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# What's New in SAS<sup>®</sup> 9.0, 9.1, 9.1.2, and 9.1.3

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### **What's New in SAS® 9.0, 9.1, 9.1.2, and 9.1.3**

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## SAS 9.0, 9.1, 9.1.2, and 9.1.3 Highlights

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### The Cornerstones of SAS

SAS®9 is built on four cornerstones: Scalability, Interoperability, Manageability, and Usability. These cornerstones are the foundation for the future of SAS.

### Scalability

- SAS now runs in many 64-bit operating environments, which allows SAS to scale in-memory processes.
- Parallel processing takes advantage of multiple CPUs by dividing processing among the available CPUs, which provides performance gains for two types of SAS processes: threaded I/O and threaded application processing. Some areas that use parallel processing include:

#### Indexing

When creating an index that requires sorting, SAS attempts to sort the data using the thread-enabled sort. By dividing the sorting task into separately executable processes, the time needed to sort the data can be reduced.

#### Selected analytic procedures

The following are thread-enabled:

##### Base SAS procedures

MEANS, REPORT, SORT, SQL, SUMMARY, TABULATE

##### SAS/STAT procedures

GLM, LOESS, REG, ROBUSTREG

##### SAS/SHARE procedure

SERVER (with the experimental THREADEDTCP option)

##### Enterprise Miner procedures

DMINE, DMREG

#### SAS/ACCESS engines

The following engines use multiple threads to access data from the DBMS server:

- Oracle
- Sybase
- DB2 (UNIX and PC)
- ODBC

- SQL Server
- Teradata

### Scalable Performance Data (SPD) Engine

The Scalable Performance Data Engine provides parallel I/O by using multiple CPUs to read SAS data and deliver it rapidly to applications.

### SAS/CONNECT

MP CONNECT gives you the ability to exploit SMP (Symmetric Multi-Processing) hardware as well as network resources to perform parallel processing and easily coordinate all the results into a single client SAS session.

### SAS Metadata Server

The SAS Metadata Server uses threads to enable the best response time for delivering metadata as requested by any number of clients.

### SAS OLAP Server

The SAS OLAP Server provides a new multi-threaded data storage and server functionality that provides faster cube performance. The data can be stored in a multidimensional form (MOLAP) or in a form that includes existing aggregations from presummarized data sources.

- SAS/CONNECT supports pipeline parallelism, which allows multiple DATA steps or procedures to execute in parallel and to pipe the output from one process as the input to the next process in a pipeline. Piping improves performance and reduces the demand for disk space.
- The time required for transferring large amounts of data when using SAS/CONNECT has been significantly reduced as a result of improvements to the file compression algorithm.

## Interoperability

- SAS Open Metadata Architecture provides common metadata services to all SAS applications, which improves communication among applications.
- The SAS Add-In for Microsoft Office is a Component Object Model (COM) add-in that extends Microsoft Office by enabling you to harness the power of SAS analytics and access data directly from Microsoft Excel, Microsoft Word, and Microsoft PowerPoint. The SAS add-in enables you to access relational data sources, access and perform analyses, and create reports within Microsoft Office.
- SAS/CONNECT libref inheritance eliminates the need to duplicate data for use in multiple SAS sessions. Server sessions can inherit client-defined librefs, which allows multiple sessions to read and write data in a single library.
- SAS Integration Technologies now includes support for creating Web services that enable cross-platform integration, an enhanced publishing framework that supports

the generation and publication of explicit and implicit events, and a new set of core infrastructure services that Java programmers can use to write applications that are integrated with the SAS platform.

- The XML LIBNAME engine imports and exports a broader variety of XML documents.

## Manageability

- SAS Management Console provides a single point-of-control for SAS administrative tasks.
- SAS Data Integration Studio (formerly named SAS ETL Studio) is a visual design tool that enables you to consolidate and manage enterprise data from a variety of source systems, applications, and technologies.
- SAS Personal Login Manager is an application that enables you to manage the metadata that describes your user accounts. You can use the SAS Personal Login Manager to add, update, and remove your logins.
- Application Response Measurement (ARM) enables you to check the availability and the transaction rates of SAS applications.
- Secure Sockets Layer (SSL) provides network security and privacy. SSL is used in Base SAS, SAS/CONNECT, SAS/SHARE, and Integration Technologies.
- The new Integration Technologies Windows Object Manager and Java Connection Service create and manage workspace objects that support new types of IOM servers.
- New IOM options are provided to support load balancing

## Usability

- SAS Information Map Studio is an application that enables you to create, manage, and view *SAS Information Maps*—business metadata about your physical data. Information maps are user-friendly metadata definitions of physical data sources that enable your business users to query a data warehouse in order to meet specific business needs.
- SAS Web Report Studio is a Web-based application that enables you to create, view, and organize reports.
- The MIGRATE procedure simplifies the process of migrating your libraries.
- New SAS/GRAPH styles provide a consistent look for output created by the Output Delivery System (ODS), which enhances readability and usability.
- The metadata LIBNAME engine enables you to read and create metadata in a SAS Metadata Repository. By incorporating metadata, this engine makes it easier to control access to the data.
- The Output Delivery System writes to more destinations and provides a greater variety of formatting selections, which enables you to select an output destination and format that best meets your reporting needs.



- User-created formats and informats can have names that are longer than eight characters, which allows you to provide names that are more descriptive.
- New SAS functions improve how you can search for character strings and regular expressions, which makes it easier for you to search your data for specific results.
- SAS Data Quality Server has been re-engineered to add increased accuracy and usability to your data.
- All help and reference documentation is accessible within a SAS session. Selecting SAS Help and Documentation from the Help menu enables you to view both online Help information and the full SAS reference library. Prior to SAS 9.0, the reference library was available only on the SAS OnlineDoc CD-ROM or in hard-copy format.
- SAS has been enhanced with accessibility features for SAS users who have disabilities.
- National Language Support (NLS) enhancements enable customers in regions around the world to process data successfully in their native languages and environments.

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## New Products in SAS 9.1.3: SAS Adapters for SAP

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The following SAS Adapters for SAP are available in SAS 9.1.3:

- [SAS Activity-Based Management Adapter 6.2 for SAP R/3](#)
- [SAS IT Management Adapter 2.7 for SAP](#)

### **SAS Activity-Based Management Adapter 6.2 for SAP R/3**

The SAS Activity-Based Management Adapter 6.2 for SAP R/3 facilitates the sharing of ABC/M data between SAP R/3 and SAS Activity-Based Management software. This adapter performs the complex moving of data between SAP Controlling module components and SAS Activity-Based Management software modules. Additionally, the adapter supports the development of ABC/M models that are compatible with R/3 and SAS Activity-Based Management. The *SAS Activity-Based Management Adapter 6.2 for SAP R/3: User's Guide* gives you step-by-step instructions for configuring and using the adapter. The user's guide is located in PDF format at [support.sas.com/sapadapters](http://support.sas.com/sapadapters).

### **SAS IT Management Adapter 2.7 for SAP**

The SAS IT Management Adapter 2.7 for SAP provides ready-to-use code that reads performance data from generic SAP servers, and transforms the data into a format that can be used by SAS IT Resource Management Solutions. A typical SAP installation can have many separate application servers that monitor various selected SAP instances. Because some instances are not critical (for example, development and test instances), the SAS IT Management Adapter for SAP enables you to choose and customize which SAP instances to monitor for performance. The adapter also reads BW cube performance statistics.

The complete solution consists of three major software components:

- SAS/ACCESS Interface to R/3
- The adapter, which consists of SAS macros for SAP R/3 and SAP BW

- SAS IT Resource Management software.

The *SAS IT Management Adapter 2.7 for SAP: User's Guide* gives you step-by-step instructions for configuring and using the adapter. The user's guide is located in PDF format at [support.sas.com/sapadapters](http://support.sas.com/sapadapters).

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## New Products in SAS 9.1.3: SAS BI Dashboard

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The SAS BI Dashboard enables users to employ dashboards to monitor key performance indicators that convey how well an organization is performing. Dashboards include graphics, text, colors, and hyperlinks. Dashboards are created, maintained, and viewed through an easy-to-use Web-based interface. All content is displayed in a role-based, secure, customizable, and extensible environment. Dashboard users can customize how information appears on their personal dashboards.

The **SAS BI Dashboard 3.1: User's Guide** provides information on the use of the SAS BI Dashboard. The user's guide in PDF format is located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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## New Products in SAS 9.1: SAS Data Surveyor

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The following SAS Data Surveyor products are new in SAS 9.1:

- [SAS Data Surveyor for PeopleSoft](#)
- [SAS Data Surveyor for Oracle Applications](#)
- [SAS Data Surveyor for SAP](#)
- [SAS Data Surveyor for Siebel](#)

### SAS Data Surveyor for PeopleSoft

The SAS Data Surveyor for PeopleSoft consists of a set of software plug-ins that provide a faster and easier way for you to access and transform your PeopleSoft data using SAS ETL Studio and SAS Management Console. It enables you to extract metadata from PeopleSoft that you can use to query PeopleSoft records. These queries enable you to

- more easily locate and use your PeopleSoft data in SAS
- browse the extracted metadata
- search the metadata to locate records that contain specific values
- query the metadata to build SAS views of PeopleSoft tables and save these views as permanent SAS views, SAS data files, or SAS source code
- specify how you want to handle PeopleSoft effective dates and effective sequencing in the source data that you extract from PeopleSoft.

### SAS Data Surveyor for Oracle Applications

The SAS Data Surveyor for Oracle Applications consists of a set of software plug-ins that provide a faster and easier way for you to access and transform your Oracle application data using SAS ETL Studio. It enables you to

- extract metadata from Oracle applications that you can use to query Oracle application tables. These queries enable you to more easily locate and use your Oracle application data in SAS.
- browse the extracted metadata.
- search the metadata to locate tables that contain specific values, query the metadata to build SAS views of Oracle application tables, and save these

views as permanent SAS views, SAS data files, or SAS source code.

Software plug-ins for SAS Management Console enable you to select or define an Oracle application server, a library to access this server, and a library to reference the metadata after it is extracted from Oracle applications.

## **SAS Data Surveyor for SAP**

The SAS Data Surveyor for SAP consists of several software plug-ins to SAS ETL Studio and SAS Management Console that enable you to

- extract metadata from your SAP BW system and write that metadata to SAS data sets.
- browse the extracted SAP BW metadata, write metadata about selected ODS objects and InfoCubes to your metadata repository, and create jobs that load the data from the ODS objects and InfoCubes into a specified SAS library.
- use Changed Data Capture (CDC) processing to identify and extract only the data in your ODS tables and InfoCubes that has changed since your last extraction.
- dynamically extract metadata from SAP R/3 system tables and write that metadata to SAS data sets or create a job that can be used to extract metadata from SAP R/3 hierarchies and groups.
- browse the extracted SAP R/3 metadata, select SAP R/3 data sources for your SAS ETL Studio data warehouse, and write metadata about those data sources to your metadata repository.
- use the SAP LIBNAME engine, which supports load balancing, user validation at logon, more efficient handling of projections, server-side joins, and directory processing.

After the SAP metadata is written to the metadata repository, you can use SAS ETL Studio to further analyze your SAP data.

## **SAS Data Surveyor for Siebel**

The SAS Data Surveyor for Siebel consists of a set of software plug-ins to SAS ETL Studio that enables you to

- read metadata from tables in your Siebel database and browse the extracted metadata to analyze your Siebel tables and identify which tables contain the source data that you want to use in your SAS ETL Studio data warehouse.
- save metadata about selected Siebel tables into your metadata repository.

- use the Siebel Enterprise Integration Manager (EIM) to update the data in either the Siebel EIM tables or the base tables in your Siebel database, and specify whether you want to overwrite or append to the data in existing Siebel EIM tables.
- generate a job in SAS ETL Studio that you can use either to repeat or to schedule the process of writing data to the specified Siebel EIM tables.
- generate a Siebel Server Manager script to submit an EIM job that imports data from the EIM tables to the appropriate Siebel base tables.

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## New Products in SAS 9.1.3: SAS e-Data ETL

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SAS 9.1.3 e-Data ETL, a component of SAS Web Analytics, is a clickstream-data-sourcing tool that enables businesses to read and process their Web data. SAS e-Data ETL provides a powerful and scalable component that gathers large volumes of Web-traffic data and provides the following features:

- the SAS e-Data ETL Administrator interface, which enables you to define and manage the webmarts in which the Web-traffic data is saved.
- the %WEBHOUND macro, which enables you to extract and transform your Web-traffic data, then save the data into webmarts.

**Note:** SAS e-Data ETL is available only with SAS Web Analytics. ■

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## New Products in SAS 9.1, 9.1.2, and 9.1.3: SAS Intelligence Platform

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SAS creates and delivers enterprise intelligence through the SAS Intelligence Platform. This cohesive platform is based on an architecture that fully integrates SAS technologies in data extraction, transformation, and loading (ETL); data storage; business intelligence; and analytic intelligence. These capabilities provide the end-to-end infrastructure that is necessary for exploring, analyzing, optimizing, reporting, and understanding your data.

The following SAS Intelligence Platform products are new in SAS 9.1, 9.1.2, and 9.1.3:

- [SAS Information Map Studio](#)
- [SAS Web Report Studio](#)
- [SAS Data Integration Studio](#)
- [SAS Management Console](#)
- [SAS Add-In for Microsoft Office](#)
- [SAS Personal Login Manager](#)

For documentation about how to install and administer the SAS 9.1.3 Intelligence Platform, see <http://support.sas.com/913administration>. These documents are also available from SAS 9.1.3 OnlineDoc on the Web at <http://support.sas.com/onlinedoc/913/docMainpage.jsp>.

### SAS Information Map Studio

SAS Information Map Studio is an application that enables you to create and manage *SAS Information Maps*—business metadata about your physical data. SAS Information Map Studio provides a graphical user interface that enables you, the information architect, to create and view information maps.

Information maps are user-friendly metadata definitions of physical data sources that enable your business users to query a data warehouse in order to meet specific business needs. Information maps enable business users to easily access enterprise-wide data by providing the following benefits:

- Users are shielded from the complexities of the physical data.

- Data storage is transparent to the users, regardless of whether the data is relational or multidimensional or whether the data is in a SAS data set or in a third-party database system.
- Business formulas and calculations are predefined, which makes them usable on a consistent basis.
- Users can easily query data for answers to business questions without having to know query languages.

For more information about the current release, see [What's New in SAS Information Map Studio 3.1](#).

## **SAS Web Report Studio**

SAS Web Report Studio is a Web-based application that enables you to create, view, and organize reports. You can use SAS Web Report Studio for the following tasks:

### **Creating reports**

- Beginning with a simple and intuitive view of your data provided by SAS Information Maps (created in SAS Information Map Studio), you can create reports based on either relational or multidimensional data sources.
- You can use the Report Wizard to quickly create simple reports or the Edit Report view to create sophisticated reports that have multiple data sources, each of which can be filtered. These reports can include various combinations of list tables, crosstabulation tables, and graphs. Using the Edit Report view, you can adjust the style to globally change colors and fonts.
- You can also insert stored processes that take the results from a block of SAS code and embed those results directly into a report.

### **Viewing and working with reports**

While viewing reports by using a thin client (a Web browser), you can filter, sort, and rank the data that is shown in list tables, crosstabulation tables, and graphs. With multidimensional data, you can drill down on data in crosstabulation tables and graphs and drill through to the underlying detail.

## Organizing reports

Reports can be shared with others or kept private. You can create folders and sub-folders for organizing your reports. Information consumers can use keywords to find the reports that they need.

## Printing and exporting reports

You can preview reports in PDF and print the report, or save and e-mail it later. You have control over many printing options, including page orientation, page range, and size of the tables and graphs. You can also export data as a spreadsheet.

For more information about the current release, see [What's New in SAS Web Report Studio 3.1](#).

## SAS Data Integration Studio

SAS Data Integration Studio (formerly named [SAS ETL Studio](#)) is a visual design tool that enables you to consolidate and manage enterprise data from a variety of source systems, applications, and technologies. This software enables you to create process flows that accomplish the following tasks:

- extract, transform, and load (ETL) data for use in data warehouses and data marts
- cleanse, migrate, synchronize, replicate, and promote data for applications and business services

SAS Data Integration Studio enables you to integrate information from any platform that is accessible to SAS and from any format that is accessible to SAS.

The *SAS Data Integration Studio: User's Guide* is available at [support.sas.com](http://support.sas.com).

For more information about the current release, see [What's New in SAS Data Integration Studio 3.4](#).

## SAS Management Console

SAS Management Console is a Java application that provides a single point of control for managing resources that are used throughout the SAS Intelligence Platform.

Rather than using a separate administrative interface for each application in your computing environment, you can use the single interface in SAS Management Console to perform the administrative tasks that are required in order to create and maintain an integrated environment across multiple platforms. For more information about SAS Management Console, see [What's New in SAS Management Console 9.1.2 and 9.1.3](#).

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

The SAS Add-In for Microsoft Office is an integral part of a complete end-to-end business intelligence solution. The SAS add-in is a Component Object Model (COM) add-in that extends Microsoft Office by enabling you to harness the power of SAS analytics, access relational data sources directly from Microsoft Word, Microsoft Excel, and Microsoft PowerPoint, and create reports within Microsoft Office. You can use the SAS add-in for the following tasks:

### **Running analyses**

- Dynamically execute stored processes and SAS tasks.
- Search for stored processes by name, date, or keyword.
- Analyze SAS or Excel data by using SAS tasks.

### **Working with results from your stored processes and SAS tasks**

- Embed the results in your documents and spreadsheets.
- Refresh the existing content to display the most updated results.
- Send the results from Microsoft Excel to Microsoft Word or Microsoft PowerPoint.
- Create reports that include the results, and apply custom styles to the reports.

### **Working with data**

- Access and view SAS data sources or any data source that is available from your SAS server. There is no size limit on the SAS data sources that you can open.

- Filter your data by using an intuitive user interface or an advanced SQL editor.
- Sort your data by an unlimited number of variables.
- Refresh your data sets to incorporate any changes that were made to a data source that is saved on a server.

For more information about the current release, see [What's New in the SAS Add-In 2.1 for Microsoft Office](#).

## **SAS Personal Login Manager**

SAS Personal Login Manager is an application that enables you to manage the metadata that describes your user accounts. In a SAS Metadata Server, the user ID and password for each user account can be stored as a login. Each login should correspond to a user account that has been established for you in the operating system (or with an alternative authentication provider such as Microsoft Active Directory Server or Lightweight Directory Access Protocol Server). You can use the SAS Personal Login Manager to add, update, and remove your logins. For example, after you change the password for your operating system user account, you can use the SAS Personal Login Manager to update that password in the SAS Metadata Server. This enables you to keep the logins that you own in the metadata synchronized with your user accounts. For more information, see the Help for the SAS Personal Login Manager.

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# New Products in SAS 9.1.3: SAS Web Analytics 5.0 and 5.1

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SAS Web Analytics takes huge volumes of e-data sources and loads them into a flexible Web mart. Business intelligence reports are created by using advanced patent-pending analytics. Information is made available through interactive reporting and visualization tools.

For more information about the current release, see [What's New in SAS Web Analytics 5.2](#).

## New Report Interface

A new Web-based report interface in SAS Web Analytics enables users to create their own reports even if they have no programming skills. In addition, reports are easier to locate and customize. Now users can add newly created reports to the system, and reports can be linked to other reports, for a greater exploration of information.

## Types of Reports

Reports in SAS Web Analytics are grouped for better accessibility; the reports provide improved metrics and enable more thorough analytics. The following types of reports can be created:

- The Scorecard enables you to monitor strategic Key Performance Indicators (KPIs) that are related to specific business goals, taking into account seasonality and unobserved patterns. For example, you can create a scorecard to find out the number of people who return to your Web site during a 15-day period.
- The Dashboard provides an early warning system for potential problems or opportunities based on key forecasting metrics in traffic, customer segments, page errors, conversion rates, and other parameters. Dial-type graphical indicators display favorable, unfavorable, and neutral business trends.
- The Segmentation report shows the statistically derived segments (identified groups of Web site visitors) that are analyzed against a business target such as total revenue or total number of new memberships. Segmentation reports show what metric defines

the segments of a population with the highest propensity to contribute to the business target. Customer segmentation enables you to determine who your most profitable and least profitable customers are, and it helps you to more specifically target your ads and your Web content.

- Dynamic Funnel Analysis reports enable you to track visitors as they change levels of identification during successive visits to your Web site. For example, customers can be tracked when they initially view your Web site anonymously, when they become registered visitors, and again when they become buyers. Funnel analysis also calculates the drop-off rate of visitors for specific online processes (a process is a predefined set of consecutively visited pages).
- Pathing Analysis reports enable you to better understand how customers traverse the site.

## **Improved Analytic Capabilities**

- Now you can report on search keywords, banner ads, and referrals, and use this information to motivate customers to view your Web site, to reduce the costs of e-marketing campaigns, and to achieve ROI objectives.
- The Report wizard enables you to easily build a custom report and preview it without having to load the data and run all the reports concurrently, as was required in earlier releases.
- The SAS System automatically detects and parses the most common Web logs: CLF, ELF from Apache, iPlanet from Sun Microsystems, and IIS from Microsoft.
- A patent-pending algorithm identifies unique sessions and ensures the accurate reconstruction of sessions to deliver accurate reports.
- The metadata-driven Web mart structure is newly designed for the SAS Web Analytics solution. Although the structure uses the familiar summary tables, the open architecture now enables you to introduce custom tables and third-party data as part of your Web mart.
- The LSF scheduler, which enables you to easily schedule the ETL batch processes,

is included in the SAS Web Analytics solution.

- The SAS Web Analytics solution uses a multi-tiered architecture to improve performance. The extraction, transformation, and loading processes occur on a backend server, while content delivery is performed on a middle-tier server.

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# What's New Documentation for Previous Releases of SAS

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To view the What's New documentation for previous releases of SAS, see [support.sas.com/documentation/whatsnew](http://support.sas.com/documentation/whatsnew).

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## What's New in Base SAS 9.0 and 9.1: Overview

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### Open Metadata Architecture

The SAS Open Metadata Architecture enables you to set up a metadata server, create metadata repositories, and write applications (clients) that use, store, or manage the metadata.

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### SAS Management Console

SAS Management Console is a Java application that provides a single point of control for administering SAS metadata. The application provides a flexible administrative environment through the use of plug-ins.

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### Procedures

New multi-threading capabilities improve processing time for the SORT, SQL, MEANS, TABULATE and REPORT procedures.

The new DOCUMENT procedure enables you to customize or modify your output hierarchy and replay your output to different destinations without rerunning the PROC or DATA step. Enhancements to the TEMPLATE procedure enable you to customize or create your own markup language for your output.

Other enhancements to Base SAS procedures improve ODS formatting, enable import and export of Microsoft Excel 2002 spreadsheets and Microsoft Access 2002 tables, support long format and informat names, list and compare SAS registries, enhance statistical processing, and enhance printer definitions.

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### Language Elements

New language elements enable the monitoring of application transactions and performance, enable parallel process using threaded technology, provide Secure Sockets Layer (SSL) access to files as well as access to files using directory services, improve searching and

manipulating of data, and provide new statistical and mathematical functions.

New engines enable the use of a broader variety of XML documents, provide access to metadata in a SAS Metadata Repository, and improve performance by using multiple CPUs to read SAS data.

In the Output Delivery System, SAS 9.0 and 9.1 provide an array of markup languages including HTML4 and XML. The new ODS GRAPHICS statement (Experimental) now enables you to produce graphics output. The new ODS DOCUMENT destination gives you more control over the structure and hierarchy of your output.

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## What's New in Base SAS 9.0, 9.1, and 9.1.3 Procedures

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### Overview

Base SAS procedures in SAS 9.0 (and later) include the following features and enhancements:

- improved ODS formatting
- ability to import and export Microsoft Excel 2002 spreadsheets and Microsoft Access 2002 tables
- ability to import and export SPSS files and Stata files
- a new Excel spreadsheet data source specification that uses the translation engine to import and export Excel spreadsheets
- support for long format and informat names
- ability to list and compare SAS registries
- support for parallel sorting operations
- improved statistical processing
- improved printer definitions.

A list of ODS table names is now provided for each procedure that supports ODS. You can use these names to reference the table when using the Output Delivery System (ODS) to select tables and create output data sets.

### Note:

- This section describes the features of Base SAS procedures that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS 9.1 (and later) is supported on OS/390 and z/OS operating systems and, throughout this document,

any reference to z/OS also applies to OS/390, unless otherwise stated.

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## Details

### The CONTENTS Procedure

The new look for output from the CONTENTS procedure and the CONTENTS statement in PROC DATASETS provides a better format for the Output Delivery System (ODS). PROC CONTENTS output now displays the data representation of a file by reporting the native platform for each file, rather than just showing whether the data representation is native or foreign. Also, PROC CONTENTS output now provides the encoding value, whether a character variable is transcoded if required, and whether the data set is part of a generation group. A new example shows how to insert PROC CONTENTS output into an ODS output data set for processing.

The new ORDER= option in the CONTENTS statement enables you to print a list of variables in alphabetical order even if they include mixed-case names.

### The COPY Procedure

The following options are new or enhanced in the COPY procedure and the COPY statement in PROC DATASETS:

- The FORCE option enables you to use the MOVE option for a SAS data set that has an audit trail.
- The CLONE option now copies the data representation and encoding data set attributes.

### The CORR Procedure

The CORR procedure has the following new features:

- The FISHER option in the PROC CORR statement requests confidence limits and **p**-values for Pearson and Spearman correlation coefficients based on Fisher's **z** transformation. Using the FISHER option, you can specify an alpha value and a null

hypothesis value. You can also specify the type of confidence limit (upper, lower, or two-sided) and whether the bias adjustment should be used for the confidence limits.

- The PLOTS=MATRIX option in the PROC CORR statement uses ODS graphics to produce either a rectangular matrix plot (if you also specify a WITH statement) or a symmetric matrix plot (if you do not specify a WITH statement) for variables.
- The PLOTS=SCATTER option in the PROC CORR statement uses ODS graphics to produce scatter plots for variables. By default, the scatter plot also includes a 95% prediction ellipse. You can use the ELLIPSE= option with the PLOTS=SCATTER option to include prediction ellipses for new observations, confidence ellipses for the mean, or no ellipses.

## The DATASETS Procedure

Directory listings from the DATASETS procedure provide a new look for output, which improves the format for the Output Delivery System (ODS).

The following statements are enhanced in the DATASETS procedure:

- The AUDIT\_ALL= option in the AUDIT statement specifies whether logging can be suspended and whether audit settings can be changed. In addition, the LOG option in the AUDIT statement now enables you to control the logging of administrative events to the audit file by using the ADMIN\_IMAGE= setting.
- The ICCREATE statement now enables you to create overlapping constraints. This means that variables in a SAS data set are part of both a primary key definition and a foreign key definition.
- The CORRECTENCODING= option in the MODIFY statement changes the encoding indicator (which is stamped in the file's descriptor information) in order to match the actual encoding of the file's data.

## The DOCUMENT Procedure

The new DOCUMENT procedure enables you to customize or modify your output hierarchy, and replay your output to different destinations without re-running the PROC or DATA step. For complete information, see **SAS Output Delivery System: User's Guide**.

## The EXPORT Procedure

The EXPORT procedure now enables you to perform the following tasks:

- export to Microsoft Excel 2002 spreadsheets and Microsoft Access 2002 tables. The new data sources are available for the Windows operating environment on 32-bit platforms if your site has a license for the SAS/ACCESS Interface for PC Files.
- export to Microsoft Excel spreadsheets (Version 5.0 and higher) by specifying DBMS=XLS. Specifying the new XLS data source uses the translation engine to export data to Excel files. It also enables you to access Excel spreadsheets on UNIX directly, without having to access the PC Files server.
- export to SPSS files on Windows. All versions of SPSS on Windows are supported.
- export to Stata files. All versions of Stata on Windows are supported.
- specify SAS data set options in the DATA= argument when you are exporting to all data sources except for delimited, comma-separated, and tab-delimited external files. For example, if the data set that you are exporting has an assigned password, use the ALTER=, PW=, READ=, or WRITE= data set option. To export only data that meets a specified condition, use the WHERE= data set option.
- identify a specific spreadsheet in a workbook by specifying the SHEET= option. Exporting to multiple sheets is available for Microsoft Excel 97, 2000, and 2002 spreadsheets for the Windows operating environment on 32-bit platforms if your site has a license for the SAS/ACCESS Interface for PC Files.

## The FCMP Procedure

The new FCMP procedure enables you to create, test, and store SAS functions and subroutines for use by other SAS procedures.

For more information about the FCMP procedure, see <http://support.sas.com/documentation/onlinedoc>. Select **Base SAS** from the Product-Specific Documentation list.

## The FONTREG Procedure

The new FONTREG procedure enables you to add system fonts to the SAS registry.

## The FORMAT Procedure

- The maximum length for character format names is now 31. The maximum length for numeric format names is now 32.
- The maximum length for character informat names is now 30. The maximum length for numeric informat names is now 31.

## The FREQ Procedure

In the PROC FREQ statement, the new NLEVELS option displays a table that shows the number of levels for each variable that is named in the TABLES statement(s).

The new ZEROS option in the WEIGHT statement enables you to include observations that have 0 weight values. The frequency and crosstabulation tables will display any levels that correspond to observations that have 0 weights. PROC FREQ includes levels that have 0 weights in the chi-square goodness-of-fit test for one-way tables, in the binomial computations for one-way tables, and in the computation of kappa statistics for two-way tables.

The following new options are available in the TABLES statement:

- The CONTENTS= option enables you to specify the text for the HTML contents file links to crosstabulation tables.
- The BDT option enables you to request Tarone's adjustment in the Breslow-Day test for homogeneity of odds ratios when you use the CMH option to compute the Breslow-Day test for stratified 2x2 tables.
- The NOWARN option suppresses the log warning message that indicates that the asymptotic chi-square test might not be valid when more than 20% of the table cells have expected frequencies that are less than 5.
- The CROSSLIST option displays crosstabulation tables in ODS column format. This option creates a table that has a table definition that you can customize by using the TEMPLATE procedure.



Additionally, PROC FREQ now produces exact confidence limits for the common odds ratio and related tests.

## The IMPORT Procedure

The IMPORT procedure now enables you to perform the following tasks:

- import Microsoft Excel 2002 spreadsheets and Microsoft Access 2002 tables. The new data sources are available for the Windows operating environment on 32-bit platforms if your site has a license for the SAS/ACCESS Interface for PC Files.
- import Microsoft Excel spreadsheets (Version 5.0 and higher) by specifying DBMS=XLS. Specifying the new XLS data source uses the translation engine to import data from Excel files. It also enables you to access Excel spreadsheets on UNIX directly, without having to access the PC Files server.
- import SPSS files on Windows. All versions of SPSS on Windows are supported.
- import Stata files. All versions of Stata on Windows are supported.
- specify SAS data set options in the OUT= argument when you are importing from all data sources except for delimited, comma-separated, and tab-delimited external files. For example, in order to assign a password for a resulting SAS data set, use the ALTER=, PW=, READ=, or WRITE= data set option. To import only data that meets a specified condition, use the WHERE= data set option.

## The INFOMAPS Procedure

The new INFOMAPS procedure enables you to create SAS Information Maps programmatically. For complete information, see the **Base SAS Guide to Information Maps**.

## The MEANS and SUMMARY Procedures

The new THREADS|NOTTHREADS option enables or prevents the activation of multi-threaded processing.

When you format class variables by using user-defined formats that are created with the MULTILABEL and NOTSORTED options, specifying the three options MLF, PRELOADFMT, and ORDER=DATA in a CLASS statement now orders the procedure output according to the label order in the format definition.

## The MIGRATE Procedure

The new MIGRATE procedure is available specifically for migrating a SAS data library from a previous release to the most recent release. For migration, PROC MIGRATE offers benefits that PROC COPY does not. For PROC MIGRATE documentation, see the Migration Community at <http://support.sas.com/rnd/migration>.

## The PROTO Procedure

The PROTO procedure, which has been available in SAS Risk Dimensions software, is now a Base SAS procedure. The PROTO procedure enables you to register, in batch, external functions that are written in the C or C++ programming languages for use in SAS programs and C-language structures and types. For PROC PROTO documentation, go to <http://support.sas.com/documentation/onlinedoc>. Select **Base SAS** from the Product-Specific Documentation list.

## The PRTDEF Procedure

There are 15 new variables to control the default printer settings.

## The PRTEXP Procedure

The new PRTEXP procedure enables you to write attributes, which are used by PROC PRTDEF to define a printer, either to a SAS data set or to the SAS log. With this capability you can replicate and modify those attributes easily.

## The PWENCODE Procedure

The new PWENCODE procedure enables you to encode a password. You can use the encoded password in place of plain-text passwords in SAS programs that access relational database management systems (RDBMS) and SAS servers (such as the SAS Metadata

Server).

## The REGISTRY Procedure

The REGISTRY procedure has three new options:

- The LISTREG option lists the contents of the registry in the log.
- The COMPAREREG1 and COMPAREREG2 options are used together to compare two registries. The results appear in the log.

## The REPORT Procedure

The REPORT procedure has the following new features:

- The new THREADS|NOTTHREADS option enables or prevents the activation of multi-threaded processing.
- Numeric class variables that do not have a format assigned to them are automatically formatted with the BEST12. format.
- PROC REPORT now writes the value `_PAGE_` for the `_BREAK_` variable in the output data set for observations that are derived from a `COMPUTE BEFORE _PAGE_` or `COMPUTE AFTER _PAGE_` statement.

## The SORT Procedure

The SORT procedure has the following new options:

- The DATECOPY option copies to the output data set the SAS internal date and time when the input data set was created, and the SAS internal date and time when it was last modified prior to the sort.
- The DUPOUT= option specifies an output data set that contains duplicate observations.
- The OVERWRITE option deletes the input data set before the replacement output data set is populated with observations.

- The THREADS|NOTTHREADS option enables or prevents the activation of multi-threaded sorting.

## The SQL Procedure

The SQL procedure has the following new features:

- The PROC SQL statement now has a THREADS | NOTTHREADS option. THREADS enables PROC SQL to take advantage of the new parallel processing capabilities in SAS when performing sorting operations.
- The PROC SQL and RESET statements now contain the BUFFERSIZE option, which enables PROC SQL to specify a buffer page size for the output.
- There are new DICTIONARY tables, new columns in existing DICTIONARY tables, and SASHELP views of the new tables. For DICTIONARY.TABLES and SASHELP.VTABLE, if a table is read-protected with a password, the only information that is listed for that table is the library name, member name, member type, and type of password protection; all other information is set to missing.
- You can now reference a permanent SAS data set by its physical filename.
- When using the INTO clause to assign values to a range of macro variables, you can now specify leading zeroes in the macro variable names.
- PROC SQL now supports TRANSCODE=YES|NO as a column modifier.
- The table limit for the PROC SQL statement has increased from 32 tables to 256 tables.

## The SYLK Procedure (Experimental)

The new SYLK procedure enables you to read an external SYLK-formatted spreadsheet into SAS, including data, formulas, and formats. You can also use PROC SYLK as a batch spreadsheet, using programming statements to manipulate data, perform calculations, generate summaries, and format the output.

For more information about the SYLK procedure, see <http://support.sas.com/>

`documentation/onlinedoc`. Select **Base SAS** from the Product-Specific Documentation list.

## The TABULATE Procedure

The TABULATE procedure has the following new features:

- The new `THREADS|NOTTHREADS` option enables or prevents the activation of multi-threaded processing.
- Available statistics include upper and lower confidence limits, skewness, and kurtosis. PROC TABULATE now supports the `ALPHA=` option, which enables you to specify a confidence level.
- Numeric class variables that do not have a format assigned to them are automatically formatted with the `BEST12.` format.
- The new `FORMAT_PRECEDENCE` and `STYLE_PRECEDENCE` options in the `TABLE` statement enable you to specify which formats and styles (defined for the column, row, or page dimensions) are applied.

Additionally, when you format class variables by using user-defined formats that are created with the `MULTILABEL` and `NOTSORTED` options, specifying the three options `MLF`, `PRELOADFMT`, and `ORDER=DATA` in a `CLASS` statement now orders the procedure output according to the label order in the format definition.

## The TEMPLATE Procedure

The TEMPLATE procedure now enables you to customize or create your own markup language for your output. For complete information, see the **SAS Output Delivery System: User's Guide**.

## The TIMEPLOT Procedure

The TIMEPLOT procedure now supports the `SPLIT=` option, which enables you to specify a character which causes labels to be split into multiple lines.

## The UNIVARIATE Procedure

The UNIVARIATE procedure has the following new features:

- The LOWER= and NOUPPER= suboptions in the KERNEL option in the HISTOGRAM statement specify the lower and upper bounds for fitted kernel density curves.
- The FRONTREF option in the HISTOGRAM statement draws reference lines in front of the histogram bars instead of behind them.

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# What's New in the Base SAS 9.0, 9.1, and 9.1.3 Language

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## Overview

New and enhanced features in Base SAS save you time, effort, and system resources by providing faster processing and easier data access and management, more robust analysis, and improved data presentation.

- By using new SAS system options that enable threading and the use of multiple CPUs, the following [SAS procedures](#) take advantage of multi-processing I/O: SORT, SQL, MEANS, TABULATE, and REPORT.
- The LIBNAME statement now supports secure access to SAS libraries on a WebDAV server.
- You can now use longer, easier-to-read names for user-created formats and informats.
- Two pre-defined component objects for the DATA step enable you to quickly store, search, and retrieve data based on lookup keys.
- The FILENAME statement now supports directory services, multiple FTP service commands, and Secure Sockets Layering (SSL).
- The Application Response Measurement (ARM) system enables you to monitor the availability and performance of transactions within and across diverse applications.
- The Perl regular expression (PRX) functions and CALL routines use a modified version of Perl as a pattern-matching language to enhance search-and-replace operations on text.
- New character functions search and compare character strings in addition to concatenating character strings.
- There are several new descriptive statistic functions and mathematical functions.
- New formats, informats, and functions support international and local values for money, datetime, and Unicode values. All data set options, formats, informats,

functions, and system options that relate to national language support are documented in the new **SAS National Language Support (NLS): User's Guide**.

- A new ODS statement enables you to render multiple ODS output formats without re-running a PROC or a DATA step. See the **SAS Output Delivery System: User's Guide**.

#### **Note:**

- This section describes the features of Base SAS that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS 9.1 (and later) is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

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## **SAS System Features**

### **Application Response Measurement (ARM)**

Application Response Measurement (ARM) enables you to monitor the availability and performance of transactions within and across diverse applications. The SAS ARM interface consists of the implementation of the ARM API as ARM macros and an ARM agent. An ARM agent generates calls to the ARM macros. New ARM system options enable you to manage the ARM environment and to log internal SAS processing transactions.

### **Cross-Environment Data Access (CEDA)**

CEDA processes SAS files that were created on a different host. This is especially useful if you have upgraded from a 32-bit platform to a 64-bit platform. Messages in the SAS log notify you when CEDA is being used to process a SAS file. See "Processing Data Using Cross-Environment Data Access (CEDA)" in **SAS Language Reference: Concepts**.

### **DATA Step Object Attributes and Methods**

SAS now provides two pre-defined component objects for use in a DATA step: the hash



object and the hash iterator object. These objects enable you to quickly and efficiently store, search, and retrieve data based on lookup keys.

The DATA step component object interface enables you to create and manipulate these component objects by using statements, attributes, and methods. You use the DATA step object dot notation to access the component object's attributes and methods.

The hash and hash iterator objects have one attribute, fourteen methods, and two statements associated with them. See [DATA Step Object Attributes and Methods](#).

## Engines

- The default BASE engine in SAS supports longer format and informat names, thread-enabled procedures such as the SORT and SUMMARY procedures, and more than 32,767 variables in a SAS data set.
- The metadata LIBNAME engine enables you to use metadata in order to access and augment data that is identified by the metadata. The metadata engine retrieves information about the target SAS data library from metadata objects in a specified SAS Metadata Repository on the SAS Metadata Server. The metadata engine provides a consistent method for accessing many data sources. That is, SAS provides different engines that have different options, behavior, and tuning requirements. By taking advantage of metadata, the necessary information that is required to access data can be created in one central location so that applications can use the metadata engine to access different sources of data, without having to understand the differences and details of each SAS engine. See the **SAS Metadata LIBNAME Engine: User's Guide**.
- The XML LIBNAME engine imports and exports a broader variety of XML documents. The XMLMAP= option specifies a separate XML document that contains specific XMLMap syntax. The XMLMap syntax, Version 1.2, tells the XML engine how to interpret the XML markup in order to successfully import an XML document. See the **SAS Metadata LIBNAME Engine: User's Guide**.
- The new SASDOC LIBNAME engine enables you to bind output objects that persist in an ODS document. See the **SAS Output Delivery System: User's Guide**.
- The new SAS Information Maps LIBNAME Engine provides a read-only way to access data that is generated from a SAS Information Map and to bring it into a SAS session. After you retrieve the data, you can run almost any SAS procedure against it.

See the **Base SAS Guide to Information Maps**.

- The new character variable padding (CVP) engine expands character variable lengths, using a specified expansion amount, so that character data truncation does not occur when a file requires transcoding. Character data truncation can occur when the number of bytes for a character in one encoding is different from the number of bytes for the same character in another encoding, such as when a single-byte character set (SBCS) is transcoded to a double-byte character set (DBCS). See the **SAS National Language Support (NLS): User's Guide**.

## Indexing

When creating an index that requires sorting, SAS tries to sort the data by using the thread-enabled sort. By dividing the sorting task into separately executable processes, the time that is required to sort the data can be reduced. See the topic "Creating an Index" in Understanding SAS Indexes in **SAS Language Reference: Concepts**.

## Integrity Constraints

Variables in a SAS data file can now be part of both a primary key (general integrity constraint) and a foreign key (referential integrity constraint). However, there are restrictions when defining a primary key constraint and a foreign key constraint that use the same variables. See the topic "Overlapping Primary Key and Foreign Key Constraints" in Understanding Integrity Constraints in **SAS Language Reference: Concepts**.

## Restricted System Options

System administrators can restrict system options from being modified by a user. You can use the RESTRICT option in the OPTIONS procedure to list the restricted options. The implementation of restricted options is specific to the operating environment. For details about how to restrict options, see the configuration guide for your operating environment. For information about listing restricted options, see the OPTIONS procedure in the **Base SAS Procedures Guide**.

## SAS Utility Macro

The SAS utility macro, %DS2CSV, is available now in Base SAS. This macro converts SAS

data sets to comma-separated values (CSV) files. Prior to SAS 9.1, this macro was available only for SAS/IntrNet users.

## Universal Unique Identifiers

A Universal Unique Identifier (UUID) is a 128-bit identifier that consists of date and time information, and the IEEE node address of a host. UUIDs are useful when objects such as rows or other components of a SAS application must be uniquely identified. For more information, see Universal Unique Identifiers in **SAS Language Reference: Concepts**.

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## SAS Language Elements

Descriptions of the new and enhanced language elements for national language support can be found in [What's New for SAS 9.0 and 9.1 National Language Support](#) in the **SAS National Language Support (NLS): User's Guide**.

## Data Set Options

- The following data set options are new:

OBSBUF=

determines the size of the view buffer for processing a DATA step view.

SPILL=

specifies whether to create a spill file for non-sequential processing of a DATA step view.

- The following data set options are enhanced:

BUFNO=

supports the same syntax as the BUFNO= system option in order to specify the number of buffers to be allocated for processing a SAS data set.

BUFSIZE=

supports the same syntax as the `BUFSIZE=` system option in order to specify the permanent buffer page size for an output SAS data set.

`FIRSTOBS=`

supports the same syntax as the `FIRSTOBS=` system option in order to specify which observation SAS processes first.

`OBS=`

supports the same syntax as the `OBS=` system option in order to specify when to stop processing observations.

## Formats

- The maximum length for character format names is increased to 31. The maximum length for numeric format names is increased to 32.
- Several formats have been enhanced with default and range values.
- The following formats are new:

`MMYY`

writes date values in the form *mmM<yy>yy*, where M is the separator and the year is written in either 2 or 4 digits.

`PERCENTN`

produces percentages, using a minus sign for negative values.

`YYMM`

writes date values in the form *<yy>yyMmm*, where the year is written in either 2 or 4 digits and M is the separator.

`YYQ`

writes date values in the form *<yy>yyQq*, where the year is written in either 2 or

4 digits, Q is the separator, and *q* is the quarter of the year.

YYQR

writes date values in the form  $\langle yy \rangle yyQqr$ , where the year is written in either 2 or 4 digits, Q is the separator, and *qr* is the quarter of the year expressed in Roman numerals.

- The PVALUE format now returns missing values that are specified by the MISSING= system option.

## Functions and CALL Routines

New functions and CALL routines include character, mathematical, descriptive statistical, and special functions, and character-string matching functions that can use PERL expressions.

- The following character functions are new:

ANYALNUM

searches a character string for an alphanumeric character and returns the first position at which it is found.

ANYALPHA

searches a character string for an alphabetic character and returns the first position at which it is found.

ANYCNTRL

searches a character string for a control character and returns the first position at which it is found.

ANYDIGIT

searches a character string for a digit and returns the first position at which it is found.

ANYFIRST

searches a character string for a character that is valid as the first character in a SAS variable name under VALIDVARNAM=V7, and returns the first position at which that character is found.

## ANYGRAPH

searches a character string for a graphical character and returns the first position at which it is found.

## ANYLOWER

searches a character string for a lowercase letter and returns the first position at which it is found.

## ANYNAME

searches a character string for a character that is valid in a SAS variable name under VALIDVARNAM=V7, and returns the first position at which that character is found.

## ANYPRINT

searches a character string for a printable character and returns the first position at which it is found.

## ANYPUNCT

searches a character string for a punctuation character and returns the first position at which it is found.

## ANYSPACE

searches a character string for a white-space character (blank, horizontal tab, vertical tab, carriage return, line feed, or form feed), and returns the first position at which it is found.

## ANYUPPER

searches a character string for an uppercase letter and returns the first position

at which it is found.

## ANYXDIGIT

searches a character string for a hexadecimal character that represents a digit and returns the first position at which that character is found.

## CAT

concatenates character strings without removing leading or trailing blanks.

## CATS

concatenates character strings and removes leading and trailing blanks.

## CATT

concatenates character strings and removes trailing blanks only.

## CATX

concatenates character strings, removes leading and trailing blanks, and inserts separators.

## CHOOSEC

returns a character value that represents the results of choosing from a list of arguments.

## CHOOSEN

returns a numeric value that represents the results of choosing from a list of arguments.

## COMPARE

returns the position of the left-most character by which two strings differ, or returns 0 if there is no difference.

## COMPGED

compares two strings by computing the generalized edit distance.

## COMPLEV

compares two strings by computing the Levenshtein edit distance.

## COUNT

counts the number of times that a specific substring of characters appears within a character string that you specify.

## COUNTC

counts the number of specific characters that either appear or do not appear within a character string that you specify.

## FIND

searches for a specific substring of characters within a character string that you specify.

## FINDC

searches for specific characters that either appear or do not appear within a character string that you specify.

## IFC

returns a character value that matches an expression.

## IFN

returns a numeric value that matches an expression.

## LENGTHC

returns the length of a character string, including trailing blanks.

## LENGTHM



returns the amount of memory (in bytes) that is allocated for a character string.

## LENGTHN

returns the length of a non-blank character string, excluding trailing blanks, and returns 0 for a blank character string.

## NLITERAL

converts a character string that you specify to a SAS name literal (n-literal).

## NOTALNUM

searches a character string for a non-alphanumeric character and returns the first position at which it is found.

## NOTALPHA

searches a character string for a non-alphabetic character and returns the first position at which it is found.

## NOTCNTRL

searches a character string for a character that is not a control character and returns the first position at which it is found.

## NOTDIGIT

searches a character string for any character that is not a digit and returns the first position at which that character is found.

## NOTFIRST

searches a character string for an invalid first character in a SAS variable name under `VALIDVARNAME=V7`, and returns the first position at which that character is found.

## NOTGRAPH

searches a character string for a non-graphical character and returns the first

position at which it is found.

## NOTLOWER

searches a character string for a character that is not a lowercase letter and returns the first position at which that character is found.

## NOTNAME

searches a character string for an invalid character in a SAS variable name under VALIDVARNAME=V7, and returns the first position at which that character is found.

## NOTPRINT

searches a character string for a non-printable character and returns the first position at which it is found.

## NOTPUNCT

searches a character string for a character that is not a punctuation character and returns the first position at which it is found.

## NOTSPACE

searches a character string for a character that is not a white-space character (blank, horizontal tab, vertical tab, carriage return, line feed, or form feed), and returns the first position at which it is found.

## NOTUPPER

searches a character string for a character that is not an uppercase letter and returns the first position at which that character is found.

## NOTXDIGIT

searches a character string for a character that is not a hexadecimal digit and returns the first position at which that character is found.

## NVALID

checks a character string for validity for use as a SAS variable name in a SAS statement.

## PROPCASE

converts all words in an argument to proper case.

## PRXCHANGE

performs a pattern-matching replacement.

## PRXPOSN

returns the value for a capture buffer.

## SCANQ

returns the  $n^{\text{th}}$  word from a character expression and ignores delimiters that are enclosed in quotation marks.

## STRIP

returns a character string with all leading and trailing blanks removed.

## SUBPAD

returns a substring that has a length you specify, using blank padding if necessary.

## SUBSTRN

returns a substring that allows a result with a length of 0.

- The following descriptive statistics functions are new:

## GEOMEAN

returns the geometric mean.

## GEOMEANZ

returns the geometric mean without fuzzing the values of the arguments that are approximately 0.

## HARMEAN

returns the harmonic mean.

## HARMEANZ

returns the harmonic mean without fuzzing the values of the arguments that are approximately 0.

## IQR

returns the interquartile range.

## LARGEST

returns the  $k^{\text{th}}$  largest non-missing value.

## MAD

returns the median absolute deviation from the median.

## MEDIAN

computes median values.

## MODZ

returns the remainder from the division of the first argument by the second argument; uses 0 fuzzing.

## PCTL

computes percentiles.

## RMS

returns the root mean square.

## SMALLEST

returns the  $k^{\text{th}}$  smallest non-missing value.

- The following External Files function is new:

## DCREATE

creates an external directory.

- The following macro functions are new:

## SYMEXIST

indicates the existence of a macro variable.

## SYMGLOBL

indicates whether a macro variable has global scope in the DATA step during DATA step execution.

## SYMLOCAL

indicates whether a macro variable has local scope in the DATA step during DATA step execution.

- The following mathematical functions are new:

## BETA

returns the value of the beta function.

## COALESCE

returns the first non-missing value from a list of numeric arguments.

## COALESCEC

returns the first non-missing value from a list of character arguments.

## LOGBETA

returns the logarithm of the beta function.

- The following probability function is new:

## LOGCDF

returns the logarithm of a left cumulative distribution function.

- The following quantile function is new:

## QUANTILE

returns the quantile from the specified distribution.

- The following special function is new:

## UUIDGEN

returns the short or the binary form of a Universal Unique Identifier (UUID).

- The following state and ZIP code function is new:

## ZIPCITY

returns a city name and the two-character postal code that corresponds to a ZIP code.

- The following trigonometric function is new:

## ATAN2

returns the arc tangent of two numeric variables.

- The following truncation functions are new:

## CEILZ

returns the smallest integer that is greater than or equal to the argument; uses 0 fuzzing.

## FLOORZ

returns the largest integer that is less than or equal to the argument; uses 0 fuzzing.

## INTZ

returns the integer portion of the argument; uses 0 fuzzing.

## ROUND

rounds the first argument to the nearest multiple of the second argument, or to the nearest integer when the second argument is omitted.

## ROUNDE

rounds the first argument to the nearest multiple of the second argument, and returns an even multiple when the first argument is halfway between the two nearest multiples.

## ROUNDZ

rounds the first argument to the nearest multiple of the second argument; uses 0 fuzzing.

- The following variable information functions are new:

## VVALUE

returns the formatted value that is associated with the variable that you specify.

## VVALUEX

returns the formatted value that is associated with the argument that you specify.

- Using Perl regular expression (PRX) functions and CALL routines is new. The

following PRX functions are new. For more information, see [Pattern Matching Using SAS Regular Expressions \(RX\)](#) and [Perl Regular Expressions \(PRX\)](#).

## PRXMATCH

searches for a pattern match and returns the position at which the pattern is found.

## PRXPAREN

returns the last bracket match for which there is a match in a pattern.

## PRXPARSE

compiles a Perl regular expression that can be used for pattern-matching a character value.

## CALL PRXCHANGE

performs a pattern-matching substitution.

## CALL PRXDEBUG

enables Perl regular expressions in a DATA step to send debug output to the SAS log.

## CALL PRXFREE

frees unneeded memory that was allocated for a Perl regular expression.

## CALL PRXNEXT

returns the position and length of a substring that matches a pattern and iterates over multiple matches within one string.

## CALL PRXPOSN

returns the start position and length for a capture buffer.

## CALL PRXSUBSTR



returns the position and length of a substring that matches a pattern.

- The following CALL routines are new:

CALL ALLPERM

generates all permutations of the values of several variables.

CALL CATS

concatenates character strings and removes leading and trailing blanks.

CALL CATT

concatenates character strings and removes trailing blanks only.

CALL CATX

concatenates character strings, removes leading and trailing blanks, and inserts separators.

CALL COMPCOST

sets the costs of operations for later use by the COMPGED function.

CALL LOGISTIC

returns the logistic value of each argument.

CALL MISSING

assigns a missing value to specified character or numeric variables.

CALL RANPERK

randomly permutes the values of the arguments and returns a permutation of **k** out of **n** values.

CALL RANPERM

randomly permutes the values of the arguments.

#### CALL SCAN

returns the position and length of a given word in a character expression.

#### CALL SCANQ

returns the position and length of a given word in a character expression, and ignores delimiters that are enclosed in quotation marks.

#### CALL SOFTMAX

returns the softmax value for each argument.

#### CALL STDIZE

standardizes the values of one or more variables.

#### CALL STREAMINIT

specifies a seed value to use for subsequent random number generation by the RAND function.

#### CALL SYMPUTX

assigns a value to a macro variable and removes both leading and trailing blanks.

#### CALL TANH

returns the hyperbolic tangent of each argument.

#### CALL VNEXT

returns the name, type, and length of a variable that is used in a DATA step.

- The following functions are enhanced:

#### COMPRESS

accepts a third optional argument that can modify the characters in the second argument.

## EXIST

accepts all SAS data library type members. A third optional argument enables you to specify a generation data set number.

## INDEXW

accepts a third optional argument that enables you to use delimiters for inter-word boundaries.

## PRXMATCH

accepts an argument that enables you to use a Perl regular expression.

## SUBSTR (left of=)

assigns a length of 8 to an undeclared variable when the function is compiled.

## Informats

- The maximum length for character informat names is increased to 30. The maximum length for numeric informat names is increased to 31.
- The following informats are new:

### ANYDTDTE

extracts date values from DATE, DATETIME, DDMMYY, JULIAN, MMDDYY, MONYY, TIME, or YYQ informat values.

### ANYDTDTM

extracts datetime values from DATE, DATETIME, DDMMYY, JULIAN, MMDDYY, MONYY, TIME, or YYQ informat values.

### ANYDTTME

extracts time values from DATE, DATETIME, DDMMYY, JULIAN, MMDDYY, MONYY, TIME, or YYQ informat values.

STIMERw.

reads time values and determines whether the values are hours, minutes, or seconds; reads the output of the STIMER system option.

