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Topic: EDF scheduler with FreeRTOS

1. Execution Analysis

Tasks	Periodicity	Deadline	Occurrence during hyper-period	Execution time
Button1	50ms	50ms	2	20us
Button2	50ms	50ms	2	20us
Periodic Transmitter	100ms	100ms	1	150us
UART	20ms	20ms	5	160us
Load1	10ms	10ms	10	5ms
Load2	100ms	100ms	1	12ms

2. CPU Load

the hyper period in this case is 100ms.

Utilization = total execution time/hyper-period

Utilization = $2(20\mu) + 2(20\mu) + 1(150\mu) + 5(160\mu) + 10(5\text{m}) + 1(12\text{m}) / (100\text{m})$

Utilization = 63.03%

3. System Schedulability

- Rate Monotonic

Utilization = 63.03%

Number of tasks = 6 $U < n(2^{1/n} - 1)$

If yes then system is schedulable

$0.63 < 0.735$

System is Schedulable

- Time Demand

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

Task	Result	Schedulable
Load1	$W1(10)=5m+0=5m$ $5<10$	Yes
UART	$W2(20)=160u+(20/10)5m=10.16m$ $10.16<20$	Yes
Button1	$W3(50)=20u+(50/20)160u+(50/10)5m=25.42m$ $25.42<50$	Yes
Button2	$W4(50)=20u+(50/50)20u+(50/20)160u+(50/10)5m=25.34m$ $25.44<50$	Yes
Periodic	$W5(100)=(100/50)20u+(100/50)20u+(100/20)160u$ $+ (100/10)5m+150u=51.03m$ $51.03<100$	Yes
Load2	$W6(100)=(100/50)20u+(100/50)20u+(100/20)160u$ $+ (100/10)5m+150u+12m=63.03m$ $63.03<100$	Yes

4. ScreenShoots

- Simso

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

File View Help

Garantt Results

* EDF.xml

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	Button_1	Periodic	<input type="checkbox"/> No	0.0	50.0	-	50.0	0.02	1	
2	Button_2	Periodic	<input type="checkbox"/> No	0.0	50.0	-	50.0	0.02	1	
3	Periodic_Transmitter	Periodic	<input type="checkbox"/> No	0.0	100.0	-	100.0	0.15	1	
4	Uart	Periodic	<input type="checkbox"/> No	0.0	20.0	-	20.0	0.16	1	
5	Load_1	Periodic	<input type="checkbox"/> No	0.0	10.0	-	10.0	5.0	1	
6	Load_2	Periodic	<input type="checkbox"/> No	0.0	100.0	-	100.0	12.0	1	

SimSo: Real-Time Scheduling Simulator - [Results]

File View Help

Garantt Results

* EDF.xml

General Logs Tasks Scheduler Processors

Observation Window:

from 0.00 to 100.00 ms

Configure...

	Total load	Payload	System load
CPU 1	0.6723	0.6303	0.0420
Average	0.6723	0.6303	0.0420



- Keil

