Lab 6

Lab Title: Linux Users, Groups, Permissions, Pipes, and Bash Scripting

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Course Title: Cloud Computing

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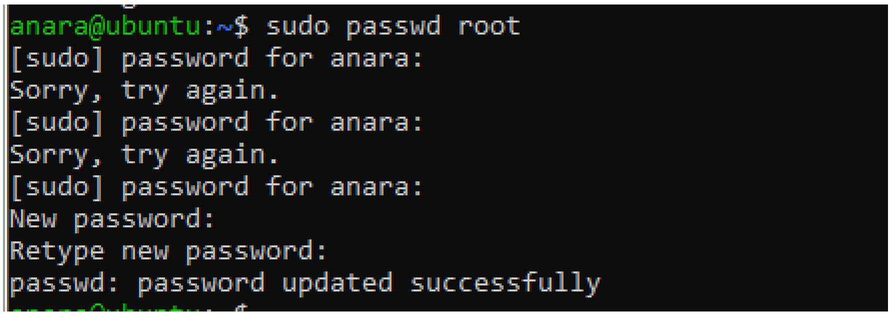
Reg#No: 2023-BSE-008

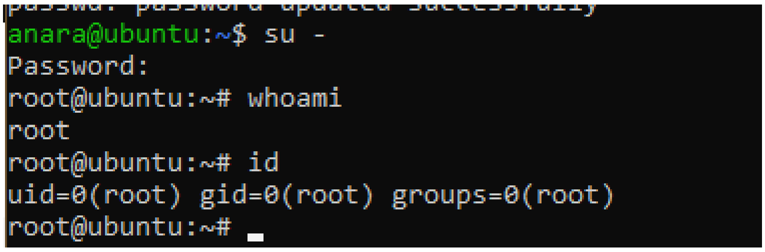
Task 1 – Switch to root with su - and back to a normal user

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



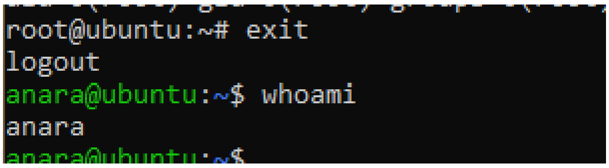
```
anara@ubuntu:~$ sudo passwd root
[sudo] password for anara:
Sorry, try again.
[sudo] password for anara:
Sorry, try again.
[sudo] password for anara:
New password:
Retype new password:
passwd: password updated successfully
```

2. **Switch to root and verify:**



```
passwd: password updated successfully
anara@ubuntu:~$ su -
Password:
root@ubuntu:~# whoami
root
root@ubuntu:~# id
uid=0(root) gid=0(root) groups=0(root)
root@ubuntu:~# _
```

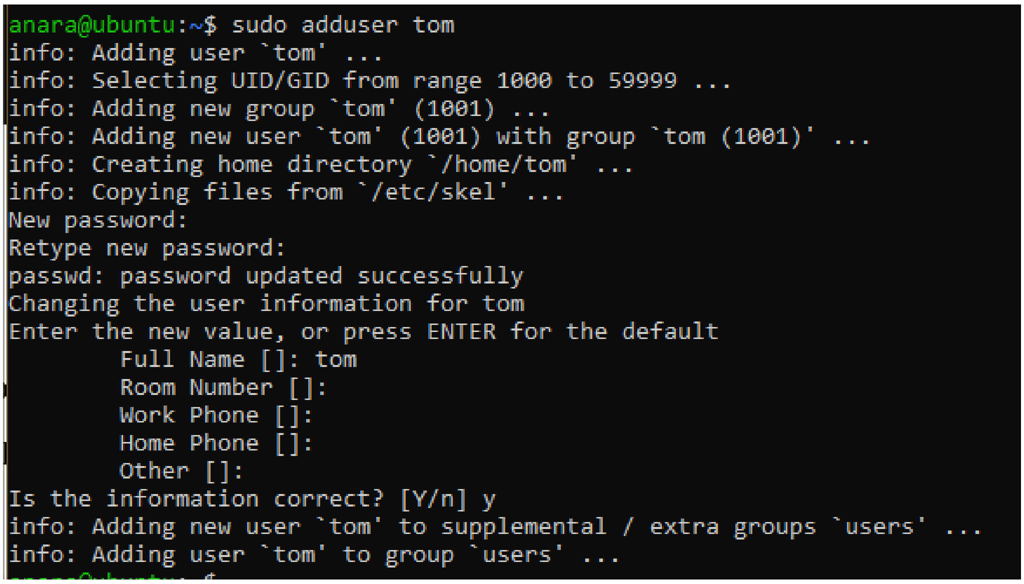
3. **Switch back to your normal user:**



```
root@ubuntu:~# exit
logout
anara@ubuntu:~$ whoami
anara
anara@ubuntu:~$
```

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

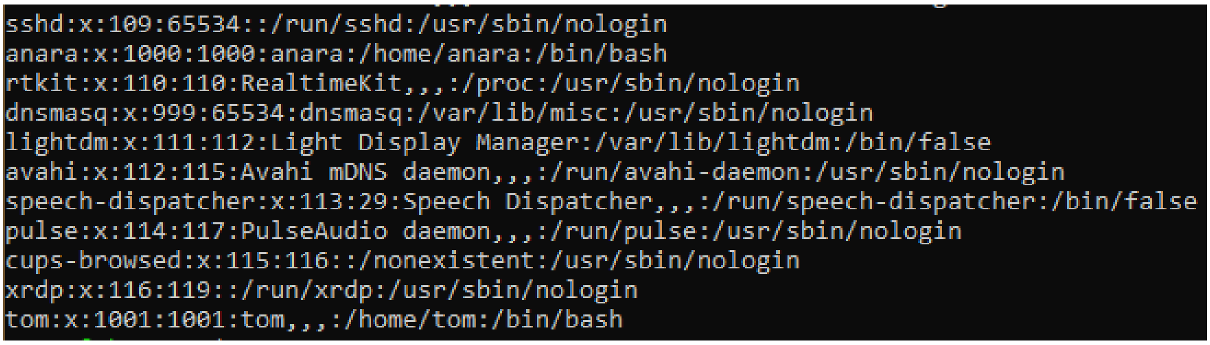
1. **Create user tom (interactive, sets password and home directory):**



```
anara@ubuntu:~$ 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 []: tom
        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' ...
```

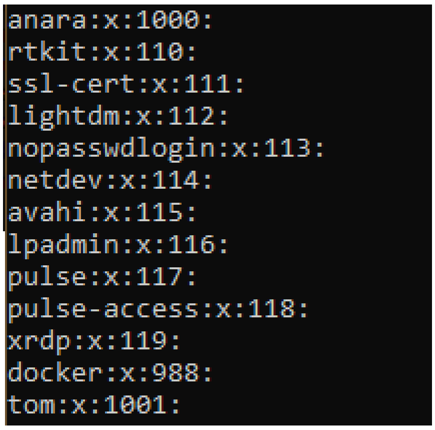
2. **Verify tom in system files (view and visually confirm presence):**

cat /etc/passwd



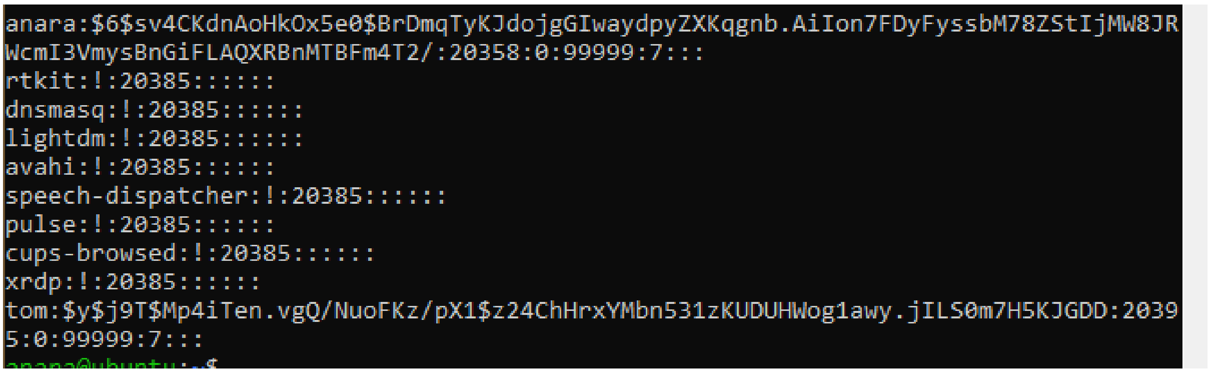
```
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
anara:x:1000:1000:anara:/home/anara:/bin/bash
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
lightdm:x:111:112:Light Display Manager:/var/lib/lightdm:/bin/false
avahi:x:112:115:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:114:117:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:116::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1001:tom,,,:/home/tom:/bin/bash
```

cat /etc/group



```
anara:x:1000:
rtkit:x:110:
ssl-cert:x:111:
lightdm:x:112:
nopasswdlogin:x:113:
netdev:x:114:
avahi:x:115:
lpadmin:x:116:
pulse:x:117:
pulse-access:x:118:
xrdp:x:119:
docker:x:988:
tom:x:1001:
```

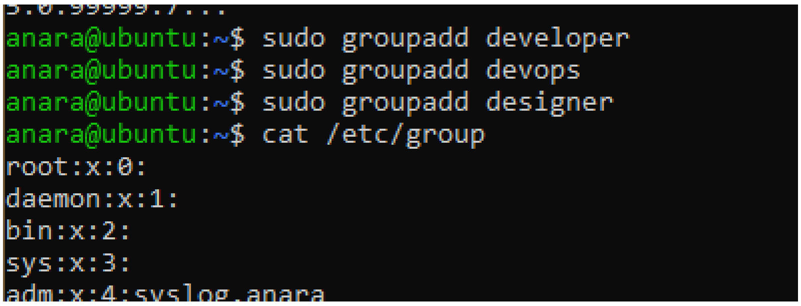
sudo cat /etc/shadow



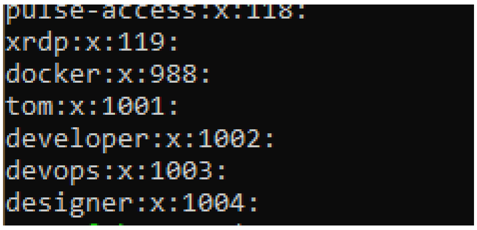
```
anara:$6$sv4CKdnAoHkOx5e0$BrDmqTyKJdojgGIwaydpyZXKqgnb.AiIon7FDyFyssbM78ZStIjMW8JR
WcmI3VmysBnGiFLAQXRBnMTBFm4T2/:20358:0:99999:7:::
rtkit:!:20385::::::
dnsmasq:!:20385::::::
lightdm:!:20385::::::
avahi:!:20385::::::
speech-dispatcher:!:20385::::::
pulse:!:20385::::::
cups-browsed:!:20385::::::
xrdp:!:20385::::::
tom:$y$j9T$Mp4iTen.vgQ/NuoFKz/pX1$z24ChHrxYMbn531zKUDUHWog1awy.jILS0m7H5KJGDD:2039
5:0:99999:7:::
```

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

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

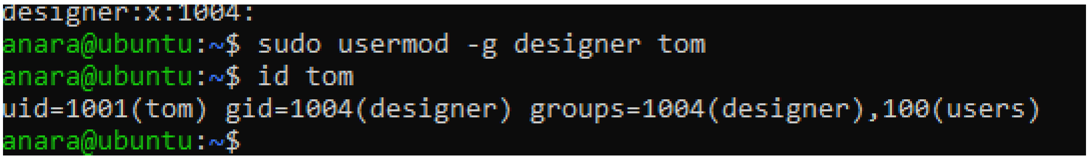


```
3.0.99999.7...
anara@ubuntu:~$ sudo groupadd developer
anara@ubuntu:~$ sudo groupadd devops
anara@ubuntu:~$ sudo groupadd designer
anara@ubuntu:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,anara
```



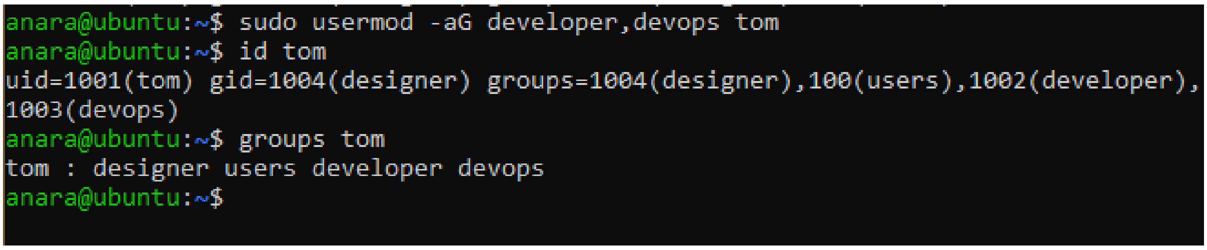
```
pulse-access:x:118:
xrdp:x:119:
docker:x:988:
tom:x:1001:
developer:x:1002:
devops:x:1003:
designer:x:1004:
```

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



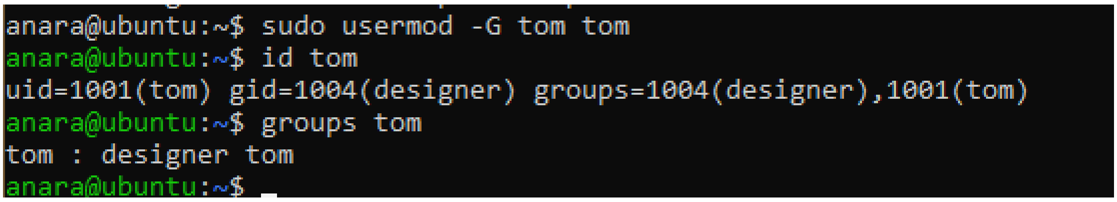
```
designer:x:1004:
anara@ubuntu:~$ sudo usermod -g designer tom
anara@ubuntu:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users)
anara@ubuntu:~$
```

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



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

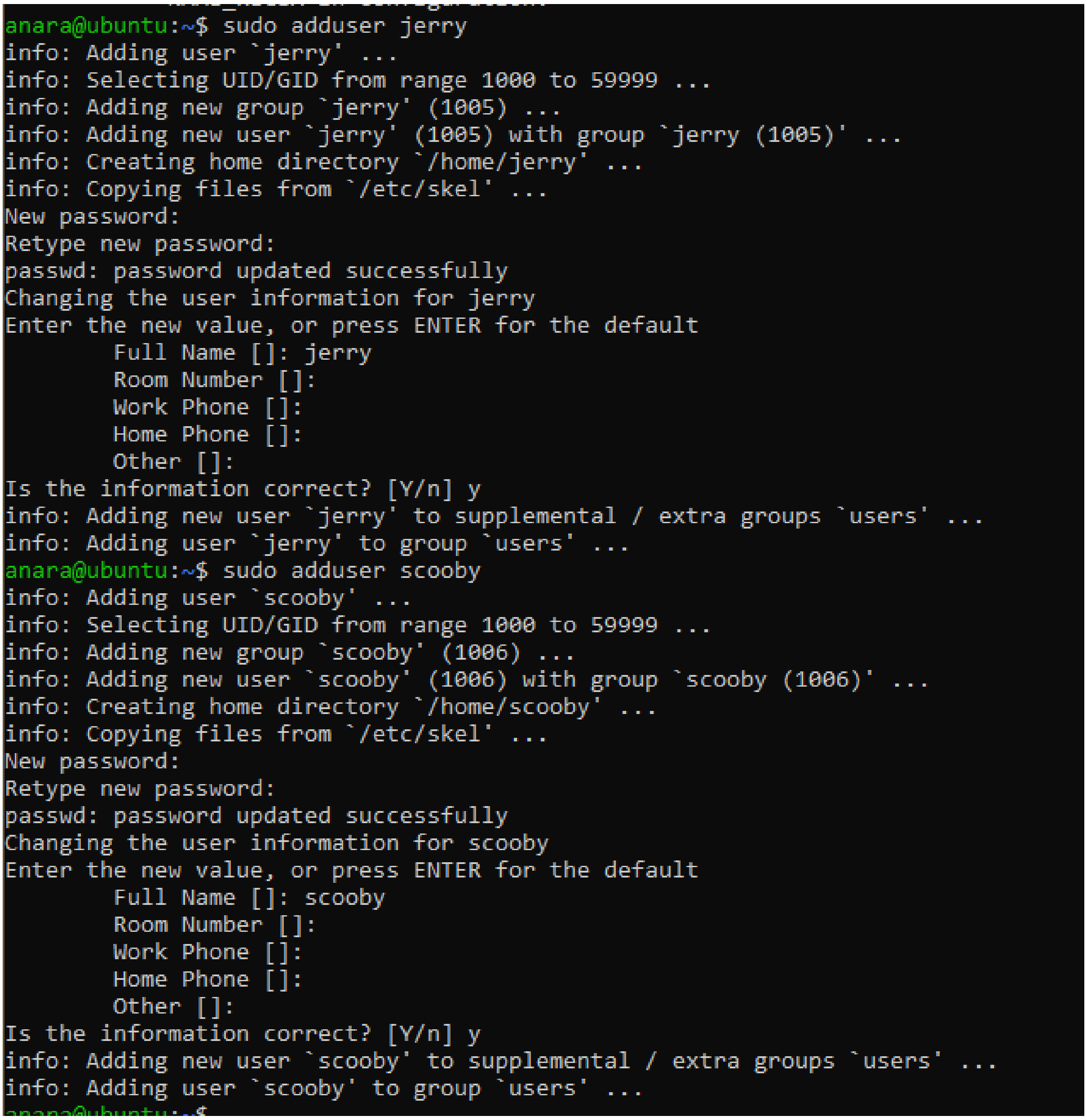
4. **Replace all secondary groups so only tom (user’s own group) remains and verify**



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

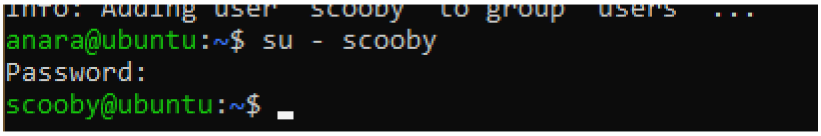
Task 4 – Create/delete users (Jerry, Scooby) and groups (jolly, anime)

1. **Create users:**



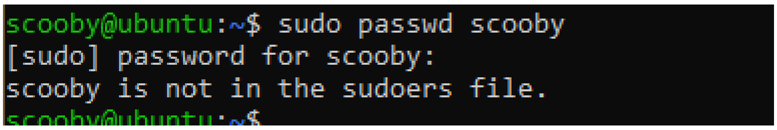
```
anara@ubuntu:~$ sudo adduser jerry
info: Adding user `jerry' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `jerry' (1005) ...
info: Adding new user `jerry' (1005) with group `jerry (1005)' ...
info: Creating home directory `/home/jerry' ...
info: Copying files from `/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 []: jerry
        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' ...
anara@ubuntu:~$ 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 []: scooby
        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' ...
anara@ubuntu:~$
```

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



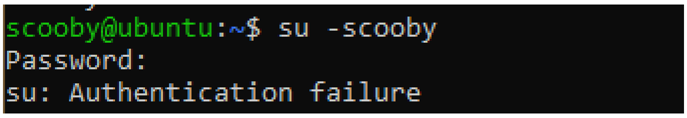
```
info: Adding user `scooby' to group `users' ...
anara@ubuntu:~$ su - scooby
Password:
scooby@ubuntu:~$ _
```

3. **Set a password for Scooby:**



```
scooby@ubuntu:~$ sudo passwd scooby
[sudo] password for scooby:
scooby is not in the sudoers file.
scooby@ubuntu:~$
```

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



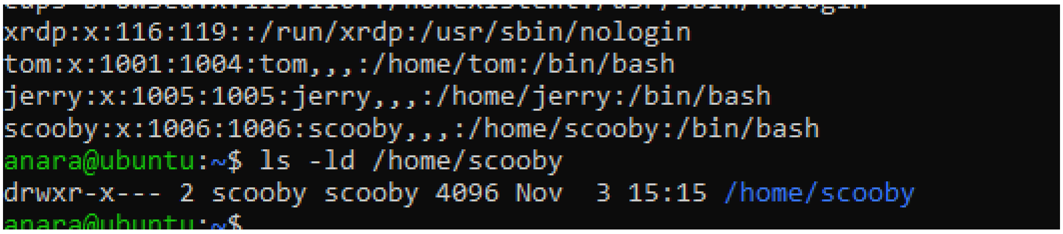
```
scooby@ubuntu:~$ su -scooby
Password:
su: Authentication failure
```

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

exit

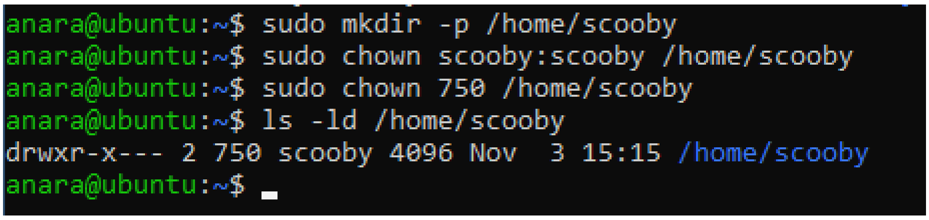
cat /etc/passwd

ls -ld /home/Scooby



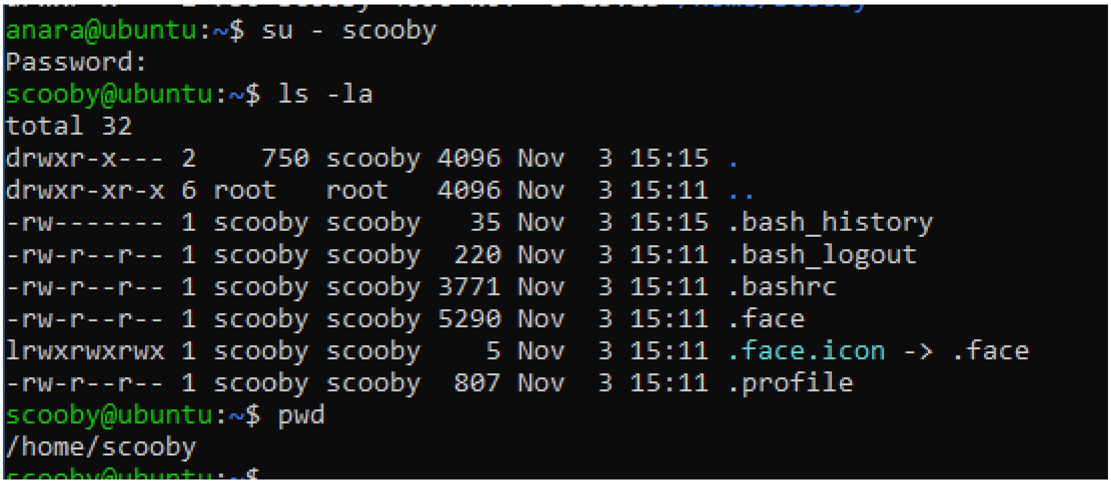
```
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:tom,,,:/home/tom:/bin/bash
jerry:x:1005:1005:jerry,,,:/home/jerry:/bin/bash
scooby:x:1006:1006:scooby,,,:/home/scooby:/bin/bash
anara@ubuntu:~$ ls -ld /home/scooby
drwxr-x--- 2 scooby scooby 4096 Nov  3 15:15 /home/scooby
anara@ubuntu:~$
```

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



```
anara@ubuntu:~$ sudo mkdir -p /home/scooby
anara@ubuntu:~$ sudo chown scooby:scooby /home/scooby
anara@ubuntu:~$ sudo chown 750 /home/scooby
anara@ubuntu:~$ ls -ld /home/scooby
drwxr-x--- 2 750 scooby 4096 Nov  3 15:15 /home/scooby
anara@ubuntu:~$ 
```

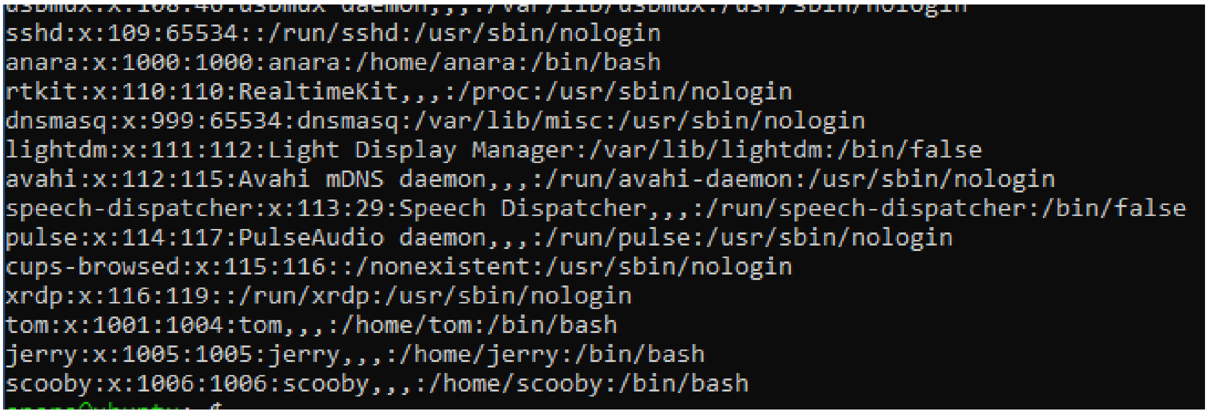
7. **Log in as Scooby again and verify you land in the correct home directory:**



```
anara@ubuntu:~$ su - scooby
Password:
scooby@ubuntu:~$ ls -la
total 32
drwxr-x--- 2    750 scooby 4096 Nov  3 15:15 .
drwxr-xr-x 6 root   root   4096 Nov  3 15:11 ..
-rw------- 1 scooby scooby   35 Nov  3 15:15 .bash_history
-rw-r--r-- 1 scooby scooby  220 Nov  3 15:11 .bash_logout
-rw-r--r-- 1 scooby scooby 3771 Nov  3 15:11 .bashrc
-rw-r--r-- 1 scooby scooby 5290 Nov  3 15:11 .face
lrwxrwxrwx 1 scooby scooby    5 Nov  3 15:11 .face.icon -> .face
-rw-r--r-- 1 scooby scooby  807 Nov  3 15:11 .profile
scooby@ubuntu:~$ pwd
/home/scooby
scooby@ubuntu:~$
```

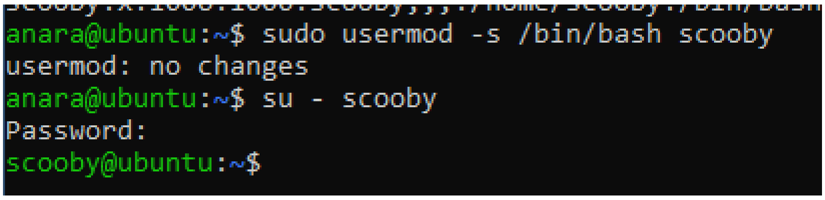
8. **Verify users in system files and observe shell of Scooby**

```
9.  cat /etc/passwd
```



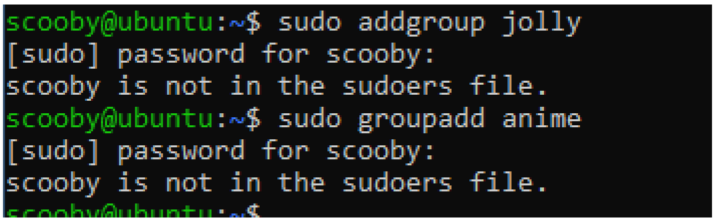
```
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
anara:x:1000:1000:anara:/home/anara:/bin/bash
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
lightdm:x:111:112:Light Display Manager:/var/lib/lightdm:/bin/false
avahi:x:112:115:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:114:117:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:116::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:tom,,,:/home/tom:/bin/bash
jerry:x:1005:1005:jerry,,,:/home/jerry:/bin/bash
scooby:x:1006:1006:scooby,,,:/home/scooby:/bin/bash
```