## ARM Macros

%ARMCONV, the new ARM macro, converts an ARM log that is created in SAS 9.0 and later, which uses a simple format, into the ARM log format that is used in SAS 8.2, which is more detailed.

## SAS Utility Macro

%DS2CSV, the new SAS utility macro, converts SAS data sets to comma-separated values (CSV) files.

## Statements

- The following statements are new:

### [ODS Statements](#)

control different features of the Output Delivery System. For more information about these statements, see the **SAS Output Delivery System: User's Guide**.

### LIBNAME Statement for WebDAV Server Access

associates a libref with a SAS library on a WebDAV server.

Beginning with SAS 9.1.3 Service Pack 4, the following option is new:

PROXY=

specifies the Uniform Resource Locator (URL) for the proxy server.

#### FILENAME, CLIPBOARD Access Method

enables you to read text data from and write text data to the clipboard on the host machine.

#### FILENAME, WebDAV Access Method

Enables you to access remote files by using the WebDAV protocol.

#### DECLARE

declares a DATA step component object; creates an instance of and initializes data for a DATA step component object.

#### \_NEW\_

creates an instance of a DATA step component object.

#### PUTLOG

writes a message to the SAS log.

- The following statements are enhanced:

#### FILENAME, FTP Access Method

supports directory services and multiple FTP service commands.

#### FILENAME, URL Access Method

supports Secure Sockets Layering (SSL).

#### LIBNAME statement

the following options are new:

COMPRESS=

controls the compression of observations in output SAS data sets in a SAS data library.

**CVPBYTES=**

specifies the number of bytes to use in order to expand character variable lengths when processing a SAS data set that requires transcoding.

**CVPENGINE=**

specifies which engine to use in order to process character variable lengths in a SAS data set that requires transcoding.

**CVPMULTIPLIER=**

specifies the multiplier value to use in order to expand character variable lengths when processing a SAS data set that requires transcoding.

**INENCODING=**

overrides the encoding for input processing.

**OUTENCODING=**

overrides the encoding for output processing.

## **System Options**

- The following system options are new:

**ARMAGENT=**

specifies an ARM agent, which is an executable module that contains a vendor's implementation of the ARM API.

**ARMLOC=**

specifies the location of the ARM log.

## ARMSUBSYS=

enables and disables the ARM subsystems that determine which internal SAS processing transactions should be logged.

## AUTHPROVIDERDOMAIN=

associates a domain suffix with an authentication provider.

## AUTOSAVELOC=

specifies the location of the Program Editor autosave file.

## BYSORTED

specifies whether observations in one or more data sets are sorted in alphabetical or numerical order or are grouped in another logical order.

## CMPLIB=

specifies one or more SAS catalogs that contain compiler subroutines that should be included during program compilation.

## CMPOPT

specifies which type of code generation optimizations should be used in the SAS language compiler.

## CPUCOUNT=

specifies the number of processors that the thread-enabled applications should assume are available for concurrent processing.

## DMSLOGSIZE=

specifies the maximum number of rows that can be displayed in the Log window in the SAS windowing environment.

## DMSOUTSIZE=

specifies the maximum number of rows that can be displayed in the Output window in the SAS windowing environment .

#### DMSSYNCHK

enables syntax checking for multiple steps in the SAS windowing environment.

#### DTRESET

updates the date and the time in the SAS log and in the listing file.

#### EMAILAUTHPROTOCOL=

specifies the authentication protocol for SMTP e-mail.

#### EMAILID=

specifies the identity of the individual who is sending e-mail from within SAS.

#### EMAILPW=

specifies your e-mail login password.

#### ERRORBYABEND

specifies how SAS responds to BY-group error conditions.

#### FONTSLC=

specifies the location that contains the SAS fonts that are loaded by a printer to use with Universal Printing.

#### HELPCMD

specifies whether SAS uses the English version or the translated version of the keyword list for the command-line Help.

#### IBUFSIZE=

specifies the buffer page size for an index file.



## LOGPARM=

controls when SAS log files are opened and closed and (in conjunction with the LOG= system option) how they are named.

## METAAUTORESOURCES=

identifies which resources should be assigned at SAS initialization.

## METACONNECT=

identifies which named connection from the metadata user profiles should be used as the default value for logging into the SAS Metadata Server.

## METAENCRYPTALG=

specifies which type of encryption should be used when communicating with a SAS Metadata Server.

## METAENCRYPTLEVEL=

specifies what should be encrypted when communicating with a SAS Metadata Server.

## METAID=

identifies the current SAS version that is installed on the SAS Metadata Server.

## METAPASSWORD=

specifies the default password for the SAS Metadata Server.

## METAPORT=

specifies the TCP port for the SAS Metadata Server.

## METAPROFILE=

specifies which file contains the SAS Metadata Server user profiles.

## METAPROTOCOL=

specifies which network protocol should be used for communicating with the SAS Metadata Server.

## METAREPOSITORY=

specifies which default SAS Metadata Repository should be used on the SAS Metadata Server.

## METASERVER=

specifies the address of the SAS Metadata Server.

## METAUSER=

specifies the default user ID for logging on to the SAS Metadata Server.

## PAGEBREAKINITIAL

begins the SAS log and listing files on a new page.

## QUOTELENMAX

specifies that SAS write a warning to the SAS log about the maximum length that can be used for strings that are enclosed in quotation marks.

## SORTEQUALS

controls the order in which PROC SORT arranges observations that have identical BY values in the output data set.

## SYSPRINTFONT

specifies the font for the current default printer.

## SYNTAXCHECK

specifies whether to validate SAS program syntax.

## TERMSTMT=

specifies which SAS statements should be executed when the SAS session is terminated.

## TEXTURELOC=

specifies the location of textures and images that are used by ODS styles.

## THREADS

specifies that SAS use threaded processing if it is available.

## TOOLSMENU

specifies whether to include or to suppress the Tools menu in windows that display SAS menus.

## UUIDCOUNT

specifies the number of UUIDs that should be acquired each time the UUID Generator Daemon is used.

## UUIDGENHOST

identifies the host and the port for the UUID Generator Daemon.

## UTILLOC=

specifies a set of file system locations in which applications can store utility files.

## VALIDFMTNAME=

specifies the length of format and informat names that can be used when creating new SAS data sets and format catalogs.

## VIEWMENU

specifies whether to include or to suppress the View menu in windows that display menus.

## V6CREATEUPDATE=

controls or monitors the creation of new, version 6 SAS data sets or the updating of existing, version 6 SAS data sets.

- The following system options have been enhanced:

## CMPOPT=

specifies which type of code generation optimizations should be used in the SAS language compiler.

## SORTSIZE=

specifies the amount of memory that is available when using the SORT procedure.

# What's New in the Windowing Environment for Base SAS 9.0 and 9.1

---

## Overview

The windowing environment in Base SAS 9.0 and later improves usability and SAS performance by providing the following new and enhanced features:

- a new window for viewing ODS documents
- a new window for managing metadata objects
- two new wizards for importing files to, exporting files from, and copying and pasting files to Microsoft Excel 2002 and Microsoft Access 2002
- new capability in the Find window that enables expanded searches of catalogs and libraries
- improvements in the Explorer Options dialog box
- improvements in the File Shortcut Assignment dialog box.

## Note:

- This section describes the features of the SAS windowing environment that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS 9.1 (and later) is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



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## Details

- The new Documents window enables you to view your ODS documents.
- The new Metadata Browser window enables you to manage your metadata objects.

- The new Export wizard exports data to Microsoft Excel 2002 spreadsheets and Microsoft Access 2002 tables. The new data sources are available under the Windows operating environment on a 32-bit platform if your site has a license for the SAS/ACCESS Interface for PC Files.
- The Export Wizard also identifies a specific spreadsheet in a workbook. Exporting to multiple sheets is available for Microsoft Excel 97, 2000, and 2002 spreadsheets under the Windows operating environment on a 32-bit platform if your site has a license for the SAS/ACCESS Interface for PC Files.
- The new Import wizard imports Microsoft Excel 2002 spreadsheets and Microsoft Access 2002 tables. The new data sources are available under the Windows operating environment on a 32-bit platform if your site has a license for the SAS/ACCESS Interface for PC Files.
- Data sets can now be copied and saved into a Microsoft Excel file and saved as HTML.
- Explorer property sheets have been re-designed to make them easier to use.
- The Find window now enables you to search all the entries in the catalogs of any library that you choose.
- The re-designed Explorer Options dialog box has tabbed pages for General, Files, Entries, Members, and Metadata. On the General Files tabbed page, the Remember Column Widths check box has been added.
- The File Shortcut Assignment dialog box can now be used to specify a proxy server and related information.

# What's New in Moving and Accessing SAS 9.0 and 9.1 Files

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## Overview

The following strategies in Base SAS are available for moving and accessing SAS files between operating environments that run different releases of SAS:

- Cross-Environment Data Access (CEDA)
- CPORT and CIMPORT procedures
- XPORT engine with the DATA step or the COPY procedure
- XML engine with the DATA step or the COPY procedure.

**Note:** This section describes the features that are new to the topic of moving SAS files since SAS 8.2. Using SAS CONNECT and SAS/SHARE to move or access SAS files are discussed in the **SAS/CONNECT User's Guide** and the **SAS/SHARE User's Guide**. ■

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## Details

### Cross-Environment Data Access (CEDA)

CEDA is a simple strategy for file access across a network. CEDA enables you to read a network-mounted SAS file from any directory-based operating environment that runs SAS 8 or later, regardless of the file format of the SAS file being accessed.

CEDA dynamically converts between the native formats of the source and target operating environments that run under different architectures (for example, UNIX and Windows). CEDA eliminates having to convert a file to transport format.

### CPORT and CIMPORT Procedures

In most cases, in order to move a SAS file between operating environments, you can use

the CPORT and CIMPORT procedures and FTP (File Transfer Protocol) to create a transport file at the source machine, transfer that file across the network, and restore the transport file to native format at the target machine.

**CAUTION:**

**Moving or accessing SAS files is not the same as migrating SAS files.**

Migration of SAS files (data and applications) is not discussed in this documentation. For details about migrating SAS files, see the Migration Community at [support.sas.com/rnd/migration](http://support.sas.com/rnd/migration). ■

## **XPORT Engine with the DATA Step or the COPY Procedure**

The XPORT engine creates files in transport format that can be transferred across operating environments, and directed to multiple target operating environments that run different releases of SAS. Transport files that are created by the XPORT engine can be transferred across operating environments and read using the XPORT engine with the DATA step or PROC COPY.

## **XML Engine with the DATA Step or the COPY Procedure**

The XML engine imports and exports XML documents. The XML format provides increased cross-architectural compatibility by storing numeric values as character data and by identifying the character encoding in a file header. XML files can be transferred across operating environments and read using the XML engine with the DATA step or with PROC COPY.

The XML engine was introduced in SAS 8.2 and is completely documented in the **SAS 9.1 XML LIBNAME Engine User's Guide**. Using the XML engine as a strategy for moving SAS files across operating environments is introduced in this documentation for SAS 9.1.

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# What's New in SAS 9.0, 9.1, and 9.1.3 Output Delivery System

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## Overview

The Output Delivery System (ODS) provides an almost limitless number of choices for reporting and displaying analytical results now with a greater variety of formatting selections and output destinations.

SAS 9.0, 9.1, and 9.1.3 provide an array of markup languages including HTML4 and XML. The `TEMPLATE` procedure and the new tagset template enable you to modify any markup language that SAS provides, or to create your own markup language for output.

The new experimental `ODS GRAPHICS` statement enables you to produce graphics output.

The new `DOCUMENT` procedure enables you to customize or modify your output hierarchy and replay your output to different destinations without rerunning the `PROC` or `DATA` step.

### Note:

- This section describes the features of the SAS Output Delivery System that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS 9.1 and 9.1.3 are supported on both OS/390 and z/OS operating systems. Unless otherwise stated, any reference to z/OS in this document also applies to OS/390.



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## Details

### SASEDOC Engine

Beginning with SAS 9.1, the new SASEDOC libname engine enables you to associate a SAS libref (library reference) with one or more output objects that are stored in an ODS document as a SAS data set.

## ODS Statements

Beginning with SAS 9.0, the following ODS statements are new:

### ODS CHTML

produces compact, minimal HTML output with no style information.

### ODS CSVALL

produces output that contains columns of data values that are separated by commas. ODS CSVALL produces tabular output with titles, notes, and bylines.

### ODS DOCBOOK

produces XML output that conforms to the DocBook DTD by OASIS.

### ODS DOCUMENT

produces a hierarchy of output objects that enables you to create multiple ODS output formats without rerunning a PROC or DATA step.

### ODS HTMLCSS

produces HTML output with cascading stylesheets that is similar to ODS HTML output.

### ODS IMODE

produces HTML output as a column of output that is separated by lines.

### ODS MARKUP

produces SAS output that is formatted using one of many different markup languages.

- Beginning with SAS 9.1.3 Service Pack 4, the following options are new:

EVENT=

specifies an event and the value for event variables that are associated with the event.

TEXT=

specifies the value for the TEXT event variable.

- Beginning with SAS 9.1.3 Service Pack 4, the following suboption is new:

TITLE=

inserts into the metadata of a file, the text string that you specify as the text to appear in the browser window title bar.

ODS PCL

produces printable output for PCL (HP LaserJet) files.

ODS PDF

produces PDF output.

ODS PHTML

produces basic HTML output that uses twelve style elements and no class attributes.

ODS PS

produces PostScript (PS) output.

ODS WML

produces a Wireless Markup Language (WML) DTD with a simple list of URLs for a table of contents.

Beginning with SAS 9.1, the following ODS statements are new:

ODS DECIMAL\_ALIGN

aligns values by the decimal point in numeric columns when no justification is

specified.

## ODS GRAPHICS (Experimental)

enables ODS automatic graphic capabilities.

## ODS USEGOPT

enables the use of graphics option settings for graphic output.

Beginning with SAS 9.1, the following statements now support new options:

## ODS PRINTER

- Beginning with SAS 9.1, the following options are new:

**BACKGROUND=**

specifies whether background colors are printed in text.

**BOOKMARKLIST=**

specifies whether to generate and display the list of bookmarks for a PDF file.

**BOOKMARKGEN=**

controls the generation of bookmarks in a PDF file.

**COLUMNS=**

specifies the number of columns to create on each page of output.

**TEXT=**

inserts text into your output.

## ODS RTF

- Beginning with SAS 9.1.3 Service Pack 4, the following options are new:

## BODYTITLE

specifies that SAS titles and footnotes are placed into the body of the RTF document rather than into the headers and footers section of the RTF document.

## CONTENTS

produces a table of contents page for RTF documents that are opened in Microsoft Word.

## TOC\_DATA | NOTOC\_DATA

specifies whether or not contents data is embedded in the RTF file as hidden text.

## COLUMNS=

specifies the number of columns to create on each page of output.

## TEXT=

inserts text into your output.

## ODS Procedures

- DOCUMENT procedure
  - Beginning with SAS 9.0, the new DOCUMENT procedure enables you to do the following:
    - produce multiple reports with a single run of a procedure or data query.
    - modify and customize your output file hierarchy by rearranging, duplicating, or removing specific tables.
    - modify and customize your output file hierarchy by rearranging, duplicating, or removing the entire output of procedures and data queries.

- generate output for one or more ODS destinations, using the newly transformed output hierarchy.
- store the ODS output objects in raw form. The output is kept in the original internal representation as a data component plus a table definition.
- Beginning with SAS 9.1, the DOCUMENT procedure enables you to do the following:
  - list documents that are in a specified library with new LIB= option in the DOC statement.
  - specify #BYLINE, #BYVAL, and #BYVAR directives in seven of the PROC DOCUMENT statements.
  - use the AFTER option in the OBPAGE statement to add or delete page breaks after output objects.
- TEMPLATE procedure
  - Beginning with SAS 9.0, the following new statements are provided in the TEMPLATE procedure.
    - The DEFINE TAGSET statement creates and modifies tagset definitions using a new definition statement and the new tagset attribute statements.
    - The DEFINE EVENT statement determines what is written to the output file using the new definition statement and the new event attribute statements.
  - Beginning with SAS 9.1, the following new features are provided in the TEMPLATE procedure.
    - The new boolean ABSTRACT= attribute can be applied to styles. If this attribute is set to TRUE, then the style will not appear in the CSS files or LaTeX style files.
    - The new ALT, LONGDESC, ACRONYM, and ABBR options in the DEFINE TABLE, DEFINE COLUMN, and DEFINE HEADER statements provide accessibility features in PROC TEMPLATE.

- The following accessibility attributes have been added to the TEMPLATE procedure.

ABBR= is a column, header, and footer attribute that provides an abbreviated form of the cell's content, which can be displayed in place of a cell's content.

SUMMARY= is a table attribute that provides a summary of the purpose and structure of a table.

- The new INDENT style element enables you to specify the distance from the left side of a cell for indentation purposes. The INDENT style element specifies where to begin the text.
- The `_LABEL_` keyword is now treated as a dynamic variable, and it can be used just like any other dynamic variable in PROC TEMPLATE. Previously, `_LABEL_` was a keyword that could only be used by itself in table and column headers.
- In the TEMPLATE procedure, if you create HTML4 output, then the BORDERCOLORDARK and BORDERCOLORLIGHT style attributes are ignored because they are not part of the HTML4 standard. If you want a color border, then use the BORDER= style attribute.

# What's New in Data Security Technologies in SAS 9.1.2 and 9.1.3

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## Overview of Data Security Technologies

**Data Security Technologies in SAS** describes the technologies used by SAS to protect the confidentiality of data that is exchanged in client/server data transfers.

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## Details about Data Security Technologies

**Data Security Technologies in SAS** consolidates the information that was previously contained in multiple SAS documents. The data security technologies that are used by SAS are provided by the following:

- SASProprietary
- SAS/SECURE
- SSL (Secure Sockets Layer)
- SSH (Secure Shell)

### Note:

Transport Layer Security (TLS) is the successor to SSL V3.0. The Internet Engineering Task Force (IETF) adopted SSL V3.0 as the **de facto** standard, modified it, renamed it TLS V1.0, and adopted it as a standard.

---

## SAS/SECURE SSL Add-In Package

In order to use the SAS 9.1.3 SSL software, you must review the licensing terms and download the appropriate SAS/SECURE SSL Add-In Package from the SAS download Web site.



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## **SSH Functionality**

Although SAS 9.1.3 software does not include a programming interface to SSH (Secure Shell) functionality, SAS does support the tunneling feature of SSH that enables a SAS client to make an encrypted connection to a SAS server.

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# What's New in the SAS 9.0 and 9.1 Macro Language Facility

---

## Overview

There are several enhancements to the Macro Language Facility including a new automatic macro variable, new comparison operators, new SAS system options, new macro statements, new functions, and a new option for the %MACRO statement.

### Note:

- This section describes the features of the SAS Macro Facility that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS 9.1 is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

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## New Automatic Macro Variable

- To take advantage of the new parallel-processing abilities in SAS, the new read-only automatic macro variable, &SYSNCPU contains the current number of CPUs that SAS can use during the current SAS session.

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## New Comparison Operators

- The IN mnemonic operator is a binary comparison operator similar to that of the DATA step, except that the operand on the right side is simply a list of values and is not enclosed in parentheses. The IN operator compares the value of the operand on the left side against the list of values in the operand on the right side.
  - You can use the # character as an alternate spelling for the IN operator.
-

## New SAS System Options

These are the new macro system options:

- The MPRINTNEST system option enables the macro nesting information to be displayed in the MPRINT output in the SAS log.
  - The MLOGICNEST system option enables the macro nesting information to be displayed in the SAS log.
  - The MINDELIMITER system option specifies the character to be used as the delimiter for the macro IN operator.
  - The MCOMPILENOTE system option specifies that a NOTE be issued to the SAS log when the compilation of a macro is completed.
  - The MAUTOLOCDISPLAY system option specifies that the source location of the autocall macro be displayed in the SAS log when the autocall macro is invoked.
- 

## New Macro Statements

- The %ABORT statement stops the macro that is executing along with the current DATA step, SAS job, or SAS session.
  - The %RETURN statement causes normal termination of the currently executing macro.
  - The %COPY statement copies specified items from a SAS macro library.
- 

## New Macro Functions

- The %SYMEXIST function returns an indication of the existence of a macro variable.
- The %SYMGLOBL function returns an indication as to whether a macro variable is global in scope.
- The %SYMLOCAL function returns an indication as to whether a macro variable is local in scope.

---

## **New Option for the %MACRO Statement**

- SOURCE is a new option that is issued in the %MACRO statement. When used with the existing STORE option, the SOURCE option combines and stores the source of the compiled macro with the compiled macro code as an entry in a SAS catalog in a permanent SAS data library.

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# What's New in the SAS 9.1 and 9.1.3 Metadata LIBNAME Engine

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## Overview

The metadata engine provides secure access to SAS data. By incorporating metadata, this engine augments and controls access to the data.

**Note:** This section describes the features of the SAS metadata engine that are new or enhanced since SAS 9.0. ■

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## Details

- The metadata engine, in conjunction with the SAS Open Metadata Architecture Authorization Facility, enables an administrator to specify user privileges in order to control which data the users are allowed to access.
- The new LIBURI= and LIBRARY= options in the LIBNAME statement provide additional methods for referencing the SASLibrary metadata object.
- The new METAOUT= option specifies access to tables in the data source.
  - The METAOUT= option in the LIBNAME statement enables you to specify access to a library.
  - The METAOUT= data set option enables you to specify access to a specific table.
  - Beginning with SAS 9.1.3 Service Pack 4, with the default behavior of the engine (METAOUT=ALL), you can no longer create or delete tables or their associated metadata. You can insert, update, and delete observations in a table. Metadata must be present for you to access the table.
  - Beginning with SAS 9.1.3 Service Pack 4, when METAOUT=DATA is specified for a table, the metadata engine behaves more like the underlying engine that is defined in the metadata; for example, data set options can be passed directly to the underlying engine.

- Beginning with SAS 9.1.3 Service Pack 4, you are advised to use the METALIB procedure instead of METAOUT=META to create, update, or delete metadata. The METAOUT=META value is not expected to be supported in the next release of the software. (For information about PROC METALIB, see the chapter about SAS language metadata interfaces in **SAS Open Metadata Interface: Reference**).
- Beginning with SAS 9.1.3 Service Pack 4, SQL implicit pass-through is supported.

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# What's New in the SAS 9.1 Scalable Performance Data Engine

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## Overview

The SAS Scalable Performance Data Engine (SPD Engine) is a SAS LIBNAME engine that provides rapid data delivery to applications by using multiple CPUs to provide parallel data I/O. The SPD Engine is not intended to replace the default Base SAS engine. Rather it is intended for rapid processing of very large data sets that are stored in partitions across multiple disk volumes.

**Note:** z/OS is the successor to the OS/390 operating system. The SAS 9.1 Scalable Performance Data Engine is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated. ■

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# What's New in the SAS 9.0, 9.1, and 9.1.3 XML LIBNAME Engine

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## Overview

The SAS 9.1 (and later) XML engine imports and exports a broader variety of XML documents. The XMLMAP= option specifies a separate XML document that contains specific XMLMap syntax. The XMLMap syntax tells the XML engine how to interpret the XML markup in order to successfully import an XML document.

**Note:** This section describes the features of the XML LIBNAME engine in SAS that are new or enhanced since SAS 8.2. ■

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## Details

- The LIBNAME Statement Syntax contains the following new options:
  - The ODSRECSEP= option controls the generation of a record separator that marks the end of a line in the output XML document.
  - The XMLCONCATENATE= option enables you to import an XML document that contains multiple XML documents, which are concatenated into one file.
  - The XMLFILEREf= option enables you to specify a fileref for the XML document that is different from the libref. If the fileref and the libref are the same, you do not need to specify the XMLFILEREf= option or the name of the XML document.
  - Beginning in SAS 9.1, the option name XMLSCHEMA= specifies an external file that contains separate schema output.
  - The XMLPROCESS= option determines how the XML engine processes character data that does not conform to W3C specifications.
- The LIBNAME Statement Syntax contains the following enhancements:
  - The XMLTYPE= option now supports the MSACCESS format type.



MSACCESS is the XML format for the markup standards that are supported for a Microsoft Access database.

- In SAS 9.1, you can store and access XMLMaps as metadata objects in a SAS Metadata Repository. The following new metadata options enable you to access a particular XMLMap in a specific repository: METAPASS=, METAPORT=, METAREPOSITORY=, METASERVER=, and METAXMLMAP=.
- Beginning in SAS 9.1.3, the XMLTYPE= option supports the CDISCODM format type. CDISCODM is the XML format for the markup standards that are defined in the Operational Data Model (ODM) that is created by the Clinical Data Interchange Standards Consortium (CDISC), which conforms to the 1.2 schema specification. The new options FORMATACTIVE=, FORMATNOREPLACE=, and FORMATLIBRARY= are used with the CDISCODM format type to specify transcoding preferences.
- The XMLMETA= option specifies whether to include metadata-related information in the exported markup. In SAS 9.1, the values for the XMLMETA= option are changed to DATA, SCHEMADATA, and SCHEMA.

**Note:** Prior to SAS 9.0, the functionality of the XMLMETA= option was performed by using the keyword XMLSCHEMA=. In SAS 9.0 (and later), the name of the XMLSCHEMA= option is changed to XMLMETA=. ■

- In the XMLMap Syntax Version 1.2, the content for the DATATYPE element (which specifies the type of data being read from the XML document for the variable) is changed to conform directly to the XML Schema data types specification. For example, in earlier versions of the DATATYPE element, the form `<DATATYPE>DT-8601</DATATYPE>` was accepted. In version 1.2, the form `<DATATYPE>dateTime</DATATYPE>` is accepted.
- Several ISO 8601 SAS formats and informats now support the international standard for the representation of dates and times.
- Using the LABEL= data set option no longer results in a warning message. However, the XML engine does not persist the information.
- SAS XML Mapper (previously named XML Atlas) is a graphical interface that generates or modifies the XML markup for an XMLMap.
- The new XMLMap Manager (a plug-in used with SAS Management Console)

provides centralized management of XMLMaps as metadata objects in a SAS Metadata Repository.

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# What's New in the SAS 9.0 and 9.1 Companion for Windows

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## Overview

New and enhanced features in Base SAS improve ease of use and SAS performance under the Windows environment:

- SAS now runs under 32- and 64- bit Windows XP and Windows Server 2003 operating environments.
- SAS servers and PCs can use memory-based SAS libraries to process SAS data.
- Network security is enhanced by using Secure Sockets Layer (SSL).
- SAS is now able to sort data using the high-performance sorting tool SyncSort for Windows, by Syncsort, Incorporated, if you have SyncSort installed at your site.
- Sharing files between UNIX and Windows has been simplified.
- You can start SAS with the same destination printer that was specified when you ended your last SAS session.
- During initialization, SAS looks in the Windows user profile directory for a configuration file if you do not specify a configuration file at SAS invocation.
- The Enhanced Editor autosave files are now saved to the Application Data folder.
- Accessibility aids can now access many of the SAS windows and dialog boxes.

### Note:

- This section describes the features of SAS Companion for Windows that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. Throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

---

## Basic Operation of SAS

The basic operation of SAS has been enhanced as follows:

- You can store a customized configuration file in the Windows user profile folder. During invocation, SAS searches this folder for a configuration file named either SASV9.CFG or .SASV9.CFG.
- Performance can be improved by processing SAS data in memory-based SAS libraries.
- Use Secure Sockets Layer (SSL) for secure networks. For information about SSL, see the **SAS/CONNECT User's Guide**.
- SAS can now sort data by using SyncSort for Windows if you have Syncsort installed at your site.
- To use the same destination printer (not the default printer) from one SAS session to the next, use the P RTPERSISTDEFAULT system option when you start SAS.
- To send an e-mail attachment with records that contain more than 256 characters, the ATTACH email-option in the FILENAME, EMAIL statement now supports the LRECL and RECFM options.
- When you attach the contents of the Results Viewer to an e-mail message, the file is attached according to its file type of either .html or .rtf.
- In 64-bit operating environments, the V6 engine is a read-only engine.
- New keyboard shortcuts are available for resizing the docking view and displaying property sheets from a window that contains a Tree view or a List view.
- If a fatal error occurs during SAS initialization or termination and the MSG dialog box is not available or the SAS log is not open, error messages are written to the SAS console log.

---

## Accessibility

The following features are new:

- Many of the SAS windows and dialog boxes can be read by accessibility aids.
- The ACCESSIBILITY system option enables access to the Customize Tools dialog box Customize tab and some SAS Properties dialog boxes.
- Text can be enlarged by using the SYSGUIFont system option.
- Accessibility aids might have fewer problems reading menus if you exclude menu icons.
- You can use the keyboard to resize the docking view.
- When a window (such as SAS Explorer) contains a List view, you can use the Sort Columns dialog box to sort the list by the detail information.
- You can resize the details columns in a List view by using the Column Settings dialog box.

---

## Enhanced Editor

The following features are new:

- To open new or existing files in an Enhanced Editor window, you can select New Program and Open Program from the File menu.
- The Enhanced Editor now recognizes XML files that have the .xml file extension.
- When you open a file in the Enhanced Editor, the tabs can be converted to spaces.
- The full path and the filename of the last submitted program or catalog entry is available by using environment variables.
- Submit one or more lines of code without submitting your complete program by using the SUBTOP command.
- Line numbers can be turned on and off by using the NUMS command.

The following features have been enhanced:

- The Enhanced Editor accepts lines of data in a DATALINES statement that are longer than 256 characters into one observation without using FILENAME statement options.
- Autosave files are saved to the Application Data folder.
- The default value for the Enhanced Editor Script appearance option is determined by the Windows regional options.

The following feature has been removed:

- The Enhanced Editor no longer prompts you to reload a file on a disk that has been updated.

---

## Graphical User Interface

The following features are new in the SAS main window:

- The Universal Printing commands are available from the File menu when you specify the UPRINTMENUSWITCH system option.
- More windowing environment workspace is available by minimizing the docking view.
- A maximum of 20 customized help files can be added to the Help menu.
- The Print and Copy toolbar buttons are always enabled if they are commands in a customized toolbar.
- To print line numbers, page numbers, and to print in color, select the Options button in the Print dialog box.
- The About SAS System dialog box includes information about the SAS version and the Windows operating environment that you are currently using.

---

## SAS Language Elements

## Commands

The following SAS commands are new:

- When a SAS window (such as the SAS Explorer window) contains a List view, you can resize the columns by using the DLGCOLUMNSIZE command.
- Sort the columns in a List view by using the DLGCOLUMNSORT command.
- Three new docking view commands, WDOCKVIEWMINIMIZE, WDOCKVIEWRESTORE, and WDOCKVIEWRESIZE, enable the docking view to be minimized, restored, and resized.
- To change the active window to the editor window that was last edited, use the WPGM command.

## Functions

The following have specific functionality in the Windows operating environment:

- The DINFO Function, the DOPTNAME Function, and the DOPTNUM Function return directory information.
- To delete an external file, use the FDELETE Function.
- Verify the existence of an external file by using either the FEXIST Function or the FILEEXIST Function.
- To assign or clear a fileref, use the FILENAME Function.
- Verify that a fileref has been assigned by using the FILEREF Function.
- Obtain information about a file by using the FINFO Function, the FOPTNAME Function, and the FOPTNUM Function.
- To assign or clear a libref, use the LIBNAME Function.

## Statements

The following statements have been enhanced:

- Share files between the UNIX and Windows operating environments by using the TERMSTR host option in the FILE and INFILE statements.
- ^Z is interpreted as character data and not as an end-of-file marker when you specify the IGNOREDOEOF host option in the %INCLUDE, FILENAME, FILE, and INFILE statements.

## System Options

The following system options are new:

- Accessibility features are extended for the Customize Tools dialog box and for some Properties dialog boxes by using the ACCESSIBILITY system option.
- If you create a customized table of contents and index for the SAS Help and Documentation, use the HELPTOC and HELPINDEX system options to specify the file location.
- Use memory-based SAS libraries to improve SAS performance by using the MEMBLKSZ and MEMMAXSZ system options.
- Improve the access to menus by accessibility aids when you use the NOMENUICONS system option.
- The same destination printer can persist from one SAS session to another by using the PRTPERSISTDEFAULT system option.
- Stop the SLEEP window from displaying when you use the SLEEP function or the WAKEUP function by specifying the NOSLEEPWINDOW system option.
- If you have SyncSort for Windows installed at your site, use these system option to specify sort options:
  - SORTPGM system option specifies to sort by using SyncSort for Windows.
  - The SORTANOM system option enables you to specify options for SyncSort for Windows.



- Use SORTCUT and SORTCUTP system options to specify the number of observations and bytes above which SyncSort for Windows is used instead of the SAS sort.
- Use the SORTDEV system option to specify a temporary directory for files that are created by SyncSort for Windows.
- The SORTPARM system option enables you to specify SyncSort parameters.
- SSLCERTISS, SSLCERTSERIAL, SSLCERTSUBJ, SSLCLIENTAUTH, and SSLCRLCHECK are new system options that support Secure Sockets Layer (SSL) authentication.
- To enlarge text for easier readability, use the SYSGUIFONT system option.
- The Universal Print commands are available from the File menu when you specify the UPRINTMENUSWITCH system option.

The following system option has been enhanced:

- The new default value for the SORTSIZE system option is MAX.

The EMAILID and EMAILPW options, which were previously available only in the Windows environment, are now available in all operating environments. See **SAS Language Reference: Dictionary**.

## Macros

The SYSSCPL automatic macro variable returns a value for the Windows XP and Windows Server 2003 operating environments.

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# What's New in the SAS 9.0 and 9.1 Companion for UNIX

---

## Overview

New and enhanced features for Base SAS improve ease of use and SAS performance under the UNIX operating environment:

- SAS for the AIX, HP-UX, and Solaris operating environments is 64-bit only.
- SMTP (Simple Mail Transfer Protocol) is now the default mail handler.
- Sharing files between UNIX and Windows has been simplified.
- Using the MODULE family of SAS functions and CALL routines, you can invoke a routine that resides in an external shared library from within SAS.
- Universal Printing is the new default printing mechanism. SAS does not support host printing functionality.

### Note:

- This section describes the features of SAS software under the UNIX operating environment that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. Throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



---

## Migrating 32-Bit SAS Files to 64-Bit SAS Files

Starting in SAS 9.0, SAS for the AIX, HP-UX, and Solaris operating environments is 64-bit only. Consequently, some SAS files (such as your SAS catalogs) that were created in 32-bit releases of SAS cannot be read by the V9 engine. You can read and write to your 32-bit SAS data sets, SAS/ACCESS views from Oracle or SYBASE, SQL views, or MDDDB files from a 64-bit SAS session using CEDA. However, you cannot update these files.

You can use the MIGRATE procedure to convert all of your SAS files to 64-bit. For more

information about the MIGRATE procedure, see the Migration Community at [support.sas.com/rnd/migration](http://support.sas.com/rnd/migration).

**Note:** If you use Remote Library Services (RLS) to access SAS files on a server, see the **SAS/CONNECT User's Guide** for information about accessing Version 6 SAS files. ■

---

## Accessing SAS Files from Previous Releases

On the 64-bit AIX, HP-UX, and Solaris platforms, the V6 and V6TAPE read-only engines provide read-only access to your Release 6.12 data sets. See **SAS Language Reference: Concepts** for more information about the compatibility of V6 files with SAS 9.1.

On the Tru64 and Linux platforms, you still have read and write access to your Release 6.12 data sets.

---

## Restricted System Options

Your site administrator can specify SAS system options for your site, a specific group, or an individual user in a restricted configuration file. Because these options are restricted, you cannot change the specified value. Use the new RESTRICT option in the OPTIONS procedure to see all the system options that have been restricted. For information about creating a restricted configuration file, see the **SAS System Configuration Guide for UNIX**.

---

## Executing UNIX Commands within a SAS Session

`umask` is added to the list of UNIX commands `cd`, `pwd`, or `setenv` that SAS checks before executing the SAS equivalent in a session when you use the X command, X statement, CALL system routine, or %SYSEXEC.

---

## Sending E-mail from within Your SAS Session

- The default mail handler is SMTP (Simple Mail Transfer Protocol), which supports attachments.
- The new BCC option in the FILENAME statement enables you to send blind copy e-mails during a SAS session.

- Using the Send Mail dialog box, you can now do the following:
    - include the contents of an active SAS window (such as the Program Editor or Log) in the body of your e-mail.
    - attach the contents of a non-text window to your e-mail. Examples of non-text windows include a graph generated by SAS/GRAPH and an image in your PROC REPORT output.
- 

## Accessing Shared Executable Libraries from SAS

Shared libraries in UNIX contain executable programs that are written in various programming languages. These libraries store useful routines that might be needed by many applications. Using the MODULE family of SAS functions and CALL routines, you can invoke a routine that resides in an external shared library from within SAS. You can access the shared library routines by using a DATA step, the IML procedure, and SCL code.

---

## Changes to the cleanwork Command

The cleanwork command can now be used to delete utility directories whose associated SAS process has ended.

---

## SAS Resources

- The `SAS.useNativeXmTextTranslations` X resource specifies whether any XmText widget translations are inherited by all instances of the Text, Combo Box, and Spin Box widgets that are used by the SAS X Motif user interface.
- The `SAS.webBrowser` resource is no longer supported. The `SAS.helpBrowser` resource now specifies the pathname of the World Wide Web browser for use when viewing the online help or when the WBROWSE command is issued.
- The following resources that were used to control your ODS results are no longer supported:
  - `SAS.resultsHTML`

- `SAS.resultsUseWork`
- `SAS.resultsTmpDir`
- `SAS.resultsHTMLStyle`
- `SAS.resultsListing`
- `SAS.resultsAutoNavigate`

To set the values for your ODS output, use the Results tab in the Preferences dialog box.

---

## SAS Language Elements

### Commands

The following commands are obsolete:

- DLGPRT
- DLGPRTMODE
- DLGPRTPREVIEW
- DLGPRTSETUP.

### Functions and CALL Routines

- To call a specific routine or module that resides in a shared library, you can use the MODULE function.
- You can store the contents of a memory address in a numeric variable on 32-bit and 64-bit platforms by using the PEEKLONG function. This function replaces the PEEK function, which was valid only on 32-bit platforms.

## Statements

- The following option is new in the FILE, FILENAME, and INFILE statements:
  - TERMSTR= enables the sharing of UNIX and PC formatted files.
- The following options are new in the %INCLUDE statement:
  - BLKSIZE= specifies the number of bytes that are physically read or written in an I/O operation.
  - ENCODING= specifies the encoding to use when reading from the specified source.
  - LRECL= specifies the record length (in bytes).
  - RECFM= controls the record format.

## Procedures

- To see all the system options that have been set by your site administrator, use the RESTRICT option in the OPTIONS procedure.
- The BMDP procedure is obsolete.

## System Options

- The following system options are new:
  - You can specify the location of the Program Editor autosave file by using the AUTOSAVELOC system option.
  - If you create a customized table of contents and index for the SAS Help and Documentation, use the HELPINDEX and HELPTOC system options to specify the file location.
  - SSLCALISTLOC, SSLCERTLOC, SSLCLIENTAUTH, SSLCRLCHECK, SSLCRLLOC, SSLPVTKEYLOC, and SSLPVTKEYPASS are new system

options that support Secure Sockets Layer (SSL) authentication.

- To set permissions for the temporary Work library when it is created, use the WORKPERMS system option.
- The following system options are enhanced:
  - If you specify only a directory path for the ALTLOG, LOG, ALTPRINT, or PRINT system options during SAS invocation, then the default filename for your log or procedure output file is *filename*.LOG or *filename*.LST, where *filename* is the name of your SAS job.
  - SMTP (Simple Mail Transfer Protocol) is the new default for the EMAILSYS system option.
  - V9 is a new value for the ENGINE system option.
  - MAX is the new default for the SORTSIZE system option. The value of MAX is based on your operating environment.
- The following system options have values that are obsolete:
  - Because the CoSort utility is no longer supported, `cosort` is not a valid value for the SORTNAME system option.
- The following system options are obsolete:
  - PROCLEAVE
  - SORTLIB
  - SYSLEAVE
  - XPRINTNM.

The UNBUFLOG system option has been replaced by the LOGPARM system option, which is available in all operating environments. For details, see **SAS Language Reference: Dictionary**

# What's New in the SAS 9.0 and 9.1 Companion for OpenVMS Alpha

---

## Overview

New and enhanced features in Base SAS improve ease of use and SAS performance under the OpenVMS Alpha operating environment:

- SAS is built to take advantage of the OpenVMS Alpha 64-bit architecture.
- Your site administrator can restrict system options for your site.
- You can create filenames similar to those on UNIX and Windows by using Extended (ODS-5) Syntax on ODS-5 enabled volumes.
- Support for cluster-level logicals has been incorporated into SAS in all areas where multi-level logical definitions were previously supported.
- SMTP (Simple Mail Transfer Protocol) is now the default for sending mail from within SAS.

### Note:

- This section describes the features of SAS software under the OpenVMS Alpha operating environment that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. Throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



---

## Migrating Your Existing SAS Files to SAS 9.1

Starting in SAS 9.0, SAS is built to take advantage of the OpenVMS Alpha 64-bit architecture. The following list explains the compatibility of your existing SAS files with SAS 9.1:

- All of your Version 7 and Version 8 SAS files (except SAS catalogs) are compatible



with SAS 9.1. To take advantage of the new SAS®9 features and access your existing SAS catalogs, convert your Version 7 and Version 8 files by using the MIGRATE procedure.

- SAS 9.1 only supports input processing for Version 6 data files using the V6 read-only engine. To access all of your Version 6 files in SAS 9.1, you need to migrate your Version 6 data libraries.

You can use the MIGRATE procedure to convert all of your SAS files to the SAS 9.1 format. For more information about the MIGRATE procedure, see the Migration Community at [support.sas.com/rnd/migration](http://support.sas.com/rnd/migration).

If you use Remote Library Services (RLS) to access SAS files on a server, see the **SAS/CONNECT User's Guide** for information about accessing Version 6 SAS files.

---

## Restricted System Options

Your site administrator can restrict SAS system options at three levels: for your site, for a specific group, or for an individual user. Because these options are restricted, you cannot change a value that is specified in the restricted configuration files. Use the new RESTRICT option for the OPTIONS procedure to see all of the system options that have been restricted. For information about creating a restricted configuration file, see **SAS System Configuration Guide for OpenVMS**.

---

## Support for Extended (ODS-5) Syntax on ODS-5 Enabled Volumes

SAS supports the Extended (ODS-5) Syntax on ODS-5 enabled volumes. The ODS-5 syntax allows longer filenames, supports more characters within filenames, preserves case within filenames, and supports deeper directory structures. These extended file specifications enable users to create filenames similar to those in UNIX and Windows. The ODS-5 and Windows file-naming conventions are similar. For example, if a filename exists in all uppercase, then any lowercase or uppercase reference to that file will resolve to uppercase.

When using the ODS-5 syntax, you must issue an X statement before using a DCL command in SAS.

---

## Support for Cluster-Level Logicals

OpenVMS 7.2 introduced the new concept of clusterwide logical definitions. Support for cluster-level logicals has been incorporated into SAS in all areas where multi-level logical definitions were previously supported. See the OpenVMS documentation for more information about cluster-level logical definitions.

SAS will use a clusterwide logical when you:

- specify a cluster-level configuration file
- specify a cluster-level autoexec file
- use the GETLOG function.

---

## Specifying an Additional Configuration File

You can specify the CONFIG= system option inside a configuration file to point to an additional configuration file. Because the options specified in this additional file are processed at the point of the CONFIG= specification, their precedence will be lower than the next option listed in the original configuration file.

---

## Functionalities That Are Unavailable from a Captive Account

Functionalities that require either a detached process or a subprocess are unavailable from a captive account. These functionalities are:

- host-specific commands that are executed asynchronously from the SYSTASK statement
- the PIPE device in the FILENAME statement
- remote sign-ons using SAS/CONNECT
- the SAS Help and Documentation in the SAS windowing environment
- the SAS Session Manager (xsassm)
- X commands that cannot be executed in the current process.

---

## Changes to SAS E-mail

- The default mail handler is SMTP (Simple Mail Transfer Protocol), which supports attachments.
- The BCC option in the FILENAME statement enables you to send blind copy e-mails during a SAS session.
- Using the Send Mail dialog box, you can now do the following:
  - include the contents of an active SAS text window (such as the Program Editor or Log) in the body of your e-mail.
  - attach the contents of a non-text window to your e-mail. Examples of non-text windows include a graph generated by SAS/GRAPH and an image in your PROC REPORT output.

**Note:** The VMS e-mail facility does not support attachments. ■

---

## Accessing External Shareable Images

Shareable images are executable files that contain one or more routines written in various programming languages. Shareable images store useful routines that might be needed by many applications. Using the MODULE family of SAS CALL routines and functions, you can invoke a routine that resides in an external shareable image from within SAS. You can access the shareable images by using a DATA step, the IML procedure, and SCL code.

---

## Engines

The following features are new or enhanced:

- The new V6 read-only engine enables you to read your Release 6.12 data sets. For more information about the V6 read-only engine, see **SAS Language Reference: Concepts**.
- The V5 and V6TAPE engines are no longer supported. Because of this, neither the V5 nor the V6TAPE options are valid in the LIBNAME statement or in the ENGINE=

system option.

---

## SAS Resources

- The following resources are new:
    - **SAS.startSessionManager** specifies whether SAS automatically starts the session manager when a new SAS session is started.
    - **SAS.suppressTutorialDialog** specifies whether SAS displays the Getting Started Tutorial dialog box at the start of your SAS session.
    - **SAS.useNativeXmTextTranslations** specifies whether any XmText widget translations are inherited by all instances of the Text, Combo Box, and Spin Box widgets used by the SAS X Motif user interface.
    - **SAS.VMSdisplay** controls how often SAS yields processing to the X windowing environment.
  - The **SAS.webBrowser** resource is no longer supported. The **SAS.helpBrowser** now specifies the pathname of the World Wide Web browser for use when viewing the online help or when the WBROWSE command is issued.
- 

## SAS Language Elements

### Commands

- The X command now breaks DCL commands that are longer than 256 characters into smaller chunks before sending them to the operating environment for processing.

### Functions

- To call a specific routine or module that resides in a shareable image, you can use the MODULE function.
- You can store the contents of a memory address in a numeric variable on 32-bit and

64-bit platforms by using the PEEKLONG function. This function replaces the PEEK function, which was valid only on 32-bit platforms.

## Procedures

- To see all the system options that have been set by your site administrator, use the RESTRICT option in the OPTIONS procedure.

## Statements

- The following options are new in the %INCLUDE statement:
  - BLKSIZE= specifies the number of bytes that are physically read or written in an I/O operation.
  - ENCODING= specifies the encoding to use when reading from the specified source.
  - LRECL= specifies the record length (in bytes).
  - RECFM= controls the record format.
- The V5 and V6TAPE options are not accepted by the LIBNAME statement.

## System Options

- The following system options are new:
  - You can specify the location of the Program Editor autosave file by using the AUTOSAVELOC= system option.
  - To specify that the asynchronous host command use a detached process, use the DETACH system option. The default is DETACH.
  - If you create a customized table of contents and index for the SAS Help and Documentation, use the HELPTOC= and HELPINDEX= system options to specify the file location.

- SSLCALISTLOC, SSLCRLLOC, SSLCERTLOC, SSLPVTKEYLOC, and SSLPVTKEYPASS are authentication security options that are under the OpenVMS Alpha operating environment. For details, see the **SAS/CONNECT User's Guide**.
- The following system options have been changed or enhanced:
  - SMTP (Simple Mail Transfer Protocol) is the new default for the EMAILSYS= system option. SMTP supports sending attachments.
  - V9 is a new value for the ENGINE= system option. V5 and V6TAPE are obsolete and not accepted as valid values.
  - The SAS\$USER logical, the default for the SASUSER= system option, now defaults to the SASUSER91 subdirectory of the SYS\$LOGIN directory.
  - MAX is the new default value for the SORTSIZE= system option.
  - The value of *stack-size* for the STACK= system option must be an integer between 65,535 and 5,242,880. The default value for most procedures is now 1,048,576 bytes.
- The following system options are obsolete or are no longer supported:
  - DBCS
  - DBCSLANG
  - DBCSTYPE
  - PROCLEAVE
  - SYSLEAVE
  - UNLOAD.

# What's New in the SAS 9.0, 9.1, and 9.1.3 Companion for z/OS

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## Overview

New features in SAS 9.0 (and later) under z/OS include support for the following items:

- long format names
- remote help
- record-level sharing (RLS) for VSAM data sets and extended-format VSAM data sets.

### Note:

- This section describes the features of SAS software under z/OS that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS 9.1 (and later) for z/OS is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.
- For important information about new developments for SAS 9.1 (and later) for z/OS, see [support.sas.com](http://support.sas.com).



---

## Details

### Long Format Names

Beginning with version 9.0, SAS supports long format names up to a maximum length of 32 bytes. Because earlier versions of SAS support format names that are only a maximum length of 8 bytes, you will not be able to use earlier versions of SAS to read SAS 9.0 (and later) data sets that contain long format names.

## Remote Help

The remote help system enables users who access SAS by using a z/OS emulator (or a real 3270) to view SAS documentation with a Web browser on a PC that is running Microsoft Windows. Previously, all documentation was displayed by the itemstore help in the SAS Help window in the z/OS emulator. By displaying this documentation in your Windows Web browser, the browsing capability is improved and the documentation content is more complete.

## SAS Language Elements

- The following SAS statements have been enhanced:
  - The NRLS option in the INFILE statement instructs SAS not to attempt to open a VSAM data set in record-level sharing (RLS) mode, even if the data set is defined as RLS eligible.
  - The libref argument in the LIBNAME statement now supports library names that contain underscores (\_).
- The following SAS system options are new:
  - The DLEXPCOUNT option reports EXCPs (Execute Channel Program calls) to direct access bound libraries.
  - The DLMSGLEVEL option specifies which level of messages to generate for SAS data libraries.
  - The FILESPACE option at initialization specifies how the FILENAME and LIBNAME statements should provide default values when allocating a new z/OS data set.
- The new SAS function DSNCATLGD verifies the existence of a file in the z/OS system catalog.



# What's New in the SAS/ACCESS 9.1 Interface to ADABAS

---

## Overview

Prior to SAS 9.1, the ADABAS engine could not process a WHERE clause and ISN option. The ADABAS engine read all of the records in the ADABAS table and returned the records to SAS, then applied the WHERE clause.

Now, the ADABAS engine issues an L1 command to the ADABAS, table that enables ADABAS to process the WHERE clause and ISN option. With this method, only one ADABAS record is read instead of the complete table, which results in a performance enhancement.

### Note:

- This section describes the only feature of the SAS/ACCESS Interface to ADABAS that has changed since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/ACCESS 9.1 for ADABAS is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



# What's New in the SAS/ACCESS 9.0 and 9.1 Interface to CA-Datcom/DB

---

## Overview

For recovery processing, the SAS/ACCESS interface to CA-Datcom/DB contains two new data set options, and the interface view engine has been enhanced to support three new data types.

### Note:

- This section describes the features of the SAS/ACCESS interface to CA-Datcom/DB that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/ACCESS 9.1 for CA-Datcom/DB is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

---

## Details

- The following data set options are new:
  - The DDBCIMIT= data set option specifies the number of rows that are to be processed before a database COMMIT statement is issued.
  - The DDBERLMT= data set option specifies the number of errors that are allowed before SAS stops processing and issues a rollback.
- The interface view engine now supports the CA-Datcom/DB data types: SQL-DATE, SQL-TIME, and SQL-STMP.
- The special user-defined URT names **USttlnnn** and **UWtttnnn**, which were used for loading the User Requirements Table, are obsolete.

# What's New in the SAS/ACCESS 9.0 and 9.1 Interface to IMS

---

## Overview

The SAS/ACCESS Interface to IMS now supports the ENCODING= data set option, which enables you to override the encoding for processing a specific input or output file.

### Note:

- This section describes the only feature of the SAS/ACCESS Interface to IMS that changed since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/ACCESS 9.1 for IMS is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



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# What's New in SAS/ACCESS 9.0 and 9.1 for PC Files

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## Overview

The differences between the PC and UNIX features for SAS/ACCESS for PC files have been significantly decreased. The documentation has also been enhanced with new sections added for these two operating environments.

### Note:

- This section describes the features of SAS/ACCESS for PC files that are new or enhanced since SAS 8.2.



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## Windows Details

- The LIBNAME statement for PC files, new for SAS 9.0, provides direct, transparent access to Microsoft Access (97, 2000, and 2002) and Microsoft Excel (5, 95, 97, 2000, and 2002).
- PROC IMPORT and PROC EXPORT, using the SAS/ACCESS engine for PC files, provide direct access to JMP data files.
- PROC SQL, using capabilities of the new PC files engine, enables you to communicate with Microsoft Access and Microsoft Excel.
- Enhancements to the Import/Export wizard and procedures enable you to interact with JMP data files and to access multiple Microsoft Excel worksheets.

---

## UNIX Details

- The SAS/ACCESS interface to PC Files on UNIX communicates with the PC files server. The server enables you to process requests for PC data.
- A new engine, called pcfiles, is available in SAS 9.1. This engine enables you to access data stored on network accessible PCs. This engine, working with new UNIX

features, also enables you to directly access Microsoft Access (97, 2000, and 2002), Microsoft Excel (5, 95, 97, 2000, and 2002), and data from ODBC data sources on the PC (for example, the Microsoft SQL Server).

- Enhancements to PROC IMPORT and PROC EXPORT enable you to access local JMP data files and remote JMP data files that are stored on the PC via the client/server model, in addition to Microsoft Access, Microsoft Excel, and ODBC data sources.
- The Pass-Through Facility for PC files uses the pfiles engine to communicate directly with Microsoft Access, Microsoft Excel, and ODBC data sources.

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## What's New in SAS/ACCESS 9.0, 9.1, 9.1.2, and 9.1.3 Interfaces to Relational Databases

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### Overview

SAS/ACCESS Interfaces for Relational Databases has the following changes and enhancements:

- Beginning with SAS 9.1.3 Service Pack 4, SAS/ACCESS Interface for [HP Neoview](#) and SAS/ACCESS Interface for [Netezza](#) are new, including [documentation enhancements](#).
- Beginning with SAS 9.1.3, SAS/ACCESS supports [additional hosts](#) for existing DBMSs.
- Beginning with SAS 9.1.2, SAS/ACCESS Interface for MySQL databases is new.
- Beginning with SAS 9.0, you can use threaded reads to complete jobs in substantially less time than if each task is handled sequentially.
- The new CV2VIEW procedure converts SAS/ACCESS view descriptors into SQL views.

---

### All Supported SAS/ACCESS Interfaces to Relational Databases

- You can use the CHANGE statement to rename SAS/ACCESS tables.
- The CV2VIEW procedure converts SAS/ACCESS view and access descriptors to the SAS 9.0 format. It can also convert a view descriptor to a SAS 9.0 SQL view. As SAS/ACCESS moves forward with LIBNAME enhancements and tighter integration with the SAS Open Metadata Repository, SAS/ACCESS views no longer is the method of choice.
- The DBMASTER= data set option designates which table is the master table when you are processing a join that involves tables from two different types of

databases.

