

ACTIVIDAD EVALUABLE

SEGURIDAD Y ALTA DISPONIBILIDAD

UD6. Proxmox y Virtualbox (video en inglés)

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Se pide:

1. Crear un documento **en inglés** con las capturas de pantallas relativas a la instalación y configuración de Proxmox sobre virtualbox guiadas.
2. Crear un video **en inglés** explicativo de 3 minutos explicando los conceptos de virtualización.
3. Crea un video **en inglés** de 2 minutos relacionado con las características y diferencias principales entre los sistemas de virtualización tratados en esta práctica.

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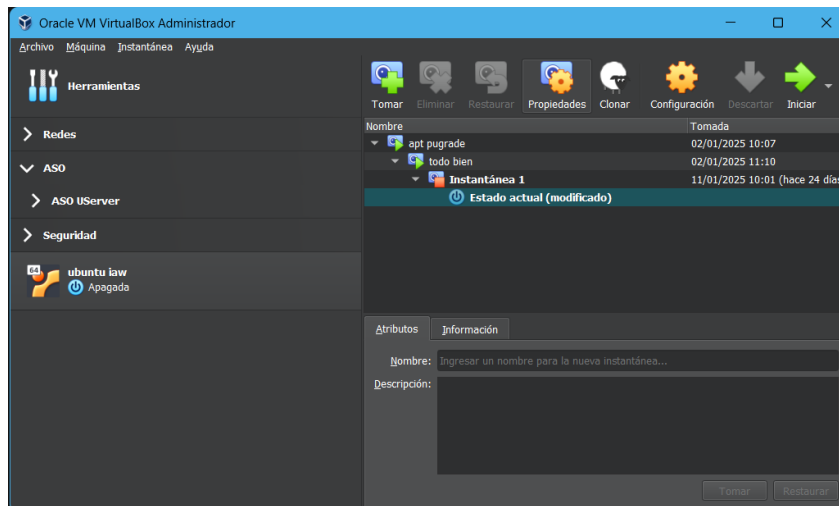


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1. Virtualization with VirtualBox

1. Installing VirtualBox






Verify the installation by opening **VirtualBox** and confirming it starts correctly once the installer has finished:



We choosed linux mint for this task:

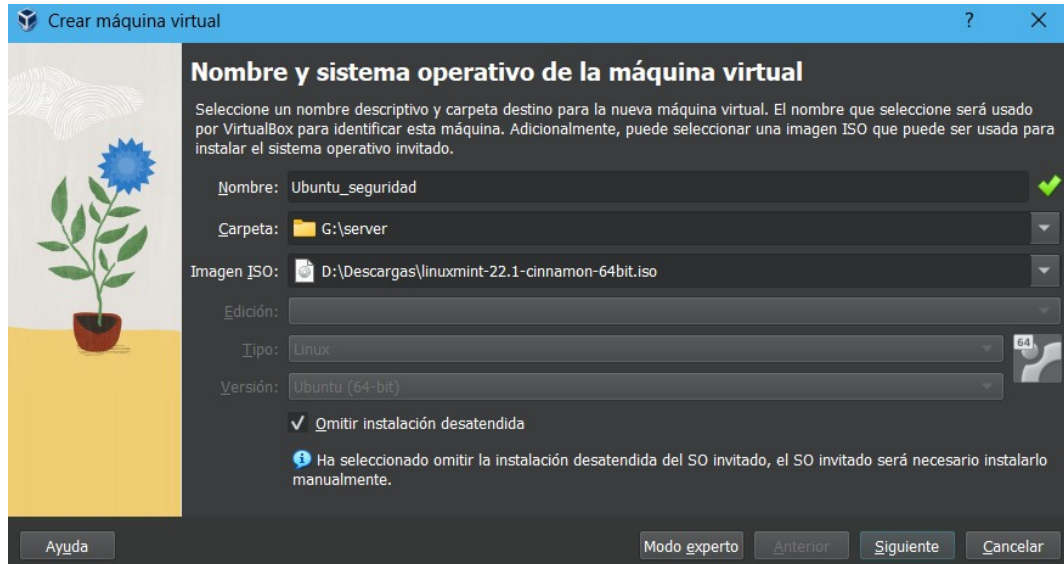


Information

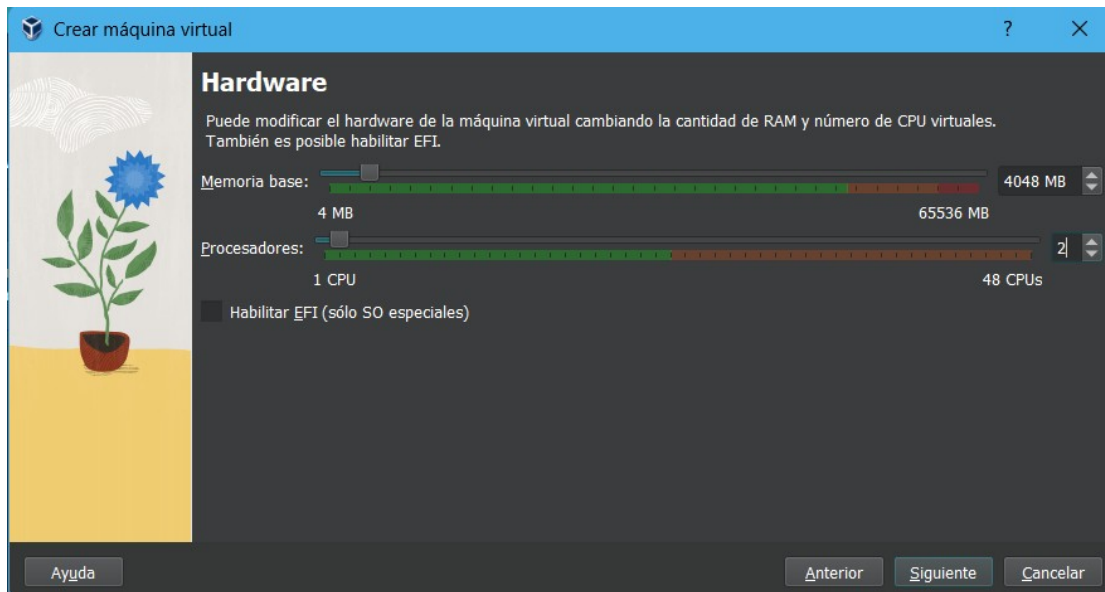
-  Size: 3GB
-  [Installation Guide](#)
-  [Release Announcement](#)
-  [Release Notes](#)
-  [Torrent Download: 64-bit](#)

