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CLASS: BSE 5B

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SUBJECT: CLOUD COMPUTING

LAB#05

TASK#01:

Runs the `java` command to trigger Ubuntu's installation suggestion, then installs Java using `apt`, verifies the version, removes it, and clears the shell cache.

Demonstrates how Ubuntu suggests and manages missing software installation via `apt`.

```
sana058@sana1:~$ 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 21.0.4+9"us1-0ubuntu1"24.04.1
sudo apt install default-jre # version 21:17-75
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
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
sana058@sana1:~$ sudo apt install default-jre
[sudo] password for sana058:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  adwaita-icon-theme alsa-topology-conf alsa-ucm-conf at-spi2-common at-spi2-core ca-certificates-java dconf-gsettings-backend dconf-service
  default-jre-headless fontconfig fonts-dejavu-extra gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-theme humanity-icon-theme java-common
  libasound2-data libasound2t64 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0t64 libatspi2.0-0t64 libavahi-client3
  libavahi-common-data libavahi-common3 libcairo-gobject2 libcairo2 libcolord2 libcups2t64 libdatrie1 libdconf1 libdrm-amdgpu libdrm-intel1 libepoxy0 libgbm1
  libgdk-pixbuf-2.0-0 libgdk-pixbuf2.0-bin libgdk-pixbuf2.0-common libgif7 libgl1 libgl1-mesa-dri libglvnd0 libglx-mesa0 libglx0 libgraphite2-3 libgtk-3-0t64
  libgtk-3-bin libgtk-3-common libharfbuzz0b libice6 liblcms2-2 libllvml9 libpango-1.0-0 libpangocairo-1.0-0 libpangoft2-1.0-0 libpciaccess0 libpcsc-lite1
  libpixman-1-0 librsvg2-2 librsvg2-common libsm6 libthai-data libthai0 libvulkan1 libwayland-client0 libwayland-cursor0 libwayland-egl1 libwayland-server0
  libx11-xcb1 libxau7 libxcb-dri3-0 libxcb-glx0 libxcb-present0 libxcb-randr0 libxcb-render0 libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xfixes0
  libxcomposite1 libxcursor1 libxdamage1 libxfixes3 libxft2 libxi6 libxinerama1 libxkbfile1 libxmu6 libxrandr2 libxrender1 libxshmfence1 libxt6t64 libxtst6
  libxv1 libxxf86dga1 libxxf86vm1 mesa-libgallium mesa-vulkan-drivers openjdk-21-jre openjdk-21-jre-headless session-migration ubuntu-mono x11-common
  x11-utils
Suggested packages:
  alsa-utils libasound2-plugins colord cups-common gvfs liblcms2-utils pcsd librsvg2-bin libnss-mdns fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-uw-y-microhei | fonts-uw-y-zenhei fonts-indic mesa-utils
Recommended packages:
  lut1
The following NEW packages will be installed:
  adwaita-icon-theme alsa-topology-conf alsa-ucm-conf at-spi2-common at-spi2-core ca-certificates-java dconf-gsettings-backend dconf-service default-jre
  default-jre-headless fontconfig fonts-dejavu-extra gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-theme humanity-icon-theme java-common
  libasound2-data libasound2t64 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0t64 libatspi2.0-0t64 libavahi-client3
  libavahi-common-data libavahi-common3 libcairo-gobject2 libcairo2 libcolord2 libcups2t64 libdatrie1 libdconf1 libdrm-amdgpu libdrm-intel1 libepoxy0 libgbm1
  libgdk-pixbuf-2.0-0 libgdk-pixbuf2.0-bin libgdk-pixbuf2.0-common libgif7 libgl1 libgl1-mesa-dri libglvnd0 libglx-mesa0 libglx0 libgraphite2-3 libgtk-3-0t64
  libgtk-3-bin libgtk-3-common libharfbuzz0b libice6 liblcms2-2 libllvml9 libpango-1.0-0 libpangocairo-1.0-0 libpangoft2-1.0-0 libpciaccess0 libpcsc-lite1
  libpixman-1-0 librsvg2-2 librsvg2-common libsm6 libthai-data libthai0 libvulkan1 libwayland-client0 libwayland-cursor0 libwayland-egl1 libwayland-server0
  libx11-xcb1 libxau7 libxcb-dri3-0 libxcb-glx0 libxcb-present0 libxcb-randr0 libxcb-render0 libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xfixes0
  libxcomposite1 libxcursor1 libxdamage1 libxfixes3 libxft2 libxi6 libxinerama1 libxkbfile1 libxmu6 libxrandr2 libxrender1 libxshmfence1 libxt6t64 libxtst6
  libxv1 libxxf86dga1 libxxf86vm1 mesa-libgallium mesa-vulkan-drivers openjdk-21-jre openjdk-21-jre-headless session-migration ubuntu-mono x11-common
  x11-utils
0 upgraded, 106 newly installed, 0 to remove and 38 not upgraded.
Need to get 118 MB of archives.
After this operation, 546 MB of additional disk space will be used.
Do you want to continue? (Y/n) _
```

```
Fetched 37.4 MB in 24s (1,581 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
67 packages can be upgraded. Run 'apt list --upgradable' to see them.
sana058@sana1:~$
```

```
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.
sana058@sana1:~$
```

```
sana058@sana1:~$ sudo apt 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:
  adwaita-icon-theme alsa-topology-conf alsa-ucm-conf at-spi2-common at-spi2-core d
  default-jre-headless fontconfig fonts-dejavu-extra gsettings-desktop-schemas gtk-
  libasound2-data libasound2t64 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wr
  libavahi-common-data libavahi-common3 libcairo-gobject2 libcairo2 libcolord2 libd
  libgdk-pixbuf-2.0-0 libgdk-pixbuf2.0-bin libgdk-pixbuf2.0-common libgif7 libgl1 l
  libgtk-3-bin libgtk-3-common libharfbuzz0b libice6 liblcms2-2 libllvm20 libpango-
  libpixman-1-0 librsvg2-2 librsvg2-common libsm6 libthai-data libthai0 libvulkan1
  libx11-xcb1 libxaw7 libxcb-dri3-0 libxcb-glx0 libxcb-present0 libxcb-randr0 libxc
  libxcomposite1 libxcursor1 libxdamage1 libxfixes3 libxft2 libxi6 libxinerama1 lib
  libxv1 libxxf86dga1 libxxf86vm1 mesa-libgallium mesa-vulkan-drivers openjdk-21-jr
  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 67 not upgraded.
After this operation, 6,144 B disk space will be freed.
(Reading database ... 101562 files and directories currently installed.)
Removing default-jre (2:1.21-75+exp1) ...
sana058@sana1:~$ _
```

```

        set a system property
-verbose:[class|module|gc|jni]
    enable verbose output for the given subsystem
--version
    print product version to the error stream and exit
--showversion
    print product version to the error stream and continue
--show-module-resolution
    print product version to the output stream and continue
    show module resolution output during startup
-? -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
-da[:<packagename>...]:<classname>]
    disable assertions with specified granularity
-esa | -enablesystemassertions
    enable system assertions
-dsa | -disablesystemassertions
    disable system assertions
-agentlib:<libname>[=<options>]
    load native agent library <libname>, e.g. -agentlib:jdwp
    see also -agentlib:jdwp=help
-agentpath:<pathname>[=<options>]
    load native agent library by full pathname
-javaagent:<jarpath>[=<options>]
    load Java programming language agent, see java.lang.instrument
-splash:<imagepath>
    show splash screen with specified image
    HiDPI 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
To specify an argument for a long option, you can use --<name>=<value> or
--<name> <value>.

