Installation

Contents

Proxmox VE is based on Debian. This is why the install disk images (ISO files) provided by Proxmox include a complete Debian system as well as all necessary Proxmox VE packages.

See the support table in the FAQ for the relationship between Proxmox VE releases and Debian releases.

The installer will guide you through the setup, allowing you to partition the local disk(s), apply basic system configurations (for example, timezone, language, network) and install all required packages. This process should not take more than a few minutes. Installing with the provided ISO is the recommended method for new and existing users.

Alternatively, Proxmox VE can be installed on top of an existing Debian system. This option is only recommended for advanced users because detailed knowledge about Proxmox VE is required.

Using the Proxmox VE Installer

The installer ISO image includes the following:

- Complete operating system (Debian Linux, 64-bit)

- The Proxmox VE installer, which partitions the local disk(s) with ext4, XFS, BTRFS (technology preview), or ZFS and installs the operating system

- Proxmox VE Linux kernel with KVM and LXC support

- Complete toolset for administering virtual machines, containers, the host system, clusters and all necessary resources

> **note** All existing data on the selected drives will be removed during the installation process. The installer does not add boot menu entries for other operating systems.

Please insert the prepared installation media (for example, USB flash drive or CD-ROM) and boot from it.

> ℹ️ Make sure that booting from the installation medium (for example, USB) is enabled in your server's firmware settings. Secure boot needs to be disabled when booting an installer prior to Proxmox VE version 8.1.

After choosing the correct entry (for example, *Boot from USB*) the Proxmox VE menu will be displayed, and one of the following options can be selected:

Install Proxmox VE (Graphical)

Starts the normal installation.

> ℹ️ It's possible to use the installation wizard with a keyboard only. Buttons can be clicked by pressing the ALT key combined with the underlined character from the respective button. For example, `ALT + N` to press a `Next` button.

Install Proxmox VE (Terminal UI)

Starts the terminal-mode installation wizard. It provides the same overall installation experience as the graphical installer, but has generally better compatibility with very old and very new hardware.

Install Proxmox VE (Terminal UI, Serial Console)

Starts the terminal-mode installation wizard, additionally setting up the Linux kernel to use the (first) serial port of the machine for in- and output. This can be used if the machine is completely headless and only has a serial console available.

Both modes use the same code base for the actual installation process to benefit from more than a decade of bug fixes and ensure feature parity.

> ℹ️ The *Terminal UI* option can be used in case the graphical installer does not work correctly, due to e.g. driver issues. See also adding the `nomodeset` kernel parameter.
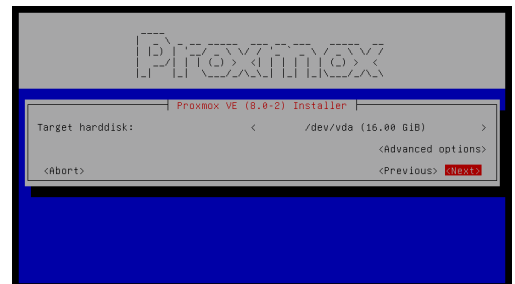
Advanced Options: Install Proxmox VE (Graphical, Debug Mode)

Starts the installation in debug mode. A console will be opened at several installation steps. This helps to debug the situation if something goes wrong. To exit a debug console, press `CTRL-D`. This option can be used to boot a live system with all basic tools available. You can use it, for example, to repair a degraded ZFS *rpool* or fix the bootloader for an existing Proxmox VE setup.

Advanced Options: Install Proxmox VE (Terminal UI, Debug Mode)

Same as the graphical debug mode, but preparing the system to run the terminal-based installer instead.

Advanced Options: Install Proxmox VE (Serial Console Debug Mode)

Same the terminal-based debug mode, but additionally sets up the Linux kernel to use the (first) serial port of the machine for in- and output.

Advanced Options: Rescue Boot

With this option you can boot an existing installation. It searches all attached hard disks. If it finds an existing installation, it boots directly into that disk using the Linux kernel from the ISO. This can be useful if there are problems with the bootloader (GRUB/`systemd-boot`) or the BIOS/UEFI is unable to read the boot block from the disk.

Advanced Options: Test Memory (memtest86+)

Runs `memtest86+`. This is useful to check if the memory is functional and free of errors. Secure Boot must be turned off in the UEFI firmware setup utility to run this option.

You normally select **Install Proxmox VE (Graphical)** to start the installation.

The first step is to read our EULA (End User License Agreement). Following this, you can select the target hard disk(s) for the installation.

By default, the whole server is used and all existing data is removed. Make sure there is no important data on the server before proceeding with the installation.

The `Options` button lets you select the target file system, which defaults to `ext4`. The installer uses LVM if you select `ext4` or `xfs` as a file system, and offers additional options to restrict LVM space (see below).

Proxmox VE can also be installed on ZFS. As ZFS offers several software RAID levels, this is an option for systems that don't have a hardware RAID controller. The target disks must be selected in the `Options` dialog. More ZFS specific settings can be changed under `Advanced Options`.