Creating a Virtual Machine (VM) in VirtualBox

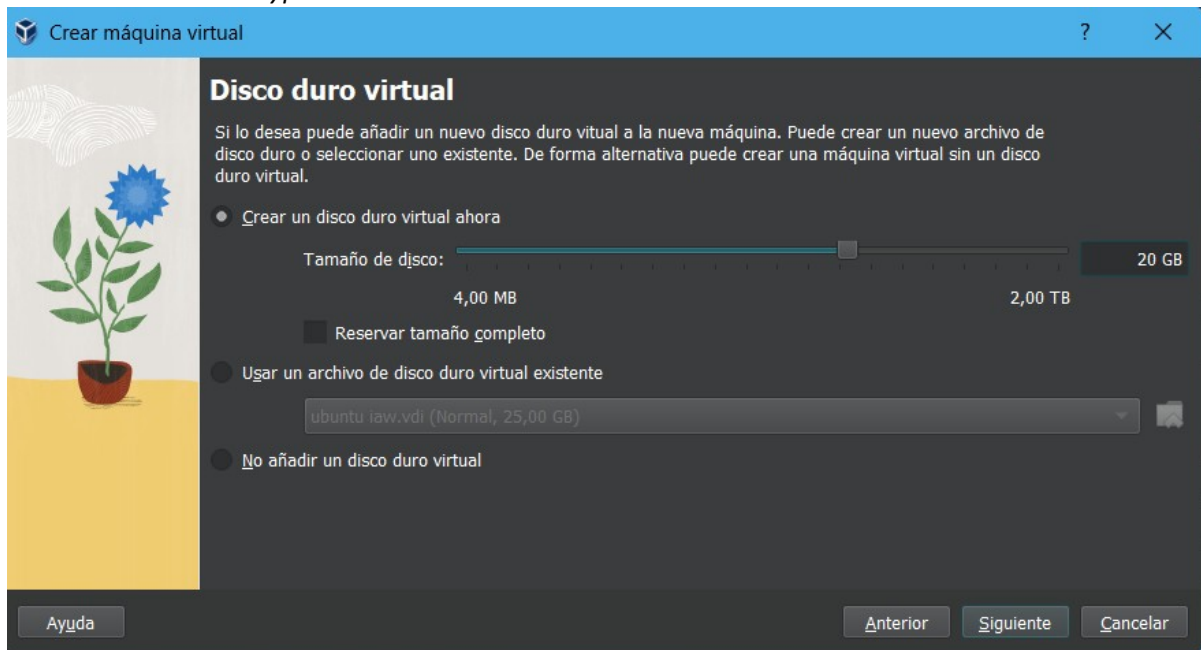
1. Name the VM (e.g., "Ubuntu_VM"), select **Linux** as the type, and **Ubuntu (64-bit)** as the version.



2. Allocate RAM to the VM (recommended: at least 2 GB).

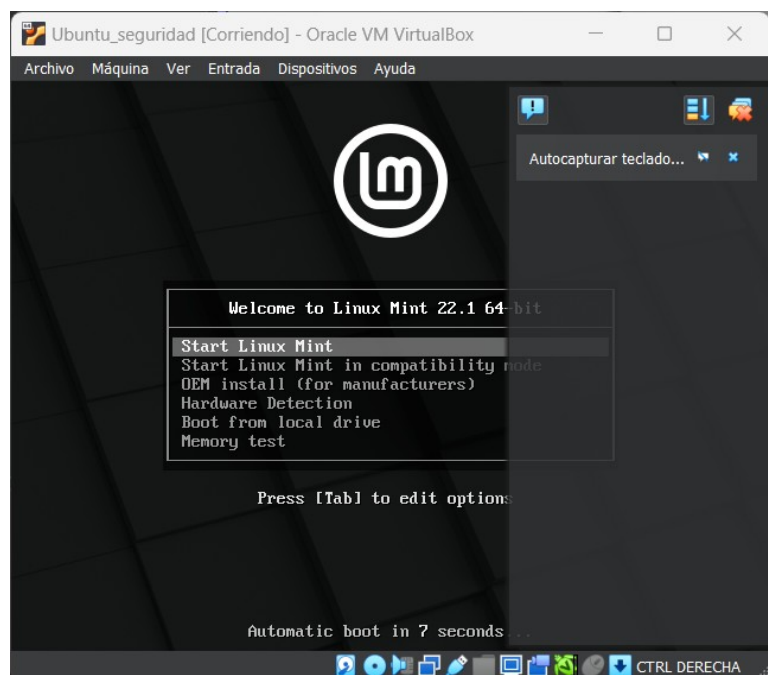


3. Create a virtual hard disk by selecting the **VDI (VirtualBox Disk Image)** format and **Dynamically allocated** as the type. A recommended size is 20 GB.



4. I skipped this part because we already put the path of the iso on the first step.

5. Start the VM and proceed with the installation of Ubuntu by following the installer's prompts.

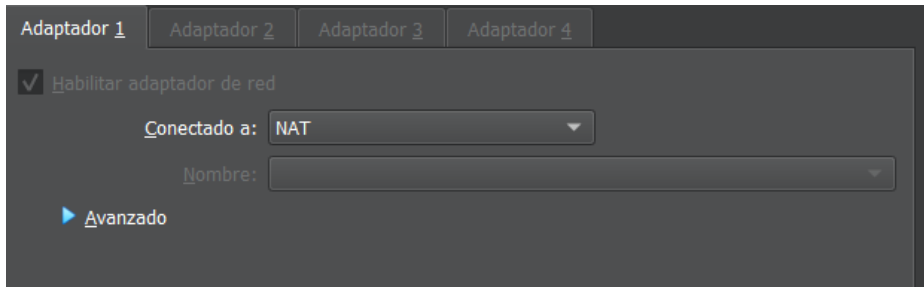


Basic Configuration of the VM

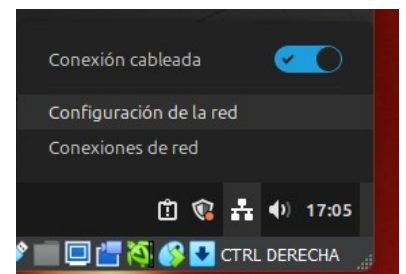
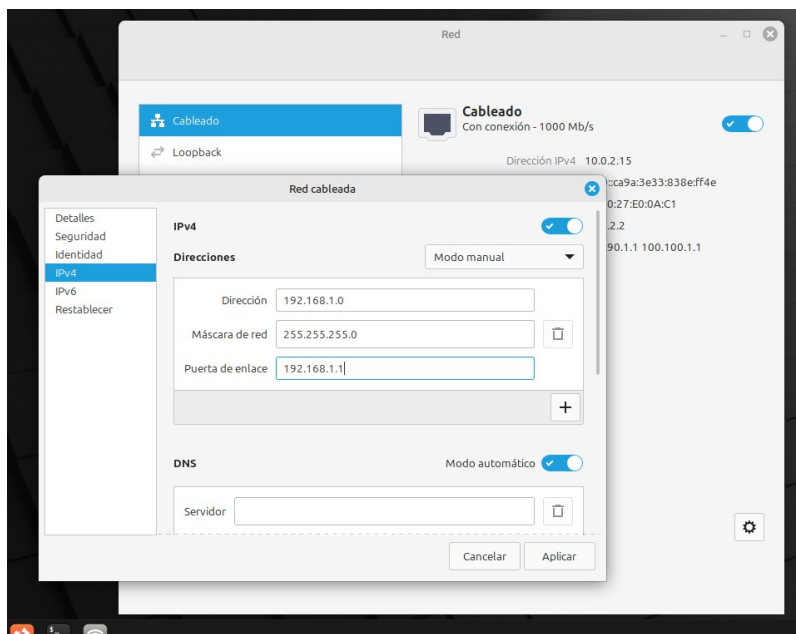
Steps: Once Ubuntu is installed,

6. Perform some configurations:

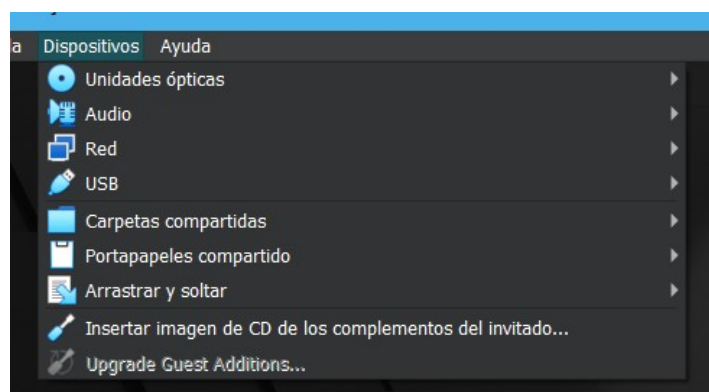
- By default the network type that virtualbox puts its NAT:



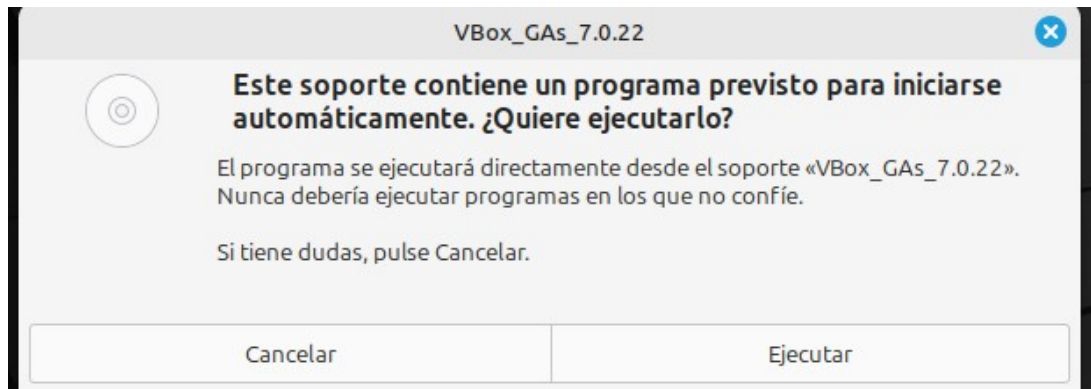
Configure the IP through the GUI:



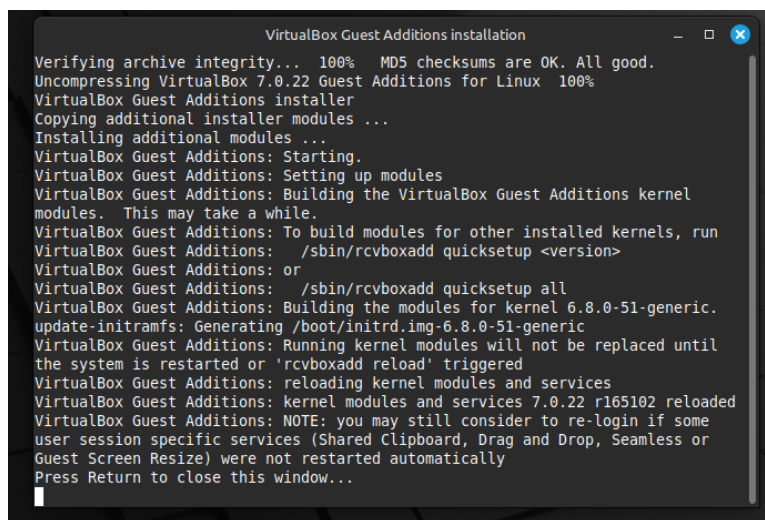
- To Install **Guest Additions** we have to choose the option below, insert the CD below:



It will show a pop up instantly:



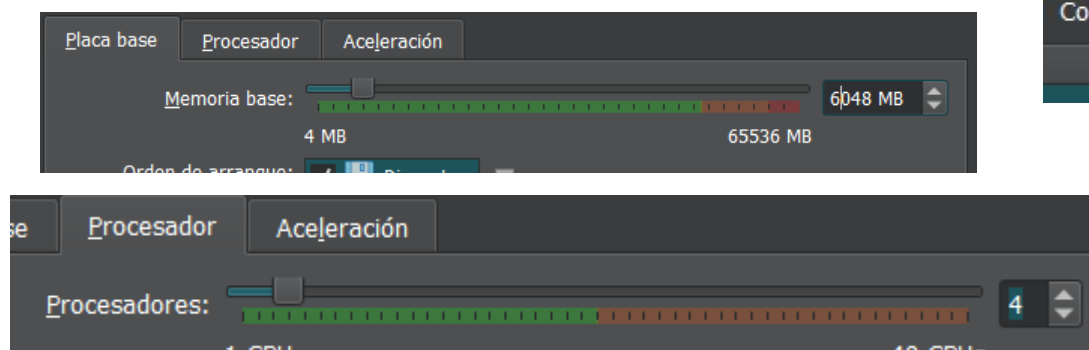
And it will automatically start the installation:



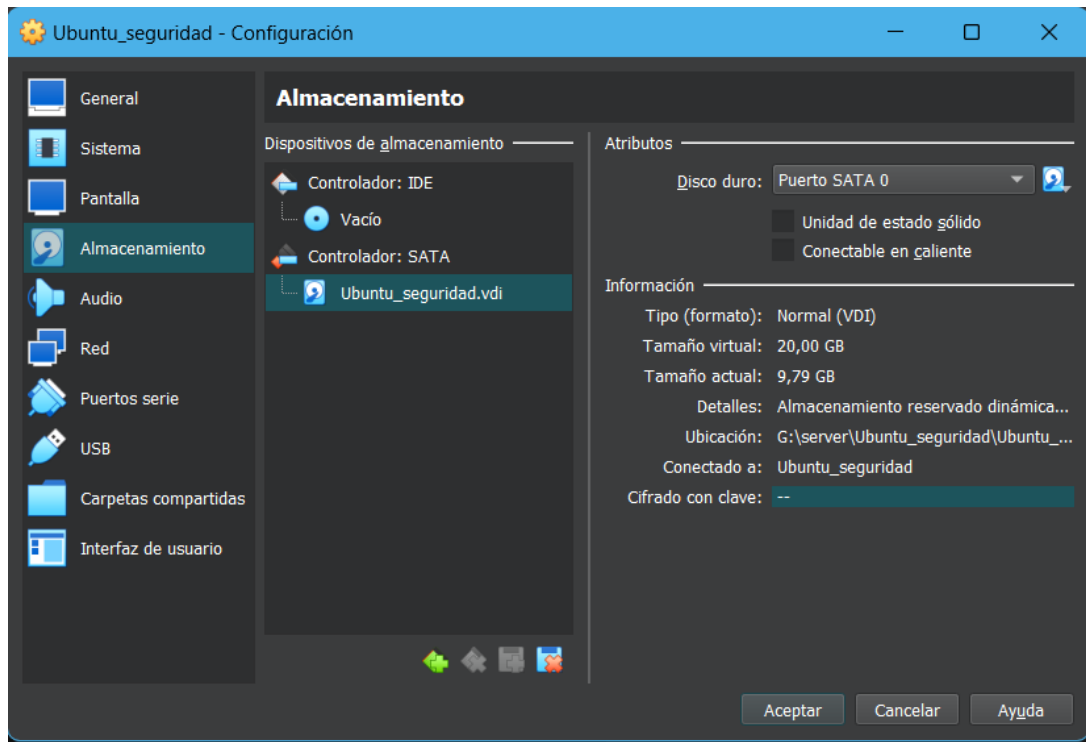
7. Configure the machine's resources:

- Adjust the number of CPUs and RAM from the VM's configuration settings in VirtualBox.

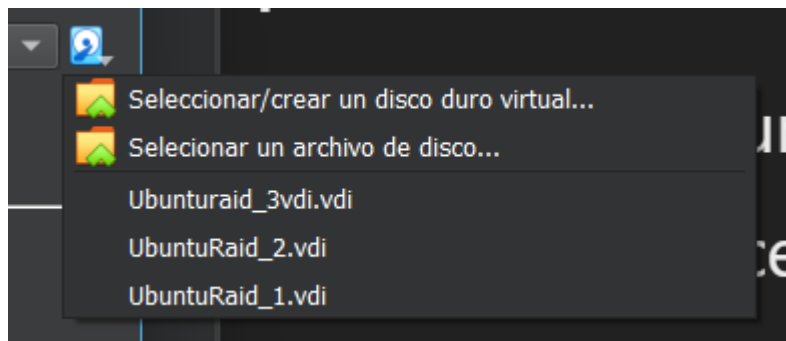
Once is installed we can click the configuration button, and then **we go to system**:



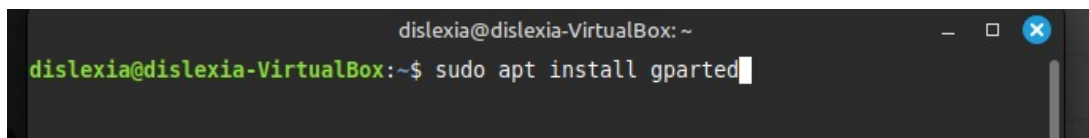
- Ensure sufficient disk space is allocated and perform functionality tests (VM boot, network verification, etc.).



