Proxmox VE 8 to 9 Upgrade Guide: Step-by-Step

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- ⏱ 13 min read

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The [release of version 9](), introduces new features and significant improvements making the [Proxmox VE]() 8 to 9 upgrade worthwhile.

By upgrading, you gain access to the **latest features**, critical **security patches**, and performance optimizations.

What's New in Proxmox VE 9?

- Improved Ceph integration (Ceph 19.2 Squid)
- Better performance in high-availability (HA) clusters
- Enhanced storage management and non-free-firmware support in Debian Trixie
- Optimized networking stack
- More stable Proxmox Backup Server (PBS) v4 support

Prerequisites

Before proceeding with he upgrade process, it's essential to **prepare your system**.

- Make sure you have a **valid backup** of your VMs and Containers.
- Check if the root partition has at least **5 GB free** (10 GB or more recommended).
- The first step is to update all nodes to the latest Proxmox VE 8 version (**8.4.1 or later**). Check your **current version** by running the command:

```
# pveversion
```

```
root@pve01:~# pveversion
pve-manager/8.4.11/14a32011146091ed (running kernel: 6.8.12-13-pve)
root@pve01:~#
```

If [Ceph cluster]() is installed, you must first upgrade it to **Ceph 19.2 Squid** before starting the [Proxmox VE]() 8 to 9 upgrade.
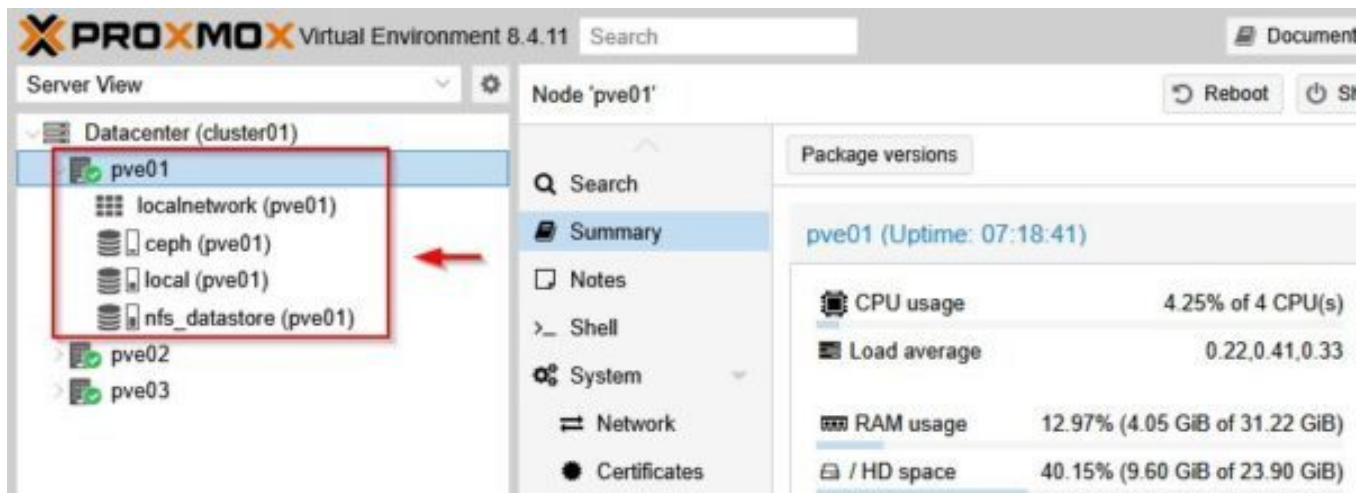
```
# ceph --version
```

```
root@pve01:~# ceph --version
ceph version 19.2.2 (72a09a98429da13daae8e462abda408dc163ff75) squid (stable)
root@pve01:~#
```

If [Proxmox Backup Server](#) is installed, **upgrade the PBS to version 4** before upgrading Proxmox VE.

Before You Upgrade Proxmox VE 8 to 9: Essential Steps

Ensure that all VMs and containers have been **migrated off the node**.

