

**IMPLEMENTASI DAN ANALISIS NESTED VIRTUALIZATION DENGAN  
PROXMOX VE PADA INFRASTRUKTUR MIKROTIK**

Dosen Pengampu:  
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Laporan ini dibuat untuk memenuhi tugas Proyek mata kuliah:

Sistem Operasi

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**PRODI TEKNIK INFORMATIKA  
FAKULTAS TEKNIK DAN TEKNOLOGI KEMARITIMAN  
UNIVERSITAS MARITIM RAJA ALI HAJI  
2025/2026**

## A. ABSTRAK

Untuk membangun laboratorium virtual yang terhubung ke internet dan terisolasi, proyek ini berhasil menerapkan arsitektur Nested Virtualization. Konfigurasi router Mikrotik untuk membuat jaringan lokal 192.168.9.0/24 dengan akses NAT ke internet adalah langkah pertama dalam implementasi. Dengan mengaktifkan fitur AMD-V Nested, VirtualBox digunakan untuk menyiapkan hypervisor tingkat pertama. Pada VirtualBox juga diinstal hypervisor tingkat kedua, Proxmox VE, yang dikonfigurasi dengan IP statis dalam jaringan Mikrotik. Sebuah Virtual Machine Guest berbasis Ubuntu Server kemudian dipasang di dalam Proxmox.

Pengujian fungsional menunjukkan bahwa integrasi multilayer berhasil. Ini ditunjukkan dengan koneksi jaringan antara host fisik dan Guest VM Ubuntu. Selain itu, fitur manajemen virtualisasi Proxmox, seperti Snapshot/Rollback dan Backup, diuji dan beroperasi dengan baik. Analisis performa menunjukkan bahwa nested virtualization dapat digunakan pada hardware terbatas dengan alokasi sumber daya yang tepat. Ini menunjukkan overhead CPU yang wajar (~40% saat beban) dan penggunaan RAM yang efisien. Projek ini memberikan model untuk membangun lingkungan yang fleksibel dan terisolasi untuk pengembangan, pengujian, dan pembelajaran.

## B. PENDAHULUAN

Dengan memfasilitasi konsolidasi server, efisiensi sumber daya, dan isolasi lingkungan, virtualisasi telah menjadi komponen penting dalam manajemen infrastruktur TI kontemporer. Konsep Nested Virtualization membawa gagasan ini ke tingkat yang lebih tinggi, di mana sebuah hypervisor (tingkat kedua) berjalan di dalam virtual machine (VM) yang dihosting oleh hypervisor lain (tingkat pertama). Teknik ini sangat berguna untuk pelatihan, pengujian, dan lab pengembangan teknologi virtualisasi, cloud, dan container tanpa memerlukan banyak server fisik.

Laporan ini mendokumentasikan implementasi lengkap sebuah lingkungan nested virtualization. Tumpukan teknologi yang digunakan meliputi Mikrotik sebagai router dan gateway, Oracle VirtualBox sebagai hypervisor tingkat pertama (L1), Proxmox VE sebagai hypervisor tingkat kedua (L2), dan Ubuntu Server sebagai guest VM. Implementasi ini bertujuan untuk menciptakan sebuah lingkungan yang terisolasi secara jaringan, memiliki akses internet, dan mampu menunjukkan kemampuan penuh manajemen virtualisasi modern.

## C. Rumusan Masalah & Tujuan Project

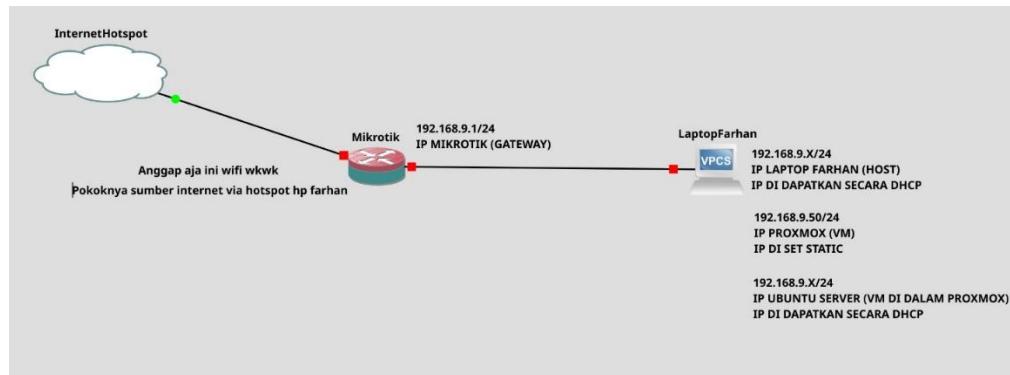
Solusi Masalah:

1. Bagaimana cara menggunakan router Mikrotik untuk membangun jaringan laboratorium virtual (192.168.9.0/24) yang terisolasi dan mendapatkan akses internet?
2. Bagaimana cara mengkonfigurasi VirtualBox untuk mendukung nested virtualization dan membridge jaringan fisik ke VM Proxmox?
3. Bagaimana saya dapat menginstal dan mengkonfigurasi Proxmox VE sebagai hypervisor L2 di VirtualBox?
4. Bagaimana cara menguji konektivitas, snapshot, dan backup untuk menunjukkan bahwa seluruh lapisan arsitektur (Fisik, VirtualBox, Proxmox, dan Guest VM) terintegrasi dengan baik?

Tujuan pekerjaan:

1. Mikrotik digunakan untuk membuat jaringan terisolasi 192.168.9.0/24 dan memungkinkan akses internet melalui jaringan nirkabel.
2. Menyediakan Virtual Machine (VM) di virtualbox yang memiliki kemampuan untuk menjalankan virtualisasi berurutan (Proxmox).
3. Instalasi dan pengaturan Proxmox VE dengan IP statis di jaringan lab.
4. Mengaktifkan Virtual Machine Guest (Ubuntu Server) di Proxmox.
5. Melakukan analisis performa dan pengujian fungsional untuk memastikan keberhasilan implementasi.

## D. PERANCANGAN ARSITEKTUR



Penjelasan Desain:

1. Sumber Internet: Hotspot dari HP Farhan.
2. Router/Gateway: Mikrotik dengan IP 192.168.9.1/24.
3. Jaringan Lokal: Subnet 192.168.9.0/24 yang terisolasi.
4. Host: Laptop Farhan mendapat IP via DHCP dari Mikrotik.
5. Hypervisor L2: Proxmox VE di-set dengan IP statis 192.168.9.50.
6. Guest VM: Ubuntu Server di dalam Proxmox mendapat IP via DHCP dari Mikrotik.

Konsep Konektivitas:

1. Mikrotik menghubungkan jaringan lokal ke internet via hotspot.
2. Semua perangkat (host, VM, nested VM) berada dalam subnet yang sama.
3. VirtualBox di-bridge ke jaringan fisik via USB LAN dongle.
4. Proxmox dan Ubuntu dapat diakses langsung dari host laptop.

Spesifikasi Resource:

1. VirtualBox VM: 6 GB RAM, 2 Core CPU, 50 GB Disk.
2. Proxmox VE: IP Static 192.168.9.50.
3. Guest VM (Ubuntu): 2 GB RAM, 2 Core CPU (Type: Host).

## E. IMPLEMENTASI

### 1. KONFIGURASI ROUTER (MIKROTIK)

Tujuan: Membuat jaringan terisolasi 192.168.9.0/24 yang memiliki akses internet via Wi-Fi.

#### 1.1 Setup Koneksi Internet (WLAN1)

##### 1) Security Profile:

- Menu Wireless -> Tab Security Profiles -> Tambah (+).
- Name: (bebas nama nya). Mode: dynamic keys. Centang WPA/WPA2 PSK.
- Isi password Wi-Fi sumber. Apply & OK.

##### 2) Interface Setup:

- Menu Wireless -> Tab WiFi Interfaces.
- Double click wlan1.

- Tab Wireless -> Mode: station. SSID: (Scan dan pilih Wi-Fi sumber). Profile: (Isi yang sudah ko buat di langkah pertama). Apply & OK.
  - Indikator: Pastikan ada huruf R (Running) di samping wlan1.
- 3) **DHCP Client:**
- Menu IP -> DHCP Client -> Tambah (+).
  - Interface: wlan1. Add Default Route: yes. Apply & OK.
  - Indikator: Status Bound.

## **1.2 Setup Jaringan Lokal (Ether3/4/5 bebas mau yang mana asalkan jangan ether 2 dan 1)**

**1) 1. IP Address:**

- Menu IP -> Addresses -> Tambah (+).
- Address: 192.168.9.1/24. Interface: ether5. Apply & OK.

**2) DHCP Server:**

- Menu IP -> DHCP Server -> Klik DHCP Setup.
- Interface: ether5 -> Next terus sampai sukses.

**3) NAT (Masquerade)**

## **2. KONFIGURASI HOST HYPERVISOR (VIRTUALBOX)**

Tujuan: Menyiapkan Virtual Machine yang mampu menjalankan virtualisasi bertingkat (Nested).

**2.1 Pemasangan Kabel & Verifikasi**

- 1) Sambungkan Mikrotik Port 5 -> USB LAN Dongle -> Laptop.
- 2) Matikan Wi-Fi Laptop.
- 3) Cek CMD: ipconfig. Pastikan Ethernet dapat IP 192.168.9.xxx.

**2.2 Pembuatan VM**

- 1) New VM: Name Proxmox-Lab. Type Linux (Debian 64-bit).
- 2) Resource: RAM 6144 MB (6GB). CPU 2 Core. Disk 50 GB.
- 3) FINISH.

**2.3 Network Bridging (Krusial)**

- 1) Settings VM -> Network.
- 2) Adapter 1: Bridged Adapter.

- 3) Name: [Pilih Nama USB LAN Dongle] (Contoh: Realtek USB GbE). Jangan pilih Wi-Fi Adapter!
- 4) Promiscuous Mode: Allow All.

## 2.4 Memasukkan ISO (Mounting)

- 1) Settings VM -> Storage.
- 2) Klik Empty (gambar CD).
- 3) Klik ikon CD biru di kanan -> Choose a disk file.
- 4) Pilih ISO Proxmox VE.

## 2.5 Aktivasi AMD-V Nested (CLI)

- 1) Tutup VirtualBox Total.
- 2) Buka CMD Sebagai Administrator, ketik:

```
cd "C:\Program Files\Oracle\VirtualBox"
VBoxManage modifyvm "Proxmox-Lab" --nested-
hw-virt on
```
- 3) ENTER.

## 3. INSTALASI & CONFIG PROXMOX

Tujuan: Menginstall OS Hypervisor dengan IP Statis yang sesuai topology Mikrotik.

### 3.1 Proses Instalasi

- 1) Start VM. Pilih Install Proxmox VE.
- 2) Ikuti wizard (EULA, Disk, Timezone, Password).
- 3) Network Setup:
  - Interface: (Default).
  - Hostname: pve.lab
  - IP Address: 192.168.9.50 (CIDR /24).
  - Gateway: 192.168.9.1 (IP Mikrotik).
  - DNS1: 192.168.9.1.
  - DNS2: 8.8.8.8.
- 4) Install & Reboot.

### 3.2 Akses & Upload

- 1) Buka Browser Laptop: <https://192.168.9.50:8006>.
- 2) Login root.

- 3) Upload ISO Ubuntu Server ke menu local (pve) -> ISO Images.

#### **4. IMPLEMENTASI GUEST VM (UBUNTU)**

Tujuan: Membuktikan Nested Virtualization berfungsi.

- 1) Create VM di Proxmox.
- 2) OS: Pilih ISO Ubuntu Server.
- 3) System: Centang Qemu Agent.
- 4) CPU: Core 2, Type: Host (Wajib!).
- 5) Memory: 2048 (2GB).
- 6) Start VM -> Install Ubuntu (Mode Minimized, Install OpenSSH).

### **F. PENGUJIAN & ANALISIS**

#### **1. PENGUJIAN (OUTPUT AKHIR PROYEK)**

##### **1.1 Uji Integrasi Jaringan (Output A)**

- 1) Skenario: Ping dari Terminal Laptop (Windows) ke IP VM Ubuntu.
- 2) Langkah:
  - Cek IP Ubuntu (via Console ip a). Misal dapat 192.168.9.253.
  - Buka CMD Laptop: ping 192.168.9.253.
- 3) Hasil: Reply from .....
- 4) Kesimpulan: Topologi Mikrotik -> VirtualBox Bridge -> Proxmox Bridge -> Ubuntu berhasil tersambung.

##### **1.2 Uji Snapshot & Rollback (Output B)**

- 1) Skenario: Mengembalikan file yang terhapus.
- 2) Langkah:
  - Di Ubuntu: echo "Abdul Ganteng" > fakta.txt.
  - Di Proxmox: Menu VM Ubuntu -> Snapshot -> Take Snapshot (Nama: Aman).
  - Di Ubuntu: rm skripsi.txt (Hapus file).
  - Di Proxmox: Menu Snapshot -> Pilih Aman -> Rollback.
  - Di Ubuntu: Cek ls.
- 3) Hasil: File fakta.txt muncul kembali.

##### **1.3 Uji Backup (Output B)**

- 1) Skenario: Full Backup VM.

- 2) Langkah:
  - Matikan VM Ubuntu.
  - Menu Backup -> Backup Now -> Mode Stop, Kompresi Zstd.
- 3) Hasil: Log menunjukkan TASK OK. File backup muncul di storage list.

#### **1.4 Laporan Performa (Output C)**

- 1) Analisis:
  - CPU Overhead: Saat Ubuntu idle, CPU Proxmox hanya terpakai ~2-4%. Saat Ubuntu update, naik ke ~40%. Ini wajar untuk Nested Virt.
  - RAM: Proxmox menggunakan total ~3.5GB (System + Guest), masih aman di alokasi 6GB.

