

## What's New in SAS® 9.4



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#### What's New in SAS® 9.4

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## **Using This Book**

### **Audience**

This book provides you with a high-level summary of SAS 9.4 and the products that run on SAS 9.4. At the end of a topic for a specific product, a link is provided to the more detailed What's New topic in the product documentation. If the documentation is secure, only licensed customers can access the What's New topic. For secure documentation, the topic in the What's New links to the software product page.

The initial release of SAS 9.4 shipped in July 2013. The first maintenance release for SAS 9.4 shipped in December 2013. The second maintenance release for SAS 9.4 shipped in August 2014. The third maintenance release for SAS 9.4 shipped in July 2015.

If you need information about any SAS product, contact your SAS account representative.



## See what's new in 9.4

With the delivery of high-performance analytics, the ability to deploy in cloud environments and standardized data management, SAS® 9.4 delivers more than ever to innovate, enable and simplify your decision making. Check out our Website to learn more.





## Introduction to SAS 9.4

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### **Overview of SAS 9.4**

SAS 9.4 includes features that are beneficial to all users at your site.

- For IT departments, SAS 9.4 provides a simplified architecture, increased security, and more deployment options.
- For SAS administrators, SAS 9.4 provides new management capabilities and administration tools.
- For data administrators, the integration of the DataFlux products creates a more complete data management solution. Also, new programming languages enable you to manipulate your data and access relational data from various data sources. New programming languages enable you to update data on the database and access relational data from various sources.
- For SAS programmers, high-performance analytics enable you to quickly analyze large amounts of data. Multi-threading capabilities have also been added so that you can perform analyses on single-machine deployments.
  - SAS Studio provides a web browser-based interface for SAS programmers to write, edit, and submit SAS code.
- For the business user, SAS 9.4 extends the options for mobile access and self-service options for data access, reporting, and exploration.

During the SAS 9.4 life cycle, maintenance releases enable us to continue delivering new functionality to our users.

■ The second maintenance release for SAS 9.4 (which shipped in August 2014) includes new releases of the SAS analytical products, such as SAS/STAT 13.2, SAS Enterprise Miner 13.2, SAS Contextual Analysis 13.2, SAS/ETS 13.2, and many more.

The third maintenance release for SAS 9.4 (which shipped in July 2015) includes new releases of SAS Studio and the SAS analytical products, such as SAS/STAT 14.1, SAS Enterprise Miner 14.1, SAS Contextual Analysis 14.1, SAS/ETS 14.1, and many more. This maintenance release also increases support for secure configurations of SAS.

## **Deploying and Administering SAS**

## **Increasing Software Availability By Using Cloud Deployments**

To make SAS available to all users in your global organization, SAS 9.4 delivers tools and technologies that support deploying, managing, and maintaining your software in public and private cloud environments. To promote innovation, SAS provides a cloud development platform. With a cloud environment, your IT department can quickly meet the demands for increased computing capacity, which makes it easier for your software to grow as your business grows.

In addition, SAS continues to support deploying SAS at your site and as hosted solutions by using SAS Solutions OnDemand.

## Reducing the Cost and Complexity of SAS **Deployments**

With SAS 9.4, no web application server, such as JBoss, WebSphere, or WebLogic, is required. SAS 9.4 includes an embedded middle-tier server called SAS Web Application Server. As a result, you don't need to spend time or money acquiring, integrating, maintaining, and supporting third-party software. The SAS Web Application Server also simplifies IT management and supports deploying SAS in a cloud environment.

## **Subsetting SAS Software Orders**

Starting with the third maintenance release for SAS 9.4, the SAS Deployment Wizard enables you to break up—or subset—your SAS software order. Subsetting your order

makes it easier to provision individual SAS clients and conserves download time and disk space. When you subset your depot, you are creating a copy of your original depot with only those products that you designate based on criteria such as operating system, product type, and language.

## Support for 32-Bit and 64-Bit Operating **Environments**

SAS applications are typically used to process large data sets. This processing benefits from higher performance environments. SAS 9.4 takes advantage of the additional memory and processing capability of the 64-bit Windows operating environments.

The first maintenance release for SAS 9.4 includes 32-bit Windows support for a broader list of products.

## **Reducing Downtime By Clustering the Metadata and Middle-Tier Servers**

To make your software more available to users in your organization, SAS 9.4 supports clustering the metadata and middle-tier servers. A metadata server cluster is a group of three or more nodes that are configured as identical metadata servers. If the servers are clustered and each server manages copies of the same data, you drastically reduce the threat of data loss. If one node in the cluster fails, users can continue working on the remaining nodes, thus reducing potential system downtime. Finally, clustering helps distribute the workload, which can result in improved performance.

## **Enhanced Management Capabilities for SAS Administrators with the SAS Environment** Manager

SAS administrators have access to enhanced management capabilities with the new SAS Environment Manager, a web-based monitoring solution for a SAS environment. SAS Environment Manager enables you to administer, monitor, and manage SAS resources, including administering the SAS Web Application Server and monitoring SAS foundation servers. The application collects and charts data on metrics for monitored resources, providing a comprehensive view of resource health and operation. It

provides functions such as auto-discovery of resources, monitoring of log events, and reporting of alerts. The application also enables administrators to manage access for metadata objects.

## **Increased Security**

Beginning with SAS 9.4, SAS/SECURE is shipped with Base SAS. You no longer need a separate license for SAS/SECURE. SAS/SECURE enhances your security options with the industry standard Advanced Encryption Standard (AES) with 64-bit salt.

Starting with the third maintenance release for SAS 9.4, SAS is shipped with a new trusted CA certificate bundle, which makes deploying SAS securely easier. At SAS installation on all hosts, use SAS Deployment Manager to automate the process of updating the CA certificates and the trusted Mozilla CA bundle. After SAS installation, you can use SAS Deployment Manager to add your own trusted certificates to this list.

## **Accessing SAS from Mobile Devices**

Often, the consumers of SAS reports are high-level executives who are in meetings, traveling, or otherwise away from the office. To meet the demands of these business professionals, SAS reports are now available from mobile devices. In the SAS Output Delivery System, the new ODS EPUB destination creates SAS reports as e-books that work optimally with the Apple iBooks e-book reader on the iPad, iPhone, or iPod.

ODS also supports output to HTML5 and Microsoft PowerPoint.

If you license the SAS Enterprise BI Server, you can use the Mobile BI app.

## **Using High-Performance Analytics**

## Analyzing Large Amounts of Data with High-Performance Analytics

If you are developing analytical models by using large amounts of data, SAS provides in-memory analytics that enable you to perform these analyses in a distributed environment. Because multiple nodes are working on the same tasks in parallel, in-memory analytics can provide significant gains in performance.

In SAS 9.4, six new domain-specific high-performance analytics products are available:

- SAS High-Performance Statistics
- SAS High-Performance Data Mining
- SAS High-Performance Text Mining
- SAS High-Performance Econometrics
- SAS High-Performance Optimization

# Using Multi-Threaded Capabilities on Single-Machine Deployments

In addition, the analytics procedures in these products are available from traditional SAS analytics products (such as SAS/STAT). Because these SAS High-Performance Analytics procedures are available from the traditional SAS analytics products, you can now run these high-performance analytics procedures on single-machine deployments.

- SAS Enterprise Miner
- SAS/ETS
- SAS Forecast Server
- SAS/OR

- SAS/STAT
- SAS Text Miner

## **Managing Your Data**

## **Building an Integrated Information Management Platform**

SAS has now fully integrated the DataFlux suite of data quality, data integration, data governance, and master data management solutions. Incorporating the DataFlux brand into SAS helps customers build a more integrated information management approach that goes beyond data management and governance to support analytics and decision management.

Some DataFlux products have changed their names to SAS, and others will in the future. For example, DataFlux Federation Server is now SAS Federation Server. Instead of being licensed separately, DataFlux products are now being combined with SAS software offerings that include other SAS products as well. Changes in offerings might affect your license renewals.

## **Performing Advanced Data Manipulation In-Database By Using DS2**

DS2 is a SAS proprietary programming language that is appropriate for advanced data manipulation and applications. DS2 is included with Base SAS and is used in conjunction with the SAS DATA step. This language also includes additional data types, ANSI SQL types, programming structure elements, and user-defined methods and packages.

To allow SQL pre-processing on input tables, the SET statement for DS2 supports FedSQL syntax. The queries that are generated at run time can exchange data interactively between DS2 and any supported database. You can run your DS2 threaded packages on a database by using the SAS In-Database Code Accelerator.

# Managing Relational Data Optimally By Using SAS FedSQL

SAS FedSQL is a SAS proprietary implementation of the ANSI SQL:1999 core standard. It provides support for new data types and other ANSI 1999 core compliance features and proprietary extensions. FedSQL provides data access technology that provides a scalable, threaded, high-performance way to access, manage, and share relational data in multiple data sources. When possible, FedSQL queries are optimized with multi-threaded algorithms to resolve large-scale operations.

SAS FedSQL enables you to access multiple data sources without performing a different SQL query for each data source. The same FedSQL query can be used on several data sources, and the results are presented in a single table. By using the FEDSQL procedure, you can submit FedSQL language statements in a Base SAS session.

## **Improving Access to Your Data**

In SAS 9.4, the SAS/ACCESS engines to Oracle, DB2, and Teradata are enhanced to improve READ and WRITE performance. In addition, there are several new SAS/ACCESS engines:

- SAS/ACCESS Interface to Hadoop
- SAS/ACCESS Interface to HAWQ
- SAS/ACCESS Interface to Impala
- SAS/ACCESS Interface to the PI System
- SAS/ACCESS Interface to PostgreSQL
- SAS/ACCESS Interface to SAP HANA
- SAS/ACCESS Interface to Vertical

**Note:** The SAS/ACCESS Interface to Impala and the SAS/ACCESS Interface to the PI System were added in the second maintenance release for SAS 9.4. The SAS/ACCESS Interface to HAWQ was added in the third maintenance release for SAS 9.4.

## **Integration with SAS Visual Analytics**

Throughout the SAS 9.4 life cycle, SAS products are integrating with SAS Visual Analytics. Many of these products can be launched from SAS Home, which is a single interface that you can use to access your SAS products. In addition, some products include SAS Visual Analytics Viewer or SAS Visual Analytics Administrator and Reporting. For more information, see the documentation for your SAS products.

Here are a few of the SAS products that are integrated with SAS Visual Analytics:

- SAS Anti-Money Laundering
- SAS Business Rules Manager
- SAS Enterprise GRC
- **SAS Financial Management**
- SAS Model Risk Management
- SAS Visual Statistics

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## SAS Foundation

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### Base SAS 9.4

## **DS2 Language**

DS2 is a SAS proprietary programming language that is appropriate for advanced data manipulation and applications. DS2 is included with Base SAS and intersects with the SAS DATA step. It also includes additional data types, ANSI SQL types, programming structure elements, and user-defined methods and packages. Several DS2 language elements accept embedded FedSQL syntax, and the run-time-generated queries can exchange data interactively between DS2 and any supported database. This action enables SQL preprocessing of input tables, which effectively combines the power of the two languages. The DS2 procedure enables you to submit DS2 language statements from a Base SAS session. Leveraging the power of the SAS Embedded Process, the SAS In-Database Code Accelerator enables you to publish a DS2 thread program to the database and execute the thread program in parallel inside the database.

The first maintenance release for SAS 9.4 includes the following DS2 changes:

- The behavior for the SAS In-Database Code Accelerator has changed where the DS2 code is not executed inside the database, by default. An option must be set to send the DS2 code to the database.
- The SAS In-Database Code Accelerator for Teradata can now run the DS2 data program as well as the thread program inside the database.
- New DS2 configuration and run-time loggers have been added to the SAS Logging Facility.

The second maintenance release for SAS 9.4 includes the following DS2 changes:

- The SAS In-Database Code Accelerator for Hadoop runs the DS2 data program as well as the thread program inside the database.
- A new predefined HTTP package enables you to construct an HTTP client to access web services.
- A new logger enables logging of HTTP traffic through the SAS Logging Facility.

A connection string parameter is available when instantiating an SQLSTMT package.

In the February 2015 release, the SAS In-Database Code Accelerator for Hadoop uses HCatalog to process complex, non-delimited files. Using HCatalog enables the SAS In-Database Code Accelerator for Hadoop to support Avro, ORC, RCFile, and Parquet file types. In addition, you can now use the DBCREATE\_TABLE\_OPTS table option to specify the output SerDe, the output delimiter of the Hive table, the output ESCAPED BY character, and any other CREATE TABLE syntax allowed by Hive.

The third maintenance release for SAS 9.4 has these changes and enhancements:

- The SAS In-Database Code Accelerator supports reading multiple tables and embedded SQL by using the SET statement, reads and writes HDFS-SPD engine file formats, and links to the MapReduce job log from the SAS log to find error messages that are related to Hadoop. The SET statement supports multiple tables and embedded SQL.
- You can change several default behaviors of a DS2 program by using the DS2\_OPTIONS statement.
- You can use the FMTINFO() function to determine whether you are using a format or informat and to obtain information about that format or informat. This function also returns the format or informat category, the description, format width values, and decimal place values.
- Three new SQLSTMT methods enable you to retrieve the number of columns, the name of a column by column number, and the type of column by column number.
- You can parse JSON text by using the JSON DS2 package.
- The D2TX package enables you to perform time zone processing.
- You can match-merge data by using the MERGE statement.
- The SELECT statement in embedded SQL text supports the PARTITION BY, ORDER BY, INDSNUM, and WHERE clauses.
- You can create a US-locale-based value regardless of the current locale by using the BESTDOTX. format.

You can partition tables by using the DBCREATE\_TABLE\_OPTS table option.

For more information, see SAS DS2 Language Reference and Base SAS Procedures Guide.

## FedSQL Language

SAS FedSQL is a SAS proprietary implementation of the ANSI SQL:1999 core standard. It provides support for new data types and other ANSI 1999 core compliance features and proprietary extensions. FedSQL provides data access technology that brings a scalable, threaded, high-performance way to access, manage, and share relational data in multiple data sources. When possible, FedSQL queries are optimized with multi-threaded algorithms in order to resolve large-scale operations. For applications, FedSQL provides a common SQL syntax across all data sources. That is, FedSQL is a vendor-neutral SQL dialect that accesses data from various data sources without submitting queries in the SQL dialect that is specific to the data source. In addition, a single FedSQL query can target data in several data sources and return a single result table. The FEDSQL procedure enables you to submit FedSQL language statements from a Base SAS session.

In its initial release, FedSQL provided access to the following data sources: SAS data sets, SAS Scalable Performance Data Engine (SPD Engine) data sets, and the following databases: Aster, DB2 for UNIX and PC operating environments, Greenplum, MySQL, Netezza, ODBC databases (such as Microsoft SQL Server), Oracle, SAP (Read-only), Sybase IQ, and Teradata.

The first maintenance release for SAS 9.4 adds support for Memory Data Store (MDS), SAP HANA, and SASHDAT data sources.

The second maintenance release for SAS 9.4 has the following FedSQL enhancements:

- Support for Hive, HDMD, and PostgreSQL data sources. Not all FedSQL statements are supported for each data source. See the documentation for FedSQL statements to determine statement support.
- The CAST function for ODBC enables you to convert a value from one data type to another.

- DBMS-specific clauses can be added when indexes are created.
- SASHDAT files can be compressed.

The third maintenance release for SAS 9.4 has these FedSQL enhancements:

- Support for HAWQ and Impala distributions of Hadoop; support for Impala includes bulk loading.
- You can specify DBMS-specific syntax to append to the CREATE TABLE statement by using the DBCREATE\_TABLE\_OPTS= table option.
- You can set the encoding for a SAS data set by using the ENCODING= table option.
- You can use the DECIMAL/NUMERIC(p,s) data type for data definition and for reading in HDMD.
- You can use the DECIMAL/NUMERIC(p,s) data type and the VARBINARY data type for data definition and for reading in Hive.
- The Hive ARRAY, MAP, STRUCT, and UNION complex types read from Hive.

For more information, see SAS FedSQL Language Reference and Base SAS Procedures Guide.

## **Hadoop Support**

The first maintenance release for SAS 9.4 enables you to use the SPD Engine to read, write, and update data in a Hadoop cluster through the HDFS. In addition, you can now use the HADOOP procedure to submit configuration properties to the Hadoop server.

The second maintenance release for SAS 9.4 has the following enhancements:

- SAS Hadoop Configuration Guide for Base SAS and SAS/ACCESS is available from the third-party site for Hadoop on support.sas.com. This book explains how to configure SAS components so that you can use SAS technology to connect to Hadoop.
- SAS can write Hadoop MapReduce job information to the SAS log.
- The SPD Engine improves Hadoop performance.

You can submit HDFS commands through WebHDFS.

The third maintenance release for SAS 9.4 has these enhancements:

Using the HADOOP procedure, you can now connect to a Hadoop cluster by copying the Hadoop configuration files to a physical location that is accessible to the SAS client machine, and then setting a SAS HADOOP CONFIG PATH environment variable to the location of the configuration files. You can also request recursive action to execute the operation on the specified directory as well as subdirectories for several HDFS statement options. Support was added for BINARY and DECIMAL data types, and options were added to enhance automatic creation of generated SQL code and to control transcode errors.

For more information about the HADOOP procedure, see Base SAS Procedures Guide.

- New HDFS statement options display the contents of files, change file access permissions, and list HDFS files. In addition, you can submit a MapReduce program and Pig language code to a Hadoop cluster through the Apache Oozie RESTful API. For more information about HDFS commands, see "FILENAME (Hadoop Access Method)" in SAS Statements: Reference.
- In the SPD Engine, current access to data that is stored in HDFS is enhanced with a new distributed lock manager. Parallel processing is expanded to write data. SPD data sets can be read in HDFS through Hive. For more information, see SAS 9.4 SPD Engine: Storing Data in the Hadoop Distributed File System.
- The SAS FedSQL language has enhanced support for these data types:
  - The DECIMAL/NUMERIC(p,s) data type is supported for data definition and for reading in HDMD.
  - The DECIMAL/NUMERIC(p,s) data type and the VARBINARY data type are supported for data definition and for reading in Hive.
  - The Hive ARRAY, MAP, STRUCT, and UNION complex types read from Hive.

In addition, by using the SQOOP procedure, you can access Apache Sqoop within a SAS session to transfer data between a database and HDFS. For more information about the SQOOP procedure, see Base SAS Procedures Guide.

For more information, see the following documentation:

- For an overview of SAS and Hadoop, see SAS and Hadoop Technology: Overview.
- To learn about common deployment scenarios, see SAS and Hadoop Technology: Deployment Scenarios.
- For more information about SAS/ACCESS Interface to Hadoop, see SAS/ACCESS to Relational Databases.

## **Improved Performance**

- SAS can process large amounts of data more efficiently by using new system options to align data and utility files on a page boundary and to set the page size for a SAS library to be the same size as a RAID stripe.
- Optimization processes to determine page size and the default size of a logical record length have been enhanced.
- The Scalable Performance Data Engine (SPD Engine) enables the caching of opened SPD Engine files.

In the second maintenance release for SAS 9.4, the SPD Engine enhances I/O control and efficiency, and improves Hadoop performance.

For more information, see SAS System Options: Reference, SAS Language Reference: Concepts, and SAS Scalable Performance Data Engine: Reference.

## **Increased Security**

- SAS/SECURE is a product within the SAS System, and it is now included with Base SAS. In prior releases, SAS/SECURE was an add-on product that was licensed separately. A separate license for SAS/SECURE is no longer required. This change makes strong encryption available in all deployments (except where prohibited by import restrictions).
- SAS/SECURE increases the security by using the industry standard Advanced Encryption Standard (AES) with 64-bit salt. The components of the SAS language that support security use the AES encryption to encrypt and secure SAS data.

- SAS supports mixed-case passwords and the IBM standard for password phrases up to 100 characters.
- SAS data sets can be better secured by placing them in a metadata-bound library, which is a physical library that is tied to a metadata object.
- The SAS logging facility supports SAS/CONNECT spawner and encryption activity, and the auditing of logging configuration changes, SAS data set access, and access to metadata-bound libraries. Logger activity and level settings can be made secure.
- Email security has been enhanced.

The first maintenance release for SAS 9.4 incorporates a new default location for the TLS Certificate Authority for UNIX and z/OS foundation servers, and support for Subject Alternative Names in TLS certificates on UNIX and z/OS clients and servers. Also new in this release, authorized users of metadata-bound libraries can access data without supplying the key-in code.

In the third maintenance release for SAS 9.4, the SAS Deployment Wizard automates the process of updating the TLS certificates in UNIX and z/OS environments and for Java applications on Windows and UNIX. In UNIX and z/OS environments, the installation process lays down a Mozilla bundle of trusted CA certificates. The installation also includes the files that are used as the trusted list of certificates. You can update this list by using the SAS Deployment Wizard. TLS versions 1.0, 1.1, and 1.2 are supported. New environment variables enable you to specify the minimum TLS protocol for OpenSSL and to specify OpenSSL ciphers.

For more information, see Encryption in SAS, Base SAS Procedures Guide, SAS Logging: Configuration and Programming Reference, SAS System Options: Reference, and SAS Guide to Metadata-Bound Libraries.

### **Execute the DATA Step in New Supported Environments**

In the first maintenance release for SAS 9.4, the DATA step runs in-memory in the SAS LASR Analytic Server and inside Hadoop using SAS/ACCESS and the SAS Embedded Process, with limitations. Note that the DATA step processing in Hadoop is preproduction.

In the second maintenance release for SAS 9.4, DATA step processing in Hadoop has moved from preproduction status to production status.

For more information, see SAS LASR Analytic Server: Reference Guide and SAS In-Database Products: User's Guide.

## **Enhance Your SAS Output**

- The Output Delivery System (ODS) Report Writing Interface (RWI) enables you to create and manipulate predefined ODS objects in a DATA step to create highly customized output.
- Using new ODS destinations, you can create EPUB, HTML5, and Microsoft PowerPoint files.
- You can now create text and list templates.
- You can arrange ODS output objects exactly where you want them on a page, or use dynamic placement of objects by using a grid structure.
- A new procedure creates table templates and binds them with input data set in one statement.
- You can animate multi-page GIF images and SVG files by setting system options.

The first maintenance release for SAS 9.4 enables you to apply cascading style sheets and includes support for EPUB 3 standard.

The second maintenance release for SAS 9.4 has enhancements for the EPUB, EPUB3, and HTML5 destinations.

The third maintenance release for SAS 9.4 has these enhancements:

- Support for Microsoft Excel that uses the ODS EXCEL statement.
- A new procedure, MSCHART, creates charts that can be opened and manipulated in Microsoft Excel.
- The default EPUB version is EPUB3.

- In ODS EPUB3, embedded video, audio, and images are supported. This functionality is provided using the Report Writing Interface (RWI) and the Inline Formatting functions that are used with the ODS ESCAPECHAR statement.
- The ODS EPUB3 statement supports new EVENT= values for figures and custom entries in a table of contents.
- The ODS POWERPOINT statement now supports style options for the slide background. This statement also supports changes to the slide transitions and their effects.
- In ODS HTML5, embedded video and audio are supported. This functionality is provided using the Report Writing Interface.

For more information, see SAS Output Delivery System: User's Guide, SAS Language Reference: Concepts, and SAS System Options: Reference.

## **Enhanced ODS Statistical Graphs**

- The ODS Graphics products provide several new plot types, including axis tables that create an axis-aligned row or column of textual data.
- Numerous plot layout, panel, and axis options have been added to control and enhance the output of your graphs. For example, you can now customize the appearance attributes for group values without changing the ODS style template. You can also now specify a color-priority rotation pattern for cycling graph data attributes.
- A new sub-pixel rendering feature provides smoother curves for line charts and more consistent spacing in bar charts.
- The ODS Graphics products provide more options for fitting or splitting data labels, curve labels, and axis tick values when there is not enough room to display the text normally. The data label positioning algorithm was improved to better position the data labels with their data markers. In addition, data markers can now be adjusted when multiple observations have the same response value.
- The ODS Graphics Designer introduces an Auto Charts feature that generates a variety of graphs automatically, based on your data.

The ODS Graphics suite of products includes the Graph Template Language, ODS Graphics procedures, ODS Graphics Designer, and ODS Graphics Editor.

In the first maintenance release for SAS 9.4, ODS Graphics has new and revised plots, charts, and panels.

In the second maintenance release for SAS 9.4, ODS Graphics has a new text plot and several enhancements to the graphics output.

In the third maintenance release for SAS 9.4, ODS Graphics has several new plot statements and includes a wide range of enhancements to plots, legends, axes, axis tables, and attribute maps. The ODS Graphics Designer enables you to create more sophisticated graphs. The ODS Graphics Editor supports editing new plot types and annotating and editing some attributes of graphs that are generated by the SAS/QC procedures. The viewport function in the ODS Graphics Editor adjusts the view of 3-D graphs, and groups are supported in histograms and density plots. For all ODS Graphics, implementation of sub-pixel rendering results in clearer images.