- DBMS metadata can now be accurately maintained within the SAS Open Metadata Repository.
- You can now encode the DBMS password that appears in SAS source code so that it does not appear as text in SAS programs.
- You can use the `DIRECT_EXE= LIBNAME` option to pass an SQL statement directly to a database by using explicit pass-through when you use PROC SQL with a libref.
- The new SQL `MULTI_DATASRC_OPT= LIBNAME` option and the `DBMASTER=` data set option optimize the performance of the SQL procedure. For more detailed information, see the passing joins to the DBMS, determining when joins will fail, and optimizing WHERE clauses topics.
- You can use the `MULTI_DATASRC_OPT= LIBNAME` option instead of the `DBKEY=` data set option to improve performance when you process a join between two data sources.
- The `SASTRACE=` system option now provides improved debugging capabilities.
- With temporary table support, DBMS temporary tables can persist from one SAS step to the next. It involves establishing a SAS connection to the DBMS that persists across SAS procedures and DATA steps.
- Threaded reads divide resource-intensive tasks into multiple independent units of work and execute those units in parallel.
- SAS/ACCESS supports these hosts:

AIX (RS/6000) for MySQL (beginning with SAS 9.1.3 Service Pack 2)

HP for Itanium for Sybase (beginning with SAS 9.1.3 Service Pack 2) and Teradata (beginning with SAS 9.1.3 Service Pack 3)

Linux for Intel for MySQL (beginning with SAS 9.1.3 Service Pack 1) and Teradata (beginning with SAS 9.1.3)

Linux for Itanium for DB2, Informix, Microsoft SQL Server, MySQL, ODBC, Oracle, and Sybase, beginning with SAS 9.1.3 Service Pack 1

64-bit Solaris systems are supported for Teradata (beginning with SAS 9.1.3 Service Pack 4)

64-bit Windows for Oracle and DB2--in addition to 64-bit UNIX, which was provided in SAS 8.2

- Beginning with SAS 9.0, support for these items is discontinued:

SAS/ACCESS Interface to CA-OpenIngres

SAS/ACCESS Interface to Oracle Rdb under OpenVMS Alpha

OS/2, OpenVMS VAX, MIPS ABI, Intel ABI, UNIX MP-RAS, and CMS operating environments

CV2ODBC procedure

---

## **SAS/ACCESS Interface to DB2 under UNIX and PC Hosts**

The following options are new:

- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS-threaded reads and the number of threads.
- The IGNORE\_READ\_ONLY\_COLUMNS= LIBNAME option and data set option specify whether to ignore or include columns whose data types are read-only when generating an SQL statement for inserts or updates.
- The SQL\_FUNCTIONS= LIBNAME option specifies that the SQL functions that match the functions that SAS supports are passed to the DBMS for processing.

---

## **SAS/ACCESS Interface to DB2 under z/OS**



**Note:** z/OS is the successor to the OS/390 operating system. SAS/ACCESS 9.1 (and later) for z/OS is supported on both OS/390 and z/OS operating systems. Throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated. ■

SAS/ACCESS Interface to DB2 under z/OS features stored procedure support that includes passing input parameters, retrieving output parameters into SAS macro variables, and retrieving result sets into SAS tables.

The following options are new:

- The BL\_DB2CURSOR= data set option specifies a string that contains a valid DB2 SELECT statement that points to either local or remote objects (tables or views). After your database administrator populates the communication database with the appropriate entries, you can select data from a remote location to load DB2 tables directly from other DB2 and non-DB2 objects.
- The BL\_DB2LDCT3= data set option specifies a string in the LOAD utility control statement, following the field specification.
- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.
- The DEGREE= LIBNAME option determines whether DB2 uses parallelism.
- The REMOTE\_DBTYPE= LIBNAME option ensures that the SQL that some SAS procedures use to access the DB2 catalog tables is generated properly, based on the database server type.
- The TRAP151= data set option removes columns that cannot be updated from a FOR UPDATE OF clause so that column update can continue.

---

## **SAS/ACCESS Interface to HP Neoview**

SAS/ACCESS Interface to HP Neoview is a new database engine that runs on specific UNIX and Windows platforms. SAS/ACCESS Interface to HP Neoview provides direct, transparent access to HP Neoview databases through LIBNAME statements or the

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.

---

## **SAS/ACCESS Interface to Informix**

The following options are new:

- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.

---

## **SAS/ACCESS Interface to Microsoft SQL Server**

The following options are new:

- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.
- The ERRLIMIT= LIBNAME option specifies the number of errors that are allowed while using the Fastload utility before SAS stops loading data to Teradata.
- The IGNORE\_READ\_ONLY\_COLUMNS= LIBNAME option and data set option specify whether to ignore or include columns where data types are read-only when generating an SQL statement for inserts or updates.

---

## **SAS/ACCESS Interface to MySQL**

Beginning with SAS 9.1.3 Service Pack 4, you can use the INSERTBUFF= LIBNAME option and data set option to specify the number of rows in a single insert operation.

Beginning with SAS 9.1.2, SAS/ACCESS Interface to MySQL is new. MySQL software

is an open-source SQL database server that runs on 32-bit Windows systems, 64-bit HP systems, and 64-bit Solaris systems. SAS/ACCESS Interface to MySQL provides direct transparent access to MySQL databases through LIBNAME statements or the Pass-Through Facility. To control data that is returned to SAS, you can use various LIBNAME and data set options that the LIBNAME engine supports.

---

## **SAS/ACCESS Interface to Netezza**

Beginning with SAS 9.1.3 Service Pack 4, SAS/ACCESS Interface to Netezza is a new database engine that runs on specific UNIX and Windows platforms. SAS/ACCESS Interface to Netezza provides direct, transparent access to Netezza databases through LIBNAME statements or the Pass-Through Facility. To control data that is returned to SAS, you can use various LIBNAME and data set options that the LIBNAME engine supports.

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## **SAS/ACCESS Interface to ODBC**

The following feature and options are new:

- ODBC 3.x standard API is supported.
  - The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
  - The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.
  - The IGNORE\_READ\_ONLY\_COLUMNS= LIBNAME option and data set option specify whether to ignore or include columns whose data types are read-only when generating an SQL statement for inserts or updates.
  - The SQL\_FUNCTIONS= LIBNAME option specifies that the SQL functions that match the functions that SAS supports by SAS are passed to the DBMS.
- 

## **SAS/ACCESS Interface to OLE DB**

The following options are new:

- The IGNORE\_READ\_ONLY\_COLUMNS= LIBNAME option and data set option specify whether to ignore or include columns whose data types are read-only when generating an SQL statement for inserts or updates.
  - The INSERTBUFF= LIBNAME option specifies the number of rows in a single insert operation.
  - The SQL\_FUNCTIONS= LIBNAME option specifies that the SQL functions that match the functions that SAS supports are passed to the DBMS.
- 

## **SAS/ACCESS Interface to Oracle**

The following options are new:

- You can use the BL\_INDEX\_OPTIONS= data set option to specify SQL\*Loader Index options with bulk loading. You can boost performance by specifying the SORTED INDEXES index option.
- The BL\_PARFILE= data set option creates a file that contains the SQL\*Loader command line options.
- You can use the BL\_RECOVERABLE= data set option to specify whether the load process is recoverable. It enhances the performance of the bulk load.
- To improve performance, you can use the BL\_SUPPRESS\_NULLIF= data set option to specify whether to suppress the NULLIF clause for specified columns when a table is created.
- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.
- You can use the OR\_UPD\_PARTITION= data set option to read, update, and delete data from a specific partition in a partitioned table, as well as insert and bulk-load data into a specific partition in a partitioned table. It also boosts performance.
- In addition to being a LIBNAME option, OR\_UPD\_NOWHERE= is now also a

data set option.

---

## **SAS/ACCESS Interface to Sybase**

The following options are new:

- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.

---

## **SAS/ACCESS Interface to Teradata**

The following features and options are new:

- The DBSLICE= data set option specifies user-supplied WHERE clauses to partition a DBMS query into component queries for threaded reads.
- The DBSLICEPARAM= LIBNAME option and data set option control the scope of DBMS threaded reads and the number of threads.
- The ERRLIMIT= LIBNAME option specifies the number of errors that are allowed while using the Fastload utility before SAS stops loading data to Teradata.
- The LOGDB= LIBNAME option specifies the name of an alternate database where the restart log tables from the Teradata FastExport utility should be created.
- You can extract data faster with the Teradata FastExport utility.
- SAS/ACCESS Interface to Teradata supports the MultiLoad bulk-load facility. MultiLoad greatly accelerates insertion of data into both empty and existing Teradata tables. The SAS/ACCESS MultiLoad facility is similar to the native Teradata MultiLoad. You invoke the MultiLoad facility with the MULTILOAD= data set option. MULTILOAD= works together with several other new MultiLoad data set options.

- Beginning with SAS 9.1.3 Service Pack 4, when processing WHERE statements that contain **literal** values for TIME or TIMESTAMP, the SAS engine passes the values to Teradata exactly as they were entered, without rounding or truncation.
- Beginning with SAS 9.1, specifying OBS=*n* causes SAS/ACCESS Interface to Teradata to append SAMPLE *n* to the SQL that Teradata generates.

---

## Documentation Enhancements

Two new supplements are available:

- **SAS/ACCESS Supplement for Netezza (SAS/ACCESS for Relational Databases)**
- **SAS/ACCESS Supplement for HP Neoview (SAS/ACCESS for Relational Databases)**

These supplements explain how SAS/ACCESS software is customized to accommodate the particular requirements and capabilities of each respective DBMS. When you use them with the separately available **SAS/ACCESS for Relational Databases: Reference**, they provide comprehensive guides for using SAS/ACCESS features and options for the DBMSs. These titles are available from SAS OnlineDoc 9.1.3 on the Web and are available for purchase from the SAS Publications Catalog.

In addition, the DISTRIBUTE\_ON= data set option is new in **SAS/ACCESS Supplement for Netezza (SAS/ACCESS for Relational Databases)** and **SAS/ACCESS for Relational Databases: Reference**.

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## What's New in SAS/ACCESS 4.2 Interface to R/3

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### Overview

SAS/ACCESS 4.2 Interface to R/3 has the following new features and enhancements:

- [simplified logon process](#)
- [enhanced authorization checks](#)
- [enhanced RFC server](#)
- [enhanced creation of an RFC server destination](#)
- [new RFC server options](#)
- [new %CALLRFC macro](#)
- [new Unicode support for RFC servers](#)
- [new SAP transport files for simplified ABAP installation](#)
- [new SAP LIBNAME engine](#)

These changes are from SAS/ACCESS 9.1 Interface to SAP 9.1 and later. For information about changes to SAS Data Surveyor 4.2 for SAP, see the [What's New](#) section in SAS OnlineDoc.

---

### Simplified Logon Process

In previous versions, you were required to enter CPI-C parameters in the logon utility when you log on to your R/3 system. You no longer need to use these parameters. You can instead enter your logon parameters in the Logon to R/3 and Advanced Parameters windows.

---

## Enhanced Authorization Checks

You can develop alternative authorization schemes for reading R/3 tables by using enhanced authorization checks through the /SAS/AUTH01 Business Add-In (BAI). By default, this BAI performs the same authorization checks as it did previously on S\_TABU\_DIS, so no further action is necessary.

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## Enhanced RFC Server

The command-line syntax for the RFC server supports two operation modes for extracting data from your SAP R/3: UNIX and Windows NT.

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## Enhanced Creation of an RFC Server Destination

simpler process for creating an RFC server destination for a small SAP configuration

Beginning with 4.1, you can omit gateway information when creating an RFC server destination for small SAP configuration.

---

## New RFC Server Options

The following RFC server options are new:

-b

[for 4.1] enables batch compatibility so that you can process V8 ACCR3 requests using a V9 RFC server.

-B

[for 4.1] boosts performance when you use it to increase the minimum buffer size for data transfers.

-S

[for 4.2] registers the SAS RFC server at an SAP gateway, enabling it to receive requests for information from the SAS RFC Server Monitor in the SAP Netweaver



## New %CALLRFC Macro

You can call RFC-enabled ABAP functions by using the new CALLRFC procedure, which the %CALLRFC macro uses internally. The CALLRFC procedure uses the RFC server to communicate with the SAP system.

---

## New Unicode Support for RFC Servers

SAS/ACCESS 4.2 Interface to R/3 and later supports Unicode SAP servers on Windows and UNIX. For details about UNIX platform support, see the **Installation Instructions for SAS/ACCESS Interface to R/3**.

---

## New SAP Transport Files for Simplified ABAP Installation

To simplify installation of the required ABAP function modules and programs, it is recommended that you import the SAP transport files rather than installing these manually. For more information, see the **Installation Instructions for SAS/ACCESS Interface to R/3**.

As a result of this change, the new RFC server and RFC dialog server no longer use the following ABAP function modules and programs:

- Z\_SAS\_BATCH\_INTERFACE\_4
- Z\_SAS\_READ\_TABLE\_CPIC
- ZSASRDBT
- ZSASRDTB

**Note:** Because the transport files for the SAS/ACCESS 4.2 Interface to R/3 require different ABAP function modules and programs than the transport files for the SAS/ACCESS Interface to SAP BW, be sure to use the correct files when you install your application. ■

---

## New SAP LIBNAME Engine

The new SAP LIBNAME engine is a read-only engine that you can use to access tables and views from SAP R/3 and SAP BW systems. It accesses an SAP system through a connection to the SAS RFC server and is part of the SAS solution to access data in an SAP system. It supports new features such as load balancing, user validation at logon, more efficient handling of projections, server-side joins, and directory processing.

Unlike other LIBNAME engines in SAS, these interfaces are read-only and do not support any forms of data set creation, deletion, or modification.

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# What's New in the SAS/ACCESS 9.1 Interface to SAP BW

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## Overview

The new features and enhancements for the SAS/ACCESS 9.1 Interface to SAP BW include

- support for SAP BW, Release 3.0
- changed data capture (CDC) processing that enables you to identify and extract only the data in your ODS tables and InfoCubes that has changed since your last extraction
- enhanced performance when using the Load Metadata wizard to extract your SAP BW metadata
- a logon process that no longer requires CPI-C logon parameters to be used.

---

## Details

- The SAS/ACCESS Interface to SAP BW now supports all SAP BW releases from SAP BW, Release 2.0B, through SAP BW, Release 3.0. The SAS/ACCESS Interface to SAP BW is now compatible with SAP BW systems that contain transactional operational data store (ODS) tables and transactional InfoCubes that were introduced in SAP BW, Release 3.0.

**Note:** The SAP BW transactional ODS tables and transactional InfoCubes do not support changed data capture (CDC) processing. ■

- The SAS/ACCESS Interface to SAP BW now provides a new method of extracting data from the ODS tables and InfoCubes in your SAP BW system. When extracting data from ODS tables and InfoCubes, you can either use full update processing, which extracts all of the data in the selected ODS table or InfoCube, or you can use changed data capture (CDC) processing. CDC processing enables you to extract only the data that has changed since your last extraction.
- The Load Metadata wizard has improved performance when extracting metadata. Now, the SAS/ACCESS Interface to SAP BW uses an ABAP function that issues a

single call to your SAP BW system rather than issuing multiple calls. This reduces the amount of time required to extract large amounts of metadata from the ODS objects and InfoCubes in your SAP BW system.

- In previous versions of the SAS/ACCESS Interface to SAP BW, the logon profiles required that CPI-C parameters be used when logging on to your SAP BW system. Now, the CPI-C parameters are no longer used when you log on to your SAP BW system. The logon utility enables you to access the following windows in which you will need to enter your logon parameters:
  - Logon to SAP BW window
  - Advanced Parameters window

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# What's New in the SAS Add-In 2.1 for Microsoft Office

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## Overview

The SAS Add-In 2.1 for Microsoft Office has the following changes and enhancements:

- enhanced integration with Microsoft Office
  - ability to publish documents and impact analysis support
  - additional job administration and control
  - support for additional data sources
  - new SAS tasks
- 

## Enhanced Integration with Microsoft Office

The SAS add-in has improved its integration with Microsoft Office by adding the following functionality:

- support for Microsoft PowerPoint. You can insert SAS results in a new slide or add the results to an existing slide.
  - ability to open a data source in a PivotTable in Microsoft Excel.
  - ability to retain appearance and formatting changes when you refresh the results.
  - ability to place multiple results on the same Excel worksheet.
  - ability to place grouped analyses on a new worksheet.
  - ability to modify the data source in Microsoft Excel, Microsoft Word, and Microsoft PowerPoint. You no longer have to open a data source first in Excel to modify the data.
  - ability to copy a data source to a SAS server.
- 

## Ability to Publish Documents and Impact Analysis Support

Using the SAS Add-In for Microsoft Office, you can publish documents to a metadata repository. You can publish workbooks, documents, or slideshows to a metadata repository. When you publish a document to the metadata repository, information about all the data

sources, stored processes, and the location of the document in WebDAV is saved to the repository. The document is saved in WebDAV.

Storing this metadata enables you to perform an impact analysis on a document. Impact analysis enables you to see where a data source came from and the items that are dependent on this source. This analysis enables you to know how changing a data source might affect other documents.

When you publish a document, the Verify Document for Impact Analysis dialog box opens to notify you that these data sources will not be tracked for impact analysis.

---

## Additional Job Administration and Control

The SAS Add-In 2.1 for Microsoft Office has added the following job administration and control functionality:

- You can schedule a document. Scheduling when the SAS content in an Excel workbook, Word document, or PowerPoint presentation is refreshed enables you to have the most up-to-date data and reports. You can specify the date and time to refresh your content. You can also specify where the results are sent.
  - You can refresh SAS content one item at a time or several at one time. On the **Execution** tab in the Properties dialog box, you can specify if the content is refreshed in the background or when you open the file.
  - You can use the SAS Status window to view currently executing jobs, cancel any running jobs, or re-run any jobs that completed with an error.
  - You can use the View SAS Contents dialog box to see the analyses and data sources that are inserted in the current Excel workbook, Word document, or PowerPoint presentation. From this window, you can delete content or save an XML representation of the contents to an external file.
- 

## Support for Additional Data Sources

In previous releases, you could select SAS data sources or Excel data as your data source. Starting with the SAS Add-In 2.1 for Microsoft Office, the following additional data sources are available:

- SAS Information Maps. An information map is a collection of data items and filters

that describes and provides a view of physical data. You can create information maps using various SAS tools, such as SAS Information Map Studio. The SAS add-in enables you to open the information maps that have been created at your site.

- OLAP cubes. This data source is available only when you open data into a PivotTable.
- 

## New SAS Tasks

The following tasks are new for this release:

- Bar-Line Chart enables you to create a vertical bar chart with a line plot overlay.
- Compare Data enables you to create a report that compares two data sets or compares two variables within or across data sets.
- Characterize Data enables you to create a summary report, graphs, and frequency and univariate SAS data sets that describe the main characteristics of the data.
- Create Time Series Data enables you to convert transactional data into fixed-interval time series.
- Data Set Attributes enables you to create a report with the data set's creation date, location, and number of observations as well as the variable names, labels, types, and formats.
- Forecast Studio Create Project enables you to specify the forecasting variables, choose whether to forecast your data hierarchically, and specify the forecast horizon for a new SAS Forecast Studio project.
- Forecast Studio Open Project enables you to open the selected series from an existing SAS Forecast Studio project and specify how to display the results.
- Model Scoring enables you to score a data set against an existing SAS Enterprise Miner predictive model.

New wizards provide a quick and easy way to use some of the SAS tasks and to contain a limited number of options. These wizards are helpful if you are new to a task or if you want to quickly generate an analysis. The following tasks have added a wizard view for this release:

- Bar Chart
- Line Chart
- Pie Chart
- Summary Statistics
- Summary Tables

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## What's New in SAS AppDev Studio 3.2, 3.2.1, and 3.2.2

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### Overview

The primary change in SAS AppDev Studio 3.2 is that the webAF development tools are now provided in the SAS AppDev Studio Eclipse Plug-ins, which are a set of plug-ins for the open-source Eclipse IDE (Integrated Development Environment) that support the development of SAS applications.

The main enhancements provided by SAS AppDev Studio 3.2.1 are support for Eclipse 3.2.1 and Eclipse Web Tools 1.5.1, and new cheat sheets for complex tasks.

SAS AppDev Studio 3.2.2 provides support for multiple versions of the SAS Web Infrastructure Kit (WIK). SAS AppDev Studio Hot Fixes, when necessary, can add additional WIK versions to the SAS Versioned Jar Repository.

SAS AppDev Studio has the following changes and enhancements:

- [new project types](#)
- [new SAS Versioned Jar Repository](#)
- [new application templates](#)
- [updates to import and export features](#)
- [enhancements to the standard Eclipse Java editor](#)
- [changes to the product bundle](#)
- [new cheat sheets](#)
- [support for multiple versions of the SAS WIK](#) (only available in 3.2.2)

For more information about SAS AppDev Studio software, see the [SAS AppDev Studio Developer's Site](https://support.sas.com/rnd/appdev/) ([support.sas.com/rnd/appdev/](https://support.sas.com/rnd/appdev/)).

---

### New Project Types

The following new project types are fundamental to developing SAS applications in Eclipse:

- SAS Java Project
  - SAS Web Application Project
- 

## **SAS Versioned Jar Repository**

The SAS Versioned Jar Repository is a collection of reusable SAS library JAR files and their dependencies. When you create a SAS project, a SAS Classpath Container provides access to the SAS Versioned Jar Repository. The SAS Classpath Container manages the underlying SAS library JAR file dependencies for your project. So, as you add features to your application that rely on certain SAS library JAR file features, you can easily manage the resulting dependencies for your project. In fact, much of this effort is performed for you automatically by the SAS AppDev Studio Eclipse Plug-ins.

---

## **New Application Templates**

The plug-ins provide templates that support the development of a variety of applications and Web applications, including SAS Information Delivery Portal Portlets, SAS Management Console and Data Integration Studio Plug-ins, Web-based reports, and OLAP solutions.

---

## **Updates to Import and Export Features**

Users of prior versions of SAS AppDev Studio can use the import features in the plug-ins to import and migrate existing SAS AppDev Studio 3.0 projects into Eclipse. The plug-ins also provide an export facility to create Web Application Archive (WAR) files or Java Archive (JAR) files from your project content.

---

## **Enhancements to the Standard Eclipse Java Editor**

The plug-ins enhance the standard Eclipse Java editor to provide assistance when you create applications based on SAS. The plug-ins enable the integration of the SAS

9.1 BI Java Documentation with the Eclipse help system. The SAS Organize Imports action and "Import from Repository" Quick Fix feature automatically manage project dependencies. Code snippets support commonly performed development tasks such as deploying SAS Foundation Services or connecting to a SAS Metadata Server or a Workspace Server, and a Quick Assist operation supports model/view connections between common Java viewer widgets and the back-end data models.

---

## Changes to the Product Bundle

SAS AppDev Studio 3.2 moves away from some older technology. For more information, see the SAS AppDev Studio 3.2 Migration Guide ([support.sas.com/rnd/appdev/doc/ADS32Migration.pdf](https://support.sas.com/rnd/appdev/doc/ADS32Migration.pdf)). The following changes have been made:

- **SAS AppDev Studio Middleware Server (MWS)** is no longer provided. It has been replaced by the scalability features that are provided in SAS Integration Technologies.
- **webEIS report builder** is no longer provided. It has been replaced by newer SAS reporting products such as SAS Web Report Studio and the SAS Web OLAP Viewer for Java.
- **SAS AppDev Studio Server-Side Catalogs**, which support connections to certain SCL-based data objects on the SAS server, are included but have been deprecated in favor of using more standard and scalable data connection technologies such as JDBC (for relational data) and the SAS®9 Java OLAP interfaces (for OLAP data).

**Note:** This is the last release of SAS AppDev Studio that will include these catalogs.

---

## New Cheat Sheets

SAS AppDev Studio 3.2.1 provides the following new cheat sheets:

### **Configure Workspace Settings Cheat Sheet**

helps users set the SAS AppDev Studio workspace settings.

### **Configure Workspace for SAS Web Application Development Cheat Sheet**

walks users through the additional steps for application development in SAS AppDev Studio.

### **Import a SAS AppDev Studio 3.2 SAS Web Application Project Cheat Sheet**

helps users import an existing SAS Web application project to a new workspace.

---

## **Support for Multiple Versions of the SAS WIK**

SAS AppDev Studio 3.2.2 provides support for multiple versions of the SAS WIK (Web Infrastructure Kit) in the SAS Web Module with WIK facet. For more information about this facet, see the [SAS AppDev Studio Developer's Site](http://support.sas.com/rnd/appdev/) (`support.sas.com/rnd/appdev/`).

New SAS Web Application projects will automatically use the latest version of the WIK, which is found in the SAS Versioned Jar Repository. You can either upgrade or downgrade the version of the SAS WIK for existing SAS Web Application projects. For more information, see the installation instructions for either the SAS AppDev Studio 3.2.2 Eclipse Plug-ins Update or the 322APPDEV01 hot fix. The instructions include information that will help you determine which version of the SAS Web Module with WIK facet corresponds to the hot fix.

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# What's New in the SAS AppDev Studio 3.3 Eclipse Plug-ins

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## Overview

The SAS AppDev Studio 3.3 Eclipse Plug-ins now support Eclipse 3.3 and Eclipse Web Tools Platform 2.0. For more information, consult these resources:

- The Eclipse platform: <http://www.eclipse.org>
  - New features provided by Eclipse 3.3 and the Eclipse Web Tools Platform 2.0: <http://www.eclipse.org/downloads/moreinfo/jee.php>
- 

## General Enhancements

- New and improved cheat sheets that guide users when configuring the SAS AppDev Studio Eclipse Plug-ins, setting up their development workspaces, and defining their Web application servers for use within the development environment.
- Improved application templates for Portlet, SAS Management Console Plug-in, and Data Integration Studio Plug-in development.
- New support for importing external Web applications.
- Enhanced support for managing JDBC connections in the DataBean Wizard and the JDBC Web application template.

Integration with SAS hotfix installers so that the development environment and application templates are automatically updated when a hotfix is installed.

For more information, see the SAS AppDev Studio 3.3 Developer's Web site at <http://support.sas.com/rnd/appdev/>.

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## What's New in SAS/ASSIST 9.0 and 9.1

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### Overview

The new Table Passwords window and several new features for current product elements enhance the usability and functionality of SAS/ASSIST.

#### Note:

- This section describes the features of SAS/ASSIST that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/ASSIST 9.1 is supported on both OS/390 and z/OS operating systems and, throughout the SAS/ASSIST documentation, any reference to z/OS also applies to OS/390, unless otherwise stated.



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### Details

#### Table Passwords Window

The new Table Passwords window lists all password-protected tables that are in currently declared SAS data libraries. In this window, you can

- enter the password for each table
- save passwords in an encrypted file that SAS/ASSIST can refer to in future sessions
- keep one or more password-protected tables from being used in the current session
- keep all password-protected tables from being used in future SAS/ASSIST sessions.

#### Data Sources Window

The Data Sources window now includes a **Deselect Libraries** button that you can use to deselect all libraries.

## **Maps Task and Create Data for Mapping Task**

The Maps task and the Create Data for Mapping task now allow you to specify two area identifier columns. This enhancement enables you to take advantage of map data sets that require two columns (for example, STATE and COUNTY) to uniquely identify each area.

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## What's New in SAS/CONNECT 9.0 and 9.1

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### Overview

New and enhanced features for SAS/CONNECT improve ease of use and SAS performance:

- MP CONNECT technology encompasses parallel processing on SMP (Symmetric Multi-Processor) hardware as well as on machines across a network via the asynchronous RSUBMIT statement or command. MP CONNECT now supports pipeline parallelism.
- SAS/CONNECT libref inheritance eliminates the need to duplicate data for use in multiple SAS sessions.
- The same command that is used to start a client session can also be used to start a server session by assigning the value `!sascmd` to the SASCMD= option in the SIGNON and RSUBMIT statements and to the SASCMD= global system option.
- To ensure information privacy, SAS/CONNECT now supports the network security protocol Secure Sockets Layer (SSL), which encrypts client/server data transfers.
- The %SYSLPUT macro statement now enables you to create a macro variable in a specific server session.
- A new SASESOCK engine in the LIBNAME statement is available for SAS/CONNECT applications that implement MP CONNECT with piping.
- Encoded passwords are supported in the RSUBMIT statement, the SIGNON statement, and in script files that contain passwords.
- The SIGNON statement supports these new options: SIGNONWAIT=, TBUFSIZE=, SERVER=, and SERVERV=.
- Compute Services (RSUBMIT statement) supports the new options SIGNONWAIT= and CPERSIST=.
- New SAS global system options are SIGNONWAIT= and SYSRPUTSYNC=.

- SAS/CONNECT server initialization errors are written to the SAS console log.

## Note:

- This section describes the features of SAS/CONNECT that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/CONNECT 9.1 is supported under both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

---

## Details

### Signon

- SAS/CONNECT libref inheritance eliminates the need to duplicate data for use in multiple SAS sessions. Server sessions can inherit client-defined librefs, allowing multiple sessions to read from and write to a single SAS library. Libref inheritance is implemented in the SIGNON and RSUBMIT statements.
- The same command that is used to start a client session can also be used to start a server session by assigning the value `!sascmd` to the SASCMD= option in the SIGNON and RSUBMIT statements and the SASCMD global system option.
- The SIGNONWAIT= option in the SIGNON statement and in the RSUBMIT statement specifies whether implicit signons within an RSUBMIT are executed synchronously or asynchronously during a SAS session. Synchronous processing means that an RSUBMIT to a server session must be completed before control is returned to the client session.

SIGNONWAIT= is now also a global SAS system option.

- The SAS 9.1 behavior of the *filename* value that is specified in the LOG= (and OUTPUT=) options in the SIGNON statement is different than in previous releases of SAS. The most recent RSUBMIT to *filename* overwrites the previous contents of *filename*. Now, instead of overwriting the file, RSUBMIT appends to the file.
- The TBUFSIZE= global system option is now also an option in the SIGNON

statement. TBUFSIZE= option in the SIGNON statement specifies the size of the buffer that is used by the SAS application layer for transferring data between a client and a server across a network.

- The SERVER= option in the SIGNON statement is used to specify a CONNECT server definition that has been defined in a SAS Metadata Repository.
- The SERVERV= option in the SIGNON statement is used to view the values that are configured in the CONNECT server definition.
- In order to recover from initialization failures, you need to view the content of the SAS console log. The location of the log varies according to the operating environment that the server session runs under.

## Compute Services

- MP CONNECT technology encompasses parallel processing on SMP (Symmetric Multi-Processor) hardware as well as on machines across a network via the asynchronous RSUBMIT statement or command.
- MP CONNECT now supports pipeline parallelism, which allows multiple SAS DATA steps or procedures to overlap execution by piping the output from one process as the input into the next process in a pipeline. Piping improves performance and reduces the demand for disk space.
- SAS/CONNECT libref inheritance eliminates the need to duplicate data for use in multiple SAS sessions. Server sessions can inherit client-defined librefs, allowing multiple sessions to read from and write to a single SAS library. Libref inheritance is implemented in the RSUBMIT and SIGNON statements.
- The same command that is used to start a client session can also be used to start a server session by assigning the value `!sascmd` to the SASCMD= option in the RSUBMIT and SIGNON statements and the SASCMD global system option.
- The %SYSLPUT statement is used to create a macro variable in a server session. Now you can identify the specific server session in which a macro should be created, which is necessary because multiple server sessions can result from executing asynchronous remote submits. The /REMOTE= option that is specified in the %SYSLPUT macro statement directs the macro definition to a specific server session.

- The SIGNONWAIT= option in the RSUBMIT statement and in the SIGNON statement specifies whether implicit signons within an RSUBMIT are executed synchronously or asynchronously during a SAS session. Synchronous processing means that an RSUBMIT to a server session must be completed before control is returned to the client session.

SIGNONWAIT= is now also a global SAS system option.

- The SAS 9.1 behavior of the *filename* value that is specified in the LOG= (and OUTPUT=) options in the RSUBMIT statement is different than in previous releases of SAS. The most recent RSUBMIT to *filename* overwrites the previous contents of *filename*. Now, instead of overwriting the file, RSUBMIT appends to the file.
- The CPERSIST option in the RSUBMIT statement is now also a global system option. CPERSIST specifies whether a connection between a client and a server persists (continues) after the RSUBMIT has completed.
- The SYSRPUTSYNC option in the RSUBMIT statement is now also a global system option. SYSRPUTSYNC sets %SYSRPUT macro variables in the client session when the %SYSRPUT statements are executed rather than when a synchronization point is encountered.

## Remote Library Services

- An explicit port number may now be specified in the SERVER= option in the LIBNAME statement if you use the TCP/IP access method and sign on to a spawner by using an explicit port specification instead of using the default port.
- SAS®9 Remote Library Services does **not** permit a SAS®9 client or server to connect to a SAS 6 client or server. Use PROC UPLOAD and PROC DOWNLOAD to connect clients and servers that run SAS®9 and SAS 6. For details, see information about cross-version issues in the **SAS/SHARE User's Guide**.
- The LIBNAME statement for the SASESOCK engine associates a libref with a TCP/IP pipe (instead of a physical disk device) for processing input and output. The SASESOCK engine is required for SAS/CONNECT applications that implement MP CONNECT with piping.

## Data Transfer Services

Improvements to the file-compression algorithm have significantly reduced the time required for large data transfers using SAS/CONNECT.

## Security

- Secure Sockets Layer (SSL) is a protocol that provides network security and privacy for SAS/CONNECT client/server transfers. To use SSL, you must first install and configure SSL. To apply SSL, you must set SAS system options.

SSL is supported only under the UNIX and Windows operating environments.

- Encoded passwords are supported in the RSUBMIT statement , the SIGNON statement , and in script files that contain passwords.

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# What's New in Communications Access Methods for SAS/CONNECT 9.1 and SAS/SHARE 9.1

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## Overview

SAS now supports

- the TCP/IP communications access method for network connections between these operating environments: OpenVMS Alpha, UNIX, Windows, and z/OS. Also, the XMS communications access method can be used between address spaces under z/OS.
- the network security protocol Secure Sockets Layer (SSL), which encrypts connections between client and server.
- a new shell script for starting SAS is provided for the z/OS spawner.
- new instructions for configuring TCP/IP that runs under the OS/390 and z/OS operating environments.
- the new Windows spawner option -NAME.
- new options for the OpenVMS spawner, UNIX spawner, Windows spawner, and z/OS spawner are -OMRCONFIGFILE and -SASSPAWNERCN. The -INSTALLDEPENDENCIES option is valid only in the Windows spawner.

## Note:

- This section describes the features of the SAS communications access methods that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. Throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



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## Details

## Access Methods and Operating Environments

- SAS now supports the TCP/IP and XMS communications access methods.
- SAS now supports the OpenVMS Alpha, UNIX, Windows, and z/OS operating environments.
- SAS no longer supports the APPC, DECnet, EHLLAPI, and NETBIOS communications access methods or the CMS, OpenVMS VAX, OS/2, Windows 95, and Windows 98 operating environments.

## SSL Protocol

SAS/CONNECT and SAS/SHARE support the Secure Sockets Layer (SSL) protocol, which provides network security and protects the privacy of information by encrypting client/server transfers under the UNIX and Windows operating environments.

## OS/390 and z/OS Operating Environments

- A new Shell Script for Starting SAS is provided for the z/OS spawner.
- New instructions are provided to configure TCP/IP that runs under the OS/390 and z/OS operating environments.

## Spawners

- The new -NAME option for the Windows spawner is used to assign a name to the spawner that is installed and started as a service. A specified name overrides the default name that is automatically assigned when the -INSTALL option is used.
- New options for the OpenVMS spawner, UNIX spawner, Windows spawner, and z/OS spawner are -OMRCONFIGFILE and -SASSPAWNERCN. The new -INSTALLDEPENDENCIES option is valid only in the Windows spawner.

# What's New for SAS Data Integration Studio 3.4

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## Overview

SAS Data Integration Studio 3.4 includes the following new features and enhancements:

- [enhanced import and export of SAS Metadata](#)
  - [enhanced copy and paste of SAS Metadata](#)
  - [enhanced SQL processing](#)
  - [enhanced table loading](#)
  - [better management of transformation output](#)
  - [new support for Web services](#)
  - [new support for message queues](#)
  - [new support for dynamic cluster tables](#)
  - [enhanced support for XML libraries and tables](#)
  - [enhanced View Data window](#)
  - [enhanced impact analysis](#)
- 

## Enhanced Import and Export of SAS Metadata

New wizards are provided for the import and export of metadata in SAS Open Metadata Architecture format. You can import and export metadata repositories, folders of metadata objects, or one or more selected metadata objects.

The new import and export wizards enable you to do the following:

- import and export data as well as the metadata for physical tables and external files
- rename imported data tables or data files and change their physical locations
- import and export dependent objects that are associated with a parent object, such as the inner job that is nested within an iterative job, or an external format file for an external file
- include access controls for a package of imported or exported objects
- import tables from multiple libraries and connect them to the same libraries or to different libraries



- import a library that is assigned to one server and reassign the library to another server
- import a SAS library and change it to a database library, and vice versa.

The features for the import and export of metadata in formats other than SAS Open Metadata Architecture format are unchanged.

---

## Enhanced Copy and Paste of SAS Metadata

SAS Data Integration Studio provides the following menu options for copy and paste operations:

### Copy

builds a list of metadata to be copied.

### Paste

copies and pastes selected metadata.

### Paste Special

enables you to select what attributes are copied and to change some attributes in the pasted object. Paste Special has features similar to the new metadata Import Wizard.

---

## Enhanced SQL Processing

A new SQL Join transformation enables you to create SQL queries that run in the context of SAS Data Integration Studio jobs. The transformation features a graphical interface that provides a consistent and intuitive setting for building the statements and clauses that constitute queries. The transformation supports the PROC SQL syntax of **Create table/view <table> AS <query expression>** and accommodates up to 256 tables in a single query. The SELECT statement supports tables being joined to themselves. It also supports subqueries; the CASE expression; and WHERE, GROUP BY, HAVING, and ORDER BY clauses. Finally, the current version of the SQL Join transformation inserts a comment into the generated code for queries that states that the code was generated by version 2 of the transformation. This comment distinguishes the code from the code that is generated by the earlier version of the SQL Join transformation.

The process of building the SQL query is performed on the **Designer** tab. The tab contains sections that are designed to simplify creating the SQL query and configuring its parts. It is

also easier to set options that optimize join performance.

---

## Enhanced Table Loading

SAS Data Integration Studio has improved the way it loads tables in a process flow.

A new Table Loader transformation provides more load options and more combinations of load options. New capabilities include the following:

- In addition to the Update-and-Insert method that was available before, you can select Update only, or Insert only.
  - You are no longer limited to SQL Insert for new records (after finding the matching). You can use the APPEND procedure instead.
  - SQL Update now has "ignore blanks" options that are similar to those for SQL Modify in previous releases.
  - For SAS tables and for some database tables, indexes and constraints can be revised without having to re-create a table.
  - For SAS tables and for some database tables, indexes and constraints can be dropped or added before or after a load. For example, Job 1 can load Table A without an index, and Job 2 can load the same Table A with an index.
  - Index dropping is available for all update methods, not just the APPEND procedure. If an index is needed for the update method, that index will not be dropped.
- 

## Better Management of Transformation Output

You can now create flows in which transformations can write directly to a persistent data store, without having to write to a temporary output table first. Also, temporary output tables are now visible in the process flow. Having a separate metadata object for each temporary output makes it easier to manage the data and metadata for these tables. You can view the data for a temporary table and update its metadata as easily as you can for a persistent data store.

---

## New Support for Web Services

A Web service is an interface that enables communication between distributed applications,

even if the applications are written in different programming languages or are running on different operating systems.

In SAS Data Integration Studio, administrators can select a job in the Inventory tree or the Custom tree and deploy the job as a Web service. After a job has been deployed in this way, any Web service client, such as a .NET application, can execute the job.

You might want to deploy a job as a Web service when the job must be accessed across platforms, when the amount of data to be input and output is not large, and when any input from or output to the Web service client can be formatted as XML tables.

---

## **New Support for Message Queues**

A message queue is a guaranteed message delivery mechanism for handling data sharing in a user-defined format. There are several widely used messaging technologies currently available. The format of the message content can be completely user defined, or it can be a format that has been commonly accepted for a particular industry segment.

SAS Data Integration Studio provides transformations for WebSphere MQ message queues and Microsoft MQ message queues. Unlike other transformations, the message queue transformations can handle binary files and unstructured data, such as text.

---

## **New Support for Dynamic Cluster Tables**

A dynamic cluster table is two or more SAS SPD Server tables that are virtually concatenated into a single entity, using metadata that is managed by the SAS SPD Server. Dynamic cluster tables can be used as the inputs or outputs in SAS Data Integration Studio jobs.

Data that is stored in dynamic cluster tables can be loaded and processed in parallel. Dynamic cluster tables provide the flexibility to add new data to or to remove historical data from the clustered table by working with the metadata for the cluster without affecting underlying tables. This capability reduces the time needed to complete the job.

Three new transformations enable you to manage dynamic cluster tables.

---

## Enhanced Support for XML Libraries and Tables

XML tables can be used as the inputs or outputs in SAS Data Integration Studio jobs. A new XML source designer is the preferred method for registering XML files in a metadata repository.

The XML source designer uses a SAS XML library to access XML files.

A new XML Writer transformation is required to create a target table in XML format.

---

## Enhanced View Data Window

The View Data window enables you to edit and create tables, as well as view them. It also has better search and navigation features.

---

## Enhanced Impact Analysis

Impact analysis identifies the tables or columns, jobs, and transformations that would be affected by a change in a selected table or column. The following enhancements have been made to impact analysis and reverse impact analysis in SAS Data Integration Studio:

- Analysis continues into dependent metadata repositories. For example, if a table in a Foundation repository is used as an input to a table in a Custom repository, impact analysis will trace from the Foundation table to the Custom table.
- You can open tables and external files in the View Data window, both on the Report tab and the Graph tab.
- You can open external files in the View File window, both on the Report tab and the Graph tab.
- Impacts are now traced through information maps, SAS Enterprise Guide projects, the SAS Add-In for Microsoft Office objects, and message queues.

# What's New for the SAS 9.0 and 9.1 Data Providers

---

## Overview

New or enhanced features in the SAS Data Providers include the following:

- a new SAS OLAP Data Provider
- a new data source syntax for easier integration
- enhanced support for ADO
- improved error reporting
- support for larger tables and longer format and informat names.

**Note:** This section describes the features of the SAS Data Providers that are new or enhanced since SAS 8.2. ■

---

## Details

### Version 6 of the SAS/SHARE Server is No Longer Supported

Version 6 of the SAS/SHARE Server is no longer supported by the SAS/SHARE Data Provider. You can still connect to Version 7 or later SAS/SHARE servers.

### SAS OLAP Data Provider

The new SAS OLAP Data Provider supports access to multidimensional data on a SAS OLAP Server through the OLE DB for OLAP interfaces.

### Data Source Syntax for Easier Integration

In addition to setting each property individually, the SAS IOM and SAS OLAP Data Providers now enable you to specify all the necessary properties in the Data Source.

### File Support across Operating Environments

The SAS Local Data Provider supports SAS data sets that were created under operating environments other than Windows. Data sets created for operating environments such as Solaris and HP-UX can be read directly by the SAS Local Data Provider.

## **In-Memory Data Set Caching**

The SAS IOM Data Provider now supports in-memory data caching by means of the new rowset property `DBPROP_SAS_PAGESIZE`, which controls how many rows the IOM server retrieves each time it processes a request. Retrieved rows are held in memory and are returned to the OLE DB consumer as needed. In-memory caching can significantly improve performance.

ADO recordsets also have a caching facility for improving performance. You can set the "CacheSize" property on the Recordset object to the number of rows that you want to retrieve on each request. To ensure the best performance, you set the "Maximum Open Rows" (`DBPROP_MAXOPENROWS`) property to a value that is at least twice the value of the "CacheSize" property.

Optimized accessors are supported as described by the OLE DB specification, and they can be used for application-specific performance tuning.

## **Positioning**

For the SAS IOM Data Provider, positioning improvements are available only when [caching is enabled](#). If you have legacy applications that are dependent on the positioning model used in SAS Data Provider releases prior to SAS 9.0, you can disable caching and return to the previous model.

## **Larger Tables and Longer Names for Formats and Informats**

The SAS Data Providers now support all rows and columns that are supported in SAS. For OLE DB consumers, two interfaces have been added to `SASExtensions.h`:

- `ISASDataSetInfo90`
- `SASDATASETINFO90`

(ADO consumers do not have access to these interfaces.)

Because longer names for formats and informats are supported, all SAS Data Providers can use SAS formats when reading data. The SAS IOM Data Provider can write data using SAS informats and apply user-written formats and informats.

## **Version-Dependent and Version-Independent ProgIDs**

All SAS Data Providers support both version-dependent and version-independent ProgIDs. This enables you to install different versions of the SAS Data Providers on the same operating environment and to write applications that use specific versions of the SAS Data Providers.

## **Error Reporting**

If you encounter a problem while using the SAS Data Providers, improved error messages give you more detailed information to help you diagnose and resolve problems more quickly.

## **Length-Setting Column Attributes and Additional ADO Column Types**

The fixed-length column attribute is now set correctly by the SAS Data Providers. This attribute affects the type of column that ADO reports. Also, the range of column types has been expanded to include `adVarChar` and `adVarWChar` when the fixed-length column attribute is not set.

## **Full Path Table IDs**

When you open a recordset using ADO or open a rowset using OLE DB, the SAS Local Data Provider supports the use of a full path, such as `c:\sasuser\data.sas7bdat`, as the table ID. To use this form of table ID, you must set the value of the "Data Source" property on the ADO Connection object and the OLE DB `DBPROP_INIT_DATASOURCE` property to `"_LOCAL_"` (the default).

## **Local Update Access by the SAS/SHARE Data Provider**

Single-user update access to a local installation of SAS is now provided by the SAS/SHARE Data Provider and users can perform SQL processing on local data sets. The SAS Local Data Provider no longer supports update access.

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# What's New in SAS Data Quality Server 9.0, 9.1, and 9.1.2

---

## Overview

New capabilities, functions, and options in SAS Data Quality Server (formerly called SAS Data Quality - Cleanse) improve your ability to:

- analyze the quality of your data
- minimize defective data
- reduce redundancies
- transform and standardize data
- merge and recombine data.

**Note:** z/OS is the successor to the OS/390 operating system. SAS Data Quality Server 9.1 is supported on both OS/390 and z/OS operating systems. Throughout this document, any reference to z/OS also applies to OS/390. ■

---

## General Enhancements

- SAS Data Quality Server is now available under the z/OS (formerly OS/390) operating environment.
  - The software is now closely integrated with:
    - SAS ETL Studio for data cleansing as part of enterprise-wide extract, transform, and load.
    - dfPower Studio and Blue Fusion from DataFlux (a SAS company) for locale editing and additional data cleansing functionality.
  - The SAS Sample Library now contains samples for SAS Data Quality Server 9.1.
-



## Locales

The following locales are provided:

- DEDEU, German language, for use with data from Germany
  - ENAUS, English for Australia
  - ENGBR, English for Great Britain
  - ENUSA, English for the United States
  - ENZSA, English for South Africa (new in SAS 9.1.2)
  - FRFRA, French for France (new in SAS 9.1.2)
  - ITITA, Italian for Italy
  - NLNLD, Dutch for The Netherlands.
- 

## Functions

The following new functions interpret input character values that have been parsed (and therefore contain delimiters):

- DQMATCHPARSED returns a match code from a parsed character value.
- DQGENDERPARSED returns a gender determination from the parsed name of an individual.

The next set of new functions helps you prepare parsed character values:

- DQPARSETOKENPUT creates a new parsed value or adds a parsed value to an existing parsed value.
- DQMATCHINFOGET returns the name of the parse definition that is associated with a specified match definition.
- DQGENDERINFOGET returns the name of the parse definition that is associated with

a specified gender definition.

The new function DQLOCALEINFOGET returns a list of the locales that are currently loaded into memory.

The new function DQPATTERN returns a pattern analysis of the words or characters in an input character value.

The existing function DQSCHEMEAPPLY and the existing CALL routine CALL DQSCHEMEAPPLY now accept the following new arguments: *scheme-lookup-method*, *match-definition*, *sensitivity*, and *locale*. These arguments implement the new scheme-apply capabilities that are also available in the DQSCHEME procedure for the APPLY statement.

---

## System Options

The following system options are new or have changed:

- DQLOCALE= specifies the locales that are to be loaded into memory.
- DQSETUPLOC= specifies the location of the setup file for SAS Data Quality Server.

---

## AUTOCALL Macros

The following AUTOCALL macros are new or have changed:

- %DQPUTLOC displays in the SAS log all the definitions and tokens in a specified locale.
- %DQLOAD loads specified locales. The new DQINFO parameter generates additional information in the SAS log for debugging purposes.
- %DQUNLOAD unloads all locales.

---

## DQSCHEME Procedure

In the PROC DQSCHEME statement, the BFD and NOBFD options enable you to generate schemes in SAS format and in BFD format. BFD format schemes can be displayed and

edited using dfPower Customize from DataFlux (a SAS company).

The new CONVERT statement enables you to convert existing schemes between SAS and BFD formats.

For the CREATE statement in the DQSCHEME procedure, the following options are new or have been changed:

- INCLUDE\_ALL enables you to fully populate the scheme. The scheme includes all output values, including those that are not transformed.
- MODE= is stored in the scheme to specify that the scheme will, by default, be applied to the entirety of each value of the input variable (when MODE=PHRASE), or to each element in each value (when MODE=ELEMENT). The value of MODE= that is stored in the scheme can be overridden by the value of the MODE= option in the APPLY statement, or in the *mode* argument in the DQSCHEMEAPPLY function or CALL routine.
- SENSITIVITY= enables you to specify the degree of complexity in the match codes that are generated internally when the scheme is built. Higher sensitivity values generate match codes that are more complex. Complex match codes are useful when you want a higher degree of similarity between the DATA values that map to a given STANDARD value.
- MATCHDEF=, which was previously known as MATCHTYPE=, specifies the match definition that is referenced during the creation of match codes.
- LOCALE= specifies a locale.

For the APPLY statement in the DQSCHEME procedure, MODE= specifies whether to apply the scheme to the entire input value or to each element of the input value. The default value is determined by the value of MODE= that was stored in the scheme when the scheme was created.

---

## DQMATCH Procedure

For the PROC DQMATCH statement, the options DELIMITER and NODELIMITER enable you to generate concatenated match codes with or without a delimiter.

For the CRITERIA statement in the DQMATCH procedure, the following options are new or

have been changed:

- SENSITIVITY= now has a maximum value of 95, which equates with the maximum sensitivity in dfPower Studio.
- MATCHCODE= enables you to generate more than one match code in a single pass through the data.
- DELIMSTR= enables you to generate match codes for parsed input character variables.
- MATCHDEF=, which was previously known as MATCHTYPE=, specifies the match definition that will be referenced during the creation of match codes.
- LOCALE= specifies a locale.

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# What's New in SAS Data Surveyor 4.2 for SAP

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## Overview

SAS Data Surveyor 4.2 for SAP has the following new features and enhancements:

- [enhanced data model view](#)
- [enhanced authorization checks](#)
- [new CallRFC transformation](#)
- [new display of RFC server information](#)
- [new search support for pre-extracted SAP BW metadata](#)
- [new subsetting support](#)
- [new WHERE statements for InfoCube job components](#)
- [new extraction options for SAP ODS objects as SAS views](#)
- [new support for loading external file data](#)

For more information about these updates, see the Help for SAS Data Surveyor 4.2 for SAP. For information about changes to SAS/ACCESS Interface to R/3, see the [What's New](#) section of the *SAS/ACCESS Interface to R/3: User's Guide*.

---

## Enhanced Data Model View

After you select InfoCubes for extraction in the BW Source Designer, you can select related InfoObjects by using the Select InfoObjects window instead of tables.

---

## Enhanced Authorization Checks

You can develop alternative authorization schemes for reading R/3 tables and BW objects by using enhanced authorization checks through the /SAS/AUTH01 Business Add-In (BAI). By default, this BAI performs the same authorization check as it did previously on S\_TABU\_DIS, so no further action is necessary.

---

## **New CallRFC Transformation**

You can use the SAP CallRFC transformation wizard to select and configure a function or BAPI from SAP RFC-enabled function modules. You can create jobs that use this transformation to extract data from SAP systems. You can then import that SAP data into SAS files, combine the SAP data with other data, or load it into an SAP system.

---

## **New Display of RFC Server Information**

You can use the SAS RFC Server Monitor to retrieve and display technical information about the SAS RFC server such as configuration settings, start-up statistics, and SAP system details.

---

## **New Search Support for Pre-Extracted SAP BW Metadata**

By using the new metadata search window in the SAP BW Source Designer wizard, you can quickly find SAP BW metadata that contains a specified search string. You can revise and refine your metadata search criteria by searching within the returned search results. Select an InfoCube or an ODS object to view the associated metadata. You can also view the actual data for an ODS object. From the search window, you can select the InfoCube or ODS object that you want to identify as a data source in SAS Data Integration Studio.

---

## **New Subsetting Support**

You can subset the extraction of SAP BW InfoCubes and ODS objects by using WHERE statements:

- In a Create Star Schema View transformation, you can add a WHERE statement to apply subset criteria within a Load InfoCube job.
- In a Load ODS Object Job transformation, you can add a WHERE statement to apply subset criteria within the job.

For both kinds of transformations, the subset information can include a WHERE statement.

---

## **New WHERE Statements for InfoCube Job Components**

When you propagate a WHERE statement to the components of the InfoCube by using the **Propagate** tab in the Create Star Schema View transformation, the extraction steps of the propagation targets and the Create Star Schema View transformation are optimized.

---

## **New Extraction Options for SAP ODS Objects as SAS Views**

You can use new extraction options in the Extraction Options window for ODS objects of the SAP BW Source Designer wizard to specify whether you want to create a SAS view from the ODS object that you specified.

---

## **New Support for Loading External File Data**

You can use a target designer wizard to load external file data into an SAP BW warehouse by creating a flat file based on InfoPackage metadata that is stored in SAP BW. The wizard registers a process to create a flat file in a format that an existing InfoPackage can load into SAP BW. The wizard generates a process flow diagram into which you can drop a SAS data set as input. By mapping the data to the flat file, you can run a job in SAS Data Integration Studio that ultimately returns the file with the new data to SAP BW. The exact process that is used to transfer the data to SAP BW depends on the InfoPackage settings and the location of the external data files.

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# What's New in SAS Enterprise Guide 4.1

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## Overview

SAS Enterprise Guide 4.1 includes the following new features and enhancements:

- improved integration with the SAS®9 platform
  - access to information maps
  - enhancements to the user interface and work flow
  - enhancements to creating a stored process
  - new and enhanced SAS tasks
  - enhancements to the OLAP Analyzer
- 

## Improved Integration with the SAS®9 Platform

SAS Enterprise Guide has improved its integration with the SAS®9 platform with the following enhancements:

- The SAS Enterprise Guide Explorer has replaced the SAS Enterprise Guide Administrator and is available from within SAS Enterprise Guide. You can use the SAS Enterprise Guide Explorer to add, modify, and delete Open Metadata Repository (OMR) resources, such as servers and users.
  - You can create reports in the SAS Report Object Model (ROM) format which allows them to be integrated with other SAS components that render ROM content, such as SAS Web Report Studio. You can add multiple results to the report along with text and images, and you can choose how to arrange them in the report.
- 

## Access to Information Maps

You can use an information map to import data to a project. After you select an information map, you can specify the data items to include, apply filters to the data, and specify an output location. When you run the information map, the result is a SAS data set that can be



used as input for further tasks and queries.

