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Lab 06

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

- Set Root Password. task1_set_root_password.png

```
sadafriaz@2023-bse-077:~$ sudo passwd root

[sudo] password for sadafriaz:
Sorry, try again.
[sudo] password for sadafriaz:
Sorry, try again.
[sudo] password for sadafriaz:
New password:
Retype new password:
passwd: password updated successfully
```

- Switch to Root Account. task1_su_root.png

```
sadafriaz@2023-bse-077:~$ su -
Password:
root@2023-bse-077:~# whoami
root
root@2023-bse-077:~# id
uid=0(root) gid=0(root) groups=0(root)
root@2023-bse-077:~#
```

- Exit to Normal User. task1_exit_to_user.png

```
root@2023-bse-077:~# exit
logout
sadafriaz@2023-bse-077:~$ whoami
sadafriaz
sadafriaz@2023-bse-077:~$ _
```

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

- Create User tom. task2_adduser_tom.png

```
sadafriaz@2023-bse-077:~$ sudo adduser tom

[sudo] password for sadafriaz:
Sorry, try again.
[sudo] password for sadafriaz:
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 []: SadafRiaz
        Room Number []: 2023-BSE-077
        Work Phone []: 03029801594
        Home Phone []: 03029801594
        Other []: none
Is the information correct? [Y/n] Y
info: Adding new user `tom' to supplemental / extra groups `users' ...
info: Adding user `tom' to group `users' ...
sadafriaz@2023-bse-077:~$ _
```

- Verify /etc/passwd. task2_verify_passwd.p

```
sadafriaz@2023-bse-077:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:992:992:systemd Resolver:/:/usr/sbin/nologin
pollinate:x:102:1::/var/cache/pollinate:/bin/false
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uuidd:x:104:105::/run/uuidd:/usr/sbin/nologin
tcpdump:x:105:107::/nonexistent:/usr/sbin/nologin
tss:x:106:108:TPM software stack,,,:/var/lib/tpm:/bin/false
landscape:x:107:109::/var/lib/landscape:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sadafriaz:x:1000:1000:sadaf riaz:/home/sadafriaz:/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
lightdm:x:111:114:Light Display Manager:/var/lib/lightdm:/bin/false
avahi:x:112:116:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:114:117:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:111::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1001:SadafRiaz,2023-BSE-077,03029801594,03029801594,none:/home/tom:/bin/bash
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$
```

- Verify /etc/group. task2_verify_group.png

```
dip:x:30:sadafriaz
www-data:x:33:
backup:x:34:
operator:x:37:
list:x:38:
irc:x:39:
src:x:40:
shadow:x:42:
utmp:x:43:
video:x:44:
sasl:x:45:
plugdev:x:46:sadafriaz
staff:x:50:
games:x:60:
users:x:100:tom
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:sadafriaz
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uuidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
sadafriaz:x:1000:
rtkit:x:110:
lpadmin:x:111:
netdev:x:112:
ssl-cert:x:113:
lightdm:x:114:
nopasswdlogin:x:115:
avahi:x:116:
pulse:x:117:
pulse-access:x:118:
xrdp:x:119:
tom:x:1001:
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$
```

- Verify /etc/shadow. task2_verify_shadow.png

```
sadafriaz@2023-bse-077:~$ sudo cat /etc/shadow

root:$y$j9T$9adsIt9AE0crAEG0D.dXH1$Smq6fLNi4bjDEKTxJ/j6OM2ntREKdIXhZgoT0w1zGID:20
daemon:*:20305:0:99999:7:::
bin:*:20305:0:99999:7:::
sys:*:20305:0:99999:7:::
sync:*:20305:0:99999:7:::
games:*:20305:0:99999:7:::
man:*:20305:0:99999:7:::
lp:*:20305:0:99999:7:::
mail:*:20305:0:99999:7:::
news:*:20305:0:99999:7:::
uucp:*:20305:0:99999:7:::
proxy:*:20305:0:99999:7:::
www-data:*:20305:0:99999:7:::
backup:*:20305:0:99999:7:::
list:*:20305:0:99999:7:::
irc:*:20305:0:99999:7:::
_apt:*:20305:0:99999:7:::
nobody:*:20305:0:99999:7:::
systemd-network:!*:20305::::::
systemd-timesync:!*:20305::::::
dhcpcd:!:20305::::::
messagebus:!:20305::::::
systemd-resolve:!*:20305::::::
pollinate:!:20305::::::
polkitd:!*:20305::::::
syslog:!:20305::::::
uuidd:!:20305::::::
tcpdump:!:20305::::::
tss:!:20305::::::
landscape:!:20305::::::
fwupd-refresh:!*:20305::::::
usbmux:!:20376::::::
sadafriaz:$6$N.CZTFSprAeC9aLD$rtlgzrZwxS7zm4knfmlh/4jPMH9DGs0yLg8FGtwfbtoPhV6pT32
sshd:!:20385::::::
rtkit:!:20386::::::
dnsmasq:!:20386::::::
lightdm:!:20386::::::
avahi:!:20386::::::
speech-dispatcher:!:20386::::::
pulse:!:20386::::::
cups-browsed:!:20386::::::
xrdp:!:20386::::::
tom:$y$j9T$USJBwEU4Pb4.Ansia2Qwa.$.3qBrKQbENshXi.MnPUDW45ljsi4DPNaTXp.KhFESoB:203
sadafriaz@2023-bse-077:~$ _
```

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

- Create Groups. task3_groupadd.png

```
users:x:100:tom
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:sadafriaz
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uuidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
sadafriaz:x:1000:
rtkit:x:110:
lpadmin:x:111:
netdev:x:112:
ssl-cert:x:113:
lightdm:x:114:
nopasswdlogin:x:115:
avahi:x:116:
pulse:x:117:
pulse-access:x:118:
xrdp:x:119:
tom:x:1001:
developer:x:1002:
devops:x:1003:
designer:x:1004:
sadafriaz@2023-bse-077:~$ _
```

- Change Primary Group. task3_change_primary_group.png

```
sadafriaz@2023-bse-077:~$ sudo usermod -g designer tom
sadafriaz@2023-bse-077:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users)
sadafriaz@2023-bse-077:~$ _
```

- Add Secondary Groups. task3_add_secondary_groups.png

```
sadafriaz@2023-bse-077:~$ sudo usermod -aG developer,devops tom
sadafriaz@2023-bse-077:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),100(users),1002(developer),1003(devops)
sadafriaz@2023-bse-077:~$ groups tom
tom : designer users developer devops
sadafriaz@2023-bse-077:~$ _
```

- Reset Secondary Groups. task3_reset_secondary_groups.png

```
sadafriaz@2023-bse-077:~$ sudo usermod -G tom tom
sadafriaz@2023-bse-077:~$ id tom
uid=1001(tom) gid=1004(designer) groups=1004(designer),1001(tom)
sadafriaz@2023-bse-077:~$ groups tom
tom : designer tom
sadafriaz@2023-bse-077:~$
```

