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SAS[®] Enterprise Guide[®] 5.1 and 6.1 : A Powerful Environment for Programmers, Too!

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Introduction

Have you been programming in SAS for a while and aren't sure HOW or IF Enterprise Guide can help you?

This presentation demonstrates how SAS programmers can use SAS Enterprise Guide as their primary interface to the SAS system while maintaining the flexibility of writing their own customized code.



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Introduction

We explore

- navigating and customizing the SAS Enterprise Guide environment
- using SAS Enterprise Guide to access existing programs and enhance processing
- exploiting the enhanced development environment including syntax completion and built-in function help
- using Code Analyzer, Report Builder, and Document Builder
- adding Project Parameters to generalize the usability of programs and processes
- leveraging built-in capabilities available in SAS Enterprise Guide to further enhance the information you deliver.

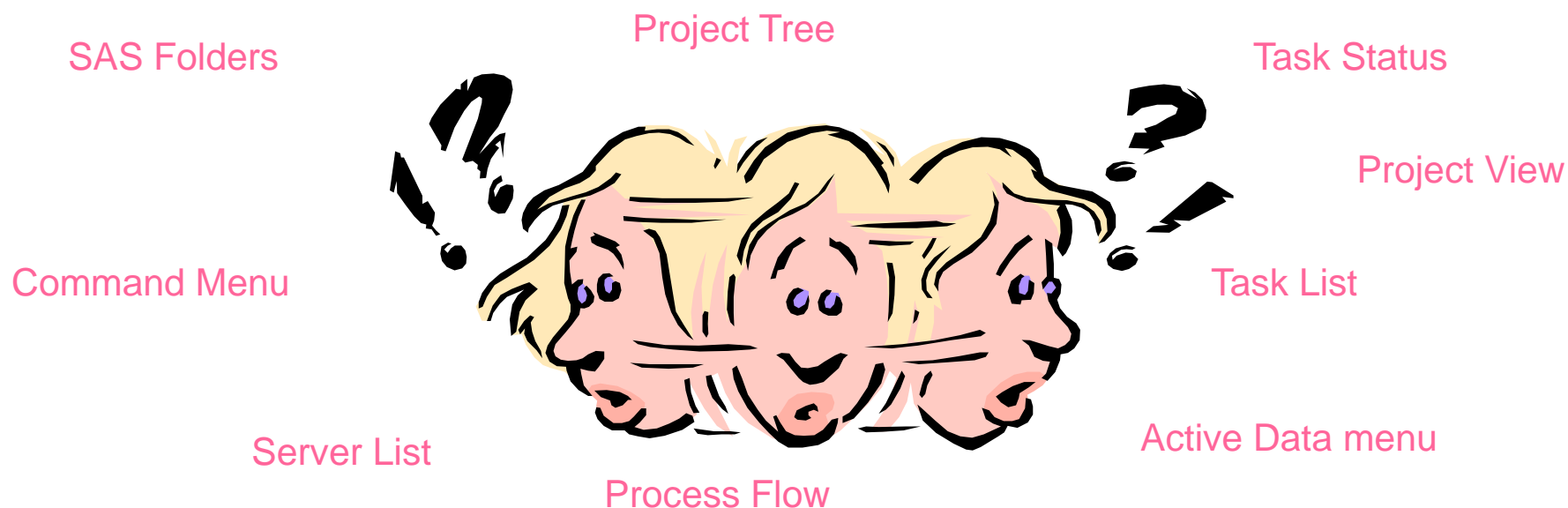
Enterprise Guide version 6.1 will be used.



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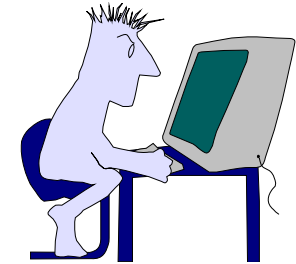
Part 1: I know how to program in SAS – How do I navigate EG?

With all of the windows and views and menus available in EG, it's hard to know where to start



How do I navigate EG?

First off, the basics..



Main Menu

- » Menu bar at the top of the screen enables logical access to tasks and views.

The Process Flow view

- » Displays all of the items in your project (code, tasks, and results) and the connections between them.

- Select **View** → **Process Flow** or **F4** or select the Process Flow tool.



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How do I navigate EG?



The Project Tree view

- Provides a hierarchical view of the items in the project and their results (similar to Windows Explorer).

- Select **View** → **Project Tree**



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Part 2: Understanding Your Data – Enterprise Guide Makes it Easy!

Before you start any new programming task, you first need to understand the data.

- The **Data Explorer** tool enables you to look at the values and composition of your data
- Be sure that the data actually contains what you are expecting before you use it.



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Data Explorer – replaces lots of code!

Why do I LOVE the Data Explorer?

Avoid typing / running lots of code

- » proc contents
- » proc means
- » proc univariate
- » proc freq
- » proc gchart
- » proc gplot
- » proc DOWNLOAD



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Using the Data Explorer

You can use either the **Server View** or the **Main Menu** to access the Data Explorer.

- In the **Server View**, expand the Servers and Libraries by selecting the **plus sign**
- **Right Click** on a dataset and select **Explorer**



Using the Data Explorer



- In the Data View, select a subset of the columns and request **Sales for Asia** only.



Helpful hint: The updates appear to the right under **Pending Updates**. The updates are not applied until you select **Apply Updates**. To remove Pending Updates, select the **X** beside the update.

