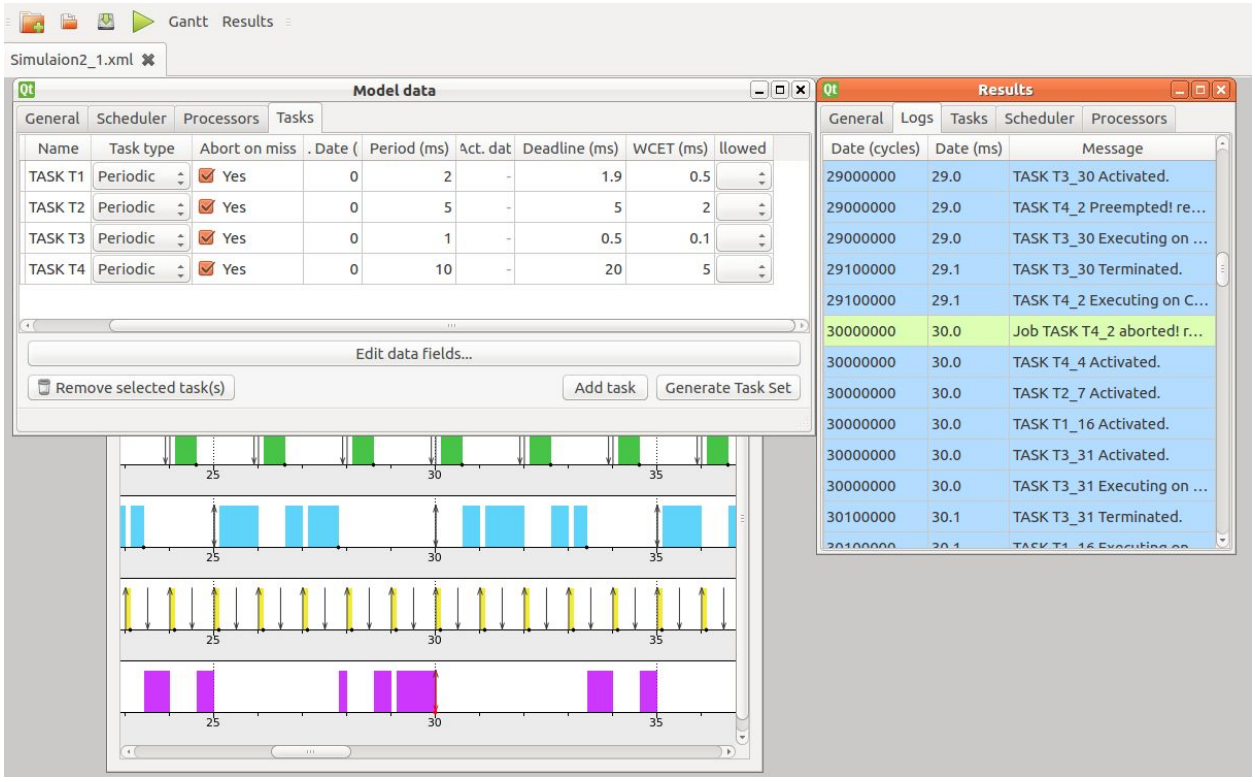
Development of Real-Time system

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



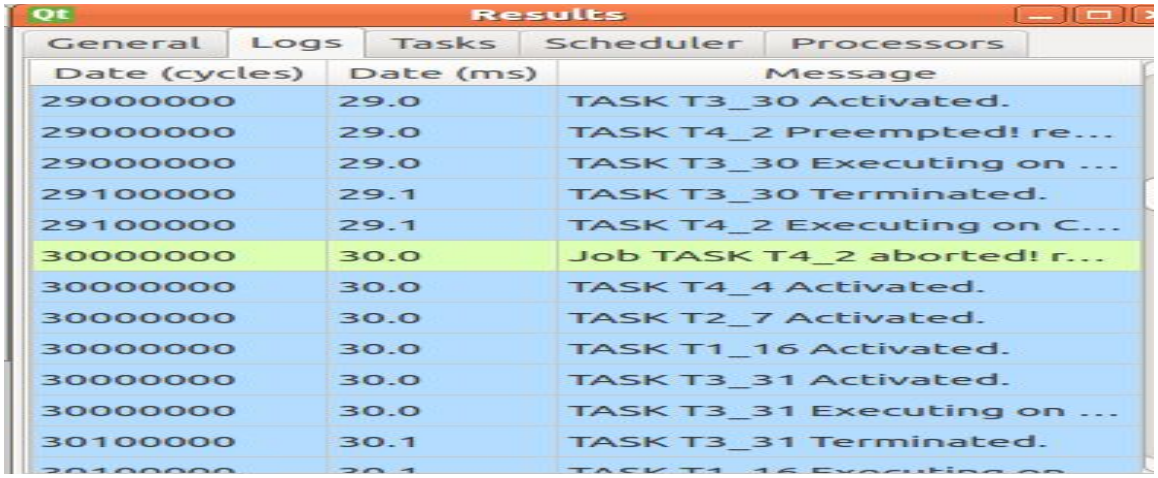
What is the utilization factor of the system and what is the value for Urm(3)

Urm(n) = n(21/n-1)

Urm(3) = 3(21/3-1) = 0,779763

So CPU load < Urm system is feasible.

