Försättsblad till skriftlig tentamen vid Linköpings Universitet

Datum för tentamen	2013-08-23
Sal (1) Om tentan går i flera salar ska du bifoga ett försättsblad till varje sal och ringa in vilken sal som avses	TER2
Tid	14-18
Kurskod	TDDI03
Provkod	TEN1
Kursnamn/benämning **Provnamn/benämning**	Datorarkitektur En skriftlig tentamen
Institution	IDA
Antal uppgifter som ingår i tentamen	14
Jour/Kursansvarig Ange vem som besöker salen	Petru Eles
Telefon under skrivtiden	0703681396
Besöker salen ca kl.	15:30
Kursadministratör/kontaktperson (namn + tfnr + mailaddress)	Carita Lilja, 1463, carita.lilja@.liu.se
Tillåtna hjälpmedel	Ordbok
Övrigt	
Vilken typ av papper ska användas, rutigt eller linjerat	
Antal exemplar i påsen	

LINKÖPINGS TEKNISKA HÖGSKOLA
Institutionen för datavetenskap
Petru Eles

Tentamen i kursen

Datorarkitektur - TDDI03

2013-08-23, kl. 14-18

Hjälpmedel:

Engelsk ordbok.

Supporting material:

English dictionary.

Poänggränser:

Maximal poäng är 40.
För godkänt krävs sammanlagt 21 poäng.

Points:

Maximum points: 40.
In order to pass the exam you need a total of minimum 21 points.

Jourhavande lärare:

Unmesh Bordoloi, tel. 0766348968

Good luck !!!

Tentamen i kursen Datorarkitektur - TDDI03, 2013-08-23, kl. 14-18
Du kan skriva på svenska eller engelska!

1. Unified caches and separate data and instruction caches: draw a picture for each of the two alternatives and comment on advantages and disadvantages.

(3p)

2. The Pentium 4 has an L1 instruction cache which is particular in several regards.
In what consists the particularity and what is the reason behind it?

(3p)

3. Data hazards in pipelines can sometimes be avoided by a technique called *forwarding*. How does this technique work? Give an example in which forwarding produces an acceleration (draw a figure which illustrates the corresponding pipelined execution).

(3p)

4. Branch history table: what does it contain and how is it used?

(2p)

5. The design of RISC architectures is based on certain characteristics of typical programs which are frequently used. Enumerate at least five such characteristics of programs.

(2p)

6.

a) What is a superscalar architecture?
b) Draw a block-diagram of a superscalar unit.

(3p)

7. Dynamic branch prediction with a two-bit scheme. How does it work?
Illustrate with the case of a loop like the one below. Compare with one-bit prediction.

```
        ----------------
LOOP    ----------------
        ----------------
        BNZ     LOOP
        ----------------
```

(3p)

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8.

a) Which are the types of data dependencies that have to be considered with an out-of-order superscalar? Give an example for each.
b) Why do we call them "true" and "artificial", respectively?
c) What can be solved by *register renamimg*? Give an example.

(3p)

9. What is speculative loading with the Itanium architecture? How does it work?

(3p)

10. Compare VLIW architectures with superscalar architectures:

a) Show similarities and differences.
b) Show the advantages and disadvantages of the two approaches.
c) Why is a superscalar consuming more power, compared to a VLIW computer?

(4p)

11. What is trace scheduling? How does it work (remember the three steps)? Why is it important with VLIW architectures?

(3p)

12.

a) What is branch predication (like in the Itanium architecture)?
b) Compare with ordinary branch prediction.

(3p)

13. Formulate Amdahl's law and comment.

(2p)

14.

a) What is hardware multithreading?
b) Why do multithreaded processors provide higher performance?
c) We have described three approaches to multithreading: interleaved, blocked, and simultaneous; what is the main characteristic of each of them?

(3p)