LINUX PROGRAMMING

LABORATORY MANUAL

B.TECH

(III YEAR – I SEM)

(2018-19)

DEPARTMENT OF INFORMATION TECHNOLOGY

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

Recognized under 2(f) and 12 (B) of UGC ACT 1956

Affiliated to JNTUH, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2008 Certified)

Maisammaguda, Dhulapally (Post Via. Hakimpet), Secunderabad – 500100, Telangana State, India

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

- To improve the quality of technical education that provides efficient software engineers with an attitude to adapt challenging IT needs of local, national and international arena, through teaching and interaction with alumni and industry.

MISSION

- Department intends to meet the contemporary challenges in the field of IT and is playing a vital role in shaping the education of the 21st century by providing unique educational and research opportunities.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1 – ANALYTICAL SKILLS

To facilitate the graduates with the ability to visualize, gather information, articulate, analyze, solve complex problems, and make decisions. These are essential to address the challenges of complex and computation intensive problems increasing their productivity.

PEO2 – TECHNICAL SKILLS

To facilitate the graduates with the technical skills that prepare them for immediate employment and pursue certification providing a deeper understanding of the technology in advanced areas of computer science and related fields, thus encouraging to pursue higher education and research based on their interest.

PEO3 – SOFT SKILLS

To facilitate the graduates with the soft skills that include fulfilling the mission, setting goals, showing self-confidence by communicating effectively, having a positive attitude, get involved in team-work, being a leader, managing their career and their life.

PEO4 – PROFESSIONAL ETHICS

To facilitate the graduates with the knowledge of professional and ethical responsibilities by paying attention to grooming, being conservative with style, following dress codes, safety codes, and adapting themselves to technological advancements.

PROGRAM SPECIFIC OUTCOMES (PSOs)

After the completion of the course, B. Tech Information Technology, the graduates will have the following Program Specific Outcomes:

1. **Fundamentals and critical knowledge of the Computer System:-** Able to Understand the working principles of the computer System and its components , Apply the knowledge to build, asses, and analyze the software and hardware aspects of it .

2. **The comprehensive and Applicative knowledge of Software Development:** Comprehensive skills of Programming Languages, Software process models, methodologies, and able to plan, develop, test, analyze, and manage the software and hardware intensive systems in heterogeneous platforms individually or working in teams.

3. **Applications of Computing Domain & Research:** Able to use the professional, managerial, interdisciplinary skill set, and domain specific tools in development processes, identify the research gaps, and provide innovative solutions to them.

PROGRAMOUTCOMES (POs)

Engineering Graduates should possess the following:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design / development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
12. **Life- long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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DEPARTMENT OF INFORMATION TECHNOLOGY

GENERAL LABORATORY INSTRUCTIONS

1. Students are advised to come to the laboratory at least 5 minutes before (to the starting time), those who come after 5 minutes will not be allowed into the lab.
2. Plan your task properly much before to the commencement, come prepared to the lab with the synopsis / program / experiment details.
3. Student should enter into the laboratory with:

a. Laboratory observation notes with all the details (Problem statement, Aim, Algorithm, Procedure, Program, Expected Output, etc.,) filled in for the lab session.

b. Laboratory Record updated up to the last session experiments and other utensils (if any) needed in the lab.

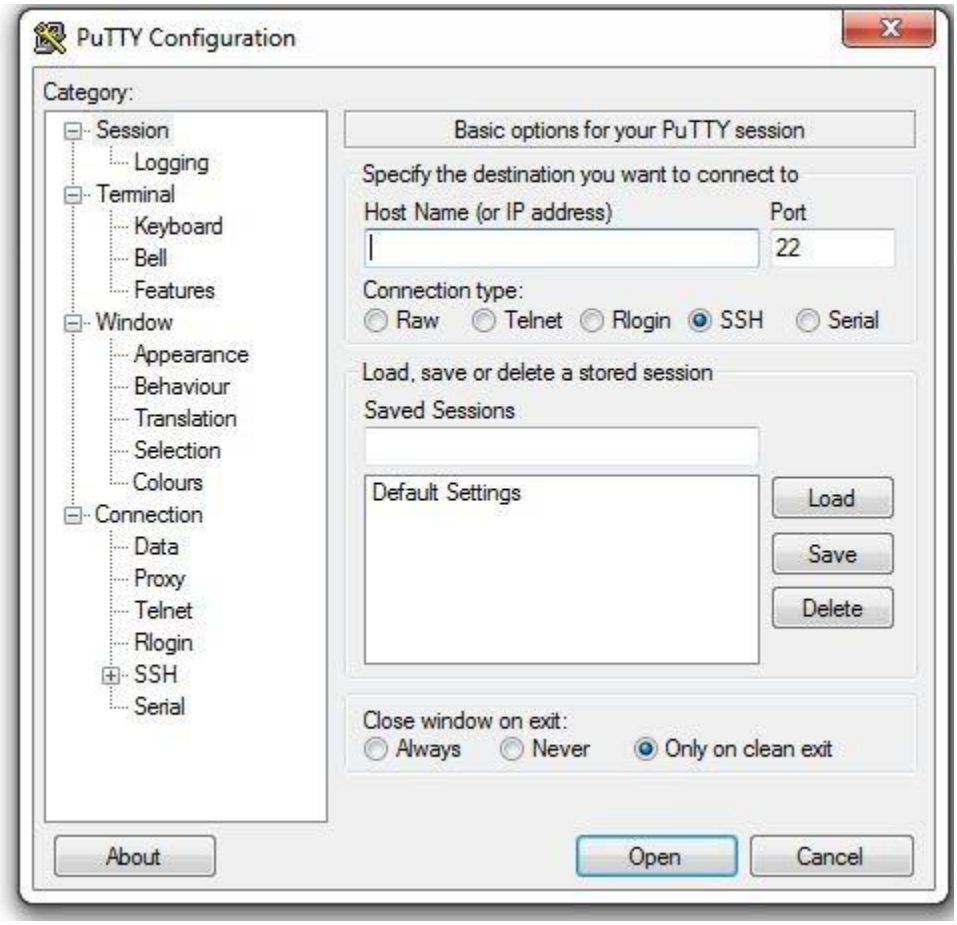
c. Proper Dress code and Identity card.

