

CLOUD COMPUTING

LAB 06

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Task 1 – Switch to root with su - and back to a normal user

Goal: Demonstrate switching to the root account using su - and exiting back to your normal user.

1. Set a root password (Ubuntu root is disabled by default; this enables su - temporarily for the lab):

```
sudo passwd root
```

```
# Enter a temporary root password for the lab
```

- Save screenshot as: task1_set_root_password.png

```
abihanadeem001@abihanadeem:~$ sudo passwd root
[sudo] password for abihanadeem001:
New password:
Retype new password:
passwd: password updated successfully
abihanadeem001@abihanadeem:~$ _
```

2. Switch to root and verify:

```
su -
```

```
whoami
```

```
id
```

- Save screenshot as: task1_su_root.png

```
abihanadeem001@abihanadeem:~$ su -
Password:
root@abihanadeem:~# whoami
root
root@abihanadeem:~# id
uid=0(root) gid=0(root) groups=0(root)
root@abihanadeem:~#
```

3. Switch back to your normal user:

```
exit
```

```
whoami
```

- Save screenshot as: task1_exit_to_user.png

```
root@abihanaadeem:~# exit
logout
abihanaadeem001@abihanaadeem:~$ whoami
abihanaadeem001
abihanaadeem001@abihanaadeem:~$ _
```

Task 2 – Create user tom and verify in passwd/group/shadow

Goal: Create a user named tom, then verify the account in system files.

1. Create user tom (interactive, sets password and home directory):

sudo adduser tom

- Save screenshot as: task2_adduser_tom.png

```
abihanaadeem001@abihanaadeem:~$ sudo adduser tom
info: Adding user `tom' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `tom' (1001) ...
info: Adding new user `tom' (1001) with group `tom (1001)' ...
info: Creating home directory `/home/tom' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for tom
Enter the new value, or press ENTER for the default
      Full Name []:
      Room Number []:
      Work Phone []:
      Home Phone []:
      Other []
Is the information correct? [Y/n] Y
info: Adding new user `tom' to supplemental / extra groups `users' ...
info: Adding user `tom' to group `users' ...
abihanaadeem001@abihanaadeem:~$ _
```

2. Verify tom in system files (view and visually confirm presence):

cat /etc/passwd

- Save screenshot as: task2_verify_passwd.png

```
abihanadeem001@abihanadeem:~$ cat /etc/passwd
cat: /etc/passwd: No such file or directory
abihanadeem001@abihanadeem:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:992:992:systemd Resolver:/:/usr/sbin/nologin
pollinate:x:102:1::/var/cache/pollinate:/bin/false
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uuidd:x:104:105::/run/uuidd:/usr/sbin/nologin
tcpdump:x:105:107::/nonexistent:/usr/sbin/nologin
tss:x:106:108:TPM software stack,,,:/var/lib/tpm:/bin/false
landscape:x:107:109::/var/lib/landscape:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
abihanadeem001:x:1000:1000:Abiha Nadeem:/home/abihanadeem001:/bin/bash
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
lightdm:x:111:112:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:112:114::/nonexistent:/bin/false
avahi:x:113:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:114:119::/var/lib/saned:/usr/sbin/nologin
colord:x:115:120:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
cups-pk-helper:x:116:121:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:121::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1001:,,,:/home/tom:/bin/bash
abihanadeem001@abihanadeem:~$ _
```

cat /etc/group

- Save screenshot as: task2_verify_group.png

```
irc:x:39:
src:x:40:
shadow:x:42:
utmp:x:43:
video:x:44:
sasl:x:45:
plugdev:x:46:abihanadeem001
staff:x:50:
games:x:60:
users:x:100:tom
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:abihanadeem001
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
abihanadeem001:x:1000:
rtkit:x:110:
ssl-cert:x:111:abihanadeem001
lightdm:x:112:
nopasswdlogin:x:113:
whoopsie:x:114:
netdev:x:115:
bluetooth:x:116:
scanner:x:117:saned
avahi:x:118:
saned:x:119:
colord:x:120:
lpadmin:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:
abihanadeem001@abihanadeem:~$
```

```
sudo cat /etc/shadow
```

- Save screenshot as: task2_verify_shadow.png

Notes: /etc/shadow stores password hashes (not plaintext). You must use sudo to read it.

```
abihanadeem001@abihanadeem:~$ sudo cat /etc/shadow
[sudo] password for abihanadeem001:
root:$y$j9T$FQh0q/1d29qaJAr3Lkg60$fktxHix5zEDP977W6JMIfHx3wvfy1Uufq0aC1ybT59t9:20394:0:99999:7:::
daemon:*:20305:0:99999:7:::
bin:*:20305:0:99999:7:::
sys:*:20305:0:99999:7:::
sync:*:20305:0:99999:7:::
games:*:20305:0:99999:7:::
man:*:20305:0:99999:7:::
lp:*:20305:0:99999:7:::
mail:*:20305:0:99999:7:::
news:*:20305:0:99999:7:::
uucp:*:20305:0:99999:7:::
proxy:*:20305:0:99999:7:::
www-data:*:20305:0:99999:7:::
backup:*:20305:0:99999:7:::
list:*:20305:0:99999:7:::
irc:*:20305:0:99999:7:::
_apt:*:20305:0:99999:7:::
nobody:*:20305:0:99999:7:::
systemd-network:*:20305:0:99999:7:::
systemd-timesync:*:20305:0:99999:7:::
dhpcd:!:20305:0:99999:7:::
messagebus:!:20305:0:99999:7:::
systemd-resolve!*:20305:0:99999:7:::
pollinate:!:20305:0:99999:7:::
polkitd:!:20305:0:99999:7:::
syslog:!:20305:0:99999:7:::
uuidd:!:20305:0:99999:7:::
tcpdump:!:20305:0:99999:7:::
tss:!:20305:0:99999:7:::
landscape:!:20305:0:99999:7:::
fwupd-refresh!*:20305:0:99999:7:::
usbmux:!:20357:0:99999:7:::
sshd:!:20357:0:99999:7:::
abihanadeem001:$6$FCv9W/050RcBwAQ1$RqdbVBmdp0M754/VmNuNDtpJiv2eGC1fbLRCxpa.V6KA1r4ppS2EJJrUxKyttMKz7pPlg68KVuX/Ssc.3zBfM0:20357:0:99999:7:::
rtkit!:!20386:0:99999:7:::
dnsmasq:!:20386:0:99999:7:::
lightdm:!:20386:0:99999:7:::
whoopsie:!:20386:0:99999:7:::
avahi:!:20386:0:99999:7:::
named:!:20386:0:99999:7:::
colord:!:20386:0:99999:7:::
cups-pk-helper:!:20386:0:99999:7:::
pulse;!:20386:0:99999:7:::
cups-browsed:!:20386:0:99999:7:::
xdp:!:20386:0:99999:7:::
tom:$y$j9T$6.U83LVLV0uuuZ.eCQ3Ve/$LIPaQmqB9mRGThIGGbyKmd8ZI8la1BfJyEXEJ/LlIm/:20394:0:99999:7:::
abihanadeem001@abihanadeem:~$
```

Task 3 – Create groups; change tom’s primary and secondary groups

Goal: Create groups developer, devops, and designer. Change tom’s primary group and manage secondary groups.

1. Create groups and verify by viewing /etc/group (visually confirm entries exist):

```
sudo groupadd developer
```

```
sudo groupadd devops
```

```
sudo groupadd designer
```

```
cat /etc/group
```

- Save screenshot as: task3_groupadd.png

```
utmp:x:43:
video:x:44:
sasl:x:45:
plugdev:x:46:abihanadeem001
staff:x:50:
games:x:60:
users:x:100:tom
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:abihanadeem001
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uuidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
abihanadeem001:x:1000:
rtkit:x:110:
ssl-cert:x:111:abihanadeem001
lightdm:x:112:
nopasswdlogin:x:113:
whoopsie:x:114:
netdev:x:115:
bluetooth:x:116:
scanner:x:117:saned
avahi:x:118:
saned:x:119:
colord:x:120:
lpadmin:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:
developer:x:1002:
devops:x:1003:
designer:x:1004:
abihanadeem001@abihanadeem:~$
```

2. Change tom's primary group to designer and verify:

sudo usermod -g designer tom

id tom

- Save screenshot as: task3_change_primary_group.png

```
abihanadeem001@abihanadeem:~$ sudo usermod -g designer tom
abihanadeem001@abihanadeem:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users)
abihanadeem001@abihanadeem:~$
```

3. Add secondary groups developer and devops to tom and verify:

sudo usermod -aG developer,devops tom

id tom

groups tom

- Save screenshot as: task3_add_secondary_groups.png

```
abihanadeem001@abihanadeem:~$ sudo usermod -aG developer,devops tom
abihanadeem001@abihanadeem:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users),1002(developer),1003(devops)
abihanadeem001@abihanadeem:~$ groups tom
tom : designer users developer devops
abihanadeem001@abihanadeem:~$ _
```

4. Replace all secondary groups so only tom (user's own group) remains and verify:

sudo usermod -G tom tom

id tom

groups tom

- Save screenshot as: task3_reset_secondary_groups.png

```
abihanadeem001@abihanadeem:~$ sudo usermod -G tom tom
abihanadeem001@abihanadeem:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),1001(tom)
abihanadeem001@abihanadeem:~$ groups tom
tom : designer tom
abihanadeem001@abihanadeem:~$
```

Task 4 – Create/delete users (Jerry, Scooby) and groups (jolly, anime)

Goal: Create users using both adduser and useradd, demonstrate login/password/home directory differences, then delete users/groups.

1. Create users:

```
sudo adduser Jerry
```

```
sudo useradd Scooby
```

- Save screenshot as: task4_add_users.png

```
abihanaadeem001@abihanaadeem:~$ sudo adduser jerry
info: Adding user `jerry' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `jerry' (1005) ...
info: Adding new user `jerry' (1005) with group `jerry (1005)' ...
info: Creating home directory `/home/jerry' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for jerry
Enter the new value, or press ENTER for the default
      Full Name []:
      Room Number []:
      Work Phone []:
      Home Phone []:
      Other []:
Is the information correct? [Y/n] Y
info: Adding new user `jerry' to supplemental / extra groups `users' ...
info: Adding user `jerry' to group `users' ...
abihanaadeem001@abihanaadeem:~$ sudo adduser Scooby
err: Please enter a username matching the regular expression
      configured via the NAME_REGEX configuration variable. Use the
      '--allow-bad-names' option to relax this check or reconfigure
      NAME_REGEX in configuration.
abihanaadeem001@abihanaadeem:~$ sudo adduser scooby
info: Adding user `scooby' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `scooby' (1006) ...
info: Adding new user `scooby' (1006) with group `scooby (1006)' ...
info: Creating home directory `/home/scooby' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for scooby
Enter the new value, or press ENTER for the default
      Full Name []:
      Room Number []:
      Work Phone []:
      Home Phone []:
      Other []:
Is the information correct? [Y/n] Y
info: Adding new user `scooby' to supplemental / extra groups `users' ...
info: Adding user `scooby' to group `users' ...
abihanaadeem001@abihanaadeem:~$ _
```

2. Try to log in as Scooby immediately (expected authentication failure because there is no password yet):

su - Scooby

- Save screenshot as: task4_scooby_su_auth_failure.png

```
sudo: adding user `Scooby' to group `users' ...
abihanadeem001@abihanadeem:~$ su -scooby
Password:
su: failed to execute cooby: No such file or directory
abihanadeem001@abihanadeem:~$ _
```

3. Set a password for Scooby:

sudo passwd Scooby

- Save screenshot as: task4_set_password_scooby.png

```
abihanadeem001@abihanadeem:~$ sudo passwd scooby
New password:
Retype new password:
passwd: password updated successfully
abihanadeem001@abihanadeem:~$ _
```

4. Try logging in as Scooby again (home directory still missing; expect a message such as “No directory, logging in with HOME=/”):

su - Scooby

- Save screenshot as: task4_scooby_su_no_home.png

```
abihanadeem001@abihanadeem:~$ su -scooby
Password:
su: failed to execute cooby: No such file or directory
abihanadeem001@abihanadeem:~$ _
```

5. Show that Scooby’s home directory does not exist yet and what /etc/passwd says:

exit

cat /etc/passwd

ls -ld /home/Scooby

- Save screenshot as: task4_scooby_no_home.png

```
abihanaadeem001@abihanaadeem:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:992:992:systemd Resolver:/:/usr/sbin/nologin
pollinate:x:102:1::/var/cache/pollinate:/bin/false
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uuidd:x:104:105::/run/uuidd:/usr/sbin/nologin
tcpdump:x:105:107::/nonexistent:/usr/sbin/nologin
tss:x:106:108:TPM software stack,,,:/var/lib/tpm:/bin/false
landscape:x:107:109::/var/lib/landscape:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
abihanaadeem001:x:1000:1000:Abiha Nadeem:/home/abihanaadeem001:/bin/bash
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
lightdm:x:111:112:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:112:114::/nonexistent:/bin/false
avahi:x:113:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:114:119::/var/lib/saned:/usr/sbin/nologin
colord:x:115:120:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
cups-pk-helper:x:116:121:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:121::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:,,,,:/home/tom:/bin/bash
jerry:x:1005:1005:,,,,:/home/jerry:/bin/bash
scooby:x:1006:1006:,,,,:/home/scooby:/bin/bash
abihanaadeem001@abihanaadeem:~$ _
```

```
abihanaadeem001@abihanaadeem:~$ ls -ld /home/scooby
drwxr-x--- 2 scooby scooby 4096 Nov  2 13:25 /home/scooby
abihanaadeem001@abihanaadeem:~$ _
```

6. Manually create Scooby's home directory and set proper ownership and permissions:

```
sudo mkdir -p /home/Scooby
```

```
sudo chown Scooby:Scooby /home/Scooby
```

```
sudo chmod 750 /home/Scooby
```

```
ls -ld /home/Scooby
```

- Save screenshot as: task4_scooby_create_home.png

```
abihanaadeem001@abihanaadeem:~$ sudo mkdir -p /home/scooby
[sudo] password for abihanaadeem001:
abihanaadeem001@abihanaadeem:~$ sudo chown scooby:scooby /home/scooby
abihanaadeem001@abihanaadeem:~$ sudo chmod 750 /home/scooby
abihanaadeem001@abihanaadeem:~$ ls -ld /home/scooby
drwxr-x--- 2 scooby scooby 4096 Nov  2 13:25 /home/scooby
abihanaadeem001@abihanaadeem:~$
```

7. Log in as Scooby again and verify you land in the correct home directory:

```
su - Scooby
```

```
pwd
```

```
ls -la
```

- Save screenshot as: task4_scooby_login_success.png

```
abihanaadeem001@abihanaadeem:~$ su - scooby
Password:
scooby@abihanaadeem:~$ ls -la
total 28
drwxr-x--- 2 scooby scooby 4096 Nov  2 13:25 .
drwxr-xr-x  6 root   root   4096 Nov  2 13:25 ..
-rw-r--r--  1 scooby scooby  220 Nov  2 13:25 .bash_logout
-rw-r--r--  1 scooby scooby 3771 Nov  2 13:25 .bashrc
-rw-r--r--  1 scooby scooby 5290 Nov  2 13:25 .face
lrwxrwxrwx  1 scooby scooby     5 Nov  2 13:25 .face.icon -> .face
-rw-r--r--  1 scooby scooby  807 Nov  2 13:25 .profile
scooby@abihanaadeem:~$
```

8. Verify users in system files and observe shell of Scooby:

```
exit
```

```
cat /etc/passwd
```

- Save screenshot as: task4_verify_users.png

```
abihanadeem001@abihanadeem:~$ cat /etc/passwd
root:x:0:0:root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management://:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization://:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:992:992:systemd Resolver://:/usr/sbin/nologin
pollinate:x:102:1::/var/cache/pollinate:/bin/false
polkit0d:x:991:991:User for polkit0d:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uuidd:x:104:105::/run/uuidd:/usr/sbin/nologin
tcpdump:x:105:107::/nonexistent:/usr/sbin/nologin
tss:x:106:108:TPM software stack,,,:/var/lib/tpm:/bin/false
landscape:x:107:109::/var/lib/landscape:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
abihanadeem001:x:1000:1000:Abiha Nadeem:/home/abihanadeem001:/bin/bash
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
lightdm:x:111:112:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:112:114::/nonexistent:/bin/false
avahi:x:113:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:114:119::/var/lib/saned:/usr/sbin/nologin
colord:x:115:120:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
cups-pk-helper:x:116:121:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:121::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:,,,:/home/tom:/bin/bash
jerry:x:1005:1005:,,,:/home/jerry:/bin/bash
scooby:x:1006:1006:,,,:/home/scooby:/bin/bash
abihanadeem001@abihanadeem:~$ _
```

