

NAME: SANA TARIQ

CLASS: BSE 5B

REG.NO: 058

SUBJECT: CLOUD COMPUTING

LAB#07

TASK#01:

```
sana058@sana1:~$ printenv
SHELL=/bin/bash
CREDENTIALS_DIRECTORY=/run/credentials/getty@tty6.service
MEMORY_PRESSURE_WRITE=c29tZSAyMDAuMDAgMjAwMDAuMAA=
XDG_SEAT=seat0
PWD=/home/sana058
LOGNAME=sana058
XDG_SESSION_TYPE=tty
SYSTEMD_EXEC_PID=1957
HOME=/home/sana058
LANG=en_US.UTF-8
LS_COLORS=r=0:di=01:34:ln=01:36:mh=00:pi=40:33:so=01:35:do=01:35:bd=40:33:01:cd=40:33:01:or=40:31:01:mi=00:su=37:41:sg=30:43:ca=00:tw=30:42:ow=34:42:st=37:44:e
x=01:32*:tar=01:31*:tgz=01:31*:arc=01:31*:arj=01:31*:tar=01:31*:lha=01:31*:l2z=01:31*:lzma=01:31*:tlz=01:31*:txz=01:31*:tz=01:31*:t7z=0
1:31*:zip=01:31*:dz=01:31*:gz=01:31*:lz=01:31*:xz=01:31*:zst=01:31*:bz2=01:31*:bz=01:31*:tbz=01:31*:tb2
2=01:31*:tz=01:31*:deb=01:31*:rpm=01:31*:jar=01:31*:war=01:31*:ear=01:31*:sane=01:31*:rar=01:31*:alz=01:31*:ace=01:31*:zoo=01:31*:cpio=01:31*:7z=01:
31*:rz=01:31*:cab=01:31*:wim=01:31*:sum=01:31*:dum=01:31*:esd=01:31*:avif=01:35*:jpeg=01:35*:mjpg=01:35*:mpeg=01:35*:glif=01:35*:bmp=01:
35*:pbm=01:35*:pgm=01:35*:ppm=01:35*:tga=01:35*:xbm=01:35*:tif=01:35*:tiff=01:35*:png=01:35*:svg=01:35*:svga=01:35*:svgs=01:35*:xmg=01:35*:pxc=01:35
*:mov=01:35*:mpg=01:35*:mpeg=01:35*:m2v=01:35*:mkv=01:35*:webm=01:35*:webp=01:35*:oggm=01:35*:mp4=01:35*:m4v=01:35*:mp4v=01:35*:vob=01:35*:qt=01:35
*:nuv=01:35*:umv=01:35*:asf=01:35*:rm=01:35*:rmvb=01:35*:flc=01:35*:avi=01:35*:flv=01:35*:gl=01:35*:dl=01:35*:xcf=01:35*:xwd=01:35*:yuv=
01:35*:cm=01:35*:emf=01:35*:ogx=01:35*:aac=00:36*:au=00:36*:flac=00:36*:m4a=00:36*:mid=00:36*:midi=00:36*:mka=00:36*:mp3=00:36*:mpc=00
:36*:ogg=00:36*:ra=00:36*:wav=00:36*:opus=00:36*:spk=00:36*:xspf=00:36*:mp3=00:36*:bik=00:90*:cdownload=00:90*:dpkg-dist=00:90*:dpkg-
new=00:90*:dpkg-old=00:90*:dpkg-tmp=00:90*:old=00:90*:orig=00:90*:part=00:90*:reJ=00:90*:rpmsnew=00:90*:rpmsave=00:90*:sup=00:90*:tmp
=00:90*:ucf-dist=00:90*:ucf-new=00:90*:ucf-old=00:90:
MEMORY_PRESSURE_WATCH=/sys/fs/cgroup/system.slice/getty@tty6.service/memory.pressure
INVOCATION_ID=107784965f374dfaad1209d9f258b5ae
LESSCLOSE=/usr/bin/lesspipe %s %
XDG_SESSION_CLASS=user
TERM=linux
LESSOPEN=| /usr/bin/lesspipe %
USER=sana058
SHLVL=1
XDG_VTNR=6
XDG_SESSION_ID=3
XDG_RUNTIME_DIR=/run/user/1000
XDG_DATA_DIRS=/usr/share/gnome:/usr/local/share:/usr/share:/var/lib/snapd/desktop
HUSHLOGIN=False
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
MAIL=/var/mail/sana058
_=~/usr/bin/printenv
```

```
sana058@sana1:~$ printenv | grep SHELL
SHELL=/bin/bash
sana058@sana1:~$ printenv | grep HOME
HOME=/home/sana058
sana058@sana1:~$ printenv | grep USER
USER=sana058
```

