

## **SAS Enterprise Guide® – Moving Beyond Your Initial Startup**

Donald L Penix Jr. (D.J.) Pinnacle Solutions, Inc., Indianapolis, IN

Roger D. Muller, Ph.D., First Phase Consulting, Carmel, IN

### **ABSTRACT**

Once the programmer has grasped the initial concepts of using SAS Enterprise Guide (or SAS EG) including the Process Flow, the program file editor, and the handling of interactions with the interface (don't forget the F4 key!), there is a wide variety of additional functionality and features that are available. Some of these tools are more designed towards the individual programmer doing typical business analyst work, while other features have functionality extending out to assist the development and deployment of enterprise-wide applications.

### **INTRODUCTION**

For the professional programmer and data analyst, there are advanced features in Enterprise Guide that are useful both for analyzing data and creating applications that will be used both by the developer and by other information consumers throughout the enterprise. The initial part of this paper covers assorted SAS EG features that are useful to both the novice and experienced SAS programmer. The later part of the paper addresses issues more useful to SAS planners and administrators on an enterprise-wide scale, but should be understood by the typical SAS analyst so they can be conversant in overall system-wide goals and in making requests to administrators. These concepts are critical in a successful implementation since in general, most all of the components of the SAS Business Intelligence Platform are heavily dependent on Enterprise Guide for their development.

### **ACCESS VIA SAS INTEGRATION TECHNOLOGIES**

Many users are familiar with using PC SAS on a local workstation or laptop. Other users may access SAS by logging directly into the server operating system and launching SAS from there, or they may submit jobs remotely to the server via SAS/CONNECT®. Enterprise Guide can actually bring both scenarios together without requiring the user to know complex configurations or architecture.

SAS Integration Technologies®, a key component in the SAS foundation, is a separately licensed product that allows users multiple options for exploiting and integrating SAS inventory (data, programs, macros, meta-items). Using a comprehensive set of industry standards, it can facilitate asynchronous business processes, interact with directory servers for security and authentication, employ a publishing framework for non-SAS content such as documents and images, and prove a service-oriented rich architecture. In addition to having scalability flexibility, Integration Technologies also supports SAS Stored Processes which is a key element in deploying standard content to a wide variety of information channels.

With respect to Enterprise Guide, one of the most important features of Integration Technologies is that it allows the user sitting at a workstation to effectively have a "console" to the remote SAS server. Or, Enterprise Guide and Integration Technologies can also be configured to run off of a local PC version of SAS that is installed on the workstation itself.

### **WHY USE SAS WITH SAS INTEGRATION TECHNOLOGIES?**

Whether on a local PC or on a server, traditional SAS usage of course could be as simple as opening up the SAS Windows Explorer and submitting code in the SAS program editor. But this limited approach has several drawbacks:

1. Programs, data, and output is not centralized;
2. IT cannot easily manage the system;
3. Applications do not have built in role-based security;
4. Reports and analysis are not readily available to the organization via flexible distribution channels.

There are of course various programming approaches and business processes that can help address these limitations, but with Enterprise Guide and Integration Technologies, these types of challenges can be resolved out of the box!

## TECHNOLOGY OVERVIEW

SAS Integration Technologies software facilitates asynchronous communication between Enterprise Guide (and other client tools) with a SAS instance. It is important to note that the Enterprise Guide application itself is actually just a dumb “client” and is not able to run SAS code on its own. In fact, on a local Windows workstation or laptop with PC SAS and Enterprise Guide, the processing initiated by Enterprise Guide on a PC SAS installation is done via the Integration Technologies components installed on the PC. Thus, from within Enterprise Guide, the server is actually referred to as “Local”.

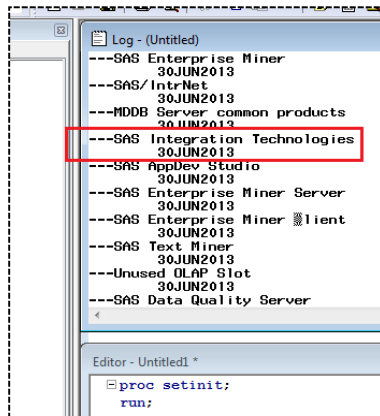


Figure 1 – SETINIT results

How do you know if SAS Integration Technologies is on the machine you are working with or attached to? You can do this in the basic SAS Program Editor or submit a job remotely. In your code, submit

```
proc setinit;  
run;
```

on the machine where SAS is running – either local or on the server. A listing will appear in the log for all licensed software and SAS Integration Technologies will be displayed if it is licensed at your organization (Figure 1).

If you have a recent version of Enterprise Guide installed on your workstation, you will almost certainly have either a local version of SAS installed, or an available version of SAS on a remote server. You can check with your SAS administration team to find out more details on your specific configuration.

## LAUNCHING SAS ENTERPRISE GUIDE

One interesting configuration that companies may utilize is Windows Terminal Services to create virtual workstations that “host” the SAS EG application and other Windows client tools. SAS EG can always be installed on all of your users workstations, however this can be time consuming and difficult to maintain patches or upgrades. By installing the SAS EG application on a Windows Terminal Server, one can literally deploy the tool out to hundreds of users with a single install.

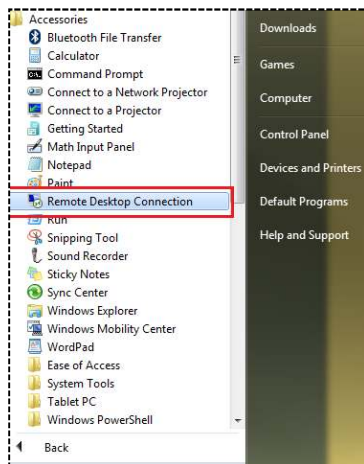


Figure 2 – Launching RDC

Windows has a client tool called Remote Desktop Connection (or RDC) built into all newer versions of workstation and server licenses. You can access it by left-mouse clicking the windows Start button, All Programs, Accessories, and selecting Remote Desktop Connection (Figure 2).

You will then see a dialog for selecting a remote server (Figure 3).



Figure 3 – RDC connection dialog

Once logged on the Windows Terminal Server, it will look similar to your normal Windows desktop however this instance will be running remotely somewhere else in your network.

Because multiple users can be logged into this one instance of a “desktop” at the same time, this allows for a single deployment of the SAS client tools, including Enterprise Guide (Figure 4). The impact of this for upgrades and patches can be significant. A single upgrade of software on a Windows Terminal Server that supports 100 users can all be done once rather than an IT administrator doing it 100 times on each local machine.

*Note: SAS has made some subtle changes in the properties and display characteristics of the interface throughout the versions. The examples shown in this paper are from using SAS Enterprise Guide 5.1. The appearance of your interface may vary slightly, however the concepts should be the same.*

