ABSTRACT
This paper explores some proven methods used to automate complex SAS® Enterprise Guide® projects so that the average Joe can run them with little or no prior experience. There are often times when a programmer is requested to extract data and dump it into Microsoft Excel® for a user. Often these data extracts are very similar and can be run with previously saved code. However, the user quite often has to wait for the programmer to have the time to simply run the code. By automating the code, the programmer regains control over their data requests. This paper discusses the benefits of establishing macro variables and creating stored procedures, among other tips.

INTRODUCTION
The purpose of this paper is to explore various easy enhancements to a SAS® Enterprise Guide® project, which will enable any user to simply run the requested code. Programmers will often be tasked to extract data into manageable segments for others to analyze. These requests are usually very similar and only need minor changes to run but the requestor may need to wait some time before priorities allow the programmer the time to actually run the extract. Building automation into these projects enable the requestor to run the projects themselves, reducing programmer load.

The automations that will be discussed in this paper will be simple tasks but proven effective. They include simple planning of the project, utilizing prompts to populate macro variables, creating stored procedures, storing user logs and automating the output. The Enterprise Guide version used for this example is 4.3, and the Microsoft Excel version is 2007. The data used in this example is accessible at data.gov and is the Consolidated State Performance Report for Achievement Assessments in Mathematics at the district level (data.gov).

PLANNING THE PROJECT
Once the programmer has a full list of requirements with information needed, the programmer then needs to consider the audience. If the person that the data request is for is familiar with SAS®, the programmer may consider simply setting up the Enterprise Guide project with simple prompts and an automated output. However, if the user has little to no experience with SAS, the programmer will want to also establish a stored procedure. Depending on the setup of the user, the stored procedure may be able to be run from SAS Web Analytics by simply clicking on a link.

ORGANIZING THE NODES
In this example, the user will have a small amount of SAS knowledge. The programmer will want to create a stored procedure but also organize the project so that it will be easy for a user to follow in Enterprise Guide. For this reason, it is best to start with a notepad named ‘READ ME’. This will give the programmer a location to record directions for running the project and any other pertinent notes. The next node should be a program node to set up libraries, a utilities node. It is much easier to have all libraries established at the beginning of any project in one location so that if paths change, the programmer has one central location to update instead of multiple locations.
The code may look something like this:

```
/*Create extract - LEA*/ /*FOR PRODUCPTIONS*/
%let basepath= /opt/sas/sasdata/EDFacts_Data/A10_REPEATABLE_ANALYTIC_PRODUCTS/ASSESS/1sch_yr./FERF_LVL/EXTRACTS/;
%let extpath= /opt/sas/sasdata/EDFacts_Data/A10_REPEATABLE_ANALYTIC_PRODUCTS/ASSESS/1sch_yr./FERF_LVL/WORKING/;
%let finalpath= /opt/sas/sasdata/EDFacts_Data/A10_REPEATABLE_ANALYTIC_PRODUCTS/ASSESS/1sch_yr./FERF_LVL/FINAL/;
```

The programmer should also organize the project so that everything is linked together. Even though Enterprise Guide will usually run the project in the correct order, it will help the user to follow the data flow in case of a run failure. This will also help ensure the stored procedure runs correctly.

To link two nodes together:

- Right click on the first node
- Click on ‘Link <node name> to’
- Select the second node from the list of nodes

RETAINING USER LOGS

One of the more helpful functions when automating a project is to retain the user logs. As the programmer is not usually running this code, the user needs to be alert for problems in the data extract. If the expected results are not returned, the user will need to have the programmer review the problem. This is much easier when the programmer has the logs from the specific session that caused the problem. As part of the utilities node, the following code should be included:

```
PROC PRINTTO
  log="/opt/sas/sasdata/EDFacts_Data/A20_AD_HOC/ESB/JEN/SAS_log.txt"
  new;
run;
```

To revert the log back to the default, add a final node with:

```
PROC PRINTTO;
run;
```

