

Implementasi VPN WireGuard untuk Secure Remote Access

Kelompok 7

1. Janumelah (2201020048)
2. Mohd Allifyan Baitul Nesam (2201020023)
3. Anjas Revaldo (2201020108)
4. Safitri Wulandari (2201020085)
5. Danish Arya Yudhistira (2201020110)
6. M. Aditya Egi Dwi Nata (2201020141)

Minggu 1: Instalasi Linux server dan client

Pada minggu 1 dilakukan tahap awal setup lingkungan percobaan VPN dengan membuat dua sistem operasi Linux menggunakan VMware Workstation, masing-masing berperan sebagai:

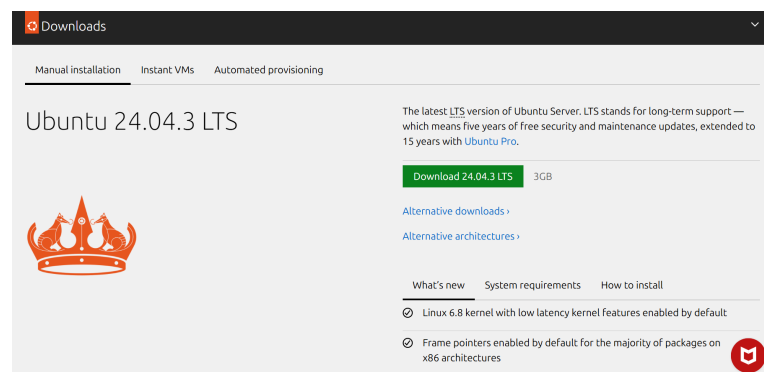
- a. Server akan dipasang WireGuard.
- b. Client akan terhubung ke server VPN.

Tahapan dan Proses:

1. Mengunduh file ISO Linux (Ubuntu Server dan Client)

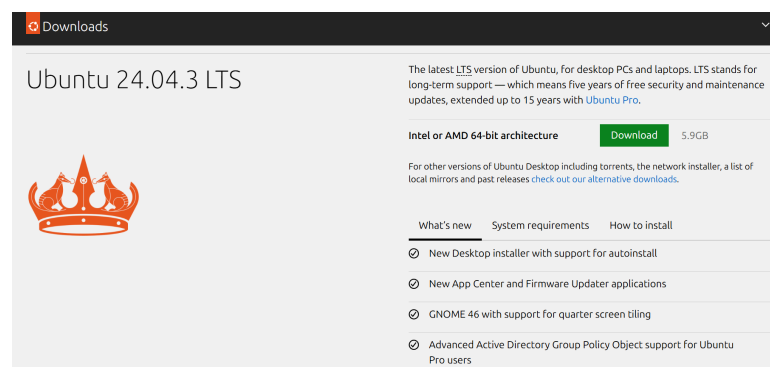
Tahap ini dilakukan untuk memperoleh file instalasi sistem operasi Ubuntu yang akan digunakan sebagai server dan client pada proses konfigurasi. Pada halaman resmi Ubuntu, terdapat dua jenis ISO yang diunduh:

a. Ubuntu Server 24.04.3 LTS



ISO ini digunakan untuk kebutuhan server karena menyediakan lingkungan minimal dan fitur yang sesuai untuk layanan jaringan serta administrasi sistem.