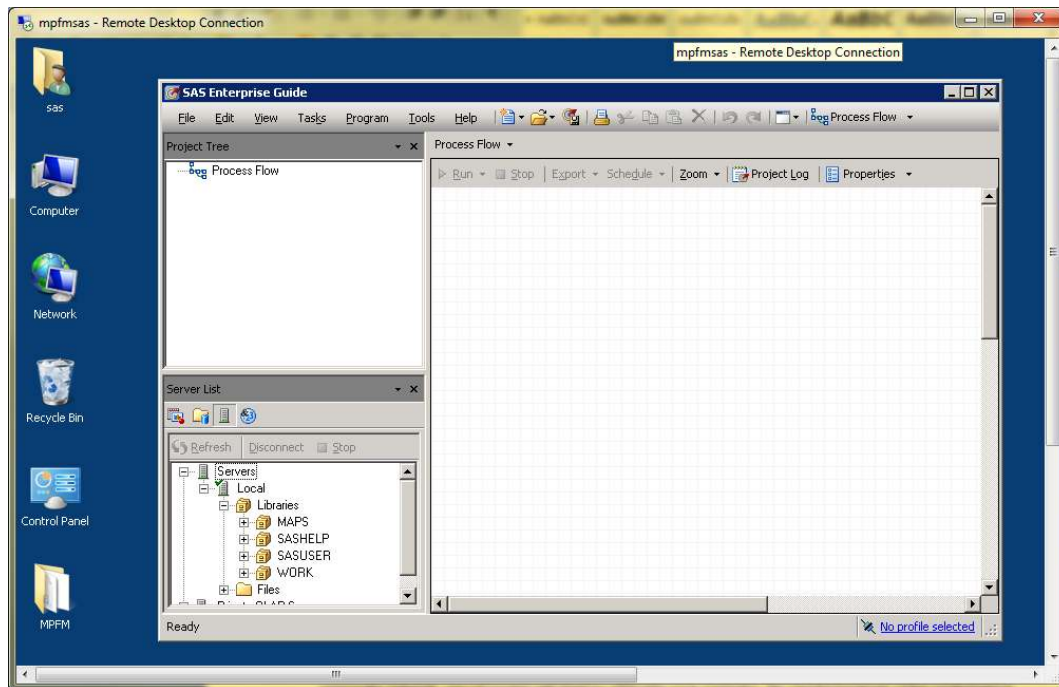


Figure 4 – Opening SAS Enterprise Guide in a Remote Desktop Connection session

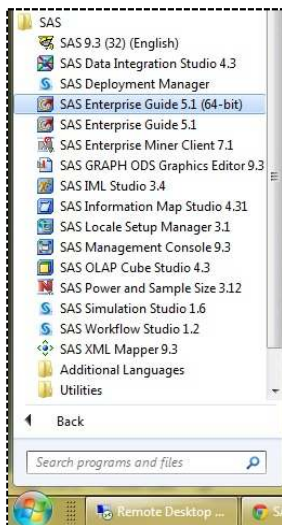


Figure 5 – Launching EG

A more common configuration of course is to simply install SAS EG directly on a Windows laptop or desktop. If you are attached to the network in your enterprise, you should be able to invoke Enterprise Guide by navigating through the Windows Start button and selecting All Programs / SAS / Enterprise Guide shortcut (Figure 5). If you are outside the corporate network, you of course will need to VPN into your company. Be careful however of the performance ramifications if your internet connection is slow. Do not hesitate to involve your enterprise networking personnel to assist with this as it is relatively easy to do for someone who knows the local architecture.

If you are launching Enterprise Guide for the first time, or if you have not previously configured it to connect to a remote server, you will only see the “Local” server as being available and “No profile selected” will appear in the lower right hand corner of the status bar (Figure 6).

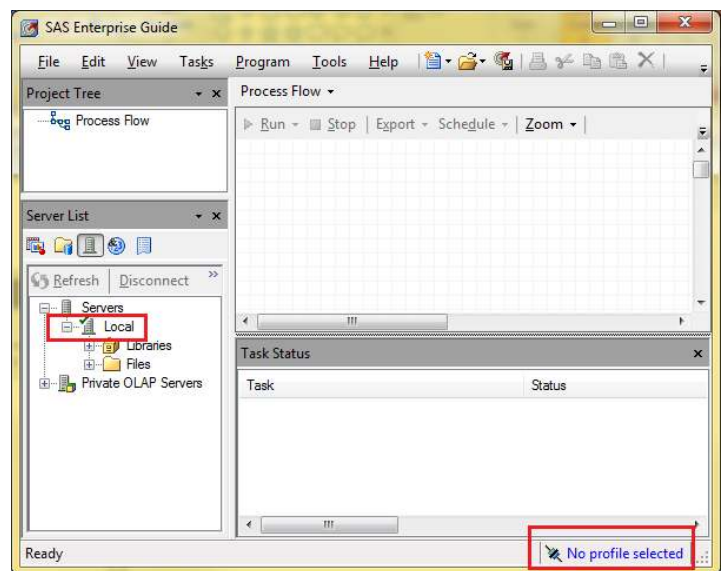
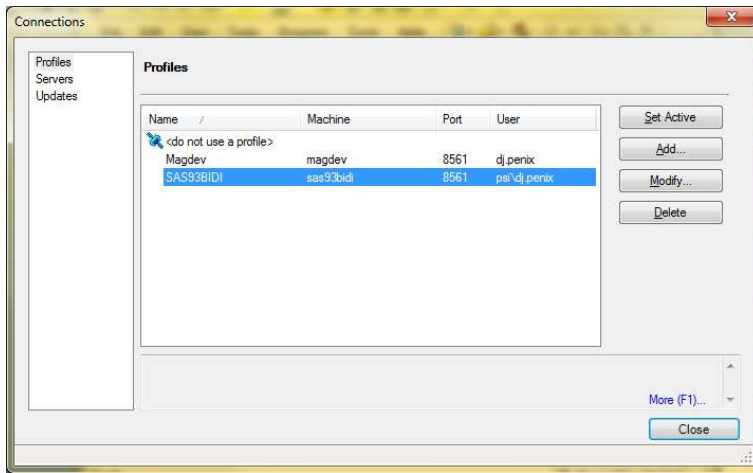


Figure 6 – EG with Local connection only

If you have a remote server available, you can click on the “No profile selected” status bar and it will display a dialog window that allows you to add or select existing connection profiles (Figure 7).

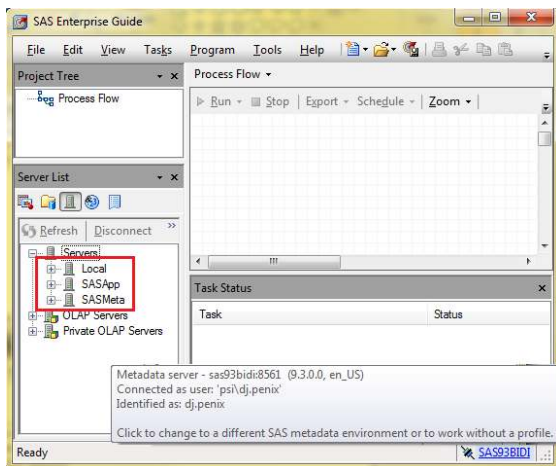


In the Connections dialog window, you can highlight other available server connections available in your organization. Note that your list may have LOTS of available servers depending on how many server licenses are available at your site.

Once a connection profile is selected, click on the “Set Active” button.

After you close the connection dialog, you will now see other various servers that are available within the connection. In this example, there are two servers – SASApp and SASMeta (Figure 8).

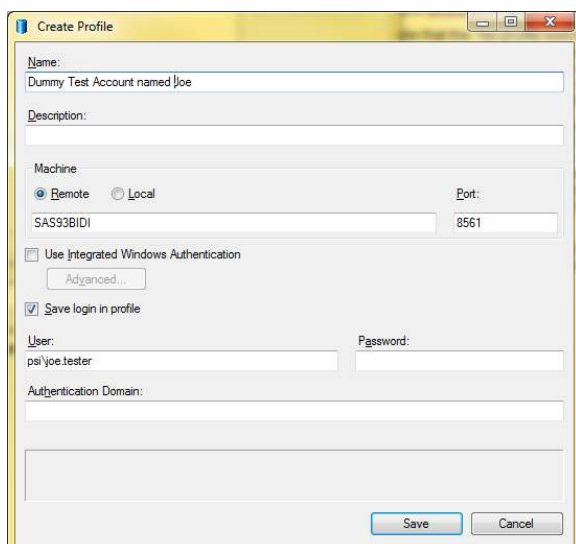
**Figure 7 – Connections profile dialog**



Also note that the “No profile selected” status has changed to the name of the connection profile that was selected. If you hover your mouse over the connection link, it will describe not only the server configuration settings, but also the user id that is connecting to the server.

This obviously brings up an interesting feature for applications that require security for the data and applications. By creating multiple connection profiles for multiple user id's on the same server, testers can easily flip back and forth between connection profiles to ensure security permissions have been applied correctly.

**Figure 8 – EG with Local and remote server(s)**



Setting up additional connection profiles are done using the same dialog window described in Figure 7 above. Click on the “Add...” button. A new dialogue will appear that allows you to enter the server and user id details (Figure 9).

In this example, a password does not need to be specified since the user id will be authenticated against a Windows Active Directory server.

**Figure 9 – Creating new connection profile**

## USING THE RIGHT LIBRARIES AND SERVERS

For beginning users of Enterprise Guide, it can often be confusing where SAS programs are submitted or even where the data is coming from. To highlight this point, let's take a look at libnames such as WORK or SASHELP.

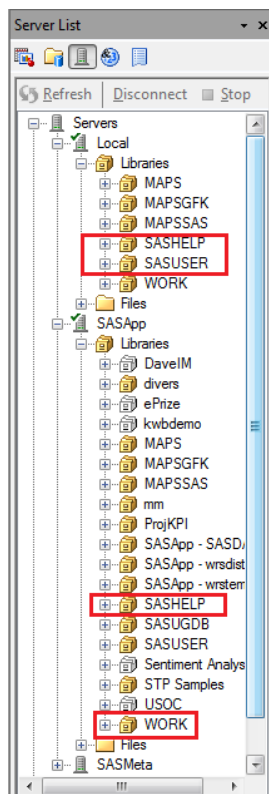


Figure 10 - Libraries

Note that both the Local server and the remote SASApp server both have the WORK and SASHELP libraries (Figure 10). This can be even more confusing if a user or organization replicates their business library names at both the local and server instances.

What if user drag-and-drops the SASHELP.CLASS table from both the Local and the SASApp server and then builds a Pie Chart for each one of them? Unless you manually change the displayed names of the data sets in the Process Flow, users may be confused as to where the data is coming from (Figure 11).

But done correctly, and with some awareness and collaboration from the development team members in advance, this can offer some nice advantages by utilizing replicated data both locally or on the server.

