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|  | **Distributed Algorithms - Exercise**  **Winter term 2018/19** | **Danh Le Phuoc**  **Qian Liu**  **ODS** |
| *Exercise sheet 2* | | |

**Exercise 2.1: Mutual Exclusion**

**Questions**

1. Lamport

The broadcast algorithm (Lamport, 1978) has been introduced in the lecture. The algorithm requires FIFO channels. Assume, we drop this precondition. Construct an example in which the algorithm does not work properly anymore.

1. Ricart and Agrawala
   1. Is this algorithm deadlock-free? Give a reasonable answer.
2. Maekawa
   1. The process mesh-algorithm (Maekawa, 1985) is based on the assumption that n processes are arranged in a quadratic mesh with an edge length of n. Consider a situation where this assumption is not given (n is not a square number). Is it still feasible to use the algorithm?

**Exercise 2.2: Snapshot**

**Questions**

1. Give an example to show that the Chandy-Lamport algorithm is flawed if channels are not FIFO.
2. Propose an adaptation of the Chandy-Lamport algorithm, in which basic messages may be buffered at the receiving processes, and the channel states of the snapshot are always empty.
3. Give a snapshot algorithm for undirected networks with non-FIFO channels that uses:

(demonstrate your solution with text, pseudo-code, and diagrams)

1. marker messages, tagged with the number of basic messages sent into a channel before the marker message
2. acknowledgments, and
3. temporary (local) freezing of the basic execution
4. Give an example in which the Lai-Yang algorithm computes a snapshot that is not a configuration of the ongoing execution.