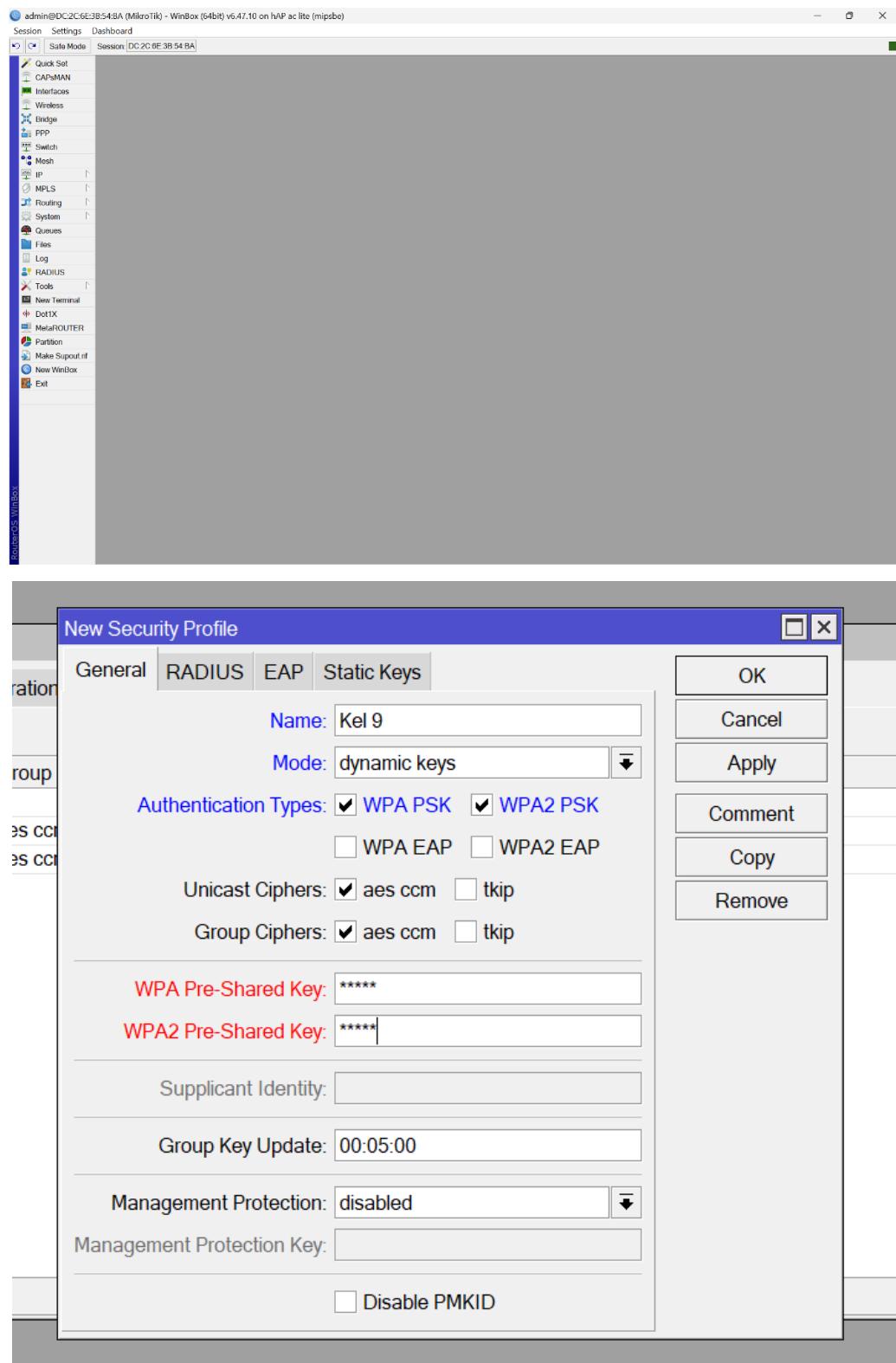
### **G. KESIMPULAN**

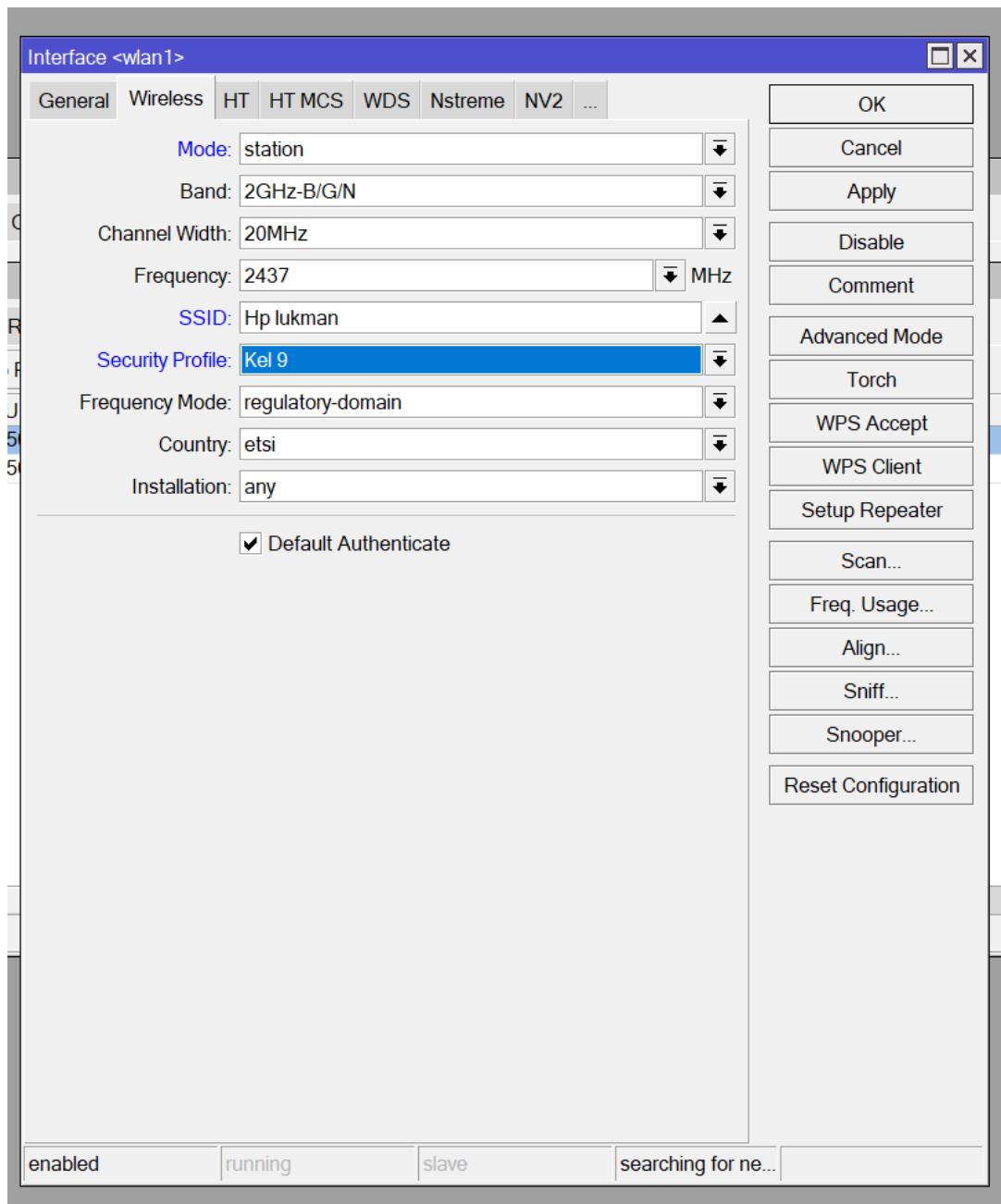
Berdasarkan seluruh tahapan implementasi dan pengujian, dapat disimpulkan bahwa:

1. Implementasi Nested Virtualization Berhasil: Setiap lapisan arsitektur, termasuk konfigurasi jaringan Mikrotik, persiapan VirtualBox dengan virtualisasi nested, instalasi Proxmox VE, dan penyebaran Virtual Machine Guest Ubuntu, berhasil dilaksanakan sesuai perencanaan.
2. Fungsionalitas Terbukti: Pengujian koneksi jaringan (ping) berjalan dengan baik, yang menunjukkan integrasi yang solid. Selain itu, fitur manajemen hypervisor kontemporer seperti snapshot, rollback, dan backup Proxmox berfungsi dengan baik di lingkungan nested.
3. Kinerja Dapat Diterima: Analisis performa menunjukkan bahwa nested virtualization dapat bekerja dengan baik pada hardware terbatas, seperti laptop, dengan overhead sumber daya yang wajar dan dapat diprediksi, asalkan sumber daya (khususnya RAM dan CPU type host) dialokasikan dengan tepat.

Sebuah laboratorium virtual yang lengkap, terisolasi, dan terhubung ke internet telah dibuat oleh proyek ini. Laboratorium ini dapat digunakan untuk eksperimen, pembelajaran, atau pengembangan lebih lanjut di bidang virtualisasi, jaringan, dan komputasi awan.

## H. LAMPIRAN





Client DHCP Client

### New DHCP Client

DHCP Advanced Status

Interface: **wlan1**

Use Peer DNS

Use Peer NTP

Add Default Route: **yes**

enabled      Status: stopped

OK Cancel Apply Disable Comment Copy Remove Release Renew

Wireless AP <B0:30:55:51:BC:6E>

Interface: **wlan1**

Address: **B0:30:55:51:BC:6E**

SSID: **DISFAR**

Channel: **2472/20-eC/gn(18dBm)**

Signal Strength: **-37**

Noise Floor: **-108**

Signal To Noise: **71**

Radio Name:

active privacy routeros ... tdma wds bridge

OK Connect

ce Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Detect Internet

**DHCP Client**

| Name      | Type                      | Actual MTU | L2 MTU | Tx    | Rx    | Tx Packet (p/s) | Rx Packet (p/s) | FP Tx | FP Rx | FP Tx Packet (p/s) |
|-----------|---------------------------|------------|--------|-------|-------|-----------------|-----------------|-------|-------|--------------------|
| ether1    | Ethernet                  | 1500       | 1598   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| ether2    | Ethernet                  | 1500       | 1598   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| ether3    | Ethernet                  | 1500       | 1598   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| ether4    | Ethernet                  | 1500       | 1598   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| ether5    | Ethernet                  | 1500       | 1598   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| kelompok4 | Bridge                    | 1500       | 1598   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| wlan1     | Wireless (Atheros AR9...) | 1500       | 1600   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |
| wlan2     | Wireless (Atheros AR9...) | 1500       | 1600   | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              |

FP Tx

| Interface | Use P... | Add D... | IP Address     | Expires After | Status |
|-----------|----------|----------|----------------|---------------|--------|
| wlan1     | yes      | yes      | 10.97.4.193/24 | 00:59:43      | bound  |

**Wireless Tables**

WiFi Interfaces W60G Station Nstreme Dual Access List Registration Connect List Security Profiles Channels

| Name    | Type                      | Actual MTU | Tx    | Rx    | Tx Packet (p/s) | Rx Packet (p/s) | FP Tx |
|---------|---------------------------|------------|-------|-------|-----------------|-----------------|-------|
| R wlan1 | Wireless (Atheros AR9...) | 1500       | 0 bps | 0 bps | 0               | 0               | 0     |
| S wlan2 | Wireless (Atheros AR9...) | 1500       | 0 bps | 0 bps | 0               | 0               | 0     |

**Wireless Tables**

WiFi Interfaces W60G Station Nstreme Dual Access List Registration Connect List Security Profiles Channels

| Name    | Type                      | Actual MTU | Tx    | Rx    | Tx Packet (p/s) | Rx Packet (p/s) | FP Tx | FP Rx | FP Tx Packet (p/s) | FP R... |
|---------|---------------------------|------------|-------|-------|-----------------|-----------------|-------|-------|--------------------|---------|
| R wlan1 | Wireless (Atheros AR9...) | 1500       | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              | 0       |
| S wlan2 | Wireless (Atheros AR9...) | 1500       | 0 bps | 0 bps | 0               | 0               | 0 bps | 0 bps | 0 bps              | 0       |

**DHCP Client**

**DHCP Client Options**

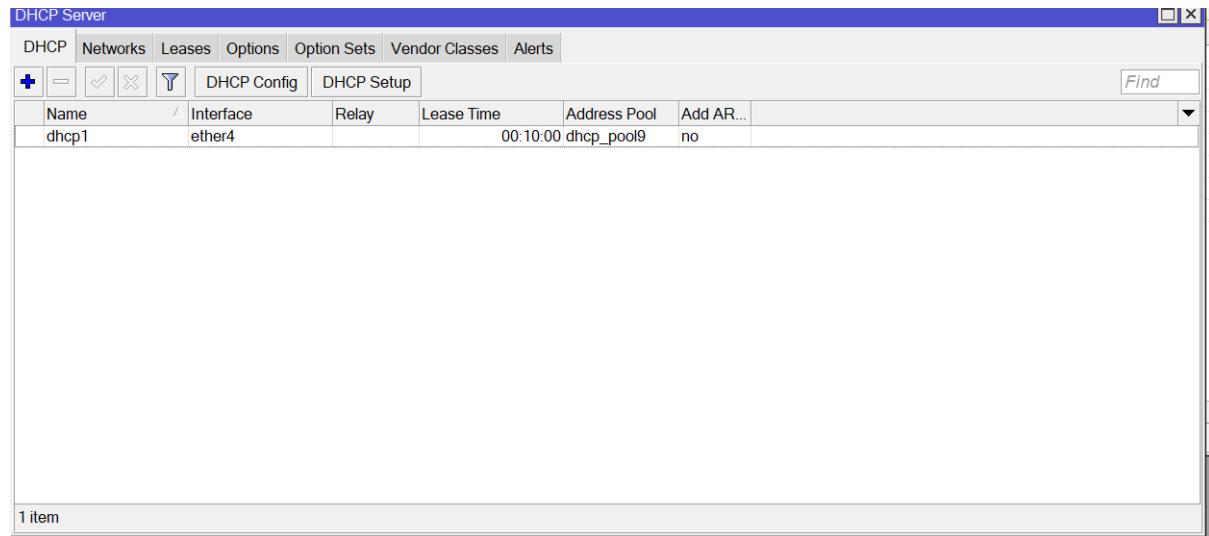
| Interface | Use P... | Add D... | IP Address     | Expires After | Status |
|-----------|----------|----------|----------------|---------------|--------|
| wlan1     | yes      | yes      | 10.97.4.193/24 | 00:58:08      | bound  |

**Interface List**

Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

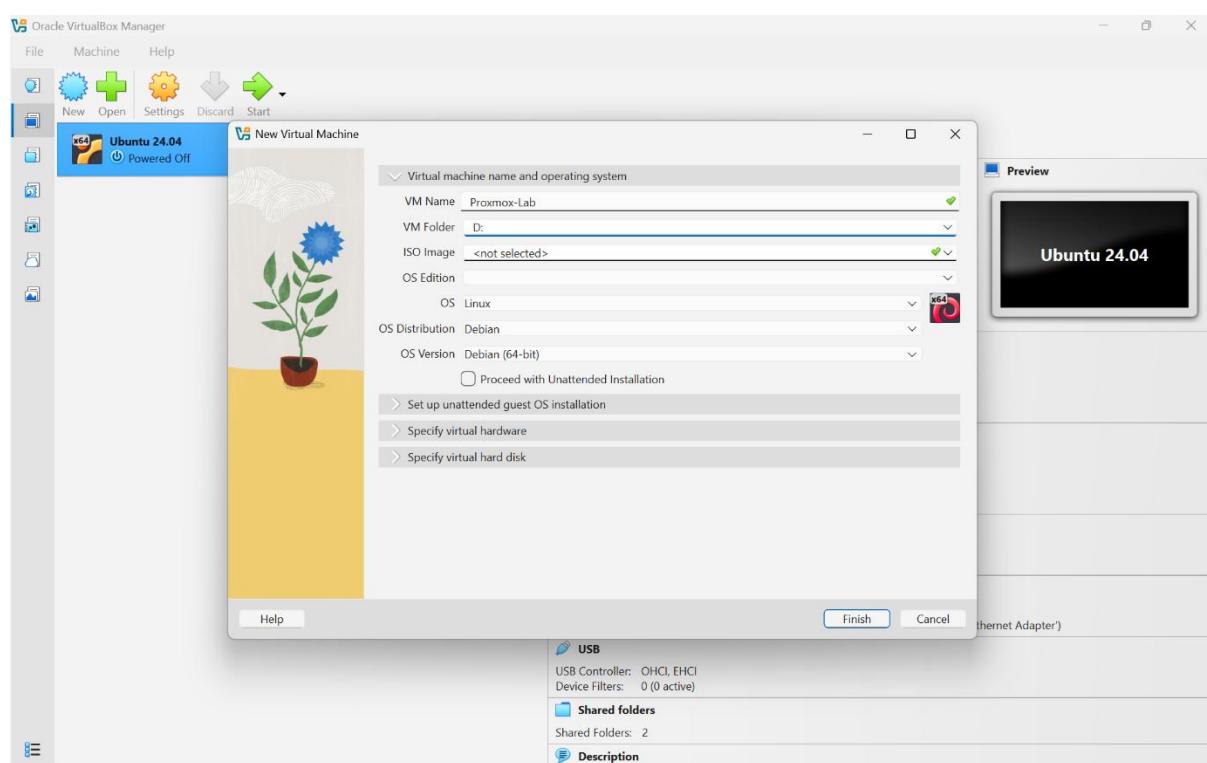
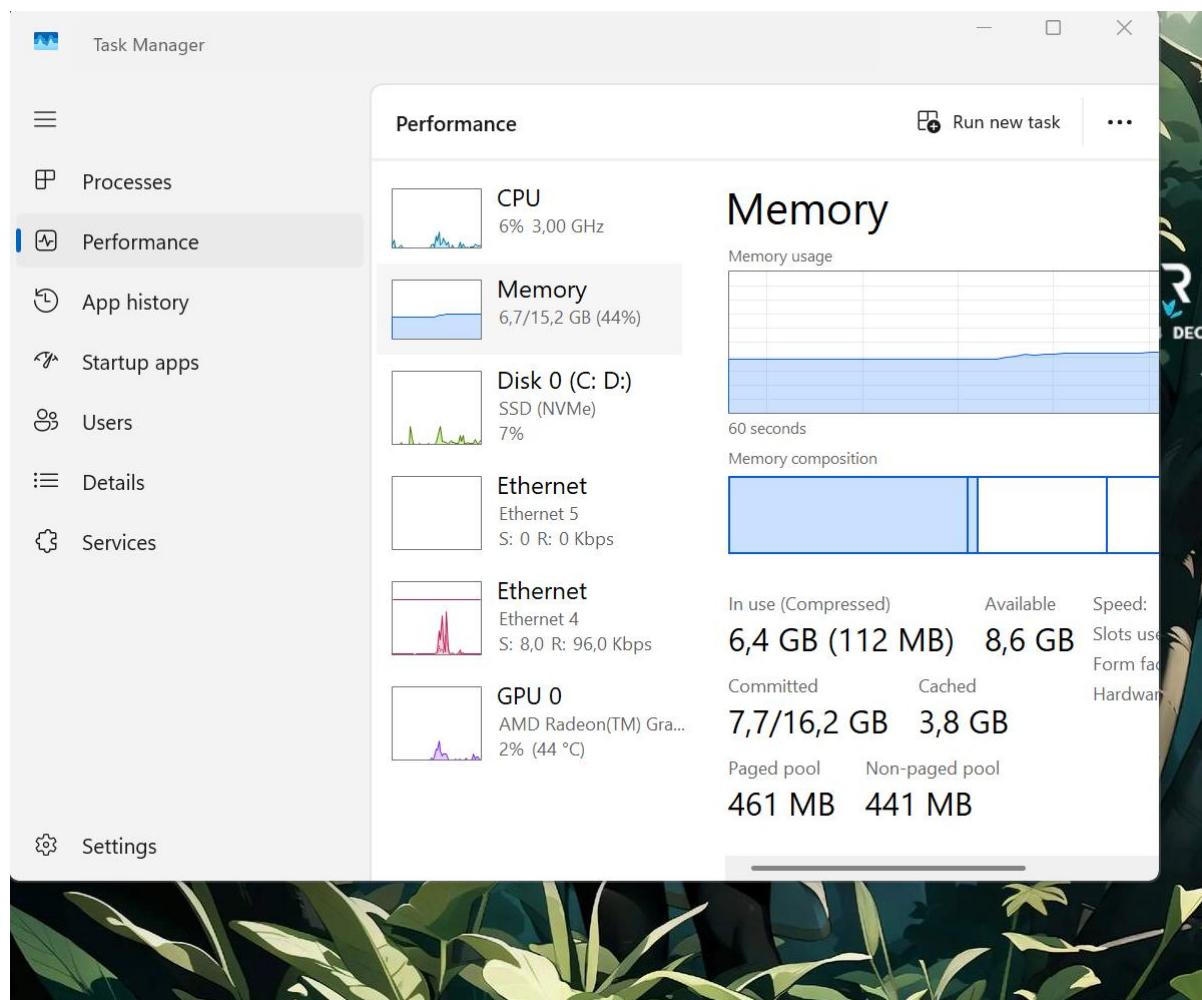
Detect Internet

