Virtual Machines
Explanation and Guide

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Contents

1 Introduction

A Virtual Machine (VM) is a computer that runs over software instead of physical computing resources. The system can operate full independent inside the "host" machine running programs, and processes in the the same way a normal computer would do.

A Virtual Machine will run an OS, which could be of any type and version. Some examples would be Windows 10/11/7/XP, a Linux distribution (Arch, Ubuntu, Parrot OS, Linux Mint, etc).

1.1 Benefits and Disadvantages
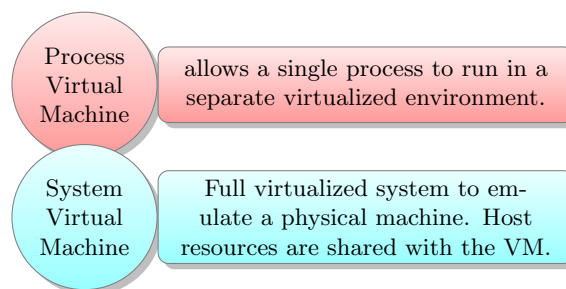
The **benefits** of using VMs are:

1. Allows running full operating systems.
2. Dedicating the specific resources that a process will need.
3. Testing and running processes in safe environments (sandboxes).
4. Can run multiple OS environments in the same computer.
5. Support legacy applications, reducing migration cost from one OS to another.
6. Regardless of the main host system, a VM can run any OS without compatibility issues.

Some **disadvantages** are:

1. It is hardware expensive to run multiple Virtual Machines simultaneously.
2. They are less efficient and are slower than a full physical computer.

1.2 Types of Virtual Machines

There are **two different types** of Virtual Machines:

Process Virtual Machine — allows a single process to run in a separate virtualized environment.

System Virtual Machine — Full virtualized system to emulate a physical machine. Host resources are shared with the VM.

1.3 Types of Virtualization

There are **5 types of virtualization**:

1. Hardware Virtualization: also known as server virtualization, allows using hardware resources efficiently to run multiple VMs at the same time. The hardware is not allocated and managed between the different systems.
2. Software Virtualization: creates a full computer with dedicated hardware to run an OS.
3. Storage Virtualization: join different storage hardware resources to appear as a single unit. It increases performance, data management, reduction of downtime and transfer of data
4. Network Virtualization: creating multiple separated networks from a unique physical one. Bandwidth can be allocated, improving reliability, security and monitoring.

5. Desktop Virtualization: separates the desktop from the physical device. It is accessed remotedly allowing users to access their working environment wherever they want.

1.4   Difference between a VM and a Container

Containers allow running isolated applications on a platform. It is in this way that is similar to Virtual Machines. The key aspect which differentiates them is that a VM will virtualize the hardware, creating a full computer, while the container will include the process and its dependencies to run. A container shares OS services and focuses on isolating the process through virtual-memory hardware.

A container is faster and only contains the files required to run the process, being simpler and smaller. These characteristics benefit using resources, booting faster and delivering applications easier.

On the other side, VMs are larger and slower. They have their independent OS kernel and offer the benefits of a completely isolated system.

2 Setting up your Linux Machine

In this section, I will be using a Virtual Machine (VM) with Parrot OS, version 4.11.3. This machine was previously set up, but in order of completion, I will cover how to create your own Parro VM.

There are multiple programs that can be used. I have previously used *VMware (free license)* and *Oracle VM VirtualBox (free license)*. Both have pretty similar configuration options, so feel free to use the one you like the most. I will be using *VMware Workstation 16 (free license)*

