

File Management and Backup Considerations When Using SAS® Enterprise Guide (EG) Software

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ABSTRACT

SAS Enterprise Guide provides a state-of-the-art user interface to SAS software in the Windows environment. The management of the code files at first appears to be very similar to the management of the code files in past PC versions of SAS. EG software uses an "Enterprise Guide Project (EGP)" file to store the project contents. Within the project, the usual SAS code files are developed. There are 2 ways these files can be stored: (a) embedded within the project (and thus not visible to file utilities such as Windows Explorer), or external to the project as ".SAS" files. This paper will discuss the pros and cons of each method and will discuss both the location of and the backup of the files. Failure to understand these file structures has led to catastrophic losses of program code when appropriate backup procedures are not in place when system or operator failures occur.

INTRODUCTION

Embarking on a new SAS programming adventure in SAS Enterprise Guide Software can appear to be deceptively simple at first. Unlike conventional PC SAS programming where all code is stored someplace of the user's choosing in "*.SAS" files, SAS Enterprise Guide uses a "project" file with the extension "*.EGP" to store the programming effort from session to session, again in a location of the user's choosing. To complicate the matter, the SAS Enterprise Guide project file may or may not contain SAS code created by the user as such (embedded) within the project file, or alternatively may make reference to externally stored SAS code files (*.SAS" files).

This paper has as its objective to demonstrate Enterprise Guide programming efforts ranging from the simplest of projects (no user-programmed SAS code as such, just Process Flow diagrams with their generated code) to much more complex programs involving process flows and multiple SAS programs including both embedded SAS code and externally-referenced SAS code files. It is very important to understand these differences in order to not only maintain and optimize the programming effort, but also to DEVELOP AN EFFECTIVE BACKUP STRATEGY. Failure to understand the various files created can lead to a massive disaster should hardware malfunction, software corrupt, networking malfunction, or user error. In addition, a "Bonus Discussion" shows how to store quick copies of programs you are working on with a minimal effort to build up your own archival system of "roll-back" versions.

LOCATION OF SAS PROGRAM FILES, BACKUP FILES AND BACKUP STRATEGY

This discussion is vital to understanding and optimizing the use of EG. First, from the standpoint of Microsoft Windows, it has long been the direction of Microsoft developers that users should place data files in the "My Documents" directory. Each user has their own separate "My Documents" folder available only to them. The days of placing code files in directories all over the hard drive are gone. Why? Lots of reasons! Consider this: if you wish to back up your files to some other location --- another hard drive, a network drive, a cloud drive, a remote service such as Carbonite, etc., --- what is the simplest way to direct that all of the desired files (and only the desired files) are backed up? Place them in "My Documents" and then copy off that folder and all of the subfolders. This can be done manually, via backup software you purchase, via your employer's host machine (good luck there), via 3rd party services over the web or "cloud", or software included with Windows.

Software included for backup with Microsoft Windows versions is changing. In Windows XP and Windows 7, there are backup and restore programs. While these are fairly simple, they are capable of getting the job done. Windows 8.1 no longer has this software, but rather has a "File History" capability which can automatically create historical versions of your files at intervals as short as 10 minutes (for more information, see [MICROSOFT 8.1 USING FILE HISTORY](#)).

Whatever you do regarding backups, do not put them on the same physical drive that your "My Documents" folder is located. At the minimum, they should be on an external drive. Ideally they are at a remote location. Never carry you only backup with you when travelling with a laptop. Consider all of the bad things that could happen when travelling - -- theft, fire, dropping, etc.

Here is a great directory organization (Figure 1) that is very compatible with all versions of SAS on any version of Windows and uses the “My Documents” folder.

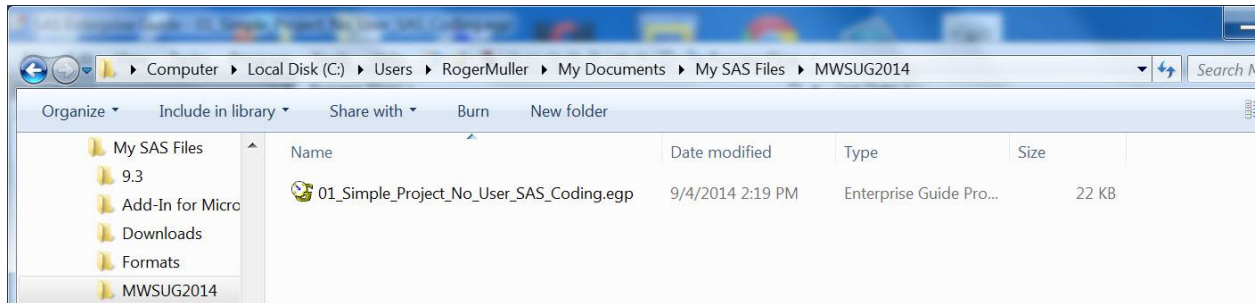


Figure 1. Example of an Excellent File Directory Structure for Storing SAS Code Which is Easy to Backup.

What if you don't like typing all of that directory info into other programs (e.g. SAS)? Many users dread this. You don't have to retype – just copy and paste! In Windows Explorer, find a file, highlight it and look at the properties (Figure 2).

Notice that the full path is displayed for the file. While it doesn't look like something that can be copied to the Windows clipboard, it indeed can be. Simply highlight the location with the mouse as shown in blue and hit Ctrl-C and the content is copied to the clipboard.

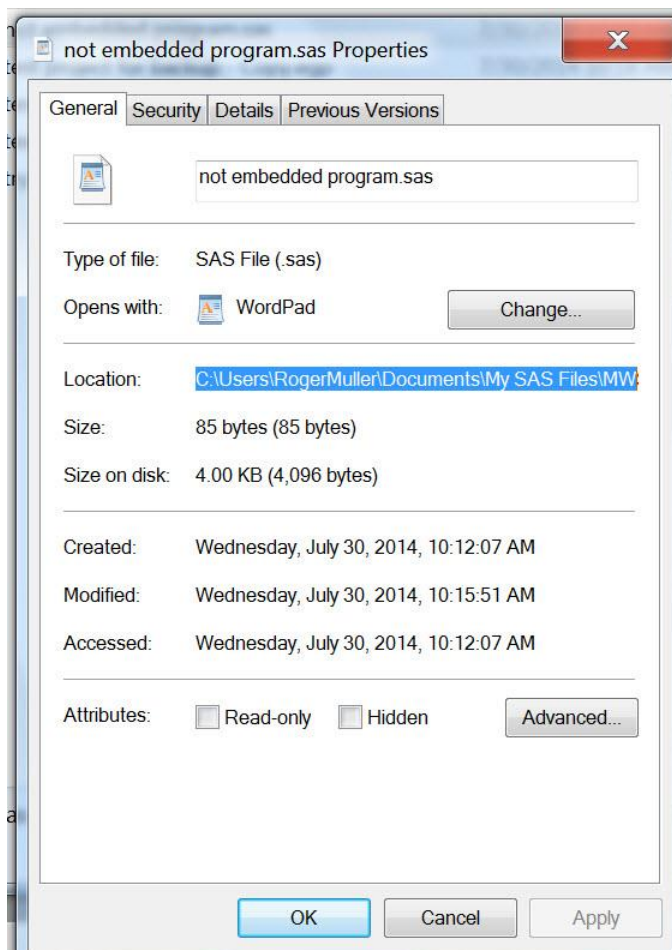


Figure 2. An Example of Showing Properties of a Stored SAS Code File with the Path Highlighted to be Copied to the Windows Clipboard with Ctrl-C.

Jumping ahead a little, we are going to paste that whole long pathname into a SAS program window in SAS Enterprise Guide by simply using Ctrl-V to paste the clipboard. Adding the %include statement, double quotes, etc., we have a program ready to run with very minimal typing and without all of the errors associated with retyping a long complicated path such as this (Figure 3).

