

# Accelerating Hyper-Converged Enterprise Virtualization using Proxmox and Ceph



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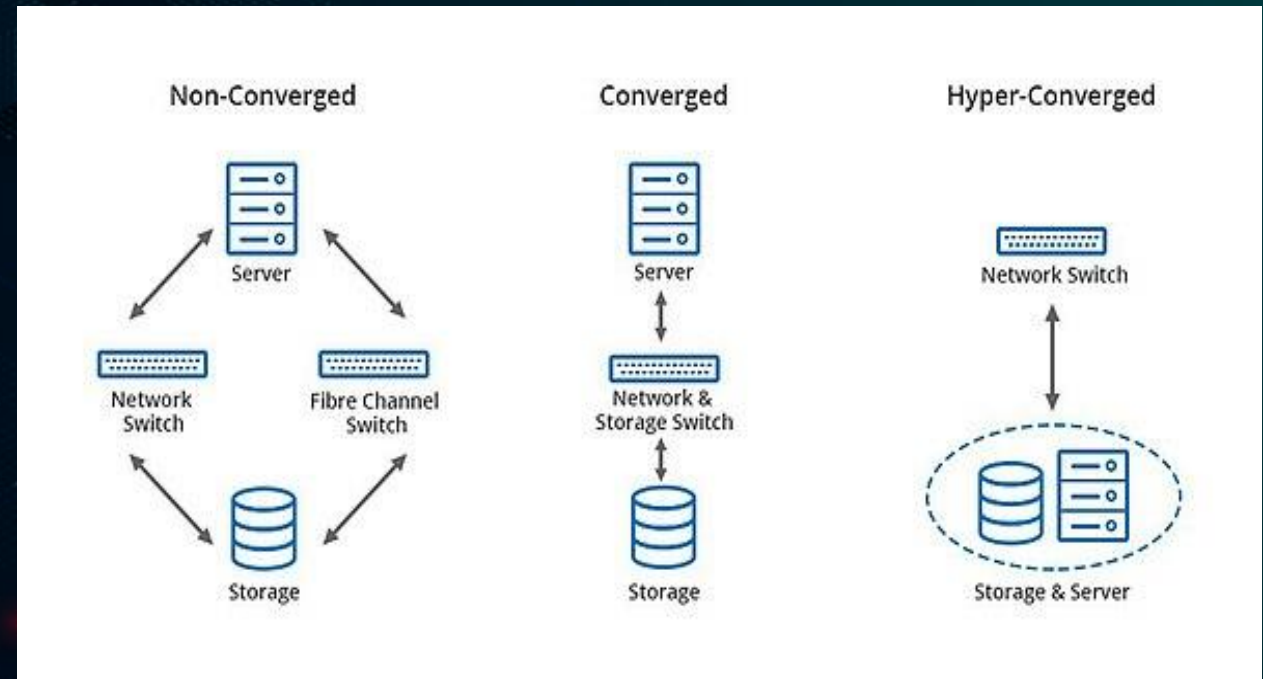
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# Hyper-Converged Infrastructure (HCI)

- ✓ **Hyper-converged infrastructure (HCI)** is a software-defined infrastructure that virtualizes all the elements of conventional "hardware-defined" systems.
- ✓ It's integrating computing (hypervisor), software-defined storage, and virtualized networking (software-defined networking).

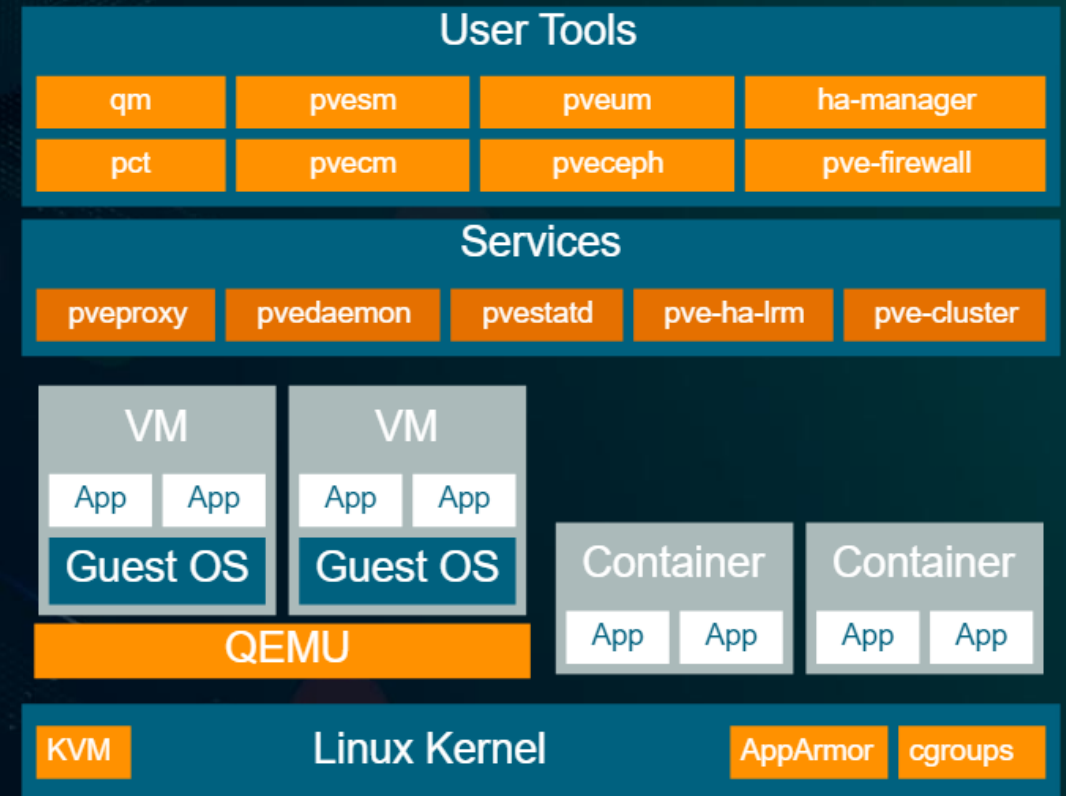


Difference between non-converged, converged and hyper-converged System  
Image Source: Wikipedia

# Proxmox Virtual Environment (Proxmox VE)

## Proxmox Virtual Environment (Proxmox VE):

- ✓ Stands as a leading open-source virtualization platform
- ✓ That revolutionizes the way organizations manage and deploy virtualized workloads.



