



EXPERIMENT - 10

Operating Systems Lab

AIM

Write a program to implement CPU scheduling for Round Robin.

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Aim:

Write a program to implement CPU scheduling for Round Robin.

Source Code:

```
#!/bin/bash

function roundrobin {
    #Initializing Bash variables
    timeQuantum=0
    awt=0
    atat=0
    temp=0
    temp2=0
    GanttChart=0
    totalwt=0
    totaltat=0

    declare -a wt
    declare -a tat
    echo "Enter the Quantum time -- "; #Accepts user input for Quantum Time and Input
    Validation
    read -r timeQuantum

    while [[ -z "$timeQuantum" ]] || [[ "$timeQuantum" -le 0 ]]
    do
        echo "Quantum time cannot be blank or less than 1, please try again."
        echo "Enter the Quantum time -- "
        read -r timeQuantum
    done

    echo -e "\n\t\t\t\t\tGantt Chart"
    echo -n "0"
    while ((1))
    do
        for ((i = 1, count=0; i <= number; i++))
        do
            temp=$timeQuantum

            if [ "${rem_bt[i]}" -eq 0 ]
            then
```

```

((count++))

continue
fi

if [ "${rem_bt[i]}" -gt "$timeQuantum" ]
then
    rem_bt[$i]=$((rem_bt[i]-timeQuantum))
    GanttChart=$((GanttChart+timeQuantum))
    echo -n " -> P[""$i"""] <- " "$GanttChart"
else
    if [ "${rem_bt[i]}" -ge 0 ]
    then
        temp=${rem_bt[i]};
        GanttChart=$((GanttChart+rem_bt[i]))
        echo -n " -> P[""$i"""] <- " "$GanttChart"
        rem_bt[$i]=0;
    fi
fi
temp2=$((temp2+temp))
tat[$i]=$temp2
done
if [ "$number" -eq "$count" ]
then
    break
fi

done
echo -e "\n\nProcess\t Burst Time \tWaiting Time\tTurnaround Time"
for ((i = 1; i <= number; i++))
{
    wt[i]=$((tat[i]-Btime[i]))
    totalwt=$((totalwt+wt[i]))
    totaltat=$((totaltat+tat[i]))

    echo -e "$i\t\t ${Btime[i]}\t\t ${wt[i]}\t\t\t${tat[i]}"
}
awt=$((echo 'scale=2;' "$totalwt" / "$number" | bc -l))
atat=$((echo 'scale=2;' "$totaltat" / "$number" | bc -l))

echo "Total waiting time =" "$totalwt"
echo "Average waiting time =" "$awt"
echo "Total Turnaround Time =" "$totaltat"

```

```
echo "Average Turnaround Time =" "$atat"
}
```

```
#Accepts user input for Number of Processes and Input Validation
```

```
echo "Enter the number of processes -- "
read -r number
while [[ "$number" -le 1 ]] || [[ -z "$number" ]]
do
echo "Error: Input valid number of processes or Input cannot be blank"
echo "Please try again."
echo "Enter the number of processes -- "
read -r number
done
```

```
declare -a Btime
declare -a p
declare -a rem_bt
```

```
#Accepts user input for Burst Time and Input Validation
```

```
for (( i=1; i<=number; i++ ))
do
```

```
echo "Enter Burst Time for Process -- $i"
read -r "Btime[i]"
```

```
while [[ "${Btime[i]}" -lt 1 ]] || [[ -z "${Btime[i]}" ]]
do
echo "Error: Input valid burst time for the process or Inputs cannot be blank"
echo "Please try again."
echo "Enter Burst Time for Process -- $i"
read -r "Btime[i]"
done
p[i]=$i #contains process number
rem_bt[i]={Btime[i]} #remaining process
done
```

```
echo -e "CPU burst Time for processes in nano second --" "${Btime[@]}"
```

```
echo -e "Process Number for CPU burst time      --" "${p[@]}"
```

```
echo ""
```

```
echo "Calculation for Round Robin for processes entered are as follows: "
roundrobin
```

