

CDAC MUMBAI

Concepts of Operating System

Assignment 1

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:

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/$ ls -l
total 2144
lrwxrwxrwx 1 root root 7 Nov 23 2023 bin -> usr/bin
drwxr-xr-x 2 root root 4096 Apr 18 2022 boot
drwxr-xr-x 16 root root 3560 Aug 28 18:38 dev
drwxr-xr-x 73 root root 4096 Aug 28 19:24 etc
drwxr-xr-x 3 root root 4096 Aug 28 19:43 home
-rwxrwxrwx 1 root root 2127224 Apr 25 23:47 init
lrwxrwxrwx 1 root root 7 Nov 23 2023 lib -> usr/lib
lrwxrwxrwx 1 root root 9 Nov 23 2023 lib32 -> usr/lib32
lrwxrwxrwx 1 root root 9 Nov 23 2023 lib64 -> usr/lib64
lrwxrwxrwx 1 root root 10 Nov 23 2023 libx32 -> usr/libx32
drwx----- 2 root root 16384 Aug 27 18:07 lost+found
drwxr-xr-x 2 root root 4096 Nov 23 2023 media
drwxr-xr-x 6 root root 4096 Aug 27 18:08 mnt
drwxr-xr-x 2 root root 4096 Nov 23 2023 opt
dr-xr-xr-x 211 root root 0 Aug 28 18:38 proc
drwx----- 4 root root 4096 Aug 27 18:09 root
drwxr-xr-x 19 root root 560 Aug 28 18:43 run
lrwxrwxrwx 1 root root 8 Nov 23 2023/sbin -> usr/sbin
drwxr-xr-x 8 root root 4096 Nov 23 2023 snap
drwxr-xr-x 2 root root 4096 Nov 23 2023 srv
dr-xr-xr-x 11 root root 0 Aug 28 18:38 sys
drwxrwxrwt 10 root root 4096 Aug 28 19:53 tmp
drwxr-xr-x 14 root root 4096 Nov 23 2023 usr
drwxr-xr-x 13 root root 4096 Nov 23 2023 var
cdac@PratyushPC:/$ sudo chmod o+w home
[sudo] password for cdac:
cdac@PratyushPC:/$ cd home
cdac@PratyushPC:/home$ mkdir LinuxAssignment
cdac@PratyushPC:/home$ ls -l
total 8
drwxr-xr-x 2 cdac cdac 4096 Aug 28 20:06 LinuxAssignment
drwxr-xr-x 4 cdac cdac 4096 Aug 28 19:27 cdac
cdac@PratyushPC:/home$ cd LinuxAssignment
cdac@PratyushPC:/home/LinuxAssignment$ |
```

b) File Management:

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

```
cdac@PratyushPC: /home/Lin  ×  +  v
cdac@PratyushPC:/home/LinuxAssignment$ nano file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ cat file1.txt
Hi there, this is Pratyush
cdac@PratyushPC:/home/LinuxAssignment$ |
```

c) Directory Management:

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

```
cdac@PratyushPC: /home/Lin  ×  +  v
cdac@PratyushPC:/home/LinuxAssignment$ ls -l
total 4
-rw-r--r-- 1 cdac cdac 27 Aug 28 20:11 file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ cd ..
cdac@PratyushPC:/home$ ls -l
total 8
drwxr-xr-x 2 cdac cdac 4096 Aug 28 20:11 LinuxAssignment
drwxr-x--- 4 cdac cdac 4096 Aug 28 19:27 cdac
cdac@PratyushPC:/home$ cd LinuxAssignment
cdac@PratyushPC:/home/LinuxAssignment$ mkdir docs
cdac@PratyushPC:/home/LinuxAssignment$ ls -l
total 8
drwxr-xr-x 2 cdac cdac 4096 Aug 28 20:13 docs
-rw-r--r-- 1 cdac cdac 27 Aug 28 20:11 file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ |
```

d) Copy and Move Files:

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

```
cdac@PratyushPC: /home/Lin  ×  +  v
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs  file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ cp file1.txt file2.txt
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs  file1.txt  file2.txt
```