4. Sign in the laboratory login register, write the TIME-IN, and occupy the computer system allotted to you by the faculty.
5. Execute your task in the laboratory, and record the results / output in the lab observation note book, and get certified by the concerned faculty.
6. All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.
7. Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.
8. Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviors with the staff and systems etc., will attract severe punishment.
9. Students must take the permission of the faculty in case of any urgency to go out; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.
10. Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

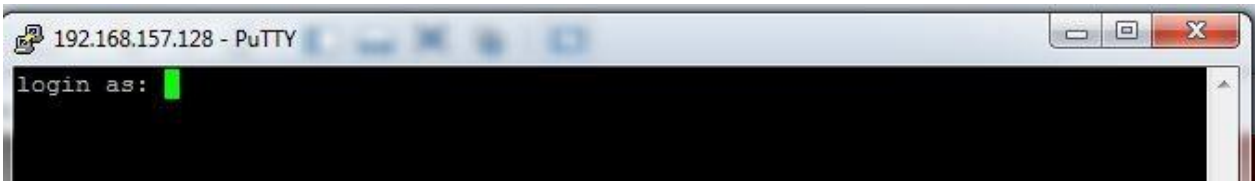
HEAD OF THE DEPARTMENT **PRINCIPAL**

Procedure to connect to LINUX

Step 1:click on putty icon available on desk top. A window is opened



Step 2:fill in ip address of linux server and click open



Step 3: provide login and password (nothing is displayed on screen while typing password)
Step 4:changethe default password at your first login

PROGRAM -1 **Date:**

Aim: Write a Shell Script that accepts a file name, starting and ending line numbers as Arguments and displays all lines between the given line numbers.

ALGORITHM:

Step 1: Create a file with 5-6 lines of data
File can be created by vi sample.dat or cat sample.dat
Step 2:Now write a shell script with
vi 1.sh
step3:Check the no of arguments for shell script
if 0 arguments then print no arguments
else if 1 argument then print 1 argument
else if 2 arguments then print 2 arguments
else check for file is there or not(if file is not there print file does not exists)
1else sed -ne "$2','$3' p' $1
sed is one of powerful filter(stream editor)
-e default option (script on command line)
-n suppresses automatic output
$2 first line number passed $3 2nd line number passed
p is a print command (prints current content to the pattern space).
$1 is name of file from which we are printing data between the line numbers.
Step 4:top

Script Name: 1sh

```
#!/bin/bash
if [ $# -lt 3 ]
then
else file echo "To execute you have to enter 3 arguments in command line in following order..." echo " File

Name ,starting line number and ending line number..."

sed -n $2,$3p $1
```

Commands used in the script:

Sed command:

stream editor for filtering and transforming text

1. Replacing or substituting string

Sed command is mostly used to replace the text in a file. The below simple sed command replaces the word "unix" with "linux" in the file.

$sed 's/unix/linux/' file.txt

2. Replacing the nth occurrence of a pattern in a line

$sed 's/unix/linux/2' file.txt

Replaces 2nd occurrence

3.printing pines for a given range

$sed –n 1,5p hello.txt

Prints first 5 lines in the file hello.txt

nl command:

The nl utility in Linux is used to give number lines of a file on console.

Example:

```
$ nl sort.txt
  1    UK
  2    Australia
  3    Newzealand
  4    Brazil
  5    America
```

Execution:

check how many lines of data in the input file

```
root@localhost sh]# cat hello.txt | nl
1 abc
2 def
3 ghi
4 abc
5 abc
6 cccc
```

Executing Shell script:

run1:

```
[root@localhost sh]# sh 1.sh abc1.txt 2 4
def
ghi
abc
```

compare with the data in the file and output

Viva Questions

1. What is a shell script?
2. How to find current shell name
3. How to switch to another shell
4. How to execute shell Script

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write a shell script to count no of character in a file ,prompt for input file			
2	Write a shell script to count no of character in a file name given in command prompt			
3	Write a shell script to perform arithmetic operation using case statement			

Signature of the F

PROGRAM -: 2 **Date:**

AIM: Write a shell script that deletes all lines containing the specified word in one or more files Supplied as arguments to it.

ALGORITHM:

Step 1: Create a file with 5-6 lines of data
Create the 2 file f1 and f2 as vi s1and vi s2
Step2: Now write a shell script with
vi 2.sh
step3:Check the no of arguments for shell script
if 0 arguments then print no arguments
else pattern=$1(word will be stored in pattern)
for fname in $*
for every filename in given files
if it is a file if [-f $fname] then
print DELETING $pattern FROM $fname
sed '/'$pattern'/d' $fname
sed acts as filter if word is a file in any line that will be deleted
'/' is used to represent regular expressions
'/d' is a delete command in sed
else print file NOT FOUND

Script name: 2.sh

```
#!/bin/bash
if [ $# -lt 2 ]then
        echo "Enter atlest two files as input in command line"
else
        printf "enter a word to find:"
        read word
        for f in $*
        do
                printf "\n In File $f:\n"
                sed /$word/d $f
         done
fi
```

Execution:
run1:
check data in input files

```
[root@localhost sh]# cat abc1.txt
abc
def
ghi
abc
abc
cccc
[root@localhost sh]# cat abc2.txt
abc
```

```
def
ghi
abc
abc
cccc
Executing shell script
[root@localhost sh]# sh 2.sh abc1.txt abc2.txt
enter a word to find:abc
In File abc1.txt:
def
ghi
cccc
In File abc2.txt:
def
ghi
cccc
```

Expected output:

Displays lines from files s1 s2 after deleting the word hi

Viva Questions

1.Explain various loops in shell script
2.Explain grep
3.Explain egep
4.Explain fgep
5. .Explain sed

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write a shell script to count occurrence of a word in a file			
2	Write a shell script to print line numbers in which a particular word has occurred where word is provides as input.			

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PROGRAM -: 3 **Date:**

Aim: Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.

ALGORITHM:

Step1: selects list of files from present working directory
Step 2:check for each file wither its is has read, write and execute permissions if true goto step 3
Step 3: print file
Step 4 :stop

Script name: 3.sh

```
#!/bin/bash
        echo "List of Files which have Read, Write and Execute Permissions in Current Directory are..."
        for file in *
        do
                if [ -r $file -a -w $file -a -x $file ]
                then
                        echo $file
                fi
        done
```

Execution:

$sh 3.sh

Expected output:
by executing above shell script you will get all files which has read ,write and execute
Permissions in current working directory

sample output

```
[root@localhost sh]# sh 3.sh
List of Files which have Read, Write and Execute Permissions in Current Directory are...
        5.sh
        a.out
```

Viva Questions:

1.Display all files in a directory
2.how to use chmod
3.How to change file permissions

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write a shell script to display all file with read or write or execute permissions provide a selection menu			
2	Write a comparison report for using chmod using symbolic representation or octal number representation			
3	Write a shell script to count no of file in current directory with full permissions			

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PROGRAM -: 4 **Date:**

Aim:-Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or directory and reports accordingly. Whenever the argument is a file it reports no of lines present in it