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

- Create Users. task4_add_users.png

```
                     NAME_REGEX in configuration.
sadafriaz@2023-bse-077:~$ sudo adduser jerry


info: Adding user `jerry' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `jerry' (1006) ...
info: Adding new user `jerry' (1006) with group `jerry (1006)' ...
info: Creating home directory `/home/jerry' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
Sorry, passwords do not match.
passwd: Authentication token manipulation error
passwd: password unchanged
Try again? [y/N] y
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 []: Sadaf Riaz
        Room Number []: 2023-BSE-077
        Work Phone []: 03029801594
        Home Phone []: 03029801594
        Other []: none
Is the information correct? [Y/n] Y
info: Adding new user `jerry' to supplemental / extra groups `users' ...
info: Adding user `jerry' to group `users' ...
sadafriaz@2023-bse-077:~$ sudo useradd Scooby
useradd: user 'Scooby' already exists
sadafriaz@2023-bse-077:~$
```

- Attempt Login Scooby (No Password). task4_scooby_su_auth_failure.png

```
useradd: user 'Scooby' already exists
sadafriaz@2023-bse-077:~$ su - Scooby
Password:
su: Authentication failure
sadafriaz@2023-bse-077:~$ _
```

- Set Scooby Password. task4_set_password_scooby.

```
sadafriaz@2023-bse-077:~$ sudo passwd Scooby
New password:
Retype new password:
passwd: password updated successfully
sadafriaz@2023-bse-077:~$
```

- Login Scooby (No Home). task4_scooby_su_no_home.png

```
passwd: password updated successfully
sadafriaz@2023-bse-077:~$ su - Scooby
Password:
su: warning: cannot change directory to /home/Scooby: No such file or directory
$
```

- Show Scooby Home Missing. task4_scooby_no_home.png

```
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:114:117:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:111::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:SadafRiaz,2023-BSE-077,03029801594,03029801594,none:/home/tom:/bin/bash
Scooby:x:1002:1005::/home/Scooby:/bin/sh
jerry:x:1006:1006:Sadaf Riaz,2023-BSE-077,03029801594,03029801594,none:/home/jerry:/bin/bash
sadafriaz@2023-bse-077:~$ ls -ld /home/Scooby
ls: cannot access '/home/Scooby': No such file or directory
sadafriaz@2023-bse-077:~$
```

- Create Scooby Home Directory. task4_scooby_create_home.png

```
sadafriaz@2023-bse-077:~$ sudo mkdir -p /home/Scooby
[sudo] password for sadafriaz:
Sorry, try again.
[sudo] password for sadafriaz:
sadafriaz@2023-bse-077:~$ sudo chown Scooby:Scooby /home/Scooby
sadafriaz@2023-bse-077:~$ sudo chmod 750 /home/Scooby
sadafriaz@2023-bse-077:~$ ls -ld /home/Scooby
drwxr-x--- 2 Scooby Scooby 4096 Oct 31 17:15 /home/Scooby
sadafriaz@2023-bse-077:~$
```

- Login Scooby Success. task4_scooby_login_success.png

```
su: authentication failure
sadafriaz@2023-bse-077:~$ su - Scooby
Password:
$ pwd
/home/Scooby
$ ls -la
total 8
drwxr-x--- 2 Scooby Scooby 4096 Oct 31 17:15 .
drwxr-xr-x 6 root   root   4096 Oct 31 17:15 ..
$ _
```

- Verify Users in System Files. task4_verify_users.png

```
$ exit
sadafriaz@2023-bse-077:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sb
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/fal
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:/us
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologi
sadafriaz:x:1000:1000:sadaf riaz:/home/sadafriaz:/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
lightdm:x:111:114:Light Display Manager:/var/lib/lightdm:/bin/fal
avahi:x:112:116:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispa
pulse:x:114:117:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:111::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:SadafRiaz,2023-BSE-077,03029801594,03029801594,no
Scooby:x:1002:1005::/home/Scooby:/bin/sh
jerry:x:1006:1006:Sadaf Riaz,2023-BSE-077,03029801594,03029801594
sadafriaz@2023-bse-077:~$
```

- Change Scooby Shell. task4_shell_switching.png

```
sadafriaz@2023-bse-077:~$ sudo usermod -s /bin/bash Scooby
sadafriaz@2023-bse-077:~$ su - Scooby
Password:
Scooby@2023-bse-077:~$ _
```

- Verify Groups. task4_verify_groups.png

```
list:x:38:
irc:x:39:
src:x:40:
shadow:x:42:
utmp:x:43:
video:x:44:
sasl:x:45:
plugdev:x:46:sadafriaz
staff:x:50:
games:x:60:
users:x:100:jerry
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
systemd-timesync:x:997:
input:x:996:
sgx:x:995:
kvm:x:994:
render:x:993:
lxd:x:101:sadafriaz
messagebus:x:102:
systemd-resolve:x:992:
_ssh:x:103:
polkitd:x:991:
crontab:x:990:
syslog:x:104:
uuidd:x:105:
rdma:x:106:
tcpdump:x:107:
tss:x:108:
landscape:x:109:
fwupd-refresh:x:989:
sadafriaz:x:1000:
rtkit:x:110:
lpadmin:x:111:
netdev:x:112:
ssl-cert:x:113:
lightdm:x:114:
nopasswdlogin:x:115:
avahi:x:116:
pulse:x:117:
pulse-access:x:118:
xrdp:x:119:
tom:x:1001:tom
developer:x:1002:
devops:x:1003:
designer:x:1004:
Scooby:x:1005:
jerry:x:1006:
Scooby@2023-bse-077:~$
```

- Delete Groups. task4_delete_groups.png

```
            plugdev:x:46:sadafriaz
            staff:x:50:
            games:x:60:
            users:x:100:jerry
            nogroup:x:65534:
            systemd-journal:x:999:
            systemd-network:x:998:
            systemd-timesync:x:997:
            input:x:996:
            sgx:x:995:
            kvm:x:994:
            render:x:993:
            lxd:x:101:sadafriaz
            messagebus:x:102:
            systemd-resolve:x:992:
            _ssh:x:103:
            polkitd:x:991:
            crontab:x:990:
            syslog:x:104:
            uuidd:x:105:
            rdma:x:106:
            tcpdump:x:107:
            tss:x:108:
            landscape:x:109:
            fwupd-refresh:x:989:
            sadafriaz:x:1000:
            rtkit:x:110:
            lpadmin:x:111:
            netdev:x:112:
            ssl-cert:x:113:
            lightdm:x:114:
            nopasswdlogin:x:115:
            avahi:x:116:
            pulse:x:117:
            pulse-access:x:118:
            xrdp:x:119:
            tom:x:1001:tom
            developer:x:1002:
            devops:x:1003:
            designer:x:1004:
            Scooby:x:1005:
```

- Delete Users. task4_delete_users.png

```
sadafriaz@2023-bse-077:~$ sudo userdel -r Scooby
userdel: Scooby mail spool (/var/mail/Scooby) not found
sadafriaz@2023-bse-077:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:992:992:systemd Resolver:/:/usr/sbin/nologin
pollinate:x:102:1::/var/cache/pollinate:/bin/false
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
syslog:x:103:104::/nonexistent:/usr/sbin/nologin
uuidd:x:104:105::/run/uuidd:/usr/sbin/nologin
tcpdump:x:105:107::/nonexistent:/usr/sbin/nologin
tss:x:106:108:TPM software stack,,,:/var/lib/tpm:/bin/false
landscape:x:107:109::/var/lib/landscape:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
usbmux:x:108:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sadafriaz:x:1000:1000:sadaf riaz:/home/sadafriaz:/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
lightdm:x:111:114:Light Display Manager:/var/lib/lightdm:/bin/false
avahi:x:112:116:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:113:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:114:117:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
cups-browsed:x:115:111::/nonexistent:/usr/sbin/nologin
xrdp:x:116:119::/run/xrdp:/usr/sbin/nologin
tom:x:1001:1004:SadafRiaz,2023-BSE-077,03029801594,03029801594,none:/home/tom:/bin
sadafriaz@2023-bse-077:~$
```