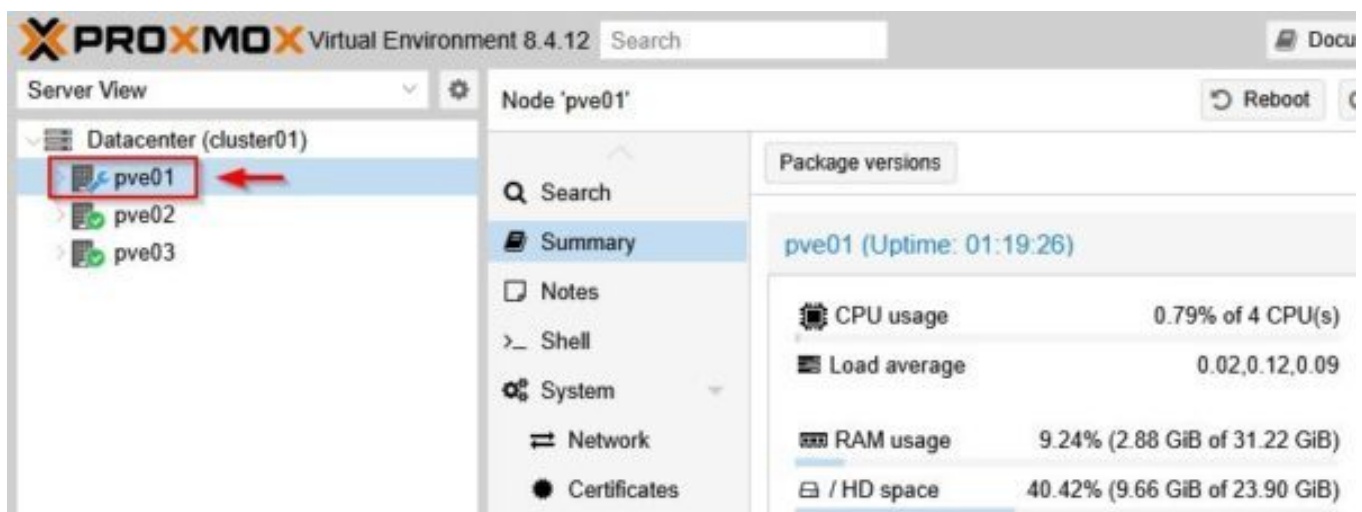Place the node in **Maintenance Mode** to **stop HA services**.

```
# ha-manager crm-command node-maintenance enable pve01
```

```
root@pve01:~# ha-manager crm-command node-maintenance enable pve01
root@pve01:~#
```

The node is in Maintenance Mode.

If your cluster is using **Ceph for hyperconverged storage**, you must prevent the cluster from **attempting to rebalance** data while the node is offline.

ceph osd set noout

```
root@pve01:~# ceph osd set noout
noout is set
root@pve01:~#
```

Update nodes to latest version 8

Make sure all nodes in the cluster are running **version 8.4.1 or newer**. Upgrade one node at a time to maintain cluster availability.

Refresh the **repositories package**.

apt update

```
root@pve01:~# apt update
Hit:1 http://ftp.it.debian.org/debian bookworm InRelease
Hit:2 http://download.proxmox.com/debian/pve bookworm InRelease
Hit:3 http://security.debian.org bookworm-security InRelease
Hit:4 http://ftp.it.debian.org/debian bookworm-updates InRelease
Hit:5 http://download.proxmox.com/debian/ceph-squid bookworm InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@pve01:~#
```

Install latest updates.

```
# apt dist-upgrade
```

```
root@pve01:~# apt dist-upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  libunbound8 pve-manager
2 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 1,138 kB of archives.
After this operation, 9,216 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://security.debian.org bookworm-security/main amd64 libunbound8
amd64 1.17.1-2+deb12u3 [553 kB]
Get:2 http://download.proxmox.com/debian/pve bookworm/pve-no-subscription
amd64 pve-manager all 8.4.12 [586 kB]
Fetched 1,138 kB in 0s (6,162 kB/s)
Reading changelogs... Done
(Reading database ... 56456 files and directories currently installed.)
Preparing to unpack .../libunbound8_1.17.1-2+deb12u3_amd64.deb ...
Unpacking libunbound8:amd64 (1.17.1-2+deb12u3) over (1.17.1-2+deb12u2) ...
Preparing to unpack .../pve-manager_8.4.12_all.deb ...
Unpacking pve-manager (8.4.12) over (8.4.11) ...
Setting up pve-manager (8.4.12) ...

Progress: [ 56%] [###############################........................]
```

When the upgrade is complete, **reboot the node**.

