

# Install Proxmox VE {Step-by-Step Guide}

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🌐 [phoenixnap.com/kb/install-proxmox](https://phoenixnap.com/kb/install-proxmox)

May 21, 2024

## Introduction

Proxmox VE is an open-source server platform for enterprise virtualization. As a Debian-based Linux distribution, Proxmox uses a modified Ubuntu kernel to run multiple virtual machines and containers on a single server.

You can deploy and manage virtualized environments through a web console or a command line, ensuring simple and fast accessibility.

**This tutorial shows how to install and configure Proxmox.**



## Prerequisites

- A physical or dedicated server.
- 64bit CPU.
- At least 1GB of RAM (and additional RAM needed for guest VMs).
- A USB stick with at least 1GB storage.

## Install Proxmox Virtual Environment via GUI

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Follow the steps below to install Proxmox VE on a physical or dedicated server.

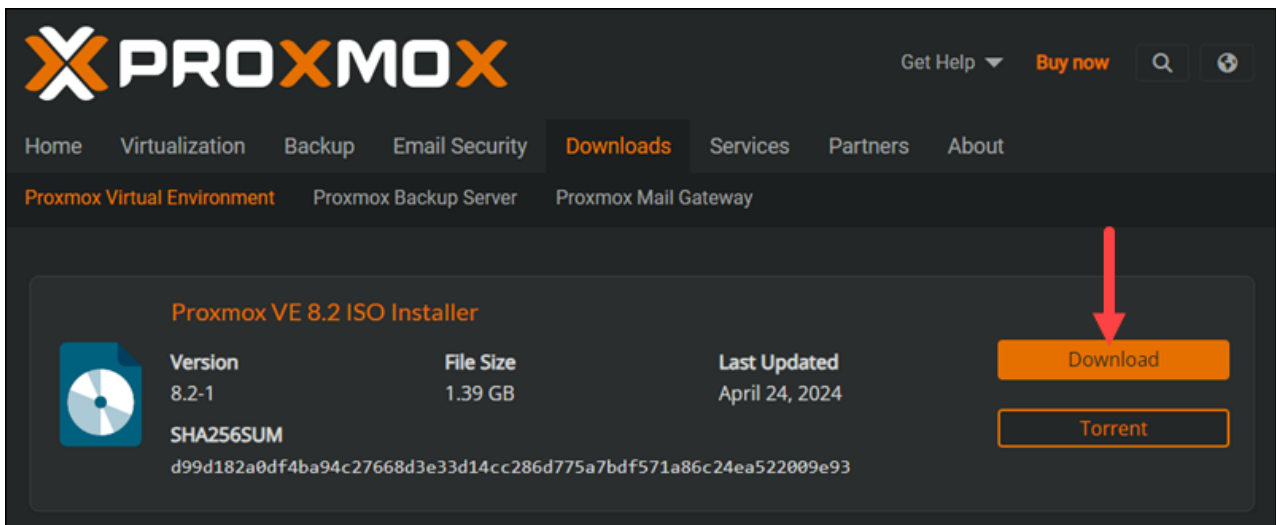
**Note:** For the best performance, use Proxmox on bare-metal hardware, especially for production environments. Boot up a phoenixNAP Bare Metal Cloud server with Proxmox installed and configured out of the box.

Bare Metal Cloud offers automated deployment with Proxmox servers typically deployed in 8 minutes (no additional costs). See how easy it is to [deploy a Bare Metal Cloud server](#).

## Step 1: Download Proxmox ISO Image

The first step is to download the Proxmox VE ISO image. Follow the steps below:

1. Navigate to the official [Proxmox ISO Downloads page](#) and find the latest Proxmox Installer available. At the time of writing, the latest version was 8.2-1. If a newer version is available, it is listed at the top. Click **Download** and save the [file](#).



## Step 2: Prepare Installation Medium

Copy the Proxmox ISO image on a CD/DVD or a USB flash drive. Although both options are possible, it is assumed that most systems don't have an optical drive.

Plug in the USB drive and copy the ISO image to the USB stick using the command line or a USB formatting utility (such as [Etcher](#) or Rufus).

**Note:** Back up and remove any data on the device as the process will erase any previously stored data.

If you are working on [Linux](#), the fastest way to create a bootable USB is to use the following syntax:

```
dd bs=1M conv=fdatasync if=./proxmox-ve_*.iso of=/device/name
```

Modify the file name and path in **if=./proxmox-ve\_\*.iso** and make sure to provide the correct USB device name in **of=/device/name**.

To find the name of your USB stick, run the following command before and after plugging in the device:

```
lsblk
```

Compare the output. The additional entry in the second output is the name of the device.

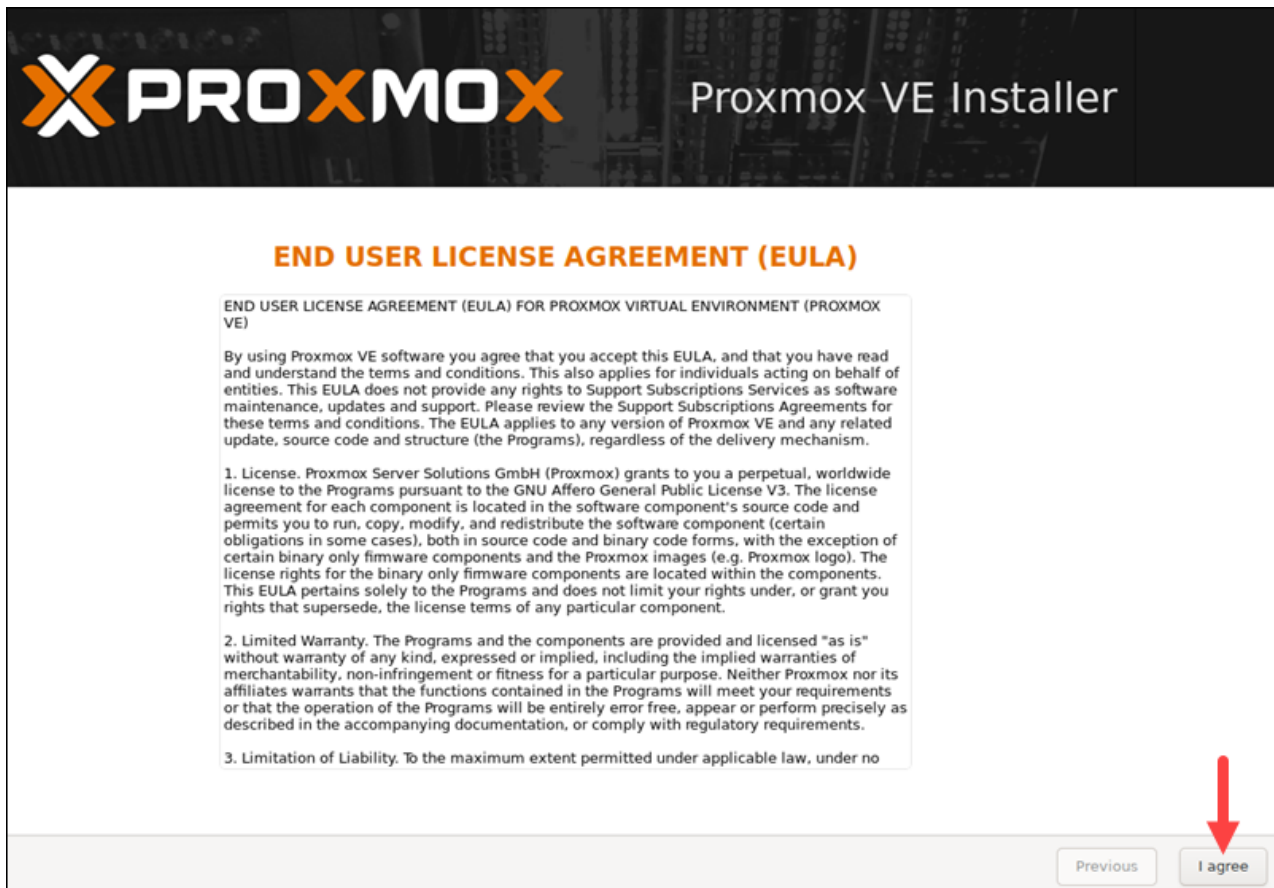
### Step 3: Launch the Proxmox Installer

