

# 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***

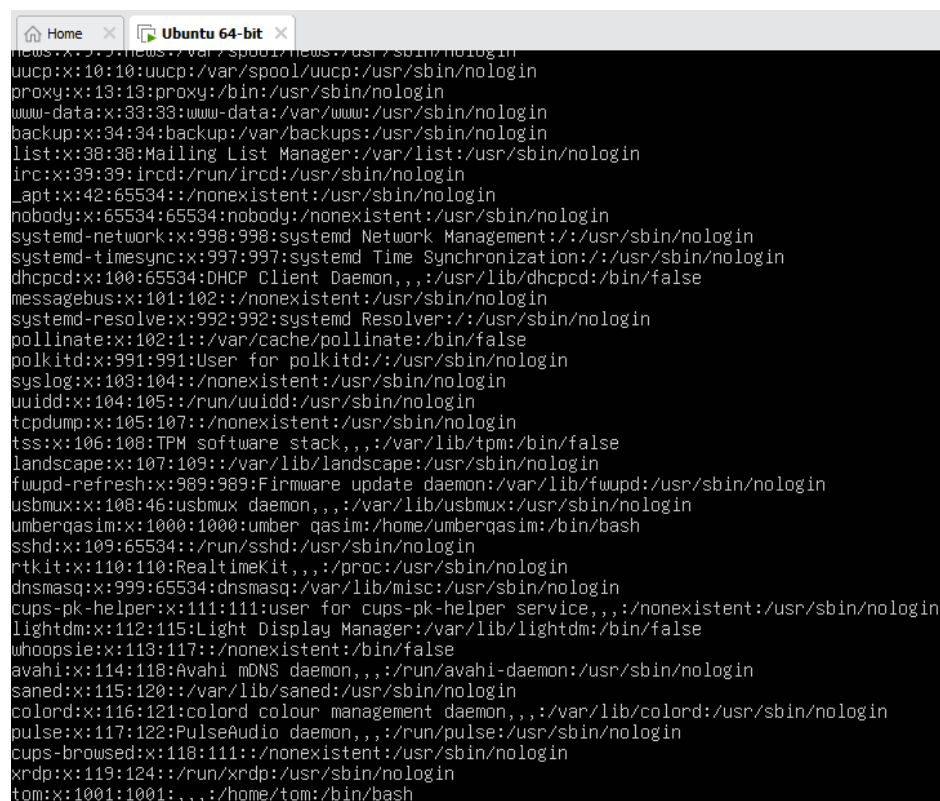
```
root@2023-bse-066:~# exit
logout
umberqasim@2023-bse-066:~$ whoami
umberqasim
```

### **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



A terminal window titled 'Ubuntu 64-bit' displays the contents of the /etc/passwd file. The output lists system users and regular users, each with their username, UID, GID, and shell path. The user 'tom' is listed at the bottom with UID 1001, GID 1001, and shell /home/tom/bin/bash.

```
news:x:7:7: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
uidd:x:104:105::/run/uidd:/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/ssh:/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:1001:1001:::/home/tom:/bin/bash
```