2.1 Installing WMware Workstation 16 Pro in Windows

1. Download the installer from the website previously provided.

2. Execute it with administrator permisions.

3. Install using the following configurations

> **The Pro version is not free, but the software includes the "VMware Workstation 16 Player", which can be used with a free license. You can install instead "VMware Workstation 16" (not Pro). This other version will only include the Player software. The steps to get it installed are exactly the same.**
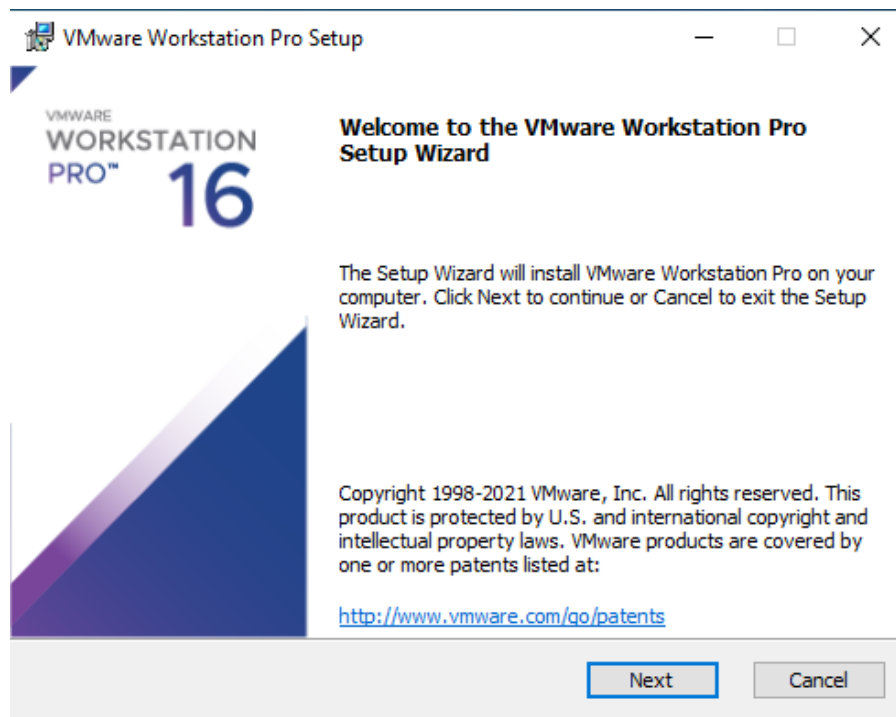
Figure 1: Press "Next".
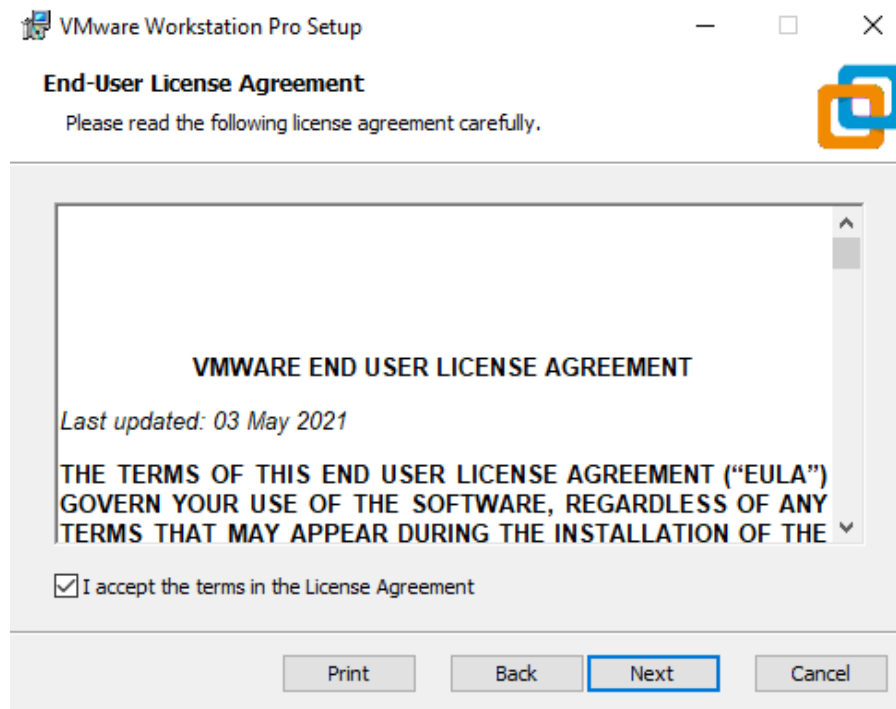
Figure 2: Accept the terms and Press "Next".
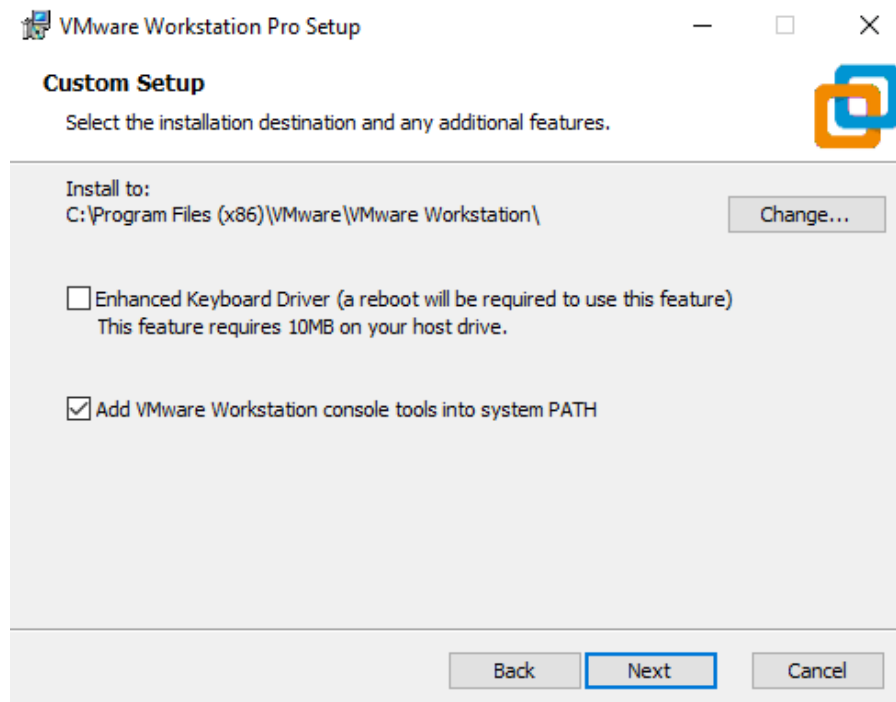
Figure 3: Tick add VMware to PATH and Press "Next".
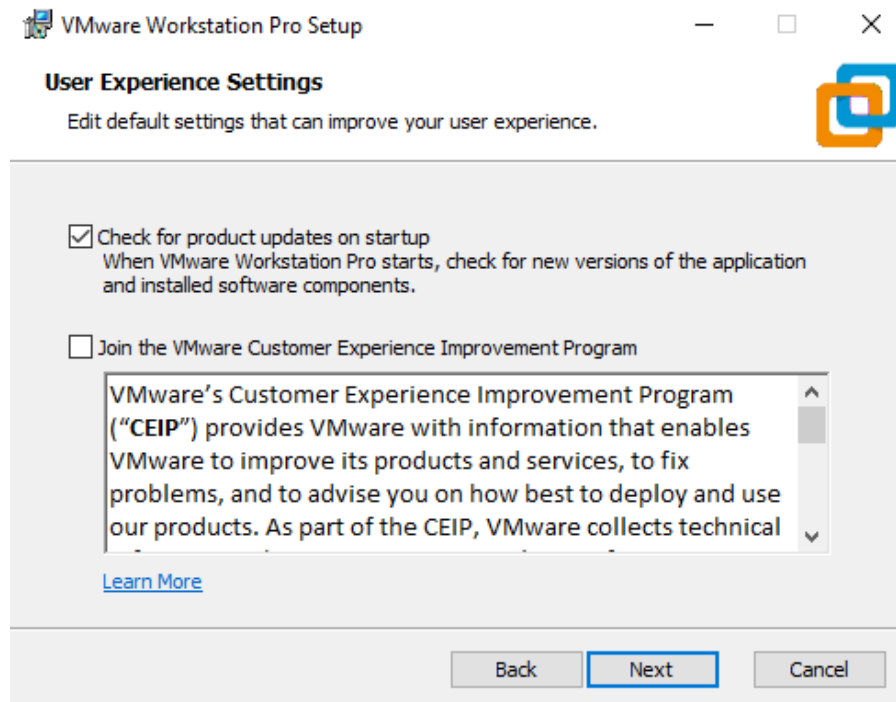
Figure 4: Un tick joining the Customer Experience Improvement Program and Press "Next".
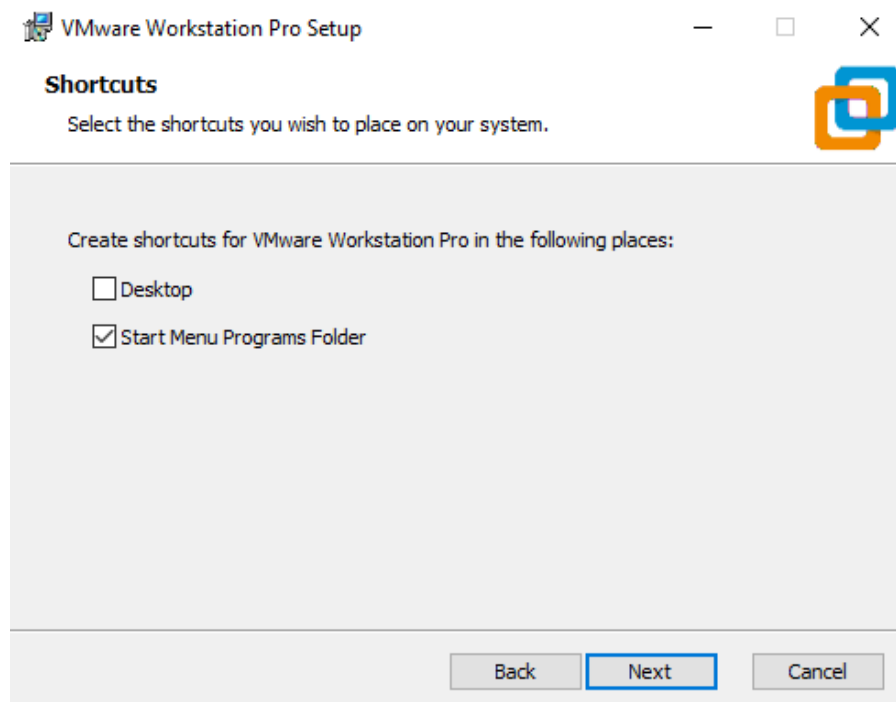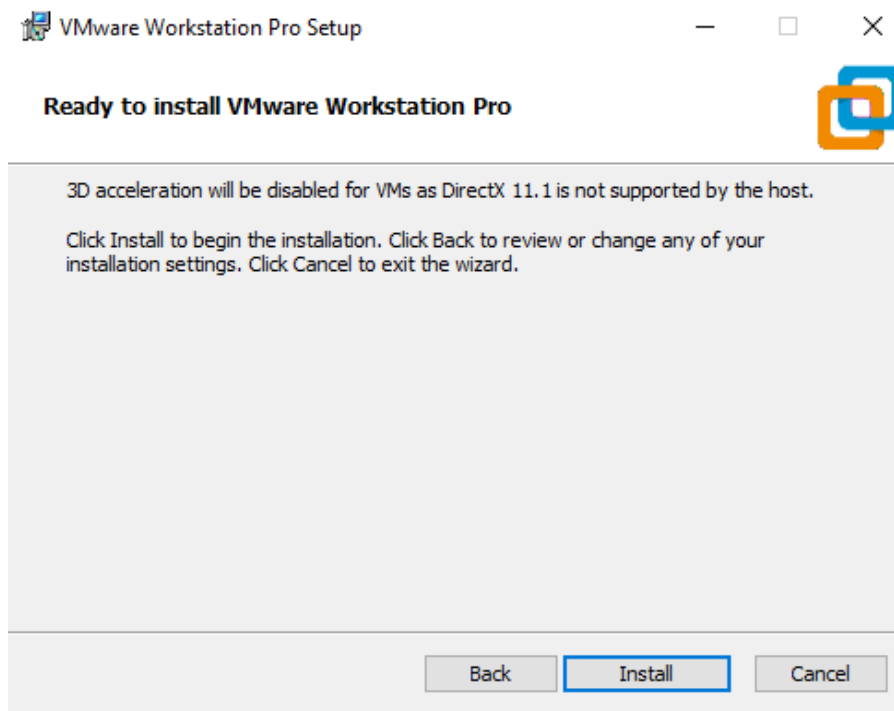

Figure 5: Press "Next".
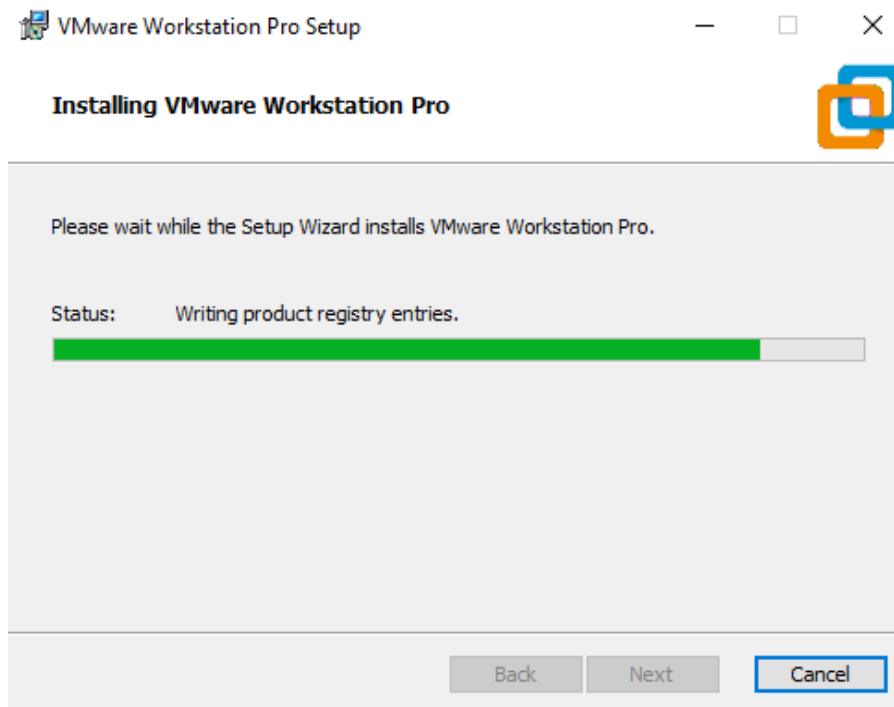
Figure 6: Press "Install".
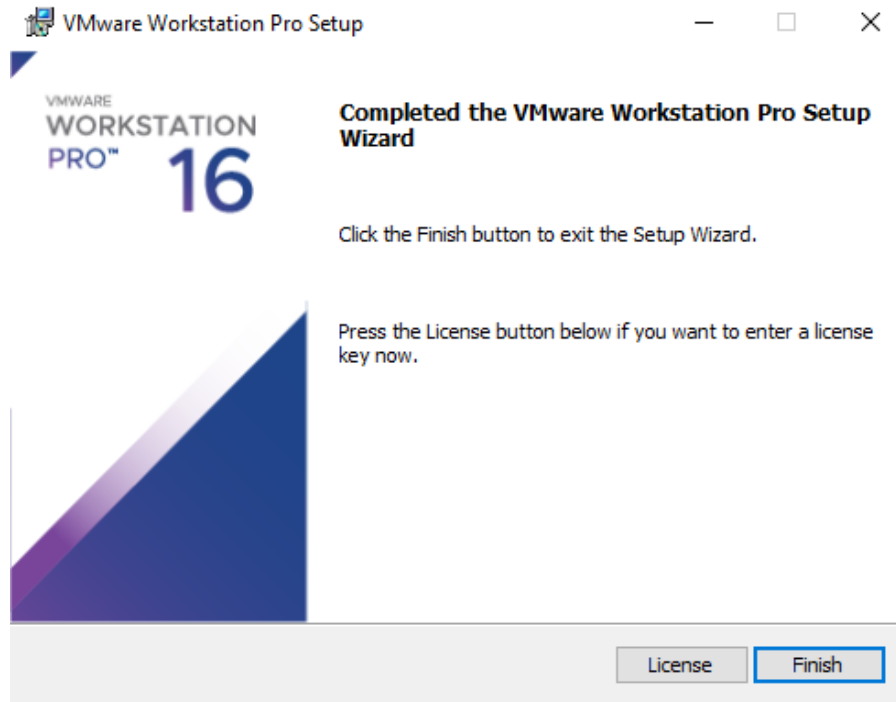

