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ENSE 452
Assignment 3

Q1 Three tasks with periods
10 millisecond
39 millisecond
1 second
WGET estimated
4 milliseconds
12 milliseconds
98 milliseconds

total time Loading of system

$$\text{total} = \frac{4\,ms}{10\,ms} + \frac{12\,ms}{39\,ms} + \frac{98\,ms}{1000\,ms}$$

$$= 0.4 + 0.3077 + 0.098$$

$$= 0.8057$$

feasible schedule

$$0.8057 \leq n(2^{1/n} - 1)$$

$$0.8057 \leq 3(2^{1/3} - 1)$$

$$0.8057 \leq 0.77976 \simeq 0.78$$

the system is not guaranteed to have feasible schedule

to make the system schedulble, we will need to reduce the total time Loading of system to be greater or equal to 0.78

- Lets increase one of the tasks period, lets increase the first task and make the period = 15ms

$$\frac{4ms}{15ms} + \frac{12ms}{39ms} + \frac{98ms}{1000ms} \leq 0.78$$

$$0.267 + 0.3077 + 0.098 \leq 0.78$$

$$0.5727 \leq 0.78$$

this would make the system to guaranteed to have feasble schedule.

Q.2) Task A

Cycle Period = 10 ms

Execution Time = 4 ms

Priority = 3 (highest

Task B

cycle Period = 20ms

Execution Time = 5 ms.

Priority = 1

Task C

cycle Period = 40 ms

Execution Time = 10ms

Priority = 2

Idle Task

Execution time = 5ms

a) i) System utilization $= \frac{\text{Execution Time}}{\text{Cycle Periode}}$

$= \frac{4ms}{10ms} + \frac{5ms}{20ms} + \frac{10ms}{40ms} = 0.9$

ii) checking if the tasks set is RMS schedulble

$0.9 \leq n(2^{1/n} - 1)$

$0.9 \leq 3(2^{1/3} - 1)$

$\therefore 0.9 \leq 0.78$

the tasks set is not guaranteed to be schudlable by RMS

Also the priorities of the tasks does not follow the RMS rule, because Task C has a higher Period which should have a lowest priority but it has higher priority than Task B which has a Lower period. Therefor this task set is not RMS scheduled

iii) since this task set is not RMS scheduled, the response times based on the priorities of the Task set

Task A with highest priority

response time = 4ms

Task C with the second highest priority

Response time = Task A + Task C = 4ms + 10 ms

= 14ms

Task B with the Lowest priority

Response time = Task A + Task C + Task B = 4ms + 10ms + 5ms

= 19ms

iv) Task A

Deadline Difference = 10ms - 4ms = 6ms

Task A beats the deadline by 6ms

Task C

Deadline Difference = 40ms - 14ms = 26ms

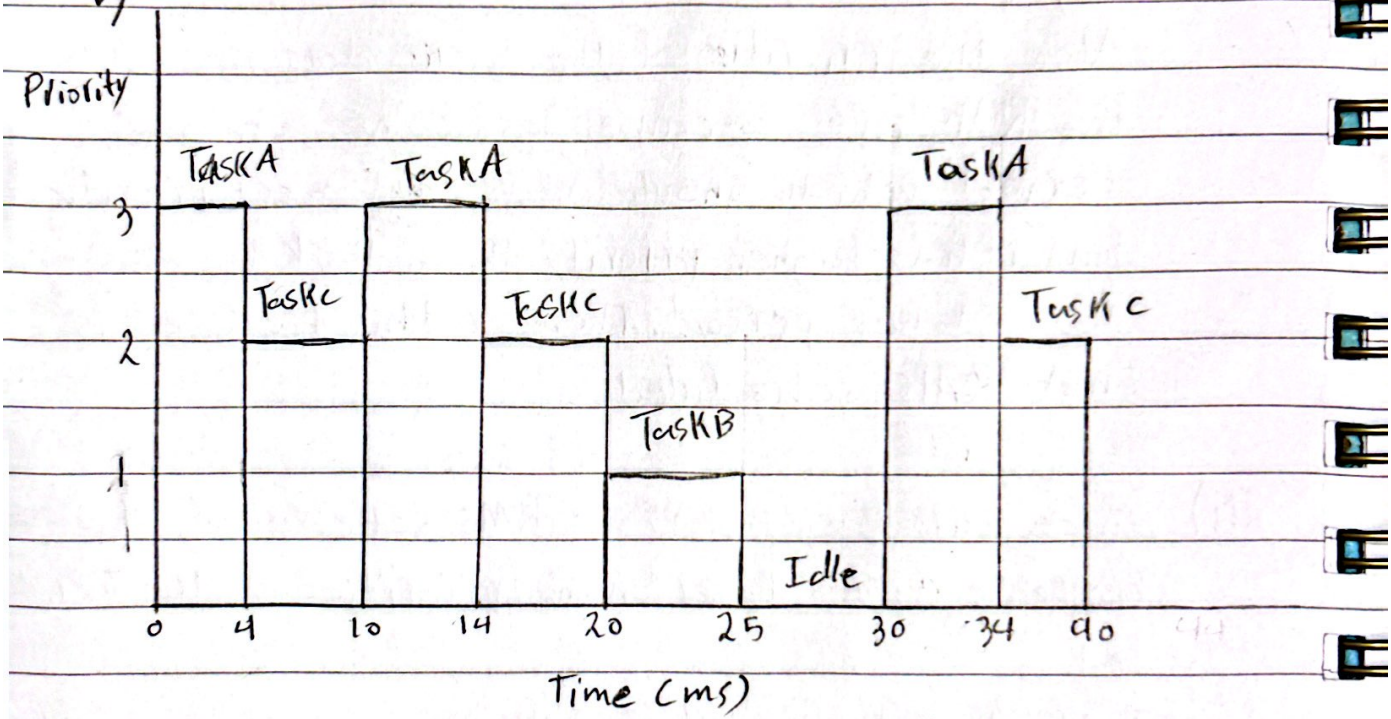
Task C beats the deadline by 26ms

Task B

Deadline difference = 20ms - 19ms = 1ms

Task B Beats the deadline by 1ms

v)



b) i) The system utilization remain the same as in Part a which is 0.9, because the execution times and the cycle periods of each task remains the same

$$\text{Utilization} = \frac{4ms}{10ms} + \frac{5ms}{20ms} + \frac{10ms}{40ms} = 0.9$$

ii) Task A response time = 4ms

Task B response time = 5ms + 4ms = 9ms

Task C response time = 10ms + 5ms + 4ms = 19ms

iii) Task A

deadline difference = 10 - 4ms = 6ms

Task A Beats the deadline by 6ms

Task B

deadline difference = 20 - 9 = 11ms

Task B Beats the deadline by 11ms

Task C

deadline difference = 40 - 19 = 21ms

task C beats the deadline by 21ms

v)