement.
- DBCREATE\_TABLE\_EXTERNAL= LIBNAME and data set options are new.
- The DBCREATE\_TABLE\_LOCATION= data set option is new.
- DBCREATE\_TABLE\_OPTS= LIBNAME and data set options are new.
- The LENGTH and TRIMN functions are now automatically passed down by default.

## SAS/ACCESS Interface to Oracle

In the second maintenance release for SAS 9.3, these items are new.

- DB\_OBJECTS= LIBNAME option
- OR\_BINARY\_DOUBLE= LIBNAME option

## SAS/ACCESS Interface to Teradata

These items are new.

- Temporal qualifiers let you specify time-dimension criteria for retrieving data from Teradata. For details, see the section about temporal data types, including how to use them in a LIBNAME statement or a DATA step.
- Using the DBCONSTRAINT= data set option, you can specify with table-level definitions where to create a table.

In the second maintenance release for SAS 9.3, these items are new or enhanced.

- The enhanced LOGDB= LIBNAME option now also works with the TPT API.
- The SLEEP= and TENACITY= data set options are enhanced, and corresponding SLEEP= and TENACITY= LIBNAME options are new.
- The new TR\_ENABLE\_INTERRUPT= LIBNAME option lets you cancel an executing Teradata query.

## Documentation Enhancements

This document includes these changes.

- SAS In-Database information is now in the *SAS In-Database Products: Administrator's Guide* and the *SAS In-Database Products: User's Guide*. See also the In-Database Processing with SAS/ACCESS topic.
- For the MySQL interface, you can use the RESULTS= LIBNAME option to specify where you want to store query results.

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## What's New in SAS/ACCESS 9.3 Interface to PC Files

### Overview

SAS/ACCESS 9.3 Interface to PC Files enables you to exchange (import and export) PC files between the original source format and SAS data sets. Files are moved between the native PC format and SAS data sets via Import and Export procedures and wizards or through the use of LIBNAME statements.

## General Enhancements

General enhancements found in this release include the following.

- In SAS/ACCESS 9.2 Interface to PC Files, the Import and Export procedures and wizards were updated to include support for JMP files. This support is now included, by default, in Base SAS. This means that you no longer need a SAS/ACCESS Interface to PC Files license to access JMP files through the use of Import and Export procedures and wizards.
- Support for the FMTLIB= option is available for JMP, SPSS, and Stata files.
- The default port number used for TCP/IP server connections has changed from 8621 to 9621. LIBNAME and the Import and Export procedure commands default to PORT=9621 if the PORT option is omitted.

## LIBNAME Engines

Starting in SAS 9.3, SAS/ACCESS 9.3 Interface to PC Files supports these LIBNAME engines:

- LIBNAME ACCESS engine for 32- and 64-bit Microsoft Windows operating systems
- LIBNAME EXCEL engine for 32- and 64-bit Microsoft Windows operating systems
- LIBNAME PCFILES engine for 32- and 64-bit Microsoft Windows operating system and for Linux and UNIX operating systems
- LIBNAME JMP engine for Linux, UNIX, and Microsoft Windows operating systems

## Import and Export Procedures and Wizards

- In this release, the Import procedure supports source type XLSX to read the Microsoft Excel 2007 and 2010 default file format (.xlsx) on Linux, UNIX, and Microsoft Windows operating systems.
- Import and Export procedures and wizards support the following source types in both 32- and 64-bit Microsoft Windows operating system.
  - Microsoft Access database files (\*.accdb, \*.mdb)
  - Microsoft Excel files (workbook: \*.xlsx, \*.xlsm, \*.xlsb; spreadsheet: \*.xls)
  - Microsoft Access database on PC Files Server
  - Microsoft Excel workbook on PC Files Server

## PC Files Server

Beginning with SAS/ACCESS 9.3 Interface to PC Files, the PC Files Server can be operated as a Windows service or as a Windows application on the 64-bit Windows operating system. This allows the server to take advantage of the associated 64-bit features and to operate more efficiently. The PC Files Server continues to operate on and support the Windows 32-bit operating system.



## 5

## SAS Add-In for Microsoft Office

<b><i>What's New in the SAS Add-In 4.3 for Microsoft Office</i></b> .....	<b>95</b>
Overview .....	95
Integration with Microsoft Outlook .....	96
Improvements to the User Interface .....	96
Enhancements to the Automation Interface .....	96
Enhancements to Editing and Viewing Data Sources .....	96
Longer Names and Custom Filters for SAS Information Maps .....	97
New OLAP Viewer for Working with OLAP Cubes .....	97
Sending and Replicating Results .....	97
Specifying Input Streams and Output Parameters for a SAS Stored Process ..	97
New and Enhanced SAS Tasks .....	98
<b><i>What's New in the SAS Add-In 5.1 for Microsoft Office</i></b> .....	<b>99</b>
Overview .....	99
New 64-bit Application .....	99
Enhancements in Microsoft Outlook .....	99
New Quick Start Tools .....	100
Enhancements to the Automation Interface .....	100
Working with OLAP Cubes .....	100
Enhancements to SAS Tasks .....	100
General Enhancements .....	101
Specifying Input Streams and Output Parameters for a SAS Stored Process ..	101
New and Enhanced SAS Tasks .....	101

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### What's New in the SAS Add-In 4.3 for Microsoft Office

#### Overview

The SAS Add-In 4.3 for Microsoft Office is available in Microsoft Excel, Microsoft Word, Microsoft PowerPoint, and Microsoft Outlook. Although some functionality is unique to a specific Microsoft Office application, most functionality is similar in each Microsoft application.

The SAS Add-In 4.3 for Microsoft Office has the following changes and enhancements:

- integration with Microsoft Outlook

- an improved user interface
- a more robust automation interface
- the ability to edit a data source and new options for viewing data sources
- longer names and custom filters for SAS Information Maps
- a new OLAP Viewer for working with OLAP cubes
- the ability to send and replicate results
- the ability to specify input streams and output parameters for a SAS Stored Process
- new and enhanced SAS tasks

**Note:** The SAS Add-In 4.3 for Microsoft Office runs on SAS 9.2 and SAS 9.3. For the latest information about the SAS Add-In for Microsoft Office, see <http://support.sas.com/software/products/addin>.

## Integration with Microsoft Outlook

The SAS Add-In for Microsoft Office is now available in Microsoft Outlook 2010 and Microsoft Outlook 2007. Here are some key features of using the SAS add-in in Microsoft Outlook:

- view SAS reports, SAS dashboards, and SAS dashboard indicators
- share a SAS report, SAS dashboard, or SAS dashboard indicator with others at your site by sending the results in an e-mail, scheduling a meeting, or assigning a task

## Improvements to the User Interface

In Microsoft Excel, Microsoft Word, and Microsoft PowerPoint 2007, the **SAS** tab in the Ribbon has been simplified. Additional groups become available depending on the type of SAS content that you select.

When you want to run a task, you are always prompted to select the data source. You are not required to use the selected data source as the input for the task.

## Enhancements to the Automation Interface

You can write Visual Basic scripts to automate the functionality in the SAS Add-In for Microsoft Office. Using the automation interface, you can perform the following tasks:

- insert a stored process, report, data view, or PivotTable into your Microsoft Office document.
- refresh SAS content that is generated by a stored process, report, information map, or task. You can also refresh data views and PivotTables.

## Enhancements to Editing and Viewing Data Sources

- In Microsoft Excel, you can now edit any data source that is accessible from a SAS server.

- By default, in Microsoft Excel, SAS data is opened into an Excel Table that uses Microsoft Excel formats. You can change the default by using the **Open data into an Excel Table** option on the Data tab in the SAS Options dialog box.
- You can specify how many data sources to keep in recent history. You can specify this value by using the Number of items to display in recent data list option on the **Data** tab in the SAS Options dialog box.

## Longer Names and Custom Filters for SAS Information Maps

- The SAS add-in can open information maps with names longer than 32 bytes in length. (This functionality is available if you are running SAS 9.3 or you have applied the third maintenance release for SAS 9.2 at your site.)
- You can create a custom filter for an information map. This custom filter is available only during your current session and is not saved to the information map.

## New OLAP Viewer for Working with OLAP Cubes

The new OLAP Viewer enables you to view data that is stored in an OLAP (online analytical processing) cube. Using the OLAP Viewer, you can create table and graph views of your data. You can also drill down through the data, create bookmarks, add calculated measures and calculated members, filter the OLAP data, and view ESRI maps.

## Sending and Replicating Results

- You can now send results from Microsoft PowerPoint or Word to a workbook in Microsoft Excel.
- After you run a report in Microsoft Outlook, you can send the results to Microsoft Excel, Word, or PowerPoint.
- You can replicate SAS content. Replicated content and the original content are treated as different SAS jobs.

## Specifying Input Streams and Output Parameters for a SAS Stored Process

SAS stored processes are created in SAS applications such as SAS Enterprise Guide or SAS Management Console. If a stored process allows input streams, then you are prompted to select a range of Excel data that will be used as the input data for a stored process. If a stored process contains output parameters, then you are prompted to select which output parameters to include in the results.

## New and Enhanced SAS Tasks

### New Tasks

- Map Chart creates a two-dimensional (choropleth) or three-dimensional (block and prism) color map that shows the variation in the value of a response variable for different geographical areas, such as counties, states, and countries.
- Scatter Plot Matrix creates a paneled graph of scatter plots for multiple combinations of variables. You can use options to overlay fit plots and ellipses on your scatter plots.
- Tile Chart enables you to create a tile chart. A tile chart is a rectangular tree map that enables you to view a large quantity of hierarchical data in a limited space. Each unique category combination is represented by a rectangular tile whose size and color are determined by response variables. These tiles are placed in a hierarchical arrangement.

### Task Enhancements

- If the input data source for a SAS task is from a DBMS engine, then SAS uses the sort functionality on the database to sort the data before running the task. Using the database functionality rather than the SORT procedure, which is used for files that are not saved to a database, optimizes the performance of the SAS task.
- To enable the SAS add-in to run tasks in a SAS grid computing environment, select the new **Generate ODS macros** option instead of the **ODS statement** option on the **Results** tab in the SAS Options dialog box. By generating ODS macro variables, the SAS add-in can set the value of these macro variables each time a SAS job is submitted. No ODS statements are generated because the ODS results are generated on the grid node and do not need to be generated again when the SAS add-in returns the results to the Microsoft application.
- The following tasks now support the DTQTR, DTMONTH, and DTDAY datetime intervals:
  - ARIMA Modeling and Forecasting
  - Basic Forecasting
  - Prepare Time Series Data
  - Regression Analysis with Autoregressive Errors
- In the Principal Component task, you can create these new plots:
  - a pattern profile plot. The value on the Y-axis is the correlation between the variable and the principal component.
  - pattern component plots. Each observation on the plot is the correlation between the variable and the two corresponding components on the plot. You can choose whether to plot the patterns in a vector.
- The interface for the Random Sample task has been redesigned.

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## What's New in the SAS Add-In 5.1 for Microsoft Office

### Overview

The SAS Add-In 5.1 for Microsoft Office is available in Microsoft Excel, Microsoft Word, Microsoft PowerPoint, and Microsoft Outlook. Although some functionality is unique to a specific Microsoft Office application, most functionality is similar in each Microsoft application.

The SAS Add-In 5.1 for Microsoft Office has the following changes and enhancements:

- a new 64-bit application
- enhancements in Microsoft Outlook, which includes integration with Microsoft Office Communicator and the ability to add comments to reports
- new Quick Start tools that you can use to automatically analyze your data
- a more robust automation interface
- changes when working with OLAP cubes
- enhanced SAS tasks, which includes the ability to create Microsoft Excel charts
- general enhancements, which includes a new default output format for graphs

You can run the SAS Add-In 5.1 for Microsoft Office on either a SAS 9.2 or SAS 9.3 server.

### New 64-bit Application

The SAS Add-In 5.1 for Microsoft Office is now available as either a 32-bit or a 64-bit application. If you are using a 32-bit Microsoft Windows operating system, then you must use the 32-bit version of the SAS Add-In for Microsoft Office. If you are using a 64-bit Windows operating system, then you can run either the 32-bit or the 64-bit version of the SAS Add-In for Microsoft Office.

### Enhancements in Microsoft Outlook

These new features and enhancements are available when you use the SAS Add-In for Microsoft Office in Microsoft Outlook.

- role-based settings. An administrator for the SAS Add-In for Microsoft Office can use SAS Management Console to manage the availability of features in Microsoft Outlook.
- integration with instant messaging tools, so you can use the functionality of Microsoft Office Communicator or Microsoft Lync while viewing the results from a report. For example, you can now check the status of the report author, add the report author to your list of contacts in Office Communicator or Microsoft Outlook, send a link to a report in an instant message, schedule a meeting, and initiate a phone call.

- the ability to add and view comments for a specific report. These comments are saved with the report, so they are visible to anyone who can review report comments. These comments are also visible when you open the report in SAS Web Report Studio 4.31 M1.

## New Quick Start Tools

The new Quick Start interface has these tools:

- The Task Gallery shows a sample of the results that are generated by each SAS task.
- In the Automatic Chart panel, the SAS Add-In for Microsoft Office creates bar charts, bubble plots, line plots, pie charts, or scatter plots based on your role assignments.
- In the Quick Stats panel, the SAS Add-In for Microsoft Office can quickly calculate the basic statistics and create basic graphs based on your input data source.

## Enhancements to the Automation Interface

- The SASDataView object now includes the DisplayAllRecords property, so you can view all of the records in a data view. You specify this parameter by using the InsertDataFromLibrary, InsertDataFromSasFolder, and InsertDataFromLocalMachine methods.
- The new CreateSASPrompts method enables you to create a new SASPrompts object. This method is available for the SASExcelAddIn, SASPowerPointAddIn, and SASWordAddIn objects.
- The new CreateSASRanges method enables you to create a new SASRanges object. This method is available for the SASExcelAddIn object.
- The new GetParameter method returns the value for the specified prompt. This method is available for the SASStoredProcess Object.

## Working with OLAP Cubes

- The OLAP Viewer is now called the OLAP Analyzer.
- When you open an OLAP cube in a PivotTable, the layout of the PivotTable is not specified by default. Instead, an empty PivotTable is created. For the SAS Add-In for Microsoft Office to automatically select the fields for the PivotTable, you must select the **Automatically select fields for OLAP PivotTables** check box on the **Data** tab in the SAS Options dialog box.

## Enhancements to SAS Tasks

- In Microsoft Excel, you can specify whether to display the results from the Bar Chart, Bubble Plot, Line Plot, or Pie Chart task as a Microsoft Excel chart. To use Microsoft Excel charts, select the **Create Microsoft Excel chart when possible** option on the **Graph** tab in the SAS Options dialog box.
- The new Show an ODS Statistical Graph task is available in both SAS Enterprise Guide and the SAS Add-In for Microsoft Office. In this task, you select the graph

definition (SGD file) to use for a selected data source. The graph definition can be created in SAS Enterprise Guide.

- In the Tile Chart task, you can now create a separate chart for each unique value of the specified BY variable.

## General Enhancements

- The SAS Add-In 5.1 for Microsoft Office runs on Microsoft Office 2010 and 2007. The 5.1 release is not supported on Microsoft Office 2003.
- You can specify the maximum number of rows to process when determining the number of distinct values in the data source.
- You can reset the SAS add-in to display all warning messages, including those that you have selected not to be shown.
- You can use values from Excel cells as the input for stored processes.
- In the SAS Options dialog box, the new **Use grid when available** option on the **Tasks** tab replaces the **Generate ODS macros instead of ODS statement** option that used to be on the **Results** tab.

## Specifying Input Streams and Output Parameters for a SAS Stored Process

SAS stored processes are created in SAS applications such as SAS Enterprise Guide or SAS Management Console. If a stored process allows input streams, then you are prompted to select a range of Excel data that will be used as the input data for a stored process. If a stored process contains output parameters, then you are prompted to select which output parameters to include in the results.

## New and Enhanced SAS Tasks

### New Tasks

- Map Chart creates a two-dimensional (choropleth) or three-dimensional (block and prism) color map that shows the variation in the value of a response variable for different geographical areas, such as counties, states, and countries.
- Scatter Plot Matrix creates a paneled graph of scatter plots for multiple combinations of variables. You can use options to overlay fit plots and ellipses on your scatter plots.
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### Task Enhancements

- If the input data source for a SAS task is from a DBMS engine, then SAS uses the sort functionality on the database to sort the data before running the task. Using the database functionality rather than the SORT procedure, which is used

for files that are not saved to a database, optimizes the performance of the SAS task.

- To enable the SAS add-in to run tasks in a SAS grid computing environment, select the new **Generate ODS macros** option instead of the **ODS statement** option on the **Results** tab in the SAS Options dialog box. By generating ODS macro variables, the SAS add-in can set the value of these macro variables each time a SAS job is submitted. No ODS statements are generated because the ODS results are generated on the grid node and do not need to be generated again when the SAS add-in returns the results to the Microsoft application.
- The following tasks now support the DTQTR, DTMONTH, and DTDAY datetime intervals:
  - ARIMA Modeling and Forecasting
  - Basic Forecasting
  - Prepare Time Series Data
  - Regression Analysis with Autoregressive Errors
- In the Principal Component task, you can create these new plots:
  - a pattern profile plot. The value on the Y-axis is the correlation between the variable and the principal component.
  - pattern component plots. Each observation on the plot is the correlation between the variable and the two corresponding components on the plot. You can choose whether to plot the patterns in a vector.
- The interface for the Random Sample task has been redesigned.



## 6

## SAS BI Dashboard

<b><i>What's New in SAS BI Dashboard 4.31</i></b> .....	<b>103</b>
Overview .....	103
Features for Dashboard Designers .....	103
Features for Business Users .....	105

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### What's New in SAS BI Dashboard 4.31

#### Overview

SAS BI Dashboard 4.31 has the following enhancements and new features:

- features for dashboard designers
- features for business users

#### Features for Dashboard Designers

In the second maintenance release of SAS BI Dashboard 4.31, the following enhancements and features have been added:

- The software offers a new indicator type called multi-line chart.
- The software offers a new feature called Bring to Front and Send to Back.
- The dynamic prompt indicator offers the following features:
  - You can specify an optional label.
  - You no longer must specify a range. The default prompt setting is now Combo box.
  - You can specify an All Values selection for filtering data on a local system or a remote server. This selection requires that the indicator data source be either a SAS Information Map or a SAS Stored Process.
- The dynamic text indicator offers a larger text box.
- When using static labels, you can specify to remove the drop shadow effect.
- The following KPI indicator gauge types support custom range color settings:
  - Arrow
  - Arrow (small)

- Button
- Cylinder
- Fancy arrow
- Pointer
- Simple arrow
- Slider
- Solid tachometer
- Traffic light (small)
- When you specify a link from an indicator or dashboard, the Set Up Link window automatically fills in the parameters in the Optional Parameter table.
- The spark table indicator offers the **Hide gauge label** setting.
- The following indicators support the selection of multiple rows or items by the business user. The multiple selection affects how an interaction displays information in a related indicator:
  - Bar chart with bullet
  - Bar chart with reference lines
  - Bubble plot
  - Clustered bar chart
  - Dual line chart
  - Forecast chart
  - Multi-line chart
  - Line chart with reference lines
  - Needle plot
  - Pie chart
  - Range map
  - Scatter histogram
  - Scatter plot
  - Schedule chart
  - Simple bar chart
  - Spark table
  - Stacked bar chart
  - Targeted bar chart
  - Tile chart
  - Vector plot
  - Waterfall chart
- You can specify parameters that can be passed to a dashboard when it is opened. These parameters are used to set the initial value of the prompts in the dashboard.
- You can specify default parameter values for any indicator that uses parameters.

- You can add extra information to data tooltips. All data items appear in the data tooltips.
- Supported formats from the SAS Stored Process data source are passed through to the indicator.

In SAS BI Dashboard 4.31, the following enhancements and features have been added:

- You create a dashboard interactively using drag-and-drop to add indicators to a dashboard.
- The software saves files in a tree folder structure.
- You can search for existing dashboards and objects and filter a search by a specific type of object.
- You can more easily customize and size each indicator in a dashboard, as well as the dashboard itself.
- You can set up indicators so that they interact with each other via events.
- You can open and view multiple dashboards on different tabs in the dashboard designer workspace.
- You can optimize screen space when building indicators and dashboards.
- As you design a dashboard, you can preview different types of indicators to easily decide which indicator is most appropriate for the data that you are using.
- You can customize fonts, font colors, and font sizes in a dashboard.

## Features for Business Users

In the second maintenance release of SAS BI Dashboard 4.31, the following enhancements and features have been added:

- You can set a Favorite for a dashboard with prompts that saves the current prompt values that you are using to view the dashboard.
- Depending on how an interaction is customized, you can select multiple rows or items at once to affect how information is displayed in a related indicator.

In SAS BI Dashboard 4.31, the following enhancements and features have been added:

- You can run SAS BI Dashboard in a separate window (the dashboard viewer) rather than in the SAS Information Delivery Portal. When run in the dashboard viewer, the software offers more functionality than when displayed in the SAS Information Delivery Portal.
- You can zoom in and view details in a dashboard.
- You can create comments for indicators in a dashboard.
- You can create and manage personal favorites.
- The software offers new indicator types, such as waterfall chart, vector plot, and spark table, which can display a table with spark lines.
- The software can brush (interactively highlight) data within an indicator. Also, indicators can interact with each other.





# SAS Concept Creation for SAS Text Miner

<i>New Products: SAS Concept Creation for SAS Text Miner</i> .....	107
About SAS Concept Creation for SAS Text Miner .....	107

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## **New Products: SAS Concept Creation for SAS Text Miner**

### **About SAS Concept Creation for SAS Text Miner**

SAS Concept Creation for SAS Text Miner (SAS Concept Creation) is an add-on product that works with SAS Text Miner. SAS Text Miner uses the binary (.li) files created in SAS Concept Creation to locate custom entities in documents that are input to SAS Text Miner.

Using the intuitive, Windows interface in the SAS Concept Creation application, subject matter experts write complex rules to define each concept in the taxonomy. This taxonomy is output as a .li file. To use the .li file that SAS Concept Creation generates, you set properties in the Text Parsing node of SAS Text Miner.



## 8

## SAS/CONNECT

<b><i>What's New in SAS/CONNECT 9.3</i></b> .....	<b>109</b>
Overview .....	109
SAS/CONNECT System Options .....	109
Support for Extended SAS Names In the UPLOAD and DOWNLOAD Procedures .....	110
Enhancements to the %SYSLPUT Statement .....	110
<b><i>What's New in Communications Access Methods for SAS/ CONNECT 9.3 and SAS/SHARE 9.3</i></b> .....	<b>111</b>
Overview .....	111
Changes to the Spawners .....	111

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### What's New in SAS/CONNECT 9.3

#### Overview

SAS/CONNECT has the following changes or enhancements:

- system options to specify the amount of time a SAS/CONNECT server listens for a client to connect before terminating and to specify whether a SAS/CONNECT server is authorized to access a SAS Metadata Server at server sign-on
- ability of the UPLOAD and DOWNLOAD procedures to support the transfer of data containing extended SAS names that are enabled by using new Base SAS system options
- new options on the %SYSLPUT macro statement to create a single macro variable in the server session or copy a specified group of macro variables to the server session

#### SAS/CONNECT System Options

- TCPLISTENTIME

The TCPLISTENTIME= option is a portable SAS system option that enables you to control idle and unresponsive sign-on connections. The option enables you to specify how long (in seconds) a server “listens” for a response from the client during sign on before it exits automatically.

- CONNECTMETACONNECTION

This option specifies whether a SAS/CONNECT server is authorized to access a SAS Metadata Server at server sign-on. The metadata credential passing now always looks for a metadata connection by default. When a SAS/CONNECT client session has an active metadata server connection and signs on to a SAS/CONNECT server, the server is automatically given access to the SAS Metadata Server for the duration of the SAS/CONNECT server session.

## Support for Extended SAS Names In the UPLOAD and DOWNLOAD Procedures

New system options in Base SAS enable greater flexibility when transferring data that contains enhanced SAS names.

By specifying the system options VALIDVARNAME=ANY and VALIDMEMNAME=EXTEND, names that contain special characters or national characters are now allowed for the following types of data with the UPLOAD and DOWNLOAD procedures:

- a SAS data set
- a SAS library
- a SAS variable
- a DBMS table
- a table column heading in a DBMS table

## Enhancements to the %SYSLPUT Statement

The enhancements to the %SYSLPUT macro statement save you time and effort by allowing you to copy multiple macro variables to a SAS server session in a single statement rather than having to copy them one by one. The new arguments enable you to define a group of variables to be copied based on variable type (automatic or user-defined), variable scope (global or local), and variable name (/LIKE= wildcard). The new wildcard option, /LIKE=, lets you specify the group of variables to be copied based on pattern-matching in the variable name. The following is a summary of the new %SYSLPUT macro statement options:

- `_ALL_`  
copies all user-generated and automatic macro variables to the server session.
- `_AUTOMATIC_`  
copies all automatic macro variables to the server session. The automatic variables copied depend on the SAS products installed at your site and on your operating system. The scope is identified as AUTOMATIC.
- `_GLOBAL_`  
copies all user-generated global macro variables to the server session. The scope is identified as GLOBAL.
- `_LOCAL_`  
copies all user-generated local macro variables to the server session. The scope is the name of the currently executing macro.
- `_/LIKE_`



Specifies a subset of macro variables whose names match a user-specified character sequence, or pattern. Only this identified group of variables with names matching the pattern will be copied to the server session.

- `_USER_`

copies all user-generated global and local macro variables to the server session. The scope is identified either as GLOBAL or as the name of the macro in which the macro variable is defined.

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## What's New in Communications Access Methods for SAS/CONNECT 9.3 and SAS/SHARE 9.3

### Overview

In SAS 9.3, the communications access methods for SAS/CONNECT and SAS/SHARE software has several changes to the spawners. These changes result in improved security, enable X command processing for the z/OS spawner, and write events to the Windows event log.

### Changes to the Spawners

- The new `-DESCRIPTION` option enables you to add a description to the Windows spawner that is installed and started as a Windows service. The description can be viewed with the services applet in Windows.
- The `ENCRYPTFIPS` security option is now available for the spawner command on all operating environments. For more information about this and all other security options, see *Encryption in SAS*, located in the Base SAS Help and Documentation.
- The `SHELL` option in the z/OS spawner can now be specified in the z/OS PARM file. This option enables the SAS session, which is invoked by the spawner, to support X command processing.
- The `LOGEVENTS` option can now be specified in the Windows spawner command. This option causes the SAS/CONNECT spawner to write events to the Windows event log. These events describe when a SAS/CONNECT server process starts, when a SAS/CONNECT server process ends, and when a SAS/CONNECT server process fails to start.



## 9

## SAS Content Categorization

<b><i>What's New in SAS Content Categorization 5.2</i></b> .....	<b>113</b>
SAS Content Categorization Studio .....	113
SAS Content Categorization Collaborative Server .....	113
SAS Content Categorization Server .....	114
SAS Contextual Extraction Studio .....	114
<b><i>What's New in SAS Content Categorization 12.1</i></b> .....	<b>115</b>
SAS Content Categorization Studio .....	115
SAS Enterprise Content Categorization Studio .....	115
SAS Enterprise Content Categorization Servers .....	116
SAS Content Categorization Single User Server .....	116
Changes to the SAS Content Categorization Studio 12.1 Documentation .....	116

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### What's New in SAS Content Categorization 5.2

#### SAS Content Categorization Studio

New and enhanced features in SAS Content Categorization Studio include the following:

- SAS licensing replaces the Teragram license.
- Graphical reporting enables you to view precision, recall, and document matching information.
- Generate subcategories now uses data from Wikipedia.

#### SAS Content Categorization Collaborative Server

New and enhanced features in SAS Content Categorization Collaborative Server include the following:

- Support for Oracle
- Support for SAS Contextual Extraction Studio concepts
- Improved support for Microsoft SQL Server
- Improved user account management

## SAS Content Categorization Server

The new features in SAS Content Categorization Server include the following:

- Most of the configuration work that was recently required to upload a binary project to SAS Content Categorization Server is now unnecessary. The creator has administrative permissions to perform this task.
- SAS Contextual Extraction Studio is now supported in SAS Content Categorization Server.
- SAS licensing replaces the Teragram license.

## SAS Contextual Extraction Studio

### Overview

New and enhanced features in SAS Contextual Extraction Studio include the following:

- Added coreference operators facilitate rule-writing precision.
- XML fields can be specified for matches.
- Additional operators enable greater rule matching precision.
- Case-insensitive matching and comments in rules are now enabled.

### Coreference Operators Added

Coreference refers to pronoun resolution. A pronoun is matched to the antecedent that it refers to when you use these operators in your contextual extraction concept rules:

- Use the coreference operator (`_ref`) to link a matched string with its canonical form.
- Use `_coref` with `CLASSIFIER` definitions.
- Use the forward (`_F`) and the preceding (`_P`) symbols to restrict coreference matches.
- Assign a new concept name for a match on a term specified by the `_ref` operator.

### XML Field Specified for Matching

Limit matches to specific XML fields when you write these fields into rules and apply them to input XML documents.

### Additional Operators for Precision

Additional operators enable greater rule matching precision. These operators include:

- Specify a stemming symbol to enable SAS Contextual Extraction Studio to match all word forms, or only all noun or verb forms.

- Specify the paragraph symbol (`PARA`) to enable SAS Contextual Extraction Studio to match all word forms, or only all noun or verb forms.
- Write a `SENT_n` operator into a rule to specify the maximum number of sentences where a match can occur.
- Use a `SENTSTART_n` operator to specify the number of words at the beginning of a sentence where a match can occur.
- Use a `SENTEND_n` operator to specify the number of words at the end of a sentence where a match can occur.

### Case-Insensitive Matching and Comments

Case-insensitive matching occurs when you select the **Case Insensitive Matching** check box in the **Data** tab for a contextual extraction concept. (By default, all matching is case sensitive.)

You can also add comments to your rules using the pound character ( `#` ).

---

## What's New in SAS Content Categorization 12.1

### SAS Content Categorization Studio

New and enhanced features in SAS Content Categorization Studio enable you to do the following:

- Automatically generate rules using features such as frequent phrase extraction and maximum entropy classifiers.
- Build a project that uses a synonym list to replace the terms that you specify in the synonym list file.
- Specify XPath expressions in Boolean category rules in order to locate matching content in XML elements.
- Export the testing results into a .csv file that can be turned into a SAS data set, a tab-delimited .txt file, or that can be used with Microsoft Excel.
- Reset concept priority settings using the Concept Priorities window.
- Use the Generate Subcategories operation with Chinese, Japanese, Korean, German, Portuguese, Spanish, French, and Italian languages.
- Apply Categories and Concepts to Excel Files.
- Develop a project using the Farsi language.
- Specify the SAS license setinit file in .txt format during installation.

### SAS Enterprise Content Categorization Studio

New and enhanced features for SAS Enterprise Content Categorization Studio enable you to do the following:

- Use predefined LITI concepts to shorten the rule-writing process.

- Use the UNLESS and NOT operators to limit rule matches.
- Specify XPath expressions in LITI rules in order to locate matching content in XML elements.
- Scroll through LITI rule types using keyboard operators.
- See the canonical forms and information fields for LITI rule matches.

## SAS Enterprise Content Categorization Servers

New and enhanced features for SAS Enterprise Content Categorization Servers enable you to do the following:

- Install SAS Content Categorization Collaborative Server, SAS Document Conversion Server, and SAS Content Categorization Server using a single installer.
- Access the rearchitected version of SAS Document Conversion Server.
- Use the Python Web services API.
- Generate .li output using API test programs.

## SAS Content Categorization Single User Server

New and enhanced features for SAS Content Categorization Single User Server enable you to do the following:

- Install SAS Document Conversion Server and SAS Content Categorization Server using a single installer.
- Access the rearchitected version of SAS Document Conversion Server.
- Use the Python Web services API.

## Changes to the SAS Content Categorization Studio 12.1 Documentation

Documentation	12.1 Product	Tasks and 5.2 Product References
<i>SAS Content Categorization Studio: Installation Guide</i>	SAS Content Categorization Studio SAS Enterprise Content Categorization Studio	Install the single user or the enterprise version of SAS Content Categorization Studio that you purchased. The enterprise version automatically installs support for collaborative features and LITI concepts.

Documentation	12.1 Product	Tasks and 5.2 Product References
<i>SAS Content Categorization Studio: User's Guide</i>	SAS Content Categorization Studio	<p>Create a SAS Content Categorization Studio project, test, and upload the project to SAS Content Categorization Server.</p> <p>This guide is written for a single user and is a companion book for <i>SAS Enterprise Content Categorization Studio: User's Guide</i>.</p>
<i>SAS Enterprise Content Categorization Studio: Administrator's Guide</i>	SAS Enterprise Content Categorization Studio with collaborative operations	Configure your server for collaborative operations. (In the 5.2 release, this book was <i>SAS Content Categorization Collaborative Server: Administrator's Guide</i> .)
<i>SAS Enterprise Content Categorization Studio: User's Guide</i>	SAS Enterprise Content Categorization Studio with collaborative operations and LITI concepts capabilities	See the cell above and use this guide to understand how collaborative operations work. Use the second part of this guide to write LITI rules and to upload these rules to SAS Content Categorization Server. (In the 5.2 release, LITI rules were explained in <i>SAS Contextual Extraction Studio: User's Guide</i> .)
<i>SAS Enterprise Content Categorization Servers: Administrator's Guide</i>	<p>Download any, or all, of the following:</p> <ul style="list-style-type: none"> <li>■ SAS Content Categorization Server</li> <li>■ SAS Enterprise Content Categorization Studio</li> <li>■ SAS Content Categorization Java API</li> <li>■ SAS Content Categorization Python API</li> <li>■ SAS Document Conversion Server and Java API</li> </ul>	<p>Install, configure, and use SAS Content Categorization Server, SAS Enterprise Content Categorization Studio, and SAS Document Conversion Server. You can also upload .li files using this product.</p> <p>In the 5.2 release, the information in this book was found in the following manuals:</p> <ul style="list-style-type: none"> <li>■ <i>SAS Content Categorization Server: Administrator's Guide</i></li> <li>■ <i>SAS Content Categorization Collaborative Server: Administrator's Guide</i></li> <li>■ <i>SAS Document Conversion: Developer's Guide</i></li> </ul>

Documentation	12.1 Product	Tasks and 5.2 Product References
<p><i>SAS Content Categorization Single User Servers: Administrator's Guide</i></p>	<p>Download any, or all, of the following:</p> <ul style="list-style-type: none"> <li>■ SAS Content Categorization Server</li> <li>■ SAS Content Categorization Java API</li> <li>■ SAS Content Categorization Python API</li> <li>■ SAS Document Conversion Server and Java API</li> </ul>	<p>Install, configure, and use SAS Content Categorization Server and SAS Document Conversion Server.</p> <p>In the 5.2 release, the information in this book was found in the following manuals:</p> <ul style="list-style-type: none"> <li>■ <i>SAS Content Categorization Server: Administrator's Guide</i></li> <li>■ <i>SAS Document Conversion: Developer's Guide</i></li> </ul>



# 10

## SAS Data Integration Studio

<b><i>What's New in SAS Data Integration Studio 4.3</i></b> .....	<b>120</b>
Overview .....	120
Integrated Versioning .....	120
New Job Management Reports .....	120
Enhanced SAS Code Importer .....	121
New Dialog Box for Searching Metadata .....	121
Deploy Jobs from a Command Line .....	121
Enhanced Support for z/OS .....	121
New Wizard for Standardizing Column Metadata .....	121
User-Defined Formats and Functions in the Expression Builder .....	122
Better Workload Balancing with SAS Grid Computing .....	122
New Transformations .....	122
Integration with DataFlux Data Management Platform .....	123
<b><i>What's New in SAS Data Integration Studio 4.4</i></b> .....	<b>123</b>
Overview .....	123
New SQL Transformations .....	124
New DB2 Bulk Table Loader .....	124
Experimental Support for Apache Hadoop .....	124
Other New Features .....	124
<b><i>What's New in SAS Data Integration Studio 4.5</i></b> .....	<b>125</b>
Overview .....	125
Support for Hadoop .....	125
Experimental High-Performance Analytics Components .....	126
New Business Rules Transformation .....	127
Other New Features .....	127
<b><i>What's New in SAS Data Integration Studio 4.6</i></b> .....	<b>128</b>
Overview .....	128
Support for Exporting Lineage Metadata to DataFlux Business Data Network .....	128
Experimental Support for Sending Hadoop Pig Code to a SAS LASR Analytic Server in HDAT Format .....	128

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## What's New in SAS Data Integration Studio

### 4.3

#### Overview

The main enhancements for SAS Data Integration Studio 4.3 include the following:

- integrated version control and rollback support for metadata
- new job management reports
- enhanced SAS Code Importer
- new dialog box for searching metadata
- deploy jobs from a command line
- enhanced support for z/OS
- new wizard for standardizing column metadata
- enhanced support for user-defined formats and analytic functions in the Expression Builder
- better workload balancing with SAS Grid Computing
- new transformations
- integration with DataFlux® Data Management Platform

#### Integrated Versioning

Within SAS Data Integration Studio, you can now save versions of jobs, tables, and other metadata to a SAS Package file, and then archive the package in a third-party versioning system. You can view the differences between versions of a selected object or between an archived version and the current version of that object. If desired, you can restore archived objects to the SAS metadata repository.

SAS Data Integration Studio supports Concurrent Versions System (CVS) or Apache Subversion (SVN) by default. If you want to use other versioning systems, you can do so with the application programming interface (API).

#### New Job Management Reports

Previous releases enabled you to run a job interactively in SAS Data Integration Studio and display run-time statistics for that job. Now you can use SAS® Web Report Studio or the SAS® Stored Process Server to display pre-built reports for multiple jobs that were executed in batch mode.

The information for these reports is captured in logs at run time, using SAS Application Resource Monitoring (ARM) capabilities. ARM correlates the job with the hardware that it is being run on, so that memory use and I/O can be captured and tagged to a specific job. Performance records are combined with error messages, warnings, table names, and other information to allow for complete, drillable reporting on historical job performance and problems. For example, you can use

cube-based reports in SAS Web Report Studio to track outlier executions of a job down to the specific, offending job step. You can use summary and detail reports to quickly diagnose problems without having to traverse multiple log files by hand. Detail reports of job-steps support stringent historical auditing of data sources and targets.

## Enhanced SAS Code Importer

In the Import SAS Code wizard, you can expand SAS macros in your jobs and create a node for each step inside of your macros. Expanding the macros provides additional detail about your job and how it works. When you run your job with the macros expansion option enabled, you can get more performance information about slow running steps. You can also identify which steps use more memory or I/O, and CPU performance.

Another option enables you to register all work tables as physical tables in a WORK library. This enables you to import SAS code that uses temporary tables that are both the source and target of a step. You can also analyze your job to determine the type and number of steps in your job. This information is provided in a report that you can review prior to importing the job.

## New Dialog Box for Searching Metadata

If you select **Tools** ► **Search** from the main menu, you can search for metadata objects by full name or partial name. You can subset a search to a specific folder, search by type, by last change date, or by other user-defined criteria. You can also save searches to a folder and access them later when needed. For example, you can use the saved search feature to maintain a “recently changed” object list.

## Deploy Jobs from a Command Line

You can now deploy SAS Data Integration Studio jobs from a command line. An example batch file is installed with the product that shows you how to use this new feature. You can deploy any number of jobs without having to start SAS Data Integration Studio.

## Enhanced Support for z/OS

Code generation line lengths can be limited to 80 characters or less. The JCL for deployed jobs can also be restricted to fit within the z/OS 80-character line length limit. Lines that go beyond the 80-character limit will flow over onto the next line.

## New Wizard for Standardizing Column Metadata

In some cases, table columns that have the same name and that are used for the same purpose should also have the same attribute values. For example, two columns named Total Sales should perhaps have the same data type and column length. The new Column Standardization wizard finds columns that have similar names and compares their attributes. It shows any inconsistency in the column attribute values. You can use this wizard to generate a report about column differences or log updates for audit purposes. You can also use the wizard to update the metadata for a target table in a SAS Data Integration Studio job. The new column attributes would be applied to the table the next time you run the job.

## User-Defined Formats and Functions in the Expression Builder

You can discover and register user-defined formats and analytic scoring functions from a relational database. After the formats and functions are registered, they appear as expressions that are available from the SAS Data Integration Studio Expression Builder. The discovered functions and formats can be placed in a folder location of your choice. Parameters on the function are also discovered and registered so that you will have enough detailed information to be able to use the function or format in your jobs.

## Better Workload Balancing with SAS Grid Computing

SAS Data Integration Studio and SAS Grid Computing now provide better workload balancing for SAS Data Integration Studio jobs. When running interactively on a grid, previous versions of SAS Data Integration Studio would create a new session for each job execution and terminate the session when the job finished. SAS Data Integration Studio now keeps the session open until the user closes the job. This better supports incremental job development because intermediate work tables will remain while the session is active, allowing you to inspect run results. You can also use various debugging features, such as running specific transformations individually.

Interactive submissions to a grid give administrators the ability to automate workload through prioritization, through resource utilization thresholds, and by limiting the number of concurrent jobs. SAS Grid Computing also supports the ability to implement run policies, such as a Fair Share policy, which allows prioritization of jobs based on user and workload.

## New Transformations

The Compare Tables transformation can be used to detect changes between two tables. It can compare a source table to another table, or it can compare a source table to a cross-reference table that includes a compare digest. This transformation supports either a direct lookup (hash object) or a disk-based compare through a MERGE statement. The hash lookup will perform faster but requires that the entire table fit into memory. If this is not practical, you can choose the MERGE statement method instead. The transformation can handle New, Update Missing, and Unchanged tables as output. You can choose to retain or delete any of the possible outputs as needed to increase efficiency. The transformation generates its results in a single pass of the data.

The SCD Type 1 Loader is used for Type 1 slowly changing dimension processing. It will detect value changes between the source and target tables and then overwrite the target table values with the source table values when a change is detected.

The SQL Set Operators transformation generates a PROC SQL statement combines the results of two or more queries by using the following set operators:

- UNION – produces all unique rows from both queries
- EXCEPT – produces rows that are part of the first query only
- INTERSECT – produces rows that are common to both query results

- OUTER UNION – concatenates the query results

The SQL Set Operator transformation is often faster than the SQL Join transformation. You can write complex queries on either side of the SQL Set Operator, combining results sets that have the same attributes but require different access paths. You can create two select statements and then combine them with an SQL Set operator, rather than trying to integrate all logic into a single join. The new transformation supports full pushdown capability so that the entire transformation will be pushed down to the database when the source and target schemas match.

The Oracle Bulk Table Loader supports all bulk-load options for Oracle tables. You can select options that affect how indexes, constraints, and table statistics are handled, including the percentage of rows sampled when gathering statistics. You can configure other Oracle load options as well, such as partition support, commit level, and Direct Path load support.

The Standardize with Definition transformation applies a selected DataFlux® Data Management Studio definition to a source column in order to standardize the data according to a set of rules.

## Integration with DataFlux Data Management Platform

DataFlux, a SAS company, recently released the DataFlux Data Management Platform. This platform provides a single environment for managing data quality, data integration, and master data management (MDM). Enterprise bundles that include SAS Data Integration Studio now also include the DataFlux Data Management Platform. One component of the new platform is DataFlux Data Management Studio, which is a desktop client that combines data quality and data integration features.

The data quality features of the platform are especially useful for SAS Data Integration Studio jobs. For example, you can use DataFlux Data Management Studio to analyze and cleanse source data before it is included in SAS Data Integration Studio jobs. You can use DataFlux data quality schemes and definitions in SAS Data Integration Studio jobs. You can also execute DataFlux jobs, profiles, and services from SAS Data Integration Studio.

---

## What's New in SAS Data Integration Studio 4.4

### Overview

The main enhancements for SAS Data Integration Studio 4.4 include the following:

- New SQL Transformations
- New DB2 Bulk Table Loader
- Experimental Support for Apache™ Hadoop™
- Other New Features

## New SQL Transformations

All SQL transformations are now grouped into a single folder called **SQL**, which is near the bottom of the Transformations tree. The existing Join, Extract, and Set Operators transformations have been moved to this folder. Six new transformations have been added to broaden and simplify SQL operations in SAS Data Integration Studio jobs.

The following transformations have been added in this release:

- The Delete transformation generates a PROC SQL statement that deletes user-selected rows in a single target table. The target table must come from a database management system that provides an implementation of the SQL Delete DML command for which a SAS/ACCESS interface is available.
- The Merge transformation inserts new rows and updates existing rows using the SQL Merge DML command. The command was officially introduced in the SQL: 2008 standard.
- The Update transformation updates user-selected columns in a single target table. The target columns can be updated by case, constant, expression, or subquery. The table must come from a database management system that provides an implementation of the SQL Update DML command for which a SAS/ACCESS interface is available.
- The Execute transformation enables you to specify custom SQL code to be executed. It provides SQL templates for supported databases.
- The Insert Rows transformation provides a simple SQL interface for inserting rows into tables.
- The Create Table transformation provides a simple SQL interface for creating tables.

The new transformations include a new Query Builder window, a simplified interface for building SQL queries.

## New DB2 Bulk Table Loader

The new DB2 Bulk Table Loader transformation can take large amounts of data from SAS or most DBMS source tables and bulk load it to a DB2 target. This loader supports multiple load techniques: **Import**, **Load**, **CLiLoad**, and **CLiLoad with truncate**. It inserts bulk load options where needed. The loader can generate table statistics after the table has been bulk loaded, in order to guide performance tuning.

## Experimental Support for Apache Hadoop

Apache Hadoop is an open-source software project that supports scalable, distributed computing. SAS Data Integration Studio has a number of experimental transformations that support Hadoop. For more information, contact SAS Technical Support.

## Other New Features

More than 70 minor enhancements and bug fixes are included in this release. Here are some of the most notable enhancements.

The version control feature supports additional releases of Concurrent Versions System server (CVS).

A **Fix Warning** control has been added to the toolbar on the **Mapping** tab for transformations. This control can be used to fix problems with automatic column mappings. For example, you can use the control to change the target column properties so that they match the source column properties.

The **Code** tab in the property windows for transformations now has a **Scroll to User Written Code** control. This control becomes active when you select **User Written Body** on this tab.

You can now control whether SAS formats and informats are automatically applied to table columns when you register tables or when code is generated for tables.

By default, SAS Data Integration Studio now looks up user credentials rather than explicitly including them in the code that it generates when it accesses tables in a library.

You can now control whether new instances of most SQL transformations use explicit SQL pass-through processing by default.

The Mining Results transformation now displays the UUID of the specified project and model. The **Precode and Postcode** tab for transformations now retains the location of code files selected on that tab. The external file wizards were updated to better handle double-byte character data. Various fixes were made to address localization, migration, and customer-reported issues.

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## What's New in SAS Data Integration Studio 4.5

### Overview

The main enhancements for SAS Data Integration Studio 4.5 include the following:

- Support for Hadoop
- Experimental High-Performance Analytics Components
- New Business Rules Transformation
- Other New Features

### Support for Hadoop

Hadoop is an open-source software project that supports scalable, distributed computing. The following transformations support the use of Hadoop Clusters in the context of SAS Data Integration Studio jobs:

- The Hadoop Container transformation enables you to connect all the sources and targets for the various steps in a container step. This container step allows for one connection to the Hadoop Cluster in the context of a SAS Data Integration Studio job. Then, all of the steps that are included in the container are submitted during the connection.

- The Hadoop File Reader and Hadoop File Writer transformations support reading and writing files from and to the Hadoop Cluster into SAS in the context of a SAS Data Integration Studio job.
- The Hive transformation supports submitting Hive code to the Hadoop Cluster in the context of a SAS Data Integration Studio job. Hive is a data warehouse system for Hadoop. You can easily summarize data, run ad hoc queries, and generate the analysis of large data sets stored in file systems that are compatible with Hadoop. Hive also enables you to project structure onto this data and query the data by using an SQL-like language called HiveQL.
- The Map Reduce transformation supports submitting MapReduce code to the Hadoop Cluster in the context of a SAS Data Integration Studio job. Hadoop MapReduce enables you to write applications that reliably process vast amounts of data in parallel on large clusters. A MapReduce job splits the input data set into chunks that are processed by the map tasks in parallel. The outputs of the maps are sorted and then input to the reduce tasks. The input and the output of the job are typically stored in a file system.
- The Pig transformation supports submitting Pig code to the Hadoop Cluster in the context of a SAS Data Integration Studio job. The transformation contains an enhanced, color-coded editor specific to the Pig Latin language. Pig Latin is a high-level language used for expressing and evaluating data analysis programs. Pig Latin supports substantial parallelization and can handle very large data sets.
- The Transfer From and Transfer To transformations support the transfer of data from and to the Hadoop Cluster in the context of a SAS Data Integration Studio job.
- The **Hadoop Monitor** items in the **Tools** menu enable you to run reports that monitor the performance of a Hadoop Cluster.
- The **Hive** Source Designer enables you to register tables in a Hive database.

