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Concepts of Operating

System Assignment 1

Problem 1:

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-F4NTC0S: ~/LinuxAssignment$ cd ~
cdac@DESKTOP-F4NTC0S: ~$ ls -la
total 52
drwxr-xr-x 7 cdac cdac 4096 Feb 27 08:39 .
drwxr-xr-x 3 root root 4096 Feb 24 13:52 ..
-rw-r--r-- 1 cdac cdac 2684 Feb 27 13:17 .bash_history
-rw-r--r-- 1 cdac cdac 220 Feb 24 13:52 .bash_logout
-rw-r--r-- 1 cdac cdac 3771 Feb 24 13:52 .bashrc
drwxr-xr-x 2 cdac cdac 4096 Feb 24 13:53 .landscape
-rw-r--r-- 1 cdac cdac 20 Feb 26 14:31 .lessht
drwxr-xr-x 3 cdac cdac 4096 Feb 26 14:33 .local
-rw-r--r-- 1 cdac cdac 0 Feb 27 03:20 .motd_shown
-rw-r--r-- 1 cdac cdac 807 Feb 24 13:52 .profile
-rw-r--r-- 1 cdac cdac 0 Feb 24 13:58 .sudo_as_admin_successful
drwxr-xr-x 3 cdac cdac 4096 Feb 26 14:28 Feb2025
drwxr-xr-x 3 cdac cdac 4096 Feb 27 09:34 LinuxAssignment
drwxr-xr-x 2 cdac cdac 4096 Feb 26 14:30 OSDAY-2
-rw-r--r-- 1 cdac cdac 24 Feb 26 14:34 abcd.txt
cdac@DESKTOP-F4NTC0S: ~$ [ -d LinuxAssignment ] || mkdir LinuxAssignment
cdac@DESKTOP-F4NTC0S: ~$ cd LinuxAssignment
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$
```

b) File Management:

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

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ cd ~/LinuxAssignment
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ touch file1.txt
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ cat file1.txt
Hello, this is file1.txt
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$
```

c) Directory Management:

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

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ cd ~/LinuxAssignment
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ mkdir docs
mkdir: cannot create directory 'docs': File exists
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ mkdir docs_new
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ ls -l
total 12
drwxr-xr-x 2 cdac cdac 4096 Feb 27 11:39 docs
drwxr-xr-x 2 cdac cdac 4096 Feb 27 15:33 docs_new
-rw-r--r-- 1 cdac cdac 25 Feb 27 15:29 file1.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$
```

d) Copy and Move Files:

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

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ cd ~/LinuxAssignment
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ cp file1.txt docs/file2.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ ls -l docs
total 4
-rwxr--r-- 1 cdac cdac 25 Feb 27 15:35 file2.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$
```

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

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ unzip zip
unzip zip
0 upgraded, 2 newly installed, 0 to remove and 109 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 4s (88.9 kB/s)
Selecting previously unselected package unzip.
(Reading database ... 40802 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@DESKTOP-F4NTC0S:~/LinuxAssignment$ zip -r docs.zip docs
adding: docs/ (stored 0%)
adding: docs/file2.txt (stored 0%)
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ mkdir docs_extracted
unzip docs.zip -d docs_extracted
Archive: docs.zip
creating: docs_extracted/docs/
extracting: docs_extracted/docs/file2.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ ls -l docs_extracted
total 4
drwxr-xr-x 2 cdac cdac 4096 Feb 27 11:39 docs
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$
```

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-F4NTC0S:~/LinuxAssignment$ ls -l ~/LinuxAssignment
total 12
drwxr-xr-x 2 cdac cdac 4096 Feb 27 11:39 docs
drwxr-xr-x 2 cdac cdac 4096 Feb 27 15:33 docs_new
-rw-r--r-- 1 cdac cdac 25 Feb 27 15:29 file1.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ ls -l ~/LinuxAssignment/docs
total 4
-rwxr--r-- 1 cdac cdac 25 Feb 27 15:35 file2.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ ls -l /
total 1484
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 8 root root 2940 Feb 27 15:18 dev
drwxr-xr-x 87 root root 4096 Feb 27 15:18 etc
drwxr-xr-x 3 root root 4096 Feb 24 13:52 home
-rwxr-xr-x 4 root root 1440152 May 7 2022 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
drwx----- 2 root root 16384 Apr 10 2019 lost+found
drwxr-xr-x 2 root root 4096 Jan 6 20:13 media
drwxr-xr-x 4 root root 4096 Feb 24 13:52 mnt
drwxr-xr-x 2 root root 4096 Jan 6 20:13 opt
dr-xr-xr-x 170 root root 0 Feb 27 15:18 proc
drwx----- 3 root root 4096 Feb 24 13:59 root
drwxr-xr-x 6 root root 120 Feb 27 15:18 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 2 root root 4096 Oct 11 08:05 snap
```

