

Getting Started with Proxmox: A Beginner's Guide to Virtualization

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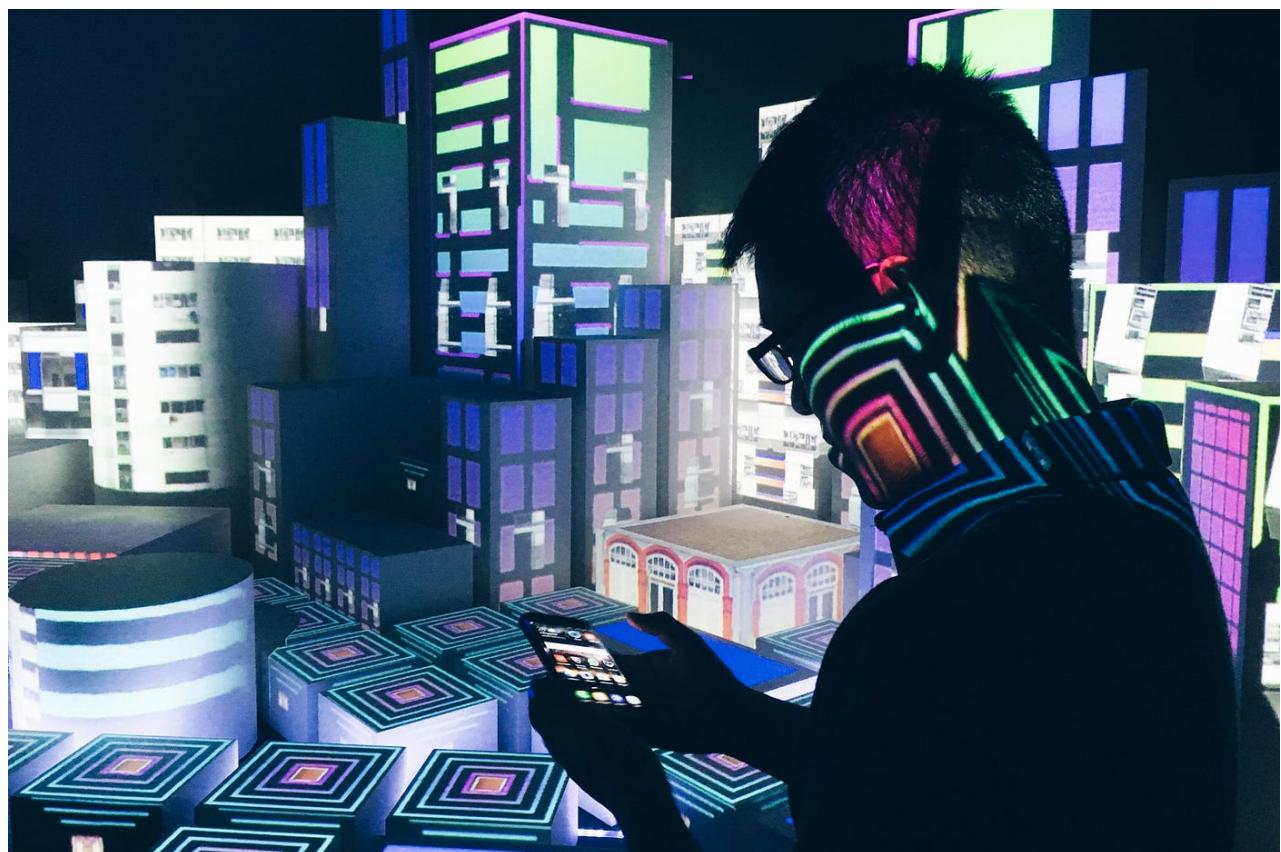


Photo by on

Proxmox is arguably virtualization's best-kept secret, and the big boys definitely want it to stay that way. Let me introduce you to Proxmox if you've been looking for the best hypervisor but haven't found it yet.



Why am I allowed to make such a bold statement on a thing you've never heard of?

The answer's easy...I've used it.

Using KVM for full virtualization and OpenVZ for container virtualization, Proxmox combines the best of both worlds .

It is an open-source virtualization platform made for managing containers and virtual machines. It offers a strong and adaptable solution for setting up and administering virtual environments. A strong platform that makes it simple for users to handle virtual machines and containers is called Proxmox Hypervisor. It is an ideal solution for small and medium-sized businesses looking to virtualize their IT infrastructure.

The formal name of it is “Proxmox Cluster file system” (pmxcfs). PMXCFs is a database-driven filesystem that houses configuration files. While using Coro sync, all modifications made to files or copies or deletions of files on this filesystem are promptly replicated across all nodes. The Coro sync cluster engine is an approach to group communication that is used to provide high availability inside an application.

Key-Features of Proxmox Hypervisor

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1. It is a project led by the community that is always expanding, with new features and enhancements being introduced on a regular basis.
 2. Allows for both KVM-based and container-based virtualization. It enables the usage of several virtual machines and containers on a single physical server.
 3. Offers a centralised management interface for managing virtual machines and containers from a single place. This simplifies the deployment, monitoring, and management of virtual environments
 4. Offers a high-availability functionality for virtual machines and containers to ensure optimum uptime. In the case of a hardware breakdown, it automatically identifies and migrates virtual computers to another node.

5. Enables users to relocate virtual machines and containers from one host to another without affecting the host's performance. This function is beneficial for load balancing, maintenance, and hardware upgrades.
6. Has an integrated backup and restore functionality that allows users to backup virtual machines and containers to an external storage device. It also enables incremental backups, which saves time and space on the hard drive.
7. This feature allows customers to duplicate virtual machines and containers to a distant site in the event of a disaster.
8. Allows users to establish several virtual environments for various departments or clients by supporting multi-tenancy. Each virtual environment is separated from the others, guaranteeing the highest level of security and privacy.
9. Enables users to add more virtual environment nodes as needed. This makes it simple to scale the virtual environment as the company expands.

Distinct Facts....

👉 Proxmox Hypervisor is based on **Debian Linux**, a widely used distribution in the Linux community. This implies that users may benefit from Debian's stability and security while simultaneously reaping the benefits of a virtualization platform.

👉 Proxmox Hypervisor is also intended to function with a wide range of hardware, including Intel and AMD CPUs, making it a versatile option for enterprises with varying hardware requirements.

👉 Proxmox Hypervisor also has a comprehensive range of networking options. It can establish virtual networks with VLAN tagging, bridges, and bond interfaces and supports both virtual and physical network interfaces. This enables users to create complicated network topologies and effortlessly link their virtual environments with their current network infrastructure.

👉 The most essential aspect is that this is a free product that is only supported by a small group of developers and community members. Isn't it exciting?

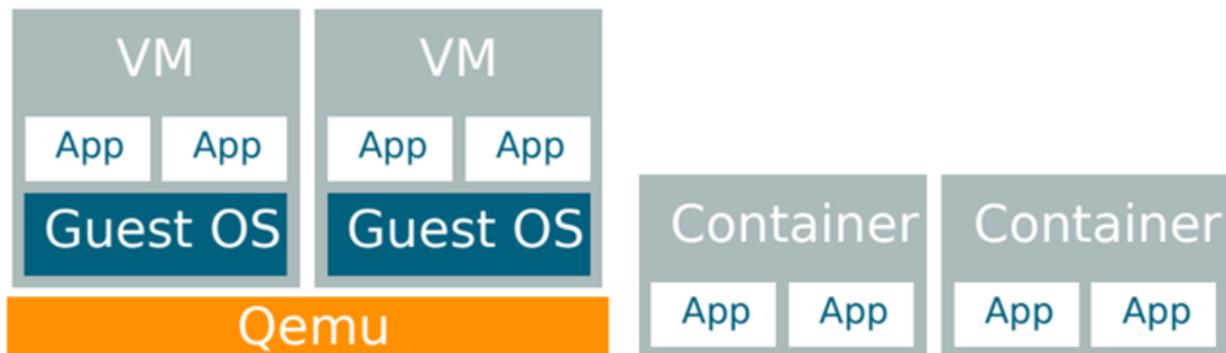
Proxmox Architecture

User Tools

qm	pvesm	pveum	ha-manager
pct	pvecm	pveceph	pve-firewall

Services

pveproxy	pvedaemon	pvestatd	pve-ha-lrm	pve-cluster
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KVM Linux Kernel AppArmor cgroups

Proxmox is a **cluster-based hypervisor** with an emphasis on high availability. It is intended for use with numerous server nodes. They provide redundancy or high availability to the platform while increasing uptime by installing several nodes in a cluster. In a production virtual environment, a cluster of nodes might range from a few dozen to several hundreds. It may be impractical for an administrator to make changes to configuration files on the cluster one node at a time. Depending on the number of nodes in the cluster, changing a single minor parameter in each node's configuration file might take many hours.

| Here's a brief comparison to help you understand Proxmox even better!

Parameter	Proxmox VE	VMware ESXi	Hyper-V
Maximum logical CPUs per host	768	896	512
Maximum RAM per host	12 TB	24 TB	48 TB
Nodes per cluster	No explicit limit	96	64
Maximum VMs per host	No explicit limit	1024	1024

Fig 1: Comparison of different Hypervisors

Features	Proxmox VE	VMware ESXi	Hyper-V
Based on	Linux KVM	VMkernel	Windows
Product type	Open source	Proprietary	Proprietary
Central management	Built-in	Supported with paid license	Supported
High availability	Supported	Supported	Supported
Load balancing	Supported	Supported	Supported
Live VM migration	Supported	Available with paid license	Supported
Migration/Conversion	Possible with third-party tools	Possible with native and third-party tools	Possible with native and third-party tools
Backup and restore	Supported	Supported	Supported
Licensing/Pricing	Free	Free with limited features, fully featured paid license	Free/included with Windows license
Support and updates	Subscription	Subscription	Included with Windows
Remote management options	Web client and CLI	Web client, CLI, PowerCLI, vCenter Server, System Center—Virtual Machine Manager (VMM)	Hyper-V manager, PowerShell, Windows Admin Center (WAC), System Center—Virtual Machine Manager (VMM), vCenter Server
Market share	Low	High	Medium

Fig 2: Comparing various hypervisors

So, now you have no excuses. Go download it, install it and experience for yourself, the ultimate hypervisor. Follow me

Getting started with Proxmox Hypervisor is easy.

