581365-8
Computer Organization II
(Tietokoneen rakenne)

Teemu Kerola

University of Helsinki

Department of Computer Science

Fall 2000

30.8.2000   Copyright Teemu Kerola 2000   1
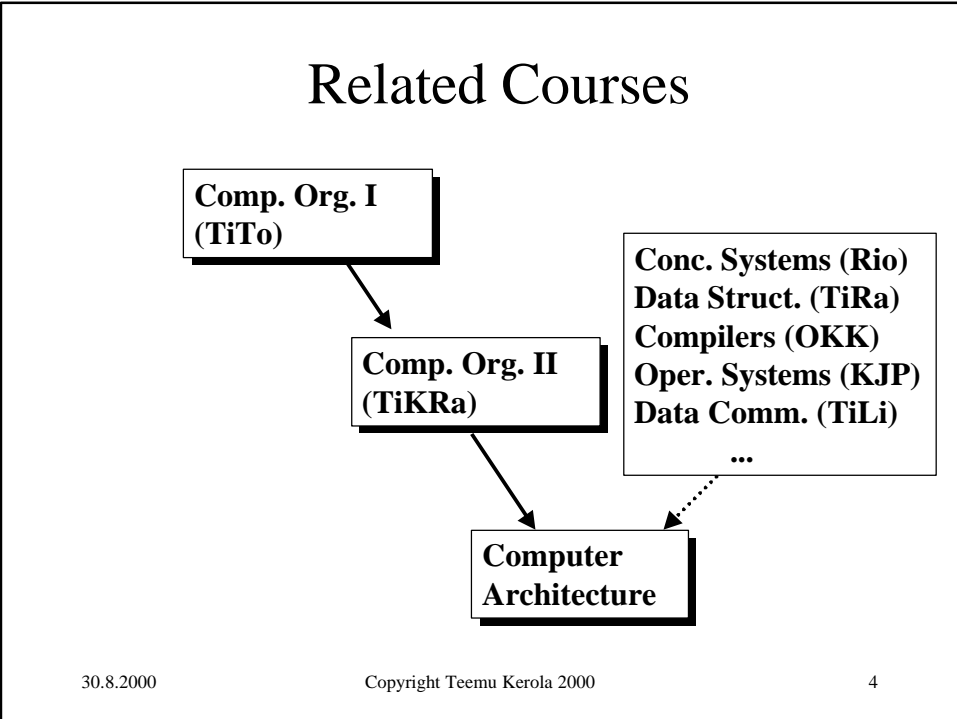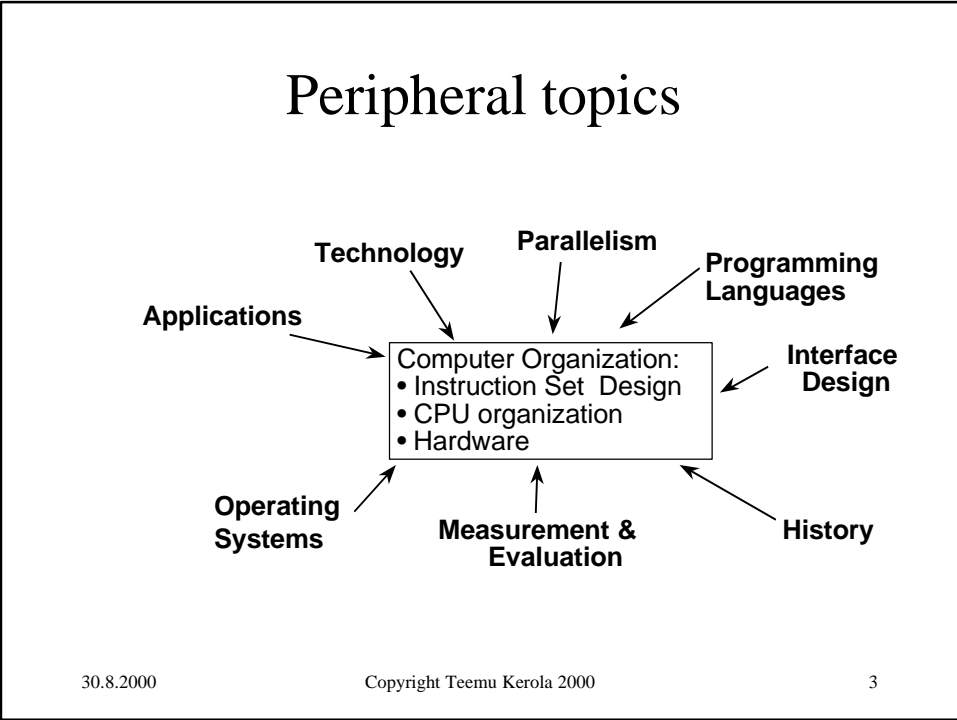
Course Focus

