

# Cloud Computing Lab

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BSE-V B

2023-BSE-056

## LAB 07

### Task 1 — Print & filter environment variables

- task1\_printenv\_all.png

```
safa@safa056:~$ printenv
SHELL=/bin/bash
PWD=/home/safa
LOGNAME=safa
XDG_SESSION_TYPE=tty
HOME=/home/safa
LANG=en_US.UTF-8
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=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:ex=01;32:*.tar=01;31:*.t
01;31:*.tarz=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.txz=01;31:*.tzo=01;31:*.tz=01;31:*.zip=01;31:*.gz=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*
=01;31:*.taz=01;31:*.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.txz=01;31:*.tzo=01;31:*.tz=01;31:*.zip=01;31:*.gz=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*
=tar=01;31:*.tgz=01;31:*.bz2=01;31:*.bz=01;31:*.tbz2=01;31:*.tbz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.ear=01;31:*.sar=01;31:*.ran=01;31:*.alz=01;31:*.ace=01
1:*.7z=01;31:*.rz=01;31:*.cab=01;31:*.wim=01;31:*.swm=01;31:*.dwm=01;31:*.esd=01;31:*.avif=01;35:*.jpeg=01;35:*.jpg=01;35:*.mjpeg=01;35:*.gif=01;35:*.bmp=01;35:*.pbm=01;3
*tga=01;35:*.xbm=01;35:*.xpm=01;35:*.tif=01;35:*.tiff=01;35:*.png=01;35:*.svg=01;35:*.svgz=01;35:*.mng=01;35:*.pxc=01;35:*.mov=01;35:*.mpg=01;35:*.mpeg=01;35:*.m2v=01;35:*.mkv=01;35:*
ogg=01;35:*.mp4=01;35:*.mdv=01;35:*.mp4v=01;35:*.vob=01;35:*.qt=01;35:*.nuv=01;35:*.asf=01;35:*.rm=01;35:*.rmvb=01;35:*.flc=01;35:*.avi=01;35:*.fli=01;35:*.flv=01;35:*.gl=
5:*.xvid=01;35:*.yuv=01;35:*.cgm=01;35:*.emf=01;35:*.ogv=01;35:*.ogx=01;35:*.aac=00;36:*.au=00;36:*.flac=00;36:*.mid=00;36:*.midi=00;36:*.mp3=00;36:*.mpc=00;36:*
v=00;36:*.oga=00;36:*.opus=00;36:*.spx=00;36:*.xspf=00;36:*.#=00;90:*.bak=00;90:*.crdownload=00;90:*.dpkg-dist=00;90:*.dpkg-new=00;90:*.dpkg-old=00;90:*.dpkg-tmp=00;90:*.old=0
;90:*.rej=00;90:*.rpmnew=00;90:*.rpmonig=00;90:*.rpmsave=00;90:*.swp=00;90:*.tmp=00;90:*.ucf-dist=00;90:*.ucf-new=00;90:*.ucf-old=00;90:
SSH_CONNECTION=192.168.56.1 53273 192.168.56.135 22
LESSCLOSE=/usr/bin/lesspipe %
XDG_SESSION_CLASS=user
TERM=xterm-256color
LESSOPEN=| /usr/bin/lesspipe %
USER=safa
SHLVL=1
XDG_SESSION_ID=1
XDG_RUNTIME_DIR=/run/user/1000
SSH_CLIENT=192.168.56.1 53273 22
XDG_DATA_DIRS=/usr/share/gnome:/usr/local/share:/usr/share:/var/lib/snapd/desktop
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/bin:/usr/games:/usr/local/games:/snap/bin
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
SSH_TTY/dev/pts/0
/usr/bin/printenv
```

- task1\_grep\_shell\_home\_user.png

```
safa@safa056:~$ printenv | grep SHELL
SHELL=/bin/bash
safa@safa056:~$ printenv | grep HOME
HOME=/home/safa
safa@safa056:~$ printenv | grep USER
USER=safa
safa@safa056:~$
```

### Task 2 — Export DB\_\* variables temporarily and observe scope

- task2\_exports\_all.png

```
safa@safa056:~$ export DB_URL="postgres://db.example.local:5432/mydb"
safa@safa056:~$ export DB_USER="labuser"
safa@safa056:~$ export DB_PASSWORD="labpass123"
safa@safa056:~$
```

