LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Department of Computer Science & Engineering

20CS59 - OPERATING SYSTEMS LAB

Name of the Student: _____

Registered Number: _____

Branch & Section: _____ **&** **../Sec**

Academic Year: **2021–2022**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

CERTIFICATE

This is to certify that this is a bonafide record of the practical workdone

by Mr./Ms. ……,

bearing Regd. Num.: 20761A05……. of B.Tech….. Semester, ……. Branch, ……

Section in the 20CS59 - OPERATING SYSTEMS LAB during theAcademic

Year: 2021-2022. –

No. of Experiments/Modules held: 08

No. of Experiments Done: 08

Date: ….. / / 2022 **Signature of the Faculty**

INTERNAL EXAMINER **EXTERNAL EXAMINER**

List of programs

Cycle-1:

Execute various UNIX system calls

1. Process Management
2. File Management
3. Input/Output System Calls

Cycle-2:

Simulate the following CPU scheduling algorithms.

a) FCFS b) SJF c) Round Robin d) Priority.

Cycle-3:

Simulate the file allocation strategies:

a) Sequential b) indexed c) Linked

Cycle-4:

Simulate MVT and MFT

simulate contiguous memory allocation techniques

a) Worst-fit b) Best fit c) First fit

Cycle-5:

Simulate all File Organization techniques

A) Single level directory b) Two level c)Hierarchical d)DAG

Cycle-6:

Simulate Bankers Algorithm for Deadlock Avoidance

Simulate Bankers algorithm for Deadlock Prevention

Cycle-7:

Simulate disk scheduling algorithms.

a) FCFS b) SCAN c) C-SCAN

Cycle-8:

Programs on process creation and synchronization, inter process communication Including shared memory , pipes and

Cycle-1: Execute various UNIX system calls

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1)Process Management system calls

a) Aim: To write C programs to simulate UNIX command fork()

Program:

```
#include<stdio.h>
#include<sys/types.h>
main()
 {   int pid;
    pid=fork();
  if(pid==0)
{
printf("\n I am the child");
printf("\n I am the parent :%d",getppid());
          printf("\n I am the child :%d",getpid());
  }
Else
{
 printf("\n I am the parent ");
 printf("\n I am the parents parent :%d",getppid());
          printf("\n I am the parent :%d\n",getpid());
  }
}
```

Output:

```
I am the child
I am the  parent:  3944
I am the child:  3945
I am the parent
I am the parents parent:  3211
I am the parent:  3944
```

b)Aim: To write C programs to simulate UNIX command execv()

Program:

```
#include<stdio.h>
 #include<unistd.h>
 main()
{
 char *temp[3];
temp[0]="ls";
temp[1]="-l";
temp[2]=(char *)0;
execv("/bin/ls",temp);
printf("this will not print\n");
}
```

Output:

```
total 76
-rwxr-xr-x   1 be322   group    4716 Mar 7 10:13  a.out
-rw-r--r--   1 be322   group     688 Feb 20  13:52  comm.c
-rw-r--r--   1 be322   group     925 Feb 20  13:54  echomsg.c
-rw-r--r--   1 be322   group     722 Feb 20  13:55  echopipe.c
-rw-r--r--   1 be322   group     178 Feb 20  13:57  exel.c
-rw-r--r--   1 be322   group     167 Mar 7   10:13  exev.c
-rw-r--r--   1 be322   group    1109 Feb 20 13:57  fflag.c
-rw-r--r--   1 be322   group     341 Dec 26  14:47  frk.c
-rw-r--r--   1 be322   group     140 Feb 20  13:57  linearg.c
-rw-r--r--   1 be322   group     528 Feb 20  13:57  lock.c
-rw-r--r--   1 be322   group     254 Feb 20  13:57  msg.c
-rw-r--r--   1 be322   group    1036 Feb 20 13:57  msgpass.c
-rw-r--r--   1 be322   group     203 Feb 20  13:58  sem.c
-rw-r--r--   1 be322   group    1167 Feb 20 13:58  sharememory.c
-rw-r--r--   1 be322   group     312 Feb 20  13:58  slp.c
-rw-r--r--   1 be322   group    1182 Feb 20 13:58  threadf.c
-rw-r--r--   1 be322   group     287 Feb 20  13:59  wt.c
```

c)Aim: To write C programs to simulate UNIX command execlp()

Program:

```
#include<stdio.h>
#include<sys/types.
h>
main()
 {
   int pid;
    pid=fork();
     if(pid==0)
    {
          printf("\n fork program started");
          execlp("/bin/ls","ls",NULL);
     }
else
    {
          printf("\nend");
    }
}
```

OUTPUT:

```
end$
 fork program started a.out
comm.c
echomsg.c
echopipe.c
exel.c exev.c
fflag.c frk.c
linearg.c
lock.c msg.c
msgpass.c
sem.c
sharememory.c
slp.c threadf.c
wt.c
```

d)Aim: To write C programs to simulate UNIX command wait()

Program:

```
#include<unistd.h>
 #include<stdio.h>
 main()
{
int i=0,pid;
 pid=fork();
 if(pid==0)
        {
         printf("child  process started\n");
                for(i=0;i<10;i++)
                 printf("\n%d",i);
                 printf("\n child process
                ends");
        }
         else
        {
        printf("\n parent process starts");
         wait(0);
        printf("\n parent process ends");
        }
}
```

Output:

```
parent process starts
 child  process started

0
1
2
3
4
5
6
7
8 9  child process
ends
 parent process ends
```

e)Aim: To write C programs to simulate UNIX command sleep()

Program :

```
#include<unistd.h>
#include<stdio.h>
main()
{
int i=0,pid;
        printf("\n ready for
        fork\n");
        pid=fork(); if(pid==0)
        {
        printf("\n child process started \n");
        sleep(4);
        for(i=0;i<10;i++)
         printf("\n%d",i);
        printf("\n child process ends");
        }
        else
        {
        printf("\n I am the parent");
        printf("\n parent process ends");
        }
}
```

Output:

```
ready for fork
 I am the parent
parent process
ends
child process started

0
1
2
3
4
5
6
7
8 9
 child process ends
```

2)File Management System calls or I/O System calls

a)Aim: To write C programs to simulate UNIX command pipe()

Program :

```
#include<stdio.h>

#include<unistd.h>

#include<sys/ipc.h>

#include<sys/types.h>

 #define msgsize 16

main()

    {
    char *msg="hello world";
     char inbuff[msgsize];
    int p[2],pid,j;
    pipe(p);
     pid=fork();
    if(pid>0)
        {

        close(p[0]);

         write(p[1],msg,msgsize);

        }

        if(pid==0)

        {

        close(p[1]);

        read(p[0],inbuff,msgsize);

        printf("%s \n",inbuff);

        }}
```

Output:

hello world

b)Aim: To write C programs to create semaphore id

Program :

```
#include<unistd.h>
 #include<sys/ipc.h>
 main()
{
 int semid,key,nsem,flag;
 key=(key_t)0X200f;
flag=IPC_CREAT|0666;
nsem=1;
semid=semget(key,nsem,flag);
printf("Created a semaphore
        with  id: %d \n",semid);
}
```

Output:

Created a semaphore with id: 589832

c)Aim: To write C programs to create shared memory id

Program :

```
#include<sys/types.h>
#include<sys/ipc.h>
#include<sys/shm.h>
main()
{
int shmid,flag;
        key_t key=0X1000;
        shmid=shmget(key,10,IPC_CREAT|0666);
        if(shmid<0)
        {
        perror("shmid failed");
            exit(1);
            }
        printf("Success shmid is %d /n",shmid);
}
```

Output:

Success shmid is: 682340

d)Aim: To write a C program for simulating File management process(Read,Write)

Program:

```
#include <unistd.h>
#include <sys/types.h>
#include <fcntl.h>
main()
{
int fd1,fd2,n;
char *ch;
fd1=open("file1", O_CREAT|O_RDWR,0666);
if(fd1==-1)
{
printf("source filw cannot be processed \n");
exit(0);
}
fd2=open("file2",O_CREAT|O_RDWR,0666);
if(fd2==-1)
{
printf("destination file cannot be processed \n");
exit(0);
}
while(1)
{
n=read(fd1,ch,1);
if(n==0)
41
break;
write(fd2,ch,1);
}
close(fd1);
close(fd2);
}
```