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



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

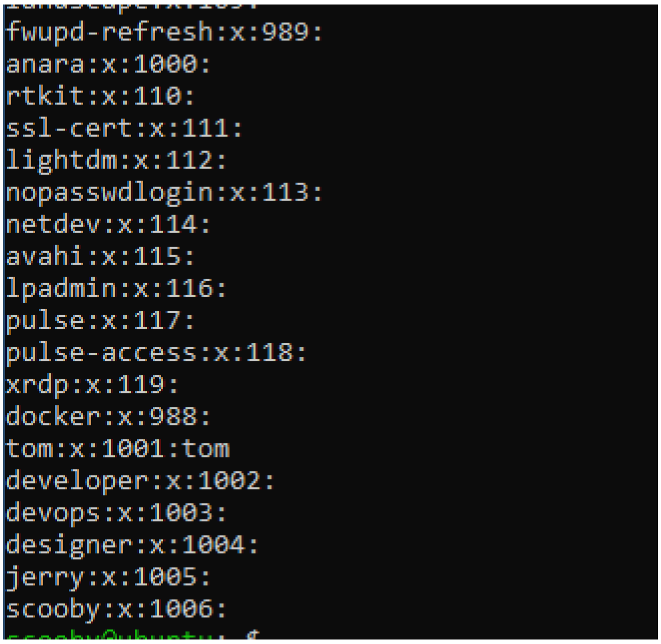
10.Create groups:



```
scooby@ubuntu:~$ sudo addgroup jolly
[sudo] password for scooby:
scooby is not in the sudoers file.
scooby@ubuntu:~$ sudo groupadd anime
[sudo] password for scooby:
scooby is not in the sudoers file.
```

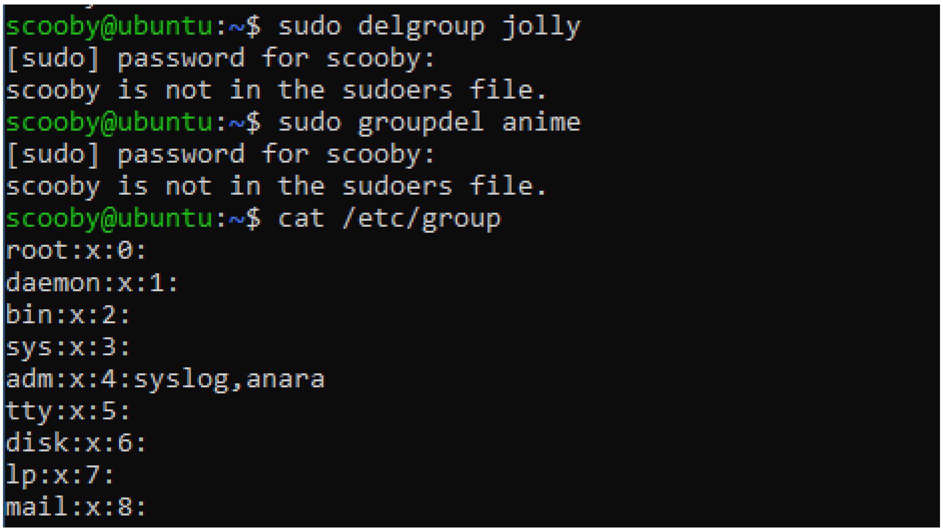
10.Verify groups:

cat /etc/group

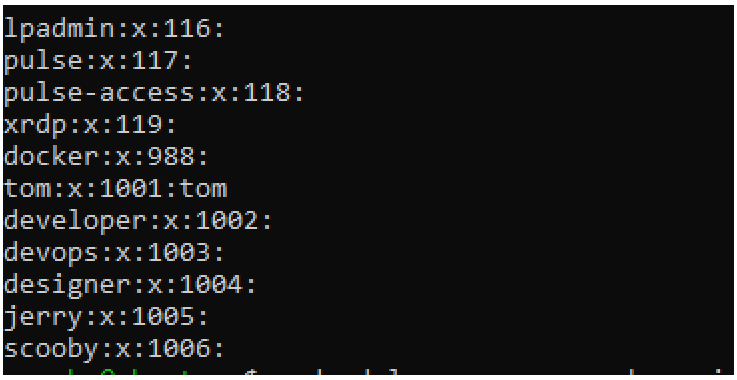


```
fwupd-refresh:x:989:
anara:x:1000:
rtkit:x:110:
ssl-cert:x:111:
lightdm:x:112:
nopasswdlogin:x:113:
netdev:x:114:
avahi:x:115:
lpadmin:x:116:
pulse:x:117:
pulse-access:x:118:
xrdp:x:119:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
jerry:x:1005:
scooby:x:1006:
```

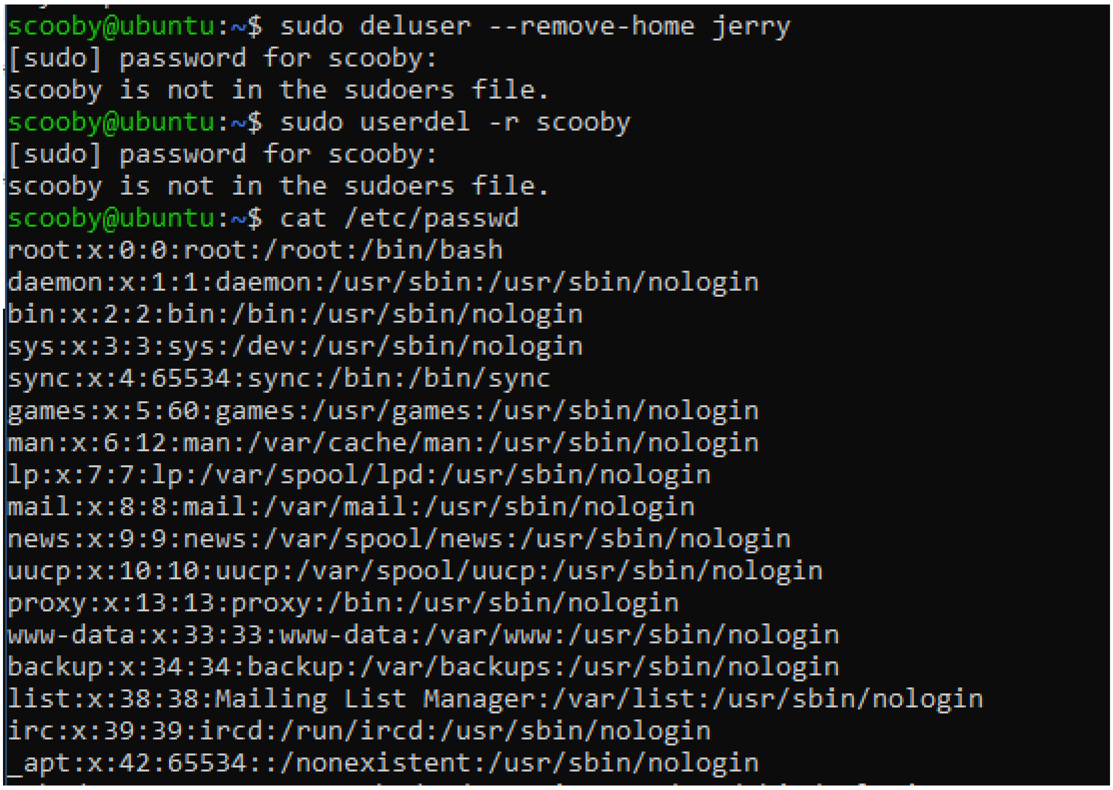
11.Delete groups and users:



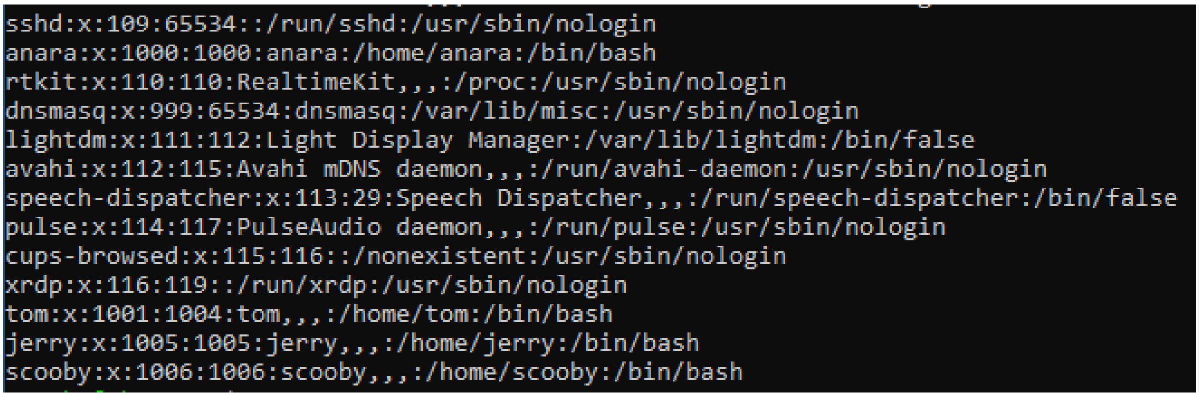
```
scooby@ubuntu:~$ sudo delgroup jolly
[sudo] password for scooby:
scooby is not in the sudoers file.
scooby@ubuntu:~$ sudo groupdel anime
[sudo] password for scooby:
scooby is not in the sudoers file.
scooby@ubuntu:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,anara
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
```



```
lpadmin:x:116:
pulse:x:117:
pulse-access:x:118:
xrdp:x:119:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
jerry:x:1005:
scooby:x:1006:
```



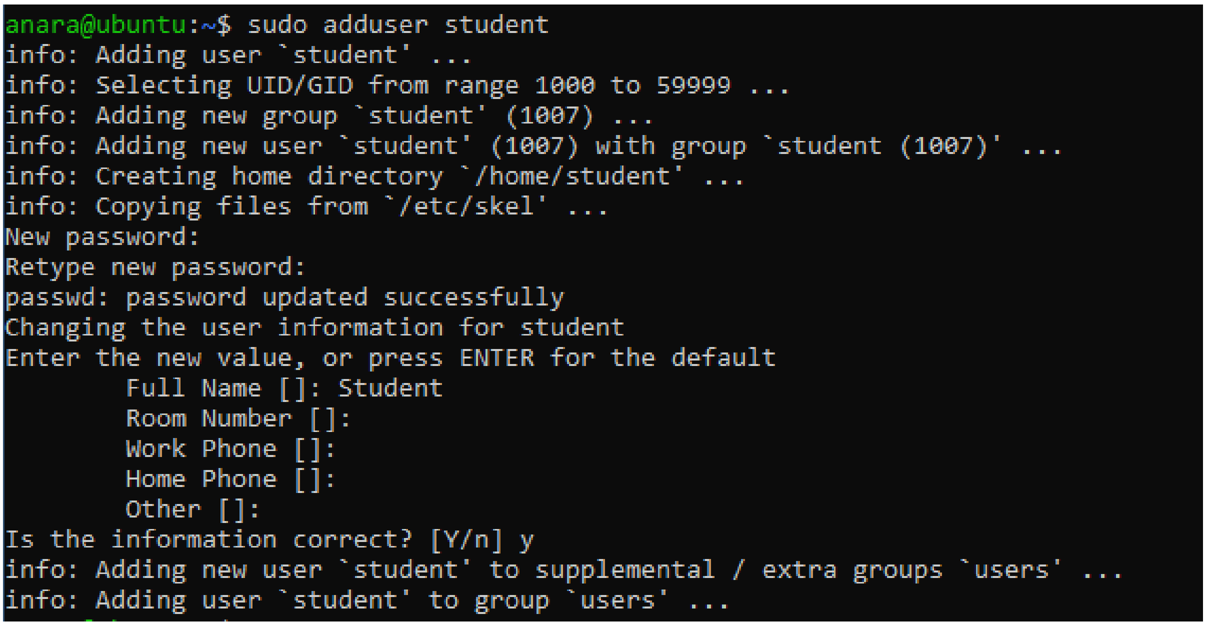
```
scooby@ubuntu:~$ sudo deluser --remove-home jerry
[sudo] password for scooby:
scooby is not in the sudoers file.
scooby@ubuntu:~$ sudo userdel -r scooby
[sudo] password for scooby:
scooby is not in the sudoers file.
scooby@ubuntu:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
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
```



```
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
anara:x:1000:1000:anara:/home/anara:/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
avahi:x:112:115:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:114:117:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:116::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:tom,,,:/home/tom:/bin/bash
jerry:x:1005:1005:jerry,,,:/home/jerry:/bin/bash
scooby:x:1006:1006:scooby,,,:/home/scooby:/bin/bash
```

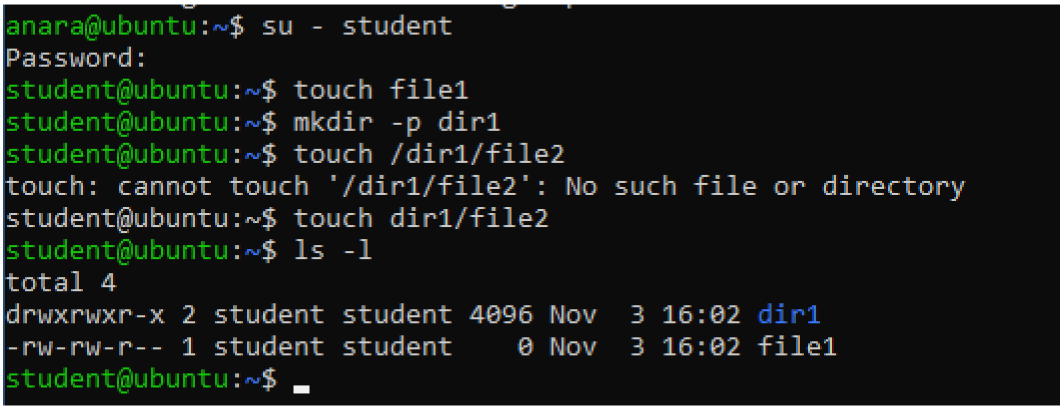
Task 5 – Create user Student; create files; set owner/group; identify file types

1. **Create Student**



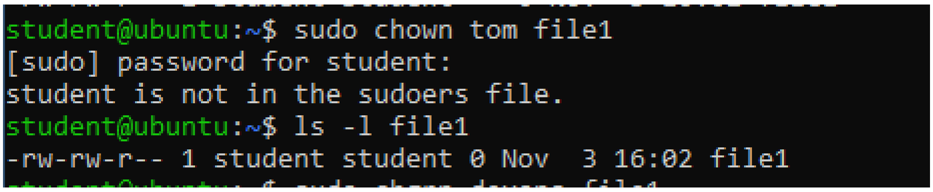
```
anara@ubuntu:~$ sudo adduser student
info: Adding user `student' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `student' (1007) ...
info: Adding new user `student' (1007) with group `student (1007)' ...
info: Creating home directory `/home/student' ...
info: Copying 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 []: Student
        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' ...
```

2. **Switch to Student and create files:**

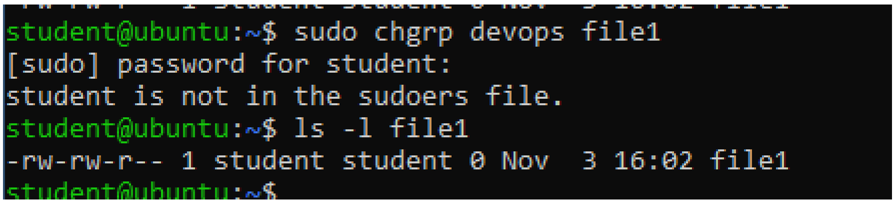


```
anara@ubuntu:~$ su - student
Password:
student@ubuntu:~$ touch file1
student@ubuntu:~$ mkdir -p dir1
student@ubuntu:~$ touch /dir1/file2
touch: cannot touch '/dir1/file2': No such file or directory
student@ubuntu:~$ touch dir1/file2
student@ubuntu:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  3 16:02 dir1
-rw-rw-r-- 1 student student    0 Nov  3 16:02 file1
student@ubuntu:~$
```

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

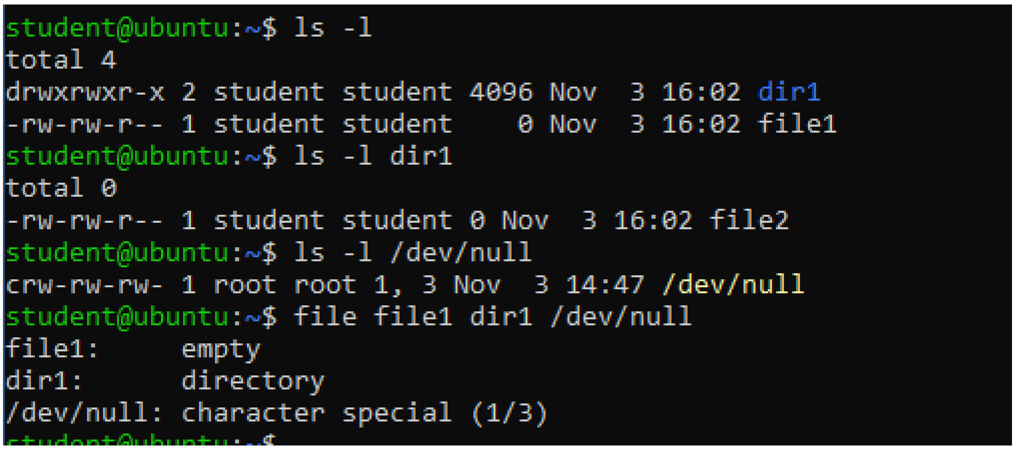


```
student@ubuntu:~$ sudo chown tom file1
[sudo] password for student:
student is not in the sudoers file.
student@ubuntu:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  3 16:02 file1
```



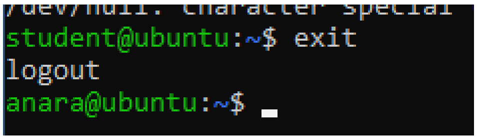
```
student@ubuntu:~$ sudo chgrp devops file1
[sudo] password for student:
student is not in the sudoers file.
student@ubuntu:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

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



```
student@ubuntu:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  3 16:02 dir1
-rw-rw-r-- 1 student student    0 Nov  3 16:02 file1
student@ubuntu:~$ ls -l dir1
total 0
-rw-rw-r-- 1 student student 0 Nov  3 16:02 file2
student@ubuntu:~$ ls -l /dev/null
crw-rw-rw- 1 root root 1, 3 Nov  3 14:47 /dev/null
student@ubuntu:~$ file file1 dir1 /dev/null
file1:     empty
dir1:      directory
/dev/null: character special (1/3)
student@ubuntu:~$
```

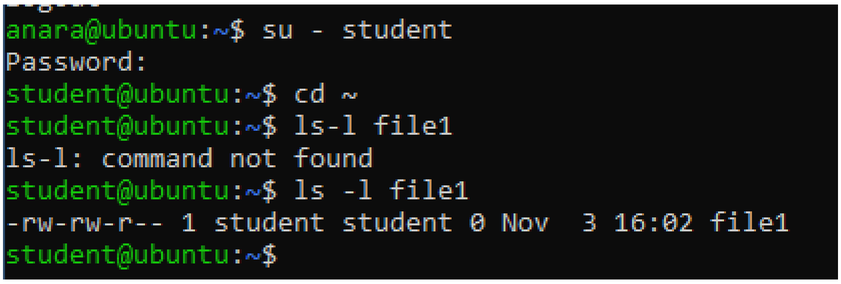
5. **Exit Student:**



```
/dev/null: character special
student@ubuntu:~$ exit
logout
anara@ubuntu:~$ _
```

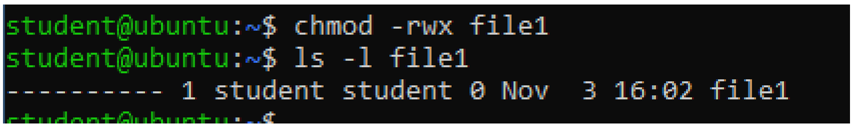
Task 6 – Change permissions using symbolic mode

1. **Ensure Student and file present:**



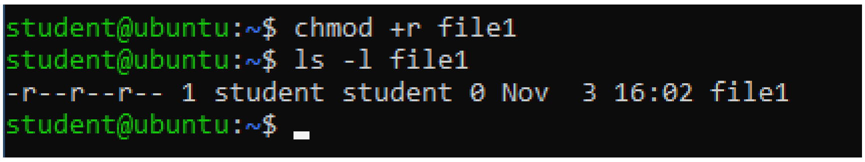
```
anara@ubuntu:~$ su - student
Password:
student@ubuntu:~$ cd ~
student@ubuntu:~$ ls-l file1
ls-l: command not found
student@ubuntu:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

2. **Remove all permissions:**



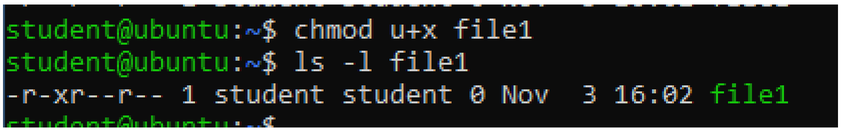
```
student@ubuntu:~$ chmod -rwx file1
student@ubuntu:~$ ls -l file1
---------- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

3. **Add read to all:**



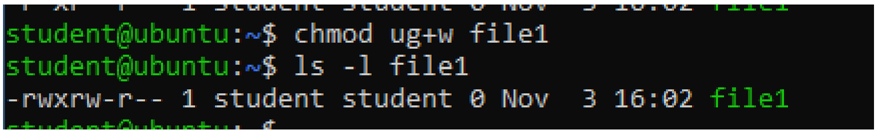
```
student@ubuntu:~$ chmod +r file1
student@ubuntu:~$ ls -l file1
-r--r--r-- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$ 
```

4. **Add execute to user:**



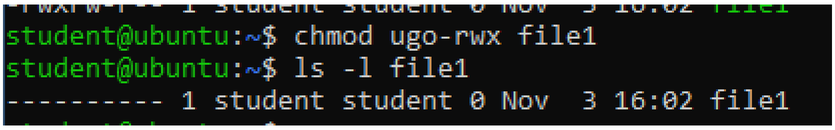
```
student@ubuntu:~$ chmod u+x file1
student@ubuntu:~$ ls -l file1
-r-xr--r-- 1 student student 0 Nov  3 16:02 file1
```

5. **Add write to user and group:**



```
student@ubuntu:~$ chmod ug+w file1
student@ubuntu:~$ ls -l file1
-rwxrw-r-- 1 student student 0 Nov  3 16:02 file1
```

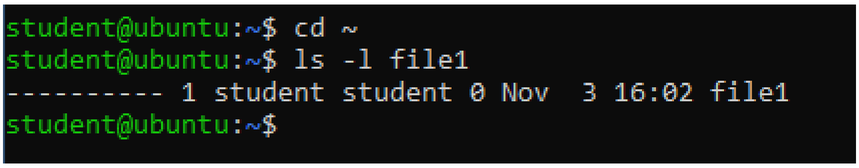
6. **Remove all permissions (explicit):**



```
student@ubuntu:~$ chmod ugo-rwx file1
student@ubuntu:~$ ls -l file1
---------- 1 student student 0 Nov  3 16:02 file1
```

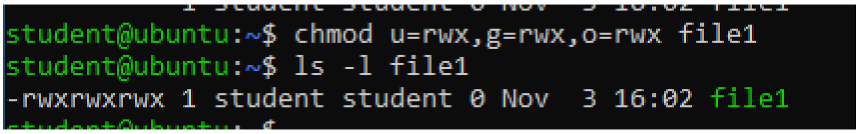
Task 7 – Change permissions using “set” symbolic form (u= g= o=)

Ensure you are Student:



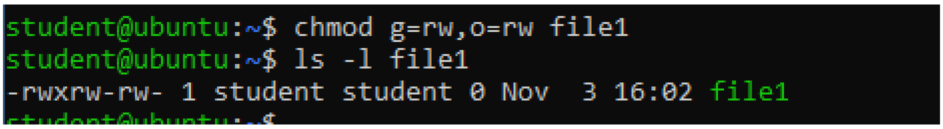
```
student@ubuntu:~$ cd ~
student@ubuntu:~$ ls -l file1
---------- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

1. **Set all to rwx:**



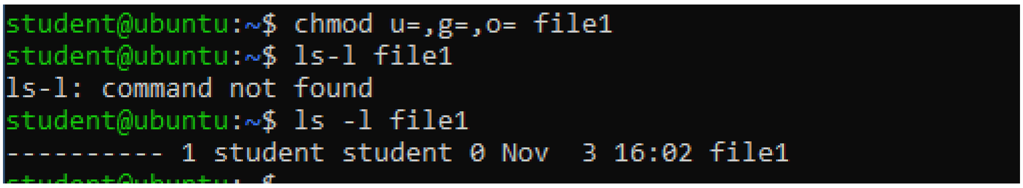
```
student@ubuntu:~$ chmod u=rwx,g=rwx,o=rwx file1
student@ubuntu:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  3 16:02 file1
```

2. **Remove execute from group and others:**



```
student@ubuntu:~$ chmod g=rw,o=rw file1
student@ubuntu:~$ ls -l file1
-rwxrw-rw- 1 student student 0 Nov  3 16:02 file1
```

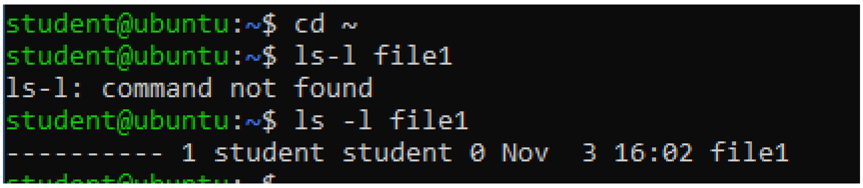
3. **Remove all permissions:**



```
student@ubuntu:~$ chmod u=,g=,o= file1
student@ubuntu:~$ ls-l file1
ls-l: command not found
student@ubuntu:~$ ls -l file1
---------- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

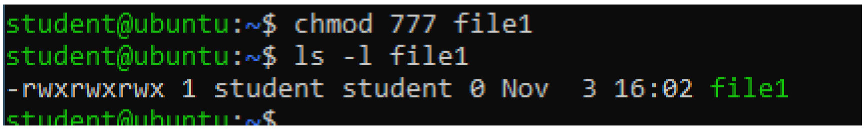
Task 8 – Change permissions using numeric (octal) mode

Ensure you are Student:



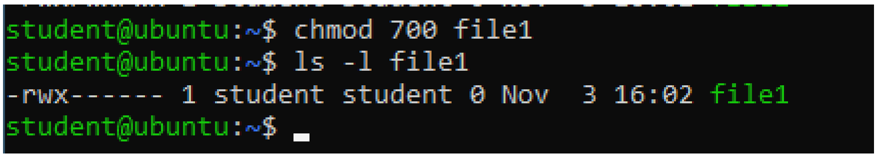
```
student@ubuntu:~$ cd ~
student@ubuntu:~$ ls-l file1
ls-l: command not found
student@ubuntu:~$ ls -l file1
---------- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

1.



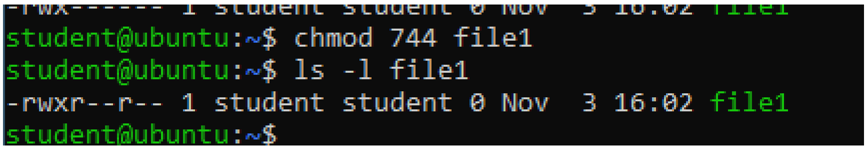
```
student@ubuntu:~$ chmod 777 file1
student@ubuntu:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

2.



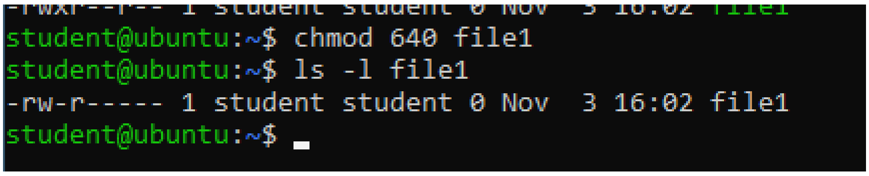
```
student@ubuntu:~$ chmod 700 file1
student@ubuntu:~$ ls -l file1
-rwx------ 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

3.