Proxmox VE Architecture  
Source: Proxmox.com

# Key Features and Advantages of Ceph



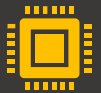
## **KVM and LXC:**

KVM for VM and LXC for containerization



## **Web-Based Management:**

Web-based interface makes it user-friendly, to manage Proxmox



## **High Availability:**

Live Migration and Fault Tolerance minimizing downtime



## **Storage Integration:**

Support ZFS, Ceph, NAS and SAN Storage for flexible and scalable management.



## **Backup and Restore:**

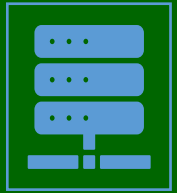
Built-in backup and restore provide data protection and recovery capabilities.



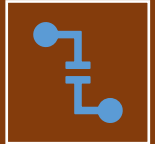
## **Resource Management:**

Precise resource allocation of CPU, Memory, and Storage.

# Ceph Storage



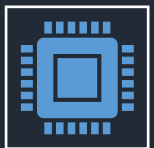
Open source, software-defined storage, Support of block, object, and file storage.



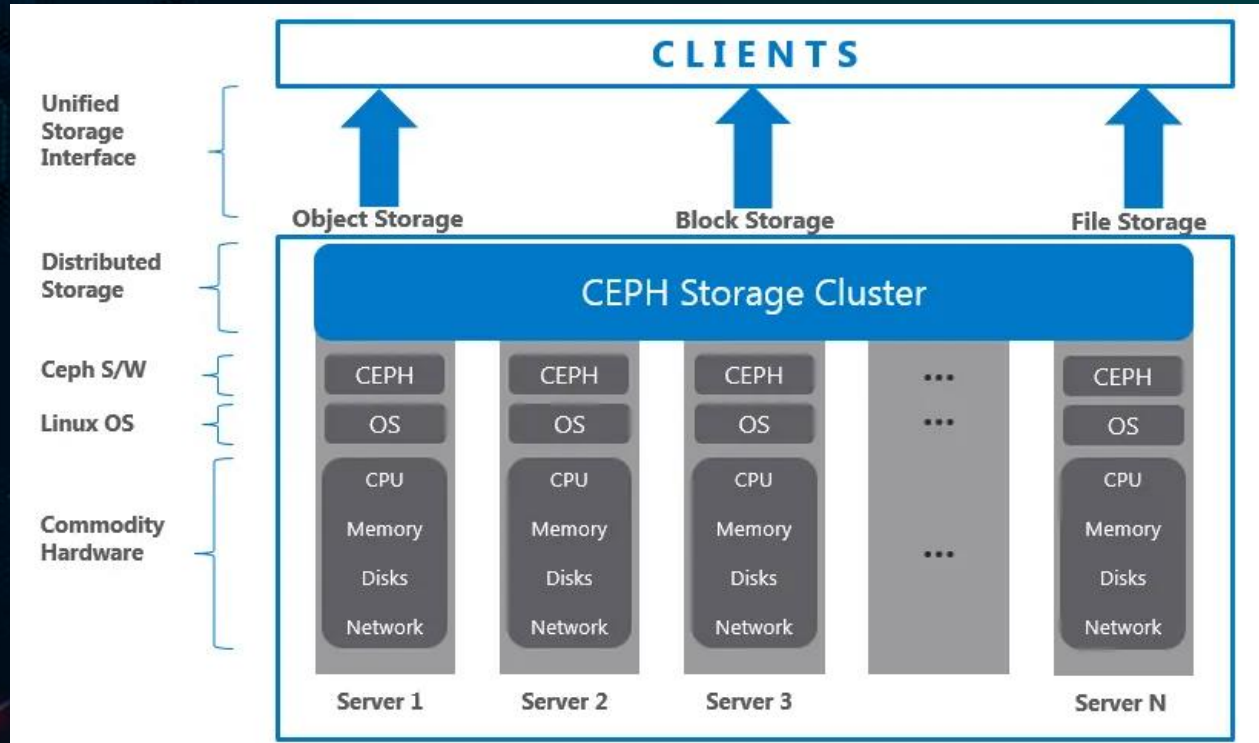
Ceph clusters run on any hardware with the help of **CRUSH** algorithm



Distributes data across the clustered nodes for highly fault-tolerant and scalable storage



Ensures data is both resilient and readily available, even in the hardware failures.



Ceph Cluster Architecture  
Image Source: Medium.com

# Key Features and Advantages of Ceph



## **Scalability:**

Scales effortlessly by adding more nodes making it suitable for enterprises storage needs.



## **Self-Healing:**

Its self-healing capability, automatically detect and repair data inconsistencies, ensuring data consistency and reliability.



## **Data Redundancy:**

Redundancy techniques, like replication and erasure coding, to protect data loss and data integrity.



## **Block and File Storage:**

Block storage for virtual machines and containers and file storage for shared data access.



## **Distributed Object Store:**

RADOS (Reliable Autonomic Distributed Object Store) forms distributed storage

# Ceph Cluster components



## **OSD (Object Storage Daemon):**

Each node runs one or more OSD daemons (one per disk). It does all data storage, replication and data recovery operations.



## **Rados Gateway:**

delivers an api service and it connect via S3 or Swift directly with Ceph.



## **Ceph Manager:**

Provide additional monitoring and interfaces to external monitoring and management systems.



## **Monitor:**

Responsible for maintaining a master copy of the cluster map. The Ceph cluster needs a minimum quorum of 3 or more to ensure high availability



**Metadata Server:** MDS handles all file operations and uses RADOS objects to store data and file system attributes.

# Managing Data with Ceph



## **Ceph Object Storage:**

Automatically replicated across different storage devices.

The CRUSH algorithm, a scalable hashing technique, controls how the objects are distributed and accessed, thus avoiding any single point of failure.



## **Block Storage:**

Block Devices, or RADOS Block Devices (RBD), allows Ceph to interact with block storage.

Providing storage solution for virtual machines and support thin provisioning and cache tiering



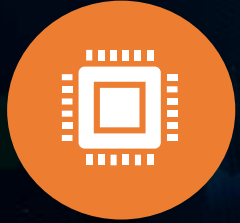
## **Ceph File System:**

It's a POSIX-compliant file system that uses a Ceph Storage Cluster to store data

Allowing for the usual file operations while adding scalability, reliability, and performance.



