LAB 04

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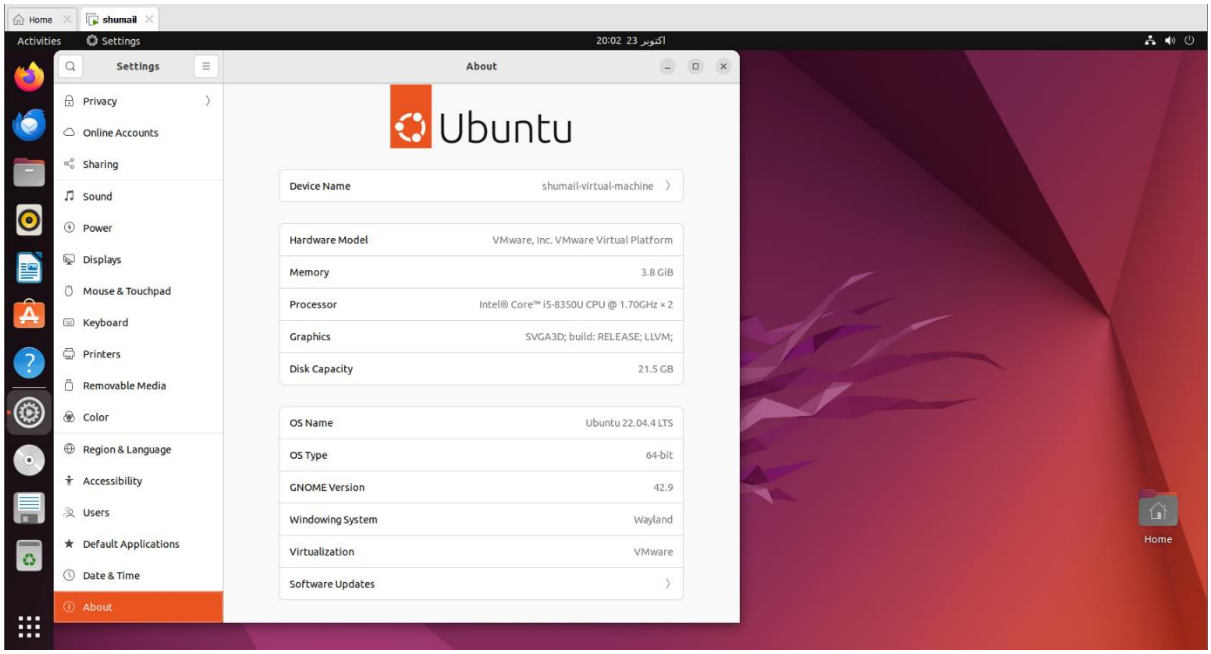
REGISTRATION #: 2023-BSE-061

DEPARTMENT: BSE(5B)

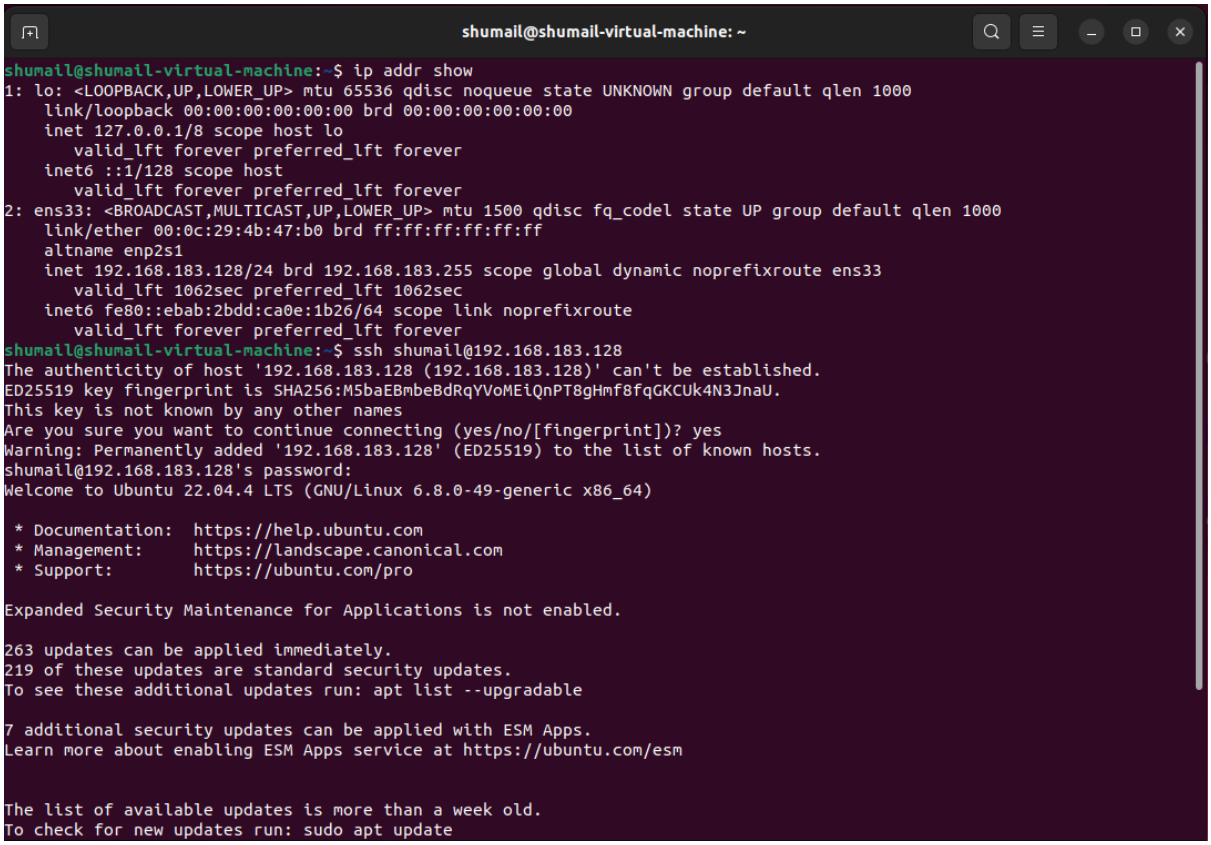
LAB TASK

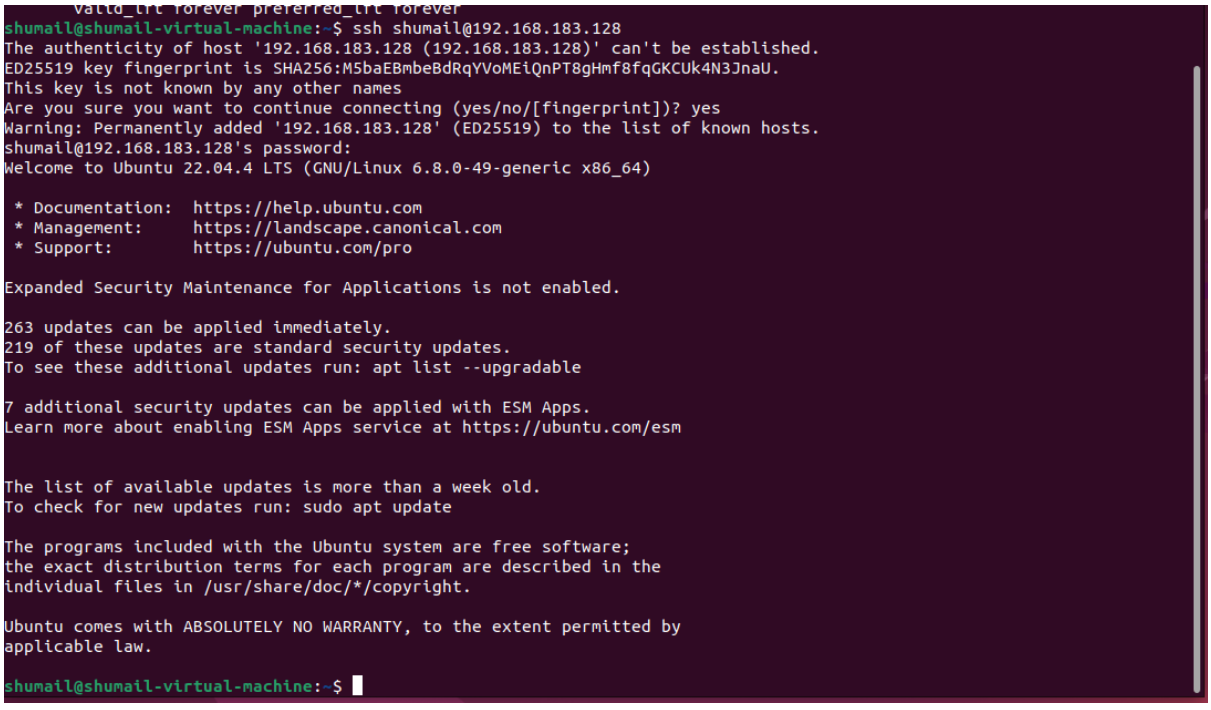
Task 1 – Verify VM resources in VMware



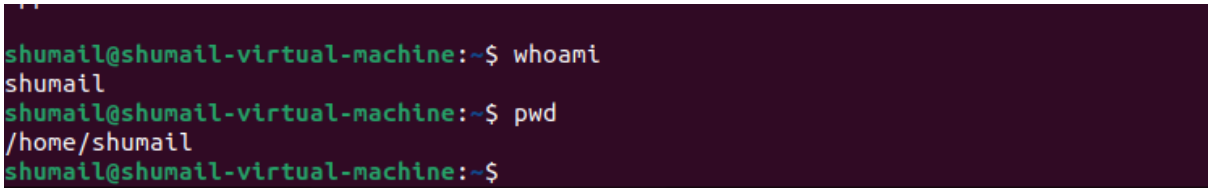
vm_settings.png

Task 2 – Start VM and log in (use your preferred host terminal method only)


