Information Systems
ISM 3011

Spring 2004
Unit 3A

Assignment for Next Class

- Read chapter 4 (pp. 130 - 171)
- Self-Assessment test (pp. 171-172)
- Check that you know the key terms listed on p. 171
- Prepare review questions 1, 13, 14
- **Prepare case studies 1, 2, 3!**

What's that?

Characteristics and Functionality

- **Data** - can be human or machine readable
- **Data entry** - converts human readable data into machine-readable form
- **Data input** - transfers machine-readable data into the system
- **Source data automation** - capturing and editing data at its source

Five Main Hardware Components

- Central processing unit (CPU)
- Primary storage (main memory; memory)
- Secondary storage
- Input devices
- Output devices

Hardware Components

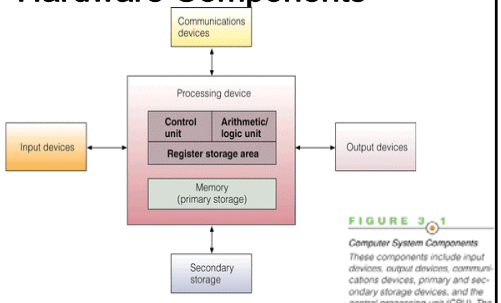


FIGURE 3-1
Computer System Components
These components include input devices, output devices, communications devices, primary and secondary storage devices, and the central processing unit (CPU). The control unit, the arithmetic/logic unit (ALU), and the register storage areas constitute the CPU.

Machine Language

CLEAR A	0000: 100
LOAD A, 7	0001: 200 7
LOAD B, 5	0003: 201 5
SUB A, B	0005: 150
JUMP TO 0034 IF ZERO	0006: 170 0034
	…
Assembler	0034: …
(Mnemonics)	Machine Language

Hardware Components in Action

- *Step 1*: Fetch instruction
- *Step 2*: Decode instruction
- *Step 3*: Execute the instruction
- *Step 4*: Store results

Hardware Components in Action

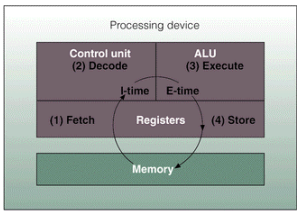
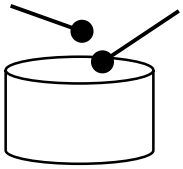


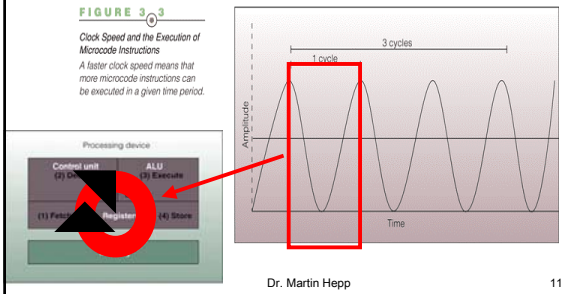
FIGURE 3.2
Execution of an Instruction
In the instruction phase, the computer's control unit fetches the instruction to be executed from memory (1). Then the instruction is decoded so the central processor can understand what is to be done (2). In the execution phase, the ALU does what it is instructed to do, making either an arithmetic computation or a logical comparison (3). Then the results are stored in the registers or in memory (4). The instruction and execution phases together make up one machine cycle.

Clock Speed – The Computer's Drum Beat



Clock Speed

FIGURE 3.3
Clock Speed and the Execution of Microcode Instructions
A faster clock speed means that more microcode instructions can be executed in a given time period.



Physical Characteristics of the CPU

- Digital circuits on chips
- Electrical current flows through silicon
- "Moore's Law" - transistor density of chips will double every 18 months

…Human capabilities do not double every 18 months!

Moore's Law

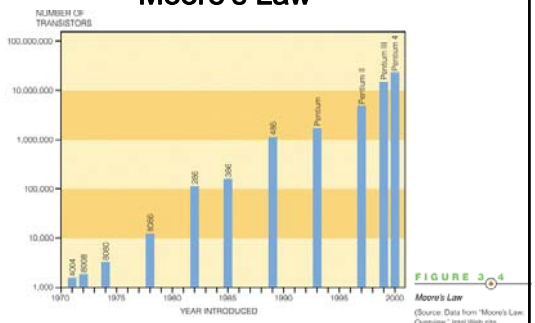


FIGURE 3-4
Moore's Law
(Source: Data from "Moore's Law Overview," Intel Web site, www.intel.com/research/silicon/mooreslaw.htm, accessed July 22, 2002.)

Complex and Reduced Instruction Set Computing

- **Complex instruction set computing (CISC)** - places as many microcode instructions into the central processor as possible
  (French Restaurant ☺)
- **Reduced instruction set computing (RISC) -** involves reducing the number of microcode instructions built into a chip to an essential set of common microcode instructions
  (Fast food ☺)

Secondary Storage

- Offers the advantages of nonvolatility, greater capacity, and greater economy
- Access methods, storage capacities, and portability required are determined by the information system's objectives

Access Methods

- **Sequential**: records must be retrieved in order
  - Devices used are called sequential access storage devices (SASD)
- **Direct**: records can be retrieved in any order
  - Devices used are called direct access storage devices (DASDs)

Devices

- Magnetic tapes
- Magnetic disks
- RAID
- Storage area networks (SAN)
- Optical disks
- Magneto-optical (MO) disks
- Digital versatile disks (DVDs)

Hard Disks

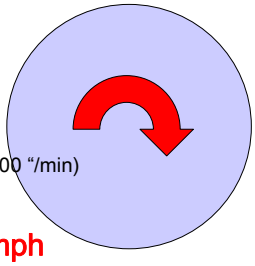
•Platters
•Read/Write Head
•Actuator Arm

http://computer.howstuffworks.com/hard-disk.htm/printable

Speed

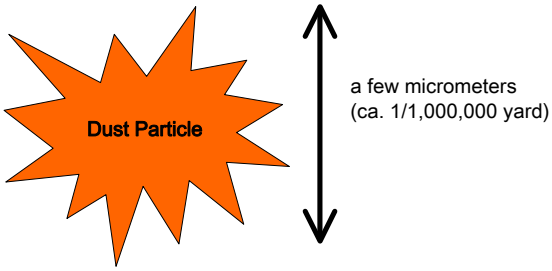
r = 3.5" / 2
diameter = 3.5 "
circumference = 2π r

⇒3.5" * 3.1415 = ca. 11"



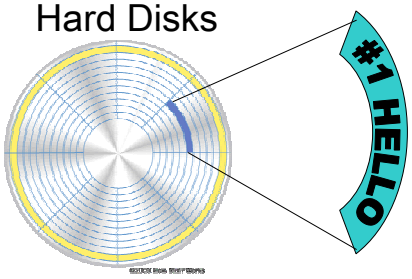
⇒7200 rpm
⇒11" * 7,200 inch/minute (79,200 "/min)
⇒11" * 7,200 * 60 inch/hour
⇒4,752,000 inch/hour
⇒4,752,000 / 63,360 => **75 mph**

Dust and Abrasion



Hard Disks

- Tracks
- Sectors



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How should you organize backup copies of your data?

Thank you!

The slides will be available on the internet at
http://ruby.fgcu.edu/courses/mhepp/
(-> CRN10033)