

Setting Up Proxmox VE

 manjit28.medium.com/setting-up-proxmox-ve-9f85e158f127

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This post is about setting up Proxmox on a bare metal server. But first of all, what is Proxmox? It's a virtualization platform that we can use to run virtual machines and containers. Compared to some other alternatives out there, it comes with Web UI, storage and backup solutions right out of the box. Installation process is pretty simple but for any hypervisor, we need to prepare the network, storage etc. in advance. I went over that in my previous post about preparing to install multiple hypervisors:

Multi-Hypervisor Homelab -Exploring VMWare ESXi Alternatives

This post is about my journey of setting up multi hypervisor home lab, exploring ESXi, Proxmox, XCP-ng, Nutanix and...

medium.com

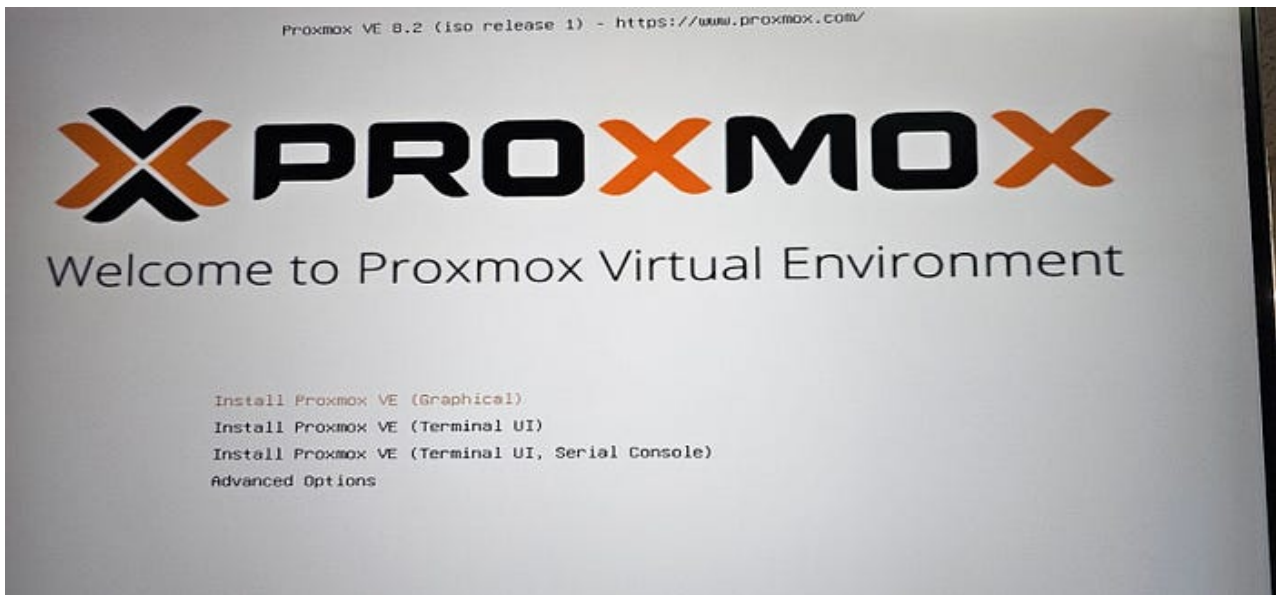
Very first thing is to get Proxmox VE ISO from following location:

Downloads

Edit description

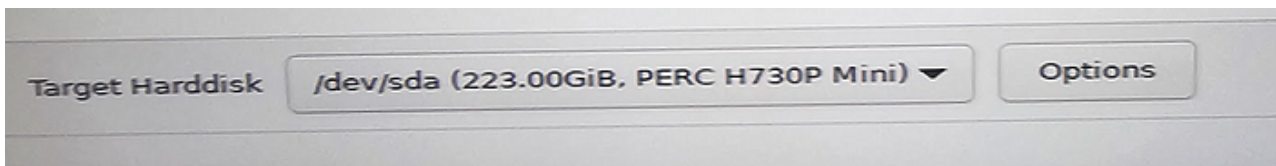
www.proxmox.com

Get this on USB media and boot the server with that ISO.



