



## **Cloud Computing Lab**

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A

**Lab 5 – Java, apt vs apt-get, snap, GUI, Vim on Ubuntu Server**

## Task 1 - Discover missing command & install Java using apt suggestion

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

```
Ubuntu 24.04.3 LTS ubuntu tty1

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

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

System information as of Fri Oct 24 08:31:03 AM UTC 2025

System load:  1.0           Processes:      244
Usage of /:   45.6% of 9.75GB Users logged in:  0
Memory usage: 13%          IPv4 address for ens33: 192.168.230.142
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

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

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

hania@ubuntu:~$ java
Command 'java' not found, but can be installed with:
sudo apt install openjdk-17-jre-headless # version 17.0.14+7-1~24.04, or
sudo apt install openjdk-21-jre-headless # version 21.0.6+7-1~24.04.1
sudo apt install default-jre             # version 2:1.17-75
sudo apt install openjdk-11-jre-headless # version 11.0.26+4-1ubuntu1~24.04
sudo apt install openjdk-8-jre-headless  # version 8u442-b06~us1-0ubuntu1~24.04
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
hania@ubuntu:~$
```

2. Use the suggested apt command (copy the exact package name suggested by the system). Example (replace with the name shown on your VM):

```
Setting up libc-dev-bin (2.39-0ubuntu0.6) ...
Setting up openssl (3.0.13-0ubuntu0.6) ...
Setting up linux-tools-common (6.8.0-86.87) ...
Setting up libxml2:amd64 (2.9.14+dfsg-1.3ubuntu0.5) ...
Setting up libudisks2-0:amd64 (2.10.1-0ubuntu1.3) ...
Setting up libc-devtools (2.39-0ubuntu0.6) ...
Setting up python3.12-minimal (3.12.3-1ubuntu0.8) ...
Setting up udisk2 (2.10.1-0ubuntu1.3) ...
Setting up libpython3.12-stdlib:amd64 (3.12.3-1ubuntu0.8) ...
Setting up bind9-lb:amd64 (1:9.18.39-0ubuntu0.24.04.2) ...
Setting up python3.12 (3.12.3-1ubuntu0.8) ...
Setting up vim-tiny (2:9.1.0016-1ubuntu7.9) ...
Setting up libpython3.12t64:amd64 (3.12.3-1ubuntu0.8) ...
Setting up open-vm-tools (2:12.5.0-1ubuntu0.24.04.2) ...
Installing new version of config file /etc/vmware-tools/tools.conf.example ...
Setting up libc6-dev:amd64 (2.39-0ubuntu0.6) ...
Setting up bind9-host (1:9.18.39-0ubuntu0.24.04.2) ...
Setting up vim (2:9.1.0016-1ubuntu7.9) ...
Setting up bind9-dnswitls (1:9.18.39-0ubuntu0.24.04.2) ...
Processing triggers for systemd (255.4-1ubuntu0.10) ...
Processing triggers for man-db (2.12.0-4build1) ...
Processing triggers for dbus (1.14.10-4ubuntu4.1) ...
Processing triggers for libc-bin (2.39-0ubuntu0.6) ...
Processing triggers for initramfs-tools (0.15ubuntu25.5) ...
update-initramfs: Generating /boot/initrd.img-6.8.0-71-generic
Scanning processes...
Scanning candidates...
Scanning linux images...

Running kernel seems to be up-to-date.

Restarting services...
/etc/needrestart/needrestart.d/systemd-manager
systemctl restart cron.service faild.service multipathd.service packagekit.service polkit.service rsyslog.service systemd-journald.service systemd-networkd.service systemd-resolved.service systemd-timesyncd.service systemd-udev.service upower.service

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

No containers need to be restarted.

User sessions running outdated binaries:
hania @ session #1: login[135]
hania @ user manager service: systemd[1358]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
hania@ubuntu:~$
```

### 3. Verify Java is installed and check version:

```
hania@ubuntu:~$ java -version
openjdk version "1.8.0_462"
OpenJDK Runtime Environment (build 1.8.0_462-8u462-ga~us1-0ubuntu2~24.04.2-b08)
OpenJDK 64-Bit Server VM (build 25.462-b08, mixed mode)
hania@ubuntu:~$
```

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

```

hani@ubuntu:~$ sudo apt remove openjdk-8-jdk -y
[sudo] password for hania:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  adwaita-icon-themealsa-topology-confalsa-ucm-confat-spi2-commonat-spi2-coreca-certificates-java dconf-gsettings-backend dconf-service fontconfig
fonts-dejavu-extra gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-themehumanity-icon-themehumanity-icon-themejava-common libasound2-data libasound2t64
libasn1c9nss0 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0t64 libatspi2.0-0t64 libavahi-client3 libavahi-common-data
libavahi-common3 libcaca0-gobject2 libcaca0t64 libccppst64 libcdm-amdgpu libcdfm-intel libdrm-nouveau2 libdrm-radeon1 libfclm12t64
libfontconfig1 libfreetype6 libgdk-pixbuf2.0-bin libgdk-pixbuf2.0-common libgl1 libgl1-mesa-dri libgl1-mesa-dev libglapi-mesa
libglvnd0 libglx-mesa0 libglx0 libgraphvizt62-3 libgtk2.0-0t64 libgtk2.0-bin libgtk2.0-common libharfbuzz0b libice-dev liblbc6 liblcm2-2 libllvm17t64
libmp3lame0 libmpeg2-t64 libosgo libopus0 libpng0-1.0-0 libpngcairo-1.0-0 libpngcairo1-0 libpngcommon1-0 libpnm1t64 libpixman-1-0
libpthread-stubs0-dev libpulse0 libsvg2-2 libsvg2-common libsm-dev libsm6 libsndfile1 libtheai-data libtheai0 libvorbis0a libvorbisenc2 libvulkan1
libwayland-client0 libx11-dev libx11-xcb1 libxcb-dev libxau7 libxcb-dr12-0 libxcb-dr13-0 libxcb-gl1x libxcb-present0 libxcb-randr0 libxcb-render0
libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xfixes0 libxcvt1-dev libxcompositel1 libxcursor1 libxdamage1 libxmdcp-dev libxf86d3 libxtt2 libx16 libxinerama1
libxxf86idle1 libxmu6 libxmuu2 libxrender1 libxshmfence1 libxst6 libxv1 libxv1xxf86dgal libxvxf86gal1 mesa-vulkan-drivers
openjdk-8-jdk-headless openjdk-8-jre openjdk-8-jre-headless session-migration ubuntu-mono x11-common x11-utils x11proto-dev xorg-sgml-doctools xttrans-dev
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  openjdk-8-jdk
0 upgraded, 0 newly installed, 1 to remove and 3 not upgraded.
After this operation, 4,995 kB disk space will be freed.
(Reading database 102247 files and directories currently installed.)
Removing openjdk-8-jdk:amd64 (8u462-ga~us1-0ubuntu2~24.04.2) ...
hani@ubuntu:~$
```

```

Reading state information... done
E: Unable to locate package clean
hania@ubuntu:~$ java -version
-bash: /usr/bin/java: No such file or directory
hania@ubuntu:~$

```

## Task 2 - Install & remove Java using apt-get (explicitly)

1. Install Java using apt-get (choose a common package, e.g., default-jre — or the same package you used in Task 1):

```
hania@ubuntu:~$ sudo apt-get update
Hit:1 http://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
```

```
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/wsimport to provide /usr/bin/wsimport (wsimport) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/xjc to provide /usr/bin/xjc (xjc) in auto mode
Setting up openjdk-8-jdk:amd64 (8u662-ga~u1-0ubuntu2~24.04.2) ...
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/appletviewer to provide /usr/bin/appletviewer (appletviewer) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jconsole to provide /usr/bin/jconsole (jconsole) in auto mode
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for libgd-pixbuf-2.0-0:amd64 (2.42.10+dfsg-3ubuntu3.2) ...
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:
hania @ session #1: login[1135]
hania @ user manager service: systemd[1358]

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

## 2. Verify Java version again:

```
hania@ubuntu:~$ java -version
openjdk version "1.8.0_462"
OpenJDK Runtime Environment (build 1.8.0_462-8u462-ga~us1-0ubuntu2~24.04.2-b08)
OpenJDK 64-Bit Server VM (build 25.462-b08, mixed mode)
hania@ubuntu:~$
```

## 3. Remove Java using apt-get remove:

```
hania@ubuntu:~$ sudo apt-get remove openjdk-8-jdk -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
adwaita-icon-theme alsa-topology-conf alsa-ucm-conf at-spi2-common at-spi2-core ca-certificates-java dconf-gsettings-editor fonts-dejavu-extra gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-theme humanity-icon-theme java-common libasound2 libatk-bridge2.0-0 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0 libatspi2.0-0 libavahi-common3 libcairo-gobject2 libcairo2 libcups2t64 libdatrie1 libdconf1 libdrm-amdgpu1 libdrm-intel1 libgail-common libgail18t64 libgdk-pixbuf-2.0-0 libgdk-pixbuf2.0-bin libgdk-pixbuf2.0-common libgif7 libgl1.0-0 libglvnd0 libglx-mesa0 libglx0 libgraphite2-3 libgtk2.0-0 libgtk2.0-bin libgtk2.0-common libharfbuzz0b libice6 libjpeg-turbo8 libmpgi2t3-0 libogg0 libopus0 libpango-1.0-0 libpangocairo-1.0-0 libpangoft2-1.0-0 libpciaccess0 libpthread-stubs0-dev libpulse0 librsync2 librsync2-common libsm-dev libsm6 libsndfile1 libthai-data libthai0 libwayland-client0 libx11-dev libx11-xcb1 libxau-dev libxau7 libxcb-dri2-0 libxcb-dri3-0 libxcb-glx0 libxcb-icccm4 libxcb-image0 libxcb-keysyms1 libxcb-randr0 libxcb-render0 libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xf86vm0 libxcb1-dev libxcomposite1 libxcursor1 libxdamage1 libxfixes0 libxfont2 libxft2 libxi6 libxml2 libxrandr2 libxrender1 libxshmfence1 libxt-dev libxt6t64 libxtst6 libxv1 libxxf86dga1 libxxf86vm1 openjdk-8-jdk-headless openjdk-8-jre openjdk-8-jre-headless session-migration ubuntu-mono x11-common x11-utils
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  openjdk-8-jdk
0 upgraded, 0 newly installed, 1 to remove and 3 not upgraded.
After this operation, 4,385 kB disk space will be freed.
(Reading database ... 102247 files and directories currently installed.)
Removing openjdk-8-jdk:amd64 (8u462-ga~us1-0ubuntu2~24.04.2) ...
```

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

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