shumail@shumail-virtual-machine: ~
shumail@shumail-virtual-machine:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
inet 127.0.0.1/8 scope host lo
valid_lft forever preferred_lft forever
inet6 ::1/128 scope host
valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
link/ether 00:0c:29:4b:47:b0 brd ff:ff:ff:ff:ff:ff
altname enp2s1
inet 192.168.183.128/24 brd 192.168.183.255 scope global dynamic noprefixroute ens33
valid_lft 1062sec preferred_lft 1062sec
inet6 fe80::ebab:2bdd:ca0e:1b26/64 scope link noprefixroute
valid_lft forever preferred_lft forever
shumail@shumail-virtual-machine:~$ ssh shumail@192.168.183.128
The authenticity of host '192.168.183.128 (192.168.183.128)' can't be established.
ED25519 key fingerprint is SHA256:M5baEBmbeBdRqYVoMEiQnPT8gHmf8fqGKCUk4N3JnaU.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.183.128' (ED25519) to the list of known hosts.
shumail@192.168.183.128's password:
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.8.0-49-generic x86_64)
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro
Expanded Security Maintenance for Applications is not enabled.
263 updates can be applied immediately.
219 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable
7 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm
The list of available updates is more than a week old.
To check for new updates run: sudo apt update


valid_lft forever preferred_lft forever
shumail@shumail-virtual-machine:~$ ssh shumail@192.168.183.128
The authenticity of host '192.168.183.128 (192.168.183.128)' can't be established.
ED25519 key fingerprint is SHA256:M5baEBmbeBdRqYVoMEiQnPT8gHmf8fqGKCUk4N3JnaU.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.183.128' (ED25519) to the list of known hosts.
shumail@192.168.183.128's password:
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.8.0-49-generic x86_64)
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro
Expanded Security Maintenance for Applications is not enabled.
263 updates can be applied immediately.
219 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable
7 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
shumail@shumail-virtual-machine:~$

vm_login,png


shumail@shumail-virtual-machine:~$ whoami
shumail
shumail@shumail-virtual-machine:~$ pwd
/home/shumail
shumail@shumail-virtual-machine:~$

whoami_pwd.png

Task 3 – Filesystem exploration — root tree and dotfiles

```
shumail@shumail-virtual-machine:~$ ls -la /
total 2191452
drwxr-xr-x  21 root root       4096 2024  25 سمبر .
drwxr-xr-x  21 root root       4096 2024  25 سمبر ..
drwxr-xr-x   3 root root       4096 2024  25 سمبر app
lrwxrwxrwx   1 root root          7 2024  25 سمبر bin -> usr/bin
drwxr-xr-x   4 root root       4096 2024  25 سمبر boot
drwxrwxr-x   2 root root       4096 2024  25 سمبر cdrom
drwxr-xr-x  19 root root       4160 19:56 23 اكتوبر dev
drwxr-xr-x 132 root root      12288 2024  25 سمبر etc
drwxr-xr-x   4 root root       4096 2024  25 سمبر home
lrwxrwxrwx   1 root root          7 2024  25 سمبر lib -> usr/lib
lrwxrwxrwx   1 root root          9 2024  25 سمبر lib32 -> usr/lib32
lrwxrwxrwx   1 root root          9 2024  25 سمبر lib64 -> usr/lib64
lrwxrwxrwx   1 root root         10 2024  25 سمبر libx32 -> usr/libx32
drwx------   2 root root      16384 2024  25 سمبر lost+found
drwxr-xr-x   4 root root       4096 2024  25 سمبر media
drwxr-xr-x   2 root root       4096 2024  21 فروري mnt
drwxr-xr-x   2 root root       4096 2024  21 فروري opt
dr-xr-xr-x 366 root root          0 19:54 23 اكتوبر proc
drwx------   5 root root       4096 2024  25 سمبر root
drwxr-xr-x  36 root root        960 20:11 23 اكتوبر run
lrwxrwxrwx   1 root root          8 2024  25 سمبر sbin -> usr/sbin
drwxr-xr-x  11 root root       4096 2024  21 فروري snap
drwxr-xr-x   2 root root       4096 2024  21 فروري srv
-rw-------   1 root root 2243952640 2024  25 سمبر swapfile
dr-xr-xr-x  13 root root          0 19:54 23 اكتوبر sys
drwxrwxrwt  19 root root       4096 20:10 23 اكتوبر tmp
drwxr-xr-x  14 root root       4096 2024  21 فروري usr
drwxr-xr-x  14 root root       4096 2024  21 فروري var
shumail@shumail-virtual-machine:~$
```

ls_root.png

```
shumail@shumail-virtual-machine:~$ ls -la /bin
lrwxrwxrwx 1 root root 7 2024  25 سمبر /bin -> usr/bin
```

ls_bin.png

```
shumail@shumail-virtual-machine:~$ ls -la /sbin
lrwxrwxrwx 1 root root 8 2024  25 سمبر /sbin -> usr/sbin
```

ls_sbin.png

```
shumail@shumail-virtual-machine:~$ ls -la /usr
total 120
drwxr-xr-x  14 root root  4096 2024  21 فروري .
drwxr-xr-x  21 root root  4096 2024  25 سمبر ..
drwxr-xr-x   2 root root 36864 2024  25 سمبر bin
drwxr-xr-x   2 root root  4096 2024  21 فروري games
drwxr-xr-x  12 root root  4096 2024  25 سمبر include
drwxr-xr-x 106 root root  4096 2024  25 سمبر lib
drwxr-xr-x   2 root root  4096 2024  21 فروري lib32
drwxr-xr-x   2 root root  4096 2024  21 فروري lib64
drwxr-xr-x  23 root root 12288 2024  25 سمبر libexec
drwxr-xr-x   2 root root  4096 2024  21 فروري libx32
drwxr-xr-x  10 root root  4096 2024  21 فروري local
drwxr-xr-x   2 root root 20480 2024  25 سمبر sbin
drwxr-xr-x 267 root root 12288 2024  25 سمبر share
drwxr-xr-x   6 root root  4096 2024  25 سمبر src
```

ls_usr.png

```
shumail@shumail-virtual-machine:~$ ls -la /opt
total 8
drwxr-xr-x  2 root root 4096 2024  21  فروری .
drwxr-xr-x 21 root root 4096 2024  25  سمبر ..
```

ls_opt.png

```
shumail@shumail-virtual-machine:~$ ls -la /etc
total 1188
drwxr-xr-x 132 root root   12288 2024  25  سمبر .
drwxr-xr-x  21 root root    4096 2024  25  سمبر ..
drwxr-xr-x   3 root root    4096 2024  21  فروری acpi
-rw-r--r--   1 root root    3028 2024  21  فروری adduser.conf
drwxr-xr-x   3 root root    4096 2024  21  فروری alsa
drwxr-xr-x   2 root root   12288 2024  25  سمبر alternatives
-rw-r--r--   1 root root     335 2022  23   مارچ anacrontab
-rw-r--r--   1 root root     433 2022  23   مارچ apg.conf
drwxr-xr-x   5 root root    4096 2024  21  فروری apm
drwxr-xr-x   3 root root    4096 2024  21  فروری apparmor
drwxr-xr-x   7 root root    4096 2024  25  سمبر apparmor.d
drwxr-xr-x   4 root root    4096 2024  21  فروری apport
-rw-r--r--   1 root root     769 2022  22  فروری appstream.conf
drwxr-xr-x   8 root root    4096 2024  25  سمبر apt
drwxr-xr-x   3 root root    4096 2024  21  فروری avahi
-rw-r--r--   1 root root    2319 2022  6   جنوری bash.bashrc
-rw-r--r--   1 root root      45 2021  11  نومبر bash_completion
drwxr-xr-x   2 root root    4096 2024  21  فروری bash_completion.d
-rw-r--r--   1 root root     367 2020  16  سمبر bindresvport.blacklist
drwxr-xr-x   2 root root    4096 2022  8   اپریل binfmt.d
drwxr-xr-x   2 root root    4096 2024  21  فروری bluetooth
-rw-r-----   1 root root      33 2024  21  فروری brlapi.key
drwxr-xr-x   7 root root    4096 2024  21  فروری brltty
-rw-r--r--   1 root root   29219 2022  28    جون brltty.conf
drwxr-xr-x   3 root root    4096 2024  21  فروری ca-certificates
-rw-r--r--   1 root root    6253 2024  21  فروری ca-certificates.conf
-rw-r--r--   1 root root    5529 2024  21  فروری ca-certificates.conf.dpkg-old
drwxr-s---   2 root dip     4096 2024  21  فروری chatscripts
drwxr-xr-x   2 root root    4096 2024  25  سمبر console-setup
drwxr-xr-x   2 root root    4096 2024  21  فروری cracklib
drwxr-xr-x   2 root root    4096 2024  25  سمبر cron.d
drwxr-xr-x   2 root root    4096 2024  21  فروری cron.daily
drwxr-xr-x   2 root root    4096 2024  21  فروری cron.hourly
drwxr-xr-x   2 root root    4096 2024  21  فروری cron.monthly
-rw-r--r--   1 root root    1136 2022  23   مارچ crontab
drwxr-xr-x   2 root root    4096 2024  21  فروری cron.weekly
drwxr-xr-x   5 root lp      4096 19:56 23 اکتوبر cups
drwxr-xr-x   2 root root    4096 2024  21  فروری cupshelpers
drwxr-xr-x   4 root root    4096 2024  21  فروری dbus-1
drwxr-xr-x   4 root root    4096 2024  21  فروری dconf
-rw-r--r--   1 root root    2969 2022  20  فروری debconf.conf
-rw-r--r--   1 root root      13 2021  22   اگست debian_version
drwxr-xr-x   3 root root    4096 2024  25  سمبر default
```

