

Downloading, Configuring, and Using the Free SAS® University Edition Software

Kirk Paul Lafler, Software Intelligence Corporation, Spring Valley, California

Charles Edwin Shipp, Consider Consulting Corporation, San Pedro, California

Ryan Paul Lafler, High School Student, Spring Valley, California

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 presents the process of downloading and configuring the SAS University Edition. 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.

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

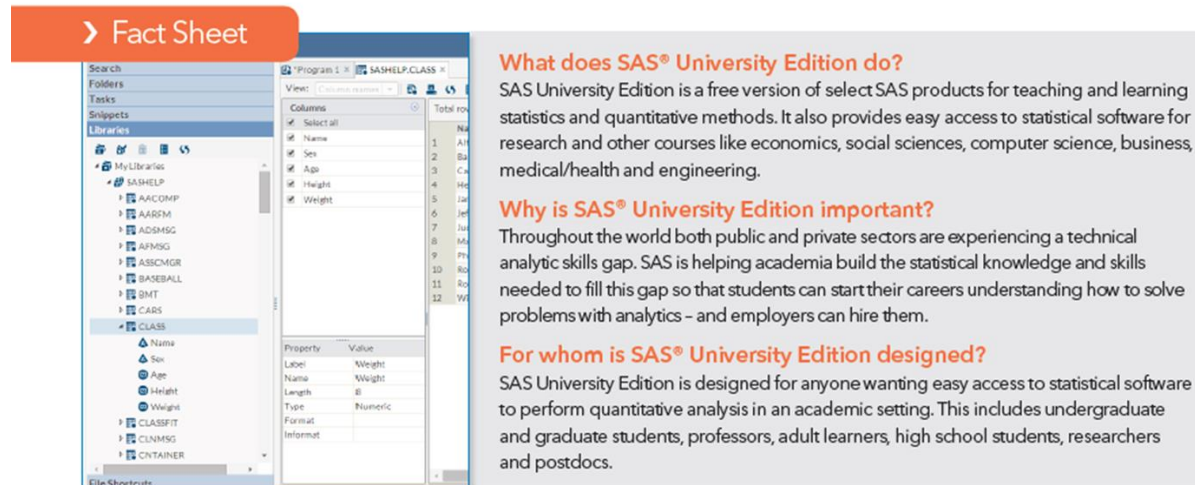
The SAS/ACCESS software supports the ability to read, write, and update data sources; provides a flexible query language; supports the access to a variety of data sources including text files, dat files, CSV files, Excel spreadsheets, Microsoft SQL Server, and ODBC; and much more.

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.



What does SAS® University Edition do?
SAS University Edition is a free version of select SAS products for teaching and learning statistics and quantitative methods. It also provides easy access to statistical software for research and other courses like economics, social sciences, computer science, business, medical/health and engineering.

Why is SAS® University Edition important?
Throughout the world both public and private sectors are experiencing a technical analytic skills gap. SAS is helping academia build the statistical knowledge and skills needed to fill this gap so that students can start their careers understanding how to solve problems with analytics – and employers can hire them.

For whom is SAS® University Edition designed?
SAS University Edition is designed for anyone wanting easy access to statistical software to perform quantitative analysis in an academic setting. This includes undergraduate and graduate students, professors, adult learners, high school students, researchers and postdocs.

SAS® University Edition

Free statistical software to improve research and launch careers

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.

KNOWLEDGE BASE / SAS PRODUCTS & SOLUTIONS

KNOWLEDGE BASE

- Products & Solutions
 - SAS 9.4
 - SAS 9.3
 - SAS 9.2
 - Maintenance & Product Upgrades
- System Requirements
- Install Center
- Third-Party Software Reference
- Documentation
- Papers
- Samples & SAS Notes
- Focus Areas

SAS® Products and Solutions

SAS® 9.4

The second maintenance release for SAS 9.4, which includes the Analytical Products 13.2, is the most recent release of SAS software. SAS 9.4 TS1M2 (9.4M2) is available to customers starting in August 2014. It delivers a more highly available and resilient platform for deploying SAS in traditional on-site environments along with additional support for private and public cloud deployments.

► [Read more about SAS 9.4 and the Analytical Products](#)

SAS Product Listing: Index A-Z

The product listing offers a one-stop shop for documentation, samples, training and news provided by product.

A B C D E F G H I J L M O Q R S T U V W

A

[SAS/ACCESS](#)
[SAS Activity-Based Management](#)
[SAS Add-In for Microsoft Office](#)
[SAS Anti-Money Laundering](#)
[SAS/AF](#)
[SAS Analytics Pro](#)
[SAS AppDev Studio](#)

↑ [Back to Top](#)

B

[Base SAS](#)

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.



