

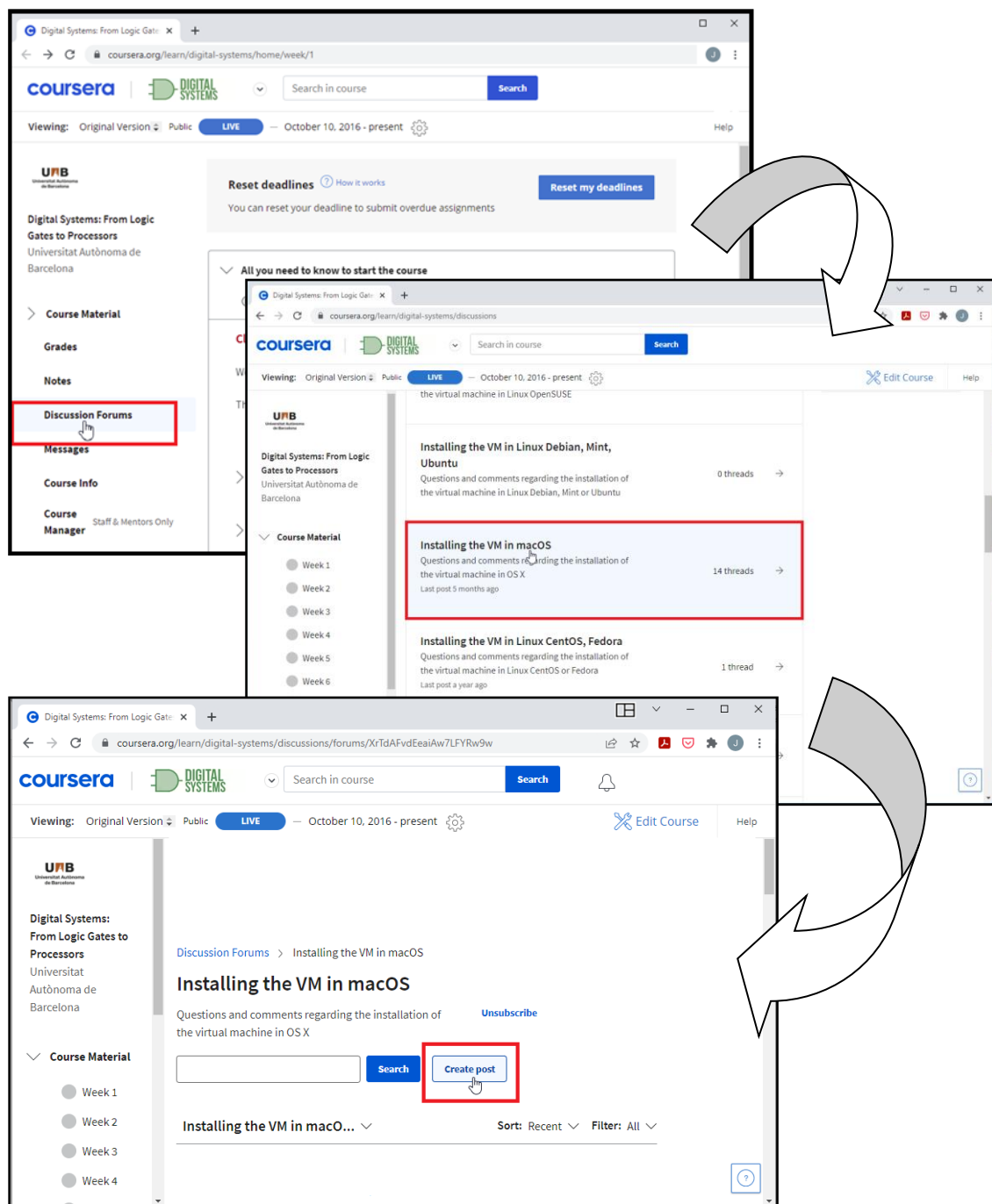
Installation of the DigitalSystemsVM virtual machine



on Intel processors



Notice

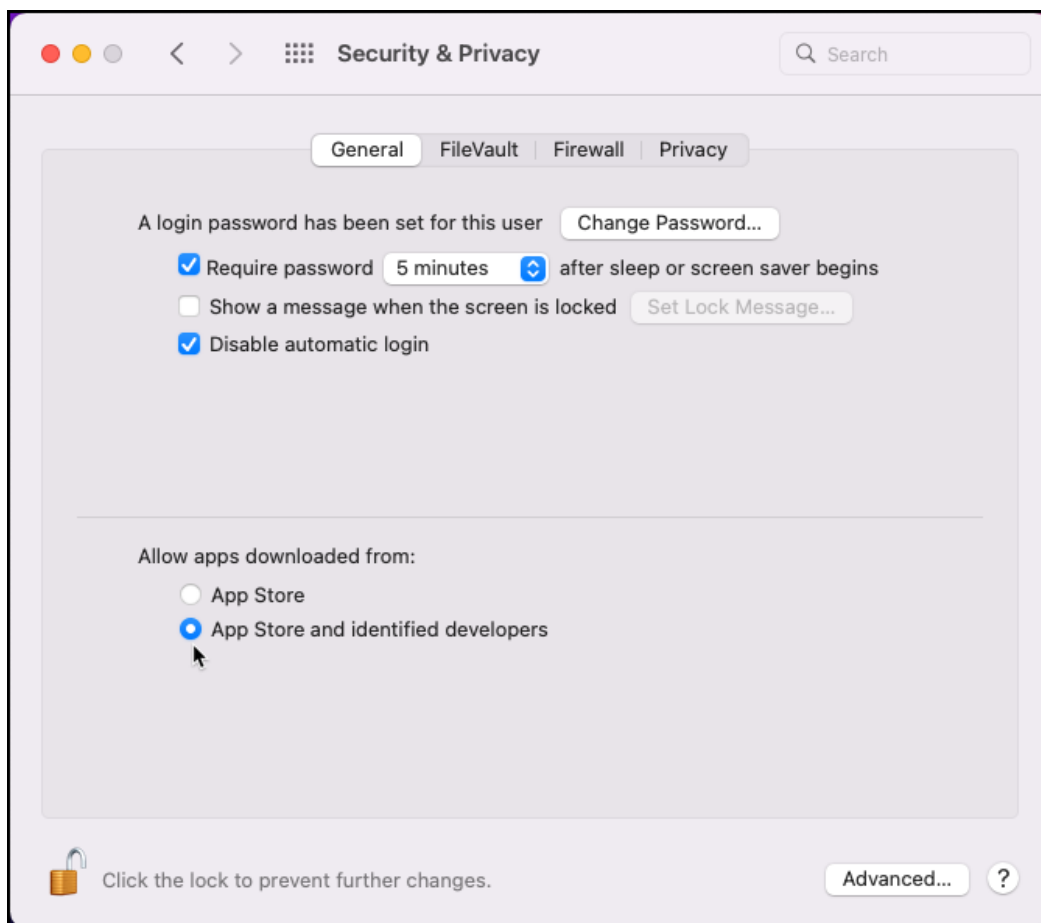
This document explains how to install the DigitalSystemsVM virtual machine on a computer with macOS 12 *Monterey* and an Intel processor. If questions or problems relating to the installation process arise, you may enter a question in the forums. In order to efficiently manage the forums, you must enter into the forum **Installing the VM in macOS** and create a new post explaining your problem. Please add information about your computer (model, processor, RAM memory, available disk space, operating system version, etc.). The following images show how to access to the **Installing the VM in macOS** forum and how to create a new post (red boxes).



Installing a VirtualBox virtual machine on macOS 12 Monterey

This document is intended to help you install VirtualBox on **macOS 12 Monterey** (running on an Intel processor). It describes the steps to follow for installing a virtual machine that contains the necessary applications to solve the assignments of this course and their automatic correction. This virtual machine, named **DigitalSystemsVM**, is a VirtualBox virtual machine running the GNU/Linux operating system, specifically SliTaz GNU/Linux 4.0 distribution. However, **NO** previous experience with this OS is required.

You will need an administrator account in order to install VirtualBox in your computer as its password may be requested during the installation. You will also need to allow the installation of applications downloaded from **App Store and identified developers**. You can set this in **System Preferences** , under the **General** tab of the **Security & Privacy** section , as shown in the following picture. An administrator account is needed to change this setting.



In order to follow these steps you must be logged into a computer with Internet connection. You should replace all instances of *username* with the name of the account in which you wish to use the virtual machine.