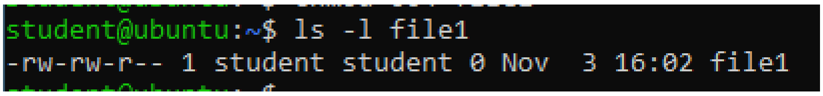
```
-rwx------ 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$ chmod 744 file1
student@ubuntu:~$ ls -l file1
-rwxr--r-- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

4.



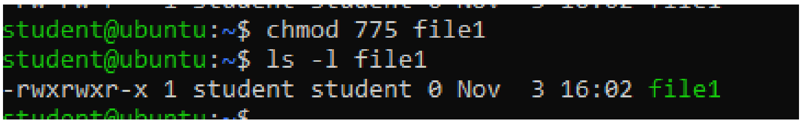
```
-rwxr--r-- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$ chmod 640 file1
student@ubuntu:~$ ls -l file1
-rw-r----- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

5.



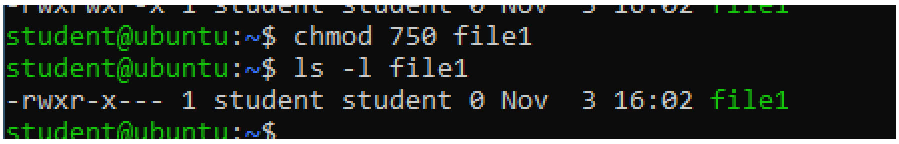
```
student@ubuntu:~$ ls -l file1
-rw-rw-r-- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

6.



```
student@ubuntu:~$ chmod 775 file1
student@ubuntu:~$ ls -l file1
-rwxrwxr-x 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

7.



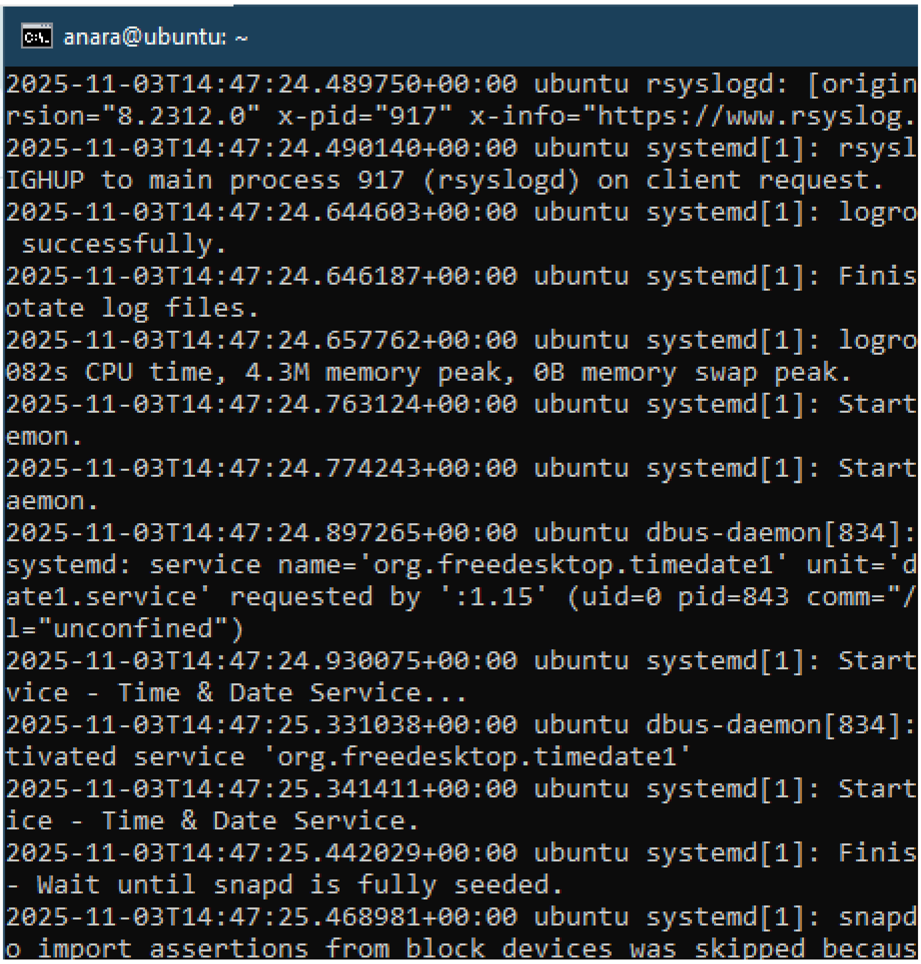
```
-rwxrwxr-x 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$ chmod 750 file1
student@ubuntu:~$ ls -l file1
-rwxr-x--- 1 student student 0 Nov  3 16:02 file1
student@ubuntu:~$
```

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

1. **less:**

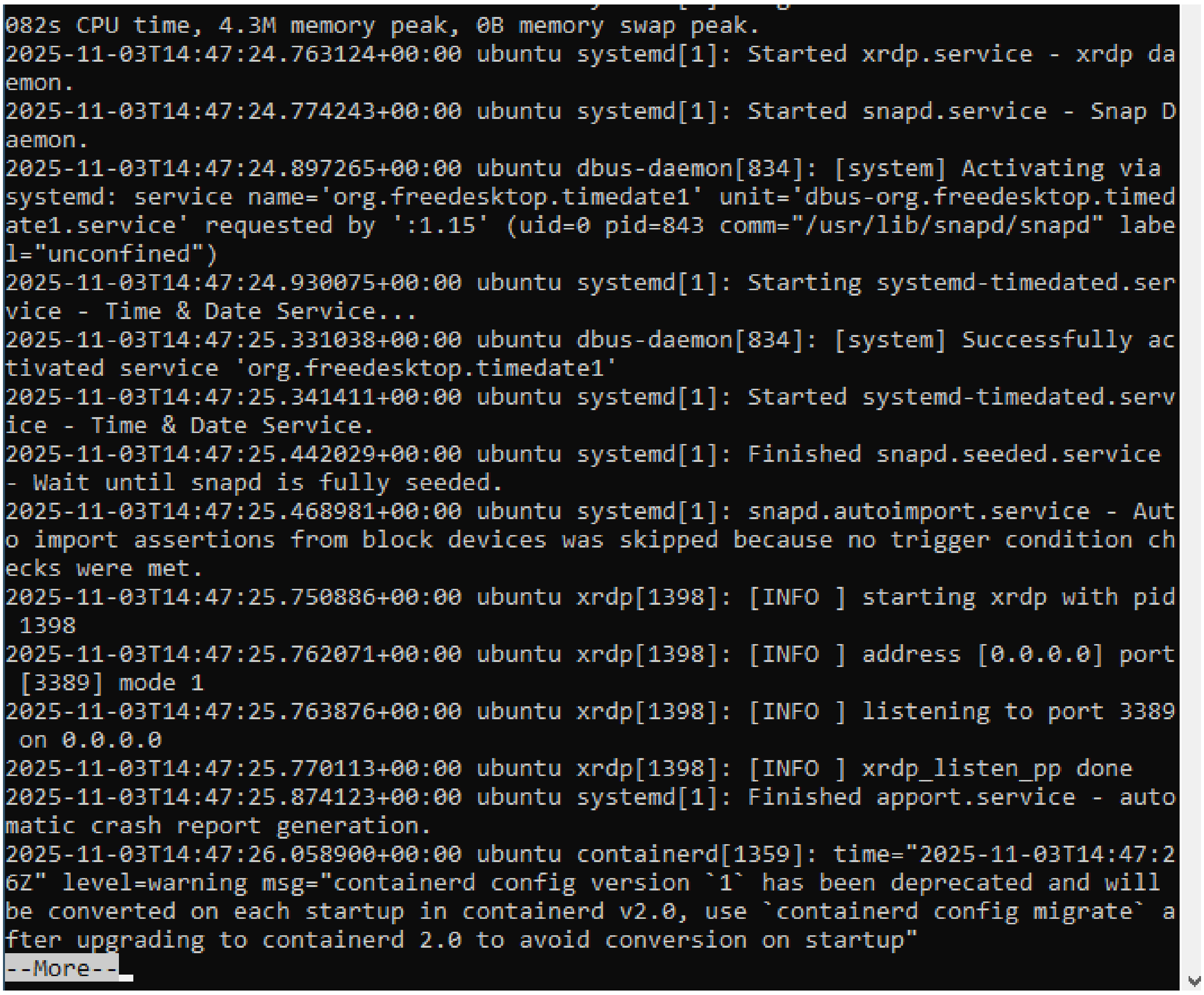
sudo cat /var/log/syslog | less

# quit q



```
2025-11-03T14:47:24.489750+00:00 ubuntu rsyslogd: [origin
rsion="8.2312.0" x-pid="917" x-info="https://www.rsyslog.
2025-11-03T14:47:24.490140+00:00 ubuntu systemd[1]: rsysl
IGHUP to main process 917 (rsyslogd) on client request.
2025-11-03T14:47:24.644603+00:00 ubuntu systemd[1]: logro
 successfully.
2025-11-03T14:47:24.646187+00:00 ubuntu systemd[1]: Finis
otate log files.
2025-11-03T14:47:24.657762+00:00 ubuntu systemd[1]: logro
082s CPU time, 4.3M memory peak, 0B memory swap peak.
2025-11-03T14:47:24.763124+00:00 ubuntu systemd[1]: Start
emon.
2025-11-03T14:47:24.774243+00:00 ubuntu systemd[1]: Start
aemon.
2025-11-03T14:47:24.897265+00:00 ubuntu dbus-daemon[834]:
systemd: service name='org.freedesktop.timedate1' unit='d
ate1.service' requested by ':1.15' (uid=0 pid=843 comm="/
l="unconfined")
2025-11-03T14:47:24.930075+00:00 ubuntu systemd[1]: Start
vice - Time & Date Service...
2025-11-03T14:47:25.331038+00:00 ubuntu dbus-daemon[834]:
tivated service 'org.freedesktop.timedate1'
2025-11-03T14:47:25.341411+00:00 ubuntu systemd[1]: Start
ice - Time & Date Service.
2025-11-03T14:47:25.442029+00:00 ubuntu systemd[1]: Finis
- Wait until snapd is fully seeded.
2025-11-03T14:47:25.468981+00:00 ubuntu systemd[1]: snapd
o import assertions from block devices was skipped becaus
```

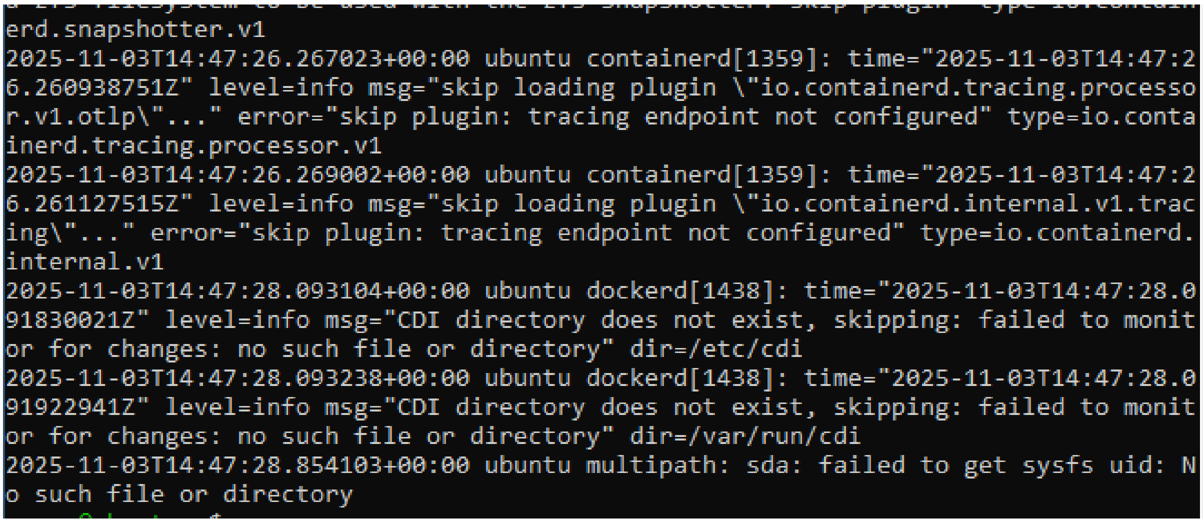
2. **more:**



```
082s CPU time, 4.3M memory peak, 0B memory swap peak.
2025-11-03T14:47:24.763124+00:00 ubuntu systemd[1]: Started xrdp.service - xrdp da
emon.
2025-11-03T14:47:24.774243+00:00 ubuntu systemd[1]: Started snapd.service - Snap D
aemon.
2025-11-03T14:47:24.897265+00:00 ubuntu dbus-daemon[834]: [system] Activating via
systemd: service name='org.freedesktop.timedate1' unit='dbus-org.freedesktop.timed
ate1.service' requested by ':1.15' (uid=0 pid=843 comm="/usr/lib/snapd/snapd" labe
l="unconfined")
2025-11-03T14:47:24.930075+00:00 ubuntu systemd[1]: Starting systemd-timedated.ser
vice - Time & Date Service...
2025-11-03T14:47:25.331038+00:00 ubuntu dbus-daemon[834]: [system] Successfully ac
tivated service 'org.freedesktop.timedate1'
2025-11-03T14:47:25.341411+00:00 ubuntu systemd[1]: Started systemd-timedated.serv
ice - Time & Date Service.
2025-11-03T14:47:25.442029+00:00 ubuntu systemd[1]: Finished snapd.seeded.service
- Wait until snapd is fully seeded.
2025-11-03T14:47:25.468981+00:00 ubuntu systemd[1]: snapd.autoimport.service - Aut
o import assertions from block devices was skipped because no trigger condition ch
ecks were met.
2025-11-03T14:47:25.750886+00:00 ubuntu xrdp[1398]: [INFO ] starting xrdp with pid
 1398
2025-11-03T14:47:25.762071+00:00 ubuntu xrdp[1398]: [INFO ] address [0.0.0.0] port
 [3389] mode 1
2025-11-03T14:47:25.763876+00:00 ubuntu xrdp[1398]: [INFO ] listening to port 3389
 on 0.0.0.0
2025-11-03T14:47:25.770113+00:00 ubuntu xrdp[1398]: [INFO ] xrdp_listen_pp done
2025-11-03T14:47:25.874123+00:00 ubuntu systemd[1]: Finished apport.service - auto
matic crash report generation.
2025-11-03T14:47:26.058900+00:00 ubuntu containerd[1359]: time="2025-11-03T14:47:2
6Z" 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` a
fter upgrading to containerd 2.0 to avoid conversion on startup"
--More--
```

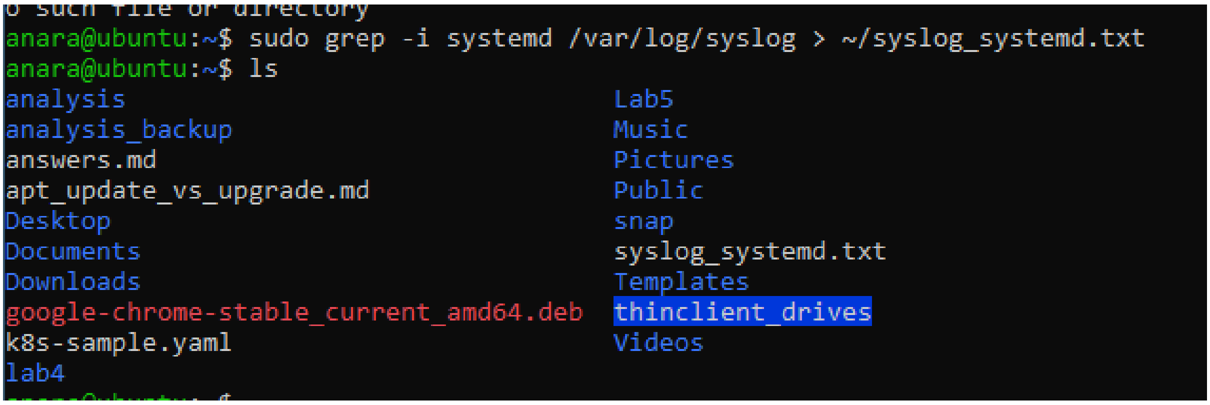
3. **grep failures/errors:**

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



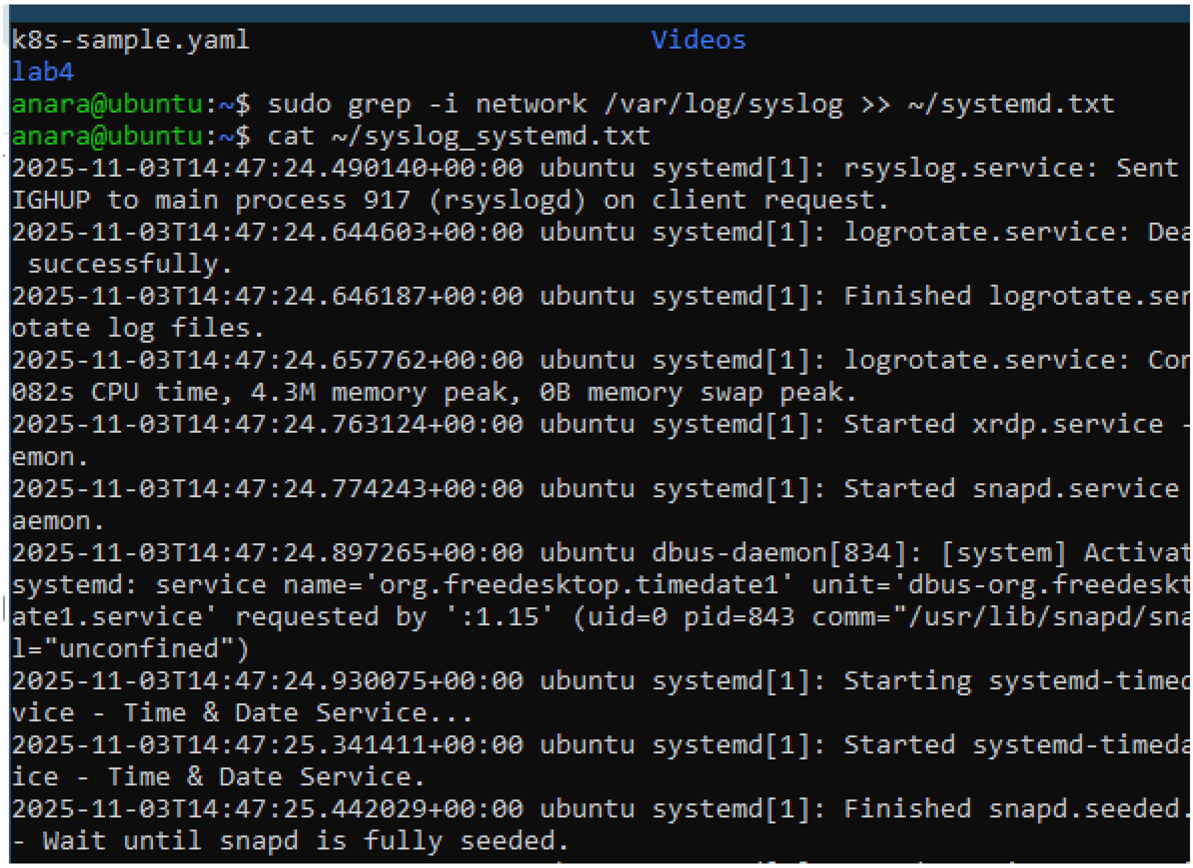
```
erd.snapshotter.v1
2025-11-03T14:47:26.267023+00:00 ubuntu containerd[1359]: time="2025-11-03T14:47:2
6.260938751Z" level=info msg="skip loading plugin \"io.containerd.tracing.processo
r.v1.otlp\"..." error="skip plugin: tracing endpoint not configured" type=io.conta
inerd.tracing.processor.v1
2025-11-03T14:47:26.269002+00:00 ubuntu containerd[1359]: time="2025-11-03T14:47:2
6.261127515Z" level=info msg="skip loading plugin \"io.containerd.internal.v1.trac
ing\"..." error="skip plugin: tracing endpoint not configured" type=io.containerd.
internal.v1
2025-11-03T14:47:28.093104+00:00 ubuntu dockerd[1438]: time="2025-11-03T14:47:28.0
91830021Z" level=info msg="CDI directory does not exist, skipping: failed to monit
or for changes: no such file or directory" dir=/etc/cdi
2025-11-03T14:47:28.093238+00:00 ubuntu dockerd[1438]: time="2025-11-03T14:47:28.0
91922941Z" level=info msg="CDI directory does not exist, skipping: failed to monit
or for changes: no such file or directory" dir=/var/run/cdi
2025-11-03T14:47:28.854103+00:00 ubuntu multipath: sda: failed to get sysfs uid: N
o such file or directory
```

4. **redirect:**



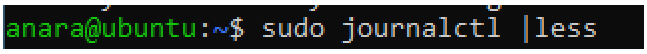
```
o such file or directory
anara@ubuntu:~$ sudo grep -i systemd /var/log/syslog > ~/syslog_systemd.txt
anara@ubuntu:~$ ls
analysis                                Lab5
analysis_backup                         Music
answers.md                              Pictures
apt_update_vs_upgrade.md                Public
Desktop                                 snap
Documents                               syslog_systemd.txt
Downloads                               Templates
google-chrome-stable_current_amd64.deb  thinclient_drives
k8s-sample.yaml                         Videos
lab4
```

Append:

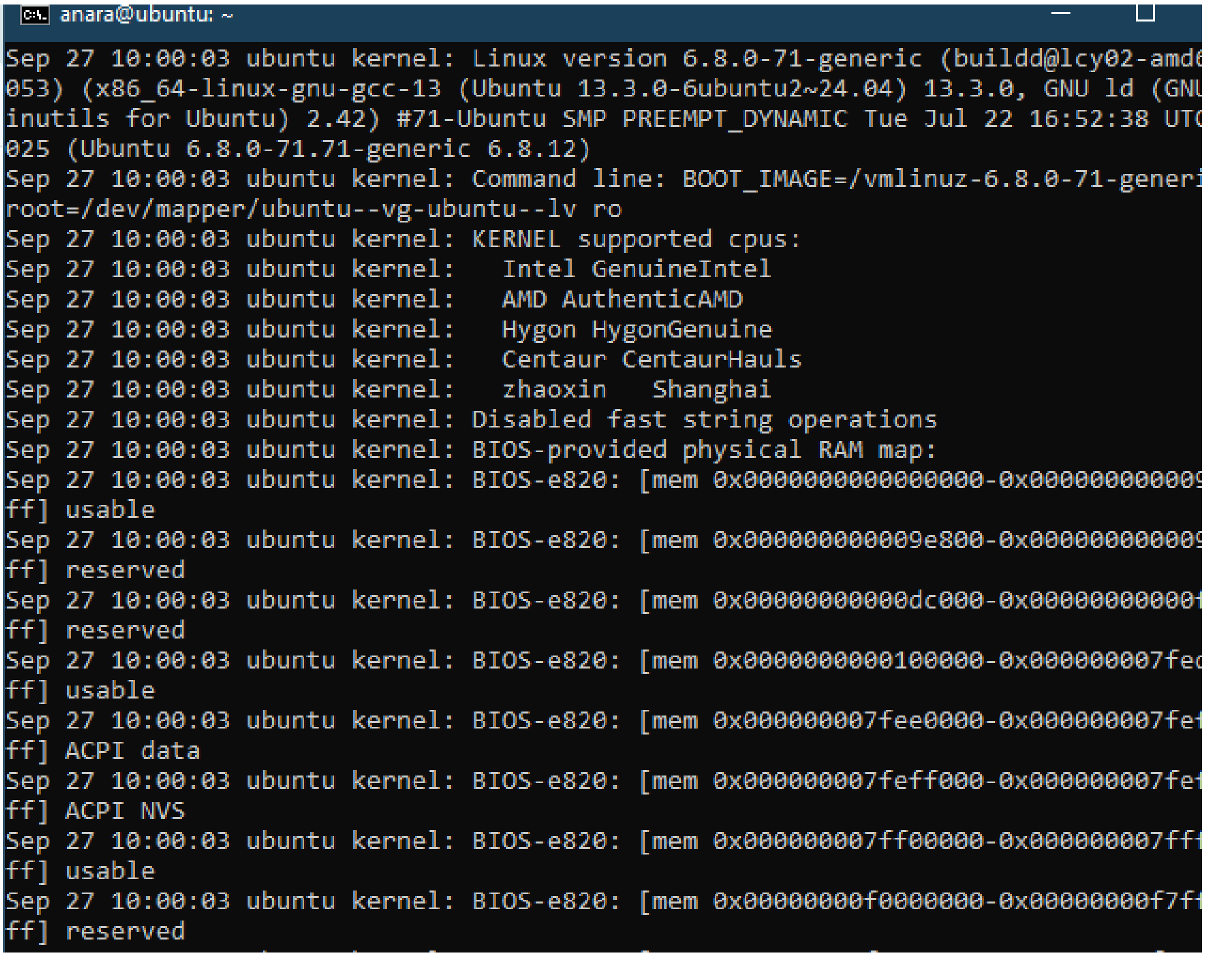


```
k8s-sample.yaml                         Videos
lab4
anara@ubuntu:~$ sudo grep -i network /var/log/syslog >> ~/systemd.txt
anara@ubuntu:~$ cat ~/syslog_systemd.txt
2025-11-03T14:47:24.490140+00:00 ubuntu systemd[1]: rsyslog.service: Sent
IGHUP to main process 917 (rsyslogd) on client request.
2025-11-03T14:47:24.644603+00:00 ubuntu systemd[1]: logrotate.service: Dea
 successfully.
2025-11-03T14:47:24.646187+00:00 ubuntu systemd[1]: Finished logrotate.ser
otate log files.
2025-11-03T14:47:24.657762+00:00 ubuntu systemd[1]: logrotate.service: Cor
082s CPU time, 4.3M memory peak, 0B memory swap peak.
2025-11-03T14:47:24.763124+00:00 ubuntu systemd[1]: Started xrdp.service -
emon.
2025-11-03T14:47:24.774243+00:00 ubuntu systemd[1]: Started snapd.service
aemon.
2025-11-03T14:47:24.897265+00:00 ubuntu dbus-daemon[834]: [system] Activat
systemd: service name='org.freedesktop.timedate1' unit='dbus-org.freedeskt
ate1.service' requested by ':1.15' (uid=0 pid=843 comm="/usr/lib/snapd/sna
l="unconfined")
2025-11-03T14:47:24.930075+00:00 ubuntu systemd[1]: Starting systemd-timed
vice - Time & Date Service...
2025-11-03T14:47:25.341411+00:00 ubuntu systemd[1]: Started systemd-timeda
ice - Time & Date Service.
2025-11-03T14:47:25.442029+00:00 ubuntu systemd[1]: Finished snapd.seeded.
- Wait until snapd is fully seeded.
```

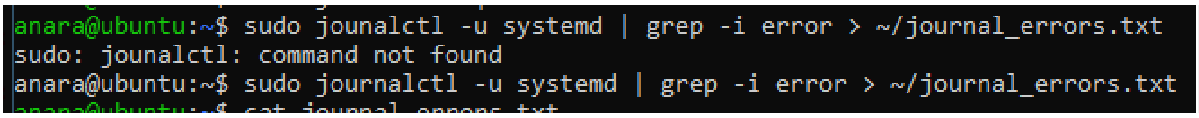
Alternative (journalctl) if needed:



```
anara@ubuntu:~$ sudo journalctl |less
```



