

FCFS CPU scheduler Code and Report

Project objective: To learn more about OS CPU scheduling through a hands-on simulation programming experience. To simulate, compare, and evaluate CPU scheduling algorithms using a consistent set of data.

Directions The following information should be included in your document, **numbered and in order:**

Names: Kyle Frudakis

Date: 03/05/2021

Language used: C++

1. Provide clear instructions on how to compile, build, and run the simulator (this will indicate that the application has been tested and works on the engineering student desktop)

- Open Microsoft Visual Studios
- Create a project
- Create a .cpp file in project
- Copy and paste code from text file provided
- Click on "Local Window Debugger"
- Output should be showing now!

2. Introduction

So this assignment is late but I am very proud to produce this even if the final time is not perfect because it took me weeks to figure it out. I did not do the calculations for wait time, response time, and others because I would like to try and focus on the next part of the project. I am ready for this assignment to not be graded and get no credit for it but as long as I completed it to some extent, I'll be happy.

3. **Insert one table** (See the ASSIGNMENT EXAMPLE) that includes the entire simulation results for CPU Utilization, Response Time (RT) , Waiting Time (WT), Turnaround Time (TT) **PER PROCESS and Averages** for both FCFS(710 time units) and SJF (810 time units)

4. Answer the following questions in full sentences with a brief explanation, IN YOUR OWN WORDS:

- a. Which algorithm (FCFS or SJF) has the best (highest) CPU utilization, why do you think that algorithm has a higher CPU utilization?
 - i. SJF has the highest CPU utilization because its priority is to do the shortest job first so more time of the cpu is used better
- b. How many context switches(**context switch is from one process to another**) are in the simulation of FCFS ?
 - i.
- c. How many context switches are in the simulation of SJF ?
- d. How does the number of context switches effect the performance of the algorithm?
- e. Which algorithm (FCFS or SJF) has the lowest average waiting time?
- f. Which algorithm (FCFS or SJF) has the lowest average response time ?
- g. Which algorithm (FCFS or SJF) has the lowest average turnaround time?

5. Insert a partial or complete Gantt chart for FCFS. **(NOTE: IF YOU DID NOT GET YOUR CODE TO WORK CORRECTLY, OR YOUR SIMULATOR DOES NOT PRODUCE THE CORRECT OUTPUT YOU MUST COMPLETE AND SUBMIT A FULL GANTT CHART IN THIS REPORT – DO NOT INSERT MY GANTT CHART, CREATE YOUR OWN)**

6. Insert the calculated results that were produced by the simulation

7. Insert the FCFS Program Output.

(for some reason, the process and burst are shifted to the left after I copy and paste. Won't show like this in real output)

Current Time: 0

Now Running: P1

.....		
Ready Queue:	Process	Burst
	P2	19
	P3	12
	P4	11
	P5	16
	P6	20
	P7	3
	P8	15

.....		
Now in I/O:	Process	Remaining I/O Time
	P1	21

.....
Current Time: 6

Now Running: P2

.....		
Ready Queue:	Process	Burst
	P3	12
	P4	11
	P5	16
	P6	20
	P7	3
	P8	15
	P1	9

.....		
Now in I/O:	Process	Remaining I/O Time
	P2	48

.....
Current Time: 25

Now Running: P3

.....		
Ready Queue:	Process	Burst
	P4	11
	P5	16
	P6	20
	P7	3
	P8	15
	P1	9
	P2	16

.....		
Now in I/O:	Process	Remaining I/O Time
	P3	14

.....

Current Time: 37

Now Running: P4

Ready Queue:	Process	Burst
	P5	16
	P6	20
	P7	3
	P8	15
	P3	6
	P1	9
	P2	16

Now in I/O:	Process	Remaining I/O Time
	P4	45

Current Time: 48

Now Running: P5

Ready Queue:	Process	Burst
	P6	20
	P7	3
	P8	15
	P3	6
	P1	9
	P4	5
	P2	16

Now in I/O:	Process	Remaining I/O Time
	P5	22

Current Time: 64

Now Running: P6

Ready Queue:	Process	Burst
	P7	3
	P8	15
	P3	6
	P1	9
	P5	15
	P4	5
	P2	16

Now in I/O:	Process	Remaining I/O Time
	P6	31

Current Time: 84

Now Running: P7

Ready Queue:	Process	Burst
--------------	---------	-------

P8	15
P3	6
P1	9
P5	15
P6	22
P4	5
P2	16

.....

