CDAC MUMBAI

Concepts of Operating System

Assignment 1 Problem

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@LAPTOP-4J0DGJ88:~$ cd ..
cdac@LAPTOP-4J0DGJ88:/home$ ls
cdac  ubuntu  user1
cdac@LAPTOP-4J0DGJ88:/home$ mkdir LinuxAssignment
mkdir: cannot create directory 'LinuxAssignment': Permission denied
cdac@LAPTOP-4J0DGJ88:/home$ sudo mkdir /home/LinuxAssignment
cdac@LAPTOP-4J0DGJ88:/home$ ls
LinuxAssignment  cdac  ubuntu  user1
cdac@LAPTOP-4J0DGJ88:/home$
```

b) File Management: a. Inside the "LinuxAssignment" directory, create a new file named "file1.txt". Display its contents.

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo nano file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ cat file1.txt
Hello
Hiii
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$
```

c) Directory Management: a. Create a new directory named "docs" inside the "LinuxAssignment" directory.

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo mkdir /home/LinuxAssignment/docs
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
docs  file1.txt  file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$
```

d) Copy and Move Files: a. Copy the "file1.txt" file into the "docs" directory and rename it to "file2.txt".

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
docs  file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ cp file1.txt docs/file2.txt
cp: cannot create regular file 'docs/file2.txt': Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo cp file1.txt docs/file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
docs  file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ cd docs
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat file2.txt
Hello
Hii
cdac@LAPTOP-4J0DGJ88:/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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ chmod o+r file2.txt
chmod: changing permissions of 'file2.txt': Operation not permitted
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l file2.txt
-rw-r--r-- 1 root root 10 Aug 28 14:15 file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo chmod o+r file2.txt
[sudo] password for cdac:
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l file2.txt
-rw-r--r-- 1 root root 10 Aug 28 14:15 file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo chmod o+r file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo chmod u+x file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l file2.txt
-rwxr--r-- 1 root root 10 Aug 28 14:15 file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo chown $USER file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l file2.txt
-rwxr--r-- 1 cdac root 10 Aug 28 14:15 file2.txt
cdac@LAPTOP-4J0DGJ88:/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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l file2.txt
-rwxr--r-- 1 cdac root 10 Aug 28 14:15 file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ su cdac
Password:
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$
```

g) File Searching: a. Search for all files with the extension ".txt" in the current directory and its subdirectories. b. Display lines containing a specific word in a file (provide a file name and the specific word to search).

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ find . -type f -name "*.txt"
./file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ grep "Hello" file2.txt
Hello
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cd ..
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ cd ..
cdac@LAPTOP-4J0DGJ88:/home$ find . -type f -name "*.txt"
./cdac/myfile.txt
find: './user1': Permission denied
find: './ubuntu': Permission denied
./LinuxAssignment/docs/file2.txt
./LinuxAssignment/file1.txt
cdac@LAPTOP-4J0DGJ88:/home$
```

h) System Information: a. Display the current system date and time.

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ date
Wed Aug 28 14:55:53 UTC 2024
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$
```

i) Networking: a. Display the IP address of the system. b. Ping a remote server to check connectivity (provide a remote server address to ping).

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ip addrs show
Object "addrs" is unknown, try "ip help".
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1400 qdisc mq state UP group defaul
t qlen 1000
    link/ether 00:15:5d:33:cf:c0 brd ff:ff:ff:ff:ff:ff
    inet 172.20.100.31/20 brd 172.20.111.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::215:5dff:fe33:cfc0/64 scope link
       valid_lft forever preferred_lft forever
```

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ping google.com
PING google.com (142.250.70.78) 56(84) bytes of data.
64 bytes from pnbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=1 ttl=52 time=1
08 ms
64 bytes from pnbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=2 ttl=52 time=1
47 ms
64 bytes from pnbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=3 ttl=52 time=1
76 ms
64 bytes from pnbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=4 ttl=52 time=1
16 ms
64 bytes from pnbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=5 ttl=52 time=1
40 ms
64 bytes from pnbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=6 ttl=52 time=3
```

```
rtt min/avg/max/mdev = 48.950/134.618/354.768/59.703 ms
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=52 time=174 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=52 time=114 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=52 time=138 ms
^C
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 3 received, 25% packet loss, time 3284ms
rtt min/avg/max/mdev = 113.509/141.899/173.709/24.695 ms
```

j) File Compression: a. Compress the "docs" directory into a zip file. b. Extract the contents of the zip file into a new directory.

