RTOS Project
EDF Implementation

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1. Analysis

First Method (Using Rate Monotonic Utilization Bound)

1) We can compute the Execution Time for All Tasks using Logical Analyzer of Keil.
2) So the tasks periodic , execution and Deadline Times (ms) will be like following:

T1: {P: 50 E: 0.02 D: 50 }
T2: {P: 50 E: 0.019 D: 50 }
T3: {P: 100 E: 0.019 D: 100 }
T4: {P: 20 E: 0.021 D: 20 }
T5: {P: 10 E: 5 D: 10 }
T6: {P: 100 E: 12 D: 100 }

Calculations:

1) First Of All We will Calculate Hyper period (Critical Instant)

   Hyper period = LCM (Deadlines) = LCM (50, 50, 100, 20, 10, 100) = 100

2) CPU Load (Utilization) = Sum($\frac{E}{P}$) = $\frac{0.02}{50} + \frac{0.019}{50} + \frac{0.019}{100} + \frac{0.021}{20} + \frac{5}{10} + \frac{12}{100} = 0.62201$
3) URM = n ($2^{1/n}$ -1) = 6 * ($2^{1/6}$ -1) = 0.734
4) So 0.62201 < 0.734 → CPU Load < URM

System guaranteed Schedulable

Second Method (Using Time Demand Analysis)

1) First Of All We will arrange the tasks according to it priority using EDF

T1: {P: 50 E: 0.02 D: 50 }
T2: {P: 50 E: 0.019 D: 50 }
T3: {P: 100 E: 0.019 D: 100 }
T4: {P: 20 E: 0.021 D: 20 }
T5: {P: 10 E: 5 D: 10 }
T6: {P: 100 E: 12 D: 100 }

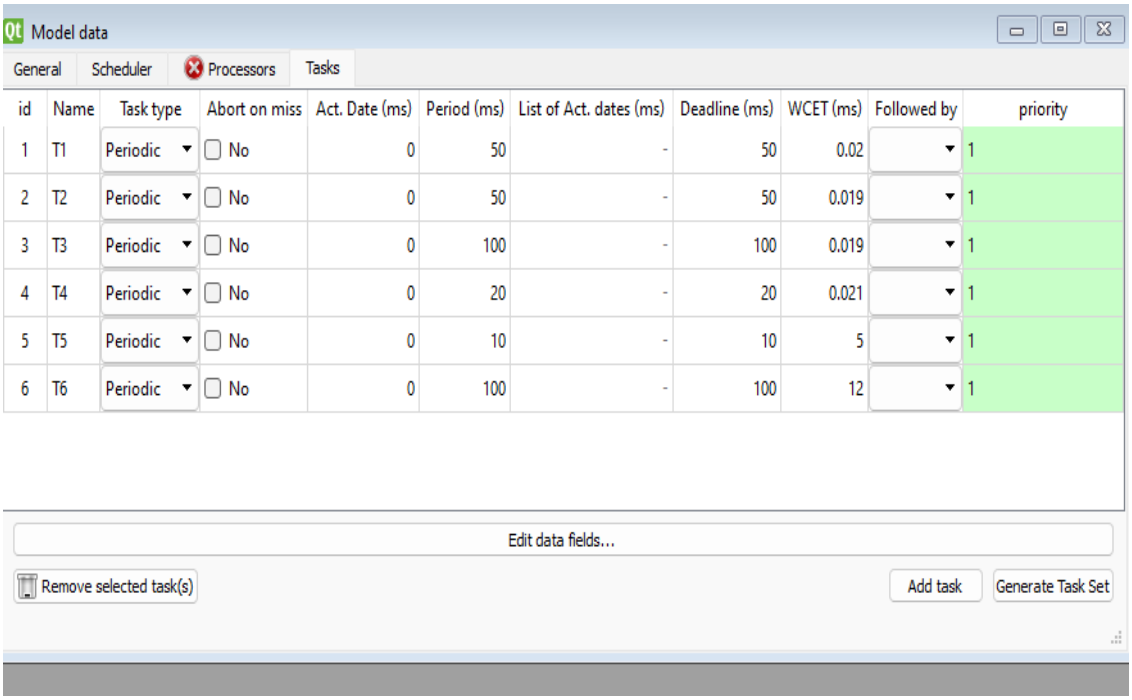
2) So arrangement will be (T5 , T4 , T1 , T2 , T3 , T6)
3) At any point of Time W(t) = E_i + Sum($\frac{t}{p}$) * E_k
   a) For T5 → W(1) …… W(5) = 5 + 0 = 5
      → W(5) < Deadline of T4 So this task scheduled
   b) For T4 → W(1) …… W(20) = $0.021 + \frac{20}{10} * 5$ = 10.021
      → W(20) < Deadline of T4 So this task scheduled
   c) For T1 → W(1) …… $W(50) = 0.02 + \frac{50}{10} * 5 + \frac{50}{20} * 0.021 = 25.083$
      → W(50) < Deadline of T1 So this task scheduled
   d) For T2 → W(1) …… $W(50) = 0.019 + \frac{50}{50} * 0.02 + \frac{50}{20} * 0.021 + \frac{50}{10} * 5 = 25.102$
      → W(50) < Deadline of T2 So this task scheduled
   e) For T3 → W(1) …… $W(100) = 0.019 + \frac{100}{50} * 0.019 + \frac{100}{50} * 0.02 + \frac{100}{20} * 0.021 + \frac{100}{10} * 5 = 50.202$
      → W(100) < Deadline of T3 So this task scheduled
   f) For T6 → W(1) …… $W(100) = 12 + \frac{100}{50} * 0.019 + \frac{100}{50} * 0.02 + \frac{100}{20} * 0.021 + \frac{100}{10} * 5 + \frac{100}{100} * 0.019 = 62.202$