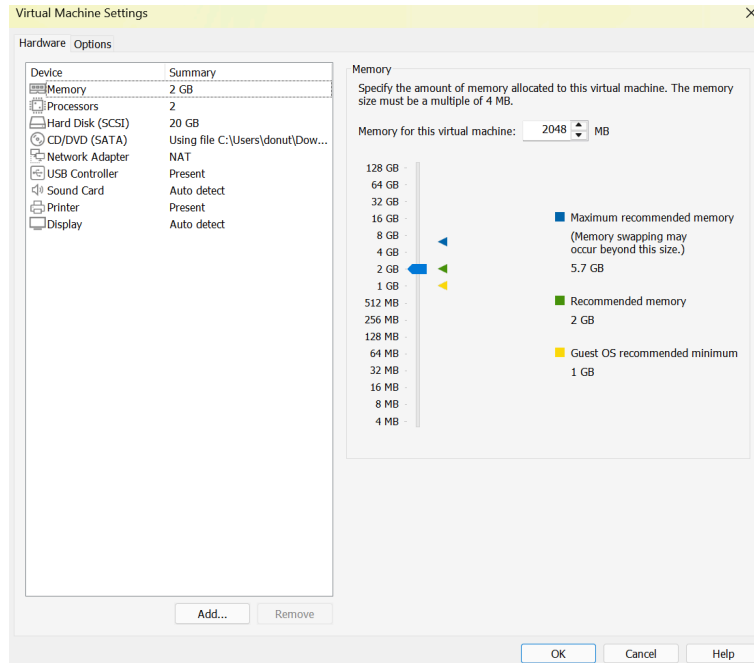
b. Ubuntu Desktop 24.04.3 LTS



ISO ini digunakan sebagai sisi client, menyediakan antarmuka grafis

(GUI) sehingga proses pengujian dan interaksi lebih mudah.

2. Membuat dua VM (Virtual Machine) dengan spesifikasi minimal



Pada tahap ini dilakukan pengaturan spesifikasi perangkat keras virtual untuk kedua VM, yaitu Ubuntu Server dan Ubuntu Client. Penyesuaian dilakukan melalui menu virtual machine settings pada VMware. Berdasarkan gambar di atas, VM Server dikonfigurasi dengan spesifikasi sebagai berikut:

a. Memory (RAM): 2 GB

Jumlah memori yang cukup untuk menjalankan layanan dasar Ubuntu Server.

b. Processors: 2 core

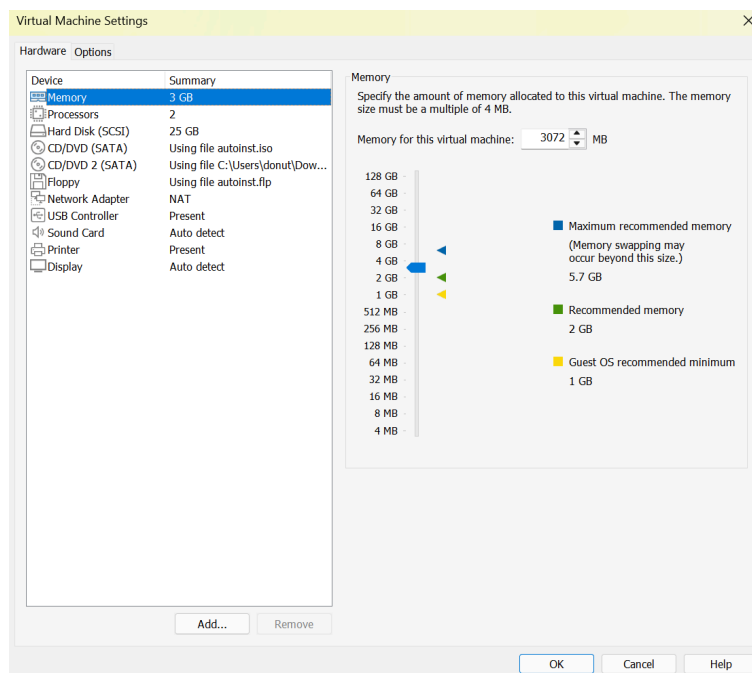
Memberikan performa yang lebih stabil untuk proses server.

c. Hard Disk: 20 GB

Kapasitas penyimpanan minimal untuk sistem operasi dan instalasi layanan tambahan.

d. Network Adapter: NAT

Menggunakan mode NAT agar server dapat terkoneksi dengan jaringan melalui IP host.