```
-bash: /usr/bin/java: No such file or directory
hania@ubuntu:~$ hash -r
hania@ubuntu:~$ java
Command 'java' not found, but can be installed with:
sudo apt install default-jre # version 2:1.17-75, or
sudo apt install openjdk-17-jre-headless # version 17.0.16+8~us1-0ubuntu1~24.04.1
sudo apt install openjdk-21-jre-headless # version 21.0.8+9~us1-0ubuntu1~24.04.1
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
```

## Task 3 - apt update vs apt upgrade - run & explain

### 1. Update the package index (this downloads the latest lists of available packages):

```

sudo apt install openjdk-11-jre-headless --no-install-recommends
hania@ubuntu:~$ sudo apt update
Hit:1 http://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
3 packages can be upgraded. Run 'apt list --upgradable' to see them.
hania@ubuntu:~$

```

2. Upgrade installed packages (this installs available updates for currently installed packages):

```

hania@ubuntu:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following NEW packages will be installed:
  linux-headers-6.8.0-86 linux-headers-6.8.0-86-generic linux-image-6.8.0-86-generic linux-modules-6.8.0-86-generic
  linux-tools-6.8.0-86 linux-tools-6.8.0-86-generic
The following packages will be upgraded:
  linux-generic linux-headers-generic linux-image-generic
3 upgraded, 7 newly installed, 0 to remove and 0 not upgraded.
3 standard LTS security updates
Need to get 191 MB of archives.
After this operation, 301 MB of additional disk space will be used.
Do you want to continue? [Y/n]

```

3. Write a short 3–5 sentence explanation describing the difference between apt update and apt upgrade. Put your text into a small file and capture it as a screenshot (do not upload the text file; provide the screenshot):

```

hania@ubuntu:~$ sudo apt upgrade
[sudo] password for hania:
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.
hania@ubuntu:~$

```

```

hania@ubuntu:~$ nano ~/apt_update_vs_upgrade.md

```

```

GNU nano 7.2 /home/hania/apt_update_vs_upgrade.md *
hello!
This is lab 5

```

## Task 4 - Install Visual Studio Code via snap on CLI and verify (DO NOT remove Code)

1. Install VS Code via snap (snap may require sudo):

```
C:\Users\DELL>ssh hania@192.168.230.142
hania@192.168.230.142's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-71-generic x86_64)

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

System information as of Fri Oct 31 10:25:02 AM UTC 2025

System load:  0.02               Processes:            217
Usage of /:   49.5% of 9.75GB    Users logged in:     1
Memory usage: 21%               IPv4 address for ens33: 192.168.230.142
Swap usage:   0%

 * 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.
```

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

```
*** System restart required ***
Last login: Fri Oct 24 06:53:49 2025 from 192.168.230.1
hania@ubuntu:~$
```

```
hania@ubuntu:~$ sudo snap install --classic code
[sudo] password for hania:

2025-10-31T10:27:34Z INFO Waiting for automatic snapd restart...
code 7d842fb8 from Visual Studio Code (vscode✓) installed
hania@ubuntu:~$
```

2. Verify snap shows the package is installed:

```
hania@ubuntu:~$ snap list code
Name Version Rev Tracking Publisher Notes
code 7d842fb8 211 latest/stable vscode✓ classic
hania@ubuntu:~$ |
```

3. Check the installed application's version. On some systems code `--version` is available; also check `snap info`:

```
hania@ubuntu:~$ code --version
1.105.1
7d842fb85a0275a4a8e4d7e040d2625abbf7f084
x64
hania@ubuntu:~$
```

4. If the code binary is not in PATH, show where the snap placed it:

```
hania@ubuntu:~$ ls -l /snap/bin | grep code
lrwxrwxrwx 1 root root 13 Oct 31 10:28 code -> /usr/bin/snap
lrwxrwxrwx 1 root root 13 Oct 31 10:28 code.url-handler -> /usr/bin/snap
hania@ubuntu:~$
```

## Task 5 - Install XFCE GUI + XRDP - minimal desktop and remote access (GUI) and launch VS Code

1. From your host, open your preferred terminal (for example: Windows Command Prompt, PowerShell, macOS Terminal, or Linux Terminal) and connect to the VM using SSH.

Example:

```
hania@ubuntu:~$ ssh hania@192.168.230.142
The authenticity of host '192.168.230.142 (192.168.230.142)' can't be established.
ED25519 key fingerprint is SHA256:jEfQHRB0Id1PGT+rFwtb5XEKSBLbrHKcgsF2BoVs07s.
This host key is known by the following other names/addresses:
  ~/.ssh/known_hosts:1: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.230.142' (ED25519) to the list of known hosts.
hania@192.168.230.142's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-71-generic x86_64)

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

System information as of Fri Oct 31 10:31:18 AM UTC 2025

System load:  0.44      Processes:    230
Usage of /:   57.8% of 9.75GB   Users logged in: 1
Memory usage: 26%      IPv4 address for ens33: 192.168.230.142
Swap usage:   0%

 * 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.

3 updates can be applied immediately.
3 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

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

*** System restart required ***
Last login: Fri Oct 31 10:25:04 2025 from 192.168.230.1
hania@ubuntu:~$
```

## 2. Update the server (download package lists and apply upgrades):

```
hania@ubuntu:~$ sudo apt update && sudo apt upgrade -y
[sudo] password for hania:
Hit:1 http://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
3 packages can be upgraded. Run 'apt list --upgradable' to see them.
Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontent. It is held by process 21996 (unattended-upgr)...
Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontent. It is held by process 21996 (unattended-upgr)

Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontent. It is held by process 21996 (unattended-upgr)...
Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontent. It is held by process 21996 (unattended-upgr)

Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  libssh-4 libxml2 linux-firmware
3 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
3 standard LTS security updates
Need to get 0 B/539 MB of archives.
After this operation, 910 kB of additional disk space will be used.
(Reading database ... 125070 files and directories currently installed.)
Preparing to unpack .../libxml2_2.9.14+dfsg-1.3ubuntu3.6_amd64.deb ...
Unpacking libxml2:amd64 (2.9.14+dfsg-1.3ubuntu3.6) over (2.9.14+dfsg-1.3ubuntu3.5) ...
Preparing to unpack .../libssh-4_0.10.6-2ubuntu0.2_amd64.deb ...
Unpacking libssh-4:amd64 (0.10.6-2ubuntu0.2) over (0.10.6-2ubuntu0.1) ...
Preparing to unpack .../linux-firmware_20240318.git3b128b60-0ubuntu2.19_amd64.deb ...
Unpacking linux-firmware (20240318.git3b128b60-0ubuntu2.19) over (20240318.git3b128b60-0ubuntu2.17) ...
Setting up linux-firmware (20240318.git3b128b60-0ubuntu2.19) ...
Setting up libssh-4:amd64 (0.10.6-2ubuntu0.2) ...
Setting up libxml2:amd64 (2.9.14+dfsg-1.3ubuntu3.6) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for initramfs-tools (0.142ubuntu25.5) ...
update-initramfs: Generating /boot/initrd.img-6.8.0-86-generic

hania@ubuntu:~$ sudo apt update
Hit:1 http://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
hania@ubuntu:~$ sudo apt upgrade -y
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.
hania@ubuntu:~$ |
```

## 3. Install XFCE and XFCE goodies (lightweight desktop):



