CS-E4110 Concurrent programming

Please note: To pass the course you need 300 total points and pass 4 rounds of the exercises. Contact the lecturer after the exam if you have not completed the exercises successfully.

The exam contains five questions. The maximum points for each question are listed in the beginning of the questions. Read the questions carefully. Give clear and compact answers. Remember to write the name of the course and your own personal information on each of your answer papers. No extra appliances are allowed in the exam.

1 (6p) What are busy-wait loops? Considering concurrent programming, sometimes they are considered very useful, but sometimes a really bad practice. Why? Give examples.

2 (10p) Answer *shortly* with clear definitions and descriptions. (Max. two points per subquestion.)

a) What is a race condition?
b) What is starvation?
c) What is Limited Critical Reference?
d) What is thread-safe code?
e) What is Dekker's algorithm?

3 (6p) The concept of sequential correctness is not sufficient for concurrent programs. Explain how the correctness of concurrent programs can be defined and checked.

4 (6p) Write a short essay (max 30 lines) on the Akka Actor programming framework. What is the programming framework like to the programmer, what are its main uses, and what its benefits and drawbacks compared to other concurrent programming models.

5 (6p) Write an essay (max 50 lines) on low-level concurrent programming.