

Cloud Computing Lab

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BSE-V B

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LAB 06

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

- task1_set_root_password.png

```
[nayab] password for nayab
New password:
Retype new password:
passwd: password updated successfully
```

- task1_su_root.png

```
user@nayab: $ su -
user@nayab
root@nayab :~# whoami
root
root@nayab :~# id
uid=0(root) gid=0(root) groups=0(root)
```

- task1_exit_to_user.png

```
uid=0(root) gid=0(ro b) group
user@nayab :~# exit
logout
user@nayaab:~$ whoami
```

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

- task2_adduser_tom.png

```
user@nayab:~$ 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' ...
```

- task2_verify_passwd.png

```
unlsmsq:x:555:55554:unlsmsq:/var/115/misc:/usr/sbin/nologin
cups-pk-helper:x:111:111:user for cups-pk-helper service,,,,:/nonexistent
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
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:tomm,11,121233,122423,1:/home/tom:/bin/bash
```

- task2_verify_group.png

```
avahi:x:118:
scanner:x:119:saned
saned:x:120:
colord:x:121:
pulse:x:122:
pulse-access:x:123:
xrdp:x:124:
tom:x:1001:
```

- task2_verify_shadow.png

```
:color@...:20384:::::
pulse!:20384::::::
cups-browsed!:20384::::::
xrdp!:20384::::::
tom:$y$j9T$wDbkuT7YE6UzUvYB3bs7f1$.u0Tv9RIuGIwzPR05mhekL00UhAa190NBFuQF7wI.t4:20391:0:99999:7:::
```

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

- task3_groupadd.png

```
tom@...:~$ groupadd developer
tom@...:~$ groupadd devops
tom@...:~$ groupadd desigher
```

- task3_change_primary_group.png

```
tom@...:~$ sudo usermod -g desigher tom
tom@...:~$ id tom
uid=1004(desigher) gid=1004(desigher),100(users)
```

- task3_add_secondary_groups.png

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

- task3_reset_secondary_groups.png

```
~$ user@nayab
gid=1004(desigher) groups=1004(des
~$ groups tom
r tom
~$
```

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

- task4_add_users.png

```
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:
stotype new password:
passwd: password updated successfully
changing the user information for Jerry
Enter the new value, or press ENTER for the default
    Full Name []: jerrykelin
    Room Number []: 6
    Work Phone []: 8798
    Home Phone []: 46587
    Other []: 7
Is the information correct? [Y/n] y
info: Adding new user `Jerry' to supplemental / extra groups `users' ...
info: Adding user `Jerry' to group `users' ...
```

- task4_scooby_su_auth_failure.png

```
user@nayab: $ suuu useruu
user@nayab:~$ su - scooby
ssword:
: Authentication failure
```

- task4_set_password_scooby.png

```
user@nayab:~$ 
user@nayab:~$ sudo passwd scooby
new password:
stotype new password:
passwd: password updated successfully
```

- task4_scooby_su_no_home.png

```
user@nayab:~$ 
user@nayab:~$ su - scooby
: cannot change directory to /home/scooby: No such file or directory
```

- task4_scooby_no_home.png

```
: com-X-1001-1004:commm,11,121233,122423,1-7:home? com..? bin? bash
jerry:x:1005:1005:jerrykelin,6,8798,46587,7:/home/jerry:/bin/
scooby:x:1006:1006::/home/scooby:/bin/sh
```

- task4_scooby_create_home.png

```
$ sudo mkdir -p /home/scooby
$ sudo chown scooby:scooby /home/scooby
$ ls -ld /home/scooby
scooby scooby 4096 Oct 30 11:49 /home/scooby
$
```

- task4_scooby_login_success.png

```
 Password:  
 $ pwd  
 /home/scooby  
 $ ls -la  
 total 8  
 drwxr-xr-x 2 scooby scooby 4096 Oct 30 11:49 .  
 drwxr-xr-x 6 root root 4096 Oct 30 11:49 ..  
 $
```