Figure 7: Wait while installing.

Figure 8: The instalation has finished, press "Finish".

> **Completed all these previous steps, you will correctly have installed the VMware Workstation Pro 16 software.**

2.2 Creating a VM in VMware Workstation 16 Player

To create a new Virtual Machine, you will need to download the ISO of the Linux Distribution you want to use. As previously mentioned, we will be using Parrot OS. You can download it using the following *link*. The version of Parrot OS that I will be using is the MATE Parrot OS 4.11.3. Feel free to install the distribution you want. Ubuntu, Parrot, Linux Mint. Most of them have a pretty similar installation. The process of creating the Virtual Machine will be exactly the same for all of them as it is independent of the OS (just to VMware).
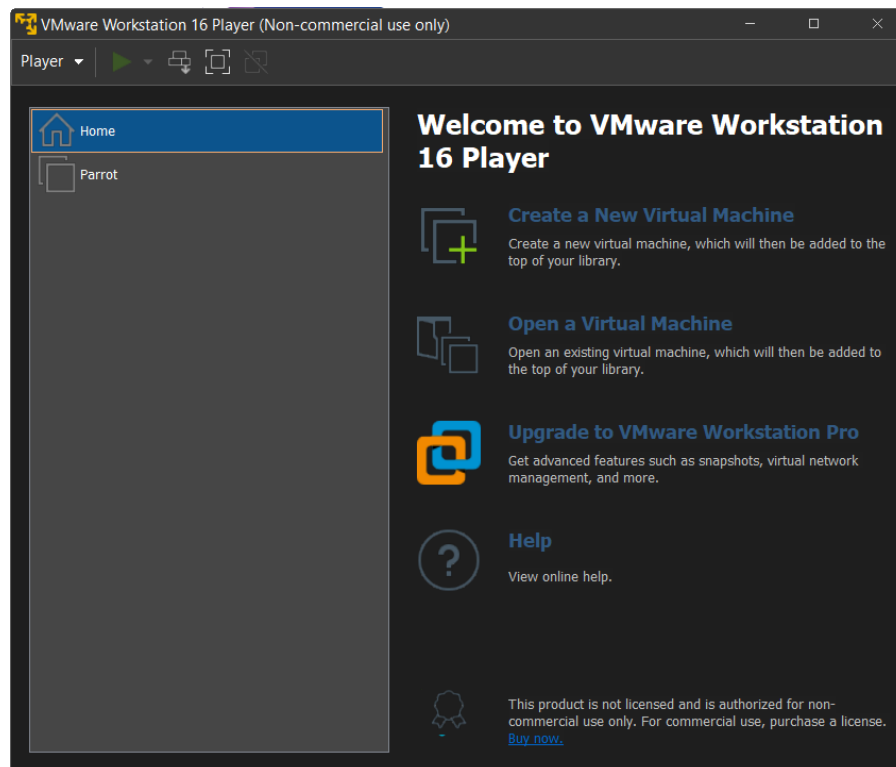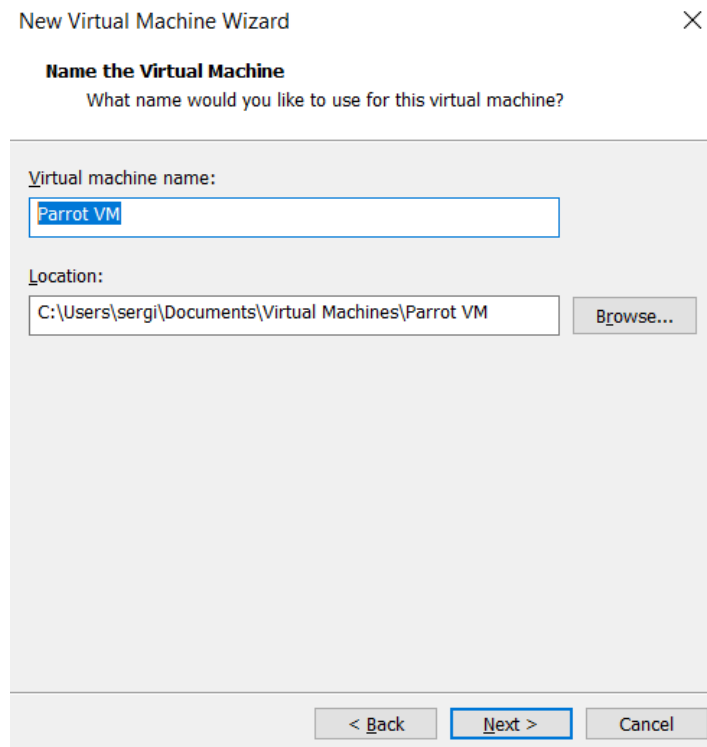
Figure 9: Press "Create a New Virtual Machine"
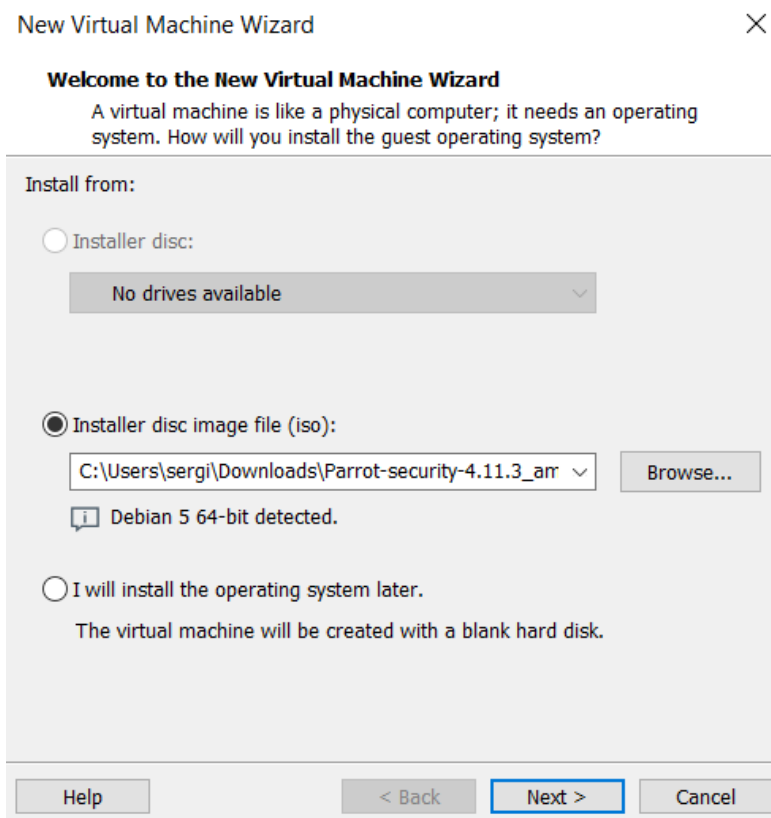
Figure 10: Select the 2nd option, Browse and Select the ISO you previously downloaded. Then, press "Next".

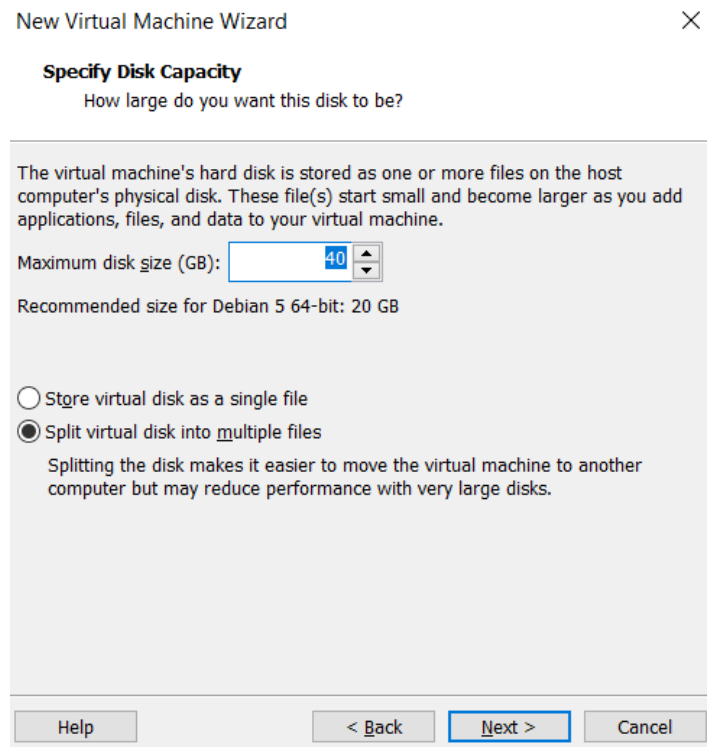Figure 11: Give your Virtual Machine a Name and select the location where you want it to be stored.

