Operating System

Lab 07 Tasks

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Batch: BSCS-5th semester

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Can you provide a detailed guide for each Linux command that includes screenshots and different examples beyond what has been taught? Additionally, can you identify each symbol and explain why it is used? Please explain each step one by one for every command.

Mkdir:

```
[root@localhost ~]# mkdir OS_Course
[root@localhost ~]# mkdir OS_Lab
[root@localhost ~]# ls
bench.py  hello.c  OS_Course  OS_Lab
[root@localhost ~]#
```

```
[root@localhost ~]# mkdir OS_Course
[root@localhost ~]# mkdir OS_Lab
[root@localhost ~]# ls
bench.py  hello.c  OS_Course  OS_Lab
[root@localhost ~]# cd OS_Lab
[root@localhost OS_Lab]# mkdir Lab_Class_Task Lab_Activities Lab_Practice
[root@localhost OS_Lab]# ls
Lab_Activities  Lab_Class_Task  Lab_Practice
[root@localhost OS_Lab]#
```

```
[root@localhost ~]# mkdir OS_Course
[root@localhost ~]# mkdir OS_Lab
[root@localhost ~]# ls
bench.py  hello.c  OS_Course  OS_Lab
[root@localhost ~]# cd OS_Lab
[root@localhost OS_Lab]# mkdir Lab_Class_Task Lab_Activities Lab_Practice
[root@localhost OS_Lab]# ls
Lab_Activities  Lab_Class_Task  Lab_Practice
[root@localhost OS_Lab]# cd Lab_Practice
[root@localhost Lab_Practice]# touch example.cpp
[root@localhost Lab_Practice]# ls
example.cpp
[root@localhost Lab_Practice]#
```

```
[root@localhost Lab_Practice]# cd ..
[root@localhost OS_Lab]#
```

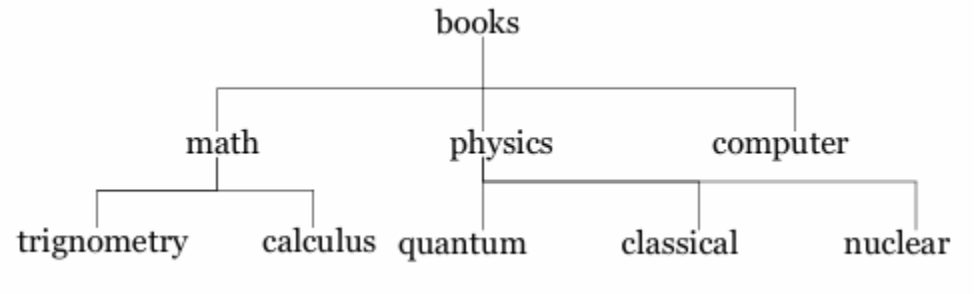
Absolute Path:

```
[root@localhost Lab_Practice]# pwd
/root/OS_Lab/Lab_Practice
[root@localhost Lab_Practice]# cd /root/OS_Lab/Lab_Activities
[root@localhost Lab_Activities]#
```

Relative Path:

```
[root@localhost Lab_Practice]# pwd
/root/OS_Lab/Lab_Practice
[root@localhost Lab_Practice]# cd ../Lab_Activities
[root@localhost Lab_Activities]#
```

Make following directory:



Solution:

```
Loading...

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[root@localhost ~]# mkdir books
[root@localhost ~]# ls
bench.py  books  hello.c
[root@localhost ~]#
```

```
[root@localhost ~]# cd books
[root@localhost books]# mkdir math
[root@localhost books]# mkdir physics
[root@localhost books]# mkdir computer
[root@localhost books]# ls
computer  math  physics
[root@localhost books]#
```

```
[root@localhost books]# cd math
[root@localhost math]# mkdir trignometry
[root@localhost math]# mkdir calculus
[root@localhost math]# ls
calculus  trignometry
[root@localhost math]#
```

```
[root@localhost math]# cd ..
[root@localhost books]# cd physics
[root@localhost physics]# mkdir quantum
[root@localhost physics]# mkdir classical
[root@localhost physics]# mkdir nuclear
[root@localhost physics]# ls
classical  nuclear  quantum
[root@localhost physics]#
```

1. **mkdir: Create a new directory**

```
[root@localhost ~]# mkdir file
[root@localhost ~]# ls
bench.py  books  file  hello.c
[root@localhost ~]#
```

