

CDAC MUMBAI

Concepts of Operating System

Assignment 1

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Problem 1 :

a) Navigate and List:

```
cdac@Satyajeet: ~/LinuxAssig x + v
cdac@Satyajeet:~$ cd ~
cdac@Satyajeet:~$ pwd
/home/cdac
cdac@Satyajeet:~$ ls
cdac@Satyajeet:~$ mkdir LinuxAssignment
cdac@Satyajeet:~$ ls
LinuxAssignment
cdac@Satyajeet:~$ pwd
/home/cdac
cdac@Satyajeet:~$ cd ~/LinuxAssignment
cdac@Satyajeet:~/LinuxAssignment$
cdac@Satyajeet:~/LinuxAssignment$ pwd
/home/cdac/LinuxAssignment
cdac@Satyajeet:~/LinuxAssignment$ |
```

b) File Management:

```
cdac@Satyajeet: ~/LinuxAssig x + v
cdac@Satyajeet:~/LinuxAssignment$ pwd
/home/cdac/LinuxAssignment
cdac@Satyajeet:~/LinuxAssignment$ touch file1.txt
cdac@Satyajeet:~/LinuxAssignment$ cat file1.txt
cdac@Satyajeet:~/LinuxAssignment$ |
```

c) Directory Management:

```
cdac@Satyajeet: ~/LinuxAssig x + v
cdac@Satyajeet:~/LinuxAssignment$ pwd
/home/cdac/LinuxAssignment
cdac@Satyajeet:~/LinuxAssignment$ mkdir docs
cdac@Satyajeet:~/LinuxAssignment$ pwd
/home/cdac/LinuxAssignment
cdac@Satyajeet:~/LinuxAssignment$ ls
docs file1.txt
cdac@Satyajeet:~/LinuxAssignment$ |
```

d) Copy and Move Files:

```
cdac@Satyajeet: ~/LinuxAssig x + v
cdac@Satyajeet:~/LinuxAssignment$ pwd
/home/cdac/LinuxAssignment
cdac@Satyajeet:~/LinuxAssignment$ ls
docs file1.txt
cdac@Satyajeet:~/LinuxAssignment$ cp file1.txt docs/file2.txt
cdac@Satyajeet:~/LinuxAssignment$ ls
docs file1.txt
cdac@Satyajeet:~/LinuxAssignment$ ls docs
file2.txt
cdac@Satyajeet:~/LinuxAssignment$ ls LinuxAssignment
ls: cannot access 'LinuxAssignment': No such file or directory
cdac@Satyajeet:~/LinuxAssignment$ |
```

e) Permissions and Ownership:

```
cdac@Satyajee: ~/LinuxAssig
cdac@Satyajee:~/LinuxAssignment/docs$ pwd
/home/cdac/LinuxAssignment/docs
cdac@Satyajee:~/LinuxAssignment/docs$ ls
file2.txt
cdac@Satyajee:~/LinuxAssignment/docs$ chmod 744 file2.txt
cdac@Satyajee:~/LinuxAssignment/docs$ ls
file2.txt
cdac@Satyajee:~/LinuxAssignment/docs$ ls -l
total 0
-rwxr--r-- 1 cdac cdac 0 Feb 27 15:42 file2.txt
cdac@Satyajee:~/LinuxAssignment/docs$
```

