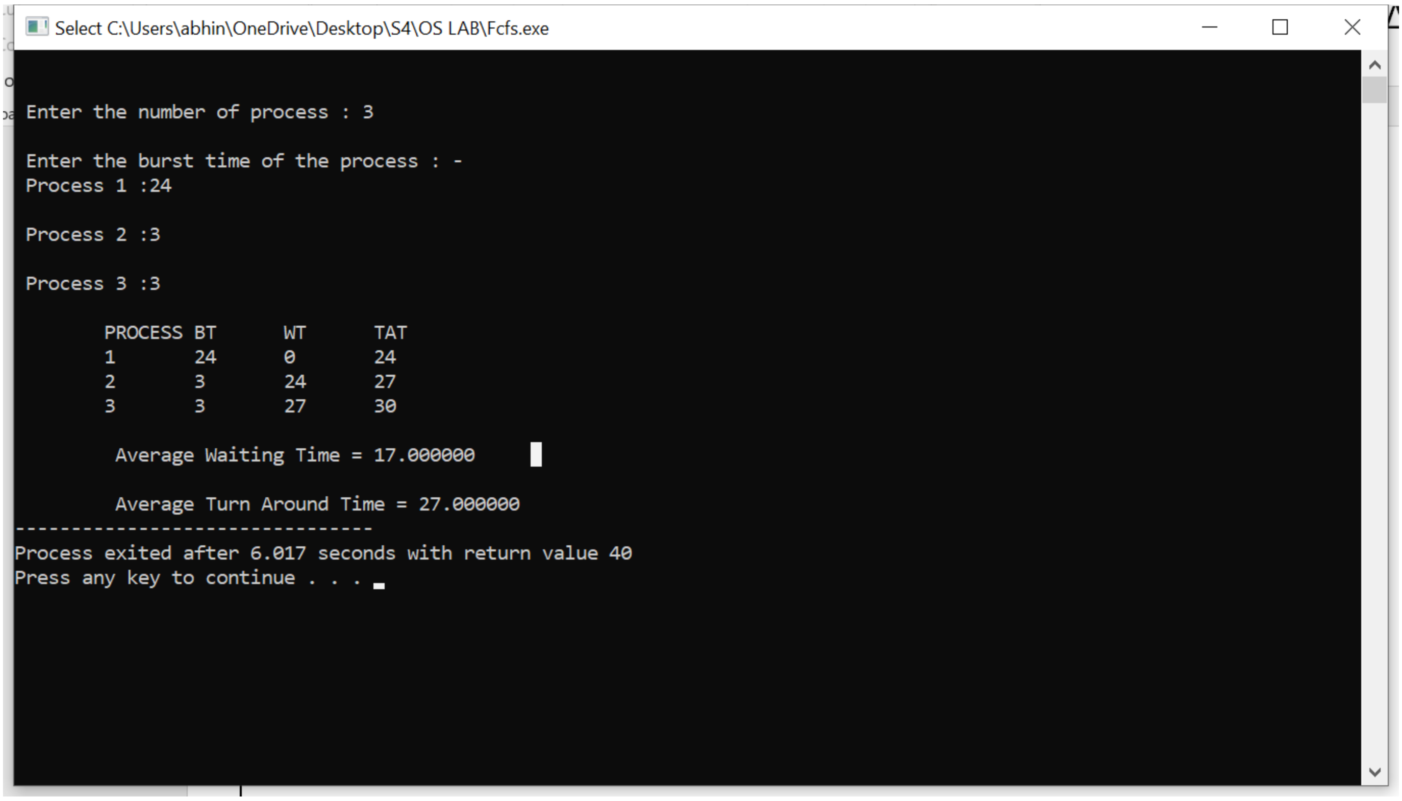
OS LAB :-

1.First Come First Serve Scheduling Algorithm

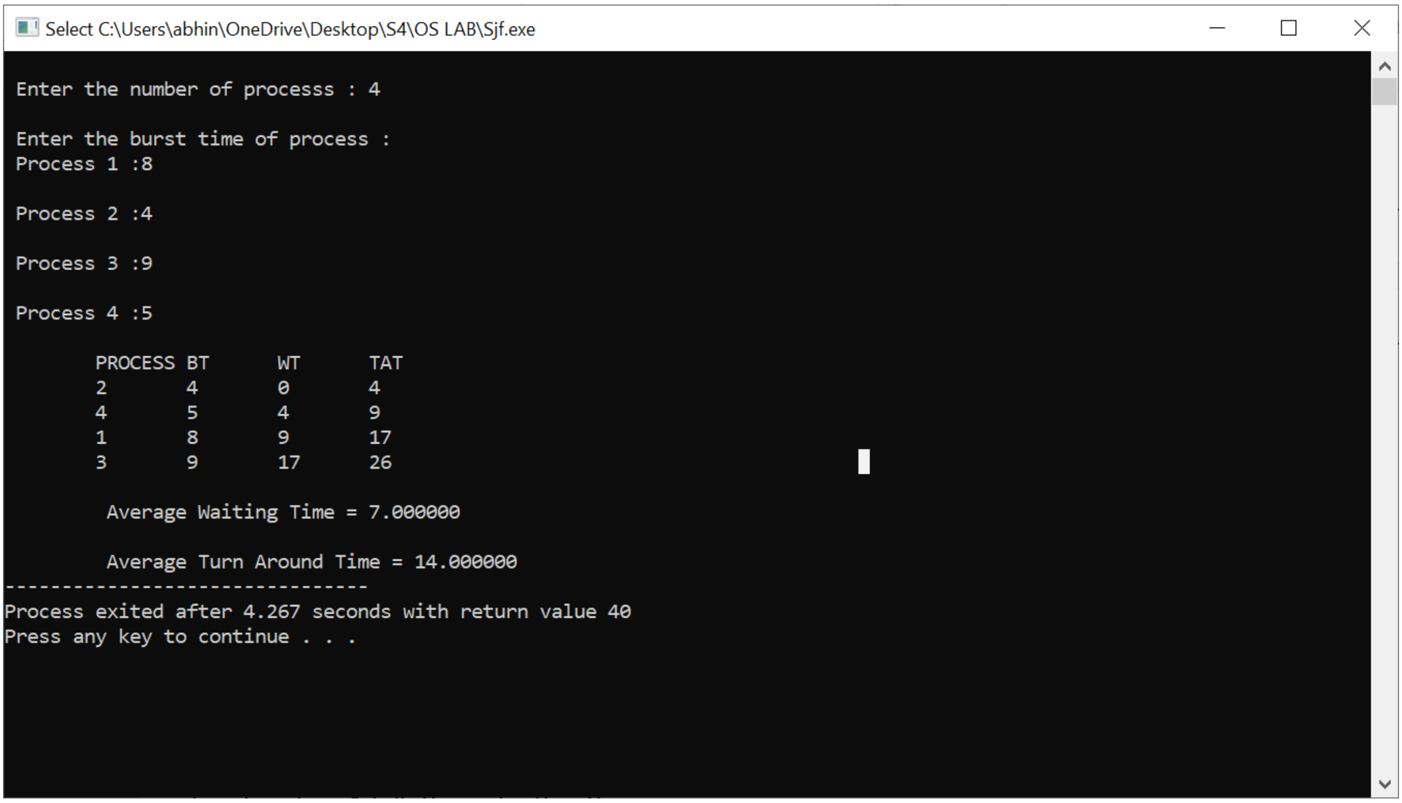
```
#include<stdio.h>
void waitTime(int process[],int n,int bt[],int wt[]) //to find waiting time of each process
{
        int i;
        wt[0]=0; //waiting time of first proc is 0
        for(i=1;i<n;i++)
        {
                wt[i]=wt[i-1]+bt[i-1];
        }
}
void turnAroundTime(int proces[],int n,int bt[],int wt[],int tat[]) //find turnaround time of each proc
{
        int i;
        for(i=0;i<n;i++)
        {
                tat[i]=bt[i]+wt[i];
        }
}
void avgTime(int process[],int n,int bt[])
{
        int wt[n],tat[n],i,tot_wt=0,tot_tat=0;
        float avgWt,avgTat;
        waitTime(process,n,bt,wt);
        turnAroundTime(process,n,bt,wt,tat);
        printf("\n\tPROCESS\tBT\tWT\tTAT");
        for(i=0;i<n;i++)
        {
           tot_wt+=wt[i];
                tot_tat+=tat[i];
                printf("\n\t%d\t%d\t%d\t%d",(i+1),bt[i],wt[i],tat[i]);
        }
        avgWt=(tot_wt/n);
        avgTat=(tot_tat/n);
        printf("\n\n\t Average Waiting Time = %f",avgWt);
        printf("\n\n\t Average Turn Around Time = %f",avgTat);
}
void main()
{
        int process[10],n,Bt[10],i;
        printf("\n\n Enter the number of process : ");
        scanf("%d",&n);
        printf("\n Enter the burst time of the process : -");
        for(i=0;i<n;i++)
        {
                printf("\n Process %d :",(i+1));
                scanf("%d",&Bt[i]);
        }
        avgTime(process,n,Bt);
}
```



```
 Enter the number of process : 3

 Enter the burst time of the process : -
 Process 1 :24

 Process 2 :3

 Process 3 :3

        PROCESS BT      WT      TAT
        1       24      0       24
        2       3       24      27
        3       3       27      30

         Average Waiting Time = 17.000000

         Average Turn Around Time = 27.000000
--------------------------------
Process exited after 6.017 seconds with return value 40
Press any key to continue . . .
```

