

Lessons learned while switching over to SAS Studio from SAS Desktop

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ABSTRACT

I've been working within the SAS desktop/server application for nearly 20 years and during that time have gotten to know my way around the block with shortcuts, abbreviations, keyboard macros and x commands to do some pretty fancy stuff. So moving over to SAS Studio was going to be a transition that I was interested in it but was not really looking forward to. As making the change would mean that some of the functionality that I enjoy would be lost and it was difficult to know what changes needed to be made to get everything working as it does in the SAS desktop environment.

In this paper, I will discuss the similarities between the desktop version and SAS Studio, provide a detailed run through of the options available within SAS Studio. These are categorized by each major window in the application (Top menu, Explorer Window, and Editor Window). I then point out some of the new functionality that SAS studio offers which I find super useful. I then note some issues that kind of drive me nuts which there may or may not be a resolution to. Lastly, I describe the changes which needed to be made to successfully move programs over from one environment to the other, along with few potential potholes that required some minor code adjustments.

Through this paper, I hope to provide the general information that I wish that I had before I had started the transition so it would have been a little easier and less daunting.

INTRODUCTION

Transitioning over from one software version to another is generally a pain, even if the updates are pretty minor. Transitioning can be a real challenge when there are a lot of "enhancements" to the newer version. The learning curve can be quite steep, and the time given to be up-to-speed is usually less than ideal. The transition to SAS Studio from Desktop SAS does require some work and there is a learning curve however, it was easy enough that the rewards are worth it.

WHY MOVE TO SAS STUDIO?

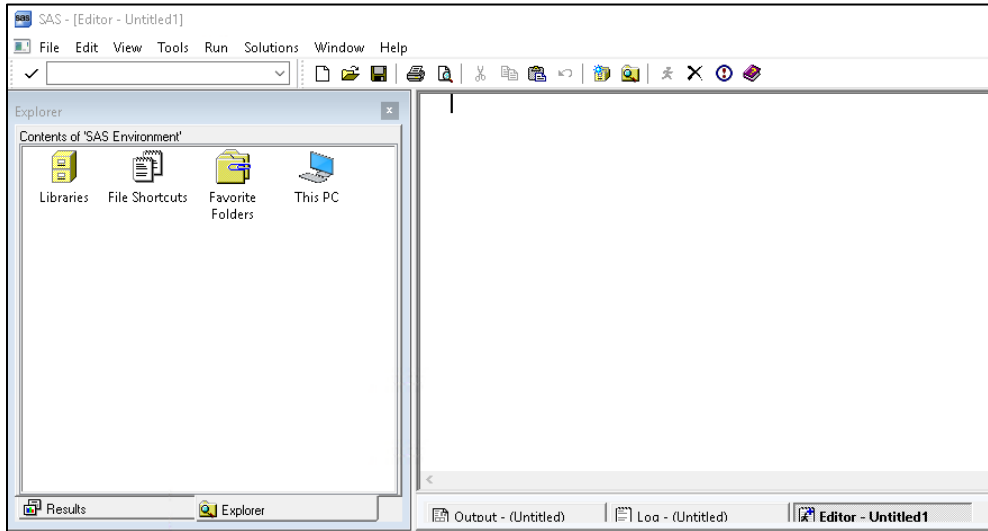
There were many reasons that our company made the decision to move to SAS Studio. Some of these reasons were:

- SAS support for older products was decreasing over time. SAS was moving on and using the newer platform felt better, no one wants to be stuck in the past.
- With employees worldwide, working with a limited number of permanent physical servers for the desktop version was challenging and we needed something that could handle differences in administration and speed more effectively.
- There are additional security enhancements using the Amazon Warehouse Services (AWS) that allow for less reliance on permanent physical server locations.
- Performance using SAS Studio was very similar to the SAS Desktop version but there was a lot more stability and less risk of sudden crash and loss of work.

So, with that said let's dive in and compare the two set ups.

LAYOUT OF SAS WINDOWS

THE STANDARD DESKTOP SAS 9.4 INTERFACE

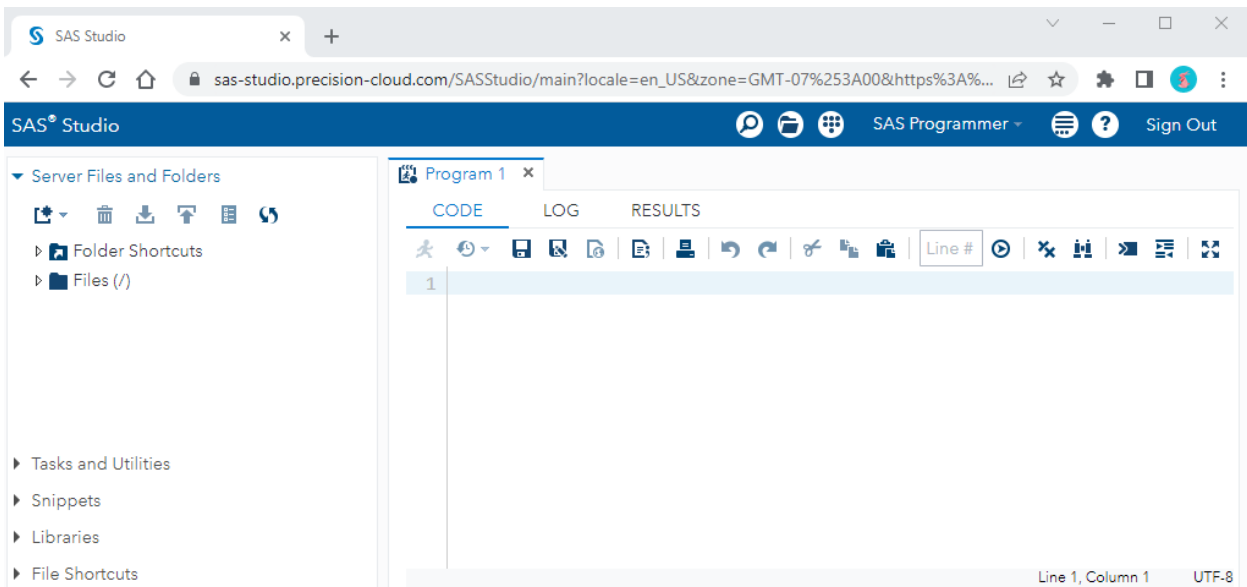


If not familiar with the standard set up here is a quick run through. At the top of the page, you have your menu bar with your standard options (file, Edit, tools, ect.) then below you have a search bar, and your icons for standard tasks (new window, open, save, print ect.).

The main page has an explorer window with two tabs Results and Explorer to view either output created or files created respectively. Lastly you have the main screen separated into three tabs (Output, Log, and Editor).

The application look is not very fancy, but it works really well and personally the only change I'd make is not having the close window - X icon so close to the running man icon.

THE SAS STUDIO INTERFACE



The interface has a similar look and feel but is housed within the browser window. The F11 key will maximize the screen and remove the browser window components so it feels even more like the standard

interface. If using Google Chrome, you can also launch SAS Studio as a web app. This method will also remove the browser window components and give you more room within this environment.

One side you have a semi-familiar Server Files and Folders section which contains a drop-down style view of Folder shortcuts, Files, Tasks and Utilities, Snippets, Libraries, and File Shortcuts.

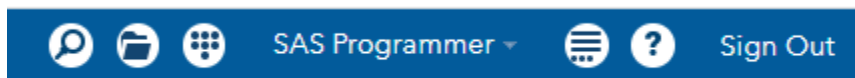
In the main area you have a similar three-tab structure but with the options on the top of the page and all within one real tab with a default name of Program 1.