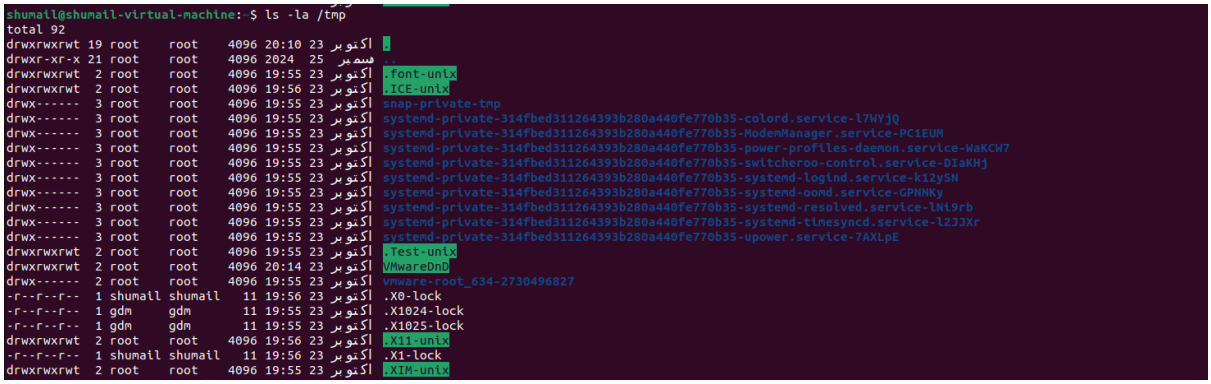
ls_etc.png

```
shumail@shumail-virtual-machine:~$ ls -la /dev
total 4
drwxr-xr-x  19 root    root        4160 19:56 23 اکتوبر .
drwxr-xr-x  21 root    root        4096 2024  25  دسمبر ..
crw-r--r--   1 root    root     10, 235 19:55 23 اکتوبر autofs
drwxr-xr-x   2 root    root         360 19:56 23 اکتوبر block
drwxr-xr-x   2 root    root         100 19:54 23 اکتوبر bsg
crw-------   1 root    root     10, 234 19:55 23 اکتوبر btrfs-control
drwxr-xr-x   3 root    root          60 19:54 23 اکتوبر bus
lrwxrwxrwx   1 root    root           3 19:56 23 اکتوبر cdrom -> sr0
drwxr-xr-x   2 root    root        3800 19:56 23 اکتوبر char
crw--w----   1 root    tty        5,   1 19:55 23 اکتوبر console
lrwxrwxrwx   1 root    root          11 19:55 23 اکتوبر core -> /proc/kcore
drwxr-xr-x   4 root    root          80 19:55 23 اکتوبر cpu
crw-------   1 root    root     10, 123 19:55 23 اکتوبر cpu_dma_latency
crw-------   1 root    root     10, 203 19:55 23 اکتوبر cuse
drwxr-xr-x   8 root    root         160 19:55 23 اکتوبر disk
drwxr-xr-x   2 root    root          60 19:54 23 اکتوبر dma_heap
crw-rw----+  1 root    audio    14,   9 19:55 23 اکتوبر dmmidi
drwxr-xr-x   3 root    root         100 19:55 23 اکتوبر dri
crw-------   1 root    root     10, 125 19:55 23 اکتوبر ecryptfs
crw-rw----   1 root    video    29,   0 19:55 23 اکتوبر fb0
lrwxrwxrwx   1 root    root          13 19:55 23 اکتوبر fd -> /proc/self/fd
brw-rw----   1 root    disk      2,   0 19:55 23 اکتوبر fd0
crw-rw-rw-   1 root    root      1,   7 19:55 23 اکتوبر full
crw-rw-rw-   1 root    root     10, 229 19:55 23 اکتوبر fuse
crw-------   1 root    root    241,   0 19:55 23 اکتوبر hidraw0
crw-------   1 root    root     10, 228 19:55 23 اکتوبر hpet
drwxr-xr-x   2 root    root          0 19:55 23 اکتوبر hugepages
crw-------   1 root    root     10, 183 19:55 23 اکتوبر hwrng
lrwxrwxrwx   1 root    root          12 19:55 23 اکتوبر initctl -> /run/initctl
drwxr-xr-x   4 root    root         320 19:56 23 اکتوبر input
crw-r--r--   1 root    root      1,  11 19:55 23 اکتوبر kmsg
lrwxrwxrwx   1 root    root          28 19:55 23 اکتوبر log -> /run/systemd/journal/dev-log
brw-rw----   1 root    disk      7,   0 19:55 23 اکتوبر loop0
brw-rw----   1 root    disk      7,   1 19:55 23 اکتوبر loop1
brw-rw----   1 root    disk      7,   2 19:55 23 اکتوبر loop2
brw-rw----   1 root    disk      7,   3 19:55 23 اکتوبر loop3
brw-rw----   1 root    disk      7,   4 19:55 23 اکتوبر loop4
brw-rw----   1 root    disk      7,   5 19:55 23 اکتوبر loop5
brw-rw----   1 root    disk      7,   6 19:55 23 اکتوبر loop6
brw-rw----   1 root    disk      7,   7 19:55 23 اکتوبر loop7
```

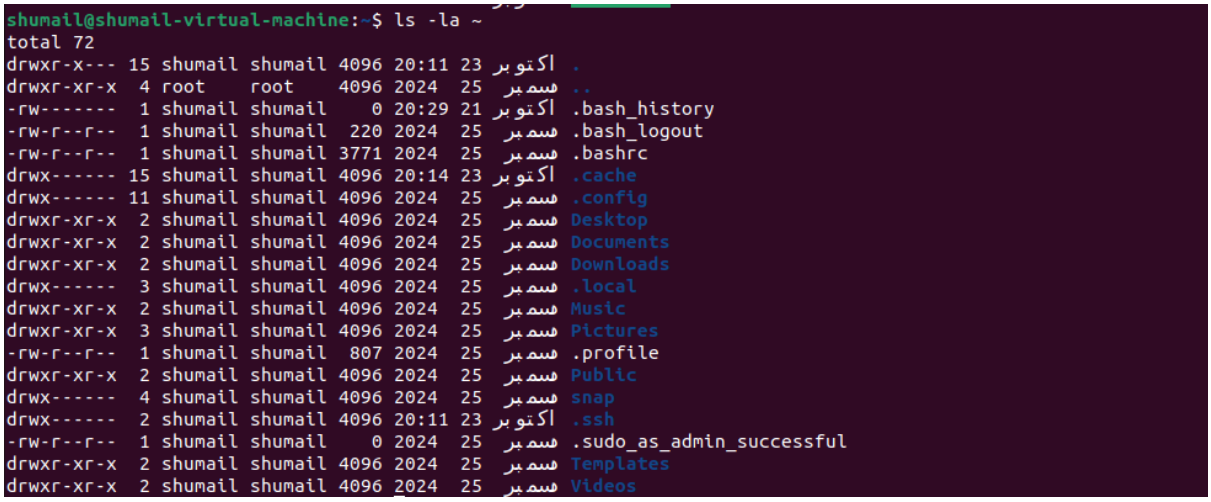
ls_dev.png

```
shumail@shumail-virtual-machine:~$ ls -la /var
total 56
drwxr-xr-x 14 root root     4096 2024  21  فروری .
drwxr-xr-x 21 root root     4096 2024  25  دسمبر ..
drwxr-xr-x  2 root root     4096 2024  26  دسمبر backups
drwxr-xr-x 18 root root     4096 2024  26  دسمبر cache
drwxrwsrwt  2 root whoopsie 4096 2024  21  فروری crash
drwxr-xr-x 69 root root     4096 2024  26  دسمبر lib
drwxrwsr-x  2 root staff    4096 2022  18  اپریل local
lrwxrwxrwx  1 root root        9 2024  25  دسمبر lock -> /run/lock
drwxrwxr-x 13 root syslog   4096 19:55 23 اکتوبر log
drwxrwsr-x  2 root mail     4096 2024  21  فروری mail
drwxrwsrwt  2 root whoopsie 4096 2024  21  فروری metrics
drwxr-xr-x  2 root root     4096 2024  21  فروری opt
lrwxrwxrwx  1 root root        4 2024  25  دسمبر run -> /run
drwxr-xr-x 10 root root     4096 2024  21  فروری snap
drwxr-xr-x  7 root root     4096 2024  21  فروری spool
drwxrwxrwt 11 root root     4096 20:01 23 اکتوبر tmp
```

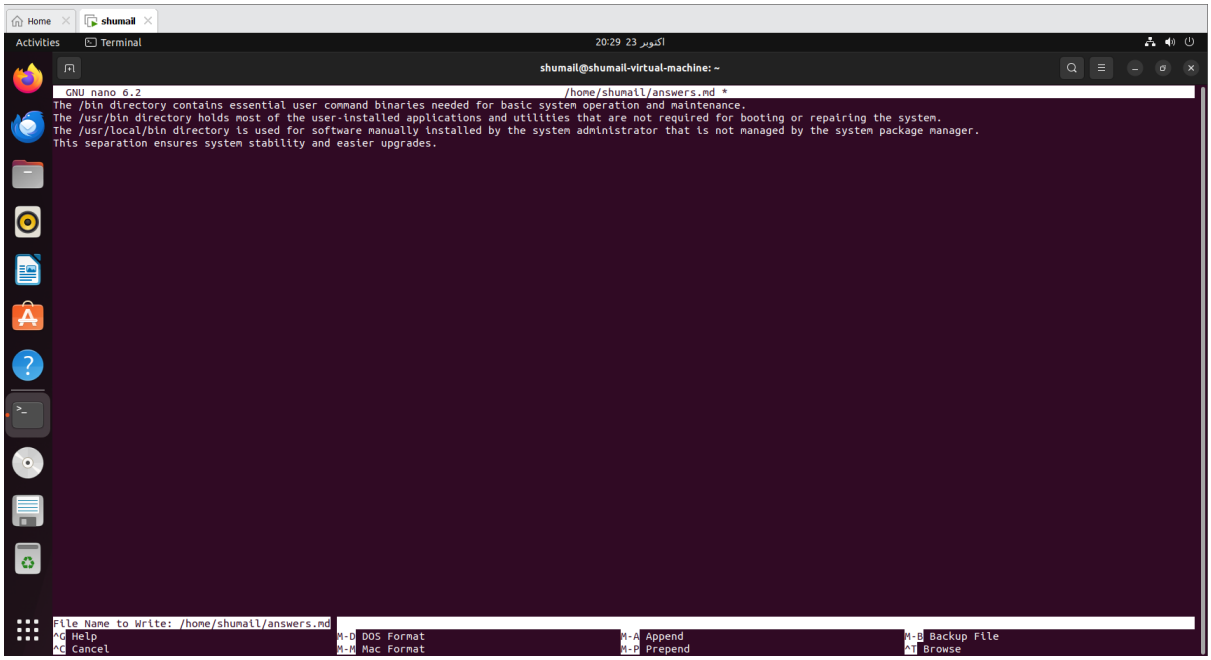
ls_var.png



ls_tmp.png



home_ls.png



answers_md.png

Task 4 – Essential CLI tasks — navigation and file operations

```
shumail@shumail-virtual-machine:~$ mkdir -p ~/lab4/workspace/python_project
```

