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Pulling Data from the Banner Operational Data Store with SAS-Enterprise Guide®: Not only Fast but Fun!

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Abstract

The assessment of learning and of services in higher education is crucial for continued improvement. Administrators and faculty, therefore, require data for their decision-making processes. There are many data input experts on campus and, unfortunately, far fewer who can extract the data in the aggregate form required by administrators, accreditors, and other institutional stakeholders. The SAS® Enterprise Guide interface with the Banner Operational Data Store is a very powerful combination of softwares that enable the end user to quickly access the institution's data and produce reports. More powerful still is the ability to bring other relational databases, such as Excel spreadsheets, into the SAS Enterprise Guide environment, thereby allowing variables not available in the Operational Data Store to be used in comparative analyses.

INTRODUCTION

The purpose of this paper is to familiarize the reader with the process of using SAS-Enterprise Guide (SAS-EG) to pull views from the Banner Operational Data Store in order to run descriptive or inferential statistics. For institutions running Ellucian-Banner, the Operational Data Store is the system that pulls and stores Banner elements from several tables in more or less logical groupings. For example, the Operational Data Store view called Academic_Outcome pulls together numerous Banner fields related to graduation. This paper will focus on student data but data in other Banner modules can be analyzed using the same process.

If you are a SAS programmer who is still writing code to manipulate, merge, and analyze your data; the procedures described in this paper may not be of interest to you. However, let me state here that as an analyst who wrote SAS code for over 20 years, once I began using SAS-EG, I never looked back! SAS-EG makes writing SAS code a thing of the past when you want to analyze your data. Analyses that might have taken hours to produce can be done in minutes. This is where the 'fun' is as referenced in the title of this paper. As for the programmers at SAS who wrote, and continue to improve SAS-EG, there aren't enough ways to say thank you. You are absolutely brilliant!

One of the most valuable attributes to using SAS-EG to pull views from the Operational Data Store is the ability to pull in and merge other files, for example, Excel spreadsheets or saved SAS datasets (SSDs). While there is a vast amount of data stored in Banner and written to the Operational Data Store, there is always going to be information about your clients or students that is either not available in Banner or else has been pulled from Banner at a point in time and then stored as static files. SAS-EG allows you to merge these external files with your Operational Data Store views; provided you have a common field to link unit record data.

ACCESSING THE OPERATIONAL DATA STORE

There is a small amount of SAS code that needs to be run in order to access the Operational Data Store. But the good news is that this code need only be written once and is easily stored and added to any SAS-EG project. Before you can create and run a project¹, you will need to work closely with the Operational Data Store manager in your IT department for two things, one is to determine the correct address for the Operational Data Store and the second is to be granted permission to access the specific Operational Data Store views that you need. This can be a bit frustrating but hang in there with IT and the various departments that 'own' access to views, it is worth the pain.

Here is an example of SAS code used to access the Operational Data Store.

```
LIBNAME ODSMGR oracle user=mccannc password="xxx_xxxx"  
path='REPT' schema=ODSMGR;  
  
RUN;
```

Once you have access to the Operational Data Store and can open views/tables, you can run analyses on these data in a SAS-EG project.

When you open SAS-EG, the screen will appear similar to Figure 1. This is your starting point for a SAS-EG Project.

¹ In SAS-EG, programs and files are stored together as a 'project'.

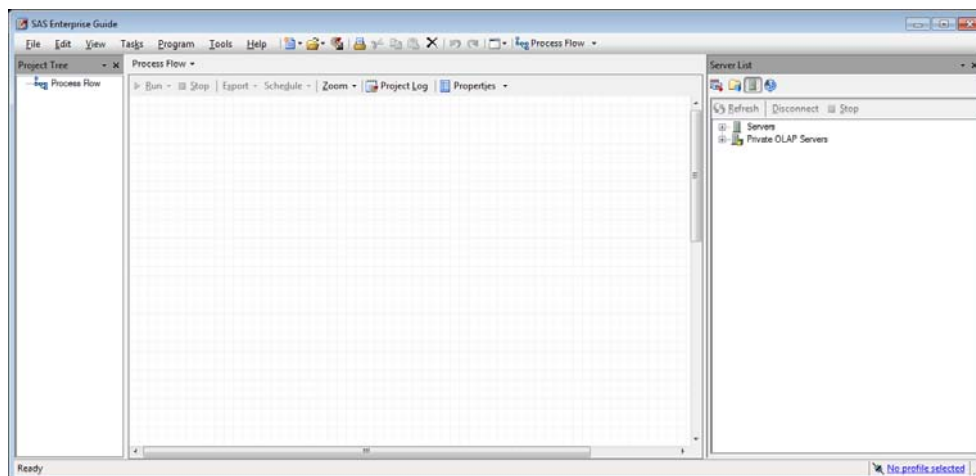


Figure 1 New Enterprise Guide Project Screen

The first task for using Banner data is to input the code allowing you to access the Operational Data Store views.

