

Paper 309-2011

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager

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ABSTRACT

The Prompt Manager in SAS® Enterprise Guide® is an excellent mechanism to create flexible and reusable projects. Advanced programmers can translate complicated code tasks and transform these tasks into a project that any level of SAS Enterprise Guide user can execute. This paper includes an example of a data upload and cleaning process. To allow novice SAS Enterprise Guide users to utilize and complete the routine process efficiently, the process in the example was simplified via code modifications and prompts.

INTRODUCTION

Using interactive prompts, which are available in SAS® Stored Processes or in SAS Enterprise Guide projects, allows for more flexible code and results in a programmer's ability to reach a broader audience. There are some differences between these two avenues, and although this paper focuses on prompts in SAS Enterprise Guide, several concepts can also be applied to prompts in SAS Stored Processes.

SAS Stored Process prompts are typically utilized by report users. These prompts enable users to choose subsections of data to analyze or to use when generating a report. Prompts for stored processes can be accessed from multiple locations (such as various Web applications and SAS clients) and are used during the program execution. In SAS Enterprise Guide, the prompts that you create are available only for that project and can be run only in SAS Enterprise Guide.

In SAS Enterprise Guide, prompts can be defined before creating a query, task, output, and so on by using the Prompt Manager. Prompts can also be defined after creating the program node (query, task, output, and so on) where the prompt will be used. These prompts are created by going to the Program Properties window. New prompts must be associated with a program (query, task, output, and so on); otherwise, the prompt will not appear during the program execution.

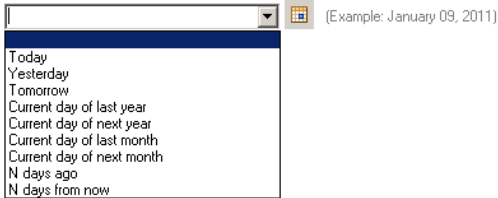
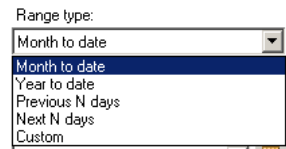
Using prompting technology can make projects reusable for any SAS Enterprise Guide user. Prompts can also be utilized to lessen the complexity of the code for beginning programmers.

PROMPT TYPES

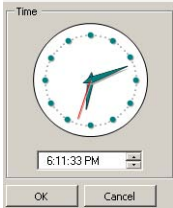
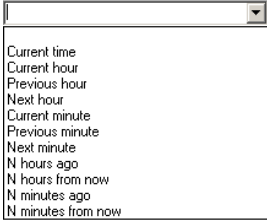
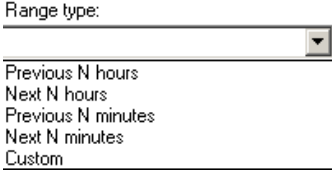
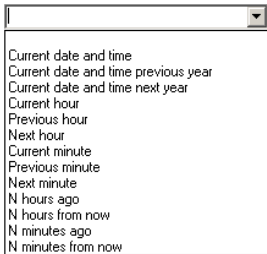
The first important item to note is that there are multiple prompt types that can be defined through the Prompt Manager. SAS Enterprise Guide describes these prompt types in the help documentation that is accessible in the product. The following table is a quick summary of what is available. The use of the term 'Prompt_name' relates directly to the name of the prompt defined within the **General** tab of the Edit Prompt window.

Prompt Type	Description	Available Macros
Text	Enter value in text box or select one or more text values.	Prompt_name If more than one option is enabled: Prompt_name Prompt_name_count Prompt_name0 (which equals &prompt_name_count) Prompt_name1 .. Prompt_namen
Text range	Enter two values in side-to-side text boxes. Tests Once entered, the prompt automatically tests either the alpha or numeric order to ensure that the lesser value is entered first.	Prompt_name_min Prompt_name_max
Hyperlink	Include a hyperlink. Also provides box for link text.	Prompt_name – link text Prompt_path – URL

