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Exercises to
Cyber-physical System Fundamentals
Summer term 2012

Assignment 10

(10 Points)

Deadline is Monday, July 9, 2012, 12:00

10.1 Real Time Calculus (3 Points)

Draw the arrival curves for a stream of events given a period of 4 time units and a jitter of 2 time units. Also draw the servive curves for a TDMA-based component with a time window (s) of 2 time units, a bandwidth (b) of 2 units and a period (p) of 4 time units.

10.2 Scheduling of independent tasks (4 Points)

Given the following set of tasks $\tau_i \in T$, with a_i denoting the arrival time, d_i the (absolute) deadline and c_i the computation time.

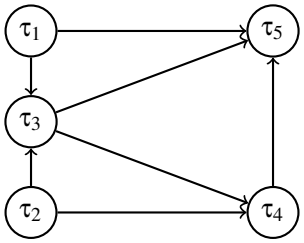
Task	a_i	d_i	c_i
τ_1	2	18	5
τ_2	0	12	4
τ_3	6	11	3
τ_4	1	13	6

Generate a schedule for this set of tasks with the scheduling algorithms Earliest Deadline First (*EDF*) and Least Laxity (*LL*), respectively. Show in a diagram at which points in time a given task is active. For *LL*, annotate the slack values when they change. Will a task miss its deadline? What happens when task τ_2 has an arrival time of 1?

10.3 Scheduling of dependent tasks (3 Points)

Given the tasks $\tau_{\{1,2,3,4,5\}} \in T$. The dependencies among the tasks is depicted by the following task graph. Here, c_i denotes the computation time and d_i the (relative, "deadline interval") deadline.

Task	c_i	d_i
τ_1	3	15
τ_2	5	13
τ_3	4	14
τ_4	4	20
τ_5	3	22



For the given tasks, determine a schedule according to Latest Deadline First (*LDF*).

General notes:

Dates and additional information can be found on the lecture website (via EWS). The assignments will be published **Tuesdays** on a weekly basis and have to be solved until the next **Monday** unless stated otherwise. Drop your sheets into the mailbox in OH16 right across the secretariat (E22) or send an e-email to your tutor. In the latter case, the submissions must be of either **PDF** or **PS** format. To pass the labs, a minimum of 50% of the total points must be achieved.