```

hania@ubuntu:~$ sudo apt install xfce4 xfce4-goodies -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  7zip accountsservice adwaita-icon-theme alsa-topology-conf alsa-ucm-conf arctica-greeter aspell aspell-en
  at-spi2-common at-spi2-core avahi-daemon ayatana-indicator-ally ayatana-indicator-application
  ayatana-indicator-common ayatana-indicator-keyboard ayatana-indicator-power ayatana-indicator-session
  ayatana-indicator-sound bamfdaemon bluez-obexd bubblewrap bzip2 cpp cpp-13 cpp-13-x86-64-linux-gnu
  cpp-x86-64-linux-gnu cups cups-browsed cups-client cups-common cups-core-drivers cups-daemon cups-filters
  cups-filters-core-drivers cups-ipp-utils cups-ppdc cups-server-common dconf-gsettings-backend dconf-service
  desktop-base desktop-file-utils dictionaries-common dns-root-data dnsmasq-base docbook-xml
  elementary-xfce-icon-theme emacsen-common enchant-2 espeak-ng espeak-ng-data evolution-data-server
  evolution-data-server-common exo-utils fontconfig fonts-droid-fallback fonts-noto-core fonts-noto-mono
  fonts-quicksand fonts-urw-base35 gcc-13-base gcr gcr4 gdal-data gdal-plugins geocode-glib-common ghostscript
  gir1.2-atk-1.0 gir1.2-atspi-2.0 gir1.2-ayatanaappindicator3-0.1 gir1.2-dbusmenu-glib-0.4 gir1.2-freedesktop
  gir1.2-gdkpixbuf-2.0 gir1.2-gstreamer-1.0 gir1.2-gtk-3.0 gir1.2-harfbuzz-0.0 gir1.2-matemenu-2.0 gir1.2-pango-1.0
  gir1.2-wnck-3.0 glib-networking glib-networking-common glib-networking-services gnome-desktop3-data gnome-keyring
  gnome-keyring-pkcs11 gnome-power-manager gnome-screensaver gnome-settings-daemon-common greybird-gtk-theme
  gsettings-desktop-schemas gsettings-ubuntu-schemas gstreamer1.0-gl gstreamer1.0-plugins-base
  gstreamer1.0-plugins-good gstreamer1.0-x gtk-update-icon-cache gtk2-engines-murrine gvfs gvfs-backends gvfs-common
  gvfs-daemons gvfs-libfs hicolor-icon-theme humanity-icon-theme hunspell-en-us i965-via-driver indicator-applet
  indicator-application indicator-appmenu indicator-common indicator-datetime indicator-keyboard indicator-messages
  indicator-printers intel-media-va-driver ipp-usb jayatana libaa1 libabsl20220623t64 libaccounts-glib0
  libaccountsservice0 libadwaita-1-0 libaec0 libao-common libao4 libarmadillo12 libarpack2t64 libasound2-data
  libasound2-plugins libasound2t64 libaspell15 libasyncns0 libatk-bridge2.0-0t64 libatk1.0-0t64 libatkmm-1.6-1v5
  libatomic1 libatspi2.0-0t64 libauthen-sasl-perl libavahi-client3 libavahi-common-data libavahi-common3
  libavahi-core7 libavahi-glib1 libavc1394-0 libavcodec60 libavutil58 libayatana-appindicator3-1 libayatana-common0
  libayatana-id03-0.4-0 libayatana-indicator3-7 libbamf3-2t64 libblas3 libblosc1 libbluetooth3 libbrlapi0.8
  libburn4t64 libcac0 libcairo-gobject2 libcairo-script-interpreter2 libcairo2 libcairomm-1.0-1v5 libcamel-1.2-64t6
  libcanberra-gtk3-0t64 libcanberra-gtk3-module libcanberra-pulse libcanberra0t64 libcdio-cdda2t64
  libcdio-paranoia2t64 libcdio19t64 libcdparanoia0 libcfitsio10t64 libcharls2 libclone-perl libcodecs2-1.2 libcolord2
  libcupst64 libcupsfilters2-common libcupsfilters2t64 libdaemon0 libdata-dump-perl libdatrie1 libdav1d7
  libdbusmenu-glib4 libdbusmenu-gtk3-4 libdconf1 libdeviceinfo0 libdotconf0 libdouble-conversion3 libdrm-amdgpu1
  libdrm-intel1 libdrm-nouveau2 libdrm-radeon1 libdv4t64 libebook-1.2-11t64 libebook-1.2-21t64
  libebook-contacts-1.2-4t64 libecal-2.0-3 libedata-book-1.2-27t64 libedata-cal-2.0-2t64 libedataserver-1.2-27t64
  libedataserverui-1.2-4t64 libegl-mesa0 libegl1 libenchant-2-2 libencode-locale-perl libepoxy0 libespeak-ng1
  libexif12 libexo-2-0 libexo-common libfcitx-gclient1 libfcitx-utils0 libfftw3-single3 libfile-basedir-perl
  libfile-desktopentry-perl libfile-listing-perl libfile-mimeinfo-perl libflac12t64 libfont-afm-perl libfontenc1
  libfreexl1 libfyba0t64 libgail-common libgail18t64 libgarcon-1-0 libgarcon-common libgarcon-gtk3-1-0 libgbm1

```

```

aspell-autobuildhash: processing: en [en_CA-wo_accents-only].
aspell-autobuildhash: processing: en [en_GB-ise-w_accents-only].
aspell-autobuildhash: processing: en [en_GB-ise-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 libgdk-pixbuf-2.0-0:amd64 (2.42.10+dfsg-3ubuntu3.2) ...
Processing triggers for sgml-base (1.31) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for dbus (1.14.10-4ubuntu4.1) ...
Processing triggers for ufw (0.36.2-6) ...
Scanning processes...
Scanning candidates...
Scanning linux images...

Pending kernel upgrade!
Running kernel version:
  6.8.0-71-generic
Diagnostics:
  The currently running kernel version is not the expected kernel version 6.8.0-86-generic.

Restarting the system to load the new kernel will not be handled automatically, so you should consider rebooting.

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:
hania @ session #1: login[1135]
hania @ user manager service: systemd[1358]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
hania@ubuntu:~$

```

#### 4. Install and enable XRDP (Remote Desktop Protocol server):

```
hania@ubuntu:~$ sudo apt install xrdp -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libfuse2t64 libpipewire-0.3-modules-xrdp pipewire-module-xrdp xorgxrdp
Suggested packages:
  pipewire-bin guacamole
The following NEW packages will be installed:
  libfuse2t64 libpipewire-0.3-modules-xrdp pipewire-module-xrdp xorgxrdp xrdp
0 upgraded, 5 newly installed, 0 to remove and 0 not upgraded.
Need to get 715 kB of archives.
After this operation, 3,895 kB of additional disk space will be used.
Get:1 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libfuse2t64 amd64 2.9.9-8.1build1 [89.9 kB]
Get:2 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 xrdp amd64 0.9.24-4 [536 kB]
Get:3 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libpipewire-0.3-modules-xrdp amd64 0.2-2 [20.6 kB]
Get:4 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 pipewire-module-xrdp all 0.2-2 [3,800 B]
Get:5 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 xorgxrdp amd64 1:0.9.19-1 [65.3 kB]
Fetched 715 kB in 0s (1,689 kB/s)

Setting up xrdp (0.9.24-4) ...
Generating 2048 bit rsa key...

ssl_gen_key_xrdp1 ok

saving to /etc/xrdp/rsakeys.ini

Created symlink /etc/systemd/system/multi-user.target.wants/xrdp-sesman.service → /usr/lib/systemd/system/xrdp-sesman.service.
Created symlink /etc/systemd/system/multi-user.target.wants/xrdp.service → /usr/lib/systemd/system/xrdp.service.
Setting up pipewire-module-xrdp (0.2-2) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Scanning processes...
Scanning candidates...
Scanning linux images...

Pending kernel upgrade!
Running kernel version:
 6.8.0-71-generic
Diagnostics:
  The currently running kernel version is not the expected kernel version 6.8.0-86-generic.

Restarting the system to load the new kernel will not be handled automatically, so you should consider rebooting.

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:
  hania @ session #1: login[1135]
  hania @ user manager service: systemd[1358]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
hania@ubuntu:~$ |

hania@ubuntu:~$ 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
hania@ubuntu:~$ |
```

#### 5. Verify XRDP status:

```

hania@ubuntu:~$ sudo systemctl status xrdp
● xrdp.service - xrdp daemon
   Loaded: loaded (/usr/lib/systemd/system/xrdp.service; enabled; preset: enabled)
   Active: active (running) since Fri 2025-10-31 10:50:02 UTC; 58s ago
     Docs: man:xrdp(8)
           man:xrdp.ini(5)
  Main PID: 38674 (xrdp)
    Tasks: 1 (limit: 2210)
  Memory: 864.0K (peak: 1.5M)
     CPU: 29ms
    CGroup: /system.slice/xrdp.service
            └─38674 /usr/sbin/xrdp

Oct 31 10:50:01 ubuntu systemd[1]: Starting xrdp.service - xrdp daemon...
Oct 31 10:50:01 ubuntu xrdp[38672]: [INFO ] address [0.0.0.0] port [3389] mode 1
Oct 31 10:50:01 ubuntu xrdp[38672]: [INFO ] listening to port 3389 on 0.0.0.0
Oct 31 10:50:01 ubuntu xrdp[38672]: [INFO ] xrdp_listen_pp done
Oct 31 10:50:01 ubuntu systemd[1]: xrdp.service: Can't open PID file /run/xrdp/xrdp.pid (yet?) after start: No such file or directory
Oct 31 10:50:02 ubuntu systemd[1]: Started xrdp.service - xrdp daemon.
Oct 31 10:50:03 ubuntu xrdp[38674]: [INFO ] starting xrdp with pid 38674
Oct 31 10:50:03 ubuntu xrdp[38674]: [INFO ] address [0.0.0.0] port [3389] mode 1
Oct 31 10:50:03 ubuntu xrdp[38674]: [INFO ] listening to port 3389 on 0.0.0.0
Oct 31 10:50:03 ubuntu xrdp[38674]: [INFO ] xrdp_listen_pp done
hania@ubuntu:~$

```

## 6. Configure XRDP to use XFCE session:

```

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

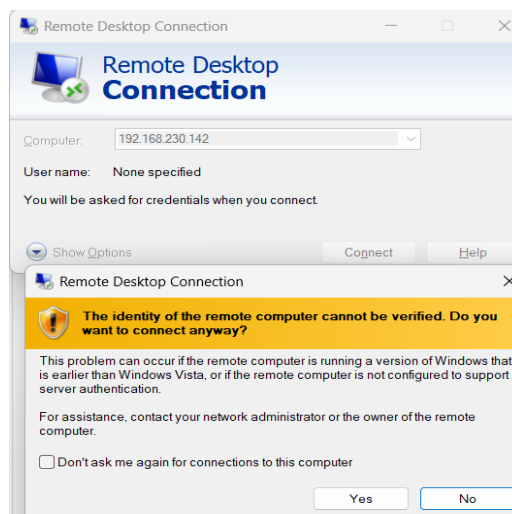
```

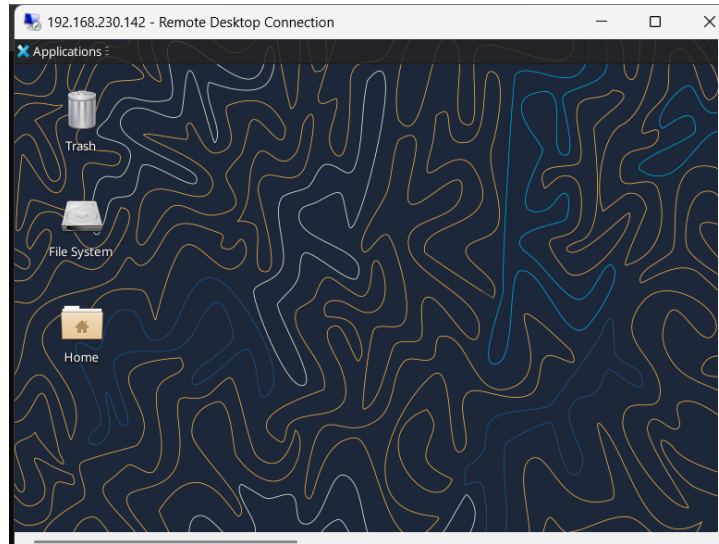
```

hania@ubuntu:~$ echo xfce4-session
xfce4-session
hania@ubuntu:~$ cat .xsession
xfce4-session
hania@ubuntu:~$