mkdir_workspace.png

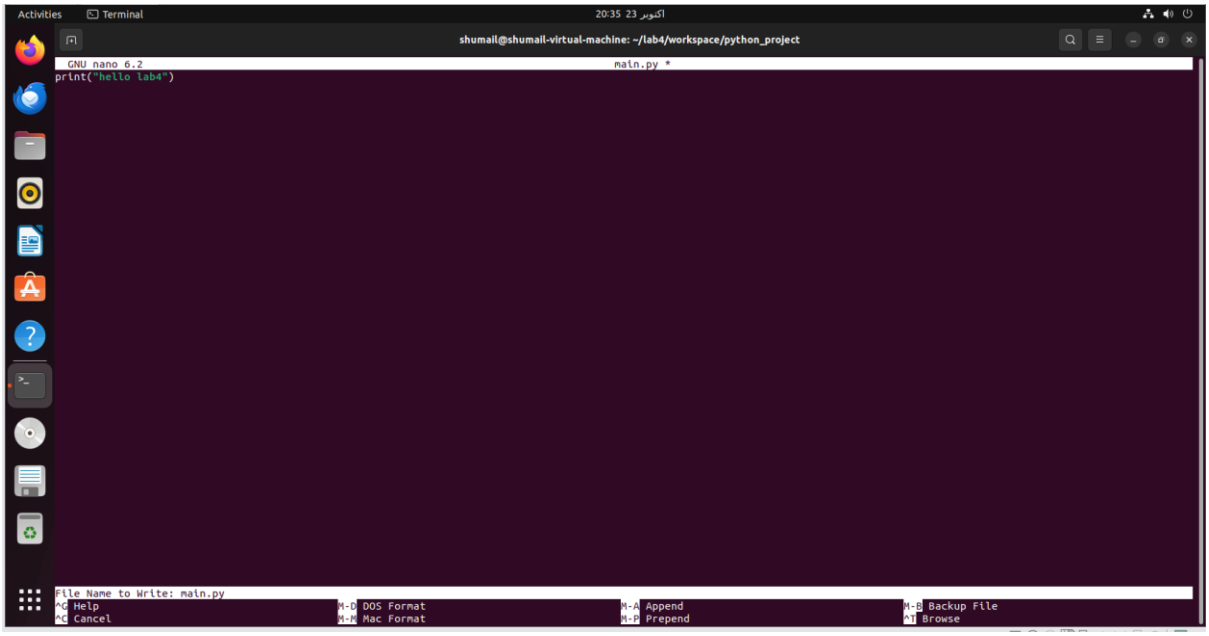
```
shumail@shumail-virtual-machine:~$ cd ~/lab4/workspace/python_project
```

cd_workspace.png

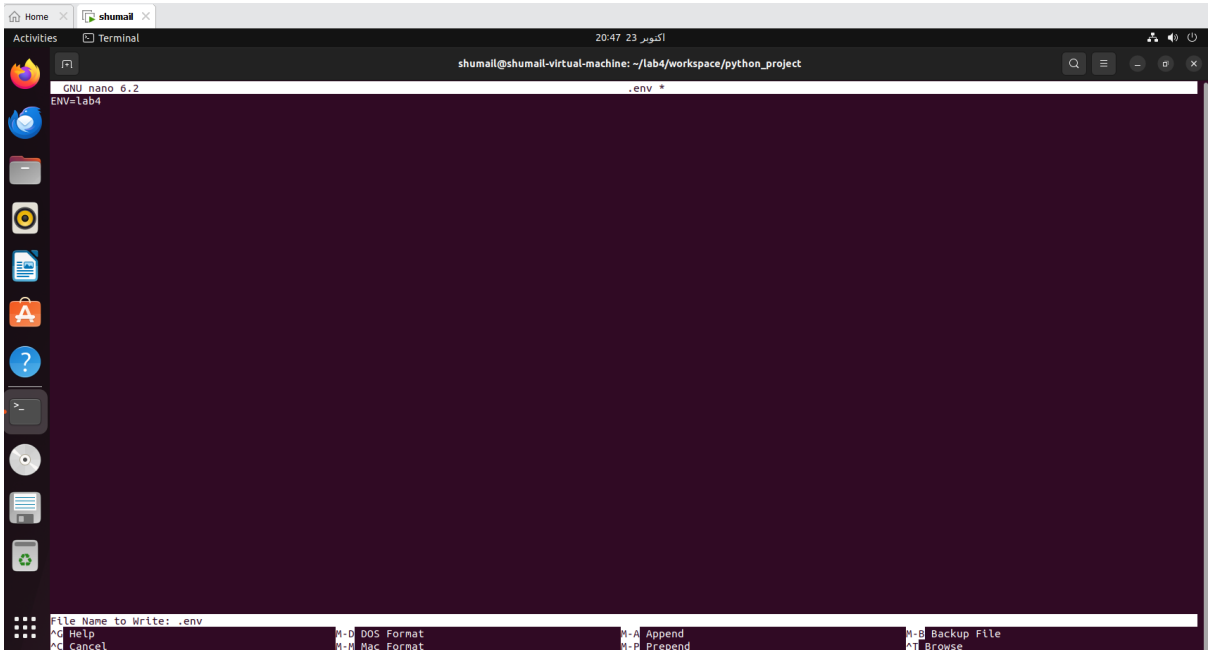
```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ pwd
/home/shumail/lab4/workspace/python_project
```

pwd_workspace.png

nano_readme.png



nano_main.png



nano_env.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ ls -la
total 20
drwxrwxr-x 2 shumail shumail 4096 20:48 23 اكتوبر .
drwxrwxr-x 3 shumail shumail 4096 20:31 23 اكتوبر ..
-rw-rw-r-- 1 shumail shumail    9 20:48 23 اكتوبر .env
-rw-rw-r-- 1 shumail shumail   20 20:47 23 اكتوبر main.py
-rw-rw-r-- 1 shumail shumail   14 20:35 23 اكتوبر README.md
```

workspace_ls.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ cp README.md README.copy.md
```

cp_readme.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ mv README.copy.md README.dev.md
```

mv_readme.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ rm README.dev.md
```

rm_readme.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ mkdir -p ~/lab4/workspace/java_app
```

mkdir_java_app.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
```

cp_recursive.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ ls -la ~/lab4/workspace
total 20
drwxrwxr-x 5 shumail shumail 4096 20:53 23 اکتوبر .
drwxrwxr-x 3 shumail shumail 4096 20:31 23 اکتوبر ..
drwxrwxr-x 2 shumail shumail 4096 20:52 23 اکتوبر java_app
drwxrwxr-x 2 shumail shumail 4096 20:53 23 اکتوبر java_app_copy
drwxrwxr-x 2 shumail shumail 4096 20:51 23 اکتوبر python_project
```

copy_verify.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ history
    1  whoami
    2  pwd
    3  ls -la /
    4  ls -la /bin
    5  ls -la /sbin
    6  ls -la /usr
    7  ls -la /opt
    8  ls -la /etc
    9  ls -la /dev
   10  ls -la /var
   11  ls -la /tmp
   12  ls -la ~
   13  nano ~/answers.md
   14  mkdir -p ~/lab4/workspace/python_project
   15  cd ~/lab4/workspace/python_project
   16  pwd
   17  nano README.md
   18  nano main.py
   19  nano .env
   20  ls -la~
   21  ls -la
   22  cp README.md README.copy.md
   23  mv README.copy.md README.dev.md
   24  rm README.dev.md
   25  mkdir -p ~/lab4/workspace/java_app
   26  cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
   27  ls -la ~/lab4/workspace
   28  history
```

history.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ cat README.md
```

tab_completion.png

Task 5 – System info, resources & processes

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ uname -a
Linux shumail-virtual-machine 6.8.0-49-generic #49~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Wed Nov  6 17:42:15 UTC 2 x86_64 x86_64 x86_64 GNU/Linux
```

Uname.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ cat /proc/cpuinfo
processor       : 0
vendor_id       : GenuineIntel
cpu family      : 6
model           : 142
model name      : Intel(R) Core(TM) i5-8350U CPU @ 1.70GHz
stepping        : 10
microcode       : 0xf6
cpu MHz         : 1895.999
cache size      : 6144 KB
physical id     : 0
siblings        : 1
core id         : 0
cpu cores       : 1
apicid          : 0
initial apicid  : 0
fpu             : yes
fpu_exception   : yes
cpuid level     : 22
wp              : yes
flags           : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ss syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon nopl xt
opology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand hypervisor lah
f_lm abm 3dnowprefetch pti ssbd ibrs ibpb stibp fsgsbase tsc_adjust bmi1 avx2 smep bmi2 invpcid rdseed adx smap clflushopt xsaveopt xsavec xgetbv1 xsaves arat md_clear flush_l1d arc
h_capabilities
bugs            : cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass l1tf mds swapgs itlb_multihit srbds mmio_stale_data retbleed gds bhi
bogomips        : 3791.99
clflush size    : 64
cache_alignment : 64
address sizes   : 45 bits physical, 48 bits virtual
power management:

processor       : 1
vendor_id       : GenuineIntel
cpu family      : 6
model           : 142
model name      : Intel(R) Core(TM) i5-8350U CPU @ 1.70GHz
stepping        : 10
microcode       : 0xf6
cpu MHz         : 1895.999
cache size      : 6144 KB
physical id     : 2
siblings        : 1
```

Cpuinfo.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ free -h
               total        used        free      shared  buff/cache   available
Mem:           3.8Gi       991Mi       1.7Gi        40Mi       1.2Gi       2.5Gi
Swap:          2.1Gi          0B       2.1Gi
```

