Cloud Computing

BSE (V-B)

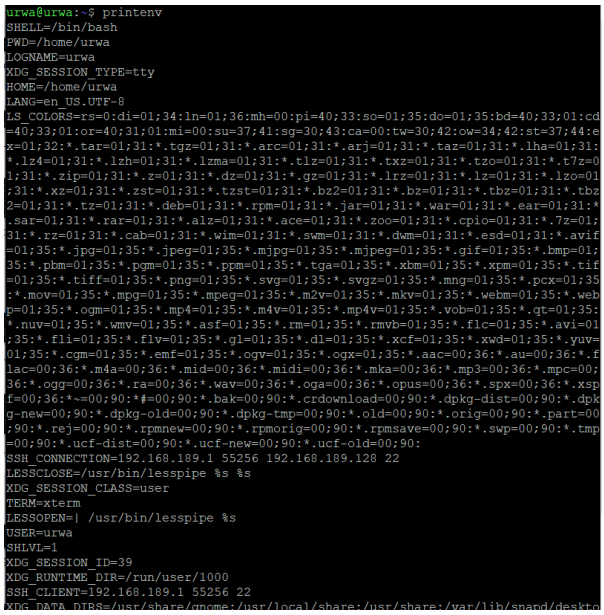
Lab 07

Submitted By: Urwa Zahra

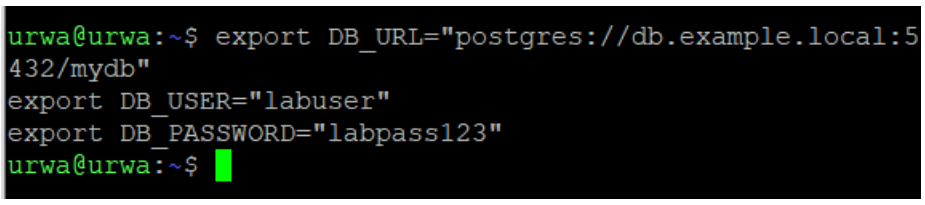
Roll No: 2023-BSE-068

Submitted To: Sir Muhammad Shoaib

Task 1: Print & filter environment variables



Task 2: Export DB_* variables temporarily and observe scope



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

```
urwa@urwa:~$ printenv | grep '^DB_'
DB_PASSWORD=labpass123
DB_USER=labuser
DB_URL=postgres://db.example.local:5432/mydb
urwa@urwa:~$
```

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

Task 3: Make DB_* variables persistent in ~/.bashrc

```
# 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 p
ckage.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't nee
 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 ];
hen
    . /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"
:w
```

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

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

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

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

```
urwa@urwa:~$ echo "$PATH"
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bi
n:/usr/games:/usr/local/games:/snap/bin
urwa@urwa:~$
```

```
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbi
n:/bin:/usr/games:/usr/local/games:/snap/bin"
Class="CC-<Urwa>"
~
~
~
```

```
urwa@urwa:~$ cat /etc/environment
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbi
n:/bin:/usr/games:/usr/local/games:/snap/bin"
Class="CC-<Urwa>"
urwa@urwa:~$
```

```
urwa@urwa:~$ echo $Class
echo "$PATH"

/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
:/usr/games:/usr/local/games:/snap/bin
urwa@urwa:~$
```

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

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

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

PATH=$PATH:~
```

```
urwa@urwa:~$ source ~/.bashrc
cd ~
welcome
Welcome to Cloud Computing urwa
urwa@urwa:~$
```

Task 5: Block and allow SSH using ufw (firewall)

```
urwa@urwa:~$ sudo ufw enable
sudo ufw status verbose
[sudo] password for urwa:
Command may disrupt existing ssh connections. Proceed with o
peration (y|n)? y
Firewall is active and enabled on system startup
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed
)
New profiles: skip
urwa@urwa:~$
```

```
urwa@urwa:~$ sudo ufw deny 22/tcp
sudo ufw status numbered
Rule added
Rule added (v6)
Status: active

