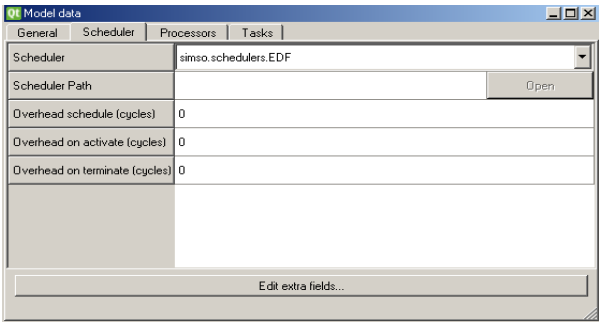
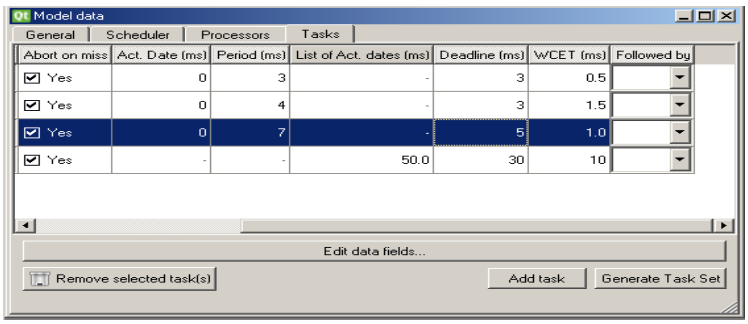
Peer Graded Assignment: Assignment 4

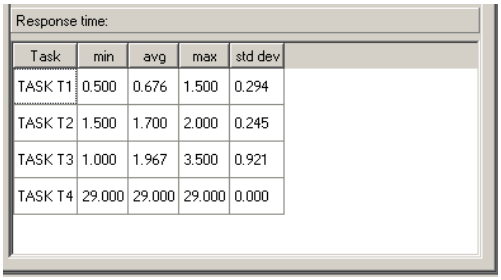
Simulation assignment

Part 1: Consider the tasks T1(3, 0.5), T2(4, 1.5, 3), T3(7, 1.0, 5) and the EDF scheduler. A sporadic job arrives at t=50 having the execution time of 10 and a relative deadline of 30. Create the sporadic task in SimSo by selecting: ”generate task set” and then list of act. Dates to the release time



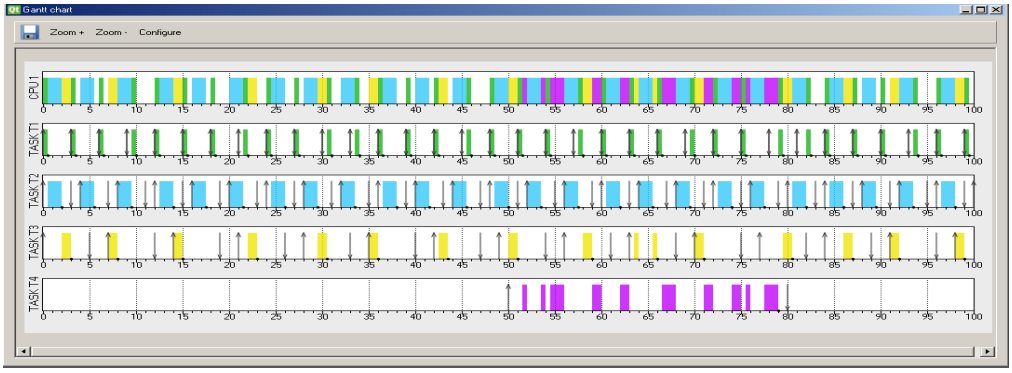


- What is the minimum/maximum/average response time of all tasks?



Ans: T1: 0.5/1.5/0.676 ms, T2: 1.5/2.0/1.7 ms, T3: 1.0/3.5/1.967 ms, sporadic job T4: 29/29/29ms.

- Is any task missing the deadline? Which task? Where?



Ans: No

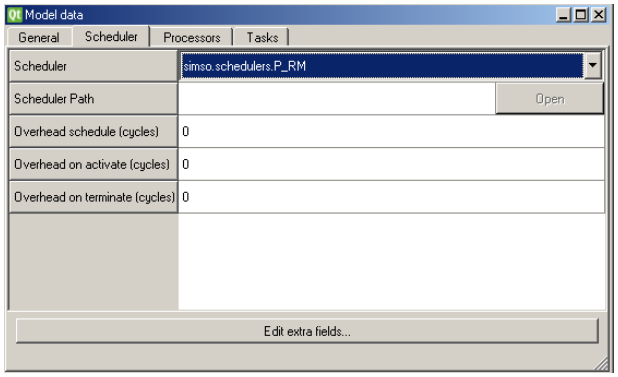
- Is the sporadic job meeting its deadline?