Meminfo.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           387M  2.0M  385M   1% /run
/dev/sda3        20G   15G  4.0G  79% /
tmpfs           1.9G     0  1.9G   0% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
/dev/sda2       512M  6.1M  506M   2% /boot/efi
tmpfs           387M  112K  387M   1% /run/user/1000
/dev/sr0        152M  152M     0 100% /media/shumail/CDROM
```

Diskinfo.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ cat /etc/os-release
PRETTY_NAME="Ubuntu 22.04.4 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.4 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=jammy
```

os-release.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ ps aux
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.1  0.2 166684 11636 ?        Ss   19:54   0:05 /sbin/init auto noprompt splash
root           2  0.0  0.0      0     0 ?        S    19:54   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        S    19:54   0:00 [pool_workqueue_release]
root           4  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-rcu_g]
root           5  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-rcu_p]
root           6  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-slub_]
root           7  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-netns]
root           8  0.0  0.0      0     0 ?        I    19:54   0:01 [kworker/0:0-events]
root           9  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/0:0H-kblockd]
root          11  0.0  0.0      0     0 ?        I    19:54   0:00 [kworker/u256:0-floppy]
root          12  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-mm_pe]
root          13  0.0  0.0      0     0 ?        I    19:54   0:00 [rcu_tasks_kthread]
root          14  0.0  0.0      0     0 ?        I    19:54   0:00 [rcu_tasks_rude_kthread]
root          15  0.0  0.0      0     0 ?        I    19:54   0:00 [rcu_tasks_trace_kthread]
root          16  0.0  0.0      0     0 ?        S    19:54   0:00 [ksoftirqd/0]
root          17  0.0  0.0      0     0 ?        I    19:54   0:01 [rcu_preempt]
root          18  0.0  0.0      0     0 ?        S    19:54   0:00 [migration/0]
root          19  0.0  0.0      0     0 ?        S    19:54   0:00 [idle_inject/0]
root          20  0.0  0.0      0     0 ?        S    19:54   0:00 [cpuhp/0]
root          21  0.0  0.0      0     0 ?        S    19:54   0:00 [cpuhp/1]
root          22  0.0  0.0      0     0 ?        S    19:54   0:00 [idle_inject/1]
root          23  0.0  0.0      0     0 ?        S    19:54   0:01 [migration/1]
root          24  0.0  0.0      0     0 ?        S    19:54   0:00 [ksoftirqd/1]
root          29  0.0  0.0      0     0 ?        S    19:54   0:00 [kdevtmpfs]
root          30  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-inet_]
root          32  0.0  0.0      0     0 ?        S    19:54   0:00 [kauditd]
root          34  0.0  0.0      0     0 ?        S    19:54   0:00 [khungtaskd]
root          35  0.0  0.0      0     0 ?        S    19:54   0:00 [oom_reaper]
root          37  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-write]
root          38  0.0  0.0      0     0 ?        S    19:54   0:00 [kcompactd0]
root          39  0.0  0.0      0     0 ?        SN   19:54   0:00 [ksmd]
root          42  0.0  0.0      0     0 ?        SN   19:54   0:00 [khugepaged]
```

processes.png

Task 6 – Users and account verification (no sudo group change)

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ sudo adduser lab4user
[sudo] password for shumail:
Adding user `lab4user' ...
Adding new group `lab4user' (1002) ...
Adding new user `lab4user' (1002) with group `lab4user' ...
Creating home directory `/home/lab4user' ...
Copying files from `/etc/skel' ...
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
Sorry, passwords do not match.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
Sorry, passwords do not match.
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for lab4user
Enter the new value, or press ENTER for the default
        Full Name []: shumail zahra
        Room Number []: 1
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] Y
```

adduser_lab4user.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ getent passwd lab4user
lab4user:x:1002:1002:shumail zahra,1,,:/home/lab4user:/bin/bash
```

lab4user_passwd.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ su - lab4user
Password:
```

su_lab4user.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ sudo whoami
[sudo] password for shumail:
root
```

sudo_whoami.png

```
lab4user@shumail-virtual-machine:~$ exit
logout
```

exit_back.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ sudo deluser --remove-home lab4user
Looking for files to backup/remove ...
Removing files ...
Removing user `lab4user' ...
Warning: group `lab4user' has no more members.
Done.
```

Deluser.png

Bonus Task 7 – Create a small demo script using an editor and run it

nano_run_demo.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ nano ~/lab4/workspace/run-demo.sh
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ chmod +x ~/lab4/workspace/run-demo.sh
```

chmod_run_demo.png

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ ~/lab4/workspace/run-demo.sh
Lab 4 demo: current user is shumail
Current time: 21:24:37 و PKT 2025 اکتوبر 23 ت
 21:24:37 up  1:29,  2 users,  load average: 0.16, 0.07, 0.04
               total        used        free      shared  buff/cache   available
Mem:           3.8Gi       977Mi       1.6Gi        40Mi       1.2Gi       2.6Gi
Swap:          2.1Gi          0B       2.1Gi
```

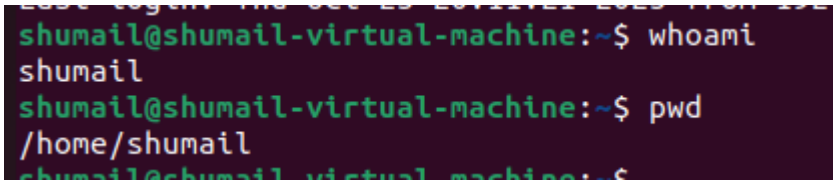
run_demo_output.png

Exam Evaluation Questions:

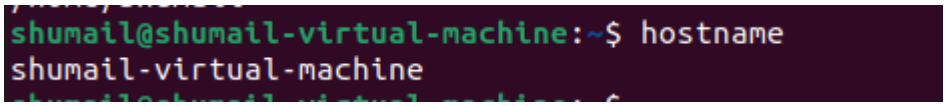
1. Remote Access Verification (Cyber Login Check)

```
shumail@shumail-virtual-machine:~/lab4/workspace/python_project$ ssh shumail@192.168.183.128
shumail@192.168.183.128's password:
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.8.0-49-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

263 updates can be applied immediately.
219 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

7 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm


The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '24.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Thu Oct 23 20:11:21 2025 from 192.168.183.128
```