      → W(100) < Deadline of T6 So this task scheduled

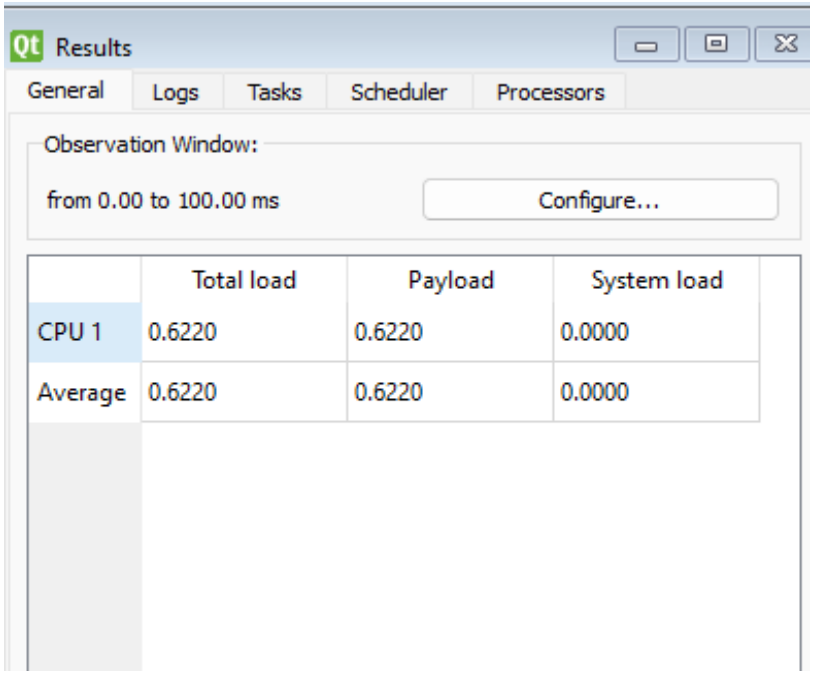
All Tasks Can guaranteed Schedulable so Over All System can guaranteed Schedulable

