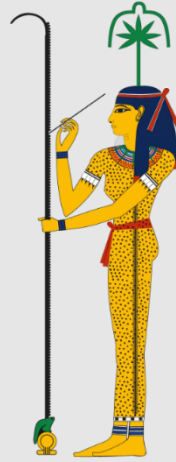


Ministry of Communications and Information Technology



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Topic: EDF scheduler with FreeRTOS

1. Execution Analysis

Tasks	Periodicity	Deadline	Occurrence during hyper - period	Execution time
Button 1	50ms	50ms	2	40us
Button 2	50ms	50ms	2	40us
Periodic Transmitter	100ms	100ms	1	100us
UART	20ms	20ms	5	180us
Load 1	10ms	10ms	10	5ms
Load 2	100ms	100ms	1	12.5ms

2. System Hyper Period

The time period after which a pattern starts to repeat itself, Hyper - period of any system is the least common multiplier for all the periodicities of all tasks Hence, hyper period here is 100ms

3. CPU Load

Utilization = total execution time/hyper-period

Utilization = $2(40\mu) + 2(40\mu) + 1(100\mu) + 5(180\mu) + 10(5\text{m}) + 1(12.5\text{m}) / (100\text{m})$

Utilization = 63.16%

4. System Schedulability

- Rate Monotonic

Utilization = 63.16%

Number of tasks = 6

$U < n(2^{1/n} - 1)$

