CSA0465 – OPERATING SYSTEMS FOR HANDLING DEADLOCKS

LAB EXPERIMENTS

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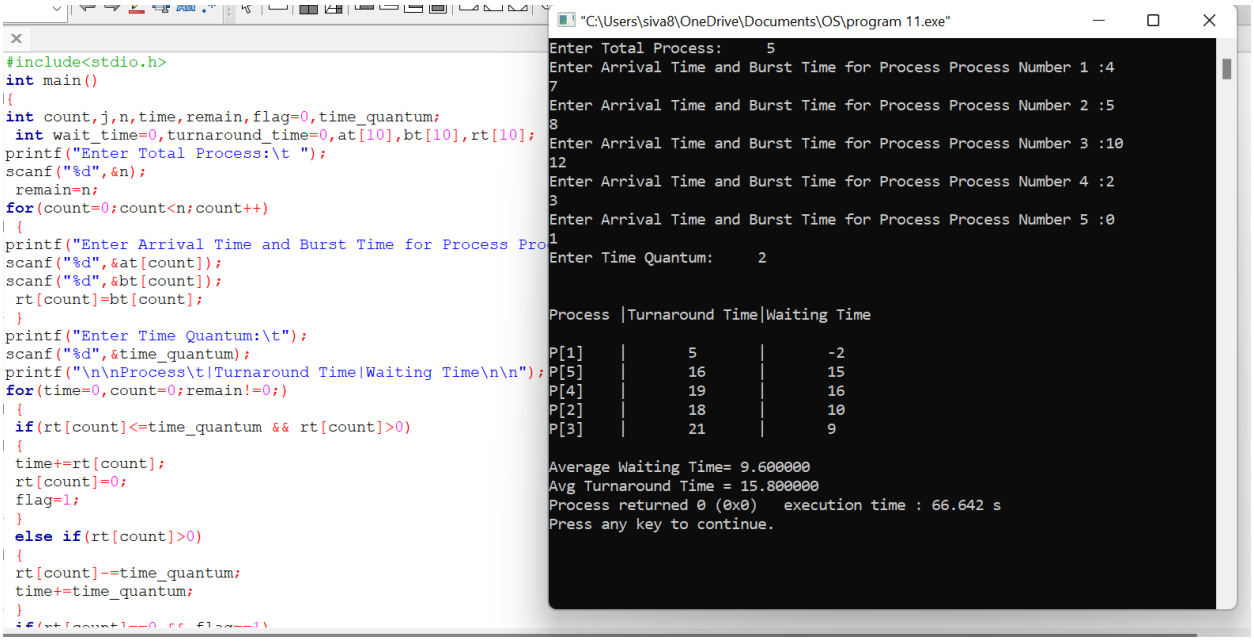
11. Round Robin :-

```
#include<stdio.h>
int main()
{
int count,j,n,time,remain,flag=0,time_quantum;
 int wait_time=0,turnaround_time=0,at[10],bt[10],rt[10];
printf("Enter Total Process:\t ");
scanf("%d",&n);
 remain=n;
for(count=0;count<n;count++)
 {
printf("Enter Arrival Time and Burst Time for Process Process Number %d :",count+1);
scanf("%d",&at[count]);
scanf("%d",&bt[count]);
 rt[count]=bt[count];
 }
printf("Enter Time Quantum:\t");
scanf("%d",&time_quantum);
printf("\n\nProcess\t|Turnaround Time|Waiting Time\n\n");
for(time=0,count=0;remain!=0;)
 {
 if(rt[count]<=time_quantum && rt[count]>0)
```

```
{
time+=rt[count];
rt[count]=0;
flag=1;
}
else if(rt[count]>0)
{
rt[count]-=time_quantum;
time+=time_quantum;
}
if(rt[count]==0 && flag==1)
{
remain--;
printf("P[%d]\t|\t%d\t|\t%d\n",count+1,time-at[count],time-at[count]-bt[count]);
wait_time+=time-at[count]-bt[count];
turnaround_time+=time-at[count];
flag=0;
}
if(count==n-1)
count=0;
else if(at[count+1]<=time)
count++;
else
count=0;
}
printf("\nAverage Waiting Time= %f\n",wait_time*1.0/n);
printf("Avg Turnaround Time = %f",turnaround_time*1.0/n);
```

return 0;