- Click on File
- Click new
- Click Program
- Copy or type your Operational Data Store access code to this screen

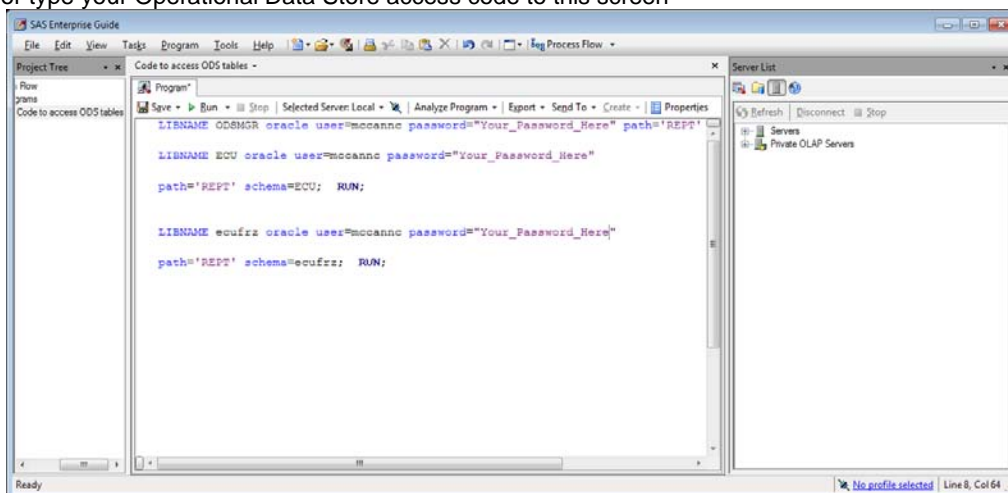


Figure 2. Code for accessing the Operational Data Store

Once you get the code to work accurately, save the code, preferably to your My SAS Files folder. In future runnings of this, and other projects where you want to access the Operational Data Store, you would need only to...

- Click on File
- Click open
- Click Program

and then select the Operational Data Store access program. Once you save your project, the access code icon remains as part of your project and you simply run the code icon in your project flow task bar and choose to run the code. You will need to run this access code each time you invoke SAS-EG in order to access the Operational Data Store.

USING THE OPERATIONAL DATA STORE

Once you have run the Operational Data Store access program successfully, you can view the datasets available to you in the SAD-EG Server List box.

- Expand Local (click the plus sign <+> to expand.)
- Expand Libraries
- Expand one of the schema you invoked with your program code, in this example, ODSMGR.

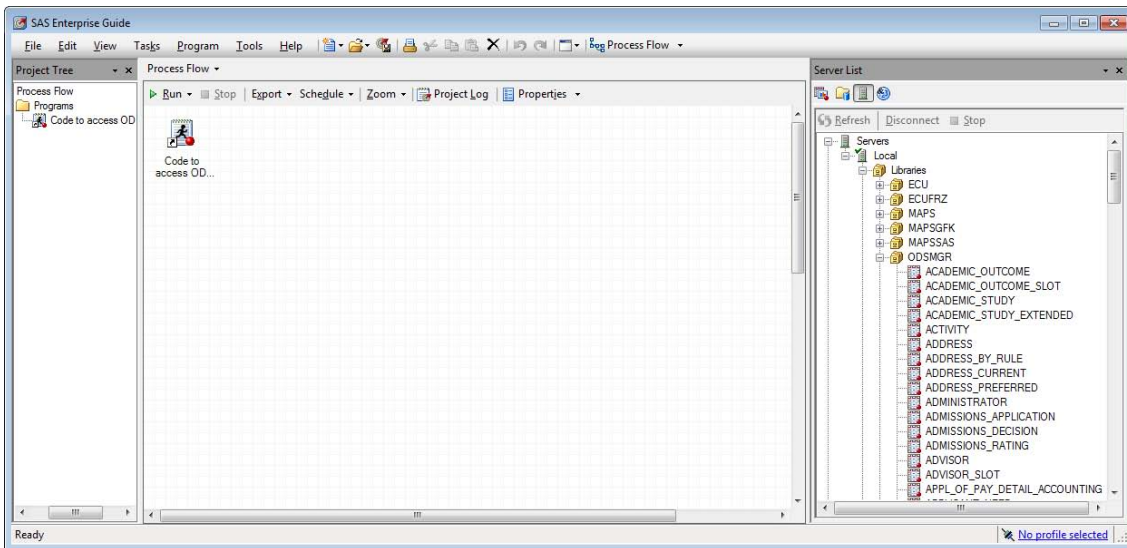


Figure 3. Listing the datasets in the Operational Data Store

All of the views that you have access to should be listed. Double click the view or views you want to use. In this example, I double clicked on Academic_Outcome. SAS-EG will open access to the datafile; it does not try to load all the data into to your project. This is a really nice feature since some of the Operational Data Store views, like Academic_Outcome, are huge. *Hint: To increase your program speed it is often beneficial to limit the number of records you want to access. Refer to the section labeled Using the Query Builder to Create New Datafiles.*

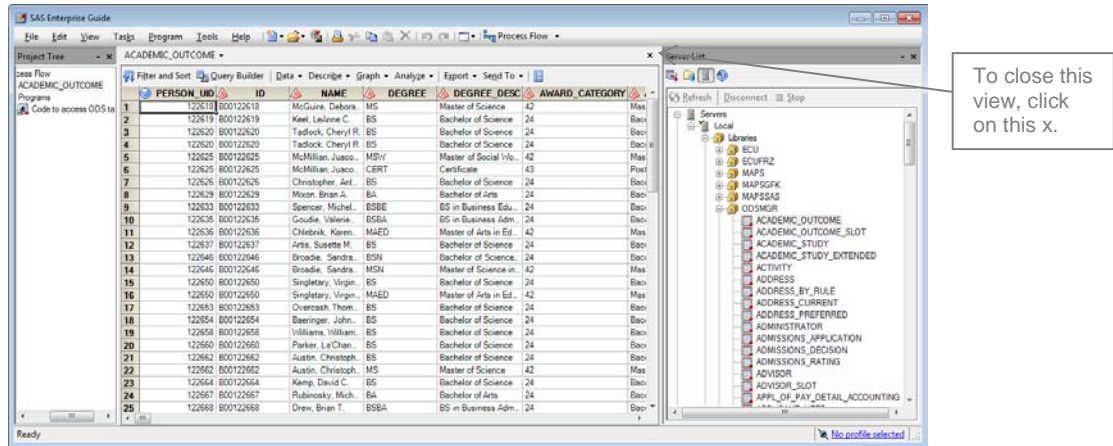


Figure 4. Opening an Operational Data Store view in SAS-EG

USING THE SAS-EG QUERY BUILDER FUNCTION

The query builder function in SAS-EG allows you to access data, limit data, recode data, and merge data to produce unique datasets. There are far too many manipulations available to the user in the query builder function to review here. Which aspects of the query builder function you use is, of course, dependent on what you are trying to accomplish but this function in SAS-EG is truly powerful and one you will want to explore extensively. So, for purposes of brevity, I've created a scenario to explore which will demonstrate some of the functions that I find most useful in my role in higher education.