- task4_verify_users.png

```
jerry:x:1005:1005:jerrykelin,6,8798,46587,7:/home/jerry  
scooby:x:1006:1006::/home/scooby:/bin/sh
```

- task4_add_groups.png

```
info: Selecting GID from range 1000 to 59999 ...  
info: Adding group `jolly' (GID 1007) ...
```

- task4_verify_groups.png

```
jerry:x:1005:  
scooby:x:1006:  
jolly:x:1007:  
anime:x:1008:
```

- task4_delete_groups.png

```
designer:x:1004:  
Jerry:x:1005:  
scooby:x:1006:
```

- task4_delete_users.png

```
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,,,:/nonexiste  
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/nologi  
saned:x:115:120::/var/lib/saned:/usr/sbin/nologin  
colord:x:116:121:colord colour management daemon,,,:/var/lib/colord:/us  
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:tomm,11,121233,122423,1:/home/tom:/bin/bash
```

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

- 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 []: student 00  
    Room Number []: 66  
    Work Phone []: 978750  
    Home Phone []: 536557978  
    Other []: 4  
Is the information correct? [Y/n] y  
info: Adding new user `student' to supplemental / extra groups `users' ...  
info: Adding user `student' to group `users' ...
```

- task5_create_files.png

```
~$ touch file1
~$ mkdir -p dir1
~$ touch dir1/file2
~$ ls -l

dent student 4096 Oct 30 12:04 dir1
dent student      0 Oct 30 12:03 file1
```

- task5_chown_file1.png

```
:~/home/student: permission denied
:~$ sudo chown tom /home/student/file1
:~$ ls -l file1
```

- task5_chgrp_file1.png

```
-rw-rw-r-- 1 tom devops 0 Oct 30 12:03 file1
```

Task 6 – Change permissions using symbolic mode

- task6_su_student.png

```
-rw-rw-r-- 1 tom devops 0 Oct 30 12:03 file1
```

- task6_chmod_remove_rwx.png

```
sudo chmod -rwx /home/student/file1
student/file1: new permissions are ----w----, not -----
ls -l file1
```

- task6_chmod_add_r.png

```
sfuqueuf@SFUQUEUF: ~$ 
-L---Lw-L-- 1 tom devops 0 Oct 30 12:03 file1
sfuqueuf@SFUQUEUF: ~$ ls -l file1
```

- task6_chmod_u_plus_x.png

```
$ sudo chmod u+x /home/student/file1
$ ls -l file1
```

- task6_chmod_ug_plus_w.png

```
:~$ sudo chmod ug+w /home/student/file1
:~$ ls -l file1
ls: cannot find 'file1': No such file or directory
```

- task6_chmod_ugo_minus_rwx.png

```
----- 1 tom devops 0 Oct 30 12:03 file1
```

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

- task7_student_context.png

```
----- 1 tom devops 0 Oct 30 12:03 file1
```

- task7_chmod_set_all_rwx.png

```
-rwxrwxrwx 1 tom devops 0 Oct 30 12:03 file1
```

- task7_remove_exec_go.png

```
rw-rw-rw- 1 tom devops 0 Oct 30 12:03 file1
```

- task7_remove_all_perms.png

```
----- 1 tom devops 0 Oct 30 12:03 file1
```

Task 8 – Change permissions using numeric (octal) mode

- task8_chmod_777.png

```
-rwxrwxrwx 1 tom devops 0 Oct 30 12:03 file1
```

- task8_chmod_700.png

```
-rwx----- 1 tom devops 0 Oct 30 12:03 file1
```

- task8_chmod_744.png

```
-rwxr--r-- 1 tom devops 0 Oct 30 12:03 file1
```

- task8_chmod_640.png

```
-rw-r----- 1 tom devops 0 Oct 30 12:03 file1
```

- task8_chmod_664.png

```
-rw-r--r-- 1 tom devops 0 Oct 30 12:03 file1
```

- task8_chmod_775.png

```
-rwxr-xr-x 1 tom devops 0 Oct 30 12:03 file1
```

- task8_chmod_750.png

```
-rwxr-x--- 1 tom devops 0 Oct 30 12:03 file1
```

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

- task9_grep_less.png

