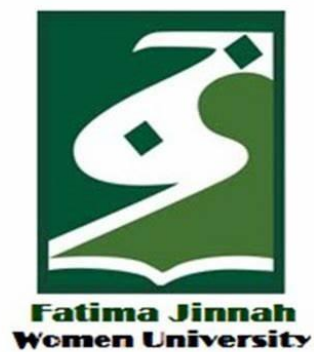


CLOUD COMPUTING LAB



SUBMITTED TO

SIR WAQAS

SUBMITTED BY

HAMNA MAHMOOD

2023-BSE-025

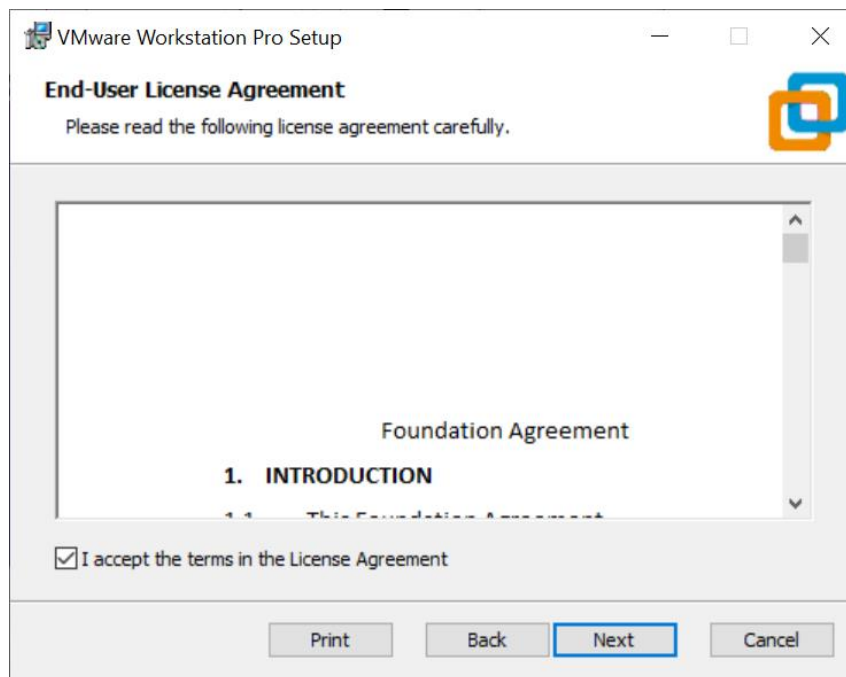
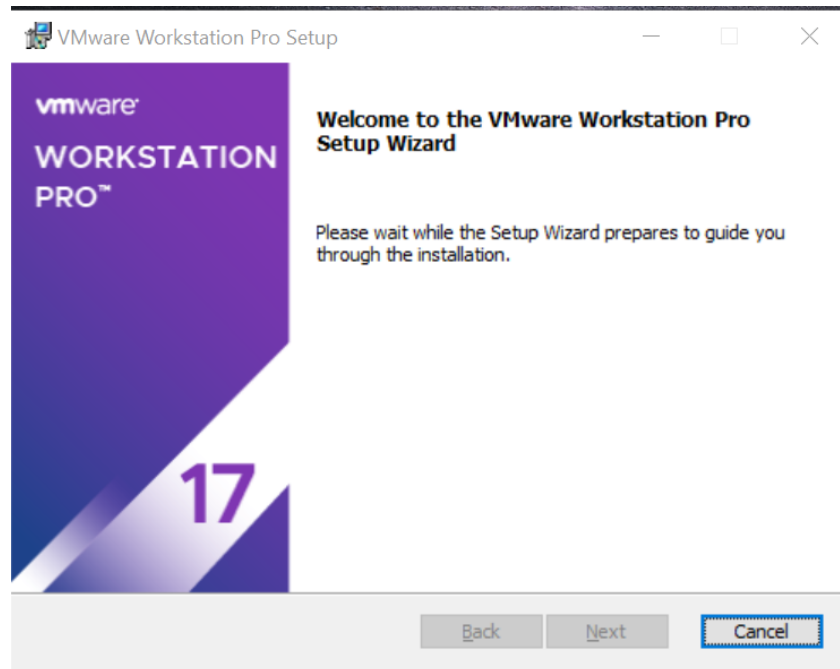
BSE V-A

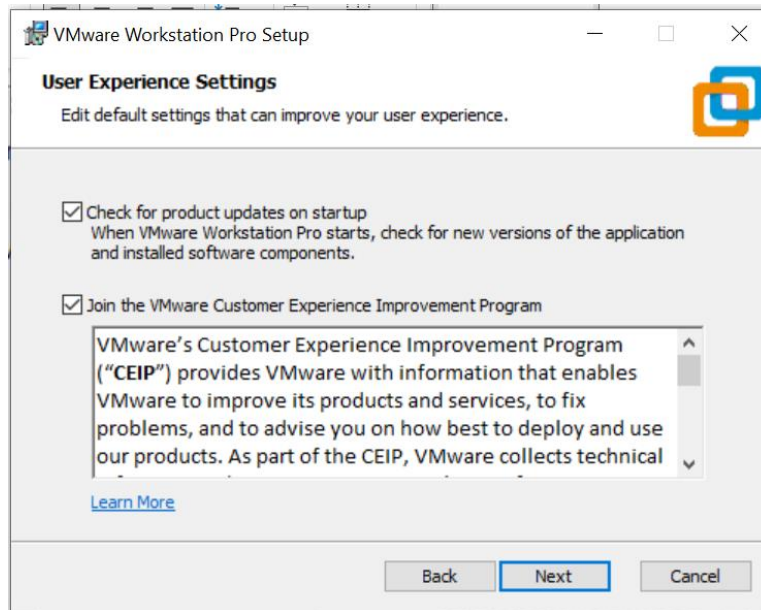
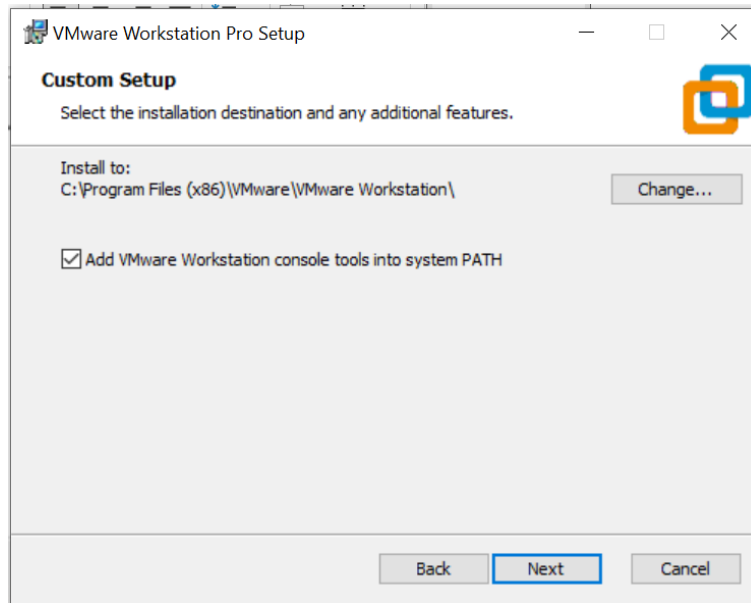
Lab 01

