

Paper 245-30

Microsoft® Office Integration with the SAS® BI Server

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ABSTRACT

SAS Add-In for Microsoft Office is a Component Object Model (COM) add-in to Microsoft Excel and Microsoft Word. SAS Add-In for Microsoft Office leverages the SAS BI Server to seamlessly expose the power of SAS data access, reporting, and analytics directly from the familiar environment of Microsoft Office. This paper discusses the capabilities and features of SAS Add-In for Microsoft Office 1.3.

INTRODUCTION

Microsoft defines a COM add-in as a program that extends the capabilities of a Microsoft Office application. SAS Add-In for Microsoft Office uses COM add-in technology to bring the data access, reporting, and analytic capabilities of SAS to Microsoft Excel and Microsoft Word. Once SAS Add-In for Microsoft Office is installed, an integrated SAS menu and SAS toolbars are available as part of the Microsoft Office environment. Using the menu and toolbars, you can directly access much of the power of SAS. SAS Add-In for Microsoft Office does not support Microsoft PowerPoint as a client. However, you can use the native Object Linking and Embedding (OLE) support in Windows to achieve some level of integration. *Appendix B—Leveraging SAS Add-In for Microsoft Office for Microsoft PowerPoint* details this capability.

Using SAS Add-In for Microsoft Office, you can access the power of SAS via three key mechanisms:

1. **Data Access**—SAS Add-In for Microsoft Office gives you the ability to open, query, sort, and browse data. The capability is via the file system or via SAS server accessible data sources (including third-party data sources via SAS/ACCESS products) of any size directly from Microsoft Excel. A key advantage of this capability is the ability to access, browse, query, and analyze data sources that are larger than the row limit of 65,536 that Microsoft Excel imposes.
2. **SAS Stored Processes**—SAS Stored Processes are SAS programs that have been parameterized and registered to a SAS Metadata Server. Stored processes enable different users throughout your organization to use SAS Enterprise BI Server clients, such as SAS Add-In for Microsoft Office, to access a wide array of SAS content developed by business analysts, statisticians, and programmers.
3. **SAS Tasks**—Using SAS tasks, you can do ad-hoc analysis to manage, summarize, and analyze Microsoft Excel data or SAS data using a wide range of SAS capabilities, such as regression analysis, linear models, and forecasting.

SAS Stored Processes and SAS tasks generate results that display in Microsoft Office applications.

ARCHITECTURE

SAS Add-In for Microsoft Office is a desktop client interface. During the SAS Add-In for Microsoft Office install, all necessary SAS components are installed. No additional SAS install is required on the client PC. SAS Add-In for Microsoft Office requires the Microsoft .NET Framework. If the Microsoft .NET Framework is not installed on your PC, SAS Add-In for Microsoft Office setup installs it. *Appendix C—SAS Add-In for Microsoft Office Requirements* details system and software requirements for SAS Add-In for Microsoft Office.

For server-side support, SAS Add-In for Microsoft Office uses the SAS 9.1 Foundation and SAS Foundation Servers of the SAS 9.1 BI infrastructure. The SAS 9.1 Foundation provides SAS products to support the powerful data access and analytic capabilities of SAS. The SAS Foundation Servers include SAS Integration Technologies for enabling client-server communication. SAS Integration Technologies provides distributed object interfaces to SAS software features and access to the following servers, which are used by SAS Add-In for Microsoft Office architecture.

The **SAS Metadata Server** is a multi-user server that surfaces metadata from one or more SAS Metadata Repositories. A SAS Metadata Repository is a collection of related metadata objects that describe enterprise data resources. The SAS Metadata Server is the central information store for SAS 9.1 products. SAS Add-In for Microsoft Office uses the SAS Metadata Server for identifying servers, data sources, and stored processes. The SAS Metadata Server provides a security model that enables you to restrict access by user or group to servers, data sources, stored processes, and more.

The **SAS Workspace Server** provides a general-purpose interface to the SAS 9.1 Foundation. Clients can submit SAS code for execution or access data on the SAS Workspace Server. SAS Add-In for Microsoft Office uses the SAS Workspace Server for accessing data sources on remote servers, for executing code generated by SAS tasks, and for executing SAS Stored Processes.

The **SAS Stored Process Server** supports the execution of stored processes. The SAS Stored Process Server provides a scalable platform for the execution of stored processes from many clients.

The **SAS Object Spawner** resides on the server host and listens for requests. When a request is received, the SAS Object Spawner authenticates the client connection and redirects the request to an appropriate SAS server. If necessary, the SAS Object Spawner launches the appropriate server (the SAS Stored Process Server or the SAS Workspace Server) to handle the request.

CONFIGURING SAS ADD-IN FOR MICROSOFT OFFICE

After you install SAS Add-In for Microsoft Office, you need to configure it to access the SAS Metadata Server. An administrator might have already configured it for you. If not, you are prompted for SAS Metadata Server information the first time you attempt to access SAS capabilities. The following dialog box displays:

The screenshot shows a Windows-style dialog box titled "Connect to SAS Metadata Server". It is divided into two main sections: "Server Information" and "Login Information".

- Server Information:**
 - There are two radio buttons. The first is "Connect to the default metadata server" (unselected). The second is "Connect using the following parameters:" (selected).
 - Below the radio buttons are four input fields:
 - "Machine Name:" with a dropdown menu showing "myserver.sas.com".
 - "Protocol:" with a dropdown menu showing "IOM Bridge".
 - "Port:" with a text box containing "8561".
 - "Authentication Domain:" with a text box containing "DefaultAuth".
- Login Information:**
 - There are two text boxes: "User name:" and "Password:", both currently empty.

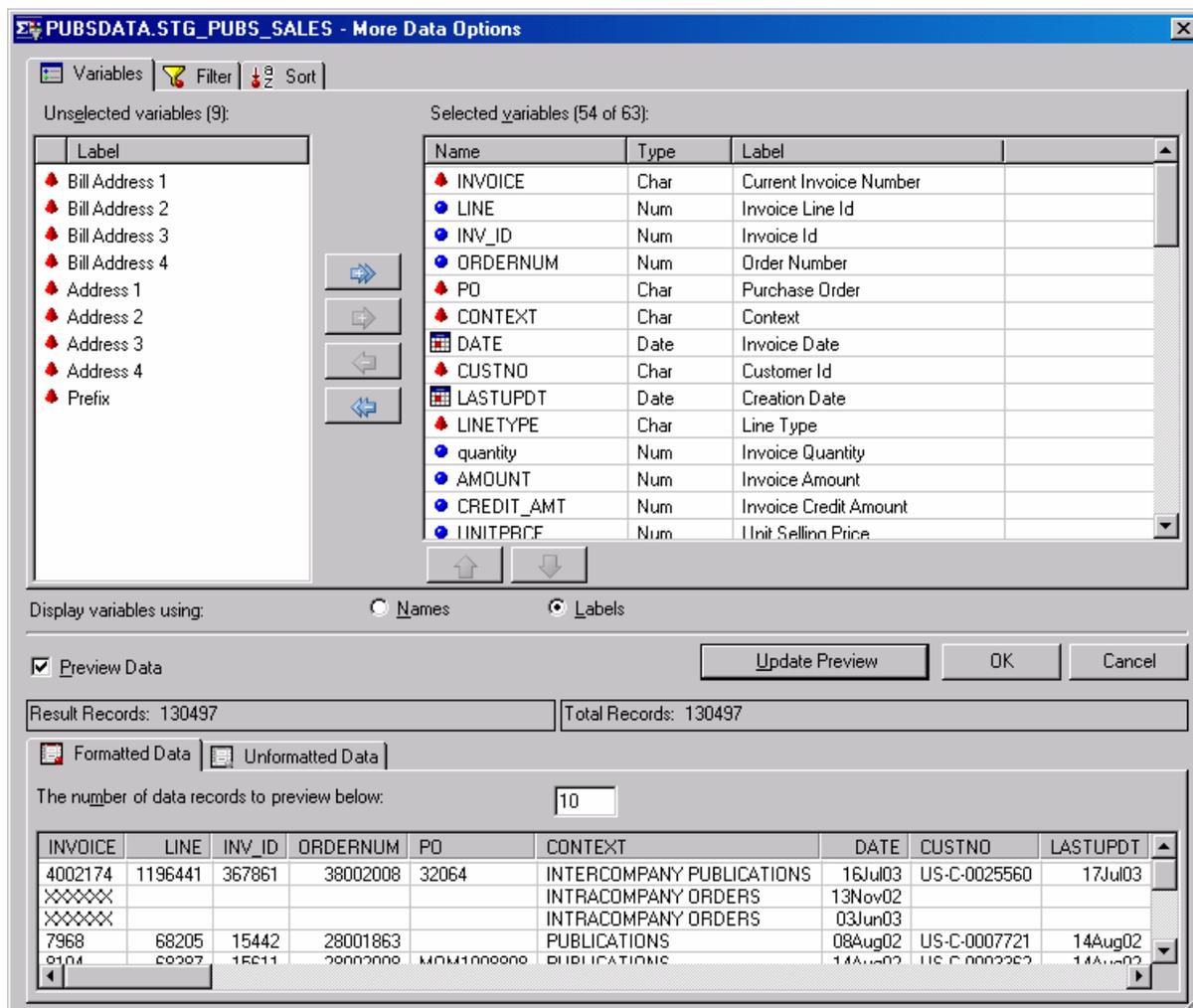
At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

