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Project: Implementing EDF Scheduler

1. Analytical Solution:

Tasks	Periodicity	Deadline	Execution in hyper-period	Execution time
Button 1	50ms	50ms	2	6.15us
Button 2	50ms	50ms	2	6.15us
Periodic Tx	100ms	100ms	1	0.13ms
UART	20ms	20ms	5	8.1us
Load 1	10ms	10ms	10	5ms
Load 2	100ms	100ms	1	12ms

Hyperperiod

It is the time in which all the tasks come together.

It is equal to 100ms.

CPU Load:

$$U = R/C$$

$$U = (E1 + E2 + E3 + E4 + E5 + E6)/H$$

$$U = ((6.15\text{us} * 2) + (6.15\text{us} * 2) + (0.13\text{ms}) + (8.1\text{us} * 5) + (5\text{ms} * 10) + (12\text{ms}))/100\text{ms}$$

$$U = 62.2\%$$

Schedulability:

- Rate Monotonic:

$$U = (6.15\text{us}/50\text{ms}) + (6.15\text{us}/50\text{ms}) + (0.13\text{ms}/100\text{ms}) + (8.1\text{us}/20\text{ms}) + (5\text{ms}/10\text{ms}) + (12\text{ms}/100\text{ms})$$

$$U = 0.622$$

$$U_{rm} = 6 * (2^{(1/6)} - 1) = 0.735$$

$$U < U_{rm}$$

System is schedulable.

- Time demand:

Worst case = 100ms

Tasks	Equations	Schedulable?
Load 1	$W1(10) = 5 + 0 = 5 < 10$	Yes
UART	$W2(20) = 8.1\text{us} + (20/10)*5 = 10 < 20$	Yes
Button 1	$W3(50) = 6.15\text{us} + (50/20)*8.1\text{us} + (50/10)*5 = 25 < 50$	Yes

Button 2	$W4(50) = 6.15\mu s + (50/50)*6.15\mu s + (50/20)*8.1\mu s + (50/10)*5 = 25 < 50$	Yes
Periodic Tx	$W5(100) = 0.13 + (100/50)*6.15\mu s + (100/50)*6.15\mu s + (100/20)*8.1\mu s + (100/10)*5 = 50 < 100$	Yes
Load 2	$W6(100) = 12 + (100/100)*0.13 + (100/50)*6.15\mu s + (100/50)*6.15\mu s + (100/20)*8.1\mu s + (100/10)*5 = 62 < 100$	Yes

2. SimSo:

SimSo: Real-Time Scheduling Simulator - [Model data]

File View Help

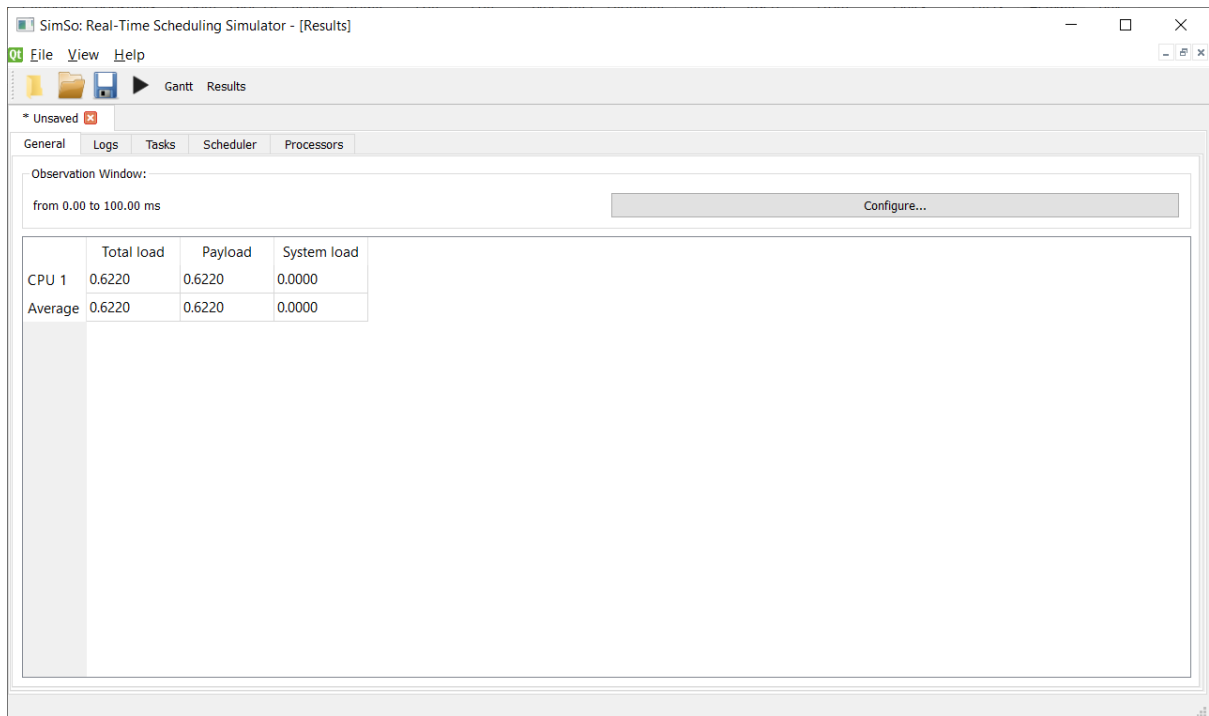
Unsaved

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	priority
1	TASK T1	Periodic	<input checked="" type="checkbox"/> Yes	0	50.0	-	50.0	0.00615	0	0
2	TASK T2	Periodic	<input checked="" type="checkbox"/> Yes	0	50.0	-	50.0	0.00615	0	0
3	TASK T3	Periodic	<input checked="" type="checkbox"/> Yes	0	100.0	-	100.0	0.13	0	0
4	TASK T4	Periodic	<input checked="" type="checkbox"/> Yes	0	20.0	-	20.0	0.0081	0	0
5	TASK T5	Periodic	<input checked="" type="checkbox"/> Yes	0	10	-	10	5.0	0	0
6	TASK T6	Periodic	<input checked="" type="checkbox"/> Yes	0	100.0	-	100.0	12.0	0	0

Edit data fields...

Remove selected task(s) Add task Generate Task Set



3. Keil:

