PRACTICAL NO.3

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ROLL: 69

BATCH: A4

Aim:Write a C program to implement I/O System Calls of Linux.

a) Create a file

b) Read contents of a file

c) Write to a file

d) Read contents of a file in a reverse order

e) Search the file to find the given pattern (Grep command)

f) Delete a file

g) To print file status using stat

h)To print file status using fstat

Using these system calls also write a program to,

1) Write a program that creates a file with a 4K bytes free space. Such files are called files with holes.

2) Write a program that copies the contents of an existing file into another file. The names of the two

file should be read as an input from the command line.

CODE:

```
#include<stdio.h>
#include<fcntl.h>
#include<unistd.h>
#include<sys/types.h>
#include<string.h>
#include<stdbool.h>
#include<stdlib.h>


void search_string(char *filename,char *pattern){
int fd = open(filename,O_RDONLY);
if(fd<0){
```

```
printf("Error opening file\n");
return;
}
char buffer[1024];
int bytes_read;
bool found = false;
while(bytes_read=read(fd,buffer,sizeof(buffer)) >0 ){
char *found_str = strstr(buffer,pattern);
if(found_str != NULL){
found = true;
break;
}
}
if(bytes_read < 0){
printf("Error reading file\n");
close(fd);
return;
}
if(found){
printf("String %s is present in file\n",pattern);
}
else{
printf("String %s is not present in file\n",pattern);
}
close(fd);
}

void call_stat(char *filename){
struct stat file_stat;
if(stat(filename,&file_stat)==0){
printf("File size: %ld bytes\n", file_stat.st_size);
printf("File permissions: %o\n", file_stat.st_mode & (S_IRWXU | S_IRWXG| S_IRWXO));
printf("File inode: %lu\n", file_stat.st_ino);
printf("File device: %lu\n", file_stat.st_dev);
printf("File number of hard links: %lu\n", file_stat.st_nlink);
printf("File UID of owner: %u\n", file_stat.st_uid);
printf("File GID of owner: %u\n", file_stat.st_gid);
printf("File last access time: %ld\n", file_stat.st_atime);
printf("File last modification time: %ld\n", file_stat.st_mtime);
printf("File last status change time: %ld\n", file_stat.st_ctime);
}
else {
printf("stat() failed");
}
}

void call_fstat(char* filename) {
int fd = open(filename, O_RDONLY);
```

