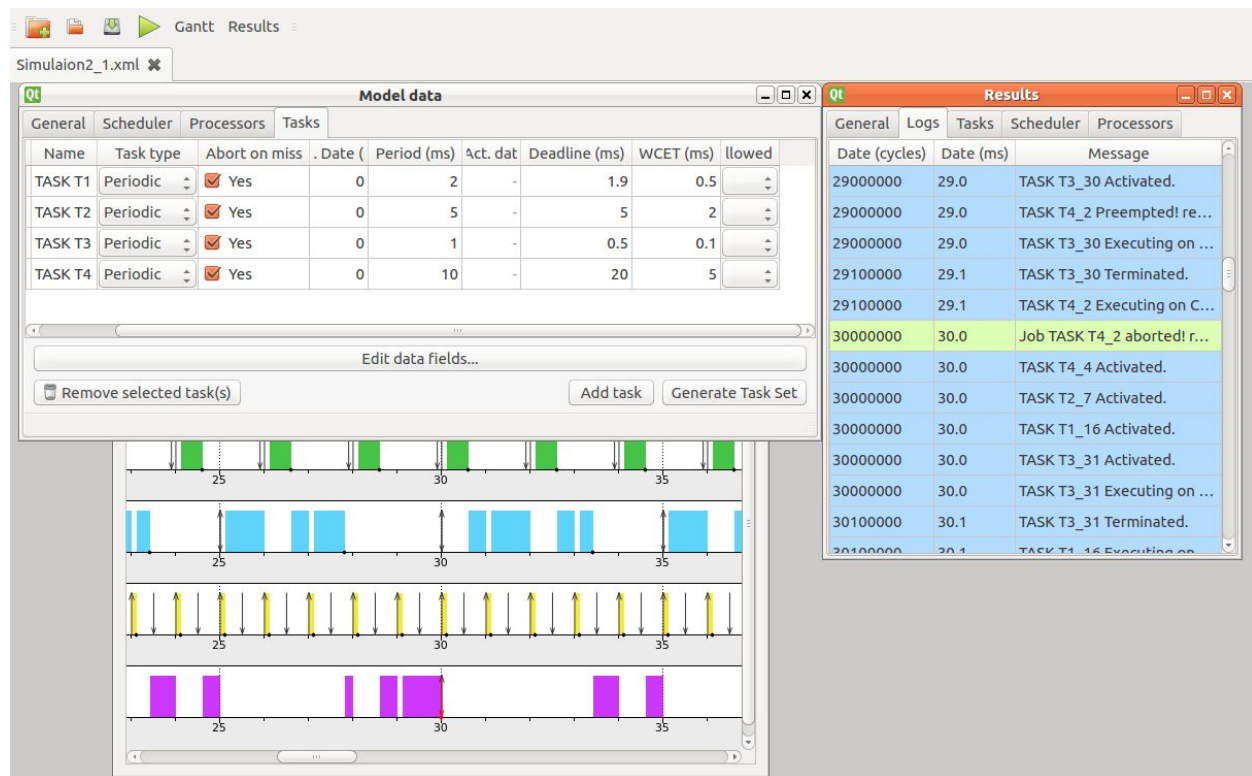


Development of Real-Time system

Assignment 3:

Simulation Assignment:

1. Input the tasks T1(2, 0.5), T2(3, 1.2), T3(6, 0.5) and the RM scheduler into the SimSo simulator



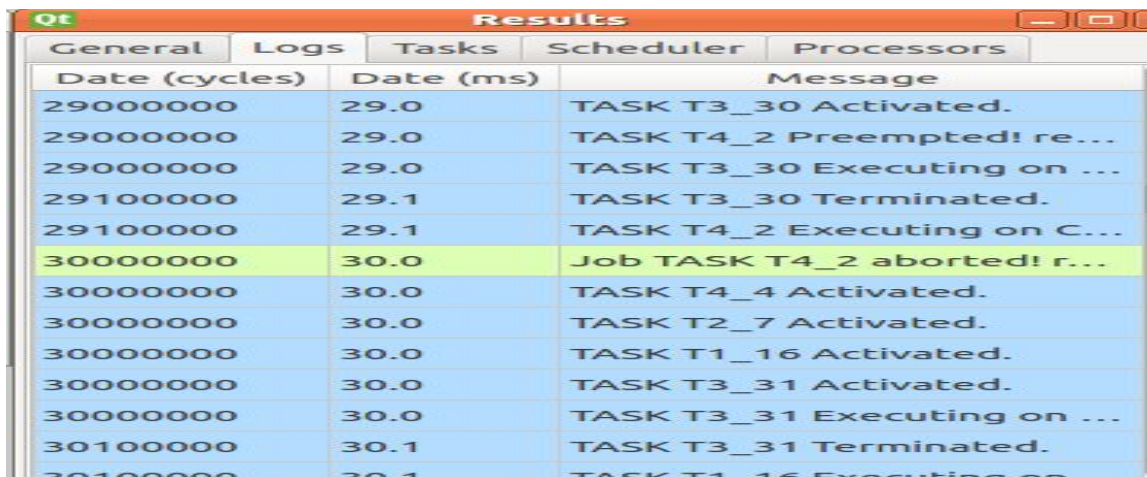
What is the utilization factor of the system and what is the value for $U_{rm}(3)$

$$U_{rm}(n) = n(21/n-1)$$

$$U_{rm}(3) = 3(21/3-1) = 0,779763$$

So CPU load < U_{rm} system is feasible.

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



The image shows a screenshot of a Qt application window titled "Results". It has a tabbed interface with tabs for "General", "Logs", "Tasks", "Scheduler", and "Processors". The "Logs" tab is selected, displaying a table of log entries. The table has three columns: "Date (cycles)", "Date (ms)", and "Message". The entries show the activation, execution, and termination of various tasks (TASK T3_30, TASK T4_2, TASK T4_4, TASK T2_7, TASK T1_16, TASK T3_31) and a job abort for TASK T4_2. The row for "Job TASK T4_2 aborted! r..." is highlighted in yellow.

Date (cycles)	Date (ms)	Message
29000000	29.0	TASK T3_30 Activated.
29000000	29.0	TASK T4_2 Preempted! re...
29000000	29.0	TASK T3_30 Executing on ...
29100000	29.1	TASK T3_30 Terminated.
29100000	29.1	TASK T4_2 Executing on C...
30000000	30.0	Job TASK T4_2 aborted! r...
30000000	30.0	TASK T4_4 Activated.
30000000	30.0	TASK T2_7 Activated.
30000000	30.0	TASK T1_16 Activated.
30000000	30.0	TASK T3_31 Activated.
30000000	30.0	TASK T3_31 Executing on ...
30100000	30.1	TASK T3_31 Terminated.
30100000	30.1	TASK T1_16 Executing on ...