Proxmox Initial Screen

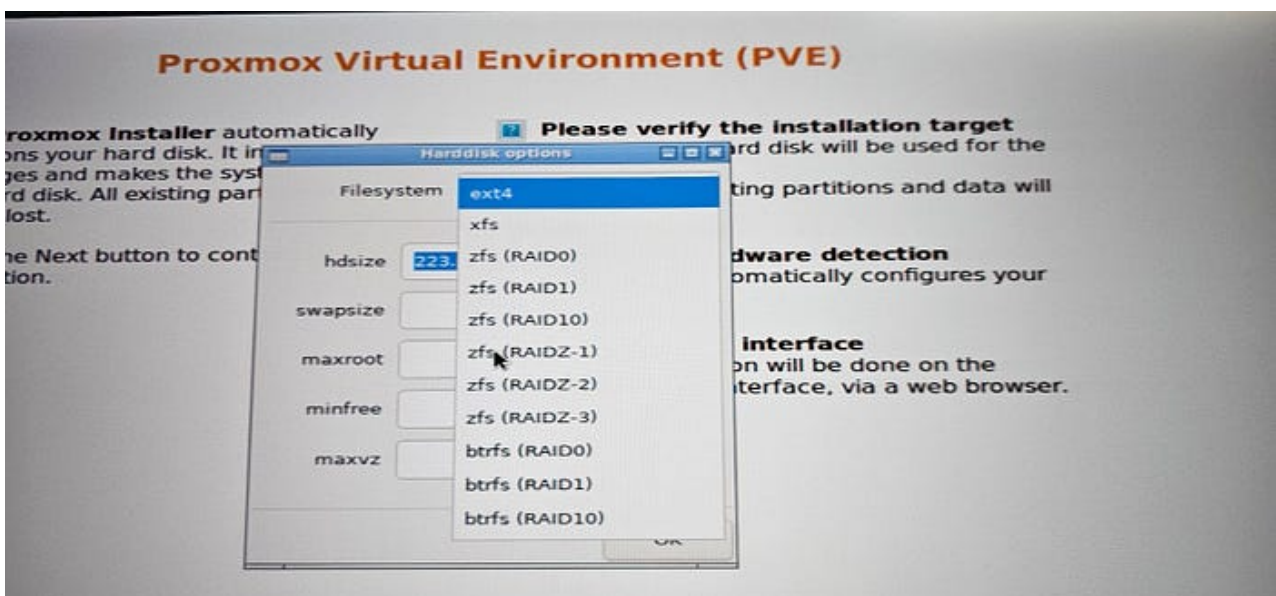
Select disk:



Select Disk for VE installation

NOTE:

At this stage decide what filesystem (ext4/zfs etc.) need to be used for Proxmox OS. I already had Raid 1 at hardware level, so I picked that drive. Otherwise at this step, we can create software based array:



Select Location:

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:

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:

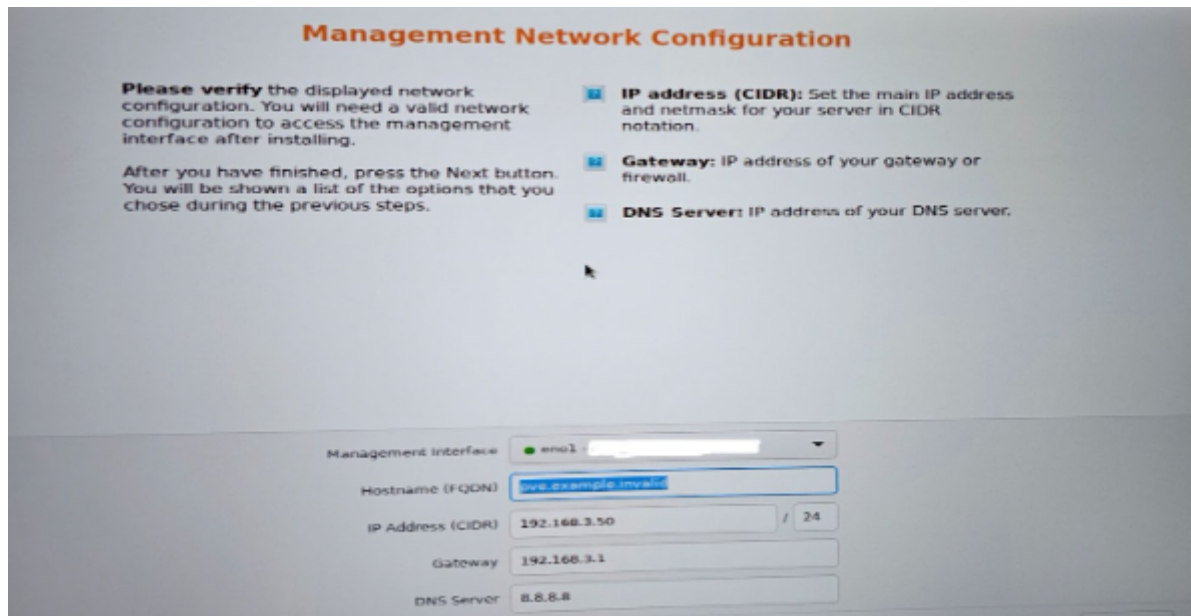
Confirm:

Email:

Network

This is a very important step. As I mentioned in my previous post above, I had prepared to have a separate network for management planes and VMs. So, I selected a network interface connected to the management plane. Also, the hostname has to be FQDN. If no name available, we can just use something like prx01.lan or prx01.local

If the DHCP server is in picture, please make sure that IP address given here is outside the range. We need it to be static as changing it later is a bit involved and has to be done at multiple places.