Step 1: Installing VirtualBox 6.1.30

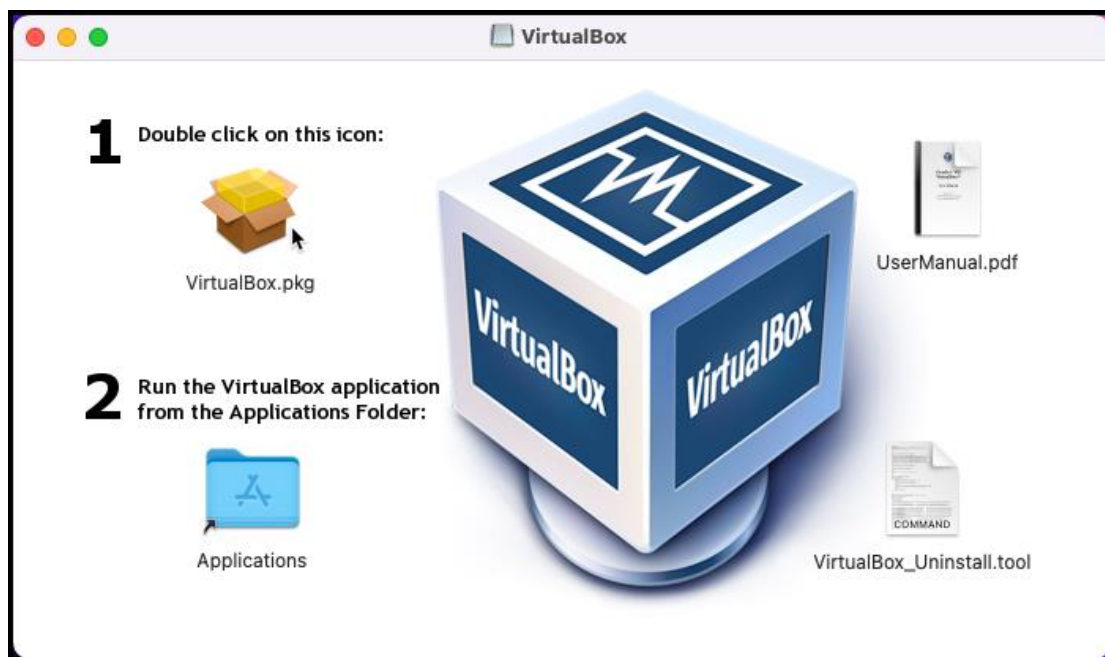
Open a web browser and download the VirtualBox application by typing

<https://download.virtualbox.org/virtualbox/6.1.30/VirtualBox-6.1.30-148432-OSX.dmg>

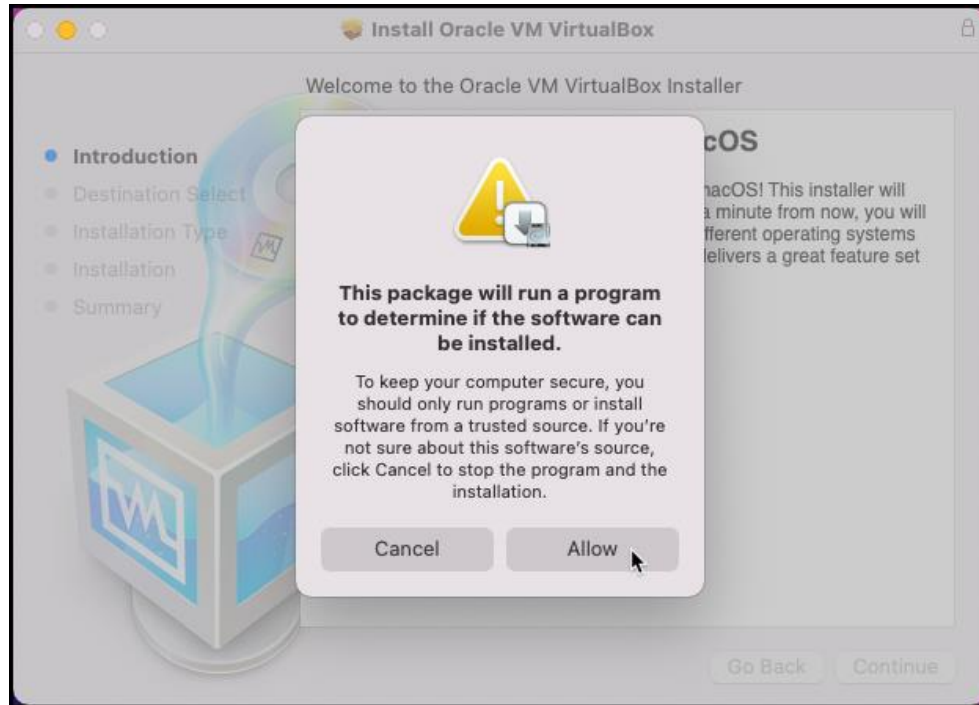
The DigitalSystemsVM machine has been exhaustively tested on the VirtualBox version found here. We highly recommend to install this specific version.

This will download the VirtualBox-6.1.30-148432-OSX.dmg file to your computer. Depending on the browser used, the file may be in the Downloads folder (in **/Users/username/Downloads/**) or in a different folder.

To start the VirtualBox installation, double-click on the **VirtualBox-6.1.30-148432-OSX.dmg** file. A window will appear (see next image) to guide you through the installation process. From here you can install VirtualBox, run it, read the documentation and uninstall the application. To continue with the installation process, double-click on the  icon shown in the section 1.



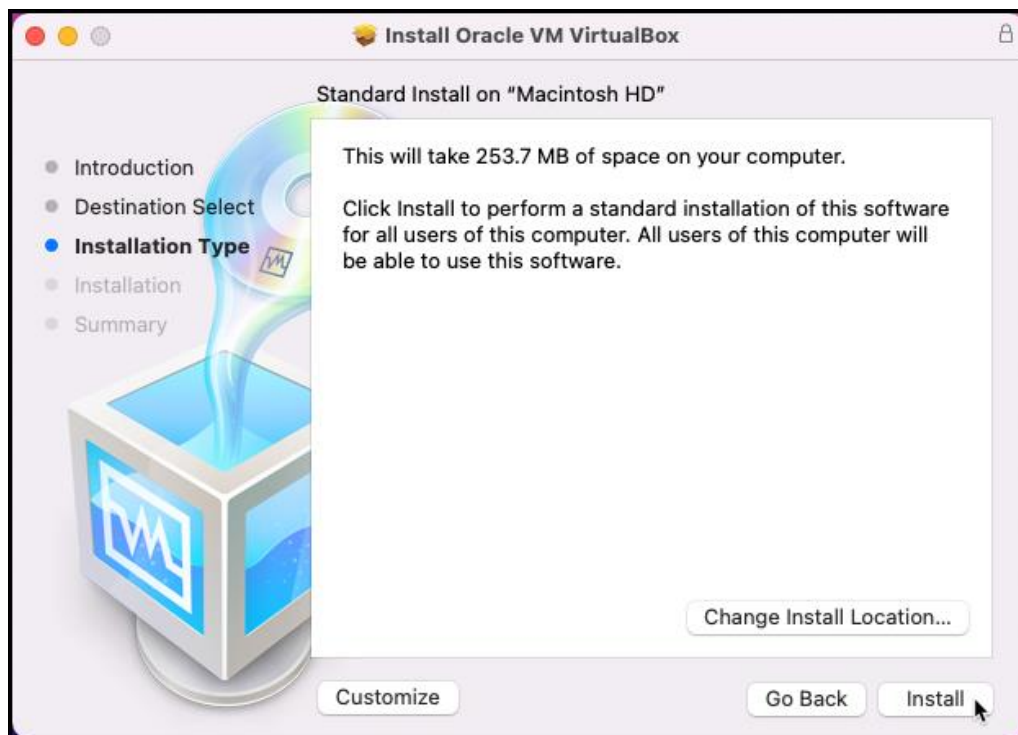
A new window appears, with a small pop up informing you that the system will verify if it is possible to install VirtualBox in this computer. Click on **Allow** (in the small pop up window) to grant permission.



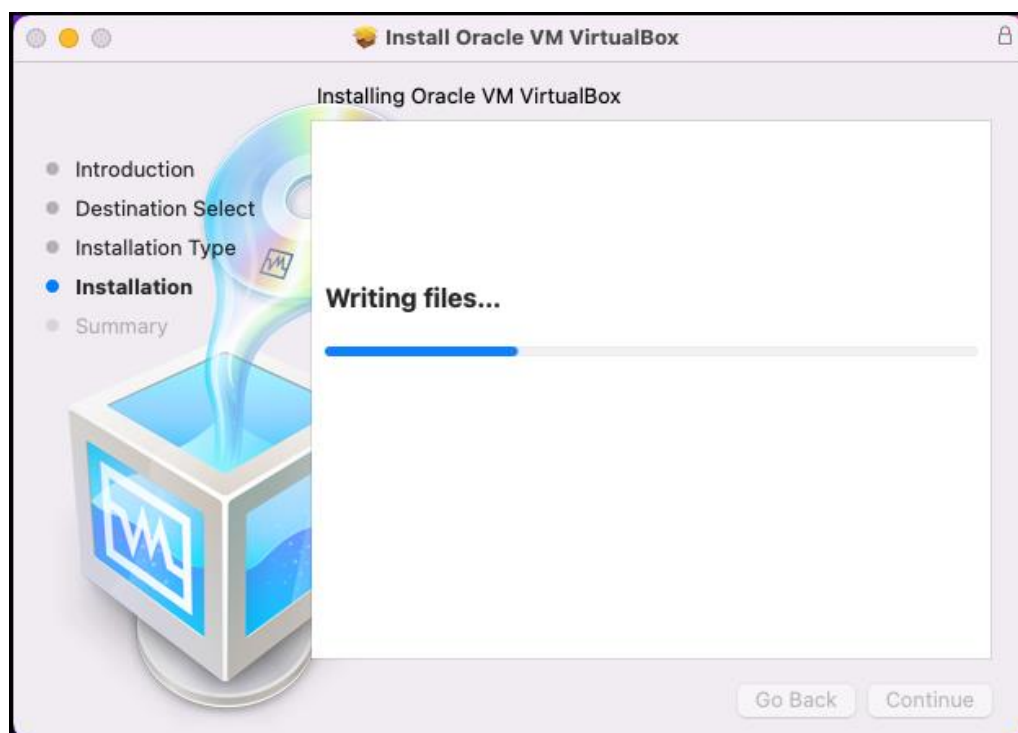
Next, click on **Continue** (in the main installation window) to continue the installation process .



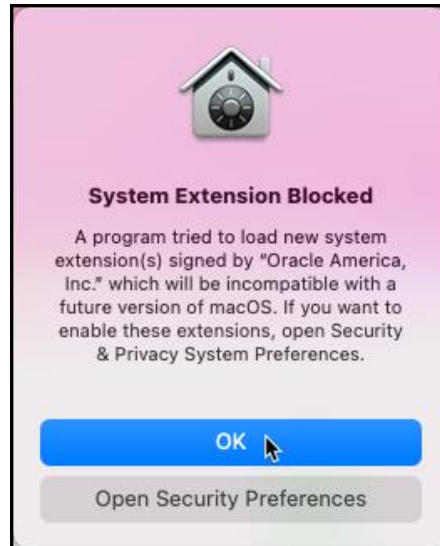
During the installation process, you will be asked to choose between a standard or custom installation. Choose the standard installation by clicking on the **Install** button.



