**1. Write a C program to display the file content in reverse order using lseek system call.** #include<stdio.h>

#include<unistd.h>

#include<fcntl.h>

int main()

{

int fd1, fd2, offset;

char c;

fd1 = open("foo.txt", O\_RDONLY);

if(fd1<0)

printf("OPEN ERROR");

fd2 = open("foorev.txt",O\_RDWR);

if(fd2<0)

printf("OPEN ERROR");

offset = lseek(fd1, 0L, SEEK\_END);

while(offset>0)

{

read(fd1, &c, 1);

write(fd2,&c,1);

lseek(fd1,-2,SEEK\_CUR);

offset--;

}

close(fd1);

close(fd2);

return 0;

}

*//create two files foo.txt and foorev.txt*

*cat foorev.txt DLROW OLLEH*

*cat foo.txt HELLO WORLD*

**2. Write a C program**

**a. to read first 20 characters from a file**

**b. seek to 10th byte *from the beginning* and display 20 characters from there**

**c. seek 10 bytes ahead from the current file offset and display 20 characters**

**d. display the file size**

#include<stdio.h>

#include<unistd.h>

#include<fcntl.h>

int main()

{

int file=0, n;

char buffer[25];

if((file=open("testfile.txt",O\_RDONLY)) < 0)

return 1;

if(read(file,buffer,20) != 20)

return 1;

//write(STDOUT\_FILENO, buffer, 20);

printf("\n");

if(lseek(file,10,SEEK\_SET) < 0)

return 1;

if(read(file,buffer,20) != 20)

return 1;

write(STDOUT\_FILENO, buffer, 20);

printf("\n");

if(lseek(file,10,SEEK\_CUR) < 0)

return 1;

if(read(file,buffer,20) != 20)

return 1;

write(STDOUT\_FILENO, buffer, 20);

printf("\n");

if((n = lseek(file,0,SEEK\_END)) <0)

return 1;

printf("size of file is %d bytes\n",n);

close(file);

return 0;

}

testfile.txt

a1234567890

b1234567890

c1234567890

d1234567890

e1234567890

f1234567890

**./a.out**

0

b1234567890

c12345

4567890

e1234567890

size of file is 72 bytes

**3. Write a C program to display various details of a file using stat structure (At least 5 fields)**

#include <unistd.h>

#include <stdio.h>

#include <sys/stat.h>

#include <sys/types.h>

int main(int argc, char \*\*argv)

{

if(argc != 2)

return 1;

struct stat fileStat;

*if(stat(argv[1],&fileStat) < 0)*

return 1;

printf("Information for %s\n",argv[1]);

printf("---------------------------\n");

printf("File Size: \t\t %d bytes\n",(int)fileStat.st\_size);

printf("Number of Links: \t %d \n",(int)fileStat.st\_nlink);

printf("File inode: \t\t %d \n", (int)fileStat.st\_ino);

printf("File Permissions: \t");

printf( (S\_ISDIR(fileStat.st\_mode)) ? "d" : "-");

printf( (fileStat.st\_mode & S\_IRUSR) ? "r" : "-");

printf( (fileStat.st\_mode & S\_IWUSR) ? "w" : "-");

printf( (fileStat.st\_mode & S\_IXUSR) ? "x" : "-");

printf( (fileStat.st\_mode & S\_IRGRP) ? "r" : "-");

printf( (fileStat.st\_mode & S\_IWGRP) ? "w" : "-");

printf( (fileStat.st\_mode & S\_IXGRP) ? "x" : "-");

printf( (fileStat.st\_mode & S\_IROTH) ? "r" : "-");

printf( (fileStat.st\_mode & S\_IWOTH) ? "w" : "-");

printf( (fileStat.st\_mode & S\_IXOTH) ? "x" : "-");

printf("\n\n");  
  
printf("The file %s a symbolic link\n", (S\_ISLNK(fileStat.st\_mode)) ? "is" : "is not");

return 0;

}

**./a.out filetype.c**

Information for filetype.c

---------------------------

File Size: 766 bytes

Number of Links: 1

File inode: 3156286

File Permissions: -rw-rw-r--

The file is not a symbolic link

**4. Write a C program to implement ls –li command which list the files in a specified directory. Your program should print 5 attributes of files.**

#include <stdio.h>

#include <unistd.h>

#include <fcntl.h>

#include <dirent.h>

#include <time.h>

#include <sys/stat.h>

int main(int argc,char\* argv[])