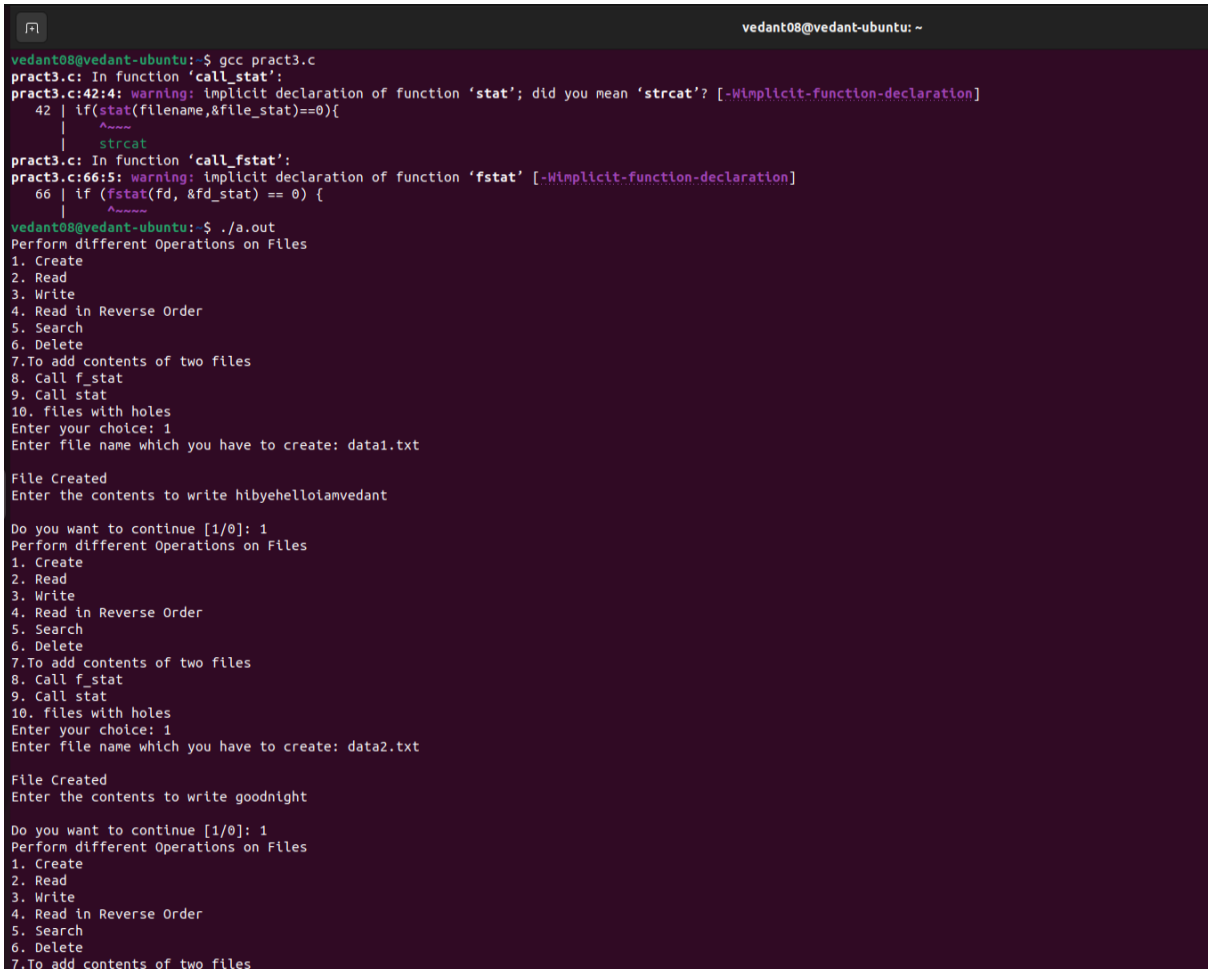
```
if (fd < 0) {
perror("Error opening file");
return;
}
struct stat fd_stat;
if (fstat(fd, &fd_stat) == 0) {
printf("File size: %ld bytes\n", fd_stat.st_size);
printf("File permissions: %o\n", fd_stat.st_mode & (S_IRWXU | S_IRWXG |S_IRWXO));
printf("File inode: %lu\n", fd_stat.st_ino);
printf("File device: %lu\n", fd_stat.st_dev);
printf("File number of hard links: %lu\n", fd_stat.st_nlink);
printf("File UID of owner: %u\n", fd_stat.st_uid);
printf("File GID of owner: %u\n", fd_stat.st_gid);
printf("File last access time: %ld\n", fd_stat.st_atime);
printf("File last modification time: %ld\n", fd_stat.st_mtime);
printf("File last status change time: %ld\n", fd_stat.st_ctime);
}
else {
perror("fstat() failed");
}
close(fd);
}

int main(){
   char data;
   char buf[100],pat[10],temp[1024];
   int ch1,ch=0,fd,nfd,n,m,charcount=0,user;
   int ret,resp,i=0,n1;
   char fname[10],dname[10];
   char *newline;
   FILE *fp;
   struct stat *sb;
   do{
printf("Perform different Operations on Files\n");
printf("1. Create\n2. Read\n3. Write\n4. Read in Reverse Order\n5. Search\n6. Delete\n7.To add
contents of two files\n8. Call f_stat\n9. Call stat\n10. files with holes");
printf("\nEnter your choice: ");
scanf("%d",&ch1);
switch(ch1){
case 1:
printf("Enter file name which you have to create: ");
scanf("%s",fname);
fd = creat(fname,0777);
printf("\nFile Created\n");
printf("Enter the contents to write ");
scanf("%s",buf);
charcount = strlen(buf);
write(fd,buf,charcount);
```

```
close(fd);
break;
case 2:
printf("Enter file name which you have to open: ");
scanf("%s",fname);
fd = open(fname,O_RDONLY,0777);
printf("\nFile Opened\n");
printf("The contents are \t");
while(read(fd,&data,1)>0){
printf("%c",data);
}
close(fd);
break;
case 3:
printf("Enter file name which you have to open: ");
scanf("%s",fname);
fd = open(fname,O_WRONLY|O_APPEND,0777);
printf("File Opened\n");