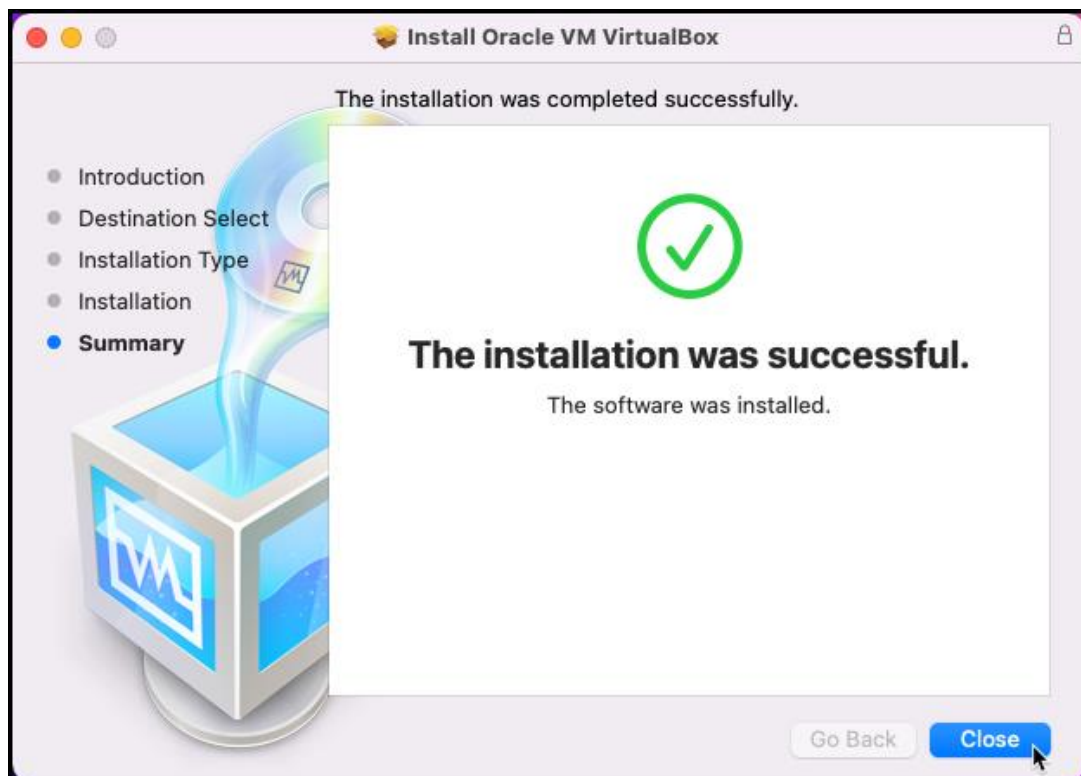
You will see an installation progress bar and some messages about the installation process.



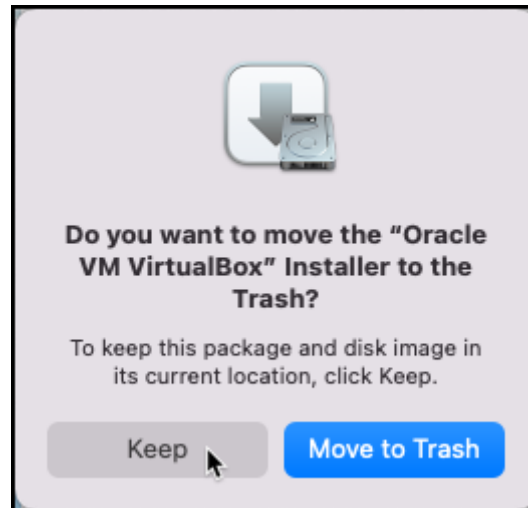
Towards the end of the installation, a message appears indicating that some system extensions signed by Oracle America (the corporation that owns VirtualBox) have been installed. These system extensions are blocked by default. In a later step they will be enabled. For now, click on the **OK** button.



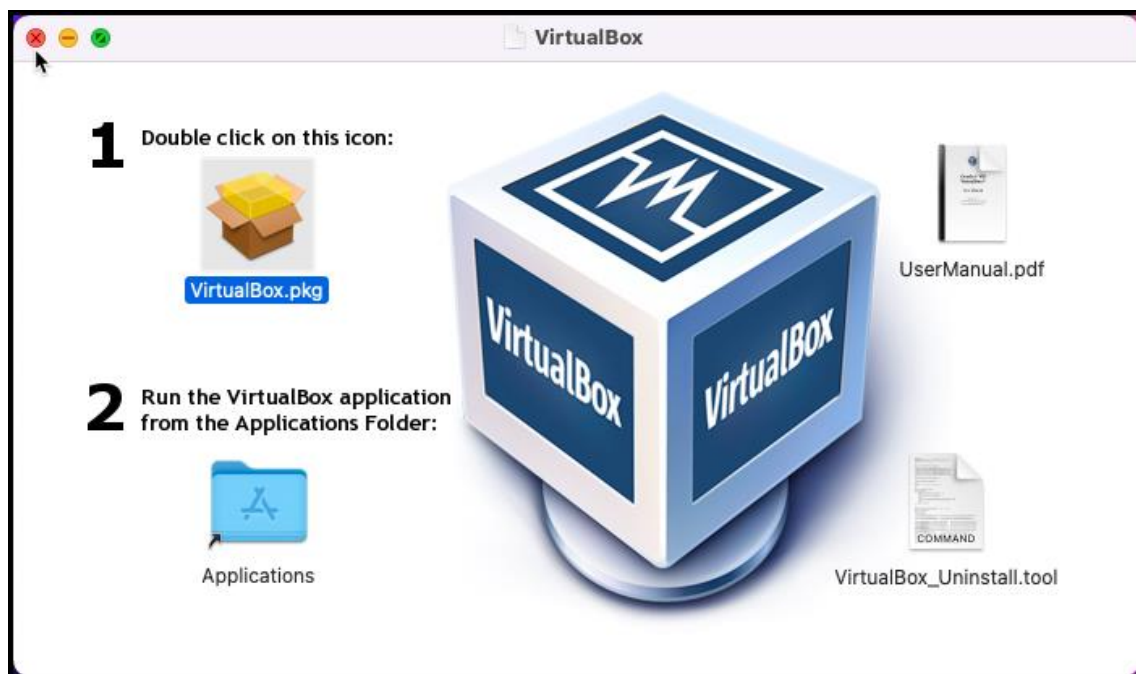
When the installation is done a message will appear (see image). Click on the **Close** button.





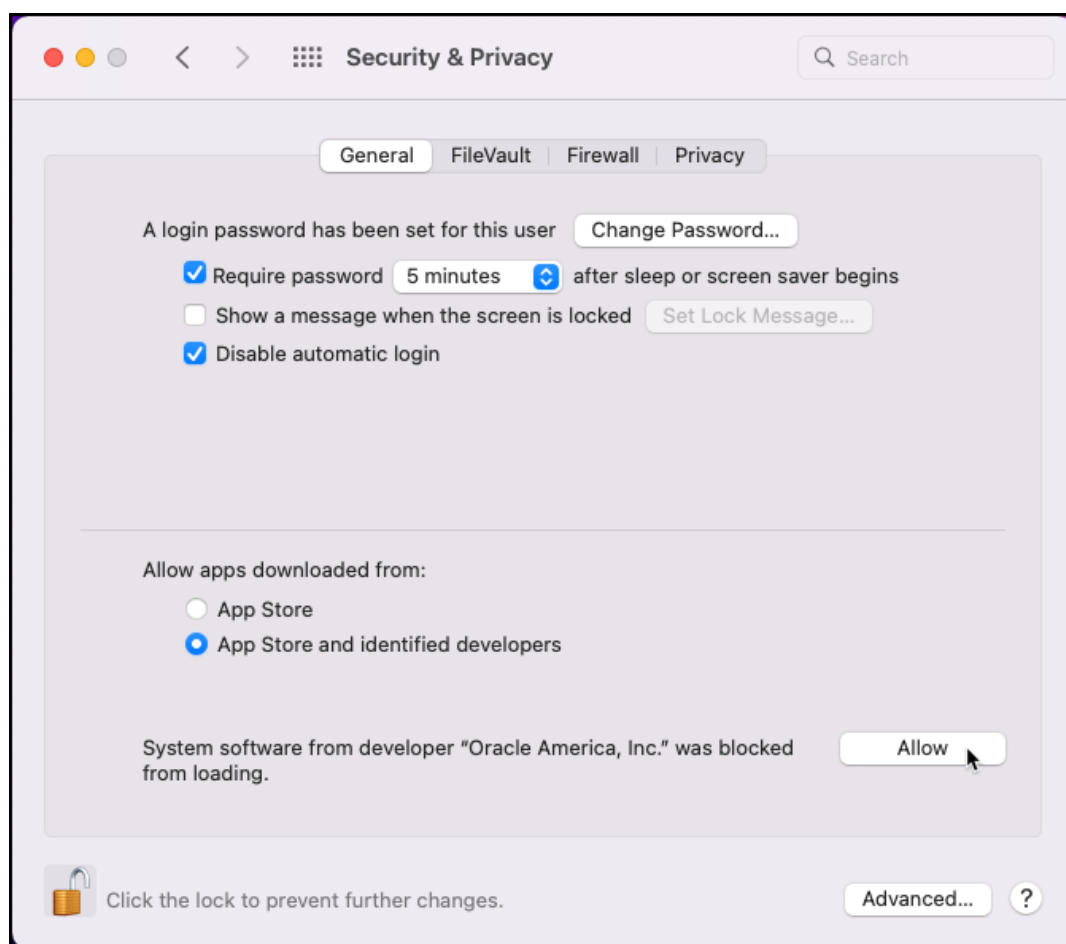
Before finishing the entire installation process, a small window opens asking if you want to remove the VirtualBox installer. Since the installer also contains the uninstall script, respond in the negative by clicking the **Keep** button. This way, you can optimally perform the uninstall whenever you want in the future.