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

- Create Student. task5_create_student.png

```
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 []: Sadaf Riaz
        Room Number []: 077
        Work Phone []: 03029801594
        Home Phone []: 003029801594
        Other []: none
Is the information correct? [Y/n] Y
info: Adding new user `student' to supplemental / extra groups `users' ..
info: Adding user `student' to group `users' ...
sadafriaz@2023-bse-077:~$ _
```

- Create Files/Directories. task5_create_files.png

```
su. Huthentication rariure
sadafriaz@2023-bse-077:~$ su - student
Password:
su: Authentication failure
sadafriaz@2023-bse-077:~$ su - student
Password:
student@2023-bse-077:~$ touch file1
student@2023-bse-077:~$ mkdir -p dir1
student@2023-bse-077:~$ touch dir1/file2
student@2023-bse-077:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  1 05:12 dir1
-rw-rw-r-- 1 student student    0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- Change Owner of file1. task5_chown_file1.png

```
sadafriaz@2023-bse-077:~$ sudo chown tom /home/student/file1
[sudo] password for sadafriaz:
sadafriaz@2023-bse-077:~$ sudo chgrp devops /home/student/file1
sadafriaz@2023-bse-077:~$ su - student
Password:
student@2023-bse-077:~$
```

- Change Group of file1. task5_chgrp_file1.png

```
sadafriaz@2023-bse-077:~$ sudo chgrp devops /home/student/file1
sadafriaz@2023-bse-077:~$ su - student
Password:
student@2023-bse-077:~$
```

- Identify File Types. task5_file_types.png

```
student@2023-bse-077:~$ ls -l
total 4
drwxrwxr-x 2 student student 4096 Nov  1 05:12 dir1
-rw-rw-r-- 1 tom     devops     0 Nov  1 05:12 file1
student@2023-bse-077:~$ ls -l dir1
total 0
-rw-rw-r-- 1 student student 0 Nov  1 05:12 file2
student@2023-bse-077:~$ ls -l /dev/null
crw-rw-rw- 1 root root 1, 3 Nov  1 05:00 /dev/null
student@2023-bse-077:~$ file file1 dir1 /dev/null
file1:     empty
dir1:      directory
/dev/null: character special (1/3)
student@2023-bse-077:~$ _
```

- Exit Student. task5_exit_student.png

```
sadafriaz@2023-bse-077:~$
```

Task 6 – Change permissions using symbolic mode

- Switch to Student. task6_su_student.png

```
sadafriaz@2023-bse-077:~$ su - student
Password:
student@2023-bse-077:~$ cd ~
student@2023-bse-077:~$ ls -l file1
-rw-rw-r-- 1 tom devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

- Remove All Permissions. task6_chmod_remove_rwx.png

```
-rw-rw-r-- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ chmod -rwx file1
student@2023-bse-077:~$ ls -l file1
---------- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- Add Read to All. task6_chmod_add_r.png

```
          1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ chmod +r file1
student@2023-bse-077:~$ ls -l file1
-r--r--r-- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

- Add Execute to User. task6_chmod_u_plus_x.png

```
student@2023-bse-077:~$ chmod u+x file1
student@2023-bse-077:~$ ls -l file1
-r-xr--r-- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- Add Write to User & Group. task6_chmod_ug_plus_w.png

```
student@2023-bse-077:~$ chmod ug+w file1
student@2023-bse-077:~$ ls -l file1
-rwxrw-r-- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

- Remove All Permissions Explicitly. task6_chmod_ugo_minus_rwx.png

```
student@2023-bse-077:~$ chmod ugo-rwx file1
student@2023-bse-077:~$ ls -l file1
---------- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

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

- Student Context. task7_student_context.png

```
student@2023-bse-077:~$ su - student
Password:
student@2023-bse-077:~$ cd ~
student@2023-bse-077:~$ ls -l file1
---------- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- Set All to rwx. task7_chmod_set_all_rwx.png

```
               1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ chmod u=rwx,g=rwx,o=rwx file1
student@2023-bse-077:~$ ls -l file1
-rwxrwxrwx 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

- Remove Execute from Group & Others. task7_remove_exec_go.png

```
student@2023-bse-077:~$ chmod g=rw,o=rw file1
student@2023-bse-077:~$ ls -l file1
-rwxrw-rw- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- Remove All Permissions. task7_remove_all_perms.png

```
student@2023-bse-077:~$ chmod g=rw,o=rw file1
student@2023-bse-077:~$ ls -l file1
-rwxrw-rw- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

Task 8 – Change permissions using numeric (octal) mode

- Student Context. task8_student_context.png

```
student@2023-bse-077:~$ su - student
Password:
student@2023-bse-077:~$ cd ~
student@2023-bse-077:~$ ls -l file1
---------- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- chmod 777. task8_chmod_777.png

```
             1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ chmod 777 file1
student@2023-bse-077:~$ ls -l file1
-rwxrwxrwx 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- chmod 700. task8_chmod_700.png

```
student@2023-bse-077:~$ chmod 700 file1
student@2023-bse-077:~$ ls -l file1

-rwx------ 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
student@2023-bse-077:~$ _
```

- chmod 744. task8_chmod_744.png

```
student@2023-bse-077:~$ chmod 744 file1
student@2023-bse-077:~$ ls -l file1
-rwxr--r-- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

- chmod 640. task8_chmod_640.png

```
student@2023-bse-077:~$ chmod 640 file1
student@2023-bse-077:~$ ls -l file1
-rw-r----- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- chmod 664. task8_chmod_664.png

```
student@2023-bse-077:~$ chmod 664 file1
student@2023-bse-077:~$ ^C
student@2023-bse-077:~$ ^C
student@2023-bse-077:~$ ^C
student@2023-bse-077:~$ ls -l file1
-rw-rw-r-- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$
```

- chmod 775. task8_chmod_775.png

```
student@2023-bse-077:~$ chmod 775 file1
student@2023-bse-077:~$ ls -l file1
-rwxrwxr-x 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

- chmod 750. task8_chmod_750.png

```
student@2023-bse-077:~$ chmod 750 file1
student@2023-bse-077:~$ ls -l file1
-rwxr-x--- 1 student devops 0 Nov  1 05:12 file1
student@2023-bse-077:~$ _
```