```
cdac@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs  file1.txt  file2.txt
cdac@PratyushPC:/home/LinuxAssignment$ mv file2.txt docs
cdac@PratyushPC:/home/LinuxAssignment$ cd docs
cdac@PratyushPC:/home/LinuxAssignment/docs$ ls -l
total 4
-rw-r--r-- 1 cdac cdac 27 Aug 28 22:26 file2.txt
cdac@PratyushPC:/home/LinuxAssignment/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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment/docs$ ls -l
total 4
-rw-r--r-- 1 cdac cdac 27 Aug 28 22:26 file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$ sudo chmod u+x file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$ ls -l
total 4
-rwxr--r-- 1 cdac cdac 27 Aug 28 22:26 file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$ sudo whoami
root
cdac@PratyushPC:/home/LinuxAssignment/docs$ sudo chown root file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$ ls -l
total 4
-rwxr--r-- 1 root cdac 27 Aug 28 22:26 file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$ sudo chown cdac file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$ ls -l
total 4
-rwxr--r-- 1 cdac cdac 27 Aug 28 22:26 file2.txt
cdac@PratyushPC:/home/LinuxAssignment/docs$
```

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@PratyushPC: /home/LinuxAssignment/docs$ cd ..
cdac@PratyushPC: /home/LinuxAssignment$ ls -l
total 8
drwxr-xr-x 2 cdac cdac 4096 Aug 28 22:33 docs
-rw-r--r-- 1 cdac cdac 27 Aug 28 20:11 file1.txt
cdac@PratyushPC: /home/LinuxAssignment$ cd ../../
cdac@PratyushPC: /$ ls -l
total 2144
lrwxrwxrwx 1 root root 7 Nov 23 2023 bin -> usr/bin
drwxr-xr-x 2 root root 4096 Apr 18 2022 boot
drwxr-xr-x 16 root root 3560 Aug 28 22:20 dev
drwxr-xr-x 73 root root 4096 Aug 28 22:20 etc
drwxr-xr-x 4 root root 4096 Aug 28 20:06 home
-rwxrwxrwx 1 root root 2127224 Apr 25 23:47 init
lrwxrwxrwx 1 root root 7 Nov 23 2023 lib -> usr/lib
lrwxrwxrwx 1 root root 9 Nov 23 2023 lib32 -> usr/lib32
lrwxrwxrwx 1 root root 9 Nov 23 2023 lib64 -> usr/lib64
lrwxrwxrwx 1 root root 10 Nov 23 2023 libx32 -> usr/libx32
drwx----- 2 root root 16384 Aug 27 18:07 lost+found
drwxr-xr-x 2 root root 4096 Nov 23 2023 media
drwxr-xr-x 6 root root 4096 Aug 27 18:08 mnt
drwxr-xr-x 2 root root 4096 Nov 23 2023 opt
dr-xr-xr-x 210 root root 0 Aug 28 22:20 proc
drwx----- 4 root root 4096 Aug 27 18:09 root
drwxr-xr-x 18 root root 540 Aug 28 22:21 run
lrwxrwxrwx 1 root root 8 Nov 23 2023 sbin -> usr/sbin
drwxr-xr-x 8 root root 4096 Nov 23 2023 snap
drwxr-xr-x 2 root root 4096 Nov 23 2023 srv
dr-xr-xr-x 11 root root 0 Aug 28 22:20 sys
drwxrwxrwt 10 root root 4096 Aug 28 22:31 tmp
drwxr-xr-x 14 root root 4096 Nov 23 2023 usr
drwxr-xr-x 13 root root 4096 Nov 23 2023 var
```

g) File Searching:

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

```
cdac@PratyushPC: /home/LinuxAssignment$ find . -type f -name "*.txt"
./docs/file2.txt
./file1.txt
cdac@PratyushPC: /home/LinuxAssignment$ ls -l
total 8
drwxr-xr-x 2 cdac cdac 4096 Aug 28 22:33 docs
-rw-r--r-- 1 cdac cdac 27 Aug 28 20:11 file1.txt
cdac@PratyushPC: /home/LinuxAssignment$ cd docs
cdac@PratyushPC: /home/LinuxAssignment/docs$ ls -l
total 4
-rwxr--r-- 1 cdac cdac 27 Aug 28 22:26 file2.txt
cdac@PratyushPC: /home/LinuxAssignment/docs$ |
```