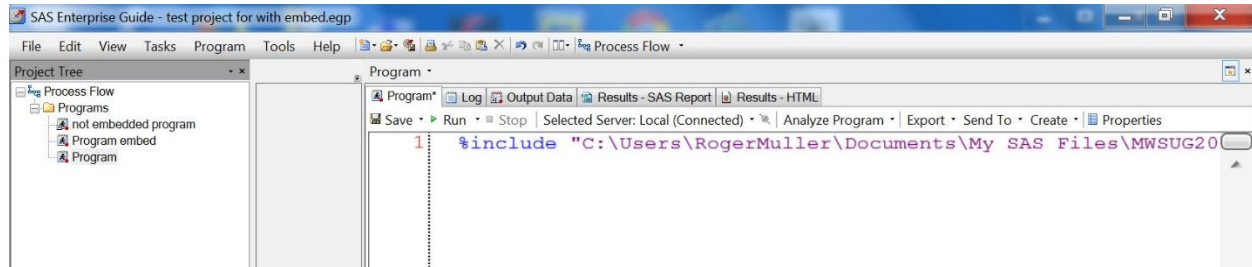


Figure 3. Example of Long Path for a File Pasted from the Windows Clipboard with Ctrl-V.

BACKING UP THE “.SAS” CODE FILES AND THE “.EGP” PROJECT FILES

Once you have established your directory structure and appreciate how long paths can easily be copied and pasted, give consideration to the backup process. Is the backup process something you have to do yourself or is it something that your employer is involved with. Make sure you understand exactly how the employer does it. If it runs a night, does the computer have to be on the network and up and running? Obviously yes. What if you take a laptop home with you, will it be backed up. Some companies backup by retaining only the most recent copy of a file with no historical archived versions of the code (snapshot). If you delete a file on the previous day and this style of “backup” is performed, everything is GONE FOREVER. YOU CANN’T BACKUP TO LAST WEEK’S FILES, etc. Good backup technique makes some provision for versioning. In any event, test the furnished backup facility by deleting a file, or ask to get a version that was on the machine one week ago. Make sure they can find it and it can be restored. Somebody might be in for a disappointing surprise!

If you use a “cloud-based” online service like Carbonite.com, make sure you go through the same deletion and restoration process. Make sure you test its capabilities and your abilities.

What if you purchase your own backup software? Make sure you backup to a different physical device than your main hard drive such as another drive on your machine, a network drive (hopefully off at another location), a USB thumbnail, etc. Make sure you go through a simulated delete and restore test.

What about the backup and restore software that comes with Microsoft Windows? It works fine for versions 7 and earlier. While not an extremely robust piece of software, it gets the job done. Version 8 is taking a different route.

GOOD NEWS COMING!

Microsoft is no longer furnishing the Backup and Restore Software for Windows 8.1 (the most recent version as of this writing). Backup of the system and application software will take place by the creation of system image files. For “data files”, a “File History” capability has been added. This facility automatically allows the user to make backup copies of files such as “.SAS” files “on the go” at user selected intervals (e.g. 10 minutes, once an hour, once a day, or whatever). These must be written to a device other than the hard drive on which they reside. This will facilitate not only backup and restore, but will also furnished a “roll-back” functionality.

The current release of SAS Enterprise Guide with Maintenance Release 1 is Version 6.1 released in December of 2013. A proposed feature shown by SAS Institute personnel at several recent trade shows has included an internal “versioning/roll-back” feature that would provide for availability of earlier versions of files being edited. This feature was in the development stage early in 2014 and may or may not become available at some future time.

In the meantime, see one of the last sections in this paper with the header of “Making Your Own Roll-Back Versions of SAS files”.

FILES NEEDING BACKUP WHEN USING SAS ENTERPRISE GUIDE SOFTWARE IN 3 DIFFERENT FASHIONS

Three different situations will be examined to show the assorted ways of using SAS Enterprise Guide and what needs backing up.

1. Running SAS Enterprise Guide with the Process Flow Window only. No SAS-coding by the user. Results only in the production of “.EGP” files.
2. The user is developing SAS code that is being stored (embedded) within the project. This again results in the production of only “.EGP” files
3. The user codes SAS files that are stored externally to the project. This results in the production of both “.EGP” files and “.SAS” files.

Following each of the detailed examples of the use of these 3 techniques, there will be a short discussion on the ramifications of this on backup processes. Rather than producing extensive text, this presentation will rely on screen captures with extended explanation on the captions for each figure.

1. RUNNING PROCESS FLOWS ONLY

SAS can be used without the need for the programmer to either know or write SAS code by using the Process Flow windows within Enterprise Guide. The use of process flows is beyond the scope of this paper. A brief example will be shown and then the backup procedures will be discussed. A SAS Enterprise Guide project is started in Figure 4. Moving on through the development of a Process Flow, the series figures ends at Figure 14 where the Windows Explorer shows there is only one EGP file created.

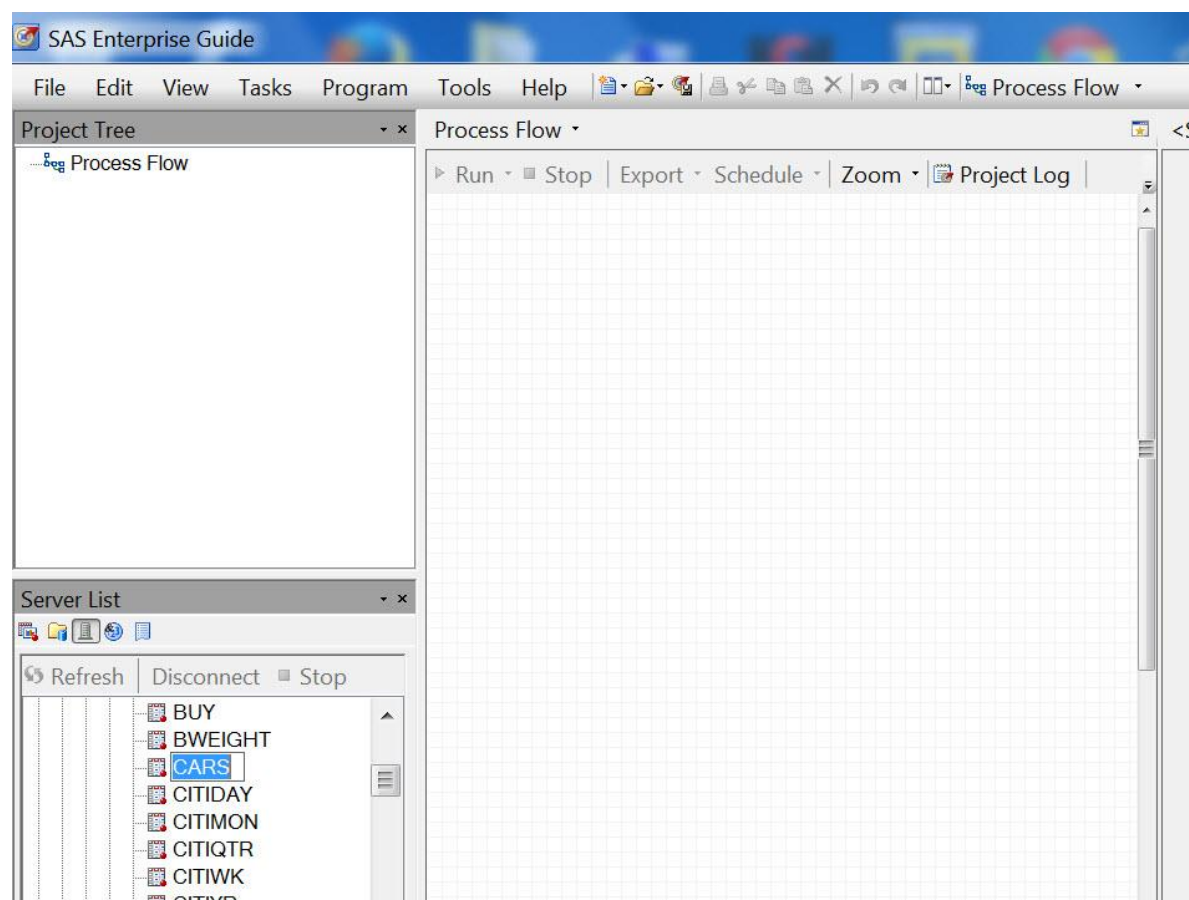


Figure 4. Starting an Enterprise Guide Project, After Opening Go to Server List Windows and Navigate to SASHELP.CARS Dataset.

