

Fatima Jinnah Women University



*Cloud Computing
Lab 5*

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A

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LAB TITLE: Java, apt vs apt-get, snap, GUI, Vim on Ubuntu Server

TASK:

Task 1: Discover Missing Command & Install Java Using apt Suggestion

Steps (inside the VM terminal):

1. Run the java command to see what the system suggests:

Java

```
hajra@ubuntu-lab:~$ java
Command 'java' not found, but can be installed with:
sudo apt install openjdk-17-jre-headless # version 17.0.16+8~us1~0ubuntu1~24.04.1, or
sudo apt install openjdk-21-jre-headless # version 21.0.8+9~us1~0ubuntu1~24.04.1
sudo apt install default-jre # version 2:1.17-75
sudo apt install openjdk-11-jre-headless # version 11.0.28+6~1ubuntu1~24.04.1
sudo apt install openjdk-25-jre-headless # version 25+36.1~24.04.2
sudo apt install openjdk-8-jre-headless # version 8u462~ga~us1~0ubuntu2~24.04.2
sudo apt install openjdk-19-jre-headless # version 19.0.2+7-4
sudo apt install openjdk-20-jre-headless # version 20.0.2+9-1
sudo apt install openjdk-22-jre-headless # version 22~22ea-1
hajra@ubuntu-lab:~$
```

2. Use the suggested apt command (copy the exact package name suggested by the system):

```
sudo apt install <suggested-package> -y
```

```
hajra@ubuntu-lab:~$ sudo apt install openjdk-17-jre-headless
[sudo] password for hajra:
Reading package lists... Done
Building dependency tree... Done
Reading status information... Done
The following additional packages will be installed:
alsa-topology-conf alsua-ucm-conf ca-certificates-java java-common libasound2-data libasound2t64 libpcsc-lite1
Suggested packages:
alsa-ucm-conf alsua-ucm-conf ca-certificates-java java-common libasound2-data libasound2t64 libpcsc-lite1 openjdk-17-jre-headless
libasound2-plugins pccs libns-mdns fonts-dejavu-extra fonts-ipafont-gothic fonts-ipafont-mincho fonts-wqy-microhei
l fonts-wqy-zhenhei fonts-indic
The following NEW packages will be installed:
alsa-topology-conf alsua-ucm-conf ca-certificates-java java-common libasound2-data libasound2t64 libpcsc-lite1 openjdk-17-jre-headless
0 upgraded, 0 newly installed, 0 to remove and 20 not upgraded.
Need to get 40.5 MB of archives.
After this operation, 198 MB of additional disk space will be used.

Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu noble/main amd64 alsua-topology-conf all 1.2.3-1.2 [16.5 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble/main amd64 libasound2-data all 1.2.11-1ubuntu0.1 [21.1 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libasound2t64 amd64 1.2.11-1ubuntu0.7 [399 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 alsua-ucm-conf all 1.2.10-1ubuntu0.7 [66.4 kB]
Get:5 http://archive.ubuntu.com/ubuntu noble/main amd64 ca-certificates-java all 20240118 [11.6 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble/main amd64 java-common all 0.75+exp1 [6,798 kB]
Get:7 http://archive.ubuntu.com/ubuntu noble/main amd64 libpcsc-lite1 amd64 2.0.3-1ubuntu1 [21.4 kB]
Get:8 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 openjdk-17-jre-headless amd64 17.0.16+8~us1~0ubuntu1~24.04.1 [48.0 MB]
Fetched 48.5 MB in 7s (6,758 kB/s)
Selecting previously unselected package alsua-topology-conf.
Reading database... 85%
```

3. Verify Java is installed and check version: `java --version`

```
hajra@ubuntu-lab:~$ java --version
openjdk 17.0.16 2025-07-15
OpenJDK Runtime Environment (build 17.0.16+8-Ubuntu-0ubuntu124.04.1)
OpenJDK 64-Bit Server VM (build 17.0.16+8-Ubuntu-0ubuntu124.04.1, mixed mode, sharing)
hajra@ubuntu-lab:~$
```

4. Remove the Java package using apt remove (use the same package name you installed):

```
sudo apt remove <suggested-package> -y
```

```
hajra@ubuntu-lab:~$ sudo apt remove openjdk-17-jre-headless -y
[sudo] password for hajra:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  alsua-topology-conf alsua-ucm-conf ca-certificates-java java-common libasound2-data libasound2t64 libpcsc-lite1
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  openjdk-17-jre-headless
0 upgraded, 0 newly installed, 1 to remove and 20 not upgraded.
After this operation, 193 MB disk space will be freed.
(Reading database ... 143550 files and directories currently installed.)
Removing openjdk-17-jre-headless:amd64 (17.0.16+8~us1~0ubuntu1~24.04.1) ...
hajra@ubuntu-lab:~$
```

5. Confirm java is no longer available:

Java

```
hajra@ubuntu-lab:~$ java
-bash: /usr/bin/java: No such file or directory
hajra@ubuntu-lab:~$
```

6. Clear the shell's command hash cache (so the shell forgets cached command locations — run as your regular user, no sudo needed):

```
hash -r
java
```

```

bush: /usr/bin/java: No such file or directory
hajra@ubuntu-lab:~$ hash -r
hajra@ubuntu-lab:~$ java
Command 'java' not found, but can be installed with:
sudo apt install openjdk-17-jre-headless # version 17.0.16+8~us1~0ubuntu1~24.04.1, or
sudo apt install openjdk-21-jre-headless # version 21.0.8+9~us1~0ubuntu1~24.04.1
sudo apt install default-jre # version 2:1.17-75
sudo apt install openjdk-11-jre-headless # version 11.0.28+6~ubuntu1~24.04.1
sudo apt install openjdk-25-jre-headless # version 25+36-1~24.04.2
sudo apt install openjdk-8-jre-headless # version 8u462~ga~us1~0ubuntu2~24.04.2
sudo apt install openjdk-19-jre-headless # version 19.0.2+7-4
sudo apt install openjdk-20-jre-headless # version 20.0.2+9-1
sudo apt install openjdk-22-jre-headless # version 22~22ea-1
hajra@ubuntu-lab:~$ 

```

Task 2: Install & Remove Java Using apt-get (Explicitly)

Steps (inside the VM terminal):

1. Install Java using apt-get

(Choose a common package, e.g., default-jre, or use the same package as in Task 1.) sudo apt-get update

```

hajra@ubuntu-lab:~$ sudo apt-get update
[sudo] password for hajra:
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
hajra@ubuntu-lab:~$ 

```

sudo apt-get install default-jre -y

```

hajra@ubuntu-lab:~$ sudo apt-get install default-jre -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  default-jre-headless fonts-dejavu-extra libatk-wrapper-java libatk-wrapper-java-jni libgif7 libxcb-shape0 libxft2 libxv1 libxxf86dg1 openjdk-21-jre
  openjdk-21-jre-headless x11-utils
Suggested packages:
  libns-mnls fonts-ipafont-gothic fonts-ipafont-mincho fonts-wqy-microhei | fonts-wqy-zenhei fonts-indic mesa-utils
Recommended packages:
  luit
The following NEW packages will be installed:
  default-jre default-jre-headless fonts-dejavu-extra libatk-wrapper-java libatk-wrapper-java-jni libgif7 libxcb-shape0 libxft2 libxv1 libxxf86dg1
  openjdk-21-jre openjdk-21-jre-headless x11-utils
0 upgraded, 13 newly installed, 0 to remove and 20 not upgraded.
Need to get 49.0 MB of archives.
After this operation, 212 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 openjdk-21-jre-headless amd64 21.0.8+9~us1~0ubuntu1~24.04.1 [46.4 MB]
Get:2 http://archive.ubuntu.com/ubuntu noble/main amd64 default-jre-headless amd64 2:1.21-75+exp1 [3,094 B]
Get:3 http://archive.ubuntu.com/ubuntu noble/main amd64 libgbm amd64 2:1.21-75+exp1 [1922 B]
Get:4 http://archive.ubuntu.com/ubuntu noble/main amd64 libgl amd64 2:1.21-75+exp1 [1922 B]
Get:5 http://archive.ubuntu.com/ubuntu noble/main amd64 libgl1-mesa amd64 2:1.21-75+exp1 [1,947 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble/main amd64 fonts-dejavu-extra all 2.37-0 [1,947 kB]
Get:7 http://archive.ubuntu.com/ubuntu noble/main amd64 libxcb-shape0 amd64 1.15~ubuntu2 [6,100 B]
Get:8 http://archive.ubuntu.com/ubuntu noble/main amd64 libxft2 amd64 2.3.6~1build1 [45.3 kB]
Get:9 http://archive.ubuntu.com/ubuntu noble/main amd64 libxv1 amd64 2:1.0.11-1.1build1 [10.7 kB]
Get:10 http://archive.ubuntu.com/ubuntu/nob... libxxf86dg1 amd64 2:1.1.5~1build1 [11.6 kB]
Get:11 http://archive.ubuntu.com/ubuntu/nob... x11-utils amd64 7.7~6build2 [189 kB]
Get:12 http://archive.ubuntu.com/ubuntu/nob... libatk-wrapper-java all 0.40.0~3build2 [54.3 kB]
Get:13 http://archive.ubuntu.com/ubuntu/nob... libatk-wrapper-java-jni amd64 0.40.0~3build2 [46.4 kB]
Fetched 49.0 MB in 6s (8,240 kB/s)
Selecting previously unselected package openjdk-21-jre-headless:amd64.
(Reading database ... 143263 files and directories currently installed.)
Preparing to unpack .../00-openjdk-21-jre-headless_21.0.8+9~us1~0ubuntu1~24.04.1_amd64.deb ...
Unpacking openjdk-21-jre-headless:amd64 (21.0.8+9~us1~0ubuntu1~24.04.1) ...

```

2. Verify Java version again:

java -version

```

hajra@ubuntu-lab:~$ java --version
openjdk 21.0.8 2025-07-15
OpenJDK Runtime Environment (build 21.0.8+9-Ubuntu-0ubuntu124.04.1)
OpenJDK 64-Bit Server VM (build 21.0.8+9-Ubuntu-0ubuntu124.04.1, mixed mode, sharing)
hajra@ubuntu-lab:~$ 

```

3. Remove Java using apt-get remove:

sudo apt-get remove default-jre -y

```

hajra@ubuntu-lab:~$ sudo apt-get remove default-jre -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  alsatopology-conf alsu-ucm-conf ca-certificates-java default-jre-headless fonts-dejavu-extra java-common libasound2-data libasound2t64 libatk-wrapper-java
  libatk-wrapper-java-jni libgif7 libpccsclient libxcb-shape0 libxft2 libxv1 libxxf86dg1 openjdk-21-jre openjdk-21-jre-headless x11-utils
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  default-jre
0 upgraded, 0 newly installed, 1 to remove and 20 not upgraded.
After this operation, 6,144 B disk space will be freed.
(Reading database ... 143707 files and directories currently installed.)
Removing default-jre (2:1.21-75+exp1) ...
hajra@ubuntu-lab:~$ 

```

4. Clear the terminal hash cache and confirm Java is missing:

hash -r java

```
hajra@ubuntu-lab:~$ hash -r
hajra@ubuntu-lab:~$ java
    .verbose[:class|module|gc|ini]
        enable verbose output for the given subsystem
    .version      print product version to the error stream and exit
    .showversion  print product version to the output stream and exit
    .show-version print product version to the error stream and continue
    .show-module-resolution
        print product version to the output stream and continue
    .? -h -help
        print this help message to the error stream
    .-help
        print this help message to the output stream
    .-X
        print help on extra options to the error stream
    .-help-extra
        print help on extra options to the output stream
    .ea[:<packagename>...|:<classname>]
        enable assertions with specified granularity
    .ea[:<packagename>...|:<classname>]
        enable assertions with specified granularity
    .-enableassertions[:<packagename>...|:<classname>]
        enable assertions with specified granularity
    .-esa | -enableSystemAssertions
        enable system assertions
    .-dsa | -disableSystemAssertions
        disable system assertions
    .-agentlib:<library>[:options]
        load native agent library <library>, e.g. -agentlib:jdwp
        spec also -agentlib:jdwp=help
    .-agentpath:<pathname>[:options]
        load native agent library by full pathname
    .-javaagent:<jarpath>[:options]
        load Java programming language agent, see JavaLangInstrument
    .-splash:<imagepath>
        splash screen with specified image
        JPEG scaled Images are automatically supported and used
        If available, the unscaled image filename, e.g. Image.ext,
        should always be passed as the argument to the -splash option.
        The most appropriate scaled image provided will be picked up
        automatically.
        See the SplashScreen API documentation for more information
    .@argument_files...
        one or more argument files containing options
    .--disable-@files
        prevent further argument file expansion
    .--enable-preview
        allow classes to depend on preview features of this release
    .--specify
        To specify an argument for a long option, you can use --name=<value> or
        --name=--value.
```

Task 3: apt update vs apt upgrade – Run & Explain

Steps (inside the VM terminal):

1. Update the package index sudo apt update

```
hajra@ubuntu-lab:~$ sudo apt update
[sudo] password for hajra:
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
20 packages can be upgraded. Run 'apt list --upgradable' to see them.
hajra@ubuntu-lab:~$
```

2. Upgrade installed packages

(This installs available updates for currently installed packages.)

```
sudo apt upgrade
```

Ubuntu 64-bit (6) - VMware Workstation

```

File Edit View VM Help || Home Ubuntu 64-bit (6)

Type here to... Library My Computer Ubuntu 64-bit

alsa-topology-conf alsu-ucm-conf ca-certificates Java default-jre-headless fonts-dejavu-extra Java-common libsound2-data libsound2t64 libatk-wrapper-java
libgl1-mesa-glx libgl1-mesa-dri libgbm libxcb-shape0 libxft2 libxvi libxkbfile0 libopenjk-21-jre openjdk-21-jre-headless x11-utils
use sudo apt autoremove to remove them.
The following packages will be upgraded:
  cloud-init distro-info-data firmware-sof-signed libpam-systemd libsystemd libsystemd-shared libsystemd libudev linux-firmware snapd sosreport systemd
  sysvinit-utils tlp udev udevadm udevadm-timesyncd tocadump ubuntu-drivers-common udev
20 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 559 kB of archives.
0. You don't have enough free space in /var/cache/apt/archives/.
hojra@ubuntu-lab:~$ sudo apt update
Hit:1 http://archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://security.ubuntu.com/ubuntu focal-security InRelease [126 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease [126 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-backports InRelease [126 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,536 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Components [175 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Components [212 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [377 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Components [309 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [7,164 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Components [212 kB]
Get:12 http://security.ubuntu.com/ubuntu focal-security/main amd64 Components [212 kB]
Get:13 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Components [11,9 kB]
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Components [212 kB]
Get:15 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Components [212 kB]
Get:16 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [52,2 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Components [412 kB]
Fetched 2,564 kB in 5s (478 kB/s)
Reading package lists... Done
Reading state information... Done
Reading state information... Done
20 packages can be upgraded. Run 'apt list --upgradable' to see them.
hojra@ubuntu-lab:~$ sudo apt upgrade
hojra@ubuntu-lab:~$ apt upgrade
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  alsatopology-conf alsu-ucm-conf ca-certificates Java default-jre-headless fonts-dejavu-extra Java-common libsound2-data libsound2t64 libatk-wrapper-java
  libgl1-mesa-glx libgl1-mesa-dri libgbm libxcb-shape0 libxft2 libxvi libxkbfile0 libopenjk-21-jre openjdk-21-jre-headless x11-utils
use sudo apt autoremove to remove them.
The following packages will be upgraded:
  cloud-init distro-info-data firmware-sof-signed libpam-systemd libsystemd libsystemd-shared libsystemd libudev linux-firmware snapd sosreport systemd
  sysvinit-utils tlp udev udevadm udevadm-timesyncd tocadump ubuntu-drivers-common udev
20 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 559 kB of archives.
After this operation, 4,281 kB of additional disk space will be used.
0 additional disk space is available in /var/cache/apt/archives/.
hojra@ubuntu-lab:~$
```

To direct input to this VM, click inside or press Ctrl+G.

