



**Karunya INSTITUTE OF TECHNOLOGY AND SCIENCES**

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## **DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

### **LABORATORY RECORD**

**2020-2021**

**Subject Code**

**18CS2064**

**Subject Name**

**Open Source Technologies Lab**

**Register No. \_\_\_\_\_URK17CS053\_\_\_\_\_**

It is hereby certified that this is the bonafide record of work done by Battula Eliza Shunemi during the Even Semester of the academic year **2020-2021** and submitted for the University Practical Examination held on **24/11/2020**.

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### **LIST OF EXPERIMENTS**

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<b>Ex. No</b>	<b>DATE</b>	<b>TITLE</b>
1	18.08.2020	ADVANCED LINUX COMMANDS
2	25.08.2020	KERNEL CONFIGURATION AND COMPIRATION
3	29.08.2020	COMPILING FROM THE SOURCE
4	01.09.2020	VIRTUALIZATION
5	08.09.2020	PACKAGE MANAGEMENT SYSTEM
6	22.09.2020	REPOSITORY IN GITHUB
7	06.10.2020	BASIC PYTHON PROGRAMMING
8	03.11.2020	BASIC PERL PROGRAMS
9	10.11.2020	FUNDAMENTAL OPERATIONS USING PERL
10	17.11.2020	KERNEL INSTALLATION

**Ex 1**

## ADVANCED LINUX COMMANDS

**Date: 18.08.20**

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### Aim:

To study and implement the Linux commands

### Description:

Sl. No.	Command Name	Meaning	options
1.	<b>ls</b>	List files and/or directories.	-a, --all do not ignore entries starting with. -A, --almost-all do not list implied. and. --author with -l, print the author of each file -b, --escape print C-style escapes for nongraphic characters  --block-size=SIZE
2.	<b>Who am i</b>	This command reveals the user who is currently logged in.	-a, --all =same as -b -d --login -p -r -t -T -u -b, --boot time of last system boot -d, --dead print dead processes -H, --heading print line of column headings -l, --login print system login processes --lookup attempt to canonicalize hostnames via DNS

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3.	<b>pwd</b>	prints the absolute path to the current working directory	<ul style="list-style-type: none"> <li>-L, --logical use PWD from the environment, even if it contains symlinks</li> <li>-P, --physical avoid all symlinks</li> </ul>
4.	<b>cal</b>	Displays the calendar of the current month	<ul style="list-style-type: none"> <li>-1, --one Display single month output. (This is the default.)</li> <li>-3, --three Display prev/current/next month output.</li> <li>-s, --Sunday Display Sunday as the first day of the week.</li> <li>-m, --Monday Display Monday as the first day of the week.</li> <li>-j, --Julian Display Julian dates (days one-based, numbered from January 1).</li> <li><u>-y, --year</u></li> </ul>
5.	<b>echo</b>	This command will echo whatever you provide it.	<ul style="list-style-type: none"> <li>-n do not output the trailing newline</li> <li>-e enable interpretation of backslash escapes</li> <li>-E disable the interpretation of backslash escapes (default)</li> </ul>

6.	<b>date</b>	Displays current time and date.	-d, --date=STRING display time described by STRING, not 'now'  -f, --file=DATEFILE like --date once for each line of DATAFILE
7.	<b>tty</b>	Displays the current terminal.	
8.	<b>id</b>	This command prints user and groups (UID and GID) of the current user.	-a ignore, for compatibility with other versions  -Z, --context print only the security context of the current user  -g, --troupe print only the effective group ID  -G, --groups print all group IDs  -n, --name print a name instead of a number, for -ugG
9.	<b>clear</b>	This command clears the screen.	
10.	<b>man</b>	To show manual page	
11.	<b>cd</b>	Change the current working directory to the directory provided as an argument.	

12.	<b>mkdir</b>	To create a directory, the 'mkdir' command is used.	
13.	<b>touch</b>	For creating an empty file, use the touch command.	
14.	<b>cp</b>	Copy files and directories	
15.	<b>mv</b>	Move files or directories. The 'mv' command works like 'cp' command, except that the original file is removed. But, the mv command can be used to rename the files (or directories).	
16.	<b>rmdir</b>	the command removes any empty directories, but cannot delete a directory if a file is present in it.	
17.	<b>file</b>	The file command determines the file type of a given file.	
18.	<b>cat</b>	The 'cat' command is actually a concatenator but can be used to view the contents of a file.	
19.	<b>head</b>	Displays the first few lines of a file. By default, the 'head' command displays the first 10 lines of a file.	
20.	<b>tail</b>	the 'tail' command shows the last 10 lines by default	<ul style="list-style-type: none"> <li>-c, --bytes=[-]K print the first K bytes of each file</li> <li>-n, --lines=[-]K print the first K lines instead of the first 10</li> <li>-q, --quiet, --silent never print headers giving file names</li> </ul>

21.	<b>wc</b>	This command counts lines, words, and letters of the input given to it.	
22.	<b>grep</b>	The ‘grep’ command searches for a pattern in a file (or standard input).	
23.	<b>vi</b>	Visual editor	
24.	<b>alias</b>	The ‘alias’ is another name for a command.	
25.	<b>history</b>	shows the commands you have entered on your terminal so far.	
26.	<b>passwd</b>	To change your password	
27.	<b>help</b>	With almost every command, ‘--help’ option shows usage summary for that command.	
28.	<b>chmod</b>	The <i>chmod</i> command lets you change access permissions for a file.	
29.	<b>stat</b>	To check the status of a file. This provides more detailed information about a file than ‘ls -l’ output.	<ul style="list-style-type: none"> <li>-L, --dereference follow links</li> <li>-f, --file-system display file system status instead of file status</li> <li>-c --format=FORMAT use the specified FORMAT instead of the default; output a newline after each use of FORMAT</li> <li>--printf=FORMAT</li> </ul>
30.	<b>ln</b>	The ln command is used in Linux to create links.	

## Exercise

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## **1. List the contents of user's home directory including the hidden files**

```
lurk17cs053$code ~\$ ls -a
. add8.c ap2.c array3.cpp compilerexp9.y exp.txt phonecalls.cpp shuni13.c7 shuni9.c unix8 2.c
. addc.c ap2.y array4.cpp complex fact.sh power.cpp shuni14.c shuni.txt unix8 3.c
. add3.c ap30.c arithematic.cpp compilerexp9.y config fib.sh .power.cpp swp shuni15.c smaple.txt unix9 1.c
. add7.c ap31.c arithematic.cpp save .config friendclass.cpp q1_2.sh shuni16.c static .unix9_1.c.swo
\ 1101.cpp addmatrix.cpp ap32.c .arun d1.cpp friendfunc.cpp q1_1.sh shuni17.c string2.cpp .unix9_1.c.swp
1103.cpp amount.cpp ap33.c .arun d2.cpp inheritance2.cpp q2_2.sh shuni18.c .string2.cpp.swp unix9a 1.c
. 1103.c amount.appp ap33.c .arun d3.cpp inheritance4.cpp q3_3.sh shuni19.c string4.cpp unix9a 2.c
. 31.h a.out ap34.c .amr.cpp d3.cpp .config k5login q3_4.sh shuni19.c.save string9.cpp unix9b 1.c
. 32.h ap11.c ap35.c .bash_history d3.cpp.save d4.cpp length.cpp q3_5.sh shuni11.c structures.cpp unix7 1.c
. 33.h ap12.c ap36.c .bash_logout d4.cpp lex.yy.c q4_1.sh shuni20.c studinfo unix7 2.c
. 34.h ap13.c ap37.c .bash_profile demo0.sh marks.cpp q6_2.sh shuni21.c sub users.txt
. 35.h ap14.c ap38.c .bashrc demo1.sh matrix sal.cpp shuni22.c swap.cpp v6.cpp
. 41.h ap17.c ap40.c bmi demo.sh matrix.cpp sample shuni23.c template.cpp .vminfo
. 51.h ap18.c ap41.c .diri shuni24.c test.cpp virtual1.cpp
. 52.h ap19.c ap42.c books.txt .diri matirxoperator.cpp sample1 shuni24.c test.cpp.save virtual2.cpp
. 51..sh.swn ap43.c borrowed.txt .diri matirxoperator.cpp sample10 shuni25.c test1.txt virtual3.cpp
. 52..sh.swn ap44.c call.txt .diri matirxoperator.cpp sample2 shuni26.c text1.txt virtual4.cpp.swm
. 52..sh.swn ap45.c .diri matirxoperator.cpp sample3 shuni27.c text2.txt virtual5.cpp.swm
. 62.h ap21.c cal.sh distance.cpp occurrence.cpp sample4.txt shuni28.c todohistory.txt virtual6.cpp.swn
. 62..sh.swn ap46.c class1.cpp.swp dogare.cpp occurrence.cpp sample5.txt shuni3a.c total virtual6.cpp.swo
. 63..sh.swn ap23.c ap47.c classname electricitybill.cpp operators series.sh shuni3.c univ1 1.c vowel.cpp
. 64..sh.swn ap24.c ap49.c compare2.cpp .diri operators.cpp shun shuni3.c univ1 1.c.save vowel?2.c
. 65..sh.swn ap25.c ap4c .diri operators.cpp shuni3.c.univ1 1.c.univ1 1.c.save vowel?2.c
. 66..sh.swn ap26.c ap5c comparefunc.cpp emacs overloading4.cpp shuni shuni4.c univ1 1.c.univ1 1.c.save vowel?2.c
. 67..sh.swn ap27.c ap6c compilerexp1.cpp exp7a.txt overloading4.cpp.swp shuni10.c shuni5.c univ1 1.c.univ1 1.c.save vowel?2.c
. 68..sh.swn add10..c ap28.c array1.cpp compilerexp1.cpp.save exp7b.txt overloading5.cpp shuni11.c shuni6.c univ1 1.c.univ1 1.c.save vowel?2.c
. 69..sh.swn add17..c ap29.c array2.cpp compilerexp4.i exp7c.txt pl.cpp shuni12.c shuni7.c word.txt
. 70..sh.swn add17..c ap29.c array2.cpp compilerexp4.i exp7c.txt pl.cpp.save shuni13.c shuni8.c univ8 1..c y.tab.c

lurk17cs053$code ~\$
```

## **2. List the content of /var directory?**

```
[urk17cs053@code ~]$ ls
```

### **3. Create two directories named dir1 & dir2**

```
[urk17cs053@code ~] $ mkdir dir7 dir8  
[urk17cs053@code ~] $ █
```

#### 4. Create a hidden directory with your name?

```
[urk17cs053@code ~]$ mkdir shuni53 .shuni53  
[urk17cs053@code ~]$ █
```

```
[urk17cs053@code ~]$ ls -a
urk17cs053@code ~]$ ls -a
. ap06.c ap09.c .class1.cpp.swp dir7 matrix.cpp qf_2.sh shunli1.c string2.cpp unix9_1.c
add10.c ap07.c ap4.c classmate dir8 matrixoperator.cpp sal.cpp shunli20.c string32.cpp.swp unix9_1.c.swp
add11.c ap28.c ap5.c compare2.cpp distance.cpp mult.cpp sample shunli21.c string19.cpp unix9_1.c
add11.c ap29.c ap6.c compare2.cpp.save dogcare.cpp newsample.txt sample10 shunli22.c string9.cpp unix9a_1.c
l101.cpp add3.c ap2.c array1.cpp comparefunc.cpp electricitybill.cpp occurrence.cpp sample2 shunli23.c structures.cpp unix9a_2.c
l103.cpp add7.c ap2.y array2.cpp compilerrexpi.cpp occurrence.cpp sample3.sh shunli24.c studinfo unix9b_1.c
31.sh addmatrixtrix.cpp ap30.c ap3.y compilerrexpi.cpp.save _electricitybill.cpp occurrence.cpp sample4.sh sub unix7_1.c
32.sh amount.cpp ap31.c aparray4.cpp compilerrexpi4.1 _emacs operators sample.txt shunli25.c swap.cpp unix7_2.c
ap11.c ap32.c arithematic.cpp compilerrexpi9.y exp4a.txt operators.cpp sample.txt shunli26.c template.cpp users.txt
33.sh ap33.c ap34.c ap35.c arithematic.cpp.save complex exp7b1.txt operator1.cpp sample.txt shunli27.c
34.sh ap12.c ap34.c ap35.c arith .exp10.txt operator2.cpp sample.txt shunli28.c
35.sh ap13.c ap35.c arith .exp11.txt operator3.cpp sample.txt shunli29.c
41.sh ap14.c ap36.c atm.cpp d1.cpp exp7c.txt operator4.cpp sample.txt shunli30.c
41.sh ap14.c ap36.c atm.cpp d2.cpp fact.sh .overloading1.cpp sample.txt shunli31.c
51.sh ap16.c ap37.c .bash_history d3.cpp fib.sh .overloading2.cpp sample.txt shunli32.c
51.sh ap17.c ap39.c .bash_logout d3.cpp phonecalls.cpp sample.txt shunli33.c
51..sh ap18.c ap3.c bash_profile d3.cpp.save friendclass.cpp power.cpp shunli34.c
ap2..sh ap19.c ap40.c .bashrc d4.cpp friendinc.cpp power.cpp sample.txt shunli35.c
ap2..sh ap20.c ap41.c kmn demo0.sh inheritance2.cpp power.cpp shunli36.c
ap2..sh ap20.c ap42.c kmn1.c demo1.sh inheritance3.cpp power.cpp shunli37.c
46..sh.swp ap21.c ap43.c kmn?.2? demo2.sh inheritance4.cpp qf_1.sh shunli38.c
ap22.c ap44.c books.txt dir1 k5login qf_2.sh shunli39.c
a1 ap23.c ap45.c borrowed.txt dir2 length.y.c qf_3.sh shunli40.c
a2 ap23.c ap45.c borrowed.txt dir2 lex.yy.c qf_4.sh shunli41.c
a2..c ap24.c ap46.c call.txt dir53 marks.cpp qf_5.sh shunli42.c
a3 ap25.c ap47.c cal.sh dir55 matrix qf_1.sh shunli43.c
[urk17cs053@code ~]$
```

## **5. Display the content of a hidden directory.**

```
[urk17cs053@code ~]$ cd .shuni53  
[urk17cs053@code .shuni53]$ ls  
file1.txt.save
```

## 6. Display the calendar of 2020.

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[urk17cs053@code .shuni53]\$ cal 2020											
2020											
<b>January</b>				<b>February</b>				<b>March</b>			
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th
5	6	7	8	9	10	11	2	3	4	5	6
12	13	14	15	16	17	18	9	10	11	12	13
19	20	21	22	23	24	25	16	17	18	19	20
26	27	28	29	30	31		23	24	25	26	27
<b>April</b>				<b>May</b>				<b>June</b>			
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th
5	6	7	8	9	10	11	3	4	5	6	7
12	13	14	15	16	17	18	10	11	12	13	14
19	20	21	22	23	24	25	17	18	19	20	21
26	27	28	29	30			24	25	26	27	28
<b>July</b>				<b>August</b>				<b>September</b>			
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th
5	6	7	8	9	10	11	2	3	4	5	6
12	13	14	15	16	17	18	9	10	11	12	13
19	20	21	22	23	24	25	16	17	18	19	20
26	27	28	29	30	31		23	24	25	26	27
<b>October</b>				<b>November</b>				<b>December</b>			
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th
4	5	6	7	8	9	10	1	2	3	4	5
11	12	13	14	15	16	17	8	9	10	11	12
18	19	20	21	22	23	24	15	16	17	18	19
25	26	27	28	29	30	31	22	23	24	25	26
29	30						27	28	29	30	31