THE POWER TO KNOW.

Providing software solutions since 1976

[support.sas.com](#)
[Knowledge Base](#)
[Support](#)
[Training & Books](#)
[Happenings](#)
[Store](#)
[Support Communities](#)

KNOWLEDGE BASE / DOCUMENTATION

KNOWLEDGE BASE

- Products & Solutions
- System Requirements
- Install Center
- Third-Party Software Reference
- Documentation
 - What's New In SAS
 - Product Index A-Z
 - SAS Analytical Products 13.2
 - SAS Analytical Products 13.1
 - SAS 9.4
 - SAS Analytical Products 12.1
 - SAS 9.3
 - SAS 9.2
 - Earlier SAS Releases
- Papers
- Samples & SAS Notes
- Focus Areas

SAS Product Documentation

Starting Points

- Product Index A-Z
- Programmer's Bookshelf
- What's New in SAS
- Documentation by Title

Syntax Shortcuts

- Syntax Lookup 9.4 | 9.3
- SAS Procedures by Name and Product 9.4 | 9.3 | 9.2
- SAS Language Elements by Name, Product, and Category 9.4 | 9.3 | 9.2

Search

Release
All SAS releases (9.2 and later)

Product
All Products

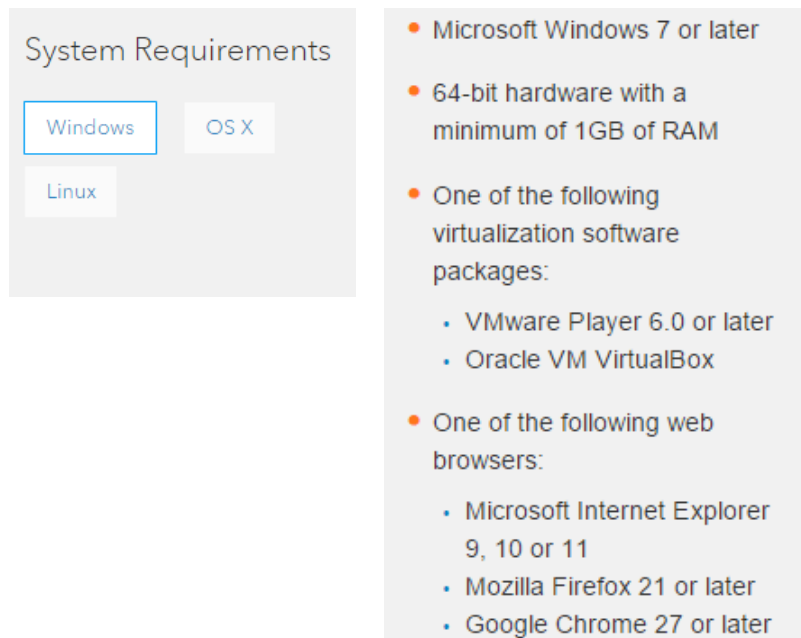
Display
☒ All topics
☐ Examples only
☐ Syntax only

Submit

Figure 4. Knowledge Base – SAS Product Documentation

System Requirements

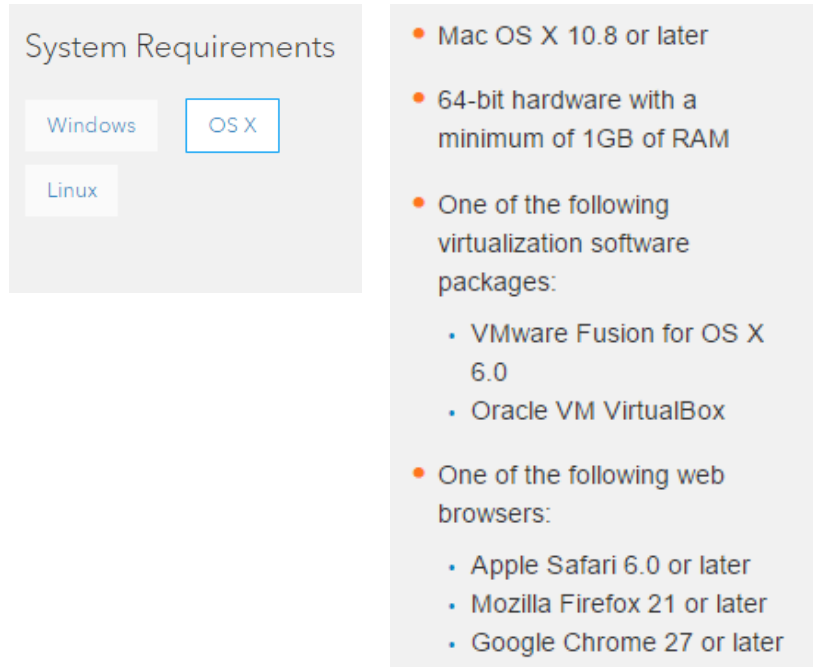
The minimum system requirements for running SAS University Edition under Windows, Mac OS X, and Linux appear below.