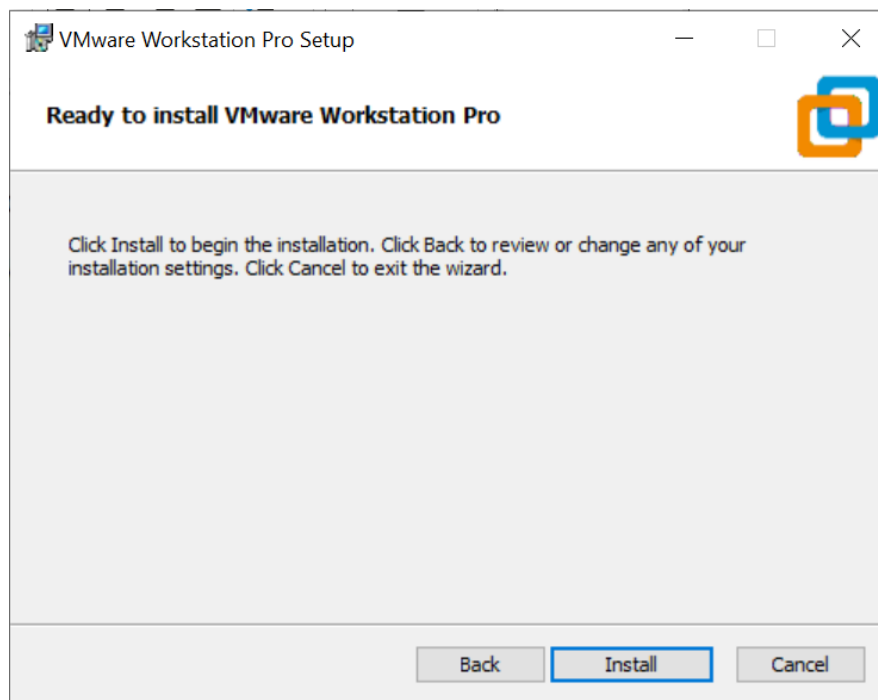
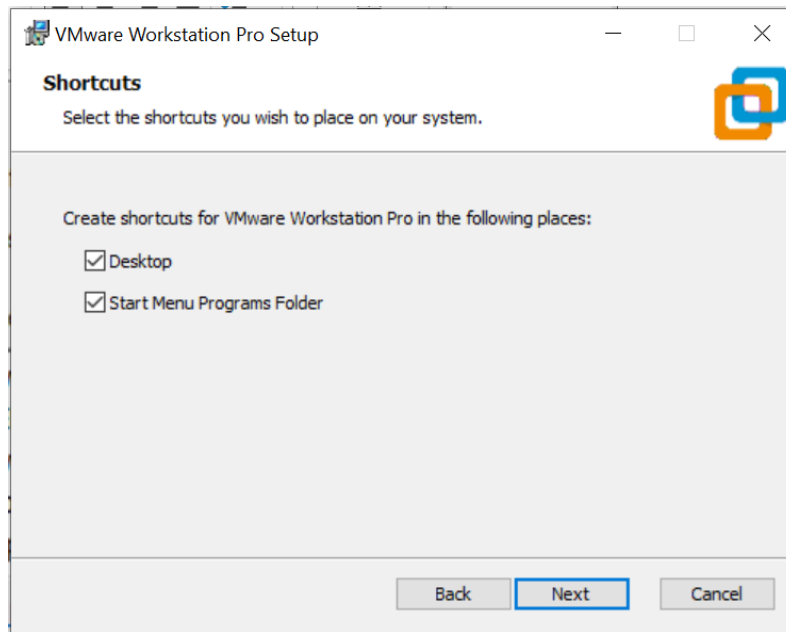
Lab title

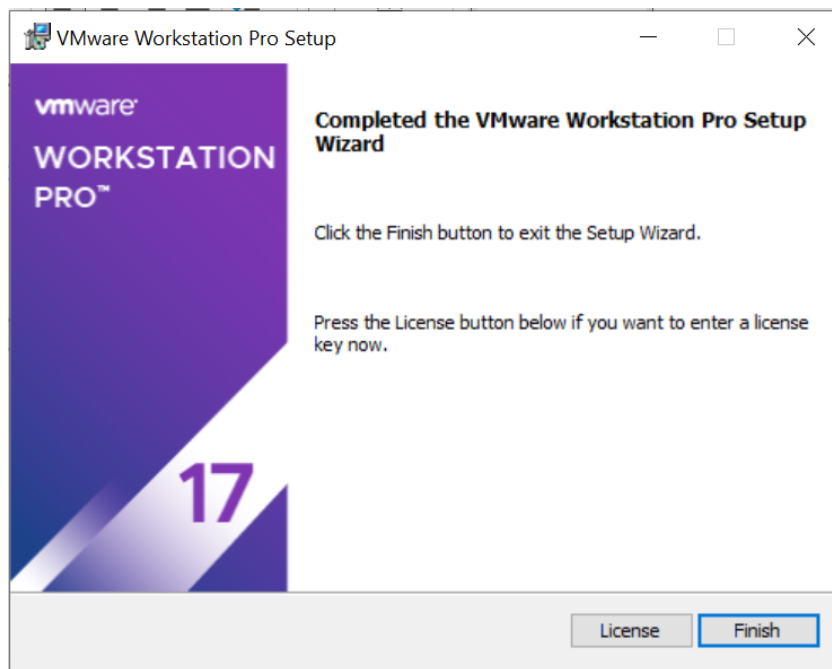
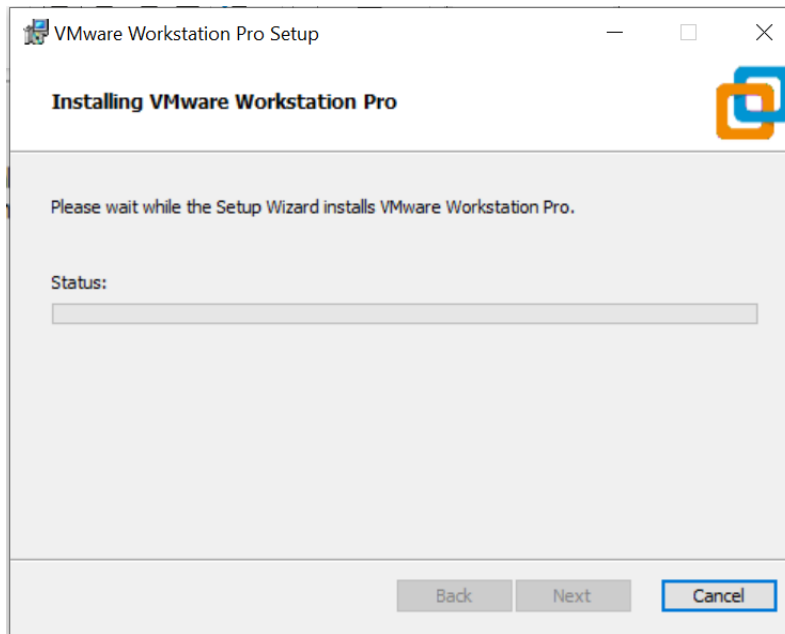
Install Ubuntu Server

