

SCHEDULING ANALYSIS

RTOS



Name: Arafa Arafa Abd El-Mawgod

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Overview

- **Task:** Schedule the following task set using rate-monotonic:
T1 {P: 5, E: 2.5, D: 5}, T2 {P: 15, E: 4.5, D: 15}, T3 {P: 20, E: 3.5, D: 20}
 - Calculate the Urm.
 - Calculate the time-demand analysis.
 - Model the task set using Simso.
 - **Provide a report with the above points using screenshots and comments on your results and analysis.**

Figure 1 overview

Goals

1. Calculate the URM.
2. Calculate the time-demand analysis.
3. Model the task set using Simso.

Deliverables

Tasks

The system consists of three tasks.

(LCD, Blood pressure, Heartbeat Reading, Temperature reading) and driven task by event

Tasks parameters

Task_ID	Execution time	Periodicity	Deadline
T1	2.5	5	5
T2	4.5	15	15
T3	3.5	20	20

Table 1 Tasks parameters

Calculations

Hyperperiod

Hyperperiod = LCM (all tasks periodicity)
=LCM (20,5,15) = 60

Urm

Task_ID	Execution time	Periodicity	Task U (E/P)
T1_LCD	2.5	5	2.5/5
T2_BLOOD	4.5	15	4.5/15
T3_HEART	3.5	20	3.5/20
Total U			0.975

Table 2 Tasks Utilization

$$\mathbf{URM = N(2^{\frac{1}{N}} - 1)}$$

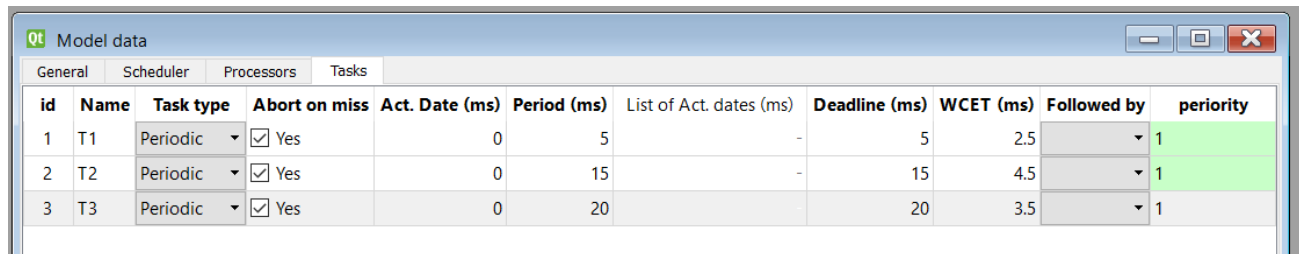
$$3 * \left(2^{\frac{1}{3}} - 1\right) = 0.799$$

Because of U > URM system need more test

Time Demand Analysis

1. Time required for T1 is $W1(5) = 2.5 + 0 = 2.5\text{ms}$
 - **2.5 < 5 (T1 is schedulable)**
2. Time required for T2 is $W2(15) = 4.5 + (2.5*3) = 12\text{ms}$
 - **12.5 < 15 (T2 is schedulable)**
3. Time required for T3 is $W3(20) = 3.5 + (4.5*2) + (2.5*4) = 22.5\text{ms}$
 - **22.5 > 20 (T3 is not schedulable)**

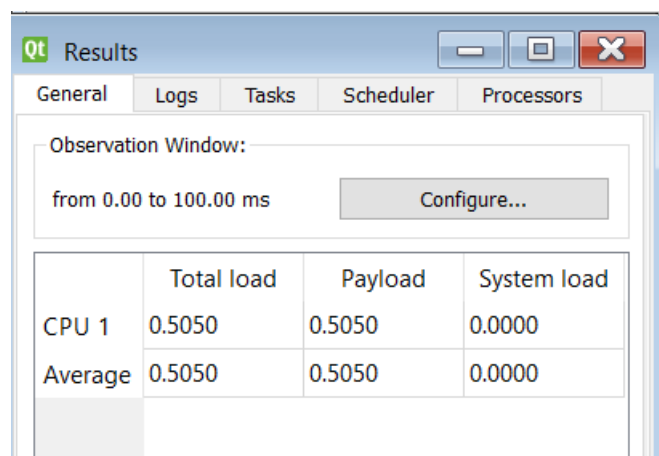
Simso output



The image shows a Qt window titled "Model data" with a tabbed interface. The "Tasks" tab is selected, displaying a table of system tasks. The table has columns for id, Name, Task type, Abort on miss, Act. Date (ms), Period (ms), List of Act. dates (ms), Deadline (ms), WCET (ms), Followed by, and priority. Three tasks are listed: T1, T2, and T3, all of which are periodic and have an abort on miss set to "Yes".

id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)	Followed by	priority
1	T1	Periodic	<input checked="" type="checkbox"/> Yes	0	5	-	5	2.5	▼	1
2	T2	Periodic	<input checked="" type="checkbox"/> Yes	0	15	-	15	4.5	▼	1
3	T3	Periodic	<input checked="" type="checkbox"/> Yes	0	20	-	20	3.5	▼	1

Figure 2 system Tasks



The image shows a Qt window titled "Results" with a tabbed interface. The "Tasks" tab is selected, displaying a table of CPU load data. The table has columns for CPU, Total load, Payload, and System load. Two rows are shown: "CPU 1" and "Average", both with a total load of 0.5050, a payload of 0.5050, and a system load of 0.0000.

	Total load	Payload	System load
CPU 1	0.5050	0.5050	0.0000
Average	0.5050	0.5050	0.0000

Figure 3 CPU Load

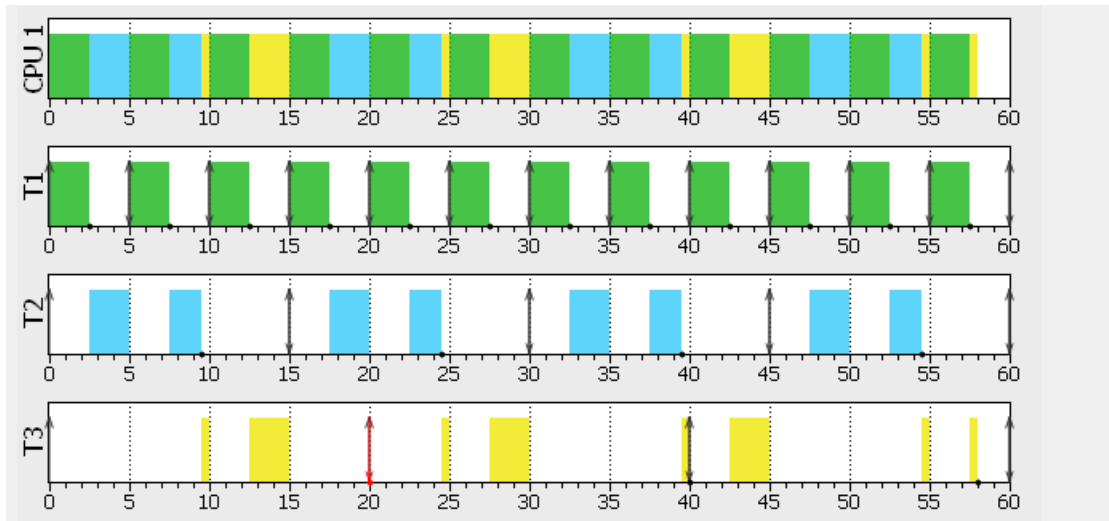


Figure 4 simso results