7. Copy the file /etc/passwd file to current directory with sample.txt as the filename

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```
[urk17cs053@code ~]$ cat /etc/passwd > sample.txt
[urk17cs053@code ~]$ cat sample.txt
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
games:x:12:100:games:/usr/games:/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin
nobody:x:99:99:Nobody:/sbin/nologin
systemd-network:x:192:192:systemd Network Management:/sbin/nologin
dbus:x:81:81:System message bus:/sbin/nologin
polkitd:x:999:998:User for polkitd:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin
postfix:x:89:89:/var/spool/postfix:/sbin/nologin
chrony:x:998:996:/var/lib/chrony:/sbin/nologin
ntp:x:38:38:/etc/ntp:/sbin/nologin
tss:x:59:59:Account used by the trousers package to sandbox the tcscd daemon:/dev/null:/sbin/nologin
nginx:x:997:995:Nginx web server:/var/lib/nginx:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
nfsnobody:x:65534:65534:Anonymous NFS User:/var/lib/nfs:/sbin/nologin
[urk17cs053@code ~]$ █
```

## 8. Create a file test1.txt using Vim editor with the following contents to it

Name	RegNo	ResearchInterest
Melvin	07af501	GridComputing
Mithin	07af502	ClusterComputing
James	07af503	ImageProcessing
Jane	07af504	Networking
Caroline	07af505	ClusterComputing
Binu	07af506	GridComputing
Aaron	07af507	ImageProcessing
Selvin	07af508	Networking
Jerwin	07af509	WirelessNetworks
Arun	07af510	GridComputing

## Answer the following questions

- a) Display the student names who are having Research Interest as Grid Computing

```
[urk17cs053@code ~]$ grep Grid text1.txt | cut -f 1  
Melvin  
Binu  
Arun
```

- b) List all the student names & RegNo in the class

```
[urk17cs053@code ~]$ cut -f 1,2 text1.txt  
Name      Regno  
Melvin    07af501  
Mithin    07af502  
James     07af503  
Jane      07af504  
Caroline   07af505      ClusterComputing  
Binu      07af506  
Aaron     07af507  
Selvin    07af508  
Jerwin    07af509  
Arun      07af510  
[urk17cs053@code ~]$
```

- c) List the count of students who have an interest as ImageProcessing and store the result in another file.

```
[urk17cs053@code ~]$ grep Image text1.txt | wc -l > text2.txt  
[urk17cs053@code ~]$ cat text2.txt  
2  
[urk17cs053@code ~]$
```

- d) Display the first two rows and last two and store them into another file.

```
[urk17cs053@code ~]$ cat text1.txt  
Name      Regno          ResearchInterest  
Melvin    07af501        GridComputing  
Mithin    07af502        ClusterComputing  
James     07af503        ImageProcessing  
Jane      07af504        Networking  
Caroline   07af505        ClusterComputing  
Binu      07af506        GridComputing  
Aaron     07af507        ImageProcessing  
Selvin    07af508        Networking  
Jerwin    07af509        WirelessNetworks  
Arun      07af510        GridComputing  
[urk17cs053@code ~]$
```

9. Display the contents of the file test1.txt without any blank lines

```
[urk17cs053@code ~]$ grep -v '^$' text1.txt
Name      Regno          ResearchInterest
Melvin    07af501        GridComputing
Mithin    07af502        ClusterComputing
James     07af503        ImageProcessing
Jane      07af504        Networking
Caroline  07af505        ClusterComputing
Binu      07af506        GridComputing
Aaron     07af507        ImageProcessing
Selvin    07af508        Networking
Jerwin   07af509        WirelessNetworks
Arun     07af510        GridComputing
[urk17cs053@code ~]$
```

## 10. Move the file sample.txt from dir1 directory to dir2 directory

```
[urk17cs053@code ~]$ mv sample.txt dir53
[urk17cs053@code ~]$ cd dir53
```

## 11. Change directory into dir2 directory

```
[urk17cs053@code dir2]$ ls
dir1  new.txt  sample1.txt
[urk17cs053@code dir2]$
```

## 12. Check whether the file sample.txt is present their

```
[urk17cs053@code dir2]$ cat sample.txt
cat: sample.txt: No such file or directory
```

## 13. Rename the file sample.txt to new.txt and check whether sample.txt is there or not?

```
[urk17cs053@code dir2]$ mv sample.txt new.txt
[urk17cs053@code dir2]$ ls
dir1  new.txt  sample1.txt
[urk17cs053@code dir2]$
```

## 14. Remove the directory dir1

```
[urk17cs053@code dir2]$ rm -r dir1
[urk17cs053@code dir2]$
```

## 15. Display last 3 lines of the file test1.txt

```
[urk17cs053@code dir2]$ tail -4 text1.txt
Aron      07af507        ImageProcessing
Selvin    07af508        Networking
Jerwin   07af509        WirelessNetworks
Arun     07af510        GridComputing
```

16. Display all the commands you have executed so far and save the list into a file named todayhistory.txt

```
[urk17cs053@code dir2]$ cat todayhistory.txt
```

17. How many files are present under your home directory?

```
[urk17cs053@code dir2]$ ls -A | wc -l  
3
```

18. Perform the sorting of three files and store the sorted file in the fourth file.

```
[urk17cs053@code dir2]$ sort file1.txt file2.txt file3.txt > file4.txt  
[urk17cs053@code dir2]$ CAT FILE4.TXT  
-bash: CAT: command not found  
[urk17cs053@code dir2]$ cat file4.txt  
"HELLO ELIZA"  
"HOW ARE YOU"  
"HOW IS UR DAY GOTNG?"
```

19. Change the permission of your newly created file such that the group users and others don't access any type of access.

```
[urk17cs053@code dir2]$ ls -l file5.txt  
-rw-rw-r-- 1 urk17cs053 urk17cs053 61 Aug 24 22:42 file5.txt  
[urk17cs053@code dir2]$ chmod 700 file5.txt  
[urk17cs053@code dir2]$ ls -l file5.txt  
-rwx----- 1 urk17cs053 urk17cs053 61 Aug 24 22:42 file5.txt  
[urk17cs053@code dir2]$
```

20. Display the network status on the shell.

```
[urk17cs053@code ~]$ netstat  
Active Internet connections (w/o servers)  
Proto Recv-Q Send-Q Local Address          Foreign Address        State  
tcp      0      0 code.karunya.edu:hbc1    code.karunya.edu:46206 ESTABLISHED  
tcp      0      0 code.karunya.edu:47504   code.karunya.edu:hbc1    ESTABLISHED  
tcp      0      0 code.karunya.edu:nfs     192.168.0.32:ftps-data ESTABLISHED  
tcp      0      0 code.karunya.edu:https   162.158.166.195:52574 ESTABLISHED  
tcp      0      0 code.karunya.edu:nfs     192.168.0.34:790    ESTABLISHED  
tcp      0      0 code.karunya.edu:hbc1    code.karunya.edu:47614 ESTABLISHED  
tcp      0      0 code.karunya.edu:hbc1    code.karunya.edu:47504 ESTABLISHED
```

21. Compares any two files and search for both common and exclusive features

```
[urk17cs053@code ~]$ diff com.txt com1.txt
1,5c1,2
< 3c3
< < ajbfja fjka sbdjkfhsakdjfbk
< \ No newline at end of the file
< -----
<
< ---
> > tdyujkgcxvnbmhfjkn
> \ No newline at the end of the file
[urk17cs053@code ~]$ █
```

22. Display the user ID, process ID, and parent process ID.

```
[urk17cs053@code ~]$ ps -f
UID      PID  PPID  C STIME TTY          TIME CMD
urk17cs+ 4899  4878  0 22:09 pts/5    00:00:00 -bash
urk17cs+ 7330  4899  0 22:38 pts/5    00:00:00 vi file1.txt
urk17cs+ 8287  4899  0 22:48 pts/5    00:00:00 ps -f
[urk17cs053@code ~]$ █
```

23. Report disk usages of the file system.

```
[urk17cs053@code ~]$ ps -f
UID      PID  PPID  C STIME TTY          TIME CMD
urk17cs+ 4899  4878  0 22:09 pts/5    00:00:00 -bash
urk17cs+ 7330  4899  0 22:38 pts/5    00:00:00 vi file1.txt
urk17cs+ 8287  4899  0 22:48 pts/5    00:00:00 ps -f
[urk17cs053@code ~]$ du -h
0        ./mozilla/plugins
0        ./mozilla/extensions
0        ./mozilla
16K     ./config/neofetch
[urk17cs053@code ~]$ █
```

24. Display the statistics of all ports connected to a network.

```
[urk17cs053@code ~]$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp     0      0 0.0.0.0:nfs              0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:46053             0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:sunrpc            0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:http              0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:mountd             0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:34067             0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:ssh               0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:hbci               0.0.0.0:*               LISTEN
tcp     0      0 localhost:smtp              0.0.0.0:*               LISTEN
tcp     0      0 0.0.0.0:https              0.0.0.0:*               LISTEN
tcp6    0      0 [::]:nfs                [::]:*                  LISTEN
tcp6    0      0 [::]:sunrpc              [::]:*                  LISTEN
tcp6    0      0 [::]:http                [::]:*                  LISTEN
tcp6    0      0 [::]:mountd              [::]:*                  LISTEN
tcp6    0      0 [::]:ssh                 [::]:*                  LISTEN
tcp6    0      0 [::]:57431               [::]:*                  LISTEN
tcp6    0      0 localhost:smtp              [::]:*                  LISTEN
tcp6    0      0 [::]:https               [::]:*                  LISTEN
tcp6    0      0 [::]:39228               [::]:*                  LISTEN
udp     0      0 0.0.0.0:39547             0.0.0.0:*               LISTEN
udp     0      0 0.0.0.0:mountd             0.0.0.0:*               LISTEN
```

## 25. Display the uptime of the system.

```
[urk17cs053@code ~]$ uptime
22:50:36 up 12 days, 11:10, 142 users,  load average: 0.00, 0.01, 0.05
[urk17cs053@code ~]$ █
```

## 26. Julian day.

```
[urk17cs053@code ~]$ date
Mon Aug 24 22:51:03 IST 2020
[urk17cs053@code ~]$ █
```

## 27. IP information.

```
[urk17cs053@code ~]$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens32: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 00:50:56:93:66:93 brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.29/24 brd 192.168.0.255 scope global noprefixroute ens32
        valid_lft forever preferred_lft forever
    inet6 fe80::1450:18ba:187f:1f02/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
[urk17cs053@code ~]$ █
```

## 28. Display only the free space in the system.

```
[urk17cs053@code ~]$ df -k
Filesystem      1K-blocks   Used Available Use% Mounted on
devtmpfs          3992636     0  3992636  0% /dev
tmpfs            4004520     0  4004520  0% /dev/shm
tmpfs            4004520  419088  3585432 11% /run
tmpfs            4004520     0  4004520  0% /sys/fs/cgroup
/dev/mapper/centos_kitscode-root  68066844 3014192  65052652  5% /
/dev/sda1        1942528 334256  1608272 18% /boot
/dev/mapper/centos_kitscode-home 24404336  32992  24371344  1% /home
/dev/mapper/centos_kitscode-data 97609148 26185356  71423792 27% /data
/dev/mapper/centos_kitscode-var 10004480 9324368   680112 94% /var
tmpfs            800908     0  800908  0% /run/user/1010883450
tmpfs            800908     0  800908  0% /run/user/1010875496
tmpfs            800908     0  800908  0% /run/user/1010875256
tmpfs            800908     0  800908  0% /run/user/1010875229
tmpfs            800908     0  800908  0% /run/user/1010883087
tmpfs            800908     0  800908  0% /run/user/1010882167
tmpfs            800908     0  800908  0% /run/user/1010875481
[urk17cs053@code ~]$
```

## 29. Linux platform is infected over the network.

