



Försättsblad till skriftlig tentamen vid Linköpings Universitet

(fylls i av ansvarig)

Datum för tentamen	2010-03-13
Sal	TER2, TERC
Tid	8-12
Kurskod	TDTS10
Provkod	TEN1
Kursnamn/benämning	Datorarkitektur
Institution	IDA
Antal uppgifter som ingår i tentamen	5
Antal sidor på tentamen (inkl. försättsbladet)	4
Jour/Kursansvarig	Dimitar Nikolov
Telefon under skrivtid	0700-794983
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

March 13, 2010 - 08:00-12:00

Jour: Dimitar Nikolov(0700-794983)

Hjälpmedel/Admitted material:

- Engelsk ordbok
- Dictionary from English to your native language

General instructions:

- This exam has 5 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 (5 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

2. Processor Design (10 points)

- Detail (compare) RISC and CISC
- 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)?

3. Memory System (10 points)

- Why do computer systems in general have both primary memory and secondary memory?
- Compare characteristics of a primary memory and a secondary memory.
- Why is fragmentation a problem for memory systems?
- For a secondary memory like a hard disc, detail where and how fragmentation may occur.
- Detail (propose) two ways to organize (store) files on a hard disc. Describe your schemes using a file of 4Kbytes where the block size is 512 bytes.
- Given your two schemes from above, compare (discuss) them in (1) time for reading, (2) time for writing and (3) fragmentation.

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?

5. I/O (5 points)

- Programmed I/O is one alternative to handle I/O operations. How does programmed I/O work? What alternatives exist (discuss and explain)?