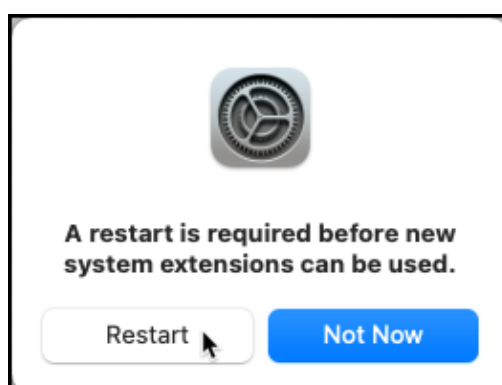
Finally, close the window with the installation instructions.



Now, the system extensions added during the VirtualBox installation will be enabled. To do so, go to **System Preferences** , **Security and Privacy** section , **General** tab. At the bottom you can see the notice *System software from developer "Oracle America, Inc." was blocked from loading*. Click on the **Allow** button.







After doing so, a window appears informing you of the need to restart the computer in order to use the new system extensions. Reboot the computer by clicking on the **Restart** button.

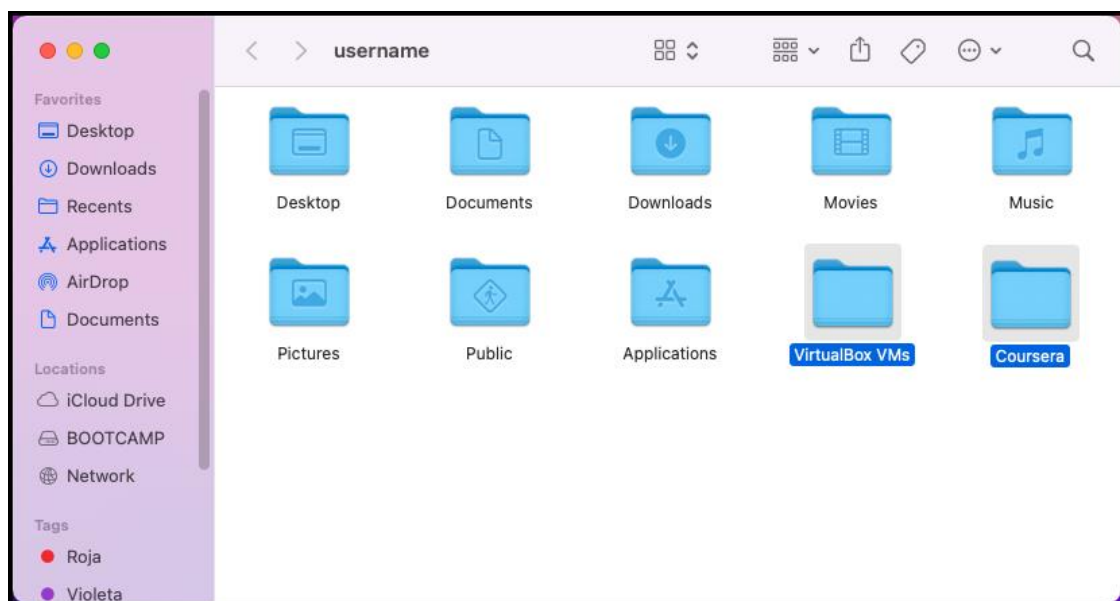
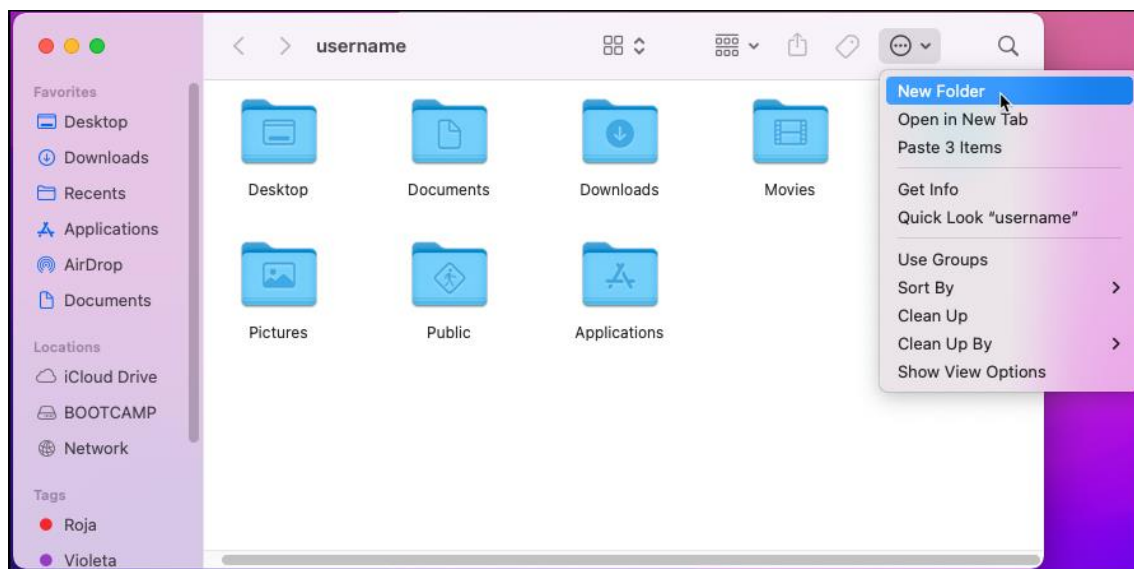



Step 2: Installing DigitalSystemsVM virtual machine

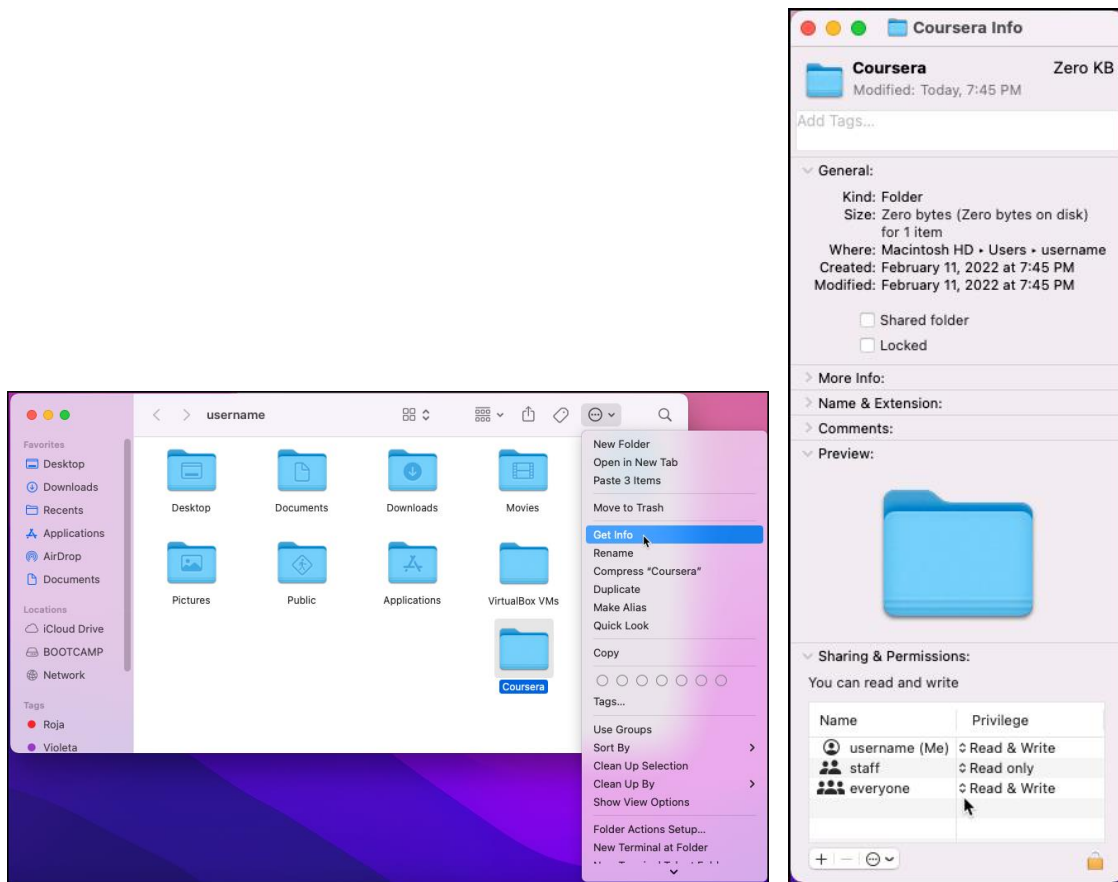
Create two folders named **VirtualBox VMs** (mind the whitespace between VirtualBox and VMs) and **Coursera** under **/Users/username/**. To do so, open the **Finder** with the home directory by typing:

   (Shift + Command + H)

click on  → “**New Folder**”, and change the name of “**untitled folder**” to **VirtualBox VMs** (see next two pictures). Repeat the process to create the folder **Coursera**.