ZFS on top of any hardware RAID is not supported and can result in data loss.

The next page asks for basic configuration options like your location, time zone, and keyboard layout. The location is used to select a nearby download server, in order to increase the speed of updates. The installer is usually able to auto-detect these settings, so you only need to change them in rare situations when auto-detection fails, or when you want to use a keyboard layout not commonly used in your country.

Next the password of the superuser (`root`) and an email address needs to be specified. The password must consist of at least 5 characters. It's highly recommended to use a stronger password. Some guidelines are:
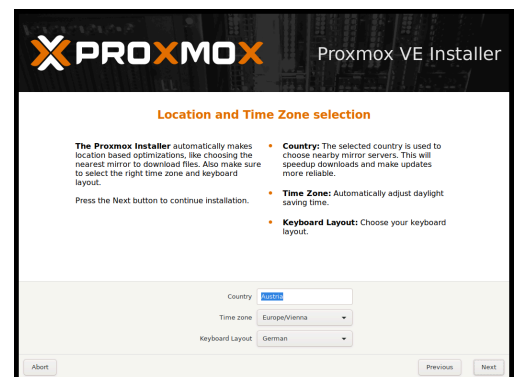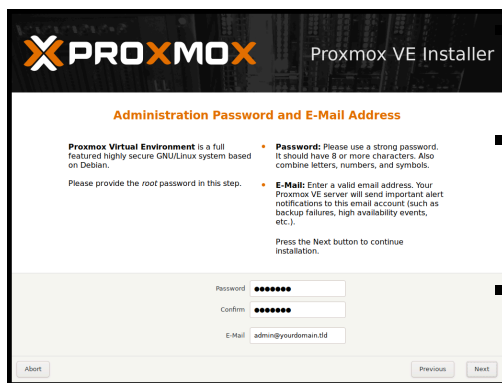
Use a minimum password length of at least 12 characters.

Include lowercase and uppercase alphabetic characters, numbers, and symbols.

Avoid character repetition, keyboard patterns, common dictionary words, letter or number sequences, usernames, relative or pet names, romantic links (current or past), and biographical information (for example ID numbers, ancestors' names or dates).

The email address is used to send notifications to the system administrator. For example:

- Information about available package updates.

- Error messages from periodic *cron* jobs.

All those notification mails will be sent to the specified email address.

The last step is the network configuration. Network interfaces that are *UP* show a filled circle in front of their name in the drop down menu. Please note that during installation you can either specify an IPv4 or IPv6 address, but not both. To configure a dual stack node, add additional IP addresses after the installation.
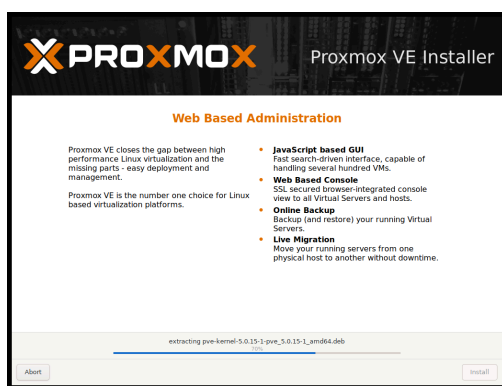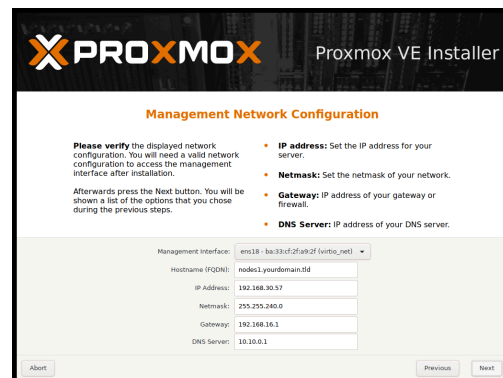

The next step shows a summary of the previously selected options. Please re-check every setting and use the `Previous` button if a setting needs to be changed.

After clicking `Install`, the installer will begin to format the disks and copy packages to the target disk(s). Please wait until this step has finished; then remove the installation medium and restart your system.

Copying the packages usually takes several minutes, mostly depending on the speed of the installation medium and the target disk performance.

When copying and setting up the packages has finished, you can reboot the server. This will be done automatically after a few seconds by default.

Installation Failure
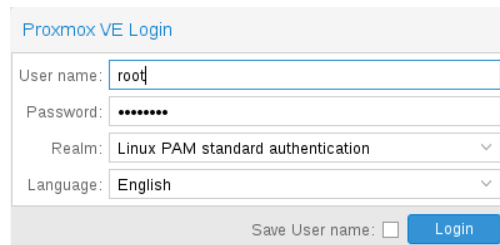
If the installation failed, check out specific errors on the second TTY (*CTRL + ALT + F2*) and ensure that the systems meets the minimum requirements.

If the installation is still not working, look at the how to get help chapter.

Accessing the Management Interface Post-Installation

After a successful installation and reboot of the system you can use the Proxmox VE web interface for further configuration.