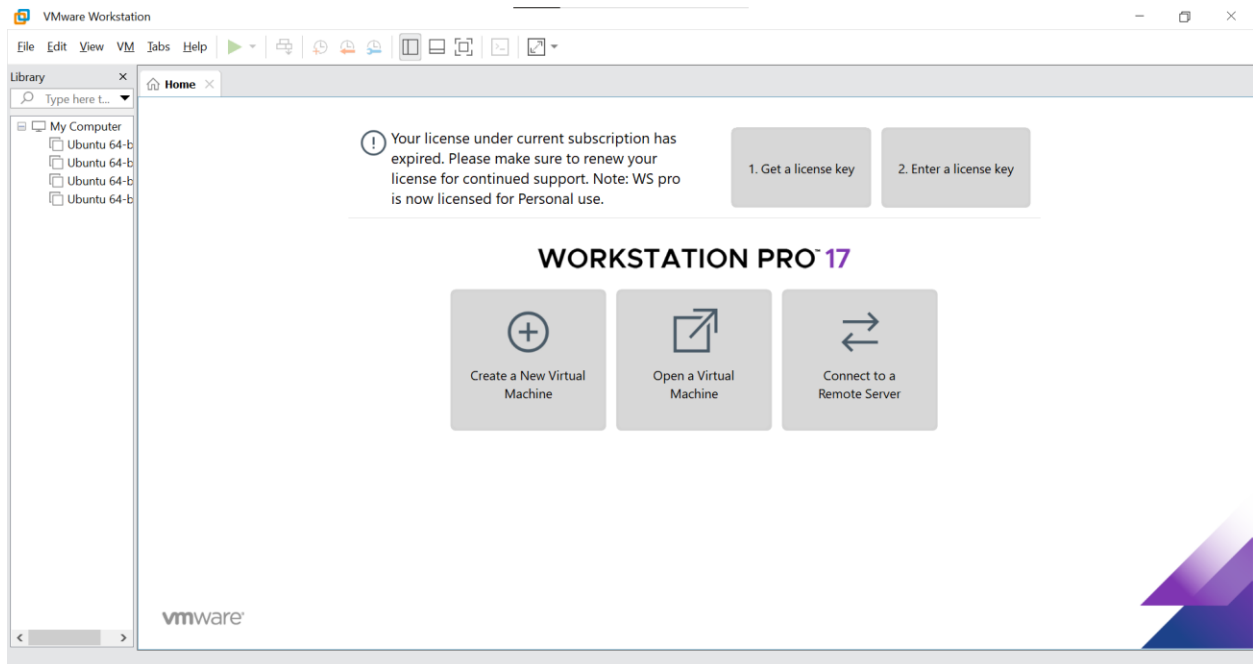
First of all, we'll download VMware Workstation Pro,



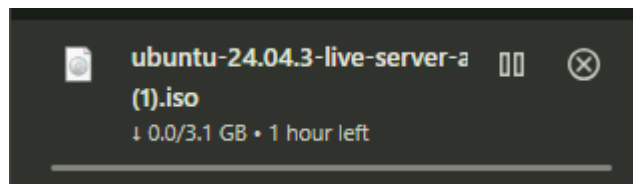




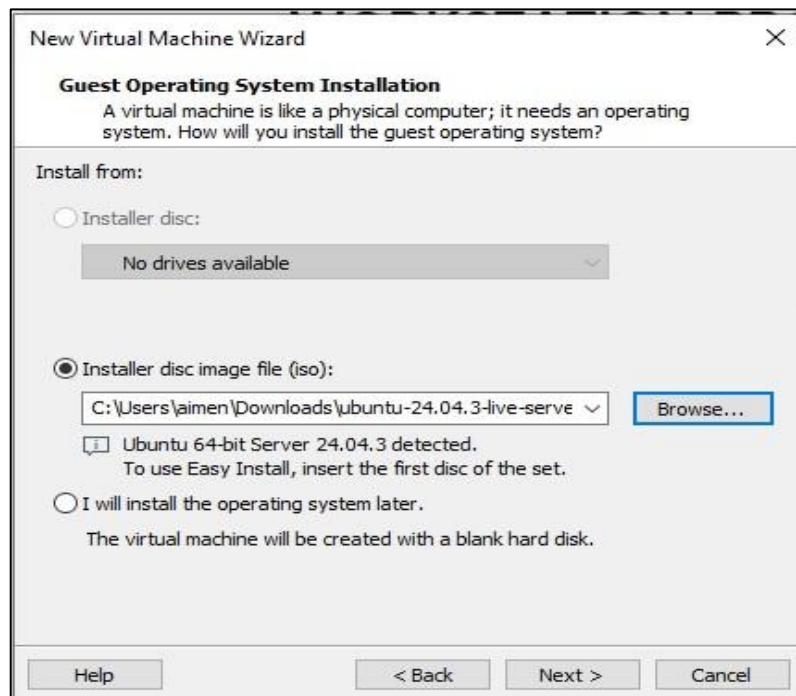




Now, we'll download Ubuntu Server 24.04 LTS version,



Going back to VMware, we'll click on 'Create a new machine',



Choosing location of where all files will be stored,

New Virtual Machine Wizard

Name the Virtual Machine
What name would you like to use for this virtual machine?

Virtual machine name:

Location:

The default location can be changed at Edit > Preferences.

< Back Next > Cancel

New Virtual Machine Wizard

Specify Disk Capacity
How large do you want this disk to be?

The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.