# Deployment Considerations



## Compute nodes:

ensure that, compute nodes meet the minimum requirements for proxmox VE. Consider factors like CPU capacity, RAM, and storage.



## Storage nodes:

for ceph storage, dedicate nodes with ample storage capacity. Disk speed and redundancy are critical considerations.



## Networking:

high-speed and low-latency networking is essential. Implement redundant network connections to ensure reliability.



## Separation of traffic:

for management, storage, and VM/container workloads. This separation improves security, simplifies troubleshooting, and optimizes performance.

# Disadvantages of Proxmox VE



## **Learning Curve:**

Proxmox VE, while user-friendly, may still have a learning curve for those new to virtualization and HCI technologies.



## **Limited Support:**

While Proxmox offers community support, enterprise-level support options are available but at an additional cost.



## **Compatibility:**

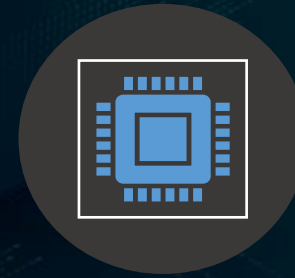
Proxmox VE primarily supports KVM for virtualization, which may not be compatible with all operating systems or software applications.

# Disadvantages of Ceph



## **Complexity:**

its distributed and highly configurable nature, can be complex to set up and manage, especially for those without prior experience.



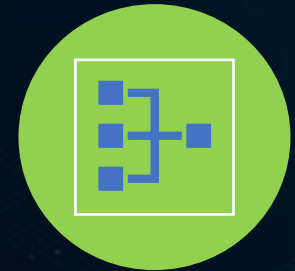
## **Resource Intensive:**

Ceph can be resource-intensive, particularly in terms of CPU and memory usage.



## **Data Recovery:**

While Ceph is known for its self-healing capabilities, data recovery from failed nodes or storage pools can be time-consuming and may require expertise.



## **Network Dependencies:**

Ceph relies heavily on a high-speed and low-latency network. Organizations with network constraints may experience performance bottlenecks.

# Performance Comparison Local Storage vs Ceph

## ✓ Disk Read/Write Speed in Local Storage:

```
mahedi@dns1:~$ sudo hdparm -tT /dev/xvda

/dev/xvda:
Timing cached reads:   17316 MB in  1.99 seconds = 8702.99 MB/sec
Timing buffered disk reads: 1032 MB in  3.00 seconds = 343.76 MB/sec
mahedi@dns1:~$ sudo dd if=/dev/zero of=test bs=10G count=1 oflag=direct
0+1 records in
0+1 records out
2147479552 bytes (2.1 GB, 2.0 GiB) copied, 8.70109 s, 247 MB/s
```

## ✓ Disk Read/Write Speed in Ceph Storage:

```
[root@oia ~]# sudo hdparm -tT /dev/sda

/dev/sda:
Timing cached reads:   21354 MB in  1.99 seconds = 10733.85 MB/sec
Timing buffered disk reads: 4042 MB in  3.00 seconds = 1346.62 MB/sec
[root@oia ~]#
[root@oia ~]# sudo dd if=/dev/zero of=test bs=10G count=1 oflag=direct
0+1 records in
0+1 records out
2147479552 bytes (2.1 GB, 2.0 GiB) copied, 2.3077 s, 931 MB/s
```

# Case Study of Dhaka University

## ✓ Before Proxmox:

- ✓ We are using VMware ESXi virtualization on servers in a rack, but we cannot use clustering due to licensing issues. And licensing costs are higher than our server hardware costs.
- ✓ When we purchased another rack of servers, we encountered the same issue regarding commercial licensing for virtualization.
- ✓ We then started using Xenserver, but its free version has limited features.
- ✓ Meanwhile, ZenServer has stopped providing free version since its new version.
- ✓ It would not have been possible to ensure high availability as there was no clustering.
- ✓ We need hyper-converged solutions to ensure high availability and robust performance.

# Case Study of Dhaka University

## ✓ **After Proxmox:**

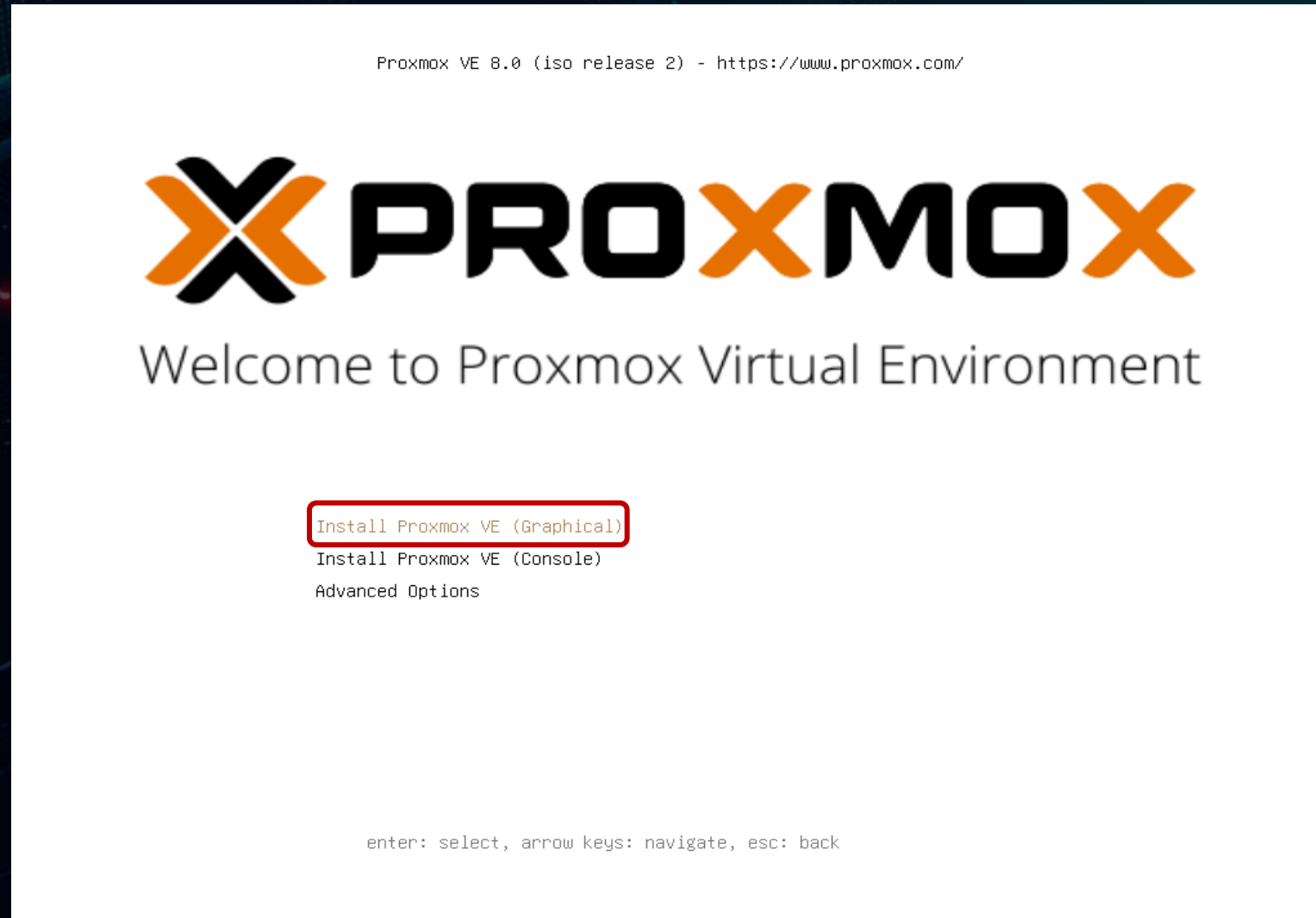
- ✓ We choose Proxmox and Ceph, which are completely free with no feature restrictions.
- ✓ Its hyper-converged clustering solutions ensure high availability and automated fault tolerance for our applications.