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: eno1

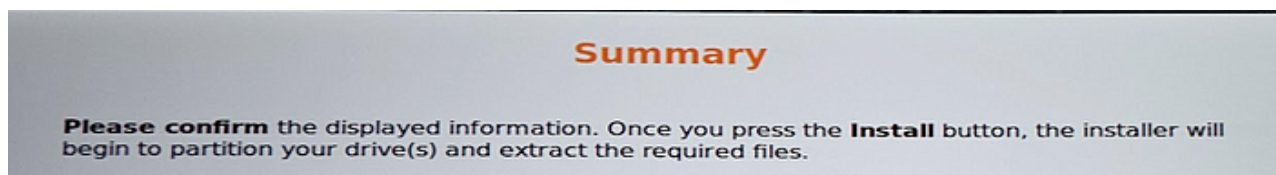
Hostname (FQDN): `pro.example.invalid`

IP Address (CIDR): `192.168.3.50 / 24`

Gateway: `192.168.3.1`

DNS Server: `8.8.8.8`

If everything looks good in confirmation screen, we can start installation:

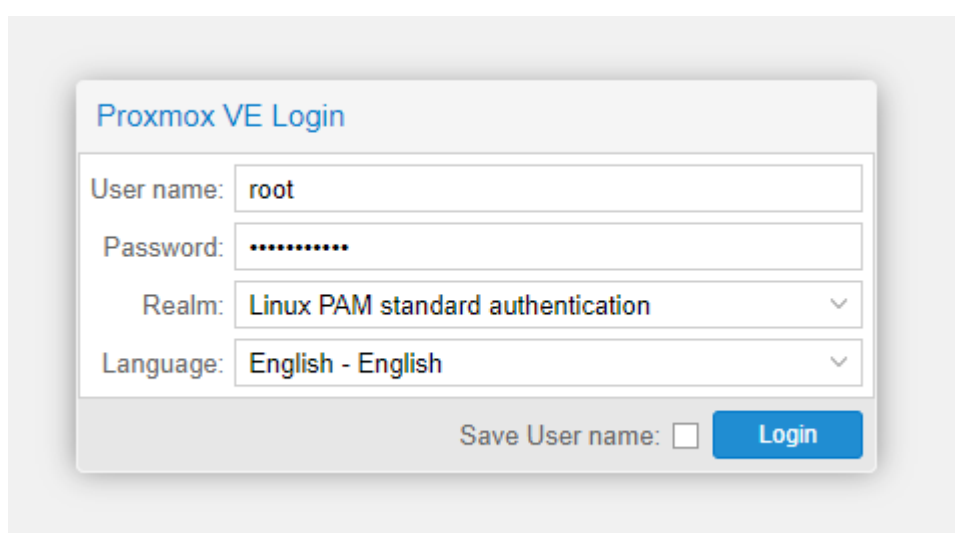


Summary

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.

At this step, Proxmox installation will begin. It does not take very long. After installation, remove the USB drive and reboot. After the server reboots, it will show us URL to connect to the web interface. Typically it is at port 8006 of the IP address that we gave in the network screen.

Once we navigate to that url and ignore certificate warning, we are presented with following screen (password that we gave at installation time with root user):



Proxmox VE Login

User name: `root`

Password: `.....`

Realm: `Linux PAM standard authentication`

Language: `English - English`

Save User name: ☐ **Login**

Proxmox Web Management Login

We'll see following message as we do not have paid subscription:

No valid subscription



You do not have a valid subscription for this server. Please visit www.proxmox.com to get a list of available options.

OK

As I did not have plans to purchase for personal use, I added a No Subscription repository. This free repository lets us get security updates. Select the node name and then click on Updates/Repositories:

Proxmox Virtual Environment 8.2.2

Server View

Node 'prx-2'

Search

Summary

Notes

Shell

System

Network

Certificates

DNS

Hosts

Options

Time

System Log

Updates

Repositories

Firewall

Disks

LVM

LVM-Thin

Directory

ZFS

Ceph

Status

Warning

The enterprise repository is enabled, but there is no active subscription!

APT Repositories

Reload Add Enable

Enabled	Types	URIs	Suites	Components	Options
File: /etc/apt/sources.list (3 repositories)					
✓	deb	http://ftp.us.debian.org/debian	bookworm	main contrib	
✓	deb	http://ftp.us.debian.org/debian	bookworm-updat...	main contrib	
✓	deb	http://security.debian.org	bookworm-security	main contrib	
File: /etc/apt/sources.list.d/ceph.list (1 repository)					
✓	deb	https://enterprise.proxmox.com/debian/ceph-quincy	bookworm	enterprise	
File: /etc/apt/sources.list.d/pve-enterprise.list (1 repository)					
✓	deb	https://enterprise.proxmox.com/debian/pve	bookworm	pve-enterprise	

Add: Repository

Repository:

No-Subscription

Description:

This is the recommended repository for testing and non-production use. Its packages are not as heavily tested and validated as the production ready enterprise repository. You don't need a subscription key to access this repository.

Status:

Not yet configured

Help

Add

Add: Repository

Repository:
Test

Description:
This repository contains the latest packages and is primarily used for test labs and by developers to test new features.

Status:
Not yet configured

? Help
Add

I have not explored Test one yet. Just went with No Subscription one. Disable paid ones.

