Distributed Algorithms
Jacobs University Bremen
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Course: CA-CS-803
April 8th, 2021

Homework 4

- Submit one ZIP file per homework sheet which contains one PDF file (including pictures, computations, formulas, explanations, etc.) and other files if needed.

Problem 4.1 *Election Algorithms vs. Mutual Exclusion* (3 points)

In the beginning of the semester, we mentioned mutual exclusion. Recall that mutual exclusion is a concurrency control property which is introduced to prevent race conditions. It is the requirement that a process cannot enter its critical section while another concurrent process is currently present or executing in its critical section.
Compare leader election to mutual exclusion and identify at least 2 differences between them. You might discuss what condition on the processes are required during both scenarios, and for instance what is known among the processes during and after execution.

Problem 4.2 *Election Algorithm for Trees* (4 points)

Why is the time complexity of the election algorithm for trees $2D$ (Lecture 16, slides $6-7$)?

Problem 4.3 *Message Complexity of the Chang-Roberts Algorithm* (3 points)

We mentioned that the Chang-Roberts election algorithm on rings has a worst case message complexity of $O(N^2)$. In which scenario does this occur?

How to submit your solutions

You can submit your solutions via *Grader* at **`https://grader.eecs.jacobs-university.de`** as one generated ZIP file containing one PDF file and other files if needed.
If there are problems with *Grader* (but only then), you can submit the file by sending mail to `k.lipskoch@jacobs-university.de` **with a subject line that starts with CA-CS-803**.

Please note, that after the deadline it will not be possible to submit solutions. It is useless to send solutions by mail, because they will not be graded.

This homework is due by Wednesdays, April 14th, 23:00.