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1. Move to the server (machine) where you want to install Proxmox and plug in the USB device.
2. While the server is booting up, access the boot menu by pressing the required keyboard key(s). Most commonly, they are either **Esc**, **F2**, **F10**, **F11**, or **F12**.
3. Select the installation medium with the Proxmox ISO image and boot from it.
4. The Proxmox VE menu appears. Select **Install Proxmox VE** to start the standard installation.



5. Read and accept the EULA to continue.



6. Choose the target hard disk where you want to install Proxmox. Click **Options** to specify additional parameters, such as the filesystem. By default, it is set to ext4.



7. Next, set the location, time zone, and keyboard layout. The installer autodetects most of these configurations.

### Location and Time Zone selection

**The Proxmox Installer** automatically makes location-based optimizations, like choosing the nearest mirror to download files from. Also make sure to select the correct time zone and keyboard layout.

Press the Next button to continue the installation.

- **Country:** The selected country is used to choose nearby mirror servers. This will speed up downloads and make updates more reliable.
- **Time Zone:** Automatically adjust daylight saving time.
- **Keyboard Layout:** Choose your keyboard layout.

Country

United States

Time zone

America/Phoenix


Keyboard Layout

U.S. English

Previous

Next

8. Create a strong password for your admin credentials, retype the password to confirm, and type in an email address for system administrator notifications.

 Proxmox VE Installer

### Administration Password and Email Address

**Proxmox Virtual Environment** is a full featured, highly secure GNU/Linux system, based on Debian.

In this step, please provide the *root* password.

- **Password:** Please use a strong password. It should be at least 8 characters long, and contain a combination of letters, numbers, and symbols.
- **Email:** Enter a valid email address. Your Proxmox VE server will send important alert notifications to this email account (such as backup failures, high availability events, etc.).

Press the Next button to continue the installation.

Password

●●●●●●●●

Confirm

●●●●●●●●

Email

example@phoenixnap.com

Previous

Next

9. The final step in installing Proxmox is setting up the network configuration. Select the management interface, a hostname for the server, an available IP address, the default gateway, and a DNS server. During the installation process, use either an IPv4 or IPv6 address. To use both, modify the configuration after installing.

**PROXMOX** Proxmox VE Installer

### Management Network Configuration

**Please verify** the displayed network configuration. You will need a valid network configuration to access the management interface after installing.

After you have finished, press the Next button. You will be shown a list of the options that you chose during the previous steps.

- **IP address (CIDR):** Set the main IP address and netmask for your server in CIDR notation.
- **Gateway:** IP address of your gateway or firewall.
- **DNS Server:** IP address of your DNS server.

Management Interface: enp0s3 - 08:00:27:0d:a7:74 (e1000)

Hostname (FQDN): pve.example.invalid

IP Address (CIDR): 10.0.2.15 / 24

Gateway: 10.0.2.2

DNS Server: 10.240.30.10

Previous Next

10. The installer summarizes the selected options. After confirming everything is in order, press **Install**.

11. Remove the USB drive and reboot the system after installation.

## Step 4: Run Proxmox

1. Once the system reboots, the Proxmox GRUB menu loads. Select **Proxmox Virtual Environment GNU/Linux** and press **Enter**.

2. Next, the Proxmox VE welcome message appears. It includes an IP address that loads Proxmox. Navigate to that IP address in a web browser of your choice.

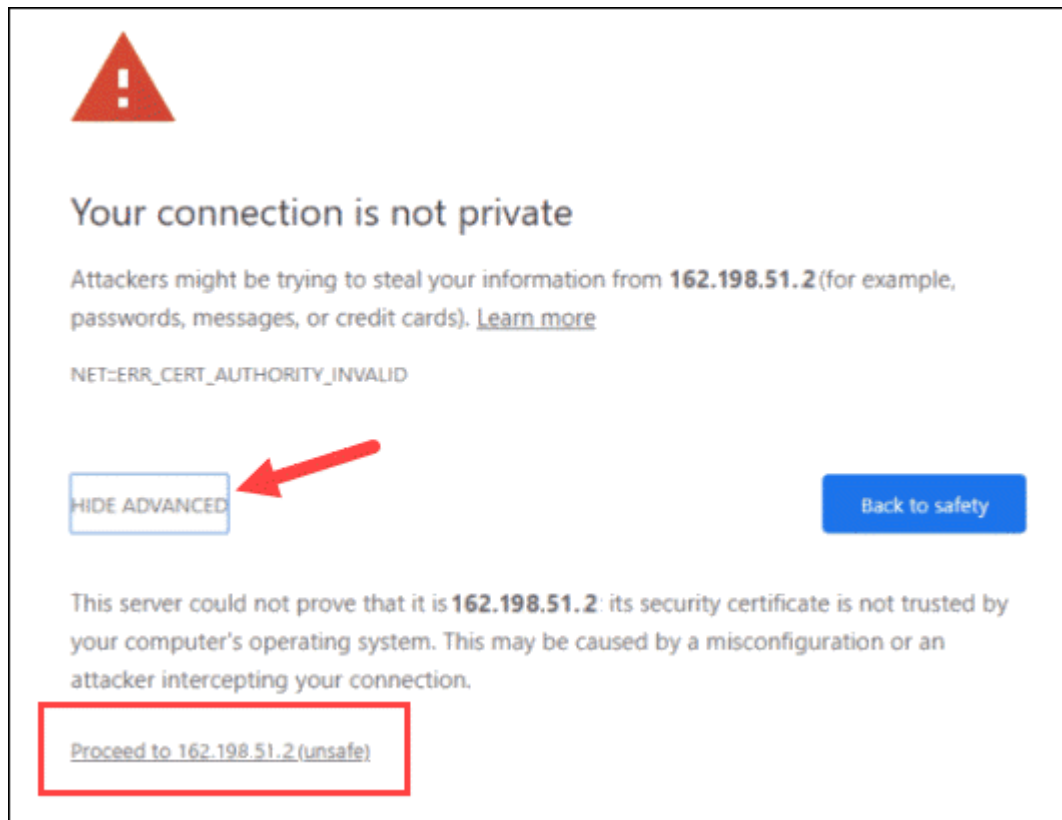
```
-----
Welcome to the Proxmox Virtual Environment. Please use your web browser to
configure this server - connect to:

https://162.198.51.2:8006/

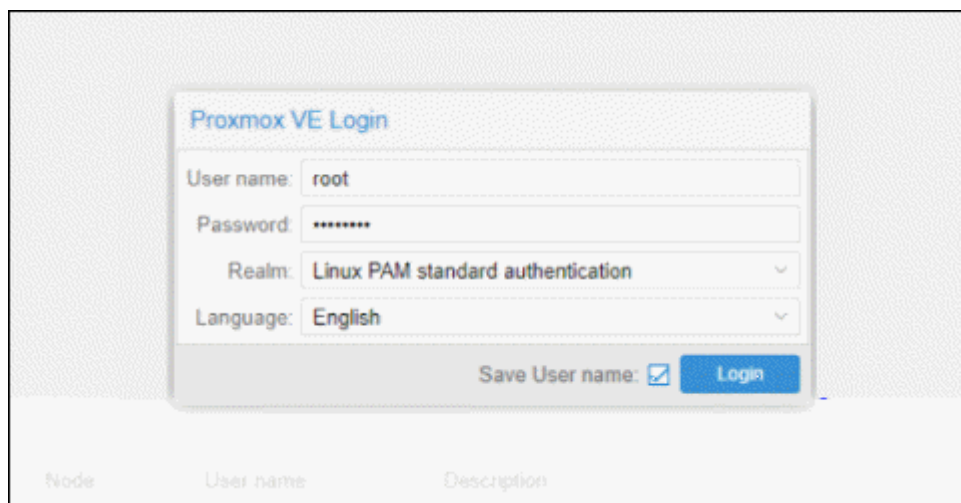
-----

proxmox login:
```