TASK#02:

```
sana058@sana1:~$ export DB_URL="postgres://db.example.local:5432/mydb"
sana058@sana1:~$ export DB_USER="labuser"
sana058@sana1:~$ export DB_PASSWORD="labpass123"
sana058@sana1:~$ echo "$DB_URL"
postgres://db.example.local:5432/mydb
sana058@sana1:~$ echo "$DB_USER"
labuser
sana058@sana1:~$ echo "$DB_PASSWORD"
labpass123
```

```
sana058@sana1:~$ printenv | grep '^DB'  
DB_PASSWORD=labpass123  
DB_USER=labuser  
DB_URL=postgres://db.example.local:5432/mydb  
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
```

```
sana058@sana1:~$ echo "DB_URL"  
DB_URL  
sana058@sana1:~$ printenv | grep '^DB'  
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
```

TASK#03:

```
# Alias definitions.  
# You may want to put all your additions into a separate file like  
# ~/.bash_aliases, instead of adding them here directly.  
# See /usr/share/doc/bash-doc/examples in the bash-doc package.  
  
if [ -f ~/.bash_aliases ]; then  
    . ~/.bash_aliases  
fi  
  
# enable programmable completion features (you don't need to enable  
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile  
# sources /etc/bash.bashrc).  
if ! shopt -oq posix; then  
    if [ -f /usr/share/bash-completion/bash_completion ]; then  
        . /usr/share/bash-completion/bash_completion  
    elif [ -f /etc/bash_completion ]; then  
        . /etc/bash_completion  
    fi  
fi  
# Lab 7 persistent DB variables  
export DB_URL="postgres://db.example.local:5432/mydb"  
export DB_USER="labuser"  
export DB_PASSWORD="labpass123"  
~  
-- INSERT --
```

```
sana058@sana1:~$ source ~/.bashrc  
echo "$DB_URL"  
postgres://db.example.local:5432/mydb  
sana058@sana1:~$ echo "$DB_USER"  
labuser  
sana058@sana1:~$ echo "$DB_PASSWORD"  
labpass123  
sana058@sana1:~$ printenv | grep '^DB_'  
DB_PASSWORD=labpass123  
DB_USER=labuser  
DB_URL=postgres://db.example.local:5432/mydb
```

```
sana1 login: sana058
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 Thu Nov 6 02:33:48 PM UTC 2025

 System load: 0.0          Processes: 234
 Usage of /: 20.7% of 47.93GB Users logged in: 1
 Memory usage: 10%         IPv4 address for ens3: 192.168.188.128
 Swap usage: 0%          

Expanded Security Maintenance for Applications is not enabled.

12 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

27 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

sana058@sana1:~$ echo "DB_URL"
DB_URL
sana058@sana1:~$ printenv | grep '^DB'
DB_PASSWORD=labpass123
DB_USER=labuser
DB_URL=postgres://db.example.local:5432/mydb
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
sana058@sana1:~$
```

TASK#04:

```
sana058@sana1:~$ sudo cat /etc/environment
[sudo] password for sana058:
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin"
Class="CC-5B-SANATARIQ-058"

sana058@sana1:~$ echo "$PATH"
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin

PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin"
Class="CC-5B-SANATARIQ-058"

sana058@sana1:~$ sudo cat /etc/environment
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin"
Class="CC-5B-SANATARIQ-058"

sana058@sana1:~$ echo "$Class"
CC-5B-SANATARIQ-058
sana058@sana1:~$ 
sana058@sana1:~$ echo "$PATH"
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
Class="CC-5B-SANATARIQ-058"
```

```
sana058@sana1:~$ cat > ~/Desktop/welcome <<'EOF'  
>#!/bin/bash  
>  
> echo "Welcome to Cloud Computing $USER"  
>  
> EOF  
sana058@sana1:~$ chmod +x ~/Desktop/welcome
```

```
sana058@sana1:~$ ls -l ~/Desktop/welcome  
-rwxrwxr-x 1 sana058 sana058 54 Nov  6 14:48 /home/sana058/Desktop/welcome
```

```
sana058@sana1:~$ cd ~/Desktop  
sana058@sana1:~/Desktop$ ./welcome  
Welcome to Cloud Computing sana058  
sana058@sana1:~/Desktop$
```

```
# Add Desktop to PATH for Lab7 welcome  
PATH="$PATH:$HOME/Desktop"  
export PATH  
EOF  
~  
~  
~  
"/~/.bashrc" 126L, 3999B written  
sana058@sana1:~/Desktop$ _
```

```
sana058@sana1:~$ source ~/.bashrc  
sana058@sana1:~$ echo "$PATH"  
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/home/sana058/Desktop  
sana058@sana1:~$  
sana058@sana1:~$ which welcome  
/home/sana058/Desktop/welcome
```