If yes then system is schedulable

$0.63 < 0.73$

System is Schedulable

- Time Demand

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

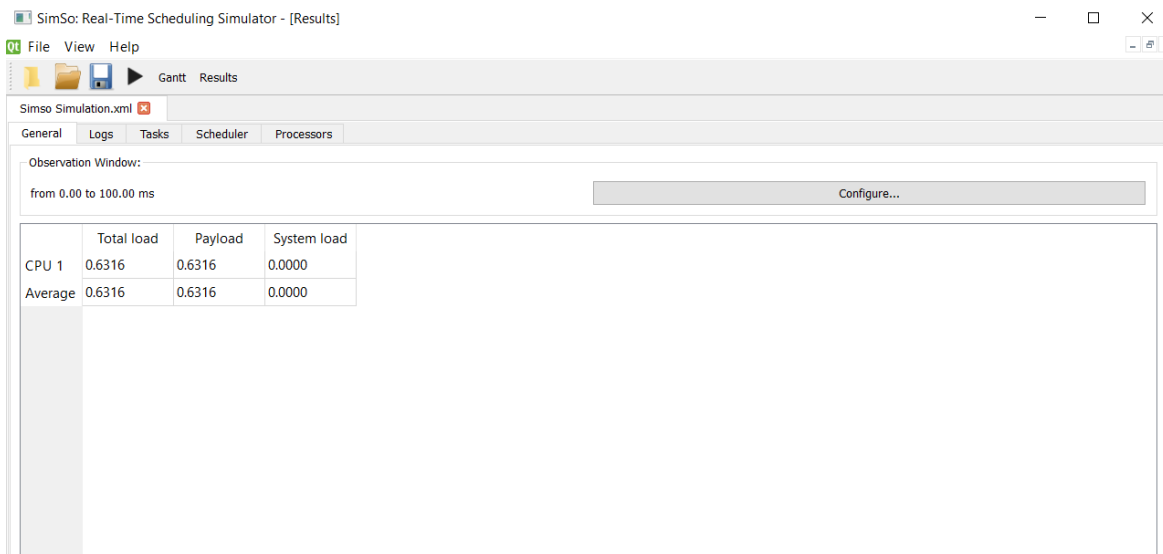
Worst case is 100ms

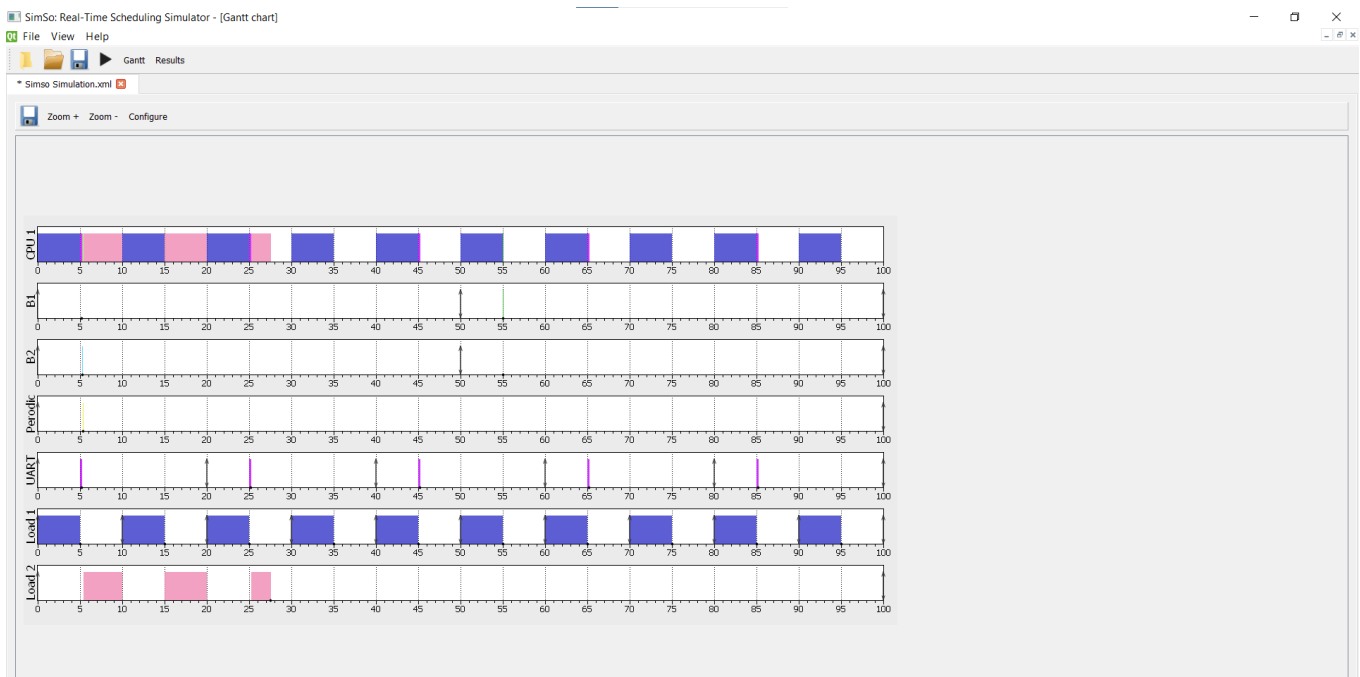
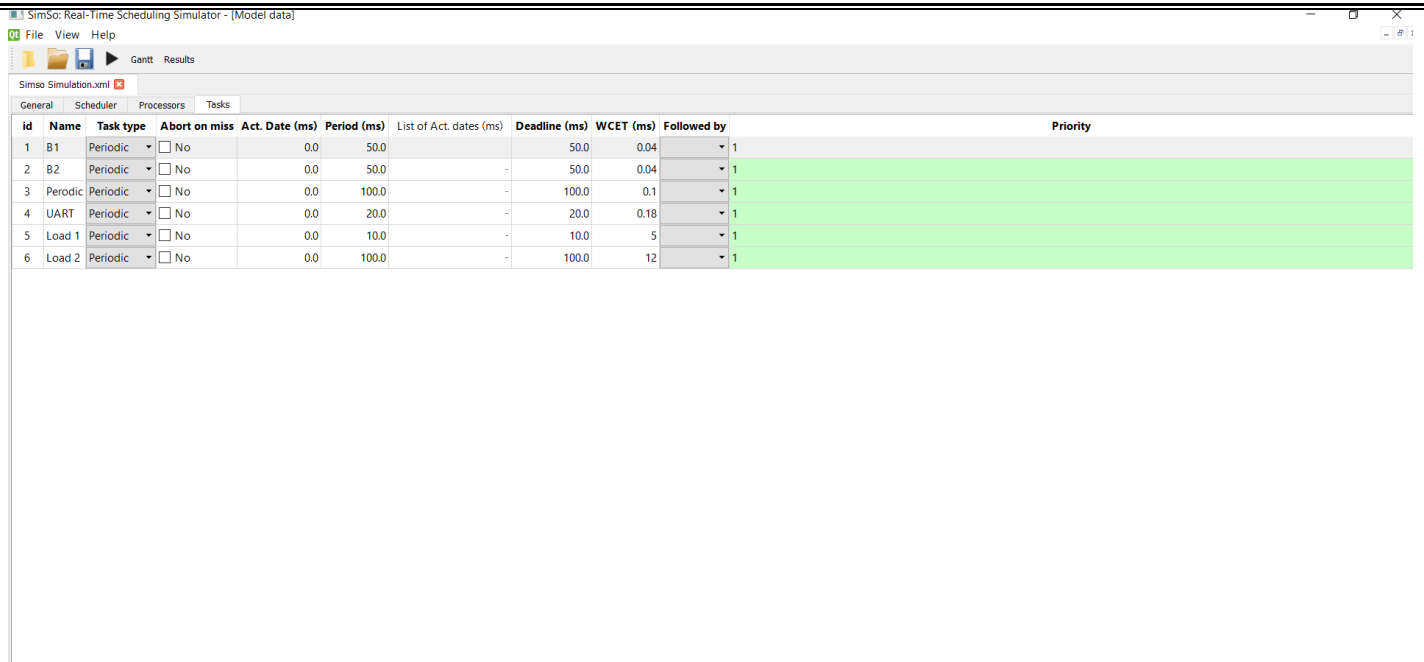
After sorting the table & doing analysis for the 6 tasks by sorting them ascendingly according to periodicity

Task	Equation & Result	Schedulable?
Load 1	$W1(10) = 5m + 0 = 5m$ $5 < 10$	Yes
UART	$W2(20) = 140u + (20/10)5m = 10.14m$ $10.14 < 20$	Yes
Button 1	$W3(50) = 30u + (50/20)140u + (50/10)5m = 25.31m$ $25.31 < 50$	Yes
Button 2	$W4(50) = 30u + (50/50)30u + (50/20)140u + (50/10)5m = 25.34m$ $25.34 < 50$	Yes
Periodic	$W5(100) = (100/50)30u + (100/50)30u + (100/20)140u + (100/10)5m$ $+ 94u = 50.914m$ $50.914 < 100$	Yes
Load 2	$W6(100) = (100/50)30u + (100/50)30u + (100/20)140u + (100/10)5m$ $+ 94u + 12.5m = 63.414m$ $63.414 < 100$	Yes

5. Screenshots from Simulators

a. SimSo





b. Keil

