



# OPERATING SYSTEM

## Lab Manual [Fall/ Spring 2019\_]

Student Name: Muhammad Fazeel Rabbani  
Student Id: 022-16-14020

Prepared By: *Dr. Noman Islam*

Instructor: *Dr. Noman Islam*

## LIST OF EXPERIMENTS

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2	__/__/__	To study and implement socket programming in Java
3	__/__/__	To study and implement multi-threading in Java
4		To study and implement concurrency control techniques in Java
5	__/__/__	To study and execute basic Linux commands on a terminal
6	__/__/__	To study and execute system administration commands on a terminal
7	__/__/__	To study and implement shell programming in Linux
8	__/__/__	To study and implement containers and dockers
9	__/__/__	To study and setup a kubernetes cluster
10	__/__/__	To study and implement process scheduling algorithms in Java

## To study and implement File I/O in Java

### Instructions:

Type the following program and save.

```
//FileTest.java
import java.io.*;
class FileTest
{
    public void fileWrite()
    {
        File dstFile = new File("K:\\myOutput\\outputfile.txt");
        PrintWriter out = new PrintWriter
            (new BufferedWriter(new FileWriter(dstFile)));
        out.print("Hello ");
        out.println("world");
        out.close();
    }
}
//FileTestMain.java
import java.io.*;

class FileTestMain
{
    public static void main(String[] args)
    {
        FileTest fileTest = new FileTest();
        fileTest.fileWrite();
    }
}
```

### Lab Tasks

1. Try to compile the class FileTest. What goes wrong? This is because opening up a file could throw an IOException, which is a checked exception. This means you have to tell Java how to deal with it, or the program won't compile
2. Run your program again. If all went successfully, open up "My Computer", and find your FilePractice folder on your K drive. You should be able to find the file "outputfile.txt". Double click on it, and take a look. What do you see?
3. Modify your program to write to the file five lines, each of which contains your name or a friend's name, followed by a space and then an age, then another space and a gpa. For example:

```
Arlene 19 3.8
Bill 22 3.5
Marilyn 15 3.9
Bryan 35 1.1
Buzz 6 4.0
```

4. Add the following method to your FileTest class:

```
public void consoleRead() throws IOException
```

```

{
    BufferedReader in = new BufferedReader(new InputStreamReader(System.in));
    System.out.print("What is your first name? ");
    String first = in.readLine();
    System.out.print("What is your last name? ");
    String last = in.readLine();
    System.out.println("Your name is " + last + ", " + first + ".");
}

```

Compile it. Add "throws" statements as necessary. Modify your main to run the consoleRead method, and recompile. Run your program. What does it do?

5. Add the following method to FileTest.

```

public void fileRead() throws IOException
{
    File srcFile = new File("K:\\FilePractice\\outputfile.txt");
    BufferedReader in = new BufferedReader(new FileReader(srcFile));
    String text = in.readLine();
    System.out.println(text);
    in.close();
}

```

Run the method. What do you see? Modify this method to print out the names, ages, and gpas of the five people you stored back in Task 1.

6. In reality, you would want to be able to separate each item on each line into different variables, rather than keeping all the information on name, age, and gpa in one string. To break it up, use a StringTokenizer.

### Seudo Code In Java::

```

package FileTest;
// @author Fazeel

import java.io.*;
import static java.lang.System.in;
import java.util.*;

public class FileTest {
    public void fileWrite()
    {
        try{
            File dstFile = new File("FileTest2.txt");
            PrintWriter out = new PrintWriter(new BufferedWriter(new FileWriter(dstFile)));
            out.println("BASIM 19 3.8");
            out.println("FAZEEL 22 3.5");
            out.println("DANIYAL 25 3.9");
            out.println("AHMAD 35 1.1");
            out.println("NIDA 16 4.0");
        }
    }
}

```

```
        out.close();
    }
    catch (Exception ex){
        System.out.println(ex);
    }
}

public void consoleRead() throws IOException
{
    BufferedReader in = new BufferedReader(new InputStreamReader(System.in));
    System.out.print("What is your first name :: ");
    String first = in.readLine();
    System.out.print("What is your last name :: ");
    String last = in.readLine();
    System.out.println("Your name is " + first + ", " + last + ".");
}

public void fileRead() throws IOException
{
    try{
        File srcFile = new File("FileTest2.txt");
        BufferedReader in = new BufferedReader(new FileReader(srcFile));
        String text=null;
        System.out.println(":: Display Record ::");
        while((text=in.readLine()) != null){
            StringTokenizer st= new StringTokenizer(text);
            System.out.println("Name :: "+ st.nextToken());
            System.out.println("Age :: "+ st.nextToken());
            System.out.println("CGPA :: "+ st.nextToken());
            System.out.println("\n");
        }
    }
    catch(Exception s){
        System.out.println(s);
    }
    in.close();
}

public static void main(String[] args) throws IOException {
    // TODO code application logic here
    FileTest fileTest = new FileTest( );
    fileTest.fileWrite();
    fileTest.consoleRead();
    fileTest.fileRead();
}
```

## Output & Display ::

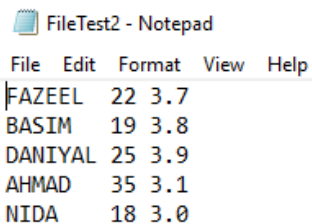
```
run:
What is your first name :: Fazeel
What is your last name  :: Rabbani
Your name is Fazeel, Rabbani.
::  Display Record  ::
Name  :: FAZEEL
Age   :: 22
CGPA  :: 3.7
```

```
Name  :: BASIM
Age   :: 19
CGPA  :: 3.8
```

```
Name  :: DANIYAL
Age   :: 25
CGPA  :: 3.9
```

```
Name  :: AHMAD
Age   :: 35
CGPA  :: 3.1
```

```
Name  :: NIDA
Age   :: 18
CGPA  :: 3.0
```



FileTest2 - Notepad

File	Edit	Format	View	Help
FAZEEL	22	3.7		
BASIM	19	3.8		
DANIYAL	25	3.9		
AHMAD	35	3.1		
NIDA	18	3.0		

## Lab 2

### To study and implement socket programming in Java

Sockets provide the communication mechanism between two computers using Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). This lab will demonstrate how to implement TCP sockets using Java. Before starting the lab, download and install Java and Eclipse IDE by following the instructions below:

1. Download and Install Java Development Kit (JDK)'s latest version
2. Download 'Eclipse' on your computer
3. Go to Eclipse folder and Run eclipse.exe file
4. The Eclipse environment will start. Now perform the lab tasks.

#### Lab Tasks:

1. Find the IP address of a local host using java program. Use the InetAddress class.

#### Pseudo Code ::

```
package ip.address;
import java.net.*;

/**
 * @author Fazeel
 */
public class IPADDRESS {
    public static void main(String[] args) {
        try{
            InetAddress IP = InetAddress.getLocalHost();
            System.out.println("IP of my system is :: "+IP.getHostAddress());
        }catch(Exception ex){
            ex.printStackTrace();
        }
    }
}
```

#### Output & Display ::

```
run:
IP of my system is :: 192.168.10.5
BUILD SUCCESSFUL (total time: 0 seconds)
```

2. Write a small port scanner application. The program usage is as follows:

```
E:\>java PortScanner 132 137
Port not in use : 132
Port not in use : 133
Port not in use : 134
Port in use : 135
Port not in use : 136
Port not in use : 137
```

## Pseudo Code ::

```
package server;

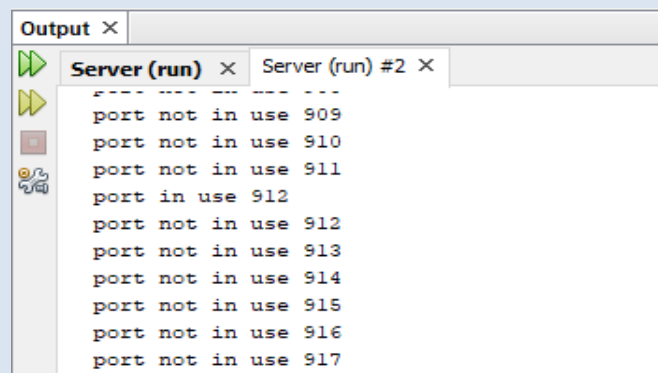
import java.io.*;
import java.net.*;

/**
 *
 * @author Fazeel
 */
public class Server {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) throws IOException {
        // TODO code application logic here
        for(int i=1;i<=65000;i++){
            try{
                Socket s=new Socket("127.0.0.1",i);
                System.out.println("port in use "+i);
                s.close();}
            catch(IOException s){

            }
            System.out.println("port not in use "+i);
        }
    }
}
```

## Output & Display ::





3. Write a small server that accepts socket connection on port 2020. Develop a client application that connects to the server.
  - a. Using `BufferedOutputStream`, write to the server “Hello”
  - b. The server should respond with the word Hello
4. Modify the Task 3 to develop an echo server

### Pseudo Code ::

```
package server;
/**
 * @author 7500
 * // Server
 */
import java.net.*;
import java.io.*;
public class Server {
    public static void main(String[] args){
        // TODO code application logic here
        try{
            ServerSocket Seve=new ServerSocket(5000);
            System.out.println("Listening.....");
            Socket sp= Seve.accept();
            DataOutputStream dos=new DataOutputStream(sp.getOutputStream());
            DataInputStream dis=new DataInputStream(sp.getInputStream());
            System.out.println("Client Arrives ::");

            // FristPart
            //      System.out.println("Read ::"+dis.readUTF());
            //      dos.writeUTF("Wa Alaikum Assalam");
            //Second part
            String data=dis.readUTF();
            System.out.println("Read ::"+data);
            dos.writeUTF(data);

            Seve.close();
        }catch(Exception ex){
            System.out.println(""+ex);
            ex.printStackTrace();
        } } }
```

//Cleint

```
package server;
```

```
import java.io.DataInputStream;
import java.io.*;
import java.net.*;

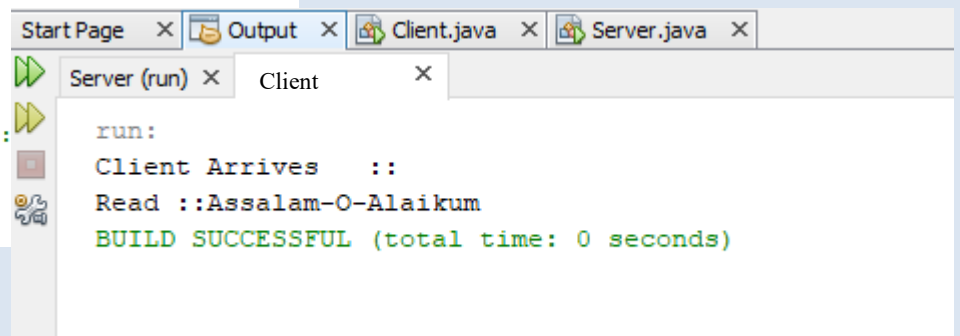
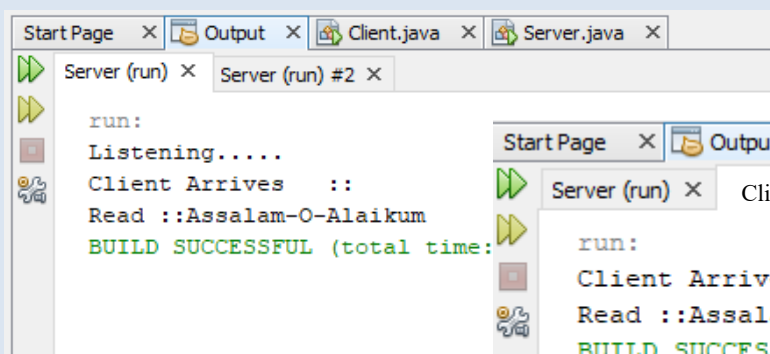
/**
 *
 * @author 7500
 */
public class Client {
    public static void main(String[] args) {
        try{
            Socket sp=new Socket("localhost",5000);
            System.out.println("Client Arrives  ::");
            DataOutputStream dos=new DataOutputStream(sp.getOutputStream());

            DataInputStream dis=new DataInputStream(sp.getInputStream());

            dos.writeUTF("Assalam-O-Alaikum");
            System.out.println("Read ::"+dis.readUTF());
            //System.out.println(""+dos.writeUTF(dis.readUTF()));

            sp.close();
        }catch(Exception ex){
            System.out.println(""+ex);
            ex.printStackTrace();
        }
    }
}
```

## Output & Display ::



## To study and implement multi-threading in Java

### Instructions:

1. A thread is an independent unit of execution.
2. In Java, the Runnable interface and Thread class of package java.lang are used for implementation of thread
3. To implement a thread, the desired class must implement the Runnable interface and provide the run() method.

```
public class MyThread implements Runnable {
    public void run() {
        //implementation of thread
    }
}
```

4. The Thread class can then be used to start a thread as follows:

```
public class TestThread
{
    public static void main( String[] args )
    {
        MyThread m = new MyThread();
        Thread t = new Thread(m);
        m.start();
    }
}
```

### Lab Tasks:

1. Write a class that implements Runnable. Define a constructor that takes the name of the thread as argument. The thread upon execution will print the name of the thread in a while loop. Define and run 5 thread objects. What output do you see?
2. In task 1, modify the run method to randomly sleep the thread for few milliseconds. Observe the output.
3. Create a multi-threaded client server application in Java.

### Pseudo Code ::

```
package thread;
/**
 * @author 7500
 * // Thread
 */

public class MyThread implements Runnable{
    private String name;
    @Override
    public void run() {
        // while(true){
            System.out.println(name);
            // Thread.sleep(1000) }
    }
    public MyThread(String name) {    this.name = name ;    }
```

```
public static void main(String[] args) {  
    try{  
        for(int i=1;i<=5;i++){  
            MyThread m = new MyThread("Test"+i);  
            Thread t = new Thread(m);  
            t.start();  
        }  
    } catch(Exception ex){  
        System.out.println("");  
    }  
}
```

## Output & Display ::

```
run:  
Test1  
Test2  
Test3  
Test4  
Test5  
BUILD SUCCESSFUL (total time: 0 seconds)
```

## Seudo Code::

```
Package thread;  
import java.io.*;  
import java.net.*;  
import java.nio.CharBuffer;  
public class Myrunable implements Runnable{  
    private Socket s;  
    public Myrunable(Socket s) {  
        this.s = s;  
    }  
    @Override  
    public void run() {  
        try {  
            DataInputStream dis = new DataInputStream(s.getInputStream());  
            DataOutputStream dos = new DataOutputStream(s.getOutputStream());  
            dos.writeUTF(dis.readUTF());  
            s.close();  
        }  
    }  
}
```

```
        catch (Exception e)
        {
            e.printStackTrace();
        }
    }
    public static void main(String[] args) {
        try{
            ServerSocket ss = new ServerSocket(4000);
            System.out.println("Server Running.....:");
            while(true)
            {
                Socket s = ss.accept();
                Myrunable st = new Myrunable(s);
                Thread t = new Thread (st);
                t.start();
            }

            } catch(Exception ex){
                System.out.println(""+ex);
            }
        }
    }
```

## Output & Display ::

```
run:
Server Running.....:
```

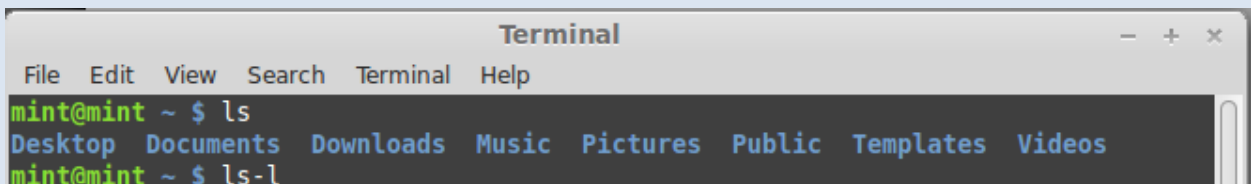
## To study and execute basic Linux commands on a terminal

Linux is a Unix-like and mostly POSIX-compliant computer operating system (OS) assembled under the model of free and open-source software development and distribution. In this lab, we will work on Ubuntu, one of the flavors of Linux. For this purpose, we will use virtualization environment.