printf("Enter the contents to write: ");
scanf("%s",buf);
charcount = strlen(buf);
write(fd,buf,charcount);
close(fd);
break;
case 4:
printf("Enter file name which you have to open: ");
scanf("%s",fname);
fd = open(fname,O_RDONLY,0777);
printf("\nFile Opened");
printf("\nThe contents in reverse order are: ");
n = lseek(fd,0,2);
lseek(fd,-1,2);
while(n-- > 0){
read(fd,&data,1);
printf("%c",data);
lseek(fd,-2,1);
}
printf("\n");
close(fd);
break;
case 5:
printf("\nEnter file name: ");
scanf("%s",fname);
printf("Enter the pattern to be searched: ");
scanf("%s",pat);
fd = open(fname,O_RDONLY);
printf("File Opened\n");
search_string(fname,pat);
```

```
break;
case 6:
printf("Enter file name which you have to delete: ");
scanf("%s\n",fname);
unlink(fname);
break;
case 7:
printf("Enter the name of first file: ");
scanf("%s",fname);
printf("Enter the name of second file: ");
scanf("%s",dname);
fd = open(fname,O_WRONLY | O_APPEND,0777);
printf("File opened for writing...\n");
nfd = open(dname, O_RDONLY,0777);
printf("File opened to read...\n");
n = lseek(nfd,0,2);
lseek(nfd,i,0);
write(fd," ",1);
while(n1=(read(nfd,buf,sizeof(buf)))>0){
if(write(fd,buf,n) != n){
printf("Error : cannot write in file\n");
close(fd);
close(nfd);
}
}
printf("Contents of file2 is copied to contents of file 1\n");
close(fd);
close(nfd);
break;
case 8:
printf("Enter file name: ");
scanf("%s",fname);
call_fstat(fname);
break;
case 9:
printf("Enter fil name: ");
scanf("%s",fname);
call_stat(fname);
break;
   case 10:
   printf("ENTER FILE NAME TO BE CREATED : ");
   scanf("%s", fname);
   fd = creat(fname, 0777);
   if(fd == -1)
      printf("UNABLE TO CREATE FILE\n");
   else {
      printf("FILE CREATED\n");
      ftruncate(fd, 4096);
```

```
        printf("File created with 4k bytes free space\n");
        close(fd);
    }
    break;

}
printf("\nDo you want to continue [1/0]: ");
scanf("%d",&resp);
if(resp==1){
user=1;
}
else{
user=0;
}
}while(user);
}
```

