KTH ROYAL INSTITUTE
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Hybrid and Embedded Systems EL2450 - Exercise 7

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Content

- Scheduling algorithms (fixed and dynamic)
- Utlization factor
- Periodic and aperiodic tasks

What is scheduling? What is the difference between fixed and dynamic algorithms? What is the utilization factor? What are periodic and aperiodic tasks?

Exercise 7.3

Problem

Consider the following set of tasks

	C_i	T_i	D_i
J_1	1	3	3
J_2	2	4	4
J_3	1	7	7

Are the tasks schedulable with rate monotonic algorithm? Are the tasks schedulable with earliest deadline first algorithm?

Exercise 7.4

Problem

Consider the following set of tasks

	C_i	T_i	D_i
J_1	1	4	4
J_2	2	5	5
J_3	3	10	10

Assume that task J_1 is a control task. Every time that a measurement is acquired, task J_1 is released. When executing, it computes an updated control signal and outputs it.

(a) Which scheduling of RM or EDF is preferable if we want to minimize the delay between the acquisition and control output?

(b) Suppose that J_2 is also a control task and that we want its maximum delay between acquisition and control output to be two time steps. Suggest a schedule which guarantees a delay of maximally two time steps, and prove that all tasks will meet their deadlines.

Exercise 7.9

Problem

Together with the periodic tasks

	C_i	T_i
J_1	1	4
J_2	1	8

we want to schedule the following aperiodic tasks with a polling server having $T_s = 5$ and $C_s = 2$. The aperiodic tasks are

	r_i	C_i
a_1	2	3
a_2	7	2
a_3	9	1
a_3	29	4

Exercise 7.10

Problem

Consider the set of tasks J_1 and J_2, assuming that an aperiodic task could ask for CPU time. In order to handle the aperiodic task we run a polling server J_s with computation time $C_s = 3$ and period $T_s = 6$. Assume that the aperiodic task has computation time $C_a = 3$ and asks for the CPU at time $t = 3$. Plot the time evolution when a polling server is used together with the two tasks J_1 and J_2 using the rate monotonic algorithm.

	C_i	T_i	D_i
J_1	1	3	3
J_2	1	4	4

Describe the scheduling activity illustrated in the plots.