Reload
Add
Disable

Enabled	Types	URLs	Suites	Components	Options
File: /etc/apt/sources.list (4 repositories)					
✓	deb	http://ftp.us.debian.org/debian	bookworm	main contrib	
✓	deb	http://ftp.us.debian.org/debian	bookworm-updat...	main contrib	
✓	deb	http://security.debian.org	bookworm-security	main contrib	
✓	deb	http://download.proxmox.com/debian/pve	bookworm	pve-no-subscription	
File: /etc/apt/sources.list.d/ceph.list (1 repository)					
✓	deb	https://enterprise.proxmox.com/debian/ceph-quincy	bookworm	enterprise	
File: /etc/apt/sources.list.d/pve-enterprise.list (1 repository)					
✓	deb	https://enterprise.proxmox.com/debian/pve	bookworm	pve-enterprise	

Package Repositories

Now we can go to Updates and that should work:

Task viewer: Update package database

Output
Status

Stop

```

starting apt-get update
Hit:1 http://ftp.us.debian.org/debian bookworm InRelease
Get:2 http://security.debian.org bookworm-security InRelease [48.0 kB]
Get:3 http://ftp.us.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:4 http://download.proxmox.com/debian/pve bookworm InRelease [2768 B]
Get:5 http://download.proxmox.com/debian/pve bookworm/pve-no-subscription amd64 Packages [336 kB]
Fetched 442 kB in 1s (346 kB/s)
Reading package lists...
TASK OK

```

Once we get the Updates, we can Upgrade:

8.2.2 Search

Node 'prx-2'

Q Search

Summary

Notes

>_ Shell

System

Network

Certificates

DNS

Hosts

Options

Time

System Log

Updates

Repositories

Refresh >_ Upgrade Changelog

Package ↑	Version		Description
	current	new	
Origin: Debian (56 Items)			
base-files	12.4+deb1...	12.4+deb1...	Debian base system miscellaneous files
bash	5.2.15-2+b2	5.2.15-2+b7	GNU Bourne Again SHell
bind9-dnsutils	1:9.18.24-1	1:9.18.28-1...	Clients provided with BIND 9
bind9-host	1:9.18.24-1	1:9.18.28-1...	DNS Lookup Utility
bind9-libs	1:9.18.24-1	1:9.18.28-1...	Shared Libraries used by BIND 9
curl	7.88.1-10+...	7.88.1-10+...	command line tool for transferring data with URL syntax
distro-info-data	0.58+deb1...	0.58+deb1...	information about the distributions' releases (data files)
gnutls-bin	3.7.9-2+de...	3.7.9-2+de...	GNU TLS library - commandline utilities
initramfs-tools	0.142	0.142+deb...	generic modular initramfs generator (automation)
initramfs-tools-core	0.142	0.142+deb...	generic modular initramfs generator (core tools)
krb5-locales	1.20.1-2+d...	1.20.1-2+d...	internationalization support for MIT Kerberos
less	590-2	590-2.1~de...	pager program similar to more

```
Starting system upgrade: apt-get dist-upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following NEW packages will be installed:
  proxmox-kernel-6.8.12-1-pve-signed
The following packages will be upgraded:
  base-files bash bind9-dnsutils bind9-host bind9-libs curl distro-info-data
  gnutls-bin ifupdown2 initramfs-tools initramfs-tools-core krb5-locales less
  libarchive13 libc-bin libc-l10n libc6 libcurl3-gnutls libcurl4 libfontconfig6
  libgl1.2.0-0 libgnutls-dane0 libgnutls30 libgnutlsxx30 libgssapi-krb5-2
  libgstreamer-plugins-base1.0-0 libk5crypto3 libkrb5-3 libkrb5support0
  libnss-systemd libnvidia3linux libopeniscsiusr libpam-systemd
  libproxmox-acme-perl libproxmox-acme-plugins libpve-cluster-api-perl
  libpve-cluster-perl libpve-common-perl libpve-guest-common-perl
  libpve-notify-perl libpve-rs-perl libpve-storage-perl libpython3.11-minimal
  libpython3.11-stdlib libqt5core5a libqt5dbus5 libqt5network5 libseccomp2 libssl3
  libsystemd-shared libsystemd0 libudev1 libutil-linux libzfs4linux libzpool5linux
  locales nano open-iscsi openssh-client openssh-server openssh-sftp-server openssl
  postfix proxmox-backup-client proxmox-backup-file-restore proxmox-firewall
  proxmox-kernel-6.8 proxmox-termpoxy proxmox-widget-toolkit pve-cluster
  pve-container pve-docs pve-esxi-import-tools pve-firewall pve-firmware
  pve-ha-manager pve-manager pve-qemu-kvm python3-idna python3.11
  python3.11-minimal qemu-server shim-helpers shim-amd64-signed shim-signed
  shim-signed-common shim-unsigned spl ssh systemd systemd-boot systemd-boot-efi
  systemd-sysv udev zfs-initramfs zfs-zed zfsutils-linux
96 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 336 MB of archives.
After this operation, 570 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

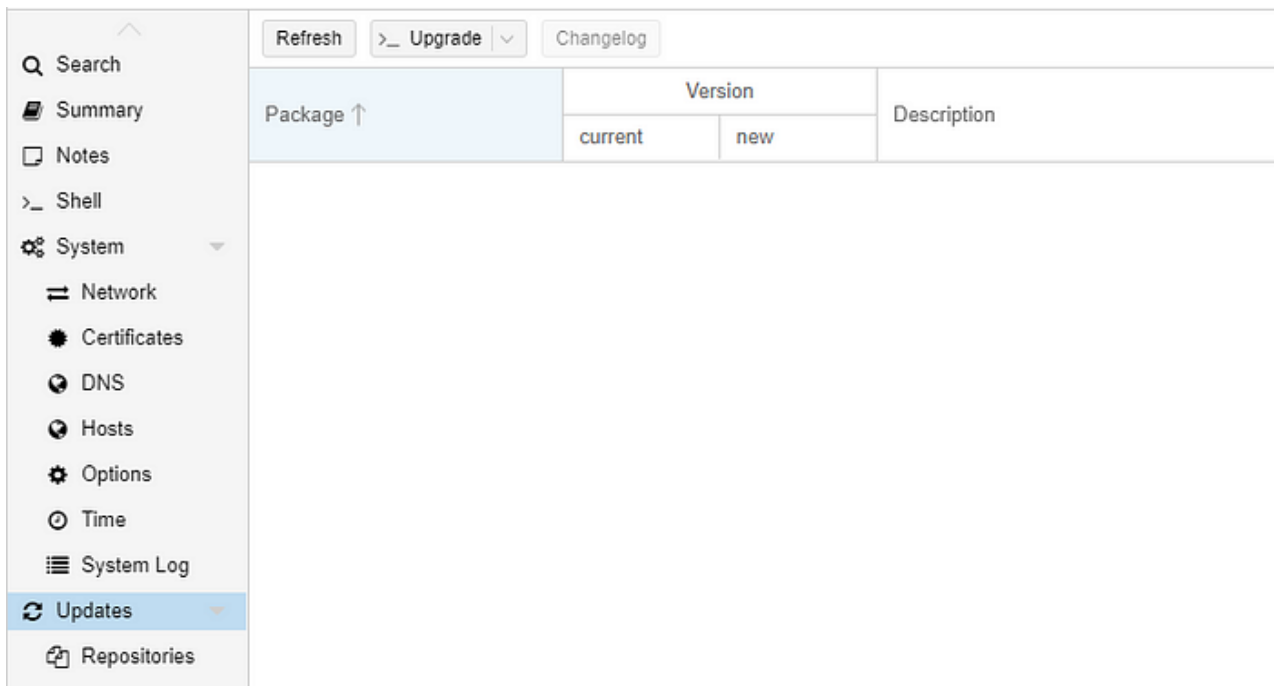
Normally if I was already running workloads, I would check individual updates and their possible impact but as this is a fresh install, I would just Upgrade all. In fact, at the end it did tell me to reboot because of some update:

```
Your System is up-to-date

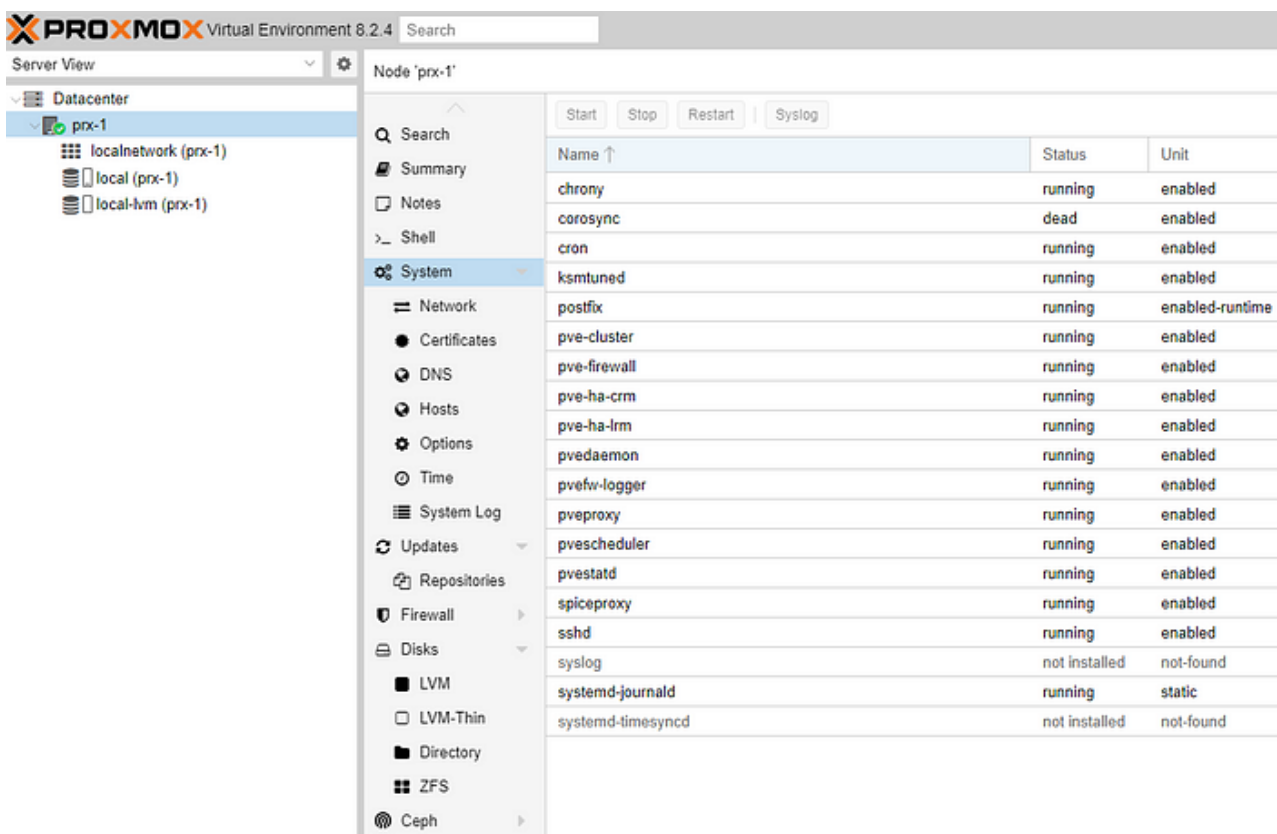
Seems you installed a kernel update - Please consider rebooting
this node to activate the new kernel.