```
[urk17cs053@code ~]$ netstat -nr
Kernel IP routing table
Destination     Gateway         Genmask        Flags  MSS Window irtt Iface
0.0.0.0         192.168.0.254  0.0.0.0        UG        0 0          0 ens32
192.168.0.0     0.0.0.0        255.255.255.0  U         0 0          0 ens32
[urk17cs053@code ~]$
```

### Results:

The Linux commands are studied and executed.

### VIDEO LINK:

<https://drive.google.com/file/d/1kpZz4KBehDK3nsR8khAzbka2o2yiZwLe/view?usp=sharing>

## **Ex 2 KERNEL CONFIGURATION, COMPILATION AND INSTALLATION**

**Date: 25.08.20**

---

### **Aim:**

To study and implement the kernel configuration, compilation and installation.

### **Description:**

#### **The Linux Kernel :**

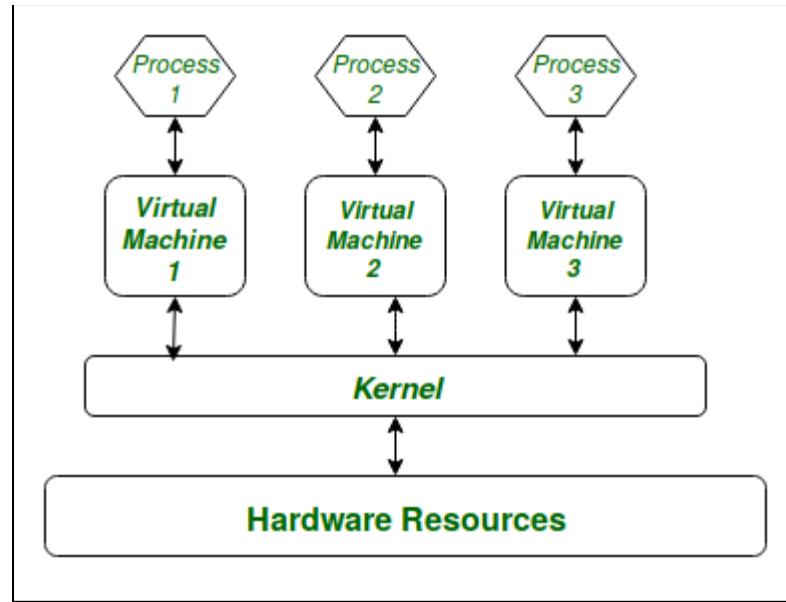
The main purpose of a computer is to run a predefined sequence of instructions, known as a program. A program under execution is often referred to as a process. Now, most special purpose computers are meant to run a single process, but in a sophisticated system such a general purpose computer, are intended to run many processes simultaneously. Any kind of process requires hardware resources such as Memory, Processor time, Storage space, etc.

In a General Purpose Computer running many processes simultaneously, we need a middle layer to manage the distribution of the hardware resources of the computer efficiently and fairly among all the various processes running on the computer. This middle layer is referred to as the kernel. Basically the kernel virtualizes the common hardware resources of the computer to provide each process with its own virtual resources. This makes the process seem as it is the sole process running on the machine. The kernel is also responsible for preventing and mitigating conflicts between different processes.

The Core Subsystems of the Linux Kernel are as follows:

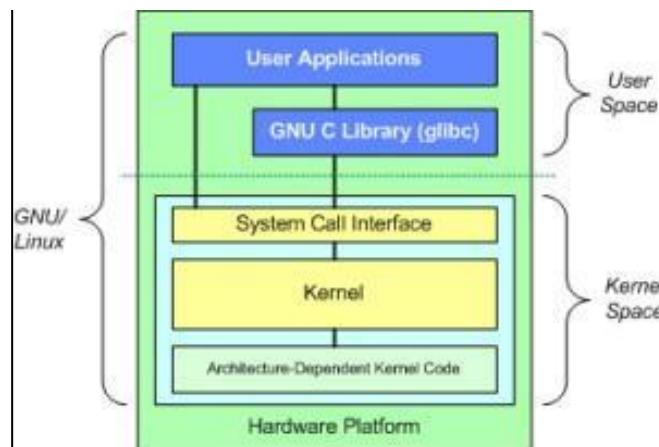
1. The Process Scheduler
2. The Memory Management Unit (MMU)
3. The Virtual File System (VFS)
4. The Networking Unit
5. Inter-Process Communication Unit

This schematically represented below:



## Architecture of system kernel :

We can think of Linux Kernel architecture to be divided into two levels – User Space and Kernel Space.



At the top is the user space. Below the user space is the kernel space. Here, the Linux kernel exists.

User Space:

This is where the user applications are executed. There is also the GNU C Library (glibc). This provides the system call interface that connects to the kernel and provides the mechanism to transition between the user-space application and the kernel.

## Kernel Space:

Here, the Linux Kernel exists which can be further divided into three levels. At the top is the system call interface, which implements the basic functions such as read and write. Below the system call interface is the kernel code, which can be more accurately defined as the architecture-independent kernel code. This code is common to all of the processor architectures supported by Linux. Below this is the architecture-dependent code, which forms what is more commonly called a BSP (Board Support Package). This code serves as the processor and platform-specific code for the given architecture.

Sl. N o.	Command Name	Meaning	Description
1.	<b>rpm -qa kernel-devel</b>	It displays the version of the kernel.	Kernel-devel - This package provides kernel headers and makes files sufficient to build modules against the kernel package.
2.	<b>uname -r</b>	uname displays the information about the system.	The command ‘uname‘ displays the information about the system.  option :  -a It prints all the system information in the following order: Kernel name, network node hostname, kernel release date, kernel version, machine hardware name, hardware platform, operating system  -s It prints the kernel name.  -n It prints the hostname of the network node  -r It prints the kernel release date  -v It prints the version of the current kernel

3.	<b>tar</b>	tar' stands for tape archive, is used to create Archive and extract the Archive files	tar command in Linux is one of the important commands which provides archiving functionality in Linux. We can use Linux tar command to create compressed or uncompressed Archive files and also maintain and modify them.
			<p><b>Options:</b></p> <ul style="list-style-type: none"> <li>-c : Creates Archive</li> <li>-x : Extract the archive</li> <li>-f : creates archive with given filename</li> <li>-t : displays or lists files in archive file</li> <li>-u : archives and adds to an existing archive file</li> <li>-v : Displays Verbose Information</li> <li>-A : Concatenates the archive files</li> <li>-z : zip, tells tar command that create tar file using gzip</li> <li>-j : filter archive tar file using tbzip</li> <li>-W : Verify a archive file</li> <li>-r : update or add file or directory in already existed .tar file</li> </ul>
4.	<b>ln</b>	A symbolic link, also known as a symlink or soft link, is a special type of file that points to another file or directory.	There are two types of links in Linux/UNIX systems:
			<ol style="list-style-type: none"> <li>1. Hard links</li> <li>2. Soft links</li> </ol>
5.	<b>make</b>	utility for building and maintaining groups of programs.	The purpose of the make utility is to determine automatically which pieces of a large program need to be recompiled, and issue the commands to recompile them. you can use make with any programming language whose compiler can be run with a

			<p>shell command. In fact, make is not limited to programs. You can use it to describe any task where some files must be updated automatically from others whenever the others change.</p> <p>Options :</p> <ul style="list-style-type: none"><li>-<b>b</b>,<b>m</b> prints online help and exitThese options are ignored for compatibility with other versions of make.</li><li>-<b>B</b> Unconditionally make all targets</li><li>-<b>d</b> Print debugging information in addition to normal processing</li><li>-<b>e</b> Give variables taken from the environment precedence over variables from makefiles</li><li>-<b>k</b> Continue as much as possible after an error</li></ul>
--	--	--	---

## Exercise

### Configure and compilation the kernel

#### Step 1 :

Download the latest kernel source from [www.kernel.org](http://www.kernel.org) or from a repository.

#### Step 2 :

Check the current kernel version and name of the kernel.

#### step 3 :

Move the module from downloads to /usr/src and uzip the file.

#### step 4 :

Make a systemlink to the existing kernel and clean the existing kernel.

#### step 5 :

Building kernel and its modules.

## step 6 :

Check the current kernel version and name of the kernel.

### Output :

Kernel Version

```
liniux@liniux-VirtualBox:~$ cat /proc/version
Linux version 5.4.0-45-generic (buildd@lgw01-amd64-033) (gcc version 9.3.0 (Ubuntu 9.3.0-10ubuntu2)) #49-Ubuntu SMP Wed Aug 26 13:38:52 UTC 2020
```

Kernel Name

```
liniux@liniux-VirtualBox:~$ uname -r
5.4.0-45-generic
```

### Unzipping kernel

```
liniux@liniux-VirtualBox:~/Downloads$ xz -d -v linux-5.8.7.tar.xz
linux-5.8.7.tar.xz (1/1)
```

Moving the kernel to /usr/src

```
liniux@liniux-VirtualBox:~$ sudo mv /home/liniux/Downloads/linux-5.8.7 /usr/src
liniux@liniux-VirtualBox:~$ cd /usr/src
liniux@liniux-VirtualBox:/usr/src$ ls
linux-5.8.7                  linux-headers-5.4.0-45
linux-headers-5.4.0-42         linux-headers-5.4.0-45-generic
linux-headers-5.4.0-42-generic vboxguest-6.1.14
```

Cleaning the kernel using make

```
liniux@liniux-VirtualBox:/usr/src$ sudo make clean
```

System link to existing kernel

```
liniux@liniux-VirtualBox:~$ sudo ln -s /usr/src/linux-5.8.5 /usr/src/linux-headers-5.4.0-45-generic/
```

Making target files

```
liniux@liniux-VirtualBox:/usr/src/linux-5.8.7$ sudo make menuconfig
  UPD      scripts/kconfig/mconf-cfg
 HOSTCC   scripts/kconfig/mconf.o
 HOSTCC   scripts/kconfig/lxdialog/checklist.o
 HOSTCC   scripts/kconfig/lxdialog/inputbox.o
 HOSTCC   scripts/kconfig/lxdialog/menubox.o
 HOSTCC   scripts/kconfig/lxdialog/textbox.o
 HOSTCC   scripts/kconfig/lxdialog/util.o
 HOSTCC   scripts/kconfig/lxdialog/yesno.o
 HOSTCC   scripts/kconfig/conffdata.o
 HOSTCC   scripts/kconfig/expr.o
 LEX      scripts/kconfig/lexer.lex.c
```

### Install kernel config

```
liniux@liniux-VirtualBox:~$ sudo apt install config
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

### Results:

The study and implement the kernel configuration, compilation and installation is studied and executed.

Video: <https://drive.google.com/file/d/1fwhlNrqLRWM9gOR-8J9F189z2QfurPag/view?usp=sharing>

## **Ex 3**

## **COMPILING FROM THE SOURCE**

**Date: 29.08.20**

---

### **Aim:**

To study and implement the compiling from the source.

### **Description:**

#### **tar**

The Linux ‘tar’ stands for tape archive, is used to create Archive and extract the Archive files. tar command in Linux is one of the important commands which provides archiving functionality in Linux. We can use Linux tar command to create compressed or uncompressed Archive files and also maintain and modify them.

#### **zip**

ZIP is a compression and file packaging utility for Unix. Each file is stored in a single .zip { .zip-filename} file with the extension .zip. ZIP is a compression and file packaging utility for Unix. Each file is stored in a single .zip { .zip-filename} file with the extension .zip.

#### **gzip**

gzip command compresses files. Each single file is compressed into a single file. The compressed file consists of a GNU zip header and deflated data. If given a file as an argument, gzip compresses the file, adds a “.gz” suffix, and deletes the original file. With no

arguments, gzip compresses the standard input and writes the compressed file to standard output.

## **Difference between Gzip and zip command in Unix and when to use which command**

- ZIP and GZIP are two very popular methods of compressing files, in order to save space, or to reduce the amount of time needed to transmit the files across the network, or internet.
- In general, GZIP is much better compared to ZIP, in terms of compression, especially when compressing a huge number of files.
- The common practice with GZIP, is to archive all the files into a single tarball before compression. In ZIP files, the individual files are compressed and then added to the archive.
- When you want to pull a single file from a ZIP, it is simply extracted, then decompressed. With GZIP, the whole file needs to be decompressed before you can extract the file you want from the archive.
- When pulling a 1MB file from a 10GB archive, it is quite clear that it would take a lot longer in GZIP, than in ZIP.
- GZIP's disadvantage in how it operates, is also responsible for GZIP's advantage. Since the compression algorithm in GZIP compresses one large file instead of multiple smaller ones, it can take advantage of the redundancy in the files to reduce the file size even further.
- If you archive and compress 10 identical files with ZIP and GZIP, the ZIP file would be over 10 times bigger than the resulting GZIP file.

## **Commands:**

Sl. No.	Command Name	Syntax	options
1.	<b>rpm</b>	rpm {rpm-file}	<b>-a, --all</b>  Query all packages  <b>-f</b>  Query for packages owning given file
2.	<b>apt-get</b>	apt-get [options] source pkg1 [pkg2 ...]	<b>-a</b>  It prints all the system information in the order

			<p><b>-s</b> It prints the kernel name.</p> <p><b>-n</b> It prints the hostname of the network node</p> <p><b>-r</b> It prints the kernel release date</p> <p><b>-v</b> It prints the version of the current kernel</p>
3.	<b>tar</b>	tar [options] [archive-file] [file or directory to be archived]	<p><b>-c</b> Creates Archive</p> <p><b>-x</b> Extract the archive</p> <p><b>-f</b> Creates archive with given filename</p> <p><b>-t</b> Displays or lists files in archive file</p> <p><b>-u</b> Archives and adds to an existing archive file</p> <p><b>-A</b> Concatenates the archive files</p>

			<p><b>-z</b></p> <p>zip, tells tar command that create tar file using gzip</p> <p><b>-W</b></p> <p>Verify a archive file</p> <p><b>-r</b></p> <p>update or add file or directory in already existed .tar file</p>
4.	<b>zip</b>	zip [options] zipfile files_list	<p><b>-d :</b></p> <p>Removes the file from the zip archive</p> <p><b>-u :</b></p> <p>Updates the file in the zip archive</p> <p><b>-m :</b></p> <p>Deletes the original files after zipping</p> <p><b>-r :</b></p> <p>To zip a directory recursively</p> <p><b>-x :</b></p> <p>Exclude the files in creating the zip</p> <p><b>-v :</b></p> <p>Verbose mode or print diagnostic version info</p>

5.	<b>gzip</b>	gzip [Options] [filenames]	<p><b>-f :</b> Sometimes a file cannot be compressed</p> <p><b>-k :</b> By default when you compress a file using the “gzip” command you end up with a new file with the extension</p> <p><b>-L :</b> This option displays the gzip license</p> <p><b>-r :</b> This option can compress every file in a folder and its subfolders</p> <p><b>-[1-9] :</b> It allows to change the compression level</p> <p><b>-v :</b> This option displays the name and percentage reduction for each file compressed or decompressed</p> <p><b>-d :</b> This option allows you to decompress a file using the “gzip” command.</p>
----	-------------	----------------------------	--

## Exercise:

### 1. Compile the source from Openttd package

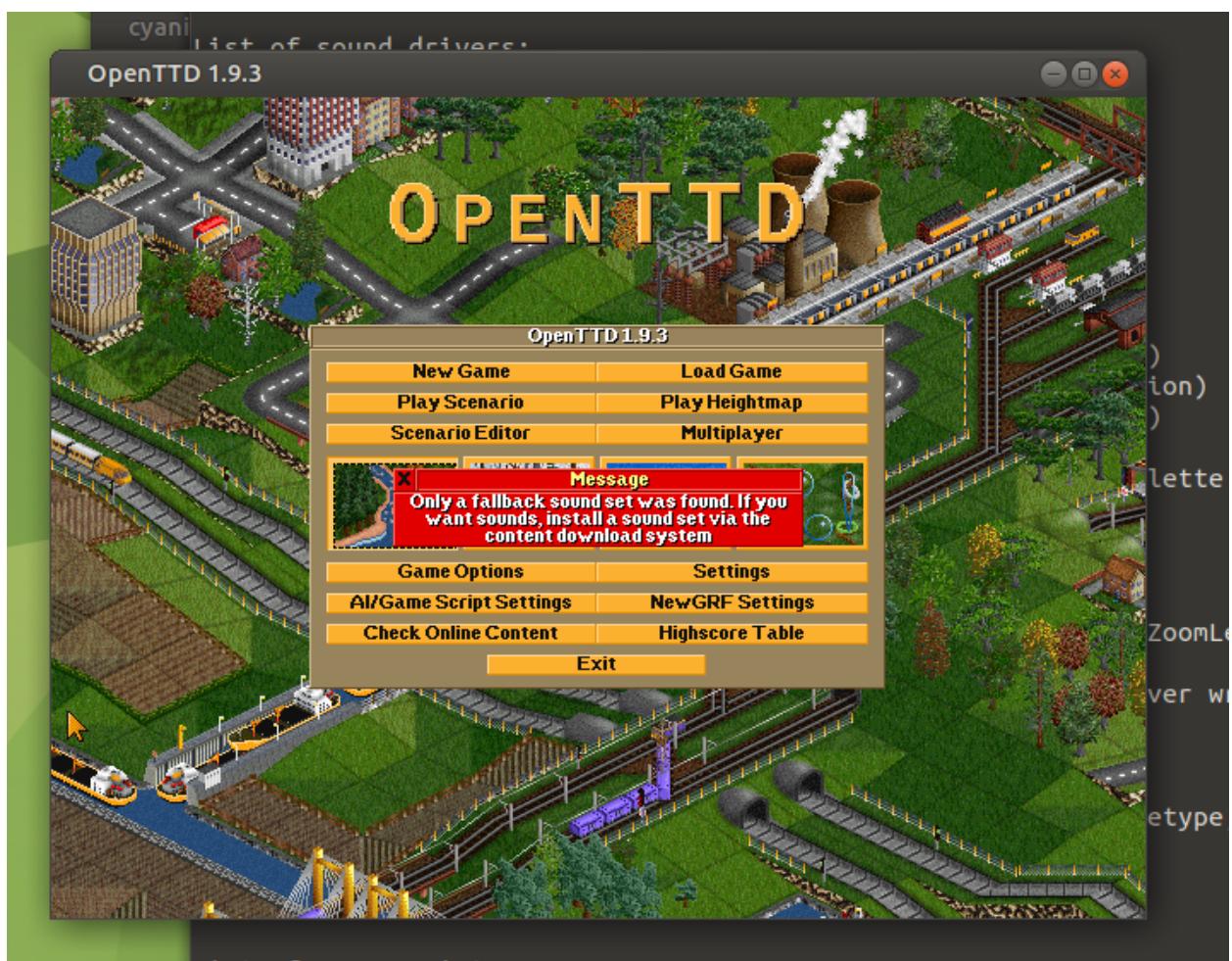
Installing Openttd using package manager

```
cyanide@veronica:~$ sudo apt-get install openttd
[sudo] password for cyanide:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  fluid-soundfont-gm libSDL1.2debian libxdg-basedir1 openttd-data
  openttd-opengfx openttd-openmsx timidity
Suggested packages:
  fluid-soundfont-gs fluidsynth openttd-opensfx freepats pmidi
  timidity-daemon
The following NEW packages will be installed:
  fluid-soundfont-gm libSDL1.2debian libxdg-basedir1 openttd
  openttd-data openttd-opengfx openttd-openmsx timidity
0 upgraded, 8 newly installed, 0 to remove and 0 not upgraded.
Need to get 128 MB of archives.
After this operation, 174 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 fluid-soun
dfont-gm all 3.1-5.1 [119 MB]
12% [1 fluid-soundfont-gm 19.0 MB/119 MB 16%]          531 kB/s 3min 25s
```

