

# Assignment 3 Report

## **1- Cyclic structured scheduler by following requirements 1,2 and 3 for finding the largest frame size:**

### First Tasks:

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

- Requirement 1:

The task with the Maximum execution time is T3. Therefore, the Frame size is:  $(f) \geq 3$

- Requirement 2:

The candidates divide the hyper period are:

$$f = \{22, 20, 15, 11, 10, 5, 4, 3, 2, 1\}$$

- Requirement 3:  $2f - \gcd(P_i, f) \leq D_i$

	T1	T2	T3
22	44-1	14	
20	40-5	14	
15	30-15	14	
10	20-5	14	
5	10-5<=14	10-5<= 26	10-1<= 22

- Results:

the largest possible frame size is  $f= 5$ .

## Second Tasks:

T1 (4; 1) T2 (5; 2; 7) T3(20; 5)

- Requirement 1:

The task with the Maximum execution time is T3.  
Therefore, the Frame size is:  $(f) \geq 5$

- Requirement 2:

The candidates that divide the hyper period are:

$$f = \{20, 10, 5, 4, 2, 1\}$$

- Requirement 3:

$$2f - \gcd(P_i, f) \leq D_i$$

	T1	T2	T3
20	$40 - 4 \leq 4$		
10	$20 - 2 \leq 4$		
5	$10 - 1 \leq 4$		
4	$8 - 4 \leq 4$	$8 - 1 \leq 7$	$8 - 4 \leq 20$

- Results:

the largest possible frame size is  $f = 4$

### Third Tasks:

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

- Requirement 1:

The task with the Maximum execution time is T3.  
Therefore, the Frame size is:

$$f \geq 9$$

- Requirement 2:

The candidates that divide the hyper period are:

$$f = \{45, 15, 12, 9, 7, 6, 5, 4, 3, 2, 1\}$$

- Requirement 3:

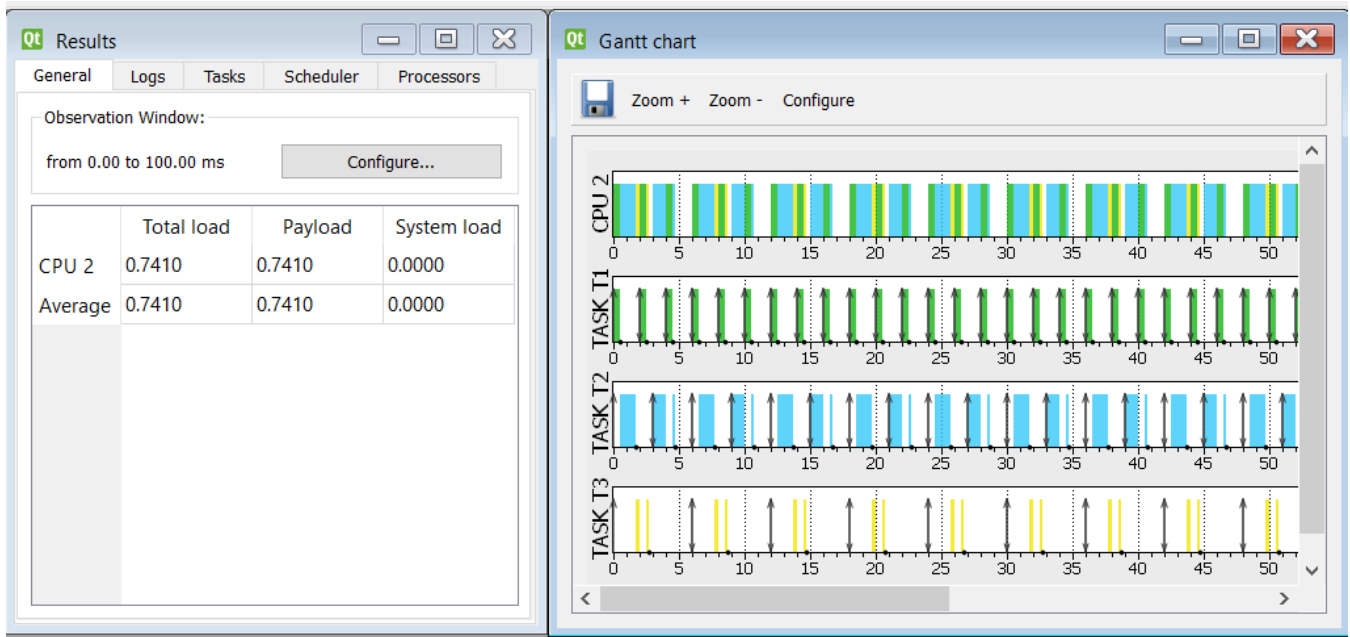
$$2f - \gcd(P_i, f) \leq D_i$$

	T1	T2	T3	T4
45	90 - 5 ≤ 5			
15	30 - 5 ≤ 5			
12	24 - 1 ≤ 5			
9	18 - 1 ≤ 5			
7	14 - 1 ≤ 5			
6	12 - 1 ≤ 5			
5	10 - 5 ≤ 5	10 - 1 ≤ 7		
4	8 - 1 ≤ 5			
3	6 - 1 ≤ 5	6 - 1 ≤ 7	6 - 3 ≤ 12	6 - 3 ≤ 45

