

# FATIMA JINNAH WOMEN UNIVERSITY

*Department of Software Engineering*



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## LAB #06

**SUBJECT: CLOUD COMPUTING**

**SUBMITTED TO: SIR MUHAMMAD SHOAIB**

**SUBMITTED BY: UMBER QASIM**

**REGISTRATION NO: 2023-BSE-066**

**CLASS: BSSE V-B**

## **Linux Users, Groups, Permissions, Pipes, and Bash Scripting**

### **Task#01: Switch to root with su - and back to a normal user**

*Set root password*

```
umberqasim@2023-bse-066:~$ sudo passwd root
[sudo] password for umberqasim:
New password:
Retype new password:
passwd: password updated successfully
```

*Switch to root*

```
umberqasim@2023-bse-066:~$ su -
Password:
root@2023-bse-066:~# whoami
root
root@2023-bse-066:~# id
uid=0(root) gid=0(root) groups=0(root)
root@2023-bse-066:~#
```

*Go back to normal user*

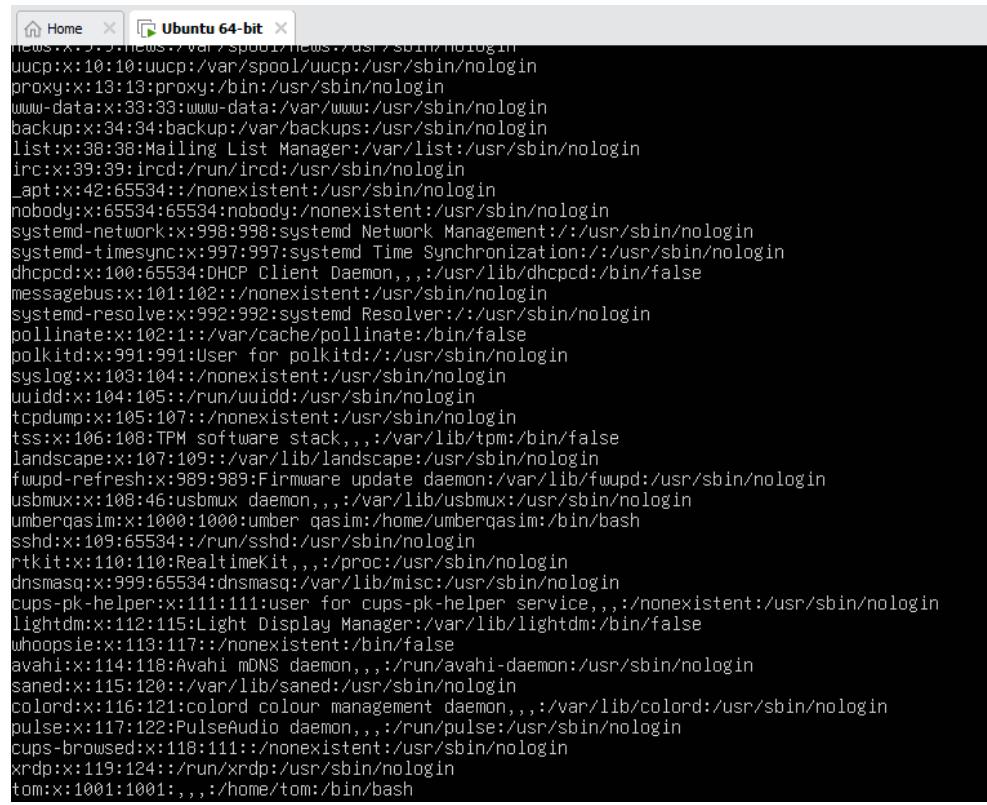
```
root@2023-bse-066:~# exit
logout
umberqasim@2023-bse-066:~$ whoami
umberqasim
```

### **Task#02: Create user tom and verify in passwd/group/shadow**

*Create user tom*

```
umberqasim@2023-bse-066:~$ 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]
info: Adding new user `tom' to supplemental / extra groups `users' ...
info: Adding user `tom' to group `users' ...
```

### **Verify tom in /etc/passwd**



```
news:x:5: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
umberqasim:x:1000:1000:umber qasim:/home/umberqasim:/bin/bash
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
rtkit:x:110:10:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:111:111:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
lightdm:x:112:115:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:113:117::/nonexistent:/bin/false
avahi:x:114:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:115:120::/var/lib/saned:/usr/sbin/nologin
colord:x:116:121:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:111::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1001:,,,:/home/tom:/bin/bash
```

### **Verify tom in /etc/group**



```
systemd-network:x:500:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxde:x:101:umberqasim
messagebus:x:102:
systemd-resolve:x:992:
_lssh: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:
umberqasim:x:1000:
rtkit:x:110:
lpadmin:x:111:
netdev:x:112:
bluetooth:x:113:
ssl-cert:x:114:
lightdm:x:115:
nopasswdlogin:x:116:
whoopsie:x:117:
avahi:x:118:
scanner:x:119:saned
saned:x:120:
colord:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:
```

### **Verify tom in /etc/shadow**

```
|| Home X | Ubuntu 64-bit X |
news:x:20005:0:99999:7:::
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:::::
systemd-timesync!:::20305:::::
dhcpcd!:::20305:::::
messagebus!:::20305:::::
systemd-resolve!:::20305:::::
polkitid!:::20305:::::
polkitid!:::20305:::::
syslog!:::20305:::::
uuidd!:::20305:::::
tcpdump!:::20305:::::
tss!:::20305:::::
landscape!:::20305:::::
fwupd-refresh!:::20305:::::
usbmux!:::20361:::::
umberqasim:$y$J9T$YQmLsFKK6Qga9eVAK9QAO/$3YPyZosJ9MC8bXLQXG1waxrelQQQuCVi5BIp4YiCu3D:20393:0:99999:7::: Activate Windows
```

### **Task#03: Create groups; change tom's primary and secondary groups**

#### **Create groups**

```
scanner .x.ii.j.saned
saned:x:120:
colord: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:
```

#### **Change tom's primary group → designer**

```
umberqasim@2023-bse-066:~$ sudo usermod -g designer tom
umberqasim@2023-bse-066:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users)
```

#### **Add secondary groups developer, devops**

```
umberqasim@2023-bse-066:~$ sudo usermod -aG developer,devops tom
umberqasim@2023-bse-066:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users),1002(developer),1003(devops)
umberqasim@2023-bse-066:~$ groups tom
tom : designer users developer devops
```

### ***Reset secondary groups***

```
umberqasim@2023-bse-066:~$ sudo usermod -G tom tom
umberqasim@2023-bse-066:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),1001(tom)
umberqasim@2023-bse-066:~$ groups tom
tom : designer tom
```

## **Task#04: Create/delete users (Jerry, Scooby) and groups (jolly, anime)**

### ***Create users (difference: adduser vs useradd)***

```
umberqasim@2023-bse-066:~$ 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' ...
umberqasim@2023-bse-066:~$ sudo useradd Scooby
```

### ***Try login as Scooby (expect auth failure)***

```
umberqasim@2023-bse-066:~$ su - Scooby
Password:
su: Authentication failure
```

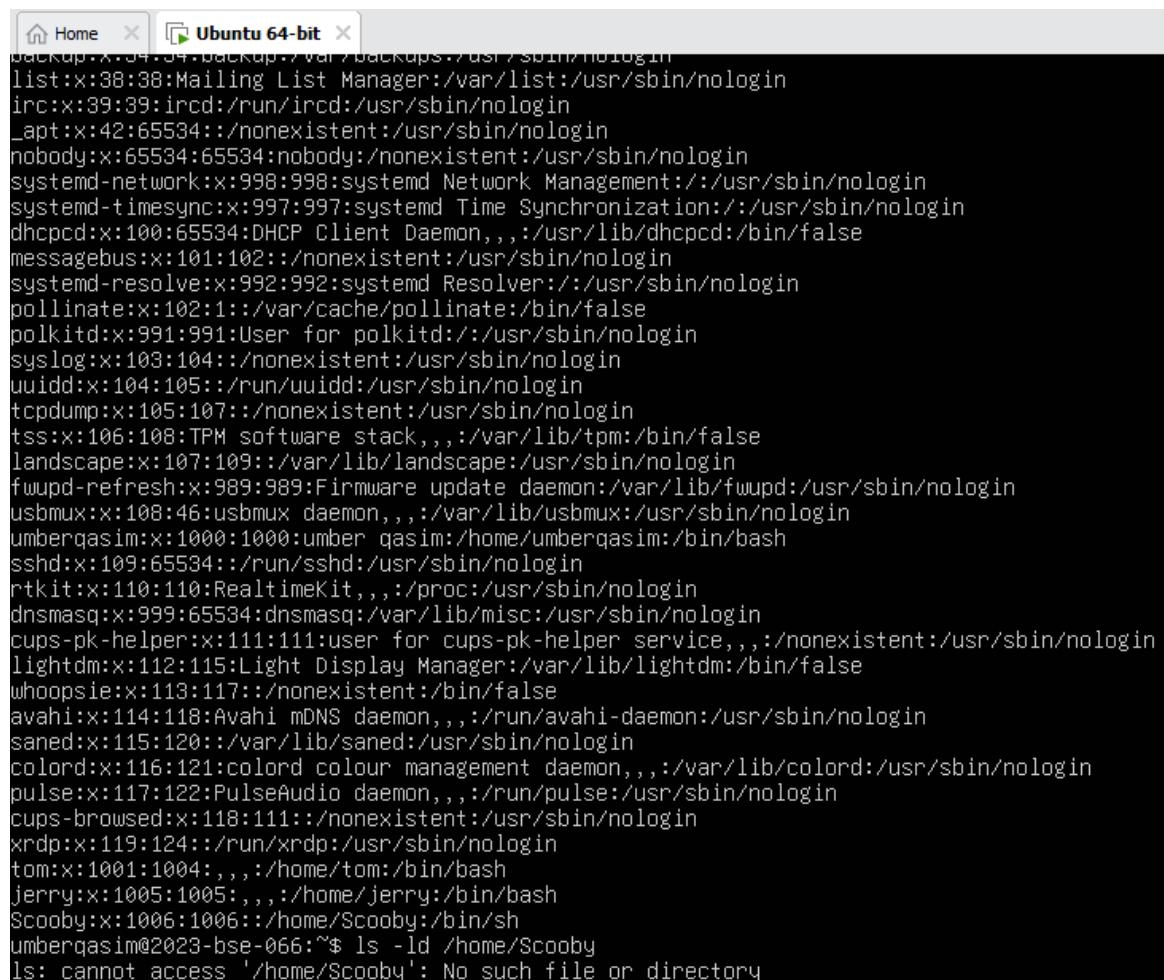
### ***Set password for Scooby***

```
umberqasim@2023-bse-066:~$ sudo passwd Scooby
New password:
Retype new password:
passwd: password updated successfully
```

### ***Try logging in again (no home directory)***

```
umberqasim@2023-bse-066:~$ su - Scooby
Password:
su: warning: cannot change directory to /home/Scooby: No such file or directory
$
```

## Verify missing home directory



```
root@X-54-34:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/var/run:/bin/false
bin:x:2:2:bin:/root:/bin/false
sys:x:3:3:sys:/root:/bin/false
sync:x:4:4:sync:/root:/bin/false
games:x:5:5:games:/root:/bin/false
operator:x:6:6:operator:/root:/bin/false
mail:x:8:8:mail:/root:/bin/false
news:x:9:9:news:/root:/bin/false
uucp:x:10:10:uucp:/root:/bin/false
lp:x:11:11:lp:/root:/bin/false
mailnull:x:12:12:mailnull:/root:/bin/false
nobody:x:99:99:nobody:/root:/bin/false
umberqasim:x:1000:1000:umber qasim:/home/umberqasim:/bin/bash
umberqasim@2023-bse-066:~$ ls -ld /home/Scooby
ls: cannot access '/home/Scooby': No such file or directory
```