For more information, see SAS Graph Template Language: Reference, SAS ODS Graphics: Procedures Guide, SAS ODS Graphics Designer: User's Guide, and SAS ODS Graphics Editor: User's Guide.

#### **Locked-down State**

In the first maintenance release for SAS 9.4, the SAS server administrator can create an environment where your SAS client has access to a specific set of directories and files if you are running in a client/server environment. All other directories and files would be inaccessible. When SAS is in a locked-down state, access to several SAS language elements is restricted.

In the second maintenance release for SAS 9.4, certain access methods and their related procedures are disabled, by default, when a SAS session is locked down.

For more information, see SAS Language Reference: Concepts. To determine whether your SAS product supports this functionality, see the Administrator's Guide for your SAS product.

## **Create Customized Attributes for Data Sets** and Variables

You can create attributes for data sets and variables to contain information that you supply by using extended attributes. Extended attributes are part of a data set and are managed with the DATASETS procedure. The procedures that process data sets, such as CPORT, DOWNLOAD, and SQL, support extended attributes. For more information, see SAS Language Reference: Concepts.

## Preserve the SAS Environment between SAS **Sessions**

The Work library data sets and catalogs, and the values of global statements, macro variables, and system options can be preserved between SAS sessions. For more information, see SAS Language Reference: Concepts, SAS System Options: Reference, and Base SAS Procedures Guide.

## Write JavaScript Object Notation (JSON)

SAS data sets can be written to an external file in JSON representation. In the third maintenance release for SAS 9.4, you can create and parse JSON text by using the DS2 JSON package. For more information, see Base SAS Procedures Guide.

## **View SAS Data Sets By Using JMP**

SAS data sets can be converted to JMP files to view them by using JMP applications such as the JMP Graph Builder iPad application. For more information, see Base SAS Procedures Guide and SAS Statements: Reference.

#### **Process Streamed Data**

SAS 9.4 processes arbitrary text that contains SAS macro specifications in an input stream. The macro code in the stream can be expanded and stored in a file.

Stream-record format can be processed by the SFTP access method. Data is transferred in image (binary) mode.

For more information, see Base SAS Procedures Guide and SAS Statements: Reference.

## **Write to a SharePoint Document Library**

You can use the WebDAV access method to write a file to a SharePoint document library, specify the name of an authentication domain metadata object, and create and delete a directory. For more information, see SAS Statements: Reference.

#### **Read User Text**

The DATAURL Access Method reads character and URL-encoded characters, and BASE64 data. For more information, see SAS Statements: Reference.

#### **Read ZIP Files**

The new ZIP Access Method reads ZIP files. For more information, see SAS Statements: Reference.

# Process Time and Datetime Values By Using Time Zones

The SAS language now supports time zones based on Universal Coordinate Time (UTC). Data sets and catalog time stamps can specify the time based on a specific time zone. You can specify a specific time zone, or you can specify an area of the world for SAS to determine the time for that area, taking into account Eastern Time.

The second maintenance release for SAS 9.4 includes several new time zone functions.

For more information, see SAS Functions and CALL Routines: Reference, SAS System Options: Reference, and SAS National Language Support (NLS): Reference Guide.

## **Manage Locale Information in a Data Set**

After placing locale information in a data set, SAS can use the data set to configure SAS for a locale. A new procedure manages the data set and writes the locale information to the SAS registry. For more information, see SAS National Language Support (NLS): Reference Guide.

## **Change the Language That Is Used for Output**

Using system options, you can change the language of SAS output and the SAS log. For more information, see SAS National Language Support (NLS): Reference Guide.

## **Audit and Report More about SAS and SAS Applications**

- New loggers audit logging configurations, access to SAS data sets, and metadatabound libraries
- The ARM DSIO subsystem has new ARM metrics that report data set information.

The second maintenance release for SAS 9.4 enables additional control over log file permissions and destinations.

For more information, see SAS Logging: Configuration and Programming Reference and SAS Interface to Application Response Measurement (ARM): Reference.

## **Support for Clustered or Single SAS Metadata** Server

The SAS Metadata Server can be configured as a clustered metadata server or as a single metadata server in SAS 9.4. For more information about enhancements that enable you to monitor and manage the cluster from SAS, see SAS Language Interfaces to Metadata.

## **Transporting SAS Files**

In the second maintenance release for SAS 9.4, you can read from and write to transport files in SAS Version 5 (V5) or SAS Version 8 (V8) formats by using autocall macros. For more information, see Moving and Accessing SAS Files.

#### **General Enhancements to SAS Procedures**

In the first maintenance release for SAS 9.4, changes and enhancements to procedures enable you to determine the encoding of data sets in a transport file, transport data sets with timezone offsets, generate a one-time password from the metadata server to access the SAS Content Server, and support user identity authentication. A link and supporting text were added for Microsoft Excel functions.

The second maintenance release for SAS 9.4 includes the following enhancements:

- In DS2 and FedSQL, you can control the behavior of the SAS session when an NLS transcoding failure occurs.
- You can control the sorting of imported files according to the destination collating sequence.
- Passwords are hidden in the SAS log.
- The REPORT procedure supports several statistical keywords.

The third maintenance release for SAS 9.4 includes these enhancements:

- Using the LUA procedure, you can run LUA code within a SAS session. The LUA procedure also enables you to call SAS functions from within blocks of LUA code.
- The following procedures support the Impala, HAWQ, and SAP HANA database management systems:
  - DS2 procedureFedSQL procedure
  - □ MEANS procedure

RANK procedure
REPORT procedure
SORT procedure
SUMMARY procedure
TABULATE procedure

For more information, see Base SAS Procedures Guide.

The FREQ procedure now does the following:

## **Enhancements to Base SAS Statistical Procedures**

- The CORR procedure can now create an output data set that contains polychoric correlation statistics and an output data set that contains polyserial correlation statistics.
  - supports Baker, exact mid-p, likelihood ratio, and logit binomial confidence limits provides score confidence limits for the odds ratio and relative risk and displays them in the corresponding plots provides Mantel-Haenszel, stratified Newcombe, and summary score estimates of the common risk (proportion) difference, which can be displayed in the risk
  - difference plot
  - produces mid p-values for exact tests
  - colors mosaic plot tiles according to the values of the Pearson residuals or the standardized residuals
  - displays the Pearson residuals in the CROSSLIST table
- The UNIVARIATE procedure now enables you to overlay histograms that are associated with different levels of a CLASS variable onto a single plot, offers improved maximum likelihood estimation for Johnson  $S_{ij}$  distribution parameters, and calculates the geometric means of analysis variables.

For more information, see Base SAS Procedures Guide: Statistical Procedures.

### **SAS under UNIX**

In the first maintenance release for SAS 9.4, you can enable SAS programs to send messages to and receive messages from an ActiveMQ message broker and any JMS API-compliant message service in the UNIX environment.

The second maintenance release for SAS 9.4 has the following enhancements:

- You can specify Read, Write, and Execute permissions for a fileref.
- The default for the MVARSIZE system option changed from 32000 to 65534.
- In a locked-down state, some FILENAME statement access methods are, by default, not available but can be re-enabled by the SAS server administrator. For more information, see "Locked-down State" on page 22.
- New information is available about UNIX environment variables.
- You can measure system performance.

In the third maintenance release for SAS 9.4, the CONTENTS procedure outputs the size of file in KB, MB, or GB.

For more information, see SAS Companion for UNIX.

### **SAS under Windows**

In the first maintenance release for SAS 9.4, details have been added in support of Windows 32-bit architecture.

The second maintenance release for SAS 9.4 has the following enhancements:

- SAS provides a utility to clear temporary files.
- You can specify Read, Write, and Execute permissions for a fileref.
- In a locked-down state, some FILENAME statement access methods are, by default, not available but can be re-enabled by the SAS server administrator.

For more information, see SAS Companion for Windows.

### SAS under z/OS

The second maintenance release for SAS 9.4 has the following enhancements:

- Large block size support for SAS libraries on tape devices improves performance and efficiency.
- The LOCKDOWN feature is supported for foundation servers.
- SAS can generate TCW channel programs for Read operations on some direct access bound libraries, improving I/O performance.

For more information, see SAS Companion for z/OS.

### **Additional Information**

For more information, see these resources:

- What's New in Base SAS 9.4: Details
- What's New in Base SAS 9.4 Procedures in Base SAS Procedures Guide
- What's New in Base SAS 9.4 Statistical Procedures in Base SAS Procedures Guide: Statistical Procedures
- What's New in Base 9.4 System Options in SAS System Options: Reference
- What's New in Base SAS 9.4 Language Concepts in SAS Language Reference: Concepts
- What's New in SAS 9.4 Scalable Performance Data Engine in SAS Scalable Performance Data Engine: Reference
- What's New in Encryption in SAS 9.4 in Encryption in SAS
- What's New in the SAS 9.4 Logging Facility in SAS Logging: Configuration and Programming Reference
- What's New in the Output Delivery System in SAS Output Delivery System: User's Guide

- What's New in SAS 9.4 Graph Template Language in SAS Graph Template Language: Reference
- What's New in SAS ODS 9.4 Graphics Procedures in SAS ODS Graphics: Procedures Guide
- What's New in SAS 9.4 ODS Graphics Designer in SAS ODS Graphics Designer: User's Guide
- What's New in SAS 9.4 ODS Graphics Editor in SAS ODS Graphics Editor: User's Guide
- What's New in SAS 9.4 Statements in SAS Statements: Reference
- What's New in SAS 9.4 Functions and CALL Routines in SAS Functions and CALL Routines: Reference
- What's New in SAS 9.4 National Language Support in SAS National Language Support (NLS): Reference Guide
- What's New in SAS 9.4 Application Response Measurement in SAS Interface to Application Response Measurement (ARM): Reference
- What's New in SAS 9.4 Language Interfaces to Metadata in SAS Language Interfaces to Metadata

### SAS/ACCESS

# SAS/ACCESS 9.4 Interface for Relational Databases

In SAS 9.4, there are several new SAS/ACCESS engines:

- SAS/ACCESS Interface to Hadoop
- SAS/ACCESS Interface to HAWQ
- SAS/ACCESS Interface to Impala

- SAS/ACCESS Interface to PI System
- SAS/ACCESS Interface to PostgreSQL
- SAS/ACCESS Interface to SAP HANA
- SAS/ACCESS Interface to Vertica

Note: The SAS/ACCESS Interface to Impala and the SAS/ACCESS Interface to PI System were added in the second maintenance release for SAS 9.4. The SAS/ACCESS Interface to HAWQ was added in the third maintenance release for SAS 9.4.

These new engines provide direct, transparent access to the engine 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 more information, see What's New in SAS/ACCESS 9.4 Interface for Relational Databases in SAS/ACCESS for Relational Databases: Reference and SAS/ACCESS Interface to the PI System: Reference.

## SAS/ACCESS 9.4 Interface to Hadoop

Starting with the second maintenance release for SAS 9.4, HiveServer2 is supported as the default Hive protocol. You can create and append to Hive tables by using the WebHDFS service. SAS supports Hive data types TIMESTAMP, DATE, and VARCHAR for Hive 0.12 and CHAR for Hive 0.13. Also, SAS supports Hive authorization and authentication by using IBM InfoSphere BigInsights 2.1. For more information, see "Hadoop Support" on page 16.

### SAS/ACCESS 9.4 Interface to HAWQ

Starting with the third maintenance release for SAS 9.4, the SAS/ACCESS Interface to HAWQ is a new interface. This interface provides direct, transparent access to HAWQ through LIBNAME statements and the SQL pass-through facility.

### SAS/ACCESS 9.4 Interface to Oracle

Starting with the second maintenance release for SAS 9.4, you can perform bulk loading by using the Oracle Direct Path API instead of the Oracle SQL\*Loader utility. Starting with Oracle 12c, the default data type for SAS character variables in SAS output is either VARCHAR2 or CLOB, depending on the length of the variable.

### SAS/ACCESS 9.4 Interface to PC Files

SAS/ACCESS 9.4 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 by using the IMPORT and EXPORT procedures and wizards or by using LIBNAME statements.

SAS/ACCESS 9.4 has several enhancements to support Microsoft Excel XLSX files. For example, you can add a new Microsoft Excel XLSX worksheet to an existing workbook, and you can replace an existing worksheet in a workbook. You can export Excel XLSX files directly to UNIX. In this release, you can specify DBMS=XLSX to read and write to Excel workbooks under UNIX and Microsoft Windows directly without accessing the PC Files Server.

Certain statements used with the IMPORT and EXPORT procedures have been updated: RANGE=, SHEET=, GETNAMES=, GUESSINGROWS=. How RANGE= and SHEET= handle special characters in names has changed in Microsoft Excel XLSX files.

The EXPORT procedure supports the ENCRYPTKEY= option, which specifies the key value that is required for exporting an AES-encrypted SAS data set. Support for the Base SAS ENCRYPTKEY= data set option is also added.

SAS/ACCESS 9.4 imports data from JMP files saved with Version 7 or later formats, and exports SAS data to JMP files with Version 7 or later formats. Support for these newer file formats enables you to access JMP files from an application such as the JMP Graph Builder iPad. SAS/ACCESS 9.4 also supports importing and exporting JMP files with more than 32,767 variables. JMP variable names can be up to 255 characters in length.

Because you can use the Base SAS IMPORT and EXPORT procedures on JMP files without a SAS/ACCESS license, the preceding information applies to SAS 9.4 as well.

In earlier releases of SAS, the META statement was used for importing and exporting JMP files. In SAS 9.4, this statement is no longer supported. Instead, extended attributes are automatically used. If extended attributes are in a file, they are automatically transferred to the new file when that file is imported or exported. For example, when importing a JMP file with extended attributes, the attributes are automatically attached to the new SAS data set.

The ROWSTATE data type is generated by JMP and is used to store several row-level characteristics. If the JMP file contains row state information, PROC IMPORT stores this information as a new variable with the name rowstate. If the EXPORT procedure finds a column named rowstate, the procedure converts this column to the row state information in the output JMP file. For more information, see "JMP Data Types" in SAS/ACCESS Interface to PC Files: Reference.

Beginning with SAS/ACCESS 9.4, when you import a Stata file, SAS can read multiple Stata missing values and map them to multiple SAS special missing values such as .a-.z or a single dot (.) for up to 27 missing values.

The PC Files Server can be operated as a Microsoft Windows service or as a Windows application on the 64-bit or 32-bit Windows operating system. Beginning with SAS/ACCESS 9.4, if the machine does not have Microsoft Office or an ACE driver already installed on it, the 64-bit version of the SAS PC Files Server is the default. For more information, see SAS PC Files Server: Installation and Configuration Guide. (This document was first available in the second maintenance release for SAS 9.4.)

Starting with the second maintenance release, SAS/ACCESS 9.4 Interface to PC Files has added a new SAS LIBNAME engine called XLSX. It enables you to directly read and write data between Microsoft Excel XLSX files and SAS on Linux, UNIX, and Microsoft Windows operating environments.

For more information, see What's New in SAS/ACCESS 9.4 Interface to PC Files in SAS/ACCESS Interface to PC Files: Reference.

# SAS/ACCESS 9.4 Interface to Microsoft SQL Server

Starting with the third maintenance release for SAS 9.4, the SAS/ACCESS Interface to Microsoft SQL Server supports the Microsoft Windows for x64 platform and the Microsoft Windows x86 platform.

### SAS/ACCESS 9.4 Interface to R/3

Starting with the third maintenance release for SAS 9.4, two new CALLRFC procedure options and LIBNAME options are available. Use the NETWEAVER option to specify that the engine uses the SAP NetWeaver RFC libraries. Use the CLASSIC option to specify that the engine uses the SAP classic RFC libraries.

#### SAS/ACCESS 9.4 Interface to SAP HANA

These new features and enhancements are available with the third maintenance release for SAS 9.4:

- When using analytic views in SQL statements, the measures have to be aggregated. Starting with the third maintenance release for SAS 9.4, the SAS/ACCESS engine generates a default statement with aggregated measures based on the metadata about the analytic view.
- SAP HANA has new PARMSTRING= and PARMDEFAULT= LIBNAME data set options. The PARMSTRING= options specify a quoted string of variable name and value pairs. The PARMDEFAULT= options specify whether the SAP HANA engine should use the defaults for variables and parameters as specified in the metadata.

### SAS/ACCESS 9.4 Interface to Teradata

Starting with the third maintenance release for SAS 9.4, these features are new or enhanced:

SAS/ACCESS supports object names that contain up to 32 characters for users who use Teradata 14.10 or later.

Support was added for the Teradata Wallet security feature.

### SAS/CONNECT 9.4

SAS/CONNECT 9.4 offers enhanced tools for managing the SAS/CONNECT spawner. including new spawner start-up options, a new spawner interface, and a new spawner executable file that is the same for each operating environment. SAS/CONNECT also features enhanced logging and messaging support, enhanced data transfer of encoded data, support for several new Base SAS language elements, and support for the upload and download of extended attributes that use the UPLOAD and DOWNLOAD procedures.

The LOCKDOWN statement and LOCKDOWN system option are new in the first maintenance release for Base SAS 9.4. With LOCKDOWN, the SAS server administrator can create a restricted environment in which the SAS/CONNECT client has limited access to a designated set of directories and files.

In the second maintenance release for SAS/CONNECT 9.4, you can now use the wildcard character to specify 0 or more characters anywhere in the filename. This new pattern-matching capability enables you to more efficiently transfer data comprised of multiple files to and from remote sessions.

For more information, see What's New in SAS/CONNECT 9.4 in SAS/CONNECT User's Guide.

### SAS/GIS 9.4

SAS/GIS 9.4 expands its import capability to include the U.S. Census Bureau's Topologically Integrated Geographic Encoding and Referencing (TIGER) shapefiles (.shp) that are dated 2007 to the present. You can now organize and analyze, either interactively or programmatically, the most current spatial data. You can also continue to work with TIGER Record Type (RT) files that are dated prior to 2007.

For more information, see What's New in SAS/GIS 9.4 in SAS/GIS: Spatial Data and Procedure Guide.

### SAS/GRAPH 9.4

SAS/GRAPH 9.4 includes the following enhancements:

- The GEOCODE procedure now supports non-U.S. street geocoding. To support non-U.S. street geocoding, new lookup data sets are available, and the existing lookup data sets are reformatted. A new import macro program, %GEOBASE2GEOCODE, and an updated version of %TIGER2GEOCODE are available from the SAS Maps Online website. These macros create lookup data sets in the new format. The new DIRECTION= option enables you to specify an alternate data set of street direction names and abbreviations, such as northwest or NW. The new STATE= option enables you to specify an alternate data set that contains state or province character names rather than FIPS numeric codes. The STREET geocoding method now provides several new and changed values for the output variables \_MATCHED\_ and \_NOTES\_ to support U.S. and non-U.S. street geocoding.
- The map data sets in the MAPSGFK library have been updated.
- The GINSIDE procedure provides two new options to control whether to keep or drop map data set variables, KEEPMAPVARS and DROPMAPVARS.
- In the GMAP procedure, the new LATLON= option specifies that the unprojected LAT and LONG variables from the map data set are used for coordinate data instead of the Y and X variables. The new RESOLUTION= option specifies that the GMAP procedure use those map observations containing a resolution variable with a certain level (value). The new preproduction OSM option enables you to specify an OpenStreetMaps style and project map data onto an OSM map.
- In the GPROJECT procedure, the LATLON= option specifies that the unprojected LAT and LONG variables from the map data set are used for coordinate data instead of the Y and X variables. The new FROM= and TO= options invoke the PROJ4

- projection and enable you to specify a coordinate system for the projection. These FROM= and TO= options can also be used together to reverse a projection.
- In the GREMOVE procedure, the new DROPVARS option drops all input data set variables from the output map data set.
- In the GPLOT procedure, the new CBASELINE= option specifies the color of the horizontal baseline for reference lines of a plot.
- The GCHART procedure provides new options. The PPERCENT= option modifies the font, height, and color of the percentages that are displayed in pie slice labels. When used with the PLABEL= option (which controls the text attributes of pie slice labels), you can easily differentiate between percentages and text labels. The EXPLODE=ALL option pulls all of the slices outward from the center of the pie.
- In the GKPI procedure, the FORMAT= option now accepts user-defined formats.
- The SVG and GIF devices now support animation. In addition, the GIF device now supports RGBA color mode (transparency) and anti-aliasing.
- The new TIFF and TIFFK devices produce TIFF images and support the RGBA and CMYK color modes, respectively.
- The new EMFDUAL device produces a graphics file that contains both EMF and EMF Plus records. It supports RGBA colors (transparency).
- The new %SHORTCUT autocall macro creates a shortcut device that is linked to the existing Universal Printers of the same name. It can also define a new Universal Printer and shortcut device and link the device to the Universal Printer.
- The Annotate Facility has several enhancements. The IMGPATH variable now accepts a URL location for graphics that are on web pages. The HTML= option enables you to animate text labels that are created with the LABEL function, and it has been added to the ARROW function. The %CENTROID macro has been enhanced to return more accurate centroid locations.
- The Tile Chart applet supports adding one or more custom menu items to the tile chart pop-up menu.
- The Treeview applet supports assigning multiple drill-down links for each node in the diagram.

TITLE and FOOTNOTE statements now support the ALT= option, which specifies
descriptive text for a URL to which a title or footnote links, or for the title or footnote
itself.

Starting with the first maintenance release of SAS 9.4, the following new functionality and enhancements are included:

- The GEOCODE procedure for street geocoding offers a new variable to handle multiple street type abbreviations, changes requirements for data set indexes, clarifies the text string requirements for the DIRECTION variable, and adds four note value tokens. In addition, the GEOCODE procedure adds two variables to the SASHELP.ZIPCODE lookup data set to support city geocoding.
- The CHORO statement in the GMAP procedure supports a production level of the OSM (OpenStreetMap) option when displaying maps using a JAVA or JAVAIMG device.
- To see a brief description of any SAS data set in the SASHELP library, as well as output displaying the first five observations in each data set, see SASHELP Data Sets.

Starting with the second maintenance release for SAS 9.4, the following new functionality and enhancements are included:

- The GEOCODE procedure for city geocoding offers a new variable to handle nonstandard state values, changes requirements for the customized versions of the SASHELP.GCSTATE lookup data set, changes variable values within the SASHELP.GCSTATE lookup data set, allows non-abbreviated state names, and offers an improved %TIGER2GEOCODE import program.
- The GRADAR procedure offers a new parameter on the SPKLABEL= option.
- The PowerPoint destination supports both the JAVAIMG device and the ACTXIMG device. The ZPNG device is disabled. Also, new HTML attributes are added to the SVG, SVGT, and SVGView devices.
- The GTILE procedure now supports the NOLEGEND option.

Starting with the third maintenance release for SAS 9.4, the following new functionality and enhancements are included:

- The CTEXT= option in the GPLOT procedure's PLOT statement now affects the color of POINTLABEL symbols.
- The SYMBOL statement's POINTLABEL COLOR= option is updated to show the sequential order of its color selection. The default color selection now aligns with the color that is specified for the axis label.
- The new GraphTitle1Text ODS style element is introduced. It controls and reduces the font size of the output of TITLE1 statements in order to improve graph title scaling.
- The maximum length for the annotate facility variables XC= and YC= is increased from 32 characters to 256 characters.
- Support is added for range geocoding with IPv6 addresses. A new version of the %MAXMIND autocall macro converts IPv6 geocoding data from MaxMind, Inc. to SAS data sets.

For more information, see What's New in SAS/GRAPH 9.4 in SAS/GRAPH: Reference.

# SAS Grid Manager 9.4

SAS Grid Manager provides grid options sets and grid-launched workspace servers. A grid options set is a collection of grid options, SAS options, and required grid resources that can be assigned when a specified SAS application is used by a specified user or group. Using grid options sets enables you to map options for grid jobs to application users without creating a new SAS Application Server context for each option and without requiring input from the application users.

Using grid-launched workspace servers enables SAS Grid Manager to launch new workspace servers for load balancing. This capability enables the grid's management and policies to be applied to the workspace server and simplifies how some SAS applications, such as SAS Enterprise Guide, send jobs to a SAS grid.