9. Change the shell from /bin/sh to /bin/bash

sudo usermod -s /bin/bash Scooby

su - Scooby

- Save screenshot as: task4_shell_switching.png

```
abihanadeem001@abihanadeem:~$ sudo usermod -s /bin/bash scooby
usermod: no changes
abihanadeem001@abihanadeem:~$ su - scooby
Password:
scooby@abihanadeem:~$
```

10. Create groups:

```
sudo addgroup jolly
```

```
sudo groupadd anime
```

- Save screenshot as: task4_add_groups.png

```
abihanadeem001@abihanadeem:~$ sudo addgroup jolly
info: Selecting GID from range 1000 to 59999 ...
info: Adding group `jolly' (GID 1007) ...
abihanadeem001@abihanadeem:~$ sudo groupadd anime
abihanadeem001@abihanadeem:~$ _
```

10. Verify groups:

```
cat /etc/group
```

- Save screenshot as: task4_verify_groups.png

```
staff:x:50:
games:x:60:
users:x:100:jerry,scooby
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxde:x:101:abihanadeem001
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uuidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
abihanadeem001:x:1000:
rtkit:x:110:
ssl-cert:x:111:abihanadeem001
lightdm:x:112:
nopasswdlogin:x:113:
whoopsie:x:114:
netdev:x:115:
bluetooth:x:116:
scanner:x:117:saned
avahi:x:118:
saned:x:119:
colord:x:120:
lpadmin:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
jerry:x:1005:
scooby:x:1006:
jolly:x:1007:
anime:x:1008:
abihanadeem001@abihanadeem:~$
```

11. Delete groups and users:

```
sudo delgroup jolly
```

```
sudo groupdel anime
```

```
cat /etc/group
```

```
sasl:x:45:  
plugdev:x:46:abihanadeem001  
staff:x:50:  
games:x:60:  
users:x:100:jerry,scooby  
nogroup:x:65534:  
systemd-journal:x:999:  
systemd-network:x:998:  
systemd-timesync:x:997:  
input:x:996:  
sgx:x:995:  
kvm:x:994:  
render:x:993:  
lxd:x:101:abihanadeem001  
messagebus:x:102:  
systemd-resolve:x:992:  
_ssh:x:103:  
polkitd:x:991:  
crontab:x:990:  
syslog:x:104:  
uuidd:x:105:  
rdma:x:106:  
tcpdump:x:107:  
tss:x:108:  
landscape:x:109:  
fwupd-refresh:x:989:  
abihanadeem001:x:1000:  
rtkit:x:110:  
ssl-cert:x:111:abihanadeem001  
lightdm:x:112:  
nopasswdlogin:x:113:  
whoopsie:x:114:  
netdev:x:115:  
bluetooth:x:116:  
scanner:x:117:saned  
avahi:x:118:  
saned:x:119:  
colord:x:120:  
lpadmin:x:121:  
pulse:x:122:  
pulse-access:x:123:  
xrdp:x:124:  
docker:x:988:  
tom:x:1001:tom  
developer:x:1002:  
devops:x:1003:  
designer:x:1004:  
jerry:x:1005:  
scooby:x:1006:  
abihanadeem001@abihanadeem:~$
```

```
sudo deluser --remove-home Jerry
```

```
sudo userdel -r Scooby
```

```
cat /etc/passwd
```

- Save screenshots as: task4_delete_groups.png, task4_delete_users.png

```
abihanadeem001@abihanadeem:~$ sudo userdel -r scooby
userdel: scooby mail spool (/var/mail/scooby) not found
abihanadeem001@abihanadeem:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:992:992:systemd Resolver:/:/usr/sbin/nologin
pollinate:x:102:1::/var/cache/pollinate:/bin/false
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uuidd:x:104:105::/run/uuidd:/usr/sbin/nologin
tcpdump:x:105:107::/nonexistent:/usr/sbin/nologin
tss:x:106:108:TPM software stack,,,:/var/lib/tpm:/bin/false
landscape:x:107:109::/var/lib/landscape:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
abihanadeem001:x:1000:1000:Abiha Nadeem:/home/abihanadeem001:/bin/bash
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
lightdm:x:111:112:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:112:114::/nonexistent:/bin/false
avahi:x:113:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:114:119::/var/lib/saned:/usr/sbin/nologin
colord:x:115:120:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
cups-pk-helper:x:116:121:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:121::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004,,,:/home/tom:/bin/bash
abihanadeem001@abihanadeem:~$ _
```

Task 5 – Create user Student; create files; set owner/group; identify file types

1. Create Student:

sudo adduser Student

- Save screenshot as: task5_create_student.png

```
abihanadeem001@abihanadeem:~$ sudo adduser student
[sudo] password for abihanadeem001:
info: Adding user `student' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `student' (1005) ...
info: Adding new user `student' (1005) with group `student (1005)' ...
info: Creating home directory `/home/student' ...
info: Copying files from `/etc/skel' ...

New password:
Retype new password:
passwd: password updated successfully
Changing the user information for student
Enter the new value, or press ENTER for the default
      Full Name []:
      Room Number []:
      Work Phone []:
      Home Phone []:
      Other []:

Is the information correct? [Y/n] Y
info: Adding new user `student' to supplemental / extra groups `users' ...
info: Adding user `student' to group `users' ...
abihanadeem001@abihanadeem:~$
```

2. Switch to Student and create files:

su - Student

touch file1

mkdir -p dir1

touch dir1/file2

ls -l

- Save screenshot as: task5_create_files.png

```
abihanadeem001@abihanadeem:~$ su - student
Password:
student@abihanadeem:~$ touch file1
student@abihanadeem:~$ mkdir -p dir1
student@abihanadeem:~$ touch dir1/file2
student@abihanadeem:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  2 15:29 dir1
-rw-rw-r-- 1 student student     0 Nov  2 15:28 file1
student@abihanadeem:~$
```

3. Change owner then group for file1 (separate commands):

```
sudo chown tom file1
```

```
ls -l file1
```

```
abihanadeem001@abihanadeem:~$ su - student  
Password:  
student@abihanadeem:~$ sudo chown tom file1  
[sudo] password for student:  
student is not in the sudoers file.  
student@abihanadeem:~$ ls -l file1  
-rw-rw-r-- 1 student student 0 Nov  2 15:28 file1  
student@abihanadeem:~$ _
```

```
sudo chgrp devops file1
```

```
ls -l file1
```

```
student@abihanadeem:~$ sudo chgrp devops file1  
[sudo] password for student:  
student is not in the sudoers file.  
student@abihanadeem:~$ ls -l file1  
-rw-rw-r-- 1 student student 0 Nov  2 15:28 file1  
student@abihanadeem:~$
```

- Save screenshots as: task5_chown_file1.png, task5_chgrp_file1.png

4. Identify files/directories and show /dev/null:

```
ls -l
```

```
ls -l dir1
```

```
ls -l /dev/null
```

```
file file1 dir1 /dev/null
```

- Save screenshot as: task5_file_types.png

```
student@abihanadeem:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  2 15:29 dir1
-rw-rw-r-- 1 student student     0 Nov  2 15:28 file1
student@abihanadeem:~$ ls -l dir1
total 0
-rw-rw-r-- 1 student student 0 Nov  2 15:29 file2
student@abihanadeem:~$ ls -l /dev/null
crw-rw-rw- 1 root  root 1, 3 Nov  2 11:48 /dev/null
student@abihanadeem:~$ file file1 dir1 /dev/null
file1:      empty
dir1:      directory
/dev/null: character special (1/3)
student@abihanadeem:~$ _
```

5. Exit Student:

exit

- Save screenshot as: task5_exit_student.png

```
abihanadeem001@abihanadeem:~$ _
```

Task 6 – Change permissions using symbolic mode

Target file: ~/file1 (run these as the Student user)

1. Ensure Student and file present:

su - Student

cd ~

ls -l file1

- Save screenshot as: task6_su_student.png

```
abihanadeem001@abihanadeem:~$ su - student
Password:
student@abihanadeem:~$ cd ~
student@abihanadeem:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$ _
```

2. Remove all permissions:

```
chmod -rwx file1
```

```
ls -l file1
```

- Save screenshot as: task6_chmod_remove_rwx.png

```
student@abihanadeem:~$ chmod -rwx file1
student@abihanadeem:~$ ls -l file1
----- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$ _
```

3. Add read to all:

```
chmod +r file1
```

```
ls -l file1
```

- Save screenshot as: task6_chmod_add_r.png

```
student@abihanadeem:~$ chmod +r file1
student@abihanadeem:~$ ls -l file1
-r--r--r-- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

4. Add execute to user:

```
chmod u+x file1
```

```
ls -l file1
```

- Save screenshot as: task6_chmod_u_plus_x.png

```
student@abihanadeem:~$ chmod u+x file1
student@abihanadeem:~$ ls -l file1
-rwxr--r-- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

5. Add write to user and group:

```
chmod ug+w file1
```

```
ls -l file1
```

- Save screenshot as: task6_chmod_ug_plus_w.png

```
student@abihanadeem:~$ chmod ug+w file1
student@abihanadeem:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

6. Remove all permissions (explicit):

```
chmod ugo-rwx file1
```

```
ls -l file1
```

- Save screenshot as: task6_chmod_ugo_minus_rwx.png

```
student@abihanadeem:~$ chmod ugo+rwx file1
student@abihanadeem:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$ _
```

Task 7 – Change permissions using “set” symbolic form (u= g= o=)

Ensure you are Student:

```
su - Student
```

```
cd ~
```

```
ls -l file1
```

- Save screenshot as: task7_student_context.png

```
student@abihanadeem:~$ su - student
Password:
student@abihanadeem:~$ cd ~
student@abihanadeem:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$ _
```

1. Set all to rwx:

```
chmod u=rwx,g=rwx,o=rwx file1
```

```
ls -l file1
```

- Save screenshot as: task7_chmod_set_all_rwx.png

```
student@abihanadeem:~$ chmod u=rwx,g=rwx,o=rwx file1
student@abihanadeem:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

2. Remove execute from group and others:

```
chmod g=rw,o=rw file1
```

```
ls -l file1
```

- Save screenshot as: task7_remove_exec_go.png

```
student@abihanadeem:~$ chmod g=rw,o=rw file1
student@abihanadeem:~$ ls -l file1
-rwxrw-rw- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

3. Remove all permissions:

```
chmod u=,g=,o= file1
```

```
ls -l file1
```

- Save screenshot as: task7_remove_all_perms.png

```
student@abihanadeem:~$ chmod u=,g=,o= file1
student@abihanadeem:~$ ls -l file1
----- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$ _
```

Task 8 – Change permissions using numeric (octal) mode

Ensure you are Student:

su - Student

cd ~

ls -l file1

- Save screenshot as: task8_student_context.png

```
student@abihanadeem:~$ su - student
Password:
student@abihanadeem:~$ cd ~
student@abihanadeem:~$ ls -l file1
----- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

Run each command and capture screenshot after each ls:

1.

chmod 777 file1

ls -l file1

- task8_chmod_777.png

```
student@abihanadeem:~$ chmod 777 file1
student@abihanadeem:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

2.

chmod 700 file1

ls -l file1

- task8_chmod_700.png

```
student@abihanadeem:~$ chmod 700 file1
student@abihanadeem:~$ ls -l file1
-rwx----- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

3.

```
chmod 744 file1
```

```
ls -l file1
```

- task8_chmod_744.png

```
student@abihanadeem:~$ chmod 744 file1
student@abihanadeem:~$ ls -l file1
-rwxr--r-- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

4.

```
chmod 640 file1
```

```
ls -l file1
```

- task8_chmod_640.png

```
student@abihanadeem:~$ chmod 640 file1
student@abihanadeem:~$ ls -l file1
-rw-r----- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

5.

```
chmod 664 file1
```

```
ls -l file1
```

- task8_chmod_664.png

```
student@abihanadeem:~$ chmod 664 file1
student@abihanadeem:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  2 15:28 file1
student@abihanadeem:~$
```

6.

```
chmod 775 file1
```

```
ls -l file1
```

- task8_chmod_775.png

```

student@abihanaadeem:~$ chmod 775 file1
student@abihanaadeem:~$ ls -l file1
-rwxrwxr-x 1 student student 0 Nov  2 15:28 file1
student@abihanaadeem:~$ _

```

7.

chmod 750 file1

ls -l file1

- task8_chmod_750.png

```

student@abihanaadeem:~$ chmod 750 file1
student@abihanaadeem:~$ ls -l file1
-rwxr-x--- 1 student student 0 Nov  2 15:28 file1
student@abihanaadeem:~$ _

```

Task 9 – Practice pipes, pagers, grep, and redirects with /var/log/syslog

1. less:

sudo cat /var/log/syslog | less

quit q

- task9_grep_less.png

```

2025-11-02T11:48:05.260757+00:00 abihanaadeem systemd[1]: rsyslog.service: Sent signal SIGHUP to main process 1287 (rsyslogd) on client request.
2025-11-02T11:48:06.260661+00:00 abihanaadeem rsyslogd: [origin software="rsyslog" swVersion="6.2312.8" x-pid="1287" x-info="https://www.rsyslog.com"] rsyslog
  over HUP...
2025-11-02T11:48:05.275212+00:00 abihanaadeem systemd[1]: Finished setvtrgb.service - Set console scheme.
2025-11-02T11:48:05.297759+00:00 abihanaadeem systemd[1]: Created slice system-getty.slice - Slice /system/getty.
2025-11-02T11:48:05.300256+00:00 abihanaadeem xrpd[1424]: Could not start log
2025-11-02T11:48:05.300394+00:00 abihanaadeem xrpd[1424]: Could not start log
2025-11-02T11:48:05.300453+00:00 abihanaadeem xrpd[1424]: error opening log file [The log is not properly started]. quitting.
2025-11-02T11:48:05.331179+00:00 abihanaadeem systemd[1]: Started getty@tty1.service - Gettys on tty1.
2025-11-02T11:48:05.331320+00:00 abihanaadeem systemd[1]: Reached target getty.target - Login Prompts.
2025-11-02T11:48:05.362256+00:00 abihanaadeem systemd[1]: xrpd.service: Control process exited, code=exited, status=1/FAILURE
2025-11-02T11:48:05.362352+00:00 abihanaadeem systemd[1]: xrpd.service: Failed with result 'exit-code'.
2025-11-02T11:48:05.365111+00:00 abihanaadeem systemd[1]: Stopped xrpd.service - Xrdp session manager...
2025-11-02T11:48:05.391028+00:00 abihanaadeem systemd[1]: Stopping wvdpm-session.service - wvdpm session manager...
2025-11-02T11:48:05.391371+00:00 abihanaadeem systemd[1]: logrotate.service: Deactivated successfully.
2025-11-02T11:48:05.391454+00:00 abihanaadeem systemd[1]: Finished logrotate.service - Rotate log files.
2025-11-02T11:48:05.443600+00:00 abihanaadeem xrpd[1430]: sesman is not running (pid file not found - /var/run/xrdp/xrdp-sesman.pid)
2025-11-02T11:48:05.443605+00:00 abihanaadeem systemd[1]: xrdp-sesman.service: Control process exited, codesexited, status=1/FAILURE
2025-11-02T11:48:05.447761+00:00 abihanaadeem xrdp[1441]: [INFO] sesman.main.loop: sesman asked to terminate
2025-11-02T11:48:05.474624+00:00 abihanaadeem systemd[1]: xrdp-sesman.service: Failed with result 'exit-code'.
2025-11-02T11:48:05.477705+00:00 abihanaadeem systemd[1]: Stopped xrdp-sesman.service - xrdp session manager.
2025-11-02T11:48:05.482350+00:00 abihanaadeem snapd[1140]: Finished apport.service - Automatic crash report generation.
2025-11-02T11:48:05.482350+00:00 abihanaadeem snapd[1140]: overlord-greeter.service - Activated state-change...
2025-11-02T11:48:05.812511+00:00 abihanaadeem snapd[1140]: overlord-greeter.service - Required by: logind
2025-11-02T11:48:05.839672+00:00 abihanaadeem snapd[1140]: logind.go[276]: started snapd[2,72 (series 16; classic) ubuntu/24.04 (amd64) linux/6.8.0-86-generic.
2025-11-02T11:48:05.874469+00:00 abihanaadeem Kernel: loop3: detected capacity change from 0 to 8
2025-11-02T11:48:05.891924+00:00 abihanaadeem snapd[1140]: daemon.go[370]: adjusting startup timeout by 45s (pessimistic estimate of 30s plus 5s per snap)
2025-11-02T11:48:05.894934+00:00 abihanaadeem systemd[1]: tmo-sysecheck:2xmountpoint\x2d1811089768.mount: Deactivated successfully.
2025-11-02T11:48:05.914469+00:00 abihanaadeem snapd[1140]: backends.go[70]: AppArmor status: apparmor is enabled and all features are available (using snap provided apparmor_parser)
2025-11-02T11:48:06.134095+00:00 abihanaadeem snapd[1140]: backend.go[141]: delegating reload of snap-confine profiles to system snap security profiles setup
2025-11-02T11:48:06.166876+00:00 abihanaadeem systemd[1]: Started snapd.service - Snap Daemon.
2025-11-02T11:48:06.182859+00:00 abihanaadeem dbus-daemon[1086]: [system] Activating via systemd: service name='org.freedesktop.timedate1' unit='dbus-org.freedesktop.timedate1.service' requested by :1.20 (uid=0 pid=1144 comm="/snap/snapd/current/usr/lib/snapd/snapd" label="unconfined")
2025-11-02T11:48:06.193636+00:00 abihanaadeem systemd[1]: Finished snapd.service - Wait until snapd is fully seeded.
2025-11-02T11:48:06.193659+00:00 abihanaadeem systemd[1]: snapd.autoimport.service - Auto Import assertions from block devices was skipped because no trigger condition checks were met.
2025-11-02T11:48:06.229318+00:00 abihanaadeem systemd[1]: Starting system-timedated.service - Time & Date Service...
2025-11-02T11:48:06.256091+00:00 abihanaadeem containerd[1394]: time="2025-11-02T11:48:06.2" level=warning msg="containerd config version '1' has been deprecated and will be converted on each startup in containerd v2.0, use 'containerd config migrate' after upgrading to containerd 2.0 to avoid conversion on startup"
2025-11-02T11:48:06.258701+00:00 abihanaadeem containerd[1394]: time="2025-11-02T11:48:06.2585109912" level=info msg="starting containerd" revision=b98a3aaece656320842a23f4a39233f4ca979766 version=v1.7.28
2025-11-02T11:48:06.312254+00:00 abihanaadeem dbus-daemon[1086]: [system] Successfully activated service 'org.freedesktop.timedate1'
2025-11-02T11:48:06.312508+00:00 abihanaadeem containerd[1394]: time="2025-11-02T11:48:06.3125080092" level=info msg="io.containerd.snapshotterv1 type=io.containerd.snapshotterv1"
2025-11-02T11:48:06.313185+00:00 abihanaadeem containerd[1394]: time="2025-11-02T11:48:06.3243860020" level=info msg="skip loading plugin \"io.containerd.snapshotterv1.auts\"..." errors="aufs is not supported (modprobe aufs failed: exit status 1 ;modprobe: FATAL: Module aufs not found in directory /lib/modules/6.8.0-86-generic\\n\")"; skip plugin" type=io.containerd.snapshotterv1
```

```

## 2. more:

```
sudo cat /var/log/syslog | more
```

- task9\_grep\_more.png

```
2025-11-02T11:48:05.269757+00:00 abihanadeem systemd[1]: rsyslog.service: Sent signal SIGHUP to main process 1287 (rsyslogd) on client request.
2025-11-02T11:48:05.266061+00:00 abihanadeem rsyslogd: [origin software="rsyslogd" swVersion="0.2312.6" x-pid="1287" x-info="https://www.rsyslog.com"] rsyslogd was HUPed
2025-11-02T11:48:05.275212+00:00 abihanadeem systemd[1]: Finished setvtrgb.service - Set console scheme.
2025-11-02T11:48:05.297756+00:00 abihanadeem systemd[1]: Created slice system-getty.slice - Slice /system/getty.
2025-11-02T11:48:05.300296+00:00 abihanadeem xrdp[1424]: Could not start log.
2025-11-02T11:48:05.300354+00:00 abihanadeem xrdp[1424]: Could not start log.
2025-11-02T11:48:05.300453+00:00 abihanadeem xrdp[1424]: error opening log file [The log is not properly started]. quitting.
2025-11-02T11:48:05.331379+00:00 abihanadeem systemd[1]: Started getty@tty1.service - Getty on tty1.
2025-11-02T11:48:05.331520+00:00 abihanadeem systemd[1]: Reached target getty.target - Login Prompts.
2025-11-02T11:48:05.362256+00:00 abihanadeem systemd[1]: xrdp.service: Control process exited, code=exited, status=1/FAILURE
2025-11-02T11:48:05.362532+00:00 abihanadeem systemd[1]: xrdp.service: Failed with result 'exit-code'.
2025-11-02T11:48:05.365176+00:00 abihanadeem systemd[1]: Started to start xrdp.service - xrdp daemon.
2025-11-02T11:48:05.391028+00:00 abihanadeem systemd[1]: Stopping xrdp-sesman.service - xrdp session manager...
2025-11-02T11:48:05.391371+00:00 abihanadeem systemd[1]: logrotate.service: Deactivated successfully.
2025-11-02T11:48:05.391454+00:00 abihanadeem systemd[1]: Finished logrotate.service - Rotate log files.
2025-11-02T11:48:05.443690+00:00 abihanadeem xrdp[1433]: sesman is not running (pid file not found - /var/run/xrdp/xrdp-sesman.pid)
2025-11-02T11:48:05.445745+00:00 abihanadeem systemd[1]: xrdp-sesman.service: Control process exited, code=exited, status=1/FAILURE
2025-11-02T11:48:05.447761+00:00 abihanadeem xrdp[1401]: sesman failed to terminate
2025-11-02T11:48:05.474624+00:00 abihanadeem systemd[1]: xrdp-sesman.service: Failed with result 'exit-code'.
2025-11-02T11:48:05.477705+00:00 abihanadeem systemd[1]: Stopped xrdp-sesman.service - xrdp session manager.
2025-11-02T11:48:05.790099+00:00 abihanadeem systemd[1]: Finished apport.service - automatic crash report generation.
2025-11-02T11:48:05.812354+00:00 abihanadeem snapd[1144]: overlord.go:288: Acquiring state lock file
2025-11-02T11:48:05.812511+00:00 abihanadeem snapd[1144]: overlord.go:293: Acquired state lock file
2025-11-02T11:48:05.839672+00:00 abihanadeem snapd[1144]: daemon.go:276: started snapd/1.72 (series 16; classic) ubuntu/24.04 (amd64) linux/6.8.0-66-generic.
2025-11-02T11:48:05.874460+00:00 abihanadeem kernel: loop3: detected capacity change from 0 to 8
2025-11-02T11:48:05.891924+00:00 abihanadeem snapd[1144]: daemon.go:370: adjusting startup timeout by 45s (pessimistic estimate of 30s plus 5s per snap)
2025-11-02T11:48:05.894934+00:00 abihanadeem systemd[1]: tmq-suscheck@2dmountpoint@2d18110089768.mount: Deactivated successfully.
2025-11-02T11:48:05.914463+00:00 abihanadeem snapd[1144]: backends.go:70: AppArmor status: apparmor is enabled and all features are available (using snap provi
der apparmor_parser)
2025-11-02T11:48:05.914463+00:00 abihanadeem snapd[1144]: backend.go:141: delegating reload of snap-confine profiles to system snap security profiles setup
2025-11-02T11:48:05.916687+00:00 abihanadeem systemd[1]: Started snapd.service - Snap Daemon.
2025-11-02T11:48:05.918285+00:00 abihanadeem dbus-daemon[1086]: [system] Activating via systemd: service name='org.freedesktop.timedate1' unit='dbus-org.freedes
ktop.timedate1.service' requested by '1:29' (uid=0 pid=1144 comm="/snap/snapd/current/usr/lib/snapd/snapd" label='unconfined')
2025-11-02T11:48:05.918359+00:00 abihanadeem systemd[1]: Finished snapd.seeded.service - Wait until snapd is fully seeded.
2025-11-02T11:48:05.918359+00:00 abihanadeem systemd[1]: snapd.autoimport.service - Auto Import assertions from block devices was skipped because no trigger con
dition checks were met.
2025-11-02T11:48:05.922938+00:00 abihanadeem systemd[1]: Starting systemd-timedated.service - Time & Date Service...
2025-11-02T11:48:05.925591+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05z" level=warning msg="containerd config version `1` has been deprecated
and will be converted on each startup in containerd v2.0, use containerd config migrate after upgrading to containerd 2.0 to avoid conversion on startup"
2025-11-02T11:48:05.925701+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.925701+00:00" level=info msg="starting containerd" revision=b98a3aaece6563
202402293f4a392a3f46a79766 version=v1.7.28
2025-11-02T11:48:05.931225+00:00 abihanadeem dbus-daemon[1086]: [system] Successfully activated service 'org.freedesktop.timedate1'
2025-11-02T11:48:05.931225+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.931225+00:00" level=info msg="loading plugin \"io.containerd.snapsho
tter.v1.aufs\"... type=io.containerd.snapshotter.v1
2025-11-02T11:48:05.931305+00:00 abihanadeem systemd[1]: Started systemd-timedated.service - Time & Date Service.
2025-11-02T11:48:05.932477+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.932477+00:00" level=info msg="skip loading plugin \"io.containerd.snapsho
tter.v1.aufs\"... error='aufs is not supported (modprobe aufs failed: exit status 1 \\"modprobe: Module aufs not found in directory /lib/modules/6.8.0-66
-generic\\n\")': skip plugin" type=io.containerd.snapshotter.v1
--More--
```

## 3. grep failures/errors:

```
sudo grep -E 'fail|error' /var/log/syslog | head
```

- task9\_grep\_head.png

```
abihanadeem@01:~$ sudo grep -E 'fail|error' /var/log/syslog | head
2025-11-02T11:48:05.300453+00:00 abihanadeem xrdp[1424]: error opening log file [The log is not properly started]. quitting.
2025-11-02T11:48:05.324775+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05z" level=info msg="skip loading plugin \"io.containerd.snapsho
tter.v1.aufs\"... error='aufs is not supported (modprobe aufs failed: exit status 1 \\"modprobe: Module aufs not found in directory /lib/modules/6.8.0-66
-generic\\n\")': skip plugin" type=io.containerd.snapshotter.v1
2025-11-02T11:48:05.331156+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.331156+00:00" level=info msg="skip loading plugin \"io.containerd.snapsho
tter.v1.blockfile\"... error='no scratch file generator: skip plugin" type=io.containerd.snapshotter.v1
2025-11-02T11:48:05.333650+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.333650+00:00" level=info msg="skip loading plugin \"io.containerd.snapsho
tter.v1.btrfs\"... error='path /var/lib/containerd/io.containerd/snapshotter.v1.btrfs must be a btrfs filesystem to be used with the btrfs snapshotter: skip plugin" ty
pe=io.containerd.snapshotter.v1
2025-11-02T11:48:05.367102+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.367102+00:00" level=info msg="skip loading plugin \"io.containerd.tracing
.processor.v1.oflop\"... error='skip plugin: tracing endpoint not configured' type=io.containerd.tracing.processor.v1
2025-11-02T11:48:05.367202+00:00 abihanadeem containerd[1394]: time="2025-11-02T11:48:05.367202+00:00" level=info msg="skip loading plugin \"io.containerd.interna
l.v1.tracing\"... error='skip plugin: tracing endpoint not configured' type=io.containerd.internal.v1
2025-11-02T11:48:05.367202+00:00 abihanadeem dockerd[1521]: time="2025-11-02T11:48:05.367202+00:00" level=info msg="CDI directory does not exist, skipping: failed
to monitor for changes: no such file or directory" dir=/var/run/cdi
2025-11-02T11:48:05.239778+00:00 abihanadeem dockerd[1521]: time="2025-11-02T11:48:05.239778+00:00" level=info msg="CDI directory does not exist, skipping: failed
to monitor for changes: no such file or directory" dir=/etc/cdi
abihanadeem@01:~$
```

## 4. redirect:

```
sudo grep -i systemd /var/log/syslog > ~/syslog_systemd.txt
```

- task9\_redirect\_overwrite.png

```
abihanaadeem001@abihanaadeem:~$ sudo grep -i systemd /var/log/syslog > ~/syslog_systemd.txt
abihanaadeem001@abihanaadeem:~$
```

append:

```
sudo grep -i network /var/log/syslog >> ~/syslog_systemd.txt
```

```
cat ~/syslog_systemd.txt
```

- task9\_redirect\_append.png

```
2025-11-02T15:20:35.396538+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T15:20:36.397955+00:00 abihanaadeem systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-02T15:30:26.410273+00:00 abihanaadeem systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-02T15:30:26.416277+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T15:30:26.416574+00:00 abihanaadeem systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-02T15:40:46.371643+00:00 abihanaadeem systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-02T15:40:46.377421+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T15:40:46.377664+00:00 abihanaadeem systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-02T15:42.542159+00:00 abihanaadeem systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-02T15:42.552980+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T16:00:01.372576+00:00 abihanaadeem systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-02T16:00:01.380634+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T16:00:01.380993+00:00 abihanaadeem systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-02T16:10:46.389158+00:00 abihanaadeem systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-02T16:10:46.395433+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T16:10:46.395646+00:00 abihanaadeem systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-02T16:20:26.371178+00:00 abihanaadeem systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-11-02T16:20:26.381518+00:00 abihanaadeem systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-11-02T16:20:26.382179+00:00 abihanaadeem systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-11-02T16:49:48.93.481432+00:00 abihanaadeem NetworkManager[1176]: <Info> [1762084089.4797] manager: (docker0): new Bridge device (/org/freedesktop/NetworkManager/Devices/3).
2025-11-02T11:49:09.487644+00:00 abihanaadeem systemd-timesyncd[687]: Network configuration changed, trying to establish connection.
2025-11-02T11:49:09.500137+00:00 abihanaadeem systemd-networkd[651]: docker0: Link UP
2025-11-02T11:49:12.931239+00:00 abihanaadeem systemd-timesyncd[687]: Network configuration changed, trying to establish connection.
2025-11-02T11:50:43.884950+00:00 abihanaadeem systemd[1]: NetworkManager-dispatcher.service: Deactivated successfully.
2025-11-02T12:36:31.984050+00:00 abihanaadeem systemd-networkd[651]: Listening on dirmngr.socket - GnuPG network certificate management daemon.
2025-11-02T12:36:31.984171+00:00 abihanaadeem systemd-networkd[651]: ens33: Lost carrier
2025-11-02T12:36:32.011938+00:00 abihanaadeem systemd-networkd[651]: ens33: DHCP lease lost
2025-11-02T12:36:32.158138+00:00 abihanaadeem systemd-timesyncd[687]: No network connectivity, watching for changes.
2025-11-02T12:36:37.910540+00:00 abihanaadeem systemd-networkd[651]: ens33: Gained carrier
2025-11-02T12:36:37.910907+00:00 abihanaadeem NetworkManager[1176]: <Info> [1762086597.8780] device (ens33): carrier: link connected
2025-11-02T12:36:37.939693+00:00 abihanaadeem systemd-timesyncd[687]: Network configuration changed, trying to establish connection.
2025-11-02T12:36:37.950619+00:00 abihanaadeem systemd-networkd[651]: ens33: DHCPv4 address 192.168.174.141/24, gateway 192.168.174.2 acquired from 192.168.174.25
4
2025-11-02T12:36:37.992385+00:00 abihanaadeem systemd-timesyncd[687]: Network configuration changed, trying to establish connection.
2025-11-02T13:31:19.764095+00:00 abihanaadeem systemd[1]: Closed dirmngr.socket - GnuPG network certificate management daemon.
2025-11-02T13:31:28.217268+00:00 abihanaadeem systemd[2639]: Listening on dirmngr.socket - GnuPG network certificate management daemon.
2025-11-02T15:07:11.052326+00:00 abihanaadeem systemd-networkd[651]: ens33: Lost carrier
2025-11-02T15:07:11.052580+00:00 abihanaadeem systemd-networkd[651]: ens33: DHCP lease lost
2025-11-02T15:07:11.225751+00:00 abihanaadeem systemd-timesyncd[687]: No network connectivity, watching for changes.
2025-11-02T15:07:11.933649+00:00 abihanaadeem NetworkManager[1176]: <Info> [1762095636.9350] device (ens33): carrier: link connected
2025-11-02T15:07:16.936409+00:00 abihanaadeem systemd-networkd[651]: ens33: Gained carrier
2025-11-02T15:07:17.0009532+00:00 abihanaadeem systemd-timesyncd[687]: Network configuration changed, trying to establish connection.
2025-11-02T15:07:17.028607+00:00 abihanaadeem systemd-networkd[651]: ens33: DHCPv4 address 192.168.174.141/24, gateway 192.168.174.25
4
2025-11-02T15:07:17.030430+00:00 abihanaadeem systemd-timesyncd[687]: Network configuration changed, trying to establish connection.
abihanaadeem001@abihanaadeem:~$
```

Alternative (journalctl) if needed:

```
sudo journalctl | less
```

```
sudo journalctl -u systemd | grep -i error > ~/journal_errors.txt
```

- task9\_journalctl\_alternative.png

```

ld (GNU Binutils for Ubuntu) 2.42) #87-Ubuntu SMP PREEMPT_DYNAMIC Mon Sep 22 18:03:36 UTC 2025 (Ubuntu 6.8.0-86.87-generic 6.8.12)
Nov 01 23:48:14 abihanadeem kernel: Command line: BOOT_IMAGE=/vmlinuz-6.8.0-86-generic root=/dev/mapper/ubuntu--vg-ubuntu--lv ro
Nov 01 23:48:14 abihanadeem kernel: KERNEL supported cpus:
Nov 01 23:48:14 abihanadeem kernel: Intel GenuineIntel
Nov 01 23:48:14 abihanadeem kernel: AMD AuthenticAMD
Nov 01 23:48:14 abihanadeem kernel: HYGON HYGONGenuine
Nov 01 23:48:14 abihanadeem kernel: Centaur CentaurHauls
Nov 01 23:48:14 abihanadeem kernel: zhaoxin Shanghai
Nov 01 23:48:14 abihanadeem kernel: Disabled fast string operations
Nov 01 23:48:14 abihanadeem kernel: BIOS-provided physical RAM map:
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000000-0x000000000000e7ff] usable
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x00000000009e000-0x000000000000ffff] reserved
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000dc000-0x000000000000ffff] reserved
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x000000000100000-0x0000000007fedffff] usable
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000007fe0000-0x0000000007fefeffff] ACPI data
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000007ffeff000-0x0000000007fetffff] ACPI NVS
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000007ff0000-0x0000000007fffffff] usable
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000000fec0000-0x000000000fec0ffff] reserved
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000000fee0000-0x000000000fee00ff] reserved
Nov 01 23:48:14 abihanadeem kernel: BIOS-e820: [mem 0x0000000000000000fffe0000-0x000000000fffffff] reserved
Nov 01 23:48:14 abihanadeem kernel: NX (Execute Disable) protection: active
Nov 01 23:48:14 abihanadeem kernel: APIC: Static calls initialized
Nov 01 23:48:14 abihanadeem kernel: SMBIOS 2.7 present.
Nov 01 23:48:14 abihanadeem kernel: DMI: VMware, Inc. VMware Virtual Platform/440BX Desktop Reference Platform, BIOS 6.00 11/12/2020
Nov 01 23:48:14 abihanadeem kernel: vmware: hypercall mode: 0x02
Nov 01 23:48:14 abihanadeem kernel: Hypervisor detected: VMware
Nov 01 23:48:14 abihanadeem kernel: vmware: TSC freq read from hypervisor : 2711.998 MHz
Nov 01 23:48:14 abihanadeem kernel: vmware: Host bus clock speed read from hypervisor : 66000000 Hz
Nov 01 23:48:14 abihanadeem kernel: vmware: using clock offset of 11016266088 ns
Nov 01 23:48:14 abihanadeem kernel: tsc: Detected 2711.998 MHz processor
Nov 01 23:48:14 abihanadeem kernel: e820: update [mem 0x00000000-0x00000fff] usable ==> reserved
Nov 01 23:48:14 abihanadeem kernel: e820: remove [mem 0x00000000-0x0000ffff] usable
Nov 01 23:48:14 abihanadeem kernel: last_pfn = 0x80000 max_arch_pfn = 0x40000000
Nov 01 23:48:14 abihanadeem kernel: total RAM covered: 3072M
Nov 01 23:48:14 abihanadeem kernel: Found optimal setting for mtrr clean up
Nov 01 23:48:14 abihanadeem kernel: gran_size: 64K chunk_size: 64K num_reg: 2 lose cover RAM: 0G
Nov 01 23:48:14 abihanadeem kernel: MTRR map: 6 entries (5 fixed + 1 variable; max 21), built from 8 variable MTRRs
Nov 01 23:48:14 abihanadeem kernel: x86/PAT: Configuration [0-7]: WB WC UC- UC KB WP UC- WT
Nov 01 23:48:14 abihanadeem kernel: found SMP MP-table at [mem 0x000f6a70-0x000f6a7f]
Nov 01 23:48:14 abihanadeem kernel: Using 64 pages for direct mapping
Nov 01 23:48:14 abihanadeem kernel: RAMDISK: [mem 0x2f195000-0x338c1ffff]
Nov 01 23:48:14 abihanadeem kernel: ACPI: Early table checksum verification disabled
Nov 01 23:48:14 abihanadeem kernel: ACPI: RSDP 0x0000000000f6a000 000024 (v02 PTLLTD)
Nov 01 23:48:14 abihanadeem kernel: ACPI: XSDT 0x0000000000fEE95FF 000064 (v01 INTEL 440BX 06040000 VMW 01324272)
Nov 01 23:48:14 abihanadeem kernel: ACPI: FACP 0x0000000000fEEE73 0000F4 (v04 INTEL 440BX 06040000 PTL 000F4240)
Nov 01 23:48:14 abihanadeem kernel: ACPI: DSDT 0x0000000000fEEAD55 01411E (v01 PTLLTD Custom 06040000 MSFT 03000001)
Nov 01 23:48:14 abihanadeem kernel: ACPI: FACS 0x0000000000fEFFFC0 000040
abihanadeem@001:~$ sudo journalctl -u systemd | grep -i error > ~/journal_errors.txt
abihanadeem@001:~$
```

## Task 10 – Script setup.sh – variables, command substitution, file/dir checks, permissions (use vim)

Goal: Using vim, write a script named setup.sh that implements each numbered step below. After writing the code for each step, run the script and capture screenshots showing the vim editor (script content) and the script output for that step. Students must add the code for each step into the same file setup.sh step-by-step (i.e., write 1., save, run and screenshot; then append 2., save, run and screenshot; and so on).

For each step you MUST:

- Open vim and edit setup.sh
- Insert only the code shown for that step (append to the existing file)
- Save and quit vim (:wq)
- Make the file executable if not already: chmod +x setup.sh
- Run the script: ./setup.sh
- Capture two screenshots:

- One showing the vim editor with the script content after you added the step (use the vim screen before :wq)
- One showing the terminal output after running the script (show the command and the output)

Start in your Student home directory (recommended).

1. Include bash shebang

- Code to add (enter in vim as the first line of the file):

```
#!/bin/bash
```

- Steps:

- i. vim setup.sh → add the shebang line → save and quit
- ii. chmod +x setup.sh
- iii. ./setup.sh

- Screenshots:

- vim editor showing the shebang: task10\_b1\_vim.png
- script run output (likely no output but show ./setup.sh run): task10\_b1\_run.png

```
#!/bin/bash
```

```
-- INSERT --
```

```
"setup.sh" [New] 1L, 12B written
student@abihanadeem:~$ chmod +x setup.sh
student@abihanadeem:~$./setup.sh
student@abihanadeem:~$
```

2. Define variable var1 and echo it

- Code to append:

```
Define and show var1
var1="Hello from Lab 6"

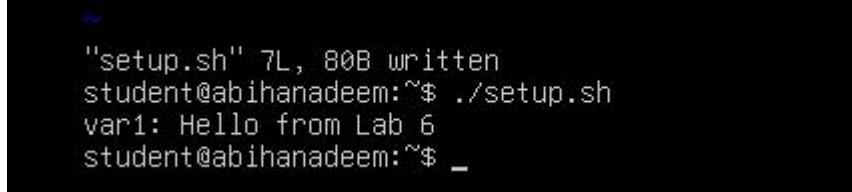
echo "var1: $var1"
```

- Steps:

- i. vim setup.sh → append the code above → save and quit
- ii. ./setup.sh

- Screenshots:

- vim editor showing var1 code appended: task10\_b2\_vim.png
- script run output showing var1 printed: task10\_b2\_run.png

3. Save output of ls -l into variable allFiles and echo it

- Code to append:

```
Save ls -l to variable and display

allFiles=$(ls -l)

echo "allFiles (ls -l):"

echo "$allFiles"
```

- Steps:
  - i. vim setup.sh → append the code above → save and quit
  - ii. ./setup.sh
- Screenshots:
  - vim editor showing allFiles code appended: task10\_b3\_vim.png
  - script run output showing the ls -l content echoed: task10\_b3\_run.png

```
#Define and show var1
var1="Hello from Lab 6"

echo "var1: $var1"

#Save ls -l to variable and display

allFiles="$(ls -l)"

echo "allFiles (ls -l):"
echo "$allFiles"
*
```

```
student@abihanadeem:~$./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov 2 15:29 dir1
-rwxr-x--- 1 student student 0 Nov 2 15:28 file1
-rwxrwxr-x 1 student student 180 Nov 2 16:52 setup.sh
student@abihanadeem:~$
```

4. If directory dir1 exists echo a message; else create it

- Code to append:

```
Directory check
if [-d "dir1"]; then
 echo "Directory dir1 exists."
else
 echo "Directory dir1 does not exist. Creating..."
```

```
mkdir -p "dir1"
echo "Directory dir1 created."
fi
```

- Steps:
  - i. vim setup.sh → append the code above → save and quit
  - ii. ./setup.sh
- Screenshots:
  - vim editor showing dir1 check code: task10\_b4\_vim.png
  - script run output showing directory message or creation: task10\_b4\_run.png

```
#!/bin/bash
#Define and show var1
var1="Hello from Lab 6"

echo "var1: $var1"

#Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"
Directory check
if [-d "dir1"]; then

 echo "Directory dir1 exists."
else

 echo "Directory dir1 does not exist. Creating..."
 mkdir -p "dir1"
 echo "Directory dir1 created."
fi_
-- INSERT --
```

```
"setup.sh" 27L, 388B written
student@abihanadeem:~$./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov 2 15:29 dir1
-rw-r-x--- 1 student student 0 Nov 2 15:28 file1
-rw-rwxr-x 1 student student 388 Nov 2 16:57 setup.sh
Directory dir1 exists.
student@abihanadeem:~$
```

5. If file dir1/file2 does not exist, create it

- Code to append:

```
File check

if [-f "dir1/file2"]; then
 echo "file2 already exists."
else
 echo "file2 does not exist. Creating..."
 touch "dir1/file2"
 chmod a-rwx "dir1/file2"
 echo "file2 created."
fi
```

- Steps:
  - i. vim setup.sh → append the code above → save and quit
  - ii. ./setup.sh
- Screenshots:
  - vim editor showing file2 check code: task10\_b5\_vim.png
  - script run output showing file creation message or existence: task10\_b5\_run.png

```
#!/bin/bash
#Define and show var1
var1="Hello from Lab 6"
echo "var1: $var1"

#Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"
Directory check
if [-d "dir1"]; then
 echo "Directory dir1 exists."
else
 echo "Directory dir1 does not exist. Creating..."
 mkdir -p "dir1"
 echo "Directory dir1 created."
fi
#File check
if [-f "dir1/file2"]; then
 echo "file2 already exists."
else
 echo "file2 does not exist. Creating..."
 touch "dir1/file2"
 chmod a-rwx "dir1/file2"
 echo "file2 created."
fi_
-- INSERT --
```

```
"setup.sh" 43L, 610B written
student@abihanadeem:~/Documents$./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov 2 15:29 dir1
-rw-r--r-- 1 student student 0 Nov 2 15:28 file1
-rw-rwxr-x 1 student student 610 Nov 2 17:01 setup.sh
Directory dir1 exists.
file2 already exists.
student@abihanadeem:~/Documents$
```

6. Check read, write, execute permissions on dir1/file2; grant missing user perms and show final ls

- Code to append:

```
Permission checks for dir1/file2 (user permissions)

f="dir1/file2"

if [! -r "$f"]; then
 echo "Read permission missing; granting to user..."
 chmod u+r "$f"
fi

if [! -w "$f"]; then
 echo "Write permission missing; granting to user..."
 chmod u+w "$f"
fi

if [! -x "$f"]; then
 echo "Execute permission missing; granting to user..."
 chmod u+x "$f"
fi

echo "Final permissions for $f:"
```

```
ls -l "$f"
```

- Steps:
  - i. vim setup.sh → append the code above → save and quit
  - ii. ./setup.sh
- Screenshots:
  - vim editor showing permission-check code: task10\_b6\_vim.png
  - script run output showing the permission grants and final ls -l dir1/file2: task10\_b6\_run.png

```
Permission checks for dir1/file2 (user permissions)
f="dir1/file2"

if [! -r "$f"]; then
 echo "Read permission missing; granting to user..."
 chmod u+r "$f"
fi

if [! -w "$f"]; then
 echo "Write permission missing; granting to user..."
 chmod u+w "$f"
fi

if [! -x "$f"]; then
 echo "Execute permission missing; granting to user..."
 chmod u+x "$f"
fi

echo "Final permissions for $f:"
ls -l "$f"
-- INSERT --
```

```
"setup.sh" 79L, 1050B written
student@abihanaadeem:~/Desktop$./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov 2 15:29 dir1
-rw-r-x--- 1 student student 0 Nov 2 15:28 file1
-rw-rwxr-x 1 student student 1050 Nov 2 17:04 setup.sh
Directory dir1 exists.
file2 already exists.
Execute permission missing; granting to user...
Final permissions for dir1/file2:
-rwxrw-r-- 1 student student 0 Nov 2 15:29 dir1/file2
student@abihanaadeem:~/Desktop$ _
```

### Task 11 – Script setup.sh – argument comparisons (eq, ne, gt, lt, ge, le) and string checks

Updated: replace the previous single-script approach with an incremental exercise. Students will overwrite setup.sh and then add each individual if-test one-by-one. After adding each if-test they must run the script with example arguments and capture screenshots. This teaches the individual comparison operators and makes each if statement a separate step.

Important overall instructions

- Start by overwriting setup.sh (vim setup.sh) and add only what the step asks (do not add all tests at once).
- After editing in vim, save (:wq), make executable (chmod +x setup.sh) if needed, then run the script with the example commands shown for each step.
- For each step capture two screenshots:
  - A vim screenshot showing the current file buffer with the newly added lines (before :wq) — name as specified for the step.
  - A terminal screenshot showing the commands you ran (chmod +x setup.sh if necessary) and the script outputs for the example invocations — name as specified for the step.
- For the numeric comparisons, set a variable num=\$1 at the top of the file before adding the individual if-tests (this will be the initial step). For string checks, set str=\$2 before adding the string if-tests.
  1. create file with shebang and set num and str variables
  - In vim create/overwrite setup.sh and insert:

```
#!/bin/bash
```

num=\$1

str=\$2

- Save and quit (:wq)
  - Make executable and run with examples:

```
chmod +x setup.sh
```

./setup.sh 10 Student

- Screenshots:

- vim content: task11\_b0\_vim.png
  - run output: task11\_b0\_run.png

```
#!/bin/bash
num=$1

str=$2

-- INSERT --
```

```
"setup.sh" 6L, 29B written
student@abihanadeem:~$./setup.sh 10 Student
student@abihanadeem:~$ -
```

2. add the -eq test (equal)

- Append to setup.sh:

```
if ["$num" -eq 10]; then
 echo "$num is equal to 10 (-eq)."
else
 echo "$num is NOT equal to 10 (-eq)."
fi
```

- Save and quit; then run these commands (capture both in one terminal screenshot):

```
./setup.sh 10 Student
```

```
./setup.sh 7 Student
```

- Screenshots:

- vim content after edit: task11\_b1\_vim.png
- run output demonstrating both cases: task11\_b1\_run.png