Check the version of Openttd

```
cyanide@veronica:~$ openttd vesrion  
OpenTTD 1.9.3
```

Run the Openttd



## 2. Compile the source from JFrog package

Download and Extract the JFrog file

```
cyanide@veronica:~/Downloads/artifactory-oss-7.9.1/app/bin$ ./artifactory
ctl
2020-10-11T16:36:27.474Z [shell] [INFO ] [] [installerCommon.sh:1431
] [main] - Checking open files and processes limits
2020-10-11T16:36:27.634Z [shell] [INFO ] [] [installerCommon.sh:1434
] [main] - Current max open files is 1024
2020-10-11T16:36:27.720Z [shell] [INFO ] [] [installerCommon.sh:1445
] [main] - Current max open processes is 6423
2020-10-11T16:36:27.982Z [shell] [INFO ] [] [installerCommon.sh:1512
] [main] - Testing directory /home/cyanide/Downloads/artifactory-oss-7.
9.1/var has read/write permissions for user id 1000
2020-10-11T16:36:28.109Z [shell] [INFO ] [] [installerCommon.sh:1527
] [main] - Permissions for /home/cyanide/Downloads/artifactory-oss-7.9.
1/var are good
2020-10-11T16:36:29.144Z [shell] [INFO ] [] [installerCommon.sh:3284
] [main] - Setting JF_SHARED_NODE_ID to veronica
2020-10-11T16:36:29.364Z [shell] [INFO ] [] [installerCommon.sh:3284
] [main] - Setting JF_SHARED_NODE_IP to 127.0.1.1
2020-10-11T16:36:29.572Z [shell] [INFO ] [] [installerCommon.sh:3284
] [main] - Setting JF_SHARED_NODE_NAME to veronica
2020-10-11T16:36:30.055Z [shell] [INFO ] [] [artifactoryCommon.sh:112
] [main] - Final command: -server -Xms512m -Xmx2g -Xss256k -XX:+UseG1GC
-XX:OnOutOfMemoryError="kill -9 %p" --add-opens java.base/java.util=ALL-
UNNAMED --add-opens java.base/java.lang.reflect=ALL-UNNAMED --add-opens j
ava.base/java.lang.invoke=ALL-UNNAMED --add-opens java.base/java.text=ALL-
UNNAMED --add-opens java.base/java.nio=ALL-UNNAMED --add-opens java.desk
top/java.awt.font=ALL-UNNAMED -Dfile.encoding=UTF8 -Djruby.compile.invoke
```

## Compiling the Source of JFrog

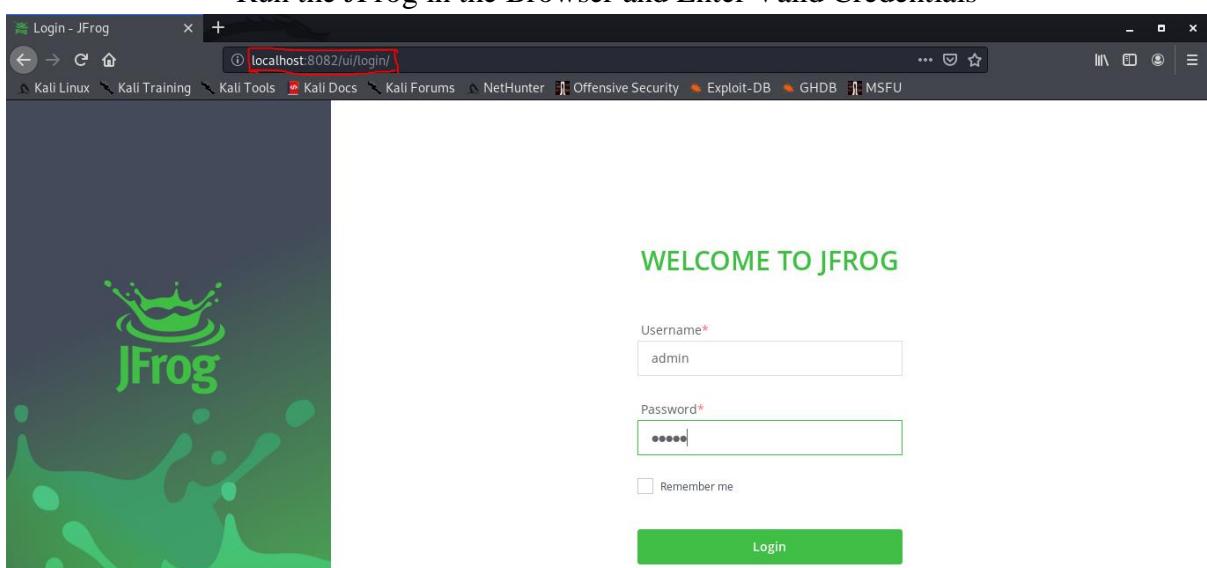
```
2020-10-11T17:03:30.246Z [jfrt] [INFO] [ec90c7643e4752e2] [.c.ConfigurationManagerImpl:97] [localhost-startStop-1] - Starting file sync
2020-10-11T17:03:31.497Z [jfrt] [INFO] [ec90c7643e4752e2] [SchemaInitializationManager:51] [localhost-startStop-1] - Post-DB initialization manager initialized
2020-10-11T17:03:35.454Z [jfrt] [INFO] [ee2af71597281e68] [factoryContextConfigListener:325] [art-init] -
```

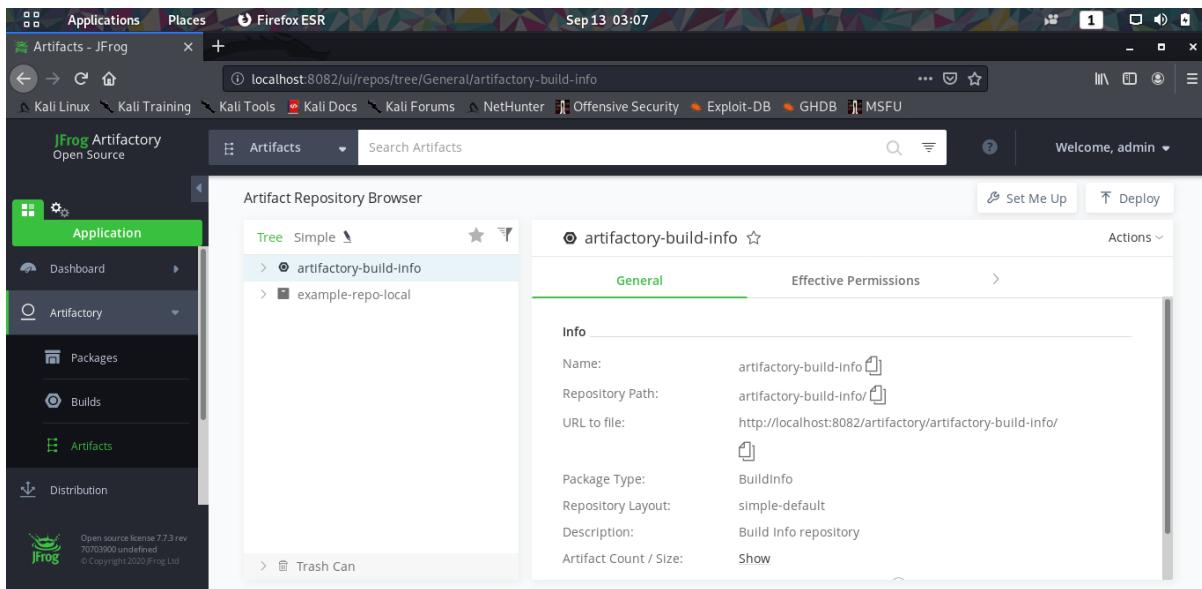


```
Version: 7.9.1
Revision: 70901900
Artifactory Home: '/home/cyanide/Downloads/artifactory-oss-7.9.1'
Node ID: 'veronica'
```

```
2020-10-11T22:33:36.213L [tomct] [INFO] [ ] [org.apache.catalina.startup.HostConfig] [org.apache.catalina.startup.HostConfig deployDescriptor] - Deployment of deployment descriptor [/home/cyanide/Downloads/artifactory-oss-7.9.1/app/artifactory/tomcat/conf/Catalina/localhost/artifactory.xml] has finished in [38.669] ms
```

## Run the JFrog in the Browser and Enter Valid Credentials





### 3. Compile the Source from gcc

Check the Version of gcc

```
cyanide@veronica:~$ gcc --version
gcc (Ubuntu 9.3.0-17ubuntu1~20.04) 9.3.0
Copyright (C) 2019 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

Sample Program

```
#include<stdio.h>
int main(){
printf("Hello world");
}
```

Compile and Run the C program using gcc

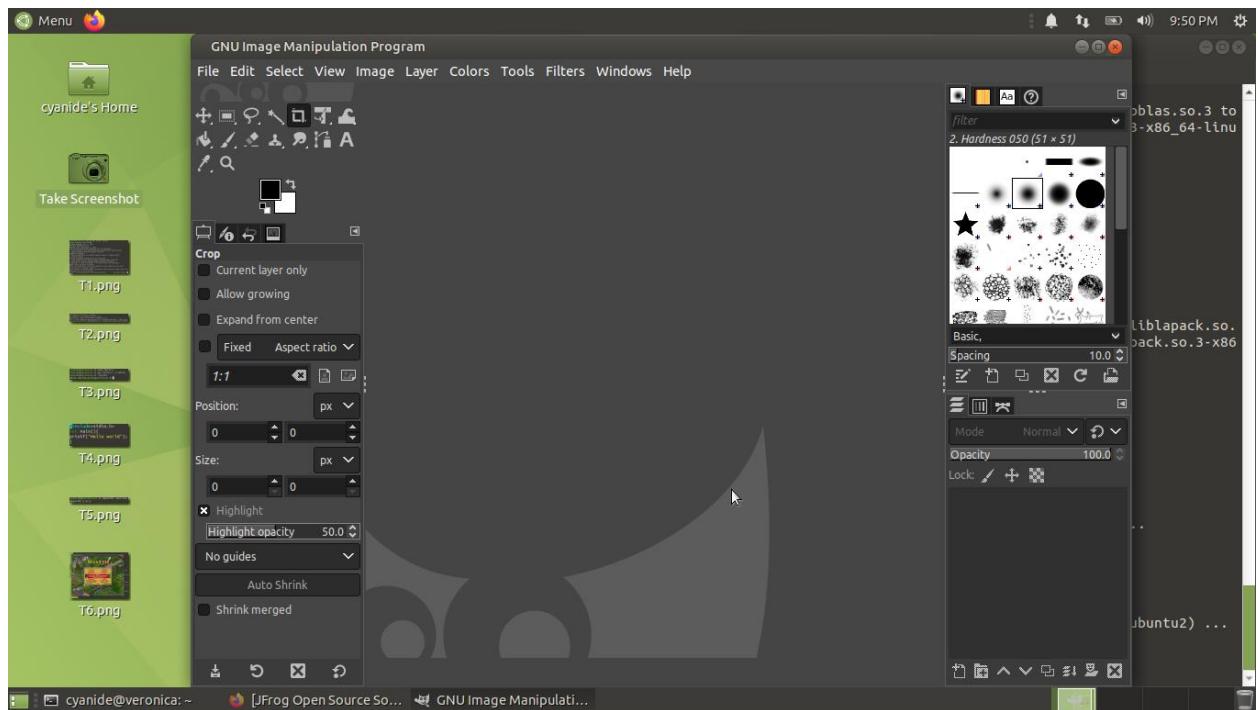
```
cyanide@veronica:~$ nano hello.c
cyanide@veronica:~$ gcc hello.c -o hello
cyanide@veronica:~$ ./hello
Hello worldcyanide@veronica:~$
```

### 4. Compile the source from any open source package(GIMP)

## Installing GIMP using package manager

```
cyanide@veronica:~$ sudo apt-get install gimp -y
[sudo] password for cyanide:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  gimp-data libamd2 libbabl-0.1-0 libblas3 libcamd2 libccolamd2
  libcholmod3 libcolamd2 libde265-0 libexiv2-27 libegl-0.4-0
  libegl-common libexiv2-2 libgfortran5 libgimp2.0 libheif1
  libilmbase24 liblapack3 libmetis5 libmng2 libmypaint-1.5-1
  libmypaint-common libopenexr24 libraw19 libsdl2-2.0-0
  libsuitesparseconfig5 libumfpack5
Suggested packages:
  gimp-help-en | gimp-help gimp-data-extras exiv2
The following NEW packages will be installed:
  gimp gimp-data libamd2 libbabl-0.1-0 libblas3 libcamd2 libccolamd2
  libcholmod3 libcolamd2 libde265-0 libexiv2-27 libegl-0.4-0
  libegl-common libexiv2-2 libgfortran5 libgimp2.0 libheif1
  libilmbase24 liblapack3 libmetis5 libmng2 libmypaint-1.5-1
  libmypaint-common libopenexr24 libraw19 libsdl2-2.0-0
  libsuitesparseconfig5 libumfpack5
0 upgraded, 28 newly installed, 0 to remove and 0 not upgraded.
Need to get 20.6 MB of archives.
After this operation, 111 MB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libbabl-0.
1-0 amd64 0.1.74-1 [272 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libilmbase
24 amd64 2.3.0-6build1 [75.1 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 li
```

Run the GIMP



## Results:

The compiling from the source is studied and executed.

**Video Link:** <https://drive.google.com/file/d/1vMFrtUcdA6NVu-2Ix4y5MzYhNtZ1CVaP/view?usp=sharing>

01-09-2020

**Ex 4. VIRTUALIZATION**

**Aim:**

Set up emulators to run FreeDOS.

**Description:**

Virtualization is creation of Virtual Machines which can emulate hardware in software or in other words it is the creation of virtual version of something such as a hardware platform, operating system, storage device, or network resources.

QEMU is a generic and open source machine emulator and virtualizer. When used as a machine emulator, QEMU can run OSes and programs made for one machine (e.g. an ARM board) on a different machine (e.g. your own PC). By using dynamic translation, it achieves very good performance. When used as a virtualizer, QEMU achieves near native performances by executing the guest code directly on the host CPU.

FreeDOS (formerly Free-DOS and PD-DOS) is an operating system for IBM PC compatible computers. FreeDOS is made up of many different, separate programs that act as "packages" to the overall FreeDOS Project.

**COMMANDS:**

Sl. No.	COMMAND	DESCRIPTION
1.	sudo apt-get	To install
2.	qemu-system --version	To see version number
3.	cd	To navigate
4.	create	To make the statement executable
5.	boot	Boot the GUI
6.	cdrom	Access bits in the CD
7.	hda	Hard drive A
8.	sudo	To give user permission

**PROCEDURE:**

1. Installing qemu.
2. Install Freedos.

3. Move the files to common location.
4. Create image in qemu.
5. Boot freeDOS on qemu.

## Outputs:

1. Installing qemu

