



National Textile University

Department of Computer Science

Subject:

Operating System

Submitted to:

Sir Nasir Mehmood

Submitted by:

Fizza Shameen

Reg number:

23-NTU-CS-1157

Lab no. :

1

Semester:

5th

Lab 1 Plan: WSL2 Setup and Ubuntu Configuration

Objective

The purpose of this lab is to introduce students to Windows Subsystem for Linux (WSL2) and guide them through the installation, setup, and configuration of Ubuntu. By the end of this lab, students should be able to run and use a Linux environment on Windows for development and operating system–related tasks.

Learning Outcomes

After completing this lab, students will be able to:

1. Understand the concept and advantages of WSL2.
2. Install and enable WSL2 on Windows.
3. Install Ubuntu from Microsoft Store.
4. Configure Ubuntu environment (update, upgrade, user setup).
5. Run basic Linux commands in Ubuntu under WSL2.

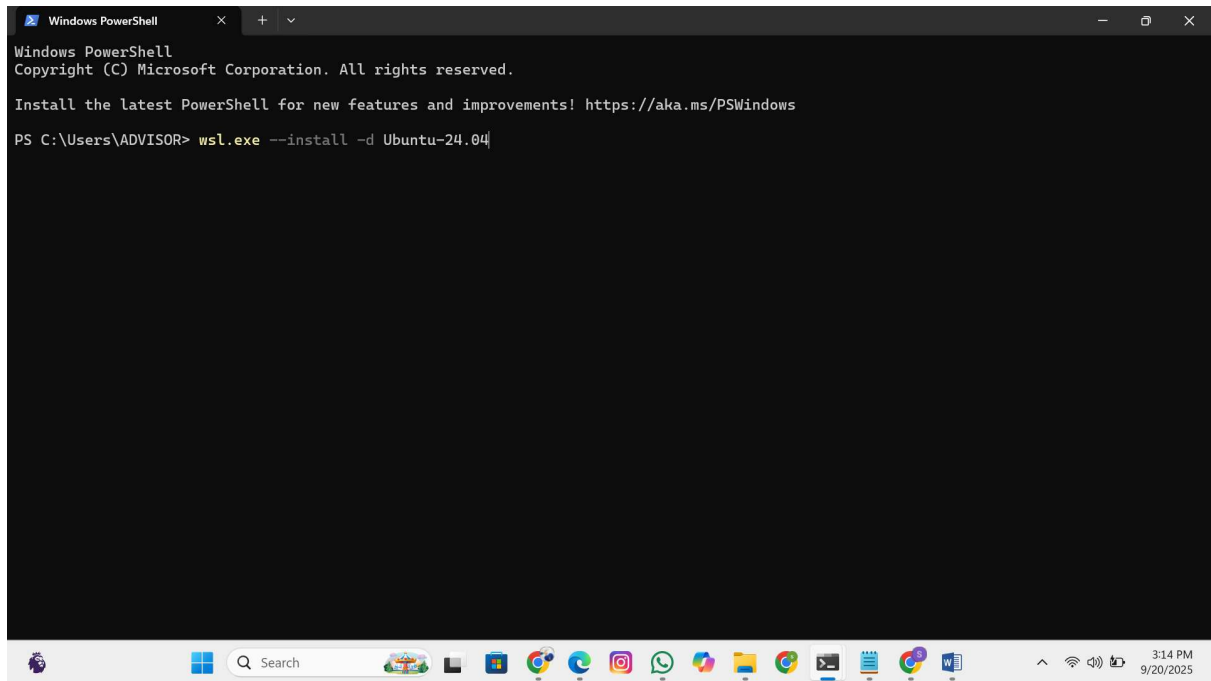
Lab Activities

Task 01: Installing WSL2 on Windows

Step 1: Open **PowerShell as Administrator**.