TASK#05:

```
sana058@sana1:~$ sudo ufw enable  
sudo ufw sta[sudo] password for sana058:  
Sorry, try again.  
[sudo] password for sana058:  
Firewall is active and enabled on system startup
```

```
sana058@sana1:~$ sudo ufw status verbose  
Status: active  
Logging: on (low)  
Default: deny (incoming), allow (outgoing), deny (routed)  
New profiles: skip
```

```
sana058@sana1:~$ sudo ufw deny proto tcp to any port 22  
Rule added  
Rule added (v6)  
sana058@sana1:~$ sudo ufw status numbered  
Status: active
```

To	Action	From
--	-----	-----
[1] 22/tcp	DENY IN	Anywhere
[2] 22/tcp (v6)	DENY IN	Anywhere (v6)

```
C:\Users\Sana>ssh sana058@192.168.188.128
ssh: connect to host 192.168.188.128 port 22: Connection timed out
```

```
sana058@sana1:~$ sudo ufw allow proto tcp to any port 22
Rule updated
Rule updated (v6)
sana058@sana1:~$ sudo ufw reload
Firewall reloaded
sana058@sana1:~$ sudo ufw status
Status: active

To                         Action      From
--                         --          --
22/tcp                      ALLOW       Anywhere
22/tcp (v6)                  ALLOW       Anywhere (v6)
```

```
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 6.8.0-86-generic x86_64)

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

System information as of Thu Nov  6 03:12:37 PM UTC 2025

System load: 0.0              Processes:           237
Usage of /: 20.7% of 47.93GB  Users logged in:      1
Memory usage: 10%            IPv4 address for ens33: 192.168.188.128
Swap usage:  0%
```

TASK#06:

```
sana058@sana1:~$ ssh-keygen -t ed25519 -f ~/.ssh/id_ed25519 -C "lab_key"
-l a ~/.ssh
Generating public/private ed25519 key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/sana058/.ssh/id_ed25519
Your public key has been saved in /home/sana058/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:ZCNJ+CtwIhgPtdk/4FVHCbBsWOrtxjD95P4qU36od8 lab_key
The key's randomart image is:
++-[ED25519 256]-+
|o. +. o**+.
|+ =...o*=+
|oo . ooo+=* + .
|o = . .+ooooo +
|. + .S. . o
| . . +
| . =.
| o..o
| .oo E
+---[SHA256]---
```

```
sana058@sana1:~$ ls -la ~/.ssh
total 16
drwx----- 2 sana058 sana058 4096 Nov  6 15:15 .
drwxr-x--- 22 sana058 sana058 4096 Nov  6 15:01 ..
-rw----- 1 sana058 sana058     0 Sep 30 14:39 authorized_keys
-rw----- 1 sana058 sana058  444 Nov  6 15:15 id_ed25519
-rw-r--r-- 1 sana058 sana058   89 Nov  6 15:15 id_ed25519.pub
```

```
sana058@sana1:~$ cat ~/.ssh/id_ed25519.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIJE3W5Vhe2WTWyn0qQfAe965dZBJt1DExBBm9CC7JSdI lab_key
-----
```

```
sana058@sana1:~$ cat ~/.ssh/authorized_keys || true
sana058@sana1:~$ mkdir -p ~/.ssh
d 70sana058@sana1:~$ chmod 700 ~/.ssh
sana058@sana1:~$ echo "ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIJE3W5Vhe2WTWyn0qQfAe965dZBJt1DExBBm9CC7JSdI lab_key" >> ~/.ssh/authorized_keys
sana058@sana1:~$ chmod 600 ~/.ssh/authorized_keys
sana058@sana1:~$ cat ~/.ssh/authorized_keys
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIJE3W5Vhe2WTWyn0qQfAe965dZBJt1DExBBm9CC7JSdI lab_key
sana058@sana1:~$ -----
```

```
C:\Users\Sana>ssh sana058@192.168.188.128
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 Thu Nov  6 03:51:00 PM UTC 2025

 System load:  0.0          Processes:           237
 Usage of /:   20.7% of 47.93GB  Users logged in:      1
 Memory usage: 10%          IPv4 address for ens33: 192.168.188.128
 Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

12 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

27 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

Last login: Thu Nov  6 15:45:14 2025 from 192.168.188.1
-----
```