- In the Quick Stats view, **Click on Click to Run all Statistics**
- **Click on the charts** generated for the Region column



Reminders - Data Explorer

Pending Updates - when selecting columns or rows



The updates appear to the right under **Pending Updates**.

- updates are not applied until you select **Apply Updates**.

To remove Pending Updates, select the **X** beside the update.

Statistics

In the Quick Stats view, Select **Click to Run all Statistics**

Optionally, run statistics on just select columns



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Using the Data Explorer

- Using the Data Exploration tool, you are able to get a general understanding of what your data contains before you start to use it in your analysis and reporting.

Now that we've seen the data and have ruled out issues that could skew our results, we are ready to use Enterprise Guide to produce reporting.



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Part 3: Here is my favorite program - how do I run it in EG (and improve it)????

```
/******  
/* Example Program 1 - Output Excel Spreadsheet w/ Shoes data */  
/******  
data Ex_Shoes_Data;  
  set sashelp.shoes;  
  AverageSalesPerStore = sales / stores;  
  label AverageSalesPerStore = 'Average Sales Per Store';  
  format AverageSalesPerStore dollar12.2;  
run;  
  
ods listing close;  
ods tagsets.ExcelXP path ='C:\HOW-01.Marje.Fecht'  
  file='EG Basic_Report.xls' style=statdoc  
  options (sheet_name = 'Example 1'  
    frozen_headers = 'Yes' autofilter = 'All'); title "Simple SAS  
Code Example 1";  
  
proc print data=Ex_Shoes_Data noobs label ;  
run;  
ods tagsets.ExcelXP close;  ods listing;
```

```
/******  
/* Create PDF Report */  
/******  
ods listing close;  
ods pdf file ='C:\HOW-01.Marje.Fecht\EG Shoes_Report.pdf';  
proc report data = Ex_Shoes_Data;  
  
  column ("Location" (Region Subsidiary Stores))  
         Product  
         ("Sales" (Sales AverageSalesPerStore))  
         ;  
  define region / order "Region";  define Subsidiary / order "Subsidiary";  
  define Stores / display "Number of Stores";  
  define Product / display "Product";  
  define Sales / Sum "Sales";  
  define AverageSalesPerStore / Sum "Avg Sales per Store";  
  break after region / summarize;  rbreak after / summarize;  
run;  
ods pdf close;  
ods listing;
```



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Running existing code



Enterprise Guide enables you to easily run existing SAS programs. Your programs will continue to 'live' where they are now and can be updated using Enterprise Guide.

Let's run `Program_1.sas` and THEN review the process and navigation.

- From the Main Menu, **File** → **Open** → **Program** to run an existing program
- Navigate to **Program_1.sas** and select **Open**.



Running existing code



The code opens in a new Tab window in Enterprise Guide.

The Content Pane has a Program context toolbar that allows you to run your code.

A Program_1 code node has been added to the workspace in the Project Tree and Process Flow views.



Notice the shortcut symbol on the Code node reminding you that this is a pointer to the originally stored .sas code.

- Run the program by **right clicking** anywhere in the code node and selecting **Run On Local** OR by selecting **Run** from the context menu.



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Viewing the LOG and Results



We will be using the Shoes Dataset from SASHELP throughout this Workshop.

- The results open in separate tabs (Proc Print and Proc Report)
- The LOG is a tab in the Program context menu bar. Select the tab to view it
- To review the resulting Excel Report, use Windows Explorer to open the Workshop folder
- Double click** on the Excel Report: `EG Basic_Report.xls`

Note that the Context based menu bar changes based on what Tab you've selected.



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Customizing the Windowing Environment

- All windows can be docked and undocked
- Resize the windows to make the best use of your real estate
- Display windows that you need and use
- Your 'nice to have' windows can be set to auto hide.



Helpful Hint: Don't like the set up?
Select **Restore Window Layout** from the Options Window.



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Splitting your screen

Enterprise Guide provides split screen options that enable you to explore tasks, programs and data side-by-side.

Option 1: Split screen to view different sections of the same tab

- Right click on the view you are looking at
- Select **Split**. Select **Stacked**, **Side by Side** or **Both**

Option 2: Split screen to view different tabs

- Select **View** from the Main Menu
- Select **Workspace layout**
- Select **Stacked** or **side by side**

Each view will have a drop down at the top left corner that allows you to select what you want to view.



Goodies in the Program editor view



Integrated SAS documentation:

If you mouse over a SAS keyword, a pop up window shows you the SAS documentation describing the keyword and the syntax.

```
/* *****  
/* Create PDF Report *  
/* *****  
  
ods listing close;  
ods  
proc  
colu
```

Keyword: ODS LISTING
Context: [ODS] ODS LISTING statement
Opens, manages, or closes the LISTING destination.
Syntax:
(1) ODS LISTING <action>;
(2) ODS LISTING <DATAPANEL=number | DATA | PAGE > <FILE=file-specification>;
("Sales" (Sales AverageSalesPerStore))
;