```

TASK#02:

Installs and removes Java using `apt-get` to show an alternate package manager workflow.

Highlights the functional similarity and subtle differences between `apt` and `apt-get`.

```
sana058@sana1:~$ sudo apt-get install default-jre -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  default-jre
0 upgraded, 1 newly installed, 0 to remove and 67 not upgraded.
Need to get 0 B/922 B of archives.
After this operation, 6,144 B of additional disk space will be used.
Selecting previously unselected package default-jre.
(Reading database ... 101561 files and directories currently installed.)
Preparing to unpack .../default-jre_2%3a1.21-75+exp1_amd64.deb ...
Unpacking default-jre (2:1.21-75+exp1) ...
Setting up default-jre (2:1.21-75+exp1) ...
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.
sana058@sana1:~$ _
```

```
sana058@sana1:~$ 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)
```

```
sana058@sana1:~$ 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:
  adwaita-icon-theme alsa-topology-conf alsa-ucm-conf at-spi2-common at-spi2-core ca
  default-jre-headless fontconfig fonts-dejavu-extra gsettings-desktop-schemas gtk-4
  libasound2-data libasound2t64 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wra
  libavahi-common-data libavahi-common3 libcairo-gobject2 libcairo2 libcolorh2 libcu
  libgdk-pixbuf-2.0-0 libgdk-pixbuf2.0-bin libgdk-pixbuf2.0-common libgif7 libgl1 li
  libgtk-3-bin libgtk-3-common libharfbuzz20b libice6 liblcms2-2 libllvm20 libpango-1
  libpixman-1-0 librsvg2-2 librsvg2-common libsm6 libthai-data libthai0 libvulkan1 l
  libx11-xcb1 libxaw7 libxcb-dri3-0 libxcb-glx0 libxcb-present0 libxcb-randr0 libxcb
  libxcomposite1 libxcursor1 libxdamage1 libxfixes3 libxft2 libxi6 libxinerama1 libx
  libxv1 libxxf86dga1 libxxf86vm1 mesa-libgallium mesa-vulkan-drivers openjdk-21-jre
  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 67 not upgraded.
After this operation, 6,144 B disk space will be freed.
(Reading database ... 101562 files and directories currently installed.)
Removing default-jre (2:1.21-75+exp1) ...
sana058@sana1:~$
```

```

        set a system property
-verbose:[class|module|gc|jni]
    enable verbose output for the given subsystem
-version
    print product version to the error stream and exit
--version
    print product version to the output stream and exit
-showversion
    print product version to the error stream and continue
--show-version
    print product version to the output stream and continue
--show-module-resolution
    show module resolution output during startup
-? -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>]
-enableassertions[:<packagename>...][:<classname>]
    enable assertions with specified granularity
-da[:<packagename>...][:<classname>]
-disableassertions[:<packagename>...][:<classname>]
    disable assertions with specified granularity
-esa | -enablesystemassertions
    enable system assertions
-dsa | -disablesystemassertions
    disable system assertions
-agentlib:<libname>[=<options>]
    load native agent library <libname>, e.g. -agentlib:jdwp=help
    see also -agentlib:jdwp=help
-agentpath:<pathname>[=<options>]
    load native agent library by full pathname
-javaagent:<jarpath>[=<options>]
    load Java programming language agent, see java.lang.instrument
-splash:<imagepath>
    show splash screen with specified image
    HiDPI 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
to specify an argument for a long option, you can use --<name>=<value> or
-<name> <value>.
sana058@sana1:~$ _