## ✓ **Benefit:**

- ✓ This saves roughly \$5K/year per server.
- ✓ Due to the use of Ceph with this, we don't need extra storage devices like SAN.
- ✓ Overall, the availability of our application is more assured than ever.
- ✓ Ensure Uptime up to 99.99%

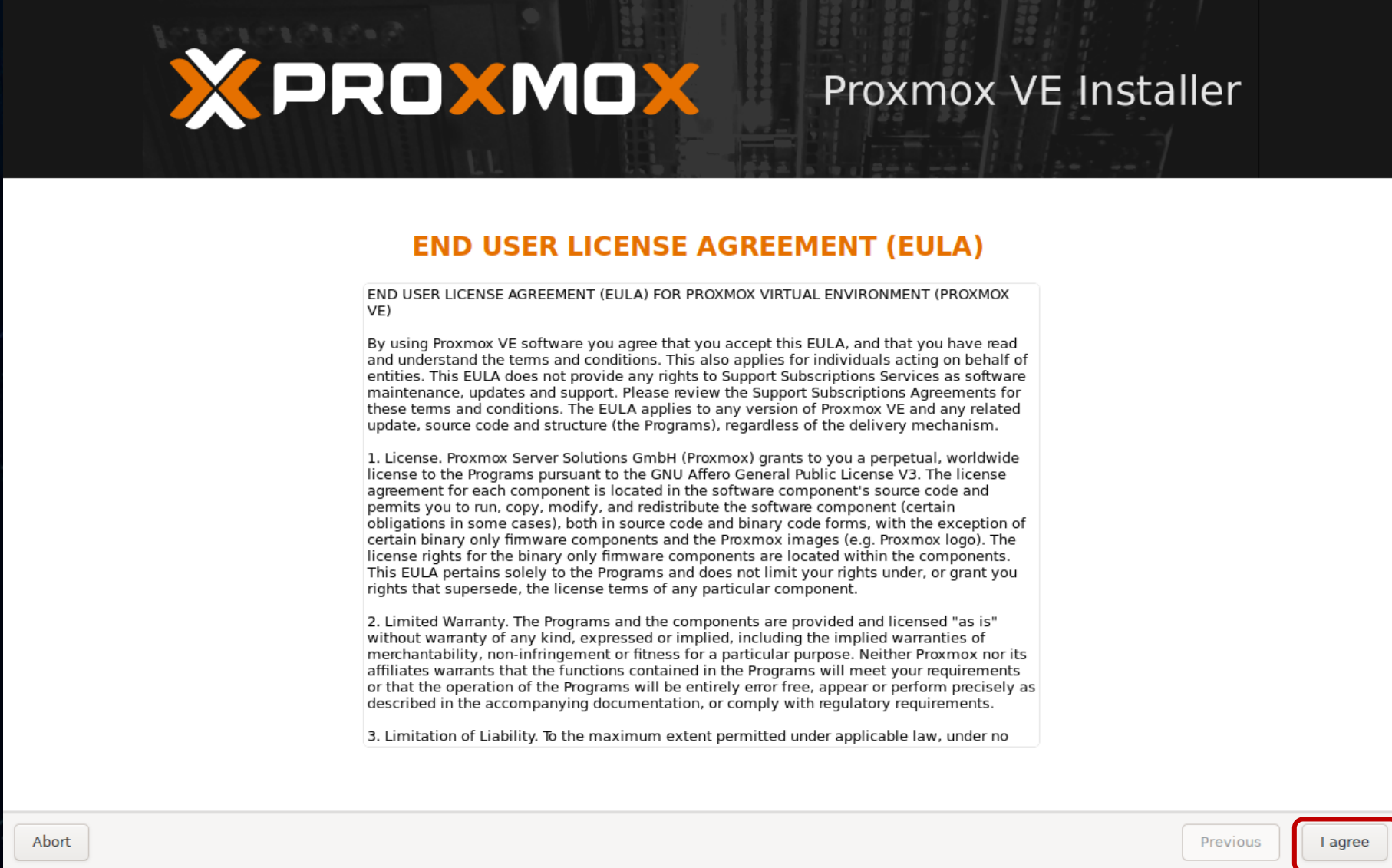
# Install Proxmox

## ✓ Boot Proxmox:



# Install Proxmox

## ✓ Accept license agreement:



The screenshot shows the Proxmox VE Installer interface. At the top, the Proxmox logo is displayed on the left, and the text "Proxmox VE Installer" is on the right. Below this, the title "END USER LICENSE AGREEMENT (EULA)" is centered in orange. The main content area contains the text of the EULA, which includes a general statement of acceptance and three numbered sections: 1. License, 2. Limited Warranty, and 3. Limitation of Liability. At the bottom of the window, there are three buttons: "Abort", "Previous", and "I agree". The "I agree" button is highlighted with a red border.

