RTOS operation and simple demonstration of RTOS task scheduling
Project Report

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Implemented various RTOS task scheduling from scratch for five different scheduling algorithms and compared them on the basis of Average waiting time, Average turnaround time and Average response time. Also sketched the Graph comparison between all these scheduling algorithms on the basis of these parameters.

Part A

Input :
We have to give the number of processes as input.

```
PS C:\Users\manav\Downloads\D2\D2\Files> g++ a.cpp -o a
PS C:\Users\manav\Downloads\D2\D2\Files> ./a
50
```

Output :
The produced output is of format "Process ID, CPU Burst, Arrival Time, Priority" for each process.

```
1       1       0       7
2       5       2       6
3       17      3       6
4       6       7       1
5       5       9       5
6       20      12      5
7       19      12      2
8       3       15      6
9       8       18      9
10      7       21      10
11      10      22      6
12      17      25      10
13      1       26      1
14      9       27      7
15      19      27      2
16      2       29      2
17      13      30      4
18      2       33      8
19      10      33      7
20      19      33      10
21      1       33      9
22      16      41      5
23      4       44      7
24      4       45      5
25      6       48      9
26      4       52      3
```

Part B

Compiling and Running :

```
PS C:\Users\manav\Downloads\D2\D2\Files> g++ -c b.cpp fcfs.cpp sjfnp.cpp sjfp.cpp rr.cp
p priority.cpp
PS C:\Users\manav\Downloads\D2\D2\Files> g++ b.o fcfs.o sjfnp.o sjfp.o rr.o priority.o
-o final
PS C:\Users\manav\Downloads\D2\D2\Files> ./final
```

Output :

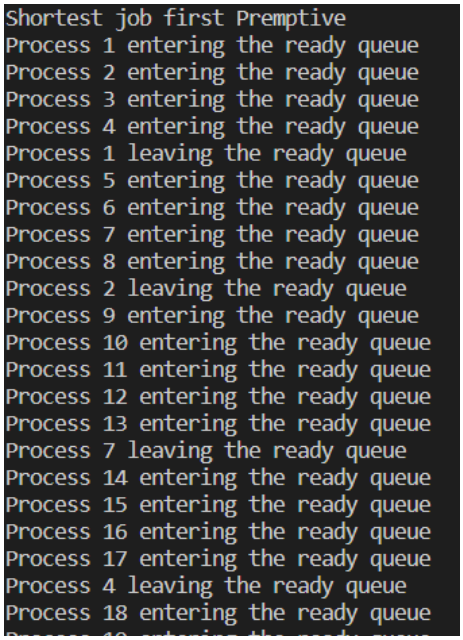
Ready queue Simulation for all the processes generated in part A.

```
First come First serve ready queue
Process 1 entering the ready queue
Process 2 entering the ready queue
Process 3 entering the ready queue
Process 4 entering the ready queue
Process 1 leaving the ready queue
Process 5 entering the ready queue
Process 6 entering the ready queue
Process 7 entering the ready queue
Process 8 entering the ready queue
Process 2 leaving the ready queue
Process 9 entering the ready queue
Process 10 entering the ready queue
Process 11 entering the ready queue
Process 12 entering the ready queue
Process 13 entering the ready queue
Process 14 entering the ready queue
Process 3 leaving the ready queue
Process 15 entering the ready queue
Process 16 entering the ready queue
Process 17 entering the ready queue
Process 18 entering the ready queue
```