Starting with the second maintenance release for SAS 9.4, a Grid Manager plug-in is available from SAS Environment Manager. This plug-in enables you to perform these tasks:

- view information about LSF clusters
- view information about and manage grid jobs, hosts on the grid, and gueues
- view information about and manage high availability applications
- view audit records

Starting with the third maintenance release for SAS 9.4, SAS Grid Manager 9.4 includes these changes:

- SAS Grid Manager for Hadoop has been added. SAS Grid Manager for Hadoop enables you to apply all of the advantages of a SAS grid, including workload management, accelerated processing, and scheduling, to a Hadoop environment. SAS server definitions and grid options sets provide the connection between SAS and Hadoop. Users of SAS will not notice any difference in their operations. They will continue to submit jobs as they normally would, but those jobs will be processed on the Hadoop grid.
- An agent plug-in and a management module have been added to SAS Environment Manager. If your grid uses Platform Suite for SAS, these components enable you to monitor and manage a SAS grid cluster. Together, the agent plug-in and the module provide some of the same functions as Platform RTM, so you can monitor and manage your grid by using the same application that you use to monitor your SAS environment. However, the plug-in and module have different purposes:

### Grid Manager Agent Plug-in

uses continuously collected metric data to monitor the performance of the grid and grid servers, graph changing metric data, and generate alerts.

### Grid Manager Module

configures and controls grid resources, views current performance data, and configures grid resources and high-availability applications.

Note: The Grid Manager module replaces the Grid Manager server plug-in that was added to SAS Environment Manager in the second maintenance release for SAS 94

- New functions have been added to return a list of hosts that are available to run grid jobs and to return a list of valid options sets.
- Support has been added for using an Oozie scheduling server. This server is used in a SAS Grid Manager for Hadoop environment.

For more information, see the software product page for SAS Grid Manager.

### SAS/SHARE 9.4

SAS/SHARE 9.4 features enhanced security with metadata-bound library support and a new USETRUSTEDUSER procedure option, as well as support for extended attributes in SAS data sets and SAS libraries. Also, SAS/SHARE naming conventions for user IDs and passwords have been enhanced to allow longer names (up to 256 characters), mixed case, spaces, and punctuation.

For more information, see What's New in SAS/SHARE 9.4 in SAS/SHARE User's Guide.

## SAS Scalable Performance Data Server

### SAS Scalable Performance Data Server 5.1

SAS 9.4 includes a new SAS Scalable Performance Data Server engine that can connect with the SPD Server. This enhances the SPD Server experience and offers expanded support for regulatory, IT, and end-user features, such as the following:

- enhanced (AES-256) encryption for data at rest
- support for the Windows 64-bit Server

- SQL performance enhancements
- new SPD Server cluster features, including online cluster management and distributed cluster tables

### **SAS Scalable Performance Data Server 5.2**

SPD Server 5.2 can read, write, and update tables in the Hadoop environment. SPD Server 5.2 supports WHERE-processing optimization in the Hadoop cluster using MapReduce. To support enterprise computing environments that have existing authentication processes and password management systems, SPD Server 5.2 provides support for performing non-native user authentication via the SAS Metadata Server.

For more information, see the software product page for SAS Scalable Performance Data Server.

### **SAS Studio**

### SAS Studio 3.1

SAS Studio is a development application for SAS that you access through your web browser. With SAS Studio, you can access your data files, libraries, and existing programs, and you can write new programs. You can also use the predefined tasks in SAS Studio to generate SAS code. When you run a program or task, SAS Studio connects to a SAS server to process the SAS code. The SAS server can be a hosted server in a cloud environment, a server in your local environment, or a copy of SAS on your local machine. After the code is processed, the results are returned to SAS Studio in your browser.

SAS Studio supports multiple web browsers, such as Microsoft Internet Explorer, Apple Safari, Mozilla Firefox, and Google Chrome.

In addition to writing and running your own SAS programs, you can use the predefined tasks that are included with SAS Studio to analyze your data. The tasks are based on

SAS System procedures and provide access to some of the most commonly used graph and analytical procedures. You can also use the default task template to write your own tasks.

### SAS Studio 3.2

SAS Studio 3.2 includes several new features for programmers. The SAS Program Package is a file that contains a snapshot of a SAS program along with its log and HTML results. The autosave functionality creates copies of each previously saved program so that you can recover files if your browser closes unexpectedly. You can create a summary page for code that you have written as well as for code that is automatically generated when you run a task. New code snippets show you how to use the SAS macro functionality.

In addition, you can now send a copy of your results, the associated code, and the log files to another user through email. You can also access files on an FTP server by creating a folder shortcut.

Several new analytical tasks (Binary Logistic Regression, Linear Regression, and Predictive Regression Modeling) are available. The new Box Plot task enables you to easily create box plots, and the new Data Exploration task uses graphs to help you learn more about your data.

For more information, see What's New in SAS Studio 3.2 in SAS Studio: User's Guide.

### SAS Studio 3.3

The Basic Edition of SAS Studio is now supported in Windows and UNIX operating environments.

SAS Studio 3.3 includes a new visual programming perspective. With this perspective you can use process flows to organize and run your work. A new query feature enables you to extract data from one or more tables according to the criteria that you specify.

SAS Studio 3.3 also includes several new tasks. The new Bubble Plot task enables you to explore the relationship between three or more variables. New analytical tasks include the Analysis of Covariance task, the Generalized Linear Models task, and the N- way ANOVA task. The new Combinatorics and Probability category includes a Combinations task, a Permutations task, two probability tasks, and two simulation tasks.

For more information, see What's New in SAS Studio 3.3 in SAS Studio: User's Guide.

### SAS Studio 3.4

SAS Studio 3.4 includes an import data tool that enables you to easily import your data from Microsoft Excel, delimited files (such as CVS), and other file types into SAS Studio. For server environments, the SAS Studio administrator can now control the starting point of the navigation tree. In the code editor, autocomplete is now available for librefs and table names. Several new analytical tasks enable you to prepare and explore your time series data and to perform modeling and forecasting. There are also enhancements to process flows.

For more information, see What's New in SAS Studio 3.4 in SAS Studio: User's Guide.

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# SAS Business Rules Manager

## **SAS Business Rules Manager 2.2**

SAS Business Rules Manager 2.2 runs on the second maintenance release for SAS 9.4. New features and enhancements in this release enable you to perform these tasks:

- create libraries and register tables in the SAS Metadata Repository
- send rule flows through approval workflows and track workflow tasks
- manage versions of rule sets and rule flows
- create rule flows as stored processes
- run a wizard to generate and import vocabularies, rule sets, and rule flows from an input data source by using the Decision Tree, Scorecard, Market Basket Analysis, or Recency Frequency Monetary discovery techniques
- execute rule flows inside the databases by using the SAS In-Database Code Accelerator for Teradata and Greenplum
- selectively include rule sets in a rule flow
- save rule flow tests and display the results of previous tests

- display the terms and lookup tables that are used in a rule set
- import terms from an input data table
- search for rule sets by term

For more information, see What's New in SAS Business Rules Manager 2.2 in SAS Business Rules Manager: User's Guide.

## **SAS Business Rules Manager 3.1**

SAS Business Rules Manager 3.1 runs on the third maintenance release for SAS 9.4.

SAS Business Rules Manager 3.1 provides new features and enhancements that enable you to perform the following tasks:

- view the relationships between data, rule flows, and the processes that consume the data and rules flows by using the features of SAS Lineage
- execute rule flows inside the Hadoop database
- lock rule set versions automatically when rule flows are published
- deploy rule flows dynamically so that SAS Data Integration Studio jobs always use the latest compatible version of a rule flow
- use the simplified list view in the rule set editor
- experience improved performance when generating rule-fired summary tables and generating rules from the New Discovery wizard
- use numeric lookup tables
- duplicate, delete, and move multiple folders, vocabularies, terms, lookup tables, rule sets, or rule flows at the same time
- use pre-existing vocabularies when you generate rules with rule discovery

For more information, see What's New in SAS Business Rules Manager 3.1 in SAS Business Rules Manager: User's Guide.

# **SAS Contextual Analysis**

## **SAS Contextual Analysis 12.3**

New for SAS 9.4, SAS Contextual Analysis is a web-based categorization application that combines the powers of SAS Text Miner and SAS Enterprise Content Categorization into a single user interface. Using SAS Contextual Analysis, you can build models that automatically categorize a set of input documents, identify key textual data in your document collections, remove meaningless textual data, categorize that data, and customize your models in order to realize the value of your text-based data.

## **SAS Contextual Analysis 13.2**

SAS Contextual Analysis 13.2 runs on the second maintenance release for SAS 9.4 and is a major product release with an enhanced user interface. SAS Contextual Analysis 13.2 combines more of the machine learning capabilities of SAS Text Miner with the rules-based linguistic methods for categorization and extraction in SAS Enterprise Content Categorization. It is now also possible to import SAS Enterprise Content Categorization projects and create custom concepts in SAS Contextual Analysis. Generated category rules follow the SAS Enterprise Content Categorization category rules format (MCAT) and are fully supported. Document-level sentiment scoring is now available. A feature for viewing and downloading score code for concepts, sentiment, and categories enables you to leverage your model to score external documents. In addition, the interfaces for document viewing, project creation and editing, and the Properties page have been enhanced.

## **SAS Contextual Analysis 14.1**

SAS Contextual Analysis 14.1 runs on the third maintenance release for SAS 9.4 and is a major product release with new and enhanced features. SAS Contextual Analysis 14.1 provides support for project data in 13 languages, including English. New project features enable you to import and export SAS Contextual Analysis project models and to share projects with other users.

The categories pane has been redesigned and now includes document frequency counts and a tree view where you can build rules. Concept and category rules can be tested interactively with sample text. Enhanced documentation for writing rules can be accessed through the online Help. New properties in the concept task enable you to apply priority and case sensitivity to concept rules. New properties in the topics task enable you to specify term density and number of topics generated.

Rules are now generated using the HPBOOLRULE procedure. Multiple cores are now accessed during project processing. The score code that is produced by SAS Contextual Analysis has been modified to include the SAS DS2 programming language so that threaded processing is enabled.

For more information, see the product documentation page for SAS Contextual Analysis.

# **SAS Decision Manager**

## **SAS Decision Manager 2.2**

SAS Decision Manager 2.2 runs on the second maintenance release for SAS 9.4. The full functionality of the SAS Model Manager Java Client application and the Workflow Console web-based application have been integrated into SAS Decision Manager 2.2.

New features and enhancements in this release enable you to perform these tasks:

- create libraries and register tables in the SAS Metadata Repository
- manage workflows and track workflow tasks
- manage versions of projects, rule sets, and rule flows
- publish models to Hadoop and SAP HANA
- create rule flows as stored processes
- run a wizard to generate and import vocabularies, rule sets, and rule flows from an input data source by using the Decision Tree, Scorecard, Market Basket Analysis, or Recency Frequency Monetary discovery techniques

- execute rule flows inside the databases by using the SAS In-Database Code Accelerator for Teradata and Greenplum
- selectively include rule sets in a rule flow
- save rule flow tests and display the results of previous tests
- display the terms and lookup tables that are used in a rule set
- import terms from an input data table
- search for rule sets by term

## **SAS Decision Manager 3.1**

SAS Decision Manager 3.1 runs on the third maintenance release for SAS 9.4.

SAS Decision Manager 3.1 provides new features and enhancements that enable you to perform the following tasks:

- build decisions with the Decision Builder and deploy these decisions by using SAS Micro Analytic Web Service
- execute rule flows, models, and decisions inside the Hadoop database
- view the relationships between data, models, rule flows, and the processes that consume these data, models, and rule flows by using the features of SAS Lineage
- lock rule set versions automatically when rule flows are published
- deploy rule flows dynamically so that SAS Data Integration Studio jobs always use the latest compatible version of a rule flow
- use the simplified list view in the rule set editor
- use numeric lookup tables
- duplicate, delete, and move multiple folders, vocabularies, terms, lookup tables, rule sets, or rule flows at the same time
- use pre-existing vocabularies when you generate rules with rule discovery

- manage SAS Factory Miner models that are registered in the SAS Model Manager model repository
- manage model versions
- import, update, and export generic models at the folder level
- access the inventory of all models in the same category view
- add and edit model keywords
- add multiple user-defined properties to a model at one time
- search the model inventory with improved performance and also filter the search results by the date modified, model properties, and user-defined properties

For more information, see the product documentation page for SAS Decision Manager.

# **SAS Enterprise Miner**

## **SAS Enterprise Miner 12.3**

SAS Enterprise Miner 12.3 is a new release that runs on SAS 9.4. This major release includes new tools and significant updates to existing tools to enhance your data mining experience. Improved scalability emphasizes the ability to train high-performance data mining nodes on complex data that is used by existing personal SAS workstations or SAS servers.

Key updates to the core data mining tools include the following:

- link analysis for the visualization of translational data as a network of interconnected, linked entities
- updated decision tree node

Data mining application extensions include the following:

support for time varying covariates with the Survival Data Mining node. Users can also set left-truncation and censor dates.

- treatment level selection for the incremental response node.
- interval target including loss given default support for the interactive grouping node of SAS Credit Scoring for SAS Enterprise Miner.

All of the high-performance data mining nodes are now available (at no additional licensing fee) for threaded parallel processing on your existing SAS Enterprise Miner desktop or server. High-performance k-means clustering and decision tree nodes have been added to SAS High-Performance Data Mining.

## **SAS Enterprise Miner 13.1**

SAS Enterprise Miner 13.1 is a major release that runs on the first maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements in the core user interface:

- The **Open Source** node enables users to integrate R language code inside a SAS Enterprise Miner process flow diagram.
- The **Save Data** node provides users with a simple way to save training, validation, test, score, or transaction data from a SAS Enterprise Miner path to a user-defined path, or a previously defined SAS library.
- The **Decision Tree** node enables users to import a previously created model and apply this model to new data.
- The Time Series Dimension Reduction node extracts features from each time series and reduces the dimension of time.
- The **Time Series Correlation** node helps users perform correlation and crosscorrelation analyses. It calculates numerous auto-correlation and cross-correlation statistics on time series data.
- The **Time Series Decomposition** node enables you to perform seasonal decomposition of time series.

Here are some of the new features and enhancements in the SAS Enterprise Miner High-Performance Data Mining nodes:

- The **HP Cluster** node uses the high-performance HPCLUSTER procedure to perform *k*-means clustering analysis in distributed computing environments.
- The **HP Forest** node provides users with a choice of variable selection methods: Out-of-Bag (OOB) Average Error for interval targets, or OOB marginal reduction for class targets.
- The **HP GLM** node uses the high-performance HPGENSELECT procedure to fit a generalized linear model in a distributed computing environment.
- The **HP Neural** node now provides a User-Defined Architecture.
- The **HP Principal Components** node performs principal component analysis by using the high-performance HPPRINCOMP procedure.
- The HP Support Vector Machine node uses the newly developed highperformance HPSVM procedure for binary classification problems.
- The HP Tree node adds support for models that have interval targets.

Here are some of the new features and enhancements in the SAS Enterprise Miner high-performance procedures:

- The new HPBNET procedure learns a Bayesian network from an input data set to create a predictive model in supervised data mining.
- The new HPCLUS procedure enables you to read and write data in distributed form and to perform clustering and scoring in parallel.
- The new HPSVM procedure executes the support vector machine (SVM) algorithm in multiple threads.
- The HPFOREST procedure offers enhancements to enable the training algorithm to use multiple concurrent threads, to segregate data for pruning and early stopping, and to generate an observation ID in scored data.
- The HPNEURAL procedures now enables you to use an arbitrary number of hidden layers to support deep learning, to specify the Poisson and gamma error function

and the exponential output layer activation function to support modeling of count data, and to specify an activation function for hidden layers and for the output layer.

## **SAS Enterprise Miner 13.2**

SAS Enterprise Miner 13.2 is a major release and runs on the second maintenance release for SAS 9.4 and later releases.

SAS Enterprise Miner 13.2 creates a metadcode sas file that enables you to specify global metadata changes. Also, the **Model Regression** node provides a new Mining Function property that enables you to specify the type of model to register.

Here are the new features and enhancements in the SAS Enterprise Miner High-Performance Data Mining node:

- The **HP Regression** node produces a new variance inflation factor (VIF) table that can be used to detect multicollinearity.
- The **HP Forest** node adds support for a partitioned validation data.
- SAS Enterprise Miner 13.2 adds support for SAP HANA and Scalable Performance Data Engine (SPD Engine).

Here are some of the new features in the SAS Enterprise Miner high-performance procedures:

- The new HPTSDR procedure reduces the dimensionality of time series (in transposed, transactional, and columnwise formats), enabling you to take advantage of fewer dimensions to perform tasks such as similarity and clustering.
- The HPCLUS procedure now uses the *k*-modes algorithm for clustering nominal input variables and enables you to specify the imputation method for nominal variables and the distance measure for similarity in the k-modes algorithm for nominal input variables.
- The HPFOREST procedure now enables you to create an ODS table that contains a variety of fit statistics for each target variable and enables you to specify the cosine activation function for both hidden layer neurons and target layer neurons.

The HPSVM procedure now supports cross validation for penalty selection, the ID statement, training output, and a new ODS table that contains penalties and their corresponding fit statistics.

## **SAS Enterprise Miner 14.1**

SAS Enterprise Miner 14.1 runs on the third maintenance release for SAS 9.4 and later releases. Here are the new features and enhancements for the SAS Enterprise Miner core user interface:

- SAS Enterprise Miner now supports PMML 4.2.
- The **Incremental Response** node includes a new property that enables you to specify whether node variable selection is performed using net information value scores or adjusted net information value scores.

Here are the new features and enhancements in the SAS Enterprise Miner High-Performance Data Mining node:

- A new HP Bayesian Network node is available.
- The HP Variable Selection node adds a new tree-based selection method.
- The HP Clustering node is enhanced to enable automatic selection of the number of clusters, via the ABC criterion.
- The HPSVM and HPForest nodes now support the creation of an analytic store. An analytic store is a portable format of the model that can be used to score observations within a database.
- The **HPForest** node also includes a new variable importance method that can be used to perform variable selection.

Here are some of the new features in the SAS Enterprise Miner high-performance procedures:

- The HP4SCORE procedure offers a variable importance method that is similar to Breiman's method and Strobl's method.
- The HPFOREST procedure can now handle large amounts of distributed data and includes new methods for selecting splitting variables.

■ The HPSVM procedure now supports the TEST option in the PARTITION statement and the VALIDATESET option in the SELECT statement.

For more information about SAS Enterprise Miner 14.1, see the software product page for SAS Enterprise Miner.

# **SAS Energy Forecasting 3.1**

Leveraging the experience that SAS has with hundreds of utilities worldwide, SAS Energy Forecasting 3.1 improves forecast results by providing trustworthy, repeatable, and defensible energy forecasts for planning horizons ranging from very short-term (for example, an hour ahead) to very long-term (for example, 50 years ahead). It is designed to meet the energy forecasting needs of the entire enterprise by providing forecasts for Energy Trading, Marketing, Risk Management, Operations, Fuels, System Planning, Finance, and any other department that might have a need for an energy forecast.

SAS Energy Forecasting 3.1 runs on the second maintenance release for SAS 9.4.

# **SAS Event Stream Processing**

## **SAS Event Stream Processing Engine 2.3**

SAS Event Stream Processing Engine 2.3 includes a new Streamviewer tool that uses the HTTP protocol. The tool provides enhanced graphic and publishing capabilities. 1+N way failover has been enhanced to support the RabbitMQ messaging system. SAS Event Stream Processing Engine now enables expressions to access an event's opcode or flags. This release also includes a new Project publish connector and a new RabbitMQ connector and adapter.

## **SAS Event Stream Processing 3.1**

SAS Event Stream Processing 3.1 (formerly known as SAS Event Stream Processing Engine) shipped in May 2015 and runs on the second maintenance release for SAS 9.4.

This release provides a web-based client that enables you to create event stream processing models. The SAS Event Stream Processing Studio client generates XML code based on the models that you define in the user interface. SAS Event Stream Processing 3.1 now supports these connectors and adapters: Twitter, Sniffer, SOAP, Netezza, and REST. This release also includes a new integrated HTTP client driver.

## **SAS Event Stream Processing 3.2**

SAS Event Stream Processing 3.2 shipped in November 2015 and runs on the third maintenance release for SAS 9.4. Starting with this release, input handlers can be written using DATA step statements. This release adds authentication and includes compression for pattern windows and changes to the HTTP API. SAS Event Stream Processing 3.2 also provides integration with Hadoop Yarn and new connectors and adapters.

For more information, see the product documentation page for SAS Event Stream Processing Engine.

### SAS/ETS

### **SAS/ETS 12.3**

SAS/ETS 12.3 is essentially a maintenance release of SAS/ETS software that runs on SAS 9.4.

In addition, the procedures that make up the SAS High-Performance Econometrics product are available with SAS/ETS for use in single-machine mode. Depending on data characteristics and model complexity, you might see performance improvements over comparable SAS/ETS functionality that is not multithreaded.

For more information, see Overview of SAS/ETS High-Performance Procedures in SAS/ETS User's Guide: High-Performance Procedures.

### **SAS/ETS 13.1**

SAS/ETS 13.1 is a major release that runs on the first maintenance release of SAS 9.4 and later releases.

Here are some of the new features and enhancements:

- The AUTOREG procedure now enables you to estimate GARCH models without constraints on parameters.
- The COPULA procedure now supports tail dependence plots.
- The COUNTREG procedure now supports the following features:
  - The STORE statement enables you to save your model parameter estimates and other statistics in item stores.
  - New options in the CLASS statement enable you to control parameterization methods, reference levels, and sort order for classification variables.
- The SEVERITY procedure now supports the following features:
  - The scale regression model can include offset variables.
  - The new OUTSCORELIB statement creates scoring functions.
- The PANEL procedure now supports the Blundell and Bond system GMM estimator.
- The QLIM procedure now provides the following features:
  - Bayesian estimation is available for most of the multivariate models.
  - Endogeneity issues can now be addressed in most models.
  - Heckman's two-step procedure now enables the model for the selected sample to be a discrete choice or limited dependent variable model.
- The SSM procedure now supports the following features:
  - □ A more general state-transition equation permits inclusion of regression effects.
  - You can now search for structural breaks in any model component.

- The UCM procedure now provides a bootstrap-based procedure for computing standard error of a series and component forecasts.
- The VARMAX procedure now supports the following features:

П	GARCH models that are estimated by maximum likelihood
	inequality constraints on parameters
	initial values for parameters
	matrix expressions, operators, and functions in the BOUND, INITIAL, RESTRICT, and TEST statements $$
	multivariate DCC GARCH models

four new forms of univariate GARCH models: exponential GARCH (EGARCH),
 power GARCH (PGARCH), quadratic GARCH (QGARCH), and the threshold

GARCH (TGARCH)

concentrated likelihood estimation for CCC and DCC GARCH models

- The new SASEFRED interface engine enables you to retrieve economic data from the FRED website, which is hosted by the Economic Research Division of the Federal Reserve Bank of St. Louis.
- The SASECRSP interface engine supports Linux X64 (64-bit), Solaris Sun UltraSPARC, Solaris on Intel x86, and Windows.
- The new SASEXFSD interface engine enables you to access FactSet data that are provided by the FactSet FASTFetch web service.

Here are some of the new high-performance features and procedures in SAS/ETS 13.1:

- The experimental high-performance HPCDM procedure estimates a compound distribution model, which is the distribution of an aggregate loss that you expect to see in a given period of time.
- The new HPCOPULA procedure is a high-performance version of the COPULA procedure, which enables you to simulate realizations of multivariate distributions by using the copula approach.

- The new HPPANEL procedure is a high-performance version of the PANEL procedure, which analyzes a class of linear econometric panel data models.
- The HPCOUNTREG procedure now supports the BY statement.
- The HPQLIM procedure now supports discrete choice models and the BY statement.
- The HPSEVERITY procedure now supports the following features:
  - BY statement
  - □ offset variables in the scale regression model
  - a new OUTSCORELIB statement, which creates scoring functions

For more information, see What's New in SAS/ETS 13.1 in SAS/ETS 13.1 User's Guide.

### **SAS/ETS 13.2**

SAS/ETS 13.2 runs on the second maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements:

- The new SASEQUAN interface engine enables you to retrieve economic data from the Quandl website.
- The COUNTREG procedure now supports the following features:
  - A number of Bayesian estimation features are supported.
  - □ You can control the number of threads that are used during optimization.
  - You can store parameter estimates and other results on a per-BY-group basis in the item store so that they can be retrieved later for scoring the BY groups in another data set.
- The PANEL procedure now supports the following features:
  - first-differenced methods for one-way and two-way models
  - panel data cross-sectional dependence test
  - Lagrange multiplier (LM) test for cross-sectional and time effects

You can limit the number of observations that are used to prepare the empirical distribution function (EDF) estimates, enabling you to speed up the EDF estimation step for large data sets, especially when you specify censoring or truncation effects.