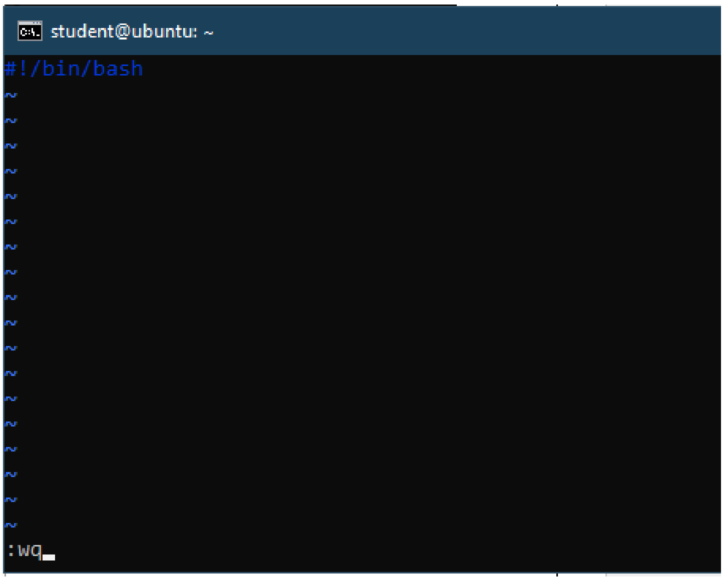
```
Sep 27 10:00:03 ubuntu kernel: Linux version 6.8.0-71-generic (buildd@lcy02-amd6
053) (x86_64-linux-gnu-gcc-13 (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0, GNU ld (GNU
inutils for Ubuntu) 2.42) #71-Ubuntu SMP PREEMPT_DYNAMIC Tue Jul 22 16:52:38 UTC
025 (Ubuntu 6.8.0-71.71-generic 6.8.12)
Sep 27 10:00:03 ubuntu kernel: Command line: BOOT_IMAGE=/vmlinuz-6.8.0-71-generi
root=/dev/mapper/ubuntu--vg-ubuntu--lv ro
Sep 27 10:00:03 ubuntu kernel: KERNEL supported cpus:
Sep 27 10:00:03 ubuntu kernel:   Intel GenuineIntel
Sep 27 10:00:03 ubuntu kernel:   AMD AuthenticAMD
Sep 27 10:00:03 ubuntu kernel:   Hygon HygonGenuine
Sep 27 10:00:03 ubuntu kernel:   Centaur CentaurHauls
Sep 27 10:00:03 ubuntu kernel:   zhaoxin   Shanghai
Sep 27 10:00:03 ubuntu kernel: Disabled fast string operations
Sep 27 10:00:03 ubuntu kernel: BIOS-provided physical RAM map:
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x0000000000000000-0x000000000009
ff] usable
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x000000000009e800-0x000000000009
ff] reserved
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x00000000000dc000-0x00000000000f
ff] reserved
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x0000000000100000-0x000000007fed
ff] usable
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x000000007fee0000-0x000000007fef
ff] ACPI data
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x000000007feff000-0x000000007fef
ff] ACPI NVS
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x000000007ff00000-0x000000007fff
ff] usable
Sep 27 10:00:03 ubuntu kernel: BIOS-e820: [mem 0x00000000f0000000-0x00000000f7ff
ff] reserved
```



```
anara@ubuntu:~$ sudo jounalctl -u systemd | grep -i error > ~/journal_errors.txt
sudo: jounalctl: command not found
anara@ubuntu:~$ sudo journalctl -u systemd | grep -i error > ~/journal_errors.txt
anara@ubuntu:~$ cat journal_errors.txt
```

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

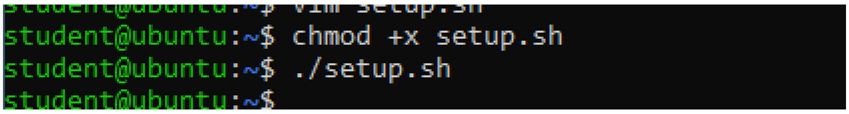
1. **Include bash shebang**



```
#!/bin/bash
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
:wq
```

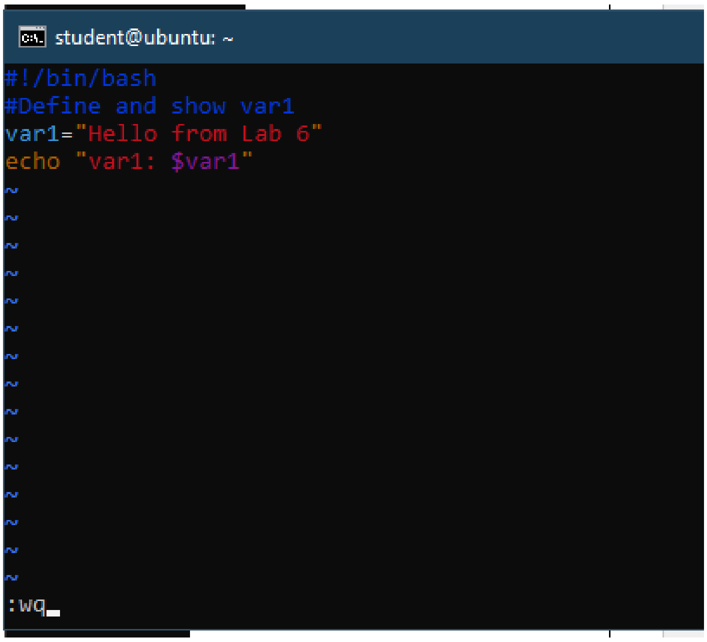
i. chmod +x setup.sh

ii. ./setup.sh

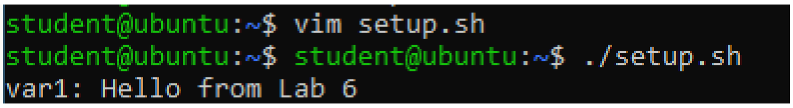


```
student@ubuntu:~$ vim setup.sh
student@ubuntu:~$ chmod +x setup.sh
student@ubuntu:~$ ./setup.sh
student@ubuntu:~$
```

2. Define variable var1 and echo it

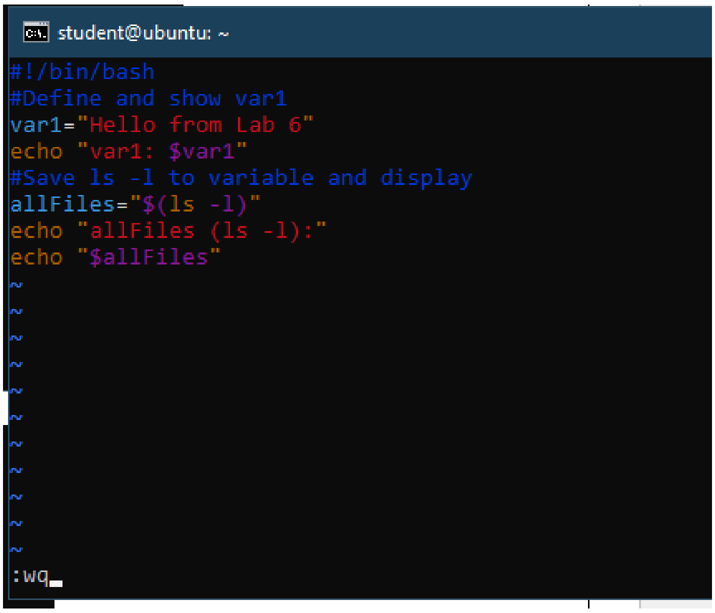


```
#!/bin/bash
#Define and show var1
var1="Hello from Lab 6"
echo "var1: $var1"
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
:wq
```

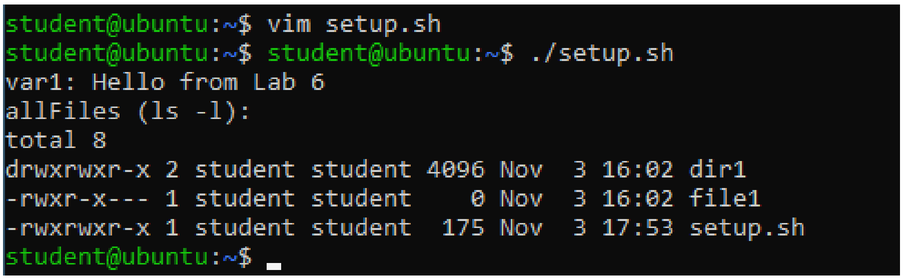


```
student@ubuntu:~$ vim setup.sh
student@ubuntu:~$ student@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
```

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

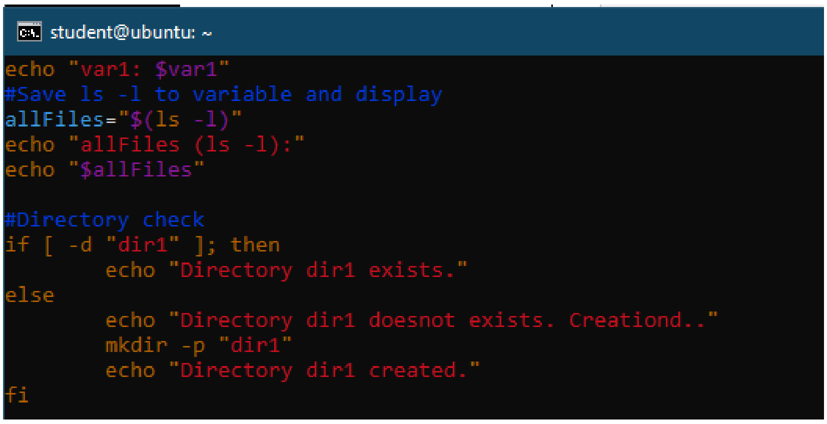


```
#!/bin/bash
#Define and show var1
var1="Hello from Lab 6"
echo "var1: $var1"
#Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"
~
~
~
~
~
~
~
~
~
~
~
:wq
```

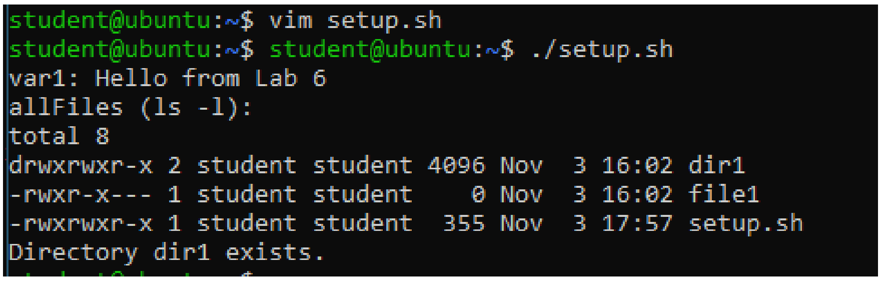


```
student@ubuntu:~$ vim setup.sh
student@ubuntu:~$ student@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  3 16:02 dir1
-rwxr-x--- 1 student student    0 Nov  3 16:02 file1
-rwxrwxr-x 1 student student  175 Nov  3 17:53 setup.sh
student@ubuntu:~$ _
```

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

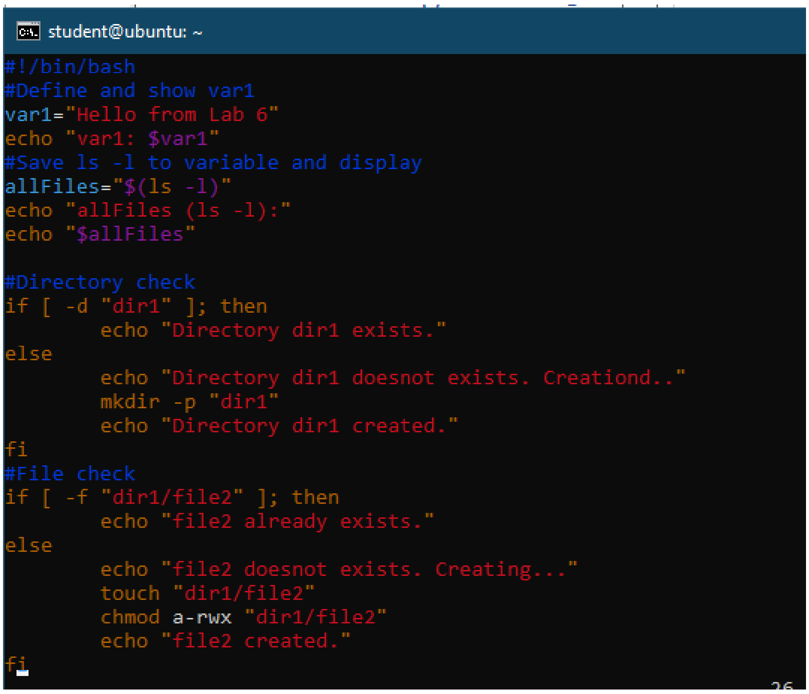


```
echo "var1: $var1"
#Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"

#Directory check
if [ -d "dir1" ]; then
        echo "Directory dir1 exists."
else
        echo "Directory dir1 doesnot exists. Creationd.."
        mkdir -p "dir1"
        echo "Directory dir1 created."
fi
```

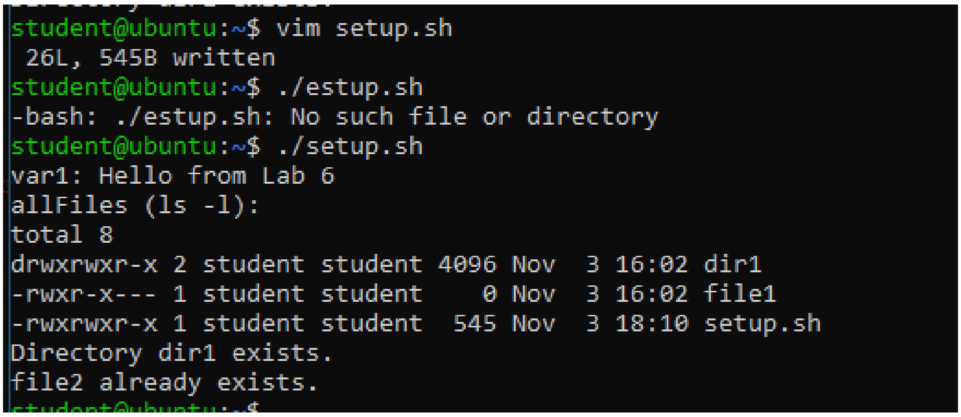


```
student@ubuntu:~$ vim setup.sh
student@ubuntu:~$ student@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  3 16:02 dir1
-rwxr-x--- 1 student student    0 Nov  3 16:02 file1
-rwxrwxr-x 1 student student  355 Nov  3 17:57 setup.sh
Directory dir1 exists.
```

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

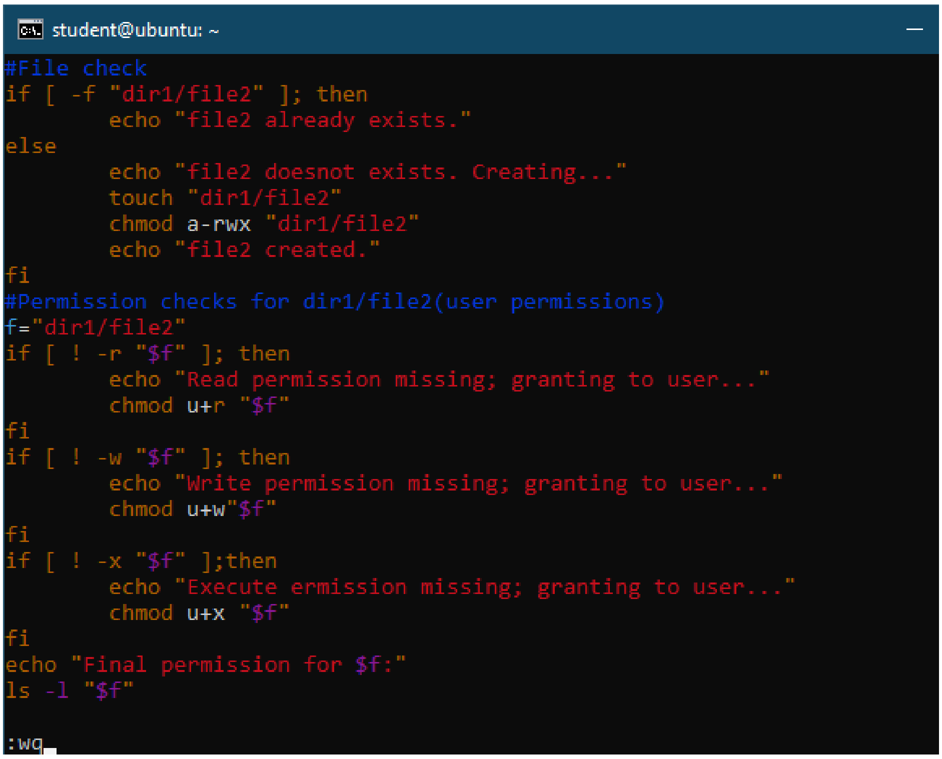


```
#!/bin/bash
#Define and show var1
var1="Hello from Lab 6"
echo "var1: $var1"
#Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"

#Directory check
if [ -d "dir1" ]; then
        echo "Directory dir1 exists."
else
        echo "Directory dir1 doesnot exists. Creationd.."
        mkdir -p "dir1"
        echo "Directory dir1 created."
fi
#File check
if [ -f "dir1/file2" ]; then
        echo "file2 already exists."
else
        echo "file2 doesnot exists. Creating..."
        touch "dir1/file2"
        chmod a-rwx "dir1/file2"
        echo "file2 created."
fi
```

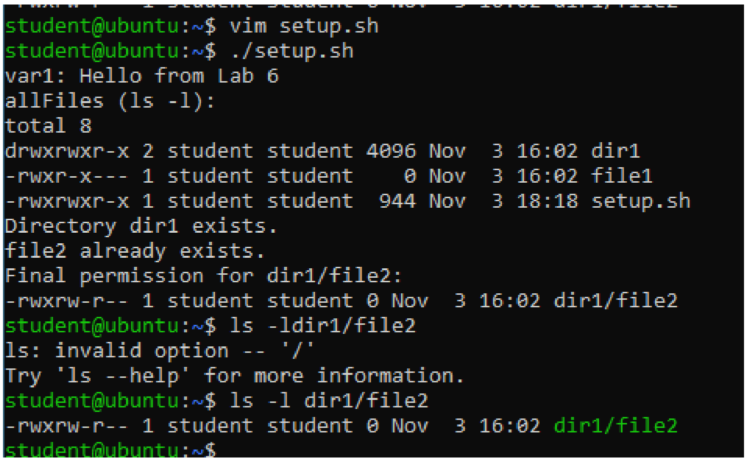


```
student@ubuntu:~$ vim setup.sh
 26L, 545B written
student@ubuntu:~$ ./estup.sh
-bash: ./estup.sh: No such file or directory
student@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  3 16:02 dir1
-rwxr-x--- 1 student student    0 Nov  3 16:02 file1
-rwxrwxr-x 1 student student  545 Nov  3 18:10 setup.sh
Directory dir1 exists.
file2 already exists.
student@ubuntu:~$
```

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



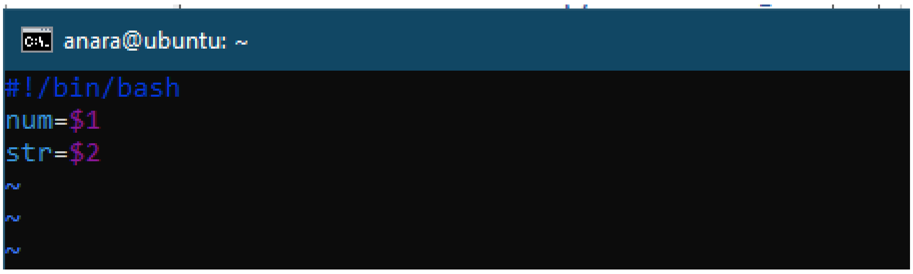
```
#File check
if [ -f "dir1/file2" ]; then
        echo "file2 already exists."
else
        echo "file2 doesnot exists. Creating..."
        touch "dir1/file2"
        chmod a-rwx "dir1/file2"
        echo "file2 created."
fi
#Permission checks for dir1/file2(user permissions)
f="dir1/file2"
if [ ! -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 "$f" ];then
        echo "Execute ermission missing; granting to user..."
        chmod u+x "$f"
fi
echo "Final permission for $f:"
ls -l "$f"

:wq
```



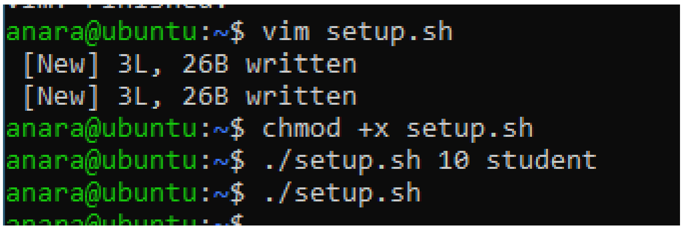
```
student@ubuntu:~$ vim setup.sh
student@ubuntu:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  3 16:02 dir1
-rwxr-x--- 1 student student    0 Nov  3 16:02 file1
-rwxrwxr-x 1 student student  944 Nov  3 18:18 setup.sh
Directory dir1 exists.
file2 already exists.
Final permission for dir1/file2:
-rwxrw-r-- 1 student student 0 Nov  3 16:02 dir1/file2
student@ubuntu:~$ ls -ldir1/file2
ls: invalid option -- '/'
Try 'ls --help' for more information.
student@ubuntu:~$ ls -l dir1/file2
-rwxrw-r-- 1 student student 0 Nov  3 16:02 dir1/file2
student@ubuntu:~$
```

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

1. **create file with shebang and set num and str variables**

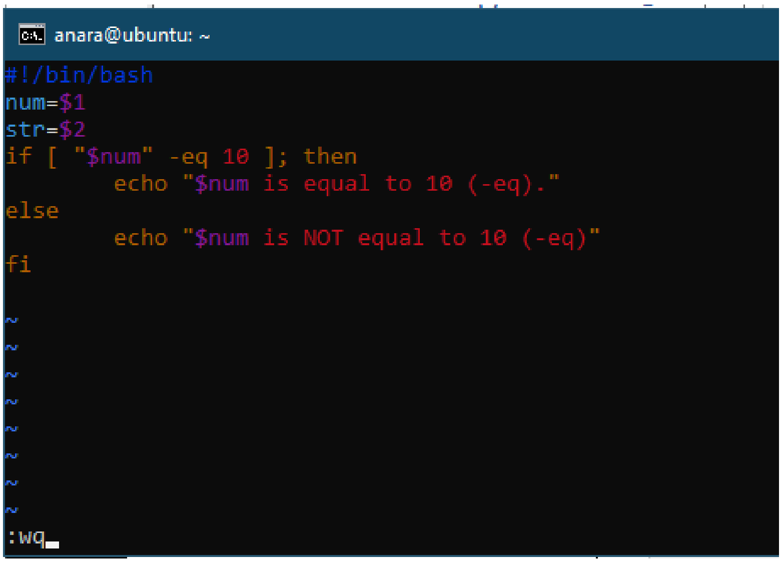


```
#!/bin/bash
num=$1
str=$2
~
~
~
```

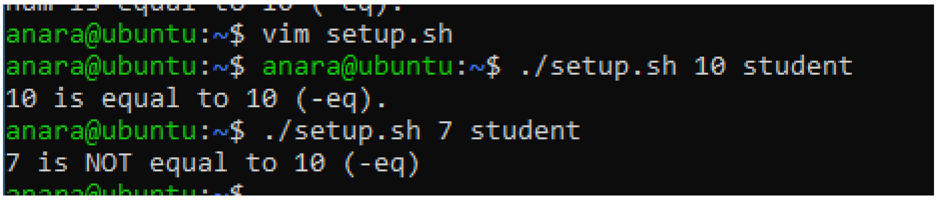


```
anara@ubuntu:~$ vim setup.sh
 [New] 3L, 26B written
 [New] 3L, 26B written
anara@ubuntu:~$ chmod +x setup.sh
anara@ubuntu:~$ ./setup.sh 10 student
anara@ubuntu:~$ ./setup.sh
anara@ubuntu:~$
```

2. **add the -eq test (equal)**

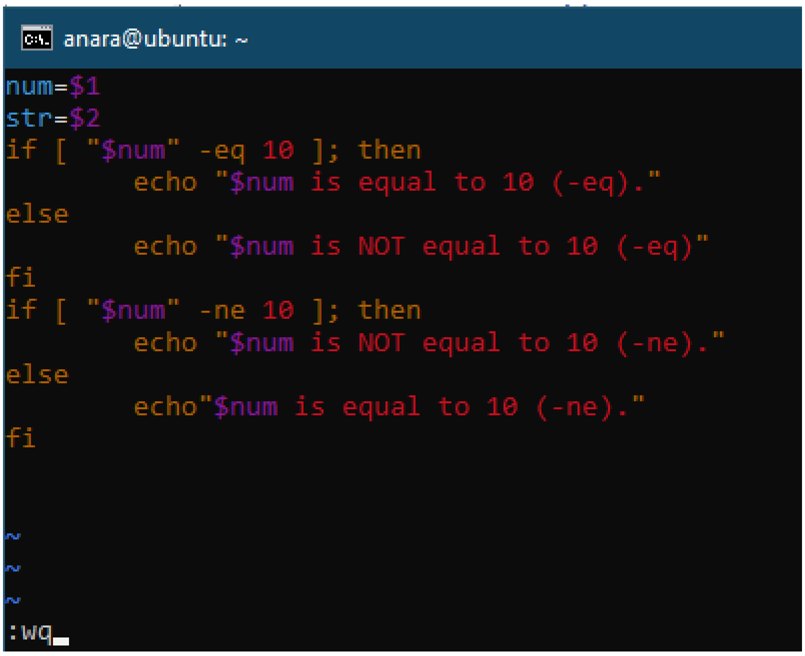


```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
else
        echo "$num is NOT equal to 10 (-eq)"
fi

~
~
~
~
~
~
~
~
:wq
```

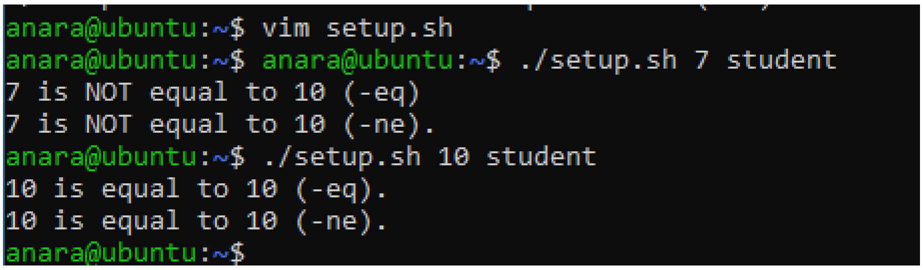


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
anara@ubuntu:~$ ./setup.sh 7 student
7 is NOT equal to 10 (-eq)
anara@ubuntu:~$
```

3. **add the -ne test (not equal)**

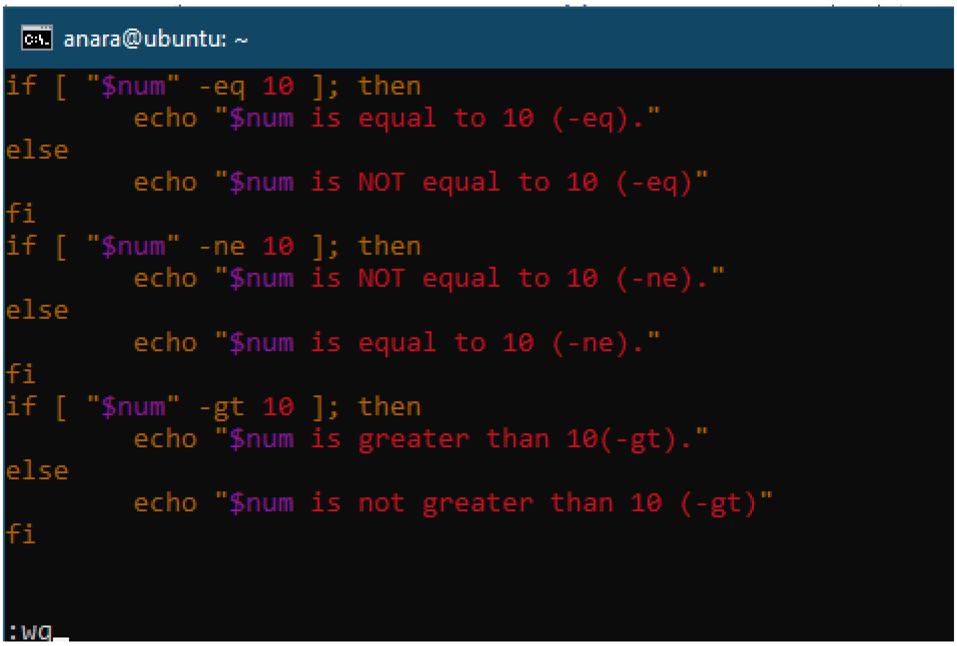


