

# Concepts of Operating System

## Assignment 1

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**Problem 1:** Read the instructions carefully and answer accordingly. If there is any need to insert some data then do that as well.

### a) Navigate and List:

a. Start by navigating to your home directory and list its contents. Then, move into a directory named "LinuxAssignment" if it exists; otherwise, create it.

```
cdac@nobeuno: ~/LinuxAssig x + v - □ x
cdac@nobeuno:~$ pwd
/home/cdac
cdac@nobeuno:~$ ls
LinuxAssignments
cdac@nobeuno:~$ cd LinuxAssignments/
cdac@nobeuno:~/LinuxAssignments$ |
```

### b) File Management:

a. Inside the "LinuxAssignment" directory, create a new file named "file1.txt". Display its contents.

```
cdac@nobeuno: ~/LinuxAssig x + v - □ x
cdac@nobeuno:~/LinuxAssignments$ nano file1.txt
cdac@nobeuno:~/LinuxAssignments$ ls
file1.txt
cdac@nobeuno:~/LinuxAssignments$ cat file1.txt
Hello, my name is Lakshit Dogra.
cdac@nobeuno:~/LinuxAssignments$ |
```

### c) Directory Management:

a. Create a new directory named "docs" inside the "LinuxAssignment" directory.

```
cdac@nobeuno: ~/LinuxAssig x + v - □ x
cdac@nobeuno:~/LinuxAssignments$ mkdir docs
cdac@nobeuno:~/LinuxAssignments$ ls
docs file1.txt
cdac@nobeuno:~/LinuxAssignments$ |
```

### d) Copy and Move Files:

a. Copy the "file1.txt" file into the "docs" directory and rename it to "file2.txt".

```
cdac@nobeuno: ~/LinuxAssig x + v - □ x
cdac@nobeuno:~/LinuxAssignments$ cp file1.txt file2.txt
cdac@nobeuno:~/LinuxAssignments$ mv file2.txt docs
cdac@nobeuno:~/LinuxAssignments$ ls
docs file1.txt
cdac@nobeuno:~/LinuxAssignments$ cd docs
cdac@nobeuno:~/LinuxAssignments/docs$ ls
file2.txt
cdac@nobeuno:~/LinuxAssignments/docs$ |
```

### e) Permissions and Ownership:

a. Change the permissions of "file2.txt" to allow read, write, and execute permissions for the owner and only read permissions for others. Then, change the owner of "file2.txt" to the current user.

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments/docs$ ls -l file2.txt
-rw-r--r-- 1 cdac cdac 33 Feb 26 17:15 file2.txt
cdac@nobeuno:~/LinuxAssignments/docs$ chmod og-rwx file2.txt
cdac@nobeuno:~/LinuxAssignments/docs$ chown cdac file2.txt
cdac@nobeuno:~/LinuxAssignments/docs$ ls -l file2.txt
-rw----- 1 cdac cdac 33 Feb 26 17:15 file2.txt
```

### f) Final Checklist:

a. Finally, list the contents of the "LinuxAssignment" directory and the root directory to ensure that all operations were performed correctly.

```
cdac@nobeuno: ~ X + v
cdac@nobeuno:~/LinuxAssignments/docs$ ls
file2.txt
cdac@nobeuno:~/LinuxAssignments/docs$ cd ..
cdac@nobeuno:~/LinuxAssignments$ ls
docs  file1.txt
cdac@nobeuno:~/LinuxAssignments$ cd ..
cdac@nobeuno:~$ ls
LinuxAssignments
```

### g) File Searching:

a. Search for all files with the extension ".txt" in the current directory and its subdirectories.

```
cdac@nobeuno: ~ X + v
cdac@nobeuno:~$ find . -type f -name "*.txt"
./LinuxAssignments/duplicate.txt
./LinuxAssignments/data.txt
./LinuxAssignments/file1.txt
./LinuxAssignments/input.txt
./LinuxAssignments/fruit.txt
./LinuxAssignments/newdocs/docs/file2.txt
./LinuxAssignments/output.txt
./LinuxAssignments/docs/file2.txt
./LinuxAssignments/numbers.txt
```

b. Display lines containing a specific word in a file (provide a file name and the specific word to search).

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ ls
data.txt docs docs1.zip duplicate.txt file1.txt fruit.txt input.txt newdocs numbers.txt output.txt
cdac@nobeuno:~/LinuxAssignments$ cat duplicate.txt
apple
banana
cherry
apple
grape
kiwi
banana
orange
grape
mango
pear
cherry
cdac@nobeuno:~/LinuxAssignments$ grep "apple" duplicate.txt
apple
apple
cdac@nobeuno:~/LinuxAssignments$ |
```