ALGORITHM:

step 1: if arguments are less than 1 print Enter at least one input file name and goto step 9
Step 2: selects list a file from list of arguments provided in command line
Step 3: check for whether it is directory if yes print is directory and goto step 9
step 4: check for whether it is a regular file if yes goto step 5 else goto step 8
Step 5: print given name is regular file
step 6: print No of lines in file
step 7: goto step
step 8: print not a file or a directory
step 9: stop

Script name: 4.sh

```
#!/bin/bash
if [ $# -lt 1 ]
then
        echo "Enter at least one input file name"
else
        for i in $*
        do
                if [ -d $i ]
                then
                        echo " given name is directory"
                elif [ -f $i ]
                then
                        echo " given name is file: $i"
                        echo " No of lines in file are : `wc -l $i`"
                else
                        echo "given name is not a file or a directory"
                fi
        done
fi
```

Execution:

provide two file names as input one a regular file and other directory
for example abc1.txt a text file as first argument and vazralu a directory as second argument

Run1:

```
[root@localhost sh]# sh 4.sh abc1.txt vazralu
given name is file: abc1.txt
No of lines in file are : 7 abc1.txt
```

vazralu is directory

run 2:[root@localhost sh]# sh 4.sh abc1.txt abc2.txt
given name is file: abc1.txt
No of lines in file are : 7 abc1.txt
given name is file: abc2.txt
No of lines in file are : 7 abc2.txt

Viva Questions:

1. What is an internal command in Linux?
Internal commands are also called shell built-in commands. Example: cd,fg. Since these are shell built-in, no process is created while executing these commands, and hence are considered to be much faster.

2. x and y are two variables containing numbers? How to add these 2 numbers?
$ expr $x + $y

3. How to add a header record to a file in Linux?
$ sed -i '1i HEADER' file

4. How to find the list of files modified in the last 30 mins in Linux?
$ find . -mmin -30

5. How to find the list of files modified in the last 20 days?
$ find . -mtime -20

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write a shell script to count no of regular files in the current working directory			
2	Write a shell script to display list of currently logged users			

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PROGRAM -: 5 **Date:**

Aim:-Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

ALGORITHM:

step1: Check the no of arguments for shell script
if 0 arguments then print no arguments
step2:else translate each word in the first file is to be on separate line
which will be stored in temp file
step3: for i in $*
for every filename in given files
step 4: translate each word in the file is to be on separate line
which will be stored in temp1 file
step5: count no of lines in temp file assign it to j
step6: initialize j=1
step 7: while i< j
extract the line that are common in both the file by using
head and tail commands
then apply the filter grep to count and print the lines
which are common to files
increment j
step 8: stop

Script name:5.sh

```
#!/bin/bash
echo "no of arguments $#"
if [ $# -le 2 ]
then
        echo "Error : Invalid number of arguments."
        exit
fi
str=`cat $1 | tr '\n' ' '`
for a in $str
do
        echo "in file $a"
        echo "Word = $a, Count = `grep -c "$a" $2`"
done
```

Execution and output:

check data in abc1.txt file
[root@localhost sh]# cat abc1.txt
abc
def
ghi
abc
abc
cccc
check data in abc1.txt file
[root@localhost sh]# cat abc2.txt
abc
def
ghi
abc
abc
cccc

executing script

[root@localhost sh]# sh 5.sh abc1.txt abc2.txt
Word = abc, Count = 3
Word = def, Count = 1
Word = ghi, Count = 1
Word = abc, Count = 3
Word = abc, Count = 3
Word = cccc, Count = 1

Viva Questions

1. What is Shell Scripting ?

Shell scripting, in Linux or Unix, is programming with the shell using which you can automate your tasks. A shell is the command interpreter which is the interface between the User and the kernel. A shell script allows you to submit a set of commands to the kernel in a batch. In addition, the shell itself is very powerful with many properties on its own, be it for string manipulation or some basic programming stuff.

2. The command "cat file" gives error message "--bash: cat: Command not found". Why?

It is because the PATH variable is corrupt or not set appropriately. And hence the error because the cat command is not available in the directories present PATH variable.

3. How to find the length of a string in Linux?

$ x="welcome" $ echo ${#x} 7

4. What are the different timestamps associated with a file?

Modification time:- Refers to the time when the file is last modified.
Access time :- The time when the file is last accessed.
Changed time :- The time when the attributes of the file are last changed.

5. How to get the list of files alone in a directory in Linux?

$ ls -lrt | grep ^-

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write a shell script to count no of regular files in the current working directory			
2	Write a shell script to display list of currently logged users			

Signature of the Faculty

PROGRAM -: 6 **Date:**

Aim:-Write a shell script to list all of the directory files in a directory.

Algorithm:

Step1: enter the name of the directory
Read dir
Step2: if it is a directory
Then list the files present in that directory
By using ls command with –p option to list all directory files in a given directory
Step 3: else enter the directory name
Step 4: stop

Script name: 6.sh

```
#!/bin/bash
echo " Enter dir name: "
read dir
if [ -d $dir ]
then
        printf " Files in Directory $dir are...\n`ls $dir`" echo " Dir does not exist"
else

fi
```

Execution and output:

```
[root@localhost sh]# sh 6.sh
Enter dir name:
japs
Files in Directory japs are...
abc1.txt
abc2.txt
ls-l.c
prg5
s1
```

Viva Questions:-

1. A string contains a absolute path of a file. How to extract the filename alone from the absolute path in Linux?

```
$ x="/home/guru/temp/f1.txt"
$ echo $x | sed 's^.*/^^'
```

2. How to find all the files created after a pre-defined date time, say after 10th April 10AM?

This can be achieved in 2 steps:

1. Create a dummy file with the time stamp, 10th April 10AM.
2.Find all the files created after this dummy file.

```
$ touch -t 1004101000 file
$ find . -newer file
```

3. The word "Unix" is present in many .txt files which is present across many files and also files present in sub directories. How to get the total count of the word "Unix" from all the .txt files?

```
$ find . -name *.txt -exec grep -c Unix '{}' \; | awk '{x+=$0;}END{print x}'
```

Assignment :-

Sno	Task	Date	Sign	Remark
1	How to find the files modified exactly before 30minutes? $ find . -mmin 30			
2	How to print the contents of a file line by line in Linux?			

Signature of the Faculty

PROGRAM -: -7 **Date:**

Aim:-Write a shell script to find factorial of a given number.

ALGORITHM

Step 1: read any number to find factorial
Step 2: initialize fact=1 and i=1
Step 3: while i less than
do
fact=fact* i
i=i+1
done
step 4:print fact
step 5:stop.

