Experiment No.: 3

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Problem Statement : Write a program to simulate CPU Scheduling Algorithms: FCFS, SJF (Preemptive), Priority (Non-Preemptive) and Round Robin (Preemptive).

Code :

1. FCFS:

```
#include<stdio.h>
int main()
{
   int bt[20], wt[20], tat[20], i, n;
   float wtavg, tatavg;

   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 PROCESS \tBURST 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", i, bt[i], wt[i], tat[i]);

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


    printf("\nPress any key to exit...");
    getchar();
    return 0;
}
```

OUTPUT:

```
cc@CC01:~$ g++ fcfs1.cpp
cc@CC01:~$ ./a.out

Enter the number of processes -- 3

Enter Burst Time for Process 0 -- 4

Enter Burst Time for Process 1 -- 5

Enter Burst Time for Process 2 -- 6
        PROCESS       BURST TIME   WAITING TIME        TURNAROUND TIME

        P0            4            0                   4
        P1            5            4                   9
        P2            6            9                   15
Average Waiting Time -- 4.333333
Average Turnaround Time -- 9.333333
cc@CC01:~$
```

2. SJF :

```
#include<stdio.h>

int main() {
    int p[20], bt[20], wt[20], tat[20], n, i, j, temp;
    float wtavg = 0, tatavg = 0;

    printf("\nEnter the number of processes: ");
    scanf("%d", &n);



    printf("\nEnter Burst Time for each process:\n");
    for(i = 0; i < n; i++) {
        p[i] = i + 1; // Process numbers from 1 to n
        printf("P%d: ", p[i]);
        scanf("%d", &bt[i]);
    }



    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 = p[j];
            p[j] = p[j + 1];
            p[j + 1] = temp;
        }
    }
}


wt[0] = 0;
for(i = 1; i < n; i++) {
    wt[i] = 0;
    for(j = 0; j < i; j++) {
        wt[i] += bt[j];
    }
}


for(i = 0; i < n; i++) {
    tat[i] = bt[i] + wt[i];
}


for(i = 0; i < n; i++) {
    wtavg += wt[i];
    tatavg += tat[i];
}
wtavg /= n;
tatavg /= n;
```

```
    printf("\nProcess\tBurst Time\tWaiting Time\tTurnaround Time\n");
    for(i = 0; i < n; i++) {
        printf("P%d\t%d\t\t%d\t\t%d\n", p[i], bt[i], wt[i], tat[i]);
    }
    printf("\nAverage Waiting Time: %.2f", wtavg);
    printf("\nAverage Turnaround Time: %.2f\n", tatavg);

    return 0;
}
```

OUTPUT:

```
cc@CC01:~$ g++ sfjalgoi1.cpp
cc@CC01:~$ ./a.out

Enter the number of processes: 4

Enter Burst Time for each process:
P1: 3
P2: 5
P3: 6
P4: 2
```

Process	Burst Time	Waiting Time	Turnaround Time
P4	2	0	2
P1	3	2	5
P2	5	5	10
P3	6	10	16

```
Average Waiting Time: 4.25
Average Turnaround Time: 8.25
cc@CC01:~$
```

3. Round Robin:

```
#include<stdio.h>

int main() {
    int i, j, n, bu[10], wa[10], tat[10], t, ct[10], max;
    float awt = 0, att = 0, temp = 0;

    printf("Enter the number of processes: ");
    scanf("%d", &n);



    for(i = 0; i < n; i++) {
        printf("Enter Burst Time for Process %d: ", i + 1);
        scanf("%d", &bu[i]);
        ct[i] = bu[i]; // Copy burst time to ct array for later calculations
    }

    printf("Enter 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("\nAverage Turnaround Time: %.2f", att / n);
printf("\nAverage Waiting Time: %.2f\n", awt / n);
printf("\nPROCESS\t BURST TIME \t WAITING TIME\t TURNAROUND TIME\n");
```

```
    for(i = 0; i < n; i++) {
        printf("%d\t %d\t\t %d\t\t %d\n", i + 1, ct[i], wa[i], tat[i]);
    }

    return 0;}
```

OUTPUT :

```
pllab0112@pllab0112-ThinkCentre-M70s:~$  ./exe

Enter the number of processes: 3

Enter Burst Time for Process 1: 23

Enter Burst Time for Process 2:3

Enter Burst Time for Process 3: 3

Enter the size of time slice: 3

Average Turnaround Time: 14.67

Average Waiting Time: 5.00

PROCESS     BURST TIME     WAITING TIME     TURNAROUND TIME
```

1	23	6	29
2	3	3	6
3	3	6	9