## Verify tom in /etc/group



A terminal window titled 'Ubuntu 64-bit' displays the contents of the /etc/group file. The output lists various system groups, each with their group name, GID, and members. The group 'tom' is listed at the bottom with GID 1001 and no members.

```
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:umberqasim
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
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
users:*:20305:0:99999:7:::
uuuop:*: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-networkd:*:20305:0:99999:7:::
systemd-timesyncd:*:20305:0:99999:7:::
dhcpcd:*:20305:0:99999:7:::
messagebus:*:20305:0:99999:7:::
systemd-resolved:*:20305:0:99999:7:::
pollinate:*:20305:0:99999:7:::
polkitd:*:20305:0:99999:7:::
syslog:*:20305:0:99999:7:::
uuidd:*:20305:0:99999:7:::
tcpdump:*:20305:0:99999:7:::
tss:*:20305:0:99999:7:::
landscape:*:20305:0:99999:7:::
fwupd-refresh:*:20305:0:99999:7:::
usbmuxd:*:20305:0:99999:7:::
umass-storage:*:20305:0:99999:7:::
sshd:*:20305:0:99999:7:::
rtkit:*:20305:0:99999:7:::
dnsmasq:*:20305:0:99999:7:::
cups-pk-helper:*:20305:0:99999:7:::
lightdm:*:20305:0:99999:7:::
whoopsie:*:20305:0:99999:7:::
avahi:*:20305:0:99999:7:::
saned:*:20305:0:99999:7:::
colord:*:20305:0:99999:7:::
pulse:*:20305:0:99999:7:::
cups-browsed:*:20305:0:99999:7:::
xrdp:*:20305:0:99999:7:::
tom:$y$j9T$YQmLsFKK6Qga9eVAV9QAa/$3YPyZosJ9MC8bXLQXG1waxre1Q0QuCV158Ip4Y1Cu3D:20393:0:99999:7:::
Activate Windows
```

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

### *Create groups*

```
scanner:x:119:
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

```
Home x Ubuntu 64-bit x
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:110:110: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
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 chown 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:
$ pwd
-sh: 1: pwd: 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

```
pr oxg:x:13:13:pr oxg:/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
dhcpd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpd:/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
uidd:x:104:105::/run/uidd:/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
groupadd: group 'anime' already exists
```

## Verify groups

```

pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
jerry:x:1005:
Scooby:x:1006:
jolly:x:1007:
anime:x:1008:

```

## Delete groups

```

color0:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
docker:x:988:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
jerry:x:1005:
Scooby:x:1006:

```

## Delete users (remove home too)

```

news:x:35:35: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
uidd:x:104:105:/run/uidd:/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)

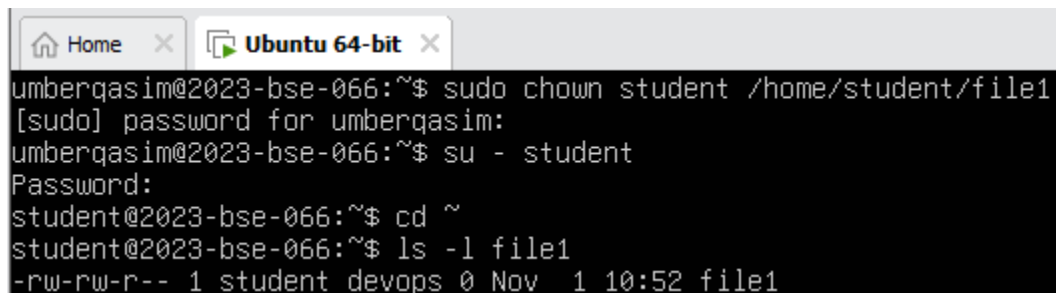
```

### *Exit Student*

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

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

### *Switch to Student user*



```

Home x Ubuntu 64-bit x
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
-r-xr-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
-rwxrwxrwx 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
-rwxr-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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_log.cpython-312.pyc.126106354973056" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_log.cpython-312.pyc.126106354973056" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_defaults.cpython-312.pyc.126106352310320" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_secret_manager.cpython-312.pyc.126106352310320" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=0
2025-10-26T11:05:10.768312+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.765:439): apparmor="DENIED" operation="mknod" tu_pro_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_system.cpython-312.pyc.126106352312368" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_exceptions.cpython-312.pyc.126106352741936" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache__/_init_.cpython-312.pyc.126106351533360" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache__/_urls.cpython-312.pyc.126106351533360" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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.
2025-10-26T11:05:16.514543+00:00 2023-bse-066 systemd-timesyncd[3299]: Timed out waiting for reply from 91.189.91.157:123 (ntp.ubuntu.com).
2025-10-26T11:05:17.128878+00:00 2023-bse-066 dbus-daemon[805]: [system] Activating via systemd: service name='org.freedesktop.PackageKit' requested by ':1.140' (uid=0 pid=21072 comm="/usr/bin/gdbus call --system --dest org.freedesktop.PackageKit 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 successfully.
umberqasim@2023-bse-066:~$
```