**PROXMOX** Proxmox VE Installer

### END USER LICENSE AGREEMENT (EULA)

END USER LICENSE AGREEMENT (EULA) FOR PROXMOX VIRTUAL ENVIRONMENT (PROXMOX VE)

By using Proxmox VE software you agree that you accept this EULA, and that you have read and understand the terms and conditions. This also applies for individuals acting on behalf of entities. This EULA does not provide any rights to Support Subscriptions Services as software maintenance, updates and support. Please review the Support Subscriptions Agreements for these terms and conditions. The EULA applies to any version of Proxmox VE and any related update, source code and structure (the Programs), regardless of the delivery mechanism.

- 1. License.** Proxmox Server Solutions GmbH (Proxmox) grants to you a perpetual, worldwide license to the Programs pursuant to the GNU Affero General Public License V3. The license agreement for each component is located in the software component's source code and permits you to run, copy, modify, and redistribute the software component (certain obligations in some cases), both in source code and binary code forms, with the exception of certain binary only firmware components and the Proxmox images (e.g. Proxmox logo). The license rights for the binary only firmware components are located within the components. This EULA pertains solely to the Programs and does not limit your rights under, or grant you rights that supersede, the license terms of any particular component.
- 2. Limited Warranty.** The Programs and the components are provided and licensed "as is" without warranty of any kind, expressed or implied, including the implied warranties of merchantability, non-infringement or fitness for a particular purpose. Neither Proxmox nor its affiliates warrants that the functions contained in the Programs will meet your requirements or that the operation of the Programs will be entirely error free, appear or perform precisely as described in the accompanying documentation, or comply with regulatory requirements.
- 3. Limitation of Liability.** To the maximum extent permitted under applicable law, under no

Abort Previous **I agree**



# Install Proxmox

## ✓ Configure Disk:

The screenshot shows the Proxmox VE Installer interface. At the top, the Proxmox logo and 'Proxmox VE Installer' are displayed. The main heading is 'Proxmox Virtual Environment (PVE)'. Below this, there is a 'Harddisk options' dialog box with the following fields: 'Filesystem' (set to 'xfs'), 'hdspace' (50.0), 'swapspace', 'maxroot', 'minfree', and 'maxvz'. The 'OK' button is highlighted with a red circle and the number 3. To the right of the dialog, there are several text blocks: 'the installation target', 'hardware detection', and 'er interface'. At the bottom of the installer window, the 'Target Harddisk' is set to '/dev/sda (50.00GiB, VMware Virtual S)'. The 'Options' button is highlighted with a red circle and the number 1. The 'Next' button is highlighted with a red circle and the number 4. The 'Abort' button is visible on the bottom left.

# Install Proxmox

## ✓ Set Location and Timezone:

**PROXMOX** Proxmox VE Installer

### 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

Time zone

Keyboard Layout

Abort Previous Next

# Install Proxmox

## ✓ Configure Root password and Email:

**PROXMOX** 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

Abort Previous **Next**

# Install Proxmox

## ✓ Set Hostname and Configure Network:

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:

Hostname (FQDN):

IP Address (CIDR):  /

Gateway:

DNS Server:

Abort

Previous

Next

# Install Proxmox

## ✓ Check Summary and Start Install:

**PROXMOX** Proxmox VE Installer

### 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:	xfs
Disk(s):	/dev/sda
Country:	Bangladesh
Timezone:	Asia/Dhaka
Keymap:	en-us
Email:	cse.mahedi@gmail.com
Management Interface:	ens33
Hostname:	proxmox-server1
IP CIDR:	192.168.65.120/24
Gateway:	192.168.65.2
DNS:	192.168.65.2

Automatically reboot after successful installation

Abort Previous **Install**

# Install Proxmox

## ✓ Proxmox Login:

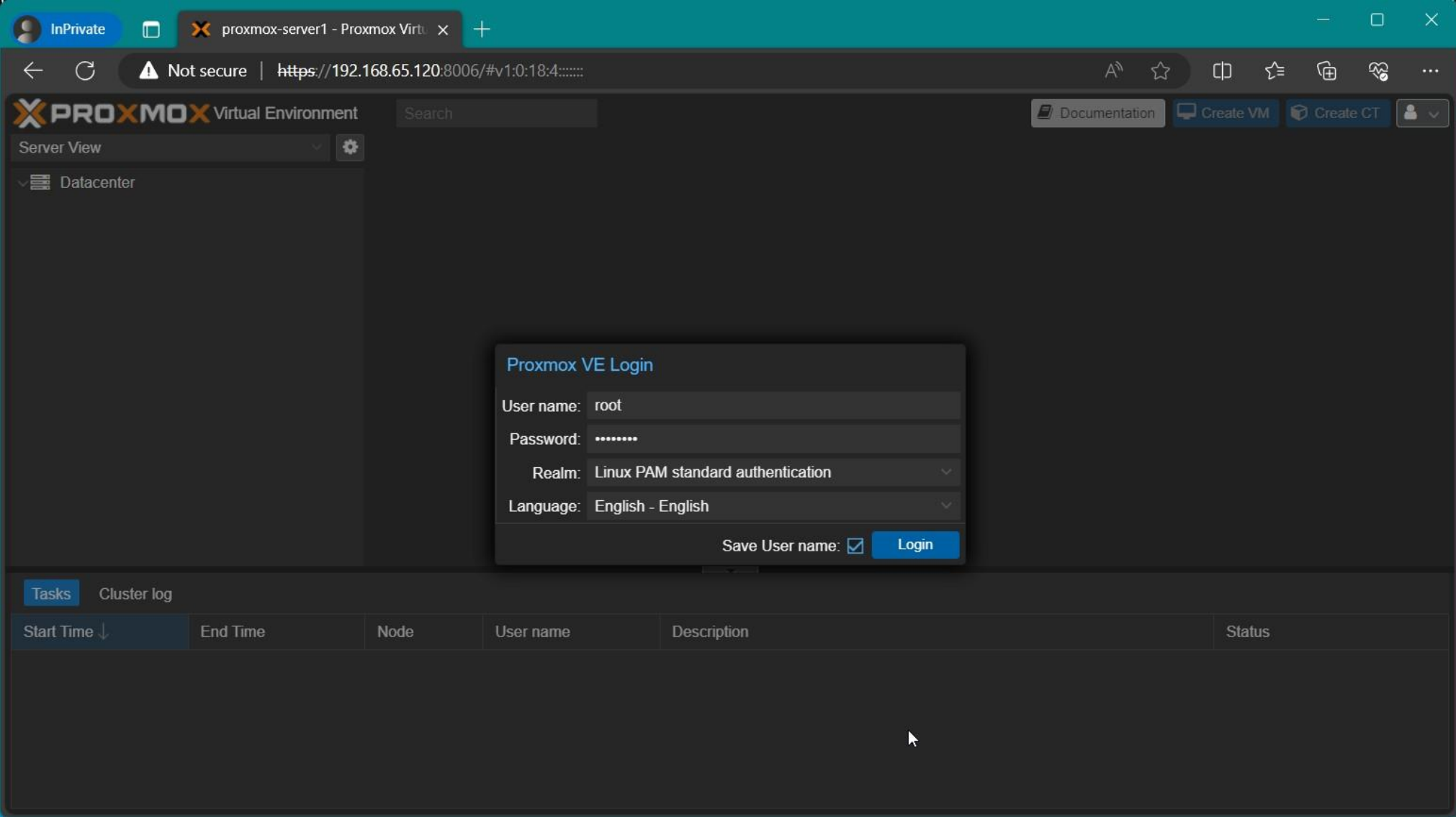
```
-----  
Welcome to the Proxmox Virtual Environment. Please use your web browser to  
configure this server - connect to:
```

```
https://192.168.65.120:8006/  
-----
```

```
proxmox-server1 login: _
```

