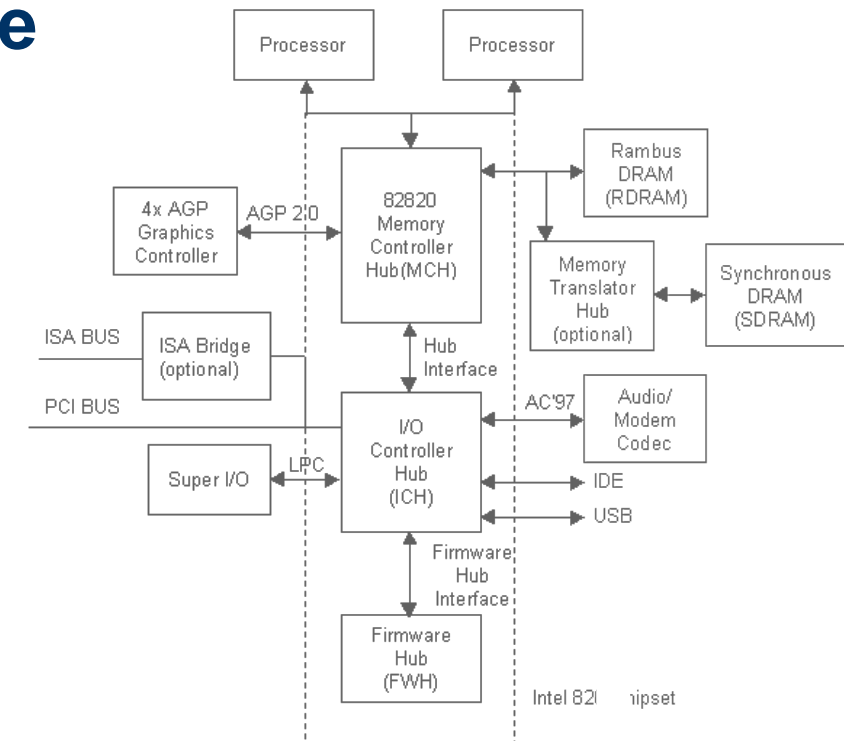
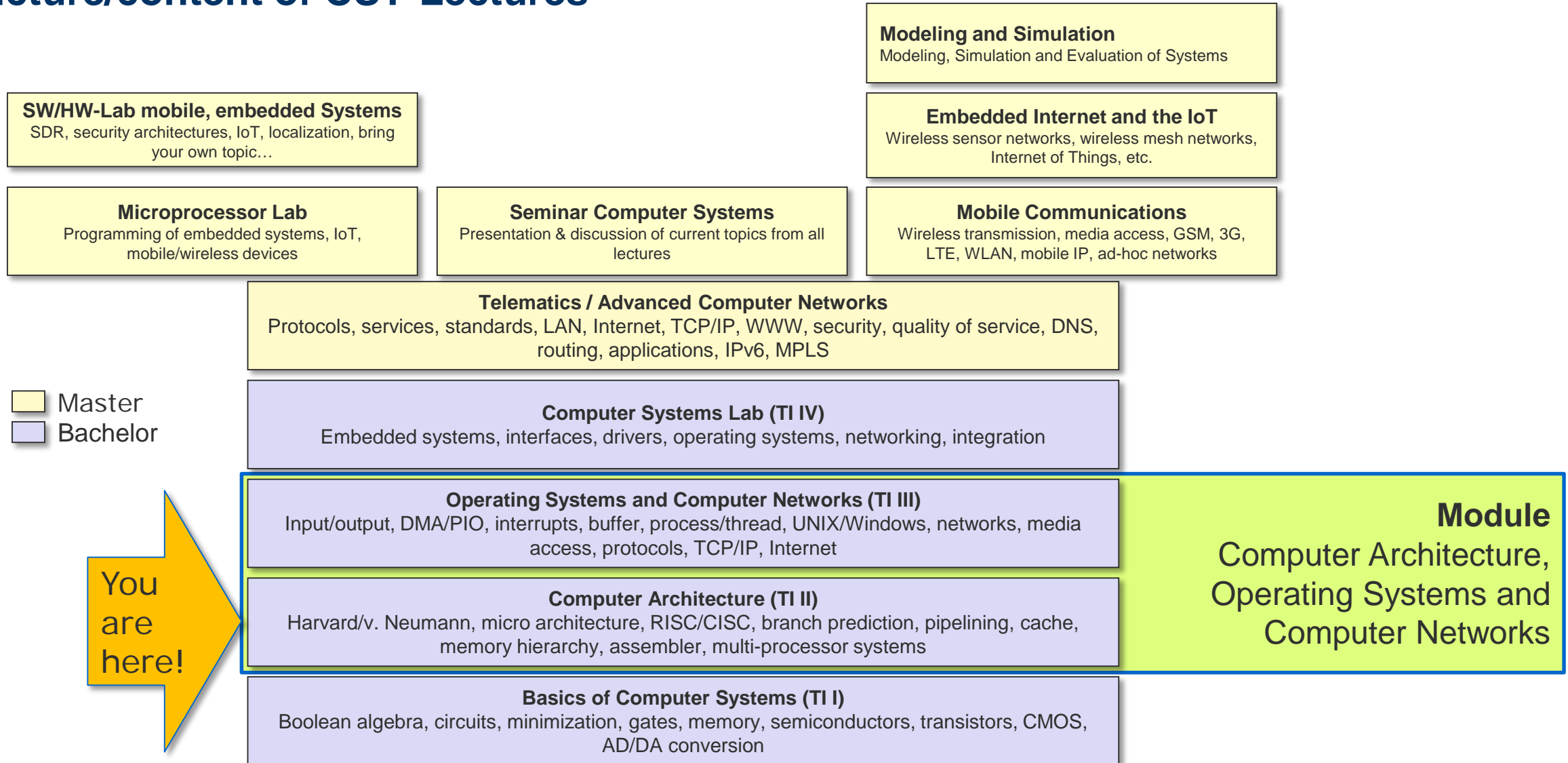