## Experimental High-Performance Analytics Components

SAS® LASR™ Analytic Server is a direct-access, NoSQL, NoMDX server that is engineered for maximum analytic performance through multithreading and distributed computing. SAS Data Integration Studio provides the following experimental High-Performance Analytics transformations for SAS LASR Analytic Servers:

- The SAS Data in HDFS Loader transformation is used to stage data into a Hadoop cluster.
- The SAS Data in HDFS Unloader transformation loads data from Hadoop into a SAS LASR Analytic Server.
- The SAS LASR Analytic Server Loader transformation loads data to a SAS LASR Analytic server.
- The SAS LASR Analytic Server Unloader transformation unloads data that has previously been loaded into a SAS LASR Analytic Server.

Source Designer wizards are used to register tables on the SAS Metadata Server. SAS Data Integration Studio provides the following experimental Source Designers for High-Performance Analytics tables:

- The **SAS Data in HDFS** Source Designer enables you to register SAS tables in a Hadoop Cluster.



- The **SAS LASR Analytic Server** Source Designer enables you to register SAS LASR Analytic tables.

For more information about these experimental components, contact SAS Technical Support.

## New Business Rules Transformation

The Business Rules transformation enables you use the business rule flow packages that are created in SAS® Business Rules Manager in the context of a SAS Data Integration Studio job. You can import business rule flows, specify flow versions, map source table columns to required input columns, and set business rule options.

The Business Rules transformation enables you to map your source data and output data into and out of the rules package. Then, the SAS Data Integration Studio job applies the rules to your data as it is run. When you run a job that includes a rules package, statistics are collected, such as the number of rules that were triggered, and the number of invalid and valid data record values. You can use this information to further refine your data as it flows through your transformation logic.

## Other New Features

Here are some of the most notable enhancements included in this release:

Support for SQL Server user-defined functions (UDFs) enables you to import UDFs for models registered through Model Manager for supported databases that include DB2, Teradata, and Netezza. You can also import native UDFs from Oracle, DB2, and Teradata. After the UDFs are imported, you can access them on the **Functions** tab of the Expression Builder window.

Performance enhancements for the SCD Type 2 Loader transform include the following:

- the ability to use character-based columns for change tracking
- an option to create an index on the permanent cross reference table
- an option to specify the SPD server update technique
- an option to sort target table records before creating the temporary cross reference table

In the past, if you selected **Tools** ► **Options** ► **Data Quality** tab and changed the DQ Setup Location, the new location could not be applied to data quality transformations in existing jobs. Now, if you change the global DQ Setup Location, you have the option to apply the new location to data quality transformations in existing jobs. To apply the global DQ Setup Location to a transformation, click the **Reset DQ Setup Location** button on the appropriate tab, such as the **Standardization** tab for the Apply Lookup Standardization transformation. The following data quality transformations support this option: Apply Lookup Standardization transformations, Standardize with Definition transformations, and Create Match Codes transformations.

A new Federation Server Source Designer enables you to register data sources that are available through a DataFlux® Federation Server. You can then access these data sources in a SAS Data Integration Studio job.

Direct lookup using a hash object in the Data Validation transformation is now supported.

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## What's New in SAS Data Integration Studio 4.6

### Overview

The main enhancements for SAS Data Integration Studio 4.6 include the following:

- Support for exporting lineage metadata to DataFlux Business Data Network
- Experimental support for sending Hadoop Pig code to a SAS® LASR™ Analytic Server in HDAT Format

### Support for Exporting Lineage Metadata to DataFlux Business Data Network

DataFlux Web Studio is a web-based application with separately licensed modules that enable you to perform data management tasks. One of these modules, DataFlux Business Data Network, enables you to manage relationships between business terms and technical information, such as the metadata for data sources and business rules. The relationships between business terms and technical information provide an important starting point for data governance projects.

If your site has licensed DataFlux Business Data Network, then you can use the following features in SAS Data Integration Studio:

- You can select jobs in the Export Lineage window and export metadata about SAS Data Integration Studio jobs and related objects to DataFlux Web Studio. DataFlux Business Data Network users can then link terms to these jobs and related objects.
- You can right-click a table in the Folders tree or the Inventory tree, then you can select **Analyze in Web Viewer**. If you provide the appropriate credentials, and if metadata for the selected table was previously exported to DataFlux Web Studio, then you can view any relationships that have been defined for that table in DataFlux Business Data Network.

### Experimental Support for Sending Hadoop Pig Code to a SAS LASR Analytic Server in HDAT Format

SAS Data Integration Studio 4.6 has experimental support for sending Hadoop Pig code to a SAS LASR Analytic Server in HDAT format (Objective Analysis Package Data format). This support is implemented with an experimental UDF that enables the output of the Pig code to be written in the HDAT format to be consumed by the SAS LASR Analytic Server.



# SAS Data Surveyor for PeopleSoft

*What's New in SAS Data Surveyor for PeopleSoft* ..... 129

Deprecated at SAS 9.3 ..... 129

## What's New in SAS Data Surveyor for PeopleSoft

### Deprecated at SAS 9.3

In the SAS 9.3 release, the SAS Data Surveyor for PeopleSoft has been deprecated and is no longer supported. The SAS Data Surveyor for PeopleSoft continues to be supported on SAS 9.2 systems.



# 12

## SAS Data Quality Server

<i>What's New in SAS 9.3 Data Quality Server</i> .....	131
Overview .....	131
New Functions and Procedures .....	131
Interoperability and Legacy Support .....	133

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### What's New in SAS 9.3 Data Quality Server

#### Overview

SAS 9.3 Data Quality Server provides procedures and functions that enable you to administer and run jobs and services on DataFlux Data Management Platform from DataFlux (a wholly owned subsidiary of SAS Institute Inc.). This release of SAS Data Quality Server also contains language elements specific to data extraction definitions.

SAS 9.3 Data Quality Server includes the following enhancements:

- New functions and procedures that support DataFlux Data Management Server 2.1 and later.
- Deprecation or replacement of legacy functions and procedures to provide a migration path from DataFlux dfPower Studio to DataFlux Data Management Studio. Some utility functions have also been renamed to reflect this.
- Inclusion of functions to enable you to process data using extraction definitions.

#### New Functions and Procedures

Many of the functions and procedures added for this release of SAS Data Quality Server support DataFlux Data Management Server 2.1 and later. These new functions and procedures begin with DM and are not compatible with DataFlux Integration Servers or DataFlux dfPower Studio applications. Additional functions and procedures included in this release of SAS Data Quality Server enable you to customize extraction definitions for use with applications such as Blue Fusion 8.2 and later. Each function and procedure is listed in the following sections along with a brief description.

## Server Process and Utility Functions

The following functions are new in SAS 9.3 Data Quality Server and operate with DataFlux Data Management Server 2.1 and later:

- The DMSRVBATCHJOB function runs a DataFlux Data Management batch job or a DataFlux Data Management process job and returns a job or process identifier, as appropriate.
- The DMSRVCOPYLOG function copies a log file from a DataFlux Data Management Server to the local machine.
- The DMSRVDELETELOG function deletes a job's log file from the DataFlux Data Management Server.
- The DMSRVJOBSTATUS function returns the status of a job that was submitted to a DataFlux Data Management Server.
- The DMSRVKILLJOB Function terminates a job that is running on a DataFlux Data Management Server.
- The DMSRVPROFILEJOB function generates a profile from a Data Management repository.
- The DMSRVUSER function sets the user name and password relative to the DataFlux Data Management Server.
- The DMSRVVER function returns the version of the DataFlux Data Management Server.

## Extraction Definition Support Functions

Extraction support functions that are new to SAS 9.3 Data Quality Server include the following:

- The DQEXTINFOGET function returns the token names in an extraction definition.
- The DQEXTRACT function returns an extracted character value.
- The DQEXTTOKENGET function returns a token from an extraction character value.
- The DQEXTTOKENPUT Function inserts a token into an extraction character value and returns the updated extraction character value.

To support the new extraction definition functions, the macro, %DQPUTLOC, now lists extraction definitions along with all other types of definitions.

## Server Process Procedures

Procedures new in SAS 9.3 Data Quality Server that work exclusively with DataFlux Data Management Server 2.1 and later include the following:

- PROC DMSRVADM returns a list of jobs running on a DataFlux Data Management Server.
- PROC DMSRVDATASVC runs DataFlux Architect and data services.
- PROC DMSRVPROCESSSVC runs DataFlux Data Management process services.

## Interoperability and Legacy Support

SAS 9.3 Data Quality Server is an optimized implementation designed to work as part of a SAS offering for an integrated system or as a component within a DataFlux Data Management Platform configuration. As a component within a DataFlux Data Management Platform configuration, several functions and procedures (identified by names beginning with DM) work exclusively with DataFlux Data Management Server 2.1 and later.

Whereas SAS 9.3 continues to support all DQSRV functions and procedures, the operations will attempt to execute using a Data Management Server by default.

Remember the following as you work with SAS Data Quality 9.3:

- DMSRV functions and procedures issue an error if a host and port that are serving up a DataFlux Integration Server are specified. This code works with DataFlux Data Management Servers only.
- All DQSRV functions and procedures run on any version of either DataFlux Data Management Server or DataFlux Integration Server, but will issue a deprecation warning.





# 13

## SAS Drivers

<b><i>What's New for the SAS 9.3 Drivers for JDBC</i></b> .....	<b>135</b>
Overview .....	135
Supported Java Versions .....	135
Enhanced Fetch Size for the IOM Driver .....	135
Documentation Enhancements .....	136
<b><i>What's New in SAS Drivers for ODBC 9.3</i></b> .....	<b>136</b>
Overview .....	136
New 64-Bit Driver .....	136
Userid/Password Override and SAS/SHARE Server Password Support .....	136
Simplified Syntax for TCP/IP Communication .....	136
Location of the SPD Server Libraries .....	137
Disable _0 Override Parsing Option Change .....	137
New DQUOTE=ANSI SQL Option .....	137

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## What's New for the SAS 9.3 Drivers for JDBC

### Overview

The SAS 9.3 release of the SAS Drivers for JDBC includes updated Java version support, a feature to enhance the fetch size for the IOM driver, and documentation enhancements.

### Supported Java Versions

SAS 9.3 supports Java 6 as the baseline Java version. The SAS Drivers for JDBC work with Java 6 and are backward compatible with Java 5.

### Enhanced Fetch Size for the IOM Driver

When using the IOM driver (`com.sas.rio.MVADriver`), the default behavior for the driver is to calculate an optimal fetch size at run time. The driver calculates the fetch size by setting the fetch size to the number of rows that fit in a 16-kilobyte buffer. This behavior can be overridden with the `setFetchSize` method.

## Documentation Enhancements

Section “Using Timestamps, Dates, and Times” provides information about SAS dates and times. Sample code for creating tables with time-related columns and inserting values is provided.

---

## What's New in SAS Drivers for ODBC 9.3

### Overview

In the first maintenance release for SAS 9.3, SAS provides the following enhancements to the SAS Drivers for ODBC:

- new 64-bit driver
- Userid/Password Override and SAS/SHARE server password support
- simplified syntax for specifying TCP/IP communication for local servers and SAS/SHARE servers
- location of SPD Server libraries is changed
- disable \_0 override parsing option enabled by default
- new DQUOTE=ANSI SQL option

### New 64-Bit Driver

SAS provides a 64-bit version of the driver so that 64-bit ODBC-compliant applications can use the driver in native mode. The 32-bit and 64-bit drivers are installed at the same time for Windows x64 operating environments.

The SAS 9.3 Drivers for ODBC are available for download from <http://support.sas.com/demosdownloads/setupcat.jsp?cat=ODBC+Drivers>.

The 64-bit driver does not support connections to the SAS Scalable Performance Data (SPD) Server.

### Userid/Password Override and SAS/SHARE Server Password Support

In SAS 9.2 and the initial release of SAS 9.3, the SAS Drivers for ODBC supported using either the SAS/SHARE server password or the Userid/Password Override feature. In this release, the SAS Drivers for ODBC support using both features at the same time.

### Simplified Syntax for TCP/IP Communication

In previous releases of the SAS Drivers for ODBC, it was necessary to edit the TCP/IP services file for the client machine with a service name. The service name was used to define the server name, and the driver used the service name to look up the

TCP/IP port number to use for communication with the SAS server. In the SAS 9.3 release, a simplified syntax of two underscores and the port number are used for both local and SAS/SHARE server access. This enhancement avoids the need to edit the TCP/IP services file. However, the legacy behavior remains in the driver for sites that already have server names defined in the TCP/IP services file.

## Location of the SPD Server Libraries

In previous releases of the SAS Drivers for ODBC, when a connection was made to an SPD Server, the driver searched for the spds.dll library file in a shared files location. With this release of the SAS Drivers for ODBC, the driver searches for the spds.dll file in the driver installation directory.

## Disable \_0 Override Parsing Option Change

The Disable \_0 Override Parsing option was not enabled in previous version of the SAS Drivers for ODBC and caused the driver to strip off a trailing \_0 from variable names when the variable name is longer than eight bytes. Enabling this option can be helpful when accessing SAS Version 6 servers or version 6 data sets, but often causes errors with newer SAS versions. In this release, the option is enabled by default to avoid parsing errors with SAS servers at version 7 and newer.

## New DQUOTE=ANSI SQL Option

The DQUOTE=ANSI SQL option appears on the **General** tab of the SAS ODBC Driver Configuration dialog box. When this option is enabled, values that are enclosed in double quotation marks are treated as variables by the SAS server that runs the query, rather than as a string. This option enables you to use DBMS names and other names that are not normally permissible in SAS as table names, column names, and aliases.



# 14

## SAS Enterprise Guide

<b><i>What's New in SAS Enterprise Guide 4.3</i></b> .....	<b>139</b>
Overview .....	139
New Program Editor with Autocomplete and Integrated Syntax Help .....	140
Recently Accessed Program Files Are Available from the File Menu .....	140
Option to Automatically Add Output Data to the Project Tree .....	140
Analyzing SAS Programs .....	140
Explicit SQL Pass-through Option .....	141
More Control over ODS Statements .....	141
Autoexec Process Flow .....	141
Sending Data Files to JMP .....	141
Working with Information Maps .....	141
Automatic Chart Option for OLAP Cubes .....	141
Create OLAP Cube Slices That Use SAS Code Instead of MDX Code .....	142
Macro Variables for Conditional Processing .....	142
Open SAS Web Report Studio Reports .....	142
New and Enhanced SAS Tasks .....	142
<b><i>What's New in SAS Enterprise Guide 5.1</i></b> .....	<b>143</b>
Overview .....	143
New 64-bit SAS Enterprise Guide Application .....	144
New Data Explorer Tool .....	144
Enhancements to the Query Builder .....	144
New Features for Editing Programs .....	144
Enhancements to the OLAP Analyzer .....	144
Improved Support for Grid Computing .....	145
Support for Parallel Execution of Tasks .....	145
Enhancements to Stored Processes .....	145
Enhancements to SAS Tasks .....	145
New Default Style for SAS Report and HTML Results .....	145
General Enhancements .....	145

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## What's New in SAS Enterprise Guide 4.3

### Overview

SAS Enterprise Guide 4.3 includes the following new features and enhancements:

- new program editor with autocomplete and integrated syntax help

- recently accessed program files are available from the File menu
- option to automatically add output data to the project tree
- ability to analyze SAS programs
- explicit SQL pass-through option
- more control over whether ODS statements are generated for the results
- autoexec process flow
- ability to send data files to JMP
- longer names and custom filters for SAS Information Maps
- automatic chart option for OLAP cubes
- ability to create OLAP cube slices that use SAS code instead of MDX code
- macro variables for conditional processing
- ability to open SAS Web Report Studio reports
- new and enhanced SAS tasks

**Note:** SAS Enterprise Guide 4.3 runs on SAS 9.2 and SAS 9.3. For the latest information about SAS Enterprise Guide, see <http://support.sas.com/software/products/guide>.

## New Program Editor with Autocomplete and Integrated Syntax Help

You can use the SAS Enterprise Guide program editor to create new programs and to edit existing SAS programs in your project. The program editor offers several features to help you reduce your programming time, including autocompletion for hundreds of SAS statements and procedures and options. The program editor also provides parenthesis matching, built-in syntax and function help, and automatic code formatting. SAS Enterprise Guide no longer includes the comprehensive SAS syntax files, but all of the syntax help is now built into the program editor.

## Recently Accessed Program Files Are Available from the File Menu

You can use the **File** menu to easily open program files that you have recently viewed.

## Option to Automatically Add Output Data to the Project Tree

A new option (**Automatically add output data to the project tree**) is available when you are setting options to manage results. When you select this option, SAS Enterprise Guide starts adding output data to the project tree after you run a task or program.

## Analyzing SAS Programs

Using SAS Enterprise Guide, you can analyze the contents of a program. You might want to analyze a SAS program for the following reasons:

- to quickly identify the different parts of the program and see how each part is related.
- to take advantage of grid computing.

## Explicit SQL Pass-through Option

When a query uses data from an external database, you can use explicit pass-through mode to send the SQL statements to the database to be processed. If the data files are very large, this can improve your performance because the files do not have to be copied to the SAS server for processing. Once the statements are processed, the results are sent back to SAS Enterprise Guide.

## More Control over ODS Statements

Two new options (**Generate ODS Statements** and **Generate ODS Macro Variables**) are available when you are specifying the general options for your results. With these options, you can specify whether to generate ODS statements or whether to save your ODS preferences as macro variables. Saving your preferences as macro variables enables you to submit programs from SAS Enterprise Guide to a SAS grid computing environment.

## Autoexec Process Flow

There are several ways to do autoexec processing in SAS Enterprise Guide. You can create a process flow named "autoexec" that can be run automatically whenever you open your project. For example, you could use this process flow to define libraries or to assign macro variables for the project.

## Sending Data Files to JMP

If you have JMP 7, JMP 8, or a later release of JMP installed on your computer, then you can send a data file from SAS Enterprise Guide to JMP. When sending a file to JMP, SAS Enterprise Guide creates a temporary copy of your selected data file and opens it in a new JMP session, where you can then use the visualization features of JMP.

## Working with Information Maps

Using SAS Enterprise Guide, you can create a custom filter for an information map. This custom filter is available only during your SAS Enterprise Guide session and is not saved to the information map.

SAS Enterprise Guide can also open information maps with names that are greater than 32 bytes in length. (This feature was added in the third maintenance release for SAS 9.2..)

## Automatic Chart Option for OLAP Cubes

In the graph view of the OLAP Analyzer, you can select a chart type of **Automatic Chart**. This chart type enables the OLAP Analyzer to choose the best chart for the data based on the number of measures and whether or not the data includes a time dimension.

## Create OLAP Cube Slices That Use SAS Code Instead of MDX Code

A new option for the slice type (**All on rows except measures**) is available when you are creating an OLAP cube slice. When you select this option, the slice is created using SAS code instead of by using MDX code. This means that a slice that is created using this option can be run from within a stored process.

## Macro Variables for Conditional Processing

When defining the condition for conditional processing, you can now use macro variables in addition to input data sets, prompts, and the date and time.

## Open SAS Web Report Studio Reports

You can use SAS Folders to find a report that is registered in metadata with SAS Web Report Studio.

## New and Enhanced SAS Tasks

### New Tasks

The following tasks are new for this release:

- Create Format from a Data Set enables you to create a SAS format by using data that is saved in a SAS data set.
- Map Chart creates a two-dimensional (choropleth) or three-dimensional (block and prism) color map that shows the variation in the value of a response variable for different geographical areas, such as counties, states, and countries.

The Create Map Chart task no longer requires specially prepared data ("feature tables") in order to create useful maps. This makes it easier to create map charts using only a map data set and your response values. The Create Map Feature Table task, provided with earlier versions of SAS Enterprise Guide, has been deprecated. Your existing projects that use this task will still run; however, you will not be able to create new steps that use the Create Map Feature Table task.

- Scatter Plot Matrix creates a paneled graph of scatter plots for multiple combinations of variables. You can use options to overlay fit plots and ellipses on your scatter plots.

### Enhanced Tasks

- If the input data source for a SAS task is from a DBMS engine, then SAS uses the sort functionality on the database to sort the data before running the task. Using the database functionality rather than the SORT procedure, which is used for files that are not saved to a database, optimizes the performance of the SAS task.
- The following tasks now support the DTQTR, DTMONTH, and DTDAY datetime intervals:
  - ARIMA Modeling and Forecasting
  - Basic Forecasting



- Prepare Time Series Data
- Regression Analysis with Autoregressive Errors
- In the Filter and Sort task, you can now specify how the name of the task appears in the SAS Enterprise Guide project. You can also specify where to save the output table.
- In the Principal Component task, you can create these new plots:
  - a pattern profile plot. The value on the Y-axis is the correlation between the variable and the principal component.
  - pattern component plots. Each observation on the plot is the correlation between the variable and the two corresponding components on the plot. You can choose whether to plot the patterns in a vector.
  - The interface for the Random Sample task has been redesigned.
- In the Tile Chart task, the following new functionality is available:
  - You can change the input data source after you open the task. You can also filter the input data source.
  - You can customize the color ramp for the tile chart. You can also use color points to specify how the colors should be distributed across the data. To specify color points, you must be running SAS 9.3 or the third maintenance release for SAS 9.2 (TS2M3). For more information about this maintenance release, see <http://support.sas.com/software/maintenance>.

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## What's New in SAS Enterprise Guide 5.1

### Overview

SAS Enterprise Guide 5.1 includes the following new features and enhancements:

- new 64-bit SAS Enterprise Guide application
- new Data Explorer tool that you can use to view a SAS data set without adding the data set to your project
- enhancements to the Query Builder, including reusable query templates and support for subqueries
- new features for editing programs
- new features in the OLAP Analyzer, including the ability to adjust values in a write-enabled OLAP cube
- improved support for grid computing
- support for parallel execution of tasks
- enhancements to stored processes
- enhancements to SAS tasks
- new default style for SAS Report and HTML results
- general enhancements

You can run SAS Enterprise Guide on either a SAS 9.2 or SAS 9.3 server.

## New 64-bit SAS Enterprise Guide Application

SAS Enterprise Guide 5.1 is now available as either a 32-bit or a 64-bit application. If you are using a 32-bit Microsoft Windows operating system, then you must use the 32-bit version of SAS Enterprise Guide. If you are using a 64-bit Windows operating system, then you can run either the 32-bit or the 64-bit version of SAS Enterprise Guide.

**Note:** In the 64-bit version of SAS Enterprise Guide, you cannot open Microsoft Exchange or Microsoft Access data or send files by using e-mail applications that support the Messaging Application Programming Interface (MAPI). If you need these features, install the 32-bit version of SAS Enterprise Guide.

## New Data Explorer Tool

The new Data Explorer tool enables you to perform the following tasks:

- Create a custom view of your data by selecting columns to include in the view, creating a filter, and sorting your data.
- Quickly calculate basic charts and statistics for each column in a SAS data set.
- Add a data exploration view to your project.

## Enhancements to the Query Builder

- Query templates enable you to save the settings for your specific query to a template that you can use again.
- Subqueries enable you to use the results from one query as the input for another query.
- You can use the **Automatically surround query expressions with parentheses** option to ensure that each expression in a filter is evaluated as a single condition.

## New Features for Editing Programs

- You can use the new Web links in the syntax help window to get additional help when you are writing or editing a SAS program.
- The autocompletion feature in the program editor can now complete SAS data set and SAS data set column names.

## Enhancements to the OLAP Analyzer

- If you are using an OLAP server that supports write-enabled cubes, then you can use the OLAP Analyzer to adjust values in the cube.
- You can change the format of measures that are displayed in the OLAP Analyzer.
- The OLAP Analyzer interface has been updated to display cube views in view groups. Each view group can contain multiple views of the cube.

- The ESRI map interface has been updated with new navigation and drawing tools.
- Search functionality has been added to the Cube Manager and the MDX Editor.

## Improved Support for Grid Computing

SAS Enterprise Guide 5.1 has a new option that enables SAS Enterprise Guide to run tasks in a SAS grid computing environment. You can use this option at the project level or for an individual task.

## Support for Parallel Execution of Tasks

SAS Enterprise Guide 5.1 has a new option that allows parallel execution of tasks on the same server. You can use this option at the project level or for an individual task.

## Enhancements to Stored Processes

In SAS Enterprise Guide, you can create stored processes that are compatible with SAS 9.2 or stored processes that run only on SAS 9.3 servers. These enhancements are for stored processes that you run on SAS 9.3 servers:

- You can hide a stored process. When you select this option, the stored process is not available in the client application where a user might run it.
- The execution options have changed in the Create New Stored Process Wizard and in the Stored Process Manager.
- For data sources and data targets, you now have the option of creating a data table to use as a data source or data target. For stored processes that are compatible with SAS 9.2, you can create only generic (byte-stream) data or an XML stream as the data source or data target.

## Enhancements to SAS Tasks

- The new Show an ODS Statistical Graph task is available in both SAS Enterprise Guide and the SAS Add-In for Microsoft Office. In this task, you select the graph definition (SGD file) to use for a selected data source. The graph definition can be created in SAS Enterprise Guide.
- In the Tile Chart task, you can now create a separate chart for each unique value of the specified BY variable.

## New Default Style for SAS Report and HTML Results

HtmBlue is the new default style for SAS Report and HTML results.

## General Enhancements

- You can suppress the GOPTIONS statement that is automatically added to the SAS code that SAS Enterprise Guide generates by using the new **Suppress graph option statement in generated code** option.

- You can now refresh a SAS Web Report Studio report from within SAS Enterprise Guide.
- You can export a data file as a Microsoft Excel Open XML Workbook (\*.xlsx) file.

# 15

## SAS Enterprise Miner

<b><i>What's New in SAS Enterprise Miner 7.1</i></b> .....	<b>148</b>
Overview .....	148
Administration .....	148
Migration .....	148
Enterprise Miner User Interface Enhancements .....	149
Rapid Predictive Modeler .....	150
Enhanced Enterprise Miner Nodes .....	150
New Enterprise Miner 7.1 Nodes .....	151
Experimental Enterprise Miner 7.1 Nodes .....	152
<b><i>What's New in SAS Enterprise Miner 7.1 M1</i></b> .....	<b>153</b>
Overview .....	153
Support for High-Performance Data Mining .....	153
New Incremental Response Node .....	154
Enhanced Nodes .....	154
EM Migration Macro .....	154
PMML Scoring .....	155
<b><i>What's New in SAS Enterprise Miner 12.1</i></b> .....	<b>155</b>
Overview .....	155
SAS Enterprise Miner Core .....	155
SAS Enterprise Miner Credit Scoring .....	156
SAS Enterprise Miner Applications .....	156
Rapid Predictive Modeler (RPM) .....	156
Support for High Performance Data Mining .....	156
<b><i>What's New in SAS Text Miner 5.1</i></b> .....	<b>157</b>
Overview .....	157
New Text Mining Nodes .....	158
Replacement of the Original Text Miner Node .....	158
Additional Supported Languages .....	158
New Functionality for Text Mining Nodes .....	158
Procedure Change .....	159
<b><i>What's New in SAS Text Miner 12.1</i></b> .....	<b>159</b>
Overview .....	159
New Text Rule Builder Node .....	160
Enhancements to Text Mining Nodes .....	160
New Sample Data Set .....	160

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## What's New in SAS Enterprise Miner 7.1

### Overview

SAS Enterprise Miner 7.1 provides many improvements and new functions in the areas of administration, user interface, and modeling to enhance the overall data mining experience.

### Administration

Installation, configuration, and administration have been significantly changed in SAS Enterprise Miner 7.1. The most important fact regards the required version of SAS. SAS Enterprise Miner 7.1 is a component of SAS 9.3 and will not function with any other SAS release.

System architecture changes aim to simplify the single user experience as well as to increase the scalability and conformity to standards of the multi-user experience. The foremost change regards the mid-tier technology: the SAS Analytics Platform server has been deprecated. The SAS Analytics Platform service is not used for any SAS 9.3 products or solutions. Existing deployments might disable and remove this service once the new installation is complete.

SAS Enterprise Miner 7.1 can be installed and configured in one of two modes. Both configurations are significantly changed for SAS 9.3:

- In *workstation* mode, SAS Foundation 9.3 and SAS Enterprise Miner 7.1 are deployed on a Microsoft Windows system in a single user configuration. This configuration is indicated for SAS Enterprise Miner Desktop, SAS Enterprise Miner Classroom, and SAS Enterprise Miner Workstation licenses. This deployment does not require the configuration step of the SAS Deployment Wizard and installing users should not select a configuration plan option. The workstation mode configuration does not require the SAS Metadata Server or the SAS Application Server. Installations based on SAS 9.2 and earlier did require those services. However, they can be removed if they are not required for any other SAS software.
- In *client / server* mode, SAS Foundation 9.3 and SAS Enterprise Miner 7.1 Server can be installed on a local or remote system for multi-user access. The SAS Web Infrastructure Platform is installed as mid-tier server. The SAS Enterprise Miner 7.1 client can be installed on a Microsoft Windows system, or can be started through Java Web Start by connecting your Internet browser to the SAS mid-tier.

### Migration

SAS Enterprise Miner stores data in three potential locations. Data in each location can be migrated to SAS 9.3.

- Configuration and user information stored in the SAS Metadata Server can be migrated using the SAS Migration Utility and the SAS Deployment Wizard.

- Data Mining project data does not need to be migrated if the SAS Server platform is not changed. If the platform is changed, (for example, from Microsoft Windows XP to Microsoft Windows 7), users should make use of the SAS Enterprise Miner Project Migration Macro available at [http://www.sas.com/apps/demosdownloads/emmigproj\\_PROD\\_sysdep.jsp?packageID=000738](http://www.sas.com/apps/demosdownloads/emmigproj_PROD_sysdep.jsp?packageID=000738) on the SAS Web site.
- Registered models can have included storage of the model package file on an industry standard WebDAV server. A client / server Enterprise Miner 7.1 installation includes the SAS Framework Server, which can be used for model package storage. If Enterprise Miner users change their WebDAV repository, they will need to archive and relocate their model package files manually.

## Enterprise Miner User Interface Enhancements

### Improved Integration

The main SAS Program Editor, Log, Output, and Graphs windows are integrated into a single tabbed dialog box interface. This change reduces window clutter inside the application.

### Project Log Window

A new Project Log window has been added that will display SAS log lines that are generated by the main application. This feature separates the system-generated log lines from the user-generated log lines. The Project Log window will be especially useful for providing system information and for performing debugging tasks.

### Library Explorer Window

The Library Explorer window now shows the contents of all diagram libraries in Read-Only mode. This change makes it easier for users to find detailed project data. The change also protects against accidental locking or alterations to system files.

### Diagram Workspace Log Viewer

Each Diagram Workspace window now includes a log viewer that shows the log lines that were generated by the diagram process. This feature makes it easier to trace diagram activity.

### Updated PMML

SAS Enterprise Miner 7.1 is now PMML 4.0 compliant.

### System \*.DMP File Association

Workstation mode Enterprise Miner 7.1 users can select and activate a data mining project file (\*.dmp) from the file system to start Enterprise Miner and load the selected data mining project.

### Local Project Model Import

In Enterprise Miner 7.1, the new local project model import feature enables you to move a project report package to a model import node in a diagram, in order to compare a new model to one that was previously packaged but not necessarily

registered. In prior releases of Enterprise Miner, you could import only registered models.

You can import model result packages in one of two ways:

- Drag and drop a model result package from the Enterprise Miner project tree to a process flow diagram, creating a model import node with the correct property values.
- Place a model import node on a process flow diagram, and then select a property that enables you to choose a model package from the project tree. The model package retains its existing property configurations.

### Mining Results Web Service

The Mining Results Web Service communicates with the SAS Metadata Server to get information about Enterprise Miner mining result models.

The Mining Results Web Service supports the following actions:

- Get list of models
- Search for model by partial value of some property
- Get details of a selected model
- Get details of list of models
- Get SPK file if available
- Register model from SPK file

## Rapid Predictive Modeler

SAS Rapid Predictive Modeler is a component of SAS Enterprise Miner that packages standard and best practice predictive model building diagrams for many scenarios within the SAS Enterprise Guide and SAS Add-in for Microsoft Office frameworks. This function has been enhanced with options for integrated scoring and data set output.

## Enhanced Enterprise Miner Nodes

### LARs Node

The LARs (Least Angle Regression) node for Enterprise Miner 7.1 now can model both interval and binary targets. If the target is binary, a logistic regression based on the linear combination of the selected variable is fitted. The LASSO (Least Absolute Shrinkage and Selection Operator) method for LARs has been augmented to handle binary variables.

### Decision Tree Node

The Decision Tree node for Enterprise Miner 7.1 has added two new properties to the Split Search grouping. The new properties determine whether to use PROC ARBOR *decision* information or PROC ARBOR *prior* information during tree split searches.

- **Use Decisions** indicates whether to use decision information (if present) during the split search. The default value is No.



- **Use Priors** indicates whether to use prior information (if present) during the split search. The default value is No.
- NODEID information has been integrated into the Tree diagrams in the Decision Tree Results browser.
- Decision Tree performs sampling before launching interactive training sessions. This makes a significant performance improvement during interactive training.
- The Interactive Decision Tree application provides a new subtree sequence feature that lets users select a subtree from a Decision Tree Assessment plot and use it as the current model.

### Scorecard Node

The Scorecard node for Enterprise Miner 7.1 adds a new property to the Adverse Characteristic grouping on the Scorecard property panel. The new property, **Generate Report**, is a binary setting that indicates whether the user wants adverse characteristics included in the score code. The **Generate Report** property identifies adverse characteristics for all exported observations.

If users set **Generate Report** to Yes, the additional report is included in the Scorecard node Results. The Adverse Characteristics report will be a bar chart. The report also generates three additional **adverse\_x** columns in the scored training table that the Scorecard node exports.

The Scorecard node Properties also has a new **Scaling Properties** group. The **Reverse Scorecard** property is a simple Boolean property with a default of No.

### IGN Node

The Interactive Grouping (IGN) Node for Enterprise Miner 7.1 includes a new method for performing grouping for input variables. The **Constrained Optimal** grouping method adds new values to both the **Interval Grouping Method** and **Ordinal Grouping Method** groups in the IGN Properties Panel, as well as several new supporting properties under **Constrained Optimal Options** and **Advanced Constrained Options**. This functionality extends previous grouping methods by surfacing several new constraints that must be met while determining the grouping definitions. It also provides users with the flexibility to assign constraints to individual variables one at a time.

### RPM Node

The Rapid Prototype Modeling (RPM) node has been enhanced to allow users to specify the RPM project name.

## New Enterprise Miner 7.1 Nodes

### Survival Node

The Enterprise Miner 7.1 Survival node performs survival analysis on mining customer databases when there are time-dependent outcomes. The data mining survival analysis is designed to implement *discrete time to event* multinomial logistic regressions that are additive and define the hazard and sub-hazard functions. In discrete time to event modeling, the event time represents the duration from the inception (start) time until the outcome date (event). The resulting event time is always a positive integer quantity.

The time effect is modeled with cubic splines to allow for flexible shapes of hazard functions. The proportional hazard function is fitted with no time varying covariates.

The Survival node includes functional modules to perform data preparation which includes censoring, data expansion to expand the data to one record for each customer per discrete time unit, sampling to reduce the expanded data set size for optimal data mining without information loss, and survival modeling, validation, reporting, and scoring.

### **Insurance Rate Making Node**

The new Ratemaking node uses a fast, highly scalable procedure that builds generalized linear models (GLMs). The node builds common distribution and link functions to build models for claim count (Poisson or negative binomial distribution with a log link function) and severity (gamma distribution with a log link function).

An implementation of the Tweedie distribution to model pure premium is available in the new Ratemaking node. There are several optimization techniques to choose from when using the Tweedie distribution. You can use an extended quasi-likelihood function to estimate the parameters of the model. A full likelihood implementation of the Tweedie distribution is available as well.

The analytical results that the Ratemaking node displays are specific to the insurance industry. For example, relativity plots for all log-link models are displayed for all input variables. Actual versus predicted count plots are available for count models such as the Poisson count model or a zero-inflated Poisson count model.

## **Experimental Enterprise Miner 7.1 Nodes**

### **SVM Node**

A support vector machine (SVM) is a supervised machine learning method that is used to perform classification and regression analysis. The SVM uses a hyperplane or a set of hyperplanes to separate points mapped on a higher dimensional space. The collections of data points that are used to construct the hyperplanes are called support vectors.

The Enterprise Miner 7.1 SVM node uses PRCC SVM and PROC SVMSCORE. The SVM node supports binary classification problems, including polynomial, radial basis function and sigmoid nonlinear kernels. The SVM node does not support multiclass problems or support vector regression.

### **Time Series Data Preparation Node**

The new Time Series Data Preparation node in Enterprise Miner enables users to manipulate transaction and time series data to facilitate time series data mining. The new node provides several types of time series data manipulation tools, including time interval definitions, data transformations and transpositions, data differencing, and missing value assignments.

### **Time Series Similarity Node**

The new Time Series Similarity node computes similarity measures for time-stamped data with respect to time using a dynamic time warping method. The tool does so by accumulating the data into a time series format, and then it computes similarity measures for sequentially ordered numeric data by respecting the ordering of the data.

The Time Series Similarity node also provides controls that enable modelers to specify parameters such as similarity measure, sequence sliding, normalization, interval, accumulation, similarity matrix, hierarchical clustering, as well as expanded and compressed sliding sequence ranges.

### Time Series Exponential Smoothing Node

The Time Series Exponential Smoothing node generates forecasts by using exponential smoothing models that have optimized smoothing weights for time series data.

Time Series Exponential Smoothing node offers forecasting models which include single exponential smoothing, double exponential smoothing, linear exponential smoothing, Damped Trend exponential smoothing, additive seasonal exponential smoothing, multiplicative seasonal exponential smoothing, Winters multiplicative method, and Winters additive method.

The Time Series Exponential Smoothing node also provides modelers with the ability to detect and replace outliers, to export some distance matrices, and to extend input time series to future values.

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## What's New in SAS Enterprise Miner 7.1 M1

### Overview

SAS Enterprise Miner 7.1M1 is a maintenance release for the SAS 9.3 system. This release updates and improves many aspects of the software and introduces a new set of changes and enhancements. It is recommended that customers apply the maintenance release to receive the best user experience.

The first maintenance release of SAS Enterprise Miner 7.1 includes the following new features and enhancements:

- support for high-performance data mining
- a new incremental response node
- enhancements to these nodes
  - Scorecard Node in Credit Scoring
  - Interactive Group node
  - Ratemaking node
  - Survival node
  - Multiplot node
- changes to the EM migration macro
- a new procedure for PMML scoring

### Support for High-Performance Data Mining

SAS has invested in developing a key set of statistical and data mining tasks that execute on a dedicated high performance appliance. The software will distribute

data, memory, and computations over a grid of systems producing dramatic improvements in large data scalability and run times. SAS Enterprise Miner 7.1M1 uses the SAS High Performance system for building predictive models. New procedures cover data binning, imputation, sampling, decisions, logistic and linear regressions, neural networks, random forests, scoring and transformations. New nodes integrate those functions into the Enterprise Miner environment. Contact your SAS sales team for more information.

## **New Incremental Response Node**

A new Incremental Response Node introduces modeling the marginal effect of a treatment on individual outcomes. The model answers questions such as which customers are more likely to purchase only due to a new sales campaign, rather than customers who would have purchased without the campaign. These customers are known as true responders. This new tool is experimental in this release.

## **Enhanced Nodes**

### **Scorecard Node in Credit Scoring**

The Scorecard Node adds the Accuracy Ratio to fit statistics and the corresponding Accuracy Profile Chart.

### **Interactive Grouping Node**

The user interface for the Interactive Grouping Node has been redesigned. The coarse detail and fine detail tabs have been consolidated to a single tab. This consolidation allows users to see and edit the relevant information without having to toggle between tabs.

### **Ratemaking Node**

A new property can be used to set the reference level for each variable and report the 95% Wald Confidence Limits in the Parameter Estimates table. The Relativity Plots include a new line band plot in which the upper and lower bound confidence intervals are displayed.

### **Survival Node**

Users can now choose to enter the cubic spline basis functions as part of the stepwise variable selection procedure in addition to the main effects.

### **Multiplot Node**

This node has been modified to provide an auto scroll function for plots. The node will automatically create plots for all input and target variables in your data set. The new control helps users cycle through the plots automatically to search for interesting patterns and relationships.

## **EM Migration Macro**

The behavior of the project migration macros has changed to make processing project data views optional. This avoids some situations that can display errors in the log that are not important to the project file migration process.

## PMML Scoring

A new procedure is available for scoring data based on models saved as PMML documents. PMML is a multi-vendor standard for encoding data mining models and is most used in scoring processes. This feature is experimental in this release. Contact SAS Technical Support for more information.

---

# What's New in SAS Enterprise Miner 12.1

## Overview

SAS Enterprise Miner 12.1 is the version of SAS Enterprise Miner that supersedes SAS Enterprise Miner 7.1M1, released in December 2011. The updated version numbering is a result of synchronizing analytical content among SAS data mining software releases. SAS Enterprise Miner 12.1 provides improvements and enhancements to the product's core user interface, as well as updates to the SAS Enterprise Miner Credit Scoring nodes, the SAS Enterprise Miner Application nodes, the Rapid Predictive Modeler (RPM) SAS Enterprise Miner add-on to SAS Enterprise Guide, and the SAS Enterprise Miner High Performance Data Mining nodes.

## SAS Enterprise Miner Core

- Several important and common SAS Enterprise Miner project properties have been promoted from macro variables that were deployed via SAS code or project start code to property selections that can be defined via the Enterprise Miner GUI properties panel.
- The SAS Enterprise Miner client can now be opened directly into a specific project or diagram, or from the most recent project and diagram.
- The %AA\_MODEL\_REGISTER macro has been added to enable users to directly register models that were developed in SAS code into the SAS Metadata Server. Once in SAS Metadata Server, the common model data can be accessed by SAS products such as SAS Model Manager, SAS Enterprise Guide, and SAS Data Integration Studio.
- The %AA\_MODEL\_EVAL macro has been added in order to compute lift and Receiver Operating Characteristic-type measures on any data set that contains probabilities and events. The %AA\_MODEL\_EVAL macro uses a two-stage approximation algorithm to calculate the model performance measures.
- Batch code from the SAS Enterprise Miner client can be used more easily with input tables of different names and locations. The SAS Enterprise Miner 12.1 batch code now integrates project start code that you can use to define libraries and options.
- The SAS Enterprise Miner SAS Code node for version 12.1 contains enhanced support for score code that contains SAS Procedure steps.
- PMML scoring for the Decision Tree, Regression, Neural Network, and Clustering nodes has been promoted to production status. New experimental

functions have been introduced for general regression and scorecards in the SAS Enterprise Miner 12.1 release.

## SAS Enterprise Miner Credit Scoring

- The Interactive Grouping node user interface has been redesigned to provide improved usability, performance, and computational scalability.
- The Interactive Grouping node has added a new **Calculated** variable role.
- The Scorecard node features an output variable that counts the number of adverse characteristics, and users can select named input variables for adverse characteristic reporting.
- The Scorecard node now processes indeterminate outcome values.

## SAS Enterprise Miner Applications

- The Gradient Boosting node now provides users with the capability to disable the H statistic calculation, resulting in improved run-time performance.
- The Incremental Response node has been promoted from experimental to production status.
- The Time Series Data Mining nodes have been promoted from experimental to production status. The production Time Series Data Mining nodes have been redesigned to provide greater ease of use as well as improved performance and scalability. It is no longer necessary to precede Time Series Data Mining nodes with a Time Series Data Preparation node. Time series data can now be processed with or without a numeric TimeID variable. Time Series Data Mining now supports sequence data. Season and Trend information is now extracted and included in Time Series Data Mining results..
- The Decision Tree output displays have been enhanced to display variable precision values in the split branches and nodes. This change improves the usability of the decision tree tool when mining with extremely large and extremely small values.

## Rapid Predictive Modeler (RPM)

- The neural network functions in the SAS Enterprise Miner Rapid Predictive Modeler (RPM) add-on for SAS Enterprise Guide have been revised. The new neural network functions provide a simplified architecture that is appropriate for business problems. The updated changes also improve the run-time performance of the RPM tool.

## Support for High Performance Data Mining

SAS is developing a key set of statistical and data mining tasks that execute on a dedicated high performance appliance. SAS High Performance (HP) software distributes data, memory, and computations over a grid of systems that produces dramatic improvements in large data scalability and run times. Enterprise Miner 12.1 uses the SAS High Performance system for building predictive models.

- All SAS Enterprise Miner High Performance data mining procedures have been enhanced with new features. The HPFOREST and HP4SCORE procedures have been promoted from experimental to production status. For more information about SAS High Performance Data Mining procedures, see the SAS Enterprise Miner documentation page at <http://support.sas.com/documentation/onlinedoc/miner/>.
- The score code generation macros have been deprecated, in favor of CODE statements on the relevant HP data mining procedures. The High Performance Impute node now supports Winsorized and Trimmed data calculations.
- A High Performance data mining Data Validation node has been added. The new High Performance Data Validation node provides users with the ability to assign data rows into training or validation partitions when training models for generalization.
- A High Performance Forest node has been added to facilitate modeling of highly nonlinear data.
- The High Performance Neural node has been enhanced with new architecture and generalization options.
- All High Performance data mining model nodes support missing values in class variables as a distinct level. This technique improves both model accuracy and model deployment.
- All High Performance data mining model nodes now report both training and validation data set fit statistics, as well as lift and Receiver Operating Characteristic (ROC) values.
- The set of High Performance data mining nodes can now be connected to more of the traditional SAS Enterprise Miner nodes.
- SAS Enterprise Miner High Performance procedures and data mining nodes have been enhanced with support for multi-byte international data sources.

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## What's New in SAS Text Miner 5.1

### Overview

SAS Text Miner 5.1 includes the following new features and enhancements:

- new text mining nodes
- replacement of the original Text Miner node
- additional supported languages
- new functionality for text mining nodes
- procedure change

## New Text Mining Nodes

### Overview of the New Text Mining Nodes

Two new nodes have been added in SAS Text Miner:

- Text Cluster Node
- Text Import Node

### Text Cluster Node

The **Text Cluster** node replaces the clustering functionality and the creation of the singular value decomposition in the original **Text Miner** node. The new node enables you to both cluster documents and experiment with different cluster settings without having to reparse the collection to see the updates.

### Text Import Node

The **Text Import** node enables you to create data sets from your own document collections or from a Web crawl, all from within the context of a SAS Enterprise Miner diagram.

## Replacement of the Original Text Miner Node

The **Text Miner** node that was available in previous releases of SAS Text Miner has now been replaced by the functionality in other SAS Text Miner nodes.

This release allows you to import diagrams from a previous release of SAS Text Miner that had a **Text Miner** node in the process flow diagram; however, new **Text Miner** nodes can no longer be created, and property values cannot be changed in imported **Text Miner** nodes.

## Additional Supported Languages

In addition to the languages supported in previous releases (Arabic, Chinese, Dutch, English, French, German, Italian, Japanese, Korean, Polish, Portuguese, Spanish, and Swedish), SAS Text Miner 5.1 also supports these languages: Czech, Danish, Finnish, Greek, Hebrew, Hungarian, Indonesian, Norwegian, Romanian, Russian, Slovak, Thai, Turkish, and Vietnamese.

**Note:** While custom entities are supported for the new languages, these languages do not come prepackaged with default entities. You can use SAS Concept Creation for SAS Text Miner to enable extraction, definition, and managing of custom entities for inclusion in text mining projects and analysis.

## New Functionality for Text Mining Nodes

### Export Synonyms from the Text Filter Node

You can create synonym data sets as you specify synonyms in the Interactive Filter Viewer.



## Import Synonyms to Use in the Text Filter Node

You can import synonyms into the **Text Filter** node using the **Import Synonyms** property.

## Improvements to Table Editing and Creating

Improvements include the ability to:

- sort columns
- insert and delete multiple rows

When a new row is added for user topics, a default weight is used.

## Text Filter Node and Text Topic Node Improvements

You can now edit any existing subset documents filter in the **Text Filter** node.

Both the **Text Filter** node and **Text Topic** node viewers allow you to find text (and find the next to cycle through all occurrences).

## Improvements to the Text Topic Viewer

The Text Topic Viewer includes the following improvements:

- Creates exactly the number of topics asked for (rather than that number or less)
- Exports raw rotated SVD topic values that are automatically set to be used by any predictive modeling nodes
- The 1/0 topic variables are still exported, and set to be automatically used by the **Segment Profiler** node.
- Automatically generated document cutoff values now have much less than half the documents in a given topic, and user-specified term and document cutoff values are now remembered whenever the **Text Topic** node is rerun.

## Procedure Change

The DOCPARSE procedure has been replaced by the TGPARSE procedure. If you currently use the DOCPARSE procedure, you will need to modify your code to use the TGPARSE procedure.

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# What's New in SAS Text Miner 12.1

## Overview

SAS Text Miner 12.1 includes the following new features and enhancements:

- new Text Rule Builder node
- enhancements to Text Mining nodes
- new sample data set

For more information, see <http://support.sas.com/software/products/txtminer>.