UTILIZING PROMPTS

One of the easiest ways to make an Enterprise Guide project open for multiple runs by anyone is to establish prompts to collect the settings for macro variables. For example, if the project is set up to run for school year 2012-2013 without macros, it will only run for that one school year. However, by establishing prompts, the same project can be run for any school year, state, and district combination. Establishing macro variables populated by prompts is a three step process. The first step is to setup the prompt.
1. In the Server List window, click on Prompt Manager and click Add

a. Next, the Add New Prompt form will need to be filled out

i. General Tab – This tab establishes the macro variable and properties

   1. Name – Macro variable
   2. Display Text – What the user will see
   3. Consider the Options

      a. Recommendations: Check ‘Requires a non-blank value’ and ‘Use prompt value throughout project’

         i. Selecting ‘Use prompt value throughout project’ creates the macro as a global variable so it does not need to be defined again.
ii. Prompt Type and Values tab

   a. For this example, select text
2. Method for populating prompt – options are user enters values, user selects values from a static list or user selects values from a dynamic list
   a. When selecting the option for a dynamic list, consider the fact that Enterprise Guide will need to query the list to get the most recent options available
      i. In this example, the query for a dynamic list would take a great deal of time and the user will only want an option of possibly six options. For this reason, select static list option
3. Number of values – options are single value, multiple value, multiple ordered values
   a. For this example, select single value
4. Minimum and Maximum Length – may be entered if desired or left blank if it will not alter the possible entries to the macro
5. Include special values – check if ‘All possible values’ or ‘Missing values’ should be an option. In this example, neither would be an option for school year so they will not be checked.
6. List of values – Click ‘Add’ and add values manually or click ‘Get Values..’ to have the list populate
   a. As school year is easily defined, for this example, select Add and manually add the desired school years.
2. The second step is to establish the query filter.
   a. Create a query as needed. In this example, a simple query will be built to include all fields and filter on both state and school year.
   b. Create a filter
      i. Select the field to filter on
      ii. In the new filter box, check the ‘Generate filter for a prompt value’ box
      iii. Click on the arrow at the end of the value box and select the prompt tab on the pop-up window
   1. Select the correct prompt
iv. Click Finish

3. The final step is only needed if using a Program node. The programmer needs to call the prompt whereas in other node types, Enterprise Guide automatically adds it when the filter is created.
   a. In the program window, click on Properties
   b. Click on Prompts in the left hand menu
   c. Click Add and select the prompt

AUTOMATING THE OUTPUT

Once the code had been run and the report or extract file is prepared, the user still needs a way to open it. Although Enterprise Guide will automatically display the results, the user may not know how to move the results from Enterprise Guide to another format. The recommendation is to automatically export the file. There are two ways to achieve this. Using the prompts, the programmer can right click on the results and select ‘Export SAS Report – Program1 as a Step In Project’. This will keep the results always exporting to the same location with the same name.
1. The first screen will have the programmer select the dataset to export.

2. Next, select the file format type
3. Select preference on using labels for column names

4. Select the path to store the file
5. Approve the code

Another method is to use a Program node to export the results. In the example below, the programmer was able to export the results and make the name dynamic based on the school year selected in the prompt:

```
PROC EXPORT data=profiles_&sch_yr._format
    outfile="/opt/sas/sasdata/EDFacts_Data/A20_AD_HOC/ESB/JEN/
    EDF_SCH_STATUS_&sch_yr.csv"
    dbms=csv REPLACE;
run;
```

**STORED PROCESS**

The final method for automating Enterprise Guide projects for the user is to compile all of the separate pieces of the project into one set of code. This is done by creating a stored procedure. The creation of a stored process will not differ greatly from user to user with the exception of where the process is stored and how it is accessed. Even if the stored process is never linked to another SAS Business Analytics tool, it is still helpful to give the user one link to click on to run instead of a full project.

1. Right click anywhere in the projects window. Select ‘Create Stored Process’
2. Enter the name of the process and where is will be saved
3. Review the code window and click Next
4. Select the ‘Execution Server’ and ‘Source Filepath’ and click next

5. Verify the library references.
   a. Some systems require that the stored process does not create the libref since it is automatically created at startup. Uncheck the libref in this situation
6. Verify the prompts are all included as necessary and in the desired display order

7. Verify Data Sources and Targets
8. Verify the stored process has created correctly by validating the summary

![Screenshot of the SAS Stored Process Wizard](image)

9. Click Finish

10. To run, right click on Stored Process node and select ‘Run Stored Process1’

![Screenshot of Stored Process1](image)

CONCLUSION

Creating an Enterprise Guide project so that users of any skill level can run it is not difficult. It only takes time and planning. This paper has walked through various techniques that can be used which are easy to implement. They include how to plan the project for the user's skill level, utilizing prompts to enable multiple runs, automating the outputs and creating stored processes. Often, what was initially a one-time ad hoc request will turn into a repeated process. Approaching each request with the tips outlined above will make the programmer's task of handing this off to the user that much easier and faster.

REFERENCES


ACKNOWLEDGMENTS

I would like to acknowledge my friends at the Department of Energy and the Department of Education for being my guinea pigs to help me figure out what techniques to use for them as users.

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