- 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.

30.8.2000   Copyright Teemu Kerola 2000   2

Peripheral topics

Technology   **Parallelism**

Applications   **Programming Languages**

Computer Organization:
• Instruction Set Design
• CPU organization
• Hardware

Interface Design

Operating Systems   **Measurement & Evaluation**   **History**

30.8.2000   Copyright Teemu Kerola 2000   3

Related Courses

Comp. Org. I (TiTo)

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

Comp. Org. II (TiKRa)

Computer Architecture

30.8.2000   Copyright Teemu Kerola 2000   4

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.

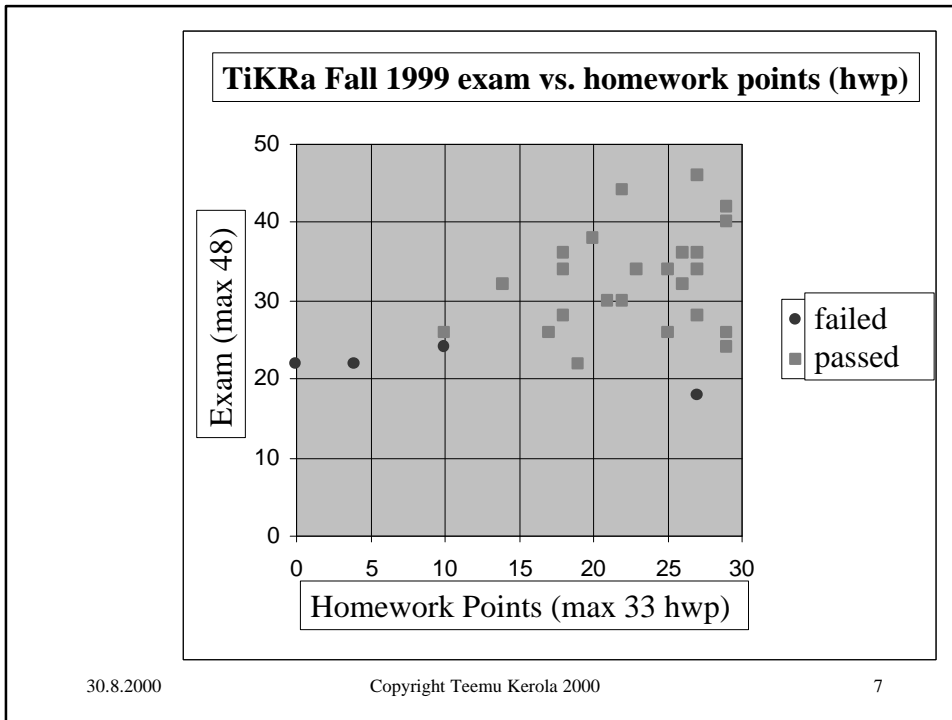30.8.2000   Copyright Teemu Kerola 2000   5