## New Text Rule Builder Node

The new **Text Rule Builder** node enables you to do predictive modeling directly from the term-by-document matrix, thereby allowing user-assisted or “active” learning. You can use the **Text Rule Builder** node to create rules that can be exported to SAS Content Categorization Studio.

## Enhancements to Text Mining Nodes

Improvements to previously existing text mining nodes include enhancements to the **Text Filter** node and viewer, the **Text Topic** node and viewer, and the **Text Cluster** node.

## New Sample Data Set

The AFINN\_SENTIMENT data set in the SAMPSIO library is new in this release. It is adapted from the AFINN sentiment publically available English sentiment lexicon. It contains two topics, ‘Positive Tone’ and ‘Negative Tone’, that can be used as User Topics in the **Text Topic** node. The AFINN\_SENTIMENT data set contains information from the [AFINN sentiment database](#), which is made available under the [Open Database License](#).

# 16

## SAS/ETS

<b><i>What's New in SAS/ETS 9.3</i></b> .....	<b>162</b>
Overview .....	162
AUTOREG Procedure .....	162
COPULA Procedure (Experimental) .....	163
ESM Procedure .....	163
SAS/ETS Model Editor Application (Experimental) .....	163
PANEL Procedure .....	164
SASECRSP Engine .....	164
SASEFAME Engine .....	164
SASEHAVR Engine .....	164
SASEXCCM Engine (Experimental) .....	164
SEVERITY Procedure .....	165
SSM Procedure (Experimental) .....	166
TCOUNTREG Procedure (Experimental) .....	167
X12 Procedure .....	167
<b><i>What's New in SAS/ETS 12.1</i></b> .....	<b>169</b>
Overview .....	169
Highlights of Changes and Enhancements .....	169
Highlights of Enhancements in SAS/ETS 9.3 .....	170
AUTOREG Procedure .....	170
COUNTREG Procedure .....	170
MODEL Procedure .....	171
PANEL Procedure .....	172
QLIM Procedure .....	172
SASECRSP Interface Engine .....	173
SASEXCCM Interface Engine .....	173
SASEXFSI Interface Engine .....	173
SEVERITY Procedure .....	173
SSM Procedure (Experimental) .....	175
TCOUNTREG Procedure (Experimental) .....	175
TIMEDATA Procedure (Experimental) .....	175
X12 Procedure .....	175
References .....	176

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## What's New in SAS/ETS 9.3

### Overview

This chapter summarizes the new features available in SAS/ETS 9.3.

If you have used SAS/ETS procedures in the past, you can review this chapter to learn about the new features that have been added. When you see a new feature that might be useful for your work, see the appropriate chapter in the *SAS/ETS User's Guide* to read about the feature in detail.

### Highlights of Changes and Enhancements

The following new procedures have been added to SAS/ETS software:

- COPULA procedure (experimental)
- SSM procedure (experimental)
- SASEXCCM interface engine (experimental)

New features have been added to the following SAS/ETS components:

- AUTOREG procedure
- ESM procedure
- PANEL procedure
- SASEFAME interface engine
- SASEHAVR interface engine
- SASECRSP interface engine
- SEVERITY procedure
- TCOUNTREG procedure
- X12 procedure

The SAS/ETS Model Editor application, provided with SAS/ETS 9.22 as an experimental interactive graphical user interface for the MODEL procedure, is deprecated and no longer documented in the *SAS/ETS User's Guide*.

### Highlights of Enhancements in SAS/ETS 9.22

Users who are updating directly to SAS/ETS 9.3 from a release prior to SAS/ETS 9.22 can find information about the SAS/ETS 9.22 changes and enhancements in the chapter "What's New in SAS/ETS for SAS 9.22" in the *SAS/ETS 9.22 User's Guide* (see [http://support.sas.com/documentation/cdl/en/etsug/63348/HTML/default/whatsnew\\_toc.htm](http://support.sas.com/documentation/cdl/en/etsug/63348/HTML/default/whatsnew_toc.htm)).

### AUTOREG Procedure

The AUTOREG procedure now supports heteroscedasticity consistent covariance matrix estimators (HCCME), which consistently estimate the covariance matrix even

when the heteroscedasticity structure might be unknown or misspecified. Five forms of HCCMEs are supported: the plain sandwich form (HC0), the degrees-of-freedom-adjustment form (HC1), two types of leverage-adjustment forms (HC2 and HC3), and the high-leverage-adjustment form (HC4).

## COPULA Procedure (Experimental)

The new experimental COPULA procedure enables you to simulate realizations or estimate parameters of multivariate distributions by using the copula approach. This approach is based on the fact that a typical multivariate distribution contains information about both the marginal behavior of individual random variables and also about the dependence structure between them. The COPULA procedure enables you to decouple these two effects and model the dependence structure of random variables by linking their cumulative distribution function (CDF) to a vector of their marginal CDFs as described by the Sklar's Theorem.

The COPULA procedure supports the following types of distributions:

- normal distribution
- *t* distribution
- Clayton distribution
- Gumbel distribution
- Frank distribution

The COPULA procedure can both estimate the parameters of copula models from data by using maximum likelihood and simulate random data from copula distributions by using either estimated or specified model parameters. The FIT statement is used for model estimation, and the SIMULATE statement is used for simulation. The PLOTS option in the FIT or SIMULATE statement provides various ODS Graphics plots that help you analyze the underlying data.

## ESM Procedure

New ODS plots and plot options are available for the ESM procedure. You can plot the periodogram for the error series or a combined periodogram and spectral density estimate plot.

## SAS/ETS Model Editor Application (Experimental)

An experimental version of a new interactive application, the SAS/ETS Model Editor, was introduced with SAS/ETS 9.22. The SAS/ETS Model Editor enables you to use the powerful features of PROC MODEL through an interactive graphical user interface.

Based on experience with the experimental version in SAS/ETS 9.22, plans for GUI features to enable easier use of the MODEL procedure are being reconsidered. This experimental SAS/ETS Model Editor application is still available with SAS/ETS 9.3. However, because design changes are anticipated, documentation for this application is not included in the *SAS/ETS 9.3 User's Guide*. Please refer to the *SAS/ETS 9.22 User's Guide* if you want to use the experimental version of the SAS/ETS Model Editor.

## PANEL Procedure

The heteroscedasticity consistent covariance matrix estimator (HCCME) was enhanced by adding the CLUSTER option for the plain sandwich form (HC0), the degrees-of-freedom-adjusted form (HC1), and two types of leverage-adjusted estimators (HC2 and HC3). The CLUSTER option enables you to calculate a cluster-corrected covariance matrix and provides cluster-adjusted standard errors for parameter estimates.

## SASECRSP Engine

The SASECRSP interface engine enables you to access and process time series, events, portfolios, and group data that reside in CRSPAccess (2.99 and earlier) legacy databases.

It also provides a seamless interface between CRSP, COMPUSTAT, and SAS data processing. Currently, SASECRSP supports access of CRSP Stock databases, CRSP Indices databases, and CRSP/Compustat Merged databases.

The following enhancement has been made to the SASECRSP access engine:

- Support has been added for Solaris (SUNOS5.10).

## SASEFAME Engine

The SASEFAME interface engine provides a seamless interface between Fame and SAS data to enable SAS users to access and process time series, case series, and formulas that reside in a Fame database. The following enhancements have been made to the SASEFAME access engine for Fame databases:

- Support has been added for 64-bit Windows.
- Support has been added for AIX.
- The SASEFAME interface uses FAME 10.

## SASEHAVR Engine

The SASEHAVR interface engine is a seamless interface between Haver and SAS data processing that enables you to read economic and financial time series data that reside in a Haver Analytics DLX (Data Link Express) database. The following enhancements have been made to the SASEHAVR access engine for Haver Analytics databases:

- Support has been added for 64-bit Windows.

## SASEXCCM Engine (Experimental)

The new experimental SASEXCCM interface engine enables you to access the CRSP/Compustat Merged Database (CCM), created from data delivered via Compustat's Xpressfeed product, and the CRSP Stock, Indices, and Treasury Databases. SASEXCCM provides a seamless interface for CRSP, Compustat, and SAS data processing. The following new features are provided by the SASEXCCM interface:

- SETID= option supports item handling data access to CRSPAccess (300 and up) databases with the designated set identifier, including `setid=250`.
- PERMNO= option enables you to select based on `permno`, a primary keytype for CRSP Stock data.
- PERMCO= option enables you to select based on `permco`, a keytype for CRSP data.
- CUSIP= option enables you to select based on `cusip`, a keytype for CRSP data.
- HCUSIP= option enables you to select based on `historical cusip`, a keytype for CRSP data.
- SICCD= option enables you to select based on `siccd`, a keytype for CRSP data.
- TICKER= option enables you to select based on `ticker`, a keytype for CRSP data.
- GVKEY= option enables you to select based on `gvkey`, a primary keytype for COMPUSTAT data.
- INDNO= option enables you to select based on `indno`, a primary keytype for CRSP Indices data.
- ITEMLIST= option specifies the data items to be selected for access. This option accepts a string in standard CRSP notation.

## SEVERITY Procedure

The SEVERITY procedure was experimental in SAS/ETS 9.22. PROC SEVERITY is now production status. The following new features and updates have been added to the SEVERITY procedure:

- The following updates have been made to the syntax:
  - The MODEL statement is now replaced with LOSS and SCALEMODEL statements. The LOSS statement specifies the response variable along with any censoring and truncation information. The SCALEMODEL statement specifies the regressor variables. The model-fitting options that were specified in the MODEL statement in SAS/ETS 9.22 should now be specified in the PROC SEVERITY statement.
  - You can now specify multiple distributions in one DIST statement. You can also use a keyword to specify a group of distributions. The syntax for specifying initial parameter values of a distribution has also been updated. If you do not specify a DIST statement, then PROC SEVERITY produces only the empirical CDF estimates and does not fit all predefined distributions by default.
- You can specify the number of occurrences for each observation by using the new FREQ statement.
- You can specify left-censoring and right-truncation by using the new LEFTCENSORED= and RIGHTTRUNCATED= options in the LOSS statement.

The method of specifying censoring has been updated. Instead of using the indicator variable, you now specify censoring by using a variable that contains the censoring limit. This enables you to specify interval-censored data; that is, data in which observations are both right-censored and left-censored.

For interval-censored data, PROC SEVERITY uses Turnbull's method to estimate the empirical distribution function (EDF). Implementation of Turnbull's EDF estimation method is an experimental feature in SAS/ETS 9.3.

- Two predefined versions of Tweedie distributions, TWEEDIE and STWEEDIE, can be fitted with PROC SEVERITY. The TWEEDIE distribution has the more popular parameterization with mean, dispersion, and index parameters. The STWEEDIE distribution has an alternative parameterization with scale, Poisson mean, and index parameters. The STWEEDIE distribution can be used for analyzing regression effects.
- You can estimate parameters by minimizing your own objective function, which can be specified using SAS programming statements. You can use various keyword functions in your SAS program, which are internally expanded by PROC SEVERITY with distribution-specific or problem-specific versions.

**Note:** This is an experimental feature in SAS/ETS 9.3.

- You can now compute quantile and limited moment for any distribution fitted with PROC SEVERITY by using the two new functions, INVCDF and LIMMOMENT, respectively. These functions are accessible in a PROC FCMP step.

## SSM Procedure (Experimental)

The new experimental SSM procedure enables linear state space modeling of time series and longitudinal data. An important feature of the SSM procedure is a modeling language that permits easy specification of possibly complex state space models. In particular, the system matrices, such as the state transition matrix and the covariance of the state disturbance, can be time-varying and their elements can depend on user-specified parameters in a complex way. Often a state space model can be specified by combining simpler submodels. This modeling language is especially suited for specification of such models. The following list identifies the key features of the SSM procedure:

- Many commonly needed state space models, such as the basic univariate and multivariate structural time series models, can be easily specified using a few keywords. Similarly, models for panel data can also be easily specified.
- The unknown model parameters are estimated by (restricted) maximum likelihood and a variety of likelihood-based information criteria are reported for model diagnostics.
- One-step-ahead and full-sample estimates of various state effects (linear combinations of the underlying state vector) and one-step-ahead residuals can be output to a data set. In particular, model-based forecasts, backcasts, interpolated missing values of the response variables, and the estimates of the latent effects such as trend, cycles, and seasonals, can be output to a data set. These estimates are generated by using the Kalman filtering and smoothing algorithm.
- State space modeling is commonly used for the analysis of regularly spaced univariate and multivariate time series data. In fact, state space modeling is quite useful for irregularly spaced, possibly with replicate measurements, longitudinal data also. An important feature of the SSM procedure is that it enables analysis of such longitudinal data, in addition to the regularly spaced univariate and multivariate time series data. Several trend models suitable for longitudinal data analysis can be easily specified using a few keywords.



## TCOUNTREG Procedure (Experimental)

The new experimental TCOUNTREG procedure is an transitional version of the COUNTREG procedure. It includes all features of the COUNTREG procedure. In addition to features implemented in the COUNTREG procedure, PROC TCOUNTREG provides the following new features:

- Two new variable selection methods are provided. The greedy search method can be used either with the forward or backward selection. In each step, the AIC or BIC criterion is evaluated, and the selection continues until the selection criterion is met. The second method uses the penalized likelihood approach to select significant variables. This method is not path-dependent as in the case of greedy search, which falls into the family of LASSO estimators. Using the penalized likelihood method, PROC TCOUNTREG fits a model to the set of all candidate variables and evaluates it simultaneously to find a subset of best-fitting variables.
- Several conditional (fixed- and random-effect) count panel data models have been added to the TCOUNTREG procedure. The unconditional panel fixed-effect models can be easily estimated in the TCOUNTREG procedure by using the CLASS statement and the dummy variable approach. This technique is relatively simple but is suitable only for a model with small number of cross sections. If the number of cross sections is large, a conditional model is typically preferred to overcome the incidental parameters problem. The TCOUNTREG procedure enables you to estimate the following types of models:
  - Poisson regression model with fixed and random effects
  - negative binomial regression model with fixed and random effects

## X12 Procedure

The following new features have been added to the X12 procedure:

- The PLOTS option in the PROC X12 statement now includes forecast plots. You can now request four different plots for the forecast series on the original scale, and if the series is transformed, on the transformed scale. The following values can be specified in PLOTS=FORECAST(*value-list*):

### FORECAST

plots the actual time series and its one-step-ahead forecasts over the historical period, and plots the forecast and its confidence bands over the forecast horizon.

### FORECASTONLY

plots the forecast and its confidence bands over the forecast horizon only.

### MODELS

plots the one-step-ahead model forecast and its confidence bands in the historical period.

### MODELFORECASTS

plots the one-step-ahead model forecast and its confidence bands in the historical period, and plots the forecast and its confidence bands over the forecast horizon.

**TRANSFORECAST**

plots the transformed time series and its one-step-ahead forecast over the historical period, and plots the forecast and its confidence bands over the forecast horizon.

**TRANSFORECASTONLY**

plots the forecast of the transformed series and its confidence bands over the forecast horizon only.

**TRANSMODELS**

plots the one-step-ahead model forecast of the transformed series and its confidence bands in the historical period.

**TRANSMODELFORECASTS**

plots the one-step-ahead model forecast of the transformed series and its confidence bands in the historical period, and plots the forecast and its confidence bands over the forecast horizon.

- The following new values are available in the PRINT= option in the AUTOMDL statement:

**ALL**

specifies that all automatic modeling output be displayed.

**NONE**

suppresses all display of automatic modeling output.

**ONLY**

specifies that only the requested automatic modeling tables be displayed.

- The following new options are available in the FORECAST statement:

**NBACKCAST=**

specifies the number of periods to backcast for regARIMA extension of the series. Backcasting has been shown to improve seasonal adjustment for short series.

**OUT1STEP**

specifies that the one-step-ahead forecasts be computed and displayed in addition to the multistep forecasts. The one-step-ahead forecasts and associated statistics are useful in evaluating the ARIMA model.

**OUTBACKCAST**

includes backcasts in certain tables that are sent to the output data set.

**OUTFORECAST**

includes forecasts in certain tables that are sent to the output data set. This option is an alias of the OUTFORECAST option in the X11 statement.

- The FINAL=USER option in the X11 statement specifies that user-defined regressors are to be removed from the final seasonally adjusted series.
- The YEARSEAS option in the OUTPUT statement specifies that variables containing values for year and season are included in the OUT= data set. These values are useful when creating seasonal plots.
- An auxiliary variable has been added to forecast data sets that are available through ODS OUTPUT. The variable `_SCALE_` indicates whether the observation refers to the original series, "Original," or the transformed series, "Transformed." The variable helps you subset the output when the series is transformed.

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## What's New in SAS/ETS 12.1

### Overview

This chapter summarizes the new features available in SAS/ETS® 12.1 software.

If you have used SAS/ETS procedures in the past, you can review this chapter to learn about the new features that have been added. When you see a new feature that might be useful for your work, turn to the appropriate chapter to read about the feature in detail.

In previous years, SAS/ETS® software was updated only with new releases of Base SAS® software, but this is no longer the case. This means that SAS/ETS software can be released to customers when enhancements are ready, and the goal is to update SAS/ETS every 12 to 18 months. To mark this newfound independence, the release numbering scheme for SAS/ETS is changing with this release. This new numbering scheme will be maintained when new versions of Base SAS and SAS/ETS ship at the same time. For example, when Base SAS 9.4 is released, SAS/ETS 13.1 will be released.

### Highlights of Changes and Enhancements

The following procedure and interface engine have been added to SAS/ETS software:

- TIMEDATA Procedure
- SASEXFSI Interface Engine

New features have been added to the following SAS/ETS components:

- AUTOREG Procedure
- COUNTREG Procedure
- MODEL Procedure
- PANEL Procedure
- QLIM Procedure
- SASECRSP Interface Engine
- SASEXCCM Interface Engine
- SEVERITY Procedure
- SSM Procedure
- TCOUNTREG Procedure
- X12 Procedure

## Highlights of Enhancements in SAS/ETS 9.3

Users who are updating directly to SAS/ETS 12.1 from a release prior can find information about the SAS/ETS 9.3 changes and enhancements in the chapter "What's New in SAS/ETS" in the *SAS/ETS 9.3 User's Guide*.

### AUTOREG Procedure

The following features have been added to the AUTOREG procedure:

- The heteroscedasticity- and autocorrelation-consistent (HAC) covariance matrix estimator is supported, which consistently estimate the covariance matrix even when the heteroscedasticity and autocorrelation structure might be unknown or misspecified. Five types of kernel functions—Bartlett, Parzen, quadratic spectral, truncated, and Tukey-Hanning kernels—are supported. The bandwidth parameter can be estimated using the Andrews (1991) method, the Newey and West (1994) method, or a flexible equation based on sample size. The prewhitening feature and adjustment of degrees of freedom are supported. The well-known Newey-West estimator is also supported.
- Multiple structural change tests proposed by Bai and Perron (1998) are supported. Specifically, these are the test of no break versus a fixed number of breaks ( $supF$  test); the equal and unequal weighted versions of double maximum tests of no break versus an unknown number of breaks given some upper bound ( $UDmaxF$  test and  $WDmaxF$  test); and the test of  $l$  versus  $l + 1$  breaks ( $supF_{l+1|l}$  test). The tests can be applied to both pure and partial structural change models. The p-value of each test, based on the simulation of the limiting distribution, and the confidence intervals of parameter estimators, including the break dates, are also provided. The constraints on the distribution of the errors and regressors across segments can be imposed. For estimating the covariance matrix the HAC estimator is supported.
- The Shin cointegration tests with p-values are supported.
- The p-values for the ERS optimal point unit root test, ERS DF-GLS unit root test, and KPSS unit root test are provided.
- The status of ERS and Ng-Perron unit root tests changed from experimental to production.

### COUNTREG Procedure

The following new features have been added to the COUNTREG procedure:

- A new variable selection method is provided. The greedy search method can be used with either forward selection or backward elimination. In each step, the AIC or BIC criterion is evaluated, and the selection continues until the selection criterion is met.
- Multiple MODEL statements are supported. This enables multiple count models to be fitted under one PROC COUNTREG call.

## MODEL Procedure

The following features have been added to the MODEL procedure:

- The OPTIMIZE option has been added to the SOLVE statement to permit the simulation of models that include constraints on the solve variables in the model program's system of equations. Upper and lower bounds on the solve variables can be imposed by using the BOUNDS statement, and linear or nonlinear constraints on functions of the solve variables can be imposed by using the RESTRICT statement. The OPTIMIZE option limits the solution space for simulations to the feasible region defined by constraints. When no feasible solution exists for a problem, information about how the constraints were violated are included in the OUT= data set if the OUTOBJVALS or OUTVIOLATIONS option is specified. The OPTIMIZE solution method computes constrained solutions by casting the simulation problem into a nonlinear optimization problem then solving the optimization problem.
- Diagnostic reports that summarize the occurrence of missing values in both estimation(FIT) and simulation(SOLVE) steps have been added to the MODEL procedure. The new REPORTMISSINGS option generates tables that describe which variables in the model and which observations in the DATA= data set contribute missing values within FIT, or SOLVE calculations. The REPORTMISSINGS option produces output that is easier to interpret when debugging model and data specification problems than the ObsUsed table, which often lacks sufficient detail, or the PUT statement, which can produce too much output. The amount of diagnostic information that the REPORTMISSINGS tables include can be limited by using the MAXERRORS= option. The tables that the REPORTMISSINGS option produces can also attribute missing quantities in the model program to missing values of independent variables in the DATA= data set.
- The ANALYZESEP= option has been added to the MODEL procedure to provide more information on the nature of misspecification errors in simulations. When the system of equations specified in a SOLVE step does not consistently determine the solve variables, the system is partitioned into those equations that overdetermine, underdetermine, and consistently determine the solve variables. The partitioning of equations and solve variables is performed by using a Dulmage-Mendelsohn (Dulmage and Mendelsohn, 1958) decomposition of the system, which is invariant to the order in which equations and variables are specified. You can display the partitioning of the system graphically by using the BLOCK plot option in the ANALYZESEP= option.
- The BLOCK and DETAILS options for visualizing the dependency structure among equations and variables within a model program have been improved. General form equations can now be analyzed and incorporated in the dependency analysis. Also, you can produce a graphical representation of the dependence of equations on solve variables by using the DETAILS option in the ANALYZESEP= option. The new dependency plot can display the relationship among many more equations and variables than was previously possible by using the DepStructure table. You can also customize the dependency plot to depict a subset of the equations and variables in the model by using the new EQGROUP and VARGROUP statements.
- Three new copula options have been added to the MODEL procedure. Monte Carlo simulations can now use the CLAYTON, GUMBEL, and FRANK Archimedean copulas to specify the correlation structure among model equations in multivariate simulations.

## PANEL Procedure

The following features have been added to the PANEL procedure:

- The panel unit root tests have been added to test the hypothesis of a unit root. Several different specifications including six groups of deterministic variables, lag specifications, and kernel and bandwidth specifications can be calculated for each test. The tests include the following:
  - Breitung's unbiased tests
  - Hadri's stationarity test
  - Harris and Tzavalis test
  - Im, Pesaran, and Shin test
  - Levin, Lin, and Chu test
  - Maddala and Wu and Choi combination tests
- Poolability tests for panel data models including F test and LR tests
- The heteroscedasticity- and autocorrelation-consistent (HAC) covariance matrix estimator is supported, which consistently estimates the covariance matrix even when the heteroscedasticity and autocorrelation structure might be unknown or misspecified. Five types of kernel functions—Bartlett, Parzen, quadratic spectral, truncated, and Tukey-Hanning kernels—are supported. The bandwidth parameter can be estimated with the Andrews method, Newey-West method, and sample size based method, or a fixed value for the bandwidth can be provided. The prewhitening feature is also available with the HAC option. The well-known Newey-West estimator is also supported.

## QLIM Procedure

The following features have been added to the QLIM procedure:

- Bayesian Estimation Features. Most of the univariate models available in the QLIM procedure can be estimated in a Bayesian framework with the BAYES statement. The main features are as follows:
  - possibility of choosing the prior distributions through the PRIOR statement
  - several tools to control and optimize the initialization and the tuning phase
  - multithreaded Metropolis sampling
  - convergence diagnostic tools: Raftery-Lewis, Heidelberger-Welch, Geweke, effective sample size
  - prior and posterior predictive analysis
- Heckman Selection Model – Two-Step Estimator. The QLIM procedure now supports Heckman's two-step estimation method, as an alternative to maximum likelihood estimation of selection models. The standard errors of the second-step OLS estimates are corrected for consistency by default. However, if the uncorrected ones are requested for testing purposes, they are available with the UNCORRECTED option.
- A new variable selection method. The greedy search method can be used with either forward selection or backward elimination. In each step, the AIC or BIC

criterion is evaluated, and the selection continues until the selection criterion is met.

- ODS Graphics plots for Bayesian and frequentist estimation methods. For the frequentist framework, the QLIM procedure can produce a graphical representation of the output that is produced with the OUTPUT statement. For the Bayesian approach, the QLIM procedure can produce the plots of the prior and the posterior predictive analysis.

## SASECRSP Interface Engine

The SASECRSP interface engine for SAS/ETS 12.1 now supports Linux X86(32-bit), Linux X64 (64-bit), Solaris Sun Ultra Sparc, Solaris on Intel x86, and both 32-bit and 64-bit Windows.

## SASEXCCM Interface Engine

The SASEXCCM interface engine is now production status for CCM, STK, and IND access. The TRS access is not supported for this release. The SASEXCCM interface engine supports Linux X86 (LNX), Linux X64 (LAX), Solaris X64 (SAX), Solaris SPARC (S64), and both 32-bit Windows (W32) and 64-bit Windows (WX6).

## SASEXFSM Interface Engine

The new SASEXFSM interface engine enables SAS users to access FactSet data that are provided by the FactSet FASTFetch Web service. This service provides access to a number of data libraries from economic and financial data sources such as Aspect Huntley Fundamentals, Compustat, Dun and Bradstreet Corporation, FactSet, Ford Equity Research, Reuters, SEDAR, Toyo Keizai, Value Line, Worldscope, CEIC, EuroStat, Global Insight, IMF International Financial Statistics, INDB Main Economic Indicators, Markit Economics, OECD, ONS (UK Office for National Statistics), U.S. Consumer Confidence Survey, Thomson Analytics Insider Trading, Trucost Environmental, SIC, and WM/Reuters.

## SEVERITY Procedure

The following features and updates have been added to the SEVERITY procedure:

- Estimation algorithms have been modified to use multiple threads of execution in parallel, which enables PROC SEVERITY to fully utilize all the CPU cores of the machine where it is being run to complete the estimation tasks significantly faster.
- A new plot, the Q-Q plot, has been added. You can request this plot by specifying the PLOTS=QQPLOT or PLOTS=ALL option in the PROC SEVERITY statement. For a distribution named `dist`, the quantile for a given value of the cumulative distribution function (CDF) is computed either by evaluating the `dist_QUANTILE` function, if it is defined for the distribution, or by inverting the `dist_CDF` function of the distribution.
- Standard errors and confidence intervals are now available for the empirical distribution function (EDF) estimates. They are written to the OUTCDF= data set. If you specify the PLOTS=CDFPERDIST option, then the lower and upper confidence limits of EDF estimates are plotted in the CDFDistPlot plots. You can specify the confidence level for the confidence interval by specifying the new

EDFALPHA= option in the PROC SEVERITY statement. For standard EDF estimators (no censoring or truncation), the standard errors are computed using the normal approximation. For Kaplan-Meier and modified Kaplan-Meier estimators (truncation with one type of censoring), Greenwood's formula is used. For Turnbull's estimator (both types of censoring with or without truncation), standard errors are computed from the estimate of the covariance matrix that is computed by inverting the Hessian matrix of Turnbull's nonparametric log-likelihood. If the Hessian matrix is singular or results in missing values for the standard errors of any of the intervals, then the normal approximation method is used.

- If you specify the SCALEMODEL statement, then the scale of the distribution depends on the values of regressors. For a given distribution family, each observation implies a different scaled version of the distribution. PROC SEVERITY needs to construct a single representative distribution from all such distributions in order to compute estimates of CDF and the probability density function (PDF) that are comparable across different distribution families. Prior to this release, the representative distribution was constructed as the weighted mixture of distributions implied by all observations. For that method, estimation of CDF or PDF for one observation requires  $O(N)$  computations, where  $N$  denotes the total number of observations. So estimation of CDF or PDF for all  $N$  observations requires  $O(N^2)$  computations, which can dominate the runtime of PROC SEVERITY even for moderately large values of  $N$ . Starting with this release, you can specify the new DFMIXTURE= option in the SCALEMODEL statement to choose one of four methods to construct the representative mixture distribution. The prior method is used when you specify DFMIXTURE=FULL option. The default method is DFMIXTURE=MEAN, which uses a distribution with scale equal to the mean of  $N$  scale values. It is significantly faster than the FULL method. The other two methods construct a mixture of  $K$  distributions each with one of  $K$  scale values, which are either the  $(K + 1)$ -quantiles from the sample of  $N$  scale values (DFMIXTURE=QUANTILE) or the scale values implied by  $K$  randomly chosen observations (DFMIXTURE=RANDOM). For  $K \ll N$ , the QUANTILE and RANDOM methods can be significantly faster than the FULL method.
- The DIST statement now supports two more keywords in addition to the \_PREDEFINED\_ keyword. If you specify the \_USER\_ keyword, then PROC SEVERITY includes all the custom distributions that you have defined in the libraries specified in the CMPLIB= system option. The \_ALL\_ keyword includes all the predefined distributions and your custom distributions. It also includes the Tweedie and scaled-Tweedie distributions that are not included by the \_PREDEFINED\_ keyword. The DIST statement also has two new options, LISTONLY and VALIDATEONLY. The LISTONLY option lists the names of the distributions that you have specified in the DIST statement and the distributions implied by any keywords that you specify. This option is especially useful in conjunction with the keywords. The VALIDATEONLY option validates all the specified distributions and writes the distribution's information to the OUTMODELIFO= data set and a new ODS table, DistributionInfo. This option is especially useful in conjunction with your custom distributions, because it enables you to check whether the definitions of the functions and subroutines that make up your distribution satisfy PROC SEVERITY's requirements.



## SSM Procedure (Experimental)

The following features have been added to the SSM procedure:

- A trend component that satisfies a two-factor (nonseasonal and seasonal) ARIMA(p,d,q)(P,D,Q)s model can be specified.
- A state subsection that satisfies a first-order, vector ARMA model—VARMA(p,q) with  $0 \leq p \leq 1$  and  $0 \leq q \leq 1$ —can be specified.
- Diagnostic plots are available for residual analysis and structural break analysis.
- New printing options enable printing of series and component forecasts and smoothed estimates. In addition, you can print estimated system matrices.
- A table that identifies extreme additive outliers is printed. Additionally, structural breaks that are associated with state shocks can also be printed.
- A new option, MATCHPARM, in the TREND statement simplifies parameter specification when the CROSS= option is specified.
- New options enable finer control over the nonlinear optimization of the likelihood in the parameter estimation phase.

## TCOUNTREG Procedure (Experimental)

The experimental TCOUNTREG procedure is a transitional version of the COUNTREG procedure. The following features have been added to the TCOUNTREG procedure:

- ODS Graphics plots are provided. The TCOUNTREG procedure can produce plots of various important predictive functions as well as model diagnostics.
- A new variable selection method is provided. The greedy search method can be used with either forward selection or backward elimination. In each step, the AIC or BIC criterion is evaluated, and the selection continues until the selection criterion is met.

## TIMEDATA Procedure (Experimental)

The new TIMEDATA procedure can process large amounts of time-stamped data, can form time series from time-stamped data, and provides a programming facility for time series data.

## X12 Procedure

The following features have been added to the X12 procedure:

- The PICKMDL statement. The PICKMDL statement causes the X12 procedure to automatically select a regARIMA model from a list of candidate models defined by the user in the MDLINFOIN= data set. The METHOD= option in the PICKMDL statement controls how the model selection is performed. The selected regARIMA model then extends the time series prior to performing the X-12-ARIMA seasonal adjustment. The PICKMDL statement is experimental for this release.

- The SEATSDECOMP statement. The SEATSDECOMP statement first computes the B1 series by using the X-12-ARIMA method and then performs a seasonal adjustment of the B1 series by using the SEATS decomposition method. SEATS is a polynomial-based seasonal decomposition method developed by Gomez and Maravall (1997a, 1997b). You can write the resulting components to a data set by specifying the OUT= option in the SEATSDECOMP statement. The SEATSDECOMP statement is experimental in this release.
- The NOAPPLY option has been added as a general option to the REGRESSION statement. The NOAPPLY option specifies whether specific regression effects are to be included in the B1 series that is seasonally adjusted.
- The AICTEST option has been added as a general option to the REGRESSION statement. The AICTEST option enables you to specify a regression effect, but the effect is not included in the regARIMA model unless the results of an AIC test determine that the effect should be included in the model. Thus, the AICTEST option can be used to automatically select regressors for the regARIMA model.

## References

- Dulmage, A. L. and Mendelsohn, N. F. (1958), "Coverings of Bipartite Graphs," *Canadian Journal of Mathematics*, 10, 517–534.
- Gomez, V. and Maravall, A. (1997a), *Guide for Using the Programs TRAMO and SEATS*, Beta Version, Banco de España.
- Gomez, V. and Maravall, A. (1997b), *Program TRAMO and SEATS: Instructions for the User*, Beta Version, Banco de España.

# 17

## SAS/Genetics

<i>What's New in SAS/Genetics 9.3</i> .....	177
Overview .....	177
INBREED Procedure .....	177
<i>What's New in SAS/Genetics 12.1</i> .....	177
Overview .....	177

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### What's New in SAS/Genetics 9.3

#### Overview

SAS/Genetics includes a new option in the INBREED procedure.

#### INBREED Procedure

The new SELFDIAG option in the PROC INBREED statement indicates that the diagonal of the matrix in the OUTCOV= output data set should include an individual's self-mating kinship coefficient instead of the individual's inbreeding coefficient when the COVAR option is not specified.

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### What's New in SAS/Genetics 12.1

#### Overview

In previous years, SAS/Genetics® software was updated only when Base SAS® software was released, but SAS/Genetics is now released independently of Base SAS software. This means that SAS/Genetics software can be released to customers when enhancements are ready, and the goal is to update SAS/Genetics every 12 to 18 months. To mark this newfound independence, the release numbering scheme for SAS/Genetics is changing with this release. This new numbering scheme will be maintained when new versions of Base SAS and SAS/Genetics ship at the same time. For example, when Base SAS 9.4 is released, SAS/Genetics 13.1 will be released.



# 18

## SAS/GRAPH

<b><i>What's New in SAS/GRAPH 9.3</i></b> .....	<b>179</b>
Overview .....	179
Changes to Default Output .....	180
ODS Graphics .....	180
The SAS/GRAPH Network Visualization Workshop .....	181
Devices and Universal Printers .....	181
Colors .....	181
The Annotate Facility .....	181
Procedures .....	181
Global Statements .....	185
Graphics Options .....	186
New Map Data Sets .....	186
Updated Map Data Sets .....	186
Enhancements in SAS/GRAPH Documentation .....	187

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## What's New in SAS/GRAPH 9.3

### Overview

There are many changes and enhancements for SAS/GRAPH 9.3. Highlights include the following:

- ODS Graphics has been moved from SAS/GRAPH to Base SAS.
- There are several enhancements to the SAS/GRAPH device drivers. The PDF and SVG devices now support drill-down functionality, and the new SVGANIM device supports animation.
- In addition to other enhancements, many procedures now support the new URL= option, which simplifies the creation of drill-down links in SAS/GRAPH output.
- Available with the second maintenance release of SAS 9.3 is MAPSGFK, a library of data sets consisting of GfK GeoMarketing digital, vector-based maps. The library reference (libref) MAPSGFK is set during system configuration and cannot be changed. SAS has licensed the vector-based map data sets representing the world from GfK GeoMarketing GmbH. These map data sets are to be used only with SAS/GRAPH for your internal business purposes. For additional information, see <http://support.sas.com/rnd/datavisualization/maponline/html/gfklicense.htm>.

- Available with the second maintenance release of SAS 9.3 is MAPSSAS, a library of data sets consisting of traditional maps updated and supplied by SAS. The library reference (libref) MAPSSAS is set during system configuration and cannot be changed. This library uses the same physical name (path) as the MAPS library when the new release of SAS is installed. MAPS can be reassigned within SAS after installation using the MAPS= system option. This provides a flexible way to transition between using the traditional maps provided in MAPSSAS and the digital vector-based maps in MAPSGFK. MAPS points to the MAPSSAS library by default.
- Two new system options, MAPSGFK= and MAPSSAS=, enable you to specify a way to locate the SAS library that contains SAS/GRAPH map data sets. For example, the library reference (libref) MAPSGFK is assigned using the option value specified by the MAPSGFK= system option. As with MAPSGFK, the MAPSSAS library reference is permanently assigned a physical name (path) in an installation configuration file. By specifying

```
MAPSGFK=MAPSGFK
```

you automatically indicate the path of the map data sets without needing to know the actual physical name (path).

Also, there are significant changes to Base SAS that are of interest to SAS/GRAPH users.

- ODS HTML is now the default destination in the SAS windowing environment for the Microsoft Windows and UNIX operating systems.
- A new default style, HTMLBlue, has been created for the default HTML destination.
- A new procedure, the QDEVICE procedure, enables you to query universal printers and devices.

## Changes to Default Output

Beginning with SAS 9.3, the LISTING destination is turned off and the HTML destination is turned on by default. This is true when running SAS in windowing mode for the Windows and UNIX operating environments. A new style, HTMLBlue, is the new default style for the HTML destination. This style enhances default output by offering a view that is optimized for display on a computer screen. Also, ODS GRAPHICS is turned on by default. Default settings for output on z/OS and for batch output on all systems have not changed.

## ODS Graphics

ODS Graphics has moved from SAS/GRAPH to Base SAS 9.3. You no longer need a SAS/GRAPH license to access ODS graphics and its related products. The documentation for these related products, which are now part of Base SAS, are listed below.

- *SAS ODS Graphics: Procedures Guide*
- *SAS Graph Template Language: User's Guide*
- *SAS Graph Template Language: Reference*
- *SAS ODS Graphics Designer: User's Guide*
- *SAS ODS Graphics Editor: User's Guide*

## The SAS/GRAPH Network Visualization Workshop

Changes for Network Visualization Workshop are documented in *SAS/GRAPH: Network Visualization Workshop User's Guide*.

### Devices and Universal Printers

- The **PDF device** now supports drill-down.
- The **JAVA device** now supports the following date and time formats: NLDATMZ, NLDATMTZ, and NLDATMWZ.
- The **SVG device** now supports data tips, drill-down, and enhanced drill-down behavior.
- The new **SVGANIM universal printer** supports animation.
- The new UEMF universal printer shortcut device produces scalable output, supports TrueType and Type1 fonts, and provides TrueColor support.
- The PNG device now produces anti-aliasing for lines and edges, which improves the appearance of angled plot lines, map borders, and so on.
- Most universal printer shortcut devices now support 32-bit CMYK colors or 32-bit RGBA (transparency) colors.

**Note:** A new procedure, the QDEVICE procedure, has been added to Base SAS. This procedure enables you to query devices and universal printers. See *Base SAS Procedures Guide* for more information.

### Colors

SAS/GRAPH now supports **RGBA color mode**. RGBA colors enable you to specify transparency. (The RGBA color mode supports alpha channel blending. Overlapping colors of varying opacity are blended together.)

### The Annotate Facility

- The new SEGONLY= option for the %CENTROID macro specifies a single segment that is used for each map area to calculate the centroid.
- Nested quotation marks are no longer required when specifying a font with the STYLE= variable.

### Procedures

#### GAREABAR Procedure

The **GAREABAR procedure** has the following changes and enhancements:

- The WIDTH=option that specifies whether a statistic is represented as a percent or a sum can now be targeted to the FIRST or LAST observation in the data set.
- The COUTLINE= option is now supported by the ACTIVEX device.

- When used with the ACTIVEX device, the hexadecimal character representing a blank ('00'x) suppresses the variable name or label on the AXIS= or the LABEL= options.

### GBARLINE Procedure

The **GBARLINE procedure** has the following new options:

- The UNIFORMAXES option in the PROC GBARLINE statement automatically generates the identical major tick mark values for the bar and plot axes.
- The URL= option enables you to specify a character variable whose values are the URLs of Web pages to be displayed when the user clicks (drills down) on elements in the graph. It is not necessary to have detailed knowledge of HTML syntax in order to use this option. This option is available in the BAR and PLOT statements.

### GCHART Procedure

The **GCHART procedure** has the following new options:

- The SUBOUTSIDE= option enables you to display a list of the subgroup values of a specific statistic above the bars. This option is available only in the VBAR and VBAR3D statements.
- The URL= option enables you to specify a character variable whose values are the URLs of Web pages to be displayed when the user clicks (drills down) on elements in the graph. It is not necessary to have detailed knowledge of HTML syntax in order to use this option. The URL= option is available in the BLOCK, horizontal and vertical BAR, PIE, DONUT, and STAR statements.

### GEOCODE Procedure

The street-level geocoding engine has been rewritten for SAS 9.3 to deliver significantly enhanced performance. (The **STREET geocoding method**, which enables you to perform geolocation for street addresses, was introduced in the third maintenance release of SAS 9.2.)

Starting with the second maintenance release for SAS 9.3, the CITY geocoding method in SAS/GRAPH supports international geocoding. The method uses lookup data sets located in the MAPSGFK library, which is also made available for use in this release. To support international geocoding, there are several new options introduced:

- the ADDRESSCOUNTRYVAR= option enables you to specify the character variable in the input address data set that contains the country name or identifier.
- the LOOKUPCITY= option enables you to specify the city matching data set for associating coordinates with addresses when performing CITY geocoding.
- the LOOKUPCOUNTRYVAR= option enables you to specify the character variable in the lookup data set that contains the country name or identifier.
- the LOOKUPLATVAR= option enables you to specify the numeric variable in the lookup data set that contains the latitude of the geocoded location. This option replaces the LOOKUPYVAR= option.
- the LOOKUPLONGVAR= option enables you to specify the numeric variable in the lookup data set that contains the longitude of the geocoded location. This option replaces the LOOKUPXVAR= option.



## **GINSIDE Procedure**

The **GINSIDE procedure** has the following changes and enhancements:

- The new INCLUDEBORDER option enables you to identify points that are on the border of a polygon as being inside of the polygon.

## **GKPI Procedure**

The **GKPI procedure** has the following new options:

- The MODE=MODERN option produces KPI charts with a streamlined appearance.
- The URL= option enables you to associate a drill-down URL with KPI charts.

## **GMAP Procedure**

The **GMAP procedure** now supports the URL= option. This option is available in the AREA, BLOCK, CHORO, and PRISM statements. The URL= option enables you to specify a character variable whose values are the URLs of Web pages to be displayed when the user clicks (drills down) on elements in the graph. It is not necessary to have detailed knowledge of HTML syntax in order to use this option.

The **GMAP procedure** can now use three predefined librefs for libraries that contain map data sets. In addition to the already existing MAPS library, new map libraries include MAPSGFK and MAPSSAS for the second maintenance release of SAS 9.3.

- MAPS points to updated versions of the traditional map data sets that are provided by SAS, just as in the past. This libref existed prior to the second maintenance release for SAS 9.3.
- MAPSSAS points to the same updated map data sets as the MAPS libref. This libref is new in the second maintenance release for SAS 9.3.
- MAPSGFK points to map data sets based on the digital, vector-based maps from GfK GeoMarketing, the single source for this map data. These data sets are covered by the GfK GeoMarketing copyright. See <http://support.sas.com/maponline/gfkllicense>. This libref is also new in the second maintenance release for SAS 9.3.

## **GPLOT Procedure**

The **GPLOT procedure** has the following changes and enhancements:

- The HTML= option enables you to identify the variable in a bubble plot input data set whose value creates a link in the HTML output file that is generated by ODS.
- The new URL= option is available in the PLOT statement. This option enables you to specify a character variable whose values are the URLs of Web pages to be displayed when the user clicks (drills down) on elements in the graph. It is not necessary to have detailed knowledge of HTML syntax in order to use this option.

## **GPROJECT Procedure**

The **GPROJECT procedure** has the following changes and enhancements:

- The GPROJECT procedure can now process and store projection parameters in a SAS data set. Stored parameters enable you to project maps and annotation points separately.

The following new options enable you to interact with parameters:

**NOPARMIN**

specifies that input parameters are not used.

**PARMIN=**

specifies the data set that contains input parameters.

**PARMOUT=**

specifies a data set where output parameters are stored.

**PARMENTRY=**

specifies the name of the entry in the parameter data set that is used.

- The ID statement no longer requires an ID variable. You can project non-polygonal data (such as annotation points) by specifying the ID statement without an ID variable.
- The new MERIDIAN= option specifies the central longitude for the projection.
- The new LATLON option specifies that the LAT and LONG variables from the map data set are used for coordinate data instead of the X and Y variables.
- Several new options enable you to explicitly set default behaviors and override options from an input parameters file:
  - DATELINE is the Boolean counterpart for NODATELINE.
  - NODUP is the Boolean counterpart for DUPOK.
  - RADIANS is the Boolean counterpart for DEGREES.
  - WESTLONG is the Boolean counterpart for EASTLONG.

### GRADAR Procedure

The **GRADAR procedure** has the following changes and enhancements:

- The URL= option enables you to specify a character variable whose values are the URLs of Web pages to be displayed when the user clicks (drills down) on elements in the graph. It is not necessary to have detailed knowledge of HTML syntax in order to use this option.
- The STARAXIS option now honors the ORDER= option in the AXIS statement. This enables you to apply minimum and maximum values as well as incremental control to the axis tick marks for the spokes in a radar chart. This is useful when you want to avoid the automatic scaling of axis tick marks that use the minimum and maximum data values.

### GREDUCE Procedure

The **GREDUCE procedure** now removes polygons with fewer than three vertices by default. The new NOCLEAN option retains polygons with fewer than three vertices.

### GTILE Procedure

The **GTILE procedure** has the following changes and enhancements:

- The GTILE procedure now supports the BY statement.
- The GTILE procedure now supports discrete colors. The COLORTYPE= option enables you to select between discrete and continuous colors in your tile chart.

- The CMISSING= option has been renamed to CDEFAULT= to make it consistent with other procedures. The alias CDEF= can be used in place of the CDEFAULT= option. For backward compatibility, the CMISSING= option and the CMISS= alias still function as before.
- The new MINLEGENDVALUE= option enables you to override the default lower endpoint value in a continuous color-ramp legend with your own value. Tiles whose value is less than the MINLEGENDVALUE= value are colored gray in the tile chart.
- New option MAXLEGENDVALUE= enables you to override the default maximum endpoint value in a continuous color-ramp legend with your own value. Tiles whose value is greater than the MAXLEGENDVALUE= value are colored gray in the tile chart.
- The new COLORPOINTS= option enables you to control the points at which a color-ramp legend transitions from one color to the next.

## Global Statements

- The SYMBOL statement's VALUE= option offers extra versatility with filled square, diamond, and triangle as special symbol selections for plotting data points on a chart. New option SPECIAL has also been added, which enables you to define unique special symbols for up to 12 plots (GPLOT) in one SYMBOL statement.
- In general, the limit for specifying variable values and text-strings on labels is increased from 32 to 256 characters. Specifically, this affects the ORDER=, VALUE=, and LABEL= options on the AXIS and LEGEND statements. This expanded limit enables you to specify up to 256 characters for each variable value for the following procedures:

GBARLINE

MIDPOINTS=*value-list* option in the BAR statement

GCHART

MIDPOINTS=*value-list* option on the HBAR, VBAR, and PIE statements

GPLOT

HAXIS= and VAXIS= options in the PLOT statement

In addition, for the GCHART procedure, the GROUP= option on the HBAR and VBAR statements now display up to 256 characters of the group variable name or label.

- The ORDER=DESCENDING option in the LEGEND statement enables you to generate a legend with items in descending order. This is especially useful when using the LEGEND Statement with the GMAP Procedure to produce maps on any device except JAVA and ACTIVEX.
- The LABEL= option on both the AXIS and LEGEND statements provides the ability to use #BYVAL and #BYVAR in axis and legend labels. When you specify #BYVAL, SAS/GRAPH substitutes the current value of the BY variable for #BYVAL. When you specify #BYVAR, SAS/GRAPH substitutes the current name of the BY variable, or label associated with the variable, for #BYVAR.
- The SPLIT= option is now available in the LEGEND statement. The option enables you to specify the split character that the LEGEND statement uses to break the text string in a legend value into multiple lines. In addition, the SPLIT= option on both the AXIS and LEGEND statements is enhanced. SPLIT= now

enables you to specify multiple split characters used to break axis values or the text string in a legend value into multiple lines.

- The **FORMAT** text-description suboption on the **REFLABEL** option in the **AXIS** statement enables you to display the formatted value assigned to the axis variable as the reference line label.

## Graphics Options

The **LFACTOR** graphics option now affects the thickness of all lines in a graph. This option is useful when you need to produce graphics using a very high resolution.

