Using the Free SAS® University Edition Software

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Abstract

The announcement of SAS Institute's free "SAS University Edition" is an exciting development for SAS users and learners around the world! The software bundle includes Base SAS, SAS/STAT, SAS/IML, Designer Studio (user interface), and SAS/ACCESS for Windows, with all the popular features found in the licensed SAS versions. This is an incredible opportunity for users, statisticians, data analysts, scientists, programmers, students, and academics everywhere to use (and learn) for career opportunities and advancement. Capabilities include data manipulation, data management, comprehensive programming language, powerful analytics, high quality graphics, world-renowned statistical analysis capabilities, and many other exciting features.

This paper and presentation describes and illustrates the process of downloading, configuring and using the SAS University Edition software. Additional topics include the process of downloading the required applications, "key" configuration strategies to run the "SAS University Edition" on your computer, and the demonstration of a few powerful features found in this exciting software bundle. We conclude with a summary of tips for success in downloading, configuring and using the SAS University Edition.

Introduction

As the demand for qualified and experienced SAS software professionals continues to grow to newer and greater horizons, it is becoming increasingly more important for students, academics, professionals, and those with a curiosity for knowledge to have a way to continue their quest for learning. Many forward-thinking learners are using every possible avenue to leverage available resources to acquire the necessary knowledge and skills to effectively use SAS software. As a result, these learners are finding an assortment of ways to better differentiate themselves from their competition.

With SAS software being used in 93 of the top 100 companies on the 2014 Fortune Global 500 List and an estimated 10-year job growth rate of 24.6%, the future for SAS specialists looks bright indeed. To better prepare, students, academics, and professionals everywhere are being encouraged to download, install and learn the "free" SAS University Edition software available from SAS Institute Inc. By doing so, learners are able to acquire essential skills including the construction of data sets (or tables) from raw data and Excel files, write programs using the SAS DATA step, use the various procedures to conduct analytics, statistical analysis and high quality report and graphics output, perform data manipulation and data management operations, as well as a number of other powerful technical techniques.

So what is the SAS University Edition software? The products and features of each product are described below.

SAS® University Edition Software

The SAS® University Edition is "free" to anyone. It falls under the SAS Analytics U umbrella and includes e-Learning modules to help SAS learners grow their analytics, technical and programming skills using powerful SAS software. Available for PC, Mac, or Linux Workstations, the SAS University Edition includes Base SAS®, SAS/STAT®, SAS/IML®, SAS/ACCESS® for Windows, and SAS Studio. It works through Virtualization Software in standalone mode and your Browser to access to SAS software.

Base SAS Features

The Base SAS software contains a built in DATA step programming language, the ability to access a wide-range of data sources, comprehensive set of functions to handle data manipulation, an assortment of "canned" and ready-to-use procedures, a comprehensive SQL language, reporting and customization feature for reports and results using Output Delivery System (ODS), data display informats and output formats, comprehensive data visualization features known as ODS Statistical Graphics, data management capabilities, and much more.

SAS/STAT® Features

The SAS/STAT software supports the application of the latest statistical techniques. It supports the following statistical routines: Analysis of Variance, Bayesian Analysis, Categorical Data Analysis, Cluster Analysis, Mixed Models, Multivariate Analysis, Nonparametric Analysis, Regression Analysis, Survey Sampling and Analysis, Statistical Graphics, and much more.

SAS/IML® Features

The SAS/IML software is an interactive matrix programming language and supports the ability to conduct Exploratory Analysis, the integration with the R programming language, dynamically linked graphics, and much more.

SAS/ACCESS® Features

The SAS/ACCESS software supports the ability to read, write, and update data sources; provides a flexible query language; supports the access to a variety of data sources including text files, dat files, CSV files, Excel spreadsheets, Microsoft SQL Server, and ODBC; and much more.

SAS Studio

The SAS Studio software serves as the user interface; supports Web applications; the access to data files, libraries and programs; the ability to recover files; dynamically link graphics; and much more.

SAS University Edition Fact Sheet, SAS Products / Solutions, Documentation and System Requirements

The SAS University Edition software Fact Sheet can be access at sas.com/universityedition, see Figure 1, below.

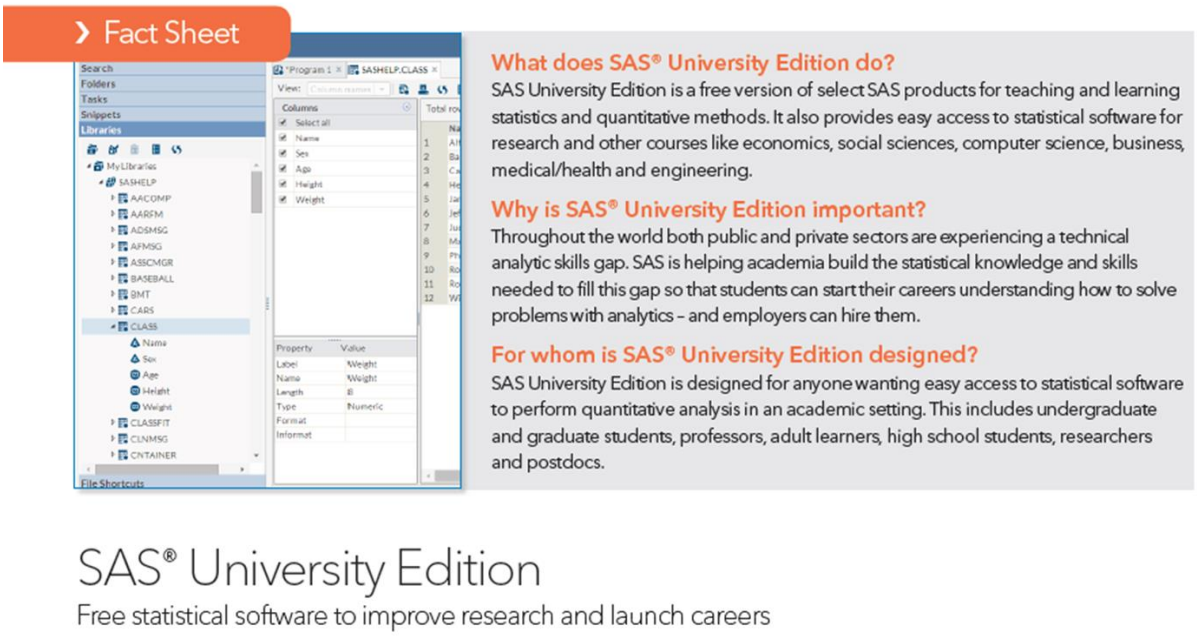

Figure 1. Snapshot from SAS University Edition Fact Sheet at sas.com/universityedition

Knowledge Base – SAS Products and Solutions

Users can easily explore the Knowledge Base of SAS Products and Solutions, System Requirements, Install Center, Third-Party Software Reference, Documentation, Papers, Samples & SAS Notes, and Focus Areas by accessing http://support.sas.com/software/, illustrated in Figure 3, below.

