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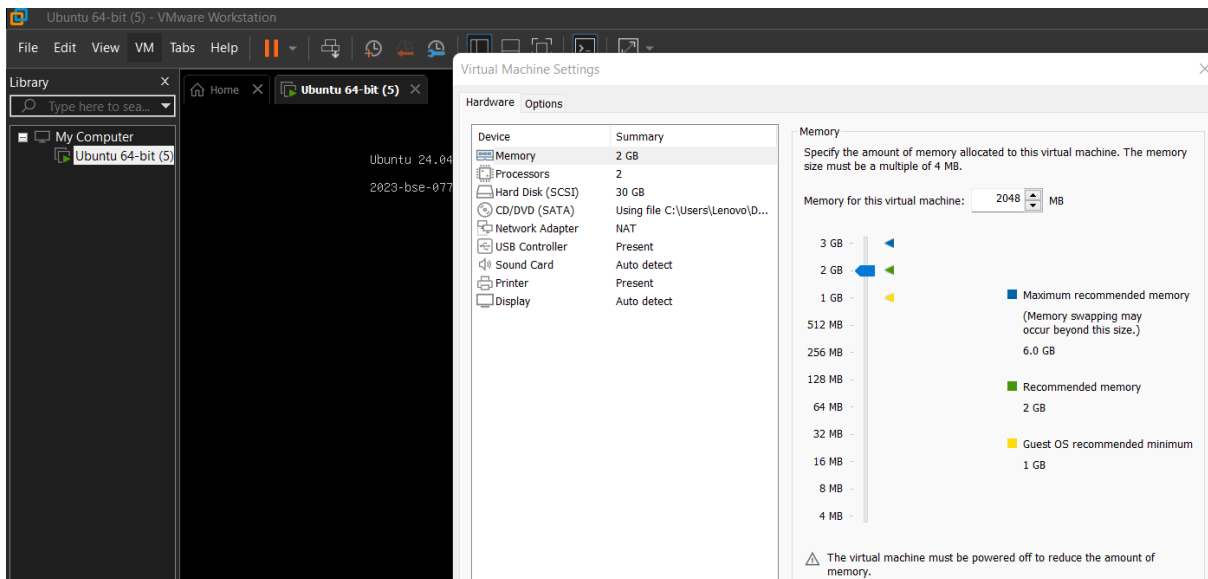
**Roll No: 2023-BSE-077**

**Class: BSE5-B**

## **Lab 04**

### **Task 1 – Verify VM Resources in VMware**

- **Check Virtual Machine Settings**



### **Task 2 – Start VM and Log In via SSH**

- **SSH Login from Host Terminal to VM – *vm\_login.png***

```
C:\Users\Lenovo>
C:\Users\Lenovo>ssh sadafriaz@192.168.64.128
The authenticity of host '192.168.64.128 (192.168.64.128)' can't be established.
ECDSA key fingerprint is SHA256:gg8DFMpjIYiy0LD5UCv112KNwBeMFdRyf005+P/qqCA.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.64.128' (ECDSA) to the list of known hosts.
sadafriaz@192.168.64.128's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-86-generic x86_64)

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

System information as of Fri Oct 24 10:42:38 AM UTC 2025

System load:  0.01          Processes:            215
Usage of /:   49.3% of 9.75GB Users logged in:       1
Memory usage: 14%          IPv4 address for ens33: 192.168.64.128
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

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

- **Verify Current User and Working Directory (whoami & pwd) – *whoami\_pwd.png***

```
0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

sadafriaz@2023-bse-077:~$ whoami
sadafriaz
sadafriaz@2023-bse-077:~$ pwd
/home/sadafriaz
sadafriaz@2023-bse-077:~$ _
```

### Task 3 – Filesystem Exploration and Hidden Files

- **View Root Directory – *ls\_root.png***