```
kernel: workqueue: blk_mq_run_work_fn hogged CPU for >10s
systemd-timesyncd[15461]: Contacted time server 185.125.100.13
kernel: workqueue: e1000_watchdog [e1000] hogged CPU for >10s
systemd[1]: unattended-upgrades.service: Deactivated successfully
systemd[1]: Stopping session-1.scope - Session 1 of User saf...
systemd[1]: Stopping session-10.scope - Session 10 of User saf...
systemd[1]: Stopping session-c1.scope - Session c1 of User saf...
systemd[1]: Removed slice system-modprobe.slice - Slice /system/modprobe
systemd[1]: Stopped target multi-user.target - Multi-User System
systemd[1]: Stopped target getty.target - Login Prompts
systemd[1]: Stopped target nss-lookup.target - Host and Network Name Lookups
systemd[1]: Stopped target sound.target - Sound Card
systemd[1]: Stopped target timers.target - Timer Units
systemd[1]: dpkg-db-backup.timer: Deactivated successfully
systemd[1]: Stopped dpkg-db-backup.timer - Daily dpkg database backup timer
systemd[1]: e2scrub_all.timer: Deactivated successfully
systemd[1]: Stopped e2scrub_all.timer - Periodic ext4 Online Metadata Check for All Filesystems
systemd[1]: fstrim.timer: Deactivated successfully
systemd[1]: Stopped fstrim.timer - Discard unused filesy...
systemd[1]: fwupd-refresh.timer: Deactivated successfully
```

- task9_grep_more.png

```
2025-10-30T11:17:56.847960+00:00 safaf056 systemd[1]: Stopping session-1.scope - Session 1 of User saf...
2025-10-30T11:17:56.850318+00:00 safaf056 systemd[1]: Stopping session-10.scope - Session 10 of User saf...
2025-10-30T11:17:56.900539+00:00 safaf056 systemd[1]: Stopping session-c1.scope - Session c1 of User saf...
2025-10-30T11:17:56.928871+00:00 safaf056 systemd[1]: Removed slice system-modprobe.slice - Slice /system/modprobe
2025-10-30T11:17:56.942188+00:00 safaf056 systemd[1]: Stopped target multi-user.target - Multi-User System
2025-10-30T11:17:56.951998+00:00 safaf056 systemd[1]: Stopped target getty.target - Login Prompts
2025-10-30T11:17:56.975862+00:00 safaf056 systemd[1]: Stopped target nss-lookup.target - Host and Network Name Lookups
2025-10-30T11:17:56.979103+00:00 safaf056 systemd[1]: Stopped target sound.target - Sound Card
2025-10-30T11:17:56.979372+00:00 safaf056 systemd[1]: Stopped target timers.target - Timer Units
2025-10-30T11:17:56.979608+00:00 safaf056 systemd[1]: dpkg-db-backup.timer: Deactivated successfully
2025-10-30T11:17:56.979826+00:00 safaf056 systemd[1]: Stopped dpkg-db-backup.timer - Daily dpkg database backup timer
2025-10-30T11:17:56.980076+00:00 safaf056 systemd[1]: e2scrub_all.timer: Deactivated successfully
2025-10-30T11:17:56.980319+00:00 safaf056 systemd[1]: Stopped e2scrub_all.timer - Periodic ext4 Online Metadata Check for All Filesystems
--More--
```

- task9_grep_head.png

```
2025-10-30T11:17:57.007961+00:00 safaf056 systemd[1]: Stopped update-notifier-download.timer - Download data for packages that failed at package install time
2025-10-30T11:18:45.415336+00:00 safaf056 multipathd[481]: sda: failed to get udev uid: No data available
2025-10-30T11:18:45.415834+00:00 safaf056 multipathd: sda: failed to get sysfs uid: No such file or directory
2025-10-30T11:18:45.415846+00:00 safaf056 multipathd: sda: failed to get sgio uid: No such file or directory
2025-10-30T11:18:45.416106+00:00 safaf056 multipathd[481]: sda: failed to get udev uid: No data available
2025-10-30T11:18:45.416122+00:00 safaf056 multipathd[481]: sda: failed to get path uid
2025-10-30T11:18:45.416133+00:00 safaf056 multipathd[481]: uevent trigger error
2025-10-30T11:18:45.574689+00:00 safaf056 systemd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled (file watch) was skipped because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
2025-10-30T11:18:45.574737+00:00 safaf056 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).
2025-10-30T11:18:45.585222+00:00 safaf056 kernel: ACPI: OSC evaluation for CPUs failed, trying PDC
```

- task9_redirect_overwrite.png

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

- task9_redirect_append.png