Figure 12: Select the size of the memory of your VM, 40GB is usually more than enough. Press "Next".
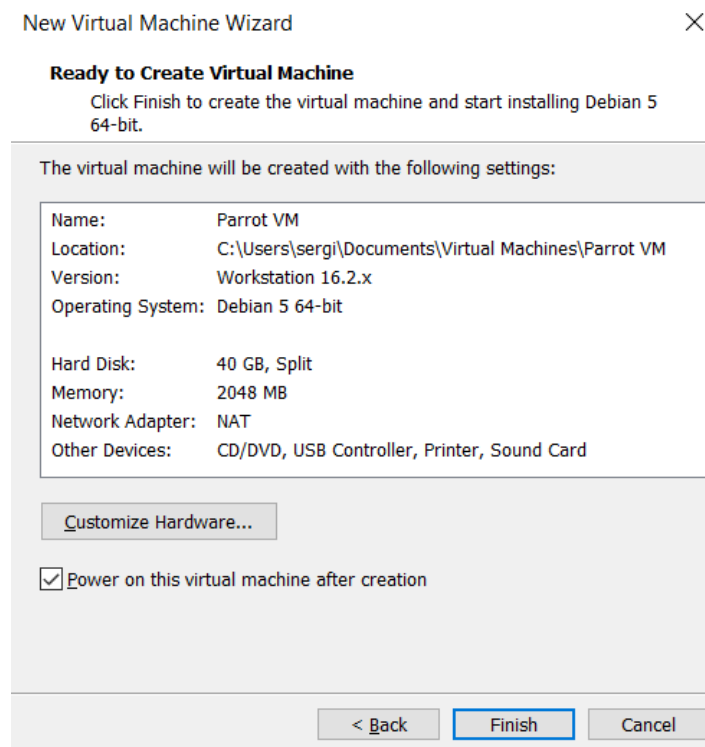
Figure 13: We recommend now Customizing the Hardware, Press "Customize Hardware...", else Press "Finish".

If you pressed "Customize Hardware", use the following recommendaitons:
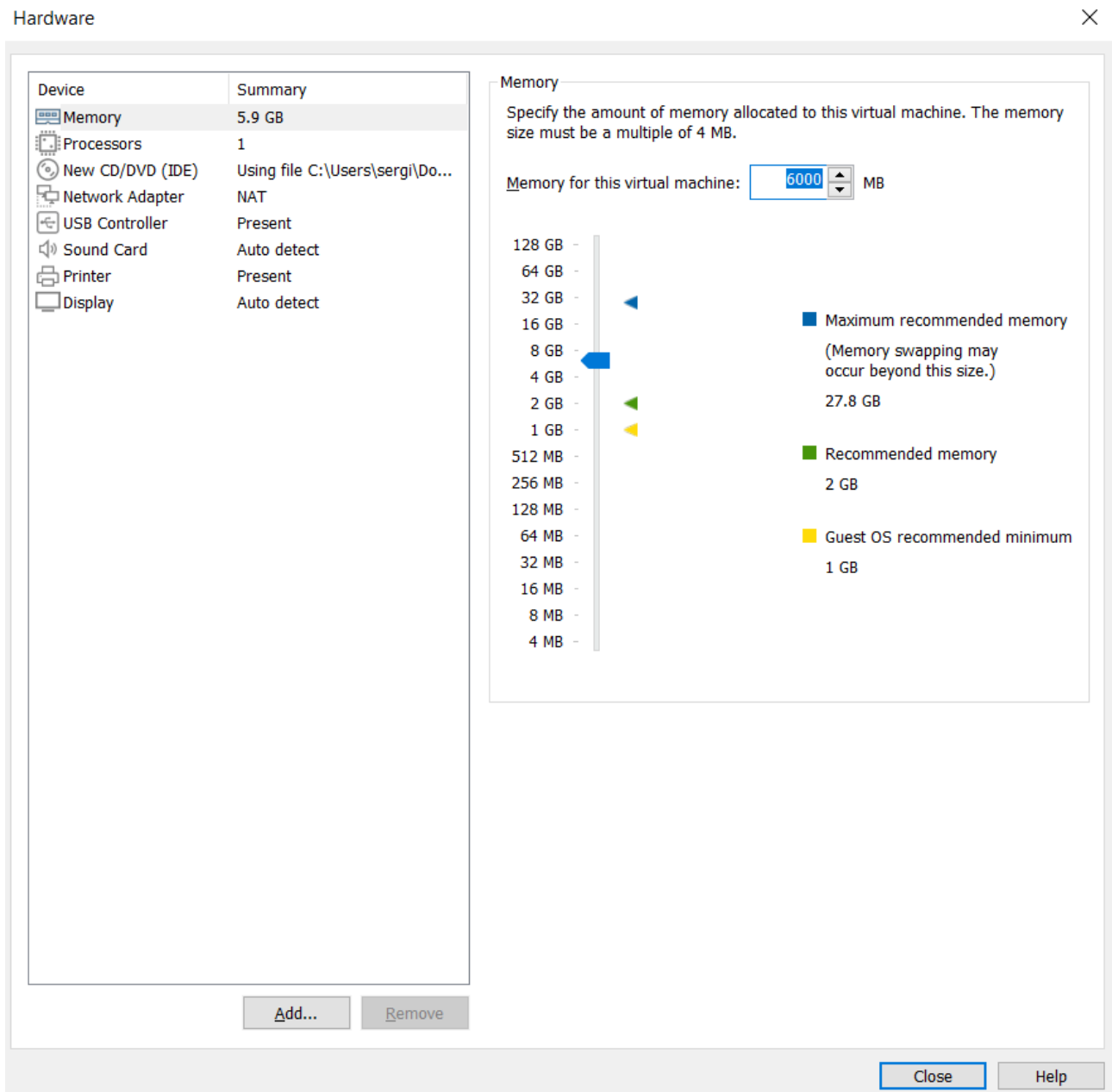

Figure 14: Give your VM the RAM memory you want. (Depends on your Hardware specifications which limits the RAM). 4GB is enough, but I usually go with 6GB.

Not dedicated enough RAM, the system will go slow, and some applications might collapse.
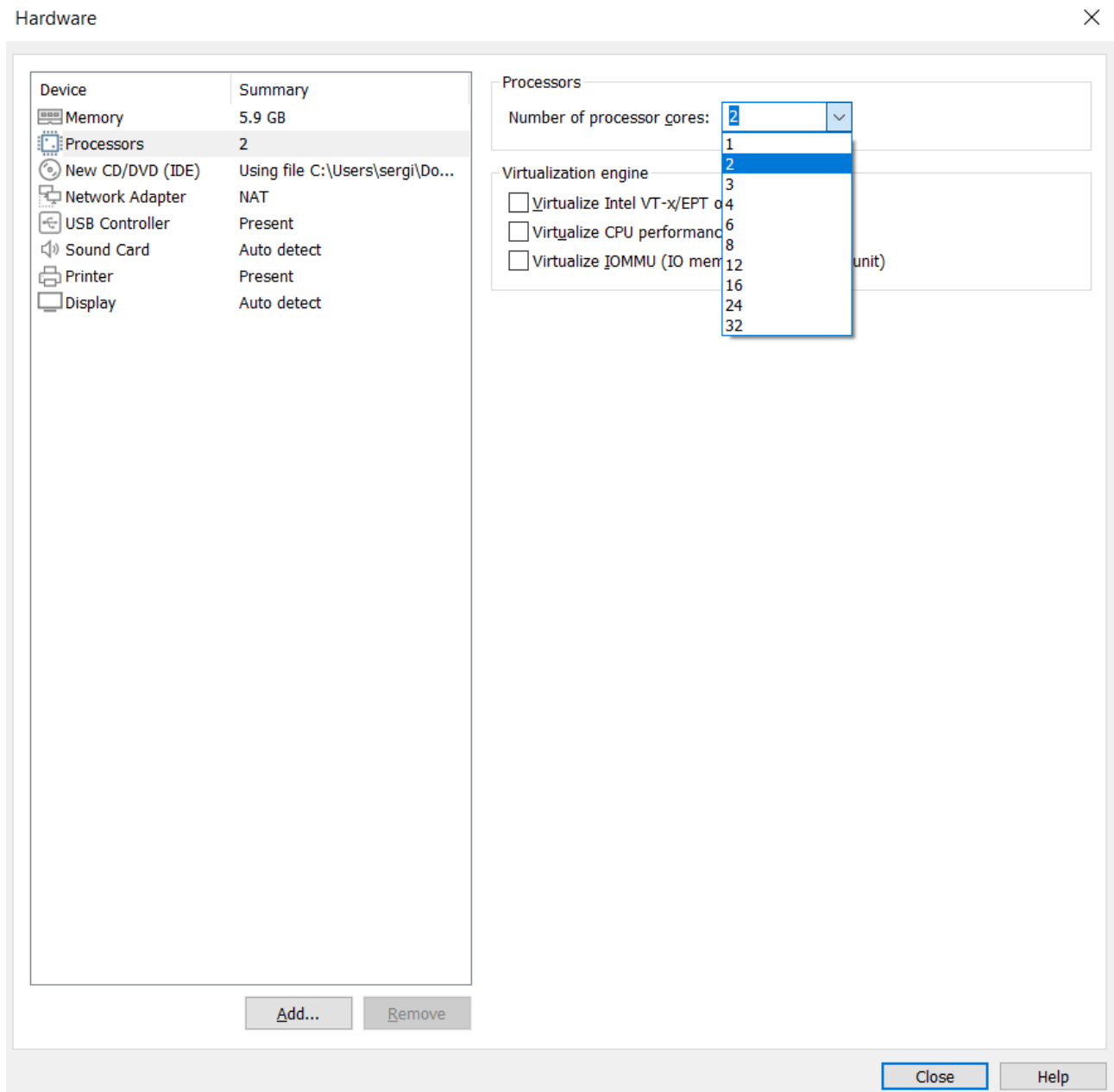
Figure 15: Select the number of processor cores for your VM. 1 is usually enough, but more will make the machine work faster. I will select 2.