OUTPUT:

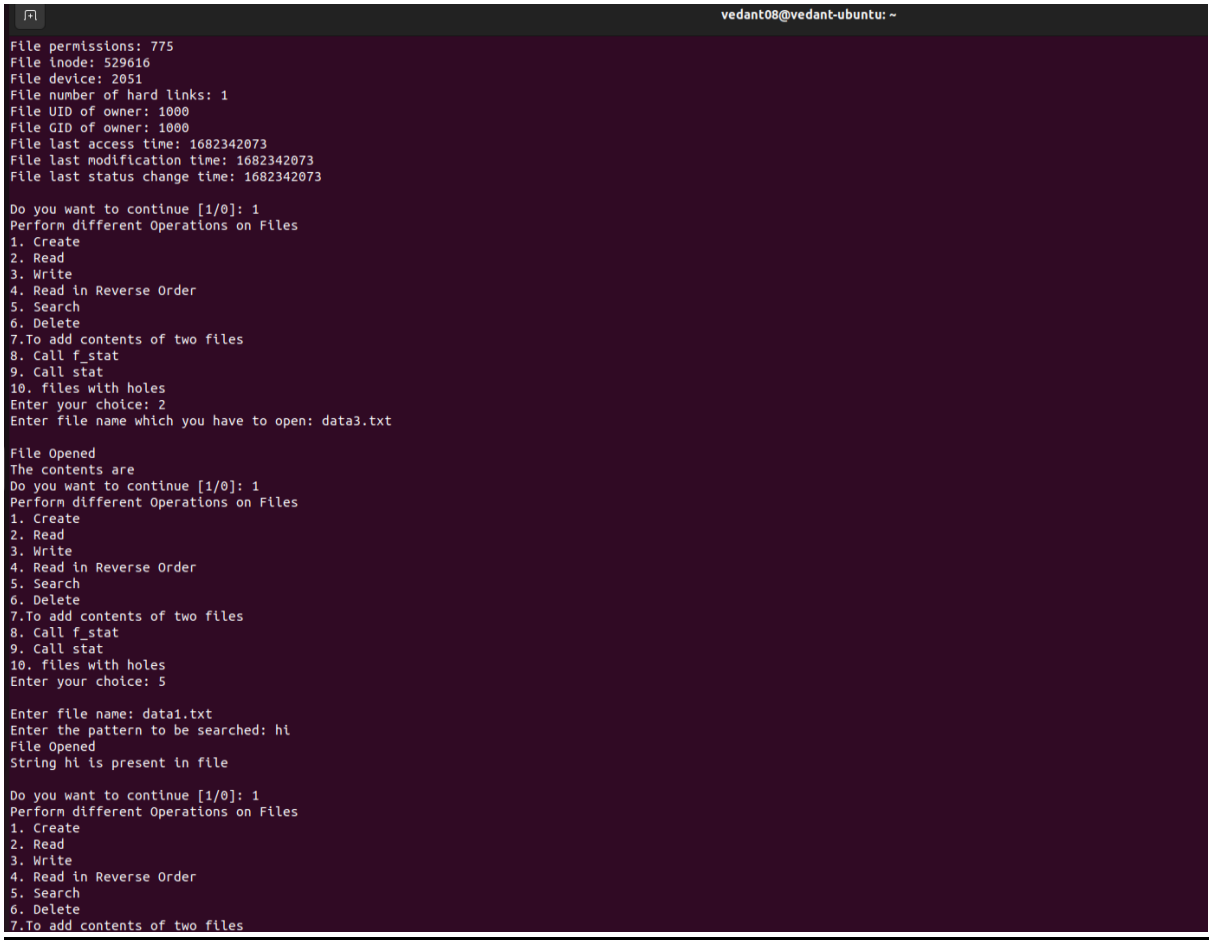


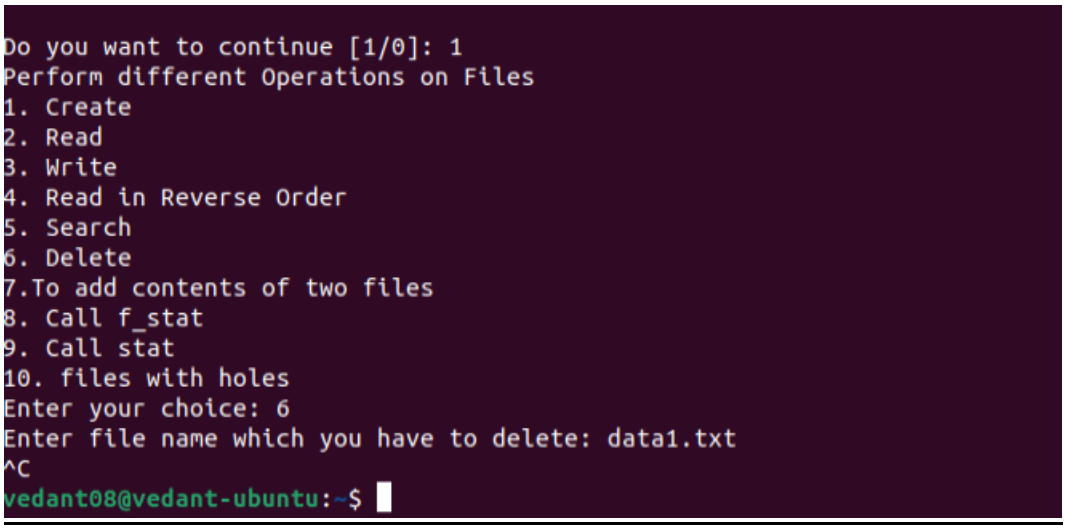
```
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 2
Enter file name which you have to open: data1.txt

File Opened
The contents are        hibyehelloiamvedant
Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 3
Enter file name which you have to open: data2.txt
File Opened
Enter the contents to write: goodmorning

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 4
Enter file name which you have to open: data2.txt

File Opened
The contents in reverse order are: gninromdoogthgindoog

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
```