Q1_remote_connection.png



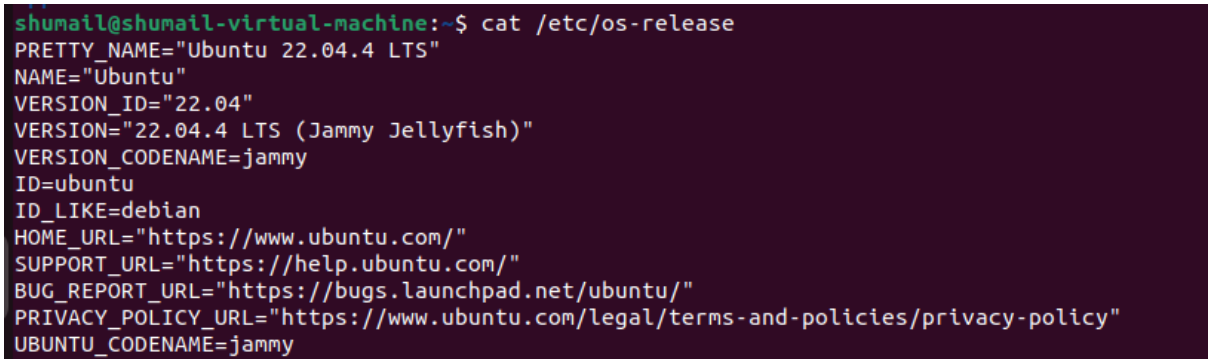
Q1_user_verification.png



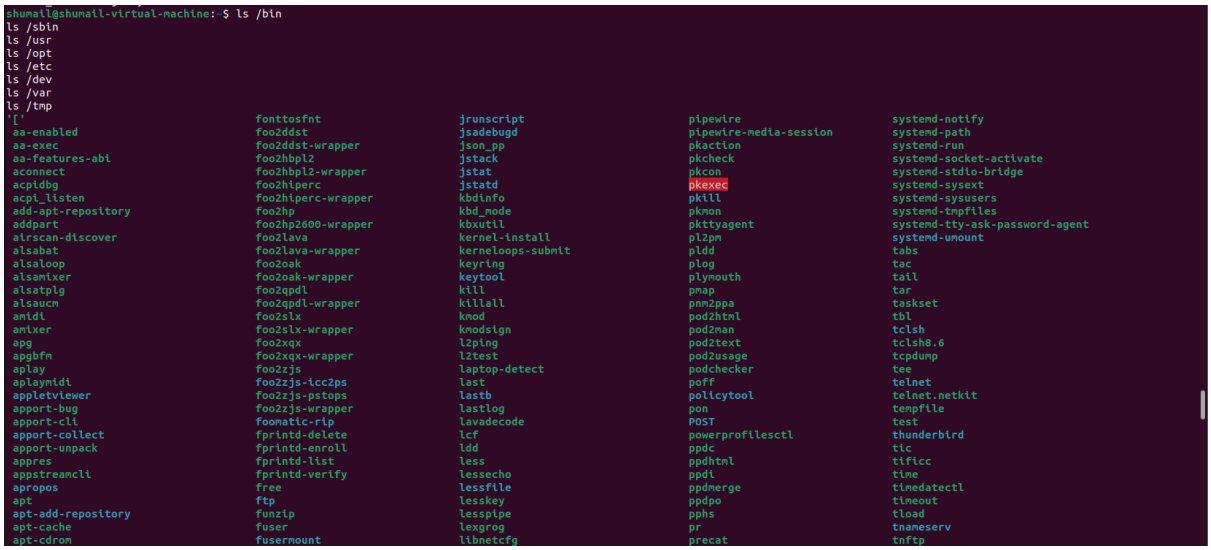
Q1_host_confirmation.png

2. Filesystem Inspection for Forensic Evidence

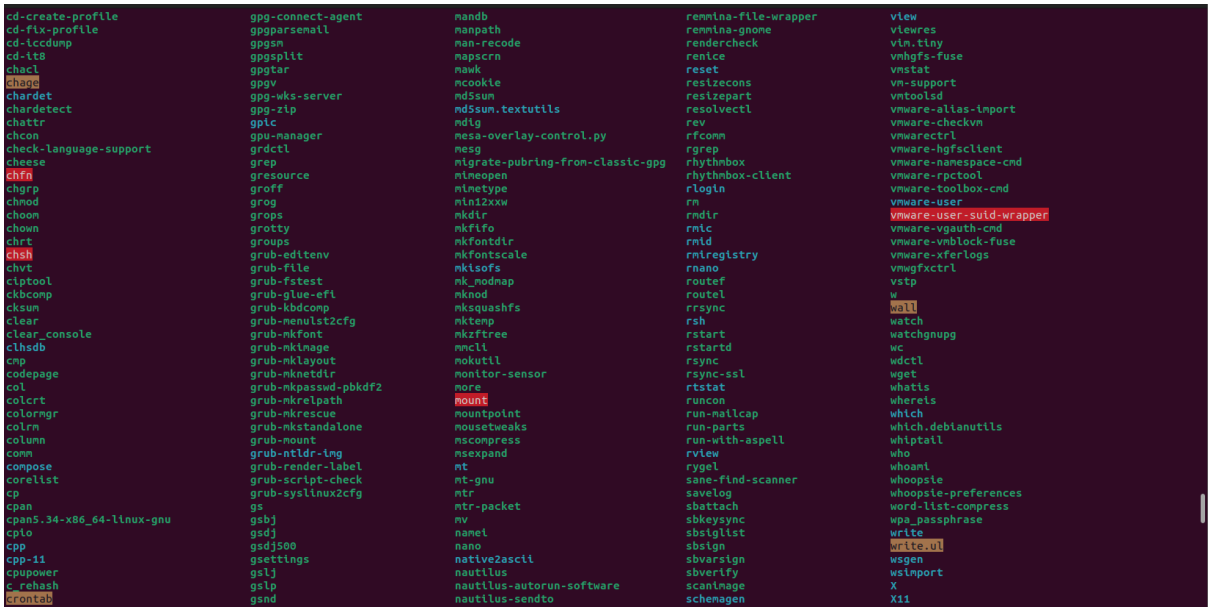
Q2_root_listing.png



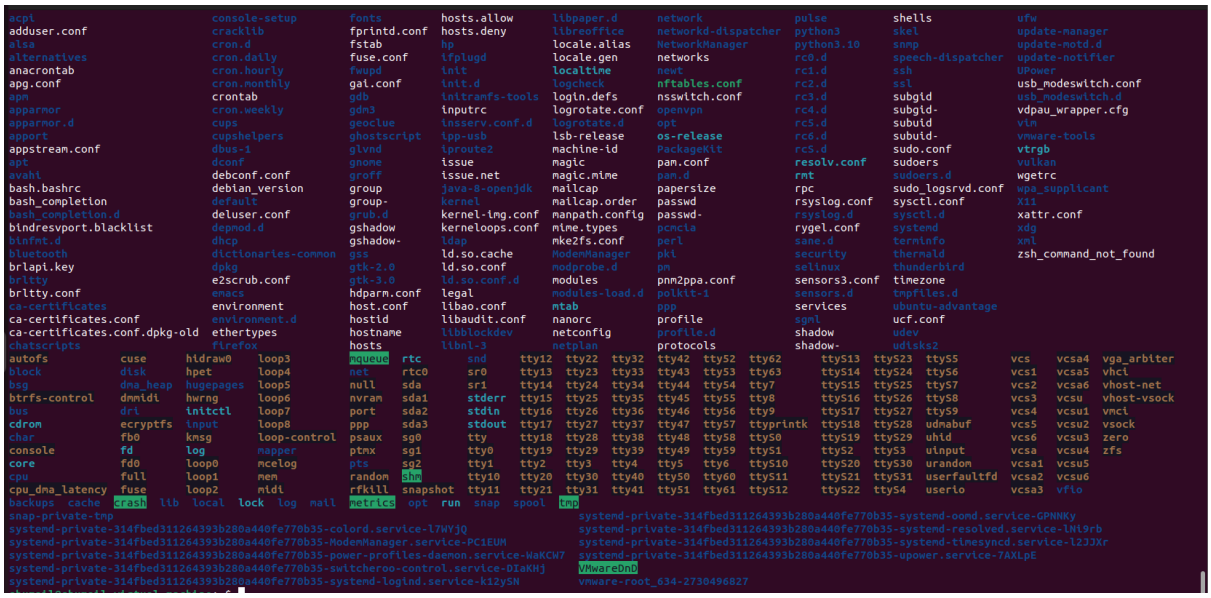
Q2_os_version.png



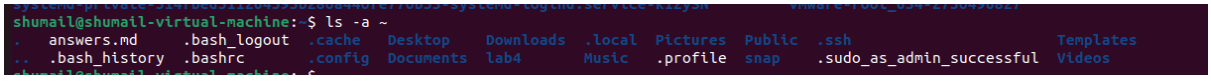
Q2_directory_evidence.png



Q2_directory_evidencee.png



Q2_directory_evidenceeee.png



Q2_hidden_files.png

```
shumail@shumail-virtual-machine:~$ nano forensic_report.md
shumail@shumail-virtual-machine:~$ cat forensic_report.md
# Forensic Filesystem Report

## Key System Directories

- **/bin**: Contains essential binary executables for all users.
- **/sbin**: System administration binaries for root users.
- **/usr**: Contains user-level programs and libraries.
- **/opt**: Optional software packages.
- **/etc**: Configuration files for the system and applications.
- **/dev**: Device files representing hardware and peripherals.
- **/var**: Variable data like logs and caches.
- **/tmp**: Temporary files used by running processes.

**Findings:**
No suspicious files found in system directories at this stage.
```

Q2_report_file.png

3. Evidence Handling & File Operations

```
shumail@shumail-virtual-machine:~$ mkdir -p ~/forensics_lab/sandbox/evidence
shumail@shumail-virtual-machine:~$ ls -R ~/forensics_lab
/home/shumail/forensics_lab:
sandbox

/home/shumail/forensics_lab/sandbox:
evidence

/home/shumail/forensics_lab/sandbox/evidence:
```

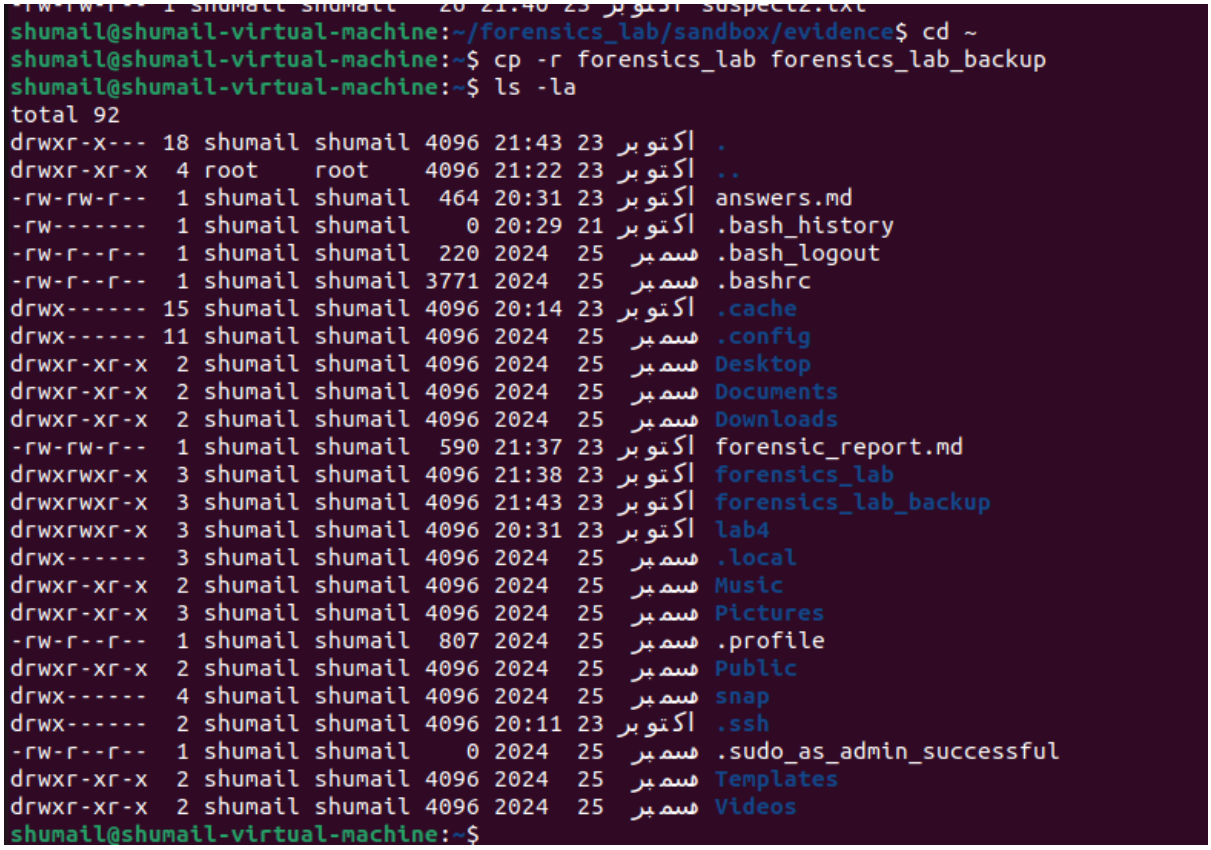
Q3_workspace_created.png

```
shumail@shumail-virtual-machine:~$ cd ~/forensics_lab/sandbox/evidence
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ nano suspect1.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ nano suspect2.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ nano .notes.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ ls -la
total 20
drwxrwxr-x 2 shumail shumail 4096 21:41 23 اکتوبر .
drwxrwxr-x 3 shumail shumail 4096 21:38 23 اکتوبر ..
-rw-rw-r-- 1 shumail shumail   23 21:41 23 اکتوبر .notes.txt
-rw-rw-r-- 1 shumail shumail   29 21:40 23 اکتوبر suspect1.txt
-rw-rw-r-- 1 shumail shumail   26 21:40 23 اکتوبر suspect2.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$
```