Other configurations, such as Network Adapters, Sound Card or Display, can be found in this Panel. The Configuration Panel of the VM will be accessible later on too.

Having completed all these steps, your VM will be ready to start running.

2.3   Installing the Parrot OS

After pressing the "Finish" button in the Configuration Panel, the VM will start immediately. The the system will show the following screen:
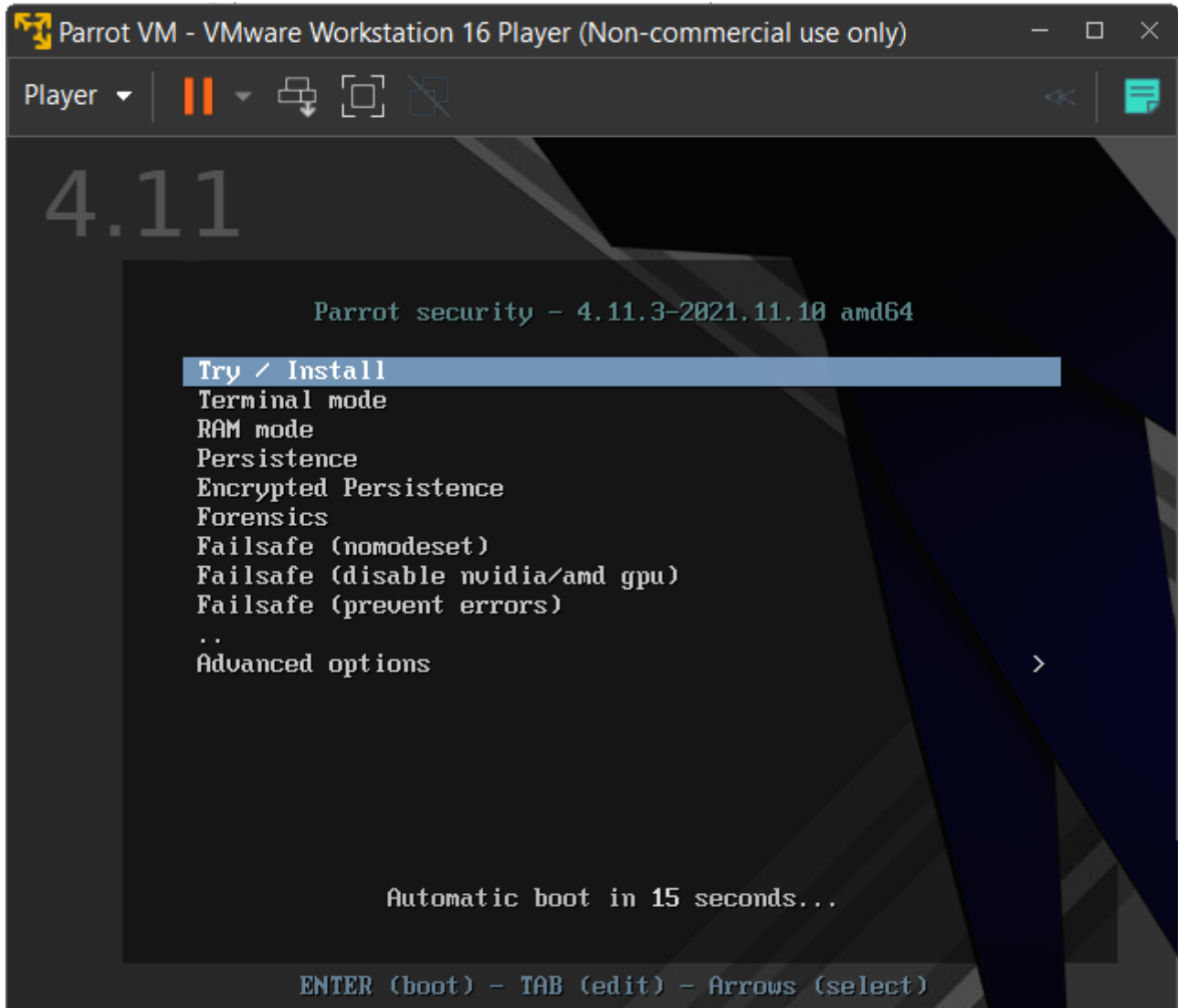

Figure 16: Press "Enter" in "Try / Install". The system will boot. Other options can be selected, but this will be more than enough for us. This option will let the user try the OS and install it. If any key from the keyboard is pressed within 30 seconds, the highlighted option will be selected.
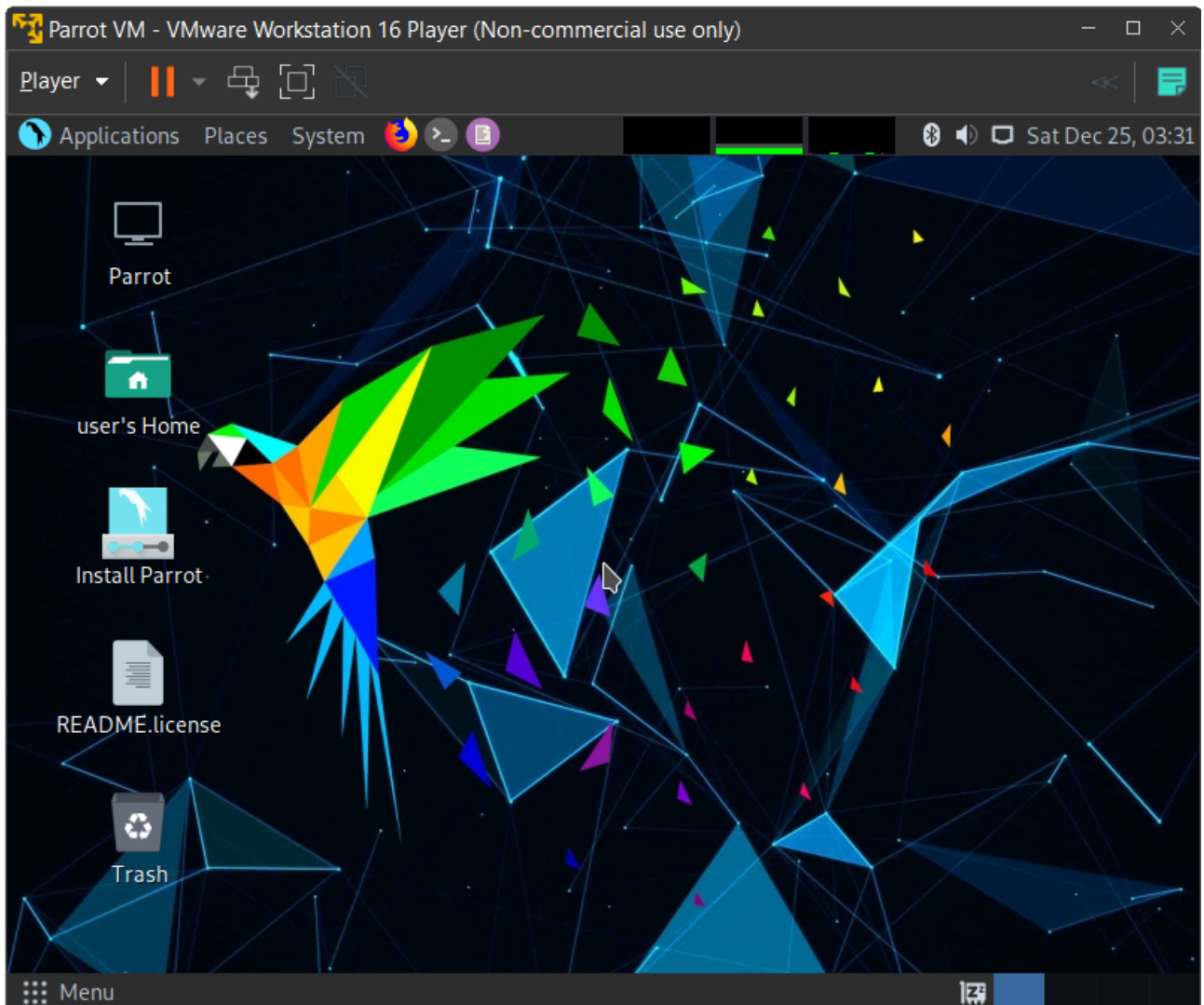
Figure 17: Parrot OS will launch in a testing mode. You will have full access to try the OS before installing.