f) Final Checklist:

```
cdac@Satyajee: ~/LinuxAssig
cdac@Satyajee:~/LinuxAssignment/docs$ pwd
/home/cdac/LinuxAssignment/docs
cdac@Satyajee:~/LinuxAssignment/docs$ cd ..
cdac@Satyajee:~/LinuxAssignment$ ls -l
total 4
drwxr-xr-x 2 cdac cdac 4096 Feb 27 15:42 docs
-rw-r--r-- 1 cdac cdac 0 Feb 27 15:24 file1.txt
cdac@Satyajee:~/LinuxAssignment$ ls
docs file1.txt
cdac@Satyajee:~/LinuxAssignment$ cd docs
cdac@Satyajee:~/LinuxAssignment/docs$ ls -l
total 0
-rwxr--r-- 1 cdac cdac 0 Feb 27 15:42 file2.txt
cdac@Satyajee:~/LinuxAssignment/docs$ ls -l /
total 2448
lrwxrwxrwx 1 root root 7 Apr 22 2024 bin -> usr/bin
drwxr-xr-x 2 root root 4096 Feb 26 2024 bin.usr-is-merged
drwxr-xr-x 2 root root 4096 Apr 22 2024 boot
drwxr-xr-x 16 root root 3580 Feb 27 08:19 dev
drwxr-xr-x 87 root root 4096 Feb 27 06:05 etc
drwxr-xr-x 3 root root 4096 Feb 24 12:10 home
-rwxrwxrwx 1 root root 2424984 Feb 12 00:59 init
lrwxrwxrwx 1 root root 7 Apr 22 2024 lib -> usr/lib
drwxr-xr-x 2 root root 4096 Apr 8 2024 lib.usr-is-merged
lrwxrwxrwx 1 root root 9 Apr 22 2024 lib64 -> usr/lib64
drwxr-xr-x 2 root root 16384 Feb 24 12:11 lost-found
drwxr-xr-x 2 root root 4096 Jan 6 20:13 media
drwxr-xr-x 8 root root 4096 Feb 24 12:01 mnt
drwxr-xr-x 2 root root 4096 Jan 6 20:13 opt
dr-xr-xr-x 285 root root 0 Feb 27 09:18 proc
drwxr-xr-x 4 root root 4096 Feb 24 12:01 root
drwxr-xr-x 19 root root 600 Feb 27 06:29 run
lrwxrwxrwx 1 root root 8 Apr 22 2024 sbin -> usr/sbin
drwxr-xr-x 2 root root 4096 Mar 31 2024 sbin.usr-is-merged
drwxr-xr-x 6 root root 4096 Feb 26 10:57 snap
drwxr-xr-x 2 root root 4096 Jan 6 20:13 srv
dr-xr-xr-x 11 root root 0 Feb 27 08:18 sys
drwxrwxrwt 12 root root 4096 Feb 27 12:38 tmp
drwxr-xr-x 12 root root 4096 Jan 6 20:13 usr
drwxr-xr-x 13 root root 4096 Feb 24 12:01 var
cdac@Satyajee:~/LinuxAssignment/docs$
```

g) File Searching:

```
cdac@Satyajee: ~/LinuxAssig
cdac@Satyajee:~$ pwd
/home/cdac
cdac@Satyajee:~$ ls
LinuxAssignment
cdac@Satyajee:~$ cd LinuxAssignment
cdac@Satyajee:~/LinuxAssignment$ ls
docs file1.txt
cdac@Satyajee:~/LinuxAssignment$ find . -type f -name "*.txt"
./file1.txt
./docs/file2.txt
cdac@Satyajee:~/LinuxAssignment$
```

h) System Information:

```
cdac@Satyajee: ~/LinuxAssig
cdac@Satyajee:~/LinuxAssignment$ ls
docs file1.txt
cdac@Satyajee:~/LinuxAssignment$ date
Thu Feb 27 17:19:43 UTC 2025
cdac@Satyajee:~/LinuxAssignment$ 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@Satyajee:~/LinuxAssignment$
```

It is showing different time.

i) Networking:

```
cdac@Satyajee:~$ pwd
/home/cdac
cdac@Satyajee:~$ ls
LinuxAssignment
cdac@Satyajee:~$ ls LinuxAssignment
docs  file1.txt
cdac@Satyajee:~$ hostname -I
172.27.232.158
cdac@Satyajee:~$ ip a
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
        inet 10.255.255.254/32 brd 10.255.255.254 scope global 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 default qlen 1000
    link/ether 00:15:5d:83:89:bd brd ff:ff:ff:ff:ff:ff
        inet 172.27.232.158/20 brd 172.27.239.255 scope global eth0
            valid_lft forever preferred_lft forever
        inet6 fe80::215:5dff:fe83:89bd/64 scope link
            valid_lft forever preferred_lft forever
cdac@Satyajee:~$ ping -c 4 google.com
PING google.com (142.250.194.238) 56(84) bytes of data:
64 bytes from del12s08-in-f14.1e100.net (142.250.194.238): icmp_seq=1 ttl=52 time=53.7 ms
64 bytes from del12s08-in-f14.1e100.net (142.250.194.238): icmp_seq=2 ttl=52 time=92.0 ms
64 bytes from del12s08-in-f14.1e100.net (142.250.194.238): icmp_seq=3 ttl=52 time=70.2 ms
64 bytes from del12s08-in-f14.1e100.net (142.250.194.238): icmp_seq=4 ttl=52 time=87.8 ms

--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 53.711/75.934/91.981/15.286 ms
cdac@Satyajee:~$ |
```