```
sadafriaz@2023-bse-077:~$ ls -la /
total 1944668
drwxr-xr-x 23 root root      4096 Oct 15 09:58 .
drwxr-xr-x 23 root root      4096 Oct 15 09:58 ..
lrwxrwxrwx  1 root root         7 Apr 22  2024 bin -> usr/bin
drwxr-xr-x  2 root root      4096 Feb 26  2024 bin.usr-is-merged
drwxr-xr-x  4 root root      4096 Oct 24 10:03 boot
dr-xr-xr-x  2 root root      4096 Aug  5 23:53 cdrom
drwxr-xr-x 20 root root     4120 Oct 24 12:38 dev
drwxr-xr-x 108 root root     4096 Oct 24 10:35 etc
drwxr-xr-x  3 root root      4096 Oct 15 10:20 home
lrwxrwxrwx  1 root root         7 Apr 22  2024 lib -> usr/lib
lrwxrwxrwx  1 root root         9 Apr 22  2024 lib64 -> usr/lib64
drwxr-xr-x  2 root root      4096 Feb 26  2024 lib.usr-is-merged
drwx----- 2 root root    16384 Oct 15 09:45 lost+found
drwxr-xr-x  2 root root      4096 Aug  5 16:54 media
drwxr-xr-x  2 root root      4096 Aug  5 16:54 mnt
drwxr-xr-x  2 root root      4096 Aug  5 16:54 opt
dr-xr-xr-x 275 root root       0 Oct 24 12:38 proc
drwx----- 3 root root      4096 Oct 24 10:41 root
drwxr-xr-x 29 root root       820 Oct 24 14:45 run
lrwxrwxrwx  1 root root         8 Apr 22  2024/sbin -> usr/sbin
drwxr-xr-x  2 root root      4096 Dec 11  2024/sbin.usr-is-merged
drwxr-xr-x  2 root root      4096 Oct 15 10:20 snap
drwxr-xr-x  2 root root      4096 Aug  5 16:54 srv
-rw----- 1 root root 1991245824 Oct 15 09:58 swap.img
dr-xr-xr-x 13 root root       0 Oct 24 12:38 sys
drwxrwxrwt 14 root root      4096 Oct 24 12:49 tmp
drwxr-xr-x 12 root root      4096 Aug  5 16:54 usr
drwxr-xr-x 12 root root      4096 Oct 24 10:34 var
sadafriaz@2023-bse-077:~$
```

- **Explore /bin Directory – *ls\_bin.png***

```
sadafriaz@2023-bse-077:~$ ls -la /bin
lrwxrwxrwx 1 root root 7 Apr 22  2024 /bin -> usr/bin
```

- Explore /sbin Directory – ls\_sbin.png

```
sadafriaz@2023-bse-077:~$ ls -la /sbin
lrwxrwxrwx 1 root root 8 Apr 22  2024 /sbin -> usr/sbin
sadafriaz@2023-bse-077:~$
```

- Explore /usr Directory – ls\_usr.png

```
sadafriaz@2023-bse-077:~$ ls -la /usr
total 108
drwxr-xr-x 12 root root 4096 Aug  5 16:54 .
drwxr-xr-x 23 root root 4096 Oct 15 09:58 ..
drwxr-xr-x  2 root root 36864 Oct 24 10:35 bin
drwxr-xr-x  2 root root 4096 Apr 22  2024 games
drwxr-xr-x 33 root root 16384 Oct 24 10:01 include
drwxr-xr-x 79 root root 4096 Oct 24 10:35 lib
drwxr-xr-x  2 root root 4096 Oct 24 10:01 lib64
drwxr-xr-x 11 root root 4096 Oct 15 09:58 libexec
drwxr-xr-x 10 root root 4096 Aug  5 16:54 local
drwxr-xr-x  2 root root 20480 Oct 24 10:35 sbin
drwxr-xr-x 124 root root 4096 Oct 24 10:35 share
drwxr-xr-x  6 root root 4096 Oct 24 10:02 src
sadafriaz@2023-bse-077:~$ _
```

- Explore /opt Directory – ls\_opt.png

```
sadafriaz@2023-bse-077:~$ ls -la /opt
total 8
drwxr-xr-x  2 root root 4096 Aug  5 16:54 .
drwxr-xr-x 23 root root 4096 Oct 15 09:58 ..
sadafriaz@2023-bse-077:~$
```

- Explore /etc Directory – ls\_etc.png