}



```
#include<stdio.h>
int main()
{
int count,j,n,time,remain,flag=0,time_quantum;
 int wait_time=0,turnaround_time=0,at[10],bt[10],rt[10];
printf("Enter Total Process:\t ");
scanf("%d",&n);
 remain=n;
for(count=0;count<n;count++)
 {
printf("Enter Arrival Time and Burst Time for Process Pro
scanf("%d",&at[count]);
scanf("%d",&bt[count]);
 rt[count]=bt[count];
 }
printf("Enter Time Quantum:\t");
scanf("%d",&time_quantum);
printf("\n\nProcess\t|Turnaround Time|Waiting Time\n\n");
for(time=0,count=0;remain!=0;)
 {
 if(rt[count]<=time_quantum && rt[count]>0)
 {
 time+=rt[count];
 rt[count]=0;
 flag=1;
 }
 else if(rt[count]>0)
 {
 rt[count]-=time_quantum;
 time+=time_quantum;
 }
```

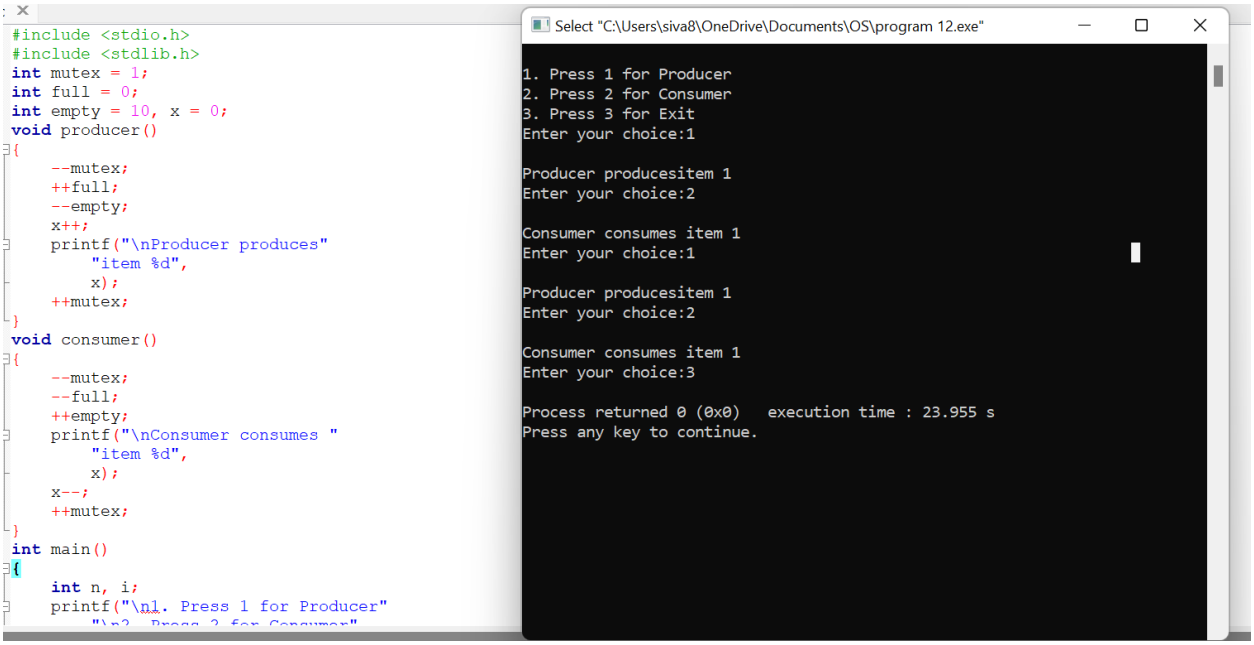
```
"C:\Users\siva8\OneDrive\Documents\OS\program 11.exe"
Enter Total Process:     5
Enter Arrival Time and Burst Time for Process Process Number 1 :4
7
Enter Arrival Time and Burst Time for Process Process Number 2 :5
8
Enter Arrival Time and Burst Time for Process Process Number 3 :10
12
Enter Arrival Time and Burst Time for Process Process Number 4 :2
3
Enter Arrival Time and Burst Time for Process Process Number 5 :0
1
Enter Time Quantum:     2


Process |Turnaround Time|Waiting Time

P[1]    |       5       |       -2
P[5]    |       16      |       15
P[4]    |       19      |       16
P[2]    |       18      |       10
P[3]    |       21      |       9

Average Waiting Time= 9.600000
Avg Turnaround Time = 15.800000
Process returned 0 (0x0)   execution time : 66.642 s
Press any key to continue.
```