The screenshot shows the 'System Requirements' page for SAS University Edition. On the left, there are three tabs: 'Windows' (selected), 'OS X', and 'Linux'. On the right, the requirements for Windows are listed:

- Microsoft Windows 7 or later
- 64-bit hardware with a minimum of 1GB of RAM
- One of the following virtualization software packages:
 - VMware Player 6.0 or later
 - Oracle VM VirtualBox
- One of the following web browsers:
 - Microsoft Internet Explorer 9, 10 or 11
 - Mozilla Firefox 21 or later
 - Google Chrome 27 or later

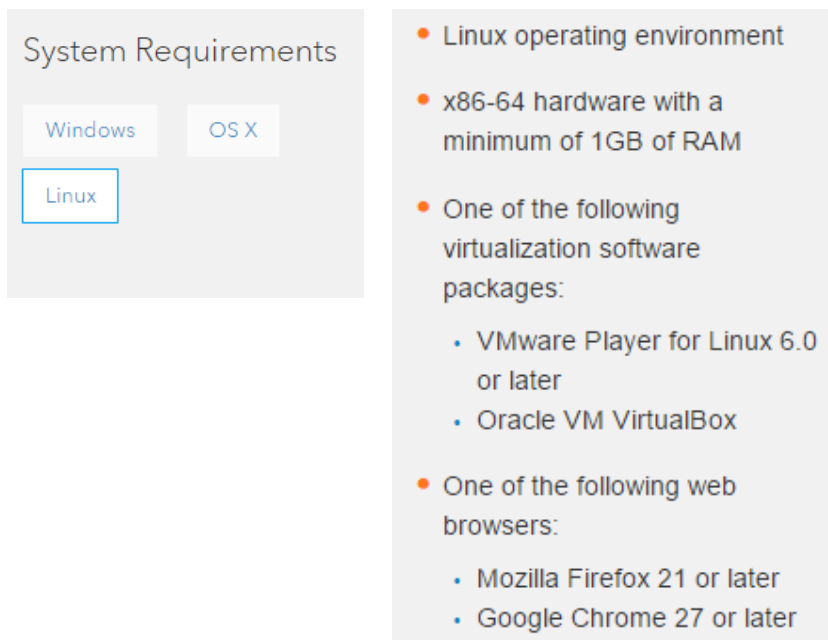
Figure 5. System Requirements for the Windows environment



The screenshot shows the 'System Requirements' page for SAS University Edition. On the left, there are three tabs: 'Windows', 'OS X' (selected), and 'Linux'. On the right, the requirements for Mac OS X are listed:

- Mac OS X 10.8 or later
- 64-bit hardware with a minimum of 1GB of RAM
- One of the following virtualization software packages:
 - VMware Fusion for OS X 6.0
 - Oracle VM VirtualBox
- One of the following web browsers:
 - Apple Safari 6.0 or later
 - Mozilla Firefox 21 or later
 - Google Chrome 27 or later

Figure 6. System Requirements for the Mac OS X environment



The screenshot shows the 'System Requirements' section of the SAS University Edition website. On the left, there are three tabs: 'Windows', 'OS X', and 'Linux'. The 'Linux' tab is selected and highlighted with a blue border. To the right of the tabs, a list of requirements is displayed in a light gray box. The requirements are as follows:

- Linux operating environment
- x86-64 hardware with a minimum of 1GB of RAM
- One of the following virtualization software packages:
 - VMware Player for Linux 6.0 or later
 - Oracle VM VirtualBox
- One of the following web browsers:
 - Mozilla Firefox 21 or later
 - Google Chrome 27 or later

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.