Here we have provided you with detailed steps right from downloading the right application file covering all the essential steps.

- Downloading Proxmox Hypervisor
- Proxmox Installation
- Creating Proxmox on Virtual Machine

| **Downloading Proxmox Hypervisor**

The first step is to download the ISO image from the Proxmox website “” and burn it to a CD or USB drive. Once you have the installation media, you can boot from it and follow the on-screen instructions to install Proxmox Hypervisor.

The screenshot shows the Proxmox Downloads page. At the top, there are links for Home, Virtualization, Backup, Email Security, Downloads (which is highlighted), Training, Partners, News, and About us. A search bar is also present. Below the navigation, there's a breadcrumb trail: Home > Downloads. The main content area is titled "Download - Software, Documentation, Agreements". It features three large icons: "Proxmox Virtual Environment" (with a server icon), "Proxmox Mail Gateway" (with a mail icon), and "Proxmox Backup Server" (with a database icon). Below these are sections for "Download Files". The first section contains two BitTorrent links: "Proxmox Mail Gateway 7.3 ISO Installer" (version 7.3-1) and "Proxmox Mail Gateway 7.3 ISO Installer" (version 7.3-1). The second section contains two BitTorrent links: "Proxmox VE 7.4 ISO Installer" (version 7.4-1) and "Proxmox VE 7.4 ISO Installer" (version 7.4-1).

Select Proxmox Virtual Environment and proceed

The screenshot shows the Proxmox VE 7.4 ISO Installer page. The navigation bar and search bar are identical to the previous page. The breadcrumb trail shows Home > Downloads > Proxmox Virtual Environment > ISO Images > Proxmox VE 7.4 ISO Installer. The main title is "Proxmox VE 7.4 ISO Installer". Below it, there's a download button with a progress bar showing "Last update: 23 March 2023 Version: 7.4-1 File size: 1.05 GB". Further down, there's a section for "SHA256SUMS for the ISO:" with a long string of characters. A "Release notes" section lists several release dates and versions. At the bottom, there's a note about updating via GUI/updater or CLI, followed by a copyright notice and links to YouTube, LinkedIn, Legal notice, Sitemap, and Privacy Policy.

https://proxmox.com/en/downloads?task=callElement&format=raw&element_id=601&element=f85c494b-2...

Click on download (version may vary)

| 2.



Create a new virtual machine

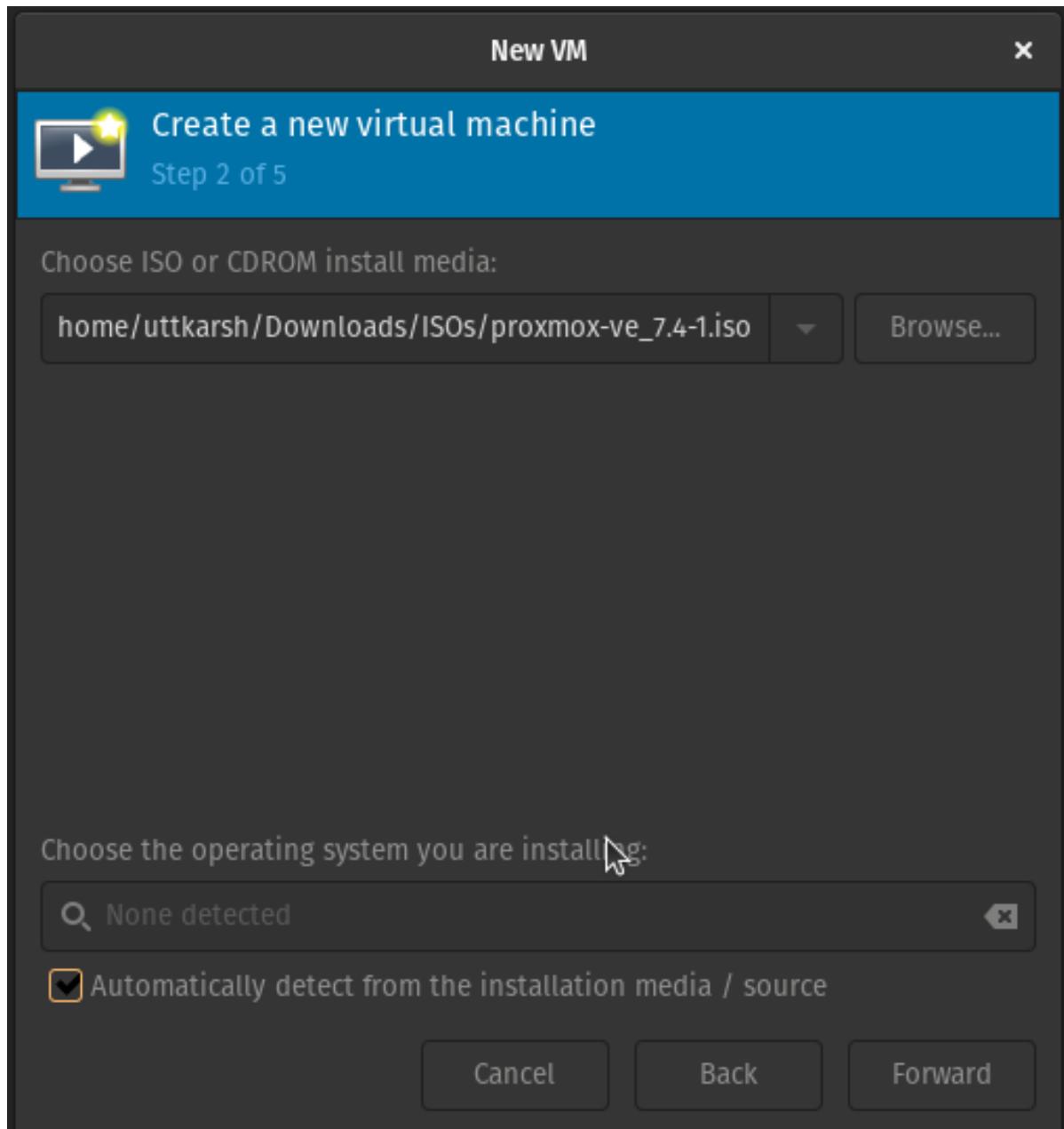
Step 1 of 5

Connection: QEMU/KVM

Choose how you would like to install the operating system

- Local install media (ISO image or CDROM) 
- Network Install (HTTP, HTTPS, or FTP)
- Import existing disk image
- Manual install

CancelBackForward



- i. On KVM, Create a new Virtual Machine of Proxmox

New VM



Create a new virtual machine

Step 3 of 5

Choose Memory and CPU settings:

Memory: 2048 - +

Up to 7554 MiB available on the host

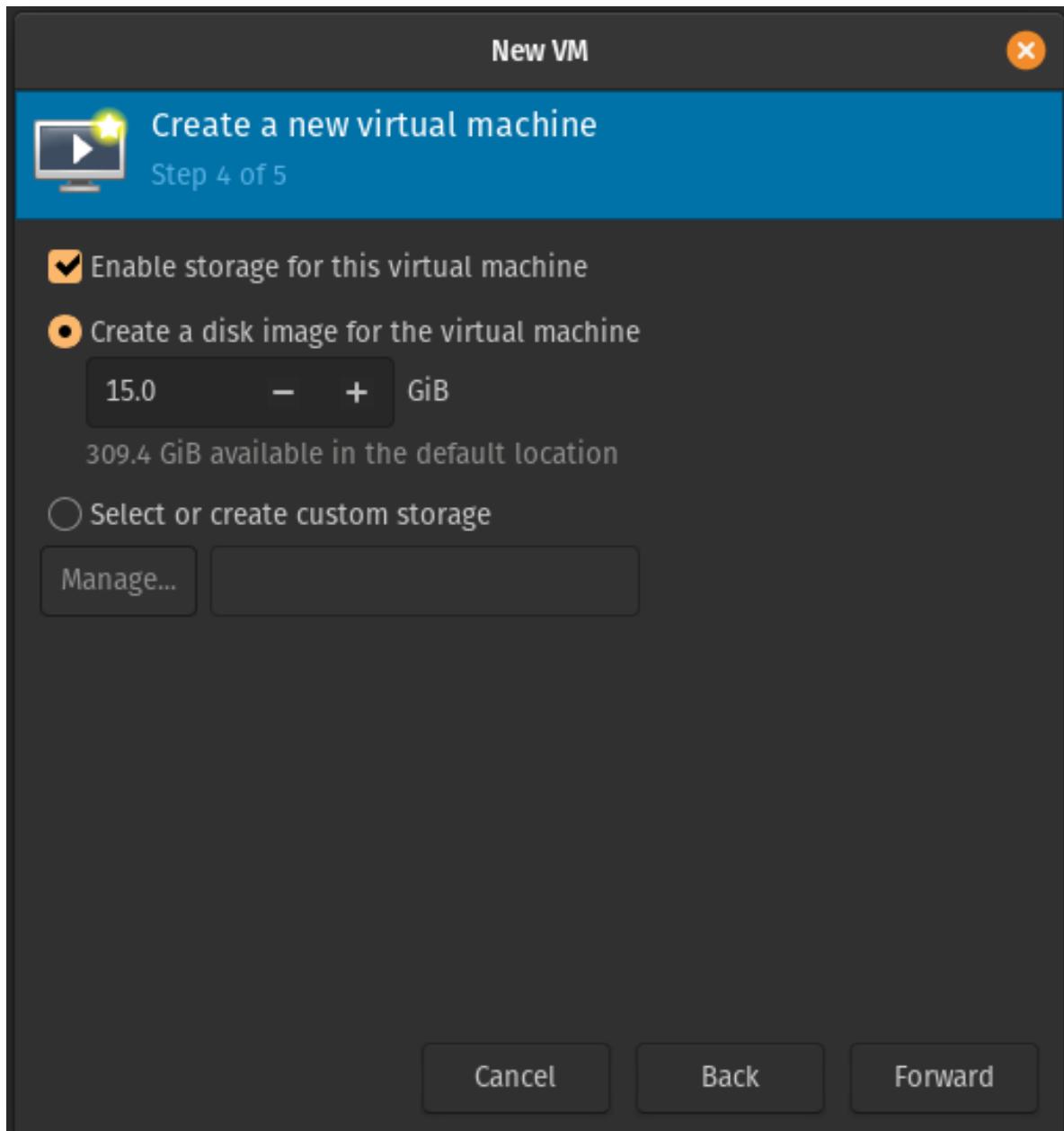
CPUs: 4 - +

Up to 12 available

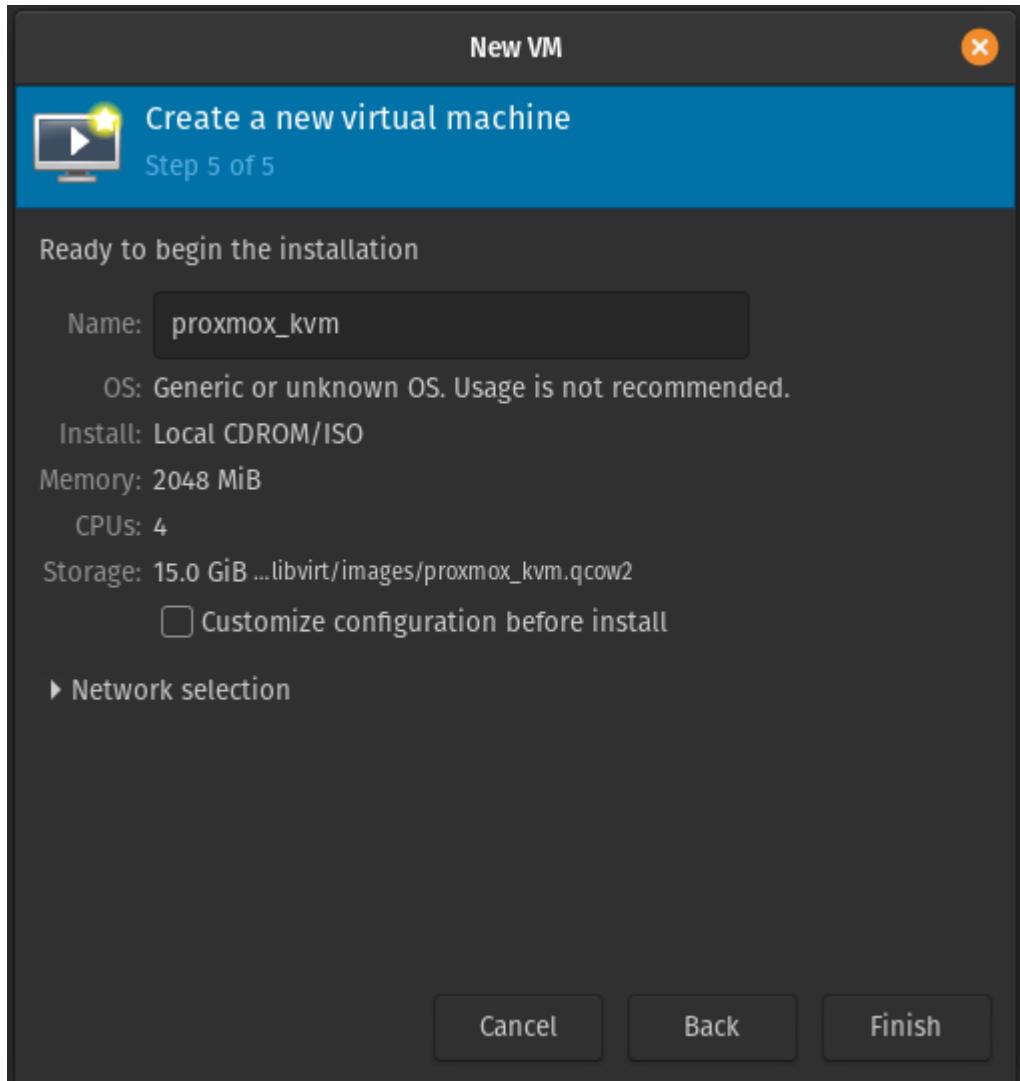
Cancel

Back

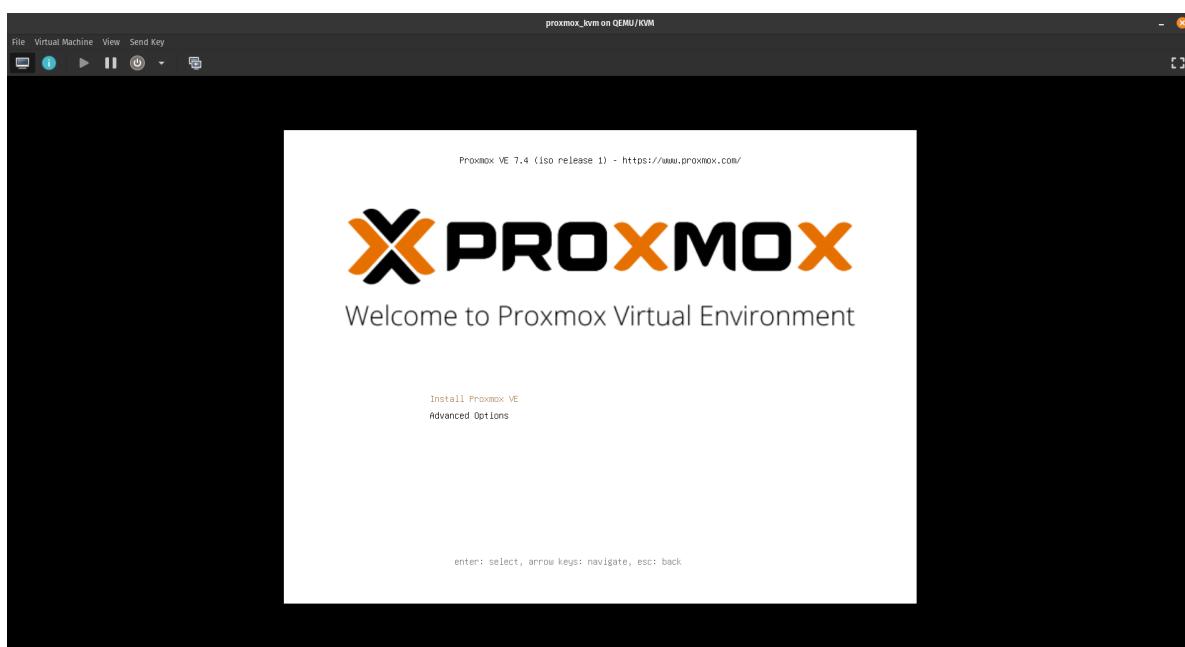
Forward



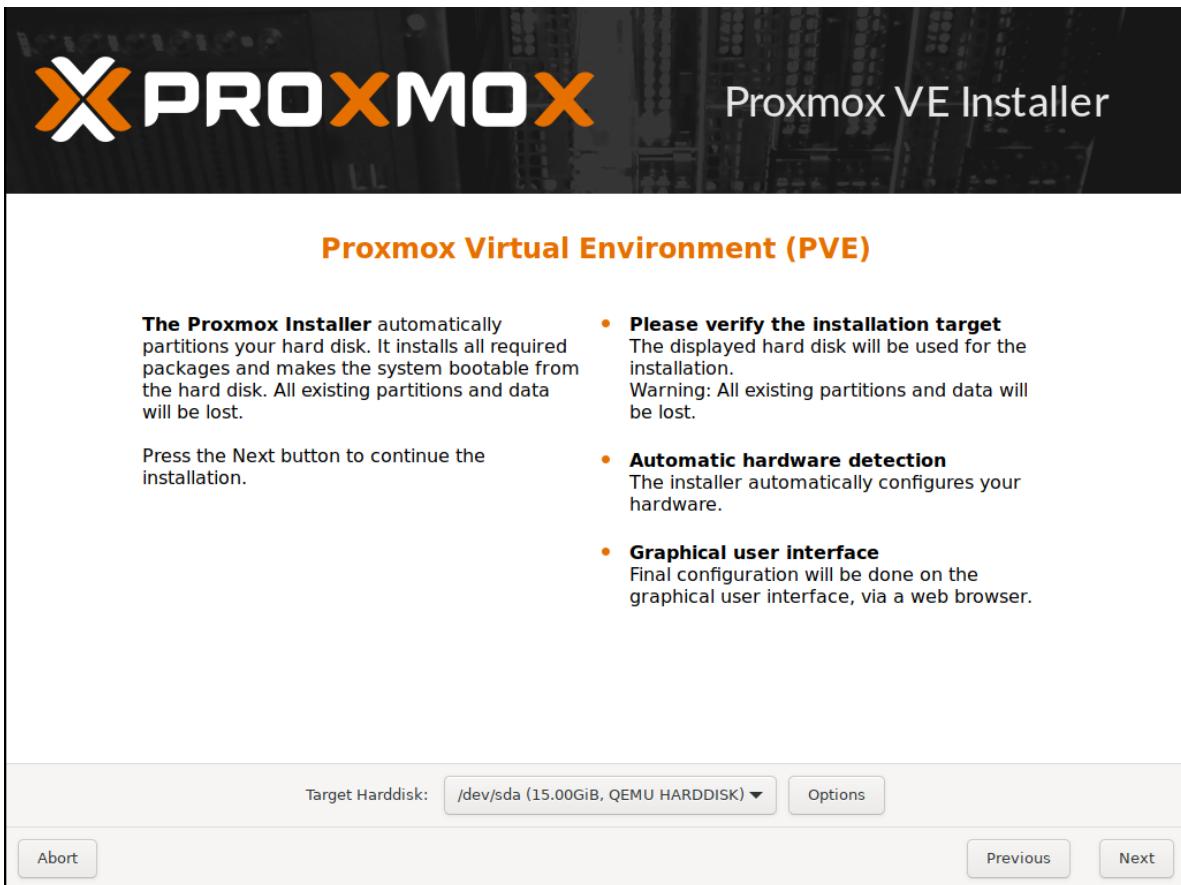
ii. Allocate Memory, CPUs and Disk Storage



iii. Give appropriate name and click on finish



iv. Click on Install Proxmox VE to get to the next screen as shown above





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

v. Select target Hard-disk and configure Country and Time Zone



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

vi. Configure Admin Password and Email Address



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



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Management Interface:

