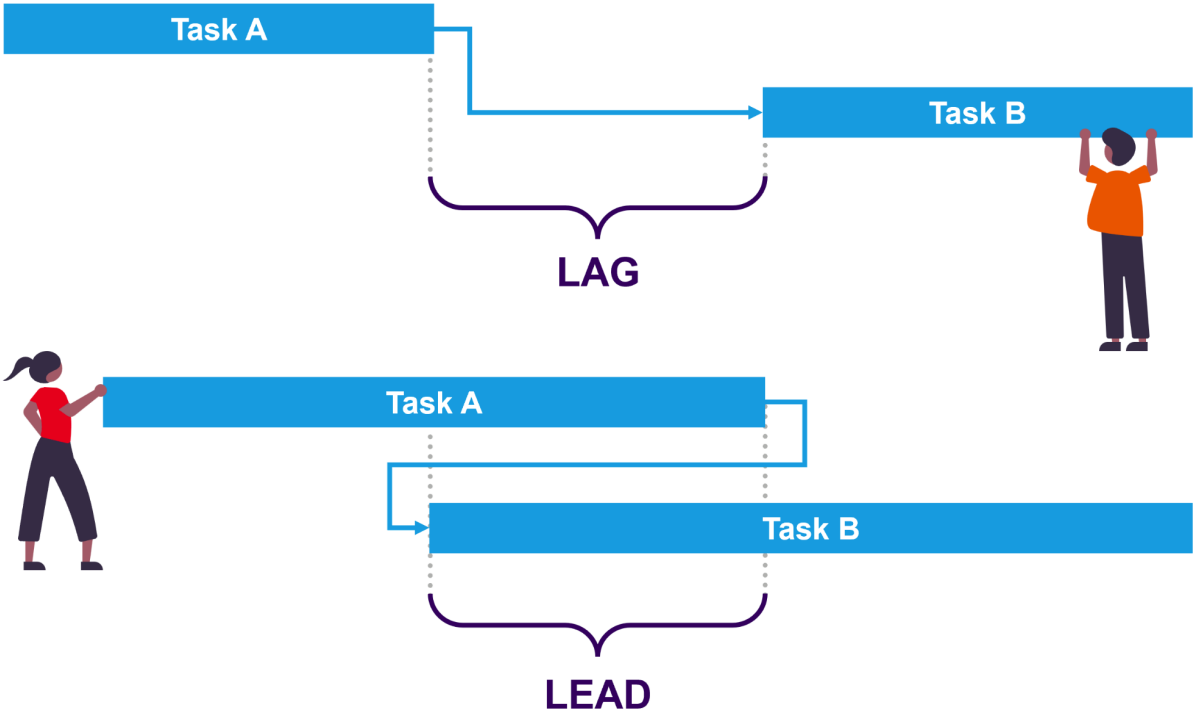

Tasks Scheduling in RTOS

10/07/2023

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Sprints

Requirements

- 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*.