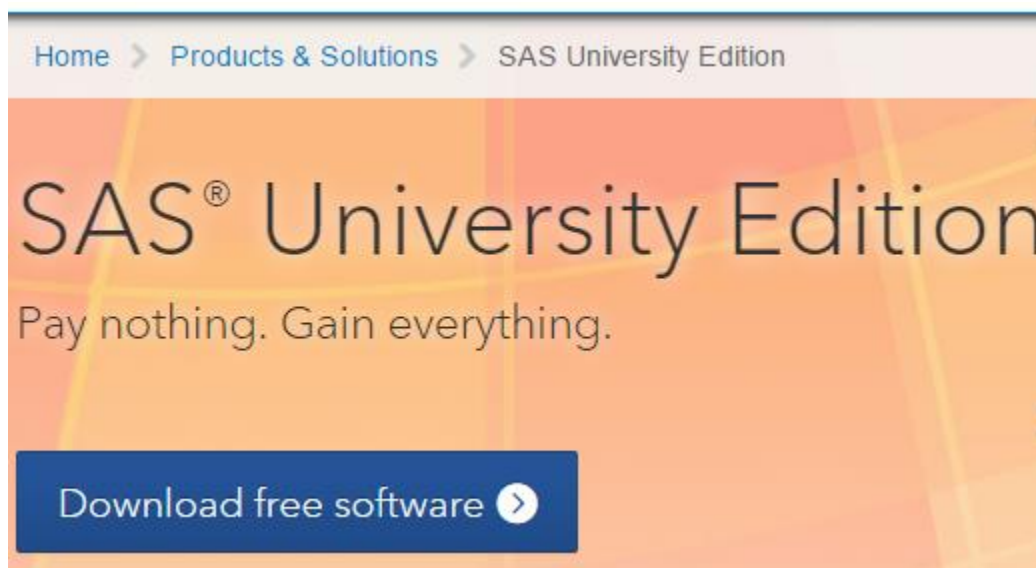


Figure 5. Online invitation to download the free SAS University Edition software

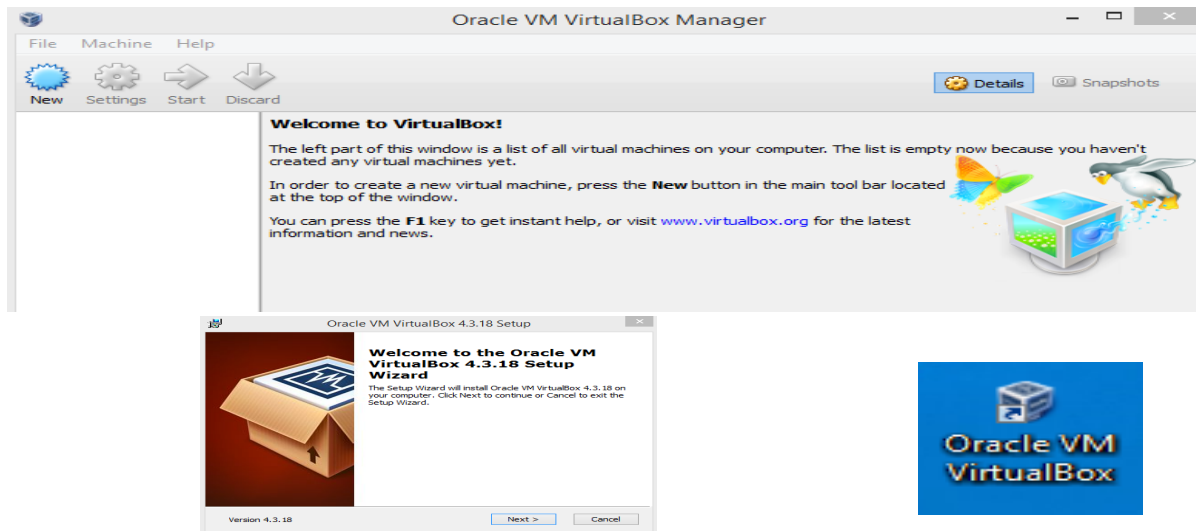


Figure 6. Downloading the free Oracle VM VirtualBox

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.

Step 1: Verify that you have a compatible virtualization software package.

Because SAS University Edition is a virtual application (or **vApp**), you need virtualization software to run it. Compatible virtualization software packages are listed in the table below. If you don't already have compatible virtualization software, you can download a package using the links below.

Windows	VMware Player 6.0 or later	Oracle VM VirtualBox
OS X	VMware Fusion for OS X 6.0	Oracle VM VirtualBox
Linux	VMware Player for Linux 6.0 or later	Oracle VM VirtualBox

Figure 8. Verify Compatible Virtualization Software Package

Step 2: Get the Quick Start Guide (PDF or video) for your virtualization software package.

Don't just download the PDF – actually read it. Or watch the video if that's more your thing. Or do both! You'll find a lot of useful info in the Quick Start Guides, including step-by-step instructions. Seriously. You won't regret it.