Script Name:7.sh

```
#!/bin/bash
echo "Factorial Calculation Script. .."
echo "Enter a number: "
read f
fact=1
factorial=1
while [ $fact -le $f ]
do
        factorial=`expr $factorial \* $fact`
        fact=`expr $fact + 1`
done
echo "Factorial of $f = $factorial"
```

Execution and Output:

```
[root@localhost sh]# sh 7.sh
Factorial Calculation Script....
Enter a number: 4
Factorial of 4 = 24
```

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write a shell script to find sum of first n natural numbers			
2	Write a shell script to find largest of given three numbers			

Signature of the Faculty

PROGRAM -: 8 **Date:**

Aim:-write an awk script to count number of lines in a file that does not contain vowels

ALGORITHM

Step 1: create a file with 5-10 lines of data

Step 2: write an awk script by using grep command to filter the lines
that do not contain vowels
awk ' $0 ~/aeiou/ {print $0}' file1

step3: count=count+1

step4:print count

step5:stop

Awk script name:nm.awk

```
BEGIN{}
{
If($0 !~/[aeiou AEIOU]/)
wordcount+=NF
}
END
{
print "Number of Lines are", wordcount
}
```

input file for awk script:data.dat

```
bcdfghj
abcdfghj
bcdfghj
ebcdfghj
bcdfghj
ibcdfghj
bcdfghj
obcdfghj
bcdfghj
ubcdfghj
```

Executing the script:

[root@localhost awk]# **awk -f nm.awk data.dat**

```
bcdfghj
bcdfghj
bcdfghj
bcdfghj
bcdfghj
```

Number f lines are 5

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write an awk script to find square root of a given number			
2	Write an awk script to find maximum of two numbers , read input from keyboard			

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PROGRAM -: 9 **Date:**

Aim:-write an awk script to find the no of characters ,words and lines in a file

ALGORITHM

Step 1: create a file with 5 to10 lines of data
Step 2: write an awk script
find the length of file
store it in chrcnt
step3: count the no of fields (NF), store it in wordcount
step4: count the no of records (NR), store it in NR
step5: print chrcnt,NRwordcount
step6: stop

Awk script name:nc.awk

```
BEGIN{}
{
        print len=length($0),"\t",$0
        wordcount+=NF
chrcnt+=len
        }
END {
        print "total characters",chrcnt
        print "Number of Lines are",NR
        print "No of Words count:",wordcount
}
```

input data file name:data.dat

```
bcdfghj
abcdfghj
bcdfghj
ebcdfghj
bcdfghj
ibcdfghj
bcdfghj
obcdfghj
bcdfghj
ubcdfghj
```

Executing the script:

[root@localhost awk]# **awk -f nc.awk data.dat**

```
7 bcdfghj
8 abcdfghj
7 bcdfghj
8 ebcdfghj
7 bcdfghj
```

8 ibcdfghj
7 bcdfghj
8 obcdfghj
7 bcdfghj
8 ubcdfghj
total characters 75
Number of Lines are 10
No of Words count: 10

VIVA QUESTIONS:

1. How to find the last modified file or the newest file in a directory?

$ ls -lrt | grep ^- | awk 'END{print $NF}'

2. How to access the 10th command line argument in a shell script in Linux?

$1 for 1st argument, $2 for 2nd, etc... For 10th argument, ${10}, for 11th, ${11} and so on.

3. How to find the sum of all numbers in a file in Linux?

$ awk '{x+=$0}END{print x}' file

4. How to delete a file which has some hidden characters in the file name?

Since the rm command may not be able to delete it, the easiest way to delete a file with some hidden characters in its name is to delete it with the find command using the inode number of the file.

$ ls –li
total 32
9962571 -rw-r--r-- 1 guru users 0 Apr 23 11:35
$ find . -inum 9962571 -exec rm '{}' \;

5. Using the grep command, how can you display or print the entire file contents?

$ grep '.*' file

6. What is the difference between a local variable and environment variable in Linux?

A local variable is the one in which the scope of the variable is only in the shell in which it is defined. An environment variable has scope in all the shells invoked by the shell in which it is defined.

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write an awk script to find square root of a given number			
2	Write an awk script to find maximum of two numbers , read input from keyboard			

Signature of the Faculty

PROGRAM -: 10 **Date:**

Aim: implement in c language the following Unix commands using system calls
a)cat b)ls c)mv

a) AIM:-Write a c program to implement **cat command** using system calls

Description:

cat COMMAND: cat linux command concatenates files and print it on the standard output.

SYNTAX:

cat [OPTIONS] [FILE]...

OPTIONS:

-A Show all.
-b Omits line numbers for blank space in the output.
-e A $ character will be printed at the end of each line prior to a new line.
-E Displays a $ (dollar sign) at the end of each line.
-n Line numbers for all the output lines.
-s If the output has multiple empty lines it replaces it with one empty line.
-T Displays the tab characters in the output.
-v Non-printing characters (with the exception of tabs, new-lines & form-feeds) are printed visibly.

Operations With cat Command:

1. To Create a new file:

$cat > file1.txt

This command creates a new file file1.txt. After typing into the file press control+d (^d) simultaneously to end the file.

2. To Append data into the file:

$cat >> file1.txt

To append data into the same file use append operator >> to write into the file, else the file will be overwritten (i.e., all of its contents will be erased).

3. To display a file:

$cat file1.txt

This command displays the data in the file.

4. To concatenate several files and display:

$cat file1.txt file2.txt

The above cat command will concatenate the two files (file1.txt and file2.txt) and it will display the output in the screen. Some times the output may not fit the monitor screen. In such situation you can print those files in a new file or display the file using less command.

cat file1.txt file2.txt | less

5. To concatenate several files and to transfer the output to another file.

$cat file1.txt file2.txt > file3.txt

In the above example the output is redirected to new file file3.txt. The cat command will create new file file3.txt and store the concatenated output into file3.txt.

Algorithm:

Step 1:Start
Step 2:read arguments from keyboard at command line
Step 3:if no of arguments are less than two print ENTER CORRECT ARGUMENTS
Else goto step 4
Step4:read the date from specified file and write it to destination file
Step 5 :stop

Program file name:11a.c

```
#include<stdio.h>
        #include<sys/types.h>
        #include<stdlib.h>
        #include<fcntl.h>
        #include<sys/stat.h>
        int main(int argc,char *argv[])
        {
        int fd,n;
        char buff[512];
                if(argc!=2)
                        printf("ENTER CORRECT ARGUMENTS :");
                if((fd=open(argv[1],4))<0)
                {
                        printf("ERROR");
                                return 0;
                }
                while(n=read(fd,buff,sizeof(buff))>0)
                        write(1,buff,n);
        }
```

b) AIM:-Write a c program to implement **ls command** using system calls

Description:

ls command is used to list the files present in a directory

Algorithm:

Step 1. Start.
Step 2. open directory using opendir( ) system call.
Step 3. read the directory using readdir( ) system call.
Step 4. print dp.name and dp.inode .
Step 5. repeat above step until end of directory.
Step 6: Stop.