```
cyanide@veronica:~/Desktop$ sudo apt-get install qemu
[sudo] password for cyanide:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  qemu
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 14.4 kB of archives.
After this operation, 122 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 qemu a
md64 1:4.2-3ubuntu6.6 [14.4 kB]
Fetched 14.4 kB in 1s (17.8 kB/s)
Selecting previously unselected package qemu.
(Reading database ... 228022 files and directories currently installed.)
Preparing to unpack .../qemu_1%3a4.2-3ubuntu6.6_amd64.deb ...
Unpacking qemu (1:4.2-3ubuntu6.6) ...
Setting up qemu (1:4.2-3ubuntu6.6) ...
```

2. QEMU dependencies

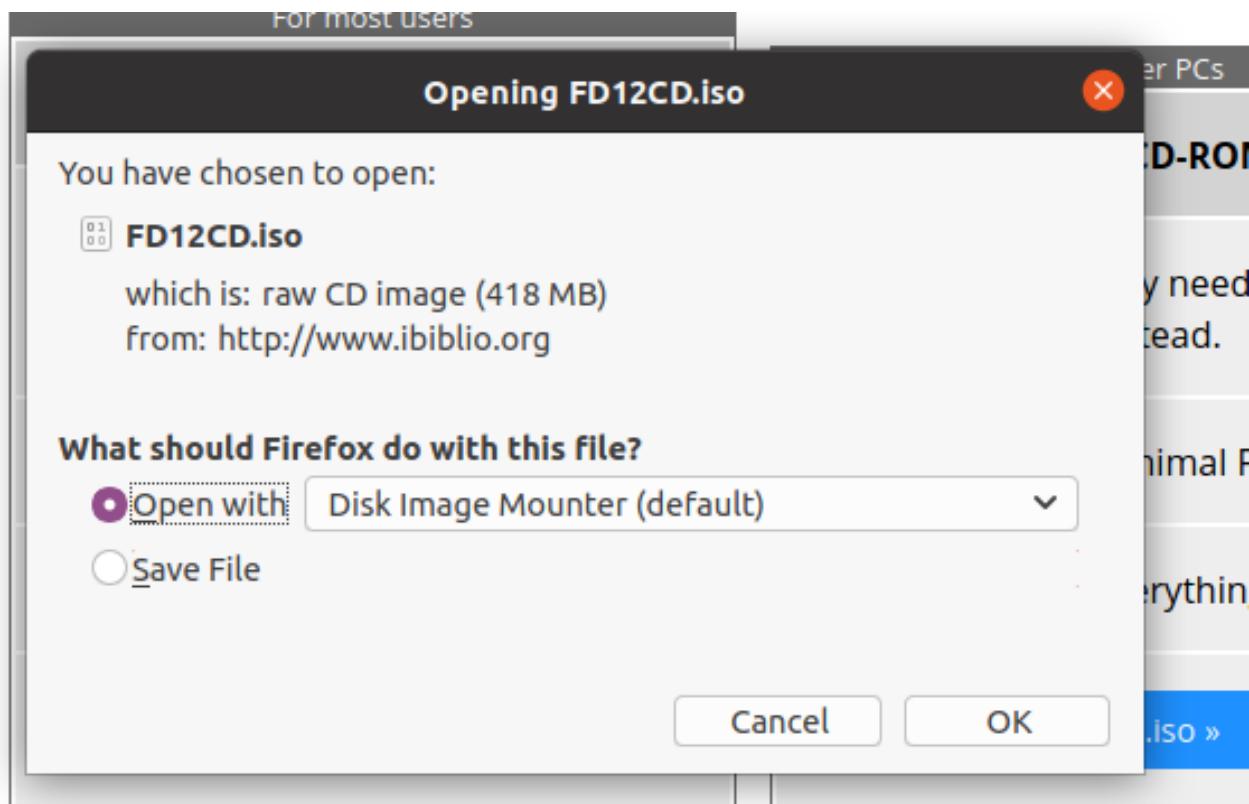
```
cyanide@veronica:~/Desktop$ sudo apt install libvirt-clients libvirt-daem
on-system bridge-utils libguestfs-tools genisoimage virtinst libosinfo-bi
n virt-manager
```

```
cyanide@veronica:~/Desktop$ sudo apt-get install qemu-kvm
[sudo] password for cyanide:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  cpu-checker ipxe-qemu ipxe-qemu-256k-compat-efi-roms libaio1 libcacard0
  libfdt1 libiscsi7 libpmem1 librbd1 libslirp0 libspice-server1
  libusbredirparser1 libvirglrenderer1 msr-tools ovmf qemu-block-extra qe
  mu-system-common qemu-system-data qemu-system-gui qemu-system-x86
  qemu-utils seabios sharutils
Suggested packages:
  vde2 debootstrap sharutils-doc bsd-mailx | mailx
The following NEW packages will be installed:
  cpu-checker ipxe-qemu ipxe-qemu-256k-compat-efi-roms libaio1 libcacard0
  libfdt1 libiscsi7 libpmem1 librbd1 libslirp0 libspice-server1
  libusbredirparser1 libvirglrenderer1 msr-tools ovmf qemu-block-extra qe
  mu-kvm qemu-system-common qemu-system-data qemu-system-gui qemu-system-x8
  6
  qemu-utils seabios sharutils
0 upgraded, 24 newly installed, 0 to remove and 0 not upgraded.
Need to get 16.1 MB of archives.
After this operation, 67.1 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 msr-tools amd6
4 1.3-3 [10.0 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 cpu-checker am
d64 0.7-1.1 [6,936 B]

Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 ipxe-q
emu all 1.0.0+git-20190109.133f4c4-0ubuntu3.2 [930 kB]

Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 ipxe-qemu-256k
-compat-efi-roms all 1.0.0+git-20150424.a25a16d-0ubuntu4 [552 kB]
```

### 3. Downloading freeDOS



## 4. Adding Users

```
cyanide@veronica:~/Desktop$ sudo adduser $USER libvirt
The user `cyanide' is already a member of `libvirt'.
cyanide@veronica:~/Desktop$ sudo adduser $USER libvirt-qemu
Adding user `cyanide' to group `libvirt-qemu' ...
Adding user cyanide to group libvirt-qemu
Done.
```

## 5. Starting Installation of free DOS in Qemu

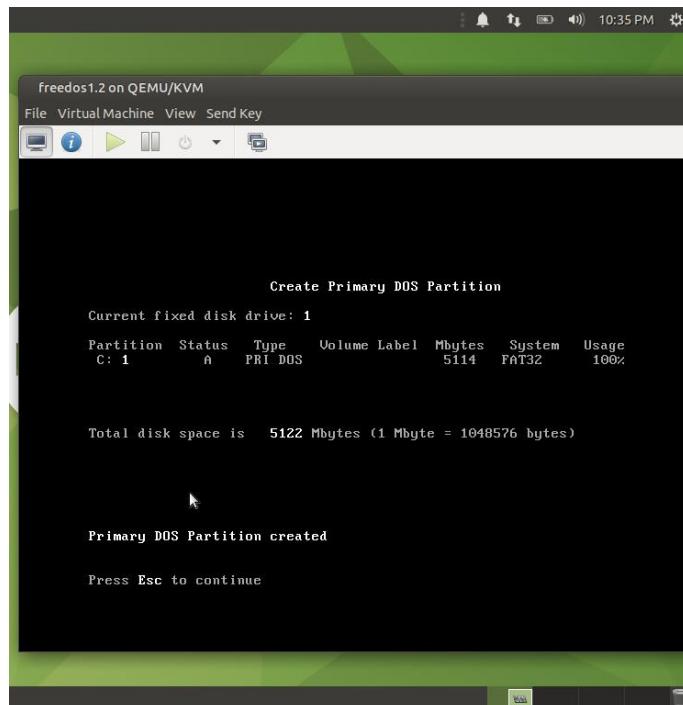
```
freedos1.2 on QEMU/KVM
File Virtual Machine View Send Key
[Icons] [i] [▶] [⏸] [⏻] [⧉] [⧉]
either version 2, or (at your option) any later version.
- InitDiskillegal partition table - drive 00 sector 0
illegal partition table - drive 00 sector 0
illegal partition table - drive 00 sector 0
illegal partition table - drive 00 sector 0
HimemX 3.34 [Sep 05 2015] (c) 1995, Till Gerken 2001-2006 Tom Ehlert
Always on A20 method used
Kernel: allocated 45 Diskbuffers = 23940 Bytes in HMA

FreeCom version 0.84-pre2 XMS_Swap [Aug 28 2006 00:29:00]

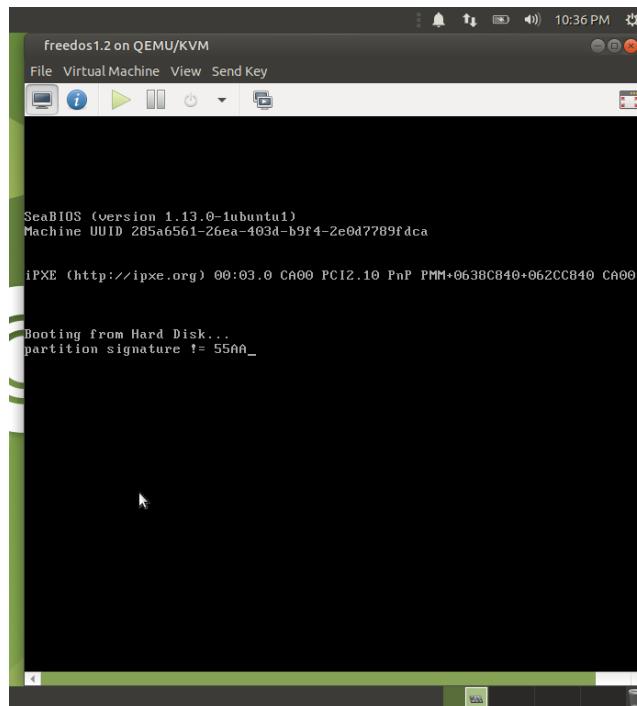
UDVD2, 4-30-2013. CD/DVD name is FDCD0001.
BAD Controller at I-O address C140h, Chip I.D. 80867010h.
CDO: IDE0 Primary-slave, QEMU DVD-ROM, PIO.
Performing action: APMDOS
If APMDOS slows down any app, use ADV:REG instead.
Going resident.
  Drives Assigned
Drive  Driver  Unit
  D:  FDCD0001  0
2 drive(s) available.

Done processing startup files FDCONFIG.SYS and AUTOEXEC.BAT
```

## 6. Disk partitioning



## 7. Restart the services



```
Machine View
Loading boot sector... booting...
FreeDOS kernel 2042 (build 2042 OEM:0xfd) [compiled May 11 2016]
Kernel compatibility 7.10 - WATCOMC - FAT32 support

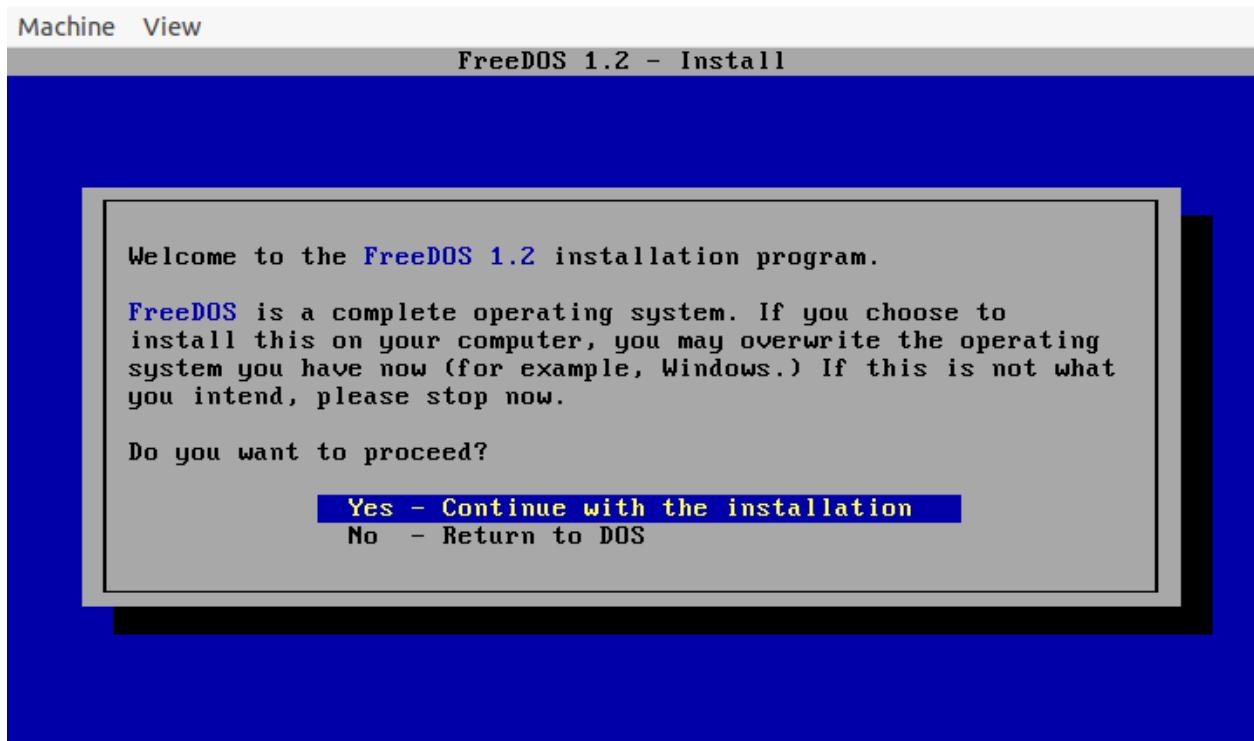
(C) Copyright 1995-2012 Pasquale J. Villani and The FreeDOS Project.
All Rights Reserved. This is free software and comes with ABSOLUTELY NO
WARRANTY; you can redistribute it and/or modify it under the terms of the
GNU General Public License as published by the Free Software Foundation;
either version 2, or (at your option) any later version.