Type here to search

Issue resolve steps:

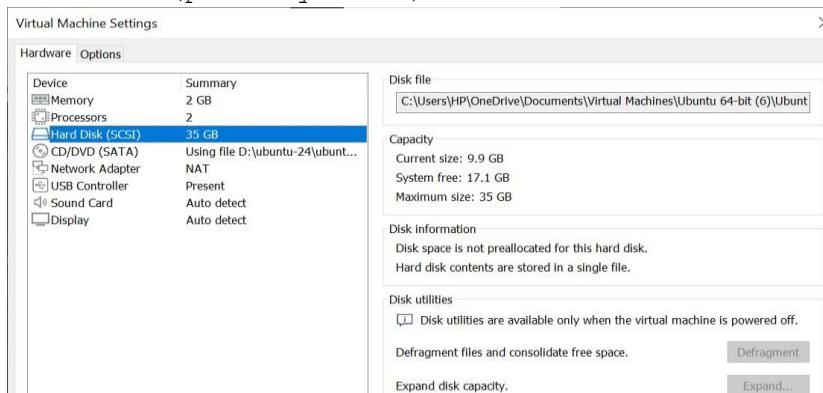
Step 1: Shut down Ubuntu

In your VM window:

sudo shutdown now

Step 2: Increase the disk size in VMware

1. In **VMware Workstation**, select your Ubuntu VM (don't power it on yet).
2. Go to **VM → Settings → Hard Disk (SCSI) → Utilities → Expand**
3. Increase it from (probably 20 GB) to **30 GB or 40 GB** → click **Expand**



25->35 GB expand

4. Click **OK** to save.

Step 3: Boot Ubuntu

1. Start your Ubuntu VM again.
2. Once you're logged in, open the terminal and run this: `df -h`

```

hojra@ubuntu-lab:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           19M   1M   18M  5% /run
/dev/mapper/ubuntu--vg-ubuntu--lv 120G  11G  98G  9% /
tmpfs           968M    0  968M  0% /dev/shm
tmpfs           512M    0  512M  0% /run/lock
/dev/sda2        2.0G  192M  1.6G  11% /boot
tmpfs           192M  192M    0  100% /run/user/1000
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/483fff25e3b712de4439962c13861cbd9b245ecd1cc07a3a337a95
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/15a02bbbf29088005fa373eefb5979cbff1b1c57575fa448e3e
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/183356de05a5d846e9b9afa5c6f530418c6a5e5183b3504220823a
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/183356de05a5d846e9b9afa5c6f530418c6a5e5183b3504220823a

```

Lsblk

```

hajra@ubuntu-lab: $ sudo lsblk
[sudo] password for hajra:


| NAME                    | MAJ:MIN | RM | SIZE   | RO | TYPE | MOUNTPOINTS                |
|-------------------------|---------|----|--------|----|------|----------------------------|
| loop0                   | 7:0     | 0  | 52.2M  | 1  | loop | /snap/aws-cli/1668         |
| loop1                   | 7:1     | 0  | 52.2M  | 1  | loop | /snap/aws-cli/1672         |
| loop2                   | 7:2     | 0  | 55.5M  | 1  | loop | /snap/core18/2952          |
| loop3                   | 7:3     | 0  | 63.8M  | 1  | loop | /snap/core20/2669          |
| loop4                   | 7:4     | 0  | 73.9M  | 1  | loop | /snap/core22/2133          |
| loop5                   | 7:5     | 0  | 66.8M  | 1  | loop | /snap/core24/1196          |
| loop6                   | 7:6     | 0  | 73.9M  | 1  | loop | /snap/core22/2139          |
| loop7                   | 7:7     | 0  | 140.6M | 1  | loop | /snap/docker/3265          |
| loop8                   | 7:8     | 0  | 66.8M  | 1  | loop | /snap/core24/1225          |
| loop9                   | 7:9     | 0  | 44.1M  | 1  | loop | /snap/doctl/2263           |
| loop10                  | 7:10    | 0  | 420.3M | 1  | loop | /snap/google-cloud-sdk/608 |
| loop11                  | 7:11    | 0  | 44.1M  | 1  | loop | /snap/doctl/2275           |
| loop12                  | 7:12    | 0  | 164.3M | 1  | loop | /snap/microk8s/8511        |
| loop13                  | 7:13    | 0  | 118.3M | 1  | loop | /snap/lxd/35624            |
| loop14                  | 7:14    | 0  | 22.7M  | 1  | loop | /snap/keepalived/3093      |
| loop15                  | 7:15    | 0  | 118.4M | 1  | loop | /snap/lxd/36153            |
| loop16                  | 7:16    | 0  | 95.7M  | 1  | loop | /snap/kata-containers/2446 |
| loop17                  | 7:17    | 0  | 336M   | 1  | loop | /snap/nextcloud/50464      |
| loop18                  | 7:18    | 0  | 76.6M  | 1  | loop | /snap/powershell/313       |
| loop19                  | 7:19    | 0  | 164.2M | 1  | loop | /snap/microk8s/8355        |
| loop20                  | 7:20    | 0  | 3.1M   | 1  | loop | /snap/mosquitto/1006       |
| loop21                  | 7:21    | 0  | 50.9M  | 1  | loop | /snap/snappy/25577         |
| loop22                  | 7:22    | 0  | 76.6M  | 1  | loop | /snap/powershell/316       |
| loop23                  | 7:23    | 0  | 13.9M  | 1  | loop | /snap/slcli/2957           |
| loop24                  | 7:24    | 0  | 50.8M  | 1  | loop | /snap/snappy/25202         |
| loop25                  | 7:25    | 0  | 23.2M  | 1  | loop | /snap/wormhole/509         |
| sda                     | 8:0     | 0  | 35G    | 0  | disk |                            |
| └─sda1                  | 8:1     | 0  | 1M     | 0  | part |                            |
| └─sda2                  | 8:2     | 0  | 2G     | 0  | part | /boot                      |
| └─sda3                  | 8:3     | 0  | 23G    | 0  | part |                            |
| └─ubuntu--vg-ubuntu--lv | 252:0   | 0  | 11.5G  | 0  | lvm  | /                          |
| sr0                     | 11:0    | 1  | 1024M  | 0  | rom  |                            |


```

Ubuntu

uses **LVM (Logical Volume Manager)** — that's why main partition is:
`/dev/mapper/ubuntu--vg-ubuntu--lv`

So now we'll **extend** that logical volume to use the extra space you added (from 25 GB → 35 GB).

output tells us:

- Your main disk is /dev/sda (35 GB total)
- Your Linux partition is /dev/sda3 (currently 23 GB)
- Your logical volume /dev/ubuntu-vg/ubuntu-lv (root '/') is only **11.5 GB** — that's the one we'll expand.

Grow the 3rd partition to fill the new disk space

`sudo growpart /dev/sda 3`

```

hajra@ubuntu-lab: $ sudo growpart /dev/sda 3
CHANGED: partition=3 start=4198400 old: size=48228352 end=52426751 new: size=69201887 end=73400286

```

This tells Ubuntu to extend partition 3 to use all available space on the disk.

Resize the physical volume

`sudo pvresize /dev/sda3`

```

hajra@ubuntu-lab: $ sudo pvresize /dev/sda3
Physical volume "/dev/sda3" changed
 1 physical volume(s) resized or updated / 0 physical volume(s) not resized

```

This

tells LVM that the underlying disk partition now has more space.

Extend your logical volume to use all free space

`sudo lvextend -l +100%FREE /dev/ubuntu-vg/ubuntu-lv`

```

hajra@ubuntu-lab: $ sudo lvextend -l +100%FREE /dev/ubuntu-vg/ubuntu-lv
Size of logical volume ubuntu-vg/ubuntu-lv changed from <11.50 GiB (2943 extents) to <33.00 GiB (8447 extents).
Logical volume ubuntu-vg/ubuntu-lv successfully resized.

```

This

expands the main LVM volume (your root filesystem).

Finally, resize your filesystem

`sudo resize2fs /dev/ubuntu-vg/ubuntu-lv`

```

hajra@ubuntu-lab: $ sudo resize2fs /dev/ubuntu-vg/ubuntu-lv
resize2fs 1.47.0 (5-Feb-2023)
Filesystem at /dev/ubuntu-vg/ubuntu-lv is mounted on /; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 5
The filesystem on /dev/ubuntu-vg/ubuntu-lv is now 8649728 (4k) blocks long.

```

This makes your root filesystem actually use the new space. After all that finishes successfully, confirm it with: `df -h`

```
hari@ubuntu-lab: ~ $ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           192M   1.6M  191M  1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv  3.9G  11G  21G  34% /
tmpfs            960M    0  960M  0% /dev/shm
tmpfs            5.0M    0  5.0M  0% /run/lock
tmpfs            1.9G  128M  1.6G  1% /root
tmpfs            192K  20K  192K  1% /run/user/1000
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/483fff25e3b712de4439962c13861cbd9b245ecd1cc07a3a337a95
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/15a028bbbf290888005fa373e0fbe59796cbf11b1c57575fa44ae3e
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/183356de05a5db846eb9bafa5c6f530418c6a565183b35b0422032a
shm              64M    0  64M  0% /var/snap/microk8s/common/run/containerd/io.containerd.grpc.v1.cri/sandboxes/47fed3330/snap
```

You

should now see / showing **around 33 GB total** instead of 12 GB.

SUMMARY:

What We Did

Ubuntu virtual machine (VM) was **running out of space** – the root partition (/) had only **12 GB total** and was **98% full**.

Even though i increased the virtual disk size in VMware (to 35 GB), Ubuntu didn't automatically use that extra space.

So, i had to **extend Ubuntu's internal partitions and filesystem** to use the new space.

Used growpart to Expand /dev/sda3

/dev/sda is my **main virtual hard disk**, and it's divided into smaller **partitions**:

Partition	Purpose	Size before	Notes
sda1	Boot loader space	1 MB	Used by GRUB to start Ubuntu
sda2	/boot partition	2 GB	Holds kernel and boot files
sda3	Main Linux partition (LVM)	23 GB → expanded to 33 GB	Holds almost all Ubuntu files

I expanded **only /dev/sda3** because that's where your **main Ubuntu data** lives.

Nothing changed in sda1 or sda2 – they stayed exactly the same.

I just used the **empty unallocated space** that was added after sda3 when the VMware disk was expanded.

```

hajra@ubuntu-lab: $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  cloud-init distro-info-data firmware-sof-signed libpam-systemd libsystemd-shared libsystemd0 libudev1 linux-firmware snapd sosreport systemd systemd-dev systemd-hwe-hwdb
  systemd-resolved systemd-sysv systemd-timesyncd tcpdump ubuntu-drivers-common udev
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 0 B of archives.
After this operation, 4,281 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpam-systemd amd64 255.4-1ubuntu8.11 [159 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-dev all 255.4-1ubuntu8.11 [108 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-timesyncd amd64 255.4-1ubuntu8.11 [353 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-resolved amd64 255.4-1ubuntu8.11 [296 kB]
Get:5 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libsystemd-shared amd64 255.4-1ubuntu8.11 [2,076 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libsystemd0 amd64 255.4-1ubuntu8.11 [434 kB]
Get:7 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-sysv amd64 255.4-1ubuntu8.11 [11.9 kB]
Get:8 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpam-systemd amd64 255.4-1ubuntu8.11 [235 kB]
Get:9 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 sosreport amd64 20240318.git3b128b60-0ubuntu2.19 [538 MB]
Get:10 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 snapd amd64 2.71ubuntu24.04 [33.9 MB]
Get:11 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libudev1 amd64 255.4-1ubuntu8.11 [176 kB]
Get:12 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 ubuntu-drivers-common amd64 1:0.9.7.6ubuntu3.4 [65.8 kB]
Get:13 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 distro-info-data all 0.60ubuntu0.5 [6,934 B]
Get:14 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-hwe-hwdb all 255.1.6 [3,688 B]
Get:15 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 tcpdump amd64 4.99.4-3ubuntu4.24.04.1 [479 kB]
Get:16 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 firmware-sof-signed all 2023.12.1-1ubuntu1.11 [7,382 kB]
Get:17 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-firmware amd64 20240318.git3b128b60-0ubuntu2.19 [538 MB]
Get:18 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 snapd amd64 2.71ubuntu24.04 [33.9 MB]
Get:19 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 sosreport amd64 4.9.2-0ubuntu0~24.04.1 [372 kB]
Get:20 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 cloud-init all 25.2-0ubuntu11~24.04.1 [625 kB]
Fetched 500 MB in 4min 46s (2,335 kB/s)
Preconfiguring packages...
(Reading database ... 142510 files and directories currently installed.)
Preparing to unpack .../0-libpam-systemd 255.4-1ubuntu8.11_amd64.deb ...
Unpacking libpam-systemd:amd64 (255.4-1ubuntu8.11) over (255.4-1ubuntu8.10) ...
Preparing to unpack .../1-systemd-dev_255.4-1ubuntu8.11_all.deb ...
Unpacking systemd-dev (255.4-1ubuntu8.11) over (255.4-1ubuntu8.10) ...
Preparing to unpack .../2-systemd-timesyncd_255.4-1ubuntu8.11_amd64.deb ...
Unpacking systemd-timesyncd (255.4-1ubuntu8.11) over (255.4-1ubuntu8.10) ...
Preparing to unpack .../3-systemd-resolved_255.4-1ubuntu8.11_amd64.deb ...
Unpacking systemd-resolved (255.4-1ubuntu8.11) over (255.4-1ubuntu8.10) ...
Preparing to unpack .../4-libsystemd-shared_255.4-1ubuntu8.11_amd64.deb ...
Setting up udev (255.4-1ubuntu8.11) ...
Setting up systemd-hw-hwdb (255.4-16) ...
Setting up systemd-resolved (255.4-1ubuntu8.11) ...
Setting up libsystemd (0.71ubuntu24.04)
Installing new version of config file /etc/apparmor.d/usr.lib.snapd.snap-confine.real ...
snapd.failure.service is disabled or a static unit not running, not starting it.
snapd-gpio-chardev-setup.target is a disabled or a static unit not running, not starting it.
snapd.snap-repair.service is a disabled or a static unit not running, not starting it.
Setting up systemd-sysv (255.4-1ubuntu8.11) ...
Setting up ubuntu-drivers-common (1:0.9.7.6ubuntu3.4) ...
Setting up libpam-systemd:amd64 (255.4-1ubuntu8.11) ...
Setting up libpam-systemd:amd64 (255.4-1ubuntu8.11) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for rsyslog (8.23.12-0ubuntu9.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for dbus (1.14.10-4ubuntu0.1) ...
Processing triggers for initramfs-tools (0.142ubuntu25.5) ...
update-initramfs: Generating /boot/initrd.img-6.8.0-86-generic
Scanning processes...
Scanning candidates...
Scanning linux images...
Running kernel seems to be up-to-date.

Restarting services...
systemctl restart fwupd.service multipathd.service open-vm-tools.service polkit.service snap.keepalived.daemon.service ssh.service udisks2.service upower.service

Service restarts being deferred:
  systemctl restart ModemManager.service
/etc/needrestart/restart.d/dbus.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.service

No containers need to be restarted.

User sessions running outdated binaries:
hajra @ session #1: login[1532]
hajra @ session #3: apt[211349], sshd[11122]
hajra @ user manager service: systemd[2562]

No VM guests are running outdated hypervisor (qemu) binaries on this host.

hajra@ubuntu-lab: $

```

3. Write a short explanation (3–5 sentences) describing the difference between apt update and apt upgrade:

nano ~/apt_update_vs_upgrade.md

```

hajra@ubuntu-lab: $ nano ~/apt_update_vs_upgrade.md
hajra@ubuntu-lab: $ hajra@ubuntu-lab: $ -

```

Write your explanation, save, and exit Nano.

4. Open the file or display it on screen:

```

hajra@ubuntu-lab: $ nano ~/apt_update_vs_upgrade.md
hajra@ubuntu-lab: $ cat ~/apt_update_vs_upgrade.md
The command 'sudo apt update' refreshes the list of available packages from online repositories. It does not install or remove anything; it just updates the local index.
On the other hand, 'sudo apt upgrade' actually installs the new versions of already-installed packages using the updated index.
Earlier, I faced issues where updates failed due to low disk space, and I had to extend the partition ('/dev/sda3') using 'growpart' to fix it. After fixing the partition, both apt update and upgrade ran successfully.
Without running apt update first, apt upgrade would not know about the latest versions available.
This process ensures the system stays up-to-date and secure.