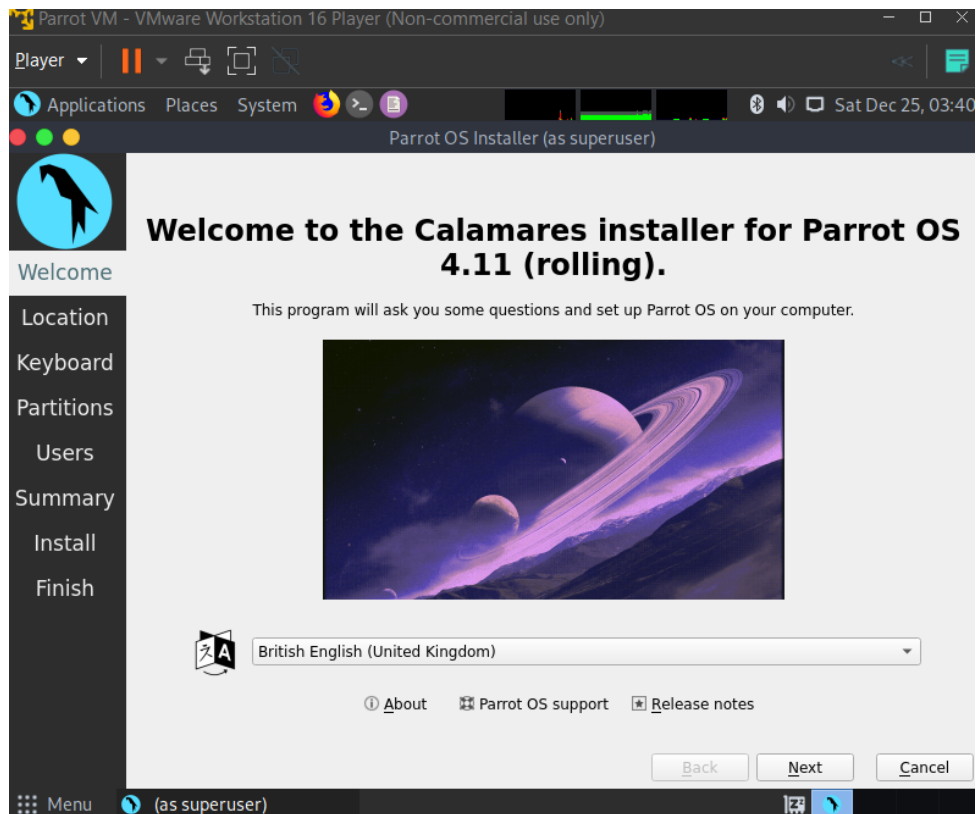To INSTALL, open the "Install Parrot" icon (double clink) from the Desktop.

Figure 18: Select the language you want to install for your OS and press "Next".
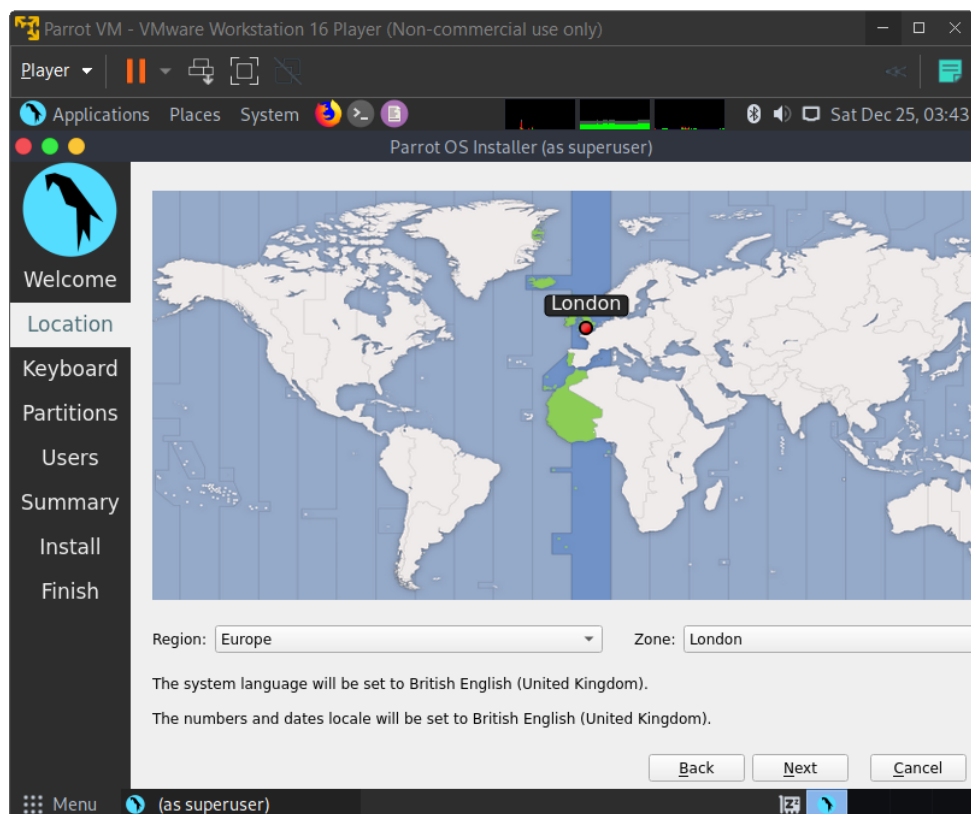

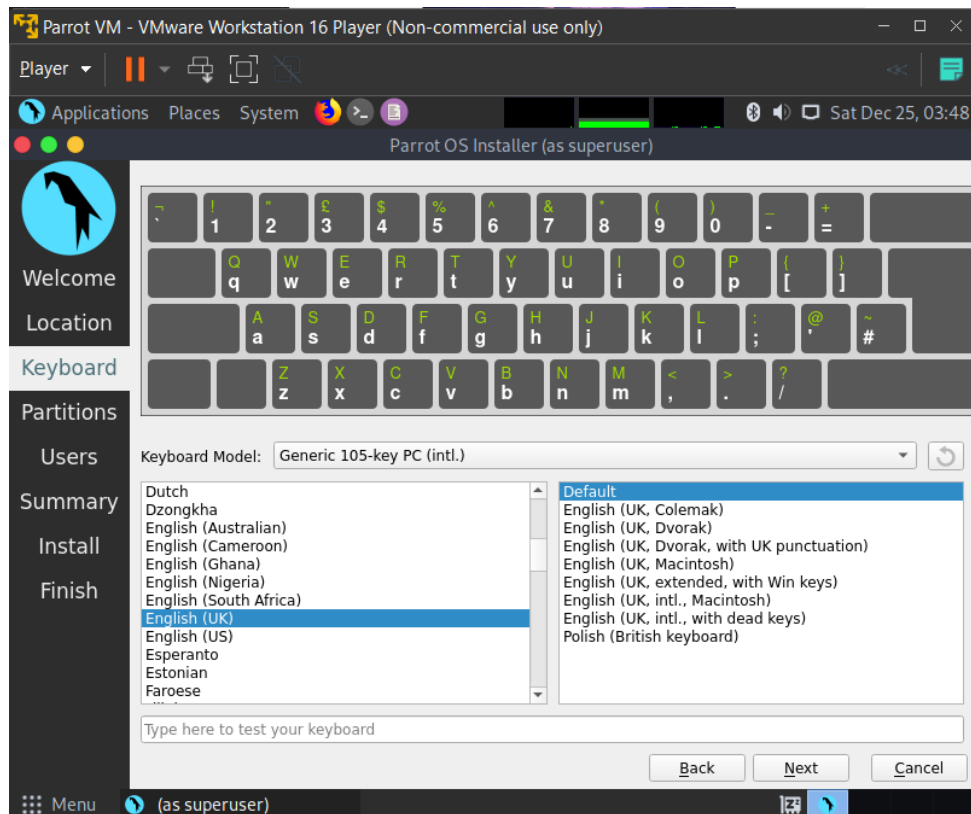Figure 19: Select the timezone of your machine and press "Next".

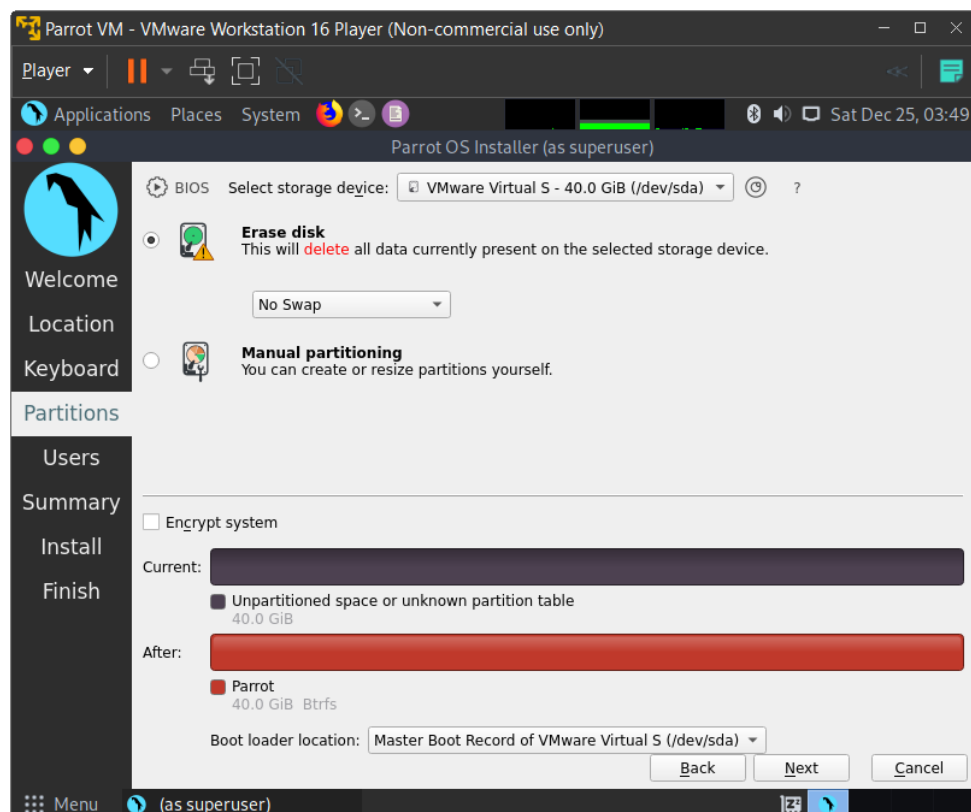Figure 20: Select your keyboard distribuition and press "Next".