This single tab but with three views changes a number of standard 'what you were used to' things.

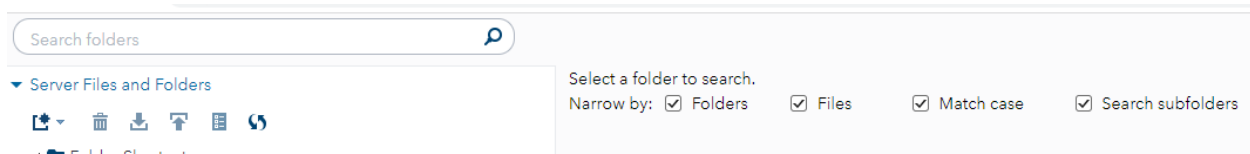
1. Since this is all one tab when you select Code, you are not able to see the Log or Results at the same time. In the desktop version I could see the log at the same time as the editor window but in the SAS Studio this is not an option any longer.
2. Each program you open will be in its own tab with its own three views, and you can't view two programs at the same time which can be a challenge.
3. When a program is run, it will automatically move to the results view and an additional view will appear called Output data.


I'll go into more detail regarding each of the windows and highlight some features that I found interesting or useful.

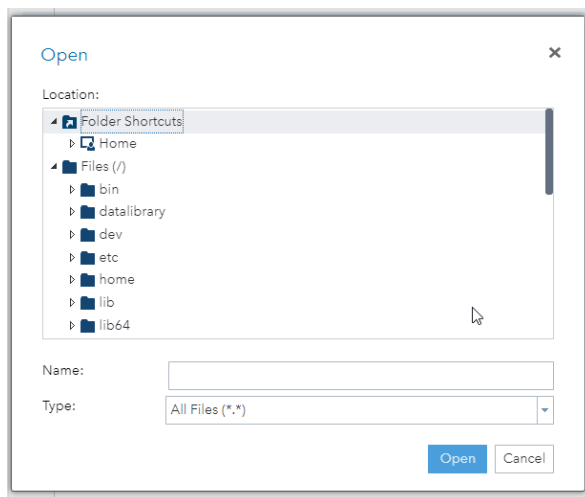
THE TOP MENU BAR




 Search Icon: Since you don't really have the windows explorer window functionality SAS has created a search icon which allows you to look for stuff within the folders and files.



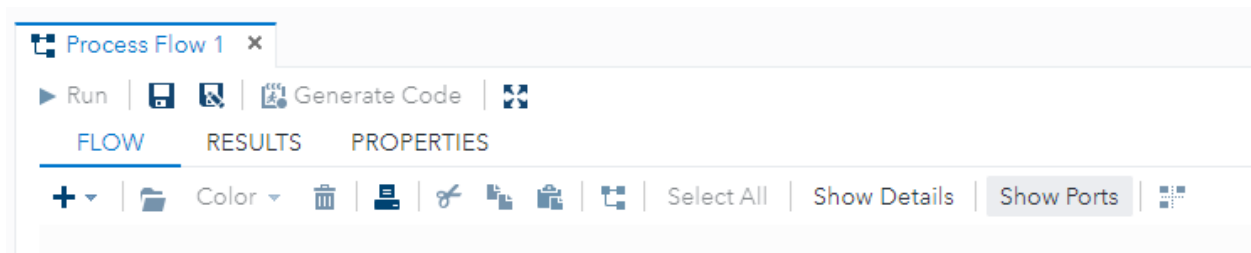
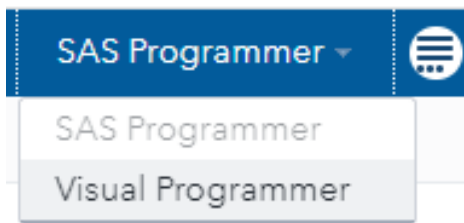
 Files Icon: You can open files from the Explorer window dropdown or from the files icon at the top of the application.




 Small menu Icon: There is a quick button to create a new window or provide other options

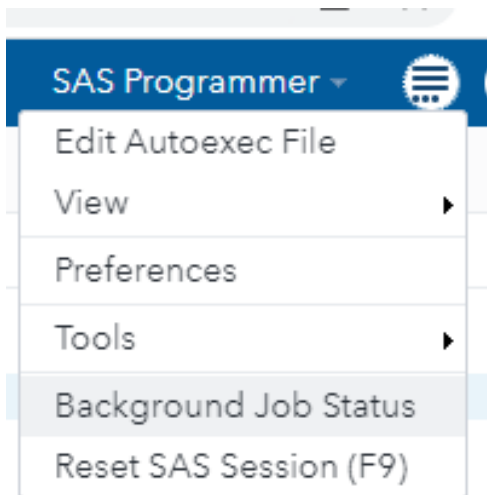


You can toggle between the type of programming you are doing (SAS Programmer or Visual Programmer). This changes the look and options of the main window.

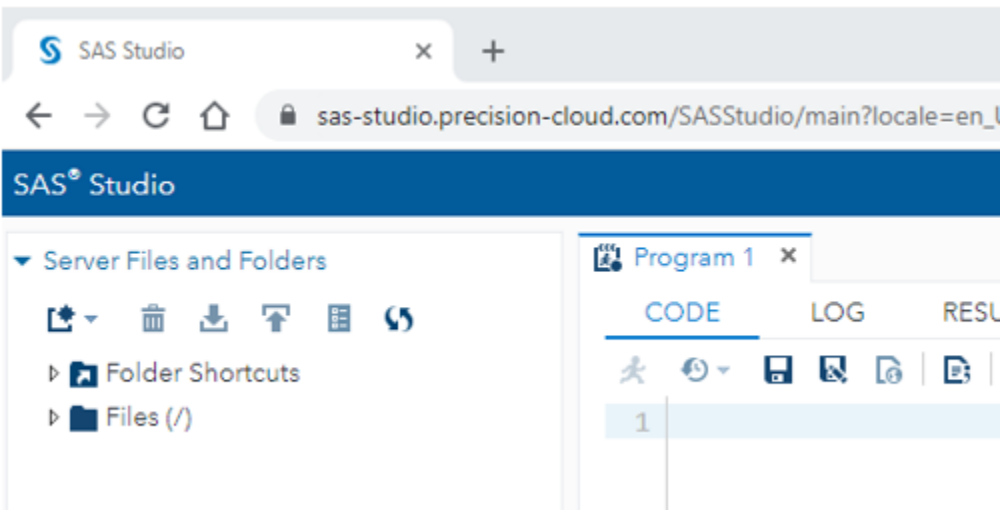


I've not programmed using the Visual Programmer – Process Flow style of SAS, so if interested the SAS documentation has some information ([see reference 1](#)).

 The more applications option icon has several options which allow you to: Edit the autoexec file, View or not view various drop downs in the explorer window, set preferences options, visualize what tools have been installed in the application, view the background Job status, and resetting the SAS session (which is really handy when something goes wrong – recursive loops, unmatched quotes, ect. so when SAS goes glitchy – F9 it!)

