



# **National Textile University**

*Department of Computer Science*

**Subject:**

**Operating System**

**Submitted To:**

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**Submitted By:**

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**Registration No:**

**23-NTU-CS-1163**

**Lab No:**

**2**

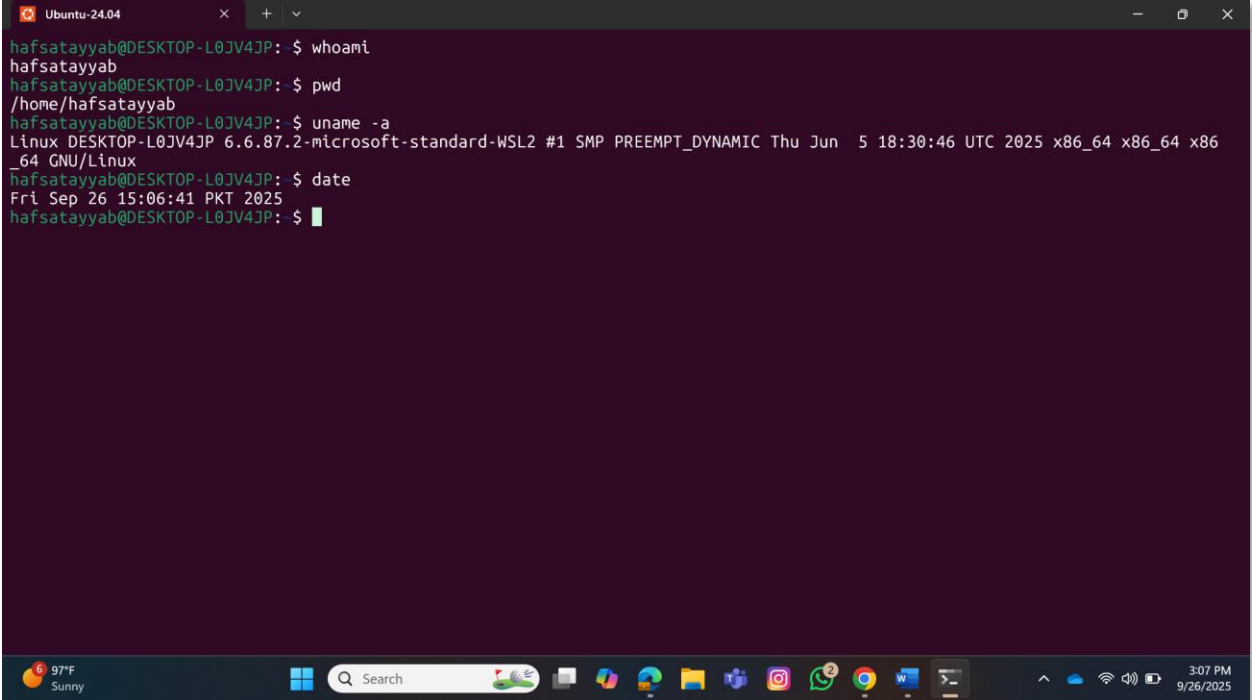
**Semester:**

**5<sup>th</sup>**

# Lab 2: Linux Basics and Introduction

## Part 1: Linux Environment Orientation

### 1.1 Understanding the Linux Environment



```
Ubuntu-24.04
hafsatayyab@DESKTOP-L0JV4JP: $ whoami
hafsatayyab
hafsatayyab@DESKTOP-L0JV4JP: $ pwd
/home/hafsatayyab
hafsatayyab@DESKTOP-L0JV4JP: $ uname -a
Linux DESKTOP-L0JV4JP 6.6.87.2-microsoft-standard-WSL2 #1 SMP PREEMPT_DYNAMIC Thu Jun 5 18:30:46 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux
hafsatayyab@DESKTOP-L0JV4JP: $ date
Fri Sep 26 15:06:41 PKT 2025
hafsatayyab@DESKTOP-L0JV4JP: $
```