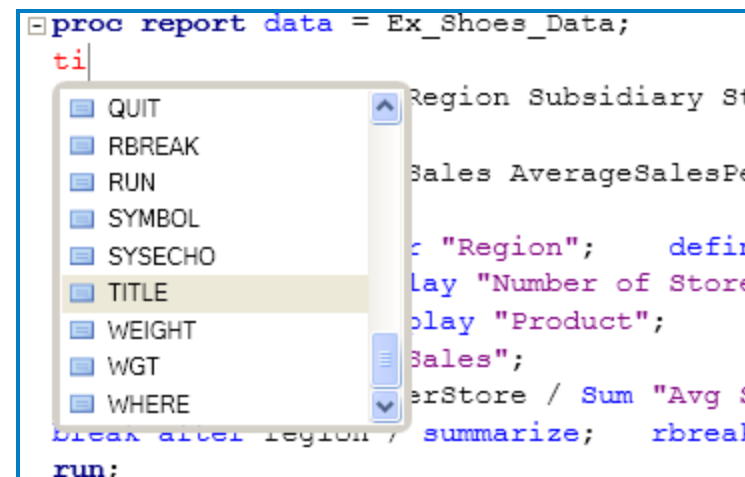
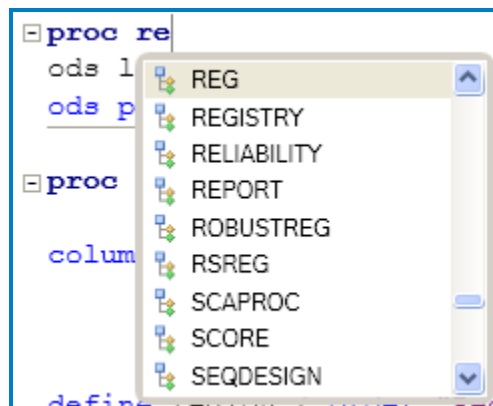
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Goodies in the Program editor view



Syntax Suggestion / Autocomplete when coding:

When you enter the first 2 letters of a SAS keyword (ie. PROC statement or option), a list will pop up of possible keywords you can select from. This includes available PROC options.



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Goodies in the Program editor view

Syntax suggestions for Macro Variables and Macro:

- for User defined Macro variables
- for User defined Macros
- only those that are defined within the active SAS program
 - Does not include macros and macro variables automatically created through an autoexec



Goodies in the Program editor view



Autocomplete for SAS libraries, Datasets and Dataset column names:

```
proc report data=
column ("Location"
Product
("Sales"
;
define region / o
define Stores / d
define Product /
define Sales / Su
define AverageSalesPerStore / Sum Avg
```

```
proc report data=work.
column ("Location" (Re
Product
("Sales" (Sales AverageSalesPerStore))
;
define region / order "Region"; define Subsidiar
define Stores / display "Number of Stores";
define Product / display "Product";
define Sales / Sum "Sales";
define AverageSalesPerStore / Sum "Avg Sales per St
break after region / summarize; rbreak after / su
run;
```



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Goodies in the Program editor view



Parenthesis Matching:

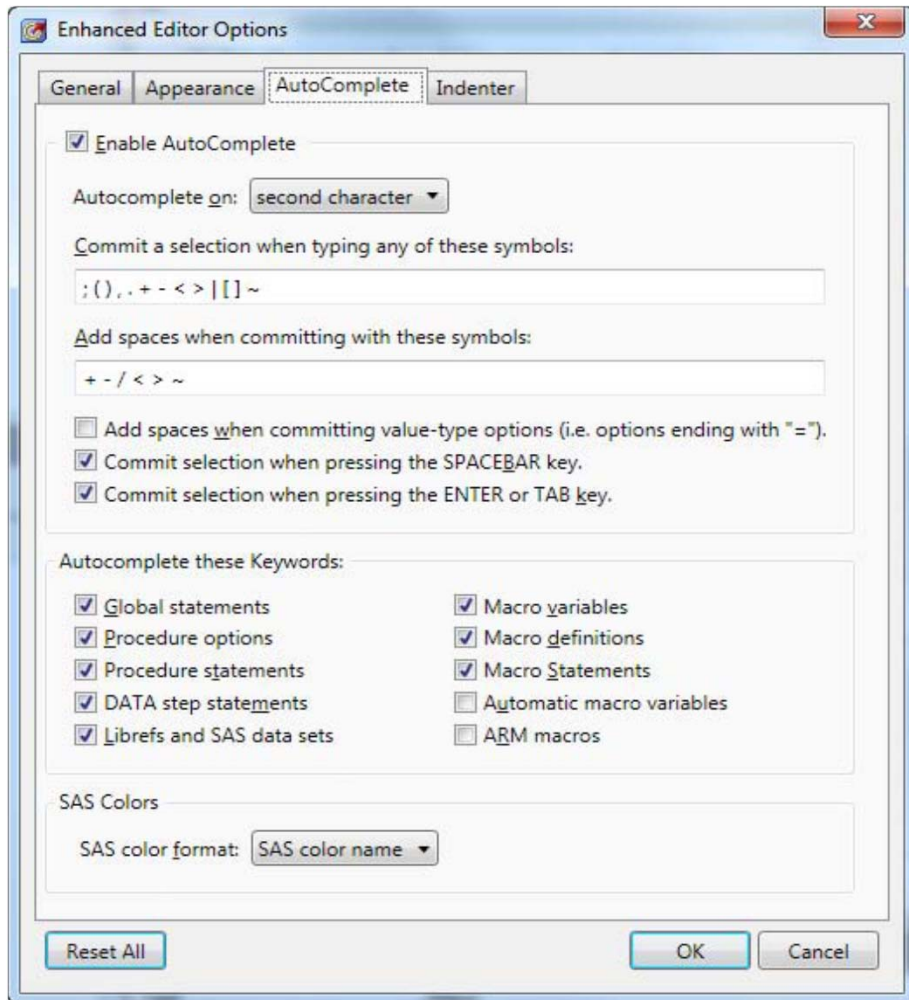
- Great for debugging macros and SQL code
- Also works for brackets ([]) and braces ({ })

```
proc report data=work.  
  
  column ("Location" (Region Subsidiary Stores))  
         Product  
         ("Sales"      (Sales AverageSalesPerStore))  
  ;
```



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That's all great but... HOW DO I TURN IT OFF????



