Dynamic Priority Scheduling

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Dynamic Priorities - Earliest Deadline First

RM and DM are optimal *fixed priority* assignments

- Maybe we can improve schedulability by using dynamic priorities?
 - Fixed priority scheduling: a task τ always has the same priority
 - Dynamic priority scheduling: τ 's priority can change during time...
 - Let's assume that the priority changes from job to job (a job J_{i,j} always has the same priority p_{h,k})

Simplest idea: give priority to tasks with the earliest absolute deadline: $d_{i,j} < d_{h,k} \Rightarrow p_{i,j} > p_{h,k}$

- Earliest Deadline First (EDF)
- DM \rightarrow *relative* deadlines; EDF \rightarrow *absolute* deadlines

■ Yes we can! (of course)

- Consider a system of periodic tasks with relative deadline equal to the period.
- The system is schedulable with EDF if and only if

$$\sum_{i} \frac{C_i}{T_i} \le 1$$

• $U_{lub} = 1 \parallel \parallel$

 $\blacksquare \text{ If } D_i \neq T_i:$

 Processor demand approach or response time analysis can be applied to EDF too

But it is not obvious!





















The Same Example – EDF



















•
$$\tau_1 = (3, 8, 8), \ \tau_2 = (6, 11, 11) \Rightarrow U = 0.92$$





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Is EDF so Wonderful?

First answer would be "yes"

- But it is not so well supported by mainline OS (or even RTOS)...
 - Why???
- Up to few months ago, no widely used RTOS provided EDF
 - But things are rapidly changing!
 - ◆ A scheduling policy based on EDF is in mainline Linux since 3.14!!!