Calculations

I. Rate-Monotonic utilization bound

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

$U = \frac{2.5}{5} + \frac{3.5}{20} + \frac{3.5}{20} = 0.975$

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

∵ U > Urm

∴ The system needs more tests

II. Time Demand Analysis

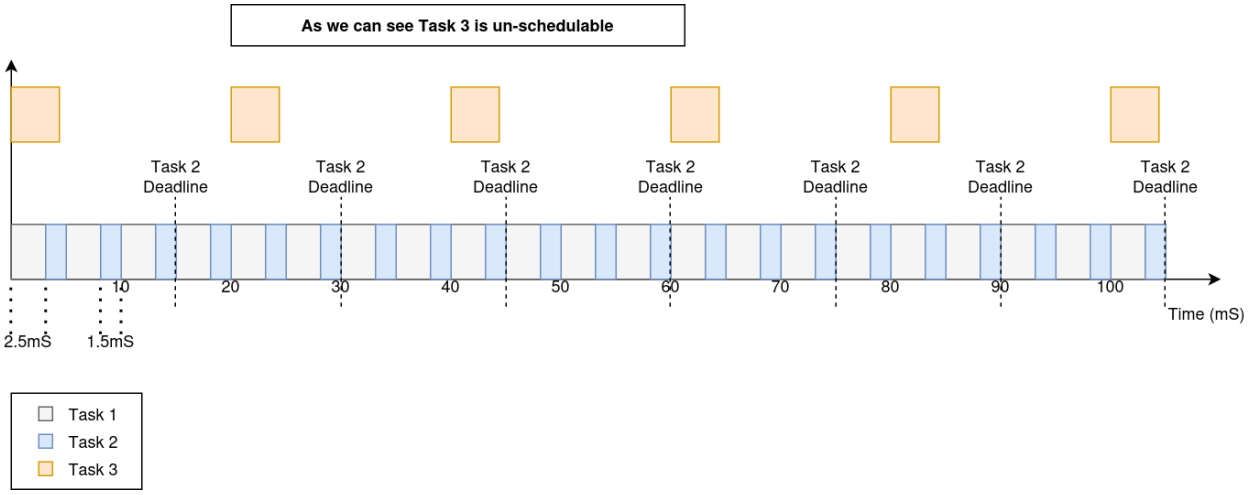
$$w_i(t) = e_i + \sum_{k=1}^{i-1} \left\lceil \frac{t}{p_k} \right\rceil e_k$$

$w(5) = 2.5 + 0 = 2.5 < 5$ ∴ Task is schedule

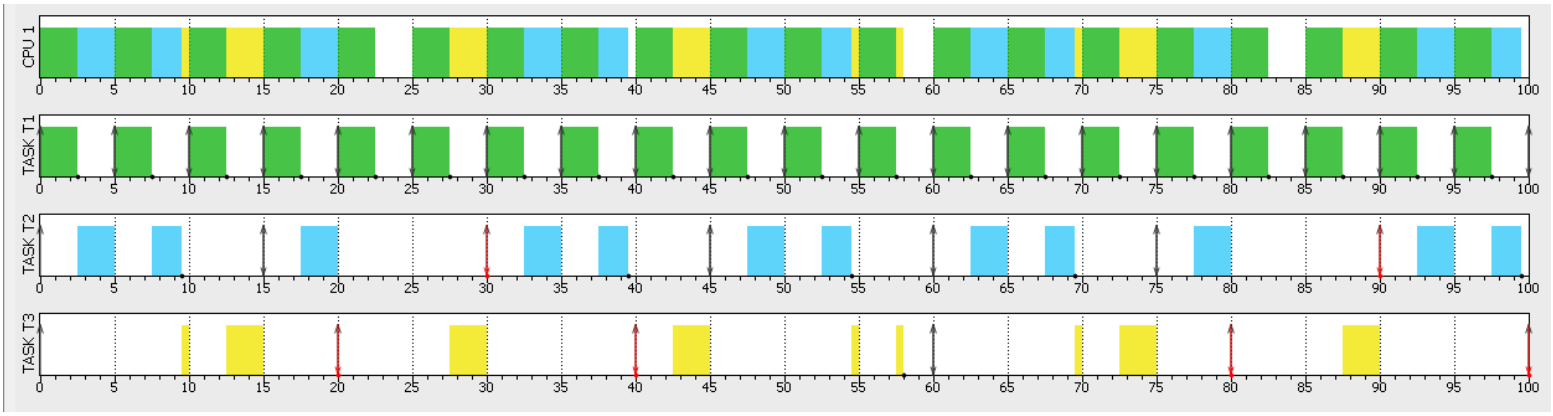
$w(15) = 4.5 + \frac{15}{5} * 2.5 = 4.5 + 3 * 2.5 = 12 < 15$ ∴ Task is schedule

$w(20) = 3.5 + \frac{20}{5} * 2.5 + \frac{20}{15} * 4.5 = 3.5 + 4 * 2.5 + 2 * 4.5 = 22.5 > 20$ ∴ Task is not schedule

Timeline Manually Drawn



Modeling the system in Simso and verify that the design is schedule.



Results of the simulation

	Total Time	Pay Load	System Load
CPU 1	0.9200	0.9200	0
Average	0.9200	0.9200	0