```
#!/bin/bash
num=$1

str=$2
if ["$num" -eq 10]; then
 echo "$num is equal to 10 (-eq)."
else
 echo "$num is NOT equal to 10 (-eq)."
fi
```

```
"setup.sh" 13L, 148B written
student@abihanadeem:~/Documents$./setup.sh 10 Student
10 is equal to 10 (-eq).
student@abihanadeem:~/Documents$./setup.sh 7 Student
7 is NOT equal to 10 (-eq).
student@abihanadeem:~/Documents$ _
```

3. add the -ne test (not equal)

- Append to setup.sh:

```
if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (-ne)."
else
 echo "$num is equal to 10 (-ne false)."
fi
```

- Save and quit; run:

```
./setup.sh 7 Student
./setup.sh 10 Student
```

- Screenshots:

- vim content: task11\_b2\_vim.png
- run output: task11\_b2\_run.png

```
#!/bin/bash
num=$1

str=$2
if ["$num" -eq 10]; then
 echo "$num is equal to 10 (-eq)."
else
 echo "$num is NOT equal to 10 (-eq)."
fi
if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (-ne)."
else
 echo "$num is equal to 10 (-ne false)."
fi_
```

```
"setup.sh" 22L, 275B written
student@abihanadeem:~$./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
student@abihanadeem:~$./setup.sh 7 Student
7 is NOT equal to 10 (-eq).
7 is not equal to 10 (-ne).
student@abihanadeem:~$ _
```

4. add the -gt test (greater than)

- Append:

```
if ["$num" -gt 10]; then
 echo "$num is greater than 10 (-gt)."
else
 echo "$num is NOT greater than 10 (-gt)."
fi
```

- Run:

```
./setup.sh 12 Student
```

```
./setup.sh 9 Student
```

- Screenshots:

- vim content: task11\_b3\_vim.png
- run output: task11\_b3\_run.png

```

#!/bin/bash
num=$1

str=$2
if ["$num" -eq 10]; then
 echo "$num is equal to 10 (-eq)."
else
 echo "$num is NOT equal to 10 (-eq)."
fi
if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (-ne)."
else
 echo "$num is equal to 10 (-ne false)."
fi
if ["$num" -gt 10]; then
 echo "$num is greater than 10 (-gt)."
else
 echo "$num is NOT greater than 10 (-gt)."
fi
*
```

```

"setup.sh" 31L, 404B written
student@abihanadeem:~$./setup.sh 12 Student
12 is NOT equal to 10 (-eq).
12 is not equal to 10 (-ne).
12 is greater than 10 (-gt).
student@abihanadeem:~$./setup.sh 9 Student
9 is NOT equal to 10 (-eq).
9 is not equal to 10 (-ne).
9 is NOT greater than 10 (-gt).
student@abihanadeem:~$
```

## 5. add the -lt test (less than)

- Append:

```

if ["$num" -lt 10]; then
 echo "$num is less than 10 (-lt)."
else
 echo "$num is NOT less than 10 (-lt)."
fi
```

- Run:

```
./setup.sh 5 Student
```

```
./setup.sh 11 Student
```

- Screenshots:

- vim content: task11\_b4\_vim.png
- run output: task11\_b4\_run.png

```
#!/bin/bash
num=$1

str=$2
if ["$num" -eq 10]; then
 echo "$num is equal to 10 (-eq)."
else
 echo "$num is NOT equal to 10 (-eq)."
fi
if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (-ne)."
else
 echo "$num is equal to 10 (-ne false)."
fi
if ["$num" -gt 10]; then
 echo "$num is greater than 10 (-gt)."
else
 echo "$num is NOT greater than 10 (-gt)."
fi
if ["$num" -lt 10]; then
 echo "$num is less than 10 (-lt)."
else
 echo "$num is NOT less than 10 (-lt)."
fi
=
```

```
"setup.sh" 41L, 528B written
student@abihanaadeem:~$./setup.sh 5 Student
5 is NOT equal to 10 (-eq).
5 is not equal to 10 (-ne).
5 is NOT greater than 10 (-gt).
5 is less than 10 (-lt).
student@abihanaadeem:~$./setup.sh 11 Student
11 is NOT equal to 10 (-eq).
11 is not equal to 10 (-ne).
11 is greater than 10 (-gt).
11 is NOT less than 10 (-lt).
student@abihanaadeem:~$ _
```

6. add the -ge test (greater than or equal)

- Append:

```
if ["$num" -ge 10]; then
 echo "$num is greater than or equal to 10 (-ge)."
else
 echo "$num is NOT greater than or equal to 10 (-ge)."
fi
```

- Run:

```
./setup.sh 10 Student
```

```
./setup.sh 8 Student
```

- Screenshots:

- vim content: task11\_b5\_vim.png
- run output: task11\_b5\_run.png

```

#!/bin/bash
num=$1

str=$2
if ["$num" -eq 10]; then
 echo "$num is equal to 10 (-eq)."
else
 echo "$num is NOT equal to 10 (-ne)."
fi
if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (-ne)."
else
 echo "$num is equal to 10 (-ne false)."
fi
if ["$num" -gt 10]; then
 echo "$num is greater than 10 (-gt)."
else
 echo "$num is NOT greater than 10 (-gt)."
fi
if ["$num" -lt 10]; then
 echo "$num is less than 10 (-lt)."
else
 echo "$num is NOT less than 10 (-lt)."
fi
if ["$num" -ge 10]; then
 echo "$num is greater than or equal to 10 (-ge)."
else
 echo "$num is NOT greater than or equal to 10 (-ge)."
fi
-- INSERT --

```

```

"setup.sh" 49L, 680B written
student@abihanaadeem:~$./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
student@abihanaadeem:~$./setup.sh 8 Student
8 is NOT equal to 10 (-eq).
8 is not equal to 10 (-ne).
8 is NOT greater than 10 (-gt).
8 is less than 10 (-lt).
8 is NOT greater than or equal to 10 (-ge).
student@abihanaadeem:~$
```

7. add the -le test (less than or equal)

- Append:

```
if ["$num" -le 10]; then
 echo "$num is less than or equal to 10 (-le)."
else
 echo "$num is NOT less than or equal to 10 (-le)."
fi
```

- Run:

```
./setup.sh 10 Student
./setup.sh 12 Student
```

- Screenshots:

- vim content: task11\_b6\_vim.png
- run output: task11\_b6\_run.png

```
if ["$num" -le 10]; then
 echo "$num is less than or equal to 10 (-le)."
else
 echo "$num is NOT less than or equal to 10 (-le)."
fi
-- INSERT --
```

```
"setup.sh" 58L, 827B written
student@abihanadeem:~$./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
student@abihanadeem:~$./setup.sh 12 Student
12 is NOT equal to 10 (-eq).
12 is not equal to 10 (-ne).
12 is greater than 10 (-gt).
12 is NOT less than 10 (-lt).
12 is greater than or equal to 10 (-ge).
12 is NOT less than or equal to 10 (-le).
student@abihanadeem:~$
```

## 8. string equality test ( = )

- Ensure str=\$2 exists at top (1.). Append:

```
if ["$str" = "Student"]; then
 echo "Second argument equals 'Student' (=)."
else
 echo "Second argument does NOT equal 'Student' (=)."
fi
```

- Run:

```
./setup.sh 10 Student
./setup.sh 10 Test
```

- Screenshots:

- vim content: task11\_b7\_vim.png
- run output: task11\_b7\_run.png

```
if ["$str" = "Student"]; then
 echo "Second argument equals 'Student' (=)."
else
 echo "Second argument does NOT equal 'Student' (=)."
fi
-- INSERT --
```

```
11
"setup.sh" 67L, 983B written
student@abihanadeem:~$./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument equals 'Student' (=).
student@abihanadeem:~$./setup.sh 10 Test
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal 'Student' (=).
student@abihanadeem:~$ _
```

## 9. string inequality test ( != )

- Append:

```
if ["$str" != "Student"]; then
 echo "Second argument is not equal to 'Student' (!=)."
else
 echo "Second argument equals 'Student' (!= false)."
fi
```

- Run:

```
./setup.sh 10 Test
```

```
./setup.sh 10 Student
```

- Screenshots:

- vim content: task11\_b8\_vim.png
- run output: task11\_b8\_run.png

```
if ["$str" != "Student"]; then
 echo "Second argument is not equal to 'Student' (!=)."
else
 echo "Second argument equals 'Student' (!= false)."
fi
-- INSERT --
```

```
"setup.sh" 77L, 1149B written
student@abihanadeem:~$./setup.sh 10 Test
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal 'Student' (=).
Second argument is not equal to 'Student' (!=).
student@abihanadeem:~$./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument equals 'Student' (=).
Second argument equals 'Student' (!= false).
student@abihanadeem:~$ _
```

## 10. check if second argument is empty (zero-length)

- Append:

```
if [-z "$str"]; then
 echo "Second argument is empty (zero-length)."
else
 echo "Second argument is not empty."
fi
```

- Run:

```
./setup.sh 10
./setup.sh 10 Student
```

- Screenshots:

- vim content: task11\_b9\_vim.png
- run output: task11\_b9\_run.png

```
if [-z "$str"]; then
 echo "Second argument is empty (zero-length)."
else
 echo "Second argument is not empty."
fi
-- INSERT --
```

```
11
"setup.sh" 86L, 1278B written
student@abihanadeem:~$./setup.sh 10
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal 'Student' (!=).
Second argument is not equal to 'Student' (!=).
Second argument is empty (zero-length).
student@abihanadeem:~$./setup.sh 10 Student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false).
10 is NOT greater than 10 (-gt).
10 is NOT less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument equals 'Student' (==).
Second argument equals 'Student' (!= false).
Second argument is not empty.
student@abihanadeem:~$
```

## Task 12 – Script setup.sh – print all arguments with a for loop

1. Create the script with shebang and basic structure

- Open vim and overwrite setup.sh:

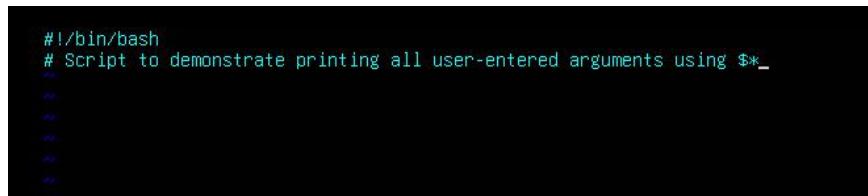
```
vim setup.sh
```

- Insert these lines (first step — shebang and a short comment):

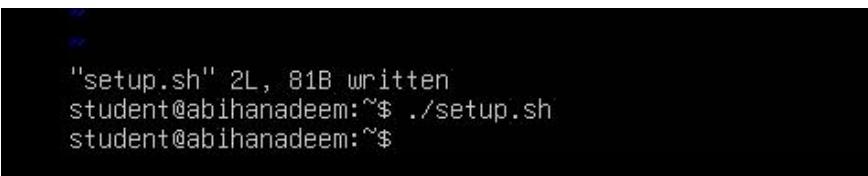
```
#!/bin/bash
```

```
Script to demonstrate printing all user-entered arguments using $*
```

- Save and quit (:wq)
- Screenshots:
  - vim editor showing the shebang and comment: task12\_b1\_vim.png
  - run (no output expected but show ./setup.sh run): task12\_b1\_run.png



```
#!/bin/bash
Script to demonstrate printing all user-entered arguments using $*
```



```
"setup.sh" 2L, 81B written
student@abihanadeem:~$./setup.sh
student@abihanadeem:~$
```

2. Append the for loop using \$\* and print each argument

- Re-open setup.sh in vim and append the following lines:

```
Print all arguments using $*
```

```
echo "Printing all arguments using \$*:"
```

```
for arg in $*; do
```

```
 echo "Argument: $arg"
```

```
done
```

- Save and quit (:wq)
- Make the script executable and run it with example arguments:

```
chmod +x setup.sh
./setup.sh one "two words" three
```

- Screenshots:
  - vim editor showing the for-loop appended: task12\_b2\_vim.png
  - script run output showing the printed arguments: task12\_b2\_run.png

```
#!/bin/bash
Script to demonstrate printing all user-entered arguments using $*
Print all arguments using $*: "
echo "Printing all arguments using \$*:"
```

```
for arg in $*; do
 echo "Argument: $arg"
done
```

```
"setup.sh" 10L, 206B written
student@abihanaadeem:~$ chmod +x setup.sh
student@abihanaadeem:~$./setup.sh one "two words" three
Printing all arguments using $*:
Argument: one
Argument: two
Argument: words
Argument: three
student@abihanaadeem:~$ _
```

### Task 13 – Script setup.sh – while loop summation and functions

Clear the previous code of setup.sh and write a new script, step-by-step, that:

- Starts with a shebang line
  - Implements an interactive while loop that prompts the user to enter numbers and keeps a running total until the user types q to quit; after each input the script echoes "Total Score: <current\_total>"
  - Implements a function sum\_two() that runs its own interactive while loop doing the same accumulation and echoes the running totals
  - Adds a second function that takes two numeric arguments, sums them, and returns the result via echo (demonstrated in the script)
  - Important: if you move the while-loop logic into the sum\_two() function, delete the standalone while-loop code to avoid running the same loop twice
1. Add the shebang line

- Open vim and overwrite setup.sh with the shebang line:

```
#!/bin/bash
```

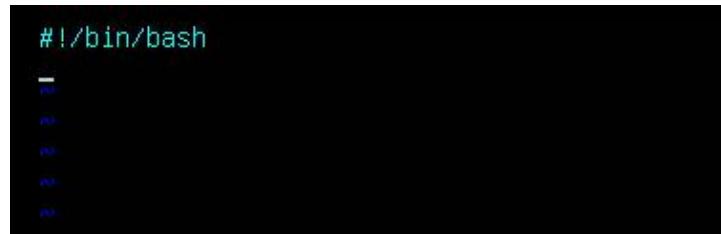
- Save and quit (:wq)
- Make executable and run (no output expected):

```
chmod +x setup.sh
```

```
./setup.sh
```

- Screenshots:

- vim editor showing shebang: task13\_b1\_vim.png
- run output: task13\_b1\_run.png



```
#!/bin/bash
```



```
"setup.sh" 2L, 13B written
student@abihanadeem:~$ chmod +x setup.sh
student@abihanadeem:~$./setup.sh
student@abihanadeem:~$ -
```

## 2. Add the while-loop summation (interactive)

- Re-open setup.sh in vim and append the while-loop:

```
While-loop summation (interactive)
```

```
sum=0
```

```
while true; do
```

```
 read -p "Enter a number (or 'q' to quit): " input
```

```
 if ["$input" = "q"]; then
```

```
 break
```

```
fi

sum=$((sum + input))
echo "Total Score: $sum"

done

echo "Final total: $sum"

- Save and quit (:wq)
- Run the script and demonstrate a short session (example): enter 5, then 7, then q

./setup.sh

interactively enter:

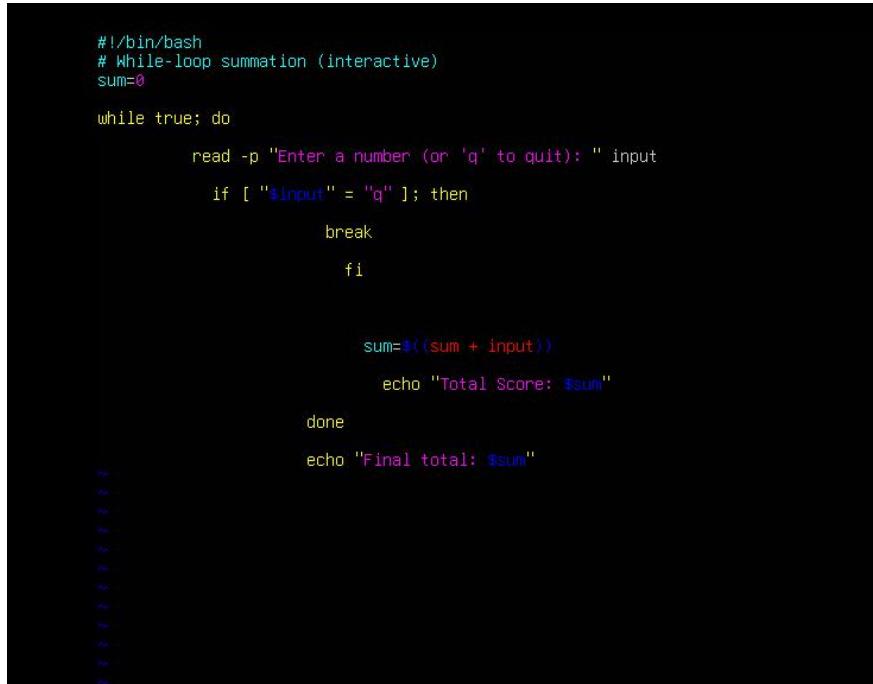
5

7

q

- Screenshots:
 - vim editor showing while-loop appended: task13_b2_vim.png
 - run output showing the interactive session and totals: task13_b2_run.png

```



