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:**
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@DESKTOP-1KKEVUC:/$ pwd
/
cdac@DESKTOP-1KKEVUC:/$ cd home
cdac@DESKTOP-1KKEVUC:/home$ ls
cdac
cdac@DESKTOP-1KKEVUC:/home$ cd LinuxAssignment
-bash: cd: LinuxAssignment: No such file or directory
cdac@DESKTOP-1KKEVUC:/home$ mkdir LinuxAssignment
mkdir: cannot create directory ‘LinuxAssignment’: Permission denied
```

Now changed the permissions of /home directory by :

```
cdac@DESKTOP-1KKEVUC:/home$ cd ..
cdac@DESKTOP-1KKEVUC:/$ sudo chmod a+rwx home
[sudo] password for cdac:
cdac@DESKTOP-1KKEVUC:/$ cd home
cdac@DESKTOP-1KKEVUC:/home$ mkdir LinuxAssignment
cdac@DESKTOP-1KKEVUC:/home$ cd LinuxAssignment
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$
```

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

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ touch file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cat file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ nano file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cat file1.txt
Hello Ubuntu!
I am the 1st file in this directory.
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$
```

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

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ mkdir docs
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ ls
docs  file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$
```

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

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cp file1.txt docs
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cd docs
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ls
file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ mv file1.txt file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ls
file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ cat file2.txt
Hello Ubuntu!
I am the 1st file in this directory.
cdac@DESKTOP-1KKEVUC:/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@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ls -al
total 12
drwxr-xr-x 2 cdac cdac 4096 Feb 26 18:26 .
drwxr-xr-x 3 cdac cdac 4096 Feb 26 18:21 ..
-rw-r--r-- 1 cdac cdac   51 Feb 26 18:25 file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ chmod u+rwx file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ chmod o+r file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ls -al
total 12
drwxr-xr-x 2 cdac cdac 4096 Feb 26 18:26 .
drwxr-xr-x 3 cdac cdac 4096 Feb 26 18:21 ..
-rwxr--r-- 1 cdac cdac   51 Feb 26 18:25 file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ whoami
cdac
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ chown cdac file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ls -al
total 12
drwxr-xr-x 2 cdac cdac 4096 Feb 26 18:26 .
drwxr-xr-x 3 cdac cdac 4096 Feb 26 18:21 ..
-rwxr--r-- 1 cdac cdac   51 Feb 26 18:25 file2.txt
cdac@DESKTOP-1KKEVUC:/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@DESKTOP-1KKEVUC:/home/LinuxAssignment$ ls
docs  file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cd ..
cdac@DESKTOP-1KKEVUC:/home$ cd ..
cdac@DESKTOP-1KKEVUC:/$ ls
bin                dev   init               lib64       mnt   root
sbin.usr-is-merged  sys  var
bin.usr-is-merged  etc   lib                lost+found  opt   run
snap                tmp
boot               home  lib.usr-is-merged  media       proc  sbin
srv                 usr
cdac@DESKTOP-1KKEVUC:/$
```

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).

a)

```
cdac@DESKTOP-1KKEVUC:/home$ find . -type f -name "*.txt"
./LinuxAssignment/file1.txt
./LinuxAssignment/docs/file2.txt
```

b)

```
cdac@DESKTOP-1KKEVUC:/home$ cd LinuxAssignment/
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cd docs
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ touch fileSearch.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ nano fileSearch.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ cat fileSearch.txt
He feels happy.
He raced to the grocery store.
He is being forced into happiness (is he actually happy?)
He went inside but realized he forgot his wallet.
The truth: He is actually not happy at all.
Others feel happy.
He raced back home to grab it.
Once he found it, he raced to the car again and drove back to the grocery store.
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ grep 'happy' fileSearch.txt
He feels happy.
He is being forced into happiness (is he actually happy?)
The truth: He is actually not happy at all.
Others feel happy.
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$
```

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

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ date '+%d-%m-%Y %I:%M %p'
26-02-2025 07:29 PM
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ date '+%d-%m-%Y %H:%M %p'
26-02-2025 19:30 PM
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ date
Wed Feb 26 19:31:09 UTC 2025
```

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).

a) (method 1)