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cd ..
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ zip -r docs.zip docs
Command 'zip' not found, but can be installed with:
sudo apt install zip
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ zip -r docs.zip docs
Command 'zip' not found, but can be installed with:
sudo apt install zip
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ zip -r docs.zip docs
Command 'zip' not found, but can be installed with:
sudo apt install zip
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo apt install zip
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  unzip
```

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ zip -r docs.zip docs
zip I/O error: Permission denied
zip error: Could not create output file (docs.zip)
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo zip -r docs.zip docs
  adding: docs/ (stored 0%)
  adding: docs/file2.txt (stored 0%)
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
docs  docs.zip  file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ mkdir extracted_docs
mkdir: cannot create directory 'extracted_docs': Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo mkdir extracted_docs
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
docs  docs.zip  extracted_docs  file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ unzip docs.zip -d extracted_docs
Archive:  docs.zip
checkdir error:  cannot create extracted_docs/docs
                 Permission denied
                 unable to process docs/.
checkdir error:  cannot create extracted_docs/docs
                 Permission denied
                 unable to process docs/file2.txt.
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ sudo unzip docs.zip -d extracted_docs
Archive:  docs.zip
   creating: extracted_docs/docs/
 extracting: extracted_docs/docs/file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ ls
docs  docs.zip  extracted_docs  file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment$ cd extracted_docs
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/extracted_docs$ ls
docs
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/extracted_docs$ cd docs
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/extracted_docs/docs$ ls
file2.txt
```

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ nano file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano file1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
file1.txt  file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat file1.txt
Have a good day
Good morning
Have a Nice day
God Bless you
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sed -i 's/day/evening/g' file1.tx
t
sed: couldn't open temporary file ./sed4gfmc3: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo sed -i 's/day/evening/g' fil
e1.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
file1.txt  file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat file1.txt
Have a good evening
Good morning
Have a Nice evening
God Bless you
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ |
```

Problem 2:

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
file1.txt  file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ nano data.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano data.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt  file1.txt  file2.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat data.txt
Have a Good Day
Good morning
Have a Nice Day
Hii my friend
Hello
What's up
Namaste
Good Day
Buy
Good Day
```

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ head -n 5 data.txt
Have a Good Day
Good morning
Have a Nice Day
Hii my friend
Hello
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ tail -n 5 data.txt
What's up
Namaste
Good Day
Buy
Good Day
```

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano numbers.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt  file1.txt  file2.txt  numbers.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ head -n 15 numbers.txt
{
1,
2,
3,
4,
5,
6,
7,
8,
9,
10,
11,
12,
13,
14,
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$
```

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

```
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ tail -n 3 numbers.txt
19,
20
}
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$
```

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano input.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt  file1.txt  file2.txt  input.txt  numbers.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat input.txt\
> ^C
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat input.txt
where there is a will there is a way
an apple a day keeps doctor away
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ tr 'a-z' 'A-Z' < input.txt > output.txt
bash: output.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo tr 'a-z' 'A-Z' < input.txt > output.txt
bash: output.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo tr 'a-z' 'A-Z' < input.txt > output.txt
bash: output.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l
total 20
-rw-r--r-- 1 root root 106 Aug 28 17:47 data.txt
-rw-r--r-- 1 root root  67 Aug 28 17:38 file1.txt
-rwxr--r-- 1 cdac root  10 Aug 28 14:15 file2.txt
-rw-r--r-- 1 root root  70 Aug 28 18:00 input.txt
-rw-r--r-- 1 root root  74 Aug 28 17:53 numbers.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls -l output.txt
ls: cannot access 'output.txt': No such file or directory
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo tr 'a-z' 'A-Z' < input.txt > output.txt
bash: output.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ tr 'a-z' 'A-Z' < input.txt > output.txt
bash: output.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo sh -c 'tr "a-z" "A-Z" < input.txt > output.txt'
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt  file1.txt  file2.txt  input.txt  numbers.txt  output.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat output.txt
WHERE THERE IS A WILL THERE IS A WAY
AN APPLE A DAY KEEPS DOCTOR AWAY
```

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ nano duplicate.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano duplicate.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt  duplicate.txt  file1.txt  file2.txt  input.txt  numbers.txt  output.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat duplicate.txt
hii hii bro
I am Iam Fine
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sort duplicate.txt | uniq
I am Iam Fine
hii hii bro
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sort duplicate.txt | uniq
I am Iam Fine
hii hii bro
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sort duplicate.txt | uniq > unique.txt
bash: unique.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo sort duplicate.txt | uniq > unique.txt
bash: unique.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo sort duplicate.txt | uniq > unique.txt
bash: unique.txt: Permission denied
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano duplicate.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sort duplicate.txt | uniq
hii hii bro
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo sh -c 'sort duplicate.txt | uniq > unique.txt'
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt       file1.txt  input.txt    output.txt
duplicate.txt  file2.txt  numbers.txt  unique.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat unique.txty
cat: unique.txty: No such file or directory
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat unique.txt
hii hii bro
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ 
```

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@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sudo nano fruit.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ ls
data.txt       file1.txt  fruit.txt  numbers.txt  unique.txt
duplicate.txt  file2.txt  input.txt  output.txt
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ cat fruit.txt
apple
banana
apple
orange
banana
apple
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ sort fruit.txt | uniq -c
      3 apple
      2 banana
      1 orange
cdac@LAPTOP-4J0DGJ88:/home/LinuxAssignment/docs$ 
```