Scenario /

You are asked to provide the retention and graduation rates for new MSN (Master of Science in Nursing) students who began in fall 2008 and fall 2009.

The approach I take to such a request is to first break out what variables I need and where to find them.

Variable	Location	Notes
New MSN	Static File	Census files (Student Data Files: SDFs) containing official enrollments.
Retention	Static File	Following semester SDFs.
Graduation	Operational Data Store	Academic_Outcome view.

- **Pulling Files into the SAS-EG Project**

The first step is to load the needed files into the SAS-EG Project. Earlier we loaded Academic_Outcome, a view in the Operational Data Store, into our project by double clicking on it in the Server List (See Figure 4). Once you close the view, clicking the 'x' in the upper right hand corner, you can then bring other objects into the project. Three SDFs are needed, fall 2008, fall 2009, and fall 2010, for the scenario. To bring these and other external datasets into your project,

- Click on File
- Click open
- Click data

This will open a search feature that lets you find the datafiles you need. The files we are looking for are saved SAS datasets (sas7bdat) but this is where you can also load Excel spreadsheets or other types of files. In Figure Five, the 'Files of type:' bar shows the different file extensions SAS-EG will search for when opening data.

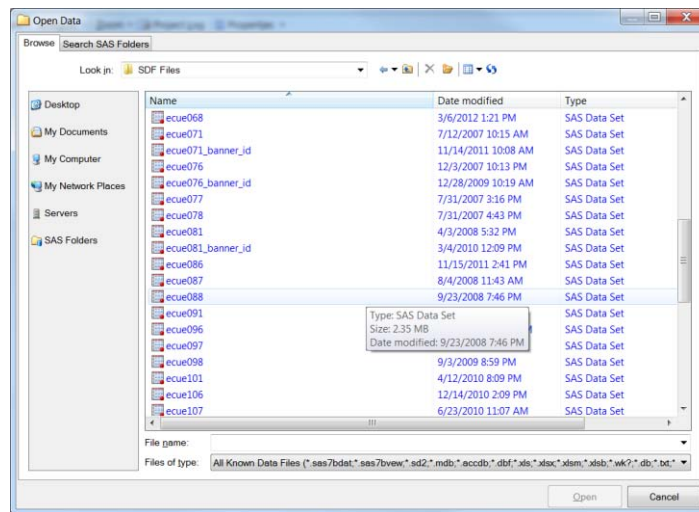


Figure 5. The Open Data screen.

To open access to a file² in your project, click on the file name and then click open. To select multiple files, hold down the <Ctrl> key, click on the file names, and then click open. SAS-EG will load the file(s) into your project. See Figure 6.

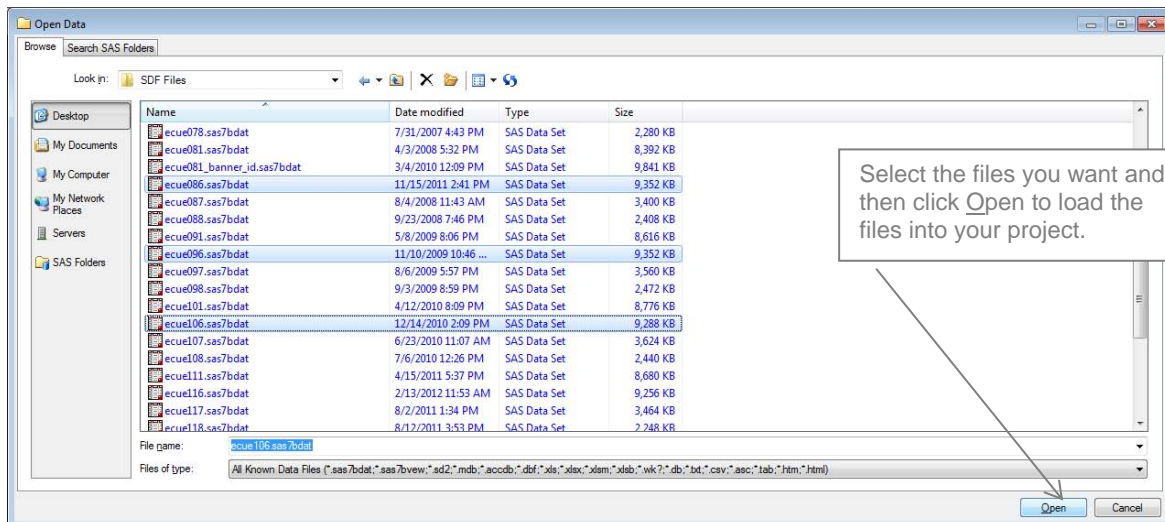


Figure 6. Opening Multiple Files

² When you are working with SAS-EG, you are not actually loading the data into your project but creating a link to the data. Keep this in mind if you move your datafile to a new physical location or if you share your project with another user. Most likely the links will no longer work and SAS-EG puts an ugly little red X on your icon and plays a horror movie sound effect to be sure you know that there is a problem.