Program name: 11b.c

```
#include<stdio.h>
#include<dirent.h>
void quit(char*,int);
int main(int argc,char **argv )
{
        DIR *dirop;
        struct dirent *dired;
```

```
        if(argc!=2)
        {
                printf("Invalid number of arguments\n");
        }
        if((dirop=opendir(argv[1]))==NULL)
                printf("Cannot open directory\n");
        while((dired=readdir(dirop))!=NULL)
                printf("%10d %s\n",dired>d_ino,dired>d_name);
        closedir(dirop);
}
```

c) **Aim :** write a c program that simulates **mv command** (using system calls)

Description:

mv command is used to move or rename a file

synatax:

```
mv file1 file2
```

here file1 is renamed as file2

Algorithm:

Step 1: Start

Step 2: open an existed file and one new open file using open() system call

Step 3: read the contents from existed file using read( ) system call

Step 4:write these contents into new file using write system call using write( ) system call

Step 5: repeat above 2 steps until eof

Step 6: close 2 file using fclose( ) system call

Step 7: delete existed file using using unlink( ) system

Step 8: Stop.

Program File name:11c.c

```
#include<stdio.h>
#include<string.h>
int main(int argc ,char *argv[])
{
int r,i;
char p[20],q[20];
if(argc<3)
        printf("improper arguments\n file names required\n");
else
if( argc==3)
{
        printf("\n%s\n",argv[1],argv[2]);
        r=link(argv[1],argv[2]);
        printf("%d\n",r);
        unlink(argv[1]);
```

```
}
else
{       for(i=1;i<argc-1;i++)
        {
           strcpy(p,argv[argc-1]);
           strcat(p,"/");
           strcat(p,argv[i]);
           printf("%s%s\n",argv[i],p);
           link(argv[i],p);
           unlink(argv[i]);
        }
}
}
```

Expected Output

Assignment :-

Sno	Task	Date	Sign	Remark
1	Write an awk script to find square root of a given number			
2	Write an awk script to find maximum of two numbers , read input from keyboard			

Signature of the Faculty

PROGRAM -: 11 **Date:**

Aim:Write a C program that takes one or more file/directory names as command line input and reports following information

A) File Type B)Number Of Links

c) Time of last Acces D) Read,write and execute permissions

Algorithm:

Step 1:start
Step 2:Declare struct stat a
Step 3:read arguments at command line
Step 4: set the status of the argument using stat(argv[i],&a);
Step 5:Check whether the given file is Directory file by using S_ISDIR(a.st_mode)
if it is a directory file print Directory file
Else
print is Regular file
Step6: print number of links
Step 7:print last time access
Step 8:Print Read,write and execute permissions
Step 9:stop

Program File name: 13.c

```
#include<stdio.h>
#include<sys/stat.h>
#include<time.h>
int main(int argc,char *argv[])
{
int i,j;
struct stat a;
for (i=1;i<argc;i++)
{
        printf("%s : ",argv[i]);
        stat(argv[i],&a);
        if(S_ISDIR(a.st_mode))
        {
                printf("is a Directory file\n");
        }
        else
        {
                printf("is Regular file\n");
        }
```

```
        printf("******File Properties*********\n");
        printf("Inode Number:%d\n",a.st_ino);
        printf("UID:%o\n",a.st_uid);
        printf("GID:%o\n",a.st_gid);
        printf("No of Links:%d\n",a.st_nlink);
        printf("Last Access time:%s",asctime(localtime(&a.st_atime)));
        printf("Permission flag:%o\n",a.st_mode%512);
        printf("size in bytes:%d\n",a.st_size);
        printf("Blocks Allocated:%d\n",a.st_blocks);
        printf("Last modification time %s\n",ctime(&a.st_atime));
        }
}
```

Assignment:

Sno	Task	Date	Sign	Remark
1	write a c program that simulates mkdir command using system calls			
2	write a c program that simulates rmdir command using system calls			

Signature of the Faculty

PROGRAM -: 12 **Date:**

Aim:Write a C program to list every file in directory, its inode number and file name

Algorithm:

Step 1:Start
Step 2:Read Directory name
Step 3:open the directory
Step 4: print file name and Inode number of each file in the directory
Step 5:Stop

Program file name:inode.c

```
#include<fcntl.h>
#include<stdio.h>
#include<dirent.h>
#include<sys/stat.h>
int main(int argc,char*argv[])
{
DIR *dirop;
struct dirent *dired;
if(argc!=2)
{
        printf("Invalid number of arguments\n");
}
else if((dirop=opendir(argv[1]))==NULL)

        printf("Cannot open Directory\n");
else
{
printf("%10s %s \n","Inode","File Name");
        while((dired=readdir(dirop))!=NULL)
         printf("%10d %s\n ",dired->d_ino,dired->d_name);
        closedir(dirop);
}
return 0;
}
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a c program to test whether the given file is seekable or not			
2	Write a c program to for requesting and releasing lock			

Signature of the Faculty

PROGRAM -: 13 **Date:**

Aim:Write a C program to create child process and allow parent process to display "parent" and the child to display "child" on the screen

Algorithm:

Step 1: start
Step2: call the fork() function to create a child process
fork function returns 2 values
step 3: which returns 0 to child process
step 4:which returns process id to the parent process
step 5:stop

Program file name:16.c

```
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
int main()
{
int pid,pid1,pid2;
        pid=fork();
        if(pid==-1)
        {
                printf("ERROR IN PROCESS CREATION \n");
                exit(0);
        }
        if(pid!=0)
        {
                pid1=getpid();
                printf("\n the parent process ID is %d", pid1);
        }
        else
        {
                pid2=getpid();
                printf("\n the child process ID is %d\n", pid2);
        }
}
```

Execution:

```
[root@dba ~]# cc -o 16 16.c
[root@dba ~]# ./16

 the child process ID is 4485
 the parent process ID is 4484
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a c program to test whether the given file is seekable or not			
2	Write a c program to for requesting and releasing lock			

Signature of the Faculty

PROGRAM -: 14 **Date:**

Aim:Write a C program to create zombie process

Algorithm: Step 1:call fork function to create a child process
Step 2:if fork()>0
Then creation of Zombie
By applying sleep function for 10 seconds
Step 3: now terminate the child process
Step 4: exit status child process not reported to parent
Step 5: status any process which is zombie can known by
Applying ps(1) command
Step 6: stop