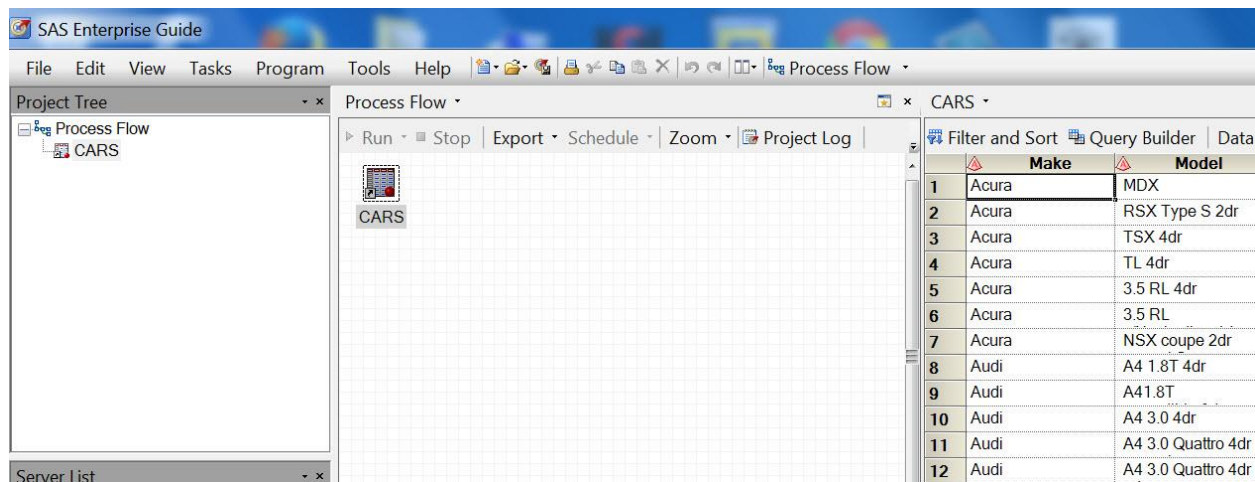


Figure 5. Drag the SASHELP.Cars Dataset to the Process Flow Window and Drop It. Note That the Dataset Opens.

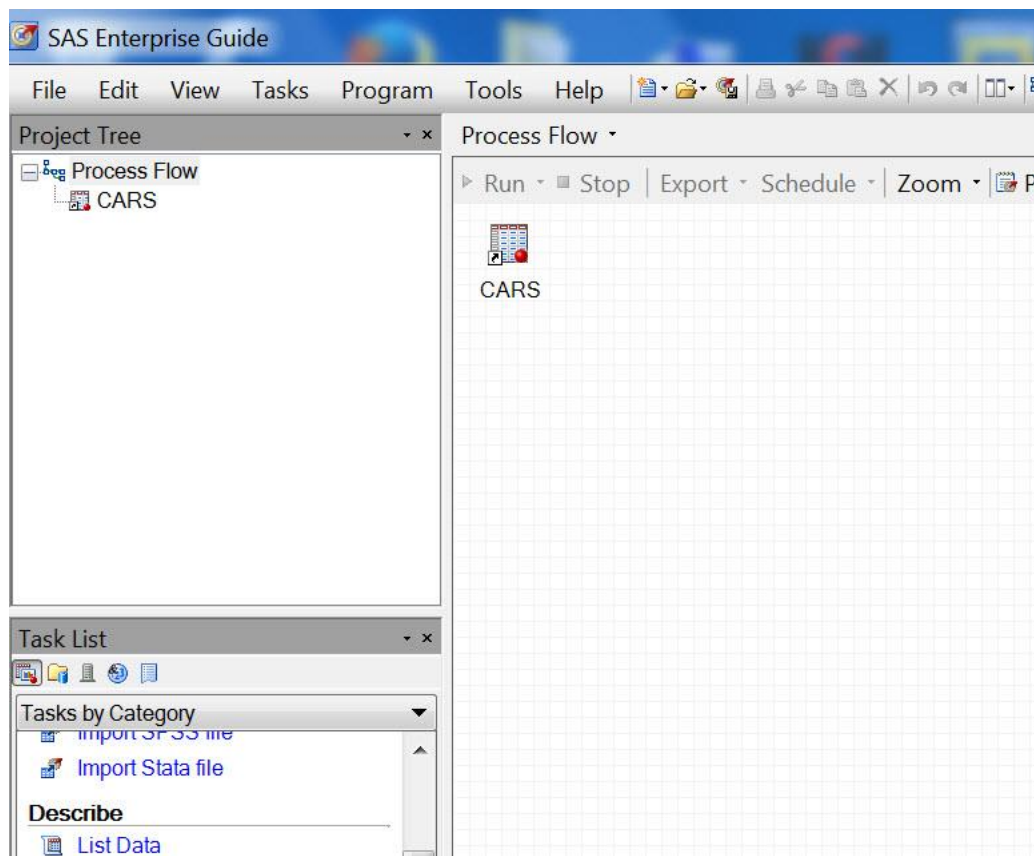


Figure 6. Now Go the Task Window in Lower Left and Find "List Data".

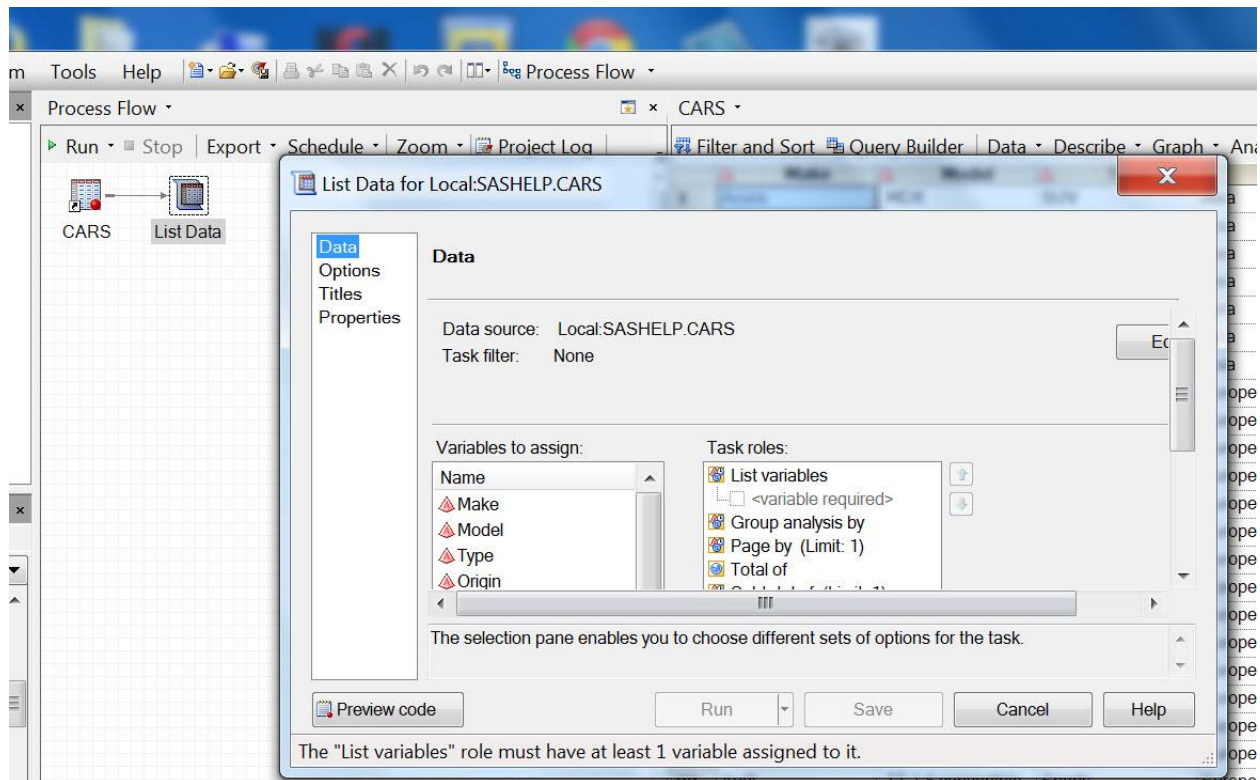


Figure 7. Drag and Drop the Task List Icon on the Cars Icon in the Process Flow Window. A Window Opens to Allow you to Define the Report Without Programming. Fill This In as Needed to Complete Your Report.