Hostname (FQDN):

IP Address (CIDR): /

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DNS Server:

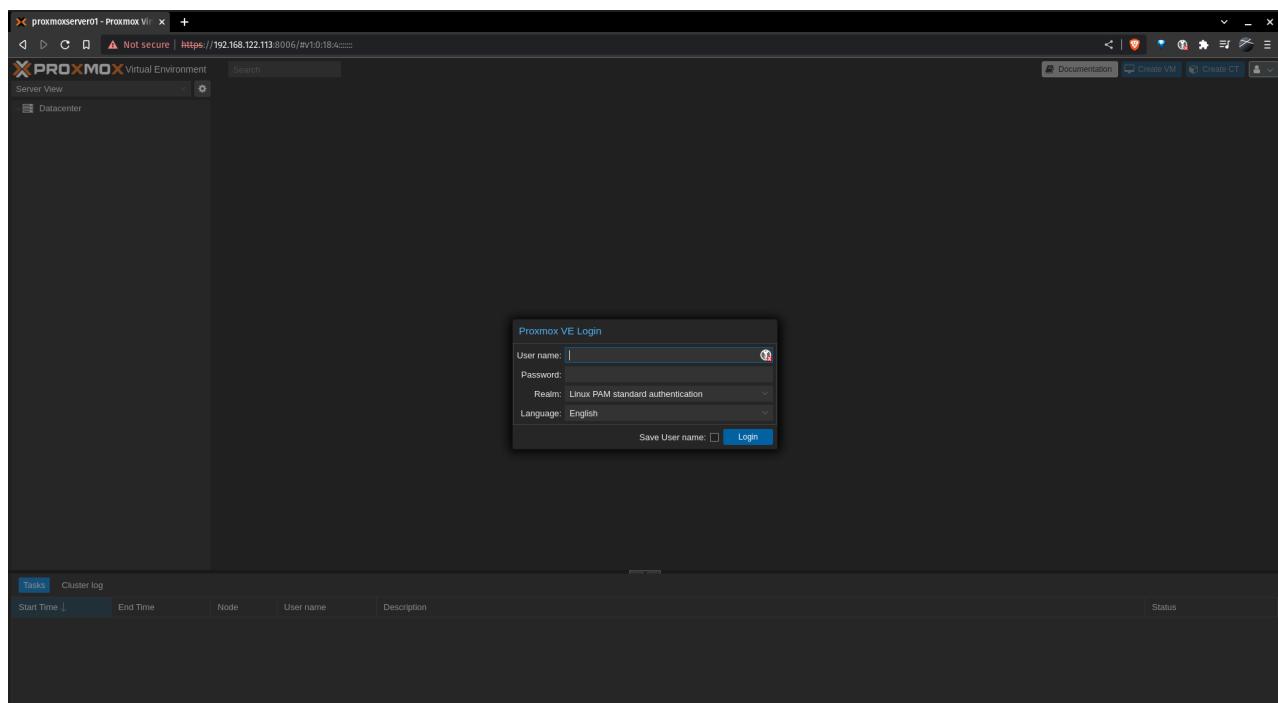
Abort

Previous

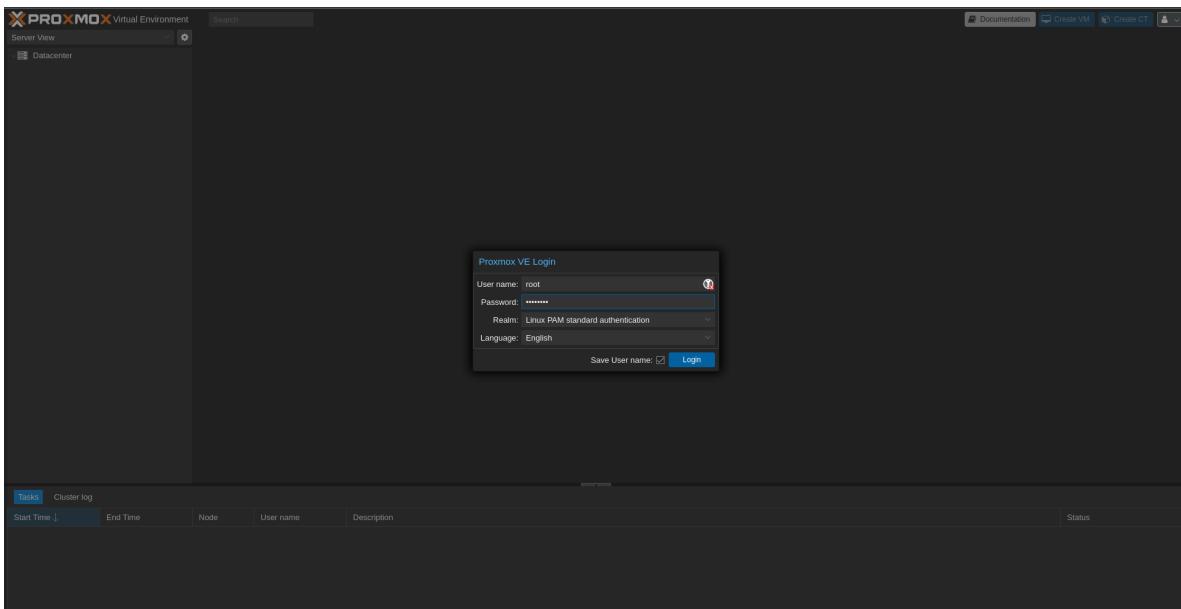
Next

vii. Configure IP Address and Gateway according to your setup

```
Welcome to the Proxmox Virtual Environment. Please use your web browser to
configure this server - connect to:
https://192.168.122.113:8006/
-----
proxmoxserver01 login: root
Password:
Login incorrect
proxmoxserver01 login:
Password:
Login incorrect
proxmoxserver01 login:
```



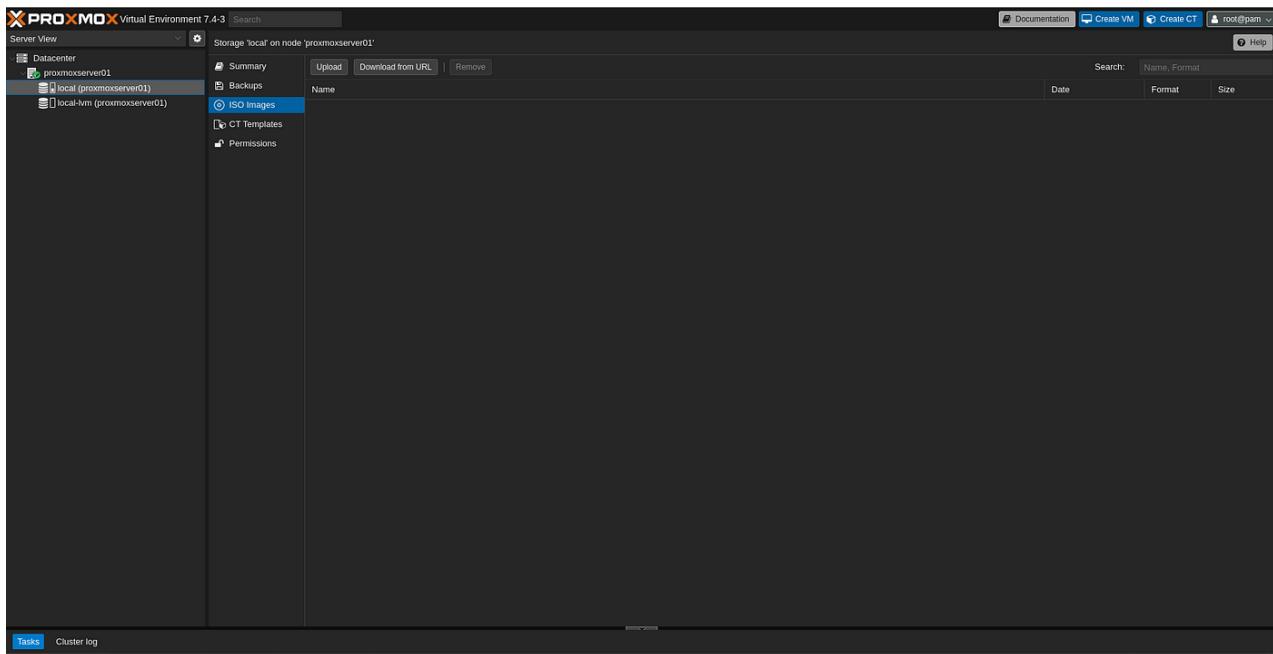
viii. On following standard steps you will be given an IP address, Simply go on that address



