581365-8
Computer Organization II
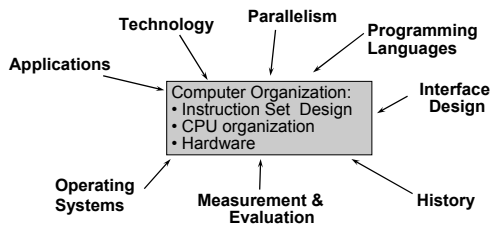# (Tietokoneen rakenne)

Teemu Kerola
University of Helsinki
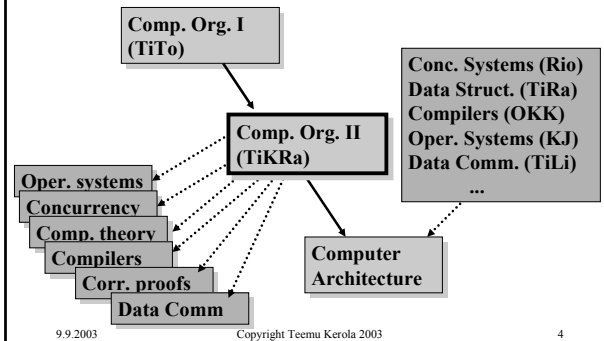Department of Computer Science

Fall 2003

Course Focus

- Understand basic computer system design from the user (human, OS, compiler) viewpoint as well as from the designer viewpoint.
- Understand how a simple hardware clock signal makes a computer to execute programs.

Peripheral topics

Technology, Parallelism, Programming Languages, Applications, Interface Design, Computer Organization: • Instruction Set Design • CPU organization • Hardware, Operating Systems, Measurement & Evaluation, History

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Related Courses

Comp. Org. I (TiTo) → Comp. Org. II (TiKRa)

Oper. systems, Concurrency, Comp. theory, Compilers, Corr. proofs, Data Comm

Conc. Systems (Rio), Data Struct. (TiRa), Compilers (OKK), Oper. Systems (KJ), Data Comm. (TiLi) ...

Computer Architecture

Notice

- These slides are made to support lectures and to be used with the text book.
- They do NOT include everything that is covered in the lectures.
- They are NOT a replacement for a text book.
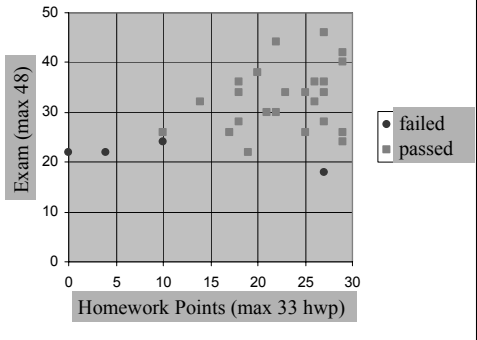- If you need a self-contained presentation, please use the text book.

Motto

- "It is not good exercise, if you do not sweat"

("Kunto ei nouse, jos ei tule hiki")
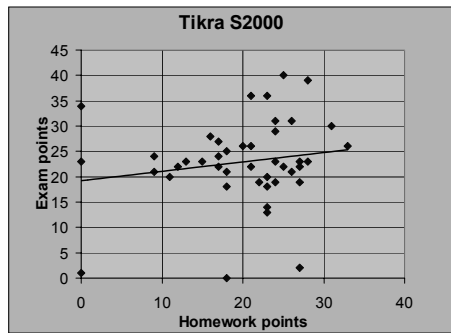
Slide 7

Studying in an Ordinary 2 cr Lecture Course (6)

- Lectures   `4h / w`
  - lecture notes in web, make copies in advance
  - learn basics in lecture
- Read same material from text book   `6h / wk`
  - little bit different approach
- Do homeworks
- Participate in practice sessions   `2h / wk`
- Read and study independently
- Take course exam   `8h ?`