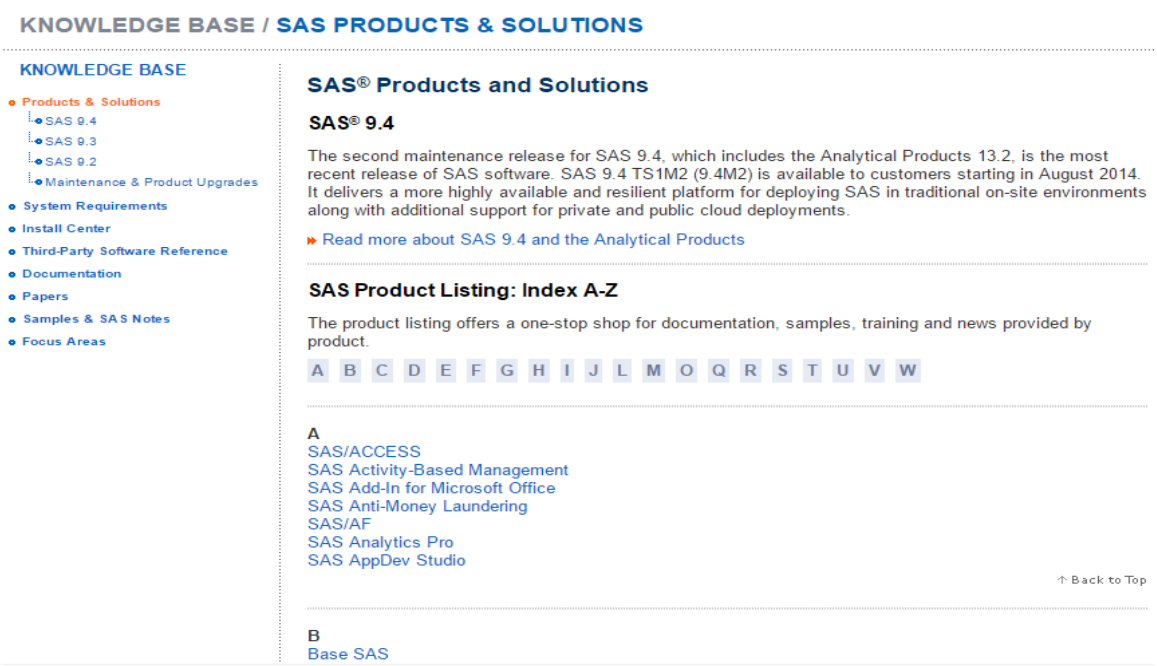

Figure 3. Knowledge Base – SAS Products and Solutions

Knowledge Base – Documentation

Users have the ability to access a comprehensive set of SAS product documentation in either HTML or PDF format and can be accessed at http://support.sas.com/documentation/index.html, as shown in Figure 4, below.

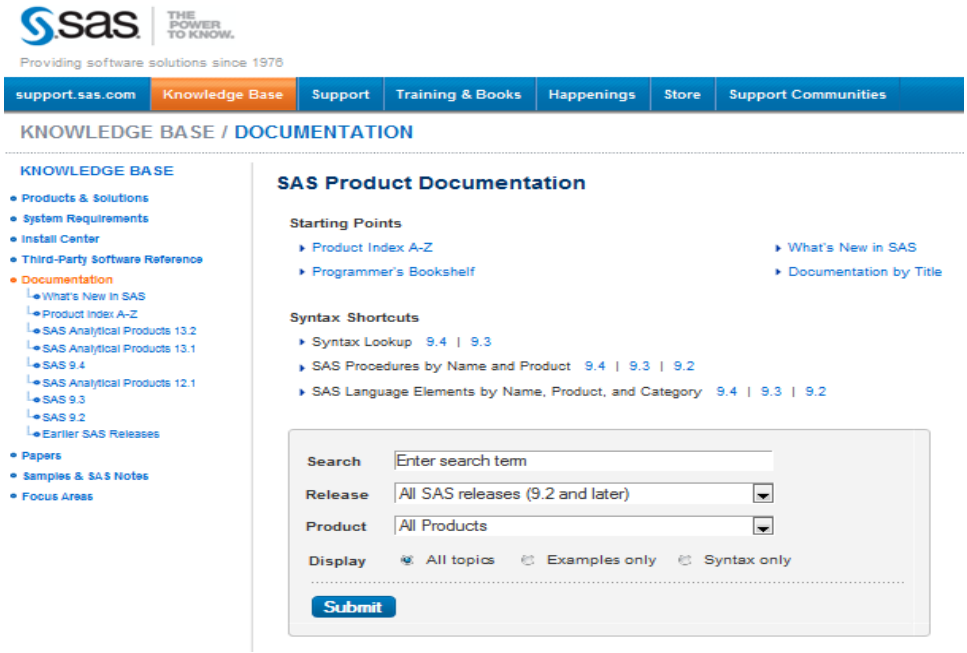

Figure 4. Knowledge Base – SAS Product Documentation

System Requirements

The minimum system requirements for running SAS University Edition under Windows, Mac OS X, and Linux appear below.