Step 2: Run command to enable WSL and Virtual Machine Platform:

```
wsl.exe --install -d Ubuntu-24.04
```



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

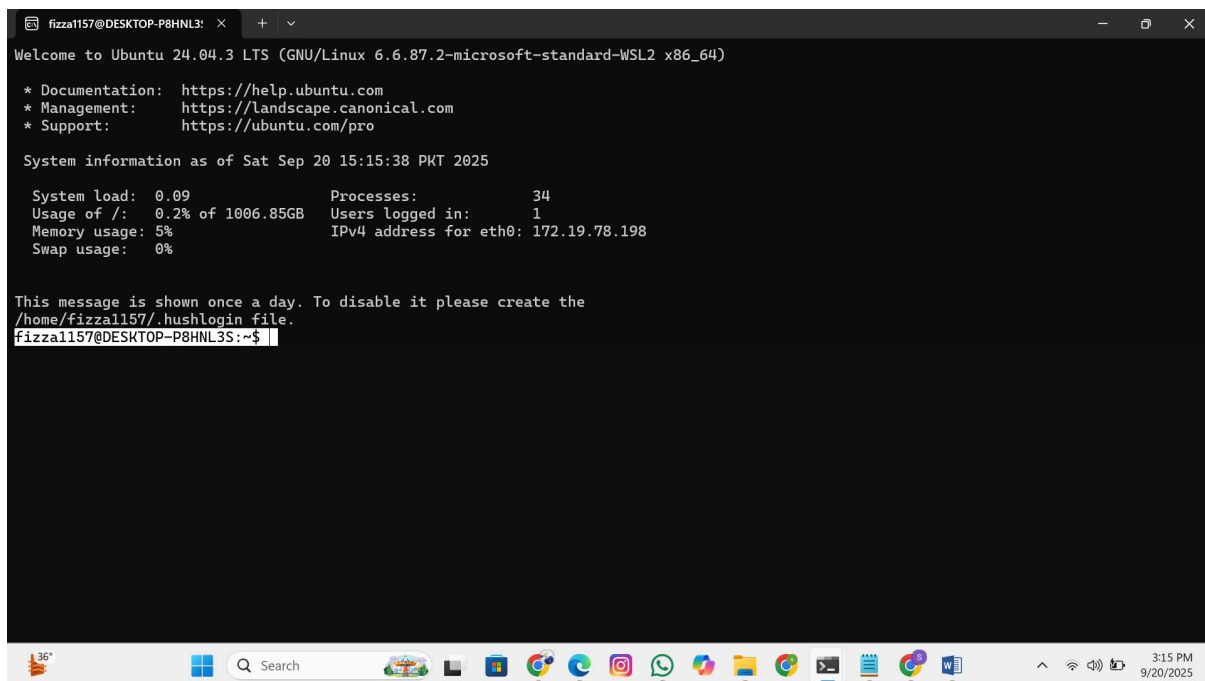
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\ADVISOR> wsl.exe --install -d Ubuntu-24.04
```

Task 02: Verifying setup on Windows

Step 1: Open Ubuntu 24.04 in Windows terminal or Ubuntu shell directly

Step 2: Create new user and password



```
fizza1157@DESKTOP-P8HNL3: ~
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.6.87.2-microsoft-standard-WSL2 x86_64)

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

System information as of Sat Sep 20 15:15:38 PKT 2025

System load:  0.09          Processes:            34
Usage of /:   0.2% of 1006.85GB Users logged in:       1
Memory usage: 5%          IPv4 address for eth0: 172.19.78.198
Swap usage:   0%

This message is shown once a day. To disable it please create the
/home/fizza1157/.hushlogin file.
fizza1157@DESKTOP-P8HNL3S:~$
```

Step 3: Run the following commands sudo apt update sudo apt upgrade