```

TASK#03:

Uses `apt update` to refresh package indexes and `apt upgrade` to install new updates.
Explains the difference between updating repository data and upgrading installed packages.

```

sana058@sana1:~$ sudo apt update
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Ign:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
67 packages can be upgraded. Run 'apt list --upgradable' to see them.
sana058@sana1:~$

```

```

67 upgraded, 7 newly installed, 0 to remove and 0 not upgraded.
37 standard LTS security updates
Need to get 789 MB/829 MB of archives.
After this operation, 308 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 coreutils amd64 9.4-3ubuntu6.1 [1,413 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-timesyncd amd64 255.4-1ubuntu8.11 [35.3 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-resolved amd64 255.4-1ubuntu8.11 [296 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libnss-systemd amd64 255.4-1ubuntu8.11 [159 kB]
Get:5 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-dev all 255.4-1ubuntu8.11 [106 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd amd64 255.4-1ubuntu8.11 [3,475 kB]
Get:7 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 udev amd64 255.4-1ubuntu8.11 [1,874 kB]
Get:8 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-sysv amd64 255.4-1ubuntu8.11 [11.9 kB]
Get:9 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpam-systemd amd64 255.4-1ubuntu8.11 [235 kB]
Get:10 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libsystemd-shared amd64 255.4-1ubuntu8.11 [2,076 kB]
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 libsystemd0 amd64 255.4-1ubuntu8.11 [434 kB]
Get:13 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-sftp-server amd64 1:9.6p1-3ubuntu13.14 [37.3 kB]
Get:14 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-server amd64 1:9.6p1-3ubuntu13.14 [510 kB]
Get:15 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-client amd64 1:9.6p1-3ubuntu13.14 [906 kB]
Get:16 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 ubuntu-drivers-common amd64 1:0.9.7.6ubuntu3.4 [65.8 kB]
Get:17 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 distro-info-data all 0.60ubuntu0.5 [6,934 B]
Get:18 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-hwe-hwdb all 255.1.6 [3,684 B]
Get:19 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 powermgmt-base all 1.37ubuntu0.1 [7,650 B]
Get:20 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 tcpdump amd64 4.99.4-3ubuntu4.24.04.1 [479 kB]
Get:21 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 firmware-sof-signed all 2023.12.1-1ubuntu1.10 [7,382 kB]
Get:22 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libfwupd2 amd64 1.9.31-0ubuntu1~24.04.1 [136 kB]
Get:23 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 fwupd amd64 1.9.31-0ubuntu1~24.04.1 [4,532 kB]
Get:24 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 landscape-common amd64 24.02-0ubuntu5.6 [93.2 kB]
Get:25 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-firmware amd64 20240318.git3b128b60-0ubuntu2.19 [538 MB]
36% [25 linux-firmware 151 MB/538 MB 28%]

```

```

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...
systemctl restart cron.service multipathd.service polkit.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:
sana058 @ session #1: apt[4124], login[901]
sana058 @ user manager service: systemd[1354]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
sana058@sana1:~$ _

```

```

sana058@sana1:~$ cat ~/apt_update_vs_upgrade.md
cat: /home/sana058/apt_update_vs_upgrade.md: No such file or directory
sana058@sana1:~$ cat ~/apt_upgrade_vs_update.md
apt update refreshes the local package index from online repositories.
It does not install or upgrade any software -it only updates metadata.
apt upgrade installs the latest versions of all currently installed packages.
You must always run apt update before apt upgrade to ensure you are getting the newest updates.
Without apt update, apt upgrade might use old information and skip the new versions.

sana058@sana1:~$ _

```

TASK#04:

Installs Visual Studio Code using the `snap` package manager and verifies its presence via terminal.

Shows how snap manages software independently from apt and stores binaries in `/snap/bin`.

```
sana058@sana1:~$ sudo snap install --classic code
[sudo] password for sana058:
2025-10-24T05:20:18Z INFO Waiting for automatic snapd restart...
code 7d842fb8 from Visual Studio Code (vscode) installed
sana058@sana1:~$ _
```

```
sana058@sana1:~$ snap list code
Name Version Rev Tracking Publisher Notes
code 7d842fb8 211 latest/stable vscode classic
sana058@sana1:~$
```

```
sana058@sana1:~$ code --version
1.105.1
7d842fb85a0275a4a8e4d7e040d2625abbf7f084
x64
sana058@sana1:~$ 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: Ht0aUHi7ofh9Fbwh6m7jUN2pAy6kzBiu
tracking: latest/stable
refresh-date: today at 05:24 UTC
channels:
  latest/stable: 7d842fb8 2025-10-15 (211) 346MB classic
  latest/candidate: ↑
  latest/beta: ↑
  latest/edge: ↑
installed: 7d842fb8 (211) 346MB classic
sana058@sana1:~$ ls -l /snap/bin
total 0
lrwxrwxrwx 1 root root 13 Oct 24 05:24 code -> /usr/bin/snap
lrwxrwxrwx 1 root root 13 Oct 24 05:24 code.url-handler -> /usr/bin/snap
sana058@sana1:~$
```

TASK#05:

Installs the XFCE desktop environment and XRDP for remote GUI access.

