-

UT 04.
INSTALATION OF OPERATING SYSTEMS ON VIRTUAL MACHINES

COMPUTER SYSTEMS
CFGS DAW

Borja Salom
2022/2023

Versión:221021.1351

Licencia

Nomenclatura

A lo largo de este tema se utilizarán distintos símbolos para distinguir elementos importantes dentro del contenido. Estos símbolos son:

 Importante

 Atención

 Interesante

INDEX

UD04. INSTALATION OF OPERATING SYSTEMS ON VIRTUAL MACHINES

1. INTRODUCTION

1.1 What is a virtual machine?

A Virtual Machine (VM) is a compute resource that uses software instead of a physical computer to run programs and deploy apps. One or more virtual "guest" machines run on a physical "host" machine. Each virtual machine runs its own operating system and functions separately from the other VMs, even when they are all running on the same host. This means that, for example, a virtual MacOS virtual machine can run on a physical PC.

Virtual machine technology is used for many use cases across on-premises and cloud environments. More recently, public cloud services are using virtual machines to provide virtual application resources to multiple users at once, for even more cost efficient and flexible compute.

1.2 What are virtual machines used for?

Virtual machines (VMs) allow a business to run an operating system that behaves like a completely separate computer in an app window on a desktop. VMs may be deployed to accommodate different levels of processing power needs, to run software that requires a different operating system, or to test applications in a safe, sandboxed environment.

Virtual machines have historically been used for server virtualization, which enables IT teams to consolidate their computing resources and improve efficiency. Additionally, virtual machines can perform specific tasks considered too risky to carry out in a host environment, such as accessing virus-infected data or testing operating systems. Since the virtual machine is separated from the rest of the system, the software inside the virtual machine cannot tamper with the host computer.

1.3 How do virtual machines work?

The virtual machine runs as a process in an application window, similar to any other application, on the operating system of the physical machine. Key files that make up a virtual machine include a log file, NVRAM setting file, virtual disk file and configuration file.

1.4 Advantages of virtual machines

Virtual machines are easy to manage and maintain, and they offer several advantages over physical machines:

- VMs can run multiple operating system environments on a single physical computer, saving physical space, time and management costs.
- Virtual machines support legacy applications, reducing the cost of migrating to a new operating system. For example, a Linux virtual machine running a distribution of Linux as the guest operating system can exist on a host server that is running a non-Linux operating system, such as Windows.
- VMs can also provide integrated disaster recovery and application provisioning options.

1.5 Disadvantages of virtual machines

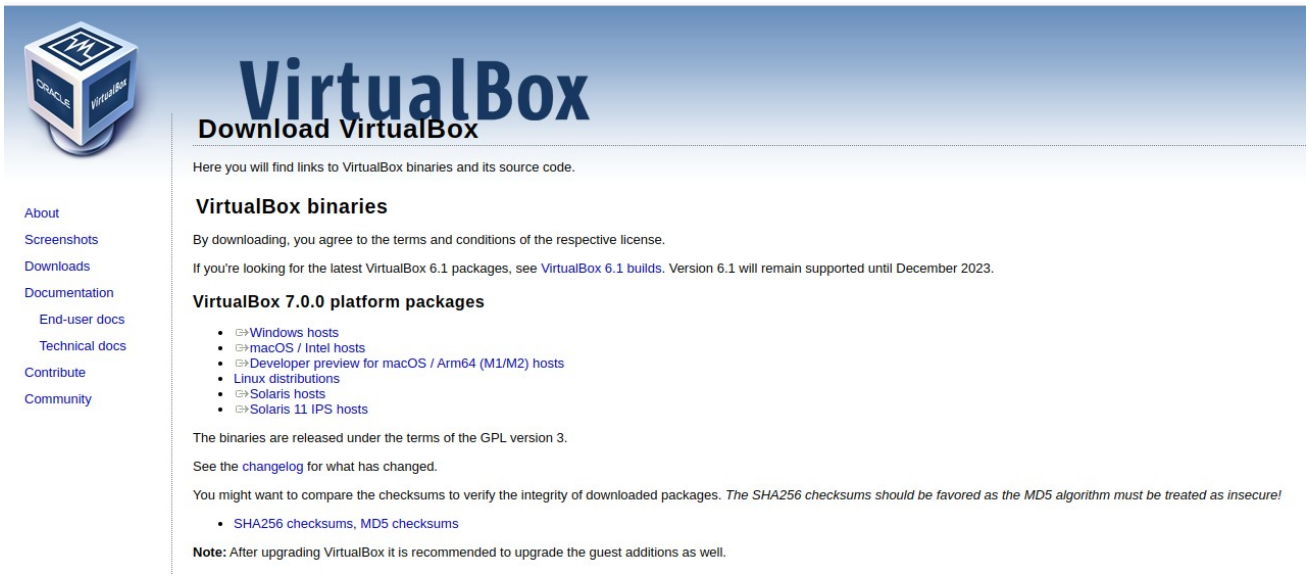
While virtual machines have several advantages over physical machines, there are also some potential disadvantages:

- Running multiple virtual machines on one physical machine can result in unstable performance if infrastructure requirements are not met.
- Virtual machines are less efficient and run slower than a full physical computer. Most enterprises use a combination of physical and virtual infrastructure to balance the corresponding advantages and disadvantages.

2. INSTALL VIRTUALBOX

2.1 DOWNLOAD LINK

You can download the latest version of VirtualBox from the VirtualBox website: https://www.virtualbox.org/wiki/Linux_Downloads according to the versión of your operating system Windows, Mac or Linux.



2.2 INSTALLATION

Depending on the operating system you use the installation will be different. To install the program in each of them you must follow the instructions provided by the official VirtualBox site.

3. VIRTUALBOX MANAGER

VirtualBox Manager is the user interface for Oracle VM VirtualBox. You can use VirtualBox Manager to create, configure, and manage your virtual machines.

This section describes the main features of the VirtualBox Manager user interface. Subsequent sections and chapters describe how to use VirtualBox Manager to perform tasks in Oracle VM VirtualBox.

3.1 VirtualBox Manager Window

When you start Oracle VM VirtualBox, the VirtualBox Manager window is displayed.

The main components of the VirtualBox Manager window are as follows:

- **The machine list.** The left pane of the VirtualBox Manager window lists all your virtual machines. If you have not yet created any virtual machines, this list is empty.
- **The Details pane.** The pane on the right displays the properties of the currently selected virtual machine. If you do not have any machines yet, the pane displays a welcome message. The toolbar buttons on the Details pane can be used to create and work with virtual machines.
- **Help Viewer.** A window that displays context-sensitive help topics for VirtualBox Manager tasks.

3.2 The machine list

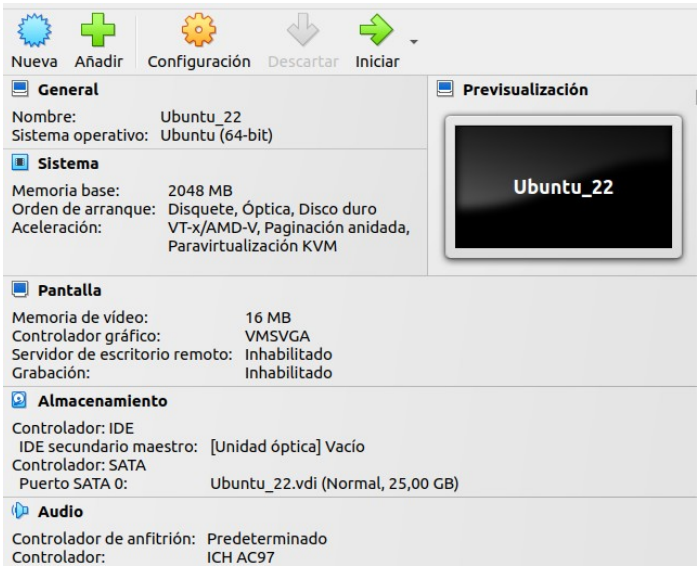
The list of virtual machines in the left pane is called the machine list.

The following methods can be used to control and configure virtual machines in the machine list:

- Right-click on the virtual machine name, to display menu options.
- Click on the Machine Tools menu, to the right of the virtual machine name.
- Click a button in the toolbar in the Details pane.