```
num=$1
str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
else
        echo "$num is NOT equal to 10 (-eq)"
fi
if [ "$num" -ne 10 ]; then
        echo "$num is NOT equal to 10 (-ne)."
else
        echo"$num is equal to 10 (-ne)."
fi



~
~
~
:wq
```

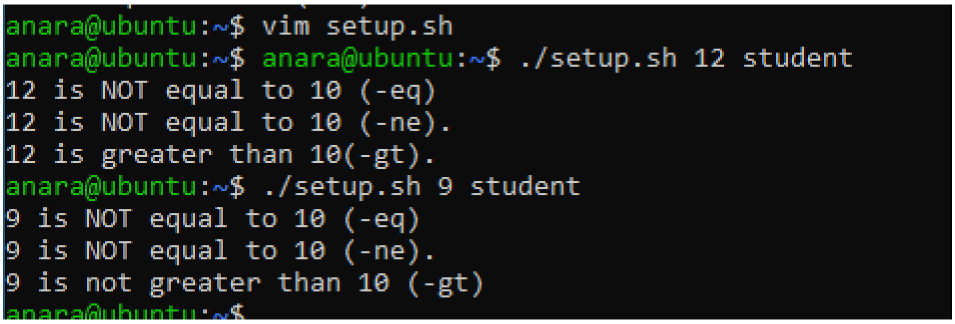


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 7 student
7 is NOT equal to 10 (-eq)
7 is NOT equal to 10 (-ne).
anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
anara@ubuntu:~$
```

4. **add the -gt test (greater than)**

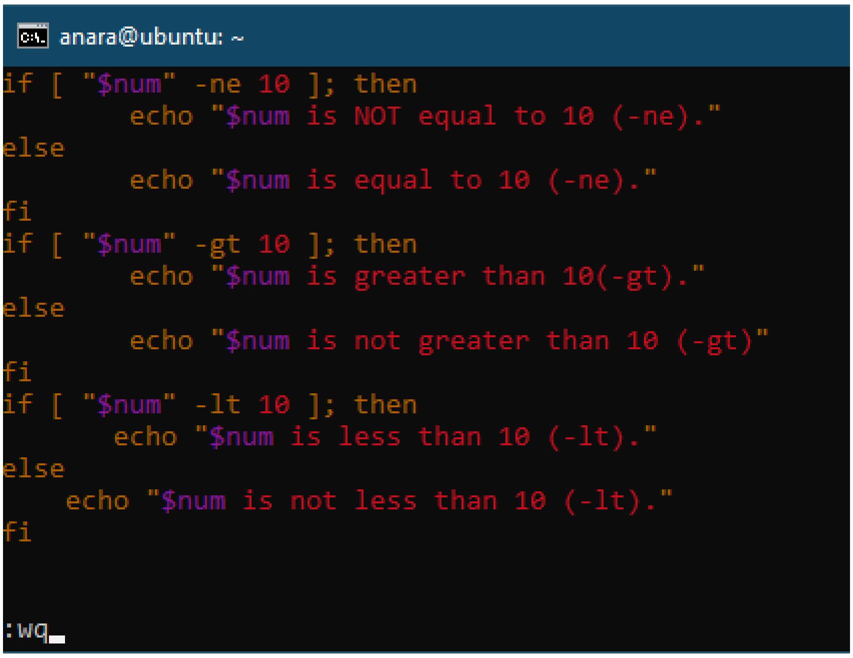


```
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."
else
        echo "$num is NOT equal to 10 (-eq)"
fi
if [ "$num" -ne 10 ]; then
        echo "$num is NOT equal to 10 (-ne)."
else
        echo "$num is equal to 10 (-ne)."
fi
if [ "$num" -gt 10 ]; then
        echo "$num is greater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


:wq
```

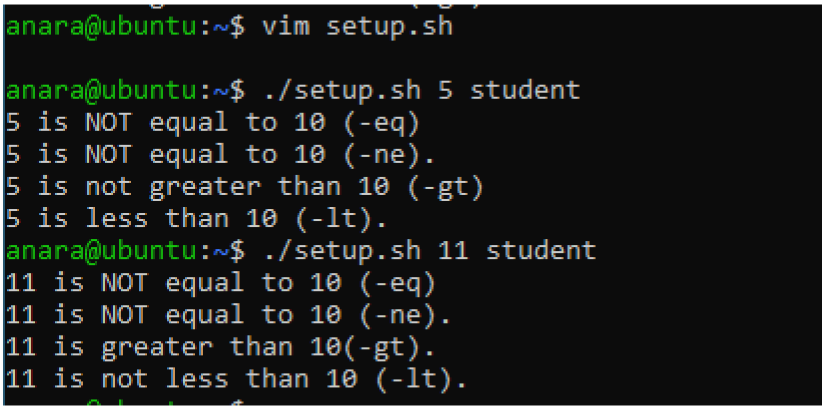


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 12 student
12 is NOT equal to 10 (-eq)
12 is NOT equal to 10 (-ne).
12 is greater than 10(-gt).
anara@ubuntu:~$ ./setup.sh 9 student
9 is NOT equal to 10 (-eq)
9 is NOT equal to 10 (-ne).
9 is not greater than 10 (-gt)
anara@ubuntu:~$
```

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

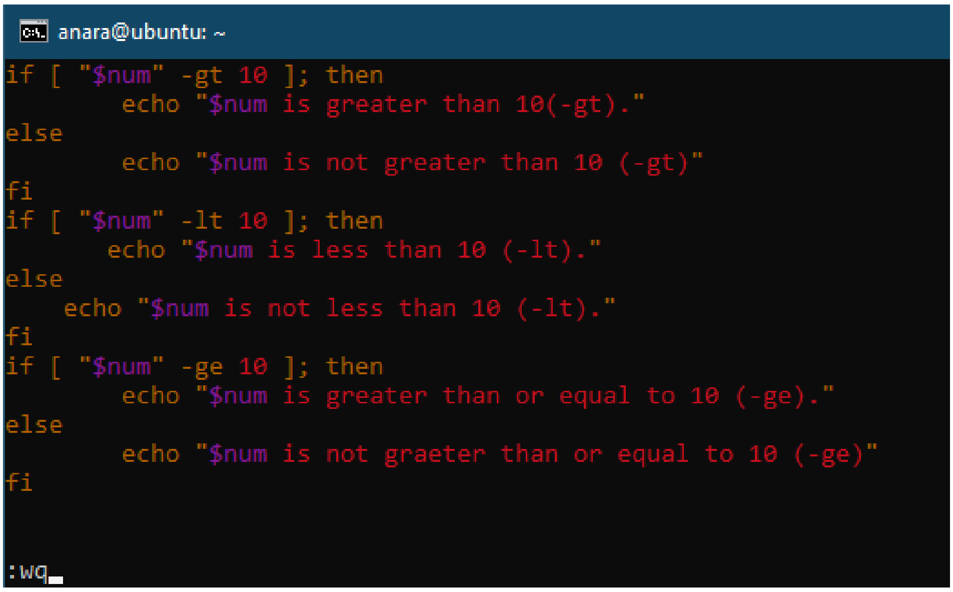


```
if [ "$num" -ne 10 ]; then
        echo "$num is NOT equal to 10 (-ne)."
else
        echo "$num is equal to 10 (-ne)."
fi
if [ "$num" -gt 10 ]; then
        echo "$num is greater than 10(-gt)."
else
        echo "$num is not greater than 10 (-gt)"
fi
if [ "$num" -lt 10 ]; then
       echo "$num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


:wq
```

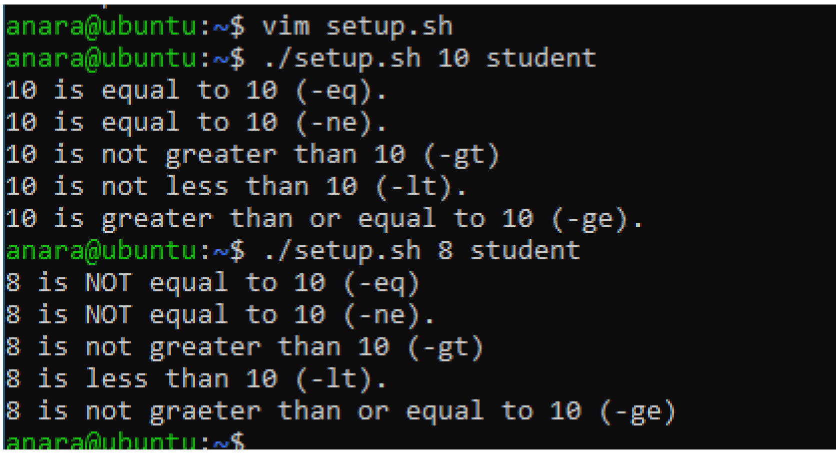


```
anara@ubuntu:~$ vim setup.sh

anara@ubuntu:~$ ./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).
anara@ubuntu:~$ ./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).
```

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

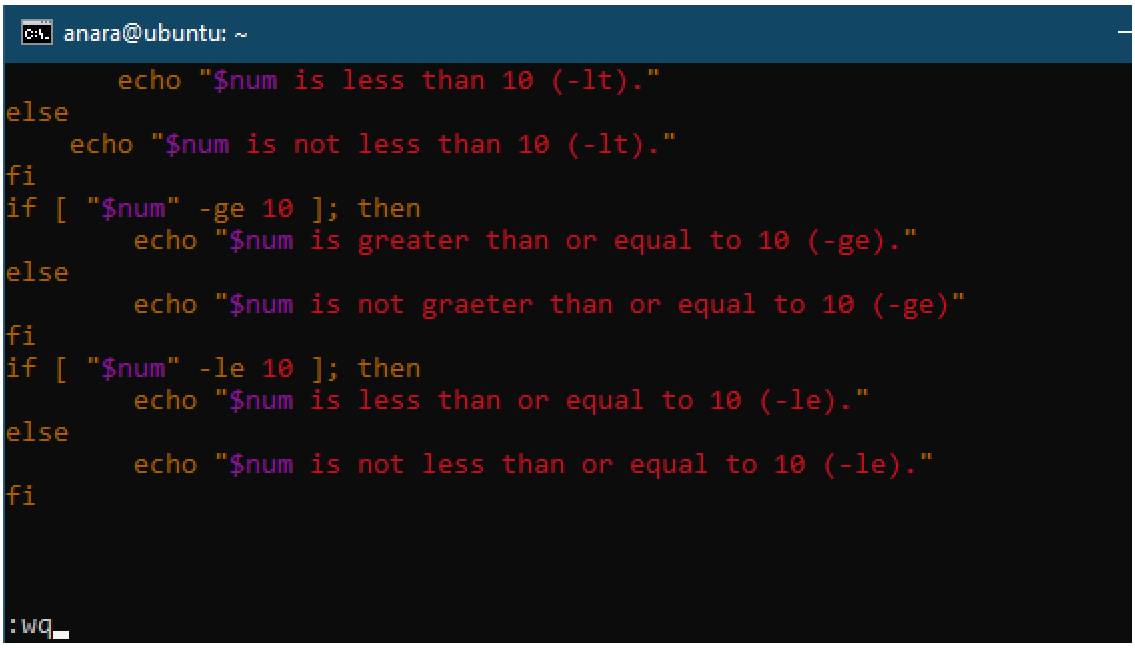


```
if [ "$num" -gt 10 ]; then
        echo "$num is greater than 10(-gt)."
else
        echo "$num is not greater than 10 (-gt)"
fi
if [ "$num" -lt 10 ]; then
       echo "$num is less than 10 (-lt)."
else
    echo "$num is not less than 10 (-lt)."
fi
if [ "$num" -ge 10 ]; then
        echo "$num is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


:wq
```

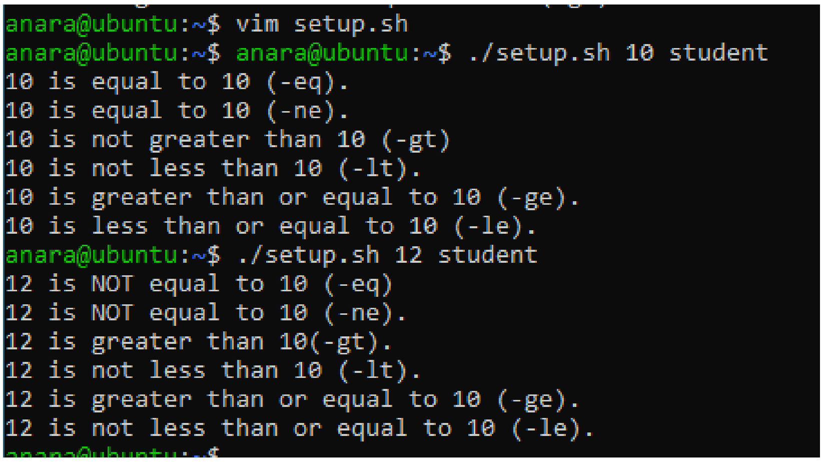


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
10 is not greater than 10 (-gt)
10 is not less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
anara@ubuntu:~$ ./setup.sh 8 student
8 is NOT equal to 10 (-eq)
8 is NOT equal to 10 (-ne).
8 is not greater than 10 (-gt)
8 is less than 10 (-lt).
8 is not graeter than or equal to 10 (-ge)
anara@ubuntu:~$
```

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



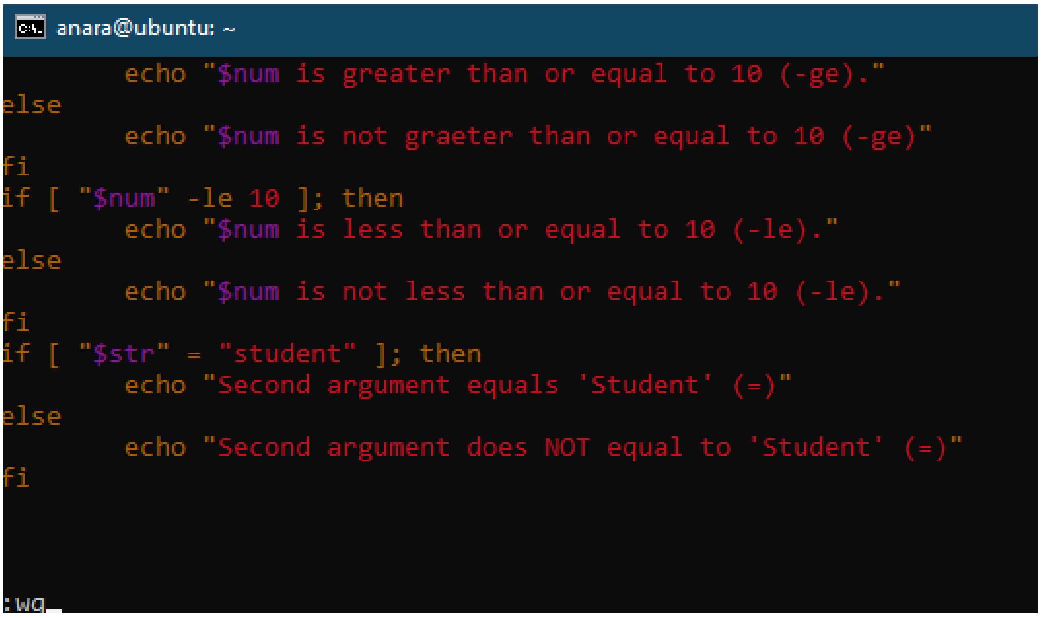
```
       echo "$num is less than 10 (-lt)."
else
    echo "$num is not less than 10 (-lt)."
fi
if [ "$num" -ge 10 ]; then
        echo "$num is greater than or equal to 10 (-ge)."
else
        echo "$num is not graeter than or equal to 10 (-ge)"
fi
if [ "$num" -le 10 ]; then
        echo "$num is less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



:wq
```



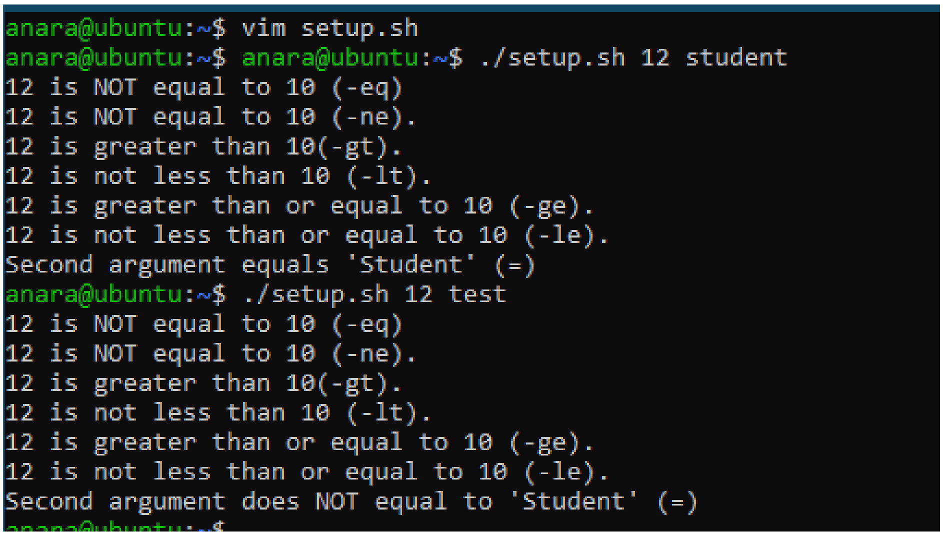
```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
10 is not greater than 10 (-gt)
10 is not less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
anara@ubuntu:~$ ./setup.sh 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).
anara@ubuntu:~$
```

8. **string equality test (=)**

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

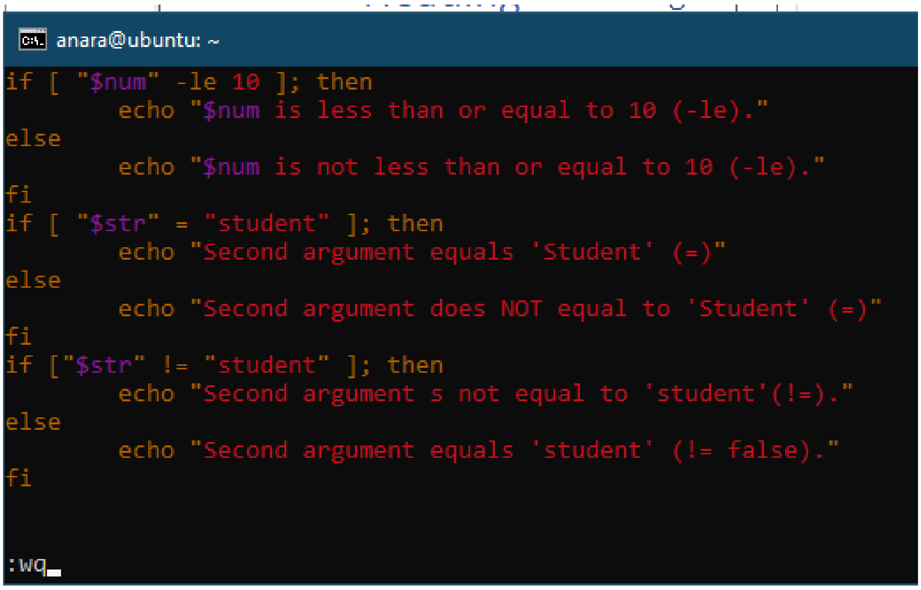


```
        echo "$num is greater than or equal to 10 (-ge)."
else
        echo "$num is not graeter than or equal to 10 (-ge)"
fi
if [ "$num" -le 10 ]; then
        echo "$num is less than or equal to 10 (-le)."
else
        echo "$num is not less than or equal to 10 (-le)."
fi
if [ "$str" = "student" ]; then
        echo "Second argument equals 'Student' (=)"
else
        echo "Second argument does NOT equal to 'Student' (=)"
fi



:wq
```

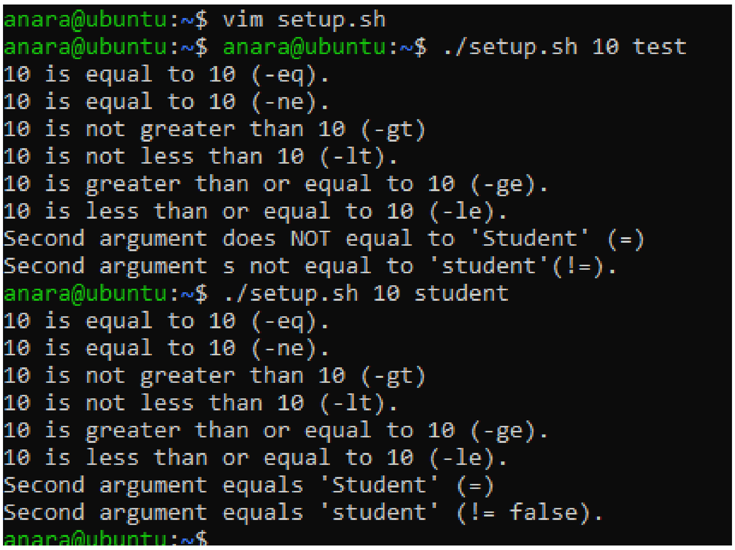


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 12 student
12 is NOT equal to 10 (-eq)
12 is NOT equal to 10 (-ne).
12 is greater than 10(-gt).
12 is not less than 10 (-lt).
12 is greater than or equal to 10 (-ge).
12 is not less than or equal to 10 (-le).
Second argument equals 'Student' (=)
anara@ubuntu:~$ ./setup.sh 12 test
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).
Second argument does NOT equal to 'Student' (=)
anara@ubuntu:~$
```

9. **string inequality test (!=)**

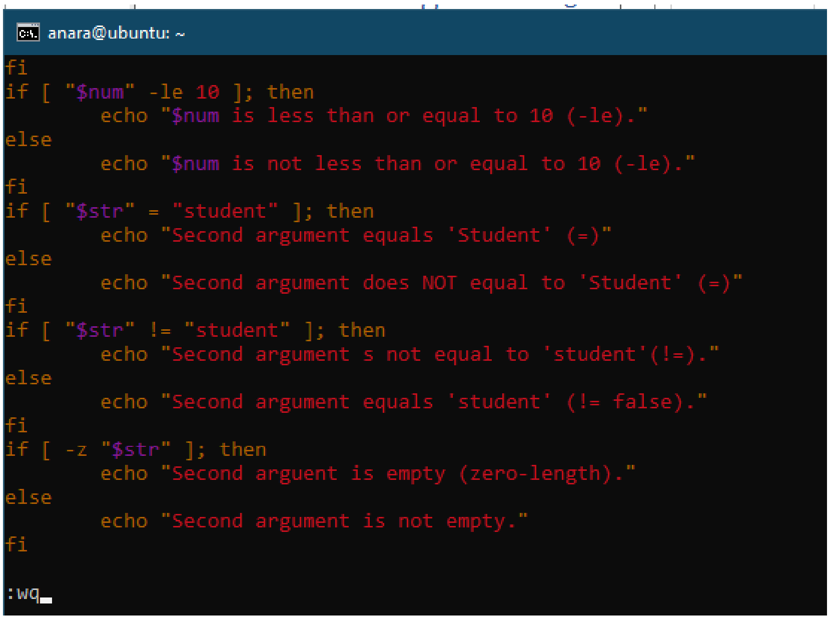


```
if [ "$num" -le 10 ]; then
        echo "$num is less than or equal to 10 (-le)."
else
        echo "$num is not less than or equal to 10 (-le)."
fi
if [ "$str" = "student" ]; then
        echo "Second argument equals 'Student' (=)"
else
        echo "Second argument does NOT equal to 'Student' (=)"
fi
if ["$str" != "student" ]; then
        echo "Second argument s not equal to 'student'(!=)."
else
        echo "Second argument equals 'student' (!= false)."
fi

:wq
```

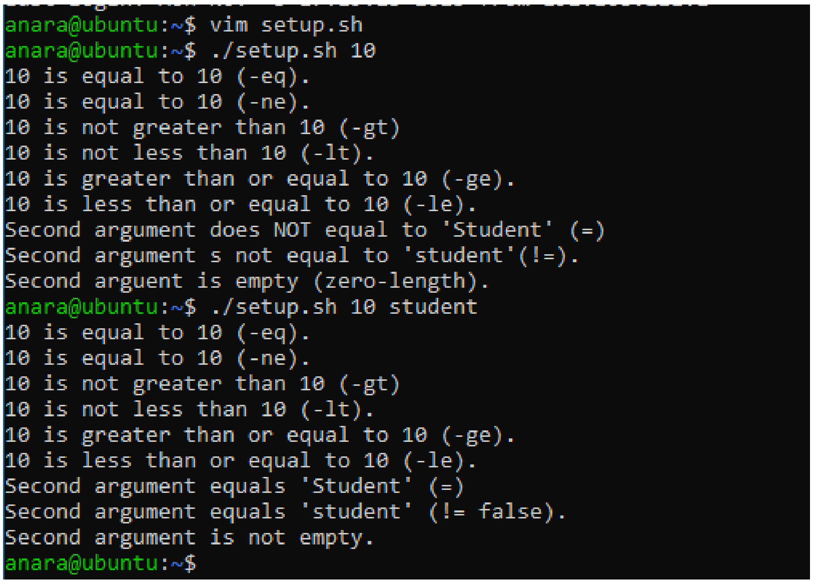


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 10 test
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
10 is not greater than 10 (-gt)
10 is not less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal to 'Student' (=)
Second argument s not equal to 'student'(!=).
anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
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).
anara@ubuntu:~$
```

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



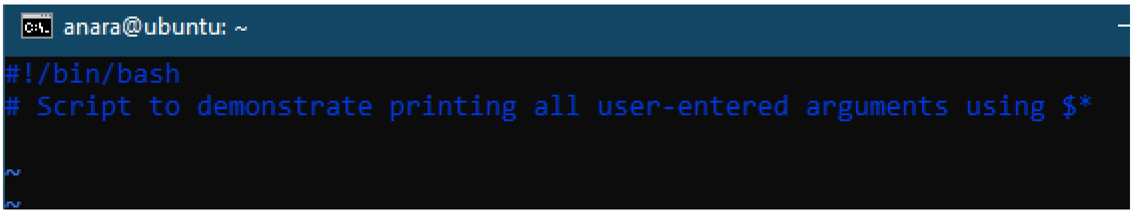
```
fi
if [ "$num" -le 10 ]; then
        echo "$num is less than or equal to 10 (-le)."
else
        echo "$num is not less than or equal to 10 (-le)."
fi
if [ "$str" = "student" ]; then
        echo "Second argument equals 'Student' (=)"
else
        echo "Second argument does NOT equal to 'Student' (=)"
fi
if [ "$str" != "student" ]; then
        echo "Second argument s not equal to 'student'(!=)."
else
        echo "Second argument equals 'student' (!= false)."
fi
if [ -z "$str" ]; then
        echo "Second arguent is empty (zero-length)."
else
        echo "Second argument is not empty."
fi

:wq
```