3. After navigating to the required IP address, you may see a warning message that the page is unsafe because Proxmox VE uses self-signed SSL certificates. Click the IP link to proceed to the Proxmox web management interface.

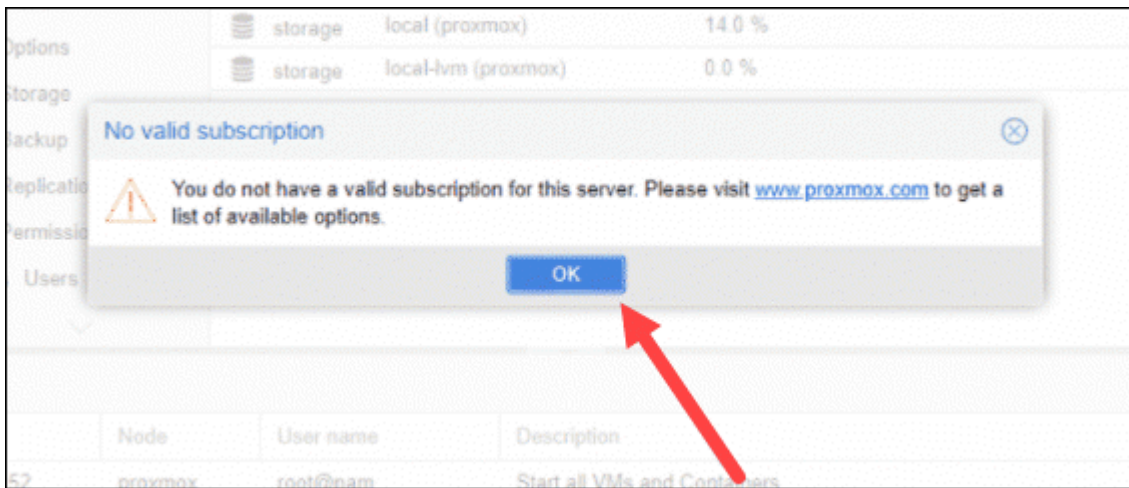


4. To access the interface, log in as root and provide the password you set when installing Proxmox.



5. A dialogue box pops up saying there is no valid subscription for the server. Proxmox offers an optional add-on service to which you can subscribe. To ignore the message, click **OK**.



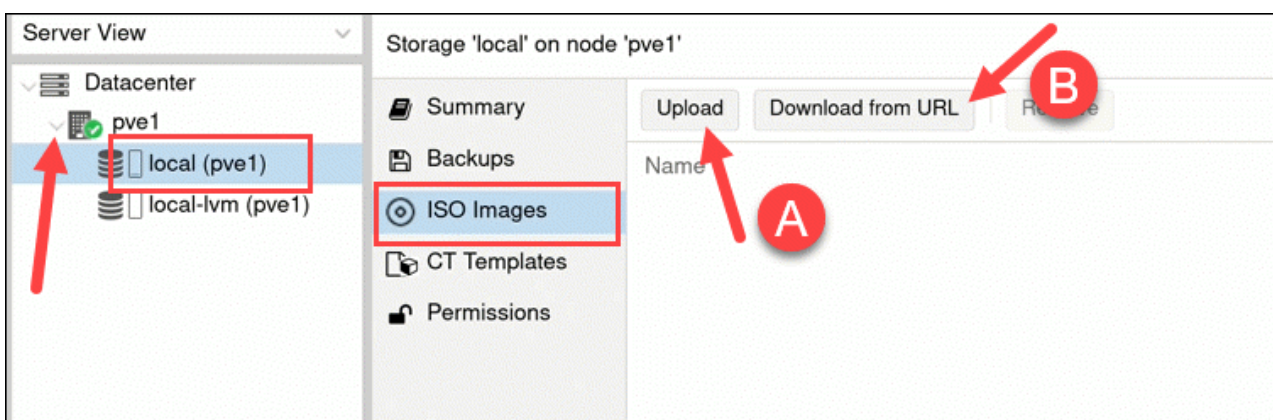


## Step 5: Create a VM

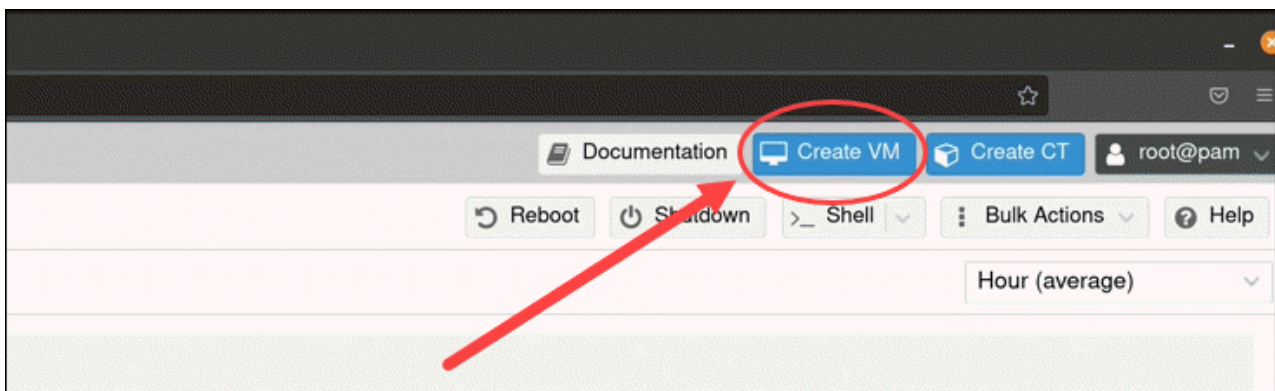
Now that you logged in to the Proxmox web console, follow these steps to create a virtual machine.