starting shell
```

After reboot, I checked again and had no more Updates to install:



At this stage, I had launched my first node for the cluster I was going to set up:



First Proxmox Node

Summary view will show resource consumption. As we can see Proxmox itself has very small footprint:

Node 'prx-1'

Q Search

Summary

Notes

>_ Shell

System

Network

Certificates

DNS

Hosts

Options

Time

System Log

Updates

Package versions

prx-1 (Uptime: 02:00:42)

CPU usage

0.02% of 56 CPU(s)

Load average

0.00,0.08,0.17

RAM usage

1.36% (1.71 GiB of 125.78 GiB)

/ HD space

5.60% (3.58 GiB of 63.92 GiB)

IO delay

0.00%

KSM sharing

0 B

SWAP usage

0.00% (0 B of 8.00 GiB)

CPU(s)

56 x Intel(R) Xeon(R) CPU E5-2697 v3 @ 2.60GHz (2 Sockets)

Kernel Version

Linux 6.8.12-1-pve (2024-08-05T16:17Z)

Boot Mode

Legacy BIOS

Manager Version

pve-manager/8.2.4/faa83925c9641325

Repository Status

Proxmox VE updates

Non production-ready repository enabled!

Resource Consumption

Before moving on, it is really a good idea to explore and be comfortable with most options in the following screen like network, dns, sys logs, disks etc.:

Node 'prx-1'

Q Search

Summary

Notes

>_ Shell

System

Network

Certificates

DNS

Hosts

Options

Time

System Log

Updates

Repositories

Firewall

Disks

LVM

LVM-Thin

Directory

ZFS







Ceph