For example, let's suppose your SAS licenses have different product bundles for the PC and Server. The Enterprise Guide application will allow you to run some programs locally, while running other programs remotely – all within the same work flow.

Another scenario where licensing on the local and remote server are identical could provide analysts on an airplane the ability to work out of the office. If the developer replicated copies of data and programs on their local PC, he/she could develop code in areas or parts of the world where VPN or other internet connections may not be available.

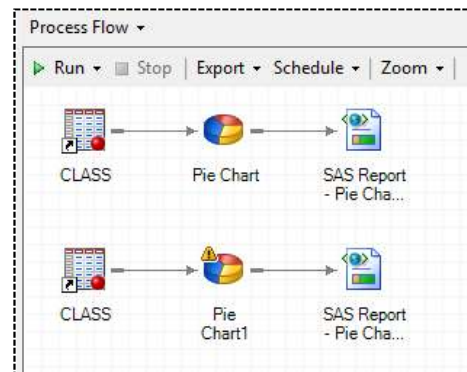


Figure 11 – Process flow example

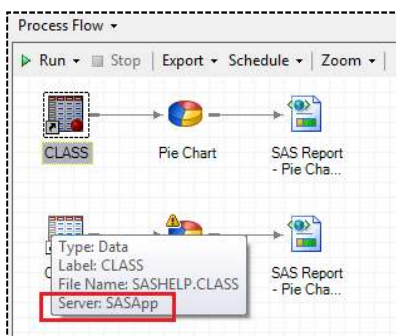


Figure 12 – Properties hover

If the descriptive labels of data are not modified to indicate location of server source, users can always hover their mouse over the dataset and a property summary of the table will be displayed (Figure 12).

## METADATA CONTENT AND FOLDERS

Another advantage of Enterprise Guide on the SAS Foundation Platform is the usage of metadata. Metadata is stored and managed in SAS so that it can leverage and facilitate the reuse of existing libraries, table definitions, reports, users & groups, permissions, business rules and much more.

To the left of the Enterprise Guide application window, users can quickly switch between the EG Task List, SAS Folders, Server List, Prompt Manager, and Data Exploration History. As noted earlier in this paper, some of these



features and usability has changed slightly over the life cycle of the application. A screen shot of an example SAS Folders list is shown below (Figure 13).

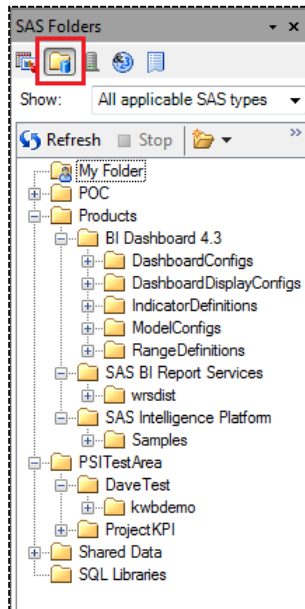


Figure 13

In earlier versions of Enterprise Guide, the projects could only be saved as \*.EGP files which produced a physical file on the workstation or in a network directory location. With more recent editions of Enterprise Guide, users can now save projects within the metadata itself. This will allow for greater collaboration among users in an organization, as well as enable administrators to employ security on their projects.

This is easily accomplished by doing a Save (or Save As... if the project was already saved in a previous location) and selecting SAS Folders as the location rather than on your Desktop or Network location (Figure 14).

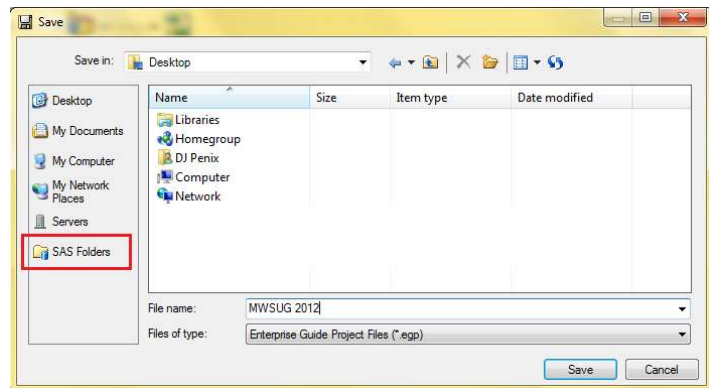


Figure 14

In this example, I will save the project in the My Folder location in the metadata (Figure 15). This is a personal location that each user on the system is allocated. Only that specific user can write or read files from this metadata folder.

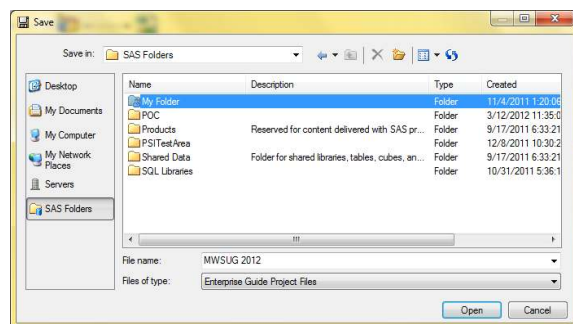


Figure 15 – Saving EG in a metadata folder

Once the save is complete and you click on the Refresh icon, you will then see that the project was saved in the My Folder location (Figure 16).

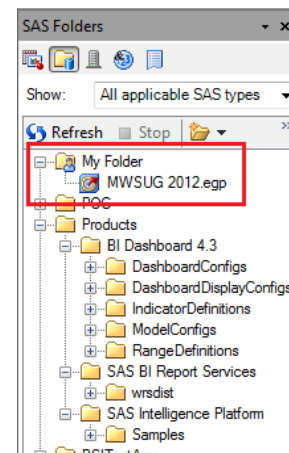


Figure 16 – EG Saved

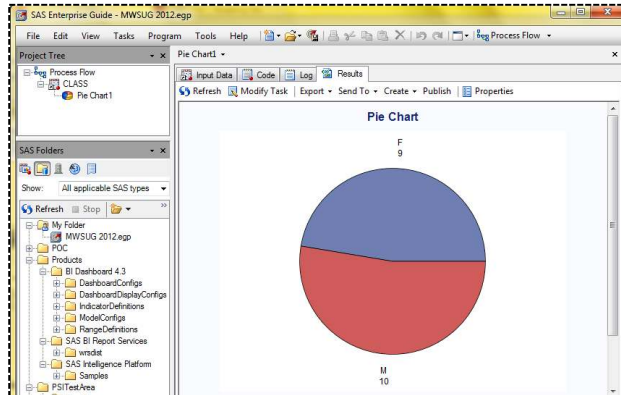
## CREATING A SAS STORED PROCESS

The primary mechanism for deploying and distributing reports to multiple users via multiple interfaces is done via the SAS Stored Process. Although a Stored Process can be used to do other tasks like execute data integration job flows, or sending email alerts for example, this paper will focus on an example of allow end users to consume a "standard" report.

For those who are unfamiliar, a SAS Stored Process is essentially the same as normal SAS code in the Base SAS language. The difference is that the program file does typically contain other header and footer information in the code. Without going into the complexities of what is in the Stored Process code “wrapper”, think of it as instructions that allow SAS Integration Technologies to make sure the code can be deployed on different platforms and different client interfaces.

Creating a stored process is very easy in Enterprise Guide. Using the same SASHELP.CLASS example of a simple pie chart running on the remote SASApp server, the next steps will demonstrate how to create a stored process and deploy it out to other information consumers.

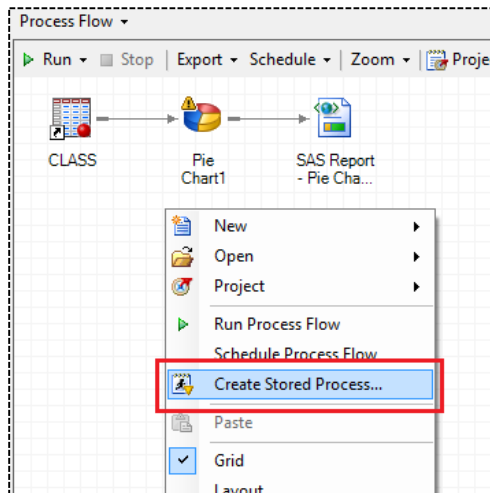
The first step in this example is to create a simple Pie Chart from the SASHELP.CLASS dataset. The Pie Chart simply generates a graph based on gender (Figure 17).



*(Note: This paper will not go into the steps as to what options were specified to create the Pie Chart and it assumes the reader has basic knowledge of creating reports in SAS Enterprise Guide.)*

**Figure 17 – Sample Pie Chart from SASHELP.CLASS**

Once the report flow has been created, right-mouse click on the Process Flow window and select Create Stored Process... to launch the wizard (Figure 18).



**Figure 18**

Screen 1 of 6 (for EG version 5.1 on SAS 9.3) will display a dialogue for the user to supply details about the Stored Process (Figure 19).