After rebooting the node, check current version.

```
# pveversion
```

```
root@pve01:~# pveversion
pve-manager/8.4.12/c2ea8261d32a5020 (running kernel: 6.8.12-13-pve)
root@pve01:~#
```

Before you begin the upgrade, run the check script to identify any **potential issues** and ensure your **system is compatible with version 9**.

```
# pve8to9 --full
```

```
root@pve01:~# pve8to9 --full
= CHECKING VERSION INFORMATION FOR PVE PACKAGES =

Checking for package updates..
PASS: all packages up-to-date

Checking proxmox-ve package version..
PASS: proxmox-ve package has version >= 8.4-0

Checking running kernel version..
PASS: running kernel '6.8.12-13-pve' is considered suitable for upgrade.

= CHECKING CLUSTER HEALTH/SETTINGS =

PASS: systemd unit 'pve-cluster.service' is in state 'active'
PASS: systemd unit 'corosync.service' is in state 'active'
PASS: Cluster Filesystem is quorate.

Analzying quorum settings and state..
INFO: configured votes - nodes: 3
INFO: configured votes - qdevice: 0
```

If any issues are found, **fix them** before proceeding with the upgrade.

```
= SUMMARY =

TOTAL:     55
PASSED:    46
SKIPPED:   7
WARNINGS:  1
FAILURES:  1   <---

ATTENTION: Please check the output for detailed information!
Try to solve the problems one at a time and then run this checklist tool a
gain.
root@pve01:~#
```

In this example, the system suggests removing the *systemd-boot* package.

```
INFO: Checking bootloader configuration...
FAIL: systemd-boot meta-package installed. This will cause problems on upgrades of ot
her boot-related packages. Remove 'systemd-boot' See https://pve.proxmox.com/wiki/Upg
rade_from_8_to_9#sd-boot-warning for more information.
INFO: Check for dkms modules...
```

Remove the package, but perform this operation carefully.

```
# apt remove systemd-boot
```

```
root@pve01:~# apt remove systemd-boot
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages will be REMOVED:
  systemd-boot
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 250 kB disk space will be freed.
Do you want to continue? [Y/n] y
(Reading database ... 56453 files and directories currently installed.)
Removing systemd-boot (252.38-1~deb12u1) ...
Processing triggers for man-db (2.11.2-2) ...
root@pve01:~#
```

Update repositories

With the new version, you can add the Proxmox VE 9 enterprise repository in the **new deb822 style**.

Add Debian repositories

Create the file */etc/apt/sources.list.d/debian.sources* and add the following lines to **support the new version Trixie**.

vi /etc/apt/sources.list.d/debian.sources

Types: deb deb-src
URIs: http://deb.debian.org/debian/
Suites: trixie trixie-updates
Components: main non-free-firmware
Signed-By: /usr/share/keyrings/debian-archive-keyring.gpg

Types: deb deb-src
URIs: http://security.debian.org/debian-security/
Suites: trixie-security
Components: main non-free-firmware
Signed-By: /usr/share/keyrings/debian-archive-keyring.gpg

```
Types: deb deb-src
URIs: http://deb.debian.org/debian/
Suites: trixie trixie-updates
Components: main non-free-firmware
Signed-By: /usr/share/keyrings/debian-archive-keyring.gpg

Types: deb deb-src
URIs: http://security.debian.org/debian-security/
Suites: trixie-security
Components: main non-free-firmware
Signed-By: /usr/share/keyrings/debian-archive-keyring.gpg
~
~
```

Add the Proxmox VE 9 repository

Create the related *pve-enterprise.sources* file.

```
# cat > /etc/apt/sources.list.d/pve-enterprise.sources << EOF
```

> *Types: deb*
> *URIs: https://enterprise.proxmox.com/debian/pve*
> *Suites: trixie*
> *Components: pve-enterprise*
> *Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg*
> *EOF*

```
root@pve01:/# cat > /etc/apt/sources.list.d/pve-enterprise.sources << EOF
> Types: deb
> URIs: https://enterprise.proxmox.com/debian/pve
> Suites: trixie
> Components: pve-enterprise
> Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg
> EOF
root@pve01:/#
```