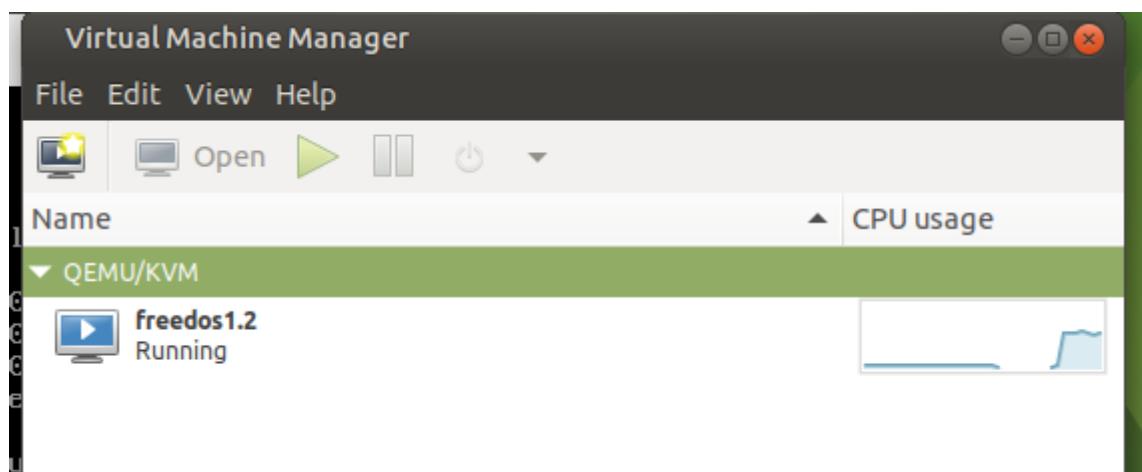
- InitDiskillegal partition table - drive 00 sector 0
illegal partition table - drive 00 sector 0
illegal partition table - drive 00 sector 0
illegal partition table - drive 00 sector 0
MEMDISK version 4.05 (2880 sectors)
HimemX 3.34 [Sep 05 2015] (c) 1995, Till Gerken 2001-2006 Tom Ehlert
Always on A20 method used
Kernel: allocated 45 Diskbuffers = 23940 Bytes in HMA

FreeCom version 0.84-pre2 XMS_Swap [Aug 28 2006 00:29:00]

UDVD2, 4-30-2013. CD/DVD name is FDCCD0001.
BAD Controller at I-O address C040h, Chip I.D. 80867010h.
CDO: IDE0 Secondary-master, QEMU DVD-ROM, PIO.
```

## 8. Setting up freeDOS





## RESULT:

FreeDOS is being run on an QEMU.

### Video link:

[https://drive.google.com/file/d/1j\\_EaNevDpYCb4vq67vHkR5KmugbYvAZd/view?usp=sharing](https://drive.google.com/file/d/1j_EaNevDpYCb4vq67vHkR5KmugbYvAZd/view?usp=sharing)

**Ex 5**  
**Date: 29.08.20**

## Package Management System

### Aim:

To study and implement the package management system

### Description:

#### Samba :

Samba is a free and open-source re-implementation of the SMB/CIFS network file sharing protocol that allows end users to access files, printers, and other shared resources.

This tutorial explains how to install Samba on Ubuntu 18.04 and configure it as a standalone server to provide file sharing across different operating systems over a network.

We'll create the following Samba shares and users.

### Users:

- **sadmin** - An administrative user with read and write access to all shares.
- **josh** - A regular user with its own private file share

### Shares:

- **users** - This share will be accessible with read/write permissions by all users.
- **josh** - This share will be accessible with read/write permissions only by users josh and sadmin.

The file shares will be accessible from all devices on your network. Later in this tutorial, we will also provide detailed instructions on how to connect to the Samba server from Linux, Windows and macOS clients.

### Exercise:

1. Install (Samba) free software re-implementation of the SMB/CIFS networking protocol.

## Installing samba using terminal

```
cyanide@veronica:~/Desktop$ sudo apt-get install samba
[sudo] password for cyanide:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
attr ibverbs-providers libboost-iostreams1.71.0 libboost-thread1.71.0
libcephfs2 libibverbs1 librados2 librdmacm1 python3-dnspython
python3-markdown python3-packaging python3-pygments python3-pyparsing
samba-vfs-modules tdb-tools
Suggested packages:
python-markdown-doc python-pygments-doc ttf-bitstream-vera
python-pyparsing-doc bind9 bind9utils ctdb ldb-tools ntp | chrony
smbldap-tools winbind
The following NEW packages will be installed:
attr ibverbs-providers libboost-iostreams1.71.0 libboost-thread1.71.0
libcephfs2 libibverbs1 librados2 librdmacm1 python3-dnspython
python3-markdown python3-packaging python3-pygments python3-pyparsing s
amba
samba-vfs-modules tdb-tools
0 upgraded, 16 newly installed, 0 to remove and 0 not upgraded.
Need to get 6,745 kB of archives.
After this operation, 44.9 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-dnspyt
hon all 1.16.0-1build1 [89.1 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 tdb-tools amd6
4 1.4.2-3build1 [24.9 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 samba
amd64 2:4.11.6+dfsg-0ubuntu1.5 [971 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 attr amd64 1:2
.4.48-5 [21.9 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libibverbs1 am
d64 28.0-1ubuntu1 [53.6 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal/main amd64 ibverbs-provid
ers amd64 28.0-1ubuntu1 [232 kB]
```

Starting the samba services

```
cyanide@veronica:~/Desktop$ sudo systemctl start smbd
cyanide@veronica:~/Desktop$ sudo systemctl status smbd
● smbd.service - Samba SMB Daemon
   Loaded: loaded (/lib/systemd/system/smbd.service; enabled; vendor p>
   Active: active (running) since Mon 2020-10-12 18:08:41 IST; 2min 56s
     Docs: man:smbd(8)
           man:samba(7)
           man:smb.conf(5)
   Main PID: 2698 (smbd)
      Status: "smbd: ready to serve connections..."
        Tasks: 4 (limit: 1936)
       Memory: 14.5M
      CGroup: /system.slice/smbd.service
              └─2698 /usr/sbin/smbd --foreground --no-process-group
                ├─2700 /usr/sbin/smbd --foreground --no-process-group
                ├─2701 /usr/sbin/smbd --foreground --no-process-group
                └─2702 /usr/sbin/smbd --foreground --no-process-group

Oct 12 18:08:40 veronica systemd[1]: Starting Samba SMB Daemon...
Oct 12 18:08:40 veronica update-apparmor-samba-profile[2692]: grep: /etc/>
Oct 12 18:08:40 veronica update-apparmor-samba-profile[2695]: diff: /etc/>
Oct 12 18:08:41 veronica systemd[1]: Started Samba SMB Daemon.
```

Allow Samba service from firewall

```
cyanide@veronica:~/Desktop$ sudo ufw allow 'Samba'
Rules updated
Rules updated (v6)
```

Test the parameters of the smb.conf file

```
cyanide@veronica:/etc/samba$ nano smb.conf
cyanide@veronica:/etc/samba$ testparm
Load smb config files from /etc/samba/smb.conf
Loaded services file OK.
Server role: ROLE_STANDALONE

Press enter to see a dump of your service definitions

# Global parameters
[global]
    log file = /var/log/samba/log.%m
    logging = file
    map to guest = Bad User
    max log size = 1000
    obey pam restrictions = Yes
    pam password change = Yes
    panic action = /usr/share/samba/panic-action %d
    passwd chat = *Enter\snew\s*\spassword:* %n\n *Retype\snew\s*\spassword:*
    * %n\n *password\supdated\ssuccessfully* .
    passwd program = /usr/bin/passwd %u
    server role = standalone server
    server string = %h server (Samba, Ubuntu)
    unix password sync = Yes
    usershare allow guests = Yes
    idmap config * : backend = tdb

[printers]
    browseable = No
    comment = All Printers
    create mask = 0700
    path = /var/spool/samba
    printable = Yes

[print$]
```

Restart the samba services

```
cyanide@veronica:/etc/samba$ sudo systemctl restart smbd
[sudo] password for cyanide:
```

Creating a normal user named pablo

```
cyanide@veronica:/etc/samba$ sudo systemctl restart smbd
[sudo] password for cyanide:
cyanide@veronica:/etc/samba$ cd
cyanide@veronica:~$ sudo mkdir /samba
cyanide@veronica:~$ sudo chgrp sambashare /samba
```

```
cyanide@veronica:~$ sudo useradd -M -d /samba/pablo -s /usr/sbin/nologin  
-G sambashare pablo  
cyanide@veronica:~$ sudo mkdir /samba/pablo  
cyanide@veronica:~$ sudo chown pablo:sambashare /samba/pablo
```

```
cyanide@veronica:~$ sudo chmod 2770 /samba/pablo
```

Setting up the Password for pablo

```
cyanide@veronica:~$ sudo smbpasswd -a pablo  
New SMB password:  
Retype new SMB password:  
Added user pablo.  
cyanide@veronica:~$ sudo smbpasswd -e pablo  
Enabled user pablo.
```

Creating a Admin user

```
cyanide@veronica:~$ sudo useradd -M -d /samba/users -s /usr/sbin/nologin  
-G sambashare sadmin  
cyanide@veronica:~$ sudo smbpasswd -a sadmin  
New SMB password:  
Retype new SMB password:  
Added user sadmin.  
cyanide@veronica:~$ sudo smbpasswd -e pablo  
Enabled user pablo.  
cyanide@veronica:~$ sudo smbpasswd -e sadmin  
Enabled user sadmin.  
cyanide@veronica:~$ sudo mkdir /samba/users  
cyanide@veronica:~$ sudo chown sadmin:sambashare /samba/users  
cyanide@veronica:~$ sudo chmod 2770 /samba/users
```

Add this configuration lines in smb.conf file

```
GNU nano 4.8                      smb.conf
create mask = 0700

# Windows clients look for this share name as a source of downloadable
# printer drivers
[print$]
comment = Printer Drivers
path = /var/lib/samba/printers
browseable = yes
read only = yes
guest ok = no
# Uncomment to allow remote administration of Windows print drivers.
# You may need to replace 'lpadmin' with the name of the group your
# admin users are members of.
# Please note that you also need to set appropriate Unix permissions
# to the drivers directory for these users to have write rights in it
;   write list = root, @lpadmin

[users]
path = /samba/users
browseable = yes
read only = no
force create mode = 0660
force directory mode = 2770
valid users = @sambashare @sadmin

[pablo]
path = /samba/pablo
browseable = no
read only = no
force create mode = 0660
force directory mode = 2770
valid users = pablo @sadmin
```

Again Restart the samba services and Installing smbclient from terminal

```
cyanide@veronica:~$ sudo systemctl restart smbd
cyanide@veronica:~$ sudo systemctl restart nmbd
cyanide@veronica:~$ sudo apt-get install smbclient
Reading package lists... Done
Building dependency tree
Reading state information... Done
smbclient is already the newest version (2:4.11.6+dfsg-0ubuntu1.5).
smbclient set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

Login into smb server by smbclient and test some commands

```
cyanide@veronica:~$ smbclient //localhost/pablo -U pablo
Enter WORKGROUP\pablo's password:
Try "help" to get a list of possible commands.
smb: \> pwd
Current directory is \\localhost\pablo\
smb: \> mkdir FU_test
NT_STATUS_ACCESS_DENIED making remote directory \FU_test
smb: \> sudo mkdir FU_test
sudo: command not found
smb: \> ls
.
D          0  Mon Oct 12 18:36:39 202
0
..
D          0  Mon Oct 12 18:43:45 202
0

          19992176 blocks of size 1024. 12397648 blocks available
smb: \> exit
```

## Results:

The package management system is studied and executed.

## Video :

<https://drive.google.com/file/d/1W6080uAKcpOKQUY3bIXyj67xxT4hqKRS/view?usp=sharing>

**Date:** 25.08.20

---

**Aim:**

To study and implement the git and git repository.

**Description:**

**The Linux Kernel :**

**GitHub** is a Git repository hosting service, but it adds many of its own features. While Git is a command line tool, **GitHub** provides a Web-based graphical interface. It also provides access control and several collaboration features, such as a wikis and basic task management tools for every project.

**GitHub** is a website for developers and programmers to collaboratively work on code. The primary benefit of **GitHub** is its version control system, which allows for seamless collaboration without compromising the integrity of the original project.

**COMMANDS:**

Sl. No.	COMMAND	DESCRIPTION
1.	git init	Initialize git repository
2.	git add filename	To add individual files
3.	git add *	To add all files
4.	git status	To see the added files status
5.	git commit -m "text"	Added text note with added file
6.	git remote add origin path	To link the files to the github repository
7.	git push -u origin master	To push files into the repository

## Exercise

### Create repository and uploading files in github

#### Step 1 :

Installing git

```
cyanide@veronica:~/Desktop$ sudo apt install git
[sudo] password for cyanide:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  git-man liberror-perl
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-el git-email git-gui
  gitk gitweb git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  git git-man liberror-perl
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 5,464 kB of archives.
After this operation, 38.4 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 liberror-perl
all 0.17029-1 [26.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 git-man all 1:
2.25.1-1ubuntu3 [884 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/main amd64 git amd64 1:2.
25.1-1ubuntu3 [4,554 kB]
Fetched 5,464 kB in 3s (1,954 kB/s)
```

#### Step 2 :

Check version

```
cyanide@veronica:~/Desktop$ git --version
git version 2.25.1
```

## Step 3 :

Initializing git

```
cyanide@veronica:~/Desktop$ git add *
cyanide@veronica:~/Desktop$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   R1.png
    new file:   R2.png
    new file:   mate-screenshot.desktop
```

