RTOS Scheduling

Anas Mahmoud Gamal

Team2

Table of Contents

1- Introduction

- **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.**

2- Design

We have 3 Tasks as follow:

Task	Periodicity (ms)	Execution time (ms)	Deadline (ms)	Priority
T1	5	2.5	5	3
T2	15	4.5	15	2
T3	20	3.5	20	1

3-Calculations

3.1 Urm

Since

$$U = \sum_{i=1}^{n} \frac{C_i}{P_i} \leq n(2^{\frac{1}{n}} - 1)$$

U = Total Utilization
C = Execution time
P = Periodicity
N = Number of tasks

- U = (2.5/5) +(4.5/15) +(3.5/20) = 0.975

- Urm = 3*(2^ (1/3) - 1) = 0.799

- Because of (U > Urm) System need more test

3.2 Time Demand Analysis

Since

$$w_i(t) = e_i + \sum_{k=1}^{i-1} \left\lceil \frac{t}{p_k} \right\rceil e_k \quad for\ 0 < t \leq p_i$$

W = Worst response time
E = Execution time
P = Periodicity
T = Time instance

-Time required for T1 is W1(5) = 2.5 + 0 = 2.5ms

  2.5 < 5 (T1 is schedulable)

-Time required for T2 is W2(15) = 4.5 + (2.5*3) = 12ms

  12.5 <15 (T2 is schedulable)

-Time required for T3 is W3(20) = 3.5 + (4.5*2) + (2.5*4) = 22.5ms

22.5 > 20 (T3 is not schedulable)

4- Simos

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	TASK T1	Periodic ▼	☑ Yes	0	5	-	5	2.5	▼	3
2	TASK T2	Periodic ▼	☑ Yes	0	15	-	15	4.5	▼	2
3	TASK T3	Periodic ▼	☑ Yes	0	20	-	20	3.5	▼	1
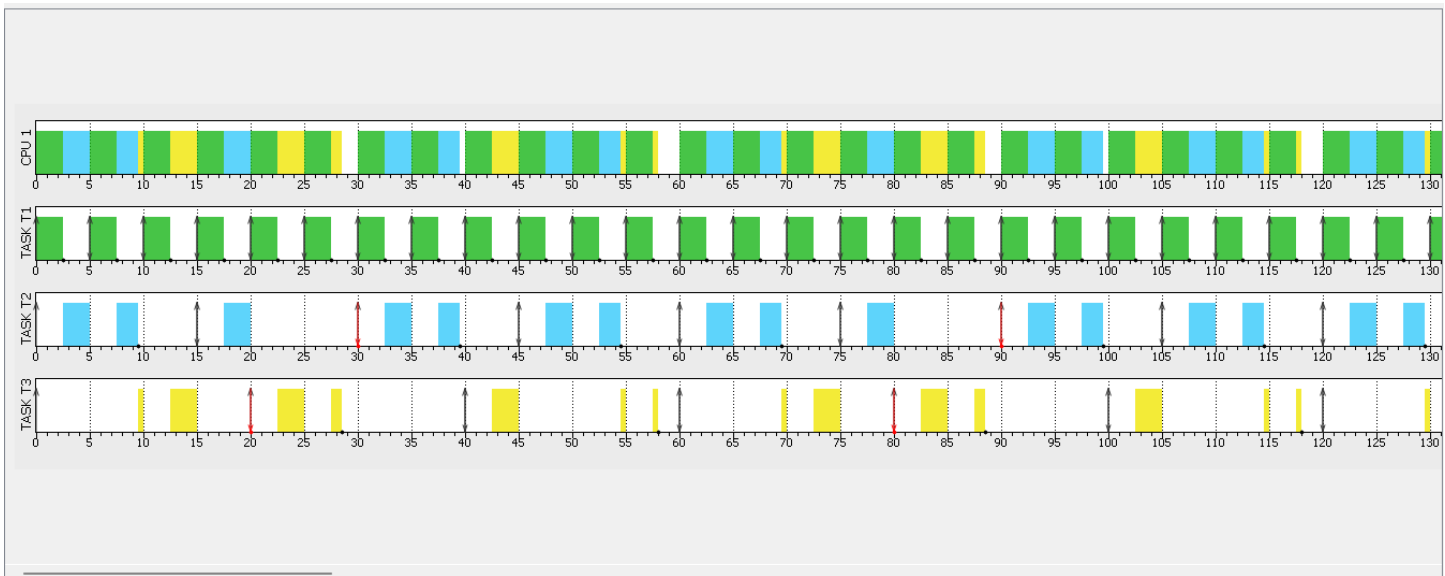
Results

General

Observation Window:

from 0.00 to 600.00 ms   Configure...

	Total load	Payload	System load
CPU 1	0.9333	0.9333	0.0000
Average	0.9333	0.9333	0.0000

Comment:

- T3 miss deadline

-CPU load is high