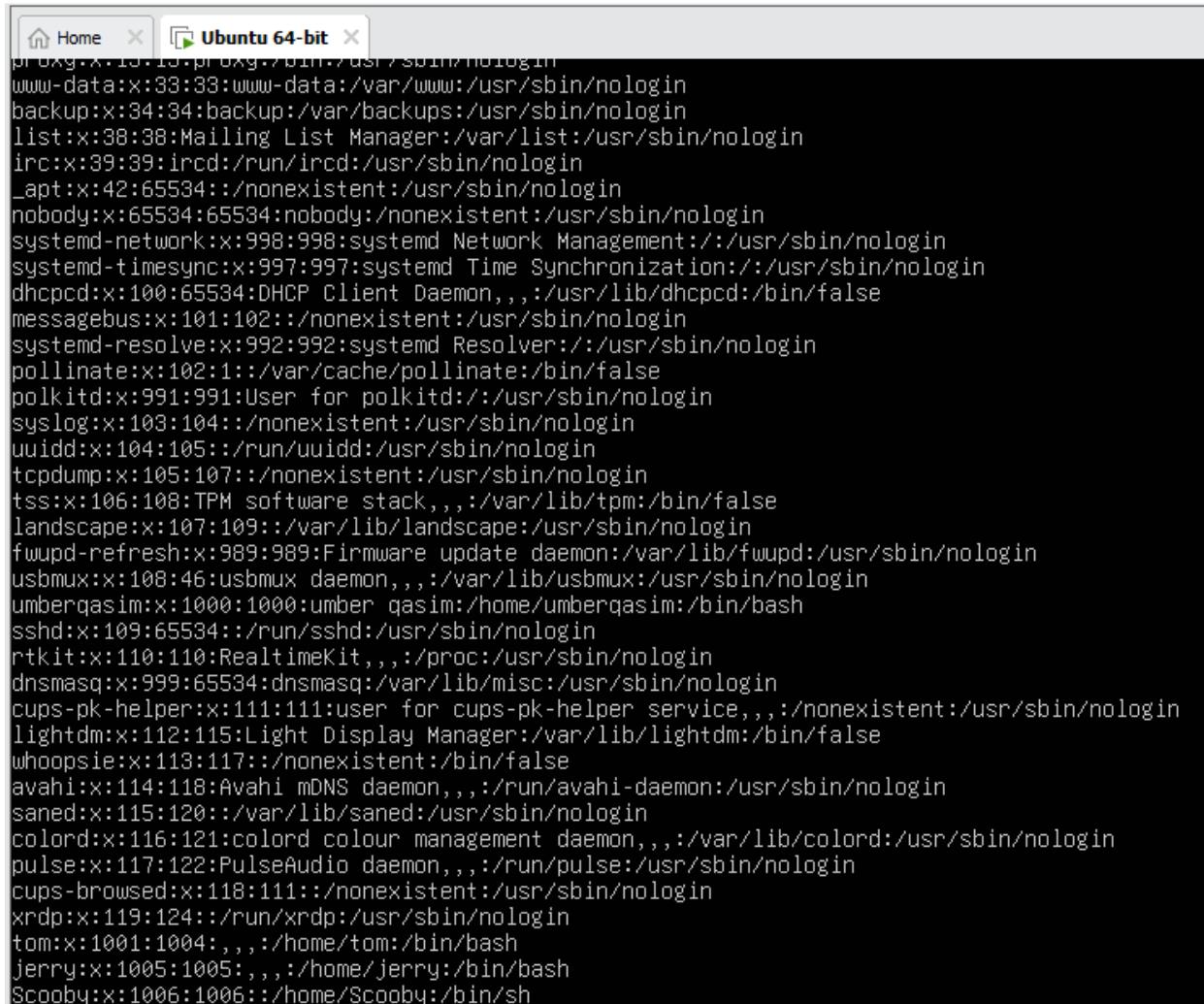
## Manually create Scooby's home directory

```
umberqasim@2023-bse-066:~$ sudo mkdir -p /home/Scooby
umberqasim@2023-bse-066:~$ sudo chown Scooby:Scooby /home/Scooby
umberqasim@2023-bse-066:~$ sudo chmod 750 /home/Scooby
umberqasim@2023-bse-066:~$ ls -ld /home/Scooby
drwxr-xr-x 2 750 Scooby 4096 Nov  1 10:09 /home/Scooby
```

## Log in as Scooby (now works)

```
umberqasim@2023-bse-066:~$ su - Scooby
Password:
$ pws
-sh: 1: pws: not found
$ exit
umberqasim@2023-bse-066:~$ su - Scooby
Password:
$ pwd
/home/Scooby
$ ls -la
total 8
drwxr-xr-x 2 750 Scooby 4096 Nov  1 10:09 .
drwxr-xr-x 6 root root   4096 Nov  1 10:09 ..
$
```

## *Verify user entries*



```
pr0xg.x.15.15.pr0xg./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
dhpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhpcd:/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
umberqasim:x:1000:1000:umber qasim:/home/umberqasim:/bin/bash
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:111:111:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
lightdm:x:112:115:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:113:117::/nonexistent:/bin/false
avahi:x:114:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:115:120::/var/lib/saned:/usr/sbin/nologin
colord:x:116:121:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:111::/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/sh
```

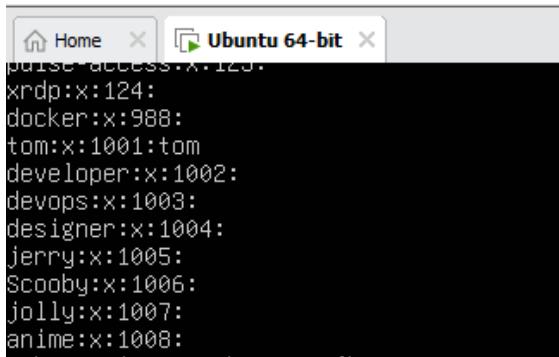
## *Change Scooby's shell to bash*

```
umberqasim@2023-bse-066:~$ sudo usermod -s /bin/bash Scooby
umberqasim@2023-bse-066:~$ su - Scooby
Password:
Scooby@2023-bse-066:~$ echo $SHELL
/bin/bash
```

## *Create groups*

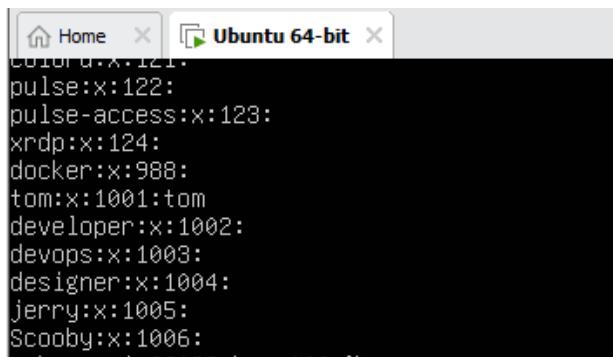
```
Scooby@2023-bse-066:~$ exit
logout
umberqasim@2023-bse-066:~$ sudo addgroup jolly
info: Selecting GID from range 1000 to 59999 ...
info: Adding group `jolly' (GID 1007) ...
umberqasim@2023-bse-066:~$ sudo groupadd anime
```

## *Verify groups*



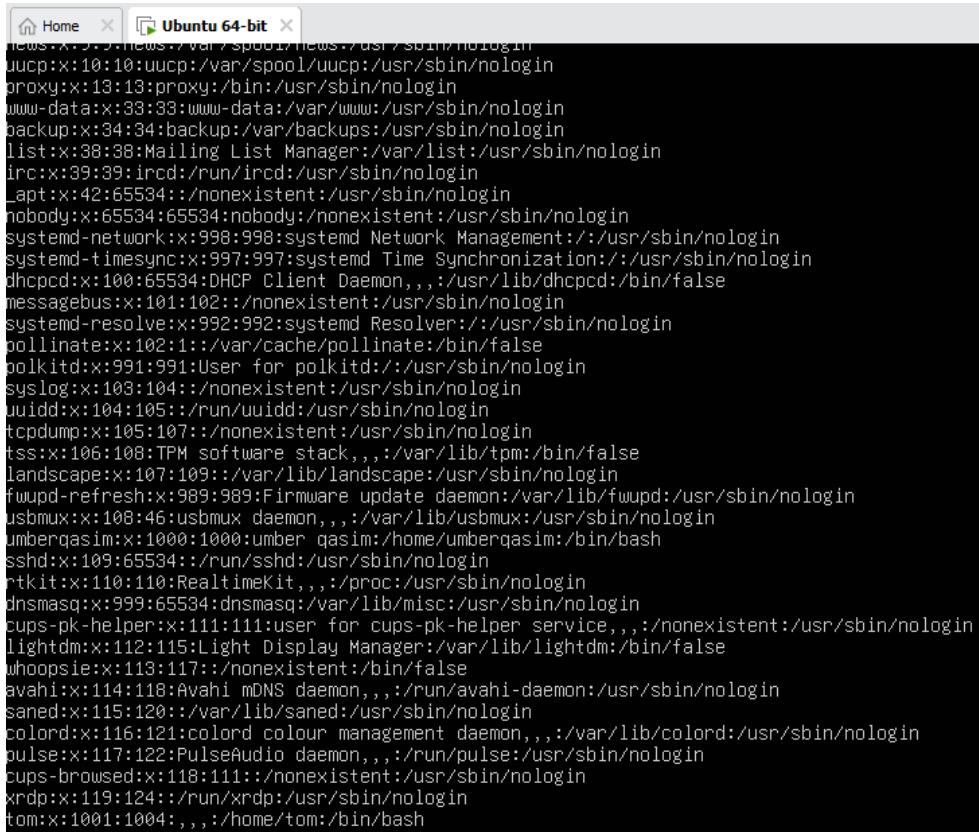
```
Home × Ubuntu 64-bit ×
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
jerry:x:1005:
Scooby:x:1006:
jolly:x:1007:
anime:x:1008:
```

### Delete groups



```
Home × Ubuntu 64-bit ×
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:
```

### Delete users (remove home too)



```
Home × Ubuntu 64-bit ×
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:1992:1992:systemd Resolver:/:/usr/sbin/nologin
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uidd:x:104:105::/run/uuid:/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
umberqasim:x:1000:1000:umber qasim:/home/umberqasim:/bin/bash
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
rtkit:x:110:110:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:111:111:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
lightdm:x:112:115:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:113:117::/nonexistent:/bin/false
avahi:x:114:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
saned:x:115:120::/var/lib/saned:/usr/sbin/nologin
colord:x:116:121:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
pulse:x:117:122:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:118:111::/nonexistent:/usr/sbin/nologin
xrdp:x:119:124::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:,,,:/home/tom:/bin/bash
```

## **Task#05: Create user Student; create files; set owner/group; identify file types**

### ***Create user Student***

```
umberqasim@2023-bse-066:~$ sudo adduser student
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' ...
```

### ***Switch to Student & create files***

```
umberqasim@2023-bse-066:~$ su - student
Password:
student@2023-bse-066:~$ touch file1
student@2023-bse-066:~$ mkdir -p dir1
student@2023-bse-066:~$ touch dir1/file2
student@2023-bse-066:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
-rw-rw-r-- 1 student student    0 Nov  1 10:52 file1
```

### ***Change owner of file1***

```
umberqasim@2023-bse-066:~$ sudo chown tom /home/student/file1
umberqasim@2023-bse-066:~$ ls -l /home/student/file1
ls: cannot access '/home/student/file1': Permission denied
umberqasim@2023-bse-066:~$ sudo ls -l /home/student/file1
-rw-rw-r-- 1 tom student 0 Nov  1 10:52 /home/student/file1
```

### ***Change group of file1***

```
umberqasim@2023-bse-066:~$ sudo chgrp devops /home/student/file1
umberqasim@2023-bse-066:~$ sudo ls -l /home/student/file1
-rw-rw-r-- 1 tom devops 0 Nov  1 10:52 /home/student/file1
```

### ***Identify file types***

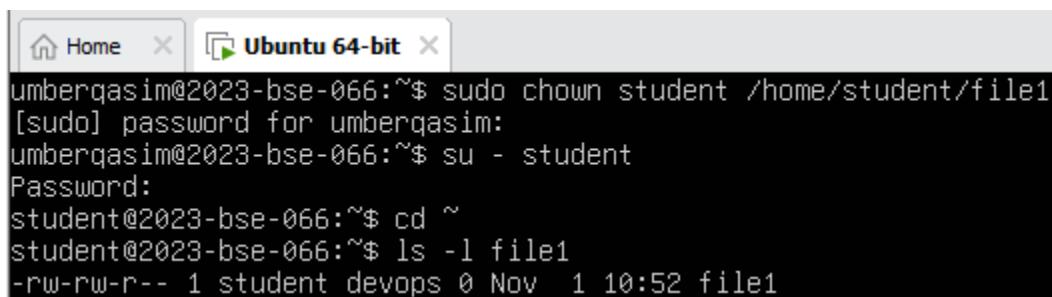
```
umberqasim@2023-bse-066:~$ su - student
Password:
student@2023-bse-066:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
-rw-rw-r-- 1 tom      devops     0 Nov  1 10:52 file1
student@2023-bse-066:~$ ls -l dir1
total 0
-rw-rw-r-- 1 student student 0 Nov  1 10:52 file2
student@2023-bse-066:~$ ls -l /dev/null
crw-rw-rw- 1 root   root    1, 3 Nov  1 06:12 /dev/null
student@2023-bse-066:~$ file file1 dir1 /dev/null
file1:      empty
dir1:      directory
/dev/null: character special (1/3)
```

*Exit Student*

```
umberqasim@2023-bse-066:~$
```

### **Task#06: Change permissions using symbolic mode**

*Switch to Student user*



```
umberqasim@2023-bse-066:~$ sudo chown student /home/student/file1
[sudo] password for umberqasim:
umberqasim@2023-bse-066:~$ su - student
Password:
student@2023-bse-066:~$ cd ~
student@2023-bse-066:~$ ls -l file1
-rw-rw-r-- 1 student devops 0 Nov  1 10:52 file1
```

*Remove all permissions*

```
student@2023-bse-066:~$ chmod -rwx file1
student@2023-bse-066:~$ ls -l file1
----- 1 student devops 0 Nov  1 10:52 file1
```

*Add read permission for all (ugo+r)*

```
student@2023-bse-066:~$ chmod +r file1
student@2023-bse-066:~$ ls -l file1
-r--r--r-- 1 student devops 0 Nov  1 10:52 file1
```

*Add execute permission to user only*

```
student@2023-bse-066:~$ chmod u+x file1
student@2023-bse-066:~$ ls -l file1
-r-xr--r-- 1 student devops 0 Nov  1 10:52 file1
```

*Add write permission to user and group*

```
student@2023-bse-066:~$ chmod ug+x file1
student@2023-bse-066:~$ ls -l file1
-rwxr-xr-- 1 student devops 0 Nov  1 10:52 file1
```

*Remove all permissions explicitly*

```
student@2023-bse-066:~$ chmod ugo-rwx file1
student@2023-bse-066:~$ ls -l file1
----- 1 student devops 0 Nov  1 10:52 file1
```

### **Task#07: Change permissions using “set” symbolic form (u= g= o=)**

*Student is active and file1 exists in Student’s home*

```
umberqasim@2023-bse-066:~$ su - student
Password:
student@2023-bse-066:~$ cd ~
student@2023-bse-066:~$ ls -l file1
----- 1 student devops 0 Nov  1 10:52 file1
```

*Set all to rwx*

```
student@2023-bse-066:~$ chmod u=rwx,g=rwx,o=rwx file1
student@2023-bse-066:~$ ls -l file1
-rwxrwxrwx 1 student devops 0 Nov  1 10:52 file1
```

*Remove execute for group & others*

```
student@2023-bse-066:~$ chmod g=rwx,o=rwx file1
student@2023-bse-066:~$ ls -l file1
-rw-rw-rwx 1 student devops 0 Nov  1 10:52 file1
```

*Remove all permissions*

```
student@2023-bse-066:~$ chmod u=,g=r,o= file1
student@2023-bse-066:~$ ls -l file1
----r---- 1 student devops 0 Nov  1 10:52 file1
```

### **Task#08: Change permissions using numeric (octal) mode**

*Switch to Student user*

```
umberqasim@2023-bse-066:~$ sudo chown student:student /home/student/file1
umberqasim@2023-bse-066:~$ su - student
Password:
student@2023-bse-066:~$ _
```

*Go to home and confirm file*

```
student@2023-bse-066:~$ cd ~
student@2023-bse-066:~$ ls -l file1
----r---- 1 student student 0 Nov  1 10:52 file1
```

*All users get rwx*

```
student@2023-bse-066:~$ chmod 777 file1
student@2023-bse-066:~$ ls -l file1
-rwxrwxrwx 1 student student 0 Nov  1 10:52 file1
```

*Only user gets rwx, others no access*

```
student@2023-bse-066:~$ chmod 700 file1
student@2023-bse-066:~$ ls -l file1
-rwx----- 1 student student 0 Nov  1 10:52 file1
```

*User rwx, group & others r*

```
student@2023-bse-066:~$ chmod 744 file1
student@2023-bse-066:~$ ls -l file1
-rwxr--r-- 1 student student 0 Nov  1 10:52 file1
```

*User rw, group r, others none*

```
student@2023-bse-066:~$ chmod 640 file1
student@2023-bse-066:~$ ls -l file1
-rw-r---- 1 student student 0 Nov  1 10:52 file1
```

*User & group rw, others r*

```
student@2023-bse-066:~$ chmod 644 file1
student@2023-bse-066:~$ ls -l file1
-rw-r--r-- 1 student student 0 Nov  1 10:52 file1
```

*User & group rwx, others r-x*

```
student@2023-bse-066:~$ chmod 775 file1
student@2023-bse-066:~$ ls -l file1
-rwxrwxr-x 1 student student 0 Nov  1 10:52 file1
```

*User rwx, group r-x, others none*

```
student@2023-bse-066:~$ chmod 750 file1
student@2023-bse-066:~$ ls -l file1
-rwrxr-x-- 1 student student 0 Nov  1 10:52 file1
```

**Task#09: Practice pipes, pagers, grep, and redirects with /var/log/syslog**

## *View with less (scrollable view)*

```
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_init__.cpython-312.pyc.12610635473056" pid=20843 comm="python"
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.701948+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.699:436): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_log.cpython-312.pyc.12610635473056" pid=20843 comm="python"
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.733242+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.729:437): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_defaults.cpython-312.pyc.126106352310320" pid=20843 comm=
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.736118+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.733:438): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_secret_manager.cpython-312.pyc.126106352310320" pid=20843
ask="c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.73812+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.765:439): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_system.cpython-312.pyc.126106352312368" pid=20843 comm=
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.819342+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.813:440): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_exceptions.cpython-312.pyc.126106352741936" pid=20843 com
" c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.858539+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.856:441): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache_/_init__.cpython-312.pyc.126106351533360" pid=20843
d_mask="c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.867938+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.866:442): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache_/_urls.cpython-312.pyc.126106351533360" pid=20843
sk="c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:12.571480+00:00 2023-bse-066 systemd[1]: man-db.service: Deactivated successfully.
2025-10-26T11:05:12.571795+00:00 2023-bse-066 systemd[1]: Finished man-db.service - Daily man-db regeneration.
2025-10-26T11:05:12.572780+00:00 2023-bse-066 systemd[1]: man-db.service: Consumed 1.611s CPU time.
2025-10-26T11:05:15.445727+00:00 2023-bse-066 systemd[1]: esm-cache.service: Deactivated successfully.
2025-10-26T11:05:15.445969+00:00 2023-bse-066 systemd[1]: Finished esm-cache.service - Update the local ESM caches.
2025-10-26T11:05:15.446057+00:00 2023-bse-066 systemd[1]: esm-cache.service: Consumed 1.958s CPU time.
2025-10-26T11:05:16.5154543+00:00 2023-bse-066 systemd-timesyncd[3299]: Timed out waiting for reply from 91.189.91.157:123 (ntp.ubuntu
2025-10-26T11:05:17.128878+00:00 2023-bse-066 dbus-daemon[805]: [system] Activating via systemd: service name='org.freedesktop.Package
ice' requested by ':1.140' (uid=0 pid=21072 comm='/usr/bin/gdbus call --system --dest org.freedesktop' label='unconfined')
2025-10-26T11:05:17.230573+00:00 2023-bse-066 systemd[1]: Starting packagekit.service - PackageKit Daemon...
2025-10-26T11:05:17.301840+00:00 2023-bse-066 PackageKit: daemon start
2025-10-26T11:05:17.554634+00:00 2023-bse-066 dbus-daemon[805]: [system] Successfully activated service 'org.freedesktop.PackageKit'
2025-10-26T11:05:17.559855+00:00 2023-bse-066 systemd[1]: Started packagekit.service - PackageKit Daemon.
2025-10-26T11:05:22.375810+00:00 2023-bse-066 systemd[1]: apt-news.service: Deactivated successfullyActivate Windows
umberqasim@2023-bse-066:~$ Go to Settings to activate Windows.
```

## *View with more (page by page)*

```
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_log.cpython-312.pyc.12610635473056" pid=20843 comm="python"
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.733242+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.729:437): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_defaults.cpython-312.pyc.126106352310320" pid=20843 comm=
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.736118+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.733:438): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_secret_manager.cpython-312.pyc.126106352310320" pid=20843
ask="c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.73812+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.765:439): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_system.cpython-312.pyc.126106352312368" pid=20843 comm=
" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.819342+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.813:440): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache_/_exceptions.cpython-312.pyc.126106352741936" pid=20843 com
" c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.858539+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.856:441): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache_/_init__.cpython-312.pyc.126106351533360" pid=20843
d_mask="c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:10.867938+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.866:442): apparmor="DENIED" operation="mknod"
tu_pro_esp_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache_/_urls.cpython-312.pyc.126106351533360" pid=20843
sk="c" denied_mask="c" fsuid=0 uid=0
2025-10-26T11:05:12.571480+00:00 2023-bse-066 systemd[1]: man-db.service: Deactivated successfully.
2025-10-26T11:05:12.571795+00:00 2023-bse-066 systemd[1]: Finished man-db.service - Daily man-db regeneration.
2025-10-26T11:05:12.572780+00:00 2023-bse-066 systemd[1]: man-db.service: Consumed 1.611s CPU time.
2025-10-26T11:05:15.445727+00:00 2023-bse-066 systemd[1]: esm-cache.service: Deactivated successfully.
2025-10-26T11:05:15.445969+00:00 2023-bse-066 systemd[1]: Finished esm-cache.service - Update the local ESM caches.
2025-10-26T11:05:15.446057+00:00 2023-bse-066 systemd[1]: esm-cache.service: Consumed 1.958s CPU time.
2025-10-26T11:05:16.5154543+00:00 2023-bse-066 systemd-timesyncd[3299]: Timed out waiting for reply from 91.189.91.157:123 (ntp.ubuntu
2025-10-26T11:05:17.128878+00:00 2023-bse-066 dbus-daemon[805]: [system] Activating via systemd: service name='org.freedesktop.Package
ice' requested by ':1.140' (uid=0 pid=21072 comm='/usr/bin/gdbus call --system --dest org.freedesktop' label='unconfined')
2025-10-26T11:05:17.230573+00:00 2023-bse-066 systemd[1]: Starting packagekit.service - PackageKit Daemon...
2025-10-26T11:05:17.301840+00:00 2023-bse-066 PackageKit: daemon start
2025-10-26T11:05:17.554634+00:00 2023-bse-066 dbus-daemon[805]: [system] Successfully activated service 'org.freedesktop.PackageKit'
2025-10-26T11:05:17.559855+00:00 2023-bse-066 systemd[1]: Started packagekit.service - PackageKit Daemon.
2025-10-26T11:05:22.375810+00:00 2023-bse-066 systemd[1]: apt-news.service: Deactivated successfullyActivate Windows
umberqasim@2023-bse-066:~$ Go to Settings to activate Windows.
```