```
drwxr-xr-x  2 root root 4096 Aug  5 17:14 sensors.d
-rw-r--r--  1 root root 12813 Mar 27  2021 services
drwxr-xr-x  2 root root 4096 Aug  5 17:02 sgml
-rw-r--r--  1 root shadow 971 Oct 24 10:35 shadow
-rw-r--r--  1 root shadow 952 Oct 15 10:20 shadow-
-rw-r--r--  1 root root 148 Aug  5 17:14 shells
drwxr-xr-x  2 root root 4096 Aug  5 16:55 skel
drwxr-xr-x  6 root root 4096 Aug  5 17:14 sos
drwxr-xr-x  4 root root 4096 Oct 24 10:35 ssh
drwxr-xr-x  4 root root 4096 Oct 24 10:02 ssl
-rw-r--r--  1 root root 23 Oct 15 10:20 subgid
-rw-r--r--  1 root root 0 Aug  5 16:54 subgid-
-rw-r--r--  1 root root 23 Oct 15 10:20 subuid
-rw-r--r--  1 root root 0 Aug  5 16:54 subuid-
-rw-r--r--  1 root root 4343 Jun 25 12:42 sudo.conf
-rw-r--r--  1 root root 1800 Jan 29  2024 sudoers
drwxr-xr-x  2 root root 4096 Aug  5 17:02 sudoers.d
-rw-r--r--  1 root root 9804 Jun 25 12:42 sudo_logsrvd.conf
drwxr-xr-x  2 root root 4096 Aug  5 17:14 supercat
-rw-r--r--  1 root root 2209 Mar 24  2024 sysctl.conf
drwxr-xr-x  2 root root 4096 Aug  5 17:02 sysctl.d
drwxr-xr-x  2 root root 4096 Aug  5 17:14 sysstat
drwxr-xr-x  6 root root 4096 Aug  5 16:49 systemd
drwxr-xr-x  2 root root 4096 Aug  5 17:00 terminfo
drwxr-xr-x  2 root root 4096 Oct 15 09:58 thermal
-rw-r--r--  1 root root 8 Aug  5 17:02 timezone
drwxr-xr-x  2 root root 4096 Aug  5 17:14 tmpfiles.d
drwxr-xr-x  2 root root 4096 Aug  5 17:14 ubuntu-advantage
-rw-r--r--  1 root root 1260 Jan 27  2023 ucf.conf
drwxr-xr-x  4 root root 4096 Aug  5 17:02 udev
drwxr-xr-x  2 root root 4096 Oct 24 10:02 udisks2
drwxr-xr-x  3 root root 4096 Aug  5 17:14 ufw
-rw-r--r--  1 root root 208 Aug  5 16:54 .updated
drwxr-xr-x  3 root root 4096 Aug  5 17:02 update-manager
drwxr-xr-x  2 root root 4096 Aug  5 17:14 update-motd.d
drwxr-xr-x  2 root root 4096 Aug  5 17:14 update-notifier
drwxr-xr-x  2 root root 4096 Oct 15 09:58 UPower
-rw-r--r--  2 root root 1529 Aug  5 17:14 usb_modeswitch.conf
drwxr-xr-x  2 root root 4096 Aug  5 17:14 usb_modeswitch.d
drwxr-xr-x  1 root root 16 Aug  5 17:02 vconsole.conf -> default/keyboard
drwxr-xr-x  2 root root 4096 Oct 24 10:03 vim
drwxr-xr-x  4 root root 4096 Oct 24 10:03 vmware-tools
lrwxrwxrwx  1 root root 23 Feb 26  2024 vtngb -> /etc/alternatives/vtngb
-rw-r--r--  1 root root 4942 Aug  5 17:14 wgetrc
drwxr-xr-x  4 root root 4096 Aug  5 17:02 x11
-rw-r--r--  1 root root 681 Apr  9  2024 xattr.conf
drwxr-xr-x  4 root root 4096 Aug  5 17:02 xdg
drwxr-xr-x  2 root root 4096 Aug  5 17:02 xml
-rw-r--r--  1 root root 460 Aug  5 17:14 zsh_command_not_found
sadafriaz@2023-bse-077:~$
```

- Explore /dev Directory – ls\_dev.png