```
stemd[1]: rsyslog.service: Sent signal SIGHUP to stemd[1].
stemd[1]: logrotate.service: Deactivated successfully
stemd[1]: Finished logrotate.service - Rotate log files.
stemd-timesyncd[15461]: Contacted time server 185.125.100.13
stemd[1]: unattended-upgrades.service: Deactivated successfully
stemd[1]: Stopping session-1.scope - Session 1 of User saf...
stemd[1]: Stopping session-10.scope - Session 10 of User saf...
stemd[1]: Stopping session-c1.scope - Session c1 of User saf...
stemd[1]: Removed slice system-modprobe.slice - Slice /system/modprobe
stemd[1]: Stopped target multi-user.target - Multi-User System
stemd[1]: Stopped target getty.target - Login Prompts
stemd[1]: Stopped target nss-lookup.target - Host and Network Name Lookups
stemd[1]: Stopped target sound.target - Sound Card
stemd[1]: Stopped target timers.target - Timer Units
stemd[1]: dpkg-db-backup.timer: Deactivated successfully
stemd[1]: Stopped dpkg-db-backup.timer - Daily dpkg database backup timer
stemd[1]: e2scrub_all.timer: Deactivated successfully
stemd[1]: Stopped e2scrub_all.timer - Periodic ext4 Online Metadata Check for All Filesystems
stemd[1]: fstrim.timer: Deactivated successfully
stemd[1]: Stopped fstrim.timer - Discard unused filesy...
stemd[1]: fwupd-refresh.timer: Deactivated successfully
stemd[1]: Stopped fwupd-refresh.timer - Refresh fwupd
stemd[1]: logrotate.timer: Deactivated successfully
stemd[1]: Stopped logrotate.timer - Daily rotation of log files
stemd[1]: man-db.timer: Deactivated successfully
stemd[1]: Stopped man-db.timer - Daily man-db reindexing
stemd[1]: man-db.timer: Deactivated successfully
```

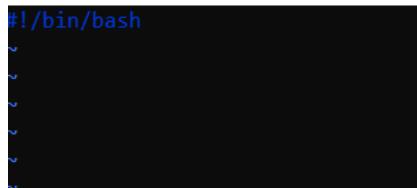
- task9_journalctl_alternative.png

```
2025-10-31T05:04:04.391816+00:00 safal056 systemd-networkd[648]: ens33: DHCPv4 address 192.
2025-10-31T05:04:04.394605+00:00 safal056 systemd-timesyncd[673]: Network configuration cha
safa@safal056:~$ sudo journalctl | less
safa@safal056:~$ sudo journalctl -u systemd | grep -i error > ~/journal_errors.txt
safa@safal056:~$ sudo journalctl -u systemd | grep -i error > ~/journal_errors.txt
```

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

- task10_b1_vim.png

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



- task10_b1_run.png

```
:~$ ./setup.sh
:~$
```

- task10_b2_vim.png

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

- task10_b2_run.png

```
var1: Hello from Lab 6
```

- task10_b3_vim.png

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

- task10_b3_run.png