```

Task 4: Install Visual Studio Code via Snap on CLI and Verify

Steps Performed:

1. Installed Visual Studio Code using the snap command:

```
sudo snap install --classic code
hajra@ubuntu-lab: $ sudo snap install --classic code
[sudo] password for hajra:
code 7d842fb8 from Visual Studio Code (vscode) installed
```

2. Verified that the package was successfully installed by listing it from snap:

```
snap list code
```

```
hajra@ubuntu-lab: $ snap list code
Name    Version   Rev  Tracking      Publisher  Notes
code   7d842fb8  211  latest/stable  vscode     classic
```

3. Checked the version of the installed application to confirm it was working correctly: code --version

```
hajra@ubuntu-lab: $ code --version
1.105.1
7d842fb85a0275a4a8e4d7e040d2625abbf7f084
x64
```

or

alternatively:

```
snap info code
```

```
hajra@ubuntu-lab: $ snap info code
name:      code
summary:   Code editing, Redefined.
publisher: Visual Studio Code (vscode)
store-url: https://snapcraft.io/code
contact:   https://twitter.com/code
license:   unset
description: Visual Studio Code is a new choice of tool that combines the simplicity of a code editor with what developers need for the core edit-build-debug cycle.
commands:
- code
- code.url-handler
snap-id:  HT0auHjZofh0Fbwh6m7jUN2pAy6kzBiu
tracking: latest/stable
refresh-date: today at 20:41 UTC
channels:
latest/stable: 7d842fb8 2025-10-15 (211) 346MB classic
latest/candidate: †
latest/beta: †
latest/edge: †
installed: 7d842fb8 (211) 346MB classic
```

4.

Located where the snap placed the binary to ensure it was correctly linked in the system PATH:

```
ls -l /snap/bin | grep code
```

```
hajra@ubuntu-lab: $ ls -l /snap/bin | grep code
lrwxrwxrwx 1 root root 13 Oct 24 20:41 code -> /usr/bin/snap
lrwxrwxrwx 1 root root 13 Oct 24 20:41 code.url-handler -> /usr/bin/snap
```

Task 5: Install XFCE GUI + XRDP and Launch VS Code

Steps Performed:

1. Connected to the virtual machine through SSH from the host terminal using:

```
ssh student@<vm-ip-address>
```

```
PS C:\Users\HP> ssh hajra@192.168.161.129
The authenticity of host '192.168.161.129 (192.168.161.129)' can't be established.
ED25519 key fingerprint is SHA256:M5unwK7+jxUhr6KM3bbMPRkgHlGd+Kq5uspTQZ5Up3w.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
```

```
Warning: Permanently added '192.168.161.129' (ED25519) to the list of known hosts.
```

```
hajra@192.168.161.129'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 Sat 27 Sep 10:28:45 UTC 2025
```

```
System load: 1.46 Processes: 276
Usage of /: 70.2% of 11.21GB Users logged in: 1
Memory usage: 57% IPV4 address for ens33: 192.168.161.129
Swap usage: 9%
```

```
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
```

```
hajra@ubuntu-lab: $ -
```

2. Updated the package lists and applied all available upgrades:

```
sudo apt update && sudo apt upgrade -y
```

```
hajra@ubuntu-lab: $ sudo apt update && sudo apt upgrade -y
[sudo] password for hajra:
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

3. Installed the XFCE desktop environment and additional XFCE tools for a lightweight GUI: sudo

```
apt install xfce4 xfce4-goodies -y
```

```
[hajra@ubuntu-lab ~]
aspell-autobuildhash: processing: en [en-variant_1].
aspell-autobuildhash: processing: en [en-variant_2].
aspell-autobuildhash: processing: en [en-w_accents-only].
aspell-autobuildhash: processing: en [en-wo_accents-only].
aspell-autobuildhash: processing: en [en-AU-variant_0].
aspell-autobuildhash: processing: en [en-AU-variant_1].
aspell-autobuildhash: processing: en [en-AU-wo_accents-only].
aspell-autobuildhash: processing: en [en-CA-variant_0].
aspell-autobuildhash: processing: en [en-CA-variant_1].
aspell-autobuildhash: processing: en [en-CA-wo_accents-only].
aspell-autobuildhash: processing: en [en-GB-ize-w_accents-only].
aspell-autobuildhash: processing: en [en-GB-ize-wo_accents-only].
aspell-autobuildhash: processing: en [en-GB-variant_0].
aspell-autobuildhash: processing: en [en-GB-variant_1].
aspell-autobuildhash: processing: en [en-US-w_accents-only].
aspell-autobuildhash: processing: en [en-US-wo_accents-only].
Processing triggers for sgml-base (1.31) ...
Processing triggers for libc-bin (2.39-1ubuntu0.6) ...
Scanning processes...
Scanning candidates...
Scanning linux images...

Running kernel seems to be up-to-date.

Restarting services...
Service restarts being deferred:
/etc/needrestart/restart.d/dbus.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.service

No containers need to be restarted.

User sessions running outdated binaries:
hajra @ session #1: login[1532]
hajra @ session #3: sshd[11122]
hajra @ user manager service: systemd[2562]

No VM guests are running outdated hypervisor (qemu) binaries on this host.

hajra@ubuntu-lab: $
```

4. Installed and enabled the XRDP service to allow remote desktop access:

```
sudo apt install xrdp -y
```

```
[hajra@ubuntu-lab ~]
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
libfuse2t64 libpiperwire-0.3-modules-xrdp pipewire-module-xrdp xorgxrdp
Suggested packages:
  pipewire-bin guacamole
The following NEW packages will be installed:
  libfuse2t64 libpiperwire-0.3-modules-xrdp pipewire-module-xrdp xorgxrdp xrdp
0 upgraded, 5 newly installed, 0 to remove and 0 not upgraded.
Service restarts being deferred:
/etc/needrestart/restart.d/dbus.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.service

No containers need to be restarted.

User sessions running outdated binaries:
hajra @ session #1: login[1532]
hajra @ session #3: sshd[11122]
hajra @ user manager service: systemd[2562]

No VM guests are running outdated hypervisor (qemu) binaries on this host.

hajra@ubuntu-lab: $
```

```
sudo systemctl enable --now xrdp
```

```
hajra@ubuntu-lab: $ sudo systemctl enable --now xrdp
Synchronizing state of xrdp.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable xrdp
```

5. Verified that the XRDP service was running properly:

```
sudo systemctl status xrdp
```

```

hajra@ubuntu-lab: $ sudo systemctl status xrdp
● xrdp.service - xrdp daemon
   Loaded: loaded (/usr/lib/systemd/system/xrdp.service; enabled; preset: enabled)
   Active: active (running) since Fri 2025-10-24 21:03:34 UTC; 3min 27s ago
     Docs: man:xrdp(8)
           man:xrdp.ini(5)
 Main PID: 464810 (xrdp)
   Tasks: 1 (limit: 2210)
  Memory: 936.0K (peak: 1.6M)
    CPU: 72ms
   CGroup: /system.slice/xrdp.service
           └─464810 /usr/sbin/xrdp

Oct 24 21:03:33 ubuntu-lab systemd[1]: Starting xrdp.service - xrdp daemon...
Oct 24 21:03:33 ubuntu-lab xrdp[464808]: [INFO ] address [0.0.0.0] port [3389] mode 1
Oct 24 21:03:33 ubuntu-lab xrdp[464808]: [INFO ] listening to port 3389 on 0.0.0.0
Oct 24 21:03:33 ubuntu-lab xrdp[464808]: [INFO ] xrdp_listen_pp done
Oct 24 21:03:33 ubuntu-lab systemd[1]: xrdp.service: can't open PID file /run/xrdp/xrdp.pid (yet?) after start: No such file or directory
Oct 24 21:03:34 ubuntu-lab systemd[1]: Started xrdp.service - xrdp daemon.
Oct 24 21:03:35 ubuntu-lab xrdp[464810]: [INFO ] starting xrdp with pid 464810
Oct 24 21:03:35 ubuntu-lab xrdp[464810]: [INFO ] address [0.0.0.0] port [3389] mode 1
Oct 24 21:03:35 ubuntu-lab xrdp[464810]: [INFO ] listening to port 3389 on 0.0.0.0
Oct 24 21:03:35 ubuntu-lab xrdp[464810]: [INFO ] xrdp_listen_pp done

```

6. Configured the XRDП session to use XFCE as the default desktop environment:

```

echo xfce4-session > ~/.xsession
hajra@ubuntu-lab: $ echo xfce4-session > ~/.xsession
hajra@ubuntu-lab: $ -

```

7. From the host system, connected to the VM using Remote Desktop Connection (mstsc) and logged in using the Ubuntu username and password.

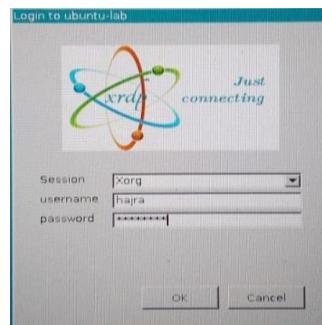
My VM's IP is 192.168.161.129

Now do this on Windows host system (not inside PowerShell):

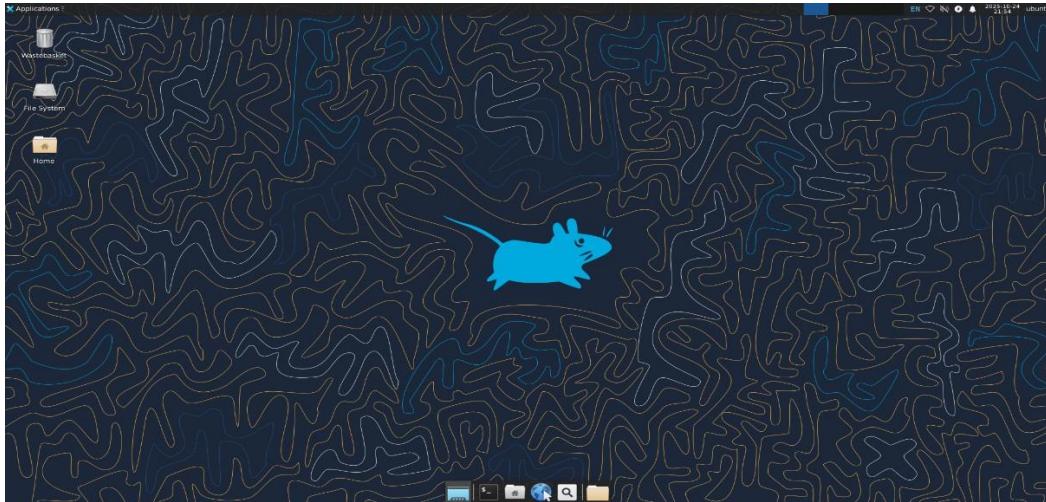
1. Press Windows + R
2. Type mstsc and press Enter
3. In the window that opens (titled *Remote Desktop Connection*):



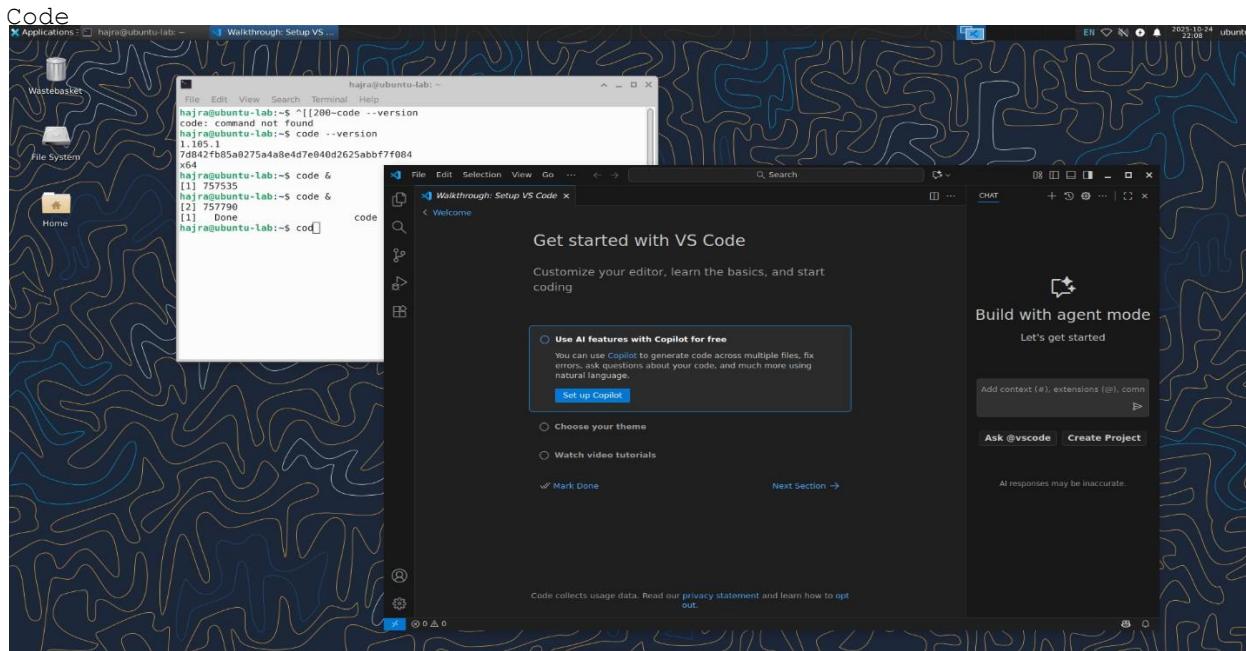
4. When prompted for credentials:



5. If a certificate warning appears → click Yes / Continue
6. Wait a few seconds — you should see the XFCE desktop (panel and menus).



8. Once logged into the GUI, launched Visual Studio Code to verify that the graphical interface and installed software worked properly:



Task 6: Install LightDM-GTK-Greeter and GUI Verification

Steps Performed:

1. Installed LightDM and LightDM-GTK-Greeter to enable a functional login screen:

```
sudo apt install lightdm lightdm-gtk-greeter -y
```

```
hajra@ubuntu-lab: $ sudo apt install lightdm lightdm-gtk-greeter -y
[sudo] password for hajra:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
lightdm is already the newest version (1.30.0-0ubuntu14).
lightdm set to manually installed.
The following additional packages will be installed:
  gnome-accessibility-themes gnome-themes-extra gnome-themes-extra-data gtk2-engines-pixbuf
The following NEW packages will be installed:
  gnome-accessibility-themes gnome-themes-extra gnome-themes-extra-data gtk2-engines-pixbuf lightdm-gtk-greeter
0 upgraded, 5 newly installed, 0 to remove and 0 not upgraded.
```

2. Created and configured LightDM settings to use XFCE as the default session and GTK greeter for login:

```
sudo mkdir -p /etc/lightdm/lightdm.conf.d
echo -e "[Seat:*]\ngreeter-session=lightdm-gtk-greeter\nuser-
```

```
session=xfce\nautologin-user-timeout=0" | sudo tee  
/etc/lightdm/lightdm.conf.d/99xfce.conf
```

```
[hajra@ubuntu-lab: $ sudo mkdir -p /etc/lightdm/lightdm.conf.d  
ngreeter-session=lightdm-gtk-greeter\nuser-session=xfce\nautologin-user-timeout=0" | sudo tee /etc/lightdm/lightdm.conf.d/99-xfce.conf  
echo -e "[Seat:*]ngreeter-session=lightdm-gtk-greeter  
user-session=xfce\nautologin-user-timeout=0" | sudo tee /etc/lightdm/lightdm.conf.d/99-xfce.conf[hajra@ubuntu-lab: $ sudo mkdir -p /etc/lightdm/lightdm.conf.d  
hajra@ubuntu-lab: $ ]
```

3. Cleaned up old or corrupted session and permission files to avoid login errors:

```
sudo rm -f /var/lib/lightdm/.Xauthority  
sudo rm -f ~/.Xauthority sudo rm -rf  
~/.cache/sessions sudo chown -R  
$USER:$USER /home/$USER
```