Here we can update or add a new VDI to the machine:



Another option that we can use inside the machine its installing gparted and resize or play with the hole partition.



2. Testing Connectivity and VM Functions

Verify that the VM has internet access and that the resources are functioning correctly:

```
dislexia@dislexia-VirtualBox: ~  
dislexia@dislexia-VirtualBox:~$ ping www.google.es  
PING www.google.es (142.250.200.67) 56(84) bytes of data.  
64 bytes from mad07s24-in-f3.1e100.net (142.250.200.67): icmp_seq=1 ttl=116 time  
=9.24 ms  
64 bytes from mad07s24-in-f3.1e100.net (142.250.200.67): icmp_seq=2 ttl=116 time  
=8.88 ms  
64 bytes from mad07s24-in-f3.1e100.net (142.250.200.67): icmp_seq=3 ttl=116 time  
=9.68 ms  
64 bytes from mad07s24-in-f3.1e100.net (142.250.200.67): icmp_seq=4 ttl=116 time  
=8.85 ms  
^C  
--- www.google.es ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3009ms  
rtt min/avg/max/mdev = 8.854/9.163/9.678/0.333 ms  
dislexia@dislexia-VirtualBox:~$
```

```
dislexia@dislexia-VirtualBox:~$ ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default  
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00  
    inet 127.0.0.1/8 scope host lo  
        valid_lft forever preferred_lft forever  
    inet6 ::1/128 scope host noprefixroute  
        valid_lft forever preferred_lft forever  
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group  
    default qlen 1000  
    link/ether 08:00:27:e0:0a:c1 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.1.10/24 brd 192.168.1.255 scope global noprefixroute enp0s3  
        valid_lft forever preferred_lft forever  
    inet6 fe80::ca9a:3e33:838e:ff4e/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
dislexia@dislexia-VirtualBox:~$
```


2. Virtualization with Proxmox VE

1. Installing Proxmox VE

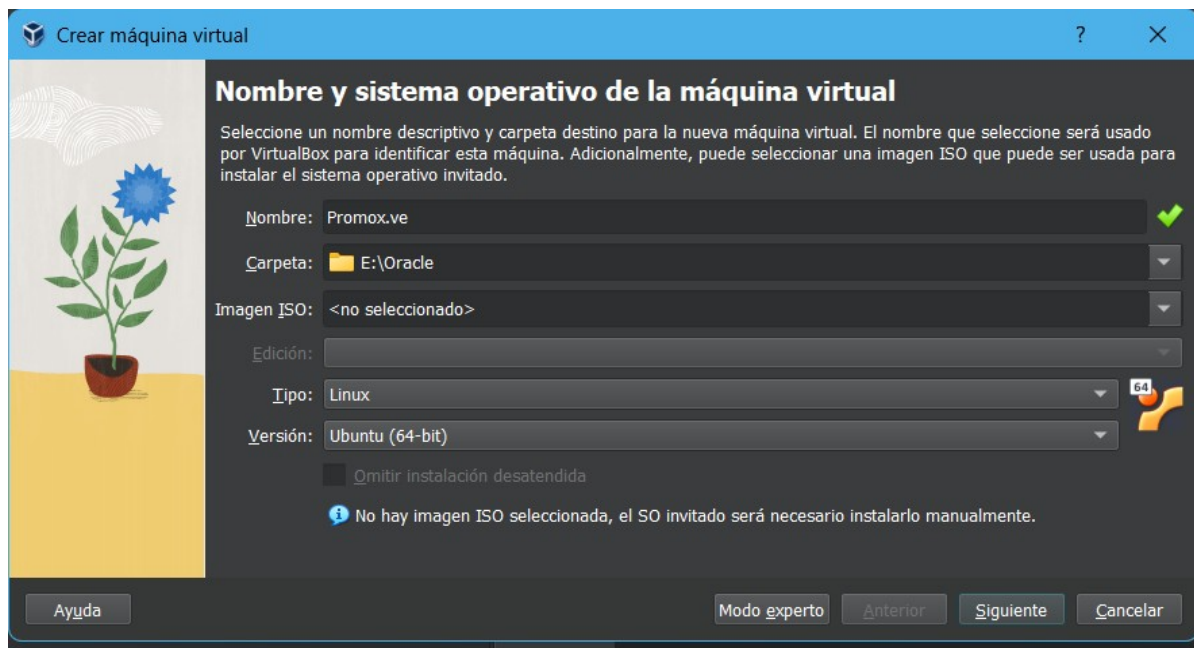
Objective: Install Proxmox VE on a physical server or a VM.

Steps:

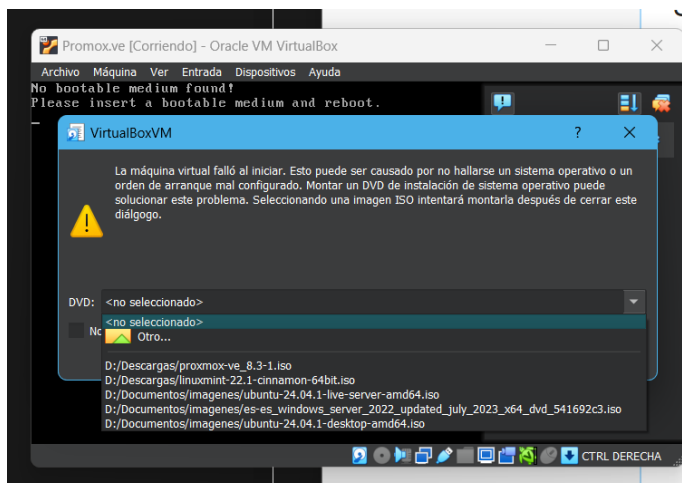
1. Go to the official [Proxmox website](https://proxmox.com/) and download the Proxmox VE ISO.



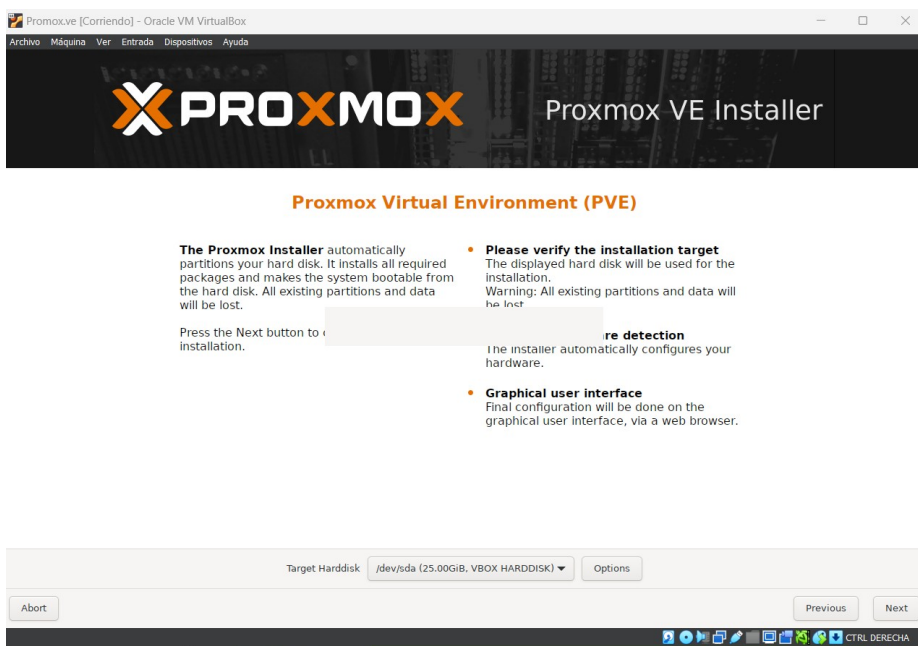
2. Create a virtual machine in **VirtualBox** or install Proxmox on a physical machine by selecting the **Proxmox VE** option during the installation.