### Lab Tasks:

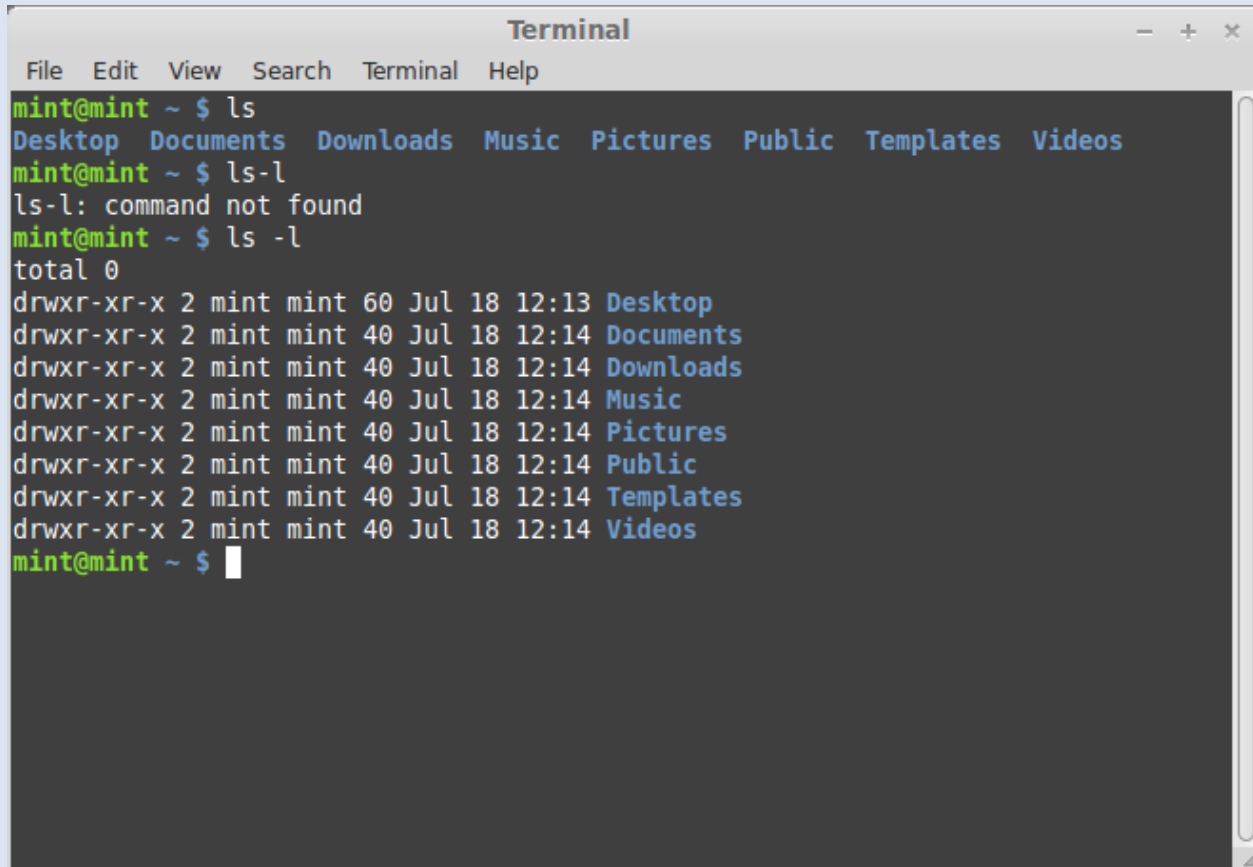
1. Using ls command find out the contents of current directory
  2. What are the permissions for normal user, group and world for each file
  3. Find out the name of current working directory
  4. Create a new folder named “lab os” using the mkdir command
  5. Switch to the directory “lab os”
  6. Create a file in the directory named “lab4.txt” using touch command
  7. List down the contents of file using cat command. Try using “more” and “less” option
  8. Find out the space consumed by directory using “du” command
  9. Copy the file to parent directory using cp command
  10. Remove the file using rm command
  11. Remove the directory using rmdir command
  12. Check the free space on disk using df command
  13. Change the password of the user using passwd command
  14. Switch to super user, using the command “su
  15. Using the history command, list down the commands run on the terminal window
- 

### 1. Using ls command find out the contents of current directory



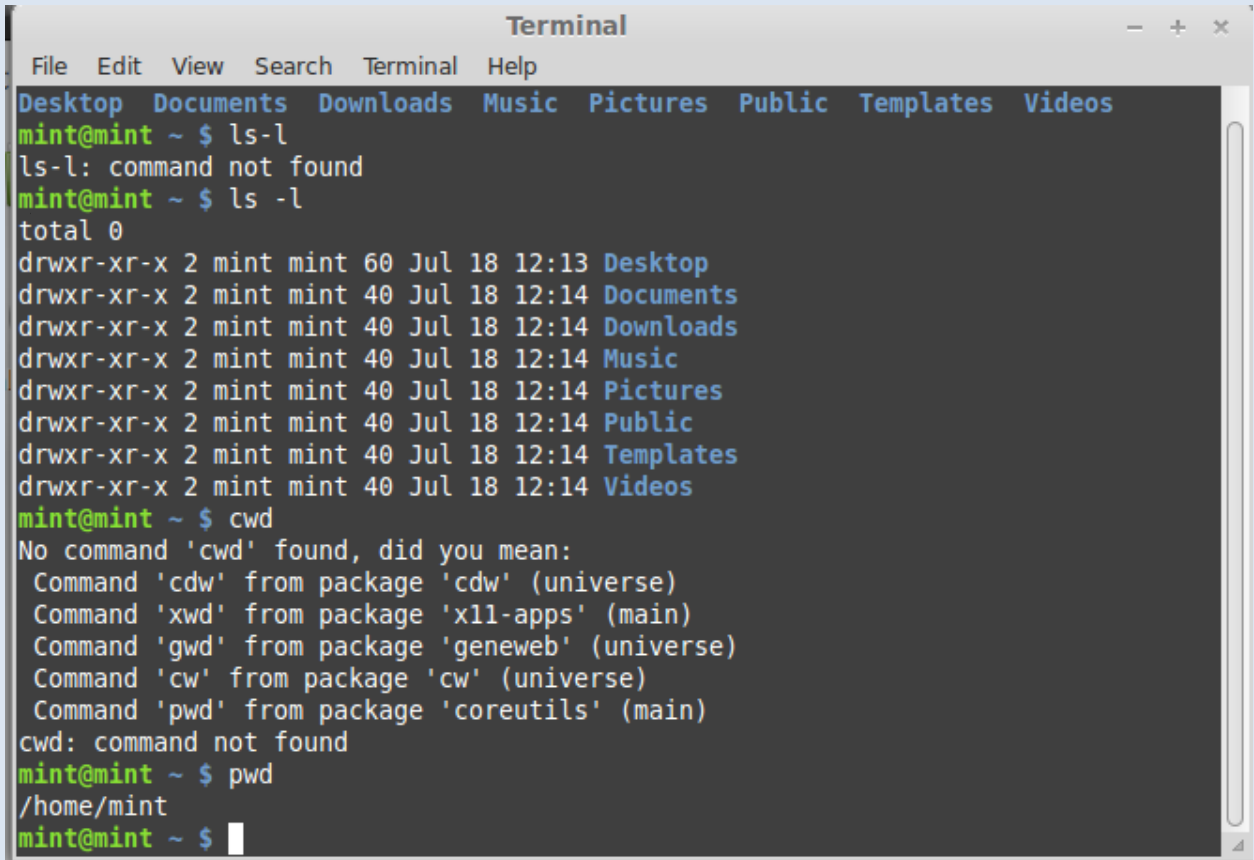
```
Terminal
File Edit View Search Terminal Help
mint@mint ~ $ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
mint@mint ~ $ ls-l
```

### 2. What are the permissions for normal user, group and world for each file

A screenshot of a Linux terminal window titled "Terminal". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal shows the following commands and output:

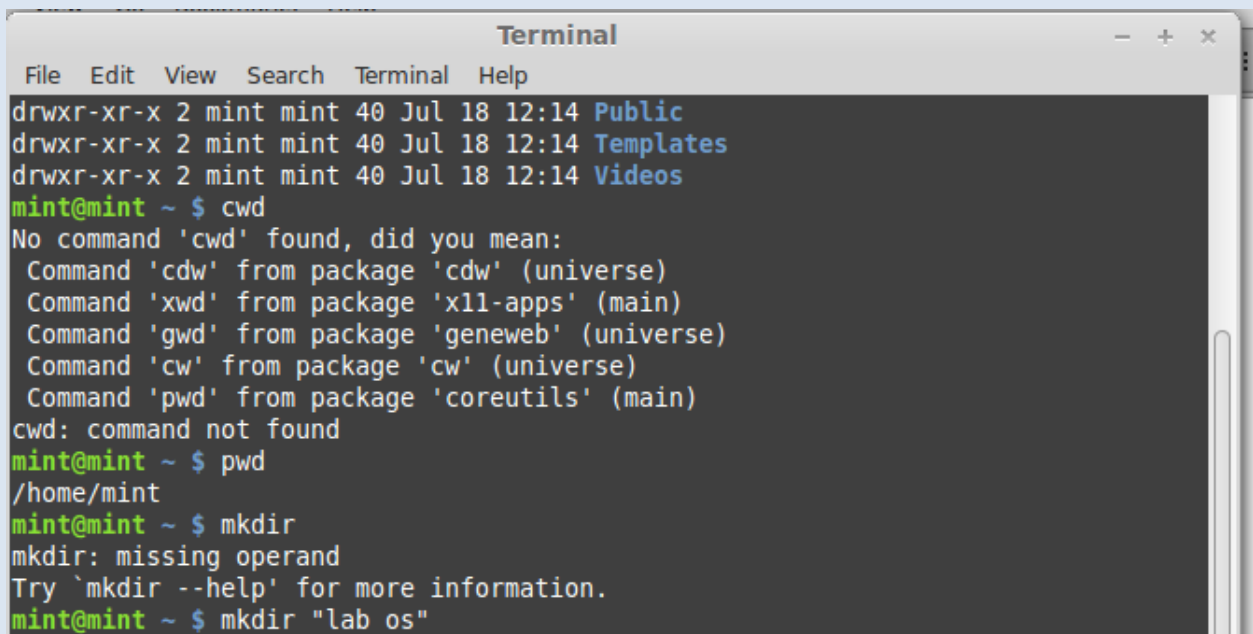
```
mint@mint ~ $ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
mint@mint ~ $ ls-l
ls-l: command not found
mint@mint ~ $ ls -l
total 0
drwxr-xr-x 2 mint mint 60 Jul 18 12:13 Desktop
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Documents
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Downloads
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Music
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Pictures
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Public
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Templates
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Videos
mint@mint ~ $
```

### 3. Find out the name of current working directory



```
Terminal
File Edit View Search Terminal Help
Desktop Documents Downloads Music Pictures Public Templates Videos
mint@mint ~ $ ls-l
ls-l: command not found
mint@mint ~ $ ls -l
total 0
drwxr-xr-x 2 mint mint 60 Jul 18 12:13 Desktop
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Documents
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Downloads
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Music
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Pictures
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Public
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Templates
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Videos
mint@mint ~ $ cwd
No command 'cwd' found, did you mean:
  Command 'cdw' from package 'cdw' (universe)
  Command 'xwd' from package 'x11-apps' (main)
  Command 'gwd' from package 'geneweb' (universe)
  Command 'cw' from package 'cw' (universe)
  Command 'pwd' from package 'coreutils' (main)
cwd: command not found
mint@mint ~ $ pwd
/home/mint
mint@mint ~ $
```

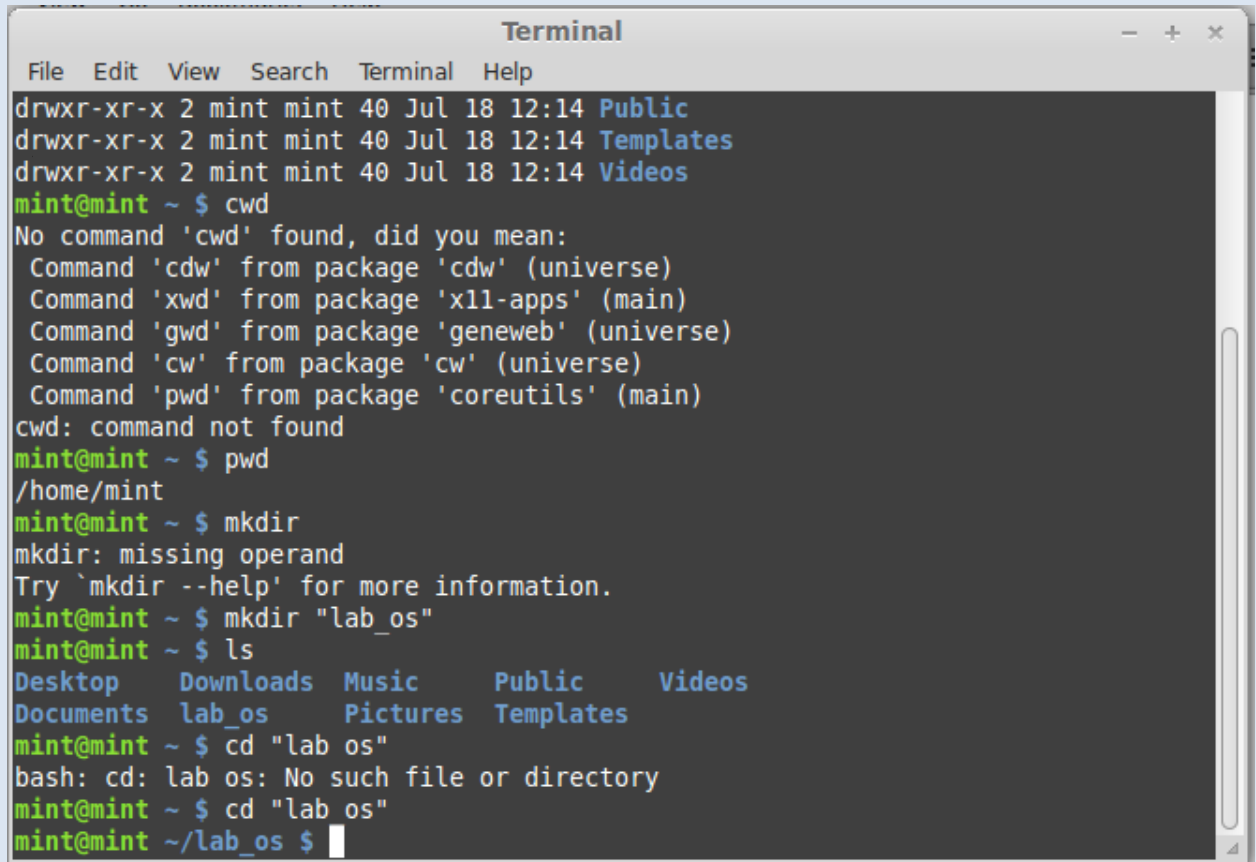
4. Create a new folder named “lab os” using the mkdir command



```
Terminal
File Edit View Search Terminal Help
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Public
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Templates
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Videos
mint@mint ~ $ cwd
No command 'cwd' found, did you mean:
  Command 'cdw' from package 'cdw' (universe)
  Command 'xwd' from package 'x11-apps' (main)
  Command 'gwd' from package 'geneweb' (universe)
  Command 'cw' from package 'cw' (universe)
  Command 'pwd' from package 'coreutils' (main)
cwd: command not found
mint@mint ~ $ pwd
/home/mint
mint@mint ~ $ mkdir
mkdir: missing operand
Try 'mkdir --help' for more information.
mint@mint ~ $ mkdir "lab_os"
```