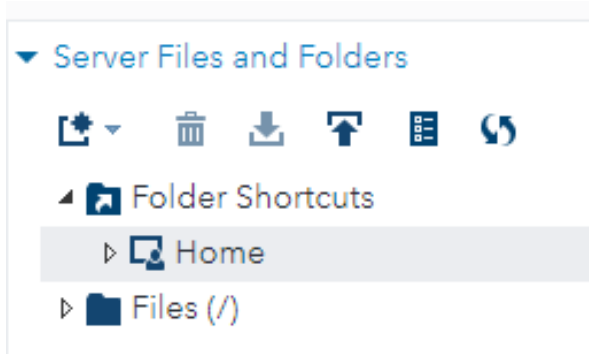








THE EXPLORER WINDOW




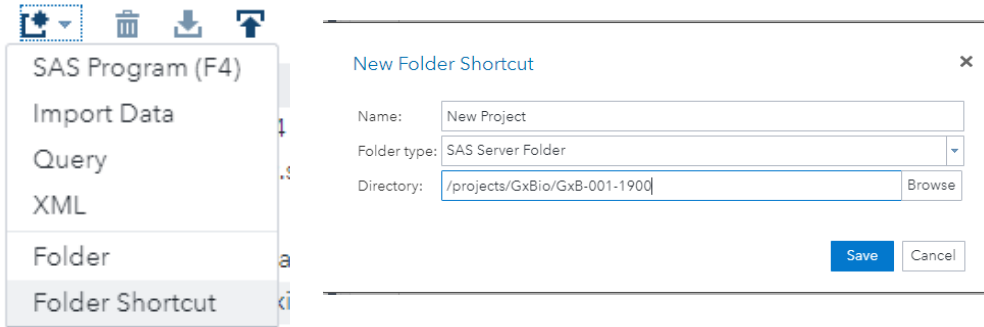
Navigating Your Files

Within the Servers Files and Folders there are a few icons at the top of the page.

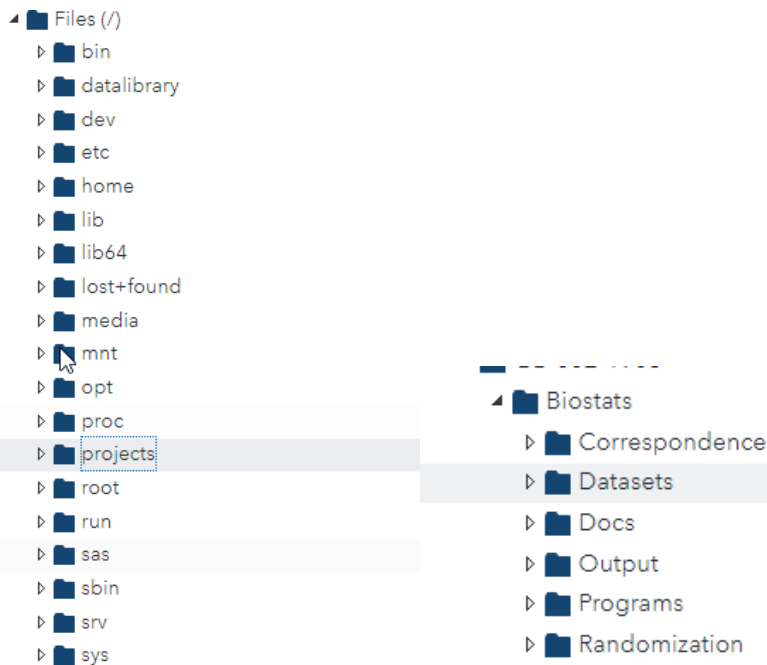


 New Program Icon: creates a new tab in the main window, or you can use a keyboard short cut of F4 while the browser window is active. This new program icon can also be used to create new folders within the file system.    There is also a delete button, a download and upload icon.  The folder attributes icon and a refresh icon . Some icons only become active when a program is selected within the file menu.

The Folder Shortcuts drop down has a default link to the home folder. I found this home folder to be quite handy as a sandbox area for testing programs as I moved over to this new environment, and it's also nice that the shortcut is already created for me. If I need to create a new shortcut, I use the Create project icon  and select folder shortcut as an option. Then a new window pops up allowing me to browse for the destination and provide the name of the shortcut.



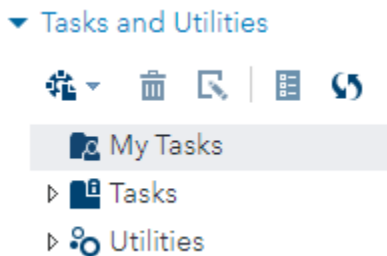
In the Files dropdown you have access to all the files stored in the system, many of the files listed in my current setup are not very helpful, but maybe they will be over time as I get used to the new system.



In my current setup, the projects folder contains all the standard folders used for our clients. We have it setup so that under the client folder we have the study name folder and within this folder a biostats folder with additional sub folders under that.

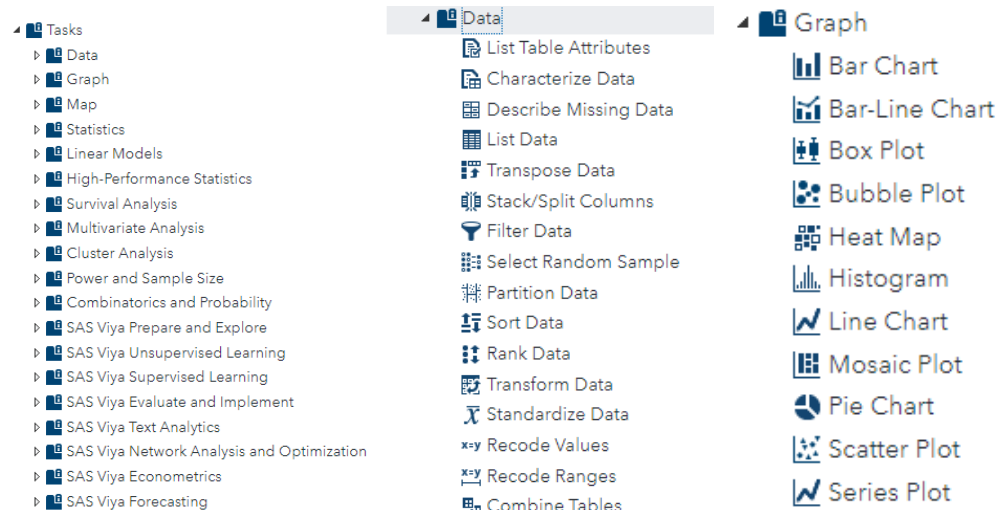
Using Tasks

In the Tasks and Utilities drop down you have three further drop downs: My Tasks, Tasks and Utilities.



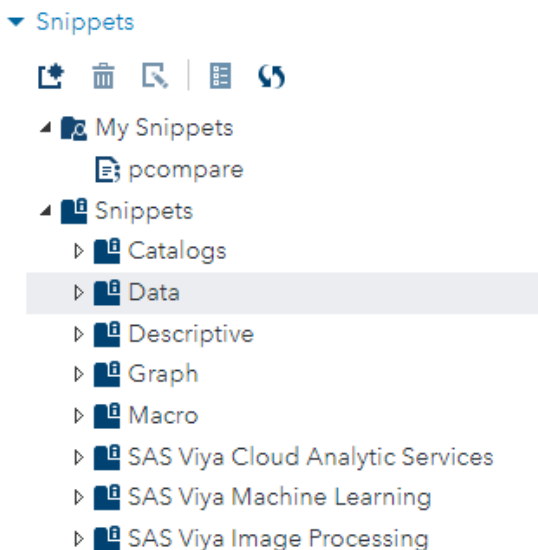
I haven't worked with the tasks area yet and have been able to do my usual work. This area is intended to provide a quick way for you to save small pieces of programming to repeat on different data when it is useful to you. The details of this is beyond the scope of this paper, but a screenshot is below that can spur some ideas of what you might be able to do.

Under the Tasks drop down there are lots of options. These are set up to be helpful starting points for starting a task. These include Data, Graph, Map, Statistics etc.