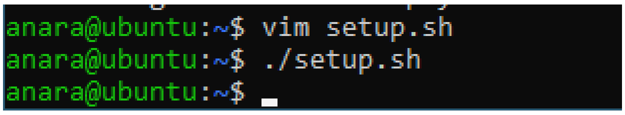
```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ ./setup.sh 10
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
10 is not greater than 10 (-gt)
10 is not less than 10 (-lt).
10 is greater than or equal to 10 (-ge).
10 is less than or equal to 10 (-le).
Second argument does NOT equal to 'Student' (=)
Second argument s not equal to 'student'(!=).
Second arguent is empty (zero-length).
anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
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.
anara@ubuntu:~$
```

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

1. Create the script with shebang and basic structure

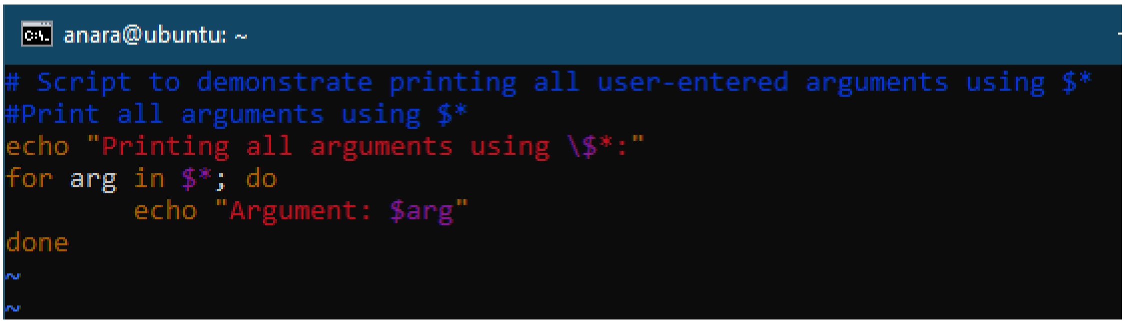


```
#!/bin/bash
# Script to demonstrate printing all user-entered arguments using $*

~
~
```

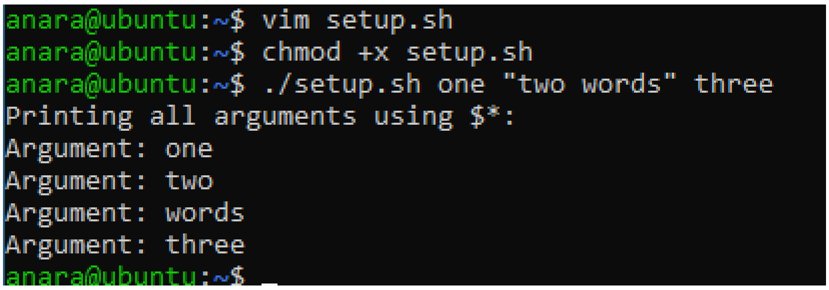


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ ./setup.sh
anara@ubuntu:~$ _
```

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



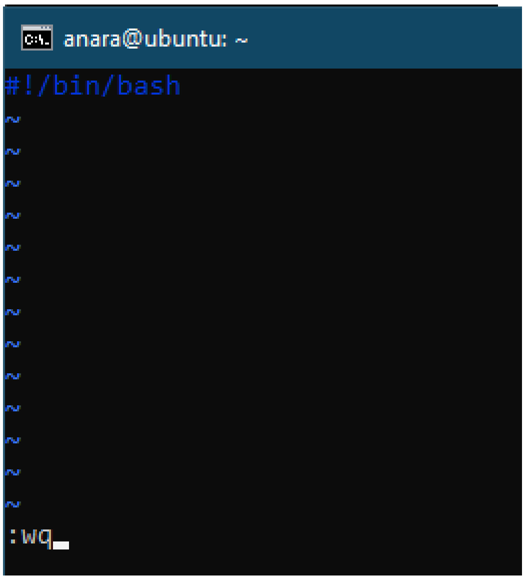
```
# Script to demonstrate printing all user-entered arguments using $*
#Print all arguments using $*
echo "Printing all arguments using \$*:"
for arg in $*; do
        echo "Argument: $arg"
done
~
~
```



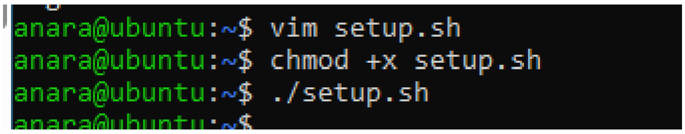
```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ chmod +x setup.sh
anara@ubuntu:~$ ./setup.sh one "two words" three
Printing all arguments using $*:
Argument: one
Argument: two
Argument: words
Argument: three
anara@ubuntu:~$ _
```

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

1. **Add the shebang line**

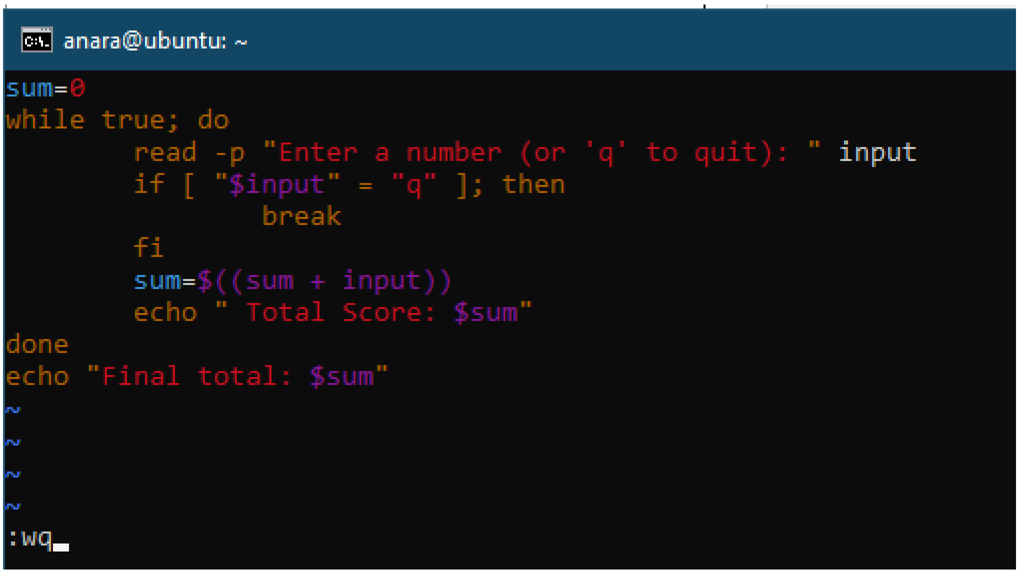


```
#!/bin/bash
~
~
~
~
~
~
~
~
~
~
~
~
~
:wq
```

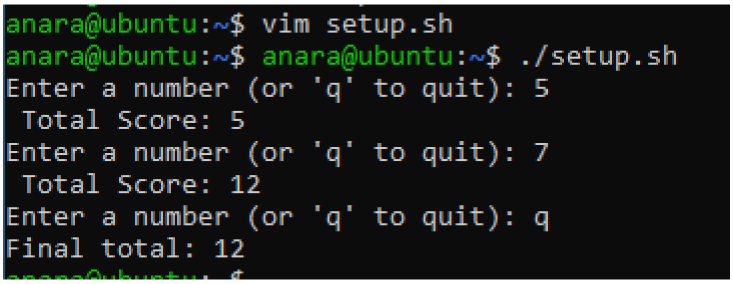


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ chmod +x setup.sh
anara@ubuntu:~$ ./setup.sh
anara@ubuntu:~$
```

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

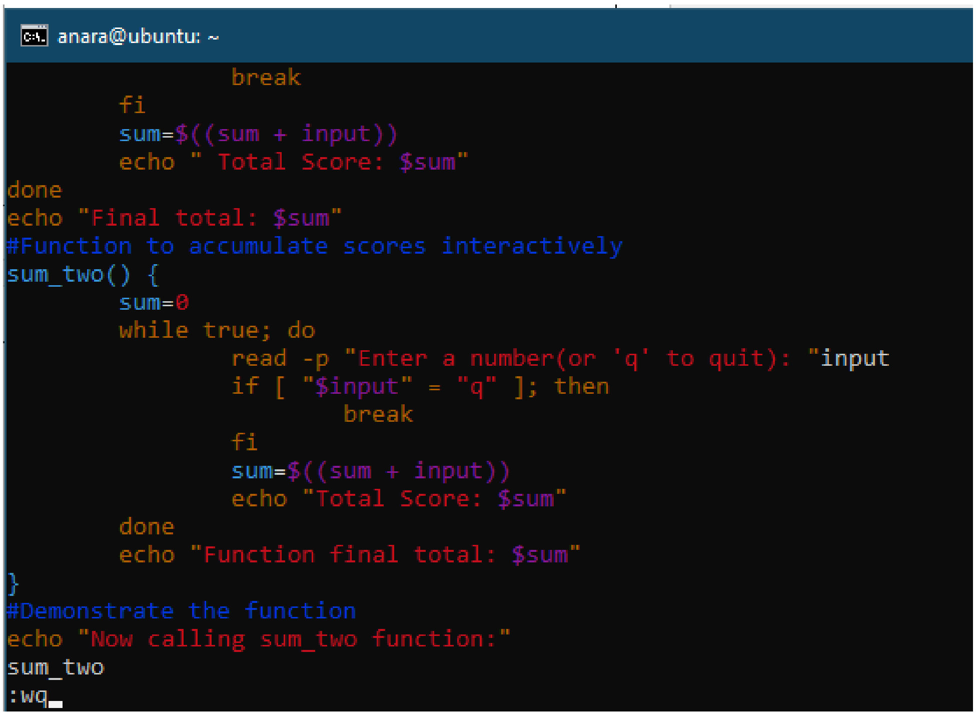


```
sum=0
while true; do
        read -p "Enter a number (or 'q' to quit): " input
        if [ "$input" = "q" ]; then
                break
        fi
        sum=$((sum + input))
        echo " Total Score: $sum"
done
echo "Final total: $sum"
~
~
~
~
:wq
```

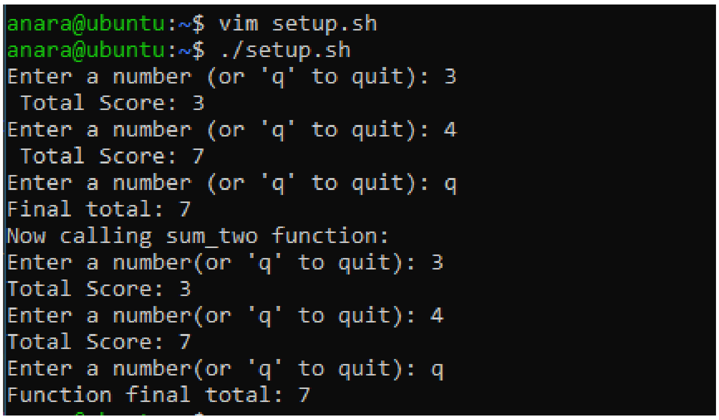


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh
Enter a number (or 'q' to quit): 5
 Total Score: 5
Enter a number (or 'q' to quit): 7
 Total Score: 12
Enter a number (or 'q' to quit): q
Final total: 12
anara@ubuntu:~$
```

3. **Add the interactive summation function and demonstrate it**

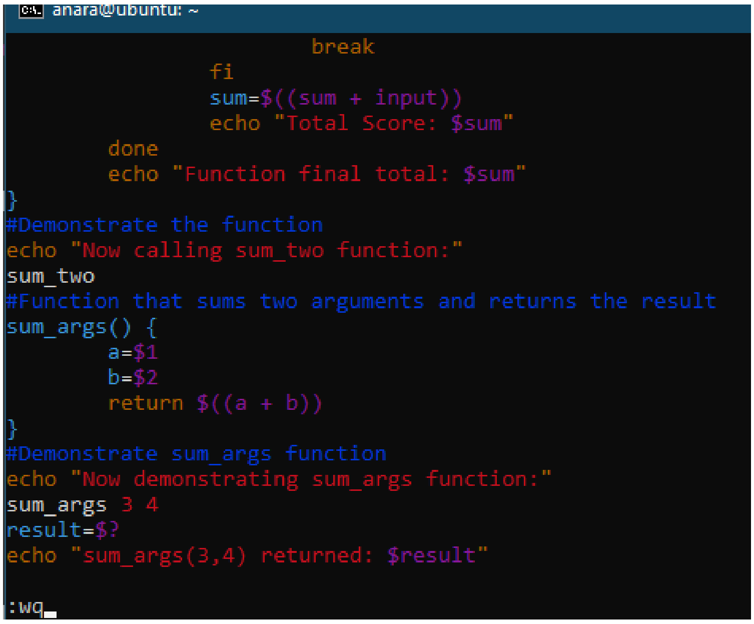


```
                break
        fi
        sum=$((sum + input))
        echo " Total Score: $sum"
done
echo "Final total: $sum"
#Function to accumulate scores interactively
sum_two() {
        sum=0
        while true; do
                read -p "Enter a number(or 'q' to quit): "input
                if [ "$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
:wq
```

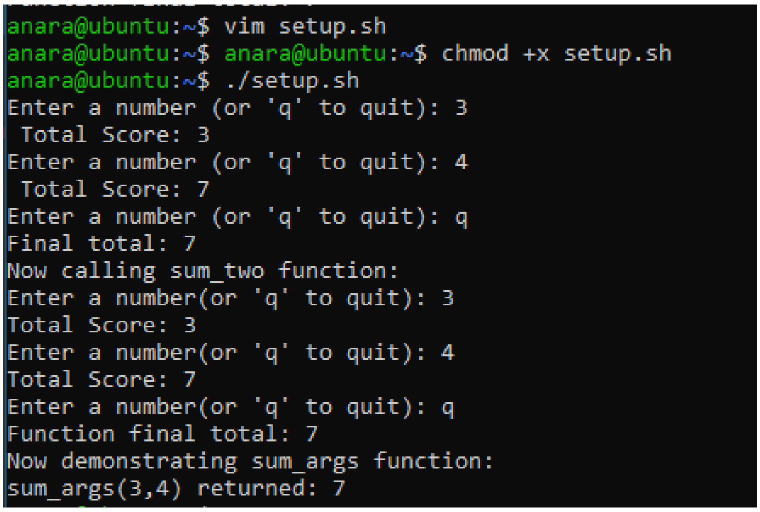


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ ./setup.sh
Enter a number (or 'q' to quit): 3
 Total Score: 3
Enter a number (or 'q' to quit): 4
 Total Score: 7
Enter a number (or 'q' to quit): q
Final total: 7
Now calling sum_two function:
Enter a number(or 'q' to quit): 3
Total Score: 3
Enter a number(or 'q' to quit): 4
Total Score: 7
Enter a number(or 'q' to quit): q
Function final total: 7
```

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



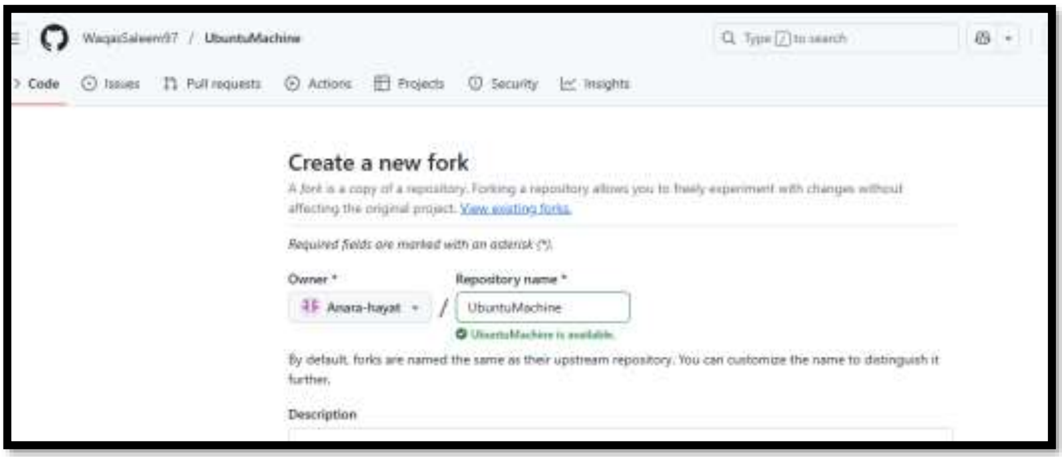
```
                        break
                fi
                sum=$((sum + input))
                echo "Total Score: $sum"
        done
        echo "Function final total: $sum"
}
#Demonstrate the function
echo "Now calling sum_two function:"
sum_two
#Function that sums two arguments and returns 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"

:wq
```



```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ chmod +x setup.sh
anara@ubuntu:~$ ./setup.sh
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
Final total: 7
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
```

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

1. Fork the repository to your GitHub account



Create a new fork

A fork is a copy of a repository. Forking a repository allows you to freely experiment with changes without affecting the original project. View existing forks.

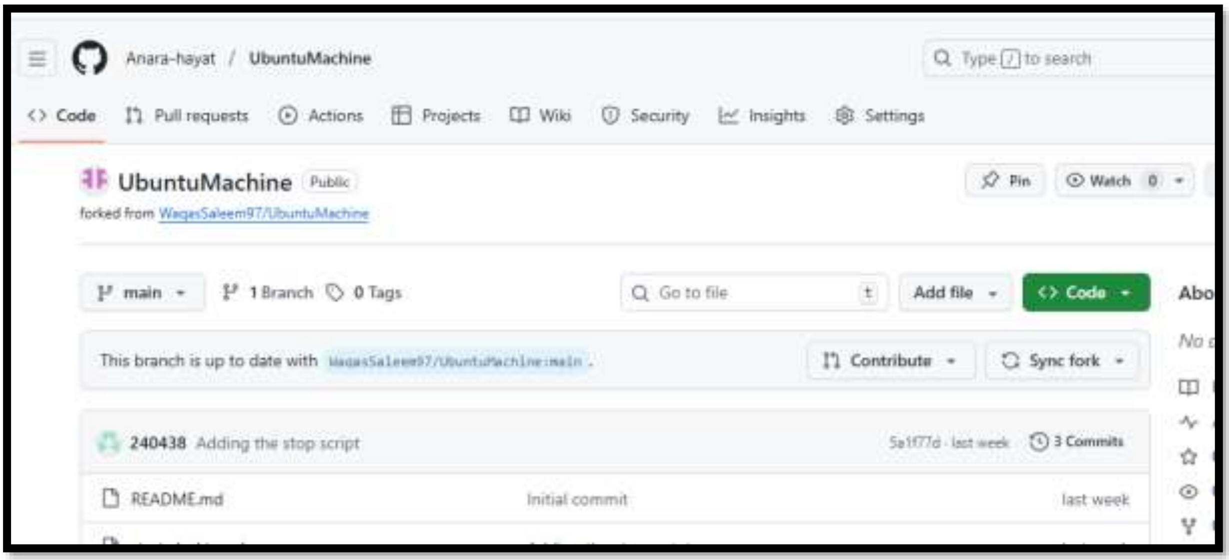
Required fields are marked with an asterisk (*).

Owner * Anara-hayat / Repository name * UbuntuMachine

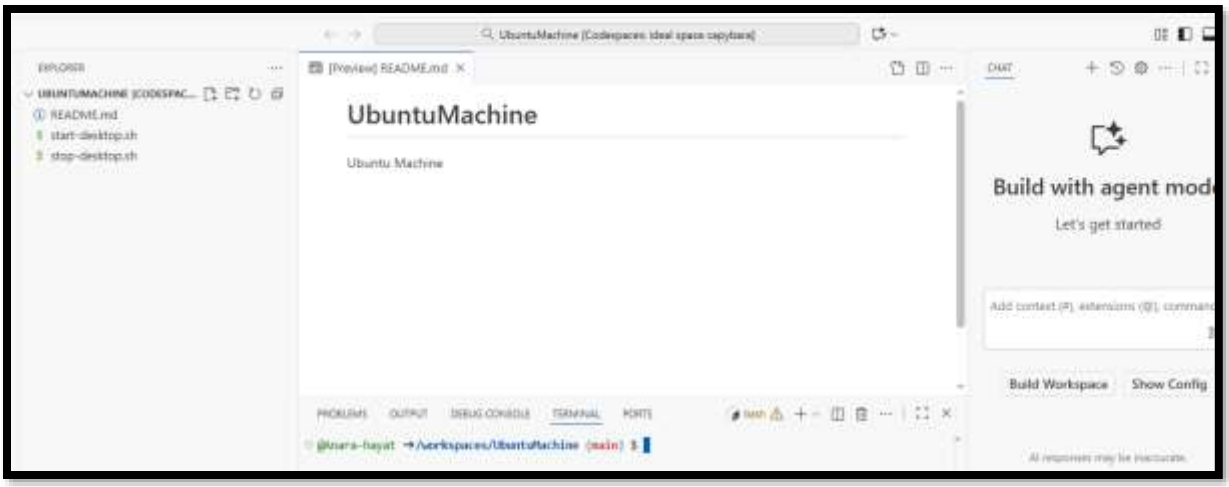
UbuntuMachine is available.

By default, forks are named the same as their upstream repository. You can customize the name to distinguish it further.

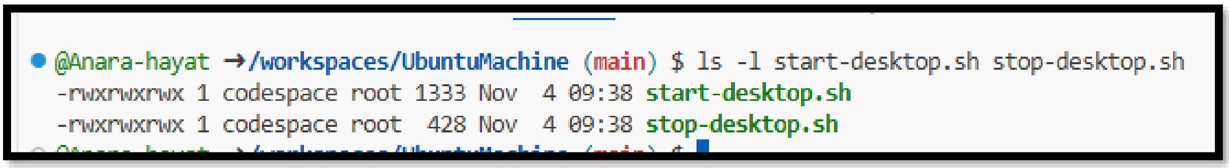
Description



2. Open a Codespace on your fork

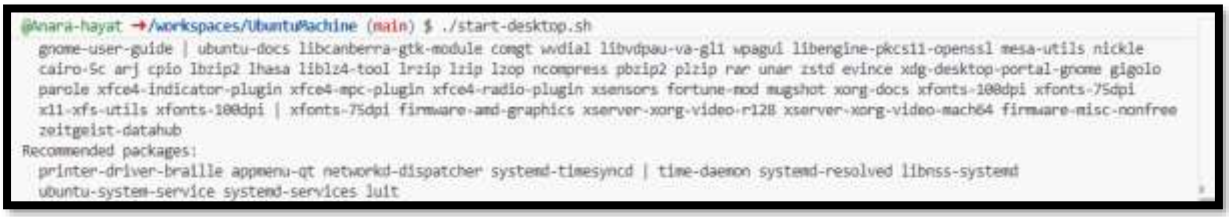


3. Verify the start script is present and executable (capture evidence)



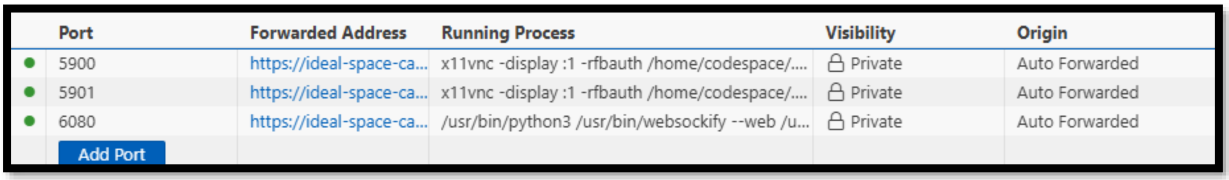
```
● @Anara-hayat →/workspaces/UbuntuMachine (main) $ ls -l start-desktop.sh stop-desktop.sh
  -rwxrwxrwx 1 codespace root 1333 Nov  4 09:38 start-desktop.sh
  -rwxrwxrwx 1 codespace root  428 Nov  4 09:38 stop-desktop.sh
```

4. Run the start script inside the Codespace terminal



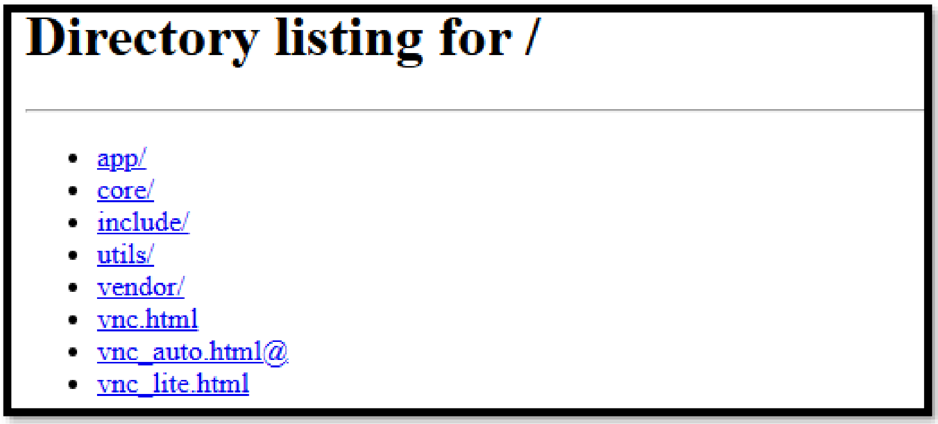
```
@Anara-hayat →/workspaces/UbuntuMachine (main) $ ./start-desktop.sh
  gnome-user-guide | ubuntu-docs libcanberra-gtk-module comgt wvdial libvdpau-va-gl1 wpagui libengine-pkcs11-openssl mesa-utils nickle
  cairo-5c arj cpio lbzip2 lhasa liblz4-tool lrzip lzip lzop ncompress pbzip2 plzip rar unar zstd evince xdg-desktop-portal-gnome gigolo
  parole xfce4-indicator-plugin xfce4-mpc-plugin xfce4-radio-plugin xsensors fortune-mod mugshot xorg-docs xfonts-100dpi xfonts-75dpi
  x11-xfs-utils xfonts-100dpi | xfonts-75dpi firmware-amd-graphics xserver-xorg-video-r128 xserver-xorg-video-mach64 firmware-misc-nonfree
  zeitgeist-datahub
Recommended packages:
  printer-driver-braille appmenu-qt networkd-dispatcher systemd-timesyncd | time-daemon systemd-resolved libnss-systemd
  ubuntu-system-service systemd-services luit
```

5. Verify forwarded ports in Codespaces (Ports view)



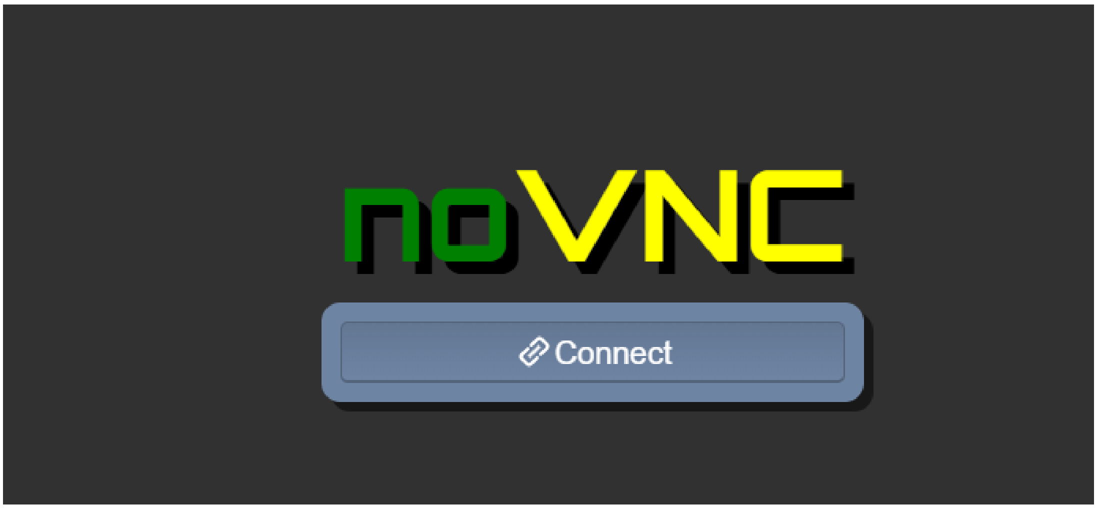
	Port	Forwarded Address	Running Process	Visibility	Origin
●	5900	https://ideal-space-ca...	x11vnc -display :1 -rfbauth /home/codespace/....	Private	Auto Forwarded
●	5901	https://ideal-space-ca...	x11vnc -display :1 -rfbauth /home/codespace/....	Private	Auto Forwarded
●	6080	https://ideal-space-ca...	/usr/bin/python3 /usr/bin/websockify --web /u...	Private	Auto Forwarded
	Add Port				

