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Exercises for Lecture  
 Real-Time Systems and Applications  
 Summer Semester 15

## Exercise Sheet 2

(11 Punkte)

**Exercise Due at Wednesday, April 22, 2015, 12:00 Uhr**

**Hinweise:** Gruppenarbeit von bis zu drei Personen aus der gleichen Übungsgruppe ist möglich. Bitte vergessen Sie nicht Ihre Namen und Ihre Matrikelnummern auf die Lösung zu schreiben. **Die Abgaben können in den beschrifteten Briefkasten vor dem Sekretariat des LS12 (OH16/E22) eingeworfen oder per Mail (PDF Format) an georg.von-der-brueggen [☺] tu-dortmund.de abgegeben werden.**

**Note:** It is allowed to work in a group of up to three persons, if these persons are from the same practice group. Please do not forget to write your name and your Matrikelnummer on the solutions. **The solutions can either be placed in the mailbox in front of the secretary's office of LS 12 (OH/E22) or sent by mail (PDF format) to georg.von-der-brueggen [☺] tu-dortmund.de**

**Exercise Sessions:**

Do, 10:15 - 11:45 OH16/E18  
 Do, 14:15 - 15:45 OH16/E18

### 2.1 Real-Time System Characteristics (2 Punkte)

What are the main differences between general purpose computing and real-time computing? List some applications for different levels of supports of real-time systems.

### 2.2 Definition of Worst-Case Execution Time (2 Punkte)

For real-time systems, it is important to know the maximum (worst-case) execution time of each task a priori. What are the definition and difference between the worst-case execution time and the worst-case response time? Even if the worst-case execution time of a task is given, there are several other problems that may be encountered during the design of a scheduling algorithm for a real-time system. Can you think of some difficulties? What are possible solutions?

### 2.3 Basic Scheduling (4 Punkte)

Suppose that the following set of jobs is given:

	$J_1$	$J_2$	$J_3$	$J_4$	$J_5$
$a_j$	0	2	8	10	15
$C_j$	4	3	6	3	4
$d_j$	6	8	16	22	20

1. What is the resulting schedule of the shortest-job-first (SJF) scheduling policy?
2. What is the resulting schedule of the earliest-deadline-first (EDF) scheduling policy?
3. What is the average response time of SJF and EDF, respectively?

4. Mr. S claims that SJF is optimal for his system, and Miss E claims that EDF is optimal for her system. Is it possible that both of them are correct? Please make their descriptions more clear.

## 2.4 Recurrent Task Models and Scheduling (2 Punkte)

Explain sporadic tasks and periodic tasks and their differences. What are their typical parameters and the applications of such task models?