- **VMware Player Quick Start Guide**

[Download the PDF](#)

[Watch the video](#)
- **VMware Fusion Quick Start Guide**

[Download the PDF](#)

[Watch the video](#)
- **Oracle VirtualBox Quick Start Guide**

[Download the PDF](#)

[Watch the video](#)

Figure 9. Download the Oracle VirtualBox Quick Start Guide

Step 3: Download SAS® University Edition.

Choose the appropriate download file for your virtualization software package. You will then be prompted to:

- a. Create or sign in to your SAS profile.
- b. Accept the user licensing agreement.
- c. Begin the download.

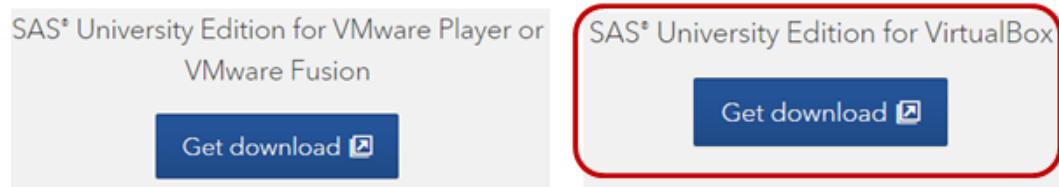


Figure 9. Download the Oracle VirtualBox Quick Start Guide



THE
POWER
TO KNOW.

SAS Login

Already Have a Profile?

Email:

Password:

☒ Keep me logged in

Login

[Forgot Password?](#)
[Need Help?](#)
[Chat Unavailable](#)

New User?

Create your profile to take full advantage of our site.

Create

Why Create a Profile?

Get social - join SAS communities.
 Get help - follow your tech support questions.
 Get software - download software/hot fixes.
 Get informed - manage e-learning/newsletters.

Figure 10. Creating and Logging in to Your SAS Profile

Thank you for your order.

Order Details

Order Status	In Progress
Order Number	105145
Order Date	October 14, 2014 1:08:04 AM EDT
Terms & Conditions	UE_LGL3535_15JUL2014

[Print a copy of this order confirmation](#)
 You will be emailed a copy of this order confirmation.

Shipment 105145-1

Description	Unit Price	Qty.	Total
 SAS University Edition VirtualBox, ESD • Single user • Non-commercial use	0.00 USD	1	0.00 USD
Download			
Item Subtotal			0.00 USD
Item Taxes			0.00 USD
Total for This Shipment			0.00 USD

Figure 11. Ready to Download SAS University Edition Software

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

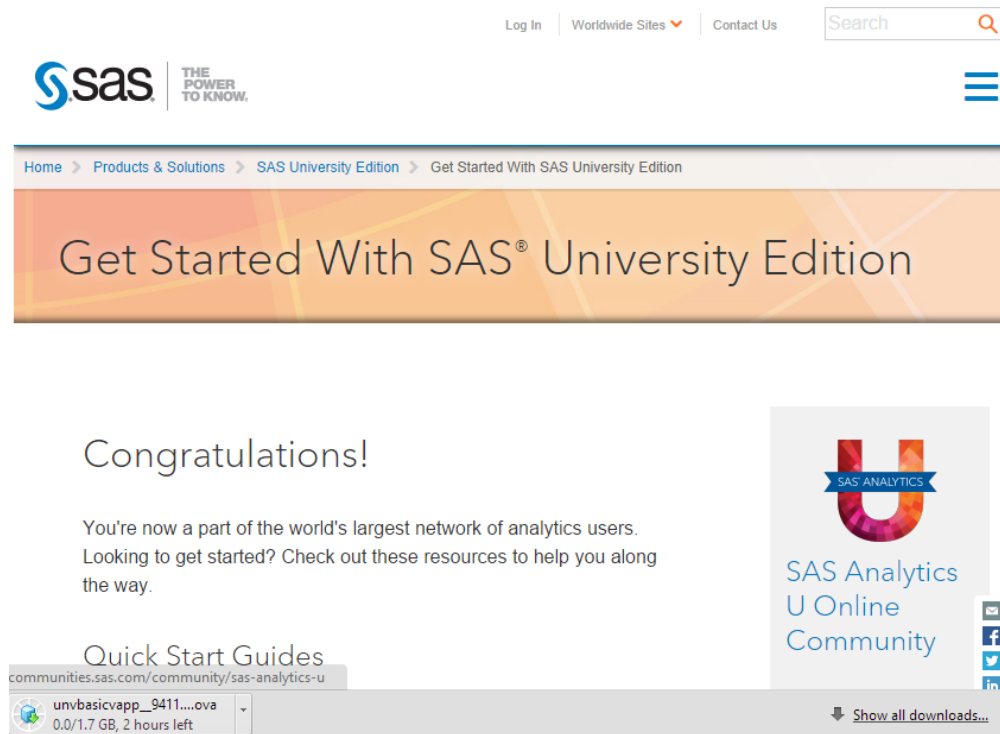


Figure 12. Get Started with SAS University Edition Software

Configuration Check List

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

SAS® University Edition: Installation Guide for Windows



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** content 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