j) File Compression:

```
cdac@Satyajee:~/LinuxAssig$ 
Unpacking zip (3.0-13ubuntu0.2) ...
Setting up unzip (6.0-28ubuntu0.1) ...
Setting up zip (3.0-13ubuntu0.2) ...
Processing triggers for man-db (2.12.0-4build2) ...
cdac@Satyajee:~$ zip -r docs.zip docs
zip warning: name not matched: docs

zip error: Nothing to do! (try: zip -r docs.zip . -i docs)
cdac@Satyajee:~$ ^C
cdac@Satyajee:~$ zip -r docs.zip . -i docs
zip warning: zip file empty
cdac@Satyajee:~$ ls docs
ls: cannot access 'docs': No such file or directory
cdac@Satyajee:~$ cd LinuxAssignment
cdac@Satyajee:~/LinuxAssignment$ ls
docs  file1.txt
cdac@Satyajee:~/LinuxAssignment$ cd docs
cdac@Satyajee:~/LinuxAssignment/docs$ ls
file2.txt
cdac@Satyajee:~/LinuxAssignment/docs$ cd ..
cdac@Satyajee:~/LinuxAssignment$ ^C
cdac@Satyajee:~/LinuxAssignment$ zip -r docs.zip . -i docs
zip warning: zip file empty
cdac@Satyajee:~/LinuxAssignment$ ls docs
file2.txt
cdac@Satyajee:~/LinuxAssignment$ zip -r docs.zip docs
  adding: docs/ (stored 0%)
  adding: docs/file2.txt (stored 0%)
cdac@Satyajee:~/LinuxAssignment$ ls
docs.zip  docs  file1.txt
cdac@Satyajee:~/LinuxAssignment$ ls docs.zip
docs.zip
cdac@Satyajee:~/LinuxAssignment$ mkdir extract_docs
cdac@Satyajee:~/LinuxAssignment$ ls extract_docs
cdac@Satyajee:~/LinuxAssignment$ unzip docs.zip -d extract_docs
Archive:  docs.zip
  creating: extract_docs/docs/
  extracting: extract_docs/docs/file2.txt
cdac@Satyajee:~/LinuxAssignment$ ls extract_docs
docs
cdac@Satyajee:~/LinuxAssignment$ ls docs
file2.txt
cdac@Satyajee:~/LinuxAssignment$ |
```

k) File Editing:

```
cdac@Satyajee:~/LinuxAssig$ 
cdac@Satyajee:~/LinuxAssignment$ pwd
/home/cdac/LinuxAssignment
cdac@Satyajee:~/LinuxAssignment$ ls
docs  docs.zip  extract_docs  file1.txt
cdac@Satyajee:~/LinuxAssignment$ nano file1.txt
cdac@Satyajee:~/LinuxAssignment$ cat file1.txt
Satyajee
Virendra
Khamkar
cdac@Satyajee:~/LinuxAssignment$ echo "Vishwajeet" > file1.txt
cdac@Satyajee:~/LinuxAssignment$ cat file1.txt
Vishwajeet
cdac@Satyajee:~/LinuxAssignment$ nano file1.txt
cdac@Satyajee:~/LinuxAssignment$ cat file1.txt
Vishwajeet
and
Satyajee
Virendra
Khamkar
cdac@Satyajee:~/LinuxAssignment$ echo "we live in Kolhapur" >> file1.txt
cdac@Satyajee:~/LinuxAssignment$ cat file1.txt
Vishwajeet
and
Satyajee
Virendra
Khamkar
we live in Kolhapur
cdac@Satyajee:~/LinuxAssignment$ |
```