Remove the old */etc/apt/sources.list.d/pve-enterprise.list*.

```
# rm /etc/apt/sources.list.d/pve-enterprise.list
```

```
root@pve01:~# rm /etc/apt/sources.list.d/pve-enterprise.list
root@pve01:~#
```

If you are using the **no-subscription repository** instead, run this command:

```
# cat > /etc/apt/sources.list.d/proxmox.sources << EOF
```

> *Types: deb*
> *URIs: http://download.proxmox.com/debian/pve*
> *Suites: trixie*

> *Components: pve-no-subscription*
> *Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg*
> *EOF*

```
root@pve01:/# cat > /etc/apt/sources.list.d/proxmox.sources << EOF
> Types: deb
> URIs: http://download.proxmox.com/debian/pve
> Suites: trixie
> Components: pve-no-subscription
> Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg
> EOF
root@pve01:/#
```

Ensure that there are **no remaining Debian Bookworm** specific repositories left.

```
# rm /etc/apt/sources.list
```

```
root@pve01:~# rm /etc/apt/sources.list
root@pve01:~#
```

Verify that the *apt update* command gets the **correct updates**.

```
# apt update
```

```
root@pve01:/etc/apt# apt update
Hit:1 http://deb.debian.org/debian trixie InRelease
Hit:2 http://security.debian.org/debian-security trixie-security InRelease
Hit:3 http://deb.debian.org/debian trixie-updates InRelease
Hit:4 http://download.proxmox.com/debian/ceph-squid bookworm InRelease
Hit:5 http://download.proxmox.com/debian/pve trixie InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
634 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@pve01:/etc/apt#
```

Upgrade the Ceph cluster

If you are using Ceph in your Proxmox infrastructure, ensure you have **Ceph 19.2 Squid** installed. If you are running an older [Ceph cluster](#), you must **upgrade it first** before upgrading to Proxmox VE 9.

Update the Ceph Package Repository

Depending on your subscription, you need to modify the repository **on each node**.

Enterprise repository

```
# cat > /etc/apt/sources.list.d/ceph.sources << EOF
```

> *Types: deb*

> *URIs: https://enterprise.proxmox.com/debian/ceph-squid*

> *Suites: trixie*

> *Components: enterprise*

> *Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg*

> *EOF*

```
root@pve01:/# cat > /etc/apt/sources.list.d/ceph.sources << EOF
> Types: deb
> URIs: https://enterprise.proxmox.com/debian/ceph-squid
> Suites: trixie
> Components: enterprise
> Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg
> EOF
root@pve01:/#
```

No-subscription repository

cat > /etc/apt/sources.list.d/ceph.sources << EOF

> *Types: deb*

> *URIs: http://download.proxmox.com/debian/ceph-squid*

> *Suites: trixie*

> *Components: no-subscription*

> *Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg*

> *EOF*

```
root@pve01:/# cat > /etc/apt/sources.list.d/ceph.sources << EOF
> Types: deb
> URIs: http://download.proxmox.com/debian/ceph-squid
> Suites: trixie
> Components: no-subscription
> Signed-By: /usr/share/keyrings/proxmox-archive-keyring.gpg
> EOF
root@pve01:/#
```

Ensure that there are **no remaining Ceph Bookworm** specific repositories left.

rm /etc/apt/sources.list.d/ceph.list

```
root@pve01:/# rm /etc/apt/sources.list.d/ceph.list
root@pve01:/#
```

When the repository entries have been updated, **refresh the repositories** package.

apt update

```
root@pve01:~# apt update
Hit:1 http://security.debian.org/debian-security trixie-security InRelease
Get:2 http://download.proxmox.com/debian/ceph-squid trixie InRelease [2,736 B
]
Hit:3 http://download.proxmox.com/debian/pve trixie InRelease
Get:4 http://download.proxmox.com/debian/ceph-squid trixie/no-subscription am
d64 Packages [23.7 kB]
Hit:5 http://deb.debian.org/debian trixie InRelease
Hit:6 http://deb.debian.org/debian trixie-updates InRelease
Fetched 26.5 kB in 5s (5,111 B/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
635 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@pve01:~#
```

Proxmox VE 8 to 9 upgrade

Once all prerequisites have been met, you can proceed with **upgrading the first node**.
Upgrade one node at a time.

