CSA0496-OPERATING SYSTEMS

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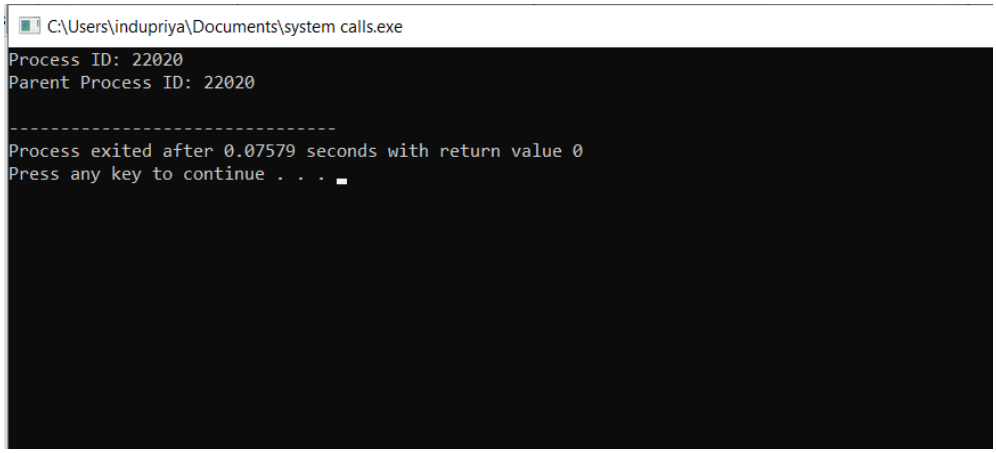
DAY-1

1.Create a new process by invoking the appropriate system call. Get the process identifier of the currently running process and its respective parent using system calls and display the same using a C program.

```
#include<stdio.h>
#include<unistd.h>
int main()
{
  printf("Process ID: %d\n", getpid() );
  printf("Parent Process ID: %d\n", getpid() );
  return 0;
}
```

OUTPUT:



2. Identify the system calls to copy the content of one file to another and illustrate the same using a C program.

PROGRAM:

```
#include<stdio.h>
#include<stdlib.h>
```

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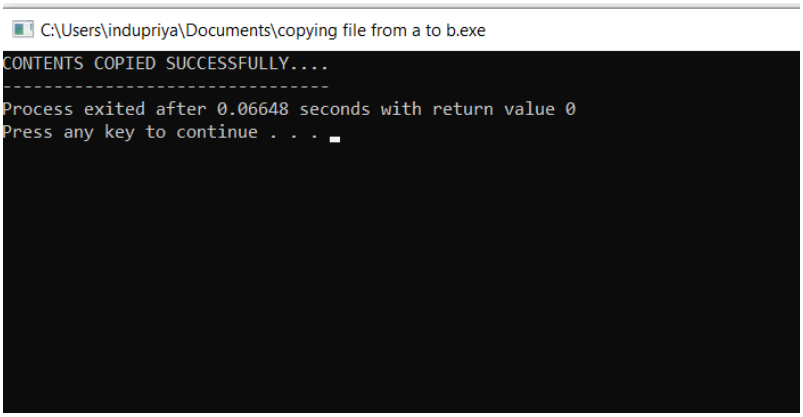
```
int main()
{
        FILE  *f1,*f2;
        char filename[100],c;
        f1=fopen("D:\DEVC++\test2.c","r");
        f2=fopen("D:\DEVC++\test1.txt","w");
        c=fgetc(f1);
        while(c!=EOF)
        {
                fputc(c,f2);
                c=fgetc(f1);
        }
        printf("CONTENTS COPIED SUCCESSFULLY....");
        fclose(f1);
        fclose(f2);
}
```

OUTPUT:



3. Design a CPU scheduling program with C using First Come First Served technique with the following considerations.

a. All processes are activated at time 0.

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b. Assume that no process waits on I/O devices.