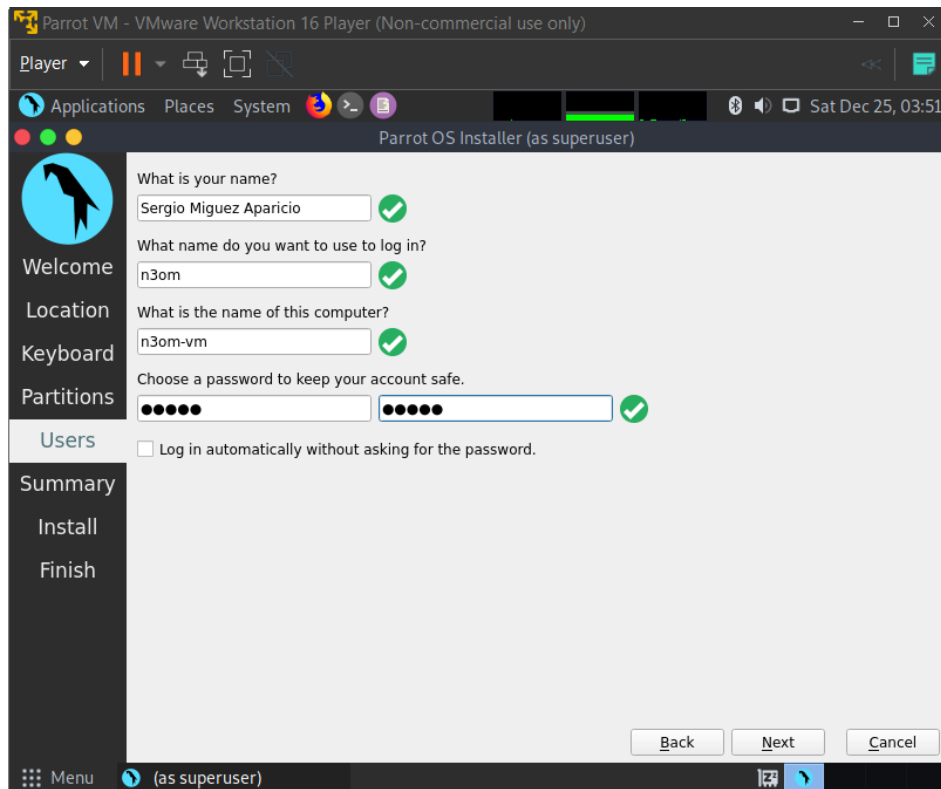Figure 21: Select "Erase disk" and press "Next".

Figure 22: Input your name, the username you want to use, the name of your system (it can be whatever you want), and add a strong password. Finally, press "Next".
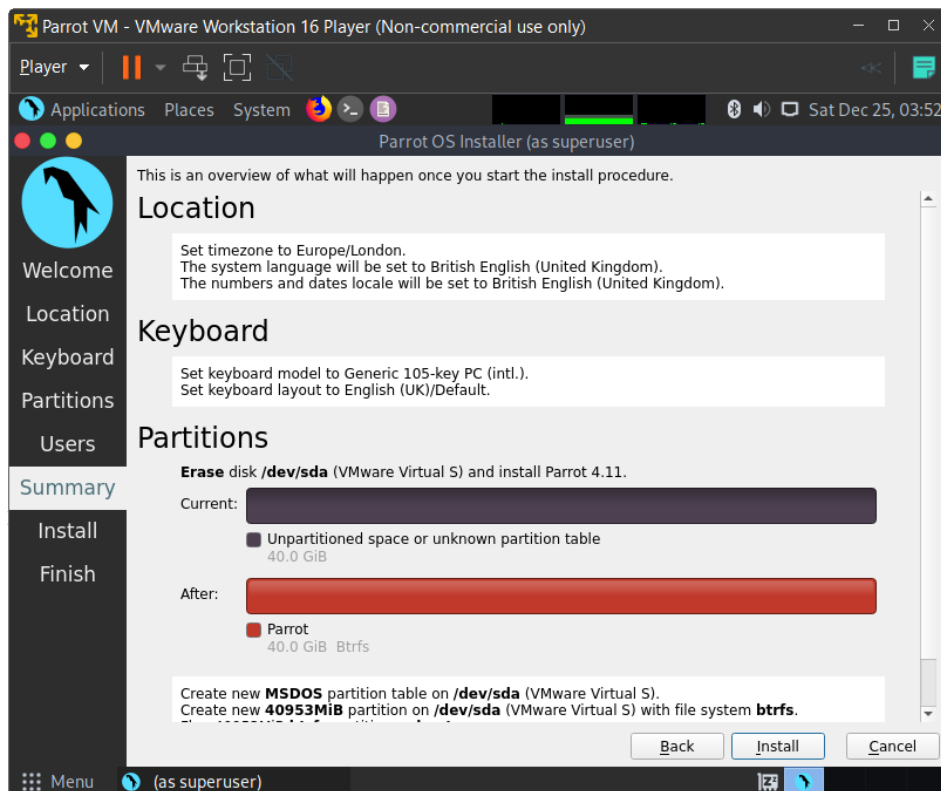

Figure 23: A final Overview will be shown to the user. If everything is correct, press "Install". A warning will show up, press "Install now".
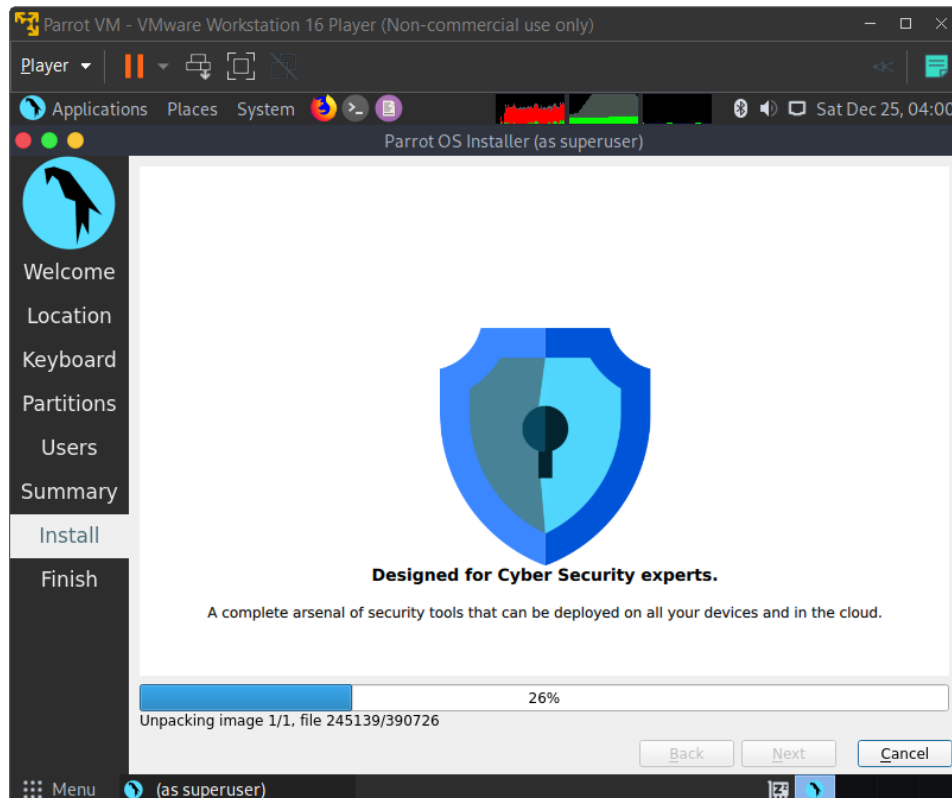
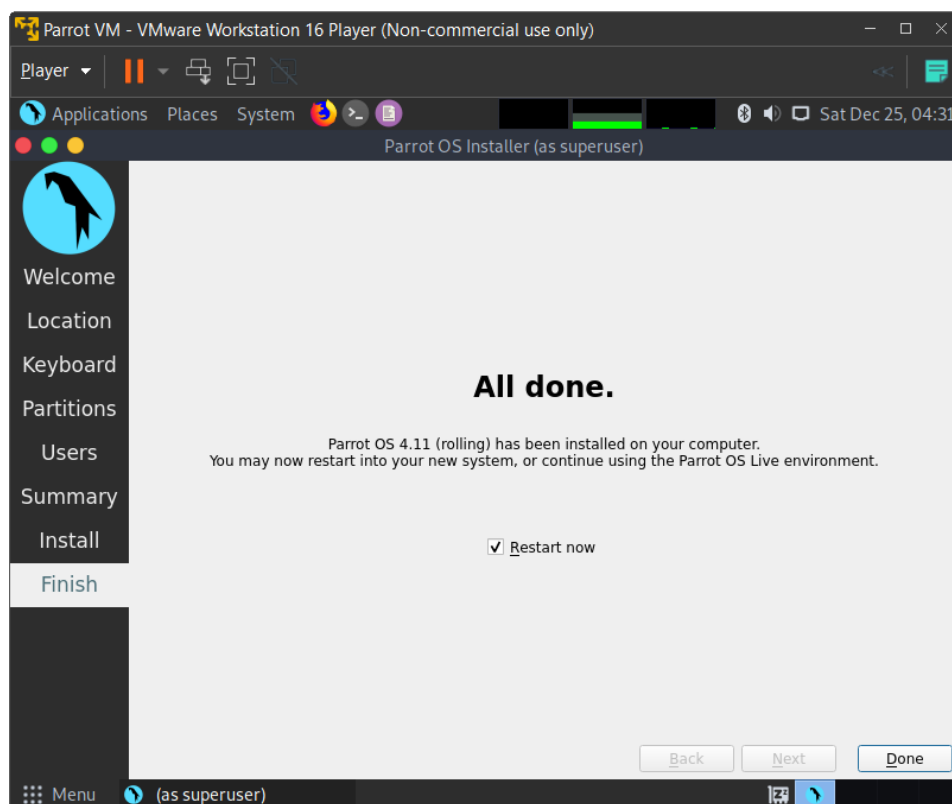Figure 24: The process will take a few minutes while the OS gets installed.