---

## Enhancements to the User Interface and Work Flow

The following enhancements were made to the SAS Enterprise Guide user interface and work flow:

- You can now define parameters for a project. The project parameters can be referenced in tasks, code, and queries and can be defined so that they prompt the user at run time.
- The Query Builder interface has been redesigned to be more intuitive and easy to use. Some of the changes include having no columns selected for the output by default, a separate window for managing joins between tables, more intuitive output data set names, and a Parameters option to create new project parameters.
- You can now create and view an aggregated log of tasks and code activity for your entire project.
- When you create new data, the New Data wizard opens to step you through the process of specifying the name and location of the new data and creating the initial columns.
- The Project Designer tab (formerly the Process Flow window) is an integral part of the SAS Enterprise Guide workspace. This tab contains all of the process flows for a project. The following enhancements have been made to process flows for this release:
  - You can create links between objects in a process flow. This enables you to create your own dependencies between objects in a process flow.
  - SAS Enterprise Guide automatically arranges the objects in a process flow, but you can re-arrange items by turning off the auto-arrange functionality.
  - You can print process flows.
- Ordered lists enable you to create a list of tasks and programs in the current project that can be run in the order that you choose. You can select objects from more than one process flow. In this way, you can group objects without changing their positions in process flows or their relationships to other objects.

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## Enhancements to Creating a Stored Process

You can now create a stored process from an entire process flow. Creating a stored process from a process flow enables you to combine several tasks or queries in a single stored

process. You cannot create a stored process from individual branches in the process flow.

---

## New and Enhanced SAS Tasks

- The following SAS tasks are new for this release:
  - Bar-Line Chart enables you to create a vertical bar chart with a line plot overlay.
  - Compare Data enables you to create a report that compares two data sets or compares two variables within or across data sets.
  - Characterize Data enables you to create a summary report, graphs, and frequency and univariate SAS data sets that describe the main characteristics of the data.
  - Create Time Series Data enables you to convert transactional data into fixed-interval time series.
  - Data Set Attributes enables you to create a report with the data set's creation date, location, and number of observations as well as the variable names, labels, types, and formats.
  - Model Scoring enables you to score a data set against an existing SAS Enterprise Miner predictive model.
- New wizards provide a quick and easy way to use some of the SAS tasks and to contain a limited number of options. These wizards are helpful if you are new to a task or if you want to quickly generate an analysis. The following tasks have added a wizard view for this release:
  - Bar Chart
  - Line Chart
  - Pie Chart
  - Summary Statistics
  - Summary Tables

---

## Enhancements to the OLAP Analyzer

The following enhancements were made to the OLAP Analyzer:

- You can now use the OLAP Analyzer to view ESRI map data that is associated with an OLAP cube if you have ArcGIS software installed on your computer.
- The new Cube Explorer enables you to select a dimension, expand a node within that dimension, and then change to another level or dimension. You can use this method to explore the data and find paths through the cube that might point to areas that

need further analysis.

- You can use the OLAP Analyzer to view member properties that might be stored with your cube. Member properties are additional attributes that can be associated with dimension members.

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## What's New in SAS Enterprise Miner 4.3

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### Overview

Two parallel versions of Enterprise Miner, either 4.3 or 5.1, are available in SAS 9.1. Enterprise Miner 4.3 is a continuation of the SAS client/SAS server system. Enterprise Miner 5.1 uses the production SAS 9.1 server and is a Web-deployable client application, which was developed using Java technology.

Enterprise Miner 4.3 includes the following new features and enhancements since Enterprise Miner 4.2:

- The Link Analysis, Time Series, and Memory-Based Reasoning nodes are production.
- Interactive training in the Tree node is supported through the Enterprise Miner Tree Desktop Application.
- Enterprise Miner Tree Desktop Application uses the new procedure ARBORETUM. A new view, Local Tree, is available.
- The Interactive Grouping node supports variables that have the model role of **Group**.
- You can register a report in the Enterprise Miner Model Repository and view the report using the Web application Enterprise Miner Model Viewer.

A comparison of Enterprise Miner 4.3 and 5.1 is summarized at the end of this document.

---

### Details

#### Link Analysis Node

The Link Analysis node is now production and includes the following new features and enhancements:

- Weighted and unweighted centrality measures are computed by default.

- Any node data variable with the name TEXT, TXT, or LABEL is assigned as the variable **label**.
- The default number of nodes that are read from the Nodes table is increased from 32 to 100.
- The Results Browser now includes a Graphs tab. The Graphs tab displays multiple plots, such as link and node distribution histograms, plots of link Chi-square values, and plots of node centrality measures.
- The Output includes a brief summary of the nodes and links data sets.
- In the Detailed Results window, you can use any column to sort the Nodes and Links tables.
- The network display controls are now contained in the Display Control window, which enables you to modify the nodes, links, link graph layout, and cluster options from a centralized window.
- You can create a custom display of your links based on the link value. You can set the color and width of a link based on a cutoff value that you specify in the Link Value window.
- You can define your own clusters or modify existing clusters in the Interactive Clustering window.
- The MDS Options window contains a Grouping Bias option that you can use to specify how to space nodes within groups.

## Tree Node

In Enterprise Miner 4.2 and earlier releases, interactive training is performed in the local SAS session. Beginning with Enterprise Miner 4.3, interactive training is supported through the Enterprise Miner Tree Desktop Application.

## Enterprise Miner Tree Desktop Application

The Enterprise Miner Tree Desktop Application in SAS mode is production in Enterprise Miner 4.3. New features and enhancements include the following:

- The Enterprise Miner Tree Desktop Application now uses the new procedure, ARBORETUM. Eventually, the ARBORETUM procedure will replace the SPLIT procedure. In general, PROC ARBORETUM runs faster than PROC SPLIT on larger data sets. Also, PROC ARBORETUM provides more informative messages and enables you to
  - prune specific nodes and explicitly define splitting rules
  - output data sets that describe the nodes and splitting rules
  - generate PMML (Predictive Model Markup Language) output
  - have more control over the performance.
- The Local Tree view enables you to view a portion of the whole tree, depending on the primary selected node and the depth that you define.

## Interactive Grouping Node

The groupings of a variable in your input data might have been defined by other methods outside of the Interactive Grouping node. If you set the model role to **Group** and the status to **Use**, the Interactive Grouping node places each level of the variable in a group, and calculates the weight of evidence and other statistics without applying the node settings.

## Model Repository

The Enterprise Miner Model Repository has been enhanced to include the following:

- Setting the model registration options and saving models to the model repository now occurs through the Reporter node. In addition, you can set the model repository that you want to use by submitting macro variables in the Program Editor.
- You can save models directly to the model repository by using the SAS Metadata Server. You do not have to define the Open Metadata Architecture Java server to communicate with the model repository.
- You can search for, browse, and delete models from a model repository by using the Enterprise Miner Model Viewer.

## Advantages of Using Enterprise Miner 5.1

The following list summarizes the advantages of using Enterprise Miner 5.1 instead of Enterprise Miner 4.3:

- Model evaluation and reporting tools provide more information.
- Graphics and data visualization tools are more tightly integrated into the product.
- Data processing and model training executes entirely on the server.
- Multiple process flow diagrams can be run concurrently.
- A single process flow diagram can execute in multiple streams on multi-CPU systems.
- Training processes can be stopped.
- The client can be run under any system, not just a SAS System.
- The server definitions and meta services are administered by the SAS Management Console.

## Comparison of Enterprise Miner 4.3 and 5.1

The following table is a listing of the primary differences between Enterprise Miner 4.3 and Enterprise Miner 5.1.

<b>Configuration</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Server	SAS 9.1 MVA	SAS 9.1 MVA

Middleware	N/A	Java  It manages multiple users and model training can be disconnected.
Client	SAS 9.1 Windows	Java 1.4.1
Metadata Server	Optional, but needed for model registration.	Required
Project Storage	Client and Server	Server
<b>SAS Environment</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Program Editor, Log, Output windows	Yes	Yes
Viewer for SAS/GRAPH output	Yes	Yes
SAS/INSIGHT	Yes	No
SAS DMS-based solutions	Yes	No
<b>Enterprise Miner Interfaces</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
SAS System GUI	Yes	No



Java client GUI	No	Yes
Batch project execution	No	Yes
Web application results viewer	Yes	Yes
Java API	No	Yes (experimental)
SAS Code node interface	Yes	Yes. It provides better support for macro variables, macros, code generation, and results definition.
SAS Code node based custom nodes	No	Yes. XML definitions for node properties.
DMTOOL custom nodes	Yes	No
Enterprise Miner Procedures Usage	Unsupported	Unsupported
<b>Metadata</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Table and Column analytical metadata	Yes	Yes

Batch interface for creating table and column metadata	No	Yes
Batch interface for creating target decision profiles	No	Yes
Sample-based metadata calculation statistics	Yes	No
Complete data-based metadata calculation statistics	No	Yes
Configurable data advisory rules	No	Yes. You can set thresholds for missing percentages.
Extensible column attributes	No	Yes. You can add additional column attributes to be included in reports.

Report column attribute	No	Yes. You can include variables that have the report attribute in most reports such as score rankings and score distributions.
Hidden variables	No	Yes. You can hide rejected variables from the variable usage user interfaces but retain them in the data for score applications.
Data Model for entire project	No	Yes. It facilitates batch and GUI execution of common projects.
<b>GUI Functionality</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
XML diagram exchange	No	Yes
Diagram copy/paste between projects	No	Yes
Open multiple diagrams	No	Yes

Open multiple results windows	No	Yes
Open multiple child windows in node results	No	Yes
Common property sheet	No	Yes
Individual property dialogs	Yes	No
Group processing	Yes (stratified, bagging, and boosting)	No
<b>Job Execution</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Stop running diagram	No	Yes
Run multiple diagrams	No	Yes
Disconnect while diagram running	No	Yes. Middleware configuration is required.
Continue work while diagrams running	No	Yes
Share projects with multiple users	Yes	Yes

Batch mode execution	No	Yes
Scheduling	No	No
Multi-threaded procedures	Yes	Yes
Multi-tasking projects	No	Yes
<b>Reporting</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
HTML Reports	Yes	No
SAS Publish Packages (SPK)	No	Yes
Web application for viewing stored models	Yes	Yes
<b>Interactive Analysis</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Tree growing and pruning	Yes	Yes
Neural network model	Yes	No
Association rule: WHERE clause	Yes	No
Transformation bin allocation	Yes	No
Filter outliers selection	Yes	No

Link analysis	Yes	No
Interactive grouping	Yes	No
Decision threshold charts	Yes	No
<b>Decision Processing</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Class target profile matrix	Yes	Yes
Class target loss matrix	Yes	Yes
Cost values and cost variables	Yes	Yes
Class target variable number of decisions	Yes	No
Interval target decisions	Yes	No
<b>Model Assessment</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
Class probability score rankings: gain, lift, etc.	Yes	Yes
Class probability score distributions	No	Yes

Classification tables in node output listings	Sometimes	Always
Decision tables in node output listings	No	Yes
Type I and Type II error table in node output listings	No	Yes
Interval target score rankings	No	Yes
Interval target score distributions	No	Yes
Interval target prediction vs. actual target	Yes. It is sample based and available in Model Manager.	Yes. It is user-generated plots of exported data.
Score rankings printed in output listings	No	Yes
Score distributions printed in output listings	No	Yes
Post-model decision matrix what-if investigations	Yes	No

Decision threshold charts	Yes	No
Komogorov-Smirnov (KS), Receiver Operating Characteristic (ROC) index, GINI statistics	No	Yes
Validation data assessment	Yes	Yes
Train and Test data assessment	Optional. You must enable it through Model Manager,	Yes
ROC chart	Yes	Yes
<b>Scoring</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>
SAS score code	Yes	Yes
C and Java score code	Yes	Yes
Separation of residual and non-residual score code	No	Yes
PMML generation	No	Yes
<b>Nodes</b>	<b>Enterprise Miner 4.3</b>	<b>Enterprise Miner 5.1</b>



Input Data	Yes	Yes
Sampling	Yes	Yes
Partitioning	Yes	Yes
Time Series	Yes	Yes
Variable Selection	Yes	Yes
SOM	Yes	No
Link Analysis	Yes	No
Insight	Yes	No. Graphs can be generated from the Results window of any node.
Distribution Explorer	Yes	No. Graphs can be generated from the Results window of any node.
Multiplot	Yes	Yes

StatExplore	No	Yes. This node computes univariate and bivariate distribution statistics for interval and class variables. Target and segment variables are used as <b>by</b> variables and/or correlation terms.
Merge	No	Yes. This node merges training, test, and validation data sets by row number or by ID variable. It is useful for combining predictions from multiple models or for matching ID in multiple tables.

Association	Yes	<p>Yes, but the Results window does not support filtering rules and scatter plot for items. This node supports network display of rules. It generates a transposed data set that has one row per customer and variables for rules. The transposed data set can be used to cluster or predict customer behavior by rules.</p>
Path Analysis	No	<p>Yes. This node uses the new PATH procedure that includes a referrer variable for Web log analysis.</p>

Transform	Yes	Yes, but this node does not support user-specified equations. It supports the creation of dummy and interactive terms.
Interactive Grouping	Yes. This node supports user-driven grouping of variable levels and bins based on GINI, Information Gain, and Weight of Evidence (WOE) scores.	No
Drop	No	Yes. This node drops variables from temporary tables for processing efficiency.
Filter	Yes	Yes, but this node does not support graphical selection of filter ranges.

Impute	Yes, this node is the Replacement node.	Yes
Principle Components	Yes. It is in the Princomp/ Dmneural node.	Yes. This node does not support the selection of number of components in the Results window.
Regression (linear and logistic)	Yes	Yes
Dmine Regression	No. Dmine regression is available as an optional output from the Variable Selection node.	Yes. This node uses the DMINE procedure to produce models that directly include the Analysis of Variance (AOV), group, and interaction effects for interval and binary targets.
Decision Tree	Yes. Use the Tree Desktop Application for interactive training.	Yes. Use the Tree Desktop Application for interactive training.

Neural Network	Yes	Yes. This node does not support interactive training or advanced user network configuration.
Rule Induction	No	Yes. This node uses an algorithm for building models by recursively identifying target events. It is useful for modeling rare events. This functionality was formerly included in DMTOOL.
Autoneural	No	Yes. This node uses an algorithm for automated MLP network building. It selects the type and number of activation functions from four different architectures. This functionality was formerly included in

		DMTOOL.
Dmneural	Yes. This node is part of the Princomp/Dmneural node.	Yes.
Two Stage Model	Yes	Yes. You can specify the options for the first and second stage models, and the neural network models that have two targets.
Memory-Based Reasoning	Yes. This node is not recommended for score deployment, because it requires training table availability.	No
Ensemble	Yes	Yes. The node supports simple averaging and voting methods. It does not support bagging and boosting models.

Model Comparison	Yes. It is the Assessment node.	Yes. This node computes ROC and KS and automatically selects a model based on your selection.
Group Processing	Yes	No
Subdiagram	Yes	No
Control Point	Yes	Yes
SAS Code	Yes	Yes. This node provides extended support through better organized macros and macro variables. It supports building model and model assessment functions, and the creation of report tables and plots.



Score	Yes	Yes. If score data is defined, the node always scores data to create output view and table.
Score Converter	Yes	No. C and Java code are included in the SPK results package. PMML code for decision trees is available on a request basis.
User Defined Model	Yes	No
Reporter	Yes	No. Reports in the SPK format can be generated from any node.
Data Set Attributes	Yes	Yes. The Metadata node in Enterprise Miner 5.1 replaces the Data Set Attributes node in Enterprise Miner 4.3.
Data Mining Database	Yes	N/A



## What's New in SAS Enterprise Miner 5.2

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### Overview

SAS Enterprise Miner 5.2 significantly expands both the feature set and architecture of Enterprise Miner.

The feature set is expanded by the following:

- new nodes for data preparation and statistical exploration
- new and faster two-dimensional and three-dimensional graphics for exploring relationships within data
- improved and additional reports for predictive models
- improved SAS score code
- new algorithms and graphical tools for Web path analysis
- sampling for rare case analysis

The architecture is enhanced by use of the SAS Analytics Platform. Using this platform has the following benefits:

- common client/server design and implementation that is shared with other SAS analytical software and delivery of improved thin client distribution, as well as improved server and user monitoring tools
- better integration with the SAS Business Intelligence Platform

The following sections detail the changes and enhancements.

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### Administration and Configuration

The following changes and enhancements improve the installation, administration, and configuration of SAS Enterprise Miner 5.2.

### SAS Analytics Platform Integration

The SAS Analytics Platform provides a common client/server architecture and

implementation for a family of products that includes SAS Enterprise Miner, SAS Forecast Studio, and SAS Inventory Studio. One instance of the Analytics Platform middle-tier server can serve all three applications. It is easier for SAS administrators to install and configure multiple SAS analytical applications.

In three-tier environments, administrators can monitor the status of the Analytics Platform server through both Web-based and client-based tools. Users can download and install the Enterprise Miner client directly from the Analytics Platform server. Administrators who configure multi-user environments must manually configure and start the Analytics Platform middle-tier services.

The SAS Analytics Platform cannot be licensed separately. The Analytics Platform installation is triggered by the installation of any of the existing SAS Analytics Platform products.

## **Access through Firewall**

In previous releases when you were running the application as a thin client, you could not cross a firewall to access the server. SAS Enterprise Miner 5.2 now provides this functionality.

## **Log On Screen**

As a result of the integration with the SAS Analytics Platform, SAS Enterprise Miner uses a new logon screen that is shared with SAS Forecast Studio and SAS Inventory Studio. You are no longer prompted for the SAS Metadata Server authentication domain when logging on to a server. Support has also been added for anonymous logons.

## **SAS Management Console Plug-In for Enterprise Miner Administration**

Some of the functionality that was in the configuration wizard in SAS Enterprise Miner 5.1 has been moved to a SAS Management Console plug-in. The SAS Management Console plug-in gives administrators better control over Enterprise Miner configurations. The following information is now stored in the SAS Management Console plug-in:

- Server start-up code.
- Default project path and security.
- Maximum concurrent nodes per process execution.
- Model group definitions.
- WebDAV location is now stored in the SAS Metadata Repository and configured by SAS Management Console. As a result, users never need to know about the

WebDAV location that is used by the Model Manager functions. WebDAV is Enterprise Miner's Web-based Distributed Authoring and Versioning. It is a set of extensions to the HTTP protocol that enable you to collaboratively edit and manage files on remote Web servers.

## Grid Processing

Grid processing is available for enterprises that need to perform computing over multiple logical or physical systems. The execution of the process flow diagram in SAS Enterprise Miner is sent to a load balancing manager that distributes the jobs to a grid of systems. This is expected to benefit users who run multiple, large-process flow diagrams, or users who manage a large multi-user environment.

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## New Nodes in SAS Enterprise Miner 5.2

SAS Enterprise Miner 5.2 contains the following new nodes that add functionality to the environment.

### Decisions Node

A Decisions node has been added to the SAS Enterprise Miner 5.2 tools menu. The Decisions node belongs to the Assess category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the Decisions node to define or modify target profiles for a target that produces optimal decisions. The decisions are made using a user-specified decision matrix and the output from a subsequent modeling procedure.

The Decisions node contains a tabbed Decision Processing window that you use to configure your decision matrix. The Decision Processing window shares the same layout as the Data Source Wizard — Decision Configuration window.

Decision matrices are no longer automatically built when you open the Decision Editor. Click the new **Build** button to create the decision matrix for the desired target.

After a decision matrix has been created, you can refresh the default decision by clicking the **Refresh** button. You might want to refresh the data when the target levels in the underlying data have changed or when the target order has changed.

See Layout of a Target Profile in the Help for the Enterprise Miner Target Profiler for more information about configuring your decision matrix.

## **Replacement Node**

A Replacement node has been added to the SAS Enterprise Miner 5.2 tools menu. The Replacement node belongs to the Modify category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the SAS Enterprise Miner 5.2 Replacement node to generate score code to process unknown levels when scoring and also to interactively specify replacement values for class levels. The Replacement node must follow a node that exports a data set, such as a Data Source, Sample, or Data Partition node.

You can use the Replacement Editor to specify the replacement values. The Replacement Editor lists the class levels for the input and target variables in the training data set.

## **SOM/Kohonen Node**

A SOM/Kohonen node has been added to the SAS Enterprise Miner 5.2 tools menu. The SOM/Kohonen node belongs to the Explore category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the SOM/Kohonen node to perform unsupervised learning by using Kohonen vector quantization (VQ), Kohonen self-organizing maps (SOMs), or batch SOMs with Nadaraya-Watson or local-linear smoothing. Kohonen VQ is a clustering method, whereas SOMs are primarily dimension-reduction methods.

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## **Enhanced Nodes in SAS Enterprise Miner 5.2**

The following nodes contain specific and significant enhancements in functionality.

### **Decision Tree Node**

Tree growth iteration plots have been added to the Decision Tree node results. A reference line in the plot indicates which subtree was selected.

Another enhancement to the Decision Tree output graphics is that Tree node plots now display information for all target levels.

Using the graph properties for the tree diagram, you can toggle between the detailed text


(which is shown) and the summarized text.

The upper limit that existed for the Split Size and Node Sample properties has been removed.

## Filter Node

The Filter node is enhanced to support interactive user selection of values to filter for both continuous and categorical variables.

In the Filter Node General Properties sheet, you can now do the following:

- Modify the variables properties for the class and interval variables in two separate editors. To open the editors, click  in the row for the Class Variables or the Interval Variables.
- Specify a new value for the Export Table property. The **All** value has been added to the Export Table property. When you select this value, no observations are removed. Instead, an indicator variable M\_FILTER is created. The M\_FILTER variable identifies the observations that would have been removed.

## Merge Node

The code for renaming and replacing variables has been revised to accommodate processes such as the one shown here. In this case, both segment variables that were created by the two different Cluster nodes will be used as inputs to the model nodes, and the creator fields of the prediction variables will contain the value REG2 instead of TREE3.

## Model Comparison Node

Changes have been made to the predictive model comparison code to improve efficiency and consistency between reports. The Model Comparison node features a new Bin-based Kolmogorov-Smirnov statistic in the results tables.

The score code now creates the bin variable with a prefix of b\_.

A baseline has been added to the Receiver Operating Characteristic (ROC) chart that is produced for binary targets.

## Path Node

The Path node has significant changes that reflect new capabilities in PROC PATH. Several new properties identify pattern-matching data sets. The scalability is improved. The Path node scoring has been greatly accelerated. New plots have been introduced to the Path node results, including the following view of rules sequences.

In the Path Node General Properties sheet, the new **Training Mode** property enables you to choose between Train and Score modes when the Path Analysis node runs. When the mode is set to Train, the node discovers a set of rules. When the mode is set to score, a previously found set of rules is applied to the transaction data set. You must specify a scoring rules data set when the Training Mode property is set to Score. The default setting for the Training Mode property is Train.

The new Funnel Counts plot shows the drop-off in the number of visitors along a particular path of interest. It can be useful to see how visitor attrition occurs along a path, indicating points of interest such as where the biggest drop-off points are.

## Principal Components Node

Major improvements have been made to the graphics output of the Principal Components node.

Of special interest is the new Principal Components Matrix plot. In the following display, the plots are color coded by target event. Two clusters are clearly seen in the PC1 and PC2 dimensions. The initial matrix contains five rows and five columns. You can determine the number of subplots that appear.

Using the Interactive Principal Components Selection window, you can now select how many principal components should be retained for analysis.

## Regression Node

The following changes have been made to the plots that are generated when you specify a model selection method:

- The Iteration plot has been enhanced with a reference line for the selected step in the regression method. You can also now select the statistic to display in the plot.
- The new Estimate Selection Plot displays the parameter estimates across various model selection steps.



The default for the Min Resource Use property is No when modeling a nominal or ordinal target and when specifying a model selection method. To improve performance but disable the model selection method, change this value to Yes.

## SAS Code Node

The SAS Code node features new training and scoring code editors.

The SAS Code editor window has Macro Variables and Macros tabs that contain lists of macro variables and macros that are used in SAS training code. You can use your mouse to drag items from the Macro Variables and Macros lists and drop them in the SAS Code editor to enhance and simplify SAS code creation.

The Score Code editor window has a Variables tab above the score code editor. The Variables tab enables you to view data set variables at the same time as the score code under composition, which makes creating new scoring code easier.

The SAS Code node is also able to use new macros:

- **%EM\_MODEL()** — Use the %EM\_MODEL() macro to specify to Enterprise Miner which target or targets your code has modeled. You can also control whether Enterprise Miner should assess individual targets, compute fit statistics, and generate score code to produce a decision, classification, or residuals variables.
- **%EM\_METACHANGE()** — Use the %EM\_METACHANGE() macro to simplify the process of changing columnmeta out of a node.
- **%EM\_REPORT()** — Use the %EM\_REPORT() macro to generate process flow diagram summary reports and plots. Many new graphics types are supported, and you have more control over the appearance of the plots.
- **%EM\_REGISTER()** — Use the %EM\_REGISTER() macro to specify a name and register a SAS data set for use with Enterprise Miner. The new PROPERTY argument indicates that the data set is a property of the node. If you specify this argument, then the data is saved when the node is copied or the flow is exported.

## Sample Node


You now have better control of the sample makeup. The Level Based value has been added as an option to the Criterion property in the Sample Node Stratified Properties. If Level Based is selected, then the sample is based on the proportion captured and sample proportion of a specific level.

This criterion is applicable only when there is one stratification variable. Use the Level

Based Options properties to specify parameters for the proportion captured, sample proportion, and level of interest.

## Transform Variables Node

You can now create data transformations by using the push button interfaces that are found in the Formula Builder and Expression Builder windows.

To open the Formula Builder window, select the Transform node in your process flow diagram, and then in the Transform Variables node properties panel, select the ellipsis button  to the right of the Formula Builder entry.

The Formula Builder window is designed to respond to both keyboard and point-and-click mouse entries when you are building expressions. You can view distributions of both input variables and created (transformed) variables. The Formula Builder window enables you to see which variables need to be transformed as well as to see the distributions of the transformed variables that were created. A tab is available to examine and manipulate the Sample Properties.

New formulas are tested by executing the code against the preview sample and testing for errors. The preceding display shows a view of two newly created variables, including a plot of the second variable, TRANS\_1.

The Expression Builder window contains a grouped list of functions, a list of variables, and an Expression Text box that has Boolean operator shortcut keys.

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## New Model Assessment Reports in SAS Enterprise Miner 5.2

The assessment plots that are displayed in modeling nodes and the Model Comparison node have been enhanced to improve usability. The Score Rankings and Score Distribution plots now provide a selection control for conveniently changing the displayed statistics.

- **Score ranking overlay plots** use the same set of axes to simultaneously display selected statistics across deciles for both training and validation data sets. Report variables are not displayed in score ranking overlay plots.
- **Score ranking matrix plots** overlay the selected statistics for standard, baseline, and best models in a lattice that is defined by the training and validation data sets. The following example plots model cumulative lift, base model cumulative lift, and the best cumulative lift across deciles. Plots can also be created for report variables.

- **Score distribution plots** display statistics across score bins in a lattice that is defined by the training and validation data sets. Plots can also be created for report variables.
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## Other Changes and Enhancements

### Graphics

The graphics libraries in the SAS Enterprise Miner client have been significantly enhanced with improved performance and many new plot types including two-dimensional and three-dimensional graphics. The following plot shows the new parallel axis and density plots.


### Data Source Wizard

The Enterprise Miner wizard for adding data sources has been revised. The Data Source Wizard Decision Editor has been changed to support multiple decisions for categorical targets. The wizard leads you more clearly through the process of creating decisions and weights.

### Refresh Metadata for a Defined Data Source

Changes to the underlying data (such as adding variables to the data source or removing variables from the data source) can affect the metadata of a data source that is defined in your project. SAS Enterprise Miner 5.2 now enables you to refresh the metadata for a defined data source rather than create a new data source. Right-click the data source in your project and select **Refresh Metadata**.

### Quick Access to Node Data

All SAS Enterprise Miner 5.2 nodes now have an Exported Data property. The Exported Data property is located near the top of each node's properties list, which is displayed in the SAS Enterprise Miner 5.2 properties panel. The Exported Data property makes it easier for you to find SAS data sets that were created by a node. Simply select a node in your process flow diagram, then click the ellipsis button  to the right of the Exported Data property to open the Exported Data window for the selected node.

### Appearance Settings Are Now Persisted

Changes that you make to the size of the Variables Editor, Data Explorer, Table Browser, Results Viewer, and Help window or to the layout of the main window are now persisted between sessions. This enables you to customize the layout of the main window to meet your needs.

## Reorganized View Menu for Results

The View menu in the Results Viewer has been reorganized for usability.

## Extension Nodes

You can write your own XML files to create additional nodes to use in SAS Enterprise Miner. Starting in SAS Enterprise Miner 5.2, the deployment of custom nodes to clients has been simplified, so that all extension files (XML files and their icons) are managed from a central location.

## Documentation Enhancements

The *Getting Started with Enterprise Miner 5.2* book describes the core functionality of SAS Enterprise Miner 5.2 and how to perform basic data mining tasks. Using this book, you will learn the following:

- how to use the graphical user interface (GUI) tools to create and manage process flow diagrams and projects. The book includes step-by-step examples of how to create a complete process flow diagram.
- how to export mining results for reporting and integration with other SAS software.
- how to use the data mining tasks for sampling, exploring, modifying, modeling, and assessing data in order to create and refine predictive models.

This book is available from the SAS 9.1.3 OnlineDoc on the Web and is available for purchase from the SAS Publications Catalog.

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## Credit Scoring Nodes

SAS Credit Scoring is a new solution in SAS Enterprise Miner 5.2. This solution offers the ability to rapidly generate automated credit scoring models that rely on statistical models.

If your site has licensed SAS Credit Scoring, the credit scoring nodes will appear on the

Credit Scoring tab in your Enterprise Miner session. SAS Enterprise Miner includes the following credit scoring nodes:

- Interactive Grouping
- Scorecard
- Reject Inference
- Credit Exchange

You can use these nodes to perform the following tasks:

- build scorecard models that assign score points to customer attributes
- group and select characteristics, automatically or interactively, by using Weights of Evidence and Information Value measures
- normalize score points to conform with company or industry standards

The business value of statistical models can be assessed by using strategy curves, profit charts, and a reject inference process in order to produce models for scoring through-the-door populations. A credit exchange tool provides additional reporting of the credit scoring results and can exchange information with the SAS Credit Risk solution.

The Interactive Grouping and Scorecard nodes have been enhanced for this release.

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# What's New in SAS Enterprise Miner 5.3

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## Overview

SAS Enterprise Miner 5.3 marks a major upgrade with the following new features and enhancements:

- [improved usability](#) and [functionality](#)
  - [enhanced administration and configuration](#)
  - [enhanced user interface](#)
  - [new options for converting SAS Enterprise Miner projects](#)
  - [new nodes](#)
  - [enhanced nodes](#)
  - [experimental nodes](#)
  - [enhanced PMML capabilities](#)
  - [enhanced capabilities for creating extension tools](#)
  - [enhanced documentation](#)
- 

## Improved Usability

SAS Enterprise Miner 5.3 features an improved user interface that incorporates common design principles established for SAS software. These enhancements include the following:

- The diagram workspace for process flow diagrams now contains navigation tools.
- Node and shortcut toolbars have been reorganized.
- Library and data explorer interfaces have been expanded.
- Interactive graphics contain controls for greater ease of use and cleaner, more technical renderings.
- New multivariate graphs have been introduced.
- Variables tables include a WHERE clause to easily find features in wide data sets.
- Property sheets have been reorganized to support training, scoring, and reporting tasks. Subsets of properties have been grouped into tearoff sheets.
- Each node supports user-defined entry notes for better version control and a more complete documentation trail of the process flow diagram analysis.
- Secure Sockets Layers (SSLs) can be used to secure authentication.

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## Improved Functionality

New data preparation tools make it easier to manipulate data and to construct a data sample for mining. For data exploration, SAS Enterprise Miner 5.3 now supports the following:

- Hierarchical market baskets have been introduced that make it easier to model actual product categories.
- Multivariate graphical data exploration tools save your interactive selections.
- The new Variable Clustering node can be used for dimension-reduction techniques.
- There are more interactive user controls in features.
- Feature creation has been enhanced with new Interactive Binning and interactive Rules Builder nodes, as well as new options in the Transformation node.
- Three new nodes that provide core predictive modeling techniques are introduced: Gradient Boosting, Support Vector Machines, and Partial Least Squares.
- The new Import Model node makes it easier to import models that were previously produced using SAS/STAT code.
- In the new Cutoff node, you can examine posterior probability distributions by using different cutoff values that you specify.
- The new Reporter node uses SAS ODS to produce reports for printing and editing that span the entire analysis.

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## Enhanced Administration and Configuration

The following changes and enhancements improve the installation, administration, and configuration of SAS Enterprise Miner 5.3:

- **Analytics Platform 1.4** — The SAS Analytics Platform, which is required by SAS Enterprise Miner 5.3, is included with a SAS Enterprise Miner 5.3 license and is installed automatically with SAS Enterprise Miner 5.3.
- **SSL Encryption** — User logins and related network traffic between the SAS Enterprise Miner 5.3 client and the SAS Analytics Platform middle tier can now be encrypted using standard Secure Sockets Layers (SSLs). Enabling SSL encryption requires additional configuration through the SAS Analytics Platform.
- **SAS Enterprise Miner Web Viewer** — The SAS Enterprise Miner Web View has been redesigned to work within the SAS Analytics Platform session instead of



requiring an external Web server. You can access the Web View functionality through the Analytics Platform Configuration Web page by clicking the Enterprise Miner link. A SAS Metadata Server user name and password are required. The Web View page presents a streamlined view of the Mining Models that are registered in the SAS Metadata Server. The SAS Model Manager product provides full functionality, including project management, version control, code review, score testing, champion selection, score deployment, and model monitoring reports.

- **SAS Version** — SAS Enterprise Miner 5.3 runs on SAS 9.1.3 SP4 and automatically includes the correct version of Base SAS.
  - **Enterprise Miner 5.2 Migration** — SAS Enterprise Miner 5.2 projects can be used in SAS Enterprise Miner 5.3 without any migration action.
  - **Enterprise Miner 4.3 Migration** — SAS Enterprise Miner 4.3 projects can be converted to SAS Enterprise Miner 5.3 projects. The project conversion preserves process flow diagram structures, many of the node properties, and many of the tool results such as the SAS log and output listings, scoring code, and results tables that are needed to produce gains charts. You can run converted SAS Enterprise Miner 4.3 diagrams in SAS Enterprise Miner 5.3 and compare the output. This satisfies the need to archive and retrieve SAS Enterprise Miner 4.3 results from within SAS Enterprise Miner 5.3.
  - **EMMETA Library** — The EMMETA library is a new library that is created at startup by SAS Enterprise Miner 5.3. The local location is named EMLMETA and the global location is named EMGMETA. You can assign the location in your project or server startup code. Use the EMMETA library to store tables that define functions used by SAS Enterprise Miner nodes. For example, you might use EMMETA to store custom variable transformations to be called by the Transform node, or variable metadata for new data or new variables that were generated by a SAS Code node.
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## Enhanced User Interface

### Nodes Toolbar and Shortcut Toolbar

The SAS Enterprise Miner 5.3 nodes toolbar and the SAS Enterprise Miner 5.3 shortcut toolbar have both been relocated and their contents have been reorganized for consistency. Additional information is available in the SAS Enterprise Miner Reference Help section of the SAS Enterprise Miner 5.3 User Interface.

### Diagram Workspace

The SAS Enterprise Miner 5.3 diagram workspace provides improved navigation and

greater ease of use when working with large process flow diagrams.

## Properties Panel

The SAS Enterprise Miner 5.3 Properties Panel has been reorganized.

- The Basic and Advanced views for the SAS Enterprise Miner node property displays have been removed. Groups of related advanced properties have been relocated to subgroups in the Properties Panel.
- SAS Enterprise Miner 5.3 now groups node properties by Train, Score, and Report functionalities. Changing a Train property causes the Train, Score, and Report actions to run the next time you run the node. Changing a Score property causes the Score and Report actions to run the next time you run the node. Changing a Report property causes only the Report action to run the next time you run the node.
- Dynamic property selections simplify tool configuration by disabling irrelevant properties based on the selected values of related properties. For example, until the Regression property for Selection Method is set to **Stepwise**, the Regression properties for Stepwise Selection Options remains dimmed and unavailable.
- Sets of related properties have been combined into subgroups that are displayed in a separate pop-up panel, which greatly simplifies the user interface.

## Library Wizard

A new SAS Enterprise Miner Library Wizard enables you to select directories in the scope of the SAS session and create simple SAS library definitions. The Library Wizard is especially useful if you are not accustomed to using SAS LIBNAME statements to allocate SAS librefs. For more complex library definitions, use the SAS Enterprise Miner project startup code or the SAS Metadata LIBNAME Engine that is accessed through SAS Management Console. The Library Wizard has a Browse Directories action that browses directories on the SAS server, and not the SAS client.

## SAS Library Explorer

The revised SAS Library Explorer displays data sets and catalogs, including some catalog contents such as SOURCE entries. You can select a data set in the SAS Library Explorer and initiate SAS Enterprise Miner data source creation. The **Refresh** button in the SAS Library Explorer updates the list of libraries, data sets, and catalogs.

## Target Profile Panel

SAS Enterprise Miner Target Profile panels have been revised in the Data Source Wizard,

the Data Source object, and the Decisions node. You can now select inverse proportions for decision weights in the Target Profile panels. Inversely proportioned decision weights are useful when working with very unbalanced data.

## **Variables Editor**

The SAS Enterprise Miner Variables Editor has been revised to include a configurable WHERE clause filter, which is helpful when navigating a long list of variables.

## **Graph Persistence**

You can create new graphs in the Results window as before, but the graphs are saved and re-created when the Results window is closed and reopened. This includes the new Graph Explore node that is the migration path for the Insight and Distribution Explorer nodes from SAS Enterprise Miner 4.3.

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## **Conversion of SAS Enterprise Miner Projects**

### **New Conversion Macro**

SAS Enterprise Miner 5.3 contains a SAS macro that enables you to convert SAS Enterprise Miner 4.3 projects to SAS Enterprise Miner 5.3 projects. The conversion macro functions only on the Windows version of SAS.

The conversion macro runs in the SAS language. It can be used to convert multiple SAS Enterprise Miner 4.3 projects to multiple SAS Enterprise Miner 5.3 projects, or to convert and consolidate multiple SAS Enterprise Miner 4.3 projects into a single SAS Enterprise Miner 5.3 project.

Converting diagrams from SAS Enterprise Miner 4.3 to SAS Enterprise Miner 5.3 requires some changes due to differences in the versions.

### **Basic Diagram Structure**

The basic process flow diagram structure is retained during project conversion, including the following:

- tool properties

- logs and output listings
- selected output tables such as LIFT
- plots and tabular listings that were created in the SAS Enterprise Miner 4.3 Results windows.

Retaining the basic diagram and results structures enables you to evenly compare SAS Enterprise Miner 4.3 and SAS Enterprise Miner 5.3 results.

## **Subdiagrams**

SAS Enterprise Miner 4.3 subdiagrams are expanded to the top level. Enter and Exit nodes appear and function in diagrams that were converted, but Enter and Exit nodes cannot be added to new SAS Enterprise Miner 5.3 process flow diagrams.

## **Replacement Node**

When converting a SAS Enterprise Miner 4.3 project whose process flow diagrams contain the Replacement node, the Replacement node can be expanded to a combination of an Impute node and a Replacement node. The combination of Impute and Replacement nodes gives you better control over the processes.

## **Ensemble Node**

When converting a SAS Enterprise Miner 4.3 project whose process flow diagrams contain stratified, bagging, or boosting models that use the Ensemble node, the Ensemble node is replaced by an End Groups node.

## **Insight and Distribution Explorer Nodes**

When converting a SAS Enterprise Miner 4.3 project whose process flow diagrams contain Insight or Distribution Explorer nodes, the nodes are replaced in the SAS Enterprise Miner 5.3 process flow diagram with Graph Explore nodes.

## **Link Analysis Node**

SAS Enterprise Miner 5.3 supports conversion of SAS Enterprise Miner 4.3 projects whose process flow diagrams contain the Link Analysis node. Link Analysis nodes from SAS Enterprise Miner 4.3 process flow diagrams appear and function in diagrams that were converted for use with SAS Enterprise Miner 5.3, but the Link Analysis node cannot be added to a new SAS Enterprise Miner 5.3 diagram. If you want to analyze transaction data,

refer to the SAS Enterprise Miner 5.3 Association, Path Analysis, and Market Basket nodes. If you want to analyze training data, continue to use the Link Analysis node from SAS Enterprise Miner 4.3.

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## **New Nodes in SAS Enterprise Miner 5.3**

SAS Enterprise Miner 5.3 contains the following new nodes that add functionality to the environment:

### **Append Node**

The Append node has been added to the SAS Enterprise Miner 5.3 **Sample** tab of the node toolbar. The Append node belongs to the Sample category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the Append node to append data sets that are exported by two or more paths in a single SAS Enterprise Miner process flow diagram.

The Append node can append data according to the data role, such as joining training data to training data, transaction data to transaction data, score data to score data, and so on. The Append node can also append data from other roles that was previously partitioned in train, test, and validate roles to one large training data set.

### **Graph Explore Node**

The Graph Explore node belongs to the Explore category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. The Graph Explore node is an advanced visualization tool that enables you to sample data and to interactively explore the data graphically in the Results window. The interactive Results window plots can be saved and used to uncover patterns and trends in the data as well as reveal extreme values in the database. Graph Explore plots are fully interactive. You can rotate a chart to different angles and move it anywhere on the screen to obtain different perspectives on the data.

### **Variable Clustering Node**

The Variable Clustering node belongs to the Explore category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. The Variable Clustering node is a useful tool for data reduction, such as choosing the best variables or cluster components for analysis. Variable clustering can be used to decrease variable redundancy and help to

reveal the underlying structure of the input variables in a data set. Large numbers of variables can complicate the task of determining the relationships that might exist between the independent variables and the target variable in a model. Models that are built with correlated variables can destabilize parameter estimates, confound variable interpretation, and increase the computing time that is required to run the model. Variable clustering can reduce the number of variables that are required to build reliable predictive or segmentation models.

## **Interactive Binning Node**

The Interactive Binning node belongs to the Modify category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. The Interactive Binning node is an interactive grouping tool that you use to model nonlinear functions of multiple modes of continuous distributions. The interactive tool computes initial bins by quintiles, then you can interactively split and combine the initial bins.

## **Rules Builder Node**

The Rules Builder node belongs to the Modify category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the Rules Builder node to create ad hoc sets of rules for your data that result in user-definable outcomes.

## **Gradient Boosting Node**

The Gradient Boosting node belongs to the Model category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. The Gradient Boosting node uses tree boosting to create a series of decision trees that together form a single predictive model. A tree in the series is fit to the residual of the prediction from the earlier trees in the series. The residual is defined in terms of the derivative of a loss function. Boosting is available for binary, nominal, and interval targets. The Gradient Boosting node is not included with SAS Enterprise Miner for the Desktop.

## **Model Import Node**

The Model Import node belongs to the Model category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the Model Import node to import models to the SAS Enterprise Miner environment that were not created by SAS Enterprise Miner. For example, models that were created using SAS PROC LOGISTIC can now be run, assessed, and modified in SAS Enterprise Miner 5.3.

## Partial Least Squares Node

The Partial Least Squares node belongs to the Model category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the Partial Least Squares node to model continuous and binary targets based on SAS/STAT PROC PLS. The Partial Least Squares node produces DATA step score code and standard predictive model assessment results.

## Cutoff Node

The Cutoff node belongs to the Assess category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the Cutoff node as a probability cutoff tool that creates a frequency table of probability distributions and graphs to assist you in determining the best cutoff point or points for decision-making models with binary target variables. Probability distributions are aggregated to the 1% level and are not smoothed between bins. Cumulative and marginal distributions are plotted. You specify the cutoff value by using a report property.

## Start Groups Node

The Start Groups node belongs to the Utility group. You use the Start Groups node to initiate a group processing segment in the process flow diagram. The Start Groups node performs the following types of group processing:

- Stratified group processing that repeats processes for values of a class variable, such as GENDER=M and GENDER=F.
- Bagging, or bootstrap aggregation, using repeated resampling.
- Boosting, or boosted bootstrap aggregation, using repeated resampling with residual-based weights.
- Index processing, which repeats processes a fixed number of times. Index processing is typically used with a Sampling node or with your code for a sample selection.

## End Groups Node

The End Groups node belongs to the Utility group. You use the End Groups node to terminate a group processing segment in the process flow diagram. If the group processing function is stratified, bagging, or boosting, the End Groups node will function as a model node and present the final aggregated model. Nodes that follow the End Groups node continue data mining processes normally, after the group processing stage is completed.

## Reporter Node

The Reporter node belongs to the Utility group. The Reporter node uses SAS ODS capability to create a single document for the given analysis in \*.pdf or \*.rtf format. The document includes important SAS Enterprise Miner results such as variable selection, model diagnostic tables, and model results plots. The document can be viewed and saved directly, and will be included in SAS Enterprise Miner report package files.

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## Enhanced Nodes in SAS Enterprise Miner 5.3

Several nodes in SAS Enterprise Miner 5.3 contain significant enhancements in functionality or have been reorganized into new SAS Enterprise Miner tool groups.

### Sample Tools

The following changes have been made to the Sample tools in SAS Enterprise Miner 5.3:

- **Filter Node** — The Filter node has been moved from the Modify tool group to the Sample tool group because the Filter node enables you to select rows of data by defining some user criteria.
- **Input Data Node** — The Input Data node adds a new dialog box for selecting a new table. You can use the new dialog box to change the input data table, but retain the metadata for variable roles and levels. The Input Data node no longer requires a predefined data source in the Project Tree folder. You can use an imported diagram, without creating a data source, by simply selecting a data table.
- **Merge Node** — The Merge node has been moved from the Utility tool group to the Sample tool group because the Merge node augments and subsets data for model building.
- **Sample Node** — The Sample node now permits you to disable sample summaries of class and interval variables in order to speed processing when working with very large data sets. The summaries are typically used to compare the sampled data with the input data, but in many cases large data sets from a stable population do not need comparison.
- **Data Partition Node** — The Data Partition node now provides you with a choice between partitioning data sets into data views or into data tables to conserve disk space. Like the Sample node, the Data Partition node also enables you to disable sample summaries of class and interval variables to speed processing when working with very large data sets.



## Explore Tools

The following changes have been made to the Explore tools in SAS Enterprise Miner 5.3:

- **Cluster Node** — The Cluster node now provides you with the option to assign user-defined labels to clusters.
- **SOM/Kohonen Node** — The SOM/Kohonen node has been enhanced so that you have more control over row and column dimensions.
- **Variable Selection Node** — The Variable Selection node has been enhanced so that you can map levels to output variables. The node also features a new interactive selection of final terms, and provides information about how class levels are collapsed in the Results window. A new option enables you to exclude classes of variables.

## Modify Tools

The following changes have been made to the Modify tools in SAS Enterprise Miner 5.3:

- **Principal Components Node** — The Principal Components node enables you to specify a suffix for the Principal Components output variables.
- **Replacement Node** — The Replacement node now provides interactive interval selection for truncating and replacing distributions.
- **Transform Node** — The Transform node features a new code editor for entering user-defined terms in transformations. User-entered code must be pure DATA step code for transformations. The user-defined transformation code cannot contain ARRAY, DATA, MERGE, OUTPUT, POINT, RETAIN, RUN, SET, or UPDATE statements. The interactive code editor is useful for automating routine transformations that are applied to multiple analyses. Transform definitions are stored in the EMMETA.TRANSFORM table.

The Transform node supports metadata-based transformations to automate routine transformations that are applied to multiple analyses.

## Model Tools

The following changes have been made to the Model node tools in SAS Enterprise Miner 5.3:

- **AutoNeural Node** — The AutoNeural node now provides a final training step to refine the selected model. You can select a target distribution (or error) function that permits modeling distributions such as Poisson, exponential, and sinusoidal.
- **Decision Tree Node** — The Decision Tree node now features cross-validation

options. The interactive tree desktop application gives you the ability to add, copy, and paste tree descendents, which is useful when using the tree to define customer segmentation schemes.

- **DMine Regression Node** — The DMine Regression node now produces Group, AOV16, and Group Interaction tables. The DMine Regression node also creates PMML, including embedded transformation, binning, and grouping functions.
- **Neural Network Node** — The Neural Network node now provides the weight decay parameter in the node properties panel, and the network parameters have been reorganized.
- **Regression Node** — The Regression node has been enhanced to enable you to assign the variable role to Rejected for successor nodes.

## Assess Tools

The following enhancements have been made to the existing Assess node tools in SAS Enterprise Miner 5.3:

- **Model Comparison Node** — The Model Comparison node features enhancements such as transposed fit statistics for easier model comparisons and a greater choice of model selection statistics, including depth of lift. The Model Comparison node also enables you to create your own labels for models, as well as the ability to manually select a champion model for export.

## Utility Tools

The following enhancements have been made to the existing Utility node tools in SAS Enterprise Miner 5.3:

- **SAS Code Node** — A new interactive code editor replaces the individual editors for Train and Score code. The new editor supports Train, Score, and Report code views. You can edit and submit code interactively while viewing the log and output listings. You can also run the diagram path up to and including the SAS Code node and view the Results window without closing the programming interface. These changes greatly enhance the ability to write SAS code in the SAS Enterprise Miner environment.

## Credit Scoring Tools

The following enhancements have been made to the add-on Credit Scoring node tools of SAS Enterprise Miner 5.3:

- **Interactive Grouping Node** — The Interactive Grouping node is able to handle mixed-type data. Special missing values in numeric columns are mapped to unique bins of the output variable instead of a separate variable. This addresses many types of credit bureau data that contains both numeric values and special codes.

A new interactive window displays "fine grain" bins that give you more control over split points for continuous data. An initial high-resolution scan of the data is made to create the "fine grain" bins before a second pass is made to create the "coarse grain" candidate bins. You can interactively use the fine grain split points when constructing the final bins.

Weight of Evidence (WOE) values can now be manually adjusted, and you can interactively override variable Input/Reject roles when performing interactive training.

- **Scorecard Node** — The Scorecard node has been enhanced so that individual terms can be ordered for model selection algorithms such as the stepwise selection algorithm. Link function selections of LOGIT, CLOGLOG, and PROBIT are available. Model selection options for STAY, STOP, and Term Ordering have been added. The Scorecard node also features Adverse Characteristic Scores for use with individual credit analysis.

---

## Experimental Nodes in SAS Enterprise Miner 5.3

The following experimental nodes are introduced in SAS Enterprise Miner 5.3:

### Market Basket Node

The Market Basket node belongs to the Explore category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the experimental Market Basket node to perform association rule mining over transaction data in conjunction with item taxonomy. This node is useful in retail marketing scenarios that involve tens of thousands of distinct items, where the items are grouped into subcategories, categories, departments, and so on, called *item taxonomy*. The Market Basket node uses the taxonomy data and generates rules at multiple levels in the taxonomy. The experimental Market Basket node is not included with SAS Enterprise Miner for the Desktop.

### Support Vector Machine Node

The Support Vector Machine node belongs to the Model category of the SAS SEMMA (Sample, Explore, Modify, Model, Assess) data mining process. You use the experimental

Support Vector Machine node for classification and regression modeling. The Support Vector Machine node uses hyperplanes to separate points that are mapped on a higher dimensional space. The data points that make up the hyperplane are called *support vectors*. The Support Vector Machine node is not included with SAS Enterprise Miner for the Desktop.

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## Enhanced PMML Capabilities

The following PMML enhancements are introduced in SAS Enterprise Miner 5.3:

- **PMML 3.1** — SAS Enterprise Miner 5.3 PMML is updated to full compatibility with DMG Version 3.1.
  - **DMine Regression Node** — The DMine Regression node now produces PMML, including optional binning and grouping transformations that are part of the model.
- 

## Enhanced Capabilities for Creating Extension Tools

In SAS Enterprise Miner 5.3, the capabilities available for SAS programmers to write custom SAS Enterprise Miner extension tools have been significantly enhanced.

- **SAS Enterprise Miner 5.2 and SAS Enterprise Miner 5.3 Extension Tools** — SAS Enterprise Miner 5.2 extension tools should function in the SAS Enterprise Miner 5.3 environment. Both Basic and Advanced level properties are mapped to the Train property group.
- **New XML Header** — SAS Enterprise Miner 5.3 extension tools can use a new XML header:

```
<Component type="AF"  
  serverclass="EM6" prefix="MYMODEL"  
  name="MyModel" group="MODEL" icon="MyModel.gif"  
  displayname="MyModel"  
  description="This tool implements My Model"  
  resource=""  
>
```

- Using the **serverclass="EM6"** declaration enables new features in your SAS code.
- **EM\_ACTION Macro** — The EM\_ACTION macro variable is a significant enhancement when used with the **serverclass="EM6"** declaration. The EM\_ACTION

- macro variable can be used to separate your Train, Score, and Report code.
- **Table Display and Edit** — SAS programmers can use simple table display and edit controls from their property sheets. This greatly improves interactive capabilities. Programmers can define which columns are displayed to the user and which columns can be edited through the parameters that are available in the tool properties XML. You can also define SAS code that runs before and after the table is edited.
  - **%EM\_REPORT Macro** — New plot types and options have been added to the EM\_REPORT macro. Plots and data views that were created using the EM\_REPORT macro are added to documents that are created by the Reporter node.
- 

## Documentation Enhancements

The **Getting Started with SAS Enterprise Miner 5.3** book is now available from SAS OnlineDoc 9.1.3 for the Web. This guide introduces you to the core functionality of SAS Enterprise Miner and shows you how to perform basic data mining tasks. You will learn how to use the graphical user interface (GUI) tools to create and manage process flow diagrams and projects, and to export mining results for reporting and integration with other SAS software. The data mining tasks you will learn include sampling, exploring, modifying, modeling, and assessing data in order to create and refine predictive models. **Getting Started with SAS Enterprise Miner 5.3** provides step-by-step examples that create a complete process flow diagram, including graphic results. This title is also available online and in hard-copy format.

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# What's New in SAS Text Miner 3.1

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## Overview

SAS Text Miner 3.1 includes the following new features and enhancements:

- new supported languages
- new encoding support
- new noun group extraction support for all languages
- new entity types
- enhanced %TMFILTER macro features
- UNIX support
- enhanced features for synonym list processing
- enhanced parsing
- new parsing procedure: DOCPARSE procedure
- new DOCScore DATA step scoring function
- improved performance
- eliminated XCMD requirement
- new quick find functionality in the Terms table of the Interactive Results window

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## New Supported Languages

The new supported languages are Japanese, Korean, Norwegian Bokmal, Simplified Chinese, and Traditional Chinese.

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## New Encoding Support

SAS Text Miner 3.1 supports encoding for the Unicode standard, UTF-8, as well as the standard encodings for Chinese, Japanese, and Korean.

---

## **New Noun Group Extraction Support**

SAS Text Miner 3.1 supports noun group extraction for all supported languages: English, Danish, Dutch, Finnish, French, German, Italian, Japanese, Korean, Norwegian Bokmal, Portuguese, Simplified Chinese, Spanish, Swedish, and Traditional Chinese.

---

## **New Entity Types**

SAS Text Miner 3.1 supports these new entity types: LANGUAGE (German and Spanish), PEOPLES (German and Spanish), PUBLICATION (German), TICKER (English), and VEHICLE (English).