1. Make sure you have ISO images for installation mediums. Move to the resource tree on the left side of your GUI.

Select the server you are running and click on **local (pve1)**. Select **ISO Images** from the menu and choose between uploading an image or downloading it from a URL.



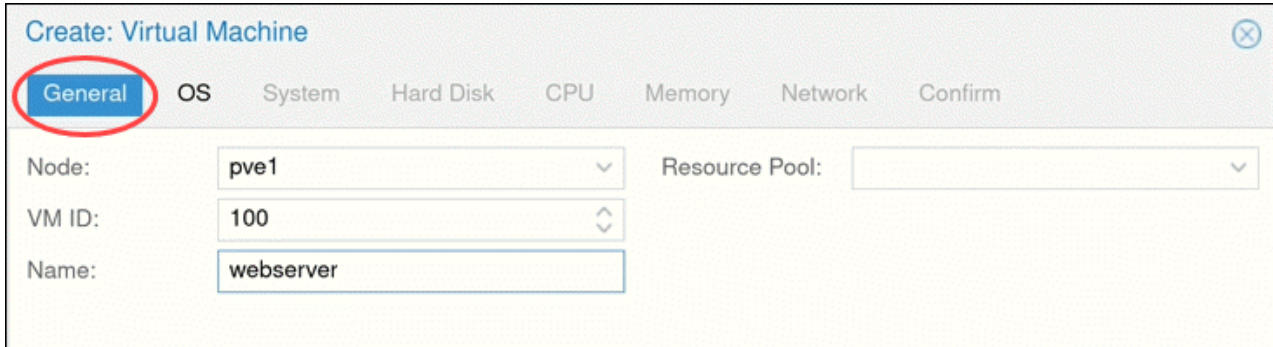
2. Once you have added an ISO image, spin up a virtual machine. Click the **Create VM** button.





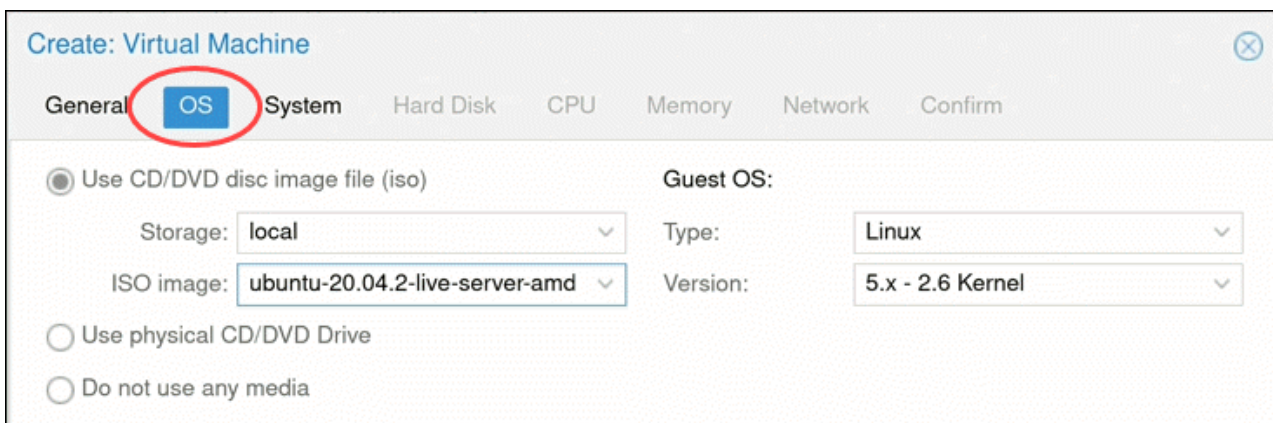
3. Provide general information about the VM:

- Start by selecting the **Node**. If you are starting and have no nodes yet, Proxmox automatically selects node 1 (**pve1**).
- Provide a **VM ID**. Each resource has to have a unique ID.
- Finally, specify a **name** for the VM.



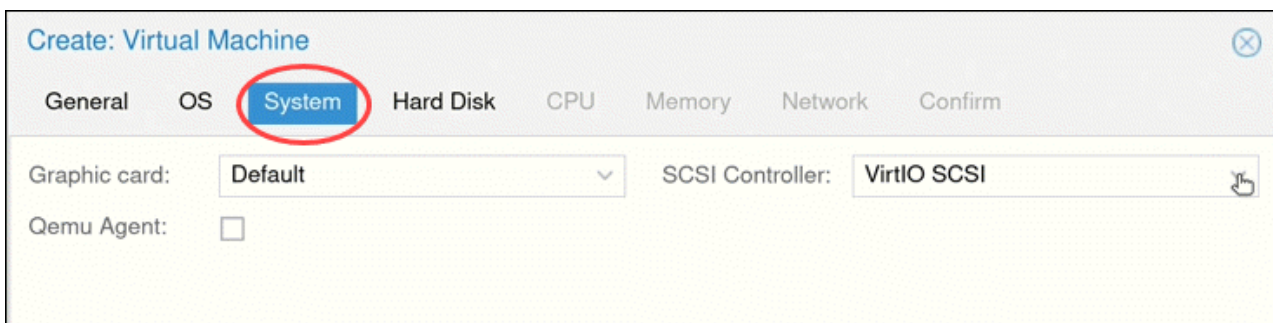
The screenshot shows the 'Create: Virtual Machine' dialog with the 'General' tab selected and highlighted by a red circle. The 'Node' dropdown is set to 'pve1', 'VM ID' is '100', and 'Name' is 'webserver'. The 'Resource Pool' dropdown is empty.

3. Next, switch to the **OS** tab and select the **ISO image** you want for your VM. Define the **OS Type** and kernel Version. Click **Next** to continue.



The screenshot shows the 'Create: Virtual Machine' dialog with the 'OS' tab selected and highlighted by a red circle. The 'Use CD/DVD disc image file (iso)' radio button is selected. 'Storage' is 'local', 'ISO image' is 'ubuntu-20.04.2-live-server-amd', 'Guest OS: Type' is 'Linux', and 'Version' is '5.x - 2.6 Kernel'. Other options like 'Use physical CD/DVD Drive' and 'Do not use any media' are unselected.

4. Modify system options (such as the **Graphic card** and **SCSI controller**) or leave the default settings.



The screenshot shows the 'Create: Virtual Machine' dialog with the 'System' tab selected and highlighted by a red circle. 'Graphic card' is set to 'Default' and 'SCSI Controller' is set to 'VirtIO SCSI'. The 'Qemu Agent' checkbox is unchecked.

5. Configure any **Hard Disk** options you want the VM to have. You can leave all the default settings. However, if the physical server uses an SSD, enable the **Discard** option.