## *Search for “fail” or “error” entries*

```
umberqasim@2023-bse-066:~$ sudo grep -E 'fail error' /var/log/syslog | head
umberqasim@2023-bse-066:~$
```

### **Redirect output to a new file (overwrite)**

```
umberqasim@2023-bse-066:~$ sudo grep -i systemd /var/log/syslog > ~/syslog_systemd.txt  
umberqasim@2023-bse-066:~$ _
```

### *Append new matches to same file*

Ubuntu 64-bit

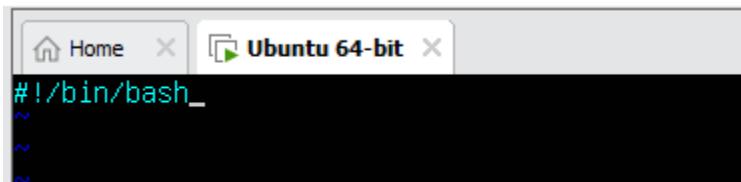
```
2025-11-01T00:12:31.17064+00:00 2023-bse-066 NetworkManager[600]: <info> [1761977551.1007] ifupdown: management mode: unmanaged
2025-11-01T06:12:31.181443+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977551.1740] ifupdown: interfaces file /etc/network/if
2025-11-01T06:12:31.222553+00:00 2023-bse-066 systemd[1]: Starting NetworkManager-dispatcher.service - Network Manager Script Dispatch
2025-11-01T06:12:31.317490+00:00 2023-bse-066 systemd[1]: Started NetworkManager-dispatcher.service - Network Manager Script Dispatch
2025-11-01T06:12:34.170252+00:00 2023-bse-066 systemd[1]: Reloading requested from client PID 1256 ('systemctl') (unit NetworkManager
2025-11-01T06:12:35.351731+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3461] dhcp: init: Using DHCP client 'internal'
2025-11-01T06:12:35.351915+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3464] manager: (lo): new Loopback device (/org
"/Devices/1)
2025-11-01T06:12:35.352319+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3476] device (ens33): carrier: link connected
2025-11-01T06:12:35.352447+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3499] manager: (ens33): new Ethernet device (/o
gen/Devices/2)
2025-11-01T06:12:35.363938+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3536] failed to open /run/network/ifstate
2025-11-01T06:12:35.364127+00:00 2023-bse-066 systemd[1]: Started NetworkManager.service - Network Manager.
2025-11-01T06:12:35.364224+00:00 2023-bse-066 systemd[1]: Reached target network.target - Network.
2025-11-01T06:12:35.364318+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3590] bus-manager: acquired D-Bus service "org
"
2025-11-01T06:12:35.375418+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3717] manager: startup complete
2025-11-01T06:12:35.377475+00:00 2023-bse-066 NetworkManager[688]: <info> [1761977555.3769] modem-manager: ModemManager available
2025-11-01T06:12:35.390642+00:00 2023-bse-066 systemd[1]: Starting NetworkManager-wait-online.service - Network Manager Wait Online..
2025-11-01T06:12:35.498071+00:00 2023-bse-066 systemd[1]: Finished NetworkManager-wait-online.service - Network Manager Wait Online.
2025-11-01T06:12:35.512070+00:00 2023-bse-066 systemd[1]: Reached target network-online.target - Network is Online.
2025-11-01T06:12:41.488677+00:00 2023-bse-066 systemd[1]: NetworkManager-dispatcher.service: Deactivated successfully.
2025-11-01T06:13:48.750287+00:00 2023-bse-066 systemd[1557]: Listening on dnsmgr.socket - GnuPG network certificate management daemo
2025-11-01T06:13:52.095442+00:00 2023-bse-066 systemd-networkd[646]: ens33: Lost carrier
2025-11-01T06:13:52.095683+00:00 2023-bse-066 systemd-networkd[646]: ens33: DHCP lease lost
2025-11-01T06:13:52.096043+00:00 2023-bse-066 systemd-networkd[646]: ens33: DHCPv6 lease lost
2025-11-01T08:40:23.145840+00:00 2023-bse-066 NetworkManager[688]: <info> [1761986423.1439] audit: op="sleep-control" arg="off" pid=
aslon: "Already awake"
2025-11-01T08:40:24.079110+00:00 2023-bse-066 systemd-networkd[646]: ens33: Gained carrier
2025-11-01T08:40:24.079589+00:00 2023-bse-066 NetworkManager[688]: <info> [1761986424.0744] device (ens33): carrier: link connected
2025-11-01T08:40:24.150565+00:00 2023-bse-066 systemd-timesyncd[671]: Network configuration changed, trying to establish connection.
2025-11-01T08:40:24.187020+00:00 2023-bse-066 systemd-networkd[646]: ens33: DHCPv4 address 192.168.254.129/24, gateway 192.168.254.2
54
2025-11-01T08:40:24.196896+00:00 2023-bse-066 systemd-timesyncd[671]: Network configuration changed, trying to establish connection.
2025-11-01T09:41:41.353259+00:00 2023-bse-066 NetworkManager[688]: <info> [1761990101.3520] audit: op="sleep-control" arg="off" pid=
aslon: "Already awake"
2025-11-01T12:09:52.149746+00:00 2023-bse-066 systemd-timesyncd[671]: Network configuration changed, trying to establish connection.
umbergasim@2023-bse-066:~$
```

*Optional (if /var/log/syslog not found or empty)*

```
Sep 30 03:12:20 2023 bse-066 kernel: BIOS-e820: [mem 0x0000000000000000-0x00000000000ffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000100000-0x0000000007fedffff] usable
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x00000000007fee0000-0x0000000007fefffff] ACPI data
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x00000000007feffff0000-0x00000000007fffffff] ACPI NVS
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x00000000007ff00000-0x00000000007ffffffff] usable
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000f000000-0x0000000000f7fffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000fec00000-0x0000000000fec0ffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000fee00000-0x0000000000fee0ffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000fffe00000-0x0000000000fffffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: NX (Execute Disable) protection: active
Sep 30 03:12:20 2023-bse-066 kernel: APIC: Static calls initialized
Sep 30 03:12:20 2023-bse-066 kernel: SMBIOS 2.7 present.
Sep 30 03:12:20 2023-bse-066 kernel: DM1: VMware, Inc. VMWare Virtual Platform/440BX Desktop Reference Platform, BIOS 6.00 11/12/2020
Sep 30 03:12:20 2023-bse-066 kernel: vmware: hypercall mode: 0x02
Sep 30 03:12:20 2023-bse-066 kernel: Hypervisor detected: VMware
Sep 30 03:12:20 2023-bse-066 kernel: vmware: TSC freq read from hypervisor : 2594.006 MHz
Sep 30 03:12:20 2023-bse-066 kernel: vmware: Host bus clock speed read from hypervisor : 66000000 Hz
Sep 30 03:12:20 2023-bse-066 kernel: vmware: using clock offset of 5468835262 ns
Sep 30 03:12:20 2023-bse-066 kernel: tsc: Detected 2594.006 MHz processor
Sep 30 03:12:20 2023-bse-066 kernel: e820: update [mem 0x00000000-0x000000ffff] usable ==> reserved
Sep 30 03:12:20 2023-bse-066 kernel: e820: remove [mem 0x0000a0000-0x0000ffff] usable
Sep 30 03:12:20 2023-bse-066 kernel: last_pfn = 0x8000 max_arch_pfn = 0x400000000
Sep 30 03:12:20 2023-bse-066 kernel: total RAM covered: 3072M
Sep 30 03:12:20 2023-bse-066 kernel: Found optimal setting for mtrr clean up
Sep 30 03:12:20 2023-bse-066 kernel: gmem_size: 64K      chunk_size: 64K      num_reg: 2      lose cover RAM: 0G
Sep 30 03:12:20 2023-bse-066 kernel: MTRR map: 6 entries (5 fixed + 1 variable; max 21), built from 8 variable MTRRs
Sep 30 03:12:20 2023-bse-066 kernel: x86/PAT: Configuration [0-7]: WB WC UC- UC WB WP UC- WT
Sep 30 03:12:20 2023-bse-066 kernel: found SMP MP-table at [mem 0x000f6a70-0x000f6a7f]
Sep 30 03:12:20 2023-bse-066 kernel: Using GB pages for direct mapping
Sep 30 03:12:20 2023-bse-066 kernel: RAMDISK: [mem 0x2f5b9000-0x33ad3fff]
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: Early table checksum verification disabled
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: RSDP 0x00000000000F6A00 000024 (v02 PTLTD )
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: XSDT 0x00000000000FEE965B 000005 (v01 INTEL 440BX 06040000 VMH 01324272)
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: FACP 0x0000000007FEFFEE73 0000F4 (v04 INTEL 440BX 06040000 PTL 000F4240)
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: DSDT 0x0000000007FEEDD55 01411E (v01 PTLTD Custom 06040000 MSFT 03000001)
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: FACS 0x0000000007FEFFFC0 000040
umbergasim@2023-bse-066:~$ sudo journalctl -u systemd | grep -i error > /journal.erros.txt
```

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

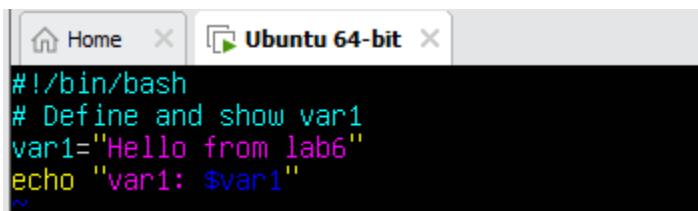
*Create script with shebang*



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

```
student@2023-bse-066:~$ chmod +x setup.sh
student@2023-bse-066:~$ ./setup.sh
```

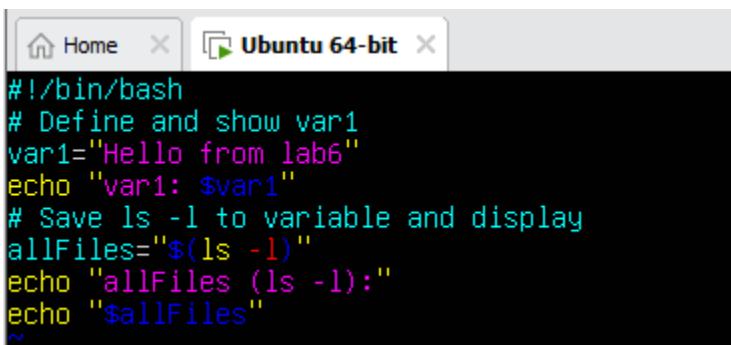
*Define variable var1*



```
#!/bin/bash
# Define and show var1
var1="Hello from lab6"
echo "var1: $var1"
```

```
student@2023-bse-066:~$ ./setup.sh
var1: Hello from lab6
```

*Save ls -l to variable*



```
#!/bin/bash
# Define and show var1
var1="Hello from lab6"
echo "var1: $var1"
# Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"
```

```
student@2023-bse-066:~$ ./setup.sh
var1: Hello from lab6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
-rw-r--r-- 1 student student    0 Nov  1 10:52 file1
-rwxrwxr-x 1 student student  176 Nov  1 12:51 setup.sh
```

### **Directory check**

```
#!/bin/bash
# Define and show var1
var1="Hello from lab6"
echo "var1: $var1"
# Save ls -l to variable and display
allFiles="$(ls -l)"
echo "allFiles (ls -l):"
echo "$allFiles"
# Directory check
if [ -d "dir1" ]; then
    echo "Directory dir1 exists."
else
    echo "Directory dir1 does not exist. Creating. . ."
    mkdir -p "dir1"
    echo "Directory dir1 created."
fi
student@2023-bse-066:~$ ./setup.sh
var1: Hello from lab6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
-rw-r--r-- 1 student student     0 Nov  1 10:52 file1
-rw-rwxr-x 1 student student   358 Nov  1 12:59 setup.sh
Directory dir1 exists.
```