```
[hajra@ubuntu-lab: $ sudo rm -f /var/lib/lightdm/.Xauthority  
[hajra@ubuntu-lab: $ sudo rm -f ~/.Xauthority  
[hajra@ubuntu-lab: $ sudo rm -rf ~/.cache/sessions  
[hajra@ubuntu-lab: $ sudo chown -R $USER:$USER /home/$USER
```

4. Restarted the LightDM service to apply changes:

```
sudo systemctl restart lightdm
```

```
[hajra@ubuntu-lab: $ sudo systemctl restart lightdm  
[hajra@ubuntu-lab: $ ]
```

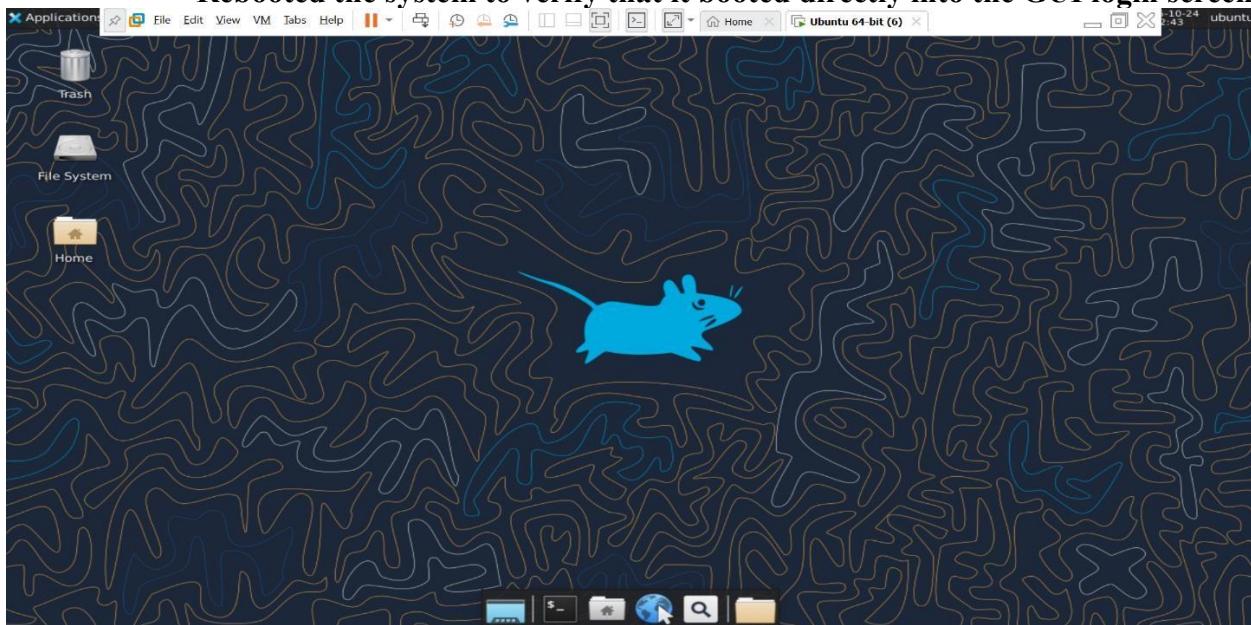
5. Enabled automatic GUI login at boot by setting the graphical target as default:

```
sudo systemctl enable lightdm  
sudo systemctl set-default graphical.target
```

```
[hajra@ubuntu-lab: $ sudo systemctl enable lightdm  
Synchronizing state of lightdm.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.  
Executing: /usr/lib/systemd/systemd-sysv-install enable lightdm  
The unit files have no installation config (WantedBy=, RequiredBy=, UpheldBy=,  
Also=, or Alias= settings in the [Install] section, and DefaultInstance= for  
template units). This means they are not meant to be enabled or disabled using systemctl.  
  
Possible reasons for having these kinds of units are:  
• A unit may be statically enabled by being symlinked from another unit's  
.wants/, .requires/, or .upholds/ directory.  
• A unit's purpose may be to act as a helper for some other unit which has  
a requirement dependency on it.  
• A unit may be started when needed via activation (socket, path, timer,  
D-Bus, udev, scripted systemctl call, ...).  
• In case of template units, the unit is meant to be enabled with some  
instance name specified.  
[hajra@ubuntu-lab: $ sudo systemctl set-default graphical.target  
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/graphical.target.  
[hajra@ubuntu-lab: $ ]
```

6.

Rebooted the system to verify that it booted directly into the GUI login screen.



7. Disabled GUI login at boot (to return to text-based CLI mode) by switching to the multi-user target:

```
sudo systemctl set-default multi-user.target sudo  
systemctl disable lightdm
```

```
[hajra@ubuntu-lab: $ sudo systemctl set-default multi-user.target  
[sudo] password for hajra:  
Removed "/etc/systemd/system/default.target".  
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/multi-user.target.  
[hajra@ubuntu-lab: $ sudo systemctl disable lightdm  
Synchronizing state of lightdm.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.  
Executing: /usr/lib/systemd/systemd-sysv-install disable lightdm  
Removed "/etc/systemd/system/display-manager.service".  
[hajra@ubuntu-lab: $ ]
```

8.

Rebooted again to confirm that the system now starts in CLI mode.

```
Ubuntu 24.04.3 LTS ubuntu-lab tty1
ubuntu-lab login: hajra
Password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-86-generic x86_64)

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

System information as of Wed 22 Oct 12:09:53 UTC 2025

 System load:  0.96      Processes:           270
 Usage of /:   56.9% of 11.21GB  Users logged in:   1
 Memory usage: 57%
 Swap usage:  9%
= / is using 66.9% of 11.21GB

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
Just raised the bar for easy, resilient and secure K8s cluster deployment.
https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

6 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

hajra@ubuntu-lab:~$
```

9. Tested manual GUI control (starting and stopping the GUI without reboot):

```
sudo systemctl start lightdm
```

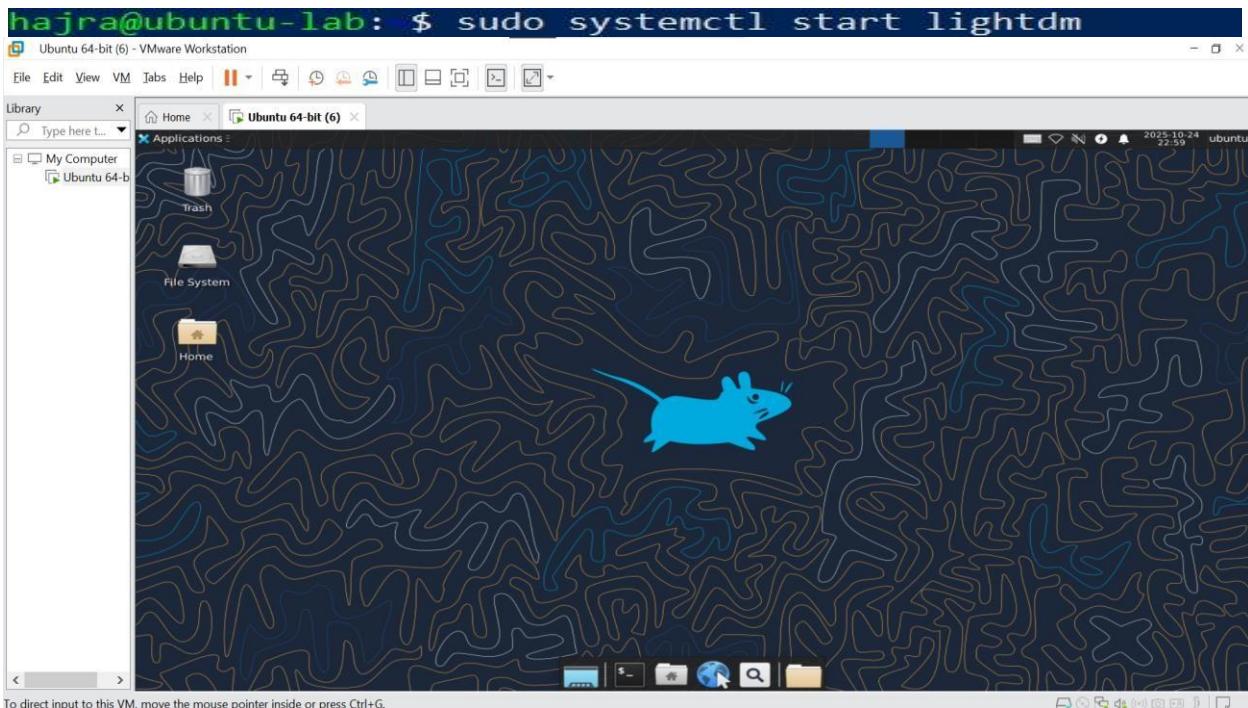
```
hajra@ubuntu-lab: $ sudo systemctl start lightdm
[sudo] password for hajra:
```

```
sudo systemctl stop lightdm
```

```
hajra@ubuntu-lab: $ sudo systemctl stop lightdm
hajra@ubuntu-lab: $
```

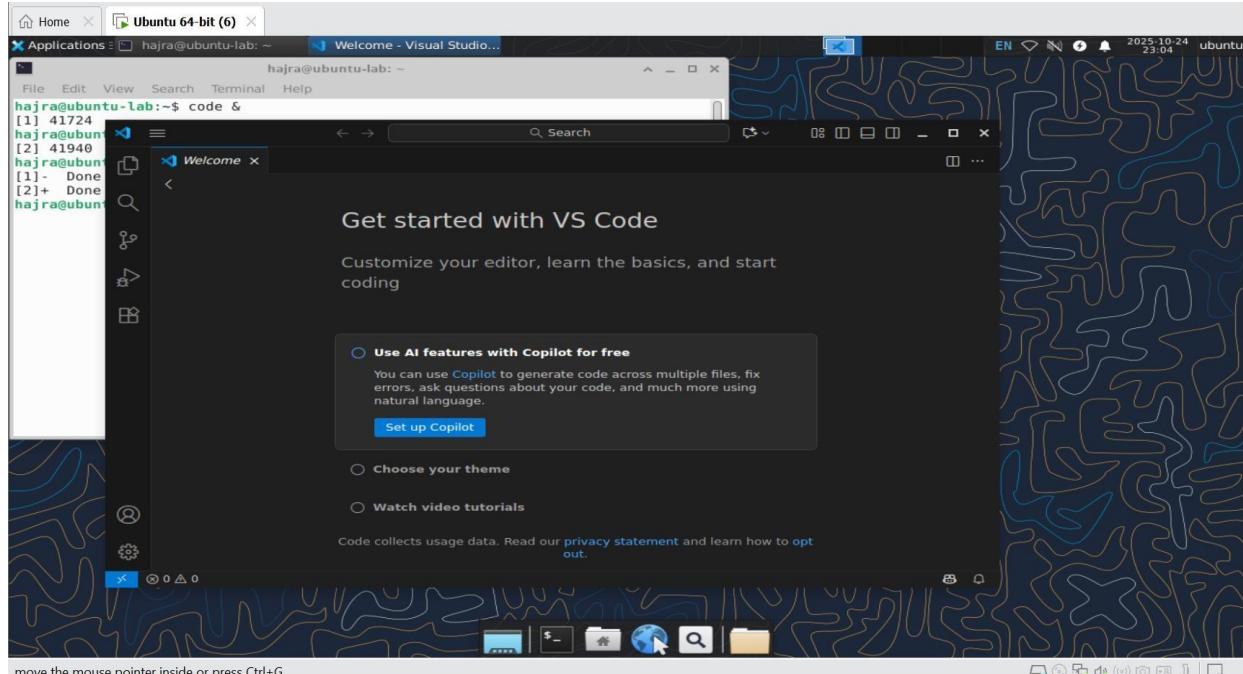
10. Started the GUI session manually when in CLI mode:

```
sudo systemctl start lightdm
```



11. Inside the GUI environment, launched Visual Studio Code (installed earlier in Task 4) to verify that it runs properly:

Code



Task 7: Install Google Chrome by Adding Its APT Source and Key

Steps Performed:

1. Attempted to install Google Chrome directly before adding its repository and key to observe the expected failure:

```
sudo apt install google-chrome-stable -y
hajra@ubuntu-lab: $ sudo apt install google-chrome-stable -y
[sudo] password for hajra:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package google-chrome-stable
```

2. Inspected the APT configuration to understand why the installation failed by listing the /etc/apt directory:

```
ls -la /etc/apt
hajra@ubuntu-lab: $ ls -la /etc/apt
total 48
drwxr-xr-x  9 root root 4096 Sep 26 21:06 .
drwxr-xr-x 147 root root 12288 Oct 24 21:25 ..
drwxr-xr-x  2 root root 4096 Oct 24 20:19 apt.conf.d
drwxr-xr-x  2 root root 4096 Mar 31 2024 auth.conf.d
drwxr-xr-x  2 root root 4096 Mar 31 2024 keyrings
drwxr-xr-x  2 root root 4096 Aug  5 17:14 preferences.d
drwxr-xr-x  2 root root 4096 Aug  5 17:14 preferences.d.snap
-rw-r--r--  1 root root   79 Sep 26 21:24 sources.list
drwxr-xr-x  2 root root 4096 Sep 26 21:24 sources.list.d
drwxr-xr-x  2 root root 4096 Aug  5 17:01 tested.gpg
```

3. Viewed the main system sources file to confirm that Google's repository was not listed:

```
cat /etc/apt/sources.list
hajra@ubuntu-lab: $ cat /etc/apt/sources.list
# Ubuntu sources have moved to /etc/apt/sources.list.d/ubuntu.sources
```

4. Checked additional repository files in /etc/apt/sources.list.d/:

```
ls -la /etc/apt/sources.list.d/
hajra@ubuntu-lab: $ ls -la /etc/apt/sources.list.d/
total 16
drwxr-xr-x  2 root root 4096 Sep 26 21:24 .
drwxr-xr-x  9 root root 4096 Sep 26 21:06 ..
-rw-r--r--  1 root root  382 Sep 26 21:06 ubuntu.sources
-rw-r--r--  1 root root 2552 Aug  5 17:02 ubuntu.sources.curtin.orig
```

5. Opened or created the `ubuntu.sources` file to verify that Google's Chrome repository was missing:

```
cat /etc/apt/sources.list.d/ubuntu.sources
hajra@ubuntu-lab: $ cat /etc/apt/sources.list.d/ubuntu.sources
Types: deb
URIs: http://archive.ubuntu.com/ubuntu
Suites: noble noble-updates noble-backports
Components: main restricted universe multiverse
Signed-By: /usr/share/keyrings/ubuntu-archive-keyring.gpg

Types: deb
URIs: http://security.ubuntu.com/ubuntu/
Suites: noble-security
Components: main restricted universe multiverse
Signed-By: /usr/share/keyrings/ubuntu-archive-keyring.gpg
```

6. Added Chrome's repository information manually to the sources file:

```
sudo nano /etc/apt/sources.list.d/ubuntu.sources
```

```
hajra@ubuntu-lab: $ sudo nano /etc/apt/sources.list.d/ubuntu.sources Then
                                                               appended:
```

```
Types: deb
URIs: http://dl.google.com/linux/chrome/deb/
Suites: stable
Components: main
Architectures: amd64
Signed-By: /etc/apt/keyrings/google.gpg
```

```

hajra@ubuntu-lab: ~
GRU nano 7.2
Types: deb
URLs:
Suites: noble noble-updates noble-backports
Components: main restricted universe multiverse
Signed-By: /usr/share/keyrings/ubuntu-archive-keyring.gpg

Types: deb
URLs:
Suites: noble-security
Components: main restricted universe multiverse
Signed-By: /usr/share/keyrings/ubuntu-archive-keyring.gpg

Types: deb
URLs:
Suites: stable
Components: main
Architectures: amd64
Signed-By: /etc/apt/keyrings/google.gpg

^C Help      ^W Write Out   ^K Where Is    ^X Cut        ^T Execute   ^C Location   M-U Undo
^Q Exit      ^R Read File   ^L Replace     ^V Paste      ^J Justify   ^G Go To Line  M-U Redo
                                         ^A Set Mark   ^B To Bracket ^H Copy      ^I Previous   M-Q Previous
                                         ^K Where Was   ^J Next      ^B Back       ^F Forward

```

7. Created the keyrings directory (if missing) and imported Google's official signing key:

```

curl -fsSL https://dl.google.com/linux/linux_signing_key.pub | sudo gpg --dearmor > /etc/apt/keyrings/google.gpg
hajra@ubuntu-lab: $ sudo mkdir -p /etc/apt/keyrings
hajra@ubuntu-lab: $ curl -fsSL https://dl.google.com/linux/linux_signing_key.pub | sudo gpg --dearmor -o /etc/apt/keyrings/google.gpg
hajra@ubuntu-lab: $ .

```

8. Updated the system package index and successfully installed Chrome:

```
sudo apt update
```

```

hajra@ubuntu-lab: $ sudo apt update
Get:1 http://dl.google.com/linux/chrome/deb stable InRelease [1,825 B]
Get:2 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Get:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:5 http://dl.google.com/linux/chrome/deb stable/main amd64 Packages [1,217 B]
Get:6 http://archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [21.6 kB]
Get:8 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [21.2 kB]
Get:9 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.3 kB]
Get:10 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 kB]
Get:11 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1,541 kB]
Get:12 http://archive.ubuntu.com/ubuntu noble-updates/main Translation-en [292 kB]
Get:13 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Components [175 kB]
Get:14 http://archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Packages [2,170 kB]
Get:15 http://archive.ubuntu.com/ubuntu noble-updates/restricted Translation-en [269 kB]
Get:16 http://archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Components [212 kB]
Get:17 http://archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [377 kB]
Get:18 http://archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Components [940 kB]
Get:19 http://archive.ubuntu.com/ubuntu noble-backports/main amd64 Components [7,138 kB]
Get:20 http://archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Components [216 kB]
Get:21 http://archive.ubuntu.com/ubuntu noble-backports/universe amd64 Components [11.0 kB]
Get:22 http://archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Components [212 kB]
Fetched 5,521 kB in 9s (608 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.

```

```
sudo apt install google-chrome-stable -y
```

```

hajra@ubuntu-lab: $ sudo apt install google-chrome-stable -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  fonts-liberation fonts-liberation-sans-narrow
The following NEW packages will be installed:
  fonts-liberation fonts-liberation-sans-narrow google-chrome-stable
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 122 MB of archives.
After this operation, 401 MB of additional disk space will be used.
Get:1 http://dl.google.com/linux/chrome/deb stable/main amd64 google-chrome-stable amd64 141.0.7390.122-1 [120 MB]
Get:2 http://archive.ubuntu.com/ubuntu/noble/main amd64 fonts-liberation all 1:2.1.5-3 [1,663 kB]
Get:3 http://archive.ubuntu.com/ubuntu/noble/main amd64 fonts-liberation-sans-narrow all 1:1.07.6-4 [197 kB]
Fetched 122 MB in 1min 11s (1,725 kB/s)

Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ubuntu5) ...
Rebuilding /usr/share/applications/bamf-2.index...
Processing triggers for desktop-file-utils (0.27-2build1) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
hajra@ubuntu-lab: $

```

9. (Alternate – Preferred Method)

Removed the earlier Chrome installation and cleaned up the previous configuration:

```
sudo apt remove google-chrome-stable -y
```

```

hajra@ubuntu-lab: $ sudo apt remove google-chrome-stable -y
[sudo] password for hajra:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages will be REMOVED:
  google-chrome-stable
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 396 MB disk space will be freed.
(Reading database ... 183468 files and directories currently installed.)
Removing google-chrome-stable (141.0.7390.122-1) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ubuntu5) ...
Rebuilding /usr/share/applications/bamf-2.index...
sudo nano /etc/apt/sources.list.d/ubuntu.sources      # removed chrome stanza
hajra@ubuntu-lab: $ sudo nano /etc/apt/sources.list.d/ubuntu.sources

```

```

hajra@ubuntu-lab: ~
GNU nano 7.2
Types: deb
URIs: http://dl.google.com/linux/chrome/deb/stable/main
Suites: noble noble-updates noble-backports
Components: main restricted universe multiverse
Signed-By: /usr/share/keyrings/ubuntu-archive-keyring.gpg

Types: deb
URIs: http://dl.google.com/linux/chrome/deb/stable/main
Suites: noble-security
Components: main restricted universe multiverse
Signed-By: /usr/share/keyrings/ubuntu-archive-keyring.gpg

```

```

sudo rm -f /etc/apt/keyrings/google.gpg
hajra@ubuntu-lab: $ sudo rm -f /etc/apt/keyrings/google.gpg
hajra@ubuntu-lab: $

```

10. Created a dedicated one-line Chrome repository file for a cleaner configuration:

```

echo "deb [arch=amd64 signed-by=/etc/apt/keyrings/google.gpg]
http://dl.google.com/linux/chrome/deb/ stable main" | sudo tee
/etc/apt/sources.list.d/google-chrome.list > /dev/null

```

```

hajra@ubuntu-lab: $ echo "deb [arch=amd64 signed-by=/etc/apt/keyrings/google.gpg] http://dl.google.com/linux/chrome/deb/ stable main" | sudo tee /etc/apt/sources.list.d/google-chrome.list >
/dev/null
hajra@ubuntu-lab: $

```

11. Verified the new sources list file:

```

ls -la /etc/apt/sources.list.d/
hajra@ubuntu-lab: $ ls -la /etc/apt/sources.list.d/
total 20
drwxr-xr-x 2 root root 4096 Oct 25 04:41 .
drwxr-xr-x 9 root root 4096 Sep 26 21:06 ..
-rw-r--r-- 1 root root 107 Oct 25 04:45 google-chrome.list
-rw-r--r-- 1 root root 384 Oct 25 04:41 ubuntu.sources
-rw-r--r-- 1 root root 2552 Aug 5 17:02 ubuntu.sources.curtin.orig

```

12. Re-added Google's signing key using the keyrings method:

```

sudo mkdir -p /etc/apt/keyrings
curl -fsSL https://dl.google.com/linux/linux_signing_key.pub | sudo gpg --dearmor o
/etc/apt/keyrings/google.gpg

```

```

hajra@ubuntu-lab: $ sudo mkdir -p /etc/apt/keyrings
hajra@ubuntu-lab: $ curl -fsSL https://dl.google.com/linux/linux_signing_key.pub | sudo gpg --dearmor -o /etc/apt/keyrings/google.gpg
hajra@ubuntu-lab: $

```

13.

Updated the package list again and reinstalled Google Chrome successfully using the new method:

```

sudo apt update

```

```

hajra@ubuntu-lab: $ sudo apt update
Hit:1 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:5 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.

```

```

sudo apt install google-chrome-stable -y

```

```

hajra@ubuntu-lab: $ sudo apt install google-chrome-stable -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  google-chrome-stable
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 120 MB of archives.
After this operation, 396 MB of additional disk space will be used.
Get: http://archive.ubuntu.com/ubuntu/pool/main/g/google-chrome-stable/main google-chrome-stable amd64 141.0.7390.122-1 [120 MB]
Fetched 120 MB in 1min 15s (1,060 kB/s)
Selecting previously unselected package google-chrome-stable.
(Reading database ... 183188 files and directories currently installed.)
Preparing to unpack .../google-chrome-stable_141.0.7390.122-1_amd64.deb ...
Unpacking google-chrome-stable (141.0.7390.122-1) ...
Setting up google-chrome-stable (141.0.7390.122-1) ...
update-alternatives: using /usr/bin/google-chrome-stable to provide /usr/bin/x-www-browser (x-www-browser) in auto mode
update-alternatives: using /usr/bin/google-chrome-stable to provide /usr/bin/gnome-www-browser (gnome-www-browser) in auto mode
update-alternatives: using /usr/bin/google-chrome-stable to provide /usr/bin/google-chrome (google-chrome) in auto mode
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for man-db (2.12.0-4ubuntu2) ...
Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ubuntu5) ...
rebuilding /usr/share/applications/bamf-2.index...
Processing triggers for desktop-file-utils (0.27-2build1) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.

hajra@ubuntu-lab: $

```

Task 8: Install Applications via PPA (Audacity & OBS Studio) and Launch

Steps Performed:

1. Added the Audacity PPA to the system and updated the package index:

```

hajra@ubuntu-lab: $ sudo add-apt-repository ppa:ubuntuhandbook1/audacity -y
Repository: 'Types: deb
URIs: https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu/
Suites: noble
Components: main
'
Description:
Unofficial build of Audacity audio editor

For help, please use Audacity forum: http://forum.audacityteam.org/

If the packages here are helpful, you may buy me a coffee:
  https://ko-fi.com/ubuntuhandbook1
More info: https://launchpad.net/~ubuntuhandbook1/+archive/ubuntu/audacity
Adding repository.
Hit:1 http://dl.google.com/linux/chrome/deb_stable InRelease
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:5 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Get: https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease [18.1 kB]
Get:7 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu/noble/main amd64 Packages [1,064 B]
Get:8 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu/noble/main Translation-en [492 B]
Fetched 19.6 kB in 5s (5,935 B/s)
Reading package lists... Done

```

```
sudo apt update
```

```

hajra@ubuntu-lab: $ sudo apt update
Hit:1 http://dl.google.com/linux/chrome/deb_stable InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:5 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease
Hit:6 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.

```

2. Installed Audacity using the apt command:

```
sudo apt install audacity -y
```

```

hajra@ubuntu-lab: $ sudo apt install audacity -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  audacity-data libdbdouble-conversion3 libflac++10 libid3tag0 liblivilv-0-0 libopusfile0 libpcre2-16-0 libpcre2-32-0 libportaudio2 libportmidi0 libportsmf0t64 libqt5core5t64
  libqt5dbus5t64 libqt5guist64 libqt5network5t64 libqt5qlm5 libqt5qlmodels5 libqt5quicks libqt5svg5 libqt5waylandclient5 libqt5waylandcompositor5 libqt5widgets5t64 libqt5x11extras5
  libsbms10 libserd-0-0 libsoundtouch1 libsratom-0-0 libsuil-0-0 libvamp-hostsd3v5 libwxbase3.2-1t64 libwgtk3.2-1t64 libxcb-icccm4 libxcb-image0 libxcb-keysyms1
  libxcb-render-util0 libxcb-xinerama0 libxcb-xinput0 libxcb-xkb1 libxcbcommon-x11-0 libzix-0-v qt5-gtk-platformtheme qttranslations5-l10n qtwaylands
Suggested packages:
  ladspa-plugin qgnomeplatform qt5-qml-image-formats-plugins qt5-qmltooling-plugins serdi sordi
The following NEW packages will be installed:
  audacity audacity-data libdbdouble-conversion3 libflac++10 libid3tag0 liblivilv-0-0 libmd4c0 libopusfile0 libpcre2-16-0 libpcre2-32-0 libportaudio2 libportmidi0 libportsmf0t64
  libqt5core5t64 libqt5dbus5t64 libqt5guist64 libqt5network5t64 libqt5qlm5 libqt5qlmodels5 libqt5quicks libqt5svg5 libqt5waylandclient5 libqt5waylandcompositor5 libqt5widgets5t64
  libqt5x11extras5 libsbms10 libserd-0-0 libsoundtouch1 libsratom-0-0 libsuil-0-0 libvamp-hostsd3v5 libwxbase3.2-1t64 libwgtk3.2-1t64 libxcb-icccm4 libxcb-image0
  libxcb-keysyms1 libxcb-render-util0 libxcb-xinerama0 libxcb-xinput0 libxcb-xkb1 libxcbcommon-x11-0 libzix-0-v qt5-gtk-platformtheme qttranslations5-l10n qtwaylands
0 upgraded, 46 newly installed, 0 to remove and 0 not upgraded.
Processing triggers for libc-bin (2.39-0ubuntu0.6) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
hajra@ubuntu-lab: $

```

3. Verified or launched Audacity from the terminal or GUI to confirm successful installation:

```
audacity --version audacity
```

```

hajra@ubuntu-lab: $ which audacity
/usr/bin/audacity
hajra@ubuntu-lab: $ dpkg -l | grep audacity
ii  audacity                               3.7.5-0build1~ubuntu24.04          amd64      fast, cross-platform audio editor
ii  audacity-data                           3.7.5-0build1~ubuntu24.04          all        fast, cross-platform audio editor (data)

```

4. Added the OBS Studio PPA and updated the package list again:

```
sudo add-apt-repository ppa:obsproject/obs-studio -y
```

```

hajra@ubuntu-lab: $ sudo add-apt-repository ppa:obsproject/obs-studio -y
Repository: 'Types: deb
URLs: https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu/
Suites: noble
Components: main
'
Description:
Latest stable release of OBS Studio
More info: https://launchpad.net/~obsproject/+archive/ubuntu/obs-studio
Adding repository.
Hit:1 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Get:5 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble InRelease [17.8 kB]
Hit:6 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease
Hit:7 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Get:8 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble/main amd64 Packages [1,172 B]
Get:9 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble/main Translation-en [160 B]
Fetched 19.9 kB in 5s (3,947 B/s)
Reading package lists...

```

```
sudo apt update
```

```

hajra@ubuntu-lab: $ sudo apt update
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:5 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:6 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble InRelease
Hit:7 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.

```

5. Installed OBS Studio using apt:

```
sudo apt install obs-studio -y
```

```

hajra@ubuntu-lab: $ sudo apt install obs-studio -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libaaudio0 libalsa-lib0 libavdevice0 libavfilter0 libavformat0 libb2-1 libb2plus0 libblas3 libbluray2 libbs2b0 libchromaprint1 libcjson1 libcdci394-25 libdecor-0-0 libdecor-0-plugin-1-gtk
  libfdk-aac2 libfftw3-double3 libflite1 libgfortran5 libgme0 liblapack3 libluajit-5.1-2 libluajit-5.1-common libmbdecrypto7t64 libmbedts1at64 libmbedx59-1t64 libmysofa1 libnormit64
  libopenal-data libopenal1 libopenmppt0t64 libpbgm-5.3-0t64 libplacebo38 libpocketsphinx1 libpostproc57 libprcdegenpp1 libqt6core0t64 libqt6dbus6t64 libqt6gui0t64 libqt6network6t64
  libqt6opengl6t64 libqt6qmld6 libqt6quick6 libqt6svg6 libqt6waylandclient6 libqt6waylandcompositor6 libqt6waylandeglclient6 libqt6waylandeglclientwintegration6
  libqt6waylandeglcompositor6 libqt6widets66 libqt6wsllshellintegration6 libqt6xml6t64 librabbitmqd librists4 librubberband2 libsd12-2.0-0 libsdio7.0 libspinhixbase3t64
  libsts1.5-gnutl libsts1.5-openssl libssh-crypt-4 libwscale7 libstot64 libudfread0 libunibreak5 libvidstab1.1 libxcb-composite0 libzimg2 libzmq5 pocketsphinx-en-us
  qt6-gtk-platformtheme qt6-qpa-plugins qt6-translations-l10n qt6-wayland
Suggested packages:
  libbluetooth-dev libfftw3-bin libfftw3-dev qt6-qmltooling-plugins sndiod
The following NEW packages will be installed:
  libaaudio0 libalsa-lib0 libavdevice0 libavfilter0 libavformat0 libb2-1 libb2plus0 libblas3 libbluray2 libbs2b0 libchromaprint1 libcjson1 libcdci394-25 libdecor-0-0 libdecor-0-plugin-1-gtk
  libfdk-aac2 libfftw3-double3 libflite1 libgfortran5 libgme0 liblapack3 libluajit-5.1-2 libluajit-5.1-common libmbdecrypto7t64 libmbedts1at64 libmbedx59-1t64 libmysofa1 libnormit64
  libopenal-data libopenal1 libopenmppt0t64 libpbgm-5.3-0t64 libplacebo38 libpocketsphinx1 libpostproc57 libprcdegenpp1 libqt6core0t64 libqt6dbus6t64 libqt6gui0t64 libqt6network6t64
  libqt6opengl6t64 libqt6qmld6 libqt6quick6 libqt6svg6 libqt6waylandclient6 libqt6waylandcompositor6 libqt6waylandeglclient6 libqt6waylandeglclientwintegration6
  libqt6waylandeglcompositor6 libqt6widets66 libqt6wsllshellintegration6 libqt6xml6t64 librabbitmqd librists4 librubberband2 libsd12-2.0-0 libsdio7.0 libspinhixbase3t64
  libsts1.5-gnutl libsts1.5-openssl libssh-crypt-4 libwscale7 libstot64 libudfread0 libunibreak5 libvidstab1.1 libxcb-composite0 libzimg2 libzmq5 obs-studio pocketsphinx-en-us
  qt6-gtk-platformtheme qt6-qpa-plugins qt6-translations-l10n qt6-wayland
0 upgraded, 75 newly installed, 0 to remove and 0 not upgraded.

```

6. Verified or launched OBS Studio to ensure that the installation completed successfully:

```
obs --version
```

```

hajra@ubuntu-lab: $ obs --version
OBS Studio - 32.0.0

```

Task 9: Create a Kubernetes Sample YAML Using Vim

Steps Performed:

1. Checked if vim was installed:

```
Vim
Select hajra@ubuntu-lab: ~
VIM - Vi IMproved
      version 9.1.697
      by Bram Moolenaar et al.
      Modified by teamvim@tracker.debian.org
      vim is open source and freely distributable
      Sponsor vim development!
      type :help sponsor <CR> for information
      type :q!          to exit
      type :help <CR> or   for on-line help
      type :help version<CR> for version info
```

for just checking vim (no changes), you can do: :q!

2. Created the Lab5 working directory and navigated into it:

```
mkdir -p ~/Lab5
cd ~/Lab5
pwd
hajra@ubuntu-lab: $ mkdir -p ~/Lab5
hajra@ubuntu-lab: $ cd ~/Lab5
hajra@ubuntu-lab:~/Lab5$ pwd
/home/hajra/Lab5
```

3. Created the Kubernetes sample YAML file using vim:

```
vim k8s-sample.yaml
hajra@ubuntu-lab:~/Lab5$ vim k8s-sample.yaml
```

Enabled insert mode (i) and pasted the following content:

```
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
```

```
hajra@ubuntu-lab:~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
```

4. Saved and exited vim:

o Pressed Esc and then

typed :wq to save the file.