Create: Virtual Machine

General OS System **Hard Disk** CPU Memory Network Confirm

Bus/Device: SCSI 0 Cache: Default (No cache)

SCSI Controller: VirtIO SCSI Discard: ☐

Storage: local-lvm

Disk size (GiB): 32

Format: Raw disk image (raw)

6. The number of **Cores** the physical server has determines how many cores you can provide to the VM. The number of cores allocated also depends on the predicted workload.

Create: Virtual Machine

General OS System Hard Disk **CPU** Memory Network Confirm

Sockets: 1 Type: Default (kvm64)

Cores: 1 Total cores: 1

7. Next, choose how much **RAM Memory (MiB)** you want to assign to the VM.

Create: Virtual Machine

General OS System Hard Disk CPU **Memory** Network Confirm

Memory (MiB): 2048

8. Move on to the **Network** tab. It is recommended to separate the management interface from the VM network. For now, leave the default setting and click **Next**.

Create: Virtual Machine

General OS System Hard Disk CPU Memory **Network** Confirm

☐ No network device

Bridge:  Model:

VLAN Tag:  MAC address:

Firewall: ☒

9. Proxmox loads the *Confirm* tab that summarizes the selected VM options. To start the VM immediately, check the box under the listed information or start the VM manually later. Click **Finish** to create the VM.

Create: Virtual Machine

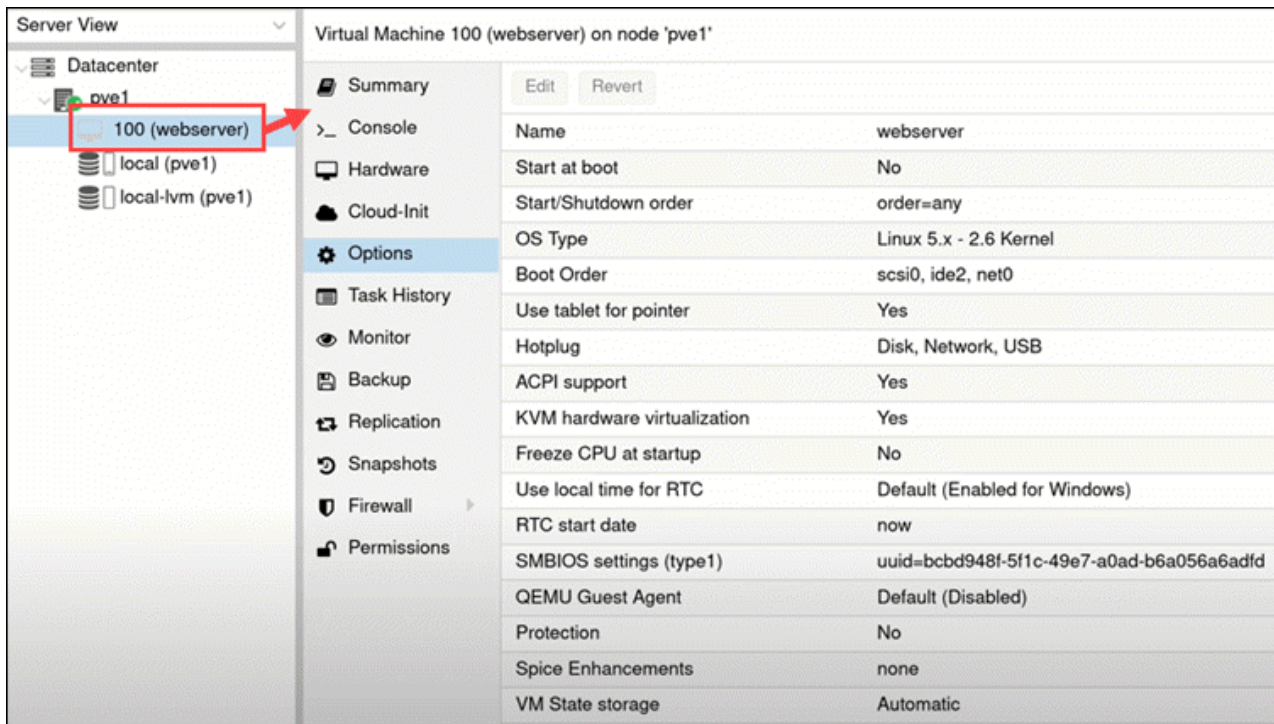
General OS System Hard Disk CPU Memory Network **Confirm**

Key ↑	Value
cores	1
ide2	local:iso/ubuntu-20.04.2-live-server-amd64.iso,media=cdrom
memory	2048
name	webserver
net0	virtio,bridge=vmbro,firewall=1
nodename	pve1
numa	0
ostype	l26
scsi0	local-lvm:16,discard=on
scsihw	virtio-scsi-pci
sockets	1
vmid	100

☐ Start after created

10. The newly created VM appears in the resource tree on the left side of the screen. Click the VM to see its specifications and options.





**Note:** Learn how to [delete a VM in Proxmox](#). The guide includes both the command line and GUI methods for deleting VM, VM disks, and VM snapshots.

## Install Proxmox Virtual Environment via Command Line

If your server is headless, use the [CLI](#) installation. The GUI and CLI use the same code base for the installation process, so the end result is the same.

Since Proxmox is based on Debian, it should not be installed on top of any other Linux distributions. Although installing it on Ubuntu might work, you are likely to encounter issues during the installation and while using the software.

If you have a machine with a system other than Debian and want to keep that system and run Proxmox, use [KVM](#) to create the Proxmox VM and run other VMs under it.

Follow the steps below to install Proxmox VE using the CLI.

### Step 1: Update Repository Information

Update your system's package repository information by running the command below:

```
sudo apt update
```

### Step 2: Configure IP Address

Configuring the server's [IP address](#) is essential, especially if you want to access Proxmox remotely or when setting up a network environment. You can configure an IP address to be static or dynamic:

- Static IP address. It's generally recommended to assign a static IP address to your server, especially for services like Proxmox VE. This ensures that the server always has the same IP address, making it easier to manage and access.
- Dynamic IP Address (DHCP). If you are using DHCP to assign IP addresses in your network, Debian can automatically obtain an IP address from your DHCP server during installation.

Follow the steps below to configure a static IP address on Debian:

1. Open the network configuration file with a text editor:

```
sudo nano /etc/network/interfaces
```

2. Find the network interface you want to configure (**eth0** for Ethernet connections or **wlan0** for wireless connections) and modify the file to include your desired network configuration.

For example, to set a static IP address, netmask, gateway, and DNS servers, add lines like the ones below and replace the values with the appropriate values for your network:

```
auto eth0
iface eth0 inet static
address 192.168.1.100
netmask 255.255.255.0
gateway 192.168.1.1
dns-nameservers 8.8.8.8 8.8.4.4
```

Ensure that the IP address you set is accessible from your network and reachable from the machine you intend to use for managing Proxmox VE.

