Syllabus 2017 Computer and Mathematical Sciences

Computer Structures

Japanese

Basic information

held this year:	yes
instructor(s)	Prof. Takafumi AOKI
room	Large Lecture Hall, GSIS
schedule	The first half year (Monday) 14:40-16:10
begins on:	04/10

Objectives and outline

The microprocessor is considered to be a key technology in present-day information society -- its applications are ranging from embedded systems to high-end supercomputers. The course will introduce the basic organization of computers and their design principle. The goal of this course is to learn the fundamentals of computers, performance measures, performance evaluation with benchmarks, machine languages, computer arithmetic, processors (with datapath and control), performance enhancement through pipelining, and application case studies, resulting in better understanding of the basic concept of hardware/software interface.

Class plan

1. Fundamentals of Computers (Historical Perspective)
2. Performance Measures for Computers
3. Measuring Performance with Benchmarks
4. Fundamentals of Machine Language (Hardware/Software Interface)
5. Fundamentals of Machine Language (Supporting Procedures in Computer Hardware)
6. Translating High-Level Languages into Machine Codes
7. Computer Arithmetic (Integer Operation)
8. Computer Arithmetic (Floating-Point Operation)
9. Processor (Single-Cycle Machine)
10. Processor (Multi-Cycle Machine)
11. Enhancing Performance with Pipelining (Overview of Pipelining)
12. Enhancing Performance with Pipelining (Pipelined Datapath)
13. Superscalar and Dynamic Pipelining
14. Other Techniques for Performance Improvement
15. Practical Microprocessors and Their Applications

Evaluation

Evaluated based on the results of final examination, home assignments (three times) and record of attendance.

Textbook(s)

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Morgan Kaufmann Pub.

Web site

http://www.aoki.ecei.tohoku.ac.jp/lecture/CS/

Office hours

Students can contact the instructor via e-mail.

Other information

Students are required not only to submit class assignments but also to review each class using handouts.
The lecture is challenging and hard, from which students can learn many.

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