```
#!/bin/bash
While-loop summation (interactive)
sum=0

while true; do
 read -p "Enter a number (or 'q' to quit): " input
 if ["$input" = "q"]; then
 break
 fi

 sum=$((sum + input))
 echo "Total Score: $sum"
done
echo "Final total: $sum"
```

```
if ["$input" = "q"]; then
 break
fi

sum=$((sum + input))
echo "Total Score: $sum"

done
echo "Final total: $sum"

```

./setup.sh 23L, 299B written  
student@abihanaadeem:~\$ ./setup.sh  
Enter a number (or 'q' to quit): 5  
Total Score: 5  
Enter a number (or 'q' to quit): 7  
Total Score: 12  
Enter a number (or 'q' to quit): q  
Final total: 12  
student@abihanaadeem:~\$ \_

3. Add the interactive summation function and demonstrate it

- Re-open setup.sh in vim and append the function sum\_two() which contains its own interactive while-loop:

```
Function to accumulate scores interactively

sum_two() {

 sum=0

 while true; do

 read -p "Enter a number (or 'q' to quit): " input

 if ["$input" = "q"]; then

 break
 fi
 done
}
```

```
fi

sum=$((sum + input))
echo "Total Score: $sum"
done
echo "Function final total: $sum"
}
```

# Demonstrate the function

echo "Now calling sum\_two function:"

sum\_two

- Save and quit (:wq)
- Important: If you have the standalone while-loop from step 2 and you place this function into the script, delete the standalone loop to avoid executing the same interactive logic twice when running the script.
- Run the script and demonstrate a short session (example): enter 3, 4, q when prompted by the function:

./setup.sh

# when prompted by the function enter:

# 3

# 4

# q

- Screenshots:
  - vim editor showing function appended: task13\_b3\_vim.png
  - run output showing the function prompts and final total: task13\_b3\_run.png

```

#!/bin/bash
While-loop summation (interactive)
Function to accumulate scores interactively
sum_two() {
 sum=0
 while true; do
 read -p "Enter a number (or 'q' to quit): " input
 if ["$input" = "q"]; then
 break
 fi

 sum=$((sum + input))
 echo "Total Score: $sum"
 done
 echo "Function final total: $sum"
 }

 # Demonstrate the function
 echo "Now calling sum_two function:"
 sum_two
}

```

```

read -p "Enter a number (or 'q' to quit): " input
if ["$input" = "q"]; then
 break
fi

sum=$((sum + input))
echo "Total Score: $sum"
done
echo "Function final total: $sum"
}

Demonstrate the function
echo "Now calling sum_two function:"
sum_two

"setup.sh" 34L, 524B written
student@abihadeem:~$./setup.sh
Now Calling sum_two function:
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 4
Total Score: 7
Enter a number (or 'q' to quit): q
Function final total: 7
student@abihadeem:~$ _

```

4. Add a function that takes two numeric arguments, sums them, and returns the result (echo)

- Re-open setup.sh in vim and append the following function and demonstration. This function accepts two numeric arguments, adds them, and return the sum. The script then captures that output and displays it.

```
Function that sums two arguments and returns the result
```

```
sum_args() {
 a=$1
 b=$2
 return $((a + b))
}
```

```
Demonstrate sum_args function
```

```
echo "Now demonstrating sum_args function:"
```

```
sum_args 3 4
```

```
result=$?
```

```
echo "sum_args(3,4) returned: $result"
```

- Save and quit (:wq)
- Run the script and capture the demonstration output:

```
chmod +x setup.sh
```

```
./setup.sh
```

```
Observe the output that shows "sum_args(3,4) returned: 7"
```

- Screenshots:
  - vim editor showing function appended: task13\_b4\_vim.png
  - run output showing function demonstration and returned sum: task13\_b4\_run.png

```

Demonstrate the function
echo "Now calling sum_two function:"
sum_two
Function that sums two arguments and returns the result
sum_args() {

 a=$1
 b=$2
 return $((a + b))
}

Demonstrate sum_args function
echo "Now demonstrating sum_args function:"
```

```

sum_args 3 4
result=$?
echo "sum_args(3,4) returned: $result"
```

```
fi
```

```

 sum=$((sum + input))
 echo "Total Score: $sum"
 done
 echo "Function final total: $sum"
}
```

```

Demonstrate the function
echo "Now calling sum_two function:"
sum_two
Function that sums two arguments and returns the result
sum_args() {
```

```

 a=$1
 b=$2
 return $((a + b))
}
```

```

}
Demonstrate sum_args function
echo "Now demonstrating sum_args function:"
```

```
sum_args 3 4
```

```
result=$?
```

```
echo "sum_args(3,4) returned: $result"
```

```

"setup.sh" 52L, 879B written
student@abihanaadeem:~$./setup.sh
Now calling sum_two function:
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 4
Total Score: 7
Enter a number (or 'q' to quit): q
Function final total: 7
Now demonstrating sum_args function:
sum_args(3,4) returned: 7
student@abihanaadeem:~$ -
```

## Task 14 – Codespaces GUI — fork repo, run start-desktop.sh, open VNC, stop GUI

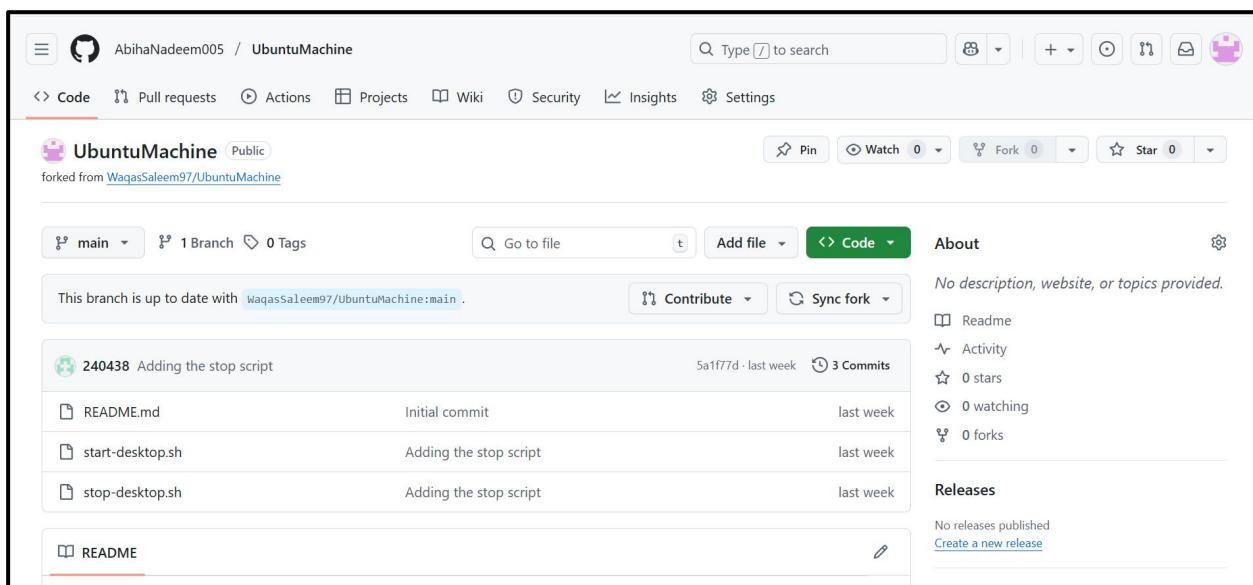
Goal: Fork the specified repository to your GitHub account, open it in GitHub Codespaces, run the provided script to start a desktop GUI, connect to the GUI via the Codespaces forwarded port (6080) -> vnc.html, and then stop the GUI using the provided stop script.

Important notes before starting:

- GitHub Codespaces must be enabled for your account/org. Codespaces availability and billing may apply.
- The instructions below assume you have permission and capacity to create a Codespace for your fork.
- If Codespaces is not available, you may perform this step on another cloud environment that exposes the same port and scripts, but the screenshot filenames below assume Codespaces.

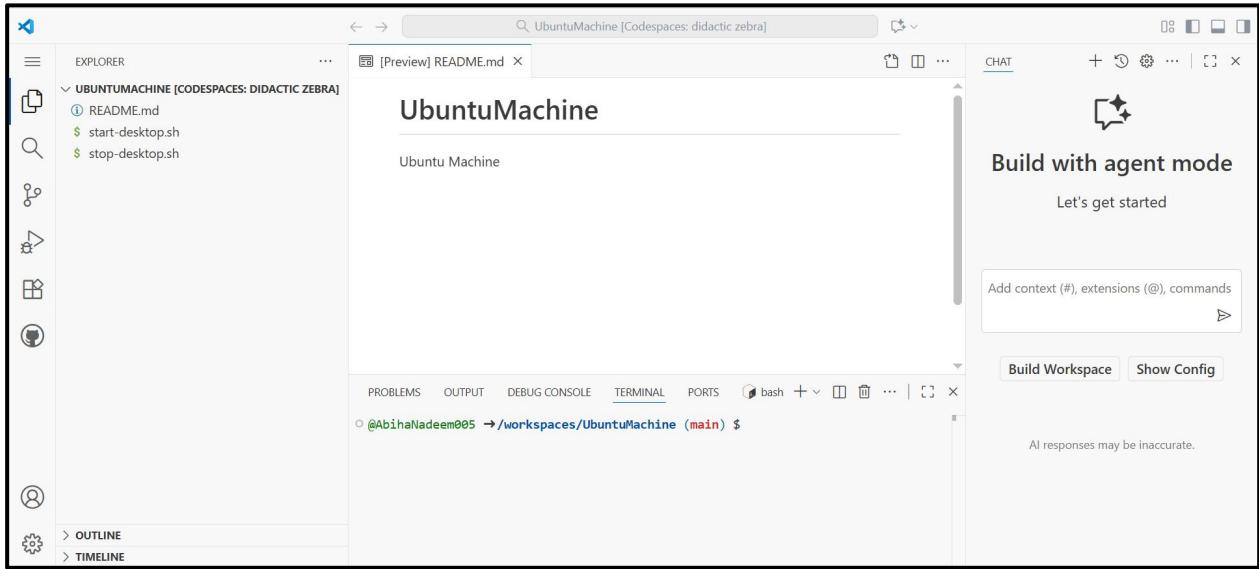
Steps:

1. Fork the repository to your GitHub account
- Open the repo URL in your browser:
  - [Ubuntu Machine](#)
- Click "Fork" (top-right) and fork it to your account.
- Save screenshot as: task14\_fork.png



## 2. Open a Codespace on your fork

- In your forked repository on GitHub, click the green "Code" button → "Open with Codespaces" → "Create codespace on main" (or appropriate branch).
- Wait for the Codespace to initialize.
- Save screenshot as: task14\_codespace\_launch.png



## 3. Verify the start script is present and executable (capture evidence)

- In the Codespace terminal list files in the repo root and show the start script and stop script exist:

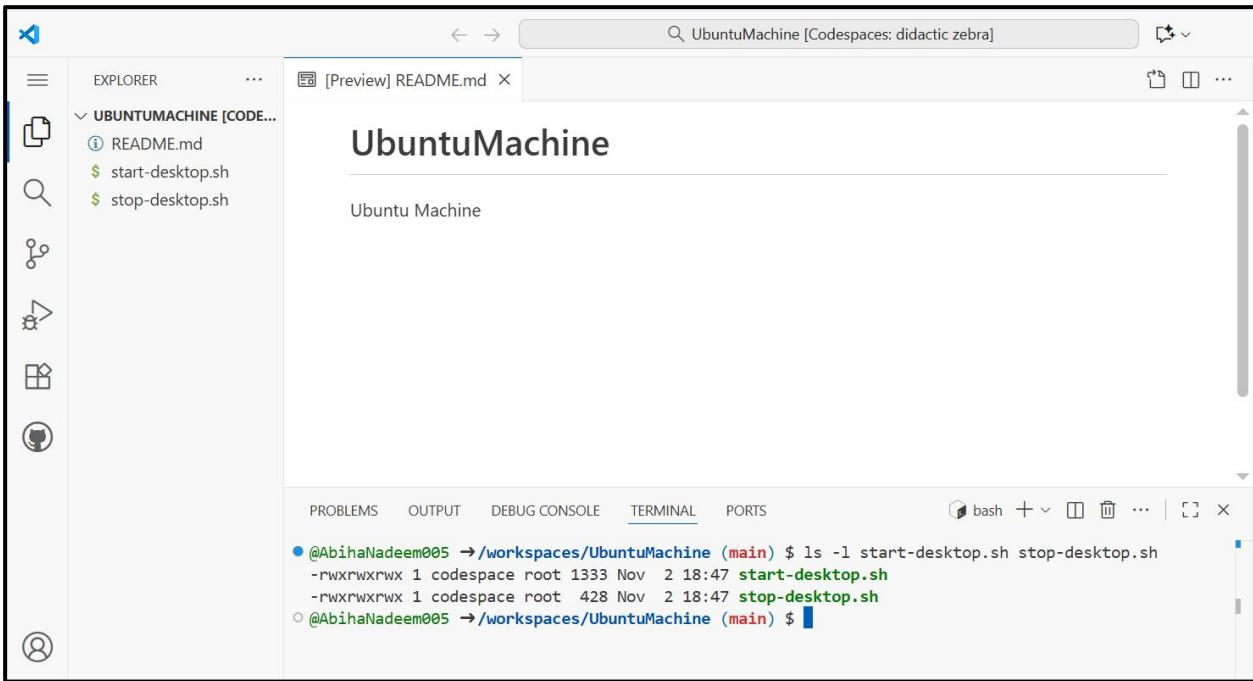
```
ls -l start-desktop.sh stop-desktop.sh
```

- If not executable, make it executable:

```
chmod +x start-desktop.sh stop-desktop.sh
```

- Save a screenshot showing the ls -l output (file listing) and the chmod command if applied:

- task14\_start\_script\_ls.png



4. Run the start script inside the Codespace terminal

- In the Codespace terminal run:

```
Ensure the start script is executable
```

```
chmod +x start-desktop.sh
```

```
Start the desktop GUI
```

```
./start-desktop.sh
```

- Capture the terminal output showing successful start messages.
- Save screenshot as: task14\_start\_run.png

The screenshot shows the VS Code interface for a Codespace named "UbuntuMachine". The left sidebar has icons for Explorer, Search, and others. The main area has tabs for PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, and PORTS (which has 3 notifications). The TERMINAL tab is active, displaying the following text:

```
ute child process "/usr/bin/pm-is-supported" (No such file or directory)

Navigate to this URL:

http://codespaces-ce7094:6080/vnc.html?host=codespaces-ce7094&port=6080

Press Ctrl-C to exit

[✓] XFCE desktop environment is running!
🌐 Access it via the Codespaces HTTPS port (6080)
○ @AbihaNadeem005 → /workspaces/UbuntuMachine (main) $ WebSocket server settings:
 - Listen on :6080
 - Web server. Web root: /usr/share/novnc
 - No SSL/TLS support (no cert file)
 - proxying from :6080 to localhost:5901

(xfdesktop:22926): GVFS-RemoteVolumeMonitor-WARNING **: 19:00:56.675: remote volume monitor with db
us name org.gtk.vfs.UDisks2VolumeMonitor is not supported