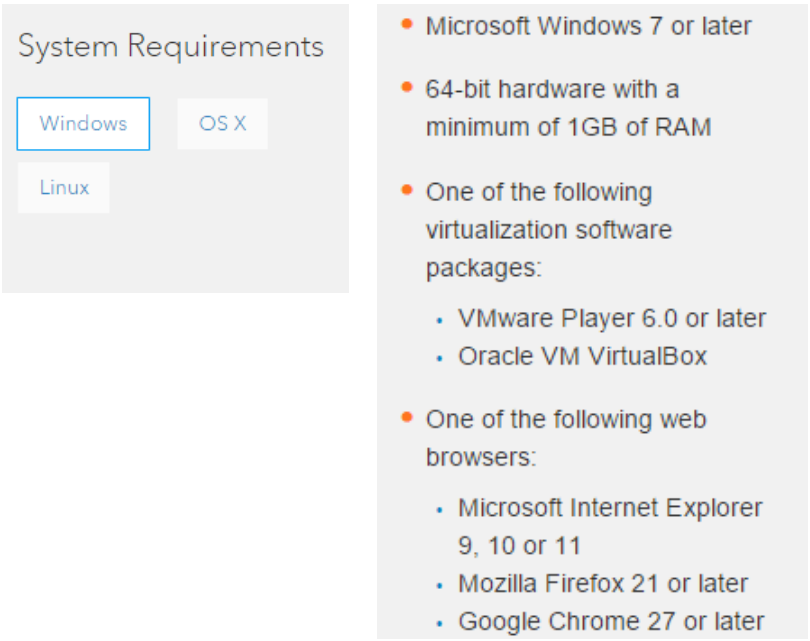

Figure 5. System Requirements for the Windows environment

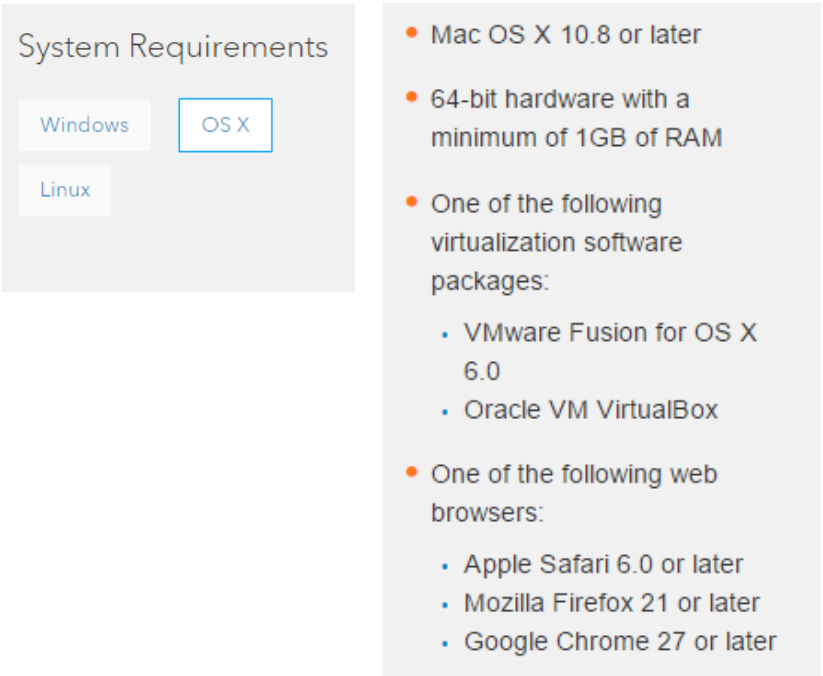

Figure 6. System Requirements for the Mac OS X environment

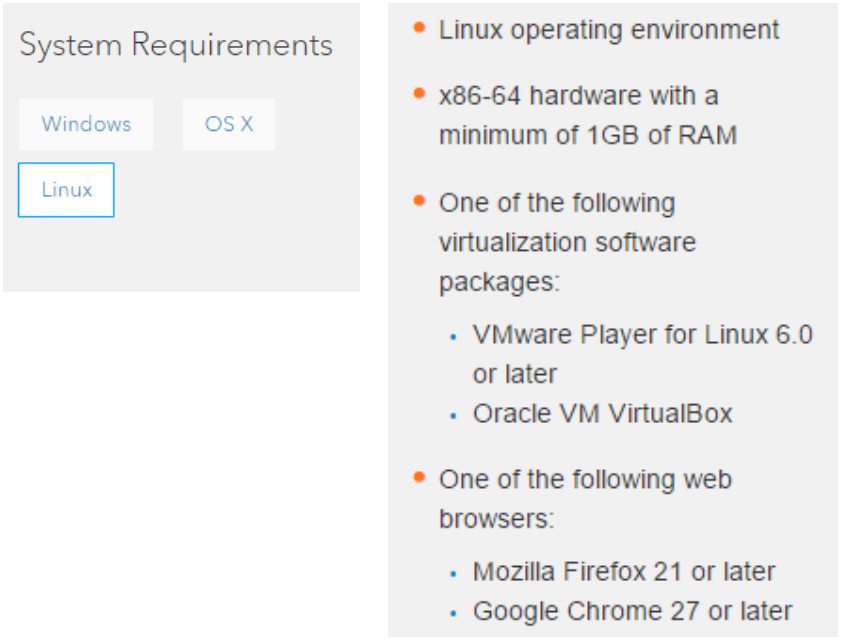

Figure 7. System Requirements for the Linux environment

Downloading the Oracle VM VirtualBox Software

The first file you'll need to download contains all of the SAS software you will use. The second file you need is run by your browser on your computer for what is called 'virtualization'. This paper illustrates downloading and using the Oracle VM VirtualBox, but you may choose to use instead virtualization via VMware Player. There is separate SAS software for each, they must match.