Program file name:17.c

```
#include <stdio.h>
#include<stdlib.h>
int main()
{
int pid;
pid=fork(); if(pid == 0)
        {       printf("Iam child my pid is %d\n",getpid());
                printf("My parent pid is:%d\n",getppid());
                exit(0);
        }
        else
         {
         printf("I am parent, my pid is %d\n",getpid()); sleep(100);
                exit(0);
          }
}
```

Execution:

To see zombie process, after running the program, open a new terminal Give this command $ps -el|grep a.out

First terminal

Compilation:

[root@dba ~]# cc 17.c

Executing binary

[root@dba ~]# ./a.out
Iam child my pid is 4732
My parent pid is:4731
I am parent, my pid is 4731

Checking for zombie process. Z means zombie process

Second terminal[root@dba ~]# ps -el|grep a.out

```
0 S     0  4731  4585  0  77   0 -   384 -      pts/3    00:00:00 a.out
1 Z     0  4732  4731  0  77   0 -     0 exit   pts/3    00:00:00 a.out <defunct>
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to create zombie process and then call system functions to execute ps(1) command to verify process is zombie			

Signature of the Faculty

PROGRAM -: 15 **Date:**

Aim:-Write a C program to illustrate how an orphan process is created

Algorithm:

Step 1: call the fork function to create the child process
Step 2:if (pid==0)
Then print child id and parent id
else goto step 4
Step 3:Then sleep(10)
Print child id and parent id
Step 4: Print child id and parent id
Step 5:which gives the information of orphan process
Step 6:stop

Program file name:18.c

```
#include <stdio.h>
#include<stdlib.h>
int main()
 {
int pid;
printf("I am the original process with PID %d and PPID %d\n",getpid(),getppid()); pid=fork();
        if(pid == 0)
        {       printf("I am child, my pid is %d ",getpid());
                printf("My Parent pid is:%d\n",getppid());
                sleep(10);
                 printf("Now my pid is %d ",getpid());
                printf("My parent pid is:%d\n",getppid());
                exit(0);
        }
        else
        {       sleep(10);
                printf("I am parent, my pid is %d\n",getpid());
                //printf("I am going to die\n");
        }
printf("PID:%d terminates...\n",getpid());
}
```

Execution:

Compilation : [root@dba ~]# cc -o 18 18-1.c

Executing Binary:

```
[root@dba ~]# ./18
I am the original process with PID 5960 and PPID 5778
I am child, my pid is 5961 My Parent pid is:5960
I am parent, my pid is 5960
PID:5960 terminates...
[root@dba ~]# Now my pid is 5961 My parent pid is:1
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to illustrate Vfork();			
2	Write a program to illustrate fork();			

Signature of the Faculty

PROGRAM -: 16 **Date:**

Aim:- Write a C program that illustrate communication between two unrelated process using named pipes

Algorithm for server :

step 1:Start
step 2:Create a first named pipe by using mkfifo system call
Pipe1=mkfifo(NP1,0666).
step 3:if mkfifo returns -1 then
print a message that error in creating the pipe.
step 4:Create a second named pipe by using mkfifo system call
Pipe2=mkfifo(NP2,0666).
step 5:if mkfifo returns -1 then
print a message that error in creating the pipe.
step 6:Open the first pipe for reading by open system call by setting
O_RDONLY Fd=open(NP1,O_RDONLY)
step 7: Open the second pipe for writing by open system call by setting
O_WRONLY Fd=open(NP2,O_WRONLY)
step 8:read the data from the first pipe by using read system call
numread=Read(fd,buf,MAX_BUF-SIZE) buf*numread+='\0'
step 9:print the data that we have read from pipe
step 10:convert the data to the upper case.
step 11:write the converted string back to second pipe by write(fd,buf, strlen(buf))
step 12:stop.

Algorithm for client :

Step 1:start
Step 2:check whether the no of arguments specified were correct or not
Step 3:if no of arguments are less then print error message
Step 4:Open the first named pipe for writing by open system call by setting
O_WRONLY Fd=open(NP1,O_WRONLY)
Step 5: .Open the second named pipe for reading by open system call by setting
O_RDONLY Fd=open(NP2,O_RDONLY)
Step 6: write the data to the pipe by using write system call
write(fd,argv[1],strlen(argv[1]))
Step 7: read the data from the first pipe by using read system call
numread=Read(fd,buf,MAX_BUF_SIZE) buf*numread+='\0'
Step 8: print the data that we have read from pipe
Step 9:stop

Program file name:named_pipe.c

```
#include<stdio.h>
 #include<stdlib.h>
#include<sys/types.h>
 #include<sys/stat.h>
 #include<string.h>
#include<fcntl.h>
        void server(int,int);
        void   client(int,int);
        int main()
        {
        int p1[2],p2[2],pid;
                pipe(p1);
                pipe(p2);
                pid=fork();
                if(pid==0)
                {
                 close(p1[1]);
                close(p2[0]);
                server(p1[0],p2[1]);
                return 0;
         }
                close(p1[0]);
                close(p2[1]);
                client(p1[1],p2[0]);
                wait();
        return 0;
        }
        void client(int wfd,int rfd)
        {
        int i,j,n;
         char fname[2000];
         char buff[2000];
         printf("ENTER THE FILE NAME :");
         scanf("%s",fname);
         printf("CLIENT SENDING THE REQUEST.....PLEASE WAIT\n");

        sleep(10);
        write(wfd,fname,2000);
        n=read(rfd,buff,2000);
        buff[n]='\0';
        printf("THE RESULTS OF CLIENTS ARE. ....\n");
        write(1,buff,n);
        }
        void server(int rfd,int wfd)
         {
        int i,j,n; char fname[2000];
                char buff[2000];
```

```
        n=read(rfd,fname,2000);
        fname[n]='\0';
        int fd=open(fname,O_RDONLY);
        sleep(10);
        if(fd<0)
                write(wfd,"can't open",9);
        else
                 n=read(fd,buff,2000);
        write(wfd,buff,n);
}
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to demonstrate the function of a pipe			
2	Write a program to demonstrate the pipe function using dup() system call			

Signature of the Faculty

PROGRAM -: 17 **Date:**

Aim:-Write a C program that receives a message from message queue and display them

Algorithm:

Step 1:Start
Step 2:Declare a message queue structure
typedef struct msgbuf {
long mtype;
char mtext[MSGSZ];
} message_buf;
Mtype =0 Retrieve the next message on the queue, regardless of its mtype.
PositiveGet the next message with an mtype equal to the specified
msgtyp.
Negative Retrieve the first message on the queue whose mtype field is
less than or equal to the absolute value of the msgtyp argument.
Usually mtype is set to1
mtext is the data this will be added to the queue.
Step 3:Get the message queue id for the "name" 1234, which was created by the server
key = 1234
Step 4 : if ((msqid = msgget(key, 0666< 0) Then print error
The msgget() function shall return the message queue identifier associated with the argument key.
Step 5: Receive message from message queue by using msgrcv function
int msgrcv(int msqid, void *msgp, size_t msgsz, long msgtyp, int msgflg);
#include < sys/msg.h>
(msgrcv(msqid, &rbuf, MSGSZ, 1, 0)
msqid: message queue id
&sbuf: pointer to user defined structure MSGSZ: message size
Message type: 1
Message flag:The msgflg argument is a bit mask constructed by ORing together zero or more of the following flags: IPC_NOWAIT or MSG_EXCEPT or MSG_NOERROR
Step 6:if msgrcv <0 return error
Step 7:otherwise print message sent is sbuf.mext
Step 8:stop

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to demonstrate a single process create a message queue and sends itself a “welcome “ message via the queue			
2	Write a program to demonstrate how we can print the status information about the queue			

Signature of the Faculty

PROGRAM -: 18 **Date:**

Aim:-Write a C program to allow cooperating process to lock a resource for exclusive use using, a) Semaphore

