S

Försättsblad till skriftlig tentamen vid Linköpings universitet

Datum för tentamen	2015-08-26
Sal (1)	TER3
Tid	14-18
Kurskod	TDTS07
Provkod	TEN2
Kursnamn/benämning **Provnamn/benämning**	Systemkonstruktion och metodik Skriftlig tentamen
Institution	IDA
Antal uppgifter som ingår i tentamen	12
Jour/Kursansvarig Ange vem som besöker salen	Petru Eles
Telefon under skrivtiden	0703681396
Besöker salen ca klockan	16
Kursadministratör/kontaktperson (namn + tfnr + mailaddress)	Carita Lilja, 1463
Tillåtna hjälpmedel	Ordbok
Övrigt	
Antal exemplar i påsen	

LINKÖPINGS TEKNISKA HÖGSKOLA
Institutionen för datavetenskap
Petru Eles

Tentamen i kursen

System Design and Methodology- TDTS07

2015-08-26, kl. 14-18

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 System Design and Methodology- TDTS07, 2015-08-26, kl. 14-18
Du kan skriva på svenska eller engelska!

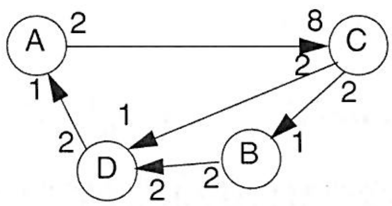
1. a) Formulate the synchrony hypothesis for FSMs. What does it imply?
   b) Under which assumptions can we correctly implement a synchronous FSM model?

   (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. Consider the synchronous dataflow graph depicted below.
   a) Find the (minimum) number of firings, for each task, during one period.
   b) Elaborate a static schedule (a sequence of task executions that can be repeated in a cycle)
   c) What is the total buffer space needed (in number of tokens); assume that the buffer space on the different links is not shared.



(3p)

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

   (2p)

5. 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)

Tentamen i kursen System Design and Methodology- TDTS07, 2015-08-26, kl. 14-18
Du kan skriva på svenska eller engelska!

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)

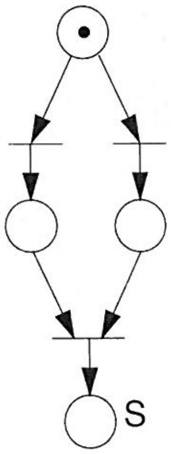


Fig. 1a

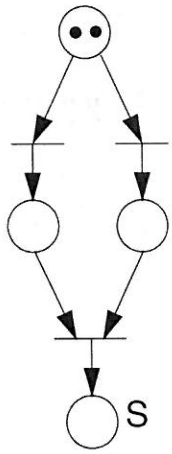


Fig. 1b

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

(2p)

8. What does it mean by an Application Specific Instruction Set Processor (ASIP)?
   We have discussed five dimensions of specialization for ASIPs. Which are those five?
   Comment on each of them.

(3p)

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

(2p)

Tentamen i kursen System Design and Methodology- TDTS07, 2015-08-26, kl. 14-18
Du kan skriva på svenska eller engelska!

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

(2p)

11. What does it mean by IP (core) based design? What types of cores can you choose from? Comment on each of them.

(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)