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Prompt Type	Description	Available Macros
Numeric	Enter value in text box or select one or more numeric values. Once entered, the prompt automatically for integers.	Prompt_name If more than one option is enabled: Prompt_name Prompt_name_count Prompt_name0 (which equals &prompt_name_count) Prompt_name1 .. Prompt_namen
Numeric range	Enter two values in side-to-side text boxes. Once entered, the prompt automatically tests for integers and verifies that the range is valid.	Prompt_name_min Prompt_name_max
Date	Enter value by using a calendar prompt. Also provides the user the option to select a relative term (such as Yesterday or N days ago). 	Prompt_name - returns results in date9. format. (01Apr2011) Prompt_name_label – returns full date (April 01, 2011) Prompt_name_end – if type of prompt selected is Week, Month, Quarter or Year Prompt_name_rel – the relative term the user selected within the prompt
Date range	Provides two date boxes with the same options as above for the Date prompt. Once entered, the prompt automatically tests for valid date ranges. Also, range types are allowed for quick entry in the two date boxes. 	Prompt_name_min – returns results in date9. format. (01Apr2011) Prompt_name_min_label - returns full date (April 01, 2011) for the first entry Prompt_name_min_rel – the relative term the user selected for the first prompt Prompt_name_max - returns full date (April 01, 2011) for the second entry Prompt_name_max_label – returns results in date9. format. (01Apr2011) Prompt_name_max_rel – the relative term the user selected for the second prompt


Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

Prompt Type	Description	Available Macros
<p>Time</p>	<p>Enter value by using a clock prompt.</p>  <p>Users also can select a relative term (such as Previous Hour or Next Minute)</p> 	<p>Prompt_name - returns the entry in time. format (16.30.22)</p> <p>Prompt_name_label - returns the entry in timeampm11. format (4:30:22 PM)</p> <p>Prompt_name_rel – the relative term that the user selected</p>
<p>Time range</p>	<p>Provides two time entry boxes with the same options as the Time prompt. Time range prompts are validated for proper range (small to large).</p> <p>Also, a range type is allowed for quick entry in the two time entry boxes.</p> <p>Range type:</p> 	<p>Prompt_name_min – returns the entry in time. format (16.30.22) for the first prompt</p> <p>Prompt_name_min_label - returns the entry in timeampm11. format (4:30:22 PM) for the first prompt</p> <p>Prompt_name_min_rel – the relative term that the user selected for the first prompt</p> <p>Prompt_name_max - returns in time. format (18.30.22) for the second entry</p> <p>Prompt_name_max_label – returns the entry in timeampm11. format (6:30:22 PM) for the second prompt</p> <p>Prompt_name_max_rel – the relative term that the user selected for the second prompt</p>
<p>Timestamp</p>	<p>Note that the value is almost in the datetime19. format. You can convert to datetime19. by completing a code step to convert space to : using the TRANWRD function.</p> <p>Here is an example in a DATA _NULL_ step:</p> <pre>input(tranwrd("&prompt_name", " ", ":"), datetime19.);</pre> <p>Also a range type is allowed for quick entry</p> 	<p>Prompt_name – returns the entry in time. format (01Apr2011 16:30:22)</p> <p>Prompt_name_label - returns the entry in timeampm11. format (4:30:22 PM)</p> <p>Prompt_name_rel – the relative term that the user selected</p>