```
crw-rw---- 1 root dialout 4, 91 Oct 24 12:38 ttyS27
crw-rw---- 1 root dialout 4, 92 Oct 24 12:38 ttyS28
crw-rw---- 1 root dialout 4, 93 Oct 24 12:38 ttyS29
crw-rw---- 1 root dialout 4, 67 Oct 24 12:38 ttyS3
crw-rw---- 1 root dialout 4, 94 Oct 24 12:38 ttyS30
crw-rw---- 1 root dialout 4, 95 Oct 24 12:38 ttyS31
crw-rw---- 1 root dialout 4, 68 Oct 24 12:38 ttyS4
crw-rw---- 1 root dialout 4, 69 Oct 24 12:38 ttyS5
crw-rw---- 1 root dialout 4, 70 Oct 24 12:38 ttyS6
crw-rw---- 1 root dialout 4, 71 Oct 24 12:38 ttyS7
crw-rw---- 1 root dialout 4, 72 Oct 24 12:38 ttyS8
crw-rw---- 1 root dialout 4, 73 Oct 24 12:38 ttyS9
drwxr-xr-x 2 root root 60 Oct 24 12:38 ubuntu-vg
crw-rw---- 1 root kvm 10, 124 Oct 24 12:38 udmabuf
crw----- 1 root root 10, 239 Oct 24 12:38 uhid
crw----- 1 root root 10, 223 Oct 24 12:38 uinput
crw-rw-rw- 1 root root 1, 9 Oct 24 12:38 urandom
crw----- 1 root root 10, 126 Oct 24 12:38 userfaultfd
crw----- 1 root root 10, 240 Oct 24 12:38 userio
crw-rw---- 1 root tty 7, 0 Oct 24 12:38 vcs
crw-rw---- 1 root tty 7, 1 Oct 24 12:38 vcs1
crw-rw---- 1 root tty 7, 2 Oct 24 12:38 vcs2
crw-rw---- 1 root tty 7, 3 Oct 24 12:38 vcs3
crw-rw---- 1 root tty 7, 4 Oct 24 12:38 vcs4
crw-rw---- 1 root tty 7, 5 Oct 24 12:38 vcs5
crw-rw---- 1 root tty 7, 6 Oct 24 12:38 vcs6
crw-rw---- 1 root tty 7, 128 Oct 24 12:38 vcsa
crw-rw---- 1 root tty 7, 129 Oct 24 12:38 vcsa1
crw-rw---- 1 root tty 7, 130 Oct 24 12:38 vcsa2
crw-rw---- 1 root tty 7, 131 Oct 24 12:38 vcsa3
crw-rw---- 1 root tty 7, 132 Oct 24 12:38 vcsa4
crw-rw---- 1 root tty 7, 133 Oct 24 12:38 vcsa5
crw-rw---- 1 root tty 7, 134 Oct 24 12:38 vcsa6
crw-rw---- 1 root tty 7, 64 Oct 24 12:38 vcsu
crw-rw---- 1 root tty 7, 65 Oct 24 12:38 vcsu1
crw-rw---- 1 root tty 7, 66 Oct 24 12:38 vcsu2
crw-rw---- 1 root tty 7, 67 Oct 24 12:38 vcsu3
crw-rw---- 1 root tty 7, 68 Oct 24 12:38 vcsu4
crw-rw---- 1 root tty 7, 69 Oct 24 12:38 vcsu5
crw-rw---- 1 root tty 7, 70 Oct 24 12:38 vcsu6
drwxr-xr-x 2 root root 60 Oct 24 12:38 vfiio
crw----- 1 root root 10, 127 Oct 24 12:38 vga_arbiter
crw----- 1 root root 10, 137 Oct 24 12:38 vhci
crw-rw---- 1 root kvm 10, 238 Oct 24 12:38 vhost-net
crw-rw---- 1 root kvm 10, 241 Oct 24 12:38 vhost-vsock
crw----- 1 root root 10, 122 Oct 24 12:38 vmci
crw-rw-rw- 1 root root 10, 121 Oct 24 12:38 vsock
crw-rw-rw- 1 root root 1, 5 Oct 24 12:38 zero
crw----- 1 root root 10, 249 Oct 24 12:38 zfs
sadafriaz@2023-bse-077:~$
```

- Explore /var Directory – ls\_var.png

```
sadafriaz@2023-bse-077:~$ ls -la /var
total 52
drwxr-xr-x 12 root root 4096 Oct 24 10:34 .
drwxr-xr-x 23 root root 4096 Oct 15 09:58 ..
drwxr-xr-x 2 root root 4096 Oct 24 05:11 backups
drwxr-xr-x 16 root root 4096 Oct 15 11:28 cache
drwxrwsrwt 2 root root 4096 Aug 5 17:02 crash
drwxr-xr-x 45 root root 4096 Oct 15 11:28 lib
drwxrwsr-x 2 root staff 4096 Apr 22 2024 local
lrwxrwxrwx 1 root root 9 Aug 5 16:54 lock -> /run/lock
drwxrwxr-x 10 root syslog 4096 Oct 24 12:38 log
drwxrwsr-x 2 root mail 4096 Aug 5 16:54 mail
drwxr-xr-x 2 root root 4096 Aug 5 16:54 opt
lrwxrwxrwx 1 root root 4 Aug 5 16:54 run -> /run
drwxr-xr-x 4 root root 4096 Aug 5 17:14 spool
drwxrwsrwt 9 root root 4096 Oct 24 12:49 tmp
-rw-r--r-- 1 root root 208 Aug 5 16:54 .updated
sadafriaz@2023-bse-077:~$
```

- Explore /tmp Directory – ls\_tmp.png

