



IMPLEMENTING EDF SCHEDULER

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Embedded System Advanced Track
FWD|Udacity

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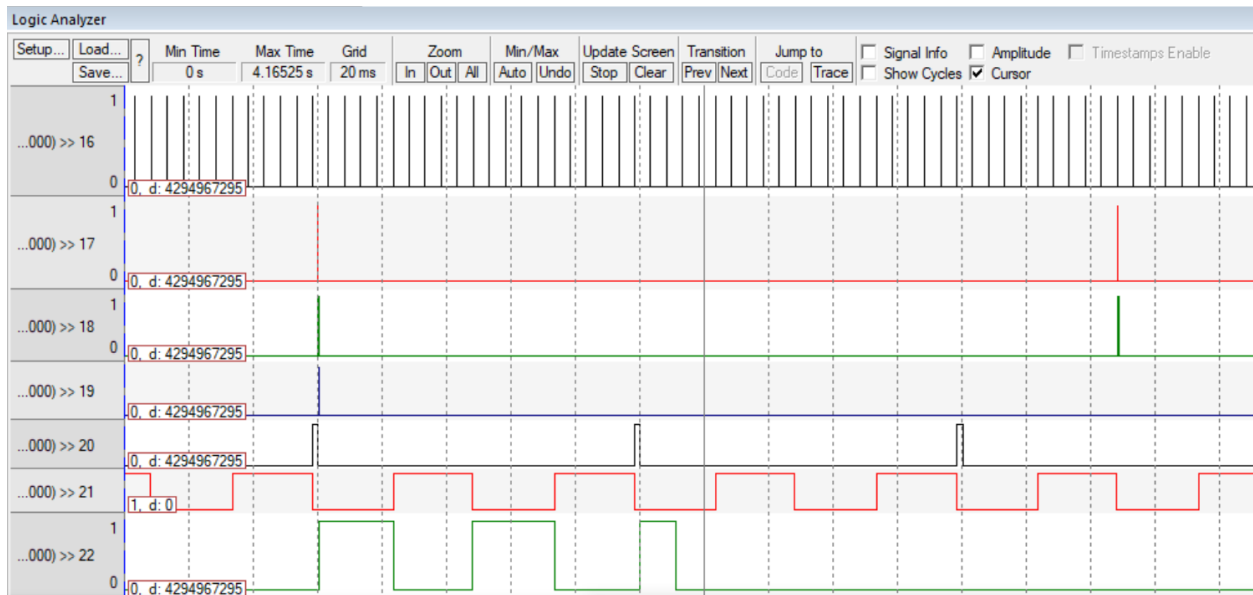
System Validation

1. HyperPeriod
2. Offline Simulator Simso
3. CPU Load/Utilization
4. system schedulability using URM technique.
5. system schedulability Time Demand analysis technique.

1. HyperPeriod

Assuming both period and deadline are the same.

Task Lists:



Task	Period	Deadline	Execution(ms)
B1	50	50	0.014767
B2	50	50	0.015033
Tx	100	100	0.029333
Rx	20	20	0.3528
L1	10	10	5
L2	100	100	12

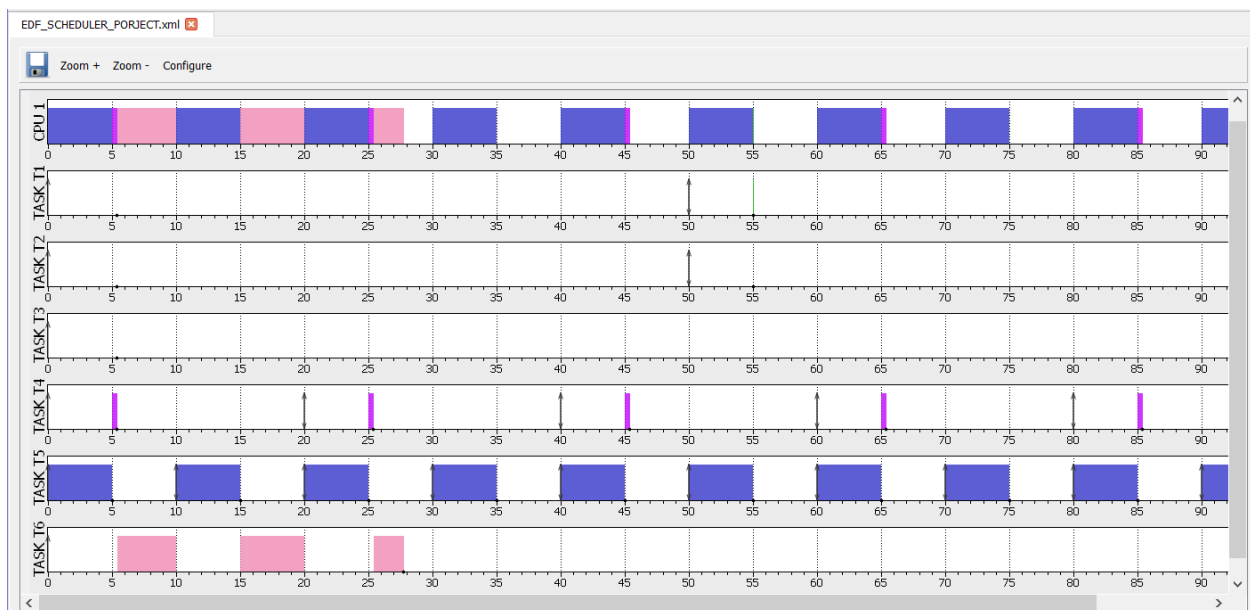
Tasks:

EDF_SCHEDULER_PROJECT.xml

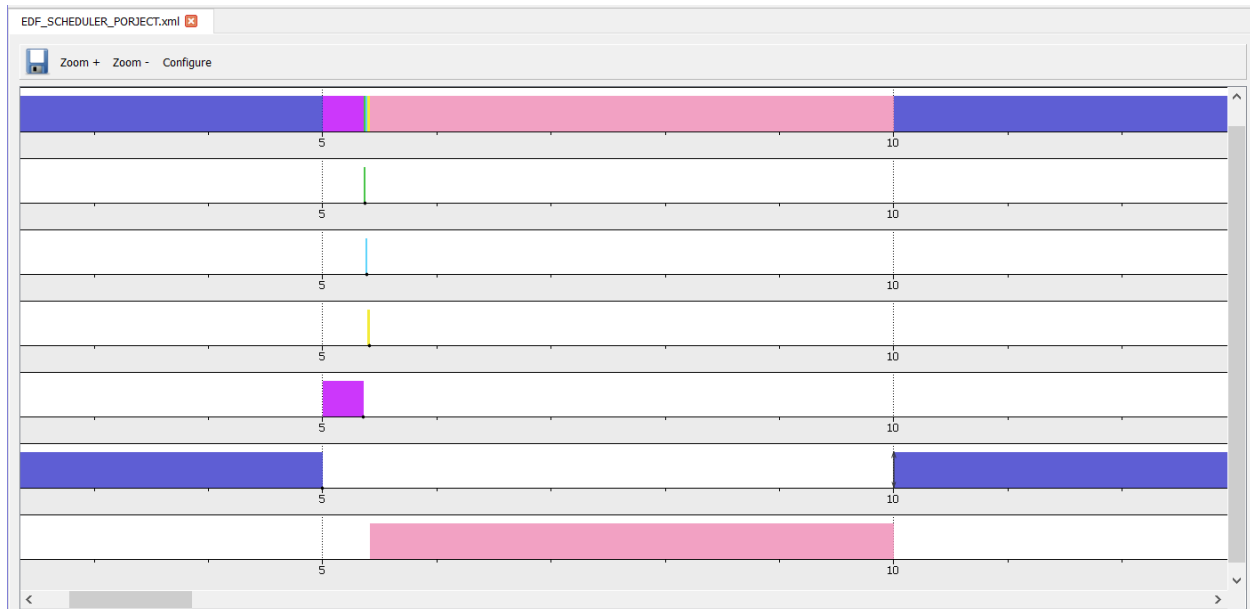
Model data

General	Scheduler	Processors	Tasks						
id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)	Followed by
1	TASK T1	Periodic	<input type="checkbox"/> No	0	50	-	50	0.014767	
2	TASK T2	Periodic	<input type="checkbox"/> No	0	50	-	50	0.015033	
3	TASK T3	Periodic	<input type="checkbox"/> No	0	100	-	100	0.02933	
4	TASK T4	Periodic	<input type="checkbox"/> No	0	20	-	20	0.3528	
5	TASK T5	Periodic	<input type="checkbox"/> No	0	10	-	10	5	
6	TASK T6	Periodic	<input type="checkbox"/> No	0	100	-	100	12	

Results:



Zoom In:



CPU Load: 63%

The image shows a screenshot of a Qt Results window. The window has a title bar with the Qt logo and the text "Results". Below the title bar are four tabs: "General", "Logs", "Tasks", "Scheduler", and "Processors". The "General" tab is selected. The "Observation Window:" section shows the time range "from 0.00 to 100.00 ms" and a "Configure..." button. Below this is a table with the following data:

	Total load	Payload	System load
CPU 1	0.6385	0.6385	0.0000
Average	0.6385	0.6385	0.0000

3. CPU Load/Utilization

Using Trace hooks and timer:

$U = \text{Total Execution time} / \text{Hyperperiod}$

$U = 63.85/100 = 0.6385 = 63.85 \%$

4. system schedulability using URM technique.

(Assuming the given set of tasks are scheduled using a fixed priority rate-monotonic scheduler)

$$\sum_{k=1}^n \frac{C_i}{T_i} \leq U = n (2^{1/n} - 1)$$

$U = 63.85 \%$

N “Number of tasks” = 6

$63.85 < 73.47$

Then the system is schedulable.

5. system schedulability Time Demand analysis technique:

$$w_i(t) = C_i + \sum_{k=1}^{i-1} \left\lceil \frac{t}{P_k} \right\rceil C_k$$

- C_i : Execution time of i th task
- P : Periodicity
- U_i : Utilization of i th task
- w_i : worst response time
- t : Current time point

The system is scheduable if the time demand for each task is less than the deadline of said task.

According to their priority,

Load 1 Task: T5(10,5,10)

$$W1(10) = 5 < 10$$

Then its Schedulable

Rx Task: T4(20, 0.3528,20)

$$W2(20) = 0.3528 + 5 = 5.3528 < 20$$

Then its Schedulable

Button 2 Task : T2(50,0.015033,50)

$$W3(50) = 5 + 5.3528 + 0.015033 = 10.367833 < 50$$

Button 1 Task: T1(50, 0.014767,50)

$$W4(5) = 10.367833 + 0.014767 + 5 + 5.3528 = 20.735 < 50$$

Tx Task : T3(100, 0.029333,100)

$$W5(100) = 20.735 + 10.368 + 5.353 + 5 = 41.456 < 50$$

Load 2 Task: T6(100,12,100)

$$W6(100) = 41.456 + 20.735 + 10.368 + 5.352 + 5 = 82.911 < 100$$

Thus, the system is schedulable.