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

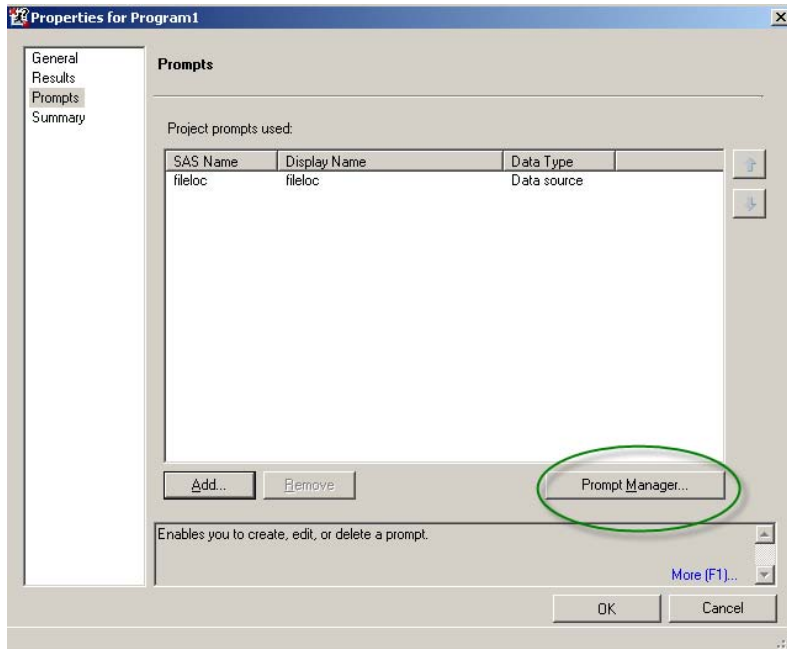
Prompt Type	Description	Available Macros
Timestamp range	<p>Provides two timestamp entries. Once entered, the prompt automatically tests for a valid range selection prior to executing project.</p> <p>Also, the same range types within the Timestamp prompt are provided to allow quick entry of values.</p> <p>Note: the conversion of the prompt to a valid datetime format is discussed in the description of the Timestamp prompt.</p>	<p>Prompt_name_min – returns the entry in time. format (01Apr2011 16:30:22) for the first prompt.</p> <p>Prompt_name_min_label - returns the entry in timeampm11. format (4:30:22 PM) for the first prompt</p> <p>Prompt_name_min_rel – the relative term the user selected for the first prompt</p> <p>Prompt_name_max - returns in time. format (18.30.22) for the second entry</p> <p>Prompt_name_max_label – returns the entry in timeampm11. format (6:30:22 PM) for the second prompt</p> <p>Prompt_name_max_rel – the relative term that the user selected for the second prompt</p>
Data source	<p>Select a data source to utilize in the project.</p> <p>Note: The format of the selection is the metadata path rather than the Libname.Table structure. Utilize the sample in SAS Note 37386 (http://support.sas.com/kb/37/386.html) and the example in the 'Utilize a Prompt for Data Source' section of this paper to derive the Libname.Table value.</p>	<p>Prompt_name – returns the metadata path of the data source selected</p> <p>Prompt_name_type – provides a numeric response for what the user selected so that the programmer can devise different actions</p> <ul style="list-style-type: none"> • 1 for tables • 2 for OLAP cubes • 4 for relational information maps • 8 for OLAP information cubes
Data source item	<p>Select a variable in a data source to utilize in the project.</p> <p>Note: The format of the selection is the metadata path rather than the Libname.Table structure. Utilize the sample in SAS Note 37386 (http://support.sas.com/kb/37/386.html) and the example in the 'Utilize a Prompt for Data Source' section of this paper to derive the Libname.Table value.</p>	<p>Prompt_name – the variable</p> <p>Prompt_name_path – the metadata path for the data table selected</p> <p>Prompt_name_type - provides a numeric response for what the user selected so that the programmer can devise different actions</p> <ul style="list-style-type: none"> • 1 for tables • 2 for OLAP cubes • 4 for relational information maps • 8 for OLAP information cubes
File or directory	<p>Select a file or directory structure to analyze in the project.</p>	<p>Prompt_name – the physical file path of the file or directory selected</p> <p>Prompt_name_server – the name of the server that contains the files or directories the user can select from. The server is defined by the prompt creator.</p>

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

Prompt Type	Description	Available Macros
Color	<p>Select a color from a color palette. The result is returned in Hex.</p> 	<p>Prompt_name – If the user selects red, it would return as cxff0000</p> <p>This prompt could be used to customize graphical output.</p>
Data library	<p>Browse through the metadata to select the library to use in the code.</p>	<p>Prompt_name – the libref</p> <p>Prompt_name_path – the metadata location of the data library</p>
Variable	<p>Select from a list of variables that the prompt creator defines. Variable names are of only one type.</p> <p>Option to allow users to manually type a variable name is also available in the Edit Prompt window.</p> <p>Note that only one entry is returned to the code.</p>	<p>Prompt_name – variable selected</p> <p>An example of when to use this prompt is if you have multiple date fields (such as open date, close date, on hold date, pending date) that the user might want to search through. A combination of the Variable prompt and the Date Range prompt would be useful to generate the query.</p>