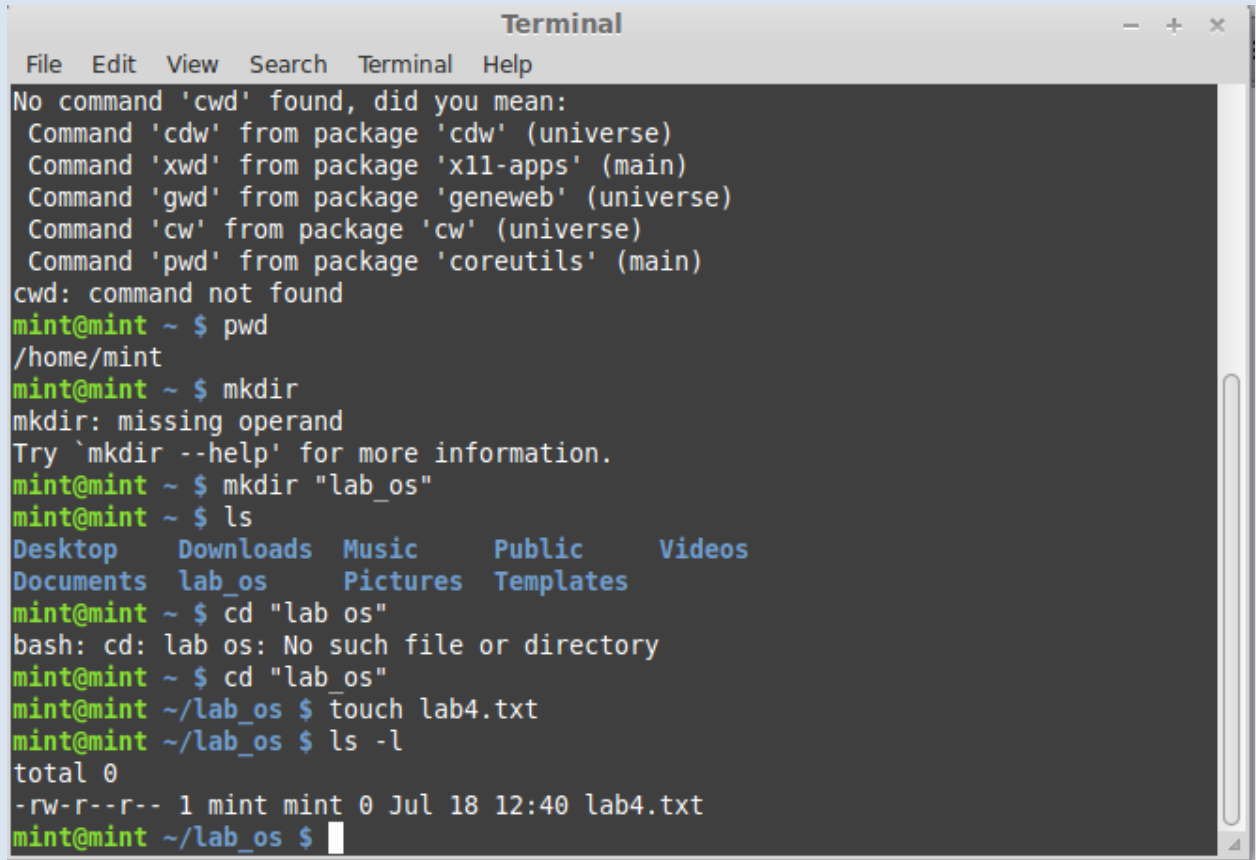


## 5. Switch to the directory “lab os”

A terminal window titled "Terminal" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

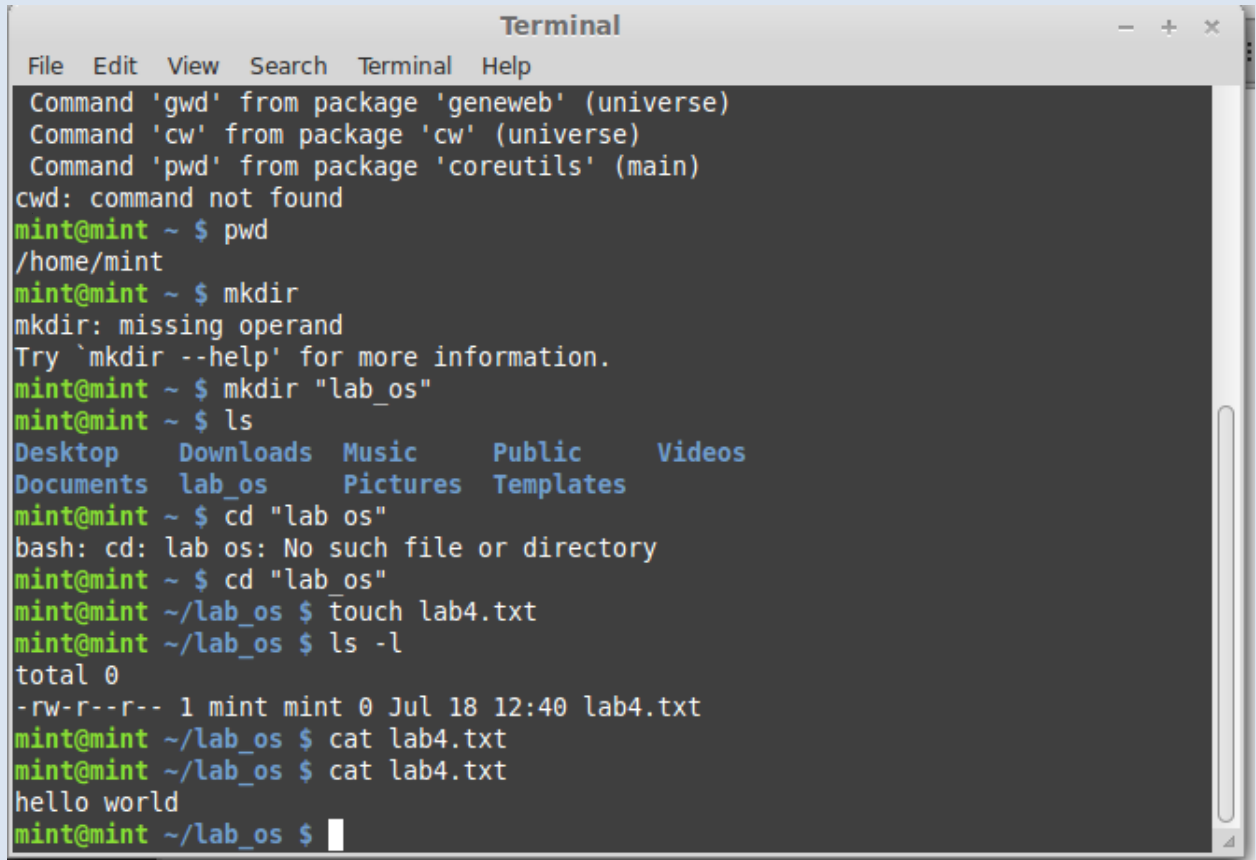
```
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Public
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Templates
drwxr-xr-x 2 mint mint 40 Jul 18 12:14 Videos
mint@mint ~ $ cwd
No command 'cwd' found, did you mean:
  Command 'cdw' from package 'cdw' (universe)
  Command 'xwd' from package 'x11-apps' (main)
  Command 'gwd' from package 'geneweb' (universe)
  Command 'cw' from package 'cw' (universe)
  Command 'pwd' from package 'coreutils' (main)
cwd: command not found
mint@mint ~ $ pwd
/home/mint
mint@mint ~ $ mkdir
mkdir: missing operand
Try 'mkdir --help' for more information.
mint@mint ~ $ mkdir "lab_os"
mint@mint ~ $ ls
Desktop  Downloads  Music      Public     Videos
Documents lab_os     Pictures   Templates
mint@mint ~ $ cd "lab os"
bash: cd: lab os: No such file or directory
mint@mint ~ $ cd "lab os"
mint@mint ~/lab_os $
```

## 6. Create a file in the directory named “lab4.txt” using touch command



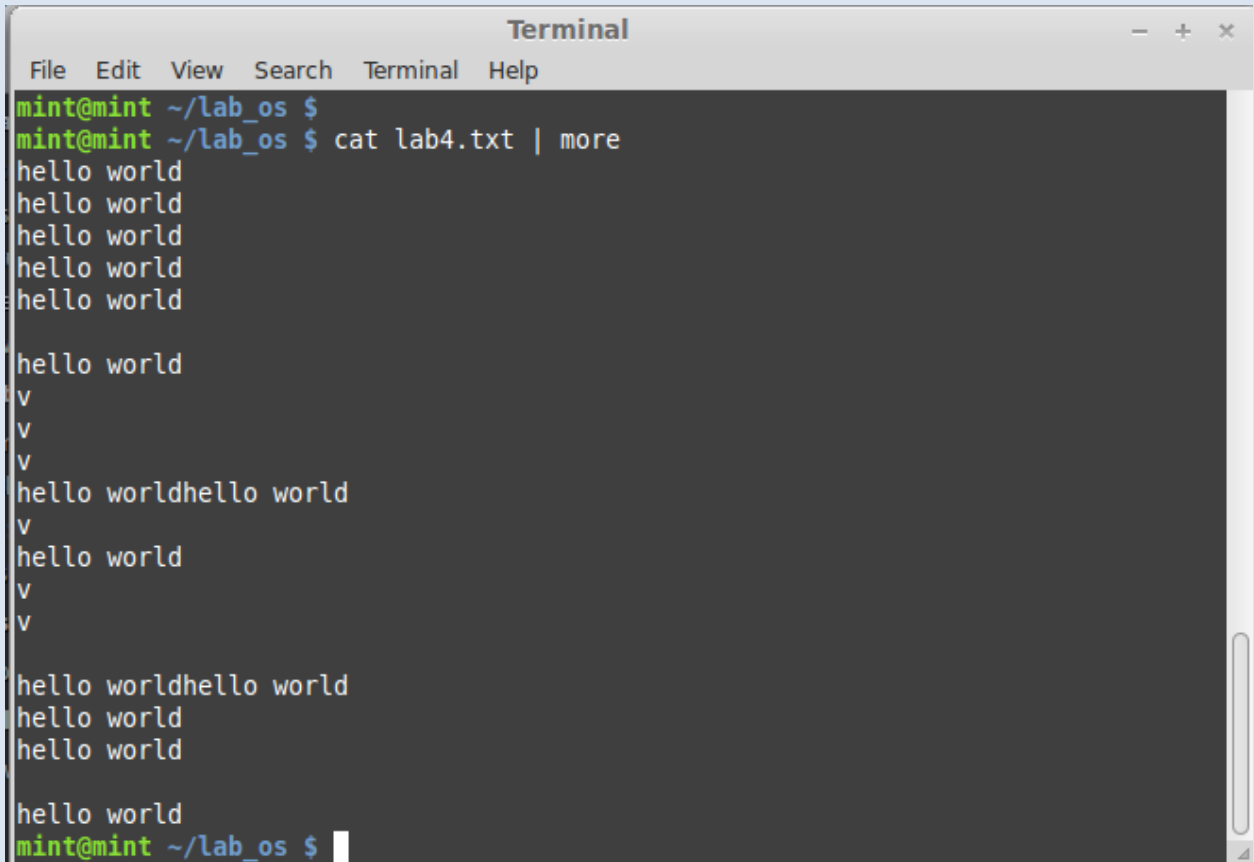
```
Terminal
File Edit View Search Terminal Help
No command 'cwd' found, did you mean:
Command 'cdw' from package 'cdw' (universe)
Command 'xwd' from package 'x11-apps' (main)
Command 'gwd' from package 'geneweb' (universe)
Command 'cw' from package 'cw' (universe)
Command 'pwd' from package 'coreutils' (main)
cwd: command not found
mint@mint ~ $ pwd
/home/mint
mint@mint ~ $ mkdir
mkdir: missing operand
Try 'mkdir --help' for more information.
mint@mint ~ $ mkdir "lab_os"
mint@mint ~ $ ls
Desktop  Downloads  Music      Public     Videos
Documents lab_os     Pictures   Templates
mint@mint ~ $ cd "lab os"
bash: cd: lab os: No such file or directory
mint@mint ~ $ cd "lab_os"
mint@mint ~/lab_os $ touch lab4.txt
mint@mint ~/lab_os $ ls -l
total 0
-rw-r--r-- 1 mint mint 0 Jul 18 12:40 lab4.txt
mint@mint ~/lab_os $
```

7. List down the contents of file using cat command. Try using “more” and “less” option

A terminal window titled "Terminal" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
Command 'gwd' from package 'geneweb' (universe)
Command 'cw' from package 'cw' (universe)
Command 'pwd' from package 'coreutils' (main)
c wd: command not found
mint@mint ~ $ pwd
/home/mint
mint@mint ~ $ mkdir
mkdir: missing operand
Try `mkdir --help' for more information.
mint@mint ~ $ mkdir "lab_os"
mint@mint ~ $ ls
Desktop  Downloads  Music      Public     Videos
Documents lab_os     Pictures   Templates
mint@mint ~ $ cd "lab os"
bash: cd: lab os: No such file or directory
mint@mint ~ $ cd "lab_os"
mint@mint ~/lab_os $ touch lab4.txt
mint@mint ~/lab_os $ ls -l
total 0
-rw-r--r-- 1 mint mint 0 Jul 18 12:40 lab4.txt
mint@mint ~/lab_os $ cat lab4.txt
mint@mint ~/lab_os $ cat lab4.txt
hello world
mint@mint ~/lab_os $
```

8. More:



```

Terminal
File Edit View Search Terminal Help
mint@mint ~/lab_os $
mint@mint ~/lab_os $ cat lab4.txt | more
hello world
hello world
hello world
hello world
hello world

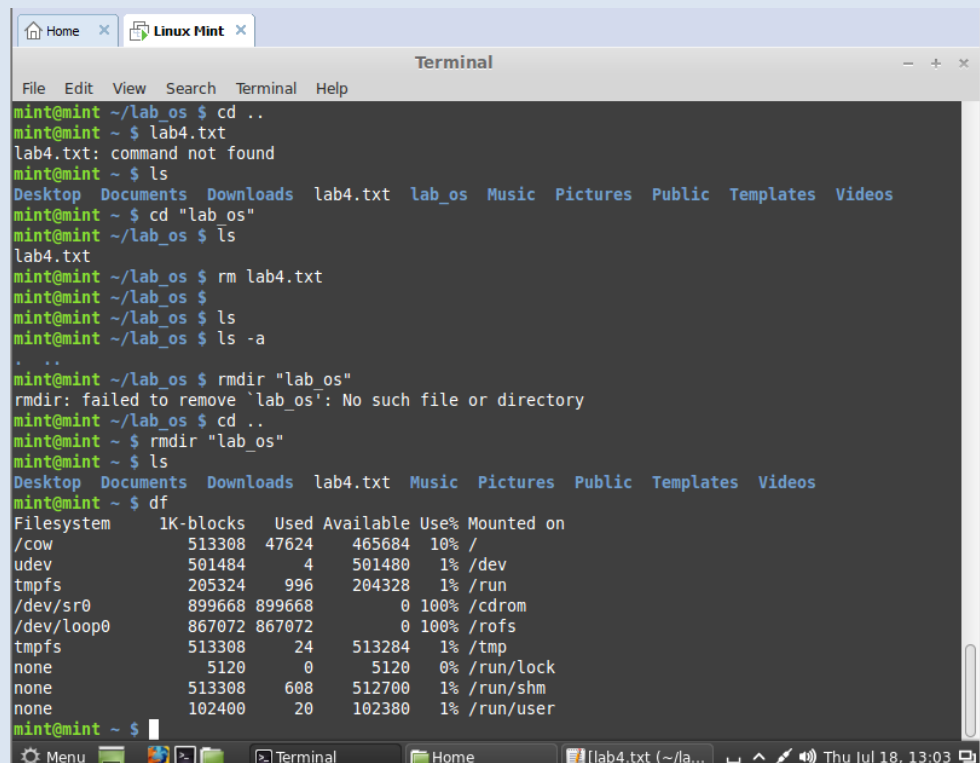
hello world
v
v
v
hello worldhello world
v
hello world
v
v

hello worldhello world
hello world
hello world

hello world
mint@mint ~/lab_os $

```

9. Find out the space consumed by directory using “du” command

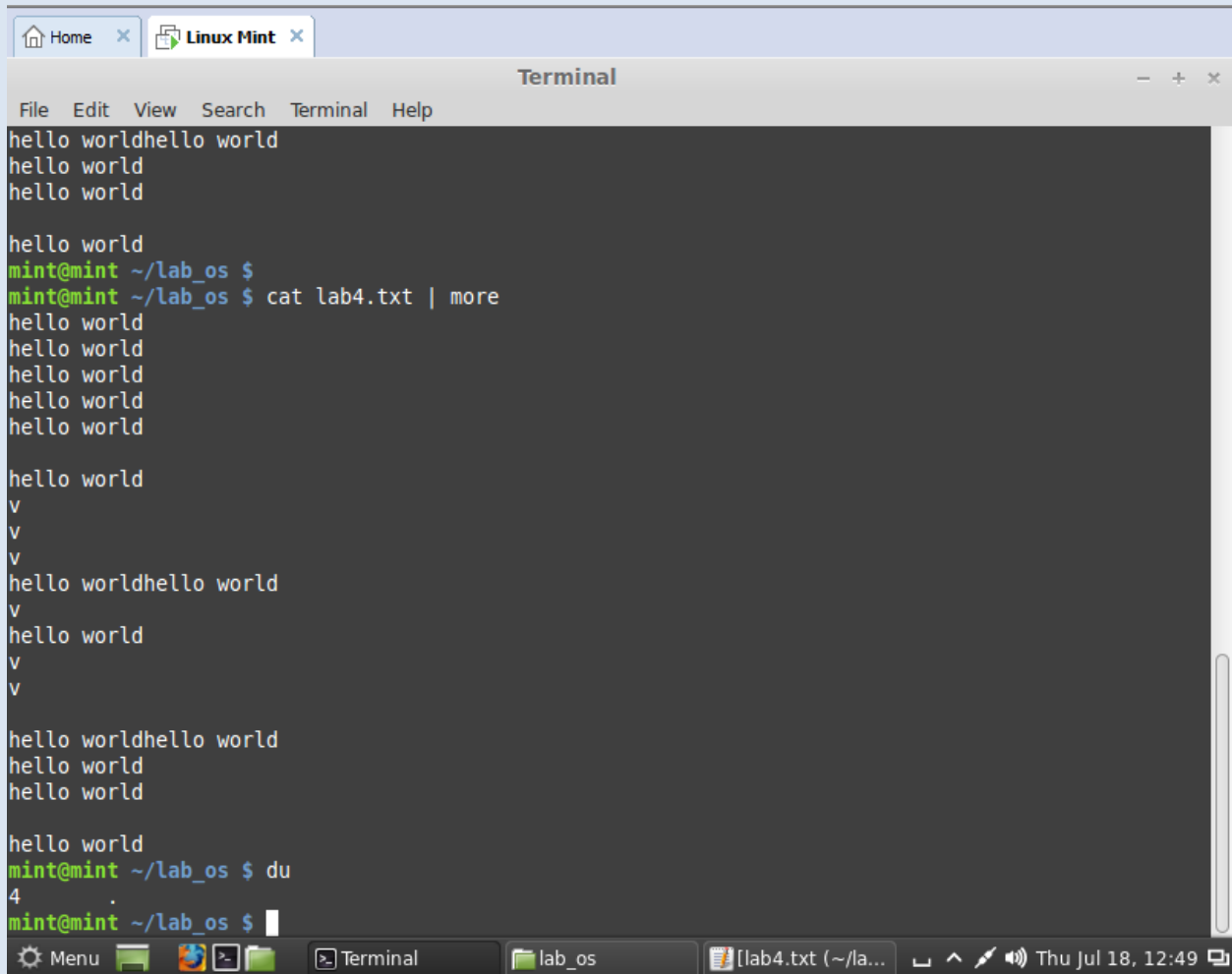