Helpful Hint:

To turn one, many or ALL autocomplete features off, update your Enhanced Editor Options
Tools – Options – SAS Program – Editor Options



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So far so good... but what if I need code changes

To change your code, you just need to

- navigate to the code node
- open the code
- make changes and save
- and then rerun the code.



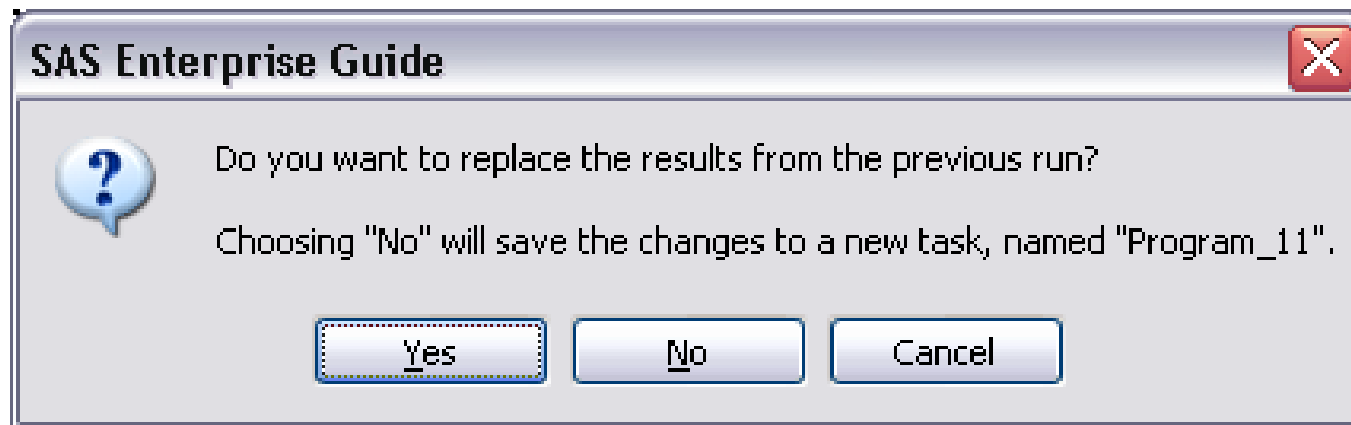
One Proc Step at a time...



Helpful Hint: What if you only want to run sections of the code?

Highlighting and submitting works the same as using the SAS Editor in Display Manager.

When rerunning code you get the following message:



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Resubmitting Code

If you select **YES** – the code is rerun and the results and log are replaced

If you select **NO** – a new version of the Code node is added to your project with its own results and log.

When Prompted with **Do you want to replace the code from the previous run?** - Select **Yes**

Note: Throughout the workshop, you will always replace the code from the previous run when resubmitting code.



Helpful Hint: Keeping separate results can be useful, BUT rename the new version of the code node to something meaningful....



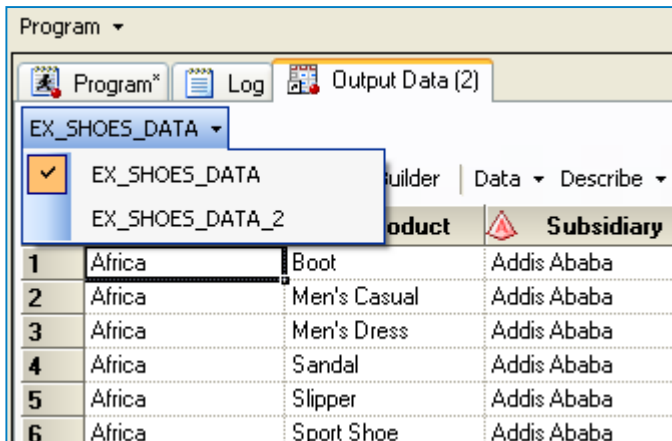
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Working with Datasets

When we ran Program_1, the generated dataset opened in a new tab called **Output**.

What if your program creates more than one dataset?

A drop down appears at the top of the output tab. This lets you select which output dataset you want to look at.



The screenshot shows the SAS Enterprise Guide interface. At the top, there is a 'Program' dropdown menu. Below it, there are tabs for 'Program*', 'Log', and 'Output Data (2)'. The 'Output Data (2)' tab is active, showing a dropdown menu with two options: 'EX_SHOES_DATA' (selected with a checkmark) and 'EX_SHOES_DATA_2'. Below the dropdown is a data grid with columns 'Product' and 'Subsidiary'. The grid contains six rows of data.

	Product	Subsidiary	
1	Africa	Boot	Addis Ababa
2	Africa	Men's Casual	Addis Ababa
3	Africa	Men's Dress	Addis Ababa
4	Africa	Sandal	Addis Ababa
5	Africa	Slipper	Addis Ababa
6	Africa	Sport Shoe	Addis Ababa



Helpful Hint: The output tab is always open. To close a dataset that Enterprise Guide sees as open, right click on the dataset and select Close Data.



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Part 4: WOW – that was fun - are graphics easy too?



Using the Ex_Shoes_Data dataset,
create a Vertical Bar chart of Sales by Region

- Select **Tasks** → **Graph** → **Bar Chart** from the main menu. This will open the Bar Chart Wizard
- In the **Bar Chart** screen, double click on Simple Vertical Bar
- In the **Task Roles** screen:
 - Drag **Region** to **Column to Chart**
 - Drag **Sales** to **Sum of**.