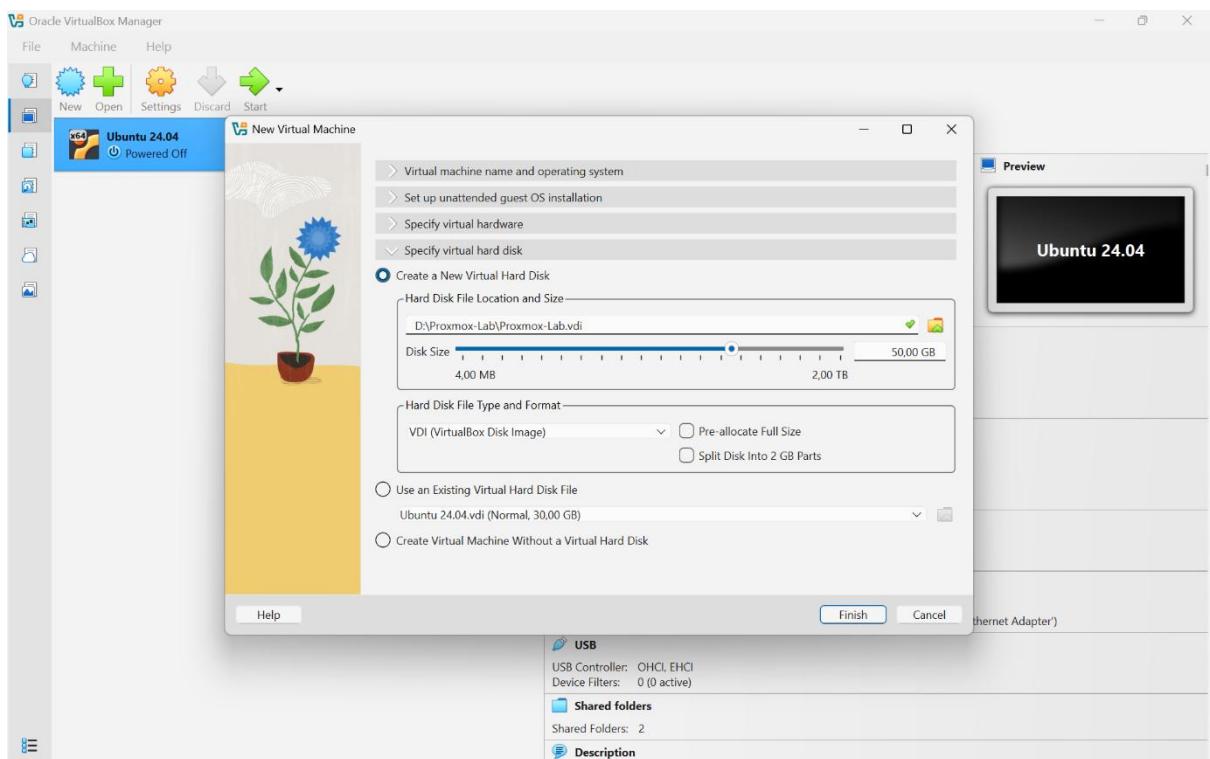
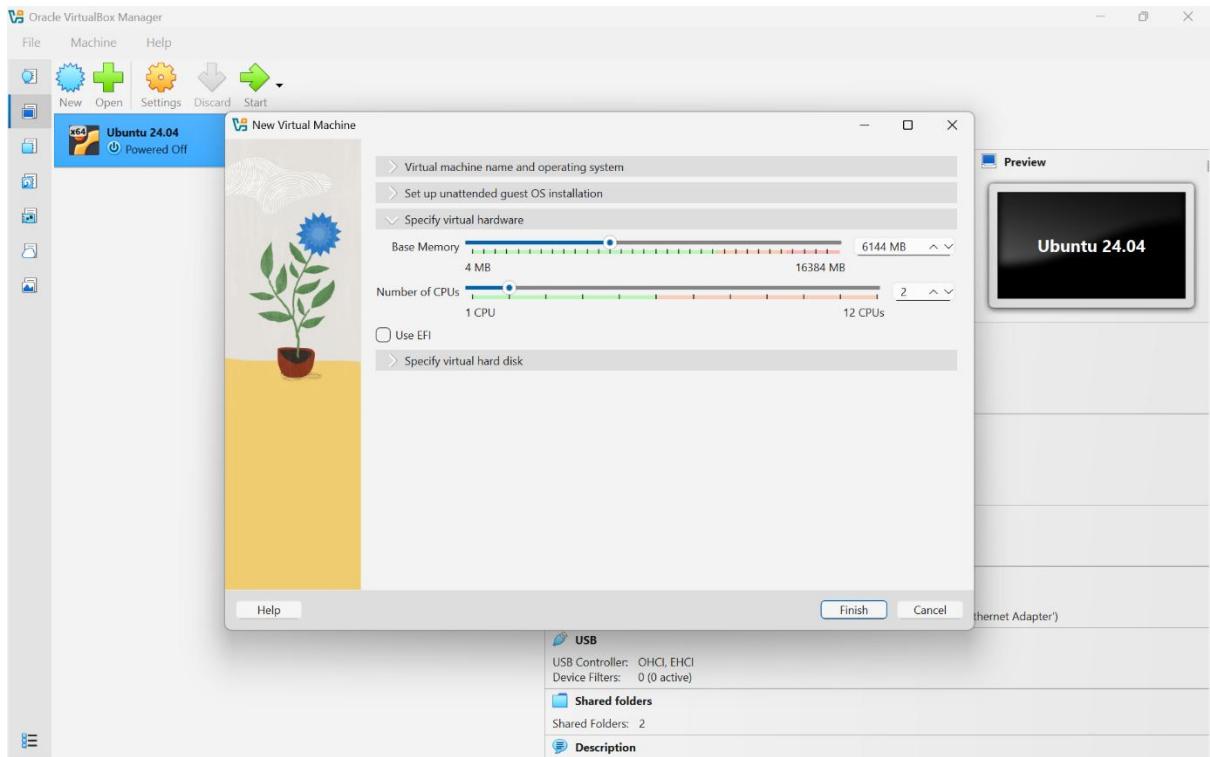
| Name      | Type                      | Actual MTU | L2 MTU | Tx         | Rx       | Tx Packet (p/s) | Rx Packet (p/s) | FP Tx      | FP Rx    | FP Tx Packet (p/s) |
|-----------|---------------------------|------------|--------|------------|----------|-----------------|-----------------|------------|----------|--------------------|
| ether1    | Ethernet                  | 1500       | 1598   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |
| ether2    | Ethernet                  | 1500       | 1598   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |
| ether3    | Ethernet                  | 1500       | 1598   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |
| ether4    | Ethernet                  | 1500       | 1598   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |
| ether5    | Ethernet                  | 1500       | 1598   | 118.4 kbps | 9.7 kbps | 14              | 14              | 127.9 kbps | 9.2 kbps | 1                  |
| kelompok4 | Bridge                    | 1500       | 1598   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |
| wlan1     | Wireless (Atheros AR9...) | 1500       | 1600   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |
| wlan2     | Wireless (Atheros AR9...) | 1500       | 1600   | 0 bps      | 0 bps    | 0               | 0               | 0 bps      | 0 bps    | 0 bps              |

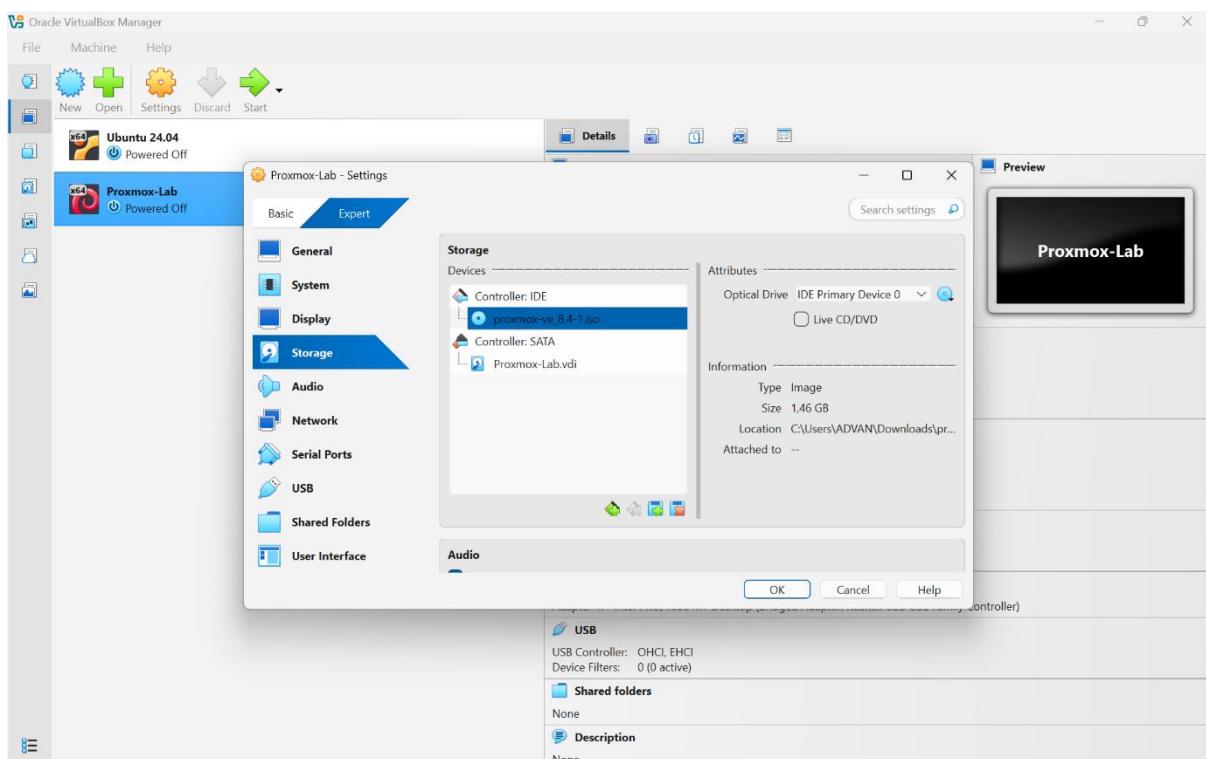
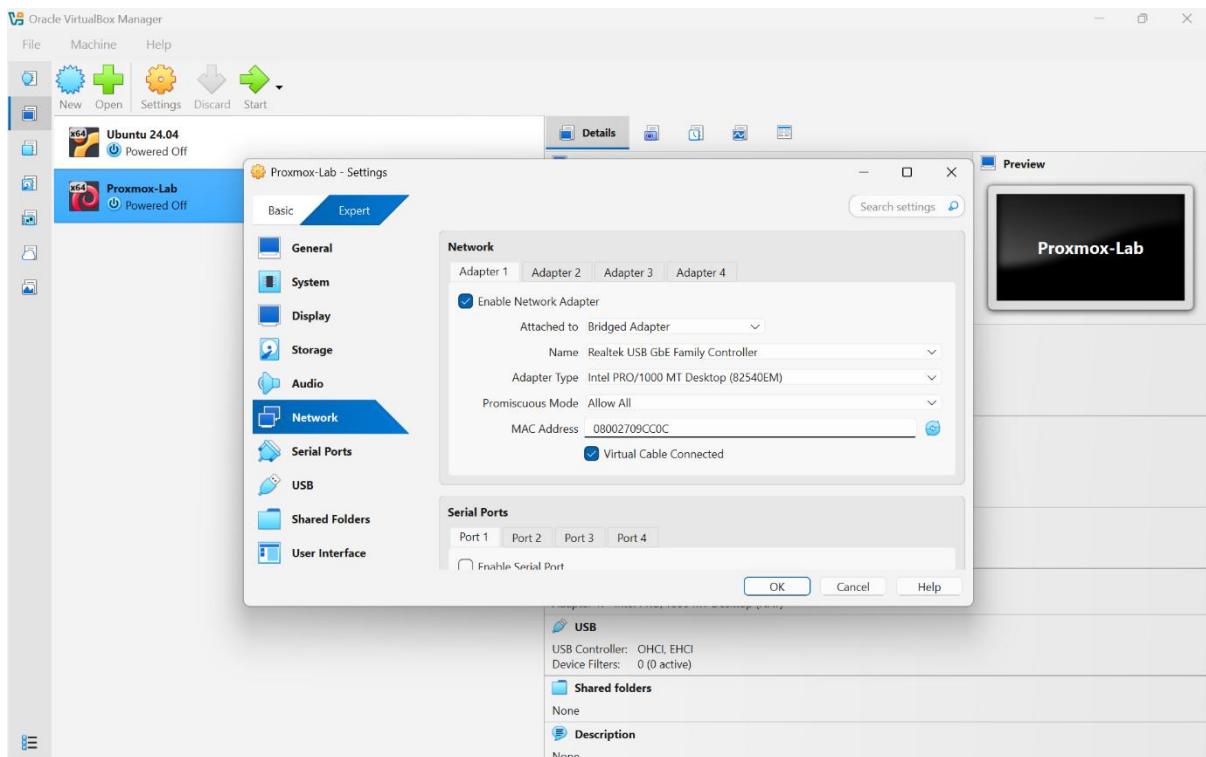