```

Linux Mint
Terminal
File Edit View Search Terminal Help
mint@mint ~/lab_os $ cd ..
mint@mint ~ $ lab4.txt
lab4.txt: command not found
mint@mint ~ $ ls
Desktop Documents Downloads lab4.txt lab_os Music Pictures Public Templates Videos
mint@mint ~ $ cd "lab_os"
mint@mint ~/lab_os $ ls
lab4.txt
mint@mint ~/lab_os $ rm lab4.txt
mint@mint ~/lab_os $
mint@mint ~/lab_os $ ls
mint@mint ~/lab_os $ ls -a
.
..
mint@mint ~/lab_os $ rmdir "lab_os"
rmdir: failed to remove `lab_os': No such file or directory
mint@mint ~/lab_os $ cd ..
mint@mint ~ $ rmdir "lab_os"
mint@mint ~ $ ls
Desktop Documents Downloads lab4.txt Music Pictures Public Templates Videos
mint@mint ~ $ df
Filesystem      1K-blocks    Used Available Use% Mounted on
/cow             513308    47624   465684   10% /
udev            501484         4    501480    1% /dev
tmpfs           205324     996   204328    1% /run
/dev/sr0        899668  899668         0  100% /cdrom
/dev/loop0      867072  867072         0  100% /rofs
tmpfs           513308      24    513284    1% /tmp
none            5120         0     5120    0% /run/lock
none            513308     608    512700    1% /run/shm
none            102400      20    102380    1% /run/user
mint@mint ~ $

```

## 10. Copy the file to parent directory using cp command



A terminal window titled "Terminal" with a menu bar (File, Edit, View, Search, Terminal, Help) and window controls. The terminal shows the following commands and output:

```
hello worldhello world
hello world
hello world

hello world
mint@mint ~/lab_os $
mint@mint ~/lab_os $ cat lab4.txt | more
hello world
hello world
hello world
hello world
hello world

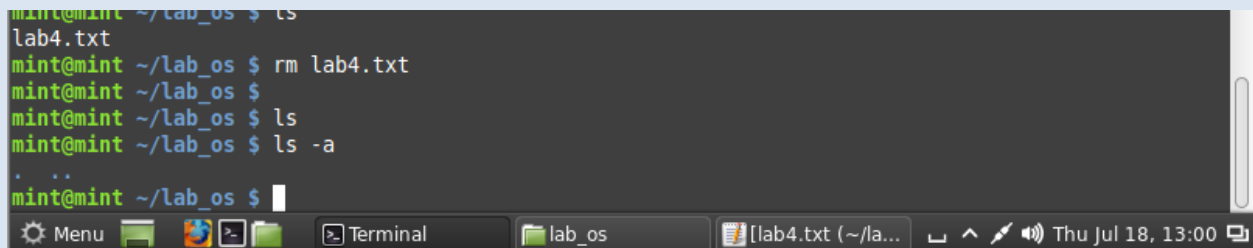
hello world
v
v
v
v
hello worldhello world
v
hello world
v
v

hello worldhello world
hello world
hello world

hello world
mint@mint ~/lab_os $ du
4
mint@mint ~/lab_os $
```

The terminal window has a taskbar at the bottom with icons for Menu, Applications, Files, Terminal, lab\_os, and lab4.txt (~/la...). The system clock shows "Thu Jul 18, 12:49".

## 11. Remove the file using rm command



A terminal window showing the following commands and output:

```
mint@mint ~/lab_os $ ls
lab4.txt
mint@mint ~/lab_os $ rm lab4.txt
mint@mint ~/lab_os $
mint@mint ~/lab_os $ ls
mint@mint ~/lab_os $ ls -a
. . .
mint@mint ~/lab_os $
```

The terminal window has a taskbar at the bottom with icons for Menu, Applications, Files, Terminal, lab\_os, and lab4.txt (~/la...). The system clock shows "Thu Jul 18, 13:00".

```

Desktop Documents Downloads lab4.txt Music Pictures Public Templates Videos
mint@mint ~ $ df
Filesystem      1K-blocks    Used Available Use% Mounted on
/cow             513308    47624    465684  10% /
udev            501484         4    501480   1% /dev
tmpfs           205324     996    204328   1% /run
/dev/sr0        899668  899668         0 100% /cdrom
/dev/loop0     867072  867072         0 100% /rofs
tmpfs           513308         24    513284   1% /tmp
none            5120         0      5120   0% /run/lock
none           513308         608    512700   1% /run/shm
none           102400         20    102380   1% /run/user
mint@mint ~ $

```

## 12. Remove the directory using rmdir command

```

passwd: password unchanged
mint@mint ~ $ passwd
Changing password for mint.
(current) UNIX password:
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
mint@mint ~ $

```

## 13. Check the free space on disk using df command

```

mint@mint: ~
File Edit View Search Terminal Help
bash: cd: /Desktop: No such file or directory
mint@mint:~$ cd Desktop
mint@mint:~/Desktop$ mkdir file3.txt
mint@mint:~/Desktop$ cd ..
mint@mint:~$ ls
Desktop    Downloads  Pictures   Templates  file1.txt
Documents  Music      Public     Videos    file2.txt
mint@mint:~$ ls Desktop
file3.txt  ubiquity.desktop
mint@mint:~$ cp /Desktop /CopyRE
cp: cannot stat '/Desktop': No such file or directory
mint@mint:~$ cp /Desktop /file3.txt
cp: cannot stat '/Desktop': No such file or directory
mint@mint:~$ cp /file3.txt /Desktop
cp: cannot stat '/file3.txt': No such file or directory
mint@mint:~$ cp -R file3.txt file1.txt
cp: cannot stat 'file3.txt': No such file or directory
mint@mint:~$ cp -R file1.txt file2.txt
mint@mint:~$ pwd
/home/mint
mint@mint:~$ ls
Desktop    Downloads  Pictures   Templates  file1.txt
Documents  Music      Public     Videos    file2.txt
mint@mint:~$

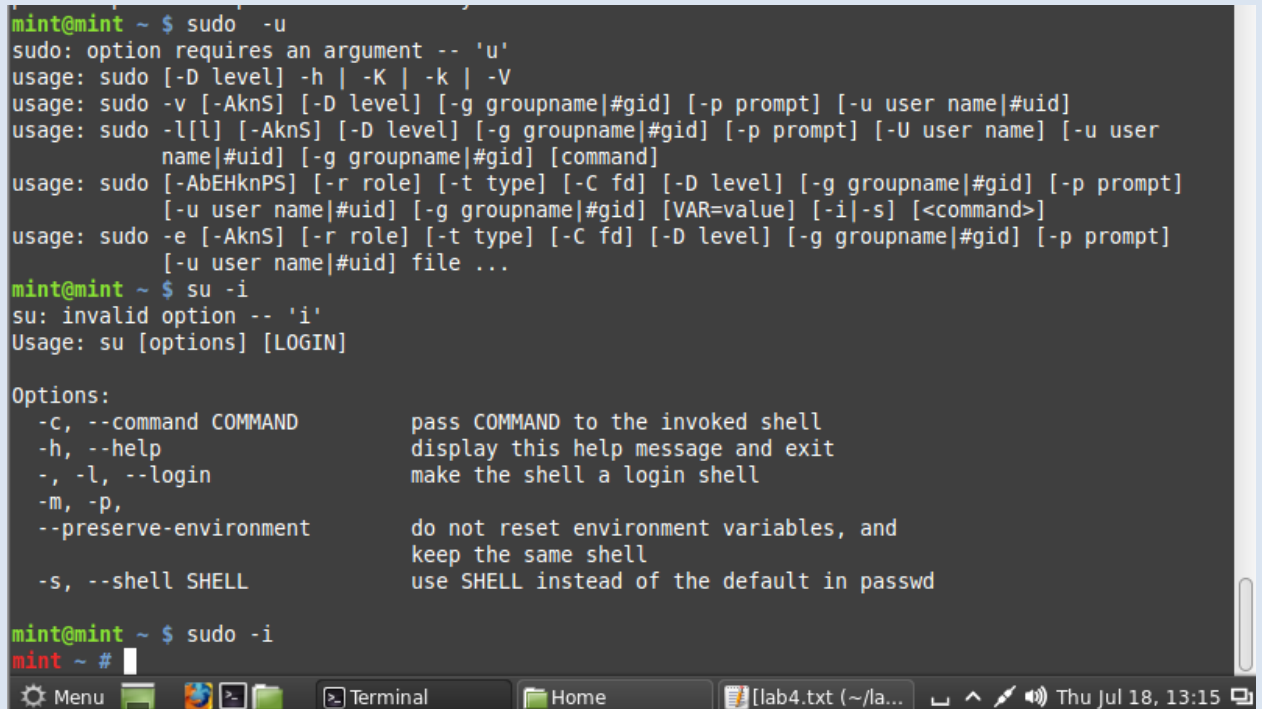
```

14. Change the password of the user using passwd command
15. Switch to super user, using the command “su”
16. Using the history command, list down the commands run on the terminal window

```
mint@mint ~ $ sudo -u
sudo: option requires an argument -- 'u'
usage: sudo [-D level] -h | -K | -k | -V
usage: sudo -v [-AknS] [-D level] [-g groupname#gid] [-p prompt] [-u user name#uid]
usage: sudo -l[] [-AknS] [-D level] [-g groupname#gid] [-p prompt] [-U user name] [-u user
name#uid] [-g groupname#gid] [command]
usage: sudo [-AbEHknPS] [-r role] [-t type] [-C fd] [-D level] [-g groupname#gid] [-p prompt]
[-u user name#uid] [-g groupname#gid] [VAR=value] [-i|-s] [<command>]
usage: sudo -e [-AknS] [-r role] [-t type] [-C fd] [-D level] [-g groupname#gid] [-p prompt]
[-u user name#uid] file ...
mint@mint ~ $ su -i
su: invalid option -- 'i'
Usage: su [options] [LOGIN]

Options:
  -c, --command COMMAND      pass COMMAND to the invoked shell
  -h, --help                 display this help message and exit
  -, -l, --login             make the shell a login shell
  -m, -p,                   do not reset environment variables, and
  --preserve-environment     keep the same shell
  -s, --shell SHELL          use SHELL instead of the default in passwd

mint@mint ~ $ sudo -i
mint ~ #
```



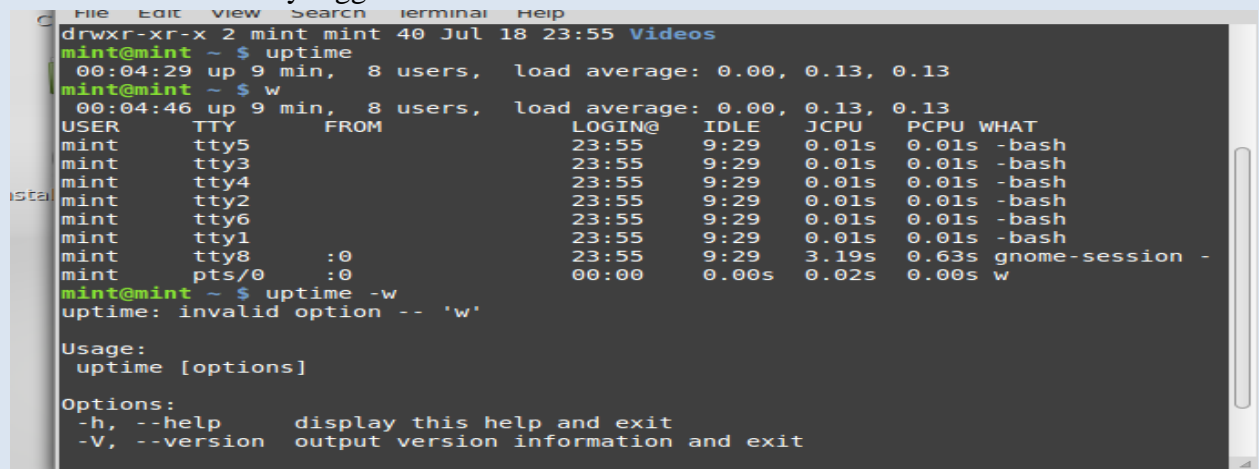
## To study and execute system administration commands on a terminal

### Instructions:

Linux comprises a set of commands for basic system administration. In this lab, we will study these commands.

### Lab Tasks:

1. Using the 'uptime' command, since how long your system is running and the number of users that are currently logged in.



```

File Edit View Search Terminal Help
drwxr-xr-x 2 mint mint 40 Jul 18 23:55 Videos
mint@mint ~ $ uptime
00:04:29 up 9 min, 8 users, load average: 0.00, 0.13, 0.13
mint@mint ~ $ w
00:04:46 up 9 min, 8 users, load average: 0.00, 0.13, 0.13
USER      TTY      FROM            LOGIN@   IDLE   JCPU   PCPU   WHAT
mint      tty5                23:55    9:29   0.01s  0.01s  -bash
mint      tty3                23:55    9:29   0.01s  0.01s  -bash
mint      tty4                23:55    9:29   0.01s  0.01s  -bash
mint      tty2                23:55    9:29   0.01s  0.01s  -bash
mint      tty6                23:55    9:29   0.01s  0.01s  -bash
mint      tty1                23:55    9:29   0.01s  0.01s  -bash
mint      tty8                23:55    9:29   3.19s  0.63s  gnome-session -
mint      pts/0              :0        00:00    0.00s  0.02s  0.00s w
mint@mint ~ $ uptime -w
uptime: invalid option -- 'w'

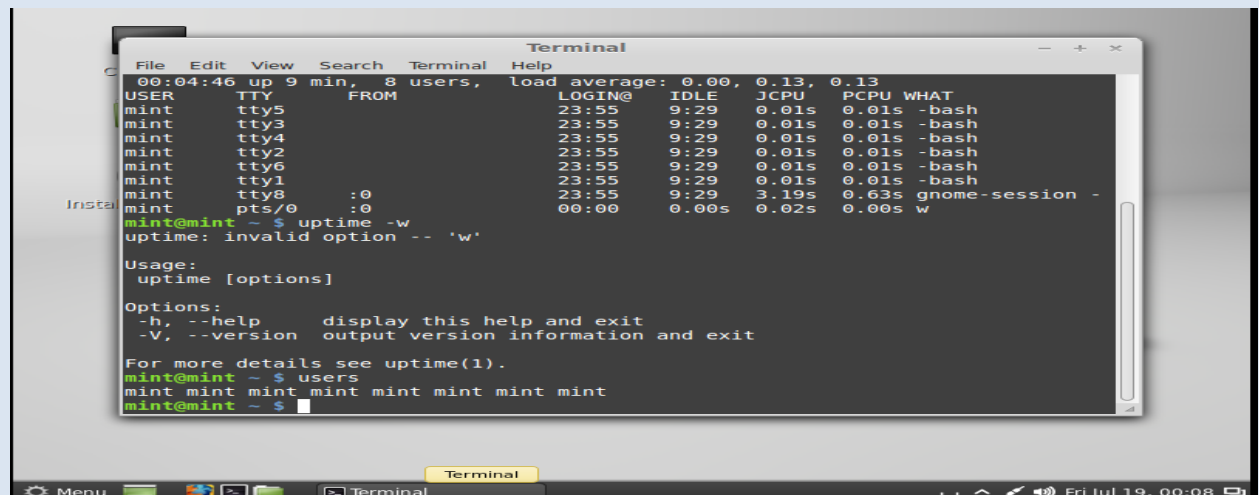
Usage:
  uptime [options]

Options:
  -h, --help      display this help and exit
  -V, --version    output version information and exit

For more details see uptime(1).
mint@mint ~ $ users
mint mint mint mint mint mint mint mint
mint@mint ~ $

```

2. Using the 'w', display the users currently logged in and their process along-with load averages



```

File Edit View Search Terminal Help
00:04:46 up 9 min, 8 users, load average: 0.00, 0.13, 0.13
USER      TTY      FROM            LOGIN@   IDLE   JCPU   PCPU   WHAT
mint      tty5                23:55    9:29   0.01s  0.01s  -bash
mint      tty3                23:55    9:29   0.01s  0.01s  -bash
mint      tty4                23:55    9:29   0.01s  0.01s  -bash
mint      tty2                23:55    9:29   0.01s  0.01s  -bash
mint      tty6                23:55    9:29   0.01s  0.01s  -bash
mint      tty1                23:55    9:29   0.01s  0.01s  -bash
mint      tty8                23:55    9:29   3.19s  0.63s  gnome-session -
mint      pts/0              :0        00:00    0.00s  0.02s  0.00s w
mint@mint ~ $ uptime -w
uptime: invalid option -- 'w'

Usage:
  uptime [options]

Options:
  -h, --help      display this help and exit
  -V, --version    output version information and exit

For more details see uptime(1).
mint@mint ~ $ users
mint mint mint mint mint mint mint mint
mint@mint ~ $

```



3. Using the 'users' command, display the currently logged in users.