DATA ACCESS

One of the features of SAS Add-In for Microsoft Office is the ability to open any data source that is accessible to SAS directly in Microsoft Excel. This feature is not available from Microsoft Word. Using the **Open SAS Data Source** dialog box, you can open a data set via the file system or open a data source by navigating the servers and libraries. The **Open SAS Data Source** dialog box populates the list of servers by reading the metadata that is defined in the SAS Metadata Server. Similarly, the list of libraries that displays for each server is based on the metadata. Each user might see a different view of the servers and libraries that are available, because the security model of the SAS

Metadata Server restricts access to individual users based on the authorizations that are defined in the metadata by the administrator. Opening a data set via the file system uses SAS Providers for OLE DB technology. Regardless of whether you access data using SAS Providers for OLE DB or using the SAS Metadata Server, SAS Add-In for Microsoft Office has the same features. The difference in the two access mechanisms occurs when you perform a filter or sort operation. Using SAS Providers for OLE DB, sorting and filtering occur on the client. Using SAS Metadata Server, sorting and filtering occur on the server where the data resides.

When opening a data source, you can select which variables you want to view in Microsoft Excel and in which order you want to view those variables. You can choose whether to use the names or the labels of the variables as the column headings in Microsoft Excel. Microsoft Excel limits the number of columns in a single worksheet to 256. SAS Add-In for Microsoft Office also has this limit. If the SAS observation number in the first column is set to display, then you are limited to 255 variables, because displaying the SAS observation number takes one column. You can select which variables you want to view from the **Open SAS Data Source** dialog box. If you want to order these variables or see a preview of the data, select the **More** button from the **Open SAS Data Source** dialog box, which launches the **More Data Options** dialog box.



One of the major issues with using Microsoft Excel to view SAS data sources is the limitation that a worksheet can display only 65,536 observations. SAS Add-In for Microsoft Office has solved this problem by allowing you to view a subset of the observations in a data source and navigate through the remaining observations. When you open a data source, SAS Add-In for Microsoft Office displays the first 5,000 observations in a worksheet. The number of observations displayed is configured using the **Options** dialog box, which is available from the **SAS** menu. Once a data source is open in a worksheet, navigational menu and toolbar items enable you to navigate through the observations. You can page through the observations, navigate to a particular observation, or navigate to the

beginning or end of the data source. Using the paging mechanism enables SAS Add-In for Microsoft Office to access many observations from within Microsoft Excel and uses memory better because only a subset of observations are displayed and loaded into memory at one time. A display of the Microsoft Excel worksheet that shows the **PUBSDATA.STG_PUBS_SALES** data source follows. The navigational toolbar indicates that you are viewing observations 1-5000.

obs	Current Invoice Number	Invoice Line Id	Invoice Id	Order Number	Purchase Order	Context	Invoice Date	Customer Id	Creation Date	Line Type	Invo
1	4002174	1196441	367861	38002008	32064	INTERCOMPANY PUBLICATIONS	16Jul2003	US-C-0025560	17Jul2003	LINE	
2	XXXXXX					INTRACOMPANY ORDERS	13Nov2002			LINE	
3	XXXXXX					INTRACOMPANY ORDERS	03Jun2003			LINE	
4	7968	68205	15442	28001863		PUBLICATIONS	08Aug2002	US-C-0007721	14Aug2002	LINE	
5	8104	68387	15611	28002008	MOM1008808	PUBLICATIONS	14Aug2002	US-C-0003362	14Aug2002	LINE	
6	8621	83330	18701	28002179		PUBLICATIONS	16Aug2002	US-C-0045916	19Aug2002	LINE	
7	8700	83587	18744	28002621		PUBLICATIONS	16Aug2002	US-C-1003972	19Aug2002	LINE	
8	9161	90120	20638	38000089	30598	INTERCOMPANY PUBLICATIONS	21Aug2002	US-C-0025560	21Aug2002	LINE	
9	9781	107306	24493	38000116		INTERCOMPANY PUBLICATIONS	26Aug2002	US-C-0025573	27Aug2002	LINE	
10	9961	108747	24910	28003566	MOM1012460	PUBLICATIONS	27Aug2002	US-C-0003362	27Aug2002	LINE	
11	10363	117794	27507	28003878		PUBLICATIONS	29Aug2002	US-C-0006404	30Aug2002	LINE	
12	11265	153005	34024	38000225	30661	INTERCOMPANY PUBLICATIONS	10Sep2002	US-C-0025560	10Sep2002	LINE	
13	11537	160591	35510	28004664		PUBLICATIONS	11Sep2002	US-C-0001784	12Sep2002	LINE	
14	12081	168568	37128	28005109	MOM1027291	PUBLICATIONS	13Sep2002	US-C-0003362	13Sep2002	LINE	
15	13871	211892	48730	28006299	48703	PUBLICATIONS	30Sep2002	US-C-0022039	30Sep2002	LINE	
16	14246	240565	50437	28006391		PUBLICATIONS	02Oct2002	US-C-1036248	02Oct2002	LINE	
17	15435	269839	56729	28007163		PUBLICATIONS	10Oct2002	US-C-1050426	10Oct2002	LINE	
18	15556	274190	57446	28007252	BEU 7014	PUBLICATIONS	11Oct2002	US-C-1050580	11Oct2002	LINE	
19	15648	275352	57764	28007295	MOM1041132	PUBLICATIONS	11Oct2002	US-C-0003362	11Oct2002	LINE	
20	16625	294107	63112	38000315		INTERCOMPANY PUBLICATIONS	21Oct2002	US-C-0025560	21Oct2002	LINE	
21	17021	299755	65701	28007902		PUBLICATIONS	22Oct2002	US-C-0022843	23Oct2002	LINE	
22	17231	304263	67012	28008091		PUBLICATIONS	24Oct2002	US-C-0080540	24Oct2002	LINE	
23	17332	305609	67815	28008120		PUBLICATIONS	24Oct2002	US-C-0028646	24Oct2002	LINE	

When you open a SAS data source in Microsoft Excel, cells populated with data in the worksheet are initially marked as protected to prevent you from accidentally changing the data. Microsoft Excel limits some capabilities when working with protected areas of a worksheet. To turn off protection for a particular worksheet, select the **Tools** drop-down menu, then **Protection**, and then **Unprotect sheet**. If you prefer not to have worksheet cells protected by default, you can modify this option by selecting the **Options** menu item from the **SAS** menu, which launches the **Options** dialog box. In the **Options** dialog box, the option is located on the **Data** tab.