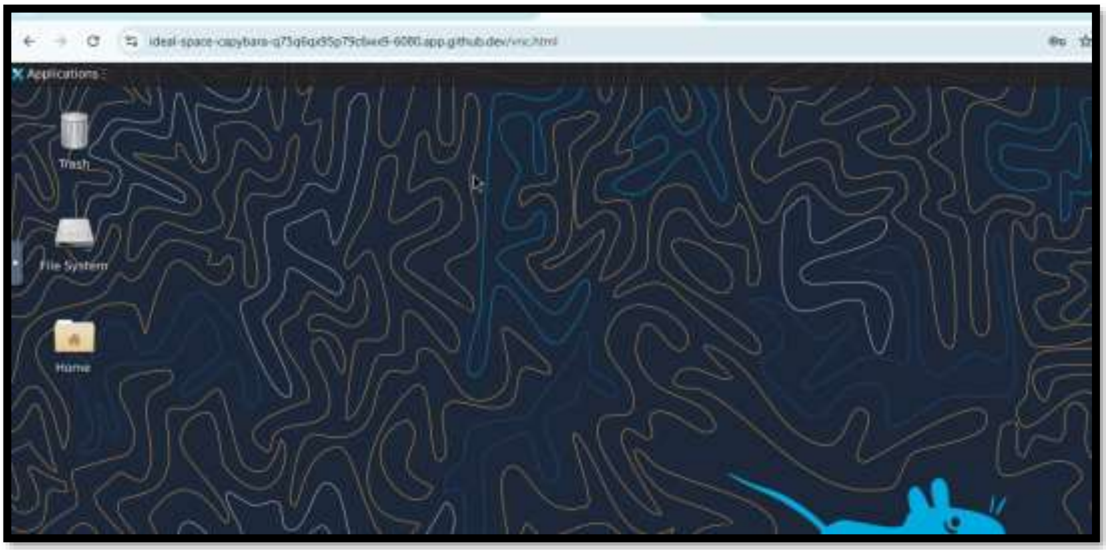
6. Open forwarded port 6080 and connect to VNC HTML page



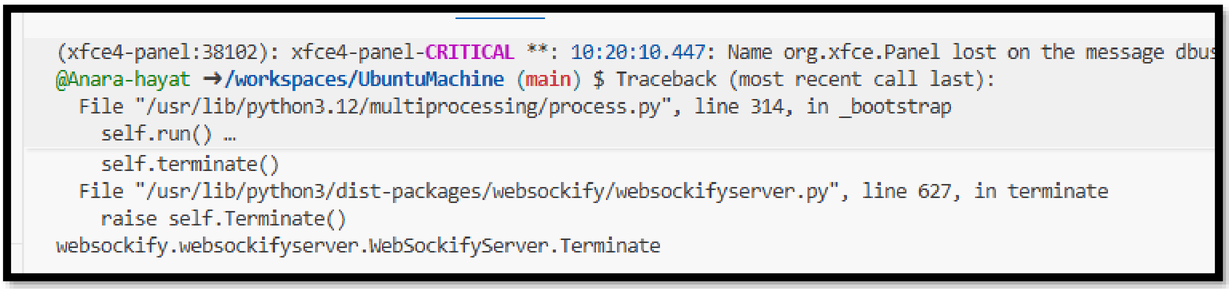
Directory listing for /

- app/
- core/
- include/
- utils/
- vendor/
- vnc.html
- vnc_auto.html@
- vnc_lite.html




ideal-space-capybara-q75q6qx95p79cbxx9-6080.app.github.dev/vnc.html
Applications
Trash
File System
Home

7. **Stop the GUI**

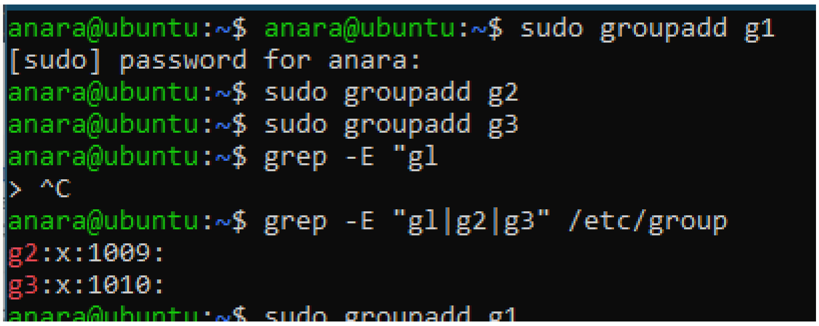


```
(xfce4-panel:38102): xfce4-panel-CRITICAL **: 10:20:10.447: Name org.xfce.Panel lost on the message dbus
@Anara-hayat →/workspaces/UbuntuMachine (main) $ Traceback (most recent call last):
  File "/usr/lib/python3.12/multiprocessing/process.py", line 314, in _bootstrap
    self.run() …
    self.terminate()
  File "/usr/lib/python3/dist-packages/websockify/websockifyserver.py", line 627, in terminate
    raise self.Terminate()
websockify.websockifyserver.WebSockifyServer.Terminate
```

Exam Evaluation Questions

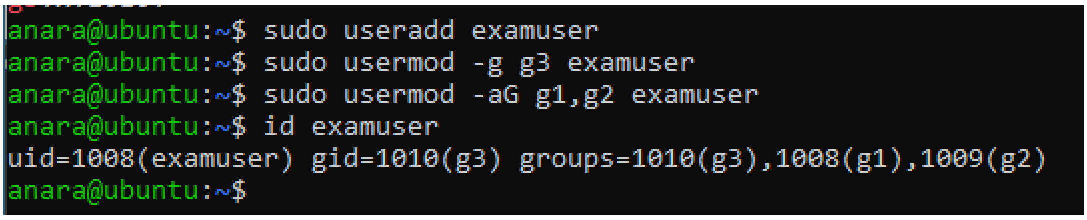
Q1. Group Management and Membership

1. **Create groups g1, g2, and g3**



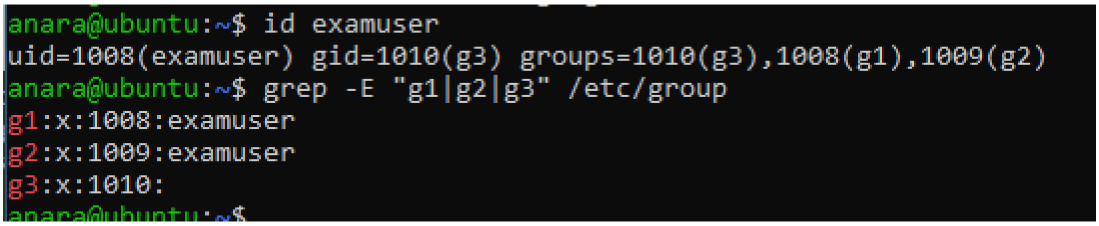
```
anara@ubuntu:~$ anara@ubuntu:~$ sudo groupadd g1
[sudo] password for anara:
anara@ubuntu:~$ sudo groupadd g2
anara@ubuntu:~$ sudo groupadd g3
anara@ubuntu:~$ grep -E "g1
> ^C
anara@ubuntu:~$ grep -E "g1|g2|g3" /etc/group
g2:x:1009:
g3:x:1010:
anara@ubuntu:~$ sudo groupadd g1
```

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



```
anara@ubuntu:~$ sudo useradd examuser
anara@ubuntu:~$ sudo usermod -g g3 examuser
anara@ubuntu:~$ sudo usermod -aG g1,g2 examuser
anara@ubuntu:~$ id examuser
uid=1008(examuser) gid=1010(g3) groups=1010(g3),1008(g1),1009(g2)
anara@ubuntu:~$
```

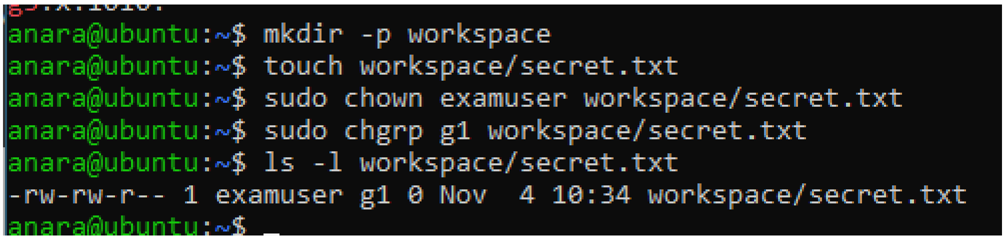
3. **Show the final id and /etc/group lines that prove the changes.**



```
anara@ubuntu:~$ id examuser
uid=1008(examuser) gid=1010(g3) groups=1010(g3),1008(g1),1009(g2)
anara@ubuntu:~$ grep -E "g1|g2|g3" /etc/group
g1:x:1008:examuser
g2:x:1009:examuser
g3:x:1010:
anara@ubuntu:~$
```

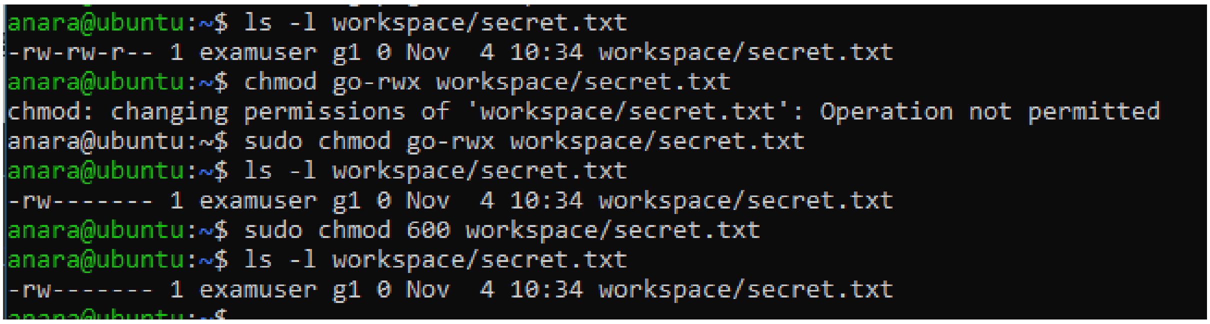
Q2. Ownership and Permission Tasks

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



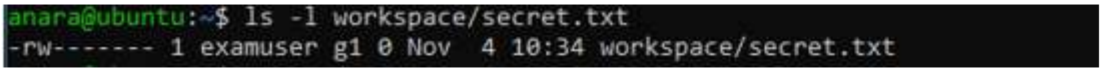
```
anara@ubuntu:~$ mkdir -p workspace
anara@ubuntu:~$ touch workspace/secret.txt
anara@ubuntu:~$ sudo chown examuser workspace/secret.txt
anara@ubuntu:~$ sudo chgrp g1 workspace/secret.txt
anara@ubuntu:~$ ls -l workspace/secret.txt
-rw-rw-r-- 1 examuser g1 0 Nov  4 10:34 workspace/secret.txt
anara@ubuntu:~$ _
```

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



```
anara@ubuntu:~$ ls -l workspace/secret.txt
-rw-rw-r-- 1 examuser g1 0 Nov  4 10:34 workspace/secret.txt
anara@ubuntu:~$ chmod go-rwx workspace/secret.txt
chmod: changing permissions of 'workspace/secret.txt': Operation not permitted
anara@ubuntu:~$ sudo chmod go-rwx workspace/secret.txt
anara@ubuntu:~$ ls -l workspace/secret.txt
-rw------- 1 examuser g1 0 Nov  4 10:34 workspace/secret.txt
anara@ubuntu:~$ sudo chmod 600 workspace/secret.txt
anara@ubuntu:~$ ls -l workspace/secret.txt
-rw------- 1 examuser g1 0 Nov  4 10:34 workspace/secret.txt
anara@ubuntu:~$
```

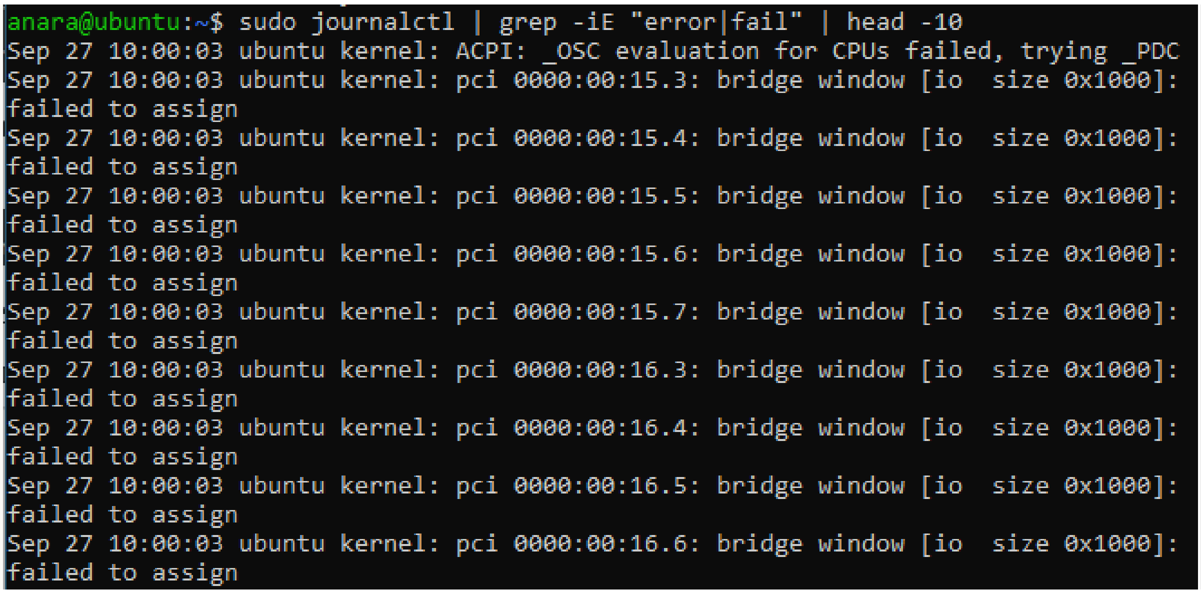
3. **Show ls -l for the file after each change to document the permission bits.**



```
anara@ubuntu:~$ ls -l workspace/secret.txt
-rw------- 1 examuser g1 0 Nov  4 10:34 workspace/secret.txt
```

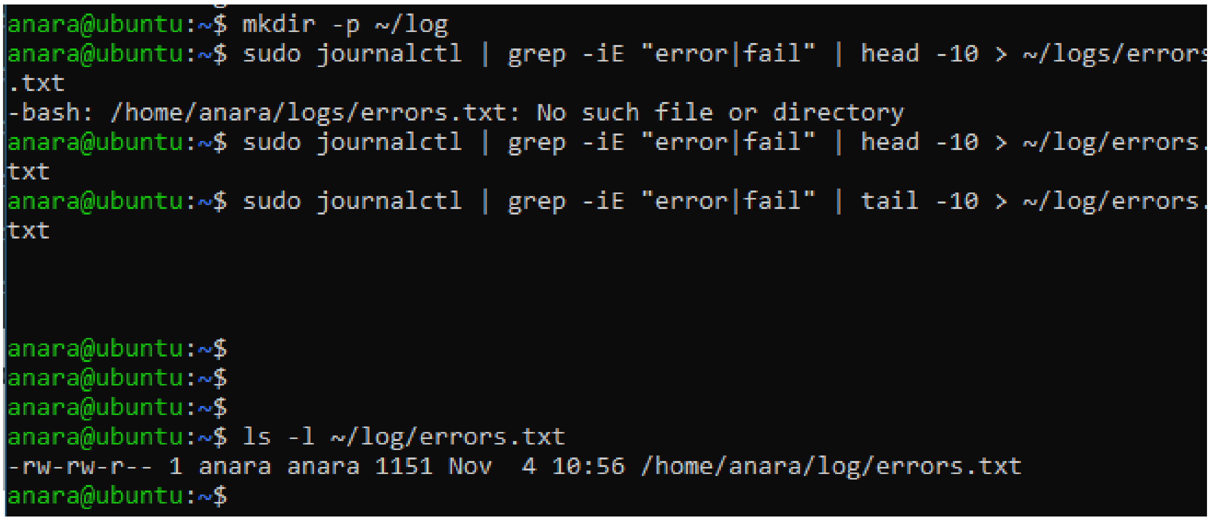
Q3. Pipes, Grep, and Redirection Practice

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



```
anara@ubuntu:~$ sudo journalctl | grep -iE "error|fail" | head -10
Sep 27 10:00:03 ubuntu kernel: ACPI: _OSC evaluation for CPUs failed, trying _PDC
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:15.3: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:15.4: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:15.5: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:15.6: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:15.7: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:16.3: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:16.4: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:16.5: bridge window [io  size 0x1000]:
failed to assign
Sep 27 10:00:03 ubuntu kernel: pci 0000:00:16.6: bridge window [io  size 0x1000]:
failed to assign
```

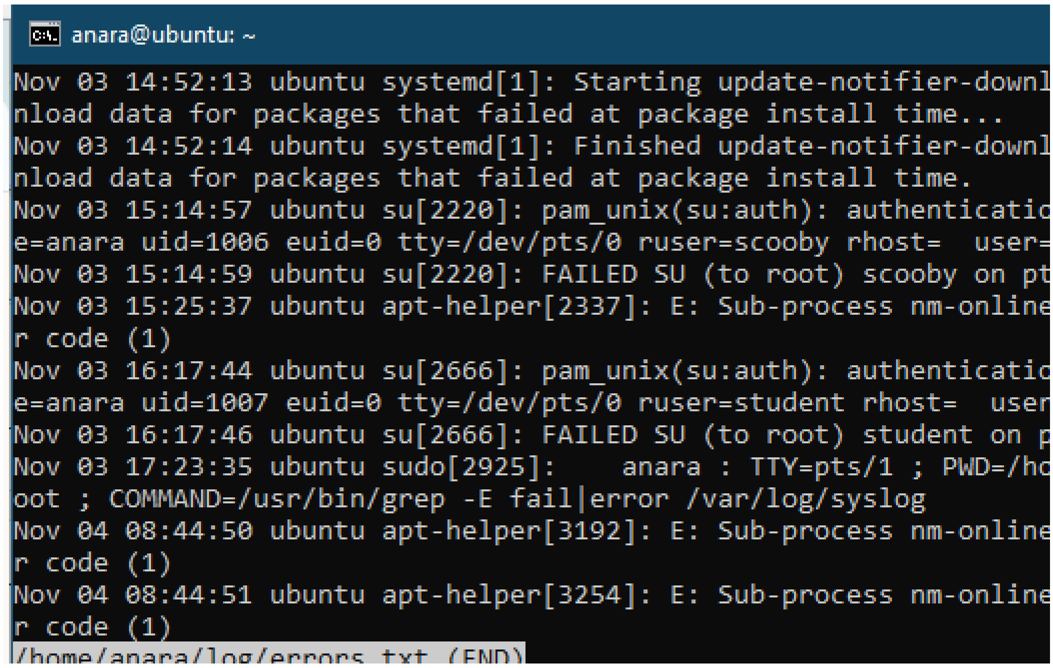
2. **Save results using redirection**



```
anara@ubuntu:~$ mkdir -p ~/log
anara@ubuntu:~$ sudo journalctl | grep -iE "error|fail" | head -10 > ~/logs/errors
.txt
-bash: /home/anara/logs/errors.txt: No such file or directory
anara@ubuntu:~$ sudo journalctl | grep -iE "error|fail" | head -10 > ~/log/errors.
txt
anara@ubuntu:~$ sudo journalctl | grep -iE "error|fail" | tail -10 > ~/log/errors.
txt



anara@ubuntu:~$
anara@ubuntu:~$
anara@ubuntu:~$
anara@ubuntu:~$ ls -l ~/log/errors.txt
-rw-rw-r-- 1 anara anara 1151 Nov  4 10:56 /home/anara/log/errors.txt
anara@ubuntu:~$
```

3. View with pager

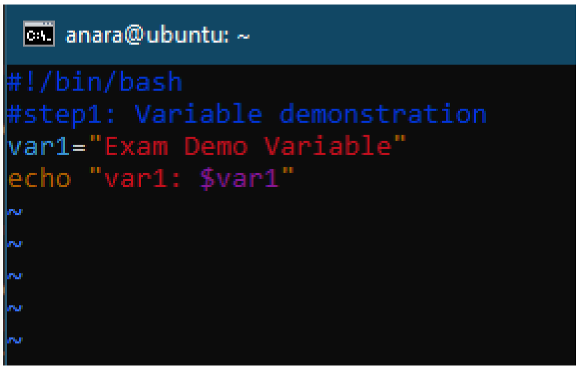
less ~/log/errors.txt



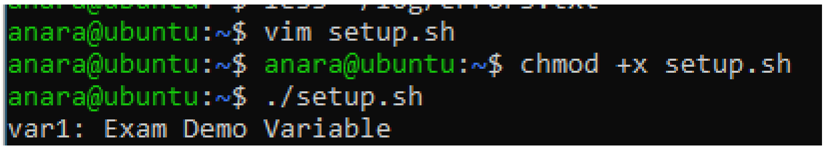
```
Nov 03 14:52:13 ubuntu systemd[1]: Starting update-notifier-downl
nload data for packages that failed at package install time...
Nov 03 14:52:14 ubuntu systemd[1]: Finished update-notifier-downl
nload data for packages that failed at package install time.
Nov 03 15:14:57 ubuntu su[2220]: pam_unix(su:auth): authenticatio
e=anara uid=1006 euid=0 tty=/dev/pts/0 ruser=scooby rhost=  user=
Nov 03 15:14:59 ubuntu su[2220]: FAILED SU (to root) scooby on pt
Nov 03 15:25:37 ubuntu apt-helper[2337]: E: Sub-process nm-online
r code (1)
Nov 03 16:17:44 ubuntu su[2666]: pam_unix(su:auth): authenticatio
e=anara uid=1007 euid=0 tty=/dev/pts/0 ruser=student rhost=  user
Nov 03 16:17:46 ubuntu su[2666]: FAILED SU (to root) student on p
Nov 03 17:23:35 ubuntu sudo[2925]:    anara : TTY=pts/1 ; PWD=/ho
oot ; COMMAND=/usr/bin/grep -E fail|error /var/log/syslog
Nov 04 08:44:50 ubuntu apt-helper[3192]: E: Sub-process nm-online
r code (1)
Nov 04 08:44:51 ubuntu apt-helper[3254]: E: Sub-process nm-online
r code (1)
/home/anara/log/errors.txt (END)
```

Q4. Script: Variables, Command Substitution, File & Dir Checks

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

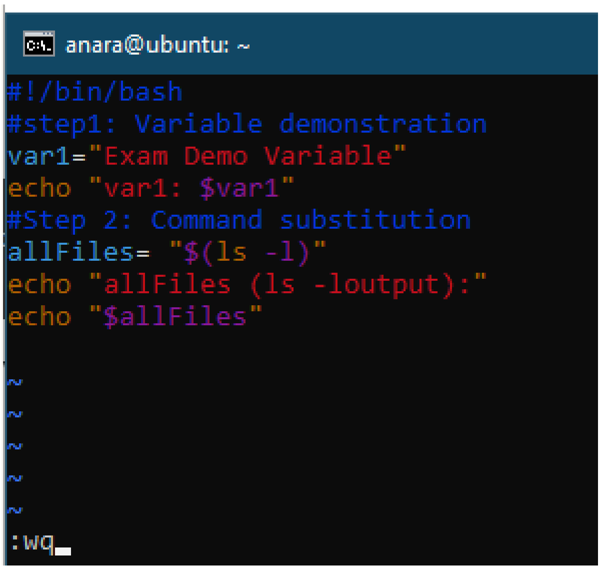


```
#!/bin/bash
#step1: Variable demonstration
var1="Exam Demo Variable"
echo "var1: $var1"
~
~
~
~
~
```

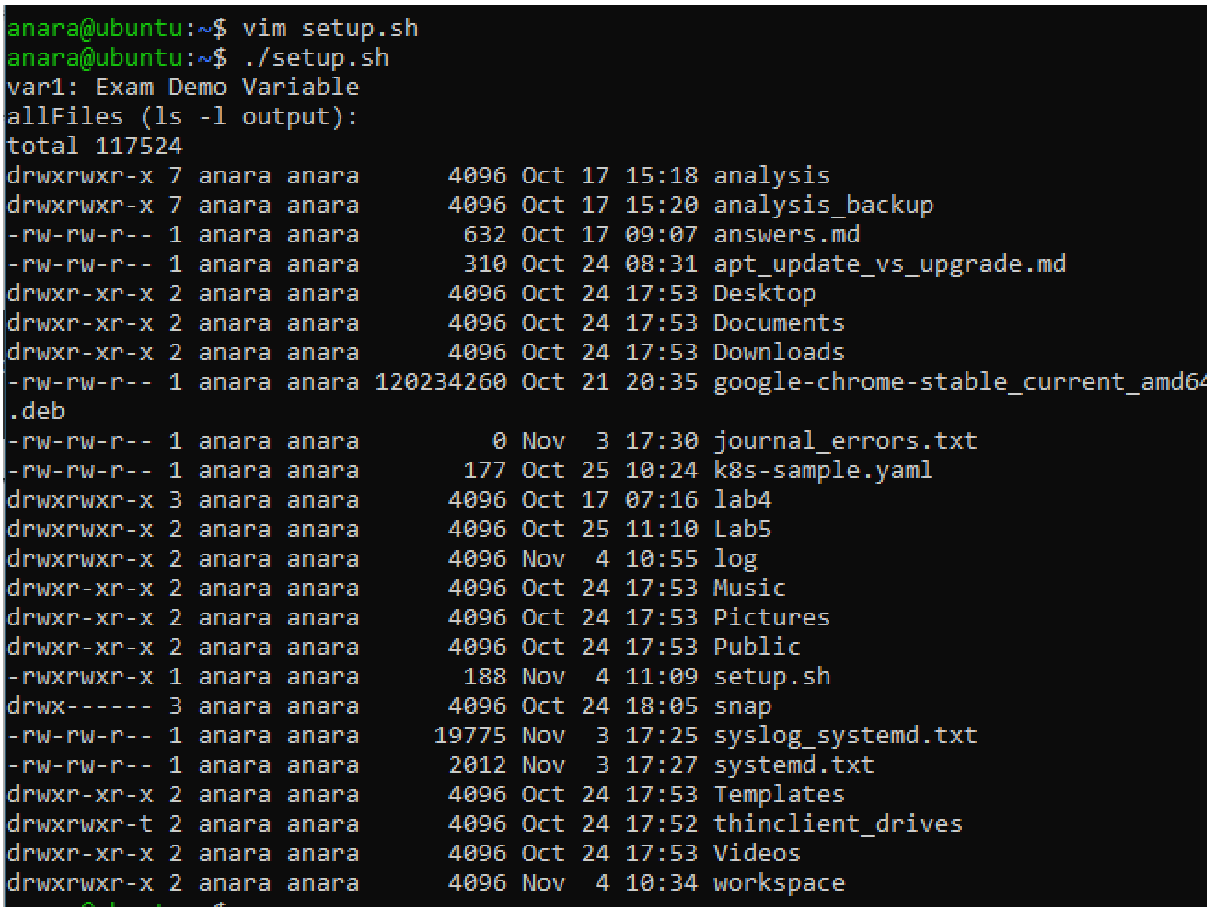


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ chmod +x setup.sh
anara@ubuntu:~$ ./setup.sh
var1: Exam Demo Variable
```

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

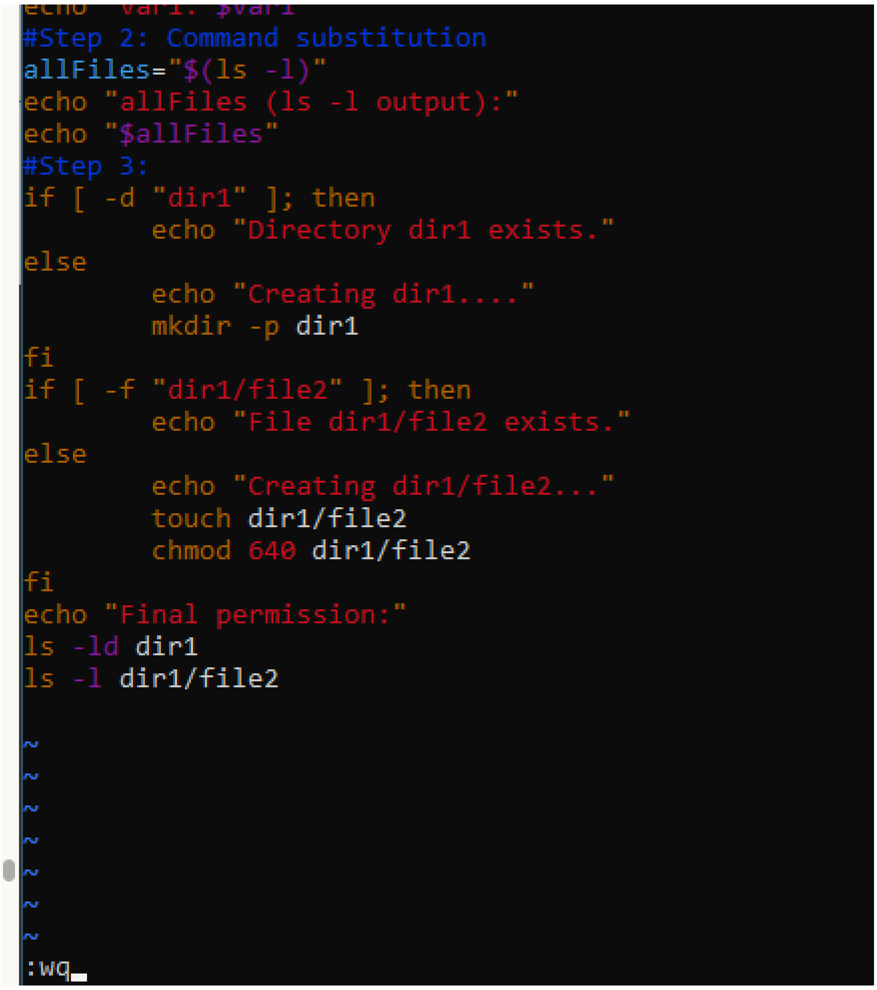


