

OBJECTIVE

Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time for the above problem.

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

DESCRIPTION

Assume all the processes arrive at the same time.

FCFS CPU SCHEDULING ALGORITHM

For FCFS scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times. The scheduling is performed on the basis of arrival time of the processes irrespective of their other parameters. Each process will be executed according to its arrival time. Calculate the waiting time and turnaround time of each of the processes accordingly.

SJF CPU SCHEDULING ALGORITHM

For SJF scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times. Arrange all the jobs in order with respect to their burst times. There may be two jobs in queue with the same execution time, and then FCFS approach is to be performed. Each process will be executed according to the length of its burst time. Then calculate the waiting time and turnaround time of each of the processes accordingly.

ROUND ROBIN CPU SCHEDULING ALGORITHM

For round robin scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times, and the size of the time slice. Time slices are assigned to each process in equal portions and in circular order, handling all processes execution. This allows every process to get an equal chance. Calculate the waiting time and turnaround time of each of the processes accordingly.

PRIORITY CPU SCHEDULING ALGORITHM

For priority scheduling algorithm, read the number of processes/jobs in the system, their CPU burst times, and the priorities. Arrange all the jobs in order with respect to their priorities. There may be two jobs in queue with the same priority, and then FCFS approach is to be performed. Each process will be executed according to its priority. Calculate the waiting time and turnaround time of each of the processes accordingly.

PROGRAM

FCFS CPU SCHEDULING ALGORITHM

```
#include<stdio.h>
#include<conio.h>
main()
{
    int bt[20], wt[20], tat[20], i, n;
    float wtavg, tatavg;
    clrscr();
    printf("\nEnter the number of processes -- ");
    scanf("%d", &n);
    for(i=0;i<n;i++)
    {
        printf("\nEnter Burst Time for Process %d -- ", i);
        scanf("%d", &bt[i]);
    }
    wt[0] = wtavg = 0;
    tat[0] = tatavg = bt[0];
    for(i=1;i<n;i++)
    {
        wt[i] = wt[i-1] +bt[i-1];
        tat[i] = tat[i-1] +bt[i];
        wtavg = wtavg + wt[i];
        tatavg = tatavg + tat[i];
    }
    printf("\t\t\t\t\tPROCESS \tBURST TIME \t WAITING TIME\t TURNAROUND\n");
```

```

for(i=0;i<n;i++)
    printf("\n\t P%d \t\t %d \t\t %d \t\t %d", i, bt[i], wt[i], tat[i]);
printf("\nAverage Waiting Time -- %f", wtavg/n); printf("\nAverage
Turnaround Time -- %f", tatavg/n); getch();
}

```

INPUT

```

Enter the number of processes -- 3
Enter Burst Time for Process 0 -- 24
Enter Burst Time for Process 1 -- 3
Enter Burst Time for Process 2 -- 3

```

OUTPUT

PROCESS	BURST TIME	WAITING TIME	TURNAROUND TIME
P0	24	0	24
P1	3	24	27
P2	3	27	30

```

Average Waiting Time-- 17.000000
Average Turnaround Time -- 27.000000

```

SJF CPU SCHEDULING ALGORITHM

```

#include<stdio.h>
#include<conio.h>
main()
{
    int p[20], bt[20], wt[20], tat[20], i, k, n, temp;
    float wtavg, tatavg;
    clrscr();
    printf("\nEnter the number of processes -- ");
    scanf("%d", &n);
    for(i=0;i<n;i++)
    {
        p[i]=i;
        printf("Enter Burst Time for Process %d -- ", i);
        scanf("%d", &bt[i]);
    }
    for(i=0;i<n;i++)
        for(k=i+1;k<n;k++)
            if(bt[i]>bt[k])
            {
                temp=bt[i];
                bt[i]=bt[k];
                bt[k]=temp;

                temp=p[i];
                p[i]=p[k];
                p[k]=temp;
            }
    wt[0] = wtavg = 0;
    tat[0] = tatavg = bt[0];
    for(i=1;i<n;i++)
    {
        wt[i] = wt[i-1] +bt[i-1];
        tat[i] = tat[i-1] +bt[i];
        wtavg = wtavg + wt[i];
        tatavg = tatavg + tat[i];
    }
    printf("\n\t PROCESS \t BURST TIME \t WAITING TIME \t TURNAROUND TIME\n");
    for(i=0;i<n;i++)

```

```

        printf("\n\t P%d \t\t %d \t\t %d \t\t %d", p[i], bt[i], wt[i],
tat[i]); printf("\nAverage Waiting Time -- %f", wtavg/n);
printf("\nAverage Turnaround Time -- %f", tatavg/n);
getch();
}

```

INPUT

```

Enter the number of processes -- 4
Enter Burst Time for Process 0 -- 6
Enter Burst Time for Process 1 -- 8
Enter Burst Time for Process 2 -- 7
Enter Burst Time for Process 3 -- 3