## View with more (page by page)

```
tu_pro_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_log.cpython-312.pyc.126106354973056" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_defaults.cpython-312.pyc.126106352310320" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_secret_manager.cpython-312.pyc.126106352310320" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=0
2025-10-26T11:05:10.768312+00:00 2023-bse-066 kernel: audit: type=1400 audit(1761476710.765:439): apparmor="DENIED" operation="mknod" tu_pro_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_system.cpython-312.pyc.126106352312368" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/_pycache__/_exceptions.cpython-312.pyc.126106352741936" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache__/_init_.cpython-312.pyc.126106351533360" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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_esm_cache" name="/usr/lib/python3/dist-packages/uaclient/messages/_pycache__/_urls.cpython-312.pyc.126106351533360" pid=20843 comm="python3" denied_mask="c" fsuid=0 ouid=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.
2025-10-26T11:05:16.514543+00:00 2023-bse-066 systemd-timesyncd[3299]: Timed out waiting for reply from 91.189.91.157:123 (ntp.ubuntu.com).
2025-10-26T11:05:17.128878+00:00 2023-bse-066 dbus-daemon[805]: [system] Activating via systemd: service name='org.freedesktop.PackageKit' requested by ':1.140' (uid=0 pid=21072 comm="/usr/bin/gdbus call --system --dest org.freedesktop.PackageKit 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 successfully.
2025-10-26T11:05:22.376130+00:00 2023-bse-066 systemd[1]: Finished apt-news.service - Update APT News.
2025-10-26T11:05:22.376312+00:00 2023-bse-066 systemd[1]: apt-news.service: Consumed 1.011s CPU time.
2025-10-26T11:05:24.404112+00:00 2023-bse-066 kernel: workqueue: ps1_avgs_work hogged CPU for >10000us 444 times, consider switching to a different CPU.
--More--
umberqasim@2023-bse-066:~$
```

## 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

```
2025-11-01T06:12:31.170642+00:00 2023-bse-066 NetworkManager[888]: <info> [1761977551.180] ifupdown: management mode: unmanaged
2025-11-01T06:12:31.181443+00:00 2023-bse-066 NetworkManager[888]: <info> [1761977551.1740] ifupdown: interfaces file /etc/network/i
2025-11-01T06:12:31.222553+00:00 2023-bse-066 systemd[1]: Starting NetworkManager-dispatcher.service - Network Manager Script Dispatc
2025-11-01T06:12:31.479076+00:00 2023-bse-066 systemd[1]: Started NetworkManager-dispatcher.service - Network Manager Script Dispatc
2025-11-01T06:12:34.107522+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[888]: <info> [1761977555.3461] dhcp: init: Using DHCP client 'internal'
2025-11-01T06:12:35.351915+00:00 2023-bse-066 NetworkManager[888]: <info> [1761977555.3464] manager: (lo): new Loopback device (/org
/Devices/1)
2025-11-01T06:12:35.352319+00:00 2023-bse-066 NetworkManager[888]: <info> [1761977555.3476] device (ens33): carrier: link connected
2025-11-01T06:12:35.352447+00:00 2023-bse-066 NetworkManager[888]: <info> [1761977555.3499] manager: (ens33): new Ethernet device (/o
ger/Devices/2)
2025-11-01T06:12:35.363938+00:00 2023-bse-066 NetworkManager[888]: <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[888]: <info> [1761977555.3590] bus-manager: acquired D-Bus service "org
2025-11-01T06:12:35.375418+00:00 2023-bse-066 NetworkManager[888]: <info> [1761977555.3717] manager: startup complete
2025-11-01T06:12:35.377475+00:00 2023-bse-066 NetworkManager[888]: <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.
2025-11-01T06:12:41.486677+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 dirnmgr.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[888]: <info> [1761986423.1439] audit: op="sleep-control" arg="off" pid=
ason="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[888]: <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.
2025-11-01T09:41:41.953259+00:00 2023-bse-066 NetworkManager[888]: <info> [1761990101.3520] audit: op="sleep-control" arg="off" pid=
ason="Already awake"
2025-11-01T12:09:52.149746+00:00 2023-bse-066 systemd-timesyncd[671]: Network configuration changed, trying to establish connection.
umberqasim@2023-bse-066:~$
```