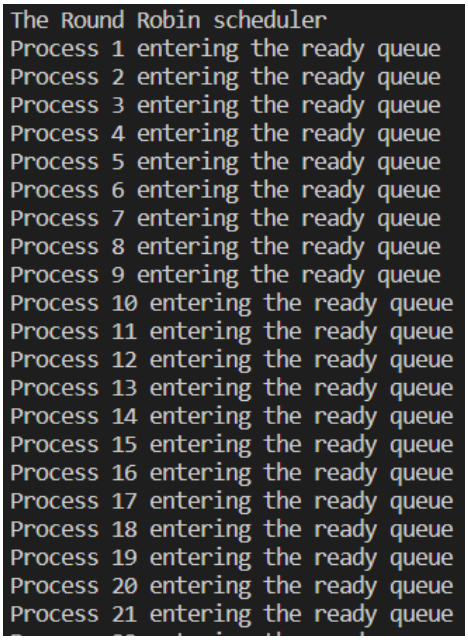
First Come First Serve

```
Shortest job first Non premptive
Process 1 entering the ready queue
Process 2 entering the ready queue
Process 37 entering the ready queue
Process 1 leaving the ready queue
Process 3 leaving the ready queue
Process 12 leaving the ready queue
Process 7 leaving the ready queue
Process 8 leaving the ready queue
Process 10 leaving the ready queue
Process 4 entering the ready queue
Process 5 leaving the ready queue
Process 13 leaving the ready queue
Process 14 leaving the ready queue
Process 2 leaving the ready queue
Process 11 leaving the ready queue
Process 38 entering the ready queue
Process 6 leaving the ready queue
Process 16 leaving the ready queue
Process 15 leaving the ready queue
Process 27 entering the ready queue
Process 3 entering the ready queue
Process 35 entering the ready queue
Process 9 leaving the ready queue
```

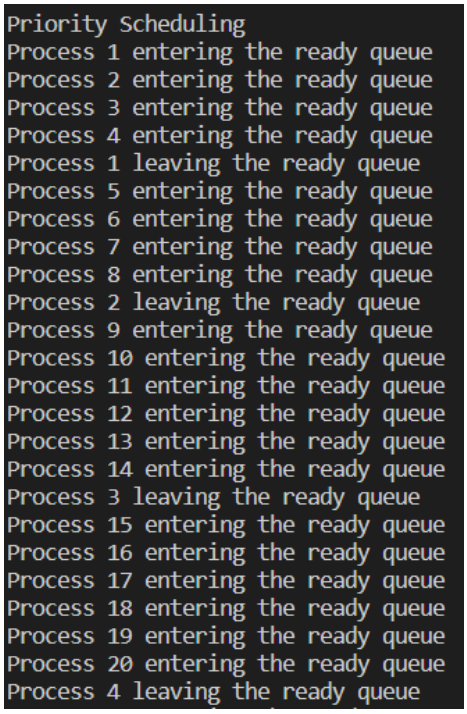
Shortest Job First (Non - Preemptive)



Shortest Job First (Preemptive)



Round Robin Scheduler



Priority Scheduling

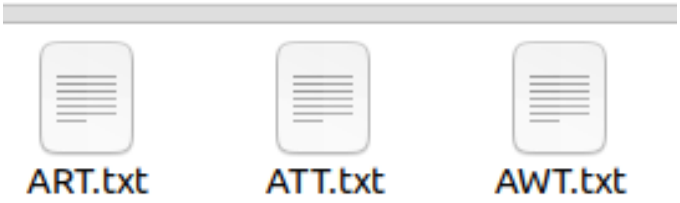
Comparison of AWT, ATT and ART :

- Average waiting time(AWT) and Average turnaround time (ATT) is highest for Round robin scheduling.
- Average Response time is lowest for Round robin scheduling.

- SJF non preemptive scheduling and SJP preemptive scheduling have all the time parameters same

```
-------------------------------------------------------------------------
Algorithm used          Average Waiting time     Average Turnaround time        Average Response time
FCFS                                236.98                      247.64                       236.98
Shortest job first np               152.06                      162.72                       152.06
Shortest job first p                152.06                      162.72                       152.06
Round robin                         323.04                       333.7                         9.92
Priority Scheduler                  236.98                      247.64                       236.98
PS C:\Users\manav\Downloads\D2\D2\Files>
```

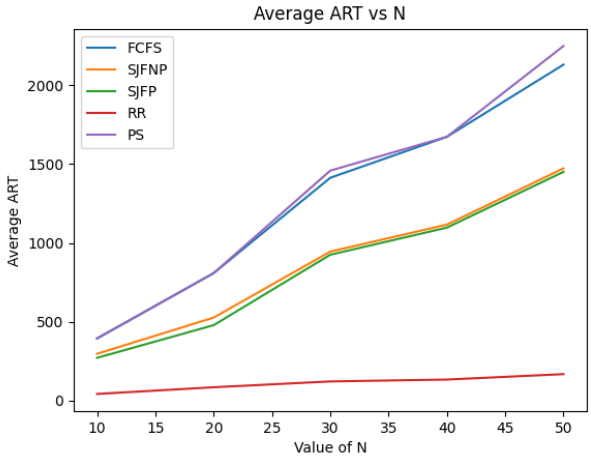
Three .txt documents are created and the values are saved in this.