Once you have access to a SAS data source in Microsoft Excel, you might want to sort the observations. The Microsoft Excel sort feature sorts only the observations that are viewable in the worksheet, which might only be a subset of the observations in the data source. The SAS Add-In for Microsoft Office sort feature can sort the entire data source using the processing power of the server. Additionally, unlike Microsoft Excel, SAS Add-In for Microsoft Office has no limit on the number of variables you can sort. You can access the SAS Add-In for Microsoft Office sort feature from the **SAS** menu or toolbar. Once the sort completes on the server, the resulting observations display in the worksheet. You can navigate through the sorted data in the same way that you navigate through the original data source.

You might want to filter observations in a data source to segment the data based on certain criteria. Like the sort feature, the Microsoft Excel filter feature filters only the observations that are viewable in the worksheet. The SAS Add-In for Microsoft Office filter feature can filter the entire data source on the server. Then, you can view the resulting observations in Microsoft Excel. SAS Add-In for Microsoft Office provides an intuitive user interface for easy

selection of filter criteria. You can apply a filter to a data source and refine the filter repeatedly until you have the view of the data you desire. You can navigate through the filtered data in the same way that you navigate through the original data source. An example filter query follows:

Specify the filters you want to apply to the data before it is loaded into Excel.

Invoice Date	Is between values (Incl)	01Nov02 and 28Nov02	...	AND	X
Invoice Amount	Is greater than	20.00	...	AND	X
Group	Is equal to	BOOKS	...	AND	X
Current Invoice Number	Is not equal to	XXXXXX	...		X

Validate Clear All Advanced Edit...

Display variables using: Names Labels

Preview Data Update Preview OK Cancel

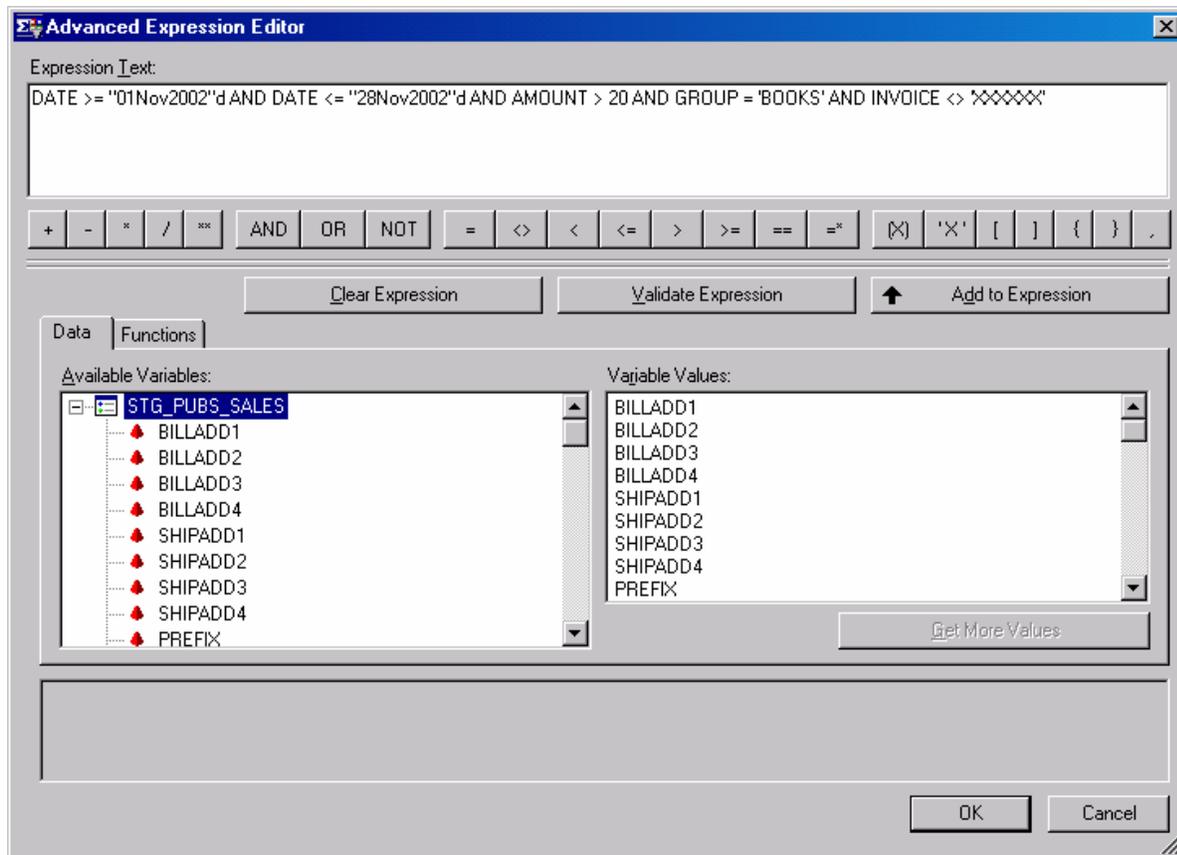
Result Records: 2170 Total Records: 130497

Formatted Data Unformatted Data

The number of data records to preview below: 10

INVOICE	LINE	INV_ID	ORDERNUM	PO	CONTEXT	DATE	CUSTNO	LASTUPDT	LINETYPE	quan
18877	381629	81961	28008934		PUBLICATIONS	07Nov02	US-C-0030860	07Nov02	LINE	
20513	418911	91708	28009796	REN0578377	PUBLICATIONS	20Nov02	US-C-0003362	21Nov02	LINE	
20869	429101	95626	28010037		PUBLICATIONS	25Nov02	US-C-0006404	25Nov02	LINE	
21253	442796	98638	28010175	MDM1066110	PUBLICATIONS	26Nov02	US-C-0003362	27Nov02	LINE	
19244	309220	82002	28009220	POE1000	PUBLICATIONS	11Nov02	US-C-0020955	11Nov02	LINE	

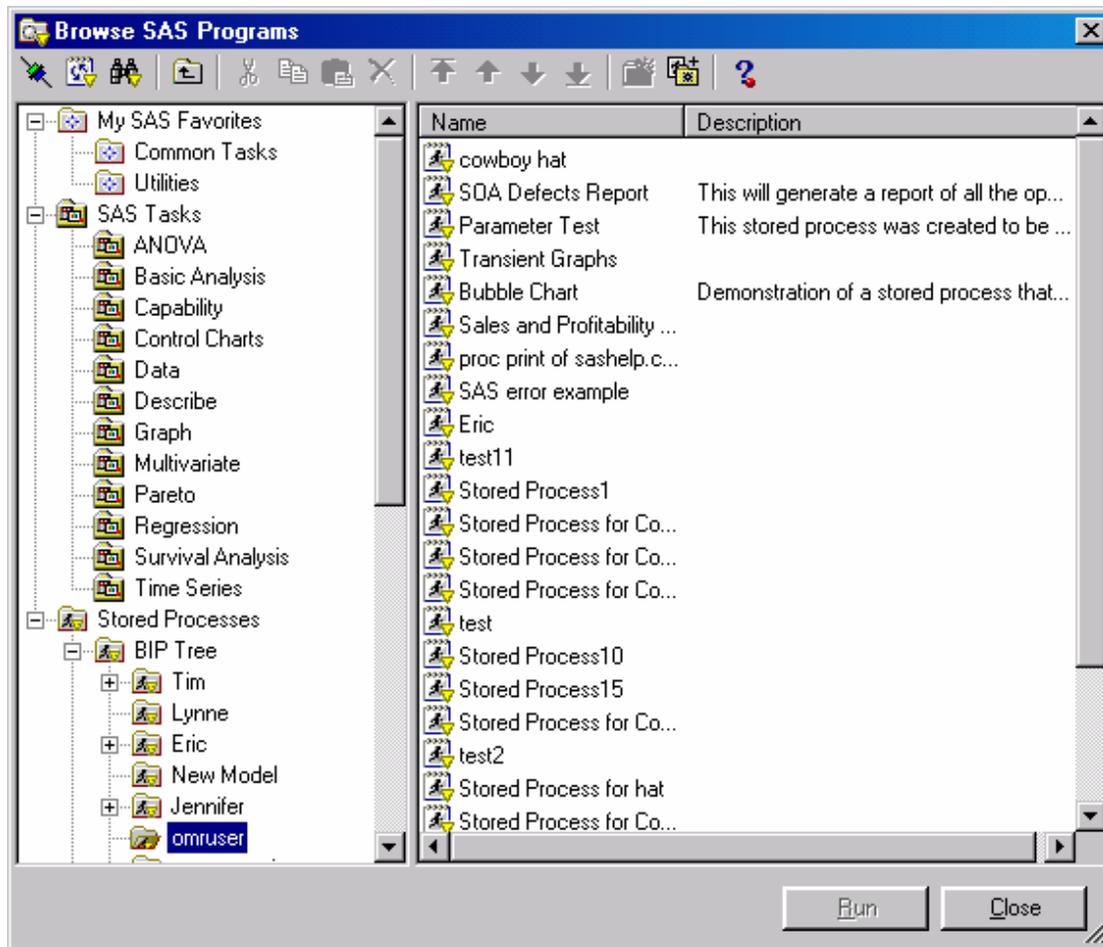
If you prefer to enter SQL code to apply filters, you can use the **Advanced Edit** dialog box. Selecting the **Advanced Edit** button from the **Filter** panel invokes a dialog box where you can enter SQL code to apply filters. Using this dialog box requires knowledge and understanding of SQL syntax. A display of the **Advanced Expression Editor** dialog box follows:



Another common activity in Microsoft Excel is applying formulas to ranges of cells. With a SAS data source opened in Microsoft Excel, you can use formulas to further manipulate the data. The formulas apply to the currently viewable data cells only. If you refresh the data or navigate to another observation number, the viewable data changes/updates in Microsoft Excel and the formulas recalculate the new data. Only formulas that exist outside the cells that are occupied by the data are retained.

ACCESSING SAS STORED PROCESSES AND SAS TASKS

SAS Stored Processes and SAS tasks enable you to execute analyses from within Microsoft Excel and Microsoft Word. In SAS Add-In for Microsoft Office, you can access the list of SAS Stored Processes and SAS tasks that are available to you using the **Browse SAS Programs** dialog box from the **SAS** menu or toolbar. The **Browse SAS Programs** dialog box includes a list of favorites (shortcuts to commonly used SAS Stored Processes or SAS tasks), a list of SAS Stored Processes that you are authorized to view, and a list of SAS tasks that are available to you. You can execute a SAS Stored Process or SAS task from this dialog box by selecting the item and selecting the **Run** button, or by double-clicking the item. You can execute items shown in the **My SAS Favorites** list in the same manner. To add an item to this list, right-click the item in the **Stored Processes** or **SAS Tasks** tree and select to add the item to **My SAS Favorites**. **My SAS Favorites** enables you to organize SAS Stored Processes and SAS tasks into folders if you want to. Adding an item to **My SAS Favorites** makes it display on a SAS toolbar drop-down menu named **My SAS Favorites**. This menu enables you to run a SAS Stored Process or a SAS task without invoking the **Browse SAS Programs** dialog box to select it. Selecting the **Manage Favorites** menu item invokes this same dialog box for easy manipulation of your favorite shortcuts. A display of the **Browse SAS Programs** dialog box follows:



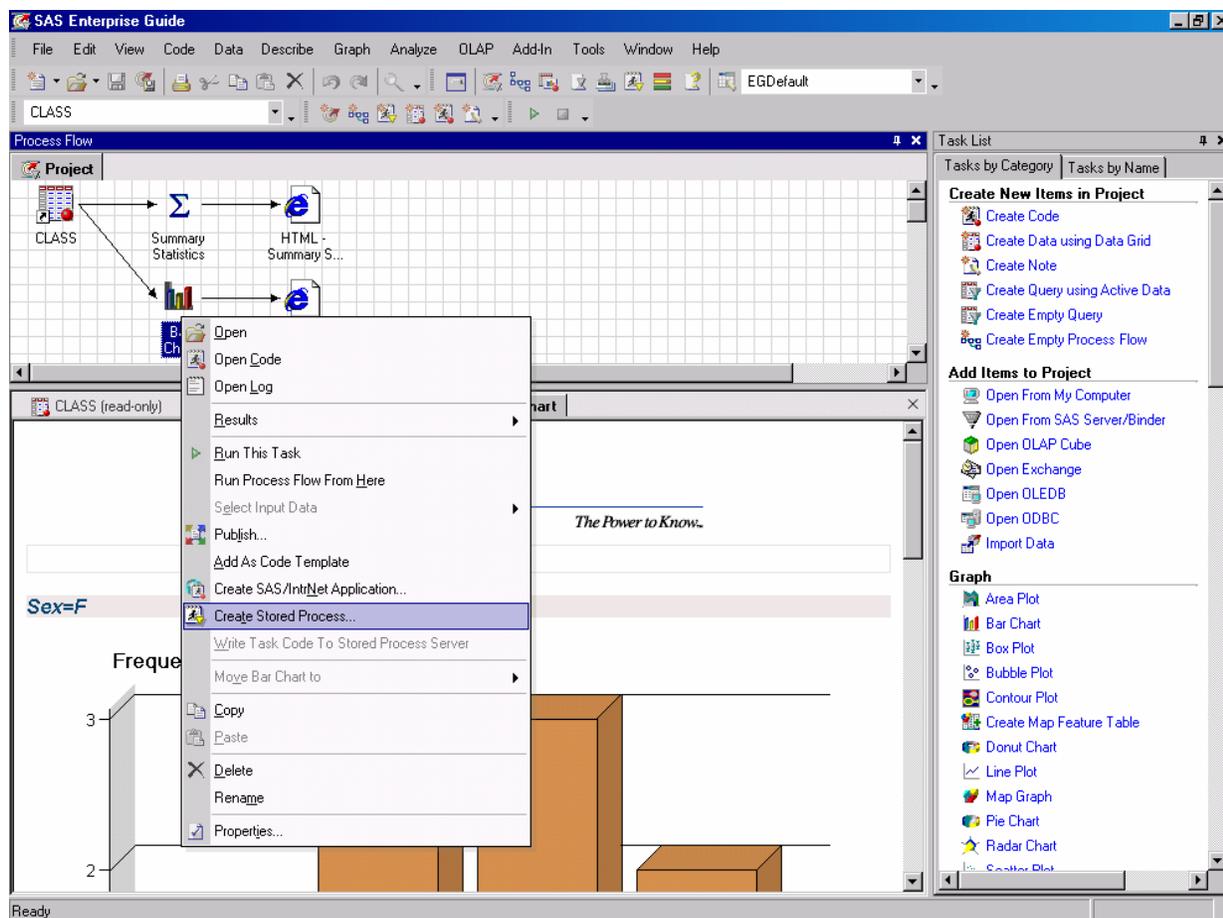
SAS STORED PROCESSES

SAS Stored Processes are SAS programs that are stored centrally on a SAS Metadata Server. SAS Stored Processes enable you to centrally maintain and manage code, give you better control over changes, enhance security and application integrity, and ensure that every client executes the latest version of code that is available. SAS Stored Processes are like other SAS programs, with an additional feature that enables customization of the program's execution. This feature enables a client, such as SAS Add-In for Microsoft Office, to supply parameters at the time the stored process is executed.

To execute a SAS program from SAS Add-In for Microsoft Office or from any other client, you need to register the SAS program in the SAS Metadata Server as a stored process. Two tools for performing registration are SAS Enterprise Guide 2.1 or later and SAS Management Console 9.1.

SAS Enterprise Guide is a project-oriented Windows client that is designed to enable quick access to the analytic power of SAS for statisticians, business analysts, and SAS programmers. In its graphical user interface, it leverages the full power of SAS by providing transparent access to data through the use of interactive dialog boxes, wizards, and property sheets that guide users through analytical and reporting tasks.