Using Snippets

The Snippets drop down contains two folders My Snippets and Snippets.

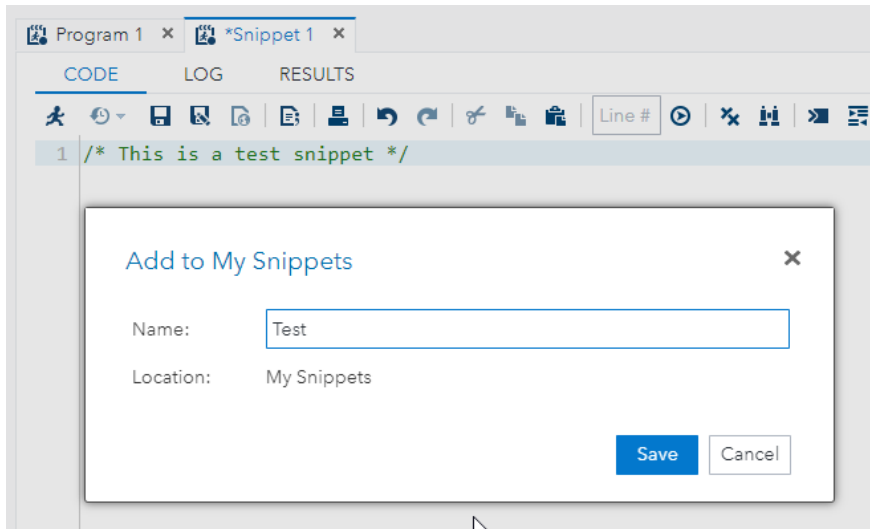


Snippets are a replacement for Keyboard Shortcuts or abbreviations, which are super handy but lose some appeal as you have to click to find and use them vs typing a setup abbreviation. You can create your own and have them appear under the My snippets drop down.

There are numerous SAS system snippets available to assist in programming.

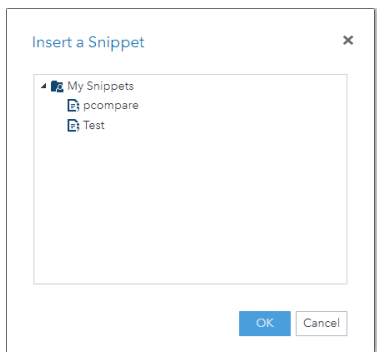
To use a snippet simply double click on the name and the code snippet will appear in the programming editor window.

To create a snippet click the create icon above the snippet bar and type in or copy paste the code you like to save then save it like a normal SAS file. It will then be saved under the My Snippets dropdown.



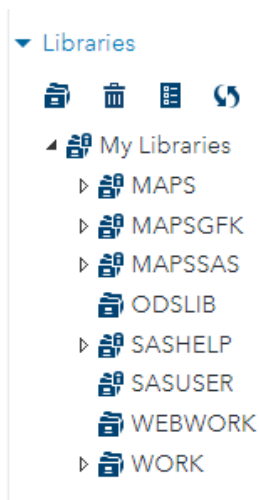
Editing the snippet can be done by selecting the edit icon above the snippet bar once a snippet has been selected.

A keyboard shortcut to pull up the snippets is ALT+I which will bring up a menu for Inserting a Snippet from the MySnippets library.



Libraries

The Libraries drop down contains similar folders as the Desktop version but with WEBWORK as an additional folder.



Viewing and Filtering your Data

When you select a file/table/dataset it will open a new tab with a view of data dataset.

The screenshot shows the WORKLINKS application interface. At the top, there is a navigation menu with options: WORK, CONSORT, FILLEDBOXES, and LINKS. Below this, a window titled 'Program 1 x WORKLINKS x' is open. The window has a 'View: Column names' dropdown and a 'Filter: (none)' field. The main area displays a table with 29 rows and 3 columns: LINKID, XL, and YL. The table data is as follows:

	LINKID	XL	YL
1	1	50	245
2	1	50	175
3	2	24	235
4	2	24	240
5	2	76	240
6	2	76	235
7	3	72	207
8	3	80	207
9	3	80	195
10	4	31	170
11	4	31	175
12	4	69	175
13	4	69	170
14	5	22	162
15	5	20	162
16	5	20	145
17	6	60	162
18	6	58	162
19	6	58	145
20	7	37	155

On the left side of the window, there is a 'Columns' panel with checkboxes for 'Select all', 'LINKID', 'XL', and 'YL'. Below this is a 'Property Value' table:

Property	Value
Label	
Name	
Length	
Type	
Format	
Informat	

This window has a lot of functionality in viewing attributes of the columns and selecting which columns are displayed on the screen.

The filter function is nice but I thought it would be a bit more point and click. Instead of typing in the variable name and the limit. No 'if' or 'where' clause needed.

The screenshot shows a dialog box titled 'Filter Table Rows'. It has a 'Clear Filter' button and a text input field containing the filter expression 'linkid=1'. There are 'Apply' and 'Cancel' buttons at the bottom.

File Shortcuts

The last dropdown option is the File Shortcuts which could be handy if there were specific files I used repeatedly over time.

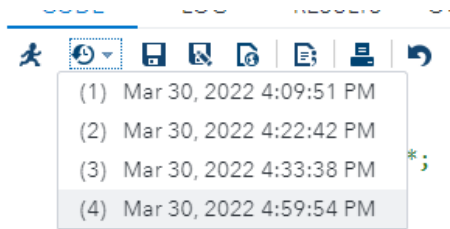
SAS holds your place: Once you drill down into any of these options within the explorer window, if you select a different drop-down type such as Snippets your original drop-down menu will remain drilled down when you return to it later.

THE EDITOR WINDOW

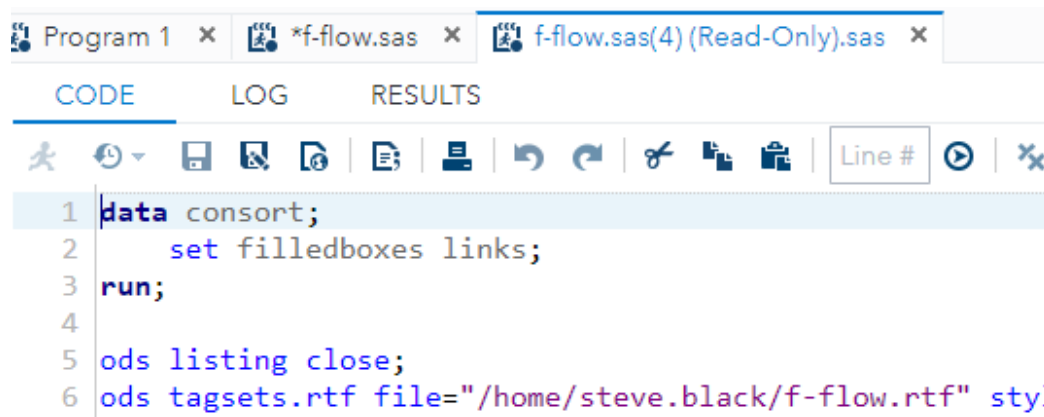
CODE VIEW




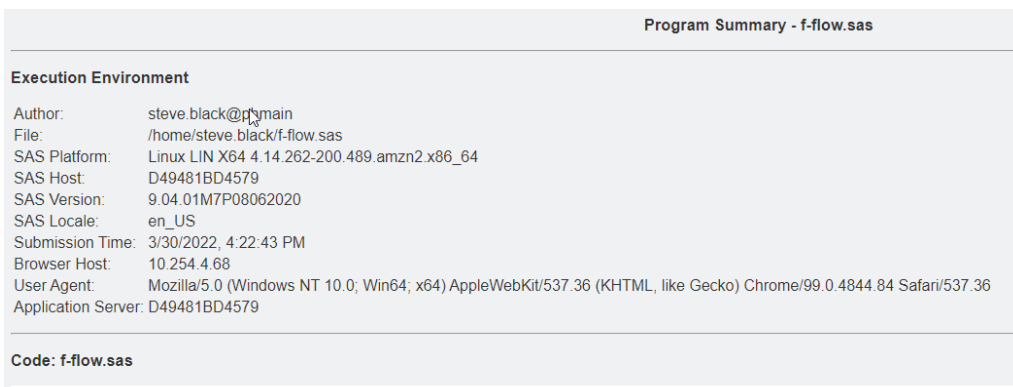
In the code tab SAS has moved the run button as your first option, far away from the X button (Yes!). Other icons that are not self-explanatory are the Submission History button which shows the date and times of each run and allows for bringing up the program logic used during that run in a new window.