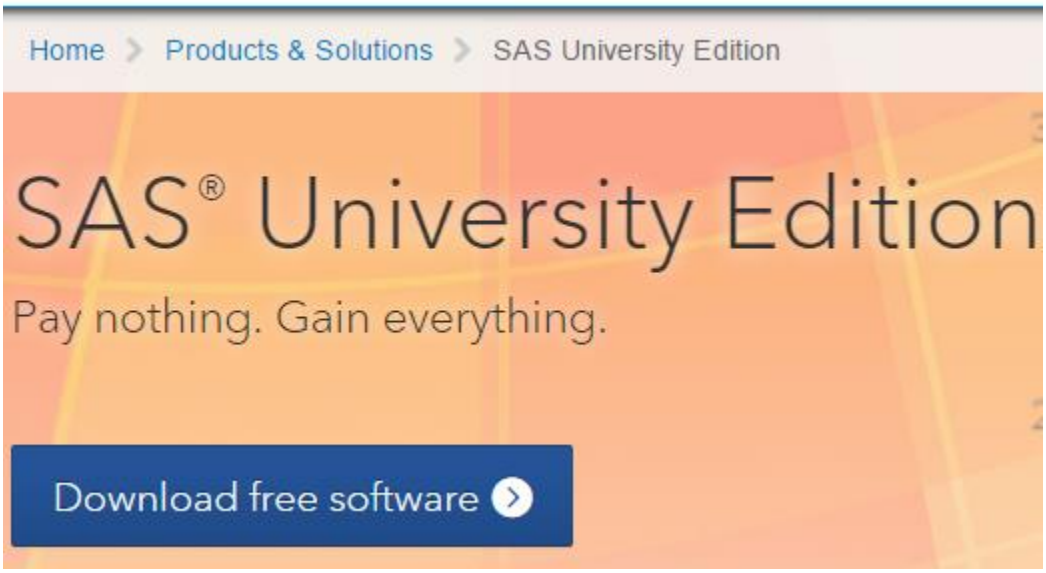

Figure 5. Online invitation to download the free SAS University Edition software

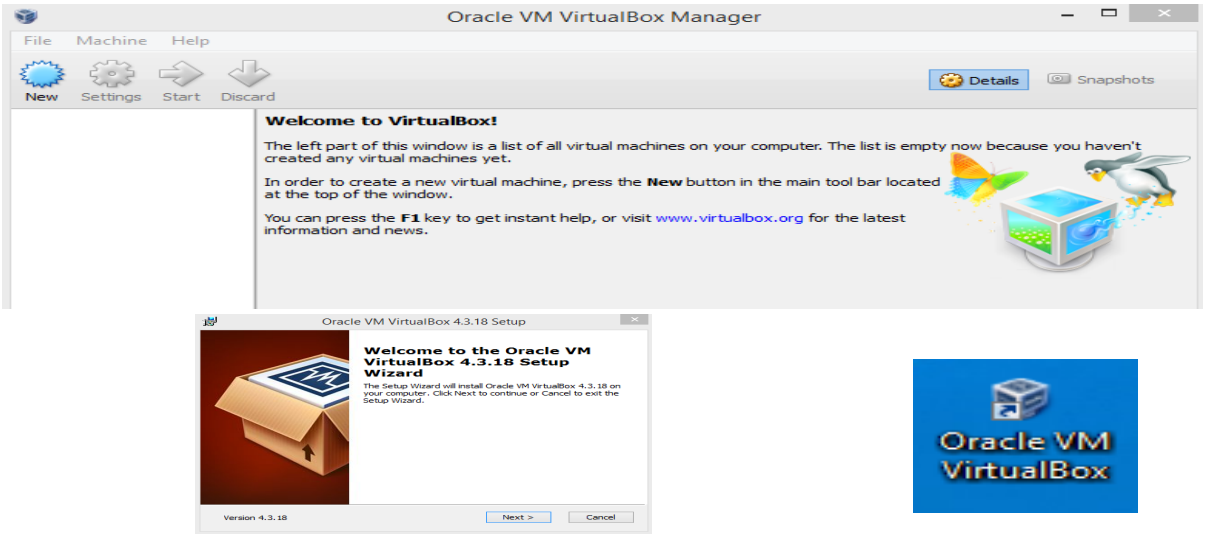

Figure 6. Downloading the free Oracle VM VirtualBox

Downloading and Configuring SAS University Edition

By adhering to the following download and configuration steps, anyone can begin using SAS University Edition software.

1. **Download the SAS University Edition software**
2. **Set the options and run for the first time.**

Downloading SAS University Edition Software

In this paper, you'll learn how to download Oracle VM VirtualBox software and SAS University Edition to a Windows environment. For more information about the Mac OS X and Linux environments, consult the specific instructions on the sas.com/universityedition website.