Motto

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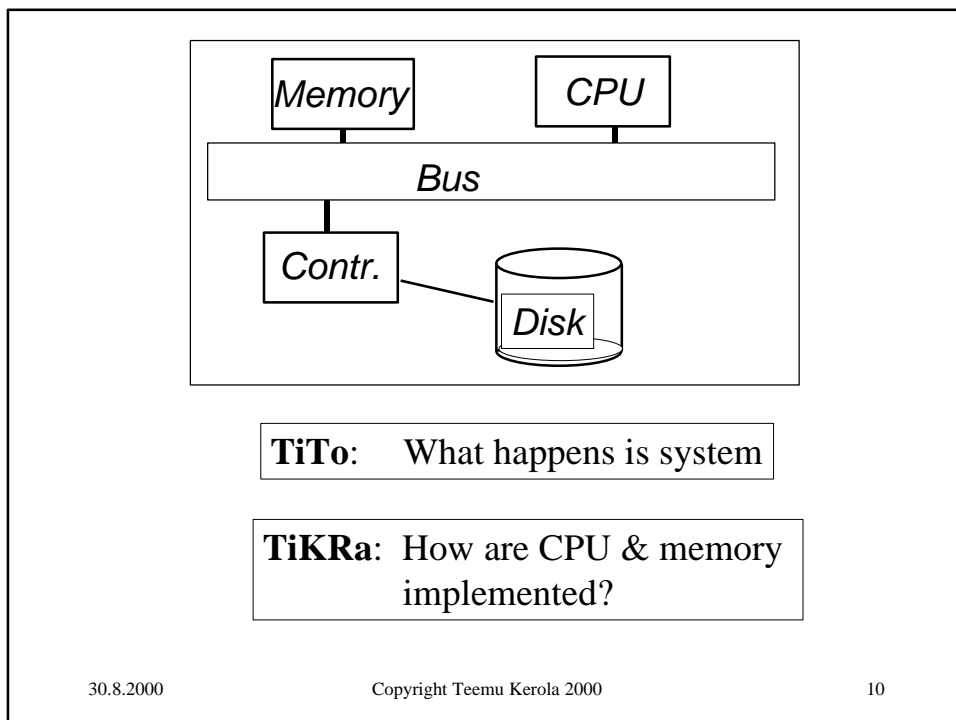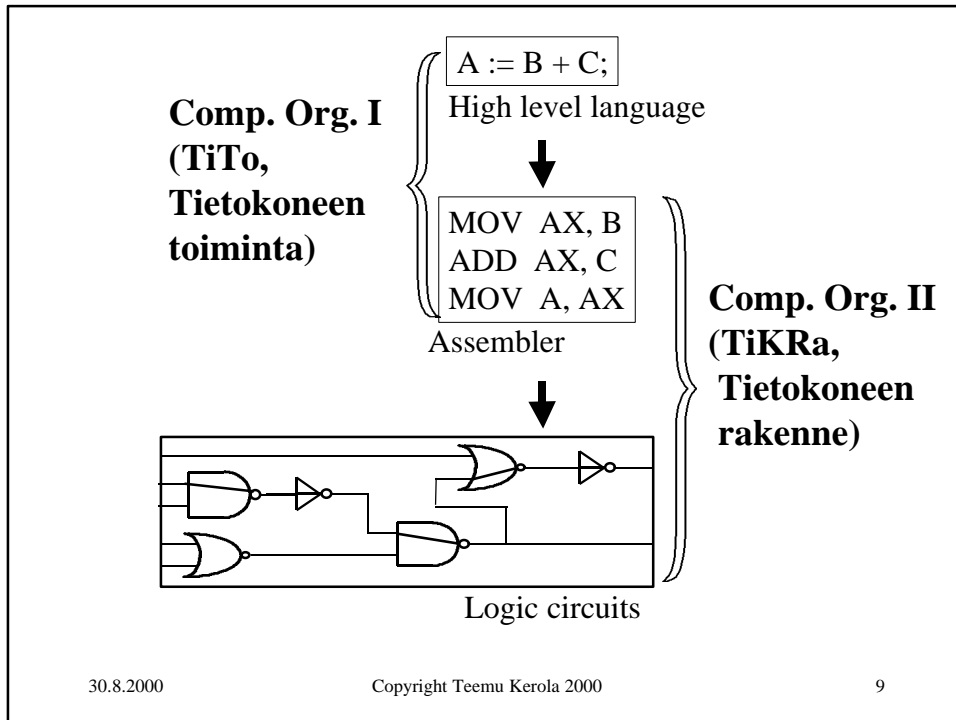 if you do not sweat"