EDITING AND APPLYING PROMPTS

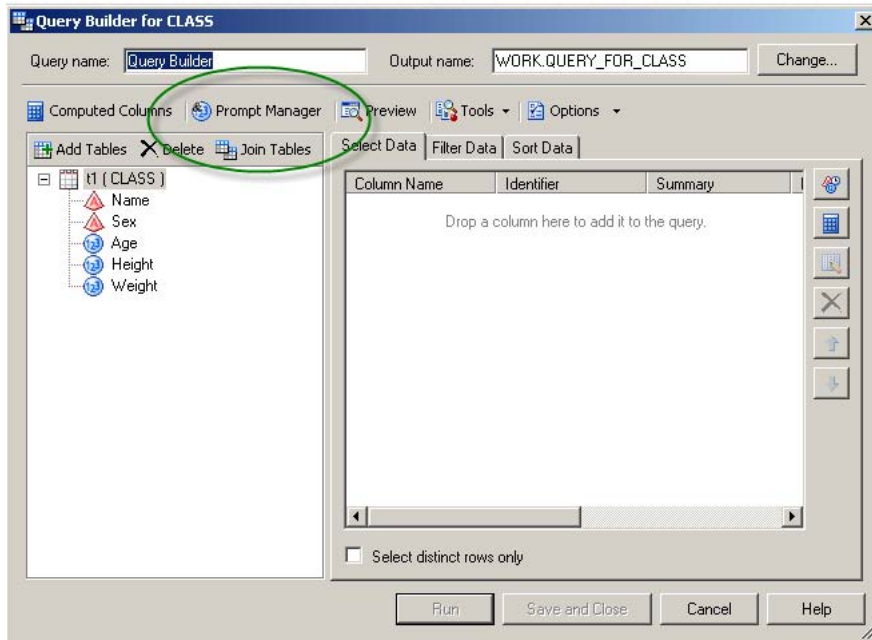
Prompts are created from the Prompt Manager, which is available from a wide range of areas in SAS Enterprise Guide. For tasks (programs, graphs, and so on), right click the program icon in the project tree or the process flow and select **Properties**. In the Properties dialog box, select **Prompts** and click **Prompt Manager** as seen below.



Display 1. Prompt Manager Selection from Properties Dialog Box

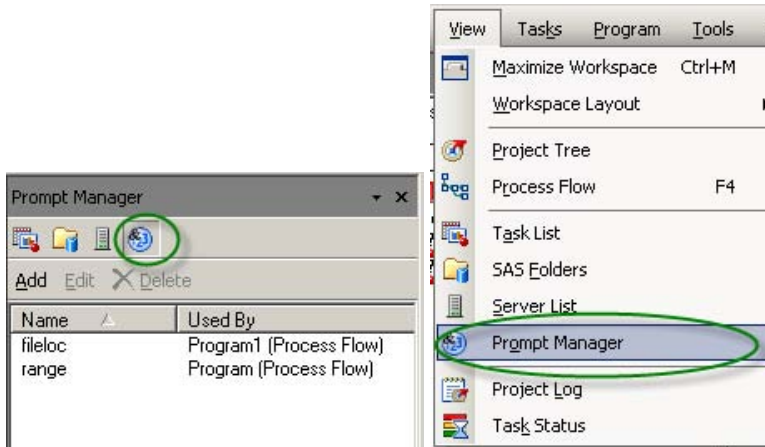
Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

You can also open the Prompt Manager directly from the Query Builder task.



Display 2. Prompt Manager Available from Query Builder

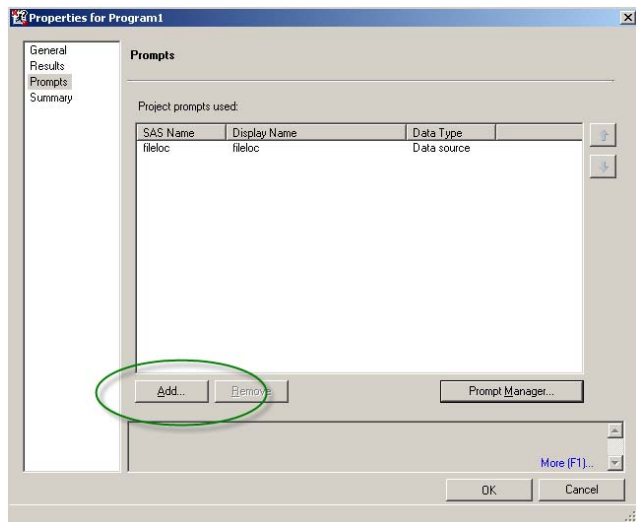
Finally, the Prompt Manager is available as a toolbar and can be viewed by selecting **View > Prompt Manager** or toggling to the toolbar from the **Task List** area.