Output:

```
vi file1
good morning
cc filerw.c
./a.out
vi file2
good morning
```

3)Input/Output System calls

Write a C program to simulate IO System calls

AIM: To write a C program for simulating IO System calls

Program:

```
#include<stdio.h>
#include<unistd.h>
#include<string.h>
#include<fcntl.h>
main( )
{
int fd[2];
char buf1[25]= "just a test\n";
char buf2[50];
fd[0]=open("file1",O_RDWR);
fd[1]=open("file2",O_RDWR);
write(fd[0], buf1, strlen(buf1));
printf("\n Enter the text now….");
scanf("\n %s",buf1);
printf("\n Cat file1 is \n hai");
write(fd[0], buf1, strlen(buf1));
lseek(fd[0], SEEK_SET, 0);
read(fd[0], buf2, sizeof(buf1));
write(fd[1], buf2, sizeof(buf2));
close(fd[0]);
close(fd[1]);
printf("\n");
return 0;
}
```

Output:

```
Enter the text now....abcdef

Cat file1 is
hai
```

Cycle-2: simulate the following CPU scheduling algorithms

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a) write a C program for simulating the FCFS (First Come First Serve) CPU scheduling algorithm

Aim: To write a C program for simulating FCFS (first come first serve) CPU Scheduling Algorithm

Program:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int arrival[10],burst[10],start[10],finish[10],wait[10],turn[10];
int i,j,n,sum=0;
float totalwait=0.0,totalturn=0.0;
float avgwait=0.0,avgturn=0.0;
start[0]=0;
printf("Enter number of Process:");
scanf("%d",&n);
for(i=0;i<n;i++)
{
printf("\n Enter process %d Arrival and Burst time \n",(i+1));
scanf("%d %d",&arrival[i],&burst[i]);
}
for(i=0;i<n;i++)
{
sum=0;
for(j=0;j<i;j++)
{
sum=sum+burst[j];
}
start[i]=sum;
}

for(i=0;i<n;i++)
```

```
{
finish[i]=burst[i]+start[i];
wait[i]=start[i]-arrival[i];
turn[i]=burst[i]+wait[i];
}
for(i=0;i<n;i++)
{
totalwait=totalwait+wait[i];
totalturn=totalturn+turn[i];
}
avgwait=totalwait/n;
avgturn=totalturn/n;
printf("\n Arrival Burst Start Finish Wait Turn \n");
for(i=0;i<n;i++)
{
printf("%7d %5d %5d %6d %4d %4d \n",arrival[i],burst[i],start[i],finish[i],wait[i],turn[i]);
}
printf("Average waiting time %f\n",avgwait);
printf("Average turnaround time %f\n",avgturn);
getch();
}
```

Output:

Enter number of Process: 3

Enter process 1 Arrival and Burst time

0 24

Enter process 2 Arrival and Burst time

0 3

Enter process 3 Arrival and Burst time

0 3

Arrival Burst Start Finish Wait Turn

0 24 0 24 0 24

0 3 24 27 24 27

0 3 27 30 27 30

Average waiting time 17.000000

Average turnaround time 27.000000

b) Write a C program for simulating the SFJ (Shortest Job First) CPU scheduling algorithm

Aim: To write a C program for simulating SJF (Shortest Job First) CPU Scheduling Algorithm

Program:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j,burst[10],start[10],finish[10],wait[10];
int n,temp;
float totalwait=0.0,totalturn=0.0;
float avgwait,avgturn;
printf("Enter number of Process:");
scanf("%d",&n);
for(i=1;i<=n;i++)
{
printf("\n Enter process %d Burst time:",i);
scanf("%d",&burst[i]);
}
for(i=1;i<=n;i++)
{
for(j=i+1;j<=n;j++)
{
if(burst[i]>burst[j])
{
temp=burst[i];
burst[i]=burst[j];
burst[j]=temp;
}
}
}
for(i=1;i<=n;i++)
{
if(i==1)
{
start[i]=0;
finish[i]=burst[i];
wait[i]=0;
}
```

```
else
{
start[i]=finish[i-1];
finish[i]=start[i]+burst[i];
wait[i]=start[i];
}
}
printf("\n Burst Start Finish Wait \n");
for(i=1;i<=n;i++)
{
printf("%5d %5d %6d %4d\n",burst[i],start[i],finish[i],wait[i]);
}
for(i=1;i<=n;i++)
{
totalwait=totalwait+wait[i];
totalturn=totalturn+finish[i];
}
avgwait=totalwait/n;
avgturn=totalturn/n;
printf("Average Waiting time %f \n",avgwait);
printf("Average Turn over time %f \n",avgturn);
getch();
}
```

Output:

Enter number of Process:3

Enter process 1 Burst time:27

Enter process 2 Burst time:1

Enter process 3 Burst time:2

Burst Start Finish Wait

1 0 1 0

2 1 3 1

27 3 30 3

Average waiting time 1.333333

Average Turn over time 11.333333

c) Write a C program for simulating the Round robin CPU scheduling algorithm

AIM: To write a C program for simulating the Round Robin CPU Scheduling Algorithm

Program:

```
#include<stdio.h>
#include<conio.h>
void main()
{
        int start[10],burst[10],need[10],execution[10],wait[10],finish[10],turn[10];
        int i,ts,n,totaltime=0,totalburst=0;
        float totalwait=0.0,totalturn=0.0,totalresp=0.0;
        float avgwait=0.0,avgturn=0.0,avgresp=0.0;
        clrscr();
        printf("Enter number of processes");
        scanf("%d",&n);
        for(i=0;i<n;i++)
        {
        printf("Enter process %d burst time",(i+1));
        scanf("%d",&burst[i]);
        }
        printf("Enter time slice");
        scanf("%d",&ts);
        for(i=0;i<n;i++)
        {
        need[i]=burst[i];
        execution[i]=0;
        wait[i]=0;
        finish[i]=0;
        turn[i]=0;
        totalburst=totalburst+burst[i];
        }
        while(totalburst>0)
        {
        for(i=0;i<n;i++)
        {
if(execution[i]==0)
        {
        start[i]=totaltime;
        }
        if(need[i]>ts)
```

```
        {
        execution[i]=execution[i]+ts;
        need[i]=need[i]-ts;
        totaltime=totaltime+ts;
        totalburst=totalburst-ts;
        }
        else
        {
        if(need[i]>0)
        {
        execution[i]=execution[i]+need[i];
        totaltime=totaltime+need[i];
        wait[i]=totaltime-execution[i];
finish[i]=wait[i]+burst[i];
        turn[i]=wait[i]+burst[i];
        totalburst=totalburst-need[i];
        need[i]=0;
        }
        }
   }
}
printf("\n process burst start wait finish turnaround ");
for(i=0;i<n;i++)
{
printf("%7d %5d %5d %5d %4d %6d \n",(i+1),burst[i],start[i],wait[i],finish[i],turn[i]);
}
for(i=0;i<n;i++)
{
        totalwait=totalwait+wait[i];
        totalturn=totalturn+turn[i];
        totalresp=totalresp+start[i];
}
avgwait=totalwait/n;
avgturn=totalturn/n;
avgresp=totalresp/n;
printf("\n Average waiting time %f\n",avgwait);
printf("\n Average turnaround time %f\n",avgturn);
printf("\n Average response time %f\n",avgresp);
getch();
}
```

Output:

Enter number of processes 3

Enter process 1 burst time 24
Enter process 2 burst time 3
Enter process 3 burst time 3
Enter time slice 2
Process burst start wait finish turnaround
1 24 0 6 30 30
2 3 2 6 9 9
3 3 4 7 10 10
Average waiting time 6.333333
Average turnaround time 16.333334
Average response time 2.000000

d)Write a C program for simulating the Priority CPU scheduling algorithm

Aim: To write a C program for simulating Priority CPU Scheduling Algorithm

PROGRAM:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int burst[10],pri[10],wait[10],start[10],finish[10];
int i,j,temp1,temp2,n,totalwait=0,totalavg=0,totalturn=0;
float avgwait=0.0,avgturn=0.0;
printf("Enter n value");
scanf("%d",&n);
for(i=1;i<=n;i++)
{
printf("\n Enter Burst time and priority of process %d",i);
scanf("%d %d",&burst[i],&pri[i]);
}
for(i=1;i<=n;i++)
{
for(j=1;j<=n;j++)
{
if(pri[i]>pri[j])
{
temp1=pri[i];
pri[i]=pri[j];
pri[j]=temp1;
temp2=burst[i];
burst[i]=burst[j];
burst[j]=temp2;
}
   }
}
for(i=1;i<=n;i++)
{
if(i==1)
{
start[i]=0;
finish[i]=burst[i];
wait[i]=start[i];}
```

```
else
{
start[i]=finish[i-1];
finish[i]=start[i]+burst[i];
wait[i]=start[i];
}
}
printf("\n Burst Priority Start Wait Finsih \n");
for(i=1;i<=n;i++)
{
printf("%5d %8d %5d %4d  %6d ",burst[i],pri[i],start[i],wait[i],finish[i]);
}
for(i=1;i<=n;i++)
{
totalwait=totalwait+wait[i];
totalturn=totalturn+finish[i];
}
avgwait=totalwait/n;
avgturn=totalturn/n;
printf("\n Average waiting time=%f \n",avgwait;
printf("\n Average turnaround time=%f \n",avgturn);
getch();
}
```

Output:

Enter n value 3

Enter Burst time and priority of process 1

24 3

Enter Burst time and priority of process 2

3 2

Enter Burst time and priority of process 3

3 1

Burst Priority Start Wait Finnish

24 3 0 0 24

3 2 24 24 27

3 1 27 27 30

Average waiting time=17.000000

Average turnaround time=27.000000

Cycle-3: Simulate the file allocation strategies

---

a)Write a c program for simulating the Sequential File Allocation algorithm

Aim: To write a c program to simulate Sequential File Allocation Strategy

Program:

```
#include<stdio.h>
#include<conio.h>
void main()
{
  int memory[25];
  int i,len,startaddr,flag,endaddr,name;
  for(i=0;i<25;i++)
  {
     memory[i]=0;
     printf("%d",memory[i]);
  }
  printf("\n Enter file name(0 to quit):");
  scanf("%d",&name);
  while(name!=0)
  {
     printf("\n Enter length of file:");
     scanf("%d",&len);
     printf("\n enter starting location of the file :");
     scanf("%d",&startaddr);
     endaddr=startaddr+len;
     flag=0;
     for(i=startaddr;(i<endaddr && endaddr<25);i++)
     {
        if(memory[i]!=0)
        {
          flag=1;
          printf("\n No sufficient memory to fill ....");
          break;
        }
     }
     if(flag==0)
     {
       for(i=startaddr;i<endaddr;i++)
```

```
      {
        memory[i]=name;
      }
    }
    printf("\n enter file name(0 to quit):");
    scanf("%d",&name);
  }
  for(i=0;i<25;i++)
  {
    printf("%d",memory[i]);
  }
  getch()
}
```

Output:

```
0000000000000000000000000
 Enter file name(0 to quit):1

 Enter length of file:3

 enter starting location of the file :1

 enter file name(0 to quit):2

 Enter length of file:4

 enter starting location of the file :3

 No sufficient memory to fill ....
 enter file name(0 to quit):3

 Enter length of file:5

 enter starting location of the file :4

 enter file name(0 to quit):0
0111333330000000000000000
```

b) Write a C program for simulating the Indexed File Allocation algorithm

Aim: To write a C program for simulating the Indexed File Allocation algorithm

Program:

```
#include<stdio.h>
//#include<conio.h>
#include<stdlib.h>
struct block
{
  int bno,flag;
};
struct block b[100];
int rnum();
void main()
{
  int p[10],r[10][10],ab[10],i,j,n,s;
  //clrscr();
  printf("\nInput");
  printf("\nentyer no.of files:");
  scanf("%d",&n);
  for(i=1;i<=n;i++)
  {
     printf("\nenter size of block %d:",i);
     scanf("%d",&p[i]);
  }
  for(i=1;i<=n;i++)
  {
    s=rnum();
    ab[i]=s;
    for(j=0;j<p[i];j++)
    {
       s=rnum();
       r[i][j]=s;
    }
  }
  printf("\n output");
  for(i=1;i<=n;i++)
  {
    printf("\nfile %d \n block %d contains:",i,ab[i]);
    for(j=0;j<p[i];j++)
    {
      printf("%6d",r[i][j]);
```

```
   }
  }
 }
int rnum()
{
  int k=0,i;
  for(i=1;i<=100;i++)
  {
    k=rand()%100;
    if(b[k].flag!=-1)
    break;
  }
  return k;
}
```

Output:

```
Input
entyer no.of files:3

enter size of block 1:5

enter size of block 2:6

enter size of block 3:9

 output
file 1
 block 83 contains:    86    77    15    93    35
file 2
 block 86 contains:    92    49    21    62    27    90
file 3
 block 59 contains:    63    26    40    26    72    36    11    68    67
```

c)Write a C program for simulating the Linked File Allocation algorithm

Aim: To write a C program for simulating the Linked File Allocation algorithm

Program:

```
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
typedef struct
{
int bno,flag,bn[20];
}
block;
block b[100],b1;
void main()
{
  int rnum();
  int p[30],kk[20],i,n,t,s1,s,r,j,c=1;
  //clrscr();
  printf("\n enter no of inputs files:");
  scanf("%d",&n);
  printf("\n input the requirements:");
  for(i=1;i<=n;i++)
  {
  printf("\n enter no of blocks needed for file%d:",i);
  scanf("%d",&p[i]);
  }
  t=1;
  for(i=1;i<=n;i++)
  {
  for(j=1;j<=p[i];j++)
  {
  s=rnum();
  b[s].flag=1;
  b[c].bno=s;
  r=p[i]-1;
  kk[i]=s;
  t=1;
  c++;
  }
  }
  while(r!=0)
```