Verifies desktop login and demonstrates launching Visual Studio Code in a graphical session.

```
sana058@sana1:~$ sudo apt update && sudo apt upgrade -y
[sudo] password for sana058:
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Get:5 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 c-n-f Metadata [15.4 kB]
Fetched 268 kB in 3s (95.2 kB/s)
Reading package lists... 9%
```

```
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:
sana058 @ session #1: login[901]
sana058 @ user manager service: systemd[1354]
```

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

```
sana058@sana1:~$ sudo apt install xrdp -y
sudo systemctl enable xrdp
systemctl restart xrdp lists... 0%
Reading package lists... Done
Building dependency tree... Done
```

```
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:
sana058 @ session #1: login[901]
sana058 @ user manager service: systemd[1354]
```

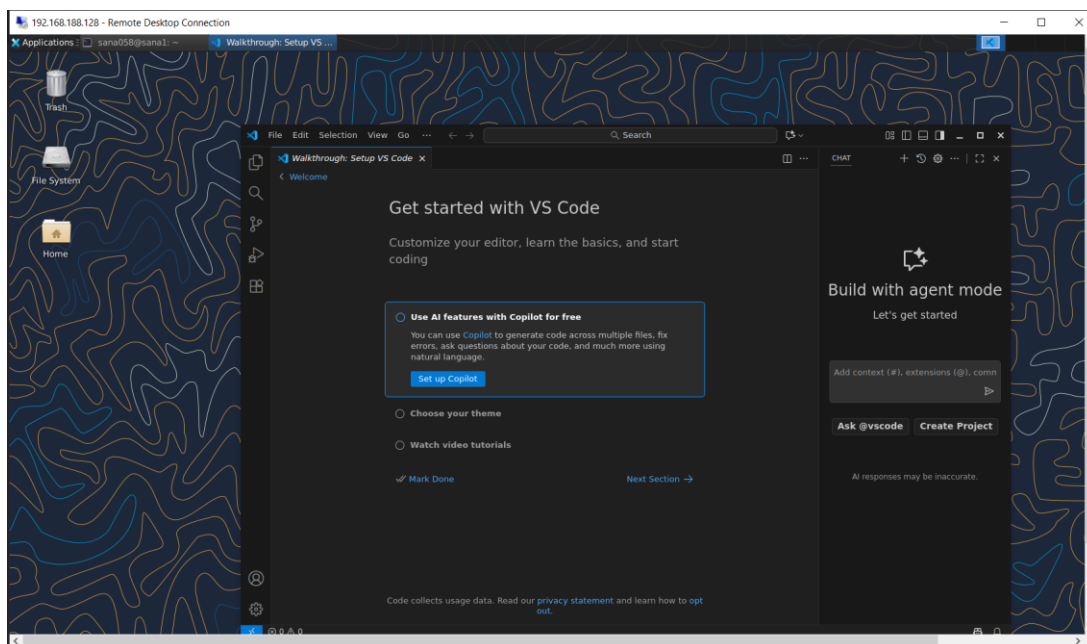
No VM guests are running outdated hypervisor (qemu) binaries on this host.

```
sana058@sana1:~$
```

```
sana058@sana1:~$ echo xfce4-session > ~/.xsession
sana058@sana1:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:d4:97:bb brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.188.128/24 metric 100 brd 192.168.188.255 scope global dynamic ens33
        valid_lft 905sec preferred_lft 905sec
    inet6 fe80::20c:29ff:fed4:97bb/64 scope link
        valid_lft forever preferred_lft forever
```




```
sana050@sana1:~$ sudo apt install software-properties-common apt-transport-https wget -y
wget -qO- https://packages.microsoft.com/keys/microsoft.asc | gpg --dearmor | sudo tee /usr/share/keyrings/packages.micr
osoft.gpg > /dev/null
echo "deb [arch=amd64 signed-by=/usr/share/keyrings/packages.microsoft.gpg] https://packages.microsoft.com/repos/code st
able main" | sudo tee /etc/apt/sources.list.d/vscode.list
sudo apt update
sudo apt install code -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
software-properties-common is already the newest version (0.99.49.3).
software-properties-common set to manually installed.
```



TASK#06:

Fixes GUI login issues by configuring LightDM and its greeter for XFCE.