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ ls -l /
total 1484
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 8 root root 2940 Feb 27 15:18 dev
drwxr-xr-x 87 root root 4096 Feb 27 15:18 etc
drwxr-xr-x 3 root root 4096 Feb 24 13:52 home
-rwxr-xr-x 4 root root 1440152 May 7 2022 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
drwx----- 2 root root 16384 Apr 10 2019 lost+found
drwxr-xr-x 2 root root 4096 Jan 6 20:13 media
drwxr-xr-x 4 root root 4096 Feb 24 13:52 mnt
drwxr-xr-x 2 root root 4096 Jan 6 20:13 opt
dr-xr-xr-x 170 root root 0 Feb 27 15:18 proc
drwx----- 3 root root 4096 Feb 24 13:59 root
drwxr-xr-x 6 root root 120 Feb 27 15:18 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 2 root root 4096 Oct 11 08:05 snap
drwxr-xr-x 2 root root 4096 Jan 6 20:13 srv
dr-xr-xr-x 11 root root 0 Feb 27 15:18 sys
drwxrwxrwt 2 root root 4096 Feb 26 11:01 tmp
drwxr-xr-x 12 root root 4096 Jan 6 20:13 usr
drwxr-xr-x 13 root root 4096 Jan 6 20:15 var
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$
```

g) File Searching:

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

```
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ find . -type f -name "*.txt"
./docs/file2.txt
./file1.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ nano "hello" file1.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$
```

h) System Information:

- Display the current system date and time.

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ date
Thu Feb 27 15:49:52 UTC 2025
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$
```

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@DESKTOP-F4NTC0S: ~/LinuxAssignment$ zip -r docs.zip docs
Command 'zip' not found, but can be installed with:
sudo apt install zip
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ 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 109 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 4s (88.9 kB/s)
Selecting previously unselected package unzip.
(Reading database ... 40802 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@DESKTOP-F4NTC0S: ~/LinuxAssignment$ zip -r docs.zip docs
```