```

Terminal
00:04:46 up 9 min, 8 users, load average: 0.00, 0.13, 0.13
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU   WHAT
mint      tty5                    23:55    9:29    0.01s  0.01s  -bash
mint      tty3                    23:55    9:29    0.01s  0.01s  -bash
mint      tty4                    23:55    9:29    0.01s  0.01s  -bash
mint      tty2                    23:55    9:29    0.01s  0.01s  -bash
mint      tty6                    23:55    9:29    0.01s  0.01s  -bash
mint      tty1                    23:55    9:29    0.01s  0.01s  -bash
mint      pts/0                :0      23:55    9:29    3.19s  0.63s  gnome-session -
mint      pts/0                :0      00:00    0.00s  0.02s  0.00s  w

mint@mint ~ $ uptime -w
uptime: invalid option -- 'w'

Usage:
uptime [options]

Options:
-h, --help      display this help and exit
-V, --version   output version information and exit

For more details see uptime(1).
mint@mint ~ $ users
mint mint mint mint mint mint mint mint
mint@mint ~ $

```

4. Using the 'top' command, display processor activity of your system and also displays tasks managed by kernel in real-time.

```

Home
Terminal
KiB Mem: 1026620 total, 730172 used, 296448 free, 83184 buffers
KiB Swap: 0 total, 0 used, 0 free, 432920 cached

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
 2940 mint      20   0  433m  96m  30m  R   3.3   9.6   0:44.68 cinnamon
 2233 root      20   0 56572  23m  6216  S   0.3   2.4   0:06.68 Xorg
 3193 mint      20   0  5204 1364 1012  R   0.3   0.1   0:00.20 top
    1 root      20   0   3468 1956 1316  S   0.0   0.2   0:00.60 init
    2 root      20   0     0     0     0  S   0.0   0.0   0:00.00 kthreadd
    3 root      20   0     0     0     0  S   0.0   0.0   0:00.09 ksoftirqd/0
    4 root      20   0     0     0     0  S   0.0   0.0   0:00.35 kworker/0:0
    6 root      rt    0     0     0     0  S   0.0   0.0   0:00.00 migration/0
    7 root      rt    0     0     0     0  S   0.0   0.0   0:00.39 watchdog/0
    8 root      0 -20     0     0     0  S   0.0   0.0   0:00.00 cpuset
    9 root      0 -20     0     0     0  S   0.0   0.0   0:00.00 khelper
   10 root      20   0     0     0     0  S   0.0   0.0   0:00.00 kdevtmpfs
   11 root      0 -20     0     0     0  S   0.0   0.0   0:00.00 netns
   12 root      20   0     0     0     0  S   0.0   0.0   0:00.00 sync_supers
   13 root      0 -20     0     0     0  S   0.0   0.0   0:00.00 bdi-default
   14 root      0 -20     0     0     0  S   0.0   0.0   0:00.00 kintegrityd
   15 root      0 -20     0     0     0  S   0.0   0.0   0:00.00 kblockd

mint@mint ~ $ ls
Desktop Documents Downloads Music os Pictures Public Templates Videos
mint@mint ~ $

```

5. Using 'tar' command, compress your home directory in Linux.

```

Terminal
File Edit View Search Terminal Help
  2 root      20    0    0    0    0 S    0.0  0.0  0:00.00 kthreadd
  3 root      20    0    0    0    0 S    0.0  0.0  0:00.09 ksoftirqd/0
  4 root      20    0    0    0    0 S    0.0  0.0  0:00.35 kworker/0:0
  6 root      rt     0    0    0    0 S    0.0  0.0  0:00.00 migration/0
  7 root      rt     0    0    0    0 S    0.0  0.0  0:00.39 watchdog/0
  8 root      0 -20   0    0    0    0 S    0.0  0.0  0:00.00 cpuset
  9 root      0 -20   0    0    0    0 S    0.0  0.0  0:00.00 khelper
 10 root      20    0    0    0    0 S    0.0  0.0  0:00.00 kdevtmpfs
 11 root      0 -20   0    0    0    0 S    0.0  0.0  0:00.00 netns
 12 root      20    0    0    0    0 S    0.0  0.0  0:00.00 sync_supers
 13 root      20    0    0    0    0 S    0.0  0.0  0:00.00 bdi-default
 14 root      0 -20   0    0    0    0 S    0.0  0.0  0:00.00 kintegrityd
 15 root      0 -20   0    0    0    0 S    0.0  0.0  0:00.00 kblockd

mint@mint ~ $ ls
Desktop Documents Downloads Music os Pictures Public Templates Videos
mint@mint ~ $ tar -cvf f.gz os
os/
mint@mint ~ $ tar -cvf f.gz os
os/
os/test/
mint@mint ~ $ tar -xvf f.tar os
os/
os/test/
mint@mint ~ $

```

6. 'lsof' command to list all open files

```

Terminal
File Edit View Search Terminal Help
s/0
lsof      3279      mint    1u      CHR      136,0      0t0      3 /dev/pt
s/0
lsof      3279      mint    2u      CHR      136,0      0t0      3 /dev/pt
s/0
lsof      3279      mint    3r      DIR        0,3        0        1 /proc
lsof      3279      mint    4r      DIR        0,3        0 26208 /proc/3
279/fd
lsof      3279      mint    5w      FIFO       0,8        0t0 26213 pipe
lsof      3279      mint    6r      FIFO       0,8        0t0 26214 pipe
lsof      3280      mint    cwd     DIR        0,17       580 9673 /home/m
int
lsof      3280      mint    rtd     DIR        0,17       240 7465 /
lsof      3280      mint    txt     REG        7,0      161888 153576 /usr/bi
n/lsof
lsof      3280      mint    mem     REG        0,16    8748544 8820 /usr/li
b/locale/locale-archive
lsof      3280      mint    mem     REG        7,0    1730024 29580 /lib/i3
86-linux-gnu/libc-2.15.so
lsof      3280      mint    mem     REG        7,0    134376 29464 /lib/i3
86-linux-gnu/ld-2.15.so
lsof      3280      mint    4r      FIFO       0,8        0t0 26213 pipe
lsof      3280      mint    7w      FIFO       0,8        0t0 26214 pipe

mint@mint ~ $

```

7. Using the 'last' command, watch activity of 'mint' user in the system

```

File Edit View Search Terminal Help
lsuf 3280 mint txt REG 7,0 161888 153576 /usr/
n/lsuf
lsuf 3280 mint mem REG 0,16 8748544 8820 /usr/
b/locale/locale-archive
lsuf 3280 mint mem REG 7,0 1730024 29580 /lib/
86-linux-gnu/libc-2.15.so
lsuf 3280 mint mem REG 7,0 134376 29464 /lib/
86-linux-gnu/ld-2.15.so
lsuf 3280 mint 4r FIFO 0,8 0t0 26213 pipe
lsuf 3280 mint 7w FIFO 0,8 0t0 26214 pipe
mint@mint ~ $ last
mint pts/1 :0 Fri Jul 19 00:00 - 00:00 (00:00)
mint pts/0 :0 Fri Jul 19 00:00 still logged in
mint tty8 :0 Thu Jul 18 23:55 still logged in
mint tty1 Thu Jul 18 23:55 still logged in
mint tty6 Thu Jul 18 23:55 still logged in
mint tty2 Thu Jul 18 23:55 still logged in
mint tty4 Thu Jul 18 23:55 still logged in
mint tty3 Thu Jul 18 23:55 still logged in
mint tty5 Thu Jul 18 23:55 still logged in
reboot system boot 3.5.0-17-generic Thu Jul 18 23:55 - 00:29 (00:34)
wtmp begins Thu Jul 18 23:55:22 2019
mint@mint ~ $

```

8. Using the 'env' command, lists all the environment variables of your system. Use 'echo' command to print values of \$HOME and \$PATH

```

File Edit View Search Terminal Help
mint@mint ~ $ echo $HOME
/home/mint
mint@mint ~ $ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games
mint@mint ~ $ ps
  PID TTY          TIME CMD
 3096 pts/0    00:00:00 bash
 3295 pts/0    00:00:00 ps
mint@mint ~ $ ps -u
warning: bad ps syntax, perhaps a bogus '-'?
See http://gitotious.org/procps/procps/blobs/master/Documentation/FAQ
  PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
    mint   1978   0.0   0.2   6136   2436 tty5      S+   Jul18   0:00 -bash
    mint   1979   0.0   0.2   6136   2440 tty3      S+   Jul18   0:00 -bash
    mint   1980   0.0   0.2   6136   2432 tty4      S+   Jul18   0:00 -bash
    mint   1981   0.0   0.2   6136   2436 tty2      S+   Jul18   0:00 -bash
    mint   1982   0.0   0.2   6136   2432 tty6      S+   Jul18   0:00 -bash
    mint   2414   0.0   0.2   6136   2436 tty1      S+   Jul18   0:00 -bash
    mint   3096   0.0   0.2   6192   2584 pts/0    Ss   00:00   0:00 bash
    mint   3296   0.0   0.1   5208   1196 pts/0    R+   00:45   0:00 ps -u
mint@mint ~ $

```

9. The 'ps' command displays about processes running in the system. Try option -ax, -u.

```

mint@mint ~ $ echo $HOME
/home/mint
mint@mint ~ $ echo $path
mint@mint ~ $ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games
mint@mint ~ $ ps
  PID TTY          TIME CMD
 3096 pts/0    00:00:00 bash
 3295 pts/0    00:00:00 ps
mint@mint ~ $ ps -u
warning: bad ps syntax, perhaps a bogus '-'?
See http://git.kernel.org/procps/procps/blobs/master/Documentation/FAQ
  PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
    mint   1978   0.0   0.2   6136   2436 tty5      S+   Jul18   0:00 -bash
    mint   1979   0.0   0.2   6136   2440 tty3      S+   Jul18   0:00 -bash
    mint   1980   0.0   0.2   6136   2432 tty4      S+   Jul18   0:00 -bash
    mint   1981   0.0   0.2   6136   2436 tty2      S+   Jul18   0:00 -bash
    mint   1982   0.0   0.2   6136   2432 tty6      S+   Jul18   0:00 -bash
    mint   2414   0.0   0.2   6136   2436 tty1      S+   Jul18   0:00 -bash
    mint   3096   0.0   0.2   6192   2584 pts/0    Ss   00:00   0:00 bash
    mint   3296   0.0   0.1   5208   1196 pts/0    R+   00:45   0:00 ps -u
mint@mint ~ $

```

10. The 'kill' command can be used to terminate process. Using this command terminate some processes of your system

```

 2963 ?          S<l    0:00 /usr/bin/pulseaudio --start --log-target=syslog
 2965 ?          SNl    0:00 /usr/lib/rtkit/rtkit-daemon
 2971 ?          S      0:00 /usr/lib/pulseaudio/pulse/gconf-helper
 2973 ?          S      0:00 /usr/lib/i386-linux-gnu/gconf/gconfd-2
 2981 ?          Sl     0:07 nemo -n
 2982 ?          Sl     0:00 nm-applet
 2983 ?          Sl     0:00 /usr/lib/policykit-1-gnome/polkit-gnome-authenticat
 2988 ?          Sl     0:00 /usr/lib/gnome-settings-daemon/gnome-fallback-mount
 2995 ?          Sl     0:00 /usr/lib/dconf/dconf-service
 3013 ?          Sl     0:00 /usr/lib/gvfs/gvfs-udisks2-volume-monitor
 3016 ?          Sl     0:00 /usr/lib/udisks2/udisksd --no-debug
 3024 ?          Sl     0:00 /usr/lib/gvfs/gvfs-gphoto2-volume-monitor
 3028 ?          Sl     0:00 /usr/lib/gvfs/gvfs-afc-volume-monitor
 3045 ?          Sl     0:00 /usr/lib/gvfs/gvfsd-trash --spawner :1.11 /org/gtk/
 3057 ?          Sl     0:00 /usr/lib/gvfs/gvfsd-metadata
 3082 ?          Sl     0:00 gnome-screensaver
 3085 ?          Sl     0:02 gnome-terminal
 3095 ?          S      0:00 gnome-pty-helper
 3096 pts/0      Ss     0:00 bash
 3230 ?          Sl     0:00 file-roller /home/mint/f.tar
 3314 ?          Sl     0:00 gcalctool
 3318 pts/0      R+     0:00 ps -ax
mint@mint ~ $ kill 3314
mint@mint ~ $

```

11. 'ifconfig' command is used to show the configuration of internet on LINUX. Use this command to find IP and MAC address of your computer

```

Home
Edit View Go Bookmarks Help
Terminal
File Edit View Search Terminal Help
3314 ? Sl 0:00 gcalctool
3318 pts/0 R+ 0:00 ps -ax
mint@mint ~ $ kill 3314
mint@mint ~ $ ifconfig
eth0 Link encap:Ethernet HWaddr 00:0c:29:84:50:76
      inet addr:192.168.60.128 Bcast:192.168.60.255 Mask:255.255.255.0
      inet6 addr: fe80::20c:29ff:fe84:5076/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:727 errors:0 dropped:0 overruns:0 frame:0
      TX packets:133 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:46842 (46.8 KB) TX bytes:21722 (21.7 KB)
      Interrupt:19 Base address:0x2000

lo Link encap:Local Loopback
     inet addr:127.0.0.1 Mask:255.0.0.0
     inet6 addr: ::1/128 Scope:Host
     UP LOOPBACK RUNNING MTU:16436 Metric:1
     RX packets:8 errors:0 dropped:0 overruns:0 frame:0
     TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
     collisions:0 txqueuelen:0
     RX bytes:802 (802.0 B) TX bytes:802 (802.0 B)

mint@mint ~ $

```

12. Using the 'netstat' command, show the status of your network

```

root@kali:~# netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 kali:33244             151.101.38.49:https     ESTABLISHED
tcp        0      0 kali:56346             oscp-router01.gno:https ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags   Type       State       I-Node  Path
unix    2      [ ]     DGRAM      24469      /run/user/0/systemd/n
otify
unix    2      [ ]     DGRAM      19127      /run/user/131/systemd
/notify
unix    3      [ ]     DGRAM      14532      /run/systemd/notify
unix   18      [ ]     DGRAM      14542      /run/systemd/journal/
dev-log
unix    2      [ ]     DGRAM      14551      /run/systemd/journal/
syslog
unix    7      [ ]     DGRAM      14577      /run/systemd/journal/

```

13. Using the ping command, to ping your localhost