```
cdac@DESKTOP-1KKEVUC:/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 1500 qdisc mq state UP
group default qlen 1000
    link/ether 00:15:5d:5a:3b:2e brd ff:ff:ff:ff:ff:ff
    inet 172.23.184.4/20 brd 172.23.191.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::215:5dff:fe5a:3b2e/64 scope link
       valid_lft forever preferred_lft forever
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$
(method 2)
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.23.184.4  netmask 255.255.240.0  broadcast
172.23.191.255
        inet6 fe80::215:5dff:fe5a:3b2e  prefixlen 64  scopeid
0x20<link>
        ether 00:15:5d:5a:3b:2e  txqueuelen 1000  (Ethernet)
        RX packets 765  bytes 263671 (263.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 682  bytes 43091 (43.0 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 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

b)

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ ping -c 5
74.125.200.136
PING 74.125.200.136 (74.125.200.136) 56(84) bytes of data.
64 bytes from 74.125.200.136: icmp_seq=1 ttl=59 time=63.3 ms
64 bytes from 74.125.200.136: icmp_seq=2 ttl=59 time=64.1 ms
64 bytes from 74.125.200.136: icmp_seq=3 ttl=59 time=63.0 ms
64 bytes from 74.125.200.136: icmp_seq=4 ttl=59 time=62.1 ms
64 bytes from 74.125.200.136: icmp_seq=5 ttl=59 time=66.0 ms

--- 74.125.200.136 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4178ms
rtt min/avg/max/mdev = 62.067/63.681/66.029/1.342 ms
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$
```

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

a)

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/docs$ cd ..
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ zip -r docDirectory.zip docs
  adding: docs/ (stored 0%)
  adding: docs/fileSearch.txt (deflated 41%)
  adding: docs/file2.txt (stored 0%)
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ ls
docDirectory.zip  docs  file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$
```

b)

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ unzip docDirectory -d NewDirectory
Archive:  docDirectory.zip
   creating: NewDirectory/docs/
  inflating: NewDirectory/docs/fileSearch.txt
 extracting: NewDirectory/docs/file2.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ ls
NewDirectory  docDirectory.zip  docs  file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cd NewDirectory/
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/NewDirectory$ ls
docs
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/NewDirectory$ cd docs
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/NewDirectory/docs$ ls
file2.txt  fileSearch.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/NewDirectory/docs$
```

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@DESKTOP-1KKEVUC:/home$ cd LinuxAssignment/
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ ls
NewDirectory  docDirectory.zip  docs  file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cat file1.txt
Hello Ubuntu!
I am the 1st file in this directory.
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ nano file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cat file1.txt
Hello Ubuntu!
I am the 1st file in this directory.
Some more sentences added through nano --------
Welcome to CDAC Mumbai, Feb 2025 batch!

cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$
```

b)