Output:

```
reeha@Reeha:/mnt/e/sem 6/Operating Systems$ ./roundRobin.sh
Enter the number of processes --
3
Enter Burst Time for Process -- 1
12
Enter Burst Time for Process -- 2
34
Enter Burst Time for Process -- 3
23
CPU burst Time for processes in nano second -- 12 34 23
Process Number for CPU burst time -- 1 2 3

Calculation for Round Robin for processes entered are as follows:
Enter the Quantum time --
2

Gantt Chart
0 -> P[1] <- 2 -> P[2] <- 4 -> P[3] <- 6 -> P[1] <- 8 -> P[2] <- 10 -> P[3] <- 12 -> P[1] <- 14 -> P[2] <- 16 -> P[3] <- 18 -> P[1] <- 20 -> P[2] <- 22 -> P[3] <- 24 -> P[1] <- 26 -> P[2] <- 28 -> P[3] <- 30 -> P[1] <- 32 -> P[2] <- 34 -> P[3] <- 36 -> P[2] <- 38 -> P[3] <- 40 -> P[2] <- 42 -> P[3] <- 44 -> P[2] <- 46 -> P[3] <- 48 -> P[2] <- 50 -> P[3] <- 52 -> P[2] <- 54 -> P[3] <- 56 -> P[2] <- 58 -> P[3] <- 59 -> P[2] <- 61 -> P[2] <- 63 -> P[2] <- 65 -> P[2] <- 67 -> P[2] <- 69

Process    Burst Time    Waiting Time    Turnaround Time
1          12          20             32
2          34          35             69
3          23          36             59

Total waiting time = 91
Average waiting time = 30.33
Total Turnaround Time = 160
Average Turnaround Time = 53.33
```

```
reeha@Reeha:/mnt/e/sem 6/Operating Systems$ ./roundRobin.sh
Enter the number of processes --
5
Enter Burst Time for Process -- 1
5
Enter Burst Time for Process -- 2
7
Enter Burst Time for Process -- 3
3
Enter Burst Time for Process -- 4
8
Enter Burst Time for Process -- 5
4
CPU burst Time for processes in nano second -- 5 7 3 8 4
Process Number for CPU burst time -- 1 2 3 4 5

Calculation for Round Robin for processes entered are as follows:
Enter the Quantum time --
3

Gantt Chart
0 -> P[1] <- 3 -> P[2] <- 6 -> P[3] <- 9 -> P[4] <- 12 -> P[5] <- 15 -> P[1] <- 17 -> P[2] <- 20 -> P[4] <- 23 -> P[5] <- 24 -> P[2] <- 25 -> P[4] <- 27

Process    Burst Time    Waiting Time    Turnaround Time
1          5          12             17
2          7          18             25
3          3          6              9
4          8          19             27
5          4          20             24

Total waiting time = 75
Average waiting time = 15.00
Total Turnaround Time = 102
Average Turnaround Time = 20.40
```

```
reeha@Reeha:/mnt/e/sem 6/Operating Systems$ ./roundRobin.sh
Enter the number of processes --
7
Enter Burst Time for Process -- 1
23
Enter Burst Time for Process -- 2
234
Enter Burst Time for Process -- 3
34
Enter Burst Time for Process -- 4
67
Enter Burst Time for Process -- 5
34
Enter Burst Time for Process -- 6
97
Enter Burst Time for Process -- 7
23
CPU burst Time for processes in nano second -- 23 234 34 67 34 97 23
Process Number for CPU burst time -- 1 2 3 4 5 6 7

Calculation for Round Robin for processes entered are as follows:
Enter the Quantum time --
20

Gantt Chart
0 -> P[1] <- 20 -> P[2] <- 40 -> P[3] <- 60 -> P[4] <- 80 -> P[5] <- 100 -> P[6] <- 120 -> P[7] <- 140 -> P[1] <- 143 -> P[2] <- 163 -> P[3] <- 177 -> P[4] <- 197 -> P[5] <- 211 -> P[6] <- 231 -> P[7] <- 234 -> P[2] <- 254 -> P[4] <- 274 -> P[6] <- 294 -> P[2] <- 314 -> P[4] <- 321 -> P[6] <- 341 -> P[2] <- 361 -> P[6] <- 378 -> P[2] <- 398 -> P[2] <- 418 -> P[2] <- 438 -> P[2] <- 458 -> P[2] <- 478 -> P[2] <- 498 -> P[2] <- 512

Process    Burst Time    Waiting Time    Turnaround Time
1          23          120            143
2          234          278            512
3          34          143            177
4          67          254            321
5          34          177            211
6          97          281            378
7          23          211            234

Total waiting time = 1464
Average waiting time = 209.14
Total Turnaround Time = 1976
Average Turnaround Time = 282.28
```