```
cdac@DESKTOP-F4NTC0S: ~/LinuxAssignment$ unzip zip
0 upgraded, 2 newly installed, 0 to remove and 109 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 4s (88.9 kB/s)
Selecting previously unselected package unzip.
(Reading database ... 40802 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@DESKTOP-F4NTC0S:~/LinuxAssignment$ zip -r docs.zip docs
  adding: docs/ (stored 0%)
  adding: docs/file2.txt (stored 0%)
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ mkdir docs_extracted
unzip docs.zip -d docs_extracted
Archive:  docs.zip
  creating: docs_extracted/docs/
  extracting: docs_extracted/docs/file2.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ ls -l docs_extracted
total 4
drwxr-xr-x 2 cdac cdac 4096 Feb 27 11:39 docs
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$
```

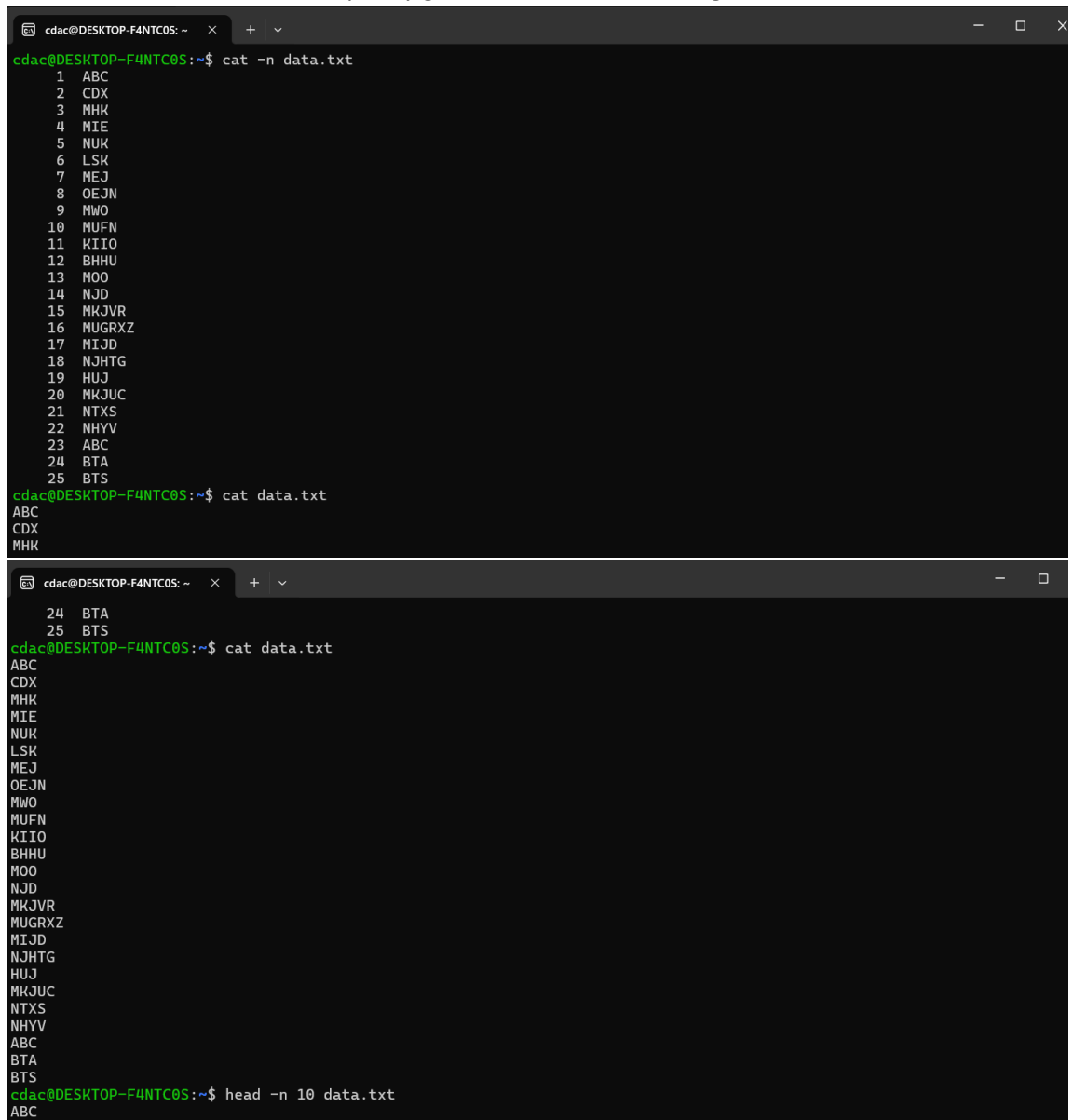
k) File Editing:

- Open the "file1.txt" file in a text editor and add some text to it.
- 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-F4NTC0S:~/LinuxAssignment$ nano file1.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ sed -i 's/hello/hi/g' file1.txt
cdac@DESKTOP-F4NTC0S:~/LinuxAssignment$ cat file1.txt
Hello, this is file1.txt
cdac@DESKTOP-F4NTC0S:~/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.



The image shows two terminal windows. The top window shows the command `cat -n data.txt` being executed, which displays the contents of `data.txt` with line numbers from 1 to 25. The bottom window shows the command `cat data.txt` being executed, which displays the contents of `data.txt` without line numbers. The contents of `data.txt` are:

```
1 ABC
2 CDX
3 MHK
4 MIE
5 NUK
6 LSK
7 MEJ
8 OEJN
9 MWO
10 MUFN
11 KIIO
12 BHHU
13 MOO
14 NJD
15 MKJVR
16 MUGRXZ
17 MIJD
18 NJHTG
19 HUJ
20 MKJUC
21 NTXS
22 NHYV
23 ABC
24 BTA
25 BTS
```

The bottom window also shows the command `head -n 10 data.txt` being executed, which displays the first 10 lines of `data.txt`:

```
ABC
CDX
MHK
MIE
NUK
LSK
MEJ
OEJN
MWO
MUFN
```

```
cdac@DESKTOP-F4NTC0S: ~  
OEJN  
MWO  
MUFN  
KIIO  
BHHU  
MOO  
NJD  
MKJVR  
MUGRXZ  
MIJD  
NJHTG  
HUJ  
MKJUC  
NTXS  
NHVY  
ABC  
BTA  
BTS  
cdac@DESKTOP-F4NTC0S:~$ head -n 10 data.txt  
ABC  
CDX  
MHK  
MIE  
NUK  
LSK  
MEJ  
OEJN  
MWO  
MUFN  
cdac@DESKTOP-F4NTC0S:~$
```

- 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-F4NTC0S: ~  
cdac@DESKTOP-F4NTC0S:~$ tail -n 5 data.txt  
NTXS  
NHVY  
ABC  
BTA  
BTS  
cdac@DESKTOP-F4NTC0S:~$
```

- 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@DESKTOP-F4NTC0S: ~  
cdac@DESKTOP-F4NTC0S:~$ nano numbers.txt  
cdac@DESKTOP-F4NTC0S:~$ head -n 15 numbers.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
cdac@DESKTOP-F4NTC0S:~$
```

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

```
cdac@DESKTOP-F4NTC0S:~$ tail -n 3 numbers.txt  
18  
19  
20  
cdac@DESKTOP-F4NTC0S:~$ cat numbers.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
cdac@DESKTOP-F4NTC0S:~$
```

- 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-F4NTC0S: ~  
cdac@DESKTOP-F4NTC0S:~$ nano input.txt  
cdac@DESKTOP-F4NTC0S:~$ cat input.txt | tr 'a-z' 'A-Z' > output.txt  
cdac@DESKTOP-F4NTC0S:~$ cat output.txt  
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z  
cdac@DESKTOP-F4NTC0S:~$
```

- 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-F4NTC0S: ~  
cdac@DESKTOP-F4NTC0S:~$ nano duplicate.txt  
cdac@DESKTOP-F4NTC0S:~$ nano duplicate.txt  
cdac@DESKTOP-F4NTC0S:~$ uniq duplicate.txt  
Radha  
Krishna  
Trushna  
Sonu  
Monu  
Tara  
Moli  
Golu  
Tillu  
Sonu  
Monu  
Tara  
cdac@DESKTOP-F4NTC0S:~$ sort duplicate.txt | uniq  
Golu  
Krishna  
Moli  
Monu  
Radha  
Sonu  
Sonu  
Tara  
Tillu  
Trushna
```

- 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-F4NTC0S: ~  
cdac@DESKTOP-F4NTC0S:~$ nano fruit.txt  
cdac@DESKTOP-F4NTC0S:~$ cat -n fruit.txt  
1 apple  
2 banana  
3 apple  
4 orange  
5 banana  
6 banana  
7 grape  
8 apple  
9 grape  
10 grape  
11 grape  
cdac@DESKTOP-F4NTC0S:~$ sort fruit.txt | uniq -c  
3 apple  
3 banana  
4 grape  
1 orange  
cdac@DESKTOP-F4NTC0S:~$
```