## Step 4 :

Adding files and checking status

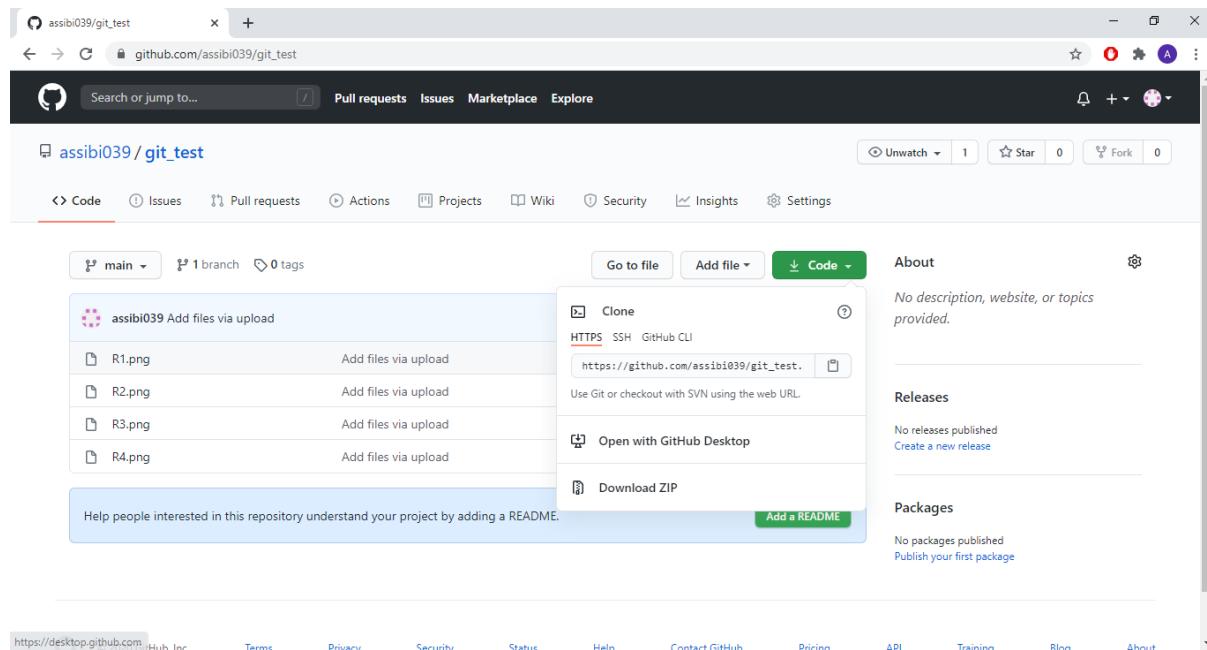
```
cyanide@veronica:~/Desktop$ git remote add origin https://github.com/assibi039/git_test.git
fatal: remote origin already exists.
cyanide@veronica:~/Desktop$ git branch -M main
cyanide@veronica:~/Desktop$ git push -u origin main
Username for 'https://github.com': assibi039
Password for 'https://assibi039@github.com':
Enumerating objects: 7, done.
Counting objects: 100% (7/7), done.
Delta compression using up to 4 threads
Compressing objects: 100% (6/6), done.
Writing objects: 100% (7/7), 99.41 KiB | 3.11 MiB/s, done.
Total 7 (delta 0), reused 0 (delta 0)
remote:
remote: Create a pull request for 'main' on GitHub by visiting:
remote:     https://github.com/assibi039/OST_Lab/pull/new/main
remote:
To https://github.com/assibi039/OST_Lab.git
 * [new branch]      main -> main
Branch 'main' set up to track remote branch 'main' from 'origin'.
cyanide@veronica:~/Desktop$
```

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---

## Step 5 :

Checking repository



## Github link :

[https://github.com/assibi039/git\\_test.git](https://github.com/assibi039/git_test.git)

## Results:

The study and implementation of the git and git repository is studied and executed.

## Video link :

[https://drive.google.com/file/d/14mpa02e64BUqCDtwl4RZ\\_UMYykV2tY18/view?usp=sharing](https://drive.google.com/file/d/14mpa02e64BUqCDtwl4RZ_UMYykV2tY18/view?usp=sharing)

Ex 7

Basic Python Programming

Date: 06.10.2020

---

Aim:

To study and implement the basic python programming.

## Exercise

### 1. Design and implement a basic calculator.

#### Source Code :

```
n=4
while(n>0):
    a = int(input("enter the first number :"))
    b = int(input("enter the second number :"))
    c = int(input("enter the operation you want :\n 1.Add \n 2.Sub \n 3.Mul \n 4.Div \n"))
    if c==1:
        print(a+b)
    elif c==2:
        print(a-b)
    elif c==3:
        print(a*b)
    elif c==4:
        print(a/b)
    else:
        print("choose the correct operation _ ")
    n=n-1
```

## Output :

```
enter the first number :2
enter the second number :3
enter the operation you want :
 1.Add
 2.Sub
 3.Mul
 4.Div
1
5
enter the first number :4
enter the second number :5
enter the operation you want :
 1.Add
 2.Sub
 3.Mul
 4.Div
2
-1
enter the first number :6
enter the second number :7
enter the operation you want :
 1.Add
 2.Sub
 3.Mul
 4.Div
3
42
enter the first number :8
enter the second number :9
enter the operation you want :
 1.Add
 2.Sub
 3.Mul
 4.Div
4
0.8888888888888888
>>> |
```

---

## 2. Find whether the given number is perfect or not.

### Source Code :

```
Number = int(input(" Please Enter any Number: "))
Sum = 0
for i in range(1, Number):
    if(Number % i == 0):
        Sum = Sum + i
if (Sum == Number):
    print("%d is a Perfect Number" %Number)
else:
    print("%d is not a Perfect Number" %Number)
```

## Output :

```
Please Enter any Number: 6
6 is a Perfect Number
>>>
=====
RESTART: C
Please Enter any Number: 28
28 is a Perfect Number
>>>
=====
RESTART: C
Please Enter any Number: 100
100 is not a Perfect Number
>>> |
```

3. Find whether the given number is Adam's number or not.

## Source Code :

```
def isAdam(num):
    n = num
    rev = 0
    while n != 0:
        rev = rev * 10 + n % 10
        n = n // 10
    sn = num ** 2
    sr = rev ** 2
    n = sr
    rev = 0
    while n != 0:
        rev = rev * 10 + n % 10
        n = n // 10
    return sn == rev

num = int(input("Enter the number: "))
if isAdam(num):
    print(str(num) + " is an Adam Number.")
else:
    print(str(num) + " is NOT an Adam Number.")
```

## Output :

```
...
===== RESTAR
Enter the number: 1
1 is an Adam Number.
>>>
===== RESTAR
Enter the number: 12
12 is an Adam Number.
>>>
===== RESTAR
Enter the number: 13
13 is an Adam Number.
>>>
===== RESTAR
Enter the number: 14
14 is NOT an Adam Number.
>>> |
```

#### 4. Write a program to check whether the given number is Armstrong or not.

##### Source Code :

```
num = int(input("Enter a number: "))
sum = 0
temp = num

while temp > 0:
    digit = temp % 10
    sum += digit ** 3
    temp //= 10

if num == sum:
    print(num,"is an Armstrong number")
else:
    print(num,"is not an Armstrong number")
```

##### Output :

```
-----  
1 Enter a number: 153  
1 153 is an Armstrong number  
2 >>>  
1 ===== RESTART: C:/  
1 Enter a number: 371  
1 371 is an Armstrong number  
2 >>>  
1 ===== RESTART: C:/  
1 Enter a number: 200  
1 200 is not an Armstrong number  
2 >>> |
```

## Results:

The study and implementation of the basic python programming are studied and executed.

Video : [https://drive.google.com/file/d/16Cd1Y4s7vngYw1MbZaa5H\\_JeYG4\\_Ifs-/view?usp=sharing](https://drive.google.com/file/d/16Cd1Y4s7vngYw1MbZaa5H_JeYG4_Ifs-/view?usp=sharing)

**Aim:**

To execute basic Perl programs

**Description:**

Perl is a family of two high-level, general-purpose, interpreted, dynamic programming languages. "Perl" refers to Perl 5, but from 2000 to 2019 it also referred to its redesigned "sister language", Perl 6, before the latter's name was officially changed to Raku in October 2019.

A Perl script can be created inside of any normal simple-text editor program. There are several programs available for every type of platform. There are many programs designed for programmers available for download on the web.

Perl uses the backslash (\) character to escape any type of character that might interfere with our code. Let's take one example where we want to print double quote

**QUESTION 1: Perform arithmetic operations using perl****PROCEDURE:**

6. Get two number inputs
7. Perform addition operation and display
8. Perform subtraction operation and display
9. Perform multiplication operation and display
10. Perform division operation and display
11. Perform modulus operation and display

**Output:**

```
1 print "Enter 2 numbers\n";
2 $a = <STDIN>;
3 $b = <STDIN>;
4
5 $c = $a + $b;
6 print 'Value of $a + $b = ' . $c . "\n";
7
8 $c = $a - $b;
9 print 'Value of $a - $b = ' . $c . "\n";
10
11 $c = $a * $b;
12 print 'Value of $a * $b = ' . $c . "\n";
13
14 $c = $a / $b;
15 print 'Value of $a / $b = ' . $c . "\n";
16
17 $c = $a % $b;
18 print 'Value of $a % $b = ' . $c . "\n";
19
20 $a = 2;
21 $b = 4;
22 $c = $a ** $b;
23 print 'Value of $a ** $b = ' . $c . "\n";
24
```

Execute Mode, Version, Inputs & Arguments  
Stdin Inputs  
5.30.0 10  
Interactive 20  
CommandLine Arguments  
Execute

Result  
CPU Time: 0.00 sec(s), Memory: 5476 kilobyte(s)

```
Enter 2 numbers
Value of $a + $b = 30
Value of $a - $b = -10
Value of $a * $b = 200
Value of $a / $b = 0.5
Value of $a % $b = 10
Value of $a ** $b = 16
```

**QUESTION 2:** Demonstrate all the escape sequences using print and say statement.

### PROCEDURE:

1. Print text on new line
2. Print text with @
3. Print text with \$
4. Print text with double quote
5. Print text with qq
6. Print text with q

### Output:

1. \n newline

The screenshot shows a terminal window with the following interface elements:

- A code editor area containing Perl code:

```
1 use 5.010;
2
3 print("hello \nbye");
4
5 say "sibi \nboy";
6
```

- An "Execute Mode, Version, In" dropdown set to "5.30.0".
- A "CommandLine Arguments" input field.
- A status bar at the bottom showing "sult" and "U Time: 0.00 sec(s), Memory: 50".
- A black output window displaying the results of the code execution:

```
hello
byesibi
boy
```

## 2. Include @

A screenshot of a Perl script editor. The code is:

```
1 use 5.010;
2
3 print "1. sibi@gmail.com";
4
5 print "2. sibi@gmail.com";
6
7 say "3. sibi@gmail.com";
8
9 say "4. sibi@gmail.com";
10
```

The editor has tabs for "Execute Mode, Version, Inputs & Arguments" and "CommandLine Arguments". The version is set to 5.30.0. The output window shows the results of the script execution:

```
:ult
I Time: 0.00 sec(s), Memory: 5212 kilobyte(s)
1. sibi.com2. sibi@gmail.com3. sibi.com
4. sibi@gmail.com
```

## 3. \$ sign

A screenshot of a Perl script editor. The code is:

```
1 use 5.010;
2
3 print "1. I have $2";
4
5 print "2. I have \$2";
6
7 say "3. I have $2";
8
9 say "4. I have \$2";
10
```

The editor has tabs for "Execute Mode, Version, Inputs & Arguments" and "CommandLine Arguments". The version is set to 5.30.0. The output window shows the results of the script execution:

```
:ult
I Time: 0.00 sec(s), Memory: 5132 kilobyte(s)
1. I have 2. I have $23. I have
4. I have $2
```

## 4. Double quotes “”

```
1 use 5.010;
2
3 print "1. He said \"I'm good\"";
4
5 #print "2. He said \"I'm good\"; #error
6
7 say "3. He said \"I'm good\"";
8
9 #say "4. He said \"I'm good\";#error
10
```

Execute Mode, Version, Inputs & Arguments  
5.30.0 ▾  
CommandLine Arguments

result  
Time: 0.00 sec(s), Memory: 5416 kilobyte(s)  
1. He said "I'm good"3. He said "I'm good"

## 5. Double qq

We can replace the double quotes that we use to enclose a string with the double q operator.

The advantage of doing this is that we need not to worry about using escape sequences for double quotes(") and brackets.

See I have not used the escape sequences for the double quotes and brackets.

```
1 use 5.010;
2
3 use strict;
4
5 use warnings;
6
7 my $name = 'sibi';
8
9 print qq(My name is "$name" and I like brackets ()\n);
```

Execute Mode, Version, Inputs & Arguments  
5.30.0 ▾  
CommandLine Arguments

result  
Time: 0.00 sec(s), Memory: 5836 kilobyte(s)  
My name is "sibi" and I like brackets ()

## 6. Single q operator – q

Single q operator works like single quotes. The special characters present inside it does not interpolate.

```
1 use 5.010;
2
3 use strict;
4
5 use warnings;
6
7 my $name = 'sibi';
8
9 print q(My name is "$name" and I like brackets ()\n);
```



## QUESTION 3: Online shopping application

### PROCEDURE:

1. Get option from user
2. Get quantity from user
3. Go to respective case and calculate cost (item cost\*quantity)
4. Display total cost

### Output:

```
1 # Online shopping application
2 print("Enter the item:\n 1.Top (Rs 100/-) \n 2.Dress (Rs 200/-) \n 3.Pants (Rs 150/-) \n 4.Shoes (Rs 250/-) \n 5.Skirt (Rs 150/-)\n");
3 $c = <STDIN>;
4 print("Enter quantity\n");
5 $a = <STDIN>;
6 if ($c == 1)
7 {
8     $cost = $a * 100;
9     print("Cost of Tops: Rs $cost\n");
10 }
11 elsif ($c == 2)
12 {
13     $cost = $a*200;
14     print("Cost of dress: Rs $cost\n");
15 }
16 elsif ($c == 3)
17 {
18     $cost = $a * 150;
19     print("Cost of pants: Rs $cost\n");
20 }
21 elsif ($c == 4)
22 {
23     $cost = $a *250;
24     print("Cost of Shoes: Rs $cost\n");
25 }
26 elsif ($c == 5)
27 {
28     $cost = $a*150;
29     print("Cost of skirt: Rs $cost\n");
30 }
31 else
32 {
33     print("Invalid Option");
34 }
```

Execute Mode, Version, Inputs & Arguments  
Stdin  
5.30.0  
Interactive  
2  
5  
CommandLine Arguments  
Execute  
Result  
CPU Time: 0.00 sec(s), Memory: 4984 kilobyte(s)  
Enter the item:  
1.Top (Rs 100/-)  
2.Dress (Rs 200/-)  
3.Pants (Rs 150/-)  
4.Shoes (Rs 250/-)  
5.Skirt (Rs 150/-)  
Enter quantity  
Cost of dress: Rs 1000

## QUESTION 4: Demonstrate arithmetic assignment operators in perl

### PROCEDURE:

1. Get two values from user
2. Use increment operator ( $+=$ ) and display the value
3. Use decrement operator ( $-=$ ) and display the value
4. Use multiplication operator ( $*=$ ) and display the value
5. Use division operator ( $/=$ ) and display the value
6. Use modulo operator ( $\% =$ ) and display the value
7. Use power operator ( $**=$ ) and display the value

## Output:

```
1  #!/usr/local/bin/perl
2
3  $a = 10;
4  $b = 20;
5
6  print "Value of \$a = $a and value of \$b = $b\n";
7
8  $c = $a + $b;
9  print "After assignment value of \$c = $c\n";
10
11 $c += $a;
12 print "Value of \$c = $c after statement \$c += \$a\n";
13
14 $c -= $a;
15 print "Value of \$c = $c after statement \$c -= \$a\n";
16
17 $c *= $a;
18 print "Value of \$c = $c after statement \$c *= \$a\n";
19
20 $c /= $a;
21 print "Value of \$c = $c after statement \$c /= \$a\n";
22
23 $c %= $a;
24 print "Value of \$c = $c after statement \$c %= \$a\n";
25
26 $c = 2;
27 $a = 4;
28 print "Value of \$a = $a and value of \$c = $c\n";
29 $c **= $a;
30 print "Value of \$c = $c after statement \$c **= \$a\n";
```

Execute Mode, Version, Inputs & Arguments  
5.30.0

CommandLine Arguments

Result

Time: 0.00 sec(s), Memory: 5480 kilobyte(s)

```
Value of $a = 10 and value of $b = 20
After assignment value of $c = 30
Value of $c = 40 after statement $c += $a
Value of $c = 30 after statement $c -= $a
Value of $c = 300 after statement $c *= $a
Value of $c = 30 after statement $c /= $a
Value of $c = 8 after statement $c %= $a
Value of $a = 4 and value of $c = 2
Value of $c = 16 after statement $c **= $a
```

Video Link: <https://drive.google.com/file/d/1KDcZBlf0kWflP1aMiC4LiX84PR-Sgu4c/view?usp=sharing>

## RESULT:

Basic perl programs are successfully executed.