Display 3. Prompt Manager Available as a Toolbar

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

After completing the options to create your prompt in the Prompt Manager, click **OK** and click **Add** in the Properties dialog box to include the prompt with this step in the project.



Display 4. Add (Associate) Prompts from Properties Dialog Box

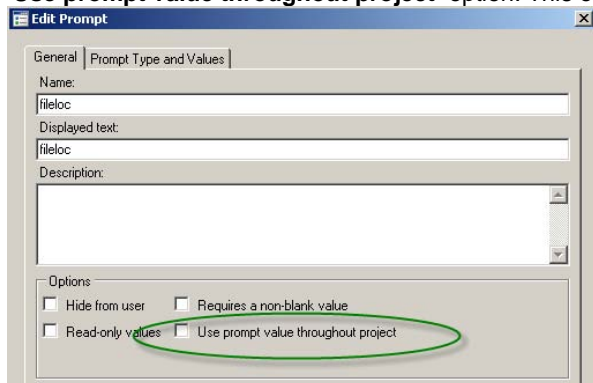
Then select the prompts that you would like to use from this step of your project.



Display 5. Associate Prompts with Program

SAS Enterprise Guide automatically combines the prompts when running the entire project. Because all needed prompts are requested initially, long-running programs can continue without constant monitoring.

In SAS Enterprise Guide 4.3, you can choose whether the prompt is used throughout the project by selecting the **'Use prompt value throughout project'** option. This option is available on the 'General' tab.



Display 6. 'Use prompt value throughout project' Option

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

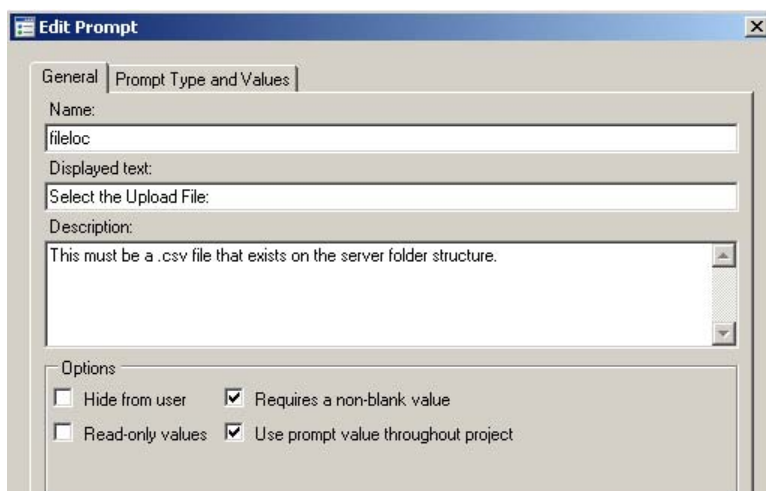
‘COMPLEX’ PROJECT CONVERSION

A SAS Enterprise Guide project was created, so an analyst could upload and clean the data in SAS Enterprise Guide prior to updating the production data system. This initial project consisted of several program tasks within the process flow. The user needed to modify the %LET statements that point to the location where to save the uploaded data.

STEP 1. UTILIZE A PROMPT FOR FILE SOURCE

Several important options were selected in the Edit Prompt dialog box.

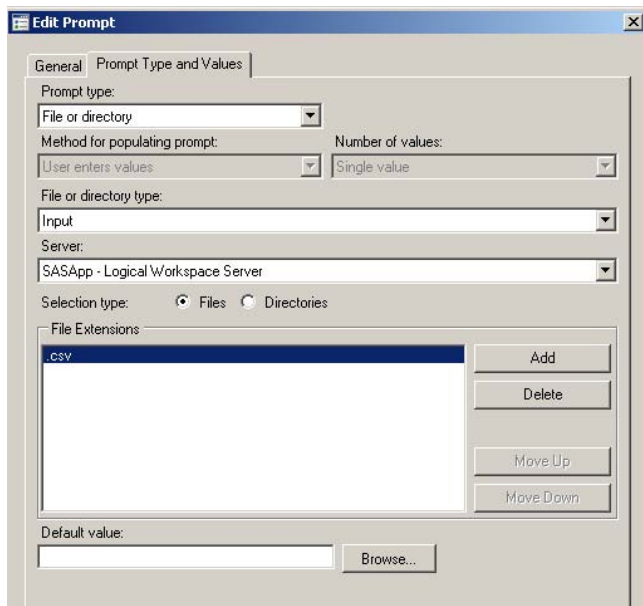
1. The **Requires a non-blank value** option ensures that the user selects a value for the prompt. The program node required a value for &fileloc in order to run successfully, so this option ensures that a blank value isn't submitted.
2. The **Use prompt value throughout project** uses the same value throughout the entire project. If there were several places where the value of the &fileloc prompt is utilized and the programmer needed the user to verify or change the value with each step, then this option should be unchecked. Note that each subsequent step in the project should also have the prompt associated with it.
3. Description text was also added to aid the user in understanding why only .csv files are viewable from the Browse window. The program node used a PROC IMPORT statement that would only accept .csv files.