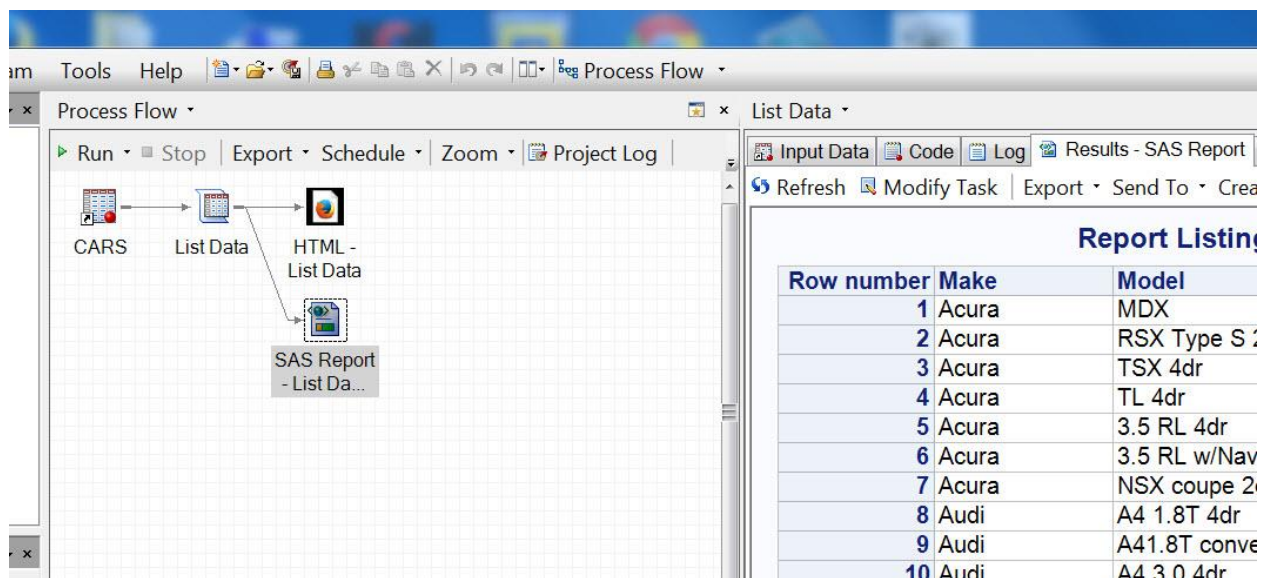


Figure 8. Run the Process Flow and the Output, Logs, Etc. Appear.

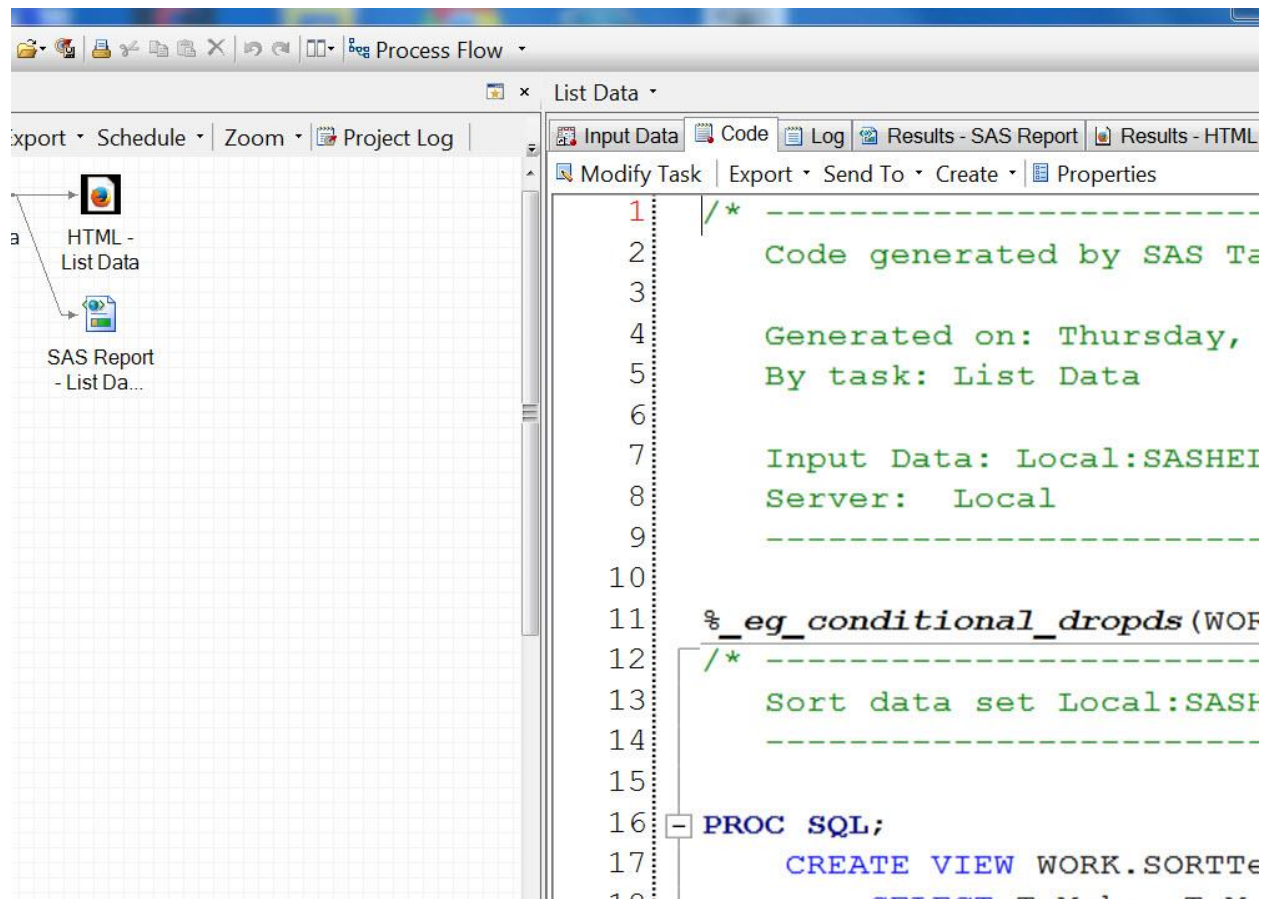


Figure 9. Click on the "Code" Tab and You Will See the "Behind the Scenes" SAS Code That Was Developed.

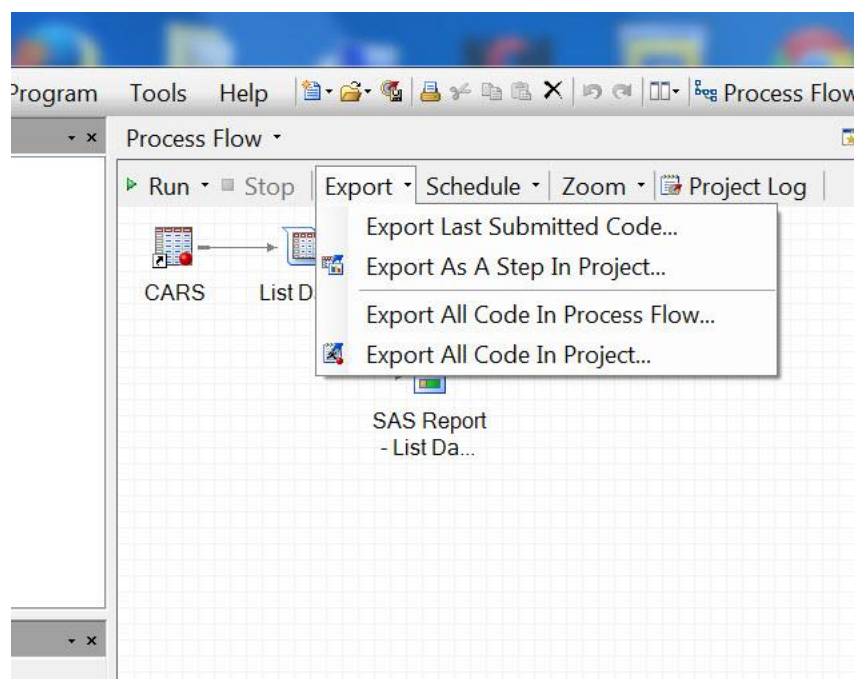


Figure 10. This Code Can be Exported If Desired to Some Location of Your Choosing.