---

## **Enhanced %TMFILTER Macro Features**

### **New Parameters**

SAS Text Miner 3.1 includes the following new parameters:

- **EXT =<EXTENSION list>** accepts a list of document extensions that are separated by spaces. When this option is used, only documents in the DIR directory that match any of the specified extensions are processed.
- **MANUAL=** indicates that the CFS service, which is normally started by the %TMFILTER macro, was started manually. This option is useful in situations in which the socket connection mechanism is unable to function properly.
- **NUMBYTES =** replaces **NUMCHARS =**. **NUMBYTES=** controls the length of the text field in bytes. The **NUMCHARS =** option has been superseded by the **NUMBYTES =** parameter now that the %TMFILTER macro supports encodings in which a character can be more than one byte long.

### **New Document Formats**

The %TMFILTER macro supports new document formats such as Microsoft Outlook and Outlook Express e-mail files and files that are created with the Open Office suite.

### **Automatic Transcoding of Documents**

Encodings are always automatically detected for each document and documents are always automatically transcoded to the session encoding. If documents cannot be transcoded correctly, the process will remove unsupported characters so that the %TMFILTER macro can process the transcoded documents.

## **Additional %TMFILTER Macro Output**

The %TMFILTER macro provides additional output:

- The SAS data set that the %TMFILTER macro generates contains the following new variables:
    - Extension - the extension of the original document.
    - Created - the date and time that the original document was created.
    - Accessed - the date and time that the original document was last accessed.
    - Modified - the date and time that the original document was last modified.
    - Size - the size of the document.
  - The %TMFILTER macro generates summary statistics from PROC FREQ that contains the frequencies of the languages that have been identified and a two-way table of the omitted and truncated variables.
- 

## **UNIX Support**

In SAS Text Miner 3.1, there is Solaris and AIX support, except for the %TMFILTER macro, which can be run on Windows only.

---

## **Enhanced Synonym List Processing**

In SAS Text Miner 3.1, you can define synonyms with different parts of speech. The synonym data set can have variables for both the parent role and child role. Previously, only one role was provided. You can define your synonym data set with the following variables:

- TERM, PARENT, and CATEGORY
  - TERM, PARENT, TERMROLE, and PARENTROLE
-



## Enhanced Parsing

In SAS Text Miner 3.1, parsing has been enhanced as follows:

- Parents are automatically created for stemmed terms even though they never occur in the training data. For example, suppose the term **employees** occurs but **employee** never occurs in your training data set. SAS Text Miner now automatically creates the parent term **employee** so that it would be recognized as equivalent to **employees** if **employee** should occur during scoring.
  - Noun group elements are stemmed when the stemming option is used. For example, the noun group **amount of defects** is changed to **amount of defect** because the parent of **defects** is **defect**.
  - Terms composed of both alphabetic characters and numeric digits are no longer dropped when the Numbers property is set to No. In previous versions, they were dropped under this condition.
  - Longer, more complex noun groups are found and the smaller subgroups that compose them are also used.
  - The parsing is now based on version 3.7.2 of Inxight's LinguistX Platform and ThingFinder.
  - All entity entries on the synonym list are now mapped based on a direct string comparison between the entry in the synonym list and the lower-cased occurrence in the text. Previous versions required first that the occurrence of the entry in the text was detected as an entity, prior to making the synonym assignment.
- 

## New DOCPARSE Procedure

A new parsing procedure, PROC DOCPARSE, parses text documents and organizes the terms and their frequencies into data sets. The DOCPARSE procedure is portable to multiple platforms, and it does not require XCMD.

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## New DOCSCORE Function

The new DOCSCORE function is called inside DATA step code. It takes a textual variable (or a reference to a document that contains text) along with information from the training run and generates a compressed term-document frequency data set called OUT.

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## **Improved Performance**

In SAS Text Miner 3.1, parsing speed is improved. Documents are processed faster than previous Text Miner releases.

---

## **Eliminated XCMD Requirement**

Previous versions of SAS Text Miner have required that the parsing be done using an XCMD call on the SAS server. In SAS Text Miner 3.1, this is no longer necessary when running the Text Miner node. However, the %TMFILTER macro still uses an XCMD requirement, so it must still be issued in a SAS session that permits XCMD calls.

---

## **New Quick Find Functionality in the Terms Table of the Interactive Results Window**

Quick find enables users to scroll quickly to a specific spot in a sorted column of the Terms table by typing a single character while the column is active. Quick find can be used in the Term, Freq, #Docs, Weight, Role, and Attribute columns.

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## What's New in SAS Text Miner 3.2

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### Overview

SAS Text Miner 3.2 includes the following new features and enhancements:

- There are five new DOCPARSE procedure options: NOMULTI, OUTOFFSET=, INKEY=, NEWKEY=, and DOCID=.
  - There is a new %TMFILTER macro default behavior and FORCE= option.
- 

### New DOCPARSE Procedure Options

The DOCPARSE procedure in SAS Text Miner 3.2 has the following new options: NOMULTI, OUTOFFSET=, INKEY=, NEWKEY=, and DOCID=:

- NOMULTI specifies whether to break multi-word tokens into their individual units.
  - OUTOFFSET= specifies an output SAS data set that contains offset information for a particular term.
  - INKEY= specifies a previously generated KEY data set.
  - NEWKEY= specifies a data set that contains new terms that are not found in the INKEY data set.
  - DOCID= specifies the starting `_DOCUMENT_` number in the OUT data set.
- 

### New %TMFILTER Macro Option

The %TMFILTER macro in SAS Text Miner 3.2 has a new default behavior that prevents users from potentially overwriting any files in the DESTDIR directory.

The %TMFILTER macro in SAS Text Miner 3.2 has a new FORCE= option, which allows users to overwrite files in the DESTDIR directory.

- FORCE= specifies whether to override the default behavior of the %TMFILTER

macro by allowing users to overwrite a nonempty DESTDIR directory.

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## What's New in SAS ETL Studio 3.3

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### Overview

SAS ETL Studio 3.3 (renamed to [SAS Data Integration Studio](#) in March 2006) makes it much easier to perform the following tasks:

- create iterative jobs (processing loops)
- view, subset, sort, and search the data in a table
- use lookup tables to populate target tables
- view the differences between imported metadata and existing metadata, and choose which changes to apply
- perform cluster analysis, in order to eliminate duplicate mailings to members of the same household, for example

**Note:** SAS ETL Studio 3.3 adds new features to the version of SAS ETL Studio that originally shipped with SAS 9.1.3.

---

### Dynamic Grid Enablement and Parallel Processing

SAS ETL Studio uses a set of macros to enable parallel processing. These macros can be enabled in two ways:

- by selecting **YES** in the **Enable parallel processing macros** option on the **Options** tab of the properties window for a job
- by including a Loop transformation in a job

When parallel processing is enabled for a SAS ETL Studio job, the transformations in the job can be executed in parallel on a single machine that supports symmetric multiprocessing (SMP) or by a grid computing network—if the grid software is licensed.

---

### Dynamic Grid Enablement and Parallel Processing for Iterative Jobs

You can create iterative jobs (processing loops) with the following new components:

- a control table that lists rows of information to be processed. You can use the Library Contents transformation to create a control table.
  - an iterative job that contains a control table and a processing loop that is implemented with the Loop transformation and the Loop End transformation. The iterative job can be executed in parallel on a single machine that supports SMP or by a grid computing network.
  - a parameterized job that contains the transformations that process the rows listed in the control table. This job is dropped between the Loop transformation and the Loop End transformation in the iterative job.
- 

## Change Analysis on Imported Metadata

When you import metadata to SAS ETL Studio, you can view the differences between the imported metadata and existing metadata and choose which changes to apply. Changes in tables, columns, indexes, and keys display in a Differences window. To help you understand the impact of a given change, you can run impact analysis or reverse impact analysis on imported tables and columns.

---

## New Lookup Transformation

You can use the new Lookup transformation in a job to load a target with columns that are taken from a source and from a number of lookup tables. The Lookup transformation offers a number of advantages over the existing Fact Table Lookup transformation:

- The Lookup transformation processes all lookups in a single DATA step, using a hashing technique that is new in SAS 9.0.
  - It supports multi-column key lookup.
  - It has better error and exception handling, including missing value and missing table support.
  - User-configurable default settings can be persisted.
  - Its lookup and error tables can be viewed in the Process Editor and in impact analysis reports.
  - It provides WHERE clause support in lookups to filter incoming lookup records.
-

---

## Enhanced Support for SPD Server Tables

The SAS Scalable Performance Data (SPD) Server is a high performance, multi-user, parallel-processing data server. It stores data in a special format that facilitates parallel processing. You can now use the properties window for an SPD Server table to specify options that are unique to those tables. You can also use a new loader transformation, the SPD Server Table Loader, to specify options that are unique to SPD Servers. The new loader generates code that is appropriate for the special data format that the SPD Server uses.

---

## New Support for Cluster Analysis

The Create Match Code transformation now supports cluster analysis as well as match code analysis. Cluster analysis assigns cluster numbers based on multiple conditions. For example, suppose you wanted to eliminate duplicate mailings to members of the same household. When analyzing a demographic database, conditions can be defined for names and for street address and zip code. Rows that match either condition receive the same cluster number and would be considered as one household.

---

## Enhanced Change Management

The following improvements make it easier to use change management in SAS ETL Studio:

- You do not have to check out a table in order to add it as a source or a target in a job.
  - When you check out a job, the tables in the job are no longer automatically checked out. This makes it easier to avoid locking more resources than you need.
  - Check-out operations have fewer restrictions in regard to repository dependencies.
  - A new menu selection (Clear Project Repository) enables you to delete all new objects and unlock all checked-out objects in a project repository.
- A check-in description can be longer than 200 characters. You can print the check-in history as well.

You must have the latest metadata server for these features to be enabled.

---

## Enhanced View Data Window

The View Data window now enables you to do the following tasks:

- Select which columns in the table to view.
  - Use WHERE clause subsetting of the data with simple and complex filters.
  - Find character and numeric data, through the entire file
  - Display the total number of records in the table in the title bar of the window (1 of ...).
  - Jump to beginning, jump to end, jump to line number.
  - Select which column names appear in the header: Metadata Name, SAS Column Name, and/or Description.
  - Sort the data by column selection, ascending, descending.
  - View formatted and unformatted data.
- 

## Enhanced Update Table Metadata Feature

This feature has been improved in the following ways:

- The METALIB procedure is used to make metadata updates. This method is faster and more reliable than previous methods.
- You can update tables that are remote to the SAS application server.
- You can select multiple tables and run Update Table Metadata against them all at once.
- You can view an improved update log which lists the tables that have been successfully updated or which have failed. The log also provides details about the updates to each table.

Your SAS application server must have the latest SAS Workspace Server component for these features to be enabled.

---

## Enhanced Support for Cubes

New options enable you to export and import cube metadata; save the OLAP procedure code that is generated for a cube; maintain calculated members that are associated with a cube; and tune aggregations.



---

## General Enhancements

- The Options window has a new **Code Generation** tab that enables you to set global options for the code that will be generated for all new jobs.
- The output table (an intermediate work table) for a number of transformations can now be either a physical table or a view. The Extract, Join, Lookup, and Data Validation transformations are among those that have this option. For details, see the **Options** tab in the property window for each transformation.
- After a job has been executed at least once, you can right-click a transformation in the job and view the contents of its work table. This helps you verify or debug the transformations in a job.
- The SCD Type 2 Loader now handles duplicate records and reloads closed-out records.
- The property window for the Extract transformation now has **Order By** and **Group By** tabs. It also has an option that determines whether the SELECT DISTINCT clause is inserted into the SQL statement for the transformation.
- You can now select, copy, and print the contents of the **Finish** tab that is used in many wizards.

Some new features in SAS Data Integration Studio 3.3 require the latest servers. It is **strongly** recommended that you upgrade your metadata for the current release of SAS ETL Studio. See the installation instructions for further information.

For details about upgrading metadata as required for SAS 9.1.3, as well as installing and configuring servers, libraries, users, and other resources that are required by SAS ETL Studio, see the *SAS 9.1.3 Intelligence Platform: Installation Guide* and the *SAS 9.1.3 Intelligence Platform: Administration Guide*.

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## What's New in SAS/ETS 9.0 and 9.1

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### Overview

New procedures in SAS/ETS include the following:

- The experimental ENTROPY procedure provides Generalized Maximum Entropy estimation for linear systems of equations.
- The QLIM procedure analyzes univariate and multivariate models where dependent variables take discrete values or values in a limited range.
- The TIMESERIES procedure analyzes time-stamped transactional data with respect to time and accumulates the data into a time series format.
- The UCM procedure provides estimation for Unobserved Component Models, also referred to as Structural Models.

Several new financial and date, time, and datetime functions have been added.

The new experimental SASEHAVR interface engine is now available to SAS/ETS for Windows users for accessing economic and financial data residing in a HAVER ANALYTICS Data Link Express (DLX) database.

New features have been added to the following SAS/ETS components:

- PROC ARIMA
- PROC EXPAND
- PROC MDC
- PROC MODEL
- PROC VARMAX
- PROC X12
- Time Series Forecasting System

---

### Financial Functions

SAS/ETS now provides new financial functions. They are described in detail in Chapter 4, "SAS Macros and Functions."

## CUMIPMT

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

## CUMPRINC

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

## IPMT

Returns the interest payment for a given period for an investment based on periodic, constant payments and a constant interest rate.

## PMT

Returns the periodic payment for a constant payment loan or the periodic saving for a future balance.

## PPMT

Returns the payment on the principal for an investment for a given period.

---

## Date, Time, and Datetime Functions

SAS/ETS now provides the following new date, time, and datetime functions. See Chapter 3, "Date Intervals, Formats, and Functions," for more details.

## INTFMT

Returns a recommended format given a date, time, or datetime interval.

## INTCINDEX

Returns the cycle index given a date, time, or datetime interval and value.

## INTCYCLE

Returns the date, time, or datetime interval at the next higher seasonal cycle given a date, time, or datetime interval.

## INTINDEX

Returns the seasonal index given a date, time, or datetime interval and value.

## INTSEA

Returns the length of the seasonal cycle given a date, time, or datetime interval.

---

## SASEHAVR Engine

The experimental SASEHAVR interface engine gives Windows users random access to economic and financial data residing in a HAVER ANALYTICS Data Link Express (DLX) database. You can limit the range of data that is read from the time series and specify a desired conversion frequency. Start dates are recommended on the libname statement to help you save resources when processing large databases or when processing a large number of observations. You can further the subsetting of your data by using the WHERE, KEEP, or DROP statements in your DATA step. You can use the SQL procedure to create a view of your resulting SAS data set.

---

## ARIMA Procedure

The OUTLIER statement of the ARIMA procedure has become production in SAS System 9. A new ID option that provides date labels to the discovered outliers has been added.

**9.1** In the presence of embedded missing values, the new default White Noise test of residuals uses the one proposed by Stoffer and Toloï (1992), which is more appropriate.

**9.1** The default forecasting algorithm when the data have embedded missing values and the model has multiple orders of differencing for the dependent series has been slightly modified. This modification usually improves the statistical properties of the forecasts.

---

## ENTROPY Procedure

The new experimental ENTROPY procedure implements a parametric method of linear estimation based on Generalized Maximum Entropy.

Often the statistical-economic model of interest is ill-posed or underdetermined for the observed data, for example when limited data is available or acquiring data is costly. For the general linear model this can imply that high degrees of collinearity exist among explanatory

variables or that there are more parameters to estimate than observations to estimate them with. These conditions lead to high variances or non-estimability for traditional GLS estimates.

The principle of maximum entropy, at the base of the ENTROPY procedure, is the foundation for an estimation methodology that is characterized by its robustness to ill-conditioned designs and its ability to fit overparameterized models.

Generalized Maximum Entropy, GME, is a means of selecting among probability distributions so as to choose the distribution that maximizes uncertainty or uniformity remaining in the distribution, subject to information already known about the distribution itself. Information takes the form of data or moment constraints in the estimation procedure. PROC ENTROPY creates a GME distribution for each parameter in the linear model, based upon support points supplied by the user. The mean of each distribution is used as the estimate of the parameter. Estimates tend to be biased, as they are a type of shrinkage estimate, but will typically portray smaller variances than OLS counterparts, making them more desirable from a mean squared error viewpoint.

PROC ENTROPY can be used to fit simultaneous systems of linear regression models, Markov models, and seemingly unrelated regression models as well as to solve pure inverse problems and **9.1** unordered, multinomial choice problems. Bounds and restrictions on parameters can be specified and Wald, Likelihood ratio, and Lagrange multiplier tests can be computed. Prior information can also be supplied to enhance estimates and data.

---

## **EXPAND Procedure**

The EXPAND procedure has several new transformation operators: moving product, moving rank, moving geometric mean, sequence operators, fractional differencing, Hodrick-Prescott filtering, and scaling.

**9.1** The EXPAND procedure has a new option for creating time series graphics. The PLOT= option enables you to graph the input, output, and transformed time series.

---

## **MDC Procedure**

The RESTRICT statement now has a new syntax and supports linear restrictions.

The new BOUNDS statement enables you to specify simple boundary constraints on the parameter estimates. You can use both the BOUNDS statement and the RESTRICT statement to impose boundary constraints; however, the BOUNDS statement provides a simpler syntax for specifying these kinds of constraints.

---

## MODEL Procedure

The SMM (Simulated Method of Moments) estimation is now available as an option in the FIT statement. This method of estimation is appropriate for estimating models in which integrals appear in the objective function and these integrals can be approximated by simulation. There may be various reasons for that to happen, for example, transformation of a latent model into an observable model, missing data, random coefficients, heterogeneity, etc. A typical use of SMM is in estimating stochastic volatility models in finance, where only the stock return is observable, while the volatility process is not, and needs to be integrated out of the likelihood function. The simulation method can be used with all the estimation methods except Full Information Maximum Likelihood (FIML) in PROC MODEL. Simulated Generalized Method of Moments (SGMM) is the default estimation method.

**9.1** Heteroscedastic Corrected Covariance Matrix Estimators (HCCME) have been implemented. The HCCME= option selects which correction is applied to the covariance matrix.

**9.1** Instrumental variables can now be specified for specific equations rather than for all equations. This is done with expanded syntax on the INSTRUMENT statement.

---

## QLIM Procedure

The new QLIM procedure analyzes univariate and multivariate limited dependent variable models where dependent variables take discrete values or dependent variables are observed only in a limited range of values. This procedure includes logit, probit, tobit, selection, and multivariate models. The multivariate model can contain discrete choice and limited endogenous variables as well as continuous endogenous variables.

The QLIM procedure supports the following models:

- linear regression model with heteroscedasticity
- probit with heteroscedasticity
- logit with heteroscedasticity
- tobit (censored and truncated) with heteroscedasticity
- Box-Cox regression with heteroscedasticity
- bivariate probit
- bivariate tobit
- sample selection and switching regression models
- multivariate limited dependent variables

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## **TIMESERIES Procedure**

The new TIMESERIES procedure analyzes time-stamped transactional data with respect to time and accumulates the data into a time series format. The procedure can perform trend and seasonal analysis on the transactions. Once the transactional data are accumulated, time domain and frequency domain analysis can be performed on the resulting time series. The procedure produces numerous graphical results related to time series analysis.

---

## **UCM Procedure**

**9.1** The new UCM procedure, experimental in SAS System 9, is production in SAS 9.1. You can use this procedure to analyze and forecast equally spaced univariate time series data using Unobserved Components Models (UCM).

The UCMs can be regarded as regression models where, apart from the usual regression variables, the model consists of components such as trend, seasonals, and cycles. In time series literature UCMs are also referred to as Structural Models. The different components in a UCM can be modeled separately and are customized to represent salient features of a given time series. The analysis provides separate in-sample and out of sample estimates (forecasts) of these component series. In particular, model-based seasonal decomposition and seasonal adjustment of the dependent series is easily available. The distribution of errors in the model is assumed to be Gaussian and the model parameters are estimated by maximizing the Gaussian likelihood. The UCM procedure can handle missing values in the

dependent series.

The domains of applicability of PROC UCM and PROC ARIMA are virtually identical; however, decomposition of a series in features such as trend, seasonals, and cycles is more convenient in PROC UCM. A seasonal decomposition of a time series can also be obtained using other procedures, for example, PROC X12. However, these seasonal decompositions generally do not take into account regression and other effects and are not model based. The seasonal decomposition in PROC UCM is based on a comprehensive model, providing all the advantages of model diagnostics.

---

## VARMAX Procedure

The VARMAX procedure now provides the following features:

- The ECTREND option is available in the ECM=( ) option of the MODEL statement to fit the VECM( $p$ ) with a restriction on the drift. The ECTREND option is ignored when either the NSEASON or NOINT option is specified.
- You can now use the DFTEST option at multiple lags. For example, DFTEST=(DLAG=(1)(12)) provides the Dickey-Fuller regular unit root test and seasonal unit root test. If the TREND= option is specified, the seasonal unit root test is not available.
- The DYNAMIC option is added to the PRINT=( ) option. This representation displays the contemporaneous relationships among the components of the vector time series.
- The CORRX, CORRY, COVPE, COVX, COVY, DECOMPOSE, IARR, IMPULSE, IMPULSX, PARCOEF, PCANCORR, and PCORR options can be used with the number in parentheses in the PRINT=( ) option. For example, you can use CORRX or CORRX(*number*). The options print the number of lags specified by *number*. The default is the number of lags specified by the LAGMAX=*number*.
- The subset BVAR model is now available.
- The statistics for the one lagged coefficient matrix are removed in the ECM.
- The last columns of the BETA and ALPHA are removed in the COINTTEST option when the NOINT option is not specified.
- The long variable names are available in the model parameter estimation table.
- The schematic representation of the estimates that shows the significance of the parameters is now available.
- Two new ODS Tables, ParameterGraph and GARCHParameterGraph, are added.

**9.1** Many ODS table names have been changed.



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## X12 Procedure

The X12 procedure default behavior has changed with regard to missing leading and trailing values. Previously the default was not to trim leading/trailing missing values from the series. This made it difficult to process multiple series within a data set when the series had differing spans. Now the default is to trim leading and trailing missing values. The new NOTRIMMISS option provides the old default behavior; when NOTRIMMISS is specified, PROC X12 will automatically generate missing value regressors for any missing value within the span of the series, including leading and trailing missing values.

The following statements and options are new:

- The AUTOMDL statement uses the TRAMO method based on the work of Gomez and Maravall (1997a and 1997b) to automatically select the ARIMA part of a regARIMA model for the time series.
- The OUTLIER statement automatically detects additive, level shift, and temporary change outliers in the time series. After the outliers are identified, the appropriate regression variables are incorporated into the model.
- The MAXITER and TOL options of the ESTIMATE statement provide additional control over the convergence of the nonlinear estimation.
- The ITPRINT and PRINTERR options of the ESTIMATE statement enable you to examine the iterations history of the nonlinear estimation.
- **9.1** The FINAL and FORCE options of the X11 statement enable you to control the final seasonally adjusted series. The FINAL option specifies whether outlier, level shift, and temporary change effects should be removed from the final seasonally adjusted series. The FORCE option specifies whether or not the yearly totals of final seasonally adjusted series match the totals of the original series.

---

## Time Series Forecasting System

Enhancements to this graphical point-and-click system provide new kinds of forecasting models, better ways to customize lists of models, greater flexibility in sharing projects over a network, and support for graphical and tabular Web reports:

- The Factored ARIMA Model Specification window provides a general purpose

interface for specifying ARIMA models. You can specify any number of factors and select the AR and MA lags to include in each factor. This makes it easy to model series with unusual and/or multiple seasonal cycles.

- **9.1** Improvements to the Model Selection List Editor window enable you to open alternate model lists included with the software as well as user defined model lists. You can create a new model list, open an existing model list, modify it, use it to replace the current list, append it to the current list, save it in a catalog, assign it to a project, or assign it as a user default list for newly created projects. Several new ARIMA and dynamic regression model lists are provided. You can combine these into large sets for automatic model selection and select from them to create the best set of candidate models for your data.
- **9.1** Project options are no longer stored exclusively in the SASUSER library. You can use any path to which you have write access by assigning the libname TSFSUSER. The system prompts you for this path if you do not have write access to the SASUSER library.
- **9.1** The Series Viewer and Model Viewer support saving graphs and tables via the Output Delivery System (ODS). Select the "Use Output Delivery System" option in the Save As dialog to create html pages and corresponding gif files. You can access and organize these using the ODS Results window, display them automatically in your browser (depending on your results preferences settings), or publish them via the Internet or an intranet. You can also create other forms of output by providing your own ODS statements.
- The Time Series Viewer and Time Series Forecasting System can now be started from a macro submitted from the Program Editor or the Enhanced Editor. The FORECAST and TSVIEW macros accept the same arguments as the FORECAST and TSVIEW commands. You can use the FORECAST macro to generate and submit any number of independent unattended forecasting runs from a data step program.

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## References

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## What's New in SAS/Genetics 9.0, 9.1, and 9.1.3

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### Overview

SAS/Genetics includes several new procedures:

- **9.1** the experimental HTSNP procedure for selecting a subset of SNPs that identify groups of haplotypes that minimize within-group diversity
- **9.1** the INBREED procedure for estimating covariance and/or inbreeding coefficients for pedigrees

New features have been added to the SAS/Genetics procedures:

- ALLELE
- CASECONTROL
- FAMILY
- HAPLOTYPE
- PSMOOTH

including options that accommodate new data formats.

---

### Accommodating New Data Formats

**9.1** There are several new options available for analyzing data in different formats. The GENOCOL and DELIMITER= options have been added to four procedures: ALLELE, CASECONTROL, FAMILY, and HAPLOTYPE. The GENOCOL option enables you to use columns containing marker genotypes instead of a pair of columns containing the two alleles that comprise the genotype. You can specify the delimiter that is used to separate the two alleles with the DELIMITER= option. In addition, the experimental options TALL, MARKER=, and INDIV= can be used collectively for data in a "tall-skinny" format in the ALLELE, CASECONTROL, and HAPLOTYPE procedures. Data sets in this format contain a marker identifier and individual identifier, along with one variable containing the marker genotypes or two columns containing marker alleles. See the individual procedures' Syntax sections for more details about these new options.

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## ALLELE Procedure

**9.1** The new options ALLELEMIN=, GENOMIN=, and HAPLOMIN= enable you to specify the minimum estimated frequency for an allele, genotype, or haplotype, respectively, to be included in its corresponding ODS table. By default, any allele, genotype, or haplotype that occurs at least once in the sample is included in the respective table. These options can be used to reduce the size of the ODS tables, or alternatively, the GENOMIN= or HAPLOMIN= options can be set to 0 to view all possible genotypes or haplotypes, not just those that are observed.

Some enhancements have been made in SAS 9.1.3 that improve the performance of calculating linkage disequilibrium (LD) statistics for a large number of marker pairs. These include:

- more efficient usage of memory when calculating LD measures
- a new LOGNOTE option to request notes indicating the status of the LD calculations be printed to the log
- a new WITH statement that gives an alternative way of specifying pairs of markers to analyze for LD and enables the partitioning of these calculations

Beginning in SAS 9.1.3, columns containing counts for alleles, genotypes, and, when HAPLO=GIVEN, haplotypes are included in the corresponding ODS table in addition to the relative frequencies that have always been displayed. Cosmetic improvements to the ODS tables in the SAS listing make these tables easier to read.

Also new, the HAPLO=NONEHWD option can be used to request that the CLD test statistic for biallelic markers be adjusted for Hardy-Weinberg disequilibrium (Weir 1996). This adjustment is also made in the correlation coefficient when requested to be displayed in the "LD Measures" table.

---

## CASECONTROL Procedure

**9.1** The new NULLSNPS= option enables you to specify SNPs to be used in calculating the variance inflation factor for genomic control. By default, if VIF is specified, the variables in the VAR statement are used, but this new option provides a way of using particular SNPs, separate from those being tested for association and which are assumed to have no association with the TRAIT variable, for genomic control (Bacanu, Devlin, and Roeder 2000).

**9.1** You can request that approximations of exact  $P$ -values for the case-control tests be reported in place of the asymptotic chi-square  $P$ -values (Westfall and Young 1993). The new PERMS= option indicates the number of permutations to be used for a Monte Carlo estimate of each exact  $P$ -value, and the random seed can be provided in the new SEED= option.

**9.1** The OUTSTAT= data set includes two new columns: NumTrait1 and NumTrait2, where the values 1 and 2 are replaced by the two values of the TRAIT variable. These columns contain the number of genotyped individuals with each trait value for each marker.

Beginning in SAS 9.1.3, the STRATA statement is available for specifying variables that define strata in the sample. A Cochran-Mantel-Haenszel statistic (Agresti 1990) is used to adjust for these categorical variables, enabling you to stratify your analysis on the basis of gender or treatment for example, or to perform a nested or matched case-control study.

Also new to SAS 9.1.3 is an OR option to have allele odds ratios and their confidence intervals, with the level specified in the ALPHA= option, included in the output data set for biallelic markers.

---

## **FAMILY Procedure**

**9.1** The new "Family Summary" ODS table displays information about each family in the data set at each of the markers. This includes the number of parents genotyped, the number of affected children, the number of unaffected children, as well as an error code indicating what type of, if any, Mendelian inconsistencies occur in a nuclear family's genotypes at each marker. The new SHOWALL option can be used to display this information for all families at each marker. By default, only those families with a genotype error are included in the table for the marker(s) where the error occurs.

**9.1** The new "Description of Error Codes" ODS table provides descriptions of the numerical error codes used in the "Family Summary" table.

**9.1** Approximations of exact  $P$ -values can now be requested in place of the asymptotic chi-square  $P$ -values for the TDT, S-TDT, SDT, and combined S-TDT and SDT using the PERMS= option. The number specified indicates the number of permutations to be used in the Monte Carlo procedure for estimating exact  $P$ -values. You can provide the random seed used for the permutations in the new SEED= option.

**9.1** The multiallelic SDT and multiallelic combined SDT/TDT are now implemented as

described by Czika and Berry (2002).

Analysis of X-linked markers is facilitated in SAS 9.1.3 by the new XLVAR statement. Markers listed in this statement can be tested for linkage and, under appropriate conditions, association with a binary trait using the X-linked versions of the TDT, S-TDT, combined S-TDT, and RC-TDT (Horvath, Laird, and Knapp 2000).

With the OUTQ= option, new to SAS 9.1.3 as well, you can create an output data set containing the pair of allelic transmission scores (Abecasis, Cookson, and Cardon 2000) for each marker allele. These scores can then be used to perform family-based tests for binary or quantitative traits in nuclear families or even extended pedigrees.

---

## HAPLOTYPE Procedure

**9.1** The EST=EM | STEPPEM option enables you to specify whether you would like haplotype frequencies to be estimated using the original EM algorithm or the new stepwise EM algorithm (Clayton 2002b). When EST=STEPPEM is specified, a cutoff to be used for trimming the set of haplotypes before adding an additional locus can be given in the new STEPTRIM= option.

**9.1** The ID statement enables variables from the input data set to be included in the OUT= data set created by PROC HAPLOTYPE in addition to or instead of the \_ID\_ variable, a unique numeric identifier assigned to each individual by the procedure.

The option EST=BAYESIAN is experimental in SAS 9.1.3 and can be used to request a Bayesian approach to the estimation of haplotype frequencies. Some new options associated with only this estimation method are BURNIN=, INTERVAL=, THETA=, and TOTALRUN=, all experimental as well.

---

## HTSNP Procedure

**9.1** The experimental HTSNP procedure implements search algorithms for identifying a subset of SNPs called *haplotype tag SNPs* (*htSNPs*) (Johnson et al. 2001) that capture much of the linkage disequilibrium and haplotype diversity among common haplotypes.

Beginning in SAS 9.1.3, PROC HTSNP contains an option CRITERION= for selecting the measure to be used for determining the best set(s) of haplotype-tagging SNPs (*htSNPs*).

The possible values for this option are PDE (Clayton 2002a), the default and the measure previously available, and RSQH, which implements the  $R_h^2$  measure of Stram et al. (2003). Additionally, the best sets of htSNPs and their criterion measure are now displayed automatically in the ODS table "Evaluation of htSNPs" so the OUTSTAT= option is no longer offered.

---

## INBREED Procedure

**9.1** The INBREED procedure is now included in SAS/Genetics in addition to SAS/STAT where it originated. This procedure calculates the covariance or inbreeding coefficients for pedigrees either by treating the population as a single generation or by performing separate analyses on each generation. You can also opt to have inbreeding and covariance coefficients averaged within each gender category.

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## PSMOOTH Procedure

**9.1** The new option TPM implements the truncated product method (Zaykin et al. 2002) for smoothing  $P$ -values over windows of markers. The TAU= option, also new, can be used in conjunction with the TPM option to specify the value of  $\tau$  at which  $P$ -values are truncated.

The Benjamini and Hochberg (1995) method of adjusting  $P$ -values to control the false discovery rate (FDR) is available in SAS 9.1.3 with the ADJUST=FDR option.

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## What's New in SAS/GRAPH 9.0 and 9.1

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### Overview

It's easier than ever to produce enhanced and detailed, informative graphics for your Web presentations. New features in SAS/GRAPH include:

- three new procedures: GAREABAR, GBARLINE, and MAPIMPORT
- new options in the GCHART procedure for producing standard pie or donut charts with a detailed, inner pie overlay
- new options in the GRADAR procedure for adjusting how a chart looks and for specifying annotation
- support for the new DOCUMENT procedure for the Output Delivery System (ODS)
- the new SAS Maps Online application
- server-side rendering using the ACTXIMG and JAVAIMG devices
- client support for annotation
- client support for ODS styles
- ActiveX support for creating graphs interactively
- ActiveX support for radar charts produced with the GRADAR procedure
- the new Java Constellation Applet
- user interface enhancements for the client graphs, such as redesigned dialogs.

### Note:

- This section describes the features of SAS/GRAPH that are new or enhanced since SAS 8.2.

- z/OS is the successor to the OS/390 operating system. SAS/GRAPH 9.1 is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

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## Details

## Procedures

The following procedures are new or enhanced:

- The GAREABAR procedure generates bar graphs in which the width of the bars are proportional to a characteristic of the data element that is represented by the bars. Area bar charts are supported only when you specify `device=activex` or `device=actximg`.
- The new GBARLINE procedure enables you to create vertical bar charts that have line plot overlays.

**Note:** The GBARLINE procedure is not supported for Java. ■

- The new MAPIMPORT procedure enables you to import ESRI Shapefiles into SAS/GRAPH map data sets.
- The new DOCUMENT procedure for ODS enables you to re-arrange or to duplicate reports--including graphs--without having to rerun your analysis. You can display output to any ODS output format without executing your SAS programs again. For more information, see the DOCUMENT procedure in **SAS Output Delivery System: User's Guide**.
- New options in the PIE statement in the GCHART procedure enable you to create detail pie charts that have an inner pie overlay. The slices in the overlay align with the slices in the outer pie and show detailed information about the major components that comprise the outer slice. The new options are `DETAIL=`, `DETAIL_PERCENT=`, `DETAIL_RADIUS=`, `DETAIL_SLICE=`, `DETAIL_THRESHOLD=`, and `DETAIL_VALUE=`.
- The GRADAR procedure has the following new options:

- ANNOTATE= specifies an annotate data set.
  - INBORDER requests a border around plots.
  - INHEIGHT= specifies the height in percent screen units of text used inside the frame of the chart.
  - LAST= specifies that the spoke that corresponds to the category is displayed to the left of the start angle.
  - MAXNVERT= specifies the maximum number of vertices.
  - MISSING accepts a missing value as a valid midpoint for the chart variable.
  - NOFRAME suppresses the frame that is drawn around the chart by default.
  - NOZERO REF turns off the zero reference line when negative values are plotted.
  - OTHER= specifies a new category that merges all categories that are not selected because of the MAXNVERT= option.
  - ORDERACROSS= specifies the display order for the values of the ACROSS= variable.
  - SPIDER draws lines on a radar chart that connect the spokes instead of the default tick marks. The resulting lines look similar to a "spider web."
  - STARINRADIUS= and STAROUTRADIUS= determine the diameter of the stars.
- The LEVELS=ALL option in the GMAP procedure uses a color ramp to assign a continuous color scheme to each response value.

## **SYMBOL Statement**

The SINGULAR= option tunes the algorithm that is used to check for singularities.

## **Graphics Options**

The following graphics options are new:

## USERINPUT

determines whether user input is enabled for the device.

## SWFONTRENDER

specifies the method used to render software fonts.

## The Annotate Facility

The following macros are new:

### %CENTROID

retrieves the centroids of polygons.

### %MAPLABEL

creates an output data set that can be used with the ANNO= option in PROC GMAP.

## SAS Maps Online Application

The new SAS Maps Online application enables you to download: data updates, sample SAS/GRAPH programs that use the map data sets delivered with SAS/GRAPH, and GIF images of maps. SAS Maps Online is located at [support.sas.com/rnd/datavisualization/maponline/html](http://support.sas.com/rnd/datavisualization/maponline/html)

## Pop-up Data Tips for Web Graphics

Web graphics now support pop-up data tips. A pop-up data tip is text that is displayed when a user moves the cursor over a portion of a Web graphic. You can add custom data tips to the output of any SAS/GRAPH procedure that supports the HTML= option.

## Server-Side Rendering

The ACTXIMG and JAVAIMG devices generate images on the server that match the look of the client graphs. These devices are especially useful when you do not need the interactivity that is provided by the client graphs. ACTXIMG is only available for Windows.

## Client Support for Annotation

The Java and ActiveX clients now support annotation through the Output Delivery System (ODS) for the G3D, GBARLINE, GCHART, GCONTOUR, GMAP, GPLOT, and GRADAR procedures. You can specify the ANNOTATE= option in these procedures when you are using the JAVA, JAVAIMG, ACTIVEX, and ACTXIMG device drivers. All annotate functions are available with each device driver (except the FRAME and IMAGE functions, which are available only with ACTIVEX and ACTXIMG).

## Client Support for ODS Styles

ODS styles now affect both table and client graph output. Sixteen new graph styles provide a consistent look for your entire ODS output, which enhances readability and usability.

## ActiveX Control

The following are enhancements for the ActiveX Control:

- The ActiveX control now supports creating graphs interactively. You can import data from SAS data sets, Microsoft Excel files, or Microsoft Access files.

**Note:** To create graphs interactively, you must have Enterprise Guide 2.0 HotFix 11 or higher installed. ■

- The ActiveX control now supports radar charts that are produced by using the GRADAR procedure.
- The ActiveX control menus now enable the following additional languages: Chinese, Japanese, Korean, and Russian. (The following languages were also available in SAS 8.2: French, German, Hebrew, Hungarian, Italian, Polish, and Spanish.)

## **Java Constellation Applet and DS2CONST Macro**

The new Java Constellation Applet, which you can generate by using the DS2CONST macro, enables you to see the relationships among node link data, such as Web click data, network flow data, and simple affinity data. You can interactively select a set of nodes to see the relationships among the nodes. You can see all of the links coming to the set of nodes or going out of a set of nodes.

## **Java Treeview Applet and DS2TREE Macro**

The new Java Treeview applet, which you can generate by using the DS2TREE macro, shows the parent-child relationships of elements in a hierarchical structure. It provides an optional "fish-eye" distortion that highlights the central area of interest, and enables you to search for, hide, and display element subtrees. A Treeview diagram is ideal for displaying data such as organizational charts or the hierarchical relationships of the pages of a Web site.

## **Java Contour Applet**

The following are enhancements for the Java Contour Applet:

- a new plot style, Smooth, enables you to display flat (linearly interpolated) planes with no outlines.
- several new parameters.

## **Java Graph Applet**

The following are enhancements in the Java Graph Applet:

- For bar charts, error bars and the CERROR= option (which sets their color) are now enabled. Bars can be labeled by statistics by using the OUTSIDE= and INSIDE= options. Patterns are enabled for 2-D bars, and improved support for the VALUE= option in the AXIS statement is provided.
- For pie charts with group variables, the OTHER=, HTML=, INVISIBLE, and EXPLODE options are available. Data tips can now be displayed for groups. The V=EMPTY option in a PATTERN statement creates hollow pie slices. The LABEL=

option enables you to specify font height and color for donut charts.

- Scatter plots now enable the BOX, STD, and HILOC interpolations. For these interpolations, you can use the SYMBOL statement to specify colors, font height and width, line type, point labels, and box width.
- The Graph applet menus now enable the following additional languages: Chinese, Japanese, Korean, and Russian. (The following languages were also available in SAS 8.2: French, German, Hebrew, Hungarian, Italian, Polish, and Spanish.)
- The MENUREMOVE parameter can be used to disable menus and menu options in the applet's user interface.

## User-Defined Formats

The Java and ActiveX devices now support user-defined formats, except for nested user-defined formats. For information about defining formats, see the documentation for the FORMAT procedure in the **Base SAS Procedures Guide**.

## Colors

Color names can now be a maximum of 64 characters in length.

## Fonts

The following fonts have been added:

- Davidb (Hebraic)
- Fsong (Chinese)
- Hebrewb
- Hei (Chinese)
- Mincho (Japanese)

## PAGEFIT Attribute for PostScript

The new PAGEFIT image attribute enables you to adjust how a PostScript image fits on the page. The PAGEFIT attribute replaces the NOFIT attribute.

## GTITLE and GFOOTNOTE Options for the ODS Statement

The behavior of the GTITLE and GFOOTNOTE options has been changed--when you specify NOGTITLE or NOGFOOTNOTE, the space in the graphic that would have been used for the title or footnote is allocated to the procedure output rather than being left empty. You need to be aware of this change if you are using annotation or mapping coordinates. For more information, see *Controlling Where Titles and Footnotes are Rendered*.

## Enhancements in SAS/GRAPH Documentation

In addition to information about new features, the SAS/GRAPH documentation now includes information about the following:

- COLORMAC and HLPCLR macros and expanded information about choosing color schemes
- DSGI routine GASK ('PATREP') and the functions GSET('PATREP') and GRAPH ('PLAY')
- map formats that are available with the GMAP procedure
- HTML generators, which are macros that generate HTML files that run one of the SAS/GRAPH applets: DS2CONST (Constellation Applet), DS2TREE (Treeview Applet), and DS2CSF (Rangeview Applet).
- attributes and parameters for Java and ActiveX, which were formerly documented in the **SAS Output Delivery System: User's Guide**.

Also, additional examples of Web-output programs have been added to the documentation and the SAS/GRAPH sample library. Documentation for the JAVA2 device driver has been removed, because JAVA and JAVA2 are now functionally equivalent.



# What's New in SAS High-Performance Forecasting 2.2

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## Overview

**Note:** This section describes the features of SAS High-Performance Forecasting that are new or enhanced since SAS 9.0.

SAS High-Performance Forecasting has a new release numbering scheme. SAS High-Performance Forecasting 2.2 provides new procedures, features, and functionality while maintaining all the capabilities of SAS 9.1.3 High-Performance Forecasting software.

New features, procedures, and functions have been added to SAS High-Performance Forecasting as follows:

- New features have been added to the HPF procedure.
- New procedures have been added for creating model specifications and model selection lists:
  - PROC HPFARIMASPEC
  - PROC HPFESMSPEC
  - PROC HPFEXMSPEC
  - PROC HPFIDMSPEC
  - PROC HPFSELECT
  - PROC HPFUCMSPEC
- The new HPFEVENTS procedure has been added for creating calendar events.
- New procedures have been added for computations:
  - PROC HPFDIAGNOSE
  - PROC HPFENGINE
- The new HPFRECONCILE procedure has been added for reconciliation of hierarchical forecasts.
- New experimental functions have been added for forecast scoring:
  - HPFSCSIG function
  - HPFSCSUB function

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## Details

# High-Performance Forecasting Release Numbering Scheme

SAS High-Performance Forecasting has a new release numbering scheme. SAS High-Performance Forecasting 2.2 provides the same features and functionality as SAS 9.1.3 High-Performance Forecasting software, and includes new procedures, functions, and features.

## HPF Procedure

The HPF procedure has the following new features:

- New options related to forecast model selection:
  - HOLDOUTPCT= option
  - SEASONTTEST= option
  - SELECT= option
- The new NBACKCAST= option is related to forecast model initialization.
- The new IDM statement is related to intermittent demand models.
- New options related to out-of-sample forecast performance statistics:
  - BACK= option
  - PRINT=PERFORMANCE option
  - PRINT=PERFORMANCESUMMARY option
  - PRINT=PERFORMANCEOVERALL option
- New options related to the processing of the data:
  - NOTSORTED option
  - REPLACEBACK option
  - SORTNAMES option
- New options related to printed and graphical output:
  - PLOT= option
  - PRINT=STATES option
- The new MAXERROR= option is related to the message log.

## HPFARIMASPEC Procedure

The new HPFARIMASPEC procedure is used to create an Autoregressive Integrated Moving Average (ARIMA) model specification file. The output of the procedure is an XML file that stores the intended ARIMA model specification. This XML specification file can be used to populate the model repository used by the HPFENGINE procedure. (Likewise, the XML files generated by the other model specification procedures in this section can also be used to populate the model repository used by PROC HPFENGINE.)

## HPFESMSPEC Procedure

The new HPFESMSPEC procedure is used to create an Exponential Smoothing Model (ESM) specification file. The output of the procedure is an XML file that stores the intended ESM model specification.

## **HPFEXMSPEC Procedure**

The new HPFEXMSPEC procedure is used to create an External Model (EXM) specification file. The output of the procedure is an XML file that stores the intended EXM model specification.

## **HPFIDMSPEC Procedure**

The HPFIDMSPEC procedure is used to create an Intermittent Demand Model (IDM) specification file. The output of the procedure is an XML file that stores the intended IDM model specification.

## **HPFSELECT Procedure**

The new HPFSELECT procedure is used to create model selections lists. A model selection list contains references to candidate model specifications stored in the model repository. The output of the procedure is an XML file that stores the intended model selection list.

The HPFSELECT procedure has the following experimental features:

- external variable mapping (EXMMAP= option)
- external forecast function (EXMFUNC= option)

## **HPFUCMSPEC Procedure**

The new HPFUCMSPEC procedure is used to create an Unobserved Component Model (UCM) specification file. The output of the procedure is an XML file that stores the intended UCM model specification.

## **HPFEVENTS Procedure**

The HPFEVENTS procedure provides a way to create and manage events associated with time series. The procedure can create events, read events from an events data set, write events to an events data set, and create dummies based on those events, if date information is provided.

A SAS event is used to model any incident that disrupts the normal flow of the process that generated the time series. Examples of commonly used events include natural disasters, retail promotions, strikes, advertising campaigns, policy changes, and data recording errors.

An event has a reference name, a date or dates associated with the event, and a set of qualifiers. The event exists separately from any time series; however, the event may be applied to one or more time series. When the event is applied to a time series, a dummy variable is generated that may be used to analyze the impact of the event on the time series.

## **HPFDIAGNOSE Procedure**

The new HPFDIAGNOSE procedure is an automatic modeling procedure to find the best model among ARIMA Models, Exponential Smoothing Models, and Unobserved Component Models.

The HPFDIAGNOSE procedure has the following functionality:

- intermittency test
- functional transformation test
- simple differencing and seasonal differencing test
- tentative simple ARMA order identification
- tentative seasonal ARMA order identification
- outlier detection
- significance test of events
- transfer functions identification
- intermittent demand model
- exponential smoothing model
- unobserved component model

## **HPFENGINE Procedure**

The new HPFENGINE procedure provides large-scale automatic forecasting of transactional or time series data. The HPFENGINE procedure extends the foundation built by PROC HPF, enabling the user to determine the list of models over which automatic selection is performed.

The use of many forecast model families is supported when HPFENGINE is used in conjunction with new procedures that generate generic model specifications. Among these models are the following:

- ARIMA
- Unobserved Component Models (UCM)
- Exponential Smoothing Models (ESM)
- Intermittent Demand Models (IDM)
- External Models (EXM)

Furthermore, users can completely customize the operation by defining their own code to generate forecasts.

For models with inputs, the STOCHASTIC statement is especially helpful for automatically forecasting those inputs that have no future values.

Also supported is the generation of a portable forecast score. The output of the SCORE statement is a file or catalog entry that, when used with the new function HPFSCSUB, can be used to efficiently generate forecasts outside of the HPFENGINE procedure.

The new HPFDIAGNOSE procedure produces output that is compatible with HPFENGINE. As a result, the task of candidate model specification can be entirely automated.

## **HPFRECONCILE Procedure**

The new HPFRECONCILE procedure provides the following functionality:

- large-scale reconciliation of hierarchical forecasts by using predictions, standard errors, and confidence limits reconciliation
- the following methods of reconciliation:
  - top-down reconciliation
  - bottom-up reconciliation
- constrained reconciliation using an interior-point quadratic programming technique that combines statistical forecasts reconciliation with judgmental constraints (overrides)
- replaces functionality of the %HPFRECON macro

## **HPFSCSIG Function**

The experimental HPFSCSIG function generates a sample signature for subsequent use by the HPFSCSUB function.

## **HPFSCSUB Function**

The experimental HPFSCSUB function uses score files to produce forecasts outside of the HPFENGINE procedure. Being a function, it is particularly well suited for use within other SAS programming contexts, such as the DATA step, or procedures that permit the specification of functions, such as the NLP procedure. The only input required is a reference to the score function, the horizon, and future values of any inputs.

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# What's New in SAS High-Performance Forecasting 2.3

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## Overview

**Note:** This section describes the features of SAS High-Performance Forecasting that are new or enhanced since SAS 9.1.3. ■

SAS High-Performance Forecasting has a new release numbering scheme. SAS High-Performance Forecasting 2.3 provides new features while maintaining all the capabilities of SAS 9.1.3 High-Performance Forecasting software.

New features have been added to the following procedures:

- [HPF](#) procedure
- [HPFDIAGNOSE](#) procedure
- [HPFENGINE](#) procedure
- [HPFEVENTS](#) procedure
- [HPFRECONCILE](#) procedure

---

## General Enhancements

### High-Performance Forecasting Release Numbering Scheme

SAS High-Performance Forecasting has a new release numbering scheme. SAS High-Performance Forecasting 2.3 provides the same features and functionality as SAS 9.1.3 High-Performance Forecasting software and includes new features.

### HPF Procedure

New features related to the forecast model selection enable you to better monitor forecast generation.

The HPF procedure has the following new features:

- OUTPROCINFO= option specifies the output data set to contain the summary information of the processing done by HPF Procedure. This option is particularly useful for easy programmatic assessment of the status of the procedure's execution via a data set instead of looking at or parsing the SAS log.
- statistics of fit related to scaled and relative errors.

## HPFDIAGNOSE Procedure

Many new features related to the diagnostics enable you to better control model generation.

The HPFDIAGNOSE procedure has the following features:

- DELAYEVENT= option specifies the delay lag for the events. If the option is not specified, the delay lag for the events is set to zero by default.
- DELAYINPUT= option specifies the delay lag for the inputs. If the option is not specified, the delay lag for the inputs is chosen appropriately by the procedure.
- ENTRYPCT= option specifies a threshold to check the percentage increment of the criterion between two candidate models. The ENTRYPCT=value should be in the range (0,100); the default is ENTRYPCT=0.1 (0.1%).
- NODIAGNOSE option specifies that the series is not to be diagnosed. If the INSELECTNAME= option and OUTEST= option are specified, the existing model specification files are written to the OUTEST data set.
- OUTPROCINFO= option specifies the output data set to contain the summary information of the processing done by the HPFDIAGNOSE procedure. This option is particularly useful for easy programmatic assessment of the status of the procedure's execution via a data set instead of looking at or parsing the SAS log.
- OUTLIER=(ENTRYPCT= ) option specifies a threshold to check the percentage increment of the criterion between two candidate models. The ENTRYPCT=value should be in the range (0,100); the default is ENTRYPCT=0.1 (0.1%). The value of the OUTLIER=(ENTRYPCT= ) option overrides the value of the ENTRYPCT= option in the HPFDIAGNOSE



statement.

- **REFINEPARMS=** option specifies that insignificant parameters of the final model are to be refined, identifies the factors to refine, and identifies the order of factors.
- **RETAINCHOOSE** option specifies that the **PROC HPFSELECT CHOOSE=** option is respected when re-diagnosing series.
- **POSITIVE** or **NEGATIVE** option is specified in the **INPUT** statement followed by the **REQUIRED=** option such as **REQUIRED=YES(POSITIVE)** and **REQUIRED=MAYBE(NEGATIVE)**. When the **REQUIRED=YES(POSITIVE)** option is specified, if its coefficient is negative, then the input variable drops out from the model.

## HPFENGINE Procedure

New features related to the forecasting engine enable you to better monitor forecast generation.

The new HPFENGINE procedure has the following features:

- **OUTPROCINFO=** option specifies the output data set to contain the summary information of the processing done by the HPFENGINE procedure. This option is particularly useful for easy programmatic assessment of the status of the procedure's execution via a data set instead of looking at or parsing the SAS log.
- statistics of fit related to scaled and relative errors.

## HPFEVENTS Procedure

New predefined date keywords have been added to the HPFEVENTS procedure:

**Table 1.1** New Holiday Date Keywords and Definitions

Date Keyword	Definition
COLUMBUS	2nd Monday in October

MLK	3rd Monday in January
USPRESIDENTS	3rd Monday in February (since 1971)
VETERANS	November 11
VETERANSUSG	date observed by U.S. government for  Monday-Friday schedule
VETERANSUSPS	date observed by U.S. government for  Monday-Saturday schedule  (U.S. Post Office)

---

## HPFRECONCILE Procedure

The following new options are available in the HPFRECONCILE procedure:

- FORCECONSTRAINT option specifies whether the user-specified constraints should be forced on the PREDICT variable in the OUTFOR= data set when the problem is infeasible because the constraints are incompatible with the aggregation constraint. The default is to leave the input unmodified.
- OUTPROCINFO= SAS-data-set specifies the output data set to contain the summary information of the processing done by PROC HPFRECONCILE. This option is particularly useful for easy programmatic assessment of the status of the procedure's execution via a data set instead of looking at or parsing the SAS log.
- WEIGHTED option specifies that the loss function for top-down reconciliation be weighted by the inverse of the variance of the input forecasts.
- OUTINFEASIBLE= data set specifies the output data set that contains summary information.

- ALIGN= option controls the alignment of SAS dates used to identify output observations. Internal processing uses aligned versions of the values of START= and END= options (if specified) and values of ID variable in input observations. The ALIGN= option accepts the following values: BEGIN, MIDDLE, and END. BEGIN is the default.

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# What's New in SAS/IML 9.0 and 9.1

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## Overview

New to SAS/IML are the following:

- A set of new iterative methods for large sparse systems of linear equations
- A set of new direct algorithms utilizing Cholesky factorization for large sparse systems of linear equations
- A new chapter on Genetic Algorithms
- A set of new functions and calls for grouping and sorting
- A set of new calls for random number generation
- A new programming feature that extends the matrix subscripting functionality

---

## Iterative Methods for Large Sparse Systems of Linear Equations

**9.1** Iterative methods create a new direction in IML: the capability to handle large, sparse matrices and systems. With sparsity exploitation and iterative approximation algorithms, IML can solve linear systems containing as many as  $10^6$  variables on a regular PC. The new methods that are used are Conjugate Gradient, Minimum Residual, and Biconjugate Gradient. The collection of preconditioners include fast incomplete Cholesky factorization and Jacobi.

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## Direct Algorithms for Large Sparse Systems of Linear Equations: Cholesky Factorization

**9.1** The Cholesky algorithm comprises a minimum degree ordering heuristic and symbolic factorization. The implementation is based on a quotient graph model.

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## Genetic Algorithms

Genetic algorithms are a family of search algorithms that seek optimal solutions to problems using an approach that parallels the principles of natural selection and evolution in nature. There are several new experimental subroutines and functions that enable you to formulate

and implement genetic algorithm optimizations. You have the flexibility either to write your own modules to specify the objective function and genetic operators or to use standard functions and operators provided by IML.