- **Using the Query Builder to Create New Datafiles**

The query builder in SAS-EG allows you to easily manipulate your files. Since many Operational Data Store files are often too large and unwieldy to manage effectively it is prudent to use the query builder to quickly reduce files to more manageable sizes. In our scenario, we are interested in reducing the Academic_Outcome view to only include records of possible interest. **It cannot be stressed enough that it is vitally important to know your data and how they are stored in the Operational Data Store before you begin manipulations or analyses.** To create a new datafile, open your dataset (double click its icon or right click its icon and select open), and then double click on the Query Builder icon on the toolbar. This opens a Query Builder box. See Figure 8.

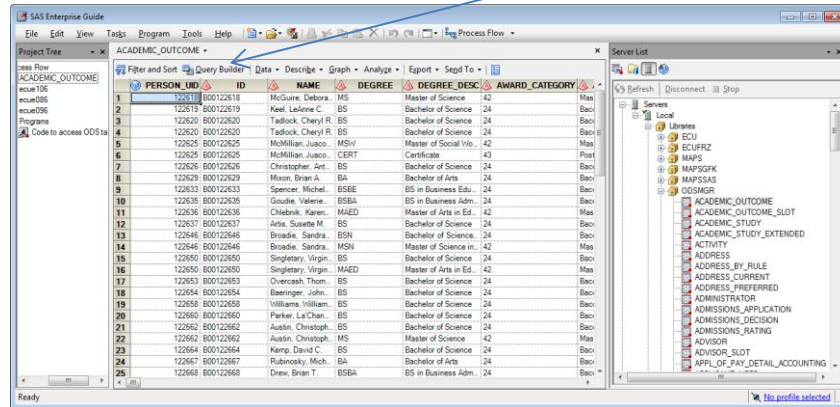


Figure 7. Open dataset

Name your Query

Rename your Output File (very handy for easier merging)

Click and drag the variables you want in your new dataset or, to include all the variables, drag the file name into the 'Select Data' box.

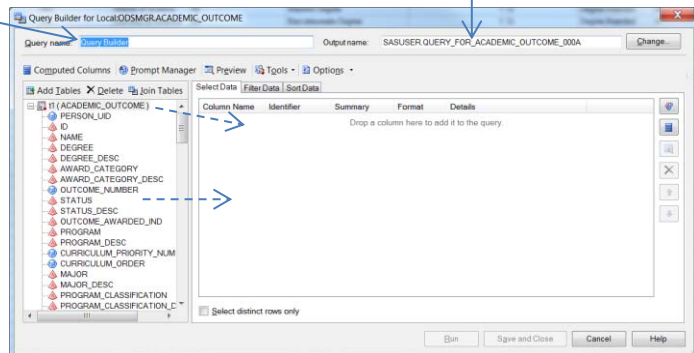


Figure 8. Building a New Dataset. The Select Data box in the Query Builder Function.

The filter data tab, see Figure 9, is one of the most convenient functions of the query builder. This is where you limit the records that are being pulled into your new dataset.

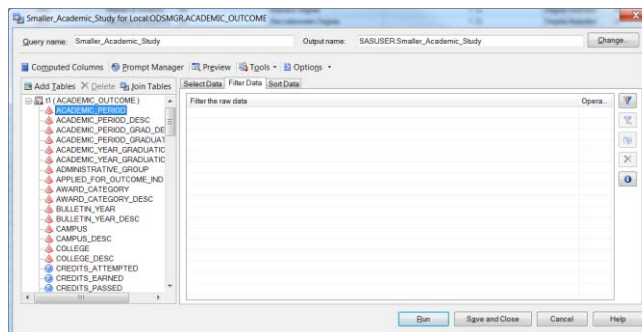


Figure 9. The Filter Data tab in the Query Builder Function.

Once you pull a field in, the Build a basic filter box pops up, Figure Ten. By clicking on the down arrow on the Operator bar, you can limit your selection based on numerous expressions such as equal to (the default), greater than, greater than or equal to, in a list, not in a list, and so on. By clicking on the down arrow to the right of the Value bar, you can get a list of all the values that field has in your database! This is a fabulous feature. You no longer have to look up or try to remember all the values of a variable; simply view the entire list and then click on the values you want.

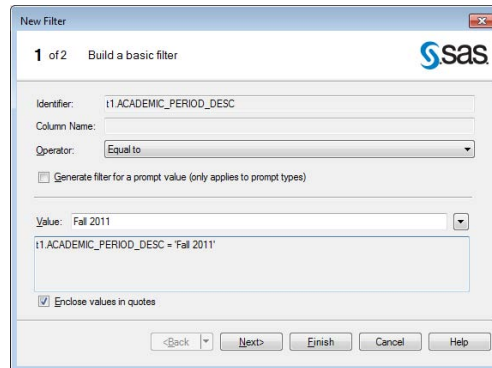


Figure 10. Build a basic filter in the Query Builder Function

Figure 11 shows the filters being used to pull in only those students who graduated from the College of Nursing after fall 2008 with a MSN degree. These are the filters needed to begin answering the part of the scenario question related to graduation.