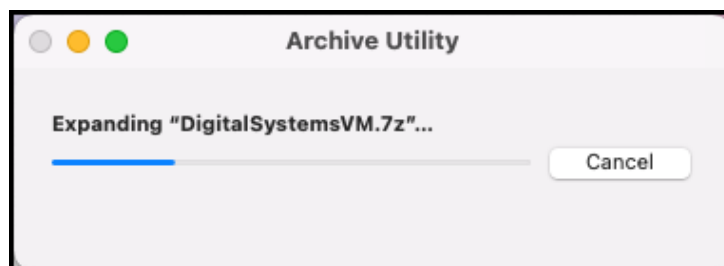


Select the **Coursera** folder, click on  → “**Get info**”, and set **Read & Write** permissions for **everyone** on the folder (see figures).




Next, download the 7z file containing the virtual machine from <https://crsrdigitalsystems.eu-central-1.linodeobjects.com/coursera/DigitalSystems/v2/VirtualMachine/DigitalSystemsVM.7z> and save it to **/Users/username/VirtualBox VMs**.

To decompress the virtual machine, double click on the file. A progress bar will display.



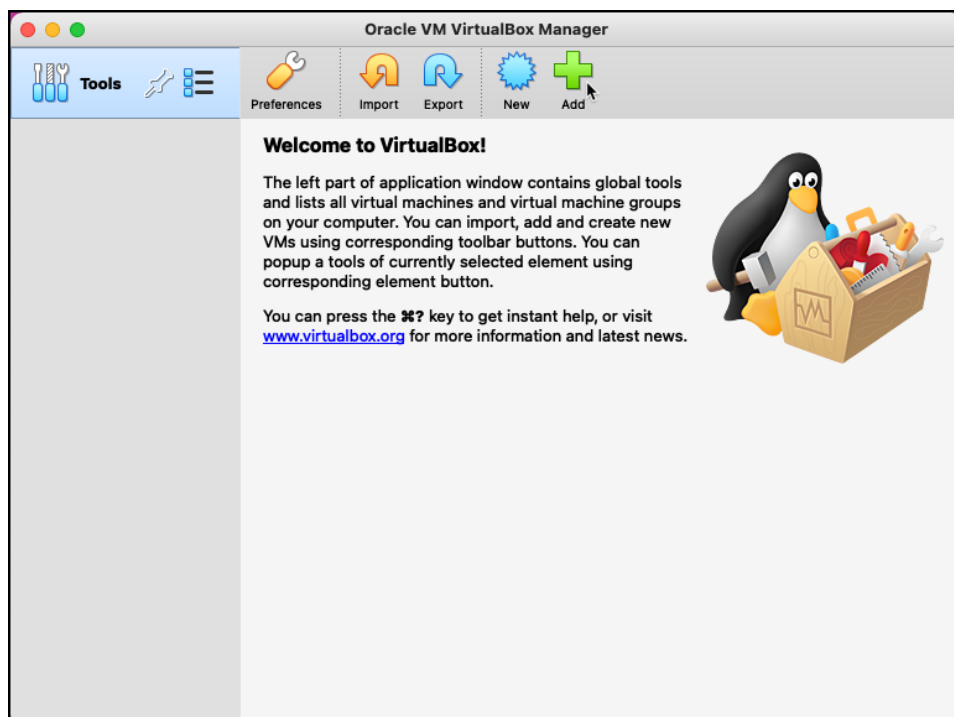
You will see a new folder named “**DigitalSystemsVM**” that contains the virtual machine files, **DigitalSystemsVM.vbox** and **DigitalSystemsVM.vmdk**.

Step 3: Adding the virtual machine and defining a shared folder

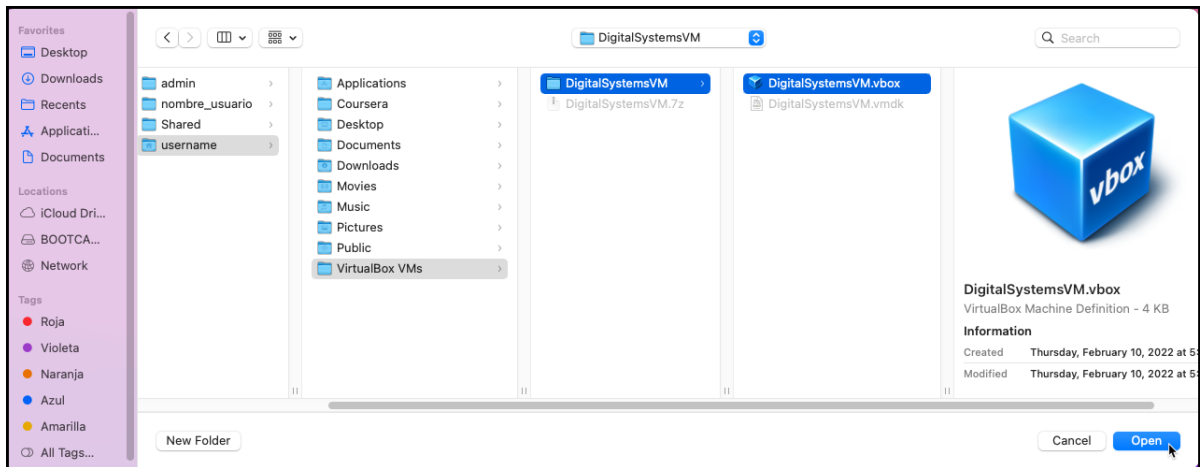
In this step you will add the **DigitalSystemsVM** virtual machine to VirtualBox. Run VirtualBox by opening the **Applications** folder in **Finder** and double-clicking on the  icon. You will see the following window:



Add the DigitalSystemsVM machine in **/Users/username/VirtualBox VMs /DigitalSystemsVM** to VirtualBox. To do so, click on **Add**.

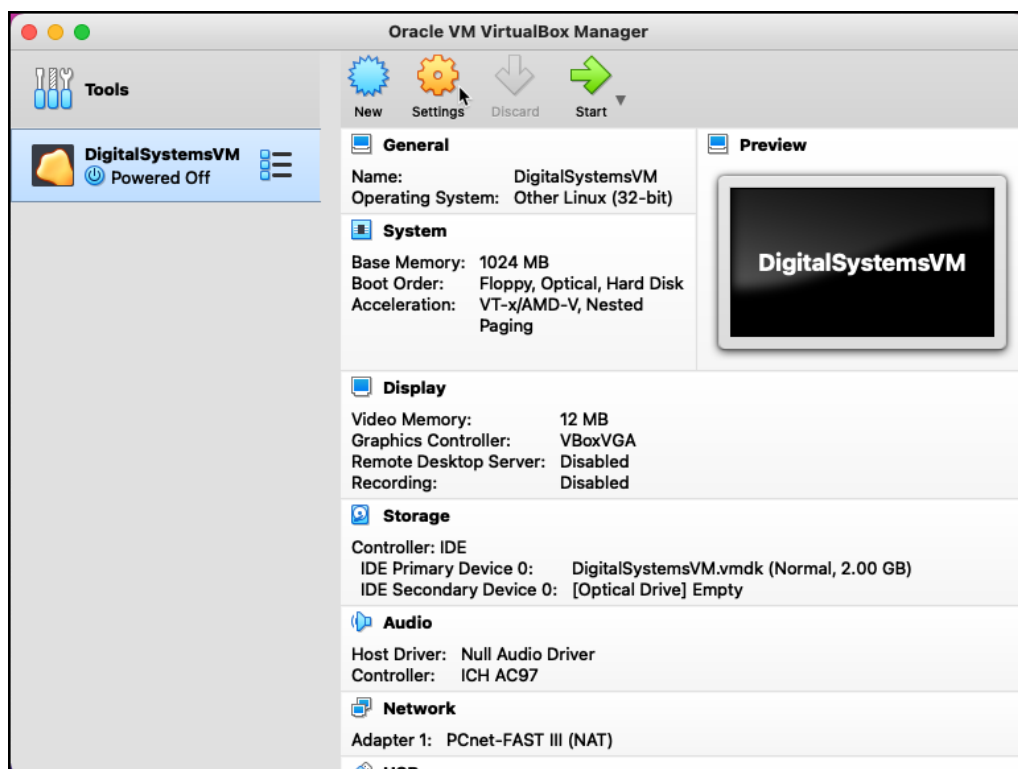


Then, select the **DigitalSystemsVM.vbox** file and click **Open**.

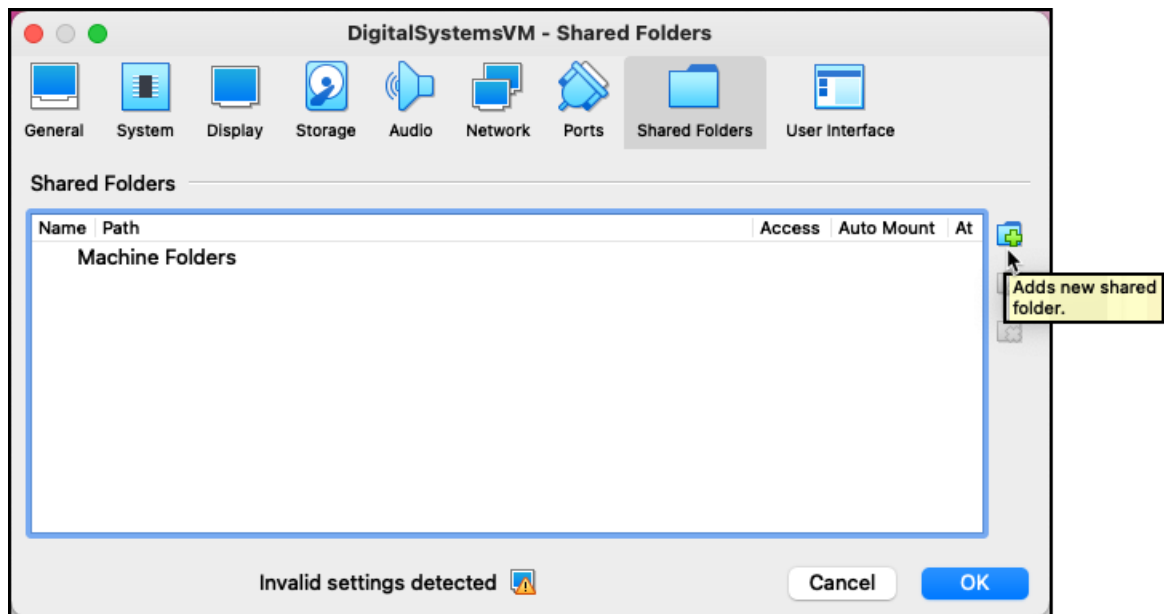


Now our machine has been added to VirtualBox and it appears in the left panel of the window.