3. Save the file and exit the text editor.
4. Restart the networking service to apply the changes:

```
sudo systemctl restart networking
```

### Step 3: Add the Proxmox Repository

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1. Elevate your access:

```
su -
```

2. Run the following command to install the prerequisite packages for the Proxmox installation:

```
apt install curl software-properties-common apt-transport-https ca-certificates
gnupg2 -y
```

3. When the installation finishes, add the Proxmox repository to the *sources.list.d* directory. Run the following command:


```
echo "deb [arch=amd64] http://download.proxmox.com/debian/pve bookworm pve-no-subscription" > /etc/apt/sources.list.d/pve-install-repo.list
```

4. After adding the repository, use the wget command to download and add the Proxmox VE repository key:

```
wget https://enterprise.proxmox.com/debian/proxmox-release-bookworm.gpg -O /etc/apt/trusted.gpg.d/proxmox-release-bookworm.gpg
```

```
root@debian:~# wget https://enterprise.proxmox.com/debian/proxmox-release-bookworm.gpg -O /etc/apt/trusted.gpg.d/proxmox-release-bookworm.gpg
--2024-05-16 09:09:23-- https://enterprise.proxmox.com/debian/proxmox-release-bookworm.gpg
Resolving enterprise.proxmox.com (enterprise.proxmox.com)... 212.224.123.70, 2a0b:7140:5:100::167
Connecting to enterprise.proxmox.com (enterprise.proxmox.com)|212.224.123.70|:443.. connected.
HTTP request sent, awaiting response... 200 OK
Length: 1187 (1.2K) [application/octet-stream]
Saving to: '/etc/apt/trusted.gpg.d/proxmox-release-bookworm.gpg'

/etc/apt/trusted.gpg 100%[=====>] 1.16K --.-KB/s in 0s

2024-05-16 09:09:23 (31.0 MB/s) - '/etc/apt/trusted.gpg.d/proxmox-release-bookworm.gpg' saved [1187/1187] 
```

5. Lastly, update the local APT cache and upgrade packages to their latest version:

```
apt update && sudo apt full-upgrade
```

## Step 4: Install the Proxmox Kernel

After the upgrade, install the Proxmox kernel to ensure you have an optimized, secure, and fully compatible environment for running Proxmox VE. Replacing the Linux kernel with Proxmox provides better performance and stability for your virtualized infrastructure.

Run the following command:

```
apt install proxmox-default-kernel -y
```

When the installation completes, a confirmation is displayed that the Proxmox kernel was successfully installed:



```
Found linux image: /boot/vmlinuz-6.1.0-18-amd64
Found initrd image: /boot/initrd.img-6.1.0-18-amd64
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
done
Setting up pve-firmware (3.11-1) ...
Setting up proxmox-kernel-6.8 (6.8.4-3) ...
Setting up proxmox-default-kernel (1.1.0) ... ←
root@debian:~# █
```

## Step 5: Install the Proxmox Packages

The next step is to install Proxmox VE and additional packages, such as **postfix** and **chrony**. **Postfix** is a mail transfer agent (MTA) that Proxmox uses to send system notifications, alerts, and other administrative emails.

Chrony is an implementation of the Network Time Protocol (**NTP**) that synchronizes the system clock with NTP servers. Although they are not mandatory, their functionalities are crucial for managing virtualized environments.

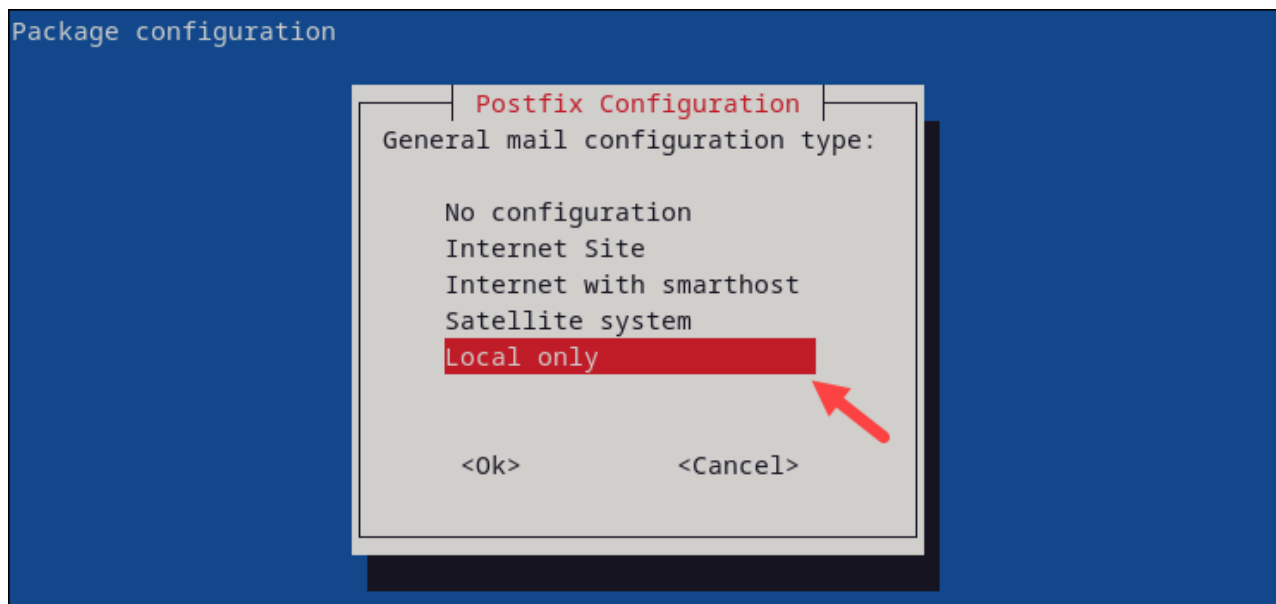
Follow the steps below:

1. Install the packages with the following command:

```
apt install proxmox-ve postfix open-iscsi chrony
```

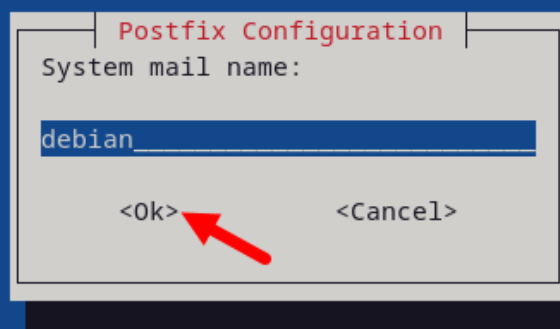
Wait until the process completes.

2. The system prompts you to configure Postfix. Press **Ok** to start the configuration, select **Local only** in the mail configuration type, and press **Enter** to confirm.



3. Provide your preferred mail name and press **Enter**.

## Package configuration



Wait for the installation to complete.