Producing a Vertical Bar Chart



- In the **Appearance** → **Layout**, uncheck the **2D box** and then change the **Shape** to **Cylinder** from the drop down list
- In the **Titles** screen:
 - Select **Graph**
 - Uncheck **Use Default Text**
 - enter a title for the graph.



Producing a Vertical Bar Chart



- Select **Run** to create the Bar Chart

The bar chart opens automatically in a new Tab in the EG session.

The context menu bar now allows us to see the input data, the code that was run, the log and the results.



Helpful Hint: The task or code node that is currently running will be highlighted in green in the Process Flow View.



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Can I *Borrow* the Code?



Leveraging Code generated by the Built in Tasks

You now have "correct" code!

How can you REUSE the code elsewhere?

- In the Context menu bar in the **Process Flow Window**, select the **Code tab**
- **Highlight** the AXIS, TITLE, FOOTNOTE, and PROC GCHART statements
- Right click anywhere on highlighted code, and select **Copy**
- Move to the **Process Flow** Window.



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Borrowing the Code EG created



Insert the copied code into a new program

- Switch back to the original Process Flow
- Select **File** → **New** → **Program**. A new code node opens
- Paste the copied code – **CNTL-V** or right click and select **Paste**
- Change the dataset name on the PROC GCHART statement to **Ex_Shoes_Data**
- Save the new code **File** → **Save Program As** → **Local Computer** and provide the name **program_2.sas**
- Submit the new code by selecting **Run**.



Helpful Hint: The Task Status Window will show you the status of the code or task you are running.



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Customizing the Graph Format



Helpful Hint: By default, graphs are generated as interactive ActiveX graphs. When creating multiple graphs, ActiveX can use a lot of system resources. You can change the default to a static format such as JPEG or GIF in the Graph Results settings in the Options Window.

Select **Tools** → **Options** → **Results** → **Graph**

Change your Graph Format by selecting one of the other formats in the drop down list.



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Part 5: A New way to Organize your SAS Programs

- Logical steps in the program can be broken into separate code nodes
- Code nodes can be linked together in the Process flow window
- The Process Flow provides a clear picture of the steps and results of the SAS code.



Helpful Hint: If project logging is turned on, the log represents a running log of the entire project. This aggregated log is created in addition to the individual logs for each node. To turn on, select **Project Log** in the context menu and then select **Turn On**



Building your own Process Flow



- In the original Process Flow...
- Link the new Program_2 code node to the Program_1 code node
 - **Right click** on the Program_1 code node in the Process Flow window
 - Select **Link Program_1 to...**
 - Select **Program_2**, and **OK**.



Helpful Hint: To remove a link between tasks or Code nodes, right click anywhere on the joining arrow and select **Delete**.



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Run your flow, again and again....



To run both code nodes,

- **Right click** on the Program_1 code node
- Select **Run Branch From Program_1**.

We've created our first flow in Enterprise Guide!



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Shouldn't I save all of this?



To save the **Project** so it is available after you leave EG

- Select **File** → **Save Project As** → **Local Computer**
- Navigate to the desired location
- Enter a name for your project and click OK.

You can build and run **multiple flows** in the same project and then toggle between them. Let's demonstrate by adding another flow to our project with help from the Code Analyzer.

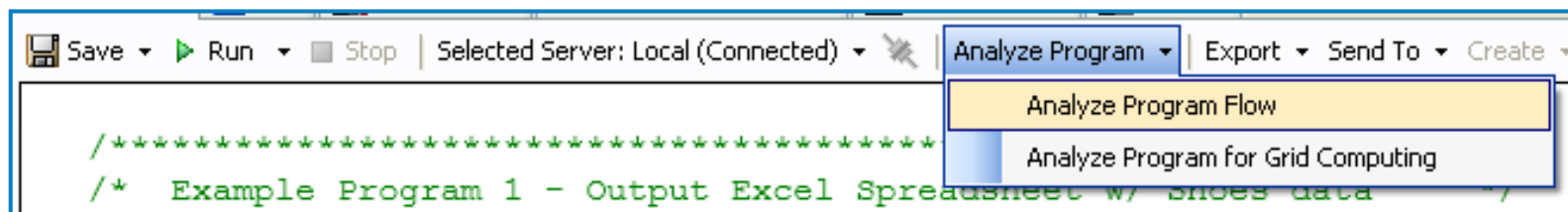


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Help for your legacy Code too!

The Code Analyzer allows you to:

- Turn that old, 40 step SAS program into a Process Flow
- Create instant documentation:
 - What steps are run
 - How long does it takes to run
 - What data is used and created in each step.

