STA 311 Statistical Computing & Data Management

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Introduction

- Course Objectives
- Course Delivery Method
- Software - SAS
- Access SAS system:
  1. RamCloud 2. SAS OnDemand
- Launch SAS Application
- A Glance of SAS Windows
- First SAS Program: "Hello World"

Course Objectives

To familiarize you with programming in the SAS language. After completing this course, you should be able to:

1. Create SAS data sets from multiple sources, including direct input, external text files, and dataset generated from other applications.
2. Write SAS data sets out in appropriate format and stored it in certain directory.
3. Use appropriate techniques to combine data sets, subset data sets, extract certain observations from datasets
4. Create basic SAS graphs and generate basic reports using appropriate procedures.
5. Perform basic statistical analyses of data.
6. Prepare for the Base SAS Programming Certification Exam

Software

SAS - Statistical Analysis System

SAS is a software suite developed by SAS Institute that offers advanced analytics, multivariate analyses, business intelligence, data management and numerous other tasks.

SAS License & Access at WCU

The Virtual Desktop allows WCU students and instructors to virtually access a select set of software applications including SAS 9.4 from a local computer with internet access.

To access the virtual desktop, you need to login to Ramcloud at

https://ramcloud.wcupa.edu/

SAS License at WCU

What Is Virtual Desktop?

A **virtual desktop** (VD) is a component of **virtual desktop infrastructure** (VDI) which is hosted on a sever in a data center (either cloud or premise) .

A **virtual desktop** uses **virtual machine** (VM, a part of VDI) is essentially just another PC we can use remotely.

When accessing virtual desktop, your local machine is only used as monitor since all computing tasks are executed on the virtual machine.

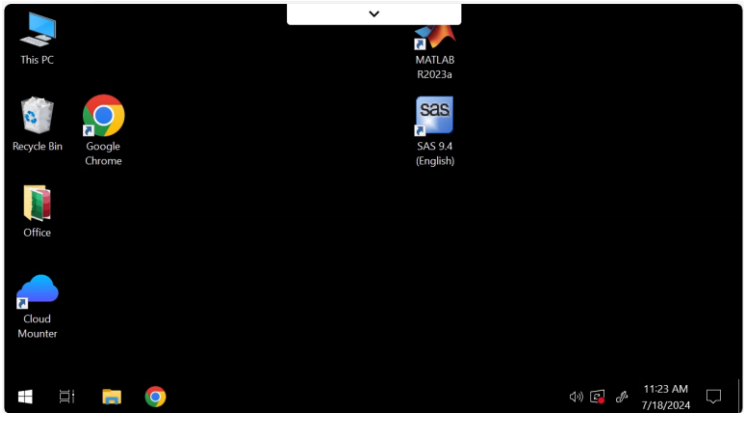
When using SAS through virtual desktop, you need to **upload** data and existing code to the virtual machine and **download** any thing to your local machine if you want to keep a copy locally.

Accessing Virtual Desktop

After you logged in RamCloud, you will see the following page

Accessing Virtual Desktop

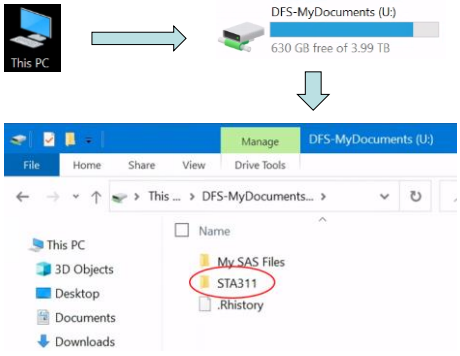
Launch SAS, Matlab Desktop



It can take a few minutes for the system to set up your desktop. Be patient!

Accessing Virtual Desktop

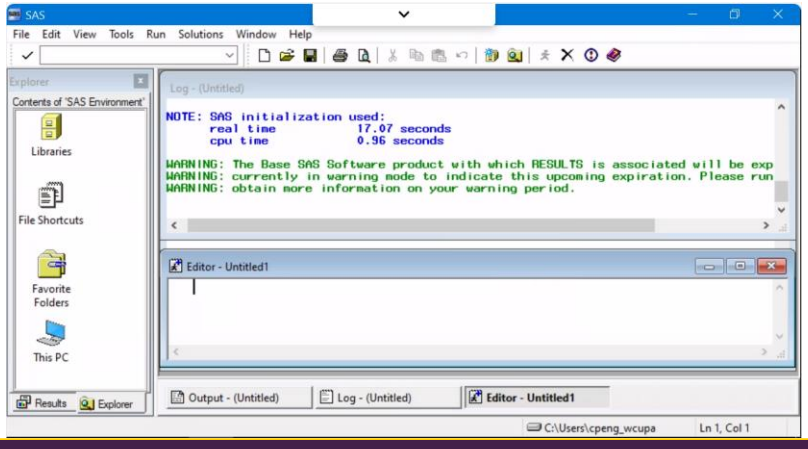
Create folders in the U drive to organize your work



You can create sub-folders if necessary. These folders can be used to define permanent SAS libraries.