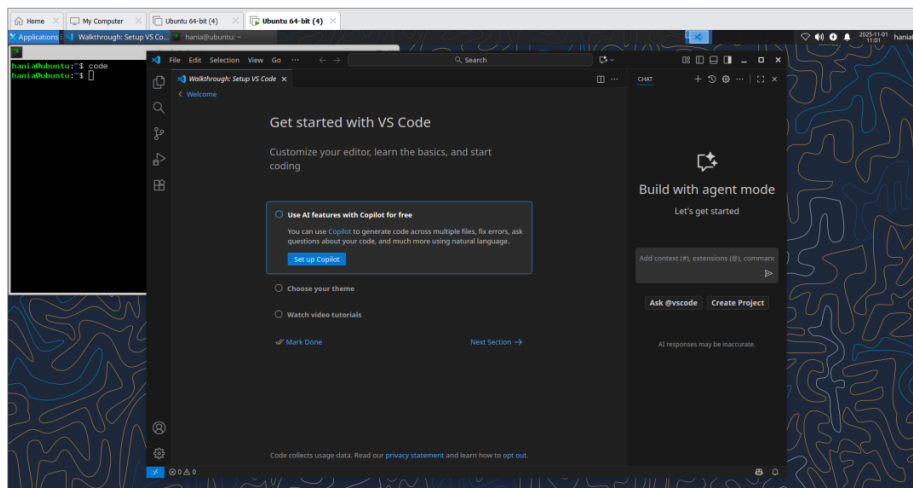
```

## 7. From a Windows host or RDP client, connect with Remote Desktop (mstsc) to your server IP and login using your Ubuntu username/password. Capture a screenshot of the remote desktop or the RDP session window (if allowed by your environment) and save it as: task5\_rdp\_connect.png





8. After you are in the GUI (local console or RDP session), launch Visual Studio Code (installed in Task 4) from the GUI menu or a terminal inside the GUI. Example command from a GUI terminal:



## Task 6 - Install lightdm-gtk-greeter and GUI verification - start GUI, open VS Code, take snapshot, then end (GUI)

1. Fix GUI login screen issues (if lightdm / greeter problems appear)
  - Install LightDM and greeter using Host Terminal:

```
hania@ubuntu:~$ sudo apt install lightdm lightdm-gtk-greeter
-y
[sudo] password for hania:
Reading package lists... 0%
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
Recommended packages:
  policykit-1
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 upgrade
d.
Need to get 2,495 kB of archives.
After this operation, 7,003 kB of additional disk space will
be used.
Get:1 http://pk.archive.ubuntu.com/ubuntu noble/main amd64 g
nome-accessibility-themes all 3.28-2ubuntu5 [2,296 kB]
Get:2 http://pk.archive.ubuntu.com/ubuntu noble/main amd64 g
nome-themes-extra-data all 3.28-2ubuntu5 [69.4 kB]
Get:3 http://pk.archive.ubuntu.com/ubuntu noble-updates/main
amd64 gtk2-engines-pixbuf amd64 2.24.33-4ubuntu1.1 [20.6 kB
]
Get:4 http://pk.archive.ubuntu.com/ubuntu noble/main amd64 g
nome-themes-extra amd64 3.28-2ubuntu5 [15.2 kB]
Get:5 http://pk.archive.ubuntu.com/ubuntu noble/universe amd
64 lightdm-gtk-greeter amd64 2.0.9-0ubuntu3 [94.3 kB]
Fetched 2,495 kB in 24s (106 kB/s)
Selecting previously unselected package gnome-accessibility-
themes.
(Reading database ... 188771 files and directories currently
installed.)
```

```
Setting up lightdm-gtk-greeter (2.0.9-0ubuntu3) ...
update-alternatives: using /usr/share/xgreeters/lightdm-gtk-
greeter.desktop to provide /usr/share/xgreeters/lightdm-gree
ter.desktop (lightdm-greeter) in auto mode
Setting up gnome-themes-extra:amd64 (3.28-2ubuntu5) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
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.
hania@ubuntu:~$
```

```

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

```

```

hania@ubuntu:~$ sudo rm -f /var/lib/lightdm/.Xauthority
hania@ubuntu:~$ ^C
hania@ubuntu:~$ sudo rm -f /var/lib/lightdm/.Xauthority
hania@ubuntu:~$ sudo rm -f ~/.Xauthority
hania@ubuntu:~$ sudo rm -rf ~/.cache/sessions
hania@ubuntu:~$ sudo chown -R $USER:$USER /home/$USER
chown: cannot access '/home/hania/thinclient_drives': Permission denied
hania@ubuntu:~$ |

```

```

hania@ubuntu:~$ sudo systemctl restart lightdm
hania@ubuntu:~$

```

2. Control GUI login at boot — ENABLE first, then DISABLE (observe and understand terminal/GUI behavior after each reboot)

```

hania@ubuntu:~$ 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.
hania@ubuntu:~$

```



```
hania@ubuntu:~$ sudo systemctl set-default graphical.target
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/graphical.target.
hania@ubuntu:~$ |
```

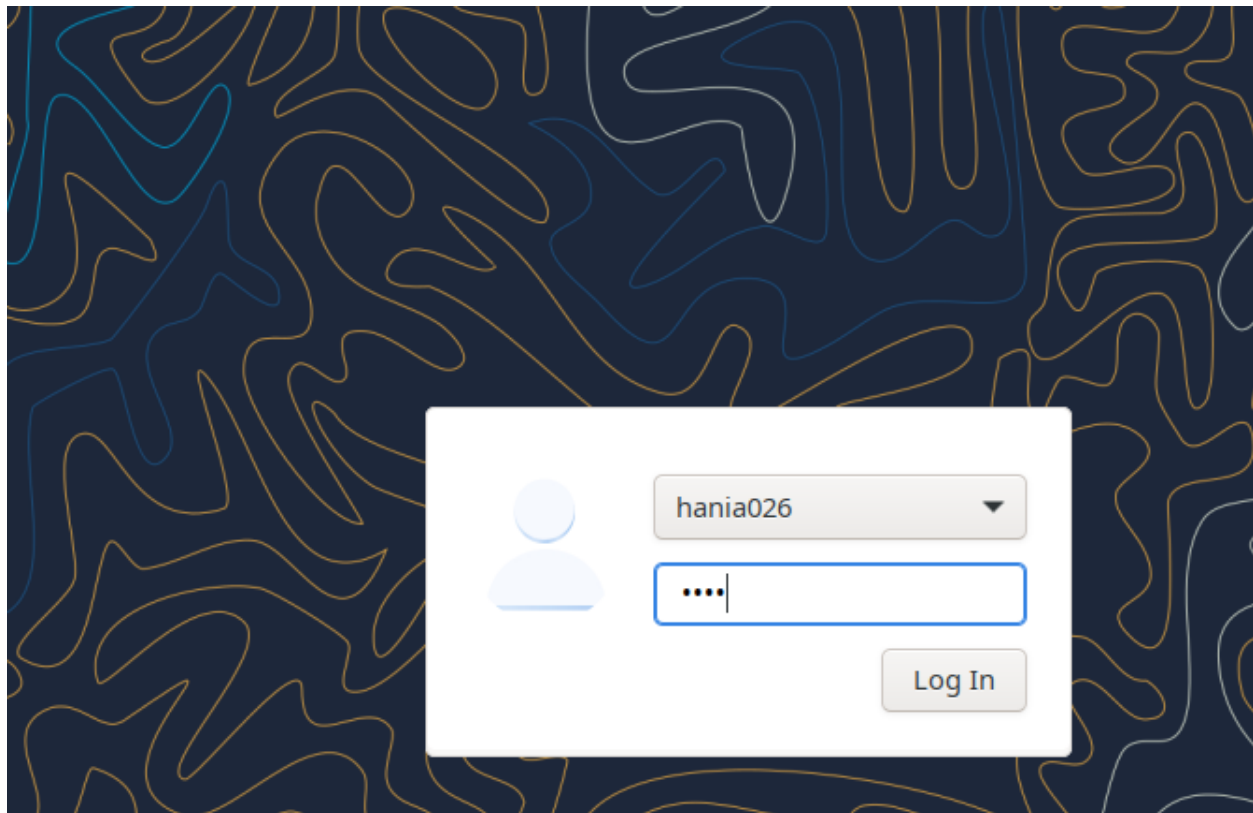
```
hania@ubuntu:~$ sudo reboot
```

Broadcast message from root@ubuntu on pts/1 (Sat 2025-11-01 10:58:13 UTC):

The system will reboot now!

