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Subject :- Operating system.

EXPERIMENT. (2)

* **Aim :-** To explore & implement system calls for file manipulation in Linux using shell scripting.

* **Theory :-**

System calls in Linux :-

System calls are functions that allow user-space programs to interact with the operating system's kernel. File manipulation system calls provide low-lvl access to files & directories.

- open() — Opens a file for reading or writing.
- read() — Reads data from a file.
- write() — writes data to a file.
- close() — closes an open file.
- stat() — Retrieves file information such as size & permissions.
- readdir() — Read directory contents.

Shell scripts can use Linux commands such as touch, cat, ls & stat to interact with files, simulating system calls functionalities.

Shell scripts for File manipulation :-

1. Creating & writing to a File :-

```
echo " Enter filename to create :"
read filename
touch " $filename"
echo " File $filename created."
echo " Enter txt to write into the file :"
read text
echo " $text " > " $filename"
echo " Text written to $filename".


echo "Enter filename to create & write :"
read filename
echo " Enter text (CTRL + D to save):"
cat > " $filename "
echo " File $filename created & saved :".
```

2. Reading a file :-

```
echo " Enter filename to read : "
read filename
if [-f " $filename" ]; then
        cat " $filename "
else
        echo " File does not exist."
fi
```

3. Appending content to a file :-

```
echo " Enter filename to append content :"
read filename
if [-f "$filename"] ; then
    echo " Enter text to append (CTRL to to save) :"
    cat >> "$filename"
    echo "content appended to $filename."
else
    echo "file does not exist."
fi
```

4. Displaying file information :-

```
echo " Enter filename to display information :"
read filename
if [-f "$filename"]; then
    stat "$filename"
else
    echo " File does not exist"
fi
```

5. Listing files in a Directory :-
```
echo "Listing files in the current directory:"
ls -lh
```

6. Renaming / Moving a File.
```
mv myfile.txt newfile.txt
ls
```

7. Copying a File.
```
cp newfile.txt copyfile.txt
ls
```

* Conclusion :-

This experiment demonstrated the use of cat, mkdir, touch, cp, rm for file manipulation in Linux. We created, rmdir, read, & appended content to files using cat >, cat >>, & cat filename. Additionally, we retrieved file information & listed directory contents using system calls. Understanding these commands is essential for efficient file handling in Linux environments.