Interface <wlan1>

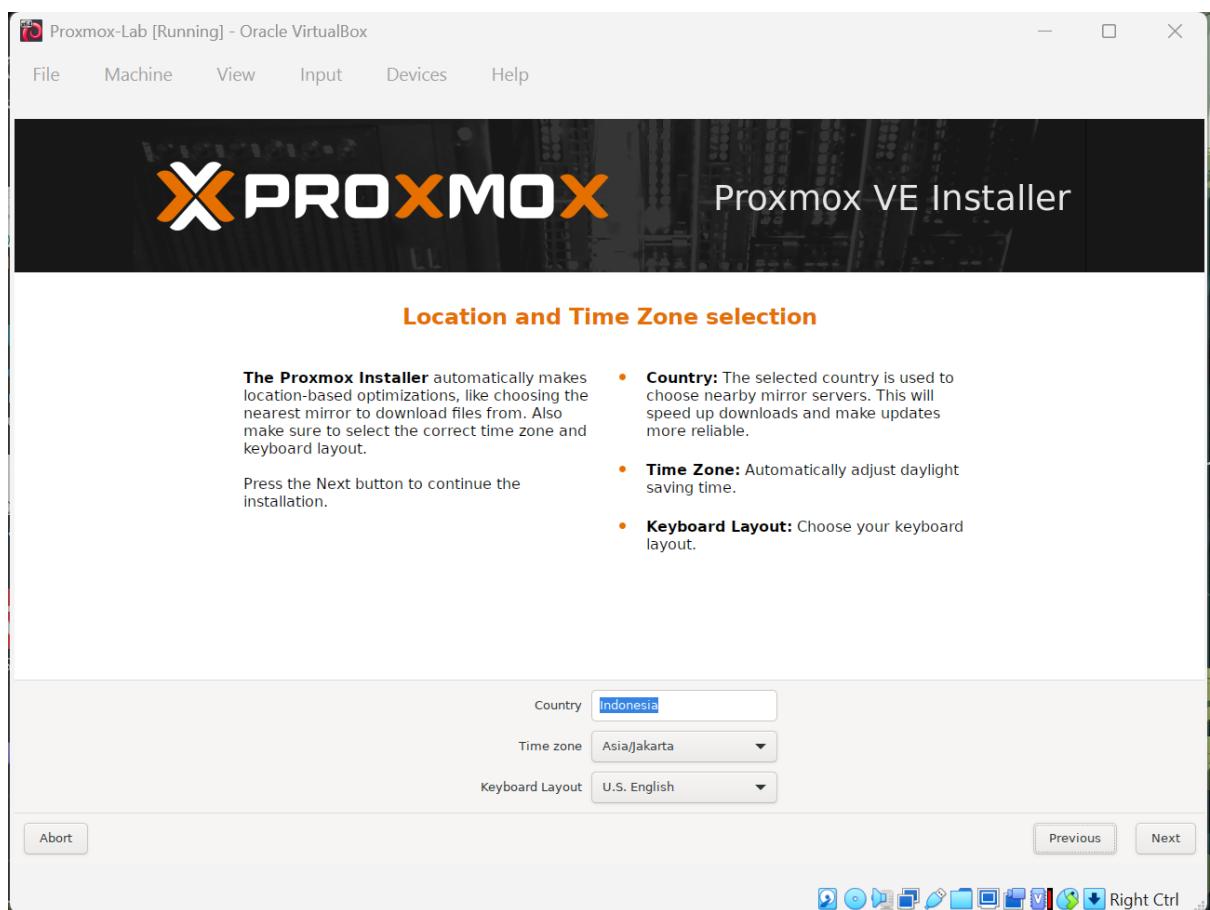
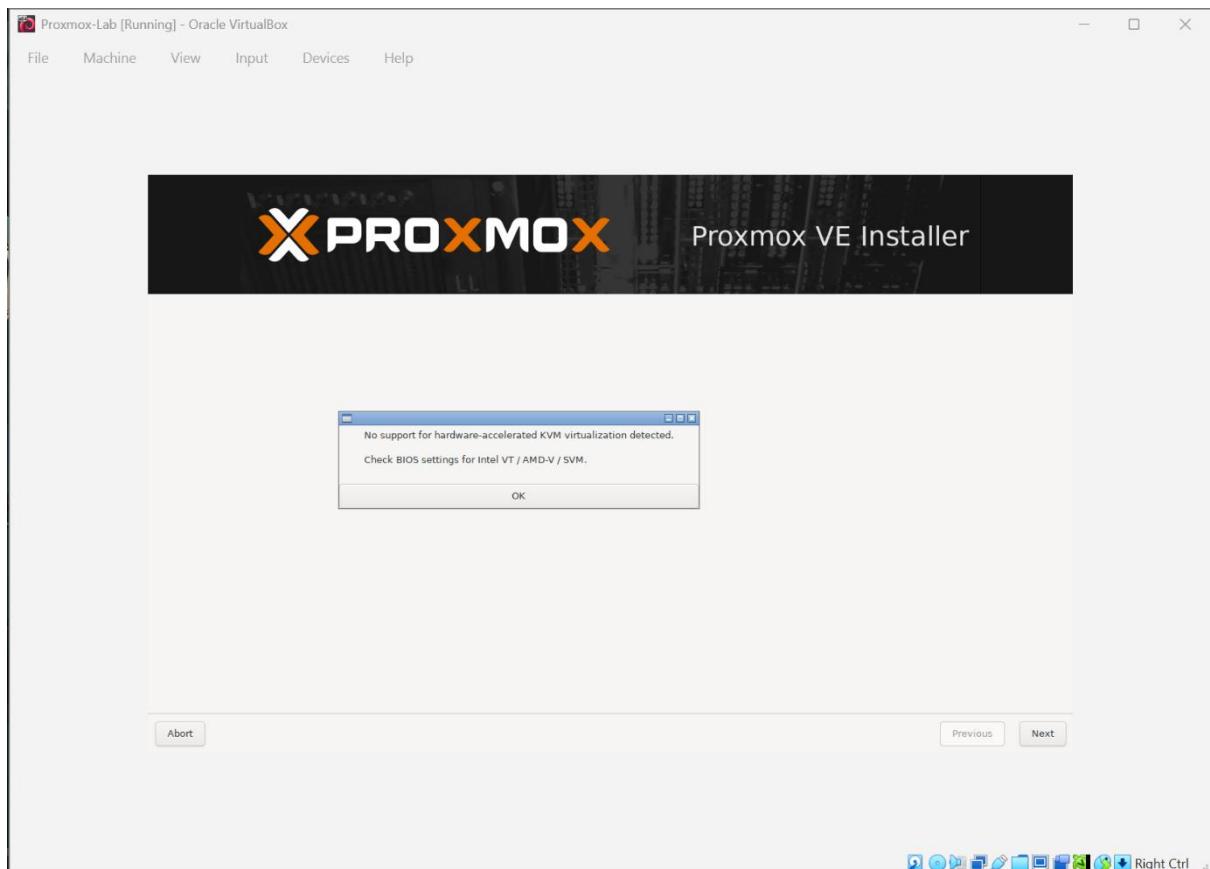
|  |          |            |                  |    |        |     |     |
|--|----------|------------|------------------|----|--------|-----|-----|
| General  | Wireless | Data Rates | Advanced         | HT | HT MCS | WDS | ... |
| <p>Mode: station</p> <p>Band: 2GHz-B/G/N</p> <p>Channel Width: 20MHz</p> <p>Frequency: 2472 MHz</p> <p>SSID: humairah</p> <p>Radio Name: DC2C6E3B54BC</p> <p>Scan List: default</p> <p>Skip DFS Channels: disabled</p> <p>Wireless Protocol: any</p> <p>Security Profile: Kel 9</p> <p>Frequency Mode: regulatory-domain</p> <p>Country: indonesia</p> <p>Installation: indoor</p> <p>WMM Support: disabled</p> <p>Station Roaming: disabled</p> <p><input checked="" type="checkbox"/> Default Authenticate</p> <p>Multicast Helper: default</p> <p><input checked="" type="checkbox"/> Multicast Buffering</p> <p><input checked="" type="checkbox"/> Keepalive Frames</p> |          |            |                  |    |        |     |     |
| enabled  | running  | slave      | connected to ess |    |        |     |     |
| <p>OK</p> <p>Cancel</p> <p>Apply</p> <p>Disable</p> <p>Comment</p> <p>Simple Mode</p> <p>Torch</p> <p>WPS Accept</p> <p>WPS Client</p> <p>Setup Repeater</p> <p>Scan...</p> <p>Freq. Usage...</p> <p>Align...</p> <p>Sniff...</p> <p>Snooper...</p> <p>Reset Configuration</p>   |          |            |                  |    |        |     |     |