```
371 Oct 16 17:17 answers.md
4096 Oct 24 04:35 Desktop
4096 Oct 24 04:35 Documents
4096 Oct 24 04:35 Downloads
    0 Oct 31 05:15 journal_errors.txt
4096 Oct 17 05:53 lab4
4096 Oct 24 11:47 Lab5
4096 Oct 24 04:35 Music
4096 Oct 24 04:35 Pictures
4096 Oct 24 04:35 Public
    102 Oct 31 11:51 setup.sh
4096 Oct 23 15:17 snap
189436 Oct 31 05:13 syslog_systemd.txt
4096 Oct 24 04:35 Templates
4096 Oct 23 16:15 thinclient_drives
4096 Oct 24 04:35 Videos
```

- task10_b4_vim.png

```
# 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
```

- task10_b4_run.png

```
Directory dir1 does not exist. Creating...
Directory dir1 created.
```

- task10_b5_vim.png

```
# 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
~
```

- task10_b5_run.png

```
file2 does not exist. Creating...
file2 created.
```

- task10_b6_vim.png

```

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

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

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

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

- task10_b6_run.png

```

Read permission missing; granting to user...
Write permission missing; granting to user...
Execute permission missing; granting to user...
Final permissions for dir1/file2:
-rwx----- 1 safa safa 0 Oct 31 11:55 dir1/file2
```

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

- task11_b0_vim.png

```

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

- task11_b0_run.png

```

$ chmod +x setup.sh
$ ./setup.sh 10 Student
$
```

- task11_b1_vim.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
~
```

- task11_b1_run.png

```

:~$ ./setup.sh 7 Student
al to 10 (-eq).
```

- task11_b2_vim.png

```
#!/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
~
```

- task11_b2_run.png

```
al to 10 (-ne).
:~$ ./setup.sh 10 Student
to 10 (-ne false).
~
```

- task11_b3_vim.png

```
#!/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
~
```

- task11_b3_run.png

```
than 10 (-gt).
$ ./setup.sh 9 Student
er than 10 (-gt).
~
```

- task11_b4_vim.png

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

- task11_b4_run.png

```
:~$ ./setup.sh 11 Student
ss than 10 (-lt).
~
```

- task11_b5_vim.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
~
```

- task11_b5_run.png

```
:~$ ./setup.sh 8 Student  
8 is less than or equal to 10 (-le).
```

- task11_b6_vim.png

```
#!/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  
~
```

- task11_b6_run.png

```
... or Equal to 10 (-le).  
:~$ ./setup.sh 12 Student  
12 is less than or equal to 10 (-le).
```

- task11_b7_vim.png

```
#!/bin/bash  
num=$1  
str=$2  
if [ "$str" = "Student" ]; then  
    echo "Second argument equals 'Student' ( = )."  
else  
    echo "Second argument does NOT equal 'Student' ( = )."  
fi  
~  
~
```

- task11_b7_run.png

```
t equals 'Student' ( = ).  
$ ./setup.sh 10 Test  
t does NOT equal 'Student' ( = ).  
$
```

- task11_b8_vim.png

```
#!/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  
~  
~
```

- task11_b8_run.png

```
ent is not equal to 'Student' ( != ).  
:~$ ./setup.sh 10 Student  
ent equals 'Student' ( != false ).  
$
```

- task11_b9_vim.png

```
#!/bin/bash
num=$1
str=$2
if [ -z "$str" ]; then
    echo "Second argument is empty (zero-length)."
else
    echo "Second argument is not empty."
fi
~
```

- task11_b9_run.png

```
$ ./setup.sh 10 Student
t is not empty.
$ ./setup.sh 10
t is empty (zero-length).
```

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

- task12_b1_vim.png

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

- task12_b2_vim.png

```
## 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
~
```

- task12_b2_run.png

```
Printing all arguments using $*:
Argument: one
Argument: two
Argument: words
Argument: three
~
```

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

- task13_b1_vim.png

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

- task13_b2_vim.png

```
# 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"
```

- task13_b2_run.png

```
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
```

- task13_b3_vim.png

```
# 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
```

- task13_b3_run.png

```
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
```

- task13_b4_vim.png

```
# Function that sums two arguments and returns the result
sum_args() {
    a=$1
    b=$2
    return $((a + b))
}