- task2\_echoes\_all.png

```
safa@safa056:~$ echo "$DB_URL"
postgres://db.example.local:5432/mydb
safa@safa056:~$ echo "$DB_USER"
labuser
safa@safa056:~$ echo "$DB_PASSWORD"
labpass123
safa@safa056:~$
```

- task2\_printenv\_grep\_db.png

```
safa@safa056:~$ printenv | grep '^DB_'
DB_PASSWORD=labpass123
DB_USER=labuser
DB_URL=postgres://db.example.local:5432/mydb
-->@-f-056--t
```

- task2\_after\_restart\_checks.png

```
safa@safa056:~$ echo "$DB_URL"

safa@safa056:~$ printenv | grep '^DB_'
safa@safa056:~$
```

## Task 3 — Make DB\_\* variables persistent in ~/.bashrc

- task3\_bashrc\_added.png

```
# add at the end:
# Lab 7 persistent DB variables
export DB_URL="postgres://db.example.local:5432/mydb"
export DB_USER="labuser"
export DB_PASSWORD="labpass123"
INSERT
```

- task3\_source\_and\_verification.png

```
safa@safa056:~$ vim ~/.bashrc
safa@safa056:~$ source ~/.bashrc
safa@safa056:~$ echo "$DB_URL"
postgres://db.example.local:5432/mydb
safa@safa056:~$ echo "$DB_USER"
labuser
safa@safa056:~$ echo "$DB_PASSWORD"
labpass123
safa@safa056:~$ printenv | grep '^DB_'
DB_PASSWORD=labpass123
DB_USER=labuser
DB_URL=postgres://db.example.local:5432/mydb
safa@safa056:~$
```

- task3\_after\_restart\_persistent.png

```
Last login: Thu Nov  6 11:34:43 2025 from 192.168.56.1
safa@safa056:~$ echo "$DB_URL"
postgres://db.example.local:5432/mydb
safa@safa056:~$ printenv | grep '^DB_'
DB_PASSWORD=labpass123
DB_USER=labuser
DB_URL=postgres://db.example.local:5432/mydb
```

# Task 4 — System-wide environment variable, welcome script, and PATH

- task4\_etc\_environment\_before.png

```
safa@safa056:~$ sudo cat /etc/environment
[sudo] password for safा:
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin"
```

- task4\_echo\_path\_before.png

```
safa@safa056:~$ echo "$PATH"
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
```

- task4\_etc\_environment\_edit\_vim.png

```
c: safा@safa056: ~
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/game
# add line: Class="CC-BSE-5B"
~
```

- task4\_etc\_environment\_after.png

```
safa@safa056:~$ cat /etc/environment
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/game
# add line: Class="CC-BSE-5B"
~
```

- task4\_echo\_class\_and\_path.png

```
safa@safa056:~$ echo $Class
safa@safa056:~$ echo "$PATH"
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/...
safa@safa056:~$
```

- task4\_welcome\_create\_and\_chmod.png

```
safa@safa056:~$ cat > ~/welcome <<'EOF'
> #!/bin/bash
> echo "Welcome to Cloud Computing $USER"
> EOF
|safa@safa056:~$ chmod +x ~/welcome
|~
```

- task4\_welcome\_run\_dot.png

```
safa@safa056:~$ cd ~
safa@safa056:~$ ./welcome
Welcome to Cloud Computing safा
safa@safa056:~$
```

- task4\_bashrc\_path\_line.png

```
PATH=$PATH:~/Desktop
export PATH
PATH=$PATH:~
~
```

- task4\_bashrc\_source\_and\_welcome.png

```
safa@safa056:~$ safा@safa056:~$ source ~/.bashrc
safa@safa056:~$ cd ~
safa@safa056:~$ welcome
```

## Task 5 — Block and allow SSH using ufw

- task5\_ufw\_enable\_and\_status.png

```
safa@safa056:~$ sudo ufw enable
Firewall is active and enabled on system startup
safa@safa056:~$ sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed)
New profiles: skip

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

safa@safa056:~$
```

- task5\_ufw\_deny\_22\_and\_status.png

```
safa@safa056:~$ sudo ufw deny 22/tcp
Rule updated
Rule updated (v6)
safa@safa056:~$ sudo ufw status numbered
Status: active

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

- task5\_ssh\_attempt\_blocked.png

```
C:\Users\ Laptop>ssh safra@192.168.56.135
ssh: connect to host 192.168.56.135 port 22: Connection timed out
```

- task5\_ufw\_allow\_reload\_status.png

