technische universität dortmund

computer science 12

Bachelor Thesis

Exactness of EDF-Like Scheduling

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EDF-Like scheduling is a class of scheduling algorithms. More specifically, a set of so-called relative priority points Π_i determines the behavior of the EDF-Like scheduling. With a proper configuration of the priority points, the scheduler can behave like many established scheduling algorithms including Fixed-Priority (FP) scheduling, First-In-First-Out (FIFO), and EDF.
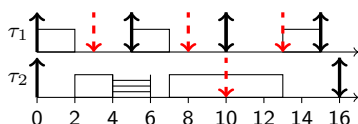

Figure 1: Task set of two tasks scheduled under EDF-Like scheduling.

In our previous work [1], we have provided a schedulability test for EDF-Like scheduling. That is, the test guarantees that no task misses its deadline using the EDF-Like scheduling algorithm. However, we have no idea how close that test is to being an *exact* test. More specifically, we raise the question:

> Which amount of task sets that are schedulable can be detected by our test to be schedulable?

To that end, focussing on FP and EDF scheduling, we first generate schedulable task sets. Afterwards, we apply the schedulability test for EDF-Like scheduling (configured to behave like FP and EDF), and determine the amount of schedulable task sets.

In this thesis,[1] the student first becomes familiar with the concept of EDF-Like scheduling and our implementation of the schedulability test. Afterwards, the student generates schedulable task sets and applies the schedulability test. Then, the amount of task sets that can be deemed schedulable by the schedulability test is evaluated, and specific scenarios where the schedulability test fails to detect the schedulability are presented.

Required Skills:

- Convenient in Python programming.
- Interest in schedulability analysis.

Acquired Skills after the thesis:

- Knowledge about schedulability analysis of real-time systems.
- Knowledge about different scheduling algorithms, specifically EDF-Like scheduling.

References:

[1] Mario Günzel, Georg von der Brüggen, Kuan-Hsun Chen, and Jian-Jia Chen. "EDF-Like Scheduling for Self-Suspending Real-Time Tasks." 2022 IEEE Real-Time Systems Symposium (RTSS). IEEE, 2022.

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[1]Other suggestions and related topics are also welcome. Please do not hesitate to make an appointment.