Maximum disk size (GB):

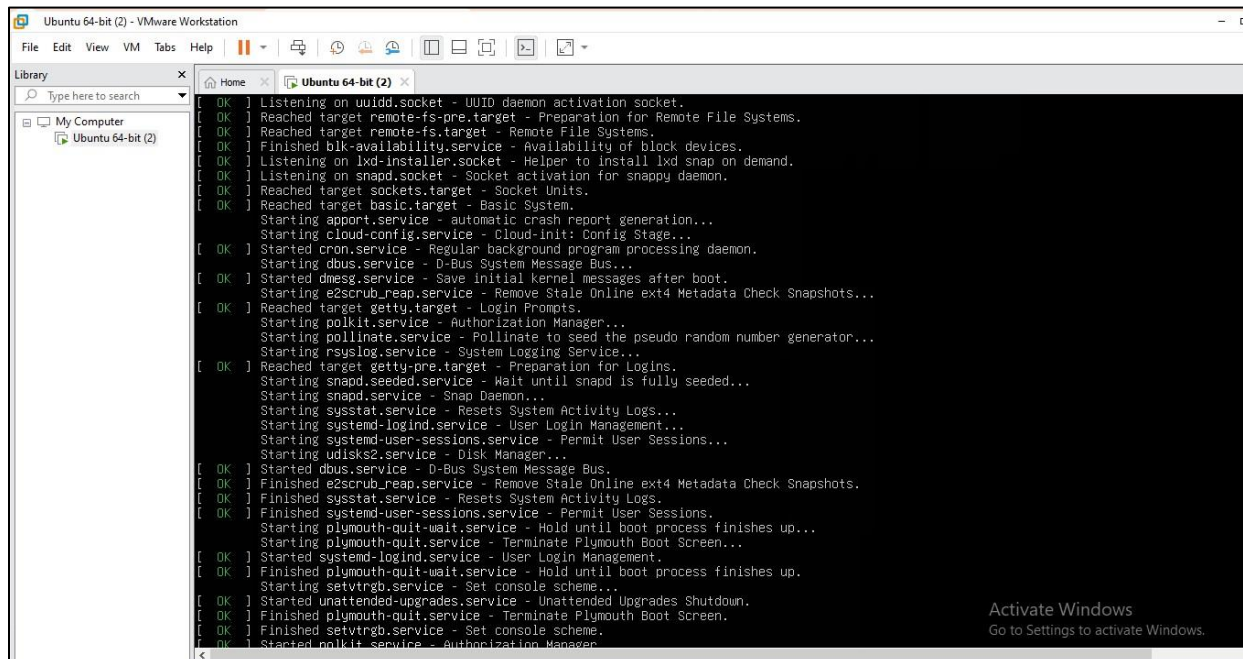
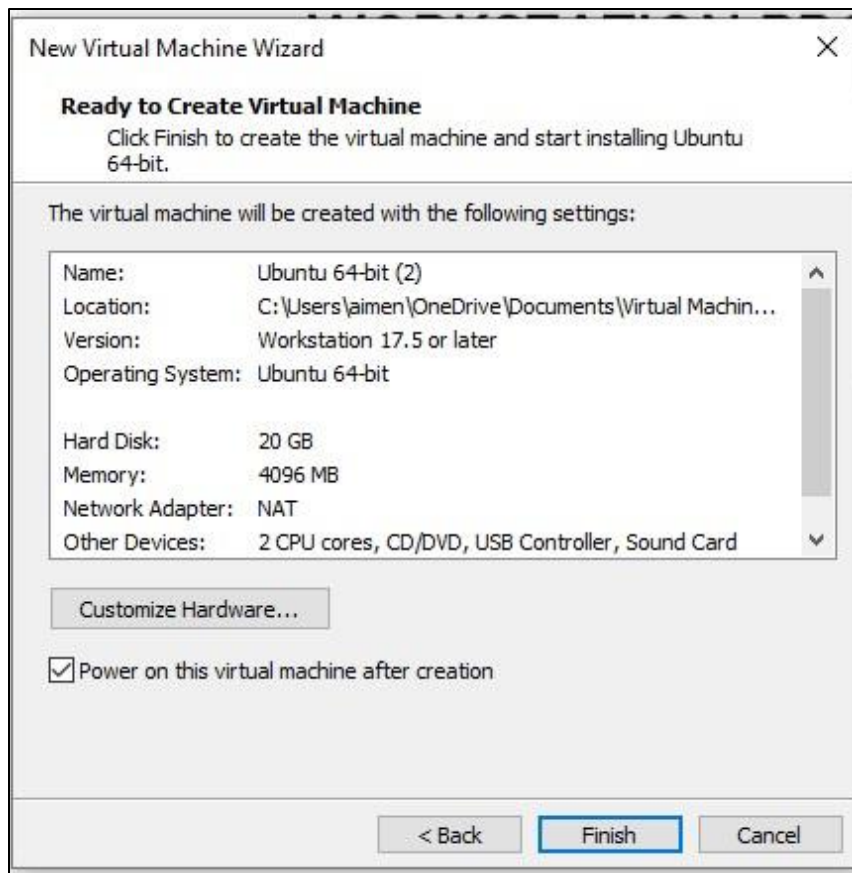
Recommended size for Ubuntu 64-bit: 20 GB