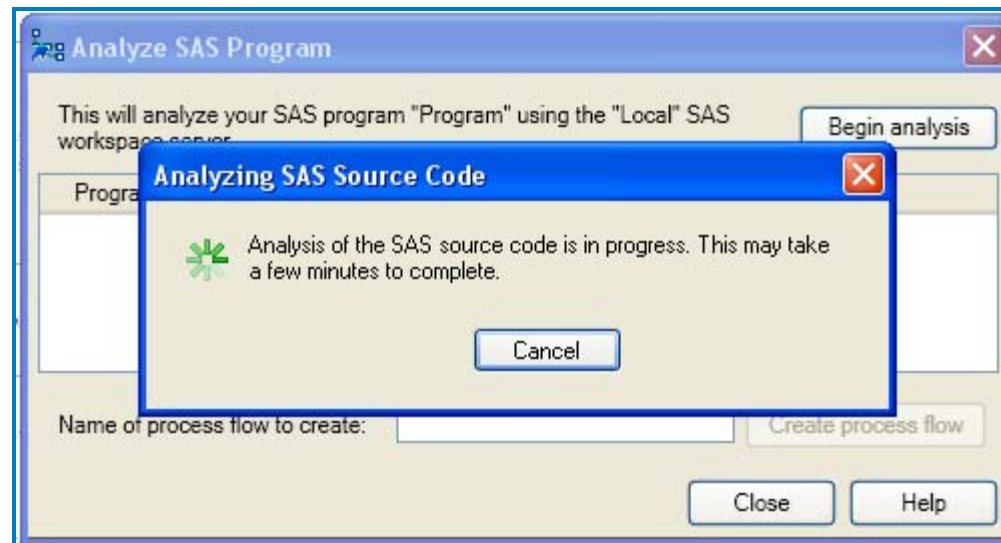


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Running the Code Analyzer



- In the Program context menu bar, select **Analyze Program** → **Analyze Program Flow**
- Select **Begin Analysis**

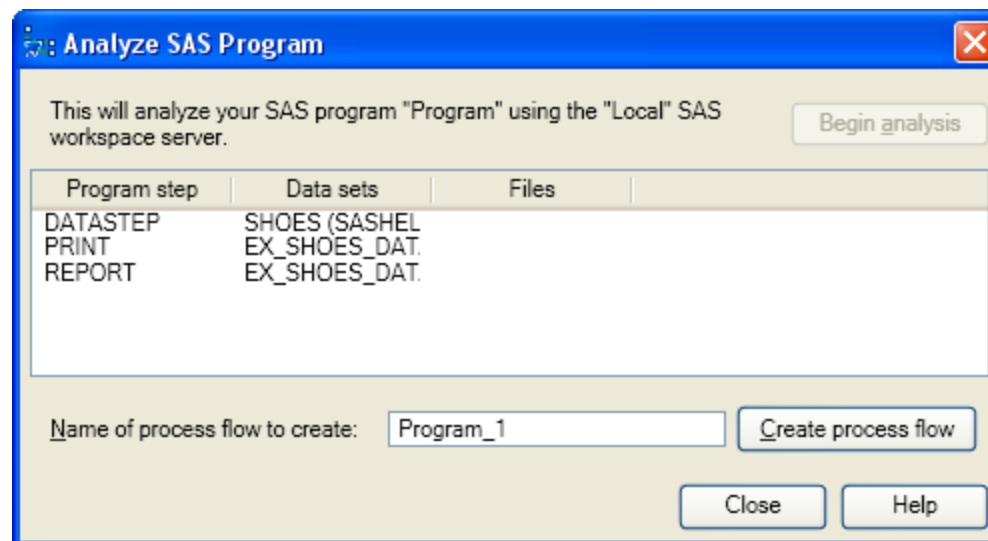


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Running the Code Analyzer



- Once the analysis is complete, select **Create Process Flow**.

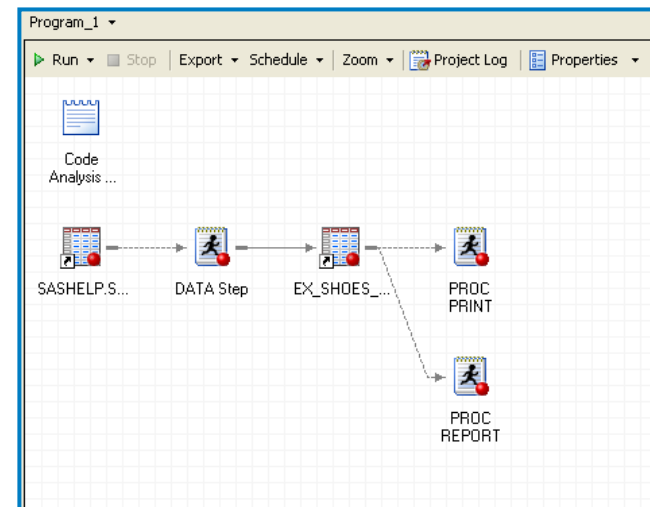
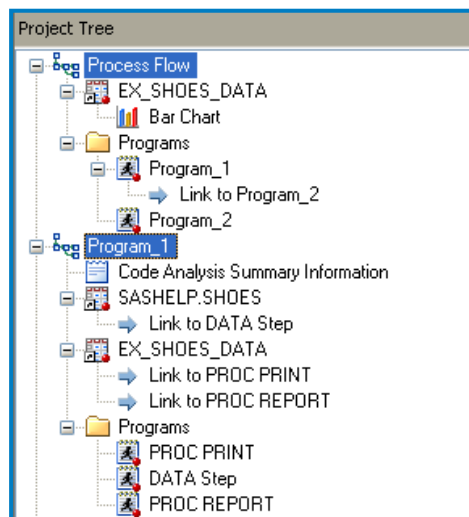


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Running the Code Analyzer



A new flow is added to your project called Program_1 (defaults to name of the program node). Note that the Code Analyzer did not run the code and produce the results.



