Exam, Introduction to Electronic System Design (DAT093)

Tuesday Oct 25, 2016

Time and place: Tuesday Oct 25, 08:30, M building

Examiner: Lars Svensson

Department: Computer Science and Engineering

Inquiries: Lars Svensson (ext. 1704); will visit the room at 9:30 and at 11:30

Solutions: To be posted on Oct 26, in PingPong

Results: To be posted on or before Nov 15, in LADOK

Grading review: Room and time to be posted in PingPong

Grade limits:

3: 24–39 points; 4: 40–49 points, 5: 50– points

Extra grade points earned during the lab course (the 2016 installment) will be added to the exam result before computing the final grade.

Allowable references and utilities: English dictionary; no other books or papers.

General: Submit your solutions, ***in English***, on the blank paper sheets provided. Write legibly; feel free to use figures to get your point across.

Please write on only one side of each sheet. Please do not combine solutions to several problems on the same sheet. Please order your sheets in sequence with the problems solved.

In some problems, it may be necessary to make assumptions. When you do, state your assumptions explicitly and motivate them. Reasoning and descriptions can give partial credit even if the end result is incorrect.

The maximum points for each problem is given in parenthesis after the problem text.

Be sure to write your identification code on each sheet!

Good luck!

Problems

1. The lecture on power dissipation brought up several ways to manage and/or reduce dissipation at different points in the design process. Briefly describe up to four of these. You'll get two points per separate and well-enough described approach. (8p)

2. (a) What is the meaning of the term "Platform design"? (3p)
   (b) How might a designer reduce the defect yield loss for her semiconductor design? What about performance yield loss? (5p)

3. (a) Compare and contrast hard and soft deadlines in a real-time computing system. (2p)
   (b) How might you verify the real-time propertes of a computing system? (2p)
   (c) How does pipelining improve performance of a microprocessor? (2p)
   (d) What limits the number of cores in a multicore processor? (2p)

4. You are asked to design the digital parts of an embedded electronic system. One of the most important decisions is what technology platform to use. Give two possible reasons to choose each of the following platform alternatives (1p per separate and well-enough described reason):

   (a) Software on off-the-shelf processor (2p)
   (b) Hardware-description language implemented on an ASIC (2p)
   (c) Hardware-description language implemented on an FPGA (2p)
   (d) Software on custom-designed processor implemented as an ASIC (2p)

5. Briefly discuss the following aspects of PCB design:

   (a) Surface-mounted vs through-hole-mounted components (2p)
   (b) Choice of substrate material and number of layers (2p)
   (c) Signal reflections (4p)

6. For the last 50 years, the pace of electronics development was set by the Moore/Dennard scaling "law". Discuss the "law" and its consequences, in particular its definition; its influene on performance, manufacturing cost, and power dissipation; and possible reasons for the end of its reign. (8p)

THE END