

Free RTOS MasterClass

Graduation Project

Implementation Of EDF Scheduler On Free RTOS

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Task Set Table:

Task Number (n)	Periodicity (P)	Execution time (C)	Deadline (D)
1	60	15.1	60
2	80	15.28	80

Calculating The CPU Load

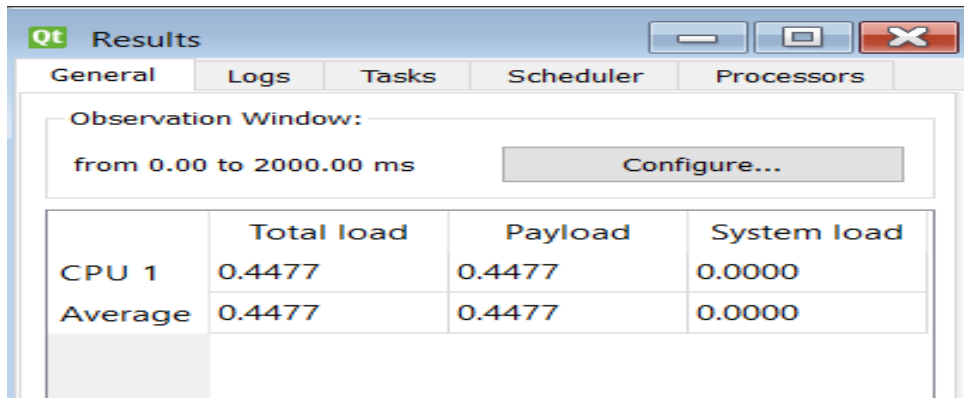
Hand Analysis:

$$U = \frac{15.1}{60} + \frac{15.28}{80} = 0.4426 \approx 44\%$$

Analysis Using Trace Task Functions:

Watch 1		
Name	Value	Type
Task1_Total_Time	0x00196A50	uint
Task2_Total_Time	0x00135DCD	uint
Total_System_Time	0x0064D7A8	uint
CPU_Load	0.444076002	float
<Enter expression>		

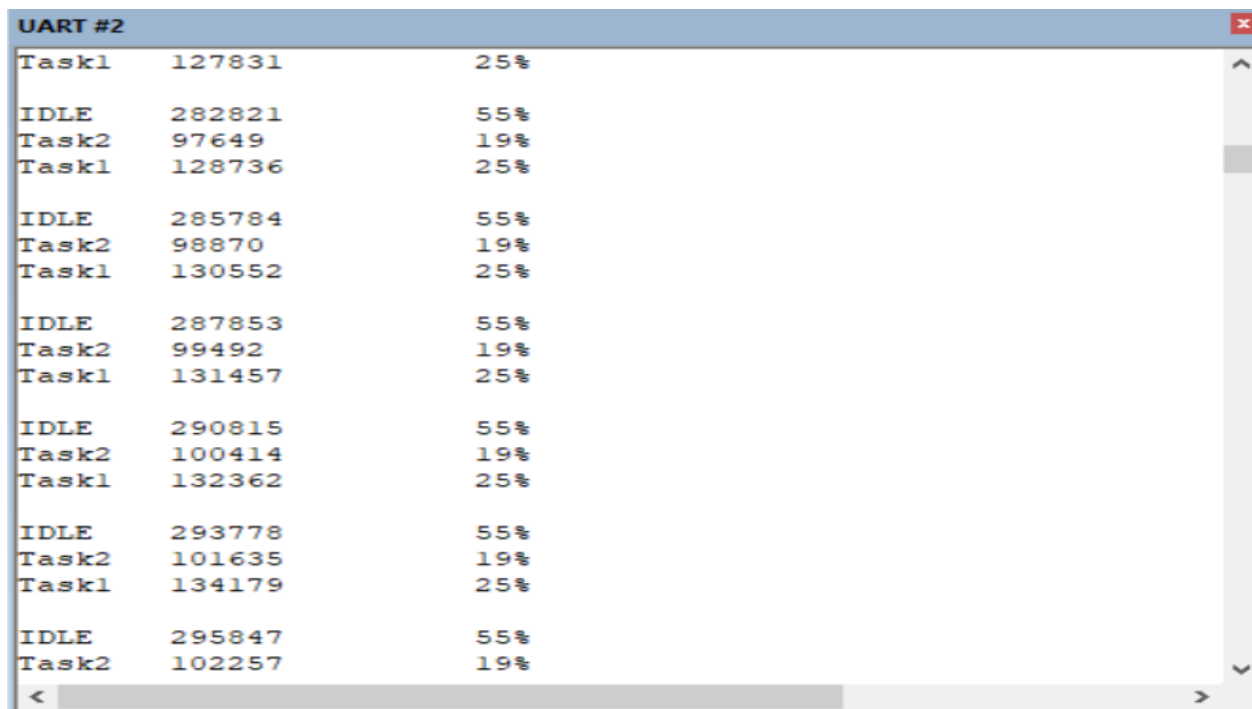
Analysis on Simso:



The image shows a Qt Results window with tabs for General, Logs, Tasks, Scheduler, and Processors. The General tab is active, displaying an 'Observation Window' from 0.00 to 2000.00 ms with a 'Configure...' button. Below this is a table with four columns: CPU 1, Total load, Payload, and System load. The table shows values for CPU 1 and an Average row.