# Install Proxmox

## ✓ Login from browser:



# Install Proxmox

## ✓ User Dashboard:

PROXMOX Virtual Environment 8.0.3

Node 'proxmox-server1'

Package versions

proxmox-server1 (Uptime: 00:29:39)

CPU usage	2.11% of 4 CPU(s)	IO delay	0.00%
Load average	0.37,0.34,0.23	KSM sharing	0 B
RAM usage	31.74% (1.20 GiB of 3.78 GiB)	SWAP usage	0.00% (0 B of 3.78 GiB)
/ HD space	12.38% (2.82 GiB of 22.80 GiB)		

CPU(s) 4 x 12th Gen Intel(R) Core(TM) i7-1255U (2 Sockets)  
Kernel Version Linux 6.2.16-3-pve #1 SMP PREEMPT\_DYNAMIC PVE 6.2.16-3 (2023-06-17T05:58Z)  
PVE Manager Version pve-manager/8.0.3/bbf3993334bfa916  
Repository Status ✔ Production-ready Enterprise repository enabled !  Enterprise repository needs valid subscription >

Tasks Cluster log

Start Time ↓	End Time	Node	User name	Description	Status
Sep 29 22:49:45	Sep 29 22:49:45	proxmox-s...	root@pam	Start all VMs and Containers	OK



# Steps to Install Ceph on Proxmox

The screenshot shows the Proxmox VE 8.0.3 interface. In the left sidebar, the server 'proxmox-server1' is selected. The 'Ceph' menu item is highlighted in the left sidebar. A dialog box is open, asking 'Ceph is not installed on this node. Would you like to install it now?' with an 'Install Ceph' button.

**1** proxmox-server1

**2** Ceph

**3** Install Ceph

Ceph is not installed on this node. Would you like to install it now?

Install Ceph

Start Time ↓	End Time	Node	User name	Description	Status
Sep 30 22:57:25	Sep 30 22:57:42	proxmox-s...	root@pam	Join Cluster	OK
Sep 30 22:56:31	Sep 30 22:56:49	proxmox-s...	root@pam	Join Cluster	OK
Sep 30 22:55:53	Sep 30 22:55:55	proxmox-s...	root@pam	Create Cluster	OK
Sep 30 22:55:01	Sep 30 22:55:03	proxmox-s...	root@pam	SRV networking - Reload	OK
Sep 30 22:54:35	Sep 30 22:54:37	proxmox-s...	root@pam	SRV networking - Reload	OK

# Steps to Install Ceph on Proxmox

Node 'proxmox-server1' [Reboot] [Shutdown]

Search [X] Setup [X]

Info Installation Configuration Success

### Ceph?

"Ceph is a unified, distributed storage system, designed for excellent performance, reliability, and scalability."

Ceph is currently **not installed** on this node. This wizard will guide you through the installation. Click on the next button below to begin. After the initial installation, the wizard will offer to create an initial configuration. This configuration step is only needed once per cluster and will be skipped if a config is already present.

Before starting the installation, please take a look at our documentation, by clicking the help button below. If you want to gain deeper knowledge about Ceph, visit [ceph.com](http://ceph.com).

**Hint:** The no-subscription repository is not the best choice for production setups.

Ceph in the cluster: Could not detect a ceph installation in the cluster

Ceph version to install: quincy (17.2) Repository: No-Subscription

[?] Help [Advanced]  **Start quincy installation**

Node proxmox-s... root@pam Create Cluster

# Steps to Install Ceph on Proxmox

```
Setup
Info Installation Configuration Success

python3-beaker python-natsort-doc python-openssl-doc python3-openssl-dbg
libapache2-mod-python python-pecan-doc python-waitress-doc python-webob-doc
python-webtest-doc ipython3 python-werkzeug-doc python3-lxml python3-watchdog
Recommended packages:
btrfs-tools python3-lxml python3-routes python3-simplejson
python3-pastescript python3-pyinotify
The following NEW packages will be installed:
ceph ceph-base ceph-mds ceph-mgr ceph-mgr-modules-core ceph-mon ceph-osd
ceph-volume cryptsetup-bin libnvme1 libparted2 libpython3.11
libsqlite3-mod-ceph nvme-cli parted python3-autocommand python3-bcrypt
python3-bs4 python3-cffi-backend python3-cheroot python3-cherrypy3
python3-cryptography python3-dateutil python3-inflect python3-jaraco.classes
python3-jaraco.collections python3-jaraco.context python3-jaraco.functools
python3-jaraco.text python3-logutils python3-mako python3-markupsafe
python3-more-itertools python3-natsort python3-openssl python3-paste
python3-pastedeploy python3-pastedeploy-tpl python3-pecan python3-portend
python3-simplegeneric python3-singledispatch python3-soupsieve
python3-tempita python3-tempora python3-tz python3-waitress python3-webob
python3-webtest python3-werkzeug python3-zc.lockfile sudo uuid-runtime
0 upgraded, 53 newly installed, 0 to remove and 38 not upgraded.
Need to get 54.6 MB of archives.
After this operation, 252 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
```