### 1.2 Getting Help in Linux

```
hafsatayyab@DESKTOP-L0JV4JP: $ man ls
hafsatayyab@DESKTOP-L0JV4JP: $ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILES (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
-a, --all                do not ignore entries starting with .
-A, --almost-all        do not list implied . and ..
--author                with -l, print the author of each file
-b, --escape             print C-style escapes for nongraphic characters
--block-size=SIZE       with -l, scale sizes by SIZE when printing them;
                        e.g., '--block-size=M'; see SIZE format below

-B, --ignore-backups     do not list implied entries ending with ~
-c                      with -lt: sort by, and show, ctime (time of last
                        change of file status information);
                        with -l: show ctime and sort by name;
                        otherwise: sort by ctime, newest first

-C                      list entries by columns
--color[=WHEN]          color the output WHEN; more info below
-d, --directory          list directories themselves, not their contents
-D, --dired              generate output designed for Emacs' dired mode
-f                      list all entries in directory order
-F, --classify[=WHEN]   append indicator (one of */=>@|) to entries WHEN
                        likewise, except do not append '*'
--file-type              across -x, commas -m, horizontal -x, long -l,
--format=WORD            single-column -1, verbose -l, vertical -C

--full-time             like -l --time-style=full-iso
-g                      like -l, but do not list owner
```

```
hafsatayyab@DESKTOP-L0JV4JP: $ which ls
/usr/bin/ls
hafsatayyab@DESKTOP-L0JV4JP: $ type ls
ls is aliased to `ls --color=auto'
hafsatayyab@DESKTOP-L0JV4JP: $
```

## Part 2: File System Navigation

### 2.1 Understanding Linux Directory Structure

```
hafsatayyab@DESKTOP-L0JV4JP: $ ls /
bin          boot         etc          init         lib.usr-is-merged  lost+found  mnt         proc         run          sbin.usr-is-merged  srv         tmp         var
bin.usr-is-merged  dev         home        lib         lib64         media       opt         root         sbin         snap          sys         usr

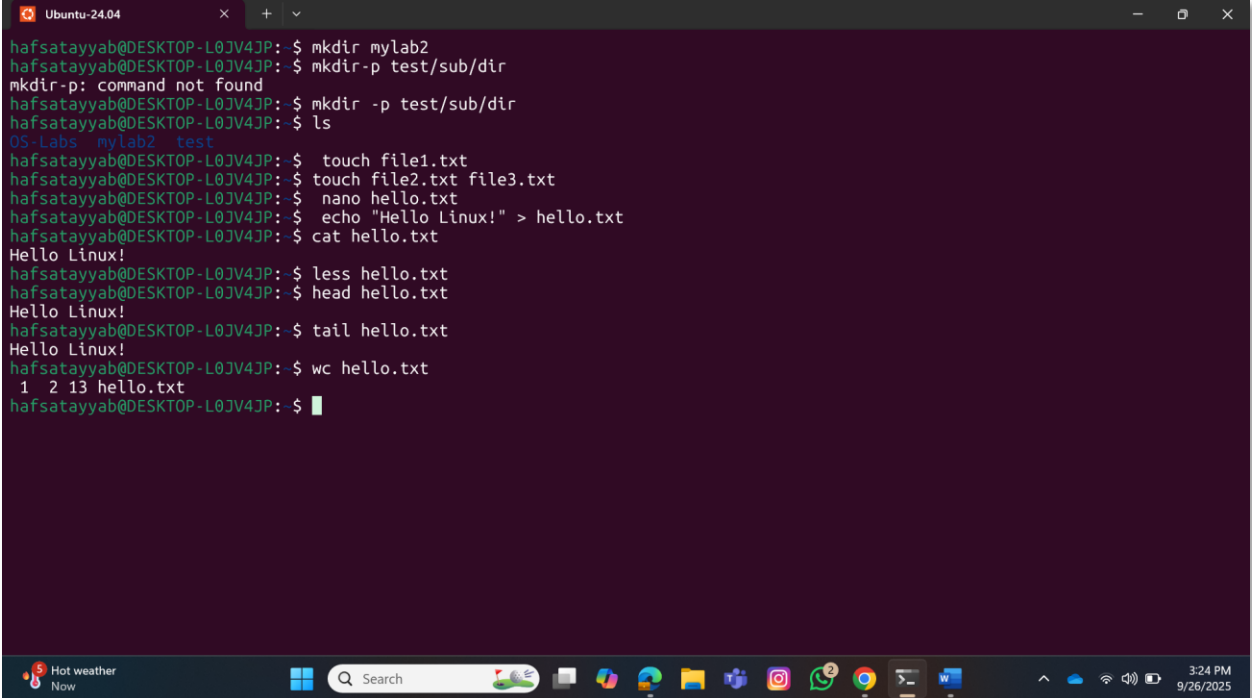
hafsatayyab@DESKTOP-L0JV4JP: $ ls -la
total 56
drwxr-x--- 8 hafsatayyab hafsatayyab 4096 Sep 26 15:12 .
drwxr-xr-x 3 root        root        4096 Sep 18 23:34 ..
-rw----- 1 hafsatayyab hafsatayyab 1205 Sep 25 22:27 .bash_history
-rw-r--r-- 1 hafsatayyab hafsatayyab 220  Sep 18 23:34 .bash_logout
-rw-r--r-- 1 hafsatayyab hafsatayyab 3771 Sep 18 23:34 .bashrc
-rwx----- 4 hafsatayyab hafsatayyab 4096 Sep 25 22:04 .cache
drwxr-xr-x 3 hafsatayyab hafsatayyab 4096 Sep 19 15:12 .dotnet
-rw-r--r-- 1 hafsatayyab hafsatayyab 62  Sep 19 16:01 .gitconfig
-rw----- 1 hafsatayyab hafsatayyab 20  Sep 26 15:12 .lessht
drwxr-xr-x 3 hafsatayyab hafsatayyab 4096 Sep 18 23:47 .local
-rw-rw-r-- 1 hafsatayyab hafsatayyab 0  Sep 26 14:27 .motd_shown
-rw-r--r-- 1 hafsatayyab hafsatayyab 807  Sep 18 23:34 .profile
drwx----- 2 hafsatayyab hafsatayyab 4096 Sep 25 20:20 .ssh
-rw-r--r-- 1 hafsatayyab hafsatayyab 0  Sep 18 23:37 .sudo_as_admin_successful
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 19 14:25 .vscode-server
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: $ cd /home
hafsatayyab@DESKTOP-L0JV4JP: /home$ cd ~
hafsatayyab@DESKTOP-L0JV4JP: $ cd -
/home
hafsatayyab@DESKTOP-L0JV4JP: /home$
```

