



Försättsblad till skriftlig tentamen vid Linköpings Universitet

(fylls i av ansvarig)

Datum för tentamen	2010-12-17
Sal	T1, T2
Tid	14-18
Kurskod	TDTS10
Provkod	TEN2
Kursnamn/benämning	Datorarkitektur
Institution	IDA
Antal uppgifter som ingår i tentamen	4
Antal sidor på tentamen (inkl. försättsbladet)	3
Jour/Kursansvarig	Erik Larsson
Telefon under skrivtid	013-286619, 0709-656619
Besöker salen ca kl.	15 och 17
Kursadministratör (namn + tfnr + mailadress)	Madeleine Häger
Tillåtna hjälpmedel	Inga
Övrigt (exempel när resultat kan ses på webben, betygsgränser, visning, övriga salar tentan går i m.m.)	10 arbetsdagar efter tentamen

Exam
Computer Architecture
TDTS10

December 17, 2010 - 14:00-18:00

Jour: Erik Larsson(0709-656619, 013-286619)

Hjälpmedel/Admitted material:

- Engelsk ordbok
- Dictionary from English to your native language

General instructions:

- This exam has 4 assignments and 2 pages, including this one.
- Read all assignments carefully and completely before you begin.
- Use a new sheet for each assignment.
- You may answer in either English or Swedish.
- Write clearly. Unreadable text will be ignored.
- Be precise in your statements. Unprecise formulations may lead to a reduction of points.
- Motivate clearly all statements and reasoning.
- Explain calculations and solution procedures.
- The assignments are not ordered according to difficulty.
- The exam is designed for 40 points.
- Grading: U, 3, 4, 5. The preliminary threshold for passing is 22 points.
- For ECTS, LiU make use of: 5=A, 4=B, 3=C, and UK=Fx.

1. Execution (10 points)

- Detail what a CPU does when it is executing a branch instruction?
- Detail how the CPU computes where to find data when register indirect addressing is used?
- What means with semantic gap?
- What are the differences between high-level language, assembly language and machine language.
- For a program in each of the languages above, what is needed to do in order to execute the program on a computer?

2. Processor Design (10 points)

- For the instruction set design - does it matter and if so how if the processor uses memory-mapped I/O or isolated I/O?
- Explain how to use a stack to enable procedure calls
- Explain how to use a large register file to enable procedure calls
- Of the techniques above, which is the most efficient (in terms of performance/speed)?
- Detail how a separate data-cache and instruction-cache impacts the performance in a pipeline

3. Memory System (10 points)

- Discuss what to think about when organizing data on a hard disk.
- Which are the typical steps in the memory hierarchy?
- Which of the steps (the memory hierarchy) are volatile?
- What does "locality of reference" mean (for memory systems)?
- What impact has "locality of reference" on the design of the memory system?

4. Operating system (10 points)

- A process may be in different states (such as running); list and explain the states in which a process can be, and explain how, when and why a process moves between states.
- What is time sharing used for?
- What is a context switch?
- What is a process control block and what is it used for in general and in particular at a context switch?