The VARMAX procedure now supports the following features:

□ *p*-values for the Johansen cointegration rank test

 multistep forecast for the multivariate GARCH model, enabling you to obtain the multistep forecast of conditional covariance matrices at any horizons ahead

The X12 procedure now enables you to specify the following:

□ the size of forecast confidence limits

		the difference in critical values for almost outliers
		the alpha value for outlier detection
		the method of calculating the critical value for outlier detection based on the alpha value and the number of observations in the span that is used for analysis
		the number of level-shift outliers to consider for forming a temporary level shift
		the method of adding outliers at each iteration of model estimation
		the rate of decay for temporary change outliers
		the moving average filter for each period
Fo	r m	ore information, see What's New in SAS/ETS 13.2 in SAS/ETS 13.2 User's Guide.
Не	ere a	are some new features in SAS/ETS high-performance procedures:
٠	Th	e HPCOUNTREG procedure now supports panel data analysis.
٠	Th	e HPSEVERITY procedure now supports the following features:
		The CLASS statement is supported.
		You can specify a wide variety of regression effects, such as singleton continuous effects, polynomial continuous effects, main CLASS variable effects, and more.
		You can save estimation results in an item store and use them for parameter initialization in a subsequent run of the SEVERITY or HPSEVERITY procedure.
		You can create scoring functions.
		PROC HPSEVERITY supports the following functions, which were previously available only in the SEVERITY procedure: You can request a variety of plots in single-machine mode; you can create a SAS data set in single-machine mode that contains the EDF and CDF estimates of all distributions that do not fail to converge; you can specify the probability of observability; and you can specify the same options in the NLOPTIONS statement that you can specify in PROC SEVERITY.

For more information, see What's New in SAS/ETS 13.2 High-Performance Procedures in SAS/ETS User's Guide: High-Performance Procedures.

#### **SAS/ETS 14.1**

SAS/ETS 14.1 is a major release that runs on the third maintenance release for SAS 9.4 and later releases.

- The COUNTREG procedure adds the TEST statement, three statements that enable you to include spatial effects in a model, and more Bayesian analysis features.
- The HPCOUNTREG procedure adds the TEST statement and support for the Conway-Maxwell distribution.
- The HPPANEL procedure adds support for the between-groups estimator, between-time-periods estimator, and pooled OLS regression.
- The MODEL procedure adds the %EQAR and %EQMA macros.
- The PANEL procedure adds more general Hausman specification tests, comparison tables for multiple models, and Hausman and Taylor (1981) and Amemiya and MaCurdy (1986) estimators.
- The QLIM procedure adds the RANDOM statement, which enables you to estimate the random-intercept models, and more Bayesian analysis features.
- The SASEFRED interface engine supports Linux X64 (LAX) hosts; real-time periods for Federal Reserve Economic Data (FRED) data; logging of diagnostics in the SAS log; requests for useful information about categories, tags, groups, and releases; and use of blanks in pathnames in options.
- The SASEXFSD interface engine supports Linux X64 (LAX) hosts, logging of diagnostics in the SAS log, the UNIVERSE= option on the ExtractFormulaHistory factlet, and use of blanks in pathnames in options.
- The SASEQUAN interface engine supports Linux X64 (LAX) hosts, up to nine Quandl codes, logging of diagnostics in the SAS log, and use of blanks in

pathnames in options. It also ensures unique names by appending the variable number to names.

- The SSM procedure adds the DEPLAG statement, which simplifies the specification of models that have lagged values of response variables in the observation equation.
- The VARMAX procedure supports vector error correction models in ARMA-GARCH form, linear equality and inequality constraints in vector error correction models, covariance and standard errors of the parameter estimates of the adjustment coefficient matrix, covariance matrix of innovations in vector error correction models. outputs of parameter estimates of the long-run parameters and the error correction trend parameters, Wald tests on any parameters in vector correction models except the long-run parameters and the error correction trend parameters, specification of initial values, and a new estimation method, the conditional maximum likelihood (CML).
- The new X13 procedure incorporates the X12 procedure in response to the US Census Bureau's inclusion of the X-12-ARIMA methodology in the X-13ARIMA-SEATS program. PROC X13 also adds numerous options, displays additional tables, and changes the default value of the MAXITER= option to 1,500.

For more information, see What's New in SAS/ETS 14.1 in SAS/ETS 14.1 User's Guide.

# **SAS Factory Miner 14.1**

SAS Factory Miner is an easy-to-use application that enables you to build models to analyze data and examine results. You can build a model by creating a project, selecting data source configurations, choosing model templates, running your analysis, and viewing results.

You can use these models to analyze data in SAS Factory Miner:

- Bayesian Network model
- Decision Tree model
- Generalized Linear model

- Gradient Boosting model
- Neural Network model
- Random Forest model
- Regression model
- Support Vector Machine model

SAS Factory Miner helps you perform data mining model creation at a segment level. For example, you could use customer data to investigate which customers are most likely to respond to online offers. Furthermore, you could build separate models for each of the regions in which your clients live. You can run multiple models and examine results to determine which modeling algorithm was most effective for the data that you have and the goals of your investigation. Comparing modeling results can help you make more informed and effective business decisions.

SAS Factory Miner 14.1 runs on the third maintenance release for SAS 9.4 and later releases.

# **SAS Forecast Server**

#### **SAS Forecast Server 12.3**

SAS Forecast Server 12.3 runs on SAS 9.4 and includes updates to the web infrastructure. SAS Forecast Server is now integrated with SAS Time Series Studio, which is now production software. SAS Time Series Studio enables you to analyze and structure your time-stamped data. You can export data from SAS Time Series Studio and import it into SAS Forecast Studio.

### **SAS Forecast Server 13.1**

SAS Forecast Server 13.1 is a new release that runs on the first maintenance release for SAS 9.4.

Here are some of the new features and enhancements in this release:

- support for Integrated Windows Authentication, clustered servers, and grid computing environments
- new options for changing the ODS format and execution server when running a report or stored process
- the ability to create a forecast data set for independent variables

#### **SAS Forecast Server 14.1**

SAS Forecast Server 14.1 runs on the third maintenance release for SAS 9.4. This release includes the new SAS Forecast Server Client, which is a web-based interface that you can use to segment your time series data, create forecasts, and track the accuracy of your forecasts. With SAS Forecast Server Client, you have the option of writing custom code to segment and model your time series.

For more information about SAS Forecast Server 14.1, see the software product page for SAS Forecast Server.

# **SAS High-Performance Risk**

# **SAS High-Performance Risk 3.1**

SAS High-Performance Risk 3.1 runs on SAS 9.4 and includes these features:

- enhancements to risk analytics include netted and collateralized exposure calculations, portfolio stressing and filtering, and an enhanced scenario builder
- integration with Hadoop and SAS LASR
- enhancements to the user interface include enhanced sorting, the ability to export graphs to Microsoft Excel, the ability to drill down in bar charts, and enhancements to stress testing
- ability for high-performance sensitivity analysis

improvements to performance

# **SAS High-Performance Risk 3.2**

SAS High-Performance Risk 3.2 runs on the first maintenance release for SAS 9.4 and provides the following new features:

- access to SAS High-Performance Risk through the SAS Visual Analytics application bar
- ability to export risk explorations to a PDF file
- user interface enhancements
- ability to send data sets from grid nodes directly to a distributed data file system or to in-memory data
- ability to perturb instrument variables in a portfolio

# **SAS High-Performance Risk 3.3**

SAS High-Performance Risk 3.3 runs on the second maintenance release for SAS 9.4 and provides the following features:

- enhancements to scenario creation and stress testing
- enhanced support for counterparty risk and credit value adjustment
- ability to price a portfolio by both positions and market states
- new SAS language statements

# **SAS High-Performance Risk 3.4**

SAS High-Performance Risk 3.4 runs on the second maintenance release for SAS 9.4 and provides these new features:

- the capability to store risk cube data files in the Hadoop Distributed File System (HDFS) in distributed mode. The primary benefit of storing risk cubes in HDFS is an improved backup and restore process.
- the ability to define statistics and include them in a risk cube. You can also include distortion risk measures in a risk cube.
- the ability to plot risk factors in the Scenario Editor.
- new language elements.

### **SAS High-Performance Risk 3.5**

SAS High-Performance Risk 3.5 runs on the third maintenance release for SAS 9.4. Starting with this release, scenario results can be stored in a risk cube. This release also includes enhancements to the user interface and new SAS language elements.

For more information, see the software product page for SAS High-Performance Risk.

#### SAS/IML

#### **SAS/IML 12.3**

SAS/IML 12.3 is essentially a maintenance release of SAS/IML software that runs on SAS 9.4.

For more information, see the software product page for SAS/IML.

### **SAS/IML 13.1**

SAS/IML 13.1 is a major release that runs on the first maintenance release of SAS 9.4 and later releases.

enhancements to the SAS/IML language syntax:			
	The NEXT keyword now supports expressions.		
	The STOP and ABORT statements now accept a default message that is displayed in the SAS log.		
	The parentheses in the RETURN statement are now optional.		
ne	ew support of the Tweedie distribution by the RANDGEN subroutine		
ne	ew statistical functions, subroutines, and modules:		
	The CV function returns the sample coefficient of variation for each column of a matrix.		
	The HEATMAPCONT call creates a heat map of a matrix whose values are visualized by using a continuous color ramp.		
	The HEATMAPDISC call creates a heat map of a matrix whose values are visualized by using a discrete color ramp.		
	The KURTOSIS function returns the sample kurtosis for each column of a matrix.		
	The LOGABSDET function returns the logarithm of the absolute value of a matrix determinant.		
	The LPSOLVE call solves linear programming problems.		
	The MILPSOLVE call solves mixed-integer linear programming problems.		
	The PALETTE function returns a discrete color palette that is suitable for choropleth maps, heat maps, and other graphical visualizations that display a relatively small number of discrete values.		

- The PARENTNAME function returns the name of the matrix that was passed to a module
- The SKEWNESS function returns the sample skewness for each column of a matrix.

For more information, see What's New in SAS/IML 13.1 in SAS/IML 13.1: User's Guide.

#### **SAS/IML 13.2**

SAS/IML 13.2 runs on the second maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements:

- The new experimental EXECUTEFILE subroutine executes SAS/IML statements that are contained in a text file.
- Although not formally a part of SAS/IML software, the new SAS/IML File Exchange in the SAS/IML Support Community enables you to share SAS/IML programs and download programs written by others. You can post SAS/IML functions, tag files, and rate files, and search for files by tags, content, or author.

For more information, see What's New in SAS/IML 13.2 in SAS/IML 13.2: User's Guide.

### **SAS/IML 14.1**

SAS/IML 14.1 is a major release that runs on the third maintenance release for SAS 9.4 and later releases.

- Large matrices (up to 231 1 elements, or more than 2 billion elements) are supported on the Windows operating system.
- The PACKAGE statement supports installing and using packages, which are ZIP files that contain source code, data sets, documentation, and sample programs. You can share and download packages from the SAS/IML File Exchange in the SAS Support Communities on support.sas.com.
- Eigenvalue computations use vendor-supplied math libraries, if available.

The RANDSEED subroutine uses a different initialization algorithm for certain seeds.

For more information, see What's New in SAS/IML 14.1 in SAS/IML 14.1: User's Guide.

# **SAS Model Manager**

### **SAS Model Manager 12.3**

SAS Model Manager 12.3 runs on SAS 9.4. Major themes for this release include the ability to manage projects collaboratively as one control group, to support additional model classes, and to perform more activities from within SAS Model Manager Workflow Console. New features and enhancements in this major release enable you to perform the following tasks:

- create and manage multiple projects in a control group
- monitor performance of champion models for all projects within a control group and publish the champion models to the SAS Metadata Repository
- schedule performance monitoring tasks.
- specify multiple data sources and collection dates when defining performance monitoring tasks.
- remove models that are published to a database.
- create folders, projects, and versions by using macros. You can also set project properties.
- create and view reports within a workflow activity.
- view the process flow diagram for a workflow.

In addition, SAS Model Manager 12.3 provides support for these areas:

- SAS Enterprise Miner Random Forest (HPFOREST), as well as the SAS/ETS COUNTREG and SEVERITY models
- multiple SAS application servers when scoring or retraining a model, and monitoring performance of champion and challenger models

For more information, see What's New in SAS Model Manager 12.3 in SAS Model Manager: User's Guide.

### **SAS Model Manager 13.1**

SAS Model Manager 13.1 runs on the second maintenance release for SAS 9.4. The SAS Model Manager Java Client application and the Workflow Console web-based application have been replaced with an integrated web-based application. The SAS Model Manager Client installation is no longer required on a user's desktop. New features and enhancements in this release enable you to perform the following tasks:

- create libraries and register tables in the SAS Metadata Repository
- manage workflows and track workflow tasks
- publish models to Hadoop and SAP HANA
- manage all versions within a project in one place
- schedule recurrent jobs
- retrain models based on the dashboard project status
- specify performance options for using dynamic data sources and generating dashboard reports
- specify additional reporting options
- attach documents and add comments

For more information, see What's New in SAS Model Manager 13.1 in SAS Model Manager: User's Guide.

### SAS Model Manager 14.1

SAS Model Manager 14.1 runs on the third maintenance release for SAS 9.4.

New features and enhancements in this release enable you to perform these tasks:

manage SAS Factory Miner models that are registered in the SAS Model Manager model repository

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- add model dependencies and view the relationships by using SAS Lineage
- manage model versions
- import, update, and export generic models at the folder level
- access the inventory of all models in the same category view
- add and edit model keywords
- add multiple user-defined properties to a model at one time
- search the model inventory with improved performance and filter the search results by the date modified, model properties, and user-defined properties

For more information, see What's New in SAS Model Manager 14.1 in SAS Model Manager: User's Guide.

### SAS/OR

#### **SAS/OR 12.3**

SAS/OR 12.3 is largely a maintenance release of SAS/OR software that runs on SAS 9.4. The most significant addition is PROC OPTLSO for parallel hybrid local search optimization. This procedure, formerly named PROC HPLSO, previously was included only in SAS High-Performance Optimization but is now available with SAS/OR for use in single-machine mode.

For more information, see the software product page for SAS/OR.

#### **SAS/OR 13.1**

SAS/OR 13.1 is a major release that runs on the first maintenance release of SAS 9.4 and later releases. It includes new features and enhancements to current features in optimization, discrete-event simulation, and constraint programming.

Here are some of the new features and enhancements:

The OPTMODEL procedure now supports:

		direct access to network optimization and analysis algorithms (Experimental)
		parallel execution of solver invocations in a COFOR loop
		support for function definition via PROC FCMP in Base SAS software
	Th	e OPTLSO procedure now provides:
		multiobjective optimization
		support for the use of array-structured data in function definition (via PROC FCMP)
•		e mixed integer linear programming (MILP) solver adds the option to execute in rallel on multiple computational cores. (Experimental)
	SA	AS Simulation Studio adds:
		support for custom block icons
		improvements to the simulation clock display
		enhancements to the Submodel block interface
		other interface improvements
For more information, see What's New in SAS/OR 13.1 in SAS/OR 13.1 User's Guide Mathematical Programming.		

### **SAS/OR 13.2**

SAS/OR 13.2 runs on the second maintenance release for SAS 9.4 and later releases.

- Several optimization solvers improve their performance.
- PROC OPTMODEL adds the experimental constraint logic programming (CLP) solver.
- The nonlinear programming (NLP) solver adds output of the covariance matrix for the decision variables (parameter estimates).
- The decomposition (DECOMP) algorithm adds new block detection features.

- For the linear programming (LP) interior point solver, the crossover algorithm is applied by default.
- The network solver is now production.
- The parallel implementation of the mixed integer linear programming (MILP) solver is now production.
- SAS Simulation Studio 13.2 provides a new optional parallel mode that executes design points and replications simultaneously on multiple computational cores, a central facility in the new Data Trimmer block to control data collection, and added control on the precision of the numeric values that the Formula block produces.

For more information, see What's New in SAS/OR 13.2 in SAS/OR 13.2 User's Guide: Mathematical Programming.

#### **SAS/OR 14.1**

SAS/OR 14.1 is a major release that runs on the third maintenance release for SAS 9.4 and later releases. It adds a number of new optimization capabilities that shorten optimization time, increase diagnostic capabilities, and make the software easier to use.

- Several solvers improve their performance.
- The concurrent FOR loop (the COFOR loop) in PROC OPTMODEL can run in distributed mode.
  - **Note:** Distributed mode requires SAS High-Performance Optimization.
- PROC OPTMODEL adds a profiler that tracks the amount of time spent in problem generation, presolve, and various stages of the solution process.
- PROC OPTNET enables parallel computing, provides faster graph data input, and adds enhancements to three of its algorithms.
- The quadratic and nonlinear solvers add irreducible infeasible set (IIS) diagnostics.
- The decomposition algorithm expands the range of constraint matrix structures that it can detect automatically.

The CLP procedure adds more variable selection strategies.

SAS Simulation Studio 14.1, a component of SAS/OR 14.1 for Windows environments, adds features that improve the accuracy of your models and give you additional controls on model execution. Highlights include the following:

- controls on the order in which dynamically created data input and output ports on blocks execute during the run of a model
- centralized controls on the ranking of blocks in a model, which determines the order of execution for events that are scheduled for the same simulation clock time
- expanded and improved controls on the allocation of resource units among resource entities when there is a scheduled adjustment
- automatic launching of the SAS server on your local PC

For more information, see What's New in SAS/OR 14.1 in SAS/OR 14.1 User's Guide: Mathematical Programming.

### SAS/QC

#### **SAS/QC 12.3**

SAS/QC 12.3 is essentially a maintenance release of SAS/QC software that runs on SAS 9.4.

For more information, see the software product page for SAS/QC.

#### **SAS/QC 13.1**

SAS/QC 13.1 is a major release that runs on the first maintenance release of SAS 9.4 and later releases.

- The CAPABILITY procedure now provides the following:
  - $\Box$  improved parameter estimation for the Johnson  $S_{ij}$  distribution

	that are associated with different levels of a CLASS variable
	e MVPMONITOR procedure supports the new SCORECHART statement, which oduces control charts of principal component score.
Th	e RELIABILITY procedure now supports the following features:
	horizontal plots of failure and censoring times for recurrent events data
	parameter estimation and probability plotting for the Gompertz and Gompertz- Makeham distributions
Th	e SHEWHART procedure has several new options:
	The ACTUALALPHA option displays the effective $\alpha$ value, which might not be the same as the requested $\alpha$ value, in the limits legend of an attribute chart. This option is available in the CCHART, NPCHART, PCHART, and UCHART statements.
	The IDSYMBOLHEIGHT= option controls the size of the symbols that are used to plot outliers in box plots that are produced by the BOXCHART statement.
	The PROBLIMITS=DISCRETE option requests discrete control limits for attribute charts. This option is available in the CCHART, NPCHART, PCHART, and UCHART statements.
	The WESTGARD= option applies Westgard rules to a Shewhart chart for quality control in health care laboratories.
	The WHISKERPERCENTILE= option requests that the whiskers of the box plots that are produced by the BOXCHART statement be drawn to percentile values.

□ support for the OVERLAY option, which overlays, onto a single plot, histograms

There are four new macros for measurement system analysis:

- The %basicEMP macro performs a basic evaluating-the-measurement-process (EMP) analysis.
- The %shortEMP macro performs the eight steps for characterizing relative utility.
- The %gaugeRR macro performs a traditional gauge repeatability and reproducibility analysis.

The %honestGaugeRR macro creates an "honest" gauge repeatability and reproducibility report.

For more information, see What's New in SAS/QC 13.1 in SAS/QC 13.1 User's Guide.

#### **SAS/QC 13.2**

SAS/QC 13.2 runs on the second maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements:

- The ANOM, CUSUM, MACONTROL, and SHEWHART procedures now use templates that are written in the Graph Template Language to produce ODS Graphics.
- The CAPABILITY procedure now calculates the geometric means of analysis variables and can save them in an output data set or display them in a graph (or both).
- The MVPMONITOR procedure now includes an option that enables you to specify the distribution that is used to compute control limits.
- The RELIABILITY procedure can now produce confidence bands for stress-lifetime plots that are produced by the RELPLOT statement.

For more information, see What's New in SAS/QC 13.2 in SAS/QC 13.2 User's Guide.

#### **SAS/QC 14.1**

SAS/QC 14.1 is a major release that runs on the third maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements:

The new, experimental RAREEVENTS procedure produces control charts for rare events. A rare event is one that occurs infrequently, with a low probability. A rare events chart is better suited than traditional control charts to detecting changes in the frequency of low-probability events.

The ANOM, CUSUM, MACONTROL, and SHEWHART procedures are now capable of producing graphs that you can edit by using the ODS Graphics Editor.

For more information, see What's New in SAS/QC 14.1 in SAS/QC 14.1 User's Guide.

### SAS/STAT

#### **SAS/STAT 12.3**

SAS/STAT 12.3 is essentially a maintenance release of SAS/STAT software that runs on SAS 9.4.

In addition, the procedures that make up the SAS High-Performance Statistics product are available with SAS/STAT for use in single-machine mode. Depending on data characteristics and model complexity, you might see performance improvements over comparable SAS/STAT functionality that is not multi-threaded. Also, these procedures provide some new features; for example, the HPGENSELECT procedure provides model selection for generalized linear models.

For more information, see Overview of SAS/STAT High-Performance Procedures in SAS/STAT User's Guide: High-Performance Procedures.

### **SAS/STAT 13.1**

SAS/STAT 13.1 is a major release that runs on the first maintenance release of SAS 9.4 and later releases.

- The experimental BCHOICE procedure performs Bayesian analysis for discrete choice models.
- The new ICLIFETEST procedure performs nonparametric survival analysis for interval-censored data.
- The experimental IRT procedure fits item response models.
- The MI procedure now provides the MNAR statement to facilitate sensitivity analysis.

- The Tweedie distribution is now supported by the GENMOD procedure.
- The competing risk model of Fine and Gray (1999) is available in the PHREG procedure.
- With the NLIN procedure, you can generate both bootstrap estimates of confidence intervals for the parameters and bootstrap estimates of the covariance matrix and correlation matrix of the parameter estimates.
- The MCMC procedure is now multithreaded.
- Path diagrams are available with the CALIS procedure.
- You can now compute power for PROC GLM-type MANOVA and repeated measurements with the GLMPOWER procedure.
- The SURVEYMEANS procedure produces domain quantile estimates.

Here are some new high-performance features and procedures in SAS/STAT:

- The new HPCANDISC procedure performs high-performance canonical discriminant analysis.
- The new HPFMM procedure performs high-performance finite mixture model analysis.
- The new HPPRINCOMP procedure performs high-performance principal component analysis.
- The SCREEN option in the SELECTION statement for the HPREG procedure requests screening stages that reduce a large number of regressors to a much smaller subset from which the final model is chosen.

For more information, see What's New in SAS/STAT 13.1 in SAS/STAT 13.1 User's Guide

#### **SAS/STAT 13.2**

SAS/STAT 13.2 runs on the second maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements:

- The new ICPHREG procedure fits proportional hazards regression models to interval-censored data.
- The new SPP procedure analyzes spatial point patterns.
- The experimental GEE procedure fits generalized linear models for longitudinal data by using the generalized estimating equations (GEE) estimation method of Liang and Zeger (1986). It also provides weighted GEE analyses.
- The FACTOR procedure generates path diagrams.
- The FMM procedure fits multinomial models.
- The IRT procedure generates polychoric correlation matrices, item characteristic curves, and test information curve plots.
- The MCMC procedure supports a categorical distribution in the MODEL, RANDOM, and PRIOR statements.
- The NLMIXED procedure enables you to specify more than one RANDOM statement in order to fit hierarchical nonlinear mixed models.
- The SEQDESIGN procedure enables you to create a ceiling-adjusted design that corresponds to integer-valued sample sizes at the stages for nonsurvival data.
- The LOGISTIC procedure enables you to add or relax constraints on parameters in nominal response and partial proportional odds models.
- The FREQ procedure now provides score confidence limits for the odds ratio and the relative risk.
- The GLMSELECT procedure enables you to apply safe screening and sure independence screening methods to reduce a large number of regressors to a smaller subset from which model selection is performed.

For more information, see What's New in SAS/STAT 13.2 in SAS/STAT 13.2 User's Guide.

#### **SAS/STAT 14.1**

SAS/STAT 14.1 is a major release that runs on the third maintenance release for SAS 9.4 and later releases.

- The new GAMPL procedure is a high-performance procedure that fits generalized additive models by penalized likelihood estimation.
- The new SURVEYIMPUTE procedure imputes missing values of an item in a sample survey by replacing them with observed values from the same item. Imputation methods include single and multiple hot-deck imputation and fully efficient fractional imputation.
- The BCHOICE procedure allows varying numbers of alternatives in choice sets for logit models.
- Exact mid-p, likelihood ratio, and Wald modified confidence limits are available for the odds ratio produced by the FREQ procedure.
- The GLIMMIX procedure provides the multilevel adaptive Gaussian quadrature algorithm of Pinheiro and Chao (2006) for multilevel models, which can greatly reduce the computational and memory requirements for these models with many random effects.
- The GLMSELECT procedure supports the group LASSO method.
- The IRT procedure fits generalized partial credit models.
- The LIFETEST procedure performs nonparametric analysis of competing-risks data.
- The LOGISTIC procedure fits an adjacent-category logit model to ordinal response data.
- The MCMC procedure adds an ordinary differential equation (ODE) solver and a general integration function, enabling the procedure to fit models that contain differential equations (for example, PK models) or models that require integration (for example, marginal likelihood models).