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

```
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000000000-0x0000000000000fff] usable
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x0000000000100000-0x00000000007fedffff] usable
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x00000000007fee0000-0x00000000007fefefff] ACPI data
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x00000000007fef0000-0x00000000007fefefff] ACPI NVS
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x00000000007fff0000-0x00000000007fffffff] usable
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x000000000f00000000-0x000000000f7fffffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x000000000fec000000-0x000000000fec0fffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x000000000fee000000-0x000000000fee00ffff] reserved
Sep 30 03:12:20 2023-bse-066 kernel: BIOS-e820: [mem 0x000000000ffe000000-0x000000000ffffffffff] 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: DMI: 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 0x000000000-0x000000ffff] usable ==> reserved
Sep 30 03:12:20 2023-bse-066 kernel: e820: remove [mem 0x000000000-0x000000ffff] usable
Sep 30 03:12:20 2023-bse-066 kernel: last_pfn = 0x80000 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: gran_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- HT
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 0x0000000007FEE95B 00005C (v01 INTEL 440BX 06040000 VMW 01324272)
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: FACP 0x0000000007FEE7E73 0000F4 (v04 INTEL 440BX 06040000 PTL 000F4240)
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: DSDT 0x0000000007FEEAD55 01411E (v01 PTLTD Custom 06040000 MSFT 03000001)
Sep 30 03:12:20 2023-bse-066 kernel: ACPI: FACS 0x0000000007FEEFFC0 000040
umberqasim@2023-bse-066:~$ sudo journalctl -u systemd | grep -i error > ~/journal_errros.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
-rwxr-x--- 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
-rwxr-x--- 1 student student   0 Nov  1 10:52 file1
-rwxrwxr-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"

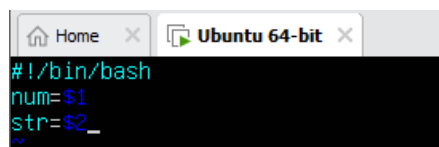
```

```

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:
-rwxrw-r-- 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**



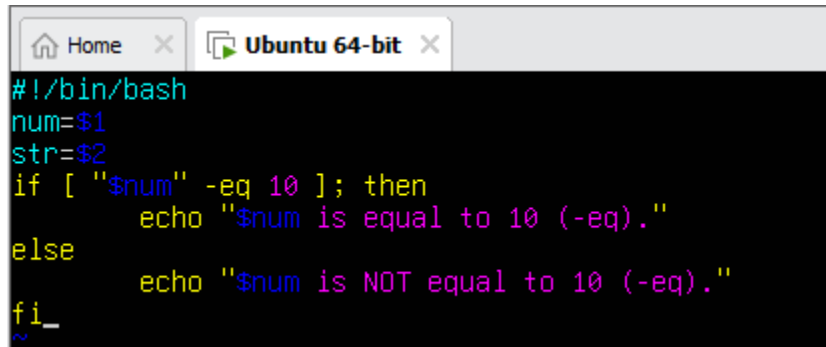
```