12. Inter Process Communication :-

```
#include <stdio.h>

#include <stdlib.h>

int mutex = 1;

int full = 0;

int empty = 10, x = 0;

void producer()

{

        --mutex;

        ++full;

        --empty;

        x++;

        printf("\nProducer produces"

                "item %d",

                x);
```

```
        ++mutex;
}
void consumer()
{
        --mutex;
        --full;
        ++empty;
        printf("\nConsumer consumes "
                "item %d",
                x);
        x--;
        ++mutex;
}
int main()
{
        int n, i;
        printf("\n1. Press 1 for Producer"
                "\n2. Press 2 for Consumer"
                "\n3. Press 3 for Exit");
#pragma omp critical
        for (i = 1; i > 0; i++) {
                printf("\nEnter your choice:");
                scanf("%d", &n);
                switch (n) {
                case 1:
                        if ((mutex == 1)
                                && (empty != 0)) {
```

```
                producer();
            }
            else {
                printf("Buffer is full!");
            }
            break;
        case 2:
                    if ((mutex == 1)
                && (full != 0)) {
                consumer();
            }
            else {
                printf("Buffer is empty!");
            }
            break;
            case 3:
            exit(0);
            break;
        }
    }
}
```



```c
#include <stdio.h>
#include <stdlib.h>
int mutex = 1;
int full = 0;
int empty = 10, x = 0;
void producer()
{
    --mutex;
    ++full;
    --empty;
    x++;
    printf("\nProducer produces"
        "item %d",
        x);
    ++mutex;
}
void consumer()
{
    --mutex;
    --full;
    ++empty;
    printf("\nConsumer consumes "
        "item %d",
        x);
    x--;
    ++mutex;
}
int main()
{
    int n, i;
    printf("\n1. Press 1 for Producer"
```

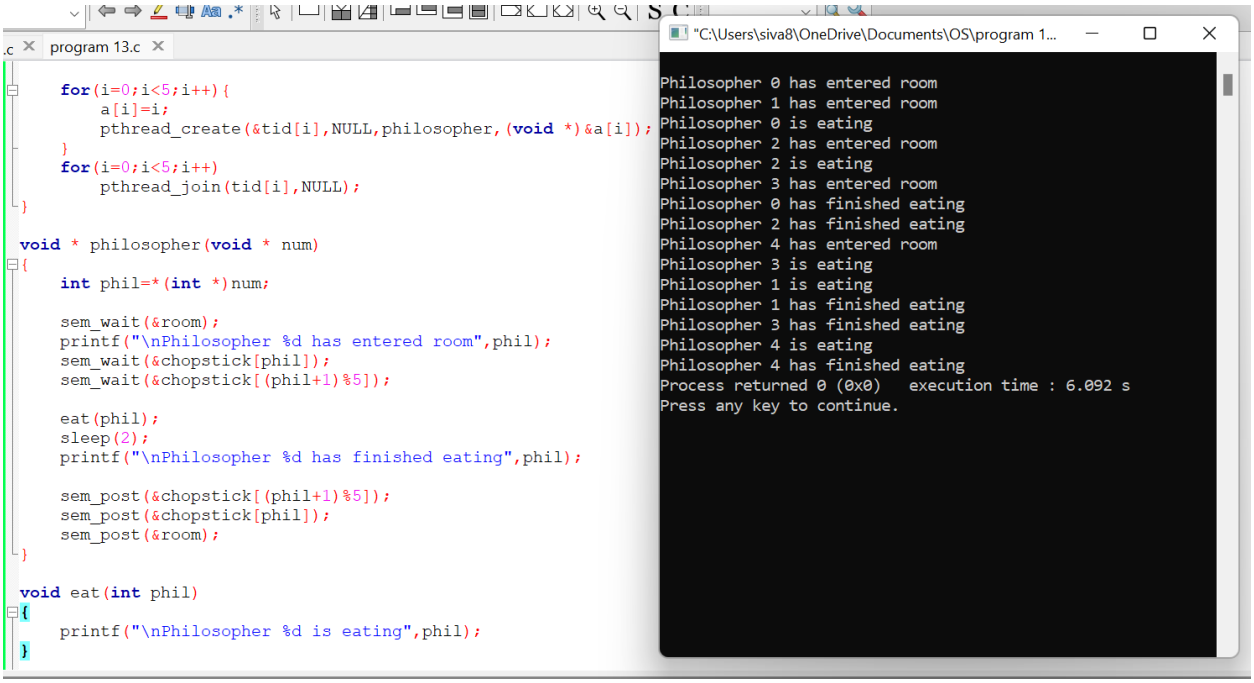
```
Select "C:\Users\siva8\OneDrive\Documents\OS\program 12.exe"

1. Press 1 for Producer
2. Press 2 for Consumer
3. Press 3 for Exit
Enter your choice:1

Producer producesitem 1
Enter your choice:2

Consumer consumes item 1
Enter your choice:1

Producer producesitem 1
Enter your choice:2

Consumer consumes item 1
Enter your choice:3

Process returned 0 (0x0)   execution time : 23.955 s
Press any key to continue.
```