Verify you have the following files in the folder /etc/apt/sources.list.d/. In this example the *pve-enterprise.sources* file is not displayed because the **no-subscription repository** is used.

```
# ls /etc/apt/sources.list.d
```

```
root@pve01:~# ls /etc/apt/sources.list.d
ceph.sources   debian.sources   proxmox.sources
root@pve01:~#
```

Before starting, ensure that **no VMs or containers are running** on the node you are
processing and the node is in **Maintenance Mode**.

Upgrade the node.

```
# apt dist-upgrade
```

```
root@pve01:~# apt dist-upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer require
d:
  libpython3.11 python3-bs4 python3-jaraco.classes python3-paste
  python3-pastedeploy python3-pastedeploy-tpl python3-pytz
  python3-singledispatch python3-soupsieve python3-tempita python3-tz
  python3-waitress python3-webtest
Use 'apt autoremove' to remove them.
The following packages will be REMOVED:
  libarchive13 libasound2 libcurl3-gnutls libcurl4 libdb5.3 libdbi1 libdw1
  libefiboot1 libefivar1 libelf1 libevent-2.1-7 libevent-core-2.1-7
  libext2fs2 libfuse2 libgdbm-compat4 libgdbm6 libglib2.0-0 libgnutls-dane0
```

When the **apt-listchanges: News** page is displayed, scroll till the end and press **q** to quit.

```
apt-listchanges: News
---------------------

openssh (1:10.0p1-1) unstable; urgency=medium

  OpenSSH 10.0p1 includes a number of changes that may affect existing
  configurations:

   * This release removes support for the weak DSA signature algorithm,
     completing the deprecation process that began in 2015 (when DSA was
     disabled by default) and repeatedly warned over the last 12 months.

   * scp(1), sftp(1): pass "ControlMaster no" to ssh when invoked by scp &
     sftp. This disables implicit session creation by these tools when
     ControlMaster was set to yes/auto by configuration, which some users
     found surprising. This change will not prevent scp/sftp from using an
     existing multiplexing session if one had already been created.

       ----------------------------------------------------------------

xkeyboard-config (2.41-2) unstable; urgency=medium

   * Several old remappings got removed between 2.38..2.41, so beware for
     instance if you relied on "dvorak" variant with us layout. (#1063725)

   * The extended variant for Greek was removed, as it was actually less
     extended than the "basic" variant. (#1063702)

 -- Timo Aaltonen <tjaalton@debian.org>  Tue, 13 Feb 2024 09:57:30 +0200

(press q to quit)
```

During the Proxmox VE 8 to 9 upgrade, you will be prompted to **confirm file changes**.

> /etc/issue – choose **No** (keep the currently installed version).

```
 The default action is to keep your current version.
*** issue (Y/I/N/O/D/Z) [default=N] ? N
Progress: [  0%] [..........................................................]
```

> Click **Yes** to restart services automatically.

```
┤ Configuring libc6:amd64 ├

There are services installed on your system which need to be
restarted when certain libraries, such as libpam, libc, and libssl,
are upgraded. Since these restarts may cause interruptions of service
for the system, you will normally be prompted on each upgrade for the
list of services you wish to restart.  You can choose this option to
avoid being prompted; instead, all necessary restarts will be done
for you automatically so you can avoid being asked questions on each
library upgrade.

Restart services during package upgrades without asking?

              <Yes>                            <No>
```

/etc/lvm/lvm.conf – recommended **Yes** (install maintainer's version).

```
 The default action is to keep your current version.
*** lvm.conf (Y/I/N/O/D/Z) [default=N] ? Y
Progress: [ 98%] [#############################################################..]
```

You may also be prompted to confirm **additional file changes**.

- *ABC/ssh/sshd_config* – if no changes were made, choose **Yes**.
- *ABC/default/grub* – normally only asked for if you changed it manually, recommended **No** if unsure.
- *ABC/chrony/chrony.conf* – if no extra changes were made, choose **Yes** (install the package maintainer's version).