Figure 25: When the installation is over, press "Done". Then press any key when it is requested and the system will boot completely.
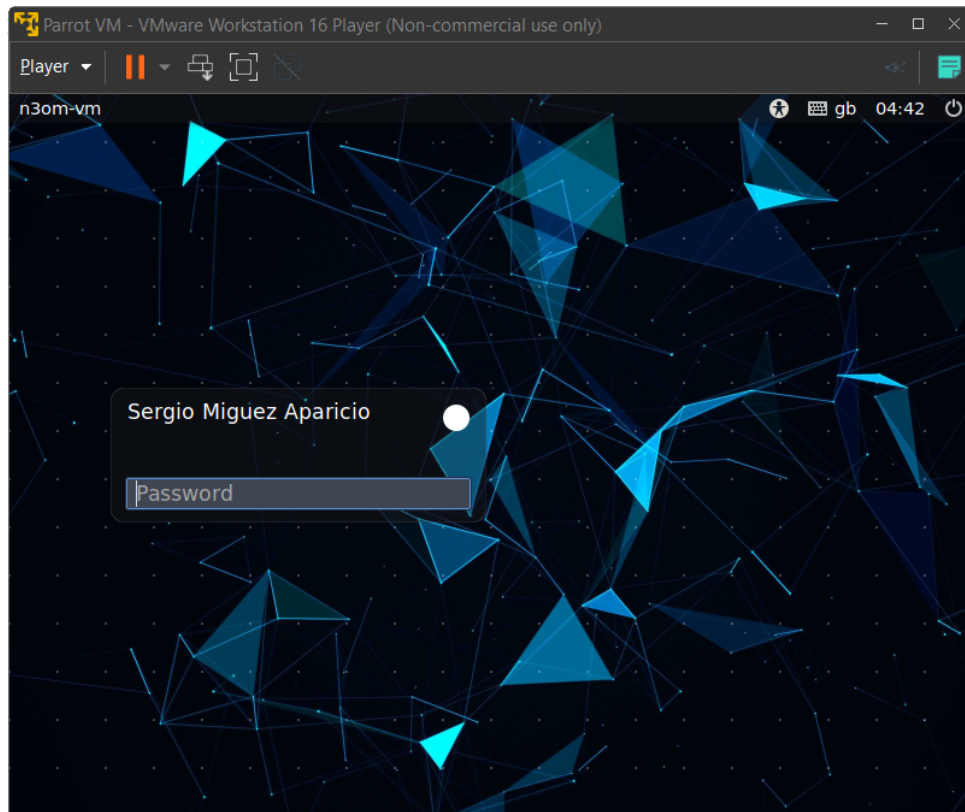
Figure 26: Login into your new VM. The process is done.

2.4 Updating Parrot OS

It is REALLY IMPORTANT that you use the following process to update your Parrot Machine.

Open the "MATE Terminal" clicking on Applications/System Tools/MATE Terminal as shown in the following figure:
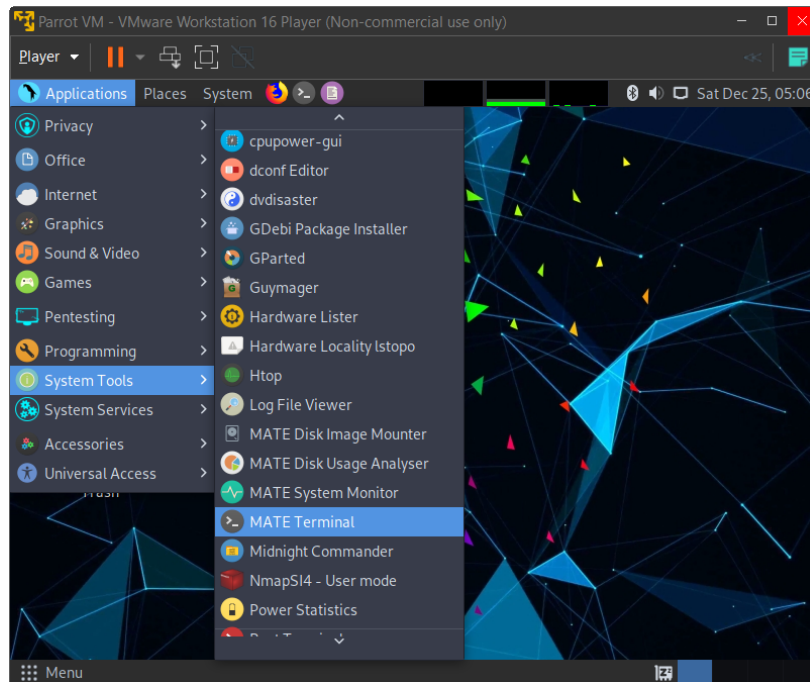

Figure 27: Opening the Terminal.

A faster option is to click directly on the MATE Terminal icon shown in the following figure:
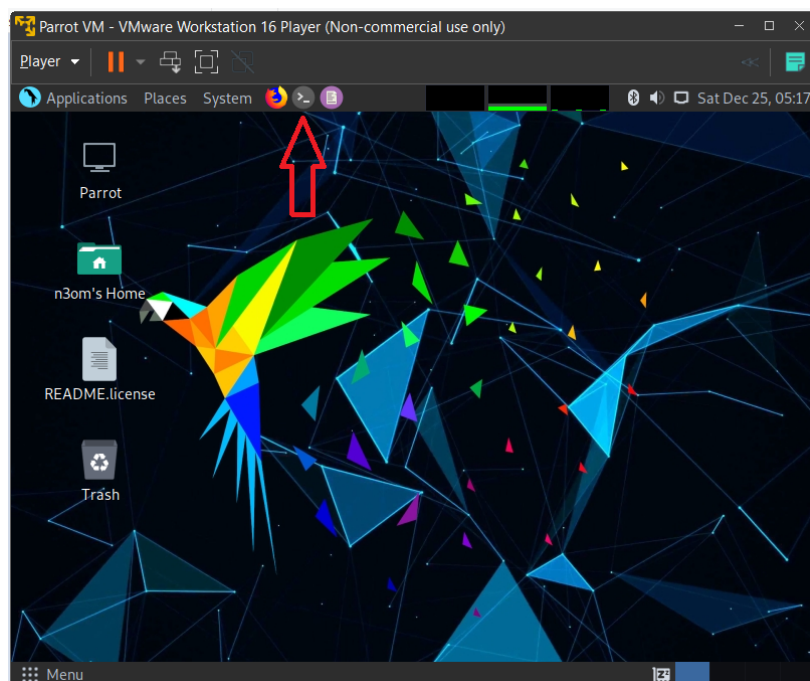

Figure 28: Opening the Terminal Button.

Having opened the terminal, enter the following code:

```
1    sudo apt update
2    # Enter your password
3    sudo parrot-upgrade
4
```

Code 1: Updating Parrot OS

It is REALLY IMPORTANT NOT to USE "sudo apt upgrade" as some packages which could be specifically updated for this distribution would be overwritten to install the latest version. This could cause later on problems using or updating the system.

Use sudo parrot-upgrade

Wait while your system gets updated to the last version. It can take a few minutes. Finally, if the system requires it, use the following code to remove the unnecessary previous version files no longer in use.

```
1    sudo apt autoremove -y
2
```

Code 2: Removing deprecated files.

3 Bibliography

1. VMware - Last accessed on 26/12/2021 - https://www.vmware.com/topics/glossary/content/virtual-machine.html

2. Oracle VirtualBox - Last accessed on 26/12/2021 - https://www.virtualbox.org/manual/ch01.html

3. Parrot OS - Last accessed on 26/12/2021 - https://www.parrotsec.org/download/