A new editor window is created when (4) was selected.

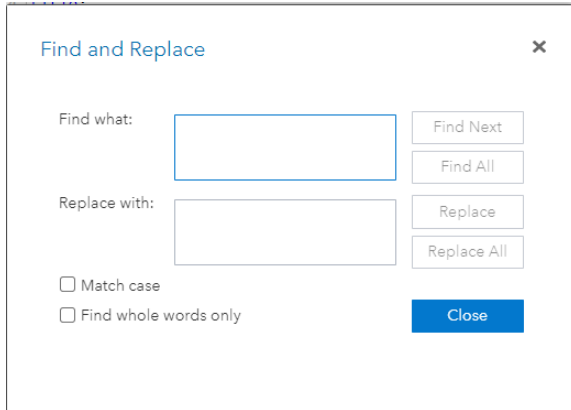



 Program Summary Icon: This icon is activated after a program has been run. In a new html window, this shows the code, log and results all on the same page, which is kind of neat. Below is an example from a sample program created.






 Add to my Snippets Icon: used to quickly create a snippet.

 Find Icon: has both find and replace as an option, which is nice.



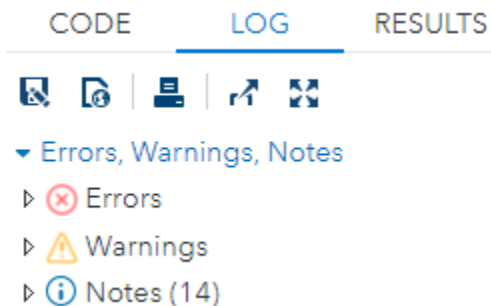
 Go to Line X icon: and the line numbers are already available.

There are a few buttons that I'm not sure what they do such as the Go Interactive and the Format Code button.  

 Max Spread Icon: removes the Explore window and maximizes the Editor window which is handy and nice that you can toggle between the two views.

LOG VIEW

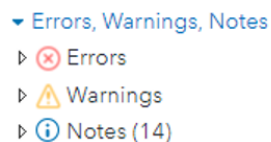
Within the LOG view, there are few icons some of which only become active after data has been run. This includes the display of the log summary bar.



From here you can save as a log file, download as an html document, print, or push the log results to a new html window. You can also maximize the view of the log.

A potentially troublesome issue is when the log is very long/large, SAS will not display the whole log. However, SAS will write it out in a separate file and put a note at the bottom of the log of where that file is stored.

This location is automatically created and is not possible to dynamically account for from within SAS.



Log Summary Bar: This is really handy and one of my favorite new features as it provides a nice way of seeing any hidden issues that may have been overlooked in the log. Many companies have a program that pulls the log text and performs these checks and then provides a summary. This Log summary bar decreases that need for individual programs, but when a batch is run it's nice to have a summary report. This is still possible but it takes a bit of footwork which I'll demonstrate in a later section.

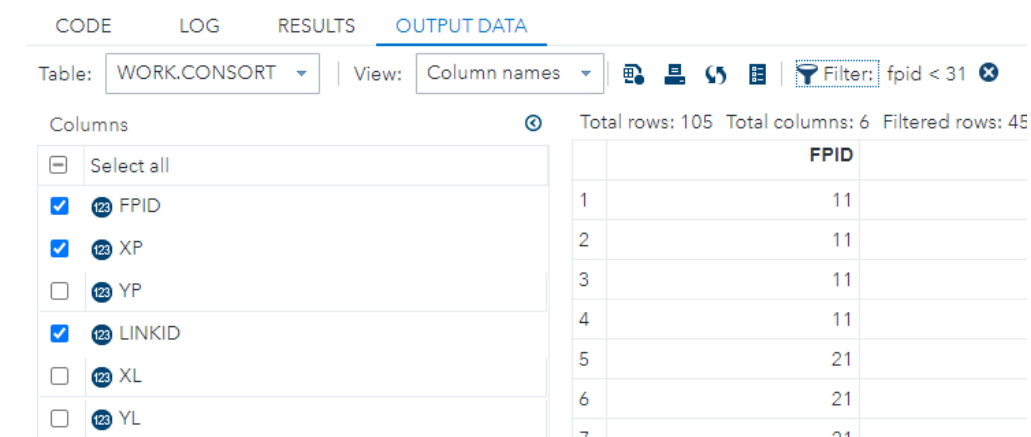
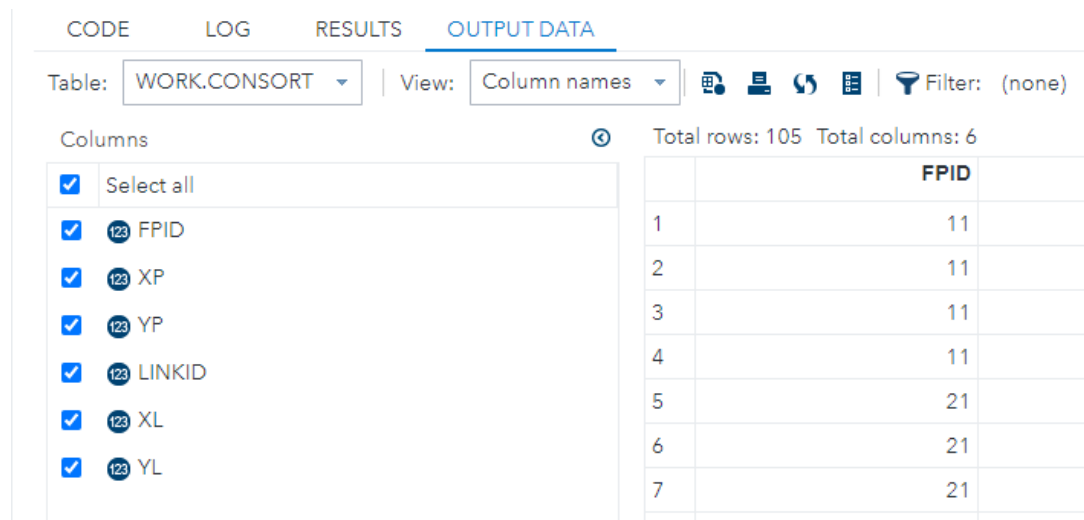
RESULTS VIEW




Within the RESULTS view there are several download options (HTML, PDF, RTF). You can download the generated data when applicable, print the results, push the results to a new html window, and finally, you can maximize the view to the whole browser window.