     To                         Action      From
     --                         ------      ----
[ 1] 22/tcp                     DENY IN     Anywhere

[ 2] 22/tcp (v6)                DENY IN     Anywhere (v6)
```

```
urwa@urwa:~$ ssh urwa@192.168.189.128
urwa@192.168.189.128'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 Wed Dec 24 04:24:56 PM UTC 2025

  System load:  0.06              Processes:             236
  Usage of /:   81.6% of 9.75GB   Users logged in:       1
  Memory usage: 24%               IPv4 address for ens33: 192
.168.189.128
  Swap usage:   0%

 * Strictly confined Kubernetes makes edge and IoT secure. Le
arn how MicroK8s
   just raised the bar for easy, resilient and secure K8s clu
ster deployment.

   https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled
.

76 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


*** System restart required ***
Last login: Wed Dec 24 16:18:46 2025 from 192.168.189.1
urwa@urwa:~$
```

```
urwa@urwa:~$ sudo ufw allow 22/tcp
sudo ufw reload
sudo ufw status
[sudo] password for urwa:
Rule updated
Rule updated (v6)
Firewall reloaded
Status: active

To                         Action      From
--                         ------      ----
22/tcp                     ALLOW       Anywhere

22/tcp (v6)                ALLOW       Anywhere (v6)
```

```
urwa@urwa:~$ ssh urwa@192.168.189.128
urwa@192.168.189.128'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 Wed Dec 24 04:27:00 PM UTC 2025

  System load:  0.13              Processes:             242
  Usage of /:   81.6% of 9.75GB   Users logged in:       1
  Memory usage: 24%               IPv4 address for ens33: 192
.168.189.128
  Swap usage:   0%

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*** System restart required ***
Last login: Wed Dec 24 16:24:56 2025 from 192.168.189.128
```

Task 6: Configure SSH key-based login from Windows host

```
urwa@urwa:~$ ssh-keygen -t ed25519 -f ~/.ssh/id_lab7 -C "lab_
key"
ls -la ~/.ssh
Generating public/private ed25519 key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/urwa/.ssh/id_lab7
Your public key has been saved in /home/urwa/.ssh/id_lab7.pub
The key fingerprint is:
SHA256:hPteY6Cio/uaUbUvZHRXTf528uzbQu5PGVIc0zqDG0E lab_key
The key's randomart image is:
+--[ED25519 256]--+
|          .+E  o.|
|       . . .o . +|
|    o o o   .o + |
|   o o +    o.=  |
|  . + . S    +++.|
| . o . o .  ..o=o|
|.   o o . +  o .+|
| o.. o . o .  oo.|
|==o.    .    ..+=|
+----[SHA256]-----+
total 24
drwx------  2 urwa urwa 4096 Dec 24 16:27 .
drwxr-x--- 25 urwa urwa 4096 Dec 23 14:50 ..
-rw-------  1 urwa urwa    0 Oct 24 14:08 authorized_keys
-rw-------  1 urwa urwa  399 Dec 24 16:27 id_lab7
-rw-r--r--  1 urwa urwa   89 Dec 24 16:27 id_lab7.pub
-rw-------  1 urwa urwa  978 Oct 24 14:58 known_hosts
-rw-r--r--  1 urwa urwa  142 Oct 24 14:57 known_hosts.old
urwa@urwa:~$
```

```
urwa@urwa:~$ ssh-keygen -t ed25519 -f $env:USERPROFILE\.ssh\i
d_lab7 -C "lab_key"
Generating public/private ed25519 key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in :USERPROFILE.sshid_lab7
Your public key has been saved in :USERPROFILE.sshid_lab7.pub
The key fingerprint is:
SHA256:1zsL+KqL70OclUUsqW8WtkYhQbsgT3Iewhosblbj3lM lab_key
The key's randomart image is:
+--[ED25519 256]--+
|     .o. +.      |
|..    ..+ o      |
|o.=o= .o =       |
|oooO.o..*  .     |
|.+ .o..ESo. .    |
|o . . = *o   .   |
|   . + +. . o    |
|     .o  . . o   |
|    .o=+... .    |
+----[SHA256]-----+
urwa@urwa:~$
```