PROGRAM:

```
#include<stdio.h>
void main()
{
int n,bt[20],wt[20],tat[20],i,j; float avwt=0,avtat=0;
printf("Enter total number of processes(maximum 20):");
scanf("%d",&n);
printf("\nEnter Process Burst Time\n");
for(i=0;i<n;i++)
{
printf("P[%d]:",i+1);
scanf("%d",&bt[i]);
}
 wt[0]=0;
for(i=1;i<n;i++)
{
wt[i]=0;
for(j=0;j<i;j++)
wt[i]+=bt[j];
}
printf("\nProcess\t\tBurst Time\tWaiting Time\tTurnaround Time"); for(i=0;i<n;i++)
{
tat[i]=bt[i]+wt[i]; avwt+=wt[i];
avtat+=tat[i];printf("\nP[%d]\t\t%d\t\t%d\t\t%d",i+1,bt[i],wt[i],tat[i]);
```

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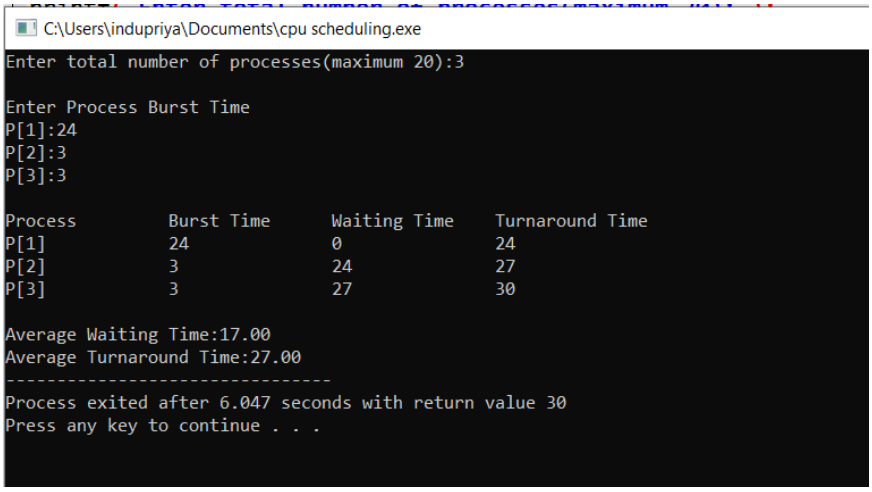
```
} avwt/=i; avtat/=i;printf("\n\nAverage Waiting
Time:%.2f",avwt);

printf("\nAverage Turnaround Time:%.2f",avtat);

}
```

OUTPUT:



```
C:\Users\indupriya\Documents\cpu scheduling.exe
Enter total number of processes(maximum 20):3

Enter Process Burst Time
P[1]:24
P[2]:3
P[3]:3

Process         Burst Time      Waiting Time    Turnaround Time
P[1]            24              0               24
P[2]            3               24              27
P[3]            3               27              30

Average Waiting Time:17.00
Average Turnaround Time:27.00
--------------------------------
Process exited after 6.047 seconds with return value 30
Press any key to continue . . .
```

4. Construct a scheduling program with C that selects the waiting process with the smallest execution time to execute next.

PROGRAM:

```
#include<stdio.h>
void main()
{
int bt[20],p[20],wt[20],tat[20],i,j,n,total=0,pos,temp;
float avg_wt,avg_tat;
printf("Enter number of process:");
scanf("%d",&n);
printf("\nEnter Burst Time:\n");
for(i=0;i<n;i++)
{printf("p%d:",i+1);
scanf("%d",&bt[i]);
```

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```
p[i]=i+1;
}
for(i=0;i<n;i++)
{
pos=i;
for(j=i+1;j<n;j++)
{
if(bt[j]<bt[pos])
pos=j;
}
temp=bt[i];
bt[i]=bt[pos];
bt[pos]=temp;
temp=p[i];
p[i]=p[pos];
p[pos]=temp;
}
wt[0]=0;
for(i=1;i<n;i++)
{
wt[i]=0;
for(j=0;j<i;j++)wt[i]+=bt[j];
total+=wt[i];
}
avg_wt=(float)total/n;
total=0;
printf("\nProcess\t Burst Time \tWaiting Time\tTurnaround Time");
for(i=0;i<n;i++)
```

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```
{
tat[i]=bt[i]+wt[i];
total+=tat[i];
printf("\np%d\t\t %d\t\t %d\t\t\t%d",p[i],bt[i],wt[i],tat[i]);
}
avg_tat=(float)total/n;
printf("\n\nAverage Waiting Time=%f",avg_wt);
printf("\nAverage Turnaround Time=%f\n",avg_tat);
}
```