OUTPUT DATA VIEW

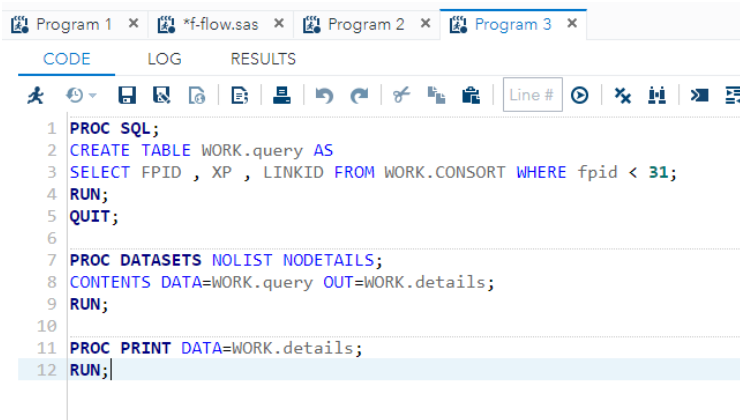
In the OUTPUT DATA view you can visualize the data that was used in creating the output. SAS will only include datasets included in the last run as an option in the output data view. You can available datasets using the TABLE option and limit the columns displayed and filter the data as discussed above.



Screenshot with filters applied and limited columns viewed.

One nice option is that if you filter a dataset and limit the columns you can select the Display the code button  and it will open a new window with the SAS code to create those same limitations for you.

Code created by SAS in new window



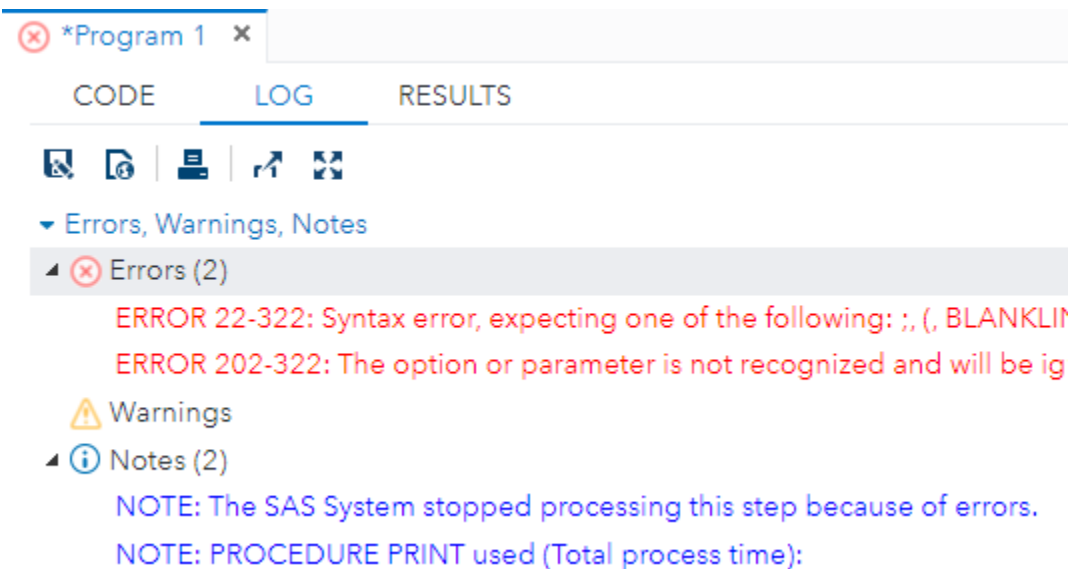
The screenshot shows a SAS Studio window with three tabs: Program 1, *f-flow.sas, Program 2, and Program 3. The 'Program 3' tab is active, showing the 'CODE' view. The code is as follows:

```
1 PROC SQL;
2 CREATE TABLE WORK.query AS
3 SELECT FPID , XP , LINKID FROM WORK.CONSORT WHERE fpid < 31;
4 RUN;
5 QUIT;
6
7 PROC DATASETS NOLIST NODetails;
8 CONTENTS DATA=WORK.query OUT=WORK.details;
9 RUN;
10
11 PROC PRINT DATA=WORK.details;
12 RUN;
```

NEW FUNCTIONALITY

When you run a program or section of code it clears the log and results every time. This is handy but takes some getting used to. In the old days, I could run something twice with a changed parameter on the second run and look at the log to compare the differences.

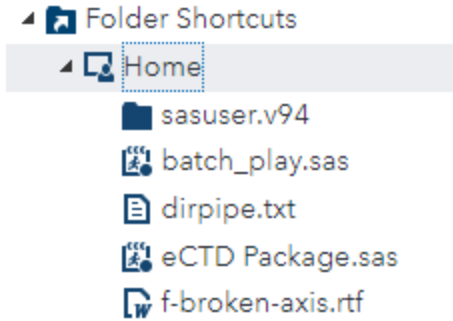
Having the log summary is nice. You can click on the arrows for more detailed information on each item when they are noted. Also, the program tab will have the symbol displayed on the top for type of issues noted, along with the 'you have not saved the file yet' asterisk, when applicable.



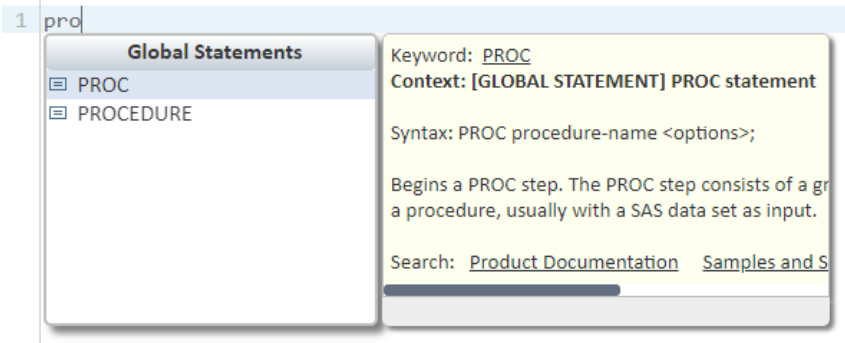
The screenshot shows the 'LOG' view of a SAS Studio window. The window title is '*Program 1'. The 'LOG' tab is selected. The log content is as follows:

```
Errors, Warnings, Notes
  Errors (2)
    ERROR 22-322: Syntax error, expecting one of the following: ;, (, BLANKLINE
    ERROR 202-322: The option or parameter is not recognized and will be ig
  Warnings
  Notes (2)
    NOTE: The SAS System stopped processing this step because of errors.
    NOTE: PROCEDURE PRINT used (Total process time):
```

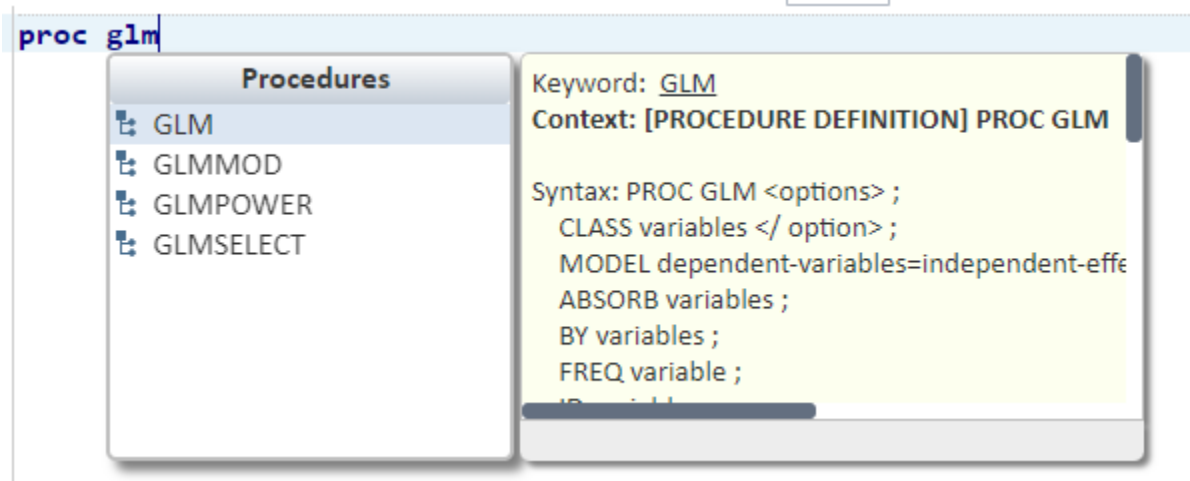
I like the home file location as it provides a ready-made place to store programs that I'm working on that may not be ready for production yet or that are for personal testing of SAS Studio.