3. Follow the installation steps to complete the Proxmox setup.



We follow the installer:



Management Interface ● enp0s3 - 08:00:27:b0:52:8c (e1000) ▼

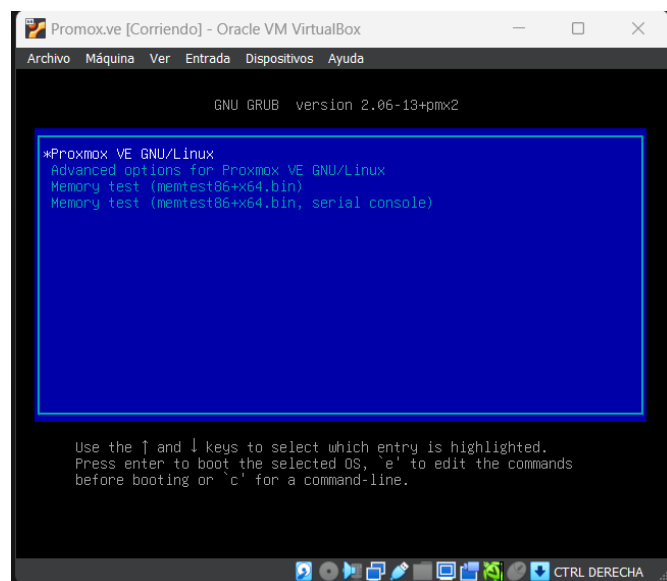
Hostname (FQDN)

IP Address (CIDR) /

Gateway

DNS Server

And we wait until it finish.



```
-----
Welcome to the Proxmox Virtual Environment. Please use your web browser to
configure this server - connect to:

https://10.0.2.15:8006/

-----

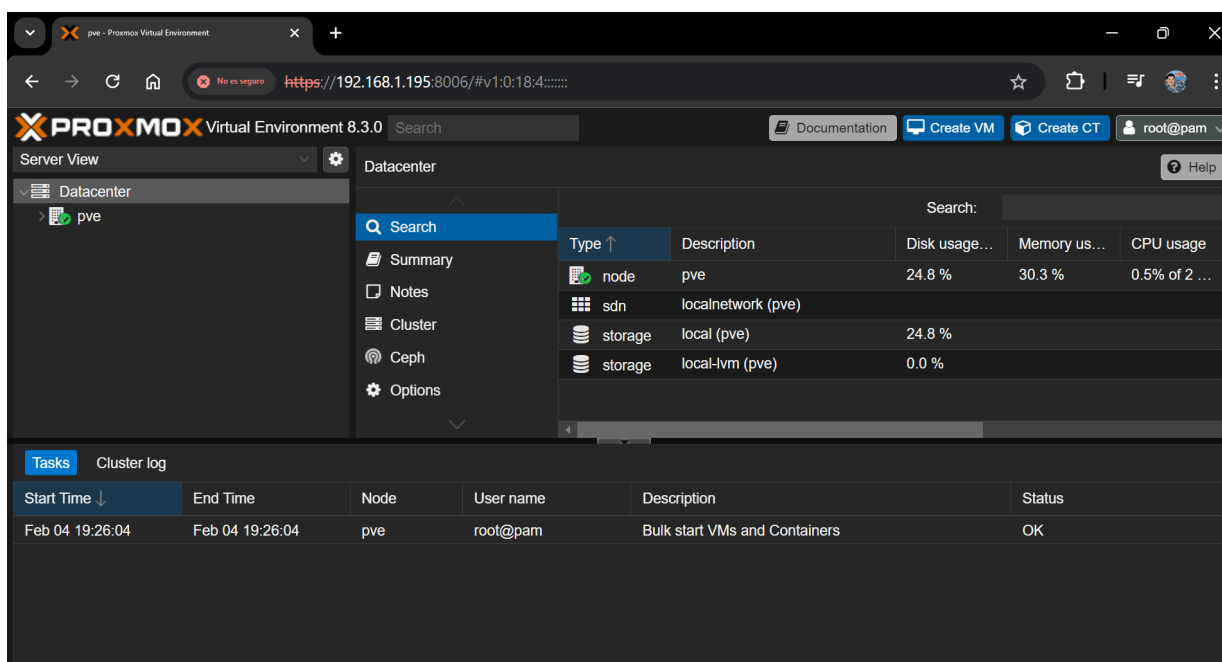
security login: _
```

2. Initial Configuration of Proxmox VE

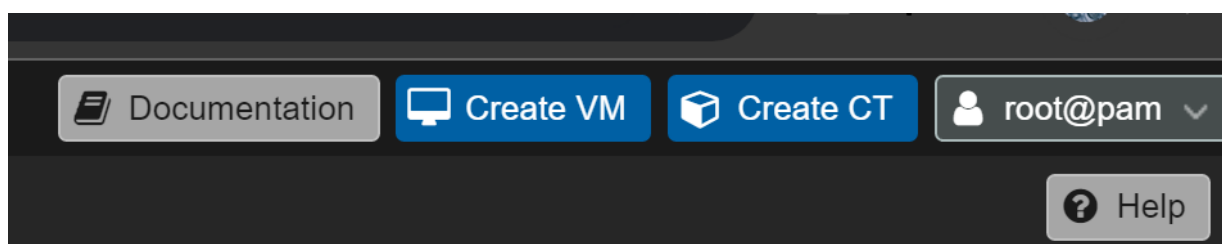
Objective: Configure Proxmox VE to manage virtual machines.

Steps:

1. Access the Proxmox web interface using a browser, entering the assigned IP address of Proxmox followed by port 8006. Example: `https://<Proxmox_server_IP>:8006`.
2. Log in with the root user and the password set during installation.



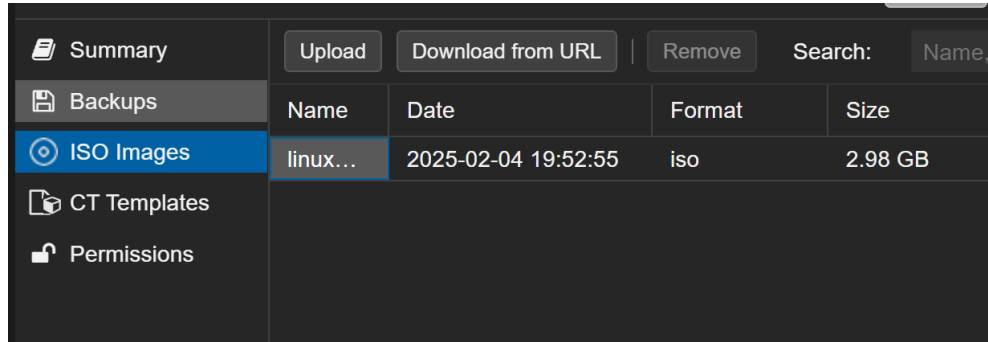
3. In the Proxmox panel, navigate to **Datacenter** → **Node** → **Create VM**.



3. Creating a Virtual Machine in Proxmox

Objective: Create and manage a virtual machine in Proxmox.

We upload to the machine the website:



Steps:

1. Click on "Create VM" and configure the following parameters:

- **VM Name** (e.g., "Ubuntu_VM_Proxmox").

Node:	pve	Resource Pool:	
VM ID:	100		
Name:	SecurityMint		

- **Select the installation media** (it could be an ISO file, such as the Ubuntu image). Allocate **CPU**, **RAM**, and **hard disk** resources as needed. For example, 2 GB of RAM and 20 GB of disk.