- Results:

the largest possible frame size is  $f = 3$

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

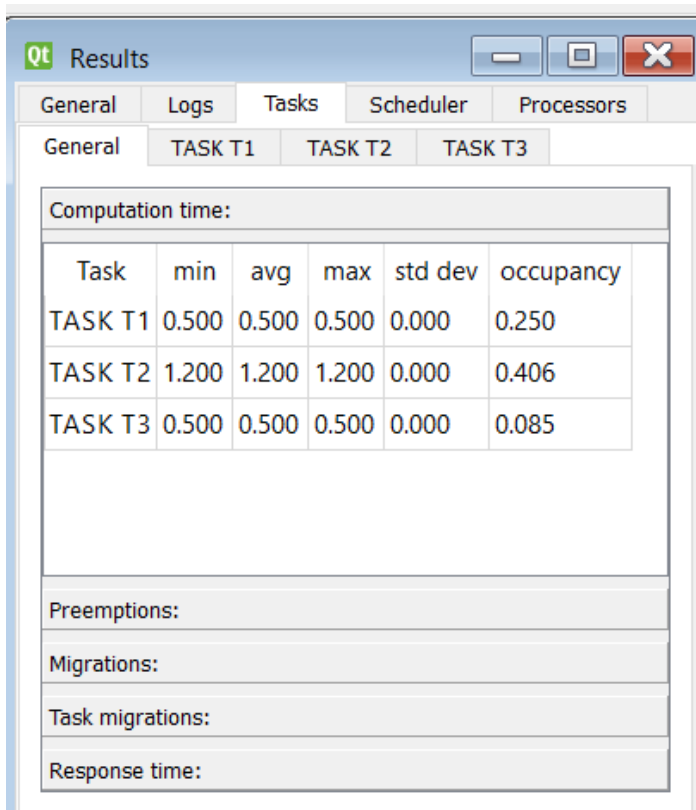


What is the utilization factor of the system and what is the value for  $U_{rm}(3)$ ?

utilization factor of the system:  $0.5/2 + 1.2/3 + 0.5/6 = 0.7333$

$U_{rm}(3)$  :  $n[2^{(1/n)} - 1] = 3[2^{(1/3)} - 1] = 0.7798$

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 "Tasks" tab is selected, and within it, the "General" sub-tab is active. This sub-tab contains a table with columns for "Task", "min", "avg", "max", "std dev", and "occupancy". The table lists three tasks: TASK T1, TASK T2, and TASK T3. Below the table, there are sections for "Computation time:", "Preemptions:", "Migrations:", "Task migrations:", and "Response time:", each followed by a large empty space for data.

Task	min	avg	max	std dev	occupancy
TASK T1	0.500	0.500	0.500	0.000	0.250
TASK T2	1.200	1.200	1.200	0.000	0.406
TASK T3	0.500	0.500	0.500	0.000	0.085

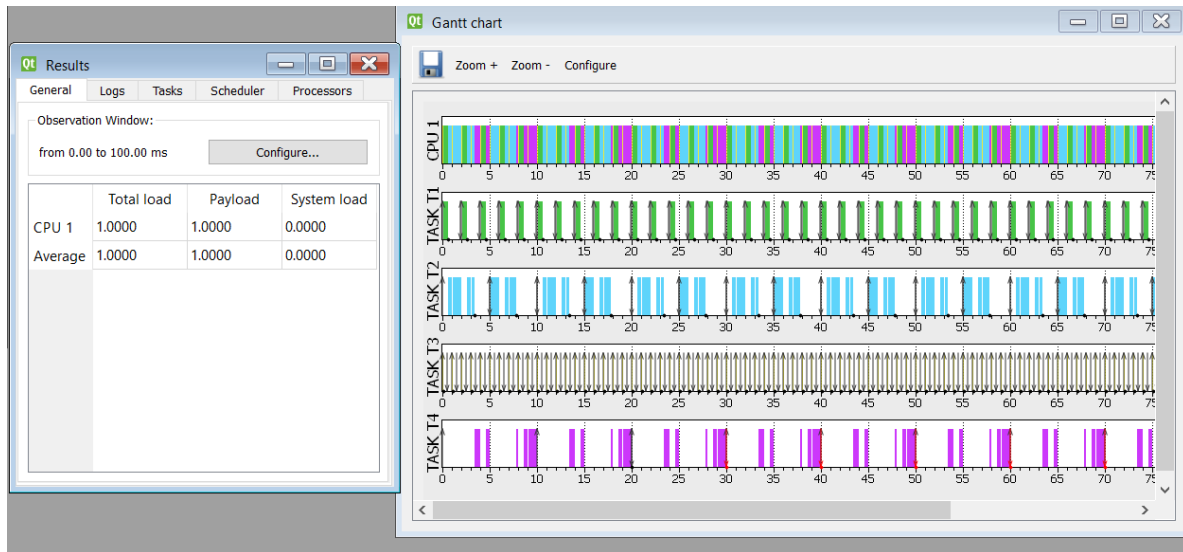
Is any task missing the deadline? Which task? Where?