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

```

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

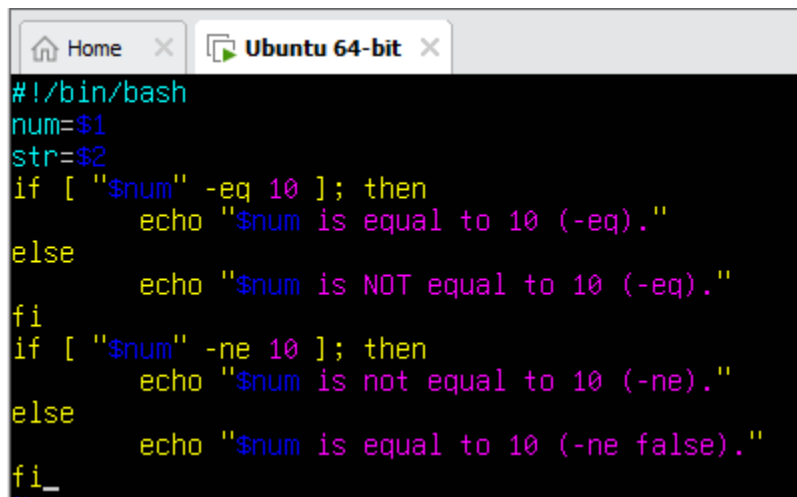
### *Numeric equality (-eq)*



```
#!/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)*



```
#!/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 (-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
~
```

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

```

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 (-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
~
```

```
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).
```

## String equality (=)

```