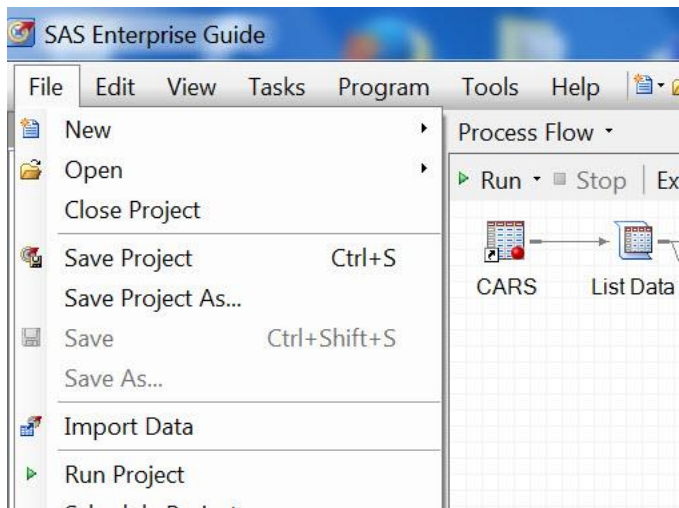


Figure 11. At This Time, Nothing Has Been Saved for Future Use. Click on File -- Save Project As..

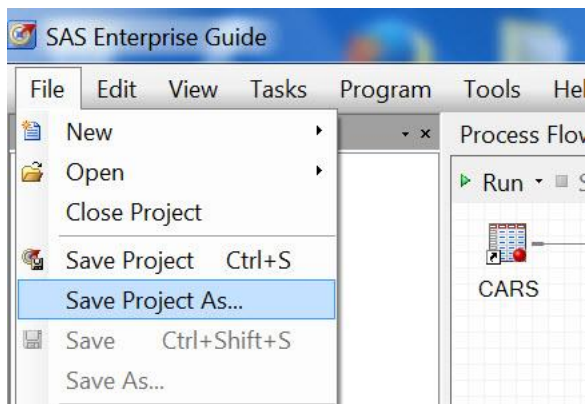


Figure 12. In the Save Project As Screen, Type "01_Simple_Project_No_User_SAS_Coding".

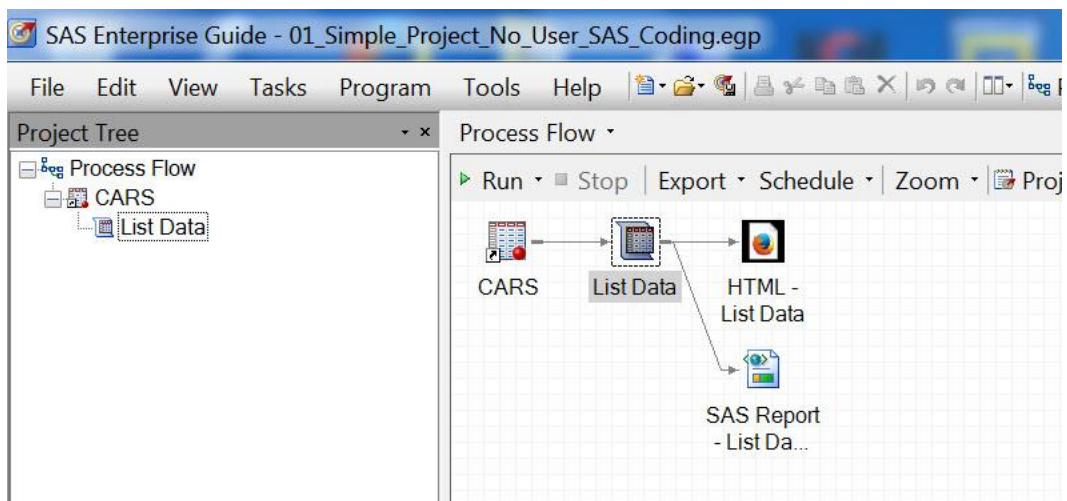


Figure 13. Note the Project Name is Now in the Blue Bar at the Top of the Window.

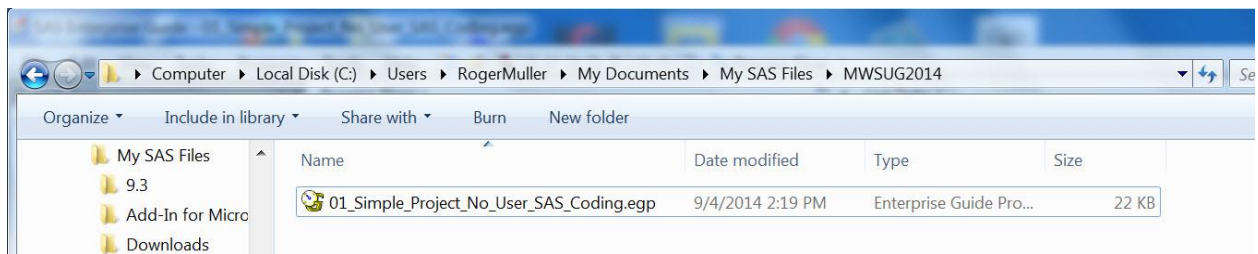


Figure 14. Go to Windows Explorer and Drill to the Folder "MWSUG2014". The ".EGP" File Just Saved Is There.

Bottom Line: One file was created that needs to be backed up.

2. USER DEVELOPED SAS CODE EMBEDDED IN PROJECT

Moving on to an example where SAS code is generated by the user (Figures 15 to 20) and stored internal to the project, we again see in Windows Explorer that a second EGP file has been generated (Figure 20). The SAS code is embedded and thus does not show as a separate entry as a ".SAS" file. Thus, only the EGP file has to be backed up.

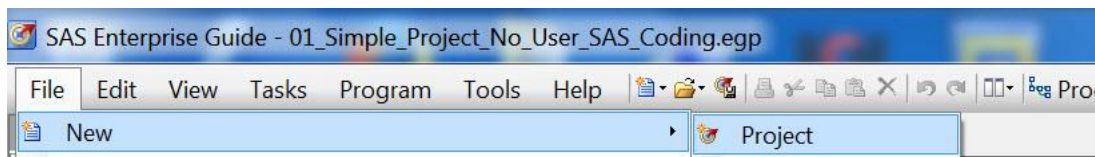


Figure 15. Picking Up from Previous Project, Select --File -- New --- Project From the Menu Bar.

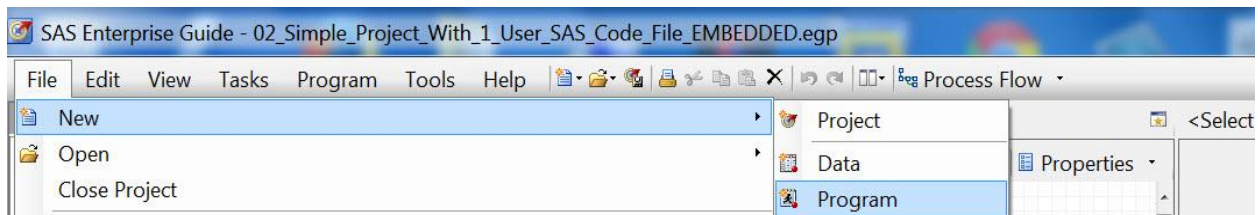


Figure 16. Note The New Project Name In the Top Bar. To Immediately Open a Programming Area for User Developed Code, Select -- File -- New --Program.