☐ Store virtual disk as a single file

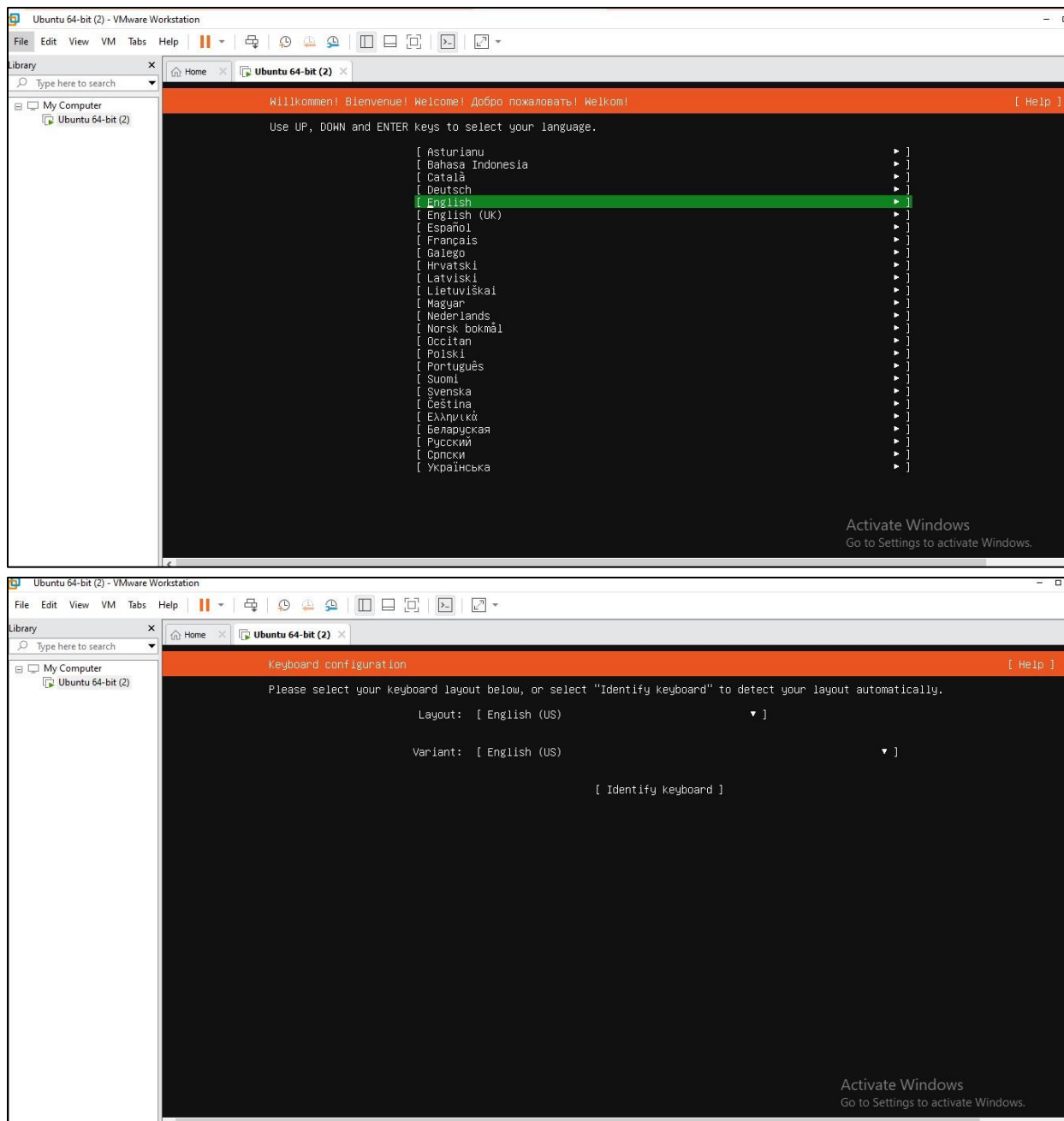
☒ Split virtual disk into multiple files

Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.

Help < Back Next > Cancel



Selecting language and keyboard,



Choose the type of installation

[Help]

Choose the base for the installation.

☒ Ubuntu Server

The default install contains a curated set of packages that provide a comfortable experience for operating your server.

☐ Ubuntu Server (minimized)

This version has been customized to have a small runtime footprint in environments where humans are not expected to log in.

Additional options

☐ Search for third-party drivers

This software is subject to license terms included with its documentation. Some is proprietary. Third-party drivers should not be installed on systems that will be used for FIPS or the real-time kernel.

Proxy configuration

[Help]

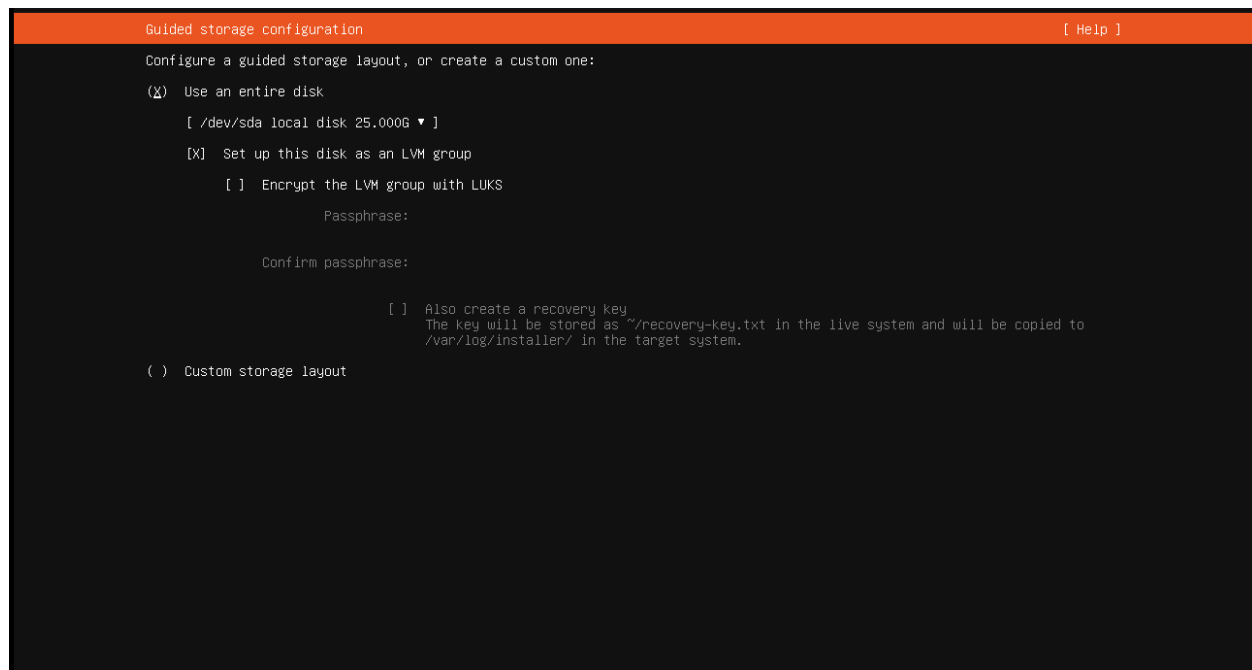
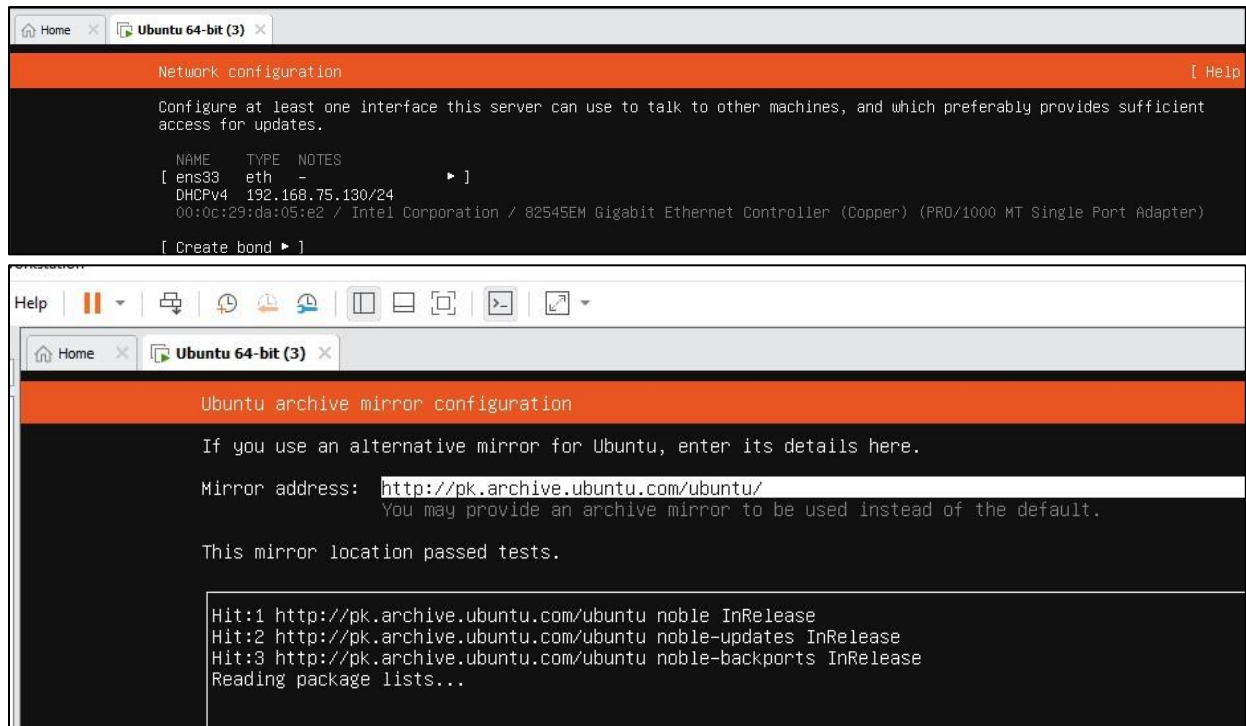
If this system requires a proxy to connect to the Internet, enter its details here.