### **File check**

```
#!/bin/bash
# Define and show var1
var1="Hello from lab6"
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
```

```
student@2023-bse-066:~/
```

```
./setup.sh
```

```
var1: Hello from lab6
```

```
allFiles (ls -l):
```

```
total 8
```

```
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
```

```
-rwxr-x--- 1 student student    0 Nov  1 10:52 file1
```

```
-rwxrwxr-x 1 student student  552 Nov  1 13:12 setup.sh
```

```
Directory dir1 exists.
```

```
file2 already exists.
```

### Permissions check

```
# 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"
```

```
student@2023-bse-066:~/
```

```
./setup.sh
```

```
var1: Hello from lab6
```

```
allFiles (ls -l):
```

```
total 8
```

```
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
```

```
-rwxr-x--- 1 student student    0 Nov  1 10:52 file1
```

```
-rwxrwxr-x 1 student student  963 Nov  1 13:20 setup.sh
```

```
Directory dir1 exists.
```

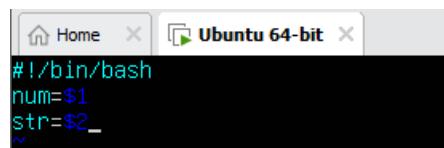
```
file2 already exists.
```

```
Execute permission missing; granting to user. . .
```

```
Final permissions for dir1/file2:
```

```
-rwxrwxr-- 1 student student 0 Nov  1 10:52 dir1/file2
```

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



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

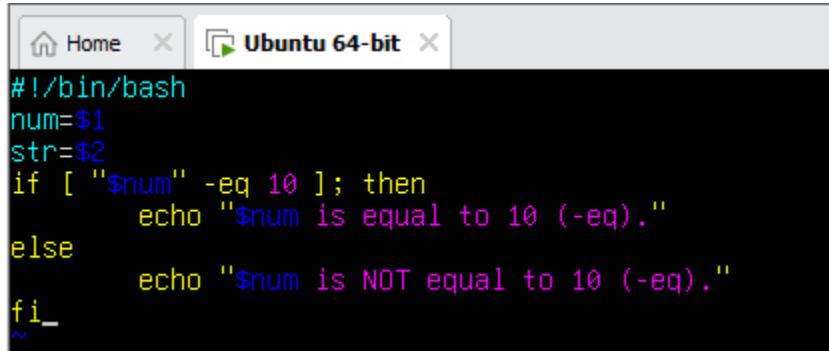
```
num=$1
```

```
str=$2
```

```
~
```

```
student@2023-bse-066:~$ chmod +x setup.sh
student@2023-bse-066:~$ ./setup.sh 10 student
```

### *Numeric equality (-eq)*

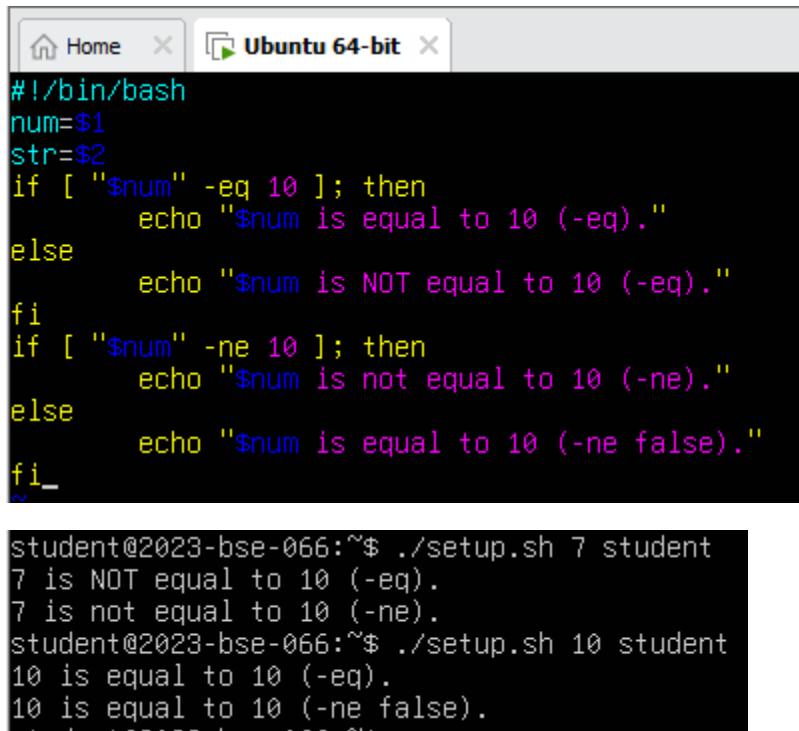


A screenshot of a terminal window titled "Ubuntu 64-bit". The code inside the window is a shell script that checks if the first argument (\$num) is equal to 10. If it is, it prints "\$num is equal to 10 (-eq)." If it's not, it prints "\$num is NOT equal to 10 (-eq.)."

```
#!/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
~
```

```
student@2023-bse-066:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
student@2023-bse-066:~$ ./setup.sh 7 student
7 is NOT equal to 10 (-eq.).
```

### *Numeric not equal (-ne)*



A screenshot of a terminal window titled "Ubuntu 64-bit". The code inside the window is a shell script. It first checks if \$num is equal to 10. If true, it prints "\$num is equal to 10 (-eq.)". If false, it prints "\$num is NOT equal to 10 (-eq.)". Then, it checks if \$num is not equal to 10. If true, it prints "\$num is not equal to 10 (-ne)". If false, it prints "\$num is equal to 10 (-ne false.)".

```
#!/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
~
```

```
student@2023-bse-066:~$ ./setup.sh 7 student
7 is NOT equal to 10 (-eq).
7 is not equal to 10 (-ne).
student@2023-bse-066:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
10 is equal to 10 (-ne false.).
```

### ***Greater than (-gt)***

```
#!/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
~
```

```
student@2023-bse-066:~/Documents$ ./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@2023-bse-066:~/Documents$ ./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).
```

### ***Less than (-lt)***

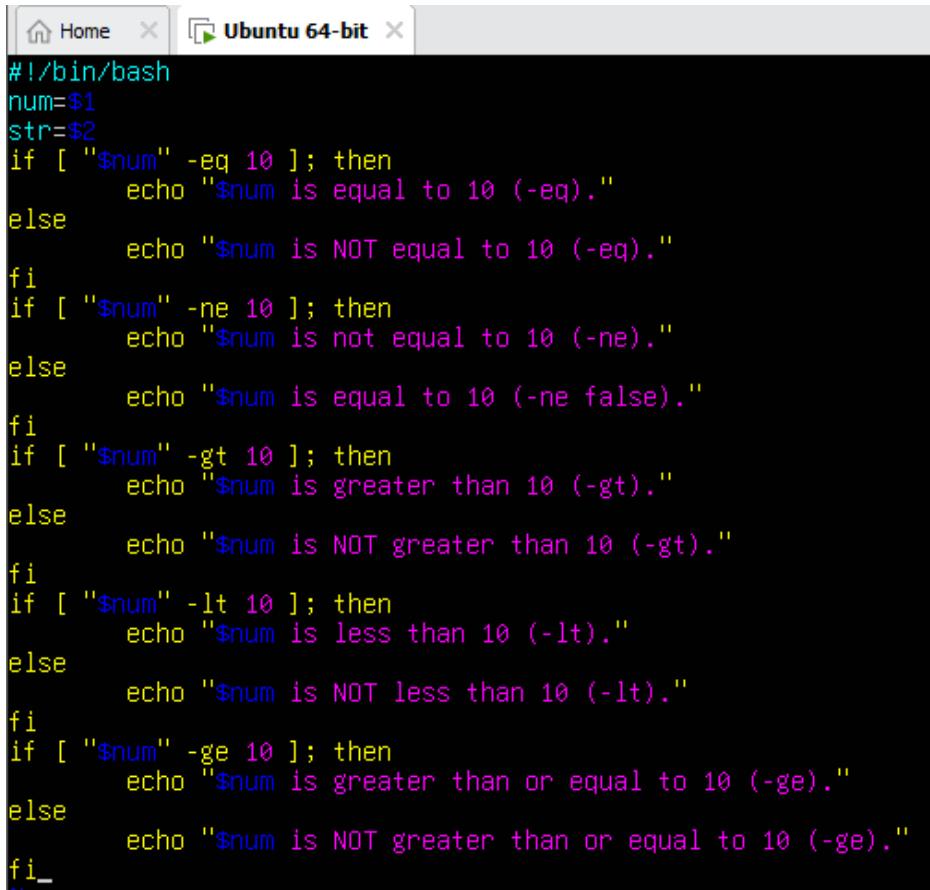
```
#!/bin/bash
num=$1
str=$2
if [ "$num" -eq 10 ]; then
    echo "$num is equal to 10 (-eq)."
else
    echo "$num is NOT equal to 10 (-ne)."
fi
if [ "$num" -ne 10 ]; then
    echo "$num is not equal to 10 (-ne)."
else
    echo "$num is equal to 10 (-ne false)."
fi
if [ "$num" -gt 10 ]; then
    echo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

```
student@2023-bse-066:~/
```

```
./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@2023-bse-066:~/
```

```
./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).
```

### ***Greater than or equal (-ge)***



```
#!/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 "$num is NOT less than 10 (-lt)."
fi
if [ "$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
```

```
"setup.sh" 28L, 619B written
student@2023-bse-066:~/
```

```
./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@2023-bse-066:~/
```

```
./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).
```

### **Less than or equal (-le)**

```
#!/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
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
~
```

```
student@2023-bse-066:~/Documents$ ./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@2023-bse-066:~/Documents$ ./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).
```

### *String equality (=)*

```
Home X Ubuntu 64-bit X
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
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 'student' ( = )."
fi
```

```
student@2023-bse-066:~$ ./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@2023-bse-066:~$ ./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' ( = ).
```

## *String inequality (! =)*

```
Home ▾ Ubuntu 64-bit ▾
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
if [ "$num" -ge 10 ]; then
    echo "$num is greater than or equal to 10 (-ge)."
else
    echo "$num is NOT greater than or equal to 10 (-ge)."
fi
if [ "$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 [ "$str" = "student" ]; then
    echo "Second argument equals 'student' ( = )."
else
    echo "Second argument does NOT equal 'student' ( = )."
fi
if [ "$str" != "student" ]; then
    echo "Second argument is not equal to 'student' ( != )."
else
    echo "Second argument equals 'student' ( != false)."
fi
~
```

```
student@2023-bse-066:~/.$ ./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@2023-bse-066:~/.$ ./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).
```

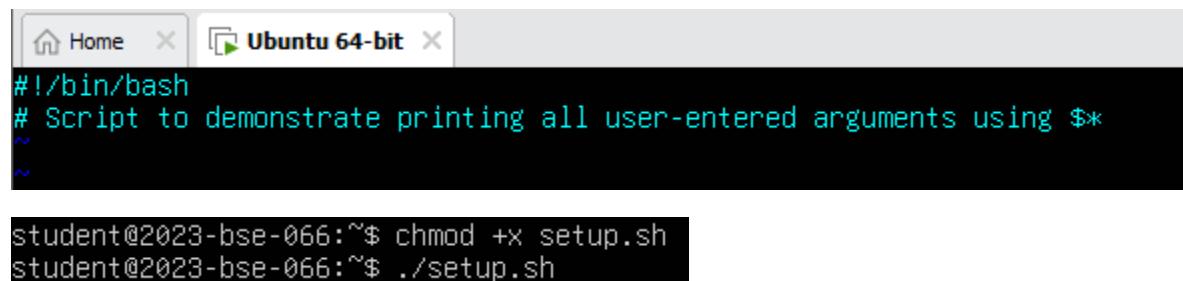
### Check zero-length string

```
Ubuntu 64-bit ~
        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
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 'student' ( = )."
fi
if [ "$str" != "student" ]; then
        echo "Second argument is not equal to 'student' ( != )."
else
        echo "Second argument equals 'student' ( != false)."
fi
if [ -z "$str" ]; then
        echo "Second argument is empty (zero-length)."
else
        echo "Second argument is not empty."
fi
```