OUTPUT:

```
C:\Users\indupriya\Documents\smallest execution.exe
Enter number of process:4

Enter Burst Time:
p1:8
p2:4
p3:9
p4:5

Process  Burst Time     Waiting Time    Turnaround Time
p2               4               0                     4
p4               5               4                     9
p1               8               9                     17
p3               9               17                    26

Average Waiting Time=7.500000
Average Turnaround Time=14.000000

--------------------------------
Process exited after 16.25 seconds with return value 35
Press any key to continue . . .
```

5. Construct a scheduling program with C that selects the waiting process with the highest priority to execute next.

PROGRAM:

```
#include<stdio.h>
struct priority_scheduling {
  char process_name;
  int burst_time;
  int waiting_time;
```

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```
  int turn_around_time;
  int priority;
};
int main() {
  int number_of_process;
  int total = 0;
  struct priority_scheduling temp_process;
  int ASCII_number = 65;
  int position;
  float average_waiting_time;
  float average_turnaround_time;
  printf("Enter the total number of Processes: ");
  scanf("%d", & number_of_process);
  struct priority_scheduling process[number_of_process];
  printf("\nPlease Enter the  Burst Time and Priority of each process:\n");
  for (int i = 0; i < number_of_process; i++) {
    process[i].process_name = (char) ASCII_number;
    printf("\nEnter the details of the process %c \n", process[i].process_name);
    printf("Enter the burst time: ");
    scanf("%d", & process[i].burst_time);
    printf("Enter the priority: ");
    scanf("%d", & process[i].priority);
    ASCII_number++;
  }
  for (int i = 0; i < number_of_process; i++) {
    position = i;
    for (int j = i + 1; j < number_of_process; j++) {
      if (process[j].priority > process[position].priority)
```

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```
      position = j;
  }
  temp_process = process[i];
  process[i] = process[position];
  process[position] = temp_process;
}
process[0].waiting_time = 0;
for (int i = 1; i < number_of_process; i++) {
  process[i].waiting_time = 0;
  for (int j = 0; j < i; j++) {
    process[i].waiting_time += process[j].burst_time;
  }
  total += process[i].waiting_time;
}
average_waiting_time = (float) total / (float) number_of_process;
total = 0;
printf("\n\nProcess_name \t Burst Time \t Waiting Time \t  Turnaround Time\n");
printf("------------------------------------------------------------\n");
for (int i = 0; i < number_of_process; i++) {
  process[i].turn_around_time = process[i].burst_time + process[i].waiting_time;
  total += process[i].turn_around_time;
  printf("\t   %c \t\t   %d \t\t %d \t\t %d", process[i].process_name, process[i].burst_time,
        process[i].waiting_time, process[i].turn_around_time);
  printf("\n------------------------------------------------------------\n");
}
average_turnaround_time = (float) total / (float) number_of_process;
printf("\n\n Average Waiting Time : %f", average_waiting_time);
printf("\n Average Turnaround Time: %f\n", average_turnaround_time);
```

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```
  return 0;
}
```

OUTPUT:

C:\Users\indupriya\Documents\scheduling(highest priority).exe

```
Enter the total number of Processes: 4

Please Enter the  Burst Time and Priority of each process:

Enter the details of the process A
Enter the burst time: 10
Enter the priority: 6

Enter the details of the process B
Enter the burst time: 5
Enter the priority: 9

Enter the details of the process C
Enter the burst time: 8
Enter the priority: 4

Enter the details of the process D
Enter the burst time: 6
Enter the priority: 2


Process_name     Burst Time      Waiting Time     Turnaround Time
-------------------------------------------------------------
          B              5             0               5
-------------------------------------------------------------
          A              10            5               15
-------------------------------------------------------------
          C              8             15              23
-------------------------------------------------------------
          D              6             23              29
-------------------------------------------------------------


