Real-Time Systems

Exercise 1: Development Flow

Basic Concepts

Repeat some of the basic terminology and concepts around real time systems:

a) What is a real-time system?

b) What differentiates hard, firm, and soft real-time?

c) Along which dimensions can you classify real-time systems?

Real-Time Systems Development

Reflect on the development flow for real-time systems.

Which steps and decisions are involved, what are the interfaces between the steps, which feedback loops can you think of?

What operating system functionality could be useful or even required to execute real-time applications?

Scheduling and Sustainability

We want to schedule three periodic tasks with the following parameters denoting their inter-release separation and their worst-case execution time requirement:

$$T_1 = (5, 1); \quad T_2 = (10, 4); \quad T_3 = (20, 8)$$

The jobs *cannot be preempted* and should be executed on a single processor.

a) Find a feasible schedule. Argue why this schedule will work for all future periods.

b) Assign priorities to the tasks such that scheduling the tasks with these priorities results in a feasible schedule.

c) Review the definition of sustainable scheduling policies. Why is this property important?

d) Imagine that the first job instance of T_2 actually runs for only 2 time units. Check if the scheduling policy from b) is sustainable.