## 2.2 Basic Navigation Commands

```
hafsatayyab@DESKTOP-L0JV4JP: $ pwd
/home/hafsatayyab
hafsatayyab@DESKTOP-L0JV4JP: $ ls
OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: $ ls -la
total 56
drwxr-x--- 8 hafsatayyab hafsatayyab 4096 Sep 26 15:12 .
drwxr-xr-x 3 root        root        4096 Sep 18 23:34 ..
-rw----- 1 hafsatayyab hafsatayyab 1205 Sep 25 22:27 .bash_history
-rw-r--r-- 1 hafsatayyab hafsatayyab 220  Sep 18 23:34 .bash_logout
-rw-r--r-- 1 hafsatayyab hafsatayyab 3771 Sep 18 23:34 .bashrc
-rwx----- 4 hafsatayyab hafsatayyab 4096 Sep 25 22:04 .cache
drwxr-xr-x 3 hafsatayyab hafsatayyab 4096 Sep 19 15:12 .dotnet
-rw-r--r-- 1 hafsatayyab hafsatayyab 62  Sep 19 16:01 .gitconfig
-rw----- 1 hafsatayyab hafsatayyab 20  Sep 26 15:12 .lessht
drwxr-xr-x 3 hafsatayyab hafsatayyab 4096 Sep 18 23:47 .local
-rw-rw-r-- 1 hafsatayyab hafsatayyab 0  Sep 26 14:27 .motd_shown
-rw-r--r-- 1 hafsatayyab hafsatayyab 807  Sep 18 23:34 .profile
drwx----- 2 hafsatayyab hafsatayyab 4096 Sep 25 20:20 .ssh
-rw-r--r-- 1 hafsatayyab hafsatayyab 0  Sep 18 23:37 .sudo_as_admin_successful
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 19 14:25 .vscode-server
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: $ ls -lh
total 4.0K
drwxr-xr-x 5 hafsatayyab hafsatayyab 4.0K Sep 26 15:04 OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: $ cd
hafsatayyab@DESKTOP-L0JV4JP: $ cd ..
hafsatayyab@DESKTOP-L0JV4JP: /home$ cd /
hafsatayyab@DESKTOP-L0JV4JP: $
```

## Part 3: File and Directory Operations

### 3.1 Creating and Managing Files/Directories



```
hafsatayyab@DESKTOP-L0JV4JP: $ mkdir mylab2
hafsatayyab@DESKTOP-L0JV4JP: $ mkdir -p test/sub/dir
mkdir -p: command not found
hafsatayyab@DESKTOP-L0JV4JP: $ mkdir -p test/sub/dir
hafsatayyab@DESKTOP-L0JV4JP: $ ls
OS-Labs  mylab2  test
hafsatayyab@DESKTOP-L0JV4JP: $ touch file1.txt
hafsatayyab@DESKTOP-L0JV4JP: $ touch file2.txt file3.txt
hafsatayyab@DESKTOP-L0JV4JP: $ nano hello.txt
hafsatayyab@DESKTOP-L0JV4JP: $ echo "Hello Linux!" > hello.txt
hafsatayyab@DESKTOP-L0JV4JP: $ cat hello.txt
Hello Linux!
hafsatayyab@DESKTOP-L0JV4JP: $ less hello.txt
hafsatayyab@DESKTOP-L0JV4JP: $ head hello.txt
Hello Linux!
hafsatayyab@DESKTOP-L0JV4JP: $ tail hello.txt
Hello Linux!
hafsatayyab@DESKTOP-L0JV4JP: $ wc hello.txt
 1  2 13 hello.txt
hafsatayyab@DESKTOP-L0JV4JP: $
```