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@Satyajeet: ~/Problem2  x  +  v
cdac@Satyajeet:~$ mkdir Problem2
cdac@Satyajeet:~$ ls
LinuxAssignment  Problem2  docs.zip
cdac@Satyajeet:~$ cd Problem2
cdac@Satyajeet:~/Problem2$ touch data.txt
cdac@Satyajeet:~/Problem2$ cat data.txt
cdac@Satyajeet:~/Problem2$ nano data.txt
cdac@Satyajeet:~/Problem2$ cat -n data.txt
 1 India
 2 is
 3 my
 4 country
 5 All
 6 Indians
 7 are
 8 my
 9 brothers
10 and
11 sisters
12 I
13 love
14 my
15 country
16
cdac@Satyajeet:~/Problem2$ head -10 data.txt
India
is
my
country
All
Indians
are
my
brothers
and
cdac@Satyajeet:~/Problem2$ |
```

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@Satyajeet: ~/Problem2  x  +  v
cdac@Satyajeet:~$ mkdir Problem2
cdac@Satyajeet:~$ ls
LinuxAssignment  Problem2  docs.zip
cdac@Satyajeet:~$ cd Problem2
cdac@Satyajeet:~/Problem2$ touch data.txt
cdac@Satyajeet:~/Problem2$ cat data.txt
cdac@Satyajeet:~/Problem2$ nano data.txt
cdac@Satyajeet:~/Problem2$ cat -n data.txt
 1 India
 2 is
 3 my
 4 country
 5 All
 6 Indians
 7 are
 8 my
 9 brothers
10 and
11 sisters
12 I
13 love
14 my
15 country
16
cdac@Satyajeet:~/Problem2$ head -10 data.txt
India
is
my
country
All
Indians
are
my
brothers
and
cdac@Satyajeet:~/Problem2$ tail -5 data.txt
I
love
my
country
cdac@Satyajeet:~/Problem2$ |
```

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@Satyajee: ~/Problem2  x  +  v
cdac@Satyajee:~/Problem2$ touch numbers.txt
cdac@Satyajee:~/Problem2$ ls
data.txt  numbers.txt
cdac@Satyajee:~/Problem2$ nano numbers.txt
cdac@Satyajee:~/Problem2$ cat numbers.txt
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
cdac@Satyajee:~/Problem2$ head -15 numbers.txt
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
cdac@Satyajee:~/Problem2$ |
```

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

```
cdac@Satyajee: ~/Problem2  x  +  v
cdac@Satyajee:~/Problem2$ cat numbers.txt
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
cdac@Satyajee:~/Problem2$ head -15 numbers.txt
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
cdac@Satyajee:~/Problem2$ tail -3 numbers.txt
19
20
21
cdac@Satyajee:~/Problem2$ |
```

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@Satyajee: ~/Problem2
cdac@Satyajee:~/Problem2$ pwd
/home/cdac/Problem2
cdac@Satyajee:~/Problem2$ ls
data.txt  numbers.txt
cdac@Satyajee:~/Problem2$ touch input.txt
cdac@Satyajee:~/Problem2$ cat input.txt
cdac@Satyajee:~/Problem2$ nano input.txt
cdac@Satyajee:~/Problem2$ cat input.txt
satyajee
virendra
khamkar
cdac@Satyajee:~/Problem2$ tr '[:lower:]' < input.txt > output.txt
tr: missing operand after '[:lower:]'
Two strings must be given when translating.
Try 'tr --help' for more information.
cdac@Satyajee:~/Problem2$ tr '[:lower:]' '[:upper:]' < input.txt > output.txt
cdac@Satyajee:~/Problem2$ cat input.txt
satyajee
virendra
khamkar
cdac@Satyajee:~/Problem2$ cat output.txt
SATYAJEE
VIRENDRA
KHAMKAR
cdac@Satyajee:~/Problem2$ |
```

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@Satyajee: ~/Problem2
cdac@Satyajee:~/Problem2$ touch duplicate.txt
cdac@Satyajee:~/Problem2$ cat duplicate.txt
cdac@Satyajee:~/Problem2$ nano duplicate.txt
cdac@Satyajee:~/Problem2$ cat duplicate.txt
Apple
Banana
Cat
Dog
Apple
cat
Banana
Elephant
cdac@Satyajee:~/Problem2$ sort duplicate.txt | unique
Command 'unique' not found, but can be installed with:
sudo apt install john
cdac@Satyajee:~/Problem2$ sort duplicate.txt | uniq
Apple
Banana
Cat
Dog
Elephant
cat
cdac@Satyajee:~/Problem2$ |
```

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@Satyajee: ~/Problem2
cdac@Satyajee:~/Problem2$ pwd
/home/cdac/Problem2
cdac@Satyajee:~/Problem2$ ls
data.txt  duplicate.txt  input.txt  numbers.txt  output.txt
cdac@Satyajee:~/Problem2$ touch fruit.txt
cdac@Satyajee:~/Problem2$ cat fruit.txt
cdac@Satyajee:~/Problem2$ nano fruit.txt
cdac@Satyajee:~/Problem2$ cat fruit.txt
Banana
Apple
Banana
Watermelon
Orange
Apple
Orange
Banana
Banana
cdac@Satyajee:~/Problem2$ sort fruit.txt | uniq -c
1
2 Apple
4 Banana
2 Orange
1 Watermelon
cdac@Satyajee:~/Problem2$ |
```