Tests GUI startup and shutdown both automatically at boot and manually using `systemctl`.

```
sana058@sana1:~$ sudo apt install lightdm lightdm-gtk-greeter -y
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 packages were automatically installed and are no longer re
  ca-certificates-java default-jre-headless fonts-dejavu-extra java-comm
  libgif7 openjdk-21-jre openjdk-21-jre-headless
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
```

```
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:
sana058 @ session #1: login[901]
sana058 @ user manager service: systemd[1354]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
sana058@sana1:~$
```

```
sana058@sana1:~$ sudo mkdir -p /etc/lightdm/lightdm.conf.d
ngreeter-session=lightdm-gtk-greeter\nuser-session=xfce\nautologin-user-timeout=0" | sudo tee /etc/lightdm/ligecho -e "[Seat:*]\ngreeter-session=lightdm-gtk-greeter\nuser-session=xfce\nautologin-user-timeout=0"
| sudo tee /etc/lightdm/lightdm.conf.d/99-xfce.conf
sana058@sana1:~$
```

```
sana058@sana1:~$ sudo rm -rf ~/.cache/sessions
sana058@sana1:~$ sudo rm -f /var/lib/lightdm/.Xauthority
sana058@sana1:~$ sudo rm -f ~/.Xauthority
sana058@sana1:~$ sudo rm -rf ~/.cache/sessions
sana058@sana1:~$ sudo chown -R $USER:$USER /home/$USER
chown: cannot access '/home/sana058/thinclient_drives': Permission denied
sana058@sana1:~$ sudo systemctl restart lightdm
sana058@sana1:~$
```

```
sana058@sana1:~$ sudo systemctl enable lightdm
sudo systemctl set-default graphical.target
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.

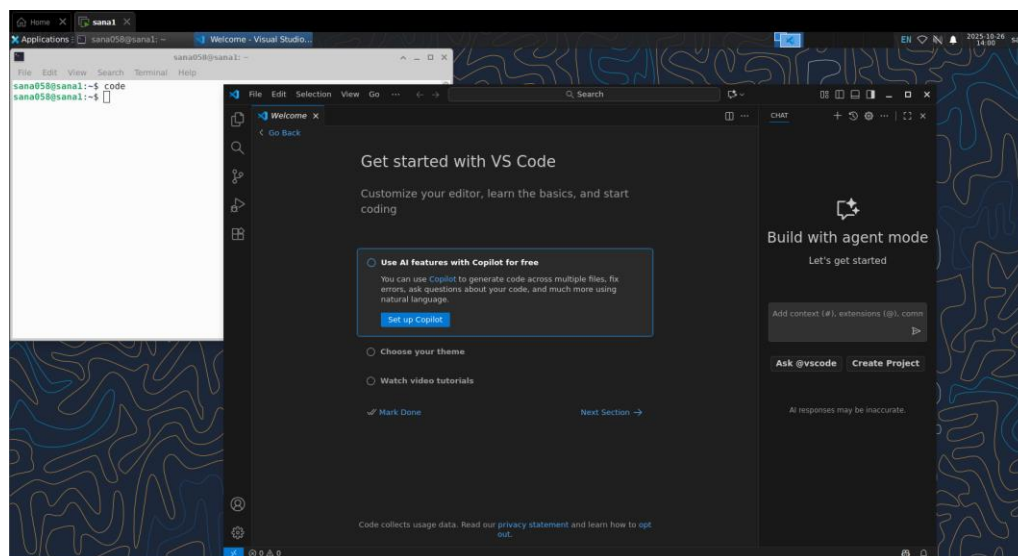
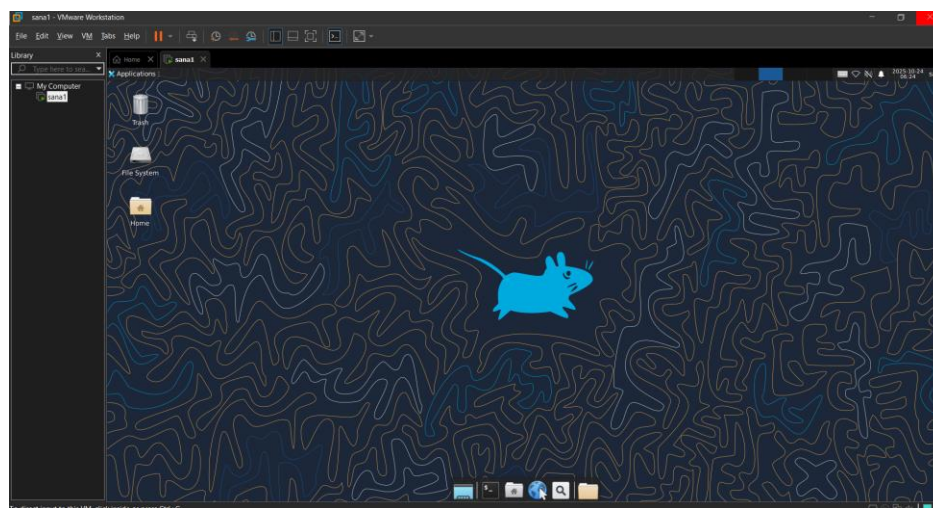
```
sana058@sana1:~$ sudo systemctl set-default graphical.target
```

```
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/graphical.target.
```

```
sana058@sana1:~$ sudo reboot
```

Broadcast message from root@sana1 on pts/2 (Fri 2025-10-24 06:08:42 UTC):

The system will reboot now!



TASK#07:

Adds Google's official repository and signing key to install Chrome via apt.

Demonstrates repository configuration, key management, and secure third-party package installation.

```
sana058@sana1:~$ sudo apt install google-chrome-stable-y
[sudo] password for sana058:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package google-chrome-stable-y
```

```
sana058@sana1:~$ ls -la /etc/apt
total 48
drwxr-xr-x  9 root root  4096 Sep 30 14:06 .
drwxr-xr-x 142 root root 12288 Oct 24 05:49 ..
drwxr-xr-x  2 root root  4096 Oct 24 05:07 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.save
-rw-r--r--  1 root root    70 Sep 30 14:30 sources.list
drwxr-xr-x  2 root root  4096 Oct 24 04:31 sources.list.d
drwxr-xr-x  2 root root  4096 Aug  5 17:01 trusted.gpg.d
```

```
sana058@sana1:~$ ls -la /etc/apt/sources.list.d/
total 16
drwxr-xr-x 2 root root 4096 Oct 24 04:31 .
drwxr-xr-x 9 root root 4096 Sep 30 14:06 ..
-rw-r--r-- 1 root root  383 Oct 24 04:31 ubuntu.sources
-rw-r--r-- 1 root root 2552 Aug  5 17:02 ubuntu.sources.curtin.orig
```