Figure 19 – Stored Process Wizard Screen 1

- In the name box, specify the name of the Stored Process – **MWSUG Standard Pie Chart**.
- In the location box, navigate to the desired metadata folder where you would like to save the stored process - **/My Folder**.
- Enter an optional Description.
- Enter optional keywords
- For SAS 9.3 you can check the option to make it 9.2 compatible. Leave that blank.
- Leave the option to Hide from user blank.

```

/* --- Start of shared macro functions. --- */
/* save the current settings of XPIXELS and YPIXELS */
/* so that they can be restored later */
%macro _sas_pushchartsize(new_xsize, new_ysize);
  %global _savedxpixels _savedypixels;
  options nonotes;
  proc sql noprint;
    select setting into :_savedxpixels
    from sashelp.vgopt
    where optname eq "XPIXELS";
    select setting into :_savedypixels
    from sashelp.vgopt
    where optname eq "YPIXELS";
  quit;
  options notes;
  GOPTIONS XPIXELS=&new_xsize YPIXELS=&new_ysize;
%mend;

/* restore the previous values for XPIXELS and YPIXELS */
%macro _sas_popchartsize;
  %if %symexist(_savedxpixels) %then %do;
    GOPTIONS XPIXELS=&_savedxpixels YPIXELS=&_savedypixels;
    %symdel _savedxpixels / nowarn;
    %symdel _savedypixels / nowarn;
  %end;
%mend;

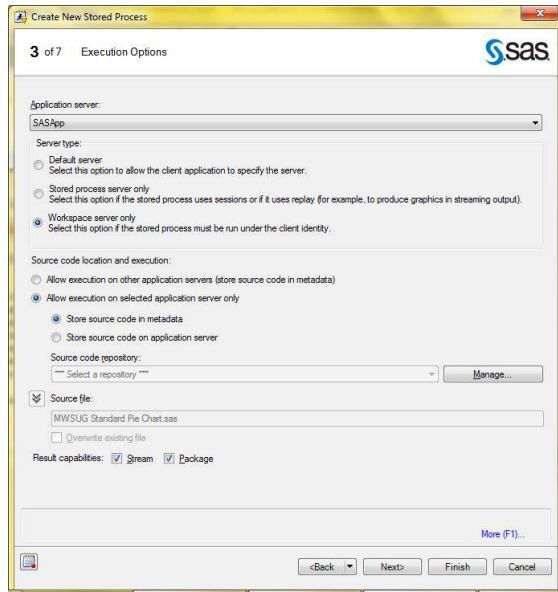
```

Figure 20 – Stored Process Wizard Screen 2

Screen 2 of the wizard displays all of the SAS code that was auto-generated in the Process Flow window (Figure 20). An important note is that the user could insert and replace whatever code was desired and convert legacy programs into a Stored Process.

For most users, there is no need to select any options so you can simply click the Next button.





**Figure 21 – Stored Process Wizard Screen 3**

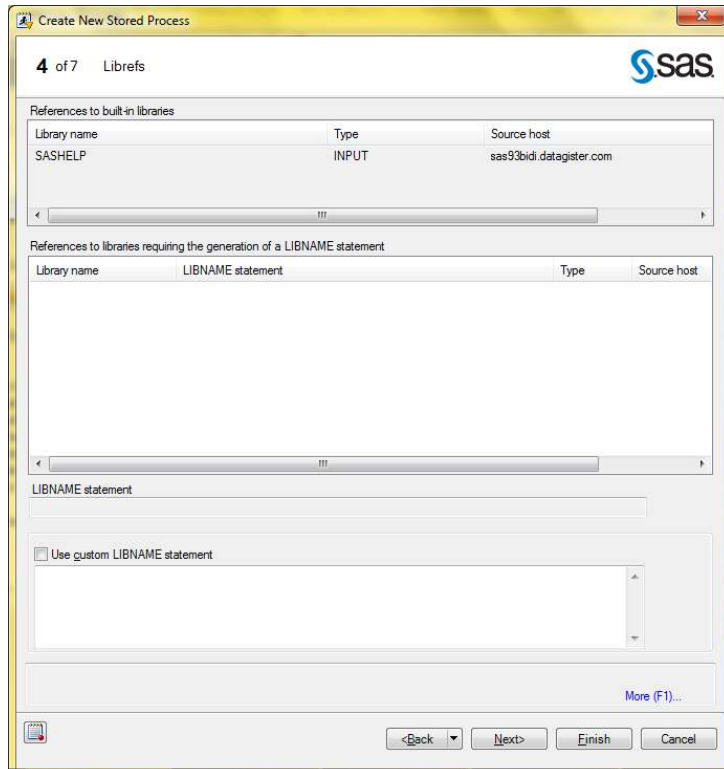
Screen 3 of the wizard will allow the developer to specify various Execution Options (Figure 21).

The Application server is where you would like the Stored Process to be executed at. Note that Local server option is not available. It is not practical to have other users execute the stored process on your local machine. Most users will simply use the default server SASApp.

A common misconception among some people is that they think that a SAS Stored Process must be run on the SAS Stored Process Server. A SAS Stored Process can also be run on the Workspace Server. There are numerous pros/cons for doing this – each of which is out of scope of this paper, but in general the Workspace Server will run the process on the SAS server using the ID of the individual calling the Stored Process. If a Stored Process is executed on the SAS Stored Process Server, it will run the process on the SAS server using a single generic account, typically called SASSRV. In previous versions of SAS, the developers had to specify one server or the other. In version 9.3, there is an option to allow the client application to specify which server it is executed on. For this example, select Workspace server only.

The next option is to specify whether the Stored Process can be executed on other application servers, or if it can only be executed on the selected application server. With that option, the user can also store the Stored Process code on the application server (in the form of a \*.sas physical file), or it can be stored in the metadata. For this example, select Store source code in metadata.

Finally, leave the default Result capabilities checked for Stream and Package. Stream output is typical for Web applications whereas a Package output is best used for Enterprise Guide output.



**Figure 22 – Stored Process Wizard Screen 4**

Screen 4 of the Wizard allows the developer to specify custom library references (Figure 22). In general, if the output was developed using the Enterprise Guide pre-defined libraries and reporting tasks, the Stored Process wizard will figure out the correct libraries for you.

Leave everything as default and click the Next button.

**Figure 23 – Stored Process Wizard Screen 5**

Screen 5 of the wizard will allow you to specify prompts (Figure 23). For this example, we are not going to define any.

Click on the Next button.

**Figure 24 – Stored Process Wizard Screen 6**

Screen 6 (SAS 9.3) of the wizard will allow you to specify Data Sources and Targets (Figure 24). If you would like your Stored Process to have Input Streams or Output Streams, you can specify them here. For this example, we are not going to define any.

Click on the Next button.

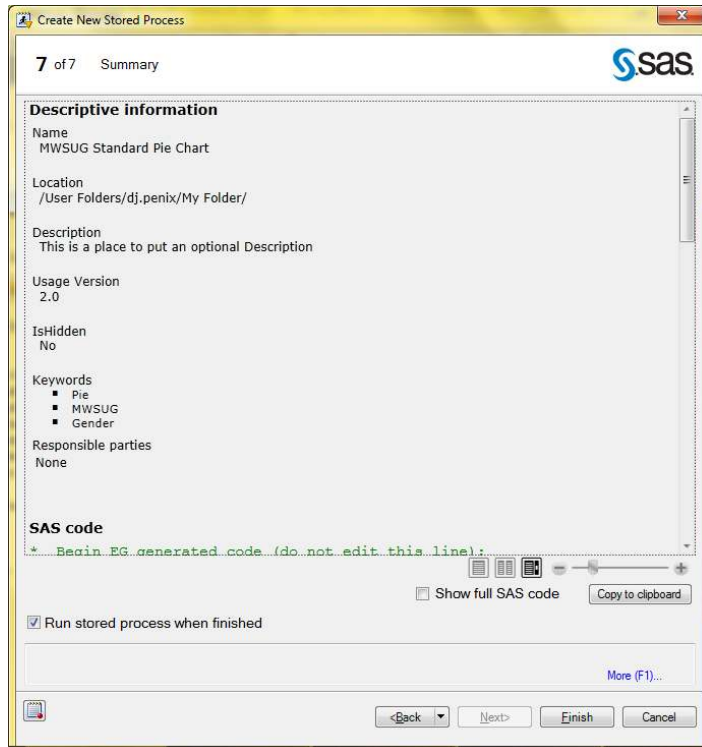


Figure 25 – Stored Process Wizard Screen 7

Screen 7 of the wizard is simply the Summary of all of the previous steps (Figure 25).

There is an option to “Run stored process when finished”. This will allow the developer to test the Stored Process before deploying it out to the other users.

Leave the option checked and click the Finish button. It will generate the same Pie Chart that was created in the Process Flow (Figure 26).