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

```
cdac@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment/docs$ grep "is" file2.txt
Hi there, this is Pratyush
This is Linux - Ubuntu
cdac@PratyushPC:/home/LinuxAssignment/docs$ |
```

h) System Information:

- a. Display the current system date and time.

```
cdac@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment/docs$ date
Wed Aug 28 22:53:19 IST 2024
cdac@PratyushPC:/home/LinuxAssignment/docs$ |
```

i) Networking:

- a. Display the IP address of the system.

```
cdac@PratyushPC: / × + v
cdac@PratyushPC:/$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 204 kB of archives.
After this operation, 819 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 net-tools amd64 1.60+git20181103.0eebece-1ubuntu5 [204 kB]
Fetched 204 kB in 2s (121 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 24208 files and directories currently installed.)
Preparing to unpack ../net-tools_1.60+git20181103.0eebece-1ubuntu5_amd64.deb ...
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Processing triggers for man-db (2.10.2-1) ...
cdac@PratyushPC:/$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.251.18 netmask 255.255.240.0 broadcast 172.30.255.255
    inet6 fe80::215:5dff:feda:ccba prefixlen 64 scopeid 0x20<link>
    ether 00:15:5d:da:cc:ba txqueuelen 1000 (Ethernet)
    RX packets 734 bytes 786890 (786.8 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 320 bytes 56338 (56.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 30 bytes 2995 (2.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 30 bytes 2995 (2.9 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

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

```
cdac@PratyushPC: /  
cdac@PratyushPC:/$ ping cdac.in  
PING cdac.in (196.1.1.30) 56(84) bytes of data.  
  
^C  
--- cdac.in ping statistics ---  
271 packets transmitted, 0 received, 100% packet loss, time 280780ms  
  
cdac@PratyushPC:/$ |
```

j) File Compression:

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

```
cdac@PratyushPC: /home/Lin × +  
cdac@PratyushPC:/home/LinuxAssignment/docs$ sudo apt install zip  
[sudo] password for cdac:  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
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 0 not upgraded.  
Need to get 350 kB of archives.  
After this operation, 929 kB of additional disk space will be used.  
Do you want to continue? [Y/n] y  
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 unzip amd64 6.0-26ubuntu3.1 [174 kB]  
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 zip amd64 3.0-12build2 [176 kB]  
Fetched 350 kB in 1s (267 kB/s)  
Selecting previously unselected package unzip.  
(Reading database ... 24257 files and directories currently installed.)  
Preparing to unpack .../unzip_6.0-26ubuntu3.1_amd64.deb ...  
Unpacking unzip (6.0-26ubuntu3.1) ...  
Selecting previously unselected package zip.  
Preparing to unpack .../zip_3.0-12build2_amd64.deb ...  
Unpacking zip (3.0-12build2) ...  
Setting up unzip (6.0-26ubuntu3.1) ...  
Setting up zip (3.0-12build2) ...  
Processing triggers for man-db (2.10.2-1) ...  
cdac@PratyushPC:/home/LinuxAssignment/docs$ ls  
file2.txt  
cdac@PratyushPC:/home/LinuxAssignment/docs$ cd ..  
cdac@PratyushPC:/home/LinuxAssignment$ zip docsdire.zip docs  
adding: docs/ (stored 0%)  
cdac@PratyushPC:/home/LinuxAssignment$ ls  
docs docsdire.zip file1.txt  
cdac@PratyushPC:/home/LinuxAssignment$ |
```

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

```
cdac@PratyushPC: /home/Lin  ×  +  v
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs docsdir.zip file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ unzip docsdir.zip -d newdocs
Archive: docsdir.zip
  creating: newdocs/docs/
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs docsdir.zip file1.txt newdocs
cdac@PratyushPC:/home/LinuxAssignment$ cd newdocs
cdac@PratyushPC:/home/LinuxAssignment/newdocs$ ls -l
total 4
drwxr-xr-x 2 cdac cdac 4096 Aug 28 22:50 docs
cdac@PratyushPC:/home/LinuxAssignment/newdocs$ |
```

k) File Editing:

- a. Open the "file1.txt" file in a text editor and add some text to it.

