

NAME: SANA TARIQ

CLASS: BSE 5B

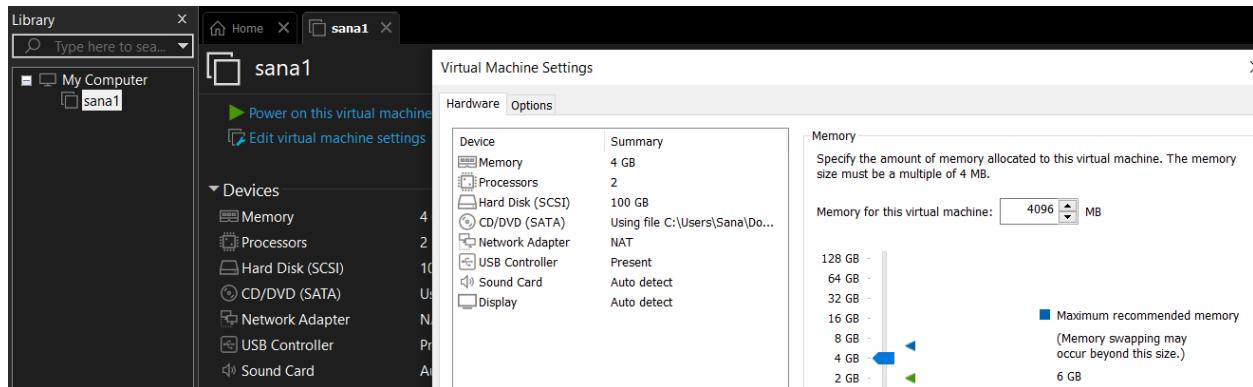
REG.NO: 058

SUBJECT: CLOUD COMPUTING

LAB#04

TASK#01:

Verify VM resources in VMware



TASK#02:

Display detailed **information about the operating system** running on your virtual machine using the correct command. Capture the output in a screenshot.

```
C:\Users\Sana>ssh sana058@192.168.188.128
sana058@192.168.188.128's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-71-generic x86_64)

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

System information as of Thu Oct 23 02:12:53 PM UTC 2025

System load:  0.07      Processes:          250
Usage of /:   13.1% of 47.93GB   Users logged in:   1
Memory usage: 7%           IPv4 address for ens33: 192.168.188.128
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

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Tue Sep 30 14:48:09 2025 from 192.168.188.1
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

```
sana058@sana1:~$ whoami  
sana058  
sana058@sana1:~$ pwd  
/home/sana058  
sana058@sana1:~$
```

TASK#03:

Create a **workspace directory structure** inside your home directory for Lab 4, including folders named `lab4`, `workspace`, and `python_project`. Take a screenshot showing the created directory structure.

```
sana058@sana1:~$ ls -la  
total 32  
drwxr-x--- 4 sana058 sana058 4096 Sep 30 15:15 .  
drwxr-xr-x  3 root    root   4096 Sep 30 14:38 ..  
-rw----- 1 sana058 sana058   11 Sep 30 15:15 .bash_history  
-rw-r--r-- 1 sana058 sana058  220 Mar 31  2024 .bash_logout  
-rw-r--r-- 1 sana058 sana058 3771 Mar 31  2024 .bashrc  
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .cache  
-rw-r--r-- 1 sana058 sana058  807 Mar 31  2024 .profile  
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .ssh  
sana058@sana1:~$
```

```
sana058@sana1:~$ ls -la /bin  
lrwxrwxrwx 1 root root 7 Apr 22  2024 /bin -> usr/bin  
sana058@sana1:~$ ls -la /sbin  
lrwxrwxrwx 1 root root 8 Apr 22  2024 /sbin -> usr/sbin  
sana058@sana1:~$ ls -la /usr  
total 96  
drwxr-xr-x 12 root root 4096 Aug  5 16:54 .  
drwxr-xr-x  23 root root 4096 Sep 30 14:23 ..  
drwxr-xr-x   2 root root 36864 Sep 30 14:30 bin  
drwxr-xr-x   2 root root 4096 Apr 22  2024 games  
drwxr-xr-x   33 root root 4096 Sep 30 14:22 include  
drwxr-xr-x   78 root root 4096 Sep 30 14:30 lib  
drwxr-xr-x   2 root root 4096 Aug  5 17:01 lib64  
drwxr-xr-x   11 root root 4096 Sep 30 14:23 libexec  
drwxr-xr-x   10 root root 4096 Aug  5 16:54 local  
drwxr-xr-x   2 root root 20480 Sep 30 14:36 sbin  
drwxr-xr-x  124 root root 4096 Sep 30 14:30 share  
drwxr-xr-x   4 root root 4096 Sep 30 14:23 src
```