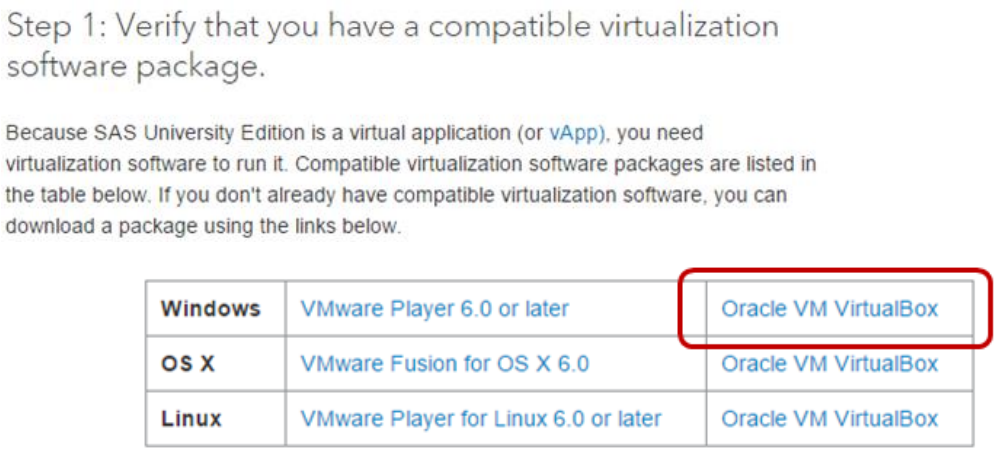

Figure 8. Verify Compatible Virtualization Software Package



Figure 9. Download the Oracle VirtualBox Quick Start Guide

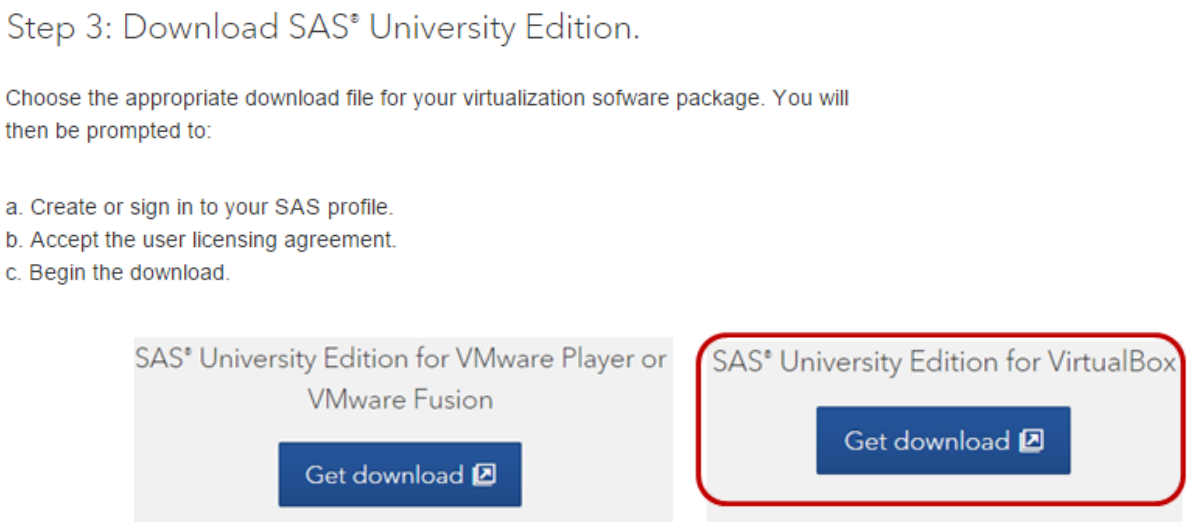

Figure 9. Download the Oracle VirtualBox Quick Start Guide

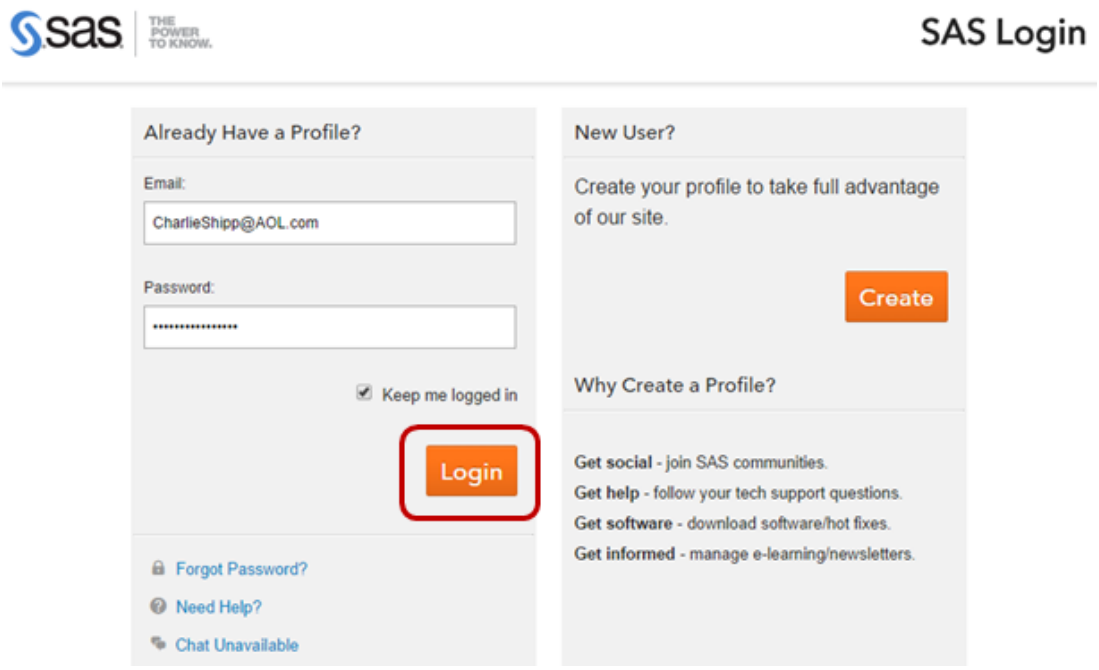

Figure 10. Creating and Logging in to Your SAS Profile

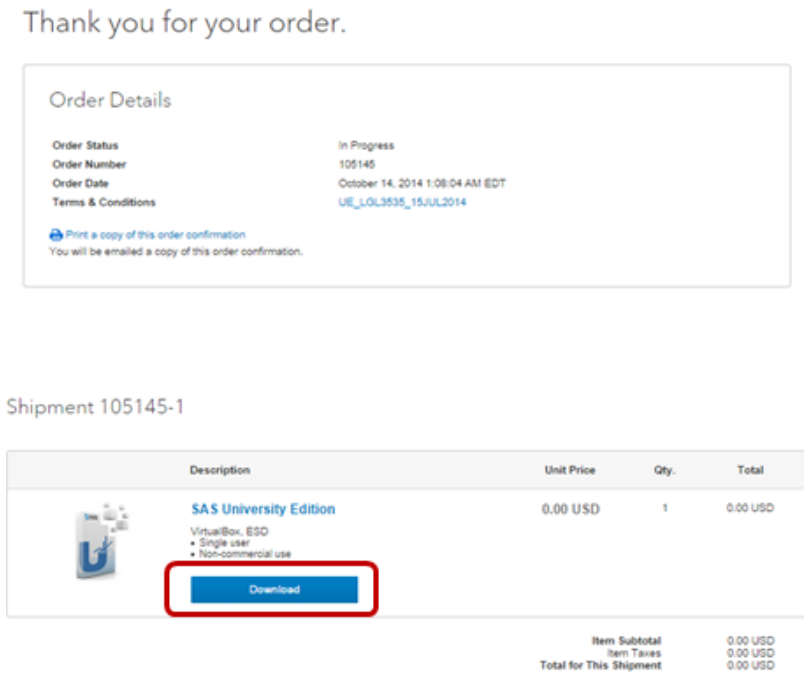

Figure 11. Ready to Download SAS University Edition Software

Congratulations! You're Now Ready to Use SAS University Edition Software

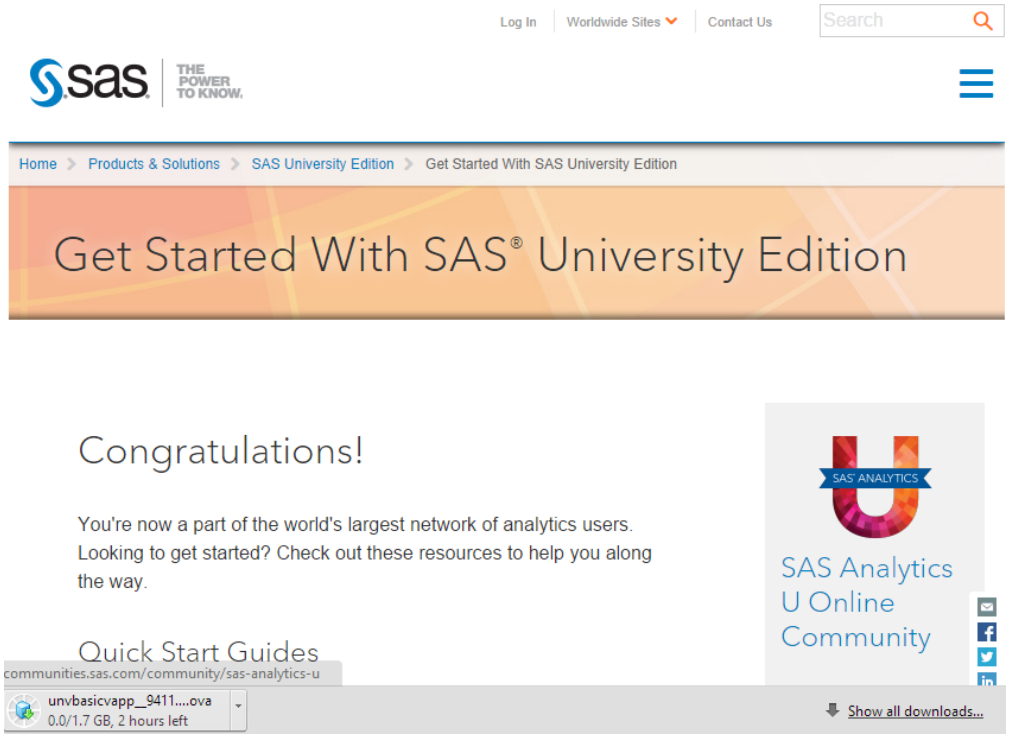

Figure 12. Get Started with SAS University Edition Software

Configuration Check List

The SAS manual has configuration details for SAS vApp and Oracle VM VirtualBox software.



Figure 13. SAS University Edition Installation Guide for Windows

We found it useful to either print the configuration instructions or have the PDF open to read.

To configure VirtualBox to work with SAS University Edition:

1) On your local computer (in a location that you will remember), create a folder called `SASUniversityEdition` and a subfolder called `myfolders`. You will save all of your SAS University Edition files to this location.
2) Launch VirtualBox.
3) Select **File** > **Import Appliance**.
4) In the **Import virtual appliance** window, click the folder icon to the right of the field. A file browser window appears.
5) Select the SAS University Edition .ova file.
6) Click **Open**.
7) Click **Next**.
8) (Optional) In the **Appliance settings** window, edit the CPU and RAM settings.