2. **rmdir: Remove an empty directory**

```
[root@localhost ~]# ls
bench.py  books  file  filee  hello.c
[root@localhost ~]# rmdir filee
[root@localhost ~]# ls
bench.py  books  file  hello.c
[root@localhost ~]#
```

3. **cd: Change directory**

```
[root@localhost ~]# ls
bench.py  books  file  hello.c
[root@localhost ~]# cd file
[root@localhost file]#
```

4. **cd/: Go to home directory**

```
[root@localhost ~]# mkdir file
[root@localhost ~]# mkdir file1
[root@localhost ~]# cd file
[root@localhost file]# mkdir file11
[root@localhost file]# mkdir file22
[root@localhost file]# cd file11
[root@localhost file11]# cd ..
[root@localhost file]#
```

5. **pwd: Present working directory**

```
[root@localhost file]# pwd
/root/file
[root@localhost file]#
```

6. **ls: List directory contents**

```
[root@localhost ~]# ls
bench.py  books  file  file1  hello.c
[root@localhost ~]#
```

7. **mv: Move or rename files and directories**

```
[root@localhost ~]# ls
bench.py  books  file  file1  hello.c
[root@localhost ~]# mv file file1
[root@localhost ~]# cd file1
[root@localhost file1]# ls
file
[root@localhost file1]#
```

8. **cp -r: Copy files and directories**

```
[root@localhost ~]# ls
bench.py  books  file1  file2  hello.c
[root@localhost ~]# cp -r file1 file2
[root@localhost ~]# cd file2
[root@localhost file2]# ls
file1
[root@localhost file2]#
```

9. **rm -r: Remove directories (if directory is not empty)**

```
[root@localhost ~]# ls
bench.py  books  file1  file2  hello.c
[root@localhost ~]# rm -r file2
[root@localhost ~]# ls
bench.py  books  file1  hello.c
[root@localhost ~]#
```

10. **ls -r: show list of directories in reverse**

```
[root@localhost ~]# ls
bench.py  books  file1  hello.c
[root@localhost ~]# ls -r
hello.c  file1  books  bench.py
[root@localhost ~]#
```

11. **ls -a: show hidden files also of that directory**

```
[root@localhost ~]# ls
bench.py  books  file1  hello.c
[root@localhost ~]# ls -a
.    .bash_logout   .bashrc   books   file1       hello.c
..   .bash_profile  bench.py  .cshrc  .fldev_cfg  .tcshrc
[root@localhost ~]#
```

12. ls -l: show all details list of files

```
[root@localhost ~]# ls
bench.py  books  file1  hello.c
[root@localhost ~]# ls -l
total 16
-rw-r--r-- 1 root root 114 Dec 26  2020 bench.py
drwxr-xr-x 5 root root 107 Sep  6 21:41 books
drwxr-xr-x 2 root root  58 Sep  6 22:08 file1
-rw-r--r-- 1 root root 185 Sep  9  2018 hello.c
[root@localhost ~]#
```

13. touch: to create an empty file

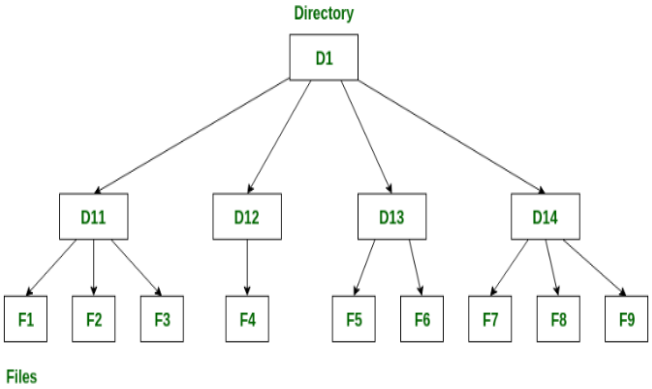
```
[root@localhost ~]# touch file
[root@localhost ~]# ls
bench.py  books  file  file1  hello.c
[root@localhost ~]#
```