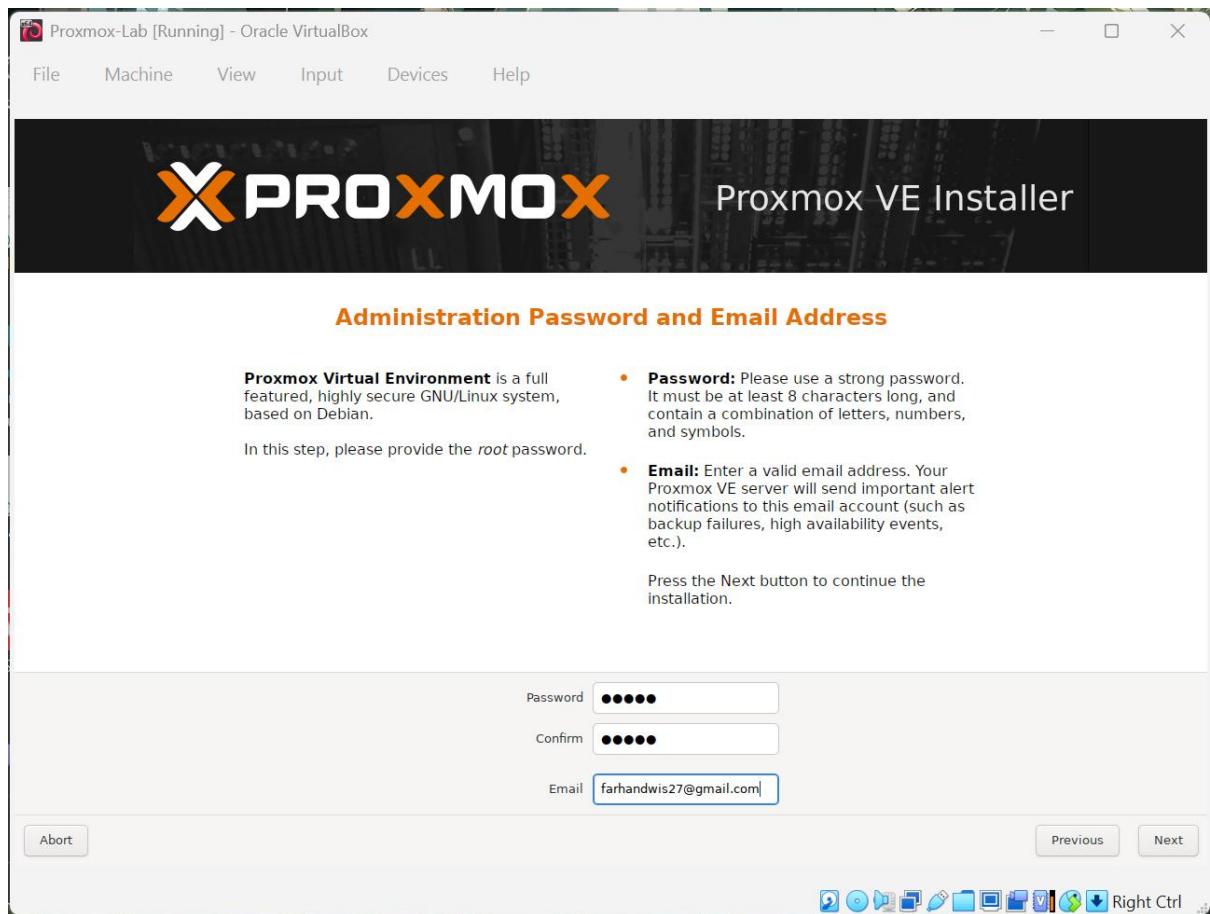


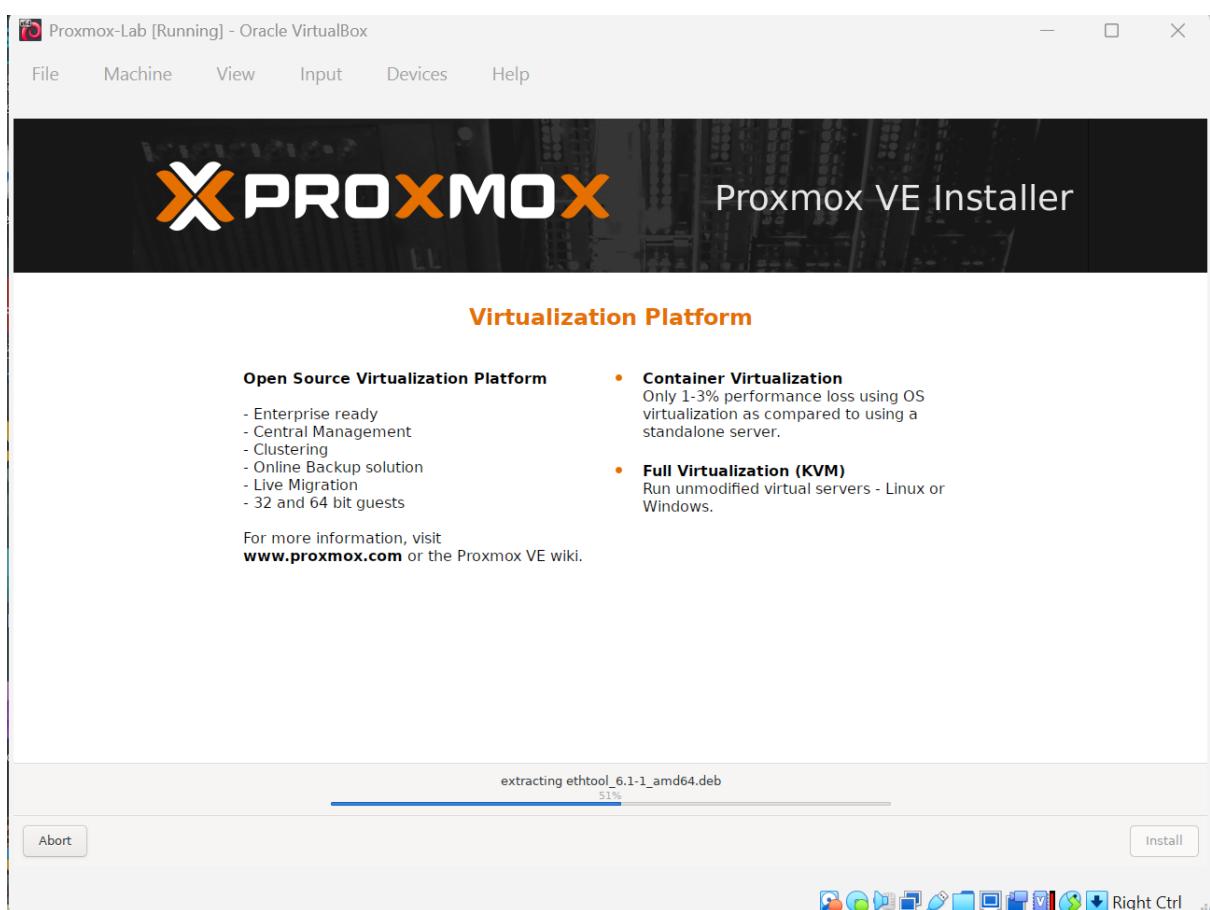
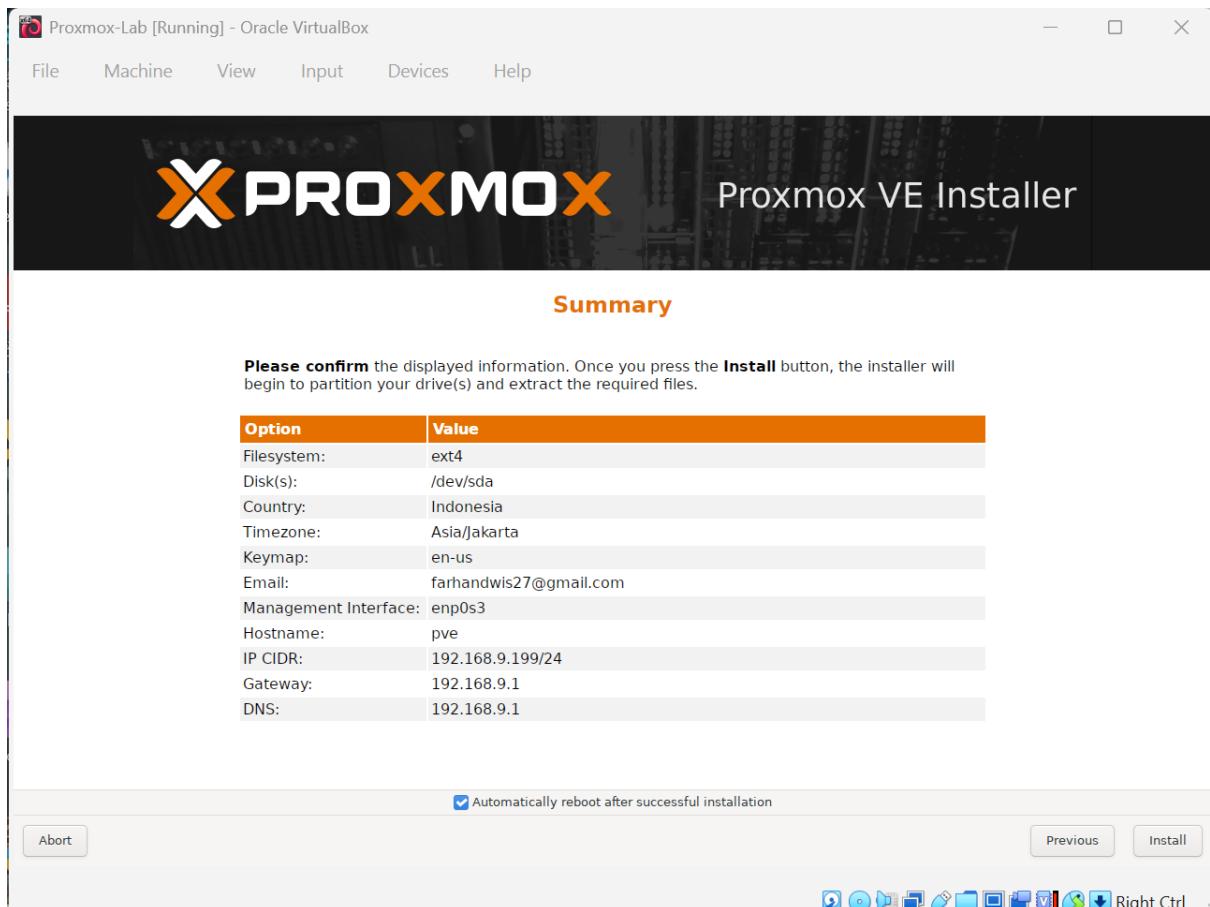


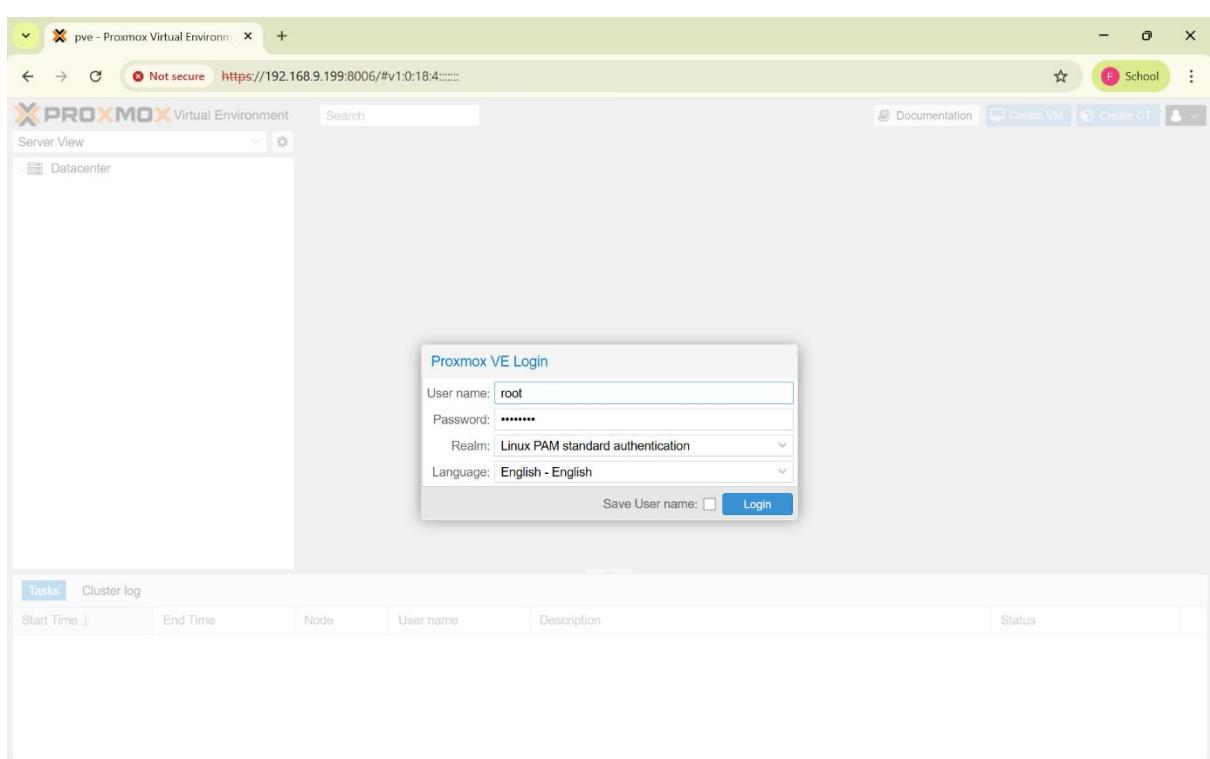
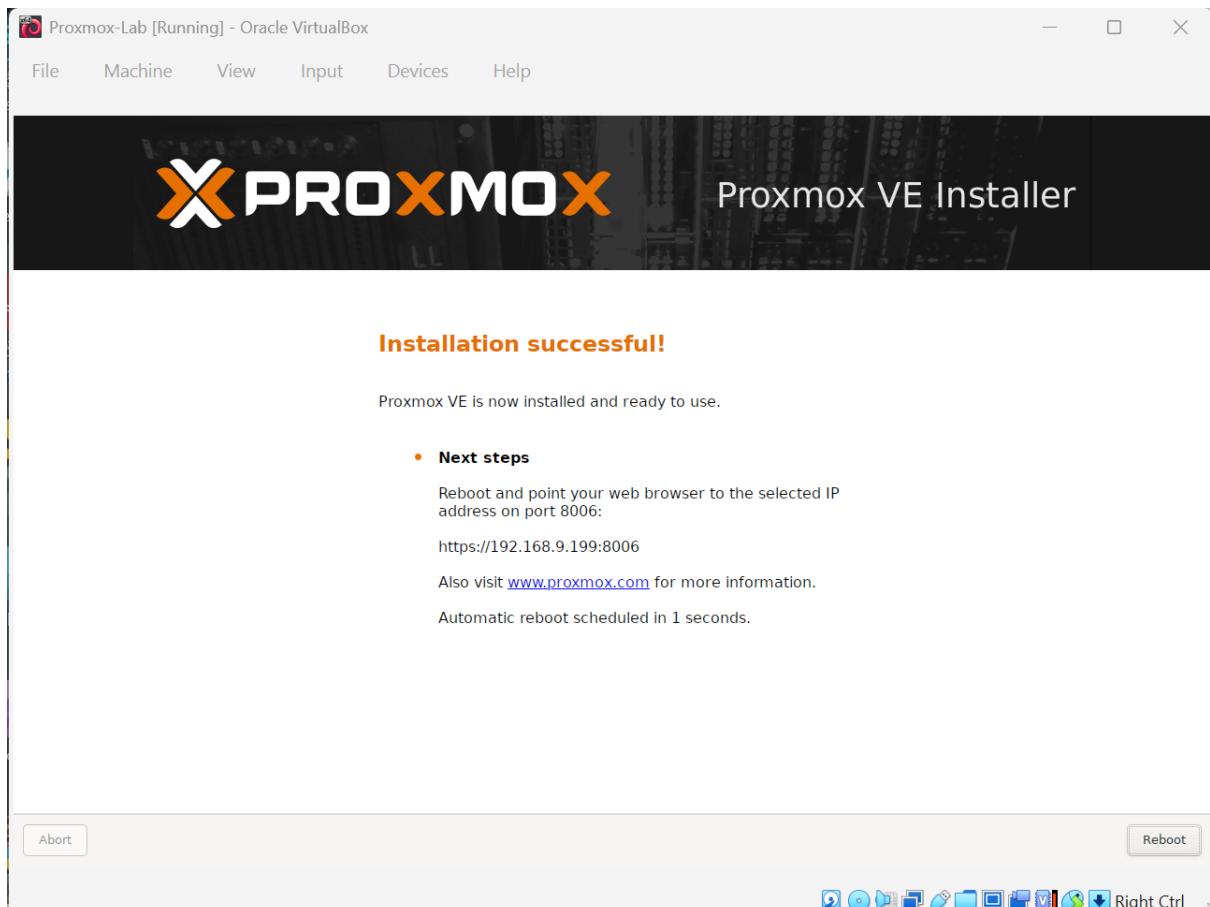


```
C:\Program Files\Oracle\VirtualBox>VBoxManage.exe modifyvm Proxmox-Lab --nested-hw-virt on
C:\Program Files\Oracle\VirtualBox>
```









The screenshot shows the Proxmox Virtual Environment 8.4.0 interface. The left sidebar is titled "Datacenter" and contains a search bar and several navigation items: Summary, Notes, Cluster, Ceph, Options, Storage, Backup, Replication, Permissions, Users, API Tokens, and Two Factor. The main panel displays a table of resources:

| Type    | Description        | Disk usage... | Memory us... | CPU usage     | Uptime   | Host CPU |
|---------|--------------------|---------------|--------------|---------------|----------|----------|
| node    | pve                | 13.1 %        | 23.9 %       | 1.5% of 2 ... | 00:03:37 | -        |
| sdn     | localnetwork (pve) |               |              |               | -        |          |
| storage | local (pve)        | 13.1 %        |              |               | -        |          |
| storage | local-lvm (pve)    | 0.0 %         |              |               | -        |          |

At the bottom, there is a "Tasks" section showing a single entry: "Dec 04 14:07:12 Dec 04 14:07:12 pve root@pam Bulk start VMs and Containers OK".

Create: Virtual Machine

**General** OS System Disks CPU Memory Network Confirm

|  |                          |                       |         |
|--|--------------------------|-----------------------|---------|
| Node:                                    | pve                      | Resource Pool:        |         |
| VM ID:                                   | 100                      | Start/Shutdown order: | any     |
| Name:                                    | Ubuntu-server-9          | Startup delay:        | default |
| Start at boot:                           | <input type="checkbox"/> | Shutdown timeout:     | default |
| <b>Tags</b><br>No Tags <a href="#">+</a> |                          |                       |         |

Help Advanced  Back Next

X PROXMOX Virtual Environment 8.4.0 Search Documentation Create VM Create CT root@pam

Server View Storage 'local' on node 'pve'

| Datacenter |                 | Summary | Upload       | Download from URL | Remove      | Search: Name, Format | Date | Format | Size |
|------------|-----------------|---------|--------------|-------------------|-------------|----------------------|------|--------|------|
|            | pve             |         | local (pve)  |                   | ISO Images  |                      |      |        |      |
|            | local-lvm (pve) |         | CT Templates |                   | Permissions |                      |      |        |      |

**Upload**

File: C:\fakepath\ubuntu-22.04.5-live-server-amd64.iso [Select File](#)

File name: ubuntu-22.04.5-live-server-amd64.iso

File size: 1.99 GiB

MIME type: -

Hash algorithm: None

Checksum: none

Uploads are stored temporarily in '/var/tmp', make sure there is enough free space.

Abort Upload

Tasks Cluster log

| Start Time      | End Time        | Node | User name | Description                   | Status |
|-----------------|-----------------|------|-----------|-------------------------------|--------|
| Dec 04 14:22:19 | Dec 04 14:22:25 | pve  | root@pam  | Shell                         | OK     |
| Dec 04 14:07:12 | Dec 04 14:07:12 | pve  | root@pam  | Bulk start VMs and Containers | OK     |

## Task viewer: Copy data



Output Status

Stop

Download

```
starting file import from: /var/tmp/pveupload-2187d6913fee42f74a7b92145760394b
target node: pve
target file: /var/lib/vz/template/iso/ubuntu-22.04.5-live-server-amd64.iso
file size is: 2136926208
command: cp -- /var/tmp/pveupload-2187d6913fee42f74a7b92145760394b /var/lib/vz/template/iso/ubuntu-22.04.5-live-server-amd64.iso
finished file import successfully
TASK OK
```

## Create: Virtual Machine



General OS System Disks CPU Memory Network Confirm

Node:

pve

Resource Pool:

VM ID:

100

Name:

Ubuntu-server-9

Start at boot:

Start/Shutdown  
order:

any

Startup delay:

default

Shutdown timeout:

default

Tags

No Tags



Help

Advanced

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Next

### Create: Virtual Machine

Use CD/DVD disc image file (iso)

Storage: local ISO image: ubuntu-22.04.5-live-se

Use physical CD/DVD Drive

Do not use any media

Guest OS:

Type: Linux Version: 6.x - 2.6 Kernel

Advanced  Back Next

### Create: Virtual Machine

General OS **System** Disks CPU Memory Network Confirm

Graphic card: Default SCSI Controller: VirtIO SCSI single

Machine: Default (i440fx) Qemu Agent:

Firmware

BIOS: Default (SeaBIOS) Add TPM:

Help Advanced  Back Next

Create: Virtual Machine

**CPU**

General OS System Disks CPU Memory Network Confirm

|               |           |              |                          |
|---------------|-----------|--------------|--------------------------|
| Sockets:      | 1         | Type:        | host                     |
| Cores:        | 2         | Total cores: | 2                        |
| VCPUs:        | 2         | CPU units:   | 100                      |
| CPU limit:    | unlimited | Enable NUMA: | <input type="checkbox"/> |
| CPU Affinity: | All Cores |              |                          |

Extra CPU Flags:

|         |         |           |   |
|---------|---------|-----------|---|
| Default | - ○●○ + | md-clear  | Required to let the guest OS know if MDS is mitigated correctly           |
| Default | - ○●○ + | pcid      | Meltdown fix cost reduction on Westmere, Sandy-, and IvyBridge Intel CPUs |
| Default | - ○●○ + | spec-ctrl | Allows improved Spectre mitigation with Intel CPUs                        |
| Default | - ○●○ + | ssbd      | Protection for "Speculative Store Bypass" for Intel models                |
| Default | - ○●○ + | ibpb      | Allows improved Spectre mitigation with AMD CPUs                          |
| Default | - ○●○ + | virt-ssbd | Basis for "Speculative Store Bypass" protection for AMD models            |