```
safa@safa056:~$ sudo ufw allow 22/tcp
Rule updated
Rule updated (v6)
safa@safa056:~$ sudo ufw reload
Firewall reloaded
safa@safa056:~$ sudo ufw status
Status: active

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

- task5\_ssh\_success\_after\_allow.png

```
C:\Users\ Laptop>ssh safra@192.168.56.135
safra@192.168.56.135's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-86-generic x86_64)
```

# Task 6 — Configure SSH key-based login from Windows host

- task6\_windows\_sshkey\_and\_list.png

```
Enter same passphrase again:
Your identification has been saved in C:\Users\ Laptop\.ssh\id_lab7
Your public key has been saved in C:\Users\ Laptop\.ssh\id_lab7.pub
The key fingerprint is:
SHA256:ch1DY033WkaOrDurLd1MZ8NH09wLUOKVim382X9dJEY lab_key
The key's randomart image is:
+--[ED25519 256]--+
| oo. ooo. |
| . ... oE .|
| .o+.o o+|
| .oo* + *|
| . S .+ 0 *|
| o + % +|
| . = * o+|
| ..+ + +|
| .o++ .|
+---[SHA256]-----+


C:\Users\ Laptop>ls -la ~/.ssh
'ls' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\ Laptop>dir %USERPROFILE%\.ssh
Volume in drive C has no label.
Volume Serial Number is ACD8-A7BE

Directory of C:\Users\ Laptop\.ssh

11/07/2025 10:14 AM <DIR> .
11/07/2025 10:14 AM <DIR> ..
09/27/2025 02:07 PM 419 id_ed25519
09/27/2025 02:07 PM 110 id_ed25519.pub
11/07/2025 10:14 AM 399 id_lab7
11/07/2025 10:14 AM 90 id_lab7.pub
10/24/2025 09:33 AM 1,674 known_hosts
10/24/2025 09:33 AM 925 known_hosts.old
       6 File(s)      3,617 bytes
      2 Dir(s)  6,718,468,096 bytes free
```

- task6\_windows\_public\_key.png

```
C:\Users\ Laptop>type %USERPROFILE%\.ssh\id_lab/.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIG/sAAcljNtpG8Q9t5IU/ToadwALXwViz2VUJ0cRgQZ3 lab_key
C:\Users\ Lanton>
```

- task6\_windows\_known\_hosts\_cleared\_and\_empty.png

```
C:\Users\ Laptop>echo "" > %USERPROFILE%\.ssh\known_hosts
C:\Users\ Laptop>type %USERPROFILE%\.ssh\known_hosts
""
```

- task6\_windows\_ssh\_accept\_hostkey\_and\_login.png

```
C:\Users\ Laptop>ssh saf@192.168.56.135
The authenticity of host '192.168.56.135 (192.168.56.135)' can't be established.
ED25519 key fingerprint is SHA256:rrrw0C97Xj50JGM0ciBh4uffKm0pGj/sTKCaf6Q0cDE.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.56.135' (ED25519) to the list of known hosts.
saf@192.168.56.135'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
```

- task6\_windows\_known\_hosts\_after\_connect.png

```
C:\Users\ Laptop>type %USERPROFILE%\ssh\known_hosts
192.168.56.135 ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIG/sDuVjbD3Lix/7JMyHDSnVtcjGRbFs+yBHE/Vuh
192.168.56.135 ssh-rsa AAAAB3NzaC1yc2EAAQABAAgCztf68yYmSHvbfEbt5F3Q0lwTImJpxgn1khdF0V4pxctJpjRzjh7ehZmmzx7r4zoTbb4UysRdu+EHn1Z5Asrg5Lm893159uDWUp3pgi6AwkIDC5Fyt
gFvWh8Uv07xo8/HLMWKKQlgjBKFd+gBs0pLxEG5HptrRyq//115Nk5pG+Cxequ0dfy0lwxd2Te6KjCjdjqnjSSee1qfTr/pyjNlxWSX197yE0Kg/e1uTx3C5cfUPQK1joF+Th+n5F4jG0hvle9b9usX5f0qqb00EG64lmlHbJ
50WJ2s8deKtjuRMRLctUwierCpCe2v4qpp7eybFDmzTfgn1HbMRY8ZwM8KtYTen+ht1Ya8bEnk/NmVO6KQApoxg4FPuuAOx8EwUsOxeC5p9ZXkb5EhePuHTQjTY+fB8gIKS01KS2KkjvJupM=
192.168.56.135 ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNgYT1tbm1zdHayNTYAAAAlbm1zdHayNTYAAAABBHDoxthlhj9AGB4+j1zangShyNQdgG1TwCTqt2tNLtLcc7GMeLP1Ex8kmPnibeTQEfuyRsFUgDPRQhGJpvaaU=
```