Now in I/O:	Process	Remaining I/O Time
P7	44	

.....

Current Time: 87

Now Running: P8

.....

Ready Queue:	Process	Burst
P3	6	
P1	9	
P5	15	
P7	7	
P6	22	
P4	5	
P2	16	

.....

Now in I/O:	Process	Remaining I/O Time
P8	50	

.....

Current Time: 102

Now Running: P3

.....

Ready Queue:	Process	Burst
P1	9	
P5	15	
P7	7	
P6	22	
P4	5	
P8	4	
P2	16	

.....

Now in I/O:	Process	Remaining I/O Time
P3	21	

.....

Current Time: 108

Now Running: P1

.....

Ready Queue:	Process	Burst
P5	15	
P7	7	
P6	22	
P3	3	
P4	5	

P8	4
P2	16

Now in I/O:	Process	Remaining I/O Time
P1	28	

Current Time: 117

Now Running: P5

Ready Queue:	Process	Burst
P7	7	
P6	22	
P3	3	
P4	5	
P1	5	
P8	4	
P2	16	

Now in I/O:	Process	Remaining I/O Time
P5	21	

Current Time: 132

Now Running: P7

Ready Queue:	Process	Burst
P6	22	
P3	3	
P4	5	
P1	5	
P8	4	
P2	16	
P5	12	

Now in I/O:	Process	Remaining I/O Time
P7	24	

Current Time: 139

Now Running: P6

Ready Queue:	Process	Burst
P3	3	
P4	5	
P1	5	
P8	4	
P2	16	
P5	12	
P7	6	

Now in I/O:	Process	Remaining I/O Time
P6	30	

.....
Current Time: 161

Now Running: P3

.....
Ready Queue: Process Burst
 P4 5
 P1 5
 P8 4
 P2 16
 P5 12
 P7 6
 P6 25

.....
Now in I/O: Process Remaining I/O Time
 P3 29

.....
Current Time: 164

Now Running: P4

.....
Ready Queue: Process Burst
 P1 5
 P8 4
 P2 16
 P5 12
 P7 6
 P3 7
 P6 25

.....
Now in I/O: Process Remaining I/O Time
 P4 41

.....
Current Time: 169

Now Running: P1

.....
Ready Queue: Process Burst
 P8 4
 P2 16
 P5 12
 P7 6
 P3 7
 P4 6
 P6 25

.....
Now in I/O: Process Remaining I/O Time
 P1 26

.....
Current Time: 174

Now Running: P8

Ready Queue:	Process	Burst
	P2	16
	P5	12
	P7	6
	P3	7
	P1	4
	P4	6
	P6	25

.....

Now in I/O:	Process	Remaining I/O Time
	P8	23

.....

Current Time: 178

Now Running: P2

.....

Ready Queue:	Process	Burst
	P5	12
	P7	6
	P3	7
	P8	11
	P1	4
	P4	6
	P6	25

.....

Now in I/O:	Process	Remaining I/O Time
	P2	32

.....

Current Time: 194

Now Running: P5

.....

Ready Queue:	Process	Burst
	P7	6
	P3	7
	P8	11
	P1	4
	P4	6
	P6	25
	P2	17

.....

Now in I/O:	Process	Remaining I/O Time
	P5	31

.....

Current Time: 206

Now Running: P7

.....

Ready Queue:	Process	Burst
	P3	7
	P8	11
	P1	4
	P4	6

P6	25
P2	17
P5	14

.....

Now in I/O:	Process	Remaining I/O Time
P7	34	

.....

Current Time: 212

Now Running: P3

.....

Ready Queue:	Process	Burst
P8	11	
P1	4	
P4	6	
P6	25	
P2	17	
P5	14	
P7	5	

.....