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Slide 8

TiKRa Fall 1999 exam vs. homework points (hwp)

Exam (max 48)

Homework Points (max 33 hwp)

- failed
- passed

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Slide 9

TiKRa Fall 2000 exam vs. homework points (hwp)

Tikra S2000

Exam points

Homework points

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Slide 10

WWW Information

- Course home page
  http://www.cs.helsinki.fi/Teemu.Kerola/tikra/
- This semester schedule
  .../tikra/S2003/aikataulu.html
- Lectures   *.../luennot/*
- Homeworks   *.../laskuharj/*
- Old exams   *.../tikra/kokeet/*
- Newsgroup   *hy.opiskelu.tktl.tikra*

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Slide 11

A := B + C;
High level language

Comp. Org. I (TiTo, Tietokoneen toiminta)

MOV AX, B
ADD AX, C
MOV A, AX
Assembler

Comp. Org. II (TiKRa, Tietokoneen rakenne)

Logic circuits

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Slide 12

Memory   *CPU*

Bus

Contr.   *Disk*
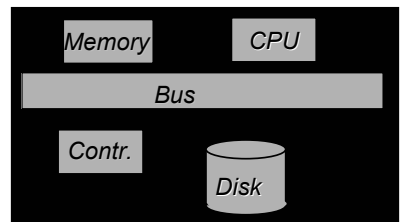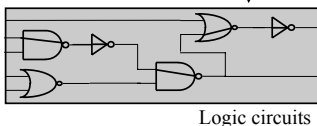
TiTo: What happens is system

TiKRa: How are CPU & memory implemented?

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The Lowest Presentation Level for Comp Org I (TiTo)

CPU

PC MAR
Control Unit
MBR

Memory

Address Bus Data Bus Control Bus
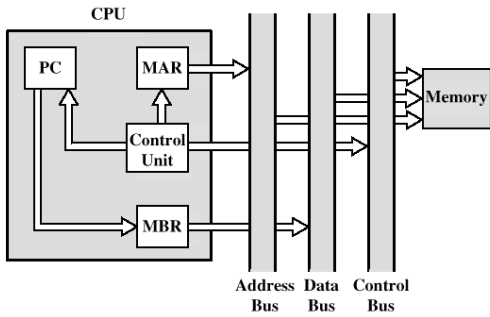
The Lowest Presentation Level for Comp Org II (TiKRa)

CLOCK SIGNAL   NOR   NOT   NAND

CarryIn
A 32 Adder Sum 32
B 32 Carry
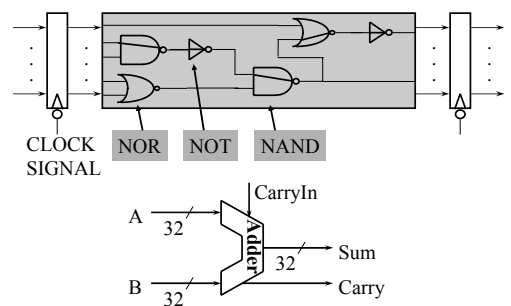
Contents

Text book: Stallings, Computer Organization & Architecture, 6th Ed., 2003   Old text book: 5th Ed, 1999

- Computer system - overall structure (Ch 1-8)   (Ch 1-7)
- System buses (Ch 3)   (Ch 3)   5th Ed, [Stal99]
- Digital logic (App A)   (App A)
- Memory hierarchy (Ch 4.3, 8.3)   (Ch 4.3, 7.3)
- Computer arithmetic (Ch 9)   (Ch 8)
- Instruction sets (Ch 10-11)   (Ch 9-10)
- CPU structure and function (Ch 12)   (Ch 10)
- Reduced Instruction Set Computers (Ch 13)   (Ch 12)
- Instr. level parall. and superscalar proc. (Ch 14)   (Ch 13)
- IA-64 (Ch 15) & Crusoe
- Control unit (Ch 16-17), Summary   (Ch 14-15)