SCHEDULING ANALYSIS

RTOS

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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. Calucalate 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

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

Simso output

Model data

General | Scheduler | Processors | Tasks

id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)	Followed by	periority
1	T1	Periodic	Yes	0	5	-	5	2.5		1
2	T2	Periodic	Yes	0	15	-	15	4.5		1
3	T3	Periodic	Yes	0	20	-	20	3.5		1

Figure 2 system Tasks

Results

General | Logs | Tasks | Scheduler | Processors

Observation Window:

from 0.00 to 100.00 ms | Configure...

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

Figure 3 CPU Load

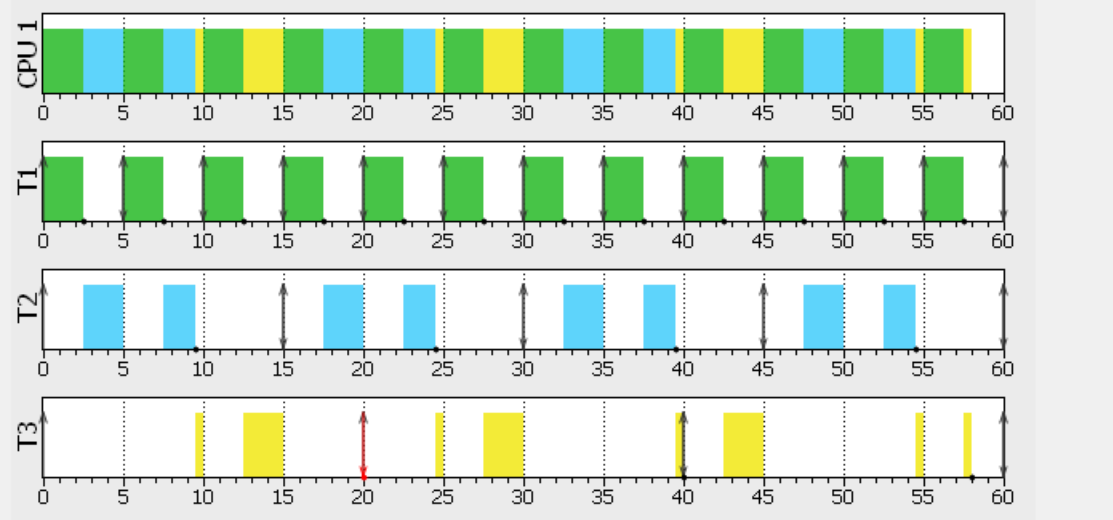

Figure 4 simso results