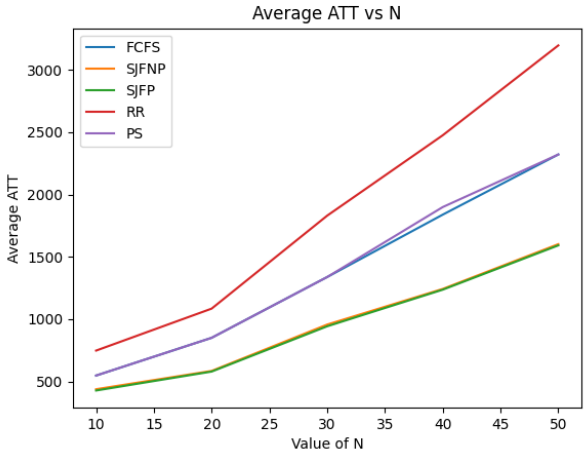


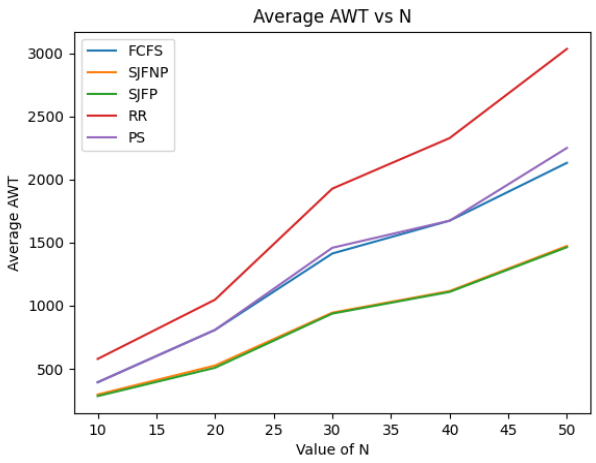
Part C

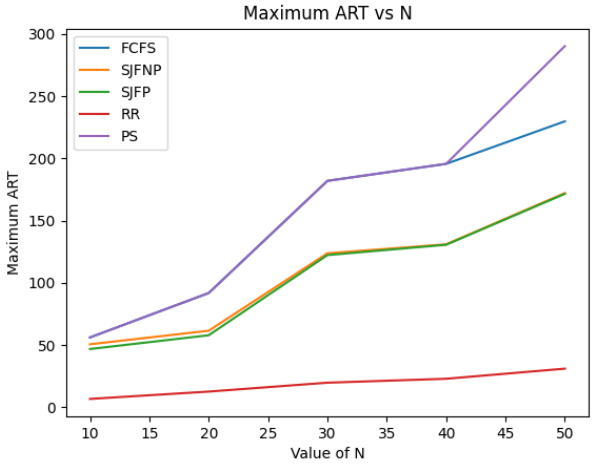
Output :

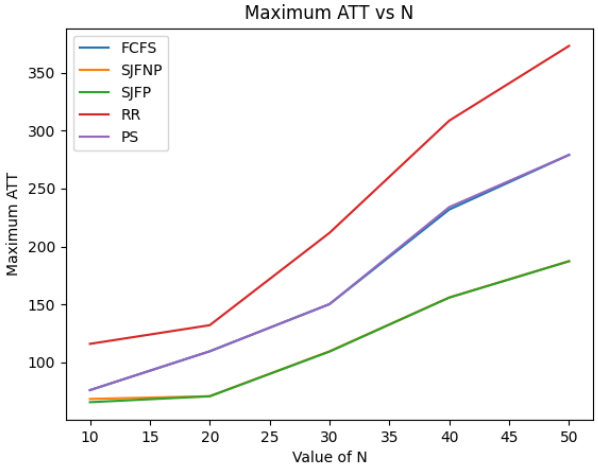
Graphs of Average ART, ATT, AWT and maximum ART, ATT, AWTand minimal ART, ATT, AWT is shown below which is also available in the graphs folder.