 Average Waiting Time : 10.750000
 Average Turnaround Time: 18.000000
```

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6. Construct a C program to implement pre-emptive priority scheduling algorithm.

PROGRAM:

```
#include<stdio.h>
 int main()
{
    int burst_time[20],p[20],waiting_time[20],tat[20],i,j,n,total=0,pos,temp;
    float avg_waiting_time,avg_tat;
    printf("please enter number of process: ");
    scanf("%d",&n);
    printf("\n enter the Burst Time:\n");
    for(i=0;i<n;i++)
    {
        printf("p%d:",i+1);
        scanf("%d",&burst_time[i]);
        p[i]=i+1;
    }
    for(i=0;i<n;i++)
    {
        pos=i;
        for(j=i+1;j<n;j++)
        {
            if(burst_time[j]<burst_time[pos])
                pos=j;
        }
        temp=burst_time[i];
        burst_time[i]=burst_time[pos];
        burst_time[pos]=temp;
        temp=p[i];
```

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```
        p[i]=p[pos];
        p[pos]=temp;
    }
     waiting_time[0]=0;
    for(i=1;i<n;i++)
    {
        waiting_time[i]=0;
        for(j=0;j<i;j++)
            waiting_time[i]+=burst_time[j];
        total+=waiting_time[i];
    }
    avg_waiting_time=(float)total/n;
    total=0;
    printf("\nProcess\t    Burst Time    \tWaiting Time\tTurnaround Time");
    for(i=0;i<n;i++)
    {
        tat[i]=burst_time[i]+waiting_time[i];
        total+=tat[i];
        printf("\np%d\t\t  %d\t\t    %d\t\t\t%d",p[i],burst_time[i],waiting_time[i],tat[i]);
    }
    avg_tat=(float)total/n;
    printf("\n\n the average Waiting Time=%f",avg_waiting_time);
    printf("\n  the average Turnaround Time=%f\n",avg_tat);
}
```

OUTPUT:

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```
C:\Users\indupriya\Documents\06 preemptive.exe
please enter number of process: 3

 enter the Burst Time:
p1:24
p2:3
p3:3

Process     Burst Time          Waiting Time    Turnaround Time
p2                3                 0                  3
p3                3                 3                  6
p1                24                6                  30

 the average Waiting Time=3.000000
  the average Turnaround Time=13.000000
```

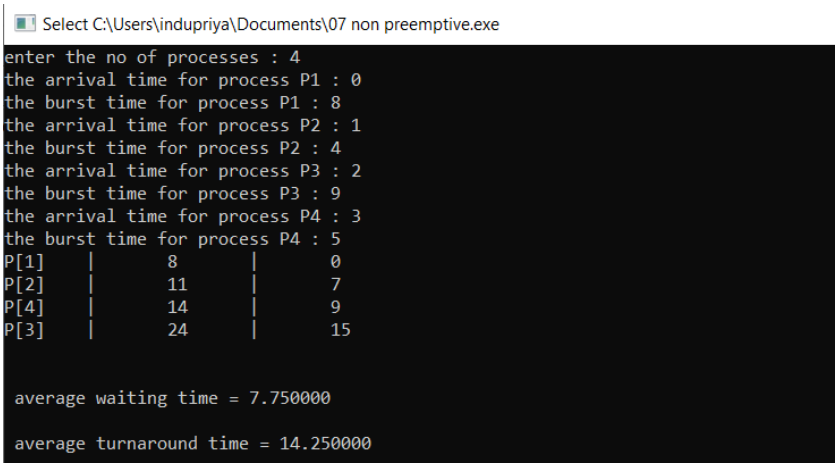
7. Construct a C program to implement non-preemptive SJF algorithm.

PROGRAM:

```
#include<stdio.h>
int main() {
  int time, burst_time[10], at[10], sum_burst_time = 0, smallest, n, i;
  int sumt = 0, sumw = 0;
  printf("enter the no of processes : ");
  scanf("%d", & n);
  for (i = 0; i < n; i++) {
    printf("the arrival time for process P%d : ", i + 1);
    scanf("%d", & at[i]);
    printf("the burst time for process P%d : ", i + 1);
    scanf("%d", & burst_time[i]);
    sum_burst_time += burst_time[i];
  }
  burst_time[9] = 9999;
  for (time = 0; time < sum_burst_time;) {
    smallest = 9;
```

```
    for (i = 0; i < n; i++) {
      if (at[i] <= time && burst_time[i] > 0 && burst_time[i] < burst_time[smallest])
        smallest = i;
    }
    printf("P[%d]\t|\t%d\t|\t%d\n", smallest + 1, time + burst_time[smallest] - at[smallest],
time - at[smallest]);
    sumt += time + burst_time[smallest] - at[smallest];
    sumw += time - at[smallest];
    time += burst_time[smallest];
    burst_time[smallest] = 0;
  }
  printf("\n\n average waiting time = %f", sumw * 1.0 / n);
  printf("\n\n average turnaround time = %f", sumt * 1.0 / n);
  return 0;
}
```

OUTPUT:



8. Construct a C program to simulate Round Robin scheduling algorithm with C.

PROGRAM:

```
#include<stdio.h>
#include<conio.h>
```

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```
int main()
{
   int i, NOP, sum=0,count=0, y, quant, wt=0, tat=0, at[10], bt[10], temp[10];
   float avg_wt, avg_tat;
   printf(" Total number of process in the system: ");
   scanf("%d", &NOP);
   y = NOP;
for(i=0; i<NOP; i++)
{
printf("\n Enter the Arrival and Burst time of the Process[%d]\n", i+1);
printf(" Arrival time is: \t");
scanf("%d", &at[i]);
printf(" \nBurst time is: \t");
scanf("%d", &bt[i]);
temp[i] = bt[i];
}
printf("Enter the Time Quantum for the process: \t");
scanf("%d", &quant);
printf("\n Process No \t\t Burst Time \t\t TAT \t\t Waiting Time ");
for(sum=0, i = 0; y!=0; )
{
if(temp[i] <= quant && temp[i] > 0)
{
   sum = sum + temp[i];
   temp[i] = 0;
   count=1;
   }
   else if(temp[i] > 0)
```

```
    {
        temp[i] = temp[i] - quant;
        sum = sum + quant;
    }
    if(temp[i]==0 && count==1)
    {
        y--;
        printf("\nProcess No[%d] \t\t %d\t\t\t\t %d\t\t\t %d", i+1, bt[i], sum-at[i], sum-at[i]-
bt[i]);
        wt = wt+sum-at[i]-bt[i];
        tat = tat+sum-at[i];
        count =0;
    }
    if(i==NOP-1)
    {
        i=0;
    }
    else if(at[i+1]<=sum)
    {
        i++;
    }
    else
    {
        i=0;
    }
}
avg_wt = wt * 1.0/NOP;
avg_tat = tat * 1.0/NOP;
```

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```
printf("\n Average Turn Around Time: \t%f", avg_wt);
printf("\n Average Waiting Time: \t%f", avg_tat);
getch();
}
```

OUTPUT:

C:\Users\indupriya\Documents\06 round robin.exe

```
Total number of process in the system: 4

Enter the Arrival and Burst time of the Process[1]
Arrival time is:0

Burst time is:8

Enter the Arrival and Burst time of the Process[2]
Arrival time is:1

Burst time is:4

Enter the Arrival and Burst time of the Process[3]
Arrival time is:2

Burst time is:9

Enter the Arrival and Burst time of the Process[4]
Arrival time is:3

Burst time is:5
Enter the Time Quantum for the process:10

 Process No              Burst Time              TAT             Waiting Time
Process No[1]            8                               8                       0
Process No[2]            4                               11                      7
Process No[3]            9                               19                      10
Process No[4]            5                               23                      18
Average Turn Around Time:       8.750000
Average Waiting Time:   15.250000
```