Now in I/O:	Process	Remaining I/O Time
P3	45	

.....

Current Time: 219

Now Running: P8

.....

Ready Queue:	Process	Burst
P1	4	
P4	6	
P6	25	
P2	17	
P5	14	
P7	5	
P3	8	

.....

Now in I/O:	Process	Remaining I/O Time
P8	31	

.....

Current Time: 230

Now Running: P1

.....

Ready Queue:	Process	Burst
P4	6	
P6	25	
P2	17	
P5	14	
P7	5	
P8	4	
P3	8	

.....

Now in I/O:	Process	Remaining I/O Time
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P1 22

.....

Current Time: 234

Now Running: P4

.....

Ready Queue: Process Burst

P6 25

P2 17

P5 14

P7 5

P1 3

P8 4

P3 8

.....

Now in I/O: Process Remaining I/O Time

P4 45

.....

Current Time: 240

Now Running: P6

.....

Ready Queue: Process Burst

P2 17

P5 14

P7 5

P1 3

P8 4

P3 8

P4 8

.....

Now in I/O: Process Remaining I/O Time

P6 29

.....

Current Time: 265

Now Running: P2

.....

Ready Queue: Process Burst

P5 14

P7 5

P1 3

P8 4

P3 8

P4 8

P6 11

.....

Now in I/O: Process Remaining I/O Time

P2 29

.....

Current Time: 282

Now Running: P5

.....
Ready Queue: Process Burst
P7 5
P1 3
P8 4
P3 8
P4 8
P6 11
P2 6

.....
Now in I/O: Process Remaining I/O Time
P5 26

.....
Current Time: 296

Now Running: P7

.....
Ready Queue: Process Burst
P1 3
P8 4
P3 8
P4 8
P6 11
P5 13
P2 6

.....
Now in I/O: Process Remaining I/O Time
P7 54

.....
Current Time: 301

Now Running: P1

.....
Ready Queue: Process Burst
P8 4
P3 8
P4 8
P6 11
P5 13
P2 6
P7 4

.....
Now in I/O: Process Remaining I/O Time
P1 41

.....
Current Time: 304

Now Running: P8

.....
Ready Queue: Process Burst
P3 8
P4 8
P6 11

P5	13
P2	6
P1	6
P7	4

.....

Now in I/O:	Process	Remaining I/O Time
P8	31	

.....

Current Time: 308

Now Running: P3

.....

Ready Queue:	Process	Burst
P4	8	
P6	11	
P5	13	
P2	6	
P1	6	
P8	3	
P7	4	

.....

.....

Now in I/O:	Process	Remaining I/O Time
P3	54	

.....

Current Time: 316

Now Running: P4

.....

Ready Queue:	Process	Burst
P6	11	
P5	13	
P2	6	
P1	6	
P8	3	
P7	4	
P3	11	

.....

.....

Now in I/O:	Process	Remaining I/O Time
P4	51	

.....

Current Time: 324

Now Running: P6

.....

Ready Queue:	Process	Burst
P5	13	
P2	6	
P1	6	
P8	3	
P7	4	
P3	11	
P4	4	

.....

Now in I/O:	Process	Remaining I/O Time
P6	44	

Current Time: 335

Now Running: P5

Ready Queue:	Process	Burst
P2	6	
P1	6	
P8	3	
P7	4	
P3	11	
P4	4	
P6	17	

Now in I/O:	Process	Remaining I/O Time
P5	31	

Current Time: 348

Now Running: P2

Ready Queue:	Process	Burst
P1	6	
P8	3	
P7	4	
P3	11	
P5	16	
P4	4	
P6	17	

Now in I/O:	Process	Remaining I/O Time
P2	44	

Current Time: 354

Now Running: P1

Ready Queue:	Process	Burst
P8	3	
P7	4	
P3	11	
P5	16	
P2	8	
P4	4	
P6	17	

Now in I/O:	Process	Remaining I/O Time
P1	45	

Current Time: 360

Now Running: P8

```
.....
Ready Queue: Process    Burst
              P7        4
              P3        11
              P5        16
              P2         8
              P4         4
              P6        17
              P1         4
```

```
.....
Now in I/O:  Process    Remaining I/O Time
              P8        47
```

```
.....
Current Time: 363
```