```
hajra@ubuntu-lab:~/Lab5$ vim k8s-sample.yaml
hajra@ubuntu-lab:~/Lab5$
```

5. Verified that the file was saved correctly:

```
ls -la
hajra@ubuntu-lab:~/Lab5$ ls -la
total 12
drwxrwxr-x  2 hajra hajra 4096 Oct 25 07:43 .
drwxr-x--- 23 hajra hajra 4096 Oct 25 07:43 ..
-rw-rw-r--  1 hajra hajra   320 Oct 25 07:43 k8s-sample.yaml
```

Task 10: Edit the Kubernetes YAML: Add Annotation and Discard Temporary Change

Steps Performed:

1. Opened the manifest file in vim:

```
cd ~/Lab5 vim k8s-
sample.yaml
hajra@ubuntu-lab:~/Lab5$ cd ~/Lab5
hajra@ubuntu-lab:~/Lab5$ vim k8s-sample.yaml
```

- Entered insert mode by pressing `i`.

2. Added a permanent annotation under the metadata section (matching YAML indentation):

```
annotations: lab:
lesson11
```

```
hajra@ubuntu-lab:~/Lab5
```

```
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
```

- Pressed `Esc` and saved the file with `:wq`.

3. Verified the annotation was added correctly:

```
cat k8s-sample.yaml
hajra@ubuntu-lab:~/Lab5$ cat k8s-sample.yaml
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: nginx-pod
spec:
  containers:
    - name: nginx
      image: nginx:1.19
      ports:
        - containerPort: 80
          restartPolicy: Always
hajra@ubuntu-lab:~/Lab5$
```

4. Practiced a temporary edit:

- Reopened the file:
`vim k8s-sample.yaml`

```
hajra@ubuntu-lab: ~/Lab5
$ vim k8s-sample.yaml
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
    name: nginx-pod
  spec:
    containers:
      - name: nginx
        image: nginx:1.19
        ports:
          - containerPort: 80
            restartPolicy: Always
```

Entered insert mode (*i*) and added a temporary comment:

```
# temp: do-not-keep
```

```
hajra@ubuntu-lab: ~/Lab5
$ vim k8s-sample.yaml
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
    name: nginx-pod
  spec:
    containers:
      - name: nginx
        image: nginx:1.19
        ports:
          - containerPort: 80
            restartPolicy: Always
          # temp: do-not-keep
```

5. Discarded the temporary change without saving:

- Pressed `Esc` and exited with `:q!`.

```
hajra@ubuntu-lab: ~/Lab5 $ vim k8s-sample.yaml
hajra@ubuntu-lab: ~/Lab5 $
```

6. Verified that the temporary comment was not saved:

```
cat k8s-sample.yaml
hajra@ubuntu-lab: ~/Lab5 $ cat k8s-sample.yaml
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
    name: nginx-pod
  spec:
    containers:
      - name: nginx
        image: nginx:1.19
        ports:
          - containerPort: 80
            restartPolicy: Always
          # temp: do-not-keep
hajra@ubuntu-lab: ~/Lab5 $
```

Task 11: Vim Editing Practice: Delete, Undo, Numeric Deletes, and Navigation Steps Performed

1. Opened the Kubernetes YAML file in vim `cd ~/Lab5 vim k8s-sample.yaml`

```
hajra@ubuntu-lab: $ cd ~/Lab5
hajra@ubuntu-lab: ~/Lab5 $ vim k8s-sample.yaml
```

2. Deleted a single line using `dd` and then undone it ○ In command mode, navigated to the line containing:

```
image: nginx:1.19
```

```
  - name: nginx
    image: nginx:1.19
    ports:
```

Deleted that line using:

Dd

```
  - name: nginx
    ports:
```

Immediately **undid** the deletion with:

U

```
- name: nginx
  image: nginx:1.19
  ports:
```

The file was restored to its original state.

3. Deleted three lines at once using numeric delete and undone it

```
apiVersion: v1
kind: Pod
metadata:
```

In **command mode**, moved the cursor to the start of the section and ran:

3dd

```
annotations:
  lab: lesson11
  name: nginx-pod
spec:
  containers:
```

(used numeric prefix form 3dd) ○

This deleted **three lines at once**.

- Immediately undid the deletion with:

U

```
apiVersion: v1
kind: Pod
metadata:
```

4. Navigation Practice

```
  restartPolicy: Always
  # temp: do-not-keep
```

Jumped to the **first line** of the file:

1G

```
apiVersion: v1
kind: Pod
metadata:
```

(Screenshot: task11_line1.png) ○

Jumped to the **last line**:

G

```
  restartPolicy: Always
  # temp: do-not-keep
```

- Practiced **line navigation** within a line:

```
  restartPolicy: Always
  # temp: do-not-keep
```

- Moved to the **end of the line**: \$

```
# temp: do-not-keep
```

- Moved back to the **start of the line**: 0

```
  # temp: do-not-keep
```

5. Exited vim without saving any changes:

:q

```
hajra@ubuntu-lab:~/Lab5$ vim k8s-sample.yaml
hajra@ubuntu-lab:~/Lab5$
```

Task 12: Vim Search, Add Matches, Substitute, and Undo

Steps Performed

1. Opened the file in vim cd ~/Lab5 vim k8s-sample.yaml

```
hajra@ubuntu-lab: $ cd ~/Lab5
hajra@ubuntu-lab:~/Lab5$ vim k8s-sample.yaml
```

2. Searched for the string “nginx”

```
  restartPolicy: Always
```

In **command mode**, typed:

/nginx and

pressed **Enter**.

```
name nginx-pod
```

The first match was **highlighted**, and the cursor moved to it.

3. **Navigated between matches** ○ Moved to the **next match** with:

```
N
```

```
lab lesson11
name nginx-pod
spec
  containers
    - name: nginx
      image: nginx:1.19
```

```
o
```

Moved back to the **previous match** with:

```
N
```

```
name nginx-pod
spec
  containers
    - name: nginx
```

4. **Added two more occurrences of “nginx”** ○

Entered **insert mode** (*i*) and added two comment lines with the word **nginx** (for example, under the metadata section):

```
# nginx test 1
# nginx test 2
```

- Pressed **Esc** and saved the file with:

```
:w
```

```
hajra@ubuntu-lab:~/Lab5$ cat k8s-sample.yaml
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: nginx-pod
  spec:
    containers:
      - name: nginx
        image: nginx:1.19
    ports:
      - containerPort: 80
        restartPolicy: Always
        # temp: do-not-keep
        # nginx added for testing
        # # another nginx line
```

5. **Verified cycling through all matches** ○

Searched again for the same string:

```
/nginx
```

```
name nginx-pod
```

○ Pressed **n** multiple

times to cycle through each match and confirmed vim highlighted every occurrence in sequence.

```
image nginx:1.19
```

6. **Substituted all “nginx” occurrences with “webapp”** ○ In **command mode**, ran:

```
:%s/nginx/webapp
apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: webapp-pod
  spec:
    containers:
      - name: webapp
        image: webapp:1.19
    ports:
      - containerPort: 80
        restartPolicy: Always
        # temp: do-not-keep
        # webapp added for testing
        # another webapp line
```

- This replaced every instance of **nginx** with **webapp** throughout the file.

7. **Undid the substitution** ○ Pressed: **U**

```

apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: nginx-pod
spec:
  containers:
    - name: nginx
      image: nginx:1.19
      ports:
        - containerPort: 80
          restartPolicy: Always
          # temp: do-not-keep

```

This reverted the file back to its previous state (before the substitution).

8. Exited vim without saving unintended changes :q!

```

hajra@ubuntu-lab:~/lab$ vim k8s-sample.yaml
hajra@ubuntu-lab:~/lab$ -

```

(Used if any temporary edits needed to be discarded.)

Exam Evaluation Question: Docker Desktop Installation

Steps Performed

1. Updated the system packages to make sure all repositories and dependencies were current:

```

sudo apt update
hajra@ubuntu-lab:~$ sudo apt update
[sudo] password for hajra:
Get:1 http://dl.google.com/linux/chrome/deb stable InRelease [1,825 B]
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Get:3 http://dl.google.com/linux/chrome/deb/stable/main amd64 Packages [1,215 B]
Get:4 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Hit:5 https://ppa.launchpadcontent.net/obs-project/obs-studio/ubuntu noble InRelease
Get:6 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:7 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease
Get:8 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [21.5 kB]
Get:9 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [208 kB]
Get:10 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.2 kB]
Get:11 http://archive.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]
Get:12 http://archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:13 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1,542 kB]
Get:14 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Components [175 kB]
Get:15 http://archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Components [212 B]
Get:16 http://archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [377 kB]
Get:17 http://archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Components [940 B]
Get:18 http://archive.ubuntu.com/ubuntu noble-backports/main amd64 Components [7,124 B]
Get:19 http://archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Components [212 B]
Get:20 http://archive.ubuntu.com/ubuntu noble-backports/universe amd64 Components [11.0 kB]
Get:21 http://archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Components [212 B]
Fetched 2,569 kB in 34s (76.0 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.

```

```
sudo apt upgrade -y
```

```

hajra@ubuntu-lab:~$ sudo apt upgrade -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
Get more security updates through Ubuntu Pro with 'esm-apps' enabled:
  libzvbi-common libczson1 libavdevice60 libpostproc57 libavcodec60
  libzvbi0t64 libavutil58 libswscale7 libswresample4 7zip libavformat60
  libavfilter9
Learn more about Ubuntu Pro at https://ubuntu.com/pro
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.

```

2. Installed required packages for Docker and GUI support:

```
sudo apt install ca-certificates curl gnupg lsb-release -y
```

```
hajra@ubuntu-lab: ~ $ sudo apt install ca-certificates curl gnupg lsb-release -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ca-certificates is already the newest version (20240203).
ca-certificates set to manually installed.
curl is already the newest version (8.5.0-2ubuntu10.6).
gnupg is already the newest version (2.4.4-2ubuntu17.3).
gnupg set to manually installed.
lsb-release is already the newest version (12.0-2).
lsb-release set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

3. Added Docker's official GPG key and repository:

```
sudo mkdir -p /etc/apt/keyrings
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o
/etc/apt/keyrings/docker.gpg
hajra@ubuntu-lab: $ sudo mkdir -p /etc/apt/keyrings
hajra@ubuntu-lab: $ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpg
hajra@ubuntu-lab: $
```

Then add the Docker repository:

```
echo \
"deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg] \
https://download.docker.com/linux/ubuntu \
$(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list >
/dev/null
hajra@ubuntu-lab: $ echo \
> "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg] \
> https://download.docker.com/linux/ubuntu \
> $(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
```

4. Updated apt and installed Docker packages (engine, CLI, and Desktop):

```
sudo apt update
```

```
hajra@ubuntu-lab: $ sudo apt update
Get:1 https://download.docker.com/linux/ubuntu noble InRelease [48.5 kB]
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:3 https://download.docker.com/linux/ubuntu noble/stable amd64 Packages [33.3 kB]
Hit:4 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:5 http://archive.ubuntu.com/ubuntu noble InRelease
Get:6 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:7 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble InRelease
Hit:8 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease
Hit:9 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Get:10 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1,541 kB]
Fetched 1,749 kB in 12s (143 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
```

```
sudo apt
install docker-ce docker-ce-cli containerd.io docker-buildx-plugin dockercompose-
plugin -y
```

```
hajra@ubuntu-lab: $ sudo apt install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin -y
Reading package lists... done
Building dependency tree... done
Reading state information... done
The following NEW packages will be installed:
  docker-ce-rootless-extras libslirp0 pigz slirp4netns
Suggested packages:
  cgroups-mount | cgroup-lite docker-model-plugin
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-compose-plugin libslirp0 pigz slirp4netns
0 upgraded, 9 newly installed, 0 to remove and 0 not upgraded.
Need to get 105 MB of archives.
After this operation, 437 MB of additional disk space will be used.
Get:1 https://download.docker.com/linux/ubuntu/noble/stable amd64 containerd.io amd64 1.7.28-1~ubuntu.24.04~noble [31.9 MB]
Get:2 http://archive.ubuntu.com/ubuntu/noble-updates amd64 pigz amd64 2.8-1 [65.6 kB]
Get:3 http://archive.ubuntu.com/ubuntu/noble/universe amd64 libslirp0 amd64 0.8.0-0ubuntu1 [6.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu/noble/universe amd64 slirp4netns amd64 1.1.1-1~build2 [34.9 kB]
Get:5 https://download.docker.com/linux/ubuntu/noble/stable amd64 docker-ce-cl1 amd64 5:28.5.1-1~ubuntu.24.04~noble [16.5 MB]
Get:6 https://download.docker.com/linux/ubuntu/noble/stable amd64 docker-ce amd64 5:28.5.1-1~ubuntu.24.04~noble [19.7 MB]
Get:7 https://download.docker.com/linux/ubuntu/noble/stable amd64 docker-buildx-plugin amd64 0.29.1-1~ubuntu.24.04~noble [15.9 MB]
Get:8 https://download.docker.com/linux/ubuntu/noble/stable amd64 docker-ce-rootless-extras amd64 5:28.5.1-1~ubuntu.24.04~noble [6,481 kB]
Get:9 https://download.docker.com/linux/ubuntu/noble/stable amd64 docker-compose-plugin amd64 2.40.2-1~ubuntu.24.04~noble [14.3 MB]
Fetched 105 MB in 47s (2,228 kB/s)
Selecting previously unselected package containerd.io.
(Reading database ... 187553 files and directories currently installed.)
Preparing to unpack .../0-containerd.io_1.7.28-1~ubuntu.24.04~noble_amd64.deb ...
Unpacking containerd.io (1.7.28-1~ubuntu.24.04~noble) ...
Selecting previously unselected package docker-ce-rootless-extras.
Preparing to unpack .../1-docker-ce-rootless-extras_533a28.5.1-1~ubuntu.24.04~noble_amd64.deb ...
Unpacking docker-ce-rootless-extras (533a28.5.1-1~ubuntu.24.04~noble) ...
Selecting previously unselected package docker-ce-cl1.
Preparing to unpack .../2-docker-ce-cl1_533a28.5.1-1~ubuntu.24.04~noble_amd64.deb ...
Unpacking docker-ce-cl1 (533a28.5.1-1~ubuntu.24.04~noble) ...
Selecting previously unselected package docker-ce.
Preparing to unpack .../3-docker-ce_533a28.5.1-1~ubuntu.24.04~noble_amd64.deb ...
Unpacking docker-ce (533a28.5.1-1~ubuntu.24.04~noble) ...
Selecting previously unselected package docker-buildx-plugin.
Preparing to unpack .../4-docker-buildx-plugin_0.29.1-1~ubuntu.24.04~noble_amd64.deb ...
Unpacking docker-buildx-plugin (0.29.1-1~ubuntu.24.04~noble) ...
Selecting previously unselected package docker-compose-plugin.
Preparing to unpack .../5-docker-compose-plugin_2.40.2-1~ubuntu.24.04~noble_amd64.deb ...
Unpacking docker-compose-plugin (2.40.2-1~ubuntu.24.04~noble) ...
```