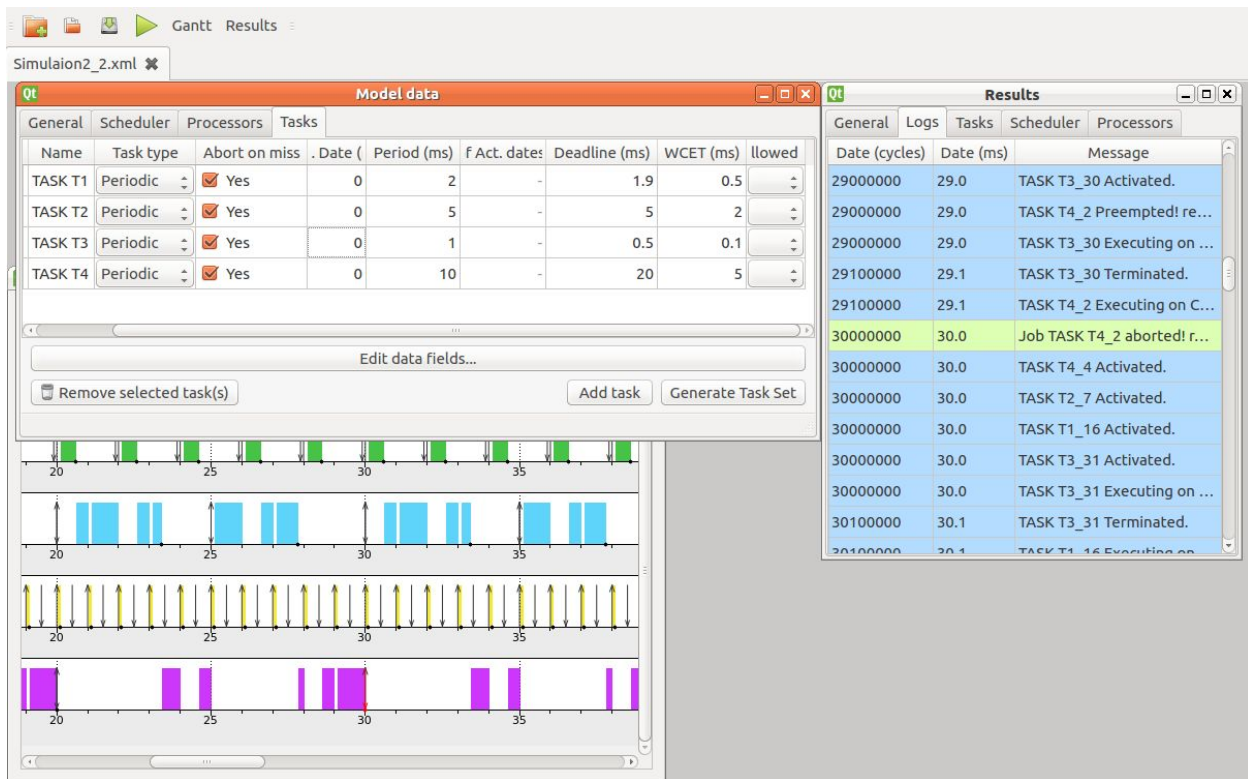
Is any task missing the deadline? Which task? Where?

No, you can see by the log that no task is missing its deadline.

If a deadline is missed, could it be avoided by changing the scheduler?

No deadline is missed so there's no need to change the scheduler type, but if this was the case, maybe it should be successful to change the scheduler to make the system feasible.

- Input the tasks T1(2, 0.5, 1.9) T2(5, 2) T3(1, 0.1, 0.5) T4(10, 5, 20) and the EDF scheduler into the SimSo simulator.

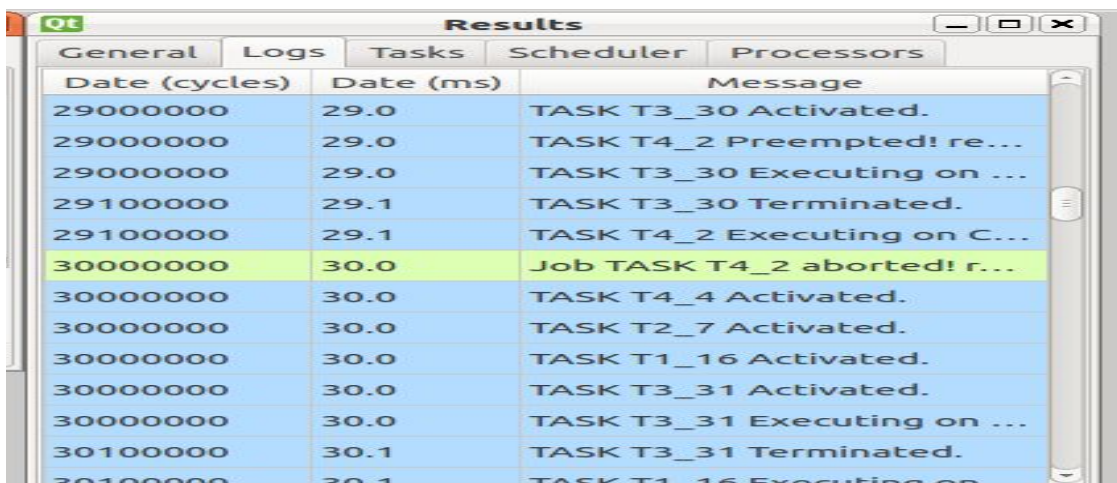


What is the utilization factor of the system and what is the value for $U_{rm}(4)$?

$$U_{rm}(4) = 0,75682846$$

For this system utilization factor is below: So the system is not feasible, as CPU is overloaded

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



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

Yes. Task 4 is aborted on 30 ms

If a deadline is missed, could it be avoided by changing the scheduler?