1. pwd command
2. mkdir command
3. ls command
4. cd command
5. rmdir command
6. touch command
7. cat command
8. mv command
9. cp command
10. deleting a file

```
student@student-virtual-machine:~/Desktop/node_backend$ cd
student@student-virtual-machine:~$ S
```

```
student@student-virtual-machine:~/Desktop/node_backend$
student@student-virtual-machine:~/Desktop/node_backend$ gcc
Command 'gcc' not found, but can be installed with:
sudo apt install gcc
student@student-virtual-machine:~/Desktop/node_backend$ mkdir blank
student@student-virtual-machine:~/Desktop/node_backend$ ls
blank   hello.c
student@student-virtual-machine:~/Desktop/node_backend$ rmdir
rmdir: missing operand
Try 'rmdir --help' for more information.
student@student-virtual-machine:~/Desktop/node_backend$ cd ..
student@student-virtual-machine:~/Desktop$ rmdir
rmdir: missing operand
Try 'rmdir --help' for more information.
student@student-virtual-machine:~/Desktop$ cd node_backend/
student@student-virtual-machine:~/Desktop/node_backend$ rmdir blank/
student@student-virtual-machine:~/Desktop/node_backend$ ls
hello.c
student@student-virtual-machine:~/Desktop/node_backend$ mkdir blank
student@student-virtual-machine:~/Desktop/node_backend$ cd ..
student@student-virtual-machine:~/Desktop$ rmdir node_backend/
rmdir: failed to remove 'node_backend/': Directory not empty
student@student-virtual-machine:~/Desktop$ cd node_backend/
student@student-virtual-machine:~/Desktop/node_backend$ ls -l
total 8
drwxrwxr-x 2 student student 4096 Feb  3 11:03 blank
-rw-rw-r-- 1 student student  118 Feb  3 10:59 hello.c
student@student-virtual-machine:~/Desktop/node_backend$ touch empty.c
student@student-virtual-machine:~/Desktop/node_backend$ ls -l
total 8
drwxrwxr-x 2 student student 4096 Feb  3 11:03 blank
-rw-rw-r-- 1 student student    0 Feb  3 11:04 empty.c
-rw-rw-r-- 1 student student  118 Feb  3 10:59 hello.c
student@student-virtual-machine:~/Desktop/node_backend$ rm empty.c
student@student-virtual-machine:~/Desktop/node_backend$ ls -l
total 8
drwxrwxr-x 2 student student 4096 Feb  3 11:03 blank
-rw-rw-r-- 1 student student  118 Feb  3 10:59 hello.c
student@student-virtual-machine:~/Desktop/node_backend$
```

```
student@student-virtual-machine:~$ cd ./
.cache/    .config/   Desktop/   Documents/ Downloads/ .gnupg/    .local/   Music/   Pictures/ Public/   snap/    .ssh/    Templates/ Videos/
student@student-virtual-machine:~$ cd desktop
bash: cd: desktop: No such file or directory
student@student-virtual-machine:~$ cd Dekstop
bash: cd: Dekstop: No such file or directory
student@student-virtual-machine:~$ cd Desktop
student@student-virtual-machine:~/Desktop$ pwd
/home/student/Desktop
student@student-virtual-machine:~/Desktop$ mkdir node_backend
student@student-virtual-machine:~/Desktop$ cd node_backend/
student@student-virtual-machine:~/Desktop/node_backend$ touch .env
student@student-virtual-machine:~/Desktop/node_backend$ touch .env
student@student-virtual-machine:~/Desktop/node_backend$ ls
student@student-virtual-machine:~/Desktop/node_backend$ cd ..
student@student-virtual-machine:~/Desktop$ ls
node_backend
student@student-virtual-machine:~/Desktop$ cd node_backend/
student@student-virtual-machine:~/Desktop/node_backend$ touch hello.c
student@student-virtual-machine:~/Desktop/node_backend$ touch .env
```

```
student@student-virtual-machine:~/Desktop/node_backend$ rmdir blank
student@student-virtual-machine:~/Desktop/node_backend$ ls -l
total 4
-rw-rw-r-- 1 student student 118 Feb  3 10:59 hello.c
student@student-virtual-machine:~/Desktop/node_backend$ cd ..
student@student-virtual-machine:~/Desktop$ mkdir C11
student@student-virtual-machine:~/Desktop$ cd
C11/            node_backend/
student@student-virtual-machine:~/Desktop$ cd C11
student@student-virtual-machine:~/Desktop/C11$ mkdir 60004230025
student@student-virtual-machine:~/Desktop/C11$ cd 60004230025/
student@student-virtual-machine:~/Desktop/C11/60004230025$ touch file1.txt
student@student-virtual-machine:~/Desktop/C11/60004230025$ touch file2.sql
student@student-virtual-machine:~/Desktop/C11/60004230025$ touch file3.py
student@student-virtual-machine:~/Desktop/C11/60004230025$ touch file4.cs
student@student-virtual-machine:~/Desktop/C11/60004230025$ ls -l
total 0
-rw-rw-r-- 1 student student 0 Feb  3 11:09 file1.txt
-rw-rw-r-- 1 student student 0 Feb  3 11:09 file2.sql
-rw-rw-r-- 1 student student 0 Feb  3 11:09 file3.py
-rw-rw-r-- 1 student student 0 Feb  3 11:10 file4.cs
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file1.txt
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file.txt
cat: file.txt: No such file or directory
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat > file1.txt
added this using cat >
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file1.txt
added this using cat >
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file1.sql
cat: file1.sql: No such file or directory
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file2.sql
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat > file2.sql
CREATE TABLE STUDENT(
 INT PRIMARY KEY AUTO_INCREMENT,
 NAME VARCHAR(50),
 DOB DATE,
 MARKS INT,
 GENDER VARCHAR(20)
 EMAIL VARCHAR(100)
);
student@student-virtual-machine:~/Desktop/C11/60004230025$ CAT FILE2.SQL
Command 'CAT' not found, but can be installed with:
sudo apt install cat-bat
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file2.sql
CREATE TABLE STUDENT(
 INT PRIMARY KEY AUTO_INCREMENT,
 NAME VARCHAR(50),
 DOB DATE,
 MARKS INT,
 GENDER VARCHAR(20)
 EMAIL VARCHAR(100)
);
student@student-virtual-machine:~/Desktop/C11/60004230025$
```

