

Cloud Computing Lab

Safa Jahangir

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=ttty
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;42:st=37;44:ex=01;32:*.tar=01;31:*.t
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:*.t7z=01;31:*.zip=01;31:*.z=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*.
=01;31:*.tztz=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:*.rar=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:*.jpg=01;35:*.jpeg=01;35:*.mjpg=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:*.pcx=01;35:*.mov=01;35:*.mpg=01;35:*.mpeg=01;35:*.m2v=01;35:*.mkv=01;35:*.
ogm=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=01;35:*.fli=01;35:*.flv=01;35:*.gl
5:*.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:*.mka=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:*=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:*.rpmorig=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 %s %s
XDG_SESSION_CLASS=user
TERM=xterm-256color
LESSOPEN=| /usr/bin/lesspipe %s
USER=safa
SHELL=/bin/bash
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:/sbin:/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
safa@safa056:~$
```

- task2_after_restart_checks.png

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

- task4_etc_environment_edit_vim.png

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

- task4_echo_class_and_path.png

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

- 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
safa@safa056:~$
```

- task4_welcome_run_dot.png

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

- task4_bashrc_path_line.png

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

- task4_bashrc_source_and_welcome.png

```
safa@safa056:~$ safa@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 safa@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 safa@192.168.56.135
safa@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:ch1DY033Wka0rDurLd1MZ8NH09wIUOKVim382X9dJEY lab_key
The key's randomart image is:
+--[ED25519 256]--+
|    oo. ooo. |
| . ... oE . |
| .O+.O o+ |
| .oo* +.* |
| . S .+ O *. |
| 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_lab7.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIG/sAAcljNtpG8Q9t5IU/ToadwALXwViz2VUJ0cRgQZ3 lab_key

C:\Users\Laptop>
```

- 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 safa@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:rrrwoC97Xj50JGM0ciBh4uffKm0pGj/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.
safa@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 AAAAC3NzaC1lZDI1NTE5AAAAIO90/sDuVjbD3Lix/7JMyHDSnVtci6RbFs+yBHE/Vuhv
192.168.56.135 ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGCZtff68yWmSHvbfEbtJ5F3QKQlWtImJpxgnlKnFDV4pxctJpjtRzjh7ehZmmxz7r4zoTbb4UysRdu+EHn1Z5Asrg5Lm803159uDMUvp3npgiw6AwkIDC5FytC
yVfVnh8Uv07xo8/HLMXXWqjBkFd+gBsOpLxEG5HptRyq//i15Nk5pG+Cxequ0dfy0Awxd2Te6KjCjdjqnjS8ee1qfTr/pyj1NlXwS19ZyE0Kgg/eY1uTx3Ce5CFUPQK10joEF+Th+n5F4jG0hv1e9b9usX5f0qqb00EG64LmH0bJ
50WJ2sBdeKtjuRMRlCtUwierCgPCe2v4qg7eybFDMzTfgmIHbMRV8ZuMn8KtYTEn+ht1Ya8bEnk/Nmv06KQApTxg4FPuuAOx8EwUsOxeC5p9ZKb5EhePuHTQjTY8+F8BgUKS01KS2KKjvJupM=
192.168.56.135 ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBDHoxthHj9AGB4+j1zangSHyNQdg61JTwWCTqt2tNLYLccD7GMELP1Ex8kmPnibeTQEflYRsFUGDPRQhGjpvaaU=
```

- task6_server_clear_authorized_keys.png

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

- task6_ssh_with_identity_file.png

```
safa@safa056:~$ echo "ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIG/sAAcljNtpG8Q9t5IU/ToadwALXwViz2VUJ0cRgQZ3 lab_key" >> ~/.ssh/authorized_keys
safa@safa056:~$ chmod 600 ~/.ssh/authorized_keys
safa@safa056:~$ cat ~/.ssh/authorized_keys
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIG/sAAcljNtpG8Q9t5IU/ToadwALXwViz2VUJ0cRgQZ3 lab_key
```

- task6_ssh_passwordless_login.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%          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.
```

- task6_ssh_with_identity_file.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;40:01;31:*.tar=01;31:*.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.t7z=01;31:*.zip=01;31:*.z=01;31:*.dz=01;31:*.tar.gz=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:*.mjpg=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:*.mpeg=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=01;35:*.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:*.bak=00;90:*.crdownload=00;90:*.dpkg-dist=00;90:*.dpkg-new=00;90:*.dpkg-old=00;90:*.rej=00;90:*.rpmnew=00;90:*.rpmorig=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
LESSCLOSE=/usr/bin/lesspipe %s %s
XDG_SESSION_CLASS=user
TERM=xterm-256color
LESSOPEN=| /usr/bin/lesspipe %s
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/napstardesktop
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: $PATH"
PATH: /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/safa/Desktop:/home/safa
safa@safa056:~$ 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"
safa@safa056:~$
```

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 safa@192.168.56.135
safa@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
safa@safa056:~$ 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

```
safa@safa056:~$ source ~/.bashrc
safa@safa056:~$ printenv | grep '^STUDENT_'
STUDENT_NAME=Safa
STUDENT_SEMESTER=BSE_5B
STUDENT_ROLL_NUMBER=056
```

EE_q3_after_restart.png

```
safa@safa056:~$ echo "Name: $STUDENT_NAME, Roll: $STUDENT_ROLL_NUMBER, Semester: $STUDENT_SEMESTER"
Name: Safa, Roll: 056, Semester: BSE_5B
safa@safa056:~$ 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

```
safa@safa056:~$ sudo ufw enable
[sudo] password for safa:
Firewall is active and enabled on system startup
safa@safa056:~$ 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)

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=51ms TTL=128
```