

# Operating Systems

## Assignment-1

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### ❖ Preface

In this assignment, I have designed a linux shell, with following commands:

- Internal commands
  - pwd
  - cd
  - echo
  - clear
  - exit
- External commands
  - ls
  - cat
  - rm
  - mkdir
  - Date

The external commands can be executed as processes in the usual way, for example,  
*ls <path> -[options]*

The external commands can also be executed as threads by inserting “&t” **before** the command, for example,  
*&t ls <path> -[options]*

### ❖ Manual

#### ★ ls

##### → Description

List information about the FILES (the current directory by default)

##### → Syntax

*ls <pathToDir> -[Options]*

##### → Options

- ◆ -a : do not ignore entries starting with .
- ◆ -l : show details of directory contents (long listing format)

## ★ Date

### → Description

Display the current time, or the time given in STRING, or last modification time of FILE

### → Syntax

*date* *-[Options]*

### → Options

- ◆ -d : display time described by STRING in the format DD-MM-YYYY
- ◆ -r : display the last modification time of FILE

## ★ Cat

### → Description

Concatenate FILE(s) to standard output. With no FILE, or when FILE is -, read standard input.

### → Syntax

*cat* *<file>* *-[Options]*

### → Options

- ◆ -n : number all output lines
- ◆ -E : display \$ at the end of each line

## ★ Rm

### → Description

Removes all the specified files, but does not remove non-empty directories.

### → Syntax

*rm* *<file1>* *<file2>* ... *-[Options]*

### → Options

- ◆ -i : prompt before every removal
- ◆ -v : explain what is being done (verbose)

## ★ Mkdir

### → Description

Create the DIRECTORY(ies), if they do not already exist

### → Syntax

*mkdir <dir1> <dir2> ... -[Options]*

### → Options

- ◆ -m : set file mode (as in chmod)
- ◆ -v : print a message for each created directory

## ★ Cd

### → Description

Change Directory

### → Syntax

*cd <directory>*

## ★ Pwd

### → Description

Print the full filename of the current working directory

### → Syntax

*pwd*

## ★ Echo

### → Description

Print the STRING(s) to standard output

### → Syntax

*echo <string>*

### → Assumptions

String should be without inverted commas or slashes, as they will get printed too

## ★ Exit

### → Description

Terminate the current shell session

### → Syntax

*exit*

## ★ Clear

### → Description

Clear the screen

### → Syntax

*clear*

## ❖ Test Cases

### ★ Ls

#### ○ Testcase-1

##### ■ Input

*ls*

##### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls
Makefile  src  README.md  bin
```

#### ○ Testcase-2

##### ■ Input

*ls src -a -l*

##### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls src -a -l
31 October 2022 16:42:28 IST 4319 shell.c
31 October 2022 00:43:36 IST 2177 ls.c
26 October 2022 19:50:57 IST 1861 cat.c
17 October 2022 00:32:29 IST 3478 mkdir.c
17 October 2022 00:32:29 IST 1278 rm.c
17 October 2022 00:32:29 IST 1652 date.c
26 October 2022 23:00:51 IST 4096 .vscode
30 October 2022 18:12:38 IST 4096 .
31 October 2022 20:48:09 IST 4096 ..
```

## ★ Cat

### ○ Testcase-1

#### ■ Input

*cat Makefile*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > cat Makefile
all:
    @ gcc src/ls.c -o bin/ls
    @ gcc src/rm.c -o bin/rm
    @ gcc src/mkdir.c -o bin/mkdir
    @ gcc src/date.c -o bin/date
    @ gcc src/cat.c -o bin/cat
    @ gcc src/shell.c -o bin/shell
    @ bin/shell

clean:
    @ rm bin/ls bin/rm bin/mkdir bin/date bin/cat bin/shell
```

### ○ Testcase-2

#### ■ Input

*cat - Makefile -n -E*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > cat - Makefile -n -E
hello
    1. hello$
I am sachin
    2. I am sachin$
thanks
    3. thanks$
    4. all:$
    5. @ gcc src/ls.c -o bin/ls$
    6. @ gcc src/rm.c -o bin/rm$
    7. @ gcc src/mkdir.c -o bin/mkdir$
    8. @ gcc src/date.c -o bin/date$
    9. @ gcc src/cat.c -o bin/cat$
   10. @ gcc src/shell.c -o bin/shell$
   11. @ bin/shell$
   12. $
   13. clean:$
   14. @ rm bin/ls bin/rm bin/mkdir bin/date bin/cat bin/shell$
   15. $
       @ rm bin/ls bin/rm bin/mkdir bin/date bin/cat bin/shell
```

## ★ Date

### ○ Testcase-1

#### ■ Input

*date*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > date  
Monday, 31 October 2022 20:57:26 IST
```

### ○ Testcase-2

#### ■ Input

*date -d 03-10-2002*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > date -d 03-10-2002  
Thursday, 03 October 2002
```

### ○ Testcase-2

#### ■ Input

*date -r Makefile*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > date -r Makefile  
Monday, 17 October 2022 00:32:29 IST
```

## ★ Mkdir

### ○ Testcase-1

#### ■ Input

```
mkdir testDir1 testDir2  
ls
```

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > mkdir testDir1 testDir2
```

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls  
Makefile testDir1 testDir2 src README.md bin
```

### ○ Testcase-2

#### ■ Input

```
mkdir testDir3 -m +rw -v
```

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > mkdir testDir3 -m +rm -v  
mkdir: created directory 'testDir3'
```

## ★ Rm

### ○ Testcase-1

#### ■ Input

```
ls  
rm testFile1.txt testDir1  
ls
```

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls  
Makefile testFile2.txt testDir1 testDir2 src README.md bin testDir3  
testFile1.txt
```

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > rm testFile1.txt testDir1  
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls  
Makefile testFile2.txt testDir2 src README.md bin testDir3
```

- **Testcase-2**

- Input

*rm testFile.txt -i -v*  
*ls*

- Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > rm testFile2.txt -i -v
rm: remove 'testFile2.txt'? -> yes
[testFile2.txt]: File deleted successfully
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls
Makefile testDir1 testDir2 src README.md bin testDir3 testFile1.txt
```

## ★ Cd

- **Testcase-1**

- Input

*cd src*

- Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > cd src
[sachin@pop-os]:/home/sachin/code/os/Assignment-1/src > |
```

- **Testcase-2**

- Input

*cd /home*

- Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1/src > cd /home
[sachin@pop-os]:/home > |
```



## ★ Pwd

### ○ Testcase-1

#### ■ Input

*pwd*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > pwd  
/home/sachin/code/os/Assignment-1
```

## ★ Echo

### ○ Testcase-1

#### ■ Input

*echo hello world*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > echo hello world  
hello world
```

## ★ Clear

### ○ Testcase-1

#### ■ Input

*ls*

*clear*

#### ■ Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > ls  
Makefile testDir1 testDir2 src README.md bin testDir3 testFile1.txt
```

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > clear|
```

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > |
```

## ★ Exit

- Testcase-1

- Input

*exit*

- Output

```
[sachin@pop-os]:/home/sachin/code/os/Assignment-1 > exit  
sachin@pop-os:~/code/os/Assignment-1$ |
```