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

- grep + less. task9_grep_less.p

```
2025-10-26T05:40:27.814775+00:00 2023-bse-077 systemd[1]: Starting systemd-journal-flush.service - Fl
2025-10-26T05:40:27.814779+00:00 2023-bse-077 systemd[1]: systemd-pstore.service - Platform Persistent
n check (ConditionDirectoryNotEmpty=/sys/fs/pstore).
2025-10-26T05:40:27.814782+00:00 2023-bse-077 systemd[1]: Starting systemd-random-seed.service - Load/
2025-10-26T05:40:27.814796+00:00 2023-bse-077 systemd[1]: systemd-repart.service - Repartition Root D:
t.
2025-10-26T05:40:27.814799+00:00 2023-bse-077 systemd[1]: Starting systemd-sysctl.service - Apply Kern
2025-10-26T05:40:27.814802+00:00 2023-bse-077 systemd[1]: Starting systemd-tmpfiles-setup-dev-early.se
2025-10-26T05:40:27.814805+00:00 2023-bse-077 multipathd[497]: multipathd v0.9.4: start up
2025-10-26T05:40:27.814808+00:00 2023-bse-077 multipathd[497]: reconfigure: setting up paths and maps
2025-10-26T05:40:27.814811+00:00 2023-bse-077 multipathd[497]: sda: failed to get udev uid: No data av
2025-10-26T05:40:27.814824+00:00 2023-bse-077 systemd[1]: systemd-tpm2-setup.service - TPM2 SRK Setup
Security=measured-uki).
2025-10-26T05:40:27.814828+00:00 2023-bse-077 systemd[1]: Activated swap swap.img.swap - /swap.img.
2025-10-26T05:40:27.814831+00:00 2023-bse-077 systemd[1]: Mounted sys-fs-fuse-connections.mount - FUSE
2025-10-26T05:40:27.814834+00:00 2023-bse-077 systemd[1]: Mounted sys-kernel-config.mount - Kernel Con
2025-10-26T05:40:27.814837+00:00 2023-bse-077 systemd[1]: Finished systemd-random-seed.service - Load/
2025-10-26T05:40:27.814840+00:00 2023-bse-077 systemd[1]: Reached target swap.target - Swaps.
2025-10-26T05:40:27.814854+00:00 2023-bse-077 systemd[1]: Finished systemd-sysctl.service - Apply Kern
2025-10-26T05:40:27.814857+00:00 2023-bse-077 systemd[1]: Finished systemd-tmpfiles-setup-dev-early.se
2025-10-26T05:40:27.814860+00:00 2023-bse-077 systemd[1]: systemd-sysusers.service - Create System Use
t.
2025-10-26T05:40:27.814862+00:00 2023-bse-077 systemd[1]: Starting systemd-tmpfiles-setup-dev.service
2025-10-26T05:40:27.814865+00:00 2023-bse-077 systemd[1]: Started multipathd.service - Device-Mapper M
2025-10-26T05:40:27.814878+00:00 2023-bse-077 systemd[1]: Finished systemd-tmpfiles-setup-dev.service
:_
```

- grep + more. task9_grep_more.png

```
2025-10-26T05:40:27.814691+00:00 2023-bse-077 systemd[1]: Finished modprobe@dm_mod.service - Load K
2025-10-26T05:40:27.814694+00:00 2023-bse-077 systemd[1]: modprobe@drm.service: Deactivated success
2025-10-26T05:40:27.814697+00:00 2023-bse-077 systemd[1]: Finished modprobe@drm.service - Load Kern
2025-10-26T05:40:27.814709+00:00 2023-bse-077 systemd[1]: modprobe@efi_pstore.service: Deactivated
2025-10-26T05:40:27.814713+00:00 2023-bse-077 systemd[1]: Finished modprobe@efi_pstore.service - Lo
2025-10-26T05:40:27.814716+00:00 2023-bse-077 systemd-modules-load[460]: Inserted module 'msr'
2025-10-26T05:40:27.814719+00:00 2023-bse-077 systemd[1]: modprobe@fuse.service: Deactivated succes
2025-10-26T05:40:27.814722+00:00 2023-bse-077 systemd[1]: Finished modprobe@fuse.service - Load Ker
2025-10-26T05:40:27.814726+00:00 2023-bse-077 systemd[1]: modprobe@loop.service: Deactivated succes
2025-10-26T05:40:27.814737+00:00 2023-bse-077 systemd[1]: Finished modprobe@loop.service - Load Ker
2025-10-26T05:40:27.814741+00:00 2023-bse-077 systemd[1]: Finished systemd-remount-fs.service - Rem
2025-10-26T05:40:27.814744+00:00 2023-bse-077 systemd-modules-load[460]: Inserted module 'dm_multip
2025-10-26T05:40:27.814748+00:00 2023-bse-077 systemd[1]: Finished systemd-modules-load.service - L
2025-10-26T05:40:27.814751+00:00 2023-bse-077 systemd[1]: Activating swap swap.img.swap - /swap.img
2025-10-26T05:40:27.814754+00:00 2023-bse-077 systemd[1]: Mounting sys-fs-fuse-connections.mount -
2025-10-26T05:40:27.814757+00:00 2023-bse-077 systemd[1]: Mounting sys-kernel-config.mount - Kernel
2025-10-26T05:40:27.814769+00:00 2023-bse-077 systemd[1]: Starting multipathd.service - Device-Mapp
2025-10-26T05:40:27.814772+00:00 2023-bse-077 systemd[1]: systemd-hwdb-update.service - Rebuild Har
k (ConditionNeedsUpdate=/etc).
2025-10-26T05:40:27.814775+00:00 2023-bse-077 systemd[1]: Starting systemd-journal-flush.service -
2025-10-26T05:40:27.814779+00:00 2023-bse-077 systemd[1]: systemd-pstore.service - Platform Persist
n check (ConditionDirectoryNotEmpty=/sys/fs/pstore).
2025-10-26T05:40:27.814782+00:00 2023-bse-077 systemd[1]: Starting systemd-random-seed.service - Lo
2025-10-26T05:40:27.814796+00:00 2023-bse-077 systemd[1]: systemd-repart.service - Repartition Root
t.
2025-10-26T05:40:27.814799+00:00 2023-bse-077 systemd[1]: Starting systemd-sysctl.service - Apply K
2025-10-26T05:40:27.814802+00:00 2023-bse-077 systemd[1]: Starting systemd-tmpfiles-setup-dev-early
2025-10-26T05:40:27.814805+00:00 2023-bse-077 multipathd[497]: multipathd v0.9.4: start up
2025-10-26T05:40:27.814808+00:00 2023-bse-077 multipathd[497]: reconfigure: setting up paths and ma
2025-10-26T05:40:27.814811+00:00 2023-bse-077 multipathd[497]: sda: failed to get udev uid: No data
2025-10-26T05:40:27.814824+00:00 2023-bse-077 systemd[1]: systemd-tpm2-setup.service - TPM2 SRK Set
Security=measured-uki).
2025-10-26T05:40:27.814828+00:00 2023-bse-077 systemd[1]: Activated swap swap.img.swap - /swap.img.
2025-10-26T05:40:27.814831+00:00 2023-bse-077 systemd[1]: Mounted sys-fs-fuse-connections.mount - F
2025-10-26T05:40:27.814834+00:00 2023-bse-077 systemd[1]: Mounted sys-kernel-config.mount - Kernel
2025-10-26T05:40:27.814837+00:00 2023-bse-077 systemd[1]: Finished systemd-random-seed.service - Lo
2025-10-26T05:40:27.814840+00:00 2023-bse-077 systemd[1]: Reached target swap.target - Swaps.
2025-10-26T05:40:27.814854+00:00 2023-bse-077 systemd[1]: Finished systemd-sysctl.service - Apply K
2025-10-26T05:40:27.814857+00:00 2023-bse-077 systemd[1]: Finished systemd-tmpfiles-setup-dev-early
2025-10-26T05:40:27.814860+00:00 2023-bse-077 systemd[1]: systemd-sysusers.service - Create System
t.
2025-10-26T05:40:27.814862+00:00 2023-bse-077 systemd[1]: Starting systemd-tmpfiles-setup-dev.servi
2025-10-26T05:40:27.814865+00:00 2023-bse-077 systemd[1]: Started multipathd.service - Device-Mappe
2025-10-26T05:40:27.814878+00:00 2023-bse-077 systemd[1]: Finished systemd-tmpfiles-setup-dev.servi
2025-10-26T05:40:27.814881+00:00 2023-bse-077 systemd[1]: Reached target local-fs-pre.target - Prep
--More--
```