Now Running: P7

```
.....
Ready Queue: Process    Burst
              P3        11
              P5        16
              P2         8
              P4         4
              P6        17
              P1         4
              P8         5
```

```
.....
Now in I/O:  Process    Remaining I/O Time
              P7        24
```

```
.....
Current Time: 367
```

Now Running: P3

```
.....
Ready Queue: Process    Burst
              P5        16
              P7         7
              P2         8
              P4         4
              P6        17
              P1         4
              P8         5
```

```
.....
Now in I/O:  Process    Remaining I/O Time
              [empty]
```

```
.....
Current Time: 378
```

Now Running: P5

```
.....
Ready Queue: Process    Burst
              P7         7
```

P2	8
P4	4
P6	17
P1	4
P8	5
P3	9

Now in I/O: Process Remaining I/O Time

P5	18
----	----

Current Time: 394

Now Running: P7

Ready Queue: Process Burst

P2	8
P4	4
P6	17
P1	4
P8	5
P5	12
P3	9

Now in I/O: Process Remaining I/O Time

P7	44
----	----

Current Time: 401

Now Running: P2

Ready Queue: Process Burst

P4	4
P6	17
P1	4
P8	5
P5	12
P3	9
P7	6

Now in I/O: Process Remaining I/O Time

P2	34
----	----

Current Time: 409

Now Running: P4

Ready Queue: Process Burst

P6	17
P1	4
P8	5
P5	12
P2	21
P3	9

P7 6

Now in I/O: Process Remaining I/O Time
 P4 61

Current Time: 413

Now Running: P6

Ready Queue: Process Burst
 P1 4
 P8 5
 P5 12
 P2 21
 P3 9
 P7 6
 P4 13

Now in I/O: Process Remaining I/O Time
 P6 34

Current Time: 430

Now Running: P1

Ready Queue: Process Burst
 P8 5
 P5 12
 P2 21
 P3 9
 P7 6
 P6 18
 P4 13

Now in I/O: Process Remaining I/O Time
 P1 27

Current Time: 434

Now Running: P8

Ready Queue: Process Burst
 P5 12
 P1 8
 P2 21
 P3 9
 P7 6
 P6 18
 P4 13

Now in I/O: Process Remaining I/O Time
 P8 21

Current Time: 439

Now Running: P5

Ready Queue:	Process	Burst
	P8	8
	P1	8
	P2	21
	P3	9
	P7	6
	P6	18
	P4	13

Now in I/O:	Process	Remaining I/O Time
	P5	21

Current Time: 451

Now Running: P8

Ready Queue:	Process	Burst
	P1	8
	P2	21
	P3	9
	P7	6
	P6	18
	P5	10
	P4	13

Now in I/O:	Process	Remaining I/O Time
	P8	31

Current Time: 459

Now Running: P1

Ready Queue:	Process	Burst
	P2	21
	P3	9
	P7	6
	P6	18
	P5	10
	P4	13
	P8	6

Now in I/O:	Process	Remaining I/O Time
	[empty]	

Current Time: 467

Now Running: P2

Ready Queue:	Process	Burst
	P3	9
	P7	6
	P6	18
	P5	10
	P4	13
	P1	3
	P8	6

.....

Now in I/O:	Process	Remaining I/O Time
	P2	34

.....

Current Time: 488

Now Running: P3

.....

Ready Queue:	Process	Burst
	P7	6
	P6	18
	P5	10
	P4	13
	P1	3
	P8	6
	P2	19

Completed Processes:

P3	0
----	---

.....

Current Time: 497

Now Running: P7

.....

Ready Queue:	Process	Burst
	P6	18
	P5	10
	P4	13
	P1	3
	P8	6
	P2	19

.....

Now in I/O:	Process	Remaining I/O Time
	P7	54

.....

Current Time: 503

Now Running: P6

.....