13. Dinning Philosopher :-

```
#include<stdio.h>

#include<stdlib.h>

#include<pthread.h>

#include<semaphore.h>

#include<unistd.h>


sem_t room;

sem_t chopstick[5];


void * philosopher(void *);

void eat(int);

int main()

{

        int i,a[5];

        pthread_t tid[5];
```

```
	sem_init(&room,0,4);

	for(i=0;i<5;i++)
		sem_init(&chopstick[i],0,1);

	for(i=0;i<5;i++){
		a[i]=i;
		pthread_create(&tid[i],NULL,philosopher,(void *)&a[i]);
	}
	for(i=0;i<5;i++)
		pthread_join(tid[i],NULL);
}

void * philosopher(void * num)
{
	int phil=*(int *)num;

	sem_wait(&room);
	printf("\nPhilosopher %d has entered room",phil);
	sem_wait(&chopstick[phil]);
	sem_wait(&chopstick[(phil+1)%5]);

	eat(phil);
	sleep(2);
	printf("\nPhilosopher %d has finished eating",phil);

	sem_post(&chopstick[(phil+1)%5]);
```

```
        sem_post(&chopstick[phil]);
        sem_post(&room);
}

void eat(int phil)
{
        printf("\nPhilosopher %d is eating",phil);
}
```



program 13.c

```
    for(i=0;i<5;i++){
        a[i]=i;
        pthread_create(&tid[i],NULL,philosopher,(void *)&a[i]);
    }
    for(i=0;i<5;i++)
        pthread_join(tid[i],NULL);
}

void * philosopher(void * num)
{
    int phil=*(int *)num;

    sem_wait(&room);
    printf("\nPhilosopher %d has entered room",phil);
    sem_wait(&chopstick[phil]);
    sem_wait(&chopstick[(phil+1)%5]);

    eat(phil);
    sleep(2);
    printf("\nPhilosopher %d has finished eating",phil);

    sem_post(&chopstick[(phil+1)%5]);
    sem_post(&chopstick[phil]);
    sem_post(&room);
}

void eat(int phil)
{
    printf("\nPhilosopher %d is eating",phil);
}
```

"C:\Users\siva8\OneDrive\Documents\OS\program 1...

```
Philosopher 0 has entered room
Philosopher 1 has entered room
Philosopher 0 is eating
Philosopher 2 has entered room
Philosopher 2 is eating
Philosopher 3 has entered room
Philosopher 0 has finished eating
Philosopher 2 has finished eating
Philosopher 4 has entered room
Philosopher 3 is eating
Philosopher 1 is eating
Philosopher 1 has finished eating
Philosopher 3 has finished eating
Philosopher 4 is eating
Philosopher 4 has finished eating
Process returned 0 (0x0)   execution time : 6.092 s
Press any key to continue.
```