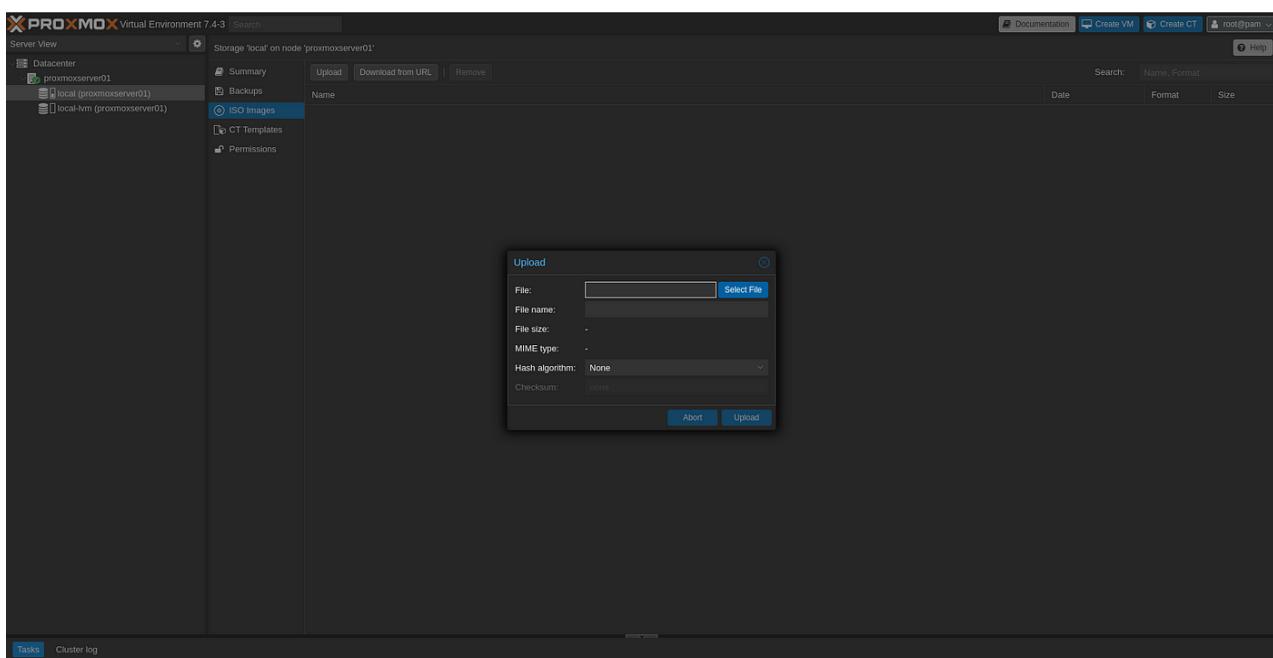
A screenshot of the Proxmox Virtual Environment 7.4-3 main interface. The left sidebar shows a tree view with 'Datacenter' selected, and a list of resources: 'proxmoxserver01' (node), 'local (proxmoxserver01)' (storage), and 'local-lvm (proxmoxserver01)' (storage). The right panel displays a table of resources with columns: Type, Description, Disk usage..., Memory us..., CPU usage, Uptime, Host CPU ..., Host Mem..., and Tags. A search bar is at the top right. Below the table is a 'Tasks' section showing a single task: 'Start all VMs and Containers' by 'proxmoxse...' at 'Mar 29 01:50:39' with status 'OK'.

ix. The IP address will take you to Proxmox Virtual Environment

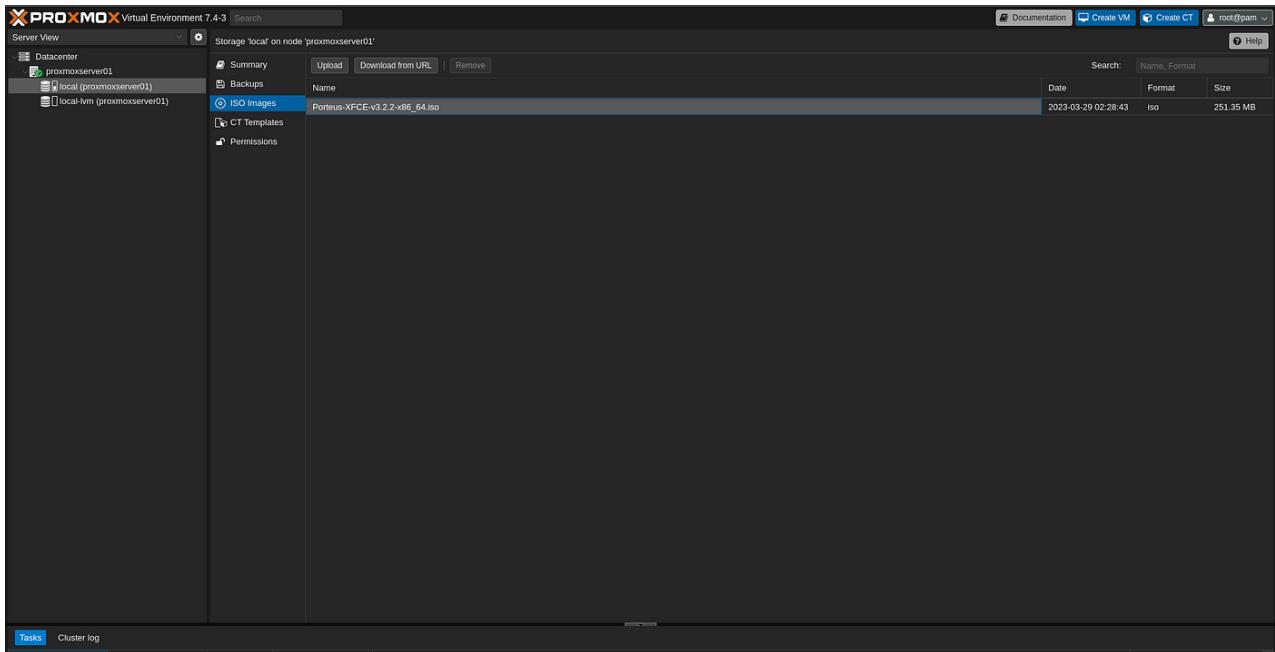
3. Creating Virtual Machine on Proxmox



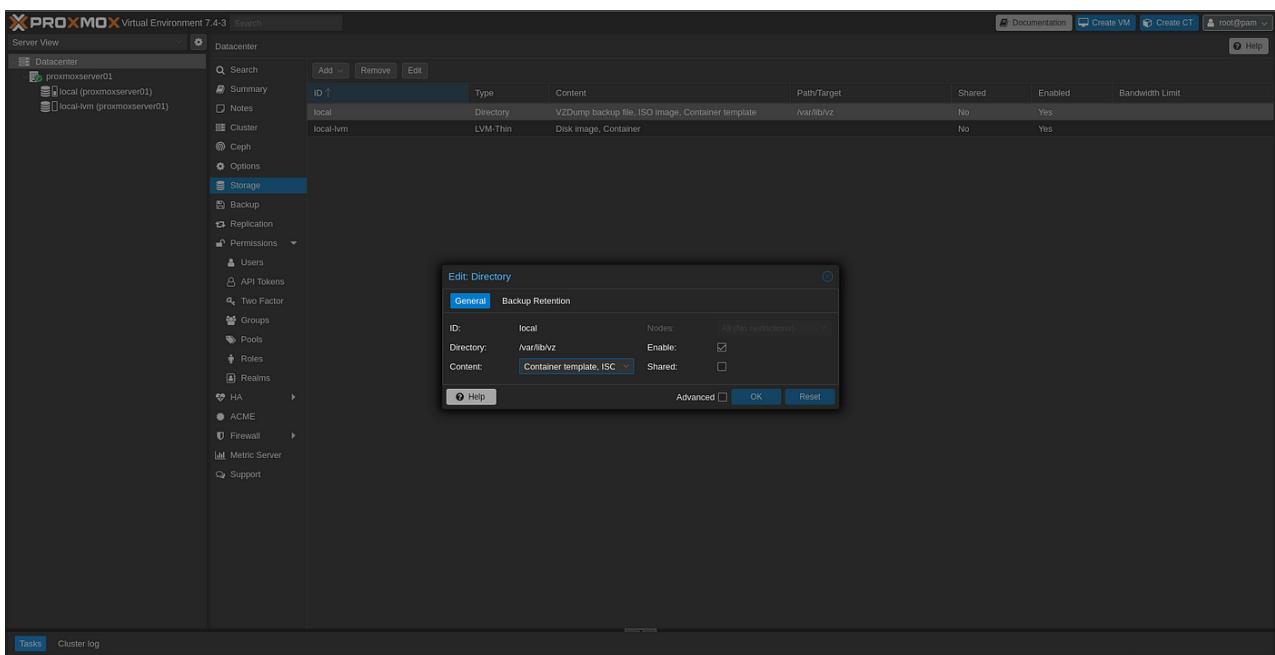
On web dashboard, select ISO images



Upload ISO Image file



The uploaded ISO file will appear on dashboard



In Storage, Update the Directory as follows

PROXMOX Virtual Environment 7.4-3

Server View Datacenter

Add Remove Edit

ID	Type	Content	Path/Target	Shared	Enabled	Bandwidth Limit
local	Directory	VZDump backup file, ISO image, Container template	/var/lib/vz	No	Yes	
local-lvm	LVM-Thin	Disk image, Container		No	Yes	

Edit: Directory

General Backup Retention

ID: local Nodes: All (No restrictions)

Directory: /var/lib/vz Enable:

Content: Container template, ISC Shared:

Help Advanced OK Reset

Tasks Cluster log

PROXMOX Virtual Environment 7.4-3

Server View Datacenter

Add Remove Edit

ID	Type	Content	Path/Target	Shared	Enabled	Bandwidth Limit
local	Directory	VZDump backup file, ISO image, Container template	/var/lib/vz	No	Yes	
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Edit: Directory

General Backup Retention

ID: local Nodes: All (No restrictions)

Directory: /var/lib/vz Enable:

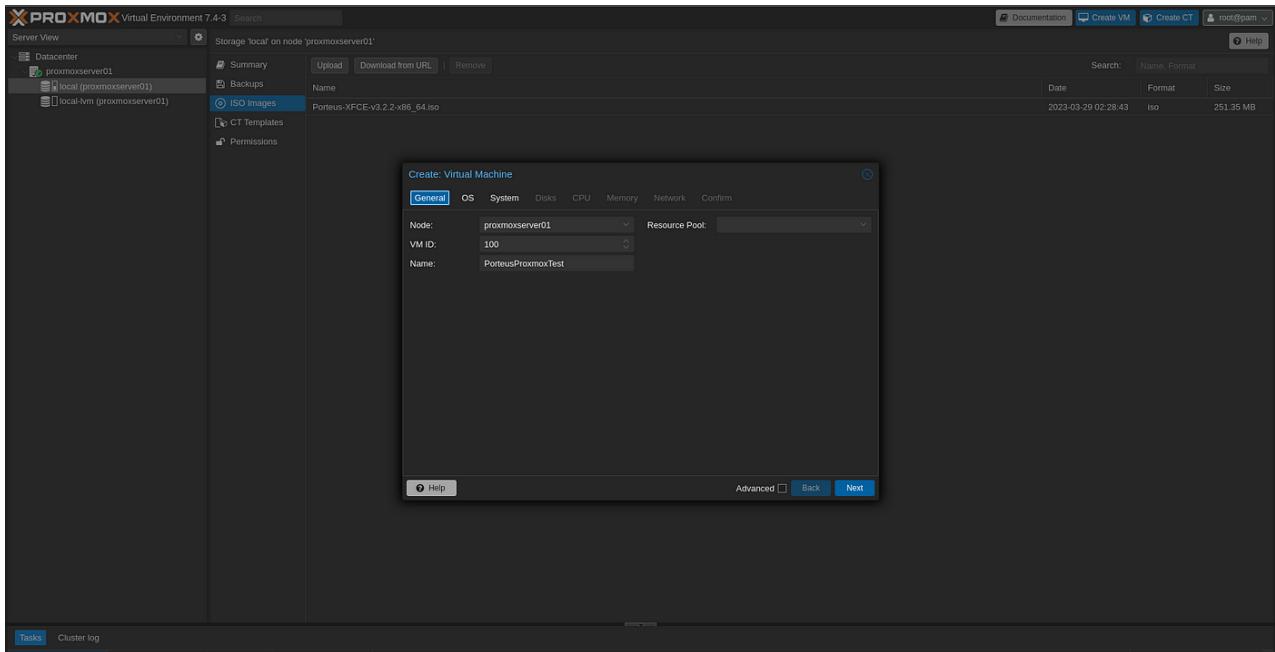
Content: Container template, ISC Shared:

Container template
Disk image
ISO image
Container template
VZDump backup file
Container
Snippets