Proxy address:

If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.

The proxy information should be given in the standard form of "http://[[user][:pass]@]host[:port]/".

The installation continues as follows,



Storage configuration[Help]

FILE SYSTEM SUMMARY

| MOUNT POINT | SIZE | TYPE | DEVICE TYPE |
|-------------|---------|----------|---------------------------------|
| [/ | 11.496G | new ext4 | new LVM Logical Volume ▶] |
| [/boot | 2.000G | new ext4 | new partition of local disk ▶] |

AVAILABLE DEVICES

| DEVICE | TYPE | SIZE |
|-------------------|------------------|-------------|
| [ubuntu-vg (new) | LVM volume group | 22.996G ▶] |
| free space | | 11.500G ▶] |

[Create software RAID (md) ▶]

[Create volume group (LVM) ▶]

USED DEVICES

| DEVICE | TYPE | SIZE |
|--|------------------|-------------|
| [ubuntu-vg (new) | LVM volume group | 22.996G ▶] |
| ubuntu-lv new, to be formatted as ext4, mounted at / | | 11.496G ▶] |

[/dev/sda

| | local disk | SIZE |
|--|------------|-------------|
| partition 1 new, BIOS grub spacer | | 25.000G ▶] |
| partition 2 new, to be formatted as ext4, mounted at /boot | | 1.000M ▶] |
| partition 3 new, PV of LVM volume group ubuntu-vg | | 2.000G ▶] |
| | | 22.997G ▶] |

Confirm destructive action

Selecting Continue below will begin the installation process and result in the loss of data on the disks selected to be formatted.

You will not be able to return to this or a previous screen once the installation has started.

Are you sure you want to continue?

[No]

[Continue]

```
Installing system [ Help ]

subiquity/load_cloud_config/extract_autoinstall:
subiquity/Early/apply_autoinstall_config:
subiquity/Reporting/apply_autoinstall_config:
subiquity/Error/apply_autoinstall_config:
subiquity/Userdata/apply_autoinstall_config:
subiquity/Package/apply_autoinstall_config:
subiquity/Debconf/apply_autoinstall_config:
subiquity/Kernel/apply_autoinstall_config:
subiquity/Zdev/apply_autoinstall_config:
subiquity/Ad/apply_autoinstall_config:
subiquity/Late/apply_autoinstall_config:
configuring apt
curtin command in-target
installing system
executing curtin install initial step
executing curtin install partitioning step
curtin command install
  configuring storage
  running 'curtin block-meta simple'
  curtin command block-meta
  removing previous storage devices
  configuring disk: disk-sda
  configuring partition: partition-0
  configuring partition: partition-1
  configuring format: format-0
  configuring partition: partition-2
  configuring lvm_volgroup: lvm_volgroup-0
  configuring lvm_partition: lvm_partition-0
  configuring format: format-1
  configuring mount: mount-1
  configuring mount: mount-0
executing curtin install extract step
curtin command install
```

```
An error occurred during installation [ Help ]

subiquity/load_cloud_config/extract_autoinstall:
subiquity/Early/apply_autoinstall_config:
subiquity/Reporting/apply_autoinstall_config:
subiquity/Error/apply_autoinstall_config:
subiquity/Userdata/apply_autoinstall_config:
subiquity/Package/apply_autoinstall_config:
subiquity/Debconf/apply_autoinstall_config:
subiquity/Kernel/apply_autoinstall_config:
subiquity/Zdev/apply_autoinstall_config:
subiquity/Ad/apply_autoinstall_config:
subiquity/Late/apply_autoinstall_config:
configuring apt
curtin command in-target

Sorry, there was a problem completing the installation.

[ View full report ]

If you want to help improve the installer, you can send an error
report.

[ Send to Canonical ]

Do you want to try starting the installation again?

[ Restart the installer ]

[ Close report ]
```

This error occurred.

- The solution is to press Alt+F3 on error screen.
- Now in the ubuntu terminal, enter 'ip a', we will look for any interface such as ens32, ens33 etc. along with an IP (192.168....).
- We will try pinging to 8.8.8.8 to ensure stable network connection.
- We will also try pinging to archive.ubuntu.com. This will test DNS.

```

hamna_25@ubuntu:~$ 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
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:9f:12:75 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.100.124/24 metric 100 brd 192.168.100.255 scope global dynamic ens33
        valid_lft 85718sec preferred_lft 85718sec
    inet6 fe80::20c:29ff:fe9f:1275/64 scope link
        valid_lft forever preferred_lft forever

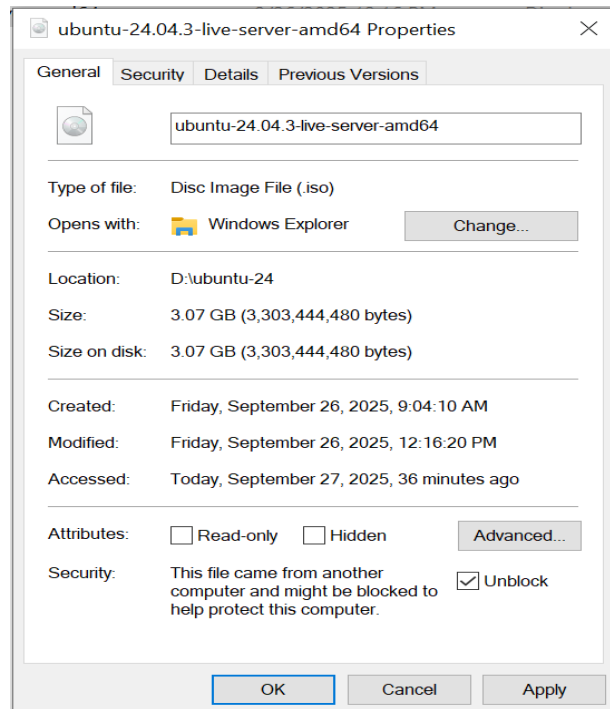
hamna_25@ubuntu:~$ ping -c 4 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=116 time=46.2 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=116 time=44.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=116 time=45.4 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=116 time=46.4 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3008ms
rtt min/avg/max/mdev = 44.425/45.586/46.368/0.767 ms
hamna_25@ubuntu:~$ ping -c 4 archive.ubuntu.com
PING archive.ubuntu.com (185.125.190.36) 56(84) bytes of data.
64 bytes from actiontoad.canonical.com (185.125.190.36): icmp_seq=1 ttl=52 time=342 ms
64 bytes from actiontoad.canonical.com (185.125.190.36): icmp_seq=2 ttl=52 time=366 ms
64 bytes from actiontoad.canonical.com (185.125.190.36): icmp_seq=3 ttl=52 time=284 ms
64 bytes from actiontoad.canonical.com (185.125.190.36): icmp_seq=4 ttl=52 time=305 ms

--- archive.ubuntu.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3007ms
rtt min/avg/max/mdev = 283.829/324.206/365.784/31.834 ms