Press Enter

Advanced  Next

root@pam Join Cluster

# Steps to Install Ceph on Proxmox

```
Setup
Info Installation Configuration Success

Created symlink /etc/systemd/system/multi-user.target.wants/ceph-osd.target -> /lib/systemd/system/ceph-osd.target.
Created symlink /etc/systemd/system/ceph.target.wants/ceph-osd.target -> /lib/systemd/system/ceph-osd.target.
Setting up ceph-mon (17.2.6-pve1+3) ...
Created symlink /etc/systemd/system/multi-user.target.wants/ceph-mon.target -> /lib/systemd/system/ceph-mon.target.
Created symlink /etc/systemd/system/ceph.target.wants/ceph-mon.target -> /lib/systemd/system/ceph-mon.target.
Setting up ceph-mgr (17.2.6-pve1+3) ...
Created symlink /etc/systemd/system/multi-user.target.wants/ceph-mgr.target -> /lib/systemd/system/ceph-mgr.target.
Created symlink /etc/systemd/system/ceph.target.wants/ceph-mgr.target -> /lib/systemd/system/ceph-mgr.target.
Setting up ceph-volume (17.2.6-pve1+3) ...
Setting up ceph (17.2.6-pve1+3) ...
Processing triggers for man-db (2.11.2-2) ...
Processing triggers for libc-bin (2.36-9) ...

installed ceph quincy successfully!

reloading API to load new Ceph RADOS library...
█

Advanced  Next
```

# Steps to Install Ceph on Proxmox

**Setup** [X]

Info Installation **Configuration** Success

Ceph cluster configuration:

Public Network IP/CIDR: 192.168.20.120/24 **1**

Cluster Network IP/CIDR: 192.168.65.120/24 **2**

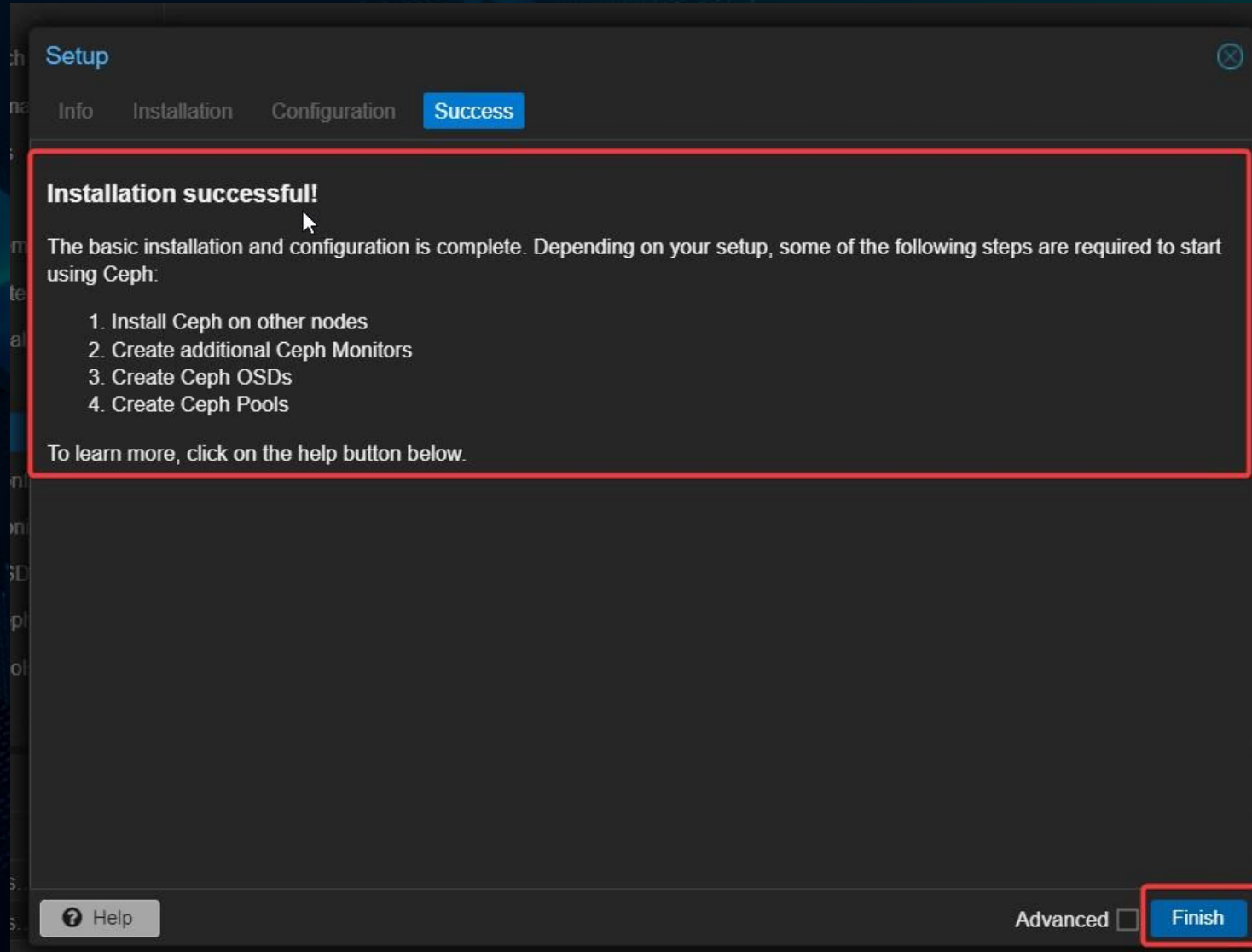
First Ceph monitor:  
Monitor node: proxmox-server1

Additional monitors are recommended. They can be created at any time in the Monitor tab.

Help [?] Advanced  **Next** **3**

# Steps to Install Ceph on Proxmox

- Install successfully, repeat these steps on other nodes:



# Create Ceph OSD Daemons

The screenshot shows the Proxmox VE 8.0.3 interface. In the left sidebar, the 'Datacenter (pve-cluster-1)' tree view has 'proxmox-server1' selected, highlighted with a red box and a red circle labeled '1'. In the main content area, the 'Ceph' menu item is highlighted with a red box and a red circle labeled '2'. The 'Create: OSD' button is highlighted with a red box and a red circle labeled '3'. Below the main content area, the 'Tasks' tab is active, showing a table of cluster log entries.