```
sana058@sana1:~$ 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
```

```

GNU nano 7.2 /etc/apt/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

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

```

```

sana058@sana1:~$ sudo mkdir -p /etc/apt/keyrings
. google.com/linux/linux_signing_key.pub | sudo gpg --dearmor -o /etc/apt/keyrings/google.gpg
curl -fsSL https://dl.google.com/linux/linux_signing_key.pub | sudo gpg --dearmor -o /etc/apt/keyrings/google.gpg

```

```

sana058@sana1:~$ sudo apt update
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.

```

```

sana058@sana1:~$ sudo apt install net-tools curl wget vim ufw -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
curl is already the newest version (8.5.0-2ubuntu10.6).
curl set to manually installed.
wget is already the newest version (1.21.4-1ubuntu4.1).
vim is already the newest version (2:9.1.0016-1ubuntu7.9).
vim set to manually installed.
ufw is already the newest version (0.36.2-6).
ufw set to manually installed.
The following packages were automatically installed and are no longer required:
  ca-certificates-java default-jre-headless fonts-dejavu-extra java-common
  libgif7 openjdk-21-jre openjdk-21-jre-headless
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 204 kB of archives.
After this operation, 811 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 net-tools
Selecting previously unselected package net-tools.
(Reading database ... 176115 files and directories currently installed.)
Preparing to unpack .../net-tools_2.10-0.1ubuntu4.4_amd64.deb ...

```

```

Unpacking net-tools (2.10-0.1ubuntu4.4) ...
Setting up net-tools (2.10-0.1ubuntu4.4) ...
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.

```

TASK#08:

Adds PPAs for Audacity and OBS Studio to extend software sources.

Installs and verifies both applications, showing how community PPAs work in Ubuntu.

```

sana058@sana1:~$ sudo apt install audacity -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  ca-certificates-java default-jre-headless fonts-dejavu-extra java-common
  libgif7 openjdk-21-jre openjdk-21-jre-headless
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  audacity-data libdouble-conversion3 libflac++10 libid3tag0 liblilv-0-0 liblilv-0-0-0 liblilv-0-0-1
  libpcre2-32-0 libportaudio2 libportmidi0 libportsmf0t64 libqt5core5t64 libqt5dbus5 libqt5gui5 libqt5network5t64
  libqt5qml15 libqt5qmlmodels5 libqt5quick5 libqt5svg5 libqt5widgets5t64 libqt5x11extras5 libsbcsms10 libserd-0-0
  libsord-0-0 libvamp-hostsdk3v5 libwxbase3.2-1t64 libwxgtk3.2-1t64 libxcb-icccm4 libxcb-image0 libxcb-render-util0
  libxcb-xinerama0 libxcb-xinput0 libxcb-xkb1 libxkbcommon0 qttranslations5-l10n qtwayland5
Suggested packages:
  ladspa-plugin qgnomeplatform-qt5 qt5-image-formats-plugins qt5-qmltooling
The following NEW packages will be installed:
  audacity audacity-data libdouble-conversion3 libflac++10 libid3tag0 liblilv-0-0 liblilv-0-0-0 liblilv-0-0-1
  libpcre2-32-0 libportaudio2 libportmidi0 libportsmf0t64 libqt5core5t64 libqt5dbus5 libqt5gui5 libqt5network5t64
  libqt5qml15 libqt5qmlmodels5 libqt5quick5 libqt5svg5 libqt5widgets5t64 libqt5x11extras5 libsbcsms10 libserd-0-0
  libsord-0-0 libvamp-hostsdk3v5 libwxbase3.2-1t64 libwxgtk3.2-1t64 libxcb-icccm4 libxcb-image0 libxcb-render-util0
  libxcb-xinerama0 libxcb-xinput0 libxcb-xkb1 libxkbcommon0 qttranslations5-l10n qtwayland5

```



```

Setting up libqt5svg5:amd64 (5.15.13-1) ...
Setting up audacity (3.4.2+dfsg-1build4) ...
Setting up qt5-gtk-platformtheme:amd64 (5.15.13+dfsg-1ubuntu1) ...
Setting up libqt5waylandclient5:amd64 (5.15.13-1) ...
Setting up libqt5quick5:amd64 (5.15.13+dfsg-1ubuntu0.1) ...
Setting up libqt5waylandcompositor5:amd64 (5.15.13-1) ...
Setting up qtwayland5:amd64 (5.15.13-1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for shared-mime-info (2.4-4) ...
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) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
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.

```

```

sana058@sana1:~$ sudo apt install obs-studio -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  ca-certificates-java default-jre-headless fonts-dejavu-extra java-common
  libgif7 openjdk-21-jre openjdk-21-jre-headless
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  fonts-freefont-ttf liba52-0.7.4 libaacs0 libaribb24-0t64 libass9 libaudio
  libavformat60 libb2-1 libbdplus0 libblas3 libbluray2 libbs2b0 libcdcb2
  libdata-dump-perl libdc1394-25 libdca0 libdecor-0-0 libdecor-0-plugin-1
  libebml5 libencode-locale-perl libfaad2 libfftw3-double3 libfile-basedi
  libfile-listing-perl libfile-mimeinfo-perl libflite1 libfont-afm-perl l
  libhtml-format-perl libhtml-parser-perl libhtml-tagset-perl libhtml-tree
  libhttp-daemon-perl libhttp-date-perl libhttp-message-perl libhttp-negoti
  libio-socket-ssl-perl libio-stringy-perl libipc-system-simple-perl libi
  liblirc-client0t64 liblua5.2-0 liblua5.2-0 liblua5.2-common libluajit-5.1
  liblwp-protocol-https-perl libmad0 libmailtools-perl libmatroska7 libmb
  libmng2 libmpcdec6 libmpeg2-4 libmysofa1 libnet-dbus-perl libnet-http-p

```