When the upgrade is complete, **reboot the node**.

```
# reboot
```

```
Processing triggers for initramfs-tools (0.148.3) ...
update-initramfs: Generating /boot/initrd.img-6.14.11-1-pve
Running hook script 'zz-proxmox-boot'..
Re-executing '/etc/kernel/postinst.d/zz-proxmox-boot' in new private mount na
mespace..
No /etc/kernel/proxmox-boot-uuids found, skipping ESP sync.
Updating kernel version 6.14.11-1-pve in systemd-boot...
Processing triggers for postfix (3.10.3-2) ...
Restarting postfix
Processing triggers for pve-ha-manager (5.0.4) ...
Processing triggers for shim-signed:amd64 (1.47+pmx1+15.8-1+pmx1) ...
root@pve01:/# reboot
root@pve01:/# Connection to 192.168.20.120 closed by remote host.
Connection to 192.168.20.120 closed.
```

After the node upgrade

After rebooting the node, check the installed Proxmox version.

```
# pveversion
```

```
root@pve01:~# pveversion
pve-manager/9.0.6/49c767b70aeb6648 (running kernel: 6.14.11-1-pve)
root@pve01:~#
```

Exit the node from **Maintenance Mode**.

```
# ha-manager crm-command node-maintenance disable pve01
```

```
root@pve01:~# ha-manager crm-command node-maintenance disable pve01
root@pve01:~#
```

Unset the *noout* flag if the Ceph cluster is in use.

```
# ceph osd unset noout
```

```
root@pve01:~# ceph osd unset noout
noout is unset
root@pve01:~#
```

Check the **Proxmox cluster** status.

```
# pvecm status
```

```
root@pve01:~# pvecm status
Cluster information
-------------------
Name:              cluster01
Config Version:    3
Transport:         knet
Secure auth:       on

Quorum information
------------------
Date:              Fri Aug 29 11:25:19 2025
Quorum provider:   corosync_votequorum
Nodes:             3
Node ID:           0x00000001
Ring ID:           1.1b5
Quorate:           Yes

Votequorum information
----------------------
Expected votes:    3
Highest expected:  3
Total votes:       3
Quorum:            2
Flags:             Quorate

Membership information
----------------------
    Nodeid        Votes Name
0x00000001            1 192.168.20.120 (local)
0x00000002            1 192.168.20.130
0x00000003            1 192.168.20.140
```

If you are using Ceph in your Proxmox infrastructure, verify the **Ceph cluster** is in a healthy state.

```
# ceph -s
```

```
root@pve01:~# ceph -s
  cluster:
    id:        302cce2d-1c21-4629-ba1e-9f14469ee758
    health: HEALTH_OK

  services:
    mon: 3 daemons, quorum pve01,pve02,pve03 (age 4m)
    mgr: pve01(active, since 4m), standbys: pve03, pve02
    osd: 3 osds: 3 up (since 4m), 3 in (since 25h)

  data:
    pools:   2 pools, 129 pgs
    objects: 18.56k objects, 70 GiB
    usage:   170 GiB used, 1.2 TiB / 1.4 TiB avail
    pgs:     129 active+clean

root@pve01:~#
```

If everything is fine, **proceed with the next node** member of the cluster.

After the cluster upgrade

After the Proxmox VE 8 to 9 upgrade, you should check if the all **nodes are up and running** and the infrastructure is **working as expected**.

Check again the **Proxmox cluster** status.

```
# pvecm status
```

```
root@pve01:~# pvecm status
Cluster information
-------------------
Name:             cluster01
Config Version:   3
Transport:        knet
Secure auth:      on

Quorum information
------------------
Date:             Fri Aug 29 16:13:55 2025
Quorum provider:  corosync_votequorum
Nodes:            3
Node ID:          0x00000001
Ring ID:          1.1eb
Quorate:          Yes

Votequorum information
----------------------
Expected votes:   3
Highest expected: 3
Total votes:      3
Quorum:           2
Flags:            Quorate

Membership information
----------------------
    Nodeid      Votes Name
0x00000001          1 192.168.20.120 (local)
0x00000002          1 192.168.20.130
0x00000003          1 192.168.20.140
root@pve01:~#
```