{

struct dirent \*dir;

struct stat mystat;

DIR \*dp;

dp = opendir(".");

if(dp)

{

while(dir == readdir(dp))

{

stat(dir->d\_name,&mystat);

// inode mode uid guid access\_time

printf("%ld %o %d %d %s %s \n",

mystat.st\_ino, mystat.st\_mode, mystat.st\_uid, mystat.st\_gid, ctime(&mystat.st\_atime),dir->d\_name);

}

}

}

**./a.out**

7346295 100664 1000 1000 Sun Apr 22 15:26:48 2018

foo.txt

7346034 100664 1000 1000 Sun Apr 22 15:47:03 2018

testfile.txt

7346290 40775 1000 1000 Sun Apr 22 16:15:51 2018

.

7346039 100664 1000 1000 Sun Apr 22 16:10:48 2018

three.c

7346024 100664 1000 1000 Sun Apr 22 15:42:06 2018

two.c **5. Write a C program to remove empty files from the given directory.** #include <stdio.h>

#include <fcntl.h>

#include <unistd.h>

#include <dirent.h>

int main()

{

int fd,n;

DIR \*dp;

struct dirent \*dir;

dp = opendir("."); //open current directory

if(dp)

{

while(dir = readdir(dp))

{

fd = open(dir->d\_name, O\_RDWR,0777);

n = lseek(fd,0,SEEK\_END);

if(!n)

{

unlink(dir->d\_name);

}

}

}

}  
//removes if the file is empty

**6. Write a C program to demonstrate the creation of soft links and the various properties of hard links**

#include <unistd.h>

#include <stdio.h>

int main(int argc, char\* argv[])

{

printf("%d",argc);

if(argc==3)

{

printf("\n %s %s \n", argv[1],argv[2]);

if((link(argv[1],argv[2]))== 0)

printf("Hard link Created! \n");

else

printf("Error in hard link Creation \n");

}

else if(argc==4)

{

printf("\n %s %s \n", argv[1],argv[2]);

if((symlink(argv[1],argv[2]))== 0)

printf("Soft link Created! \n");

else

printf("Error in soft link Creation \n");

}

return 0;

}

./a.out l4.c hlink1

./a.out l4.c symlink dummy

HARDLINK

$ ./a.out prog.c hlink

Hard linking prog.c and hlink

Hard link created

$ ls -li prog.c hlink

3157142 -rw-rw-r-- 2 guest1 guest1 34 Mar 5 09:21 hlink

3157142 -rw-rw-r-- 2 guest1 guest1 34 Mar 5 09:21 prog.c

SOFTLINK

$./a.out prog.c slink dummy

Soft linking prog.c and slink

Soft link created

$ls -li prog.c hlink slink

3157142 -rw-rw-r-- 2 guest1 guest1 34 Mar 5 09:21 hlink

3157142 -rw-rw-r-- 2 guest1 guest1 34 Mar 5 09:21 prog.c

3157335 lrwxrwxrwx 1 guest1 guest1 6 Mar 5 09:23 slink -> prog.c

**7. Write a C program to Copy access and modification time of a file to another file using utime function.**#include <stdio.h>

#include <sys/stat.h>

#include <sys/types.h>

#include <unistd.h>

#include <utime.h>

#include <time.h>

#include <fcntl.h>

int main(int argc,char\* argv[]) //copying ctime and mtime of argv[2] to argv[1]

{

int fd;

struct stat buf1;

struct stat buf2;

struct utimbuf times;

if(stat(argv[1],&buf1)<0)

printf("Error!\n");

if(stat(argv[2],&buf2)<0)

printf("Error!\n");

printf("Before Copying ...\n");

printf("Access Time %s\nModification Time %s\n",ctime(&buf1.st\_atime),ctime(&buf1.st\_mtime));

times.modtime = buf2.st\_mtime;

times.actime = buf2.st\_mtime;

if(utime(argv[1],&times)<0)

printf("Error copying time \n");

if(stat(argv[1],&buf1)<0)

printf("Error!\n");

printf("After Copying ...\n");

printf("Access Time %s\nModification Time %s\n",ctime(&buf1.st\_atime),ctime(&buf1.st\_mtime));

}

**$ ls -li three.c six.c**

7346518 -rw-rw-r-- 2 behera behera 660 Apr 22 16:27 six.c

7346039 -rw-rw-r-- 1 behera behera 1228 Apr 22 16:10 three.c

*$ ./a.out three.c six.c*

Before Copying ...