```
sadafriaz@2023-bse-077:~$ ls -la /tmp
total 56
drwxrwxrwt 14 root root 4096 Oct 24 12:49 .
drwxr-xr-x 23 root root 4096 Oct 15 09:58 ..
drwxrwxrwt 2 root root 4096 Oct 24 12:38 .font-unix
drwxrwxrwt 2 root root 4096 Oct 24 12:38 .ICE-unix
drwx----- 3 root root 4096 Oct 24 12:49 systemd-private-23d38cada1bc46989517314f39ef1873-fwupd.service-wvY8Rc
drwx----- 3 root root 4096 Oct 24 12:38 systemd-private-23d38cada1bc46989517314f39ef1873-ModemManager.service-3tHqk7
drwx----- 3 root root 4096 Oct 24 12:38 systemd-private-23d38cada1bc46989517314f39ef1873-polkit.service-jr0UI9
drwx----- 3 root root 4096 Oct 24 12:38 systemd-private-23d38cada1bc46989517314f39ef1873-systemd-logind.service-K4mD18
drwx----- 3 root root 4096 Oct 24 12:38 systemd-private-23d38cada1bc46989517314f39ef1873-systemd-resolved.service-PVPCIp
drwx----- 3 root root 4096 Oct 24 12:38 systemd-private-23d38cada1bc46989517314f39ef1873-systemd-timesyncd.service-bfYB0u
drwx----- 3 root root 4096 Oct 24 12:49 systemd-private-23d38cada1bc46989517314f39ef1873-upower.service-9EIWqt
drwx----- 2 root root 4096 Oct 24 12:38 vmware-root_740-2939460834
drwxrwxrwt 2 root root 4096 Oct 24 12:38 .X11-unix
drwxrwxrwt 2 root root 4096 Oct 24 12:38 .XIM-unix
```

- List Home Directory Contents – home\_ls.png

```
sadafriaz@2023-bse-077:~$ ls -la ~
total 32
drwxr-xr-x 4 sadafriaz sadafriaz 4096 Oct 15 11:39 .
drwxr-xr-x 3 root root 4096 Oct 15 10:20 ..
-rw----- 1 sadafriaz sadafriaz 255 Oct 24 10:06 .bash_history
-rw-r--r-- 1 sadafriaz sadafriaz 220 Mar 31 2024 .bash_logout
-rw-r--r-- 1 sadafriaz sadafriaz 3771 Mar 31 2024 .bashrc
drwx----- 2 sadafriaz sadafriaz 4096 Oct 15 10:21 .cache
-rw-r--r-- 1 sadafriaz sadafriaz 807 Mar 31 2024 .profile
drwx----- 2 sadafriaz sadafriaz 4096 Oct 15 10:21 .ssh
-rw-r--r-- 1 sadafriaz sadafriaz 0 Oct 15 11:39 .sudo_as_admin_successful
sadafriaz@2023-bse-077:~$ _
```

- Record Answers in answers.md – answers\_md.png

```
sadafriaz@2023-bse-077:~$ cat ~/answers.md
The /bin directory contains essential user command binaries needed for basic system operations such as ls and cp.
The /usr/bin directory holds most of the user commands and applications that are not required for booting but are used by normal user.
The /usr/local/bin directory is for user-installed software and scripts that are not managed by the system's package manager.
sadafriaz@2023-bse-077:~$
```

## Task 4 – Essential CLI Tasks (Navigation & File Operations)

- Create Workspace Directory – mkdir\_workspace.png

```
sadafriaz@2023-bse-077:~$ mkdir -p ~/lab4/workspace/python_project
sadafriaz@2023-bse-077:~$
```

- Change to Workspace Directory – cd\_workspace.png

```
sadafriaz@2023-bse-077:~$ cd ~/lab4/workspace/python_project
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- Display Current Path (pwd) – pwd\_workspace.png

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ pwd
/home/sadafriaz/lab4/workspace/python_project
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Create File using Nano – nano\_readme.png**

```
GNU nano 7.2
lab 4 Readme_
```

- **Create Second File using Nano – nano\_main.png**

```
GNU nano 7.2 main.py *
print("hello lab4")
```

- **Create Environment File using Nano – nano\_env.png**

```
GNU nano 7.2
ENV=lab4
```

- **List Files in Workspace – workspace\_ls.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ ls -la
total 20
drwxrwxr-x 2 sadafriaz sadafriaz 4096 Oct 24 16:11 .
drwxrwxr-x 3 sadafriaz sadafriaz 4096 Oct 24 15:37 ..
-rw-rw-r-- 1 sadafriaz sadafriaz   9 Oct 24 16:11 env
-rw-rw-r-- 1 sadafriaz sadafriaz  20 Oct 24 16:03 main.py
-rw-rw-r-- 1 sadafriaz sadafriaz  13 Oct 24 16:01 README.md
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Copy File Using cp Command – cp\_readme.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ cp README.md README.copy.md
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Move File Using mv Command – mv\_readme.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ mv README.copy.md README.dev.md
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ _
```

- **Remove File Using rm Command – rm\_readme.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ rm README.dev.md
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Create Directory for Java App – mkdir\_java\_app.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ mkdir -p ~/lab4/workspace/java_aap
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ _
```