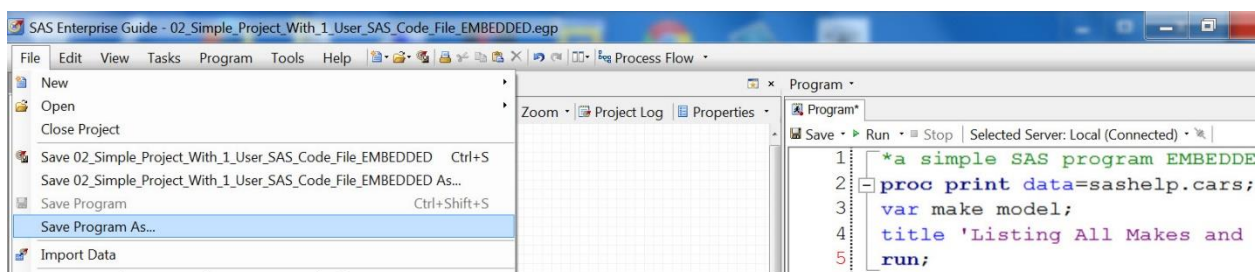


Figure 17. Upon Entering Code, Select from the Menu -- File -- Save Program As and Enter the name "Program Entered and Embedded in SAS EG Project 02".

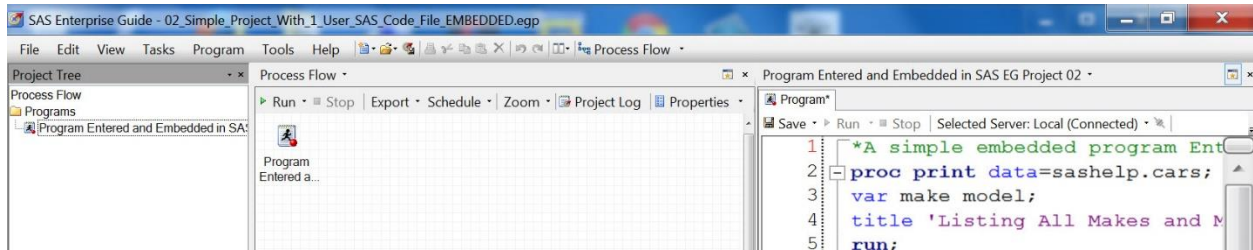


Figure 18. Note that this Program Name Appears in the "Project Tree" Window. The Icon is for a SAS File. The Icon Does Not Have an Overlying Shortcut Arrow on It.

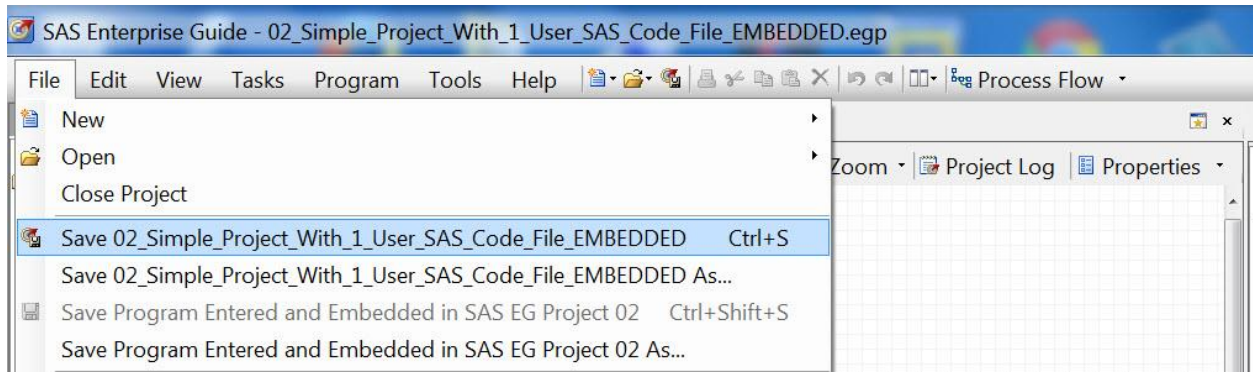


Figure 19. Now, Do a -- File -- Save Project (Note we are NOT Doing a File - Save -- Program).

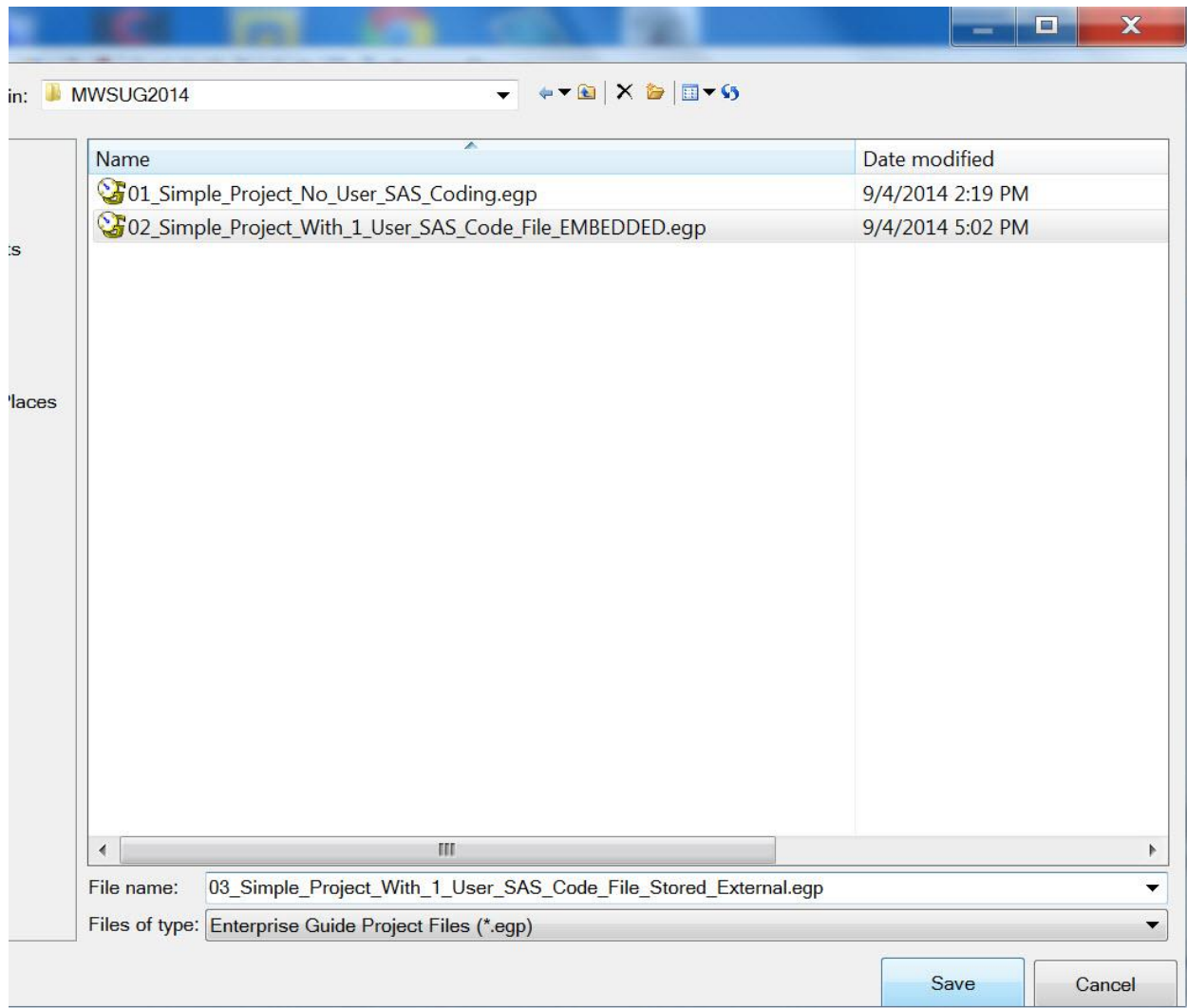


Figure 20. In Windows Explorer, Look at Directory "MWSUG", There are Two Project Files. There is no ".SAS" Program File. The Coding Performed was Embedded in the Project File.

Bottom Line: One file was created that needs to be backed up.

3. USER DEVELOPED SAS CODE STORE EXTERNAL TO THE PROJECT

In the last example, SAS code is generated by the user (Figures 21 to 26) and stored externally as a separate file. In Figure 26, we see both project file (03...egp) and a "*.SAS" file that were generated. Obviously they would not necessarily be in the same directory, let alone the same device in a real world example. Needless to say, they both need to be backed up as separate independent events.