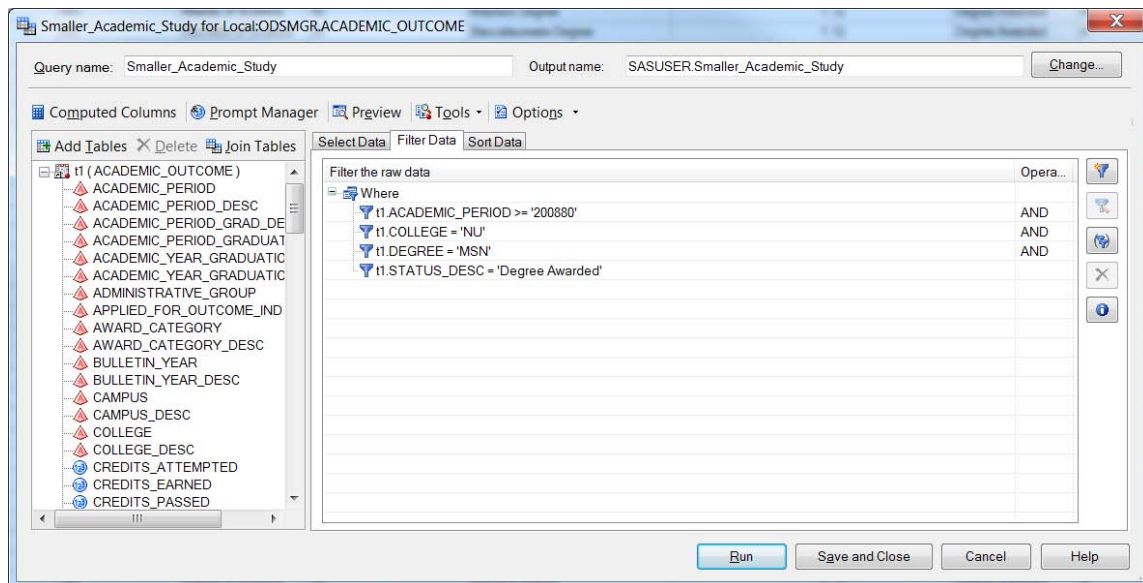


Figure 11. Completed Filter Data Screen in the Query Builder Function

- **Merging Files within the SAS-EG Project**

Figure 12 is a snapshot of all the files we need with the appropriate records selected to determine the retention and graduation rates of the entering fall 2008 and fall 2009 MSN cohorts. The Smaller Academic_Study dataset has graduate information. The datasets labeled MSN Cohort 2008 and MSN Cohort 2009 have the new MSN Students for each of those fall semesters. And the static files for '09 and '10 will be used for determining retention.

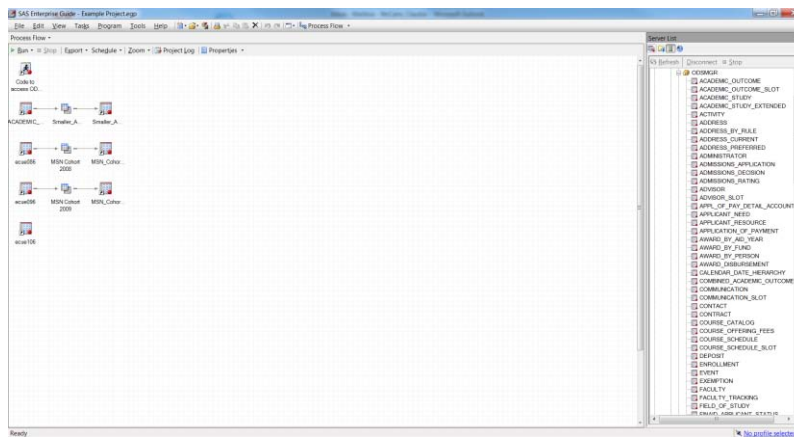


Figure 12. SAS-EG Project Screen

To begin, we want to know how many of the Fall 2008 cohort were enrolled in the Fall 2009 semester. To do this, we need to merge the MSN Cohort 2008 dataset with the fall 2009 enrollment dataset (ecue096).

1. Open the MSN Cohort 2008 dataset by double clicking the icon.
2. Click on Query Builder on the task bar
3. Rename the query, rename the output name
4. Click on the Add Tables icon

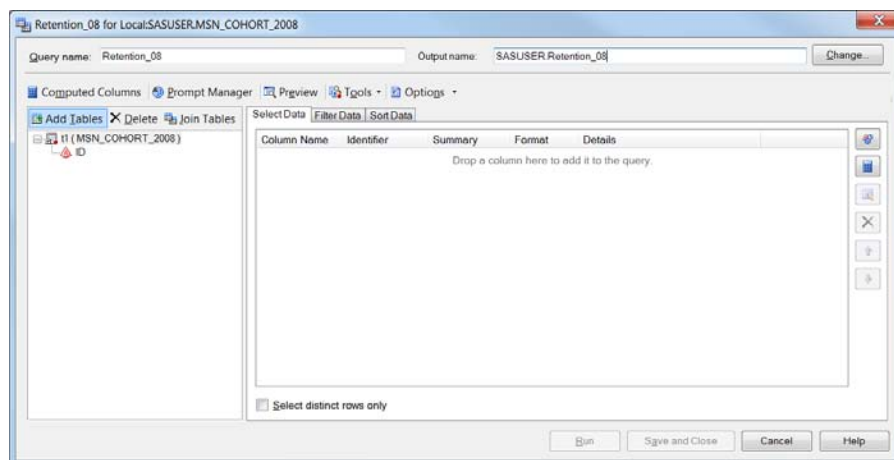


Figure 13. Merging Files using the Query Builder Function.

The Add tables icon opens the Open Data screen. The default is a list of the datasets in your project.

In our example, we want to add the Fall 2009 enrollment file, ecue096, to the query.