## New Map Data Sets

Map data sets for SAS 9.3 are available at SAS Maps Online for roads in the United States. See <http://support.sas.com/rnd/datavisualization/mapsonline/html/usroads.html>.

New map data sets are available with the second maintenance release of SAS 9.3. Most are provided with the release installation, and additional map data sets can be downloaded from the SAS Maps Online Web site. See <http://support.sas.com//mapsonline>.

Available with the second maintenance release of SAS 9.3 is **MAPSGFK**, a library of data sets consisting of GfK GeoMarketing digital, vector-based maps. SAS has licensed the vector-based map data sets representing the world from GfK GeoMarketing GmbH. These map data sets are to be used only with SAS/GRAPH for your internal business purposes. For additional information, see <http://support.sas.com/mapsonline/gfkllicense>.

Run the following code to generate a list of the GfK digital, vector-based map data sets available in the **MAPSGFK** library:

```
proc datasets lib=mapsgfk;
run;
```

Available with the second maintenance release of SAS 9.3 is **MAPSSAS**, a library of data sets consisting of traditional maps updated and supplied by SAS. The library reference (libref) **MAPSSAS** is set during system configuration and cannot be changed. This library uses the same physical name (path) as the **MAPS** library when the new release of SAS is installed. **MAPS** points to the **MAPSSAS** library by default.

Run the following code to generate a list of the updated traditional map data sets available in the **MAPSSAS** library:

```
proc datasets lib=mapssas;
run;
```

## Updated Map Data Sets

Some of the map data sets in the **MAPS** library have been updated for SAS 9.3.

Data Set(s)	Changes
MEXICO, MEXICO2	New unprojected values in the <b>LAT</b> and <b>LONG</b> variables are more accurate.

Data Set(s)	Changes
GERMANY, GERMANY2	<p>updated with counties and new districts. The following new variables have been added:</p> <ul style="list-style-type: none"> <li>■ COUNTY</li> <li>■ CNTYNAME</li> </ul> <p>The following variables are no longer available:</p> <ul style="list-style-type: none"> <li>■ AREA</li> <li>■ COUNTRY</li> <li>■ DISTNAME</li> </ul>
PERU, PERU2	<p>New unprojected values in the LAT and LONG variables are more accurate.</p>
USCITY	<p>updated with new values. Some new cities have been added, and some city names have been standardized.</p> <p><i>Note:</i> The projected X and Y values might be different due to the need to re-project the data set.</p>
RUSSIA, RUSSIA2	<p>updated with new regions and ID numbers. The RUSSIA data set contains a new DENSITY variable. The RUSSIA2 contains the following new variables:</p> <ul style="list-style-type: none"> <li>■ OLDID</li> <li>■ EREGION</li> <li>■ EREGNAME</li> <li>■ REGTYPE</li> <li>■ FEDIST</li> <li>■ FEDNAME</li> </ul> <p>The ID numbers for these data sets have changed. You might need to change your response data in any existing SAS programs that use these data sets.</p>
CNTYNAME, COUNTY, USCOUNTY	<p>updated with county names and boundaries for Alaska.</p>

The MAPS library reference (libref) existed prior to the second maintenance release for SAS 9.3 and points to updated versions of the traditional map data sets that are provided by SAS, just as in the past. The MAPS libref and the MAPSSAS libref both point to the same location.

## Enhancements in SAS/GRAPH Documentation

SAS/GRAPH documentation now includes the following:

- Base SAS 9.3 system options that SAS/GRAPH uses.
- An updated ZIP codes figure and reorganized information in the GEOCODE procedure. Starting with the second maintenance release for SAS 9.3, the

GEOCODE procedure chapter is rewritten to provide information about international city geocoding.

- Starting with the second maintenance release for SAS 9.3, the GMAP procedure chapter is rewritten to provide information about map data sets licensed by SAS from GfK GeoMarketing GmbH. These data sets are covered by the GfK GeoMarketing copyright. See <http://support.sas.com/rnd/datavisualization/maponline/html/gfklicense.htm>. The GMAP chapter also continues to provide details about the traditional map data sets that have been available with SAS 9.3 and earlier releases. Both types of data sets are provided with SAS/GRAPH for mapping.

# 19

## SAS Grid Manager

<b><i>What's New in SAS Grid Manager 9.3</i></b> .....	<b>189</b>
Overview .....	189
Grid Support for SAS Servers .....	189
Grid Support for the SAS Add-In for Microsoft Office .....	190
Automatic Grid Processing for SAS Enterprise Guide and the SAS Add-In for Microsoft Office .....	190
New Options for SAS Grid Manager Client Utility .....	190

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### What's New in SAS Grid Manager 9.3

#### Overview

SAS Grid Manager has the following new features and enhancements:

- The capability for SAS Grid Manager to provide load balancing for stored process servers, OLAP servers, and pooled workspace servers has been added.
- Support has been added in the SAS Add-In 4.3 for Microsoft Office to enable tasks to be processed on a grid.
- Support has been added in SAS Enterprise Guide 5.1 and the SAS Add-In 5.1 for Microsoft Office to automatically run jobs on a grid.
- New options have been added to SAS Grid Manager Client Utility, including the ability to stage files into and out of the grid.

#### Grid Support for SAS Servers

SAS Grid Manager can now be used to provide load balancing for the following types of servers (in addition to workspace servers) running in a grid:

- stored process servers
- OLAP servers
- pooled workspace servers

This capability provides a robust way to enable load balancing for any clients that use these servers.

## Grid Support for the SAS Add-In for Microsoft Office

The SAS Add-In 4.3 for Microsoft Office provides the capability to process tasks on a grid. Options are provided to include the pre- and post-code required to submit tasks to the grid and to generate ODS macros.

## Automatic Grid Processing for SAS Enterprise Guide and the SAS Add-In for Microsoft Office

SAS Enterprise Guide 5.1 and the SAS Add-In 5.1 for Microsoft Office provide support for automatically running jobs on a grid. The **Use grid if available** option on the Project Properties window and the Task Properties window specify that the project or task automatically runs on an available grid.

## New Options for SAS Grid Manager Client Utility

The following new options have been added to the SAS Grid Manager Client Utility (SASGSUB):

### GRIDWAIT

specifies that the SAS Grid Manager Client Utility waits until the job has completed running, either successfully or with an error. If the job does not complete, it must be ended manually.

### GRIDLRESTARTOK

specifies that a job can be restarted at a labeled section

### GRIDRUNCMD

specifies a command (other than a SAS command) that is run on the grid

In addition to using a shared directory, you can use staging to move files into and out of the grid. The files to be moved to the grid are stored in a specified staging directory, and a specified transfer program moves the files into the grid. When processing is complete, the files are transferred back to the staging directory. Use the SAS Deployment Wizard during the installation process to specify whether your grid will use a shared directory or staging. If you use staging, you must specify a staging directory and transfer program.

The following new options have been added to SASGSUB to support staging:

### GRDISTAGECMD

specifies the remote copy command used to stage files to the grid

### GRIDSTAGEFILEHOST

specifies the name of the host that stores files that are staged into the grid

### GRIDFORCECLEAN

specifies that the job directory on the grid is deleted, regardless of whether the job was successful or not

The Grid Manager Client Utility can now read license file information from metadata, rather than having to specify it on the `-GRIDLICENSEFILE` option.



# 20

## SAS High-Performance Forecasting

<b><i>What's New in SAS High-Performance Forecasting 4.1</i></b> .....	<b>191</b>
Overview .....	191
HPF Procedure Enhancements .....	191
HPFDIAGNOSE Procedure Enhancements .....	192
HPFENGINE Procedure Enhancements .....	192
HPFSELECT Procedure Enhancements .....	192
HPFTEMPRECON Procedure .....	193
<b><i>What's New in SAS High-Performance Forecasting 12.1</i></b> .....	<b>193</b>
General Enhancements .....	193

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### What's New in SAS High-Performance Forecasting 4.1

#### Overview

SAS High-Performance Forecasting 4.1 coincides with SAS 9.3. Each release provides new features while maintaining all the capabilities of previous releases.

New features in SAS High-Performance Forecasting 4.1 are briefly summarized here:

- The HPF procedure supports new ODS plots.
- The HPFDIAGNOSE procedure includes support for combined models and auxiliary data set support.
- The HPFENGINE procedure includes support for combined models, a generalized model selection topology, auxiliary data sets, new ODS plots, and more.
- The HPFSELECT procedure includes support for defining model combination lists.
- HPFTEMPRECON is a new procedure to perform temporal reconciliation of time series forecasts that are generated at two different frequencies. Temporal reconciliation is commonly referred to as benchmarking.

#### HPF Procedure Enhancements

The HPF procedure contains the following new features:

- New ODS plots and plot options are available. You can plot the periodogram for the error series or a combined periodogram and spectral density estimate plot. You can also generate the prediction error correlation plot matrix.

## HPFDIAGNOSE Procedure Enhancements

The HPFDIAGNOSE procedure contains the following new features:

- Auxiliary data set support enables the HPFDIAGNOSE procedure to use other data sets as additional input sources for explanatory variables that are needed during the run of the procedure. Previously all variables that were required during the procedure run had to be physically present in the primary DATA= data set.
- The COMBINE statement directs the HPFDIAGNOSE procedure to generate a model combination list for the set of automatic models that are generated from its time series diagnostics. This model combination list is included in the generated model selection list as another candidate forecast for the HPFENGINE procedure to consider in its forecast selection process.

## HPFENGINE Procedure Enhancements

The HPFENGINE procedure contains the following new features:

- New ODS plots and plot options are available. You can plot the periodogram for the error series or a combined periodogram and spectral density estimate plot. You can also generate the prediction error correlation plot matrix.
- Auxiliary data set support enables the HPFENGINE procedure to use other data sets as additional input sources for explanatory variables that are needed during the run of the procedure. Previously all variables that were required during the procedure run had to be physically present in the primary DATA= data set.
- The FORCEBACK option enables you to change the default behavior so that a BACK= region is strictly enforced across all BY groups.
- The OUTACCDATA= option directs the HPFENGINE procedure to capture variable information from the run to feed into the HPFTEMPRECON procedure.
- The HPFENGINE procedure supports a more general model selection topology. Termed the forecast model selection graph, it remains semantically compatible with the previous model selection list.
- The HPFENGINE procedure supports combined models as part of its automated model selection process. User-defined combined model lists are created through the HPFSELECT procedure. The HPFDIAGNOSE procedure can optionally create combined model lists as part of its custom model generation process.

## HPFSELECT Procedure Enhancements

The HPFSELECT procedure contains the following new features:

- The COMBINE statement directs the HPFSELECT procedure to create a combined model list. Statement options enable you to control different aspects of the forecast combination process for the candidate models identified in the SPEC statements.

## HPFTEMPRECON Procedure

The HFTEMPRECON procedure is a new procedure.

---

# What's New in SAS High-Performance Forecasting 12.1

## General Enhancements

SAS High-Performance Forecasting 12.1 includes several new features that are briefly summarized here. Each release provides new features while maintaining all the capabilities of previous releases.

- The HPFENGINE procedure supports LOESS overlays in the error series ODS plots.
- The HPFARIMASPEC procedure includes a change to enable conformant differencing for input variables.
- The HPFREPOSITORY procedure is a new procedure to enable you to efficiently query both model and score repository catalogs in order to generate various types of ODS reports for them. This procedure is experimental in this release.



## 21

## SAS/IML

<b><i>What's New in SAS/IML 9.3</i></b> .....	<b>195</b>
Overview .....	195
Calling SAS Procedures from PROC IML .....	195
Calling R Functions from PROC IML .....	196
New Functions and Subroutines .....	196
Changes to the IMLMLIB Library .....	198
Documentation Enhancements .....	198
<b><i>What's New in SAS/IML 12.1</i></b> .....	<b>198</b>
Overview .....	198
Enhancements to the SAS/IML Syntax .....	199
New Functions, Subroutines, and Modules .....	200

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## What's New in SAS/IML 9.3

### Overview

SAS/IML 9.3 includes two new features that are related to calling other languages from within the IML procedure:

- calling SAS procedures and DATA steps from PROC IML
- calling functions in the R statistical programming language from PROC IML

In addition, SAS/IML 9.3 provides several new functions and subroutines.

### Calling SAS Procedures from PROC IML

SAS/IML 9.3 supports the SUBMIT and ENDSUBMIT statements. These statements delimit a block of statements that are sent to another language for processing.

The SUBMIT and ENDSUBMIT statements enable you to call SAS procedures and DATA steps without leaving the IML procedure. This feature has been very popular in SAS/IML Studio since it was introduced in 2002. The feature is now available in PROC IML.

You can use SAS data sets to transfer data between SAS/IML matrices and SAS procedures. SAS procedures require that data be in a SAS data set.

## Calling R Functions from PROC IML

The SUBMIT and ENDSUBMIT statements also provide an interface to the R statistical programming language, so that you can submit R statements from within your SAS/IML program. To submit statements to R, specify the R option in the SUBMIT statement.

You can transfer data from SAS/IML matrices and SAS data sets into R matrices and R data frames, and vice versa. Specifically, the following subroutines are available to transfer data from a SAS format into an R format:

*Table A. Transferring from a SAS Source to an R Destination*

Subroutine	SAS Source	R Destination
ExportDataSetToR	SAS data set	R data frame
ExportMatrixToR	SAS/IML matrix	R matrix

In addition, the following subroutines are available to transfer data from an R format into a SAS format:

*Table A. Transferring from an R Source to a SAS Destination*

Subroutine	R Source	SAS Destination
ImportDataSetFromR	R expression	SAS data set
ImportMatrixFromR	R expression	SAS/IML matrix

In the previous table, an "R expression" can be the name of a data frame, the name of a matrix, or an expression that results in either of these data structures.

## New Functions and Subroutines

### ALLCOMB Function

generates all combinations of  $n$  elements taken  $k$  at a time.

### ALLPERM Function

generates all permutations of  $n$  elements.

### BIN Function

divides numeric values into a set of disjoint intervals called bins. The BIN function indicates which elements are contained in each bin.

### CORR Function

computes a sample correlation matrix for data. The function supports Pearson's product-moment correlations, Hoeffding's  $D$  statistics, Kendall's tau- $b$  coefficients, and Spearman's correlation coefficients based on the ranks of the variables. The function supports two different methods for dealing with missing values in the data.

- COV Function**  
computes a sample variance-covariance matrix for data. The function supports two different methods for dealing with missing values in the data.
- COUNTN Function**  
counts the number of nonmissing values in a matrix.
- COUNTMISS Function**  
counts the number of missing values in a matrix.
- COUNTUNIQUE Function**  
counts the number of unique values in a matrix.
- CUPROD Function**  
computes the cumulative product of elements in a matrix.
- DIF Function**  
computes the differences between data values and one or more lagged (shifted) values for time series data.
- ELEMENT Function**  
returns a matrix that indicates which elements of one matrix are also elements of a second matrix.
- FULL Function**  
converts a matrix stored in a sparse format into a matrix stored in a dense format.
- LAG Function**  
computes one or more lagged (shifted) values for time series data.
- MEAN Function**  
computes a sample mean of data. The function can compute arithmetic means, trimmed means, and Winsorized means.
- PROD Function**  
computes the product of elements in one or more matrices.
- QNTL Call**  
computes sample quantiles for data.
- RANCOMB Function**  
returns random combinations of  $n$  elements taken  $k$  at a time.
- RANGE Function**  
returns the range of values for a set of matrices.
- RANPERM Function**  
returns random permutations of  $n$  elements.
- SHAPECOL Function**  
reshapes and repeats values by columns.
- SQRVECH Function**  
converts a symmetric matrix which is stored columnwise to a square matrix.
- STD Function**  
computes a sample standard deviation for each column of a data matrix.
- SPARSE Function**  
converts a matrix that contains many zeros into a matrix stored in a sparse format which suitable for use with the ITSOLVER subroutine or the SOLVELIN subroutine.

**TABULATE Call**

counts the number of elements in each of the unique categories of the argument.

**VAR Function**

computes a sample variance for each column of a data matrix.

**VECH Function**

creates a vector from the columns of the lower triangular elements of a matrix.

## Changes to the IMLMLIB Library

The CORR module has been removed from the IMLMLIB library. In its place is the built-in CORR function.

The MEDIAN, QUARTILE, and STANDARD modules now support missing values in the data argument.

## Documentation Enhancements

The first six chapters of the *SAS/IML User's Guide* have been completely rewritten in order to provide new users with a gentle introduction to the SAS/IML language. Two new chapters have been written:

- Chapter 10, Submitting SAS Statements, describes how to call SAS procedures from within PROC IML.
- Chapter 11, Calling Functions in the R Language, describes how to call R functions from within PROC IML.

---

## What's New in SAS/IML 12.1

### Overview

In previous years, SAS/IML software was updated only with new releases of Base SAS® software, but this is no longer the case. This means that SAS/IML software can be released to customers when enhancements are ready, and the goal is to update SAS/IML every 12 to 18 months. To mark this newfound independence, the release numbering scheme for SAS/IML is changing with this release. This new numbering scheme will be maintained when new versions of Base SAS and SAS/IML ship at the same time. For example, when Base SAS 9.4 is released, SAS/IML 13.1 will be released.

SAS/IML 12.1 includes the following changes and enhancements:

- a new syntax for defining default parameter values in user-defined modules
- a new syntax for reading and writing SAS data sets whose names are not known until run time
- new statistical functions, subroutines, and modules
- support for additional distributions and parameters for generating random samples by using the RANDGEN subroutine



## Enhancements to the SAS/IML Syntax

SAS/IML 12.1 includes the following enhancements to the syntax:

- SAS/IML supports a new syntax that defines optional arguments and default parameter values for user-defined modules. One implication of the new syntax is that you cannot omit a parameter when you call a user-defined subroutine unless the module definition explicitly specifies that the parameter is optional. This syntax change might require that you modify SAS/IML programs that parsed and ran without error in previous releases.
- There is a new syntax for reading and writing SAS data sets that enables you to read data sets whose name is given by a run-time expression rather than by a literal value. For example, the following syntax is now valid:

```
dsname = "Sashelp.Class";
use (dsname);
read all var _NUM_ into X;
close (dsname);
```

This syntax is equivalent to the following statements:

```
use Sashelp.Class;
read all var _NUM_ into X;
close Sashelp.Class;
```

This functionality is available in the CLOSE, CREATE, EDIT, SETIN, SETOUT, SORT, and USE statements.

- You can now pass the same matrix into a module in several parameter locations. The first time that a variable is passed, it is passed by reference. Subsequent arguments receive a copy of the matrix. For example, the following syntax is now valid:

```
start DotProduct(x,y);
    return( x`*y );
finish;

x = {1,2,3,4};
z = DotProduct(x, x); /* pass the same matrix twice */
```

- There is a new syntax for defining an assignment to an empty matrix. The statement `x={}`; is similar to using the FREE statement. This syntax can be used to specify that the default value of a module argument is the empty matrix.

In addition, SAS/IML 12.1 includes the following enhancements to functions, subroutines, and modules:

- The RANDGEN subroutine now accepts vectors of parameters. These vectors can be used to fill a matrix with random values such that each column (or row) of the matrix is sampled from a different distribution.
- The ROOT function now accepts an optional parameter that you can use to determine whether a matrix is positive definite.
- The SUBSTR function now accepts any parameter as a vector. These vectors can be used to extract several substrings from a string with a single call.

## New Functions, Subroutines, and Modules

### **DIMENSION Function**

The DIMENSION function returns a  $1 \times 2$  vector whose elements are the number of rows and columns, respectively, of a matrix.

### **DISTANCE Function**

The DISTANCE function computes pairwise distances between rows of a matrix.

### **FROOT Function**

The FROOT function finds zeros of a univariate function by using a numerical root-finding method.

### **ISSKIPPED Function**

The ISSKIPPED function enables you to determine whether an optional argument to a user-defined module was skipped when the module was called.

### **MAHALANOBIS Function**

The MAHALANOBIS function computes the Mahalanobis distance between observations. This function is part of the IMLMLIB library of modules.

### **NDX2SUB Function**

The NDX2SUB function converts the indices of a matrix into subscripts. This function is part of the IMLMLIB library of modules.

### **NORM Function**

The NORM function computes the vector or matrix norm of its argument.

### **RANPERK Function**

The RANPERK function returns a random permutation of  $k$  elements from a finite set of  $n$  elements,  $k \leq n$ .

### **SAMPLE Function**

The SAMPLE function generates a random sample of a finite set.

### **SUB2NDX Function**

The SUB2NDX function converts the subscripts of a matrix into indices. This function is part of the IMLMLIB library of modules.

## 22

## SAS In-Database Products

<b><i>What's New in SAS 9.3 In-Database Products</i></b> .....	<b>201</b>
Overview .....	201
Documentation Enhancements .....	202
Compiled Publishing Macros .....	202
Additional Alias for INDCONN Macro Password Argument .....	202
In-Database Procedures .....	202
Support for SAS/STAT Linear Models .....	203
Support for Reading and Writing Data to HDFS for High- Performance Analytics .....	203
Aster nCluster Changes .....	203
DB2 Changes .....	203
Greenplum Changes .....	204
Netezza Changes .....	204
Oracle Changes .....	204
Teradata Changes .....	204

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## What's New in SAS 9.3 In-Database Products

### Overview

Starting in SAS 9.3, the user documentation for format publishing, in-database procedures, and the SAS Scoring Accelerator are combined into this document, *SAS 9.3 In-Database Products: User's Guide*.

Support for Teradata V13, Netezza V6.0, and Aster *n*Cluster V6 has been added.

Some Base SAS procedures have been enhanced for in-database processing inside Aster *n*Cluster, Greenplum, and Netezza.

In the November 2011 release, format publishing is supported for Aster *n*Cluster and Greenplum. In addition, in-database scoring for Teradata has been enhanced by the addition of the SAS Embedded Process. The SAS Embedded Process is a SAS server process that runs within Teradata to read and write data.

In the December 2011 release, in-database scoring for DB2 has been enhanced by the addition of the SAS Embedded Process.

In the April 2012 release, you can use the SAS Scoring Accelerator in conjunction with SAS Model Manager to manage and deploy scoring models in Greenplum.

In the June 2012 release, in-database scoring is supported for Oracle using the SAS Embedded Process.

In the August 2012 release, in-database scoring for Greenplum has been enhanced by the addition of the SAS Embedded Process.

In the December 2012 release, installation and configuration information for the SAS Embedded Process for Hadoop is added to the *SAS In-Database Products: Administrator's Guide*. The SAS Embedded Process must be installed and configured before you can read and write data to a Hadoop Distributed File System (HDFS) in parallel for High-Performance Analytics.

## Documentation Enhancements

Starting in SAS 9.3, the user documentation for these in-database technologies has been combined into this document, *SAS In-Database Products: User's Guide*:

- Format publishing and the SAS\_PUT( ) function were previously documented in *SAS/ACCESS for Relational Databases: Reference*.
- In-database procedures were previously documented in *SAS/ACCESS for Relational Databases: Reference*.

**Note:** Each in-database procedure has its own specific considerations and limitations. For more information, see the documentation for the procedure.

- Scoring Accelerator was previously documented in the *SAS Scoring Accelerator: User's Guide* for each database.

The in-database installation and configuration documentation can be found in *SAS In-Database Products: Administrator's Guide*.

The configuration instructions for the SAS Model Manager In-Database Scoring Scripts product have been moved to this book from the *SAS Model Manager: User's Guide*.

## Compiled Publishing Macros

All publishing macros are compiled now for better security. There is no change in how you run the publishing macros.

## Additional Alias for INDCONN Macro Password Argument

You can now use PASS= for the password argument in the INDCONN macro variable.

## In-Database Procedures

There are several enhancements to in-database procedures:

- You can use the SAS In-Database technology to run some Base SAS procedures inside Aster nCluster, Greenplum, and Netezza.
- In BY-group processing, the NOTSORTED option is now ignored because the data is always returned in sorted order. Previously, the NOTSORTED option was not supported.

## Support for SAS/STAT Linear Models

In the August 2012 release, the SAS Scoring Accelerator now supports importing SAS/STAT linear models and SAS High-Performance Analytics models from a SAS package file (.SPK). Models that have a DATA step score code type can also be scored, published, and included in performance monitoring. SAS Model Manager is required.

## Support for Reading and Writing Data to HDFS for High-Performance Analytics

In the December 2012 release, installation and configuration information for the SAS Embedded Process for Hadoop is added to the *SAS In-Database Products: Administrator's Guide*. The SAS Embedded Process must be installed and configured before you can read and write data to a Hadoop Distributed File System (HDFS) in parallel for High-Performance Analytics (HPA).

## Aster nCluster Changes

The following changes have been made for Aster nCluster:

- Support for Aster nCluster V6 has been added.
- If you use Aster nCluster V6, you can specify a schema where the scoring model files are published. You specify this schema in the INDCONN macro variable, and you can use the MODEL\_SCHEMA parameter in the SAS\_SCORE() function when you execute the scoring model.
- In the November 2011 release, format publishing is now supported. Format publishing enables you to execute SAS PUT function calls inside the database. You can reference most of the formats that SAS supplies and the custom formats that you create with PROC FORMAT.
- In the December 2011 release, the default value for the SQLGENERATION system option now includes Aster nCluster. This means that procedures automatically run inside the database.

## DB2 Changes

The following changes have been made for DB2:

- Format publishing is now supported. Format publishing enables you to execute SAS PUT function calls inside the database. You can reference most of the formats that SAS supplies and the custom formats that you create with PROC FORMAT.
- In the December 2011 release, in-database scoring for DB2 has been enhanced by the addition of the SAS Embedded Process. The SAS Embedded Process is a SAS server process that runs within DB2 to read and write data. The SAS Embedded Process can be used with the SAS Scoring Accelerator for DB2 under UNIX to run scoring models.
- In the December 2011 release, the DB2IDA utility was added to control the SAS Embedded Process. DB2IDA is a utility that is installed with the DB2 server. The DB2IDA command enables you to manually stop and restart the SAS Embedded Process without shutting down the database.

## Greenplum Changes

The following changes have been made for Greenplum:

- In the November 2011 release, format publishing is now supported. Format publishing enables you to execute SAS PUT function calls inside the database. You can reference most of the formats that SAS supplies and the custom formats that you create with PROC FORMAT.
- In the December 2011 release, the default value for the SQLGENERATION system option now includes Greenplum. This means that procedures automatically run inside the database.
- In the April 2012 release, you can use the SAS Scoring Accelerator in conjunction with SAS Model Manager to manage and deploy scoring models in Greenplum.
- In the August 2012 release, in-database scoring for Greenplum has been enhanced by the addition of the SAS Embedded Process. The SAS Embedded Process is a SAS server process that runs within Greenplum to read and write data. The SAS Embedded Process can be used with the SAS Scoring Accelerator for Greenplum to run scoring models.

**Note:** Starting with the August 2012 release, SAS is not compatible with Greenplum version 4.0 or older when publishing formats or running scoring models. If you use the second maintenance release of SAS 9.3, you must use Greenplum version 4.2.2 or later.

## Netezza Changes

The following changes have been made for Netezza:

- Support for Netezza V6.0 has been added.
- Netezza Performance Server (NPS) is no longer supported.
- You can now run Netezza format and model publishing macros in fenced mode and in unfenced mode. Fenced mode means that the format and scoring functions that are published are isolated in a separate process in the Netezza database when they are invoked. An error does not cause the database to stop. When the format or scoring functions are ready for production, you can run the macro to publish the functions in unfenced mode.

## Oracle Changes

In the June 2012 release, in-database scoring for Oracle is supported using the SAS Embedded Process. The SAS Embedded Process is a SAS server process that runs within Oracle to read and write data. The SAS Embedded Process can be used with the SAS Scoring Accelerator for Oracle to run scoring models.

## Teradata Changes

The following changes have been made for Teradata:

- V2R6 on Linux is no longer supported.

- In the November 2011 release, in-database scoring for Teradata has been enhanced by the addition of the SAS Embedded Process. The SAS Embedded Process is a SAS server process that runs within Teradata to read and write data. The SAS Embedded Process can be used with the SAS Scoring Accelerator for Teradata to run scoring models. During the installation process, there is an additional RPM file that must be installed. This RPM file contains the SAS Embedded Process. In addition, you must download and install the SAS Embedded Process support functions.





# 23

## SAS Information Delivery Portal

<i>What's New in SAS Information Delivery Portal 4.31</i> .....	207
Overview .....	207
General Enhancements .....	207
New Report Portlet .....	208

### What's New in SAS Information Delivery Portal 4.31

#### Overview

The SAS Information Delivery Portal 4.3 and 4.31 includes a number of general enhancements and a new report portlet.

**Note:** The new features and enhancements in SAS Information Delivery Portal 4.3 and 4.31 are the same. The difference is that SAS Information Delivery Portal 4.3 runs on SAS 9.2, and SAS Information Delivery Portal 4.31 runs on SAS 9.3. For the latest information about the SAS Information Delivery Portal, see <http://support.sas.com/software/products/portal>.

#### General Enhancements

- A new **Customize** menu is available from the banner. Some options from the **Options** menu have been moved to the **Customize** menu to improve usability.
- The **Options** menu has been modified to improve usability. Some of the selections have been reordered, and others have been moved to the new **Customize** menu.
- Depending on the software that has been installed, the portal now uses SAS Web Report Studio or SAS Web Report Viewer to display SAS Information Maps.
- Data explorations are no longer available from the portal. As part of the migration from a previous release of SAS Information Delivery Portal, an administrator might have converted your data explorations to SAS reports.
- The Information Map Viewer portlet is no longer available. You can use the new report portlet to display data from information maps. As part of the migration from a previous release of SAS Information Delivery Portal, an administrator might have converted your Information Map Viewer portlets to report portlets.

- Publishing SAS information maps is no longer supported.

## **New Report Portlet**

Publishing SAS information maps is no longer supported.

## 24

## SAS Information Map Studio

<b><i>What's New in SAS Information Map Studio 4.31</i></b> .....	<b>209</b>
Overview .....	209
Enhancements to the User Interface .....	210
Bulk Editing .....	211
Enhanced Data Item Features .....	211
Enhanced Filter Features .....	211
Enhanced Prompt Features .....	211
Resource Replacement .....	212
Data Source Management .....	212
Information Map Management .....	212
Application Administration .....	212
Deprecated Features .....	213
Documentation Enhancements .....	213

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### What's New in SAS Information Map Studio 4.31

#### Overview



SAS Information Map Studio has the following new features and enhancements:

- enhanced user interface
- new bulk editing capabilities
- enhanced data item features
- enhanced filter features
- enhanced prompt features
- a new resource replacement feature
- enhanced data source management features
- enhanced information map management
- application administration updates
- deprecated features
- documentation enhancements

**Note:** For the latest information about SAS Information Map Studio, see <http://support.sas.com/software/products/ims>.

## Enhancements to the User Interface

The following enhancements have been made to the user interface:

- The new **Resources** pane has the following tabs:
  - The new **Information Map Folders** (  ) tab enables you to manage your information maps and provides a new **Copy to Folder** feature that replaces the **Move to Folder** feature for information maps and folders. This tab replaces the **Metadata Repository** pane.
  - The new **Application Servers** (  ) tab enables you to add data sources and stored processes. This tab replaces the Insert Table, Insert Cube, and Stored Processes dialog boxes.
- The **Design** tab (formerly called the **Presentation** tab) has the following enhancements:
  - The **Selected Resources** pane (formerly called the **Physical Data** pane) now displays the application server and libraries that data sources are associated with. This pane also displays the stored process (if any) that is associated with the information map.
  - The **Information Map Contents** pane (formerly called the **Information Map** pane) provides a new **Copy to Folder** feature that combines the ease of **Move to Folder** with the functionality of copy and paste. A standard drag-and-drop feature is also available for moving items.
- The **Relationships** tab has the following enhancements:
  - You can use the new toolbar on the tab to resize or automatically rearrange the data sources on the tab.
  - You can reposition the updated Venn diagram icons along the relationship line to improve visibility.
  - You can view tooltips about the relationships when you position your mouse pointer over the relationships.
- The new **Properties** pane enables you to view all of the properties of a selected item at a glance. Certain properties can be modified directly in the pane. You can also use this pane to simultaneously update multiple data items or multiple custom properties.
- The Table Properties dialog box has been redesigned. You can now set aggregation options for a data source that references an information map table, view more information about the resources that a data source references, and manage the columns for a data source.
- The application's icons have been redesigned and improved:
  - New icons have been added that distinguish between the following items:
    - non-calculated data items and calculated data items
    - numeric columns and date, time, and timestamp columns
    - STANDARD, TIME, and GEO dimensions and their associated hierarchies, levels, and members

- Unresolved resources and unusable items are now marked with a red x (✘).
- The unique key indicator has been removed.
- The icons in the user interface no longer indicate that you are denied WriteMetadata access to an information map or folder.

## Bulk Editing

You can now simultaneously modify multiple data items and custom properties.

## Enhanced Data Item Features

The following enhancements are available for data items:

- Data values that are hyperlink tags can now be rendered as hyperlinks in query results.
- Support is now available for the totaling of non-additive expressions.
- In the second maintenance release for SAS Information Map Studio 4.2, you can designate that a data item be used in the default query for SAS Web Report.

## Enhanced Filter Features

The following enhancements are available for filters:

- You can now designate that a filter be hidden so that end users do not use a filter (for example, a prefilter) that you don't want them to use.
- You can now select multiple (non-prompted) filters for a test query.
- You can use the new browse-and-search feature to locate the values (or members) for any of the following items:
  - a character data item whose value-generation method provides a dynamically generated list of values
  - a character expression
  - an OLAP data item
- You can use the new identity-driven property **SAS.IdentityGroups** to return the names of the user groups and roles that a requesting user belongs to.

## Enhanced Prompt Features

The following enhancements are available for prompts:

- Prompts have been redesigned to provide more functionality. For example, you can now create prompts that use dynamically generated value lists.
- You can now establish dependencies between prompts in a filter expression.
- You can create prompts for OLAP filters.
- Prompts that are created for a stored process and made globally available (shared) can be used by filters. For more information about creating a shared prompt, see the Help for stored processes in SAS Management Console.


- Unique unformatted values are no longer required for a prompt's static (custom) list of values.

## Resource Replacement

The new resource replacement feature enables you to replace resources that are unresolved or no longer relevant. This feature replaces the **XML** tab and the XML editor.

## Data Source Management

The following enhancements have been made to data source management:

- You can now add data sources and stored processes from the  tab in the main window. You can add an item by double-clicking it, using its pop-up menu option, or dragging it to the **Selected Resources** pane.
- The new auto-arrange feature on the **Relationships** tab in the main window enables you to rearrange the data sources on the tab so that they more closely resemble a star schema. An undo feature is also available.
- The new zoom feature on the **Relationships** tab in the main window enables you to see more of your data sources in a single view.
- You can now select specific columns to use or omit from a data source by using the new **Columns** tab in the Table Properties dialog box.
- You can now use information map tables as data sources.

## Information Map Management

You can now store your personal copies of information maps in a personal folder (My Folder). For more information about the personal folder, see the section on working with SAS folders in the *SAS Intelligence Platform: System Administration Guide*.

## Application Administration

The following application administration updates have been implemented:

- You can now clear the default connection profile setting by clicking **Clear** on the **General** tab in the Options dialog box.
- You can now specify what to use for a default data item description on the **Data Items** tab in the Options dialog box.
- Log files and application property files have been moved to the following locations:
  - On Windows Vista systems: C:\Users\user-ID\AppData\Roaming\SAS\SASInformationMapStudio\application-version-number
  - On Windows XP systems: C:\Documents and Settings\user-ID\Application Data\SAS\SASInformationMapStudio\application-version-number

**Note:** The CopyPaste.log file that is generated by the **Copy to Folder** feature is created in the following locations:

- On Windows Vista systems: C:\Users\user-ID\AppData\Roaming\SAS\Log

- On Windows XP systems: C:\Documents and Settings\user-ID\Application Data\SAS\LOGS
- You can access the Diagnostic Settings dialog box by adding the - loggingSetupDialog parameter to the application's .ini file.
- The application now supports independent metadata repositories. For more information about SAS Metadata Repositories, see the *SAS Intelligence Platform: System Administration Guide*.
- The application now supports Citrix servers.
- If your metadata server runs on Windows, you can select **Use Integrated Windows authentication** in the Connection Profile wizard to seamlessly launch SAS Information Map Studio. For more information, see the section about single sign-on in the *SAS Intelligence Platform: Security Administration Guide*.
- If your configuration supports server-side pooling for workspace servers, then queries against relational information maps will now run on those pooled servers. For information about using pooled workspace servers, see the *SAS Intelligence Platform: Security Administration Guide*.

## Deprecated Features

The following features have been deprecated:

- You can no longer export information maps as XML files. To import previously exported information maps, use the **Open from XML** menu option.  
**Note:** To import and export information maps as packages, use the import and export features that are available from the **Folders** tab in SAS Management Console.
- When you create a prompt, you can no longer use a data item's value-generation method for that prompt. In SAS Information Map Studio 4.2, you can specify a similar method within the prompt itself. Any prompt that was created before that release and that relies on the value-generation method of a data item will be converted to use the prompt's own corresponding method.
- SAS Information Map Studio 4.2 does not provide the ability to automatically convert prompt values to uppercase before a query is run. Any prompt that was created before SAS Information Map Studio 4.2 but that is saved in this release will also lose that ability.

## Documentation Enhancements

*SAS Information Map Studio: Getting Started with SAS Information Maps* (previously *SAS Information Map Studio: Creating Your First Information Map*) was updated and reorganized. This document provides step-by-step instructions for creating an information map that uses SAS sample data.





# 25

## SAS Information Retrieval Studio

<i>What's New in SAS Information Retrieval Studio 1.3</i> .....	215
General Enhancements .....	215
<i>What's New in SAS Information Retrieval Studio 12.1</i> .....	216
General Enhancements .....	216

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### What's New in SAS Information Retrieval Studio 1.3

#### General Enhancements

New and enhanced features in SAS Information Retrieval Studio include the following:

- SAS licensing replaces the Teragram license.
- The `content_categorization` Document Processor wizard replaces the `categorizer`, `concept_extractor`, and `contextual_extractor` processors.
- The `add_field` Document Processor enables you to add a field with a constant value to each input document.
- The `export_to_files` document processor now enables you to mark pre-escaped fields for XML documents. Use this processor to create nested XML tags.
- The `parse_xml` document processor can now be instantiated multiple times. This feature enables you to support multiple document schemas. This processor can also copy the original URL of the compound document into each resulting, split document.
- The `export_csv` document processor now supports a non-escaped output mode.
- Entry point quota control is now available for the web crawler. This feature enables seed-only crawling.
- The `match_and_copy` document processor is similar to the `substitute` document processor. Use the `match_and_copy` document processor to write the output to a different field from the input.
- The default fields `ctime`, `mtime`, and `atime` are included in the **Input fields** to exclude field for the content categorization document processor. These fields preclude these timestamps from processing by SAS Content Categorization Server.

- The passwords in the web crawler Credentials pane are now obscured.

---

## What's New in SAS Information Retrieval Studio 12.1

### General Enhancements

New and enhanced features in SAS Information Retrieval Studio enable you to do the following:

- Install the SAS Web Crawler, SAS Search and Indexing, and SAS Document Conversion Server with SAS Information Retrieval Studio. Crawling and search are conditionally enabled based on the SAS solutions you license.
- Create multiple information retrieval projects using a single installation.
- Use virtual indexing, in which automatic segmentation and federation enable search indexes to scale beyond the limits of a single machine.
- Use Markup Matcher to extract fielded data from HTML or XML documents on a specific site. This component includes a point-and-click user interface to edit and test your matchers, along with support for XPath and regular expression rules.
- Choose incremental recrawling or limit transversal depth when you use the Web Crawler.

# 26

## SAS Integration Technologies

<b><i>What's New in SAS 9.3 Integration Technologies</i></b> .....	<b>218</b>
Overview .....	218
General Enhancements .....	218
<b><i>What's New in SAS 9.3 Stored Processes</i></b> .....	<b>219</b>
Overview .....	219
Stored Process Reports .....	219
PROC STP .....	219
SAS Stored Process Web Application Enhancements .....	219
Metadata Enhancements .....	220
General Enhancements .....	220
<b><i>What's New in SAS 9.3 BI Web Services</i></b> .....	<b>221</b>
Overview .....	221
General Enhancements .....	221
SAS Stored Process Enhancements .....	221
Transport Type Additions .....	222
<b><i>What's New in SAS 9.3 Publishing Framework</i></b> .....	<b>222</b>
Overview .....	222
General Enhancements .....	222
<b><i>What's New in Integration Technologies Java Client Development</i></b> .....	<b>223</b>
Overview .....	223
Zero-Configuration Workspace Servers .....	223
Logging Service Deprecation .....	223
<b><i>What's New in SAS 9.3 Foundation Services</i></b> .....	<b>223</b>
Overview .....	223
Logging Service Deprecation .....	223
<b><i>What's New in Application Messaging with SAS 9.3</i></b> .....	<b>224</b>
Overview .....	224
JMS File Access Method .....	224
JMS Polling Server .....	224
New Attributes for the MQINQ Call Routine .....	224
Simplified JMS Configuration for Second Maintenance Release .....	224

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## What's New in SAS 9.3 Integration Technologies

### Overview

New features for SAS Integration Technologies in SAS 9.3 include a number of general enhancements for the following products:

- SAS Stored Processes
- SAS BI Web Services
- SAS Publishing Framework
- Application Messaging
- SAS Foundation Services
- SAS Integration Technologies Java Clients

### General Enhancements

SAS Integration Technologies includes the following enhancements:

- SAS 9.3 Stored Processes introduces several new features, including stored process reports, the STP procedure, enhancements to the SAS Stored Process Web Application and stored process metadata, as well as general enhancements. See the *SAS Stored Processes: Developer's Guide*.
- SAS BI Web Services introduce several new features for programmers that make it easier to consume SAS Stored Processes using popular Web service protocols. New features include support for new transport types, integration with SAS 9.3 Stored Process features, more management capabilities, an engine rewrite for speedier execution and more comprehensive extensions, and a feature that eliminates the need to use the Deploy as Web Service wizard in SAS Management Console to create new generated Web services. In addition, SAS BI Web Services for .NET has been discontinued in SAS 9.3. See the *SAS BI Web Services: Developer's Guide*.
- SAS Publishing Framework provides the ability to publish to Microsoft SharePoint, as well as new properties for CALL routines. See the *SAS Publishing Framework: Developer's Guide*.
- Application messaging provides a new JMS file access method, support for JMS polling servers, and new attributes for the MQINQ call routine. See *Application Messaging with SAS*.
- In SAS Foundation Services, the Logging service is deprecated.
- SAS Integration Technologies provides a new zero-configuration workspace server. See the *SAS Integration Technologies: Java Client Developer's Guide*.

---

## What's New in SAS 9.3 Stored Processes

### Overview

SAS 9.3 Stored Processes introduces several new features, including stored process reports, the STP procedure, enhancements to the SAS Stored Process Web Application and stored process metadata, as well as general enhancements.

### Stored Process Reports

A stored process report is a new object type that contains stored process output that is cached. The output can be viewed without re-executing the stored process. Stored process reports can be defined in SAS Management Console.

### PROC STP

PROC STP enables users to execute a stored process from a SAS program. PROC STP can be executed in an interactive, batch, or server SAS session and can even be executed by another stored process.

### SAS Stored Process Web Application Enhancements

The following enhancements have been added to the SAS Stored Process Web Application:

- Alerts can be suppressed if you run a stored process and include the `_ACTION=NOALERT` parameter.
- The `_WELCOME` parameter can be used in a URL to forward the Web browser to a specified welcome page.
- A search feature enables you to locate stored processes or stored process reports based on name, description, or keyword. The default search form is invoked with `_ACTION=SEARCH`.
- The `_ACTION=XML` parameter can be combined with other `_ACTION` values to return XML data. For example, `_ACTION=TREE,XML` returns a stored processes tree list.
- The `_FORM` parameter specifies the location of a custom input form JSP file to use when the stored process is run with `_ACTION=FORM`. The parameter can be entered on the URL or defined as a permanent parameter in the stored process.
- The SAS Stored Process Web Application can be used to display, retrieve, and rerun stored process reports.
- The `_TYPE` parameter can be used to limit tree and search functions to display only stored processes or only stored process reports. For example, to generate a stored process report tree from a URL, add the parameter `_TYPE=REPORT` to the URL as follows:

`http://xxx.yyy.com:8080/SASStoredProcess/do?_action=index&_type=report`

- The `_TARGET` URL parameter overrides the fixed form target value. You can use `_TARGET=BLANK` to always force a new window.
- Any stored process or report marked as hidden in SAS Management Console does not show up in the tree or search results.

## Metadata Enhancements

The following enhancements have been added to the Stored Process Properties dialog box and the New Stored Process wizard in SAS Management Console:

- Helper stored processes can be hidden from the end user. You can specify this option on the **General** tab of the Stored Process Properties dialog box in SAS Management Console.
- Stored processes can have a server context specified when they are registered, instead of a specific logical server. This means that a workspace server or stored process server is automatically chosen when the stored process is run, depending on what other parameters are specified for the stored process.
- Stored process source code can be stored on the SAS Metadata Server, and the source code can be viewed, added, or modified when you view, register, or modify a stored process in SAS Management Console.
- Data tables can be specified as data sources and data targets.

The New Stored Process Report wizard and Stored Process Report Properties dialog box have been added to SAS Management Console. The wizard and dialog box can be used to create and manage stored process reports.

## General Enhancements

The following general enhancements have been added to SAS Stored Processes:

- The SAS Workspace Server supports stored processes with streaming output, except stored processes that use sessions or replay (such as embedded images in streaming output).
- The `*ProcessBody` comment is no longer needed for new stored processes that execute on the SAS Workspace Server.
- Result packages can be published to Microsoft SharePoint.
- Reserved global macro variables `_ARCHIVE_PATH`, `_ARCHIVE_NAME`, and `_GENERATED_NAME` have been added for publishing to WebDAV and Sharepoint. The `_DEBUG_FILE` reserved macro variable has been added for publishing to Sharepoint. Reserved global macro variables `_FOLDER_PATH`, `_METAPASS`, and `_METAUSER` have been added for publishing to subscribers.

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## What's New in SAS 9.3 BI Web Services

### Overview

SAS 9.3 BI Web Services introduce several new features for programmers that make it easier to consume SAS Stored Processes using popular Web service protocols. New features include support for new transport types, integration with SAS 9.3 Stored Process features, more management capabilities, an engine rewrite for speedier execution and more comprehensive extensions, and a feature that eliminates the need to use the Deploy as Web Service wizard in SAS Management Console to create new generated Web services by exposing stored processes for dynamic execution. In addition, SAS BI Web Services for .NET has been discontinued in SAS 9.3.

### General Enhancements

The following general enhancements have been added to SAS BI Web Services:

- The SAS BI Web Services for Java engine has been rewritten to use the Spring Framework. This new engine is backwards compatible with SAS 9.2 generated Web services and the XMLA Web service. You can continue to use any existing client proxy code when invoking migrated SAS 9.2 generated Web services and XMLA proxies should continue to work as they did in SAS 9.2.
- You no longer need to generate Web services using the Deploy as a Web Service wizard in SAS Management Console. As soon as you create a SAS Stored Process, it is available for execution by SAS BI Web Services. You can continue to generate Web services to group multiple stored processes under one endpoint or to publish the intent that these stored processes are to be executed by Web service clients.
- SAS BI Web Services for .NET has been discontinued. SAS BI Web Services for Java will support migrated .NET 9.2 generated Web services in a way that is transparent for clients. In fact, clients should need only to change endpoint addresses (and this step can be omitted if a proxy server is used).

### SAS Stored Process Enhancements

The following stored process enhancements have been added to SAS BI Web Services:

- The SAS Workspace Server supports stored processes with output parameters and stored processes with streaming output, except stored processes that use sessions.
- Data tables can be specified as data sources and data targets. Data tables are similar to traditional data sources and targets, but they eliminate the need for stored process authors to hardcode LIBNAME statements in SAS code. Also, data tables enable stored process authors to specify a template table. This template table is used to automatically generate schema for the table in SAS BI Web Service WSDLs.

## Transport Type Additions

SAS BI Web Services has always provided SOAP endpoints for XMLA and generated Web services. SOAP is widely used in enterprise scenarios because of the set of WS-\* standards available for the protocol, for its use of a Web Service Description Language (WSDL) files, and for its structured and namespaced messages. However, sometimes SOAP is overkill. Many mobile client development libraries lack native SOAP libraries and Web applications typically use client-side asynchronous JavaScript remoting calls where SOAP is not appropriate. Therefore, SAS 9.3 BI Web Services supports plain XML and JSON as transport types.

---

## What's New in SAS 9.3 Publishing Framework

### Overview

SAS 9.3 Publishing Framework provides the ability to publish to Microsoft SharePoint, as well as new properties for CALL routines.