3.3 The details pane

The Details pane shows configuration information for a virtual machine that is selected in the machine list. The pane also includes a toolbar for performing tasks.



A **toolbar** at the top of the Details pane contains buttons that enable you to configure the selected virtual machine, or to create a new virtual machine.

The toolbar includes the following buttons:

- **New.** Creates a new virtual machine, and adds it to the machine list.
- **Add**. Adds an existing virtual machine to the machine list.
- **Settings**. Displays the Settings window for the virtual machine, enabling you to make configuration changes.
- **Discard**. For a running virtual machine, discards the saved state for the virtual machine and closes it down.
- **Show/Start.** For a running virtual machine, **Show** displays the virtual machine window. For a stopped virtual machine, **Start** displays options for powering up the virtual machine.

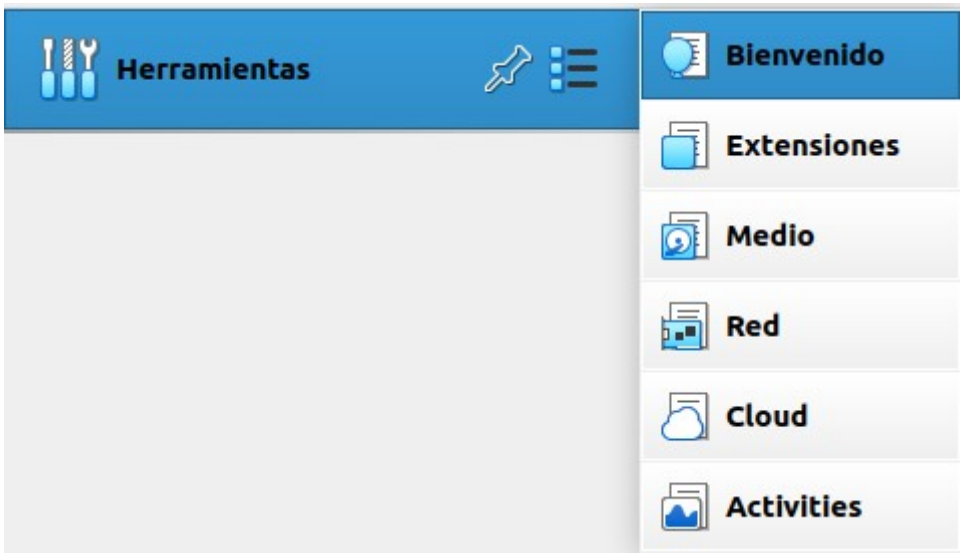
3.4 Manage Tools

VirtualBox Manager provides two types of user tools, to enable you to perform common tasks easily.

- **Global Tools.** These tools apply to all virtual machines.
- **Machine Tools**. These tools apply to a specific virtual machine.

3.4.1 Global tools menu

In the left pane of the VirtualBox Manager window, click the Menu icon in the Tools banner located above the machine list. The Global Tools menu is displayed.



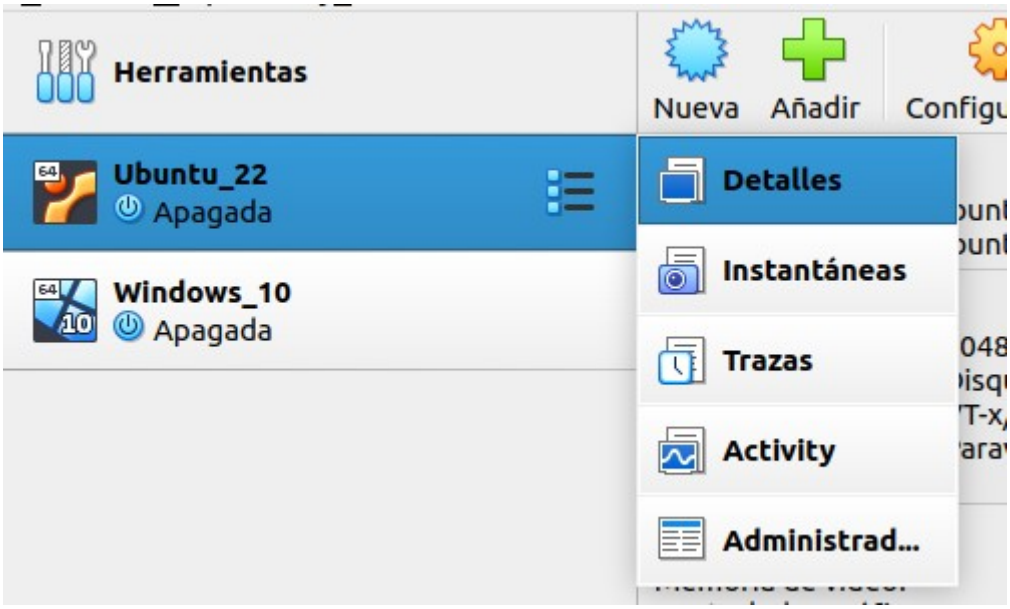
A drop-down list enables you to select from the following global tools:

- **Welcome**. Displays the VirtualBox Manager welcome message. The VirtualBox Manager toolbar is also included, to enable you to get started with using Oracle VM VirtualBox.
- **Extensions**. Displays the Extension Pack Manager tool. This tool is used to install and uninstall Oracle VM VirtualBox Extension Packs.
- **Media**. Displays the Virtual Media Manager tool. This tool is used to manage the disk images used by Oracle VM VirtualBox.
- **Network**. Displays the Network Manager tool. This tool is used to create and configure some types of networks used by Oracle VM VirtualBox.
- **Cloud**. Displays the Cloud Profile Editor tool. This tool is used to configure connections to a cloud service, such as Oracle Cloud Infrastructure.
- **Activities**. Displays the VM Activity Overview tool. This tool is used to monitor performance and resource usage of virtual machines.

The Pin icon is used to keep the Tools banner visible as you scroll down the entries in the machine list.

3.4.2 Machine Tools

In the machine list in the left pane of the VirtualBox Manager window, select a virtual machine. Click the Menu icon to the right of the virtual machine name. The Machine Tools menu is displayed.



A drop-down list enables you to select from the following machine tools:

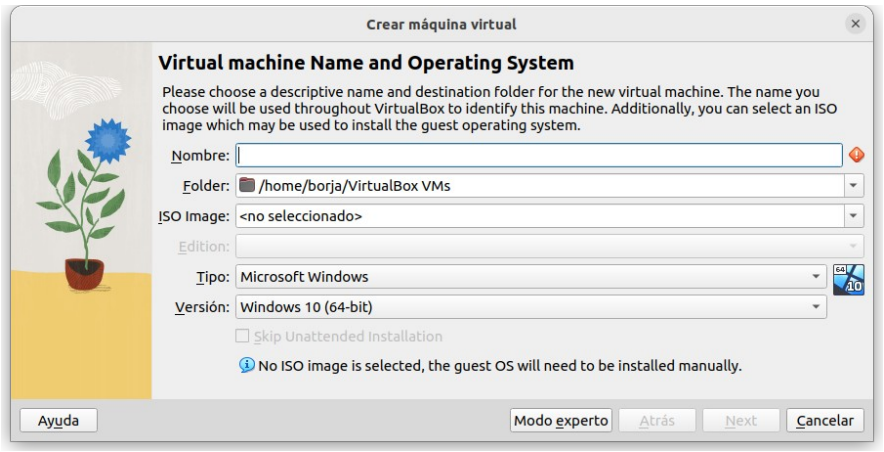
- **Details**. Displays the Details pane for the selected virtual machine.
- **Snapshots**. Displays the Snapshots tool. This tool enables you to view and manage snapshots for the virtual machine.
- **Logs**. Displays the Log Viewer tool. This tool enables you to view and search system logs for the virtual machine.
- **Activity**. Displays the VM Activity page of the Session Information dialog. This dialog enables you to view and analyze performance metrics for the virtual machine.
- **File Manager**. Displays the Guest Control File Manager tool. This tool enables you to manage files on the guest system.

4. CREATE A VIRTUAL MACHINE

Click **New** in the VirtualBox Manager window. The Create Virtual Machine wizard is shown, to guide you through the required steps for setting up a new virtual machine (VM).