```
sana058@sana1:~$ ls -la /opt  
total 8  
drwxr-xr-x  2 root root 4096 Aug  5 16:54 .  
drwxr-xr-x  23 root root 4096 Sep 30 14:23 ..
```

```

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----- 1 root shadow     969 Sep 30 14:38 shadow
-rw-r----- 1 root shadow     969 Sep 30 14:38 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 Sep 30 14:38 ssh
drwxr-xr-x  4 root root      4096 Aug  5 17:02 ssl
-rw-r--r--  1 root root     21 Sep 30 14:38 subgid
-rw-r--r--  1 root root      0 Aug  5 16:54 subgid-
-rw-r--r--  1 root root     21 Sep 30 14:38 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
-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 Sep 30 14:23 thermald
-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 Aug  5 17:14 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 Sep 30 14:23 UPower
-rw-r--r--  1 root root    1523 Aug  5 17:14 usb_modeswitch.conf
drwxr-xr-x  2 root root      4096 Aug  5 17:14 usb_modeswitch.d
lrwxrwxrwx  1 root root      16 Aug  5 17:02 vconsole.conf -> default/keyboard
drwxr-xr-x  2 root root      4096 Aug  5 17:14 vim
drwxr-xr-x  4 root root      4096 Aug  5 17:14 vmware-tools
lrwxrwxrwx  1 root root     23 Feb 26 2024 vtrgb -> /etc/alternatives/vtrgb
-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  8 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
sensors@sensor1:~$
```

```
crw-rw---- 1 root dialout 4, 91 Oct 23 14:09 ttys27
crw-rw---- 1 root dialout 4, 92 Oct 23 14:09 ttys28
crw-rw---- 1 root dialout 4, 93 Oct 23 14:09 ttys29
crw-rw---- 1 root dialout 4, 67 Oct 23 14:09 ttys3
crw-rw---- 1 root dialout 4, 94 Oct 23 14:09 ttys30
crw-rw---- 1 root dialout 4, 95 Oct 23 14:09 ttys31
crw-rw---- 1 root dialout 4, 68 Oct 23 14:09 ttys4
crw-rw---- 1 root dialout 4, 69 Oct 23 14:09 ttys5
crw-rw---- 1 root dialout 4, 70 Oct 23 14:09 ttys6
crw-rw---- 1 root dialout 4, 71 Oct 23 14:09 ttys7
crw-rw---- 1 root dialout 4, 72 Oct 23 14:09 ttys8
crw-rw---- 1 root dialout 4, 73 Oct 23 14:09 ttys9
drwxr-xr-x 2 root root 60 Oct 23 14:09 ubuntu-vg
crw-rw---- 1 root kvm 10, 124 Oct 23 14:09 udmabuf
crw----- 1 root root 10, 239 Oct 23 14:09 uhid
crw----- 1 root root 10, 223 Oct 23 14:09 uinput
crw-rw-rw- 1 root root 1, 9 Oct 23 14:09 urandom
crw----- 1 root root 10, 126 Oct 23 14:09 userfaultfd
crw----- 1 root root 10, 240 Oct 23 14:09 userio
crw-rw---- 1 root tty 7, 0 Oct 23 14:09 vcs
crw-rw---- 1 root tty 7, 1 Oct 23 14:09 vcs1
crw-rw---- 1 root tty 7, 2 Oct 23 14:09 vcs2
crw-rw---- 1 root tty 7, 3 Oct 23 14:09 vcs3
crw-rw---- 1 root tty 7, 4 Oct 23 14:09 vcs4
crw-rw---- 1 root tty 7, 5 Oct 23 14:09 vcs5
crw-rw---- 1 root tty 7, 6 Oct 23 14:09 vcs6
crw-rw---- 1 root tty 7, 128 Oct 23 14:09 vcsa
crw-rw---- 1 root tty 7, 129 Oct 23 14:09 vcsa1
crw-rw---- 1 root tty 7, 130 Oct 23 14:09 vcsa2
crw-rw---- 1 root tty 7, 131 Oct 23 14:09 vcsa3
crw-rw---- 1 root tty 7, 132 Oct 23 14:09 vcsa4
crw-rw---- 1 root tty 7, 133 Oct 23 14:09 vcsa5
crw-rw---- 1 root tty 7, 134 Oct 23 14:09 vcsa6
crw-rw---- 1 root tty 7, 64 Oct 23 14:09 vcsu
crw-rw---- 1 root tty 7, 65 Oct 23 14:09 vcsu1
crw-rw---- 1 root tty 7, 66 Oct 23 14:09 vcsu2
crw-rw---- 1 root tty 7, 67 Oct 23 14:09 vcsu3
crw-rw---- 1 root tty 7, 68 Oct 23 14:09 vcsu4
crw-rw---- 1 root tty 7, 69 Oct 23 14:09 vcsu5
crw-rw---- 1 root tty 7, 70 Oct 23 14:09 vcsu6
drwxr-xr-x 2 root root 60 Oct 23 14:09 vfio
crw----- 1 root root 10, 127 Oct 23 14:09 vga_arbiter
crw----- 1 root root 10, 137 Oct 23 14:09 vhci
crw-rw---- 1 root kvm 10, 238 Oct 23 14:09 vhost-net
crw-rw---- 1 root kvm 10, 241 Oct 23 14:09 vhost-vsock
crw----- 1 root root 10, 122 Oct 23 14:09 vmci
crw-rw-rw- 1 root root 10, 121 Oct 23 14:09 vsock
crw-rw-rw- 1 root root 1, 5 Oct 23 14:09 zero
crw----- 1 root root 10, 249 Oct 23 14:09 zfs
```