- **Copy Folder Recursively – cp\_recursive.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ _
```

- **Verify Copied Folder – copy\_verify.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ ls -la ~/lab4/workspace
total 20
drwxrwxr-x 5 sadafriaz sadafriaz 4096 Oct 24 16:28 .
drwxrwxr-x 3 sadafriaz sadafriaz 4096 Oct 24 15:37 ..
drwxrwxr-x 2 sadafriaz sadafriaz 4096 Oct 24 16:25 java_aap
drwxrwxr-x 2 sadafriaz sadafriaz 4096 Oct 24 16:28 java_app_copy
drwxrwxr-x 2 sadafriaz sadafriaz 4096 Oct 24 16:22 python_project
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Display Command History – history.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ history
 1 sudo apt update
 2 sudo apt install open-vm-tool-desktop-y
 3 sudo reboot
 4 sudo apt update
 5 sudo apt install openssh-server
 6 sudo apt --fix-missing
 7 sudo apt install -f
 8 sudo dpkg --configure -a
 9 sudo apt full-upgrade
10 sudo apt install openssh-server
11 sudo reboot
12 whoami
13 pwd
14 ls -la /
15 ls -la /bin
16 ls -la /sbin
17 ls -la /usr
18 ls -la /opt
19 ls -la /etc
20 ls -la /dev
21 ls -la /var
22 ls -la /vtmp
23 ls -la /tmp
24 ls -la ~
25 nano ~/answers.md
26 cat ~/answers.md
27 mkdir -p ~/lab4/workspace/python_project
28 cd ~/lab4/workspace/python_project
29 pwd
30 nano README.md
31 nano main.py
32 nano env
33 ls -la
34 cp README.md README.copy.md
35 mv README.copy.md README.dev.md
36 rm README.dev.md
37 mkdir -p ~/lab4/workspace/java_aap
38 cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
39 ls -la ~/lab4/workspace
40 history
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

## Task 5 – System Info, Resources & Processes

- Display System Information (uname) – uname.png

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ uname -a
Linux 2023-bse-077 6.8.0-86-generic #87-Ubuntu SMP PREEMPT_DYNAMIC Mon Sep 22 18:03:36 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux
```

- View CPU Information – cpuinfo.png

```
core id           : 0
cpu cores         : 1
apicid            : 0
initial apicid    : 0
fpu               : yes
fpu_exception     : yes
cpuid level       : 32
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 rep_good nopl xtopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq sse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave
e_ux f16c rdrand hypervisor lahf_lm abm 3dnowprefetch pt1 ssbd ibrs ibpb stibp fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx smap clflushopt
clwb sha_ni xsaveopt xsavec xgetbv1 xsaves avx_vnni arat umip gfni vaes vpclmulqdq rdpid movdiri movdir64b fsrm serialize flush_lid arch_capabilities
bugs             : cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass l1tf mds swapgs retbleed rfid bhi
bogomips         : 4992.00
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             : 154
model name        : 12th Gen Intel(R) Core(TM) i3-1215U
stepping          : 4
microcode         : 0xffffffff
cpu MHz           : 2496.000
cache size        : 10240 KB
physical id       : 2
siblings          : 1
core id           : 0
cpu cores         : 1
apicid            : 2
initial apicid    : 2
fpu               : yes
fpu_exception     : yes
cpuid level       : 32
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 rep_good nopl xtopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq sse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave
e_ux f16c rdrand hypervisor lahf_lm abm 3dnowprefetch pt1 ssbd ibrs ibpb stibp fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx smap clflushopt
clwb sha_ni xsaveopt xsavec xgetbv1 xsaves avx_vnni arat umip gfni vaes vpclmulqdq rdpid movdiri movdir64b fsrm serialize flush_lid arch_capabilities
bugs             : cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass l1tf mds swapgs retbleed rfid bhi
bogomips         : 4992.00
clflush size      : 64
cache_alignment   : 64
address sizes     : 45 bits physical, 48 bits virtual
power management:

sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- View Memory Information – meminfo.png

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ free -h
               total        used        free       shared    buff/cache       available
Mem:           1.9Gi        357Mi        1.4Gi         1.2Mi        287Mi        1.5Gi
Swap:          1.9Gi          0B        1.9Gi
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ _
```

- Check Disk Usage – diskinfo.png

```
Swap:          1.9Gi          0B        1.9Gi
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           192M  1.3M  191M   1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv 9.8G  4.9G  4.5G  53% /
tmpfs           960M    0  960M   0% /dev/shm
tmpfs           5.0M    0   5.0M   0% /run/lock
/dev/sda2       1.8G  192M  1.5G  12% /boot
tmpfs          192M   8.0K  192M   1% /run/user/1000
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```



- Display OS Release Info – os-release.png

```

sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ cat /etc/os-release
PRETTY_NAME="Ubuntu 24.04.3 LTS"
NAME="Ubuntu"
VERSION_ID="24.04"
VERSION="24.04.3 LTS (Noble Numbat)"
VERSION_CODENAME=noble
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=noble
LOGO=ubuntu-logo
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$

```

- List Running Processes – processes.png