SAS hints: the moment I type “pro” SAS pops up a number of windows to try to help me out.

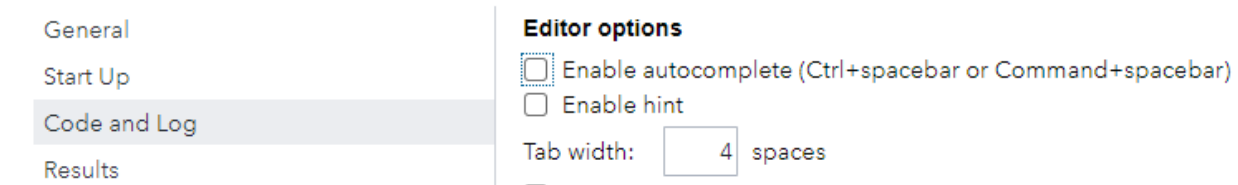


The more specific I get the better able SAS is to help me in the window

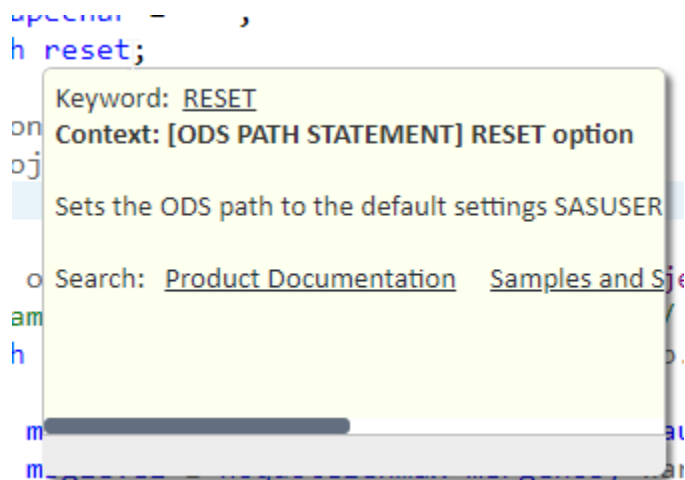


Granted this can be a bit annoying over time and this functionality can be turned off in the preferences section (uncheck Enable autocomplete).

Preferences



Similarly, if you hover over a SAS keyword (blue text) a helpful description or link to documentation will show up near that word.

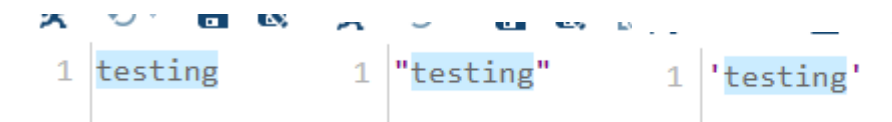


This can also be disabled in the preferences by unchecking the Enable hint option.

The Preference menu is nice and allows for some neat modifications, it's pretty self-explanatory so I won't go into much detail, but I do recommend looking through the options.


A NIFTY UPDATE FOR QUOTING TEXT

You can highlight a text by holding down the right click mouse button and scrolling over the text and then hit SHIFT+ the quote key and it will put both double quotes around the highlighted text or highlight the text and hit the quote key and it will place single quotes around the highlighted text.



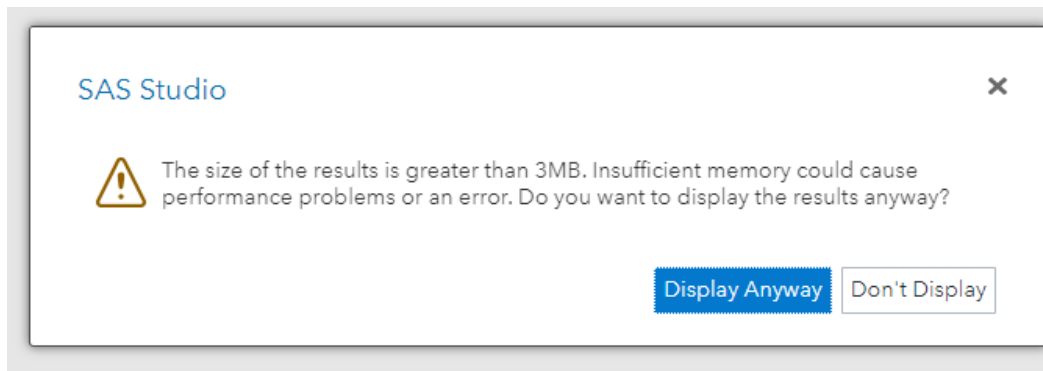
If you do need help from SAS Technical Support it's helpful to provide the SAS Studio information from these system macro variables:

```
%put Site: &sysssite Release: &sysvlong System: &sysscp &sysscpl;
```

Much of this information can also be found in the program summary output by hitting the program summary icon in the editor window. 

RESULT SIZE LIMITATION

When generating the results files over 3MB, you get a popup warning noting the large size and you have the option of displaying or not displaying the result. Kind of nice, kind of annoying.



ISSUES THAT DRIVE ME NUTS

LOG SIZE LIMITATION

For logs that are pretty long you get this warning midway through the run and the log output stops.

WARNING: Maximum log size exceeded. [Click here to view full log.](#)

A similar warning is pushed out to the Issue summary bar, and this has the location of the full log included, but it's not copyable.

```
▼ Errors, Warnings, Notes
  ▶ ⚠ Errors
  ▲ ⚠ Warnings (1)
    <br> WARNING: Maximum log size exceeded. <a href="/sasexec/submissions/89f7f6cd-f688-49e9-9ce1-15249fb9cd0f/log" class="logTarget" target="_blar
  ▶ ⓘ Notes (2553)
```

To see the full log, you have to physically click on the link at the bottom of the log window, which will open up a new HTML window with the full log. This link will be active during the SAS session but will be disabled once the SAS session closes. The link is created dynamically and is not reference-able from within SAS to pull into SAS. You can also directly save the log to a location and review later. This will download the full log (not the shortened one on the screen).

The Issue Summary Bar will still point out any issues and provide details, but you lose some functionality in easily navigating the full log. This is more of a pain with large batch submissions as in SAS desktop our company has a SAS program that would dynamically read in the log after the program had been run and run similar checks on the text of the log.

To bypass this issue, I've found that you can change the log printing destination, but you would have to know beforehand that the that log was going to be too long and that this step was needed.

You can change the output destination the log during any part of your program using the PROC PRINTTO option.

```
Syntax: PROC PRINTTO LOG=<path and filename>;
run;
```

Then at the end of the program you would close the log destination with: `PROC PRINTTO; run;`

This however will disable the log from appearing within the log view from the point that the first PROC PRINTO is run.