```
hania@ubuntu:~$ client_loop: send disconnect: Connection reset
```

```
C:\Users\DELL>
```



```
hania@ubuntu:~$ sudo systemctl set-default multi-user.target
[sudo] password for hania:
Removed "/etc/systemd/system/default.target".
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/multi-user.target.
hania@ubuntu:~$ 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".
hania@ubuntu:~$
```

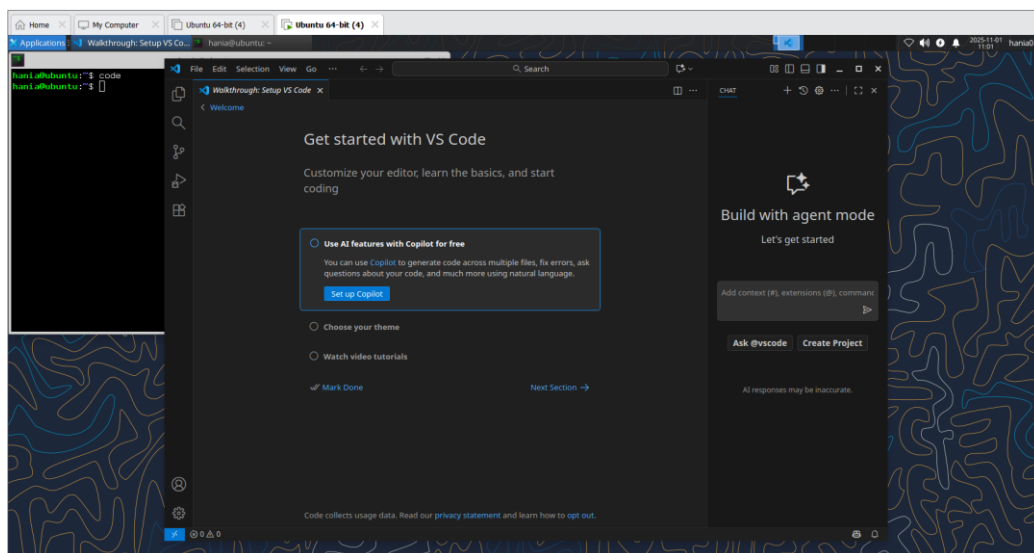
```
hania@ubuntu:~$ sudo reboot

Broadcast message from root@ubuntu on pts/1 (Sat 2025-11-01
11:05:49 UTC):

The system will reboot now!

hania@ubuntu:~$ client_loop: send disconnect: Connection reset
C:\Users\DELL>
```

4. In the GUI session launch Visual Studio Code (installed earlier in Task 4). From a GUI terminal inside the desktop, run:





## Task 7 - Install Google Chrome by adding its apt source & key (Chrome)

1. (Learning step — first command must be the install attempt) Attempt to install Google Chrome directly to see the failure when the repo/key are missing:

```
hania@ubuntu:~$ sudo apt install google-chrome-stable -y
[sudo] password for hania:
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 upgrade
d.
Need to get 118 MB/119 MB of archives.
After this operation, 395 MB of additional disk space will b
e used.
Get:1 http://dl.google.com/linux/chrome/deb stable/main amd6
4 google-chrome-stable amd64 142.0.7444.59-1 [118 MB]
Ign:1 http://dl.google.com/linux/chrome/deb stable/main amd6
4 google-chrome-stable amd64 142.0.7444.59-1
Get:1 http://dl.google.com/linux/chrome/deb stable/main amd6
4 google-chrome-stable amd64 142.0.7444.59-1 [118 MB]
Fetched 15.5 MB in 9min 18s (27.7 kB/s)
Selecting previously unselected package fonts-liberation.
(Reading database ... 192802 files and directories currently
installed.)
Preparing to unpack .../fonts-liberation_1%3a2.1.5-3_all.deb
...
Unpacking fonts-liberation (1:2.1.5-3) ...
Selecting previously unselected package google-chrome-stable
.
Preparing to unpack .../google-chrome-stable_142.0.7444.59-1
_amd64.deb ...
Unpacking google-chrome-stable (142.0.7444.59-1) ...
Selecting previously unselected package fonts-liberation-san
s-narrow.
Preparing to unpack .../fonts-liberation-sans-narrow_1%3a1.0
7.6-4_all.deb ...
Unpacking fonts-liberation-sans-narrow (1:1.07.6-4) ...
```

```
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.
hania@ubuntu:~$ |
```

2. Inspect apt configuration so you understand why install failed. List the /etc/apt directory:

```
hania@ubuntu:~$ ls -la /etc/apt
total 64
drwxr-xr-x  9 root root  4096 Nov  1 11:11 .
drwxr-xr-x 141 root root 12288 Oct 31 10:50 ..
drwxr-xr-x  2 root root  4096 Aug  5 17:14 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.saf
ve
-rw-r--r--  1 root root    70 Sep 29 05:09 sources.list
drwxr-xr-x  2 root root  4096 Nov  1 11:12 sources.list.d
-rw-r--r--  1 root root 12775 Nov  1 11:11 trusted.gpg
drwxr-xr-x  2 root root  4096 Nov  1 11:31 trusted.gpg.d
hania@ubuntu:~$
```

3. View the main /etc/apt/sources.list:

```
hania@ubuntu:~$ cat /etc/apt/sources.list
# Ubuntu sources have moved to /etc/apt/sources.list.d/ubuntu.sources
hania@ubuntu:~$
```

4. List files under /etc/apt/sources.list.d:

```
hania@ubuntu:~$ ls -la /etc/apt/sources.list.d/
total 20
drwxr-xr-x 2 root root 4096 Nov  1 11:12 .
drwxr-xr-x 9 root root 4096 Nov  1 11:11 ..
-rw-r--r-- 1 root root  190 Nov  1 11:31 google-chrome.list
-rw-r--r-- 1 root root  386 Sep 29 05:09 ubuntu.sources
-rw-r--r-- 1 root root 2552 Aug  5 17:02 ubuntu.sources.curt
in.orig
hania@ubuntu:~$ |
```

5. If there is a file named ubuntu.sources (or similarly named source file), display it to see whether Chrome's repo is present:

```
hania@ubuntu:~$ cat /etc/apt/sources.list.d/ubuntu.sources
Types: deb
URIs: http://pk.archive.ubuntu.com/ubuntu/
Suites: 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
hania@ubuntu:~$
```

6. Add Chrome repository metadata to a sources file (method A — using ubuntu.sources). Open or create the file and append the stanza (you can alternatively use the preferred one-line method in step 11):

```
hania@ubuntu: ~  
/etc/apt/sources.list.d/ubuntu.sources  
Types: deb  
URIs: http://pk.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
```

7. Ensure the keyrings directory exists and import Google's signing key:

```
hania@ubuntu:~$ curl -fsSL https://dl.google.com/linux/linux  
_signing_key.pub | sudo gpg --dearmor -o /etc/apt/keyrings/g  
oogle.gpg  
File '/etc/apt/keyrings/google.gpg' exists. Overwrite? (y/N)  
y  
hania@ubuntu:~$ |
```

8. Update apt and attempt to install Chrome again (now that repo + key are added):

```
hania@ubuntu:~$ sudo apt update  
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRel  
ease  
Hit:2 https://dl.google.com/linux/chrome/deb stable InReleas  
e  
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble InRelease  
Hit:4 http://pk.archive.ubuntu.com/ubuntu noble-updates InRe  
lease  
Hit:5 http://pk.archive.ubuntu.com/ubuntu noble-backports In  
Release  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
All packages are up to date.  
hania@ubuntu:~$ sudo apt install google-chrome-stable -y  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
google-chrome-stable is already the newest version (142.0.74  
44.59-1).  
0 upgraded, 0 newly installed, 0 to remove and 0 not upgrade  
d.  
hania@ubuntu:~$ |
```

9. Cleanup before alternate method you added the chrome earlier and want to switch to the preferred method:

```
hania@ubuntu:~$ sudo apt remove google-chrome-stable -y
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, 390 MB disk space will be freed.
(Reading database ... 193113 files and directories currently
installed.)
Removing google-chrome-stable (142.0.7444.59-1) ...
Processing triggers for desktop-file-utils (0.27-2build1) ..
.
Processing triggers for mate-menus (1.26.1-1build3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ub
untu5) ...
Rebuilding /usr/share/applications/bamf-2.index...
hania@ubuntu:~$ sudo nano /etc/apt/sources.list.d/ubuntu.sou
rces
```

```
hania@ubuntu: ~
/etc/apt/sources.list.d/ubuntu.sources
Types: deb
URIs: http://pk.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
```

```
μσυτῖ@πρσυσῖν:~$ |
μσυτῖ@πρσυσῖν:~$ zpqo lW -t \εfc\sbç\κελιτῖυδz\δοοδγε·δβδ
```

11. Create a dedicated one-line list file for Google Chrome (preferred):

```
hania@ubuntu:~$ echo "deb [arch=amd64 signed-by=/etc/apt/key
rings/google.gpg] http://dl.google.com/linux/chrome/deb/ sta
ble main" | sudo tee /etc/apt/sources.list.d/google-chrome.l
ist > /dev/null
[sudo] password for hania:
hania@ubuntu:~$ |
```

12. Verify the new file exists:

```
hania@ubuntu:~$ ls -la /etc/apt/sources.list.d/
total 20
drwxr-xr-x 2 root root 4096 Nov  1 11:38 .
drwxr-xr-x 9 root root 4096 Nov  1 11:11 ..
-rw-r--r-- 1 root root  107 Nov  3 05:48 google-chrome.list
-rw-r--r-- 1 root root  386 Nov  1 11:38 ubuntu.sources
-rw-r--r-- 1 root root 2552 Aug  5 17:02 ubuntu.sources.curt
in.orig
hania@ubuntu:~$ |
```

13. Re-add the Google signing key (if removed previously or not present):

```
hania@ubuntu:~$ sudo mkdir -p /etc/apt/keyrings
hania@ubuntu:~$ curl -fsSL https://dl.google.com/linux/linux
_signing_key.pub | sudo gpg --dearmor -o /etc/apt/keyrings/g
oogle.gpg
hania@ubuntu:~$ |
```

14. Update apt and install Chrome (preferred flow):