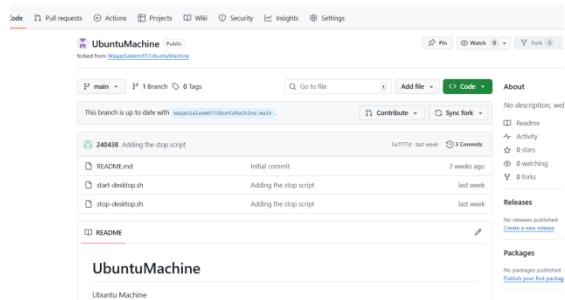
# Demonstrate sum_args function
echo "Now demonstrating sum_args function:"
sum_args 3 4
result=$?
echo "sum_args(3,4) returned: $result"
```

- task13_b4_run.png

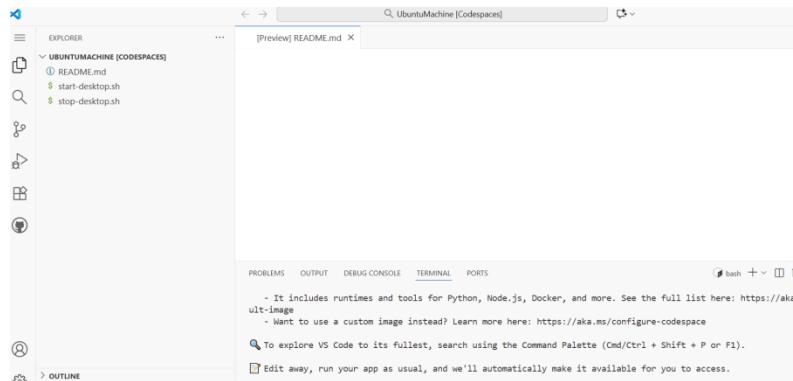
```
Now demonstrating sum_args function:  
sum_args(3,4) returned: 7
```

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

- task14_fork.png



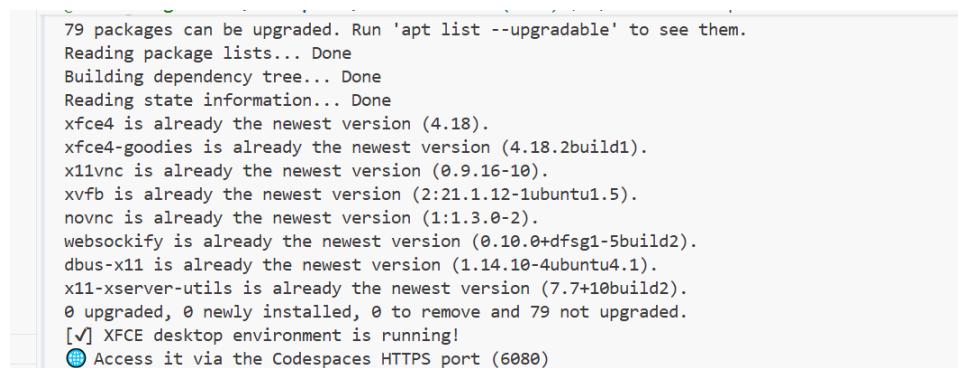
- task14_codespace_launch.png



- task14_start_script_ls.png