2.Shortest Job First Scheduling Algorithm

```
//Shortest Job First
#include<stdio.h>
int process[10],bt[10],wt[10],tat[10];
int n,totWt=0,totTat=0;
float avgWt,avgTat;
void waitTime(int process[],int n)
{
        int i;
        wt[0]=0;
        for(i=1;i<n;i++)
        {
                wt[i]=wt[i-1]+bt[i-1];
                totWt+=wt[i];
        }

}
void turnAroundTime(int process[],int n)
{
        int i;
        for(i=0;i<n;i++)
        {
                tat[i]=wt[i]+bt[i];
                totTat+=tat[i];
        }

}
void main()
{
        int i,j,temp;
        printf("\n Enter the number of processs : ");
        scanf("%d",&n);
        printf("\n Enter the burst time of process : ");
        for(i=0;i<n;i++)
        {
                printf("\n Process %d :",(i+1));
                process[i]=i+1;
                scanf("%d",&bt[i]);
        }
        //Sorting the processes in ascending order of burst time
        for(i=0;i<(n-1);i++)
        {
                for(j=0;j<(n-i-1);j++)
                {
                   if(bt[j]>bt[j+1])
                        {
                          temp=bt[j];
                          bt[j]=bt[j+1];
                          bt[j+1]=temp;

                          temp=process[j];    //while sorting, process are also sorted
                          process[j]=process[j+1];
                          process[j+1]=temp;
                        }
                }
        }
        waitTime(process,n);
        turnAroundTime(process,n);
        avgWt=totWt/n;
        avgTat=totTat/n;
        printf("\n\tPROCESS\tBT\tWT\tTAT");
        for(i=0;i<n;i++)
        {
                printf("\n\t%d\t%d\t%d\t%d",process[i],bt[i],wt[i],tat[i]);
        }
    printf("\n\n\t Average Waiting Time = %f",avgWt);
        printf("\n\n\t Average Turn Around Time = %f",avgTat);
}
```

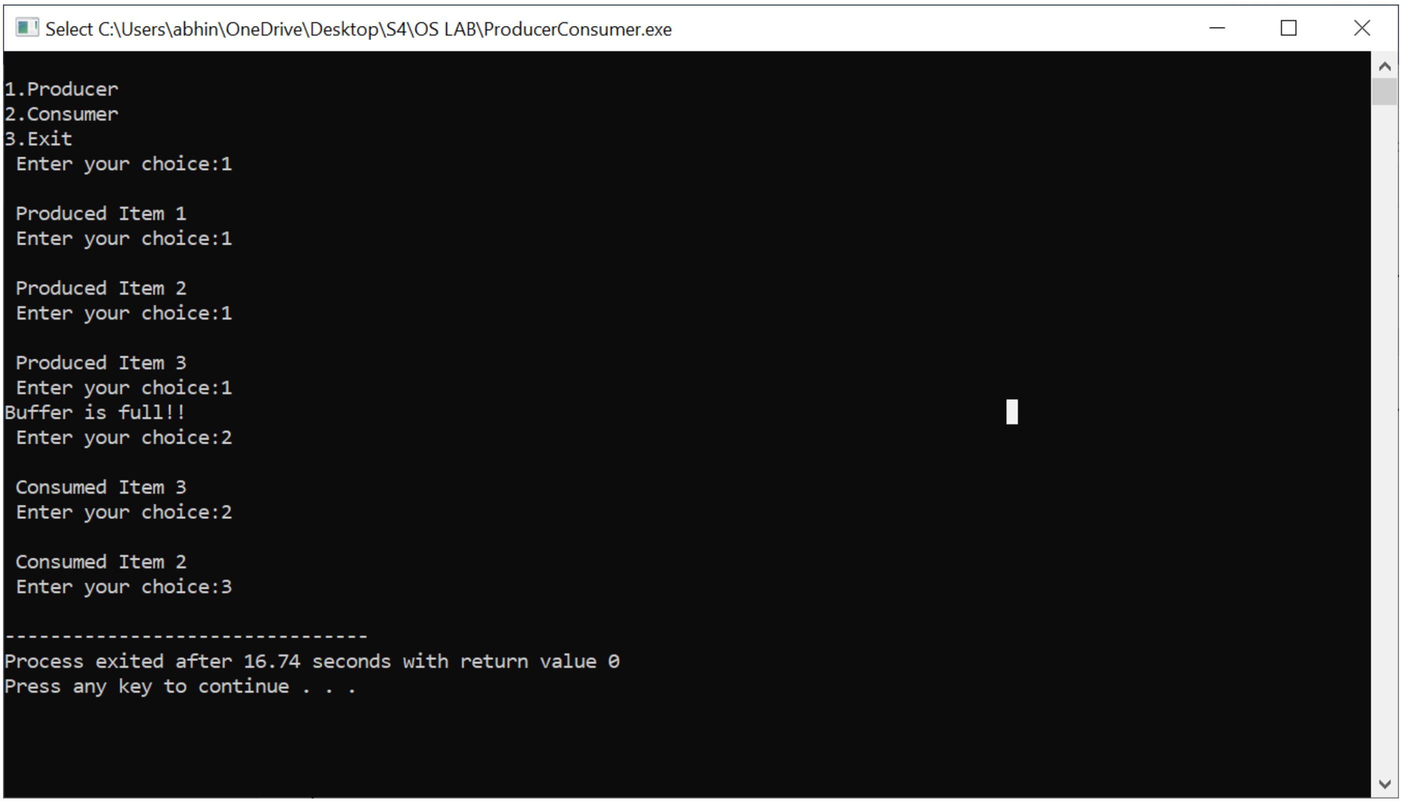


```
Enter the number of processs : 4

Enter the burst time of process :
Process 1 :8

Process 2 :4

Process 3 :9

Process 4 :5

       PROCESS BT      WT      TAT
       2       4       0       4
       4       5       4       9
       1       8       9       17
       3       9       17      26

        Average Waiting Time = 7.000000

        Average Turn Around Time = 14.000000
--------------------------------
Process exited after 4.267 seconds with return value 40
Press any key to continue . . .
```