Ans: The sporadic job finished on time.

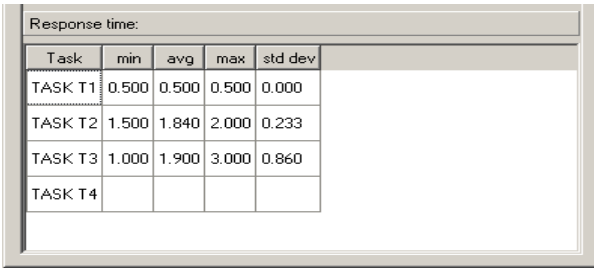
- What is the response time for the sporadic job?

  Ans: 29 ms

Part 2: Consider the tasks T1(3, 0.5), T2(4, 1.5, 3), T3(7, 1.0, 5) and the RM scheduler. A sporadic job arrives at t=50 having the execution time of 10 and a relative deadline of 30. Create the sporadic task in SimSo by selecting: ”generate task set” and then list of act. Dates to the release time

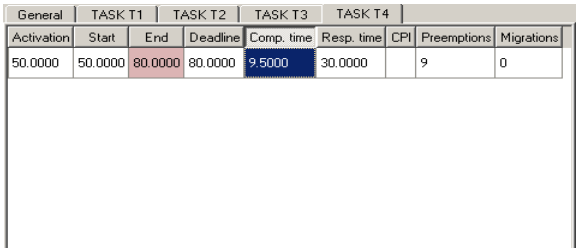


- What is the minimum/maximum/average response time of all tasks?



Response time:

Task	min	avg	max	std dev
TASK T1	0.500	0.500	0.500	0.000
TASK T2	1.500	1.840	2.000	0.233
TASK T3	1.000	1.900	3.000	0.860
TASK T4				

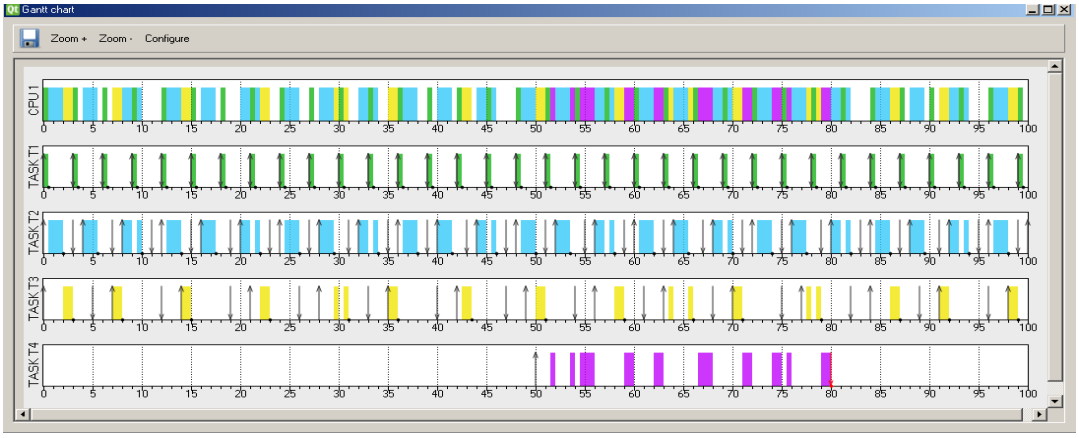


General | TASK T1 | TASK T2 | TASK T3 | TASK T4

Activation	Start	End	Deadline	Comp. time	Resp. time	CPI	Preemptions	Migrations
50.0000	50.0000	80.0000	80.0000	9.5000	30.0000		9	0

Ans: T1: 0.5/0.5/0.5ms, T2: 1.5/2.0/1.84ms, T3: 1.0/3.0/1.9ms, sporadic job T4: 30ms

- Is any task missing the deadline? Which task? Where?



Ans: T4 (sporadic job) just hits the deadline, at 80ms.

- Is the sporadic job meeting its deadline?
  Ans: It just hit the deadline, at 80ms.
- What is the response time for the sporadic job?
  Ans: 30ms
- Which scheduler is better is better in this example; EDF or RM?
  Ans: In this example, EDF is better.