Pada gambar di atas, VM Client mendapatkan spesifikasi yang sedikit lebih tinggi karena menggunakan Ubuntu Desktop dengan antarmuka grafis (GUI):

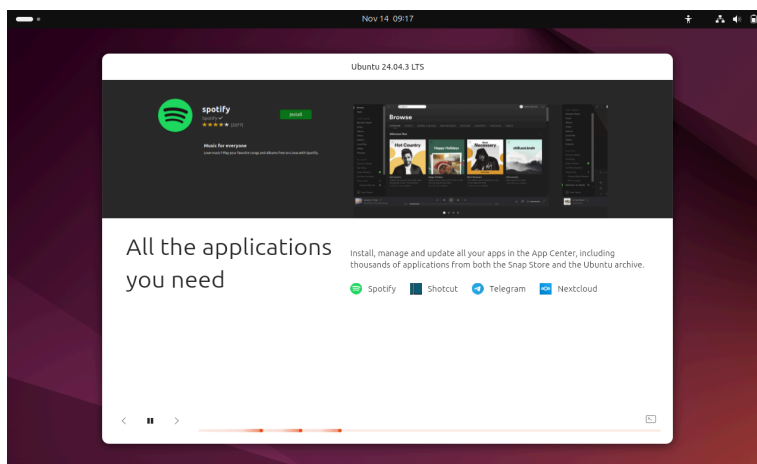
- a. Memory (RAM): 3 GB
Menyediakan memori tambahan untuk mendukung lingkungan desktop.
- b. Processors: 2 core
Memberikan kelancaran saat menjalankan aplikasi GUI.
- c. Hard Disk: 25 GB
Kapasitas lebih besar untuk menampung aplikasi dan kebutuhan pengguna.
- d. Network Adapter: NAT
Memungkinkan client memperoleh akses jaringan melalui host.

3. Melakukan instalasi sistem operasi Linux pada kedua VM

```
start: subiquity/install/install/curtin_install/run_curtin_step: executing curtin install extract step
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install: curtin command install
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract: writing install sources to disk
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract/builtin: running 'curtin extract'
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract/builtin/cmd-extract: curtin command extract
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract/builtin/cmd-extract/: acquiring and extracting image from csi://
/ripe/ripe80tc29/mount
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract/builtin/cmd-extract/: acquiring and extracting image from csi://
/ripe/ripe80tc29/mount
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract/builtin: running 'curtin extract'
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-extract: writing install sources to disk
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install: curtin command install
start: subiquity/install/install/curtin_install/run_curtin_step: executing curtin install extract step
start: subiquity/install/install/curtin_install/setup_target/cmd-in-target: curtin command in-target
start: subiquity/install/install/curtin_install/setup_target/cmd-in-target: curtin command in-target
finish: subiquity/install/install/curtin_install/setup_target: configuring keyboard
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install: curtin command install
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks: configuring installed system
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin: running 'curtin curthooks'
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks: curtin command curthooks
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/writing-apt-config: configuring apt con
figuring apt
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/writing-apt-config: configuring apt co
nfiguring apt
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/installing-missing-packages: installing
missing packages
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/: installing packages on target system
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/: installing packages on target system
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/installing-missing-packages: installin
g missing packages
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/installing-missing-packages: installin
g missing packages
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/configuring-iscsi-service: configuring
iscsi service
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/configuring-iscsi-service: configuring
iscsi service
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/configuring-mdadm-service: configuring
raid (mdadm) service
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/configuring-mdadm-service: configuring
raid (mdadm) service
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/configuring-nvme-over-tcp: configuring
nvme over tcp
finish: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/configuring-nvme-over-tcp: configuring
nvme over tcp
start: subiquity/install/install/curtin_install/run_curtin_step/cmd-install/stage-curthooks/builtin/cmd-curthooks/installing-kernel: installing kernel
start: subiquity/network/send_update: DMDEG error3
finish: subiquity/network/send_update: DMDEG error3
```

Pada gambar pertama, instalasi Ubuntu Server dilakukan melalui mode teks (terminal). Tahapan yang terlihat pada screenshot antara lain:

- Ekstraksi file instalasi ke disk VM.
- Instalasi paket inti (core system packages).
- Konfigurasi layanan sistem seperti network service.
- Instalasi kernel Linux.
- Persiapan sistem untuk reboot pertama setelah instalasi selesai.