3.Consumer Producer

```
#include<stdio.h>

#include<stdlib.h>

int mutex=1,full=0,empty=3,x=0;

int wait(int s)

{

        return (--s);

}

int signal(int s)

{

        return (++s);

}

void producer()

{

        mutex=wait(mutex);

        full=signal(full);

        empty=wait(empty);

        x++;
```

```
    printf("\n Produced Item %d ",x);
    mutex=signal(mutex);
}
void consumer()
{
    mutex=wait(mutex);
    full=wait(full);
    empty=signal(empty);
    printf("\n Consumed Item %d ",x);
    x--;
    mutex=signal(mutex);
}
void main()
{
    int n;
    printf("\n1.Producer\n2.Consumer\n3.Exit");
    while(1)
    {
        printf("\n Enter 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;

                }
        }
}
```



Select C:\Users\abhin\OneDrive\Desktop\S4\OS LAB\ProducerConsumer.exe

```
1.Producer
2.Consumer
3.Exit
 Enter your choice:1

 Produced Item 1
 Enter your choice:1

 Produced Item 2
 Enter your choice:1

 Produced Item 3
 Enter your choice:1
Buffer is full!!
 Enter your choice:2

 Consumed Item 3
 Enter your choice:2

 Consumed Item 2
 Enter your choice:3

--------------------------------
Process exited after 16.74 seconds with return value 0
Press any key to continue . . .
```

First Fit Memory Allocation

```
#include<stdio.h>
#define size 10
void main()
{
                  int block[size],file[size],bno,fno,flag[size],alloc[size],frag[size],i,j,temp;
                  printf("\n Enter the number of blocks : ");
                  scanf("%d",&bno);
                  printf("\n Enter the number of files : ");
                  scanf("%d",&fno);
                  printf("\n Enter the size of blocks : ");
                for(i=1;i<=bno;i++)
                  {
                       printf("\n Block %d : ",i);
```

```
        scanf("%d",&block[i]);
}
printf("\n Enter the size of files : ");
for(i=1;i<=fno;i++)
{
    printf("\n File %d :  ",i);
        scanf("%d",&file[i]);
}
//Initialising flag[] as 0 and Alloc[] as -1
for(i=1;i<=size;i++)
 flag[i]=0;
for(i=1;i<=size;i++)
 alloc[i]=-1;
// First fit code
for(i=1;i<=fno;i++)
{
        for(j=1;j<=bno;j++)
        {
                if(flag[j]==0)
                {
                        temp=block[j]-file[i];
                        if(temp>=0)
                        {
                            alloc[i]=j;
                            flag[i]=1;
                            break;
                        }
                }

        }
        frag[i]=temp;
}
printf("\n First Fit Allocation : - \n");
printf("\n\tFno.\tFsize\tBno.\t\tBsize\t\tFrag\n");
```

```
                for(i=1;i<=fno;i++)
                {
                     printf("\n\t%d\t%d\t%d\t\t%d\t\t%d",i,file[i],alloc[i],block[alloc[i]],frag[i]);

                }
}
```

Best Fit Memory Allocation

```
#include<stdio.h>
#define size 10
void main()
{
                int block[size],file[size],bno,fno,flag[size],alloc[size],frag[size]
                 i,j,temp,lowest =10000;
                printf("\n Enter the number of blocks : ");
                scanf("%d",&bno);
                printf("\n Enter the number of files : ");
                scanf("%d",&fno);
                printf("\n Enter the size of blocks : ");
                 for(i=1;i<=bno;i++)
                {
                    printf("\n Block %d : ",i);
                    scanf("%d",&block[i]);
                }
                printf("\n Enter the size of files : ");
                for(i=1;i<=fno;i++)
                {
                  printf("\n File %d :  ",i);
                    scanf("%d",&file[i]);
                }
                //Initialising flag[] as 0 and Alloc[] as -1
                for(i=1;i<=size;i++)
                 flag[i]=0;
                for(i=1;i<=size;i++)
                 alloc[i]=-1;
```

```
         //Best fit code
        for(i=1;i<=fno;i++)
        {
            for(j=1;j<=bno;j++)
            {
                if(flag[j]==0)
                {
                    temp=block[j]-file[i];
                    if(temp>=0)
                    {
                        if(lowest>temp)
                        {
                            alloc[i]=j;
                            lowest=temp;
                        }
                    }
                }
            }
            frag[i]=lowest;
            flag[alloc[i]]=1;
            lowest=100000;
        }
        printf("\n Best Fit Allocation : - \n");
        printf("\n\tFno.\tFsize\tBno.\t\tBsize\t\tFrag\n");
        for(i=1;i<=fno;i++)
        {
             printf("\n\t%d\t%d\t%d\t\t%d\t\t%d",i,file[i],alloc[i],block[alloc[i]],frag[i]);
        }
}
```