To restore the printing back to the log view set the log destination to LOG.

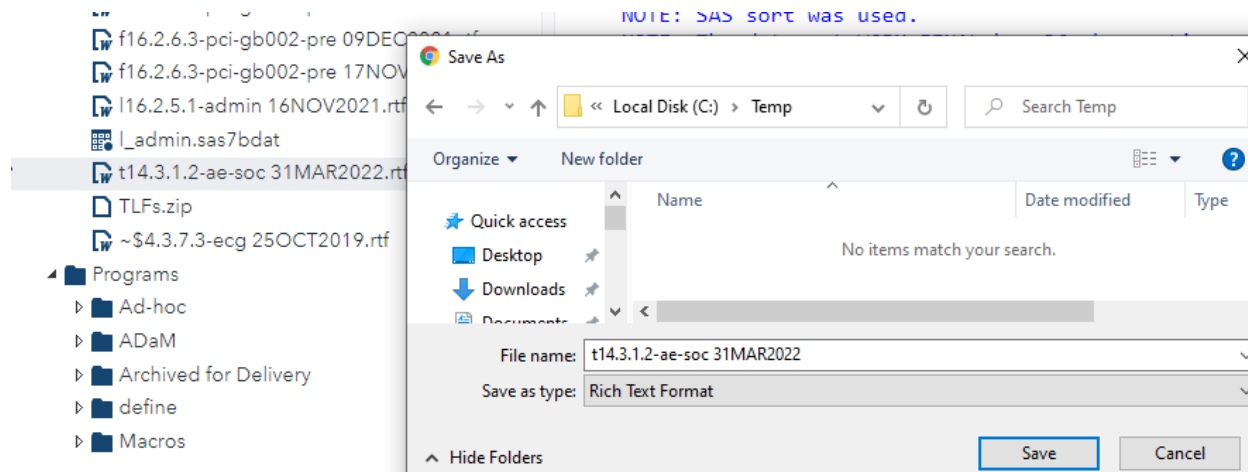
```
Syntax: PROC PRINTTO LOG=LOG;
```

It would be nice if you could have both a saved version and the log view version, but alas it is what it is.

VIEWING RTF OUTPUT

When a table or figure program is run the RESULTS view provides a nice view of the output in HTML style. However, in a number of cases I need to make sure that the RTF output looks like it should as the text styling and layout maybe different from the HTML so the columns may not have the same spacing requirements. This is especially true when dealing with figures and how it looks on the page.

Depending on how your organization sets up the SAS Studio environment, it's possible that you will need to actually download the file onto your computer before you can open it.



FINDING OUTPUT FILES WITHIN THE DROPDOWN MENU

Because the output files are located in the dropdown menu and sorted alphabetically, they are harder to locate vs being sorted by the date time created. There may be additional system options to assist in this issue.

LOSS OF SYSTEM KEYBOARD MACRO

In Desktop SAS, I use the system information and Keyboard macros to create the current date and am able to quickly put this into my code within the editor window ([see reference 2](#)). As far as I have found, SAS Studio does not have this option to put in the system date as text into the program editor window.

Related to this is I have a Keyboard Abbreviation of my name and have assigned a key to it of ALT+N, whereas with Snippets I have to click ALT+I then select the snippet wanted with my mouse, it's not too onerous but it was faster using Keyboard Abbreviations.

OPENING MULTIPLE PROGRAMS AT ONCE – NOT AN OPTION

You cannot open several SAS programs at the same time, the CNTL + does not work, you can only open one file at a time, kind of a bummer.

ADAPTIONS THAT I'VE HAD TO MAKE

THE BIGGEST CHANGE - FILE REFERENCE UPDATES

In the SAS desktop version, all directory references were noted in the standard style: X:\BigPharma\Study 001\programs, however in SAS Studio these must be changed to: /projects/BigPharma/Study 001/programs. Note the forward slash vs backwards slash. This small change required all references in both macro's, programs, import/export statements and include statements to be modified, which can be a challenge when moving over a fully completed study into the SAS Studio environment.

SEGMENTED MEMORY

The history and background macro values of the program can be nullified with each new run so some macros that are dependent on values from other macro's need to be included in the same run statement. This can be a bit tricky if you have really long programs and you are trying to fix an issue in the later stages of the program without running the majority of the program every time. It's not always the case but it's something to be mindful of, especially when something that worked a second ago, does not work at all after a run of a small segment of code. As mentioned earlier: if you select a small portion of code to be run then only datasets created within that code would be available in the Output Data View.

IMPORT SYNTAX CHANGES

I found that when importing XLSX data using the LIBNAME PCFILES statement this must be replaced with the LIBNAME XLSX statement.

STANDARD TEMP LOCATION

While using SAS desktop we often used a temp directory location to place small text files. This had to be updated but luckily with the home location being a standard and the username being a system macro variable called `&_CLIENTUSERID` I can create a standard temp location that works for all users in the system called `/home/&_CLIENTUSERID/`.

SEPARATE EXPLORER WINDOW

Since this is an online application not having the windows explorer file is an adjustment. Having to use the drop-down menu to pull up programs and such takes some adjusting. Using Folder Shortcuts helps in finding things faster, but it was nice having a separate window open to locate files and sort by date. There may be additional system options to assist in this issue.

X COMMAND SYNTAX UPDATE

As a SAS super user, I was very concerned about the loss of using X commands in SAS Studio but gratefully these commands still work. Although I had to change my syntax a bit.

To create a directory, I have to now create each folder whereas before I could create the last folder needed in the directory and SAS would create all the other subfolders, that's a big change.

Syntax: `x mkdir "/projects/BigPharama/Study 001/programs/adhoc/";`

To create a directory of folders into a text file using x command:

```
x ls "/projects/BigPharama/Study 001/programs/"
>/home/&_CLIENTUSERID/dir.txt;
```

Then to bring in this text file I use the infile statement:

```
data _in_dir; length filename $200;
infile "/home/&_CLIENTUSERID/dir.txt";
input;
```

To copy a file from one location to another:

```
x cp "/projects/BigPharama/Study 001/programs/fileone.sas" >
"/projects/BigPharama/Study 001/programs/adhoc/fileone.sas";
```

deleting a file:

```
x rm "/home/&_CLIENTUSERID/dir.txt";
```

DM WEDIT - GONE

Things that you can't do: Dynamically open up a program from within SAS Studio. You can run a program using the `%include` statement, but I have not found a way to dynamically open it up from within SAS.

STYLE SHEET REFERENCE UPDATE

One small thing I found is that the style sheet template that we used was called something like rtf_9pt, in the moving of a study over, SAS Studio did not like the use of the number 9 so we changed it to rtf_ninept and this worked fine.

CONCLUSION

In this paper I have reviewed the new SAS Studio application and provided details on areas that I found to be kind of the same and quite different from the SAS Desktop version. Overall, the learning curve is not huge but it takes some getting used to. SAS Studio opens up some new horizons with /home and system updates and I will enjoy the helpful prompts that are available especially for figures in using the various options in SGPLOT.

It will take some adjustment to use Snippets and other Task inserts but that is doable. In making the transition I've found that once the file references were changed, most of the programs ran smoothly and that it was not nearly as traumatic as I thought it might be.

In the paper I note a few items that will be a challenge for me to adjust to but I acknowledge that there may be solutions to these issues or clever workarounds that others have found that I did not find at the time this paper was written.

I hope that through this paper you may have found some useful tips in moving over to SAS studio and that this helps in making the transition a little easier and even friendly.

REFERENCES

SAS Documentation, SAS Studio - Working with Process Flows:

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