   Note: The SAS University Edition virtual image is configured to use 1GB of RAM and two processors. You can increase the RAM that is assigned to the SAS University Edition virtual image, but you should assign half (50%) or less of the available physical RAM. You cannot increase the number of processors that are assigned to the SAS University Edition virtual image.
9) In the **Appliance settings** window, click **Import**.
   The imported virtual machine is displayed in the **Oracle VM VirtualBox Manager** window.
   Note: If the message `drives in use` is displayed, click **Ignore**.
10) Select **Machine** > **Settings**.
11) In the navigation pane, click **Shared Folders**.
12) In the upper right of the **Settings** window, click +. The **Add Share** window appears.
13) In the **Folder Path** field, click the arrow and select **Other**.
    A file browser window appears.
14) Select the `myfolders` folder that you created, and then click **OK**. This folder is mapped to the **My Folders** folder in SAS Studio
    Note: The shared folder name is case sensitive.
    Note: You can add network folders that you have access permissions to. Do not include a backslash (\) in the network folder name.
15) In the **Add Share** window, confirm that **Read-only** is NOT selected.
16) In the **Add Share** window, click **Auto-mount**. Then click **OK**.
17) (Optional) Create additional shared folders. Additional shared folders are displayed in SAS Studio under **Folder Shortcuts**.
18) In the **Settings** window, click **OK**.

Figure 14. Oracle VirtualBox Configuration Instructions

Now you're ready to open and launch Oracle VirtualBox from your download area or your desktop.