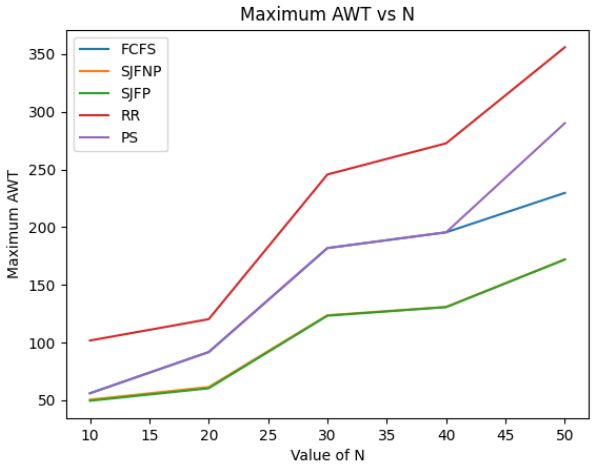


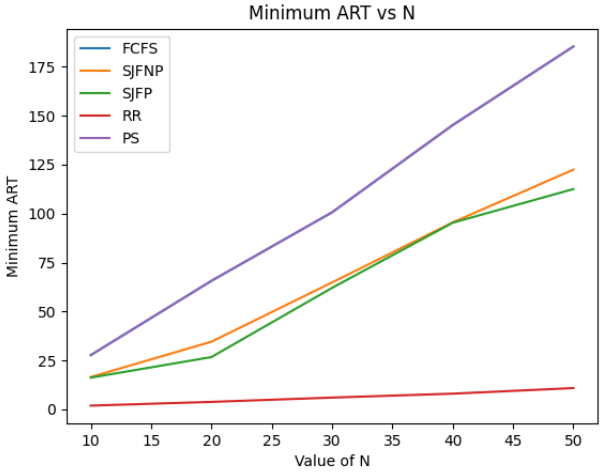


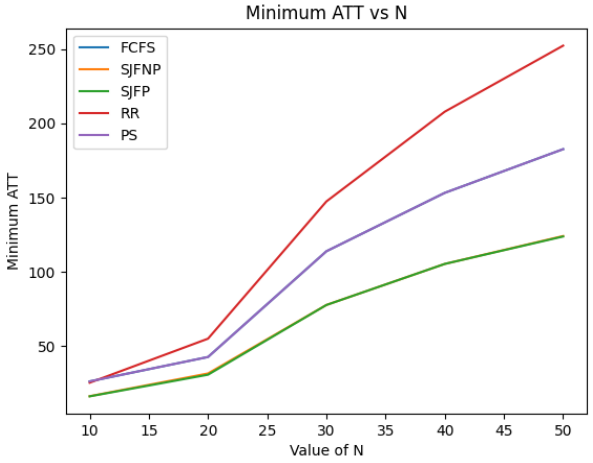

Average AWT vs N
FCFS
SJFNP
SJFP
RR
PS
Average AWT
Value of N

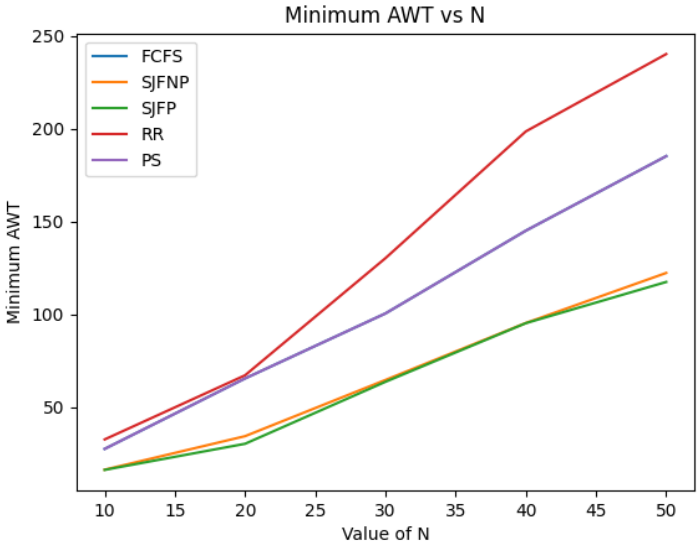

Maximum ART vs N
FCFS
SJFNP
SJFP
RR
PS
Maximum ART
Value of N


Maximum ATT vs N
FCFS
SJFNP
SJFP
RR
PS
Maximum ATT
Value of N


Maximum AWT vs N
FCFS
SJFNP
SJFP
RR
PS
Maximum AWT
Value of N


Minimum ART vs N
FCFS
SJFNP
SJFP
RR
PS
Minimum ART
Value of N


Minimum ATT vs N
FCFS
SJFNP
SJFP
RR
PS
Minimum ATT
Value of N



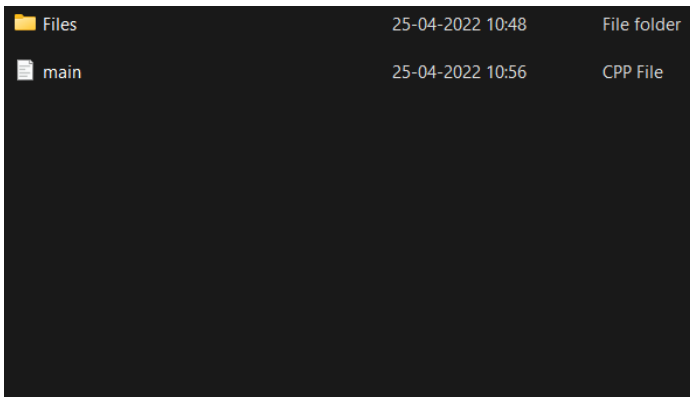
Part D

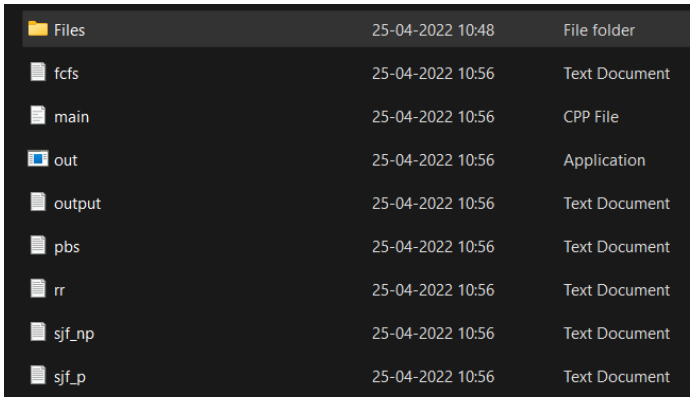
Compiling and Running :

```
PS C:\Users\manav\Downloads\CourseProject_D2\D2> g++ -o out main.cpp
PS C:\Users\manav\Downloads\CourseProject_D2\D2> ./out 5
```

Output :

Before Running the main.cpp file :





After running the main.cpp file :

Each of the text file will contains the ART, AWT and ATT details as follows :

```
Total
AWT : 29.66
ATT : 41.06
ART : 4.24

Minimum
AWT : 14.8
ATT : 24
ART : 4

Maximum
AWT : 53
ATT : 68.8
ART : 6.4
```

```
Total
AWT : 16.12
ATT : 27.52
ART : 16.22

Minimum
AWT : 9
ATT : 18.2
ART : 8.8

Maximum
AWT : 27
ATT : 42.8
ART : 28.2
```

```
Total
AWT : 14.92
ATT : 26.32
ART : 16.4

Minimum
AWT : 7.8
ATT : 17
ART : 9.6

Maximum
AWT : 26.6
ATT : 42.4
ART : 27.8
```

```
Total
AWT : 20.76
ATT : 32.16
ART : 18.62

Minimum
AWT : 14.2
ATT : 23.4
ART : 13.2

Maximum
AWT : 30.2
ATT : 46
ART : 31.4
```

```
Total
AWT : 22.12
ATT : 33.52
ART : 22.12

Minimum
AWT : 16.4
ATT : 25.4
ART : 16.4

Maximum
AWT : 35
ATT : 50.8
ART : 35
```