---

## **New Functions and Calls**

### **BY Group Processing for Matrices**

A new function, UNIQUEBY, has been added to IML that makes it easier to retrieve and process BY groups in a sorted matrix. You can use the SORT and SORTNDX calls to sort a matrix, and then call the UNIQUEBY function to get a vector of indices of the first row of each unique BY group in the input matrix. See the Language Reference section for full details.

### **SORT and SORTNDX Calls**

Two new subroutines have been added to make sorting of matrices easier. The SORT call sorts a matrix in place, sorting the rows by specified columns. The SORTNDX function creates an index matrix, without rearranging the input matrix, which enables you to access the rows of the input matrix in sorted order. The SORTNDX call will normally be faster than the SORT call, and you can use it to create multiple indexes into the same input matrix. See the Language Reference section for full details.

### **RANDSEED and RANDGEN Calls**

**9.1** Two new subroutines have been added to improve the efficiency of random number generation. RANDSEED and RANDGEN use the same algorithm as the data functions STREAMINIT and RAND, with changes to maximize performance in IML. See the Language Reference section for full details.

---

## **New Programming Feature**

### **Subscripting by Row or Column Names**

Matrix subscripting functionality has been extended, so that you can specify a set of rows or columns by the names given in a MATTRIB statement or assigned by a data set statement. This is done by using a character matrix as one or both of the subscripts. IML will attempt to match character string elements to column or row names assigned to the matrix. See the

Language Reference section for full details and examples.

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# What's New in SAS Information Delivery Portal 2.0

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## Overview of New Portal Features

The SAS Information Delivery Portal 2.0 includes the following new features:

- enhanced user interface
- integration with the new SAS solutions and Business Intelligence tools
- new metadata architecture
- development of new portlets
- enhancements to the information map viewer
- enhancements to the SAS Web Infrastructure Kit
- improved management of content items
- more robust management of pages and portlets

---

## Enhancements to the User Interface

The SAS Information Delivery Portal's user interface is completely redesigned. It provides increased usability, improved quality of presentation, and consistency with other products in the SAS solutions and Business Intelligence suites.

From a single point in the portal, you can enter your preferences for locale, theme, e-mail notifications, and date and time formats. These selected preferences apply to all SAS solutions that run in the portal.

---

## Integration with the New SAS Solutions and Business Intelligence Tools

The SAS Information Delivery Portal can now be installed as part of a larger interoperable suite of SAS solutions and Business Intelligence tools that are designed to meet the needs

of different audiences, with the portal serving as a single access point. A single sign-on mechanism enables user authentication and session information to be shared among applications. You need to log on only once in order to access all of the information that you are authorized to see.

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## **New Metadata Architecture**

The new SAS Metadata Server provides a central point for administering portal users, configuring system resources, and controlling access to portal content.

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## **Development of New Portlets**

The portal was developed using a new Web application architecture that eases customization and enables new portlets to be developed and deployed quickly.

The following new portlets have been added:

- In SAS 9.1.3 Service Pack 2, you can create your own WebDAV content portlets. A WebDAV content portlet displays the contents of an HTML fragment that is stored in the portal's WebDAV repository.

In SAS 9.1.3 Service Pack 4, a WebDAV content portlet can contain a link to additional detailed information. To specify the link, you can enter a URL that uses the proprietary SAS Business Intelligence Platform (SBIP) protocol. You can also enter an SBIP URL to specify the HTML fragment for the portlet.

- In SAS 9.1.3 Service Pack 3, you can create your own WebDAV graph portlets. A WebDAV graph portlet displays a graph that uses data from the portal's WebDAV repository. The portlet can also include a link to additional detailed information.
  - In SAS 9.1.3 Service Pack 3, you can create your own information map viewer portlets. An information map viewer portlet displays data by using bookmarks that you create in the Visual Data Explorer component.
- 

## **Enhancements to the Information Map Viewer**

The following enhancements were made to the information map viewer:



- The new information map viewer enables relational and OLAP data to be viewed using graphics and tables.
- In SAS 9.1.3 Service Pack 2, extensive enhancements were made to the information map viewing functions.
- In SAS 9.1.3 Service Pack 4, you can perform the following tasks:
  - view ESRI maps
  - edit properties for each of the data viewers
  - apply SAS formats to your data items
  - calculate data items by using functions
  - create data filters that are based on relative time values

---

## **Enhancements to the SAS Web Infrastructure Kit**

The following enhancements have been made to the SAS Web Infrastructure Kit, which serves as the infrastructure for the SAS Information Delivery Portal Web application:

- In SAS 9.1.3, the SAS Web Infrastructure Kit includes the capability to run the remote SAS Services application as a Windows service. This capability is enabled through the use of the Java Service Wrapper from Tanuki Software, which is provided with SAS Foundation Services.
- In SAS 9.1.3, the IBM WebSphere servlet container is now a supported platform for the SAS Web Infrastructure Kit.
- In SAS 9.1.3 Service Pack 2, the SAS Web Infrastructure Kit includes new tools that content administrators can use to delete shared pages and page templates from the metadata repository.
- In SAS 9.1.3 Service Pack 2, the SAS Web Infrastructure Kit includes a new theme called SAS Winter, which administrators can use as a basis for creating new themes. In addition, the style sheets that are included in the themes have been modified.

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## Logging Off from a Portal Session

In SAS 9.1.3 Service Pack 2, if you log on to a Web server in order to access the portal, you now have the ability to log off from a portal session.

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## Managing Content Items

In SAS Information Delivery Portal 2.0, you can perform the following tasks:

- e-mail links to portal content
- share content with other users in a group
- publish content to SAS publication channels
- bookmark content for future reference
- receive alert notifications for some types of content

In SAS 9.1.3 Service Pack 3, you can create, edit, and delete applications and syndication channels. In addition, you can create new content items (including pages, portlets, applications, syndication channels, and links) without adding them to the portal.

In SAS 9.1.3 Service Pack 3, you can delete and edit content items from the search results page.

In SAS 9.1.3 Service Pack 3, content administrators can perform the following tasks:

- create, share, and delete page templates
- share pages, portlets, links, applications, and syndication channels
- edit and delete shared portlets, links, applications, and syndication channels

---

## Managing Pages and Portlets

In SAS 9.1.3 Service Pack 3, the following enhancements have been added for laying out

and deleting pages:

- Pages can be laid out either in columns or in a grid (with rows and columns). In a grid layout, individual portlets can span columns and rows. For both types of layouts, you can specify the percentage width for each column.
- When deleting a page, you can now specify whether to also delete the portlets that are on the page. When deleting a collection portlet, you can now specify whether to also delete the items that are displayed in the portlet.

In SAS 9.1.3 Service Pack 3, the properties of a page now include a page rank, which indicates the importance of the page as compared to other pages. This value can be used to determine the order in which pages are listed in the navigation bar.

In SAS 9.1.3 Service Pack 3, the workflow for adding, creating, and editing pages and portlets has changed:

- The Options menu now includes two entries for editing pages, one for editing page content and one for editing page properties.
- Editable portlets now include two edit icons, one for editing portlet content and one for editing portlet properties.
- When editing the contents of a collection portlet, you can specify whether the portlet is to display each item's location and description. This option is also available for the Bookmarks portlet.

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# What's New in SAS Information Map Studio 3.1

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## Overview

SAS Information Map Studio has been updated with new functionality and usability enhancements that make the application more flexible and easier to use.

- The relationship and filter interfaces have been redesigned to include new and improved functionality.
  - Prefilters and required tables are now supported.
  - Row-level permissions can now be applied to relational data sources (including SAS data sets).
  - New user options and a new custom properties viewer are now available.
  - The **Properties** tab in the SAS Information Map Studio main window has been removed.
- 

## Redesigned Relationship Interfaces

The redesigned relationship interfaces include the following enhancements:

- a new interface for describing join cardinality
  - an updated graphical user interface that displays industry-standard notation for join type and cardinality
  - identification of columns that are defined as unique keys in the metadata
  - support for non-equijoins
  - support for join expressions that are created by the INFOMAPS procedure
- 

## Redesigned Filter Interfaces

The redesigned filter definition dialog boxes include the following enhancements:

- support for assigning general and authorization-based prefilters that enable you to pre-screen and subset data before any other part of a query is run

- support for relative date, time, and timestamp values
  - support for date, time, and timestamp prompts
  - support for identity-driven properties that are stored in the metadata and that can be used in a filter as the values against which target data is compared
  - support for filter expressions that are created by the INFOMAPS procedure
- 

## Support for Required Tables

Relational data sources can now be designated as required so that they are used in every query that is generated from an information map.

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## Security Enhancements

The application's security features include the following enhancements:

- support for row-level permissions, which is implemented by exploiting the following new features:
    - enforcement of the Read permission (as set in the metadata) for information maps
    - the ability to assign filters either universally (as general prefilters) or to specific identities (as authorization-based prefilters)
    - the ability to apply user-specific filtering without defining a separate filter for each user (identity-driven filters)
    - required tables
  - relocation of the **Authorization** tab that was in the Information Map Properties dialog box to the new Authorization dialog box. You can open the Authorization dialog box by selecting **Tools** ➤ **Authorization** from the menu bar.
- 

## Support Changes for Prompt Values

Support has changed for the following types of prompt values:

- Prompts based on date, time, and timestamp values are now supported.

- Dynamically generated prompt values are no longer supported.
- 

## **New User Options**

New options have been added for hiding join type and cardinality notation.

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## **Redesigned Administrative Tools Interface**

The Administrative Tools dialog box has been renamed, redesigned, and now includes a new custom properties viewer.

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## **Improved Access to Diagnostic Settings**

The Log On dialog box has been redesigned to provide faster access to your diagnostic settings. Also, the new default location of the log file is the Windows Profiles directory for your user ID.

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# What's New in SAS Integration Technologies 9.0, 9.1, 9.1.2, and 9.1.3

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## Overview

SAS Integration Technologies includes the following enhancements.

- Performance and scalability improvements
- Use of the SAS Metadata Server to store configuration information
- Support for creating Web services
- Enhanced SAS Stored Processes
- New SAS Foundation Services
- The new SAS Web Infrastructure Kit
- Event publishing capabilities
- Messaging interface updates
- The new **SAS Integration Technologies Server Administrator's Guide**.

## Note:

- This section describes the features of SAS Integration Technologies that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS Integration Technologies is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.



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## Details

## **SAS Metadata Server**

The SAS Metadata Server stores configuration information for servers and other SAS Integration Technologies resources, and SAS Management Console is used to administer this information.

## **Web Services**

Support is provided for creating Web services that implement the XML for Analysis Version 1.1 interface to call SAS Stored Processes.

With SAS 9.1.3 Service Pack 4, SAS BI Web Services for Java can be secured using trusted Web server authentication. This provides a way for SAS BI Web Services for Java to identify the calling user by using basic Web server authentication.

## **SAS Stored Processes**

SAS Stored Processes can operate on a SAS Stored Process Server to produce streaming output for use in Web applications. You can use SAS Stored Processes in the following ways.

- Use the SAS Stored Process Web Application to execute a stored process and return the results to a browser.
- Use the StoredProcessService application programming interface (API) to invoke stored processes from Java applications, JavaServer Pages, servlets, and custom tag sets.
- A SAS Stored Process can be invoked from the SAS Information Delivery Portal.

With SAS 9.1.3 Service Pack 2, the property page of the SAS Stored Process Web Application includes new interactive features.

## **SAS Foundation Services**

SAS Foundation Services is a new set of core infrastructure services that Java



programmers can use to write applications that are integrated with the SAS platform. The services provide dynamic service discovery, user authentication, profile management, session context management, metadata and content repository access, and activity logging. Extension services for event management, information publishing, stored process execution, and enhanced IOM client connection are also provided.

You can use the Foundation Services Manager plug-in to SAS Management Console to configure service deployments and services, and you can use the Application Monitor plug-in to monitor the activities and performance of applications that are enabled by SAS Foundation Services.

Foundation Services 1.2 includes BI Manager, which is a new SAS Management Console plug-in. BI Manager provides a common interface for the administration of SAS BI objects, including information maps, stored processes, reports, and data explorations. BI Manager also provides the ability to promote BI metadata and related content.

## **Integrated Object Model (IOM) Server**

The Integrated Object Model (IOM) server includes the following enhancements.

- The IOM server has been re-engineered to take advantage of the new Threaded Kernel (TK) technology in SAS®9. This enhancement reduces response time for IOM client applications that access Component Object Model (COM) servers and IOM Bridge servers. The enhancement is transparent and does not require changes to server configurations or to client programs.
- New load-balancing options in the IOM server configuration model enable more efficient deployment of server processes across machines.
- A new Windows Object Manager enables clients to interact with multiple types of IOM servers. The new service creates and manages objects for four "flavors" of IOM servers: SAS Workspace Servers, SAS Metadata Servers, SAS Stored Process Servers, and SAS OLAP Servers.
- A new Java Connection Service (part of SAS Foundation Services) enables clients to interact with multiple types of IOM servers.
  - This new service creates and manages objects for four "flavors" of IOM servers: SAS Workspace Servers, SAS Metadata Servers, SAS Stored Process Servers, and SAS OLAP Servers.

- This service also provides pooling and server failover scalability features and support for load-balancing spawners.
- At this time, SAS Integration Technologies 9 and later does not support the use of Object Request Brokers (ORBs) under the Common Object Request Broker Architecture (CORBA) on server platforms, nor does it support communication with client ORBs using the Internet Inter-ORB Protocol (IIOP).
- For COM and DCOM launched servers, all file access verifications are now performed only with the user ID under which the server was launched. The additional level of security checking, which was based on the client user ID, has been removed. Before upgrading to SAS Integration Technologies 9 or later, the security policies at the following sites should be reviewed.
  - Sites that launch COM workspace servers by using the "this user" identity setting in the DCOM configuration utility
  - Sites that use COM+ pooling.

For more details, see the Windows Security section in the SAS Integration Technologies Developer's Guide at [support.sas.com/rnd/itech/doc9/dev\\_guide/index.html](http://support.sas.com/rnd/itech/doc9/dev_guide/index.html) .

## Security

SAS Integration Technologies now uses the following new security features that are provided with SAS Open Metadata Architecture.

- SAS Management Console User Manager plug-in and SAS Personal Login Manager for registering SAS users, groups, and login information in a SAS Metadata Repository.
- SAS Management Console Authorization Manager plug-in for setting access controls in a SAS Metadata Repository.
- The host operating environment's authentication provider to authenticate users of IOM servers. As an alternative, you can authenticate users of SAS Metadata Servers and OLAP servers by using an LDAP directory server or a Microsoft Active Directory server.

## SAS Web Infrastructure Kit

The new SAS Web Infrastructure Kit provides an infrastructure for creating Web applications that use portal technology by including the following items.

- SAS Java components, Web infrastructure components, and a services infrastructure
- A portal Web application shell that provides page navigation, portlet rendering, log-on and log-off capability, metadata searching, bookmarking, personalization, and content administration features
- Predefined portlets for content viewing and file structure navigation
- A portlet development kit, which includes an API and a set of best practices, for developing custom portlets
- Administrative tools for deploying services, portlets, themes, global preferences, and additional Web applications.

The SAS Web Infrastructure Kit provides the infrastructure for the SAS Information Delivery Portal product.

The following enhancements have been made to the SAS Web Infrastructure Kit:

- In SAS 9.1.3, the SAS Web Infrastructure Kit includes the capability to run the remote SAS Services application as a Windows service. This capability is enabled through the use of the Java Service Wrapper from Tanuki Software, which is provided with SAS Foundation Services.
- In SAS 9.1.3, the IBM WebSphere servlet container is now a supported platform for the SAS Web Infrastructure Kit.
- In SAS 9.1.3 Service Pack 2, the SAS Web Infrastructure Kit includes new tools that content administrators can use to delete shared pages and page templates from the metadata repository.
- In SAS 9.1.3 Service Pack 2, the SAS Web Infrastructure Kit includes a new theme called SAS Winter, which administrators can use as a basis for creating new themes. In addition, the style sheets that are included in the themes have been modified.

- In SAS 9.1.3 Service Pack 3 and Service Pack 4, the SAS Web Infrastructure Kit includes modifications to the theme templates and style sheets.

## Publishing Framework

The Publishing Framework includes the following enhancements.

- Publication of packages to a channel supports subscribers who specify the webDAV transport (in addition to queue and e-mail), and a default webDAV server can be specified in the channel definition.
- The Publishing Framework plug-in to SAS Management Console enables channel and subscription information to be administered on a SAS Metadata Server.
- New CALL routines use the new Event Services API to enable the publication of an event, which provides support for dynamic event-driven processes.
- The SAS Package Reader application provides improved viewing of large tables.
- The SAS Subscription Manager application contains the following enhancements.
  - The My Subscriptions and My Groups windows provide pop-up menus that are activated by right-clicking a window item.
  - You can specify name and value exclusion filters in addition to inclusion filters.
  - Name and value pairs are listed in ascending alphabetical order.
  - The application now recognizes the groups to which a subscriber is associated.

## Messaging Interfaces

The Messaging interfaces include the following enhancements.

- The Common Messaging Interface supports the certified message delivery features of the TIBCO Rendezvous software and does not require a field identifier for messages from TIBCO Rendezvous. In addition, the Common Messaging Interface provides support for headers and libraries that are included in TIBCO Rendezvous Version 7.1 for Windows NT, Windows 2000, Windows XP, AIX 5.1, HP Tru64 UNIX, HP-UX 11.0,

Linux, and Solaris 8.

- The WebSphere MQ (formerly named MQSeries) Messaging Interface provides support for the following software versions.
  - IBM WebSphere MQ Version 5.3 under Windows NT, Windows 2000, Windows XP, and z/OS
  - IBM WebSphere MQ Client Version 5.2 under HP-UX 11.0, Solaris 8, and AIX 5.1
  - IBM WebSphere MQ Version 5.2 under Linux.
- Beginning with SAS 9.0 Integration Technologies, the Geneva Message Queuing (GMQ) Interface is not provided.

## Documentation Enhancements

Documentation for administering servers has been moved from the **SAS Integration Technologies Administrator's Guide** to the new **SAS Integration Technologies Server Administrator's Guide**.

For SAS 9.1.3, the following documentation changes have been made:

- The new **SAS Intelligence Platform: Application Server Administration Guide** provides server administration documentation for the SAS Intelligence Platform. To access this document, go to <http://support.sas.com/913administration>.

For customers who are not using the SAS Intelligence Platform, server administration information continues to be available in the **SAS Integration Technologies Server Administrator's Guide**.

- The **SAS Web Infrastructure Kit Administrator's Guide** has been removed. Documentation for administering the SAS Web Infrastructure Kit and the SAS Information Delivery Portal is now located in the new **SAS Intelligence Platform: Web Application Administration Guide**, which can be accessed at <http://support.sas.com/913administration>.

# What's New in the SAS 9.1.3 Intelligence Platform

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## Overview

SAS creates and delivers enterprise intelligence through the SAS Intelligence Platform. The platform provides the end-to-end infrastructure that is necessary for exploring, analyzing, optimizing, reporting, and understanding your data. The SAS Intelligence Platform is comprised of the following software packages: SAS BI Server, SAS Enterprise BI Server, SAS Data Integration Server, SAS Enterprise Data Integration Server, and SAS Intelligence Storage.

For documentation about how to install and administer the SAS Intelligence Platform, see <http://support.sas.com/913administration>. These documents are also available from SAS 9.1.3 OnlineDoc on the Web at <http://support.sas.com/onlinedoc/913/docMainpage.jsp>.

---

## Documentation Enhancements

### Changes to the Administration Documentation Library

The **SAS Intelligence Platform: Administration Guide** has been divided into five documents to address particular audience needs. For example, there are now separate documents for a database administrator and a Web applications administrator.

The **SAS OLAP Server: Administrator's Guide** and **SAS Web Infrastructure Kit: Administrator's Guide** are now fully integrated into the SAS Intelligence Platform library, and no longer exist as separate documents.

### Installation Documentation

- **SAS Intelligence Platform: Pre-installation Checklists** includes updated checklists that you should complete before you install the platform. The checklists are duplicated in the installation guide for your convenience. For this release, enhancements include a new pre-installation checklist for Xythos WebFile Server.
- **SAS Intelligence Platform: Installation Guide** explains step by step how to install and configure the software. This document includes a duplicate set of the pre-

installation checklists. For this release, the troubleshooting chapter was updated and moved to a separate document. Other changes include more instructions for building a depot on a UNIX system and additional information about installing Xythos WebFile Server.

- **SAS Intelligence Platform: Troubleshooting Your Initial Installation** is a new document that explains how to diagnose and fix problems that occur when you first install the platform.

## Administration Documentation

- **SAS Intelligence Platform: System Administration Guide** covers administrative and maintenance tasks that apply to the platform as a whole. It contains new and revised information about starting and stopping servers, checking the status of servers, setting server logging options, administering the SAS Metadata Server and SAS Metadata Repositories, and scheduling SAS jobs.
- **SAS Intelligence Platform: Security Administration Guide** explains the security model for the SAS Intelligence Platform and provides instructions for performing security-related administrative tasks, with an emphasis on suite-wide aspects of the security functionality that SAS provides. This release includes a new chapter on OLAP member-level permissions.
- **SAS Intelligence Platform: Data Administration Guide** covers administrative tasks that are related to data management, including connecting to data sources, managing libraries, optimizing data storage, and managing OLAP cube data.
- **SAS Intelligence Platform: Application Server Administration Guide** covers administrative tasks that are related to the SAS Application Server, a logical entity that can include a SAS Workspace Server, a SAS Stored Process Server, a SAS OLAP Server, and a SAS/CONNECT Server. This document also contains administrative tasks for batch servers and grid servers.
- **SAS Intelligence Platform: Desktop Application Administration Guide** covers administrative tasks related to SAS desktop applications such as SAS Data Integration Studio, SAS Enterprise Guide, SAS Information Map Studio, SAS Management Console, and others.
- **SAS Intelligence Platform: Web Application Administration Guide** explains how to administer the SAS Web applications that run in the middle tier of the platform, including the SAS Information Delivery Portal, SAS Web Report Studio, and SAS Web OLAP Viewer for Java.

# What's New in Application Server Administration for the SAS 9.1.3 Intelligence Platform

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## Overview

The **SAS Intelligence Platform: Application Server Administration Guide** explains how to administer a SAS Application Server. It contains information that was previously in these documents:

- **SAS Intelligence Platform: Administration Guide**
- **SAS Integration Technologies: Server Administrator's Guide**
- **SAS OLAP Server: Administrator's Guide**

This document also contains new material.

---

## Documentation Enhancements

This document now includes the following:

- It integrates information about SAS Application Servers, SAS Workspace Servers, and SAS Stored Process Servers that was in the **SAS Intelligence Platform: Administration Guide** and in the **SAS Integration Technologies: Server Administrator's Guide**.
- It includes information about administering a SAS OLAP Server that was previously in the **SAS OLAP Server: Administrator's Guide**.
- It includes information about grid computing from the **SAS Intelligence Platform: Administration Guide**.

This document also contains new material on the following subjects:

- processing remote data and moving data between machines using the SAS/CONNECT Server
- defining jobs to be run in batch mode using the SAS batch servers



- specifying in a SAS Grid Server the command to be run on the machines in a computing grid

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# What's New in Data Administration for the SAS 9.1.3 Intelligence Platform

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## Overview

The **SAS Intelligence Platform: Data Administration Guide** focuses on the SAS Intelligence Platform and third-party products that you need to install and the metadata objects that you need to create in order to establish connectivity to your data sources (and data targets). It also deals with topics such as setting up shared access to SAS data and explains how using different data-access engines affects security.

---

## Documentation Enhancements

This document contains information that was previously in the **SAS Intelligence Platform: Administration Guide**. Among the enhancements is new information about the following:

- establishing connectivity to XML data
- managing OLAP cube data
- using grid computing to optimize data storage

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# What's New in Desktop Application Administration for the SAS 9.1.3 Intelligence Platform

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## Overview

The desktop applications of the SAS Intelligence Platform provide a comprehensive suite of knowledge generation and reporting capabilities in a series of graphical interfaces. The new administrator's guide, **SAS Intelligence Platform: Desktop Application Administration Guide**, shows you how to configure and manage the desktop application across your enterprise.

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## Documentation Enhancements

The **SAS Intelligence Platform: Desktop Application Administration Guide** addresses all of the administrative tasks for the following desktop applications:

- SAS Add-In for Microsoft Office
- SAS Data Integration Studio
- SAS Enterprise Guide
- SAS Enterprise Miner
- SAS Information Map Studio
- SAS Management Console
- SAS OLAP Cube Studio

For some of the desktop applications, the information in the new document complements existing information in other documents. For example, it documents administrative tasks for SAS Enterprise Guide that are specific to the SAS Intelligence Platform. Other administrative tasks are documented in **Administering SAS Enterprise Guide**.

Most of the content in the new document was formerly part of the **SAS Intelligence Platform: Administration Guide**. For information about the administrative documentation

for the SAS Intelligence Platform, see <http://support.sas.com/documentation/configuration/913admin.html>.

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# What's New in Installation for the SAS 9.1.3 Intelligence Platform

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## Overview

The **SAS Intelligence Platform: Installation Guide** explains how to install and configure the SAS Intelligence Platform. This information covers the following software packages:

- SAS Data Integration Server
- SAS Enterprise Data Integration Server
- SAS BI Server
- SAS Enterprise BI Server
- SAS Intelligence Storage

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## Documentation Enhancements

This document has the following enhancements:

- These chapters have been reordered to reflect the order in which the tasks are actually performed at most sites:
  - "Setting Up Required Users and Groups and Allocating Ports"
  - "Locating Your Software Order E-mail, SID Files, and Deployment Plan"
  - "Building a SAS Software Depot"
- The chapter "Building a SAS Software Depot" contains more detailed information about how to build a depot on a UNIX system.
- The chapter "Installing Third-Party Products" and the chapter "Installing and Configuring Your SAS Software" include updated information about installing Xythos

WebFile Server for use as a WebDAV server.

- New configuration instructions in the chapter "Installing and Configuring Your SAS Software" explain how to handle a situation where different SAS servers use different authentication providers.
- The appendix "Uninstalling the SAS Intelligence Platform" explains how to remove the platform from the machines in your system.

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# What's New in the Pre-installation Checklists for the SAS 9.1.3 Intelligence Platform

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## Overview

**SAS Intelligence Platform: Pre-installation Checklists** is a companion to the **SAS Intelligence Platform: Installation Guide**. The installation guide leads you step by step through the installation of the SAS Intelligence Platform and, in the course of doing so, has you complete a number of pre-installation checklists. In these checklists, you record information such as the credentials for special SAS users and the installation locations of third-party products.

This document contains only the checklists, not the explanations of how to complete the checklists. It is intended for users who have installed the platform before and no longer need the explanatory material.

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## Documentation Enhancements

The following changes and enhancements have been made to the pre-installation checklists:

- The Xythos WebFile Server topic contains a new checklist in which you should record the information that the SAS Configuration Wizard will need when it configures Xythos WebFile Server.
- Information has been added about TCP/IP ports required by the products in the Platform Suite for SAS and the SAS OS Scheduler. You must allocate ports for these products during pre-installation.

# What's New in Security Administration for the SAS 9.1.3 Intelligence Platform

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## Overview

Changes to security aspects of the SAS Intelligence Platform in Service Pack 4 include a new access requirement, a BI row-level permissions feature, and expanded support for Web authentication.

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## New Access Requirement: The Read Permission for Information Maps

A new access requirement affects users who view reports that are based on information maps (or otherwise interact with information maps). In order to access data through an information map, users must have the Read permission for that information map. In the interest of greater security, the Read permission is not granted to anyone in the initial configuration. Therefore, before users can perform actions such as generating reports that are based on information maps, you must grant Read access using a strategy that is appropriate for your site. This is a new requirement with SAS Web Report Studio 3.1, SAS Information Map Studio 3.1, and Service Pack 4.

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## BI Row-Level Permissions

BI row-level permissions is a new feature that enables you to define fine-grained access controls for relational data and SAS data sets when the data is accessed through information maps. This feature requires Service Pack 4 and SAS Information Map Studio 3.1.

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## Expanded Support for Web Authentication

Web authentication support has been expanded to include the SAS Web OLAP Viewer for Java. This enables you to authenticate users of this application using the Web server's authentication provider (rather than the metadata server's authentication provider). This is an enhanced feature that requires SAS Web OLAP Viewer 3.1.

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## Documentation Enhancements

The following changes have been made in the second edition of this document:

- The instructions for directly using an alternate authentication provider have been revised. See [Using LDAP or Active Directory](#).
- A chapter on OLAP member-level permissions has been added. See [OLAP Member-Level Permissions](#).

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# What's New in System Administration for the SAS 9.1.3 Intelligence Platform

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## Overview

SAS creates and delivers enterprise intelligence through the SAS Intelligence Platform, which provides the end-to-end infrastructure that is necessary for exploring, analyzing, optimizing, reporting, and understanding your data.

The **SAS Intelligence Platform: System Administration Guide** is a new document that covers administrative tasks that you need to perform on an ongoing basis after the initial installation and configuration of the SAS Intelligence Platform. The document covers tasks that apply to the SAS Intelligence Platform as a whole. It is one of several new documents that are being published to replace the **SAS Intelligence Platform: Administration Guide**.

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## Documentation Enhancements

This document contains the following new information:

- a summary of system administration tasks
- instructions for starting and stopping servers and for checking the status of servers
- instructions for setting up and using an operating system scheduling server
- instructions for setting logging options for SAS servers
- reference information about the location of configuration files and log files

This document contains the following enhancements:

- The information about performing SAS Metadata Server backups has been reorganized and enhanced.
- The documentation about scheduling has been reorganized and enhanced.

This document contains the following information that was previously in the **SAS Intelligence Platform: Administration Guide**:

- a description of the default system configuration that is put in place by the SAS Configuration Wizard
- administrative tasks for SAS Metadata Servers and SAS Metadata Repositories
- instructions for setting up scheduling for jobs and reports
- reference information regarding initial users, ports, and the structure and content of configuration directories

This document also contains information about starting and monitoring SAS OLAP Servers that was previously in the **SAS OLAP Server: Administrator's Guide**.

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# What's New in Troubleshooting Your Initial Installation for the SAS 9.1.3 Intelligence Platform

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## Overview

The **SAS Intelligence Platform: Installation Guide** led you through the installation and initial configuration of your SAS Intelligence Platform system. The current document, **SAS Intelligence Platform: Troubleshooting Your Initial Installation**, is intended as a troubleshooting resource if you have any problems with your initial installation. For additional help, see <http://support.sas.com/techsup/intro.html>.

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## Documentation Enhancements

This document contains troubleshooting content that was previously in the **SAS Intelligence Platform: Installation Guide**.

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## What's New in Web Application Administration for the SAS 9.1.3 Intelligence Platform

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### Overview

The SAS Intelligence Platform has expanded its support for the IBM WebSphere Application Server.

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### Support for IBM WebSphere Application Server 6.1

In addition to supporting IBM WebSphere Application Server 5.1 and 6.0.2, the SAS Intelligence Platform now supports Version 6.1 of the application server. The **SAS Intelligence Platform: Web Application Administration Guide** includes information about tuning WebSphere 6.1.

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## What's New in SAS Inventory Optimization 1.3

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### Overview

The SAS Inventory Replenishment Planning product has a new name, SAS Inventory Optimization. SAS Inventory Optimization also has a new version numbering scheme. SAS Inventory Optimization 1.3 provides more features and greater functionality than SAS Inventory Replenishment Planning 1.2 and SAS 9.1.2 Inventory Replenishment Planning.

SAS Inventory Optimization enables you to calculate periodic-review inventory replenishment policies using information about demand, lead time, costs, and desired service measures.

SAS Inventory Replenishment Planning 9.1.2 included the experimental MIRP procedure for calculating inventory control parameters in multiechelon supply chains. The MIRP procedure is designed to help users better understand how network topologies, cost structures, and service level requirements, among other factors, impact the inventory investment and allocation across a supply chain.

SAS Inventory Replenishment Planning 1.2 included

- new options for the IRP procedure to give the user more control over calculating policies
- improvements in the IRP algorithms
- production-level MIRP procedure, which replaces the experimental MIRP procedure
- the new SAS Inventory Policy Studio solution, which provides a user-friendly interface to the IRP procedure

SAS Inventory Optimization 1.3 includes

- new features in the MIRP procedure
- the production-level version of SAS Inventory Policy Studio, which provides a user-friendly interface to the IRP procedure

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### PROC IRP

## What's New in SAS Inventory Optimization 1.3

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### Overview

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### PROC IRP

PROC IRP can calculate four types of replenishment policies. These policies are determined through a number of algorithms that are controlled by user-specified options. PROC IRP can accommodate both single-location and two-echelon distribution inventory systems.

The input data set to PROC IRP specifies information about lead time, demand, and costs, as well as options to control the policy. The output data set produced by PROC IRP gives the policy parameters for each item. In addition, estimates of measures such as fill rate, ready rate, and average inventory, among others, are included in the output data set.

With SAS Inventory Replenishment Planning 1.2 and SAS Inventory Optimization 1.3, PROC IRP includes new and improved algorithms. In addition, new options give the user more control over optimization of policies:

- ALGORITHM= option
- QGRID= option
- DIST= option

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## PROC MIRP

SAS Inventory Replenishment Planning 1.2 and higher includes the production-level MIRP procedure. PROC MIRP can calculate inventory control parameters for all stock-keeping locations in general supply chain networks, which may consist of any combination of serial, assembly, and distribution subnetworks. These parameters ensure that service requirements are satisfied at minimum inventory cost for every supply chain. PROC MIRP gives users flexibility in modeling their supply chain networks. These functionalities include:

- two replenishment policies: base-stock policy and min-max policy
- four service-level measures: ready rate, fill rate, backorder ratio, and waiting time probability
- order constraints: minimum size, maximum size, and fixed lot size
- multiple-period replenishment planning
- backlog and lost sales options
- intermittent demand

The input data sets to PROC MIRP specify information about lead times, holding costs, service levels, and demand of stock-keeping location in the networks, as well as information about the structure of the networks. The output data set produced by PROC MIRP gives the inventory control parameters, along with estimates of measures such as order quantities, backlogs, and service levels, for each stock-keeping location and each period in a planning horizon. PROC MIRP can also be used to evaluate the performance of users' own inventory



policies.

In SAS Inventory Optimization 1.3, PROC MIRP includes support for random lead time. This new functionality enables users to capture uncertainties in lead times between locations within a supply chain network, and from external suppliers to any locations in the network. Users specify the minimum, average, and maximum values for lead times. PROC MIRP uses these values in a triangular distribution to model the lead time uncertainty.

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## SAS Inventory Policy Studio

SAS Inventory Optimization 1.2 included a preproduction version of SAS Inventory Policy Studio. SAS Inventory Optimization 1.3 includes production-level SAS Inventory Policy Studio, a graphical user interface designed to support the use of PROC IRP for users new to SAS or unfamiliar with the SAS language. In addition to supporting the optimization of inventory policies, Inventory Policy Studio

- facilitates the creation and management of projects, enabling users to plan inventory policies for specific categories of products
- enables users to create "what if" scenarios using different parameters or forecasts, and determine the impact on policies, customer service levels, and costs
- provides a graphical sensitivity analysis to assist users in quickly gauging the impact that changes in specific parameters will have on policies, customer service levels, and costs
- provides reporting capabilities
- provides the SAS Inventory Optimization Script Runner, which enables users to write and run or schedule batch scripts for certain SAS Inventory Policy Studio tasks

After creating scenarios, and calculating, evaluating, and promoting policies, the user can export the project table for use in other operational systems.

SAS Inventory Policy Studio does not support all of the capabilities of PROC IRP. For example, SAS Inventory Policy Studio

- does not support the use of backorder penalty costs as input to policy calculations
- does not support policy calculation for two-echelon systems

For information about SAS Inventory Policy Studio, see the *SAS Inventory Optimization 1.3: Inventory Policy Studio User's Guide*.

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# What's New in SAS/IntrNet 9.0 and 9.1

## Application Dispatcher

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### Overview

Application Dispatcher provides Application Broker and Load Manager enhancements, additional server encodings for z/OS, a new logging feature, new options for the PROC APPSRV statement, file upload capability, and enhanced documentation.

### Note:

- This section describes the features of SAS/IntrNet: Application Dispatcher that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/IntrNet 9.1: Application Dispatcher is supported in both the OS/390 and z/OS operating environments and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

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### Details

SAS/IntrNet: Application Dispatcher includes the following enhancements:

- The [Application Dispatcher samples](#) are now part of the samples database.
- You can now use Application Dispatcher to upload one or more files to your Application Server.
- The Application Broker default welcome page can be replaced by a customized welcome page.
- SAS Enterprise Guide 3.0 includes experimental support for building SAS/IntrNet: Application Dispatcher applications. You can use SAS Enterprise Guide to generate or modify SAS programs and to generate input HTML forms for your SAS/IntrNet applications. See the Working with SAS/IntrNet Applications section in the SAS Enterprise Guide product Help for more information.
- The `_NOLOG_` feature enables you to create special macro symbols that can be sent to the Application Server without publishing the macro values in the APPSRV log.
- SAS/IntrNet: Application Dispatcher now supports the following additional parameters for starting the Load Manager:

`-maxreq=minutes`

specifies the maximum time it should take for the Application Server to send a BUSY state after the Application Server is allocated to the Application Broker.

`-maxrun=minutes`

specifies the expected maximum job run-time in minutes before an Application Server is declared as hung.

`-maxstart=minutes`

specifies the maximum time that it should take an Application Server to start.

`-nokill`

specifies not to kill a pool server that is marked as hung.

`-workdir=directory`

enables you to specify the current working directory as a start parameter for the Load Manager.

- You can obtain an Application Server activity report by using the Application Broker and running the LOADCURRENT program.
- The documentation now includes a sample Web application that demonstrates some of the features of Application Dispatcher sessions. The sample application is an online library. Users can login, select one or more items to check out of the library, and request by e-mail that the selected items be delivered. The sample code shows how to create a session and then create, modify, and view macro variables and data sets in that session.
- Two additional versions of the Application Broker have been developed for heavily loaded systems where performance is critical. The two new modules are `broker.dll` (ISAPI Windows) and `broker.so` (GWAPI z/OS).
- For z/OS, the SAS®9 Application Broker requires that the IBM Web maintenance patch, PQ47248, be installed if you intend to use a Web server codepage (FSCP) other than `ibm-1047`.
- SAS/IntrNet: Application Broker on z/OS now supports Windows server encodings in addition to the previously supported ISO-8859 encodings. New encodings include
  - `wlatin1` (Western Europe): This value is the default in all cases except when the Web server is using IBM-870 or IBM-1025 encoding.
  - `wlatin2` (Eastern Europe): This value is the default when the Web server is using IBM-870 encoding.
  - `wcyrillic` (Cyrillic): This value is the default when the Web server is using IBM-1025 encoding.

The z/OS Application Broker also supports a new ISO-8859 encoding:

- ISO-8859-15 (Latin9): This encoding is recommended only if your Web server and SAS System are using any of the IBM-114x encodings.

SAS/IntrNet: Application Broker on z/OS now supports the following additional Web server fscp encodings:

- EBCDIC1140 (North America)
  - EBCDIC1141 (Austria/Germany)
  - EBCDIC1142 (Denmark/Norway)
  - EBCDIC1143 (Finland/Sweden)
  - EBCDIC1144 (Italy)
  - EBCDIC1145 (Spain)
  - EBCDIC1146 (United Kingdom)
  - EBCDIC1147 (France)
  - EBCDIC1148 (International)
- The `_DEBUG` option now supports a list of case-insensitive keywords that can be entered to indicate which debug values to enable.
  - The `ConnectionError` directive enables users to specify the message to be displayed when there is an Application Server connection error.
  - The `SHAREPOLL=` and `NOSHAREPOLL` options enable the `PROC APPSRV` statement to control the period of SAS/SHARE libref polling and to disable polling of the SAS/SHARE server librefs, respectively.
  - Load Manager log filename directives have been added to enable the rollover of Load Manager log files. Special codes inserted into the log filename specify the format and frequency for creating log files.
  - Documentation for the `BrokerPassword` directive was added. The directive enables users to specify a password in order to protect the Application Broker administration interface.

# What's New in SAS/IntrNet 9.0 and 9.1 htmSQL

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## Overview

htmSQL for SAS/IntrNet 9.0 and 9.1 includes a new administration option and more flexibility for coding directives.

### Note:

This section describes the features of SAS/IntrNet: htmSQL that are new or enhanced since SAS 8.2.

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## Details

- The new `SET` configuration option enables administrators to set default values for name and value pairs.
- Parameter values for htmSQL directives can now be delimited with either double or single quotation marks.

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## What's New in SAS Management Console 9.1.2 and 9.1.3

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### Overview

SAS Management Console is a Java application that provides a single point of control for managing resources that are used throughout the SAS Intelligence Platform. Instead of using a separate administrative interface for each application in your computing environment, you can use the single interface in SAS Management Console to perform the administrative tasks that are required for creating and maintaining an integrated environment across multiple platforms. SAS Management Console enables you to manage the following resources:

- server definitions
- library definitions
- user definitions
- resource access controls
- metadata repositories
- SAS licenses
- job schedules
- XML maps

SAS Management Console works by creating and maintaining metadata definitions for each computing resource or control. These metadata definitions are stored in a repository on a SAS Metadata Server, which makes them available for use by other applications. For more information, see the **SAS 9.1.3 Management Console: User's Guide**.

The 9.1.3 release of SAS Management Console provides support for the SAS Scalable Performance Data (SPD) Server, enables you to import data tables into a library, places new libraries and imported tables into folders, enables you to schedule flows using operating system scheduling servers, provides support for grid computing, updates resource templates, and changes the source for metadata import and export bridges.

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## General Enhancements

SAS Management Console now contains the following enhancements:

- Support is added for the SAS Scalable Performance Data Server by enabling you to define SAS SPD Server libraries, servers, and schemas. You must run the Upgrade Metadata function to add support for the SAS SPD Server.
- You can import data tables to SAS Management Console libraries by using the Import Tables wizard. The wizard lets you register existing SAS data sets in the metadata repository.
- When you create a new library, it is now automatically placed in a folder with the same name as the library. Imported data tables are stored in the folder for the library to which they were imported.
- Resource templates for server, library, and schema definitions have been changed. Use the Upgrade Metadata function to apply the new resource templates to your metadata server. If you are upgrading a metadata server from SAS 9.1 to SAS 9.1.3, the resource template changes in SAS 9.1.2 are applied before the SAS 9.1.3 changes are applied.
- Flows can be scheduled using operating system scheduling services. You define an operating system scheduling server in SAS Management Console, then use the Schedule Manager plug-in to submit flows to the server. The server uses operating system commands to schedule and run the flows.
- Support is added for a grid computing configuration. Resource templates have been added for the SAS Grid Server and the Grid Monitoring Server to enable you to create a grid computing environment. A resource template has been added for the Process Manager server, which is used to schedule jobs in a grid computing environment. The SAS Grid Manager plug-in has been added to enable you to monitor the performance of a grid and to cancel jobs.
- Metadata bridges, which are used when importing or exporting metadata, are now obtained from your SAS Account Executive or from [support.sas.com](http://support.sas.com). Metadata bridges provide the ability to import from or export to a variety of metadata formats.



# What's New in SAS 9.0 and 9.1 National Language Support (NLS)

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## Overview

- All information that is related to NLS has been consolidated into a single document for your convenience.
- The LOCALE= option supports a new set of locale values in the form of Portable Operating System Interface (POSIX) names.
- The LOCALE= option supports new values that identify unique language and country combinations.
- The LIBNAME statement for Base SAS supports three new options for NLS: CVPBYTES=, CVPENGINE=, and CVPMULTIPLIER=.
- The LIBNAME statement for the XML engine supports three new options for NLS: ODSCHARSET=, ODSTRANTAB=, and XMLENCODING=.
- The LIBNAME statement in SAS/SHARE supports the RENCODING= option for NLS.
- Numerous NLS formats, informats, and functions are new. These new language elements are in the following categories: Bi-directional text handling, Date/Time, Monetary, and Unicode.

**Note:** z/OS is the successor to the OS/390 operating system. SAS 9.1 is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated. ■

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## Details

### New Document Consolidates Information about NLS

SAS 9.1 introduces the **SAS National Language Support (NLS): User's Guide**, which consolidates all information about NLS that was previously contained in multiple SAS

documents. The **SAS National Language Support (NLS): User's Guide** provides comprehensive conceptual information and detailed syntax for all SAS language elements that contain NLS properties.

## Expanded Values for the **LOCALE=** System Option

- Locale can be specified by using Portable Operating System Interface (POSIX) naming standards. For example, the `en_US` value is the POSIX equivalent for the SAS value `English_UnitedStates`.
- Previous releases of SAS software specified some **LOCALE=** values in the form of *language*. The **LOCALE=** option supports new values that identify unique language and country combinations that are specified in the form *language\_country*. Some single **LOCALE=** values have been replaced by more granular values. Some new values have been added, and some values have been deleted. Here is a summary of the changes to **LOCALE=** values:

### Arabic

The single **LOCALE=** value for Arabic has been deleted. The following new values have been added: `Arabic_Algeria`, `Arabic_Bahrain`, `Arabic_Egypt`, `Arabic_Jordan`, `Arabic_Kuwait`, `Arabic_Lebanon`, `Arabic_Morocco`, `Arabic_Oman`, `Arabic_Qatar`, `Arabic_SaudiArabia`, `Arabic_Tunisia`, and `Arabic_UnitedArabEmirates`.

### Chinese

The single **LOCALE=** value for Chinese has been deleted. The values `Chinese_Simplified` and `Chinese_Traditional` have also been deleted.

### Dutch

The single **LOCALE=** value for Dutch has been deleted. The following new values have been added: `Dutch_Belgium` and `Dutch_Netherlands`.

### English

The single **LOCALE=** value for English has been deleted. The following new values have been added: `English_HongKong`, `English_India`, and `English_Singapore`. The `English_Britain` value has been changed to

English\_UnitedKingdom.

Estonian\_Estonia

The LOCALE= value for Estonian\_Estonia is new.

French

The single LOCALE= value for French has been deleted. A new value, French\_Luxembourg, has been added.

German

The single LOCALE= value for German has been deleted. The following new values have been added: German\_Liechtenstein and German\_Luxembourg.

Spanish

The LOCALE= values for Spain and Spanish\_LatinAmerica have been deleted. The single LOCALE= value for Spanish\_LatinAmerica has been replaced by the following new values: Spanish\_Argentina, Spanish\_Bolivia, Spanish\_Chile, Spanish\_Columbia, Spanish\_CostaRica, Spanish\_DominicanRepublic, Spanish\_Ecuador, Spanish\_ElSalvador, Spanish\_Guatemala, Spanish\_Honduras, Spanish\_Mexico, Spanish\_Nicaragua, Spanish\_Panama, Spanish\_Paraguay, Spanish\_Peru, Spanish\_PuertoRico, Spanish\_UnitedStates, Spanish\_Uruguay, and Spanish\_Venezuela.

For a comprehensive list, see Values for the LOCALE= System Option.

## **New Options in LIBNAME Statements for NLS**

- The LIBNAME statement in Base SAS supports the following new options for NLS:

CVPBYTES=, CVPENGINE=, and CVPMULTIPLIER= Options

specify the attributes for character variables that are needed in order to process (or transcode) a SAS file.

- The LIBNAME statement for the XML engine supports the following new options for NLS:

## ODSCHARSET= Option

specifies the character set to be generated in the META declaration for the output.

## ODSTRANTAB = Option

specifies the translation table to use when transcoding an XML document for an output file.

## XMLENCODING= Option

specifies the encoding to use when reading, writing, copying, or saving an external file.

- The LIBNAME statement in SAS/SHARE supports the following new option for NLS:

## RENCODING= Option

specifies that the ASCII-based or EBCDIC-based encoding be used when transcoding data for a SAS/SHARE server session that is using an ASCIIANY or an EBCDICANY session encoding.

## Formats for NLS

The following formats for NLS are new:

### \$CPTDWw. Format

writes a character string in Hebrew text that is encoded in IBM-PC (cp862) to Windows Hebrew encoding (cp1255).

### \$CPTWDw. Format

writes a character string that is encoded in Windows (cp1255) to Hebrew DOS (cp862) encoding.

### HDATE w. Format

writes date values in the form *yyyy mmmmm dd* where *yyyy* is the year, *mmmmm* represents the month's name in Hebrew, and *dd* is the day of month.

#### HEBDATE *w*. Format

writes date values according to the Jewish calendar.

#### \$LOGVS *w*. Format

writes a character string that is in left-to-right logical order to visual order.

#### \$LOGVSR *w*. Format

writes a character string that is in right-to-left logical order to visual order.

#### NLDATE *w*. Format

converts a SAS date value to the date value of the specified locale, and then writes the value in the format of the date value.

#### NLDATEMN *w*. Format

converts a SAS date value to the date value of the specified locale, and then writes the date value in the format of the name of the month.

#### NLDATEW *w*. Format

converts a SAS date value to the date value of the specified locale, and then writes the date value in the format of the date and the day of the week.

#### NLDATEWN *w*. Format

converts the SAS date value to the date value of the specified locale, and then writes the date value in the format of the name of the day of the week.

#### NLDATM *w*. Format

converts a SAS datetime value to the datetime value of the specified locale, and then writes the value in the format of the datetime.

### NLDATMAP*w*. Format

converts a SAS datetime value to the datetime value of the specified locale, and then writes the value in the format of the datetime with a.m. or p.m.

### NLDATMTM*w*. Format

converts the time portion of a SAS datetime value to the time-of-day value of the specified locale, and then writes the value in the format of the time of the day.

### NLDATMW*w*. Format

converts a SAS date value to a datetime value of the specified locale, and then writes the value in the format of day of the week and the datetime.

### NLMNY*w.d* Format

writes the monetary format of the local expression in the specified locale using local currency.

### NLMNYI*w.d* Format

writes the monetary format of the international expression in the specified locale.

### NLNUM*w.d* Format

writes the numeric format of the local expression in the specified locale.

### NLNUMI*w.d* Format

writes the numeric format of the international expression in the specified locale.

### NLPCT*w.d* Format

writes percentage data of the local expression in the specified locale.

### NLPCTI*w.d* Format

writes percentage data of the international expression in the specified locale.

## NLTIMAP $w$ . Format

converts a SAS time value to the time value of a specified locale, and then writes the value in the format of the time with a.m. or p.m.

## NLTIME $w$ . Format

converts a SAS time value to the time value of the specified locale, and then writes the value in the format of the time.

## \$UCS2B $w$ . Format

writes a character string in big-endian, 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding.

## \$UCS2BE $w$ . Format

writes a big-endian, 16-bit, universal character set code in 2 octets (UCS2), character string in the encoding of the current SAS session.

## \$UCS2L $w$ . Format

writes data in little-endian, 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding.

## \$UCS2LE $w$ . Format

writes a character string that is encoded in little-endian, 16-bit, universal character set code in 2 octets (UCS2), in the encoding of the current SAS session.

## \$UCS2X $w$ . Format

writes a character string in native-endian, 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding.

## \$UCS2XE $w$ . Format

writes a native-endian, universal character set code in 2 octets (UCS2), character string in the encoding of the current SAS session.

### **\$UCS4Bw. Format**

writes a character string in big-endian, 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding.

### **\$UCS4BEw. Format**

writes a big-endian, 32-bit, universal character set code in 4 octets (UCS4), character string in the encoding of the current SAS session.

### **\$UCS4Lw. Format**

writes a character string in little-endian, 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding.

### **\$UCS4LEw. Format**

writes a little-endian, 32-bit, universal character set code in 4 octets (UCS4), character string in the encoding of the current SAS session.

### **\$UCS4Xw. Format**

writes a character string in native-endian, 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding.

### **\$UCS4XEw. Format**

writes a native-endian, 32-bit, universal character set code in 4 octets (UCS4), character string in the encoding of the current SAS session.

### **\$UESCw. Format**

writes a character string that is encoded in the current SAS session in Unicode escape (UESC) representation.

### **\$UESCEw. Format**

writes a Unicode escape (UESC) representation character string in the encoding of the current SAS session.



### \$UNCR $w$ . Format

writes a character string that is encoded in the current SAS session in numeric character representation (NCR).

### \$UNCRE $w$ . Format

writes the numeric character representation (NCR) character string in the encoding of the current SAS session.

### \$UPAREN $w$ . Format

writes a character string that is encoded in the current SAS session in Unicode parenthesis (UPAREN) representation.

### \$UPARENE $w$ . Format

writes a Unicode parenthesis (UPAREN) character string in the encoding of the current SAS session.

### \$UTF8X $w$ . Format

writes a character string in universal transformation format (UTF-8) encoding.

### \$VSLOG $w$ . Format

writes a character string that is in visual order to left-to-right logical order.

### \$VSLOGR $w$ . Format

writes a character string that is in visual order to right-to-left logical order.

### WEEKU $w$ . Format

writes a week number in decimal format by using the U algorithm.

### WEEKV $w$ . Format

writes a week number in decimal format by using the V algorithm.

## WEEKWw. Format

writes a week number in decimal format by using the W algorithm.

## Informats for NLS

The following informats for NLS are new:

### \$CPTDWw. Informat

reads a character string that is encoded in Hebrew DOS (cp862) and then converts the character string to Windows (cp1255) encoding.

### \$CPTWDw. Informat

reads a character string that is encoded in Windows (cp1255) and then converts the character string to Hebrew DOS (cp862) encoding.

### \$LOGVS $w$ . Informat

reads a character string that is in left-to-right logical order and then converts the character string to visual order.

### \$LOGVSR $w$ . Informat

reads a character string that is in right-to-left logical order and then converts the character string to visual order.

### NLMNY $w.d$ Informat

reads monetary data in the specified locale for the local expression, and then converts the data to a numeric value.

### NLMNYI $w.d$ Informat

reads monetary data in the specified locale for the international expression, and then converts the data to a numeric value.

### NLNUM $w.d$ Informat

reads numeric data in the specified locale for local expressions, and then converts the data to a numeric value.

#### NLNUMI*w.d* Informat

reads numeric data in the specified locale for international expressions, and then converts the data to a numeric value.

#### NLPCT*w.d* Informat

reads percentage data in the specified locale for local expressions, and then converts the data to a numeric value.

#### NLPCTI*w.d* Informat

reads percentage data in the specified locale for international expressions, and then converts the data to a numeric value.

#### \$UCS2B*w.* Informat

reads a character string that is encoded in big-endian, 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding, and then converts the character string to the encoding of the current SAS session.

#### \$UCS2BE*w.* Informat

reads a character string that is in the encoding of the current SAS session and then converts the character string to big-endian, 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding.

#### \$UCS2L*w.* Informat

reads a character string that is encoded in little-endian, 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding, and then converts the character string to the encoding of the current SAS session.

#### \$UCS2LE*w.* Informat

reads a character string that is in the encoding of the current SAS session and then converts the character string to little-endian, 16-bit, universal character set

code in 2 octets (UCS2), Unicode encoding.

#### \$UCS2Xw. Informat

reads a character string that is encoded in 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding, and then converts the character string to the encoding of the current SAS session.

#### \$UCS2XEw. Informat

reads a character string that is in the encoding of the current SAS session and then converts the character string to 16-bit, universal character set code in 2 octets (UCS2), Unicode encoding.