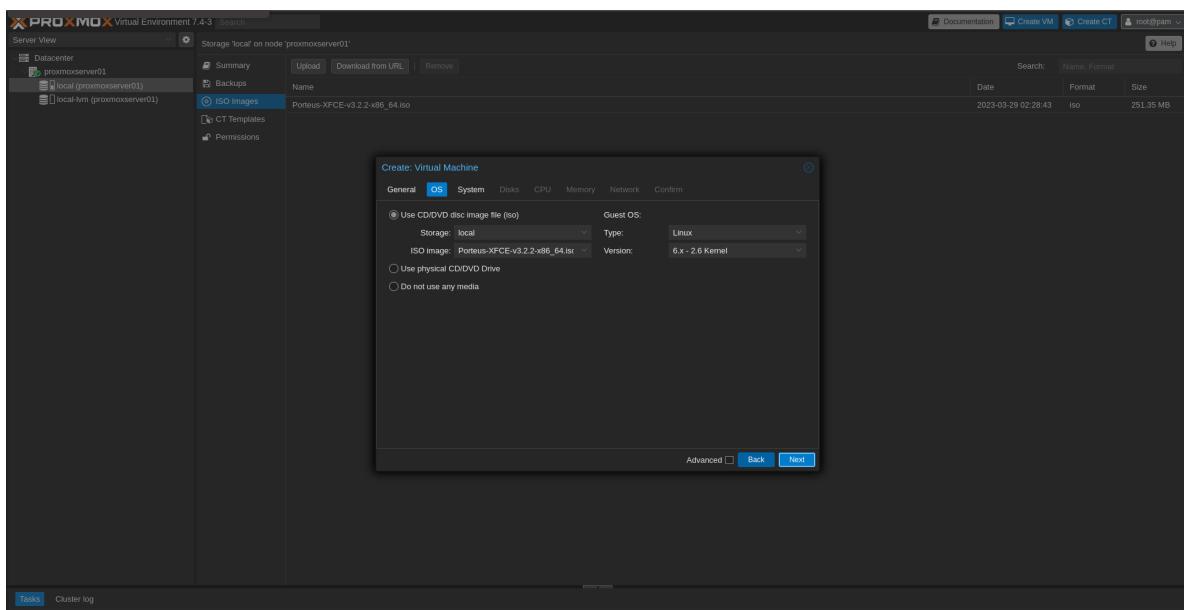
Help Advanced OK Reset

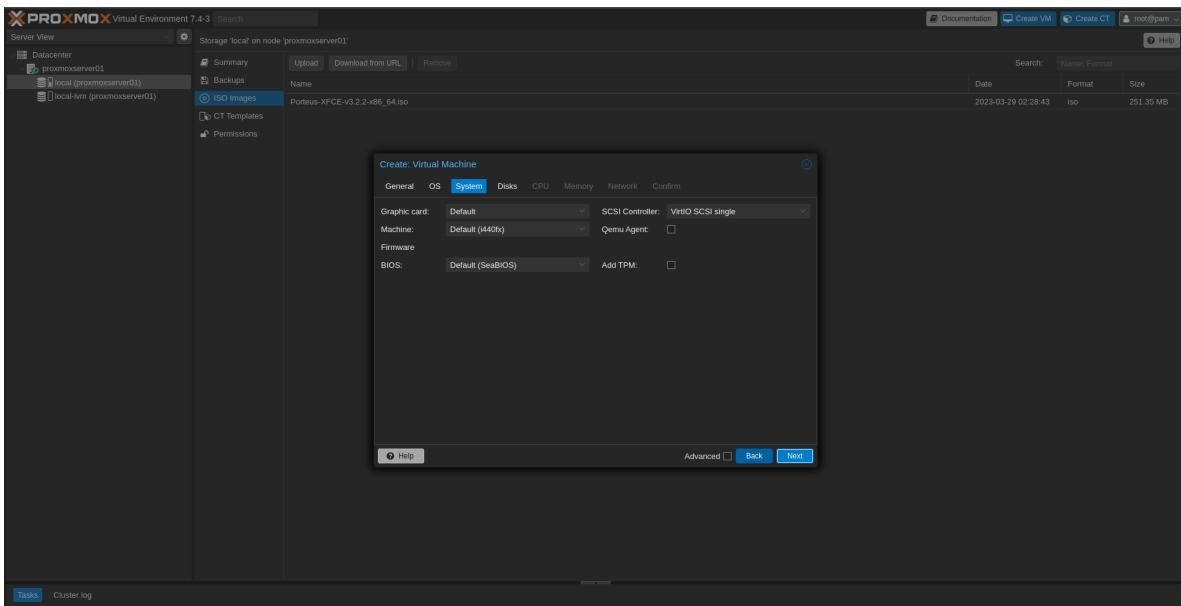
Tasks Cluster log

Update Registry

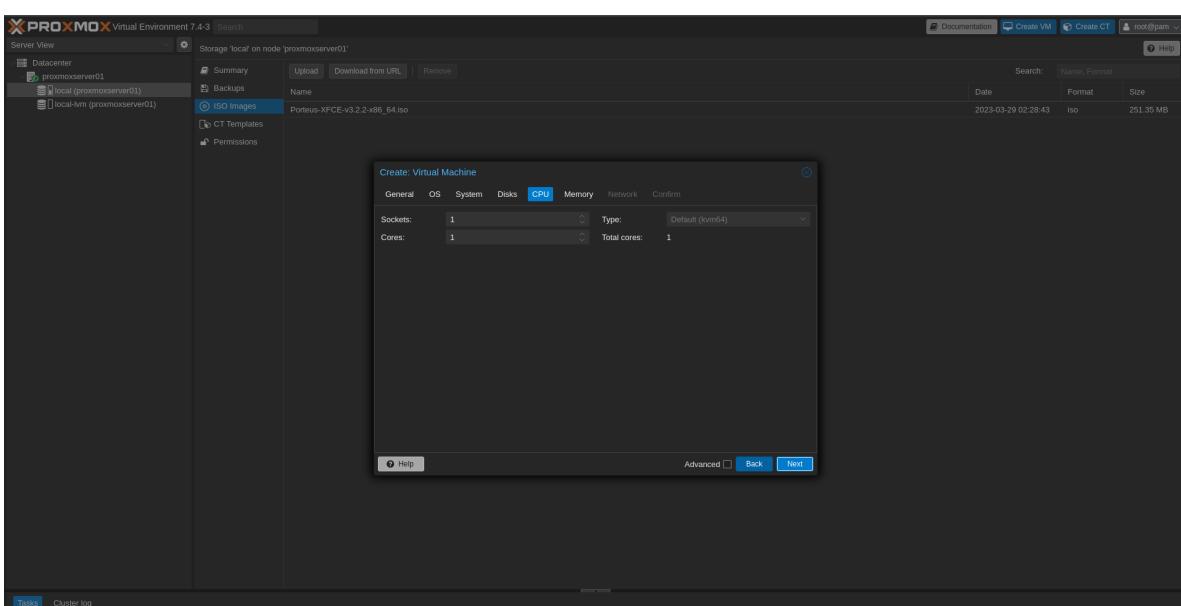
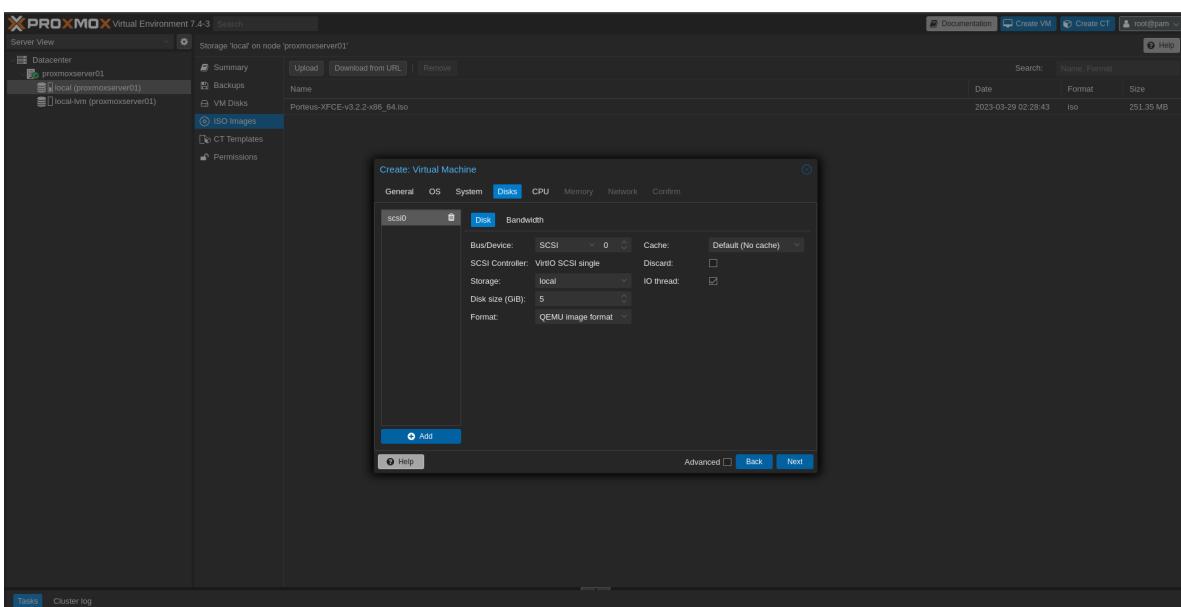


Once done with configurations, click on Create VM (Upper right corner)

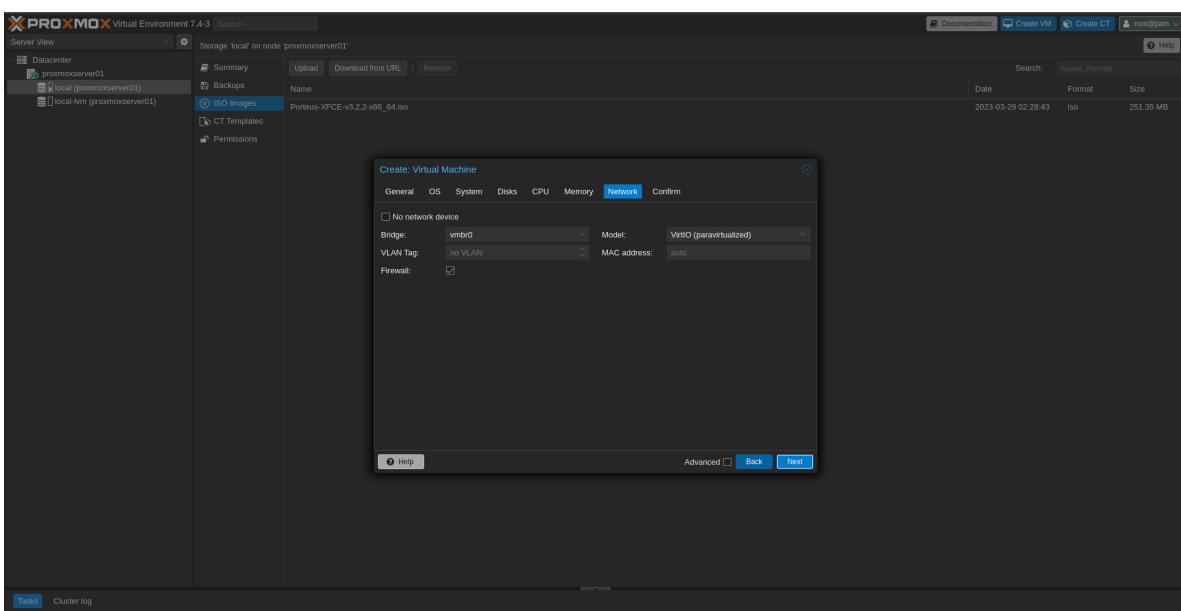
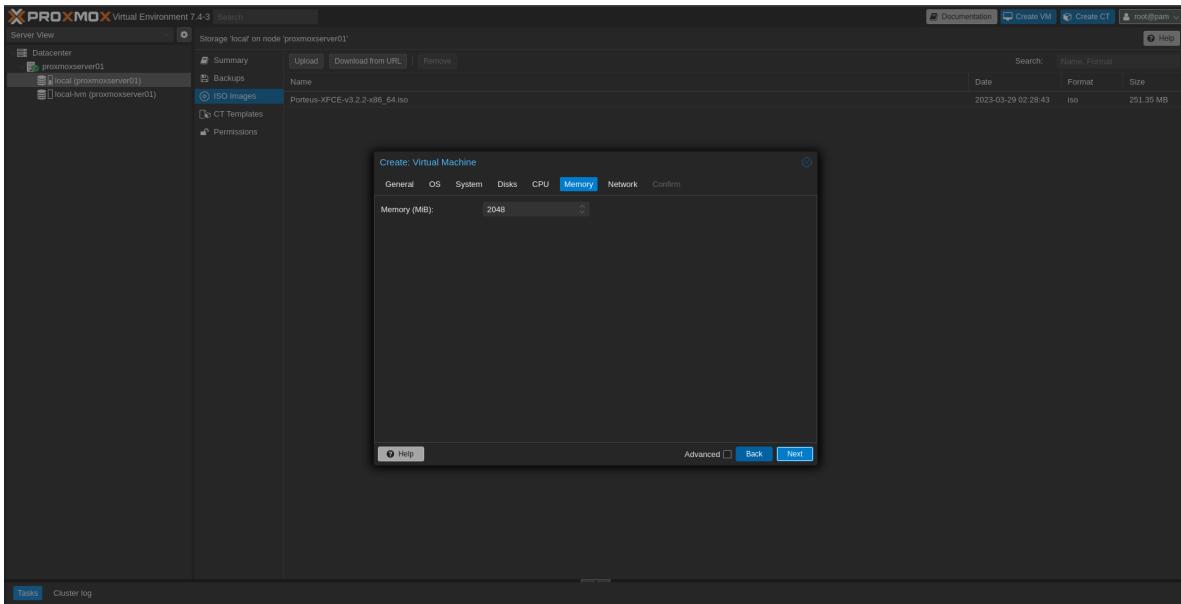




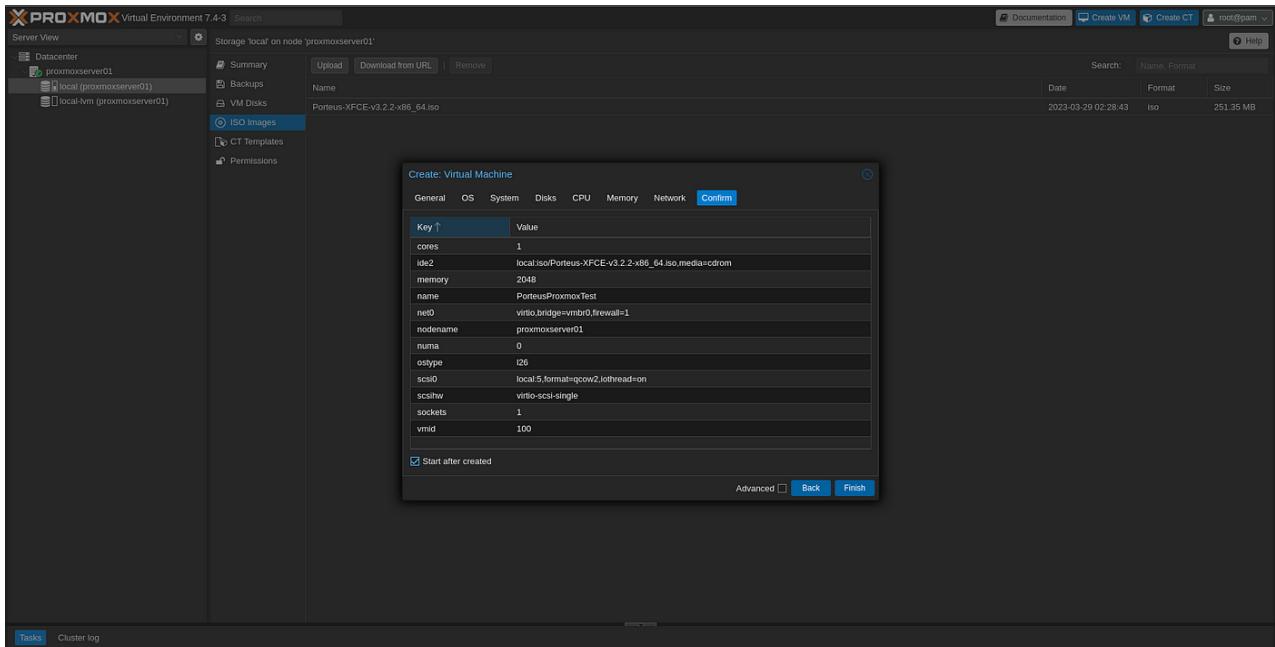
Select appropriate OS and System configurations