TI II: Computer Architecture

Prof. Dr.-Ing. Jochen Schiller
Computer Systems & Telematics
Freie Universität Berlin, Germany



Structure/content of CST-Lectures



Content

1. Introduction

- Single Processor Systems
- Historical overview
- Six-level computer architecture

2. Data representation and Computer arithmetic

- Data and number representation
- Basic arithmetic

3. Microarchitecture

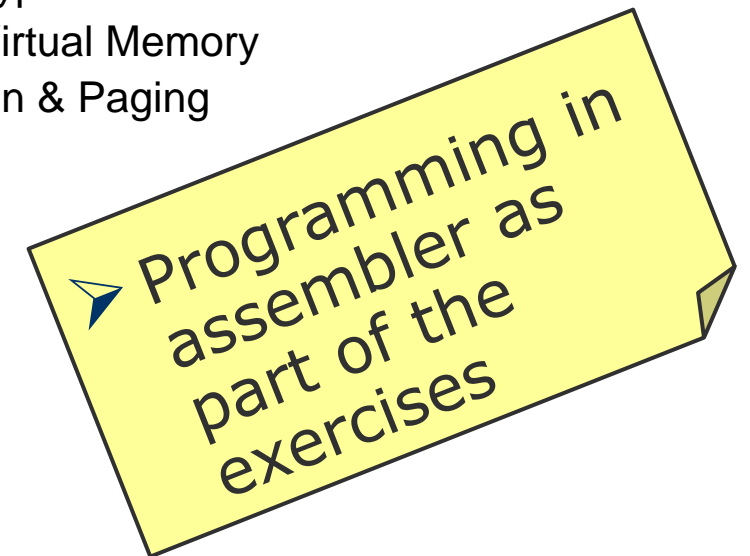
- Microprocessor architecture
- Microprogramming
- Pipelining