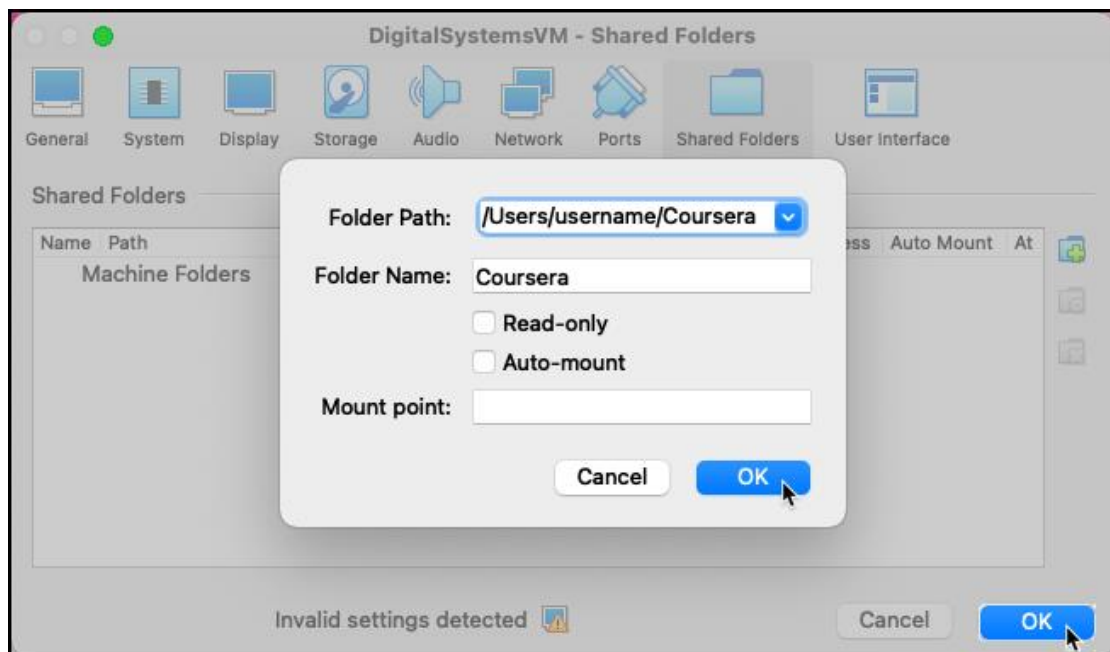
Finally, define the folder **Coursera** created in the previous step as a “shared folder”, i.e., a folder accessible from the host and from the virtual machine. To do so, select the virtual machine and click on **Settings**.



A window opens. Select the option **Shared Folders** in the new window and click on the icon “+” located at right (see arrow in the next figure).



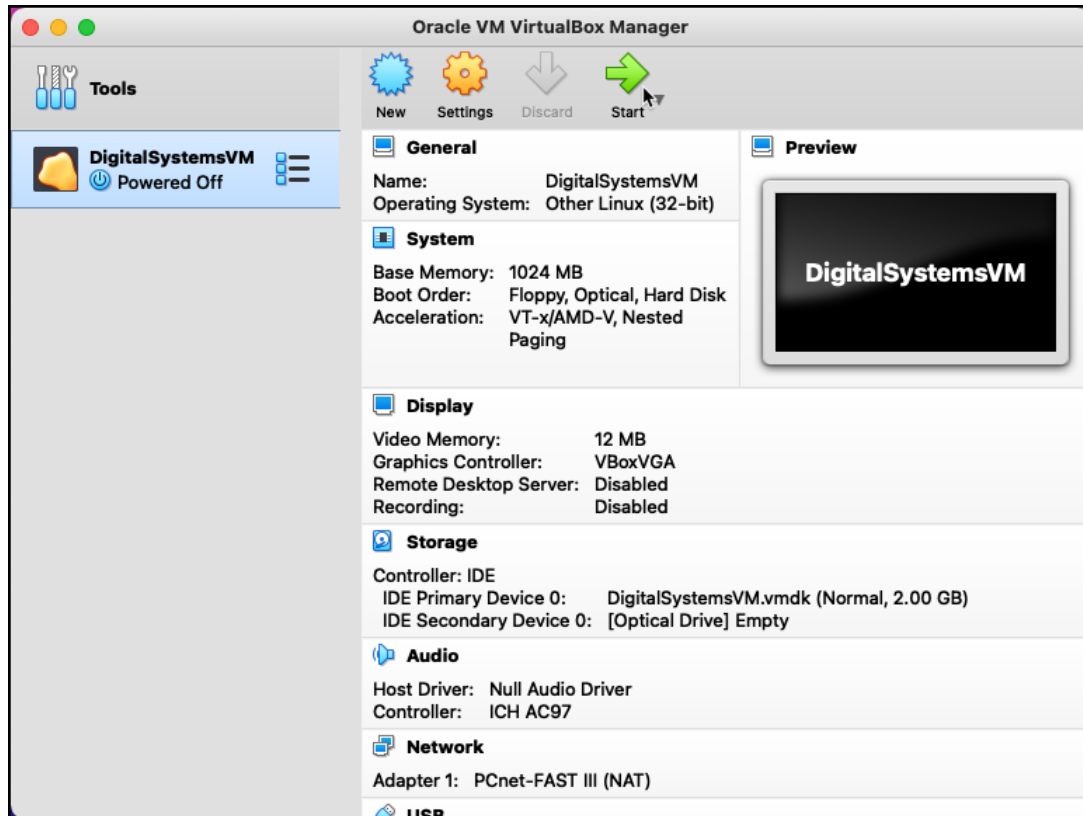
A new window opens. Select the path **/Users/username/Coursera** in the “Folder Path”, introduce **Coursera** in the “Folder Name” and click on **OK** in both windows (in the little one and in the Settings window).





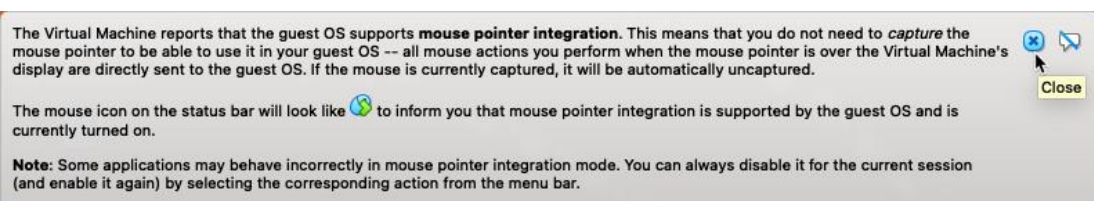
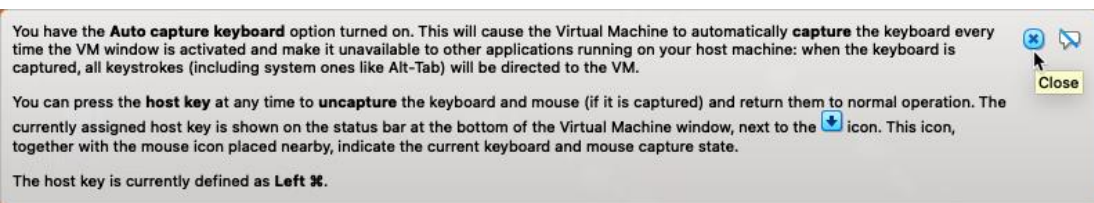
Processes described in this step only have to be performed ONE TIME, before the first run of the machine.

Step 4: Running the virtual machine

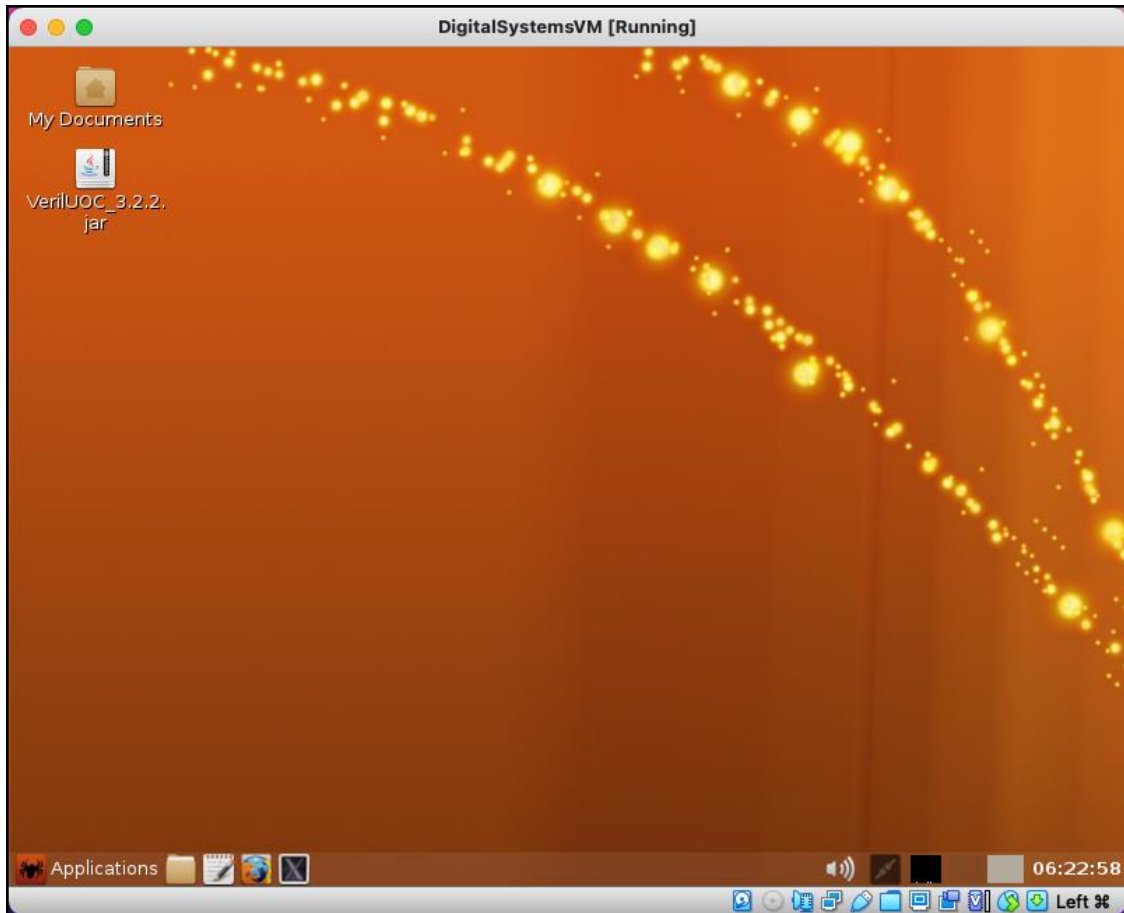
To run the machine, press the **Start** button as shown in the following picture.