4. Confirm that Proxmox was installed by running the command below:

```
ss -tunelp | grep 8006
```

```
root@debian:~# ss -tunelp | grep 8006
tcp    LISTEN 0      4096      *:8006      *:~      users:(( "pveproxy
worker",pid=34847,fd=6),("pveproxy worker",pid=34846,fd=6),("pveproxy worker",pid
=34845,fd=6),("pveproxy",pid=23985,fd=6)) uid:33 ino:53607 sk:100c cgroup:/system.
slice/pveproxy.service v6only:0 <->
root@debian:~#
```

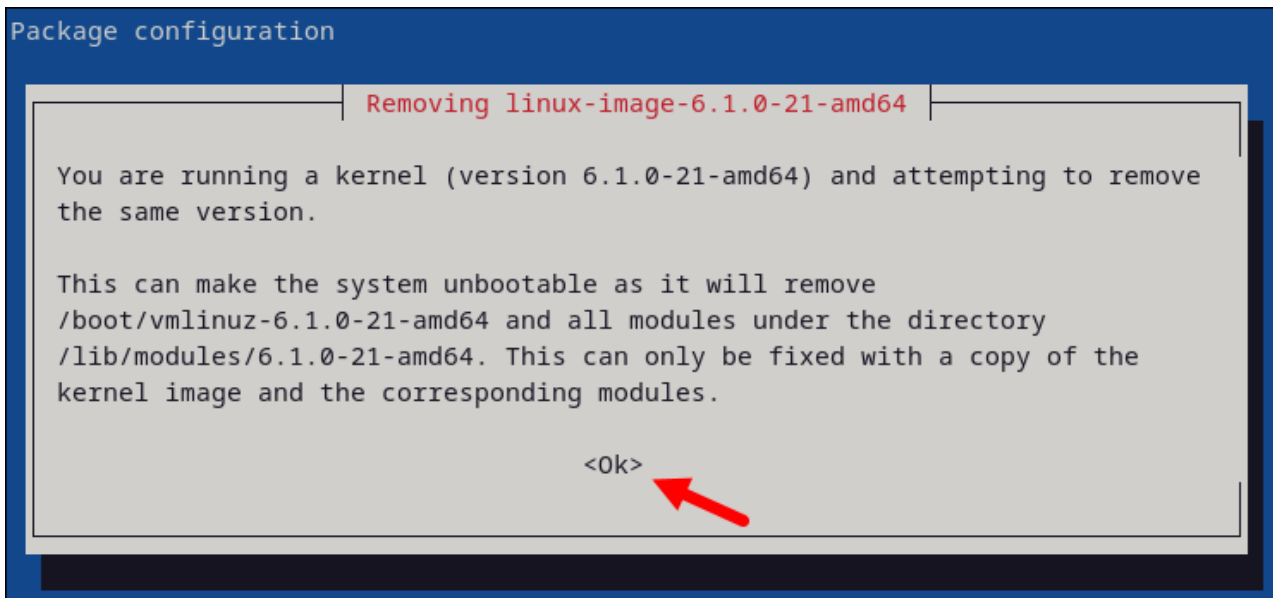
Proxmox VE is installed and listening on TCP port 8006, as we can see from the output.

## Step 6: Remove the Linux Kernel

Keeping the default Debian kernel can cause issues, so removing it from the system is recommended. Run the following command:

```
apt remove linux-image-amd64 'linux-image-6.1*'
```

A prompt appears asking you to confirm the kernel removal. Use the arrow keys to select **Ok** and press **Enter** to confirm.



## Step 7: Update GRUB

Complete the process by updating the GRUB configuration file:

```
update-grub
```

```
root@debian:~# update-grub
Generating grub configuration file ...
Found background image: /usr/share/images/desktop-base/desktop-grub.png
Found linux image: /boot/vmlinuz-6.8.4-3-pve
Found initrd image: /boot/initrd.img-6.8.4-3-pve
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
done
root@debian:~#
```

Additionally, it is recommended to remove the **os-prober** package to prevent it from listing any virtual machines you create with Proxmox in the boot menu. Run the following command:

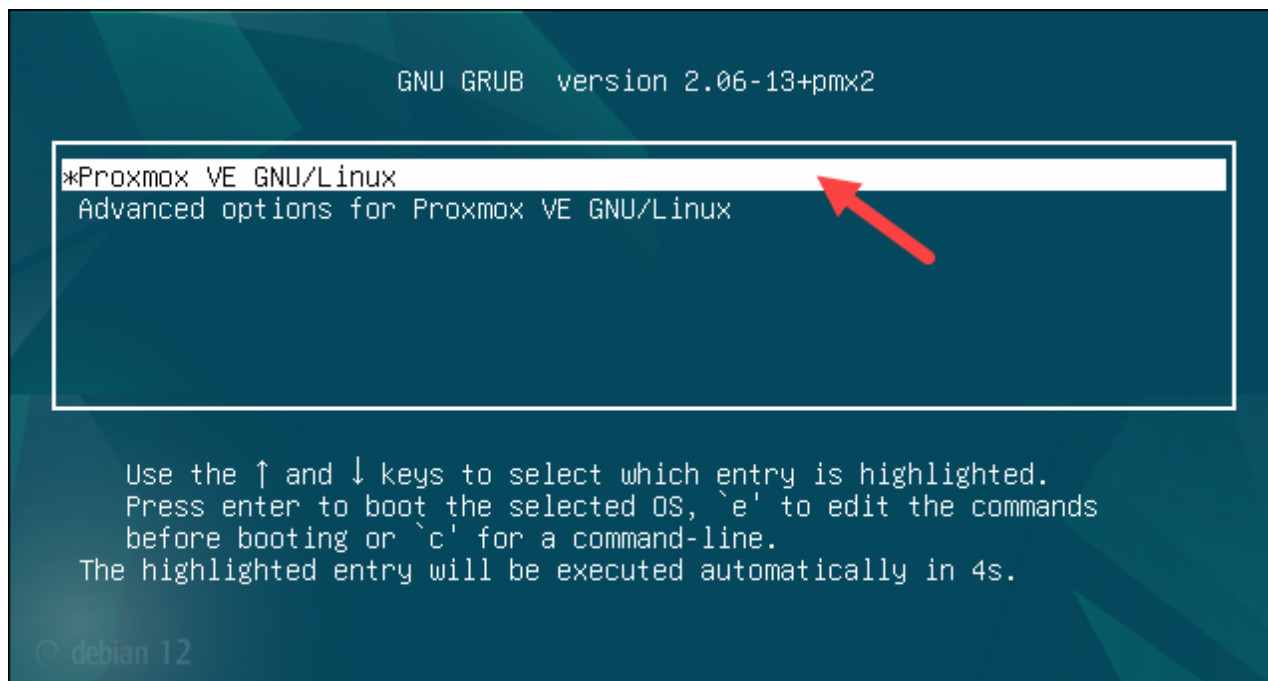
```
apt remove os-prober
```

Reboot the system to complete the process:

```
reboot
```

## Step 7: Access Proxmox Web Interface

On boot, the GRUB loader shows the **Proxmox VE** entry. Select it and press **Enter** to proceed.



When the system boots, open a web browser and navigate to the admin web interface. Use the following URL:

`https://[your_IP_address]:8006/`

Replace **[your\_IP\_address]** with your machine's IP address. Log in with your root credentials to create and manage your VMs, containers, etc.