-

- grep head. task9_grep_head.png

-
- Redirect Overwrite. task9_redirect_overwrite.png

- Redirect Append. task9_redirect_append.png

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

- Shebang Line. task10_b1_vim.png / task10_b1_run.png

```
student@2023-bse-077:~$ chmod +x setup.sh

student@2023-bse-077:~$
student@2023-bse-077:~$ ./setup.sh

student@2023-bse-077:~$
student@2023-bse-077:~$
```

- Define var1. task10_b2_vim.png / task10_b2_run.png

```
#!/bin/bash
#
nd show var1

var1="Hello from Lab 6"

echo "var1: $var1"


~
```

```
"setup.sh" 9L, 74B written
student@2023-bse-077:~$ ./setup.sh

./setup.sh: line 3: nd: command not found
var1: Hello from Lab 6
student@2023-bse-077:~$
student@2023-bse-077:~$ _
```

- Save ls -l to Variable. task10_b3_vim.png / task10_b3_run.png

```
# Step 3: Save ls -1 to variable and display
allFiles="$(ls -1)"

echo "allFiles (ls -1):"
echo "$allFiles"

~
```

- Directory Check. task10_b4_vim.png / task10_b4_run.png

```
#!/bin/bash
#
#
#
# Step 2: Define and show var1

var1="Hello from Lab 6"
echo "var1: $var1"

# Step 3: Save ls -1 to variable and display
allFiles="$(ls -1)"

echo "allFiles (ls -1):"
echo "$allFiles"
#Step 4: 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
~
~
```

```
~
"setup.sh" 29L, 418B written
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -1):
dir1
file1
setup.sh
Directory dir1 exists.
student@2023-bse-077:~$ _
```

- File Check. task10_b5_vim.png / task10_b5_run.png

```
#Step 5: 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
~
~
~
~
```

```
~
~
"setup.sh" 46L, 649B written
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -1):
dir1
file1
setup.sh
Directory dir1 exists.
file2 already exists.
student@2023-bse-077:~$ _
```

- Permission Checks. task10_b6_vim.png / task10_b6_run.png

```
#Step 6: Permission checks for dir1/file2 (user permissions)
f="dir1/file2"
if [ ! -r "$f" ]; then
        echo "Read permission missing; granting to user..."
            chmod u+r "$f"
    fi


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


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


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

```
ls -l "$f"
"setup.sh" 83L, 1097B written
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh
var1: Hello from Lab 6
allFiles (ls -1):
dir1
file1
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 05:12 dir1/file2
student@2023-bse-077:~$ _
```

Task 11 – Script setup.sh – argument comparisons and string checks

- Shebang + Variables. task11_b0_vim.png / task11_b0_run.png

```
num=$1
str=$2

~
~
~
```

```
~
~
~
"setup.sh" 5L, 28B written
student@2023-bse-077:~$ ./setup.sh
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh
student@2023-bse-077:~$ _
```

- Numeric -eq Test. task11_b1_vim.png / task11_b1_run.png

```
#!/bin/bash

num=$1

str=$2
if [ "$num" -eq 10 ]; then
        echo "$num is equal to 10 (-eq)."

  else
          echo "$num is NOT equal to 10 (-eq)."

fi
~
~
~
~
```

```
~
~
~
~
~
~
"setup.sh" 23L, 190B written
student@2023-bse-077:~$ ./setup.sh 10 Student
10 is equal to 10 (-eq).
student@2023-bse-077:~$ ./setup.sh 7 Student
7 is NOT equal to 10 (-eq).
student@2023-bse-077:~$ _
```

- Numeric -ne Test. task11_b2_vim.png / task11_b2_run.png


```bash
#!/bin/bash

num=$1
str=$2


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

```
"setup.sh" 20L, 163B written
student@2023-bse-077:~$ ./setup.sh 7 Student
7 is not equal to 10 (-ne).
student@2023-bse-077:~$ ./setup.sh 10 Student
10 is equal to 10 (-ne false).
student@2023-bse-077:~$ _
```

- Numeric -gt Test. task11_b3_vim.png / task11_b3_run.png


```bash
#!/bin/bash

num=$1

str=$2
if [ "$num" -gt 10 ]; then

        echo "$num is greater than 10 (-gt)."

  else

          echo "$num is NOT greater than 10 (-gt)."

fi
```

```
"setup.sh" 19L, 162B written
student@2023-bse-077:~$ ./setup.sh 12 Student
12 is greater than 10 (-gt).
student@2023-bse-077:~$ ./setup.sh 9 Student
9 is NOT greater than 10 (-gt).
student@2023-bse-077:~$ _
```

- Numeric -lt Test. task11_b4_vim.png / task11_b4_run.png

```
num=$1
str=$2

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

~
```

```
"setup.sh" 18L, 153B written
student@2023-bse-077:~$ ./setup.sh 5 Student
5 is less than 10 (-lt).
student@2023-bse-077:~$ ./setup.sh 11 Student
11 is NOT less than 10 (-lt).
student@2023-bse-077:~$
```

- Numeric -ge Test. task11_b5_vim.png / task11_b5_run.png

```
#!/bin/bash
num=$1
str=$2
if [ "$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
```

```
student@2023-bse-077:~$ ./setup.sh 10 Student
10 is greater than or equal to 10 (-ge).
student@2023-bse-077:~$ ./setup.sh 8 Student
8 is NOT greater than or equal to 10 (-ge).
student@2023-bse-077:~$
```

- Numeric -le Test. task11_b6_vim.png / task11_b6_run.png

```bash
#!/bin/bash

num=$1

str=$2
if [ "$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
~
```

```
"setup.sh" 16L, 178B written
student@2023-bse-077:~$ ./setup.sh 10 Student
10 is less than or equal to 10 (-le).
student@2023-bse-077:~$ ./setup.sh 12 Student
12 is NOT less than or equal to 10 (-le).
student@2023-bse-077:~$
```

- String Equality (=). task11_b7_vim.png / task11_b7_run.png

```bash
#!/bin/bash

num=$1

str=$2
if [ "$str" = "Student" ]; then

        echo "Second argument equals 'Student' ( = )."

  else

        echo "Second argument does NOT equal 'Student' ( = )."

fi
~
~
```

```
~
~
"setup.sh" 16L, 186B written
student@2023-bse-077:~$ ./setup.sh 10 Student
Second argument equals 'Student' ( = ).
student@2023-bse-077:~$ ./setup.sh 10 Test
Second argument does NOT equal 'Student' ( = ).
student@2023-bse-077:~$ _
```