14. cat > file: create file and gave us space to write data in that file

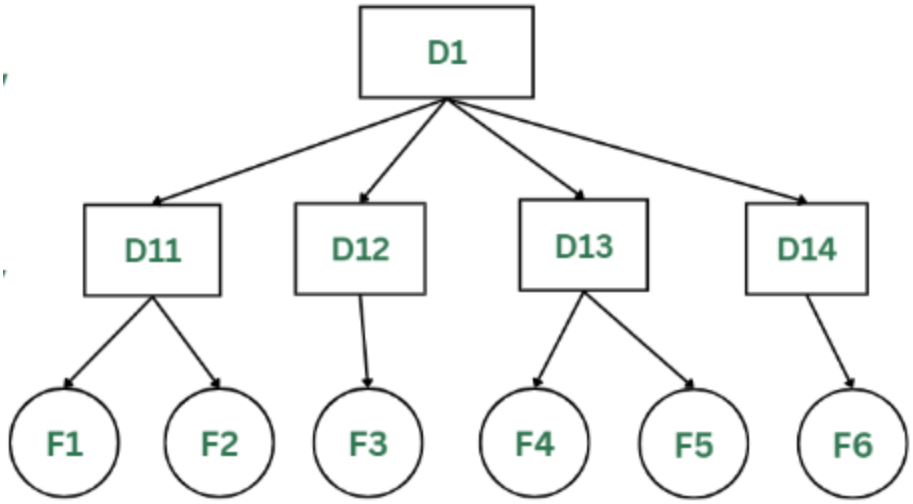
```
[root@localhost ~]# ls
bench.py  books  file  file1  hello.c
[root@localhost ~]# cat > file2
this is file 2
[root@localhost ~]# ls
bench.py  books  file  file1  file2  hello.c
[root@localhost ~]#
```

15. cat file: read data from that file

```
[root@localhost ~]# ls
bench.py  books  file  file1  hello.c
[root@localhost ~]# cat > file2
this is file 2
[root@localhost ~]# ls
bench.py  books  file  file1  file2  hello.c
[root@localhost ~]# cat file2
this is file 2
[root@localhost ~]#
```




```
[root@localhost ~]# ls
bench.py  books  file1  file2  hello.c
[root@localhost ~]# cp -r file1 file2
[root@localhost ~]# mkdir D1
[root@localhost ~]# cd D1
[root@localhost D1]# mkdir D11
[root@localhost D1]# mkdir D12
[root@localhost D1]# mkdir D13
[root@localhost D1]# mkdir D14
[root@localhost D1]# ls
D11  D12  D13  D14
[root@localhost D1]# cd D11
[root@localhost D11]# touch F1
[root@localhost D11]# touch F2
[root@localhost D11]# touch F3
[root@localhost D11]# ls
F1  F2  F3
[root@localhost D11]# cd ..
[root@localhost D1]# cd D12
[root@localhost D12]# touch F4
[root@localhost D12]# ls
F4
[root@localhost D12]# cd ..
[root@localhost D1]# cd D13
[root@localhost D13]# touch F5
[root@localhost D13]# touch F6
[root@localhost D13]# ls
F5  F6
[root@localhost D13]# cd ..
[root@localhost D1]# cd D14
[root@localhost D14]# touch F7
[root@localhost D14]# touch F8
[root@localhost D14]# touch F9
[root@localhost D14]# ls
F6  F7  F8  F9
[root@localhost D14]#
```




```
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[root@localhost ~]# mkdir D1
[root@localhost ~]# ls
bench.py  D1  hello.c
[root@localhost ~]# cd D1
[root@localhost D1]# mkdir D11
[root@localhost D1]# mkdir D12
[root@localhost D1]# mkdir D13
[root@localhost D1]# mkdir D14
[root@localhost D1]# ls
D11  D12  D13  D14
[root@localhost D1]# cd D11
[root@localhost D11]# touch F1 F2
[root@localhost D11]# ls
F1  F2
[root@localhost D11]# cd ..
[root@localhost D1]# cd D12
[root@localhost D12]# touch F3
[root@localhost D12]# ls
F3
[root@localhost D12]# cd ..
[root@localhost D1]# cd D13
[root@localhost D13]# touch F4 F5
[root@localhost D13]# ls
F4  F5
[root@localhost D13]# cd ..
[root@localhost D1]# cd D14
[root@localhost D14]# touch F6
[root@localhost D14]# ls
F6
[root@localhost D14]# cd
[root@localhost ~]#
```

```
[root@localhost ~]# cat > LINUXOS
I'm Dua Amir and this is my file of LINUX operating System.
[root@localhost ~]# ls
bench.py  D1  hello.c  LINUXOS
[root@localhost ~]#
```