```
sana058@sana1:~$ ls -la /tmp
total 52
drwxrwxrwt 13 root root 4096 Oct 23 14:10 .
drwxr-xr-x 23 root root 4096 Sep 30 14:23 ..
drwxrwxrwt 2 root root 4096 Oct 23 14:09 .font-unix
drwxrwxrwt 2 root root 4096 Oct 23 14:09 .ICE-unix
drwx----- 2 root root 4096 Oct 23 14:09 snap-private-tmp
drwx----- 3 root root 4096 Oct 23 14:09 systemd-private-0aice7000e7d4c36b8e5afca8c0e5ec2-ModemManager.service-tBbXJa
drwx----- 3 root root 4096 Oct 23 14:09 systemd-private-0aice7000e7d4c36b8e5afca8c0e5ec2-polkit.service-ItEmKC
drwx----- 3 root root 4096 Oct 23 14:09 systemd-private-0aice7000e7d4c36b8e5afca8c0e5ec2-systemd-logind.service-DsEE38
drwx----- 3 root root 4096 Oct 23 14:09 systemd-private-0aice7000e7d4c36b8e5afca8c0e5ec2-systemd-resolved.service-MkjJ74
drwx----- 3 root root 4096 Oct 23 14:09 systemd-private-0aice7000e7d4c36b8e5afca8c0e5ec2-systemd-timesyncd.service-SjOJu2
drwx----- 2 root root 4096 Oct 23 14:09 vmware-root_802-2991202885
drwxrwxrwt 2 root root 4096 Oct 23 14:09 .X11-unix
drwxrwxrwt 2 root root 4096 Oct 23 14:09 .XIM-unix
sana058@sana1:~$ ls -la /var
total 56
drwxr-xr-x 13 root root 4096 Sep 30 14:37 .
drwxr-xr-x 23 root root 4096 Sep 30 14:23 ..
drwxr-xr-x 2 root root 4096 Oct 23 14:09 backups
drwxr-xr-x 14 root root 4096 Sep 30 14:39 cache
drwxrwsrwt 2 root root 4096 Aug 5 17:02 crash
drwxr-xr-x 44 root root 4096 Sep 30 14:38 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 23 14:09 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 2 root root 4096 May 21 15:46 snap
drwxr-xr-x 4 root root 4096 Aug 5 17:14 spool
drwxrwxrwt 7 root root 4096 Oct 23 14:10 tmp
-rw-r--r-- 1 root root 208 Aug 5 16:54 .updated
```

```
sana058@sana1:~$ ls -la ~
total 32
drwxr-x--- 4 sana058 sana058 4096 Sep 30 15:15 .
drwxr-xr-x 3 root root 4096 Sep 30 14:38 ..
-rw----- 1 sana058 sana058 11 Sep 30 15:15 .bash_history
-rw-r--r-- 1 sana058 sana058 220 Mar 31 2024 .bash_logout
-rw-r--r-- 1 sana058 sana058 3771 Mar 31 2024 .bashrc
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .cache
-rw-r--r-- 1 sana058 sana058 807 Mar 31 2024 .profile
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .ssh
```

```
sana058@sana1:~$ cat ~/answers.md
/bin contains essential user commands binaries required for minimal system operation and for single-user mode. /usr/bin holds the majority of standard user comm
ands and applications installed by distribution. /usr/local/bin is for locally built or manually installed programs - things you or the admin install should not
be overwritten by distro package updates.
sana058@sana1:~$
```

TASK#04:

Navigate to the `python_project` directory you created and display the **full current path** to confirm your location. Take a screenshot of the command and output.