1. Point your browser to the IP address given during the installation and port 8006, for example: https://youripaddress:8006

2. Log in using the `root` (realm *PAM*) username and the password chosen during installation.

3. Upload your subscription key to gain access to the Enterprise repository. Otherwise, you will need to set up one of the public, less tested package repositories to get updates for security fixes, bug fixes, and new features.

4. Check the IP configuration and hostname.

5. Check the timezone.

6. Check your Firewall settings.

Advanced LVM Configuration Options

The installer creates a Volume Group (VG) called `pve`, and additional Logical Volumes (LVs) called `root`, `data`, and `swap`, if `ext4` or `xfs` is used. To control the size of these volumes use:

hdsize

   Defines the total hard disk size to be used. This way you can reserve free space on the hard disk for further partitioning (for example for an additional PV and VG on the same hard disk that can be used for LVM storage).

swapsize

   Defines the size of the `swap` volume. The default is the size of the installed memory, minimum 4 GB and maximum 8 GB. The resulting value cannot be greater than `hdsize/8`.

> 📓 If set to `0`, no `swap` volume will be created.

maxroot

Defines the maximum size of the `root` volume, which stores the operation system. The maximum limit of the `root` volume size is `hdsize/4`.

maxvz

Defines the maximum size of the `data` volume. The actual size of the `data` volume is:

`datasize = hdsize - rootsize - swapsize - minfree`

Where `datasize` cannot be bigger than `maxvz`.

> 📓 In case of LVM thin, the `data` pool will only be created if `datasize` is bigger than 4GB.

> 📓 If set to `0`, no `data` volume will be created and the storage configuration will be adapted accordingly.

minfree

Defines the amount of free space that should be left in the LVM volume group `pve`. With more than 128GB storage available, the default is 16GB, otherwise `hdsize/8` will be used.

> 📓 LVM requires free space in the VG for snapshot creation (not required for lvmthin snapshots).

Advanced ZFS Configuration Options

The installer creates the ZFS pool `rpool`, if ZFS is used. No swap space is created but you can reserve some unpartitioned space on the install disks for swap. You can also create a swap zvol after the installation, although this can lead to problems (see ZFS swap notes).

ashift

Defines the `ashift` value for the created pool. The `ashift` needs to be set at least to the sector-size of the underlying disks (2 to the power of `ashift` is the sector-size), or any disk which might be put in the pool (for example the replacement of a defective disk).

compress

Defines whether compression is enabled for `rpool`.

checksum

Defines which checksumming algorithm should be used for `rpool`.

copies

Defines the `copies` parameter for `rpool`. Check the `zfs(8)` manpage for the semantics, and why this does not replace redundancy on disk-level.

ARC max size

Defines the maximum size the ARC can grow to and thus limits the amount of memory ZFS will use. See also the section on how to limit ZFS memory usage for more details.

hdsize

Defines the total hard disk size to be used. This is useful to save free space on the hard disk(s) for further partitioning (for example to create a swap-partition). `hdsize` is only honored for bootable disks, that is only the first disk or mirror for RAID0, RAID1 or RAID10, and all disks in RAID-Z[123].

ZFS Performance Tips

ZFS works best with a lot of memory. If you intend to use ZFS make sure to have enough RAM available for it. A good calculation is 4GB plus 1GB RAM for each TB RAW disk space.

ZFS can use a dedicated drive as write cache, called the ZFS Intent Log (ZIL). Use a fast drive (SSD) for it. It can be added after installation with the following command:

```
# zpool add <pool-name> log </dev/path_to_fast_ssd>
```

Adding the `nomodeset` Kernel Parameter

Problems may arise on very old or very new hardware due to graphics drivers. If the installation hangs during boot, you can try adding the `nomodeset` parameter. This prevents the Linux kernel from loading any graphics drivers and forces it to continue using the BIOS/UEFI-provided framebuffer.

On the Proxmox VE bootloader menu, navigate to *Install Proxmox VE (Terminal UI)* and press `e` to edit the entry. Using the arrow keys, navigate to the line starting with `linux`, move the cursor to the end of that line and add the parameter `nomodeset`, separated by a space from the pre-existing last parameter.

Then press `Ctrl-X` or `F10` to boot the configuration.

Unattended Installation

It is possible to install Proxmox VE automatically in an unattended manner. This enables you to fully automate the setup process on bare-metal. Once the installation is complete and the host has booted up, automation tools like Ansible can be used to further configure the installation.

The necessary options for the installer must be provided in an answer file. This file allows the use of filter rules to determine which disks and network cards should be used.

To use the automated installation, it is first necessary to prepare an installation ISO. Visit our wiki for more details and information on the unattended installation.

Video Tutorials

See the list of all official tutorials on our Proxmox VE YouTube Channel

See Also

- Prepare Installation Media

- Install Proxmox VE on Debian 12 Bookworm

- System Requirements

- Package Repositories

- Host System Administration

- Network Configuration

- Installation: Tips and Tricks

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