Access Time Sun Apr 22 16:10:48 2018

Modification Time Sun Apr 22 16:10:48 2018

After Copying ...

Access Time Sun Apr 22 16:27:25 2018

Modification Time Sun Apr 22 16:27:25 2018

**$ ls -li three.c six.c**

7346518 -rw-rw-r-- 2 behera behera 660 Apr 22 16:27 six.c

7346039 -rw-rw-r-- 1 behera behera 1228 Apr 22 16:27 three.c

**8. Write a C program to illustrate effect of setjmp and longjmp functions on register and volatile variables.**#include<stdio.h>

#include<stdlib.h>

#include<setjmp.h>

static void f1(int, int, int, int);

static jmp\_buf jmpbuffer;

static int globval;

int main(void)

{

int autoval;

register int regival;

volatile int volaval;

static int statval;

globval = 1; autoval = 2; regival = 3; volaval = 4; statval = 5;

if (setjmp(jmpbuffer) != 0)

{

printf("after longjmp:\n");

printf("globval = %d, autoval = %d, regival = %d, volaval = %d, statval = %d\n", globval, autoval, regival, volaval, statval);

exit(0);

}

// Change variables after setjmp, but before longjmp.

globval = 95; autoval = 96; regival = 97; volaval = 98; statval = 99;

f1(autoval, regival, volaval, statval); /\* never returns \*/

exit(0);

}

static void f1(int i, int j, int k, int l)

{

printf("in f1():\n");

printf("globval = %d, autoval = %d, regival = %d, volaval = %d, statval = %d\n", globval, i, j, k, l);

globval=10000;

longjmp(jmpbuffer, 1);

}

//checks for setjmp() returns 0 ( the return is from a direct invocation)

// it returns a non-zero value when it is a call from longjmp, setjmp

// goes to f1(), which moves the execution to setjump

**// Removed the unnecessary f2 function**[**https://docs.google.com/document/d/18BwpuvW-4HtDThdJNq1Xtq-jyBXvxLW08NH\_pXcp\_cg/edit**](https://docs.google.com/document/d/18BwpuvW-4HtDThdJNq1Xtq-jyBXvxLW08NH_pXcp_cg/edit) **refer this for orignial program**

**$ ./a.out**

in f1():

globval = 95, autoval = 96, regival = 97, volaval = 98, statval = 99

after longjmp:

globval = 10000, autoval = 96, regival = 97, volaval = 98, statval = 99

**9. C program to simulate copy command by accepting the filenames from command line. Report all errors.** #include<stdio.h>

#include<fcntl.h>

#include<unistd.h>

#include<stdlib.h>

int main(int argc, char \*argv[])

{

char buf[100];

int fd1,fd2;

off\_t size,ret,set;

ssize\_t readdata,writedata;

if(argc<3)

printf("TOO FEW ARGUMENTS");

if((fd1=open(argv[1],O\_RDONLY)) == -1) //Open file 1

printf("ERROR IN OPENING FILE: FILE DOES NOT EXIST \n");

else

printf("FILE 1 OPENED SUCCESSFULLY \n");

//open file 2 in RW mode, truncate its length to 0, create the file if it does not exist, 0666 is the access permission for the created file. order is important.

if((fd2=open(argv[2],O\_WRONLY | O\_CREAT | O\_TRUNC, 0666)) == -1)

printf("ERROR IN OPENING FILE");

else

printf("FILE 2 OPENED SUCCESSFULLY \n");

size=lseek(fd1,0L,SEEK\_END);

//obtain the size of file 1 using lseek

if(size==-1)

printf("ERROR: COULD NOT OBTAIN FILE SIZE \n");

else

printf("FILE SIZE OF FILE 1 OBTAINED \n");

ret=lseek(fd1,0L,SEEK\_SET);

//change the current pointer to the beginning of the file

if(ret==-1)

printf("RETRACE FAILED \n");

if((readdata=read(fd1,buf,size)) == -1)

printf("ERROR IN READING FILE CONTENTS \n");

if((writedata=write(fd2,buf,size)) != size)

printf("ERROR IN COPYING FILE");

else

printf("FILE COPIED SUCCESSFULLY");

return 0;