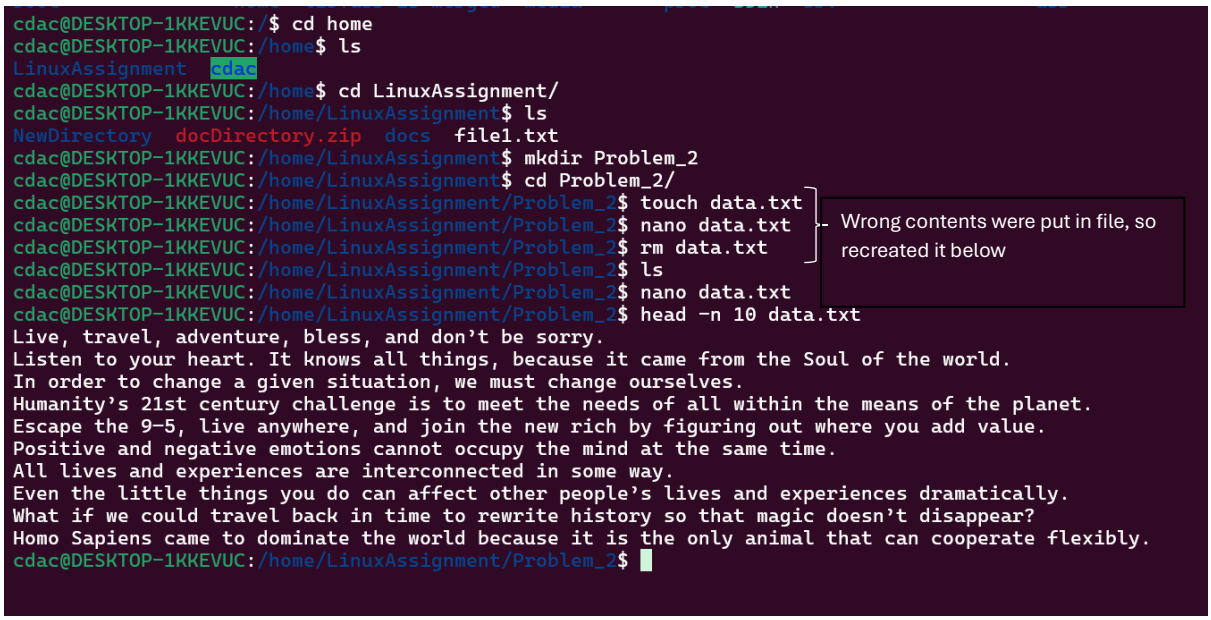
```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cat file1.txt
Hello Ubuntu!
I am the 1st file in this directory.
Some more sentences added through nano --------
Welcome to CDAC Mumbai, Feb 2025 batch!

cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ sed -i 's/Ubuntu/Windows/g' file1.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$ cat file1.txt
Hello Windows!
I am the 1st file in this directory.
Some more sentences added through nano --------
Welcome to CDAC Mumbai, Feb 2025 batch!

cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment$
```

Explanation:

- sed = Stream EDitor
- -i = in-place (i.e. save back to the original file)
- The command string:
    - s = the substitute command
    - original = a regular expression describing the word to replace (or just the word itself)
    - new = the text to replace it with
    - g = global (i.e. replace all and not just the first occurrence)
- file.txt = the file name

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.

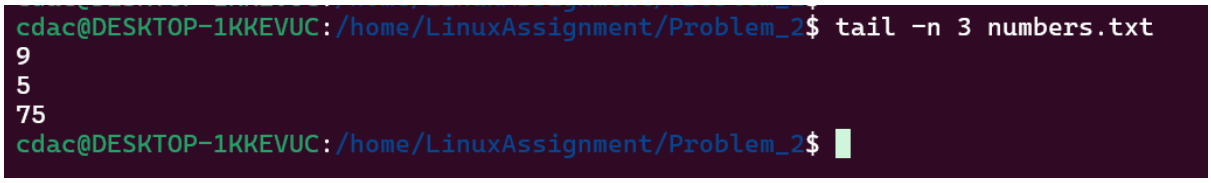


b. Now, to check the end of the file for any recent additions, display the last 5 lines of "data.txt" using another command.

```
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ tail -n 5 data.txt
The Hard Thing about Hard Things
Unshakeable
Zero to one
Sprint
Thinking Fast then Slow
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
```

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.

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



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@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ touch input.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ nano input.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ cat input.txt
this is a sample text.
it has some lowercase letters.
and some more.
let's see if the command works.
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ tr a-z A-z < input.txt > output.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ ls
data.txt  input.txt  numbers.txt  output.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ cat output.txt
THIS IS A SAMPLE TEXT.
IT HAS SOME LOWERCASE LETTERS.
AND SOME MORE.
LET'S SEE IF THE COMMAND WORKS.
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
```

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@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ touch duplicate.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ nano duplicate.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ cat duplicate.txt
hello world
this is a test
another line
hello world
test complete
this is a test
final line
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ cat duplicate.txt | sort | uniq
another line
final line
hello world
test complete
this is a test
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
```

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@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ touch fruit.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ nano fruit.txt
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ cat fruit.txt
apple
banana
cherry
apple
date
banana
fig
grape
cherry
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$ cat fruit.txt | sort | uniq -c
      2 apple
      2 banana
      2 cherry
      1 date
      1 fig
      1 grape
cdac@DESKTOP-1KKEVUC:/home/LinuxAssignment/Problem_2$
```