Display 7. General Tab in the Edit Prompt Dialog Box for File Location

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

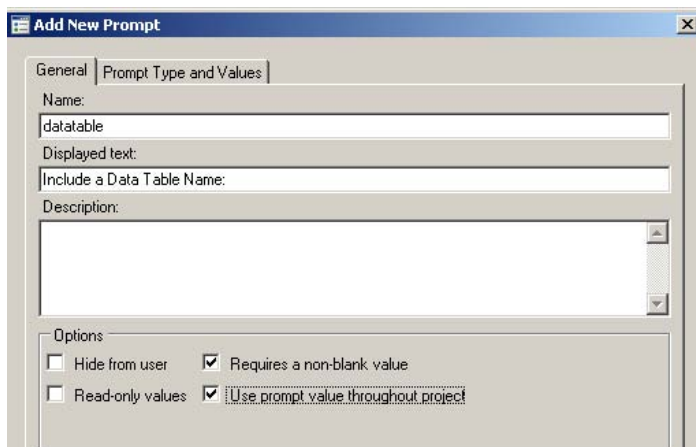
The two main items modified in this dialog box were the prompt type, which changed to **File or directory**, and the .csv file extension was added in the **File Extension** area. When the user browsed through files on the SASApp Logical Workspace Server, only files with .csv extension were viewable.



Display 8. Prompt Type and Values Tab for File Location

STEP 2. UTILIZE A PROMPT FOR DATA SOURCE

When including a prompt for the data source, the following options were also selected: **Requires a non-blank value** and **Use prompt value throughout project**.



Display 9. General Tab in the Add New Prompt Dialog Box for a Data Table

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

For the prompt type, **Text** was selected. A hint was added, so the user knows to type the library and name of the data table as the value of the prompt.

Display 10. Prompt Type and Values Tab for Data Table When the Prompt Type = 'Text'

Another option for the prompt type is Data source. Implementing this prompt type requires some coding because the prompt returns only the metadata location for the table definition.

After selecting **Data source** as the prompt type, the only data source type checked is table because the code is utilizing a DATA step to update this table.

Display 11. Prompt Type and Values Tab for Data Table When the Prompt Type = 'Data source'

In the SAS code (using the stored process example in SAS Note 37386 (<http://support.sas.com/kb/37/386.html>) as a guide) the following processing step is run to generate a macro that contains the “libname.table” format for subsequent steps. **Important Note:** The highlighted text is required in SAS Enterprise Guide prompting but not in SAS Stored Processes.

```
%metaauto;
%metadata_getDatafileFromPath(path=&fileloc.(Table),
                             type=&fileloc_type,
                             assignlib=y,
                             outvar=MYTABLE,
                             debug=y);
```

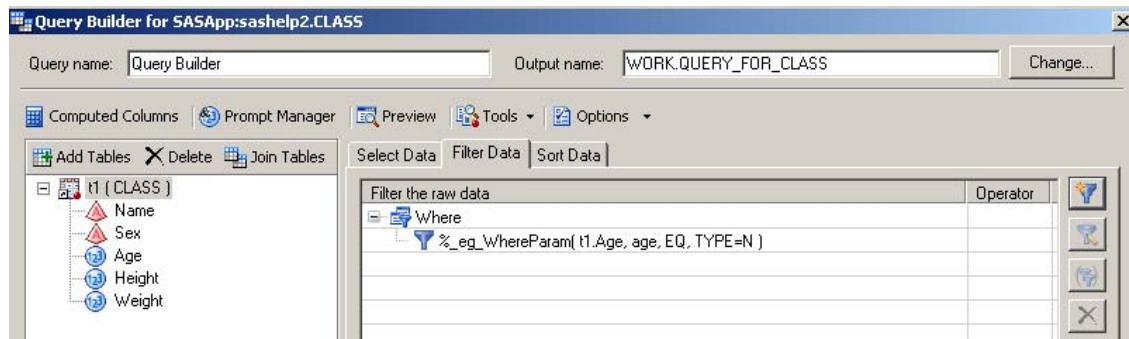
Subsequent code uses the OUTVAR= option as a macro. Here is an example from SAS Note 37386 at <http://support.sas.com/kb/37/386.html>.

```
proc print data=&MYTABLE(obs=25) label;
run;
```