	Total load	Payload	System load
CPU 1	0.4477	0.4477	0.0000
Average	0.4477	0.4477	0.0000

Runtime Analysis:



The image shows a UART #2 window displaying a list of tasks and their execution times and percentages. The tasks are Task1, IDLE, and Task2, with their respective execution times and percentages listed in a table.

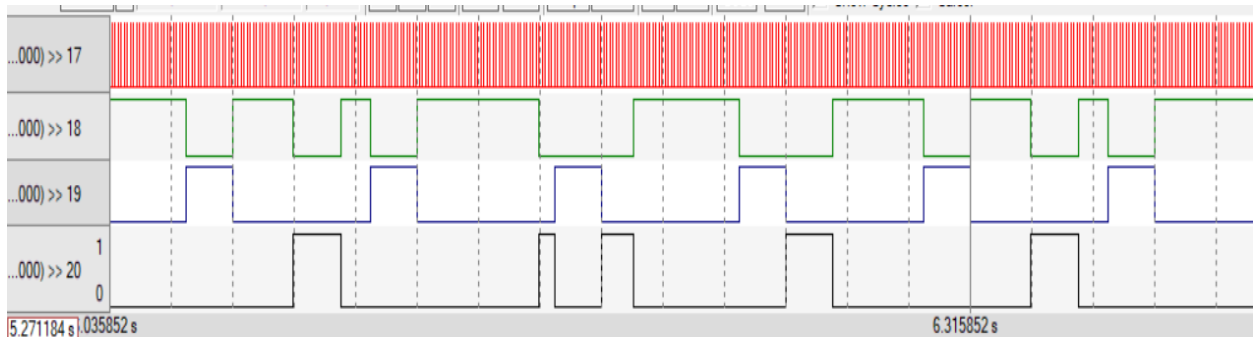
Task	Time	Percentage
Task1	127831	25%
IDLE	282821	55%
Task2	97649	19%
Task1	128736	25%
IDLE	285784	55%
Task2	98870	19%
Task1	130552	25%
IDLE	287853	55%
Task2	99492	19%
Task1	131457	25%
IDLE	290815	55%
Task2	100414	19%
Task1	132362	25%
IDLE	293778	55%
Task2	101635	19%
Task1	134179	25%
IDLE	295847	55%
Task2	102257	19%

System Total time = 293778 + 101635 + 134179 = 529592

$$\text{CPU Load} = U = \frac{101635 + 134179}{529592} = 0.4452 \approx 44\%$$

Checking The Schedulability

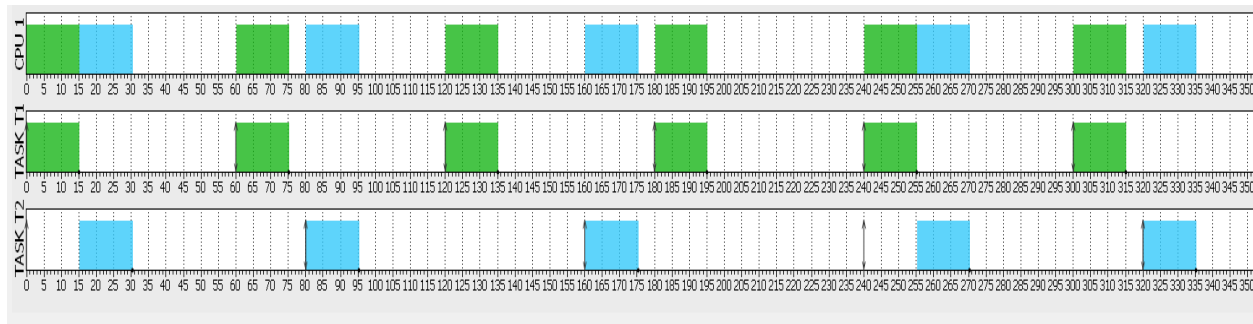
During Runtime:



Task1 is indicated in blue color

Task2 is indicated in black color

Using Simso:



Watch 1		
Name	Value	Type
Task1_Misses_Counter	0x00000000	int
Task2_Misses_Counter	0x00000000	int
<Enter expression>		

Comments:

- From The Graphs provided we can see that no task misses its deadline
- For the task set chosen above we obtain $U = 0.442$
- For EDF Schedulers the system is considered Schedulable if $U \leq 1$
- As $U = 0.442 < 1$ so the system is guaranteed to be Schedulable
- The total CPU Load = 44 % which is considered reasonable
- The Hand analysis , Runtime analysis and simulation all provide the same results for the CPU Load calculations
- The CPU Load can be decreased further more by increasing the periodicity of Task1 or Task2