



Försättsblad till skriftlig tentamen vid Linköpings Universitet

(fylls i av ansvarig)

Datum för tentamen	2011-04-28
Sal	TER3
Tid	08-12
Kurskod	TDTS10
Provkod	TEN2
Kursnamn/benämning	Datorarkitektur
Institution	IDA
Antal uppgifter som ingår i tentamen	4
Antal sidor på tentamen (inkl. försättsbladet)	4
Jour/Kursansvarig	Erik Larsson
Telefon under skrivtid	013-286619, 0709-656619
Besöker salen ca kl.	9 och 11
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

April 28, 2011 - 08:00-12:00

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 3 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)

- What would the program counter, the zero status register, R1 and R2 contain after execution of the program below?

Address	Instruction/Data
0	LOAD R2, #10
1	LOAD R1, #0
2	ADD R1, (R2)
3	ADD R1, R2
4	BR 6
5	MUL R2, R1
6	HLT
7	ADD R1, R2
8	SUB R2, #1
9	HLT
10	4
11	5
12	8

The instructions are:

LOAD=load, SUB=subtraction,
 ADD=addition, BR=unconditional branch,
 HLT=halt
 numbers/data are given in decimal numbers

- For the program above, what is needed to do in order to execute the program on a computer?
- For the program above, is it executing on a RISC or a CISC machine?

2. Processor Design (10 points)

- Ever since the first computers, performance has been a major drive. Describe, discuss and compare two techniques that aims at improving performance.
- The instruction set design is an important part of processor design. Detail one instruction that has impact on the processor design.
- How does interrupt-driven I/O work?

3. Memory System (10 points)

- What is paging? And how is logic and physical addresses related?
- What is a page fault? Detail what happens at a page fault.
- Discuss which parameters impact the design when organizing data on a hard disk.

- Which are the typical steps in the memory hierarchy?
- How does demand paging and trashing relate and how to control trashing?

4. Operating system (10 points)

- Detail advantages and disadvantages of making use of an operating system.
- Discuss what an operating system does and detail some features (like employing time sharing (of course you cannot detail time sharing)).
- What is time sharing?
- To employ time sharing, when and how does the operating system intervene the execution.