```
| →/workspaces/UbuntuMachine (main) $ ls -l start-desktop.sh stop-desktop.sh  
| despace root 1333 Nov 6 09:36 start-desktop.sh  
| despace root 428 Nov 6 09:36 stop-desktop.sh  
| →/workspaces/UbuntuMachine (main) $
```

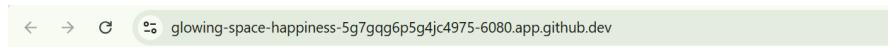
- task14_start_run.png



- task14_ports_view.png

Port	Forwarded Address	Running Process	Visibility	Origin
5900	https://glowing-spa...	x11vnc -display :1 -rfbauth /home/codespac...	Public	Auto Forwarded
5901	https://glowing-spa...	x11vnc -display :1 -rfbauth /home/codespac...	Private	Auto Forwarded
6080	https://glowing-spa...	/usr/bin/python3 /usr/bin/websockify --web...	Private	Auto Forwarded

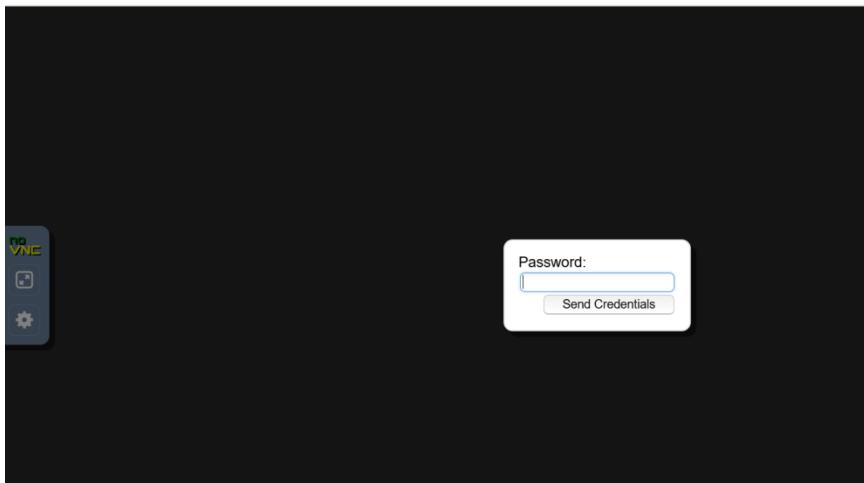
- task14_vnc_url.png



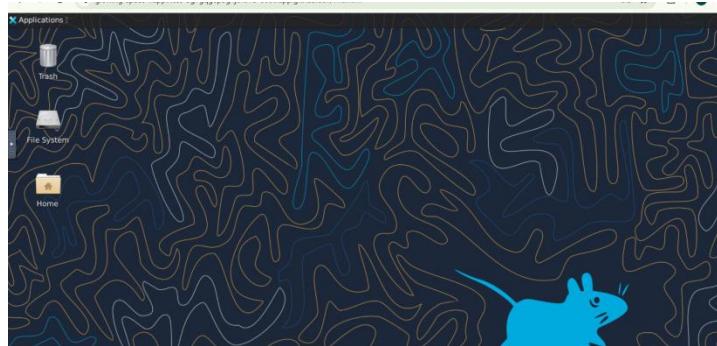
Directory listing for /

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

- task14_vnc_password_prompt.png



- task14_vnc_desktop.png



- task14_vnc_connect.png



- task14_stop_run.png

```
[*] Stopping noVNC server...
Terminating WebSockets proxy (21483)
[*] Stopping x11vnc server...
In exit
Terminating child 23304
Process Process-34:
caught signal: 15
[*] Stopping XFCE desktop session...
```

Exam Evaluation Questions

1. Group Management and Membership

Q1_groups_created.png

```
~$ sudo addgroup g1
group GID from range 1000 to 59999 ...
group `g1' (GID 1006) ...
~$ sudo addgroup g2
group GID from range 1000 to 59999 ...
group `g2' (GID 1007) ...
~$ sudo addgroup g3
group GID from range 1000 to 59999 ...
group `g3' (GID 1008) ...
```

Q1_group_changes.png

```
~$ sudo usermod -g g3 -G g1,g2 examuser
~$
```

Q1_group_verification.png

```
$ id examuser
examuser gid=1008(g3) groups=1008(g3),1006(g1),1007(g2)
$ cat /etc/group
```

```
student:x:1005:
g1:x:1006:examuser
g2:x:1007:examuser
g3:x:1008:
examuser:x:1009:
```

2. Ownership and Permission Tasks

Q2_chown_chgrp.png

```
~$ mkdir -p workspace  
~$ touch workspace/secret.txt  
~$ sudo chown examuser:g1 workspace/secret.txt  
~$
```

Q2_symbolic_numeric.png

```
~$ sudo chmod g-rwx,o-rwx workspace/secret.txt  
~$ ls -l workspace/secret.txt
```

```
:~$ sudo chmod 700 workspace/secret.txt  
~$ ls -l workspace/secret.txt
```

Q2_permissions_ls.png