}

**./a.out:**

//Create two files - copy contents of file 1 into file 2

$ vi magic.txt

$ vi tricks.txt

$ ./a.out magic.txt tricks.txt

FILE 1 OPENED SUCCESSFULLY

FILE 2 OPENED SUCCESSFULLY

FILE SIZE OF FILE 1 OBTAINED

FILE COPIED SUCCESSFULLY

**10. Write a C program to avoid zombie status of a process.**

#include<stdio.h>

#include<sys/types.h>

#include<unistd.h>

#include<sys/wait.h>

#include<stdlib.h>

int main(void)

{

pid\_t pid;

if ((pid = fork()) < 0)

printf("fork error");

else if (pid == 0)

{

/\* first child \*/

if ((pid = fork()) < 0)

printf("fork error");

else if (pid > 0)

exit(0);

sleep(2);

printf("second child, parent pid = %ld\n", (long)getppid());

exit(0);

}

if (waitpid(pid, NULL, 0) != pid)

printf("waitpid error");

exit(0);

}

**./a.out:**

//notice how it moves to the next line

:~$ ./a.out

:~$ second child, parent pid = 1

// should be adopted by init

**// print all pid’s and check.   
//init has a different pid for different systems  
  
11. Write a C program to demonstrate race condition among parent and child processes.**#include<stdio.h>

#include<sys/types.h>

#include<unistd.h>

#include<stdlib.h>

static void charatatime(char \*);

int main(void)

{

pid\_t pid;

if ((pid = fork()) < 0)

printf("fork error");

else if (pid == 0)

charatatime(" \*\*child child child child child child child child child \*\* \n");

else

charatatime(" PARENT PARENT\n");

exit(0);

}

static void charatatime(char \*str)

{

char \*ptr; int c;

setbuf(stdout, NULL); /\* set unbuffered \*/

for (ptr = str; (c = \*ptr++) != 0; )

putc(c, stdout);

}

**output:**

PARENT P A\*R\*EcNhTi

ld child child child child child child child child \*\*

//or could even be

PARENT PARENT

\*\*child child child child child child child child child \*\*

**12. Write a C program such that it initializes itself as a daemon Process.**

**13. Write a C program using sigaction system call which calls a signal handler on SIGINT signal and then reset the default action of the SIGINT signal**#include <stdio.h>

#include <unistd.h>

#include <signal.h>

struct sigaction sig;

void handler(int val)

{

printf("Interrupt Received!\n");

sig.sa\_handler = SIG\_DFL;

sigaction(SIGINT,&sig,0);

}

int main()

{

sig.sa\_flags = 0;

sigemptyset(&sig.sa\_mask);

sigaddset(&sig.sa\_mask,SIGINT); // listen only for SIGNIT

sig.sa\_handler = handler;

sigaction(SIGINT,&sig,0);

while(1)

{

printf("Do not press Ctrl+C \n");

sleep(1);

}

}

//press ctrl+c for the interrupt

**./a.out**

Do not press Ctrl+C

Do not press Ctrl+C

Do not press Ctrl+C

Do not press Ctrl+C

^CInterrupt Received!

Do not press Ctrl+C

Do not press Ctrl+C

Do not press Ctrl+C

^C

//Ctrl+c for interrupt   
//stops after two interrupts

**14. Write a C program (use signal system call)**

**i. which calls a signal handler on SIGINT signal and then reset the default action of the SIGINT signal**

**ii. Which ignores SIGINT signal and then reset the default action of SIGINT signal**#include <stdio.h>

#include <unistd.h>

#include <signal.h>

void callback()

{

printf("Interrupt Received !\n");

(void)signal(SIGINT,SIG\_DFL);

}

int main()

{

int ch,i=0;

printf("Enter choice\n");

scanf("%d",&ch);

switch(ch)

{

case 1 : (void)signal(SIGINT,callback); //shows the interrupt

break;

case 2 : (void)signal(SIGINT,SIG\_IGN); //ignores the interrupt

break;

}

while(1)

{

sleep(1);

printf("Press CTRL+C ...\n");

i++;

if(i == 10 && ch == 2)

(void) signal(SIGINT,SIG\_DFL);

}

return 0;

}

**./a.out**Enter choice

1

Press CTRL+C ...

Press CTRL+C ...

^CInterrupt Received !

Press CTRL+C ...

Press CTRL+C ...

Press CTRL+C ...

Press CTRL+C ...

^C

\*\*\*\*And\*\*\*\*\*

Enter choice

2

Press CTRL+C ...

Press CTRL+C ...

^C

Press CTRL+C ...

^C

Press CTRL+C ...

Press CTRL+C ...

^Z

[2]+ Stopped