```

root      458  0.0  0.0      0  0 ?    I<  13:49  0:00 [kworker/R-kmpat]
root      485  0.0  0.0      0  0 ?    I  13:49  0:00 [kworker/u256:1]
root      497  0.0  1.3 354628 27392 ?    Ssl  13:49  0:01 /sbin/multipathd -d -s
root      496  0.0  0.4 30508 9088 ?    Ss  13:49  0:00 /usr/lib/systemd/systemd-udev
root      510  0.0  0.0      0  0 ?    S  13:49  0:00 [psimon]
root      560  0.0  0.0      0  0 ?    I<  13:49  0:00 [kworker/1:2H-kblockd]
root      576  0.0  0.0      0  0 ?    S  13:49  0:00 [irq/57-vmu_vmc1]
root      578  0.0  0.0      0  0 ?    S  13:49  0:00 [irq/58-vmu_vmc1]
root      580  0.0  0.0      0  0 ?    S  13:49  0:00 [irq/59-vmu_vmc1]
root      587  0.0  0.0      0  0 ?    S  13:49  0:00 [jbd2/sda2-8]
root      588  0.0  0.0      0  0 ?    I<  13:49  0:00 [kworker/R-ext4:]
systemd+  624  0.0  0.4 19008 9344 ?    Ss  13:49  0:00 /usr/lib/systemd/systemd-networkd
systemd+  630  0.0  0.6 21580 12800 ?    Ss  13:49  0:00 /usr/lib/systemd/systemd-resolved
systemd+  636  0.0  0.3 91024 7800 ?    Ssl  13:49  0:00 /usr/lib/systemd/systemd-timesyncd
root      680  0.0  0.0      0  0 ?    I<  13:49  0:00 [kworker/R-cfg80]
root      695  0.0  0.0      0  0 ?    S  13:49  0:00 [irq/16-vmwgfx]
root      696  0.0  0.0      0  0 ?    I<  13:49  0:00 [kworker/R-ttm]
root      739  0.0  0.6 53464 12160 ?    Ss  13:49  0:00 /usr/bin/VGAAuthService
root      740  0.2  0.4 242148 9216 ?    Ssl  13:49  0:21 /usr/bin/vmtoclsd
message+  741  0.0  0.2  8796 5584 ?    Ss  13:49  0:00 dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-o
polkitd   750  0.0  0.4 368164 7936 ?    Ssl  13:49  0:00 /usr/lib/polkit-1/polkitd --no-debug
root      784  0.0  0.4 18152 8784 ?    Ss  13:49  0:00 /usr/lib/systemd/systemd-logind
root      795  0.0  0.6 468952 13440 ?    Ssl  13:49  0:00 /usr/libexec/udisks2/udisksd
syslog    822  0.0  0.3 222508 6164 ?    Ssl  13:49  0:00 /usr/sbin/rsyslogd -n -iNONE
root      847  0.0  1.1 109692 22912 ?    Ssl  13:49  0:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
root      877  0.0  0.6 318356 12544 ?    Ssl  13:49  0:00 /usr/sbin/ModemManager
root      1135 0.0  0.1 6824 2688 ?    Ss  13:49  0:00 /usr/sbin/cron -f -P
root      1141 0.0  0.4 12020 7936 ?    Ss  13:49  0:00 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
root      1147 0.0  0.2  6944 4796 tty1  Ss  13:49  0:00 /bin/login -p -
root      1223 0.0  2.2 595688 43424 ?    Ssl  14:00  0:02 /usr/libexec/fwupd/fwupd
root      1230 0.0  0.4 313964 8960 ?    Ssl  14:00  0:00 /usr/libexec/upowerd
root      1437 0.0  0.0      0  0 ?    S  14:45  0:00 [psimon]
sadafriz+ 1440 0.0  0.5 20264 11136 ?    Ss  14:45  0:00 /usr/lib/systemd/systemd --user
sadafriz+ 1441 0.0  0.1 21152 3500 ?    S  14:45  0:00 (sd-pam)
sadafriz+ 1451 0.0  0.2 8652 5504 tty1  S  14:45  0:00 -bash
root      1495 0.0  0.0      0  0 ?    I<  14:45  0:00 [kworker/R-tls-s]
root      1578 0.0  0.0      0  0 ?    I  15:40  0:03 [kworker/1:3-events]
root      1579 0.0  0.0      0  0 ?    I  15:41  0:00 [kworker/u258:1-events_power_efficient]
root      1585 0.0  0.0      0  0 ?    I  15:41  0:00 [kworker/0:1-cgroup_destroy]
root      1587 0.0  0.0      0  0 ?    I  15:41  0:00 [kworker/u257:2-events_power_efficient]
root      1602 0.0  0.0      0  0 ?    I<  15:55  0:00 [kworker/0:2H-kblockd]
root      1607 0.0  0.0      0  0 ?    I  16:00  0:01 [kworker/0:2-mpt_poll_0]
root      1615 0.0  0.0      0  0 ?    I  16:05  0:00 [kworker/u257:3-events_power_efficient]
root      1623 0.0  0.0      0  0 ?    I  16:14  0:00 [kworker/u258:2-events_unbound]
root      1631 0.0  0.0      0  0 ?    I  16:18  0:00 [kworker/1:1-cgub_release]
root      1638 0.0  0.0      0  0 ?    I  16:22  0:00 [kworker/u257:0-events_power_efficient]
root      1646 0.0  0.0      0  0 ?    I  16:20  0:00 [kworker/u258:4-events_power_efficient]
root      1655 0.0  0.0      0  0 ?    I  16:33  0:00 [kworker/u258:0-events_unbound]
sadafriz+ 1664 1100 0.2 10884 4480 tty1  R+  16:38  0:00 ps aux
sadafriaz@2023-bse-077:~/lab4/workspace/python_projects$

```

## Task 6 – User and Account Verification

- Create New User (adduser) – adduser\_lab4user.png