```
  {
  s1=rnum();
  b[s].bn[t]=s1;
  b[s].flag=1;
  b[i].bno=s1;
  r=r-1;
  t=t+1;
  }
  c++;
  printf("\n allocation\n");
  c=1;
  for(i=1;i<=n;i++)
  {
            printf("\nallocated for file %d:",i);
            for(j=1;j<=p[i];j++)
            {
            if(j==1)
            {
            printf("%3d",b[c].bno);
            c++;
            }
            else
            {
               printf("--->%3d",b[c].bno);
               c++;
            }
  }
  printf("\n");
}
}
int rnum()
{
int k=0,i;
for(i=1;i<=100;i++)
{
k=rand()%100;
k+=10;
if(b[k].flag!=1)
break;
}
return k;
}
```

Output:

enter no of inputs files:3

input the requirements:

enter no of blocks needed for file1:5

enter no of blocks needed for file2:4

enter no of blocks needed for file3:2

allocation

allocated for file 1: 93---> 96---> 87--->100--->103

allocated for file 2: 45--->102---> 59---> 31

allocated for file 3: 72---> 37

Cycle-4:

---

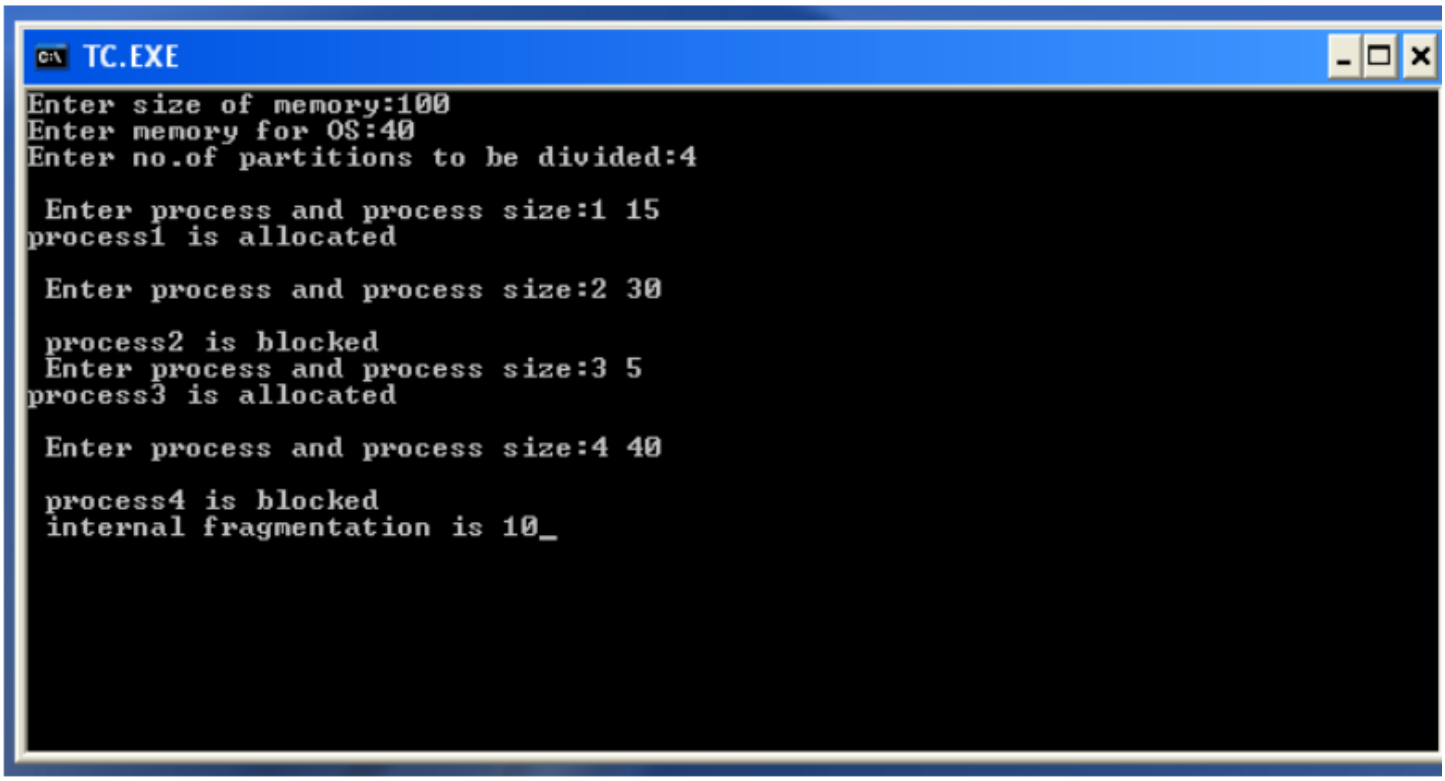
a) Write a C program to simulate MFT(Multiprogramming with Fixed number of Tasks)

Aim: To write a C program to simulate MFT(Multiprogramming with Fixed number of Tasks)

Program:

```
#include<stdio.h>
#include<conio.h>
main()
{
    int ms,i,ps[20],n,size,p[20],s,intr=0;
    clrscr();
    printf("Enter size of memory:");
    scanf("%d",&ms);
    printf("Enter memory for OS:");
    scanf("%d",&s);
    ms-=s;
    printf("Enter no.of partitions to be divided:");
    scanf("%d",&n);
    size=ms/n;
    for(i=0;i<n;i++)
    {
            printf("\n Enter process and process size:");
            scanf("%d%d",&p[i],&ps[i]);
            if(ps[i]<=size)
            {
                    intr=intr+size-ps[i];
                    printf("process%d is allocated\n",p[i]);
            }
            else
                    printf("\n process%d is blocked",p[i]);
    }
    printf("\n internal fragmentation is %d",intr);
    getch();
}
```

Output:


TC.EXE
Enter size of memory:100
Enter memory for OS:40
Enter no.of partitions to be divided:4
Enter process and process size:1 15
process1 is allocated
Enter process and process size:2 30
process2 is blocked
Enter process and process size:3 5
process3 is allocated
Enter process and process size:4 40
process4 is blocked
internal fragmentation is 10_

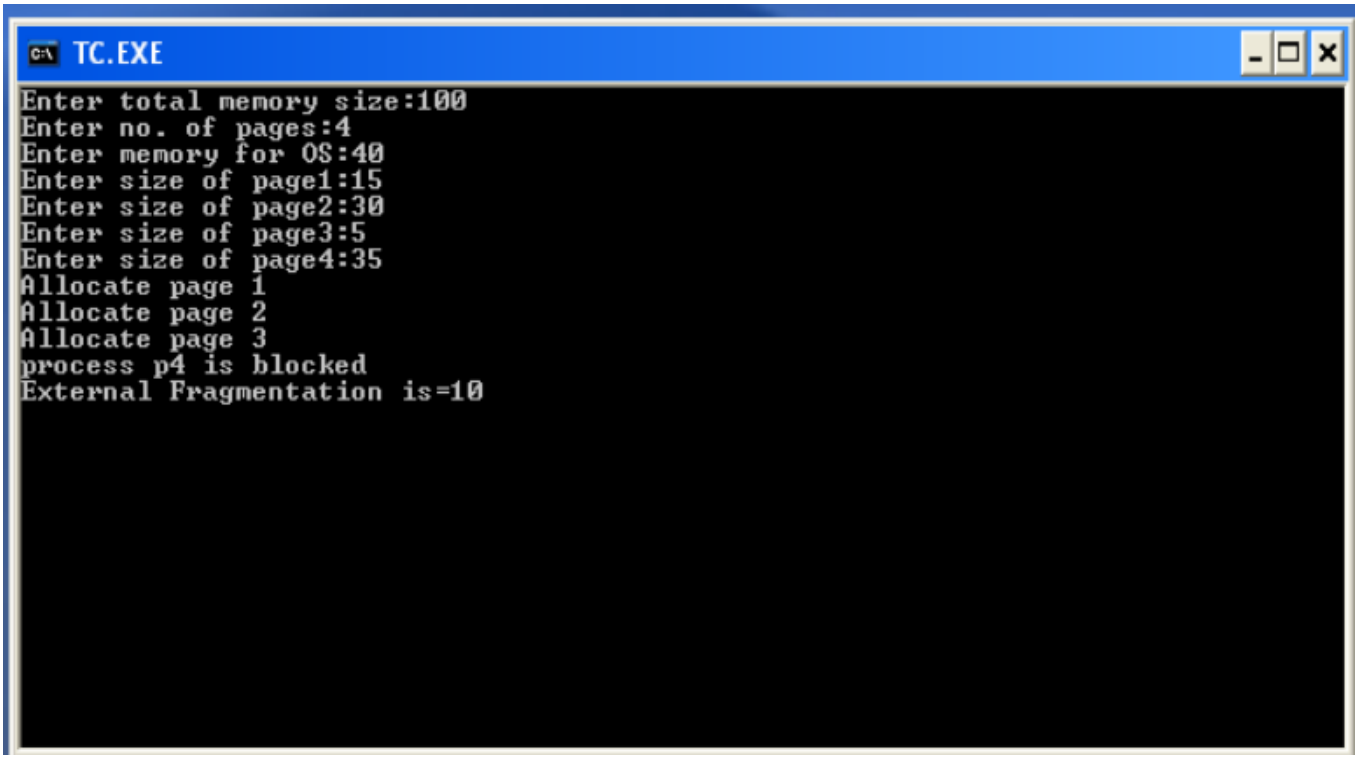
b) Write a C programming to simulate MFT(Multiprogramming with Variable number of Tasks)

Aim: To write a C program to simulate MVT (Multiprogramming with Variable number of Tasks)

Program:

```
#include<stdio.h>
#include<conio.h>
main()
{
    int i,m,n,tot,s[20];
    clrscr();
    printf("Enter total memory size:");
    scanf("%d",&tot);
    printf("Enter no. of pages:");
    scanf("%d",&n);
    printf("Enter memory for OS:");
    scanf("%d",&m);
    for(i=0;i<n;i++)
    {
            printf("Enter size of page%d:",i+1);
            scanf("%d",&s[i]);
    }
    tot=tot-m;
    for(i=0;i<n;i++)
    {
            if(tot>=s[i])
            {
                    printf("Allocate page %d\n",i+1);
                    tot=tot-s[i];
            }
            else
                    printf("process p%d is blocked\n",i+1);
    }
    printf("External Fragmentation is=%d",tot);
    getch();
}
```

Output:


TC.EXE
Enter total memory size:100
Enter no. of pages:4
Enter memory for OS:40
Enter size of page1:15
Enter size of page2:30
Enter size of page3:5
Enter size of page4:35
Allocate page 1
Allocate page 2
Allocate page 3
process p4 is blocked
External Fragmentation is=10

Simulate contiguous memory allocation techniques
a) Worst-fit b) Best-fit c) First-fit

a)Write a C program to simulate Worst-Fit memory allocation technique

Aim: To Write a C program for simulating Worst-Fit memory allocation technique

Program:

```
#include<stdio.h>

#include<conio.h>

#define max 25

void main()

{

int frag[max],b[max],f[max],i,j,nb,nf,temp,highest=0;

static int bf[max],ff[max];

clrscr();

printf("\nEnter the number of blocks:");

scanf("%d",&nb);

printf("Enter the number of files:");

scanf("%d",&nf);

printf("\nEnter the size of the blocks:-\n");

for(i=1;i<=nb;i++)

{

printf("Block %d:",i);

scanf("%d",&b[i]);

}

printf("Enter the size of the files:-\n");

for(i=1;i<=nf;i++)
```

```
{
printf("File %d:",i);
scanf("%d",&f[i]);
}
for(i=1;i<=nf;i++)
{
for(j=1;j<=nb;j++)
{
if(bf[j]!=1) //if bf[j] is not allocated
{
temp=b[j]-f[i];
if(temp>=0)
if(highest<temp)
{
ff[i]=j;
highest=temp;
}
}
}
frag[i]=highest;
bf[ff[i]]=1;
highest=0;
}
printf("\nFile_no  \tFile_size  \tBlock_no  \tBlock_size  \tFragment");
```

```
for(i=1;i<=nf;i++)
printf("\n%d\t\t%d\t\t%d\t\t%d\t\t%d",i,f[i],ff[i],b[ff[i]],frag[i]);
getch();
}
```

Output:

```
Enter the number of blocks:4
Enter the number of files:3

Enter the size of the blocks:-
Block 1:5
Block 2:8
Block 3:4
Block 4:10
Enter the size of the files:-
File 1:1
File 2:4
File 3:7

File_no         File_size       Block_no        Block_size      Fragment
1               1               4               10              9
2               4               2               8               4
3               7               0               0               0
```

b)Write a C program to simulate Best-Fit memory allocation technique

Aim: To Write a C program for simulating Best-Fit memory allocation technique

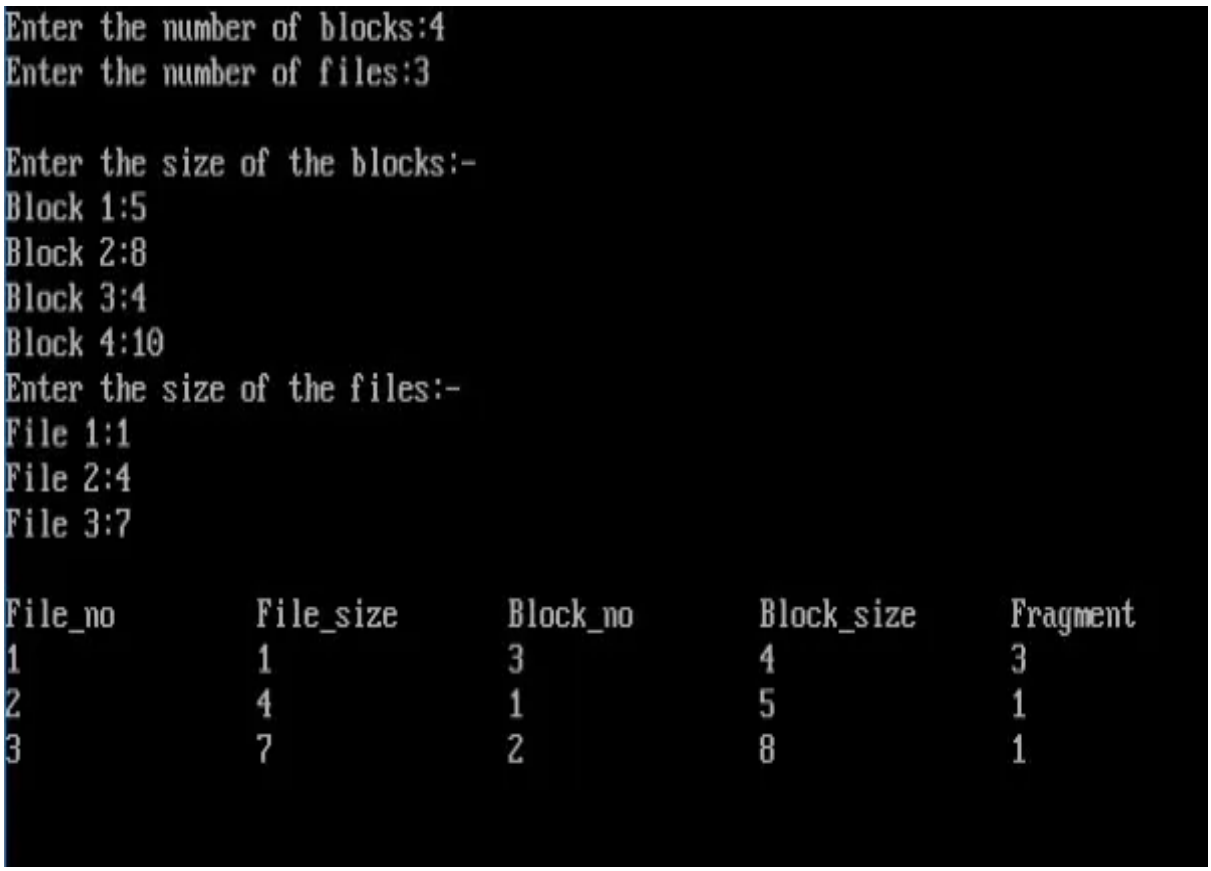
Program:

```
#include<stdio.h>

#include<conio.h>

#define max 25

void main()

{

int frag[max],b[max],f[max],i,j,nb,nf,temp,lowest=10000;

static int bf[max],ff[max];

clrscr();

printf("\nEnter the number of blocks:");

scanf("%d",&nb);

printf("Enter the number of files:");

scanf("%d",&nf);

printf("\nEnter the size of the blocks:-\n");

for(i=1;i<=nb;i++)

{

printf("Block %d:",i);

scanf("%d",&b[i]);

}

printf("Enter the size of the files:-\n");

for(i=1;i<=nf;i++)

{

printf("File %d:",i);
```

```
scanf("%d",&f[i]);
}
for(i=1;i<=nf;i++)
{
for(j=1;j<=nb;j++)
{
if(bf[j]!=1)
{
temp=b[j]-f[i];
if(temp>=0)
if(lowest>temp)
{
ff[i]=j;
lowest=temp;
}
}
}
frag[i]=lowest;
bf[ff[i]]=1;
lowest=10000;
}
printf("\nFile_no \tFile_size \tBlock_no \tBlock_size \tFragment");
for(i=1;i<=nf && ff[i]!=0;i++)
printf("\n%d\t\t%d\t\t%d\t\t%d\t\t%d",i,f[i],ff[i],b[ff[i]],frag[i]);
```