```
cdac@PratyushPC: /home/Lin  ×  +  v
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs docsdir.zip file1.txt newdocs
cdac@PratyushPC:/home/LinuxAssignment$ nano file1.txt|
```

```
cdac@PratyushPC: /home/Lin  ×  +  v
GNU nano 6.2
Hi there, this is Pratyush

I am editing the file|
```

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
docs docsdir.zip file1.txt newdocs
cdac@PratyushPC:/home/LinuxAssignment$ cat file1.txt
Hi there, this is Pratyush

I am editing the file
cdac@PratyushPC:/home/LinuxAssignment$ sed -i 's/editing/edited/g' file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ cat file1.txt
Hi there, this is Pratyush

I am edited the file
cdac@PratyushPC:/home/LinuxAssignment$ sed -i 's/am/have/g' file1.txt
cdac@PratyushPC:/home/LinuxAssignment$ cat file1.txt
Hi there, this is Pratyush

I have edited the file
cdac@PratyushPC:/home/LinuxAssignment$ |
```


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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip file1.txt newdocs
cdac@PratyushPC:/home/LinuxAssignment$ head data.txt
Hi
Hello
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Weekend
cdac@PratyushPC:/home/LinuxAssignment$ |
```

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip file1.txt newdocs
cdac@PratyushPC:/home/LinuxAssignment$ tail -n 5 data.txt
Weekday
Month
Year
Week
Day
cdac@PratyushPC:/home/LinuxAssignment$ |
```

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip file1.txt newdocs numbers.txt
cdac@PratyushPC:/home/LinuxAssignment$ head -n 15 numbers.txt
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
cdac@PratyushPC:/home/LinuxAssignment$ |
```

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

```
cdac@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ tail -n 3 numbers.txt
47
49
51
cdac@PratyushPC:/home/LinuxAssignment$ |
```

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip file1.txt input.txt newdocs numbers.txt
cdac@PratyushPC:/home/LinuxAssignment$ cat input.txt
This is the second exercise of assignment 1
cdac@PratyushPC:/home/LinuxAssignment$ tr 'a-z' 'A-Z' < input.txt > output.txt
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip file1.txt input.txt newdocs numbers.txt output.txt
cdac@PratyushPC:/home/LinuxAssignment$ cat output.txt
THIS IS THE SECOND EXERCISE OF ASSIGNMENT 1
cdac@PratyushPC:/home/LinuxAssignment$ |
```

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip duplicate.txt file1.txt input.txt newdocs numbers.txt output.txt
cdac@PratyushPC:/home/LinuxAssignment$ sort duplicate.txt | uniq
Hello
Hey
Hi
What
Why
cdac@PratyushPC:/home/LinuxAssignment$ |
```

- 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@PratyushPC: /home/Lin × + v
cdac@PratyushPC:/home/LinuxAssignment$ ls
data.txt docs docsdir.zip duplicate.txt file1.txt fruit.txt input.txt newdocs numbers.txt output.txt
cdac@PratyushPC:/home/LinuxAssignment$ cat fruit.txt
Apple
Guava
Mango
Apple
Mango
Litchi
Apple
Mango
Litchi
Pear
Mango
cdac@PratyushPC:/home/LinuxAssignment$ sort fruit.txt | uniq -c | awk '{print $2 ": " $1}'
Apple: 3
Guava: 1
Litchi: 2
Mango: 4
Pear: 1
cdac@PratyushPC:/home/LinuxAssignment$ |
```

Submission Guidelines:

- Document each step of your solution and any challenges faced.
- Upload it on your GitHub repository

Additional Tips:

- Experiment with different options and parameters of each command to explore their functionalities.