4.1 Name and Operating System

Use this page to specify a name and operating system (OS) for the virtual machine and to change the storage location used for Vms. You can also choose to disable the unattended guest operating system install feature.

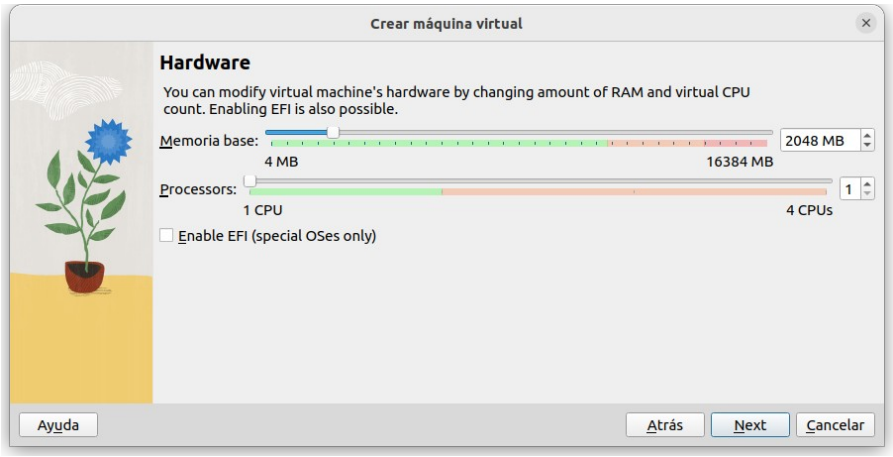


The following fields are available on this wizard page:

- **Name**. A name for the new VM. The name you enter is shown in the machine list of VirtualBox Manager and is also used for the virtual machine's files on disk. Be sure to assign each VM an informative name that describes the OS and software running on the VM. For example, a name such as Windows 10 with Visio.
- **Folder**. The location where VMs are stored on your computer, called the machine folder. The default folder location is shown.
- **ISO Image.** Select an ISO image file. The image file can be used to install an OS on the new virtual machine or it can be attached to a DVD drive on the new virtual machine.
- **Type and Version.** These fields are used to select the OS that you want to install on the new virtual machine.
- **Skip Unattended Installation.** Disables unattended guest OS installation, even if an ISO image is selected that supports unattended installation. In that case, the selected ISO image is mounted automatically on the DVD drive of the new virtual machine and user interaction is required to complete the OS installation. The unattended installation step in the wizard is skipped.

4.2 Hardware

Use this page to configure hardware settings for the virtual machine.



The following fields are available on this wizard page:

- Base Memory. Select the amount of RAM that Oracle VM VirtualBox should allocate every time the virtual machine is started. The amount of memory selected here will be taken away from your host machine and presented to the guest OS, which will report this size as the virtual machines installed RAM.

  Choose this setting carefully. The memory you give to the VM will not be available to your host OS while the VM is running, so do not specify more than you can spare.

  For example, if your host machine has 4 GB of RAM and you enter 2048 MB as the amount of RAM for a particular virtual machine, you will only have 2 GB left for all the other software on your host while the VM is running. If you run two VMs at the same time, even more memory will be allocated for the second VM, which may not even be able to start if that memory is not available.

  On the other hand, you should specify as much as your guest OS and your applications will require to run properly. A guest OS may require at least 1 or 2 GB of memory to install and boot up. For best performance, more memory than that may be required.