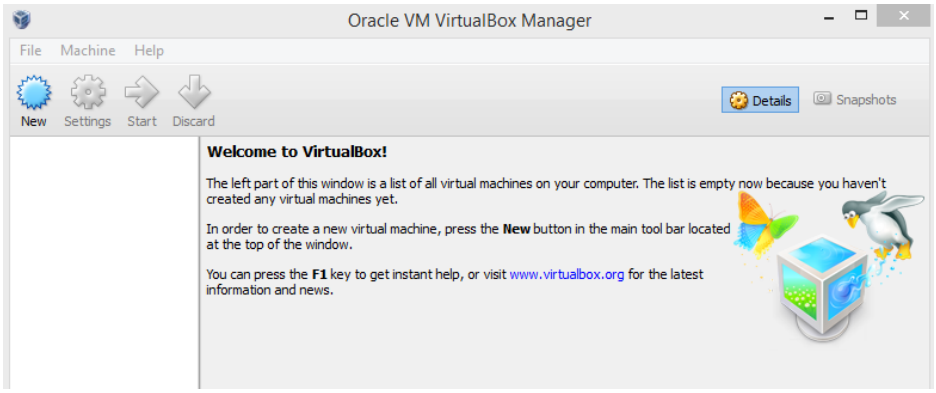

Figure 15. Welcome to Oracle VirtualBox

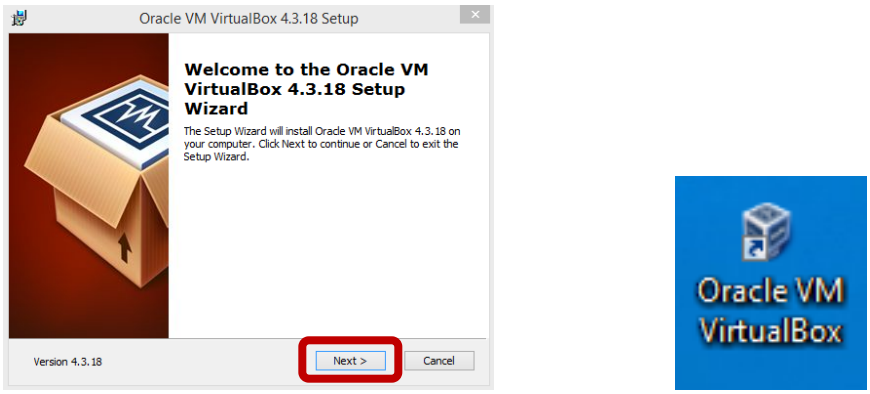

Figure 16. Open and Launch Oracle VM VirtualBox Setup

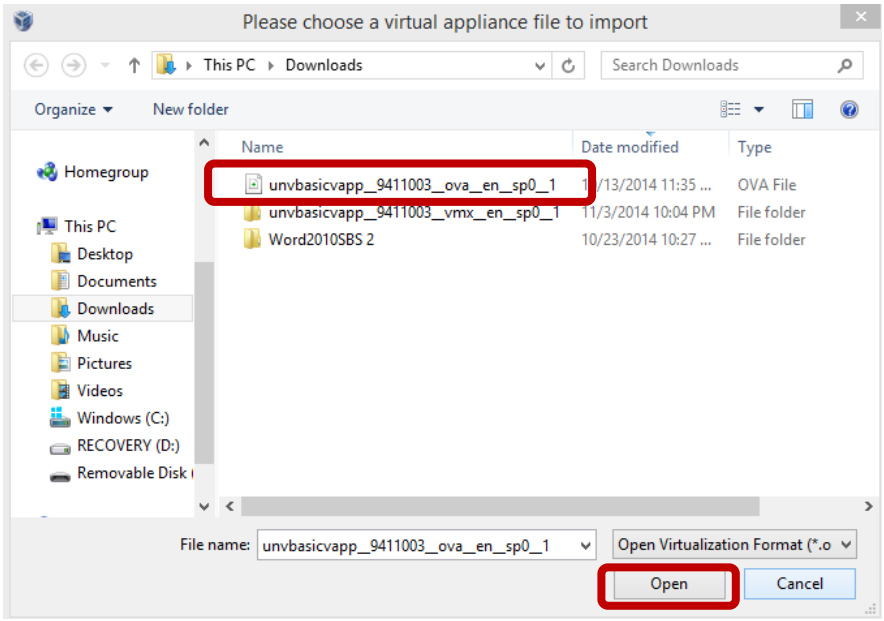

Figure 17. Select the desired VM VirtualBox Appliance to import and Click "Open"

Consider changing 1024 MB RAM to 2048 MB . . . then click IMPORT.

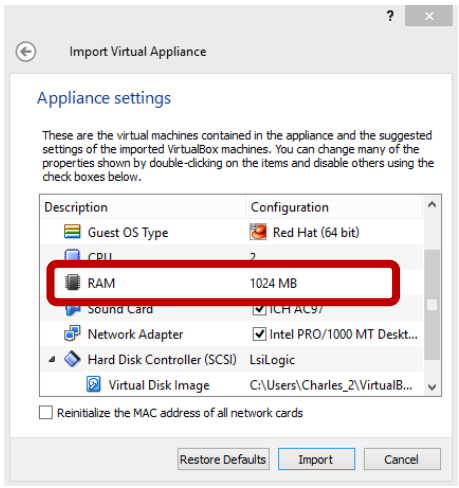

Figure 18. Oracle VM VirtualBox RAM Appliance settings

Importing the Oracle VM VirtualBox Appliance takes about 3 minutes.

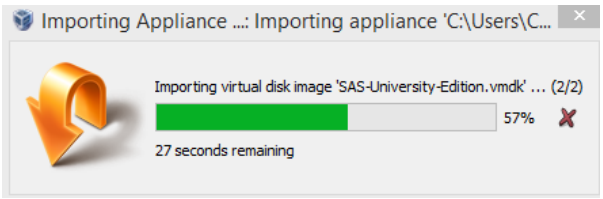

Figure 19. Importing the Oracle VM VirtualBox RAM Appliance

Now, select Machine Settings.

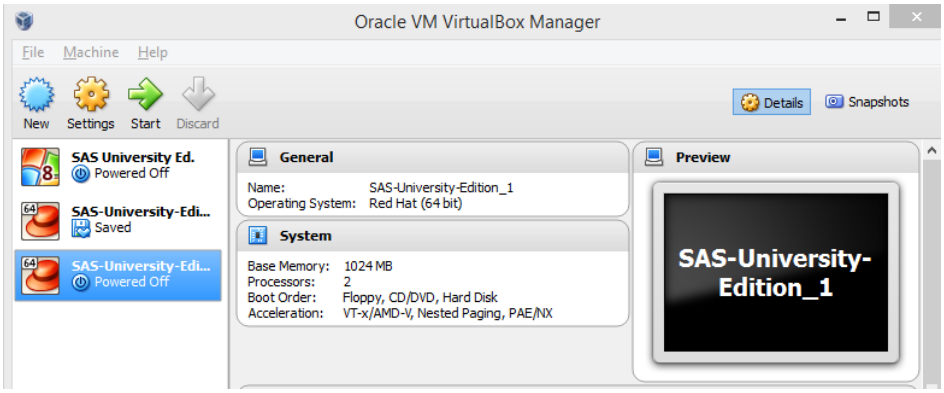

Figure 20. Oracle VM VirtualBox Machine settings

This completes the configuration of Oracle VM VirtualBox.