```
#include<stdio.h>
#include<stdlib.h>
#include<error.h>
#include<sys/types.h>
#include<sys/ipc.h>
#include<sys/sem.h>
int main(void)
{
key_t key;
int semid;
union semun arg;
if((key==ftok("sem demo.c","j"))== -1)
{
perror("ftok");
exit(1);
}
if(semid=semget(key,1,0666|IPC_CREAT))== -1)
{
perror("semget"):
exit(1);
}
arg.val=1;
if(semctl(semid,0,SETVAL,arg)== -1)
{
perror("smctl");
exit(1);
}
return 0;
}
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program using the simpler semaphore operation			
2	Write a program to create a semaphore			

Signature of the Faculty

PROGRAM -: 19 **Date:**

Aim:-Write a C program that illustrate the suspending and resuming process using signal

Algorithm:

Step 1: call the signal function to generate the signal
Step 2:execution of process will be started
Step 3:call alarm function to suspend the execution of current process
Step 4:then it will execute the signal function
Step 5:again the process will be resumed
Step 6:stop

Program

```
#include<stdio.h>
int main()
{
int n;
        if(signal(SIGALRM,sig_alarm)==SIG_ERR)
        printf(,Signal error‘);
        alarm(5);
        for(n=0;n<=15;n++)
                printf(,from for loop n=%d‘,n);
        printf(,main program terminated‘);
}

void sig_alarm(int signo)
{
        printf(,from sigalarm function‘);
}
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program using kill and rise functions			
2	Write a program using abort()			

Signature of the Faculty

PROGRAM -: 20 **Date:**

Aim:-Write a C program that implements producer –consumer system with two processes using semaphores

Algorithm for producer :

step 1:Start
step 2:Create a named pipe by using mkfifo system call Pipe1=mkfifo(NP1,0666)
step 3:if mkfifo returns -1 then print a message that error in creating the pipe
step 4:Open the pipe for reading by open system call by setting O-RDONLY Fd=open(NP1,O-RDONLY)
step 5:read the data from the pipe by using read system call
numread=Read(fd,buf,MAX-BUF-SIZE)
step 6:print the data that we have read from pipe
step 7:convert the data to the upper case.
step 8:print the converted data
step 9:stop.

Algorithm for consumer:

Step 1:start
step 2:check whether the no of arguments specified were correct or not
step3:if no of arguments are less then print error message
step 4:Open the pipe for writing by open system call by setting O_WRONLY
Fd= open (NP1, O_WRONLY)
step 5: write the data to the pipe by using write system call write(fd,argv[1],strlen(argv[1]))
step 6:stop

Consumer:

```
#include<stdio.h>
#include<unistd.h>
#include<fcntl.h>
#define MAXSIZE 10
#define FIFO_NAME    "myfifo"
int main()
{
int fifoid; int fd, n; char *r;
        system("clear");
        r=(char *)malloc(sizeof(char)*MAXSIZE); int open_mode=O_RDONLY;
        if( (fd=open(FIFO_NAME, open_mode)) < 0 )
        {
                printf("\nError: Named pipe cannot be opened\n"); exit(0);
        }
        while(1)
        {
                n=read(fd, r, MAXSIZE); if(n > 0)
                printf("\nConsumer read: %s", r);
        }
} /*main close*/
```

Producer program:

```
#include<stdio.h>
#include<unistd.h>
#include<fcntl.h>
#define MAXSIZE 10
#define FIFO_NAME "myfifo"
```

```
 int main()
{
int fifoid; int fd, n; char *w;
int open_mode;
        system("clear");
        w=(char *)malloc(sizeof(char)*MAXSIZE);
        open_mode=O_WRONLY;
        fifoid=mkfifo(FIFO_NAME, 0755);
 if(fifoid==-1)
{
        printf("\nError: Named pipe cannot be Created\n"); exit(0);
}
if( (fd=open(FIFO_NAME, open_mode)) < 0 )
{
        printf("\nError: Named pipe cannot be opened\n");
        exit(0);
}
while(1)
{
        printf("\nProducer :"); fflush(stdin);
        read(0, w, MAXSIZE);
         n=write(fd, w, MAXSIZE);
         if(n > 0)
                printf("\nProducer sent: %s", w);
}

} /*main close*/
```

Output:

```
$ cc –o producer producer.c                #first window
$cc –o consumer consumer.c                 # second window
$ ./producer      #first window
$./consumer       # second window
Producer:
Producer sent:   hai                #first window
Consumer read: hai                  # second window
Producer sent:  good morning        #first window
Consumer read: good morning # second window
Producer sent:  welcome             #first window
Consumer read: welcome              # second window
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to demonstrate getting and setting the socket options through socket related system call			
2	Write a program to demonstrate bind system call.			