```

Setting up liblwp-protocol-https-perl (6.13-1) ...
Setting up libwww-perl (6.76-1) ...
Setting up libxml-parser-perl (2.47-1build3) ...
Setting up libxml-twig-perl (1:3.52-2) ...
Setting up libnet-dbus-perl (1.2.0-2build3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for fontconfig (2.15.0-1.1ubuntu2) ...
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) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for libvlc-bin:amd64 (3.0.20-3build6) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

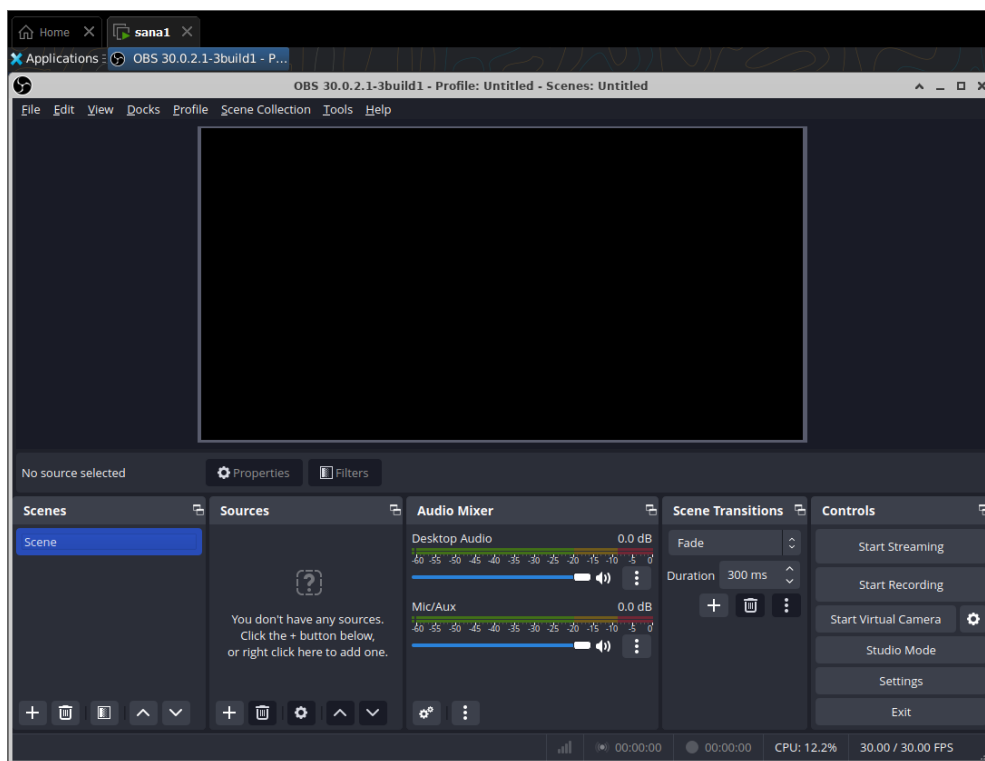
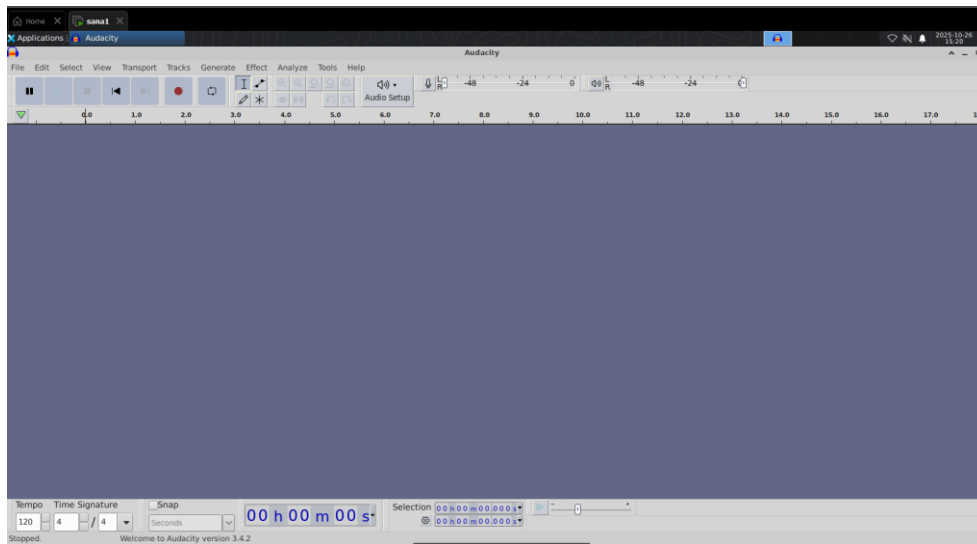
No services need to be restarted.

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.

```



TASK#09:

Checks vim installation, creates a `Lab5` directory, and writes a Kubernetes Pod YAML file. Practices basic vim editing commands to create and save configuration files.

```
sana058@sana1:~$ mkdir -p ~/Lab5
sana058@sana1:~$ cd ~/Lab5
sana058@sana1:~/Lab5$ pwd
/home/sana058/Lab5
sana058@sana1:~/Lab5$ _
```



```

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

```

```

"k8s-sample.yaml" [New] 11L, 171B written
sana058@sana1:~/Lab5$ ls
k8s-sample.yaml
sana058@sana1:~/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
sana058@sana1:~/Lab5$

```

TASK#10:

Edits the YAML file to add an annotation under metadata, saves and verifies changes.

Demonstrates temporary edits and quitting vim without saving using :q!.