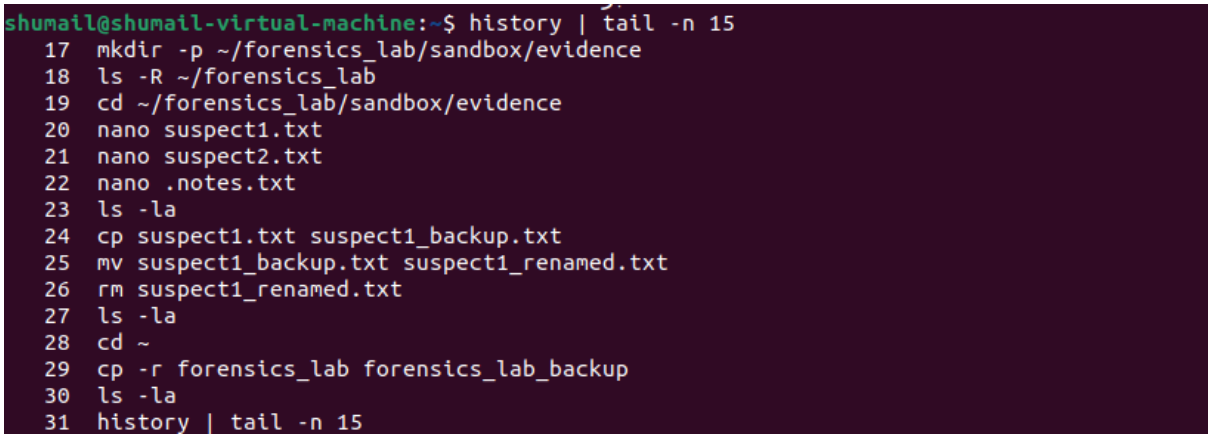
Q3_files_created.png

```
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ cp suspect1.txt suspect1_backup.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ mv suspect1_backup.txt suspect1_renamed.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ rm suspect1_renamed.txt
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ ls -la
total 20
drwxrwxr-x 2 shumail shumail 4096 21:42 23 اکتوبر .
drwxrwxr-x 3 shumail shumail 4096 21:38 23 اکتوبر ..
-rw-rw-r-- 1 shumail shumail   23 21:41 23 اکتوبر .notes.txt
-rw-rw-r-- 1 shumail shumail   29 21:40 23 اکتوبر suspect1.txt
-rw-rw-r-- 1 shumail shumail   26 21:40 23 اکتوبر suspect2.txt
```

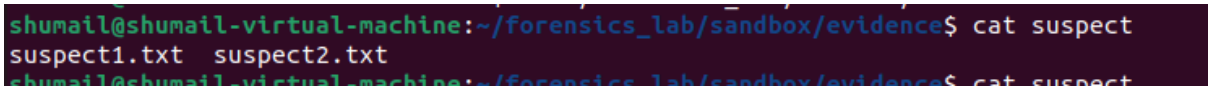
Q3_backup_handling.png



Q3_workspace_backup.png



Q3_command_history.png



Q3_autocomplete.png

4. System Profiling and Process Monitoring

```
cat: suspect: No such file or directory
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ cat /etc/os-release
PRETTY_NAME="Ubuntu 22.04.4 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.4 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=jammy
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ uname -r
6.8.0-49-generic
```

Q4_system_info.png

```
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ lscpu
Architecture:            x86_64
  CPU op-mode(s):        32-bit, 64-bit
  Address sizes:         45 bits physical, 48 bits virtual
  Byte Order:            Little Endian
CPU(s):                  2
  On-line CPU(s) list:   0,1
Vendor ID:               GenuineIntel
  Model name:            Intel(R) Core(TM) i5-8350U CPU @ 1.70GHz
    CPU family:          6
    Model:               142
    Thread(s) per core:  1
    Core(s) per socket:  1
    Socket(s):           2
    Stepping:            10
    BogoMIPS:            3791.99
    Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ss syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon
                          nopl xtopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xs
                         ave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch pti ssbd ibrs ibpb stibp fsgsbase tsc_adjust bmi1 avx2 smep bmi2 invpcid rdseed adx smap clflushop
                         t xsaveopt xsavec xgetbv1 xsaves arat md_clear flush_l1d arch_capabilities
Virtualization features:
  Hypervisor vendor:     VMware
  Virtualization type:   full
Caches (sum of all):
  L1d:                   64 KiB (2 instances)
  L1i:                   64 KiB (2 instances)
  L2:                    512 KiB (2 instances)
  L3:                    12 MiB (2 instances)
NUMA:
  NUMA node(s):          1
  NUMA node0 CPU(s):     0,1
Vulnerabilities:
  Gather data sampling:  Unknown: Dependent on hypervisor status
  Itlb multihit:         KVM: Mitigation: VMX unsupported
  L1tf:                  Mitigation; PTE Inversion
  Mds:                   Mitigation; Clear CPU buffers; SMT Host state unknown
  Meltdown:              Mitigation; PTI
  Mmio stale data:       Mitigation; Clear CPU buffers; SMT Host state unknown
  Reg file data sampling: Not affected
  Retbleed:              Mitigation; IBRS
  Spec rstack overflow:  Not affected
  Spec store bypass:     Mitigation; Speculative Store Bypass disabled via prctl
```

```
  L2:                    512 KiB (2 instances)
  L3:                    12 MiB (2 instances)
NUMA:
  NUMA node(s):          1
  NUMA node0 CPU(s):     0,1
Vulnerabilities:
  Gather data sampling:  Unknown: Dependent on hypervisor status
  Itlb multihit:         KVM: Mitigation: VMX unsupported
  L1tf:                  Mitigation; PTE Inversion
  Mds:                   Mitigation; Clear CPU buffers; SMT Host state unknown
  Meltdown:              Mitigation; PTI
  Mmio stale data:       Mitigation; Clear CPU buffers; SMT Host state unknown
  Reg file data sampling: Not affected
  Retbleed:              Mitigation; IBRS
  Spec rstack overflow:  Not affected
  Spec store bypass:     Mitigation; Speculative Store Bypass disabled via prctl
  Spectre v1:            Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Spectre v2:            Mitigation; IBRS; IBPB conditional; STIBP disabled; RSB filling; PBRSB-eIBRS Not affected; BHI SW loop, KVM SW loop
  Srbds:                 Unknown: Dependent on hypervisor status
  Tsx async abort:       Not affected
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ free -h
               total        used        free      shared  buff/cache   available
Mem:           3.8Gi       975Mi       1.4Gi        40Mi       1.5Gi       2.5Gi
Swap:          2.1Gi          0B       2.1Gi
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           387M  2.0M  385M   1% /run
/dev/sda3        20G   14G  4.2G  77% /
tmpfs           1.9G     0  1.9G   0% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
/dev/sda2       512M  6.1M  506M   2% /boot/efi
tmpfs           387M  112K  387M   1% /run/user/1000
/dev/sr0        152M  152M     0 100% /media/shumail/CDROM
```