5. Downloaded and installed Docker Desktop for Linux:

```
wget https://desktop.docker.com/linux/main/amd64/docker-desktop-amd64.deb
```

```

hajra@ubuntu-lab: $ wget https://desktop.docker.com/linux/main/amd64/docker-desktop-amd64.deb
--2025-10-25 16:35:58-- https://desktop.docker.com/linux/main/amd64/docker-desktop-amd64.deb
Resolving desktop.docker.com (desktop.docker.com)... 3.160.77.4, 3.160.77.45, 3.160.77.55, ...
Connecting to desktop.docker.com (desktop.docker.com)|3.160.77.4|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 421490404 (402M) [application/octet-stream]
Saving to: 'docker-desktop-amd64.deb'

docker-desktop-amd64.deb          100%[=====] 401.96M  1.97MB/s   in 3m 20s

2025-10-25 16:39:19 (2.01 MB/s) - 'docker-desktop-amd64.deb' saved [421490404/421490404]

sudo apt install ./docker-desktop-amd64.deb -y
hajra@ubuntu-lab: $ sudo apt install ./docker-desktop-amd64.deb -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Note, selecting 'docker-desktop' instead of './docker-desktop-amd64.deb'
The following NEW packages will be installed:
  cpu-checker ipxe-qemu ipxe-qemu-ipxe libboost-iostreams1.83.0 libboost-thread1.83.0 libbrlapi0.8 libcacard0 libdadxct1 libfdt1 libiscsi7 libndctl6 libpmemobj1
  librados2 librbd1 librdomacm16 libspice-server1 libsubfd4 liburing2 libusbredirparser164 libvirglrenderer1 msr-tools ovmf pass qemu-block-extra qemu-system-common
  qemu-system-gui qemu-system-modules-opengl qemu-system-modules-spice qemu-system-x86 qemu-utils qrencode seabios tree uidmap wl-clipboard xclip
Suggested packages:
  gstreamer1.0-libav gstreamer1.0-plugins-ugly libxml-simple-perl python ruby samba vde2
The following NEW packages will be installed:
  cpu-checker docker-desktop ipxe-qemu ipxe-qemu-ipxe libboost-iostreams1.83.0 libboost-thread1.83.0 libbrlapi0.8 libcacard0 libdadxct1 libfdt1 libiscsi7 libndctl6
  libpmemobj1 librados2 librbd1 librdomacm16 libspice-server1 libsubfd4 liburing2 libusbredirparser164 libvirglrenderer1 msr-tools ovmf pass qemu-block-extra qemu-system-common
  qemu-system-data qemu-system-gui qemu-system-modules-opengl qemu-system-modules-spice qemu-system-x86 qemu-utils qrencode seabios tree uidmap wl-clipboard xclip
0 upgraded, 39 newly installed, 0 to remove and 0 not upgraded.

```

6. Started Docker Desktop application:

```
systemctl --user start docker-desktop
```

```

hajra@ubuntu-lab: $ systemctl --user start docker-desktop
hajra@ubuntu-lab: $ █

```

7.

Verified Docker Desktop installation:

```

hajra@ubuntu-lab: $ sudo systemctl status docker
● docker.service - Docker Application Container Engine
  Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; preset: enabled)
    Active: active (running) since Sat 2025-10-25 16:34:38 UTC; 10min ago
TriggeredBy: ● docker.socket
  Docs: https://docs.docker.com
 Main PID: 768054 (dockerd)
   Tasks: 9
  Memory: 21.7M (peak: 97.0M swap: 18.7M swap peak: 18.9M)
    CPU: 1.027s
   Group: /system.slice/docker.service
         └─768054 /usr/bin/dockerd -H fd:// - containerd=/run/containerd/containerd.sock

Oct 25 16:34:36 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:36.979378282Z" level=info msg="detected 127.0.0.53 nameserver, assuming systemd-resolved, so using resolv.conf: /run/systemd/resolve/stub-resolv.conf"
Oct 25 16:34:37 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:37.056151433Z" level=info msg="Creating a containerd client" address=/run/containerd/containerd.sock timeout=1m0s
Oct 25 16:34:37 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:37.139148930Z" level=info msg="Loading containers: start."
Oct 25 16:34:38 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:38.110602097Z" level=info msg="Loading containers: done."
Oct 25 16:34:38 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:38.179496347Z" level=info msg="Docker daemon" commit=f8215cc containerd-snapshotter=false storage-driver=overlay2 version=2025-10-25T16:34:38.179496347Z
Oct 25 16:34:38 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:38.180289602Z" level=info msg="Initializing buildkit"
Oct 25 16:34:38 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:38.257145265Z" level=info msg="Completed buildkit initialization"
Oct 25 16:34:38 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:38.270917845Z" level=info msg="Daemon has completed initialization"
Oct 25 16:34:38 ubuntu-lab dockerd[768054]: time="2025-10-25T16:34:38.271223404Z" level=info msg="API listen on /run/docker.sock"
Oct 25 16:34:38 ubuntu-lab systemd[1]: Started docker.service - Docker Application Container Engine.

```

Opened Applications → Docker Desktop ○

Confirmed the Docker icon appeared in the system tray.

- Verified that Docker Engine was running with:

```
docker version
```

```

hajra@ubuntu-lab: $ docker version
Client: Docker Engine - Community
  Version:           28.5.1
  API version:       1.51
  Go version:        go1.24.8
  Git commit:        e180ab8
  Built:             Wed Oct  8 12:17:26 2025
  OS/Arch:           linux/amd64
  Context:           default

Server: Docker Engine - Community
  Version:           28.5.1
  API version:       1.51 (minimum version 1.24)
  Go version:        go1.24.8
  Git commit:        f8215cc
  Built:             Wed Oct  8 12:17:26 2025
  OS/Arch:           linux/amd64
  Experimental:     false
  containerd:        v1.7.28
  gitCommit:         b98a3ace656320842a23f4a392a33f46af97866
  runtimes:          runc v1.1.0-0-g0a628d1
  Version:           1.3.0
  gitCommit:         V1.3.0-0-g4ca628d1
  docker-init:       Version: 0.19.0
  gitCommit:         de40ad0

```

```
docker info
```

```

hajra@ubuntu-lab: $ docker info
Client: Docker Engine - Community
 Version: 20.10.12
 API version: 1.41
 Context: default
 Debug Mode: false
 Plugins:
  auth: Docker AI Agent - Ask Gordon (Docker Inc.)
    Version: v1.9.11
    Path: /home/hajra/.docker/cli-plugins/docker-ai
  buildx: Docker Buildx (Docker Inc.)
    Version: v0.20.3+desktop.1
    Path: /home/hajra/.docker/cli-plugins/docker-buildx
  compose: Docker Compose (Docker Inc.)
    Version: v2.10.3+dev.3
    Path: /home/hajra/.docker/cli-plugins/docker-compose
  debug: Get a shell into any image or container (Docker Inc.)
    Version: v0.10.12
    Path: /home/hajra/.docker/cli-plugins/docker-debug
  desktop: Docker Desktop commands (Docker Inc.)
    Version: vB.2.2
    Path: /home/hajra/.docker/cli-plugins/docker-desktop
  extensions: Manages Docker extensions (Docker Inc.)
    Version: vB.2.31
    Path: /home/hajra/.docker/cli-plugins/docker-extension
  init: Creates Docker-related starter files for your project (Docker Inc.)
    Version: v1.4.0
    Path: /home/hajra/.docker/cli-plugins/docker-init
  mcp: Docker MCP Plugin (Docker Inc.)
    Version: vB.24.0
    Path: /home/hajra/.docker/cli-plugins/docker-mcp
  offload: Docker offload (Docker Inc.)
    Version: vB.5.1
    Path: /home/hajra/.docker/cli-plugins/docker-offload
  sandbox: Docker sandbox (Docker Inc.)
    Version: v0.1.3
    Path: /home/hajra/.docker/cli-plugins/docker-sandbox
  show: View the packaged-based Software Bill of Materials (SBOM) for an image (Anchore Inc.)
    Version: v0.1.0
    Path: /home/hajra/.docker/cli-plugins/docker-show
  scout: Docker Scout (Docker Inc.)
    Version: v1.18.3
    Path: /home/hajra/.docker/cli-plugins/docker-scout
Server:
Containers: 0
Running: 0
Paused: 0
Stopped: 0
Images:
Server Version: 20.5.1
Storage Driver: overlay2
Backing Filesystem: extfs
Supports Type: native
Using metacopy: False
Native Overlay Diff: True
Logging Driver: json-file
Cgroup Driver: systemd
Cgroup Version: 2
Plugins:
Volume: local
Network: bridge host ipvlan macvlan null overlay
Log: awslogs fluentd gcplogs geft journalctl json-file local logstash syslog
Cloud Provider: None
Directories:
/etc/cdi
/var/run/cdi
Shared Memory
Runtimes: io.containerd.runc.v2 runc
Default Runtime: runc
Init: io.containerd.init.v2
containerd version: b9b1aaac656320842a23f4a392a33f46af97866
runc version: v1.30.0-0-gc4a628d1
init version: deada0d
seccomp options:
apparmor
seccomp
Profile builtin
cpuaccount
Kernel Version: 6.8.0-86-generic
Operating System: Ubuntu 24.04.3 LTS
CPU Architecture: x86_64
CPUs: 2
Total Memory: 14756MB
Name: ubuntu-1sh
ID: 49239b75-fc34-402c-82ab-b6e673409f02
Docker Root Dir: /var/lib/docker

```

8. Install GUI (XFCE) Environment

Run this in your Ubuntu VM terminal:

```
sudo apt update
```

```

hajra@ubuntu-lab: $ sudo apt update
Hit:1 https://download.docker.com/linux/ubuntu noble InRelease
Hit:2 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:5 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:6 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:7 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble InRelease
Hit:8 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.

```

```
sudo apt install xfce4 xfce4-goodies -y
```

```

hajra@ubuntu-lab: $ sudo apt install xfce4 xfce4-goodies -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
xfce4 is already the newest version (4.18).
xfce4-goodies is already the newest version (4.18.2build1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.

```

This installs the XFCE desktop and some useful components (lightweight, works well in VMware). It may take a few minutes.

9. Verify or (Re)Enable XRDP for Remote GUI Access

Now let's ensure you can actually open and *see* the XFCE desktop GUI through VMware (or RDP if needed).

Run this command next:

```
sudo systemctl enable --now xrdp
```

```

hajra@ubuntu-lab: $ sudo systemctl enable --now xrdp
Synchronizing state of xrdp.service with sysv service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable xrdp

```

Then check XRDP status:

```
sudo systemctl status xrdp
```

```

hajra@ubuntu-lab: $ sudo systemctl status xrdp
● xrdp.service - xrdp daemon
   Loaded: loaded (/usr/lib/systemd/system/xrdp.service; enabled; preset: enabled)
     Active: active (running) since Sat 2025-10-25 13:35:12 UTC; 3h 28min ago
       Docs: man:xrdp(8)
             man:xrdp.ini(5)
   Main PID: 1769 (xrdp)
      Tasks: 1 (limit: 2207)
     Memory: 148.0K (peak: 1.9M swap: 724.0K swap peak: 724.0K)
        CPU: 130ms
      CGroup: /system.slice/xrdp.service
              └─1769 /usr/sbin/xrdp

Oct 25 13:35:08 ubuntu-lab systemd[1]: Starting xrdp.service - xrdp daemon...
Oct 25 13:35:11 ubuntu-lab xrdp[1732]: [INFO] address [0.0.0.0] port [3389] mode 1
Oct 25 13:35:11 ubuntu-lab xrdp[1732]: [INFO] listening to port 3389 on 0.0.0.0
Oct 25 13:35:11 ubuntu-lab xrdp[1732]: [INFO] xrdp_listen_pp done
Oct 25 13:35:11 ubuntu-lab xrdp[1732]: [INFO] xrdp.service: Can't open PID file /run/xrdp/xrdp.pid (yet?) after start: No such file or directory
Oct 25 13:35:12 ubuntu-lab systemd[1]: Started xrdp.service - xrdp daemon.
Oct 25 13:35:13 ubuntu-lab xrdp[1769]: [INFO] starting xrdp with pid 1769
Oct 25 13:35:13 ubuntu-lab xrdp[1769]: [INFO] address [0.0.0.0] port [3389] mode 1
Oct 25 13:35:13 ubuntu-lab xrdp[1769]: [INFO] listening to port 3389 on 0.0.0.0
Oct 25 13:35:13 ubuntu-lab xrdp[1769]: [INFO] xrdp_listen_pp done

```

10. Switch to GUI mode

Run this command in your terminal:

```

sudo systemctl set-default graphical.target
sudo
systemctl isolate graphical.target
hajra@ubuntu-lab: $ sudo systemctl set-default graphical.target
Removed "/etc/systemd/system/default.target".
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/graphical.target.
hajra@ubuntu-lab: $ sudo systemctl isolate graphical.target
hajra@ubuntu-lab: $

```

Then, wait a few seconds — your screen should change to a **login window** (the XFCE GUI login).

If it doesn't, you can reboot manually:

```
sudo reboot
```

```

hajra@ubuntu-lab: $ sudo reboot
Broadcast message from root@ubuntu-lab on pts/1 (Sat 2025-10-25 17:11:38 UTC):
The system will reboot now!
hajra@ubuntu-lab: $ client_loop: send disconnect: Connection reset
PS C:\Users\HP>

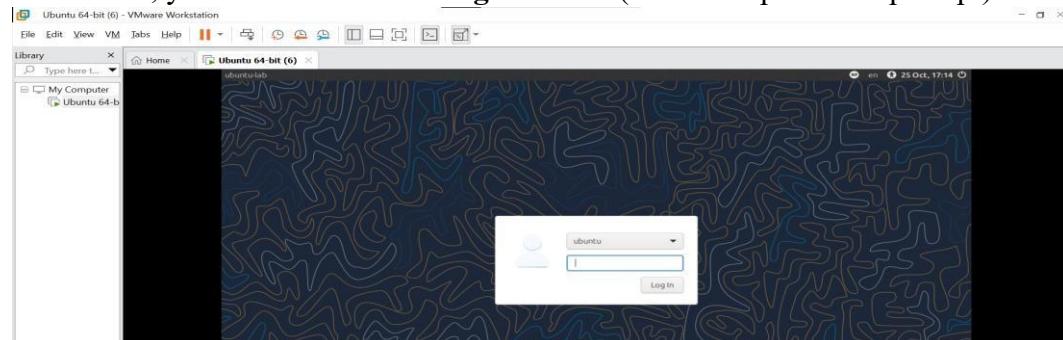
```

11. Started the GUI session manually when in CLI mode: sudo

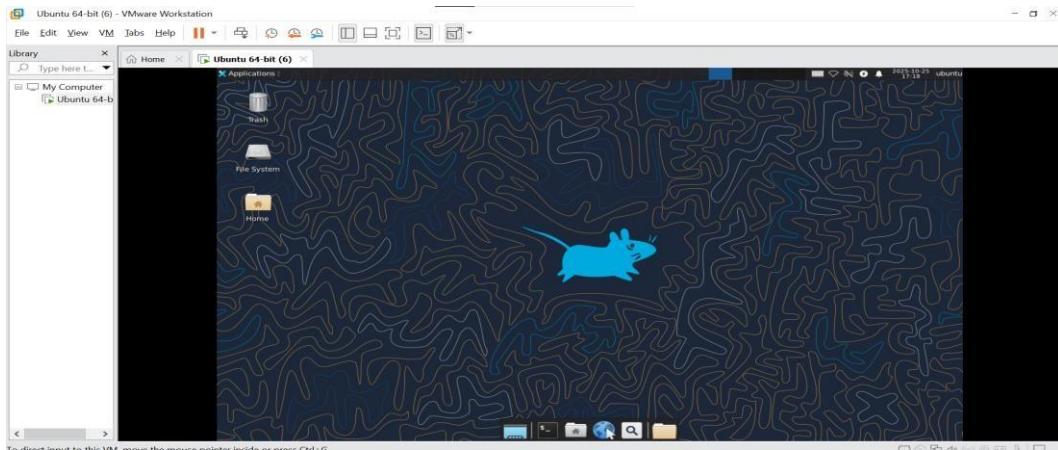
```
systemctl start lightdm
```

After this:

- In VMware, your VM will show a **login screen** (username/password prompt).