- String Inequality (!=). task11_b8_vim.png / task11_b8_run.png

```bash
#!/bin/bash

num=$1

str=$2
if [ "$str" != "Student" ]; then

        echo "Second argument is not equal to 'Student' ( != )."

  else

            echo "Second argument equals 'Student' ( != false)."

fi
```

```
~
~
~
"setup.sh" 16L, 195B written
student@2023-bse-077:~$ ./setup.sh 10 Test./setup.sh 10 Test
Second argument is not equal to 'Student' ( != ).
student@2023-bse-077:~$ ./setup.sh 10 Test
Second argument is not equal to 'Student' ( != ).
student@2023-bse-077:~$ ./setup.sh 10 Student
Second argument equals 'Student' ( != false).
student@2023-bse-077:~$
```

- Zero-length Check (-z). task11_b9_vim.png / task11_b9_run.png

```bash
#!/bin/bash

num=$1

str=$f
if [ -z "$str" ]; then

        echo "Second argument is empty (zero-length)."

  else

            echo "Second argument is not empty."

fi

_
```

```
~
~
~
~
~
~
~
"setup.sh" 16L, 160B written
student@2023-bse-077:~$ ./setup.sh 10
Second argument is empty (zero-length).
student@2023-bse-077:~$ ./setup.sh 10 Student
Second argument is empty (zero-length).
student@2023-bse-077:~$
```

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

- Shebang + Comment. task12_b1_vim.png / task12_b1_run.png

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

```
~
"setup.sh" 3L, 84B written
student@2023-bse-077:~$ ./setup.sh
student@2023-bse-077:~$
```

- For Loop Printing Arguments. task12_b2_vim.png / task12_b2_run.png

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

echo "Printing all arguments using \$*:"

 for arg in $*; do

   echo "Argument: $arg"

   done
~
~
```

```
~
~
~
~
"setup.sh" 13L, 248B written
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh one "two words" three
Printing all arguments using $*:
Argument: one
Argument: two
Argument: words
Argument: three
student@2023-bse-077:~$ _
```

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

- Shebang Line. task13_b1_vim.png / task13_b1_run.png

```
#!/bin/bash
#
#_
~
~
~
~
```

```
~
~
~
~
"setup.sh" 3L, 16B written
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh
student@2023-bse-077:~$ _
```

- While-loop Summation. task13_b2_vim.png / task13_b2_run.png

```bash
#!/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"
~
~
~
```

```
~
~
~
"setup.sh" 26L, 303B written
student@2023-bse-077:~$ ./setup.sh
Enter a number (or 'q' to quit): 5
Total Score: 5
Enter a number (or 'q' to quit): 7
Total Score: 12
Enter a number (or 'q' to quit): q
Final total: 12
student@2023-bse-077:~$ _
```

- Interactive Summation Function. task13_b3_vim.png / task13_b3_run.png

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


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


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

```
~
"setup.sh" 37L, 507B written
student@2023-bse-077:~$ ./setup.sh

Now calling sum_two function:
Enter a number (or 'q' to quit): Total Score: 0
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 4
Total Score: 7
Enter a number (or 'q' to quit): q
Function final total: 7
student@2023-bse-077:~$
```

- Sum Arguments Function. task13_b4_vim.png / task13_b4_run.png

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

                    }


                    # Function that sums two arguments and returns the result
                    #
                     sum_args() {

                        a=$1

                        b=$2

                            return $((a + b))

                            }


                            # Demonstrate sum_two function

                            echo "Now calling sum_two function:"

                            sum_two
-- INSERT --
```

```
"setup.sh" 63L, 1050B written
student@2023-bse-077:~$ chmod +x setup.sh
student@2023-bse-077:~$ ./setup.sh
Now calling sum_two function:
Enter a number (or 'q' to quit): 3
Total Score: 3
Enter a number (or 'q' to quit): 4
Total Score: 7
Enter a number (or 'q' to quit): q
Function final total: 7
Now demonstrating sum_args function:
sum_args(3,4) returned: 7
student@2023-bse-077:~$
```
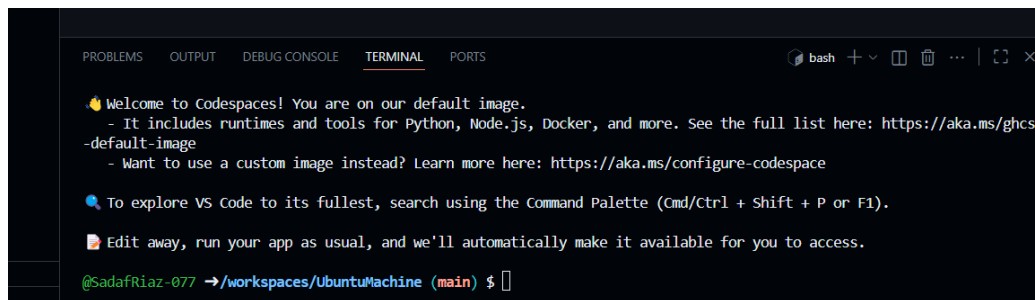
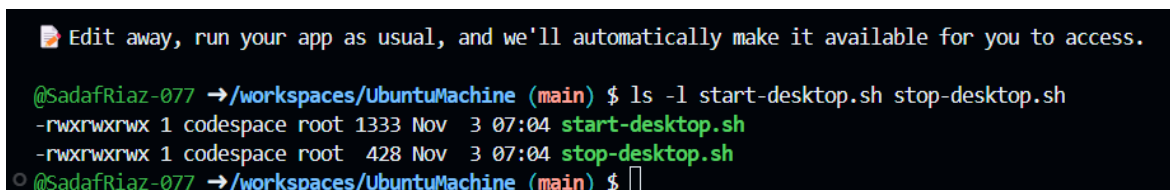**Task 14 – Codespaces GUI — fork repo, run start-desktop.sh, open VNC, stop GUI**
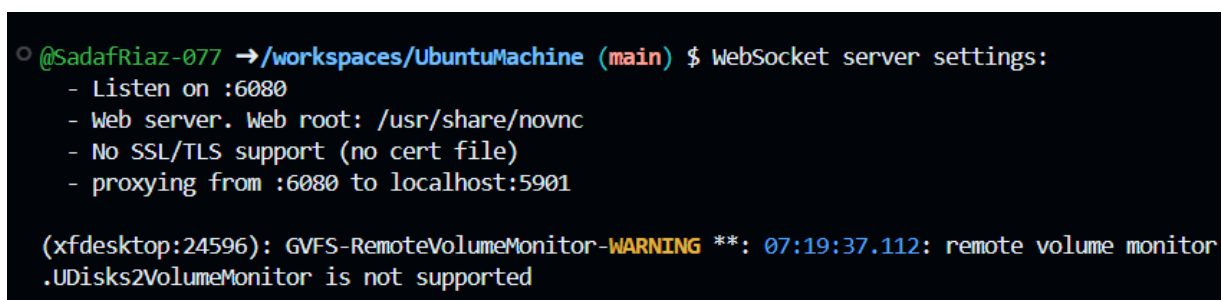
- Fork Repository. task14_fork.png
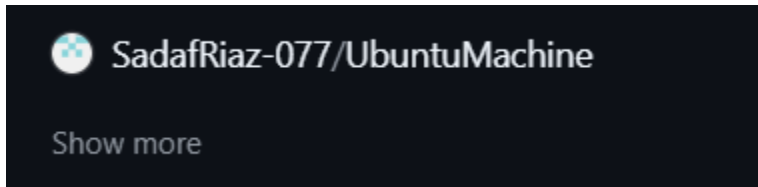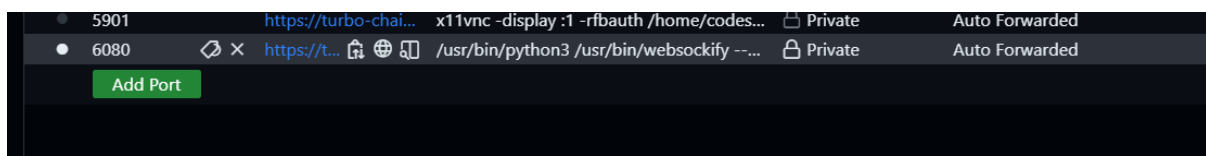