```
sana058@sana1:~$ mkdir -p ~/lab4/workspace/python_project
sana058@sana1:~$ cd ~/lab4/workspace/python_project
sana058@sana1:~/lab4/workspace/python_project$ pwd
/home/sana058/lab4/workspace/python_project
sana058@sana1:~/lab4/workspace/python_project$
```

```
sana058@sana1:~/lab4/workspace/python_project$ cat .env
ENV=LAB4
sana058@sana1:~/lab4/workspace/python_project$ cat README.md
LAB4-README
sana058@sana1:~/lab4/workspace/python_project$ cat main.py
hello LAB-4
sana058@sana1:~/lab4/workspace/python_project$
```

```
sana058@sana1:~/lab4/workspace/python_project$ ls -la ~
total 44
drwxr-x--- 6 sana058 sana058 4096 Oct 23 14:42 .
drwxr-xr-x  3 root    root   4096 Sep 30 14:38 ..
-rw-rw-r--  1 sana058 sana058  365 Oct 23 14:30 answers.md
-rw-----  1 sana058 sana058  258 Oct 23 14:35 .bash_history
-rw-r--r--  1 sana058 sana058  220 Mar 31 2024 .bash_logout
-rw-r--r--  1 sana058 sana058 3771 Mar 31 2024 .bashrc
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .cache
drwxrwxr-x  3 sana058 sana058 4096 Oct 23 14:42 lab4
drwxrwxr-x  3 sana058 sana058 4096 Oct 23 14:26 .local
-rw-r--r--  1 sana058 sana058  807 Mar 31 2024 .profile
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .ssh
sana058@sana1:~/lab4/workspace/python_project$
```

```
sana058@sana1:~/lab4/workspace/python_project$ cp README.md README.copy.md
sana058@sana1:~/lab4/workspace/python_project$ mv README.copy.md README.dev.md
sana058@sana1:~/lab4/workspace/python_project$ rm README.dev.md
sana058@sana1:~/lab4/workspace/python_project$ _
```

```
sana058@sana1:~/lab4/workspace/python_project$ mkdir -p ~/lab4/workspace/java_app
sana058@sana1:~/lab4/workspace/python_project$ cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
sana058@sana1:~/lab4/workspace/python_project$ ls -la ~/lab4/workspace
total 20
drwxrwxr-x  5 sana058 sana058 4096 Oct 23 14:55 .
drwxrwxr-x  3 sana058 sana058 4096 Oct 23 14:42 ..
drwxrwxr-x  2 sana058 sana058 4096 Oct 23 14:54 java_app
drwxrwxr-x  2 sana058 sana058 4096 Oct 23 14:55 java_app_copy
drwxrwxr-x  2 sana058 sana058 4096 Oct 23 14:52 python_project
sana058@sana1:~/lab4/workspace/python_project$ _
```

```
sana058@sana1:~/lab4/workspace/python_project$ nano main.py
.env      main.py      README.md
sana058@sana1:~/lab4/workspace/python_project$ nano main.py
```

TASK#05:

Create a new **shell script file** named `run-demo.sh` inside the `workspace` directory. Add commands to display the current user, current date and time, and system information. Save and exit the file.

```
sana058@sana1:~/lab4/workspace/python_project$ uname -a
Linux sana1 6.8.0-71-generic #71-Ubuntu SMP PREEMPT_DYNAMIC Tue Jul 22 16:52:38 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux
```

```
sana058@sana1:~/lab4/workspace/python_project$ free -h
              total        used        free      shared  buff/cache   available
Mem:       3.8Gi       497Mi      2.7Gi      1.5Mi      807Mi      3.3Gi
Swap:      3.8Gi         0B      3.8Gi

sana058@sana1:~/lab4/workspace/python_project$ df -h
Filesystem            Size  Used Avail Use% Mounted on
tmpfs                 387M  1.5M  386M  1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv  48G  6.6G  39G  15% /
tmpfs                 1.9G     0  1.9G  0% /dev/shm
tmpfs                 5.0M     0  5.0M  0% /run/lock
/dev/sda2               2.0G  100M  1.7G  6% /boot
tmpfs                 387M   12K  387M  1% /run/user/1000
```

```
sana058@sana1:~/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
sana058@sana1:~/lab4/workspace/python_project$ _
```