### General Enhancements

The following general enhancements have been added to the SAS Publishing Framework:

- You can use the Publish Package CALL routines to publish and retrieve packages to and from SharePoint. Publishing to SharePoint is similar to publishing to WebDAV in that it facilitates concurrent access to and update of package data on the Internet.
- The INSERT\_FILE CALL routine can have a DESTINATION\_FILENAME property defined. This property enables you to specify a different destination filename when publishing a package.
- The HTTP\_TOKENAUTH property can be used when publishing to WebDAV. This property enables token authentication to a SAS Content Server.
- The GENERATED\_NAME property is supported when publishing to WebDAV, archive, or SharePoint. This property enables you to obtain the name of the generated package or archive.



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## What's New in Integration Technologies Java Client Development

### Overview

SAS 9.3 Integration Technologies provides a new zero-configuration workspace server interface. In addition, the Logging service is deprecated.

### Zero-Configuration Workspace Servers

The new zero-configuration workspace server interface enables you to launch a workspace server without specifying any connection information or configuring server metadata. Zero-configuration workspace servers require that SAS Foundation is installed on the same Windows machine where your client is running.

### Logging Service Deprecation

The Logging service is deprecated in SAS 9.3. Custom SAS clients should use Log4j to perform logging tasks.

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## What's New in SAS 9.3 Foundation Services

### Overview

In SAS 9.3 Foundation Services, the Logging service is deprecated.

### Logging Service Deprecation

The Logging service is deprecated in SAS 9.3. Custom SAS clients should use Log4j to perform logging tasks.

## What's New in Application Messaging with SAS 9.3

### Overview

The following changes and enhancements are available in Application Messaging with SAS 9.3:

- a new JMS file access method
- support for JMS polling servers
- new attributes for the MQINQ call routine

For the second maintenance release of SAS 9.3, the configuration tasks for JMS polling servers and the JMS file access method have been simplified.

### JMS File Access Method

The new JMS file access method enables you to access JMS destinations by using the FILENAME, FILE, and INFILE statements.

### JMS Polling Server

Support is added for JMS polling servers.

### New Attributes for the MQINQ Call Routine

The MQINQ call routine has several new attributes, which are specific to z/OS:

- ACTIVE\_CHANNELS
- MAX\_CHANNELS
- TCP\_CHANNELS

### Simplified JMS Configuration for Second Maintenance Release

For the second maintenance release of SAS 9.3, the Java configuration tasks for JMS polling servers and the JMS file access method have been simplified.

## 27

## SAS Intelligence Platform

<b><i>What's New in Application Server Administration for the SAS 9.3 Intelligence Platform</i></b> .....	<b>227</b>
Overview .....	227
Added Object Spawner Command Option for Load-balancing Peer without a Peer Refresh .....	227
Enhanced Support for Running SAS Code at Server Session Boundaries ...	227
Enhanced Support for Running SAS Code at Server Boundaries .....	227
Added Single Sign-on Support, Based on Kerberos, for UNIX .....	228
Added Object Spawner Support for FIPS .....	228
Changed Server Credentials for Load Balancing .....	228
Added Support for Grid Algorithm .....	228
Changed Object Spawner Refresh .....	228
Added New SAS Procedure: PROC IOMOPERATE .....	228
<b><i>What's New in Desktop Application Administration for the SAS 9.3 Intelligence Platform</i></b> .....	<b>228</b>
Overview .....	228
Documentation Enhancements .....	229
<b><i>What's New in Data Administration for the SAS 9.3 Intelligence Platform</i></b> ...	<b>230</b>
Overview .....	230
Support for DataFlux Federation Server .....	230
Support for Hadoop through SAS/ACCESS Interface to Hadoop .....	230
Preproduction Server and Library Wizards for SAS LASR Analytic Server ...	231
New Library Pre-Assignment Options .....	231
New Wizard for Standardizing Column Metadata .....	231
SAS Data Surveyor for PeopleSoft .....	231
<b><i>What's New in Installation and Configuration for the SAS 9.3 Intelligence Platform</i></b> .....	<b>232</b>
Overview .....	232
SAS Download Manager No Longer Installed .....	232
Capability to Subset SAS Software Orders .....	232
SAS Middle Tier Supported on 64-Bit Systems Only .....	233
z/OS Deployment Enhancements .....	233
Capability to Build a Middle-Tier Configuration for Deployment on Another Machine .....	233
Enhanced Support for Locale and Encoding .....	233
New SAS Uninstaller for Windows .....	233
New Text-Based Interface for SAS Deployment Tools .....	233
SAS Download Manager Dependencies on Linux .....	233
New Depot Checker Utility .....	233
Hot Fixes Now Part of Your Initial SAS Installation .....	234

SAS Hot Fixes Now Installed Using the Deployment Wizard .....	234
New Web Infrastructure Database Configuration Options .....	234
IPC Timeout Configuration Option for WebSphere .....	234
<b>What's New in Middle-Tier Administration for the SAS 9.3</b>	
<b>Intelligence Platform .....</b>	<b>234</b>
Overview .....	234
SAS Middle Tier Supported on 64-Bit Systems Only .....	235
SAS BI Web Services for .NET Is No Longer Shipped .....	235
Web Application Logging with Log4j .....	235
Changes to the Audit Service .....	235
New Configuration Scripting Tools .....	235
Predefined Role for SAS Comment Manager .....	236
New SAS Logon Manager Security Policy to Disable	
Concurrent Logon Sessions .....	236
Documentation Enhancements .....	236
<b>What's New in Migration for the SAS 9.3 Intelligence Platform .....</b>	<b>237</b>
Overview .....	237
Changes for SAS 9.3 Migration .....	237
Port Remapping .....	237
Enhanced Analysis Report .....	237
<b>What's New in System Administration for the SAS 9.3</b>	
<b>Intelligence Platform .....</b>	<b>238</b>
Overview .....	238
Changes to SAS Server Operation, Monitoring, and Logging .....	238
New Backup and Recovery Facility for the SAS Metadata Server .....	239
Changes to SAS Metadata Server Administration .....	240
Enhancements to SAS Folders .....	240
Enhancements to Promotion Tools .....	241
SAS 9.3 to SAS 9.3 Migration .....	241
Deprecated Features .....	241
Documentation Enhancements .....	242
<b>What's New in Security Administration in SAS 9.3 .....</b>	<b>242</b>
Overview .....	242
Auditing .....	242
Authentication .....	243
Authorization .....	243
Encryption .....	244
User Administration .....	244
Documentation Changes .....	244
<b>What's New in Web Application Administration for the</b>	
<b>SAS 9.3 Intelligence Platform .....</b>	<b>245</b>
Overview .....	245
SAS Information Delivery Portal .....	245
SAS BI Portlets .....	246
SAS Web Report Studio .....	247
SAS BI Dashboard .....	249
Documentation Changes .....	251

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## What's New in Application Server Administration for the SAS 9.3 Intelligence Platform

### Overview

The *SAS Intelligence Platform: Application Server Administration Guide* explains how to administer a SAS Application Server.

This document contains the following enhancements and changes to the SAS Intelligence Platform:

- [Added Object Spawner Command Option for Load-balancing Peer without a Peer Refresh on page 227](#)
- [Enhanced Support for Running SAS Code at Server Session Boundaries on page 227](#)
- [Enhanced Support for Running SAS Code at Server Boundaries on page 227](#)
- [Added Single Sign-on Support, Based on Kerberos, for UNIX on page 228](#)
- [Added Object Spawner Support for FIPS on page 228](#)
- [Changed Server Credentials for Load Balancing on page 228](#)
- [Added Support for Grid Algorithm on page 228](#)
- [Changed Object Spawner Refresh on page 228](#)
- [Added New SAS Procedure: PROC IOMOPERATE on page 228](#)

### Added Object Spawner Command Option for Load-balancing Peer without a Peer Refresh

A new Object Spawner command option (-lbaddtocluster) enables you to add a new host to an existing load balancing peer object without requiring a peer refresh. This feature is required for cloud computing and software as a service models.

### Enhanced Support for Running SAS Code at Server Session Boundaries

In addition to the stored process server, the workspace server and pooled workspace server now support running SAS code at server session start up and shutdown.

### Enhanced Support for Running SAS Code at Server Boundaries

In SAS 9.3, the IOM servers also support running SAS code at server start up and shutdown.

## Added Single Sign-on Support, Based on Kerberos, for UNIX

Single sign-on support based on Kerberos has been added for SAS servers running on UNIX.

## Added Object Spawner Support for FIPS

The object spawner supports the Federal Information Processing Standards (FIPS) compliance mode that is provided by SAS/SECURE software in its implementation of the FIPS 140-2 specification.

## Changed Server Credentials for Load Balancing

Server load balancing generates its own credentials internally in SAS 9.3. Logical server credentials are no longer needed.

## Added Support for Grid Algorithm

The load-balancing grid algorithm is now supported for the OLAP, stored process, and pooled workspace servers.

## Changed Object Spawner Refresh

In SAS 9.3, when you refresh the object spawner, the spawner now quiesces any servers that it has started. The servers shut down when their clients have completed their work.

## Added New SAS Procedure: PROC IOMOPERATE

There is a new SAS 9.3 procedure, PROC IOMOPERATE. It administers SAS servers that support the SAS IOM infrastructure.

---

# What's New in Desktop Application Administration for the SAS 9.3 Intelligence Platform

## Overview

The *SAS Intelligence Platform: Desktop Application Administration Guide* contains new and updated administrative tasks that are associated with seven client applications.

## Documentation Enhancements

For SAS 9.3, the *SAS Intelligence Platform: Desktop Application Administration Guide* contains enhancements for the following applications.

### SAS Add-In for Microsoft Office

The chapter for the SAS Add-In for Microsoft Office now addresses the following administrative topics:

- Migrate SAS content between releases, either automatically, or using a migration wizard.
- Maintain multiple versions of the SAS Add-in on a single host. You select the release that you want to run by selecting a utility.
- Administer the use of SAS content in Outlook instant messages.
- Use a SAS grid for parallel processing.
- Use capabilities to configure access to SAS comments, dashboards, and OLAP cubes in Outlook.
- Set options to govern refresh rates for SAS functionality in Outlook.
- Roles and capabilities have been added and changed.

### SAS Enterprise Guide

The chapter for SAS Enterprise Guide now addresses the following administrative topics:

- The SAS Enterprise Guide chapter now documents all of the administrative tasks that are performed with SAS Enterprise Guide Explorer. Included are all tasks that apply to the use of local repositories, when you are not using a SAS Metadata Server. This chapter now supersedes and replaces the document *Administering SAS Enterprise Guide*.
- Roles and capabilities have been added and changed.

### SAS Data Integration Studio

The SAS Data Integration Studio chapter now documents administrative tasks associated with the DataFlux Data Management Platform. The chapter now includes updates to the data quality configuration topics.

### SAS Enterprise Miner

The technical content in the SAS Enterprise Miner chapter is now provided in the document *SAS Enterprise Miner: Administration and Configuration*.

---

## What's New in Data Administration for the SAS 9.3 Intelligence Platform

### Overview

This document focuses on the SAS Intelligence Platform and establishing connectivity to your data sources (and data targets). Information about third-party products that you need to install and the metadata objects that you need to create are also described. It also contains information about setting up shared access to SAS data and explains how using different data-access engines affects security.

- Support for DataFlux Federation Server
- Support for Hadoop through SAS/ACCESS Interface to Hadoop
- Preproduction Server and Library Wizards for SAS LASR Analytic Server
- New Library Pre-Assignment Options
- New Wizard for Standardizing Column Metadata
- SAS Data Surveyor for PeopleSoft

### Support for DataFlux Federation Server

In the second maintenance release for SAS 9.3, the LIBNAME engine for DataFlux Federation Server is introduced. SAS Management Console is enhanced to provide wizards for registering DataFlux Federation Servers and DataFlux Federation Server libraries. The DataFlux Federation Server is a data server that provides scalable, threaded, multi-user, standards-based data access technology in order to process and seamlessly integrate data from multiple data sources. The server acts as a hub that provides clients with data by accessing, managing, and sharing SAS data as well as data from several third-party databases.

### Support for Hadoop through SAS/ACCESS Interface to Hadoop

In the second maintenance release for SAS 9.3, SAS Management Console is enhanced to provide wizards for registering Hadoop Servers and libraries that access data in Hadoop through a Hive Server. Hadoop is an open-source technology for large data volume storage and processing. It provides scalability from a combination of high bandwidth, the Hadoop Distributed File System (HDFS), and fault-tolerant distributed processing. SAS Data Management provides integration with Hadoop in three ways:

- reading and writing data in HDFS
- sending programs and managing execution of programs in Hadoop clusters
- selecting transformations from a library that includes Pig, Hive, and MapReduce processing



This document focuses on registering the Hadoop server in metadata and then registering libraries that use Hive for reading and writing tables.

## Preproduction Server and Library Wizards for SAS LASR Analytic Server

In the second maintenance release for SAS 9.3, SAS Management Console is enhanced to provide preproduction wizards for registering servers and libraries for SAS LASR Analytic Server. The preproduction wizards are identified in the following list:

- SAS LASR Analytic Server  
This wizard is used to identify the connection information for a server instance and register it in metadata.
- SAS LASR Analytic Server Library  
This wizard is used to register tables that are loaded in memory on a SAS LASR Analytic Server instance.
- SAS Data in HDFS Library  
This wizard is used to register libraries for tables that are stored in the Hadoop Distributed File System (HDFS). The library only works with SASHDAT files that are created with the OLIPHANT procedure or with the SAS Data in HDFS Engine.

## New Library Pre-Assignment Options

Libraries can be pre-assigned so that the engine that is used for data access is controlled by the SAS administrator. For SAS 9.3, three options are used to identify how the library is pre-assigned. The options are to use the native engine that is identified in metadata, to use the metadata engine, or to indicate that an external configuration file has the LIBNAME statement for the library. These pre-assignment options help administrators control how the SAS clients access the data.

## New Wizard for Standardizing Column Metadata

In some cases, table columns that have the same name and that are used for the same purpose should also have the same attribute values. For example, two columns named Total Sales should perhaps have the same data type and column length. The Column Standardization wizard finds columns that have similar names and compares their attributes. It shows any inconsistency in the column attribute values. You can use this wizard to generate a report about column differences or to log updates for audit purposes. You can also use the wizard to update the metadata for a table.

## SAS Data Surveyor for PeopleSoft

In the SAS 9.3 release, the SAS Data Surveyor for PeopleSoft is no longer available. The SAS Data Surveyor for PeopleSoft continues to be supported on SAS 9.2 systems.

---

## What's New in Installation and Configuration for the SAS 9.3 Intelligence Platform

### Overview

The *SAS Intelligence Platform: Installation and Configuration Guide* explains how to install and initially configure the SAS Intelligence Platform.

This document contains new material on the following enhancements and changes to the SAS Intelligence Platform deployment tools:

- SAS Download Manager no longer installed
- capability to subset SAS Software Depots
- SAS middle tier supported on 64-bit systems only
- z/OS deployment enhancements
- capability to build a middle-tier configuration for deployment on another machine
- enhanced support for locale and encoding
- new SAS uninstaller for Windows

The following enhancements and changes to the SAS Intelligence Platform deployment tools were made in the March 2012 release of SAS 9.3:

- new text-based interface for SAS Deployment tools
- SAS Download Manager Dependencies on Linux
- new depot checker utility

The following enhancements and changes to the SAS Intelligence Platform deployment tools were made in the second maintenance release for SAS 9.3:

- hot fixes now part of your initial SAS installation
- SAS hot fixes now installed using the deployment wizard
- new Web Infrastructure Database configuration options
- IPC timeout configuration option for WebSphere

### SAS Download Manager No Longer Installed

For SAS 9.3, you no longer install the SAS Download Manager. You simply download and run it.

### Capability to Subset SAS Software Orders

Both the SAS Download Manager and the SAS Deployment Wizard enable you to subset—or break up—your software order. This enables you to create significantly

smaller SAS Software Depots targeted for different sets of users based on operating system, product type, and language.

## **SAS Middle Tier Supported on 64-Bit Systems Only**

The SAS 9.3 middle tier is supported only on 64-bit operating systems.

## **z/OS Deployment Enhancements**

SAS 9.3 has enhanced the deployment experience for the z/OS platform through deployment wizard enhancements and a software depot mover tool.

## **Capability to Build a Middle-Tier Configuration for Deployment on Another Machine**

The SAS Deployment Wizard enables the SAS administrator to perform the SAS Web tier deployment on a machine that does not contain a Web application server. After the deployment is complete, the SAS administrator compresses the Web tier configuration and hands it off to his Web administrator counterpart to deploy on the target Web application server machine.

## **Enhanced Support for Locale and Encoding**

The SAS Deployment Wizard has enhanced support for configuring locales and encodings.

## **New SAS Uninstaller for Windows**

SAS 9.3 has a new uninstaller on Windows that enables you to uninstall multiple SAS 9.3 applications in a single operation.

## **New Text-Based Interface for SAS Deployment Tools**

In the March 2012 release of SAS 9.3, the SAS Deployment Wizard, SAS Deployment Manager, and SAS Download Manager can be run on operating systems that do not have windowing systems.

## **SAS Download Manager Dependencies on Linux**

In the March 2012 release of SAS 9.3, there are certain 64-bit Linux dependencies.

## **New Depot Checker Utility**

In the March 2012 release of SAS 9.3, SAS provides a utility with which you can verify the integrity of your SAS Software Depot.

## Hot Fixes Now Part of Your Initial SAS Installation

In the second maintenance release for SAS 9.3, the SAS Download Manager automatically downloads the necessary SAS hot fixes required by the SAS products in your initial order. This enhancement makes the following possible:

- Your SAS software is up-to-date with hot fixes deemed critical by SAS Technical Support after your initial deployment.

You avoid the multi-step process of deploying software and then having to immediately update it with hot fixes. The SAS Deployment Wizard applies hot fixes prior to the configuration phase. You no longer have to reconfigure products immediately after their initial configuration.

- The SAS Deployment Wizard applies hot fixes prior to the configuration phase.

You no longer have to reconfigure products immediately after their initial configuration.

## SAS Hot Fixes Now Installed Using the Deployment Wizard

In the second maintenance release for SAS 9.3, the SAS hot fix tool (sashf) has been deprecated. The SAS Deployment Wizard is now used to install SAS hot fixes.

For more information, see the SAS Deployment Wizard and SAS Deployment Manager User's Guide located at <http://support.sas.com/documentation/installcenter/en/ikdeploywizug/64204/PDF/default/user.pdf>.

## New Web Infrastructure Database Configuration Options

In the second maintenance release for SAS 9.3, the SAS Deployment Wizard enables you to configure the catalog and schema pattern for the SAS Web Infrastructure Database.

## IPC Timeout Configuration Option for WebSphere

In the second maintenance release for SAS 9.3, there is now an IPC timeout configuration option for WebSphere managed servers.

---

## What's New in Middle-Tier Administration for the SAS 9.3 Intelligence Platform

### Overview

The SAS 9.3 middle-tier software has the following changes and enhancements:

- SAS Middle Tier Supported on 64-Bit Systems Only
- SAS BI Web Services for .NET Is No Longer Shipped
- Web Application Logging with Log4j
- Changes to the Audit Service
- New Configuration Scripting Tools
- Predefined Role for SAS Comment Manager
- New SAS Logon Manager Security Policy to Disable Concurrent Logon Sessions
- Documentation Enhancements

## **SAS Middle Tier Supported on 64-Bit Systems Only**

The SAS 9.3 middle-tier software is supported on 64-bit operating systems only.

## **SAS BI Web Services for .NET Is No Longer Shipped**

SAS has discontinued the SAS BI Web Services for .NET product. Customers that used the functionality provided by this application are encouraged to transition to the SAS BI Web Services for Java product.

## **Web Application Logging with Log4j**

In the SAS 9.2 release, logging for the SAS Web applications was performed with a logging service. For the SAS 9.3 release, logging is performed with log4j. Logging configuration is performed in two ways. First, each Web application reads a log4j configuration file. Second, some Web applications enable dynamic logging changes that can be set in the SAS Web Administration Console.

## **Changes to the Audit Service**

In the SAS 9.2 release, audit records could be stored to a log file or to a database. In the SAS 9.3 release, all SAS deployments are configured to use the SAS Web Infrastructure Platform database. The SAS 9.3 release also has an update to the SAS Web Administration Console to display user-level audit information.

## **New Configuration Scripting Tools**

For the SAS 9.3 release, the SAS middle-tier software includes a configuration scripting tool for each of the three supported Web applications servers. The primary purpose of the configuration scripting tools is to support configuring a Web application server for sites that do not permit running the SAS Deployment Wizard on a middle-tier machine.

In the first maintenance release of SAS 9.3, the syntax for invoking a single command on JBoss and WebSphere Application Server changed. In addition, the commands or operations are no longer pre-production status.

## Predefined Role for SAS Comment Manager

In the SAS 9.2 release, editing and deletion capabilities in the SAS Comment Manager were accomplished by creating a role and assigning users to that role. In SAS 9.3, users requiring these capabilities should be assigned to a new predefined role, Comments:Administrator.

## New SAS Logon Manager Security Policy to Disable Concurrent Logon Sessions

For the SAS 9.3 release, SAS Logon Manager can be configured to prevent concurrent logon sessions. This option might be attractive for deployments in highly regulated environments.

## Documentation Enhancements

- In the second maintenance release of SAS 9.3, information about the Web application start-up sequence is enhanced. For deployments that use IBM WebSphere Application Server, there is a sequence for five applications, but the remaining Web applications can be started in any sequence.
- In the second maintenance release of SAS 9.3, procedural information about configuring third-party vendor software such as HTTP servers and proxy plug-ins is removed. Documentation that describes the procedural steps is provided at <http://support.sas.com/thirdpartysupport>.
- In the first maintenance release of SAS 9.3, the configuration scripting tools chapter is enhanced to include more procedural information. Step-action procedures that describe how to run the tools to configure the middle-tier software are new.
- In the first maintenance release of SAS 9.3, procedural information about configuring Secure Sockets Layer (SSL) is removed. Documentation that describes the procedural steps is provided at <http://support.sas.com/thirdpartysupport>.
- SAS Logon Manager is documented in its own chapter. New configuration steps are provided for configuring custom logon, log off, and time-out messages. More information is provided about configuring HTTP session time-out intervals.
- The configuration steps for rebuilding and redeploying the SAS Web applications has been revised. More information about when the Web application server can be running, or must be stopped, is provided.
- Information about configuring the JGroups bind address has been added. This information was previously provided by SAS Technical Support in a SAS Note.

---

## What's New in Migration for the SAS 9.3 Intelligence Platform

### Overview

The *SAS 9.3 Intelligence Platform: Migration Guide* describes the migration approach for upgrading your SAS Intelligence Platform 9.1.3 or 9.2 content and configuration to SAS 9.3. It describes the various phases of design, execution, and validation of your migration using the SAS migration tools.

### Changes for SAS 9.3 Migration

Changes in SAS 9.3 regarding migration include the following:

- SAS 9.3 is installed in a SASHOME directory.
- No baseline is required to migrate SAS 9.2. (SAS 9.1.3 still requires SP4.)
- Different versions of the SAS Migration Utility are used, depending on which version of SAS you are migrating from.
- Several new migration utility properties have been added.
- The SAS 9.3 middle tier is supported only on 64-bit operating systems.
- SAS Deployment Wizard no longer uses a separate System Requirements Wizard.
- The versions of various clients that shipped with SAS 9.2 (SAS Enterprise Guide, SAS Add-In for Microsoft Office, and JMP) are compatible with SAS 9.3 deployments.

### Port Remapping

In the October 2011 release of SAS 9.3, you can designate different ports for your SAS 9.3 deployment using the SAS Deployment Wizard.

### Enhanced Analysis Report

In the October 2011 release of SAS 9.3, the migration utility analysis report has been enhanced to create a list of all products configured in the current SAS deployment.

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## What's New in System Administration for the SAS 9.3 Intelligence Platform

### Overview

The SAS Intelligence Platform includes the following enhancements and changes for SAS 9.3:

- changes to SAS server operation, monitoring, and logging
- a new backup and recovery facility for the SAS Metadata Server
- changes to metadata server administration
- enhancements to SAS Folders
- enhancements to the promotion tools (including the Export SAS Package and Import SAS Package wizards and the batch export and import tools.
- SAS 9.3 to SAS 9.3 migration, which enables you to use the SAS Migration Utility along with the SAS Deployment Wizard to create a copy of your SAS 9.3 deployment
- deprecated features
- documentation enhancements

### Changes to SAS Server Operation, Monitoring, and Logging

SAS 9.3 includes the following changes to operation, monitoring, and logging for SAS servers:

- The new SAS Framework Data Server is the default location for middle-tier data such as alerts, comments, and workflows, as well as data for the SAS Content Server and SAS Service Parts Optimization. The server is provided as an alternative to using a third-party DBMS. (The server cannot be used as a general-purpose data store.)
- Audit.Meta.Updates is a new logging category for the SAS Metadata Server that enables you to capture events that are performed on metadata objects. The logged events include adding, updating, deleting, checking out, checking in, and fetching objects, as well as undoing checkouts.
- Alternative logging configuration files called logconfig.apm.xml are provided for use with the SAS Enterprise BI Audit and Performance Measurement package. This package is available for download from <http://support.sas.com/rnd/emi>. The logging configuration files are customized for your deployment.
- In SAS Management Console, you can now use the Server Manager **Options** tab to dynamically update the JNLLINEMAX and JNLSTRMAX object server parameters. These parameters pertain to the SAS Metadata Server, SAS OLAP Server, and SAS object spawner, as well as to processes on SAS Workspace Servers, SAS Pooled Workspace Servers, and SAS Stored Process Servers.



This feature enables you to capture generated XML entries in the metadata server log without stopping the server.

- The second maintenance release for SAS 9.3 includes new files that can be used to customize the following shell scripts: `level_env.sh`, `appservercontext_env.sh`, `sas.sh`, `connectspawner.sh`, `metadataserver.sh`, `olapserver.sh`, `shareserver.sh`, and `sasbatch.sh`. Use of these files, which have the suffix `_usermods.sh`, prevents script customizations from being overwritten when a new SAS release is installed.

## New Backup and Recovery Facility for the SAS Metadata Server

The SAS 9.3 Metadata Server includes a new server-based facility that performs metadata server backups automatically on a scheduled basis. This facility can also be used to perform ad hoc backups and to perform roll-forward recovery. The facility replaces the `%OMABAKUP` macro, which was available in SAS 9.1 and 9.2, and the Backup and Restore Wizard in SAS Management Console, which was available in SAS 9.2.

The backup and recovery facility provides the following features:

- A schedule of daily backups is configured by the SAS Deployment Wizard. Therefore, daily backups are taken without the need for administrator intervention. In addition, unscheduled backups are launched automatically in certain situations, such as after the SAS Deployment Wizard configures the SAS Metadata Server.
- Administrators can use SAS Management Console to change the schedule and the configuration options, including the backup directory location and the backup retention policy. Backups can also be run on an ad hoc (unscheduled) basis from SAS Management Console, from the operating system command line, from SAS, or through third-party scheduling software.
- When repositories are restored in the event of a metadata server failure, transactions recorded in the journal file can be used to perform roll-forward recovery to a specified point in time after the last backup was taken.
- SAS Management Console displays detailed backup and recovery history. The history includes all backups that are run using the server's backup facility, regardless of how the backup was invoked (from the server's own scheduling facility, from SAS Management Console, from the command line, from SAS, or from third-party scheduling software). Status icons indicate which backups are active and which backups have been deleted based on the retention policy. When you view the properties of a backup, the backup files are validated, and the status icon is updated to indicate whether the backup is usable.
- The backup process is a "hot" backup that executes in a separate thread while the metadata server is running. Therefore, the server does not need to be paused during the backup and all transactions, including updates, continue to be processed.

If journaling has been disabled or if the Reorganize Repositories backup option has been selected, the server is paused for read-only use, so that queries (but not updates) can continue to be processed.

- The metadata server runs its own backup and recovery processes. These processes do not rely on any other servers, such as workspace servers, DATA step batch servers, or scheduling servers. Because the metadata server has

permission to access all of the needed files, there is no need to set up a host account with special operating system rights and permissions.

## Changes to SAS Metadata Server Administration

The following changes have been made to administration for the SAS Metadata Server:

- In the Metadata Manager in SAS Management Console, the Active Server Properties dialog box includes a new **Statistics** tab that displays metadata server statistics including CPU seconds, memory utilization, thread utilization, and I/O activity.
- A new feature has been added to the Metadata Manager in SAS Management Console that enables you to test alert e-mails without stopping the metadata server.
- Configuration options are available to enable authentication to the e-mail server. These options can be specified in the SAS Deployment Wizard if the custom installation option is selected. They can also be specified in the metadata server invocation command.
- A new option, `-optimizeIMDB`, has been added for the metadata server command. This option helps optimize the memory usage of the metadata server by analyzing the handling of character variables. It replaces the `%OMARUNAN` macro and the `RUNANALYSIS` option of `%OMABAKUP`, which were available in previous releases.
- A new configuration option, `OMA JOURNALTYPE=`, has been added for the metadata server. This option specifies the type of journal file that is created. The SAS Deployment Wizard sets this option to `ROLL_FORWARD` during installation or during migration from SAS 9.1.3 or 9.2. The `ROLL_FORWARD` setting creates a linear journal file that permanently stores all transactions that have occurred since the most recent backup. The journal file is written to the same location as the associated backup files. Transactions recorded in the journal file can be used to perform roll-forward recovery to a specified point in time after the last backup was taken.
- For Metadata Manager functions such as creating a new repository and registering a repository, the **Browse** button is now enabled for navigation to the directory path for metadata repositories.

## Enhancements to SAS Folders

The following enhancements have been implemented for the SAS Folders tree in SAS Management Console:

- On the new **Search** tab, you can search for metadata objects that meet specified search criteria. You can search based on object names, locations, descriptions, object types, creation or modification dates, keywords, and responsibilities. You can save any search to a Search folder. The search is rerun whenever the folder is opened.
- You can create a Favorites folder in which to save references to often-used metadata definitions. Within the Favorites folder, you can create favorites groups to organize these references.

- The name of the parent folder that contains users' home folders has been changed from Users to User Folders. If you use the SAS Migration Utility to migrate to SAS 9.3 from a previous version, then the folder name Users is retained.
- Virtual folders called Servers and Security are displayed under the System folder in the SAS Folders tree for use in promoting server and security objects.

## Enhancements to Promotion Tools

The following enhancements have been added to the promotion tools. These tools include the Export SAS Package and Import SAS Package wizards in SAS Management Console, SAS Data Integration Studio, and SAS OLAP Cube Studio, as well as the batch import and export tools.

- In SAS Management Console, support has been added for promoting additional object types including security objects (users, user groups, roles, and access control templates) and server objects (SAS Application Servers and their component servers, SAS object spawners, and SAS/CONNECT spawners).

In the second maintenance release of SAS 9.3, promotion support was added for additional server types including database servers, Hadoop servers, DataFlux Federation Servers, message queue polling servers, operating system scheduling services, Platform Process Manager scheduling servers, SAS/SHARE servers, and SAS Scalable Performance Data (SPD) servers.

- Advanced filtering options enable you to identify objects for export based on their keywords, notes, extended attributes, and responsibilities fields.
- As part of the promotion process, you can reorganize content by specifying new folder locations for individual objects that you are importing. The connections among objects are maintained.
- When tables or external files are overwritten during an import, you can use the Change Analysis feature to identify and resolve differences in column metadata. (This feature is not available in the batch import tool.)

## SAS 9.3 to SAS 9.3 Migration

You can use the SAS Migration Utility along with the SAS Deployment Wizard to create a second SAS 9.3 deployment that contains the same SAS content and the same configuration as an existing SAS 9.3 deployment.

## Deprecated Features

The following features have been removed:

- The following options for the metadata server configuration file (omacfg.xml) have been deprecated: OMA ALERTEMAILATTACHMENT and OMA JNLPRE. Attachments to alert e-mails for the metadata server are no longer supported.
- The %OMARUNAN macro has been deprecated. It has been replaced by the -optimizeIMDB option of the metadata server command.
- The Backup and Restore Wizard has been removed from SAS Management Console, and the %OMABAKUP macro has been deprecated. These features have been replaced by the new [metadata server backup and recovery facility](#).

## Documentation Enhancements

The following enhancements have been made to the *SAS Intelligence Platform: System Administration Guide*:

- A new chapter about using the Deployment Tester plug-in for SAS Management Console has been added.
- A new topic about using the Metadata Analyze and Repair utility in SAS Management Console has been added.
- The documentation for promotion tools has been expanded and reorganized into four separate chapters.
- In the second edition, expanded documentation has been provided for same-version (SAS 9.3 to SAS 9.3) migration.
- In the second edition, instructions for setting global options have been added to the documentation for the batch export and import tools. These options can be used to change the default behavior of the batch tools when exporting and importing stored processes and tables.

---

## What's New in Security Administration in SAS 9.3

### Overview

New and enhanced features in the following areas increase security and manageability:

- auditing
- authentication
- authorization
- encryption
- user administration
- documentation

### Auditing

- You can create audit records for additions, deletions, and updates to public objects (in the Audit.Meta.Updates.PublicObjects category).
- You can create audit records for additions, deletions, and updates to a user's contact information and external identity value (in the Audit.Meta.Security.UserAdm category).

## Authentication

- In Integrated Windows authentication (IWA), support is extended to include servers on UNIX. You can use IWA from Windows desktop clients to servers on Windows and UNIX.
- In Integrated Windows authentication, the default service principal name (SPN) no longer includes a port value. The format is `SAS/machine`, where *machine* is the host machine's fully qualified domain name. For example, `SAS/A12345.company.com`.
- User IDs that include unrecognized `@domain` qualifiers are sent to the `-primpd` provider, if that option is specified. Previously, such IDs were sent to the host, regardless of whether `-primpd` was specified. The `-primpd` option is a SAS system option (PRIMARYPROVIDERDOMAIN). This minor change affects specialized configurations in which the metadata server directly uses LDAP as an authentication provider.
- User IDs that include down-level domain qualifiers are examined to determine whether SAS recognizes the qualifier as an `-authpd` domain. If the qualifier is recognized, the submitted credentials are sent to the associated provider. Previously, such IDs were automatically sent to the host (or to the `-primpd` provider, if that option is specified). The `-authpd` option is a SAS system option (AUTHPROVIDERDOMAIN). This minor change affects specialized configurations in which the metadata server directly uses LDAP as an authentication provider. In such configurations, users can successfully log on even if they submit their user IDs in down-level format. For example, if `-authpd ADIR:USA` is specified in the metadata server start command, someone who logs on as `USA\joe` is now authenticated directly against Active Directory, regardless of whether `-primpd` is set.
- In the initial configuration for a new deployment, the SAS Stored Process Web Application doesn't accept PUBLIC-only users.

## Authorization

- You can use a new type of public object, the OLAP shared dimension, to help centralize access control. You define and secure a shared dimension once, and then include it in multiple cubes. Each shared dimension inherits effective permissions from its parent folder (not from the cubes that include it).
- In metadata promotion, you can import and export access control templates (ACTs).
- In SAS Management Console, you can find ACTs by searching or by navigating on the **Folders** tab.
- In authorization reporting, if you use the `MEMBERTYPES` option and don't specify to include folders, folders are not included.
- In authorization reporting, new options enable you to specify whether to include columns (when a table is returned) and cube components (when a cube is returned).
- In the authorization display for a SAS Application Server, the `CheckInMetadata` permission is listed. This helps to clarify the ability of change-managed users to associate objects (such as library definitions) to the server. Change management

is an optional feature that is supported for only SAS Data Integration Studio. See the *SAS Intelligence Platform: Desktop Application Administration Guide*.

## Encryption

- In direct LDAP authentication, you can use LDAPS for direct connections between the metadata server and the LDAP server. This new feature is applicable in a specialized configuration in which the metadata server directly uses LDAP as an authentication provider.
- In Secure Sockets Layer (SSL) configuration, you can exchange OpenSSL libraries.
- If you have SAS/SECURE, you can use SHA-256 hashing for SAS internal account passwords that are stored in the SAS metadata. New deployments that include SAS/SECURE use SHA-256 by default. A new metadata server option enables you to alter the default.
- If you have SAS/SECURE, you can force it to use only services that are part of the Federal Information Processing Standard (FIPS) 140-2 specification. This feature can be enabled during installation, and is configured through a new SAS system option (ENCRYPTFIPS).

## User Administration

- In interfaces such as SAS Management Console and SAS Personal Login Manager, when you connect to a 9.3 metadata server, the **Logins** table displays a blank cell if no password is stored. When you connect to a 9.2 metadata server, empty password values are still displayed as eight asterisks.
- In metadata promotion, you can import and export users, groups, roles, and authentication domains.
- In SAS Management Console, you can find users, groups, and roles by searching or by navigating on the **Folders** tab.
- In user bulk load and synchronization, the Active Directory sample code includes a check to prevent a synchronization that would delete all identities.

## Documentation Changes

- Documentation for OLAP member-level permissions is exclusively in *SAS OLAP Server: User's Guide*.
- Documentation for BI row-level permissions has moved to a new guide, *SAS Guide to BI Row-Level Permissions*.

---

# What's New in Web Application Administration for the SAS 9.3 Intelligence Platform

## Overview

The middle tier of the SAS Intelligence Platform includes enhancements and changes for these Web applications and the documentation:

- [SAS Information Delivery Portal](#)
- [SAS BI Portlets](#)
- [SAS Web Report Studio](#)
- [SAS BI Dashboard](#)
- [Documentation Changes](#)

In the second maintenance release for 4.31, the following Web applications have changes and enhancements:

- SAS Web Report Studio
- SAS BI Dashboard

## SAS Information Delivery Portal

### Changes in the First Maintenance Release for 4.31

The first maintenance release for 4.31 includes a change to the command syntax for the `removePortal` command that is used for removing a User or Group Permissions Tree. When an existing Permissions Tree is being deleted, and it contains non-DBCS characters or non-Latin characters, the command syntax should include `PermissionsTree_extract.xml` instead of `PermissionsTree.xml`.

### Changes in the 4.31 Release

The 4.31 release of SAS Information Delivery Portal includes the following changes and enhancements:

- The content promotion tool includes a new `build.properties` file. When promoting portal content from a SAS 9.1.3 environment to a SAS 9.3 or SAS 9.2 environment, the values for certain parameters in this file are modified to ensure that the appropriate metadata repository ID and the names of the internal accounts for `sasadm` and `sastrust` are specified to prepare the target system.
- An additional `upgradeMetadata` command is used when promoting a Portal Application Tree or a portlet instance to a target SAS 9.3 system from a source system with SAS 9.1.3 or SAS 9.2.
- Message logging is accomplished with logging contexts that are added to the `SASportal-log4j` file.

## Features Ported from the 4.3 Release

The following enhancements and changes that were introduced in the 4.3 release have been ported to the 4.31 release:

- Messages that are displayed at the top of pages and in the title bar of portlets can be hidden by specifying two new properties and their values in SAS Management Console.
- A content promotion tool is provided. This tool consists of stand-alone batch scripts, shell scripts, and metadata extraction templates. These scripts and templates use the metadata server's import and export capabilities to promote portal metadata.
- SAS BI Portlets are displayed with the Flex interface.
- You can alert users by displaying a warning message before they are logged out of their inactive sessions. For information about using this feature, see *SAS Intelligence Platform: Middle-Tier Administration Guide*.
- You can choose to enable unchallenged access to the portal. Users can then access the portal and interact with selected content without providing a user ID and password. The option is similar to the Public Kiosk feature in the SAS 9.1.3 release of the SAS Information Delivery Portal.
- A Diagnostics Portlet enables you to view information about the portal's environment.

The SAS Web OLAP Viewer for Java is no longer supported. It has been replaced by functionality that is available in SAS Web Report Studio. Therefore, SAS Information Delivery Portal 4.31 contains the following changes:

- Bookmarks and data explorations are not supported.
- All data explorations are migrated to SAS Web Report Studio 4.31 reports. However, users can still use the search capabilities within SAS Information Delivery Portal 4.31 to find those reports, as well as information maps.
- SAS Information Delivery Portal 4.31 includes a new Report Portlet that displays SAS Web Report Studio 4.31 reports.
- During software updates, the SAS Information Delivery Portal converts instances of the Information Map Viewer portlet to the new Report Portlet.
- Visual Data Explorer is not available to display information maps.

If SAS Information Delivery Portal 4.31 runs on a JBoss Web application server, and Secure Sockets Layer is configured in your environment, the `server.xml` file should be edited to specify the `emptySessionPath` parameter within the section on SSL Connector. This is necessary to enable the SAS BI Portlets to run in this environment.

## SAS BI Portlets

### Features Ported from the 4.3 Release

New features and changes introduced in the November 2010 release have been ported to the 4.31 release of SAS BI Portlets. These ported changes include the following:



- SAS 9.3 supports SAS BI Portlets on WebSphere 7 application server and WebSphere Portal Server 7. This document contains updated instructions for deploying these portlets to WebSphere 7.
- The SAS BI Dashboard portlet is a new addition to the suite of SAS BI Portlets.
- The Diagnostics portlet is a new portlet that enables you to determine the current status of the portal's environment.
- The SAS Collection Portlet, which is included in the suite of SAS BI Portlets and is compliant with JSR 168, does not allow users to search for data explorations. All data explorations are migrated to SAS Web Report Studio 4.31 reports. Users can, however, search for information maps in SAS BI Portlets.

## SAS Web Report Studio

### Changes in the Second Maintenance Release for 4.31

The second maintenance release for SAS Web Report Studio 4.31 includes the following enhancements:

- You can specify a company preferred folder that serves as a default folder for saving users' reports.
- To prevent users from exporting entire reports, you can configure and remove the **Export** option under the **File** menu and the **Export** toolbar button.
- You can enable the display of a report and filter name in the exported data.
- You can determine how prompt values are saved in reports. The `wrs.save.promptValues.option` property enables you to specify one of three values that are valid for this property. The value that you specify for this property determines how prompt values are saved in reports.
- You can enable the display of standard text in an e-mail sent by a user from within the application. This is useful if you want a standard text message to precede the URL address for the report in the e-mail. Or, you can customize the e-mail message by specifying the location of the URL address within the standard text in the e-mail.
- Users can specify a preferred locale in SAS Preferences Manager. The locale specified in SAS Preferences Manager is applied to SAS Web Report Studio.
- The locale preference that is specified by users in SAS Preferences Manager is applied to all reports that are scheduled via Platform Suite for SAS or SAS In-process scheduling for SAS Web Report Studio.
- A user can open a SAS Web Report Studio report, make modifications that are saved in a report definition snapshot, and e-mail the URL for the report definition snapshot to a recipient. The report definition snapshot is always associated with the original report, but the original report remains unchanged when the report definition snapshot is created and e-mailed. If the original report is deleted, any report definition snapshots that are associated with that original report are automatically deleted.
- A maximum of 50 report definition snapshots can be created from a SAS Web Report Studio report. You can increase the number of report definition snapshots that are created from an existing report by configuring the `wrs.numEmailSnapshotsMax` property. This property enables you to specify

the maximum number of report definition snapshots for each SAS Web Report Studio report.

- Message logging is accomplished with logging contexts that are added to the `SASwrs-log4j` file.

### Features Ported from the 4.3 Release

The following enhancements and changes that were introduced in the 4.3 release have been ported to the 4.31 release:

- Folders for images, templates, and items for report distribution for users now reside within the `/SASWebReportStudio/Common` folder. Previously, these folders were located within the `/SAS Folders/System/Applications/SAS Web Report Studio/Web Report Studio 4.2` folder.
- By default, clustering is enabled.
- By default, in-process scheduling is supported in a clustered environment. An in-process scheduling server runs as a process inside SAS Web Report Studio. This process eliminates the need to send jobs to an external scheduling server.
- SAS Web Report Studio 4.31 has 30 UDP ports available for use by the application. These ports are in the range of 7560 to 7589.
- An event is logged in the `WebReportStudio_KeyActions.log` file when a user creates, edits, or deletes a distribution list.
- Details about SAS Web Report Studio users' logon and logoff information from sessions can be viewed conveniently in the `WebReportStudio_KeyActions.log` file.
- You can specify a different directory (other than the default directory) where the Key User Action log files can be saved.
- You can specify whether the display of the left pane in SAS Web Report Studio window should depend on the user's preferences during the previous logon session.
- Two new capabilities have been added to SAS Web Report Studio 4.31 and SAS Web Report Viewer 4.31: Allow Direct Access to Cubes and Allow Direct Access to Tables. The Allow Direct Access to Cubes capability is included by default in the following roles: Web Report Studio: Report Creation, Web Report Studio: Advanced, and Web Report Viewer: Advanced.
- The Open Maps as Reports capability has been renamed to Allow Direct Access to Information Maps. In addition, the Repair Report capability has been renamed to Update Resources. For sites that upgrade from SAS Web Report Studio 4.2, the names of these capabilities will remain the same.
- New styles are available for reports.
- The Distribute Report Wizard includes new features.
- SAS Web Report Studio reports can be scheduled only by regular users with a SAS identity. SAS internal accounts cannot be used to schedule reports.
- The optional `trusted` parameter is not available in the Report Output Generation tool.
- To distribute reports with the Report Output Generation tool in environments with multihomed machines, the `outputgen.ini` file should be updated to include the `-Djgroups.bind_addr` command.

- Reports can be scheduled only by regular users with a metadata identity. SAS internal accounts such as the SAS Trusted User cannot be used to schedule reports.

### SAS Web OLAP Viewer for Java

The SAS Web OLAP Viewer for Java application is no longer supported. It has been replaced by functionality that is available in SAS Web Report Studio 4.31.

The following enhancements and changes that were introduced in the 4.3 release have been ported to the 4.31 release:

- Bookmarks and data explorations are not supported.
- All data explorations are migrated to SAS Web Report Studio 4.31 reports. You can still use the search capabilities within SAS Information Delivery Portal 4.31 to find those reports, as well as, the information maps.
- The migration tool creates a copy of the original data explorations and bookmarks, and places them in the same location where the original content resided.
- Visual Data Explorer is not available to display information maps in SAS Information Delivery Portal 4.31.
- In Edit mode within the portal, users can select a SAS Web Report Studio report instead of a data exploration.
- The SAS Collection Portlet, which is included in the suite of SAS BI Portlets and is compliant with JSR 168, does not allow users to search for data explorations. All data explorations are migrated to SAS Web Report Studio 4.31 reports. Users can, however, search for information maps.

## SAS BI Dashboard

### Changes in the Second Maintenance Release for 4.31

You can enable the display of a default dashboard for your users. When this feature is enabled by configuring the `bid.DefaultDashboard` property, users who log on to SAS BI Dashboard are always presented with the default dashboard.

### Changes in the 4.31 Release

The following new administration features are available in the 4.31 release of SAS BI Dashboard:

- Using the Export SAS Package and Import SAS Package wizards provided by the SAS Intelligence Platform, you can promote individual metadata objects or groups of objects in SAS BI Dashboard 4.31 from one server to another or within the same metadata server.
- The frequency with which the data cache is inspected for caching updates can be configured and customized for your environment by supplying a custom value for the configuration property in SAS Management Console.
- Two new configuration properties are available for data caching. The values for these configuration properties can be customized in SAS Management Console. These values enable you to determine the frequency with which configuration objects or dashboard objects are updated in the cache.

- Message logging is accomplished with logging contexts that are added to the `SASBIDashboard-log4j` file.

### Features Ported from the 4.3 Release

The following enhancements and changes that were introduced in the 4.3 release have been ported to the 4.31 release:

- Storage folders for SAS BI Dashboard 4.31 now exist in both the foundation SAS Metadata Repository and the SAS Content Server or the file system.
- Users' folders for SAS BI Dashboard 4.31 can be located anywhere below the `SAS Folders` directory on the `Folders` tab of SAS Management Console. Previously, in SAS BI Dashboard 4.2, you were required to use predefined storage folders. This is no longer the case.
- Configuration files for SAS BI Dashboard 4.31 are stored on the SAS Content Server. Previously, all files were stored in a file system.
- You can use the SAS Content Server Administration Console to manage SAS BI Dashboard 4.31 files and WebDAV folders in the SAS Content Server.
- You can enable users to log on, view, and interact with a dashboard by creating metadata identities for the users.
- You can register a stored process and make it available to SAS BI Dashboard 4.31 users.
- Three types of caching are available: data caching, content caching, and client caching.
- Data caching was available previously in SAS BI Dashboard 4.2. Beginning with SAS BI Dashboard 4.31, files for data caching are stored in the SAS Content Server.
- Content caching, which is a new type of caching, is enabled by default in SAS BI Dashboard 4.31.
- Client browsers that display dashboards with SAS BI Dashboard 4.31 use Adobe Flash Player (Version 10.0 or above) in the Rich Internet Application (RIA) architecture. Client caching is enabled by default.
- Image files are no longer cached.
- SAS BI Dashboard 4.31 supports the SAS Comment Manager. All users that can log on to the application can view and add comments. To be able to edit and delete comments, users or administrators must belong to the `Comments:Administrator` role.
- DSX files are stored in the SAS Content Server.
- DSX files are modified by exporting the DSX file from SAS Management Console, making necessary changes to the files, and importing the files.
- The SAS BI Dashboard Portlet is installed along with the other SAS BI Portlets. This portlet allows users to display a dashboard that is created with the SAS BI Dashboard application. The configuration of this portlet is identical to the configuration of the SAS BI Portlets for the WebSphere Portal.
- You can specify a session time-out interval for inactive user sessions.
- You can alert users by displaying a warning message before they are logged out of their inactive sessions.