```
Linux prx-1 6.8.12-1-pve #1 SMP PREEMPT_DYNAMIC PMX 6.8.12-1 (2024-08-05T16:17Z) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Mon Sep  2 11:38:32 EDT 2024 on pts/0
root@prx-1:~#
```

In my case, clicking on Disks got me following:

<div> <div>Reload</div> <div>Show S.M.A.R.T. values</div> <div>Initialize Disk with GPT</div> <div>Wipe Disk</div> </div>					
Device	Type	Usage	Size	GPT	Model
 /dev/sda	unknown	partitions	239.44 GB	Yes	PERC_H730P_Mini
 /dev/sda1	partition	BIOS boot	1.03 MB	Yes	
 /dev/sda2	partition	EFI	1.07 GB	Yes	
 /dev/sda3	partition	LVM	238.37 GB	Yes	
 /dev/sdb	unknown	No	479.56 GB	No	PERC_H730P_Mini
 /dev/sdc	unknown	No	479.56 GB	No	PERC_H730P_Mini

Networking shows following as we have not configured second bridge yet:

<div> <div>Create ▾</div> <div>Revert</div> <div>Edit</div> <div>Remove</div> <div>Apply Configuration</div> </div>							
Name ↑	Type	Active	Autostart	VLAN a...	Ports/Slaves	Bond Mode	CIDR
eno1	Network Device	Yes	No	No			
eno2	Network Device	No	No	No			
eno3	Network Device	No	No	No			
eno4	Network Device	No	No	No			
vmbr0	Linux Bridge	Yes	Yes	No	eno1		192.168.3.10/24

As I had mentioned in previous post, xcp-ng gives most of functionality of web interface on console itself:

Customize System**Status Display**

Network and Management Interface
Authentication
Virtual Machines
Disks and Storage Repositories
< Resource Pool Configuration
Hardware and BIOS Information
Keyboard and Timezone
Remote Service Configuration
Backup, Restore and Update
Technical Support
Reboot or Shutdown
Local Command Shell

<Enter> OK <Up/Down> Select

But in Proxmox, we do not have that. It is just a shell. On the other hand, using commands on shell, we can do whatever we could do using the web interface. I have not run into any scenario yet where I would miss that console functionality. I still have access through the web interface and through ssh connection to shell and using commands there.

Before wrapping up, what good is a hypervisor if we do not launch a VM there? But first we need an image to launch a VM from. We can either Upload from local machine or just give it direct web url to download image from on following screen:

PROXMOX Virtual Environment 8.2.4 Search

Server View

- Datacenter
 - prx-1
 - localnetwork (prx-1)
 - local (prx-1)
 - local-lvm (prx-1)

Storage 'local' on node 'prx-1'

- Summary
- Backups
- ISO Images
- CT Templates
- Permissions

Upload Download from URL Remove

Name

ubuntu-22.04.4-live-server-amd64.iso

Documentation Create VM Create CT root@pam Help

Search: Name, Format

Date	Format	Size
2024-09-02 11:54:01	iso	2.10 GB

VM Id has to be unique but it can be anything:

Create: Virtual Machine

General OS System Disks CPU Memory Network Confirm

Node: prx-1 Resource Pool:

VM ID: 100

Name:

Start at boot: ☐

Start/Shutdown order: any

Startup delay: default

Shutdown timeout: default

After going through each screen, ended up with following summary:

Create: Virtual Machine

General
OS
System
Disks
CPU
Memory
Network
Confirm

Key ↑	Value
cores	2
cpu	x86-64-v2-AES
ide2	local:iso/ubuntu-22.04.4-live-server-amd64.iso,media=cdrom