Worst Fit Memory Allocation

```
#include<stdio.h>
#define size 10
void main()
{
```

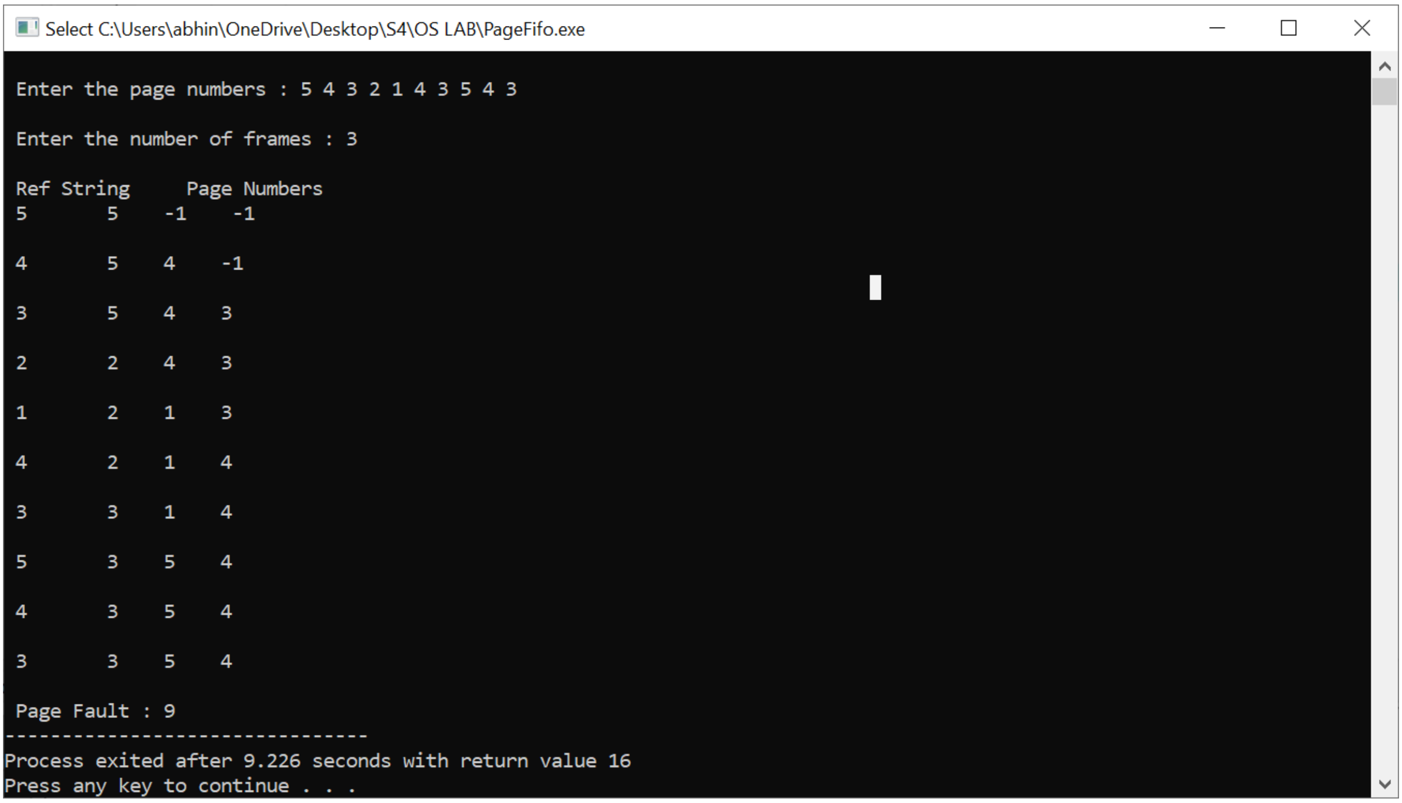
```
int block[size],file[size],bno,fno,flag[size],alloc[size],frag[size],i,j,temp,highest=0;
printf("\n Enter the number of blocks : ");
scanf("%d",&bno);
printf("\n Enter the number of files : ");
scanf("%d",&fno);
printf("\n Enter the size of blocks : ");
for(i=1;i<=bno;i++)
{
     printf("\n Block %d : ",i);
     scanf("%d",&block[i]);
}
printf("\n Enter the size of files : ");
for(i=1;i<=fno;i++)
{
   printf("\n File %d :  ",i);
     scanf("%d",&file[i]);
}
//Initialising flag[] as 0 and alloc[] as -1
for(i=1;i<=size;i++)
 flag[i]=0;
for(i=1;i<=size;i++)
 alloc[i]=-1;
for(i=1;i<=fno;i++)
{
  for(j=1;j<=bno;j++)
  {
      if(flag[j]==0)
      {
            temp=block[j]-file[i];
            if(temp>=0)
            {
                    if(highest<temp)
                    {
                      alloc[i]=j;
```

```
                                        highest=temp;
                            }
                        }
                    }
                }
                frag[i]=highest;
                flag[alloc[i]]=1;
                highest=0;
            }

            printf("\n Worst Fit Allocation : - \n");
            printf("\n\tFno.\tFsize\tBno.\t\tBsize\t\tFrag\n");
            for(i=1;i<=fno;i++)
            {
                printf("\n\t%d\t%d\t%d\t\t%d\t\t%d",i,file[i],alloc[i],block[alloc[i]],frag[i]);

            }
}
```