```
fpu      : yes
fpu_exception : yes
cpuid level  : 27
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 xtTopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq vmx ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_
           deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow ept vpid ept_ad fsgsbase tsc_adjust
           bmi1 avx2 smep bmi2 erms invpcid avx512f avx512dq rdseed adx smap avx512fma clflushopt avx512cd sha_nl avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves arat vn
           ml avx512vbmi umip pkru ospkc avx512_vbm12 gfni vaes vpclmulqdq avx512_vnni avx512_bit16 avx512_vppcnrdq rdpid frm md_clear flush_lid arch_capabilities
vmx flags    : vmnl invvpid ept_x_only ept_ad tsc_offset vtrr mtf ept vpid unrestricted_guest pte ept_mode_based_exec
bugs       : spectre_v1 spectre_v2 spec_store_bypass swaps itlb_multihit srbd mmio_stale_data retbleed elibrss_pbrsb gds bhi
bogomips   : 2380.79
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     : 126
model name : Intel(R) Core(TM) i5-1035G1 CPU @ 1.00GHz
stepping   : 5
microcode  : 0xbc
cpu MHz    : 1190.399
cache size : 6144 KB
physical id: 2
siblings   : 1
core id   : 0
cpu cores  : 1
apicid     : 2
initial apicid : 2
fpu       : yes
fpu_exception : yes
cpuid level  : 27
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 xtTopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq vmx ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_
           deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow ept vpid ept_ad fsgsbase tsc_adjust
           bmi1 avx2 smep bmi2 erms invpcid avx512f avx512dq rdseed adx smap avx512fma clflushopt avx512cd sha_nl avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves arat vn
           ml avx512vbmi umip pkru ospkc avx512_vbm12 gfni vaes vpclmulqdq avx512_vnni avx512_bit16 avx512_vppcnrdq rdpid frm md_clear flush_lid arch_capabilities
vmx flags    : vmnl invvpid ept_x_only ept_ad tsc_offset vtrr mtf ept vpid unrestricted_guest pte ept_mode_based_exec
bugs       : spectre_v1 spectre_v2 spec_store_bypass swaps itlb_multihit srbd mmio_stale_data retbleed elibrss_pbrsb gds bhi
bogomips   : 2380.79
clflush size : 64
cache_alignment : 64
address sizes : 45 bits physical, 48 bits virtual
power management:
sana058@sana1:~/lab4/workspace/python_project$ cat /proc/cpuinfo_
```

TASK#06:

Change the file permissions of `run-demo.sh` to make it **executable** using the appropriate command. Take a screenshot showing the command used.

```
sana058@sana1:~/lab4/workspace/python_project$ sudo adduser lab4user
[sudo] password for sana058:
Sorry, try again.
[sudo] password for sana058:
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 []:
    Room Number []:
    Work Phone []:
    Home Phone []: 123
    Other []: 1111
Is the information correct? [Y/n] n
Changing the user information for lab4user
Enter the new value, or press ENTER for the default
    Full Name []: ryomen sukuna
    Room Number []: 666
    Work Phone []: 234
    Home Phone [123]: 123
    Other [1111]: 1111
Is the information correct? [Y/n] y
info: Adding new user `lab4user' to supplemental / extra groups `users' ...
info: Adding user `lab4user' to group `users' ...
```

```
sana058@sana1:~/lab4/workspace/python_project$ getent passwd lab4user
lab4user:x:1001:1001:ryomen sukuna,666,234,123,1111:/home/lab4user:/bin/bash
sana058@sana1:~/lab4/workspace/python_project$ su -lab4user
su: invalid option -- 'a'
Try 'su --help' for more information.
sana058@sana1:~/lab4/workspace/python_project$ su - lab4user
Password:
lab4user@sana1:~$ _
```

```
lab4user@sana1:~$ sudo whoami
[sudo] password for lab4user:
lab4user is not in the sudoers file.
lab4user@sana1:~$ _
```

```
sana058@sana1:~/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' ...
sana058@sana1:~/lab4/workspace/python_project$ _
```

BONUS TASK#07:

Execute the `run-demo.sh` script and observe its output displaying system details. Take a screenshot showing the execution and results.

```
GNU nano 7.2
#!/bin/bash
echo "Lab4 demo: current user is $(whoami)"
echo " Current time: $(date)"
uptime
free -h
```

```
sana058@sana1:~/lab4/workspace/python_project$ chmod +x ~/lab4/workspace/run-demo.sh
sana058@sana1:~/lab4/workspace/python_project$ ls -l ~/lab4/workspace/run-demo.sh
-rwxrwxr-x 1 sana058 sana058 101 Oct 23 16:11 /home/sana058/lab4/workspace/run-demo.sh
sana058@sana1:~/lab4/workspace/python_project$ sudo ~/lab4/workspace/run-demo.sh
[sudo] password for sana058:
Lab4 demo: current user is root
Current time: Thu Oct 23 04:14:12 PM UTC 2025
16:14:12 up 28 min, 1 user, load average: 0.02, 0.01, 0.00
      total        used        free      shared  buff/cache   available
Mem:       3.8Gi       467Mi      3.3Gi       1.5Mi       240Mi      3.3Gi
Swap:      3.8Gi        0B      3.8Gi
sana058@sana1:~/lab4/workspace/python_project$ _
```

EXAM EVALUATION QUESTIONS:

QUESTION#01:

Q1 — Remote Access Verification (Cyber Login Check)

Connect remotely to your Ubuntu VM from your host terminal using SSH. Take a screenshot showing the successful connection.

Run `whoami` and `pwd` to verify your current user and working directory. Capture both outputs in one screenshot.

Confirm you are connected to the correct host machine by displaying the hostname using `hostname`. Take a screenshot.