- Run the new Flow: Right click on the starting dataset (SASHELP.Shoes)
- Select **Run Branch from SASHELP.SHOES.**




Multiple Flows in the same Project



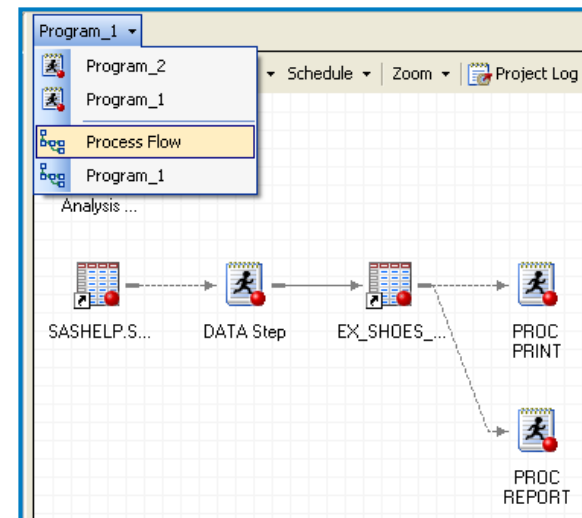
To toggle or switch between Process Flows, you can use the Project Tree View and double click on the Flow you want to look at.

You can also use the Drop down at the top of the Process Flow View.



Helpful Hint: When working with multiple flows, it's a good idea to rename them to something meaningful in order to keep them organized. Right click on the Process flow in the Project Tree and select Rename.

- Toggle back to the Original Process Flow.
- Select drop down arrow.
- Select **Process Flow**.



Part 6: Using Tasks in EG 6.1

As experienced SAS programmers, you probably have a lot of familiarity with certain PROCs. However, since the SAS language is extensive, there are probably many areas that you haven't explored.

One of the benefits of using Enterprise Guide is that **Tasks** guide you through requirements and quickly produce results without YOU having to learn new procedures.

In addition to accessing tasks via the menu bar, the **TASK GALLERY** was added to EG 6.1 to provide you with visual access to all of the tasks, as well as extra information about the tasks.



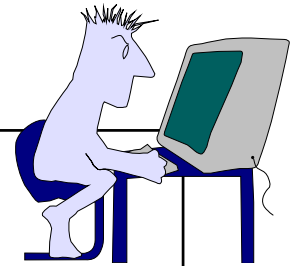
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Part 7: Adding some flexibility to your Enterprise Guide Project

- Project Prompts
 - You can add Project Prompts (formerly known as Parameters) that will prompt the user for a response when running a task, query or code.
 - » Values that the user enters are available as macro variables
 - » The user can enter a value or you can provide a list of values for the user to choose from.



Project Prompts



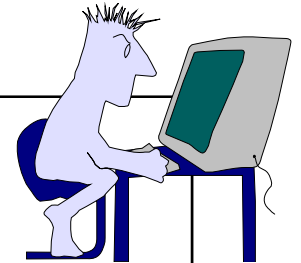
- Select **View** → **Prompt Manager**
- Select **Add** to add a new Prompt.
- Under the General tab, enter **RegionID** in the name section.
- Enter **Please select a Region** in the Displayed Text section.
- Select the **Prompt Type and Values** tab.
- In the Prompt Type Value dropdown, select **Text**
- In the **Method for populating Prompt** dropdown, Select **User Selects values from a static list**.
- Select **Get Values...** to identify the source of the static list.

When loading values from an underlying table, the possible value list is refreshed to make sure that it includes new values that may have been added in your data



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Project Prompts

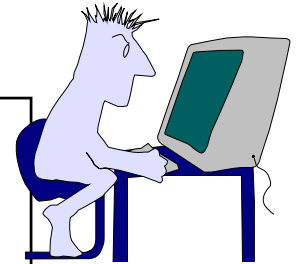


- Select **Browse** to load values from SASHELP.SHOES
- Navigate to the SHOES dataset: **Servers** → **Local** → **Libraries** → **SASHELP** → **SHOES**
- From the **Columns** dropdown in the **Unformatted Values** section, select **Region**
- From the **Columns** dropdown in the **Formatted Values** section, select **Region**
- In the **Available values** section, under the **Browse** tab, select **Get Values**
- Move all values over to the **Selected Values** window.
- Select **OK**.



Project Prompts

- In the **List of Values**, select **Canada** as the default value and select **OK**
- In the Process Flow window, **Right click** on the Program_1 Code Node, and select **Properties**
- Select **Prompts** and select **Add**
- Select **RegionID** and select **OK**
- Select **OK** again to close the Program node Properties window.



RegionID now appears in the Prompt Manager View.



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Project Prompts



Now, modify your program so that the prompts control the report data.

- Open the Program_1 code node
- In the program, **ADD** where `Region = "®ionID";` in the Ex_Shoes_Data datastep
- **Save** the changes to your Program_1 code node
- **Right click** on the Program_1 code node, and select **Run Branch From Program_1**.



Project Prompts



When prompted to select a Region, select **Asia** from the drop down list. Select **Run**.

The reports now reflect data for only **Asia**.

REMINDER: the temporary SAS data set resulting from Program_1 now reflects just one country. If other tasks refer to this dataset, they will now run for just the subset of data.



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Part 8: Helpful Tips and Tricks

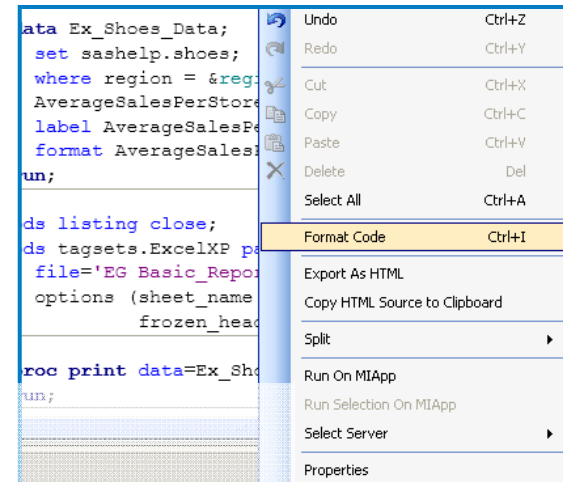


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Cleaning up after your co-workers

If you have *inherited poorly formatted code...*

- Right click anywhere in the Program
- Select **Format Code**



Helpful Hint:

Specify formatting preferences, or override the options



Tools → **Options** → **SAS Programs** → **Editor Options** → **Indenter**

set the spacing on indents and select which statements signal a new line.