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
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 x Ubuntu 64-bit x
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

```

fi          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:~$ ./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.
```



## **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:~$ ./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:~$
```

*Add function sum\_args (2 arguments)*

```
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"
```

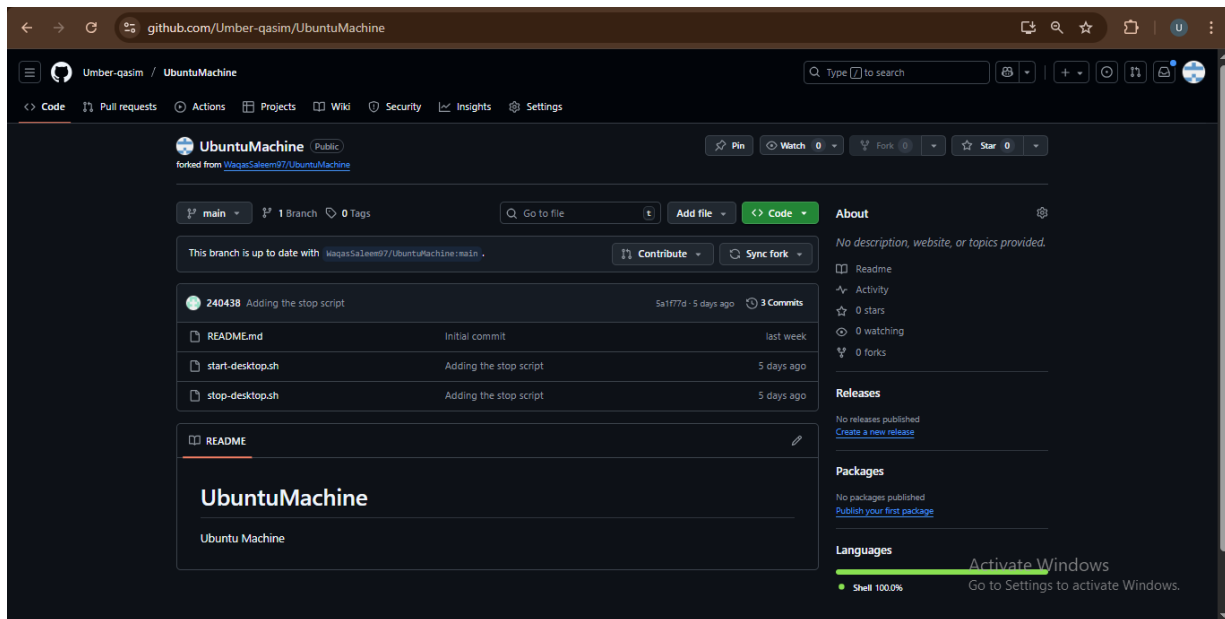
```

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

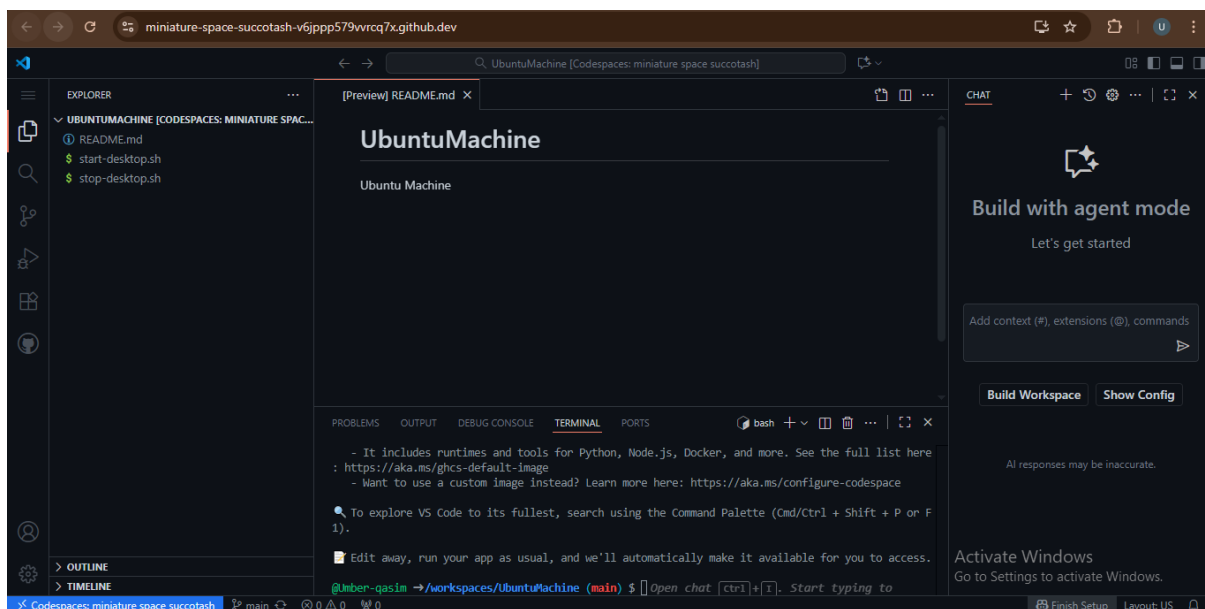
```