#### \$UCS4Bw. Informat

reads a character string that is encoded in big-endian, 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding, and then converts the character string to the encoding of the current SAS session.

#### \$UCS4Lw. Informat

reads a character string that is encoded in little-endian, 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding, and then converts the character string to the encoding of the current SAS session.

#### \$UCS4Xw. Informat

reads a character string that is encoded in 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding, and then converts the character string to the encoding of the current SAS session.

#### \$UCS4XEw. Informat

reads a character string that is in the encoding of the current SAS session and then converts the character string to 32-bit, universal character set code in 4 octets (UCS4), Unicode encoding.

#### \$UESCw. Informat

reads a character string that is encoded in Unicode escape (UESC)

representation, and then converts the character string to the encoding of the current SAS session.

#### `$UESCEw. Informat`

reads a character string that is encoded in the current SAS session, and then converts the character string to Unicode escape (UESC) representation.

#### `$UNCRw. Informat`

reads the numeric character representation (NCR) character string, and then converts the character string to the encoding of the current SAS session.

#### `$UNCREw. Informat`

reads a character string in the encoding of the current SAS session, and then converts the character string to session-encoded numeric character representation (NCR).

#### `$UPARENw. Informat`

reads a character string that is encoded in Unicode parenthesis (UPAREN) representation, and then converts the character string to the encoding of the current SAS session.

#### `$UPARENEw. Informat`

reads a character string that is encoded in the current SAS session, and then converts the character string to the encoding of the Unicode parenthesis (UPAREN) representation.

#### `$UPARENPW. Informat`

reads a character string that is encoded in Unicode parenthesis (UPAREN) representation, and then converts the character string to the encoding of the current SAS session with national characters remaining in the encoding of the UPAREN representation.

#### `$UTF8Xw. Informat`

reads a character string that is encoded in Unicode transformation format (UTF-

8), and then converts the character string to the encoding of the current SAS session.

**\$VSLOG***w*. Informat

reads a character string that is in visual order and then converts the character string to left-to-right logical order.

**\$VSLOGR***w*. Informat

reads a character string that is in visual order and then converts the character string to right-to-left logical order.

**WEEKU***w*. Informat

reads the format of the number-of-week value within the year and returns a SAS date value by using the U algorithm.

**WEEKV***w*. Informat

reads the format of the number-of-week value within the year and returns a SAS date value using the V algorithm.

**WEEKW***w*. Informat

reads the format of the number-of-week value within the year and returns a SAS date value using the W algorithm.

## **Functions for NLS**

The following functions for NLS are new:

#### NLDATE Function

converts the SAS date value to the date value of the specified locale by using the date-format modifiers.

#### NLDATM Function

converts the SAS datetime values to the time value of the specified locale using the datetime-format modifiers.

#### NLTIME Function

converts the SAS time or datetime value to the time value of the specified locale using the time-format modifiers.

#### TRANTAB Function

transcodes a data string by using a translation table.

#### VARTRANSCODE Function

returns the transcode attribute of a SAS data set variable.

#### VTRANSCODE Function

returns a value that indicates whether transcoding is enabled for the specified character variable.

#### VTRANSCODEX Function

returns a value that indicates whether transcoding is enabled for the specified argument.

#### WEEK Function

returns the week-number value.





## What's New in the SAS OLAP Server 9.1 and 9.1.3

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### Overview

The SAS OLAP Server software enables users to develop and deploy scalable Online Analytical Processing (OLAP) applications. In addition, automated data loading and cube building are available through a new application called SAS OLAP Cube Studio, which was developed using Java technology.

OLAP queries are performed using the Multidimensional Expressions (MDX) query language in client applications that are connected to the SAS OLAP Server by using the following:

- the SQL Pass-Through Facility for OLAP, which is designed to process MDX queries within the PROC SQL environment
- open access technologies such as OLE DB for OLAP, ADO MD, and Java

The SAS OLAP Server software has the following new and enhanced features:

- new tools for data loading and cube building
- new options added to the PROC OLAP statement
- new functions
- new tuning capabilities for the query thread pool
- new tuning options window
- improved performance
- improved querying capability
- improved aggregation tuning
- additional enhancements

**Note:** This section describes the features of the SAS OLAP Server that are new or enhanced since SAS 8.2. ■

---

## New Tools for Data Loading and Cube Building

The OLAP procedure, in addition to cube building, includes options for handling ragged hierarchies, defining global calculated members and named sets, assigning properties to levels, and optimizing cube creation and query performance. It also supports multiple hierarchies and drill-through tables.

SAS OLAP Cube Studio is an alternative Java interface to the OLAP procedure. This interface is also integrated with SAS Data Integration Studio.

---

## New Options Added to the PROC OLAP Statement

The following options have been added to the PROC OLAP statement:

### COMPACT\_NWAY

when building a cube from a star schema, this option enables additional summarizations during the cube build that can decrease the size of the NWAY aggregation.

### IGNORE\_MISSING\_DIMKEYS=TERSE | VERBOSE

when building a cube from a star schema, this option enables the continuation of the build when the fact table is found to contain keys that are not present in any of the dimension tables. The log receives information about the number and location of the missing keys.

For more information about these new options, see the **SAS OLAP Server: User's Guide**.

---

## New Functions

The following functions are new:

- A Specify Map function has been added to SAS OLAP Cube Studio. The Specify Map function enables you to store ESRI Geographic Information System (GIS) spatial map

information in the SAS Metadata Repository. This GIS information can then be read by the SAS OLAP Server and returned during a cube query.

- The Export Cube and Import Cube functions enable you to copy cube metadata from a source repository to a target repository, and if needed, to another server. The Export Cube function enables you to extract a cube's metadata from the source repository and save it in a file that you specify. All information about a cube, including its dimensions, hierarchies, levels, measures, notes, properties, calculated measures, aggregations, and security settings, will be extracted. The Import Cube function then enables you to save the cube metadata to another metadata repository on another metadata server.
- The Define Distinct Count function enables you to store NUNIQUE (Distinct Count) statistics as measures with a SAS OLAP cube. You can add or delete a distinct count measure either with PROC OLAP or in the Cube Designer wizard, within SAS OLAP Cube Studio. You can add or delete a Distinct Count measure. You can also modify the name, caption, format, units, and description of the measure.
- The Synchronize Levels function enables you to synchronize a cube when the input table for an existing cube has encountered a column name change. This function finds the name differences between the cube and its input table and changes the hierarchy level names to match the input table column names.

---

## **New Tuning Capabilities for the Query Thread Pool**

New tuning capabilities for the query thread pool are now available for each of your SAS OLAP Servers. Tuning the query thread pool enables you to optimize performance based on the number and frequency of query requests that are received by a SAS OLAP Server.

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## **New Tuning Options Window**

A tuning Options window has been added to the Manual Tuning function and the Advanced Aggregation Tuning plug-in. The Options window enables you to specify certain performance options in the PROC OLAP statement when adding or modifying aggregations for a cube. In this window you can view the current values and change the values when needed.

---

## **Improved Performance**

Server performance is recorded and analyzed by using the Application Response Measurement (ARM) system.

The new multi-threaded data storage and server functionality provide faster cube performance. The data can be stored in a multidimensional form (MOLAP) or in a form that includes existing aggregations from presummarized data sources.

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## Improved Querying Capability

An SQL Pass-Through Facility for OLAP is available in SAS for use in querying cubes.

A subquery cache can now be enabled, disabled, and sized for each of your SAS OLAP Servers. The new cache stores subqueries that generate empty result sets.

---

## Improved Aggregation Tuning

Aggregations can be added to or deleted from existing cubes. In addition, further enhancements for aggregation tuning have been made:

- The AGGREGATION statement in PROC OLAP and the Manual Tuning function in SAS OLAP Cube Studio have been enhanced for use with cubes that employ aggregated data from other tables or for use with cubes that have no NWAY aggregation.
  - The Advanced Aggregation Tuning plug-in provides a point-and-click interface that enables you to create and add aggregations to the list of existing aggregations that might already be defined for the cube.
- 

## General Enhancements

General enhancements are as follows:

- The metadata structure is improved, and metadata is stored with the cube.
- Caching and logging can be enabled or disabled.
- Support for ad hoc calculations and time dimensions is improved.

- The start-up file generator has been removed from the SAS OLAP Server Monitor plug-in for SAS Management Console. SAS OLAP Servers are now automatically installed as Windows services; server start-up options are set by an INI file that is installed by the SAS Deployment wizard.
- When creating a cube dimension in the Cube Designer in SAS OLAP Cube Studio, a hierarchy for a dimension will automatically be created when no hierarchy has been explicitly defined and you click the **Finish** button in this window. This default hierarchy includes all levels that were specified for the current dimension and the order they were listed in for the dimension.
- The Calculated Members plug-in provides a point-and-click interface that enables you to add new measures or modify existing measures for the selected cube.

---

## Documentation Enhancements

The **SAS OLAP Server: Administrator's Guide** is no longer available. The administrative documentation for the SAS OLAP Server software has been moved into the following documents and updated:

### **SAS Intelligence Platform: Application Server Administration Guide**

describes the configuration, tuning, and management of SAS OLAP Servers.

### **SAS Intelligence Platform: Desktop Application Administration Guide**

describes the administration of SAS OLAP Cube Studio.

### **SAS Intelligence Platform: System Administration Guide**

describes SAS OLAP Server start, stop, restart, monitoring, and cube data import and export.

### **SAS Intelligence Platform: Security Administration Guide**

describes security issues for SAS OLAP cubes, including a newly updated section about member-level security.

## **SAS Intelligence Platform: Data Administration Guide**

describes how to define libraries and schemas for SAS OLAP cubes.

The SAS Intelligence Platform documentation is available from SAS 9.1.3 OnlineDoc on the Web at <http://support.sas.com/onlinedoc/913/docMainpage.jsp> and at <http://support.sas.com/documentation/configuration/913admin.html>.

**Note:** The other SAS OLAP Server documents, the **SAS OLAP Server: User's Guide** and the **SAS OLAP Server: MDX Guide** remain available. ■

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# What's New in SAS Open Metadata Architecture 9.0, 9.1, 9.1.2, and 9.1.3

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## Overview

SAS®9 enhances your ability to store, manage, and use metadata by implementing SAS Open Metadata Architecture. SAS Open Metadata Architecture 9.0 (and later) provides a framework for creating and managing metadata and applications that use metadata. This enables separate applications to share metadata. The metadata architecture also saves development effort because applications do not have to implement their own metadata facilities.

### Note:

- This section describes the features of SAS Open Metadata Architecture that are new or enhanced since 9.0.
- z/OS is the successor to the OS/390 operating system. SAS Open Metadata Architecture 9.0 (and later) is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

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## Details

### Components of SAS®9 Open Metadata Architecture

SAS®9 Open Metadata Architecture enables you to set up a metadata server, create metadata repositories, and write applications (clients) that store, use, or manage the metadata. The following components are part of the framework:

- SAS Metadata Repository is a collection of related metadata objects that describe enterprise data resources.
- SAS Metadata Server is a multi-user server that makes metadata available from one or more SAS Metadata Repositories. The metadata server is supported by SAS Integration Technologies, which is required in order to use SAS Open

## Metadata Architecture.

- The SAS Open Metadata Interface and SAS Java Metadata Interface are application programming interfaces (APIs) for interacting with the SAS Metadata Server. SAS 9.0 (and later) clients use these APIs to deliver metadata services.
- The SAS Metadata Model comprises many metadata types that define the information that you store in metadata repositories for a variety of enterprise needs, such as storing LIBNAME statements, DBMS schemas, data mining, OLAP information, transformations, servers, and much more.
- The SAS Open Metadata Architecture Authorization Facility is a subsystem of the metadata server that returns authorization decisions based on access controls that are in the metadata. The facility is used to control access to metadata objects on the metadata server. It can also be used to control access and the actions that can be performed on resources that the metadata objects describe.

Documentation for SAS Open Metadata Architecture components is available in the following titles in SAS Help and Documentation and SAS OnlineDoc: **Getting Started with the SAS Open Metadata Interface**, **SAS Open Metadata Interface: Reference**, **SAS Open Metadata Interface: User's Guide**, **SAS Java Metadata Interface: User's Guide**, **SAS Intelligence Platform: System Administration Guide**, and **SAS Intelligence Platform: Security Administration Guide**.

## Clients of SAS®9 Open Metadata Architecture

SAS®9 ships multiple SAS Open Metadata Architecture clients that use the metadata model and API. These clients facilitate managing and using metadata repositories and accessing metadata by using the metadata server. The following software components are clients of the SAS Open Metadata Architecture:

- SAS Management Console, which is a new standardized interface for managing various SAS resources, including metadata. SAS Management Console also uses metadata to manage those resources. The Metadata Manager plug-in facilitates tasks such as creating and managing repositories and controlling the metadata server. The User Manager plug-in enables you to register users and groups on the metadata server and manage their registrations. The Authorization Manager plug-in enables you to define access controls to SAS Metadata Repositories and to individual metadata within a repository.



- A SAS language metadata interface that enables you to manage metadata from within SAS. This interface includes the following elements:
  - the METAOPERATE and METADATA procedures, which enable you to control the metadata server and issue SAS Open Metadata Interface method calls from within SAS
  - the METABROWSE and METAFIND commands (new in SAS 9.1), which enable you to browse and search for specific metadata in SAS Metadata Repositories
  - the METACON command (new in SAS 9.1), which enables you to manage server connections
  - portable SAS system options, which enable you to specify default server connection parameters and repository settings for your SAS session
  - a family of SAS metadata DATA step functions (new in SAS 9.1), which enable you to get, set, and update the properties of SAS metadata objects in a DATA step program
  - the metadata LIBNAME engine that, along with your SAS engine, stores and builds LIBNAME statements using information in SAS metadata repositories.

Other SAS products and solutions that are clients of the SAS Open Metadata Architecture include SAS Data Integration Studio, SAS Information Delivery Portal, SAS Information Map Studio, SAS OLAP Cube Studio, SAS Web Report Studio, and SAS Marketing Automation.

Documentation for SAS Open Metadata Architecture clients is available in SAS Help and Documentation, SAS OnlineDoc, and in the Help that is delivered with the client software.

## **Enhanced User Support**

Beginning with SAS 9.1, the SAS Metadata Server supports an unrestricted user, administrative users, and trusted users. These special users can perform tasks that cannot be performed by other users. For more information, see the **SAS Intelligence Platform: Security Administration Guide**.

## Support for ARM Logging

Beginning with SAS 9.1, the SAS Metadata Server supports ARM logging. Application Response Measurement (ARM) is a standard for managing distributed application performance. The ARM\_OMA subsystem records transaction start-and-stop times that can be used to develop timing statistics for server performance testing. ARM\_OMA logging (which is optional) is invoked by passing ARM-related system options in the command that starts the metadata server. For more information, see the **SAS Intelligence Platform: System Administration Guide**.

## Repository Auditing

Beginning with SAS 9.1, the SAS Metadata Server gives you the option to save information about changes to a repository in a set of audit files. The information in the audit files can be used to restore the metadata in a repository to a previous state. Auditing is performed on individual repositories and is invoked in SAS Management Console after a repository is created. For more information, see the **SAS Intelligence Platform: System Administration Guide**.

## Importing and Exporting Metadata

Beginning with SAS 9.1, wizards were added to SAS Management Console that enable metadata administrators to import and export metadata to and from other metadata models. By default, the wizards use the Common Warehouse Metamodel (CWM) format. In addition, you can add import and export formats by installing the Model Bridge software from Meta Integration. For more information, see the **SAS Intelligence Platform: System Administration Guide**.

## Repositories Created for External DBMS

Beginning with SAS 9.1, when the appropriate SAS/ACCESS software is installed, administrators can create repositories in Oracle or in DB2 from IBM by specifying an engine and library and engine connection options when a repository is created. For more information, see the **SAS Intelligence Platform: System Administration Guide**.

## New Macros

The following macros for use by metadata administrators are new in SAS 9.1, 9.1.2, or 9.1.3:

%OMABAKUP autocall macro (9.1)

automates the metadata server backup process.

%MDUIMPC and %MDUIMPL autocall macros (9.1)

import user and group information from enterprise data sources to the metadata server. Before you can use these macros, you must extract the necessary user and group information from existing stores.

%OMAPORT autocall macro (9.1.2)

ports a SAS Metadata Repository that is created in one host environment to another host environment.

%OMARUNAN autocall macro (9.1.3)

optimizes the memory footprint of SAS Metadata Repositories by eliminating unnecessary indexes, storing long character variables as varying length strings, and removing duplicate copies of strings in repository data sets. %OMARUNAN replaces the %OMAOPTMZ macro that was provided in SAS 9.1. %OMARUNAN is preferred to %OMAOPTMZ because it analyzes all repositories at once, instead of one repository at a time, and operates on existing backups of SAS Metadata Repositories instead of making an additional copy of repositories.

The %OMABAKUP, %OMARUNAN and %OMAPORT macros are described in more detail in the **SAS Intelligence Platform: System Administration Guide**. The %MDUIMPC and %MDUIMPL macros are described in the **SAS Intelligence Platform: Security Administration Guide**.

## Increased Security for SASUSERS and PUBLIC Groups

Beginning with SAS 9.1.2, the SAS Open Metadata Architecture Authorization Facility no longer allows anyone, including the unrestricted user, to modify or delete the SASUSERS and PUBLIC groups. For more information, see the **SAS Intelligence Platform: Security Administration Guide**.

## Sample User Import Applications

Beginning with SAS 9.1.2, two sample applications are provided that metadata administrators can modify to extract user and group information from enterprise data sources and create identity metadata in a SAS Metadata Repository. The application **importad.sas** extracts user information from Microsoft Active Directory domain

controller files. The application **importpw.sas** extracts user information from UNIX `/etc/passwd` files. After the information is extracted, the applications use the `%MDUIMPC` and `%MDUIMPL` macros to read the information into the appropriate format and load it into a SAS Metadata Repository. These applications are available in the SAS Sample Library. For more information, see the **SAS Intelligence Platform: Security Administration Guide**.

## Workunit Journaling

Beginning with SAS 9.1.3, the SAS Metadata Server supports new `omaconfig.xml` options that enable administrators to configure the metadata server to write metadata updates to a high-speed workunit journal file prior to updating repositories on disk. Workunit journaling improves performance on multiprocessor metadata servers and also improves the metadata server's recovery ability by maintaining a copy of all uncommitted updates. For information about the workunit journaling options, see the **SAS Intelligence Platform: System Administration Guide**.

## Expanded Search Capability

Beginning with SAS 9.1.3, the `<XMLSelect>` search element in the SAS Open Metadata Interface supports the comparison operator `=:` (an equal sign with a colon modifier). This operator compares only the specified prefix in a character string. For more information, see the section "Filtering a `GetMetadataObjects` Request" under "Querying All Metadata of a Specified Type" in the **SAS Open Metadata Interface: User's Guide**.

## Ability to Reclaim Unused Disk Space

Beginning with SAS 9.1.3 Service Pack 2, the metadata server backup macro, `%OMABAKUP`, supports a `REORG` option that reclaims unused disk space from SAS Metadata Repositories. The `%OMABAKUP` macro also converts special characters that are not supported in directory names by the host environment to underscores. For more information, see the **SAS Intelligence Platform: System Administration Guide**.

## Additional Server Startup Options and New Best Practices Recommendation for `MAXACTIVETHREADS`

Beginning with SAS 9.1.3 Service Pack 3, two additional `objectserverparms` options can be set in the SAS Metadata Server start command to improve server

performance. The options, THREADSMIN (TMIN) and THREADSMAX (TMAX), control the minimum and maximum number of threads that are allowed in the SAS Metadata Server's thread pool. A thread is a channel that is available for handling user requests. A thread pool defines the number of threads that are available to a server, regardless of the number of user requests that are made. When these options are set, the number of available threads is not allowed to fall below TMIN or to exceed TMAX.

The optimum values for TMIN and TMAX are dependent on the setting of the MAXACTIVETHREADS metadata server configuration option.

MAXACTIVETHREADS, which is set in the metadata server's omaconfig.xml file, specifies the maximum number of threads that are allowed to run concurrently on the metadata server. There are new best-practices recommendations for MAXACTIVETHREADS with SAS 9.1.3 Service Pack 3 as well. For information about the new recommendations, and to better understand how the metadata server uses threads, see the **SAS Intelligence Platform: System Administration Guide**.

The SAS Configuration Wizard does not set TMIN and TMAX for you. To take advantage of the performance gains that are available with these options, edit the metadata server start command file and add the options manually. If you performed a planned SAS installation, this file is located in a MetadataServer .bat or script file in C:\SAS\name\_of\_plan.xml\Lev1\SASMain\MetadataServer. Information about the content of the metadata server start command and where TMIN and TMAX are specified is also in the **SAS Intelligence Platform: System Administration Guide**.

## **PHYSICAL\_DELETE Server Configuration Option Deprecated**

Beginning with SAS 9.1.3 Service Pack 3, the reserved omaconfig.xml option, PHYSICAL\_DELETE, is deprecated.

## **SAS Open Metadata Interface Enhancements**

Beginning with SAS 9.1.3 Service Pack 3, the SAS Open Metadata Interface Status method supports <PlatformVersion/> and <ModelVersion/> parameters. These parameters enable clients to retrieve the SAS Metadata Server and SAS Metadata Model version numbers, respectively. For more information, see the Status method in the IServer class in **SAS Open Metadata Interface: Reference**.

The CheckinMetadata method is also modified. The method no longer restricts the number of characters that can be entered in the changeDesc parameter. The changeDesc parameter enables clients to include a description of object modifications with the Change metadata that is automatically generated by the check-in process.

Information that is entered in changeDesc used to be stored as a Change object attribute but now is stored in a TextStore object. For more information, see the CheckinMetadata method in the IOMI class in **SAS Open Metadata Interface: Reference**.

## **SAS Java Metadata Interface Enhancement**

Beginning with SAS 9.1.3 Service Pack 3, a getPlatformVersion() method has been added to the SAS Java Metadata Interface. For more information, see the SAS Java Metadata Interface API specification at [support.sas.com/rnd/gendoc/bi/api/](http://support.sas.com/rnd/gendoc/bi/api/). The getPlatformVersion() method is in the MetadataWorkspace class.

## **New SAS Language Interface for Metadata**

Beginning with SAS 9.1.3 Service Pack 3, the METALIB procedure is available to automate the creation and maintenance of the table metadata defined for a SAS library. For more information, see the METALIB procedure in **SAS Open Metadata Interface: Reference**.

## **Automated Restore of the Metadata Server**

Beginning with SAS 9.1.3 Service Pack 4, the SAS Metadata Server backup macro, %OMABAKUP, supports automated restore of the SAS Metadata Server by setting a RESTORE option. In addition, a new REPOSITORYLIST option is available that permits selective backup and restore of SAS Metadata Repositories. For more information, see the **SAS Intelligence Platform: System Administration Guide**.

## **Repository Analysis Option Added to %OMABAKUP**

Beginning with SAS 9.1.3 Service Pack 4, the %OMABAKUP macro supports a new RUNANALYSIS option. The RUNANALYSIS option executes the %OMARUNAN macro to analyze and optimize the memory footprint of SAS Metadata Repositories immediately after the backup copies of repositories are made. The option is provided to give administrators the choice of analyzing repositories as part of the backup process or of executing %OMARUNAN independently. For information about the RUNANALYSIS option, see the **SAS Intelligence Platform: System Administration Guide**.

## What's New in SAS/OR 9.1.3, Release 3.1 and Release 3.2

---

### Overview

SAS/OR version 9.1.3, release 3.1 and release 3.2 contain several new and enhanced features designed to expand the scale and scope of problems that SAS/OR can address. These enhancements also make it easier for you to use the capabilities of SAS/OR. Brief descriptions of the new features are presented in the following sections. For more information, refer to the SAS/OR documentation, available in the following six volumes:

- SAS/OR User's Guide: Bills of Material Processing
- SAS/OR User's Guide: Constraint Programming
- SAS/OR User's Guide: Local Search Optimization
- SAS/OR User's Guide: Mathematical Programming
- SAS/OR User's Guide: Project Management
- SAS/OR User's Guide: The QSIM Application

Online help can also be found under the corresponding classification.

---

### The NETFLOW Procedure

The NETFLOW procedure for network flow optimization contains a new feature that enables you to specify and solve generalized network problems. In generalized networks the amount of flow entering an arc might not equal the amount of flow leaving the arc, signifying a loss or a gain as flow traverses the arc. A new PROC NETFLOW option, GENNET, indicates that the network is generalized. Generalized networks have a broad range of practical applications, including the following:

- transportation of perishable goods (weight loss due to drying)
- financial investment account balances (interest rates)
- manufacturing (yield ratios)
- electrical power generation (loss during transmission along lines)

Another new option, `EXCESS=`, enables you to use PROC NETFLOW to solve an even wider variety of network flow optimization problems for both standard and generalized networks. As a result, PROC NETFLOW is equipped to deal with many frequently encountered challenges to successful network flow optimization, such as the following:

- networks with excess supply or demand
- networks containing nodes with unknown supply and demand values
- networks with nodes having range constraints on supply and demand

---

## The OPTLP Procedure

The OPTLP procedure provides linear programming solvers and enables you to choose from three linear programming solvers: primal simplex, dual simplex, and interior point (experimental). The simplex solvers implement a two-phase simplex method, and the interior point solver implements a primal-dual predictor-corrector algorithm. All three solvers are newly rewritten and are designed for excellent performance and scalability. Presolvers, which work aggressively to reduce the effective size of problems before the solvers are invoked, are also provided.

New in SAS/OR 9.1.3 release 3.2, the `TIMETYPE=` option enables you to specify the type of time (real time or CPU time) that can be limited via the `MAXTIME=` option and reported via the `_OROPTLP_` macro variable.

PROC OPTLP accepts linear programming problems that are submitted in an MPS-format SAS data set. The MPS-format SAS data set corresponds closely to the MPS-format text file (commonly used in the optimization community) and was first introduced in SAS/OR version 9.1.3, release 2.1.

---

## The OPTMILP Procedure

The new OPTMILP procedure solves mixed-integer linear programming problems with an LP-based branch-and-bound algorithm that has been completely rewritten for this release. The algorithm also implements advanced techniques including presolvers, cutting planes, and primal heuristics. The resulting improvements in efficiency enable you to use PROC OPTMILP to solve larger and more complex optimization problems than you could solve with previous releases of SAS/OR.



PROC OPTMILP accepts mixed-integer linear programming problems that are submitted in an MPS-format SAS data set.

---

## The OPTMODEL Procedure

The OPTMODEL procedure provides a modeling environment tailored to building, solving, and maintaining optimization models. This makes the process of translating the symbolic formulation of an optimization model into PROC OPTMODEL virtually transparent, since the modeling language mimics the symbolic algebra of the formulation as closely as possible. PROC OPTMODEL also streamlines and simplifies the critical process of populating optimization models with data from SAS data sets. All of this transparency produces models that are more easily inspected for completeness and correctness, more easily corrected, and more easily modified, whether through structural changes or through the substitution of new data for old.

The OPTMODEL procedure comprises the powerful OPTMODEL modeling language and state-of-the-art solvers for several classes of mathematical programming problems. Seven solvers are available to OPTMODEL:

<b>Problem</b>	<b>Solver</b>
Linear Programming	<b>LP</b>
Mixed Integer Programming	<b>MILP</b>
Quadratic Programming (experimental)	<b>QP</b>
Nonlinear Programming, Unconstrained	<b>NLPU</b>
General Nonlinear Programming	<b>NLPC</b>
General Nonlinear Programming	<b>SQP</b>
General Nonlinear Programming (experimental)	<b>IPNLP</b>

---

## The OPTQP Procedure

The OPTQP procedure solves quadratic programming problems with a new infeasible primal-dual predictor-corrector interior point algorithm. Performance is excellent for

both sparse and dense quadratic programming problems, and PROC OPTQP excels at solving large problems efficiently.

PROC OPTQP accepts quadratic programming problems that are submitted in a QPS-format SAS data set. The QPS-format SAS data set corresponds closely to the format of the QPS text file (a widely accepted extension of the MPS format) and was introduced in SAS/OR 9.1.3, release 2.1.

---

## **Earned Value Management Macros - *Experimental***

The set of experimental Earned Value Management macros complement the current SAS/OR procedures for project and resource scheduling (PROC CPM and PROC PM) by providing diagnostic information about the execution of scheduled projects. Earned Value Management (EVM) is growing in prominence and acceptance in the project management community due to its ability to turn information about partially completed projects into valid, early projections of overall project performance. EVM measures current project execution against the project execution plan on a cost and schedule basis.

SAS/OR provides two sets of EVM macros: a set of four analytical macros to compute EVM metrics, and a set of six macros to create graphical reports based on these metrics. A wide variety of EVM metrics and performance projections, for both task-by-task and project-wide evaluations, are supported.

---

## **Microsoft Project Conversion Macro - *Experimental***

The SAS macros %MDBTOPM and %MP2KTOPM have been used in previous releases of SAS/OR to convert files saved by Microsoft Project 98 and Microsoft Project 2000 (and later), respectively, into SAS data sets that can be used as input for project scheduling with SAS/OR. Now these two macros are combined in the SAS macro %MSPTOSAS, which converts Microsoft Project 98 (and later) data. This experimental macro generates the necessary SAS data sets, determines the values of the relevant options, and invokes PROC PM in SAS/OR with the converted project data. The %MSPTOSAS macro enables you to use Microsoft Project for the input of project data and still take advantage of the excellent project and resource scheduling capabilities of SAS/OR.

Execution of the %MSPTOSAS macro requires SAS/ACCESS software.

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## What's New in SAS/QC 9.0 and 9.1

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### Overview

SAS/QC now includes the ANOM procedure for analysis of means, a graphical and statistical method for comparing a set of means to determine whether any of them are significantly different from the overall mean. There are also a number of enhancements to the existing CAPABILITY, OPTEX, RELIABILITY, and SHEWHART procedures.

The ADX Interface for Design of Experiments is a guided point-and-click solution for engineers, scientists, statisticians, and other researchers who collaboratively design, analyze, and interpret experiments to improve industrial processes and products. The ADX Interface supports a variety of designs, including two-level, mixed level, response surface, mixture, optimal, and split-plot.

The ADX Interface now enables you to

- create general factorial designs with factors having up to nine levels
- create two-level full factorial and minimum aberration fractional factorial generalized split-plot designs
- **9.1** delete inactive factors and project a fractional-factorial design to a higher-resolution design
- **9.1** join the means in a box plot
- **9.1** show clear and aliased effects in the alias structure
- **9.1** display confidence intervals in the response calculator and experiment report
- **9.1** honor block structure in a blocked design during design randomization

The ADX Interface is documented in the book *Getting Started with the SAS 9 ADX Interface for Design of Experiments*.

---

### ANOM Procedure

**9.1** The ANOM procedure produces analysis of means (ANOM) charts for identifying group means that differ significantly from the overall mean. An ANOM chart is similar to a control chart, with a process variable statistic (such as a mean) plotted versus a classification or group variable. Decision limits on the chart are used to determine which of the group means

are significantly different.

ANOM can be used as an alternative to analysis of variance (ANOVA) in the fixed effects situation. ANOM differs from ANOVA in that it identifies the groups that are different; ANOVA only determines whether a significant difference exists. ANOM has the additional advantage of a convenient graphical representation and lends itself to quality improvement applications in which the end user has limited background in statistics.

PROC ANOM can be applied to both variables and attribute data, and to equal and unequal sample sizes.

---

## CAPABILITY Procedure

You can now juxtapose displays, including box-and-whisker plots, dot plots, and carpet plots, with histograms as aids for visualizing the distribution of process data. The following options are new in the HISTOGRAM statement:

- The BMCBOXFILL= option specifies the fill color for a box-and-whisker plot in the bottom margin. By default, the box-and-whisker plot is not filled.
- The BMCFRAME= option specifies the color for filling the frame of a bottom margin plot. By default, this area is not filled.
- The BMCOLOR= option specifies the color of the dot plot, carpet plot, or the outline of a box-and-whisker plot in the bottom margin.
- The BMMARGIN= option specifies the height of a bottom margin plot.
- The BMPLOT= option produces a box-and-whisker plot, dot plot, or carpet plot along the bottom margin of a histogram. A box-and-whisker plot gives a summary of the data distribution that a histogram alone does not provide. A dot plot or carpet plot shows the distribution of individual observations.

The following options are new in the COMPHIST and HISTOGRAM statements:

- The FRONTREF option causes reference lines to be drawn in front of histogram bars.
- The LOWER= suboption in the KERNEL option specifies lower bounds for fitted kernel density estimates.
- The UPPER= suboption in the KERNEL option specifies upper bounds for fitted kernel density estimates.

**9.1** CLASS= variables specified in the COMPHIST statement can now have values longer than 16 characters.

---

## OPTEX Procedure

The OPTEX procedure now enables you to control how CLASS variables are modeled, by specifying options for the ordering of levels and the parameterization of design matrix columns associated with the levels. In addition, the default parameterization has been changed to be orthogonal, providing efficiency values and parameter variances that are easier to interpret and to compare.

The following options are new in the CLASS statement:

- The DESCENDING option reverses the sorting order of the classification levels.
- The ORDER= option specifies how the classification levels are sorted.
- The PARAM= option specifies the parameterization method for the design matrix columns associated with classification levels.
- The REF= option specifies the reference level for effect or reference parameterization.

---

## RELIABILITY Procedure

- The MCFPLOT statement has been enhanced to allow recurrence and censoring ages to be grouped into intervals.
- The INTERPOLATE= option, in the MCFPLOT statement, enables plotted points to be connected with either a step function or a straight line.
- The PPOS=NELSONAALEN option, in the PROBLOT statement, enables the use of Nelson-Aalen plotting positions.
- **9.1** You can create probability plots when all failure modes act and plot CDF estimates for individual modes on the same plot.
- **9.1** You can compute cumulative distribution function estimates and confidence limits when all modes act.

---

## SHEWHART Procedure

In previous releases of the SHEWHART procedure, the data associated with a subgroup in an input summary data set had to be complete for that subgroup to be plotted. For example, if the variable `_LCLX_` in a `TABLE=` data set contained a missing value for a given subgroup, that subgroup would not be plotted. The SHEWHART procedure now processes data and control limit values independently, so that the missing value for `_LCLX_` produces a gap in the lower control limit line for that subgroup. The data, central line, and upper

control limit for the subgroup are all plotted, assuming the values of the associated variables are not missing.

**9.1** Phase and block variable values can now be up to 48 characters long.

The following options are new or enhanced:

- The BOX= option in the PROC SHEWHART statement specifies an input data set containing subgroup summary data for producing schematic box charts.
- The CGRID= option specifies the color of horizontal grid lines positioned at labeled major tick marks.
- The CLABEL= option specifies the text color for labels produced by the ALLLABEL=, ALLLABEL2=, OUTLABEL=, and OUTLABEL2= options.
- The CTESTLABBOX= option specifies the text color for non-overlapping labels for positive tests for special causes.
- The CTESTSYM= option specifies the color of the symbol used to plot subgroups with positive tests for special causes.
- The HTML2= option enables you to associate URLs with subgroup points on a secondary chart when graphics output is directed to HTML.
- The LABELANGLE= option specifies the angle at which labels produced by the ALLLABEL=, ALLLABEL2=, OUTLABEL=, and OUTLABEL2= options are drawn.
- The OUTBOX= option in the BOXCHART statement produces an output data set containing complete subgroup summary data for schematic box charts.
- **9.1** The PHASEVARLABEL option displays the phase variable label above the phase values.
- **9.1** The PHASEVALSEP option draws a vertical line separating phase values.
- The SMETHOD=MVGRANGE option in the XRCHART statement causes the process standard deviation to be estimated using a moving range of subgroup averages. You can use this to construct control charts for means when the  $j$ th measurement in the  $i$ th subgroup can be modeled as  $x_{ij} = \sigma_B \omega_i + \sigma_W \epsilon_{ij}$ , where  $\sigma_B^2$  is the between-subgroup variance,  $\sigma_W^2$  is the within-subgroup variance, the  $\omega_i$  are independent with zero mean and unit variance, and the  $\omega_i$  are independent of the  $\epsilon_{ij}$ . This method can also be used to construct the three-way control chart, which is advocated for this situation by Wheeler (1995). A three-way control chart is useful when sampling, or within-group, variation is not the only source of variation, as discussed in "Multiple Components of Variation". A three-way control chart comprises a chart of subgroup means, a moving range chart of the subgroup means, and a chart of subgroup ranges. When you specify the SMETHOD=MVGRANGE option, the XRCHART statement produces the appropriate charts of subgroup means and subgroup ranges.
- The TESTLABBOX option produces labels for subgroups with positive tests for special causes that are positioned so they do not overlap, if possible. The labels are

enclosed in boxes which are connected to the associated subgroup points with line segments.

- The TESTSYM= option specifies a symbol for plotting subgroups with positive tests for special causes.
- The TESTSYMHT= option specifies the height of the symbol used to plot subgroups with positive tests for special causes.
- The WNEEDLES= option specifies the width, in pixels, of needles that connect plotted points to the central line.
- **9.1** The ZEROSTD=NOLIMITS option suppresses the degenerate control limits on a control chart produced when the estimated process standard deviation  $\hat{\sigma}$  is zero.

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## References

Wheeler, D. J. (1995), *Advanced Topics in Statistical Process Control*, Knoxville, TN: SPC Press, Inc.

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# What's New in SAS 9.0 and 9.1 ADX Interface for Design of Experiments

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## Overview

The SAS ADX Interface for Design of Experiments includes enhancements related to response surface designs, mixture designs, general factorial designs, and split-plot designs. Furthermore, ADX can now import data from SAS data sets or external file formats, and it can export design information to SAS data sets or external file formats.

The SAS ADX Interface now enables you to

- create general factorial designs with factors having up to nine levels
- create two-level full factorial and fractional factorial split-plot designs
- **9.1** delete inactive factors and project a fractional-factorial design to a higher-resolution design
- **9.1** join the means in a box plot
- **9.1** show clear and aliased effects in the alias structure
- **9.1** display confidence intervals in the response calculator and experiment report
- **9.1** honor block structure in a blocked design during design randomization

---

## Details

### Response Surface Designs

ADX can now create designs based on Hartley's (1959) small response surface designs.

Variance dispersion graphs are generated in the design details so you can compare designs and choose the best number of center points. This option requires SAS/IML software.

### Mixture Designs

Process variables can now be included in the creation and analysis of mixture designs. Mixture designs with process variables are created using the optimal design interface. The analysis will determine whether process variables are significant, but all such variables will be included in the optimization process. In the optimization tools, process variables are

treated as fixed-level factors.

## General Factorial Designs

General factorial designs are designs that run all combinations of factor levels. In ADX, you can create general factorials with factors having any number of levels.

## Split-Plot Designs

ADX can now create full factorial and two-level minimum aberration fractional factorial generalized split-plot designs as described in Huang, Chen, and Voelkel (1998).

## Data Import and Export

ADX can import factor and response values from SAS data sets or external files. You can create the design in ADX and import solely the response information, or you can import both the factor levels and the response.

ADX can export design information to SAS data sets and external files for inclusion in a data warehouse. You can export variable information, experiment details, and values for the factors and response.

Access to external file formats requires SAS/ACCESS software.

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## References

Hartley, H. O. (1959), "Smallest Composite Designs for Quadratic Response Surfaces," *Biometrics*, 15, 611--624.

Huang, P., Chen, D., and Voelkel, J. O. (1998), "Minimum-Aberration Two-Level Split-Plot Designs," *Technometrics*, 40, 314--326.

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# What's New in SAS Scalable Performance Data Server 4.3

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## Overview

This document summarizes enhancements and upgrades contained in SAS Scalable Performance Data Server 4.3. To view the enhancements and upgrades that were contained in SPD Server 4.4, see [What's New in SAS Scalable Performance Data Server 4.4](#).

---

## SAS 9.1.3 Compatibility and Large Table Support

SPD Server 4.3 is compatible with the improved I/O infrastructure of SAS 9.1.3.

SPD Server 4.3 provides on-disk structures that are compatible with SAS®9 and the large table capacities that it supports. Enterprise-wide data mining often creates immense tables. In order to generate business intelligence quickly, the ability to update tables that contain billions of rows is more important than ever. Previous versions of SPD Server were based on 32-bit architecture that supported just over 2 billion rows and 32,768 columns. SPD Server 4.3 is based on a 64-bit architecture which supports tables with over *9 quintillion* rows and over *2 billion columns*.

The architectural differences between SAS®9 and earlier versions mean that SPD Server 4.3 cannot access SPD Server 3.x stores, and vice versa. For more information on sharing SPD Server 3.x and SPD Server 4.3 data stores, see the chapter, "SPD Server 3.x and SPD Server 4.x Compatibility" in the online SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

---

## SPD Server 4.3 and SAS 9.1.3 Password Encoding

SPD Server 4.3 supports the integration of the SAS 9.1.3 PROC PWENCODE. This permits scripts to be generated that do not explicitly contain secure passwords that could easily be

used without authorization. You must run PROC PWENCODE in Base SAS to enable the usage of script password encoding within SPD Server 4.3. See the Base SAS documentation for detailed instruction on running PROC PWENCODE for use with SPD Server 4.3.

The example below shows an SPD Server 4.3 LIBNAME statement that utilizes the password encoding option:

```
libname mylib sasspds 'spdsdata'  
  server=kaboom.5200  
  user='spdsuser'  
  password='{sas001}c3BkcZEyMw==';
```

---

## SPD Server 4.3 and the SAS Management Console Utility

The SAS Management Console (SMC) is a Java application that provides a single point of control for managing multiple SAS application resources. Rather than using a separate administrative interface for each application in your enterprise intelligence environment, you can use SAS Management Console's single interface to perform the administrative tasks required to create and maintain an integrated environment.

SAS Management Console manages resources and controls by creating and maintaining metadata definitions for entities such as:

- server definitions
- library definitions
- user definitions
- resource access controls
- metadata repositories
- job schedules

After installing the SPD Server 4.3 Java plug-in file, SPD Server administrators can use the SPD Server Manager utility in SAS Management Console to configure SPD Server 4.3 user/ group passwords and ACLs instead of using the traditional SPD Server **psmgr** utility and PROC SPDO commands.

By default, SAS Management Console looks for plug-ins in the **plugins** subdirectory of each installed SAS product. The Java plug-in file that makes the

SPD Server Manager utility available in SAS Management Console is located at

*SASROOT/spds43/plugins/sas.smc.SpdsMgr.jar*

**Note:** *SASROOT* represents the path to the base directory of the SAS software installation on your client machine. The Java plug-in file path above is specifically for SPD Server 4.3. The Java plug-in file for SPD Server 4.4 resides [in a different location](#).

---

## SPD Server 4.3 and SAS Data Integration Studio

You can integrate the processing power of SPD Server 4.3 with other SAS software tools, such as SAS Data Integration Studio. The same plug-in file that SPD Server uses to integrate with the SAS Management Console can be used to integrate SPD Server resources into the SAS Data Integration Studio user interface.

SAS Data Integration Studio is software that enables data warehouse specialists to create and manage metadata objects that define sources, targets, and the sequence of steps for the extraction, transformation, and loading of data into data marts or warehouses. SPD Server can be an excellent tool for managing the large tables of data associated with large data marts and warehouses.

By default, SAS Data Integration Studio looks for plug-ins in the **plugins** subdirectory of the SAS Data Integration Studios installation. To integrate SPD Server 4.3 functionality into the SAS Data Integration Studio user interface, copy the SPD Server 4.3 Java plug-in file into the SAS Data Integration Studio **plugins** subdirectory.

The SPD Server 4.3 Java plug-in file is located at:

*SASROOT/spds43/plugins/sas.smc.SpdsMgr.jar*

**Note:** *SASROOT* represents the path to the base directory of the SAS software installation on your client machine. *Spds43/* represents the installed SPD Server software directory. The name of the installed SPD Server software directory varies according to the specific version and release of your SPD Server software. For example, the path to your SPD Server Java plug-in file might begin with *SASROOT/spds43*, *SASROOT/spds43tsm1*, or *SASROOT/spds43tsm2*, depending on if you have the original SPD Server 4.3 software, or the first or second maintenance release of the SPD Server 4.3 software.

Copy the SPD Server 4.3 Java plug-in file to the SAS Data Integration Studio **plugins** directory:

```
SASROOT/SASETLStudio/9.1/plugins/sas.smc.SpdsMgr.jar
```

---

## SPD Server 4.3 Utility Requirements

SPD Server 4.3 provides NLS functionality, or National Language Support for multiple languages and character sets in database operations. As a result, all SPD Server 4.3 utilities require access to the *InstallDir*/**bin64** directory, and you must ensure that the *InstallDir*/**bin64** directory is included in your SPD Server 4.3 PATH.

Here is an example of statement that specifies the necessary path:

```
LD_LIBRARY_PATH=$LD_LIBRARY_PATH:InstallDir/bin64  
  
export LD_LIBRARY_PATH
```

---

## SPD Server 4.3 SQL Planner Enhancements

SPD Server 4.3 includes SQL Planner optimizations. SQL Planner optimizations improve the performance of the more frequent query types that used in data mining solutions such as Enterprise Marketing Automation. A key enhancement to the SPD Server 4.3 SQL Planner is optimizing correlated queries through the use of query rewrite techniques. Correlated queries are common in business and analytic intelligence data mining. Another significant enhancement is the tighter integration of the Parallel Group-By technology in the planner. The tighter integration adds performance benefits to nested Group-By syntax.

### SPD Server 4.3 STARJOIN Facility

The SPD Server 4.3 enhanced SQL planner includes the new STARJOIN facility. The SPD Server 4.3 STARJOIN facility validates, optimizes, and executes SQL queries on data that is configured in a star schema. Star schemas are composed of two or more normalized dimension tables that surround a centralized fact table. The centralized fact table contains data elements of interest derived from the dimension tables.

For more detailed information on expression support for STARJOIN, see the SQL section in the chapter on, "STARJOIN Optimization," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## SPD Server 4.3 Index Scans

SPD Server 4.3 SQL provides users with the capability to use lightning-fast index scans on large tables. Rather than scanning entire tables which may have millions or billions of rows, in specific cases, SPD Server 4.3 SQL can utilize index data to resolve the query. Index data is compact, small, and faster to scan than an entire table. SPD Server 4.3 SQL provides enhanced index scan support for the following functions:

**min**, **max**, **count**, **count distinct**, **nmiss**, and **range** functions.

For more detailed information on server index scans, see the section on Index Scans in the chapter on, "Optimizing SAS Scalable Performance Data Server Performance," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## SPD Server 4.3 Optimized Correlated Queries

Intelligent storage must have the ability to interpret and process complex requests such as correlated queries. A correlated query is a select expression where a predicate within the query has a relationship to a column that is defined in another scope. Today's business and analytic intelligence tools often generate SQL queries that are nested 3 or 4 layers deep. Queries with cross nested relationships consume significant processor resources and require more time to complete processing. New algorithms in the SQL Planner of SPD Server 4.3 implement techniques that significantly improve the performance of correlated queries for patterns that permit query rewrites or query de-correlation.

## SPD Server 4.3 Parallel Group-By

Parallel Group-By is a high performance parallel summarization of data executed using SQL. Parallel Group-By works against single tables used to aggregate data. Summarization tasks are common in data warehousing applications. Parallel Group-By was developed to speed up processor performance summarization tasks. Parallel Group-By is often used in SQL queries (through the use of sub queries) to

apply selection lists for inclusion or exclusion.

The Parallel Group-By support in SPD Server 4.3 has been expanded in many areas. Parallel Group-By is integrated into the WHERE-clause planner code so that it will boost the capabilities of the SPD Server SQL engine. Any section of code that matches the Parallel Group-By trigger pattern will use it.

For more detailed information on server index scans, see the section on Index Scans in the section on Parallel Group-By in the chapter on, "Optimizing SAS Scalable Performance Data Server Performance," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## SPD Server 4.3 Parallel Join

Parallel join is a high performance pairwise join of two SPD Server tables. The parallel join feature enhances join performance in two ways. First, SPD Server parallel joins are performed using parallel threading. Second, SPD Server parallel joins use enhanced data summarization methods after rows in a table are joined.

For more detailed information on SPD Server parallel joins, see the section on Parallel Joins in the in the chapter on, "Optimizing SAS Scalable Performance Data Server Performance," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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## SPD Server 4.3 Minmax Table Indexing

SPD Server 4.3 contains a new table option called *MINMAXVARLIST=*. The primary purpose of the *MINMAXVARLIST=* table option is for use with SPD Server 4.3 dynamic cluster tables, where specific members in the dynamic cluster contain a set or range of values, such as sales data for a given month. When a SPD Server SQL sub setting where-clause specifies specific months from a range of sales data, the WHERE planner checks the min/max indexes. Based on the min/max index information, the SPD Server WHERE planner includes or eliminates member tables in the dynamic cluster for evaluation.

Use the *MINMAXVARLIST=* table option with numeric columns. *MINMAXVARLIST=* uses the list of columns you submit to build an index. The *MINMAXVARLIST=* index contains only the minimum and maximum values for each column. The WHERE-clause planner uses the index to filter SQL predicates quickly, and to include or eliminate member tables belonging



to the cluster table from the evaluation.

Although the MINMAXVARLIST= table option is primarily intended for use with dynamic clusters, it also works on standard SPD Server tables. MINMAXVARLIST= can help reduce the need to create many indexes on a table, which can save valuable resources and space.

For more detailed information on SPD Server parallel joins, see the section on Minmax Indexes in the in the chapter on, "Optimizing SAS Scalable Performance Data Server Performance," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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## SPD Server 4.3 WHERE-Costing Improvements

The WHERE-clause Planner implemented in SPD Server 4.3 avoids computation-intensive operations and uses simple computations where possible. WHERE-clauses in large database operations can be very resource-intensive operations. In SPD Server 3.x and earlier releases, query authors often needed to manually "tune" queries for performance. The "tuning" was accomplished using macro variables and index settings. The WHERE-clause planner integrated into SPD Server 4.3 does the "tuning" work for the user by costing the different approaches to index evaluation.

For more detailed information on SPD Server WHERE-costing improvements, see the section on the WHERE-Clause Planner in the in the chapter on, "Optimizing SAS Scalable Performance Data Server Performance," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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## SPD Server 4.3 Clustered Tables

SPD Server 4.3 uses a virtual table structure called a **clustered table**. Why are clustered tables important? Clustered data tables provide a storage architecture that SPD Server 4.3 can take advantage of by using its parallel processing and data management capabilities.

A clustered table is a structure that can store multiple SPD Server tables. A clustered table is composed of members (also called generations or partitions). Each member can store a single SPD Server table. The clustered table uses a layer of metadata to manage the members. clustered tables can be used in WHERE-clause costing as well. Each member in

a clustered table is analyzed and assigned an EVAL strategy that best fits the data patterns in the member or slot. Using multiple EVAL strategies while performing WHERE-clause costing on a clustered table provides better process granularity, which can improve overall data throughput and performance.

## **Dynamic Cluster Tables**

SPD Server Cluster Tables are virtual SPD Server table structures. SPD Server 4.3 cluster tables are a bound collection of multiple members. Each member is a standard SPD Server table. All member tables that belong to a given dynamic cluster table must share the same metadata formats and organization. SPD Server 4.3 clustered data tables use the metadata layer to manage the data that is contained in the member tables.

The SPD Server 4.3 dynamic cluster table structure provides an architecture that enables flexible loading, rapid storage, and parallel processing features for very large data tables. Using dynamic cluster tables, loading, removing data from, and refreshing very large data marts becomes easier and more timely. Dynamic cluster tables also provide organizational features and performance benefits that traditional SAS and SPD Server tables do not have.

For example, users can add new data or remove historical data from very large tables by accessing only the member tables that are affected by the change. It is possible to access the individual member tables in parallel. This strategy reduces the time needed for the job to complete and is accomplished using very simple commands. Furthermore, a complete refresh of a dynamic cluster table can take place using a fraction of the disk space that would be needed to refresh a large standard table that contained the same data.

For more detailed information on SPD Server dynamic cluster tables, see the chapter on, "Dynamic Cluster Tables," in the SPD Server User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## **Unsupported Features in Clustered Tables**

Because of differences in the load and read structures for clustered tables, some standard features normally associated with Base SAS and SPD Server tables are currently not supported in SPD Server 4.3 clustered tables.

The non-supported features in Dynamic Cluster tables are:

- You cannot append data to a dynamic cluster table. To append data to a dynamic cluster table, the table must be un-clustered, the data is appended to the individual un-clustered files, then the un-clustered files must be re-clustered.
- Record-Level Locking
- SPD Server Backup/Restore Utility
- Copying data with PROC COPY or PROC SQL

If you have a task for a Dynamic Cluster table that requires one of the above features, you should undo the cluster and create standard SPD Server tables before continuing.

---

## SPD Server 4.3 Random Placement of Initial Data Partitions in DATAPATH= List

In SPD Server 3.x, the first data partition files for all tables in the same domain started in the first DATAPATH= setting that was defined in the **libnames.parm** LIBNAME configuration file. Subsequent data partition files for that table would be placed in subsequent data paths. When all SPD Server datapath contain a data partition file, the process returns to the first datapath and continues in the same fashion. However, many SPD Server installations have many small-to-medium-sized tables that would not have data partition files in all of the available datapath. This strategy could unevenly balance the distribution of data on the disk, resulting with the first few datapath in a domain containing significantly more data than the last few datapath in the domain. The skewed data distribution results in unbalanced I/O.

In SPD Server 4.3, the first partition for tables in a domain is no longer assigned to the first DATAPATH= setting that was defined in the **libnames.parm** domain definition. Instead, SPD Server chooses randomly from the available data paths when placing the first partition for a large data table. As a result, the data is physically distributed more evenly and permits more balanced I/O within SPD Server processing.

By default, SPD Server 4.3 is configured to utilize random placement of initial data partitions among SPD Server data paths. The RANDOMPLACEDPF option is specified in the **spdsserv.parm** file. To disable random placement of initial data partitions in the DATAPATH= list, remove the RANDOMPLACEDPF option from your **spdsserv.parm** file.

Additional information on the RANDOMPLACEDPF option can be found in the SPD Server Administrator's Guide, Second Edition: Setting Up SPD Server Parameter Files, under **spdsserv.parm** file options.

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## SPD Server 4.3 Debugging Tools

SPD Server 4.3 includes debugging tools that system administrators will find useful. The debugging tools will allow SPD Server system administrators to create debug images and to evaluate test images without interfering with a pre-existing production SPD Server environment. The debugging tools are for use with SPD Server 4.3 running on SAS 9.1.3. The debugging tools are organized into LIBNAME statement options for debugging, and server parameter file options for debugging. enable SPD Server 4.3 users to create a debug image that will not interfere with the SPD Server environment.

For more detailed information on SPD Server debugging tools, see the chapter on, "SPD Server Debugging Tools," in the SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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# What's New in SAS Scalable Performance Data Server 4.4, 4.41, 4.42, 4.43, 4.44, and 4.45

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## Overview

This document summarizes enhancements and changes in SPD Server 4.4, including the SPD Server 4.45, SPD Server 4.44, SPD Server 4.43, SPD Server 4.42 and SPD Server 4.41 maintenance releases. To view the enhancements and upgrades that were contained in SPD Server 4.3, see [What's New in SAS Scalable Performance Data Server 4.3](#).