- Launch Codespace. task14_codespace_launch.png

- Verify Start Script. task14_start_script_ls.png

- Run Start Script. task14_start_run.png
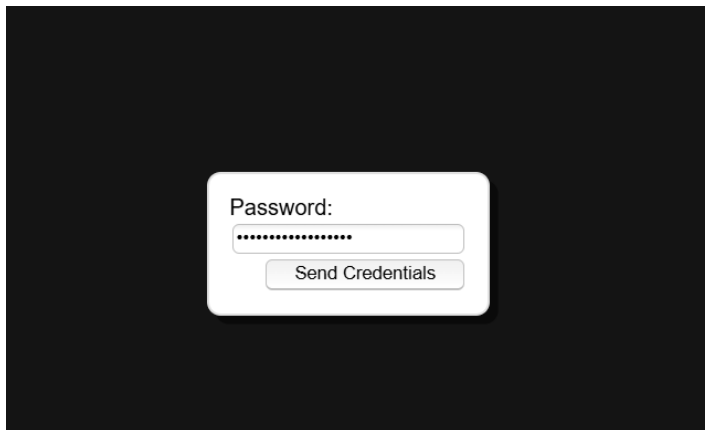

- Ports View. task14_ports_view.png

- VNC URL. task14_vnc_url.png

Directory listing for /

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

- VNC Password Prompt. task14_vnc_password_prompt.png

- VNC Desktop. task14_vnc_desktop.png

- Stop GUI. task14_stop_run.png


```
● @SadafRiaz-077 →/workspaces/UbuntuMachine (main) $ ./stop-desktop.sh
[*] Stopping noVNC server...

Terminating WebSockets proxy (24762)
In exit
[*] Stopping x11vnc server...
caught signal: 15
03/11/2025 07:38:12 [*] Stopping XFCE desktop session...
deleted 60 tile_row polling images.
[*] Stopping virtual X server (Xvfb)...

(xfwm4:24559): libxfce4ui-WARNING **: 07:38:12.077: ICE I/O Error

(xfwm4:24559): libxfce4ui-WARNING **: 07:38:12.078: Disconnected from session manager.

(xfce4-power-manager:24610): libxfce4ui-WARNING **: 07:38:12.078: ICE I/O Error

(xfce4-power-manager:24610): libxfce4ui-WARNING **: 07:38:12.078: Disconnected from session manager.

(xfsettingsd:24573): libxfce4ui-WARNING **: 07:38:12.078: ICE I/O Error

(xfsettingsd:24573): libxfce4ui-WARNING **: 07:38:12.078: Disconnected from session manager.

(xfce4-panel:24577): libxfce4ui-WARNING **: 07:38:12.078: ICE I/O Error

(xfce4-panel:24577): libxfce4ui-WARNING **: 07:38:12.078: Disconnected from session manager.

(xfdesktop:24596): libxfce4ui-WARNING **: 07:38:12.079: ICE I/O Error

(xfdesktop:24596): libxfce4ui-WARNING **: 07:38:12.080: Disconnected from session manager.
[√] All services stopped.
```

Exam Evaluation Questions

Q1:

- Group Management and Membership. Q1_groups_created.png


```
sadafriaz@2023-bse-077:~$ sudo groupadd g1
[sudo] password for sadafriaz:
sadafriaz@2023-bse-077:~$ sudo groupadd g2
sadafriaz@2023-bse-077:~$ sudo groupadd g3
sadafriaz@2023-bse-077:~$
```

- Change Primary Group. Q1_group_changes.png


```
sadafriaz@2023-bse-077:~$ sudo usermod -g g3 examuser

sadafriaz@2023-bse-077:~$ sudo usermod -aG g1,g2 examuser

sadafriaz@2023-bse-077:~$
```

- Verify Groups. Q1_group_verification.png

```
sadafriaz@2023-bse-077:~$ id examuser

uid=1006(examuser) gid=1008(g3) groups=1008(g3),1006(g1),1007(g2)
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ grep examuser /etc/group
g1:x:1006:examuser
g2:x:1007:examuser
examuser:x:1009:
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$
```

Q2:

- Ownership and Permission Tasks. Q2_chown_chgrp.png

```
sadafriaz@2023-bse-077:~$ mkdir -p workspace
sadafriaz@2023-bse-077:~$ touch workspace/secret.txt
sadafriaz@2023-bse-077:~$ ls -l workspace
total 0
-rw-rw-r-- 1 sadafriaz sadafriaz 0 Nov  5 18:49 secret.txt
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ _
```

- Symbolic/Numeric Permissions. Q2_symbolic_numeric.png

```
sadafriaz@2023-bse-077:~$ sudo chmod go-rwx workspace/secret.txt


sadafriaz@2023-bse-077:~$
```

- Verify Permissions. Q2_permissions_ls.png

```
sadafriaz@2023-bse-077:~$ ls -l workspace
total 0
-rw------- 1 examuser g1 0 Nov  5 18:49 secret.txt
sadafriaz@2023-bse-077:~$
```

