

ECE 1175 - Homework 3 Solutions

Question 1

1. Absolute deadline for each job needs to be computed.
2. Change process priority on the fly.
3. Possible factors could be:
 - the number of running processes
 - the number of priorities associated with processes
 - the method of deadline estimation.

Question 2

1. $T1 = (8, 15)$, $T2 = (12, 20)$

$$U = 8/15 + 12/20 = 17/15 > 1$$

==> Not schedulable with RMS or EDF.

We could increase period to make it schedulable. For example, $T1 = (8, 30)$, $T2 = (12, 40)$.

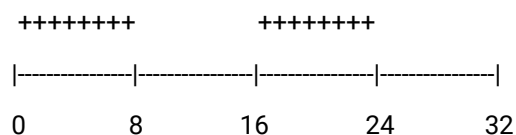
2. $T1 = (8, 16)$, $T2 = (10, 20)$

$$U = 8/16 + 10/20 = 1$$

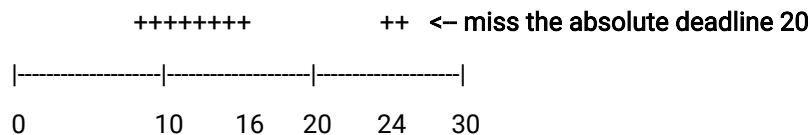
==> Schedulable with EDF.

For RMS, U_b is only a **sufficient** condition, so it's necessary to check it by manually drawing the flowchart.

T1:



T2:



T2 misses the deadline ==> **Not schedulable with RMS**

To make it schedulable with RMS, again we could increase the period. For example, $T1 = (8, 32)$, $T2 = (10, 20)$

3. $T1 = (8, 20)$, $T2 = (10, 25)$

$$U = 8/20 + 10/25 = 0.8 < 1 \implies \text{Schedulable with EDF}$$

$$U < U_b(2) = 0.828 \implies \text{Schedulable with RMS}$$

Question 3

Priority: $T1 > T3 > T4$

T4 is executing critical sections of R1 and R2.

If T3 requests the lock first from R2, T4 will inherit the priority of T3. But T1 can still preempt T4 from R1 because priority $T1 > T3$.

If T4 requests the lock first from R1, T4 will inherit the priority of T1. This time T3 cannot preempt T4 from R2 because priority $T1 > T3$.

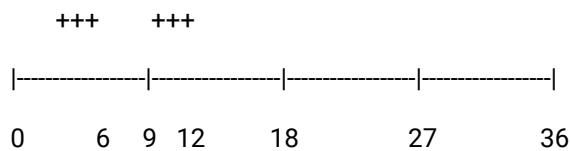
Question 4

Correction: $T2 = (3, 9) \rightarrow (3, 9)$ Otherwise T2 will always miss the deadline. (It's OK to say T2 will miss the deadline if you don't correct this.)

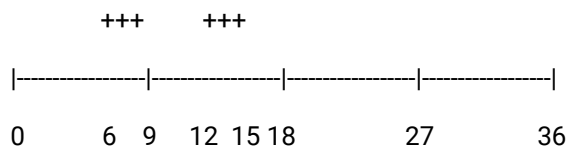
T1:



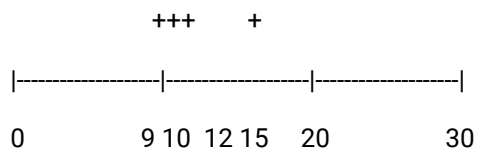
T2,1:



T2,2:



T3:



None of these tasks will miss deadlines.