- The NPAR1WAY procedure performs stratified rank-based analysis for two-sample data.
- The POWER procedure supports Cox proportional hazards regression models.
- The HPSPLIT procedure for classification and regression trees has been updated to include the MODEL and CLASS statements and tree plots, cross validation plots, and ROCS curves.
- The HPGENSELECT procedure for model selection for generalized linear models now provides the LASSO method.

For more information, see What's New in SAS/STAT 14.1 in SAS/STAT 14.1 User's Guide.

### **SAS Text Miner**

#### **SAS Text Miner 12.3**

SAS Text Miner 12.3 includes enhancements to node performance and results. When importing table information in various dialog boxes, the **Import** button has been replaced with the **Replace Table** and **Add Table** buttons. You can choose whether to replace the currently selected table or add to the currently selected table. Results for the **Text Rule Builder** node include a new Document Rules table and a Rule Success graph.

You can use SMP mode in SAS 9.4 on a properly enabled SAS Server to deploy the **HP Text Miner** node in a process flow diagram, and use the HPTMINE and HPTMSCORE procedures. Using the **HP Text Miner** node in a process flow diagram can lead to multi-threaded processing gains in many cases. For more information, see the HP Text Miner Node chapter in SAS Enterprise Miner High-Performance Data Mining Node Reference.

### **SAS Text Miner 13.1**

SAS Text Miner 13.1 is a major release that runs on the first maintenance release for SAS 9.4 and later releases. This release includes the new **Text Profile** node,

enhancements to node performances and results, and an enhancement to the highperformance HPTMINE procedure.

- The new **Text Profile** node enables you to profile a target variable by using terms that are found in the documents.
- The **Text Parsing** node contains a new **Select Languages** property, which enables you to specify the languages to keep in the document collection.
- The results for the **Text Topic** node contain these new items:
  - □ a **Terms** table, which shows terms and their weights for each topic
  - a **Topic Terms** matrix graph, which shows the topic values across terms.
- The high-performance HPTMINE procedure now supports the NONORMDOC keyword in the OUTDOCPRO= option in the SVD statement to control whether document projections are normalized.

#### **SAS Text Miner 13.2**

SAS Text Miner 13.2 runs on the second maintenance release for SAS 9.4.

Here are some of the new features and enhancements in the high-performance procedures for SAS Text Miner:

- The HPTMINE procedure supports the following new functionality:
  - You can parse text data in the German language, and you can specify which language is used in the input data set of documents.
  - You can parse documents that contain more than 32K characters.
  - ☐ You can run in SVD-only mode, which enables you to parse documents and compute the singular value decomposition (SVD) separately in two procedure calls when you want to try different parameters for SVD computation after document parsing.
  - □ You can discover topics that exist in your text corpus.
  - You can store the term-by-document matrix in the Base64-encoded sparse rows (BESR) format.

	the Base64-encoded sparse rows (BESR) format to store the term-by-document matrix.
	You can specify custom LITI files for custom entity and noun group extraction.
	You can specify whether to include terms that have _keep=N in the OUTTERMS= data set and in the OUTCHILD= data set.
Th	e HPTMSCORE procedure supports the following new functionality:
	You can parse text data in the German language.
	You can parse documents that contain more than 32K characters.
	Custom LITI files for custom entity and noun group extraction are supported

#### **SAS Text Miner 14.1**

SAS Text Miner 14.1 runs on the third maintenance release for SAS 9.4 and later releases.

Here are some of the new features and enhancements in SAS Text Miner 14.1:

- A new HPBOOLRULE procedure replaces macros in the Text Rule Builder node.
- Enhancements to the HPTMINE procedure enable you to select or ignore parts of speech, attributes, and entities, as well as to build a search index.
- The HP Text Miner node now uses PROC HPTMINE to perform topic rotation and to create the topic table.
- Eleven parsing languages have been added to the **Language** property in the **HP Text Miner** node. The complete list of parsing languages includes Chinese, Dutch,
  English, Finnish, French, German, Italian, Japanese, Korean, Portuguese, Russian,
  Spanish, and Turkish.
- The new macro variable EM\_TERM\_LOC enables users to specify a location for SAS Text Miner nodes to write output data sets. These data sets are needed as input to SAS Text Miner score code.

An **item** variable with term | role information has been added to the transaction output that is exported from the **Text Topic** node and the **Text Filter** node. This variable is added to the transaction tables valid trans and test trans when a Data Partition node is used in a process flow diagram, such as Input Data node (for example, NEWS) > Data Partition node > Text Parsing node > Text Filter node.

One benefit of exporting term | role information in the transaction table is that the **Association** node shows this information in the rules that it generates if the node is used in a process flow diagram, such as Input data node (for example, ABSTRACT)> Text Parsing node > Text Filter node > Association node.

Here are some of the new features and enhancements in the high-performance procedures for SAS Text Miner:

- The new HPBOOLRULE procedure enables you to extract Boolean rules from largescale transactional data. PROC HPBOOLRULE adds essential capability to highperformance text mining for supervised rule-based modeling. In the current release, you can use the HPBOOLRULE procedure to read data and extract rules only in single-machine mode. The HPBOOLRULE procedure can automatically generate a set of Boolean rules by analyzing a text corpus that has been processed by the HPTMINE procedure and represented in a transactional format.
- The HPTMINE procedure supports the following new languages, statement, and options:
  - □ You can parse text data in the following newly supported languages: Chinese. Dutch, Finnish, French, Italian, Japanese, Korean, Portuguese, Russian, Spanish, and Turkish.
  - □ You can use the HPTMINE procedure to generate a search index for a text corpus. The index can be input to the TMUTIL procedure for querying the text corpus.
  - □ You can use the new SELECT statement to specify the parts of speech, entities, or attributes that you want to include in or exclude from your analysis.
  - You can specify a terms table when running the HPTMINE procedure in SVDonly mode. The terms table is required by topic discovery.

For more information about the new features and enhancements in SAS Text Miner 14.1, see the software product page for SAS Text Miner.

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# **SAS In-Memory Statistics**

SAS In-Memory Statistics provides a single, interactive programming environment for the entire analytical life cycle inside the Hadoop environment.

- Interactive programming enables you to move through the entire analytical life cycle in Hadoop with an extremely fast, multi-user environment.
- In-memory analytical processing enables you to get fast analytic computations that are optimized for multiple passes across distributed clusters.
- Because data is held in-memory, you can increase speed and reduce latency.
- Analytical data management enables you to prepare data for modeling with data integration, variable transformations and creation, and exploratory analysis.
- You can quickly create, evaluate, and compare multiple statistical models.
- With statistical algorithms and machine-learning techniques, you can uncover patterns and trends faster.
- You can analyze your unstructured and structured data by using a wide range of text analysis techniques.
- You receive personalized, meaningful recommendations in real time with a high level of customization.

# **SAS High-Performance Analytics Infrastructure**

# **About the SAS High-Performance Analytics Infrastructure**

The SAS High-Performance Analytics Infrastructure consists of these products:

- SAS High-Performance Computing Management Console
- SAS High-Performance Deployment of Hadoop
- SAS High-Performance Analytics environment

# **SAS High-Performance Analytics Infrastructure 2.1**

SAS High-Performance Analytics Infrastructure 2.1 supports Kerberos. This release also provides a way to configure SAS High-Performance Deployment of Hadoop with multiple data devices. Finally, SAS supplies a security wrapper that you can use to limit the use of sudo commands to specific directories.

# SAS High-Performance Analytics Infrastructure 2.4

In SAS High-Performance Computing Management Console 2.4, you can use the RPM installer to install the console into any directory that contains the <code>-prefix</code> option. SAS High-Performance Computing Management Console 2.4 also includes a tarball installer. Use this tarball installer when a non-RPM installer is desired or the RPM version on the machine is not compatible with the console.

In the SAS High-Performance Analytics environment, a new installation script supports the new word cloud feature in SAS Visual Analytics. Also, the simultaneous utilities commands (simcp and simsh) are installed with the SAS High-Performance Analytics environment.

# **SAS High-Performance Analytics Infrastructure 2.8**

In this release, the SAS High-Performance Deployment of Hadoop has been upgraded to Apache Hadoop version 2.4.

The SAS High-Performance Analytics environment now supports Cloudera CDH 5 and IBM BigInsights as co-located data sources. The environment can also read data from SAP HANA in parallel. This environment also now includes a resource management template and support for YARN.

# **SAS High-Performance Analytics Infrastructure 2.91**

SAS High-Performance Analytics Infrastructure 2.91 includes a new environment variable that helps you decide how much memory to request. During installation, you can now specify whether the SAS High-Performance Analytics environment reads and writes MapR data directly. Finally, enhancements have been made to the prompts in the installation script for the SAS High-Performance of Hadoop.

# SAS High-Performance Analytics Infrastructure 2.94

The SAS High-Performance Analytics 2.94 environment supports reading and writing files by using AES encryption with 256-bit keys.

# **SAS High-Performance Analytics Infrastructure 3.1**

In release 3.1, the SAS High-Performance Analytics environment supports a remote parallel connection with MapR.

# **SAS High-Performance Computing Management Console**

# **About SAS High-Performance Computing Management Console**

The console is a web application that is used by system administrators to manage high-performance computing environments that use SAS software. Maintaining high-performance computing (HPC) environments is challenging because of the large number of machines that are used in the distributed computing environment. The console eases this challenge by propagating changes, such as adding user IDs, to all the machines in the environment.

# SAS High-Performance Computing Management Console 2.1

The console is enhanced to support machine groups. It is now possible to perform operations on groups of machines rather than all of the machines in the SAS High-Performance Analytics environment. The simultaneous copy (simcp) command is enhanced to support return codes. Return codes can be used to provide error checking in scripts.

# SAS High-Performance Computing Management Console 2.4

The installation process for the console is enhanced to support a relocatable RPM so that you can install the console in any directory that you choose. The console can also be installed from a tarball (TAR file). This installation method also enables you to install the console in any directory that you choose.

Other than the enhancements to the installation process, the console has no other customer-visible features for the 2.4 release.

# **SAS LASR Analytic Server**

# SAS LASR Analytic Server 2.1 and 2.2

SAS LASR Analytic Server functions as an analytic platform, providing speedy, secure, multi-user access to in-memory data. For smaller data sets, the server can be deployed on a single machine. For larger data volumes, the server can be deployed on a distributed computing environment.

In SAS LASR Analytic Server 2.1, the server is enhanced to offer administrators controls for enforcing memory utilization limits for distributed deployments. The IMSTAT procedure is enhanced to enable administrators to manage in-memory tables.

In SAS LASR Analytic Server 2.2, the IMSTAT procedure is enhanced to support joining in-memory tables in a simple star schema and appending the entire in-memory tables. The DATA step is enhanced to support running in-memory for scoring.

# **SAS LASR Analytic Server 2.3**

SAS LASR Analytic Server 2.3 includes many updates, including the following:

- The new RECOMMEND procedure enables you to develop a recommender system. A common goal for a recommender system is to make personalized recommendations.
- The IMSTAT procedure is enhanced to enable in-memory statistical programming. The procedure statements that enable statistical programming are licensed separately from the statements for data and server management. SAS In-Memory Statistics for Hadoop is an offering that includes the statistical statements.
- The TEXTPARSE statement is added to the IMSTAT procedure to support inmemory text analysis. This statement is licensed separately from the data and server management statements.

# SAS LASR Analytic Server 2.4

SAS LASR Analytic Server 2.4 includes many updates, including the following:

- The server supports compressed in-memory tables. The SAS Data in HDFS engine also supports adding tables to HDFS in compressed form.
- The IMSTAT procedure is enhanced as follows:
  - The AGGREGATE statement is new. It is used to aggregate values of one or more variables. Many aggregation methods are available, including quartiles and distinct counts.
  - □ The FORECAST statement is enhanced to support goal-seeking analysis.
  - The DROPCOLUMN statement is added to remove a column that was added with the COMPUTE statement.
- The RECOMMEND procedure is enhanced to support storing recommendations in a temporary in-memory table. The procedure is also enhanced to support reading transaction data from an in-memory table. This can be used for the ARM method to recommend new items based on recent activities

# **SAS LASR Analytic Server 2.5**

SAS LASR Analytic Server 2.5 includes many updates, including the following:

- The server has two automatic tables that you can use to monitor server and table memory use. The two tables are named T LASRMEMORY and T TABLEMEMORY. The tables are automatically available in a SAS LASR Analytic Server library.
- The IMSTAT procedure is enhanced as follows:
  - □ The AGGREGATE statement is enhanced to support the KEEPRECORD option and the KEEP= option. The KEEPRECORD option is used to add an aggregated value for each input observation by aggregating the input observations with ID= values that are specified in the INTERVAL= option and the WINDOWINT= option.

The KEEP= option is used to transfer variables from the active table to the ODS table output or temporary table.

- □ The NEURAL statement is added to the IMSTAT procedure. The statement is used to train feed-forward artificial neural networks (ANN). The statement can also use the trained networks to score data sets.
- ☐ The SAVE statement is enhanced to support a CSV option. This option enables saving in-memory tables to HDFS in comma-separated value format.
- The SERVERPARM statement is enhanced to support the TABLECEILING option. This option enables an administrator to set a soft limit for memory use by tables.
- □ The analytic statements that support generating SAS DATA step code with a CODE= option are enhanced. If the active table that is analyzed includes columns with special characters or international characters that require the name literal syntax for a column such as 'profit (%) 'n, then the generated code also uses the name literal syntax. The enhancement applies to the following statements:
  - CLUSTER
  - DECISIONTREE
  - GENMODEL
  - GLM
  - LOGISTIC
  - NEURAL
  - RANDOMWOODS

For more information, see the product documentation page for SAS LASR Analytic Server and the software product page for SAS Visual Analytics.

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### **SAS Add-In for Microsoft Office**

#### SAS Add-In 6.1 for Microsoft Office

The SAS Add-In 6.1 for Microsoft Office provides integration with SAS Visual Analytics 6.1. (The first maintenance release for the SAS Add-In 6.1 provides integration with SAS Visual Analytics 6.2 and 6.3.) Because of this integration, you can use the SAS add-in to open and refresh reports that were created using SAS Visual Analytics Designer and SAS Visual Analytics Explorer. You can access and manage favorites that were created in SAS Visual Analytics. In Microsoft Outlook, the SAS add-in also provides a view similar to the Hub in SAS Visual Analytics. This view enables you to easily access and comment on your favorite and recently opened SAS Visual Analytics reports.

A new stand-alone installer is also available for the SAS Add-In for Microsoft Office. The new installer is much smaller, thereby making it easier to install over a distributed deployment, especially using provisioning tools such as Microsoft System Center Configuration Manager (SCCM). For more information, see SAS Deployment Wizard and SAS Deployment Manager 9.4: User's Guide at http://support.sas.com/ deploywizug94.html.

#### SAS Add-In 7.1 for Microsoft Office

The SAS Add-In 7.1 for Microsoft Office runs on Microsoft Office 2013, 2010, and 2007, and can be run with a SAS 9.2, a SAS 9.3, or a SAS 9.4 server.

A key feature in this release is integration with SAS Visual Analytics 6.2, 6.3, 6.4, and 7.1.

Starting with this release, the SAS Add-In for Microsoft Office supports SAS Visual Analytics reports that enable you to brush, filter, drill, expand, and collapse elements. You can interact with this functionality in Microsoft Excel, Microsoft Word, Microsoft PowerPoint, and Microsoft Outlook.

- You can preview the contents of a SAS Visual Analytics report before inserting any objects into your Microsoft Office document. You can select the specific objects to include, or you can insert the entire report.
- You can specify whether to display any specified filters before an object in a SAS Visual Analytics report. If you are opening a crosstabulation report, the filter also includes any breadcrumbs.
- You can also view and add comments to a SAS Visual Analytics report. You can view the rules for conditional highlighting. (These rules were defined when the report was created in SAS Visual Analytics.) You can also view the aggregated data that was used to create a graph in a SAS Visual Analytics report.

Another key feature in this release is the new task interface and integration of tasks that are shipped with SAS Studio. The redesigned task interface displays your recent and favorite tasks. Categories, filters, and searching functionality enable you to quickly find the task that you need. From this interface, you can access SAS Add-In for Microsoft Office tasks and SAS Studio tasks.

Additional new features include the availability of SAS Central in Microsoft Excel, Microsoft Word, Microsoft PowerPoint, and Microsoft Outlook. Using SAS Central (a view similar to the Hub in SAS Visual Analytics), you can easily access your SAS Visual Analytics reports and SAS Stored Processes.

Also, the SAS Add-In 7.1 for Microsoft Office includes the new Upload to LASR task that enables you to upload data to SAS LASR Analytic Server so that you can access the data in SAS Visual Analytics.

### SAS Add-In 7.11 for Microsoft Office

The SAS Add-In 7.11 for Microsoft Office shipped in May 2015. This release supports SAS Visual Analytics 7.2 and 7.3. Here are some of the new features and enhancements for this release:

- Better integration with SAS Visual Analytics results in the ability to remove and find report elements in your Microsoft Office document.
- Using the SAS add-in in Microsoft Outlook, you can export a SAS Visual Analytics report to PDF.

- If your SAS Visual Analytics report contains sparklines, these lines are available when you open the report in Microsoft Excel.
- You can enable the SAS Add-In for Microsoft Office to automatically check for software updates.

For more information, see the software product page for SAS Add-In for Microsoft Office.

## **SAS Enterprise Guide**

### **SAS Enterprise Guide 6.1**

SAS Enterprise Guide 6.1 is supported on SAS 9.4, 9.3, and 9.2. Enhancements for this release include the following:

- integration with SAS high-performance tools with the addition of the High-Performance Logistic and High-Performance Linear Regression tasks.
- improved programmer productivity with the new Log Summary window, which lists all the errors, warnings, and notes that were generated when the program ran, as well as related line numbers and a sample of the affected code.
- the ability to analyze a SAS program to determine whether there are any possible internationalization issues. Internationalization is the process by which a program is optimized so that it can be adapted to any language and region without being rewritten. When you analyze a program for internationalization, SAS Enterprise Guide lists the lines of code that might be affected and suggests substitutions when possible.
- the ability to use notes to add information to a process flow or to specific objects in the process flow.
- administration enhancements, such as the new stand-alone installer and application streaming support. The new installer is much smaller, thereby making it easier to install over a distributed deployment, especially using provisioning tools such as System Center Configuration Manager (SCCM). For more information, see SAS

Deployment Wizard and SAS Deployment Manager 9.4: User's Guide at http:// support.sas.com/deploywizug94.html.

The first maintenance release for SAS Enterprise Guide 6.1 (which shipped in December 2013) provides integration with SAS Visual Analytics 6.2 and 6.3. Because of this integration, you can open and refresh reports that were created using SAS Visual Analytics Designer and SAS Visual Analytics Explorer. You can also save a SAS Visual Analytics report with your SAS Enterprise Guide project.

### **SAS Enterprise Guide 7.1**

SAS Enterprise Guide 7.1 is supported on SAS 9.4, 9.3, and 9.2. Some of the new features and enhancements include the following:

- SAS Enterprise Guide 7.1 supports integration with SAS Visual Analytics 6.2, 6.3, 6.4, and 7.1.
- The new program history feature enables you to track the changes that you and other programmers make to programs in SAS Enterprise Guide.
- You can search your project for text that you specify.
- In the Tasks pane, you can now search for a task by name, SAS procedure, or keyword. You can filter the list of tasks by predefined categories or by SAS procedure. You can also quickly access any tasks that you recently opened or that you marked as favorites.
- If you have SAS Studio and Microsoft Internet Explorer 10 (or later) installed on your machine, you can also run SAS Studio tasks in SAS Enterprise Guide.
- SAS Enterprise Guide 7.1 includes the new Upload to LASR task that enables you to upload data to SAS LASR Analytic Server so that you can access the data in SAS Visual Analytics.
- The new Project Log Summary window is displayed with the Project Log window and includes an aggregated list of all the messages that have been generated in the project log.
- The SAS Macro Variable Viewer enables you to view all of the SAS macro variables that are defined in your current SAS session. You can use this window to see

changes to the macro variables while you work in SAS Enterprise Guide and to quickly evaluate a macro expression.

- The SAS System Options Viewer enables you to view all of the SAS system options that are defined for your current SAS session.
- Smart highlighting is available in the Program Editor. By default, when you select or search for a word in the Program Editor, all other occurrences of that word are also highlighted.
- You can now open the Query Builder with multiple tables selected. The Query Builder automatically joins the tables if the tables include columns with matching names and data types.
- You can now copy and paste process flows.

### **SAS Enterprise Guide 7.11**

SAS Enterprise Guide 7.11 shipped in May 2015. This release supports SAS Visual Analytics 7.2 and 7.3. Here are some of the new features and enhancements in this release:

- You can quickly filter your data by using a WHERE expression.
- You can enable SAS Enterprise Guide to automatically check for software updates.
- You can export a SAS Visual Analytics report to PDF.
- You can copy and paste prompts within the same project or into another SAS Enterprise Guide project.
- You can add data and reports to your list of favorites.
- You can create case-insensitive filters in the Query Builder or when you filter and sort your data by using the Filter and Sort task.

For more information, see the software product page for SAS Enterprise Guide.

### **SAS Mobile BI**

### **About SAS Mobile BI**

SAS Mobile BI enables users to view SAS Visual Analytics reports on Apple iPads and iPhones and Android tablets and smartphones. You can download the free iPad and iPhone app from the Apple iTunes store. You can download the free Android app from Google Play.

### SAS Mobile BI 7.20

SAS Mobile BI 7.20 enables users to view SAS Visual Analytics reports on Apple iPads and iPhones, and Android tablets and smartphones.

Here are some of the changes and enhancements in this release:

- support for Apple iPhones and Android smartphones
- new support for best-fit layout of report content on tablets and smartphones
- many enhancements and fixes

### SAS Mobile BI 7.21

SAS Mobile BI 7.21 includes a new server connection time-out feature that provides additional report security. This release also provides support for viewing collections and favorite groups. These items are defined on the SAS Home Page. Finally, SAS Mobile BI 7.21 supports new report features that are provided by SAS Visual Analytics 7.2.

### **SAS 9.4 OLAP Server**

The SAS 9.4 OLAP Server has several new features for 9.4:

- new OLAPCONTENTS procedure for generating reports of OLAP cube information
- new OLAPCONFIG method for setting SAS OLAP Server options in batch mode
- updated OLAPOPERATE procedure
- new MDX Case statement
- new VISUALTOTALS BEHAVIOR option for calculated measures

In addition, properties for multilingual cubes are automatically updated in multiple languages when reports are generated. And, the SQLRC macro can be used with the SQL pass-through facility for OLAP.

In the first maintenance release for the SAS 9.4 OLAP Server, these new features and enhancements were added:

- A new LOGICALSERVERNAME option was added to the OLAPOPERATE procedure.
- You can enable execution of user-defined (FORMAT procedure style) formats in the SPD Server. For more information, see SAS OLAP Server: User's Guide.
- A new INSTR MDX function was added. For more information, see SAS OLAP Server: MDX Guide.
- The LOCKDOWN option and statement are supported by the SAS OLAP Server.

In the third maintenance release for SAS 9.4, the SAS OLAP Server: User's Guide includes information about SAS OLAP variations, MDX function behavior and ragged or unbalanced hierarchies, and the new THREADPOOLQRY option.

For more information, see What's New in SAS 9.4 OLAP Server in SAS OLAP Server: User's Guide.

## **SAS Web Parts 6.1 for Microsoft SharePoint**

Web Parts are an integrated set of controls that enable you to provide customized, dynamic content on your website. By using Microsoft Windows SharePoint Services, you can add SAS content directly to your website.

In SAS Web Parts 6.1 for Microsoft SharePoint, administrators can create connection profiles for the SharePoint users at your site. Two SAS Web Parts are now available:

- The SAS Central Web Part lists any SAS Visual Analytics reports that you recently opened and any favorites that you have created. It also enables you to open additional reports. These reports open in a new web browser.
  - Note: The SAS Central Web Part is available only if your site licenses SAS Visual Analytics.
- The SAS Content Viewer Web Part enables you to add SAS content such as reports, the results from a stored process, or a dashboard to your SharePoint site.