```

OUTPUT

PROCESS	BURST TIME	WAITING TIME	TURNAROUND TIME
P3	3	0	3
P0	6	3	9
P2	7	9	16
P1	8	16	24
Average Waiting Time --		7.000000	
Average Turnaround Time --		13.000000	

ROUND ROBIN CPU SCHEDULING ALGORITHM

```

#include<stdio.h>
main()
{
    int i,j,n,bu[10],wa[10],tat[10],t,ct[10],max;
    float awt=0,att=0,temp=0;
    clrscr();
    printf("Enter the no of processes -- ");
    scanf("%d",&n);

    for(i=0;i<n;i++)
    {
        printf("\nEnter Burst Time for process %d -- ", i+1);
        scanf("%d",&bu[i]);
        ct[i]=bu[i];
    }
    printf("\nEnter the size of time slice -- ");
    scanf("%d",&t);
    max=bu[0];
    for(i=1;i<n;i++)
        if(max<bu[i])
            max=bu[i];
    for(j=0;j<(max/t)+1;j++)
        for(i=0;i<n;i++)
            if(bu[i]!=0)
                if(bu[i]<=t)
                {
                    tat[i]=temp+bu[i];
                    temp=temp+bu[i];
                    bu[i]=0;
                }
                else
                {
                    bu[i]=bu[i]-t;
                    temp=temp+t;
                }

    for(i=0;i<n;i++)
    {
        wa[i]=tat[i]-ct[i];
        att+=tat[i];
    }
}

```

```

        awt+=wa[i];
    }
    printf("\nThe Average Turnaround time is -- %f",att/n);
    printf("\nThe Average Waiting time is -- %f ",awt/n);
    printf("\n\tPROCESS\t BURST TIME \t WAITING TIME\tTURNAROUND TIME\n");
    for(i=0;i<n;i++)
        printf("\t%d \t %d \t %d \t %d \n",i+1,ct[i],wa[i],tat[i]);
    getch();
}

```

INPUT

Enter the no of processes – 3
 Enter Burst Time for process 1 – 24
 Enter Burst Time for process 2 -- 3
 Enter Burst Time for process 3 -- 3

Enter the size of time slice – 3

OUTPUT

The Average Turnaround time is – 15.666667
 The Average Waiting time is -- 5.666667

PROCESS	BURST TIME	WAITING TIME	TURNAROUND TIME
1	24	6	30
2	3	4	7
3	3	7	10

PRIORITY CPU SCHEDULING ALGORITHM

```

#include<stdio.h>
main()
{
    int p[20],bt[20],pri[20], wt[20],tat[20],i, k, n, temp;
    float wtavg, tatavg;
    clrscr();
    printf("Enter the number of processes --- ");
    scanf("%d",&n);

    for(i=0;i<n;i++)
    {
        p[i] = i;
        printf("Enter the Burst Time & Priority of Process %d --- ",i);
        scanf("%d %d",&bt[i], &pri[i]);
    }
    for(i=0;i<n;i++)
        for(k=i+1;k<n;k++)
            if(pri[i] > pri[k])
            {
                temp=p[i];
                p[i]=p[k];
                p[k]=temp;

                temp=bt[i];
                bt[i]=bt[k];
                bt[k]=temp;

                temp=pri[i];
                pri[i]=pri[k];
                pri[k]=temp;
            }

    wtavg = wt[0] = 0;
    tatavg = tat[0] = bt[0];
}

```

```

for(i=1;i<n;i++)
{
    wt[i] = wt[i-1] + bt[i-1];
    tat[i] = tat[i-1] + bt[i];

    wtavg = wtavg + wt[i];
    tatavg = tatavg + tat[i];
}

printf("\nPROCESS\t\tPRIORITY\tBURST TIME\tWAITING TIME\tTURNAROUND TIME");
for(i=0;i<n;i++)
    printf("\n%d \t\t %d \t\t %d \t\t %d \t\t %d ",p[i],pri[i],bt[i],wt[i],tat[i]);

printf("\nAverage Waiting Time is --- %f",wtavg/n);
printf("\nAverage Turnaround Time is --- %f",tatavg/n);
getch();
}

```

INPUT

```

Enter the number of processes -- 5
Enter the Burst Time & Priority of Process 0 --- 10    3
Enter the Burst Time & Priority of Process 1 --- 1     1
Enter the Burst Time & Priority of Process 2 --- 2     4
Enter the Burst Time & Priority of Process 3 --- 1     5
Enter the Burst Time & Priority of Process 4 --- 5     2

```

OUTPUT

PROCESS	PRIORITY	BURST TIME	WAITING TIME	TURNAROUND TIME
1	1	1	0	1
4	2	5	1	6
0	3	10	6	16
2	4	2	16	18
3	5	1	18	19

Average Waiting Time is --- 8.200000
 Average Turnaround Time is --- 12.000000