14. Bankers Algorithm :-

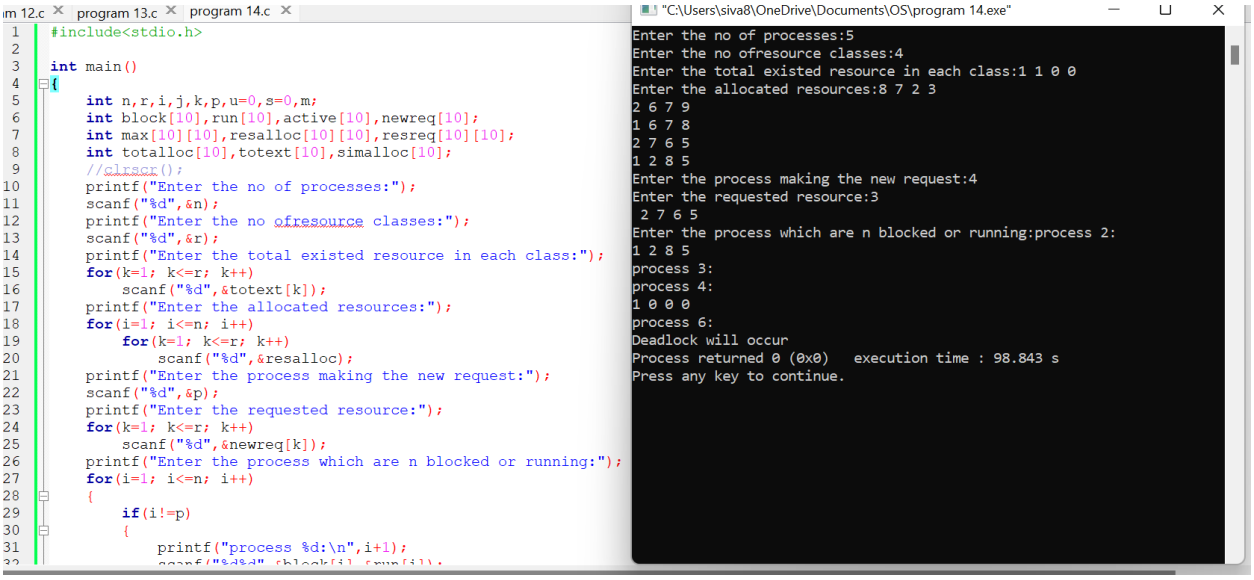
```
#include<stdio.h>

int main()
{
   int n,r,i,j,k,p,u=0,s=0,m;
   int block[10],run[10],active[10],newreq[10];
   int max[10][10],resalloc[10][10],resreq[10][10];
```

```
int totalloc[10],totext[10],simalloc[10];
//clrscr();
printf("Enter the no of processes:");
scanf("%d",&n);
printf("Enter the no ofresource classes:");
scanf("%d",&r);
printf("Enter the total existed resource in each class:");
for(k=1; k<=r; k++)
   scanf("%d",&totext[k]);
printf("Enter the allocated resources:");
for(i=1; i<=n; i++)
   for(k=1; k<=r; k++)
      scanf("%d",&resalloc);
printf("Enter the process making the new request:");
scanf("%d",&p);
printf("Enter the requested resource:");
for(k=1; k<=r; k++)
   scanf("%d",&newreq[k]);
printf("Enter the process which are n blocked or running:");
for(i=1; i<=n; i++)
{
   if(i!=p)
   {
      printf("process %d:\n",i+1);
      scanf("%d%d",&block[i],&run[i]);
   }
}
```

```
block[p]=0;
run[p]=0;
for(k=1; k<=r; k++)
{

   j=0;
   for(i=1; i<=n; i++)
   {
      totalloc[k]=j+resalloc[i][k];
      j=totalloc[k];
   }
}
for(i=1; i<=n; i++)
{
   if(block[i]==1||run[i]==1)
      active[i]=1;
   else
      active[i]=0;
}
for(k=1; k<=r; k++)
{
   resalloc[p][k]+=newreq[k];
   totalloc[k]+=newreq[k];
}
for(k=1; k<=r; k++)
{
   if(totext[k]-totalloc[k]<0)
```

```
    {
        u=1;
        break;
    }
}
if(u==0)
{
    for(k=1; k<=r; k++)
        simalloc[k]=totalloc[k];
    for(s=1; s<=n; s++)
        for(i=1; i<=n; i++)
        {
            if(active[i]==1)
            {
                j=0;
                for(k=1; k<=r; k++)
                {
                    if((totext[k]-simalloc[k])<(max[i][k]-resalloc[i][k]))
                    {
                        j=1;
                        break;
                    }
                }
            }
            if(j==0)

            {
```

```
                active[i]=0;
                for(k=1; k<=r; k++)
                   simalloc[k]=resalloc[i][k];
             }
          }
       m=0;
       for(k=1; k<=r; k++)
          resreq[p][k]=newreq[k];
       printf("Deadlock willn't occur");
    }
    else
    {
       for(k=1; k<=r; k++)
       {
          resalloc[p][k]=newreq[k];
          totalloc[k]=newreq[k];
       }
       printf("Deadlock will occur");
    }

}
```



```
#include<stdio.h>

int main()
{
    int n,r,i,j,k,p,u=0,s=0,m;
    int block[10],run[10],active[10],newreq[10];
    int max[10][10],resalloc[10][10],resreq[10][10];
    int totalloc[10],totext[10],simalloc[10];
    //clrscr();
    printf("Enter the no of processes:");
    scanf("%d",&n);
    printf("Enter the no ofresource classes:");
    scanf("%d",&r);
    printf("Enter the total existed resource in each class:");
    for(k=1; k<=r; k++)
        scanf("%d",&totext[k]);
    printf("Enter the allocated resources:");
    for(i=1; i<=n; i++)
        for(k=1; k<=r; k++)
            scanf("%d",&resalloc);
    printf("Enter the process making the new request:");
    scanf("%d",&p);
    printf("Enter the requested resource:");
    for(k=1; k<=r; k++)
        scanf("%d",&newreq[k]);
    printf("Enter the process which are n blocked or running:");
    for(i=1; i<=n; i++)
    {
        if(i!=p)
        {
            printf("process %d:\n",i+1);
```

```
"C:\Users\siva8\OneDrive\Documents\OS\program 14.exe"
Enter the no of processes:5
Enter the no ofresource classes:4
Enter the total existed resource in each class:1 1 0 0
Enter the allocated resources:8 7 2 3
2 6 7 9
1 6 7 8
2 7 6 5
1 2 8 5
Enter the process making the new request:4
Enter the requested resource:3
 2 7 6 5
Enter the process which are n blocked or running:process 2:
1 2 8 5
process 3:
process 4:
1 0 0 0
process 6:
Deadlock will occur
Process returned 0 (0x0)   execution time : 98.843 s
Press any key to continue.
```