```
C:\Users\Sana>ssh sana058@192.168.188.128
sana058@192.168.188.128's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-71-generic x86_64)

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

System information as of Thu Oct 23 02:12:53 PM UTC 2025

System load: 0.07      Processes:           250
Usage of /: 13.1% of 47.93GB  Users logged in:        1
Memory usage: 7%          IPv4 address for ens33: 192.168.188.128
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

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Tue Sep 30 14:48:09 2025 from 192.168.188.1
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

```
sana058@sana1:~$ whoami  
sana058  
sana058@sana1:~$ pwd  
/home/sana058  
sana058@sana1:~$
```

```
sana058@sana1:~/lab4/workspace/python_project$ hostname && echo $HOME  
sana1  
/home/sana058  
sana058@sana1:~/lab4/workspace/python_project$
```

QUESTION#02:

Q2 — System Exploration and Reporting

Display a detailed list of all files and directories located in the system's root directory (/). Take a screenshot of the command and its output.

Display your operating system's release and version information. Capture the command and output in a screenshot.

Provide evidence of directory listings for key system directories such as /bin, /etc, /usr, and /var. You may combine all listings into a single screenshot or separate them individually.

List all visible and hidden files in your home directory. Take a screenshot showing the complete command output.

Create a Markdown file named answers.md in your home directory and record your written answers to the above questions. Take a screenshot showing the file being created or edited.

```
sana058@sana1:~$ ls -la  
total 32  
drwxr-x--- 4 sana058 sana058 4096 Sep 30 15:15 .  
drwxr-xr-x 3 root root 4096 Sep 30 14:38 ..  
-rw----- 1 sana058 sana058 11 Sep 30 15:15 .bash_history  
-rw-r--r-- 1 sana058 sana058 220 Mar 31 2024 .bash_logout  
-rw-r--r-- 1 sana058 sana058 3771 Mar 31 2024 .bashrc  
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .cache  
-rw-r--r-- 1 sana058 sana058 807 Mar 31 2024 .profile  
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .ssh  
sana058@sana1:~$
```

```
sana058@sana1:~$ ls -la /opt  
total 8  
drwxr-xr-x 2 root root 4096 Aug 5 16:54 .  
drwxr-xr-x 23 root root 4096 Sep 30 14:23 ..
```

```
sana058@sana1:~$ ls -la /bin
lrwxrwxrwx 1 root root 7 Apr 22 2024 /bin -> usr/bin
sana058@sana1:~$ ls -la /sbin
lrwxrwxrwx 1 root root 8 Apr 22 2024 /sbin -> usr/sbin
sana058@sana1:~$ ls -la /usr
total 96
drwxr-xr-x 12 root root 4096 Aug 5 16:54 .
drwxr-xr-x 23 root root 4096 Sep 30 14:23 ..
drwxr-xr-x 2 root root 36864 Sep 30 14:30 bin
drwxr-xr-x 2 root root 4096 Apr 22 2024 games
drwxr-xr-x 33 root root 4096 Sep 30 14:22 include
drwxr-xr-x 78 root root 4096 Sep 30 14:30 lib
drwxr-xr-x 2 root root 4096 Aug 5 17:01 lib64
drwxr-xr-x 11 root root 4096 Sep 30 14:23 libexec
drwxr-xr-x 10 root root 4096 Aug 5 16:54 local
drwxr-xr-x 2 root root 20480 Sep 30 14:36 sbin
drwxr-xr-x 124 root root 4096 Sep 30 14:30 share
drwxr-xr-x 4 root root 4096 Sep 30 14:23 src
```

QUESTION#03:

Q3 — Workspace Management and File Handling

Create a directory structure for your Lab 4 workspace (e.g.,

`~/lab4/workspace/python_projects`). Provide a screenshot showing that the directories were successfully created.

Create and edit three files inside your workspace — `README.md`, `main.py`, and `.env`. Each file should contain sample content. Capture separate screenshots showing each file being edited.

Demonstrate file management by copying, renaming, and deleting a file within your workspace. Include screenshots for each step (copy, rename, delete).

Create a backup copy of your entire workspace directory using recursive copy (`cp -r`). Then verify the backup contents. Provide screenshots of both actions.