Page Replacement FIFO

```
#include<stdio.h>
void main()
{
            int page[20],frame[20],np,nf,i,j,k,avail,count=0;
            printf("\n Enter the number of pages : ");
            scanf("%d",&np);
            printf("\n Enter the page numbers : ");
            for(i=1;i<=np;i++)
             scanf("%d",&page[i]);
            printf("\n Enter the number of frames : ");
            scanf("%d",&nf);
            j=0;
```

```
                   for(i=0;i<nf;i++)
                    frame[i]=-1;

              printf("\n Ref String\tPage Numbers");
                   for(i=1;i<=np;i++)
                   {
                         printf("\n %d\t",page[i]);
                         avail=0;
                         for(k=0;k<nf;k++)
                         {
                                 if(frame[k]==page[i])
                                 {
                                  avail=1;
                                  for(k=0;k<nf;k++)
                                    printf(" %d   ",frame[k]);
                                }
                                 if(avail==0)
                                 {
                                   frame[j]=page[i];
                                   j=(j+1)%nf;
                                   count++;
                                   for(k=0;k<nf;k++)
                                    printf(" %d   ",frame[k]);
                                 }
                                 printf("\n");
                         }
                   }
                   printf("\n Page Fault : %d",count);


}
```



Select C:\Users\abhin\OneDrive\Desktop\S4\OS LAB\PageFifo.exe

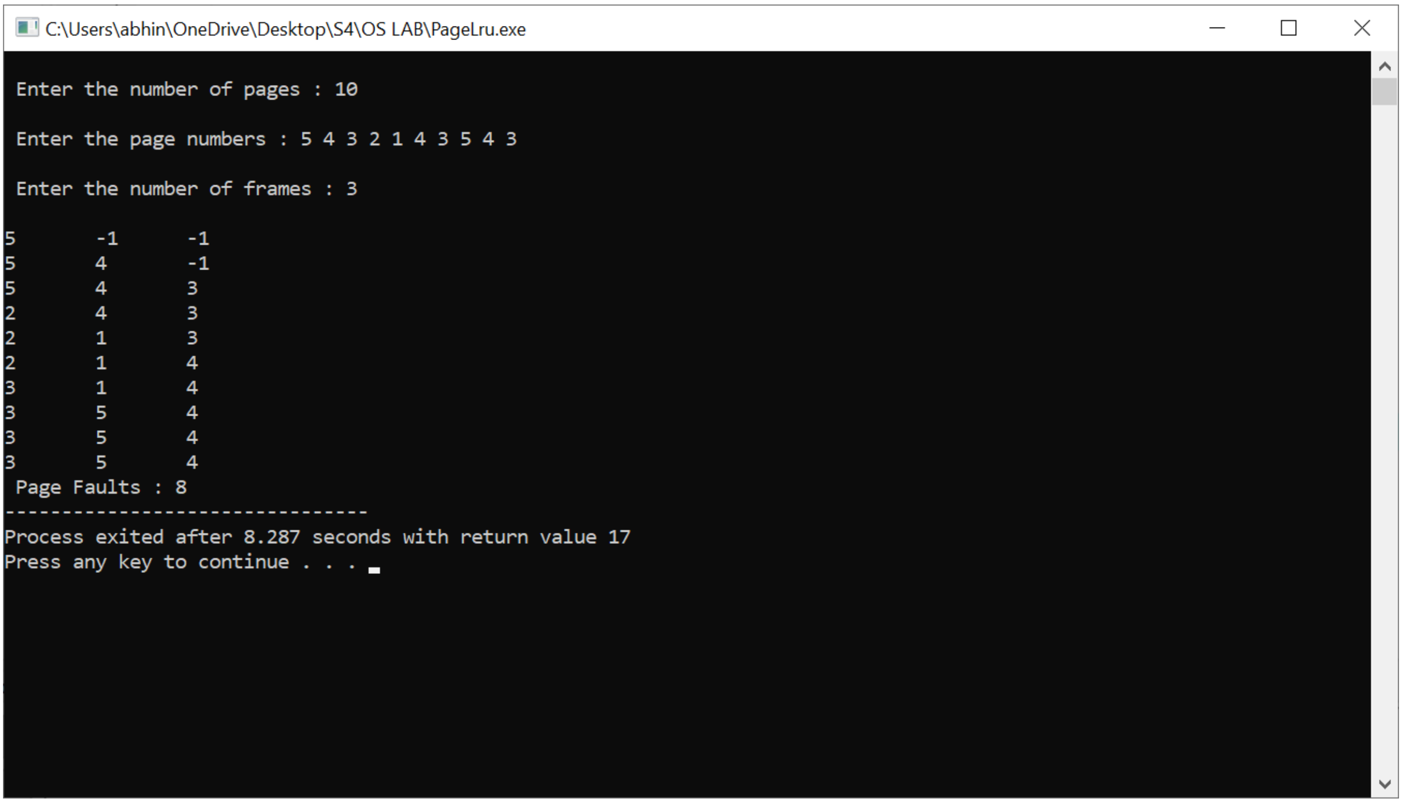
```
Enter the page numbers : 5 4 3 2 1 4 3 5 4 3

Enter the number of frames : 3

Ref String     Page Numbers
5       5    -1    -1

4       5    4    -1

3       5    4    3

2       2    4    3

1       2    1    3

4       2    1    4

3       3    1    4

5       3    5    4

4       3    5    4

3       3    5    4

Page Fault : 9
--------------------------------
Process exited after 9.226 seconds with return value 16
Press any key to continue . . .
```

