

# Operating Systems (521453A)

## Laboratory Exercises, Spring 2012

Read chapters 4, 5, 7 and 8 from the book before the lab work. Answer following questions beforehand and return to assistant at the beginning of lab work (1 answer sheet / student group). Information about commands can be found from the unix manuals (*man command*, when using the command line terminal). Manuals are also available on the course's webpage.

### Pre-Exercises

1. Process coordination and deadlocks
  - (a) Explain the following (What do they mean, What causes them, What are the consequences). Add also examples of each.
    - i. producer-consumer problem
    - ii. critical-section problem
    - iii. deadlock
  - (b) Explain briefly 2 solutions for the bounded buffer problem (found in the text book).
  - (c) What kind of solutions to critical-section problem are there in the book. List solutions according to following categories.
    - i. Solutions that are easy to program by yourself.
    - ii. Solutions that are based on hardware properties.
    - iii. Solutions that are offered by operating system or as a library function.
  - (d) What are the main options in handling deadlocks (both before and after the deadlock has happened)? Introduce 1 option from every category.
2. Command *pthread\_create*
  - (a) How can you affect the attributes of the created thread?
  - (b) How one decides, what the new thread does (which code it runs)?
3. Command *fork*
  - (a) What is the purpose of the command?
  - (b) Which qualities of the mother process are inherited to a child process?
  - (c) In which cases may the *fork* command fail?
4. Command *exec*
  - (a) What is the purpose of the command?
  - (b) What happens if a thread of a threaded process executes *exec* command?
5. Socket communication
  - (a) What is the purpose of *socket* command?
  - (b) What is the purpose of *bind* command?