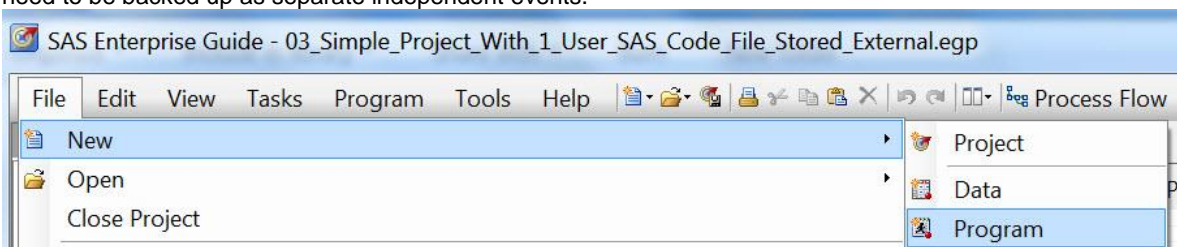


Figure 21. Now Start a New Project Named "03_Simple....." (Process Not Shown) and Then Do File -- New -- Program and Code in the Program Window (Several steps are not shown as they are redundant with previous examples).

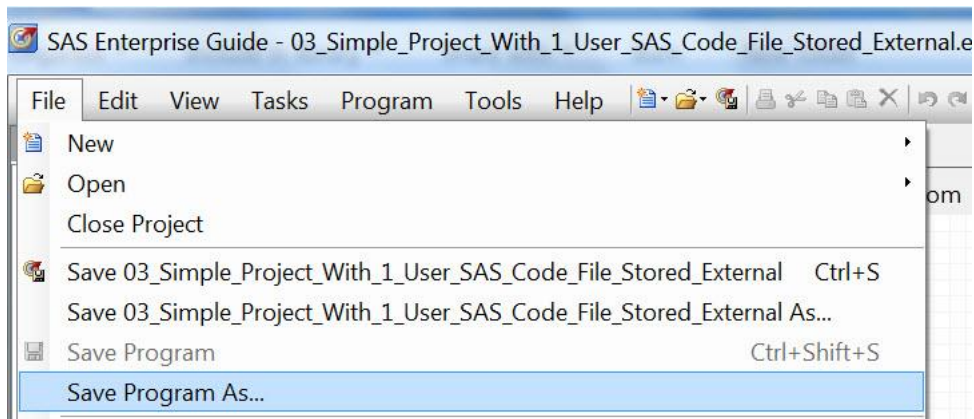


Figure 22. Once Coding is Complete, Save the Program Externally in One of Two Fashions. This Figure shows File -- Save Program As.

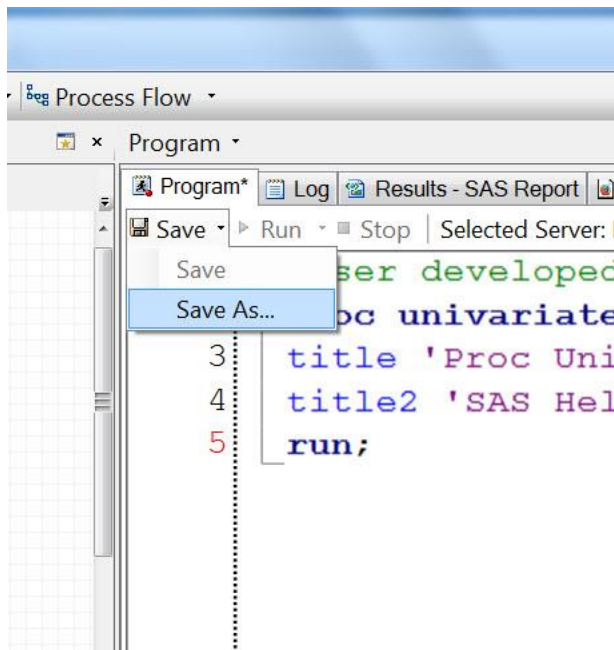


Figure 23. Or Alternatively, Use the "Save" and "Save As" Tabs At the Top of the Programming Window.

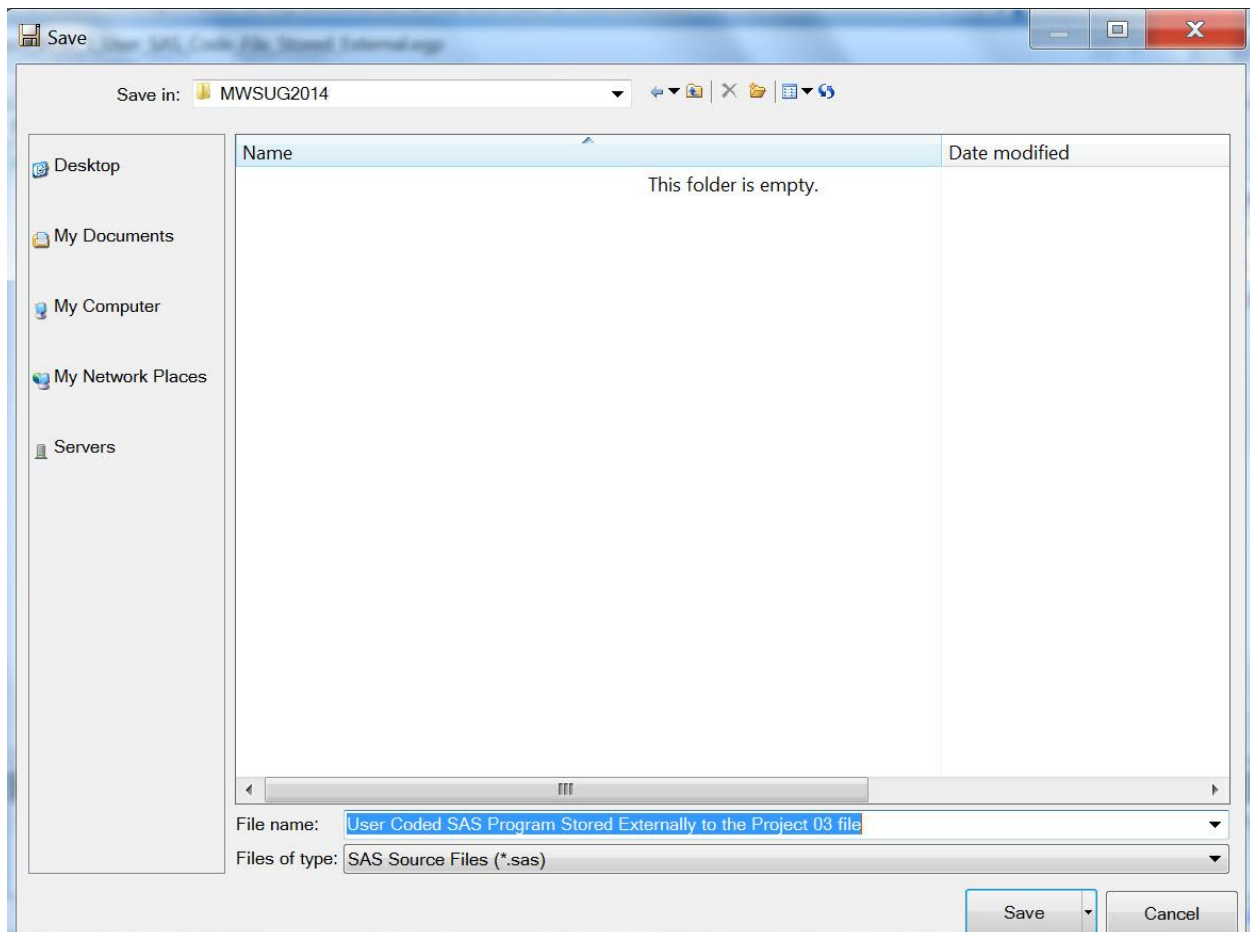


Figure 24. In Either Case, You Will Arrive at the MWSUG Folder, Assign a Name to the “.SAS” File and Save It Here To Store Externally to the Project.

