Tentamen i kursen

System Design and Methodology- TDTS 30

2005-03-10, 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:

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Good luck !!!

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Du kan skriva på svenska eller engelska!

1. 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.

   (3p)

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

   (2p)

3. a) What does it mean by control-dependent and data-dependent synchronization?
   b) Give an example for each?

   (2p)

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

   (2p)

5. Define synchronous dataflow networks.
   Show, by an example, how static scheduling of a synchronous dataflow network is possible.
   Transform the example such that it becomes an "ordinary" Kahn process network and show that static scheduling is not possible.

   (3p)

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

   (2p)

7. We have identified three properties which can be analyzed on systems modeled as Petri Nets:
   - Boundedness.
   - Liveness.
   - Reachability.
   How is each of these properties defined?
   What is the practical significance of each of these properties (what does it say about the system)?

   (3p)

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

   (3p)

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

   (2p)

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

    (2p)

11. 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)

12. 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.

    (3p)