Help Advanced  Back Next

Create: Virtual Machine

**Memory**

General OS System Disks CPU Memory Network Confirm

|                       |                                     |
|-----------------------|-------------------------------------|
| Memory (MiB):         | 2048                                |
| Minimum memory (MiB): | 2048                                |
| Shares:               | Default (1000)                      |
| Ballooning Device:    | <input checked="" type="checkbox"/> |

Help Advanced  Back Next

Create: Virtual Machine

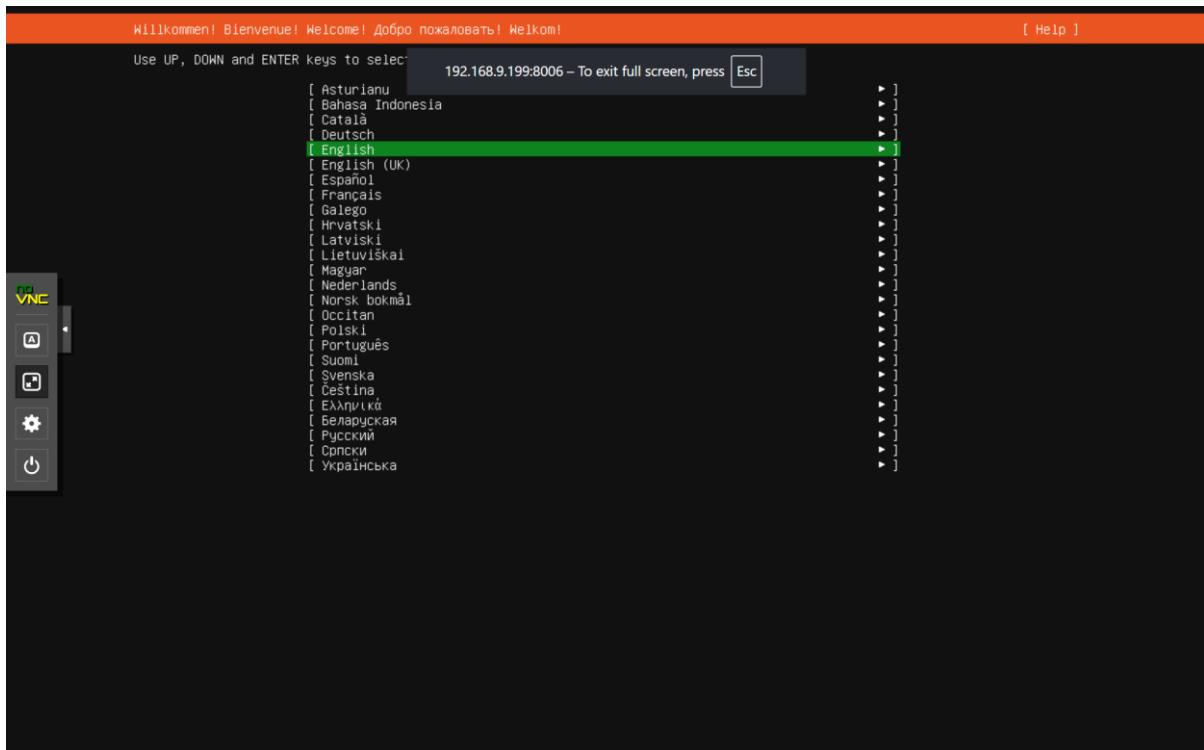
**CPU**

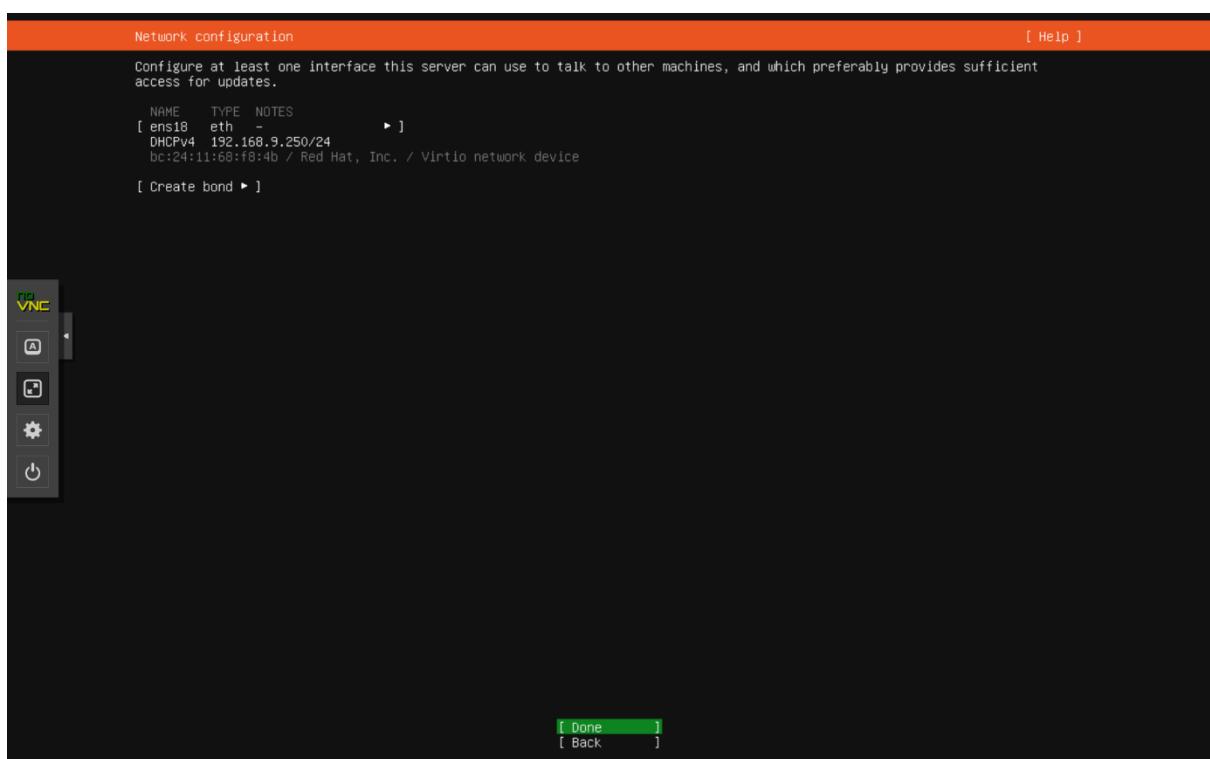
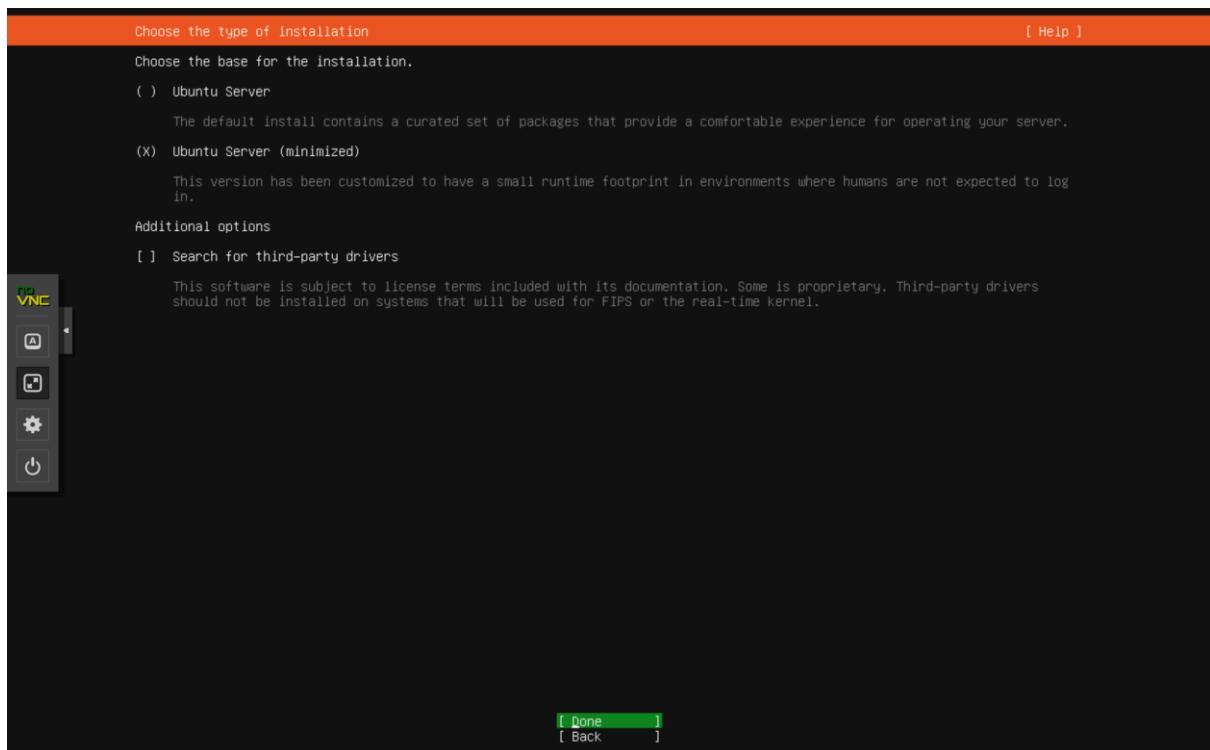
|               |           |              |                          |
|---------------|-----------|--------------|--------------------------|
| Sockets:      | 1         | Type:        | x86-64-v2-AES            |
| Cores:        | 2         | Total cores: | 2                        |
| VCPUs:        | 2         | CPU units:   | 100                      |
| CPU limit:    | unlimited | Enable NUMA: | <input type="checkbox"/> |
| CPU Affinity: | All Cores |              |                          |

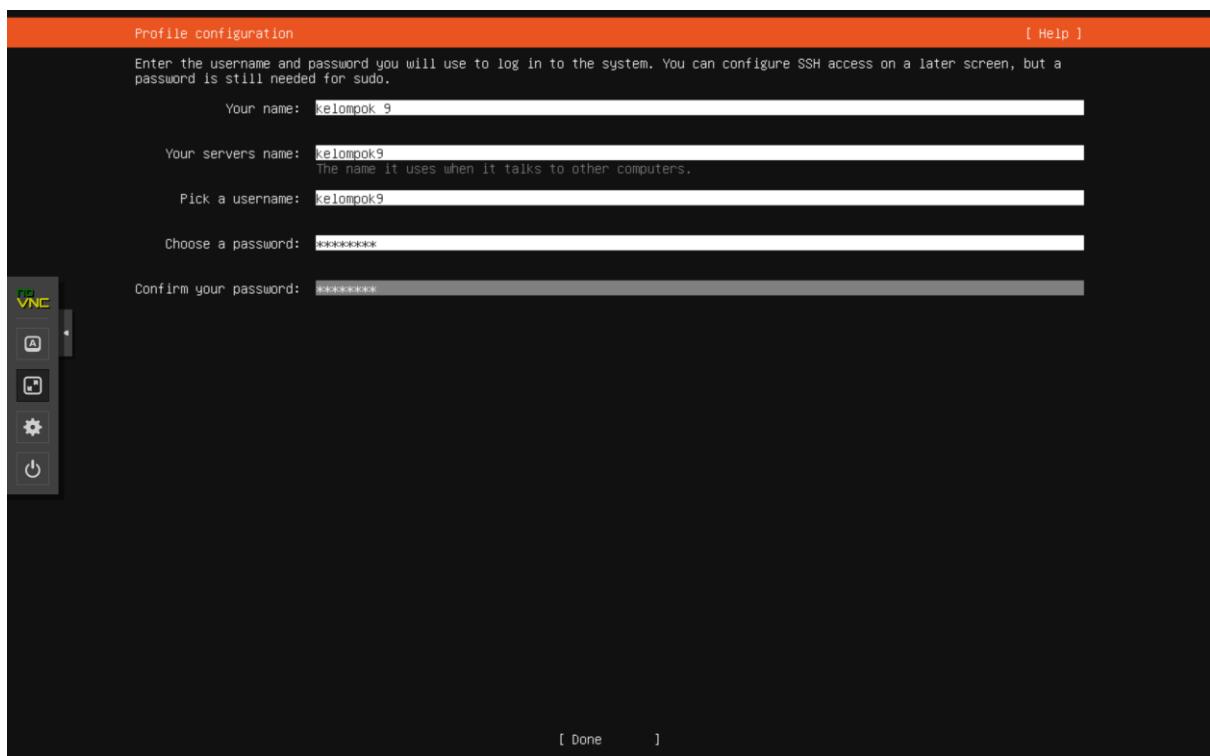
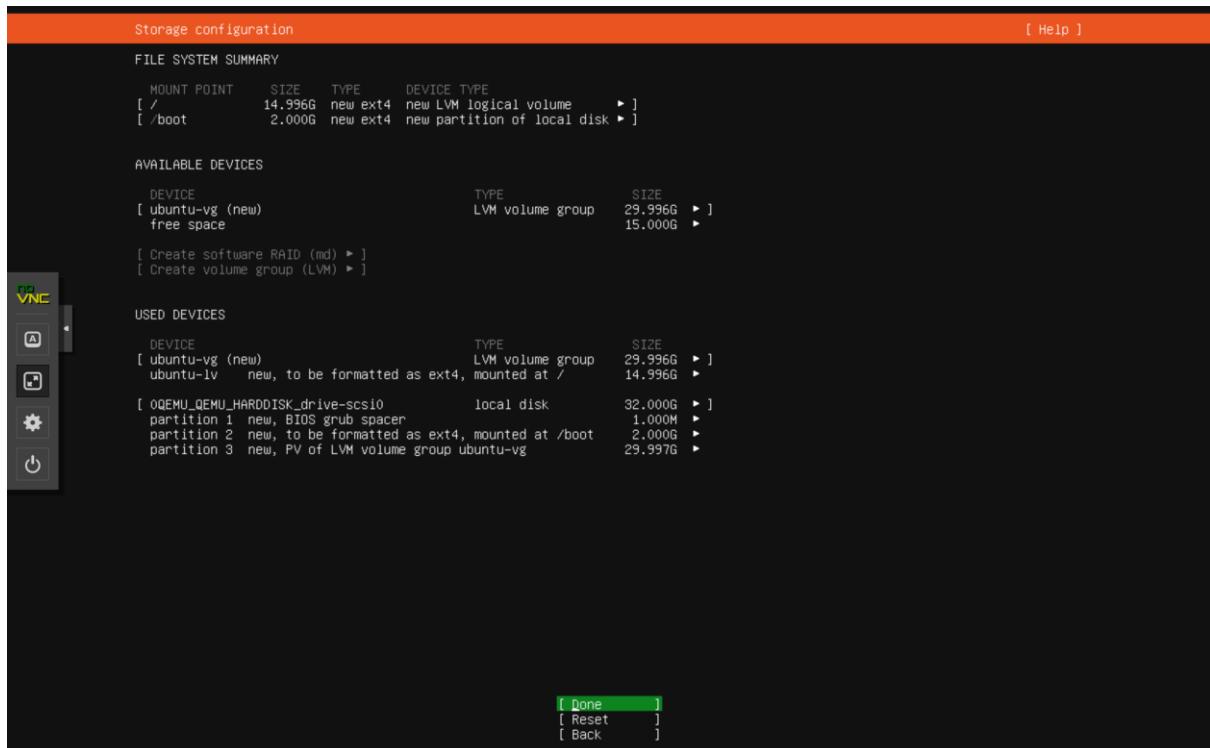
Extra CPU Flags:

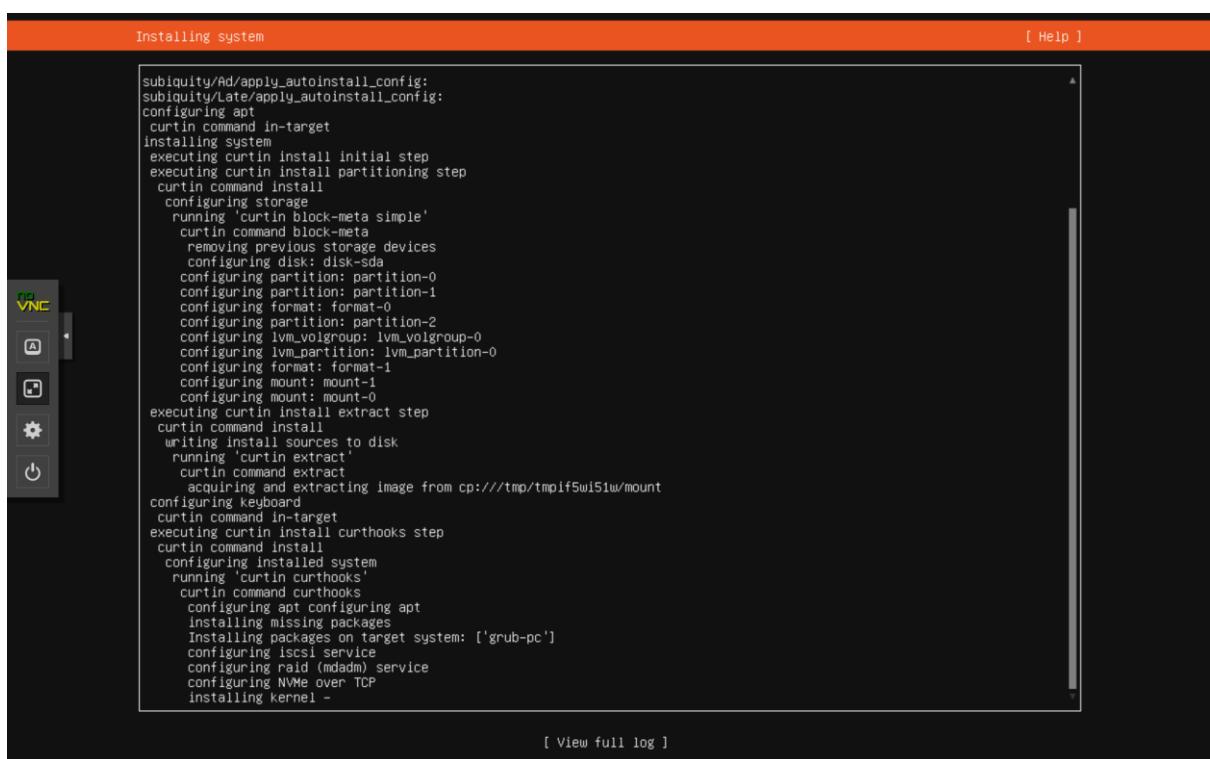
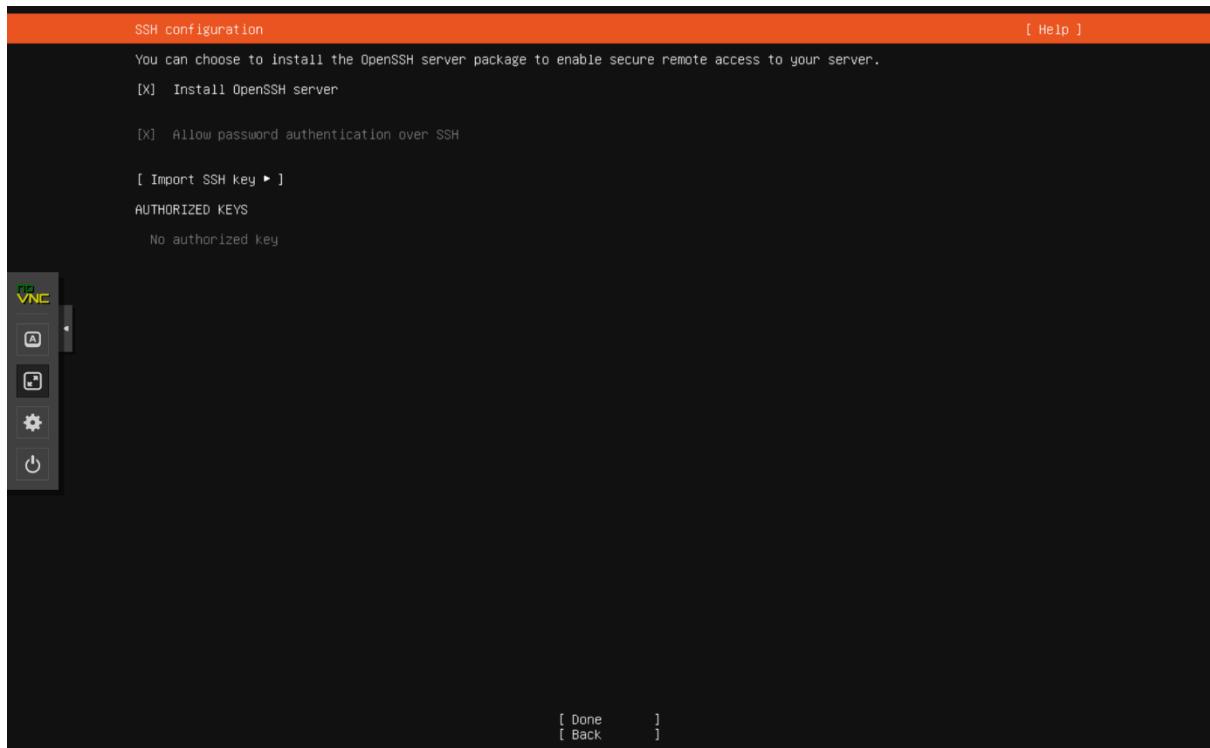
|         |  |           |   |
|---------|--|-----------|---|
| Default | - <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> + | md-clear  | Required to let the guest OS know if MDS is mitigated correctly           |
| Default | - <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> + | pcid      | Meltdown fix cost reduction on Westmere, Sandy-, and IvyBridge Intel CPUs |
| Default | - <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> + | spec-ctrl | Allows improved Spectre mitigation with Intel CPUs                        |
| Default | - <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> + | ssbd      | Protection for "Speculative Store Bypass" for Intel models                |
| Default | - <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> + | ibpb      | Allows improved Spectre mitigation with AMD CPUs                          |
| Default | - <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> + | virt-ssbd | Basis for "Speculative Store Bypass" protection for AMD models            |

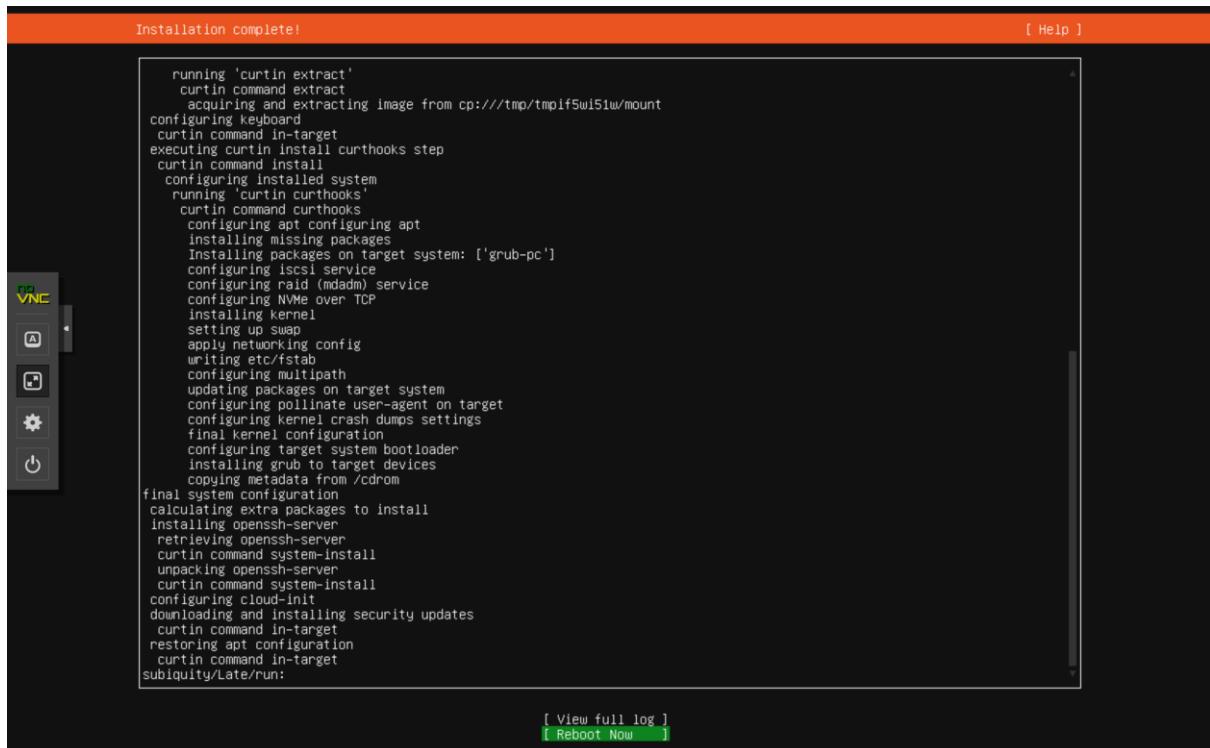
Help  Advanced  Back Next











```
Login incorrect
kelompok9 login: kelompok9
password:
Welcome to Ubuntu 22.04.5 LTS (GNU/Linux 5.15.0-163-generic x86_64)

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

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

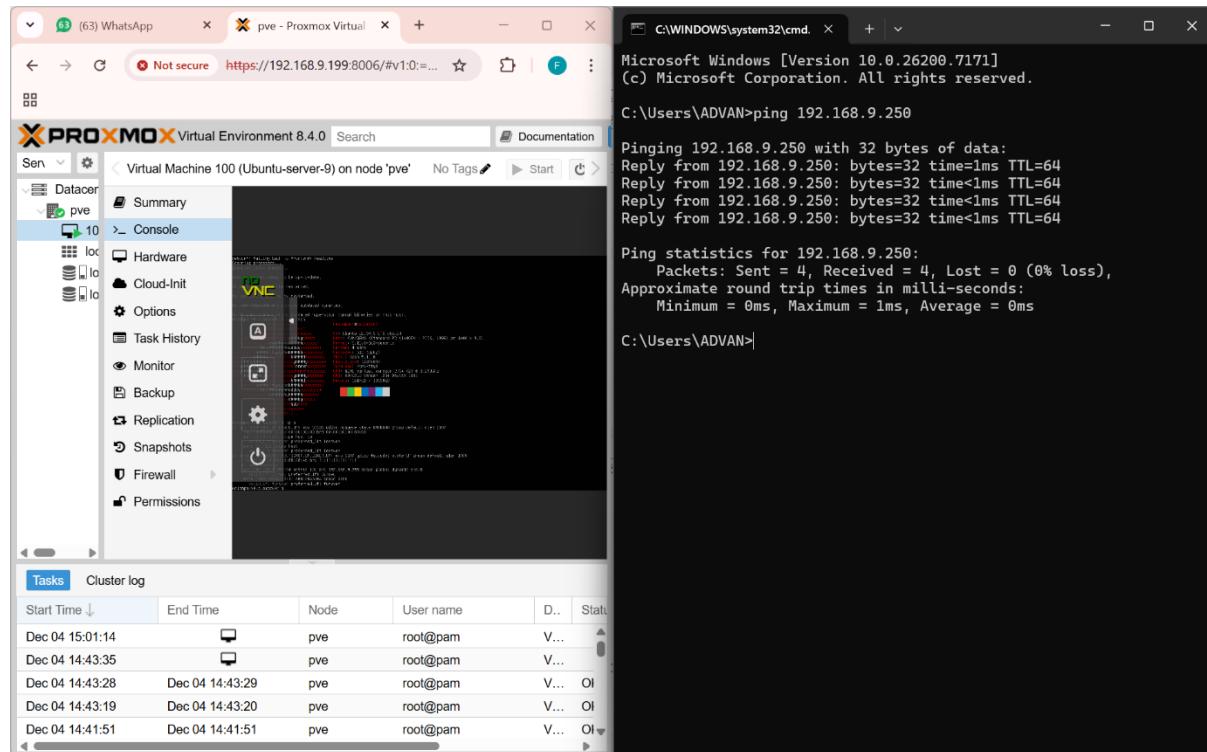
To restore this content, you can run the 'unminimize' command.

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/<package>/copyright.

[VNC] comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

[A] To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

[?] kelompok9@kelompok9:~$ ip a
1: lo <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
2: eth0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether bc:24:11:68:f8:4b brd ff:ff:ff:ff:ff:ff
    altname enp0s18
    inet 192.168.9.250/24 metric 100 brd 192.168.9.255 scope global dynamic ens18
        valid_lft 514sec preferred_lft 514sec
        inet6 fe80::be24:11ff:fe68:f84b/64 scope link
            valid_lft forever preferred_lft forever
kelompok9@kelompok9:~$ sudo apt update
[sudo] password for kelompok9:
Hit:1 http://id.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://id.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://id.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu jammy-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
46 packages can be upgraded. Run 'apt list --upgradable' to see them.
kelompok9@kelompok9:~$
```



Task viewer: VM 100 - Snapshot

**Output** Status

Stop Download

```

WARNING: You have not turned on protection against thin pools running out of space.
WARNING: Set activation/thin_pool_autoextend_threshold below 100 to trigger automatic extension of thin pools before they get full.
Logical volume "vm-100-state-farhan_keren" created.
WARNING: Sum of all thin volume sizes (<36.49 GiB) exceeds the size of thin pool pve/data and the amount of free space in volume group (<6.13 GiB).
saving VM state and RAM using storage 'local-lvm'
290.00 B in 0s
378.70 MiB in 1s
481.58 MiB in 2s
595.19 MiB in 3s
688.04 MiB in 4s
798.93 MiB in 5s
845.18 MiB in 6s
845.68 MiB in 7s
1022.51 MiB in 8s
completed saving the VM state in 8s, saved 1.08 GiB
snapshotting 'drive-scsi0' (local-lvm:vm-100-disk-0)
WARNING: You have not turned on protection against thin pools running out of space.
WARNING: Set activation/thin_pool_autoextend_threshold below 100 to trigger automatic extension of thin pools before they get full.
Logical volume "snap_vm-100-disk-0_farhan_keren" created.
WARNING: Sum of all thin volume sizes (<68.49 GiB) exceeds the size of thin pool pve/data and the size of whole volume group (<49.50 GiB).
TASK OK

```

PROXMOX Virtual Environment 8.4.0 Search

Virtual Machine 100 (Ubuntu-server-9) on node 'pve' No Tags

Documentation Create VM Create CT root@pam

Ser Datacenter pve 10

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

Take Snapshot Rollback Edit Remove

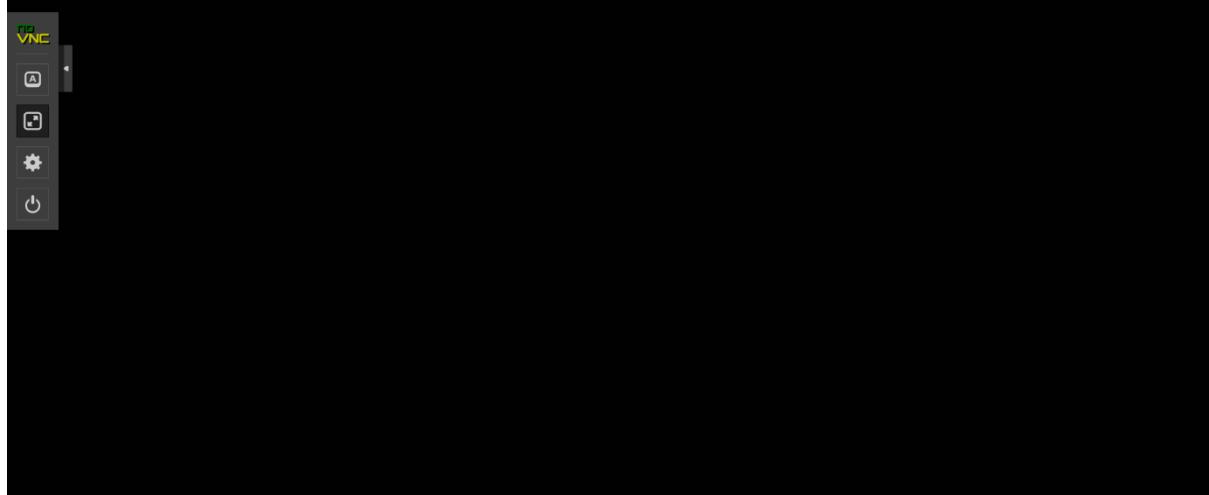
| Name        | RAM | Date/Status         | Description   |
|-------------|-----|---------------------|---------------|
| farhankeren | Yes | 2025-12-04 15:34:48 | You are here! |