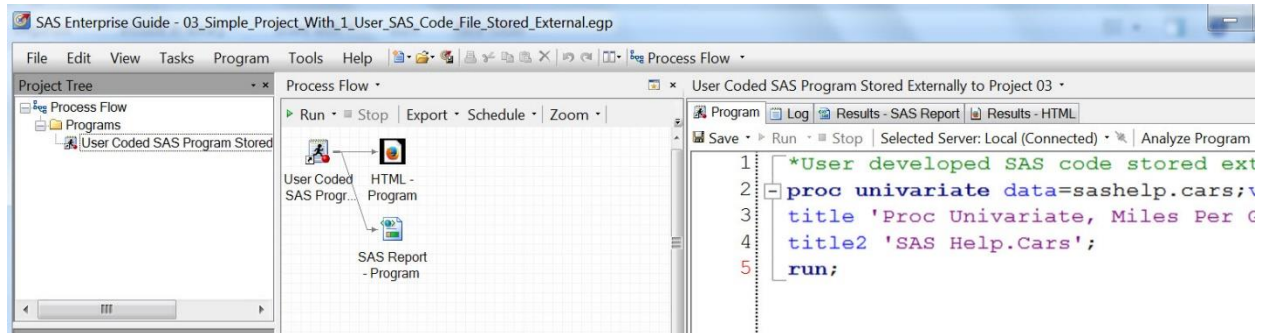


Figure 25. Note in the Project Tree Window, This Filename Appears With a SHORTCUT Icon, Indicating it is External to the Project (the shortcut icon has a bold curved arrow superimposed).

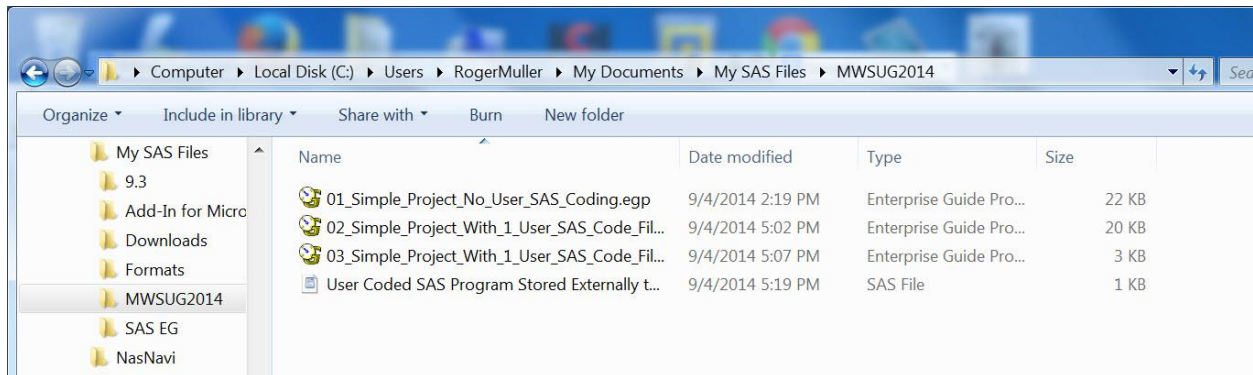


Figure 26. In Windows Explorer, We Now Have Three Projects (.EGP) and One User Coded SAS File (.SAS).

Bottom Line: Files of two types were created that need to be backed up.

WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF EACH STYLE (METHOD) OF USING ENTERPRISE GUIDE.

In the first example, only drag and drop programming is used. This is great for beginning programs or those wanting to advance their skill set by using the intelligent capabilities of SAS Enterprise Guide here and looking at the code generated. Needless to say, the project file needs to be backed up frequently. Further discussion of advantages and disadvantages of this style of program is not within the scope of this paper.

In the second example, user coded file is embedded within the project. This is very simple and straight forward providing the user understands what is occurring. (1) But, and this is a very big but, if this file gets corrupted in any way or if the hard drive storage device crashes a major catastrophe can be in the making if adequate backup procedures are not in place. (2) The contents of the embedded SAS code files are not available unless the project is open in Enterprise Guide. Other users can't open it to retrieve code, the developer can't retrieve code without opening an additional Enterprise Guide session. Text editors can't be used. **These two limitations are VERY SERIOUS IN THE AUTHOR'S OPINION.**

In the third example, user code was stored in external SAS files that are NOT embedded in the project file. This is a great way of working. Just remember there are two items to backup. This makes it much easier for both you and others to retrieve code for other uses.

There is nothing wrong with any of these methods of using SAS Enterprise Guide. Just know and understand them and faithfully back them up correctly. Remember that all three examples can be used simultaneously.

BONUS MATERIAL, HOW TO MAKE YOUR OWN "ROLL-BACK" VERSIONS OF FILES

Throughout this paper there has been frequent mention of backup and "roll-back" capabilities. There is promise in future releases from both Microsoft and SAS to furnish tools to enhance this capability. What about today? Here is a "bonus" discussion on creating "roll-back" versions of both project (EGP) and SAS files. While one can certainly follow a "Save Project As", or a "Save File As", from menus, this is horrible as the working environment is turned over to these new files in SAS EG. What is desired is to keep the working environment on the current file and "write-off" a copy of this file as a slightly different name. Here goes!

- While in EG, save the file in your current directory.
- Jump over to a Windows Explorer Window (Window Key plus E). Drill you way to the current directory where the file is currently stored.

- Highlight the file, do a copy and a paste into the same directory (this is permissible even though SAS Enterprise Guide has the file open).
- The new file will appear with the same name with the additional word “ - Copy”.
- Rename the file and insert some sort of date and time in the filename after the word “ - Copy”. In the example, I use “2014_090414_6pm”. There’s no question when that file was placed there. Furthermore, a listing of files will sort and display beautifully in Windows Explorer.
- Return to SAS Enterprise Guide and keep coding.
- If something bad happens, delete the current file and rename one of your “roll-backs” and continue from there.
- Look at the final result in Figure 27. The “roll-back” copies are highlighted in blue.

Simple! Why didn’t someone show me this roll-back technique a long time ago? Don’t forget to delete some of the roll-backs when they are no longer needed. Incidentally, the “roll-back” files are in “My Documents” so they will be backed up like all other files.

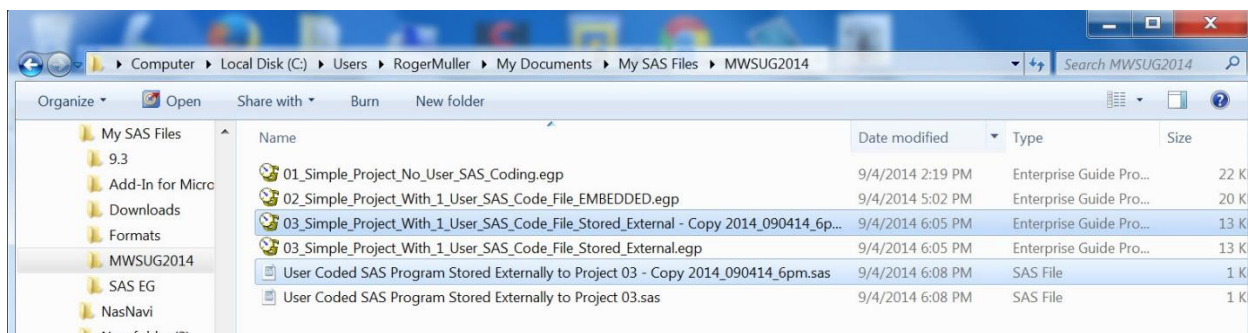


Figure 27. Now Go To Windows Explorer. Several Things Were Done Here and Not Shown in Detail. First, the 03..EGP Was Highlighted, Copied and Pasted to Make a Duplicate Copy with the Word " - Copy" in the Filename. This Filename Was Then Renamed to Add a Datetime in the Name ("2014_090414_6pm"). The 03....SAS File was Treated Similarly. The New Files Which Can Be Used for "Roll-Back" Purposes are Highlighted in Blue in the Figure. These are Here for Historical Roll-Back Only. SAS Enterprise Guide Continues to Work With the "Original" Files When You Return to EG.

CONCLUSION

A fundamental understanding of project files (*.EGP) and SAS code files (*.SAS) and embedding vs external storage is essential for the long-term use of SAS Enterprise Guide. Attention must be given to backup and restore procedures. A “roll-back” process can be established to maintain file history for retrieving previous versions of a file.

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Muller, Roger D., 2013c "SAS Enterprise Guide® --Implementation Hints and Techniques for Insuring Success With Traditional SAS Programmers in a Pharmaceutical Development Role". Proceedings of PharmaSUG 2013, Paper PO20.

RECOMMENDED READING

[Microsoft 8.1 Using File History](#)

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