```
fizza1157@DESKTOP-P8HNL3S:~$ sudo apt install build-essential
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  libllvm19
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  bzip2 cpp cpp-13 cpp-13-x86-64-linux-gnu cpp-x86-64-linux-gnu dpkg dpkg-dev fakeroot g++ g++-13 g++-13-x86-64-linux-gnu
g++-x86-64-linux-gnu gcc gcc-13 gcc-13-base gcc-13-x86-64-linux-gnu gcc-x86-64-linux-gnu libalgorithm-diff-perl
libalgorithm-diff-xs-perl libalgorithm-merge-perl libaom3 libasan8 libatomic1 libc-dev-bin libc-devtools libc6-dev libcc1-0
libcrypt-dev libde265-0 libdpkg-perl libfakeroot libfile-fcntllock-perl libgcc-13-dev libgd3 libgomp1 libheif-plugin-aomdec
libheif-plugin-aomenc libheif-plugin-libde265 libheif1 libhwasan0 libisl23 libitm1 liblsan0 libmpc3 libquadmath0 libstdc++-13-dev
libtsan2 libubsan1 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev rpcsvc-proto
Suggested packages:
  bzip2-doc cpp-doc gcc-13-locales cpp-13-doc debsig-verify debian-keyring g++-multilib g++-13-multilib gcc-13-doc gcc-multilib
autoconf automake libtool flex bison gdb gcc-doc gcc-13-multilib gdb-x86-64-linux-gnu glibc-doc bsr libgd-tools
libheif-plugin-x265 libheif-plugin-ffmpegdec libheif-plugin-jpegdec libheif-plugin-jpegenc libheif-plugin-j2kdec
libheif-plugin-j2kenc libheif-plugin-rav1e libheif-plugin-svtenc libstdc++-13-doc make-doc
The following NEW packages will be installed:
  build-essential bzip2 cpp cpp-13 cpp-13-x86-64-linux-gnu cpp-x86-64-linux-gnu dpkg-dev fakeroot g++ g++-13
g++-13-x86-64-linux-gnu g++-x86-64-linux-gnu gcc gcc-13 gcc-13-base gcc-13-x86-64-linux-gnu gcc-x86-64-linux-gnu
libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libaom3 libasan8 libatomic1 libc-dev-bin libc-devtools
libc6-dev libcc1-0 libcrypt-dev libde265-0 libdpkg-perl libfakeroot libfile-fcntllock-perl libgcc-13-dev libgd3 libgomp1
libheif-plugin-aomdec libheif-plugin-aomenc libheif-plugin-libde265 libheif1 libhwasan0 libisl23 libitm1 liblsan0 libmpc3
libquadmath0 libstdc++-13-dev libtsan2 libubsan1 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev rpcsvc-proto
The following packages will be upgraded:
  dpkg
1 upgraded, 54 newly installed, 0 to remove and 2 not upgraded.
Need to get 72.6 MB of archives.
After this operation, 242 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 dpkg amd64 1.22.6ubuntu6.2 [1281 kB]
```

```
fizza1157@DESKTOP-P8HNL3S:~$ sudo apt install build-essential
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Setting up build-essential (12.10ubuntu1) ...
Setting up libheif1:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libgd3:amd64 (2.3.3-9ubuntu5) ...
Setting up libc-devtools (2.39-0ubuntu8.5) ...
Setting up libheif-plugin-aomdec:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-libde265:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-aomenc:amd64 (1.17.6-1ubuntu4.1) ...
Processing triggers for libc-bin (2.39-0ubuntu8.5) ...
Processing triggers for man-db (2.12.0-4build2) ...
fizza1157@DESKTOP-P8HNL3S:~$ sudo apt install build-essential -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package build-essential -y
fizza1157@DESKTOP-P8HNL3S:~$ gcc --version
gcc (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

fizza1157@DESKTOP-P8HNL3S:~$ g++ --version
g++ (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

fizza1157@DESKTOP-P8HNL3S:~$ git config --list
fizza1157@DESKTOP-P8HNL3S:~$ ssh-keygen -t ed25519
Generating public/private ed25519 key pair.
Enter file in which to save the key (/home/fizza1157/.ssh/id_ed25519):
Created directory '/home/fizza1157/.ssh'.
Enter passphrase (empty for no passphrase): |
```