Start SAS Session

Click Start 



Access SAS Studio via SAS OnDemand

SAS OnDemand is essentially a Virtual Desktop provide by SAS. It works the same as WCU's Virtual Desktop.

It is FREE!

Access SAS Studio via SAS OnDemand

To use SAS Studio via SAS OnDemand, you need to follow the next few steps:

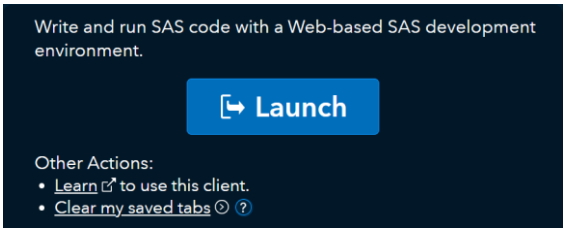
Step 1: Create your SAS profile (if you don't have one) at:
https://www.sas.com/profile/ui/#/create

Step 2: Register for SAS OnDemand for academics (see instruction)
https://support.sas.com/content/dam/SAS/support/en/products-solutions/ondemand/registration-sas-studio.pdf

Step 3: Sign in SAS OnDemand at (top right corner button):
https://welcome.oda.sas.com/

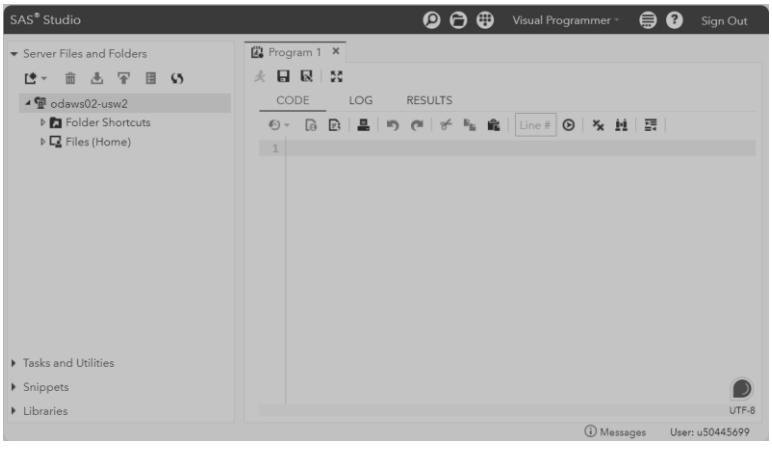
Access SAS Studio via SAS OnDemand

Sign SAS OnDemand and Launch SAS Studio



SAS Studio via SAS OnDemand

SAS Studio GUI! Ready for Coding!



SAS Studio via SAS OnDemand

You can similarly create folders and subfolders to organize your projects on SAS OnDemand!

Because SAS Studio is hosted on SAS Cloud, you still need to upload existing data files and code and download any information from SAS OnDemand to store a copy on your local machine!

SAS Windows

- **Log Window**: It is an execution window. Here, you can check the execution of your program. It also displays errors, warnings and notes.
- **Code Window**: This window is also known as editor window. Consider it as a blank paper or a notepad, where you can write your SAS code.
- **Output Window**: As the name suggests, this window displays the output of the program/ code which you write in the editor.
- **Result Window**: It is an index that list all the outputs of programs that are run in one session. Since it holds the results of a particular session, if you close the software and restart it, the result window will be empty.
- **Explore Window**: It holds the list of all the libraries in the system. You can also browse the system supported files here.

SAS Datasets and Variables

SAS Data Sets

SAS data sets are called as data files. Data files constitute of rows and columns. Rows hold observations and columns hold Variable names.

SAS Variables

SAS has two types of variables:

- **Numeric variables**: This is the default variable type. These variables are used in mathematical expressions.
- **Character variables**: Character variables are used for values that are not used in mathematical expressions.

They are treated as text or strings. A variable becomes a character variable by adding a '$' sign at the end of the variable name.