```

"k8s-sample.yaml" 13L, 204B written
sana058@sana1:~/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
sana058@sana1:~/Lab5$ _

```

```

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_
~

```

```

sana058@sana1:~/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
sana058@sana1:~/Lab5$ _

```

TASK#11:

Practices vim deletion, undo, and navigation commands like dd, u, 1G, and G.

Shows how to efficiently modify and move through text files using command mode operations.

```

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

```

```

apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: nginx-pod
spec:
  containers:
  - name: nginx
    ports:
    - containerPort: 80
  restartPolicy: Always
~

```

```

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

```

```

  annotations:
    lab: lesson11
  name: nginx-pod
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
~
~
~

```

TASK#12:

Uses vim search and substitution commands (/ , n , :%s) to find and replace text.

Practices undoing and exiting without saving, reinforcing text manipulation techniques.

```

~
~
/nginx_

```

```

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

```

```

apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: nginx-pod
  #nginx
  #nginx_
spec:
  containers:
  - name: nginx
    image: nginx:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
~
~

```

```

apiVersion: v1
kind: Pod
metadata:
  annotations:
    lab: lesson11
  name: webapp-pod
  #webapp
  #webapp
spec:
  containers:
  - name: webapp
    image: webapp:1.19
    ports:
    - containerPort: 80
  restartPolicy: Always
~
~

```

EXAM EVALUATION QUESTIONS:

Installation of Docker:

```
sana058@sana1:~$ 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.
The following packages were automatically installed and are no longer required:
  ca-certificates-java default-jre-headless fonts-dejavu-extra java-common libatk-wrapper-java libatk-wrapper-java-jni libgif7 openjdk-21-jre
  openjdk-21-jre-headless
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 5 not upgraded.
sana058@sana1:~$
```

```
sana058@sana1:~$ echo \
> "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg] \
> https://download.docker.com/linux/ubuntu \
> $(lsb_release -cs) stable" | \
> sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
sana058@sana1:~$
```

```
sana058@sana1:~$ sudo apt update
Get:1 https://download.docker.com/linux/ubuntu noble InRelease [48.5 kB]
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Get:3 https://download.docker.com/linux/ubuntu noble/stable amd64 Packages [33.3 kB]
Hit:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:6 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Fetched 81.7 kB in 1s (99.7 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
5 packages can be upgraded. Run 'apt list --upgradable' to see them.
sana058@sana1:~$ 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 packages were automatically installed and are no longer required:
  ca-certificates-java default-jre-headless fonts-dejavu-extra java-common libatk-wrapper-java libatk-wrapper-java-jni libgif7 openjdk-21-jre
  openjdk-21-jre-headless
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  docker-ce-rootless-extras libslirp0 pigz slirp4netns
Suggested packages:
  cgroupfs-mount | cgroup-lite docker-model-plugin
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootless-extras docker-compose-plugin libslirp0 pigz slirp4netns
0 upgraded, 9 newly installed, 0 to remove and 5 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/universe amd64 pigz amd64 2.8-1 [65.6 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble/main amd64 libslirp0 amd64 4.7.0-1ubuntu3 [63.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble/universe amd64 slirp4netns amd64 1.2.1-1build2 [34.9 kB]
Get:5 https://download.docker.com/linux/ubuntu noble/stable amd64 docker-ce-cli amd64 5:28.5.1-1~ubuntu.24.04~noble [16.5 MB]
37% [5 docker-ce-cli 4,456 kB/16.5 MB 27%] _
```

```
sana058@sana1:~$ sudo systemctl start docker
sana058@sana1:~$ sudo systemctl enable docker
Synchronizing state of docker.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable docker
sana058@sana1:~$ _
```

```
sana058@sana1:~$ 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 Thu 2025-10-30 14:22:28 UTC; 1min 37s ago
 TriggeredBy: ● docker.socket
   Docs: https://docs.docker.com
  Main PID: 2793 (dockerd)
    Tasks: 9
   Memory: 21.8M (peak: 22.3M)
      CPU: 362ms
   CGroup: /system.slice/docker.service
           └─2793 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.126880838Z" level=info msg="detected 127.0.0.53 nameserver, assuming systemd-resolved, so using >
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.154993873Z" level=info msg="Creating a containerd client" address=/run/containerd/containerd.sock
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.233265392Z" level=info msg="Loading containers: start."
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.813385938Z" level=info msg="Loading containers: done."
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.833497945Z" level=info msg="Docker daemon" commit=f8215cc containerd-snapshotter=false storage-d>
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.833660475Z" level=info msg="Initializing buildkit"
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.858367830Z" level=info msg="Completed buildkit initialization"
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.865736069Z" level=info msg="Daemon has completed initialization"
Oct 30 14:22:28 sana1 dockerd[2793]: time="2025-10-30T14:22:28.866019617Z" level=info msg="API listen on /run/docker.sock"
Oct 30 14:22:28 sana1 systemd[1]: Started docker.service - Docker Application Container Engine.
lines 1-22/22 (END)
```

```
sana058@sana1:~$ docker --version
Docker version 28.5.1, build e180ab8
sana058@sana1:~$ 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/>

```
sana058@sana1:~$ _
```