```

We will also need to check the unblock checkbox in properties of ubuntu ISO file.



Restarting vm again, giving alternate mirror location,

```
Ubuntu archive mirror configuration [ Help ]

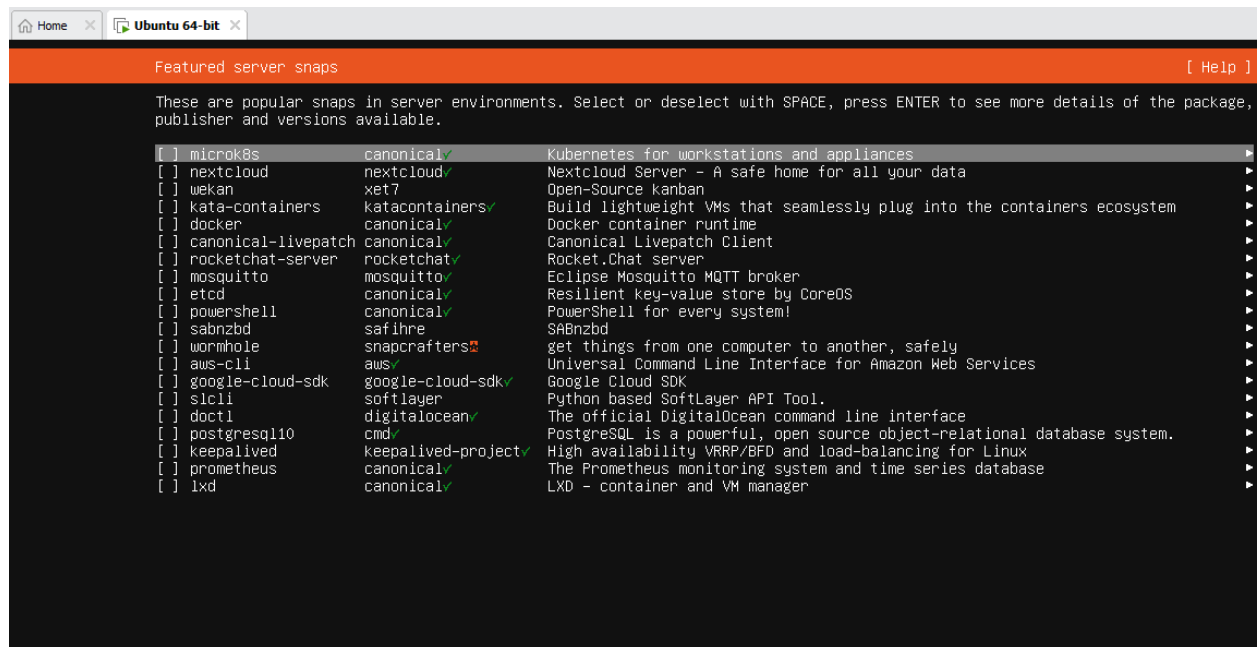
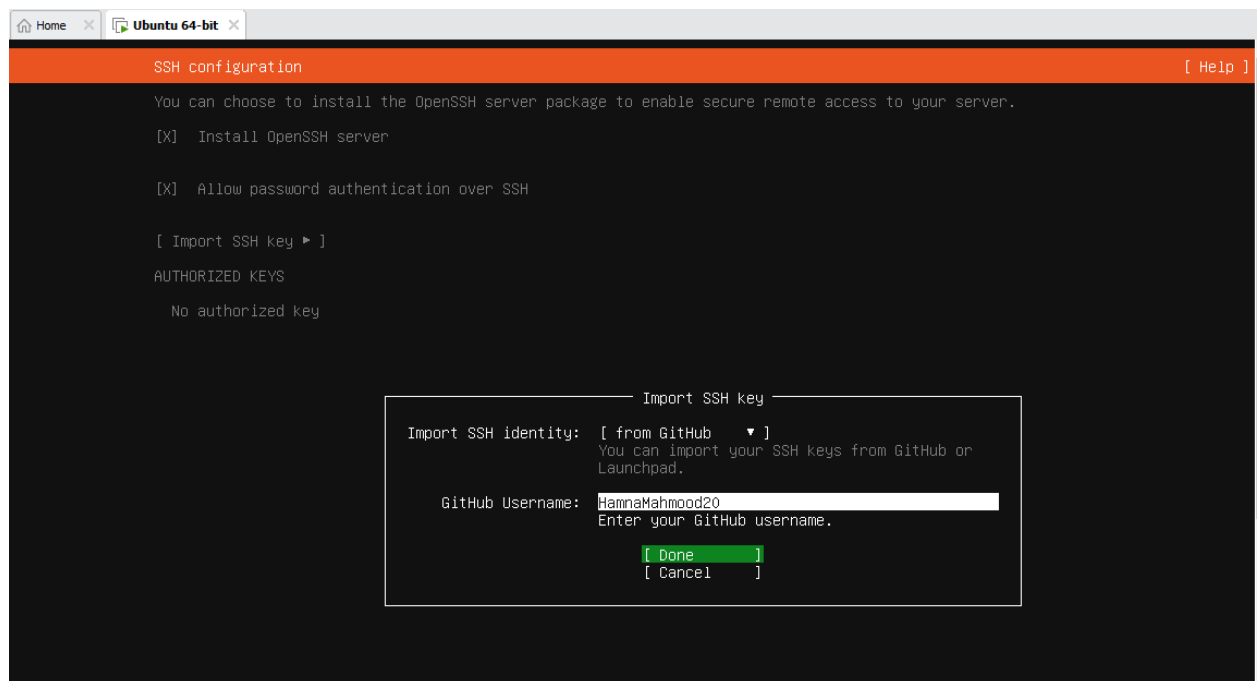
If you use an alternative mirror for Ubuntu, enter its details here.

Mirror address: http://mirror.pit.teraswitch.com/ubuntu
                You may provide an archive mirror to be used instead of the default.

This mirror location passed tests.

Hit:1 http://mirror.pit.teraswitch.com/ubuntu noble InRelease
Get:2 http://mirror.pit.teraswitch.com/ubuntu noble-updates InRelease [126 kB]
Get:3 http://mirror.pit.teraswitch.com/ubuntu noble-backports InRelease [126 kB]
Fetched 252 kB in 12s (21.5 kB/s)
Reading package lists...
```


