

EDF Scheduler Implementation with FreeRTOS

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Analytical Method

| Task | Periodicity | Execution Time (msec) | Hyperperiod |
|----------------------|-------------|-----------------------|-------------|
| Button_1_monitor | 50 | 0.024 | 2 |
| Button_2_monitor | 50 | 0.024 | 2 |
| Periodic_Transmitter | 100 | 0.09 | 1 |
| Uart_Reciever | 20 | 0.025 | 5 |
| Load_1_Simulation | 10 | 5 | 10 |
| Load_2_Simulation | 100 | 12 | 1 |

1. System Hyper period

Hyperperiod = 100ms

2. CPU Load

Utilization = Total Execution Time over Hyperperiod/Hyperperiod

U = 62.32%

3. System schedulability

3.1. Rate Monotonic

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

U = 0.62321, n=6

$$UU_{rm} = 6 (2^{1/6} - 1) = 0.734$$

System is schedulable

3.2. Time Demand Analysis

$$w(t) = e_i - \sum_{k=1}^{i-1} \frac{t}{p_k} * e_k$$

1. $w_1(10) = 5ms + 0 = 5$

$$w(10) = 5 < 10$$

2. $w_2(20) = 27us + (20/10) 5ms = 10.027 ms$

$$w(20) = 10.027 < 20$$

3. $w_3(50) = 24us + (50/10) 5ms + (50/20) 27us = 25.0915 ms$

$$w(50) = 25.0915 < 50$$

4. $w_4(50) = 24us + (50/10) 5ms + (50/20) 27us + (50/50) 27us = 25.1185 ms$

$$w(50) = 25.1185 < 50$$

5. $w_5(100) = 90us + (100/10) 5ms + (100/20) 27us + (100/50) 24us +$

$$(100/50) 24us = 50.465ms$$

$$w(100) = 50.465 < 100$$

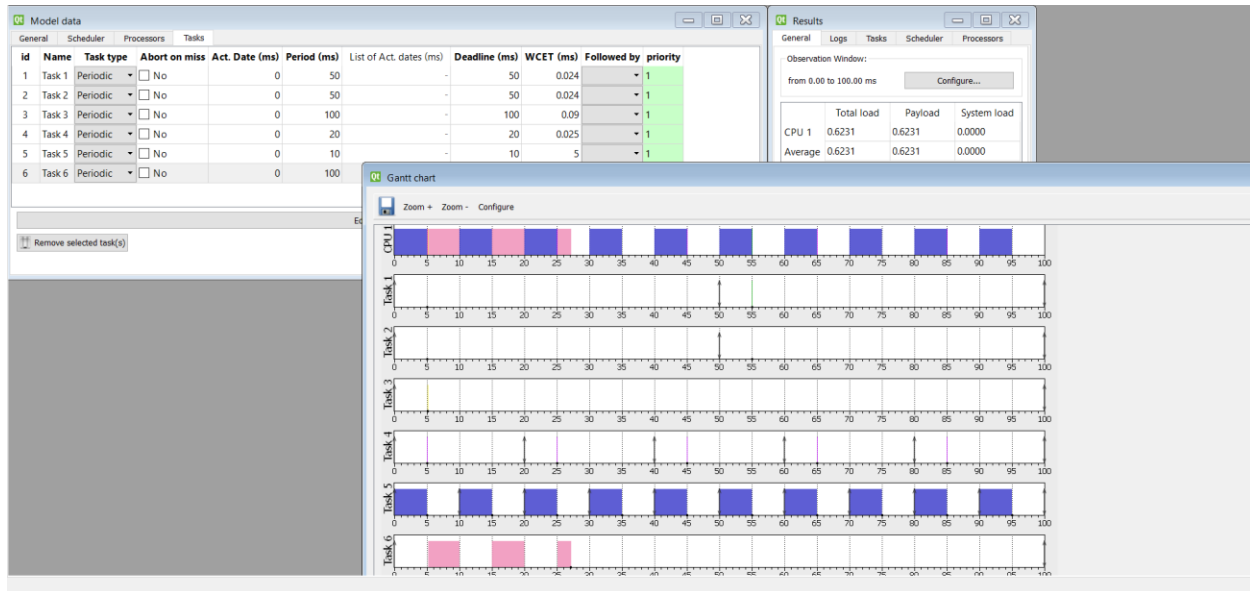
6. $w_6(100) = 12ms + (100/10) 5ms + (100/20) 27us + (100/50) 24us +$

$$(100/50) 24us + (100/100) 90us = 62.321$$

$$w(100) = 62.321 < 100$$

All Tasks are schedulable

Simso Simulator



Keil Simulator

Logic Analyzer

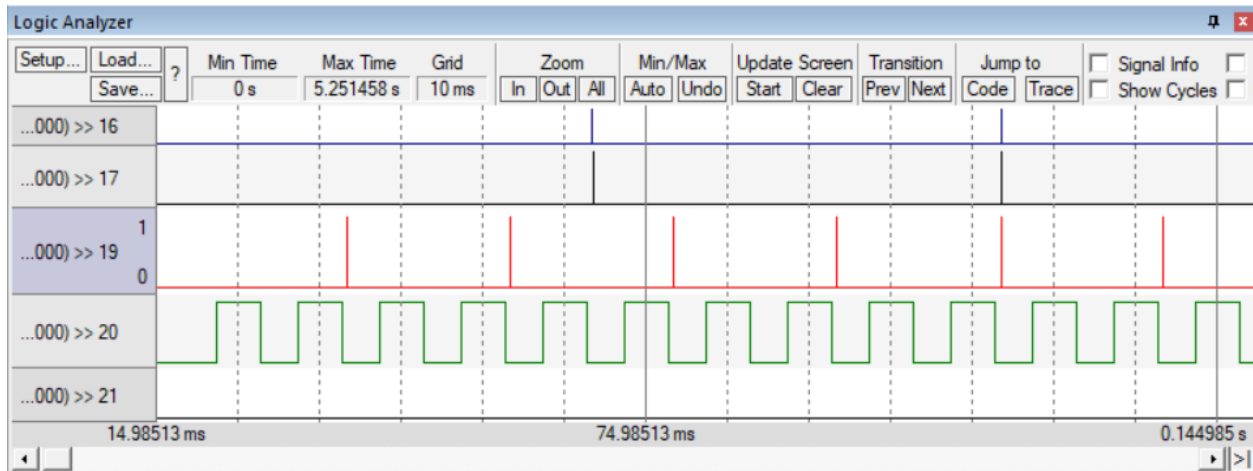


Figure 1: snapshot of the output

Video

<https://youtu.be/TdUh2guBPOo>