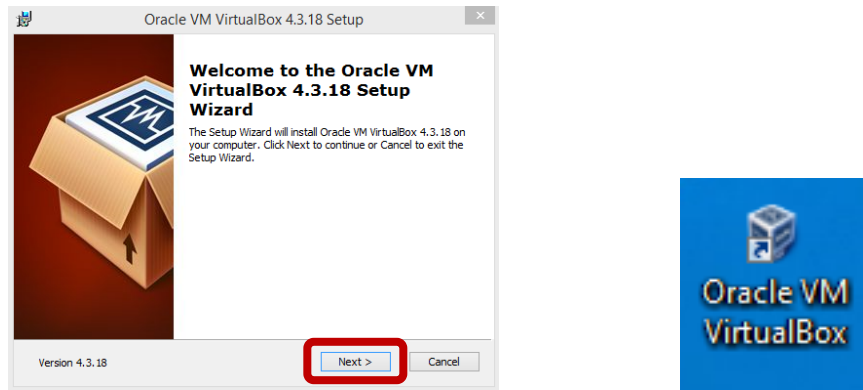


Figure 16. Open and Launch Oracle VM VirtualBox Setup

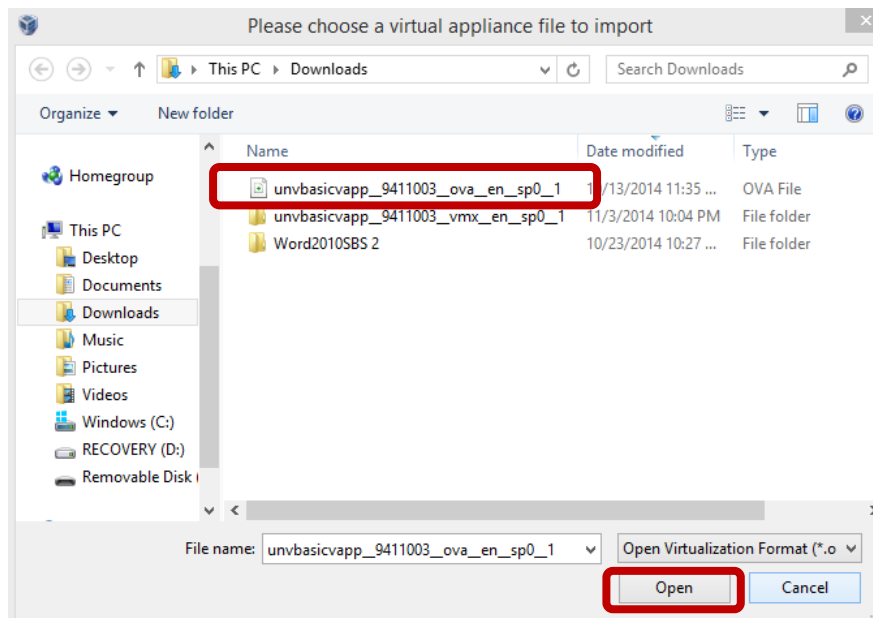


Figure 17. Select the desired VM VirtualBox Appliance to import and Click “Open”

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

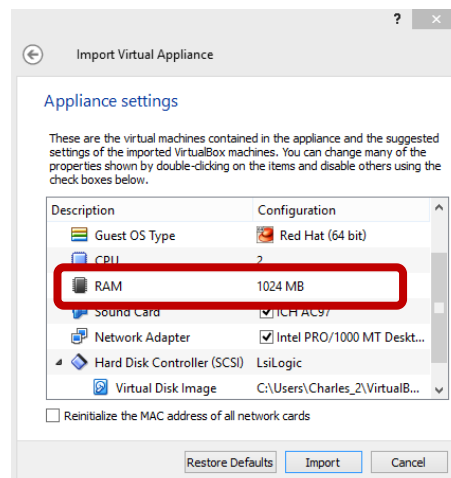


Figure 18. Oracle VM VirtualBox RAM Appliance settings

Importing the Oracle VM VirtualBox Appliance takes about 3 minutes.