Symbolic method:

```
[root@localhost ~]# chmod u+rwx LINUXOS
[root@localhost ~]# chmod g+rw LINUXOS
[root@localhost ~]# chmod o+r LINUXOS
[root@localhost ~]# ls -l LINUXOS
-rwxrw-r-- 1 root root 59 Sep  7 13:16 LINUXOS
[root@localhost ~]#
```

Numeric method:

```
[root@localhost ~]# chmod 764 LINUXOS
[root@localhost ~]# ls -l LINUXOS
-rwxrw-r-- 1 root root 59 Sep  7 13:16 LINUXOS
[root@localhost ~]#
```

```
[root@localhost ~]# mkdir lab4
[root@localhost ~]# ls
bench.py  D1  hello.c  lab4  LINUXOS
[root@localhost ~]# cd lab4
[root@localhost lab4]# touch quiz
[root@localhost lab4]# touch report
[root@localhost lab4]# touch cprogram
[root@localhost lab4]# ls
cprogram  quiz  report
[root@localhost lab4]# chmod 644 quiz
[root@localhost lab4]# chmod 664 report
[root@localhost lab4]# chmod 771 cprogram
[root@localhost lab4]# ls -l
total 0
-rwxrwx--x 1 root root 0 Sep  7 13:26 cprogram
-rw-r--r-- 1 root root 0 Sep  7 13:26 quiz
-rw-rw-r-- 1 root root 0 Sep  7 13:26 report
[root@localhost lab4]#
```

```
[root@localhost ~]# mkdir OSLAB
[root@localhost ~]# mkdir OSTheory
[root@localhost ~]# ls
bench.py  D1  hello.c  lab4  LINUXOS  OSLAB  OSTheory
[root@localhost ~]# cd OSLAB
[root@localhost OSLAB]# cat > overview.txt
Overview of Operating Systems.^C
[root@localhost OSLAB]# cat > details.txt
Detailed study of key OS concepts.^C
[root@localhost OSLAB]# cat > applications.txt
Applications and examples of OS concepts.^C
[root@localhost OSLAB]# ls
applications.txt  details.txt  overview.txt
[root@localhost OSLAB]# cat overview.txt details.txt applications.txt >Combinedt
xt
[root@localhost OSLAB]# cat Combinedtxt
Overview of Operating Systems.Detailed study of key OS concepts.Applications and
 examples of OS concepts.[root@localhost OSLAB]#
```

Use of Touch:

```
[root@localhost ~]# mkdir A
[root@localhost ~]# mkdir B
[root@localhost ~]# ls
A  B  bench.py  D1  hello.c  lab4  LINUXOS  OSLAB  OSTheory
[root@localhost ~]# cd A
[root@localhost A]# touch FinalTerm
[root@localhost A]# touch MidTerm
[root@localhost A]# ls
FinalTerm  MidTerm
[root@localhost A]# cd ..
[root@localhost ~]# cd B
[root@localhost B]# touch OSTheory
[root@localhost B]# touch OSLAB
[root@localhost B]# ls
OSLAB  OSTheory
[root@localhost B]# cd
[root@localhost ~]# mv /root/A/MidTerm /root/B/Task
[root@localhost ~]# cd B
[root@localhost B]# ls
OSLAB  OSTheory  Task
[root@localhost B]# cd ..
[root@localhost ~]# cd A
[root@localhost A]# ls
FinalTerm
[root@localhost A]#
```

Use of nano:

```
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[root@localhost ~]# nano DrawCircle.cpp
```

```
  GNU nano 5.3                    DrawCircle.cpp                    Modified
# include <iostream>
# include <cmath>
using namespace std;
int main (){
int radius = 9;
int center_x=radius, center_y=radius;
double aspect_ratio=1.9;
for(int y=0; y<=2*radius; y++){
for(int x=0; x<=2*radius*aspect_ratio; x++){
double dist=sqrt(pow((x/aspect_ratio)- center_x,2) +pow(y - center_y,2));
if(fabs(dist-radius) < 0.2){
cout<<"*";
}
else {
cout<<" ";
}
}
cout<<endl;
}
return 0;
}
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

Exit