Replacement LRU

```
#include<stdio.h>
int Lru(int time[],int n)
{
        int i,min=time[0],pos;
        for(i=0;i<n;i++)
        {
                        if(time[i]<min)
                        {
                                min=time[i];
                                pos=i;
                        }
        }
        return pos;
}
void main()
{
        int page[20],frame[20],time[20],np,nf,i,j,pos,flag1,flag2,count=0,fault=0;
        printf("\n Enter the number of pages : ");
```

```
 scanf("%d",&np);
 printf("\n Enter the page numbers : ");
 for(i=0;i<np;i++)
  scanf("%d",&page[i]);
 printf("\n Enter the number of frames : ");
 scanf("%d",&nf);
 for(i=0;i<nf;i++)
  frame[i]=-1;
 for(i=0;i<np;i++)
 {
   flag1=flag2=0;
   for(j=0;j<nf;j++)
   {
                if(frame[j]==page[i])
                {
                   count++;
                   time[j]=count;
                   flag1=flag2=1;
                   break;
                }
}
   if(flag1==0)
   {
                for(j=0;j<nf;j++)
                {
                  if(frame[j]==-1)
                  {
                       count++;
                       fault++;


                      time[j]=count;
                       frame[j]=page[i];
                       flag2=1;
                       break;
```

```
                        }
                      }
            }
            if(flag2==0)
            {
                                    pos=Lru(time,nf);
                                    count++;
                                    fault++;
                                    frame[pos]=page[i];
                                    time[pos]=count;
            }
            printf("\n");
            for(j=0;j<nf;j++)
            {
                              printf("%d\t",frame[j]);
            }
          }
          printf("\n Page Faults : %d",fault);
}
```

