11 – Wrapup lecture

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Today's Lecture

- Course wrapup – Exam hints
- Master thesis projects

That's about it

- I hope this course have improved your skills in at least the following areas:
  - Fixed-point arithmetic
  - Efficient implementation of typical DSP algorithms
  - Datapath design and instruction set design (especially efficient use of hardware multiplexing)
  - Firmware design skills (especially inner loops)
  - Increased your understanding of the inner workings of a processor
- Note that all of these skills should be applicable beyond ASIP design (e.g. designing an accelerator in an FPGA)

That's about it

- Questions about any lecture, exercise, lab, or task from an old exam?
  - Come visit me in my office (feel free to call my office phone (013-284059) ahead of time to ensure that you do not walk to the B-building in vain)

My (Andreas') exam philosophy

- My goals:
  - Studying old exams should teach you skills that will be useful in real life. (For example, the problems in the exam are based on (simplified) real-world problems in many cases.)
  - It should be possible to solve most of the questions in different ways (e.g., you can often choose whether to place most of the complexity in software or hardware, just as in reality)
    - Hint: Try to find a good trade-off here to allow you to solve the problem as quickly as possible.
- Note: In many cases I create the exam in such a way that it is possible to showcase a specific technique in the solution proposal (although other

Comments about Andreas' exam

- "4 timmar tycker jag var lite för lite för att hinna göra tentamen…"
- "Det blev lite stressigt. Många hann inte med att svara på allt, jag hann precis. Eventuellt så kanske tentan var lite för stor för tiden…"
- "Good with fresh questions."

Comments about Andreas' exam

- "Exam is not easy but it completely tests ones understanding of the subject. Infact [sic] this is one of those courses in my curriculum which is not just a pushover and one needs a solid understanding of the concepts to crack the exam. This course has helped me very much and has modelled me to think in the right direction and perspective."
- "Gillar att tentan känns lite åt problemlösningshållet istälelt [sic] för ett test av vad du kommer ihåg från föreläsningar/läst i boken etc."

Hints for the exam

- 50 points, you need 21 to pass
  - Approximately 25 points for well specified tasks
  - Typical question: Draw the schematic of a MAC unit based on this specification
- Approximately 25 points for open questions
  - Typical question: Create the specification of a MAC unit optimized for these programs. Draw a schematic of this MAC unit!

On the amount of time

- 50 points, 4 hours $\Rightarrow$ about 4.5 minutes per point.
- A student who knows the material well should be able to answer all questions within the alloted time
- This is backed up by previous exam results:
  - The distribution of U,3,4,5 looks reasonable
  - (Best result yet: 49 points!)
- If you aim for grade three, be prepared for the fact that you may not have time to answer all problems.

Hints for the exam

- Conclusion: It is possible to pass the exam without having to perform software/hardware co-design
  - Very small margin for error!
- However, you should be able to get a grade 4 merely by answering all well specified tasks and answering all subtasks of open questions that do not require you to actually draw schematics.

Fairly common pitfalls (serious)

- Adding extra inputs/outputs to a unit (e.g, solutions that require multiport memories or extra ports on the register file)
- Ignoring the clock cycle constraints
- Using significantly more hardware than required

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Fairly common pitfalls (not so serious)

- Using somewhat more hardware than required
- Forgot about the need for NOP operation
- Forgot about specifying the contents of blocks like SAT, ROUND, etc

Do not get stuck!

- First of all, briefly study ALL problems and decide on an order

- If you cannot solve a problem under the given constraints, figure out a way of solving it without violating the constraints too blatantly

    - Please make a note that you are violating the constraints and how you are trying to minimize the impact of this.

- (Also, there have been some unintentional cases of exam problems that can be interpreted in different ways. Do not be afraid to ask for clarification during the exam.)

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After this course

- TSEA44 Computer Hardware – a System on Chip (given by Kent Palmkvist) is a good course which complements TSEA26 for the complete SoC experience
- TDDB44 Compiler design
  - More or less a necessity if you want to design processors for a living
  - A very good course even if you do not plan to do so...
- Unfortunately, both courses are in the same block...

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Teaching Assistant Opportunities

- During the spring we will need teaching assistants
- Ad will be out, contact me to know when

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