Ready Queue:	Process	Burst
	P5	10
	P4	13
	P1	3
	P8	6
	P2	19
	P7	5

.....
Now in I/O: Process Remaining I/O Time
P6 31
.....

Current Time: 521

Now Running: P5

.....
Ready Queue: Process Burst
P4 13
P1 3
P8 6
P2 19
P6 6
P7 5
.....

Now in I/O: Process Remaining I/O Time
[empty]

.....
Current Time: 531

Now Running: P4

.....
Ready Queue: Process Burst
P1 3
P8 6
P2 19
P5 11
P6 6
P7 5
.....

Now in I/O: Process Remaining I/O Time
P4 54
.....

Current Time: 544

Now Running: P1

.....
Ready Queue: Process Burst
P8 6
P2 19
P5 11
P6 6
P7 5
P4 11
.....

Completed Processes:

P3 0
P1 0

.....
Current Time: 547

Now Running: P8

```

.....
Ready Queue:  Process      Burst
              P2          19
              P5          11
              P6           6
              P7           5
              P4          11

```

```

.....
Now in I/O:   Process      Remaining I/O Time
              [empty]

```

```

.....
Current Time: 553

```

Now Running: P2

```

.....
Ready Queue:  Process      Burst
              P5          11
              P6           6
              P7           5
              P8           9
              P4          11

```

```

.....
Now in I/O:   Process      Remaining I/O Time
              P2          39

```

```

.....
Current Time: 572

```

Now Running: P5

```

.....
Ready Queue:  Process      Burst
              P6           6
              P7           5
              P8           9
              P4          11
              P2          10

```

Completed Processes:

```

              P3          0
              P1          0
              P5          0

```

```

.....
Current Time: 583

```

Now Running: P6

```

.....
Ready Queue:  Process      Burst
              P7           5
              P8           9
              P4          11
              P2          10

```

```

.....
Now in I/O:   Process      Remaining I/O Time
              [empty]

```

.....

Current Time: 589

Now Running: P7

.....

Ready Queue:	Process	Burst
	P8	9
	P6	16
	P4	11
	P2	10

.....

Now in I/O:	Process	Remaining I/O Time
	P7	21

.....

Current Time: 594

Now Running: P8

.....

Ready Queue:	Process	Burst
	P6	16
	P7	6
	P4	11
	P2	10

Completed Processes:

P3	0
P1	0
P5	0
P8	0

.....

Current Time: 603

Now Running: P6

.....

Ready Queue:	Process	Burst
	P7	6
	P4	11
	P2	10

Completed Processes:

P3	0
P1	0
P5	0
P8	0
P6	0

.....

Current Time: 619

Now Running: P7

.....

Ready Queue:	Process	Burst
	P4	11
	P2	10

.....

Now in I/O: Process Remaining I/O Time
 [empty]

Current Time: 625

Now Running: P4

Ready Queue: Process Burst
 P2 10
 P7 4

Now in I/O: Process Remaining I/O Time
 [empty]

Current Time: 636

Now Running: P2

Ready Queue: Process Burst
 P7 4
 P4 10

Now in I/O: Process Remaining I/O Time
 [empty]

Current Time: 646

Now Running: P7

Ready Queue: Process Burst
 P2 7
 P4 10

Completed Processes:

P3 0
P1 0
P5 0
P8 0
P6 0
P7 0

Current Time: 650

Now Running: P2

Ready Queue: Process Burst
 P4 10

Completed Processes:

P3 0
P1 0
P5 0

P8	0
P6	0
P7	0
P2	0

.....
Current Time: 657

Now Running: P4

.....
Ready Queue: Process Burst

Completed Processes:

P3	0
P1	0
P5	0
P8	0
P6	0
P7	0
P2	0
P4	0

.....
final time: 667

linked list has been destroyed

linked list has been destroyed

linked list has been destroyed

C:\Users\fruda\OneDrive\Desktop\FAU\FAU 2020-2021 Spring Classes\Computer Operating Systems\FCFS_project\Debug\FCFS_project.exe (process 21952) exited with code 0.

To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.

Press any key to close this window . . .