```
hania@ubuntu:~$ sudo apt update
Hit:1 http://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRe
lease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports In
Release
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRel
ease
Hit:5 http://dl.google.com/linux/chrome/deb stable InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
hania@ubuntu:~$ |
```

```
hania@ubuntu:~$ 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 upgrade
d.
Need to get 118 MB of archives.
After this operation, 390 MB of additional disk space will b
e used.
Get:1 http://dl.google.com/linux/chrome/deb stable/main amd6
4 google-chrome-stable amd64 142.0.7444.59-1 [118 MB]
Fetched 118 MB in 9s (13.6 MB/s)
Selecting previously unselected package google-chrome-stable
.
(Reading database ... 192831 files and directories currently
installed.)
Preparing to unpack ../google-chrome-stable_142.0.7444.59-1
_amd64.deb ...
Unpacking google-chrome-stable (142.0.7444.59-1) ...
Setting up google-chrome-stable (142.0.7444.59-1) ...
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 au
to mode
update-alternatives: using /usr/bin/google-chrome-stable to
provide /usr/bin/google-chrome (google-chrome) in auto mode
Processing triggers for mate-menus (1.26.1-1build3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ub
untu5) ...
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.
```

```
.
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.
hania@ubuntu:~$ |
```

## Task 8 - Install applications via PPA (Audacity & OBS) and launch

1. Add the Audacity PPA, update apt and install audacity:

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

For help, please use Audacity forum: http://forum.audacityte
am.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/u
buntu/audacity
Adding repository.
Hit:1 http://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRe
lease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports In
Release
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRel
ease
Hit:5 http://dl.google.com/linux/chrome/deb stable InRelease
Get:6 https://ppa.launchpadcontent.net/ubuntuhandbook1/audac
ity/ubuntu noble InRelease [18.1 kB]
Get:7 https://ppa.launchpadcontent.net/ubuntuhandbook1/audac
ity/ubuntu noble/main amd64 Packages [1,064 B]
Get:8 https://ppa.launchpadcontent.net/ubuntuhandbook1/audac
ity/ubuntu noble/main Translation-en [492 B]
Fetched 19.6 kB in 2s (13.0 kB/s)
Reading package lists... Done
hania@ubuntu:~$ |
```

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

```
hania@ubuntu:~$ 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 libflac++10 libid3tag0 liblilv-0-0
  libopusfile0 libpcres2-32-0 libportaudio2 libportmidi0
  libportsmf0t64 libqt5x11extras5 libsbsms10 libserd-0-0
  libsord-0-0 libsordtouch1 libsratom-0-0 libsuil-0-0
  libvamp-hostsdk3v5 libwxbase3.2-1t64 libwxgtk3.2-1t64
  libzix-0-0
Suggested packages:
  ladspa-plugin serdi sordi
The following NEW packages will be installed:
  audacity audacity-data libflac++10 libid3tag0
  liblilv-0-0 libopusfile0 libpcres2-32-0 libportaudio2
  libportmidi0 libportsmf0t64 libqt5x11extras5 libsbsms10
  libserd-0-0 libsord-0-0 libsordtouch1 libsratom-0-0
  libsuil-0-0 libvamp-hostsdk3v5 libwxbase3.2-1t64
  libwxgtk3.2-1t64 libzix-0-0
0 upgraded, 21 newly installed, 0 to remove and 0 not upgraded.
Need to get 16.6 MB of archives.
After this operation, 65.1 MB of additional disk space will
be used.
Get:1 http://pk.archive.ubuntu.com/ubuntu noble/main amd64 libflac++10 amd64 1.4.3+ds-2.1ubuntu2 [30.8 kB]
Get:2 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libid3tag0 amd64 0.15.1b-14build1 [33.6 kB]
Get:3 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libserd-0-0 amd64 0.32.2-1 [43.6 kB]
Get:4 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libzix-0-0 amd64 0.4.2-2build1 [23.6 kB]
Get:5 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libsord-0-0 amd64 0.16.16-2build1 [15.8 kB]
Get:6 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 libsratom-0-0 amd64 0.6.16-1build1 [17.3 kB]
Get:7 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 liblilv-0-0 amd64 0.24.22-1build1 [41.0 kB]
Get:8 http://pk.archive.ubuntu.com/ubuntu noble/universe amd
```



```

Setting up libsuid-0-0:amd64 (0.10.20-1build1) ...
Setting up libflac++10:amd64 (1.4.3+ds-2.1ubuntu2) ...
Setting up libid3tag0:amd64 (0.15.1b-14build1) ...
Setting up libpcres2-32-0:amd64 (10.42-4ubuntu2) ...
Setting up libsoundtouch1:amd64 (2.3.2+ds1-1build1) ...
Setting up libportmidi0:amd64 (1:217-6.1build3) ...
Setting up libsbml0:amd64 (2.3.0-1build1) ...
Setting up libwxbase3.2-1t64:amd64 (3.2.4+dfsg-4build1) ...
Setting up libopusfile0:amd64 (0.12-4build3) ...
Setting up libwxgtk3.2-1t64:amd64 (3.2.4+dfsg-4build1) ...
Setting up libserd-0-0:amd64 (0.32.2-1) ...
Setting up libsord-0-0:amd64 (0.16.16-2build1) ...
Setting up libsratom-0-0:amd64 (0.6.16-1build1) ...
Setting up liblilv-0-0:amd64 (0.24.22-1build1) ...
Setting up audacity (3.7.5-0build1~ubuntu24.04) ...
Processing triggers for shared-mime-info (2.4-4) ...
Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ubu
untu5) ...
Rebuilding /usr/share/applications/bamf-2.index...
Processing triggers for desktop-file-utils (0.27-2build1) ..
.
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for mate-menus (1.26.1-1build3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for man-db (2.12.0-4build2) ...
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.
hania@ubuntu:~$ |

```

2. Launch Audacity (from GUI or CLI). On a headless server you may not get a GUI window — if you are using the XFCE GUI session, launch from a GUI terminal or run check for binary:

```

hania@ubuntu:~$ audacity --version
hania@ubuntu:~$ audacity
hania@ubuntu:~$ |

```

3. Add the OBS Studio PPA, update apt and install obs-studio:



```
hania@ubuntu:~$ sudo add-apt-repository ppa:obsproject/obs-studio -y
Repository: 'Types: deb
URIs: 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://pk.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://pk.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://pk.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:6 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu noble InRelease [17.8 kB]
Hit:7 https://ppa.launchpadcontent.net/ubuntuhandbook1/audacity/ubuntu noble 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 19.1 kB in 6s (3,057 B/s)
Reading package lists... Done
hania@ubuntu:~$
```

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

```

hania@ubuntu:~$ 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:
  libaacs0 libass9 libavdevice60 libavfilter9
  libavformat60 libb2-1 libbdplus0 libbluray2 libbs2b0
  libchromaprint1 libcjson1 libdc1394-25 libdecor-0-0
  libdecor-0-plugin-1-gtk libfdk-aac2 libfftw3-double3
  libflite1 libgme0 liblua5.1-2 liblua5.1-common
  libmbedcrypto7t64 libmbdts14t64 libmbdx509-1t64
  libmysofa1 libnorm1t64 libopenal-data libopenal1
  libopenmpt0t64 libpgm-5.3-0t64 libplacebo338
  libpocketsphinx3 libpostproc57 libqrencodegencpp1
  libqt6core6t64 libqt6dbus6t64 libqt6gui6t64
  libqt6network6t64 libqt6opengl6t64 libqt6qml6
  libqt6qmlmodels6 libqt6quick6 libqt6svg6
  libqt6waylandclient6 libqt6waylandcompositor6
  libqt6waylandeglclienthwintegration6
  libqt6waylandegllcompositorhwintegration6
  libqt6widgets6t64 libqt6wslshellintegration6
  libqt6xml6t64 librabbitmq4 librist4 librubberband2
  libsdl2-2.0-0 libsndio7.0 libspnbase3t64
  libsrtp1.5-gnutls libsrtp1.5-openssl libssh-gcrypt-4
  libswscale7 libts0t64 libudfread0 libunibreak5
  libvidstab1.1 libxcb-composite0 libzim2 libzmq5
  pocketsphinx-en-us qt6-gtk-platformtheme qt6-qtbase-plugins
  qt6-translations-l10n qt6-wayland
Suggested packages:
  libbluray-bdj libfftw3-bin libfftw3-dev
  qt6-qmltooling-plugins sndiod
The following NEW packages will be installed:
  libaacs0 libass9 libavdevice60 libavfilter9
  libavformat60 libb2-1 libbdplus0 libbluray2 libbs2b0
  libchromaprint1 libcjson1 libdc1394-25 libdecor-0-0
  libdecor-0-plugin-1-gtk libfdk-aac2 libfftw3-double3
  libflite1 libgme0 liblua5.1-2 liblua5.1-common
  libmbedcrypto7t64 libmbdts14t64 libmbdx509-1t64
  libmysofa1 libnorm1t64 libopenal-data libopenal1
  libopenmpt0t64 libpgm-5.3-0t64 libplacebo338

```

```

Setting up libass9:amd64 (1:0.17.1-2build1) ...
Setting up qt6-gtk-platformtheme:amd64 (6.4.2+dfsg-21.1build
5) ...
Setting up libqt6quick6:amd64 (6.4.2+dfsg-4build3) ...
Setting up libmbdts14t64:amd64 (2.28.8-1) ...
Setting up libqt6wslshellintegration6:amd64 (6.4.2-5build3) .
...
Setting up libqt6waylandcompositor6:amd64 (6.4.2-5build3) ..
.
Setting up libqt6waylandegllcompositorhwintegration6:amd64 (6
.4.2-5build3) ...
Setting up libqt6waylandeglclienthwintegration6:amd64 (6.4.2
-5build3) ...
Setting up libavfilter9:amd64 (7:6.1.1-3ubuntu5) ...
Setting up qt6-wayland:amd64 (6.4.2-5build3) ...
Setting up libavdevice60:amd64 (7:6.1.1-3ubuntu5) ...
Setting up obs-studio (32.0.2-0obsproject1-noble) ...
Processing triggers for bamfdaemon (0.5.6+22.04.20220217-0ub
untu5) ...
Rebuilding /usr/share/applications/bamf-2.index...
Processing triggers for desktop-file-utils (0.27-2build1) ..
.
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for mate-menus (1.26.1-1build3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for man-db (2.12.0-4build2) ...
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.
hania@ubuntu:~$