<input checked="" type="radio"/> Use CD/DVD disc image file (iso)	Guest OS:
Storage: local	Type: Linux
ISO image: linuxmint-22.1-cinnam	Version: 6.x - 2.6 Kernel
<input type="radio"/> Use physical CD/DVD Drive	
<input type="radio"/> Do not use any media	

-CPU:

Sockets:	2	Type:	x86-64-v2-AES
Cores:	2	Total cores:	4

-HDD:

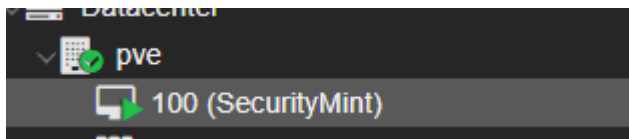
Hard Disk (scsi0)	local-lvm:vm-100-disk-0,iothread=1,size=20G
-------------------	---

- RAM:

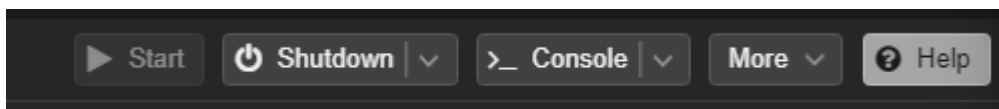
Memory (MiB):	2048
Minimum memory (MiB):	2048
Shares:	Default (1000)
Ballooning Device:	<input checked="" type="checkbox"/>

2. Follow the wizard to complete the VM creation process.

Once its created we have will have this in our left menu:



3. Once created, click "Start" to boot the VM and install Ubuntu as you did earlier.

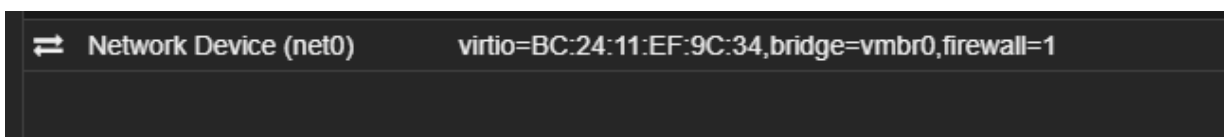


4. Configuring Network in Proxmox Objective:

Configure the network for the VM. **Steps:**

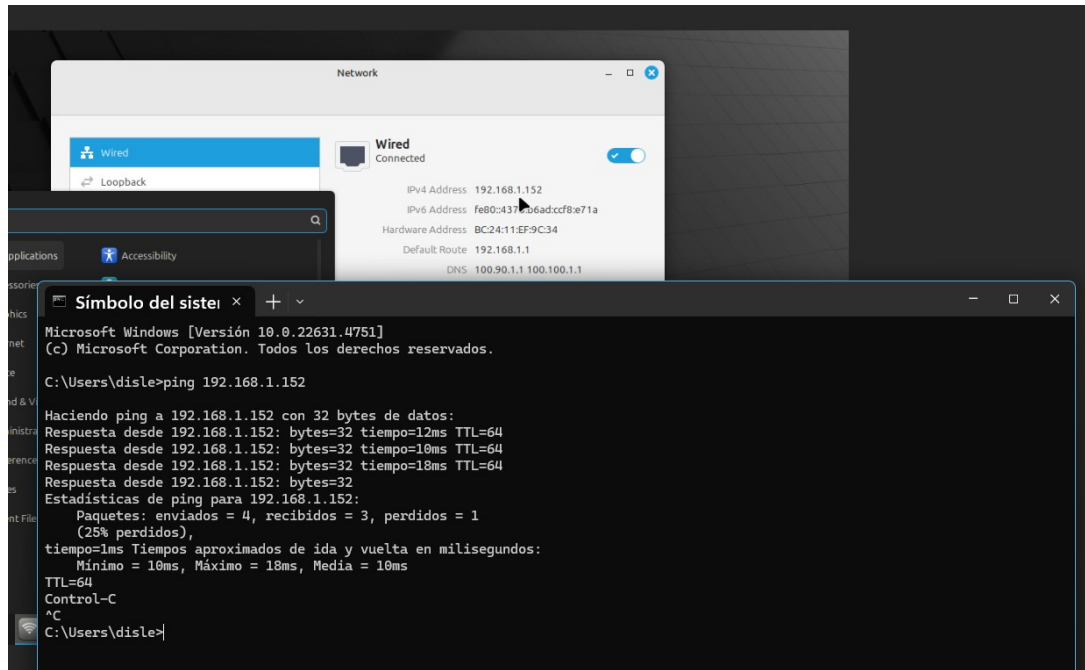
1. During installation, ensure the VM is configured with a **bridged network** or NAT according to the network requirements.

By default its configured in bridge, option vmbr0:



- If you need access to the VM from other machines, configure a **bridge network** (Bridge) to connect the VM to the physical network.

-We can test connectivity through our main computer with a ping:



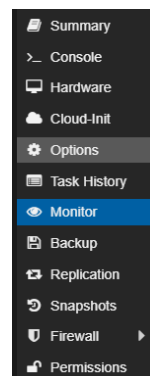
5. Managing Virtual Machines in Proxmox Objective:

Administer and monitor virtual machines. **Steps:**

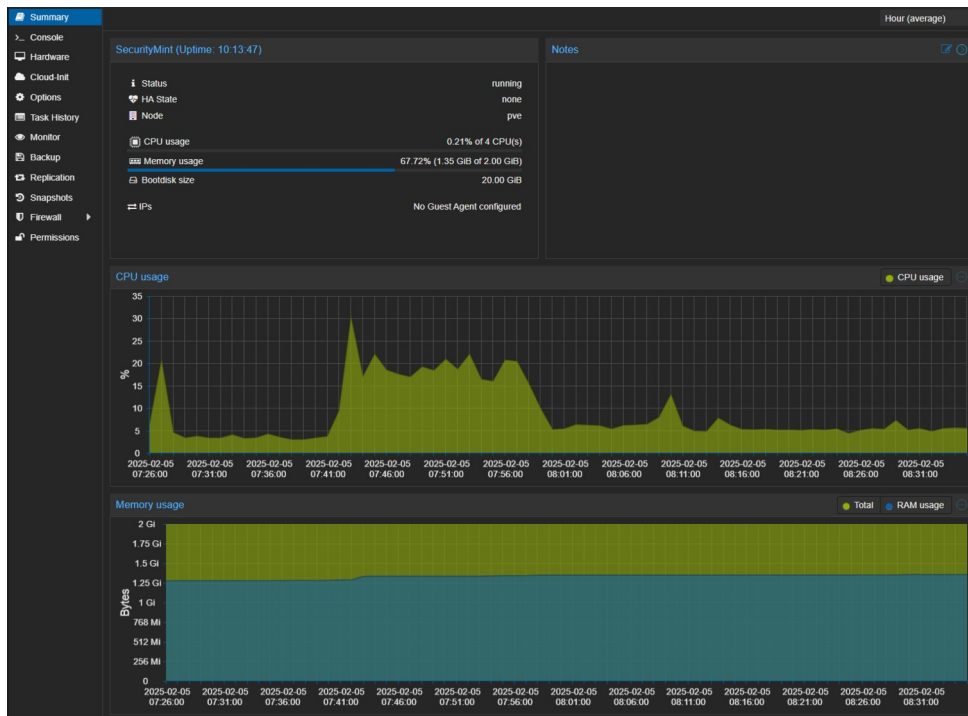
- Use the web interface to perform administration tasks such as:
 - Clicking on the node pve we can see a table with **general info**:

Type	Description	Disk usage...	Memory us...	CPU usage	Uptime	Host CPU ...	Host Mem...	Tags
qemu	100 (SecurityMint)	0.0 %	67.5 %	1.5% of 4 ...	10:03:41	1.5% of 4 ...	35.7 %	

We can see other info in the VM menu, monitor:



And then in the vm machine we can see the summary also that it will show the graphs:



- Configuring **boot options**, **backup**, and **migration** for the VM.

Boot is located on hardware options, with in the boot order:

Options	OS Type	Linux 6.x - 2.6 Kernel
Task History	Boot Order	scsi0, ide2, net0
Monitor	Use tablet for pointer	Yes
	Hotplug	Disk, Network, USB

Double-click and it will pop-up a menu to edit the boot order.

