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Exercise for lecture Real-Time Operating Systems Design and Implementation
Winter semester 2019/2020

Exercise Sheet 5

(20 Points)

Thursday, December 12, 2019

Note: This exercise lasts for three weeks.

5.1 Earliest Deadline First (EDF) Algorithm Implementation (20 points)

Implement the EDF algorithm in FreeRTOS. You need to modify (at least) the following:

- Task Control Block (TCB) to consider periodic tasks.
  - Hint: Add period, worst-case execution time and relative deadline parameters.
- Scheduling policy.

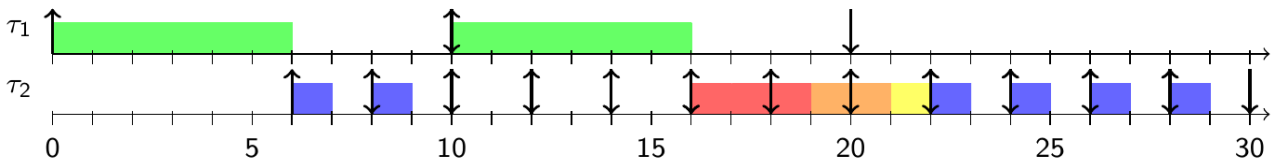
Furthermore, track the task execution and print the information of the tasks that miss their deadlines. Test your scheduler using two different task sets: (1) A task set with total utilization of 100% and (2) a task set with total utilization more than 100%.

Bonus - Strict Periodicity (10 points):

Given two implicit-deadline, independent, and periodic tasks:

- $\tau_1 : C_1 = 6$ and $T_1 = 10$
- $\tau_2 : C_2 = 1$ and $T_2 = 2$

Consider the following situations (the expected timing behavior):



- Some jobs in the system miss deadlines.
- The postponed jobs should still be released periodiclly and strictly.

Please implement a mechanism to handle the deadline misses (overrun) correctly.