## Documentation Changes

The `wrs.footer.xhtml` property has been deprecated, and it has been removed from this document.



# 28

## SAS Inventory Optimization

<i>What's New in SAS Inventory Optimization 2.1</i> .....	253
Overview .....	253
Changes to the MIRP Procedure .....	253

### What's New in SAS Inventory Optimization 2.1

#### Overview

In SAS Inventory Optimization 2.1, the MIRP procedure provides more features and greater functionality than it did in SAS Inventory Optimization 1.3. There is no change in the IRP procedure. SAS Inventory Policy Studio, which was part of the previous release, is no longer available due to changes in the Analytical Platform.

#### Changes to the MIRP Procedure

The following functionality is added in the new release of the MIRP procedure:

- Service-level optimization for internal locations in a network. The internal locations are locations that support other locations within the same network. They do not face customer demand directly. The MIRP procedure optimizes service levels at internal locations subject to service-level constraints at customer-facing locations.
- Service-level evaluation for internal locations in a network. The MIRP procedure evaluates total network costs for a given set of service-level constraints at all locations.
- Policy optimization for all locations given their service-level targets. The procedure calculates optimal reorder and order-up-to levels for all locations.

In the previous version, service-level optimization and policy optimization were done in a single call. Since service-level optimization is normally conducted much less frequently than policy optimization, it is better to separate them from each other.

- Order generation for all locations in a network. The procedure uses marginal analysis to determine optimal inventory allocation when a location does not have enough inventory to meet replenishment requirements from its downstream locations.

- Prediction of key performance indicators (KPIs). The procedure estimates KPIs based on the specified reorder and order-up-to levels.

In the previous version, KPI prediction was part of the optimization and evaluation. It is quite common in practice that reorder and order-up-to levels are optimized once a week, but KPIs need to be reviewed on a daily basis. With KPI prediction being a separate functionality, the MIRP procedure provides more flexibility to support inventory replenishment planning.

- Since the new release separates service-level optimization and KPI prediction from the policy optimization, the performance of the MIRP procedure has greatly improved.



# 29

## SAS/IntrNet

<i>What's New in SAS/IntrNet 9.3</i> .....	<b>255</b>
Overview .....	255
General Enhancements .....	255
<i>What's New in SAS/IntrNet 9.3 Application Dispatcher</i> .....	<b>255</b>
Overview .....	255
General Enhancements .....	256

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## What's New in SAS/IntrNet 9.3

### Overview

SAS/IntrNet software provides the ability to manage your configuration through the SAS Deployment Manager.

### General Enhancements

SAS/IntrNet Application Dispatcher includes the following enhancement:

- The SAS/IntrNet Configuration Utility has been replaced by the SAS/IntrNet Service Tasks in the SAS Deployment Manager. The Create a New IntrNet Service utility on Windows and the inetcfg.pl script on UNIX are no longer available.

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## What's New in SAS/IntrNet 9.3 Application Dispatcher

### Overview

SAS/IntrNet software provides the ability to manage your configuration through the SAS Deployment Manager.

## General Enhancements

SAS/IntrNet Application Dispatcher includes the following enhancement:

- The SAS/IntrNet Configuration Utility has been replaced by the SAS/IntrNet Service Tasks in the SAS Deployment Manager. The Create a New IntrNet Service utility on Windows and the inetcfg.pl script on UNIX are no longer available.

# 30

## SAS Management Console

<b><i>What's New in SAS Management Console 9.3</i></b> .....	<b>257</b>
Overview .....	257
Search View .....	257
BI Lineage Plug-in .....	258
Server Backup and Restore .....	258
Favorites Folder .....	258
Virtual Folders .....	258
New and Revised Resource Templates .....	258

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## What's New in SAS Management Console 9.3

### Overview

SAS Management Console has the following new features and enhancements:

- The Search view enables you to search for metadata objects.
- The BI Lineage plug-in enables you to scan BI objects and determine the connections among the objects such as reports, maps, tables, cubes, and stored processes that contribute to the selected BI objects.
- The server backup and restore facility enables you to back up and restore the contents of the metadata repository, either manually or through a schedule.
- The Favorites folder enables you to quickly access metadata objects.
- Virtual folders contain saved groupings of types of objects so they can be easily exported. For example, the Users folder contains all user definitions. You can export the Users folder to export all of the user definitions. Virtual folders are not metadata objects, but exist only on the client machine.
- Resource templates have been added and revised for server and library definitions.

### Search View

A new Search tab has been added to SAS Management Console to provide the capability to search for metadata objects. The search function can locate metadata objects based on any combination of these criteria:

- location
- name
- object type
- date created or last modified
- keyword
- responsibility (name and role)

Searches can be saved. A search folder can be put anywhere. When opened, the folder reruns the search and shows the results of the search as the contents of that search folder.

## BI Lineage Plug-in

The BI Lineage plug-in scans the BI objects in a subset of the SAS Folders tree and determines the connections among the objects such as reports, maps, tables, cubes, and stored processes that contribute to the selected BI objects. You can choose any object included in the scan and view the lineage or the reverse lineage for the object.

A lineage consists of the other objects in the scan that contribute to the selected BI object. These objects would cause a change in the selected object if any of them changed. A reverse lineage consists of the other objects that use information from the selected BI object. These are objects that would be affected if the selected object were to change.

## Server Backup and Restore

The server backup and restore facility enables you to back up and restore the contents of the active SAS Metadata Server. You can set a schedule for automatic backups, view a list of previous backups, and recover the server contents from a selected backup.

## Favorites Folder

The Favorites folder stores shortcuts to selected metadata objects that you use or need access to often.

## Virtual Folders

Virtual folders contain all the objects of one type that do not have a parent folder. For example, SAS Folders/System/Servers is a folder containing all servers.

## New and Revised Resource Templates

Resource templates have been added for the following server and library definitions:

- Sybase IQ server and library
- Greenplum server and library
- Queue Manager for JMS server
- Distributed In-Process Scheduling Server
- SAS Framework Data Server

- DataFlux Federation Server
- DataFlux Federation Server library
- Hadoop Server
- Hadoop via Hive library

Resource templates have been modified for the following library definition:

- Pre-assigned library



## 31

## SAS Model Manager

<b><i>What's New in SAS Model Manager 12.1</i></b> .....	<b>261</b>
Overview .....	261
Enhanced Support to Manage Documents .....	262
Ability to Use Tables from a Local or Network Drive .....	262
Ability to Import SAS/STAT Linear Models and SAS High- Performance Analytics Models .....	262
Ability to Create DATA Step Score Code for PMML Models .....	262
Ability to Schedule Scoring Tasks .....	262
Enhanced Support for Champion and Challenger Models .....	262
Enhanced Support for Publishing Models .....	263
Enhanced Performance Monitoring and Reporting .....	263
Ability to Create an Aggregated Report .....	263
Ability to Create Basel Model Validation Reports .....	264
Ability to View Dashboard Reports and Manage Dashboard Report Definitions .....	264
Ability to Perform Model Management Tasks Using SAS Model Manager Workflow Console .....	264
Ability to Associate Milestones with Workflow Activities .....	264

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## What's New in SAS Model Manager 12.1

### Overview

SAS Model Manager 12.1 has the following new features and enhancements:

- enhanced support to manage documents
- ability to use tables from a local or network drive
- ability to import SAS/STAT linear models and SAS High-Performance Analytics models
- ability to create DATA step score code for PMML models
- ability to schedule scoring tasks
- enhanced support for champion and challenger models
- enhanced support for publishing models
- enhanced performance monitoring and reporting
- ability to create aggregated reports

- ability to create Basel model validation reports
- ability to view dashboard reports and manage dashboard report definitions
- ability to perform model management tasks using SAS Model Manager Workflow Console
- ability to associate milestones with workflow activities

## Enhanced Support to Manage Documents

SAS Model Manager provides the ability for the **Documents** folder to be created at the organizational folder level and project folder level, in addition to the **Documents** folder that is created by default when a new version is created. You can also create subfolders within the **Documents** folder. You can associate documents with a modeling project by attaching them to the **Documents** folder or a subfolder.

## Ability to Use Tables from a Local or Network Drive

SAS Model Manager now provides the ability to edit the SAS Model Manager start-up code so that you can submit a LIBNAME statement to define a libref or other SAS code. Therefore, you can use tables from a local or network drive instead of data sources that are registered in the SAS Metadata Repository.

## Ability to Import SAS/STAT Linear Models and SAS High-Performance Analytics Models

SAS Model Manager now supports importing SAS/STAT linear models and SAS High-Performance Analytics models from a SAS package file (.SPK). Models that have a DATA step score code type can also be scored, published, and included in performance monitoring.

## Ability to Create DATA Step Score Code for PMML Models

SAS Model Manager now supports the creation of DATA step score code for PMML models, which enables a PMML model to be included in scoring tasks, reporting, and performance monitoring. PMML 4.0 (or higher) is supported by SAS Model Manager for creating DATA step score codes when importing models.

## Ability to Schedule Scoring Tasks

SAS Model Manager uses the scoring task scheduler to enable a user to schedule a scoring task to run at a certain date and time on available servers, and to specify where to save the scoring task output. You can then view the job history for a scoring task.

## Enhanced Support for Champion and Challenger Models

SAS Model Manager now provides support for challenger models. When a model is set as the project champion, the version that contains the champion model is



automatically set as the default version. Models can then be selected as challengers to the project champion model. Only one champion model can be set per project. You can monitor and publish the challenger models in addition to the champion model.

## Enhanced Support for Publishing Models

SAS Model Manager now supports the selection of multiple models when publishing to the SAS Metadata Repository and to a database. The SAS Embedded Process publish method can be used to publish model scoring files to a database. The databases that are currently supported for publishing models using the SAS Embedded Process are Teradata, Greenplum, Oracle, and DB2.

## Enhanced Performance Monitoring and Reporting

The following enhancements have been made to performance monitoring and reporting:

- Performance monitoring can now be performed for projects that are associated with a prediction model function that has an interval target.
- Performance monitoring and scoring can now be performed on an appliance that is configured to use High-Performance Analytics. Teradata and Greenplum currently support the High-Performance Analytics configuration.
- If the performance data source that you specified when you created a performance task contains data in the scoring output variables, you can choose to omit the running of the scoring task when executing a performance task.
- The Interval Target Variable report has been added to the available model comparison reports. The Interval Target Variable report creates two plots for you to view the actual versus predicted values for a model and the actual versus residual values for a model. The Interval Target Variable report can be created only for prediction models.
- The Training Summary Data Set report has been added to the training summary reports. The Training Summary Data Set report creates frequency and distribution charts to validate data set variables.
- The Champion and Challenger Performance Report has been added to the available reports. If you want to determine how a challenger model performs in comparison to the champion model, you can define and execute performance monitoring reports for a champion model and a challenger model, and then create a Champion and Challenger Performance report to compare the two models.

## Ability to Create an Aggregated Report

SAS Model Manager now enables you to create an aggregated report to combine multiple reports from the **Reports** folder into a single report. The format of the aggregated report can be PDF, HTML, or RTF. Aggregated reports are stored in the **Documents** folder.

## Ability to Create Basel Model Validation Reports

Basel reports have been added to the available reports to provide several statistical measures to validate the stability, performance, and calibration of models. Model validation reports can be created for the two key types of Basel II risk models: probability of default (PD) and loss given default (LGD).

## Ability to View Dashboard Reports and Manage Dashboard Report Definitions

SAS Model Manager provides the ability to launch a browser to view the Dashboard Reports from the SAS Model Manager client and the SAS Model Manager Workflow Console. You can also create, edit, and delete project dashboard report definitions from the SAS Model Manager client.

## Ability to Perform Model Management Tasks Using SAS Model Manager Workflow Console

SAS Model Manager now enables you to integrate SAS Workflow with some of the model management tasks that are normally performed in the SAS Model Manager client. Workflow process definitions can be configured to use model management components with the workflow activities.

Here are the model management tasks that can be performed:

- import models
- view models
- set a project champion model and flag challenger models
- publish models
- add, view, or delete attachments
- view reports
- view performance

## Ability to Associate Milestones with Workflow Activities

SAS Model Manager now enables you to associate milestones with workflow activities as part of the workflow process definition. Activities that are associated with a milestone appear on the **Workflow Milestones** tab in the version details section of the SAS Model Manager client. The Workflow Milestone report has also been added to the available reports.

## 32

## SAS National Language Support

<i>What's New in the SAS 9.3 National Language Support</i> .....	<b>265</b>
Overview .....	265
General Enhancements .....	265
Additional Encodings .....	265
Formats .....	266
Functions .....	266
System Options .....	267

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### What's New in the SAS 9.3 National Language Support

#### Overview

In this release, SAS has expanded the scope and capabilities of National Language Support (NLS). NLS is a set of features that enable a software product to function properly in every global market for which the product is targeted. SAS contains NLS features to ensure that you can write SAS applications that conform to local language conventions. Typically, software that is written in the English language works well for users who use the English language and data that is formatted using the conventions that are observed in the United States. However, without NLS, these products might not work as well for users in other regions of the world. NLS in SAS enables users in regions such as Asia and Europe to process data successfully in their native languages and environments.

#### General Enhancements

The following enhancements are implemented for SAS 9.3:

- The aliases were updated in the LOCALE= System Option table.
- The European Currency Conversion section was updated with the new members that use the Euro.

#### Additional Encodings

The following encodings are new:

- Open Edition Katakana  
specifies the encoding for Open Edition Katakana
- Open Edition Korean  
specifies the encoding for Open Edition Korean
- Open Edition Simplified Chinese  
specifies the encoding for Open Edition Simplified Chinese
- Open Edition Traditional Chinese  
specifies the encoding for Open Edition Traditional Chinese
- Open Edition Japanese  
specifies the encoding for Open Edition Japanese
- Open Edition Japanese-IBM-939E  
specifies the encoding for Open Edition Japanese-IBM-939E

## Formats

The following formats are new:

- NLDATMTZ  
converts the time portion of the SAS date time of the locale to the time of day and time zone
- NLDATMWZ  
converts SAS date values of the specified locale to the day of week, date time, and time zone
- NLDATMZ  
converts the SAS date time values to the locale sensitive date time string as the time zone and date time

The following format has been updated:

- YEN  
The default value has changed from 1 to 8.

## Functions

The following functions are new:

- ENCODCOMPAT  
verifies the transcoding compatibility between two encodings
- ENCODISVALID  
specifies a valid encoding name
- SASMSG  
specifies a message from a data set. The returned message is based on the current locale and a specified key.
- SASMSG1  
specifies a message from a specified data set. The specified message is based on a specified locale value and a specified key value.
- SETLOCALE  
specifies the locale keys for the current SAS locale

## System Options

The following system options are new:

### URLENCODING

controls the percent encoding behavior of the URLENCODING and URLDECODE functions

### VALIDMEMNAME

specifies the rules for naming SAS data sets, views, and item stores

### VALIDVARNAME

specifies the rules for valid SAS variable names that can be created and processed during a SAS session

The following system option is enhanced:

### DFLANG

The DFLANG system option supports the locale option.



# 33

## SAS OLAP Server

<i>What's New in the SAS 9.3 OLAP Server</i> .....	<b>269</b>
Overview .....	269
Cube Designer Wizard Restructure and Enhancements .....	269
Multiple Language Support for Drill-through Tables and Caption Tables .....	270
Shared Dimension Support .....	270
Specify a New Default Member .....	270
Linguistic Sorting Function .....	270
Reorganize Function .....	270
Cube Options .....	271
Distinct Count Options .....	271
New OLAP Procedure Options .....	271

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## What's New in the SAS 9.3 OLAP Server

### Overview

The SAS 9.3 OLAP Server provides the following changes and enhancements:

- restructure and enhance the Cube Designer wizard
- add Multiple Language Support for drill-through tables and caption tables
- add support for shared dimensions
- new and improved functions and options

### Cube Designer Wizard Restructure and Enhancements

The Cube Designer wizard is used to create new cube definitions and edit existing cube definitions in SAS OLAP Cube Studio. It has been redesigned to make navigating the wizard and editing a cube easier. The pages of the wizard have been modified and reduced in number to simplify the cube building and editing process. You can now make changes to an existing cube without following a sequential order in the wizard. The **Next** button displays the available pages in a drop-down menu. You can go to the next page of the Cube Designer wizard or select a specific page in the wizard. This enables you to bypass pages that you do not need to edit. The **Finish** button is also now available from most pages in the wizard. You can now

save the cube definition and, if desired, build the cube from most pages in the wizard.

## Multiple Language Support for Drill-through Tables and Caption Tables

Multilingual cubes show member information in the language of the query session. Now, your multilingual cubes can also return captions and drill-through data in the language of the query session.

You provide language-specific captions for multilingual cubes in one or more caption tables. Caption tables must be registered with the metadata server. The naming convention for the caption tables follows the same convention as that of translated dimension tables. Each table, except for the default language, is suffixed with the five-character locale code.

In SAS OLAP Cube Studio, you can select a primary drill-through table. Additional tables for each language must also be registered in metadata, but you do not need to select them.

## Shared Dimension Support

A SAS shared dimension provides a common dimension that is created and updated in one location and is automatically reflected across all cubes that use the dimension. In SAS OLAP Cube Studio, the Shared Dimension Designer wizard enables you to create and edit a shared dimension. This common dimension is created and updated in one place and is automatically reflected across all cubes that use the dimension. After you have created a shared dimension, you can select the dimension for use in a new or existing cube. SAS OLAP Cube Studio enables you to define, update, and use a shared dimension in a cube. After you have created a shared dimension, you can edit the structure of the shared dimension and perform various updates and changes to the shared dimension.

## Specify a New Default Member

When you query SAS OLAP cubes, a default member is used to subset a dimension if that dimension is not on the rows or columns of a report. When a SAS OLAP cube is built, the ALL member is the default. You can now assign a different default member at the start of query sessions. The new default member is specified in PROC OLAP using the DEFAULT\_MEMBER option on the HEIRARCHY statement. In SAS OLAP Cube Studio, set the **Default Member** option using the Quick Edit dialog box.

## Linguistic Sorting Function

The Linguistic Sorting function enables you to select locale and collate options for SAS OLAP cubes that use a single language. The **Linguistic Sorting** tab is available on the General page of the Cube Designer wizard in SAS OLAP Cube Studio.

## Reorganize Function

When updating a cube, you might need to add or change members for the cube. As a result, a level might run out of space for new level members after multiple cube



update events. This occurs when new level members have been added to the same sorted location for each event. If too many new level members are inserted into the same sort location, this can result in structural errors in the cube and can cause the cube update to fail. At this point, you must reorganize the sort locations for members for the particular level that failed, or choose to reorganize all levels for the cube. The Reorganize function can be used with a cube that has been incrementally updated. This function reorganizes the levels in a cube, making room for more members. The Reorganize function is accessed from the **Incremental Update** sub-menu.

## Cube Options

The **Cube Options** tab displays the currently selected drill-through table for a cube and enables you to select a new drill-through table for the cube if needed. You can apply the new drill-through table to the cube without rebuilding the cube. The **Cube Options** tab can be accessed from the Quick Edit dialog box in SAS OLAP Cube Studio.

## Distinct Count Options

In SAS OLAP Cube Studio, you can select whether to include calculated members in the distinct count of a measure for a cube. You can include or exclude calculated members for a measure. You can apply the updated distinct count setting to the cube without rebuilding the cube. The **Distinct Count Options** tab can be accessed from the Quick Edit dialog box in SAS OLAP Cube Studio

## New OLAP Procedure Options

The following OLAP Procedure options are new for the SAS 9.3 OLAP Server.

New PROC OLAP statement:

- USE\_DIMENSION

New PROC OLAP statement options:

- CUBETABLELIBREF
- CUBETABLECAPPREF
- DTLIBREF
- DTMEMMPREF
- DTMEMMPREFOPTS
- FORCE
- MLSCAPUPD
- MLSID
- SORTSEQ
- SYNCHRONIZE\_AGGRS

New DIMENSION statement options:

- DIMTABLECAPPREF
- MLSID
- PATH

- SHARED

The MLSID option is also new for the HIERARCHY, LEVEL, MEASURE, and PROPERTY statements. Additionally, the ALL\_MLSID option on the HIERARCHY statement enables you to specify the ID that relates to the ALL member caption. An MLSID can also be specified in the DEFINE statement to allow for language-specific captions on your global calculated measure or member.

### **New OLAPOPERATE Procedure Options**

The following options and statements are new for the OLAPOPERATE procedure in SAS 9.3 OLAP Server:

- LIST CUBES
- OUT, in LIST QUERIES, LIST ROWSETS, and LIST SESSIONS
- CUBE, INACTIVE, and USER, in CLOSE SESSION
- INACTIVE, in CANCEL QUERY
- QUIESCE SERVER
- PAUSE SERVER
- RESUME SERVER

# 34

## SAS Ontology Management

<i>What's New in SAS Ontology Management Studio 12.1</i> .....	273
General Enhancements .....	273

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### What's New in SAS Ontology Management Studio 12.1

#### General Enhancements

New and enhanced features in SAS Ontology Management Studio enable you to do the following:

- Import projects that are specified in RDF/OWL format if these projects can be mapped to an existing feature set in SAS Ontology Management Studio.
- Upload entity classes into a SAS Enterprise Content Categorization Studio data repository as LITI classifier concepts.
- Copy and paste multiple values, simultaneously, from one slot into another slot.
- Clone an instance.
- Display the class of each instance that is referenced by an Instance Of slot value.
- Change the default value of the Instance status slot to inactive if you are an administrator.
- Choose to enable automatic updates for the instance cache when a user selects a class.
- Reset all class locks in the Repository Maintenance window.
- Store the most recent world language that is used for uploading each class to SAS Enterprise Content Categorization Studio in exported files.
- Specify the SAS license setinit file in .txt format when you are connecting to a repository.



# 35

## SAS Open Metadata Architecture

<b><i>What's New in SAS Open Metadata Interface: Reference and Usage</i></b> .....	<b>275</b>
Overview .....	275
Metadata Access Improvements .....	275
SAS Metadata Server Backup Support .....	276
Alert E-Mail Notification System Testing .....	277
SAS Metadata Server Status Reporting Improvements .....	278
Authorization Improvements .....	278
Documentation Updates .....	279
<b><i>What's New in the SAS 9.3 Java Metadata Interface</i></b> .....	<b>279</b>
<b><i>What's New in SAS 9.3 Metadata Model: Reference</i></b> .....	<b>279</b>
Overview .....	279
New Metadata Types .....	279
Enhancements to Existing Metadata Types .....	280
Documentation Modifications .....	280

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## What's New in SAS Open Metadata Interface: Reference and Usage

### Overview

The SAS 9.3 Open Metadata Interface has been enhanced to improve metadata access, to support SAS Metadata Server backups, to improve testing of the alert e-mail notification system, to improve SAS Metadata Server status reporting, and to improve authorization processing on cubes.

This documentation has been updated to describe how the SAS Open Metadata Interface and SAS Java Metadata Interface are affected by the SAS type dictionary.

### Metadata Access Improvements

In the IOMI server interface, the following improvements have been made to metadata access:

- The GetMetadata method supports four new flags.

#### OMI\_FULL\_OBJECT (2)

uses a type definition from the new SAS type dictionary to determine the associations to expand for the specified object. This is assuming that the

specified object is a PrimaryType subtype in the SAS Metadata Model, and that it stores valid values in the PublicType and UsageVersion attributes.

OMI\_NOEXPAND\_DUPS (524288)

modifies OMI\_TEMPLATE (4) and OMI\_FULL\_OBJECT (2) processing so that associated objects indicated by the user-defined template or type definition are expanded only once per primary object specified in the INMETADATA parameter. The objects that are expanded are tracked by ID.

OMI\_UNLOCK (131072)

unlocks an object lock that is held by the caller.

OMI\_UNLOCK\_FORCE (262144)

unlocks an object lock that is held by another user.

- The GetMetadata and DeleteMetadata methods support a new, optional form for submitting user-defined templates. The new template form specifies one or more <TEMPLATE> subelements within the <TEMPLATES> element in the OPTIONS parameter. Both the <TEMPLATE> subelement and the metadata property string to which it applies specify a TemplateName attribute. The TemplateName attribute value maps the template to the metadata property string that it is meant to expand. The TemplateName attribute is supported in metadata property strings that are submitted in the INMETADATA parameter and in another <TEMPLATE> element.

The new template form supports new attributes in templates that can be used to control the scope of the associated objects affected by a request.

- The search functionality that is supported on association names has been expanded to include the full search syntax supported in the GetMetadataObjects <XMLSELECT search="criteria"/> element.
- The syntax supported in the <XMLSELECT search="criteria"/> element has been enhanced as follows:
  - A NOT logical operator enables clients to get objects that do not have specified attributes or that do not have specified associations.
  - A NOT function enables clients to get objects that do not have specified associations.
  - Support for explicit AND and OR operators between association path criteria enables clients to concatenate association paths in a search string. For example, you can specify to return objects that have this association path *and* that association path, or to return objects that have this association path *or* that association path.

## SAS Metadata Server Backup Support

The SAS 9.3 Metadata Server includes a server-based facility that can be used to perform unassisted, scheduled metadata server backups. The facility enables roll-forward recovery of the metadata server from the metadata server journal. The recommended interfaces for interacting with the facility are SAS Management Console or a MetadataServer script in the configuration's **SASMeta/MetadataServer** subdirectory. If programmatic access is needed to the facility, you can get it using the following IServer methods:

- The Refresh method has the following new XML elements in the OPTIONS parameter. These optional elements set a backup configuration and a backup

schedule for the SAS Metadata Server, execute an ad hoc server backup, recover the SAS Metadata Server from a server backup, and restart the backup scheduler thread.

- <BACKUP *options*/>
  - <BACKUPCONFIGURATION *attributes*/>
  - <RECOVER *required-and-optional-parameters*/>
  - <SCHEDULE Event="Backup" WEEKDAY $n$ ="*timevalue*"/>
  - <SCHEDULER/>
- The Status method has the following new XML elements in the INMETA parameter. These elements return information about the SAS Metadata Server's backup configuration, server backup schedule, server backup history, and specific server backup and recovery operations.
    - <BACKUP *attribute(s)*/>
    - <BACKUPCONFIGURATION/>
    - <METADATASERVERBACKUPCONFIGURATION/>
    - <METADATASERVERBACKUPHISTORY/>
    - <METADATASERVERBACKUPMANIFEST/>
    - <METADATASERVERRECOVERYMANIFEST/>
    - <SCHEDULE Event="Backup" WEEKDAY $n$ ="*timevalue*"/>
    - <SCHEDULER PING=""/>
  - The Pause and Resume methods have a new XML element in the OPTIONS parameter, <FORCE/>, which regains control of the SAS Metadata Server in the event that the metadata server does not respond during backup recovery processing. Using <FORCE/> in the Pause method enables you to specify to return the server to an ADMIN state. When used in the Resume method, the server is returned to an ONLINE state.

## Alert E-Mail Notification System Testing

The IServer interface has been enhanced to enable alert e-mail notification system testing.

- The Refresh method supports a new XML element in the OPTIONS parameter, <OMA ALERTEMAILTEST="*text*"/>, which sends a test e-mail message to the addresses configured in the SAS Metadata Server's omaconfig.xml file. If the intended recipients do not receive the e-mail message, this indicates a problem with the e-mail server's configuration.
- The Refresh method supports the following XML elements in the OPTIONS parameter to enable you to temporarily change system options that configure the e-mail server:
  - <OMA EMAILAUTHPROTOCOL="LOGIN | NONE"/>  
Changes the authentication protocol for SMTP e-mail that is sent by the SAS Metadata Server.

<OMA EMAILHOST="*network-server-address*"/>

Changes the network address of the enterprise's SMTP server (for example, mailhost.company.com).

<OMA EMAILID="*server-email-address*"/>

Changes the e-mail address for the **From** field of alert e-mail messages that are sent by the SAS Metadata Server.

<OMA EMAILPW="*password*"/>

Specifies the logon password to be used with the e-mail address that you specified for the EMAILID option.

<OMA EMAILPORT="*port-number*"/>

Changes the port number that is used by the SMTP server that you specified for the EMAILHOST option.

- The Refresh method supports a <OMA ALERTEMAIL="*email-address*"/> XML element in the OPTIONS parameter to enable you to change the recipients for alert e-mail messages.

The e-mail server is initially configured based on input specified at installation. This configuration is recorded in the sasv9.cfg configuration file. The OMA e-mail options that you specify with the Refresh method override the e-mail settings in the sasv9.cfg file for the duration of the server session. If alert e-mail messages cannot be sent after installation, the OMA e-mail options can be used to modify alert e-mail settings until a working combination of system option values is found. To permanently change the alert e-mail system option settings, you must stop the SAS Metadata Server, and then modify the sasv9.cfg file.

You can get the current values of the OMA e-mail options by using the Status method.

## SAS Metadata Server Status Reporting Improvements

The IServer interface has been enhanced to improve metadata server status reporting.

- The IServer Status method supports the following new XML elements in the INMETA parameter, which return server statistics:
  - <OMA USER\_CPU\_TIME=""/>
  - <OMA SYSTEM\_CPU\_TIME=""/>
  - <OMA CURRENT\_TIME=""/>
  - <OMA CURRENT\_MEMORY=""/>
  - <OMA HIGH\_WATER\_MEMORY=""/>
  - <OMA CURRENT\_THREAD\_COUNT=""/>
  - <OMA HIGH\_WATER\_THREAD\_COUNT=""/>
  - <OMA TOTAL\_IO\_COUNT=""/>

## Authorization Improvements

The ISecurity server interface has been enhanced to improve authorization processing on cubes.



- The GetAuthorizations method supports a new authType value, SharedDimension. The new value returns an array that contains the output value of SharedDimension in the first row, and a value for each Level and Hierarchy of a cube in subsequent rows.

## Documentation Updates

- The SAS type dictionary affects interfaces that read and write metadata. A new chapter describes the use of the SAS type dictionary.
- SAS Java Metadata Interface usage examples have been updated to show the use of the SAS type dictionary.

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## What's New in the SAS 9.3 Java Metadata Interface

The local version of the SAS Java Metadata Interface, which is represented by the com.sas.metadata package, has been deprecated. SAS recommends that if an application uses the local version, it be modified to use the remote version. The remote version is represented by the com.sas.metadata.remote package.

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## What's New in SAS 9.3 Metadata Model: Reference

### Overview

The SAS 9.3 Metadata Model has been modified to enhance modeling of Cubes and mining result output. It also includes new metadata types and attributes for graphical metadata interfaces.

### New Metadata Types

- For Cubes, the new metadata types, CalculatedMember and NamedSet, enable the formula that created the CalculatedMember or NamedSet to be associated with the Dimension, Hierarchy, or Level to which they belong. The metadata types are subtypes of GlobalFormula, which was used to store this information in SAS 9.2.
- For graphical metadata user interfaces:
  - The new FavoritesContainer metadata type stores links to objects that users mark as favorites in the SAS Folders tree.
  - The new Search metadata type stores search criteria that users select to save for reuse in the SAS Management Console **Search** tab.

## Enhancements to Existing Metadata Types

Six existing metadata types were modified.

- GlobalFormula has been elevated to an abstract type. Abstract metadata types are not instantiated in a SAS Metadata Repository.
- The Login metadata type has been re-parented as a PrimaryType subtype. A PrimaryType subtype can be added, updated, secured, and deleted independently of other objects in a SAS Metadata Repository.
- The lengths of the LogicalColumn metadata type's SASFormat and SASInformat attributes have been increased to support 43 characters instead of 32.
- An association has been added between the MiningResult and TextStore metadata types. MiningResult has a ResultPMML association to TextStore; TextStore has an OwningMiningResult association to MiningResult.
- The PrimaryType metadata type has a new attribute, IsHidden. IsHidden is a Boolean value that indicates if the object is visible in metadata user interfaces such as in the SAS Folders tree and on the **Search** tab.
- The SoftwareComponent metadata type has a new attribute, ConfigureVersion. ConfigureVersion supports a string that indicates the version of the code in the configuration directory.

## Documentation Modifications

- The documentation for the RepositoryBase metadata type was enhanced to describe new usage of the RepositoryType attribute.
- The metadata model usage scenarios have been removed.

# 36

## SAS/OR

<b><i>What's New in SAS/OR 9.3</i></b> .....	<b>281</b>
Overview .....	281
The CLP Procedure .....	283
The CPM Procedure .....	283
Microsoft Project Conversion Macros .....	284
The OPTLP Procedure .....	284
The OPTMODEL Procedure .....	284
SAS Simulation Studio 1.6 .....	285
<b><i>What's New in SAS/OR 12.1</i></b> .....	<b>286</b>
Overview .....	286
Highlights of Enhancements in SAS/OR 12.1 .....	286
The CLP Procedure .....	287
The DTREE, GANTT, and NETDRAW Procedures .....	287
Supporting Technologies for Optimization .....	287
PROC OPTMODEL: Nonlinear Optimization .....	288
Linear Optimization with PROC OPTMODEL and PROC OPTLP .....	288
Mixed Integer Linear Optimization with PROC OPTMODEL and PROC OPTMILP .....	289
The Decomposition Algorithm .....	289
Setting the Cutting Plane Strategy .....	290
Conflict Search .....	290
PROC OPTMILP: Option Tuning .....	290
PROC OPTMODEL: The SUBMIT Block .....	291
Network Optimization with PROC OPTNET .....	291
SAS Simulation Studio 12.1 .....	292

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## What's New in SAS/OR 9.3

### Overview

SAS/OR 9.3 includes a number of additions and improvements that enhance the performance and capabilities of SAS/OR software in several areas. These updates also make it easier to work with SAS/OR software and the solutions that it produces. Brief descriptions are presented in the following sections.

### Highlights of Enhancements in SAS/OR 9.3

Highlights of the changes include the following:

- The CLP procedure's scheduling mode, which solves scheduling constraint satisfaction problems (CSPs), is now production. The CLP procedure now supports the specification of an objective function.
- The CPM procedure adds a control on the use of progress update information with resource-constrained schedules.
- The Microsoft Project conversion macro %SASTOMSP is production.
- The linear programming interior point solver adds an experimental crossover option that converts the optimal solution found to an optimal basic feasible solution.
- The linear programming solver adds a network simplex algorithm for problems with a dominant or embedded network structure.
- The nonlinear programming solver adds an active set solution algorithm and also adds a multistart capability.
- All optimization solvers (linear, mixed-integer linear, quadratic, and nonlinear) add performance improvements.
- SAS Simulation Studio adds Windows 64-bit support, closer integration with JMP, and several interface and technical enhancements.

More information about the changes and enhancements is provided in this chapter. Details can be found in the relevant volumes of the *SAS/OR 9.3 User's Guide* and in the *SAS Simulation Studio 1.6: User's Guide*.

### Highlights of Enhancements in SAS/OR 9.22

Some users are moving directly from SAS/OR 9.2 to SAS/OR 9.3. The following are some of the major enhancements that were introduced in SAS/OR 9.22:

- You can customize the format of the time axis on the Gantt chart.
- You can import and convert Microsoft Project data that has been saved in XML format.
- The CLP procedure is now production with the exception of the scheduling-related constraints.
- The OPTMODEL procedure supports named problems to enable easy manipulation of multiple subproblems.
- The IPNLP and NLPU solvers support new techniques for large-scale optimization.
- SAS Simulation Studio 1.5 is a new graphical application for discrete event simulation and is included with SAS/OR software.

### Documentation Enhancements

The OPTMODEL family of mathematical programming procedures constitutes a completely new generation of optimization capabilities, distinct from and preferred over the older SAS/OR mathematical optimization procedures. The newer optimization procedures access new, far more scalable optimization solvers and use more accessible and extensible syntax than the older procedures. Therefore, SAS/OR users are encouraged to migrate to the newer optimization procedures. Accordingly, *SAS/OR User's Guide: Mathematical Programming* now includes

information about the OPTMODEL family of procedures and their associated optimization solvers. Information about the older procedures and solvers is still available in *SAS/OR User's Guide: Mathematical Programming Legacy Procedures*.

## The CLP Procedure

The CLP procedure is a finite-domain constraint programming solver for solving constraint satisfaction problems (CSPs) with linear, logical, global, and scheduling constraints. The CLP procedure, including the scheduling constraints, is production in SAS/OR 9.3.

PROC CLP has the following enhancements:

- enhancements for specifying an objective function:
  - The `_TYPE_` variable values MAX and MIN can be used to specify an objective in the Constraint input data set.
  - The experimental OBJ statement enables you to set upper (UB= option) and lower (LB= option) bounds on the value of an objective function that is specified in the Constraint data set. If upper and lower bounds for the objective value are not specified, the CLP procedure tries to derive bounds from the domains of the variables that appear in the objective function.
  - You can also use the OBJ statement to specify the tolerance (TOL= option) used for finding a locally optimal objective value.
- expanded variable and activity selection strategy options:
  - The ACTSELECT= option in the SCHEDULE statement adds the PRIORITY value, which specifies that activities of highest priority should be selected to break ties between activities with identical start times.
  - The experimental EVALACTSEL option in the SCHEDULE statement evaluates all of the possible activity selection strategies by attempting to find a solution with each.
  - The experimental EVALVARSEL option in the PROC CLP statement evaluates all of the possible variable selection strategies by attempting to find a solution with each.
  - The new macro variables `_ORCLPEAS_` and `_ORCLPEVS_` record the results of the evaluations requested by the EVALACTSEL and EVALVARSEL options, respectively.

## The CPM Procedure

The CPM procedure performs project and resource scheduling and can be used for planning, controlling, and monitoring a project. For SAS/OR 9.3, PROC CPM adds the experimental SETFINISH= option, which enables progress update information to override resource considerations when determining the resource-constrained finish times of activities. Specifying SETFINISH=EARLY gives priority to progress update information, and the default value SETFINISH=MAX sets the resource-constrained finish times to ensure that all resources assigned to an activity complete their work as originally scheduled.

## Microsoft Project Conversion Macros

The %SASTOMSP macro is production. This macro converts data sets that are used by the CPM and PM procedures into an MDB file that is readable by Microsoft Project 2000, 2002, and 2003. The macro converts information that is common to PROC CPM, PROC PM, and Microsoft Project; this information includes hierarchical relationships, precedence relationships, time constraints, resource availabilities, resource requirements, project calendars, resource calendars, task calendars, holiday information, and work- shift information. In addition, the early and late schedules, the actual start and finish times, the resource-constrained schedule, and the baseline schedule are also extracted and stored as start-finish variables.

Execution of the %MSPTOSAS and %SASTOMSP macros requires SAS/ACCESS® software.

## The OPTLP Procedure

The OPTLP procedure solves linear programming problems with solvers that have been improved and augmented for SAS/OR 9.3:

- A network simplex algorithm has been added to solve linear programming problems that have a significant network structure embedded within them. This solver operates by first identifying and extracting the largest possible network structure within the problem. It finds an optimal solution to the network problem and then uses this solution as the core of an advanced initial solution for the entire problem, which is solved with the primal or dual simplex solver. As with other linear programming solvers, the network simplex solver is specified using the SOLVER=NS option. The new SOLVER2= option, used only when SOLVER=NS, is used to specify the solver to be used for solving the overall problem after the network problem has been solved.
- For the interior point solver, the experimental CROSSOVER= option specifies that a solution found by the interior point solver should be converted to a basic feasible solution such as would be found by a primal or dual simplex solver. In many cases a basic feasible solution is more practically useful than the type of solution typically identified by an interior point solver. CROSSOVER=ON activates the crossover algorithm, which by default (CROSSOVER=OFF) is not used.

These new features are also accessible from the OPTMODEL procedure.

## The OPTMODEL Procedure

The OPTMODEL procedure provides a modeling syntax designed specifically for building and working with optimization models including linear, mixed-integer, quadratic, and general nonlinear optimization.

In SAS/OR 9.3, PROC OPTMODEL adds features that give you greater control over the disposition of models and solutions:

- The CREATE DATA statement adds options that enable you to control the formatting, length, and labeling of output data set variables that are created from an optimization model or its solution.
- The SAVE MPS and SAVE QPS statements enable you to specify an objective function that determines which objective among several alternatives is saved as the problem objective in the MPS or QPS data set.

SAS/OR 9.3 delivers very significant upgrades for nonlinear optimization:

- A new experimental active-set solver is available and is recommended for both small- and large-scale problems. The active-set solver is often the preferred solver if the problem being addressed contains only bound constraints, and it can also deliver superior performance for other classes of problems.
- The new multistart method considers multiple starting points for the optimization process. This approach is useful for nonlinear optimization problems that might have many locally optimal solutions, which is common if either or both of the objective and constraint functions are non-convex. In such a case, one of the locally optimal solutions is also the globally optimal solution; with the multistart algorithm, the nonlinear optimization solver starts at several different initial points and then reports back the best among the multiple locally optimal solutions that it has found. In the first phase of the multistart algorithm, the feasible region of the optimization problem is explored and candidate starting points are determined so as to be most likely to produce good locally optimal solutions. In the second phase, a subset of the candidates is selected (according to criteria designed to produce better and distinct locally optimal solutions) and used as starting points for the nonlinear optimization solver. Two options can be used to control these phases: the `MSBNDRANGE=` option limits the initial exploration of the feasible region and is especially useful with unbounded problems, and the `MSNUMSTARTS=` option specifies the number of starting points to be used. After the multistart algorithm has concluded, the solution with the best objective function is reported. The `.msinit` suffix can be used to produce the values of the decision variables at the starting point that ultimately lead to the discovery of this solution.

## SAS Simulation Studio 1.6

SAS Simulation Studio is a graphical application that enables you to build, run, and analyze discrete event simulation models. Application areas include retail, customer service, health care, transportation, and many other industries. The graphical user interface of SAS Simulation Studio provides extensive modeling tools suitable for both novice and advanced simulation users.

In SAS/OR 9.3, SAS Simulation Studio 1.6 provides the following enhancements:

- support for the 64-bit Windows platform along with the 32-bit Windows platform support it has always offered
- improved features and usability:
  - a new set of icons for all blocks
  - new graphics technology for graphical display blocks (bar charts, scatter plots, histograms, and so on)
  - cut-and-paste capabilities to aid in replicating sections of models
  - a new Snapshot feature that provides a scaled-down view of the entire model, which can be used to navigate to sections of interest in larger models that extend beyond the boundaries of one monitor screen
- enhanced ability to work with data and generate samples from probability distributions. You can now sample from nonhomogeneous Poisson processes and empirical distributions (discrete and continuous). Integration with JMP® distribution-fitting capabilities is tighter than in previous releases: you can now select a candidate fitted distribution from JMP software and with one click

transmit the distribution and parameter settings back to the appropriate Numeric Source block in SAS Simulation Studio.

- new blocks:
  - The Observation Source block enables you to sample an entire observation from a source data set in a single step; this is useful when many variables from the same data set are used in a simulation model.
  - The Dataset Writer block, when signaled to do so, saves data collected during a simulation model run to a specified location.
  - The Dataset Holder block also receives data collected during a simulation model run but makes the data available for queries during the same run.
  - The Stopper block enables you to create a signal that immediately stops a simulation model run and can also trigger the saving of key simulation data near or at the end of the simulation model run.
  - The Stat Collector block enables you to collect time-persistent statistics and values.
- access to SAS software (to run SAS programs during or after a simulation model run) not only on the local PC but also on a remote SAS server

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## What's New in SAS/OR 12.1

### Overview

SAS/OR 12.1 delivers a broad range of new capabilities and enhanced features, encompassing optimization, constraint programming, and discrete-event simulation. SAS/OR 12.1 enhancements significantly improve performance and expand your tool set for building, analyzing, and solving operations research models.

In previous years, SAS/OR® software was updated only with new releases of Base SAS® software, but this is no longer the case. This means that SAS/OR software can be released to customers when enhancements are ready, and the goal is to update SAS/OR every 12 to 18 months. To mark this newfound independence, the release numbering scheme for SAS/OR is changing with this release. This new numbering scheme will be maintained when new versions of Base SAS and SAS/OR ship at the same time. For example, when Base SAS 9.4 is released, SAS/OR 13.1 will be released.

### Highlights of Enhancements in SAS/OR 12.1

Highlights of the SAS/OR enhancements include the following:

- multithreading is used to improve performance in these three areas:
  - PROC OPTMODEL problem generation
  - multistart for nonlinear optimization
  - option tuning for mixed integer linear optimization
- concurrent solve capability (experimental) for linear programming (LP) and nonlinear programming (NLP)



- improvements to all simplex LP algorithms and mixed integer linear programming (MILP) solver
- new decomposition (DECOMP) algorithm for LP and MILP
- new option for controlling MILP cutting plane strategy
- new conflict search capability for MILP solver
- option tuning for PROC OPTMILP
- new procedure, PROC OPTNET, for network optimization and analysis
- new SUBMIT block for invoking SAS code within PROC OPTMODEL
- SAS Simulation Studio improvements:
  - one-click connection of remote blocks in large models
  - autoscrolling for navigating large models
  - new search capability for block types and label content
  - alternative Experiment window configuration for large experiments
  - selective animation capability
  - new submodel component (experimental)

## The CLP Procedure

In SAS/OR 12.1, the CLP procedure adds two classes of constraints that expand its capabilities and can accelerate its solution process. The LEXICO statement imposes a lexicographic ordering between pairs of variable lists. Lexicographic order is essentially analogous to alphabetical order but expands the concept to include numeric values. One vector (list) of values is lexicographically less than another if the corresponding elements are equal up to a certain point and immediately after that point the next element of the first vector is numerically less than the second. Lexicographic ordering can be useful in eliminating certain types of symmetry that can arise among solutions to constraint satisfaction problems (CSPs). Imposing a lexicographic ordering eliminates many of the mutually symmetric solutions, reducing the number of permissible solutions to the problem and in turn shortening the solution process.

Another constraint class that is added to PROC CLP for SAS/OR 12.1 is the bin-packing constraint, imposed via the PACK statement. A bin-packing constraint directs that a specified number of items must be placed into a specified number of bins, subject to the capacities (expressed in numbers of items) of the bins. The PACK statement provides a compact way to express such constraints, which can often be useful components of larger CSPs or optimization problems.

## The DTREE, GANTT, and NETDRAW Procedures

In SAS/OR 12.1 the DTREE, GANTT, and NETDRAW procedures each add procedure-specific graph styles that control fonts, line colors, bar and node fill colors, and background images.

## Supporting Technologies for Optimization

The underlying improvements in optimization in SAS/OR 12.1 are chiefly related to multithreading, which denotes the use of multiple computational cores to enable

computations to be executed in parallel rather than serially. Multithreading can provide dramatic performance improvements for optimization because these underlying computations are performed many times in the course of an optimization process.

The underlying linear algebra operations for the linear, quadratic, and nonlinear interior point optimization algorithms are now multithreaded. The LP, QP, and NLP solvers can be used by PROC OPTMODEL, PROC OPTLP, and PROC OPTQP in SAS/OR. For nonlinear optimization with PROC OPTMODEL, the evaluation of nonlinear functions is multithreaded for improved performance.

Finally, the process of creating an optimization model from PROC OPTMODEL statements has been multithreaded. PROC OPTMODEL contains powerful declarative and programming statements and is adept at enabling data-driven definition of optimization models, with the result that a rather small section of PROC OPTMODEL code can create a very large optimization model when it is executed. Multithreading can dramatically shorten the time that is needed to create an optimization model.

In SAS/OR 12.1 you can use the NTHREADS= option in the PERFORMANCE statement in PROC OPTMODEL and other SAS/OR optimization procedures to specify the number of cores to be used. Otherwise, SAS detects the number of cores available and uses them.

## PROC OPTMODEL: Nonlinear Optimization

The nonlinear optimization solver that PROC OPTMODEL uses builds on the introduction of multithreading for its two most significant improvements in SAS/OR 12.1. First, in addition to the nonlinear solver options ALGORITHM=ACTIVESET and ALGORITHM=INTERIORPOINT, SAS/OR 12.1 introduces the ALGORITHM=CONCURRENT option (experimental), with which you can invoke both the active set and interior point algorithms for the specified problem, running in parallel on separate threads. The solution process terminates when either of the algorithms terminates. For repeated solves of a number of similarly structured problems or simply for problems for which the best algorithm isn't readily apparent, ALGORITHM=CONCURRENT should prove useful and illuminating.

Second, multithreading is central to the nonlinear optimization solver's enhanced multistart capability, which now takes advantage of multiple threads to execute optimizations from multiple starting points in parallel. The multistart capability is essential for problems that feature nonconvex nonlinear functions in either or both of the objective and the constraints because such problems might have multiple locally optimal points. Starting optimization from several different starting points helps to overcome this difficulty, and multithreading this process helps to ensure that the overall optimization process runs as fast as possible.

## Linear Optimization with PROC OPTMODEL and PROC OPTLP

Extensive improvements to the primal and dual simplex linear optimization algorithms produce better performance and better integration with the crossover algorithm, which converts solutions that are found by the interior point algorithm into more usable basic optimal solutions. The crossover algorithm itself has undergone extensive enhancements that improve its speed and stability.