** (xfdesktop:22926): WARNING **: 19:00:56.776: Failed to get system bus: Could not connect: No suc
h file or directory
```

Below the terminal, there are sections for OUTLINE and TIMELINE.

## 5. Verify forwarded ports in Codespaces (Ports view)

- Open the Codespaces "Ports" panel / view and confirm port 6080 is forwarded and visible.
- Save a screenshot of the Ports view showing port 6080 and its status:
  - task14\_ports\_view.png

The screenshot shows the VS Code interface for a Codespace named "UbuntuMachine". The left sidebar has icons for Explorer, Search, and others. The main area has tabs for PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, and PORTS (which has 3 notifications). The PORTS tab is active, displaying a table of forwarded ports:

| Port | Forwarded Address                                                                   | Running Process               | Visibility | Origin         |
|------|-------------------------------------------------------------------------------------|-------------------------------|------------|----------------|
| 5900 | <a href="https://didactic-zebra-wrq74596...">https://didactic-zebra-wrq74596...</a> | x1vnc -display:1 -rfbauth...  | Private    | Auto Forwarded |
| 5901 | <a href="https://didactic-zebra-wrq74596...">https://didactic-zebra-wrq74596...</a> | x1vnc -display:1 -rfbauth...  | Private    | Auto Forwarded |
| 6080 | <a href="https://didactic-zebra-wrq74596...">https://didactic-zebra-wrq74596...</a> | /usr/bin/python3 /usr/bin/... | Private    | Auto Forwarded |

At the bottom of the table is a blue "Add Port" button.

## 6. Open forwarded port 6080 and connect to VNC HTML page

- In the Codespaces UI, open the forwarded port's preview URL or copy the forwarded URL and open it in your browser.
- Visit the port 6080 address and click the vnc.html link.
- When prompted for a password enter:

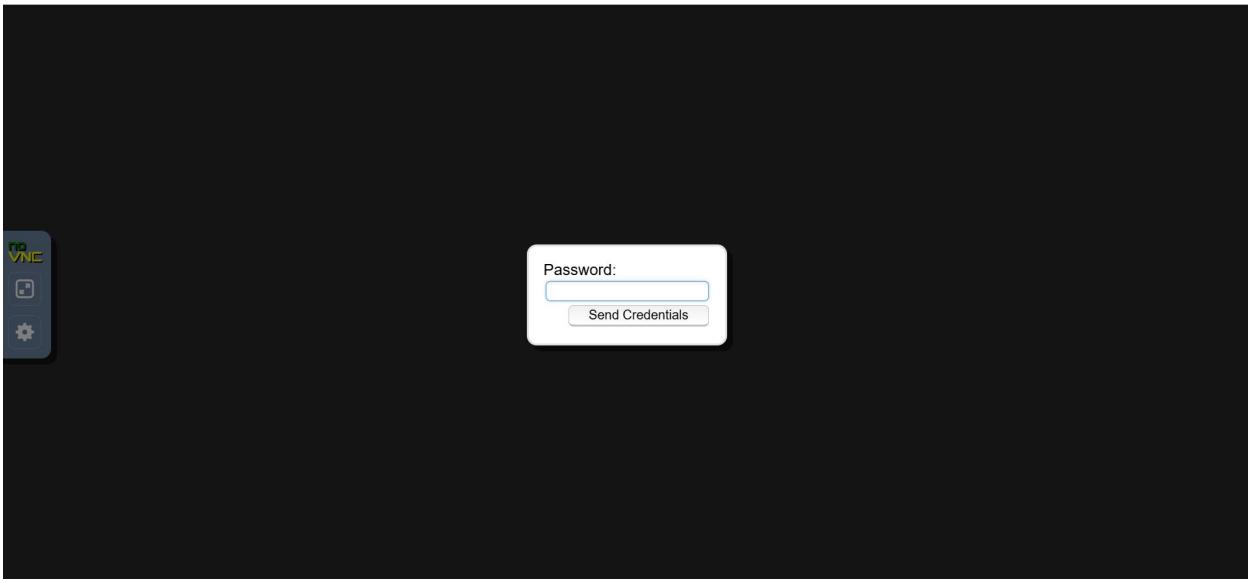
codespace

- Capture screenshots of:
  - The browser showing the forwarded port URL in the address bar / Codespaces preview: task14\_vnc\_url.png

## Directory listing for /

- [app/](#)
- [core/](#)
- [include/](#)
- [utils/](#)
- [vendor/](#)
- [vnc.html](#)
- [vnc\\_auto.html@](#)
- [vnc\\_lite.html](#)

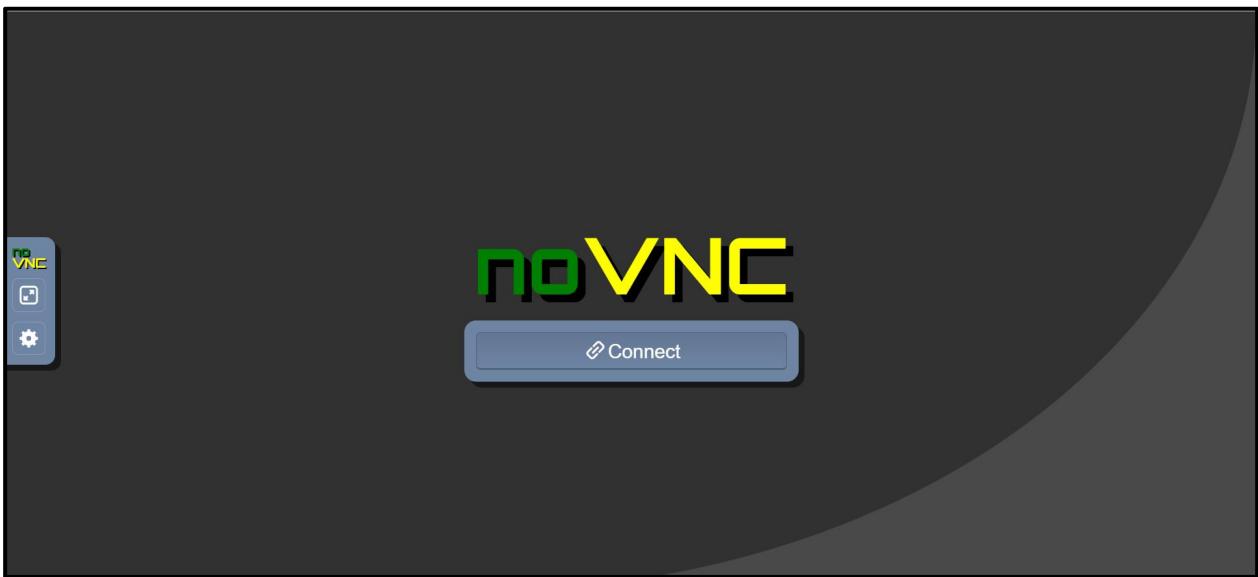
- The VNC password prompt (showing password field; do NOT include typed password in a screenshot): task14\_vnc\_password\_prompt.png



- The VNC session after successful connection showing the GUI/desktop: task14\_vnc\_desktop.png



- (Optional) A focused screenshot of vnc.html UI showing the "Connect" button before/after connecting: task14\_vnc\_connect.png



## 7. Stop the GUI

- When finished, return to the Codespace terminal and run:

```
./stop-desktop.sh
```

- Capture the terminal output that shows the GUI stopping and any cleanup messages.
- Save screenshot as: task14\_stop\_run.png

The screenshot shows the VS Code interface with the title bar "UbuntuMachine [Codespaces: didactic zebra]". The left sidebar has icons for Explorer, Search, and Outline. The main area shows a terminal window titled "[Preview] README.md" with the following content:

```

UbuntuMachine
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
@AbihaNadeem005 → /workspaces/UbuntuMachine (main) $ WebSocket server settings:
- Listen on :6080
- Web server. Web root: /usr/share/novnc
- No SSL/TLS support (no cert file)
- proxying from :6080 to localhost:5901 ...
[*] Stopping x11vnc server...
In exit
[*] Stopping XFCE desktop session...
caught signal: 15
02/11/2025 19:10:42 deleted 60 tile_row polling images.
[*] Stopping virtual X server (Xvfb)...
[✓] All services stopped.

(Thunar:22903): thunar-WARNING **: 19:10:42.488: Name 'org.xfce.FileManager' lost on the message bus.

(Thunar:22903): thunar-WARNING **: 19:10:42.489: Name 'org.freedesktop.FileManager1' lost on the message bus.
xfsettingsd: Another instance took over. Leaving...

** (xfce4-power-manager:22932): WARNING **: 19:10:42.502: Error: The connection is closed

** (xfce4-power-manager:22932): WARNING **: 19:10:42.502: Error: The connection is closed
@AbihaNadeem005 → /workspaces/UbuntuMachine (main) $

```

## Exam Evaluation Questions

### 1. Group Management and Membership

#### Scenario:

Create groups and manage a user's primary and supplementary group memberships.

#### Steps:

1. Create groups g1, g2, and g3.
  - Screenshot: Q1\_groups\_created.png

```

abihanadeem001@abihanaadeem:~$ sudo groupadd g1
[sudo] password for abihanaadeem001:
abihanadeem001@abihanaadeem:~$ sudo groupadd g2
abihanadeem001@abihanaadeem:~$ sudo groupadd g3
abihanadeem001@abihanaadeem:~$
```

2. Change examuser's primary group to g3 and add g1 and g2 as supplementary groups.

- Screenshot: Q1\_group\_changes.png

```

abihanadeem001@abihanaadeem:~$ sudo useradd -m examuser
abihanadeem001@abihanaadeem:~$ sudo usermod -g g3 examuser
abihanadeem001@abihanaadeem:~$ sudo usermod -aG g1,g2 examuser
abihanadeem001@abihanaadeem:~$ id examuser
uid=1006(examuser) gid=1008(g3) groups=1008(g3),1006(g1),1007(g2)
abihanadeem001@abihanaadeem:~$
```

3. Show the final id and /etc/group lines that prove the changes.

- o Screenshot: Q1\_group\_verification.png

```
abihanadeem001@abihanadeem:~$ id examuser
uid=1006(examuser) gid=1008(g3) groups=1008(g3),1006(g1),1007(g2)
abihanadeem001@abihanadeem:~$ _
```

```
games:x:60:
users:x:100:student
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:abihanadeem001
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uuidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
abihanadeem001:x:1000:
rtkit:x:110:
ssl-cert:x:111:abihanadeem001
lightdm:x:112:
nopasswdlogin:x:113:
whoopsie:x:114:
netdev:x:115:
bluetooth:x:116:
scanner:x:117:saned
avahi:x:118:
saned:x:119:
colord:x:120:
lpadmin:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
student:x:1005:
g1:x:1006:examuser
g2:x:1007:examuser
g3:x:1008:
examuser:x:1009:
abihanadeem001@abihanadeem:~$
```

## 2. Ownership and Permission Tasks

### Scenario:

Demonstrate ownership changes and apply both symbolic and numeric permission changes.

### Steps:

1. Create workspace/secret.txt, change its owner to examuser and group to g1.

- o Screenshot: Q2\_chown\_chgrp.png

```
abihanaadeem001@abihanaadeem:~$ mkdir -p workspace
abihanaadeem001@abihanaadeem:~$ touch workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ sudo chown examuser:g1 workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ ls -l workspace/secret.txt
-rw-rw-r-- 1 examuser g1 0 Nov 3 05:35 workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ _
```

2. Remove all permissions for group and others using a symbolic command, then using a numeric command to achieve the same result.

- o Screenshot: Q2\_symbolic\_numeric.png

```
abihanaadeem001@abihanaadeem:~$ sudo chmod go-rwx workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ ls -l workspace/secret.txt
-rw----- 1 examuser g1 0 Nov 3 05:35 workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ _
```

3. Show ls -l for the file after each change to document the permission bits.

- o Screenshot: Q2\_permissions\_ls.png

```
abihanaadeem001@abihanaadeem:~$ sudo chmod go-rwx workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ ls -l workspace/secret.txt
-rw----- 1 examuser g1 0 Nov 3 05:35 workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ sudo chmod 700 workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ ls -l workspace/secret.txt
-rwx----- 1 examuser g1 0 Nov 3 05:35 workspace/secret.txt
abihanaadeem001@abihanaadeem:~$ _
```

## 3. Pipes, Grep, and Redirection Practice

### Scenario:

Filter system logs and save results using redirection and piping.

### Steps:

1. Use grep (or journalctl where applicable) with a pipe to find lines containing "error" or "fail" and show the first 20 results.

- Screenshot: Q3\_grep\_pipe.png

```
abihanaadeem001@abihanaadeem:~$ journalctl -xe | grep -i -E "error|fail" | head -n 20
Nov 03 05:10:29 abihanaadeem multipathd[488]: sda: failed to get udev uid: No data available
Nov 03 05:10:30 abihanaadeem multipathd[587]: sda: failed to get sysfs uid: No such file or directory
Nov 03 05:10:30 abihanaadeem multipathd[587]: sda: failed to get sgio uid: No such file or directory
Nov 03 05:10:30 abihanaadeem multipathd[488]: sda: failed to get udev uid: No data available
Nov 03 05:10:30 abihanaadeem multipathd[488]: sda: failed to get path uid
Nov 03 05:10:30 abihanaadeem multipathd[488]: uevent trigger error
Nov 03 05:10:33 abihanaadeem systemd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled (file watch) was skipped because of a
n unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
Nov 03 05:10:33 abihanaadeem systemd[1]: apport-autoreport.timer - Process error reports when automatic reporting is enabled (timer based) was skipped because of
an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
Nov 03 05:10:34 abihanaadeem systemd[1]: Starting grub-initrd-fallback.service - GRUB failed boot detection...
Nov 03 05:10:35 abihanaadeem systemd[1]: Finished grub-initrd-fallback.service - GRUB failed boot detection.
Nov 03 05:10:38 abihanaadeem NetworkManager[928]: <Info> [1762146638..3267] failed to open /run/network/ifstate
Nov 03 05:10:38 abihanaadeem systemd[1]: Started update-notifier-download.timer - Download data for packages that failed at package install time.
Nov 03 05:10:39 abihanaadeem xrdp[1323]: error opening log file [/The log is not properly started]. quitting.
Nov 03 05:10:39 abihanaadeem systemd[1]: xrdp.service: Control process exited, code=exited, status=1/FAILURE
Nov 03 05:10:39 abihanaadeem systemd[1]: xrdp.service: Failed with result 'exit-code'.
[[Unit Subject: Unit failed
The unit xrdp.service has entered the 'failed' state with result 'exit-code'.
Nov 03 05:10:39 abihanaadeem systemd[1]: Failed to start xrdp.service - xrdp daemon.
[[Subject: A start job for unit xrdp.service has failed
A start job for unit xrdp.service has finished with a failure.
abihanaadeem001@abihanaadeem:~$ _
```

- Save the filtered results to a file `~/logs/errors.txt` using overwrite, then append additional matching lines using append redirection.

- Screenshot: Q3\_redirect\_overwrite\_append.png

```
abihanaadeem001@abihanaadeem:~$ mkdir -p ~/logs
abihanaadeem001@abihanaadeem:~$ journalctl -xe | grep -i -E "error|fail" > ~/logs/errors.txt
-bash: ~/logs/errors.txt: No such file or directory
abihanaadeem001@abihanaadeem:~$ journalctl -xe | grep -i -E "error|fail" > "/logs/errors.txt"
abihanaadeem001@abihanaadeem:~$ journalctl -xe | grep -i -E "error|fail" >> ~/logs/errors.txt
abihanaadeem001@abihanaadeem:~$
```

- Use a pager to view the saved file.

- Screenshot: Q3\_pager\_view.png