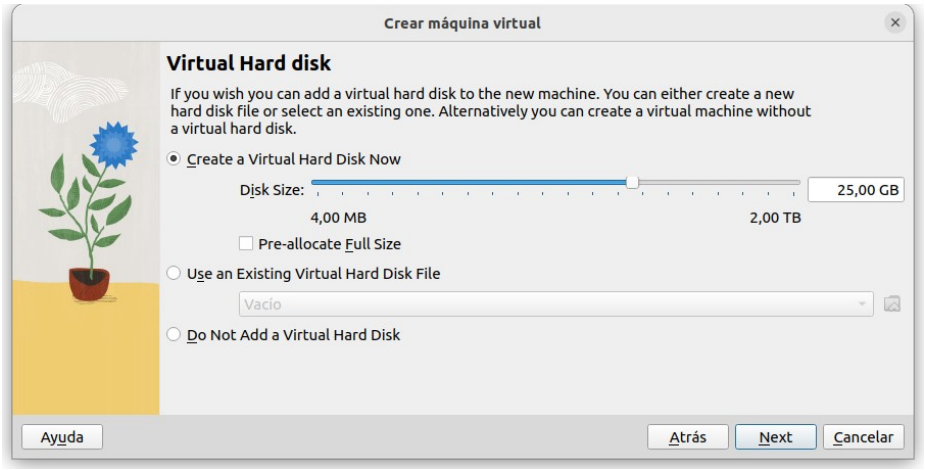
- Processor(s). Select the number of virtual processors to assign to the VM.

  It is not advised to assign more than half of the total processor threads from the host machine.

- Enable EFI. Enables Extensible Firware Interface (EFI) booting for the guest OS.

4.3 Hard Disk

Use this page to specify a virtual hard disk for the virtual machine.

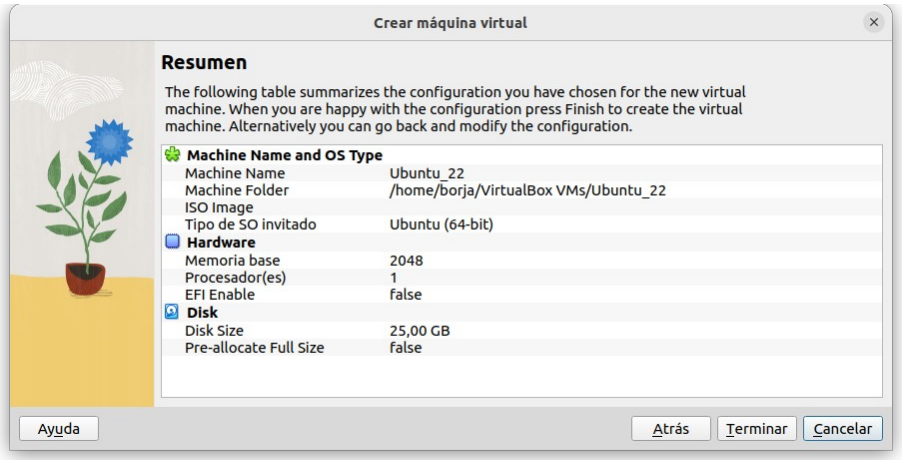


The following fields are available on this wizard page:

- **Create a Virtual Hard Disk Now.** Creates a new empty virtual hard disk image, located in the VM's machine folder. Enter the following settings:
  - **Disk Size**. Use the slider to select a maximum size for the hard disk in the new VM.
  - **Pre-Allocate Full Size**. This setting determines the type of image file used for the disk image. Select this setting to use a fixed-size file for the disk image. Deselect this setting to use a dynamically allocated file for the disk image. The different types of image file behave as follows:
    - **Dynamically allocated file.** This type of image file only grows in size when the guest actually stores data on its virtual hard disk. Therefore, this file is small initially. As the drive is filled with data, the file grows to the specified size.
    - **Fixed-size file.** This type of image file immediately occupies the file specified, even if only a fraction of that virtual hard disk space is actually in use. While occupying much more space, a fixed-size file incurs less overhead and is therefore slightly faster than a dynamically allocated file.
- **Use an Existing Hard Disk File.** Enables you to select an existing disk image file to use with the new VM.
- **Do Not Add a Virtual Hard Disk.** The new VM is created without a hard disk.

4.4 Summary

This page displays a summary of the configuration for the virtual machine.



If you are not happy with any of the settings, use the **Back** button to return to the corresponding page and modify the setting.

Click **Finish** to create your new virtual machine. The virtual machine is displayed in the machine list on the left side of the VirtualBox Manager window, with the name that you entered on the first page of the wizard.