```

root@kali:~# ping localhost
PING localhost (::1) 56 data bytes
64 bytes from localhost (::1): icmp_seq=1 ttl=64 time=0.037 ms
64 bytes from localhost (::1): icmp_seq=2 ttl=64 time=0.050 ms
64 bytes from localhost (::1): icmp_seq=3 ttl=64 time=0.048 ms
64 bytes from localhost (::1): icmp_seq=4 ttl=64 time=0.052 ms
64 bytes from localhost (::1): icmp_seq=5 ttl=64 time=0.059 ms
64 bytes from localhost (::1): icmp_seq=6 ttl=64 time=0.065 ms
64 bytes from localhost (::1): icmp_seq=7 ttl=64 time=0.095 ms
64 bytes from localhost (::1): icmp_seq=8 ttl=64 time=0.106 ms
64 bytes from localhost (::1): icmp_seq=9 ttl=64 time=0.059 ms
64 bytes from localhost (::1): icmp_seq=10 ttl=64 time=0.041 ms

```



14. Create a group named 'student' using groupadd
15. Create a file named 'hello.txt'
16. Using the 'useradd' command create a user with your name in the group student
17. Change the owner of hello.txt to user you just created
18. Change the group owner of hello.txt to group student

```
root@kali:~# sudo groupadd std
root@kali:~# touch hello.txt
root@kali:~# ls
core      Documents  hello.txt  Pictures  Templates  Videos
Desktop   Downloads  Music      Public    Update.apk
root@kali:~# sudo useradd fazeel
root@kali:~# ls -l
total 1628
-rw----- 1 root root 1921024 Nov 11 13:13 core
drwxr-xr-x 4 root root  4096 Oct 22 09:36 Desktop
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Documents
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Downloads
-rw-r--r-- 1 root root    0 Nov 11 13:19 hello.txt
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Music
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Pictures
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Public
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Templates
-rw-r--r-- 1 root root 10087 Aug 31 07:40 Update.apk
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Videos
```

```
root@kali:~# chown fazeel hello.txt
root@kali:~# chgrp std hello.txt
root@kali:~# ls -l
total 1628
-rw----- 1 fazeel std 0 Nov 11 13:19 hello.txt
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Music
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Pictures
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Public
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Templates
-rw-r--r-- 1 root root 10087 Aug 31 07:40 Update.apk
drwxr-xr-x 2 root root  4096 Aug 30 14:30 Videos
```

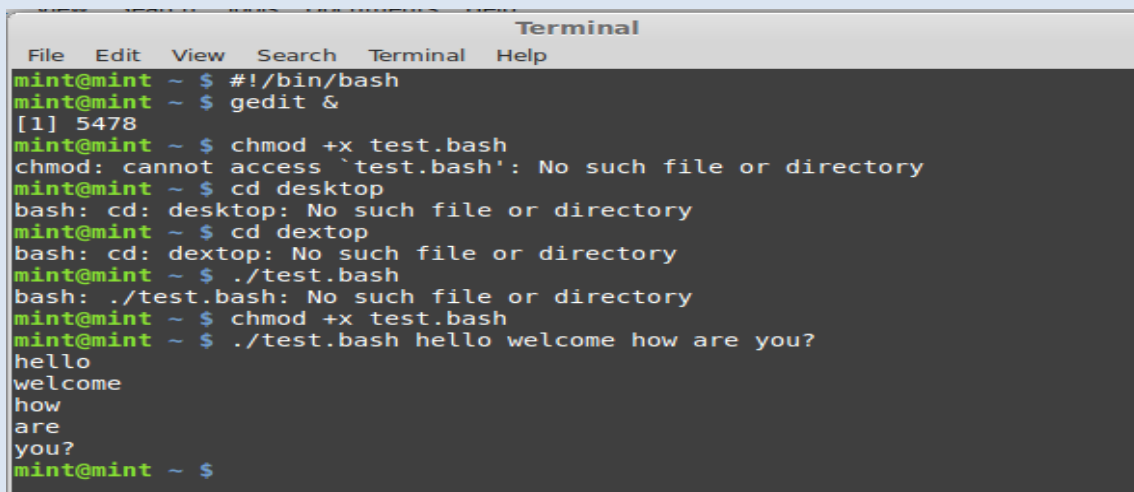
## To study and implement shell programming in Linux

### Instructions:

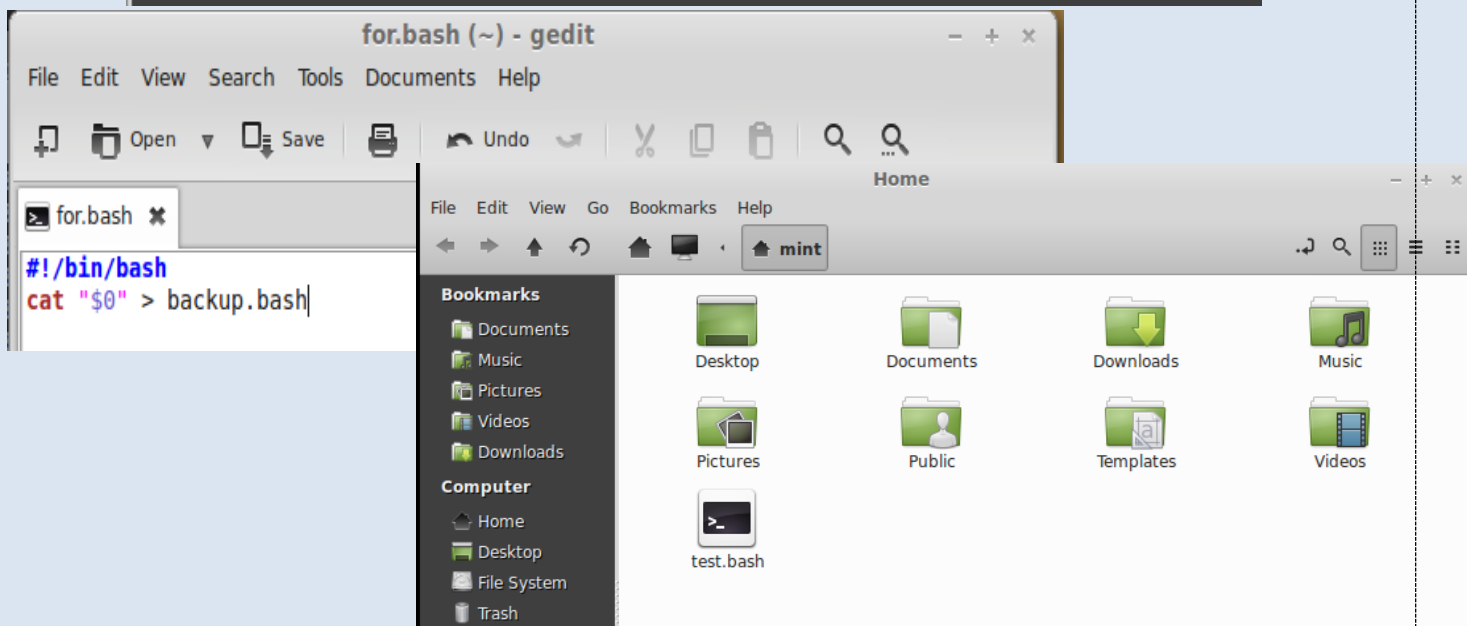
1. A shell script is a computer program designed to be run by the Unix shell, a command-line interpreter
2. The various dialects of shell scripts are considered to be scripting languages.
3. Typical operations performed by shell scripts include file manipulation, program execution, and printing text.

### Lab Tasks:

1. Write a script that backs itself up, that is, copies itself to a file named backup.sh.  
Hint: Use the cat command

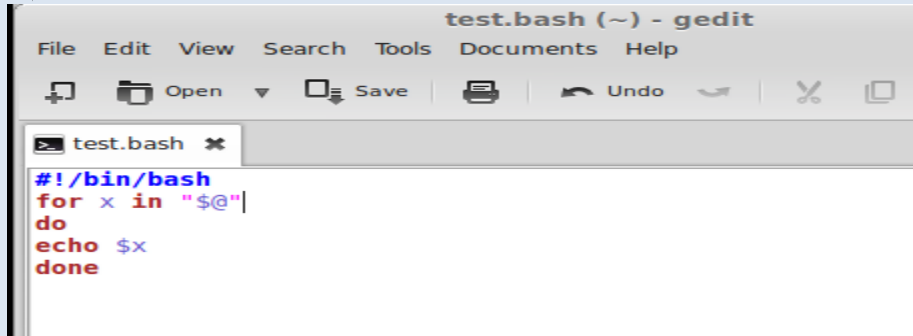


```
Terminal
File Edit View Search Terminal Help
mint@mint ~ $ #!/bin/bash
mint@mint ~ $ gedit &
[1] 5478
mint@mint ~ $ chmod +x test.bash
chmod: cannot access `test.bash': No such file or directory
mint@mint ~ $ cd desktop
bash: cd: desktop: No such file or directory
mint@mint ~ $ cd dextop
bash: cd: dextop: No such file or directory
mint@mint ~ $ ./test.bash
bash: ./test.bash: No such file or directory
mint@mint ~ $ chmod +x test.bash
mint@mint ~ $ ./test.bash hello welcome how are you?
hello
welcome
how
are
you?
mint@mint ~ $
```



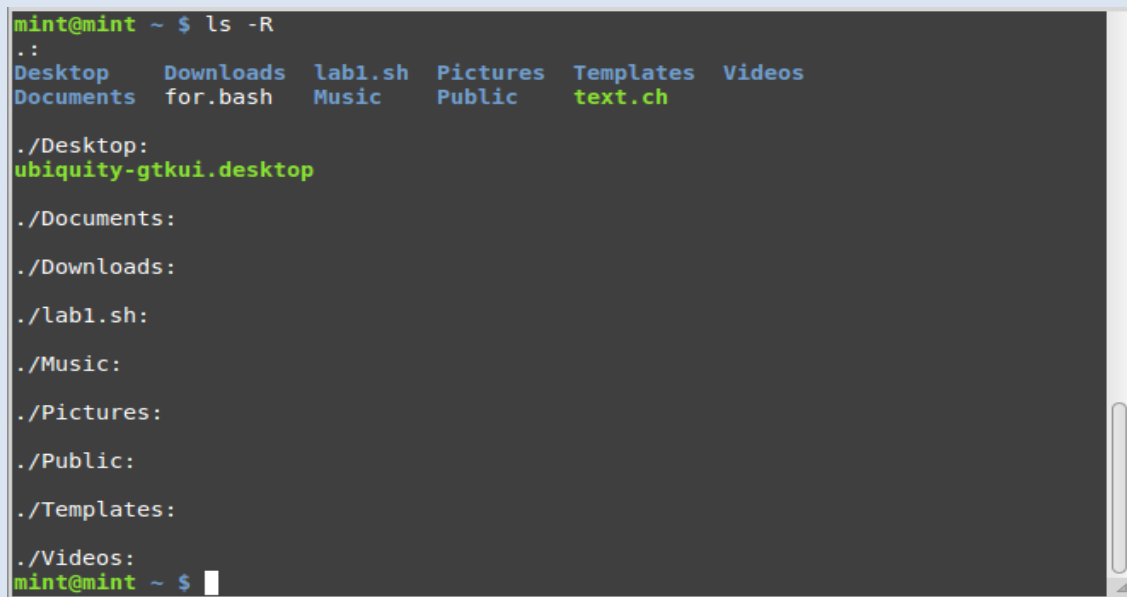
2. Write a script that echoes itself to stdout, but backwards.

Hint: Use the tac command



```
#!/bin/bash
for x in "$@"
do
echo $x
done
```

3. Perform a recursive directory listing on the user's home directory and save the information to a file.



```
mint@mint ~ $ ls -R
.:
Desktop  Downloads  lab1.sh  Pictures  Templates  Videos
Documents  for.bash  Music    Public    text.ch

./Desktop:
ubiquity-gtkui.desktop

./Documents:

./Downloads:

./lab1.sh:

./Music:

./Pictures:

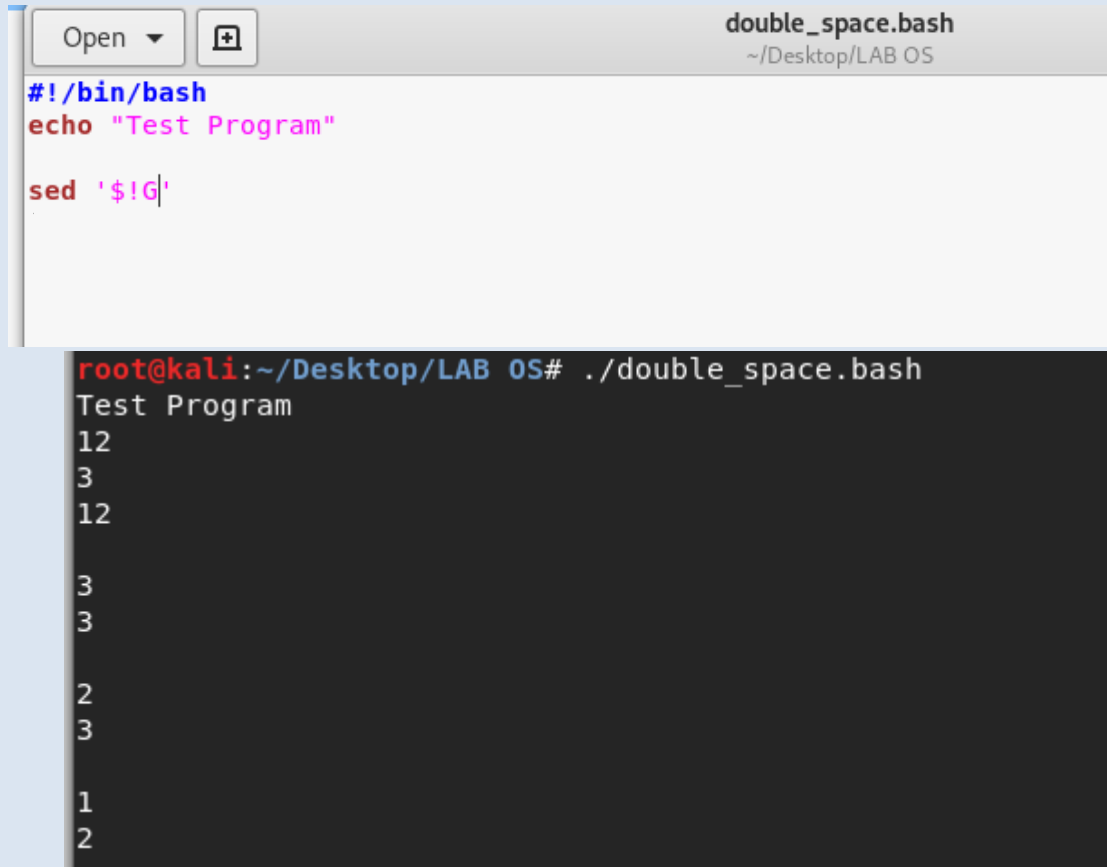
./Public:

./Templates:

./Videos:
mint@mint ~ $
```

4. Write a script that reads each line of a target file, then writes the line back to stdout, but with an extra blank line following. This has the effect of double-spacing the file.