The image shows a terminal window titled "Ubuntu-24.04" with a dark purple background. The user, hafsatayyab, is at a desktop environment. The terminal shows a series of commands to create a directory structure and files. The user attempts to use 'mkdir -p' but receives an error because the command is not found. They then successfully create the directory 'test/sub/dir' using 'mkdir -p'. They list the contents of the current directory, showing 'OS-Labs', 'mylab2', and 'test'. Next, they create three empty files: 'file1.txt', 'file2.txt', and 'file3.txt' using the 'touch' command. They then create a file named 'hello.txt' using 'echo "Hello Linux!" > hello.txt'. They verify the content of 'hello.txt' using 'cat', 'less', 'head', and 'tail' commands, all showing 'Hello Linux!'. Finally, they use 'wc' to check the word count of 'hello.txt', which is 1 line, 2 words, and 13 characters. The terminal window is open over a Windows taskbar at the bottom, which shows the time as 3:24 PM on 9/26/2025.

### 3.2 Copying, Moving, and Deleting

```
Ubuntu-24.04
hafsatayyab@DESKTOP-L0JV4JP: $ cp hello.txt backup.txt
hafsatayyab@DESKTOP-L0JV4JP: $ cp -r mylab2 mylab2_backup
hafsatayyab@DESKTOP-L0JV4JP: $ mv backup.txt renamed.txt
hafsatayyab@DESKTOP-L0JV4JP: $ rm renamed.txt
hafsatayyab@DESKTOP-L0JV4JP: $ rm -r mylab2_backup
rm-r: command not found
hafsatayyab@DESKTOP-L0JV4JP: $ rm -r mylab2_backup
hafsatayyab@DESKTOP-L0JV4JP: $ rmdir empty_directory
rmdir: failed to remove 'empty_directory': No such file or directory
hafsatayyab@DESKTOP-L0JV4JP: $ ls
OS-Labs  file1.txt  file2.txt  file3.txt  hello.txt  mylab2  test
hafsatayyab@DESKTOP-L0JV4JP: $ rm -r test
hafsatayyab@DESKTOP-L0JV4JP: $ rm file1.txt
hafsatayyab@DESKTOP-L0JV4JP: $ rm file2.txt
hafsatayyab@DESKTOP-L0JV4JP: $ rm file3.txt
hafsatayyab@DESKTOP-L0JV4JP: $ rm hello.txt
hafsatayyab@DESKTOP-L0JV4JP: $ ls
OS-Labs  mylab2
hafsatayyab@DESKTOP-L0JV4JP: $ rm -r mylab2
hafsatayyab@DESKTOP-L0JV4JP: $ ls
OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: $
```

## Part 4: File Permissions and Ownership

### 4.1 Understanding File Permissions

```
Ubuntu-24.04
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
-rw-r--r-- 1 hafsatayyab hafsatayyab 0 Sep 26 16:06 file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ chmod 755 file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
-rwxr-xr-x 1 hafsatayyab hafsatayyab 0 Sep 26 16:06 file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ chmod u+x file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
-rwxr-xr-x 1 hafsatayyab hafsatayyab 0 Sep 26 16:06 file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ chmod g-w file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
-rwxr-xr-x 1 hafsatayyab hafsatayyab 0 Sep 26 16:06 file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ chown user:group file.txt
chown: invalid user: 'user:group'
hafsatayyab@DESKTOP-L0JV4JP: $ sudo chmod g-w file.txt
[sudo] password for hafsatayyab:
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
drwxr-xr-x 5 hafsatayyab hafsatayyab 4096 Sep 26 15:04 OS-Labs
-rwxr-xr-x 1 hafsatayyab hafsatayyab 0 Sep 26 16:06 file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ sudo chown user:group file.txt
chown: invalid user: 'user:group'
hafsatayyab@DESKTOP-L0JV4JP: $ sudo chown hafsatayyab:hafsatayyab file.txt
hafsatayyab@DESKTOP-L0JV4JP: $ ls -l
total 4
```

96°F Sunny 4:22 PM 9/26/2025