Pay special attention to the following notes for SAS System compatibility related to your SPD Server 4.4 media:

- The SPD Server 4.4 distribution CD-ROM comes packaged with client modules that are compatible with SAS®9.
- SPD Server 4.4 is not compatible with SAS versions earlier than SAS®9. Consult the appropriate UNIX or Windows installation guide for more information about SAS software requirements for use with SPD Server 4.4.
- For SAS 9.1.3 Service Pack 3 and earlier releases, you must **rename** the `sassqlu_for_sas913_sp3_and_earlier` modules from the SPD Server client installation to `sassqlu`. If you do not rename this module for SAS 9.1.3 Service Pack 3 and earlier releases, problems will occur with SPD Server implicit pass-through SQL that utilizes three part names. You will get an SQL parse error from SPD Server that causes the implicit pass-through SQL to fail.

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## SPD Server 4.45 Enhancements

SPD Server 4.45, also called SPD Server 4.4 TSM5, is an interim release. SPD Server 4.45 contains maintenance fixes and feature enhancements that are not in SPD Server 4.44 and earlier releases.

## General Enhancements

The following feature enhancements are provided in SPD Server 4.45:

- SPD Server index performance after deleting values from a table has been improved. When values are deleted from a table, corresponding SPD Server 4.45 index values are virtually deleted, instead of physically deleted. Virtually deleted index values are invisible to SQL index queries. When you virtually delete an index value instead of physically deleting it, updating the index metadata requires less overhead resources. However, virtually deleted index values still occupy space in the disk image for the index. This disk image space can be reclaimed by using the ixutil index utility to reorganize the index. See the "SAS Scalable Performance Data Server Index Utility Ixutil" section of the online *SAS Scalable Performance Data Server 4.45: Administrator's Guide* for more detailed information about using the ixutil utility to generate virtually deleted value statistics and to reorganize indexes for optimum performance.
- SPD Server SQL has been enhanced to remove partial tables that can be created if certain SQL queries fail during execution. Previously, if an SQL statement such as, CREATE TABLE as SELECT failed during execution, partial tables were created that SPD Server could subsequently use, which led to erroneous results.

**Note:** The online *SAS Scalable Performance Data Server 4.45: Administrator's Guide* and the *SAS Scalable Performance Data Server 4.45: User's Guide* can be found at <http://support.sas.com/documentation/onlinedoc/spds/index.html>.

## CLUSTER LIST Statement Enhancements

The SPD Server CLUSTER LIST statement output lists the member tables of a dynamic cluster in numbered order. In SPD Server 4.45, more information is produced by the CLUSTER LIST statement.

Now, CLUSTER LIST statement output lists the member tables in a dynamic cluster, the maximum number of slots that are available in the cluster, and the unique index validation status.

The following example uses PROC SPDO to create a dynamic cluster that has a unique index, five member tables, and space for a sixth table. Then, a CLUSTER LIST statement is issued. The output lists the dynamic cluster name, the names of each member table, the maximum number of member tables, and the unique index validation status.

```
PROC SPDO library=&libdom ;
CLUSTER CREATE natlsales ;
    mem=ne_region
    mem=se_region
    mem=central_region
    mem=nw_region
    mem=sw_region
MAXSLOT=6
UNIQUEINDEX=yes ;
```

NOTE: CLUSTER NATLSALES has been created with 6 maximum slots.

```
CLUSTER LIST natlsales;
```

```
Cluster Name NATLSALES, Mem=NE_REGION
```

```
Cluster Name NATLSALES, Mem=SE_REGION
```

```
Cluster Name NATLSALES, Mem=CENTRAL_REGION
```

```
Cluster Name NATLSALES, Mem=NW_REGION
```

```
Cluster Name NATLSALES, Mem=SW_REGION
```

NOTE: The maximum number of possible slots is 6.

NOTE: Unique index is validated in CLUSTER NATLSALES.

## Method Trace for SQL Enhancements

The enhanced SPD Server method trace for SQL now includes the names of the source tables. Including source table names makes it easier to determine how the SPD Server SQL planner constructed the query in cases where multiple source tables were used.

To better understand the method trace enhancement, the following example shows a simple SQL statement that joins two tables and explicitly states the SPD Server execution methods that you want to use. The enhanced information content is displayed:

### Before SPD Server 4.45:

```
PROC SQL;
CONNECT to sasspds(dbq= ... );
EXECUTE(RESET _method) by sasspds;
EXECUTE(CREATE TABLE c as SELECT t1.b t2.c
        FROM a t1, b t2
        WHERE t1.a = t2.a) by sasspds;
```

SPDS\_NOTE: SQL execution methods chosen are:

```
sqxcrt
sqxjpl
```

SPDS\_NOTE: Table X000003.C created, with 1 rows and 2 columns.

### SPD Server 4.45:

```
PROC SQL;
CONNECT to sasspds(dbq= ... );
EXECUTE(RESET _method) by sasspds;
EXECUTE(CREATE TABLE c as SELECT t1.b t2.c
        FROM a t1, b t2
        WHERE t1.a = t2.a) by sasspds;
```



SPDS\_NOTE: SQL execution methods chosen are:

sqxcrta

sqxjpl1

sqxrc ( [X0000001].A (alias = t1) )

sqxrc ( [X0000001].B (alias = t2) )

SPDS\_NOTE: Table X0000001.C created, with 1 rows and 2 columns.

See the section "Important SPD Server SQL Planner Options" in the online *SAS Scalable Performance Data Server 4.45: User's Guide* for more information on the SPD Server SQL planner.

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## SPD Server 4.44 Enhancements

SPD Server 4.44, also called SPD Server 4.4 TSM4, is an interim release. SPD Server 4.44 contains maintenance fixes and feature enhancements that are not in SPD Server 4.43 and earlier releases.

The following feature enhancement is provided in SPD Server 4.44:

- LASTCLUSTERMEMBER is a new argument that you can use with the MEMNUM= table option to when you want to query or read from the last member table of a dynamic cluster. Instead of counting cluster members to determine the number ( $n$ ) of the last member to use in the statement MEMNUM= $n$ ; you can specify MEMNUM=LASTCLUSTERMEMBER. When you specify MEMNUM=LASTCLUSTERMEMBER, SPD Server selects the last member for you. No numeric value for  $n$  is required when you use the LASTCLUSTERMEMBER argument.

For example, to view the contents of the last member table in a cluster called Clustername, issue the statement:

```
PROC CONTENTS data=Clustername(MEMNUM=LASTCLUSTERMEMBER) ;
```

See the section "Querying and Reading Member Tables in a Dynamic Cluster" in the online *SAS Scalable Performance Data Server 4.45: User's Guide* for more information.

**Note:** The online *SAS Scalable Performance Data Server 4.45: Administrator's Guide* and the *SAS Scalable Performance Data Server 4.45: User's Guide* can be found at <http://support.sas.com/documentation/onlinedoc/spds/index.html>

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## SPD Server 4.43 Enhancements

SPD Server 4.43, or SPD Server 4.4 TSM3, is an interim release. SPD Server 4.43 contains maintenance fixes and feature enhancements that are not found in SPD Server 4.42 and previous releases.

### General Enhancements

The following feature improvements are provided in the SPD Server 4.43 release:

- The Windows 64 client WIA64 is supported. For more information on Windows 64 client support, see the "Installing and Configuring SPD Server Clients" topic in the "SPD Server Windows Installation Guide" documentation, or the "Configuring SPD Server Client Software" topic in the "SPD Server UNIX Installation Guide" documentation in the Installation section of the online *SAS Scalable Performance Data Server 4.43: Administrator's Guide*.
- The SPD Server Index Utility adds an option to provide index distribution statistics. For more information on the index distribution statistics option, see the "Ixutil Options" topic in the "SPD Server Index Utility Ixutil" documentation in the System Management section of the online *SAS Scalable Performance Data Server 4.43: Administrator's Guide*.
- Documentation has been added for using SPD Server with an Internet firewall. For more information on configuring SPD Server for use with Internet firewalls, see the "Using SPD Server with an Internet Firewall" documentation in the Security section of the online *SAS Scalable Performance Data Server 4.43: Administrator's Guide*.
- Internal performance optimizations have been implemented in SPD Server pass-through SQL. The updated SPD Server pass-through SQL improves the performance of queries that select a small number of columns from a table. The performance gains are most noticeable when joining tables where the result set contains only a small proportion of the total number of columns that exist in the joined tables.
- BY-clause control has been enhanced. A new server parameter option, [NO]BYINDEX, and a corresponding server macro, SPDSNBIX=, are used to permit BY-clauses on an indexed variable to sort the table using the variable's index. For more information on the [NO]BYINDEX server parameter option, see the "Setting Up SPD Server Parameter Files" documentation in the Configuration section of the online *SAS Scalable Performance Data Server 4.43: Administrator's Guide*. For more information on the SPDSNBIX= server macro, see the "SPD Server Macro Variables" documentation of the "SPD Server Reference" section of the online *SAS Scalable Performance Data Server 4.43: User's Guide*.
- SPD Server 4.43 features secure LDAP authentication for Solaris, AIX, HP-UX, and HP

Itanium. For more information on secure LDAP authentication, see the "SPD Server Parameter File Configurations for LDAP" topic in the "Setting Up SPD Server Parameter files" documentation in the Configuration section of the online *SAS Scalable Performance Data Server 4.43: Administrator's Guide*.

- The SPD Server cluster add operation has been modified to allow cluster reads while a cluster add is progress. The reader sees the state of the cluster when the read begins. Cluster adds still are exclusive operations; a cluster can only have one add operation occurring at any time.

**Note:** The online *SAS Scalable Performance Data Server 4.43: Administrator's Guide* and the *SAS Scalable Performance Data Server 4.43: User's Guide* can be found at <http://support.sas.com/documentation/onlinedoc/spds/index.html>

## **CLUSTER MODIFY Command for PROC SPDO**

The PROC SPDO command set for dynamic clusters features a new CLUSTER MODIFY cluster command. The CLUSTER MODIFY command sets a MINMAXVARLIST attribute on one or more variables that belong to an existing dynamic cluster. When the SPD Server runs the CLUSTER MODIFY command, the dynamic cluster is unclustered while the variable modifications are made to the individual member tables. The cluster is recreated after the MINMAXVARLIST changes are completed.

For more information on the CLUSTER MODIFY command, see the "Modify Dynamic Cluster Tables" topic in the "SPD Server Dynamic Tables" document in the "SPD Server Usage" section of the online *SAS Scalable Performance Data Server 4.43: User's Guide*.

## **Table Option MEMNUM= for Dynamic Clusters**

Dynamic clusters provide a table option MEMNUM=. The MEMNUM= option allows you to perform query or read operations on a single member table that belongs to the cluster. When you use the MEMNUM= option, SPD Server opens only the specified member table instead of opening all of the member tables that belong to the cluster.

For more information on the MEMNUM= option, see the "Querying and Reading Member Tables in a Dynamic Cluster" topic in the "SPD Server Dynamic Tables" document in the "SPD Server Usage" section of the online *SAS Scalable Performance Data Server 4.43: User's Guide*.

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## **SPD Server 4.42 Enhancements**

SPD Server 4.42, or SPD Server 4.4 TSM2, is an interim release. SPD Server 4.42 contains

maintenance fixes and feature enhancements not found in SPD Server 4.41 and previous releases.

## General Enhancements

The following feature enhancements are provided in the SPD Server 4.42 release:

- The SQL reset option, PRINTLOG, logs SQL queries to the SPD Server log. For more information, see the "Important SPD Server SQL Planner Options" section of the documentation chapter "Scalable Performance Data Server SQL Features," in the online SPD Server 4.4 User's Guide.
- SQL LIBNAMEs and record-level locking LIBNAMEs are supported. For more information, see the "LIBNAME Proxy Commands" section of the documentation chapter "Scalable Performance Data Server Operator Interface Procedure (PROC SPDO)," in the online SPD Server 4.4 Administrator's Guide.
- An SPD Server proxy manager utility is part of the SAS Management Console. The SPD Server Manager utility monitors SPD Server LIBNAME activity. For more information, see the "Proxy Manager" section of the documentation chapter "Administering and Configuring SPD Server Using the SAS Management Console," in the online SPD Server 4.4 Administrator's Guide.
- The SPD Server STARJOIN facility offers an IN-SET transformation. The IN-SET transformation allows you to use star schema processing when the star schema's fact and dimension tables have simple indexes on join columns. For more information, see the "SPD Server STARJOIN Optimization" section in the documentation chapter "Scalable Performance Data Server STARJOIN Facility," in the online SPD Server 4.4 User's Guide.
- A BY clause sort optimization is available for cluster tables if the member tables in the star schema are sorted by the BY variable. For more information, see the "Dynamic Cluster BY Clause Optimization" section in the documentation chapter "Scalable Performance Data Server Dynamic Cluster Tables," in the online SPD Server 4.4 User's Guide.
- Secure LDAP authentication is available for Solaris, AIX, and Windows. For more information, see the "SPD Server Parameter File Configurations for LDAP " section in the documentation chapter "Setting Up Scalable Performance Data Server Parameter files," in the online SPD Server 4.4 Administrator's Guide.

The SPD Server User's Guide and Administrator's Guide documents in PDF format can be viewed online at the following URL: [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## Cluster Create Option for Unique Indexes

The CLUSTER CREATE command in PROC SPDO has a new optional argument that allows the user to specify whether unique indexes that are defined in the member tables should be validated and marked as unique in the cluster. If the UNIQUEINDEX option is set to NO, then unique indexes are not validated and the cluster metadata will not show the indexes as unique within the

cluster. If the UNIQUEINDEX option is not specified, then it defaults to YES and the indexes are validated and marked unique within the cluster.

The usage syntax for the Cluster Create option is:

```
CLUSTER CREATE clustername  
MEM=member_table1  
MEM=member_table2  
...  
MEM=member_table_n  
MAXSLOT=n  
UNIQUEINDEX=<yes/no>;
```

For more detailed information on PROC SPDO commands, see the chapter "SPD Server Operator Interface Procedure (PROC SPDO)," in the online SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## **Additional Operator Interface Proxy Commands**

The existing PROC SPDO (SPD Server Operator Interface Procedure) command set has new commands that gather proxy information about pass-through SQL librefs. The new commands, LIST USERS/LOCKING and SET USER/LOCKING, return information to the user about record-level locking proxies that are associated with pass-through SQL librefs.

The new privileged operator command OPER INTERRUPT provides the ability for certain users to interrupt long-running jobs. The new OPER DISCONNECT privileged operator command disconnects the proxy from its client. The OPER HALT and OPER RESUME privileged operator commands are no longer supported.

For more detailed information on Operator Interface Proxy Commands, see the chapter "SPD Server Operator Interface Procedure (PROC SPDO)," in the online SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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## **SPD Server 4.41 Enhancements**

SPD Server 4.41, or SPD Server 4.4 TSM1, is an interim release. SPD Server 4.41 contains maintenance fixes and feature enhancements not found in SPD Server 4.4 and previous releases.

The following feature enhancements are provided in the SPD Server 4.41 release:

- Indexes can be created on materialized views. For more information, see the "Materialized Views" section in the chapter "Optimizing SAS Scalable Performance Data Server Performance," in the online SPD Server 4.4 User's Guide.
- The std, avg, stderr, uss, css, and var GROUP BY functions are supported for use with fast index scans. All functions that can utilize index scans can also accept the DISTINCT term as well. For more information, see the "Index Scans" section in the chapter "Optimizing SAS Scalable Performance Data Server Performance," in the online SPD Server 4.4 User's Guide.
- The SPDSBKUP utility backs up MINMAXVARLIST information in addition to table column metadata such as FORMAT and LABEL. The SPDSRSTR utility restores the MINMAXVARLIST metadata with the table column metadata. For more information about SPDSBKUP and SPDSRSTR, see the chapter "SAS Scalable Performance Data Server Backup and Restore Utilities," in the SPD Server 4.4 Administrator's Guide.
- When you create a sorted table by using the ORDER BY clause with the CREATE TABLE SQL statement, the ORDER BY column in the newly created table is marked as sorted. Subsequent queries to the table that include an ORDER BY on the column will not cause the table to be re-sorted.

The SPD Server User's Guide and Administrator's Guide documents in PDF format can be viewed online at the following URL: [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

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## **SPD Server 4.4 User's Guide and Administrator's Guide**

The SPD Server 4.4 User's Guide and Administrator's Guide has been removed from the installation media. The documentation is available at the following URL:

[http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

Placing the SPD Server 4.4 documentation on the SAS Documentation Page enables simple access via a bookmarked location on your preferred Web browser. Placing the SPD Server 4.4 documentation on the SAS Documentation Page also facilitates rapid distribution of periodic SAS documentation updates between successive SPD Server releases.

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## **SPD Server 4.4 Platform Support Changes**

### **New Platforms:**

SPD Server 4.4 has added support for the UNIX Solaris x64 platform.

## Platforms No Longer Supported:

SPD Server 4.4 no longer supports the Linux ia64 platform or the UNIX HP TRU64 platform.

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## SPD Server 4.4 and SAS Data Integration Studio

You can integrate the processing power of SPD Server 4.4 with SAS Data Integration Studio. The plug-in file that SPD Server uses to integrate with the SAS Management Console can also integrate SPD Server resources into the SAS Data Integration Studio user interface.

To integrate SPD Server 4.4 functionality into the SAS Data Integration Studio user interface, copy the SPD Server 4.4 Java plug-in file into the SAS Data Integration Studio **plugins** subdirectory.

The SPD Server 4.4 Java plug-in file is located at:

***SASROOT/spds44/spdssmc/sas.smc.SpdsMgr.jar***

**Note:** *SASROOT* represents the path to the base directory of the SAS software installation on your client machine. *Spds44/* represents the installed SPD Server software directory. The name of the installed SPD Server software directory varies according to the specific version and release of your SPD Server software. For example, the path to your SPD Server Java plug-in file might begin with *SASROOT/spds44*, *SASROOT/spds44tsm1*, or *SASROOT/spds44tsm2*, depending on if you have the original SPD Server 4.4 software, or the first or second maintenance release of the SPD Server 4.4 software.

Copy the SPD Server 4.4 Java plug-in file to the SAS Data Integration Studio **plugins** directory:

***SASROOT/ SASETLStudio/9.1/plugins/sas.smc.SpdsMgr.jar***

---

## SPD Server 4.4 New Features

### Materialized Views

A Materialized View will save the results of a SQL view in a temporary table. When the view is queried, rather than executing the view to determine the results, the temporary table is used. If any of the input tables to the view are modified, the Materialized View will dynamically update the temporary results. Materialized View is only supported via the

SPD Server SQL pass-through interface. A materialized view can result in significant performance gains for SQL queries that reference the view.

For more detailed information on materialized views, see the section on Materialized Views in the chapter on, " Optimizing SAS Scalable Performance Data Server Performance," in the online SPD Server 4.4 User Documentation located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## **SPD Server Profiling**

A Server Profiling and Logger process is available to monitor and log the activity of the SPD Server processes. Once logged, the output can be formatted to be read into a SAS table for post analysis.

The SMC SPD Server Manager can connect to the Server Profiling Logger to provide real-time feedback of the SPD Server 4.4 process activity. The SPD Server 4.4 process profile panel will dynamically refresh SPD Server process activity such as memory and CPU usage. SPD Server processes are identified by their process ID, and for any proxy process the SPD Username that is associated with the proxy.

This feature is only available for SPD Server 4.4 installed on UNIX.

For more detailed information on SPD Server Profiling, see the chapter on, " SMC SPD Server Manager" in the online SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## **LDAP Password Authentication**

LDAP Authentication will cause SPD Server to authenticate a user password via LDAP rather than by the password in the PSMGR database. LDAP authentication will allow a SPDS User to have the same user/password as their UNIX/Windows logon, PROVIDED the UNIX/Windows logon meets the SPD Server User/Password character restrictions.

The administrator can select the mode of password authentication with server parameters; either via the PSMGR database or LDAP. Once selected all authentication will be done in that mode. With LDAP Authentication, a SPD user must still be entered in the SPD Server PSMGR database to maintain other information necessary for the SPD Server such as the User's groups and access level.

This feature is only available for SPD Server 4.4 installed on Windows or Solaris.

For more detailed information on SPD Server LDAP Authentication, see the chapter on, " SPD Server Password Manager Utility," in the online SPD Server 4.4 Administrator's



Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## Dynamic Locking

Dynamic Locking provides more flexible locking semantics on a domain which allows multiple clients to share both read and write access to tables in the domain without getting member lock failures. Dynamic Locking differs from SPD record level locking in that clients using dynamic locking connect to a separate SPD User Proxy process for each libname connection in the domain, versus record level locking where all users share the same Record Level Locking Proxy process. Having separate proxy processes versus the single record level proxy lessens the chance of hitting resource limits in the single process, and removes a single Record Level Locking point of failure for the Record Level Proxy.

Dynamic Locking may provide better performance than record level locking for some cases where concurrent reads and updates to a table are required, however the performance benefit needs to be measured on a case by case basis.

For more detailed information on SPD Server Dynamic Locking, see the chapter on, "Accessing and Creating SAS Scalable Performance Data Server Tables," in the online SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## Surfacing Ports through an Internet Firewall

SPD Scalable Performance Data Server uses a client- server relationship, where the client cannot exist on the same host as the server. If the site has an internet firewall, it is necessary to control the ports that the SPD Server and client use for communication such that those ports can be surfaced through the internet firewall. Certain ports that the SPD Server utilizes are defined at start-up time, and can therefore be easily controlled. However, ports are dynamically allocated to support each connection to the SPD Server and the subsequent User Proxy process(s) created as a result of the connection. These ports are usually allocated as any available port. To be able to control the dynamic ports used by SPD Server, the MINPORTNO and MAXPORTNO server parameters can be used.

For more detailed information on surfacing ports through an internet firewall, see the chapter on, "Setting Up SPD Server Host Parameter Files," in the online SPD Server 4.4 Administrator's Guide, and the sections on "How do SPDS server and client processes communicate" and "How do I know which ports must be surfaced through an internet firewall" in the chapter on, "SPD Server Frequently Asked Questions," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).



The MINPORTNO and MAXPORTNO server parameters are now fully supported features in SPD Server 4.4.

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## **SPD Server 4.4 Enhancements**

### **Minmax Table Indexing for Character Columns**

The SPD Server table option for MINMAXVARLIST= has been enhanced to also support character columns. The SPD Server WHERE planner will utilize the minmaxvarlist for a table to quickly determine if a where clause on the column can be quickly evaluated as trivially TRUE or FALSE.

For more detailed information on Minmax table indexing, see the chapter on, "Optimizing SAS Scalable Performance Data Server Performance on Minmax Indexes," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

### **Expression Support for STARJOIN**

The SPD Server STARJOIN optimization has been enhanced to be able to accept queries that previously could not use the optimization because they met the STARJOIN requirements except that a selected column was an expression rather than a simple column.

For more detailed information on expression support for STARJOIN, see SQL section in the chapter on, "STARJOIN Optimization," in the SPD Server 4.4 User's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

### **Dynamic Support for Larger Index Keys**

The SPD Server Indexes can now dynamically support an index key up to 32,608 bytes long. An index key is the sum of the length of all of the columns that comprise the index. Previously, it was necessary to reconfigure the server BTREE\_PAGESIZE option to support larger index keys. With dynamic sizing of the index metadata to support large index keys, this is no longer necessary and the BTREE\_PAGESIZE server option is now obsolete.

### **SORTEDBY Specification for Dynamic Clusters**

SPD Server now supports the SORTEDBY specification for columns that are defined on a dynamic cluster. In order to use the SORTEDBY specification, each member table in the dynamic cluster must have SORTEDBY specification set for the column. You specify the SORTEDBY setting on a dynamic cluster in the same way you would for a simple table.

```
PROC DATASETS library=libdomain;  
modify clustername(sortedby=<var>);  
quit;
```

The SORTEDBY specification assumes that the dynamic cluster was created using member tables that were added in the correct SORTEDBY order.

## Additional Backup, Restore, and List Options

The SPD Server backup utility has added a "-v" option to provide verbose output. The "-v" option will log the full name of the backup file and table of contents file.

The SPD Server backup utility has added a "-proj <dir>" option to support backing up files in a domain project directory.

The SPD Server restore utility has added a "-proj <dir>" option to support restoring files to a domain project directory.

The SPD Server list utility has added a "-s" option to include the size (in bytes) of the component files listed.

The SPD Server list utility has added an "-info" option to get table information for a domain, including the number of component metadata, data, and index files for a table, and the accumulated size of the component files for a table.

For more detailed information, see the chapter on, "SPD Server Backup and Restore Utilities," in the online SPD Server 4.4 Administrator's Guide, located at [http://support.sas.com/documentation/onlinedoc/91pdf/index\\_913.html](http://support.sas.com/documentation/onlinedoc/91pdf/index_913.html).

## Additional Ixutil Options

The SPD Server ixutil utility has added the -crejidx option to create a join index, the -deljidx option to delete a join index, the -statjidx option to print join index statistics, and the -lstjidx option to list the join indexes in a domain.

For more detailed information, see the chapter on, "SPD Server Index Utility," in the online SPD Server 4.4 Administrator's Guide, located at <http://support.sas.com/>

[documentation/onlinedoc/91pdf/index\\_913.html](documentation/onlinedoc/91pdf/index_913.html).

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## What's New in SAS/SHARE 9.0 and 9.1

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### Overview

The following new and enhanced features for SAS/SHARE ensure information privacy and improve ease of use:

- The network security protocol Secure Sockets Layer (SSL) encrypts connections between client and server.
- TCP/IP users can specify a port number explicitly, instead of specifying an already defined server ID.
- Any form of a password option in a SAS/SHARE statement can be specified as an encoded password.
- The SERVER= option in the LIBNAME statement specifies a CONNECT server definition that has been defined in a SAS Metadata Repository.
- The HOSTNAME= option in the LIBNAME statement specifies the name of the node on which the SAS/SHARE server runs.
- The CLIENTID= option in the PROC SERVER statement enables you to select whether the log identifies clients by their session names or their secured names.
- The THREADEDTCP option in the PROC SERVER statement invokes the threaded version of the TCP/IP access method and associated threaded infrastructure when the TCP/IP access method is specified. (This option is experimental.)
- Specifying an automatic log rollover by using the LOGPARM option is a preferred log management strategy for a SAS/SHARE server.
- Revised procedures are available for creating the SAS/SHARE server environment under the UNIX and Windows operating environments.
- If the SAS/SHARE server log is not available, error messages are written to the SAS console log.

- The documentation includes new information about server log messages and SAS system options that are used with SAS/SHARE. For details, see Interpreting Server Log Messages; SAS/SHARE General SAS System Options; SAS/SECURE and SAS Proprietary System Options; and Secure Sockets Layer (SSL) Options.

## Note:

- This section describes the features of SAS/SHARE 9.1 that are new or enhanced since SAS 8.2.
- z/OS is the successor to the OS/390 operating system. SAS/SHARE is supported on both OS/390 and z/OS operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

---

## Details

### Security

- Secure Sockets Layer (SSL) is a protocol that provides network security and protects the privacy of information by encrypting SAS/SHARE client/server transfers under the UNIX and Windows operating environments. SSL is implemented by means of Secure Sockets Layer (SSL) Options.
- Using encoded passwords promotes security and enables you to store SAS programs that do not contain clear-text passwords. The syntax for each of the following statements in SAS/SHARE enables you to specify encoded passwords.
  - PROC SERVER
    - OAPW=*password*;
    - UAPW=*password*;
    - PT2DBPW=*password*;
  - LIBNAME
    - PASSWORD=*password*;

- `SAPW=password;`
- PROC OPERATE
  - `SAPW=password;`
  - `PASSWORD=password;`
  - `DISPLAY SERVER (SAPW=password);`
  - `QUIESCE SERVER (SAPW=password);`
  - `START SERVER (SAPW=password);`
  - `STOP SERVER (SAPW=password);`
- PROC SQL;
  - `CONNECT TO REMOTE (SAPW=password);`
  - `SELECT...FROM CONNECTION TO (PASSWORD=password);`
  - `SELECT...FROM CONNECTION TO (PT2DBPW=password);`

## Compatibility

SAS 9.1 does not permit a client or a server to connect to a Version 6 server or client. For details, see SAS/SHARE Cross-Version Issues, SAS 9.1.

## Explicit Port Specification

If a SAS/SHARE client uses the TCP/IP access method to access a SAS/SHARE server by using an explicit port specification instead of the server ID, you can now use two consecutive underscores ( \_ \_ ) with a port number in the syntax, in place of a server ID that has been defined in the client TCP/IP SERVICES file. An explicit port can be specified in the `SERVER=` option in

- the LIBNAME statement
- the SERVER procedure
- the OPERATE procedure
- the Remote SQL Pass-Through (RSPT) facility.

**Note:** Specifying a server using a port number is **not** supported for ODBC clients. ■

## Enhanced Use of the LOGPARM System Option

Specifying an automatic log rollover is a preferred strategy for managing a SAS/SHARE server session. Setting the "ROLLOVER=AUTO" value for the LOGPARM option closes the current log and opens a new log file if the value of the LOG= option changes. Rollover is triggered by a change in the value of the LOG= option. For examples of configuring automatic log rollover in the server environment, see UNIX and Windows.

## New LIBNAME Options and Values

- The SERVER= option in the LIBNAME statement specifies a CONNECT server definition that has been defined in a SAS Metadata Repository.
- The HOSTNAME= option in the LIBNAME statement specifies the name of the node on which the SAS/SHARE server runs.

## New PROC SERVER Options

- The CLIENTID= option in the PROC SERVER statement enables you to select whether the log identifies clients by their session names or their secured names. Your choice determines the search order that is used to locate the appropriate client ID.
- The THREADEDTCP option in the PROC SERVER statement invokes the threaded version of the TCP/IP access method and associated threaded infrastructure when the TCP/IP access method is specified.

### **CAUTION:**

**THREADEDTCP is an experimental option that is available in SAS 9.1**

Do not use this option in production jobs. ■

## **Using the SAS Console Log to Analyze Server Errors**

If the SAS/SHARE server encounters problems at SAS initialization or at SAS termination, the server log might not be available to receive error messages. If the server log is not available, error messages are written to the SAS console log. For details about the SAS console log, see the companion documentation that is appropriate for the operating environment that you are using.

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# What's New in SAS/STAT 9.0 and 9.1, and Post-Release Downloads

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## Overview

This release brings several new procedures to SAS/STAT software. The MI and MIANALYZE procedures implement the multiple imputation strategy for missing data. Experimental in Releases 8.1 and 8.2, these procedures are now production. The ROBUSTREG procedure analyzes data that may include outliers; it provides stable results in their presence. The TPHREG procedure is a test release of the PHREG procedure that incorporates the CLASS statement.

Power and sample size computations also become available in SAS 9.1. New procedures POWER and GLMPOWER provide these computations for a number of analyses, and the Power and Sample Size Application surfaces them through a point-and-click interface.

SAS 9.1 introduces two new procedures for the analysis of survey data. The SURVEYFREQ procedure produces one-way to  $n$ -way frequency and crosstabulation tables for data collected from surveys. These tables include estimates of totals and proportions (overall, row percentages, column percentages) and the corresponding standard errors. The SURVEYLOGISTIC procedure performs logistic regression for survey data, and it can also fit links such as the cumulative logit, generalized logit, probit, and complementary log-log functions. Both of these procedures incorporate complex survey sample designs, including designs with stratification, clustering, and unequal weighting, in their computations.

In addition, this release includes numerous enhancements to existing procedures. For example, conditional logistic regression is available in the LOGISTIC procedure through the new STRATA statement, and scoring of data sets is available through the new SCORE statement. The GLM procedure now provides the ability to form classification groups using the full formatted length of the CLASS variable levels. In addition, the SURVIVAL statement in the LIFETEST procedure enables you to create confidence bands (also known as simultaneous confidence intervals) for the survivor function  $S(t)$  and to specify a transformation for computing the confidence bands and the pointwise confidence intervals.

Several new procedures have been made available for the Windows release via web download. See below for more information.

More information about the changes and enhancements to SAS/STAT software follows. Features new in SAS 9.1 are indicated with a 9.1 icon; other features were available with SAS 9.0. Details can be found in the documentation for the individual procedures.

## Parallelization

Selected functionalities in the GLM, LOESS, REG, and ROBUSTREG procedures have been multithreaded to exploit hardware with multiple CPUs. Refer to Cohen (2002) for more details.

## Statistical Graphics Using ODS

A number of SAS/STAT procedures are using an experimental extension to the Output Delivery System (ODS) that enables them to create statistical graphics automatically. The facility is invoked when you include an ODS GRAPHICS statement before your procedure statements. Graphics are then created automatically, or when you specify procedure options for graphics. Procedures taking advantage of ODS graphics are the ANOVA, CORRESP, GAM, GENMOD, GLM, KDE, LIFETEST, LOESS, LOGISTIC, MI, MIXED, PHREG, PLS, PRINCOMP, PRINQUAL, REG, ROBUSTREG, and TPSLINE procedures. The plots produced and the corresponding options are described in the documentation for the individual procedures.

## Post SAS 9.1 Web Downloads

Several procedures are now available via Web download for the Windows platform. They only work with SAS 9.1. PROC GLIMMIX fits generalized linear mixed models. The experimental QUANTREG procedure performs quantile regression. The experimental GLMSELECT procedure performs effect selection in the framework of general linear models. For more information about these procedures and a link to the download site, see [www.sas.com/statistics/](http://www.sas.com/statistics/)

---

## CATMOD Procedure

**9.1** Memory handling has been improved in the CATMOD procedure. The PARAM=REFERENCE option has been added to the MODEL statement and produces reference cell parameterization. Other new options include the ITPRINT, DESIGN, and PROFILE|POPPROFILE options in the PROC statement.

---

## **DISTANCE Procedure**

**9.1** The new DISTANCE procedure computes various measures of distance, dissimilarity, or similarity between the observations (rows) of a SAS data set. These proximity measures are stored as a lower triangular matrix or a square matrix in an output data set (depending on the SHAPE= option) that can then be used as input to the CLUSTER, MDS, and MODECLUS procedures. The input data set may contain numeric or character variables, or both, depending on which proximity measure is used. PROC DISTANCE also provides various nonparametric and parametric methods for standardizing variables. Distance matrices are used frequently in data mining, genomics, marketing, financial analysis, management science, education, chemistry, psychology, biology, and various other fields.

---

## **FACTOR Procedure**

The NOPROMAXNORM option turns off the default row normalization of the pre-rotated factor pattern, which is used in computing the promax target matrix.

You can now produce standard errors and confidence limits with the METHOD=ML option for the PROMAX factor solutions. You can obtain the standard errors with the SE option, control the coverage displays with the COVER= option, and set the coverage level with the ALPHA= option.

---

## **FREQ Procedure**

The BDT option includes Tarone's adjustment in the Breslow-Day test for homogeneity of odds ratios. Refer to Agresti (1996) and Tarone (1985).

The ZEROS option in the WEIGHT statement includes zero-weight observations in the analysis. (By default, PROC FREQ does not process zero-weight observations.) With the ZEROS option, PROC FREQ displays zero-weight levels in crosstabulation and frequency tables. For one-way tables, the ZEROS option includes zero-weight levels in chi-square tests and binomial statistics. For multiway tables, the ZEROS option includes zero-weight levels in kappa statistics.

The CROSSLIST option displays crosstabulation tables in ODS column format. Unlike the default crosstabulation table, the CROSSLIST table has a table definition that you can

customize with PROC TEMPLATE. The NLEVELS option provides a table with the number of levels for all TABLES statement variables.

**9.1** The FREQ procedure now produces exact confidence limits for the common odds ratio and related tests.

---

## GENMOD Procedure

The GENMOD procedure now forms classification groups using the full formatted length of the CLASS variable levels. Several new full-rank CLASS variable parameterizations are now available: polynomial, orthogonal polynomial, effect, orthogonal effect, reference, orthogonal reference, ordinal, and orthogonal ordinal. The default parameterization remains the same less-than-full-rank parameterization used in previous releases.

Zero is now a valid value for the negative binomial dispersion parameter corresponding to the Poisson distribution. If a fixed value of zero is specified, a score test for overdispersion (Cameron and Trivedi 1998) is computed.

**9.1** As an experimental feature, PROC GENMOD now provides model assessment based on aggregates of residuals.

---

## GLM Procedure

The GLM procedure now forms classification groups using the full formatted length of the CLASS variable levels.

In addition, you can compute exact  $p$ -values for three of the four multivariate tests (Wilks' Lambda, the Hotelling-Lawley Trace, and Roy's Greatest Root) and an improved  $F$ -approximation for the fourth (Pillai's Trace). The default MSTAT=FAPPROX in the MANOVA and REPEATED statements produces multivariate tests using approximations based on the  $F$  distribution. Specifying MSTAT=EXACT computes exact  $p$ -values for three of the four tests (Wilks' Lambda, the Hotelling-Lawley Trace, and Roy's Greatest Root) and an improved  $F$ -approximation for the fourth (Pillai's Trace).

---

## GLMPOWER Procedure

**9.1** The GLMPOWER procedure performs prospective analyses for linear models, with a variety of goals:

- determining the sample size required to obtain a significant result with adequate probability (power)
- characterizing the power of a study to detect a meaningful effect
- conducting what-if analyses to assess sensitivity of the power or required sample size to other factors

You specify the design and the cell means using an exemplary data set, a data set of artificial values constructed to represent the intended sampling design and the surmised response means in the underlying population. You specify the model and contrasts using MODEL and CONTRAST statements similar to those in the GLM procedure. You specify the remaining parameters with the POWER statement, which is similar to analysis statements in the new POWER procedure.

---

## KDE Procedure

**9.1** The new UNIVAR and BIVAR statements provide improved syntax. The BIVAR statement lists variables in the input data set for which bivariate kernel density estimates are to be computed. The UNIVAR statement lists variables in the input data set for which univariate kernel density estimates are to be computed.

---

## LIFETEST Procedure

The new SURVIVAL statement enables you to create confidence bands (also known as simultaneous confidence intervals) for the survivor function  $S(t)$  and to specify a transformation for computing the confidence bands and the pointwise confidence intervals. It contains the following options.

- The OUT= option names the output SAS data set that contains survival estimates as in the OUTSURV= option in the PROC LIFETEST statement.
- The CONFTYPE= option specifies the transformation applied to  $S(t)$  to obtain the pointwise confidence intervals and the confidence bands. Four transforms are available: the arcsine-square root transform, the complementary log-log transform, the logarithmic transform, and the logit transform.
- The CONFBAND= option specifies the confidence bands to add to the OUT= data set. You can choose the equal precision confidence bands (Nair 1984), or the Hall-

- Wellner bands (Hall and Wellner 1980), or both.
- The BANDMAX= option specifies the maximum time for the confidence bands.
  - The BANDMIN= option specifies the minimum time for the confidence bands.
  - The STDERR option adds the column of standard error of the estimated survivor function to the OUT= data set.
  - The ALPHA= option sets the confidence level for pointwise confidence intervals as well as the confidence bands.

**9.1** The LIFETEST procedure now provides additional tests for comparing two or more samples of survival data, including the Tarone-Ware test, Peto-Peto test, modified Peto-Peto test, and the Fleming-Harrington  $G_{\rho}$  family of tests. Trend tests for ordered alternatives can be requested. Also available are stratified tests for comparing survival function while adjusting for prognostic factors that affect the event rates.

---

## LOESS Procedure

**9.1** The LOESS procedure now performs DF computations using a sparse method when appropriate. In addition, the DFMETHOD=APPROX option is available.

---

## LOGISTIC Procedure

The new SCORE statement enables you to score new data sets and compute fit statistics and ROC curves without refitting the model. Information for a fitted model can be saved to a SAS data set with the OUTMODEL= option, while the INMODEL= option inputs the model information required for the scoring.

The new STRATA statement enables you to perform conditional logistic regression on highly stratified data using the method of Gail, Lubin, and Rubenstein (1981). The OFFSET option is now enabled for logistic regression.

The LOGISTIC procedure now forms classification groups using the full formatted length of the CLASS variable levels.

Several new CLASS parameterizations are available: ordinal, orthogonal effect, orthogonal reference, and orthogonal ordinal.

You can now output the design matrix using the new OUTDESIGN= option.

The definition of concordance has been changed to make it more meaningful for ordinal models. The new definition is consistent with that used in previous releases for the binary response model.

**9.1** Enhancements for the exact computations include

- improved performance
- Monte Carlo method
- mid- $p$  confidence intervals

For an exact conditional analysis, specifying the STRATA statement performs an efficient stratified analysis. The method of Mehta, Patel, and Senchaudhuri (1992), which is more efficient than the Hirji, Tsiatis, and Mehta (1989) algorithm for many problems, is now available with the METHOD=NETWORK option.

---

## MI Procedure

The INITIAL= option in the EM statement sets the initial estimates for the EM algorithm. Either the means and covariances from complete cases or the means and standard deviations from available cases can be used as the initial estimates for the EM algorithm. You can also specify the correlations for the initial estimates from available cases.

**9.1** For data sets with monotone missingness, the REGPMM option in the MONOTONE statement uses the predictive mean matching method to impute a value randomly from a set of observed values whose predicted values are closest to the predicted value for the missing value from the simulated regression model.

You can specify more than one method in the MONOTONE statement, and for each imputed variable, the covariates can be specified separately.

The DETAILS option in the MONOTONE statement requests the display of the model parameters used for each imputation.

The experimental CLASS statement is now available to specify categorical variables. These classification variables are used either as covariates for imputed variables or as imputed variables for data sets with monotone missing patterns.

The experimental options LOGISTIC and DISCRIM in the MONOTONE statement impute missing categorical variables by logistic and discriminant methods, respectively.

---

## MIANALYZE Procedure

You can now specify the PARM= data set without specifying either the COVB= or XPXI= option when the data set contains the standard errors for the parameter estimates.

The DATA= option includes data sets that contain both parameter estimates and their associated standard errors in each observation of the data set.

The BCOV, WCOV, and TCOV options control the display of the between-imputation, within-imputation, and total covariance matrices.

A TEST statement tests linear hypotheses about the parameters,  $H_0: \mathbf{L}\boldsymbol{\beta} = \mathbf{c}$ . For each TEST statement, the procedure combines the estimate and associated standard error for each linear component ( a row of  $\mathbf{L}\boldsymbol{\beta}$  ). It can also combine the estimates and associated covariance matrix for all linear components.

The MODELEFFECTS statement lists the effects in the data set to be analyzed. Each effect is a variable or a combination of variables, and is specified with a special notation using variable names and operators. The STDERR statement lists the standard errors associated with the effects in the MODELEFFECTS statement when both parameter estimates and standard errors are saved as variables in the same DATA= data set.

The experimental CLASS statement specifies categorical variables. PROC MIANALYZE reads and combines parameter estimates and covariance matrices for parameters with CLASS variables.

---

## MIXED Procedure

**9.1** The MIXED procedure now supports geometrically anisotropic covariance structures and covariance models in the Matern class. The LCOMPONENTS option in the MODEL statement produces one degree of freedom tests for fixed effects that correspond to individual estimable functions for Type I, II, and III effects.

**9.1** The experimental RESIDUAL option of the MODEL statement computes Pearson-type and (internally) studentized residuals. The experimental INFLUENCE option in the MODEL statement computes influence diagnostics by noniterative or iterative methods. Experimental ODS graphics display the results for both of these options.



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## NPARGWAY Procedure

The new *D* option provides the one-sided  $D_+$  and  $D_-$  statistics for the asymptotic two-sample Kolmogorov-Smirnov test, in addition to the two-sided  $D$  statistic given by the EDF option. The KS option in the EXACT statement gives exact tests for the Kolmogorov-Smirnov  $D_+$ ,  $D_-$ , and  $D$  for two-sample problems.

---

## PHREG Procedure

The new WEIGHT statement enables you to specify case weights when you are using the BRESLOW or EFRON method for handling ties. Robust sandwich variance estimators of Binder (1992) are computed for the estimated regression parameters. You can specify the option NORMALIZE to normalize the weights so that they add up the actual sample size.

Two options have been added to the TEST statement: AVERAGE and E. The AVERAGE option enables you to compute a combined estimate of all the effects in the given TEST statement. This option gives you an easy way to carry out inferences of the common value of (say) the treatment effects had they been assumed equal. The E option specifies that the linear coefficients and constants be printed. When the AVERAGE option is specified along with the E option, the optimal weights of the average effect are also printed in the same tables as the coefficients.

The recurrence algorithm of Gail, Lubin, and Rubinstein (1981) for computing the exact discrete partial likelihood and its partial derivatives has been modified to use the logarithmic scale. This enables a much larger number of ties to be handled without the numeric problems of overflowing and underflowing.

**9.1** You can use the PHREG procedure to fit the rate/mean model for the recurrent events data and obtain prediction of the cumulative mean function for a given pattern of fixed covariates.

As an experimental feature, the PHREG procedure now can produce model assessments based on cumulative residuals.

---

## POWER Procedure

**9.1** The POWER procedure performs prospective analyses for a variety of goals such as the following:

- determining the sample size required to get a significant result with adequate probability (power)
- characterizing the power of a study to detect a meaningful effect
- conducting what-if analyses to assess sensitivity of the power or required sample size to other factors

This procedure covers a variety of statistical analyses such as *t* tests, equivalence tests, and confidence intervals for means; exact binomial, chi-square, Fisher's exact, and McNemar tests for proportions; multiple regression and correlation; one-way analysis of variance; and rank tests for comparing survival curves.

The POWER procedure is one of several tools available in SAS/STAT software for power and sample size analysis. PROC GLMPOWER covers more complex linear models, and the Power and Sample Size Application provides a user interface and implements many of the analyses supported in the procedures.

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## Power and Sample Size Application

The Power and Sample Size Application (PSS) is an interface that provides power and sample size computations. The application includes tasks for determining sample size and power for a variety of statistical analyses, including *t*-tests, ANOVA, proportions, equivalence testing, linear models, survival analysis, and table statistics. The application provides multiple input parameter options, stores results in a project format, displays power curves, and produces appropriate narratives for the results. Note that this application is included with SAS/STAT software but needs to be installed from the Mid Tier CD.

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## ROBUSTREG Procedure

**9.1** The ROBUSTREG procedure provides resistant (stable) results in the presence of outliers by limiting the influence of outliers. In statistical applications of outlier detection and robust regression, the methods most commonly used today are Huber (1973) M estimation, high breakdown value estimation, and combinations of these two methods. The ROBUSTREG procedure provides four such methods: M estimation, LTS estimation, S estimation, and MM estimation. With these four methods, the ROBUSTREG procedure acts as an integrated tool for outlier detection and robust regression with various contaminated

data. The ROBUSTREG procedure is scalable such that it can be used for applications in data cleansing and data mining.

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## **SURVEYFREQ Procedure**

**9.1** The SURVEYFREQ procedure produces one-way to  $n$ -way frequency and crosstabulation tables for survey data. These tables include estimates of totals and proportions (overall, row percentages, column percentages) and the corresponding standard errors. Like the other survey procedures, PROC SURVEYFREQ computes these variance estimates based on the sample design used to obtain the survey data. The design can be a complex sample survey design with stratification, clustering, and unequal weighting. PROC SURVEYFREQ also provides design-based tests of association between variables.

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## **SURVEYLOGISTIC Procedure**

**9.1** The SURVEYLOGISTIC procedure performs logistic regression on data that arise from a survey sampling scheme. PROC SURVEYLOGISTIC incorporates complex survey sample designs, including designs with stratification, clustering, and unequal weighting, in its estimation process. Variances of the regression parameters and odds ratios are computed using a Taylor expansion approximation. The SURVEYLOGISTIC procedure is similar in syntax to the LOGISTIC procedure, and it can fit link functions such as the logit, cumulative logit, generalized logit, probit, and complementary log-log functions. Maximum likelihood estimation of the regression coefficients is carried out with either the Fisher-scoring algorithm or the Newton-Raphson algorithm.

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## **SURVEYMEANS Procedure**

The STACKING option requests the procedure to produce the output data sets using a stacking table structure, which was the default in earlier releases. The new default is to produce a rectangular table structure in the output data sets. The STACKING option affects the Domain, Ratio, Statistics, and StrataInfo tables.

**9.1** One-sided confidence limits are now available for descriptive statistics.

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## **SURVEYREG Procedure**

The SURVEYREG procedure now provides the ability to form classification groups using the full formatted length of the CLASS variable levels, instead of just the first 16 characters of the levels. The ANOVA option in the MODEL statement requests that the ANOVA table be included in the output.

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## **SURVEYSELECT Procedure**

The OUTALL option produces an output data set that includes all observations from the DATA= input data set, both those observations selected for the sample and those observations not selected. With the OUTALL option, the OUT= data set contains a variable Selected that indicates whether or not the observation was selected. The OUTALL option is available for equal probability selection methods (METHOD=SRS, URS, SYS, and SEQ).

The SELECTALL option includes all stratum observations in the sample when the stratum sample size exceeds the number of observations in the stratum. The SELECTALL option is available for without-replacement selection methods (METHOD=SRS, SYS, SEQ, PPS, and PPS\_SAMPFORD). It is not available for with-replacement or with-minimum-replacement methods, or for those PPS methods that select two units per stratum.

**9.1** The OUTSEED option includes the initial seed for each stratum in the output data set. Additionally, you can input initial seeds by strata with the SEED=SAS-data-set option.

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## **TPHREG Procedure**

The experimental TPHREG procedure adds the CLASS statement to the PHREG procedure. The CLASS statement enables you to specify categorical variables (also known as CLASS variables) as explanatory variables. Explanatory effects for the model, including covariates, main effects, interactions, and nested effects, can be specified in the same way as in the GLM procedure. The CLASS statement supports less-than-full-rank parameterization as well as various full-rank parameterizations such as reference coding and effect coding. Other CLASS statement features that are found in PROC LOGISTIC, such as specifying specific categories as reference levels, are also available.

The TPHREG procedure also enables you to specify CONTRAST statements for testing customized hypotheses concerning the regression parameters. Each CONTRAST statement

also provides estimation of individual rows of contrasts, which is particularly useful in comparing the hazards between the categories of a CLASS explanatory variable.

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## TPSPLINE Procedure

**9.1** The COEF option in the OUTPUT statement enables you to output coefficients of the fitted function.

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## TRANSREG Procedure

The TRANSREG procedure has new transformation options for centering and standardizing variables, CENTER and Z, before the transformations. The new EXKNOTS= option specifies exterior knots for SPLINE and MSPLINE transformations and BSPLINE expansions.

The new algorithm option INDIVIDUAL with METHOD=MORALS fits each model for each dependent variable individually and independently of the other dependent variables.

With hypothesis tests, the TRANSREG procedure now produces a table with the number of observations, and, when there are CLASS variables, a class level information table.

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## What's New in SAS Web Analytics 5.2

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### Overview

New capabilities, functions, and options in SAS Web Analytics 5.2 improve your ability to perform the following tasks:

- more accurately capture information by using a page tagging template
- view additional information in the improved Path Analysis report
- run dynamic funnel reports and scheduled funnel reports (reports that are executed routinely with the ETL process in a batch program)
- take advantage of a more powerful and flexible Equation Editor
- better integrate and manipulate data for dashboards, segmentation reports, and scorecards with external data sources
- independently develop and test new summarizations by using the new %WASUMTST macro

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### Details

- Page tagging, which is the ability to place JavaScript or other code on the Web to more accurately capture Web data, has become a standard requirement for Web analysis vendors. SAS Web Analytics 5.2 now supports this page tagging capability by providing a page tagging template.
- The Path Analysis report in SAS Web Analytics 5.2 includes the following new parameters:
  - percent of overall visitors
  - percent drop-off
  - percent of visitors remaining from the start of the clickstream path

- The %WAPATHDP macro has been extensively updated, which significantly improves the performance of the Path Analysis report.
  - Reports in SAS Web Analytics 5.2 are grouped for better accessibility.
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## What's New in SAS Web Report Studio 3.1

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### Overview

New and enhanced features in SAS Web Report Studio include the following:

- improved workflow for reports
- more control over report creation
- improved scheduling
- more control over formatting viewed reports
- new filtering capabilities for tables, graphs, and maps
- ability to distribute reports via e-mail
- ability to insert geographical maps

**Note:** You must have permission to use some of the following features. If you have questions about your authorization, contact your system administrator. ■

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### Improved Workflow for Reports

The following enhancements were made to the workflow:

- The new Report Management page enables you to interact with the entire repository of reports. Actions include viewing a list of reports that you have scheduled, and moving, copying, and deleting multiple selected reports.
  - For existing reports, you can save without having to view the Save As dialog box.
  - You can maintain an archive for a report. Archived reports are saved in PDF file format.
-

# More Control over Report Creation

## Improved Layout Design

You can exercise more control over layout design by using these new layout features:

- The new drag-and-drop functionality enables you to place objects into the body grid "cells."
- You can merge and split cells in the body grid to position objects exactly where you want them to appear.
- You can align objects within cells.
- You can add visual elements such as headers, footers, images, and text to report sections that contain a stored process. The visual elements are independent of the stored process output. (Previously, a stored process section could contain only the stored process.)

## New Group Break Features

These new group break features enable you to refine your output:

- For multidimensional data sources, you can specify group breaks for any level of a hierarchy. For example, if a time hierarchy has the levels Year, Quarter, and Month, you can select any level as a group break level. (Previously, you could only select Year.)
- You can include dynamic text with each group break level.
- You can add an ascending or descending sort to each group break level.
- You can select group breaks based on the number of categories or hierarchies in the report section. For example, if there are six categories in the report section, then you can select up to five group break levels. (Previously, you could specify a maximum of three group breaks, regardless of the number of categories or hierarchies used in the report section.)

## More Flexibility in Defining the Query for a Report Section

Your ability to define the query that obtains the data for a report section has been enhanced in the following ways:

- For multidimensional data sources that contain a time hierarchy, you can create custom data items that are based on relative time. You can calculate the difference in a selected measure over a previous period or previous year, percentage change of a selected measure over a previous period or previous year, and a selected measure's cumulative value to the current period.
- You can reorder data items after you have selected them for the report section. The order of the data items determines how they are assigned by default in tables, graphs, and maps. (Previously, you could not move data items up or down in the selection list after you selected them.)
- You can add more than one stored process to a report section.
- You can create a report section that uses both query methods: data items selected from data sources and stored processes.
- For categories in relational data sources, you can create prompted section filters that enable users to query for prompt values.

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## Improved Scheduling

Report scheduling has been enhanced in the following ways:

- A new Schedule Report Wizard makes it easier for you to specify scheduling options.
  - You can schedule stored processes and reports that use stored processes. (Previously, you could only schedule reports that exclusively used data items from a data source.)
  - You can schedule an entire folder of reports.
  - You can specify prompt values for reports and stored processes that have prompts.
-

## More Control over Formatting Viewed Reports

When you are viewing a report, this additional functionality is available:

- You can resize individual table columns by using your mouse.
- You can resize graphs and maps by using your mouse.
- You can modify table, graph, and map properties. (Previously, properties could be changed only when editing or creating reports.)

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## New Filtering Capabilities for Tables, Graphs, and Maps

Your ability to filter tables, graphs, and maps has been improved in the following ways:

- For tables, graphs, and maps, you can filter on relative time periods. For example, create a filter to see values based on a purchase date as of yesterday.
- Data items that are assigned to the hidden function in tables, graphs, and maps can be included in filters for those objects.

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## Ability to Distribute Reports via E-mail

A new Distribute Report Wizard enables you to distribute reports via e-mail as a PDF attachment or embedded HTML. Reports with group breaks can be distributed to targeted recipients based on the breaks. For example, you have a sales report with group breaks on regions. Each sales manager in the recipient list could receive information on just his or her respective region.

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## Ability to Insert Geographical Maps

If geographic mapping is enabled for a multidimensional data source that is used in a report section, you can insert a map object into the layout of a report. This means that queries can consider spatial proximity as part of the analysis.