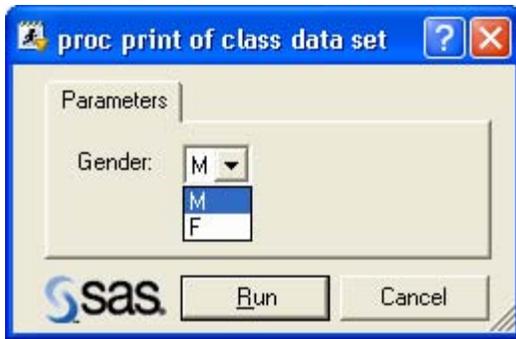
Using SAS Enterprise Guide, you can generate and administer SAS Stored Processes in an interactive way. You can register the results of a SAS task as a SAS Stored Process. Or, you can open or create a SAS program and register it as a SAS Stored Process. SAS Enterprise Guide adds the required macros to enable the SAS program to run successfully. To register a SAS Stored Process from SAS Enterprise Guide, select the desired results or SAS code. Right-click to display the context menu and select the menu item **Create Stored Process**, which launches the **Stored Process Wizard**. A display of SAS Enterprise Guide with the **Create Stored Process** menu item selected follows:



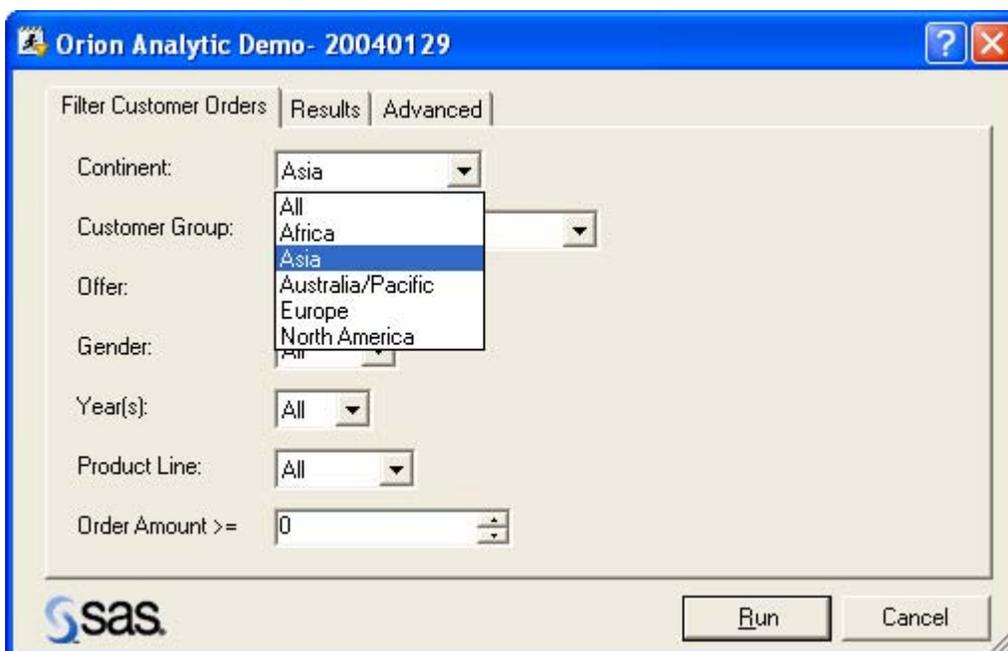
SAS Management Console is an administrative tool that performs administrative functions. To use SAS Management Console to register a SAS Stored Process, you need to modify the SAS Stored Process program to include the **%STPBEGIN** and **%STPEND** macros. These macros provide standardized functionality for generating and delivering output from a SAS Stored Process in a variety of formats and styles with minimal programming effort. The **%STPBEGIN** macro initializes the Output Delivery System (ODS) to generate output from the SAS Stored Process. The **%STPEND** macro terminates ODS processing and completes delivery of the output to clients, such as SAS Add-In for Microsoft Office. An example SAS Stored Process program follows:

```
%global gender;
%stpbegin; /* initialize ODS processing of output */
proc print data=sashelp.class;
  where (sex = "&gender");
run;
%stpend; /* terminate ODS processing of output */
```

In this example, **PROC PRINT** filters the **SASHELP.CLASS** data set based on the **gender** macro variable and prints the results. When registering this SAS Stored Process, define one parameter labeled **Gender** to enable the user to dynamically determine which observations to display. The resulting prompt follows:

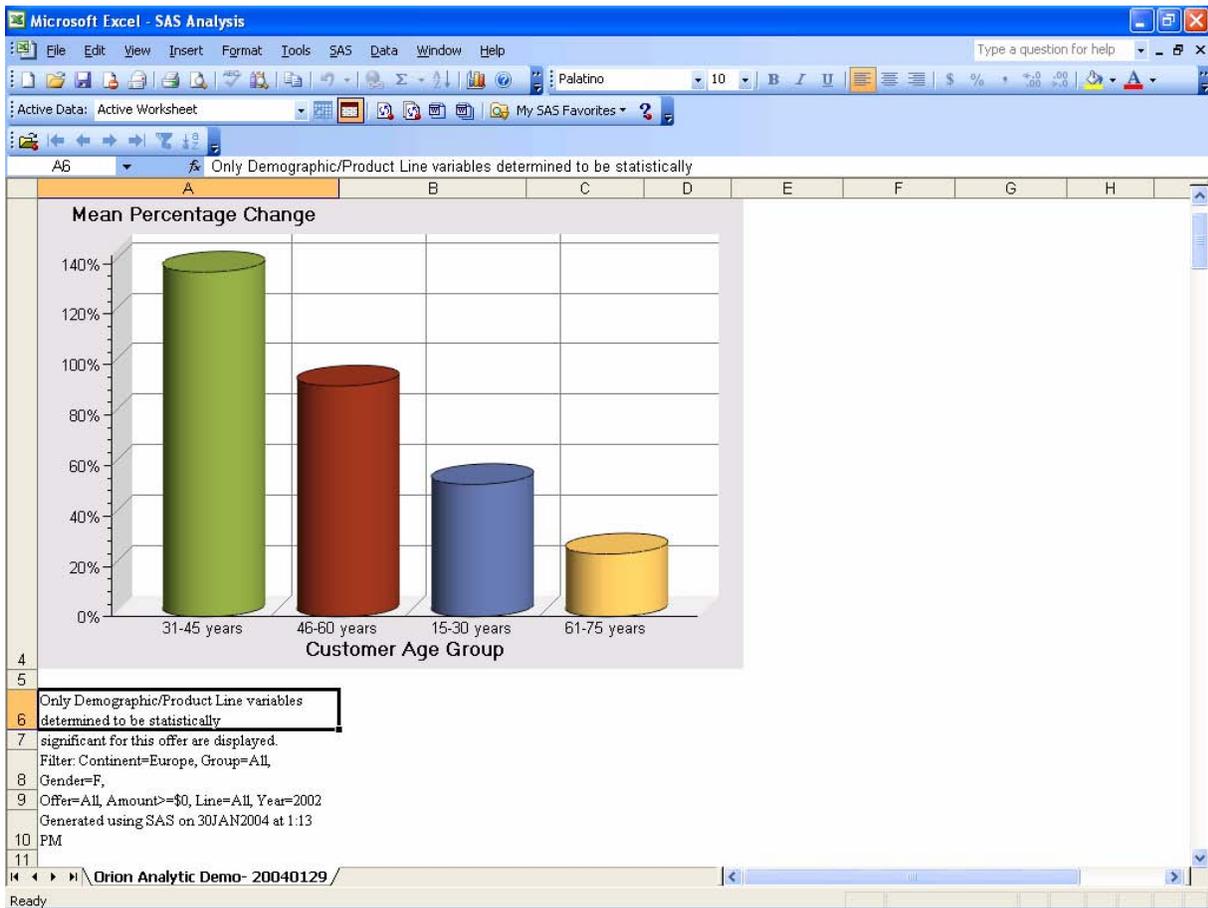


A prompt for a more complex SAS Stored Process follows:



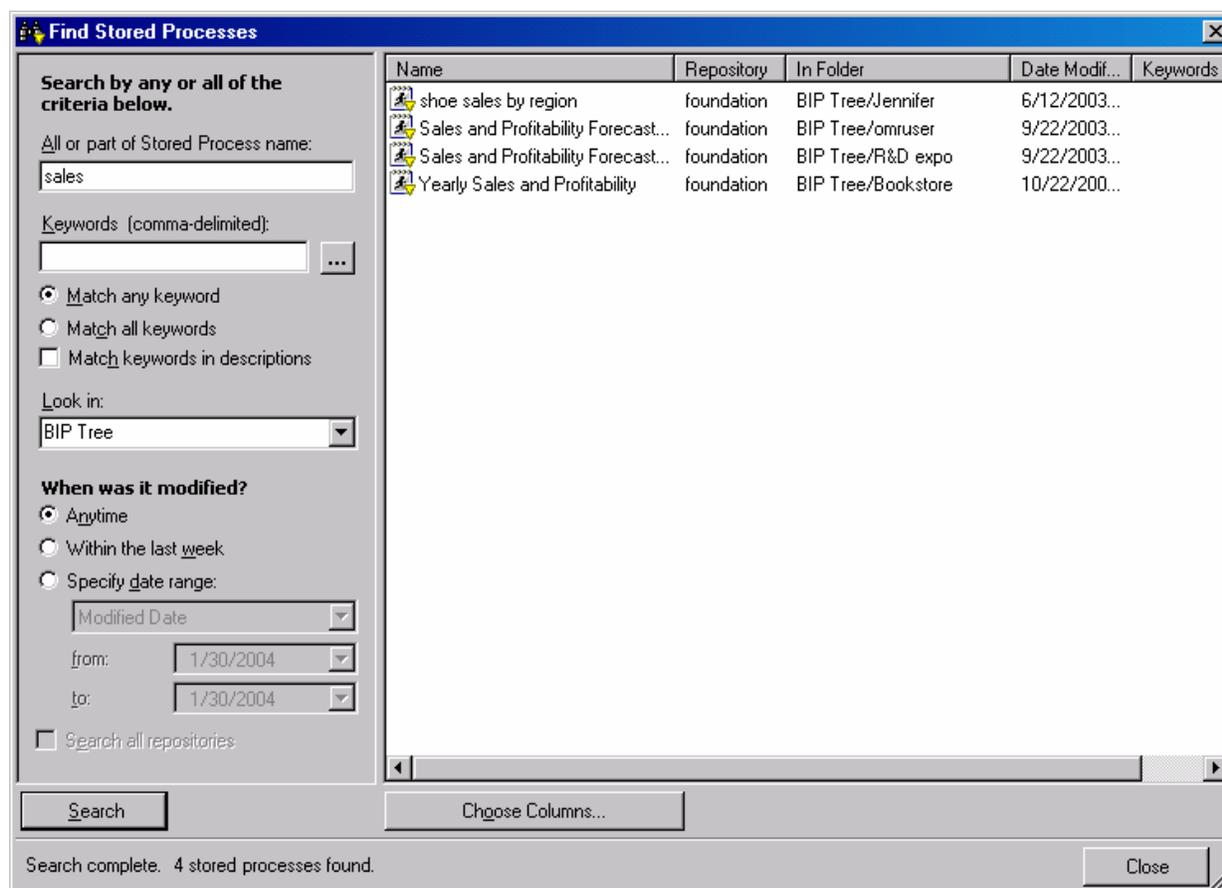
Most SAS Stored Processes generate output that shows the results of the analysis. Results display in a Microsoft Excel worksheet or in a Microsoft Word document. The *Analytic Results* section details how to handle results in Microsoft Office applications.

The results from the more complex SAS Stored Process follows:



Another feature of SAS Stored Processes is the ability to find stored processes by name, date modified, or keyword. Because SAS Stored Processes are stored centrally on the SAS Metadata Server, new SAS Stored Processes can be made available at any time. The **Find Stored Processes** dialog box is used to search the available SAS Stored Processes. This dialog box is under the **Browse SAS Programs** dialog box. The **Find** toolbar and menu item are enabled only when a node in the **Stored Processes** tree is highlighted.

The **Find Stored Processes** dialog box follows:



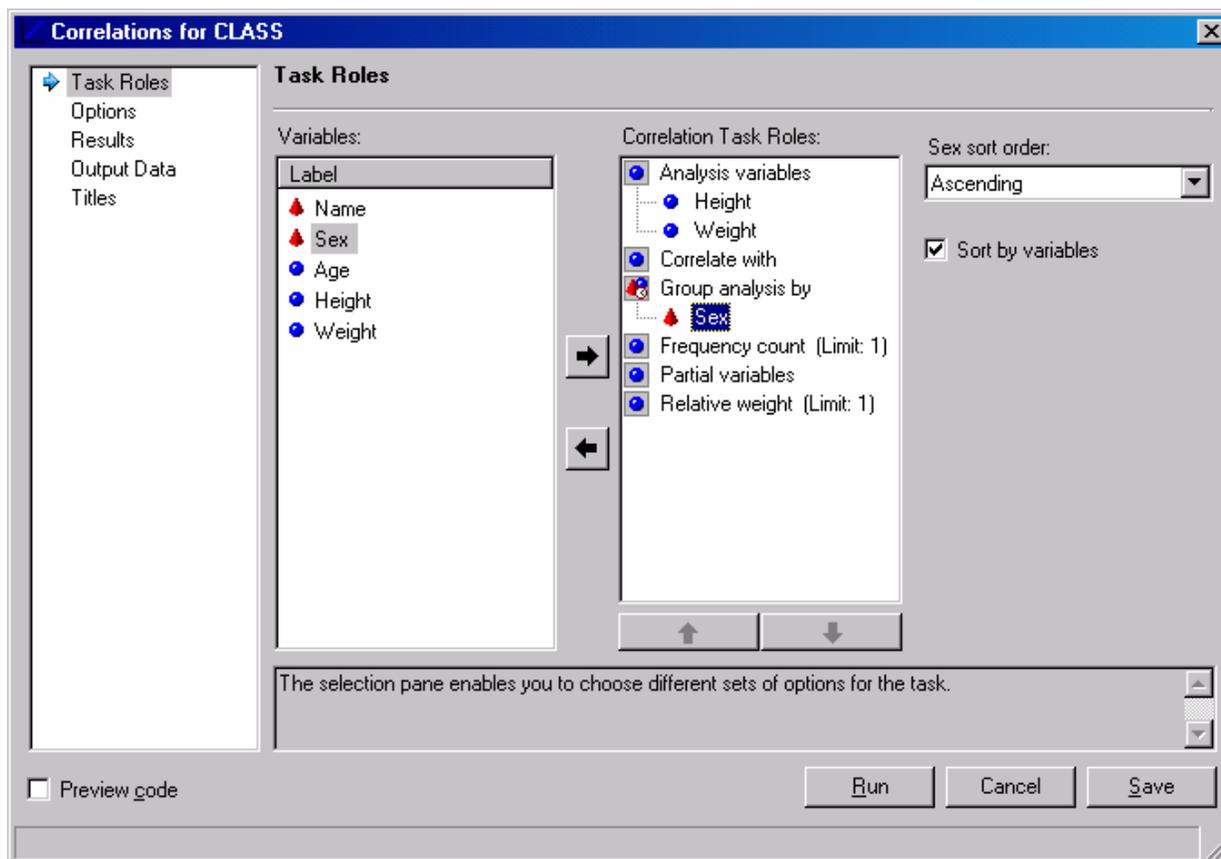
SAS TASKS

SAS tasks are a set of dialog boxes that guide you through an analysis. SAS tasks that are available in SAS Add-In for Microsoft Office are the same SAS tasks that are available in SAS Enterprise Guide 3.0. SAS Add-In for Microsoft Office includes 61 SAS tasks. The SAS tasks encompass many of the common types of analyses that are done using SAS, without you having to have any knowledge of the SAS language. SAS tasks generate code on the client machine based on user selections, and the code is submitted to a SAS Workspace Server. The results display in a Microsoft Excel worksheet or a Microsoft Word document. The *Analytic Results* section details how to handle results in Microsoft Office applications.

