Försättsblad till skriftlig tentamen vid Linköpings universitet

(fylls i av ansvarig)

Datum för tentamen	2014-08-27
Sal	TER1
Tid	14-18
Kurskod	TDDI08
Provkod	TEN1
Kursnamn/benämning	Konstruktion av inbyggda system
Institution	*IDA*
Antal uppgifter som ingår i tentamen	12
Antal sidor på tentamen (inkl. försättsbladet)	5
Jour/Kursansvarig	Petru Eles
Telefon under skrivtid	0703681396
Besöker salen ca kl.	15:30
Kursadministratör (namn + tfnnr + mailadress)	Carita Lilja, 1463, carita.lilja@.liu.se
Tillåtna hjälpmedel	Ordbok
Övrigt (exempel när resultat kan ses på webben, betygsgränser, visning, övriga salar tentan går i m.m.)	
Vilken typ av papper ska användas, rutigt eller linjerat	
Antal exemplar i påsen	4

2009-05-13/lisli

LINKÖPINGS TEKNISKA HÖGSKOLA
Institutionen för datavetenskap
Petru Eles

Tentamen i kursen

Embedded Systems Design - TDDI08

2014-08-27, kl. 8-12

Hjälpmedel:

Engelsk ordbok.

Supporting material:

English dictionary.

Poänggränser:

Maximal poäng är 30.
För godkänt krävs sammanlagt 16 poäng.

Points:

Maximum points: 30.
In order to pass the exam you need a total of minimum 16 points.

Jourhavande lärare:

Petru Eles, tel. 0703681396

Good luck !!!

Tentamen i kursen Embedded Systems Design - TDDI08, 2014-08-27, kl. 14-18
Du kan skriva på svenska eller engelska!

1. a) Formulate the synchrony hypothesis for FSMs. What does it imply?
   b) Under which assumptions can we correctly implement a synchronous FSM model?

   (2p)

2. a) Describe, using a flow graph, the design flow of an embedded systems, from an informal specification to fabrication.
   b) Give short comments on the design steps which belong to the system-level.
   c) Why is the proposed design flow better than the traditional one?

   (3p)

3. Give an example and show how determinism is lost with a GALS model as opposed to a synchronous FSM.

   (2p)

4. Define Kahn process networks and synchronous dataflow models.
   Give an example of a Kahn process network. Show that it cannot be statically scheduled.
   Adjust the example such that it becomes a synchronous dataflow model. Show a static schedule for this new model.

   (3p)

5. Timed automata are a particular (the simplest) form of hybrid automata. Give an example of a timed automata model of your choice. Explain the model. Specify the same model as hybrid automata.

   (3p)

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6. a) Are Petri Net models deterministic?

   b) Consider the model in Fig 1a). Can the place *S* eventually be marked? Is it guaranteed to be marked?

   c) Consider the model in Fig. 1b). Starting with the marking in the figure, which is (are) the possible next state(s) of the system? Can the place *S* eventually be marked? Is it guaranteed to be marked?

(3p)

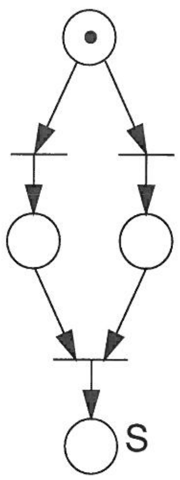

Fig. 1a

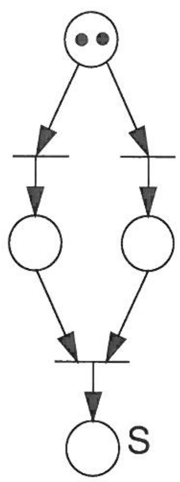

Fig. 1b

7. How does a discrete event simulator work?
   Illustrate by a flow-graph.

(2p)

8. We have introduced three particular policies for shut-down with Dynamic Power Management: time-out, predictive, and stochastic. Describe the main characteristics of each. Compare.

(2p)

9. Describe a simple design flow for processor specialization. Illustrate also by a figure. Comment on the design tools you need.

(3p)

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10. Illustrate by a diagram the trade-off energy consumption vs. flexibility for ASIC, FPGA, ASIP, and general-purpose processor.

(2p)

11. a) Formulate the scheduling problem for a set of real-time tasks.
    b) What does it mean that a task set is schedulable?
    c) What does it mean by preemptive and non-preemptive scheduling?

(2p)

12. a) What is the basic principle for task scheduling on DVS processors?
    b) What is the problem if we consider particularities, concerning power consumption, of individual tasks?
    c) How do we solve the problem that only discrete voltage levels are available?
    d) Discuss what the problems are if leakage energy is ignored.

(3p)