Programming assignment

Please find the source code here : https://github.com/wantingchen/FreeRTOS-Sim

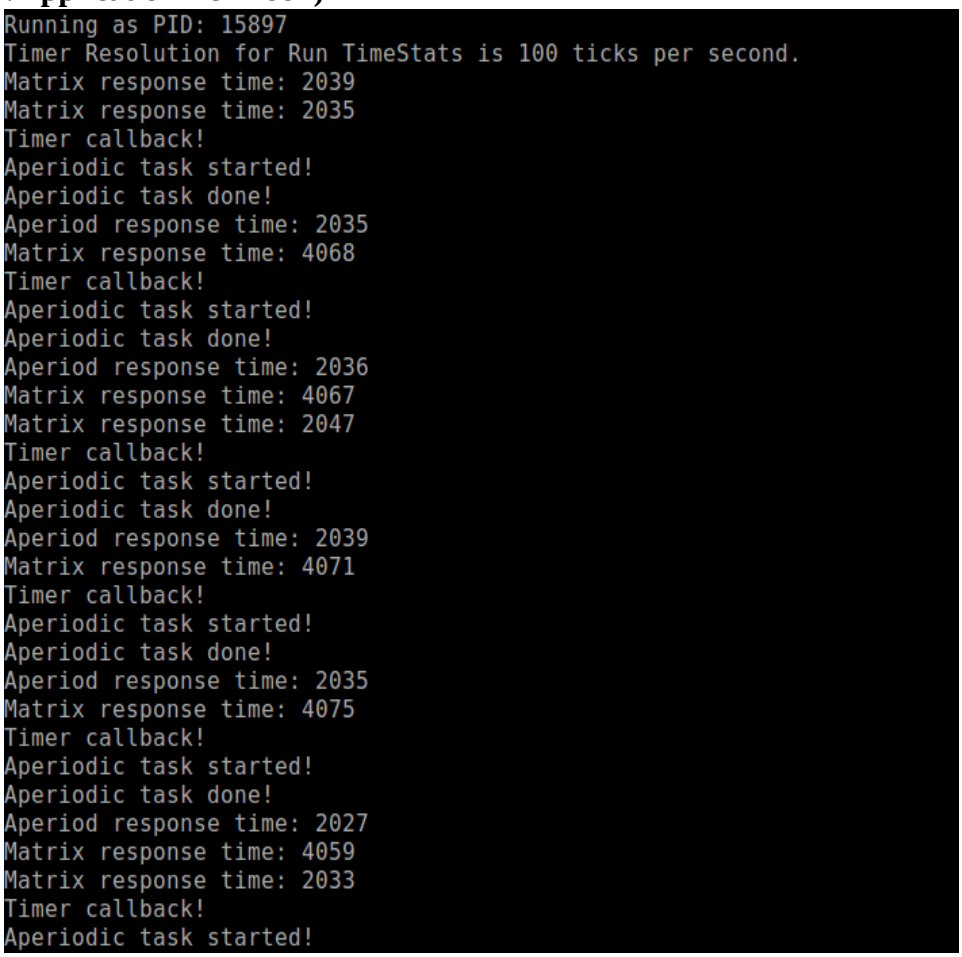
The following questions should be solved with programming and the questions should be answered in a report:

- Is the system fast enough to handle all aperiodic tasks? Why?
  Ans: No. If aperiodic task can be finished, we should be able to see both the message "Aperiodic task started!" and "Aperiodic task done!". But according to the screenshot, only "Aperiodic task started!" can be seen. It means that the process has been interrupted and restart from the beginning. (Here "Matrix response time: ..." is the message indicating the response time of matrixtask, which is executed by vApplicationTickHook)

```
Running as PID: 15814
Timer Resolution for Run TimeStats is 100 ticks per second.
Matrix response time: 2037
Matrix response time: 2043
Timer callback!
Aperiodic task started!
Matrix response time: 2092
Matrix response time: 2074
Timer callback!
Aperiodic task started!
Matrix response time: 2031
Matrix response time: 2044
Matrix response time: 2039
Timer callback!
Aperiodic task started!
Matrix response time: 2038
Matrix response time: 2038
Timer callback!
Matrix response time: 2036
Aperiodic task started!
Matrix response time: 2032
Timer callback!
Matrix response time: 2030
Aperiodic task started!
Matrix response time: 2030
Matrix response time: 2063
Timer callback!
Aperiodic task started!
Matrix response time: 2031
Matrix response time: 2033
Timer callback!
Matrix response time: 2038
Aperiodic task started!
```

- If not, solve this problem without alter the functionality of any task
  Ans: We just need to set this aperiodic task to higher priority, like this: xTaskCreate((pdTASK_CODE)aperiodic_task, (char *)"Aperiodic", configMINIMAL_STACK_SIZE, NULL, 4, &aperiodic_handle);

Here is the result, you can see both message “Aperiodic task started!” and "Aperiodic task done!”. (Here “Matrix response time: ...” and “Aperiod response time: ...” is the message indicating the response time of matrixtask and aperiodic task, which are executed by vApplicationTickHook)



- What is the response time of the aperiodic task?

  Ans: according to the result estimated by vApplicationTickHook, it is around 2030 ms.
- Provide a screenshot of the running system

  Ans: As above.