EXAM EVALUATION QUESTIONS:

QUESTION#01:

```
sana058@sana1:~$ printenv | grep PATH
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/sana058/Desktop
sana058@sana1:~$ printenv | grep LANG
LANG=en_US.UTF-8
sana058@sana1:~$ printenv | grep PWD
PWD=/home/sana058
```

QUESTION#02:

```
sana058@sana1:~$ export STUDENT_NAME="Sana Aurakzai"
sana058@sana1:~$ export STUDENT_ROLL_NUMBER="CS1234"
sana058@sana1:~$ export STUDENT_SEMESTER="Fall2025"
sana058@sana1:~$ echo "$STUDENT_NAME"
Sana Aurakzai
ho sana058@sana1:~$ echo "$STUDENT_ROLL_NUMBER"
CS1234
hosana058@sana1:~$ echo "$STUDENT_SEMESTER"
Fall2025
```

```
sana058@sana1:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Sana Aurakzai
STUDENT_SEMESTER=Fall2025
STUDENT_ROLL_NUMBER=CS1234
```

```
sana058@sana1:~$ echo "$STUDENT_NAME"
sana058@sana1:~$ printenv | grep '^STUDENT_'
sana058@sana1:~$ _
```

QUESTION#03:

```
sana058@sana1:~$ cat >> ~/.bashrc <<'EOF'
> export STUDENT_NAME="Sana Aurakzai"
>
> export STUDENT_ROLL_NUMBER="CS1234"
>
> export STUDENT_SEMESTER="Fall2025"
>
> EOF
sana058@sana1:~$ tail -n 8 ~/.bashrc
PATH="$PATH:$HOME/Desktop"
export PATH
export STUDENT_NAME="Sana Aurakzai"
export STUDENT_ROLL_NUMBER="CS1234"
export STUDENT_SEMESTER="Fall2025"
```

```
sana058@sana1:~$ echo "$STUDENT_NAME"
Sana Aurakzai
sana058@sana1:~$
sana058@sana1:~$ echo "$STUDENT_ROLL_NUMBER"
hCS1234
osana058@sana1:~$
sana058@sana1:~$ echo "$STUDENT_SEMESTER"
Fall2025
```

```
sana058@sana1:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Sana Aurakzai
STUDENT_SEMESTER=Fall2025
STUDENT_ROLL_NUMBER=CS1234
```

```
Ubuntu 24.04.3 LTS sana1 tty5

sana1 login: sana058
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 Mon Nov 10 02:35:58 PM UTC 2025

System load: 0.0          Processes: 229
Usage of /: 20.7% of 47.93GB  Users logged in: 1
Memory usage: 10%          IPv4 address for ens33: 192.168.188.128
Swap usage: 0%          

Expanded Security Maintenance for Applications is not enabled.

12 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

27 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

sana058@sana1:~$ echo "$STUDENT_NAME"
Sana Aurakzai
sana058@sana1:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Sana Aurakzai
STUDENT_SEMESTER=Fall2025
STUDENT_ROLL_NUMBER=CS1234
sana058@sana1:~$ _
```

QUESTION#04:

```
sana058@sana1:~$ sudo ufw --force enable
[sudo] password for sana058:
Firewall is active and enabled on system startup
sana058@sana1:~$ sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), deny (routed)
New profiles: skip

To                         Action      From
--                         ----      ---
22/tcp                      ALLOW IN   Anywhere
22/tcp (v6)                  ALLOW IN   Anywhere (v6)
```

```
C:\Users\Sana>ping 192.168.188.128

Pinging 192.168.188.128 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.188.128:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
sana058@sana1:~$ sudo ufw status numbered
Status: active

To                         Action      From
--                         ----       ---
[ 1] 22/tcp                  ALLOW IN    Anywhere
[ 2] 22/tcp (v6)             ALLOW IN    Anywhere (v6)

sana058@sana1:~$ ping -c 3 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=128 time=58.7 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=128 time=44.5 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=128 time=45.5 ms

--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 44.497/49.557/58.681/6.464 ms
```

```
C:\Users\Sana>ping 192.168.188.128

Pinging 192.168.188.128 with 32 bytes of data:
Reply from 192.168.188.128: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.188.128:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```