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



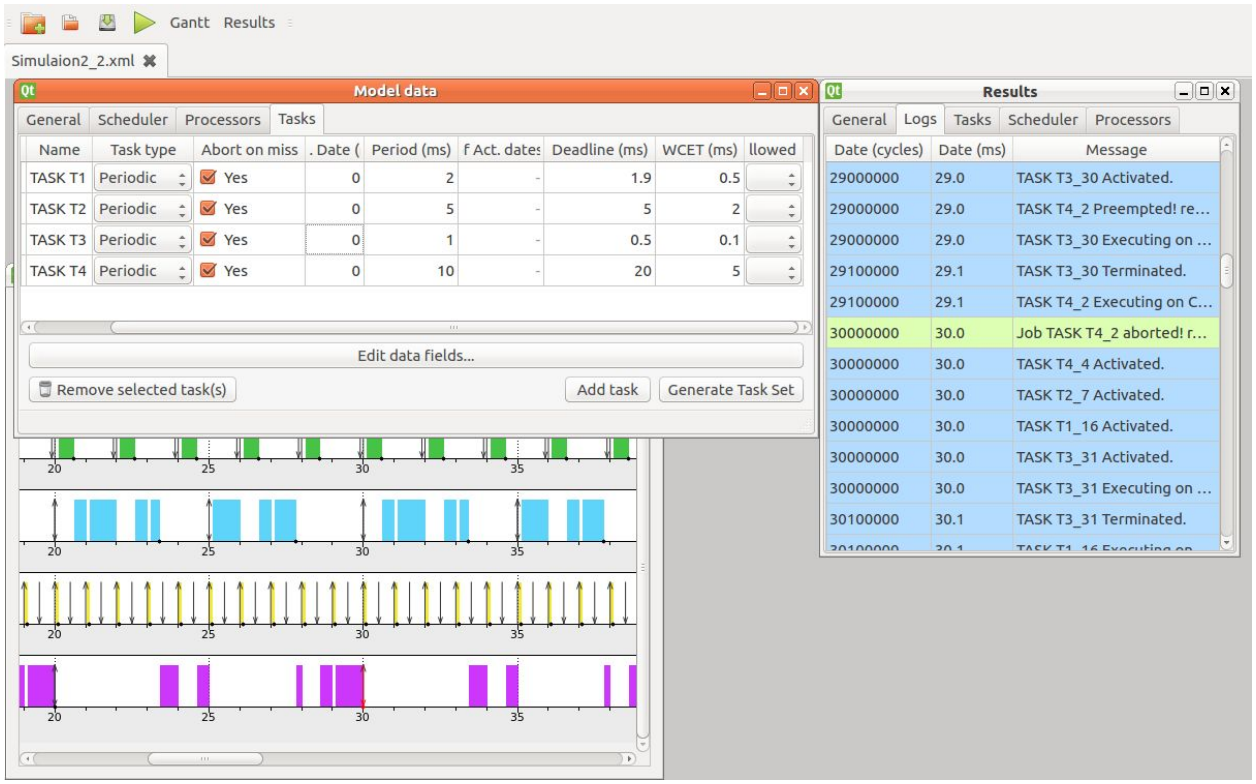
Is any task missing the deadline? Which task? Where?

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.

2. 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 Urm(4)?

Urm(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 devides H evenly

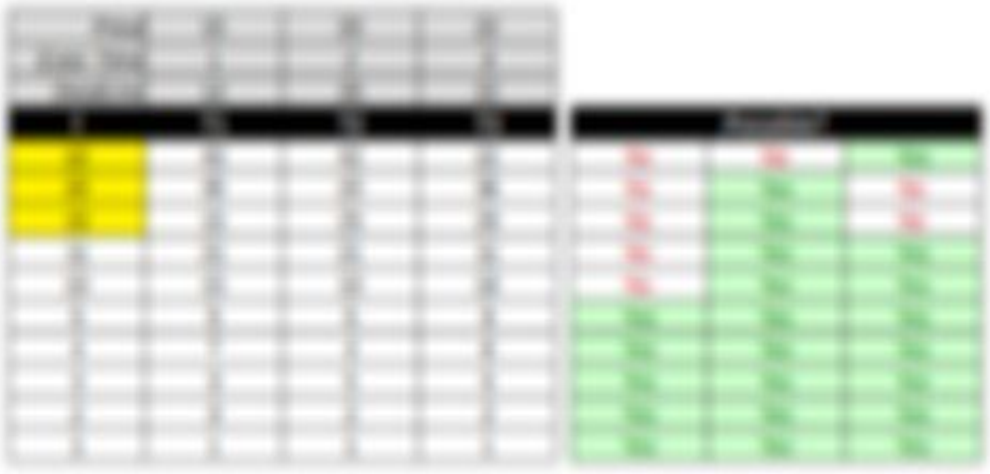
Requirement 3: Calculate $2f - GCD(p_i, f) <= D_i$

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

Requirement 1: f>= 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.



So, frame size should be 5

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

Requirement 1: f>= 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.