SAS Code Structure

SAS programming is based on two building blocks

- **DATA Step**: The DATA step creates a SAS data set and then passes the data onto a PROC step
- **PROC Step**: The PROC step processes the data

A SAS program should follow below mentioned rules

- Almost every code will begin with either DATA or a PROC Step
- Every SAS statement ends with a semi colon
- A SAS step ends with either RUN or QUIT
- SAS codes are not case sensitive
- You can write a SAS statement across different lines or you can write multiple statements in one line

SAS Datasets and Variables

SAS Libraries

SAS library is a collection of SAS data files that are stored in the same folder or directory on your computer or other storage such as USB drive or a space in the cloud.

- **Temporary Library**: In this library, the data set gets deleted when the SAS session ends.
- **Permanent Library**: Data sets are saved permanently. Hence, they can be accessed in the future SAS sessions.

Users can also create or define a new library known as user defined libraries by using the keyword **LIBNAME**. These are also permanent libraries.

Your First Workable SAS Code "Hello World!"

Editor - Untitled1 *

```
/*********************************
      My First SAS Program
       Author: C. Peng
       Date:  08/22/2020
   Topics: 1. Data Step
           2. Procedure Step
*********************************/

/* Data Step: create a SAS dataset with one variable  */

DATA work.HelloWorld;   /* libname.datasetName */
  mylstSAScode = "Hello World";
RUN;

/* Procedure step: print out the SAS dataset */
PROC PRINT DATA = work.HelloWorld;
RUN;
```

Your First Workable SAS Code "Hello World!"

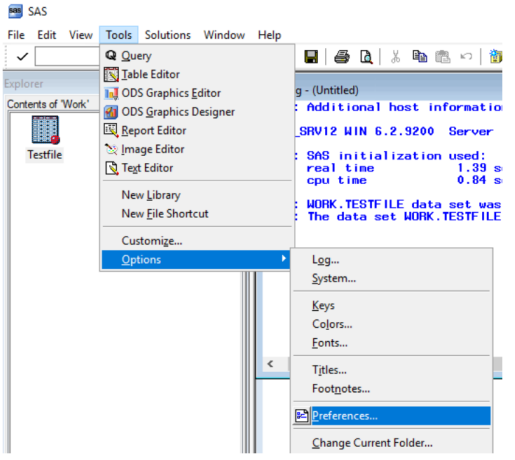

```
/************************************
     My First SAS Program
      Author:  C. Peng
        Date:  08/22/2020
      Topics:  1. Data Step
               2. Procedure Step
*************************************/

/* Data Step: create a SAS dataset with one variable  */

DATA work.HelloWorld;   /* libname.datasetName */
 my1stSAScode = "Hello World";
RUN;

/* Procedure step: print out the SAS dataset */
PROC PRINT DATA = work.HelloWorld;
RUN;
```



```
308  /*******************************
309        My First SAS Program
310         Author: C. Peng
311         Date:  08/22/2020
312     Topics: 1. Data Step
313             2. Procedure Step
314  *******************************/
315
316  /* Data Step: create a SAS dataset with one variable  */
317
318  DATA work.HelloWorld;   /* libname.datasetName */
319   my1stSAScode = "Hello World";
320  RUN;

NOTE: The data set WORK.HELLOWORLD has 1 observations and 1 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


321
322  /* Procedure step: print out the SAS dataset */
323  PROC PRINT DATA = work.HelloWorld;
324  RUN;

NOTE: There were 1 observations read from the data set WORK.HELLOWORLD.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.04 seconds
      cpu time            0.00 seconds
```

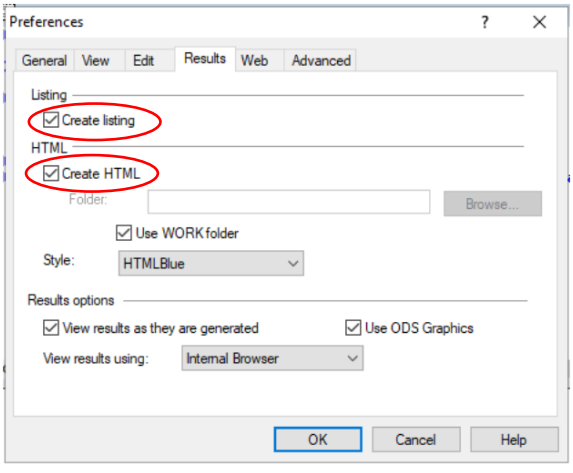
Your First Workable SAS Code "Hello World!"

Select Output Formats: HTML and Listing



Your First Workable SAS Code "Hello World!"

Select Output Formats: HTML and Listing



Your First Workable SAS Code "Hello World!"

Listing Output

Interested in exploring more features of SAS window environment?