Paralleling developments in nonlinear optimization, SAS/OR 12.1 linear optimization introduces a concurrent algorithm, invoked with the ALGORITHM=CONCURRENT

option, in the SOLVE WITH LP statement for PROC OPTMODEL or in the PROC OPTLP statement. The concurrent LP algorithm runs a selection of linear optimization algorithms in parallel on different threads, with settings to suit the problem at hand. The optimization process terminates when the first algorithm identifies an optimal solution. As with nonlinear optimization, the concurrent LP algorithm has the potential to produce significant reductions in the time needed to solve challenging problems and to provide insights that are useful when you solve a large number of similarly structured problems.

## Mixed Integer Linear Optimization with PROC OPTMODEL and PROC OPTMILP

Mixed integer linear optimization in SAS/OR 12.1 builds on and extends the advances in linear optimization. Overall, solver speed has increased by over 50% (on a library of test problems) compared to SAS/OR 9.3. The branch-and-bound algorithm has approximately doubled its ability to evaluate and solve component linear optimization problems (which are referred to as nodes in the branch-and-bound tree). These improvements have significantly reduced solution time for difficult problems.

## The Decomposition Algorithm

The most fundamental change to both linear and mixed integer linear optimization in SAS/OR 12.1 is the addition of the decomposition (DECOMP) algorithm, which is invoked with a specialized set of options in the SOLVE WITH LP and SOLVE WITH MILP statements for PROC OPTMODEL or in the DECOMP statement for PROC OPTLP and PROC OPTMILP. For many linear and mixed integer linear optimization problems, most of the constraints apply only to a small set of decision variables. Typically there are many such sets of constraints, complemented by a small set of linking constraints that apply to all or most of the decision variables. Optimization problems with these characteristics are said to have a "block-angular" structure, because it is easy to arrange the rows of the constraint matrix so that the nonzero values, which correspond to the local sets of constraints, appear as blocks along the main diagonal.

The DECOMP algorithm exploits this structure, decomposing the overall optimization problem into a set of component problems that can be solved in parallel on separate computational threads. The algorithm repeatedly solves these component problems and then cycles back to the overall problem to update key information that is used the next time the component problems are solved. This process repeats until it produces a solution to the complete problem, with the linking constraints present. The combination of parallelized solving of the component problems and the iterative coordination with the solution of the overall problem can greatly reduce solution time for problems that were formerly regarded as too time-consuming to solve practically.

To use the DECOMP algorithm, you must either manually or automatically identify the blocks of the constraint matrix that correspond to component problems. The METHOD= option controls the means by which blocks are identified. METHOD=USER enables you to specify the blocks yourself, using the .block suffix to declare blocks. This is by far the most common method of defining blocks. If your problem has a significant or dominant network structure, you can use METHOD=NETWORK to identify the blocks in the problem automatically. Finally, if no linking constraints are present in your problem, then METHOD=AUTO identifies the blocks automatically.

The DECOMP algorithm uses a number of detailed options that specify how the solution processes for the component problems and the overall problem are configured and how they coordinate with each other. You can also specify the number of computational threads to make available for processing component problems and the level of detail in the information to appear in the SAS log. Options specific to the linear and mixed integer linear solvers that are used by the DECOMP algorithm are largely identical to those for the respective solvers.

## Setting the Cutting Plane Strategy

Cutting planes are a major component of the mixed integer linear optimization solver, accelerating its progress by removing fractional (not integer feasible) solutions. SAS/OR 12.1 adds the CUTSTRATEGY= option in the PROC OPTMILP statement and in the SOLVE WITH MILP statement for PROC OPTMODEL, enabling you to determine the aggressiveness of your overall cutting plane strategy. This option complements the individual cut class controls (CUTCLQUE=, CUTGOMORY=, CUTMIR=, and so on), with which you can enable or disable certain cut types, and the ALLCUTS= option, which enables or disables all cutting planes. In contrast, the CUTSTRATEGY= option controls cuts at a higher level, creating a profile for cutting plane use. As the cut strategy becomes more aggressive, more effort is directed toward creating cutting planes and more cutting planes are applied. The available values of the CUTSTRATEGY= option are AUTOMATIC, BASIC, MODERATE, and AGGRESSIVE; the default is AUTOMATIC. The precise cutting plane strategy that corresponds to each of these settings can vary from problem to problem, because the strategy is also tuned to suit the problem at hand.

## Conflict Search

Another means of accelerating the solution process for mixed integer linear optimization takes information from infeasible linear optimization problems that are encountered during an initial exploratory phase of the branch-and-bound process. This information is analyzed and ultimately is used to help the branch-and-bound process avoid combinations of decision variable values that are known to lead to infeasibility. This approach, known as conflict analysis or conflict search, influences presolve operations on branch-and-bound nodes, cutting planes, computation of decision variable bounds, and branching. Although the approach is complex, its application in SAS/OR 12.1 is straightforward. The CONFLICTSEARCH= option in the PROC OPTMILP statement or the SOLVE WITH MILP statement in PROC OPTMODEL enables you to specify the level of conflict search to be performed. The available values for the CONFLICTSEARCH= option are NONE, AUTOMATIC, MODERATE, and AGGRESSIVE. A more aggressive search strategy explores more branch-and-bound nodes initially before the branch-and-bound algorithm is restarted with information from infeasible nodes included. The default value is AUTOMATIC, which enables the solver to choose the search strategy.

## PROC OPTMILP: Option Tuning

The final SAS/OR 12.1 improvement to the mixed integer linear optimization solver is option tuning, which helps you determine the best option settings for PROC OPTMILP. There are many options and settings available, including controls on the presolve process, branching, heuristics, and cutting planes. The TUNER statement enables you to investigate the effects of the many possible combinations of option settings on solver performance and determine which should perform best. The PROBLEMS= option enables you to submit several problems for tuning at once. The

OPTIONMODE= option specifies the options to be tuned. OPTIONMODE=USER indicates that you will supply a set of options and initial values via the OPTIONVALUES= data set, OPTIONMODE=AUTO (the default) tunes a small set of predetermined options, and OPTIONMODE=FULL tunes a much more extensive option set.

Option tuning starts by using an initial set of option values to solve the problem. The problem is solved repeatedly with different option values, with a local search algorithm to guide the choices. When the tuning process terminates, the best option values are output to a data set specified by the SUMMARY= option. You can control the amount of time used by this process by specifying the MAXTIME= option. You can multithread this process by using the NTHREADS= option in the PERFORMANCE statement for PROC OPTMILP, permitting analyses of various settings to occur simultaneously.

## PROC OPTMODEL: The SUBMIT Block

In SAS/OR 12.1, PROC OPTMODEL adds the ability to execute other SAS code nested inside PROC OPTMODEL syntax. This code is executed immediately after the preceding PROC OPTMODEL syntax and before the syntax that follows. Thus you can use the SUBMIT block to, for example, invoke other SAS procedures to perform analyses, to display results, or for other purposes, as an integral part of the process of creating and solving an optimization model with PROC OPTMODEL. This addition makes it even easier to integrate the operation of PROC OPTMODEL with other SAS capabilities.

To create a SUBMIT block, use a SUBMIT statement (which must appear on a line by itself) followed by the SAS code to be executed, and terminate the SUBMIT block with an ENDSUBMIT statement (which also must appear on a line by itself). The SUBMIT statement enables you to pass PROC OPTMODEL parameters, constants, and evaluated expressions to the SAS code as macro variables.

## Network Optimization with PROC OPTNET

PROC OPTNET, new in SAS/OR 12.1, provides several algorithms for investigating the characteristics of networks and solving network-oriented optimization problems. A network, sometimes referred to as a graph, consists of a set of nodes that are connected by a set of arcs, edges, or links. There are many applications of network structures in real-world problems, including supply chain analysis, communications, transportation, and utilities problems. PROC OPTNET addresses the following classes of network problems:

- biconnected components
- maximal cliques
- connected components
- cycle detection
- weighted matching
- minimum-cost network flow
- minimum cut
- minimum spanning tree
- shortest path
- transitive closure

- traveling salesman

PROC OPTNET syntax provides a dedicated statement for each problem class in the preceding list.

The formats of PROC OPTNET input data sets are designed to fit network-structured data, easing the process of specifying network-oriented problems. The underlying algorithms are highly efficient and can successfully address problems of varying levels of detail and scale. PROC OPTNET is a logical destination for users who are migrating from some of the legacy optimization procedures in SAS/OR. Former users of PROC NETFLOW can turn to PROC OPTNET to solve shortest-path and minimum-cost network flow problems, and former users of PROC ASSIGN can instead use the LINEAR\_ASSIGNMENT statement in PROC OPTNET to solve assignment problems.

## SAS Simulation Studio 12.1

SAS Simulation Studio 12.1, a component of SAS/OR 12.1 for Windows environments, adds several features that improve your ability to build, explore, and work with large, complex discrete-event simulation models. Large models present a number of challenges to a graphical user interface such as that of SAS Simulation Studio. Connection of model components, navigation within a model, identification of objects or areas of interest, and management of different levels of modeling are all tasks that can become more difficult as the model size grows significantly beyond what can be displayed on one screen. An indirect effect of model growth is an increased number of factors and responses that are needed to parameterize and investigate the performance of the system being modeled.

Improvements in SAS Simulation Studio 12.1 address each of these issues. In SAS Simulation Studio, you connect blocks by dragging the cursor to create links between output and input ports on regular blocks and Connector blocks. SAS Simulation Studio 12.1 automatically scrolls the display of the Model window as you drag the link that is being created from its origin to its destination, thus enabling you to create a link between two blocks that are located far apart (additionally you can connect any two blocks by clicking on the OutEntity port of the first block and then clicking on the InEntity port of the second block). Automatic scrolling also enables you to navigate a large model more easily. To move to a new area in the Model window, you can simply hold down the left mouse button and drag the visible region of the model to the desired area. This works for simple navigation and for moving a block to a new, remote location in the model.

SAS Simulation Studio 12.1 also enables you to search among the blocks in a model and identify the blocks that have a specified type, a certain character string in their label, or both. From the listing of identified blocks, you can open the Properties dialog box for each identified block and edit its settings. Thus, if you can identify a set of blocks that need similar updates, then you can make these updates without manually searching through the model for qualifying blocks and editing them individually. For very large models, this capability not only makes the update process easier but also makes it more thorough because you can identify qualifying blocks centrally.

When you design experiments for large simulation models, you often need a large number of factors to parameterize the model and a large number of responses to track system performance in sufficient detail. This was a challenge prior to SAS Simulation Studio 12.1 because the Experiment window displayed factors and responses in the header row of a table, with design points and their replications' results displayed in the rows below. A very large number of factors and responses

did not fit on one screen in this display scheme, and you had to scroll across the Experiment window to view all of them.

SAS Simulation Studio 12.1 provides you with two alternative configurations for the Experiment window. The Design Matrix tab presents the tabular layout described earlier. The Design Point tab presents each design point in its own display. Factors and responses (summarized over replications) are displayed in separate tables, each with the factor or response names appearing in one column and the respective values in a second column. This layout enables a large number of factors and responses to be displayed. Response values for each replication of the design point can be displayed in a separate window.

SAS Simulation Studio 12.1 enhances its multilevel model management features by introducing the submodel component (experimental). Like the compound block, the submodel encapsulates a group of SAS Simulation Studio blocks and their connections, but the submodel outpaces the compound block in some important ways. The submodel, when expanded, opens in its own window. This means a submodel in its collapsed form can be placed close to other blocks in the Model window without requiring space for its expanded form (as is needed for compound blocks). The most important property of the submodel is its ability to be copied and instantiated in several locations simultaneously, whether in the same model, in different models in the same project, or in different projects. Each such instance is a direct reference to the original submodel, not a disconnected copy. Thus you can edit the submodel by editing any of its instances; changes that are made to any instance are propagated to all current and future instances of the submodel. This feature enables you to maintain consistency across your models and projects.

Finally, SAS Simulation Studio 12.1 introduces powerful new animation controls that should prove highly useful in debugging simulation models. In the past, animation could be switched on or off and its speed controlled, but these choices were made for the entire model. If you needed to animate a particular segment of the model, perhaps during a specific time span for the simulation clock, you had to focus your attention on that area and pay special attention when the time period of interest arrived. In SAS Simulation Studio 12.1 you can select both the area of the model to animate (by selecting a block or a compound block) and the time period over which animation should occur (by specifying the start and end times for animation). You can also control simulation speed for each such selection. Multiple selections are supported so that you can choose to animate several areas of the model, each during its defined time period and at its chosen speed.





## 37

## SAS Providers for OLE DB

<i>What's New in the SAS 9.3 Providers for OLE DB</i> .....	295
Overview .....	295
Retrieve SAS Data Set Type, Label, Encoding, and Code Page from the Schema Rowset .....	295
Clarify Use of the DBBINDING.dwFlags Member .....	295
Cancel MDX Queries .....	296
Support Internet Protocol v6 Addresses .....	296

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### What's New in the SAS 9.3 Providers for OLE DB

#### Overview

The SAS Providers for OLE DB have the following changes and enhancements:

- retrieve SAS data set type, label, encoding, and code page from schema tables rowset
- clarify use of the DBBINDING.dwFlags member
- cancel MDX queries

#### Retrieve SAS Data Set Type, Label, Encoding, and Code Page from the Schema Rowset

For the SAS/SHARE provider and Local provider, the SAS data set type, label, encoding, and Windows code page can be retrieved from the schema rowset. The information for these fields is the same information that is provided by the CONTENTS procedure.

#### Clarify Use of the DBBINDING.dwFlags Member

For customers that program to the OLE DB interface, a clarification has been made to the documentation for the DBBINDING.dwFlags member. Previous releases of the providers used a version of the Microsoft Active Template Library for Microsoft Visual Studio 6. This version of the library did not validate the value of this member. Beginning with the 9.3 release, the providers use the Microsoft Visual Studio 2008 version of the library. This version of the library does validate the dwFlags member.

For the SAS providers, the value must be zero. A value of zero indicates that the provider returns text, as opposed to HTML or a COM object. SAS providers only support returning text.

## **Cancel MDX Queries**

When the OLAP provider is used to perform an MDX query, the request can be cancelled with the Cancel method. This support is limited to MDX queries that are made asynchronously and with the Execute method.

## **Support Internet Protocol v6 Addresses**

The IOM provider and the OLAP provider support using IPv6 addresses in a connection string.

# 38

## SAS/QC

<b><i>What's New in SAS/QC 9.3</i></b> .....	<b>297</b>
Overview .....	297
New MVPMODEL Procedure (Experimental) .....	297
New MVPMONITOR Procedure (Experimental) .....	298
CAPABILITY Procedure Enhancements .....	298
FACTEX Procedure Enhancements .....	298
RELIABILITY Procedure Enhancements .....	299
References .....	299
<b><i>What's New in SAS/QC 12.1</i></b> .....	<b>299</b>
Overview .....	299
Production Status for the MVP Procedures .....	299
CAPABILITY Procedure Enhancements .....	300
PARETO Procedure Enhancements .....	301
RELIABILITY Procedure Enhancements .....	301
References .....	302

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## What's New in SAS/QC 9.3

### Overview

SAS/QC 9.3 includes two new experimental procedures for multivariate process monitoring and enhancements to the CAPABILITY, FACTEX, and RELIABILITY procedures.

The new MVPMODEL and MVPMONITOR procedures are used together to monitor multivariate process variation over time in order to determine whether the process is stable or to detect changes in a stable process.

### New MVPMODEL Procedure (Experimental)

The MVPMODEL procedure provides computational and graphical tools for building a principal components model from multivariate process data in which the measured variables are continuous and correlated. This model then serves as input to the MVPMONITOR procedure.

The MVPMODEL procedure implements principal components analysis (PCA) techniques which evolved in the field of chemometrics for monitoring hundreds or even thousands of correlated process variables; refer to Kourti and MacGregor

(1995,1996 ) for an introduction. These techniques differ from the classical multivariate  $T^2$  chart in which Hotelling's  $T^2$  statistic is computed as a distance from the multivariate mean scaled by the covariance matrix of the variables; refer to Alt 1985(). Instead, principal component methods compute  $T^2$  based on a small number of principal components that model most of the variation in the data.

The principal components approach offers several advantages over the construction of the classical  $T^2$  chart:

- It avoids computational issues that arise when the process variables are collinear and their covariance matrix is nearly singular.
- It offers diagnostic tools for interpreting unusual values of  $T^2$  .
- By projecting the data to a low-dimensional subspace, a principal components model more adequately describes the variation in a multivariate process, which is often driven by a small number of underlying factors which are not directly observable.

## New MVPMONITOR Procedure (Experimental)

The MVPMONITOR procedure produces control charts for multivariate process data. It reads output data sets that contain statistics and principal components model information and that were created by the MVPMODEL procedure. The MVPMONITOR procedure creates two multivariate control charts:  $T^2$  charts and SPE (squared prediction error) charts. It can also create contribution plots, in addition to score plots in some cases.

Multivariate control charts detect unusual variation that would not be uncovered by individually monitoring the variables with univariate control charts, such as Shewhart charts. A major impetus in the development of multivariate control charts is the inadequacy of individual univariate control charts when working with correlated measurement variables. A multivariate control chart can detect changes in the linear relationships of the variables in addition to their marginal means and variances.

## CAPABILITY Procedure Enhancements

The CAPABILITY procedure supports five new fitted distributions for SAS/QC 9.3:

- Gumbel distribution
- inverse Gaussian distribution
- generalized Pareto distribution
- power function distribution
- Rayleigh distribution

These new distributions are available in the CDFPLOT, HISTOGRAM, PROBPLOT, PPLOT, and QQPLOT statements.

## FACTEX Procedure Enhancements

In the FACTEX procedure, the MAXCLEAR option has been added to the MODEL statement for SAS/QC 9.3. The MAXCLEAR option requests "a design that maximizes the number of clear interactions, those which are not aliased with any other effects that are either required to be estimable or assumed to be

nonnegligible." In the context of resolution 4 designs, a MaxClear design maximizes the number of two-factor interactions that are unaliased with any other interaction.

## RELIABILITY Procedure Enhancements

The RELIABILITY procedure for SAS/QC 9.3 includes enhancements related to fitting parametric models for lifetime and recurrent events data. The RELIABILITY procedure now enables you to do the following:

- estimate parameters and construct probability plots for the three parameter Weibull distribution
- estimate the parameters of nonhomogeneous Poisson process models for recurrent events data and plot the cumulative mean and intensity functions

## References

Alt, F. (1985), "Multivariate Quality Control," *Encyclopedia of Statistical Sciences*, Volume 6.

Kourti, T. and MacGregor, J. F. (1995), "Process Analysis, Monitoring and Diagnosis, Using Multivariate Projection Methods," *Chemometrics and Intelligent Laboratory Systems*, 28, 3-21.

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## What's New in SAS/QC 12.1

### Overview

SAS/QC 12.1 includes three new procedures for multivariate process monitoring, as well as enhancements to the CAPABILITY, PARETO, and RELIABILITY procedures.

In previous years, SAS/QC® software was updated only with new releases of Base SAS® software, but this is no longer the case. This means that SAS/QC software can be released to customers when enhancements are ready, and the goal is to update SAS/QC every 12 to 18 months. To mark this newfound independence, the release numbering scheme for SAS/QC is changing with this release. This new numbering scheme will be maintained when new versions of Base SAS and SAS/QC ship at the same time. For example, when Base SAS 9.4 is released, SAS/QC 13.1 will be released.

### Production Status for the MVP Procedures

The MVPMODEL, MVPMONITOR, and MVPDIAGNOSE procedures, referred to collectively as the *MVP procedures*, are used together for multivariate process monitoring. The MVPMODEL and MVPMONITOR procedures were introduced as experimental procedures in SAS/QC 9.3 and are production for SAS/QC 12.1. The MVPDIAGNOSE procedure is new in SAS/QC 12.1.

The MVPMODEL procedure provides computational and graphical tools for building a principal component model from multivariate process data in which the measured variables are continuous and correlated. It implements principal component analysis (PCA) techniques that evolved in the field of chemometrics for monitoring hundreds or even thousands of correlated process variables; see Kourti and MacGregor (1995, 1996) for an introduction. A principal component model reduces the dimensionality of the data by projecting the process measurements to a low-dimensional subspace that is defined by a small number of principal components. This subspace is known as the *model hyperplane*.

The principal component model and other output from PROC MVPMODEL serve as input to the MVPMONITOR and MVPDIAGNOSE procedures.

The MVPMONITOR procedure creates control charts for multivariate process data by using the principal component model that is produced by the MVPMODEL procedure. Multivariate control charts detect unusual variation that would not be uncovered by individually monitoring the process variables with univariate control charts, such as Shewhart charts. PROC MVPMONITOR creates two types of multivariate control chart.  $T^2$  charts detect unusual variation within the model hyperplane, whereas squared prediction error (SPE) charts detect unusual variation from the hyperplane.

The MVPDIAGNOSE procedure produces principal component score plots and process variable contribution plots that are used to investigate the causes of unusual variation in a process.

## CAPABILITY Procedure Enhancements

The CAPABILITY procedure supports several new options. The CDFPLOT, COMPHISTOGRAM, HISTOGRAM, PPLOT, PROBPLOT, and QQPLOT statements support the following new options for specifying titles and footnotes in graphs that are produced by using ODS Graphics:

- ODSFOOTNOTE= adds a footnote to the graph.
- ODSFOOTNOTE2= adds a secondary footnote to the graph.
- ODSTITLE= specifies the graph title.
- ODSTITLE2= specifies a secondary graph title.

You can use these options to specify your own graph titles and footnotes without modifying ODS graph templates or using the ODS Graphics Editor.

The CDFPLOT, COMPHISTOGRAM, HISTOGRAM, PROBPLOT, and QQPLOT statements support the following new options for displaying reference lines at the values of computed statistics:

- STATREF= specifies keywords that identify the statistics.
- CSTATREF= specifies the colors of the reference lines.
- LSTATREF= specifies the line types of the reference lines.
- STATREFLABELS= specifies labels for the reference lines.
- STATREFSUBCHAR= specifies a substitution character for incorporating statistic values into reference line labels.

For example, specifying STATREF=MEAN in a HISTOGRAM statement produces a histogram that has a vertical reference line at the mean of the data.

The COMPHISTOGRAM and HISTOGRAM statements support the new CLIPCURVES option, which clips fitted distribution curves that extend above the highest histogram bar. This eliminates compression of the histogram bars caused by extremely high fitted curve peaks.

The OUTPUT statement supports the following new options:

- CIPCTLDF= computes distribution-free confidence limits for percentiles that you request by specifying the PCTLPTS= option.
- CIPCTLNORMAL= computes confidence limits that assume normality for percentiles that you request by specifying the PCTLPTS= option.
- PCTLGROUP= controls how variables that you request by specifying the PCTLPTS= option are grouped in the OUTPUT data set.

In addition, the CHREF=, CVREF=, LHREF=, and LVREF= options have been enhanced. These options now accept lists of values so that different reference lines in a single graph can be displayed by using different colors and line types. They are available in the CDFPLOT, COMPHISTOGRAM, HISTOGRAM, PPLOT, PROBLOT, and QQPLOT statements.

## PARETO Procedure Enhancements

The HBAR and VBAR statements now support the CHARTTYPE= option, which enables you to create variations on the traditional Pareto chart, as described by Wilkinson (2006). These statements also support the following new options for specifying titles and footnotes in graphs that are produced by using ODS Graphics:

- ODSFOOTNOTE= adds a footnote to the graph.
- ODSFOOTNOTE2= adds a secondary footnote to the graph.
- ODSITLE= specifies the graph title.
- ODSITLE2= specifies a secondary graph title.

These options enable you to specify your own graph titles without modifying ODS graph templates or using the ODS Graphics Editor.

## RELIABILITY Procedure Enhancements

The RELIABILITY procedure now supports the following statements that provide further analysis of regression models that are fit by using a MODEL statement:

- The EFFECTPLOT statement produces a display of the fitted model and provides options for changing and enhancing the displays.
- The ESTIMATE statement provides a mechanism for obtaining custom hypothesis tests.
- The LSMEANS statement computes and compares least squares means of fixed effects.
- The LSMESTIMATE statement provides a mechanism for obtaining custom hypothesis tests among least squares means.
- The SLICE statement provides a general mechanism for performing a partitioned analysis of the least squares means for an interaction.
- The STORE statement saves the context and results of the statistical analysis to an item store.

- The TEST statement performs F tests for model effects that test Type I, Type II, or Type III hypotheses.

These statements are common to many SAS/STAT® procedures and are fully documented in the *SAS/STAT 12.1 User's Guide*.

PROC RELIABILITY also provides the following new features:

- confidence bands for mean and intensity functions for recurrent events
- two-sample log-rank-type test for recurrent events
- trend tests for recurrent events parametric models
- Duane plots
- profile likelihood confidence intervals for survival function

## References

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# 39

## SAS Sentiment Analysis

<i>What's New in SAS Sentiment Analysis 1.3</i> .....	<b>303</b>
SAS Sentiment Analysis Studio .....	303
SAS Sentiment Analysis Server .....	304
<i>What's New in SAS Sentiment Analysis 12.1</i> .....	<b>305</b>
SAS Sentiment Analysis Studio .....	305
SAS Sentiment Analysis Server .....	305
SAS Sentiment Analysis Workbench .....	305

### What's New in SAS Sentiment Analysis 1.3

#### SAS Sentiment Analysis Studio

##### Overview

New and enhanced features in SAS Sentiment Analysis Studio include the following:

- improved user interface
- rule enhancements
- additional languages
- SAS licensing replaces the Teragram license

##### Improved User Interface

The following enhancements were made to the user interface:

- The **Set test configuration** and **Search rules** buttons appear in the standard toolbar.
- **Polarity Keywords** and **Product** tabs are merged into the **Rule** tab.
- The Rule pane displays the **Search Result**, **Syntax Errors**, and **Rule Evaluation Result** tabs.
- The Project Settings Dialog dialog box replaces the Preferences Wizard. You can specify the settings for your rule-based and statistical models separately.

## Rule Enhancements

The following enhancements were made to the rules:

- Positive and negative rules are now weighted the same. By default, the **Relative weight of positive rules in rule-based model** is set to 100% in the Set Test Configuration window.
 

**Note:** At this time, changing this setting has no effect on sentiment scores.
- In-place editing enables you to edit your rules in the **Body** field using the operations that are available in a drop-down menu.
- Use the Search Rules dialog box to locate matching terms in your rules. See the results in the Search Result pane in the Rule pane.
- Syntax checking occurs automatically when you either edit a rule or build a model.
- Specify the coreference operator ( `_ref` ) for pronoun resolution. In other words, when a pronoun or another word refers to the canonical form for a term, return the canonical form.
- Define rules that limit matches to the specified XML fields.
- Use the Rule Editor window to edit your rules in tree format. Other editing operations are also available in menu format when you right-click on a rule.
- Specify and reference intermediate entities (concepts) in your rules. Intermediate concepts can be referenced by other concepts to shorten the rule-writing process. This feature enables you to write once and reference multiple times.
- Append an at sign ( `@` ) to your rules to make morphological expansion possible.
- Use the Set Test Configuration dialog box to specify the model settings for the testing operation.

## Additional Languages

The following languages have been added: Czech, Danish, Finnish, Greek, Hebrew, Hungarian, Indonesian, Norwegian, Romanian, Russian, Slovak, Thai, Turkish, Vietnamese, and Farsi (beta version).

## Licensing

SAS licensing replaces the Teragram License. For more information, see *SAS Sentiment Analysis Studio: Installation Guide*.

# SAS Sentiment Analysis Server

## Overview

New and enhanced features in SAS Sentiment Analysis Server include the following:

- improved logging mechanism
- SAS licensing replaces the Teragram license

## Logging

Control the size and number of the logging files.

## Licensing

SAS licensing replaces the Teragram license.

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# What's New in SAS Sentiment Analysis 12.1

## SAS Sentiment Analysis Studio

New and enhanced features for SAS Sentiment Analysis Studio enable you to do the following:

- Create projects using the Farsi language.
- Develop multi-level taxonomies that drill deeper than two levels.
- Define subfeatures for your product features.
- Write rules for your products and for unclassified sentiment.
- Use the UNLESS operator to limit rule matches when the specified term is present in a document.
- Obtain sentiment scores for each node.
- Choose whether to roll up the sentiment scores from the child nodes to the parent nodes.
- Use keyboard shortcuts and search box functionalities.
- Upload models directly to SAS Sentiment Analysis Server.
- Specify the SAS license setinit file in .txt format during installation.

## SAS Sentiment Analysis Server

New and enhanced features for SAS Sentiment Analysis Server enable you to do the following:

- Use the new features listed for SAS Sentiment Analysis Studio.
- Specify the SAS license setinit file in .txt format during installation.

## SAS Sentiment Analysis Workbench

New and enhanced features for SAS Sentiment Analysis Workbench enable you to do the following:

- Use the new features listed for SAS Sentiment Analysis Studio.
- Work within the new user interface that includes changes at the application level as well as the **Search** and **Reports** tabs.
- Use the enhanced reporting operation including the ability to export reports in .jpg , .png , .pdf , and .bmp formats as well as the existing .xml format.
- Specify the SAS license setinit file in .txt format during installation.



## 40

## SAS/SHARE

<b><i>What's New in SAS/SHARE 9.3</i></b> .....	<b>307</b>
Overview .....	307
Extended SAS Library Names with VALIDMEMNAME .....	307
THREADEDTCP Option on PROC SERVER .....	308
Enhancements to Document .....	308
<b><i>What's New in Communications Access Methods for SAS/CONNECT 9.3 and SAS/SHARE 9.3</i></b> .....	<b>308</b>
Overview .....	308
Changes to the Spawners .....	308

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**What's New in SAS/SHARE 9.3**
**Overview**

The following features are new or enhanced for SAS/SHARE 9.3:

- support for extended data set and library names with the integration of the new VALIDMEMNAME system option into SAS/SHARE
- full support for the THREADEDTCP option in the SERVER procedure
- documentation enhancements

**Extended SAS Library Names with VALIDMEMNAME**

SAS/SHARE 9.3 offers you greater flexibility when naming SAS library members (data set names, data views, and item stores) with the integration of the new VALIDMEMNAME= system option. The option extends the allowable characters in a SAS member name to international characters, characters supported by third-party databases, some special characters, and characters comprising names of up to 32 bytes in length.

This option has been enhanced in SAS/SHARE to allow for client-side control of extended library names, regardless of what is set on the server. The value that you specify for this option when connecting with a SAS/SHARE 9.3 client will take precedence over the server setting for that session.

## THREADEDTCP Option on PROC SERVER

The previously experimental option, THREADEDTCP, is now fully supported in the PROC SERVER statement for SAS 9.3. The option specifies whether the threaded version of the TCP access method and associated threaded infrastructure should be used when TCP/IP communication is specified. Threading enables multiple, concurrent reception and transmission activity when the server runs on SMP hardware.

## Enhancements to Document

A section has been added that describes how SAS syntax is represented in this document. This section describes how various text styles (for example, uppercase bold) and special characters (for example, angle brackets) are used to represent various parts of SAS language syntax.

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## What's New in Communications Access Methods for SAS/CONNECT 9.3 and SAS/SHARE 9.3

### Overview

In SAS 9.3, the communications access methods for SAS/CONNECT and SAS/SHARE software has several changes to the spawners. These changes result in improved security, enable X command processing for the z/OS spawner, and write events to the Windows event log.

### Changes to the Spawners

- The new -DESCRIPTION option enables you to add a description to the Windows spawner that is installed and started as a Windows service. The description can be viewed with the services applet in Windows.
- The ENCRYPTFIPS security option is now available for the spawner command on all operating environments. For more information about this and all other security options, see *Encryption in SAS*, located in the Base SAS Help and Documentation.
- The SHELL option in the z/OS spawner can now be specified in the z/OS PARM file. This option enables the SAS session, which is invoked by the spawner, to support X command processing.
- The LOGEVENTS option can now be specified in the Windows spawner command. This option causes the SAS/CONNECT spawner to write events to the Windows event log. These events describe when a SAS/CONNECT server process starts, when a SAS/CONNECT server process ends, and when a SAS/CONNECT server process fails to start.

## 41

## SAS Simulation Studio

<i>What's New in SAS Simulation Studio 1.6</i> .....	<b>309</b>
Overview .....	309
Expanded Support .....	310
Improved Usability .....	310
Enhanced Data Manipulation .....	311
<i>What's New in SAS Simulation Studio 12.1</i> .....	<b>312</b>
Overview .....	312

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### What's New in SAS Simulation Studio 1.6

#### Overview

SAS Simulation Studio is a graphical application that enables you to build, run, and analyze discrete event simulation models. Application areas include retail, customer service, health care, transportation, and many other industries. The graphical user interface of SAS Simulation Studio provides extensive modeling tools suitable for both novice and advanced simulation users.

SAS Simulation Studio 1.6 provides the following enhancements:

- support for the 64-bit Windows platform along with the 32-bit Windows platform support it has always offered
- improved features and usability:
  - a new set of icons for all blocks
  - new graphics technology for graphical display blocks (bar charts, scatter plots, histograms, and so on)
  - cut-and-paste capabilities to aid in replicating sections of models
  - a new Snapshot feature that provides a scaled-down view of the entire model, which can be used to navigate to sections of interest in larger models that extend beyond the boundaries of one monitor screen.
- enhanced ability to work with data and generate samples from probability distributions. You can now sample from nonhomogeneous Poisson processes and empirical distributions (discrete and continuous). Integration with JMP® distribution-fitting capabilities is tighter than in previous releases: you can now select a candidate fitted distribution from JMP software and with one click

transmit the distribution and parameter settings back to the appropriate Numeric Source block in SAS Simulation Studio.

- new blocks:
  - The Observation Source block enables you to sample an entire observation from a source data set in a single step; this is useful when many variables from the same data set are used in a simulation model.
  - The Dataset Writer block, when signaled to do so, saves data collected during a simulation model run to a specified location.
  - The Dataset Holder block also receives data collected during a simulation model run but makes the data available for queries during the same run.
  - The Stopper block enables you to create a signal that immediately stops a simulation model run and can also trigger the saving of key simulation data near or at the end of the simulation model run.
  - The Stat Collector block enables you to collect time-persistent statistics and values.
- access to SAS software (to run SAS programs during or after a simulation model run) not only on the local PC but also on a remote SAS server.

## Expanded Support

SAS Simulation Studio 1.6 expands to include support for the 64-bit Windows platform along with the 32-bit Windows platform support that has always been offered.

## Improved Usability

SAS Simulation Studio 1.6 debuts a new set of icons for all blocks and new graphics technology for graphical display blocks (bar charts, scatter plots, histograms, and so on).

Simulation Studio 1.6 adds cut-and-paste capabilities to aid in replicating sections of models for reuse. An individual or compound block can be copied from one model and be pasted in the same model, in another model in the same project, or in a model in another project.

Viewing large models is also easier thanks to the new Snapshot feature, which is accessible by right-clicking in the background of a model. The Snapshot produces a scaled-down view of the entire model with a blue highlighted area that indicates the currently visible portion of the model. By dragging this highlighted area, you can navigate the model and change the portion that is visible. A related Track Animation feature, also accessible by right-clicking in the background of a model, causes the visible portion of the model to shift so that the current animation in the model is visible; in effect the visible portion of the model "tracks" or follows model animation as it occurs during the simulation run.

Another new feature expands the basis on which Simulation Studio can interact with other SAS software and SAS data sets. Although previous releases of Simulation Studio required that SAS software be installed on the same PC, Simulation Studio 1.6 can connect to SAS software that is installed on a remote server. This greatly expands the possible uses of both SAS analytical capabilities and data by Simulation Studio.



## Enhanced Data Manipulation

Simulation Studio 1.6 enhances its ability to work with source data. The new Observation Source block enables you to sample an entire observation (or row) from a source SAS data set or JMP table in a single step; this is an expansion of the ability of the "SAS Data Column" choice for the Numeric Source block, which samples one variable at a time. This enhanced sampling capability is especially useful with models in which a great deal of data must be sampled from the same data source at one time, making such models far more compact than in the past. For example, the Observation Source block enables you to read an entire row from a data set and assign it as an entity attribute. The new dot (.) operator available in the Formula block can be used to access the values of the observation's member variables.

Integration with JMP distribution-fitting capabilities is now incorporated into the Numeric Source block and is tighter in Simulation Studio 1.6 than in past releases. This integration enables you to use the JMP "fit all" capability to view numerous candidate distributions and graphs of their respective fits of the specified data. Selecting your choice of distribution among these candidates automatically populates the appropriate Numeric Source block with the chosen distribution and its parameter values.

Simulation Studio 1.6 also adds new capabilities for sampling from data-driven probability distributions. You can use data to specify a discrete empirical distribution (for which the data specify values and associated probabilities of occurrence) or a continuous empirical distribution (for which the data specify ordered values and corresponding cumulative probabilities). Additionally, you can specify nonhomogeneous Poisson processes (in which the arrival rate varies over time). These include count-based processes (for which the data specify time intervals and associated arrival counts) and rate-based processes (for which the data specify time intervals and associated arrival rates). More details about both empirical distributions and nonhomogeneous Poisson processes can be found in Appendix A, Random Variation in a Model in the *SAS Simulation Studio: User's Guide*.

Two new blocks, the Dataset Holder and Dataset Writer, work together to provide more flexible and more extensive access to data. The Dataset Holder block provides a repository for data and enables customized queries and extractions from the data; it enables you to view and access the entire data set and does not limit you to a single variable or a single observation. The Dataset Writer block enables you to create output data at any point during the simulation run. Collectively, the Dataset Holder and Dataset Writer blocks enable event-driven data interactions (read and write) throughout the simulation run. Each is compatible with both SAS data sets and JMP tables.

The Stats Collector block expands your ability to calculate statistics on simulation-generated data, generalizing capabilities found in the Queue Stats Collector and Server Stats Collector blocks to work with any specified sources of data. Finally, the new Stopper block enables you to create an event that immediately stops the simulation run and can also trigger the saving of key simulation data near or at the end of the simulation run.

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## What's New in SAS Simulation Studio 12.1

### Overview

SAS Simulation Studio 12.1, a discrete event simulation application for Windows environments, adds several features that improve your ability to build, explore, and work with large, complex discrete-event simulation models. Large models present a number of challenges to a graphical user interface such as that of SAS Simulation Studio. Connection of model components, navigation within a model, identification of objects or areas of interest, and management of different levels of modeling are all tasks that can become more difficult as the model size grows significantly beyond what can be displayed on one screen. An indirect effect of model growth is an increased number of factors and responses that are needed to parameterize and investigate the performance of the system being modeled.

Improvements in SAS Simulation Studio 12.1 address each of these issues. In SAS Simulation Studio, you connect blocks by dragging the cursor to create links between output and input ports on regular blocks and Connector blocks. SAS Simulation Studio 12.1 automatically scrolls the display of the Model window as you drag the link that is being created from its origin to its destination, thus enabling you to create a link between two blocks that are located far apart (additionally you can connect any two blocks by clicking on the OutEntity port of the first block and then clicking on the InEntity port of the second block). Automatic scrolling also enables you to navigate a large model more easily. To move to a new area in the Model window, you can simply hold down the left mouse button and drag the visible region of the model to the desired area. This works for simple navigation and for moving a block to a new, remote location in the model.

SAS Simulation Studio 12.1 also enables you to search among the blocks in a model and identify the blocks that have a specified type, a certain character string in their label, or both. From the listing of identified blocks, you can open the Properties dialog box for each identified block and edit its settings. Thus, if you can identify a set of blocks that need similar updates, then you can make these updates without manually searching through the model for qualifying blocks and editing them individually. For very large models, this capability not only makes the update process easier but also makes it more thorough because you can identify qualifying blocks centrally.

When you design experiments for large simulation models, you often need a large number of factors to parameterize the model and a large number of responses to track system performance in sufficient detail. This was a challenge prior to SAS Simulation Studio 12.1 because the Experiment window displayed factors and responses in the header row of a table, with design points and their replications' results displayed in the rows below. A very large number of factors and responses did not fit on one screen in this display scheme, and you had to scroll across the Experiment window to view all of them.

SAS Simulation Studio 12.1 provides you with two alternative configurations for the Experiment window. The Design Matrix tab presents the tabular layout described earlier. The Design Point tab presents each design point in its own display. Factors and responses (summarized over replications) are displayed in separate tables, each with the factor or response names appearing in one column and the respective

values in a second column. This layout enables a large number of factors and responses to be displayed. Response values for each replication of the design point can be displayed in a separate window.

SAS Simulation Studio 12.1 enhances its multilevel model management features by introducing the submodel component (experimental). Like the compound block, the submodel encapsulates a group of SAS Simulation Studio blocks and their connections, but the submodel outpaces the compound block in some important ways. The submodel, when expanded, opens in its own window. This means a submodel in its collapsed form can be placed close to other blocks in the Model window without requiring space for its expanded form (as is needed for compound blocks). The most important property of the submodel is its ability to be copied and instantiated in several locations simultaneously, whether in the same model, in different models in the same project, or in different projects. Each such instance is a direct reference to the original submodel, not a disconnected copy. Thus you can edit the submodel by editing any of its instances; changes that are made to any instance are propagated to all current and future instances of the submodel. This feature enables you to maintain consistency across your models and projects.

Finally, SAS Simulation Studio 12.1 introduces powerful new animation controls that should prove highly useful in debugging simulation models. In the past, animation could be switched on or off and its speed controlled, but these choices were made for the entire model. If you needed to animate a particular segment of the model, perhaps during a specific time span for the simulation clock, you had to focus your attention on that area and pay special attention when the time period of interest arrived. In SAS Simulation Studio 12.1 you can select both the area of the model to animate (by selecting a block or a compound block) and the time period over which animation should occur (by specifying the start and end times for animation). You can also control simulation speed for each such selection. Multiple selections are supported so that you can choose to animate several areas of the model, each during its defined time period and at its chosen speed.



## 42

## SAS/STAT

<b><i>What's New in SAS/STAT 9.3</i></b> .....	<b>315</b>
Overview .....	315
Enhancements .....	317
What's Changed .....	321
<b><i>What's New in SAS/STAT 12.1</i></b> .....	<b>322</b>
Overview .....	322
New Procedures .....	323
Highlights of Enhancements .....	324
Highlights of Enhancements in SAS/STAT 9.3 .....	324
New Macros .....	325
Enhancements .....	325
What's Changed .....	330
References .....	331

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## What's New in SAS/STAT 9.3

### Overview

SAS/STAT 9.3 includes one new procedure and many enhancements.

#### **New Experimental FMM Procedure**

The experimental FMM procedure fits statistical models to data where the distribution of the response is a finite mixture of univariate distributions. These models are useful for applications such as estimating multimodal or heavy-tailed densities, fitting zero-inflated or hurdle models to count data with excess zeros, modeling overdispersed data, and fitting regression models with complex error distributions.

PROC FMM fits finite mixtures of regression models or finite mixtures of generalized linear models in which the regression structure and the covariates can be the same across components or different. Maximum likelihood and Bayesian methods are available with the FMM procedure.

## Highlights of Enhancements

The following are the highlights of the enhancements in SAS/STAT 9.3:

- The EFFECT statement is now production. This statement is available in the HPMIXED, GLIMMIX, GLMSELECT, LOGISTIC, ORTHOREG, PHREG, PLS, QUANTREG, ROBUSTREG, SURVEYLOGISTIC, and SURVEYREG procedures.
- The MCMC procedure now supports the RANDOM statement.
- The METHOD=FIML option in the CALIS procedure is now production. This option specifies the full information maximum likelihood method. Instead of deleting observations with missing values, the full information maximum likelihood method uses all available information from all observations.
- The SURVEYPHREG procedure is now production.
- The HPMIXED procedure now provides a REPEATED statement and additional covariance structures.
- The MI procedure offers fully conditional specification methods for multiple imputation.

More information about the changes and enhancements follows. Details can be found in the documentation for the individual procedures in the *SAS/STAT 9.3 User's Guide*.

## Highlights of Enhancements in SAS/STAT 9.22

Some users might be unfamiliar with updates made in SAS/STAT 9.22. The following are some of the major enhancements that were introduced in SAS/STAT 9.22:

- The experimental SURVEYPHREG procedure performs regression analysis based on the Cox proportional hazards model for sample survey data. The procedure provides design-based variance estimates, confidence intervals, and hypothesis tests concerning the parameters and model effects.
- The PLM procedure takes model results that are stored from SAS/STAT linear modeling procedures and performs additional postfitting inferences without your having to repeat your original analysis. The PLM procedure can perform tasks such as testing hypotheses, computing confidence intervals, producing prediction plots, and scoring new data sets by using familiar statements such as the ESTIMATE, LSMEANS, LSMESTIMATE, and SLICE statements.
- The EFFECT statement is now available in the GLIMMIX, GLMSELECT, HPMIXED, ORTHOREG, PHREG, PLS, QUANTREG, ROBUSTREG, SURVEYLOGISTIC, and SURVEYREG procedures. This statement enables you to construct a much richer family of linear models than you can traditionally define with the CLASS statement. Effect types include splines for semiparametric modeling, multimember effects for situations in which measurements can belong to more than one class, lag effects, and polynomials.
- Exact Poisson regression is now available with the GENMOD procedure.
- The MCMC procedure can create samples from the posterior predictive distribution.
- The zero-inflated negative binomial model is now available with the GENMOD procedure.
- The HPMIXED procedure is now production.

- The CALIS procedure has been completely revised and includes enhancements that were formerly available in the experimental TCALIS procedure.

## ODS Graphics Changes

Producing graphs with ODS Graphics no longer requires a SAS/GRAPH® license. In addition, the family of statistical graphics procedures (SGPANEL, SGPLOT, SGRENDER, and SGSCATTER) has moved from SAS/GRAPH to Base SAS® license.

The MAXPOINTS= option has been added to the ANOVA, CLUSTER, GLM, LOGISTIC, MIXED, QUANTREG, and VARCLUS procedures. This option specifies a limit for the number of points that can be displayed on certain plots, and these plots are not created when this limit is exceeded. Note that the REG procedure already provided this option.

The frequency plots and cumulative frequency plots of PROC FREQ and the weighted frequency plot of PROC SURVEYFREQ are no longer produced automatically when ODS Graphics is enabled. You can request these graphs with the PLOTS= option.

In SAS 9.3, the default destination in the SAS windowing environment is HTML; in addition, ODS Graphics is enabled by default in the SAS windowing environment. These new defaults have several advantages. Graphs are integrated with tables, and all output is displayed in the same HTML file using a new style. This new style, HTMLBLUE, is an all-color style, which is designed to integrate tables and modern statistical graphics. You can view and modify the default settings by selecting **Tools** ► **Options** ► **Preference** from the menu at the top of the main SAS window. Then click the **Results** tab.

## Enhancements

### CALIS Procedure

The following features are now production:

- METHOD=FIML option
- mean structure analysis with the COSAN model
- extended PATH modeling language that supports the specification of variances or covariances as paths
- unnamed free parameter specification in all model types
- improved RAM model specification

In addition, PROC CALIS now provides detailed analysis of the missing patterns with the FIML estimation method. With the COVPATTERN= and MEANPATTERN= options, you can specify various standard mean and covariance patterns by using keywords. PROC CALIS then generates the required covariance and mean structures automatically.

### CLUSTER Procedure

The CLUSTER procedure now produces a dendrogram by default when ODS Graphics is enabled. The MAXCLUS= option enables you to right-truncate the CCC, PSF, and PST2 plots to improve readability. The MAXPOINTS= option enables you to suppress the dendrogram when there is a large number of clusters.

**EFFECT Statement**

The EFFECT statement is now production. This statement is available in the HPMIXED, GLIMMIX, GLMSELECT, LOGISTIC, ORTHOREG, PHREG, PLS, QUANTREG, ROBUSTREG, SURVEYLOGISTIC, and SURVEYREG procedures.

The NATURALCUBIC option specifies a natural cubic spline basis for the spline expansion.

**EFFECTPLOT Statement**

The CLUSTER option modifies the box plot display by displaying a plot for each level of the SLICEBY= classification variable.

**FREQ Procedure**

The FREQ procedure now produces agreement plots when the AGREE option is specified and ODS Graphics is enabled. It also offers a number of alternative confidence limits for the proportion difference, and it provides exact unconditional confidence limits for the proportion difference that are based on the Farrington-Manning score statistic.

**GENMOD Procedure**

The EXACTMAX option in the MODEL statement limits the number of response values for exact Poisson regression.

**GLIMMIX Procedure**

The EFFECT statement is now production.

**GLMPOWER Procedure**

The GLMPOWER procedure now produces its graphs with ODS Graphics.

**GLMSELECT Procedure**

The GLMSELECT procedure now provides a STORE statement which enables you to save the context and results of the statistical analysis for further processing with the PLM procedure.

The MODELAVERAGE statement, which specifies model selection on resampled subsets of the input data, is now production.

The EFFECT statement is now production.