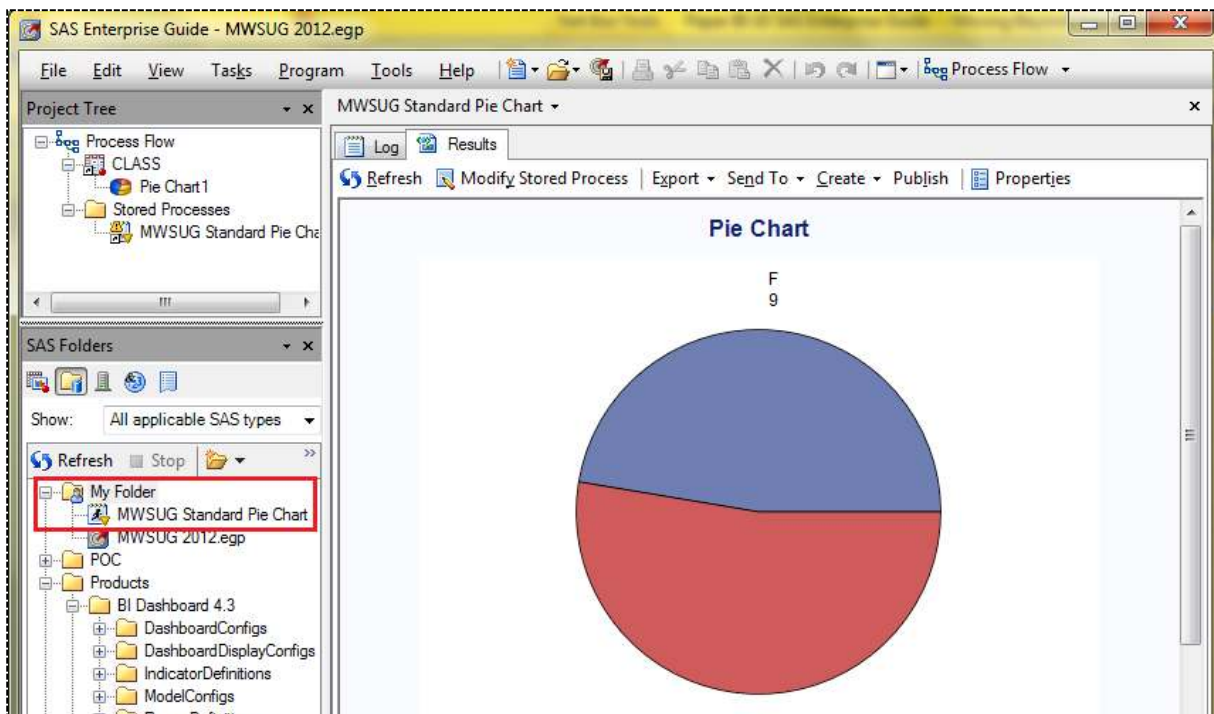


Figure 26 – Results of the executed Stored Process

Note that there is a new icon that looks like a SAS Program with an inverted orange triangle. This is the standard icon for a SAS Stored Process.

## SHARING AND DISTRIBUTING CONTENT ACROSS MULTIPLE INTERFACES

Now that we created the SAS Stored Process, we can execute it on multiple interfaces. Depending on the licensed suite of SAS products at your site, these may or may not be available to you.

The SAS Add-In for Microsoft Office® is a component that allows end users to build and run SAS Tasks as well as execute a SAS Stored Process. Available for Excel (Figure 27), Word, PowerPoint, and even Outlook, users can get SAS reports from interfaces that they are familiar with.

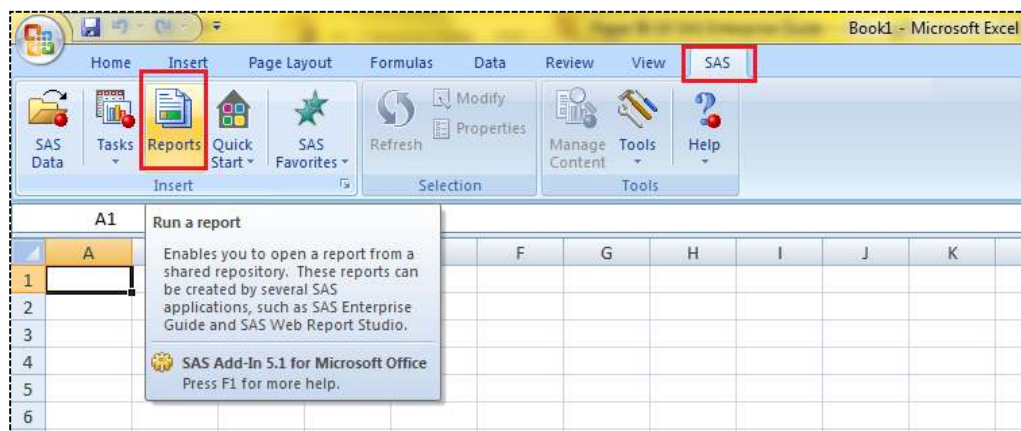


Figure 27 – SAS Add-In for Microsoft Office 5.1 ribbon for Microsoft Excel 2007

The Add-In will create a new SAS menu and depending on the version of Office and SAS that you have, the ribbon will look like the figure above. By clicking on the Reports button, you can navigate in the SAS metadata folder structure and specify the Stored Process we just created in the previous steps (Figure 28).