Signature of the Faculty

PROGRAM -: 21 **Date:**

Aim:-Write client server programs using c for interaction between server and client process using Unix Domain sockets

Algorithm:-

Sample UNIX server
Step 1:define NAME "socket"
Step 2: sock = socket(AF_UNIX, SOCK_STREAM, 0);
Step 3:if (sock < 0) perror("opening stream socket"); exit(1);
step4: server.sun_family = AF_UNIX;
strcpy(server.sun_path, NAME);
if (bind(sock, (struct sockaddr *) &server, sizeof(struct sockaddr_un)))
{
perror("binding stream socket"); exit(1);
}
step 5: print ("Socket has name %s\n", server.sun_path);
listen(sock, 5);
step 6: for (;;)
{
msgsock = accept(sock, 0, 0);
if (msgsock == -1)
perror("accept");
else
do { bzero(buf, sizeof(buf));
if ((rval = read(msgsock, buf, 1024)) < 0)

perror("reading stream message");
else if (rval == 0)
else print ("-->%s\n", buf);
} while (rval > 0);
close(msgsock);
}
close(sock);
unlink(NAME);
}

Step 7:stop

Programs:

Server.c

```
#include <stdio.h>
#include <sys/socket.h>
#include <sys/un.h>
#include <sys/types.h>
#include <unistd.h>
```

```
#include <string.h>
int connection_handler(int connection_fd)
{
 int nbytes;
 char buffer[256];
 nbytes = read(connection_fd, buffer, 256);
 buffer[nbytes] = 0;
 printf("MESSAGE FROM CLIENT: %s\n", buffer);
 nbytes = snprintf(buffer, 256, "hello from the server");
 write(connection_fd, buffer, nbytes);
 close(connection_fd);
 return 0;
}
int main(void)
{
 struct sockaddr_un address;
 int socket_fd, connection_fd;
 socklen_t address_length;
 pid_t child;
 socket_fd = socket(PF_UNIX, SOCK_STREAM, 0);
 if(socket_fd < 0)
 {
  printf("socket() failed\n");
  return 1;
 }
 unlink("./demo_socket");
 /* start with a clean address structure */
 memset(&address, 0, sizeof(struct sockaddr_un));
 address.sun_family = AF_UNIX;
 snprintf(address.sun_path, UNIX_PATH_MAX, "./demo_socket");

 if(bind(socket_fd,
         (struct sockaddr *) &address,
         sizeof(struct sockaddr_un)) != 0)
 {
  printf("bind() failed\n");
  return 1;
 }
 if(listen(socket_fd, 5) != 0)
 {
  printf("listen() failed\n");
  return 1;
```

```
 }
 while((connection_fd = accept(socket_fd,
                        (struct sockaddr *) &address,
&address_length)) > -1)
 {
  child = fork();
  if(child == 0)
  {
   /* now inside newly created connection handling process */
   return connection_handler(connection_fd);
  }
  /* still inside server process */
  close(connection_fd);
 }
 close(socket_fd);
 unlink("./demo_socket");
 return 0;
}
```

Client.c

```
#include <stdio.h>
#include <sys/socket.h>
#include <sys/un.h>
#include <unistd.h>
#include <string.h>
int main(void)
{
 struct sockaddr_un address;
 int socket_fd, nbytes;
 char buffer[256];

 socket_fd = socket(PF_UNIX, SOCK_STREAM, 0);
 if(socket_fd < 0)
 {
  printf("socket() failed\n");
  return 1;
 }/* start with a clean address structure */
 memset(&address, 0, sizeof(struct sockaddr_un));
 address.sun_family = AF_UNIX;
 snprintf(address.sun_path, UNIX_PATH_MAX, "./demo_socket");

 if(connect(socket_fd,
        (struct sockaddr *) &address,
```

```
sizeof(struct sockaddr_un)) != 0)

{
 printf("connect() failed\n");
 return 1;
}
nbytes = snprintf(buffer, 256, "hello from a client");
write(socket_fd, buffer, nbytes);
nbytes = read(socket_fd, buffer, 256);
buffer[nbytes] = 0;
printf("MESSAGE FROM SERVER:
%s\n", buffer); close(socket_fd);
return 0;
}
```

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to demonstrate getting and setting the socket options through socket related system call			
2	Write a program to demonstrate bind system call.			

Signature of the Faculty

PROGRAM -: 22 **Date:**

Aim:-Write a C program that illustrates two processes communicating using Shared memory

Algorithm:-

step1.Start

step 2.Include header files required for the program are

```
#include <sys/types.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <unistd.h>
#include <string.h>
#include <errno.h>
```

step 3.Declare the variable which are required as

```
pid_t pid
int *shared /* pointer to the shm */
int shmid
```

step 4.Use shmget function to create shared memory

```
#include <sys/shm.h>
int shmget(key_t key, size_t size, int shmflg)
```

The shmget() function shall return the shared memory identifier associated with key The argument key is equal to IPC_PRIVATE. so that the operating system selects the next available key for a newly created shared block of memory. Size represents size of shared memory block Shmflg shared memory permissions which are represented by octal integer

```
shmid = shmget (IPC_PRIVATE, sizeof(int), IPC_CREAT | 0666);
print the shared memory id
```

step 5.if fork()==0 Then

```
begin
    shared = shmat(shmid, (void *) 0, 0)
    print the shared variable(shared) *shared=2
    print *shared sleep(2)
    print *shared
end
```

step 6.else

```
begin
    shared = shmat(shmid, (void *) 0, 0)
    print the shared variable(shared)
    print *shared sleep(1) *shared=30
    printf("Parent value=%d\n", *shared);
    sleep(5)
    shmctl(shmid, IPC_RMID, 0)
end
```

step 7.stop.

```
#include <sys/types.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <unistd.h>
#include <string.h>
#include <errno.h>
int main(void) {
pid_t pid;
int *shared; /* pointer to the shm */ int shmid;
shmid = shmget(IPC_PRIVATE, sizeof(int), IPC_CREAT | 0666); printf("Shared Memory
ID=%u",shmid);
if (fork() == 0) { /* Child */

/* Attach to shared memory and print the pointer */ shared = shmat(shmid, (void *) 0, 0);
printf("Child pointer %u\n", shared); *shared=1;
printf("Child value=%d\n", *shared); sleep(2);
printf("Child value=%d\n", *shared); } else { /* Parent */
/* Attach to shared memory and print the pointer */ shared = shmat(shmid, (void *) 0, 0);
printf("Parent pointer %u\n", shared); printf("Parent value=%d\n", *shared); sleep(1);
*shared=42;
printf("Parent value=%d\n", *shared); sleep(5);
shmctl(shmid, IPC_RMID, 0);
}
}
sampath@localhost ipc]$cc shared_mem.c
 [sampath@localhost ipc]$ ./a.out
```

Shared Memory ID=65537Child pointer 3086680064 Child value=1

Shared Memory ID=65537Parent pointer 3086680064 Parent value=1

Parent value=42 Child value=42

Viva questions

1. define shared memory

2. what are file locking functions. 3.what are shared memory system calls.
4.define internet domain sockets
5.Difference between internet and unix domain sockets.

Assignment:

Sno	Task	Date	Sign	Remark
1	Write a program to demonstrate communication of two different process via shared memory			
2	Write a program to demonstrate that the shared memory created will be available even after the process which created is exited.			

Signature of the Faculty