```
student@2023-bse-066:~/Desktop$ ./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@2023-bse-066:~/Desktop$ ./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.
```

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

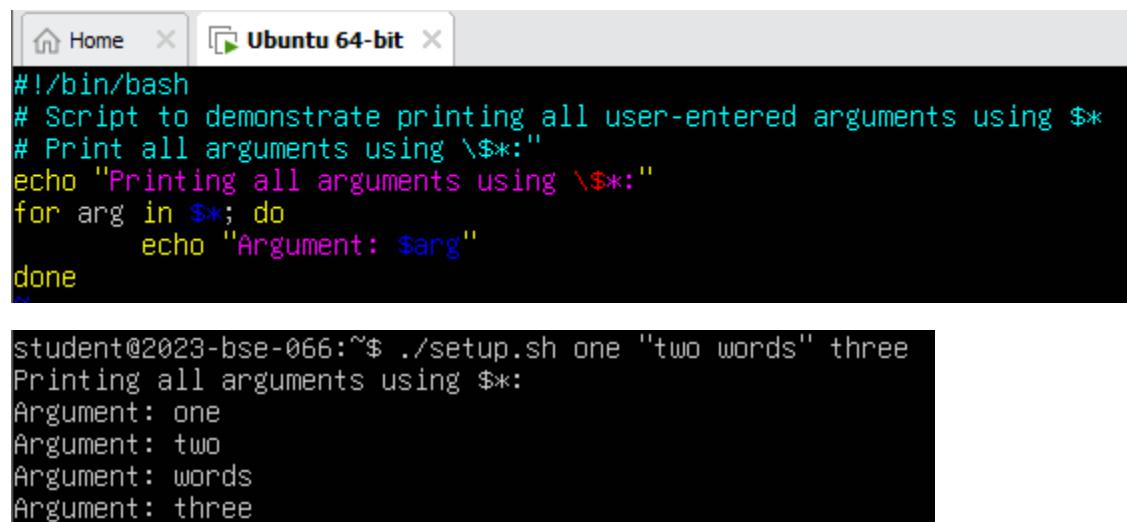
*Add shebang + comment as the first step*



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

```
student@2023-bse-066:~$ chmod +x setup.sh
student@2023-bse-066:~$ ./setup.sh
```

*Append the for-loop for arguments*

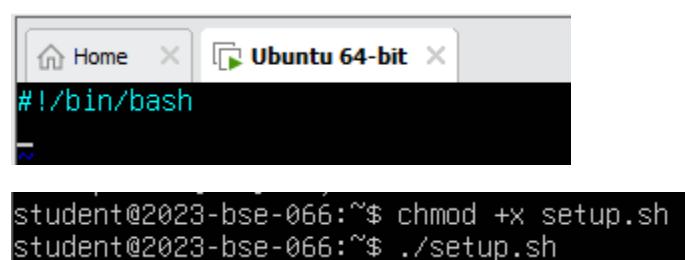


```
#!/bin/bash
# Script to demonstrate printing all user-entered arguments using $*
# Print all arguments using '$*'
echo "Printing all arguments using '$*:'"
for arg in $*; do
    echo "Argument: $arg"
done
```

```
student@2023-bse-066:~$ ./setup.sh one "two words" three
Printing all arguments using '$*:':
Argument: one
Argument: two
Argument: words
Argument: three
```

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

*Shebang only*



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

```
student@2023-bse-066:~$ chmod +x setup.sh
student@2023-bse-066:~$ ./setup.sh
```

### *Interactive while-loop summation*

```
#!/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"
```

```
student@2023-bse-066:~$ ./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
```

### *Add function sum\_two*

```
#!/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

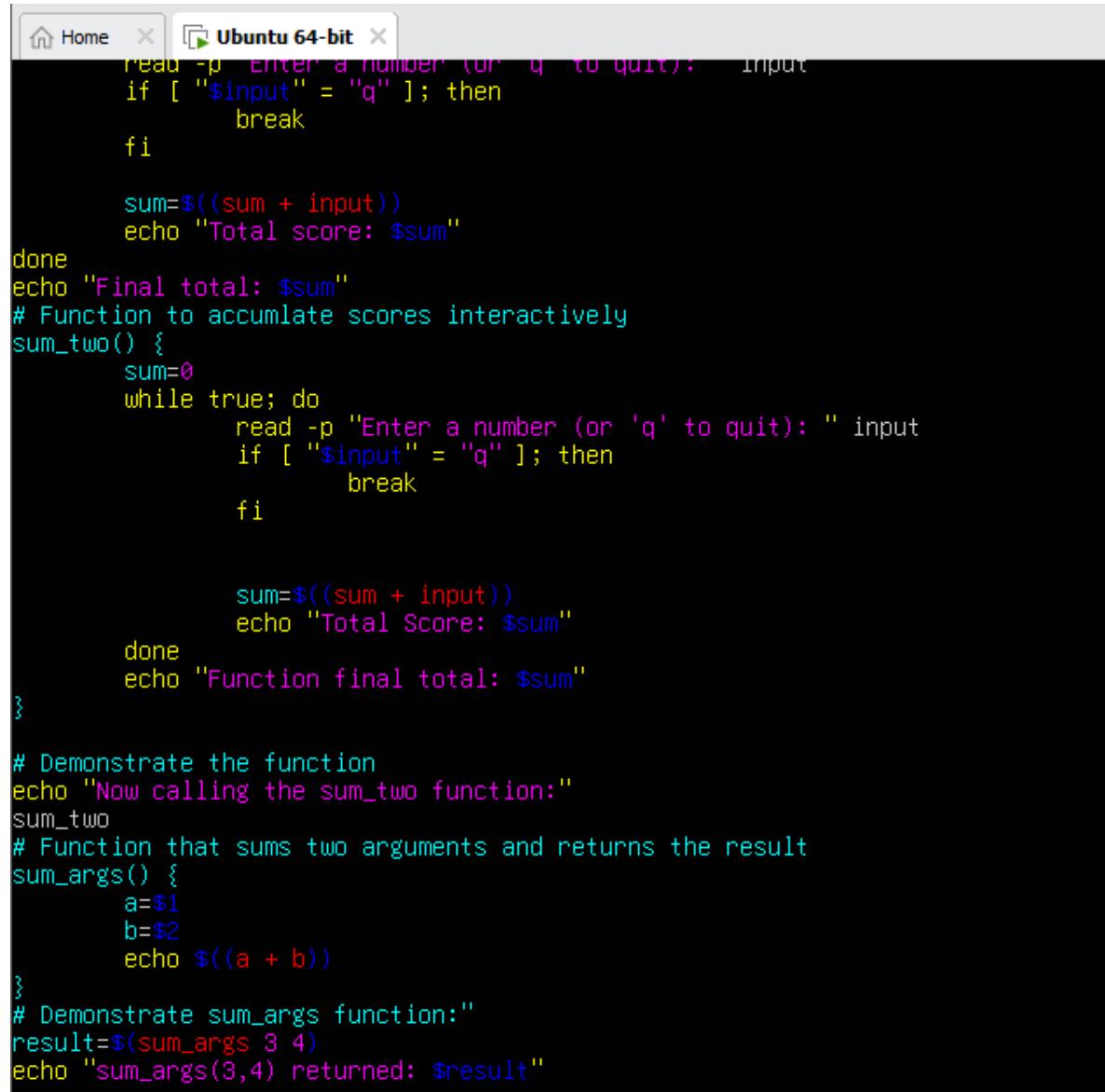
    sum=$((sum + input))
    echo "Total score: $sum"
done
echo "Final total: $sum"
# Function to accumulate scores interactively
sum_two() {
    sum=0
    while true; do
        read -p "Enter a number (or 'q' to quit): " input
        if [ "$input" = "q" ]; then
            break
        fi

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

# Demonstrate the function
echo "Now calling the sum_two function:"
sum_two
~
```

```
student@2023-bse-066:~/Documents$ ./setup.sh
Enter a number (or 'q' to quit): 2
Total score: 2
Enter a number (or 'q' to quit): 4
Total score: 6
Enter a number (or 'q' to quit): q
Final total: 6
Now calling the sum_two function:
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 7
Total Score: 10
Enter a number (or 'q' to quit): q
Function final total: 10
student@2023-bse-066:~/Documents$
```

### Add function sum\_args (2 arguments)



```
student@2023-bse-066:~/Documents$ ./setup.sh
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: $sum"
# Function to accumulate scores interactively
sum_two() {
    sum=0
    while true; do
        read -p "Enter a number (or 'q' to quit): " input
        if [ "$input" = "q" ]; then
            break
        fi

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

# Demonstrate the function
echo "Now calling the sum_two function:"
sum_two
# Function that sums two arguments and returns the result
sum_args() {
    a=$1
    b=$2
    echo $((a + b))
}
# Demonstrate sum_args function:
result=$(sum_args 3 4)
echo "sum_args(3,4) returned: $result"
```

```

student@2023-bse-066:~$ chmod +x setup.sh
student@2023-bse-066:~$ ./setup.sh
Enter a number (or 'q' to quit): q
Final total: 0
Now calling the sum_two function:
Enter a number (or 'q' to quit): q
Function final total: 0
sum_args(3,4) returned: 7

```

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

### Fork the repository

The screenshot shows a GitHub repository page for 'UbuntuMachine'. The repository has 1 branch and 0 tags. The README.md file contains the text 'Ubuntu Machine'. The repository was forked from WaqasSaleem97/UbuntuMachine. It has 3 commits, including one by the user adding a stop script. The repository has 0 stars, 0 forks, and 0 watching.

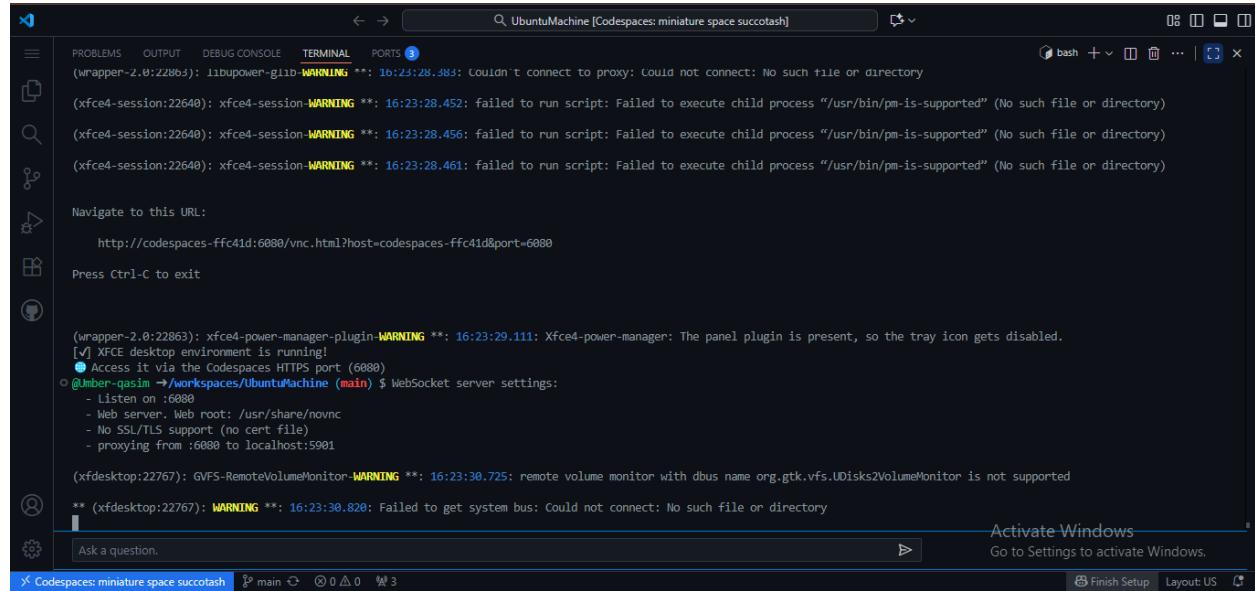
### Open Codespace

The screenshot shows the VS Code interface within a Codespace. The Explorer sidebar shows files like README.md, start-desktop.sh, and stop-desktop.sh. The terminal shows the command 'chmod +x setup.sh' being run. A chat window on the right says 'Build with agent mode' and 'Let's get started'. A message at the bottom says 'Activate Windows Go to Settings to activate Windows.'

## Verify start script exists