SAS tasks require that an input data source know what data to act upon. SAS Add-In for Microsoft Office provides an active data source concept that enables you to select data for analyses, which can then be used for multiple analyses without having to re-specify the data to use each time you run a task. The active data source can be an active Microsoft Excel worksheet, a SAS data source that was opened in Microsoft Excel, or a SAS data source that was referenced from Microsoft Excel. By default, active data is set to the active worksheet, meaning that the SAS task uses the contents of the active worksheet as the active data. If the worksheet contains Microsoft Excel data, the SAS task generates a **CARDS** statement that defines the cells in the worksheet as a temporary data set. This temporary data set is used as the data source for the generated analysis code.

To analyze SAS data without opening the data source in Microsoft Excel, select the **Active Data** drop-down menu and choose **Select SAS Data Source**. Selecting a data source this way makes the data source the active data for tasks, but does not open the data source in the worksheet. If you are using SAS tasks to perform analyses with a variety of data sources, you can set an option in the **Options** dialog box to prompt for a data source each time you execute a SAS task.

A SAS task named **Correlations** is shown in the following dialog box:



ANALYTIC RESULTS

Using SAS Add-In for Microsoft Office, you can generate analytic results from SAS Stored Processes or SAS tasks and view the results in Microsoft Office applications.

In Microsoft Excel, the results of an analysis are displayed in a new worksheet, with each result occupying its own worksheet. By default, each worksheet is protected to prevent accidental changes. If you want to add content to the worksheet or modify the worksheet, you can unprotect it by selecting the **Tools** drop-down menu, the **Protection** menu item, and then the **Unprotect sheet** menu item. If you prefer that worksheets not be protected by default, modify the setting on the **Results** tab in the SAS **Options** dialog box. By default, new worksheets are added to the active workbook after the active worksheet. You can have multiple worksheets in the same workbook.

In Microsoft Word, the results of an analysis are added to the active document at the position of the cursor. Multiple results can exist within one Microsoft Word document.

The results display from the **Correlations** task as follows:

The screenshot shows a Microsoft Excel window titled "SASHELP.CLASS" with a worksheet named "Correlation Analysis". The output is as follows:

Correlation Analysis

The CORR Procedure

Sex=F

2 Variables: Height Weight

Simple Statistics							
Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	
Height	9	60.58889	5.01833	545.3	51.3	66.5	
Weight	9	90.11111	19.38391	811	50.5	112.5	

Pearson Correlation Coefficients, N = 9			
Prob > r under H0: Rho=0			
Height	Height	Weight	
	1	0.88655	
		0.0014	
Weight	Weight	Height	
	1	0.88655	
		0.0014	

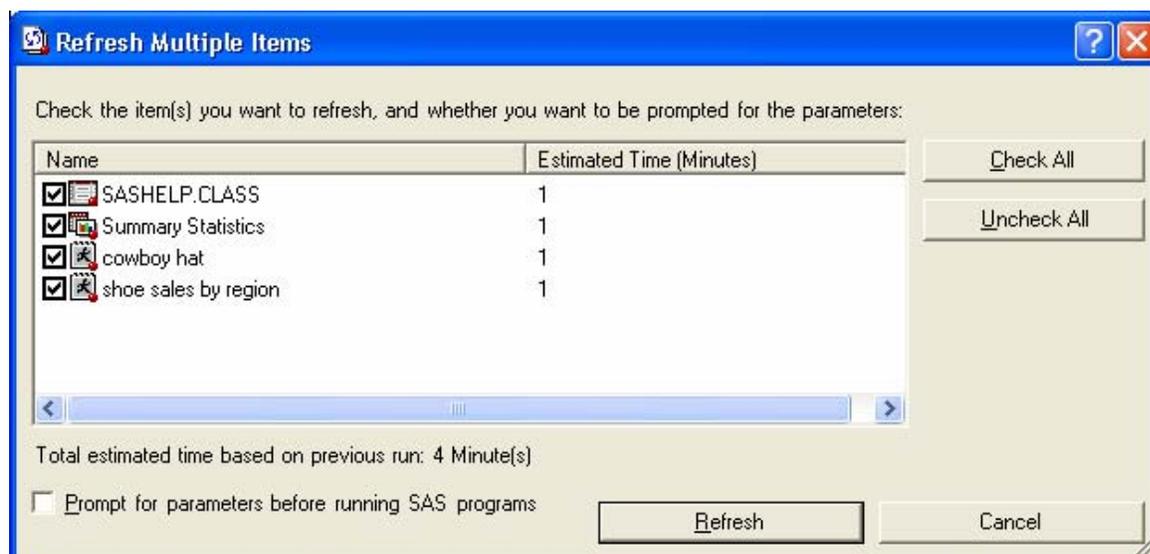
Generated by SAS (pcrdsrv3, WIN_SRV) on 30JAN2004 at 3:15 PM

When you save a workbook or document that contains analytic results, information that defines the analysis is saved and stored as part of the workbook or document.

When you open the analytic results later, the original results will still be displayed. You can refresh the analytic results by selecting the **Refresh** toolbar button or menu item. If the SAS Stored Process program has been modified or if the data source that was used in the SAS Stored Process or SAS task has changed, you might want to refresh your analytic results. For example, suppose you ran the **Summary Statistics** task using a SAS data source as input. If this SAS data source is updated, you can re-open the worksheet and refresh the results. When you select **Refresh**, the task prompt displays, initialized with the values that generated the current results. When you select **Run**, the analysis re-executes and replaces the results.

If you have multiple results to refresh in the same workbook or document, you can use the **Refresh Multiple Items** dialog box. The **Refresh Multiple Items** dialog box scans the active workbook or document to find all analytic results generated by SAS, displays these results, and lets you selectively choose which ones to refresh. In Microsoft Excel, the **Refresh Multiple Items** dialog box also displays any worksheets in the active workbook containing SAS data sources. If you select to refresh a data source, SAS Add-In for Microsoft Office retrieves the latest copy of the data and replaces the contents in the worksheet. As a result, you can create workbooks or documents of standard reports and refresh the reports, as needed, to reflect the latest data.

A display of the **Refresh Multiple Items** dialog box follows:



You can e-mail a workbook or document that contains analytic results to another person, who can view the results even if he or she does not have SAS Add-In for Microsoft Office installed. If the person has a connection to the same SAS Metadata Server, he or she can update the results using the refresh capabilities.

In Microsoft Excel, you can generate results in HyperText Markup Language (HTML) or comma-separated values (CSV) format.

If you use HTML, results include formatting, which can be modified using the **Style Manager**. The **Style Manager** is available from the **SAS** menu or from the **Options** dialog box. With the **Style Manager**, you can select pre-defined style sheets supplied by SAS, or you can create and select your own custom style sheets where you can define colors, fonts, background images, and more. The custom style sheets enable you to add a company letterhead or background image. With HTML, you can generate graphs. By default, the graphs display using the ActiveX format, which embeds graphical output into a single file and produces an interactive image. With the interactive image, you can hover over points on the graph to see detailed information about a particular data point. HTML sometimes generates large files, depending on the amount of data and formatting.

If you are interested only in the values that are generated by the analysis, you should use the CSV format. With CSV, no formatting is applied. Consequently, the results are much smaller and load more quickly in Microsoft Excel. When using CSV format, no graphs display.

In Microsoft Word, you can generate results in HTML or Rich Text Format (RTF).

HTML has the same features in Microsoft Word as it does in Microsoft Excel, except that in Microsoft Word, graphs are not interactive by default because Microsoft Word does not activate COM objects by default. If you want to see the values of points as you hover over them, right-click the graph and select **Edit**, which enables the interactivity of the graph.

RTF is a native Microsoft Word format and displays like HTML. With RTF, the ActiveX format and the ActiveX Image format for graphs are not supported. You must select one of the static formats (GIF, JPEG, or PNG) for displaying graphs.