```
getch();
}
```

Output:



c)Write a C program to simulate First-Fit memory allocation technique

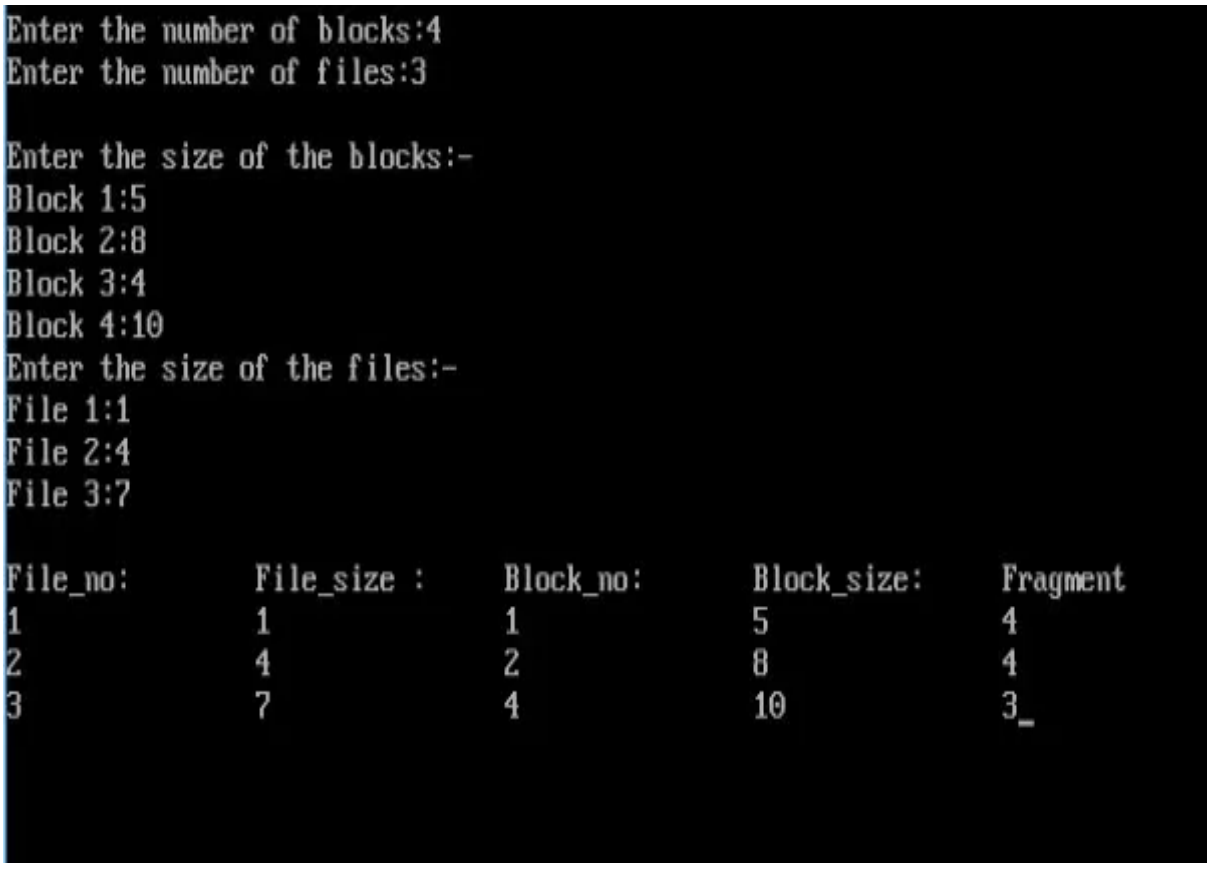
Aim: To Write a C program for simulating First-Fit memory allocation technique

Program:

```
#include<stdio.h>

#include<conio.h>

#define max 25

void main()

{

int frag[max],b[max],f[max],i,j,nb,nf,temp;

static int bf[max],ff[max];

clrscr();

printf("\nEnter the number of blocks:");

scanf("%d",&nb);

printf("Enter the number of files:");

scanf("%d",&nf);

printf("\nEnter the size of the blocks:-\n");

for(i=1;i<=nb;i++)

{

printf("Block %d:",i);

scanf("%d",&b[i]);

}

printf("Enter the size of the files:-\n");

for(i=1;i<=nf;i++)

{

printf("File %d:",i);
```

```
scanf("%d",&f[i]);
}
for(i=1;i<=nf;i++)
{
for(j=1;j<=nb;j++)
{
if(bf[j]!=1)
{
temp=b[j]-f[i];
if(temp>=0)
{
ff[i]=j;
break;
}
}
}
frag[i]=temp;
bf[ff[i]]=1;
}
printf("\nFile_no:\tFile_size :\tBlock_no:\tBlock_size:\tFragment");
for(i=1;i<=nf;i++)
printf("\n%d\t\t%d\t\t%d\t\t%d\t\t%d",i,f[i],ff[i],b[ff[i]],frag[i]);
getch();
}
```

Output:


Enter the number of blocks:4
Enter the number of files:3
Enter the size of the blocks:-
Block 1:5
Block 2:8
Block 3:4
Block 4:10
Enter the size of the files:-
File 1:1
File 2:4
File 3:7
File_no: File_size : Block_no: Block_size: Fragment
1 1 1 5 4
2 4 2 8 4
3 7 4 10 3

Cycle-5: Simulate all File Organization techniques

---

a) Write a C program to simulate Single Level Directory file Organization technique

Aim: To write a C program for simulating Single level Directory file Organization technique

Program:

```
#include<stdio.h>
//#include<conio.h>
#include<string.h>
void main()
{
int nf=0,i=0,j=0,ch;
char mdname[10],fname[10][10],name[10];
//clrscr();
printf("Enter the directory name:");
scanf("%s",mdname);
printf("Enter the number of files:");
scanf("%d",&nf);
do
{
printf("Enter file name to be created:");
scanf("%s",name);
for(i=0;i<nf;i++)
{
if(!strcmp(name,fname[i]))
break;
}
if(i==nf)
{
strcpy(fname[j++],name);
nf++;
}
else
printf("There is already %s\n",name);
printf("Do you want to enter another file(yes - 1 or no - 0):");
scanf("%d",&ch);
}
while(ch==1);
printf("Directory name is:%s\n",mdname);
printf("Files names are:");
```

```
for(i=0;i<j;i++)
printf("\n%s",fname[i]);
//getch();
}
```

Output:

```
Enter the directory name:abc
Enter the number of files:2
Enter file name to be created:aaa
Do you want to enter another file(yes - 1 or no - 0):1
Enter file name to be created:bbb
Do you want to enter another file(yes - 1 or no - 0):0
Directory name is:abc
Files names are:
aaa
bbb
```

b) Write a C program to simulate Two Level Directory file Organization technique

Aim: To write a C program for simulating Two level Directory file Organization technique

Pogram:

```
#include<stdio.h>
//#include<conio.h>
#include<string.h>
struct st
{
char dname[10];
char sdname[10][10];
char fname[10][10][10];
int ds,sds[10];
}dir[10];
void main()
{
int i,j,k,n;
//clrscr();
printf("enter number of directories:");
scanf("%d",&n);
for(i=0;i<n;i++)
{
printf("enter directory %d names:",i+1);
scanf("%s",dir[i].dname);
printf("enter size of directories:");
scanf("%d",&dir[i].ds);
for(j=0;j<dir[i].ds;j++)
{
printf("enter subdirectory name and size:");
scanf("%s",dir[i].sdname[j]);
scanf("%d",&dir[i].sds[j]);
for(k=0;k<dir[i].sds[j];k++)
{
printf("enter file name:");
scanf("%s",dir[i].fname[j][k]);
}
}
}
printf("\ndirname\t\tsize\tsubdirname\tsize\tfiles");
printf("\n**************************************************\n");
for(i=0;i<n;i++)
```

```
{
printf("%s\t\t%d",dir[i].dname,dir[i].ds);
for(j=0;j<dir[i].ds;j++)
{
printf("\t%s\t\t%d\t",dir[i].sdname[j],dir[i].sds[j]);
for(k=0;k<dir[i].sds[j];k++)
printf("%s\t",dir[i].fname[j][k]);
printf("\n\t\t");
}
printf("\n");
}
//getch();
}
```

OUTPUT:

```
enter number of directories:1
enter directory 1 names:aaa
enter size of directories:2
enter subdirectory name and size:abc 2
enter file name:bb
enter file name:cc
enter subdirectory name and size:def 2
enter file name:dd
enter file name:ee

dirname        size    subdirname      size    files
*****************************************************
aaa              2          abc          2      bb      cc
                            def          2      dd      ee
```

c)Write a C program to simulate Hierarchical Level Directory file Organization technique

Aim: To write a C program for simulating Single level Directory file Organization technique

Program:

```
#include<stdio.h>
#include<stdlib.h>
struct node{
char N[25];
int df;
struct node *pc;
struct node *ps;
};
struct node *A[20];
int in = 0,c = 0;
void create(struct node *P,int N)
{
int i;
struct node *Tmp,*T;
Tmp = P;
for(i = 0 ;i<N;i++)
{
T = malloc(sizeof(struct node));
printf("Enter name:");
scanf("%s",T->N);
printf("Enter dir(1) or file(0): ");
scanf("%d",&T->df);
if(T-> df == 1)
{
A[c] = T;
c++;
}
T->pc = NULL;
T->ps = NULL;
if(i == 0)
{
Tmp -> pc = T;
Tmp = T;
}
else{
Tmp -> ps = T;
Tmp = T;
```

```
}
}
}
void display(struct node *P)
{
int i;
P = P->pc;
do{
printf("\n%s(%d)",P->N,P->df);
if(P->df == 1 && P->pc != NULL)
display(P);
P = P->ps;
}while(P!=NULL);
}
void main()
{
int nu,nc,i,j,k;
struct node *Hdr;
Hdr = malloc(sizeof(struct node));
Hdr->df = 1;
Hdr->pc = NULL;
Hdr->ps = NULL;
printf("Enter number of users: ");
scanf("%d",&nu);
create(Hdr,nu);
for(in = 0;in<c;in++)
{
printf("\nEnter number of child nodes for %s: ",A[in]->N);
scanf("%d",&nc);
create(A[in],nc);
}
printf("\nHierarchical\n");
display(Hdr);
}
```

Output:

Enter number of users: 1
Enter name:aaa
Enter dir(1) or file(0): 1

Enter number of child nodes for aaa: 2
Enter name:file1
Enter dir(1) or file(0): 0
Enter name:file2
Enter dir(1) or file(0): 1

Enter number of child nodes for file2: 0

Hierarchical

aaa(1)
file1(0)
file2(1)

d)Write a C program to simulate DAG file Organization technique

Aim: To write a C program for simulating DAG file Organization technique

Program:

```
#include<stdio.h>
//#include<conio.h>
#include<string.h>
struct node
{
char N[25];
int df;
struct node *ptr;
};
struct node *A[20];
int in=0;c=0;
 void display()
 {
  int i;
  struct node *P;
  for(i=0;i<c;i++)
  {
   P = A[i];
   printf("\n%s(%d)",P->N,P->df);
   P = P->ptr;

   while(P!= NULL)
   {
    printf("->%s(%d)",P->N,P->df);
    P = P->ptr;
    }
   }
  }
  void DAG()
  {
  struct node *T,*P,*Tmp;
  int i,j,Flag,nv;
  for(in=0;in<c;in++)
  {
   P = A[in];
   printf("\n enter no.of adjacent vertices for %s:",A[in]->N);
   scanf("%d",&nv);
   for(i=0;i<nv;i++)
```

```
{
 T = malloc(sizeof(struct node));
 printf("enter name");
 scanf("%s",T->N);
 printf("enter dir(1) or file(0):");
 scanf("%d",&T->df);
 T->ptr = T;
 P=T;
 if(T->df==1)
 {
  Flag = 1;
  for(j=0;j<c;j++)
  {
   if(strcmp(A[j]->N,T->N)==0)
   {
   Flag = 0;
   break;
   }
  }
 if(Flag==1)
 {
  Tmp = malloc(sizeof(struct node));
  strcpy(Tmp->N,T->N);
  Tmp->df = T->df;
  Tmp->ptr = NULL;
  A[c] = Tmp;
  c++;
 }
 }
 }
 }
 }
 void create(int N)
 {
  int i;
  struct node *T;
  for(i=0;i<N;i++)
  {
   T = malloc(sizeof(struct node));
   printf("enter name:");
   scanf("%s",T->N);
   printf("enter dir(1) or file(0):");
```

```
 scanf("%d",&T->df);
 T->ptr=NULL;
 A[c]=T;
 c++;
}
}
void main()
{
int nu;
//clrscr();
printf("enter no.of users:");
scanf("%d",&nu);
create(nu);
DAG();
printf("\n DAG - adjancey list representation\n");
display();
//getch();
}
```

Output:

```
enter no.of users:2
enter name:abc
enter dir(1) or file(0):1
enter name:def
enter dir(1) or file(0):0

enter no.of adjacent vertices for abc:2
enter name:aaa
enter dir(1) or file(0):0
enter name:bbb
enter dir(1) or file(0):0

enter no.of adjacent vertices for def:1
enter name: hhh
enter dir(1) or file(0):0

 DAG - adjancey list representation

abc(1)
def(0)
```

Cycle-6: simulate bankers algorithm for Deadlock Avoidance and Deadlock Prevention

---

a)Write a C program to simulate Bankers Algorithm for Deadlock Avoidance

Aim: To write a C program for simulating Bankers Algorithm for Deadlock Avoidance

Program:

```
#include<stdio.h>
//#include<conio.h>
void main()
{
int available[3],work[5],max[5][3],allocation[5][3],need[5][3],safe[5],totalres[5];
char finish[5];
int i,j,k,totalloc=0,state,value=0;
//clrscr();
printf("Enter Instances of each Resource");
for(i=0;i<3;i++)
{
scanf("%d",&totalres[i]);
}
printf("Enter Maximum resources for each processes");
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
printf("\n Enter process %d Resource %d",i,(j+1));
scanf("%d",&max[i][j]);
}
}
//clrscr();
printf("Enter number of resources allocated to each Process");
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
printf("\n Enter the resource of R%d allocated to process %d",(j+1),i);
scanf("%d",&allocation[i][j]);
}
```

```
}
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
need[i][j]=max[i][j]-allocation[i][j];
}
}
for(i=0;i<5;i++)
{
finish[i]='f';
}
for(i=0;i<3;i++)
{
totalloc=0;
for(j=0;j<5;j++)
{
totalloc=totalloc+allocation[j][i];
}
available[i]=totalres[i]-totalloc;
work[i]=available[i];
}
//clrscr();
printf("\n Allocated Resources \n");
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
printf("%d",allocation[i][j]);
}
printf("\n");
}
printf("\n Maximum Resources \n");
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
printf("%d",max[i][j]);
}
printf("\n");
}
printf("\n Needed Reources \n");
```

```
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
printf("%d",need[i][j]);
}
printf("\n");
}
printf("\n Available Reources");
for(i=0;i<3;i++)
{
printf("%d",available[i]);
}
printf("\n");
for(i=0;i<5;i++)
{
for(j=0;j<3;j++)
{
if((finish[i]=='f')&&(need[i][j]<=work[j]))
{
state=1;
continue;
}
else
{
state=0;
break;
}
}
if(state==1)
{
for(j=0;j<3;j++)
{
work[j]=work[j]+allocation[i][j];
}
finish[i]='t';
safe[value]=i;
++value;
}
if(i==4)
{
if(value==5)
```

```
{
break;
}
else
{
i=-1;
}
}
}
printf("\n Safe States are");
for(i=0;i<5;i++)
{
printf("P%d",safe[i]);
}
}
```

Output:

```
Enter Instances of each Resource 10
5
7
Enter Maximum resources for each processes
 Enter process 0 Resource 1: 7
 Enter process 0 Resource 2: 5
 Enter process 0 Resource 3: 3
 Enter process 1 Resource 1: 3
 Enter process 1 Resource 2: 2
 Enter process 1 Resource 3: 2
 Enter process 2 Resource 1: 9
 Enter process 2 Resource 2: 0
 Enter process 2 Resource 3: 2
 Enter process 3 Resource 1: 2
 Enter process 3 Resource 2: 2
 Enter process 3 Resource 3: 2
 Enter process 4 Resource 1: 4
 Enter process 4 Resource 2: 3
 Enter process 4 Resource 3: 3
 Enter number of resources allocated to each Process
 Enter the resource of R1 allocated to process 0:0
 Enter the resource of R2 allocated to process 0:1
 Enter the resource of R3 allocated to process 0:0
 Enter the resource of R1 allocated to process 1:2
 Enter the resource of R2 allocated to process 1:0
 Enter the resource of R3 allocated to process 1:0
 Enter the resource of R1 allocated to process 2:3
 Enter the resource of R2 allocated to process 2:0
 Enter the resource of R3 allocated to process 2:2
```

Enter the resource of R1 allocated to process 3:2
Enter the resource of R2 allocated to process 3:1
Enter the resource of R3 allocated to process 3:1
Enter the resource of R1 allocated to process 4:0
Enter the resource of R2 allocated to process 40
Enter the resource of R3 allocated to process 4:2

Allocated Resources
010
200
302
211
002

Maximum Resources
753
322
902
222
433

Needed Resources
743
122
600
011
431
Available Reources332
Safe States areP1P3P4P0P2

b)Write a C program to simulate Bankers Algorithm for Deadlock Prevention

Aim: To write a C program for simulating Bankers Algorithm for Deadlock Prevention

Program:

```
#include<stdio.h>
#include<conio.h>
 void main()
{
 int nort,nopro,avail[20],req[20][20],i,j,k,flag=0;
 clrscr();
 printf("\n enter the no of resource types:");
 scanf("%d",&nort);

 printf("\n enter the no of instances of each resource type:");
 for(i=0;i<nort;i++)
 scanf("%d",&avail[i]);

 printf("\n enter the no of processes:");
 scanf("%d",&nopro);

 printf("\n enter the requests of each process:");
 for(i=0;i<nopro;i++)
 for(j=0;j<nort;j++)
 scanf("%d",&req[i][j]);

 for(i=0;i<nopro;i++)
 {
  flag=0;
  for(j=0;j<nort;j++)
  {
   if(req[i][j]>avail[j])
   {
     flag=1;
   }
  }
  if(flag==1)
  {
   printf("\n resources for process p%d cannot be allocated to prevent deadlock",i);
  }
  else
  {
```

```
   for(k=0;k<nort;k++)
   {
    avail[k]=avail[k]-req[i][k];
    printf("\n%d instances of resource type R%d are allocated to process
P%d",req[i][k],k,i);
   }
  }
 }
 printf("\n remaining resources after allocation are");
 for(i=0;i<nort;i++)
 printf("\n  %d",avail[i]);
 getch();
 }
```

Output:

```
enter the no of resource types:2

 enter the no of instances of each resource type:3 4

 enter the no of processes:2

 enter the requests of each process:5 6 2 1

 resources for process p0 cannot be allocated to prevent deadlock
2 instances of resource type R0 are allocated to process P1
1 instances of resource type R1 are allocated to process P1
 remaining resources after allocation are
  1
  3
```

Cycle-7: Simulate disk scheduling algorithms

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a)Write a C program to simulate FCFS (First Come First Serve) Disk scheduling algorithm

Aim: To write a C program for simulating FCFS (First come First Serve) Disk Scheduling Algorithm

Program:

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
   int RQ[100],i,n,TotalHeadMoment=0,initial;
   printf("Enter the number of Requests\n");
   scanf("%d",&n);
   printf("Enter the Requests sequence\n");
   for(i=0;i<n;i++)
    scanf("%d",&RQ[i]);
   printf("Enter initial head position\n");
   scanf("%d",&initial);

   // logic for FCFS disk scheduling

   for(i=0;i<n;i++)
   {
      TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
      initial=RQ[i];
   }

   printf("Total head moment is %d",TotalHeadMoment);
   return 0;

}
```

Output:

```
Enter the number of Requests
8
Enter the Requests sequence
95  180 34 119 11 123 62 64
Enter initial head position
50
Total head moment is 644
```

b)Write a C program to simulate SCAN disk scheduling algorithm

Aim: To write a C program for simulating SCAN disk Scheduling Algorithm

Program:

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
   int RQ[100],i,j,n,TotalHeadMoment=0,initial,size,move;
   printf("Enter the number of Requests\n");
   scanf("%d",&n);
   printf("Enter the Requests sequence\n");
   for(i=0;i<n;i++)
    scanf("%d",&RQ[i]);
   printf("Enter initial head position\n");
   scanf("%d",&initial);
   printf("Enter total disk size\n");
   scanf("%d",&size);
   printf("Enter the head movement direction for high 1 and for low 0\n");
   scanf("%d",&move);

   // logic for Scan disk scheduling

      /*logic for sort the request array */
   for(i=0;i<n;i++)
   {
      for(j=0;j<n-i-1;j++)
      {
         if(RQ[j]>RQ[j+1])
         {
            int temp;
            temp=RQ[j];
            RQ[j]=RQ[j+1];
            RQ[j+1]=temp;
         }

      }
   }

   int index;
   for(i=0;i<n;i++)
   {
      if(initial<RQ[i])
```

```
    {
        index=i;
        break;
    }
}

// if movement is towards high value
if(move==1)
{
    for(i=index;i<n;i++)
    {
        TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
        initial=RQ[i];
    }
    //  last movement for max size
    TotalHeadMoment=TotalHeadMoment+abs(size-RQ[i-1]-1);
    initial = size-1;
    for(i=index-1;i>=0;i--)
    {
         TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
         initial=RQ[i];

    }
}
// if movement is towards low value
else
{
    for(i=index-1;i>=0;i--)
    {
        TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
        initial=RQ[i];
    }
    //  last movement for min size
    TotalHeadMoment=TotalHeadMoment+abs(RQ[i+1]-0);
    initial =0;
    for(i=index;i<n;i++)
    {
         TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
         initial=RQ[i];

    }
}
```

```
    printf("Total head movement is %d",TotalHeadMoment);
    return 0;
}
```

Output:

```
Enter the number of Requests
8
Enter the Requests sequence
95 180 34 119 11 123 62 64
Enter initial head position
50
Enter total disk size
200
Enter the head movement direction for high 1 and for low 0
1
Total head movement is 337
```

c)Write a C program to simulate CSCAN disk scheduling algorithm

Aim: To write a C program for simulating CSCAN disk Scheduling Algorithm

Program:

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
   int RQ[100],i,j,n,TotalHeadMoment=0,initial,size,move;
   printf("Enter the number of Requests\n");
   scanf("%d",&n);
   printf("Enter the Requests sequence\n");
   for(i=0;i<n;i++)
    scanf("%d",&RQ[i]);
   printf("Enter initial head position\n");
   scanf("%d",&initial);
   printf("Enter total disk size\n");
   scanf("%d",&size);
   printf("Enter the head movement direction for high 1 and for low 0\n");
   scanf("%d",&move);

   // logic for C-Scan disk scheduling

      /*logic for sort the request array */
   for(i=0;i<n;i++)
   {
      for( j=0;j<n-i-1;j++)
      {
         if(RQ[j]>RQ[j+1])
         {
            int temp;
            temp=RQ[j];
            RQ[j]=RQ[j+1];
            RQ[j+1]=temp;
         }

      }
   }

   int index;
   for(i=0;i<n;i++)
   {
      if(initial<RQ[i])
```

```
    {
       index=i;
       break;
    }
}

// if movement is towards high value
if(move==1)
{
    for(i=index;i<n;i++)
    {
       TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
       initial=RQ[i];
    }
    //  last movement for max size
    TotalHeadMoment=TotalHeadMoment+abs(size-RQ[i-1]-1);
    /*movement max to min disk */
    TotalHeadMoment=TotalHeadMoment+abs(size-1-0);
    initial=0;
    for( i=0;i<index;i++)
    {
        TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
        initial=RQ[i];

    }
}
// if movement is towards low value
else
{
    for(i=index-1;i>=0;i--)
    {
       TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
       initial=RQ[i];
    }
    //  last movement for min size
    TotalHeadMoment=TotalHeadMoment+abs(RQ[i+1]-0);
    /*movement min to max disk */
    TotalHeadMoment=TotalHeadMoment+abs(size-1-0);
    initial =size-1;
    for(i=n-1;i>=index;i--)
    {
        TotalHeadMoment=TotalHeadMoment+abs(RQ[i]-initial);
```

```
            initial=RQ[i];

        }
    }

    printf("Total head movement is %d",TotalHeadMoment);
    return 0;
}
```

Output:

```
Enter the number of Requests
8
Enter the Requests sequence
95 180 34 119 11 123 62 64
Enter initial head position
50
Enter total disk size
200
Enter the head movement direction for high 1 and for low 0
1
Total head movement is 382
```