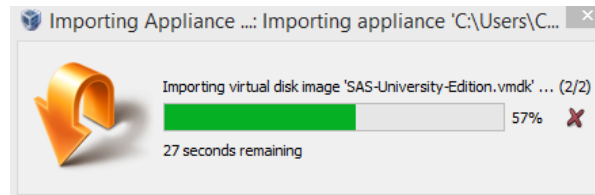


Figure 19. Importing the Oracle VM VirtualBox RAM Appliance

Now, select Machine Settings.

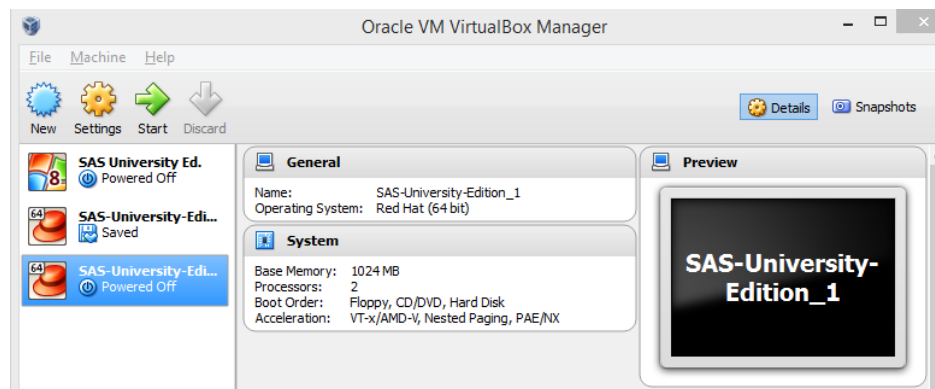


Figure 20. Oracle VM VirtualBox Machine settings

This completes the configuration of Oracle VM VirtualBox.