Q3

- Pipes, Grep, Redirection Practice. Q3_grep_pipe.png

```
sadafriaz@2023-bse-077:~$ ls -l workspace
total 0
-rw------- 1 examuser g1 0 Nov  5 18:49 secret.txt
sadafriaz@2023-bse-077:~$ sudo grep -iE "error|fail" /var/log/syslog | head -n 20

2025-11-02T04:55:57.853476+00:00 2023-bse-077 systemd[1]: Starting update-notifier-download.service - Download data for packages that failed at package install
time...
2025-11-02T04:55:58.248078+00:00 2023-bse-077 systemd[1]: Finished update-notifier-download.service - Download data for packages that failed at package install
time.
2025-11-02T05:15:09.154373+00:00 2023-bse-077 multipathd[480]: sda: failed to get udev uid: No data available
2025-11-02T05:15:09.155011+00:00 2023-bse-077 (udev-worker)[567]: dm-0: Process '/usr/bin/unshare -m /usr/bin/snap auto-import --mount=/dev/dm-0' failed with ex
it code 1.
2025-11-02T05:15:09.155032+00:00 2023-bse-077 multipath: sda: failed to get sysfs uid: No such file or directory
2025-11-02T05:15:09.155090+00:00 2023-bse-077 multipath: sda: failed to get sgio uid: No such file or directory
2025-11-02T05:15:09.155115+00:00 2023-bse-077 (udev-worker)[568]: sr0: Process '/usr/bin/unshare -m /usr/bin/snap auto-import --mount=/dev/sr0' failed with exit
code 1.
2025-11-02T05:15:09.155126+00:00 2023-bse-077 (udev-worker)[533]: sda: Process '/usr/bin/unshare -m /usr/bin/snap auto-import --mount=/dev/sda' failed with exit
code 1.
2025-11-02T05:15:09.155136+00:00 2023-bse-077 multipathd[480]: sda: failed to get udev uid: No data available
2025-11-02T05:15:09.155146+00:00 2023-bse-077 multipathd[480]: sda: failed to get path uid
2025-11-02T05:15:09.155182+00:00 2023-bse-077 multipathd[480]: uevent trigger error
2025-11-02T05:15:09.155192+00:00 2023-bse-077 (udev-worker)[533]: sda1: Process '/usr/bin/unshare -m /usr/bin/snap auto-import --mount=/dev/sda1' failed with ex
it code 1.
2025-11-02T05:15:09.155222+00:00 2023-bse-077 (udev-worker)[537]: sda2: Process '/usr/bin/unshare -m /usr/bin/snap auto-import --mount=/dev/sda2' failed with ex
it code 1.
2025-11-02T05:15:09.155283+00:00 2023-bse-077 (udev-worker)[544]: sda3: Process '/usr/bin/unshare -m /usr/bin/snap auto-import --mount=/dev/sda3' failed with ex
it code 1.
2025-11-02T05:15:09.180656+00:00 2023-bse-077 systemd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled (file watch) was sk
ipped because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
2025-11-02T05:15:09.180685+00:00 2023-bse-077 systemd[1]: apport-autoreport.timer - Process error reports when automatic reporting is enabled (timer based) was
skipped because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
2025-11-02T05:15:09.202266+00:00 2023-bse-077 systemd[1]: Starting grub-initrd-fallback.service - GRUB failed boot detection...
2025-11-02T05:15:09.098091+00:00 2023-bse-077 systemd[1]: Finished grub-initrd-fallback.service - GRUB failed boot detection.
2025-11-02T05:15:09.208021+00:00 2023-bse-077 kernel: ACPI: _OSC evaluation for CPUs failed, trying _PDC
2025-11-02T05:15:09.215855+00:00 2023-bse-077 kernel: pci 0000:00:15.3: bridge window [io  size 0x1000]: failed to assign
sadafriaz@2023-bse-077:~$
```

- Redirect Overwrite/Append. Q3_redirect_overwrite_append.png

```
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ mkdir -p ~/logs
sadafriaz@2023-bse-077:~$ sudo grep -iE "error|fail" /var/log/syslog > ~/logs/errors.txt
grep: /var/log/syslog: binary file matches
sadafriaz@2023-bse-077:~$ ls -l ~/logs

total 112
-rw-rw-r-- 1 sadafriaz sadafriaz 113364 Nov  5 18:59 errors.txt
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ ls -l ~/logs

total 112
-rw-rw-r-- 1 sadafriaz sadafriaz 113364 Nov  5 18:59 errors.txt
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$
```

Q4:

- Script Variables & Command Substitution. Q4_step1_var1.png

```
~
~
~
~
~
~
~
"setup.sh" [New] 7L, 90B written
sadafriaz@2023-bse-077:~$ chmod +x setup.sh
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ ./setup.sh
Variable value: LinuxLab
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$
```

- Command Substitution ls -l. Q4_step2_allfiles.png

- Directory/File Checks. Q4_step3_dirfile_checks.png

- Numeric Comparison -eq. Q5_eq_examples.png

- Numeric Comparisons -ne/-gt/-lt/-ge/-le. Q5_numeric_tests.png

```
"setup.sh" 82L, 924B written
sadafriaz@2023-bse-077:~$ ./setup.sh 4 test
Number not equal to 5
Numeric comparisons for num=4
-ne: 4 is not equal to 5
-gt: 4 is greater than 3
-lt: 4 is less than 10
-ge: 4 is less than 5
-le: 4 is less than or equal to 7
sadafriaz@2023-bse-077:~$ ./setup.sh 9 test
Number not equal to 5
Numeric comparisons for num=9
-ne: 9 is not equal to 5
-gt: 9 is greater than 3
-lt: 9 is less than 10
-ge: 9 is greater than or equal to 5
-le: 9 is greater than 7
sadafriaz@2023-bse-077:~$ _
```

- String Comparisons (= / != / -z). Q5_string_tests.png

```
"setup.sh" 121L, 1372B written
sadafriaz@2023-bse-077:~$ ./setup.sh 5 test
Number equals 5
Numeric comparisons for num=5
-ne: 5 is equal to 5
-gt: 5 is greater than 3
-lt: 5 is less than 10
-ge: 5 is greater than or equal to 5
-le: 5 is less than or equal to 7
String comparisons for str='test'
String equals 'test'
String is not 'hello'
String is not empty (-z false)
sadafriaz@2023-bse-077:~$ ./setup.sh 5 hello
Number equals 5
Numeric comparisons for num=5
-ne: 5 is equal to 5
-gt: 5 is greater than 3
-lt: 5 is less than 10
-ge: 5 is greater than or equal to 5
-le: 5 is less than or equal to 7
String comparisons for str='hello'
String not equal to 'test'
String equals 'hello'
String is not empty (-z false)
sadafriaz@2023-bse-077:~$ _
```

Q6-

- For Loop & Argument Handling. Q6_script_forloop_vim.png

```bash
#!/bin/bash
#
# Q6: For Loop and Argument Handling

echo "Printing all provided arguments:"

for arg in "$@"
do
    echo "$arg"
    done
~
~
```

- For Loop Run Output. Q6_forloop_run.png

```
"setup.sh" 17L, 144B written
sadafriaz@2023-bse-077:~$ chmod +x setup.sh
sadafriaz@2023-bse-077:~$ ./setup.sh apple banana cherry

Printing all provided arguments:
apple
banana
cherry
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ ./setup.sh "red apple" "yellow banana" grape

Printing all provided arguments:
red apple
yellow banana
grape
sadafriaz@2023-bse-077:~$
sadafriaz@2023-bse-077:~$ _
```

Q7-

- While Loop Summation. Q7_while_session.png

```bash
#!/bin/bash
#_Q7: While Loop Summation and Function Example

sum_numbers() {
    n=$1
    sum=0
    i=1

    while [ $i -le $n ]
    do
        sum=$((sum + i))
        i=$((i + 1))
    done

    echo "The sum of numbers from 1 to $n is: $sum"
}

# If user gives argument, use it; otherwise, ask
if [ -n "$1" ]; then
    sum_numbers "$1"
    else
        read -p "Enter a number: " num
            sum_numbers "$num"
                fi
~
~
~
-- INSERT --
```

- Function Sum Arguments. Q7_function_sum.png

```
sadafriaz@2023-bse-077:~$ ./sum.sh
Enter a number: 5
5 is: 15of numbers from 1 to
sadafriaz@2023-bse-077:~$ _
```