

Announcement

Midterm 2 on Wednesday!

Midterm 2 has very similar format to midterm 1.

Bring a one-page cheat sheet! It can be double sided, but **no typing**.

You can bring a calculator, but you do not need it.

It is not cumulative, we will cover what we have learnt after midterm 1.

We will not have questions on PCP in short answer questions, but will have PCP questions in T/F and multiple choice.

Real Time Systems and Control Applications



Contents Midterm 1 Review

Example

Consider the following set of tasks (consider only one job in each task):

T1(5; 10; 4; 10 [R1; 2])

T2(2; 15; 6; 15 [R3; 4[R2 ; 1]])

T3(0; 20; 8; 20 [R2; 6[R3; 3]])

The resource R1 is required by T1 after it has executed for 1 time unit.

The resource R2 is required by task T2 after it has executed for 2 time units and by Task T3 after it has executed 1 time unit.

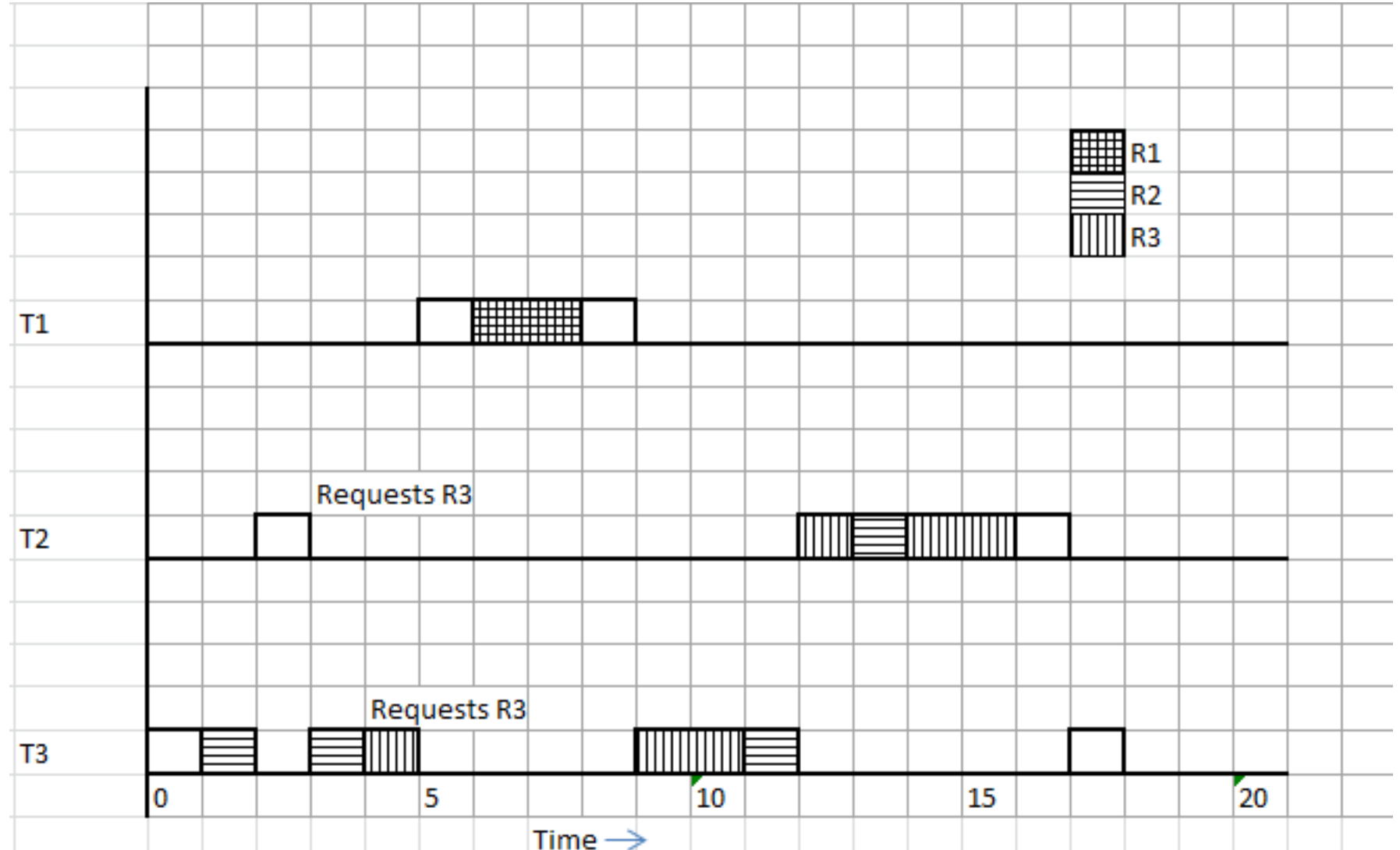
The resource R3 is required by task T2 after it has executed 1 time unit and by task T3 after it has executed 3 time units.

Show the schedule for these tasks based on RM algorithm and uses the Priority Ceiling Protocol (PCP).

Answer

At time $t=3$ when T2 requests resource R3, but T3 is in critical section and will use R3, so priority inheritance occur, T3 increases its priority to that of T2.

At time $t=5$ when T1 arrives, T1's priority is higher than the priority ceiling of the system. So T1 is executed. At $t=6$, resource R1 is free and T1 has higher priority than the priority ceiling of the system. So T1 successfully holds R1.



What will be covered?

- Use network Flow to model CE scheduling
- RM
 - Schedulability Tests
- DM
 - DM is better than RM in terms of schedulability
- EDF
 - Optimal scheduler
 - Why still use DM or RM in many cases
- Priority Inversion
 - Cause of priority inversion
 - Solutions to the priority inversion: NPCS, PIP, PCP

In Class Quiz Question

Consider the following set of tasks (consider only one job in each task):

T1(5; 10; 4; 10 [R1; 2])

T2(2; 15; 6; 15 [R3; 4[R2 : 1]])

T3(0; 20; 8; 20 [R2; 6[R3; 3]])

The resource R1 is required by T1 after it has executed for 1 time unit.

The resource R2 is required by task T2 after it has executed for 2 time units and by Task T3 after it has executed 1 time unit.

The resource R3 is required by task T2 after it has executed 1 time unit and by task T3 after it has executed 3 time units.

Show the schedule for these tasks based on RM algorithm and uses the NPCS and PIP