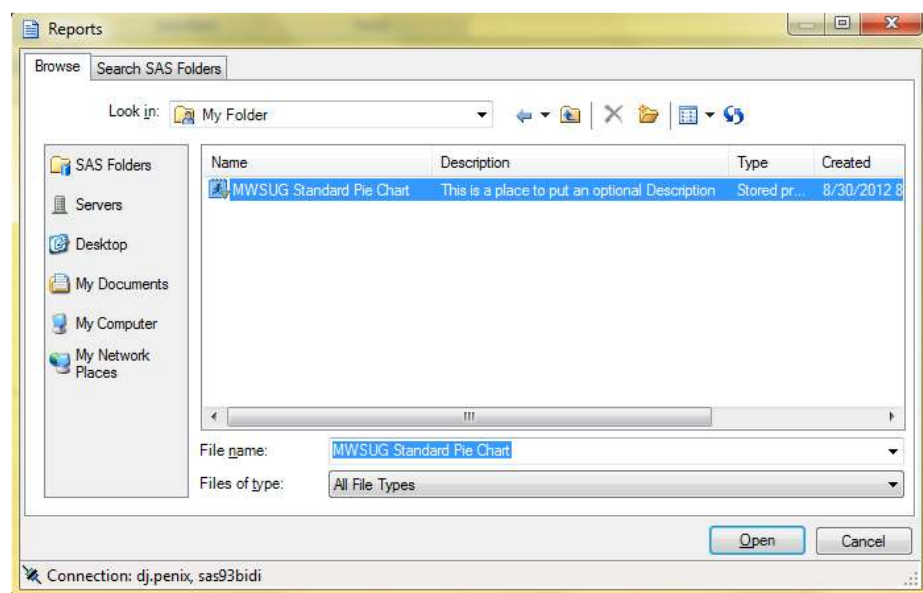


Figure 28 – Selecting a Stored Process report in Excel 2007

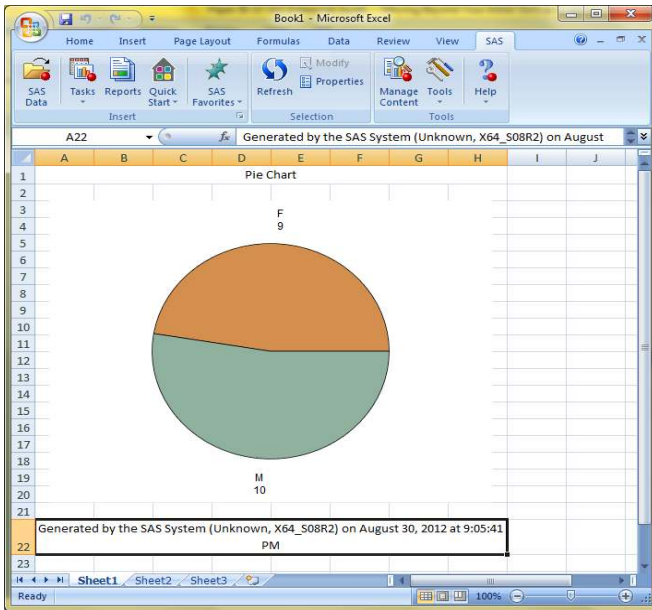


Figure 29 – Stored Process Results in Excel

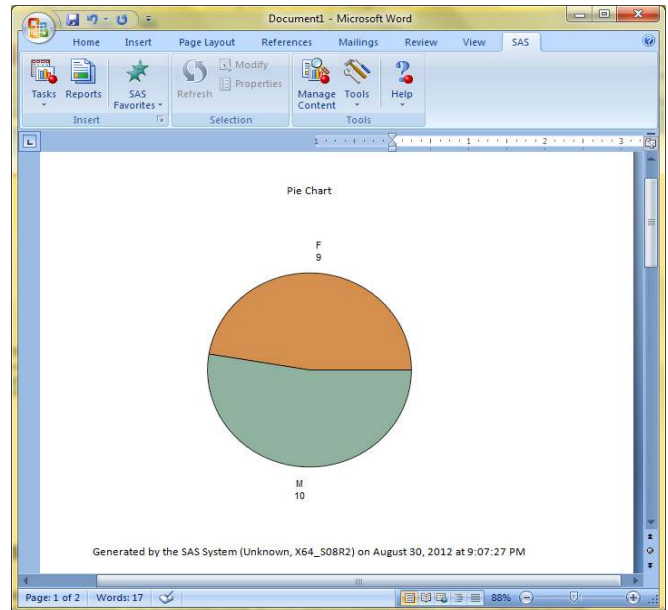


Figure 30 – Stored Process Results in Word

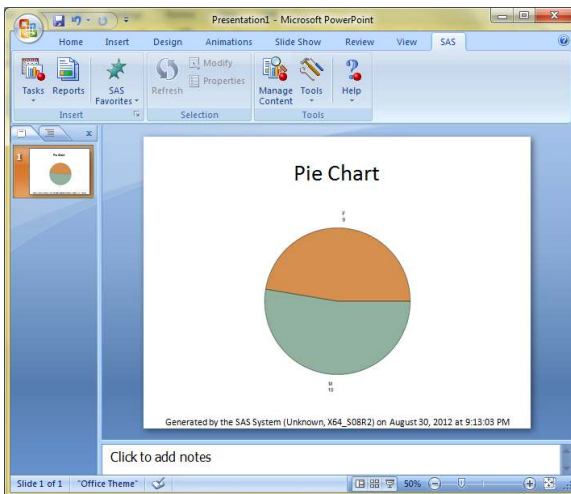


Figure 31 – Stored Process Results PowerPoint

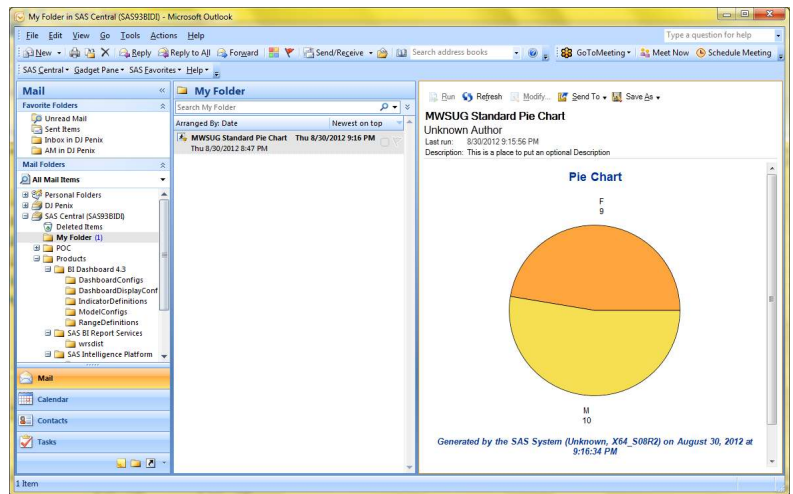


Figure 32 – Stored Process Results in Outlook

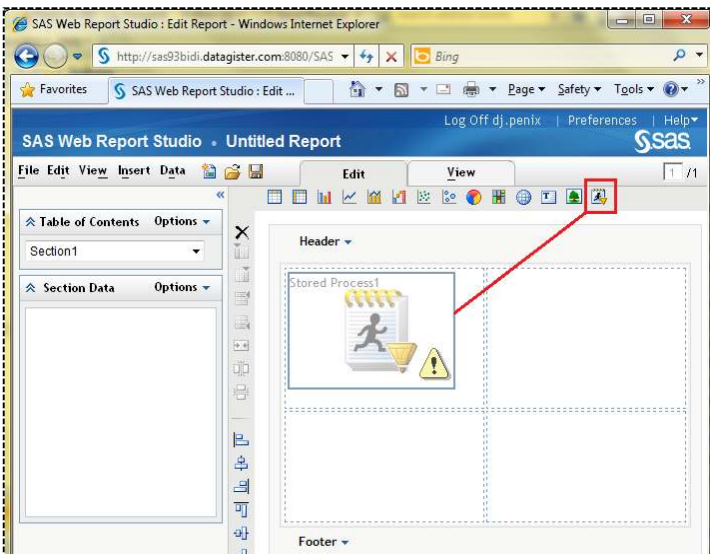


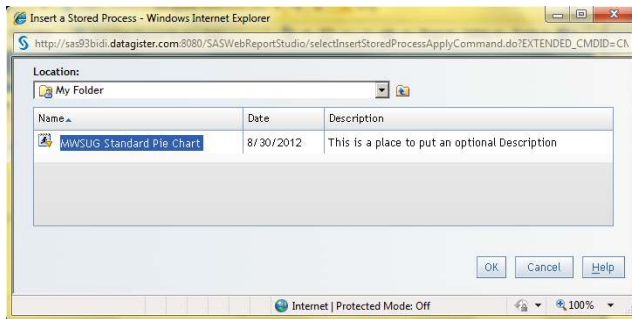
Figure 33 – Setting up a Web Report with a Stored Process

The Stored Process can also be set up to be displayed on a Web Report. In the SAS Web Report Studio (WRS) application, click and drag the Stored Process icon over to a report layout cell (Figure 33).

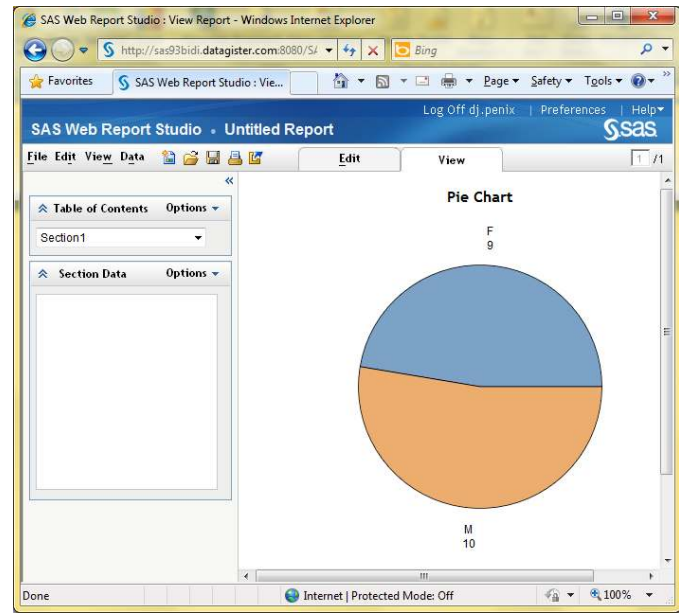
Right-mouse click on the icon to navigate and select the same Stored Process that was created in previous steps (Figure 34).

Click on the View tab and the Stored Process will execute and then display the Pie Chart (Figure 35).





**Figure 34 – Selecting the Stored Process in WRS**



**Figure 35 – Viewing the Stored Process in WRS**

SAS Stored Processes can be used in many different client applications. Here is a brief list of some of the SAS tools you can use.

- JMP
- SAS Add-In for Microsoft Office
- SAS BI Dashboard
- SAS BI Web Services
- SAS Data Integration Studio
- SAS Information Map Studio
- SAS Stored Process Web Application
- SAS Web Report Studio
- Stored Process Java API
- Stored Process Windows API
- SAS Information Delivery Portal
- SAS Code (New in 9.3!)
- SAS Enterprise Guide

Now that you see how easy it is to create a stored process and deploy information, what is stopping you from taking your existing SAS legacy code and converting them to Stored Processes? This would immediately make them available in multiple interfaces, including the web. Making your reports web ready has never been this easy!

## PERMISSIONS AND ROLE BASED ACCESS

Although tools to manage user permissions and customize functionality based on roles are not included in the Enterprise Guide application, they are a part of the SAS Management Console (SAS MC). End users of EG may not be aware of such features since they can only be modified by someone who has access to the SAS MC and has the necessary permissions to adjust the settings. You might need to talk with your administrator to discuss if they are aware of these capabilities.

In order to set up your Enterprise Guide system with robust permissions and role based functionality, it is first important to understand the concepts of three (3) key metadata items in the SAS MC application:

- Users – individuals who log into one or more SAS applications
- Groups – teams of one or more Users
- Roles – settings of capabilities in the system

After logging into the SAS MC, navigate to the Plug-ins tab. Here you will see various components to manage the SAS metadata, including the User Manager. If you click on the User Manager item, a pane on the right side of application will appear. Make sure that Show Users is checked, and to make it easier to filter and see ONLY users, uncheck the other boxes for Show Groups and Show Roles (Figure 36). Some of the users are out of the box and are created during the installation time, such as the SAS Demo user or SAS Administrator user.