Start Time ↓	End Time	Node	User name	Description	Status
Sep 30 23:15:26	Sep 30 23:15:32	proxmox-s...	root@pam	Ceph Manager mgr.proxmox-server1 - Create	OK
Sep 30 23:15:25	Sep 30 23:15:26	proxmox-s...	root@pam	Ceph Monitor mon.proxmox-server1 - Create	OK
Sep 30 23:06:00	Sep 30 23:11:08	proxmox-s...	root@pam	Shell	OK
Sep 30 22:57:25	Sep 30 22:57:42	proxmox-s...	root@pam	Join Cluster	OK
Sep 30 22:56:31	Sep 30 22:56:49	proxmox-s...	root@pam	Join Cluster	OK

# Create Ceph OSD Daemons

The screenshot shows a web-based interface for creating Ceph OSDs. At the top, there are buttons for 'Reload', 'Create: OSD', and 'Manage Global Flags'. On the right, it says 'No OSD selected' and has 'Details' and 'Start' buttons. Below this is a table with columns: Name, Class, OSD Type, Status, Version, weight, and reweight. A single entry 'default' is visible in the 'Name' column.

A modal window titled 'Create: Ceph OSD' is open. It contains the following fields:

- 'Disk:' dropdown menu with the value '/dev/sdb' selected. This field is highlighted with a red box and a red circle containing the number '1'.
- 'DB Disk:' dropdown menu with the value 'use OSD disk' selected.
- 'DB size (GiB):' dropdown menu with the value 'Automatic' selected.

Below the fields is a yellow warning box with the text: 'Note: Ceph is not compatible with disks backed by a hardware RAID controller. For details see [the reference documentation](#)'.

At the bottom of the modal, there is a 'Help' button, an 'Advanced' checkbox (which is unchecked), and a 'Create' button. The 'Create' button is highlighted with a red box and a red circle containing the number '2'.



# Create Ceph OSD Daemons

Reload | Create: OSD | Manage Global Flags | No OSD selected

Name	Class	OSD Type	Status	Version
default				

Task: Ceph OSD sdb - Create

running...

Details

Reload | Create: OSD | Manage Global Flags | No OSD selected | Details

Name	Class	OSD Type	Status	Version	weight	rev
default						
proxmox-server1				17.2.6		
osd.0	hdd	filestore	down / in		0.0488	

# Create Ceph Pool

The screenshot shows the Proxmox VE 8.0.3 interface. The left sidebar displays a tree view of the cluster 'Datacenter (pve-cluster-1)' with nodes 'proxmox-server1', 'proxmox-server2', and 'proxmox-server3'. The 'proxmox-server1' node is selected and highlighted with a red circle labeled '1'. The main content area shows the 'Ceph' configuration page for 'Node proxmox-server1'. The 'Pools' menu item is highlighted with a red box labeled '2'. The 'Create' button is highlighted with a red box labeled '3'. The main content area displays a table of existing Ceph pools:

Pool #	Name	Size/min	# of Placem...	Optimal # o...	Autoscale ...	CRUSH Rule (ID)	Used (%)
1	.mgr	3/2	1	1	on	replicated_rule (0)	1.32 MiB (0.00%)
							1.32 MiB

The bottom of the interface shows a 'Tasks' tab with a 'Cluster log' table:

Start Time ↓	End Time	Node	User name	Description	Status
Sep 30 23:41:35	Sep 30 23:41:46	proxmox-s...	root@pam	Ceph OSD sdb - Create	OK
Sep 30 23:41:02	Sep 30 23:41:14	proxmox-s...	root@pam	Ceph OSD sdb - Create	OK
Sep 30 23:38:20	Sep 30 23:40:45	proxmox-s...	root@pam	Shell	OK
Sep 30 23:32:15	Sep 30 23:37:52	proxmox-s...	root@pam	Shell	OK
Sep 30 23:30:53	Sep 30 23:31:09	proxmox-s...	root@pam	Shell	OK

# Create Ceph Pool

Create Edit Destroy

Pool #	Name	Size/min	# of Placem...	Optimal # o...
1	.mgr	3/2	1	1

**Create: Ceph Pool** [Close]

Name: **Ceph-VM-Storage** PG Autoscale Mode: on

Size: 3 Add as Storage:

Help  Advanced **Create**

**1** **2**

# Create Ceph Pool

- Pool is ready and available in all servers to store VMs:

The screenshot displays the Proxmox Virtual Environment (VE) 8.0.3 interface. The left sidebar shows a tree view of the cluster with three nodes: proxmox-server1, proxmox-server2, and proxmox-server3. Each node has a 'Ceph-VM-Storage' pool highlighted in red. The main panel shows the configuration for the 'Ceph-VM-Storage' pool on node 'proxmox-server1'. The pool is listed as '2 Ceph-VM-Storage' with a size of 3/2, 128 placement groups, and 32 optimal placement groups. The CRUSH rule is 'replicated\_rule (0)' and it is currently used for 0 B (0.00%).

Pool #	Name	Size/min	# of Place...	Optimal # ...	Autoscale ...	CRUSH Rule (ID)	Used (%)
1	.mgr	3/2	1	1	on	replicated_rule (0)	1.32 MiB (0.00%)
2	Ceph-VM-Storage	3/2	128	32	on	replicated_rule (0)	0 B (0.00%)

The 'Tasks' section at the bottom shows the following log entries:

Start Time	End Time	Node	User name	Description	Status
Sep 30 23:46:38	Sep 30 23:46:47	proxmox-s...	root@pam	Ceph Pool Ceph-VM-Storage - Create	OK
Sep 30 23:41:35	Sep 30 23:41:46	proxmox-s...	root@pam	Ceph OSD sdb - Create	OK
Sep 30 23:41:02	Sep 30 23:41:14	proxmox-s...	root@pam	Ceph OSD sdb - Create	OK
Sep 30 23:38:20	Sep 30 23:40:45	proxmox-s...	root@pam	Shell	OK
Sep 30 23:32:15	Sep 30 23:37:52	proxmox-s...	root@pam	Shell	OK

# Live demo

✓ **Live Demo from test lab (Max 5mins) / Recorded Video**

Thank You

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