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

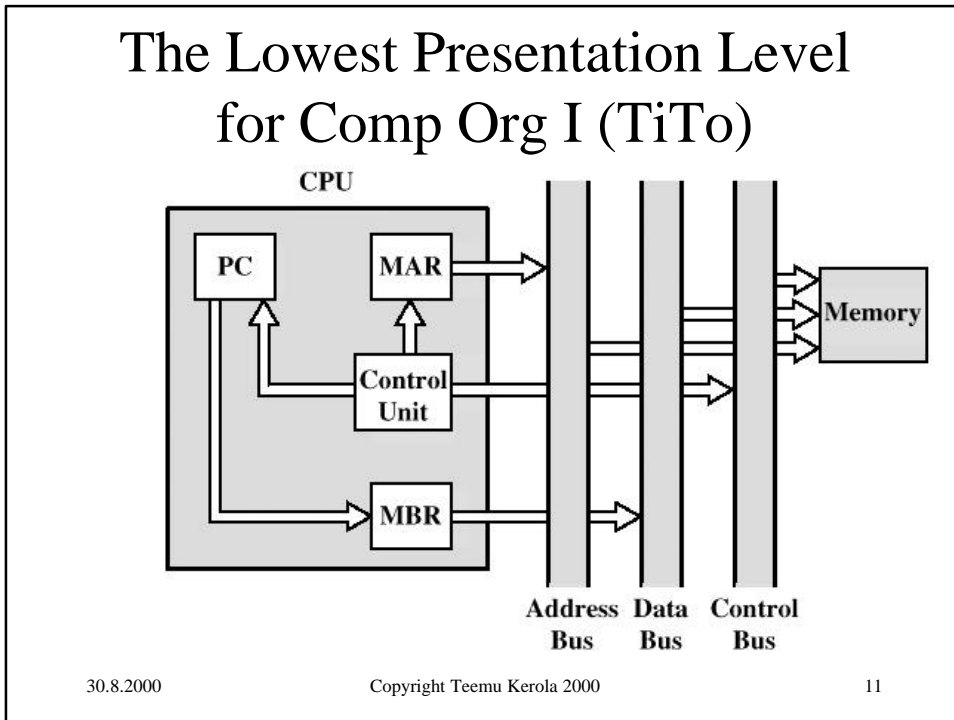30.8.2000   Copyright Teemu Kerola 2000   6

TiKRa Fall 1999 exam vs. homework points (hwp)

30.8.2000   Copyright Teemu Kerola 2000   7

WWW Information

- Course home page
    http://www.cs.helsinki.fi/Teemu.Kerola/tikra/
- This semester schedule
    .../tikra/S2000/aikataulu.html
- Lectures   *.../luennot/*
- Homeworks   *.../laskuharj/*
- Old exams   *.../tikra/kokeet/*
- Newsgroup   *hy.opiskelu.tktl.tikra*

30.8.2000   Copyright Teemu Kerola 2000   8

**Comp. Org. I
(TiTo,
Tietokoneen
toiminta)**

A := B + C;

High level language

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

Assembler

**Comp. Org. II
(TiKRa,
Tietokoneen
rakenne)**

Logic circuits

30.8.2000 Copyright Teemu Kerola 2000 9

Memory CPU

Bus

Contr.

Disk

TiTo: What happens is system

TiKRa: How are CPU & memory
             implemented?

30.8.2000 Copyright Teemu Kerola 2000 10

The Lowest Presentation Level for Comp Org I (TiTo)

CPU

PC   MAR

Control Unit

MBR

Memory

Address Bus   Data Bus   Control Bus

30.8.2000   Copyright Teemu Kerola 2000   11

The Lowest Presentation Level for Comp Org II (TiKRa)

CLOCK SIGNAL

NOR   NOT   NAND

CarryIn

A —32— Adder —32— Sum

B —32—   Carry

30.8.2000   Copyright Teemu Kerola 2000   12

Contents

- Computer system - overall structure (Ch 1-7)
- System buses (Ch 3)
- Digital logic (App A)
- Memory hierarchy (Ch 4.3, 7.4)
- Computer arithmetic (Ch 8)
- Instruction sets (Ch 9-10)
- CPU structure and function (Ch 11)
- Reduced Instruction Set Computers (Ch 12)
- Instr. level parall. and superscalar proc. (Ch 13)
- Control unit (Ch 14-15)