During booting several windows will appear to inform you that the keyboard and mouse may be used directly from the virtual machine. Close these windows by pressing . You may also press  to stop these windows from popping in the future.



After booting the **DigitalSystemsVM** virtual machine, it will be displayed in a different window. DigitalSystemsVM is configured to login directly with the **mooccf** user account, with the password **mooccf**. You will be using this account to solve the problems of this course. The following picture shows the desktop of the **mooccf** account with the **VerilUOC_Desktop** application that you will use to complete the course exercises.



Before using the virtual machine you may need to change some part of the configuration from within the virtual machine.

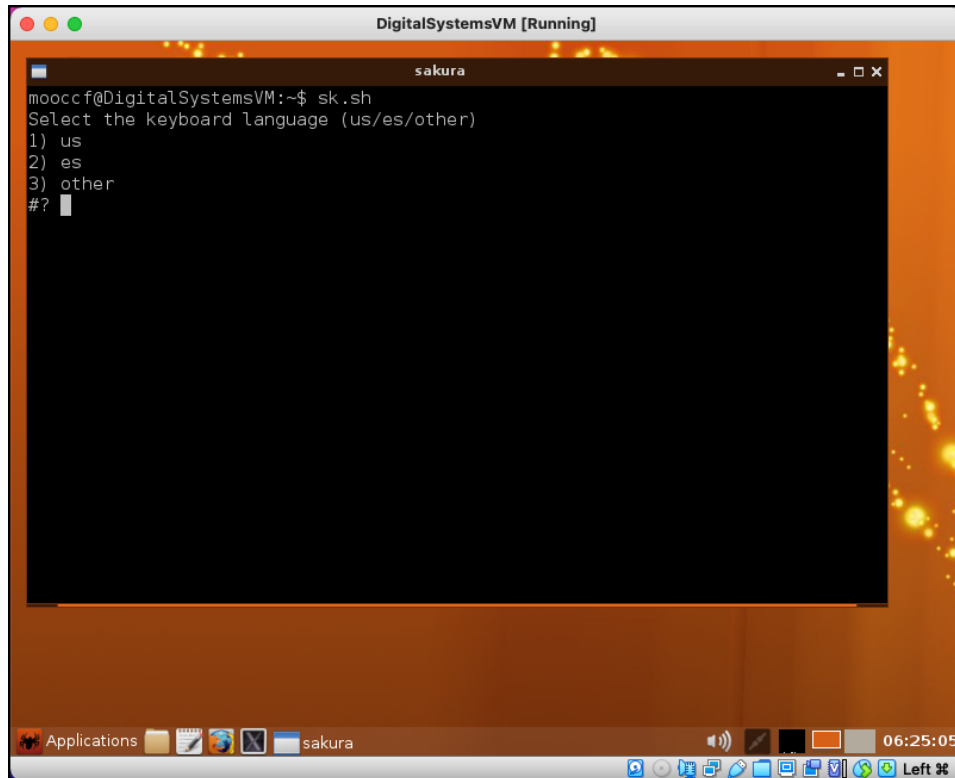
The virtual machine has the "es - qwerty" Spanish keyboard selected by default. If you want to switch to another keyboard (for instance, the English keyboard), click on the X icon located in the bottom panel of the DigitalSystemsVM virtual machine to open a terminal.



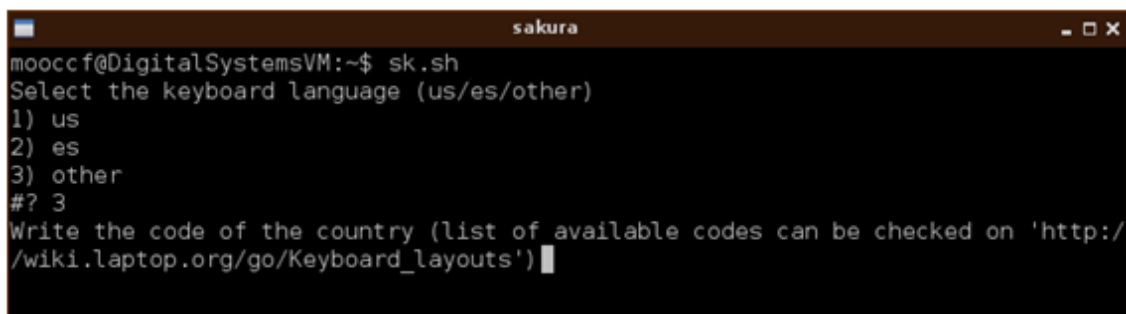
Execute the following command in the terminal to set up the keyboard:

sk.sh

Note: the simplest way to write the above command is to type the characters **sk** and then press the **TAB** key to fill in the rest of the command.



Type **1** in **#?** for an **English** keyboard, **2** for a **Spanish** keyboard, **3** for **any other**, and then click on **Return**. When a 3 has been selected a new question appears on the screen asking for the identifier of the keyboard you are using. Consult the codes in http://wiki.laptop.org/go/Keyboard_layouts and click on **Return**.



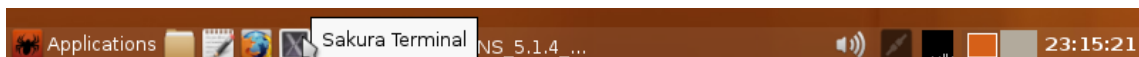
Finally, run the command:

exit

Step 5: Installing *Guest Additions*

The **Guest Additions** of VirtualBox are a set of device drivers and system applications designed to simplify the use of a VirtualBox virtual machine and optimize its performance. Next paragraphs describe how to install a specific version of the Guest Additions on the virtual machine DigitalSystemsVM. Let us note that this is a different version to which would correspond to the VirtualBox 6.1.30 version.

Open a terminal in the DigitalSystemsVM virtual machine by clicking on the icon with an “X” in the lower panel.



To install the Guest Additions package, type in the terminal the following command:

`runguestadditions.sh`

Note: this may take a while. It may even appear to stop for a moment. Please wait patiently until the *prompt* is displayed again in the terminal, as shown in the figure.

```

sakura
mooccf@DigitalSystemsVM:~$ runguestadditions.sh
Verifying archive integrity... All good.
Uncompressing VirtualBox 5.0.16 Guest Additions for Linux.....
VirtualBox Guest Additions installer
Copying additional installer modules ...
add_symlink: link file /usr/lib/VBoxGuestAdditions already exists
Installing additional modules ...
Removing existing VirtualBox non-DKMS kernel modules ...done.
Building the VirtualBox Guest Additions kernel modules
Building the main Guest Additions module ...done.
Building the shared folder support module ...done.
Building the OpenGL support module ...done.
Doing non-kernel setup of the Guest Additions ...done.
Starting the VirtualBox Guest Additions ...done.
Installing the Window System drivers
Installing X.Org Server 1.9 modules ...done.
Setting up the Window System to use the Guest Additions ...done.
You may need to restart the the Window System (or just restart the guest system)
to enable the Guest Additions.

Installing graphics libraries and desktop services components ...done.
mooccf@DigitalSystemsVM:~$ █

```

In the same terminal, run the commands:


`runafterguest.sh`

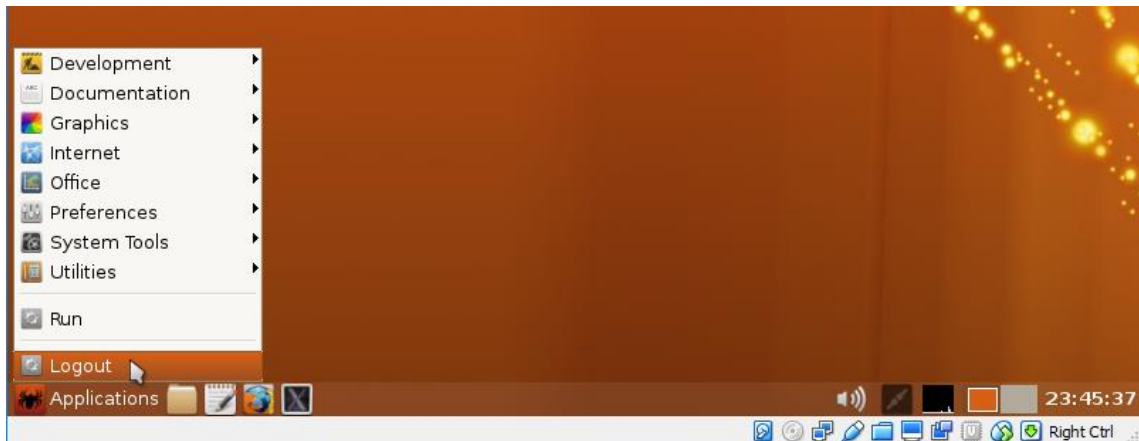
`exit`

Finally, shut down or reboot the virtual machine as explain below.

