Introduction to the course

Fall 2022

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DTU Compute, Technical University of Denmark

DTU 02155 Computer Architecture and Engineering

Course Information

Instructors

Alberto Nannarelli, Building 322, Room 130
Martin Schoeberl, Building 322, Room 128

Teaching Assistant

Christa Skytte Jensen
Ulrik Helk

Time & Place:

Monday afternoons:
13:00-17:00 in Building 341, Auditorium 22

Format:

- 2 hours (13:00-15:00) lecture
- 2 hours (15:00-17:00) paper&pencil exercises OR computer exercises

Website:

http://www.compute.dtu.dk/courses/02155/

02155 Website

DTU 02155 Computer Architecture and Engineering

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Tentative Schedule

The assigned time slot is divided into two **sessions** of two hours each.

Color coding for the **sessions**

Lecture	Paper & Pencil Exercises	Computer Exercises

The lectures are in Building **341** Auditorium **22**.

Week	LECTURES (13:00-15:00)	LABS (15:00-17:00)
1 29/08/22 (AN)	Computer Abstractions and Technology *Readings:* **P&H** Chapter 1 *Suggested exercises:* 1.3, 1.4, 1.5, 1.6, 1.9, 1.12(1,3,4,6).	Paper & pencil exercises: Number representation and performance.
2 05/09/22 (MS)	Instructions: Language of the Computer (part I) *Readings:* **P&H** Chapter 2 *Suggested exercises:*	Introduction to RISC-V ISA and the Venus Simulator. See instructions at lab2.

02155 Fall 2022 (E22). Modified by Alberto Nannarelli on Friday August 26, 2022

Online Communication via #Slack

Official information will still be through DTU Learn messages.

For informal conversations on the course, help on homeworks, etc. we use **Slack**

https://cae2022.slack.com/

Prerequisites

- General programming skills:
  - C, C++, Java, or similar.
- • Possibly some exposure to microprocessors and basic assembly language programming.

DTU courses:

- 02131 Embedded systems

  OR

  02138 Digital Electronics
- 02102 Introductory Programming

Course Objectives

You will learn (hopefully!)

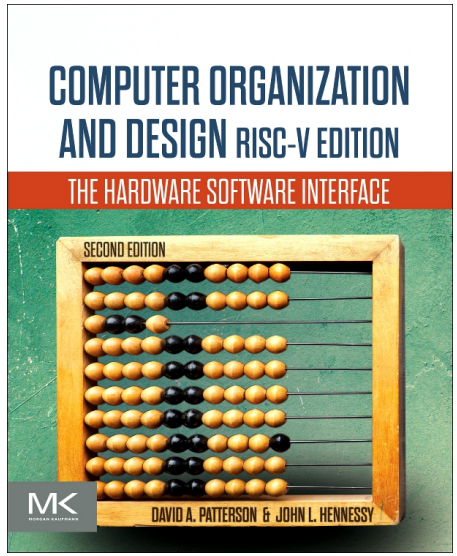
- The internal structure of a processor, including:
  pipeline, memory hierarchy, virtual memory, busses, etc.
- What throughput and latency are
- Software running on CPUs:
  instruction set, compiler and operating system.
- How hardware and software interact in a computer.

Book and Reading Material

Computer Organization and Design RISC-V Edition
The Hardware/Software Interface

David A. Patterson, John L. Hennessy
Morgan Kaufmann, 2nd edition, 2021

ISBN: 9780128203316



Additional reading material useful for labs (see next)

Labs/Exercises

Two types of exercises:

- Paper and pencil exercises aiming at helping you prepare for the written exam
- Computer labs where a simulator is used to better understand how the processor and memory work

Lab project work is group based (2 students per group)

Most lab material (RISC-V) is on GitHub:

- https://github.com/schoeberl/cae-lab
- You can contribute
- Martin (owner) accepts pull requests

Project

The project is an instruction set simulator for RISC-V

More info in the next weeks.....

Evaluation and Exam

The final grade is a combination of

exam, project and deliverables

The exam consists of

- A two-hour written exam
  scheduled for Thursday the 8th of December 2022 (E2A)

The project consists of

- Demonstration of the project
- Report of the project

The deliverables (2 this year) consist of

- labs and/or paper&pencil exercises

How to be Successful in the Course

Teachers' hints

1. Come to lectures
   - Listen
     Do not sleep, do not play with phone, "whatsApp", text, etc.
   - Be proactive:
     participate in discussions, ask and answer questions, etc.
   - If you do not understand something, ask for clarifications
2. Come to labs and stay until 17:00
   - Come prepared (do the previous week homeworks)
   - Work on the exercises and if you need help, ask the TA
3. At home (in the days after the lecture)
   - Read the book and understand the concepts.
   - Do the suggested exercises and the lab homework.
   - If something is not clear, ask the teacher/TA by Slack or at the next lecture.

REMEMBER you are supposed to devote 9 hours/week to 5 ECTS courses!

Questions

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