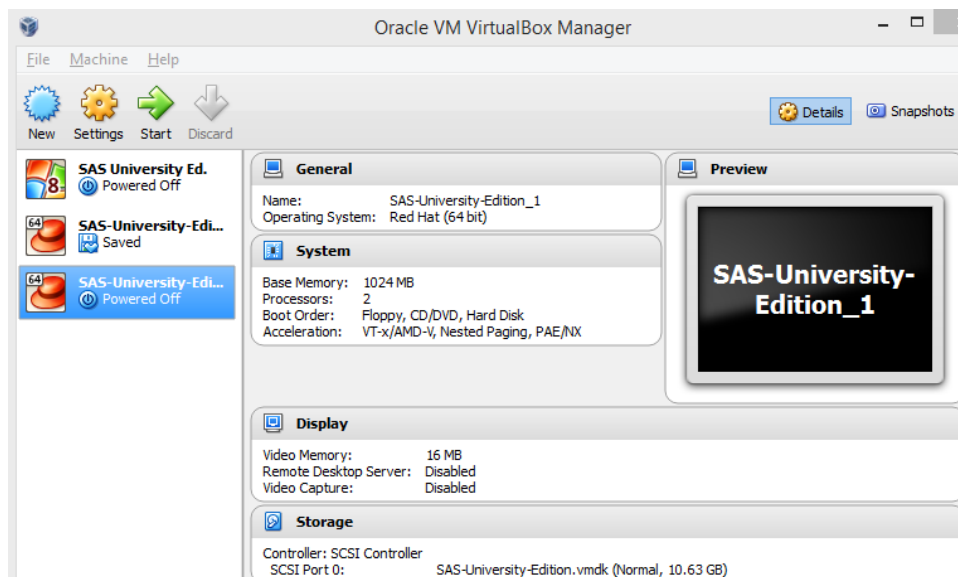


Figure 21. Oracle VM VirtualBox Configuration completion

SAS University Edition Processing

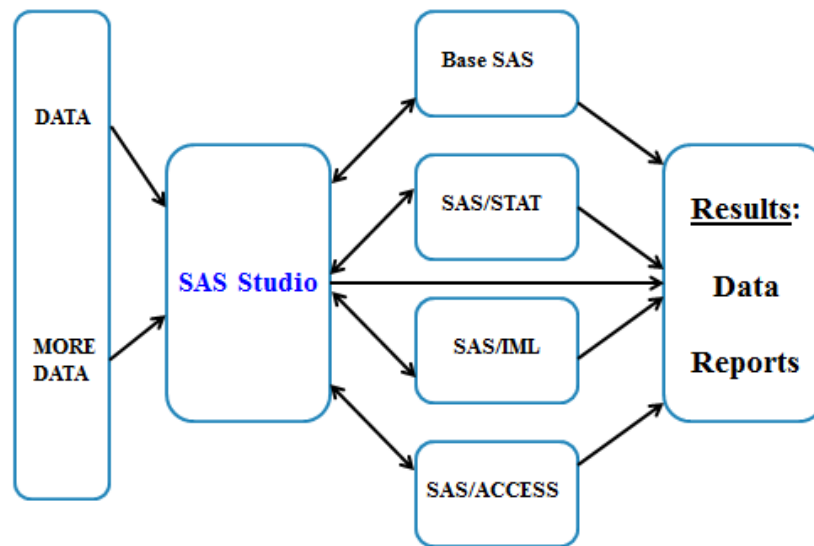


Figure 22. SAS Studio Control Flow

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.

References

- Lafler, Kirk Paul and Charles Edwin Shipp. 2016. *Downloading, Configuring, and Using the Free SAS University Edition Software*, Proceedings of the Wisconsin-Illinois SAS Users Group (WIILSU) Conference – 2016.
- Lafler, Kirk Paul and Charles Edwin Shipp. 2015. *Downloading, Configuring, and Using the Free SAS University Edition Software*, Proceedings of the Pharmaceutical SAS Users Group (PharmaSUG) Conference – 2015.
- Lafler, Kirk Paul. 2015. *A Review of Free Massive Open Online Content (MOOC) for SAS Learners*, Proceedings of the SAS Global Forum (SGF) Conference – 2015.
- Lafler, Kirk Paul and Charles Edwin Shipp. 2014. *Downloading, Configuring, and Using the Free SAS University Edition Software*, Proceedings of the South Central SAS Users Group (SCSUG) Conference – 2014.
- Lafler, Kirk Paul and Charles Edwin Shipp. 2014. *What's Hot, What's Not – Skills for SAS Professionals*, Proceedings of the South Central SAS Users Group (SCSUG) Conference – 2014.

Lafler, Kirk Paul and Charles Edwin Shipp. 2013. *What's Hot, What's Not – Skills for SAS Professionals*, PharmaSUG 2013; San Diego SAS Users Group (SANDS) Meeting – March 2013; IowaSUG 2013; and NebraskaSUG 2013.

Lafler, Kirk Paul and Charles Edwin Shipp. 2012. *What's Hot, What's Not – Skills for SAS Professionals*, Proceedings of the MidWest SAS Users Group (MWSUG) Conference – 2012.

Lafler, Kirk Paul and Charles Edwin Shipp. 2011. *What's Hot, What's Not – Skills for SAS Professionals*, Proceedings of the South Central SAS Users Group (SCSUG) Conference – 2011.

Lafler, Kirk Paul and Charles Edwin Shipp. 2011. *What's Hot, What's Not – Skills for SAS Professionals*, Proceedings of the SAS Global Forum (SGF) Conference – 2011.

Lafler, Kirk Paul and Charles Edwin Shipp. 2008. *What's Hot, What's Not – Skills for SAS Professionals*, Proceedings of the Annual Western Users of SAS Software (WUSS) Conference – 2008.

Acknowledgments

The authors thank Harry Droogendyk and Darryl Putnam, Planning/Support/Administration Section Chairs, for accepting our abstract and paper; Brian Varney, SESUG 2016 Academic Chair, Kristen Harrington, SESUG 2016 Operations Chair, the SouthEast SAS Users Group (SESUG) Executive Board, and SAS Institute for organizing and supporting a great conference!

Trademark Citations

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration. Other brand and product names are trademarks of their respective companies.

About the Authors

Kirk Paul Lafler is an entrepreneur, consultant and founder of Software Intelligence Corporation, and has been using SAS since 1979. Kirk is a SAS Certified Professional, provider of IT consulting services, professor at UC San Diego Extension and educator to SAS users around the world, mentor, and emeritus sasCommunity.org 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.

Ryan Paul Lafler is a senior at Valhalla High School in El Cajon, California with interests in the implementation and use of operating systems, statistics and SAS University Edition software, and the application of security strategies and techniques. Ryan works with proprietary and open-source operating systems including SAS University Edition software; uses malware and antivirus tools and software to identify and remove malicious software (malware) issues and threats; and is the recipient of a “Best” contributed paper at the 2013 Western Users of SAS Software (WUSS) Conference.

Comments and suggestions can be sent to:

Kirk Paul Lafler

Senior SAS® Consultant, Application Developer, Educator and Author
Software Intelligence Corporation

E-mail: KirkLafler@cs.com

LinkedIn: <http://www.linkedin.com/in/KirkPaulLafler>

Twitter: @sasNerd