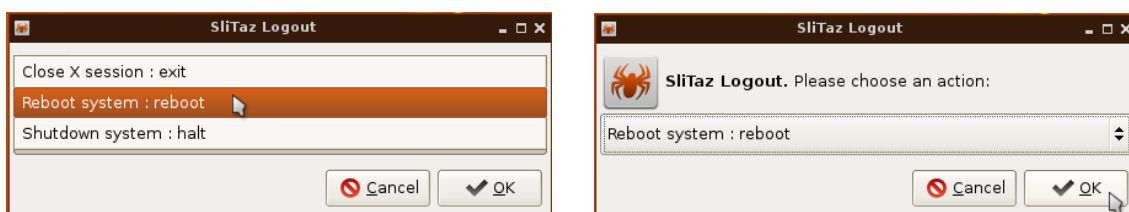
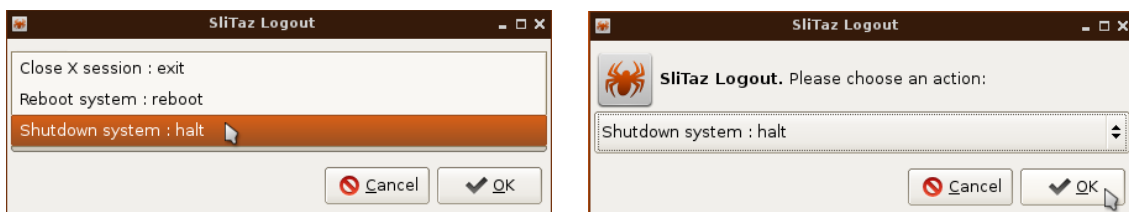
Step 6: Shutting down or rebooting the machine

Run the following command to shut down or reboot the virtual machine:

 **Applications → Logout**

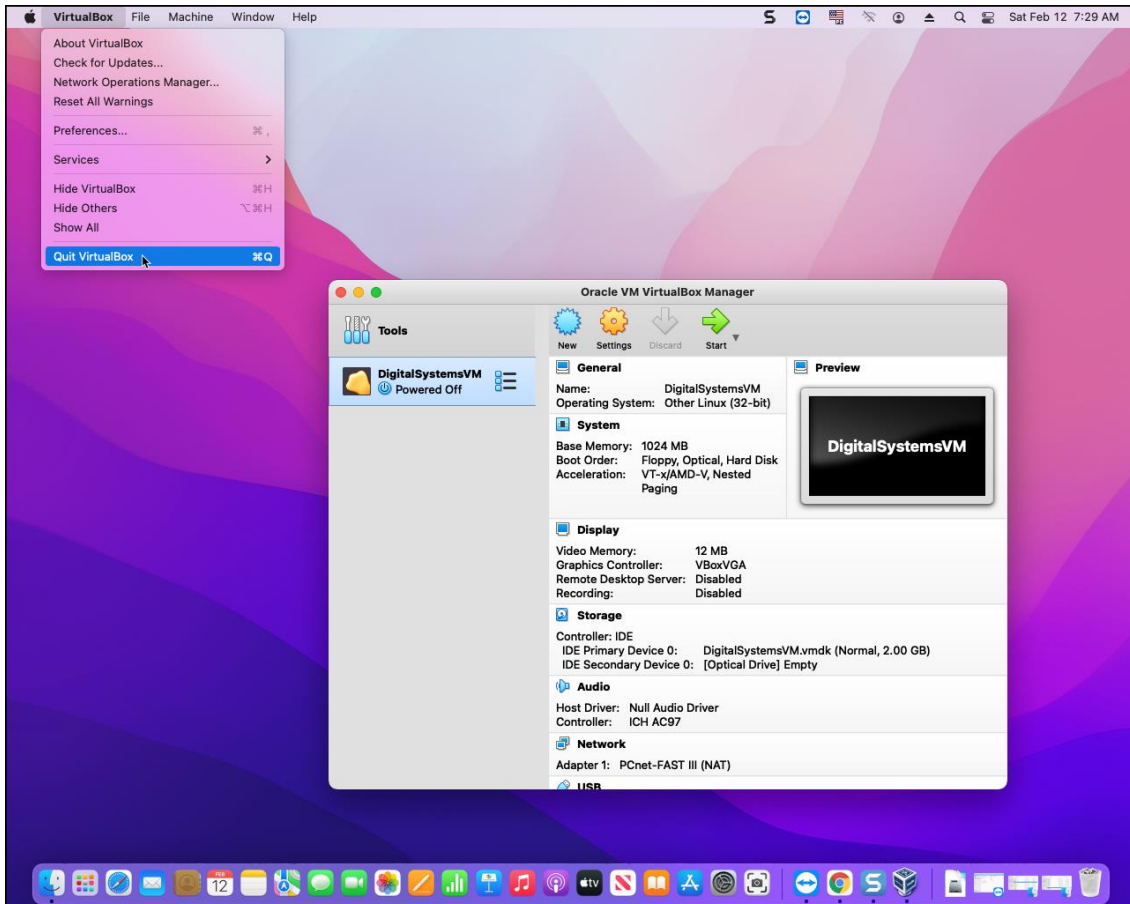


Select Shutdown system: Halt or Reboot system: Reboot as desired in the new window (see figures) and press **OK**.



When the virtual machine shuts down, you may close VirtualBox by running the following command from the top panel of the OS X desktop when the main window of VirtualBox is selected:

VirtualBox → Quit VirtualBox



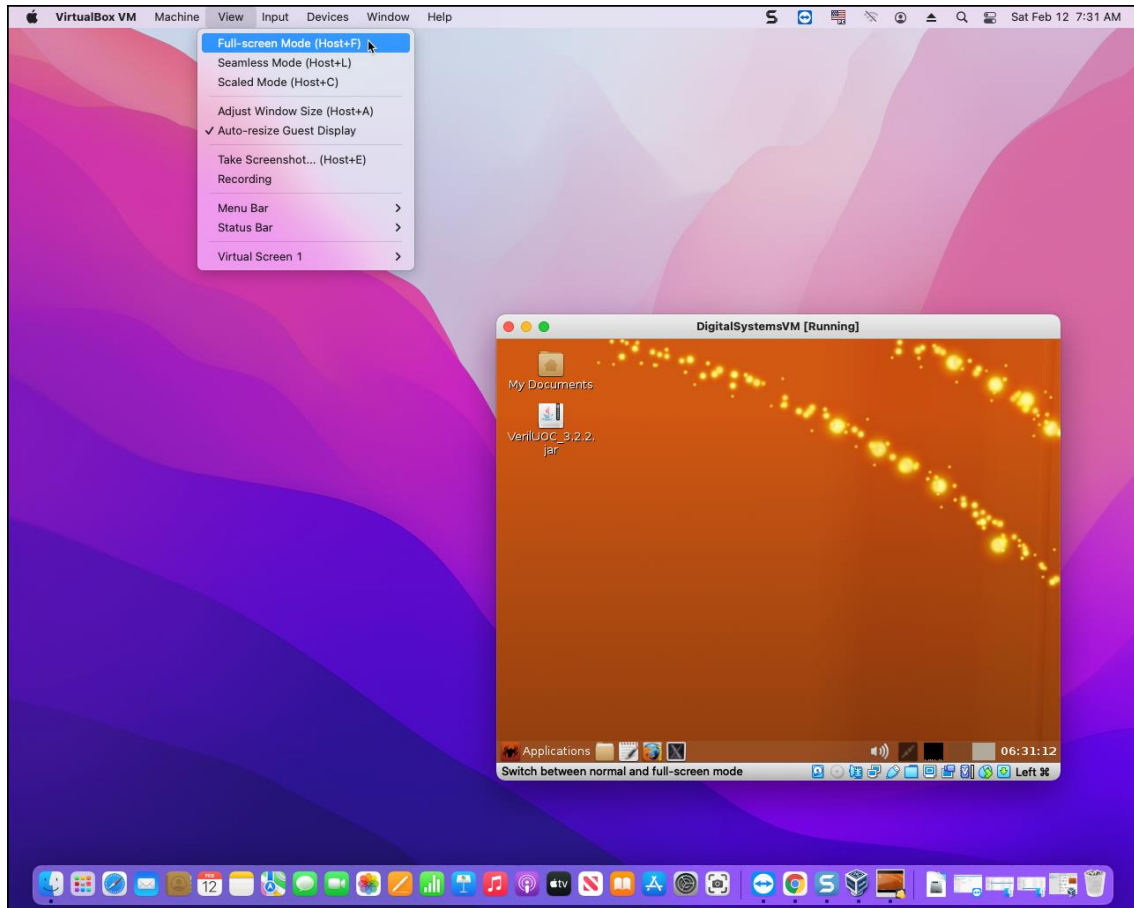
Additional comments

-We strongly recommend NOT to update the VirtualBox application nor the DigitalSystemsVM virtual machine during the duration of this course.

- The shared folder **Coursera** is mounted in the directory **/media/Coursera** in the virtual machine.

- You may choose to work with the virtual machine in full-screen mode. To do so, press **Left Cmd (⌘) + f** or select from the menu

View → Full-screen Mode



To return to window mode run the same command again, i. e. press **Left Cmd (⌘) + f** or select from the menu

View → Full-screen Mode