```
#!/bin/bash
#step1: Variable demonstration
var1="Exam Demo Variable"
echo "var1: $var1"
#Step 2: Command substitution
allFiles= "$(ls -l)"
echo "allFiles (ls -loutput):"
echo "$allFiles"

~
~
~
~
~
:wq
```

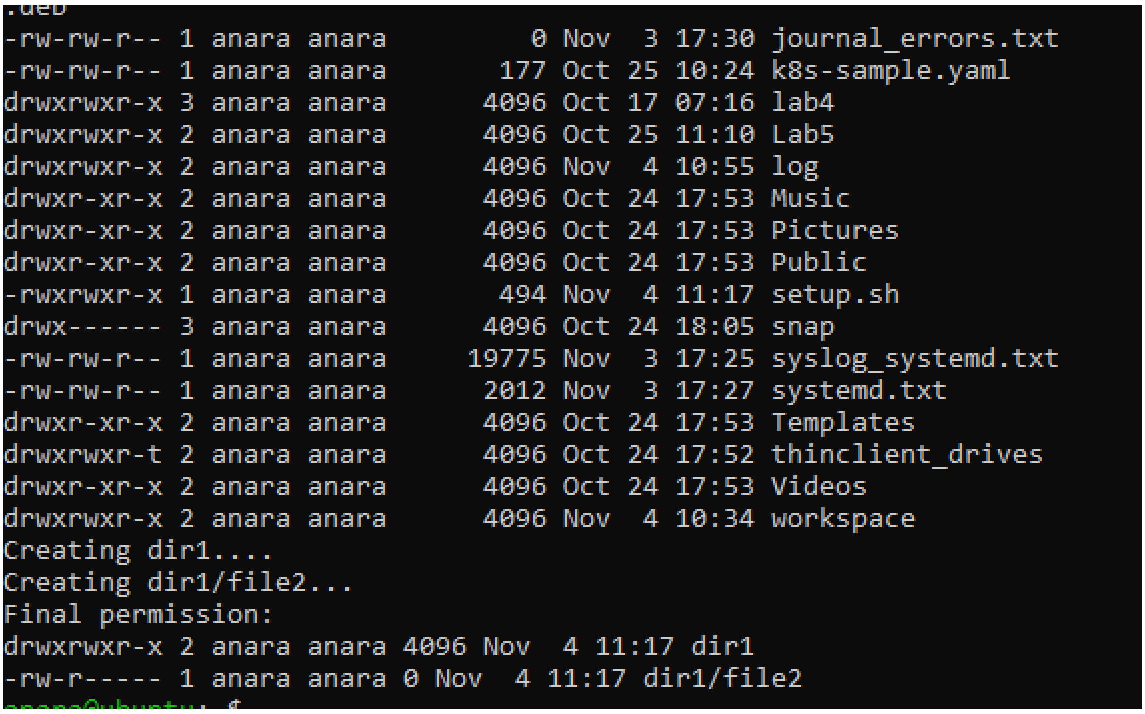


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ ./setup.sh
var1: Exam Demo Variable
allFiles (ls -l output):
total 117524
drwxrwxr-x 7 anara anara      4096 Oct 17 15:18 analysis
drwxrwxr-x 7 anara anara      4096 Oct 17 15:20 analysis_backup
-rw-rw-r-- 1 anara anara       632 Oct 17 09:07 answers.md
-rw-rw-r-- 1 anara anara       310 Oct 24 08:31 apt_update_vs_upgrade.md
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Desktop
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Documents
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Downloads
-rw-rw-r-- 1 anara anara 120234260 Oct 21 20:35 google-chrome-stable_current_amd64
.deb
-rw-rw-r-- 1 anara anara         0 Nov  3 17:30 journal_errors.txt
-rw-rw-r-- 1 anara anara       177 Oct 25 10:24 k8s-sample.yaml
drwxrwxr-x 3 anara anara      4096 Oct 17 07:16 lab4
drwxrwxr-x 2 anara anara      4096 Oct 25 11:10 Lab5
drwxrwxr-x 2 anara anara      4096 Nov  4 10:55 log
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Music
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Pictures
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Public
-rwxrwxr-x 1 anara anara       188 Nov  4 11:09 setup.sh
drwx------ 3 anara anara      4096 Oct 24 18:05 snap
-rw-rw-r-- 1 anara anara     19775 Nov  3 17:25 syslog_systemd.txt
-rw-rw-r-- 1 anara anara      2012 Nov  3 17:27 systemd.txt
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Templates
drwxrwxr-t 2 anara anara      4096 Oct 24 17:52 thinclient_drives
drwxr-xr-x 2 anara anara      4096 Oct 24 17:53 Videos
drwxrwxr-x 2 anara anara      4096 Nov  4 10:34 workspace
```

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



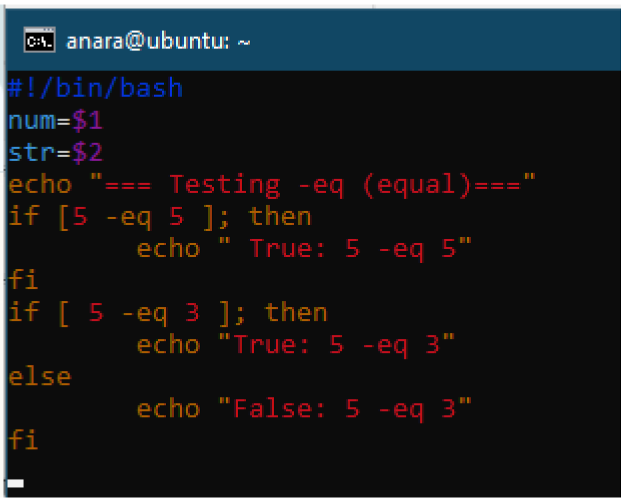
```
echo "var1: $var1"
#Step 2: Command substitution
allFiles="$(ls -l)"
echo "allFiles (ls -l output):"
echo "$allFiles"
#Step 3:
if [ -d "dir1" ]; then
        echo "Directory dir1 exists."
else
        echo "Creating dir1...."
        mkdir -p dir1
fi
if [ -f "dir1/file2" ]; then
        echo "File dir1/file2 exists."
else
        echo "Creating dir1/file2..."
        touch dir1/file2
        chmod 640 dir1/file2
fi
echo "Final permission:"
ls -ld dir1
ls -l dir1/file2

~
~
~
~
~
~
~
:wq
```



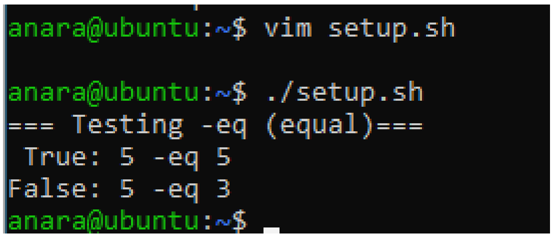
```
.deb
-rw-rw-r-- 1 anara anara        0 Nov  3 17:30 journal_errors.txt
-rw-rw-r-- 1 anara anara      177 Oct 25 10:24 k8s-sample.yaml
drwxrwxr-x 3 anara anara     4096 Oct 17 07:16 lab4
drwxrwxr-x 2 anara anara     4096 Oct 25 11:10 Lab5
drwxrwxr-x 2 anara anara     4096 Nov  4 10:55 log
drwxr-xr-x 2 anara anara     4096 Oct 24 17:53 Music
drwxr-xr-x 2 anara anara     4096 Oct 24 17:53 Pictures
drwxr-xr-x 2 anara anara     4096 Oct 24 17:53 Public
-rwxrwxr-x 1 anara anara      494 Nov  4 11:17 setup.sh
drwx------ 3 anara anara     4096 Oct 24 18:05 snap
-rw-rw-r-- 1 anara anara    19775 Nov  3 17:25 syslog_systemd.txt
-rw-rw-r-- 1 anara anara     2012 Nov  3 17:27 systemd.txt
drwxr-xr-x 2 anara anara     4096 Oct 24 17:53 Templates
drwxrwxr-t 2 anara anara     4096 Oct 24 17:52 thinclient_drives
drwxr-xr-x 2 anara anara     4096 Oct 24 17:53 Videos
drwxrwxr-x 2 anara anara     4096 Nov  4 10:34 workspace
Creating dir1....
Creating dir1/file2...
Final permission:
drwxrwxr-x 2 anara anara 4096 Nov  4 11:17 dir1
-rw-r----- 1 anara anara 0 Nov  4 11:17 dir1/file2
anara@ubuntu:~$
```

Q5. Script: Comparisons and String Tests

1. **Overwrite setup.sh to set num=$1 and str=$2, and add an -eq test showing true and false examples.**

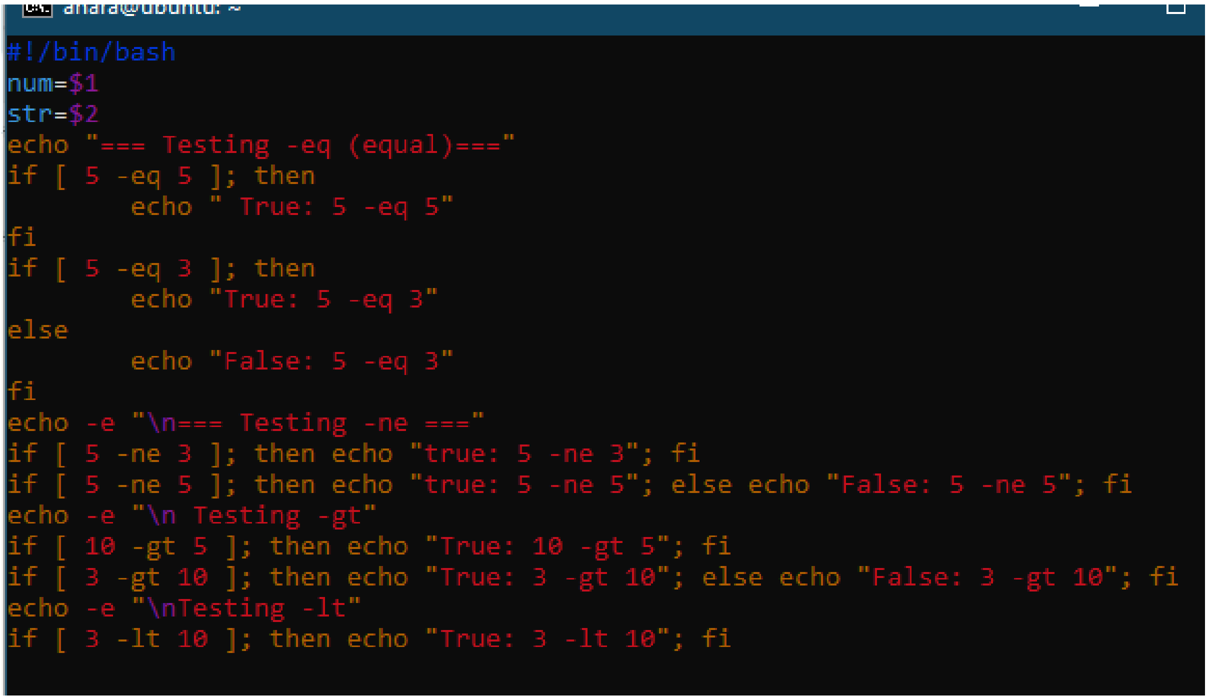


```
#!/bin/bash
num=$1
str=$2
echo "=== Testing -eq (equal)==="
if [5 -eq 5 ]; then
        echo " True: 5 -eq 5"
fi
if [ 5 -eq 3 ]; then
        echo "True: 5 -eq 3"
else
        echo "False: 5 -eq 3"
fi
```

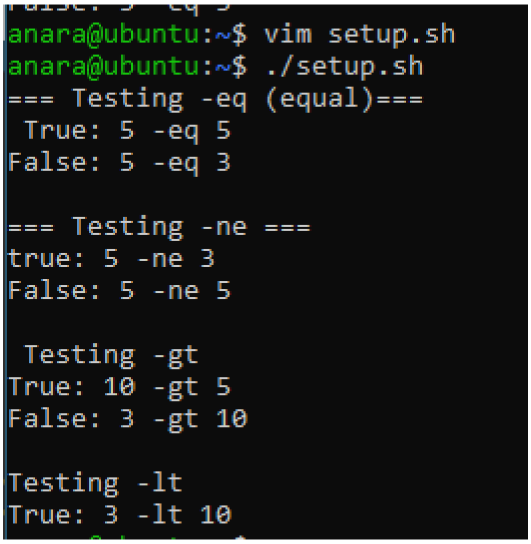


```
anara@ubuntu:~$ vim setup.sh

anara@ubuntu:~$ ./setup.sh
=== Testing -eq (equal)===
 True: 5 -eq 5
False: 5 -eq 3
anara@ubuntu:~$
```

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

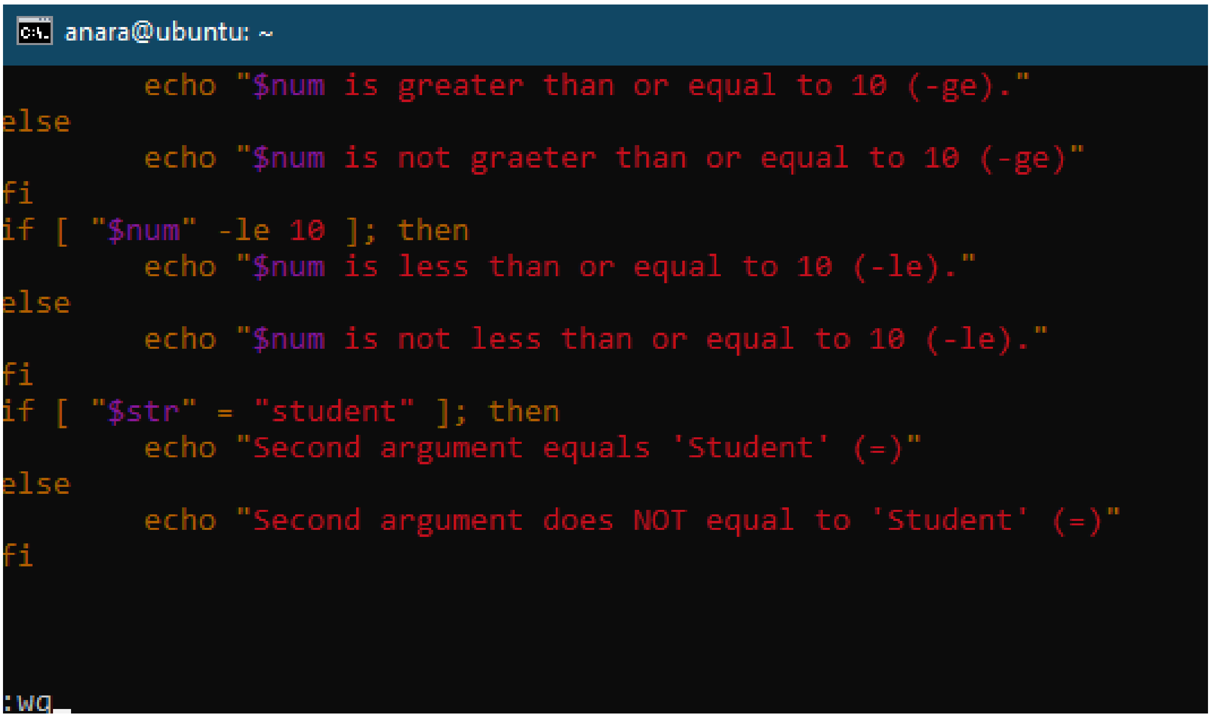


```
#!/bin/bash
num=$1
str=$2
echo "=== Testing -eq (equal)==="
if [ 5 -eq 5 ]; then
        echo " True: 5 -eq 5"
fi
if [ 5 -eq 3 ]; then
        echo "True: 5 -eq 3"
else
        echo "False: 5 -eq 3"
fi
echo -e "\n=== Testing -ne ==="
if [ 5 -ne 3 ]; then echo "true: 5 -ne 3"; fi
if [ 5 -ne 5 ]; then echo "true: 5 -ne 5"; else echo "False: 5 -ne 5"; fi
echo -e "\n Testing -gt"
if [ 10 -gt 5 ]; then echo "True: 10 -gt 5"; fi
if [ 3 -gt 10 ]; then echo "True: 3 -gt 10"; else echo "False: 3 -gt 10"; fi
echo -e "\nTesting -lt"
if [ 3 -lt 10 ]; then echo "True: 3 -lt 10"; fi
```

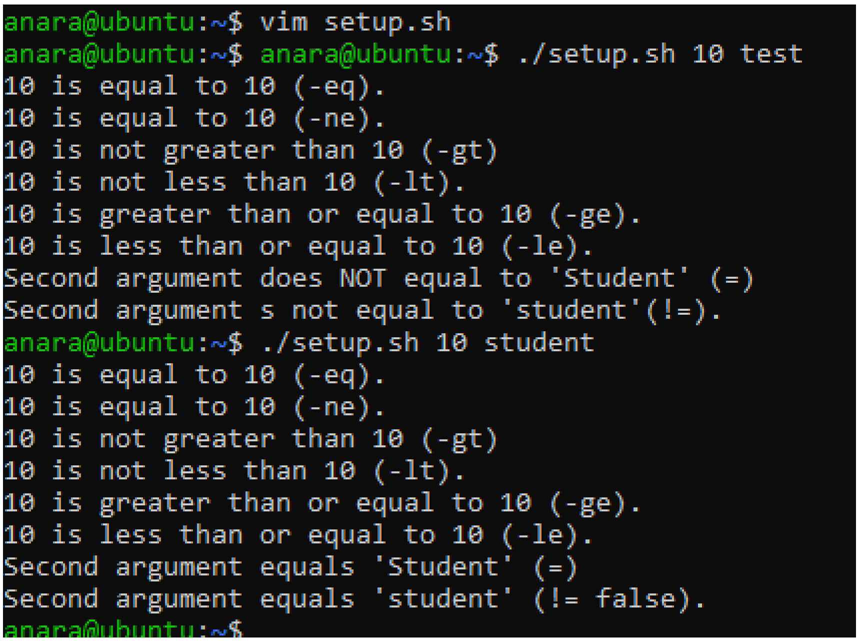


```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ ./setup.sh
=== Testing -eq (equal)===
 True: 5 -eq 5
False: 5 -eq 3

=== Testing -ne ===
true: 5 -ne 3
False: 5 -ne 5

 Testing -gt
True: 10 -gt 5
False: 3 -gt 10

Testing -lt
True: 3 -lt 10
```

3. **Append string tests**



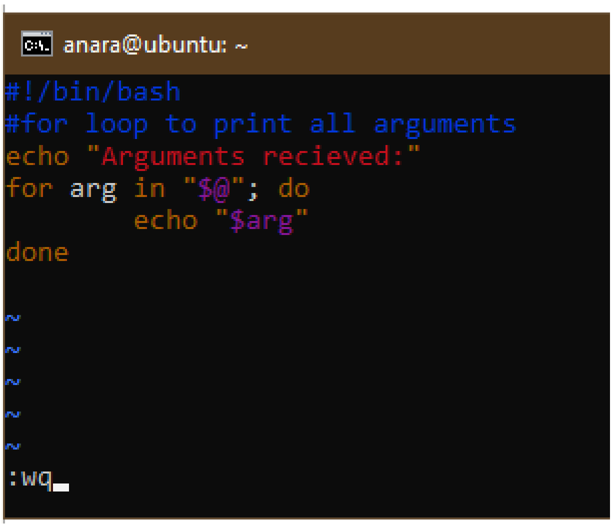
```
        echo "$num is greater than or equal to 10 (-ge)."
else
        echo "$num is not graeter than or equal to 10 (-ge)"
fi
if [ "$num" -le 10 ]; then
        echo "$num is less than or equal to 10 (-le)."
else
        echo "$num is not less than or equal to 10 (-le)."
fi
if [ "$str" = "student" ]; then
        echo "Second argument equals 'Student' (=)"
else
        echo "Second argument does NOT equal to 'Student' (=)"
fi



:wq
```



```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./setup.sh 10 test
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
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 to 'Student' (=)
Second argument s not equal to 'student'(!=).
anara@ubuntu:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne).
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).
anara@ubuntu:~$
```

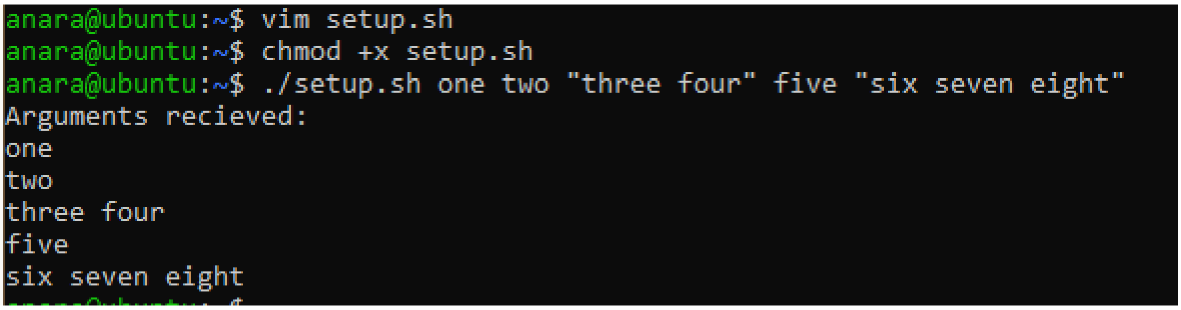
Question 6: Script - For Loop and Argument Handling

1. **Create/overwrite setup.sh to print every argument using "$@" in a for loop and save the file.**



```
#!/bin/bash
#for loop to print all arguments
echo "Arguments recieved:"
for arg in "$@"; do
        echo "$arg"
done

~
~
~
~
~
:wq
```

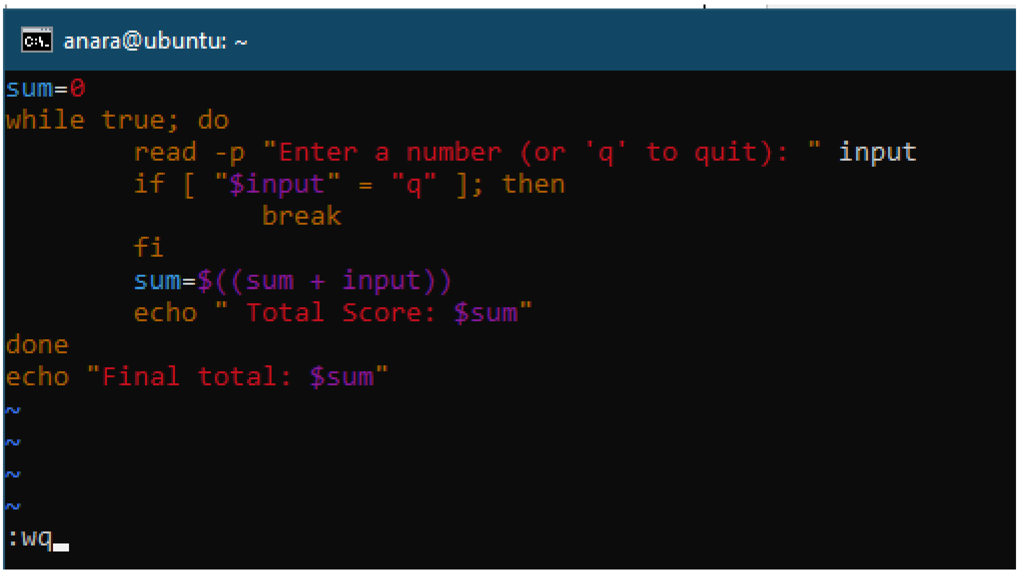
2. **Run the script with various arguments**



```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ chmod +x setup.sh
anara@ubuntu:~$ ./setup.sh one two "three four" five "six seven eight"
Arguments recieved:
one
two
three four
five
six seven eight
```

Q7. Script: While Loop Summation and Functions

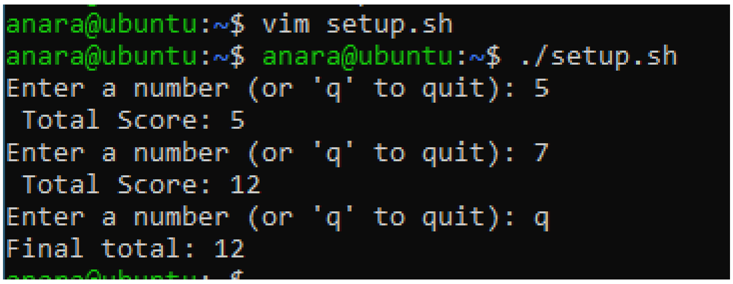
1. **Write an interactive while-loop that accumulates numbers until q is entered and shows running totals.**



anara@ubuntu: ~

```
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"
~
~
~
~
:wq
```

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



```
anara@ubuntu:~$ vim setup.sh
anara@ubuntu:~$ anara@ubuntu:~$ ./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
```

****