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EG 6.1 - Log Summary

A great new feature was added to Enterprise Guide 6.1 – to help you quickly zoom in on issues - Log Summary window.

The Log Summary lists:

- all the errors, warnings, and notes that were generated when the program ran
- line numbers and a sample of the affected code.



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Tips for working with Large Data in EG



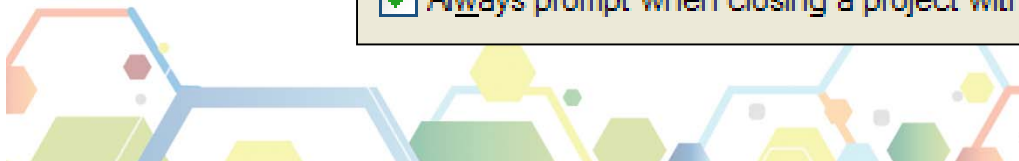
Helpful Hint: Update your options so that SAS EG does not try to open any new data when it is added to your project.

By default, Enterprise Guide is going to try to open any new data that you add to your project. This can be time consuming when you add large database tables to your project view.

Select **Tools** → **Options** → **Data**

UNCHECK Automatically open data when added to project

- Use data tables in unprotected (read/write) mode
- Automatically open data when added to project
- Always prompt when closing a project with temporary data references



Tips for working with Large Data in EG



Helpful Hint: Get info about table attributes without opening your data by **assigning** libraries in your server list

When the libraries in your server list are assigned (folder icon is yellow), you can retrieve the details about any tables in that library by right clicking the table name and selecting **Properties**

The **Columns** tab in the property window will list all of the columns in that table, along with their type, length and format

To assign a library, right click on the library name and select **Assign**

This allows you to get some more information about your data without having to open it up from the source.



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Project Recovery

- Enable Project Recovery
 - EG will *autosave* your project based on the interval you set.
 - Select **Tools** → **Options** → **Project Recovery**
 - Select **Enable Project Recovery**.



Autoexec Processing

- If you have some code or a flow that you want to execute whenever your Project is opened, create a Process Flow named **Autoexec**.
- Enterprise Guide will detect that there is an Autoexec flow in your project and will execute it whenever your project is opened.
- By default, Enterprise Guide will prompt you to run the Autoexec flow. If you don't want to be prompted before it runs, select **Tools → Options → General** and check the box that says:

Automatically run "Autoexec" process flow when project opens



Sharing your Projects with Others



Helpful Hint: When creating projects that will be shared and run by others, you can add descriptive notes to your project that explain what the project and each task is doing. For example, you can add details around changes that may need to be made to the code, where the results are going, what input is expected, etc.

- Select **File** → **New** → **Note**
- You can link each note to specific tasks:
 - **Right-click** on the note node, select **Link Note to...**
 - **Select** the task or code node that you want to link to
 - Select **OK**.



Emailing Notes

- Email a note to communicate information about your job
 - Notes added to your project can be emailed (if your site supports this)
 - Combine notes with conditional processes.



Exporting Code

- Export all the code from your project
 - Once you've completed your work, you may have a mix of tasks and custom code nodes. You can save these in a single SAS file.
- Select **File** → **Export** → **Export All Code**
 - You can choose which elements in your project you want to include in this final .SAS file and which order the code should appear.



Ordered Lists of Task

- You can create an ***Ordered List*** of tasks or .sas code nodes to run
 - You can specify any order for the tasks
 - The ordered list of tasks will run sequentially.
 - To create an ordered list, select **File → New → Ordered List.**



Running Tasks in Parallel

Starting in EG 5.1, you can run tasks and process flow paths in parallel on the same server instead of having to wait for them to run one at a time.

This can be enabled at the task level or at the Project level.

- To set tasks to run in parallel, go to **File → Project Properties**.
- Go to the Code Submission window and make sure that the **“Allow parallel execution on the same server”** box is checked.

Now if you are running more than one task in separate branches, you'll notice that they aren't cued up waiting to run one after the other. They will run at the same time.



Running Tasks in Parallel

You can also control this at the individual task level by right clicking on the task, and selecting Task Properties.

Under the Code Submission view, you can select to either use the settings set at the Project level, or customize the options for the specific task.



Helpful Hint: you may be launching more than one workspace server connection when running in parallel, so changes that you make in one session (adding macro variables, libraries etc) may not get picked up in the tasks or code that is running in the other session.



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Ready to get started...

With the basics now in place, you are ready to find out what else you can do with Enterprise Guide

- Build conditional flows to add more logic and flexibility
 - Understand the differences when using Enterprise Guide in a Server Environment
 - Explore the built-in tasks; create your own custom tasks; or build projects to share with others
-
- Expand your knowledge with
 - Q+A from a similar talk - Chris Hemedinger's post <http://blogs.sas.com/content/sasdummy/2014/02/17/favorite-eg-tricks-fecht/>
 - Free tutorials / learning opportunities on the web



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Thank You !



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