For more information, see What's New in SAS Web Parts 6.1 for Microsoft SharePoint in the SAS Web Parts for Microsoft SharePoint: User's Guide.

## SAS Web Report Studio 4.4

SAS Web Report Studio 4.4 provides enhanced totals and subtotals. It also supports several additional browsers.

For more information, see What's New in SAS Web Report Studio 4.4 in the SAS Web Report Studio: User's Guide.

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## **SAS Data Management Standard**

Starting with SAS 9.4, the SAS Data Management Standard 2.41 (or later) offering replaces the SAS Enterprise Data Integration Server offering. The SAS Data Management Standard offering includes a mix of DataFlux products, such as DataFlux Data Management Studio, DataFlux Data Management Server, and DataFlux Authentication Server, as well as SAS products, such as SAS Data Integration Studio and SAS/ACCESS. For a list of the products in this offering and its "Advanced" version, see the software product page for SAS Data Management and SAS Data Integration Server.

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For a list of SAS support for DataFlux Data Management products, see SAS Note 51665.

### **DataFlux Authentication Server**

### **DataFlux Authentication Server 3.2**

DataFlux Authentication Server supports authorization and authentication for the DataFlux Data Management products in certain SAS software offerings, such as the SAS Data Management offerings. Some components in the offerings are now configured by default to use a SAS Metadata Server instead of the Authentication Server. Other components, such as the optional SAS Federation Server, are required to use the DataFlux Authentication Server. For more information, see *DataFlux Authentication Server: Administrator's Guide*.

### **DataFlux Authentication Server 4.1**

The installation process for the UNIX and Linux operating environments now automates the configuration process for host authentication. In prior releases, this configuration process occurred after installation. After installation, authentication can be reconfigured in any operating environment.

The configuration option AdminLoginManagementPolicy now defines an administrator's ability to add, modify, or delete users with the ASBATCH utility.

DataFlux Authentication Server 4.1: Administrator's Guide now describes how to display user names in log files, rather than login names. For more information, see the product documentation page for DataFlux Authentication Server.

## **DataFlux Data Management Server**

### **DataFlux Data Management Server 2.5**

DataFlux Data Management Server runs jobs and real-time services in response to requests that are submitted by authorized SOAP/HTTP clients. DataFlux Data Management Server 2.5 runs on SAS 9.4.

Here are the primary enhancements in DataFlux Data Management Server 2.5:

- The DataFlux Data Management Server has a new server configuration and security.
- The SAS Metadata Server is configured by default for security.
- The SAS Metadata Server provides configuration options when the server starts.
- SAS Job Monitor collects job status and statistics.

### **DataFlux Data Management Server 2.6**

DataFlux Data Management Server 2.6 runs on the first maintenance release for SAS 9.4 and later releases.

Here are the primary enhancements in DataFlux Data Management Server 2.6:

- When you import objects that replace existing objects, you can now apply the permissions from the existing object to the new object.
- Objects, jobs, and services receive a default access control list (ACL) when they are added to the DataFlux Data Management Server. In the 2.6 release, the default ACL contains ALLOW or DENY permissions for lists of users and groups.
- To make batch and profile job logs more accessible to administrators and to the SAS Job Monitor, you can now specify a separate storage location for those log files.
- When you run jobs with the dmpexec command, you can now configure the log files that are generated by those job runs.
- You can now enable the capture of log data for the SOAP packets that are received and transmitted by the DataFlux Data Management Server.
- You can now validate XML in output data from real-time services.

For more information, see the software product page for DataFlux Data Management Studio and DataFlux Data Management Server.

## **DataFlux Data Management Studio**

### **DataFlux Data Management Studio 2.5**

Here are the main enhancements for DataFlux Data Management Studio 2.5:

- SAS Metadata Servers can now authenticate connections to DataFlux Data Management Servers.
- The job logs now provide run-time statistics for nodes within jobs.
- If your site has licensed SAS Environment Manager and SAS Job Monitor, then you can use a web browser to display run-time statistics for Data Management Studio jobs and the nodes within those jobs.

### **DataFlux Data Management Studio 2.6**

Here are the main enhancements for DataFlux Data Management Studio 2.6:

- enhanced interface for customizing quality knowledge bases
- new ODBC drivers for Apache Hive and Cloudera Impala
- changes to clustering
- support added for SAS Lineage Viewer
- support added for SAS Business Data Network

For more information, see the software product page for DataFlux Data Management Studio and DataFlux Data Management Server.

### **DataFlux Secure 2.5**

DataFlux Secure enables the enhancement of security for components in certain SAS software offerings, such as the Data Management offerings. The DataFlux Secure software is now installed by default, in a disabled state, together with these components. You can enable enhanced encryption, SSL/TLS protection, and FIPS compliance on your platform components. Starting with the May 2014 release, the keyconfig utility is available to assist with the configuration of SSL on the SAS Federation Server Manager.

For more information, see *DataFlux Secure 2.5 Administrator's Guide* available from the product documentation page for *DataFlux Secure*.

## SAS Quality Knowledge Base for **Contact Information**

### SAS Quality Knowledge Base for Contact **Information 22**

SAS Quality Knowledge Base for Contact Information 22 includes updates to the E-mail Parse and Standardization definitions for all locales.

In addition, these languages and locales have updates:

- English, New Zealand
- English, United States
- Danish, Denmark
- French, France
- Portuguese, Brazil

### **SAS Quality Knowledge Base for Contact Information 23**

SAS Quality Knowledge Base for Contact Information 23 introduces support for Hebrew, Israel **Date** definition

This release also includes updates for these locales:

- Portuguese, Brazil
- Spanish, Mexico
- Turkish, Turkey

For all locales, these definitions are updated:

Address (Global) parse definitions

#### E-mail match definitions

SAS Quality Knowledge Base for Contact Information 23 also includes updates for **Field Name** identification analysis and match definitions for these locales:

- All English locales
- Chinese, China
- Danish, Denmark
- German, Germany
- French, France
- Hebrew, Israel

## SAS Quality Knowledge Base for Contact Information 24

SAS Quality Knowledge Base for Contact Information 24 includes updates for the following locales and definitions:

- Portuguese, Brazil
- Spanish, Mexico
- Spanish, Spain

# **SAS Quality Knowledge Base for Contact Information 25**

SAS Quality Knowledge Base for Contact Information 25 introduces support for the English, Philippines locale.

# SAS Quality Knowledge Base for Contact Information 26

SAS Quality Knowledge Base for Contact Information 26 includes updates for these locales:

- English, Philippines
- Portuguese, Brazil
- Spanish, Mexico

New email identification, match, parse, and standardization definitions are available for all locales.

For more information, see the software product page for Quality Knowledge Base (QKB) for SAS and DataFlux.

## **Quality Knowledge Base Locales for Contact Information 2013A**

Quality Knowledge Base Locales for Contact Information 2013A introduces support for the Hebrew, Israel language and locale.

Support is updated for address-related definitions for the English, New Zealand language and locale.

## SAS Quality Knowledge Base for **Product Data 5**

SAS Quality Knowledge Base for Product Data contains extraction, parsing, standardization, and pattern analysis definitions for attributes in generic product data. This release also contains additional generic character-based standardization definitions

# Quality Knowledge Base Locales for Product Data 2013A

Quality Knowledge Base Locales for Product Data 2013A introduces support for the Italian, Italy language and locale.

Support is updated for the French and German Packaging/UOM Standardization definitions.

### **SAS Business Data Network 3.1**

A business data term list is an authoritative vocabulary that promotes a common understanding between stakeholders in an organization. SAS Business Data Network 3.1 is an application that enables you to manage a business data term list. It supports a collaborative approach to managing the following information:

- Descriptions of business terms, including their requirements and attributes
- Related source data and reference data
- Contacts (such as technical owners, business owners, and interested parties)
- Relationships between terms and processes (such as Data Management Studio jobs, services, and business rules)

By linking terms to business rules and data monitoring processes, SAS Business Data Network provides a single entry point for all data consumers to better understand their data. Data stewards, IT staff and enterprise architects can use the terms to promote a common vocabulary across projects and business units. Permissions can be set to allow only specific users to access and control the data in SAS Business Data Network.

## **SAS Data Loader 2.2 for Hadoop**

SAS Data Loader for Hadoop provides self-service big data preparation, data quality, and data integration for business analysts and data scientists. The point-and-click user interface enables users to prepare, integrate, and cleanse big data faster and easier without writing code. In addition, power users can run SAS code and data quality functions faster on Hadoop for improved productivity and reduced data movement.

SAS Data Loader for Hadoop 2.2 runs on the second maintenance release for SAS 9.4. In this release, SAS Data Loader for Hadoop enables you to query, join, profile, and transform data on Hadoop. You can move relational data sources and SAS data sets to and from Hadoop. You can parse and standardize your data inside Hadoop. Using SAS Data Loader for Hadoop, you can load data into memory for visualization or analysis. You can also run SAS code and data quality functions in parallel on Hadoop.

For more information, see the software product page for SAS Data Loader for Hadoop.

## **SAS Data Integration Studio**

### **SAS Data Integration Studio 4.7**

SAS Data Integration Studio runs on SAS 9.4. Starting with this release, you can access third-party web clients from SAS Data Integration Studio jobs. This feature enables you to programmatically access the information from these clients and use it in your data integration projects. You can also deploy many jobs at once through a new commandline interface.

### **SAS Data Integration Studio 4.8**

SAS Data Integration Studio 4.8 runs on the first maintenance release for SAS 9.4.

.Here are the main enhancements for SAS Data Integration Studio 4.8:

- new transformations that support conditional processing in jobs
- new source designer wizards for Vertica and SAP HANA
- a new, experimental transformation that incorporates SAS Decision Manager flows into jobs

### **SAS Data Integration Studio 4.9**

SAS Data Integration Studio 4.9 runs on the second maintenance release for SAS 9.4.

Here are the main enhancements for SAS Data Integration Studio 4.9:

- A new source designer wizard is available for Cloudera Impala.
- The High-Performance Analytics Transformations and Enterprise Decision Management transformation are now production.

For more information, see What's New in SAS Data Integration Studio 4.9 in SAS Data Integration Studio: User's Guide.

### **SAS Data Integration Studio 4.901**

SAS Data Integration Studio 4.901 runs on the third maintenance release for SAS 9.4.

Here are the main enhancements in SAS Data Integration Studio 4.901:

- Three new transformations are available: Fork, Fork End, and Wait For Completion nodes.
- This release includes updated support for the Hadoop (Hive), HAWQ, Impala, LASR, PI, and SASHDAT engines.
- The PI LIBNAME engine is supported.
- A new HAWQ source designer is available.

For more information, see What's New in SAS Data Integration Studio 4.901 in SAS Data Integration Studio: User's Guide.

## **SAS Data Management Console**

SAS Data Management Console is a central, web-based environment that enables you to open data management and data governance products that are installed on your system. The console enables you to set preferences for these products and to view information from them. The console's home page displays SAS products, components, and features based on the roles and capabilities that are associated with your logon.

SAS Data Management Console is included in a number of SAS Data Management and SAS MDM offerings. For more information, see the product documentation page for SAS Data Management Console.

## **SAS Data Quality Accelerator for Teradata**

### **SAS Data Quality Accelerator 2.4 for Teradata**

SAS Data Quality Accelerator for Teradata is a new product that provides in-database data quality functionality. The data quality functionality is provided as Teradata stored procedures, which enable you to perform a number of tasks, such as parsing, analyzing patterns, and generating match codes. Executing data quality operations inside the database, rather than as a separate utility outside of the database, provides the following benefits: eliminates network I/O performance, leverages multi-node architectures for linear performance gains, and makes information more secure because it never leaves the database. This product includes a Quality Knowledge Base (QKB) and tools for transferring and deploying the QKB in the Teradata database.

# SAS Data Quality Accelerator 2.5 for Teradata

SAS Data Quality Accelerator 2.5 for Teradata includes new stored procedures and changes to existing stored procedures.

SAS Data Quality Accelerator 2.5 for Teradata expands its data quality offerings by adding parsed variants of the DQ\_GENDER(), DQ\_MATCH(), and DQ\_STANDARDIZE() stored procedures. The new DQ\_GENDER\_PARSED(), DQ\_MATCH\_PARSED(), and DQ\_STANDARDIZE\_PARSED() stored procedures accept pre-parsed data as input instead of a single input string.

This release also adds pre-parsed support, informational, and session-management stored procedures.

- The pre-parsed support stored procedures create and manage token-to-column mappings that serve as input to the DQ\_OPERATION\_PARSED() stored procedures.
- The informational stored procedures list the locales and SAS Quality Knowledge Base definitions that are available to the SAS Data Quality Accelerator for Teradata session.
- The stored procedure for session management can cause the stored procedures to overwrite existing output tables instead of appending data to them.

## SAS Data Quality Accelerator 2.6 for Teradata

SAS Data Quality Accelerator 2.6 for Teradata includes internal enhancements that provide improved memory management and streamline the software infrastructure.

For more information, see the product documentation page for SAS Data Quality Accelerator for Teradata.

### **SAS Data Quality Accelerator 2.7 for Teradata**

SAS Data Quality Accelerator 2.7 for Teradata includes enhancements that make it compatible with the most recent versions of underlying SAS in-database technologies. As a result, the way that the software is installed in the Teradata database has changed.

The documentation has also changed. Post-installation configuration and administration instructions for the accelerator are now published in the "Administrator's Guide for Teradata" section in SAS In-Database Products: Administrator's Guide instead of in SAS Data Quality Accelerator for Teradata: User's Guide.

## **SAS 9.4 Data Quality Server**

SAS Data Quality Server consists of SAS language elements that perform data quality operations (matching, standardization, and so on), as well as elements that interoperate with the DataFlux Data Management Server. SAS Data Quality Server is delivered with a sample Quality Knowledge Base (QKB), which is available from SAS.

SAS 9.4 Data Quality Server communicates with components in certain SAS offerings, such as the SAS Data Management offerings, 2.41 and later, to provide an integrated system. SAS Data Quality Server is also a key component of the SAS Data Quality offerings.

In the third maintenance release for SAS 9.4, the SAS Data Quality Server is enhanced with the DQLOCLST procedure. The DQLOCLST procedure creates a data set that includes the list of locales in the Quality Knowledge Base that is named by the SAS option DQSETUPLOC.

In the third maintenance release for SAS 9.4, the SAS Data Quality Server is upgraded to synchronize results with DataFlux Data Management Studio 2.7.

For more information, see What's New in SAS 9.4 Data Quality Server in SAS Data Quality Server: Reference.

### **SAS Data Remediation**

### **SAS Data Remediation 2.1**

SAS Data Remediation enables users to manage and correct issues that are triggered by business rules in SAS MDM batch jobs and real-time processes. Data remediation allows user- or role-based access to data exceptions, which are categorized by application and subject area. Once data remediation issues have been reviewed, they can be corrected through the same application, eliminating the need for another user to complete the correction process.

SAS Data Remediation works in conjunction with SAS MDM, SAS Task Manager, and other SAS data management products.

### **SAS Data Remediation 2.2**

SAS Data Remediation 2.2 now includes a group-by functionality. There were enhancements to the remediation plug-in. SAS Data Remediation 2.2 includes a new overview portlet and the ability to view reports for SAS Visual Analytics. You can now save your preferences in SAS Data Remediation 2.2.

For more information, see the product documentation page for SAS Data Remediation.

## **SAS Data Surveyor 5.1 for SAP**

SAS Data Surveyor 5.1 for SAP includes new functions for semantically partitioned objects (SPO) and SAP HANA-optimized InfoCubes.

For more information, see the software product page for SAS Data Surveyors.

### **SAS Federation Server**

#### About SAS Federation Server

SAS Federation Server provides the business ability to quickly build virtual views of data from multiple sources, without moving or copying the data. It also supports data caching for frequently used data, which can result in improved query performance. The security features for SAS Federation Server include data masking, row-level security, and centralized access for improved governance.

### SAS Federation Server 3.2

DataFlux Federation Server is now SAS Federation Server. This renaming is a result of the recent integration of DataFlux products into the SAS suite of data quality, data integration, data governance, and master data management solutions.

In-Memory Data Store (MDS) is a transactional in-memory data store that can be implemented on SAS Federation Server.

Privilege caching is offered as a tool for streamlining privilege determination, which results in improved performance.

For more information, see What's New in SAS Federation Server 3.2 in SAS Federation Server: Administrator's Guide.

### **SAS Federation Server 4.1**

Here are the main enhancements for SAS Federation Server 4.1.

- There are four new drivers:
  - SAS Federation Server Driver for SAP HANA
  - SAS Federation Server Driver for Netezza
  - SAS Federation Server Driver for PostgreSQL

- □ SAS Federation Server SASHDAT Data Source Driver
- SAS Federation Server delivers a new data masking function as a method of 'deidentifying' sensitive information within data sources.
- The SQL language scripting capabilities handle administrative needs for start-up and shutdown events.
- New API (which is implemented as a REST interface) supports interacting with and managing SAS Federation Server.

For more information, see What's New in SAS Federation Server 4.1 in SAS Federation Server: Administrator's Guide.

### **SAS Job Monitor**

### **SAS Job Monitor 2.1**

SAS Job Monitor is a plug-in for SAS Environment Manager that integrates information from SAS Data Integration Studio, DataFlux Data Management Server, and specific jobs from DataFlux Data Management Studio. Using SAS Job Monitor, you can oversee the state of jobs that are run from these applications.

SAS Job Monitor reads job logs at specified locations and displays run-time statistics from the logs, enabling you to monitor status information and performance statistics. Using the jobs table, you can view historical run times and also drill down to a job for details, trends, and status.

Help is available from within the product.

### **SAS Job Monitor 2.2**

Job Monitor 2.2 provides additional parameters to configure an environment locale.

The Job Monitor agent plug-in uses its language and country settings to parse the log for SAS Data Integration Studio. (The default values for the language and country settings come from the machine on which the agent is running.) The language and

country settings have to match between the Job Monitor agent and SAS Data Integration Studio. To override the language, country, and variant used by the Job Monitor agent plug-in, new options were added to the user interface. These options override the agent plug-in's settings for Data Integration Studio. In addition, an encoding option was added for both SAS Data Integration Studio and SAS Data Management Server jobs, to override the agent plug-in's setting.

## **SAS Lineage 3.1**

SAS Lineage 3.1 is a web-based diagram component for visualizing relationships between objects. It is used as a stand-alone lineage and relationship viewer that can be accessed by SAS database management and business intelligence applications. The component has two modes: first, a network diagram displays all relationships. Second, two left-to-right dependency diagrams are available: one that displays data governance information (governance) and another that displays parent and child relationships only (impact analysis). The relationship information displayed in these diagrams is drawn from the Relationship database that is a part of the Web Infrastructure Platform Data Server.

### **SAS MDM**

### **SAS MDM 4.1**

SAS MDM is a product that integrates master data management technologies with those in SAS 9.4. SAS MDM is a web-based application that provides a single, accurate, and unified view of corporate data, integrating information from various data sources into one master record. SAS enables you to develop master data management processes. SAS provides the technology required to analyze existing data resources, build a unified view of that information, and manage that master view of data over time. The latest release features performance enhancements and integration with SAS metadata.

SAS MDM works in conjunction with SAS Data Remediation, SAS Task Manager, SAS Visual Process Orchestration, and other SAS data management products.

#### **SAS MDM 4.2**

SAS MDM 4.2 includes new features and enhancements in these areas:

- reports for SAS Visual Analytics
- source system management functionality
- process control enhancements
- relationship type attributes
- cross-field clustering
- source system harmonization

For more information, see the product documentation page for SAS MDM.

## **SAS Task Manager**

### **SAS Task Manager 2.1**

SAS Task Manager is a complementary application to others, such as SAS MDM, that integrates with SAS Workflow technologies. It gives users direct access to a workflow that might have been initiated from another SAS application. Users can start, stop, and transition workflows that have been uploaded to the SAS Workflow server environment.

SAS Task Manager works in conjunction with SAS MDM, SAS Data Remediation, and other SAS data management products.

### **SAS Task Manager 2.2**

The main enhancement for SAS Task Manager 2.2 is four new user preferences.

For more information, see the product documentation page for SAS Task Manager.

### **SAS Visual Process Orchestration**

### **SAS Visual Process Orchestration 2.1**

SAS Visual Process Orchestration is a web authoring environment that is launched from SAS Data Management Console. The authoring environment provides nodes that can be used to build orchestration jobs, which are process jobs that run other jobs.

An orchestration job can integrate executable files from various systems into a single process flow. A single orchestration job can run one or more executable files, such as SAS Data Integration Studio jobs, DataFlux Data Management Studio jobs, SAS code files, third-party programs, scripts, and web services. SAS Visual Process Orchestration can execute referenced jobs in parallel; apply control logic such as looping and IF/ THEN/ELSE handling; and handle events, error-checking, and run-time statistics for each node in the orchestration job.

SAS Visual Process Orchestration Server provides a Design Server and a Run-time Server to coordinate enterprise development and execution of orchestration jobs. The Design Server supports the development of orchestration jobs by using separate threads, file locking, and test execution. The Run-time Server triggers the execution of orchestration jobs in response to requests that are submitted by authorized SOAP/ HTTP clients.

### SAS Visual Process Orchestration 2.2

SAS Lineage is a web client that enables you to view the lineage of sources and targets in a job. If the SAS Relationship Content Service has been enabled, you can export lineage metadata from SAS Visual Process Orchestration to the service, where it can be accessed by SAS Lineage.

The documentation for SAS Visual Process Orchestration has been enhanced for these topics:

logging on to SAS Data Management Console. The logon topic now describes a number of ways to access that application.

configuring SAS Job Monitor for SAS Visual Process Orchestration jobs. If your site has licensed SAS Environment Manager and SAS Job Monitor, then you can use a web browser to display run-time statistics for SAS Visual Process Orchestration jobs. The topic for SAS Job Monitor now includes more details about configuring that application for Orchestration jobs.

For more information, see the product documentation page for SAS Visual Process Orchestration.

## SAS Customer Intelligence

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## **SAS Marketing Automation**

### **SAS Marketing Automation 6.3**

SAS Marketing Automation 6.3 has changes and enhancements in these areas:

- fault tolerance through middle-tier clustering
- multiple SAS Customer Intelligence Studio windows
- business context database upload options
- Reports workspace
- diagram nodes

- previewing export files
- generating diagram documents

### **SAS Marketing Automation 6.4**

SAS Marketing Automation 6.4 has changes and enhancements in these areas:

- publishing campaigns
- refining output
- staging treatments
- additional supported databases

For more information, see the software product page for SAS Marketing Automation.

## **SAS Marketing Optimization**

### **SAS Marketing Optimization 6.3**

SAS Marketing Optimization 6.3 has changes and enhancements in these areas:

- double-byte character support for input data tables
- enhanced agent scalability option for scenarios
- enhanced reporting data output options
- consistent scaling for sensitivity analysis
- SAS Visual Analytics reporting services

### **SAS Marketing Optimization 6.4**

SAS Marketing Optimization 6.4 has changes and enhancements in these areas:

- publication of solution tables to the SAS Marketing Optimization LASR Analytic Server
- editable pre-populated constraints
- score code generation for some types of scenarios
- optimization of prioritization scenarios
- improved implementation of the optimization algorithm

For more information, see the software product page for SAS Marketing Optimization.

## **SAS Real-Time Decision Manager**

### **SAS Real-Time Decision Manager 6.3**

SAS Real-Time Decision Manager 6.3 has changes and enhancements in these areas:

- fault tolerance through middle-tier clustering
- multiple SAS Customer Intelligence Studio windows
- diagram nodes
- campaigns
- treatments
- calculated variables

### **SAS Real-Time Decision Manager 6.4**

SAS Real-Time Decision Manager 6.4 has changes and enhancements in these areas:

- campaign deployment
- configuration of run-time services
- documents and reporting
- treatments
- variables and custom processes

For more information, see the software product page for SAS Real-Time Decision Manager.

## SAS Financial Management

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## **SAS Financial Management**

### **SAS Financial Management 5.4**

SAS Financial Management 5.4 introduces process management support, data validation, and enhanced data entry and reporting options. Process Management is a new SAS Financial Management framework that enables administrators and users to perform these tasks

- define and manage company-specific business processes
- automate key Financial Management tasks
- view the status of processes and tasks, and identify and resolve delays and other problems

Process management also includes user notification at the business process and task levels, commenting, and audit history.

### **SAS Financial Management 5.5**

SAS Financial Management 5.5 includes several performance improvements, such as leveraging standby and failover support. This support is provided by the SAS Web Server to implement a high availability configuration.

SAS Financial Management 5.5 now includes SAS Visual Analytics Viewer from which you can launch your reports. Content promotion has been expanded to support the promotion of several new objects. This release includes enhancements to forecasting and expanded auto-allocation functionality.