memory	4096
net0	virtio,bridge=vbr0,firewall=1
nodename	prx-1
numa	0
onboot	1
ostype	l26
scsi0	local-lvm:32,iotread=on
scsihw	virtio-scsi-single
sockets	1
vmid	100

☒ Start after created

Advanced ☒
Back
Finish

Summary screen for VM creation

Logs at bottom of screen shows:

Tasks

Cluster log

Start Time ↓	End Time	Node	User name	Description
Sep 02 12:00:36	Sep 02 12:00:43	prx-1	root@pam	VM 100 - Start
Sep 02 12:00:35	Sep 02 12:00:36	prx-1	root@pam	VM 100 - Create

Datacenter
prx-1
100 (VM 100)
localnetwork (prx-1)
local (prx-1)
local-lvm (prx-1)

Summary
> Console
Hardware
Cloud-Init
Options
Task History
Monitor
Backup
Replication
Snapshots
Firewall
Permissions

VM 100 (Uptime: 00:00:52)

i
Status
running

HA State
none

Node
prx-1

CPU usage
49.30% of 2 CPU(s)

Memory usage
10.50% (430.12 MiB of 4.00 GiB)

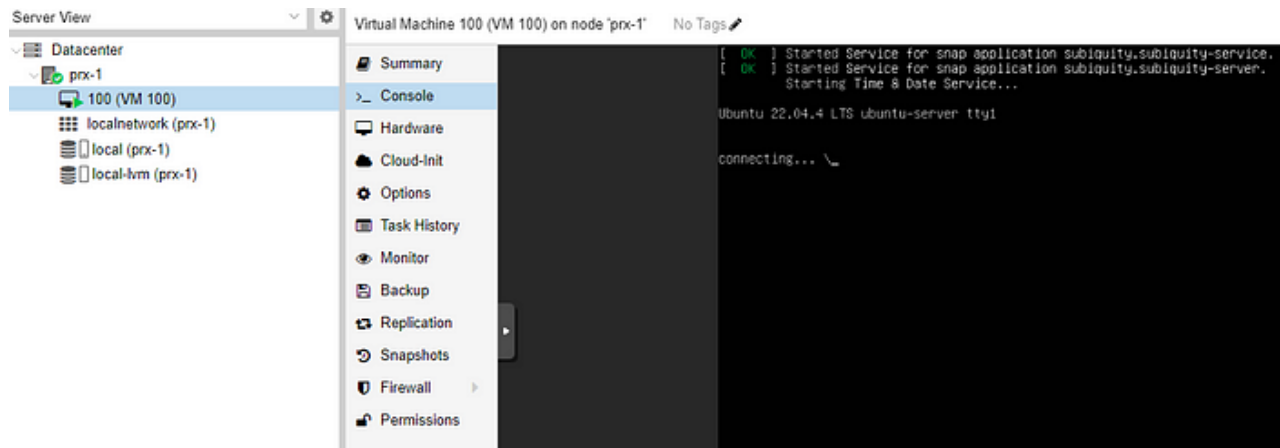
Bootdisk size
32.00 GiB

IPs
No Guest Agent configured

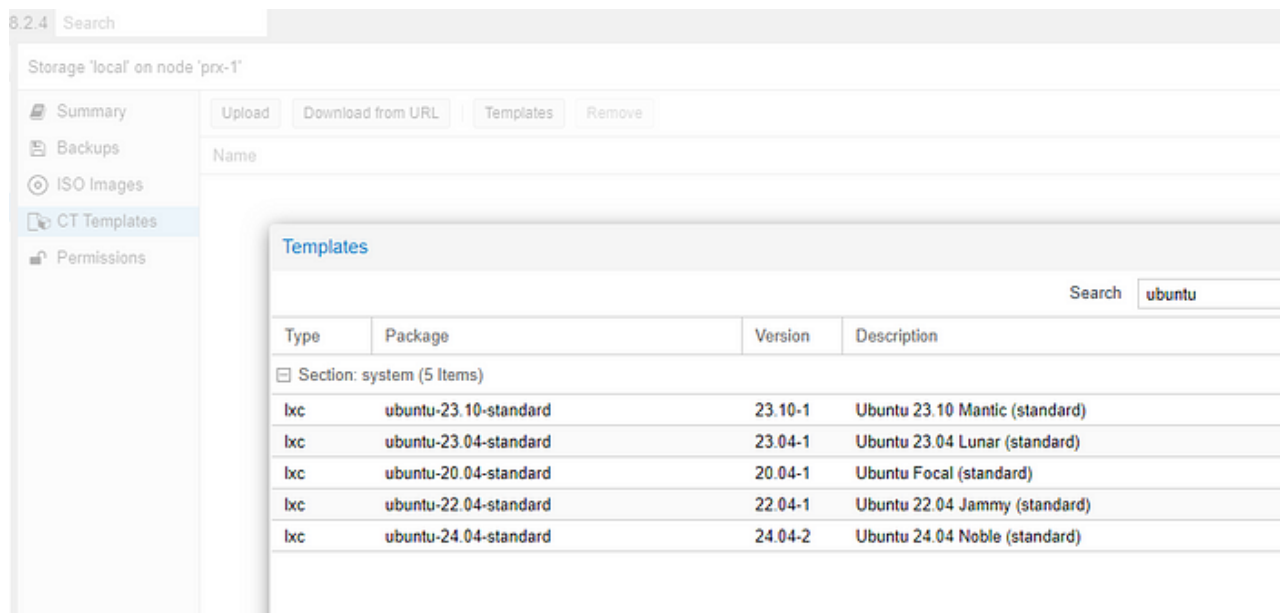
Notes

13/16

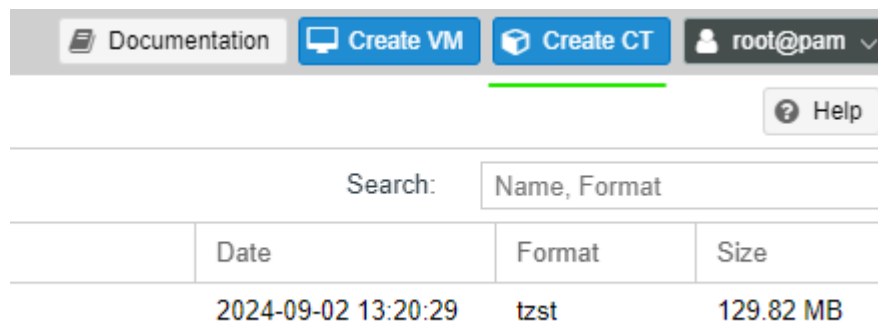
Once it is started, we can connect to console and do a typical Ubuntu installation (as that is what our ISO was):



We can also create containers directly on Proxmox. First, we need to get Templates:



Now, let us create a container:



Create Container

Create: LXC Container

General
Template
Disks
CPU
Memory
Network
DNS
Confirm

Node:
prx-1
Resource Pool:
CT ID:
101
Password:
Hostname:
test-ct-1
Confirm password:
Unprivileged container:
Nesting:
SSH public key(s):
Load SSH Key File

Tags
No Tags

CT ID and VM ID are not separate pools, ID needs to be unique across VMs and Containers.

Create: LXC Container

General
Template
Disks
CPU
Memory
Network
DNS
Confirm

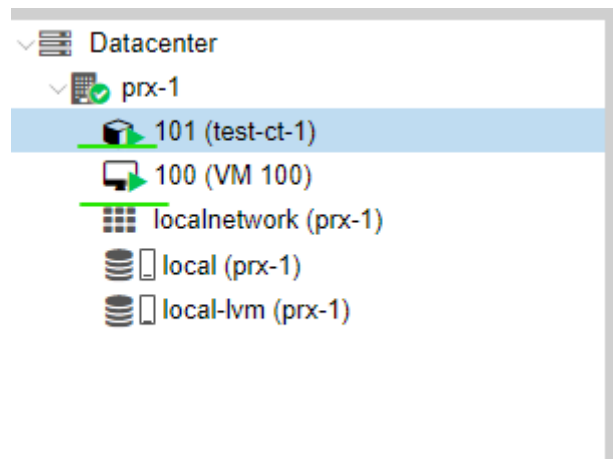
Name:
eth0
IPv4:
Static
DHCP
MAC address:
auto
IPv4/CIDR:
Bridge:
vmbr0
Gateway (IPv4):
VLAN Tag:
no VLAN
IPv6:
Static
DHCP
SLAAC
Firewall:
IPv6/CIDR:
Gateway (IPv6):
Disconnect:
Rate limit (MB/s):
unlimited
MTU:
Same as bridge

Create: LXC Container

General
Template
Disks
CPU
Memory
Network
DNS
Confirm

DNS domain:
use host settings
DNS servers:
use host settings

Also, containers will come up much faster than a VM. Login with user 'root' and password that was selected on first screen:



Container 101 (test-ct-1) on node 'prx-1' No Tags

Summary

Console

Resources

Network

DNS

Options

Task History

Backup

Replication

Snapshots

Firewall

Permissions

```
Ubuntu 22.04 LTS test-ct-1 tty1
test-ct-1 login: root
Password:
Welcome to Ubuntu 22.04 LTS (GNU/Linux 6.8.12-1-pve x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@test-ct-1:~#
```

NOTE: Unlike containers in Kubernetes, these containers are on the same network (because we picked that in the wizard above). So, if we check the IP address of the container, we would see that it belongs to the same DHCP range that the host is on and can be accessed directly. So, it works just like VMs in that sense.

There is still a lot to do for storage, networking, cluster and HA. That will be covered in a future post. In the meantime I'll set up other nodes to be added to the cluster.

Thanks!