```
@Umber-qasim → /workspaces/UbuntuMachine (main) $ ls -l start-desktop.sh stop-desktop.sh
-rwxrwxrwx 1 codespace root 1333 Nov  1 16:13 start-desktop.sh
-rwxrwxrwx 1 codespace root  428 Nov  1 16:13 stop-desktop.sh
• @Umber-qasim → /workspaces/UbuntuMachine (main) $ chmod +x start-desktop.sh stop-desktop.sh
```

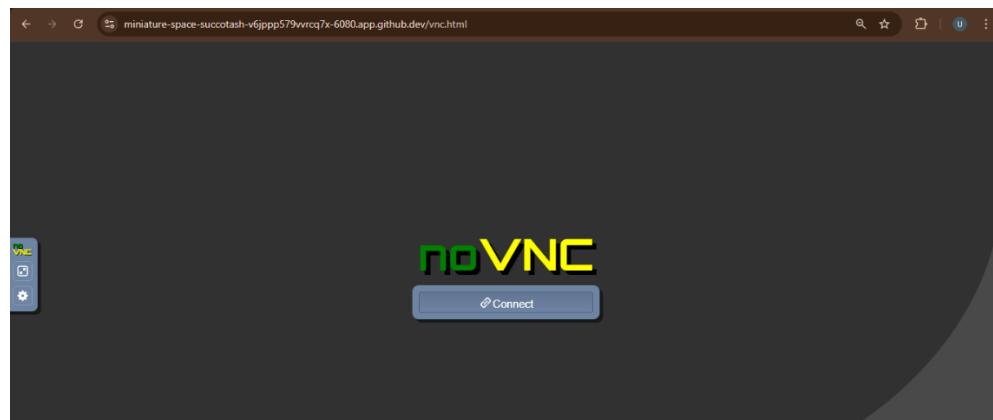
## Start GUI



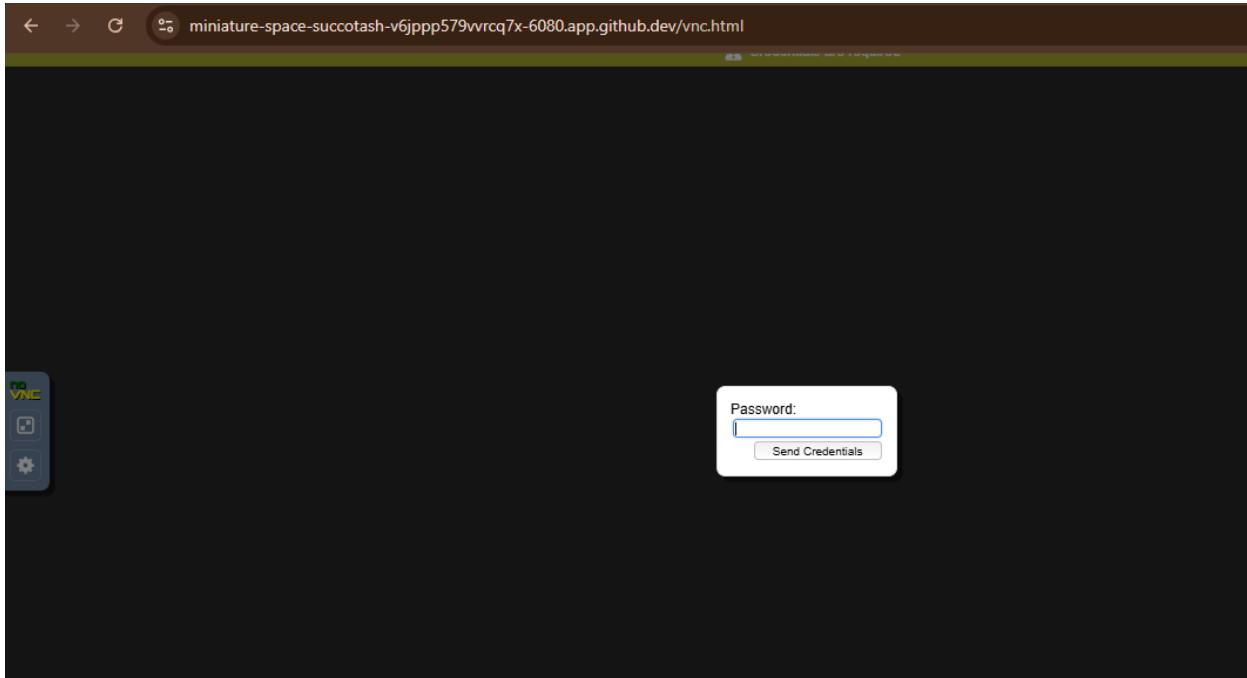
## Verify forwarded port (6080)

Ports				
Port	Forwarded Address	Running Process	Visibility	Origin
5900	https://miniature-space-succotash-v6jppp579vrcq7x.github.dev	x1vnc -display :1 -rfbauth /home/codespace/vnc/passwd -n... x1vnc -display :1 -rfbauth /home/codespace/vnc/passwd -n...	Private	Auto Forwarded
5901	https://miniature-space-succotash-v6jppp579vrcq7x.github.dev	x1vnc -display :1 -rfbauth /home/codespace/vnc/passwd -n... x1vnc -display :1 -rfbauth /home/codespace/vnc/passwd -n...	Private	Auto Forwarded
6080	https://miniature-space-succotash-v6jppp579vrcq7x.github.dev	/usr/bin/python3 /usr/bin/websockify -web /usr/share/novnc... /usr/bin/python3 /usr/bin/websockify -web /usr/share/novnc...	Public	Auto Forwarded

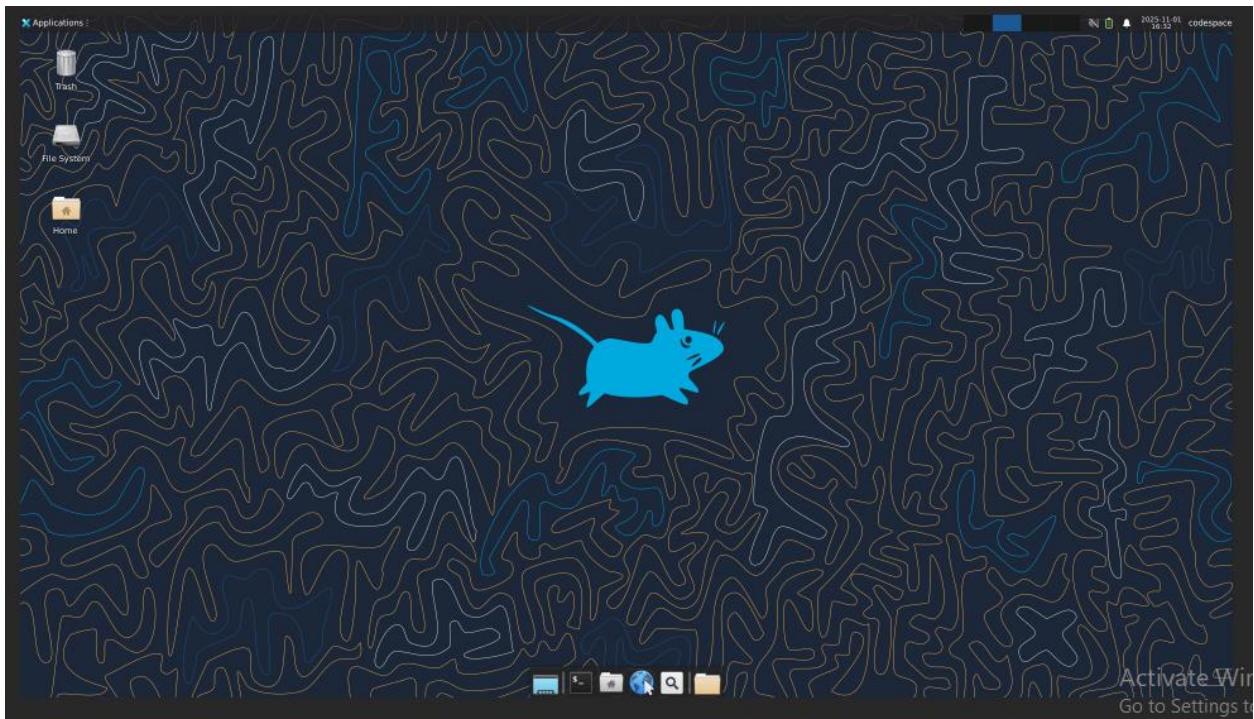
## Open VNC in browser



### *VNC password prompt*



*showing the GUI/desktop*



## ***Stop the GUI***

```
./stop-desktop.sh
[*] Stopping noVNC server...

Terminating WebSockets proxy (22903)
[*] Stopping x11vnc server...
In exit
Terminating child 26083
Process Process-21:
01/11/2025 16:34:31 client_count: 0
01/11/2025 16:34:31 Restored X server key autorepeat to: 1
01/11/2025 16:34:31 Client 127.0.0.1 gone
01/11/2025 16:34:31 Statistics          events   Transmit/ RawEquiv ( saved)
01/11/2025 16:34:31 ServerCutText      :    1 |     16/     16 (  0.0%)
01/11/2025 16:34:31 FramebufferUpdate :   16 |      0/      0 (  0.0%)
01/11/2025 16:34:31 LastRect          :    4 |     48/     48 (  0.0%)
01/11/2025 16:34:31 tight             :   70 |  669887/  8640584 ( 92.2%)
01/11/2025 16:34:31 RichCursor        :    1 |    2400/    2400 (  0.0%)
01/11/2025 16:34:31 ExtendedDesktopSize:    1 |     32/     32 (  0.0%)
01/11/2025 16:34:31 TOTALS            :   93 |  672383/  8643080 ( 92.2%)
01/11/2025 16:34:31 Statistics          events   Received/ RawEquiv ( saved)
01/11/2025 16:34:31 KeyEvent           :    12 |     96/     96 (  0.0%)
caught signal: 15
[*] Stopping XFCE desktop session...
[*] Stopping virtual X server (Xvfb)...