- task6\_server\_clearAuthorizedKeys.png

```
safa@safa056:~$ mkdir -p ~/.ssh
safa@safa056:~$ chmod 700 ~/.ssh
safa@safa056:~$ > ~/.ssh/authorized_keys
safa@safa056:~$ cat ~/.ssh/authorized_keys
```

- task6\_ssh\_withIdentityFile.png

```
safa@safa056:~$ echo "ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIG/sAAcljNtpG8Q9t5IU/ToadwALXwViz2VUJ0cRgQZ3 lab_key" >> ~/.ssh/authorized_keys
safa@safa056:~$ chmod 600 ~/.ssh/authorized_keys
safa@safa056:~$ cat ~/.ssh/authorized_keys
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIG/sAAcljNtpG8Q9t5IU/ToadwALXwViz2VUJ0cRgQZ3 lab_key
```

- task6\_ssh\_passwordlessLogin.png

```
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 Nov  7 05:36:54 AM UTC 2025

 System load:  0.0          Processes:           230
 Usage of /:   88.2% of  9.75GB   Users logged in:    1
 Memory usage: 8%
 Swap usage:   0%
 
=> / is using 88.2% of 9.75GB

Expanded Security Maintenance for Applications is not enabled.
```

- task6\_ssh\_withIdentityFile.png

```
C:\Users\ Laptop>ssh -i %USERPROFILE%\ssh\id_lab7 safa@192.168.56.135
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
```

# Exam Evaluation Questions

## Q1: Quick Environment Audit

EE\_q1\_env\_all.png

```
safa@safa056:~$ printenv
SHELL=/bin/bash
DB_PASSWORD=labpass123
PWD=/home/safa
LOGNAME=safa
XDG_SESSION_TYPE=tty
DB_USER=labuser
HOME=/home/safa
LANG=en_US.UTF-8
LS_COLORS=rs=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;43:01;31:*.taz=01;31:*.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.tz=01;31:*.zip=01;31:*.z=01;31:*.dz=01;31:*.gz=01;31:*.bz=01;31:*.bz2=01;31:*.bz=01;31:*.tbz=01;31:*.tbz2=01;31:*.tz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.war=01;31:*.ear=01;31:*.sar=01;31:*.7z=01;31:*.rz=01;31:*.cab=01;31:*.wim=01;31:*.swm=01;31:*.dwm=01;31:*.esd=01;31:*.avif=01;35:*.jpg=01;35:*.jpeg=01;35:*.mjpeg=01;35:*.tga=01;35:*.xbm=01;35:*.xpm=01;35:*.tif=01;35:*.tiff=01;35:*.png=01;35:*.svg=01;35:*.svgz=01;35:*.mng=01;35:*.pcx=01;35:*.mov=01;35:*.mpg=01;35:*.ogg=01;35:*.mp4=01;35:*.m4v=01;35:*.mp4v=01;35:*.vob=01;35:*.qt=01;35:*.nuv=01;35:*.wmv=01;35:*.asf=01;35:*.rm=01;35:*.rmvb=01;35:*.flc=01;35:*.avi=05:*.xwd=01;35:*.yuv=01;35:*.cgm=01;35:*.emf=01;35:*.ogv=01;35:*.ogx=01;35:*.aac=00;36:*.au=00;36:*.flac=00;36:*.m4a=00;36:*.mid=00;36:*.midi=00;36:*.v=00;36:*.oga=00;36:*.opus=00;36:*.spx=00;36:*.xspf=00;36:~00;90:~#00;90:*.bak=00;90:*.crdownload=00;90:*.dpkg-dist=00;90:*.dpkg-new=00;90:*.dpkg;90:*.rej=00;90:*.rpmsave=00;90:*.swp=00;90:*.tmp=00;90:*.ucf-dist=00;90:*.ucf-new=00;90:*.ucf-old=00;90:SSH_CONNECTION=192.168.56.1 51262 192.168.56.135 22
SSH_CLOSE=/usr/bin/lesspipe %s %
LESSCLOSE=/usr/bin/lesspipe %
XDG_SESSION_CLASS=user
TERM=xterm-256color
LESSOPEN=| /usr/bin/lesspipe %
USER=safa
SHLVL=1
DB_URL=postgres://db.example.local:5432/mydb
XDG_SESSION_ID=16
XDG_RUNTIME_DIR=/run/user/1000
SSH_CLIENT=192.168.56.1 51262 22
XDG_DATA_DIRS=/usr/share/gnome:/usr/local/share:/usr/share:/var/lib/snapd/desktop
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/safa/Desktop:/home/safa
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
SSH_TTY=/dev/pts/0
_=/usr/bin/printenv
```