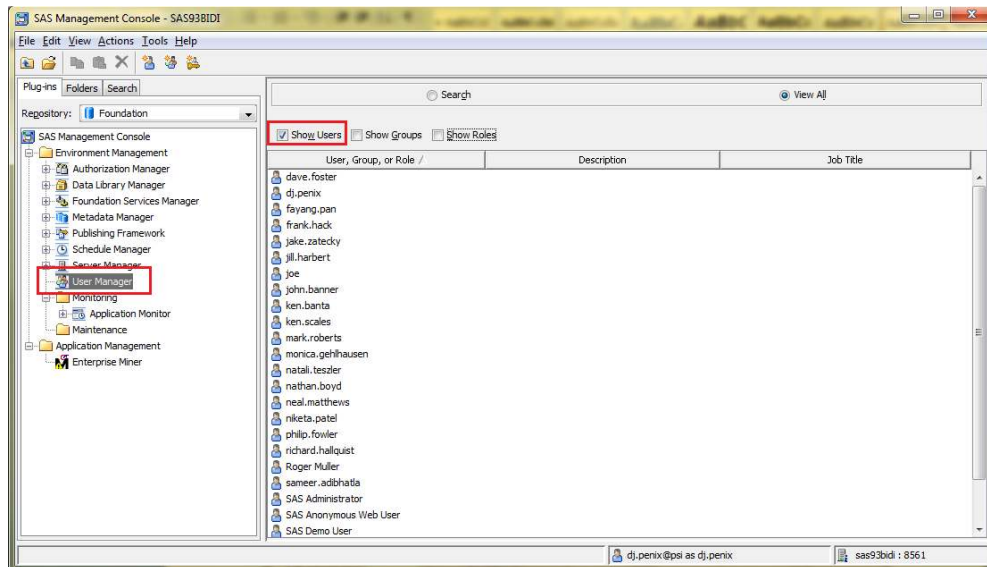


Figure 36 – Managing Users in SAS Management Console

Next, check Show Groups and uncheck Show Users. The list of each of the items in this section will contain a list of Groups that are defined in the system (Figure 37). Many of these are out of the box Groups that we created during the installation, such as the SASUSERS or BI Dashboard Administrators. Others may be custom based on the needs of the business. It is important to note that Groups are typically utilized to authorize access in a READ/WRITE/DELETE fashion for data, folders, reports, and metadata objects for example. Groups, and Users, are typically either granted access or they are denied.

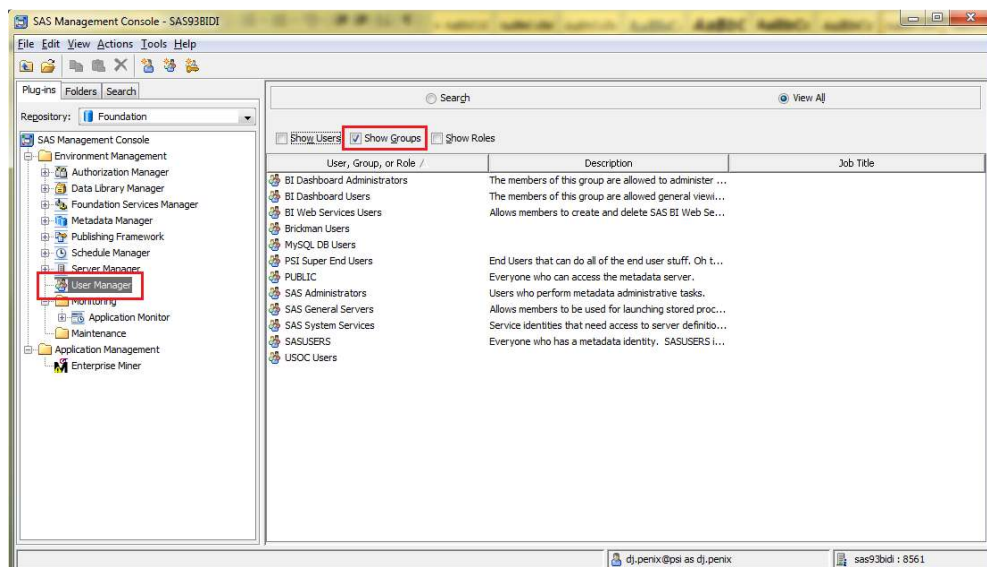
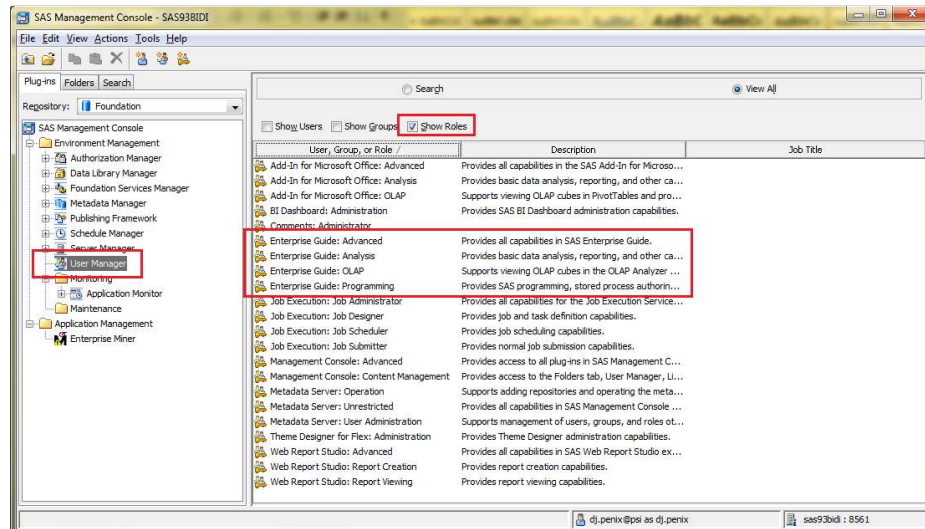


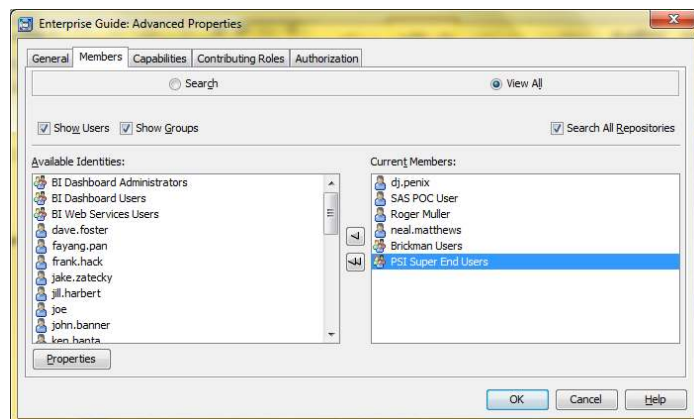
Figure 37 – Managing Groups in SAS Management Console

Next, check the Show Roles box and uncheck the Show Groups box (Figure 38). This now displays a list of available Roles in the SAS system. Roles allow Users or Groups the capabilities to do certain functions within an application. Note that in the example there are four (4) different Roles that are specific to Enterprise Guide: Advanced, Analysis, OLAP, and Programming.



**Figure 38 – Managing Roles in SAS Management Console**

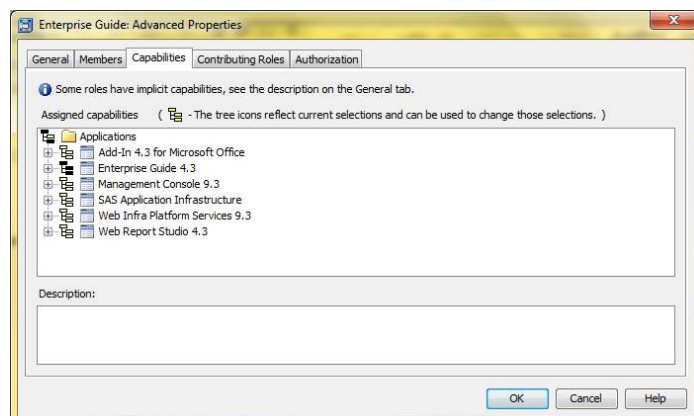
Let's first explore the properties for the Advanced role. Right-mouse click on the Enterprise Guide: Advanced role and select properties.