Start Shutdown Console More Help

Tasks Cluster log

| Start Time      | End Time        | Node | User name | Description              | Status |
|-----------------|-----------------|------|-----------|--------------------------|--------|
| Dec 04 15:34:47 | Dec 04 15:34:58 | pve  | root@pam  | VM 100 - Snapshot        | OK     |
| Dec 04 15:33:51 | Dec 04 15:34:40 | pve  | root@pam  | VM/CT 100 - Console      | OK     |
| Dec 04 15:33:47 | Dec 04 15:33:47 | pve  | root@pam  | VM 100 - Delete Snapshot | OK     |
| Dec 04 15:33:07 | Dec 04 15:33:10 | pve  | root@pam  | VM/CT 100 - Console      | OK     |
| Dec 04 15:32:48 | Dec 04 15:33:07 | pve  | root@pam  | VM/CT 100 - Console      | OK     |
| Dec 04 15:32:37 | Dec 04 15:32:40 | pve  | root@pam  | VM/CT 100 - Console      | OK     |

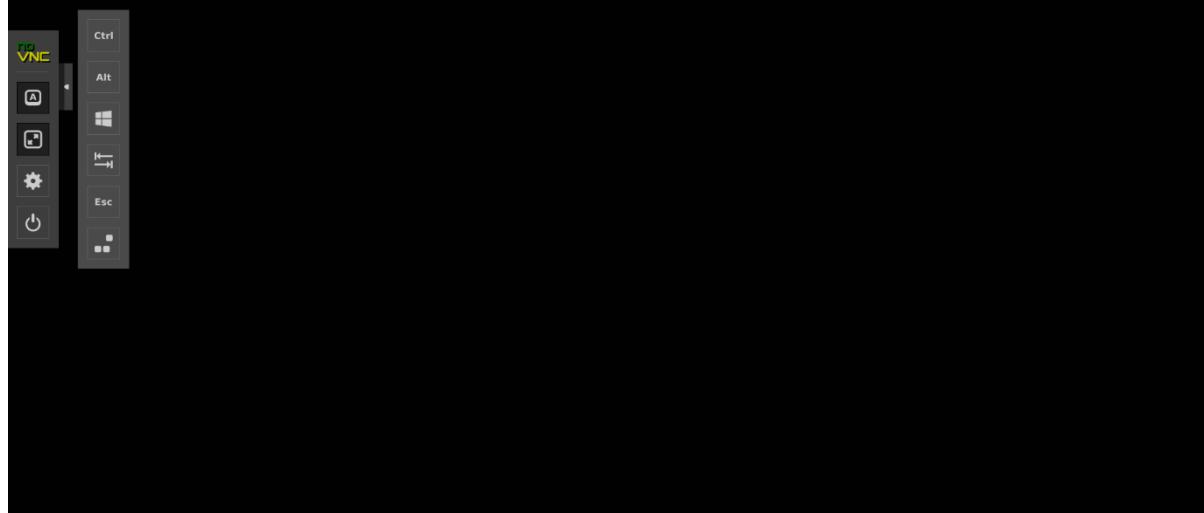
```
kelompok9@kelompok9:~$ echo "farhankeren" > fakta.txt
kelompok9@kelompok9:~$ rm fakta.txt
kelompok9@kelompok9:~$
```



The screenshot shows the Proxmox Virtual Environment 8.4.0 interface. On the left, a sidebar lists storage (Datacenter), hosts (pve), and virtual machines (VM 10). VM 10 is selected, showing its summary, hardware, and snapshots. The 'Solutions' tab is active. In the center, a table shows the snapshot 'farhankeren' with details: Name: farhankeren, RAM: Yes, Date/Status: 2025-12-04 15:34:48, Description: You are here!. A 'Task: VM 100 - Rollback' dialog is open, showing a progress bar at 'running...'. At the bottom, a table lists recent tasks:

| Start Time      | End Time        | Node | User name | Description              | Status     |
|-----------------|-----------------|------|-----------|--------------------------|------------|
| Dec 04 15:35:54 |                 | pve  | root@pam  | VM 100 - Rollback        | running... |
| Dec 04 15:35:16 | Dec 04 15:35:49 | pve  | root@pam  | VM/CT 100 - Console      | OK         |
| Dec 04 15:34:47 | Dec 04 15:34:58 | pve  | root@pam  | VM 100 - Snapshot        | OK         |
| Dec 04 15:33:51 | Dec 04 15:34:40 | pve  | root@pam  | VM/CT 100 - Console      | OK         |
| Dec 04 15:33:47 | Dec 04 15:33:47 | pve  | root@pam  | VM 100 - Delete Snapshot | OK         |
| Dec 04 15:33:07 | Dec 04 15:33:10 | pve  | root@pam  | VM/CT 100 - Console      | OK         |

```
kelompok9@kelompok9:~$ ls  
fakta.txt  
kelompok9@kelompok9:~$
```



Backup VM 100 (Ubuntu-server-9)

|                            |                          |                    |                      |
|----------------------------|--------------------------|--------------------|----------------------|
| Storage:                   | local                    | Compression:       | ZSTD (fast and good) |
| Mode:                      | Stop                     | Notification mode: | Auto                 |
| Protected:                 | <input type="checkbox"/> | Send email to:     | none                 |
| PBS change detection mode: | Default                  |                    |                      |
| Notes:                     | {{guestname}}            |                    |                      |

Possible template variables are: {{cluster}}, {{guestname}}, {{node}}, {{vmid}}

[Help](#) [Backup](#)

Mode User name Description

**X PROXMOX Virtual Environment 8.4.0** Search

Virtual Machine 100 (Ubuntu-server-9) on node 'pve' No Tags

Start Shutdown Console More Help

**Task viewer: VM/CT 100 - Backup**

**Output** Status

Stop Download

```
INFO: 11% (3.8 GB of 32.0 GB) in 1s, read: 224.8 MB/s, write: 195.2 MB/s
INFO: 14% (4.7 GB of 32.0 GB) in 1s, read: 313.0 MB/s, write: 176.6 MB/s
INFO: 16% (5.3 GB of 32.0 GB) in 1s, read: 183.6 MB/s, write: 148.4 MB/s
INFO: 19% (6.3 GB of 32.0 GB) in 1s, read: 371.0 MB/s, write: 107.8 MB/s
INFO: 21% (7.0 GB of 32.0 GB) in 1s, read: 218.3 MB/s, write: 160.1 MB/s
INFO: 27% (8.7 GB of 32.0 GB) in 1s, read: 570.7 MB/s, write: 133.2 MB/s
INFO: 28% (9.1 GB of 32.0 GB) in 1s, read: 140.2 MB/s, write: 135.1 MB/s
INFO: 33% (10.7 GB of 32.0 GB) in 1s, read: 549.4 MB/s, write: 83.9 MB/s
INFO: 46% (14.8 GB of 32.0 GB) in 1s, read: 1.4 GB/s, write: 28.0 KB/s
INFO: 58% (18.9 GB of 32.0 GB) in 1s, read: 1.4 GB/s, write: 10.7 KB/s
INFO: 71% (22.9 GB of 32.0 GB) in 1s, read: 1.3 GB/s, write: 0 B/s
INFO: 84% (27.0 GB of 32.0 GB) in 1s, read: 1.3 GB/s, write: 0 B/s
INFO: 96% (31.0 GB of 32.0 GB) in 1s, read: 1.3 GB/s, write: 0 B/s
INFO: 100% (32.0 GB of 32.0 GB) in 1s, read: 1.0 GB/s, write: 8.0 KB/s
INFO: backup is sparse: 27.62 GB (86%) total zero data
INFO: transferred 32.0 GB in 49 seconds (668.7 MB/s)
INFO: stopping kvm after backup task
INFO: archive file size: 1.69GB
INFO: adding notes to backup
INFO: Finished Backup of VM 100 (00:00:51)
INFO: Backup job finished at 2025-12-04 15:38:35
INFO: Backup job finished successfully
INFO: notified via target 'mail-to-root'
TASK OK
```

Start Time ↓ End Time

| Start Time      | End Time        |
|-----------------|-----------------|
| Dec 04 15:37:44 | Dec 04 15:38:35 |
| Dec 04 15:37:04 | Dec 04 15:37:44 |
| Dec 04 15:36:06 | Dec 04 15:37:11 |
| Dec 04 15:35:54 | Dec 04 15:35:58 |
| Dec 04 15:35:16 | Dec 04 15:35:49 |
| Dec 04 15:34:47 | Dec 04 15:34:59 |

Tasks Cluster log

Status

**X PROXMOX Virtual Environment 8.4.0** Search

Virtual Machine 100 (Ubuntu-server-9) on node 'pve' No Tags

Start Shutdown Console More Help

**Backup now** Restore Show Configuration Edit Notes Change Protection Remove Storage: local

| Name  | Notes           | Date ↓              | Format  | Size    |
|---|-----------------|---------------------|---------|---------|
| vzdump-qemu-100-2025_12_04-15_37_44.vma.zst | Ubuntu-server-9 | 2025-12-04 15:37:44 | vma.zst | 1.80 GB |

**Server View**

**Datacenter**

- pve
  - 100 (Ubuntu-server-9)
    - localnetwork (pve)
    - local (pve)
    - local-lvm (pve)

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

pve - Proxmox Virtual Environment | roleback - Penelusuran Google

<https://192.168.9.199:8006/#v1.0:=qemu%2F100:4>

**XPROXMOX Virtual Environment 8.4.0**

Virtual Machine 100 (Ubuntu-server-9) on node 'pve' No Tags

Start Shutdown Console More Help

**Summary**

**Ubuntu-server-9 (Uptime: 00:01:32)**

- Status: running
- HA State: none
- Node: pve
- CPU usage: 0.66% of 2 CPU(s)
- Memory usage: 14.95% (306.07 MiB of 2.00 GiB)
- Bootdisk size: 32.00 GiB
- IPs: Guest Agent not running

**Notes**

**CPU usage**

**Tasks Cluster log**

| Start Time      | End Time        | Node | User name | Description         | Status                      |
|-----------------|-----------------|------|-----------|---------------------|-----------------------------|
| Dec 04 15:41:15 | Dec 04 15:41:39 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:40:21 | Dec 04 15:40:48 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:40:20 | Dec 04 15:40:30 | pve  | root@pam  | VM/CT 100 - Console | Error: connection timed out |
| Dec 04 15:40:19 | Dec 04 15:40:20 | pve  | root@pam  | VM 100 - Start      | OK                          |
| Dec 04 15:37:44 | Dec 04 15:38:35 | pve  | root@pam  | VM/CT 100 - Backup  | OK                          |
| Dec 04 15:37:04 | Dec 04 15:37:12 | pve  | root@pam  | VM 100 - Shutdown   | OK                          |

```
kelompok9@kelompok9:~$ sudo apt upgrade
[sudo] password for kelompok9:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  libnss-systemd libpam-systemd libudev1 systemd systemd-sysv systemd-timesyncd udev
The following packages will be upgraded:
  apt cloud-init cryptsetup cryptsetup-bin cryptsetup-initramfs distro-info-data dm-eventd dmsetup gir1.2-packagekitglib-1.0 initramfs-tools
  initramfs-tools-bin initramfs-tools-core libapt-pkg6.0 libcryptsetup12 libdevmapper-event1.02.1 libdevmapper1.02.1 libglib2.0-0 libglib2.0-bin
  libglib2.0-0-data libldap-2.5-0 libldap-common liblvm2cmd2.03 libopeniscsiusr libpackagekit1-glib2-18 libseccomp2 linux-base lvm2 needrestart open-iscsi
  packagekit packagekit-tools pci.ids polinate python3-update-manager snapd systemd-hwe-hudb ubuntu-server-minimal xfsprogs
38 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
Need to get 41.4 MB of archives.
After this operation, 16.7 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
get:1 http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libapt-pkg6.0 amd64 2.4.14 [912 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libseccomp2 amd64 2.5.3-2ubuntu3~22.04.1 [47.4 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 apt amd64 2.4.14 [1363 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libdevmapper1.02.1 amd64 2:1.02.175-2.1ubuntu5 [139 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libdevmapper-event1.02.1 amd64 2:1.02.175-2.1ubuntu5 [12.7 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dmsetup amd64 2:1.02.175-2.1ubuntu5 [81.7 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 liblvm2cmd2.03 amd64 2.03.11-2.1ubuntu5 [757 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dmeventd amd64 2:1.02.175-2.1ubuntu5 [38.2 kB]
http://id.archive.ubuntu.com/ubuntu jammy-updates/main amd64 lvm2 amd64 2.03.11-2.1ubuntu5 [1154 kB]
lvm2 8635 B/1154 kB 1%
```

VNC

Power

**X PROXMOX Virtual Environment 8.4.0**

Server View | Documentation | Create VM | Create CT | root@pam | More | Help

Virtual Machine 100 (Ubuntu-server-9) on node 'pve' | No Tags | Start | Shutdown | Console | More | Help

**Summary**

Ubuntu-server-9 (Uptime: 00:02:41)

- Status: running
- HA State: none
- Node: pve
- CPU usage: 53.32% of 2 CPU(s)
- Memory usage: 28.87% (591.33 MiB of 2.00 GiB)
- Bootdisk size: 32.00 GiB
- IPs: Guest Agent not running

**Notes**

Hour (average)

**Tasks** Cluster log

| Start Time      | End Time        | Node | User name | Description         | Status                      |
|-----------------|-----------------|------|-----------|---------------------|-----------------------------|
| Dec 04 15:42:00 | Dec 04 15:42:36 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:41:15 | Dec 04 15:41:39 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:40:21 | Dec 04 15:40:48 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:40:20 | Dec 04 15:40:30 | pve  | root@pam  | VM/CT 100 - Console | Error: connection timed out |
| Dec 04 15:40:19 | Dec 04 15:40:20 | pve  | root@pam  | VM 100 - Start      | OK                          |
| Dec 04 15:27:44 | Dec 04 15:29:25 | pve  | root@pam  | VM/CT 100 - Backup  | OK                          |

**X PROXMOX Virtual Environment 8.4.0**

Server View | Documentation | Create VM | Create CT | root@pam | More | Help

Virtual Machine 100 (Ubuntu-server-9) on node 'pve' | No Tags | Start | Shutdown | Console | More | Help

**Summary**

Ubuntu-server-9 (Uptime: 00:05:33)

- Status: running
- HA State: none
- Node: pve
- CPU usage: 0.69% of 2 CPU(s)
- Memory usage: 51.45% (1.03 GiB of 2.00 GiB)
- Bootdisk size: 32.00 GiB
- IPs: Guest Agent not running

**Notes**

Hour (average)

**Tasks** Cluster log

| Start Time      | End Time        | Node | User name | Description         | Status                      |
|-----------------|-----------------|------|-----------|---------------------|-----------------------------|
| Dec 04 15:43:17 | Dec 04 15:45:19 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:43:08 | Dec 04 15:43:13 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:42:00 | Dec 04 15:42:36 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:41:15 | Dec 04 15:41:39 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:40:21 | Dec 04 15:40:48 | pve  | root@pam  | VM/CT 100 - Console | OK                          |
| Dec 04 15:40:20 | Dec 04 15:40:30 | pve  | root@pam  | VM/CT 100 - Console | Error: connection timed out |