(xfce4-power-manager:22777): libxfce4ui-WARNING **: 16:34:31.040: ICE I/O Error
```

## **Exam Evaluation Questions**

### **I. Group Management and Membership**

*Create groups g1, g2, g3*

```
umberqasim@2023-bse-066:~$ sudo groupadd g1
[sudo] password for umberqasim:
umberqasim@2023-bse-066:~$ sudo groupadd g2
umberqasim@2023-bse-066:~$ sudo groupadd g3
```

*Change examuser's primary group to g3*

```
umberqasim@2023-bse-066:~$ sudo useradd -m examuser
umberqasim@2023-bse-066:~$ sudo usermod -g g3 examuser
umberqasim@2023-bse-066:~$ sudo usermod -aG g1,g2 examuser
```

*Verify group membership changes*

```
umberqasim@2023-bse-066:~$ id examuser
uid=1006(examuser) gid=1008(g3) groups=1008(g3),1006(g1),1007(g2)
umberqasim@2023-bse-066:~$ grep examuser /etc/group
g1:x:1006:examuser
g2:x:1007:examuser
examuser:x:1009:
```

## **II. Ownership and Permission Tasks**

*Create file and set ownership*

```
umberqasim@2023-bse-066:~$ mkdir -p workspace
umberqasim@2023-bse-066:~$ cd workspace
umberqasim@2023-bse-066:~/workspace$ sudo touch secret.txt
umberqasim@2023-bse-066:~/workspace$ sudo chown examuser:g1 secret.txt
umberqasim@2023-bse-066:~/workspace$ ls -l secret.txt
-rw-r--r-- 1 examuser g1 0 Nov 1 18:41 secret.txt
```

*Remove permissions (symbolic method)*

```
umberqasim@2023-bse-066:~/workspace$ sudo chown examuser:g1 secret.txt
umberqasim@2023-bse-066:~/workspace$ ls -l secret.txt
-rw-r--r-- 1 examuser g1 0 Nov 1 18:41 secret.txt
umberqasim@2023-bse-066:~/workspace$ sudo chmod go-rwx secret.txt
umberqasim@2023-bse-066:~/workspace$ ls -l secret.txt
-rw----- 1 examuser g1 0 Nov 1 18:41 secret.txt
```

*Do the same using numeric (octal) mode*

```
umberqasim@2023-bse-066:~/workspace$ sudo chmod 600 secret.txt
umberqasim@2023-bse-066:~/workspace$ ls -l secret.txt
-rw----- 1 examuser g1 0 Nov 1 18:41 secret.txt
```

## **III. Pipes, Grep, and Redirection Practice**

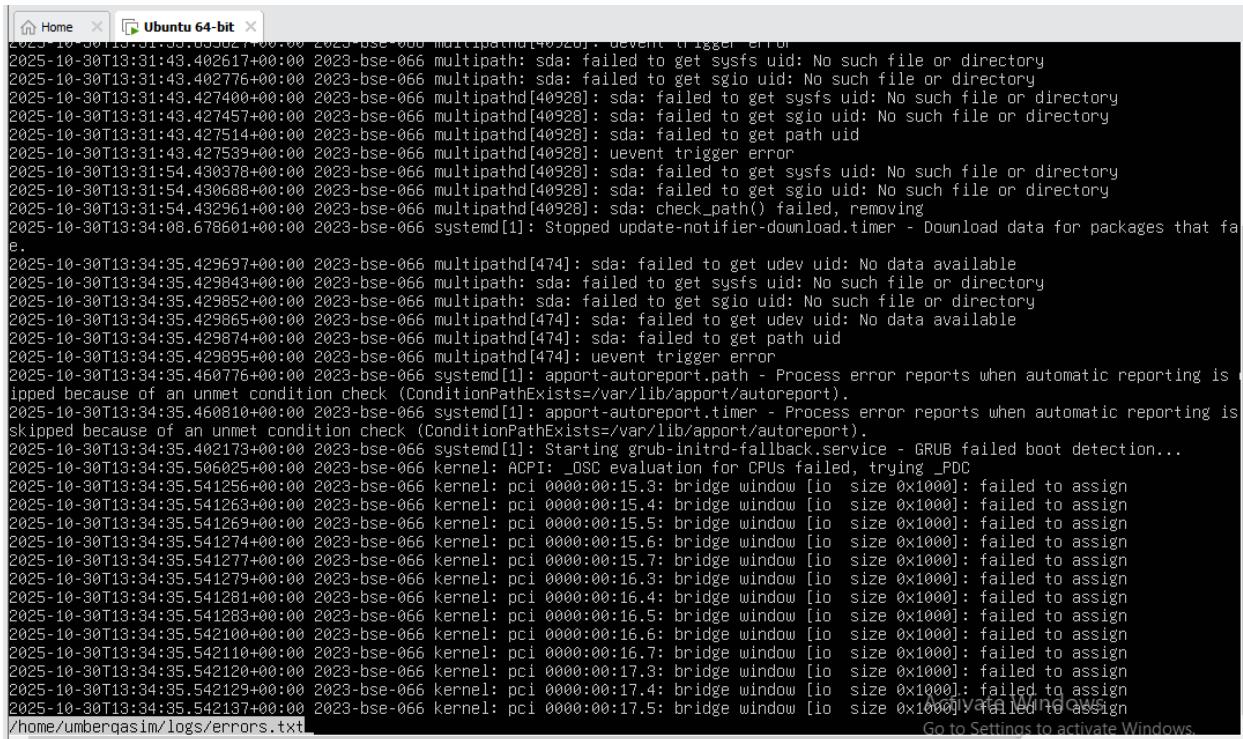
*Find errors or failures (Pipe + Grep)*

```
umberqasim@2023-bse-066:~$ sudo grep -E 'error|fail' /var/log/syslog | head -20
2025-10-30T13:31:14.083382+00:00 2023-bse-066 multipathd[40928]: sda: failed to get udev uid: No data available
2025-10-30T13:31:15.162806+00:00 2023-bse-066 fwupd[40945]: 13:31:15.160 FuEngine           failed to add device /sys/devices/pci0000:00/00/ata4/host4/target4:0:0/0:0/block/sr0: failed to open /dev/sr0: No medium found
2025-10-30T13:31:23.191254+00:00 2023-bse-066 multipath: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:23.191487+00:00 2023-bse-066 multipath: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:23.222084+00:00 2023-bse-066 multipathd[40928]: sda: failed to get udev uid: No data available
2025-10-30T13:31:23.222185+00:00 2023-bse-066 multipathd[40928]: sda: failed to get path uid
2025-10-30T13:31:23.222245+00:00 2023-bse-066 multipathd[40928]: uevent trigger error
2025-10-30T13:31:33.603719+00:00 2023-bse-066 multipath: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:33.603838+00:00 2023-bse-066 multipath: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:33.635281+00:00 2023-bse-066 multipathd[40928]: sda: failed to get udev uid: No data available
2025-10-30T13:31:33.635527+00:00 2023-bse-066 multipathd[40928]: sda: failed to get path uid
2025-10-30T13:31:33.635627+00:00 2023-bse-066 multipathd[40928]: uevent trigger error
2025-10-30T13:31:43.402617+00:00 2023-bse-066 multipath: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:43.402776+00:00 2023-bse-066 multipath: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:43.427400+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:43.427457+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:43.427514+00:00 2023-bse-066 multipathd[40928]: sda: failed to get path uid
2025-10-30T13:31:43.427539+00:00 2023-bse-066 multipathd[40928]: uevent trigger error
2025-10-30T13:31:54.430378+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:54.430688+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sgio uid: No such file or directory
```

*Redirect results to a file (overwrite)*

```
umberqasim@2023-bse-066:~$ mkdir -p ~/logs
umberqasim@2023-bse-066:~$ sudo grep -E 'error|fail' /var/log/syslog > ~/logs/errors.txt
umberqasim@2023-bse-066:~$ sudo grep -E 'critical|warning' /var/log/syslog >> ~/logs/errors.txt
```

## *View using pager*



```
2025-10-30T13:31:43.402617+00:00 2023-bse-066 multipathd[40928]: uevent trigger error
2025-10-30T13:31:43.402776+00:00 2023-bse-066 multipathd: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:43.402776+00:00 2023-bse-066 multipathd: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:43.427400+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:43.427457+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:43.427514+00:00 2023-bse-066 multipathd[40928]: sda: failed to get path uid
2025-10-30T13:31:43.427539+00:00 2023-bse-066 multipathd[40928]: uevent trigger error
2025-10-30T13:31:54.430378+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:31:54.430688+00:00 2023-bse-066 multipathd[40928]: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:31:54.432961+00:00 2023-bse-066 multipathd[40928]: sda: check_path() failed, removing
2025-10-30T13:34:08.678601+00:00 2023-bse-066 systemd[1]: Stopped update-notifier-download.timer - Download data for packages that fa...
e.
2025-10-30T13:34:35.429697+00:00 2023-bse-066 multipathd[474]: sda: failed to get udev uid: No data available
2025-10-30T13:34:35.429843+00:00 2023-bse-066 multipathd: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:34:35.429852+00:00 2023-bse-066 multipathd: sda: failed to get sgio uid: No such file or directory
2025-10-30T13:34:35.429865+00:00 2023-bse-066 multipathd[474]: sda: failed to get udev uid: No data available
2025-10-30T13:34:35.429874+00:00 2023-bse-066 multipathd[474]: sda: failed to get path uid
2025-10-30T13:34:35.429895+00:00 2023-bse-066 multipathd[474]: uevent trigger error
2025-10-30T13:34:35.468776+00:00 2023-bse-066 systemd[1]: apport-autoreport.path - Process error reports when automatic reporting is ...
ipped because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
2025-10-30T13:34:35.468010+00:00 2023-bse-066 systemd[1]: apport-autoreport.timer - Process error reports when automatic reporting is ...
skipped because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
2025-10-30T13:34:35.402173+00:00 2023-bse-066 systemd[1]: Starting grub-initrd-fallback.service - GRUB failed boot detection...
2025-10-30T13:34:35.506025+00:00 2023-bse-066 kernel: ACPI: _OSC evaluation for CPUs failed, trying _PDC
2025-10-30T13:34:35.541256+00:00 2023-bse-066 kernel: pci 0000:00:15.3: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541263+00:00 2023-bse-066 kernel: pci 0000:00:15.4: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541269+00:00 2023-bse-066 kernel: pci 0000:00:15.5: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541274+00:00 2023-bse-066 kernel: pci 0000:00:15.6: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541277+00:00 2023-bse-066 kernel: pci 0000:00:15.7: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541279+00:00 2023-bse-066 kernel: pci 0000:00:16.3: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541281+00:00 2023-bse-066 kernel: pci 0000:00:16.4: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.541283+00:00 2023-bse-066 kernel: pci 0000:00:16.5: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.542100+00:00 2023-bse-066 kernel: pci 0000:00:16.6: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.542110+00:00 2023-bse-066 kernel: pci 0000:00:16.7: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.542120+00:00 2023-bse-066 kernel: pci 0000:00:17.3: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.542129+00:00 2023-bse-066 kernel: pci 0000:00:17.4: bridge window [io size 0x1000]: failed to assign
2025-10-30T13:34:35.542137+00:00 2023-bse-066 kernel: pci 0000:00:17.5: bridge window [io size 0x1000]: failed to assign
/home/umberqasim/logs/errors.txt
```

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

*Create the script file and add a variable*

```
student@2023-bse-066:~$ ./setup.sh
var1: Hello from lab6
```

*Add command substitution (ls -l)*

```
student@2023-bse-066:~$ ./setup.sh
var1: Hello from lab6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
-rw-r--r-- 1 student student     0 Nov  1 10:52 file1
-rw-rwxr-x 1 student student  176 Nov  1 12:51 setup.sh
```

*Add directory and file checks*

```
student@2023-bse-066:~$ ./setup.sh
var1: Hello from lab6
allFiles (ls -l):
total 8
drwxrwxr-x 2 student student 4096 Nov  1 10:52 dir1
-rw-r--r-- 1 student student     0 Nov  1 10:52 file1
-rw-rwxr-x 1 student student  963 Nov  1 13:20 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  1 10:52 dir1/file2
```

## **V. Script: Comparisons and String Tests**

*Showing true and false examples*

```
student@2023-bse-066:~$ ./setup.sh 10 student
10 is equal to 10 (-eq).
student@2023-bse-066:~$ ./setup.sh 7 student
7 is NOT equal to 10 (-eq).
```

*Add more numeric comparisons*

```
student@2023-bse-066:~$ ./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@2023-bse-066:~$ ./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).
```

*Add string tests*

```
student@2023-bse-066:~$ ./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@2023-bse-066:~$ ./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.
```

## **VI. Script: For Loop and Argument Handling**

*Print every argument in a script:*

```
Home X Ubuntu 64-bit X
#!/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
```

*Run the script:*

```
student@2023-bse-066:~/Documents$ ./setup.sh one "two words" three
Printing all arguments using '$*':
Argument: one
Argument: two
Argument: words
Argument: three
```

## VII. Script: While Loop Summation and Functions

*Interactive while-loop*

```
student@2023-bse-066:~/Documents$ ./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
```

*Add function sum\_args (2 arguments)*

```
# Function that sums two arguments and returns the result
sum_args() {
    a=$1
    b=$2
    echo $((a + b))
}
# Demonstrate sum_args function:
result=$(sum_args 3 4)
echo "sum_args(3,4) returned: $result"
```