```

4. Launch OBS Studio (from GUI or verify binary presence):

```
hania@ubuntu:~$ obs --version
OBS Studio - 32.0.2
hania@ubuntu:~$ obs
qt.qpa.xcb: could not connect to display
qt.qpa.plugin: Could not load the Qt platform plugin "xcb" in "" even though it was found.
This application failed to start because no Qt platform plugin in could be initialized. Reinstalling the application may fix this problem.

Available platform plugins are: offscreen, xcb, minimal, minimalegl, vkkhrdisplay, vnc, wayland, wayland-egl, eglfs, linuxfb.

Aborted (core dumped)
hania@ubuntu:~$ |
```

## Task 9 - Create a Kubernetes sample YAML using vim

1. Check whether vim is installed by running:

```

      VIM - Vi IMproved
      version 9.1.697
      by Bram Moolenaar et al.
      Modified by team+vim@tracker.debian.org
      Vim is open source and freely distributable

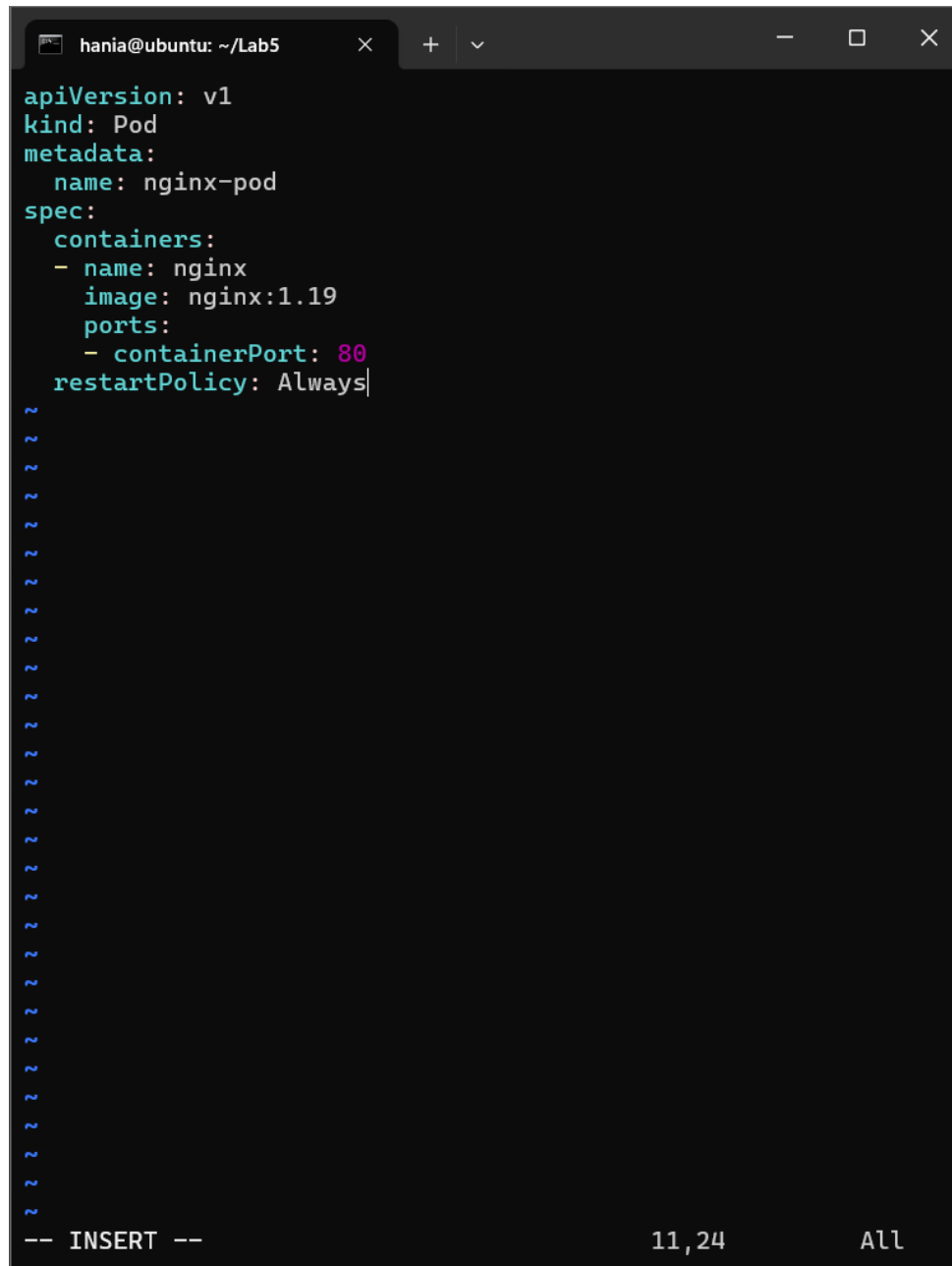
      Help poor children in Uganda!
type   :help iccf<Enter>      for information

type   :q<Enter>              to exit
type   :help<Enter> or <F1>   for on-line help
type   :help version9<Enter> for version info
```

2. Create the Lab5 working directory in your home and change into it:

```
hania@ubuntu:~$ mkdir -p ~/Lab5
hania@ubuntu:~$ cd ~/Lab5
hania@ubuntu:~/Lab5$ |
```

3. Create the Kubernetes sample file using vim:



The screenshot shows a terminal window titled 'hania@ubuntu: ~/Lab5'. Inside, a Kubernetes manifest file is being edited in vim. The manifest is a YAML file for a Pod. The content is as follows:

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

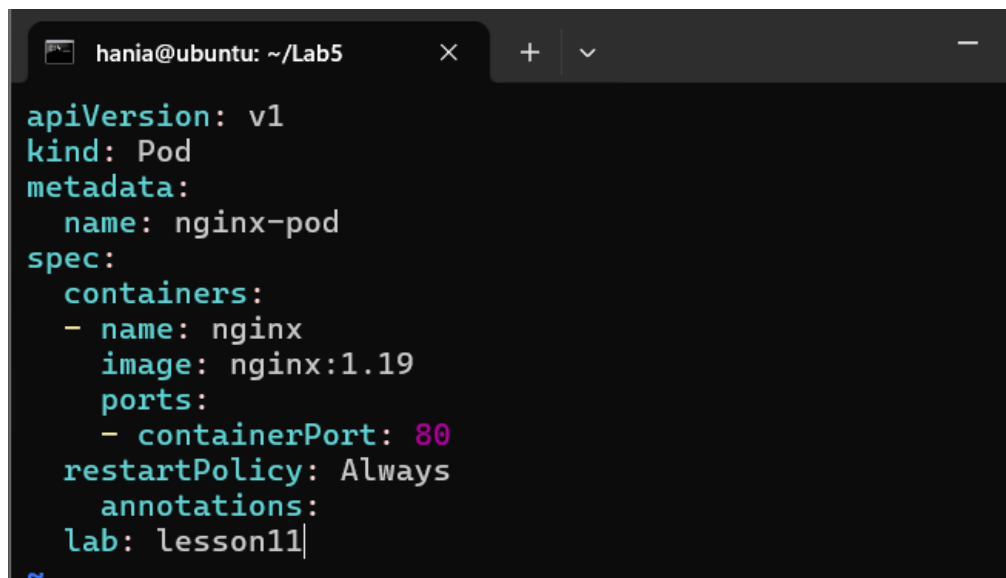
The vim editor interface is visible, showing the file is in INSERT mode. The status bar at the bottom indicates '-- INSERT --', the cursor position is '11,24', and the file name is 'All'.

4. Exit insert mode by pressing `Esc`, then save and quit vim with:

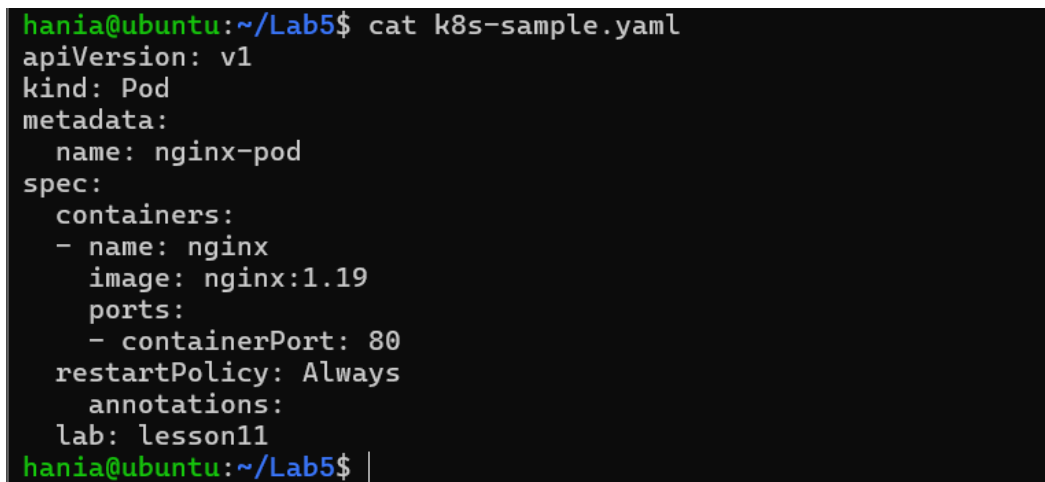
```
hania@ubuntu:~/Lab5$ ls -la
total 12
drwxrwxr-x  2 hania hania 4096 Nov  3 06:17 .
drwxr-x--- 22 hania hania 4096 Nov  3 06:17 ..
-rw-rw-r--  1 hania hania  170 Nov  3 06:17 k8s-sample.yaml
hania@ubuntu:~/Lab5$ |
```