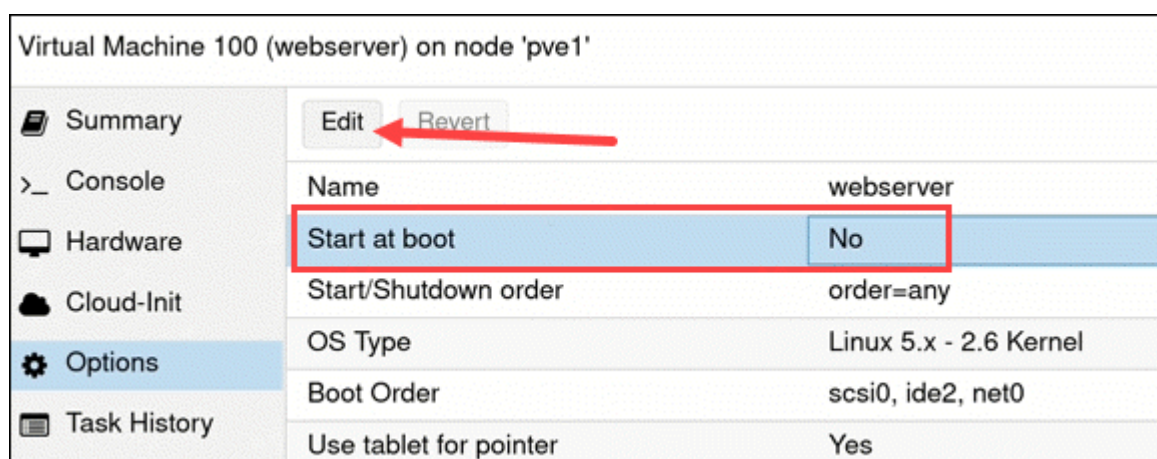
## Configure Proxmox Virtual Environment

After creating a virtual machine, move on to configuring the environment.

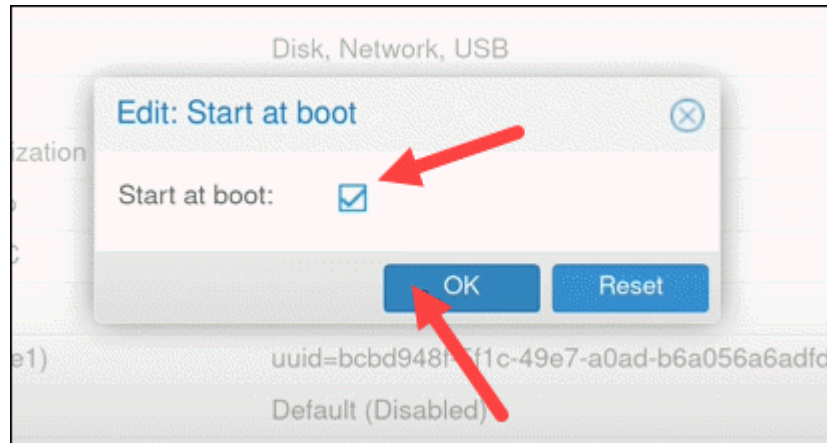
### Start VM at Boot

If the **Start at boot** option is set to **No**, the VM does not automatically start after rebooting the server. This means you need to log in to the Proxmox interface and start the VM manually.

To change the default setting, highlight the option and click the **Edit** button.



Check the box and click **OK**.



## Increase/Decrease Virtual Disk Size

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The simplest way to increase or decrease a VM's virtual disk size is through the command-line interface, which can be done online or offline. When increasing disk space, modify the partition table and file system inside the VM to update to the new size.

When decreasing a VM's disk space, back up any data you want to save and reduce the file system and partition inside the VM first.

The general syntax for increasing/decreasing virtual disk size is:

```
qm resize [virtual_machine_ID] [disk] [size]
```

For instance, to add 10G to a **virtio0** disk on a VM with the ID 100, run:

```
qm resize 100 virtio0 +10G
```

## Enable NAT Networking Mode

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As mentioned above, it is a good idea to change the default bridge networking mode to prevent the Proxmox host and VMs from being on the same network. To create a separate network, enable NAT networking mode. Follow the steps below:

1. Edit the *Interfaces* file. Open the command line and run:

```
sudo nano /etc/network/interfaces
```

The file shows that **vmbro** is the default bridge public network for Proxmox, as in the example below:

```
auto lo
iface lo inet loopback
iface eno1 inet manual
auto vmbr0
iface vmbr0 inet static
    address 131.10.22.115
    netmask 255.255.255.0
    gateway 131.10.22.1
    bridge_ports eno1
    bridge_stp off
    bridge_fd 0
post-up echo 1 > /proc/sys/net/ipv4/ip_forward
post-up iptables -t nat -A POSTROUTING -s '10.10.10.0/24' -o vmbr0 -j
MASQUERADE
post-down iptables -t nat -D POSTROUTING -s '10.10.10.0/24' -o vmbr0 -j
MASQUERADE
```

2. Save and exit the file.

3. Restart your network service for changes to take effect:

```
sudo systemctl restart networking
```

The NAT networking mode is now enabled.

## Installing Proxmox: FAQ

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This section covers the commonly asked questions about installing and using Proxmox.

### What Are the Minimum System Requirements for Installing Proxmox?

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The following minimum requirements are intended solely for evaluation purposes and are not suitable for production environments:

- **CPU:** 64-bit processor (Intel EMT64 or AMD64). The motherboard and CPU must support Intel VT/AMD-V for full KVM virtualization.
- **RAM:** 1 GB, plus additional memory as needed for virtual machines.
- **Storage:** Hard drive/SSD.
- **Network:** One network interface card (NIC).

### What Are the Recommended System Requirements for Installing Proxmox?

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The recommended system requirements for installing and using Proxmox are:

- **CPU:** 64-bit processor (Intel EMT64 or AMD64) with Intel VT/AMD-V support.
- **RAM:** At least 2 GB for the OS and Proxmox VE services, with additional memory allocated for virtual machines. Storage solutions like Ceph and ZFS require roughly 1 GB of RAM per TB of used storage.



- **Storage:** Fast and redundant storage is preferred, with SSDs providing optimal performance. SSDs with Power-Loss-Protection (PLP) are recommended for better performance.
- **Network:** Redundant multi-gigabit NICs are recommended, with additional NICs as needed based on the storage technology and cluster setup.
- **PCI(e) Passthrough:** The CPU must support VT-d/AMD-d.

## What System Should Proxmox Be Installed On?

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Proxmox VE (Virtual Environment) is a complete, stand-alone virtualization management solution that includes its own operating system. Therefore, Proxmox VE is installed directly onto the hardware as an operating system, and it does not require another underlying OS. It comes with its own ISO installer, which includes a Debian-based Linux operating system along with the Proxmox management interface and tools.

While not typically recommended for production environments, it is possible to install Proxmox VE on top of an existing Debian system, as described in the CLI installation section above. This can be useful for testing or in specific use cases.

## Which Operating Systems Can Run on Proxmox?

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Proxmox can run a variety of operating systems within its virtual machines, including:

- **Linux Distributions.** Ubuntu, Debian, Rocky Linux, Fedora, Red Hat Enterprise Linux (RHEL), and many others.
- **Windows:** Windows Server (all versions), Windows 10, Windows 11.
- **BSD Variants:** FreeBSD, OpenBSD, NetBSD.
- **Other Unix-like Systems:** Solaris, OpenIndiana.

The OSes are supported through KVM-based virtualization and LXC containers.

## Conclusion

In this article, you learned how to install and configure Proxmox VE. For more information, check out Proxmox official documentation. Explore automated Proxmox deployments by checking out the available Bare Metal Cloud instances and select a configuration that suits your needs and budget.

To learn how Proxmox differs from other type-1 hypervisors, read our Proxmox vs. ESXi article.

Was this article helpful?

YesNo

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