15. Multi Threading :-

```
#include<string.h>

#include<stdlib.h>

#include<stdio.h>

struct

{

char dname[10],fname[10][10];

int fcnt;

}dir[10];

int main()

{

int i,ch,dcnt,k;

char f[30], d[30];

dcnt=0;

while(1)

{

printf("\n\n1. Create Directory\t2. Create File\t3. Delete File");

printf("\n4. Search File\t\t5. Display\t6. Exit\tEnter your choice -- ");
```

```
scanf("%d",&ch);
switch(ch)
{
case 1: printf("\nEnter name of directory -- ");
scanf("%s", dir[dcnt].dname);
dir[dcnt].fcnt=0;
dcnt++;
printf("Directory created");
break;
case 2: printf("\nEnter name of the directory -- ");
scanf("%s",d);
for(i=0;i<dcnt;i++)
if(strcmp(d,dir[i].dname)==0)
{
printf("Enter name of the file -- ");
scanf("%s",dir[i].fname[dir[i].fcnt]);
printf("File created");
break;
}
if(i==dcnt)
printf("Directory %s not found",d);
break;
case 3: printf("\nEnter name of the directory -- ");
scanf("%s",d);
for(i=0;i<dcnt;i++)
{
if(strcmp(d,dir[i].dname)==0)
```

```
{
printf("Enter name of the file -- ");
scanf("%s",f);
for(k=0;k<dir[i].fcnt;k++)
{
if(strcmp(f, dir[i].fname[k])==0)
{
printf("File %s is deleted ",f);
dir[i].fcnt--;
strcpy(dir[i].fname[k],dir[i].fname[dir[i].fcnt]);
goto jmp;
}
}
printf("File %s not found",f);
goto jmp;
}
}
printf("Directory %s not found",d);
jmp : break;
case 4: printf("\nEnter name of the directory -- ");
scanf("%s",d);
for(i=0;i<dcnt;i++)
{
if(strcmp(d,dir[i].dname)==0)
{
printf("Enter the name of the file -- ");
scanf("%s",f);
```

```
for(k=0;k<dir[i].fcnt;k++)
{
if(strcmp(f, dir[i].fname[k])==0)
{
printf("File %s is found ",f);
goto jmp1;
}
}
printf("File %s not found",f);
goto jmp1;
}
}
printf("Directory %s not found",d);
jmp1: break;
case 5: if(dcnt==0)
printf("\nNo Directory's ");
else
{
printf("\nDirectory\tFiles");
for(i=0;i<dcnt;i++)
{
printf("\n%s\t\t",dir[i].dname);
for(k=0;k<dir[i].fcnt;k++)
printf("\t%s",dir[i].fname[k]);
}
}
break;
```

```
default:exit(0);

}

}

}
```

Output :-