Edit: Boot Order

#	Enabled	Device	Description
1	<input checked="" type="checkbox"/>	scsi0	local-lvm:vm-100-disk-0,iothread=1,size=20G
2	<input checked="" type="checkbox"/>	ide2	local:iso/linuxmint-22.1-cinnamon-64bit.iso,media=cdrom...
3	<input checked="" type="checkbox"/>	net0	virtio=BC:24:11:EF:9C:34,bridge=vbr0,firewall=1

Drag and drop to reorder

? Help
OK

-Backup option:

Once its created will send a email to that mail and we will se on the web interface

Backup VM 100

Storage:local

Mode:Stop

Protected:☒

Notes:{{guestname}}

Compression:ZSTD (fast and good)

Notification mode:Auto

Send email to:admin@local

Possible template variables are: {{cluster}}, {{guestname}}, {{node}}, {{vmid}}

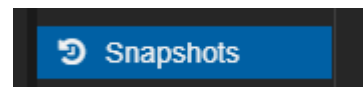
Help

Backup

```
INFO: adding notes to backup
INFO: Finished Backup of VM 100 (00:01:11)
INFO: Backup finished at 2025-02-05 08:10:01
INFO: Backup job finished successfully
TASK OK
```

Name	Notes	Date	Format	Size
vzdump-gemu-100-2025_02_05-08_08_50.vma.zst	Fresh install	2025-02-05 08:08:50	vma.zst	4.06 GB

- Snapshot option:**



Take Snapshot | Rollback | Edit | Remove

Name	RAM	Date/Status	Description
NOW			You are here!

Now we are going to hit take snapshot and later, we hit take Snapshot:

Create: VM100 Snapshot



Name:FreshSnapshot

Include RAM:☒

Description:Apt update && upgrade

Take Snapshot

Later we will see this snapshot:


FreshSnapshot
 **NOW**

Yes

2025-02-05 08:17:26

Apt update && upgrade
You are here!

Migration option:

Now lets create a cluster on the datacenter:

Cluster Information

Create Cluster
Join Information
Join Cluster

Cluster Name: pve2
Config Version: 1

Cluster Nodes

Nodename	ID ↑	Votes	Link 2
pve	1	1	192.168.1.213

We open the join information button and copy the info to paste on the other node:

Join Information:

eyJpcEFkZHJlc3MiOiIxOTluMTY4LjEuMjEzliwiZmluZ2VycHJpbnQiOiIwRDoxOTto2Rjo3MjpBMDpBNDpEQTozQzo2RDdo5NjpmjzMTTo1MjoyRjo3NzpcNjEODo4RDpBNzo4RTpDMDo2MDo4MzpDQjpDQjowMjo5MjpCRDo0Nz
pDQzpBNDowRiIsInBIZXJMaW5rcyl6eylyljo1MTkyLjE2OC4xLjlxMyJ9LCJyaW5nX2FkZHIiOiIsMTkyLjE2OC4xLjlx
MvIdIiCjE0b3RlbiSI6evJ27XJzaW9uIiIiMjEzliwiZmluZ2VycHJpbnQiOiIwRDoxOTto2Rjo3MjpBMDpBNDpEQTozQzo2RDdo5NjpmjzMTTo1MjoyRjo3NzpcNjEODo4RDpBNzo4RTpDMDo2MDo4MzpDQjpDQjowMjo5MjpCRDo0Nz

Copy Information

Description

We will have to make a new server in order to migrate our vm to the other server on a “Live migration”, so we have to make another node on other machine:

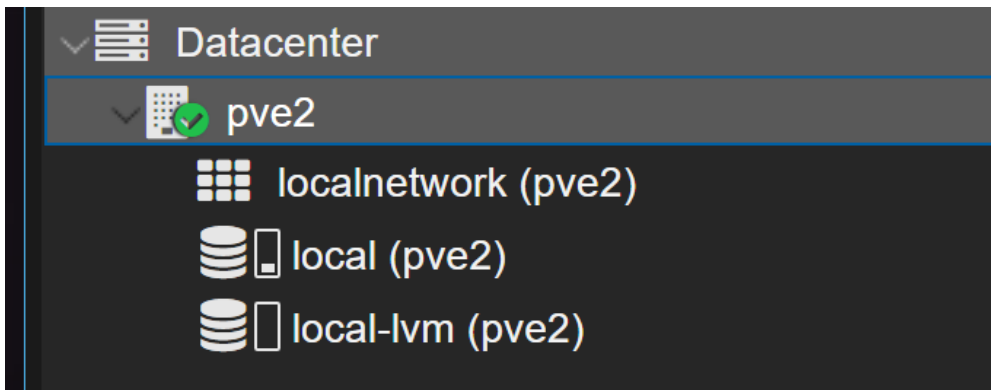
Summary

Please confirm the displayed information. Once you press the **Install** button, the installer will begin to partition your drive(s) and extract the required files.

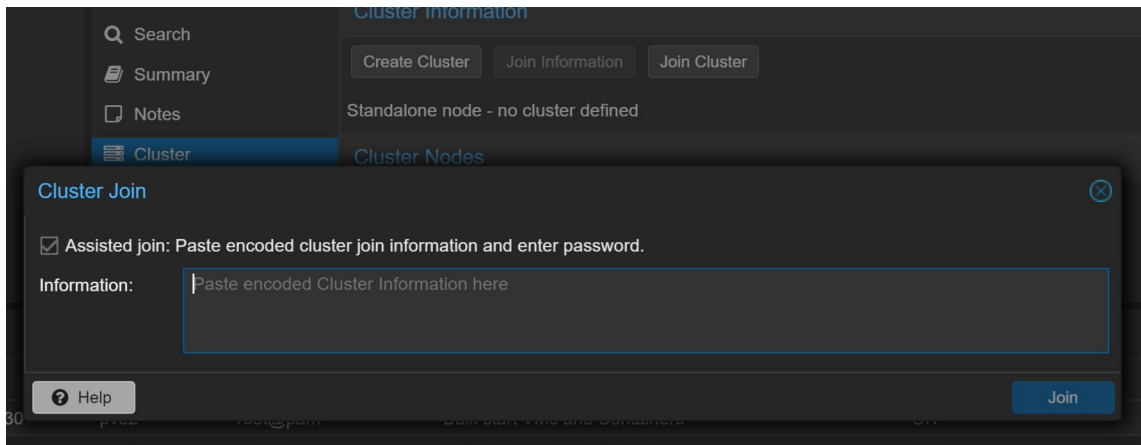
Option	Value
Filesystem:	ext4
Disk(s):	/dev/sda
Country:	Spain
Timezone:	Europe/Madrid
Keymap:	es
Email:	admin@gmail.es
Management Interface:	enp0s3
Hostname:	pve2
IP CIDR:	192.168.1.174/24
Gateway:	192.168.1.1
DNS:	100.90.1.1

We will now login into the other proxmox interface:

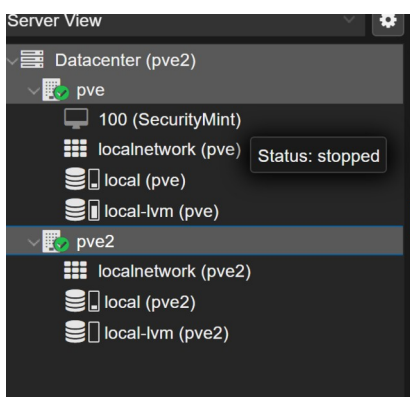
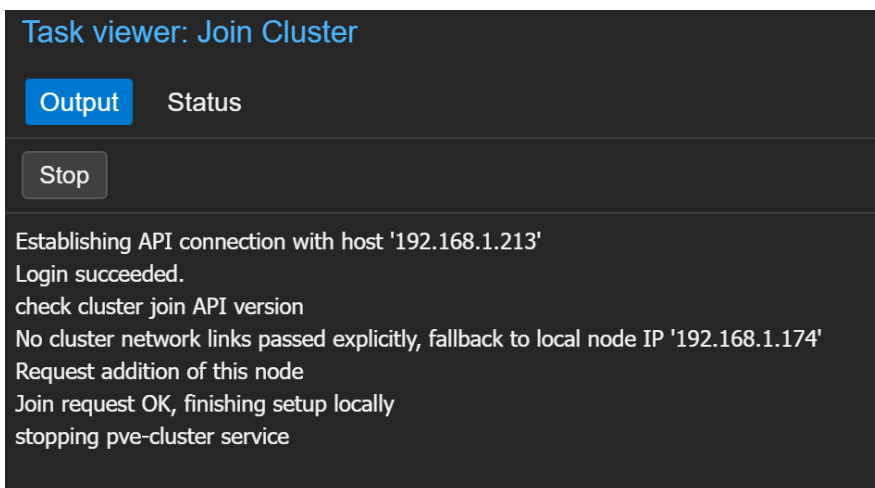
```
configure this server - connect  
https://192.168.1.174:8006/
```



Now we will join the cluster with the join information that we had of the previous node:

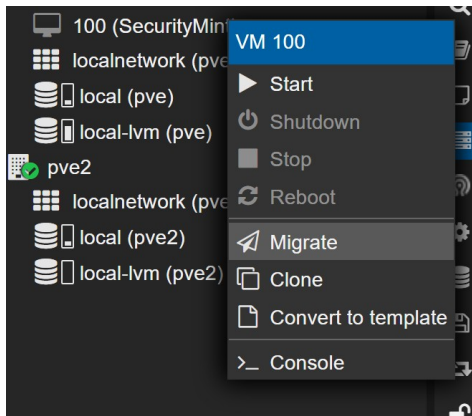


Once its copied we can see the completion of the task:

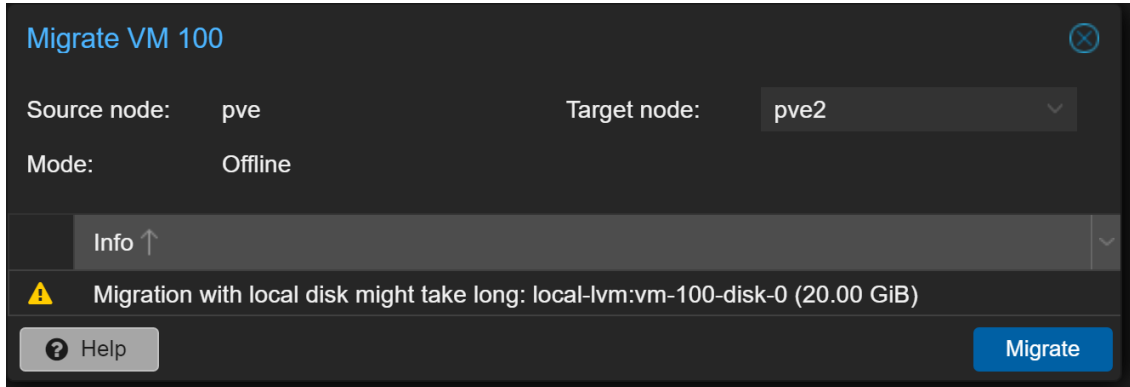


Now we can go to the first interface .213 and see that we have both nodes activated:

And now if we can get the migrate option right-clicking on the VM:



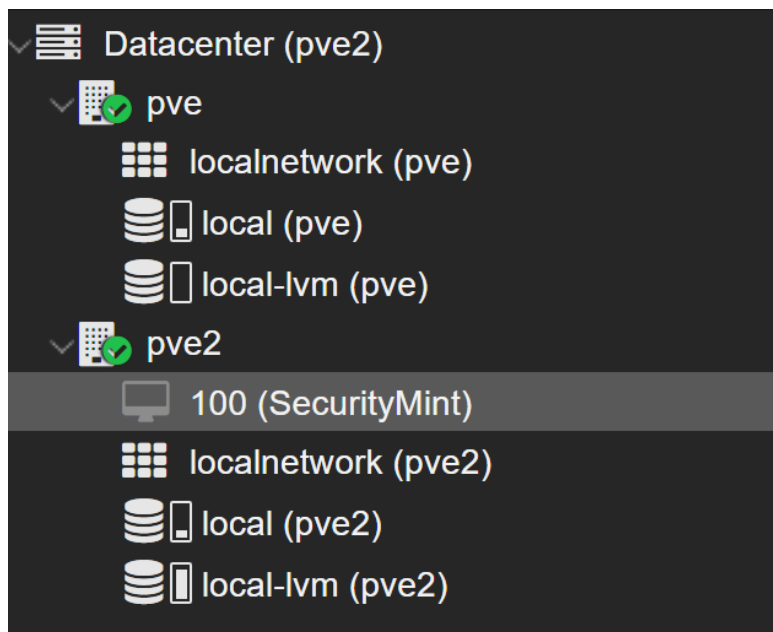
Now its easy, we just have to follow the pop-up:



As we see, the warning that appears its related to the low space on the local disk, but we can hit enter anyways, we will have to wait until the task finish:

```
2025-02-09 18:14:26 729743360 bytes (730 MB, 696 MiB) copied, 3 s, 243 MB/s
2025-02-09 18:14:29 1052049408 bytes (1.1 GB, 1003 MiB) copied, 6 s, 175 MB/s
```

And later we will see that the migration was successfully:



3. Comparison of VirtualBox and Proxmox

VirtualBox, as we saw, is super easy to use and configure. To use it, you only need to install the .exe on your operating system. Since it is a Type 2 hypervisor, it can only run on an existing operating system and not directly on bare metal hardware. It provides easy access to the application, but it could be slower and more challenging to use if you have a low-end computer running both your OS and VirtualBox.

Another advantage is that you only need to download an ISO file onto your computer and add a new virtual machine. The installation pop-up will guide you through the process until you power on the machine you created. Additionally, the network configuration options are very easy to understand and set up, even when creating NAT networks or private networks for interconnecting your machines.

On the other hand, the backup and cloning system is very easy to use, allowing you to import a new machine later. If you click "Add", navigate to the directory, and select the .vbox file, the machine will be imported automatically.

However, the snapshot system is a bit tricky compared to other hypervisors like VMware, overall VirtualBox is a good software choice for students, casual users, or developers who need to quickly deploy an OS for testing purposes.

Now, let's talk about **Proxmox**, a newer software. This one is a Type 1 hypervisor, which means it can be installed directly on bare metal hardware, without requiring an existing operating system. This makes it very useful for deploying virtual machines or operating systems on old computers or new servers through a remote hypervisor.

Proxmox is harder to get used to. You need to create a node for each system, and each node can contain multiple VMs, forming a cluster. Setting up your first machine is less intuitive compared to VirtualBox, but on the other hand, it offers more advanced options. The networking configuration is also more advanced but harder to understand. Once deployed, you can upload an image from your local storage to the node you created in Proxmox and install it.

Additionally, we saw that you can create a cluster of nodes to migrate machines live or offline, which is a very useful feature. You also have real-time metrics for your node (computer/server) and every VM running on it.

Proxmox is a powerful and professional tool for deploying VMs and clusters on servers or computers. However, it requires a lot of knowledge or extensive documentation reading to master this hypervisor.

Main points:

Feature	VirtualBox	Proxmox
Hypervisor Type	Type 2 (Runs on an OS)	Type 1 (Bare metal)
Performance	Slower, dependent on host OS	Faster, direct access to hardware
Use Case	Desktop virtualization, testing	Server virtualization, data centers
Cluster Support	No	Yes, multi-node clusters
Container Support	No	Yes (LXC)
Snapshots & Backups	Limited	Advanced snapshot & backup features
Networking	Basic NAT/Bridged	Advanced SDN (Software-defined Networking)