```

sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ sudo adduser lab4user
[sudo] password for sadafriz:
info: Adding user `lab4user' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `lab4user' (1001) ...
info: Adding new user `lab4user' (1001) with group `lab4user' (1001) ...
info: Creating home directory `/home/lab4user' ...
info: 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 []: sadafriz
    Room Number []: 077
    Work Phone []: 03029801594
    Home Phone []: 03029801594
    Other []: no
Is the information correct? [Y/n] Y
info: Adding new user `lab4user' to supplemental / extra groups `users' ...
info: Adding user `lab4user' to group `users' ...
sadafriaz@2023-bse-077:~/lab4/workspace/python_projects$

```

- **Set Password for New User – lab4user\_passwd.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ getent passwd lab4user
lab4user:x:1001:1001:sadafriaz,077,03029801594,03029801594,no:/home/lab4user:/bin/bash
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Switch to New User (su command) – su\_lab4user.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ getent passwd lab4user
lab4user:x:1001:1001:sadafriaz,077,03029801594,03029801594,no:/home/lab4user:/bin/bash
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ su - lab4user
Password:
lab4user@2023-bse-077:~$ _
```

- **Verify Admin Access Using sudo – sudo\_whoami.png**

```
lab4user@2023-bse-077:~$ sudo whoami
[sudo] password for lab4user:
lab4user is not in the sudoers file.
lab4user@2023-bse-077:~$
```

- **Return to Original User – exit\_back.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ _
```

- **Delete Created User (Optional) – deluser.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ sudo deluser --remove-home lab4user
info: Looking for files to backup/remove ...
info: Removing files ...
info: Removing crontab ...
info: Removing user 'lab4user' ...
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ _
```

### **Bonus Task 7 – Demo Script**

- **Create Demo Script Using Nano – nano\_run\_demo.png**

```
GNU nano 7.2 /home/
#!/bin/bash
echo "lab 4 demo:current user is $(whoami)"
echo "Current time: $(date)"
uptime
free -h
```

- **Grant Execute Permission (chmod) – chmod\_run\_demo.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ chmod +x ~/lab4/workspace/run-demo.sh
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Run Demo Script – run\_demo\_output.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ chmod +x ~/lab4/workspace/run-demo.sh
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ ~/lab4/workspace/run-demo.sh
lab 4 demo:current user is sadafriaz
Current time: Fri Oct 24 05:27:08 PM UTC 2025
 17:27:08 up  3:37,  1 user,  load average: 0.01, 0.00, 0.00
Mem:           total        used        free      shared  buff/cache   available
Swap:          1.9Gi         363Mi        1.4Gi        1.2Mi       301Mi       1.5Gi
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```

- **Run Script with Sudo (Optional) – run\_demo\_output\_sudo.png**

```
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$ sudo ~/lab4/workspace/run-demo.sh
[sudo] password for sadafriaz:
Sorry, try again.
[sudo] password for sadafriaz:
lab 4 demo:current user is root
Current time: Fri Oct 24 05:28:30 PM UTC 2025
 17:28:30 up  3:39,  1 user,  load average: 0.00, 0.00, 0.00
Mem:           total        used        free      shared  buff/cache   available
Swap:          1.9Gi         363Mi        1.4Gi        1.2Mi       302Mi       1.5Gi
sadafriaz@2023-bse-077:~/lab4/workspace/python_project$
```