For more information, see the software product page for SAS Financial Management.

# SAS Fraud and Compliance Products

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# **SAS Anti-Money Laundering**

#### **SAS Anti-Money Laundering 6.1**

SAS Anti-Money Laundering 6.1 runs on SAS 9.4 and has these new features:

- streamlined user interface to provide consistent user experience throughout the portfolio and improved integration among the applications.
- scenario promotion that enables the user to export and import scenarios and associated headers, to download .spk (SAS package) files to a local machine, and to import to a separate system.

- configurable workflow that displays a task list with available transitions and a visual diagram of the workflow states and transitions. The workflow also provides task lists that are shown on the Investigator and Manager Home screens and a completion report that indicates which rules were updated and created.
- Related Entities Visualization that enables additional regulatory reporting support for select forms within the FinCEN, FinTRAC, and AUSTRAC regulatory agencies.
- integration with the SAS Customer Due Diligence solution. This feature provides transparency between an institution's SAS Anti-Money Laundering and Customer Due Diligence activities.

#### **SAS Anti-Money Laundering 6.2**

SAS Anti-Money Laundering 6.2 has new sample scenarios for Correspondent Banking to take advantage of the enhancements to the SAS Anti-Money Laundering data model. This release also includes a new relationship grid to quickly assess details about parties that are associated with the Correspondent Banking behavior.

#### **SAS Anti-Money Laundering 6.3**

SAS Anti-Money Laundering 6.3 includes SAS Visual Analytics Administrator and Reporting, which enables out-of-the-box reporting for alerts. Starting with this release, regulatory reports are pre-populated with subject information, and the process for electronically filing reports is automated. In addition, user interface enhancements enable you to page all data grids, export transactions to a CSV file, work with a redesigned interface for entering notes, and perform multi-column sorting. Also, the integration of Apache Solr enhances search capabilities.

For more information, see the software product page for SAS Anti-Money Laundering.

# **SAS Customer Due Diligence**

#### **SAS Customer Due Diligence 6.1**

SAS Customer Due Diligence enables you to understand a customer's profile and to establish an expectation about the customer's behavior. SAS Customer Due Diligence collects data and performs risk rating and profiling on customers who are at risk to be involved in fraud, money laundering, or other illegal activities. Risk rating helps financial institutions meet the compliance requirements that are set by government and regulatory organizations.

#### **SAS Customer Due Diligence 6.2**

SAS Customer Due Diligence 6.2 includes a new strategy rule to incorporate the scoring of new customers. This release also includes an improved manual case creation process and case links to previously created parties.

#### **SAS Customer Due Diligence 6.3**

SAS Customer Due Diligence 6.3 includes a new strategy rule to incorporate the scoring of regulatory reports. The integration of Apache Solr enhances search capabilities. In addition, user interface enhancements enable you to page all data grids, export transactions to a CSV file, work with a redesigned interface for entering notes, and perform multi-column sorting.

For more information, see the software product page for SAS Customer Due Diligence.

# **SAS Peer Group Analysis 6.1**

SAS Peer Group Analysis compares an entity's (account or party) current behavior with that of its historical behavior and also its peers' behavior. SAS Peer Group Analysis

provides a process to build a prep data set, which can be used by SAS Peer Group Analysis headers and scenarios. Alerts that are generated by SAS Peer Group Analysis scenarios can be displayed in the user interface and can include fields that are specific to SAS Peer Group Analysis in the alert details screen.

SAS Peer Group Analysis is an add-on to SAS High-Performance Anti-Money Laundering.

For more information, see the software product page for SAS Anti-Money Laundering.

# **SAS Social Network Analysis Server 6.2**

SAS Social Network Analysis Server 6.2 includes performance enhancements and updates. Here are some of the updates in this release:

- performance enhancements to the social network analysis diagram
- administrator-enabled network legend for the social network analysis diagram

The first maintenance release for SAS Social Network Analysis Server 6.2 includes the addition of an export feature that enables users to export alerts and designated columns directly from the Alerts window.

This release also includes expanded development and configuration features for analysts, administrators, and installers. Here are some of those features:

- a new method of plug-in development
- integration with SAS Management Console Configuration Manager and SAS
   Preferences to promote ease of configuration and management, and the addition of new configuration parameters to control the user experience
- streamlined post-installation and configuration process

In the first maintenance release for SAS Social Network Analysis Server 6.2, you can now use a custom URL to direct users to a specific Alert Details window within a defined alert series. The second maintenance release for SAS Social Network Analysis Server 6.2 includes these enhancements and operational changes:

- You can easily adjust the column widths for all of the table data.
- In the Alerts window, you can save multiple custom views that are related to a specific alert series. You can also manage the views through the solution interface.
- The Export feature now includes alert details.

For more information, see the software product page for SAS Social Network Analysis.

# SAS In-Database Products

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#### **SAS 9.4 In-Database Products**

Beginning with SAS 9.4, in-database processing has been enhanced by the addition of the SAS In-Database Code Accelerator. The SAS In-Database Code Accelerator enables you to publish a DS2 thread program to the database and execute the thread program in parallel inside the database.

In-database scoring for Netezza has been enhanced by the addition of the SAS Embedded Process. The SAS Embedded Process is a SAS server process that runs within Netezza to read and write data.

In the July 2013 release, in-database scoring is supported for the SAS Scalable Performance Data Server.

In the September 2013 release, in-database processing for Hadoop was enhanced by the addition of the SAS Scoring Accelerator for Hadoop. Also, in the September 2013 release, the autocall macros that initialized the publishing macros are no longer needed for any DBMS. However, the autocall macros are still supported.

In the December 2013 release, the SAS In-Database Code Accelerator for Teradata now can run the DS2 data program as well as the thread program inside the database. Also, for the SAS In-Database Code Accelerator, the default behavior has changed from the 9.4 release. DS2 code no longer executes inside the database by default. The DS2ACCEL system option and the PROC DS2 DS2ACCEL option control this behavior.

DATA step processing in Hadoop is now preproduction, so limited DATA step programs can be run inside Hadoop for scoring.

In the August 2014 release, the SAS Scoring Accelerator for SAP HANA is now available, and running limited DATA step scoring programs in Hadoop is now production. Also, numerous changes were made to the installation and configuration script for the SAS Embedded Process for Hadoop.

In the February 2015 release, the SAS In-Database Code Accelerator for Hadoop uses HCatalog to process complex, non-delimited files. Using HCatalog enables the SAS In-Database Code Accelerator for Hadoop to support Avro, ORC, RCFile, and Parquet file types. In addition, you can now use the DBCREATE\_TABLE\_OPTS table option to specify the output SerDe, the output delimiter of the Hive table, the output ESCAPED BY character, and any other CREATE TABLE syntax allowed by Hive.

In the July 2015 release, the SAS In-Database Scoring Accelerator for Hadoop now supports the SPD Engine HDFS file format. All of the SAS In-Database Code Accelerators support a SET statement with embedded SQL, a SET statement with multiple input tables, and a MERGE statement. The run and publish model macros for the SAS Scoring Accelerator for Hadoop now support the SAS\_HADOOP\_CONFIG\_PATH environment variable. This support eliminates the need for a merged configuration file. The SAS Scoring Accelerator for Hadoop, SAP HANA, and Teradata supports model scoring by using item stores.

The installation and configuration of the SAS Embedded Process for Hadoop has been improved and simplified:

- For Cloudera and Hortonworks, Cloudera Manager and Ambari are used to install the SAS Embedded Process and the SAS Hadoop MapReduce JAR files.
- For IBM BigInsights, MapR, and Pivotal HD, the in-database deployment package is delivered to the client from the SAS Install Depot.

In addition, the SAS Embedded Process and the SAS Hadoop MapReduce JAR files are installed with one script instead of two separate scripts. The new process has a smaller client footprint and is a faster installation.

The SAS Embedded Process for Hadoop has been rewritten and no longer runs as a Linux service. The SAS Embedded Process for Hadoop now supports IBM BigInsights,

MapR, and Pivotal HD Hadoop distributions. The installation and configuration of the SAS Embedded Process for Teradata has been improved and simplified. The indatabase deployment package is delivered to the client from the SAS Install Depot. The new process has a smaller client footprint and is a faster installation.

For more information, see What's New in the SAS 9.4 In-Database Products in SAS In-Database Products: User's Guide.

# SAS Integration Technologies

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# **SAS 9.4 Integration Technologies**

SAS Integration Technologies includes the following enhancements:

- SAS Stored Processes introduces new features for the STP procedure and the SAS Stored Process Web Application, as well as general enhancements.
- SAS BI Web Services includes an update for RESTful web services.
- SAS Publishing Framework has added support for circular integrity constraints and extended attributes. If you are publishing to SharePoint or WebDAV, SSL setup can be done using TKESSL. In addition, event publishing is obsolete, and the event publishing documentation has been removed.
- Directory Services includes new TLS\_MODE\_ON and TLS\_MODE\_OFF options for the LDAPS\_OPEN CALL routine.
  - In the first maintenance release for SAS 9.4 Integration Technologies, the new PagedResults argument for the LDAPS\_SEARCH CALL routine can be used to specify the number of results on a page of output.
- Application messaging provides a new ACTIVEMQ file access method and two new arguments for the CLOSEQUEUE CALL routine.

In SAS Foundation Services, the Event Broker Service is no longer available.

For more information, see the software product page for SAS Integration Technologies.

#### **SAS Workflow Studio 1.3**

SAS Workflow Studio 1.3 has the following enhancements:

- support for SAS Web Infrastructure Platform privileges and roles and for web-layer permissions. Run-time access control is no longer dependent on SAS metadata and has been updated to support more granular privileges.
- a new dialog box that enables workflow template owners to specify permissions for individual templates.
- improved workflow template validation, such as verification of mandatory policy properties.
- a new dialog box that displays the workflow tree for two versions of a template sideby-side. This dialog box enables you to easily evaluate the differences between the two versions of the template.
- a new policy, Submit a JES Job, that enables you to execute code that has been registered with the SAS Job Execution Service.
- a new policy action, Invoke REST Web Service.
- two new properties, Error Code and Error Message, for the Invoke Web Service policy, which supports business logic based on potential error conditions.
- support for Date data objects in timer expressions. Using Date data objects allows the dynamic use of datetime values at run time. Also, with Date data objects, you can now enter negative relative offsets, which trigger actions prior to the date that was specified by the data object.
- support for a new TODAY function in decision gateway expressions. This function retrieves the current datetime system value, which enables you to specify a specific date offset from the current date.

# SAS Intelligence Platform

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# **SAS Environment Manager**

#### **About SAS Environment Manager**

SAS Environment Manager is a new monitoring and management system for SAS deployments. Features include automatic resource discovery, monitoring of remote systems, personal and role-based dashboards, alerting, and visualization. The application provides web-based management, operation, and proactive monitoring of servers on both the middle tier and the SAS server tier. SAS Environment Manager incorporates some of VMware's Hyperic technology in order to offer enterprise-class operational features.

#### **SAS Environment Manager 2.3**

In the <u>first maintenance release</u> for SAS 9.4, SAS Environment Manager includes the ability to manage folders and to view and change authorization settings in SAS metadata.

In the second maintenance release for SAS 9.4, SAS Environment Manager includes the ability to create and update access control templates (ACTs). ACTs enable you to avoid repeatedly adding the same explicit controls for the same identities on multiple objects. When you apply an ACT to an object, the pattern settings in an ACT are added to the direct controls of an object.

For more information, see What's New in SAS Environment Manager 2.3 in SAS Environment Manager: User's Guide.

#### **SAS Environment Manager 2.4**

SAS Environment Manager 2.4 runs on the second maintenance release for SAS 9.4.

Here are some of the new features and enhancements for this release:

The SAS Environment Manager Service Management Architecture provides functions and capabilities that enable SAS Environment Manager to fit into a service-

- oriented architecture (SOA). These functions include SAS Environment Manager Extended Monitoring, Audit, Performance, and Measurement (APM) ETL; Agent-Collected Metric (ACM) ETL; and a solution kit framework.
- SAS Environment Manager provides services that enable you to import and export event data.
- Environment Snapshot contains a comprehensive list of the system information in the SAS Environment Manager database. This snapshot provides you with valuable information about your system.
- SAS Environment Manager 2.4 also includes a facility that enables you to manage user definitions in SAS metadata. The user administration features in SAS Environment Manager enable you to create and maintain users, groups, and roles. You can also manage memberships, logins, and internal accounts.

For more information, see What's New in SAS Environment Manager 2.4 in SAS Environment Manager: User's Guide.

#### **SAS Environment Manager 2.5**

SAS Environment Manager 2.5 runs on the third maintenance release for SAS 9.4.

Here are some of the new features and enhancements for this release:

- Support has been added in SAS Environment Manager Administration for managing metadata definitions for SAS users, servers, and libraries. User definitions can be viewed, created, and edited. Server and library definitions can be viewed, and SAS LASR libraries and servers and Base SAS libraries can be created and edited.
- The stored process reports in the Report Center have been replaced with stored process prompts. Using stored processes enables you to generate reports based on criteria that you select, and provides for greater customization of the report parameters.
- The SAS Environment Management Data Mart now supports a federated data mart. A federated data mart enables you to collect metric data in data marts for several SAS deployments, copy that data to a single collector deployment, and view the collected metric data in one place.

- Log collection and discovery has been improved. Rather than relying on log locations that are stored in metadata, the ETL processes look through the directory structure of a SAS deployment to find log files.
- Support has been added for collecting metric data from a SAS grid. Metric data is collected and reported upon for the grid and for individual grid nodes.
- The new SAS Backup Manager is available on the **Administration** tab. For more information, see "New Backup Tools" on page 151.

For more information, see What's New in SAS Environment Manager 2.5 in SAS Environment Manager: User's Guide.

# **SAS 9.4 Intelligence Platform**

# SAS Web Server and SAS Web Application Server

Starting with SAS 9.4, the middle-tier software includes SAS Web Server for use as an HTTP server and SAS Web Application Server, so that a third-party web application server is no longer needed. SAS Web Application Server is a lightweight server that provides enterprise-class features for running SAS web applications. The SAS deployment tools can configure these servers automatically. The tools simplify the configuration of vertical and horizontal clustering as well as HTTP load balancing.

Starting with the third maintenance release for SAS 9.4, SAS has made changes that are expected to result in a 40% to 50% decrease in start-up time for SAS Web Application Server.

# **Metadata Server Clustering**

The new metadata server clustering feature provides redundancy and high availability of the metadata server, which is a core component of the SAS infrastructure. Clustering ensures that the server continues to operate if a server host machine fails.

Effective with the second maintenance release for SAS 9.4, metadata server clustering is supported on z/OS. In previous SAS 9.4 releases, it is supported only on UNIX and Windows.

#### **New Backup Tools**

The new Deployment Backup and Recovery tool provides an integrated method for backing up and recovering SAS content across multiple tiers and machines.

The third maintenance release for SAS 9.4 includes SAS Backup Manager, which is an easy-to-use interface for scheduling, configuring, monitoring, and performing integrated backups. The interface incorporates most of the functions of the Deployment Backup and Recovery tool's batch commands. SAS Backup Manager can be accessed from the **Administration** tab of SAS Environment Manager.

#### **New Batch Tools for Relationship Reporting**

The first maintenance release for SAS 9.4 includes new batch tools for relationship reporting. You can use these tools to identify relationships among the content objects in the SAS Folder tree.

The second maintenance release for SAS 9.4 includes a new batch command that you can use to run the metadata analyze and repair tools that are available in SAS Management Console.

The third maintenance release for SAS 9.4 includes a new batch command that enables you to use SAS Metadata Bridges to load third-party lineage information to the SAS Relationship Service.

#### **Security Enhancements**

The following security enhancements are included in SAS 9.4:

You can now use either SAS Management Console or the AUTHLIB procedure to bind SAS data to metadata. All access from SAS to metadata-bound data is subject to metadata-layer permissions.

- The first maintenance release for SAS 9.4 provides the ability to put a SAS server in a locked-down state, ensuring that the process can access only designated resources in the host operating environment. For more information, see "Locked-down State" on page 22.
- In the second maintenance release for SAS 9.4, Integrated Windows Authentication on Linux systems no longer requires the use of Quest Authentication Services. SAS can leverage the libraries that are shipped with the supported operating system or that are provided in most third-party authentication solutions.
- The third maintenance release for SAS 9.4 provides these enhancements:
  - the ability to audit internal accounts on the middle tier
  - the ability to specify a whitelist of sites that are allowed to link to SAS web applications
  - improved Transport Layer Security
  - □ Windows Challenge/Response (NTLM) support for proxy authentication

For additional information, see "Audit and Report More about SAS and SAS Applications" on page 25.

#### **Smaller WAR Files for SAS Web Applications**

Starting with the third maintenance release for SAS 9.4, some SAS web applications no longer include JAR files, which makes the corresponding WAR files smaller. The web applications that support this feature now load the common JAR files from a central repository in the SASHome directory instead of including copies of the files in the WAR file. This change results in a smaller configuration area.

### **DataFlux Integration**

Beginning in 2012, SAS has fully integrated the DataFlux suite of data quality, data integration, data governance, and master data management solutions. SAS data management offerings now include products with the DataFlux name, such as Data Management Studio, as well as other SAS products, including Base SAS, SAS/ACCESS interfaces, and the SAS Metadata Server.

When SAS integrated the DataFlux product line into SAS offerings, some products such as SAS MDM and SAS Federation Server were enhanced and rebranded. Other products have retained the DataFlux name but continue to be enhanced and adapted to SAS. Support for SAS Metadata Server has been added to DataFlux Data Management Studio on an incremental basis. For example, DataFlux Data Management Studio 2.5 and 2.6 can use either DataFlux Authentication Server or SAS Metadata Server for user authentication.

New SAS offerings, including the comprehensive SAS Data Management Advanced and Standard offerings, replace offerings such as SAS Enterprise Data Integration Server. These offerings enable customers to choose from a broader array of data management products and enable them to add SAS products such as SAS LASR Analytic Server and SAS Visual Analytics Administration and Reporting.

#### **Changes to Migration and Deployment**

In the first maintenance release for SAS 9.4, a feature has been added that identifies those versions of SAS offerings that are unable to be migrated directly to SAS 9.4 with the SAS Migration Utility. The Migration Utility Analysis Report identifies which products to update in order to prepare them for migration.

In the second maintenance release for SAS 9.4, the SAS Deployment Wizard enables you to specify the size of your web application based on the number of users and workload. In addition, the SAS Deployment Wizard provides an option to install only the newly released documentation.

In the third maintenance release for SAS 9.4, several features have been added to the SAS Deployment Wizard:

- If the wizard is interrupted and then restarted during the installation phase, it will install only those SAS products that it has not already installed.
- The wizard enables you to reduce the number of password prompts for required SAS internal accounts, metadata-based server accounts, and SAS Web Infrastructure Data Server accounts.

In the third maintenance release for SAS 9.4, support has also been added for compressing and validating SAS Software Depots. In addition, the SAS Migration Utility has been enhanced to protect passwords in the migration package from being exposed.

#### **General Enhancements**

- In SAS 9.4, users can view some SAS Web Report Studio relational reports on mobile devices with SAS Mobile BI. In addition, users can manage mobile access permissions through the use of whitelisting and blacklisting devices.
- Beginning in October 2014, new roles and capabilities are available for the SAS Add-In 7.1 for Microsoft Office and SAS Enterprise Guide 7.1.
- Starting with the third maintenance release for SAS 9.4 and the release of SAS Visual Analytics 7.2, Visual Analytics Hub is a sibling of Visual Analytics, immediately below SAS Application Infrastructure. This adjustment to the software architecture is reflected on the **Plug-ins** tab in SAS Management Console.

#### **Additional Information**

For more information, see these What's New topics:

- What's New in Installation and Configuration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Installation and Configuration Guide
- What's New in Migration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Migration Guide
- What's New in Application Server Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Application Server Administration Guide
- What's New in System Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: System Administration Guide
- What's New in Desktop Application Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Desktop Application Administration Guide
- What's New in Security Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Security Administration Guide

- What's New in Middle-Tier Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Middle-Tier Administration Guide
- What's New in Data Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Data Administration Guide
- What's New in Web Application Administration for the SAS 9.4 Intelligence Platform in the SAS Intelligence Platform: Web Application Administration Guide

#### **SAS Information Retrieval Studio 1.53**

SAS Information Retrieval Studio 1.53 provides SSL support for search.

For more information, see "Updates to SAS Information Retrieval Studio for SSL" in SAS Intelligence Platform: Middle-Tier Administration Guide.

# **SAS Theme Designer for Flex**

#### **SAS Theme Designer 4.1 for Flex**

For SAS Theme Designer 4.1 for Flex, the SAS Corporate theme is now the default theme, which has been updated with a new color palette that is based on a navy blue palette.

You can now access SAS Theme Designer for Flex from the SAS Visual Analytics Hub to create custom themes. In addition, report themes are now automatically created when a custom application theme is created in SAS Theme Designer for Flex. These custom report themes can then be used in SAS Visual Analytics reports.

#### **SAS Theme Designer 4.2 for Flex**

The User Interface Components pane and the Properties pane have been combined into a single pane for SAS Theme Designer 4.2 for Flex. The User Interface **Components** pane now contains all components to create or modify a theme. In

addition, you can now customize the font style for a theme. In the **User Interface Components** pane, the **Global Settings** option now contains a setting for **Font**.

The name for a theme is now assigned when you are saving or saving and deploying a theme. And, when a theme is deployed, undeployed, or deleted in SAS Theme Designer 4.2 for Flex, the list of available themes is immediately updated in applications that use Flex themes.

For more information, see What's New in SAS Theme Designer 4.2 for Flex in SAS Theme Designer for Flex: User's Guide.

#### **SAS Theme Designer 4.7 for Flex**

You can now access SAS Theme Designer 4.7 for Flex from a new Sign-In Screen. When accessing SAS Theme Designer 4.7 for Flex from the SAS Visual Analytics 7.2 Home page, the **Home** banner enables you to select the **SAS Theme Designer** (**Classic**) option. When you select this option, the SAS Theme Designer for Flex opens.

# SAS IT Resource Management

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# **SAS IT Resource Management**

#### **SAS IT Resource Management 3.4**

SAS IT Resource Management 3.4 became available in December 2013. In this release, you can use exception analysis processing to define, evaluate, detect, and report on exceptional conditions in IT data marts. Also new in this release is the ITRM Report Center web application used to view, organize, filter, and share SAS IT Resource Management performance and exception reports. Integration with SAS Visual Analytics was added through macros that enable you to load and update ITRM tables into the SAS LASR Analytic Server. There is a new wizard to add domain categories to an existing staging transformation. As is true for all releases, there are also multiple adapter updates.

#### **SAS IT Resource Management 3.5**

SAS IT Resource Management 3.5 became available in September 2014. In this release, upon request, SAS Visual Analytics and the in-memory SAS LASR Analytic Server can be included with the solution. Reference documentation about installing and

configuring SAS IT Resource Management without the SAS middle tier is available in *Guide to Operating SAS IT Resource Management 3.5 without a Middle Tier.* Version updates as well as enhanced support capabilities are provided for multiple adapters with this release. As is true for all releases, there are also multiple adapter updates.

#### **SAS IT Resource Management 3.6**

SAS IT Resource Management 3.6 became available in May 2015. In this release, two new adapters are provided: SAS Environment Manager and ASG TMONDB2 V5. As with earlier releases, there are also multiple adapter updates. In addition, the copy function of ITRM Report Center is enhanced.

For more information, see *What's New in SAS IT Resource Management* from the product documentation page for SAS IT Resource Management.

# SAS Risk Management

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# **SAS Enterprise GRC 6.1**

SAS shipped SAS Enterprise GRC 6.1 in October 2014.

This release has added several new features, which include, but are not limited to the following:

- The procedure to install SAS Enterprise GRC and its dependent products has been simplified.
- SAS Enterprise GRC 6.1 now integrates with SAS Visual Analytics. Users can now shift between the SAS Enterprise GRC and SAS Visual Analytics user interfaces for managing and running reports. In addition, two new SAS Visual Analytics reports are provided by default.
- New security features have been added to protect the server from malicious web traffic.

- Attachments can now be filtered by name and file type.
- Updates have been made to screen definitions and workflows to improve usability and performance.
- Several new data loaders have been added.

For more information, see the software product page for SAS Enterprise GRC.

### SAS OpRisk VaR 6.1

SAS OpRisk VaR 6.1 enables you to perform incremental data load, incremental VaR calculation, and reporting using web services rather than the user interface. New reports in this release include FFIEC – Schedule 5 and COREP – Operational Risk.