Check if the **Ceph cluster** is in a healthy state.

```
# ceph -s
```

```
root@pve01:~# ceph -s
  cluster:
    id:      302cce2d-1c21-4629-ba1e-9f14469ee758
    health: HEALTH_OK

  services:
    mon: 3 daemons, quorum pve01,pve02,pve03 (age 14m)
    mgr: pve01(active, since 4h), standbys: pve02, pve03
    osd: 3 osds: 3 up (since 14m), 3 in (since 30h)

  data:
    pools:   2 pools, 129 pgs
    objects: 18.56k objects, 70 GiB
    usage:   170 GiB used, 1.2 TiB / 1.4 TiB avail
    pgs:     129 active+clean

root@pve01:~#
```
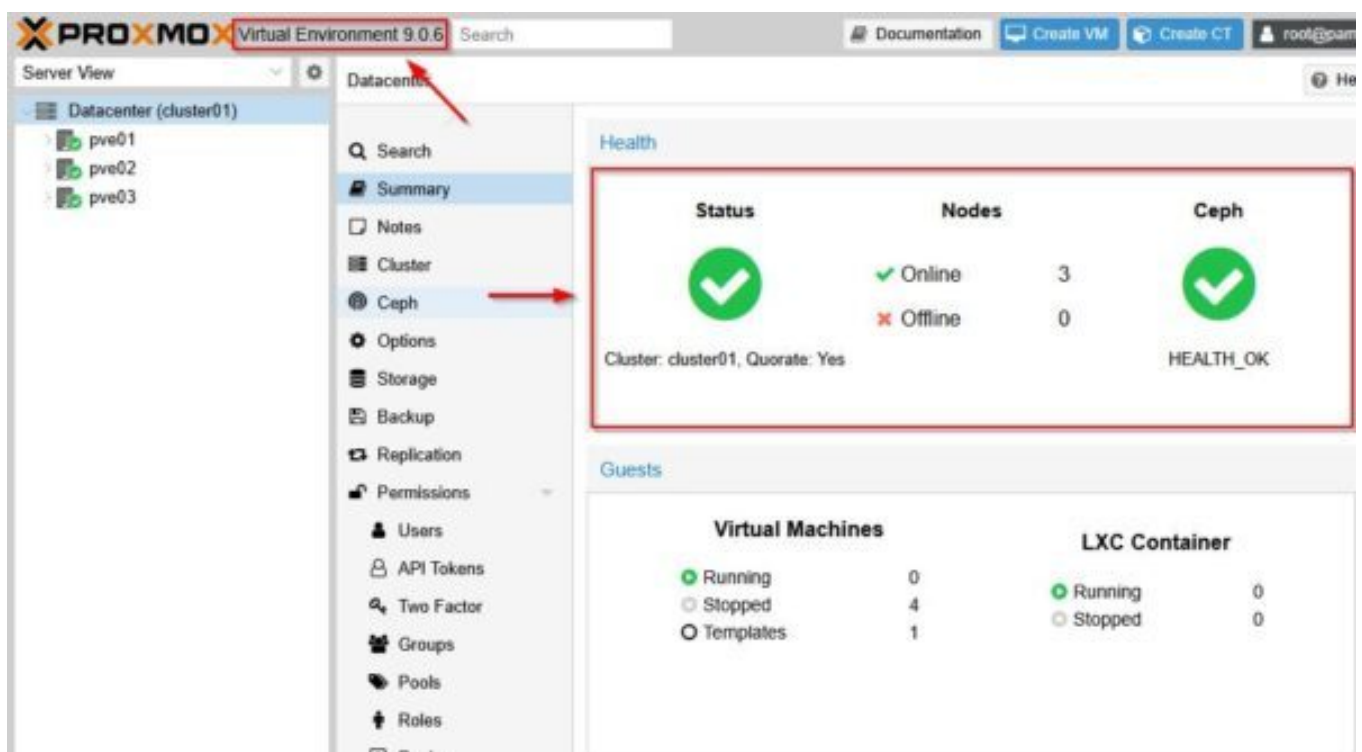
If you are using **HA and HA groups**, HA groups will be automatically migrated to **HA rules** once all cluster nodes have been upgraded to Proxmox VE 9.

Proxmox is now running version 9.

Wrap up

Proxmox 9 introduces **new features and enhancements**, primarily focused on storage, networking, and high-availability management. **Careful planning** will ensure a smooth upgrade from Proxmox VE 8 to 9.

Before you begin, make sure you have **working backups** of your VMs and containers in case something goes wrong.

Hey! Found Paolo's article helpful? Looking to deploy a new, easy-to-manage, and cost-effective hyperconverged infrastructure?

[Alex Bykovskyi](#) StarWind Virtual HCI Appliance Product Manager

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