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Example: scheduling using RM

Problem: Assume a system with tasks according to the figure below. The timing properties of the tasks are given in the table. Schedule the tasks using rate-monotonic scheduling (RM).

- a) What is the utilization of the task set?
- b) What is the outcome of Liu & Layland's feasibility test for RM?
- c) Show that the tasks are schedulable using RM.







Task	C,	O,	T,
Α	1	0	3
В	1	0	4
С	1	0	5

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Example: scheduling using RM

a) The utilization U of the system is

$$U = \sum_{i=1}^{n} \frac{C_i}{T_i} = \frac{1}{3} + \frac{1}{4} + \frac{1}{5} \approx 0.783$$

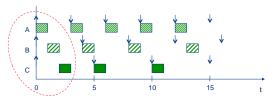
b) The utilization bound $U_{\it hub}$ of the test is

$$U_{lub} = n(2^{1/n} - 1) = 3(2^{1/3} - 1) \approx 0.780$$

Since $U > U_{lub}$ and the test is only a sufficient one, we cannot yet determine whether the task set is schedulable or not.

Example: scheduling using RM

c) Simulate an execution of the tasks:

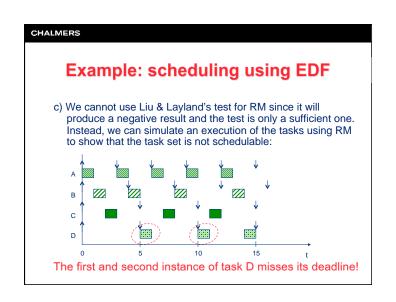


Liu & Layland have shown that <u>if</u> the task set is schedulable when all tasks arrive at the same time (i.e., at t=0), then the task set is also schedulable in all other cases. Hence, it is enough to demonstrate that the <u>first</u> instance of each task will meet its deadline.

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Example: scheduling using EDF Problem: Assume a system with tasks according to the figure below. The timing properties of the tasks are given in the table. a) What is the utilization of the task set? b) What is the outcome of Liu & Layland's feasibility test for EDF? c) Show that the tasks are not schedulable using RM. d) Show that the tasks are schedulable using EDF.



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Example: scheduling using EDF

a) The utilization U of the system is

$$U = \sum_{i=1}^{n} \frac{C_i}{T_i} = \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{5} \approx 0.983$$

b) Since U < 1 we know that the task set is schedulable according to Liu & Layland.