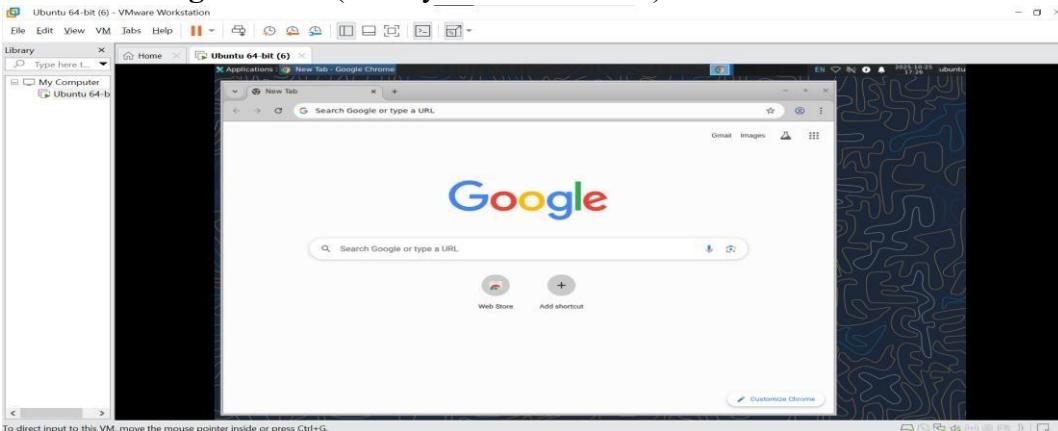
- Login as user **hajra**.
- When asked to choose a session, select **XFCE Session**.



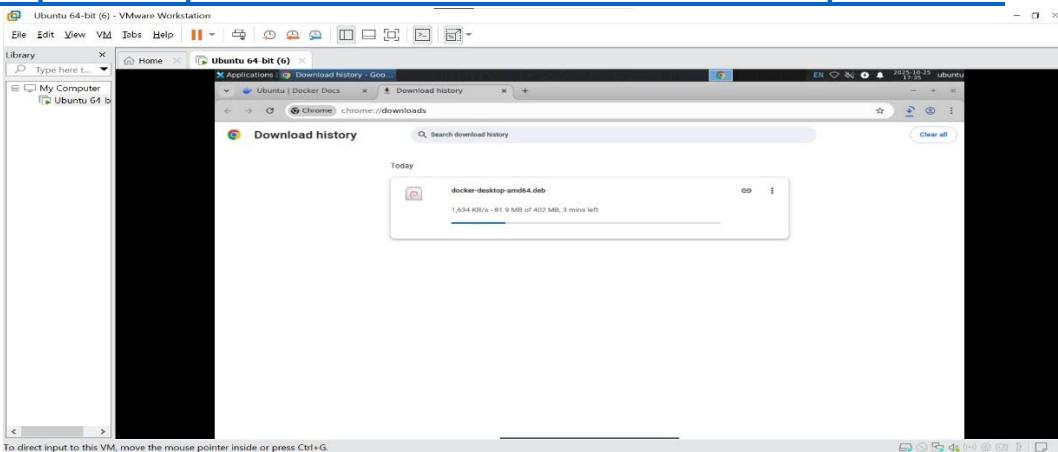
12. Download the Docker Desktop .deb package

Now that you're inside XFCE:

1. Click the **blue globe icon** (that's your web browser).



2. In the browser, go to given link and this automatically download the file:
<https://desktop.docker.com/linux/main/amd64/docker-desktop-amd64.deb>



13. Install Docker Desktop

Run the following commands one by one **in your terminal** (you should still be in your home directory ~):

```
cd ~/Downloads
```

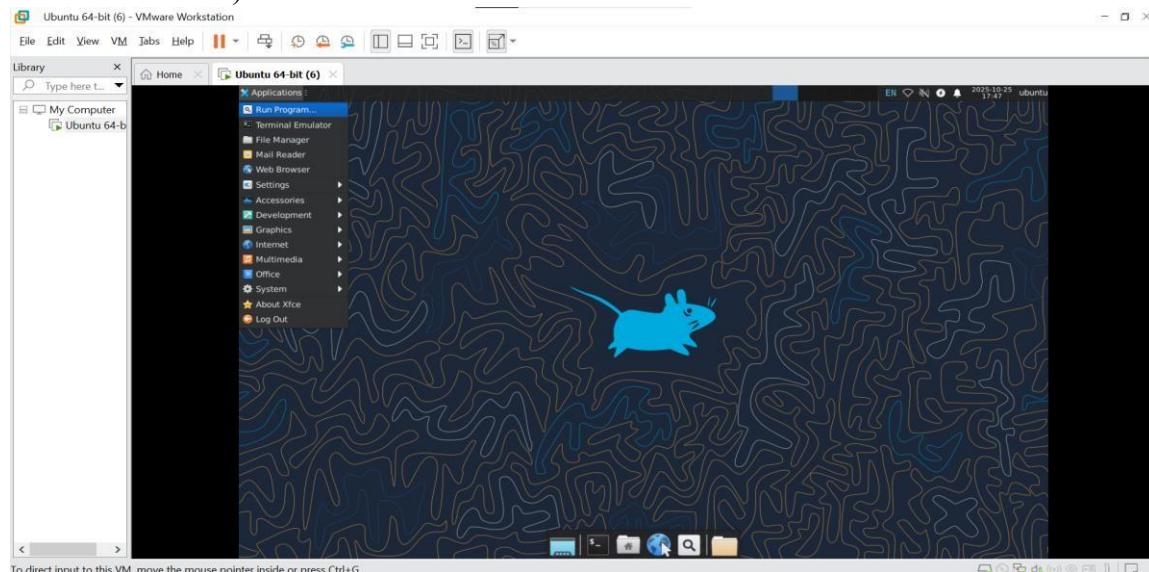
```
hajra@ubuntu-lab: $ cd ~/Downloads
hajra@ubuntu-lab: ~/Downloads $ ls
docker-desktop-amd64.deb
hajra@ubuntu-lab: ~/Downloads $
```

Then install it using:

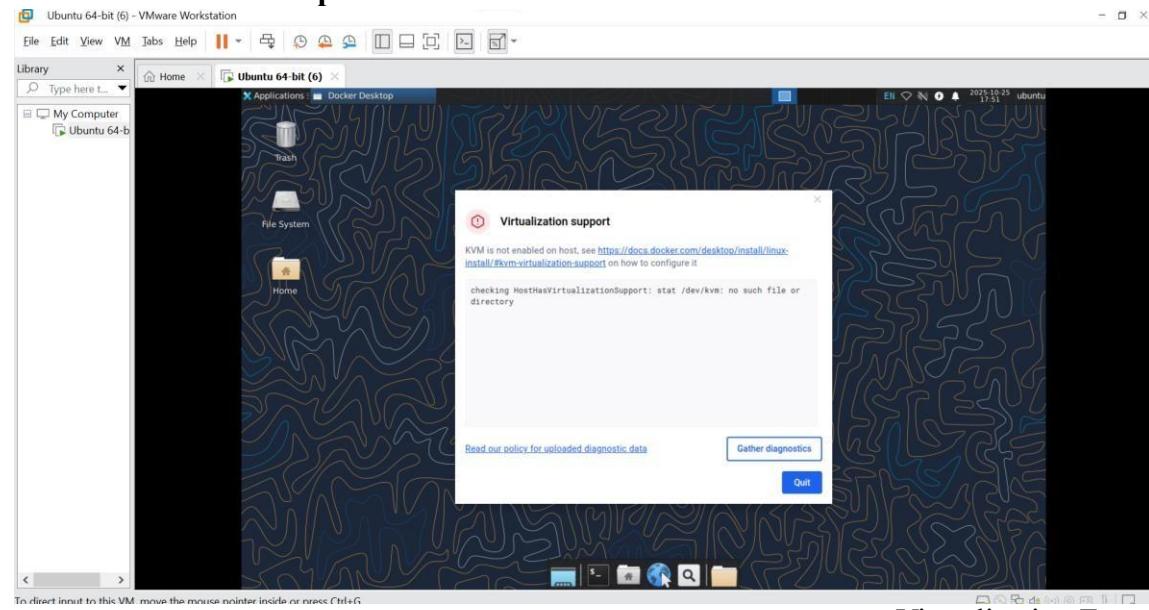
```
sudo apt install ./docker-desktop-amd64.deb -y
```

```
hajra@ubuntu-lab: ~/Downloads$ sudo apt install ./docker-desktop-amd64.deb -y
[sudo] password for hajra:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Note, selecting 'docker-desktop' instead of './docker-desktop-amd64.deb'
docker-desktop is already the newest version (4.49.0-208700).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
hajra@ubuntu-lab: ~/Downloads$
```

1. In your **Ubuntu GUI** (XFCE desktop), click the **Applications menu** (usually at the top-left or bottom-left corner).

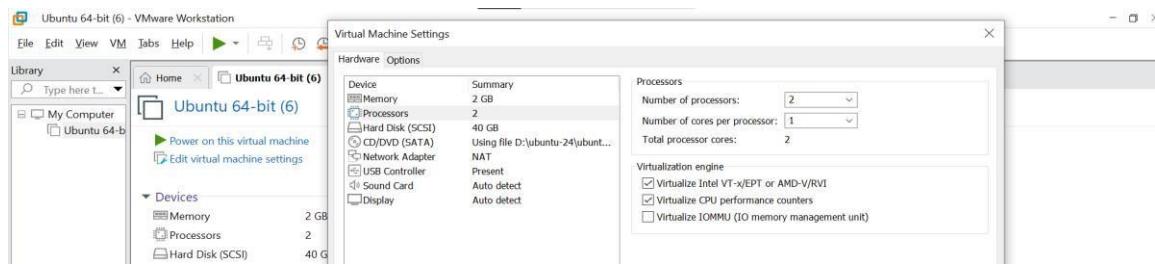


2. Type **Docker Desktop** in the search bar.
3. Click on **Docker Desktop** to launch it.



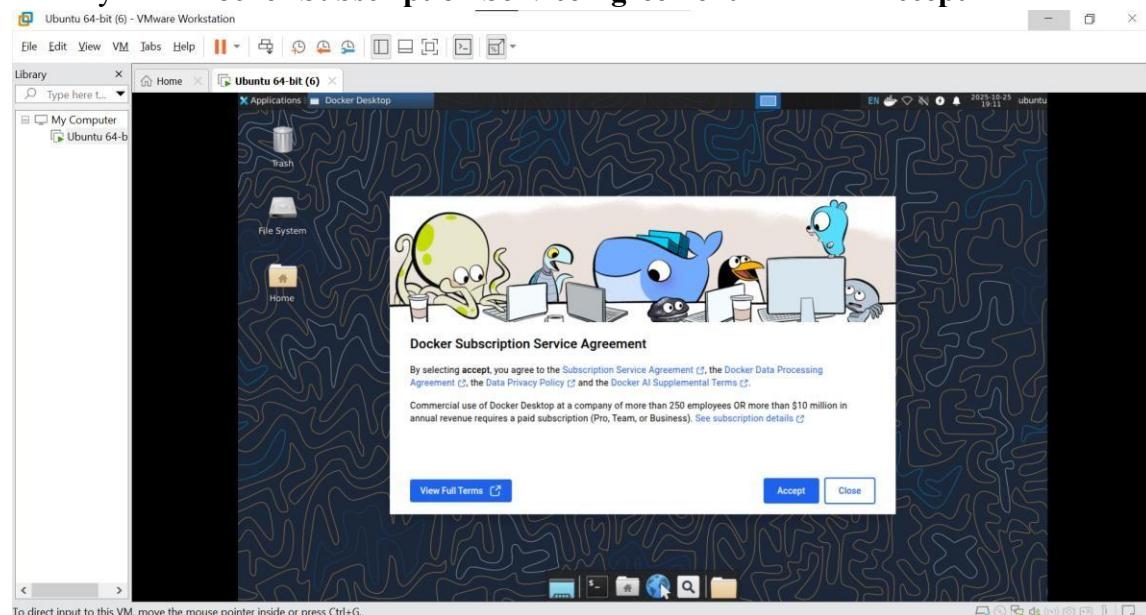
Virtualization Error.

Solution:



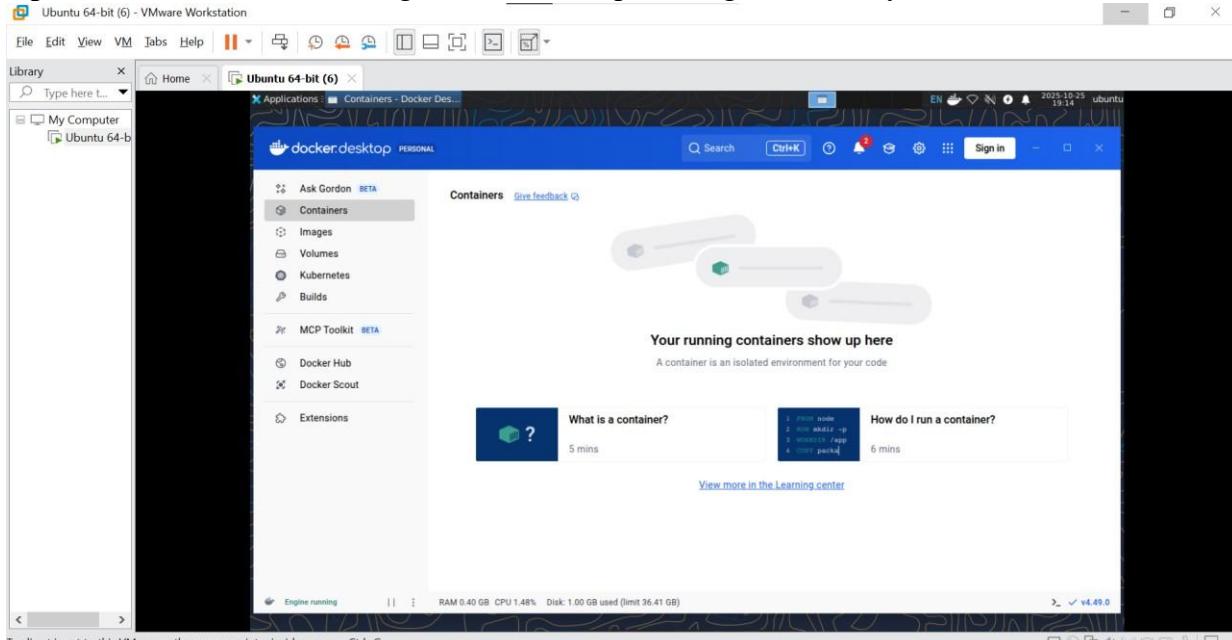
When it opens:

- You may see a **Docker Subscription Service Agreement** — click “Accept”.



- Then wait a bit while Docker Desktop starts up (it might take 30–60 seconds).
- Once you see the Docker whale icon or the main Docker Desktop window, that means it's running.

14. Captured a screenshot showing Docker Desktop running successfully.



Result / Output

Docker Desktop was successfully installed and launched on the Ubuntu VM.

The verification confirmed that Docker Engine and Docker Desktop were both active and functional.