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

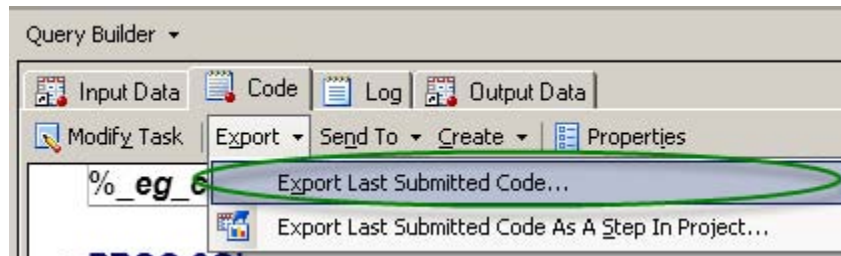
PROMPT CONVERSIONS AND TRANSLATIONS

When using the Prompt Manager from Enterprise Guide Query Builder task, the %_eg_WhereParam is inserted into the code.



Display 12. Query Builder with %_eg_WhereParam

You can take a sneak peak of this code by then exporting the query builder's last submitted code.



Display 13. Query Builder Export of Last Submitted Code

Another use for this macro code is that it can then be copied into stored processes or your macro catalog for further use. Included is the top/bottom of the macro found in the exported code.

```
%macro _eg_WhereParam( COLUMN, PARM, OPERATOR, TYPE=S, MATCHALL=_ALL_VALUES_,
  MATCHALL_CLAUSE=1, MAX= );
///
%mend:
```

The arguments for the _eg_WhereParam macro include the following:

1. Column, defines the evaluated variable
2. Parm, must equal the name of the Prompt
3. Operator, the condition of the variable to prompt evaluation. Valid options include:
 - Between, Not Between EG, =, NE, <>, IN, NOT IN
 - Note that when using between and not between, a range prompt is required or an inclusion of the MAX= value.
4. Type, type of variable. Valid options include:
 - String or S, Date or D, Time or T, Datetime or DT
 - Default Value is String

After you've completed your project, you can easily leverage your prompts in SAS Stored Processes with almost no extra work. When you use Enterprise Guide to create a stored process, the project prompts are automatically converted into stored process prompts. Note that this is a one-way conversion: the prompts within your Enterprise Guide project are not connected to those that are added to the stored process. This means that when you need to make a change to a prompt, you must change it in both the Enterprise Guide project and within the stored process.

Creating Reusable Programs by Using SAS® Enterprise Guide® Prompt Manager, continued

CONCLUSION

Prompting in a SAS Enterprise Guide project is an extremely valuable mechanism to make the project 'user-proof'. Prompting allows modifications without directly interacting with code and individual tasks. Consider current projects that are essentially duplicates with minor changes (such as date ranges) and move these to reusable and efficient programs by including a date range prompt. Review projects that initially appear complex (due to the code changes required to get them to work with each run) and convert these code changes to prompts.

RECOMMENDED READING

- Hemedinger, Chris. 2008. "Find Out What You're Missing: Programming with SAS Enterprise Guide." *Proceedings of the SAS Global Forum 2008 Conference*. Cary, NC: SAS Institute Inc. Available at <http://support.sas.com/resources/papers/sgf2008/eguide.pdf>.
- McDaniel, Stephen, and Chris Hemedinger. 2010. *SAS For Dummies*. 2d ed. Hoboken, NJ: Wiley Publishing, Inc.
- Sucher, Kenneth. 2010. "Interactive and Efficient Macro Programming with Prompts in SAS Enterprise Guide 4.2" *Proceedings of the SAS Global Forum 2010 Conference*. Cary, NC: SAS Institute Inc. Available at <http://support.sas.com/resources/papers/proceedings10/036-2010.pdf>

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