## h) System Information:

- a. Display the current system date and time.

```
cdac@nobeuno: ~  
cdac@nobeuno:~$ date  
Thu Feb 27 13:17:05 UTC 2025  
cdac@nobeuno:~$ cal  
February 2025  
Su Mo Tu We Th Fr Sa  
                1  
2  3  4  5  6  7  8  
9 10 11 12 13 14 15  
16 17 18 19 20 21 22  
23 24 25 26 27 28  
cdac@nobeuno:~$ |
```

## i) Networking:

- a. Display the IP address of the system.

```
cdac@nobeuno: ~  
cdac@nobeuno:~$ ipconfig.exe  
  
Windows IP Configuration  
  
Wireless LAN adapter Local Area Connection* 1:  
  
Media State . . . . . : Media disconnected  
Connection-specific DNS Suffix  . :  
  
Wireless LAN adapter Local Area Connection* 2:  
  
Media State . . . . . : Media disconnected  
Connection-specific DNS Suffix  . :  
  
Wireless LAN adapter Wi-Fi:  
  
Connection-specific DNS Suffix  . :  
IPv6 Address. . . . . : 2405:201:5501:b22a:2636:b4bc:c0ee:7308  
Temporary IPv6 Address. . . . . : 2405:201:5501:b22a:35be:6c9a:2726:1e8b  
Link-Local IPv6 Address . . . . . : fe80::28db:807f:a892:6a61%7  
IPv4 Address. . . . . : 192.168.29.12  
Subnet Mask . . . . . : 255.255.255.0  
Default Gateway . . . . . : fe80::96fb:a7ff:fe64:a44f%7  
192.168.29.1  
  
Ethernet adapter vEthernet (WSL (Hyper-V firewall)):  
  
Connection-specific DNS Suffix  . :  
Link-Local IPv6 Address . . . . . : fe80::563d:cf11:e963:e58%34  
IPv4 Address. . . . . : 172.23.224.1  
Subnet Mask . . . . . : 255.255.240.0  
Default Gateway . . . . . :  
cdac@nobeuno:~$ |
```

- b. Ping a remote server to check connectivity (provide a remote server address to ping).

```
cdac@nobeuno: ~/LinuxAssignm  
cdac@nobeuno:~/LinuxAssignments$ ping -c 5 google.com  
PING google.com (142.250.207.206) 56(84) bytes of data:  
64 bytes from del12s10-in-f14.1e100.net (142.250.207.206): icmp_seq=1 ttl=52 time=17.1 ms  
64 bytes from del12s10-in-f14.1e100.net (142.250.207.206): icmp_seq=2 ttl=52 time=19.7 ms  
64 bytes from del12s10-in-f14.1e100.net (142.250.207.206): icmp_seq=3 ttl=52 time=23.8 ms  
64 bytes from del12s10-in-f14.1e100.net (142.250.207.206): icmp_seq=4 ttl=52 time=17.1 ms  
64 bytes from del12s10-in-f14.1e100.net (142.250.207.206): icmp_seq=5 ttl=52 time=17.3 ms  
  
--- google.com ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 3998ms  
rtt min/avg/max/mdev = 17.066/19.015/23.828/2.605 ms  
cdac@nobeuno:~/LinuxAssignments$ |
```

## j) File Compression:

- a. Compress the "docs" directory into a zip file.

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ sudo apt install zip
[sudo] password for cdac:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  libllvm17t64
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  unzip
The following NEW packages will be installed:
  unzip zip
0 upgraded, 2 newly installed, 0 to remove and 10 not upgraded.
Need to get 350 kB of archives.
After this operation, 933 kB 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 unzip amd64 6.0-28ubuntu4.1 [174 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 zip amd64 3.0-13ubuntu0.2 [176 kB]
Fetched 350 kB in 1s (241 kB/s)
Selecting previously unselected package unzip.
(Reading database ... 40782 files and directories currently installed.)
Preparing to unpack .../unzip_6.0-28ubuntu4.1_amd64.deb ...
Unpacking unzip (6.0-28ubuntu4.1) ...
Selecting previously unselected package zip.
Preparing to unpack .../zip_3.0-13ubuntu0.2_amd64.deb ...
Unpacking zip (3.0-13ubuntu0.2) ...
Setting up unzip (6.0-28ubuntu4.1) ...
Setting up zip (3.0-13ubuntu0.2) ...
Processing triggers for man-db (2.12.0-4build2) ...
cdac@nobeuno:~/LinuxAssignments$ zip -r docs1.zip docs
  adding: docs/ (stored 0%)
  adding: docs/file2.txt (stored 0%)
cdac@nobeuno:~/LinuxAssignments$ ls
data.txt  docs  docs1.zip  duplicate.txt  file1.txt  fruit.txt  input.txt  numbers.txt  output.txt
cdac@nobeuno:~/LinuxAssignments$
```

- b. Extract the contents of the zip file into a new directory.

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ ls
data.txt  docs  docs1.zip  duplicate.txt  file1.txt  fruit.txt  input.txt  numbers.txt  output.txt
cdac@nobeuno:~/LinuxAssignments$ unzip docs1.zip -d newdocs
Archive:  docs1.zip
  creating: newdocs/docs/
  extracting: newdocs/docs/file2.txt
cdac@nobeuno:~/LinuxAssignments$ ls
data.txt  docs  docs1.zip  duplicate.txt  file1.txt  fruit.txt  input.txt  newdocs  numbers.txt  output.txt
cdac@nobeuno:~/LinuxAssignments$
```

