



GÖTEBORG UNIVERSITY
The Board of the IT Faculty

DIT122, Computer System Engineering, 7.5 higher education credits

First Cycle

1. Confirmation

The syllabus was confirmed by the Faculty Board of IT University on 2006-11-17 and revised 2009-09-15 to be valid from the spring term 2010.

Field of education: Science

Responsible department: Computer Science and Engineering

2. Position in the educational system

The course is a part of the Computer Science bachelor's programme and an elective course at Gothenburg University.

3. Entrance qualifications

Requirement for the course is to have successfully completed one year of an education aiming at a bachelor degree within Computer Science or equivalent. The course Machine oriented programming is also required.

4. Course content

The course aims to convey how a modern computer system is constructed and how its hardware modules interact with each other and with low-level software. Performance issues are particularly emphasized, since many design decisions are made to maximize performance at a given cost, or to minimize cost at a given performance level.

5. Outcomes

After completion of the course the student is expected be able to:

- Identify and describe the constituent hardware components of a computer system.
- Give an overview of the instruction-set architecture of a modern three-address computer. Read and write simple assembly programs for this machine.

- Identify and describe the hardware components of a simple implementation of the ISA.
- Motivate pipelining as a design principle for microprocessors.
- Identify the basic types of conflicts that occur as a result of pipelining.
- Identify and describe simple methods to avoid and work around these conflicts, describe limitations of these simple methods, and estimate their influence on performance.
- Use arithmetic instructions (integer and floating-point) in a correct way.
- Describe the function and performance influence of a memory hierarchy, including caches, main memory and virtual memory, including different parameters for size, block size, and associativity.
- Compute the performance (for simple load cases) of an I/O system, particularly one consisting of processors, buses, and hard disks. Identify performance bottlenecks in such a system.
- Explain how computer system performance is defined and measured.
- Estimate the influence of parameter changes on system performance above.
- Carry out a simple co-optimization of software (at assembly level) with hardware parameters to reach the best possible cost/performance ratio for a certain system.

6. Required reading

See separate literature list.

7. Assessment

The course will be examined by a written exam and a written report.

The student who has failed a test twice has the right to change examiner, unless weighty argument can be adduced. A written application should be sent to the department.

8. Grading scale

The grades are Pass, Pass with distinction or Fail.

9. Course evaluation

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire can be used to ensure written information. The outcome of the evaluations serves to improve the course by indication which parts could be added, improved, changed or removed.

10. Additional information

The course is given in English.