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ mv file2.sql file
file1.txt  file2.sql  file3.py   file4.cs
student@student-virtual-machine:~/Desktop/C11/60004230025$ mkdir move_here
student@student-virtual-machine:~/Desktop/C11/60004230025$ mv file2.sql /move_here
mv: cannot move 'file2.sql' to '/move_here': Permission denied
student@student-virtual-machine:~/Desktop/C11/60004230025$ mv file2.sql /home/student/Desktop/C11/60004230025/move_here
student@student-virtual-machine:~/Desktop/C11/60004230025$ ls -l
total 8
-rw-rw-r-- 1 student student   23 Feb  3 11:13 file1.txt
-rw-rw-r-- 1 student student    0 Feb  3 11:09 file3.py
-rw-rw-r-- 1 student student    0 Feb  3 11:10 file4.cs
drwxrwxr-x 2 student student 4096 Feb  3 11:24 move_here
student@student-virtual-machine:~/Desktop/C11/60004230025$ cd move_here/
student@student-virtual-machine:~/Desktop/C11/60004230025/move_here$ ls -l
total 4
-rw-rw-r-- 1 student student 177 Feb  3 11:20 file2.sql
```

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ ls -l
total 0
-rw-rw-r-- 1 student student 0 Feb  3 11:09 file1.txt
-rw-rw-r-- 1 student student 0 Feb  3 11:09 file2.sql
-rw-rw-r-- 1 student student 0 Feb  3 11:09 file3.py
-rw-rw-r-- 1 student student 0 Feb  3 11:10 file4.cs
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file1.txt
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file.txt
cat: file.txt: No such file or directory
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat > file1.txt
added this using cat >
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file1.txt
added this using cat >
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file1.sql
cat: file1.sql: No such file or directory
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file2.sql
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat > file2.sql
CREATE TABLE STUDENT(
 INT PRIMARY KEY AUTO_INCREMENT,
 NAME VARCHAR(50),
 DOB DATE,
 MARKS INT,
 GENDER VARCHAR(20)
 EMAIL VARCHAR(100)
);
student@student-virtual-machine:~/Desktop/C11/60004230025$ CAT FILE2.SQL
Command 'CAT' not found, but can be installed with:
sudo apt install cat-bat
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file2.sql
CREATE TABLE STUDENT(
 INT PRIMARY KEY AUTO_INCREMENT,
 NAME VARCHAR(50),
 DOB DATE,
 MARKS INT,
 GENDER VARCHAR(20)
 EMAIL VARCHAR(100)
);
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat >> file2.sql
use database university_60000230025;
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat file2.sql
CREATE TABLE STUDENT(
 INT PRIMARY KEY AUTO_INCREMENT,
 NAME VARCHAR(50),
 DOB DATE,
 MARKS INT,
 GENDER VARCHAR(20)
 EMAIL VARCHAR(100)
);
use database university_60000230025;
student@student-virtual-machine:~/Desktop/C11/60004230025$
```

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ cp file1.txt /home/student/Desktop/C11/60004230025/move_here
student@student-virtual-machine:~/Desktop/C11/60004230025$ cd move_here/
student@student-virtual-machine:~/Desktop/C11/60004230025/move_here$ ls -l
total 8
-rw-rw-r-- 1 student student  23 Feb  3 11:29 file1.txt
-rw-rw-r-- 1 student student 208 Feb  3 11:26 file2.sql
student@student-virtual-machine:~/Desktop/C11/60004230025/move_here$
```

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ rm -r file4.cs
student@student-virtual-machine:~/Desktop/C11/60004230025$ ls -l
total 8
-rw-rw-r-- 1 student student   23 Feb  3 11:13 file1.txt
-rw-rw-r-- 1 student student    0 Feb  3 11:09 file3.py
drwxrwxr-x 2 student student 4096 Feb  3 11:29 move_here
```