Q4_resource_info.png

```
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ ps aux
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.2 166684 11636 ?        Ss   19:54   0:05 /sbin/init auto noprompt splash
root           2  0.0  0.0      0     0 ?        S    19:54   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        S    19:54   0:00 [pool_workqueue_release]
root           4  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-rcu_g]
root           5  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-rcu_p]
root           6  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-slub_]
root           7  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-netns]
root           9  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/0:0H-kblockd]
root          11  0.0  0.0      0     0 ?        I    19:54   0:00 [kworker/u256:0-floppy]
root          12  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-mm_pe]
root          13  0.0  0.0      0     0 ?        I    19:54   0:00 [rcu_tasks_kthread]
root          14  0.0  0.0      0     0 ?        I    19:54   0:00 [rcu_tasks_rude_kthread]
root          15  0.0  0.0      0     0 ?        I    19:54   0:00 [rcu_tasks_trace_kthread]
root          16  0.0  0.0      0     0 ?        S    19:54   0:00 [ksoftirqd/0]
root          17  0.0  0.0      0     0 ?        I    19:54   0:02 [rcu_preempt]
root          18  0.0  0.0      0     0 ?        S    19:54   0:00 [migration/0]
root          19  0.0  0.0      0     0 ?        S    19:54   0:00 [idle_inject/0]
root          20  0.0  0.0      0     0 ?        S    19:54   0:00 [cpuhp/0]
root          21  0.0  0.0      0     0 ?        S    19:54   0:00 [cpuhp/1]
root          22  0.0  0.0      0     0 ?        S    19:54   0:00 [idle_inject/1]
root          23  0.0  0.0      0     0 ?        S    19:54   0:01 [migration/1]
root          24  0.0  0.0      0     0 ?        S    19:54   0:00 [ksoftirqd/1]
root          29  0.0  0.0      0     0 ?        S    19:54   0:00 [kdevtmpfs]
root          30  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-inet_]
root          32  0.0  0.0      0     0 ?        S    19:54   0:00 [kauditd]
root          34  0.0  0.0      0     0 ?        S    19:54   0:00 [khungtaskd]
root          35  0.0  0.0      0     0 ?        S    19:54   0:00 [oom_reaper]
root          37  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-write]
root          38  0.0  0.0      0     0 ?        S    19:54   0:00 [kcompactd0]
root          39  0.0  0.0      0     0 ?        SN   19:54   0:00 [ksmd]
root          42  0.0  0.0      0     0 ?        SN   19:54   0:00 [khugepaged]
root          43  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-kinte]
root          44  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-kbloc]
root          45  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-blkcg]
root          46  0.0  0.0      0     0 ?        S    19:54   0:00 [irq/9-acpi]
root          47  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-tpm_d]
root          48  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-ata_s]
root          49  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-md]
root          50  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-md_bi]
root          51  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-edac-]
root          52  0.0  0.0      0     0 ?        I<   19:54   0:00 [kworker/R-devfr]
```

```
shumail     2151  0.0  0.5 306312 22532 ?        Sl   19:56   0:00 /snap/snapd-desktop-integration/83/usr/bin/snapd-desktop-integration
shumail     2155  0.0  0.3 755220 14336 ?        Ssl  19:56   0:00 /usr/libexec/xdg-desktop-portal
shumail     2159  0.0  0.7 663264 29548 ?        Ssl  19:56   0:00 /usr/libexec/xdg-desktop-portal-gnome
shumail     2178  0.0  0.1 163832  7680 ?        Sl   19:56   0:03 /usr/libexec/ibus-engine-simple
shumail     2181  0.0  2.0 235300 81552 ?        S    19:56   0:04 /usr/bin/Xwayland :0 -rootless -noreset -accessx -core -auth /run/user/1000/.mutter-Xwaylandauth.EYPME3 -listen 4
shumail     2209  0.0  0.7 2599852 28304 ?       Sl   19:56   0:00 /usr/bin/gjs /usr/share/gnome-shell/org.gnome.ScreenSaver
shumail     2268  0.0  2.0 547780 80016 ?        Ssl  19:56   0:00 /usr/libexec/gsd-xsettings
shumail     2271  0.0  0.6 345184 25676 ?        Ssl  19:56   0:00 /usr/libexec/xdg-desktop-portal-gtk
shumail     2297  0.0  0.6 194556 25392 ?        Sl   19:56   0:00 /usr/libexec/ibus-x11
shumail     2402  0.0  0.8 495096 32348 ?        Sl   19:57   0:01 update-notifier
shumail     2647  0.0  0.1  46960  7680 ?        Ss   20:00   0:00 /usr/lib/bluetooth/obexd
shumail     2719  0.8  1.4 559520 57480 ?        Rsl  20:06   1:01 /usr/libexec/gnome-terminal-server
shumail     2737  0.0  0.1  11360  5248 pts/0    Ss   20:06   0:00 bash
shumail     2776  0.0  0.2  17276  8448 pts/0    S+   20:11   0:00 ssh shumail@192.168.183.128
root        2777  0.0  0.2  17432 11080 ?        Ss   20:11   0:00 sshd: shumail [priv]
shumail     2780  0.0  0.1   7976  5632 ?        S    20:11   0:00 /usr/bin/ssh-agent -D -a /run/user/1000/keyring/.ssh
shumail     2859  0.0  0.2  17564  8000 ?        R    20:11   0:00 sshd: shumail@pts/1
shumail     2861  0.0  0.1  11564  5632 pts/1    Ss   20:11   0:00 -bash
root        2875  0.0  0.0      0     0 ?        I<   20:11   0:00 [kworker/R-tls-s]
root        2937  0.0  0.0      0     0 ?        I<   20:20   0:00 [kworker/u261:0-ttm]
root        3123  0.0  0.0      0     0 ?        I<   20:47   0:00 [kworker/u260:5-ttm]
root        3186  0.0  0.0      0     0 ?        I    20:55   0:00 [kworker/u258:4-events_unbound]
root        3218  0.0  0.0      0     0 ?        I<   21:07   0:00 [kworker/u261:3-ttm]
root        3219  0.0  0.0      0     0 ?        I    21:07   0:00 [kworker/u257:3-events_unbound]
root        3241  0.2  0.0      0     0 ?        I    21:11   0:06 [kworker/1:1-events]
root        3245  0.0  0.0      0     0 ?        I    21:12   0:02 [kworker/0:2-mpt_poll_0]
shumail     3266  0.0  1.5 2788976 62092 ?       Sl   21:12   0:02 gjs /usr/share/gnome-shell/extensions/ding@rastersoft.com/ding.js -E -P /usr/share/gnome-shell/extensions/ding@ras
root        3283  0.0  0.0      0     0 ?        I<   21:12   0:00 [kworker/u260:0-ttm]
root        3374  0.0  0.0      0     0 ?        I    21:21   0:00 [kworker/u257:0-events_unbound]
shumail     3468  0.0  0.2  17276  8192 pts/1    S+   21:27   0:00 ssh shumail@192.168.183.128
root        3469  0.0  0.2  17424 11040 ?        Ss   21:27   0:00 sshd: shumail [priv]
shumail     3549  0.0  0.2  17556  8004 ?        D    21:27   0:00 sshd: shumail@pts/2
shumail     3550  0.0  0.1  11616  5504 pts/2    Ss   21:27   0:01 -bash
root        3558  0.0  0.0      0     0 ?        I    21:28   0:00 [kworker/u257:2-events_power_efficient]
root        3620  0.0  0.0      0     0 ?        I    21:40   0:00 [kworker/u258:1-events_unbound]
root        4138  0.0  0.0      0     0 ?        I    21:48   0:00 [kworker/0:0-rcu_par_gp]
root        4141  0.0  0.0      0     0 ?        I    21:48   0:00 [kworker/u258:2-events_power_efficient]
root        4142  0.0  0.0      0     0 ?        I    21:48   0:00 [kworker/1:0-rcu_par_gp]
root        4575  0.0  0.0      0     0 ?        I    21:56   0:00 [kworker/0:1-events]
root        4578  0.0  0.0      0     0 ?        I    21:56   0:00 [kworker/u258:0-flush-8:0]
root        4579  0.0  0.0      0     0 ?        I    21:56   0:00 [kworker/1:2]
root        4589  0.0  0.0      0     0 ?        I<   21:56   0:00 [kworker/0:2H-kblockd]
root        4601  0.0  0.0      0     0 ?        I    21:59   0:00 [kworker/u257:1-events_unbound]
shumail     4607  0.0  0.0  13024  3456 pts/2    R+   22:00   0:00 ps aux
```

Q4_process_list

5. User Account Audit & Privilege Escalation Simulation

```
shumail@shumail-virtual-machine:~/forensics_lab/sandbox/evidence$ sudo adduser lab4user
Adding user `lab4user' ...
Adding new group `lab4user' (1002) ...
Adding new user `lab4user' (1002) with group `lab4user' ...
Creating home directory `/home/lab4user' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for lab4user
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
```

Q5_user_created.png

```
shumail@shumail-virtual-machine:~$ sudo adduser lab4user
adduser: The user `lab4user' already exists.
```

```
adduser: The user `lab4user' already exists.
shumail@shumail-virtual-machine:~$ grep lab4user /etc/passwd
lab4user:x:1002:1002:,,,:/home/lab4user:/bin/bash
```

Q5_user_verified.png

```
shumail@shumail-virtual-machine:~$ su - lab4user
Password:
lab4user@shumail-virtual-machine:~$ whoami
lab4user
```

Q5_user_login.png

```
lab4user@shumail-virtual-machine:~$ sudo apt update
[sudo] password for lab4user:
lab4user is not in the sudoers file.  This incident will be reported.
```

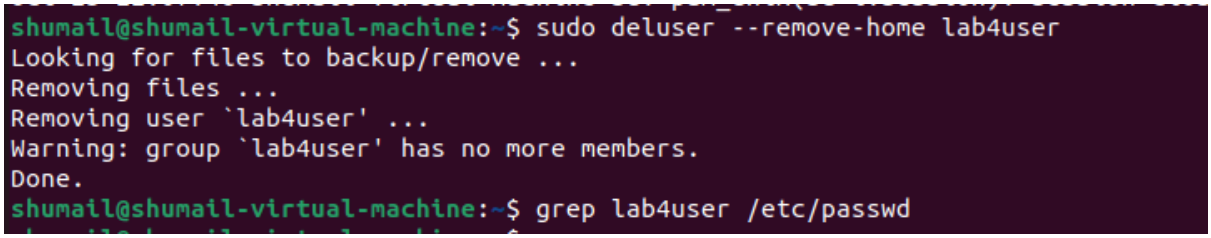
Q5_permission_denied.png

```
lab4user@shumail-virtual-machine:~$ exit
logout
shumail@shumail-virtual-machine:~$ whoami
shumail
```

Q5_switch_back.png

```
shumail@shumail-virtual-machine:~$ sudo cat /var/log/auth.log | grep lab4user | tail -n 10
Oct 23 22:03:06 shumail-virtual-machine groupadd[4612]: group added to /etc/gshadow: name=lab4user
Oct 23 22:03:06 shumail-virtual-machine groupadd[4612]: new group: name=lab4user, GID=1002
Oct 23 22:03:06 shumail-virtual-machine useradd[4618]: new user: name=lab4user, UID=1002, GID=1002, home=/home/lab4user, shell=/bin/bash, from=/dev/pts/3
Oct 23 22:03:20 shumail-virtual-machine passwd[4629]: pam_unix(passwd:chauthtok): password changed for lab4user
Oct 23 22:03:23 shumail-virtual-machine chfn[4630]: changed user 'lab4user' information
Oct 23 22:04:31 shumail-virtual-machine sudo:  shumail : TTY=pts/2 ; PWD=/home/shumail ; USER=root ; COMMAND=/usr/sbin/adduser lab4user
Oct 23 22:06:03 shumail-virtual-machine su: (to lab4user) shumail on pts/2
Oct 23 22:06:03 shumail-virtual-machine su: pam_unix(su-l:session): session opened for user lab4user(uid=1002) by shumail(uid=1000)
Oct 23 22:07:06 shumail-virtual-machine sudo: lab4user : user NOT in sudoers ; TTY=pts/2 ; PWD=/home/lab4user ; USER=root ; COMMAND=/usr/bin/apt update
Oct 23 22:07:46 shumail-virtual-machine su: pam_unix(su-l:session): session closed for user lab4user
```

Q5_authlog_analysis.png



Q5_user_removed