SSH Configuration



Installing Ubuntu,

```
Home x Ubuntu 64-bit x
Installing system [ Help ]

Subiquity/Ad/apply_autoinstall_config:
Subiquity/Late/apply_autoinstall_config:
configuring apt
curtin command in-target
installing system
executing curtin install initial step
executing curtin install partitioning step
curtin command install
configuring storage
  running 'curtin block-meta simple'
  curtin command block-meta
  removing previous storage devices
  configuring disk: disk-sda
  configuring partition: partition-0
  configuring partition: partition-1
  configuring format: format-0
  configuring partition: partition-2
  configuring lvm_volgroup: lvm_volgroup-0
  configuring lvm_partition: lvm_partition-0
  configuring format: format-1
  configuring mount: mount-1
  configuring mount: mount-0
executing curtin install extract step
curtin command install
  writing install sources to disk
  running 'curtin extract'
  curtin command extract
    acquiring and extracting image from cp:///tmp/tmp5db3qq2w/mount
configuring keyboard
curtin command in-target
executing curtin install curthooks step
curtin command install
  configuring installed system
  curtin command curthooks
```

In shell, typing in commands to generate key,

```
PS C:\Users\ABC> ssh-keygen -t ed25519 -C "test-key"
>>
Generating public/private ed25519 key pair.
Enter file in which to save the key (C:\Users\ABC/.ssh/id_ed25519):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in C:\Users\ABC/.ssh/id_ed25519
Your public key has been saved in C:\Users\ABC/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:dMz2H85tcxDOAV9j+OFIwPeP4X7iW67VTa7hVX8htr34 test-key
The key's randomart image is:
+---[ED25519 256]---+
|      .==o|
|      o  oo==|
|      . =  *.|=
|      . o . o O|
|      S   . B.=
|      +.*B|
|      ==%|
|      .=BE|
|      =B+.|
+-----[SHA256]-----+
```

Getting public key,

```
+-----[SHA256]-----cat ~/.ssh/id_ed25519.pub
>> C:\Users\ABC>
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIG7bevFQIU4VxIk0qaPIeUVsAs9POg73GSB0FU3FNiAH test-key
```

Opening vm again and copying the last line and pasting into Ubuntu Vm by first making a directory,

```

Starting systemd-tmpfiles-setup.service - Create Volatile Files and Directories...
Starting ufw.service - Uncomplicated firewall...
OK ] Finished console-setup.service - Set console font and keymap.
OK ] Finished finalrd.service - Create runtime dir for shutdown pivot root.
OK ] Finished plymouth-read-write.service - Plymouth To Write Out Runtime Data.
OK ] Finished ldconfig.service - Rebuild Dynamic Linker Cache.
Mounting proc-sys-fs-binfmt_misc.mount - Mountable File Formats File System...
OK ] Finished ufw.service - Uncomplicated firewall.
OK ] Mounted proc-sys-fs-binfmt_misc.mount - Mountable File Formats File System.
OK ] Finished systemd-binfmt.service - Set Up Additional Binary Formats.
OK ] Finished systemd-tmpfiles-setup.service - Create Volatile Files and Directories.
Starting systemd-journal-catalog-update.service - Rebuild Journal Catalog...
Starting systemd-resolved.service - Network Name Resolution...
Starting systemd-timesyncd.service - Network Time Synchronization...
Starting systemd-update-utmp.service - Record System Boot/Shutdown in UTMP...
OK ] Finished systemd-journal-catalog-update.service - Rebuild Journal Catalog.
Starting systemd-update-done.service - Update is Completed...
OK ] Finished systemd-update-utmp.service - Record System Boot/Shutdown in UTMP.
OK ] Finished systemd-update-done.service - Update is Completed.
OK ] Started systemd-timesyncd.service - Network Time Synchronization.
OK ] Reached target time-set.target - System Time Set.
OK ] Started systemd-resolved.service - Network Name Resolution.
OK ] Reached target nss-lookup.target - Host and Network Name Lookups.
18.478251] piix4_smbus 0000:00:07.3: SMBus Host Controller not enabled!
OK ] Listening on systemd-rfkill.socket - Load/Save RF Kill Switch Status /dev/rfkill Watch.
OK ] Reached target sound.target - Sound Card.
OK ] Finished apparmor.service - Load AppArmor profiles.
Starting snapd.apparmor.service - Load AppArmor profiles managed internally by snapd...
OK ] Started vgauth.service - Authentication service for virtual machines hosted on VMware.
OK ] Started open-vm-tools.service - Service for virtual machines hosted on VMware.
Starting cloud-init-local.service - Cloud-init: Local Stage (pre-network)...
```

After a few minutes of installation, we are prompted to enter login and password which we set during installation,

```

ubuntu1804 login: hamna_25
Password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-71-generic x86_64)

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

System information as of Sun Sep 28 12:43:40 AM UTC 2025

System load: 0.14           Memory usage: 7%    Processes:      209
Usage of /: 38.2% of 13.67GB Swap usage:   0%    Users logged in: 0

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

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

Setting up SSH,

```
PS C:\Users\ABC> ssh hamna_25@192.168.100.124
The authenticity of host '192.168.100.124 (192.168.100.124)' can't be established.
ED25519 key fingerprint is SHA256:SmwV64lvqFARVku+D30pyc/pvx1YhlcWblCxNX0Pcag.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.100.124' (ED25519) to the list of known hosts.
hamna_25@192.168.100.124's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-84-generic x86_64)

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

System information as of Sun Sep 28 07:32:56 PM UTC 2025

System load:  0.68               Processes:           247
Usage of /:   42.3% of 11.21GB   Users logged in:    1
Memory usage: 7%                IPv4 address for ens33: 192.168.100.124
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

13 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

hamna_25@ubuntu:~$
```

Now, we are remotely logged into our vm using SSH from shell successfully.