No because system is overloaded, CPU load is greater than 1. It's necessary to add a second CPU.

Theory assignment:

Find the largest possible frame size for the cyclic structured scheduler by following requirements 1,2 and 3 for finding the largest frame size. The following three task sets should be used:

Considering that tasks with no deadline specified, their deadlines will be equal to their periods

Task(Period, Exec. Time, Deadline)

Used excel to calculate requirement 3, also used it's built in function GCD to calculate Greatest Common Divisor.

Requirement 1: Largest frame size, equal to the largest execution time off all tasks

Requirement 2: Candidates that divides H evenly

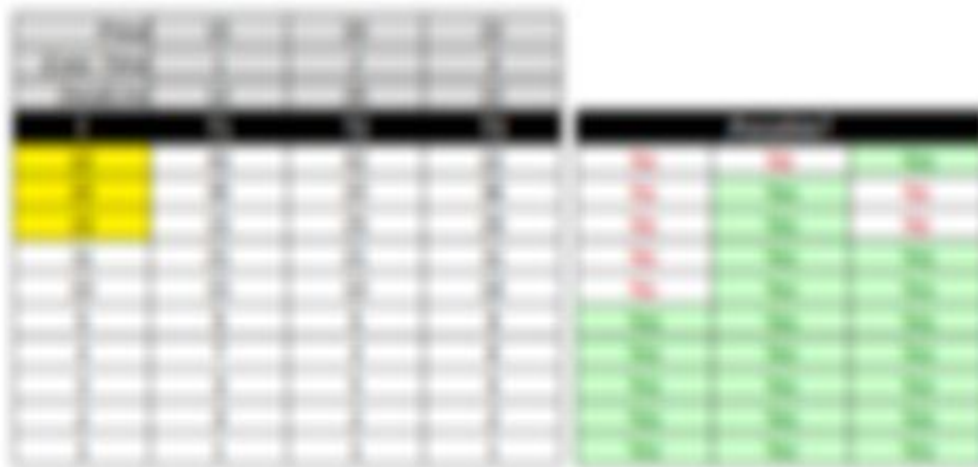
Requirement 3: Calculate $2f - \text{GCD}(p_i, f) \leq D_i$

1.1) T1(15, 1, 14) T2(20, 2, 26) T3(22, 3)

Requirement 1: $f \geq 3$

Requirement 2: Candidates are $f \{22, 20, 15, 11, 10, 5, 4, 3, 2, 1\}$

Requirement 3: Done in excel as per below table.



f	2f	GCD(p1, f)	2f - GCD(p1, f)	GCD(p2, f)	2f - GCD(p2, f)	GCD(p3, f)	2f - GCD(p3, f)
22	44	1	43	2	42	3	41
20	40	1	39	2	38	3	37
15	30	1	29	2	28	3	27
11	22	1	21	2	20	3	19
10	20	1	19	2	18	3	17
5	10	1	9	2	8	3	7
4	8	1	7	2	6	3	5
3	6	1	5	2	4	3	3
2	4	1	3	2	2	3	1
1	2	1	1	2	0	3	-1

So, frame size should be 5

1.3) T1(5, 0.1) T2(7, 1) T3(12, 6) T4(45, 9)

Requirement 1: $f \geq 9$

Requirement 2: Candidates are $f \{45, 12, 9, 6, 5, 4, 3, 2, 1\}$

Requirement 3: Done in excel as per below table.



So system to be feasible tasks 3 and 2 must be split to be able to be fit into a frame size of 5.