Display your recent terminal command history to show all commands executed during this section. Capture it in a screenshot.

Demonstrate shell auto-completion by partially typing a command or filename and using the **Tab** key to complete it. Take a screenshot showing the process.

```
sana058@sana1:~$ mkdir -p ~/lab4/workspace/python_project
sana058@sana1:~$ cd ~/lab4/workspace/python_project
sana058@sana1:~/lab4/workspace/python_project$ pwd
/home/sana058/lab4/workspace/python_project
sana058@sana1:~/lab4/workspace/python_project$
```

```
sana058@sana1:~/lab4/workspace/python_project$ cat .env
ENV=LAB4
sana058@sana1:~/lab4/workspace/python_project$ cat README.md
LAB4-README
sana058@sana1:~/lab4/workspace/python_project$ cat main.py
hello LAB-4
sana058@sana1:~/lab4/workspace/python_project$
```

```
sana058@sana1:~/lab4/workspace/python_project$ ls -la ~
total 44
drwxr-x--- 6 sana058 sana058 4096 Oct 23 14:42 .
drwxr-xr-x 3 root    root    4096 Sep 30 14:38 ..
-rw-rw-r-- 1 sana058 sana058 365 Oct 23 14:30 answers.md
-rw----- 1 sana058 sana058 258 Oct 23 14:35 .bash_history
-rw-r--r-- 1 sana058 sana058 220 Mar 31 2024 .bash_logout
-rw-r--r-- 1 sana058 sana058 3771 Mar 31 2024 .bashrc
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .cache
drwxrwxr-x 3 sana058 sana058 4096 Oct 23 14:42 lab4
drwxrwxr-x 3 sana058 sana058 4096 Oct 23 14:26 .local
-rw-r--r-- 1 sana058 sana058 807 Mar 31 2024 .profile
drwx----- 2 sana058 sana058 4096 Sep 30 14:39 .ssh
sana058@sana1:~/lab4/workspace/python_project$
```

```
sana058@sana1:~/lab4/workspace/python_project$ cp README.md README.copy.md
sana058@sana1:~/lab4/workspace/python_project$ mv README.copy.md README.dev.md
sana058@sana1:~/lab4/workspace/python_project$ rm README.dev.md
sana058@sana1:~/lab4/workspace/python_project$ _
```

```
sana058@sana1:~/lab4/workspace/python_projects$ mkdir -p ~/lab4/workspace/java_app
sana058@sana1:~/Lab4/workspace/python_projects$ cp -r ~/lab4/workspace/python_project ~/lab4/workspace/java_app_copy
sana058@sana1:~/lab4/workspace/python_projects$ ls -la ~/lab4/workspace
total 20
drwxrwxr-x 5 sana058 sana058 4096 Oct 23 14:55 .
drwxrwxr-x 3 sana058 sana058 4096 Oct 23 14:42 ..
drwxrwxr-x 2 sana058 sana058 4096 Oct 23 14:54 java_app
drwxrwxr-x 2 sana058 sana058 4096 Oct 23 14:55 java_app_copy
drwxrwxr-x 2 sana058 sana058 4096 Oct 23 14:52 python_project
sana058@sana1:~/lab4/workspace/python_projects$ _
```

```
sana058@sana1:~/lab4/workspace/python_project$ nano main.py
.env      main.py      README.md
sana058@sana1:~/lab4/workspace/python_project$ nano main.py
```

QUESTION #04:

Q4 — System Profiling & Process Monitoring

Display OS and kernel version information using commands like `uname -a` or `cat /etc/os-release`.