```

double_space.bash
~/Desktop/LAB OS

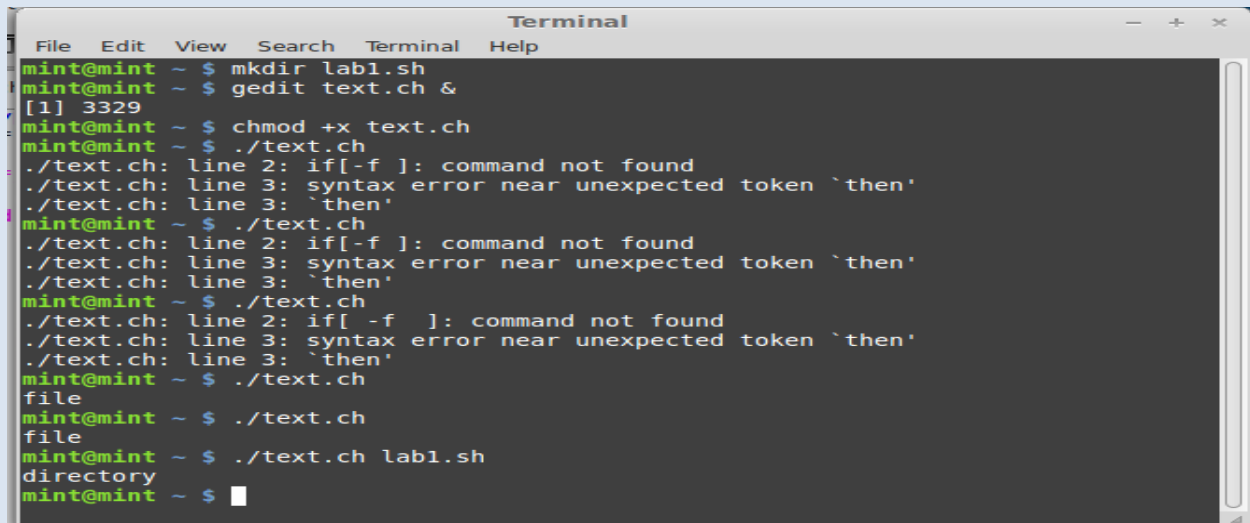
#!/bin/bash
echo "Test Program"

sed '$!G'

root@kali:~/Desktop/LAB OS# ./double_space.bash
Test Program
12
3
12
3
3
2
3
1
2

```

- Write a shell script that takes a command –line argument and reports on whether it is directory, a file

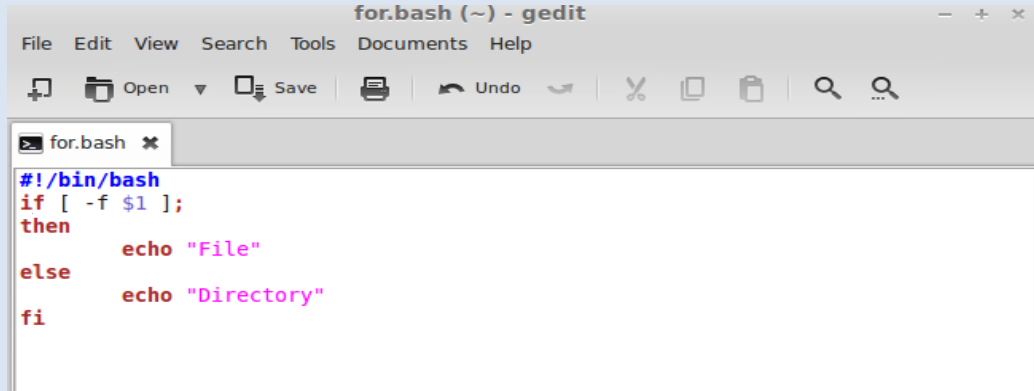


```

Terminal
File Edit View Search Terminal Help

mint@mint ~ $ mkdir lab1.sh
mint@mint ~ $ gedit text.ch &
[1] 3329
mint@mint ~ $ chmod +x text.ch
mint@mint ~ $ ./text.ch
./text.ch: line 2: if[-f ]: command not found
./text.ch: line 3: syntax error near unexpected token `then'
./text.ch: line 3: `then'
mint@mint ~ $ ./text.ch
./text.ch: line 2: if[-f ]: command not found
./text.ch: line 3: syntax error near unexpected token `then'
./text.ch: line 3: `then'
mint@mint ~ $ ./text.ch
./text.ch: line 2: if[-f ]: command not found
./text.ch: line 3: syntax error near unexpected token `then'
./text.ch: line 3: `then'
mint@mint ~ $ ./text.ch
file
mint@mint ~ $ ./text.ch
file
mint@mint ~ $ ./text.ch lab1.sh
directory
mint@mint ~ $

```



```
#!/bin/bash
if [ -f $1 ];
then
    echo "File"
else
    echo "Directory"
fi
```

6. Write a shell script program to display list of user currently logged in.

```
mint@mint ~ $ who
mint    tty2      2019-08-06 11:59
mint    tty4      2019-08-06 11:59
mint    tty5      2019-08-06 11:59
mint    tty3      2019-08-06 11:59
mint    tty6      2019-08-06 11:59
mint    tty1      2019-08-06 11:59
mint    tty8      2019-08-06 11:59 (:0)
mint    pts/0     2019-08-06 12:28 (:0)
```

7. Shell script program to count number of files in a Directory.

```
mint@mint ~ $ ls
Desktop  Downloads  lab1.sh  Pictures  Templates  Videos
Documents  for.bash  Music    Public    text.ch

mint@mint ~ $ wc -w\ text.ch
wc: invalid option -- '\'
Try 'wc --help' for more information.
mint@mint ~ $ wc -w text.ch
13 text.ch
mint@mint ~ $ -l text.ch
-l: command not found
mint@mint ~ $ wc -l text.ch
9 text.ch
mint@mint ~ $
```

```
mint@mint ~ $ ls | wc -w
11
mint@mint ~ $ ls
Desktop  Downloads  lab1.sh  Pictures  Templates  Videos
Documents  for.bash  Music    Public    text.ch
mint@mint ~ $ ./text.ch
11
mint@mint ~ $
```

## To study and implement concurrency control techniques in Java

Java provides the synchronized key word for implementing concurrency control while using multi-threaded applications. In this lab, you will learn how to implement these techniques.

### Instructions:

Create the following program in Java:

```
public class UnsynchronizedExample {  
    public static void main(String[] args) {  
        new PrintStringsThread("Hello ", "there.");  
        new PrintStringsThread("How are ", "you?");  
        new PrintStringsThread("Thank you ", "very much!");  
    }  
}
```

```
public class PrintStringsThread implements Runnable {
```

```
    Thread thread;  
    String str1, str2;
```

```
    PrintStringsThread(String str1, String str2) {  
        this.str1 = str1;  
        this.str2 = str2;  
        thread = new Thread(this);  
        thread.start();  
    }
```

```
    public void run() {  
        TwoStrings.print(str1, str2);  
    }
```

```
}
```

```
public class TwoStrings {
```

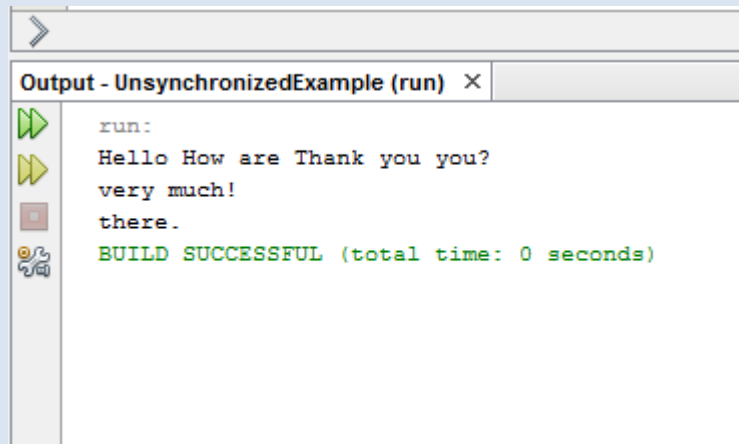
```
    // This method is not synchronized  
    static void print(String str1, String str2) {  
        System.out.print(str1);  
        try {  
            Thread.sleep(500);  
        } catch (InterruptedException ie) {  
        }  
        System.out.println(str2);  
    }
```

```
}
```

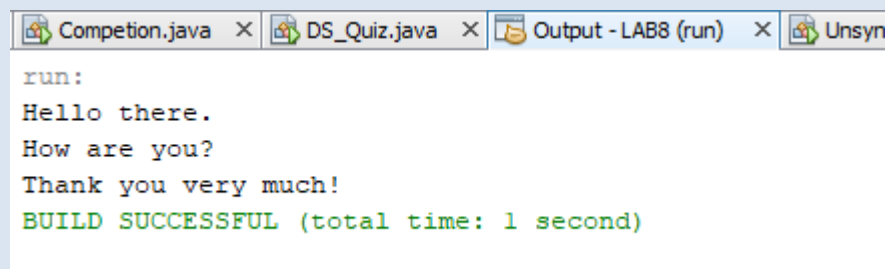
**Lab Tasks:**

1. What output do you see? Explain the output.
2. Now use the synchronized methods to display the desired result.
3. Now use the synchronized keyword on an object to synchronize.

## Output & Display ::

**Task 2 ::***Code ::*

```
public class TwoStrings {  
    static synchronized void print(String str1, String str2) {  
        System.out.print(str1);  
        try {  
            Thread.sleep(500);  
        } catch (InterruptedException ie) { }  
        System.out.println(str2);}  
}
```

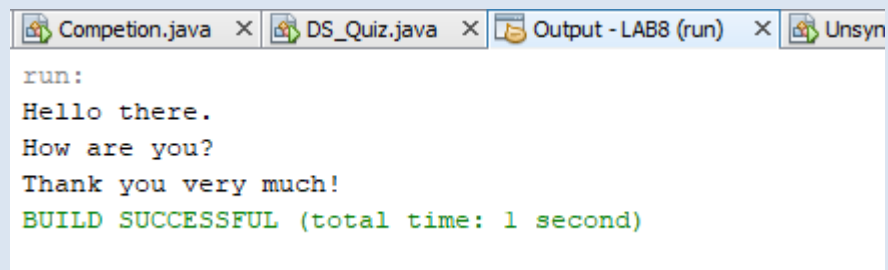
*Out Put Display*

## Task #3

### Scudo Code in Java ::

```
public class PrintStringsThread implements Runnable {  
  
    Thread thread;  
    String str1, str2;  
    static TwoStrings Printer=new TwoStrings();  
    PrintStringsThread (String str1, String str2) {  
        this.str1 = str1;  
        this.str2 = str2;  
        thread = new Thread(this);  
        thread.start();  
    }  
    @Override  
    public void run() {  
        synchronized(Printer){  
            Printer.print(str1, str2);  
        }  
    }  
}
```

### *Out Put Display*



## To study and implement process scheduling algorithms in Java

### Instructions:

In this lab, we will implement different CPU scheduling techniques.

### Lab Tasks

1. **Shortest Job First:** The number of processes and burst time is input from the user. The program should then print total access time, burst time and wait time for every process. Also print the average wait time.  
Hint: Sort the element based on their burst time
2. Simulate the First Come First Serve and Priority scheduling algorithm.

### Scudo Code in Java ::

```
package shortest.job;
import java.util.*;
/**
 *
 * @author Fazeel
 */
public class ShortestJob {
/**
 * @param args the command line arguments
 */
static Vector v = new Vector();
public static void main(String[] args) {
// TODO code application logic here
System.out.println("Enter number of processes: ");
Scanner s = new Scanner(System.in);
int n = s.nextInt();
for(int i=0;i<n;i++) {
System.out.println("Process " + i + " Burst Time: ");
process p = new process();
p.burst_time = s.nextInt();
v.add(p);
}
v.sort(new Comparator() {
public int compare(Object a, Object b) {
return ((process)a).burst_time - ((process)b).burst_time;
}
});
int c = 0 ;
```

```
for(int i=0;i<v.size();i++) {  
    ((process)v.get(i)).wait_time = c;  
    c+=((process)v.get(i)).burst_time;  
}  
  
System.out.println(v);  
}  
}
```

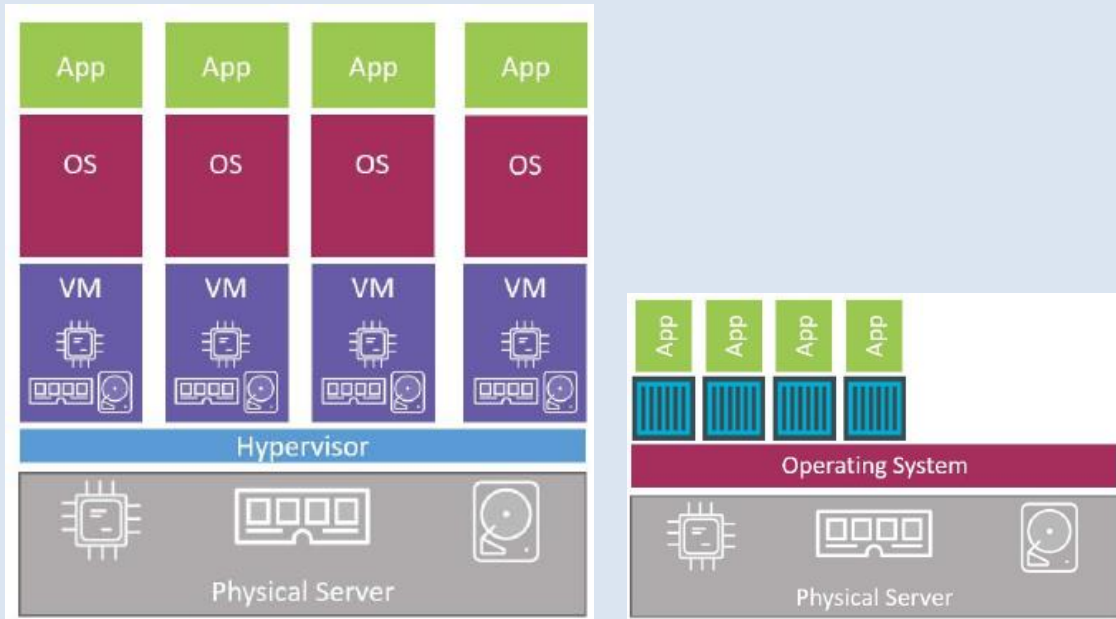
## OUTPUT :

```
run:  
Enter number of processes:  
5  
Process 0 Burst Time:  
21  
Process 1 Burst Time:  
45  
Process 2 Burst Time:  
78  
Process 3 Burst Time:  
12  
Process 4 Burst Time:  
32  
[0      12      0, 0    21      12, 0    32      33, 0    45      65, 0    78      110]  
BUILD SUCCESSFUL (total time: 13 seconds)
```

## To study and implement containers and dockers

### Instructions:

A container image is a lightweight, stand-alone, executable package of a piece of software that includes everything needed to run it: code, runtime, system tools, system libraries, settings.



The VM Approach

The container approach

Figure 10.1: The difference between container and VM approach

### Lab Tasks

#### *Docker commands*

1. Download and install the VMware toolbox for windows
2. List the images available on your system with command “docker image ls”.
3. Goto [dockerhub.com](https://dockerhub.com) and browse for repositories of alpine, python, tensorflow
4. Pull the repository of alpine using `docker pull alpine:latest`
5. Now list down the images again
6. Start a container using command `docker container run -it alpine:latest /bin/bash`
7. Run a `ps` command from inside of the container to list all running processes



8. Press Ctrl-PQ to exit the container without terminating it
9. You can see all running containers on your system using the docker container ls
10. Attach to the running container again with command “docker container exec -it vigilant\_borg bash” where vigilant\_borg is the name of your container
11. Press Ctrl-PQ again to exit the container
12. Stop the running container with command “docker container stop vigilant\_borg”.
13. Remove the container using command docker container rm vigilant\_borg

### Building docker images

14. Clone a repository using command “git clone <https://github.com/nigelpoulton/psweb.git>”
15. Change your directory using “cd psweb”
16. List the contents of the Dockerfile using “cat Dockerfile”
17. Build the docker image using “docker image build -t os:latest .”
18. Check to make sure that the new os:latest image exists on your host
19. Now run a container with the newly create image “docker container run -d --name web1 -p 8080:8080 os:latest”
20. Open a web browser and navigate to the DNS name or IP address of the host that you are running the container from and point it to port 8080. Well done. You’ve taken an application and containerized it (built a Docker image from it).