5. RUNNING A VIRTUAL MACHINE

To start a virtual machine, you have the following options:

- Double-click on the VM's entry in the machine list in VirtualBox Manager.
- Select the VM's entry in the machine list in VirtualBox Manager, and click Start in the toolbar the top of the window.
- Go to the VirtualBox VMs folder in your system user's home directory. Find the subdirectory of the machine you want to start and double-click on the machine settings file. This file has a .vbox file extension.

Starting a virtual machine displays a new window, and the virtual machine which you selected will boot up. Everything which would normally be seen on the virtual system's monitor is shown in the window.

5.1 Start a new VM for the first time

When you start a VM for the first time the OS installation process is started automatically, using the ISO image file specified in the Create Virtual Machine wizard.

Follow the onscreen instructions to install your OS.

5.2 Resizing the Machine’s Window

You can resize the VM's window while that VM is running. When you do, the window is scaled as follows:

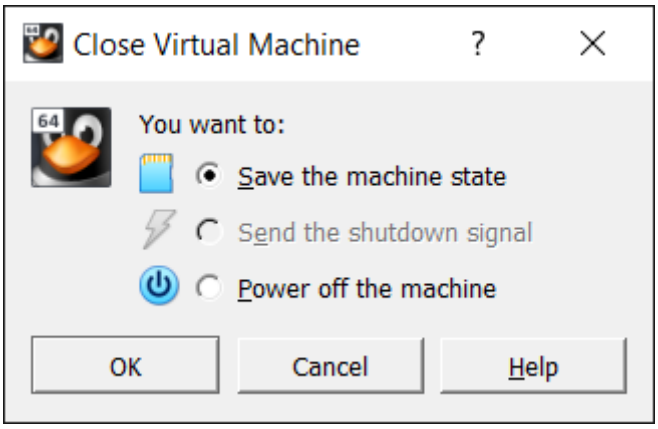
- If you have **scaled mode** enabled, then the virtual machine's screen will be scaled to the size of the window. This can be useful if you have many machines running and want to have a look at one of them while it is running in the background. Alternatively, it might be useful to enlarge a window if the VM's output screen is very small, for example because you are running an old OS in it.

  To enable scaled mode, press **Host key + C**, or select **Scaled Mode** from the **View** menu in the VM window. To leave scaled mode, press **Host key + C** again.

  The aspect ratio of the guest screen is preserved when resizing the window. To ignore the aspect ratio, press **Shift** during the resize operation.
- If you have the Guest Additions installed and they support automatic **resizing**, the Guest Additions will automatically adjust the screen resolution of the guest OS. For example, if you are running a Windows guest with a resolution of 1024x768 pixels and you then resize the VM window to make it 100 pixels wider, the Guest Additions will change the Windows display resolution to 1124x768.
- Otherwise, if the window is bigger than the VM's screen, the screen will be centered. If it is smaller, then scroll bars will be added to the machine window.

5.3 Saving the State of the Machine

When you click on the **Close** button of your virtual machine window, at the top right of the window, just like you would close any other window on your system, Oracle VM VirtualBox asks you whether you want to save or power off the VM. As a shortcut, you can also press **Host key + Q**.



The difference between the three options is crucial. They mean the following:

- **Save the machine state:** With this option, Oracle VM VirtualBox freezes the virtual machine by completely saving its state to your local disk.

  When you start the VM again later, you will find that the VM continues exactly where it was left off. All your programs will still be open, and your computer resumes operation. Saving the state of a virtual machine is thus in some ways similar to suspending a laptop computer by closing its lid.
- **Send the shutdown signal.** This will send an ACPI shutdown signal to the virtual machine, which has the same effect as if you had pressed the power button on a real computer. This should trigger a proper shutdown mechanism from within the VM.
- **Power off the machine:** With this option, Oracle VM VirtualBox also stops running the virtual machine, but without saving its state.

6. BIBLIOGRAPHY

- VirtualBox Download:

  https://www.virtualbox.org/wiki/Downloads
- User Manual VirtualBox:

  https://www.virtualbox.org/manual/UserManual.html#intro-save-machine-state
- What is a virutal machine?

  https://www.vmware.com/topics/glossary/content/virtual-machine.html#:~:text=A%20Virtual%20Machine%20(VM)%20is,a%20physical%20%E2%80%9Chost%E2%80%9D%20machine.