Display CPU, memory, and disk usage using `cat /proc/cpuinfo`, `free -h`, and `df -h`.
List all active running processes using `ps aux` or `top`.

```
sana058@sana1:~/lab4/workspace/python_project$ uname -a
Linux sana1 6.8.0-71-generic #71-Ubuntu SMP PREEMPT_DYNAMIC Tue Jul 22 16:52:38 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux
```

```
sana058@sana1:~/lab4/workspace/python_project$ free -h
              total        used        free      shared  buff/cache   available
Mem:       3.8Gi       497Mi      2.7Gi      1.5Mi      807Mi      3.3Gi
Swap:      3.8Gi         0B      3.8Gi

sana058@sana1:~/lab4/workspace/python_project$ df -h
Filesystem            Size  Used Avail Use% Mounted on
tmpfs                 387M  1.5M  386M  1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv  48G  6.6G  39G  15% /
tmpfs                 1.9G     0  1.9G  0% /dev/shm
tmpfs                 5.0M     0  5.0M  0% /run/lock
/dev/sda2               2.0G  100M  1.7G  6% /boot
tmpfs                 387M   12K  387M  1% /run/user/1000
```

```
sana058@sana1:~/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
sana058@sana1:~/lab4/workspace/python_project$ _
```

```
fpu      : yes
fpu_exception : yes
cpuid level  : 27
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 xtTopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq vmx ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_
           deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow ept vpid ept_ad fsgsbase tsc_adjust
           bmi1 avx2 smpc bmi2 erms invpcid avx512f avx512dq rdseed adx smap avx512fma clflushopt avx512cd sha_nl avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves arat vn
           ml avx512vbmi umip pkru ospkc avx512_vbm12 gfni vaes vpclmulqdq avx512_vnni avx512_bit16 avx512_vppcnrdq rdpid frm md_clear flush_lid arch_capabilities
vmx flags    : vmml invvpid ept_x_only ept_ad tsc_offset vtrr mtf ept vpid unrestricted_guest pte ept_mode_based_exec
bugs       : spectre_v1 spectre_v2 spec_store_bypass swaps itlb_multihit srbd mmio_stale_data retbleed elibrss_pbrsb gds bhi
bogomips   : 2380.79
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     : 126
model name : Intel(R) Core(TM) i5-1035G1 CPU @ 1.00GHz
stepping   : 5
microcode  : 0xbc
cpu MHz    : 1190.399
cache size : 6144 KB
physical id: 2
siblings   : 1
core id   : 0
cpu cores  : 1
apicid     : 2
initial apicid : 2
fpu       : yes
fpu_exception : yes
cpuid level  : 27
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 xtTopology tsc_reliable nonstop_tsc cpuid tsc_known_freq pni pclmulqdq vmx ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_
           deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow ept vpid ept_ad fsgsbase tsc_adjust
           bmi1 avx2 smpc bmi2 erms invpcid avx512f avx512dq rdseed adx smap avx512fma clflushopt avx512cd sha_nl avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves arat vn
           ml avx512vbmi umip pkru ospkc avx512_vbm12 gfni vaes vpclmulqdq avx512_vnni avx512_bit16 avx512_vppcnrdq rdpid frm md_clear flush_lid arch_capabilities
vmx flags    : vmml invvpid ept_x_only ept_ad tsc_offset vtrr mtf ept vpid unrestricted_guest pte ept_mode_based_exec
bugs       : spectre_v1 spectre_v2 spec_store_bypass swaps itlb_multihit srbd mmio_stale_data retbleed elibrss_pbrsb gds bhi
bogomips   : 2380.79
clflush size : 64
cache_alignment : 64
address sizes : 45 bits physical, 48 bits virtual
power management:
sana058@sana1:~/lab4/workspace/python_project$ cat /proc/cpuinfo_
```

QUESTION#05:

Q5 — User Account Audit & Privilege Escalation Simulation

Create a new user account named `lab4user` using `sudo adduser lab4user`.

Verify the user entry exists in the system with `getent passwd lab4user`.

Switch to the new user using `su - lab4user` and confirm login. Attempt to run an administrative command (like `sudo whoami`) as `lab4user` — show the permission denied error.

Exit from `lab4user` and return to your main user.

View `/var/log/auth.log` to confirm login attempts by `lab4user`.

Remove the `lab4user` account and verify deletion using `sudo deluser --remove-home lab4user`.

```
sana058@sana1:~/lab4/workspace/python_project$ sudo adduser lab4user
[sudo] password for sana058:
Sorry, try again.
[sudo] password for sana058:
[sudo] password for sana058:
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 []:
      Room Number []:
      Work Phone []:
      Home Phone []: 123
      Other []: 1111
Is the information correct? [Y/n] n
Changing the user information for lab4user
Enter the new value, or press ENTER for the default
      Full Name []: ryomen sukuna
      Room Number []: 666
      Work Phone []: 234
      Home Phone [123]: 123
      Other [1111]: 1111
Is the information correct? [Y/n] y
info: Adding new user `lab4user' to supplemental / extra groups `users' ...
info: Adding user `lab4user' to group `users' ...
```

```
sana058@sana1:~/lab4/workspace/python_project$ getent passwd lab4user
lab4user:x:1001:1001:ryomen sukuna,666,234,123,1111:/home/lab4user:/bin/bash
sana058@sana1:~/lab4/workspace/python_project$ su -lab4user
su: invalid option -- 'a'
Try 'su --help' for more information.
sana058@sana1:~/lab4/workspace/python_project$ su - lab4user
Password:
lab4user@sana1:~$ _
```

```
Lab4user@sana1:~$ sudo whoami  
[sudo] password for lab4user:  
lab4user is not in the sudoers file.  
Lab4user@sana1:~$
```

```
sana058@sana1:~/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' ...  
sana058@sana1:~/lab4/workspace/python_project$ _
```