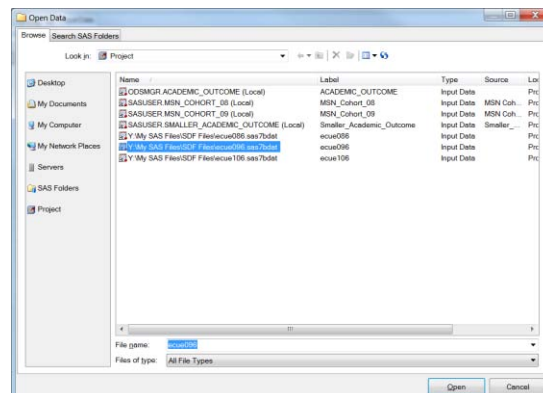


Figure 14. Adding Tables for the Merge

Highlight the file you want to add and click the Open button. Either one of two screens will open. If SAS-EG cannot find a variable to match on, as is the case in this example, SAS-EG will prompt you that a suitable join could not be determined and that you will need to join the tables manually.

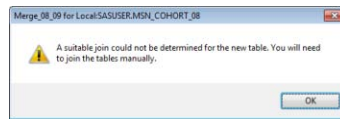


Figure 15. Problem with join.

Once you click OK to this message, the Tables and Joins Screen will pop up allowing you to establish the appropriate join between the two tables. In this example, we need to join ID with Item100. Double click on ID in t1, hold down the mouse button and drag the cursor to Item100 in t2. This 'connects' the join variables.

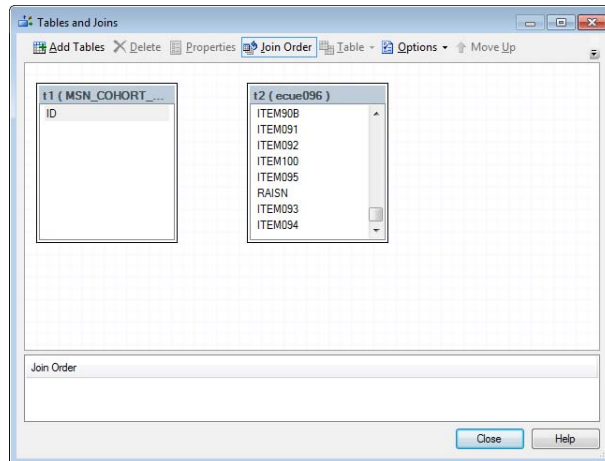


Figure 16. Tables and Joins Screen

Once you 'connect' the join variables, the Join Properties Screen appears. Here is where you can verify that the appropriate variables are being used to establish the join, select the type of join, and filter the join.

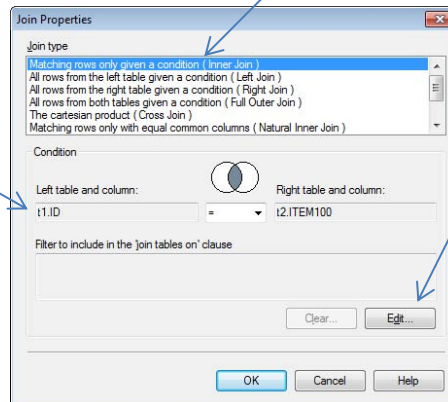


Figure 17. The Join Properties Screen

In our scenario, we want to pull in all the records from our 2008 cohort file (Left Join).

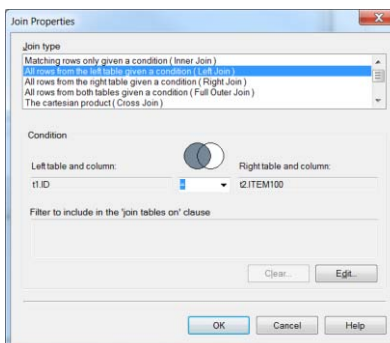


Figure 18. Example of a Left Join

If the variable you want to join tables on has the same name in each of the datasets, the SAS-EG default is to add the new table to your Query, when you use the Add Tables function, and then join the tables by the like variable. In order to view the join, click on the JOIN Tables tab to bring up the Tables and Joins screen. *It is a good idea to look at the join in any case to be sure SAS-EG is matching on the variable you are expecting or wanting it to match on.*