EE\_q1\_env\_filters.png

```
safa@safa056:~$ echo "PATH: $PATH"
PATH: /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/
safa@safa056:~$ echo "LANG: $LANG"
LANG: en_US.UTF-8
safa@safa056:~$ echo "PWD: $PWD"
PWD: /home/safa
```

## Q2: Short-lived Student Info

EE\_q2\_exports.png

```
safa@safa056:~$ export STUDENT_NAME="Safa"
safa@safa056:~$ export STUDENT_ROLL_NUMBER="2023-BSE-056"
safa@safa056:~$ export STUDENT_SEMESTER="BSE-5B"
+ [ -n $STUDENT_NAME ] &
```

EE\_q2\_echoes.png

```
safa@safa056:~$ echo "Name: $STUDENT_NAME, Roll: $STUDENT_ROLL_NUMBER, Semester: $STUDENT_SEMESTER"
Name: Safa, Roll: 2023-BSE-056, Semester: BSE-5B
```

EE\_q2\_printenv\_grep.png

```
safa@safa056:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Safa
STUDENT_SEMESTER=BSE-5B
STUDENT_ROLL_NUMBER=2023-BSE-056
```

EE\_q2\_after\_restart.png

```
C:\Users\ Laptop>ssh safaf@192.168.56.135
safaf@192.168.56.135'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 Nov 7 05:55:39 AM UTC 2025

System load: 0.0 Processes: 229
Usage of /: 88.2% of 9.75GB Users logged in: 1
Memory usage: 8% IPv4 address for ens33: 192.168.56.135
Swap usage: 0%

=> / is using 88.2% of 9.75GB

Expanded Security Maintenance for Applications is not enabled.

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

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

Last login: Fri Nov 7 05:37:27 2025 from 192.168.56.1
safaf@safaf056:~$ printenv | grep '^STUDENT_'
```

## Q3: Make It Sticky (Persistence Check for Student Info)

EE\_q3\_bashrc\_editor.png

```
export STUDENT_NAME="Safa"
export STUDENT_ROLL_NUMBER="056"
export STUDENT_SEMESTER="BSE_5B"
```

EE\_q3\_after\_source.png

```
safaf@safaf056:~$ source ~/.bashrc
safaf@safaf056:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Safa
STUDENT_SEMESTER=BSE_5B
STUDENT_ROLL_NUMBER=056
```

EE\_q3\_after\_restart.png

```
safaf@safaf056:~$ echo "Name: $STUDENT_NAME, Roll: $STUDENT_ROLL_NUMBER, Semester: $STUDENT_SEMESTER"
Name: Safa, Roll: 056, Semester: BSE_5B
safaf@safaf056:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Safa
STUDENT_SEMESTER=BSE_5B
STUDENT_ROLL_NUMBER=056
```

## Q4: Firewall Rules: Block and Restore Ping (ICMP)

EE\_q5\_ufw\_enable\_status.png

```
safaf@safaf056:~$ sudo ufw enable
[sudo] password for safaf:
Firewall is active and enabled on system startup
safaf@safaf056:~$ sudo ufw status
Status: active

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

EE\_q5\_ufw\_deny\_ping\_status.png

```
safa@safa056:~$ sudo ufw reload
Firewall not enabled (skipping reload)
safa@safa056:~$ sudo ufw status numbered
Status: active
```

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

EE\_q5\_ping\_blocked.png

```
C:\Users\ Laptop>ping 192.168.56.135

Pinging 192.168.56.135 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.56.135:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

EE\_q5\_ufw\_allow\_ping\_status.png

```
safa@safa056:~$ sudo ufw status
Status: active

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

safa@safa056:~$
```

EE\_q5\_ping\_success.png

```
C:\Users\ Laptop>ping 192.168.56.135

Pinging 192.168.56.135 with 32 bytes of data:
Request timed out.
Reply from 192.168.56.135: byte=32 time=51ms TTL=128
Request timed out. 04           time=tim<---+1ms TTL=128
```