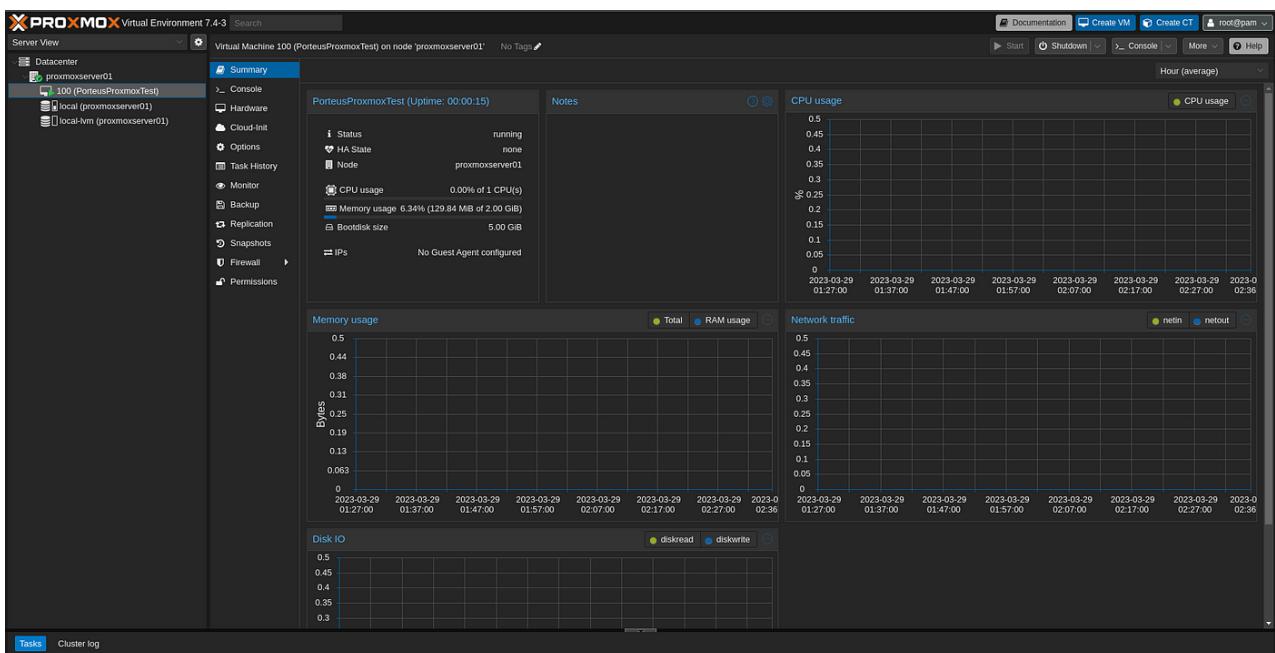
Select appropriate Disk and CPU configurations



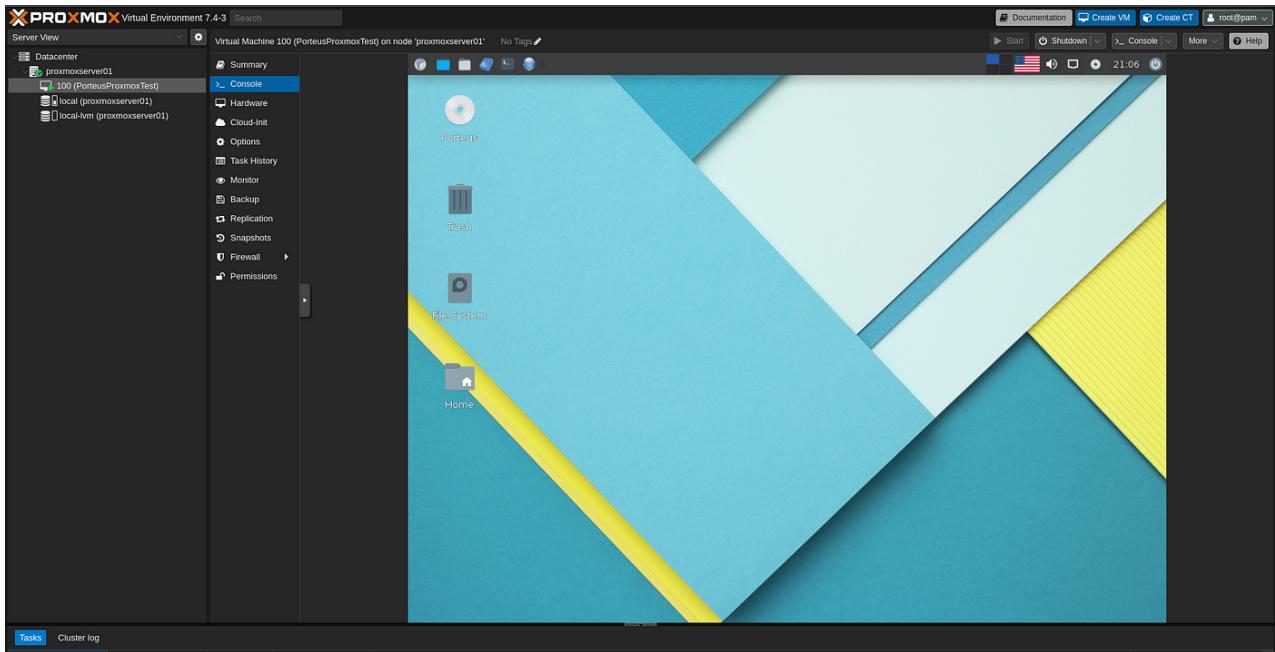
Select appropriate Memory and Network configurations



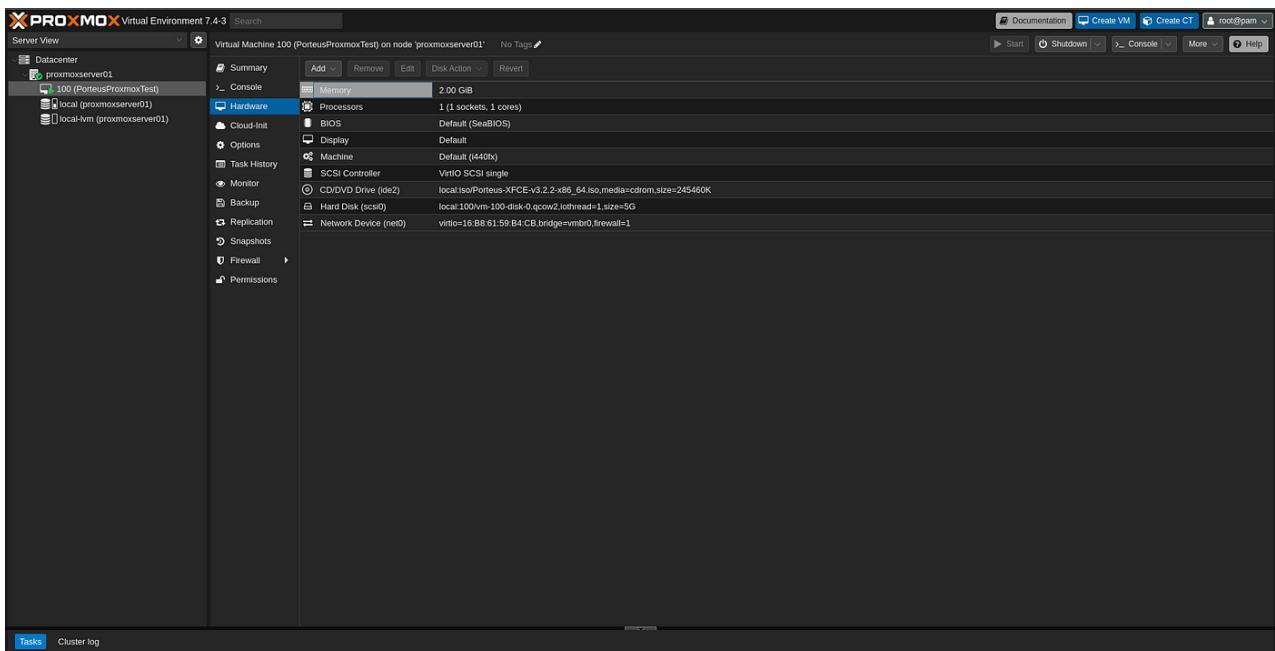
Confirm your configuration and Click on Next



Your VM will be visible along with its dashboard



GUI interface of installed VM



Hardware Configuration of Installed VM

Conclusion

There is no universal answer to virtualization.

If **enterprise-class functionality and simplicity of management** are your top goals, **Proxmox VE is a good solution**. It is also ideal for firms with small or agreement-based management teams. You may run your production workload on Proxmox VE by selecting a suitable subscription plan that includes updates and support. Proxmox VE is suited for small and medium-sized organisations who cannot afford a subscription.

Proxmox Hypervisor is a strong and adaptable virtualization platform that offers a variety of features and benefits. It is a suitable option for virtualizing IT infrastructure due to its open-source nature, centralised administration interface, and support for both KVM and container-based virtualization.

Whether you are looking to deploy virtual machines for testing or production workloads, Proxmox Hypervisor is an excellent choice.