```
-rwx----- 1 examuser g1 0 Nov 6 10:13 workspace/secret.txt
```

3. Pipes, Grep, and Redirection Practice

Q3_grep_pipe.png

```
urnalctl | grep -i -E 'error|fail' | head -n 20  
kernel: ACPI: _OSC evaluation for CPUs failed, trying _PDC  
kernel: pci 0000:00:15.3: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:15.4: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:15.5: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:15.6: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:15.7: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:16.3: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:16.4: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:16.5: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:16.6: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:16.7: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:17.3: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:17.4: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:17.5: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:17.6: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:17.7: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:18.2: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:18.3: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:18.4: bridge window [io size 0x1000]: failed to assign  
kernel: pci 0000:00:18.5: bridge window [io size 0x1000]: failed to assign
```

Q3_redirect_overwrite_append.png

```
:~$ sudo journalctl | grep -i 'fail' >> ~/logs/errors.txt
```

Q3_pager_view.png

```
cause of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).  
stmd[1]: apport-autoreport.timer - Process error reports when automatic reporting is enabled  
because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).  
ltipathd[472]: uevent trigger error  
ltipathd[472]: uevent trigger error  
ltipathd[472]: uevent trigger error  
rnel: RAS: Correctable Errors collector initialized.  
ltipathd[476]: uevent trigger error  
stmd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled  
cause of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).  
stmd[1]: apport-autoreport.timer - Process error reports when automatic reporting is enabled  
because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).  
ltipathd[476]: uevent trigger error  
ltipathd[476]: uevent trigger error  
ltipathd[476]: uevent trigger error  
rnel: RAS: Correctable Errors collector initialized.  
ltipathd[470]: uevent trigger error  
stmd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled  
cause of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).  
stmd[1]: apport-autoreport.timer - Process error reports when automatic reporting is enabled  
because of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).  
ltipathd[470]: uevent trigger error  
ltipathd[470]: uevent trigger error  
ltipathd[470]: uevent trigger error  
rnel: RAS: Correctable Errors collector initialized.  
ltipathd[479]: uevent trigger error  
stmd[1]: apport-autoreport.path - Process error reports when automatic reporting is enabled  
cause of an unmet condition check (ConditionPathExists=/var/lib/apport/autoreport).
```

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

Q4_step1_var1.png

```
#!/bin/bash
var1="Task Four Check"
echo "Variable 1: $var1"
```

Q4_step2_allfiles.png

```
#!/bin/bash
var1="Task Four Check"
echo "Variable 1: $var1"
allfiles=$(ls -1)
echo -e "\nAll Files:\n$allfiles"
```

5. Script: Comparisons and String Tests

Q5_eq_examples.png

```
--- 1. Numeric Equality (-eq) Tests ---
Testing 10 -eq 10:
  Result (True case): 10 is equal to 10.
  Result (False case): 10 is NOT equal to 5.
```

Q5_numeric_tests.png

```
--- 2. Numeric Range Tests (using 15) ---
15 -ne 5 (True)
15 -ne 10 (False)
15 -gt 10 (True)
15 -ge 10 (True)
```

Q5_string_tests.png

```
match = 'match' (True)
-z match (False: string is NOT empty)
```

6. Script: For Loop and Argument Handling

Q6_script_forloop_vim.png

```
#!/bin/bash
for arg in "$@"; do
    echo "Argument Found: $arg"
done
```

Q6_forloop_run.png

```
Argument Found: first_word
Argument Found: multi word phrase
Argument Found: three-words
Argument Found: last one
```

7. Script: While Loop Summation and Functions

Q7_while_session.png

```
--- Interactive Summation ---
Enter numbers to add (or 'q' to quit):
Enter number or 'q': 5
Running Total: 5
Enter number or 'q': 676
Running Total: 681
Enter number or 'q': 33
Running Total: 714
Enter number or 'q': q
Stopping. Final Total: 714
```

07_function_sum.png

```
--- Function Summation Demonstration ---
Input 1: 15
Input 2: 27
Result captured in variable: 42
```