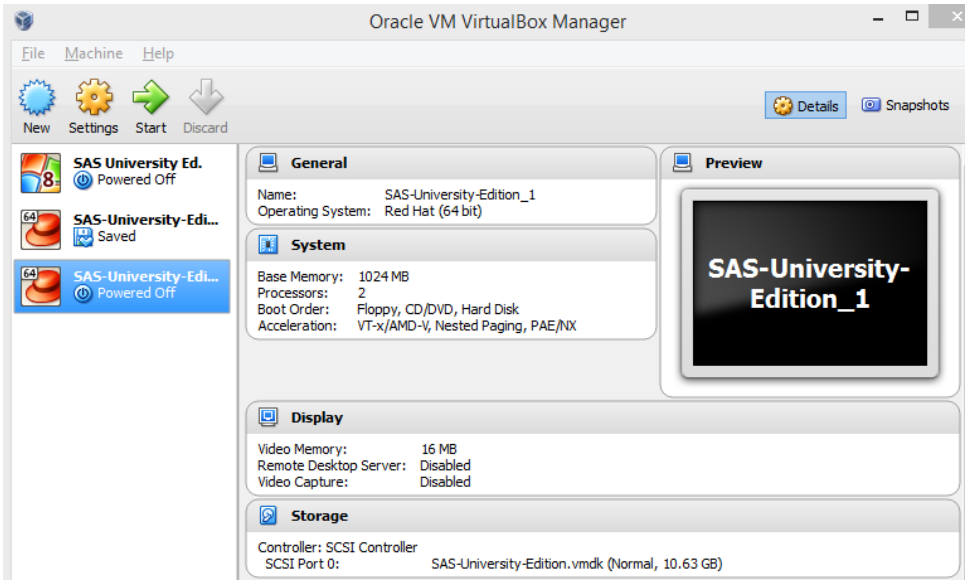

Figure 21. Oracle VM VirtualBox Configuration completion

SAS University Edition Processing

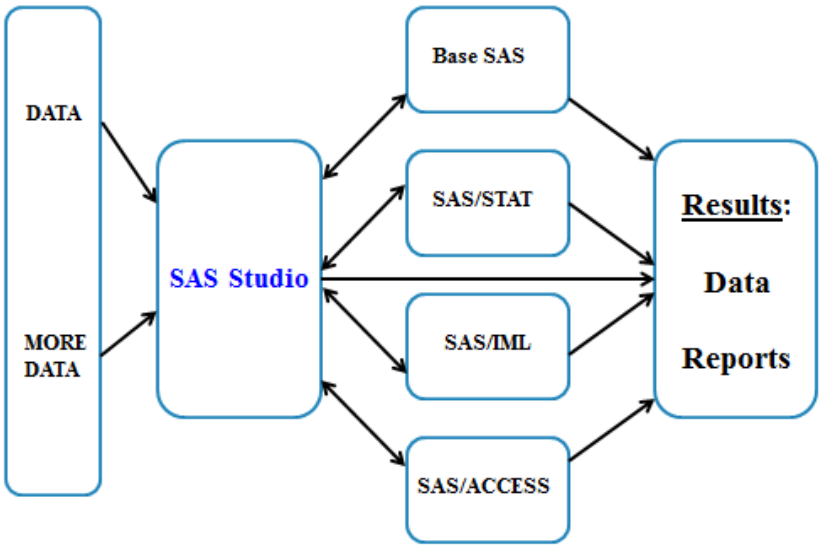

Figure 22. SAS Studio Control Flow

SAS University Edition Coding Examples

In this section, SAS learners are provided with a sampling of essential SAS coding techniques to begin their knowledge acquisition.

Displaying table attributes with PROC CONTENTS

```
libname mydata '/folders/myfolders/' ;
proc contents lib=mydata.movies ;
 title ;
run ;
```

Sorting data with PROC SORT

```
libname mydata '/folders/myfolders/' ;
proc sort data=mydata.movies
          out=sorted_movies ;
 by rating title ;
run ;
```

Printing data with PROC PRINT

```
libname mydata '/folders/myfolders/' ;
proc print data=sorted_movies ;
 var title category length ;
 by rating ;
run ;
```

Transposing data with PROC TRANSPOSE

```
libname mydata '/folders/myfolders/' ;
proc transpose data=mydata.movies
               out=transposed_movies ;
 var title ;
 by rating ;
run ;
```

DATA Step Match-Merge

```
libname mydata '/folders/myfolders/' ;
data match_merge ;
 merge mydata.movies(in=m)
       mydata.actors(in=a) ;
 if m and a ;
run ;
```

Conventional Matching Join with PROC SQL

```
libname mydata '/folders/myfolders/' ;
proc sql ;
 select m.title, rating, length,
        actor_leading
  from mydata.movies  m,
       mydata.actors a
   where m.title = a.title ;
quit ;
```

Conclusion

With SAS software being used in 93 of the top 100 companies on the 2014 Fortune Global 500 List and an estimated 10-year job growth rate of 24.6%, the future for SAS specialists looks bright indeed. The announcement of SAS Institute's free "SAS University Edition" is an exciting development for SAS users and learners around the world! To better prepare, students, academics, and professionals everywhere are being encouraged to download, install and learn the "free" SAS University Edition software available from SAS Institute Inc., consisting of Base SAS®, SAS/STAT®, SAS/IML®, SAS/ACCESS® for Windows, and SAS Studio. By doing so, learners are able to acquire essential skills including the construction of data sets (or tables) from raw data and Excel files, write programs using the SAS DATA step, use the various procedures to conduct analytics, statistical analysis and high quality report and graphics output, perform data manipulation and data management operations, as well as a number of other powerful technical techniques.

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Kirk Paul Lafler has been using SAS since 1979 and is consultant and founder of Software Intelligence Corporation. He is a SAS Certified Professional, provider of IT consulting services, trainer to SAS users around the world, mentor, and sasCommunity.org emeritus Advisory Board member. As the author of six books including Google® Search Complete! (Odyssey Press. 2014) and PROC SQL: Beyond the Basics Using SAS, Second Edition (SAS Press. 2013); Kirk has written more than five hundred papers and articles; been an Invited speaker and trainer at five hundred-plus SAS International, regional, special-interest, local, and in-house user group conferences and meetings; and is the recipient of 23 "Best" contributed paper, hands-on workshop (HOW), and poster awards.

Charles Edwin Shipp is a programmer, consultant, mentor and author, and has been using the SAS and JMP software since 1980. He is credited in the original JMP manual for his roles in the early days. Charlie has written more than one hundred papers and has been an invited speaker at more than one hundred International, regional, special-interest, local, and in-house SAS and JMP conferences and meetings, and is the recipient of 13 "Best" contributed paper and poster awards. He is the co-author of several books including Google Search Complete! (Odyssey Press. 2014); and Quick Results with SAS/GRAPH Software (SAS Press. 1994). Currently, Charlie is involved as an eBook author, sasCommunity.org Advisory Board member, mentor, application developer, and consultant in SAS and JMP software.

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