No, There is no tasks missing the deadline

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

Of course ,but There is no tasks missing the deadline

### **3- 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:**

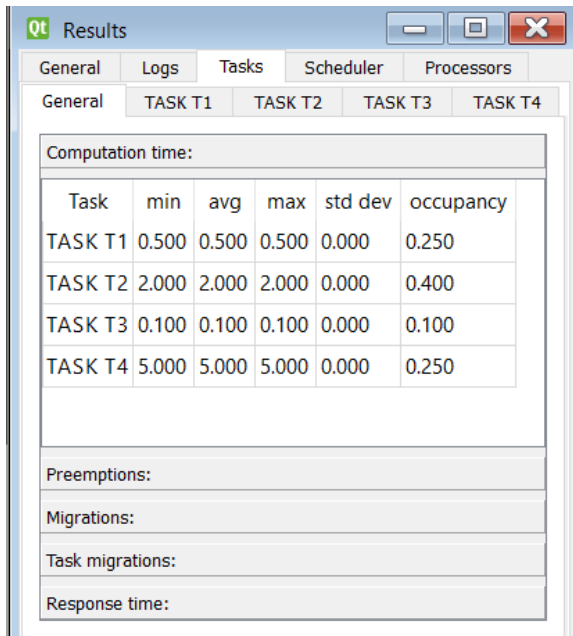


What is the utilization factor of the system and what is the value for  $U_{rm}(4)$ ?

utilization factor of the system:  $0.5/2 + 2/5 + 0.1/1 + 5/10 = 1.25$

$U_{rm}(4)$  :  $n[2^{(1/n)} - 1] = 4[2^{(1/4)} - 1] = 0.7568$

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



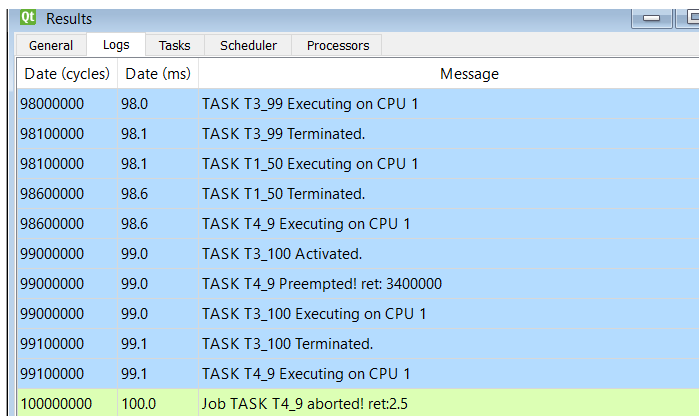
The screenshot shows the 'Qt Results' window with the 'Tasks' tab selected. It displays a table of computation times for four tasks: TASK T1, TASK T2, TASK T3, and TASK T4. The table includes columns for min, avg, max, std dev, and occupancy. Below the table are sections for Preemptions, Migrations, Task migrations, and Response time.

Computation time:					
Task	min	avg	max	std dev	occupancy
TASK T1	0.500	0.500	0.500	0.000	0.250
TASK T2	2.000	2.000	2.000	0.000	0.400
TASK T3	0.100	0.100	0.100	0.000	0.100
TASK T4	5.000	5.000	5.000	0.000	0.250

Preemptions:  
Migrations:  
Task migrations:  
Response time:

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

Yes, Task4 missed the deadline 9 times on time 30,40,50,60,70,80,90,100



The screenshot shows the 'Qt Results' window with the 'Logs' tab selected. It displays a log of task events with columns for Date (cycles), Date (ms), and Message. The log shows the execution and termination of tasks T3, T1, and T4, as well as a preempted task T4 and a job aborted task T4.

Date (cycles)	Date (ms)	Message
98000000	98.0	TASK T3_99 Executing on CPU 1
98100000	98.1	TASK T3_99 Terminated.
98100000	98.1	TASK T1_50 Executing on CPU 1
98600000	98.6	TASK T1_50 Terminated.
98600000	98.6	TASK T4_9 Executing on CPU 1
99000000	99.0	TASK T3_100 Activated.
99000000	99.0	TASK T4_9 Preempted! ret: 3400000
99000000	99.0	TASK T3_100 Executing on CPU 1
99100000	99.1	TASK T3_100 Terminated.
99100000	99.1	TASK T4_9 Executing on CPU 1
100000000	100.0	Job TASK T4_9 aborted! ret:2.5

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

Of course , it can be avoided by changing the scheduler