```

Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Windows\system32> docker image ls
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
PS C:\Windows\system32> docker image build -t kuba .
Sending build context to Docker daemon  924.2kB
Step 1/3 : FROM node:7
7: Pulling from library/node
ad74af05f5a2: Pull complete
2b83280b0eb: Pull complete
a9a5b35f6ead: Pull complete
3245b5a1c52c: Pull complete
afae05743392: Pull complete
4f0a9f216a1c: Pull complete
3f40ad2666bc: Pull complete
49c0ed396b49: Pull complete
Digest: sha256:a5622dca39a372ac031ef60c45a285eeba7bce9ee9ed66dad3a01e29ab8d
Status: Downloaded newer image for node:7
--> d9aed20b68a4
Step 2/3 : ADD app.js /app.js
--> 359fa53be316
Step 3/3 : ENTRYPOINT ["node", "app.js"]
--> Running in 3aaa3b9c741
Removing intermediate container 3aaa3b9c741
--> c3e7872f1581
Successfully built c3e7872f1581
SECURITY WARNING: You are building a Docker image from Windows against a non-Windows Docker host. All files and directories added to build context will have '-rwxr-xr-x' permissions. It is recommended to double check and reset permissions for sensitive files and directories.
PS C:\Users\7500\Desktop\OS> docker image ls
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
kuba                 latest             c3e7872f1581       About a minute ago  660MB
node                 7                  d9aed20b68a4       2 years ago        660MB

```

## Lab 11

### To study and setup a Kubernetes cluster

Kubernetes abstracts away the hardware infrastructure and exposes your whole datacenter as a single enormous computational resource. It allows you to deploy and run your software components without having to know about the actual servers underneath. When deploying a multi-component application through Kubernetes, it selects a server for each component, deploys it, and enables it to easily find and communicate with all the other components of your application.

#### Lab Tasks:

##### Setup

1. Install docker desktop from <http://www.dockerhub.com>
2. Next, download the kubectl from <https://kubernetes.io/>

##### Build an image:

3. Create a sample nodes.js server file (app.js)

```
const http = require('http');
const os = require('os');
console.log("Kubia server starting...");
var handler = function(request, response) { console.log("Received request from " + request.connection.remoteAddress);
response.writeHead(200);
response.end("You've hit " + os.hostname() + "\n"); };
var www = http.createServer(handler);
www.listen(8080);
```
4. Now create a docker file:

```
FROM node:7
ADD app.js /app.js
ENTRYPOINT ["node", "app.js"]
```
5. Now run the following command to build an image:  
`docker build -t kubia .`
6. Enable kubernetes on your system (it is available in System tray)
7. Switch the context of kubectl by running:  
`kubectl config use-context docker-for-desktop`

##### Getting details about nodes and cluster

8. Run the following command to check if your cluster is working: `kubectl cluster-info`
9. List all the nodes in your cluster: `kubectl get nodes`
10. To see more detailed information about an object, you can use the `kubectl describe` command

### Deploying an application

11. Deploy your application using the following command: `kubectl run kubia --image=luksa/kubia --port=8080 --generator=run/v1`
12. List all the pods using following command: `kubectl get pods`
13. Expose your replication controller using following command: `kubectl expose rc kubia --type=LoadBalancer --name kubia-http`
14. Now, list the services using: `kubectl get services`
15. Access your application from the listed URL.

### Replication controllers

16. Your pod is managed by a ReplicationController. See the replication controller with the following command: `kubectl get replicationcontrollers`
  17. Scale up the number of replicas of your pod with following command: `kubectl scale rc kubia --replicas=3`
  18. Now run the following command: `kubectl get rc`
  19. Run the following command to see number of pods: `kubectl get pods`
- For more details, run: `kubectl get pods -o wide`

## DISPLAY OUTPUT

```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Windows\system32> docker image ls
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
PS C:\Windows\system32> docker image build -t kubia .
unknown shorthand flag: 't' in -t
See 'docker image --help'.

Usage: docker image COMMAND

Manage images

Commands:
  build      Build an image from a Dockerfile
  history    Show the history of an image
  import     Import the contents from a tarball to create a filesystem image
  inspect    Display detailed information on one or more images
  load       Load an image from a tar archive or STDIN
  ls         List images
  prune      Remove unused images
  pull       Pull an image or a repository from a registry
  push       Push an image or a repository to a registry
  rm         Remove one or more images
  save       Save one or more images to a tar archive (streamed to STDOUT by default)
  tag        Create a tag TARGET_IMAGE that refers to SOURCE_IMAGE

Run 'docker image COMMAND --help' for more information on a command.

PS C:\Windows\system32> cd C:\Users\7500\Desktop\OS
PS C:\Users\7500\Desktop\OS> docker image build -t kubia .
Sending build context to Docker daemon 924.2MB
Step 1/3 : FROM node:7
7: Pulling from library/node
4d74a05f5a2: Pull complete
2b032b8bbe8b: Pull complete
a9a5b35f6ead: Pull complete
3245b5alc52e: Pull complete
4fa075743392: Pull complete
9fb9f21641cd: Pull complete
3f40ad2666bc: Pull complete
49c0ed396bd9: Pull complete
Digest: sha256:a5c2cd6dc3fa372ac831ef60c45a285eba7bce9ee9ed66dad3a01e29ab8d
Status: Downloaded newer image for node:7
----> d9aed20b68a4
Step 2/3 : ADD app.js /app.js
----> 359fab0e316
Step 3/3 : ENTRYPOINT ["node", "app.js"]
----> Running in 3aaae3b9c741
Removing intermediate container 3aaae3b9c741
----> c3e7872f1581
Successfully built c3e7872f1581
Successfully tagged kubia:latest
SECURITY WARNING: You are building a Docker image from Windows against a non-Windows Docker host. All files and directories added to build context will have '-rwxr-xr-x' permissions. It is recommended to double check and reset permissions for sensitive files and directories.
PS C:\Users\7500\Desktop\OS> docker image ls
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
kubia                latest              c3e7872f1581       About a minute ago  660MB
node                 7                   d9aed20b68a4       2 years ago        660MB
```

```

Administrator: Windows PowerShell
permissions for sensitive files and directories.
PS C:\Users\7500\Desktop\OS> docker image ls
REPOSITORY TAG IMAGE ID CREATED SIZE
kubia latest c3e702f1581 About a minute ago 660MB
node 7 d9aed20b68a4 2 years ago 660MB
PS C:\Users\7500\Desktop\OS> docker container run -d --name web1 -p 8080:8080 os:latest
Unable to find image 'os:latest' locally
C:\Program Files\Docker\Docker\Resources\bin\docker.exe: Error response from daemon: pull access denied for os, repository does not exist or may require 'docker login': denied: requested access to the resource is denied.
See 'C:\Program Files\Docker\Docker\Resources\bin\docker.exe run --help'.
PS C:\Users\7500\Desktop\OS> docker container run -d --name web1 -p 8080:8080 kubia
f3f6808164ae7743d4bc120e2eb17577719a10035920e5b2de4228999a7a249
PS C:\Users\7500\Desktop\OS> docker container ls
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
f3f6808164ae kubia "node app.js" 18 seconds ago Up 17 seconds 0.0.0.0:8080->8080/tcp web1
PS C:\Users\7500\Desktop\OS> kubectl cluster-info
To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
error: couldn't get version/kind; json parse error: json: cannot unmarshal string into Go value of type struct { APIVersion string "json:\apiVersion,omitempty\"; Kind string "json:\kind,omitempty\"; }
PS C:\Users\7500\Desktop\OS> kubectl get nodes
error: couldn't get version/kind; json parse error: json: cannot unmarshal string into Go value of type struct { APIVersion string "json:\apiVersion,omitempty\"; Kind string "json:\kind,omitempty\"; }
PS C:\Users\7500\Desktop\OS> kubectl describe
NAME STATUS ROLES AGE VERSION
docker-desktop Ready master 118s v1.14.8
PS C:\Users\7500\Desktop\OS> kubectl cluster-info
Kubernetes is running at https://kubernetes.docker.internal:6443
kubelet is running at https://kubernetes.docker.internal:6443/api/v1/namespaces/kube-system/services/kube-dns/proxy
To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
PS C:\Users\7500\Desktop\OS> kubectl describe command
error: the server doesn't have a resource type "command"
PS C:\Users\7500\Desktop\OS> kubectl describe
error: You must specify the type of resource to describe. Use "kubectl api-resources" for a complete list of supported resources.
PS C:\Users\7500\Desktop\OS> kubectl describe DockerFile
error: You must specify the type of resource to describe. Use "kubectl api-resources" for a complete list of supported resources.
PS C:\Users\7500\Desktop\OS> kubectl describe docker-desktop
error: the server doesn't have a resource type "docker-desktop"
PS C:\Users\7500\Desktop\OS> kubectl describe DockerFile
error: the server doesn't have a resource type "DockerFile"
PS C:\Users\7500\Desktop\OS> kubectl describe node docker-desktop
Name: docker-desktop
Roles: master
Labels: beta.kubernetes.io/arch=amd64
beta.kubernetes.io/os=linux
kubernetes.io/arch=amd64
kubernetes.io/hostname=docker-desktop
kubernetes.io/os=linux
node-role.kubernetes.io/master=
Annotations: kubeadm.alpha.kubernetes.io/cri-socket: /var/run/dockerhim.sock
node.alpha.kubernetes.io/ttl: 0
volumes.kubernetes.io/controller-managed-attach-detach: true
CreationTimestamp: Mon, 16 Dec 2019 16:36:35 +0500
Taints: <none>
Unschedulable: false
Conditions:
Type Status LastHeartbeatTime LastTransitionTime Reason Message
-----
MemoryPressure False Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletHasSufficientMemory kubelet has sufficient memory available
DiskPressure False Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletHasNoDiskPressure kubelet has no disk pressure
PIDPressure False Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletHasSufficientPID kubelet has sufficient PID available
Ready True Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletReady kubelet is posting ready status
Addresses:
InternalIP: 192.168.65.3
Hostname: docker-desktop
Capacity:
cpu: 2
ephemeral-storage: 61255652Ki
hugepages-1Gi: 0
hugepages-2Mi: 0
memory: 2027960Ki
pods: 110
Allocatable:
cpu: 2
ephemeral-storage: 56453208790
hugepages-1Gi: 0
hugepages-2Mi: 0
memory: 1925560Ki
pods: 110
System Info:
Machine ID: 95b6e422-c483-4d59-9d13-3f11f5c6d4d4
System UUID: AB60A92-AE72-3F41-8205-E005F5FEE8D0
Boot ID: 2e1c7f2b-2548-4541-bcf5-d05685629fd9
Kernel Version: 4.9.184-linuxkit
OS Image: Docker Desktop
Operating System: linux
Architecture: amd64
Container Runtime Version: docker://19.3.5
Kubelet Version: v1.14.8
Kube-Proxy Version: v1.14.8
Non-terminated Pods: (9 in total)
Namespace Name CPU Requests CPU Limits Memory Requests Memory Limits AGE
-----
docker compose-6c6d745f6-c4bv 0 (0%) 0 (0%) 0 (0%) 0 (0%) 3m26s
docker compose-api-57ff65b8c7-6xgp 0 (0%) 0 (0%) 0 (0%) 0 (0%) 3m27s
kube-system coredns-6dcd8c9d9c-wp9nb 100m (5%) 0 (0%) 70Mi (3%) 170Mi (8%) 4m26s
kube-system etcd-docker-desktop 0 (0%) 0 (0%) 0 (0%) 0 (0%) 3m12s
kube-system kube-apiserver-docker-desktop 250m (12%) 0 (0%) 0 (0%) 0 (0%) 3m28s
kube-system kube-controller-manager-docker-desktop 200m (10%) 0 (0%) 0 (0%) 0 (0%) 3m37s
kube-system kube-proxy-ragp 0 (0%) 0 (0%) 0 (0%) 0 (0%) 4m26s
kube-system kube-scheduler-docker-desktop 100m (5%) 0 (0%) 0 (0%) 0 (0%) 3m13s
Allocated resources:
(Total limits may be over 100 percent, i.e., overcommitted.)
Resource Requests Limits
-----
cpu 750m (37%) 0 (0%)
memory 140Mi (7%) 340Mi (18%)
ephemeral-storage 0 (0%) 0 (0%)
Events:
Type Reason Age From Message
-----
Normal Starting 4m41s kubelet, docker-desktop Starting kubelet.
Normal NodeHasSufficientMemory 4m40s (x8 over 4m40s) kubelet, docker-desktop Node docker-desktop status is now: NodeHasSufficientMemory
Normal NodeHasNoDiskPressure 4m40s (x8 over 4m40s) kubelet, docker-desktop Node docker-desktop status is now: NodeHasNoDiskPressure

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Administrator: Windows PowerShell
Type Status LastHeartbeatTime LastTransitionTime Reason Message
-----
MemoryPressure False Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletHasSufficientMemory kubelet has sufficient memory available
DiskPressure False Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletHasNoDiskPressure kubelet has no disk pressure
PIDPressure False Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletHasSufficientPID kubelet has sufficient PID available
Ready True Mon, 16 Dec 2019 16:41:06 +0500 Mon, 16 Dec 2019 16:36:34 +0500 KubeletReady kubelet is posting ready status
Addresses:
InternalIP: 192.168.65.3
Hostname: docker-desktop
Capacity:
cpu: 2
ephemeral-storage: 56453208790
hugepages-1Gi: 0
hugepages-2Mi: 0
memory: 1925560Ki
pods: 110
Allocatable:
cpu: 2
ephemeral-storage: 56453208790
hugepages-1Gi: 0
hugepages-2Mi: 0
memory: 1925560Ki
pods: 110
System Info:
Machine ID: 95b6e422-c483-4d59-9d13-3f11f5c6d4d4
System UUID: AB60A92-AE72-3F41-8205-E005F5FEE8D0
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Architecture: amd64
Container Runtime Version: docker://19.3.5
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Namespace Name CPU Requests CPU Limits Memory Requests Memory Limits AGE
-----
docker compose-6c6d745f6-c4bv 0 (0%) 0 (0%) 0 (0%) 0 (0%) 3m26s
docker compose-api-57ff65b8c7-6xgp 0 (0%) 0 (0%) 0 (0%) 0 (0%) 3m27s
kube-system coredns-6dcd8c9d9c-wp9nb 100m (5%) 0 (0%) 70Mi (3%) 170Mi (8%) 4m26s
kube-system etcd-docker-desktop 0 (0%) 0 (0%) 0 (0%) 0 (0%) 3m12s
kube-system kube-apiserver-docker-desktop 250m (12%) 0 (0%) 0 (0%) 0 (0%) 3m28s
kube-system kube-controller-manager-docker-desktop 200m (10%) 0 (0%) 0 (0%) 0 (0%) 3m37s
kube-system kube-proxy-ragp 0 (0%) 0 (0%) 0 (0%) 0 (0%) 4m26s
kube-system kube-scheduler-docker-desktop 100m (5%) 0 (0%) 0 (0%) 0 (0%) 3m13s
Allocated resources:
(Total limits may be over 100 percent, i.e., overcommitted.)
Resource Requests Limits
-----
cpu 750m (37%) 0 (0%)
memory 140Mi (7%) 340Mi (18%)
ephemeral-storage 0 (0%) 0 (0%)
Events:
Type Reason Age From Message
-----
Normal Starting 4m41s kubelet, docker-desktop Starting kubelet.
Normal NodeHasSufficientMemory 4m40s (x8 over 4m40s) kubelet, docker-desktop Node docker-desktop status is now: NodeHasSufficientMemory
Normal NodeHasNoDiskPressure 4m40s (x8 over 4m40s) kubelet, docker-desktop Node docker-desktop status is now: NodeHasNoDiskPressure

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Administrator: Windows PowerShell

Resource      Requests      Limits
-----
cpu           750m (37%)    0 (0%)
memory       140Mi (7%)    340Mi (18%)
ephemeral-storage 0 (0%)        0 (0%)

Events:
Type Reason      Age      From      Message
----
Normal Starting    4m41s    kubelet, docker-desktop    Starting kubelet.
Normal NodeHasSufficientMemory 4m40s (x8 over 4m40s) kubelet, docker-desktop    Node docker-desktop status is now: NodeHasSufficientMemory
Normal NodeHasNoDiskPressure 4m40s (x8 over 4m40s) kubelet, docker-desktop    Node docker-desktop status is now: NodeHasNoDiskPressure
Normal NodeHasSufficientPID 4m40s (x7 over 4m40s) kubelet, docker-desktop    Node docker-desktop status is now: NodeHasSufficientPID
Normal NodeAllocatableEnforced 4m40s    kubelet, docker-desktop    Updated Node Allocatable limit across pods
Normal Starting    4m25s    kube-proxy, docker-desktop    Starting kube-proxy.

PS C:\Users\7500\Desktop\OS> kubectl run kubia --image=kubia --port=8080 --generator=run/v1

PS C:\Users\7500\Desktop\OS> kubectl run kubia2 --image=kubia --port=8080 --generator=run/v1
kubectl run --generator=run/v1 is DEPRECATED and will be removed in a future version. Use kubectl run --generator=run-pod/v1 or kubectl create instead.
replicationcontroller/kubia2 created
PS C:\Users\7500\Desktop\OS> kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
kubia2-spxzv  0/1     ImagePullBackOff  0           24s
PS C:\Users\7500\Desktop\OS> kubectl expose rc kubia --type=LoadBalancer --name kubia-http
Error from server (NotFound): replicationcontrollers "kubia" not found
PS C:\Users\7500\Desktop\OS> kubectl expose rc kubia2 --type=LoadBalancer --name kubia2-http
service/kubia2-http exposed
PS C:\Users\7500\Desktop\OS> docker container ls
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS          NAMES
f3f6808164ae   kubia      "node app.js"           20 minutes ago Up 20 minutes 0.0.0.0:8080->8080/tcp   web1
PS C:\Users\7500\Desktop\OS> docker container stop f3f6808164ae
f3f6808164ae
PS C:\Users\7500\Desktop\OS> docker container ls
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS          NAMES
f3f6808164ae   kubia      "node app.js"           20 minutes ago Up 20 minutes 0.0.0.0:8080->8080/tcp   web1
PS C:\Users\7500\Desktop\OS> kubectl get services
NAME          TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)          AGE
kubernetis   ClusterIP     10.96.0.1    <none>         443/TCP          12m
kubia2-http   LoadBalancer 10.100.64.193 localhost     8080:30635/TCP   2m23s

```