2. Simso

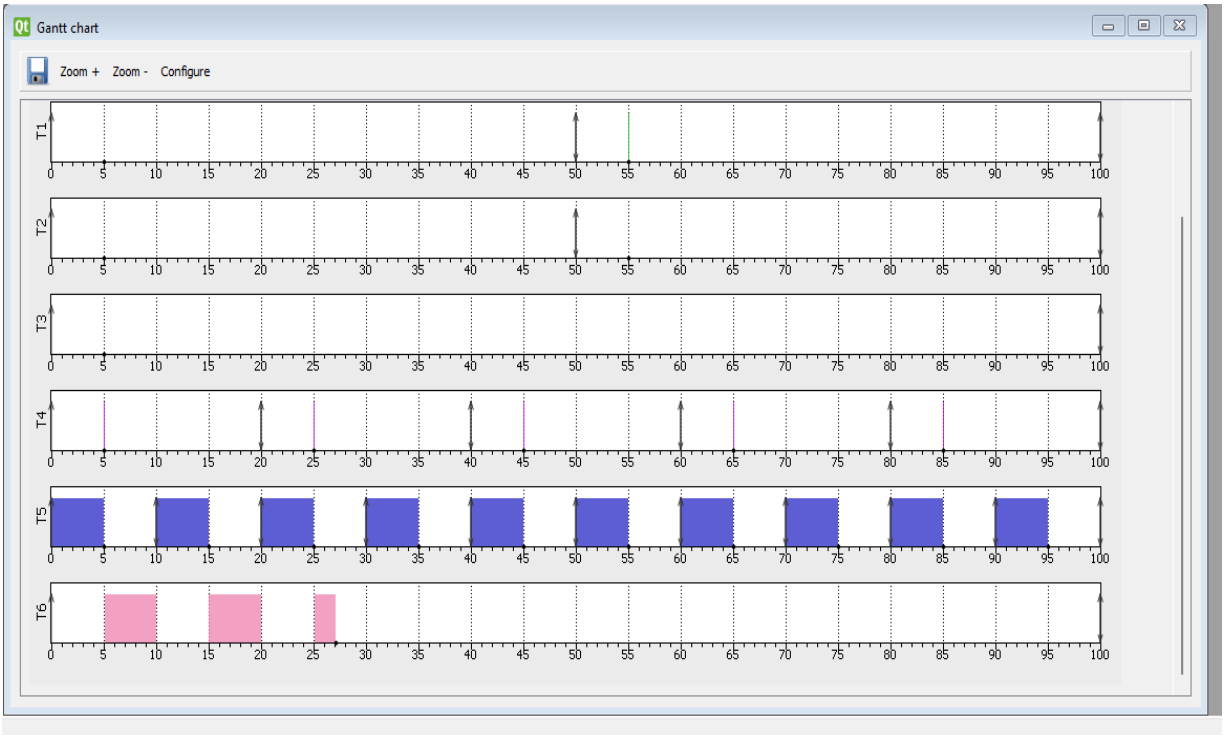
1) Tasks Creation



2) CPU Load



3) Gantt Chart



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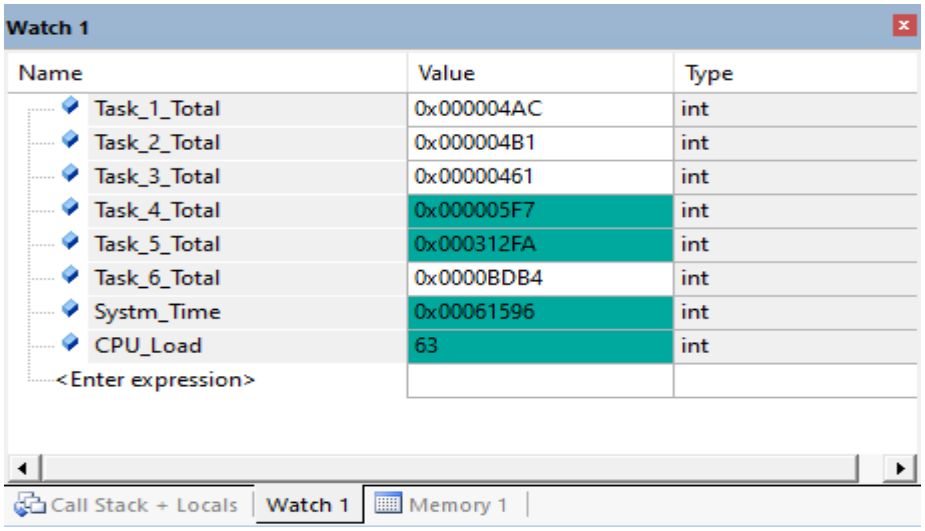
3. Keil

1) CPU Load



2) Logical Analyzer