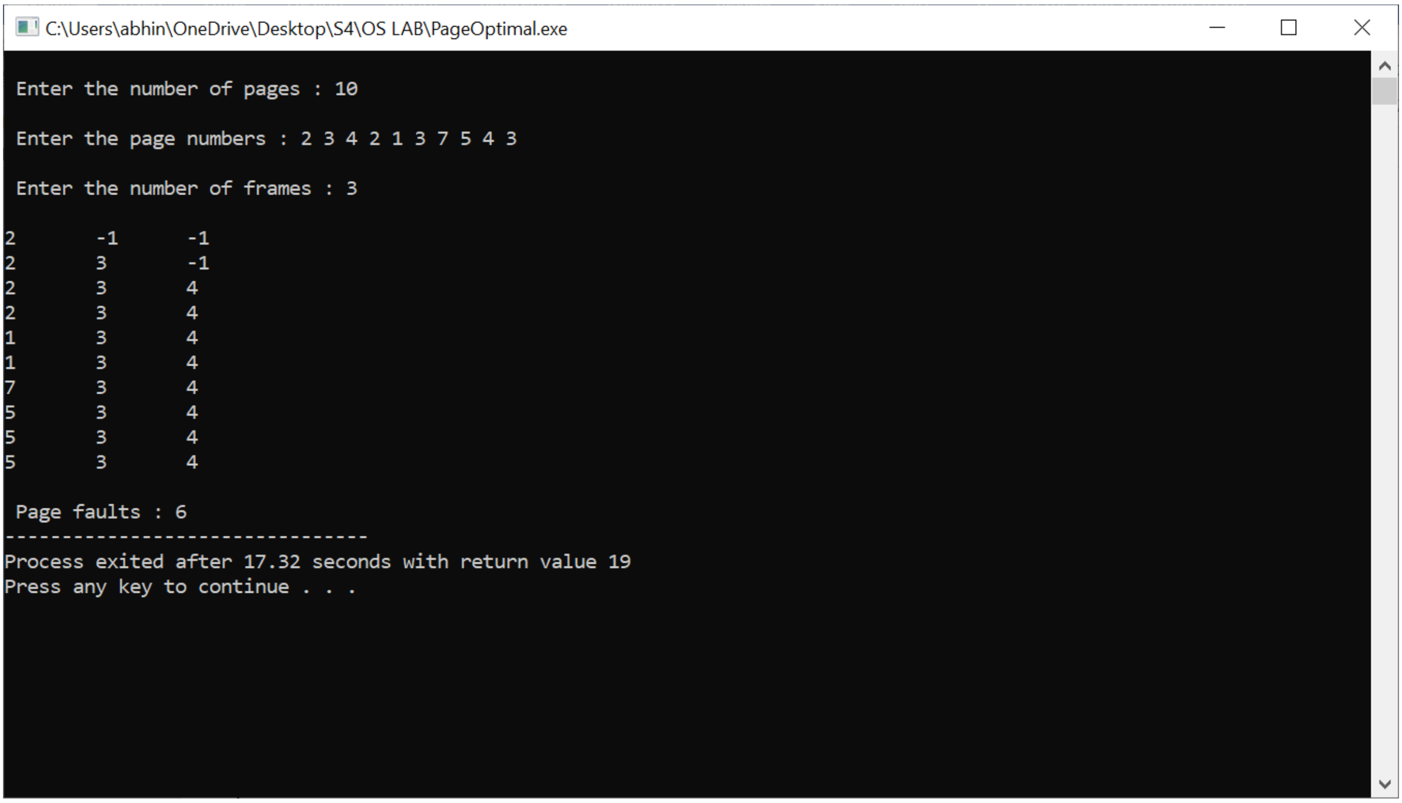


```
 Enter the number of pages : 10

 Enter the page numbers : 5 4 3 2 1 4 3 5 4 3

 Enter the number of frames : 3

5       -1      -1
5       4       -1
5       4       3
2       4       3
2       1       3
2       1       4
3       1       4
3       5       4
3       5       4
3       5       4
 Page Faults : 8
--------------------------------
Process exited after 8.287 seconds with return value 17
Press any key to continue . . .
```

Page Replacement algorithm Optimal

```
#include<stdio.h>
#include<stdlib.h>
void main()
{
    int page[20],frame[20],temp[20],np,nf,i,j,k,pos,flag1,flag2,flag3,max,faults=0;
        printf("\n Enter the number of pages : ");
        scanf("%d",&np);
        printf("\n Enter the page numbers : ");
        for(i=0;i<np;i++)
         scanf("%d",&page[i]);
        printf("\n Enter the number of frames : ");
        scanf("%d",&nf);
        for(i=0;i<nf;i++)
         frame[i]=-1;
        for(i=0;i<np;i++)
        {
          flag1=flag2=0;
          for(j=0;j<nf;j++)
          {
                if(frame[j]==page[i])
                {
                  flag1=flag2=1;
                        break;
           }
          }
          if(flag1==0)
          {
                for(j=0;j<nf;j++)
                {
                        if(frame[j]==-1)
                        {
                                faults++;
                                frame[j]=page[i];
                flag2=1;
                break;
            }
       }
  }
  if(flag2==0)
  {
      flag3=0;
      for(j=0;j<nf;j++)
      {
       temp[j]=-1;
       for(k=i+1;k<np;k++)
       {
           if(frame[j]==page[k])
           {
                temp[j]=k;
                break;
           }
  }
   }
      for(j=0;j<nf;j++)
      {
           if(temp[j]==-1)
           {
                pos=j;
                flag3=1;
                break;
           }
      }
if(flag3==0)
{
 max=temp[0];
 pos=0;
 for(j=1;j<nf;j++)
```

```
        {
                if(temp[j]>max)
                {
                        max=temp[j];
                        pos=j;
                                }
                        }
                }
                frame[pos]=page[i];
                faults++;
         }
         printf("\n");
         for(j = 0; j < nf; ++j){
      printf("%d\t", frame[j]);
     }
  }
         printf("\n\n Page faults : %d ",faults);
}
```



```
 Enter the number of pages : 10

 Enter the page numbers : 2 3 4 2 1 3 7 5 4 3

 Enter the number of frames : 3

2       -1      -1
2       3       -1
2       3       4
2       3       4
1       3       4
1       3       4
7       3       4
5       3       4
5       3       4
5       3       4

 Page faults : 6
--------------------------------
Process exited after 17.32 seconds with return value 19
Press any key to continue . . .
```