```
Save modified buffer?
 Y Yes
 N No           ^C Cancel
```

Yes

```
File Name to Write: DrawCircle.cpp
^G Help              M-D DOS Format      M-A Append          M-B Backup File
^C Cancel            M-M Mac Format      M-P Prepend         ^T Browse
```

Enter

```
[root@localhost ~]# g++ DrawCircle.cpp -o DrawCircle

[root@localhost ~]#
[root@localhost ~]# ./DrawCircle
              *******
         **             *
      *                    *
    *                        *
   *                          *
  *                            *
 *                              *

*                                *
*                                *
*                                *

 *                              *
  *                            *
   *                          *
    *                        *
      *                    *
         **             *
              *******
[root@localhost ~]#
```

```
Loading...

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[root@localhost ~]# date +%r
08:36:13 AM
[root@localhost ~]# date +%D
09/17/24
[root@localhost ~]# date +%A
Tuesday
[root@localhost ~]# date +%m
09
[root@localhost ~]# date +%y
24
[root@localhost ~]#
```

Hours and Minutes:

```
[root@localhost ~]# date +"%H:%M"
09:37
```

Date in years:

```
[root@localhost ~]# date +%Y
2024
```

Complete Time:

```
[root@localhost ~]# date +"%d-%m-%Y %H:%M:%S"
15-09-2024 09:40:03
```

Yesterday date:

```
[root@localhost ~]# date --date="yesterday" +"%d-%m-%Y"
14-09-2024
```

Tomorrow date:

```
[root@localhost ~]# date --date="tomorrow" +"%d-%m-%Y"
16-09-2024
```

10 days ago date:

```
[root@localhost ~]# date --date="10 days ago" +"%d-%m-%Y"
05-09-2024
```

Calendar:

```
[root@localhost ~]# cal
   September 2024
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
29 30
```

Calendar of specific month:

```
[root@localhost ~]# cal 05 2024
      May 2024
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 29 30 31
```

Welcoming message:

```
[root@localhost ~]# echo "Welcome! Today's date and time is: $(date)"
Welcome! Today's date and time is: Sun Sep 15 09:46:10 AM UTC 2024
```

Clear:

```
[root@localhost ~]# clear
```

```
[root@localhost ~]#
```

Reverse a file:

```
[root@localhost ~]# cat > data.txt
Mango
Apple
Date
Grapes
Fig[root@localhost ~]# sort -r data.txt
Mango
Grapes
Fig
Date
Apple
[root@localhost ~]#
```

Sort in column vise:

```
[root@localhost ~]# cat >records.txt
Dua 47849
Zainab 46462
Samreen 46484[root@localhost ~]# sort -k 2 records.txt
Zainab 46462
Samreen 46484
Dua 47849
[root@localhost ~]#
```

Command to run a C++ File:

```
gcc dua.c -o duaa
```

By above command, a file created. To execute that file, we just write following command.

```
./duaa
```

-O:

By using -o option, we name our program's output file.

```
gcc dua.c -o duaa
```

Compile a C++ program:

```
g++ dua.cpp -o duaa
```

Run a program:

```
./duaa
```

Templates in C++ in Linux

```
  GNU nano 5.3                          program.cpp
# include <iostream>
using namespace std;

template <typename T>
T add (T a, T b){
return a+b;
}

int main (){
cout << add(5,10) <<endl;
cout << add(4.9, 10.1) << endl;
return 0;
}
```

We use following command to make a file executable:

```
chmod +x myfile
```

Redirections and Pipe operators:

```
Loading...

Welcome to Fedora 33 (riscv64)

[root@localhost ~]# cat > File
Hi, I'm Dua^C
[root@localhost ~]# echo "Me Dua" > File
[root@localhost ~]# cat File
Me Dua
[root@localhost ~]# echo "5th semester" >> File
[root@localhost ~]# cat File
Me Dua
5th semester
[root@localhost ~]# mkdir k1
[root@localhost ~]# cd k1
[root@localhost k1]# mkdir c1 c2
[root@localhost k1]# cd
[root@localhost ~]# ls k1
c1  c2
```

```
[root@localhost ~]# ls AAA k1 >> both 2>&1
[root@localhost ~]# cat both
ls: cannot access 'AAA': No such file or directory
k1:
c1
c2
[root@localhost ~]#
```