```
Windows PowerShell
PS C:\Users\TT> Clear-Content $env:USERPROFILE\.ssh\known_hosts
>>
PS C:\Users\TT> type $env:USERPROFILE\.ssh\known_hosts
PS C:\Users\TT>
```

```
urwa@urwa:~$ ssh urwa@192.168.189.128
urwa@192.168.189.128'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 Wed Dec 24 04:41:47 PM UTC 2025

  System load:  0.1               Processes:             243
  Usage of /:   81.6% of 9.75GB   Users logged in:       1
  Memory usage: 25%               IPv4 address for ens33: 192
.168.189.128
  Swap usage:   0%

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ster deployment.

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*** System restart required ***
Last login: Wed Dec 24 16:27:01 2025 from 192.168.189.128
urwa@urwa:~$
```

```
PS C:\Users\TT> type $env:USERPROFILE\.ssh\known_hosts
192.168.189.128 ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAICEziKJxXvUE8EI6SBnfKqtXd3UMn
tCks2usNM1yGEzJK
192.168.189.128 ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABgQDVX55msLieE1a/QhcNUxLxSShIb
tCVaji6622z8nQTGd2eL9a6RWL+dgyQ4niN6JPAYkbtLu1mctMOzcjBbAUpvg6BA/Yw47WYHpnsBG/Y1Mn
2CpPov0+srdgjUsGLRZBEeF78rSzT8kjxYACfFzR4HyRVEr5J1OpFA8LZBFYvl7s98ugJLjgYhsA4DY/Y
h+FnaqMOtBb7wwc3WdIYrS781k111PR6SJFP1832OprFmeygU/wKwMOzH2JpwDr0mXfpbK/D6zZAahNDg
M3xbB0wcrBB+Sgb3LUrWVbpQ9aaIpMQW3M6LQ2Bec2FSXtwmQck4qBhVZK2fngL10/pW76Q+io1V2BVUw
9BkAmjw2Hce+2gUPqMsRVqEULooKtLQ/lpzhVWB1tP9SX9ETa08v16oHmjhePYGd9RxUSio28KlMi61gT
VhPIx7Ll+ohojFX/47JvvzIQVYxutg3MVD4vhuAYnG/xQy+J2980MiHHlDLpCSFxGu9C9nj+PjeYE6z0s
=
192.168.189.128 ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyN
TYAAABBBE6J5rCnzv1A1oZlNKHVclqUCUg1dyim6+6tyZmHDM8NPvJ5I9NQ6ztaAOUUvCvqH13JIRHlhx
1nCkCAt6vA3aM=
PS C:\Users\TT>
```

```
urwa@urwa:~$ mkdir -p ~/.ssh
chmod 700 ~/.ssh
> ~/.ssh/authorized_keys
urwa@urwa:~$
```

```
PS C:\Users\TT> ssh urwa@192.168.189.128
urwa@192.168.189.128's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-86-generic x86_64)

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

 System information as of Wed Dec 24 04:48:23 PM UTC 2025

  System load:  0.02              Processes:              251
  Usage of /:   81.6% of 9.75GB   Users logged in:        1
  Memory usage: 25%               IPv4 address for ens33: 192.168.189.128
  Swap usage:   0%

 * Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
   just raised the bar for easy, resilient and secure K8s cluster deployment.

   https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

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*** System restart required ***
Last login: Wed Dec 24 16:45:25 2025 from 192.168.189.1
```

```
urwa@urwa:~$ ssh -i ~/.ssh/id_lab7 urwa@192.168.189.128
urwa@192.168.189.128'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 Wed Dec 24 04:50:00 PM UTC 2025

  System load:  0.0               Processes:              255
  Usage of /:   81.6% of 9.75GB   Users logged in:        1
  Memory usage: 26%               IPv4 address for ens33: 192.168.189.128
  Swap usage:   0%

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*** System restart required ***
Last login: Wed Dec 24 16:48:24 2025 from 192.168.189.1
```