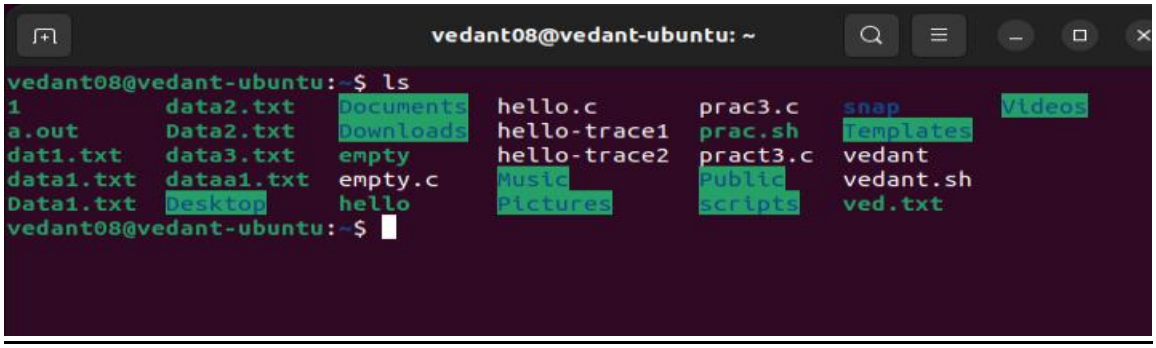
```
vedant08@vedant-ubuntu: ~
9. Call stat
10. files with holes
Enter your choice: 7
Enter the name of first file: data1.txt
Enter the name of second file: data2.txt
File opened for writing...
File opened to read...
Contents of file2 is copied to contents of file 1

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 2
Enter file name which you have to open: data1.txt

File Opened
The contents are        hibyehelloiamvedant goodnightgoodmorning
Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 8
Enter file name: data1.txt
File size: 40 bytes
File permissions: 775
File inode: 529633
File device: 2051
File number of hard links: 1
File UID of owner: 1000
File GID of owner: 1000
File last access time: 1682342043
File last modification time: 1682342030
File last status change time: 1682342030

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
```

```
vedant08@vedant-ubuntu: ~
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 9
Enter fil name: data2.txt
File size: 20 bytes
File permissions: 775
File inode: 529634
File device: 2051
File number of hard links: 1
File UID of owner: 1000
File GID of owner: 1000
File last access time: 1682342006
File last modification time: 1682341993
File last status change time: 1682341993

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 10
ENTER FILE NAME TO BE CREATED : data3.txt
FILE CREATED
File created with 4k bytes free space

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 9
Enter fil name: data3.txt
File size: 4096 bytes
File permissions: 775
```


```
vedant08@vedant-ubuntu: ~
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 9
Enter fil name: data2.txt
File size: 20 bytes
File permissions: 775
File inode: 529634
File device: 2051
File number of hard links: 1
File UID of owner: 1000
File GID of owner: 1000
File last access time: 1682342006
File last modification time: 1682341993
File last status change time: 1682341993

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 10
ENTER FILE NAME TO BE CREATED : data3.txt
FILE CREATED
File created with 4k bytes free space

Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 9
Enter fil name: data3.txt
File size: 4096 bytes
File permissions: 775
```


vedant08@vedant-ubuntu: ~
File permissions: 775
File inode: 529616
File device: 2051
File number of hard links: 1
File UID of owner: 1000
File GID of owner: 1000
File last access time: 1682342073
File last modification time: 1682342073
File last status change time: 1682342073
Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 2
Enter file name which you have to open: data3.txt
File Opened
The contents are
Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 5
Enter file name: data1.txt
Enter the pattern to be searched: hi
File Opened
String hi is present in file
Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files


Do you want to continue [1/0]: 1
Perform different Operations on Files
1. Create
2. Read
3. Write
4. Read in Reverse Order
5. Search
6. Delete
7.To add contents of two files
8. Call f_stat
9. Call stat
10. files with holes
Enter your choice: 6
Enter file name which you have to delete: data1.txt
^C
vedant08@vedant-ubuntu:~$


vedant08@vedant-ubuntu: ~
vedant08@vedant-ubuntu:~$ ls
1 data2.txt Documents hello.c prac3.c snap Videos
a.out Data2.txt Downloads hello-trace1 prac.sh Templates
dat1.txt data3.txt empty hello-trace2 pract3.c vedant
data1.txt dataa1.txt empty.c Music Public vedant.sh
Data1.txt Desktop hello Pictures scripts ved.txt
vedant08@vedant-ubuntu:~$