Gambar di atas menunjukkan proses instalasi Ubuntu Desktop pada VM client. Tampilan installer menunjukkan:

- Pengenalan fitur-fitur Ubuntu (App Center, aplikasi-aplikasi populer).
- Proses instalasi berjalan di background.
- Menunggu hingga instalasi sistem selesai sepenuhnya.

4. Melakukan ping pada kedua sistem

```
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-67-generic x86_64)

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

System information as of Fri Nov 14 09:07:58 AM UTC 2025

System load:          0.02
Usage of /:            10.5% of 24.46GB
Memory usage:         2%
Swap usage:           0%
Processes:            32
Users logged in:       0
IPV4 address for enp0s3: 10.0.2.15
IPV6 address for enp0s3: fd17:625c:f037:2:a00:27ff:fe01:1c95

Expanded Security Maintenance for Applications is not enabled.

26 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

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.

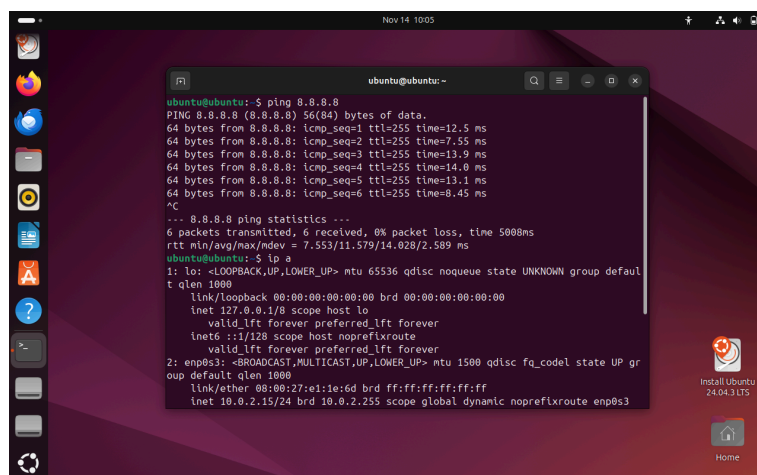
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@server01:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data:
64 bytes from 8.8.8.8: icmp_seq=1 ttl=255 time=10.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=7.32 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=6.7 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=8.44 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=255 time=10.2 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=255 time=7.22 ms

--- 8.8.8.8 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5006ms
rtt min/avg/max/mdev = 7.216/14.097/45.710/13.030 ms
ubuntu@server01:~$
```

Pada gambar di atas terlihat bahwa perintah ping 8.8.8.8 dijalankan pada sistem pertama. Hasil pengujian menunjukkan adanya reply dari host tujuan. Hal ini menandakan bahwa:

- Sistem pertama sudah memperoleh konfigurasi jaringan yang valid.
- Sistem dapat berkomunikasi keluar jaringan (akses internet tersedia).
- Tidak terdapat packet loss selama pengujian.



```
Nov 14 10:05

ubuntu@ubuntu:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data:
64 bytes from 8.8.8.8: icmp_seq=1 ttl=255 time=12.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=7.55 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=13.9 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=14.0 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=255 time=13.1 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=255 time=8.45 ms
^C
--- 8.8.8.8 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 7.553/11.579/14.028/2.589 ms
ubuntu@ubuntu:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    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
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:e1:1e:6d brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
```

Pada gambar di atas, sistem kedua juga menjalankan perintah ping 8.8.8.8 dan memperoleh hasil reply yang sama. Setelah pengujian ping, ditampilkan pula hasil perintah ip a yang menunjukkan:

- Interface jaringan dalam kondisi aktif.
- Sistem telah menerima alamat IP secara dinamis.
- Rute jaringan dan konfigurasi interface berfungsi dengan baik.

Hasil:

1. Dua mesin Linux berhasil dibuat dan terkoneksi ke jaringan internal VMware.
2. Sistem dapat saling ping, menandakan konektivitas awal sudah siap.
3. Lingkungan siap digunakan untuk instalasi WireGuard pada minggu ke-2.