SAS Add-In for Microsoft Office exposes a variety of formats for graph output. You can select ActiveX, ActiveX Image, GIF, JPEG, or PNG. Each format has its own advantages. ActiveX and ActiveX Image are interactive. The other formats are static. Microsoft Office applications do not have the same issues with the ActiveX format that Web applications do. If you generate graphs using the ActiveX format and e-mail the resulting worksheet or document to a person who does not have the SAS/Graph ActiveX control, the person can view a static version of the graph without needing to download the SAS/Graph ActiveX control.

APPENDIX A—SAS ADD-IN FOR MICROSOFT OFFICE FEATURES

These features apply to Microsoft Excel and Microsoft Word unless explicitly specified.

Version	Feature
1.0	Open any size SAS data source in Microsoft Excel
	Filter SAS data source using SQL syntax in Microsoft Excel
	Sort SAS data source in Microsoft Excel
	Refresh SAS data source in Microsoft Excel
	Execute SAS Stored Processes and view results in Microsoft Office applications
	Execute experimental SAS tasks and view results in Microsoft Office applications
	Refresh results
	Provide estimate of time to refresh each analysis or multiple analyses
	Send results from Microsoft Excel to Microsoft Word
	Provide favorites support, which are shortcuts to commonly used SAS Stored Processes or SAS tasks
1.2	Filter SAS data source using an intuitive user interface in Microsoft Excel
	Filter SAS data source using an advanced SQL function builder in Microsoft Excel
	Sort SAS data source by unlimited number of variables in Microsoft Excel
	Sort, filter, and order columns when opening SAS data source in Microsoft Excel
	Retain Microsoft Excel formulas that surround SAS data source when you refresh
	Search for SAS Stored Processes by name, date, or keyword
	Create custom style sheets for results
1.3	Execute large selection of production SAS tasks

APPENDIX B—LEVERAGING SAS ADD-IN FOR MICROSOFT OFFICE FROM MICROSOFT POWERPOINT

SAS Add-In for Microsoft Office plans to support Microsoft PowerPoint as a client in a future release. For now, you can use the native OLE support in Windows to achieve some level of integration. Using the OLE support enables you to link a Microsoft PowerPoint slide to a particular Microsoft Excel worksheet or Microsoft Word document. Any updates to the worksheet or document are reflected in the linked slide. If the worksheet or document includes SAS results, you can refresh the results from within Microsoft Excel or Microsoft Word and the slides update to display the latest changes.

ENABLING MICROSOFT POWERPOINT UPDATES FROM MICROSOFT EXCEL AND MICROSOFT WORD

The following steps are necessary to link a Microsoft PowerPoint slide to a SAS result:

1. Generate results in Microsoft Excel or Microsoft Word using SAS Add-In for Microsoft Office.
2. Save the worksheet or document.
3. Highlight the results in the Microsoft Excel worksheet or Microsoft Word document that you want to link to your Microsoft PowerPoint slide. Microsoft PowerPoint links to that exact location in the worksheet or document. Any modifications to the location cause the Microsoft PowerPoint slide to display the wrong results. To select all the SAS results, select **CTRL-G**, which opens the **Go To** window. In Microsoft Excel, select **_SOA_ResultsRange** and select **Go To**. In Microsoft Word, go to a bookmark and then select the name of the SAS Stored Process or task result. Select the **Go To** button. This highlights all of the SAS results.
4. Copy the content to the clipboard using the **Edit** drop-down menu and the **Copy** menu item, or **CTRL-C**.
5. Switch to Microsoft PowerPoint and insert a slide in which to place the content.
6. Select the **Edit** drop-down menu and the **Paste Special** menu item.
7. Select the **Paste Link** radio button.
8. Select the **OK** button.

You have now created a linked object in Microsoft PowerPoint that points to the worksheet or document. Any updates to the worksheet or document causes the Microsoft PowerPoint slide to update. For example, if you switch back to the Microsoft Office application and refresh, the Microsoft PowerPoint slide updates. Any time you open the Microsoft PowerPoint slideshow, you are prompted to **Update links**. If you select the **OK** button, Microsoft PowerPoint launches Microsoft Excel or Microsoft Word in the background and grabs the updated contents of the

worksheet or document. If you do not have the linked worksheets or documents on your machine, you can view the slides without issue. However, you cannot update slides to reflect any updated results. If you want another user to update the slides, you have to send the user the Microsoft PowerPoint file and the dependent Microsoft Excel worksheets or Microsoft Word documents. Microsoft PowerPoint enables the user to specify the location of the linked files on his or her machine using the **Links** dialog box, which is available from the **Edit** drop-down menu.

ADDITIONAL CAPABILITIES USING MICROSOFT WORD

In Microsoft Word, you can define a bookmark that identifies only part of the result from SAS. For example, if you have multiple tables or graphs generated from one SAS Stored Process, you could define bookmarks to each table or graph and place each one on separate slides. When you refresh in Microsoft Word, the bookmarks are retained and the Microsoft PowerPoint slides display the updated content. You need to keep one issue in mind with this approach—if you change the characteristics of the result on a refresh, your bookmark will probably change and the Microsoft PowerPoint slide will not display the desired contents. If this happens, adjust the bookmark in Microsoft Word using the bookmark capabilities.

APPENDIX C—SAS ADD-IN FOR MICROSOFT OFFICE REQUIREMENTS

OPERATING SYSTEMS

Windows NT 4.0 (Service Pack 6a or later)

Windows 2000 (Service Pack 2 or later)

Windows XP

Note: The required Microsoft .NET framework cannot be installed on 64-bit machines.

MINIMUM PROCESSOR SPEED

133 MHz

300 MHz or higher recommended

MEMORY REQUIREMENTS

128 MB minimum

256 MB or more recommended

ADDITIONAL SOFTWARE REQUIREMENTS

One of the following Microsoft Office installs is required:

Microsoft Office 2000 (SR1 or later) for English installs

Microsoft Office 2000 (SP3 or later) for non-English installs

Microsoft Office 2002

Microsoft Office 2003

SAS BI Server

DISK SPACE REQUIREMENTS

System Components	144 MB
SAS Add-In for Microsoft Office plus Components	59 MB
Total Required Disk Space	203 MB

Required System Components	Version	Disk Space Required
Microsoft .NET Framework	1.1	110 MB*
Microsoft Data Access Components (MDAC)	2.7	20 MB**
Visual C++ Redistributables Bundle	6.0	10 MB
Visual C++ Redistributables Bundle	7.0	4 MB

*The Microsoft .Net Framework requires 150 MB during the install for the creation of temporary files. The final footprint after the install is 110 MB. The Microsoft .Net Framework requires Microsoft Internet Explorer 5.01 or later.

**MDAC already exists on Windows XP, so this 20 MB is not required on that operating system.

SAS Products for Third-Party Components	Version	Disk Space Required
SAS Integration Technologies	9.1	2.7 MB
SAS Providers for OLE DB	9.1	5.5 MB
SAS/Graph OCX	3.0	6.7 MB
SAS Enhanced Editor	9.1	2.4 MB
SAS Formats	9.1	1.2 MB
Xerces XML Parser	1.5.1	1.3 MB
SyncFusion Redistributables	2.0	4.4 MB
SAS BI Client Tasks	3.0	22.6 MB
SAS Add-In for Microsoft Office	1.2	5.6 MB

CONCLUSION

SAS Add-In for Microsoft Office leverages the knowledge base of many users by bringing the power of the SAS BI Server to the applications with which they are familiar. The ability to execute analytics directly from Microsoft Excel and Microsoft Word brings new capabilities to the Microsoft Office environment and enables a familiar user experience. In the past, SAS has provided ways to integrate with Microsoft Office applications. Most of these ways required using SAS to export data or results to Microsoft Office applications. SAS Add-In for Microsoft Office takes a different approach by leveraging your knowledge of Microsoft Office and bringing the capabilities of SAS directly to a familiar environment. SAS Add-In for Microsoft Office gives Microsoft Office users *The Power to Know*[®].

CONTACT INFORMATION

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