## Task 10 - Edit the Kubernetes YAML - add annotation, verify, then discard temporary change

1. Open the manifest with vim:



```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```



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

3. Discard changes (practice: make a temporary edit and exit without saving)



```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

2. Delete the line containing `image: nginx:1.19` with a single command:

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
~
```

3. Delete 3 lines at once using the numeric delete command:

**Before delete command**

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
~
~
~
~
~
~
~
```

**After delete command**



```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    restartPolicy: Always
    annotations:
      lab: lesson11
~
~
```

After undo command

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
    restartPolicy: Always
    annotations:
      lab: lesson11
~
~
```

#### 4. Navigation practice (from command mode)

Move to first line

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
    restartPolicy: Always
    annotations:
      lab: lesson11
~
~
```

- Jump to the last line:

```

hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
lab: lesson11

```

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

## Task 12 - Vim search, add matches, substitute, undo

1. Open the file with vim:

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

2. Search for the string nginx using the forward search command:

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

3. Move to the next match and previous match:

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
```

4. Add two more occurrences of the word `nginx` in the file:

[illegible]

5. Demonstrate that  $n$  cycles forward through all matches:

```

❏ hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
    - name: nginx
      image: nginx:1.19
      ports:
        - containerPort: 80
  restartPolicy: Always
  annotations:
lab: lesson11
#this is comment line

```

6. Substitute all occurrences of nginx with webapp:

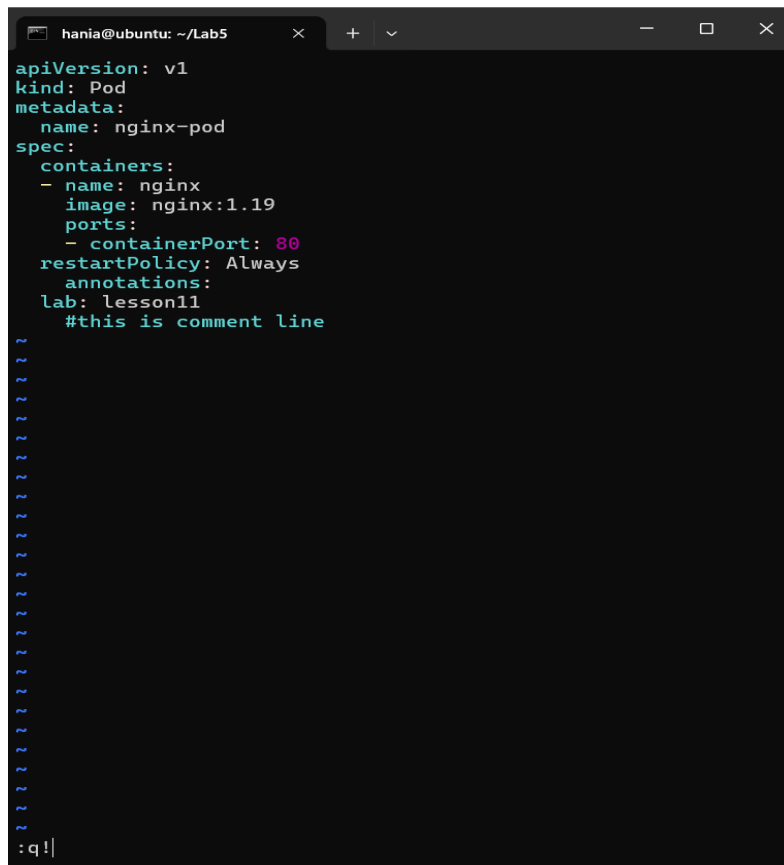
```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: webapp-pod
spec:
  containers:
  - name: webapp
    image: webapp:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
  #this is comment line
~
~
~
~
```

7. Immediately undo the substitution using u:

After undo

```
hania@ubuntu: ~/Lab5
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
  #this is comment line
~
~
~
~
~
~
~
~
```

- Quit vim without saving any accidental changes (if you didn't already save after substitution and want to discard):



The screenshot shows a terminal window with a vim editor. The file being edited is a Kubernetes Pod manifest. The content of the file is as follows:

```
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
  annotations:
  lab: lesson11
  #this is comment line
```

The vim editor interface shows the file name as `hania@ubuntu: ~/Lab5`. The cursor is at the end of the last line of the manifest. The bottom of the screen shows the vim command `:q!` being entered, which is used to quit the editor without saving changes.

## Exam Evaluation Question

Installation of docker desktop

```
hania@ubuntu:~$ sudo apt install docker.io -y_
```

```

Get:4 http://security.ubuntu.com/ubuntu noble-security/main amd64 containerd amd64 1.7.24-0ubuntu1~24.04.2 [37.0 MB]
Get:5 http://pk.archive.ubuntu.com/ubuntu noble/universe amd64 ubuntu-fan all 0.12.16 [35.2 kB]
Get:6 http://security.ubuntu.com/ubuntu noble-security/universe amd64 docker.io amd64 27.5.1-0ubuntu3~24.04.2 [33.0 MB]
Fetched 78.8 MB in 9s (8,307 kB/s)
Preconfiguring packages ...
Selecting previously unselected package pigz.
(Reading database ... 196606 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.8-1_amd64.deb ...
Unpacking pigz (2.8-1) ...
Selecting previously unselected package bridge-utils.
Preparing to unpack .../1-bridge-utils_1.7.1-1ubuntu2_amd64.deb ...
Unpacking bridge-utils (1.7.1-1ubuntu2) ...
Selecting previously unselected package runc.
Preparing to unpack .../2-runc_1.1.12-0ubuntu3.1_amd64.deb ...
Unpacking runc (1.1.12-0ubuntu3.1) ...
Selecting previously unselected package containerd.
Preparing to unpack .../3-containerd_1.7.24-0ubuntu1~24.04.2_amd64.deb ...
Unpacking containerd (1.7.24-0ubuntu1~24.04.2) ...
Selecting previously unselected package docker.io.
Preparing to unpack .../4-docker.io_27.5.1-0ubuntu3~24.04.2_amd64.deb ...
Unpacking docker.io (27.5.1-0ubuntu3~24.04.2) ...
Selecting previously unselected package ubuntu-fan.
Preparing to unpack .../5-ubuntu-fan_0.12.16_all.deb ...
Unpacking ubuntu-fan (0.12.16) ...
Setting up runc (1.1.12-0ubuntu3.1) ...
Setting up bridge-utils (1.7.1-1ubuntu2) ...
Setting up pigz (2.8-1) ...
Setting up containerd (1.7.24-0ubuntu1~24.04.2) ...
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /usr/lib/systemd/system/containerd.service.
Setting up ubuntu-fan (0.12.16) ...
Created symlink /etc/systemd/system/multi-user.target.wants/ubuntu-fan.service → /usr/lib/systemd/system/ubuntu-fan.service.
Setting up docker.io (27.5.1-0ubuntu3~24.04.2) ...
info: Selecting GID from range 100 to 999 ...
info: Adding group 'docker' (GID 120) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /usr/lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/lib/systemd/system/docker.socket.
Processing triggers for man-db (2.12.0-4build2) ...
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.
hania@ubuntu:~$ _

```

```

hania@ubuntu:~$ sudo systemctl status docker
sudo: systemctl: command not found
hania@ubuntu:~$ 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 Mon 2025-11-03 08:31:33 UTC; 2min 8s ago
   TriggeredBy: • docker.socket
     Docs: https://docs.docker.com
    Main PID: 3634 (dockerd)
      Tasks: 9
     Memory: 21.1M (peak: 21.9M)
        CPU: 593ms
    CGroup: /system.slice/docker.service
            └─3634 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Nov 03 08:31:33 ubuntu systemd[1]: Starting docker.service - Docker Application Container Engine...
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.168090500Z" level=info msg="Starting up"
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.168995493Z" level=info msg="OTEL tracing is not configured, using no-op tracer provider"
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.169179753Z" level=info msg="detected 127.0.0.53 nameserver, assuming systemd-resolved, so using"
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.264780999Z" level=info msg="Loading containers: start."
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.850185427Z" level=info msg="Loading containers: done."
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.885120370Z" level=info msg="Docker daemon" commit="27.5.1-0ubuntu3~24.04.2" containerd-snapshot"
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.885494305Z" level=info msg="Daemon has completed initialization"
Nov 03 08:31:33 ubuntu dockerd[3634]: time="2025-11-03T08:31:33.941000079Z" level=info msg="API listen on /run/docker.sock"
Nov 03 08:31:33 ubuntu systemd[1]: Started docker.service - Docker Application Container Engine.
lines 1-22/22 (END)

```

```

hania@ubuntu:~$ docker --version
Docker version 27.5.1, build 27.5.1-0ubuntu3~24.04.2
hania@ubuntu:~$ _

```

```
hania@ubuntu:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
17eec7bbc9d7: Pull complete
Digest: sha256:56433a6be3fda188089fb548eae3d91df3ed0d6589f7c2656121b911198df065
Status: Downloaded newer image for hello-world:latest
```

Hello from Docker!  
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:

1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.  
(amd64)
3. The Docker daemon created a new container from that image which runs the executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it to your terminal.

To try something more ambitious, you can run an Ubuntu container with:  
\$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:  
<https://hub.docker.com/>

For more examples and ideas, visit:  
<https://docs.docker.com/get-started/>

```
hania@ubuntu:~$ sudo docker ps -a
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS              PORTS          NAMES
3de35b2b0620   hello-world    "/hello"                 3 minutes ago   Exited (0) 3 minutes ago           eloquent_jones
hania@ubuntu:~$
```