EGFWD: ADVANCED EMBEDDED SYSTEMS

RTOS Project Report

Prepared By:

Eng. Ahmed Mostafa Rizk

BSc. Electronics and Communication Engineering

Ain Shams University

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SPRINTS EGFWD

Advanced Embedded Systems Track

1-Hyperperiod

The hyperperiod is basically the LCM of the periodicity of all tasks.

In our case:-

Hyperperiod(H)=LCM(10,20,50,100)=100ms

2-CPU Load

We assume that the execution time for the first 4 tasks to be zeroes as they were all around 2-6 microseconds. In this case, the CPU load is as follows:

$$CPU\ Load = \frac{E5 + E6}{H} = \frac{(5 * 10) + (12 * 1)}{100} = 0.62(62\%)$$

3-Schedulability

3.1 URM

$$U = \sum_{i=1}^{n} \frac{C_i}{P_i}$$

$$(where\ C\ is\ Execution\ Time\ and\ P\ is\ Periodicity)$$

$$U = \frac{5}{10} + \frac{12}{100} = 0.62$$

$$URM = n\left(2^{\frac{1}{n}} - 1\right) = 6\left(2^{\frac{1}{6}} - 1\right) = 0.73$$

$$U < URM$$

(so, the system is guaranteed schedulable)

3.2 Time Demand Analysis

Let's start with task 5:-

W_5=5ms directly

(because it is the highest priority task)

5ms<10ms(deadline)

Task 5 is schedulable.

As for task 4 (Priority 2):-

$$W_4 = 0\ (Approximately) + \left(\frac{20}{10} * 5\right) = 10ms$$

10ms<20ms

Task 4 is schedulable.

As for tasks 1 & 2:-

$$W_{1,2} = 0\ (Approximately) + \left(\frac{50}{10} * 5\right) = 25ms$$

25ms<50ms

Tasks 1 & 2 are schedulable.

As for task 6:-

$$W_6 = 12ms + \left(\frac{100}{10} * 5\right) = 62ms$$

62ms<100ms

Task 5 is schedulable.

And finally, task 3 (in case 6 runs first, since both share the same priority):-

$$W_3 = 0\ (Approximately) + (\frac{100}{100} * 12) + \left(\frac{100}{10} * 5\right) = 62ms$$

62ms<100ms

Task 3 is schedulable.