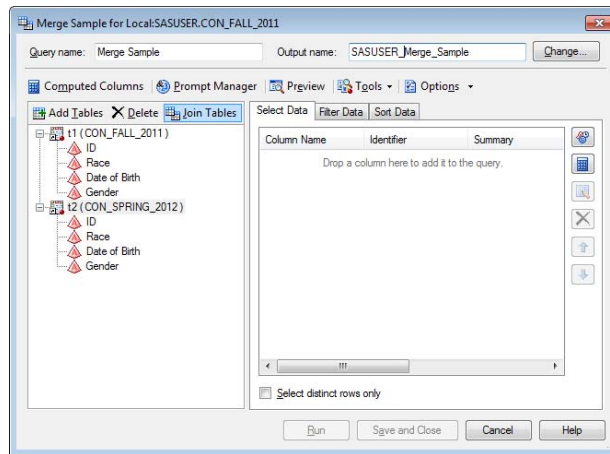


Figure 19. Join Tables tab in Query Builder

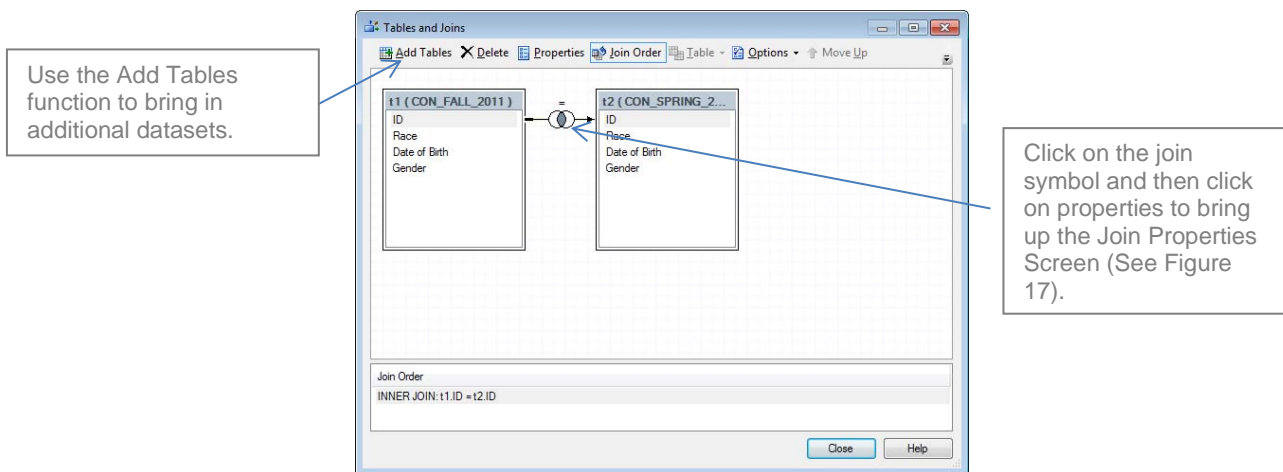


Figure 20. Options in the Tables and Joins Screen

You can also begin the merge process by opening your dataset, running a Query Builder process, and then clicking on Join Tables to open the Tables and Joins screen. Then use the Add Tables function here to pull in datasets and modify joins. Once you are satisfied with how the datasets are merging, simply click the Run button on the Query Builder screen to create your new dataset. SAS-EG will open your dataset when it completes the Run.

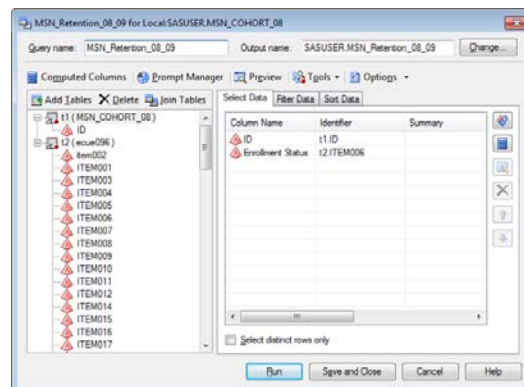


Figure 21. Run the Query Builder

ID	Enrollment Status
1	3
2	3
3	3
4	3
5	3
6	3
7	3
8	3
9	3
10	3
11	3
12	3
13	3
14	3
15	3
16	3
17	3
18	3
19	3
20	3
21	3
22	3
23	3
24	3
25	3
26	3

Figure 22. The Dataset Output

In our retention and graduation scenario, having run the merge between the fall 2008 cohort and the fall 2009 enrollment file, we can now simply run a frequency on the students' enrollment status variable for fall 2009. We know how many from fall 2008 were enrolled in fall 2009 (not missing on enrollment status) and how many were not enrolled in fall 2009 (missing on enrollment status). Thus the retention rate for the fall 2008 MSN class is 125/150 or 83.3%.

Fall 2008 MSN Cohort Members Enrolled Fall 2009

The FREQ Procedure

Enrollment Status	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3	122	97.60	122	97.60
4	3	2.40	125	100.00

Frequency Missing = 25

Generated by the SAS System (Local, W32_7PRO) on August 13, 2012 at 11:32:07 AM

Figure 23. Output to Determine Retention

The next step would be to repeat the same procedure with the Fall 2009 cohort file and the fall 2010 enrollment file. The result is 106/120 or 88.3%.

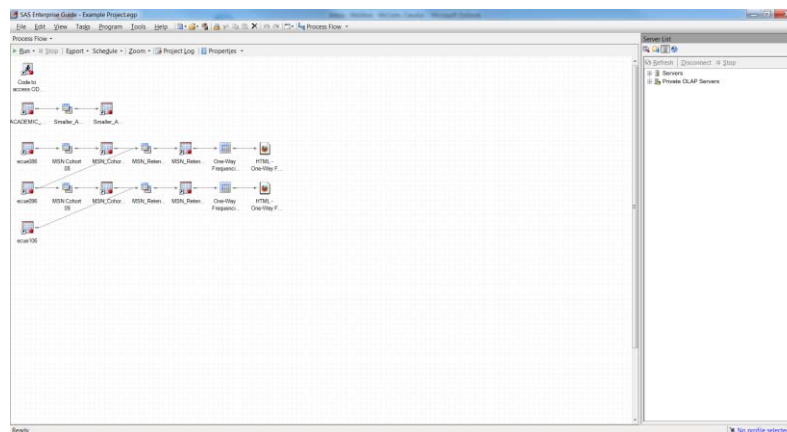


Figure 24. The Process Flow after running the retention analyses.

The only other piece of information needed is how many of the cohort members graduated with an MSN. For this analysis we match each of the cohort files to the Smaller_Academic_Outcome file that was created earlier.

- Open Smaller_Academic_Outcome
- Click on Query Builder

- Click on Add Tables and add the MSN_08_Cohort
- Drag the Grad Date field into select data
- Click on Join Tables to modify the join to get all the Cohort records.
- Run a frequency on Grad Date to determine how many graduated (valid value) vs. how many did not graduate (missing value)

Finally we need only repeat this same process for the Fall 2009 cohort. Modifying the Table Properties is a quick way to repeat this process without having to start from scratch. To do this:

1. Modify the graduated query for 2008 (right click on the query icon and click modify)
2. Change the query name and the output name.
3. Click on Join Tables and right click on the 2008 cohort table. This brings up the Table Properties screen. See Figure 17.
4. Click on Change and change the table to the MSN_COHORT_09 table. Click OK, Click Close.
5. Run the program choosing NO to the prompt about replacing the previous run.
6. Run the descriptive frequency again on Grad Date and compute the graduation rate for the 2009 cohort.

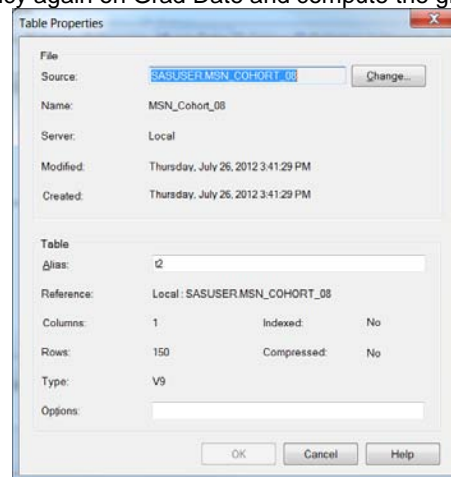


Figure 25. The Table Properties Screen

This completes the analyses and we are ready to report back. As you become more familiar with SAS-EG and with the data contained in your various datasets, this process can be done very quickly. Much quicker than writing code!

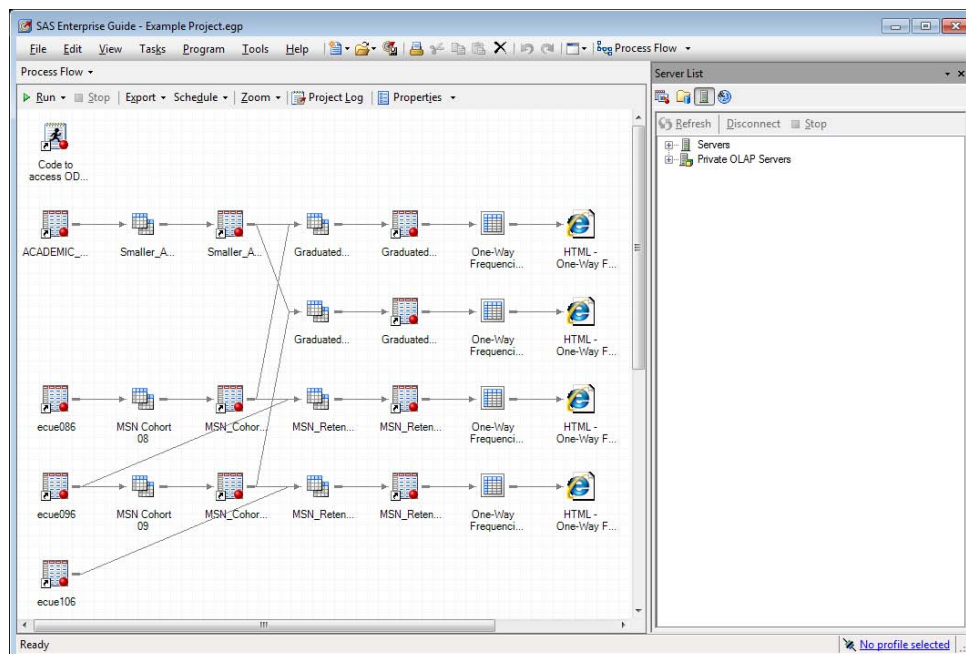


Figure 26. The Final Process Flow of the Project.

CONCLUSION

The purpose of this paper is to give end users a start on using SAS-Enterprise Guide as an analysis tool for Banner/Operational Data Store tables. I do not know of any more powerful or easier to use software that lets you pull data from the Operational Data Store, merge it with other Operational Data Store tables or tables external to the Operational Data Store, and run a vast number descriptive or inferential statistics all at the click of a few buttons. Perhaps the most frustrating aspect to writing this paper is not having had enough time or space to share all the tools and options available in SAS-Enterprise Guide that have been so helpful to me. I have used SAS-Enterprise Guide on a daily basis for the past five years at a higher education institution running Banner student, human resources, and financial modules. I can't imagine doing my job without it.

End users not using the Banner/ Operational Data Store will also find SAS-Enterprise Guide a very useful analytic tool. Whether you store your data in SAS, Excel, Access, dBASE, Lotus, or Paradox, or some combination of these, this paper should help you get started with this powerful SAS software. The technical support team at SAS for SAS-Enterprise Guide is a great group and has always been very effective in providing answers to problems in a timely, and patient, manner.

Table of Figures

Figure 1 New Enterprise Guide Project Screen.....	2
Figure 2. Code for accessing the Operational Data Store.....	2
Figure 3. Listing the datasets in the Operational Data Store.....	3
Figure 4. Opening an Operational Data Store view in SAS-EG.....	3
Figure 5. The Open Data screen.....	4
Figure 6. Opening Multiple Files.....	4
Figure 7. Open dataset.....	5
Figure 8. Building a New Dataset. The Select Data box in the Query Builder Function.....	5
Figure 10. The Filter Data tab in the Query Builder Function.....	5
Figure 11. Build a basic filter in the Query Builder Function.....	6
Figure 12. Completed Filter Data Screen in the Query Builder Function.....	6
Figure 13. SAS-EG Project Screen.....	7
Figure 14. Merging Files using the Query Builder Function.....	7
Figure 15. Adding Tables for the Merge.....	7
Figure 16. Problem with join.....	8
Figure 17. Tables and Joins Screen.....	8
Figure 18. The Join Properties Screen.....	8
Figure 19. Example of a Left Join.....	9
Figure 20. Join Tables tab in Query Builder.....	9
Figure 21. Options in the Tables and Joins Screen.....	9
Figure 22. Run the Query Builder.....	9
Figure 23. The Dataset Output.....	10
Figure 24. Output to Determine Retention.....	10
Figure 25. The Process Flow after running the retention analyses.....	10
Figure 26. The Table Properties Screen.....	11
Figure 27. The Final Process Flow of the Project.....	11

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