Ex 9. FUNDEMENTAL OPERATIONS OF PERL

10-11-2020

**Aim:**

To execute basic Perl programs

**Description:**

**ARRAYS IN PERL:**

An array is a variable that stores an ordered list of scalar values. Array variables are preceded by an "at" (@) sign. To refer to a single element of an array, you will use the dollar sign (\$) with the variable name followed by the index of the element in square brackets.

```
@ages = (25, 30, 40);  
  
@names = ("John Paul", "Lisa", "Kumar");  
  
print "\$ages[0] = $ages[0]\n";  
print "\$ages[1] = $ages[1]\n";  
print "\$ages[2] = $ages[2]\n";  
print "\$names[0] = $names[0]\n";  
print "\$names[1] = $names[1]\n";  
print "\$names[2] = $names[2]\n";
```

**ARITHMETIC OPERATIONS OF PERL:**

Sl.No.	Operator & Description
1	+ ( Addition )

	<b>Example</b> – \$a + \$b will give 30
2	<b>- (Subtraction)</b> <b>Example</b> – \$a - \$b will give -10
3	<b>* (Multiplication)</b> <b>Example</b> – \$a * \$b will give 200
4	<b>/ (Division)</b> <b>Example</b> – \$b / \$a will give 2
5	<b>% (Modulus)</b> <b>Example</b> – \$b % \$a will give 0
6	<b>** (Exponent)</b> <b>Example</b> – \$a**\$b will give 10 to the power 20

## QUESTION 1: Demonstrate various operators in perl.

### PROCEDURE:

12. Get choice from user for arithmetic, comparison, string, bitwise operation
13. If arithmetic operation then choice operation
14. Perform operation and print the value
15. If comparison operation
16. Enter 2 values
17. Check if values are equal or greater than or less than
18. Print the output
19. If string operation then enter two strings
20. Perform concatenation operation and print the result
21. If bitwise operation then enter two values
22. Perform bitwise &, |, <<, >> and print the value

### Source code:

```
# Perl operators
```

```
print("Choose an option: \n 1.Arithmetic operation \n 2.Comparision operation\n 3.String Operation \n 4.Bitwise Operation\n");
$c = <STDIN>;
if ($c == 1)
{
    print("ARITHMETIC OPERATIONS\n");
    print("Enter two values\n");
    $a = <STDIN>;
    $b = <STDIN>;
    print("Choose an option: \n 1.Addition \n 2.Subtraction\n 3.multiplication \n 4.Division \n
5.Modulus\n");
    $op = <STDIN>;
    if($op == 1)
    {
        $tot = $a+$b;
        print("Sum of numbers: $tot\n");
    }
    elseif ($op ==2)
    {
        $tot = $a-$b;
        print("Difference between both values: $tot\n");
    }
    elseif ($op == 3)
    {
        $tot = $a*$b;
        print("Product of both the numbers: $tot\n");
    }
    elseif ($op == 4)
    {
        $tot = $a/$b;
        print("Qoutinent of both the numbers: $tot\n");
    }
    elseif ($op == 5)
    {
        $tot = $a%$b;
        print("Modulus of both the numbers: $tot\n");
    }
    else
    {
        print ("Invalid Option\n");
    }
}
elseif ($c == 2)
{
    print("COMPARISION OPERATION\n");
    print("Enter two values\n");
    $a = <STDIN>;
    $b = <STDIN>;
```

```
if($a == $b)
{
    print("The values are equal\n");
}
elsif($a >$b)
{
    print ("Greater value: $a\n");
    print ("Lower values: $b\n");
}
else
{
    print("Lower value: $a\n");
    print("Greater value: $b\n")
}
if($a != $b)
{
    print("Both values are not equal\n");
}

}
elseif ($c == 3)
{
    print("STRING OPERATION\n");
    print("Enter two strings\n");
    $x = <STDIN>;
    $y = <STDIN>;
    $z = $x.$y;
    print("Conactenated String: $z");
}
elsif ($c == 4)
{
    print("BITWISE OPERATOR\n");
    print("Enter two values\n");
    $a = <STDIN>;
    $b = <STDIN>;
    $and = $a &$b;
    print("Performing bitwise AND: $and\n");
    $or = $a|$b;
    print("Printing bitwise OR: $or");
    $left = $a<<2;
    print("Performing left shift: $left");
    $right = $a>>2;
    print("Performing right shift: $right");
}
else
{
    print("Invalid Operation");
}
```

## Output:

The screenshot shows a Perl script being run in an IDE. The code handles arithmetic operations based on user input. The interface includes tabs for 'Execute Mode, Version, Inputs & Arguments' and 'Stdin Inputs'. The 'Stdin Inputs' tab shows values 1, 30, 20, and 1 entered. The 'Execute' button is visible. The 'Result' tab displays the program's output, which includes a menu of options (1.Arithmetic operation, 2.Comparision operation, 3.String Operation, 4.Bitwise Operation), a section for 'ARITHMETIC OPERATIONS', and a final output 'Sum of numbers: 50'.

```
1 # Perl operators
2 print("Choose an option: \n 1.Arithmetic operation \n 2.Comparision operation\n 3.String Operation \n 4.Bitwise Operation");
3 $c = <STDIN>;
4 if ($c == 1)
5 {
6     print("ARITHMETIC OPERATIONS\n");
7     print("Enter two values\n");
8     $a = <STDIN>;
9     $b = <STDIN>;
10    print("Choose an option: \n 1.Addition \n 2.Subtraction\n 3.multiplication \n 4.Division \n 5.Modulus\n");
11    $op = <STDIN>;
12    if($op == 1)
13    {
14        $tot = $a+$b;
15        print("Sum of numbers: $tot\n");
16    }
17    elsif ($op == 2)
18    {
19        $tot = $a-$b;
20        print("Difference between both values: $tot\n");
21    }
22    elsif ($op == 3)
23    {
24        $tot = $a*$b;
25        print("Product of both the numbers: $tot\n");
26    }
27    elsif ($op == 4)
28    {
29        $tot = $a/$b;
30        print("Quotient of both the numbers: $tot\n");
31    }
32    elsif ($op == 5)
33    {
34        $tot = $a%$b;
35        print("Modulus of both the numbers: $tot\n");
36    }
37    else
38    {
39        print ("Invalid Option\n");
40 }
```

## QUESTION 2: Print 10 inputs received from the user.

### PROCEDURE:

7. Create a for loop that executes from 0 to 9
8. Input values into an array
9. Print the array

### Source code :

```
print ("Enter 10 values\n");
for ($i =0; $i<10;$i++)
{
```

```
$arr[$i]<STDIN>;  
}  
print("THE VALUES:\n");  
for ($i =0; $i<10;$i++)  
{  
    print $arr[$i];  
}
```

## Output:

▼ Execute Mode, Version, Inputs & Arguments

Stdin Inputs  
5.30.0  
Interactive

CommandLine Arguments

5  
10  
15  
20  
25  
30  
35  
40

Execute ... ↻

result  
PU Time: 0.00 sec(s), Memory: 4976 kilobyte(s)

```
Enter 10 values
THE VALUES:
5
10
15
20
25
30
35
40
45
50
```

Video Link: <https://drive.google.com/file/d/1hvHrm0eHPGRUBuVP6xzptAeLY5Db-E8G/view?usp=sharing>

## RESULT:

Basic perl programs are successfully executed.

---

**Ex 10                    KERNEL INSTALLATION**  
**Date: 17.11.20**

---

**Aim:**

To study and implement the kernel installation.

**Description:**

**Kernel Space:**

Here, the Linux Kernel exists which can be further divided into three levels. At the top is the system call interface, which implements the basic functions such as read and write. Below the system call interface is the kernel code, which can be more accurately defined as the architecture-independent kernel code. This code is common to all of the processor architectures supported by Linux. Below this is the architecture-dependent code, which forms what is more commonly called a BSP (Board Support Package). This code serves as the processor and platform-specific code for the given architecture.

Sl. No .	Command Name	Meaning	Description
1	<b>rpm -qa kernel-devel</b>	It displays the version of the kernel.	Kernel-devel - This package provides kernel headers and makes files sufficient to build modules against the kernel package.
2	<b>uname -r</b>	uname displays the information about the system.	The command ‘uname‘ displays the information about the system. <b>option :</b> -a It prints all the system information in the following order: Kernel name, network node hostname, kernel release date, kernel version, machine hardware name, hardware platform, operating system

			<ul style="list-style-type: none"> <li>-s It prints the kernel name.</li> <li>-n It prints the hostname of the network node</li> <li>-r It prints the kernel release date</li> <li>-v It prints the version of the current kernel</li> </ul>
3	<b>tar</b>	tar stands for tape archive, is used to create Archive and extract the Archive files	<p><b>tar</b> command in Linux is one of the important commands which provides archiving functionality in Linux. We can use Linux tar command to create compressed or uncompressed Archive files and also maintain and modify them. <b>Options:</b></p> <ul style="list-style-type: none"> <li>-c : Creates Archive</li> <li>-x : Extract the archive</li> <li>-f : creates archive with given filename</li> <li>-t : displays or lists files in archive file</li> <li>-u : archives and adds to an existing archive file</li> <li>-v : Displays Verbose Information</li> <li>-A : Concatenates the archive files</li> <li>-z : zip, tells tar command that create tar file using gzip</li> <li>-j : filter archive tar file using tbzip</li> <li>-W : Verify a archive file</li> <li>-r : update or add file or directory in already existed .tar file</li> </ul>
4	<b>ln</b>	A symbolic link, also known as a symlink or soft link, is a special type of file that points to another file or directory.	There are two types of links in Linux/UNIX systems: 1. Hard links 2. Soft links

## Exercise

### Step 1 :

Check the current kernel version and name of the kernel.

```
cyanide@friday:/proc$ cat version
Linux version 5.4.0-42-generic (buildd@lgw01-amd64-038) (gcc version 9.3.0 (Ubuntu 9.3.0-10ubuntu2)) #46-Ubuntu SMP Fri Jul 10 00:24:02 UTC 2020
```

```
cyanide@friday:/proc$ uname -r  
5.4.0-42-generic
```

## Step 2 :

Building kernel and its modules.

### Output:

Moving the kernel to /usr/src

```
cyanide@friday:/usr/src$ sudo cp /home/cyanide/Downloads/linux-5.8.5.tar.xz .  
[sudo] password for cyanide:  
cyanide@friday:/usr/src$ ls  
linux-5.8.5.tar.xz  linux-headers-5.4.0-42  linux-headers-5.4.0-42-generic
```

Cleaning the kernel using make

```
cyanide@friday:/usr/src/linux-5.8.5$ sudo make clean
```

System link to existing kernel

```
cyanide@friday:~$ sudo ln -s /usr/src/linux-5.8.5 /usr/src/linux-headers-5.4.0-42-generic  
/
```

```
cyanide@friday:/usr/src$ cd linux-5.8.5/  
cyanide@friday:/usr/src/linux-5.8.5$ sudo make mrproper
```

Making target files

```
cyanide@friday:/usr/src/linux-5.8.5$ sudo make menuconfig
YACC    scripts/kconfig/parser.tab.[ch]
HOSTCC  scripts/kconfig/lexer.lex.o
HOSTCC  scripts/kconfig/parser.tab.o
HOSTCC  scripts/kconfig/preprocess.o
HOSTCC  scripts/kconfig/symbol.o
HOSTCC  scripts/kconfig/util.o
HOSTLD  scripts/kconfig/mconf
scripts/kconfig/mconf  Kconfig
#
# using defaults found in /boot/config-5.4.0-42-generic
#
/boot/config-5.4.0-42-generic:3815:warning: symbol value 'm' invalid for ISDN_CAPI
/boot/config-5.4.0-42-generic:8245:warning: symbol value 'm' invalid for ASHMEM
/boot/config-5.4.0-42-generic:9205:warning: symbol value 'm' invalid for ANDROID_BINDER_IPC
/boot/config-5.4.0-42-generic:9206:warning: symbol value 'm' invalid for ANDROID_BINDERFS
/boot/config-5.4.0-42-generic:9274:warning: symbol value 'm' invalid for INTERCONNECT
No change to .config

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.
```

```
cyanide@friday:/usr/src/linux-5.8.5$ sudo make clean
```

New kernel proof

```
cyanide@friday:/usr/src/linux-5.8.5$ sudo make
HOSTCC scripts/sign-file
HOSTCC scripts/extract-cert
HOSTCC scripts/insert-sys-cert
WRAP arch/x86/include/generated/uapi/asm/bpf_perf_event.h
WRAP arch/x86/include/generated/uapi/asm/errno.h
WRAP arch/x86/include/generated/uapi/asm/fcntl.h
WRAP arch/x86/include/generated/uapi/asm/ioctl.h
WRAP arch/x86/include/generated/uapi/asm/ioctls.h
WRAP arch/x86/include/generated/uapi/asm/ipcbuf.h
WRAP arch/x86/include/generated/uapi/asm/param.h
WRAP arch/x86/include/generated/uapi/asm/poll.h
WRAP arch/x86/include/generated/uapi/asm/resource.h
WRAP arch/x86/include/generated/uapi/asm/socket.h
WRAP arch/x86/include/generated/uapi/asm/sockios.h
WRAP arch/x86/include/generated/uapi/asm/termbits.h
WRAP arch/x86/include/generated/uapi/asm/termios.h
WRAP arch/x86/include/generated/uapi/asm/types.h
WRAP arch/x86/include/generated/asm/early_ioremap.h
WRAP arch/x86/include/generated/asm/export.h
WRAP arch/x86/include/generated/asm/mcs_spinlock.h
WRAP arch/x86/include/generated/asm/dma-contiguous.h
WRAP arch/x86/include/generated/asm/irq_regs.h
WRAP arch/x86/include/generated/asm/mm-arch-hooks.h
WRAP arch/x86/include/generated/asm/mmiowb.h
UPD include/config/kernel.release
UPD include/generated/uapi/linux/version.h
UPD include/generated/utsrelease.h
CC scripts/mod/empty.o
HOSTCC scripts/mod/mk_elfconfig
MKELF scripts/mod/elfconfig.h
HOSTCC scripts/mod/modpost.o
CC scripts/mod/devicetable-offsets.s
UPD scripts/mod/devicetable-offsets.h
```

## Results:

The kernel installation is studied and executed.

## Video :

<https://drive.google.com/file/d/1haOTizfE21XrwALTARSU0OefeMpjgDy/view?usp=sharing>