```
fizza1157@DESKTOP-P8HNL3: ~$ cd ~/.ssh/
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ ^C
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ ^C
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ ssh -T git@github.com
The authenticity of host 'github.com (20.207.73.82)' can't be established.
ED25519 key fingerprint is SHA256:+DiY3wvV6TuJJhbpZisF/zLDA0zPMSvHdkr4UvCQqU.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'github.com' (ED25519) to the list of known hosts.
git@github.com: Permission denied (publickey).
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ git clone git@Fizza-hub902.com
fatal: repository 'git@Fizza-hub902.com' does not exist
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ git clone git@github.com:Fizza-hub902/Test-OS.git
Cloning into 'Test-OS'...
git@github.com: Permission denied (publickey).
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ git config --global user.name "Fizza"
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ git config --global user.email "shanzal202@gmail.com"
fizza1157@DESKTOP-P8HNL3: ~/.ssh$
```

Generate SSH Key:

```
fizza1157@DESKTOP-P8HNL3: ~$ cd ~/.ssh
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ ssh-keygen -t ed25519 -C "shabbird12@gmail.com"
Generating public/private ed25519 key pair.
Enter file in which to save the key (/home/fizza1157/.ssh/id_ed25519):
/home/fizza1157/.ssh/id_ed25519 already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/fizza1157/.ssh/id_ed25519
Your public key has been saved in /home/fizza1157/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:ZnPnL2CFr2c652gVv7Hsy27NU+brTFICWi8oq9+yvAA shabbird12@gmail.com
The key's randomart image is:
+--[ED25519 256]--+
|
|      .
|      o..
|      + oo.
|  E  .So..+.o.+
|    .ooo+.o+o+|
|    .  oo**+|
|    +.. o***+|
|    .+=. .o**O+|
+-----[SHA256]-----+
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ ls
id_ed25519  id_ed25519.github  known_hosts
id_ed25519.pub  id_ed25519.github.pub
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ cat ~/.ssh/id_ed25519.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAINcMm50JiBuZE7FI4IuxRlkvXjUC9qb2tBVc76+jtLn shabbird12@gmail.com
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ ssh -T git@github.com
Hi Fizza-hub902! You've successfully authenticated, but GitHub does not provide shell access.
fizza1157@DESKTOP-P8HNL3: ~/.ssh$ git clone git@github.com:Fizza-hub902/wsl_lab1.git
Cloning into 'wsl_lab1'...
```

Navigate to SSH Folder:

```
fizza1157@DESKTOP-P8HNL3: x + v
Enter file in which to save the key (/home/fizza1157/.ssh/id_ed25519):
/home/fizza1157/.ssh/id_ed25519 already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/fizza1157/.ssh/id_ed25519
Your public key has been saved in /home/fizza1157/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:ZnPnL2CFr2c652gVv7Hsy27NU+brTFICWi8oq9+yvAA shabbird12@gmail.com
The key's randomart image is:
+--[ED25519 256]--+
|
|      .
|      + oo.
|      + oo.
|    E .So..+o.+
|      . ooo +.o+o+|
|      . . ooo**+|
|      +.. o****+|
|      ..=+ .o**o+|
+-----[SHA256]-----+
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ ls
id_ed25519 id_ed25519_github known_hosts
id_ed25519.pub id_ed25519_github.pub
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ cat ~/.ssh/id_ed25519.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAINCmM50JiBuZE7FI4luxRLkvXjUC9qb2tBVc76+jtLn shabbird12@gmail.com
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ ssh -T git@github.com
Hi Fizza-hub902! You've successfully authenticated, but GitHub does not provide shell access.
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ git clone git@github.com:Fizza-hub902/wsl_lab1.git
Cloning into 'wsl_lab1'...
ERROR: Repository not found.
fatal: Could not read from remote repository.
```

Copy Public Key and add to
Github and then test
connection:

```
fizza1157@DESKTOP-P8HNL3: x + v
+ oo. |
E .So..+o.+ |
. ooo +.o+o+|
. . ooo**+|
+.. o****+|
..=+ .o**o+|
+-----[SHA256]-----+
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ ls
id_ed25519 id_ed25519_github known_hosts
id_ed25519.pub id_ed25519_github.pub
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ cat ~/.ssh/id_ed25519.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAINCmM50JiBuZE7FI4luxRLkvXjUC9qb2tBVc76+jtLn shabbird12@gmail.com
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ ssh -T git@github.com
Hi Fizza-hub902! You've successfully authenticated, but GitHub does not provide shell access.
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ git clone git@github.com:Fizza-hub902/wsl_lab1.git
Cloning into 'wsl_lab1'...
ERROR: Repository not found.
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ git clone git@github.com:Fizza-hub902/wsl_lab1.git
Cloning into 'wsl_lab1'...
warning: You appear to have cloned an empty repository.
fizza1157@DESKTOP-P8HNL3S:~/.ssh$ cd wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ echo "# My first WSL lab project" > README.md
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ git add .
git commit -m "Initial commit"
[main (root-commit) 4956f13] Initial commit
1 file changed, 1 insertion(+)
create mode 100644 README.md
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ git push origin main
Enumerating objects: 3, done.
```


Clone Repo via SSH

```
fizzal157@DESKTOP-P8HNL3: ~  
Cloning into 'wsl_lab1'...  
ERROR: Repository not found.  
fatal: Could not read from remote repository.  
  
Please make sure you have the correct access rights  
and the repository exists.  
fizzal157@DESKTOP-P8HNL3:~/.ssh$ git clone git@github.com:Fizza-hub902/wsl_lab1.git  
Cloning into 'wsl_lab1'...  
warning: You appear to have cloned an empty repository.  
fizzal157@DESKTOP-P8HNL3:~/.ssh$ cd wsl_lab1  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ echo "# My first WSL lab project" > README.md  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ git add .  
git commit -m "Initial commit"  
[main (root-commit) 4956f13] Initial commit  
1 file changed, 1 insertion(+)  
create mode 100644 README.md  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ git push origin main  
Enumerating objects: 3, done.  
Counting objects: 100% (3/3), done.  
Writing objects: 100% (3/3), 248 bytes | 248.00 KiB/s, done.  
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0  
To github.com:Fizza-hub902/wsl_lab1.git  
* [new branch]      main -> main  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ cd ~/wsl_lab1  
pwd  
-bash: cd: /home/fizzal157/wsl_lab1: No such file or directory  
/home/fizzal157/.ssh/wsl_lab1  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ cd ~/.ssh/wsl_lab1  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ pwd  
/home/fizzal157/.ssh/wsl_lab1  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ explorer.exe .  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ mv ~/.ssh/wsl_lab1 ~/wsl_lab1  
fizzal157@DESKTOP-P8HNL3:~/.ssh/wsl_lab1$ cd ~/wsl_lab1
```

Task 03: Linux filesystem and directory structure

Step 1: Explore Linux filesystem and basic linux files.

Step 2: Explore how Ubuntu (Linux) can access Windows file system under /mnt/c/.

```
fizza1157@DESKTOP-P8HNL3: ~/.ssh/wsl_lab1$ git push origin main
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Writing objects: 100% (3/3), 248 bytes | 248.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:Fizza-hub902/wsl_lab1.git
 * [new branch]      main -> main
fizza1157@DESKTOP-P8HNL3S:~/.ssh/wsl_lab1$ cd ~/wsl_lab1
pwd
-bash: cd: /home/fizza1157/wsl_lab1: No such file or directory
/home/fizza1157/.ssh/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/.ssh/wsl_lab1$ cd ~/.ssh/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/.ssh/wsl_lab1$ pwd
/home/fizza1157/.ssh/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/.ssh/wsl_lab1$ explorer.exe .
fizza1157@DESKTOP-P8HNL3S:~/.ssh/wsl_lab1$ mv ~/.ssh/wsl_lab1 ~/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/.ssh/wsl_lab1$ cd ~/wsl_lab1
explorer.exe .
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ mv ~/.ssh/wsl_lab1 ~/wsl_lab1
mv: cannot stat '/home/fizza1157/.ssh/wsl_lab1': No such file or directory
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ cd ~/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ cd ~/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ explorer.exe .
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ cd ~/wsl_lab1
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ echo "Hello GitHub from WSL + Windows!" > hello.txt
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$ explorer.exe .
fizza1157@DESKTOP-P8HNL3S:~/wsl_lab1$
```

Step 3: Practice creating files in Windows and accessing them in Ubuntu.