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

### Fork the repository



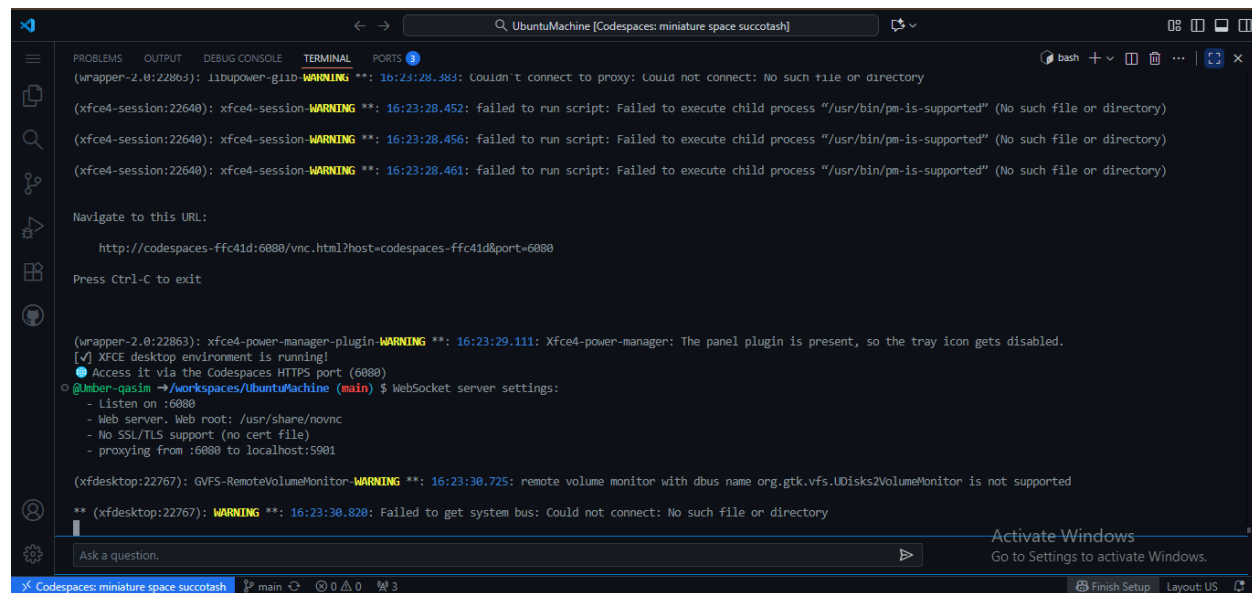
### Open Codespace



## Verify start script exists

```
@Umbur-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
@Umbur-qasim →/workspaces/UbuntuMachine (main) $ chmod +x start-desktop.sh stop-desktop.sh
```

## Start GUI



## Verify forwarded port (6080)

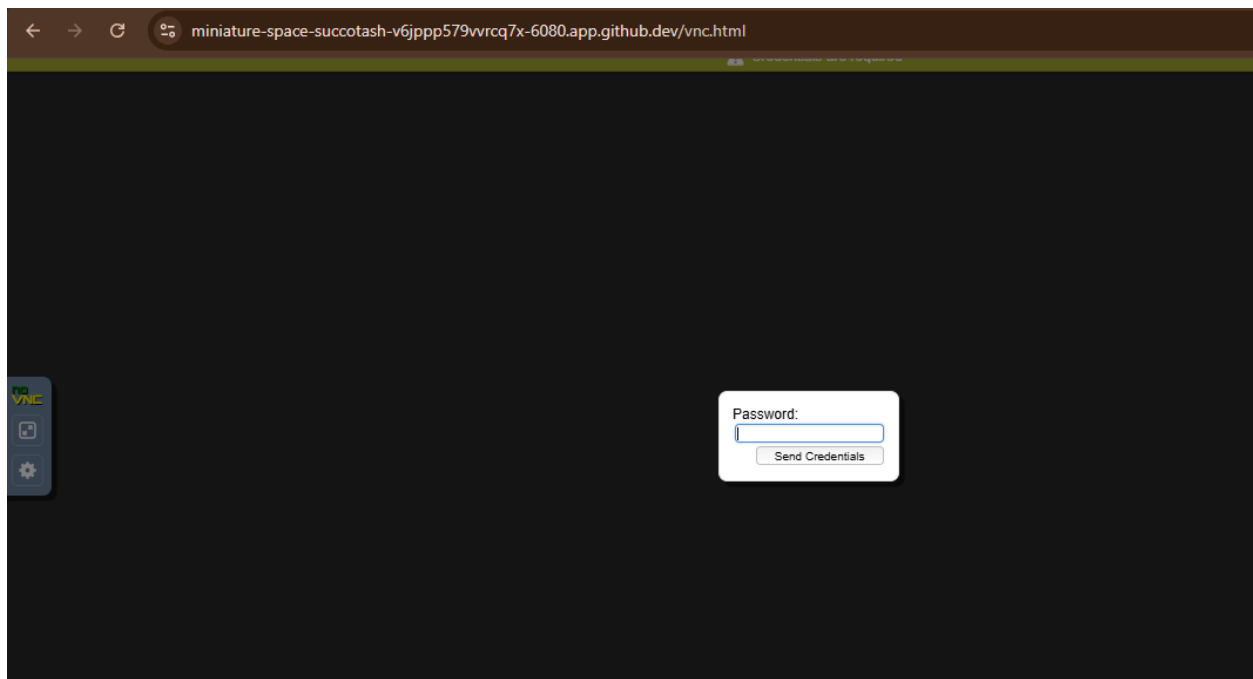
The screenshot shows the Visual Studio Code interface with the PORTS pane active. The table below represents the data shown in the pane:

Port	Forwarded Address	Running Process	Visibility	Origin
5900	https://miniature-space-succ...	x11vnc -display :1 -rfbauth /home/codespace/vnc/passwd -n...	Private	Auto Forwarded
5901	https://miniature-space-succ...	x11vnc -display :1 -rfbauth /home/codespace/vnc/passwd -n...	Private	Auto Forwarded
6080	https://miniature-space-succ...	/usr/bin/python3 /usr/bin/websocketify --web /usr/share/novnc...	Public	Auto Forwarded

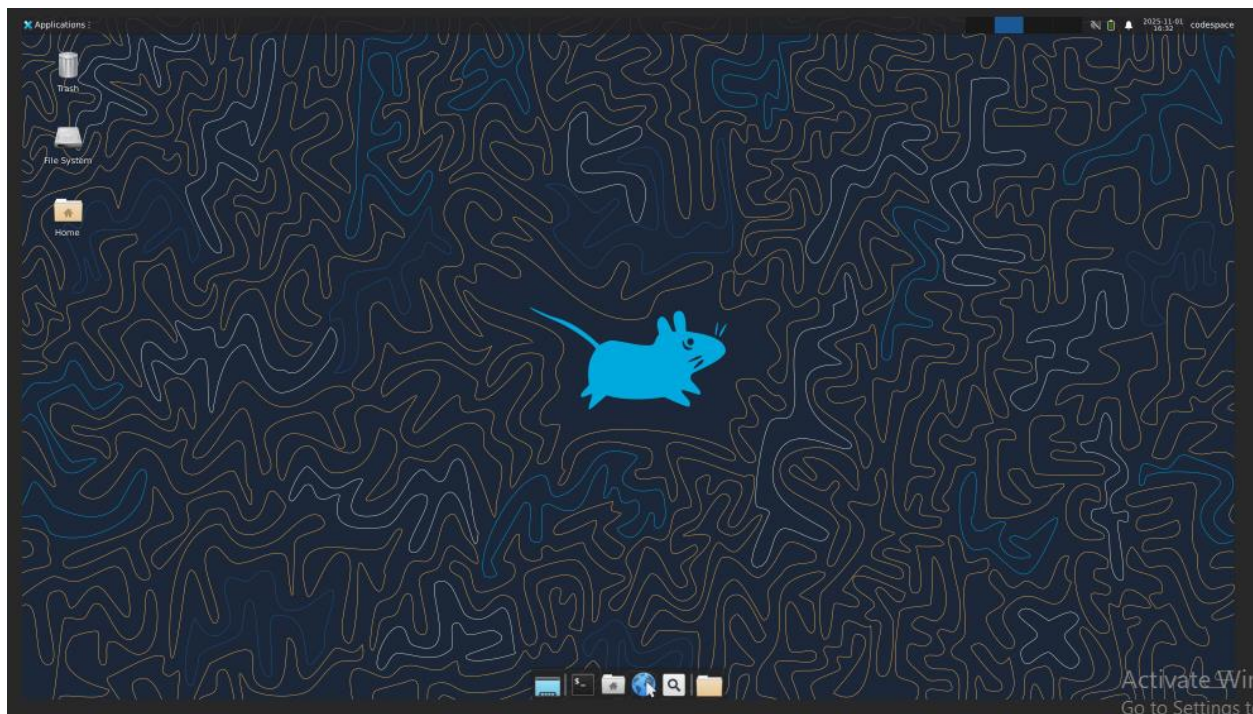
## Open VNC in browser



## *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
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
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 fuupd[40945]: 13:31:15.160 FuEngine failed to add device /sys/devices/pci00
04:0/ata4/host4/target4:0:0:4:0:0:0/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
2025-10-30T13:31:33.603839+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*

```
2025-10-30T13:31:33.833827+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
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 multipath: sda: failed to get sysfs uid: No such file or directory
2025-10-30T13:34:35.429852+00:00 2023-bse-066 multipath: 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
2025-10-30T13:34:35.460776+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).
2025-10-30T13:34:35.460810+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
-rwxr-x--- 1 student student   0 Nov  1 10:52 file1
-rwxrwxr-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
-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:
-rwxrwx-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:*

```
#!/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:~$ ./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:~$ ./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"
```