

COMP 322/L—Introduction to Operating Systems and System Architecture

Assignment #2—Batch Process Scheduling

Objective:

To calculate the timing parameters of batch processes based on different scheduling algorithms.

Specification:

The program mimics the execution of different processes under different scheduling algorithms. The simulation maintains a table that reflects the current state of the system, based on choosing from a menu of choices, where each choice calls the appropriate procedure, where the choices are:

- 1) Enter parameters
- 2) Schedule processes with FIFO algorithm
- 3) Schedule processes with SJF algorithm
- 4) Schedule processes with SRT algorithm
- 5) Quit program and free memory

Assignment:

- Create a table to record the status of different processes based on the following parameters:
 - *id*: the unique identifier of the process [**auto-generated, starting from 1—do not input from the user**]
 - *arrival*: the point in time when the process enters the ready list to be executed by the CPU [**input from the user**]
 - *total_cpu*: the amount of CPU time the process will consume between arrival and departure [**input from the user**]
 - *total_remaining*: the amount of CPU time remaining for a process to complete [**used for SRT scheduling only**]
 - *done*: a flag that indicates whether the process has been successfully completed (1) or not (0)
 - *start_time*: the time when the process has begun being executed by the CPU
 - *already_started*: a flag that indicated whether the process has already begun (1) or not (0) [**used for SRT scheduling only**]
 - *end_time*: the time when the process has been completed by the CPU
 - *turnaround_time*: the sum of the total CPU time and the waiting time (alternatively: the difference between the end time and the arrival time)
- Calculate the values for the *start_time*, *end_time*, and *turnaround_time* for each process based on the selected scheduling algorithm.

What NOT to do:

- Do NOT modify the choice values (1,2,3,4,5) or input characters and then try to convert them to integers--the test script used for grading your assignment will not work correctly.
- Do NOT turn in an alternate version of the assignment downloaded from the Internet (coursehero, chegg, reddit, github, ChatGPT, etc.) or submitted from you or another student from a previous semester—the test cases from this semester will not work on a previous semester's assignment.
- Do NOT turn in your assignment coded in another programming language (C++, C#, Java).

What to turn in:

- The source code as a C file uploaded to Canvas by the deadline of 11:59pm PST (-20% per consecutive day for late submissions, up to the 4th day—note 1 minute late counts as a day late, 1 day and 1 minute late counts as 2 days late, etc.)
- As a note, even though your code may compile on a compiler you have installed on your computer, I do not have access to your computer. I will be using the following free online compiler for testing, so make sure your code compiles with the following online C compiler before submitting: https://www.onlinegdb.com/online_c_compiler
If it does not compile with the above compiler, the default grade is 0 points since I cannot run it.

Sample output

Batch scheduling

- 1) Enter parameters
- 2) Schedule processes with FIFO algorithm
- 3) Schedule processes with SJF algorithm
- 4) Schedule processes with SRT algorithm
- 5) Quit and free memory

Enter selection: 1

Enter total number of processes: 3

Enter arrival cycle for process 1: 0

Enter total cycles for process 1: 6

Enter arrival cycle for process 2: 1

Enter total cycles for process 2: 3

Enter arrival cycle for process 3: 3

Enter total cycles for process 3: 2

PID	Arrival	Total	Start	End	Turnaround

1	0	6			
2	1	3			
3	3	2			

Batch scheduling

- 1) Enter parameters
- 2) Schedule processes with FIFO algorithm
- 3) Schedule processes with SJF algorithm
- 4) Schedule processes with SRT algorithm
- 5) Quit and free memory

Enter selection: 2

PID	Arrival	Total	Start	End	Turnaround

1	0	6	0	6	6
2	1	3	6	9	8
3	3	2	9	11	8

Batch scheduling

- 1) Enter parameters
- 2) Schedule processes with FIFO algorithm
- 3) Schedule processes with SJF algorithm
- 4) Schedule processes with SRT algorithm
- 5) Quit and free memory

Enter selection: 3

PID	Arrival	Total	Start	End	Turnaround

1	0	6	0	6	6
2	1	3	8	11	10
3	3	2	6	8	5

Batch scheduling

- 1) Enter parameters
- 2) Schedule processes with FIFO algorithm
- 3) Schedule processes with SJF algorithm
- 4) Schedule processes with SRT algorithm
- 5) Quit and free memory

Enter selection: 4

PID	Arrival	Total	Start	End	Turnaround

1	0	6	0	11	11
2	1	3	1	4	3
3	3	2	4	6	3

Batch scheduling

- 1) Enter parameters
- 2) Schedule processes with FIFO algorithm
- 3) Schedule processes with SJF algorithm
- 4) Schedule processes with SRT algorithm
- 5) Quit and free memory

Enter selection: 5

Quitting program