Here are the enhanced analytics in this release:

- the ability to compute the effect of one additional large loss on VaR
- the ability to model the severity of your losses by combining two lognormal distributions

The second maintenance release for SAS OpRisk VaR 6.1 shipped in May 2015. Here are some of the new features and enhancements in this release:

- Custom scaling enables you to define your own scale factors for internal data.
- Single loss approximation to VaR enables you to quickly learn how different modeling choices affect the VaR.
- Additional dependence structure options provide you with increased flexibility in specifying the dependence structure for a simulation.

For more information, see the software product page for SAS OpRisk VaR.

#### **SAS Risk Dimensions**

SAS Risk Dimensions 6.1, 6.2, 6.3, 6.4, and 6.5 run on SAS 9.4. Here are some highlights for these releases:

- SAS Risk Dimensions 6.1 includes infrastructure changes to support SAS High-Performance Risk 3.1 and SAS Risk Management for Banking 3.2.
- SAS Risk Dimensions 6.5 includes infrastructure changes to support SAS High-Performance Risk 3.5 and SAS Model Implementation Platform 2.1.

The latest release is SAS Risk Dimensions 6.5. For more information, see the software product page for SAS Risk Dimensions.

# **SAS Model Risk Management**

SAS Model Risk Management runs on the second maintenance release for SAS 9.4. It is a user-friendly, web-based application that facilitates the capture and life cycle management of statistical model-related information. That information is then used to conduct all aspects of model risk management, including governance. Specifically, SAS Model Risk Management facilitates the entry, collection, transfer, storage, tracking, and reporting of models that are drawn from multiple lines of business across an organization. It also integrates with other SAS products, including the SAS Workflow Engine and SAS Visual Analytics.

SAS Model Risk Management enables you to perform the following activities:

- create, update, and track your model inventory across the model life cycle
- conduct model reviews, including full scope validation and other types of reviews
- perform assessments of model candidates
- create and track findings (effective challenges) and develop action plans

- conduct change management related to all aspects of the model life cycle
- conduct model usage tracking
- measure, manage, and monitor model risk assessment
- retire models
- initiate and manage "in system" ad hoc communication
- manage documents and workflows
- create and manage model governance policies
- enhance and extend all functional capabilities provided with the solution
- access an aggregated view of models through interactive dashboards
- generate reports based on entered and collected data

Each of these activities can be tied to other activities in the system. Therefore, the SAS Model Risk Management application provides an integrated and centralized framework for collecting, managing, and storing model information, while capturing all changes, communication, and interactions across the model life cycle.

The SAS Model Risk Management system also provides the ability to extensively customize the user interface and add new fields, links, and user interface elements; rename windows and labels; add new screens; and so on.

# **SAS Risk Management for Banking 3.3**

SAS Risk Management for Banking 3.3 extends the bank's capability to assess, monitor, optimize, and create regulatory reports for financial risks. The various analyses within SAS Risk Management for Banking can be run on SAS High-Performance Risk in addition to SAS Risk Dimensions. Running calculations of large portfolios in a distributed environment on SAS High-Performance Risk has substantial performance benefits. The multithreading capabilities of SAS High-Performance Risk also mean that performance is enhanced even in solo mode.

New Monte Carlo simulation methods are offered for several of the analysis tasks.

The regulatory Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) calculations are extended in the areas of classification of contingent cash flows and in accounting for collateral. The collateral management tools enable you to perform these tasks:

- estimate collateral shortfalls
- predict the impact of the downgrading of collateral assets
- predict the impact of the downgrading of the bank
- predict the impact of derivative volatilities

For more information, see the software product page for SAS Risk Management for Banking.

# SAS Visual Analytics

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# **SAS Visual Analytics**

### **About SAS Visual Analytics**

SAS Visual Analytics is a web-based product that uses SAS high-performance analytic technologies to explore huge volumes of data quickly in order to see patterns and trends.

### **SAS Visual Analytics 6.2**

Here are some of the updates in SAS Visual Analytics 6.2:

- The SAS Visual Analytics home page now displays tables, and the search has been enhanced to include any registered SAS types, not only reports, explorations, and stored processes.
- SAS Visual Data Builder now supports input tables from the SAS LASR Analytic Server and has improved performance with the Greenplum Data Computing Appliance.
- In SAS Visual Analytics Explorer, forecasting has been enhanced to support underlying factors and scenario analysis. You can now create aggregated measures and perform decision tree analysis. You can also rank your data based on the greatest and least aggregated values.
- SAS Visual Analytics Designer has been enhanced to give you the ability to create new aggregated calculated items for tables and graphs, filter or rank your data based on the top or bottom values, and change the report theme. You can add links to a specific section in a target report or add links from a report object, text, or image to another report. You can group more than five gauges in a report.
- Using SAS Visual Analytics Administrator, you can define permission conditions in an interactive editor. You can use either blacklisting or whitelisting to manage mobile devices. You can register tables.

For more information, see What's New in SAS Visual Analytics 6.2 in the SAS Visual Analytics: User's Guide.

#### **SAS Visual Analytics 6.3**

SAS Visual Analytics 6.3 contains many new features, including the following:

- Simplified self-service capabilities enable users to quickly and easily load their own data, whether the users are exploring data or designing a report.
- You can use Esri mapping technology when exploring data and designing reports.
- Network diagrams enable you to see the relationships and contributions between elements with nodes on a chart and across a geo map.
- Alerts that are based on expressions notify report subscribers when metrics reach specific values.

- You can create custom graph templates for reports.
- Guest access, which does not require a login ID or password, is available for viewing explorations, reports, and dashboards.
- New text analysis capabilities enable you to understand the most common terms and topics discussed in your Twitter streams or other text fields such as "customer comments."

Integration with SAS Office Analytics enables customers to display SAS Visual Analytics content in Microsoft Excel, PowerPoint, Word, Outlook, and SharePoint.

For more information, see What's New in SAS Visual Analytics 6.3 in the SAS Visual Analytics: User's Guide.

### **SAS Visual Analytics 6.4**

Salesforce

SAS Visual Analytics 6.4 contains many updates, including the following:

YO	ou can now import data from these third-party vendor database servers:
	Aster
	BigInsights
	Cloudera
	DB2
	Greenplum
	Hortonworks
	MySQL
	Netezza
	ODBC
	Oracle
	PostgreSQL

- ☐ SAP HANA
- □ SQL Server
- □ Teradata
- □ Vertica
- Importing data from massively parallel processing databases has been enhanced.
- Working with visualizations usability is improved.
- Designing reports usability is improved.

For more information, see What's New in SAS Visual Analytics 6.4 in the SAS Visual Analytics: User's Guide.

#### **SAS Visual Analytics 7.1**

SAS Visual Analytics 7.1 contains many updates, including the following:

- Importing data from Pivotal HD and Cloudera Impala is supported.
- A new Sankey diagram visualization enables you to perform path analytics. Path analytics displays flows of data from one event (value) to another as a series of paths.
- With goal seeking, you can specify a target value for the forecast measure, and then determine the values of the underlying factors that would be required to achieve the target value.
- Text analytics in a word cloud visualization enables you to analyze the sentiment of documents in your document collection. It also enables you to explore a selection of specific documents as a new visualization.
- Parameters are supported for report controls, and can be used in calculations, filters, ranks, and display rules.
- New options for printing to PDF are available for reports. You can use category data items, calculated items that are categories, and custom categories in custom sorts. You can distribute reports to other users based on a schedule. Report designers can

localize (or translate) the labels, tooltips, and other descriptive text that are part of reports.

A predefined report provides insight into how your site uses SAS Visual Analytics. The report is populated after you enable auditing, and is visible only to administrators.

For more information, see What's New in SAS Visual Analytics 7.1 in SAS Visual Analytics: User's Guide.

#### **SAS Visual Analytics 7.2**

SAS Visual Analytics 7.2 contains many updates, including the following:

- SAS Visual Statistics is visually and functionally integrated with SAS Visual Analytics Explorer. A new feature in SAS Visual Statistics is that you can derive predicted values for predictive models. (SAS Visual Statistics remains a separately licensed product.)
- Decision tree visualizations include an icicle plot of the nodes in the tree.
- You can import data from Google Analytics, Facebook, and MapR. You can import a ZIP file that contains a single spreadsheet or delimited text file.
- A new report theme, SAS Snow, provides a clean, uncluttered default appearance for your reports.
- When you print a report to PDF, new options are available (for example, you can add page numbers).
- When you send a report by email, you can attach a PDF of the report.
- Calculated data items and grouped category data items can be changed into geographic data items and used in geo maps.
- In URLs that link to reports in the designer or viewer, you can include parametervalue pairs. For example:

```
http://abc.com/SASVisualAnalyticsViewer/...&Origin=Europe&Cost=3
```

For more information, see What's New in SAS Visual Analytics 7.2 in SAS Visual Analytics: User's Guide.

#### **SAS Visual Analytics 7.3**

SAS Visual Analytics 7.3 contains these updates:

- Samples tables, sample reports, and a sample exploration (if you have SAS Visual Analytics Explorer) are now available. When the samples are installed, you can access them from SAS Home (the home page).
- You can now import data from a Pivotal HAWQ database.
- SAS Visual Analytics Designer has a new Expand clipped content option, which is available for printing to PDF. This option enables you to print the entire content of tables, crosstabs, gauges, and containers with content that is only partially available in the layout of the report section.
- SAS Visual Analytics Viewer has a new appearance called modern, which is the default. You can use preferences to specify the default appearance of the viewer as modern or classic. The modern appearance includes a **Report Refresh** setting, which lets you specify how many minutes to wait between update checks.

For more information, see What's New in SAS Visual Analytics 7.3 in SAS Visual Analytics: User's Guide.

#### **SAS Visual Statistics**

SAS Visual Statistics uses the in-memory capabilities of SAS LASR Analytic Server to create and compare powerful statistical models in an easy-to-use, web-based interface. SAS Visual Statistics extends the capabilities of SAS Visual Analytics by creating, testing, and comparing models based on the patterns discovered in SAS Visual Analytics. SAS Visual Statistics enables you to export model score code in order to apply your model to new data.

SAS Visual Statistics is integrated with SAS Visual Analytics in order to provide a seamless transition between the two solutions. Documentation for SAS Visual Statistics 7.2 and later is contained in the documentation for SAS Visual Analytics.

# **Appendix 1**

# **Documentation Enhancements**

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#### **Overview**

The What's New documentation is cumulative and is updated whenever there is an update to a SAS product. The following topics will help you determine what changes were made after the initial release of SAS 9.4, which shipped in July 2013.

# November 2015 (SAS 9.4, Rev. 940\_15w47)

SAS Event Stream Processing 3.2 is now available. For more information, see "SAS Event Stream Processing 3.2" on page 58.

The first maintenance release for SAS Contextual Analysis 14.1 is now available. For more information, see "SAS Contextual Analysis 14.1" on page 49.

# **October 2015 (SAS 9.4, Rev.** 940 15w42)

These products shipped a new release:

- "SAS High-Performance Risk 3.5" on page 69
- "SAS Risk Dimensions" on page 161

These products shipped a maintenance release:

- the first maintenance release for SAS Anti-Money Laundering 6.3. For more information, see "SAS Anti-Money Laundering 6.3" on page 136.
- the second maintenance release for Social Network Analysis Server 6.2. For more information, see "SAS Social Network Analysis Server 6.2" on page 138.

# August 2015 (SAS 9.4, Rev. 940\_15w33)

These products shipped a new release:

- SAS Quality Knowledge Base for Contact Information 26. For more information, see "SAS Quality Knowledge Base for Contact Information 26" on page 114.
- SAS Visual Analytics 7.3. For more information, see "SAS Visual Analytics 7.3" on page 170.

## July 2015 (SAS 9.4, Rev. 940 15w29)

SAS Factory Miner 14.1 is a new product. For more information, see "SAS Factory Miner 14.1" on page 65.

#### These products shipped a new release:

- "SAS Business Rules Manager 3.1" on page 48
- "SAS Contextual Analysis 14.1" on page 49
- "SAS Data Integration Studio 4.901" on page 118
- "SAS Decision Manager 3.1" on page 51
- "SAS Enterprise Miner 14.1" on page 56
- "SAS Environment Manager 2.5" on page 149
- "SAS/ETS 14.1" on page 64
- "SAS Forecast Server 14.1" on page 67
- "SAS High-Performance Analytics Infrastructure 3.1" on page 92
- "SAS/IML 14.1" on page 71
- "SAS 9.4 In-Database Products" on page 141
- "SAS Model Manager 14.1" on page 73
- "SAS/OR 14.1" on page 76
- "SAS/QC 14.1" on page 79
- "SAS/STAT 14.1" on page 83
- "SAS Studio 3.4" on page 44
- "SAS Text Miner 14.1" on page 86
- "SAS Theme Designer 4.7 for Flex" on page 156

These products were updated as part of the third maintenance release for SAS 9.4:

- "Base SAS 9.4" on page 13
- "SAS/ACCESS" on page 30
- "SAS 9.4 Data Quality Server" on page 121
- "SAS/GRAPH 9.4" on page 36

- "SAS Grid Manager 9.4" on page 39
- "SAS 9.4 Intelligence Platform" on page 150
- "SAS 9.4 OLAP Server" on page 104

### May 2015 (SAS 9.4, Rev. 940 15w20)

SAS Model Risk Management is a new product. For more information, see "SAS Model Risk Management" on page 161.

These products shipped a new release:

- "SAS Add-In 7.11 for Microsoft Office" on page 99
- "SAS Enterprise Guide 7.11" on page 102
- "SAS Event Stream Processing 3.1" on page 57
- "SAS High-Performance Analytics Infrastructure 2.94" on page 92
- "SAS High-Performance Risk 3.4" on page 69
- "SAS IT Resource Management 3.6" on page 158
- "SAS Risk Management for Banking 3.3" on page 162
- "SAS Visual Analytics 7.2" on page 169

## April 2015 (SAS 9.4, Rev. 940 15w16)

SAS Scalable Performance Data Server 5.2 is now available. For more information, see "SAS Scalable Performance Data Server 5.2" on page 42.

## March 2015 (SAS 9.4, Rev. 940\_15w12)

#### These products are new:

- SAS Data Loader for Hadoop. For more information, see "SAS Data Loader 2.2 for Hadoop" on page 117.
- SAS Energy Forecasting. For more information, see "SAS Energy Forecasting 3.1" on page 57.

#### These products shipped a new release:

- "SAS Data Remediation 2.2" on page 122
- "SAS Job Monitor 2.2" on page 124
- "SAS Marketing Automation 6.4" on page 130
- "SAS Marketing Optimization 6.4" on page 131
- "SAS MDM 4.2" on page 126
- "SAS Real-Time Decision Manager 6.4" on page 132
- "SAS Task Manager 2.2" on page 126
- "SAS Visual Process Orchestration 2.2" on page 127

# February 2015 (SAS 9.4, Rev. 940\_15w08)

#### These products shipped a new release:

- "SAS Data Quality Accelerator 2.6 for Teradata" on page 120
- "SAS Quality Knowledge Base for Contact Information 25" on page 114

"SAS Studio 3.3" on page 43

These products were enhanced:

- the DS2 language. The SAS In-Database Code Accelerator for Hadoop now uses HCatalog to process complex, non-delimited files. For more information, see "DS2 Language" on page 13.
- SAS 9.4 In-Database Code Accelerator for Hadoop. For more information, see "SAS 9.4 In-Database Products" on page 141.

## **January 2015 (SAS 9.4, Rev.** 940 15w04)

These products shipped a new release:

- "SAS Anti-Money Laundering 6.3" on page 136
- "SAS Customer Due Diligence 6.3" on page 137
- "SAS Financial Management 5.5" on page 134

SAS Social Network Analysis Server 6.2 shipped its first maintenance release. For more information, see "SAS Social Network Analysis Server 6.2" on page 138.

# November 2014 (SAS 9.4, Rev. 940 14w47)

These products are new:

- "SAS Business Data Network 3.1" on page 116
- "SAS Lineage 3.1" on page 125

These products shipped a new release:

"DataFlux Data Management Server 2.6" on page 110

- "SAS Event Stream Processing Engine 2.3" on page 57
- "SAS High-Performance Analytics Infrastructure 2.91" on page 92
- "SAS High-Performance Risk 3.3" on page 68
- "SAS LASR Analytic Server 2.5" on page 95
- "SAS Quality Knowledge Base for Contact Information 24" on page 114
- "SAS Quality Knowledge Base for Product Data 5" on page 115

# October 2014 (SAS 9.4, Rev. 940\_14w41)

#### These products shipped a new release:

- "DataFlux Data Management Studio 2.6" on page 112
- "SAS Add-In 7.1 for Microsoft Office" on page 98
- "SAS Enterprise GRC 6.1" on page 159
- "SAS Enterprise Guide 7.1" on page 101
- "SAS Environment Manager 2.4" on page 148
- "SAS Information Retrieval Studio 1.53" on page 155
- "SAS Visual Analytics 7.1" on page 168

# September 2014 (SAS 9.4, Rev. 940\_14w36)

SAS IT Resource Management 3.5 is a new release. For more information, see "SAS IT Resource Management 3.5" on page 157.

## August 2014 (SAS 9.4, Rev. 940 14w32)

#### These products shipped a new release:

- "SAS Contextual Analysis 12.3" on page 49
- "SAS Business Rules Manager 2.2" on page 47
- "SAS Data Integration Studio 4.9" on page 118
- "SAS Decision Manager 2.2" on page 50
- "SAS Environment Manager" on page 148
- "SAS Enterprise Miner 13.2" on page 55
- "SAS/ETS 13.2" on page 61
- "SAS/IML 13.2" on page 71
- "SAS Model Manager 13.1" on page 73
- "SAS/OR 13.2" on page 75
- "SAS/QC 13.2" on page 79
- "SAS/STAT 13.2" on page 81
- "SAS Studio 3.2" on page 43
- "SAS Text Miner 13.2" on page 85

#### These products are new:

- SAS/ACCESS Interface to Impala
- SAS/ACCESS Interface to the PI System

These products shipped as part of the second maintenance release for SAS 9.4:

- "Base SAS 9.4" on page 13
- "SAS/ACCESS 9.4 Interface to Hadoop" on page 31

- "SAS/ACCESS 9.4 Interface to Oracle" on page 32
- "SAS/ACCESS 9.4 Interface to PC Files" on page 32
- "SAS/CONNECT 9.4" on page 35
- "SAS/GRAPH 9.4" on page 36
- "SAS Grid Manager 9.4" on page 39
- "SAS 9.4 Integration Technologies" on page 145
- "SAS 9.4 Intelligence Platform" on page 150
- "SAS 9.4 OLAP Server" on page 104

# June 2014 (SAS 9.4, Rev. 940\_14w23)

These products shipped a new release:

- "SAS OpRisk VaR 6.1" on page 160
- "SAS Quality Knowledge Base for Contact Information 23" on page 113

## May 2014 (SAS 9.4, Rev. 940\_14w19)

These products shipped a new release:

- "DataFlux Authentication Server 4.1" on page 110
- "SAS Federation Server 4.1" on page 123

SAS DataFlux Secure 2.5 was updated. For more information, see "DataFlux Secure 2.5" on page 112.

## April 2014 (SAS 9.4, Rev. 940 14w14)

#### These products shipped a new release:

- "SAS Anti-Money Laundering 6.2" on page 136
- "SAS Data Quality Accelerator 2.5 for Teradata" on page 120

#### These products shipped a maintenance release:

- "SAS Data Remediation 2.1" on page 122
- "SAS MDM 4.1" on page 125
- "SAS Task Manager 2.1" on page 126

# March 2014 (SAS 9.4, Rev. 940 14w11)

#### These products are new:

- "SAS In-Memory Statistics" on page 90
- "SAS Studio 3.1" on page 42

#### These products shipped a new release:

- "SAS LASR Analytic Server 2.3" on page 94
- "SAS Visual Analytics 6.4" on page 167

The documentation was updated for SAS Data Surveyor 5.1 for SAP. For more information, see "SAS Data Surveyor 5.1 for SAP" on page 122.

# December 2013 (SAS 9.4, Rev. 940\_13w51)

The first maintenance release for SAS 9.4 shipped in December 2013. Several products were updated in this maintenance release.

- "SAS/ACCESS 9.4 Interface to PC Files" on page 32
- "Base SAS 9.4" on page 13
- "SAS/CONNECT 9.4" on page 35
- "SAS 9.4 In-Database Products" on page 141
- "SAS 9.4 Integration Technologies" on page 145
- "SAS 9.4 Intelligence Platform" on page 150
- "SAS 9.4 OLAP Server" on page 104

#### These products shipped a new release:

- "SAS Data Integration Studio 4.8" on page 117
- "SAS Enterprise Miner 13.1" on page 53
- "SAS/ETS 13.1" on page 59
- "SAS Financial Management 5.4" on page 133
- "SAS Forecast Server 13.1" on page 66
- "SAS High-Performance Computing Management Console 2.4" on page 93
- "SAS High-Performance Risk 3.2" on page 68
- "SAS/IML 13.1" on page 70
- "SAS LASR Analytic Server 2.1 and 2.2" on page 94
- "SAS/OR" on page 74

- "SAS/QC" on page 77
- "SAS/STAT 13.1" on page 80
- "SAS Theme Designer 4.2 for Flex" on page 155
- "SAS Text Miner 13.1" on page 84
- "SAS Visual Analytics 6.3" on page 166

#### These products shipped a maintenance release:

- The first maintenance release for SAS Add-In 6.1 for Microsoft Office is available. For more information, see "SAS Add-In 6.1 for Microsoft Office" on page 98.
- The first maintenance release for SAS Enterprise Guide 6.1 is available. For more information, see "SAS Enterprise Guide 7.1" on page 101.

# November 2013 (SAS 9.4, Rev. 940 13w45)

#### These products shipped a new release:

- "SAS Anti-Money Laundering 6.1" on page 135
- "SAS Quality Knowledge Base for Contact Information 22" on page 113

#### These products are new:

- "SAS Customer Due Diligence 6.1" on page 137
- "SAS Peer Group Analysis 6.1" on page 137

# October 2013 (SAS 9.4, Rev. 940\_13w40)

#### These products are new:

- "DataFlux Data Management Server 2.5" on page 110
- "DataFlux Data Management Studio 2.5" on page 111
- "SAS Contextual Analysis 12.3" on page 49
- "SAS Data Management Console" on page 119
- "SAS Data Remediation 2.1" on page 122
- "SAS Job Monitor 2.1" on page 124
- "SAS MDM 4.1" on page 125
- "SAS Visual Process Orchestration 2.1" on page 127

These products shipped a new release.

- "DataFlux Authentication Server 3.2" on page 109
- "DataFlux Secure 2.5" on page 112
- "SAS Data Quality Accelerator 2.4 for Teradata" on page 119

# September 2013 (SAS 9.4, Rev. 940\_13w36)

SAS Data Quality Accelerator for Teradata 2.4 is a new product. For more information, see "SAS Data Quality Accelerator 2.4 for Teradata" on page 119.

# July 2013 (SAS 9.4, Rev. 940\_13w30)

The In-Database products were updated. For more information, see "SAS 9.4 In-Database Products" on page 141.

# **Recommended Reading**

For more information about the new features or enhancements for a specific product, see the What's New topic in the product documentation. The product documentation is available 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 this book. Therefore, you might not be able to access the Help for all SAS products.

Round out your SAS knowledge with these recommended books, which include real-world examples from expert users:

- The Little SAS Book: A Primer at http://go.sas.com/read001
- The Little SAS Book for SAS Enterprise Guide at http://go.sas.com/read002
- Output Delivery System: The Basics and Beyond at http://go.sas.com/read003
- Custom Tasks for SAS Enterprise Guide Using Microsoft .NET at http://go.sas.com/ read004
- Data Quality for Analytics Using SAS at http://go.sas.com/read005
- Statistical Graphics Procedures by Example: Effective Graphs Using SAS at http:// go.sas.com/read006
- Decision Trees for Analytics Using SAS Enterprise Miner at http://go.sas.com/ read007

#### 188 Recommended Reading

For a complete list of SAS publications, go to sas.com/store/books. If you have questions about which titles you need, please contact a SAS Representative:

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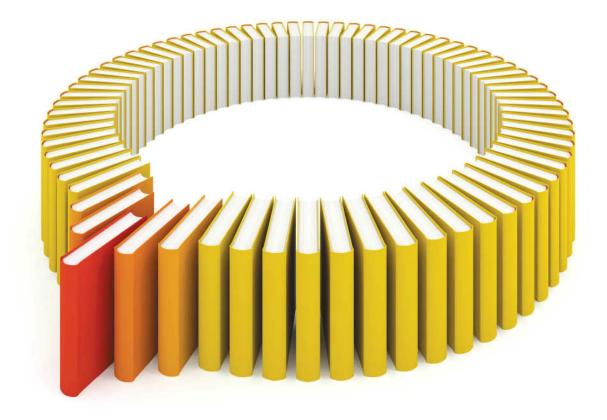
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