**Figure 39 – Viewing members of a Role**

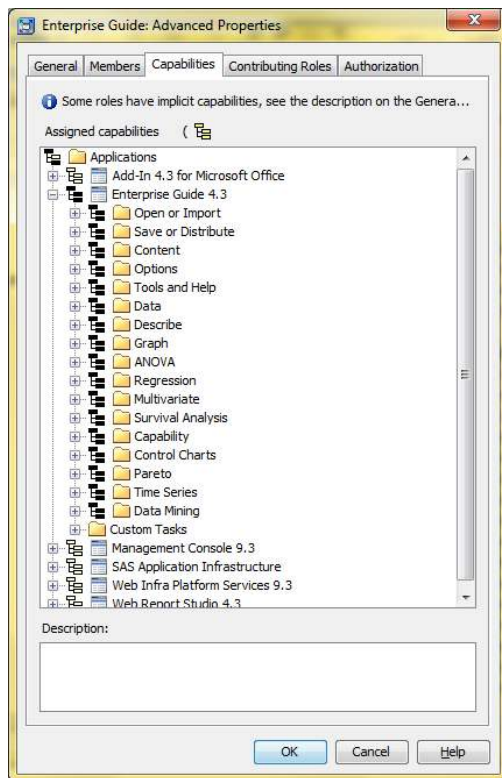
If you select the Members tab, you will see all Users and Groups who are assigned access to this role (Figure 39).

Adding or removing members to this role is as easy as moving them back and forward with the arrows.



**Figure 40 – Viewing capabilities of a Role**

Next, click on the Capabilities tab. You will now see the various applications that are relevant to this role (Figure 40). In this example, because we selected a role related to Enterprise Guide, the Enterprise Guide 4.3 tree icon is shaded black whereas the other applications, such as Add-In 4.3 for Microsoft Office, Web Report Studio 4.3, etc. are all un-shaded.

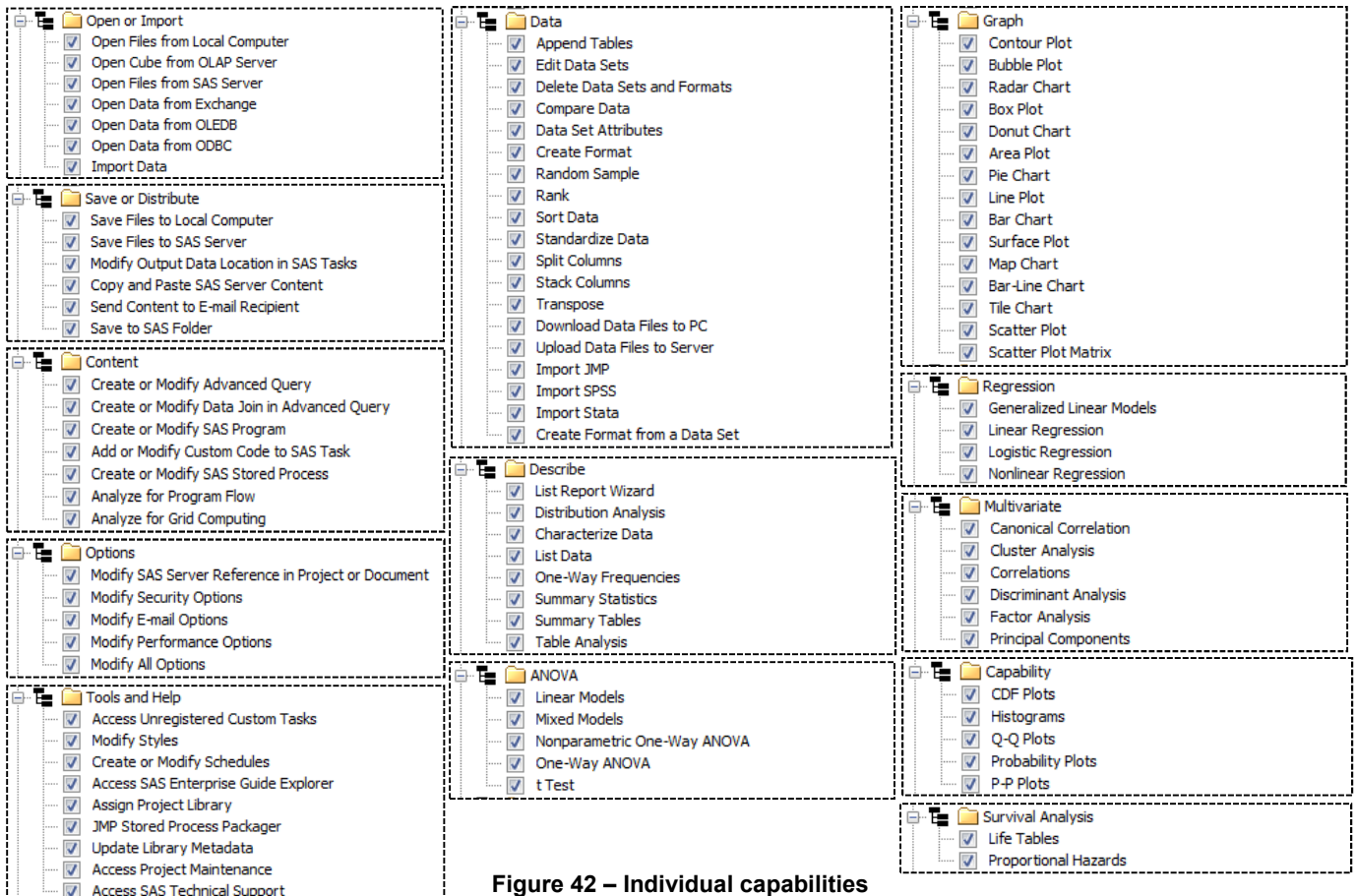


If we expand the Enterprise Guide 4.3 application tree, we will now see several different capability categories (Figure 41) including:

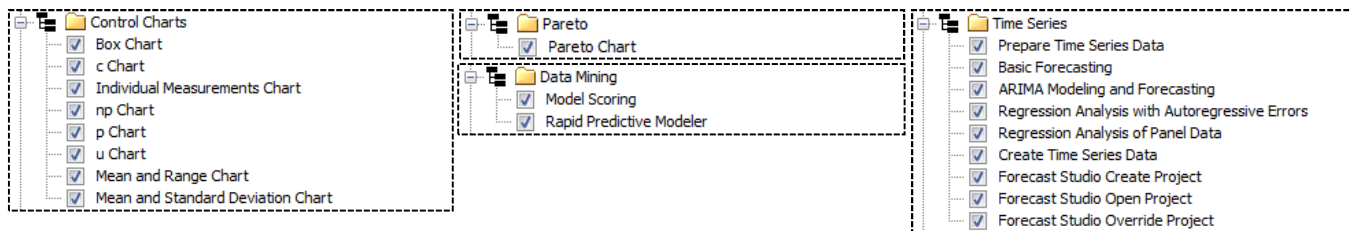
- Open or Import
- Save or Distribute
- Content
- Options
- Tools and Help
- Data
- Describe
- Graph
- ANOVA
- Regression
- Multivariate
- Survival Analysis
- Capability
- Control Charts
- Pareto
- Time Series
- Data Mining
- and Custom Tasks

If we expand each of the sub-trees, we see each of the specific capabilities that users can, or cannot do based on their membership to this Role (Figures 42 & 43). This out of the box Role can be customized, or companies can create their own custom Roles for each of their applications.

**Figure 41 – EG Capability sub-categories**



**Figure 42 – Individual capabilities**



**Figure 43 – Individual capabilities (cont.)**

A few good examples where this functionality would come in handy?

- Prevent business users from accidentally creating an advanced SQL query that would generate a run-away process.
- Simplify the interface functionality for high-level executives who might be overwhelmed by a complex interface.
- Prevent users from downloading data files to the PC, which might create security problems in highly regulated environments.

Please check with your SAS administrator if you need to implement any of these role based features.

## CONCLUSION

The few examples provided herein are intended to give the audience an overview of how important SAS Enterprise Guide is to the overall SAS Business Intelligence Platform. While the EG interface can be used as a simple replacement for the legacy SAS Windows Explorer, leveraged properly it can help with security, developmental efficiency, centralize maintenance, and facilitate enterprise wide distribution of your reports and analysis. The mechanism that can make this all happen is SAS Integration Technologies.

With the usage of Local and remote Servers, developers can work in situations where there is no available network connectivity, and leverage instances where site licenses are different throughout an organization.

## REFERENCES

[Overview of SAS Intelligence Platform](#)

[SAS Add-in for Microsoft Office](#)

[SAS Overview of Stored Processes](#)

## CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the authors at:

Name: Donald L. Penix, Jr. (D.J.)  
 Enterprise: Pinnacle Solutions, Inc.  
 Address: 426 East New York Street  
 City, State ZIP: Indianapolis, IN 46202  
 Work Phone: 317-423-9143 x801  
 E-mail: [dj.penix@psiconsultants.com](mailto:dj.penix@psiconsultants.com)  
 Web: <http://www.psiconsultants.com>

Name: Roger D. Muller, Ph.D.  
 Enterprise: First Phase Consulting, Inc.  
 Address: 14475 Stephanie St.  
 City, State ZIP: Carmel, IN 46033  
 Work Phone: 317/846-5782  
 E-mail: [rdmuller@hotmail.com](mailto:rdmuller@hotmail.com)

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