## k) File Editing:

- a. Open the "file1.txt" file in a text editor and add some text to it.
- b. Replace a specific word in the "file1.txt" file with another word (provide the original word and the word to replace it with).

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ ls
data.txt  docs  docs1.zip  duplicate.txt  file1.txt  fruit.txt  input.txt  newdocs  numbers.txt  output.txt
cdac@nobeuno:~/LinuxAssignments$ nano file1.txt
cdac@nobeuno:~/LinuxAssignments$ cat file1.txt
Hello, my name is Lakshit Dogra.
Hope you have a nice day ahead.
cdac@nobeuno:~/LinuxAssignments$ sed -i 's/ahead/always/g' file1.txt
cdac@nobeuno:~/LinuxAssignments$ cat file1.txt
Hello, my name is Lakshit Dogra.
Hope you have a nice day always.
cdac@nobeuno:~/LinuxAssignments$
```

**Problem 2:** Read the instructions carefully and answer accordingly. If there is any need to insert some data then do that as well.

a. Suppose you have a file named "data.txt" containing important information. Display the first 10 lines of this file to quickly glance at its contents using a command.

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ nano data.txt
cdac@nobeuno:~/LinuxAssignments$ head -10 data.txt
Lakshit
Aditi
Himanshu
Ruturaj
Nayan
Dhananjay
Shubham
Mrunal
Sanika
Darshan
cdac@nobeuno:~/LinuxAssignments$ |
```

b. Now, to check the end of the file for any recent additions, display the last 5 lines of "data.txt" using another command.

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ tail -5 data.txt
Utsav
Abhay
Krutika
Aditya
Mihir
cdac@nobeuno:~/LinuxAssignments$ |
```

c. In a file named "numbers.txt," there are a series of numbers. Display the first 15 lines of this file to analyze the initial data set.

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ nano numbers.txt
cdac@nobeuno:~/LinuxAssignments$ head -15 numbers.txt
42
17
9
35
27
5
14
3
29
49
33
18
6
21
12
cdac@nobeuno:~/LinuxAssignments$ |
```

d. To focus on the last few numbers of the dataset, display the last 3 lines of "numbers.txt".

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ tail -3 numbers.txt
40
20
1
cdac@nobeuno:~/LinuxAssignments$ |
```

e. Imagine you have a file named "input.txt" with text content. Use a command to translate all lowercase letters to uppercase in "input.txt" and save the modified text in a new file named "output.txt."

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ nano input.txt
cdac@nobeuno:~/LinuxAssignments$ cat input.txt
this is lowercase

THIS IS UPPERCASE

$P3C14L C#4R4CT3R$

1234567890
cdac@nobeuno:~/LinuxAssignments$ tr [:lower:] [:upper:] < input.txt > output.txt
cdac@nobeuno:~/LinuxAssignments$ cat output.txt
THIS IS LOWERCASE

THIS IS UPPERCASE

$P3C14L C#4R4CT3R$

1234567890
```

f. In a file named "duplicate.txt," there are several lines of text, some of which are duplicates. Use a command to display only the unique lines from "duplicate.txt."

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ nano duplicate.txt
cdac@nobeuno:~/LinuxAssignments$ cat duplicate.txt
apple
banana
cherry
apple
grape
kiwi
banana
orange
grape
mango
pear
cherry
cdac@nobeuno:~/LinuxAssignments$ cat duplicate.txt | sort | uniq
apple
banana
cherry
grape
kiwi
mango
orange
pear
```

g. In a file named "fruit.txt," there is a list of fruits, but some fruits are repeated. Use a command to display each unique fruit along with the count of its occurrences in "fruit.txt."

```
cdac@nobeuno: ~/LinuxAssig X + v
cdac@nobeuno:~/LinuxAssignments$ nano fruit.txt
cdac@nobeuno:~/LinuxAssignments$ nano fruit.txt
cdac@nobeuno:~/LinuxAssignments$ cat fruit.txt
banana
apple
banana
cherry
apple
grape
kiwi
banana
orange
grape
mango
pear
cherry

cdac@nobeuno:~/LinuxAssignments$ cat fruit.txt | sort | uniq
apple
banana
cherry
grape
kiwi
mango
orange
pear
```