```
Nov 03 05:10:29 abihanaadeem multipathd[488]: sda: failed to get udev uid: No data available
Nov 03 05:10:30 abihanaadeem multipathd[587]: sda: failed to get sysfs uid: No such file or directory
Nov 03 05:10:30 abihanaadeem multipathd[587]: sda: failed to get sgio uid: No such file or directory
Nov 03 05:10:30 abihanaadeem multipathd[488]: sda: failed to get udev uid: No data available
Nov 03 05:10:30 abihanaadeem multipathd[488]: sda: failed to get path uid
Nov 03 05:10:30 abihanaadeem multipathd[488]: uevent trigger error
Nov 03 05:10:33 abihanaadeem systemd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled (file watch) was skipped because of a
n unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
Nov 03 05:10:33 abihanaadeem systemd[1]: apport-autoreport.timer - Process error reports when automatic reporting is enabled (timer based) was skipped because of
an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
Nov 03 05:10:34 abihanaadeem systemd[1]: Starting grub-initrd-fallback.service - GRUB failed boot detection...
Nov 03 05:10:35 abihanaadeem systemd[1]: Finished grub-initrd-fallback.service - GRUB failed boot detection.
Nov 03 05:10:38 abihanaadeem NetworkManager[928]: <Info> [1762146638..3267] failed to open /run/network/ifstate
Nov 03 05:10:38 abihanaadeem systemd[1]: Started update-notifier-download.timer - Download data for packages that failed at package install time.
Nov 03 05:10:39 abihanaadeem xrdp[1323]: error opening log file [/The log is not properly started]. quitting.
Nov 03 05:10:39 abihanaadeem systemd[1]: xrdp.service: Control process exited, code=exited, status=1/FAILURE
Nov 03 05:10:39 abihanaadeem systemd[1]: xrdp.service: Failed with result 'exit-code'.
[[Unit Subject: Unit failed
The unit xrdp.service has entered the 'failed' state with result 'exit-code'.
Nov 03 05:10:39 abihanaadeem systemd[1]: Failed to start xrdp.service - xrdp daemon.
[[Subject: A start job for unit xrdp.service has failed
A start job for unit xrdp.service has finished with a failure.
Nov 03 05:10:39 abihanaadeem systemd[1]: xrdp.service: Control process exited, code=exited, status=1/FAILURE
Nov 03 05:10:39 abihanaadeem systemd[1]: xrdp.service: Failed with result 'exit-code'.
[[Unit Subject: Unit failed
The unit xrdp-seman.service has entered the 'failed' state with result 'exit-code'.
Nov 03 05:10:40 abihanaadeem multipathd[1423]: sda: failed to get sysfs uid: No such file or directory
Nov 03 05:10:40 abihanaadeem multipathd[1423]: sda: failed to get sgio uid: No such file or directory
Nov 03 05:10:40 abihanaadeem multipathd[488]: sda: failed to get udev uid: No data available
Nov 03 05:10:40 abihanaadeem multipathd[488]: sda: failed to get path uid
Nov 03 05:10:40 abihanaadeem multipathd[488]: uevent trigger error
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.283320901Z" level=info msg="skip loading plugin \"io.containerd.snapshotter.v1.aufs\"...
" error="aufs is not supported (modprobe aufs failed: exit status 1)modprobe: FATAL: Module aufs not found in directory /lib/modules/6.8.0-86-generic\n\n": s
kip plugin" type=io.containerd.snapshotter.v1
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.295710643Z" level=info msg="skip loading plugin \"io.containerd.snapshotter.v1.blockfile
\"..." error="no scratch file generator: skip plugin" type=io.containerd.snapshotter.v1
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.300598780Z" level=info msg="skip loading plugin \"io.containerd.snapshotter.v1.btrfs\"...
" error="path /var/lib/containerd/io.containerd.snapshotter.v1.btrfs (ext4) must be a btrfs filesystem to be used with the btrfs snapshotter: skip plugin" type
=io.containerd.snapshotter.v1
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.301465515Z" level=info msg="skip loading plugin \"io.containerd.snapshotter.v1.devmapper
\"..." error="devmapper not configured: skip plugin" type=io.containerd.snapshotter.v1
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.304549329Z" level=info msg="skip loading plugin \"io.containerd.snapshotter.v1.zfs\"...
" error="path /var/lib/containerd/io.containerd.snapshotter.v1.zfs must be a zfs filesystem to be used with the zfs snapshotter: skip plugin" type=io.containerd.
snapshotter.v1
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.330694877Z" level=info msg="skip loading plugin \"io.containerd.tracing.processor.v1.ctl
pv..." error="skip plugin: tracing endpoint not configured" type=io.containerd.tracing.processor.v1
Nov 03 05:10:40 abihanaadeem containerd[1308]: time="2025-11-03T05:10:40.330744547Z" level=info msg="skip loading plugin \"io.containerd.internal.v1.tracing\"...
" error="skip plugin: tracing endpoint not configured" type=io.containerd.internal.v1
/home/abihanaadeem001/logs/errors.txt
```

#### 4. Script: Variables, Command Substitution, File & Dir Checks

##### Scenario:

Build and run a script incrementally that demonstrates variables, command substitution, and filesystem checks.

##### Steps:

1. Create setup.sh with a shebang and a variable var1 that you echo.

- o Screenshot: Q4\_step1\_var1.png

```
#!/bin/bash
var1="Hello this is var1"
echo "$var1"

~
```

```
~
~
"setup.sh" 3L, 51B written
abihanadeem001@abihanadeem:~$./setup.sh
Hello this is var1
abihanadeem001@abihanadeem:~$
```

2. Append command substitution that stores ls -l output into a variable and echo it.

- o Screenshot: Q4\_step2\_allfiles.png

```
#!/bin/bash
var1="Hello this is var1"
echo "$var1"

files=$(ls -l)
echo "Files in current directory:"
echo "$files"

~
```

```

"setup.sh" 7L, 119B written
abihanaadeem001@abihanaadeem:~$./setup.sh
Hello this is var1
Files in current directory:
total 544344
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 430 Oct 23 16:41 answers.md
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 465 Oct 25 09:44 apt_update_vs_upgrade.md
drwxrwxr-x 3 abihanaadeem001 abihanaadeem001 4096 Oct 26 17:56 CC-Lab3
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Desktop
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 404639744 Oct 30 17:41 docker-desktop-amd64.deb
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 152625152 Oct 30 17:21 docker-desktop-amd64.deb.1
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 409 Oct 26 12:08 docker-desktop.deb
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 12:12 Documents
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 30 07:47 Downloads
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 0 Nov 2 16:32 journal_errors.txt
drwxrwxr-x 3 abihanaadeem001 abihanaadeem001 4096 Oct 23 16:55 lab4
drwxrwxr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 26 11:22 Lab5
drwxrwxr-x 2 abihanaadeem001 abihanaadeem001 4096 Nov 3 05:57 logs
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Music
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Pictures
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Public
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 774 Oct 23 18:34 Q2_report.md
drwxrwxr-x 6 abihanaadeem001 abihanaadeem001 4096 Oct 23 18:50 sandbox_workspace
drwxrwxr-x 6 abihanaadeem001 abihanaadeem001 4096 Oct 23 18:52 sandbox_workspace_backup
-rwxrwxr-x 1 abihanaadeem001 abihanaadeem001 119 Nov 3 06:49 setup.sh
drwx----- 1 abihanaadeem001 abihanaadeem001 4096 Oct 24 07:52 snap
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 40987 Nov 2 16:30 syslog_systemd.txt
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Templates
drwxrwxr-t 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 thinclient_drives
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Videos
drwxrwxr-x 2 abihanaadeem001 abihanaadeem001 4096 Nov 3 05:35 workspace
abihanaadeem001@abihanaadeem:~$
```

3. Append directory and file checks that create dir1 and dir1/file2 if missing, and display their final permissions.

- o Screenshot: Q4\_step3\_dirfile\_checks.png

```

#!/bin/bash
vari="Hello this is var1"
echo "$vari"

files=$(ls -1)
echo "Files in current directory:"
echo "$files"

#Check and create directory and file
dir="dir1"
file="$dir/file2"

#create directory if it doesn't exist
if [! -d "$dir"]; then
 mkdir "$dir"
 echo "Directory $dir created."
fi

#create file if it doesn't exist
if [! -f "$file"]; then
 touch "$file"
 echo "File $file created."
fi

#Show final permissions
echo "Final permissions:"
```

```

"setup.sh" 29L, 481B written
abihanaadeem001@abihanaadeem:~/`$./setup.sh
Hello this is vari
Files in current directory:
total 544344
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 430 Oct 23 16:41 answers.md
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 465 Oct 25 09:44 apt_update_vs_upgrade.md
drwxrwxr-x 3 abihanaadeem001 abihanaadeem001 4096 Oct 26 17:56 CC-Lab3
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Desktop
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 404639744 Oct 30 17:41 docker-desktop-amd64.deb
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 152625152 Oct 30 17:21 docker-desktop-amd64.deb.1
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 409 Oct 26 12:08 docker-desktop.deb
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 12:12 Documents
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 30 07:47 Downloads
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 0 Nov 2 16:32 journal_errors.txt
drwxrwxr-x 3 abihanaadeem001 abihanaadeem001 4096 Oct 23 16:55 lab4
drwxrwxr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 26 11:22 Lab5
drwxrwxr-x 2 abihanaadeem001 abihanaadeem001 4096 Nov 3 05:57 logs
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Music
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Pictures
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Public
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 774 Oct 23 18:34 Q2_report.md
drwxrwxr-x 6 abihanaadeem001 abihanaadeem001 4096 Oct 23 18:50 sandbox_workspace
drwxrwxr-x 6 abihanaadeem001 abihanaadeem001 4096 Oct 23 18:52 sandbox_workspace_backup
-rwuxrwxr-x 1 abihanaadeem001 abihanaadeem001 481 Nov 3 06:58 setup.sh
drwx----- 3 abihanaadeem001 abihanaadeem001 4096 Oct 24 07:52 snap
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 40987 Nov 2 16:30 syslog_systemd.txt
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Templates
drwxrwxr-t 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 thinclient_drives
drwxr-xr-x 2 abihanaadeem001 abihanaadeem001 4096 Oct 25 11:09 Videos
drwxrwxr-x 2 abihanaadeem001 abihanaadeem001 4096 Nov 3 05:35 workspace
Directory dir1 created.
File dir1/file2 created.
Final permissions:
total 0
-rw-rw-r-- 1 abihanaadeem001 abihanaadeem001 0 Nov 3 06:58 file2
abihanaadeem001@abihanaadeem:~$ _

```

## 5. Script: Comparisons and String Tests

### Scenario:

Incrementally add numeric and string comparison tests to a script and show both true/false cases.

### Steps:

1. Overwrite setup.sh to set num=\$1 and str=\$2, and add an -eq test showing true and false examples.
  - o Screenshot: Q5\_eq\_examples.png

```

#!/bin/bash
num=$1
str=$2
if ["$num" -eq 5]; then
 echo "$num is equal to 5"
else
 echo "$num is not equal to 5"
fi

^
^
^
^

```

```
~ "setup.sh" 10L, 120B written
abihanaadeem001@abihanaadeem:~$./setup.sh 4
4 is not equal to 5
abihanaadeem001@abihanaadeem:~$./setup.sh 5
5 is equal to 5
abihanaadeem001@abihanaadeem:~$./setup.sh 78
78 is not equal to 5
abihanaadeem001@abihanaadeem:~$ _
```

2. Append -ne, -gt, -lt, -ge, and -le tests and demonstrate at least one true and one false invocation for each.

- o Screenshot: Q5\_numeric\_tests.png

```
#!/bin/bash
num=$1
str=$2
if ["$num" -eq 5]; then
 echo "$num is equal to 5 (true)"
else
 echo "$num is not equal to 5 (false)"
fi

if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (true)"
else
 echo "$num is equal to 10 (false)"
fi

if ["$num" -gt 2]; then
 echo "$num is greater than 2 (true)"
else
 echo "$num is not greater than 2 (false)"
fi

if ["$num" -ge 14]; then
 echo "$num is greater than or equal to 14 (true)"
else
 echo "$num is less than 14 (false)"
fi

if ["$num" -le 12]; then
 echo "$num is less than or equal to 12 (true)"
else
 echo "$num is greater than 12 (false)"
fi
```

```
"setup.sh" 34L, 610B written
abihanadeem001@abihanadeem:~$./setup.sh 12
12 is not equal to 5 (false)
12 is not equal to 10 (true)
12 is greater than 2 (true)
12 is less than 14 (false)
12 is less than or equal to 12 (true)
abihanadeem001@abihanadeem:~$./setup.sh 2
2 is not equal to 5 (false)
2 is not equal to 10 (true)
2 is not greater than 2 (false)
2 is less than 14 (false)
2 is less than or equal to 12 (true)
abihanadeem001@abihanadeem:~$ _
```

3. Append string equality (=) and inequality (!=) checks and a -z (zero-length) test for the second argument, demonstrating true/false cases.

- o Screenshot: Q5\_string\_tests.png

```
str=$2
if ["$num" -eq 5]; then
 echo "$num is equal to 5 (true)"
else
 echo "$num is not equal to 5 (false)"
fi

if ["$num" -ne 10]; then
 echo "$num is not equal to 10 (true)"
else
 echo "$num is equal to 10 (false)"
fi

if ["$num" -gt 2]; then
 echo "$num is greater than 2 (true)"
else
 echo "$num is not greater than 2 (false)"
fi

if ["$num" -ge 14]; then
 echo "$num is greater than or equal to 14 (true)"
else
 echo "$num is less than 14 (false)"
fi

if ["$num" -le 12]; then
 echo "$num is less than or equal to 12 (true)"
else
 echo "$num is greater than 12 (false)"
fi

if ["$str" = "hello"]; then
 echo "String is equal to 'hello' (true)"
else
 echo "String is not equal to 'hello' (false)"
fi

if ["$str" != "world"]; then
 echo "String is not equal to world (true)"
else
 echo "String is equal to world (false)"
fi

if [-z "$str"]; then
 echo "String has zero length (true)"
else
 echo "String is not zero length (false)"
fi

-- INSERT --
```

```

 echo "$num is greater than 12 (false)"
fi

if ["$str" = "hello"]; then
 echo "String is equal to 'hello' (true)"
else
 echo "String is not equal to 'hello' (false)"
fi

if ["$str" != "world"]; then
 echo "String is not equal to world (true)"
else
 echo "String is equal to world (false)"
fi

if [-z "$str"]; then
 echo "String has zero length (true)"
else
 echo "String is not zero length (false)"
fi

"setup.sh" 51L, 974B written
abihanaadeem001@abihanaadeem:~$./setup.sh 4 hello
4 is not equal to 5 (false)
4 is not equal to 10 (true)
4 is greater than 2 (true)
4 is less than 14 (false)
4 is less than or equal to 12 (true)
String is equal to 'hello' (true)
String is not equal to world (true)
String is not zero length (false)
abihanaadeem001@abihanaadeem:~$./setup.sh 8 world
8 is not equal to 5 (false)
8 is not equal to 10 (true)
8 is greater than 2 (true)
8 is less than 14 (false)
8 is less than or equal to 12 (true)
String is not equal to 'hello' (false)
String is equal to world (false)
String is not zero length (false)
abihanaadeem001@abihanaadeem:~$./setup.sh 16 ""
16 is not equal to 5 (false)
16 is not equal to 10 (true)
16 is greater than 2 (true)
16 is greater than or equal to 14 (true)
16 is greater than 12 (false)
String is not equal to 'hello' (false)
String is not equal to world (true)
String has zero length (true)
abihanaadeem001@abihanaadeem:~$
```

## 6. Script: For Loop and Argument Handling

### Scenario:

Write a script that prints all provided arguments and demonstrate correct handling of quoted multi-word arguments.

## Steps:

1. Create/overwrite setup.sh to print every argument using "\$@" in a for loop and save the file.
    - o Screenshot: Q6\_script\_forloop\_vim.png

```
#!/bin/bash
echo "List of all arguments passed:"
for arg in "$@"
do
 echo "$arg"
done
```

- Run the script with mixed single and quoted multi-word arguments and capture the output showing each argument on its own line.
    - Screenshot: Q6\_forloop\_run.png

```
abihanaadeem001@abihanaadeem:~$./setup.sh Hello "Good Morning" 123
List of all arguments passed:
Hello
Good Morning
123
abihanaadeem001@abihanaadeem:~$ _
```

## 7. Script: While Loop Summation and Functions

### Scenario:

Implement an interactive or non-interactive summation function and a demonstrated function that returns a numeric result.

### Steps:

1. Write an interactive while-loop that accumulates numbers until q is entered and shows running totals.

- o Screenshot: Q7\_while\_session.png

```
#!/bin/bash
sum=0
while true
do
 read -p "Enter a number (or 'q' to quit): " num
 if ["$num" = "q"]; then
 break
 fi
 sum=$((sum + num))
 echo "Current total: $sum"
done
echo "Final Total: $sum"
```

```
abihanaadeem001@abihanaadeem:~$./setup.sh
Enter a number (or 'q' to quit): 4
Current total: 4
Enter a number (or 'q' to quit): 5
Current total: 9
Enter a number (or 'q' to quit): 2
Current total: 11
Enter a number (or 'q' to quit): 6
Current total: 17
Enter a number (or 'q' to quit): 3
Current total: 20
Enter a number (or 'q' to quit): q
Final Total: 20
abihanaadeem001@abihanaadeem:~$
```

2. Add a function that accepts two numeric arguments, returns their sum, and demonstrate capturing its result in a variable.

- o Screenshot: Q7\_function\_sum.png

```
#!/bin/bash
sum_two()
{
 local a=$1
 local b=$2
 echo $((a + b))
}
result=$(sum_two 3 4)
echo "The sum of 3 and 4 is: $result"
```

```
"setup.sh" 11L, 133B written
abihanadeem001@abihanadeem:~$./setup.sh
The sum of 3 and 4 is: 7
abihanadeem001@abihanadeem:~$ _
```

\*\*\*\*\*