**HPMIXED Procedure**

The HPMIXED procedure now provides the REPEATED statement, which defines the repeated effect and the residual covariance structure in the mixed model. The AR(1), CS, CSH, UC, UCH, and UN covariance structures are now available with the TYPE= option in the RANDOM statement.

The EFFECT statement is now production.

**LIFETEST Procedure**

The X axis tick marks are now aligned with the at-risk values in the survival plot.



## LOGISTIC Procedure

You can now request that standardized residuals be saved in the output data set. In addition, the STDRES suboption of the INFLUENCE option in the MODEL statement includes standardized residuals and likelihood residuals in the resulting display. The FITSTAT option in the SCORE statement produces the AIC, SBC, RSq, AUC, and Brier score fit statistics. Additionally, the ODDSRATIO statement and the CLDISPLAY= suboption of the CLODDS option control the appearance of the confidence limit error bars.

The EFFECT statement is now production.

## MCMC Procedure

The new RANDOM statement simplifies the construction of hierarchical random-effects models and significantly reduces simulation time while improving convergence, especially in models with a large number of subjects or clusters. This statement defines random effects that can enter the model in a linear or nonlinear fashion and supports univariate and multivariate prior distributions.

In addition to the default Metropolis-based algorithms, PROC MCMC now takes advantages of certain forms of conjugacy in the model in order to sample directly from the target conditional distributions. In many situations, the conjugate sampler increases sampling efficiency and provides a substantial reduction in computing time.

The MCMC procedure now supports multivariate distributions including the Dirichlet, inverse Wishart, multivariate normal, and multinomial distributions.

## MI Procedure

The experimental FCS statement specifies a multivariate imputation by fully conditional specification (FCS) methods. For data with an arbitrary missing data pattern, these methods enable you to impute missing values for all variables, assuming that a joint distribution for these variables exists. The FCS method requires fewer iterations than the MCMC method.

## MULTTEST Procedure

The STOUFFER option in the PROC statement produces adjusted  $p$ -values by using the Stouffer-Liptak combination method.

## NLIN Procedure

The NLIN procedure provides several experimental features for diagnosing your nonlinear model fit, including the PLOTS, NLINMEASURES, and BIAS options in the PROC NLIN statement, in addition to producing observation-wise statistics in the OUTPUT data set. The PLOTS option enables you to plot the fitted model, fit diagnostics, tangential and Jacobian leverage, and local influence. The NLINMEASURES displays global measures of nonlinearity, and the BIAS option computes Box's bias statistics for the parameter estimates. Finally, you can add the leverage, local influence, and residual diagnostics in the output data set that is produced with the OUTPUT statement.

## ORTHOREG Procedure

The EFFECT statement is now production.

### **PHREG Procedure**

The PHREG procedure now fits frailty models with the addition of the RANDOM statement. You often use frailty models when you analyze clustered data and want to account for the within-cluster correlation with random effects. In addition, the NLOPTIONS statement is available with PROC PHREG, and the Zellner g-prior is now available for the piecewise exponential model.

The EFFECT statement is production.

### **PLS Procedure**

The EFFECT statement is now production.

### **POWER Procedure**

Graphs are now produced with ODS Graphics.

### **QUANTREG Procedure**

The new QINTERACT option in the TEST statement enables you to test whether any difference exists among the coefficients across quantiles if several quantiles are specified in the MODEL statement.

The RANKSCORE option in the TEST statement now supports the tau score function, which is appropriate for non-iid error models.

The EFFECT statement is now production.

### **ROBUSTREG Procedure**

The new MCDINFO suboption of the LEVERAGE option in the MODEL statement displays detailed information about the MCD covariance estimate, including the low-dimensional structure, the breakdown value, the MCD center, and the MCD covariance.

The EFFECT statement is now production.

### **SURVEYFREQ Procedure**

You can now produce Rao-Scott chi-square tests with second-order corrections.

### **SURVEYLOGISTIC Procedure**

Replication variance estimation is now available for domain analysis.

The EFFECT statement is now production.

### **SURVEYMEANS Procedure**

Variance estimation based on replication methods is now available for quantiles.

### **SURVEYPHREG Procedure**

The SURVEYPHREG procedure is now production. Also, the addition of programming statements enables you to include time-dependent covariates in the model.

### **SURVEYREG Procedure**

The SURVEYREG procedure now provides replication variance estimation for domain analysis.

The EFFECT statement is now production.

### **SURVEYSELECT Procedure**

Instead of specifying the total sample size to allocate among the strata, you can specify the desired margin of error for estimating the overall mean from the stratified sample.

### **VARCLUS Procedure**

The VARCLUS procedure now produces a dendrogram by default when ODS Graphics is enabled. The MAXPOINTS= option enables you to suppress the dendrogram when there is a large number of clusters.

## **What's Changed**

What follows are changes in software behavior from SAS/STAT 9.22 to SAS/STAT 9.3. Several of these changes are related to ODS Graphics. A few procedures have adopted the MAXPOINTS= option as a way to avoid producing plots when the number of points exceeds a specified limit. The default limit is 5,000 points.

### **ANOVA Procedure**

Box plots, which are created with the MEANS statement or for one-way ANOVA when ODS Graphics is enabled, are not produced when the number of outlier points exceeds the limit, which is controlled by the MAXPOINTS= option.

### **CLUSTER Procedure**

The CLUSTER procedure now produces a dendrogram by default when ODS Graphics is enabled.

### **FREQ Procedure**

Frequency plots and cumulative frequency plots are no longer produced by default when ODS Graphics is enabled. You can request these plots with the PLOTS=FREQPLOT and PLOTS=CUMFREQPLOT options in the TABLES statement.

### **GLM Procedure**

The fit plot, box plot, interaction plot, ANCOVA plot, and contour fit plot are not produced when the number of points exceeds the limit, which is controlled by the MAXPOINTS= option. This limit also applies to diagnostic plots and residual plots.

### **LOGISTIC Procedure**

Plots associated with the INFLUENCE or IPLOTS= options in the MODEL statement are not produced when the number of points exceeds the limit, which is controlled by the MAXPOINTS= option.

If the ODDSRATIO statement or CLODDS= option is specified, the default "Odds Ratio" table is no longer produced, and only the requested results are displayed.

### **MCMC Procedure**

PROC MCMC no longer produces the tuning, burn-in, and sampling history tables by default. To produce this information, specify the MCHISTORY= option in the PROC MCMC statement.

The scaled inverse chi-square distribution is parameterized in terms of  $scale^2$ , as opposed to  $scale$  in the previous release.

### **MIXED Procedure**

Plots associated with the INFLUENCE, RESIDUAL, and VCIRY options are not produced when the number of points exceeds the limit, which is controlled by the MAXPOINTS= option.

### **QUANTREG Procedure**

The fit plot is not produced when the number of points exceeds the limit, which is controlled by the MAXPOINTS= option.

The rank score test has changed.

### **SURVEYFREQ Procedure**

The weighted frequency plot is no longer produced by default when ODS Graphics is enabled. You can request this display with the PLOTS=WTFREQPLOT option in the TABLES statement.

### **VARCLUS Procedure**

The VARCLUS procedure now produces a dendrogram by default when ODS Graphics is enabled.

---

## **What's New in SAS/STAT 12.1**

### **Overview**

SAS/STAT 12.1 includes four new procedures and many enhancements.

In previous years, SAS/STAT® software was updated only with new releases of Base SAS® software, but this is no longer the case. This means that SAS/STAT software can be released to customers when enhancements are ready, and the goal is to update SAS/STAT every 12 to 18 months. To mark this newfound independence, the release numbering scheme for SAS/STAT is changing with this release. This new numbering scheme will be maintained when new versions of Base SAS and SAS/STAT ship at the same time. For example, when Base SAS 9.4 is released, SAS/STAT 13.1 will be released.

## New Procedures

### New Experimental ADAPTIVEREG Procedure

The ADAPTIVEREG procedure fits multivariate adaptive regression splines. The method is a nonparametric regression technique that combines both regression splines and model selection methods. It constructs spline basis functions in an adaptive way by automatically selecting appropriate knot values for different variables. The procedure performs model reduction by applying model selection techniques. Thus, the ADAPTIVEREG procedure is both a nonparametric regression procedure and a predictive modeling procedure.

The ADAPTIVEREG procedure supports models with classification variables, and it provides options for improving modeling speed. PROC ADAPTIVEREG extends the method to data with response variables that are distributed in the exponential family, including the binomial, Poisson, negative binomial, gamma, and inverse Gaussian distributions. PROC ADAPTIVEREG is multithreaded, enabling it to take advantage of multiple processors.

### New Experimental QUANTLIFE Procedure

The QUANTLIFE procedure implements two quantile regression approaches that have been developed to account for right-censoring and provide valid estimates. Portnoy (2003) proposed a method to estimate conditional quantile functions from survival data by generalizing the idea of the Kaplan-Meier estimator of the survival function, and Peng and Huang (2008) developed a quantile regression approach motivated by the Nelson-Aalen estimator of the cumulative hazard function. Both methods are implemented with linear programming algorithms in the QUANTLIFE procedure. Like the standard quantile regression method for uncensored data, these two methods are distribution-free and are applicable to heteroscedastic data.

The QUANTLIFE procedure produces survival plots, conditional quantile plots, and quantile process plots. It performs semiparametric quantile regression when you specify spline effects. PROC QUANTLIFE takes advantage of parallel computing when multiple processors are available.

### New Experimental QUANTSELECT Procedure

The QUANTSELECT procedure performs model selection for linear quantile regression. It provides capabilities similar to those offered by the GLMSELECT procedure (provides model selection for univariate linear models) including forward, backward, stepwise, LASSO, and adaptive LASSO selection methods. You can specify criteria such as AIC, SBC, AICC, adjusted R<sup>2</sup>, and significance levels to compare the fit of models, to determine when to stop the model selection process, and to choose the final selection model. The QUANTSELECT procedure supports constructed effects (such as smoothing splines and polynomials) and the SPLIT option for its CLASS statement. PROC QUANTREG produces parameter estimates, progression plots, and a variety of criterion progression plots.

PROC QUANTSELECT supports constructed effects such as regression spline, and it enables you to partition your data into training, validation, and testing roles. It is also multithreaded so that it can take advantage of multiple processors.

PROC QUANTSELECT is very efficient and can handle hundreds of variables and thousands of observations.

## New STDRATE Procedure

The STDRATE procedure computes direct and indirect standardized rates and risks for study populations. With direct standardization, you compute the weighted average of stratum-specific estimates in the study population, using weights such as population-time from a standard or reference population. With indirect standardization, you compute the weighted average of stratum-specific estimates in the reference population by using weights from the study population. The procedure provides summary statistics such as rate and risk estimates (and their confidence limits) for each stratum, as well as graphs.

## Highlights of Enhancements

The following are highlights of other enhancements in SAS/STAT 12.1:

- The MCMC procedure now models missing values by default. The RANDOM statement supports multilevel hierarchy to an arbitrary depth. The procedure also implements faster and more efficient sampling algorithms.
- The PHREG procedure supports Bayesian frailty models.
- The FMM procedure for finite mixture models is now production and adds several truncated distributions.
- The LIFEREG and PROBIT procedures include additional postprocessing statements. They now support the TEST, LSMEANS, LSMESTIMATE, ESTIMATE, SLICE, and EFFECTPLOT statements.
- The FREQ procedure produces mosaic plots.
- The SURVEYSELECT procedure provides Poisson sampling.
- The SURVEYMEANS procedure now performs poststratification estimation.
- The GLM, MIXED, GLIMMIX, and ORTHOREG procedures support the REF= option in the CLASS statement.

More information about the changes and enhancements follows. Details can be found in the documentation for the individual procedures in the *SAS/STAT 12.1 User's Guide*.

## Highlights of Enhancements in SAS/STAT 9.3

Some users might be unfamiliar with updates made in SAS/STAT 9.3. The following are some of the major enhancements that were introduced in SAS/STAT 9.3:

- The experimental FMM procedure fits statistical models to data where the distribution of the response is a finite mixture of univariate distributions. These models are useful for applications such as estimating multimodal or heavy-tailed densities, fitting zero-inflated or hurdle models to count data with excess zeros, modeling overdispersed data, and fitting regression models with complex error distributions.
- The EFFECT statement became production. This statement is available in the HPMIXED, GLIMMIX, GLMSELECT, LOGISTIC, ORTHOREG, PHREG, PLS, QUANTREG, ROBUSTREG, SURVEYLOGISTIC, and SURVEYREG procedures.
- The MCMC procedure added a RANDOM statement, which simplifies the specification of hierarchical random-effects models and significantly reduces simulation time while improving convergence.

- The METHOD=FIML option in the CALIS procedure became production. This option specifies the full information maximum likelihood method.
- The SURVEYPHREG procedure became production and handles time-dependent covariates.
- The HPMIXED procedure added a REPEATED statement and additional covariance structures.
- The MI procedure added fully conditional specification methods for multiple imputation.
- The NLIN procedure was updated with features for diagnosing the nonlinear model fit.

## New Macros

### Bayesian Analysis Postprocessing Macros

Postprocessing macros are now available in the SAS autocall library. These macros duplicate the corresponding summary and diagnostic capabilities provided by the MCMC procedure and can be used with any SAS data set that contains posterior samples. These macros are documented with the MCMC procedure.

#### %CIF Macro

The %CIF macro implements nonparametric methods for estimating cumulative incidence functions with competing risks data. The macro can also be used to test the hypothesis that cumulative incidence functions are identical across groups. The %CIF macro is available from the SAS autocall library.

## Enhancements

### CALIS Procedure

The CALIS procedure now provides the following features:

- Residual analysis at the case level or observation level is provided when you input raw data.
- Robust estimation is now available. You can request either direct robust estimation based on residual weighting or two-stage robust estimation based on analyzing the robust mean and covariance matrices.
- The BASEFUNC= and BASEFIT= options enable you to input the model fit information of the customized baseline model of your choice. With this input information, PROC CALIS computes various fit indices (mainly the incremental fit indices) based on your customized model fit rather than the fit of the default uncorrelatedness model.

### EFFECTPLOT Statement

The CLUSTER option in the EFFECTPLOT statement modifies the INTERACTION plot-type by displaying the levels of the SLICEBY= effect in a side-by-side fashion. The CONNECT option in the EFFECTPLOT statement modifies the BOX and INTERACTION plot-types by connecting the predicted values with a line.

### **FMM Procedure**

The FMM procedure is now production and adds the truncated exponential, truncated lognormal, truncated negative binomial, and truncated normal distributions.

### **FREQ Procedure**

The Agresti-Caffo and Miettinen-Nurminen confidence limits for the risk (proportion) difference are now available, and any confidence limit type can now be displayed in the risk difference plot. You can also request a continuity correction for the Wilson confidence limits for a binomial proportion.

The PLCORR option in the TEST statement produces Wald and likelihood ratio tests for the polychoric correlation coefficient.

The new DF= chi-square option specifies or adjusts the degrees of freedom for chi-square tests. The TESTF= chi-square option now permits you to provide null frequencies for a one-way chi-square test by using a secondary input data set. Similarly, the TESTP= chi-square option now permits you to provide null proportions by using a secondary input data set.

The LRCHISQ chi-square option in the TABLES statement produces a likelihood ratio chi-square test for one-way tables. This test can be based on a null hypothesis of equal proportions, specified proportions, or specified frequencies. The LRCHISQ option in the EXACT statement produces an exact likelihood ratio chi-square test for one-way tables.

The EXACT statement can now produce Barnard's exact unconditional test for the risk difference as well as an exact likelihood ratio goodness-of-fit test.

The MAXLEVELS=n option in the TABLES statement specifies the maximum number of variable levels to display in one-way frequency tables; it also applies to one-way frequency plots.

The CROSSLIST(STDRES) option in the TABLES statement displays standardized residuals in the CROSSLIST table for two-way crosstabulation.

Mosaic plots are now produced with the PLOTS=MOSAICPLOT option. The GROUPBY= plot option specifies the primary grouping for two-way frequency plots. The new TWOWAY=CLUSTER plot option provides a cluster layout for two-way frequency plots that are displayed as bar charts.

### **GLIMMIX Procedure**

The new DDFM=KENWARDROGER2 option applies the (prediction) standard error and degrees-of-freedom correction that are detailed by Kenward and Roger (2009). This correction further reduces the precision estimator bias for the fixed and random effects under nonlinear covariance structures.

The odds ratio, relative risk, and kappa plots now display the common (overall) statistic in addition to the statistics for each two-way table (stratum).

### **LIFEREG Procedure**

The LIFEREG procedure now supports numerous postprocessing statements including the ESTIMATE, EFFECTPLOT, LSMEANS, LSMESTIMATE, SLICE, STORE, and TEST statements.



## LIFETEST Procedure

The LIFETEST procedure now supports a WEIGHT statement. For survival plot enhancements, the MAXLEN= option of the ATRISK option specifies a maximum number of characters that can be used in displaying stratum labels, and the OUTSIDE option of the ATRISK option specifies that the at-risk table be drawn outside the plot area. If you assign a label to a strata variable, that label is used in all tables and graphs.

## LOESS Procedure

The LOESS procedure now supports an OUTPUT statement.

## LOGISTIC Procedure

PROC LOGISTIC provides partial proportional odds logistic regression with the UNEQUALSLOPES option in the MODEL statement. The ESTIMATE, LSMEANS, LSMESTIMATE, SLICE, and STORE statements can now be used for a stratified analysis. The PCORR option in the MODEL statement computes the partial correlation statistic for each model parameter (excluding the intercept).

The ID statement specifies variables in the DATA= data set that are used for labeling ROC curves and influence diagnostic plots.

The NLOPTIONS statement controls the optimization process for conditional analyses (specified with a STRATA statement) and for constrained optimization (specified with the UNEQUALSLOPES option in the MODEL statement).

The EFFECTPLOT statement and the PLOTS=EFFECT option have two new options for displaying plots with a CLASS effect on the X axis. The CLUSTER option displays the levels of the SLICEBY= effect in a side-by-side fashion. The CONNECT option connects the predicted values with a line.

## MCMC Procedure

The MCMC procedure provides the following new capabilities:

- The MODEL statement augments missing values in the response variable by default. PROC MCMC treats missing values as unknown parameters and incorporates the sampling of the missing data as part of the Markov chain.
- The RANDOM statement supports multilevel hierarchical modeling to an arbitrary depth; a random effect can appear in the distributional hierarchy of other random effects.
- More distributions, such as multivariate normal distribution with autoregressive structure, Poisson distribution, and general distribution (for the construction of nonstandard distributions), are made available for the RANDOM statement.
- Direct sampling and more conjugate sampling algorithms are available for all parameters in the model (including model parameters, random-effects parameters, and missing data variables) when appropriate.
- A slice sampler is an alternative sampling algorithm for both the model parameters and random-effects parameters.

### MULTTEST Procedure

The ID statement names one or more variables for identifying observations in the output and in the plots. In addition, the MANHATTAN plot option generates a Manhattan plot.

### NLIN Procedure

The PROFILE statement selects parameters for profiling for the assessment of their nonlinear characteristics. It can also gauge the influence of each observation on the selected parameters.

### NPAR1WAY Procedure

The following options are added to the PROC NPAR1WAY statement:

- The DSCF option requests the Dwass, Steel, Critchlow-Fligner multiple comparison procedure, which is based on pairwise two-sample rankings.
- The FP option requests the Fligner-Policello test for two-sample data.
- The ADJUST option adjusts for location differences among classes before tests for scale differences are performed.
- The REFCLASS= option of the HL option specifies which of the two CLASS variable levels (samples) to use as the reference class X for the location shift, Y-X.

### ODS Graphics

You can use the new ODS GRAPHICS statement option BYLINE=FOOTNOTE or BYLINE=TITLE to display BY-group lines in a footnote or title in graphs.

### PHREG Procedure

The DIST= option in the RANDOM statement enables you to specify either a gamma or lognormal distribution for the shared frailty. Bayesian frailty models are now supported. The DISPERSIONPRIOR= option in the BAYES statement specifies the prior distribution of the dispersion parameter.

Fleming-Harrington estimates can be requested with the METHOD=FM option in the BASELINE statement and in the OUTPUT statement. The DIRADJ option in the BASELINE statement specifies direct adjusted survival curves.

### POWER Procedure

You can specify the multiple correlation between the tested predictor and the covariates with the CORR= option in the LOGISTIC statement.

### PROBIT Procedure

The PROBIT procedure now supports numerous postprocessing statements including the ESTIMATE, EFFECTPLOT, LSMEANS, LSMESTIMATE, SLICE, STORE, and TEST statements.

### QUANTREG Procedure

The QUANTREG procedure now supports the ESTIMATE statement. The EFFECT statement now supports the effect-types COLLECTION, LAG, MULTIMEMBER, and POLYNOMIAL in addition to SPLINE.

### REG Procedure

The REG procedure creates heat maps for residual and fit plots when the MAXPOINTS= threshold is exceeded.

### ROBUSTREG Procedure

The STDI= option in the OUTPUT statement specifies a variable to contain the estimates of the standard errors of the individual predicted values.

### SEQDESIGN Procedure

The MODEL=INPUTEVENTS option in the SAMPLESIZE statement specifies the number of events from a fixed-sample study of survival data. There are two new INPUTEVENTS options for the sample size computation: ACCRUAL= and LOSS=. The ACCRUAL= option specifies the method for individual accrual. The LOSS= option specifies the individual loss to follow-up in the sample size computation.

The STOP=BOTH option in the DESIGN statement specifies the condition of early stopping for the design. The new BETABOUNDARY=BINDING suboption computes the Type I error probability with the acceptance boundary, and the new BETABOUNDARY=NONBINDING suboption computes the Type I error probability without the acceptance boundary.

### SEQTEST Procedure

The BETABOUNDARY option in the PROC SEQTEST statement specifies whether the  $\beta$  boundary is used in the computation of the Type I error level  $\alpha$ . The BETABOUNDARY=BINDING option computes the Type I error probability with the  $\beta$  (acceptance) boundary, and the BETABOUNDARY=NONBINDING suboption computes the Type I error probability without the  $\beta$  boundary.

### SURVEYFREQ Procedure

The SURVEYFREQ procedure now produces mosaic plots for crosstabulation tables. The GROUPBY= plot option specifies the primary grouping for two-way weighted frequency plots.

### SURVEYMEANS Procedure

You can now estimate geometric means for finite populations with the GEOMEAN keyword in the PROC SURVEYMEANS statement. The new POSTSTRATA statement provides poststratification analysis.

### SURVEYPHREG Procedure

The SERATIO and VARRATIO options in the MODEL statement compute the ratio of two standard errors for the regression coefficients and the ratio of two variances for the regression coefficients, respectively.

### **SURVEYREG Procedure**

The STB option in the MODEL statement produces standardized regression coefficients.

### **SURVEYSELECT Procedure**

The SURVEYSELECT procedure now provides Bernoulli and Poisson sampling.

## **What's Changed**

What follows are changes in software behavior from SAS/STAT 9.3 to SAS/STAT 12.1.

### **LIFETEST Procedure**

If you assign a label to a strata variable, the procedure now uses the label instead of the variable name in all tables and graphs.

### **FREQ Procedure**

The appearance of the default bar chart for two-way frequency plots has changed. The row level labels have been moved outside the plot so that the row grouping appears less dominant.

For two-way dot plots (TYPE=DOTPLOT) in nonstacked layouts, the default positions of the row and column variables are reversed to group graph cells by the column variable. You can specify GROUPBY=ROW to group graph cells by the row variable.

### **MCMC Procedure**

Random-effects parameter names are constructed using the formatted values rather than the unformatted values.

If the MISSING= option is not specified, PROC MCMC samples all missing values (including partial missing in some cases) by default. Observations for which the procedure failed to identify proper sampling algorithms are discarded prior to the simulation. If the MISSING= option is explicitly specified (AC or CC), the option is honored.

PROC MCMC avoids performing an optimization prior to the start of the simulation if the only sampling algorithms used in the program are conjugate or direct.

PROC MCMC now permits a model specification that has only RANDOM and MODEL statements; PRIOR and PARMS statements are no longer required in that case.

### **MULTTEST Procedure**

By default, the AFDR and PFDR are constrained to be greater than or equal to the raw p-value. The UNRESTRICT option of the PROC MULTTEST statement's AFDR and PFDR options estimates the AFDR and PFDR as defined in Benjamini and Hochberg (2000), which allows the adjustment to reduce the raw p-value.

## **SURVEYSELECT Procedure**

PROC SURVEYSELECT now uses the Mersenne-Twister random number generator by default. In previous releases, PROC SURVEYSELECT used the RANUNI random number generator. To reproduce samples that PROC SURVEYSELECT selected in releases prior to SAS/STAT 12.1, you can use the RANUNI option with the SEED= option (for the same input data set and selection parameters).

## **GLIMMIX, GLM, HPMIXED, and MIXED Procedures**

PCs running Windows 64-bit operating systems can now allocate more than 2Gb of memory to fit a model. This change affects the GLIMMIX, GLM, HPMIXED, and MIXED procedures.

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## 43

## SAS Visual Analytics

<b><i>What's New in SAS Visual Analytics 5.2</i></b> .....	<b>333</b>
Enhancements to the Data Preparation Interface .....	333
Enhancements to SAS High-Performance Computing Management Console .....	334
Enhancements to the Home Page .....	334
Enhancements to the Explorer Interface .....	335
Enhancements to the Designer Interface .....	335
<b><i>What's New in SAS Visual Analytics 6.1</i></b> .....	<b>335</b>
SAS Visual Data Builder .....	335
SAS Visual Analytics Administrator .....	336
SAS Visual Analytics Home Page .....	337
SAS Visual Analytics Explorer .....	337
SAS Visual Analytics Designer .....	338
Documentation Enhancements .....	339
<b><i>What's New in SAS Visual Analytics 6.1 Administration</i></b> .....	<b>339</b>
Overview .....	339
SAS LASR Analytic Servers .....	340
SAS Visual Data Builder .....	340
SAS Visual Analytics Administrator .....	341
Servers and Libraries in the Metadata .....	341
New Security Model .....	341
Row-level Security .....	342
Capabilities .....	342
Predefined Groups .....	342
Passwordless SSH Keys .....	342
Server and Table Signature Files .....	342
Web Authentication for Mobile Devices .....	343
SAS Visual Analytics 6.1 Promotion .....	343

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## What's New in SAS Visual Analytics 5.2

### Enhancements to the Data Preparation Interface

#### Support for Jobs

The data preparation interface adds support for saving the data preparation activities as a job. The job is stored as an object in metadata. Metadata security applies to the

object so that the jobs are visible to users that are authorized to use them only. Scheduling can be used to perform routine tasks such as restaging data, starting and stopping SAS LASR Analytic Server instances, and loading and unloading data.

For deployments that include SAS Data Integration Studio, jobs can be deployed for scheduling. Alternatively, you can export the code for the job to a directory and use it with a SAS DATA Step Batch Server. The batch server and the Schedule Manager support scheduling jobs. SAS Visual Analytics also includes support for using operating system scheduling and Platform Suite for SAS.

### **Enhancements to Preparing Data**

The following enhancements are available when preparing data:

- Tables can be joined with a variety of join conditions such as inner join, left outer join, right outer join, and full outer join.
- Output data can be stored in Teradata and EMC Greenplum through SAS/ACCESS interfaces. The SAS LASR Analytic Server supports these two third-party vendor databases as a co-located data provider.

### **Support for New Co-Located Data Providers**

SAS Visual Analytics Hadoop continues to be supported as the distributed data provider that is available from SAS. This release adds support for using Teradata and EMC Greenplum as co-located data providers. Data access is provided by a SAS/ACCESS interface that is used by the data preparation interface for reading and writing tables. Once the data is distributed to one of the third-party vendor appliances, the data preparation interface can be used to load the distributed data into a SAS LASR Analytic Server instance.

## **Enhancements to SAS High-Performance Computing Management Console**

Enhancements to the console include:

- support for HTTPS
- support for Teradata and EMC Greenplum co-located data providers.
- support for generating Secure Shell (SSH) keys for existing operating system user accounts.
- support for distributing the shared mid-tier key to existing operating system user accounts. The key can be distributed independently from generating SSH keys.
- support for monitoring long-running queries and temporary tables in EMC Greenplum.

## **Enhancements to the Home Page**

New and enhanced features to the home page include:

- Thumbnail images are available for explorations.
- The object inspector has been enhanced. For example, it displays thumbnail images for explorations.
- The search has been improved.



## Enhancements to the Explorer Interface

The explorer interface has a new crosstab visualization type.

## Enhancements to the Designer Interface

New and enhanced features in the designer interface include:

- You can add text, images, and titles to reports.
- You can add and update interactions for report objects using a new **Interactions** tab in the right pane.
- You can add and reply to comments on reports using a new **Comments** tab in the right pane.
- You can add and update data items for report objects using a new **Roles** tab in the right pane.
- You can configure the tabs in the right pane. For example, you can choose to display icons instead of the tab names.
- Using the updated data pane, you can get details about the measures in the report.
- You can replace the data source for a report.
- You can add duplicate data items.
- The interface is more accessible via a keyboard.
- The count aggregation is available for data items.
- There is a frequency assignment for data items.
- You can export data to Microsoft Excel, tab-separated values (TSV) files, and comma-separated values (CSV) files.

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## What's New in SAS Visual Analytics 6.1

### SAS Visual Data Builder

The SAS Visual Data Builder application replaces the data preparation actions that were performed with the data preparation interface in the 5.2 release. The application is used to perform analytic data preparation. Enhanced features in SAS Visual Data Builder include:

- You can build queries from registered tables. The queries are used to join tables, add calculated columns for analytics, and sort data.
- You can use the pivot by feature so that data can be aggregated by the values of a categorical variable. For example, you can pivot a customer transactions table by the type of purchase or transaction type.

- You can specify a set of aggregations to apply automatically to all the numeric variables in a table. For example, you can specify that the minimum, maximum, mean, and standard deviation are calculated for the variables in a fact table.
- You can schedule queries to run automatically.
- You can load tables to memory on a SAS LASR Analytic Server. You can also design a query to stage data in a co-located data provider before loading the table to memory.

## SAS Visual Analytics Administrator

The SAS Visual Analytics Administrator includes the following features that were available previously in the 5.2 release of the Data Preparation interface:

- **HDFS** tab
- **Resource Monitor** tab
- **Process Monitor** tab
- **Mobile Devices** tab

Enhanced features in the SAS Visual Analytics Administrator include:

- You can manage metadata-based security for folders and tables in SAS Folders.
- In the navigation pane for SAS Folders, you can select a folder or table, and right-click to select **Authorization**. In the Authorization page, you can view the effective permissions for tables in the metadata, and modify permissions. You can also set an explicit grant or denial to a table for a specific group or user.
- Row-level security is supported for LASR tables.

Row-level permission conditions are specified in the New Permission Condition window for LASR tables. You access this window by navigating the SAS Folders tree in the navigation pane, selecting a table, right-clicking and selecting **Authorization**. Then, you can set permission conditions for a LASR table.

- The permissions origins feature identifies the source of each effective permission. Origins answers are available on an object's Authorization page.
- The **LASR Tables** tab enables you to start and stop the SAS LASR Analytic Server, and view information about the status, host, and port information for server connections. User account information for the start time of a SAS LASR Analytic Server connection, and the last time it was accessed is displayed.
- Within the **LASR Tables** tab, you can work with tables by loading them to the SAS LASR Analytic Server or by unloading them. The **Load a Table** window enables you to load tables.
- The Add Table window enables you to add tables to HDFS. The Add to data server window enables you to add tables to Greenplum and Teradata servers.
- In the **Manage Environment** panel within the Preferences window, you can record SAS statements to a single file or within separate files. This feature enables you to review the SAS statements for a task.

## SAS Visual Analytics Home Page

New and enhanced features to the home page include:

- You can now refine your search results on the home page. For example, you can refine your search using type, author, the last modified date, or a combination of these.
- You view either thumbnails or lists of items on the home page.
- You can view and execute stored processes. Thumbnail images are available for stored processes.
- The **Links** pane links you to the overview video for SAS Visual Analytics. The pane also enables you to define and manage your own collection of links.
- The object inspector has been enhanced. For example, you can click with either your right or left mouse button to open the object inspector. When you click on an empty space, the object inspector is closed.
- Queries are displayed as content on the home page.

## SAS Visual Analytics Explorer

New and enhanced features in SAS Visual Analytics Explorer include:

- A new treemap visualization type is available. Treemaps display your data as a series of rectangles, where each rectangle represents a category value or a hierarchy node.
- The correlation matrix visualization type can now be created directly.
- Crosstabs have been enhanced. You can navigate a hierarchy by drilling, expanding, and collapsing. You can also enable totals and subtotals for both rows and columns in the crosstab.
- New fit lines are available for data analysis, including linear, quadratic, cubic, and PSpline fits.
- A new forecasting feature enables you to add forecasted values to a line chart.
- A new **Comments** tab and Exploration Comments window enable you to create and view comments for visualizations and visual explorations.
- A new data brushing feature enables you to select data values in one visualization and highlight the corresponding values in your other visualizations.
- You can create new data items by using the new calculate data items feature. Calculated data items enable you to create new measures by using mathematical and logical operators in a calculation expression. You can also use datetime operators to calculate new date and time data items.
- You can derive distinct counts for your category data items. Distinct counts display the number of distinct values for a category and can be used as measures in your visualizations.
- The Edit Filter window has been enhanced to enable more advanced filter expressions.
- You can create new filters from the selected data values in a visualization. Filtering from a selection enables you to quickly remove or focus on a specific set of data values.

- You can create duplicate data items in order to use multiple aggregations for a data item in the same visualization.
- You can select the colors that are associated with each value of your category data items. The colors are used in any visualization that performs grouping.

## SAS Visual Analytics Designer

New and enhanced features in SAS Visual Analytics Designer include:

- The new precision report layout enables you to drop objects anywhere onto the canvas and to size them as you like. You can overlap objects and control the depth order of these overlapping objects by sending objects backward or bringing them forward. You can scroll in the precision layout.
- A new geo map report object is available. You can also create geographic data items using latitude and longitude data. Any geo map that is generated by SAS Visual Analytics Explorer can be opened by SAS Visual Analytics Designer.
- You can add SAS stored processes as a report object in a report.
- You can use the new horizontal or vertical containers for laying out reports. Each container will hold one "row" or one "column" of report objects. The layout of the containers enables you to scroll objects beyond what is immediately visible on the screen.
- You can add new controls (drop-down lists, lists, button bars, text input fields, and range sliders) as report objects in reports. These report objects let you filter or control the scope of the data that you are currently viewing.
- The new report views enable you to change the size of the canvas that you use for laying out reports. There are three report views: **Full Screen**, **Tablet**, or **Wide-Screen Tablet**.
- A new preference enables you to specify which report view you want to use when you open new or existing reports.
- Using the updated **Data** pane, you can refresh to get new data items. A new feature also lets you duplicate data items. You can create hierarchy, geography, and calculated data items. You can also show or hide data items. The **Data** pane enables you to create global filters. User-defined formats in the data are now honored, but cannot be set in SAS Visual Analytics Designer.
- List tables have been enhanced. You can display spark lines as a column value. List tables can display totals and have display rules. Detail data is supported for list tables.
- Crosstabs have been enhanced. You can navigate a hierarchy by drilling, expanding, and collapsing. You can also create a hierarchy from a crosstab. You can enable totals and subtotals for both rows and columns in the crosstab. Crosstabs now have the ability to expand to show all the members of a data item.
- Interactions now allow list tables, crosstabs, and gauges as the source. You can now multi-select elements (for example, multiple rows in a table or multiple bars in a bar chart) in the source object of an interaction. You can also clear your selections for gauges, rows in a table, and so on, in the source object of an interaction.
- The titles for report objects can now use rich text elements for formatting.
- Most graphs now support display rules, hierarchies, and drilling.

- Bubble plots now support aggregated data. A group role was added.
- Text objects can now have hyperlinks.
- A new **Filters** tab in the right pane enables you to add a filter (or filters) to the selected report object. Filters can be set for the report, report objects, or both.
- List tables, crosstabs, bubble plots, treemaps, line charts, and bar charts that are imported from SAS Visual Analytics Explorer now support calculated columns, drilling, as well as editing properties and styles.
- Box plots, line chart with forecast, correlation matrix, heat map, histogram, geo maps, and the object with fit lines (linear, quadratic, cubic, and PSpline fits) that are opened from SAS Visual Analytics Explorer now support the editing of properties and styles.

## Documentation Enhancements

The *SAS Visual Analytics: User's Guide* uses new terminology to refer to the SAS Visual Analytics interfaces:

- The SAS Visual Analytics explorer interface is now SAS Visual Analytics Explorer.
- The SAS Visual Analytics designer interface is now SAS Visual Analytics Designer.
- The SAS Visual Analytics web viewer is now SAS Visual Analytics Viewer.

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## What's New in SAS Visual Analytics 6.1 Administration

### Overview

The following enhancements and changes apply to SAS Visual Analytics 6.1:

- The SAS Visual Analytics Data Preparation interface has been replaced by two new applications with robust new features - the SAS Visual Data Builder and the SAS Visual Analytics Administrator.
- Geo maps are supported in both SAS Visual Analytics Explorer and SAS Visual Analytics Designer. Both applications support the selection of columns for longitudes and latitudes that exist in the data. The automatic mapping of geo columns that are based on items such as countries, states, or cities is available only in SAS Visual Analytics Explorer.
- SAS Visual Analytics web viewer supports streaming output for stored processes. The results of the stored process are displayed in the SAS Visual Analytics web viewer immediately after execution. The data sources for stored processes can be either LASR tables in the SAS LASR Analytic Server or tables in the metadata.
- On the SAS Visual Analytics Home page, thumbnails enable users to open explorations, reports, queries, or stored processes. By default, the SAS Visual Analytics 6.1 deployment does not enable shared thumbnails. Shared thumbnails

do not honor row-level security that might have been enforced for the data in an object that is associated with a particular thumbnail. However, you can enable the sharing of thumbnails.

- Treemaps and correlation matrices are supported by SAS Visual Analytics Explorer. For high-cardinality data, data thresholds are set for both treemaps and correlation matrices.
- SAS Visual Analytics Transport Service includes new properties that can be configured:

```
viewerservices.data.default.interactive.drill.depth
```

determines the amount of data that is sent to the mobile device for offline drilling.

```
viewerservices.lasr.socketTimeout.milliseconds.interactions
```

determines the duration of wait time when the SAS Mobile BI application makes an attempt to contact the SAS LASR Analytic Server. This property is applicable for live requests from a mobile device for tasks such as filtering, brushing, and drilling.

```
viewerservices.lasr.socketTimeout.milliseconds.subscribe
```

determines how long the SAS Mobile BI application waits for a response to a query in a subscribed report when it contacts the SAS LASR Analytic Server.

- SAS LASR Authorization Service, SAS Visual Analytics Administrator, and SAS Visual Data Builder use log4j to perform logging.
- The `scheduler.sh` script for the Search Interface to SAS Content automatically enables `loadindex` to run and search for items to be updated. You can modify the interval frequency at which you want the `scheduler.sh` script to run. You can also customize the settings for automatic e-mail notifications to a recipient when the search index is loaded successfully or when errors occur. If you prefer not to receive e-mail notifications, they can be turned off.

## SAS LASR Analytic Servers

SAS Visual Analytics 6.1 provides support for distributed and non-distributed SAS LASR Analytic Servers. The non-distributed SAS LASR Analytic Server is deployed in organizations where data sources are not co-located, and the data is loaded to memory via serial processing. When the distributed SAS LASR Analytic Server is deployed, data sources can be loaded directly to the SAS LASR Analytic Server or via parallel processing from co-located data providers such as the SAS High-Performance Deployment of Hadoop, Teradata server, or Greenplum server.

## SAS Visual Data Builder

SAS Visual Data Builder enables analysts and data administrators to perform analytic data preparation. You can build queries to perform joins, add calculated columns, and subset and sort data. Several productivity features speed the creation of columns based on common aggregation functions. Once you design your queries, you can reuse them as subqueries for more sophisticated queries, export them as jobs for scheduling, or schedule the query directly from the user interface.

SAS Visual Data Builder also provides a series of features that are used in deployments that include SAS LASR Analytic Server. You can load an existing table directly into memory, load the results of a query into memory, or append rows to an in-memory table on a server.

## SAS Visual Analytics Administrator

SAS Visual Analytics Administrator enables administrators to view SAS LASR Analytic Servers that are registered in the metadata and manage server connections by starting or stopping them in the **LASR Tables** tab. You can load registered tables from SAS metadata to the SAS LASR Analytic Servers.

You can add tables to HDFS, or to co-located providers such as Teradata and Greenplum servers. Then, you can load tables from the co-located providers to the SAS LASR Analytic Servers.

An Authorization page provides quick information about the effective permissions for a table or a folder, indicates any direct access controls, and enables you to add or remove explicit controls. You can add an explicit grant or denial for LASR tables. You can also set a row-level permission for a LASR table by selecting a conditional grant and specifying the condition.

## Servers and Libraries in the Metadata

SAS Visual Analytics uses the servers and LASR libraries that are registered in SAS metadata. During the deployment of SAS Visual Analytics, a set of default servers and libraries are registered for you. One of the default servers is a SAS LASR Analytic Server, and a library for that server that is named SAS Visual Analytics LASR.

A Hadoop, Teradata, or Greenplum server and associated library name is only included when a distributed SAS LASR Analytic Server is deployed. All deployments include the SAS LASR Analytic Server and an associated library.

## New Security Model

SAS Visual Analytics 6.1 uses the metadata authorization layer to manage access to metadata objects such as reports, explorations, stored processes, tables, folders, and queries. All users are required to have metadata identities, and only data administrators are required to have passwordless SSH configured for their accounts. User access to a metadata object is determined by the metadata permissions assigned to the user's SAS identity and the groups or roles to which a user is assigned.

User access to data sources in the SAS LASR Analytic Server is managed by the SAS LASR Authorization Service in the middle tier. When a SAS Visual Analytics application user requests access to a data source (LASR table) in the SAS LASR Analytic Server, the SAS LASR Authorization Service provides a signed grant to the application. The SAS Visual Analytics application submits the signed grant to the SAS LASR Analytic Server. When the SAS LASR Analytic Server receives the signed grant, it performs the following actions:

- validates the signature on the grant.
- processes the request based on the constraints of the grant. For example, this might include limiting a user's access to rows via the permission conditions that apply to the data source.

## Row-level Security

In this release, row-level security enables you to control who can access particular rows within a LASR table, and it is defined by data filter expressions. For example, row-level access distinctions can be based on a simple attribute (such as security clearance level) or on a more complex expression that consists of multiple criteria. Row-level security information is stored in the SAS metadata.

## Capabilities

New capabilities in this release that enable application features include:

- **View Report and Stored Process**
- **Build Data**
- **Purge Mobile Report Data**
- **Require Passcode on Mobile Devices**
- **Manage Authorization**
- **Browse HDFS**

Because organizations might have different administrators perform different types of administration, this release offers administration capabilities that you can enable in a granular fashion for custom roles.

## Predefined Groups

Two new predefined groups are available in this release for administrators:

### **Visual Analytics Data Administrators Group**

This group belongs to the **Visual Analytics: Administration** role. The **Visual Analytics: Administration** role contains the most comprehensive set of capabilities that are enabled for application features.

### **Visual Data Builder Administrators Group**

This group belongs to the **Visual Analytics: Data Building** role. The **Visual Analytics: Data Building** role is primarily intended for data administrators that work with SAS Visual Data Builder.

## Passwordless SSH Keys

In the SAS Visual Analytics 6.1 release, passwordless SSH is required only for administrators who perform the following tasks:

- Start and stop SAS LASR Analytic Server connections in SAS Visual Analytics Administrator.
- Load, unload, or reload tables to the SAS LASR Analytic Server.

## Server and Table Signature Files

When a SAS LASR Analytic Server connection is started in SAS Visual Analytics Administrator, a server signature file is created and stored in the `/tmp` directory. The server signature file is accessed when the server connection is stopped in SAS



Visual Analytics Administrator. When tables are loaded from SAS Visual Analytics Administrator or SAS Visual Data Builder to the SAS LASR Analytic Server, table signature files are created and stored in the `/tmp` directory.

## Web Authentication for Mobile Devices

Web authentication for SAS Mobile BI is handled by SAS Visual Analytics Transport Services. In this release, SAS Mobile BI supports the basic method of web authentication.

## SAS Visual Analytics 6.1 Promotion

SAS Visual Analytics objects can be promoted from a 6.1 to a 6.1 environment by using the Export SAS Package and Import SAS Package wizards provided by the SAS Intelligence Platform. You can promote SAS Visual Analytics objects from one server to another or within the same metadata server.

Explorations and reports reference tables that were loaded into the SAS LASR Analytic Server and made available to users. After the promotion process is completed, when you open an exploration or report, the application attempts to retrieve the relevant table from the SAS LASR Analytic Server. If that table is no longer available in the server's memory, an error message is displayed. You can make the explorations and reports work by loading the data source into the SAS LASR Analytic Server and making it available to the promoted exploration or report.



# 44

## SAS Web Report Studio

<b><i>What's New in SAS Web Report Studio 4.31</i></b> .....	<b>345</b>
Overview .....	345
Enhanced Graph Features .....	345
New Report Capabilities .....	346
Enhanced Productivity for Users .....	346
Improved Report Administration .....	346
Enhanced Printing Capabilities .....	346
Improved Tables .....	347
New Report Features .....	347
Enhanced Ability to Send Reports Using E-mail .....	347
Improved Exporting .....	348

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## What's New in SAS Web Report Studio 4.31

### Overview

New and enhanced features in SAS Web Report Studio 4.31 include the following:

- enhanced graph features
- new report capabilities
- enhanced productivity for users
- improved report administration
- enhanced printing capabilities

The second maintenance release of SAS Web Report Studio 4.31 contains the following changes and enhancements:

- improved tables
- new report features
- enhanced ability to send reports using e-mail
- improved exporting

### Enhanced Graph Features

The following enhancements were made to graphs:

- A bubble plot has been added. This new graph type is a variation of a scatter plot in which the markers are replaced with bubbles.
- Skins are available for graphs, so that you can change the appearance.
- You can control the size of the “other” slice in a pie chart.
- You can drag and drop a second measure for a bar-line chart or a scatter plot.

## New Report Capabilities

The following new capabilities are available for reports:

- For prompts, a default value is no longer required.
- Measure filters and rankings are now allowed on some synchronized objects.
- You can add row numbers to list tables using the Properties dialog box.
- Count distinct, which is a function that returns the number of distinct values for a specified column, is available in crosstabulation tables.
- The layout for the report header and footer has improved.

## Enhanced Productivity for Users

The following productivity enhancements are available:

- You can copy report sections.
- Authorized users can open cubes and tables directly.
- You can now insert rows and columns between existing rows and columns in the layout grid using the vertical toolbar.
- Information map data item name changes are propagated automatically.
- The state of the left pane (either hidden or displayed) is saved between sessions.
- A new find option is available for multidimensional crosstabulation tables.
- You can now select multiple publication channels when you schedule a report.

## Improved Report Administration

The following improvements have been made to report administration:

- Multiple schedules for a single report can be made by multiple users.
- Authorized users can update reports where referenced data items have been removed from an information map.
- You can pass hidden data items to a destination report for relational data.
- You can link a report to another SAS application that is passing parameters.

## Enhanced Printing Capabilities

The following enhancements were made for printing:

- You can now specify that you want to print to the A3 paper size.

- Comments can be appended to printed report content.

## Improved Tables

The second maintenance release of SAS Web Report Studio 4.31 contains the following table improvements:

- You can conditionally highlight rows and columns based on a category value or member.
- You can control the number of decimal places for the percent of totals.
- All members at the same level are aligned, whether or not there are child members.

## New Report Features

The second maintenance release of SAS Web Report Studio 4.31 contains the following report features:

- In a report header or footer, you can associate a URL with an image. You can also display prompt values in a header or a footer.
- You can customize colors anywhere that you can change a color.
- You can display numbers and dates that are based on your browser's regional settings.
- In graphs, you can have dual Y-axes with three or more measures.
- While viewing a report, you can switch hierarchies in the dimensions.
- You can use your current browser session to link to a non-report URL. Previously, you could only launch content in a new browser session.
- A new system option lets the Save dialog box switch to the Save As dialog box when you do not have Write Metadata permissions for the current report or folder.
- SAS Web Report Studio administrators can now create a company preferred folder as a default location for saving reports. This means that you will have **Company preferred folder** and **My folder** options, as well as other locations, when you save a report.

## Enhanced Ability to Send Reports Using E-mail

The second maintenance release of SAS Web Report Studio 4.31 has enhanced your ability to e-mail reports:

- Group break values are distributed in the subject line of the e-mail message.
- You can save results and navigation automatically.
- A new system option lets you include standard text when you send the e-mail message.
- You can create a report definition snapshot, which is a customized report that is created from an original SAS Web Report Studio report and then e-mailed to a recipient. Group break information is included in a report definition snapshot.

## Improved Exporting

The second maintenance release of SAS Web Report Studio 4.31 contains improvements to exporting:

- You can export data from individual report objects to the native XLSX output format for Microsoft Excel.
- The report name and the applied filter information are visible in exported report output.