4. Instruction Set Architecture

- CISC vs. RISC
- Data types, Addressing, Instructions
- Assembler

5. Memories

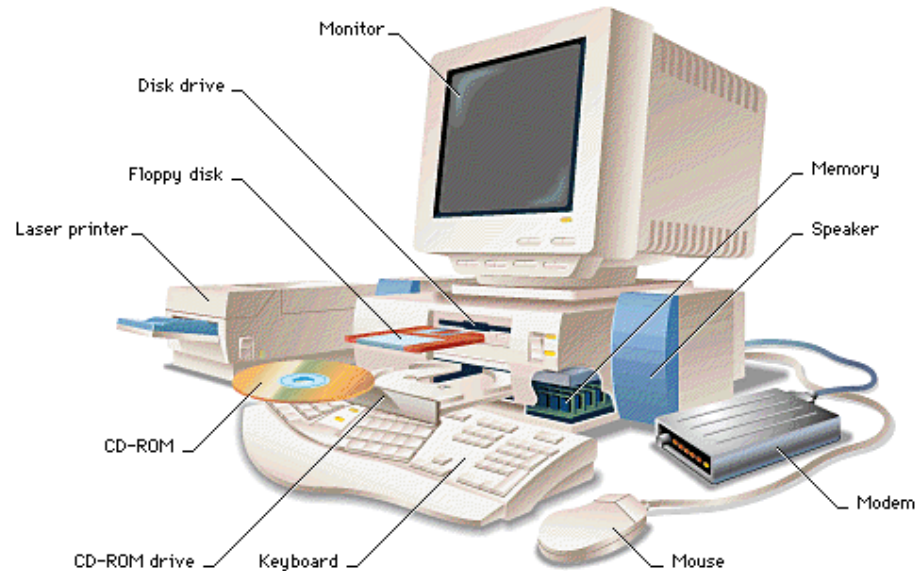
- Hierarchy, Types
- Physical & Virtual Memory
- Segmentation & Paging
- Caches



Topics of this Course

Have you ever ...

- opened the case of a computer?
- assembled a computer from components?
- written a program in Java/Python/Rust/JavaScript?
- written a program in C?
- written a program in Assembler?



Topics of this Course

At the end of this course, you should ...

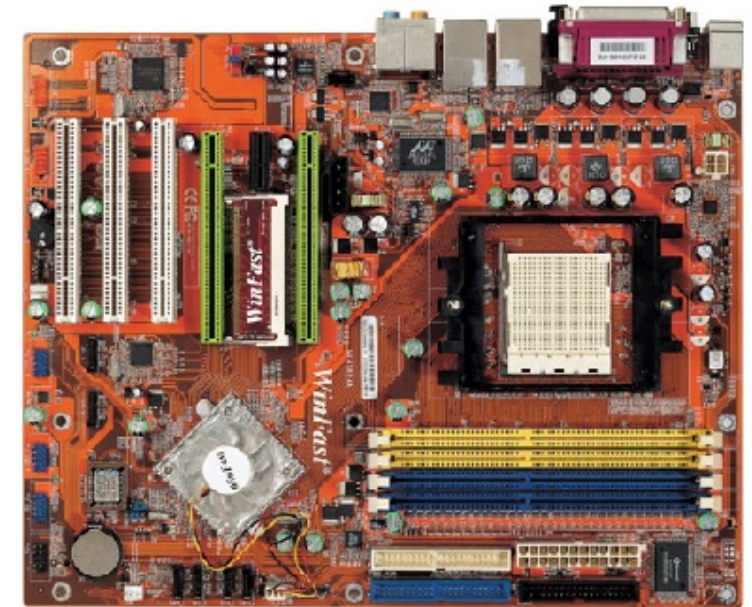
- know the different components of a computer system
- know the internals of a computer
- know how a computer stores data, i.e., text, audio, video
- know how a program is executed
- be able to write small assembler programs
- understand basic arithmetic

This should help you to

- understand computers in general
- understand how high-level programming languages are translated into machine language
- improve your programming skills
- optimize the performance of your programs



<https://de.ifixit.com/Teardown/iPhone+8+Teardown/97481>



Literature

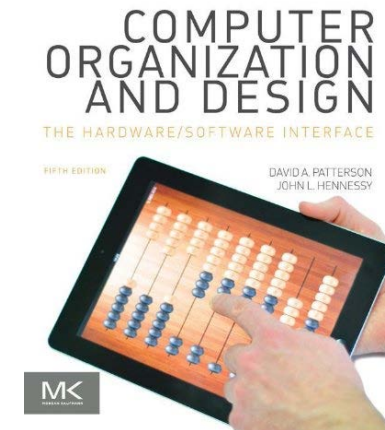
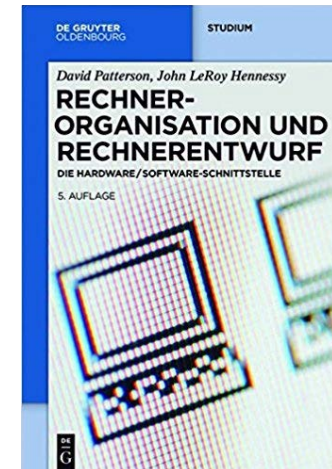
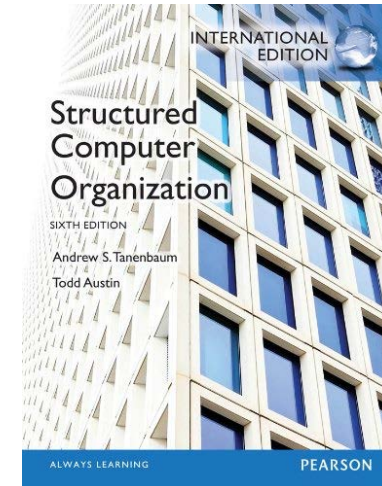
The course follows (roughly) the books:

- A. S. Tanenbaum, T. Austin:
Structured Computer Organization, 6. edition,
Pearson, 2013

Rechnerarchitektur, 6. Auflage, Pearson Studium,
2014

- D. A. Patterson, J. L. Hennessy: Computer
Organization and Design, 5. edition, Morgan
Kaufmann, 2013

Rechnerorganisation und -entwurf, 5. Auflage, De
Gruyter, 2016



Course Organization



Q&A virtual via
Webex meetings –
tutorials in real
life!

General:

Lecture

- Available online
- Flipped-classroom: Q&A, discussions, Friday, 8:30-10h, via Webex (invitations see KVV)

Office Hours

- Jochen Schiller: via email or <https://fu-berlin.webex.com/meet/jochen.schiller>
- Tutors: during tutorials

News and Updates

- KVV course site (via announcements)

Tutorials

- Groups of approx. 25-30 students
- Time depends on group
- Registration via KVV

Assignments:

New assignments each week

- Available in KVV

Discussion

- During the tutorials

Practical assignments

- @home and in the labs, should work on all platforms
- More during Q&A/tutorials

Handing in

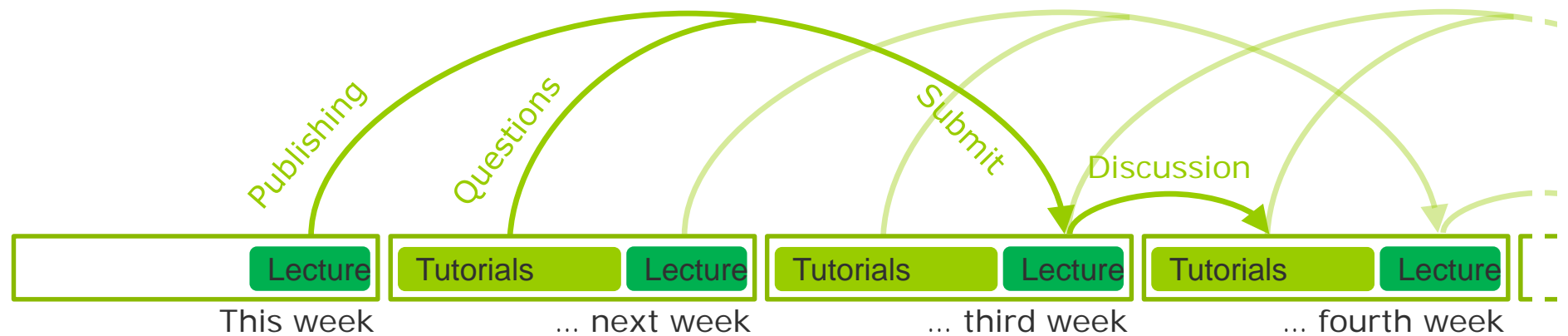
- **Right on time!**
- Complete electronic workflow!
- Solutions handed in too late will be ignored!

Assignments

Exercises: Available on Fridays in KVV after Q&A

Submission: Two weeks later until start of class (Fri, **8:30**)

Discussion: Three weeks later in tutorials



Criteria for Successful Participation

Active participation in the tutorials is essential!

- Minimum n-2 times present

Hand in your assignments on time

- Teamwork is required with 2 students per team

Successful submission of at least n-2 assignments


Each student with a correct answer must be able to present the assignment during the tutorials

- At least one presentation during the tutorials

At least 50% of the max. number of points in the exam are required

Only the exam counts for grading!

Exam: to be announced



DO NOT FORGET to register in campus management (grading/exam) and whiteboard (course organisation)

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