

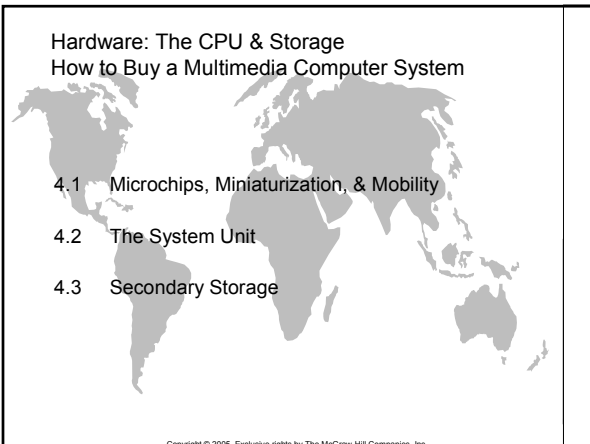
Using Information Technology

Chapter 3

Hardware: The CPU & Storage

Hardware: The CPU & Storage

How to Buy a Multimedia Computer System

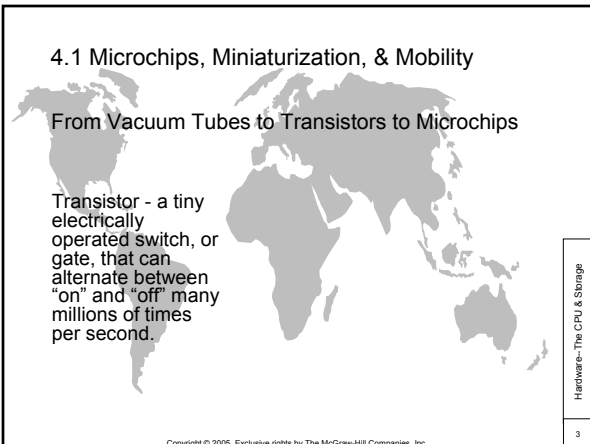


- 4.1 Microchips, Miniaturization, & Mobility
- 4.2 The System Unit
- 4.3 Secondary Storage

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4.1 Microchips, Miniaturization, & Mobility

From Vacuum Tubes to Transistors to Microchips



Transistor - a tiny electrically operated switch, or gate, that can alternate between "on" and "off" many millions of times per second.

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Hardware: The CPU & Storage

Miniaturization Miracles: Microchips, Microprocessors, & Micromachines

Microchips store and process data in all electronic gadgetry.

A microprocessor is the miniaturized circuitry of a computer processor.



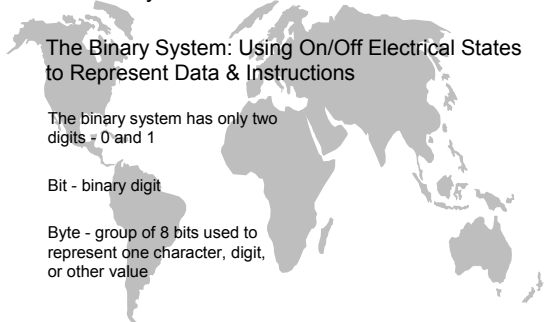
4.2 The System Unit

The Binary System: Using On/Off Electrical States to Represent Data & Instructions

The binary system has only two digits - 0 and 1

Bit - binary digit

Byte - group of 8 bits used to represent one character, digit, or other value



The Binary System: Using On/Off Electrical States to Represent Data & Instructions

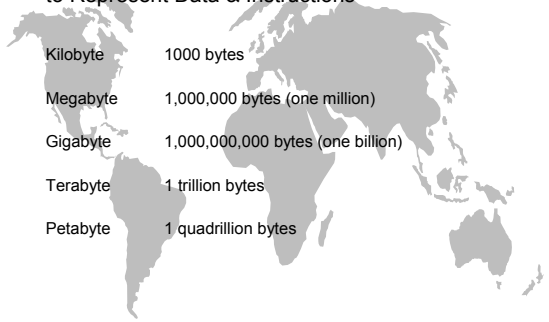
Kilobyte 1000 bytes

Megabyte 1,000,000 bytes (one million)

Gigabyte 1,000,000,000 bytes (one billion)

Terabyte 1 trillion bytes

Petabyte 1 quadrillion bytes

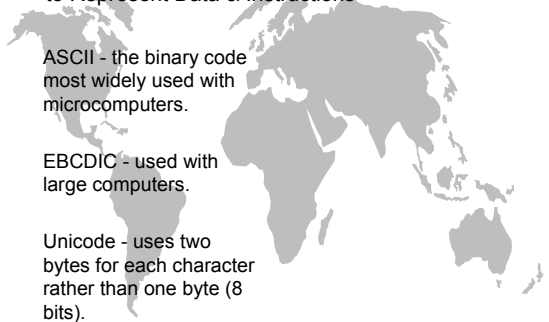


The Binary System: Using On/Off Electrical States to Represent Data & Instructions

ASCII - the binary code most widely used with microcomputers.

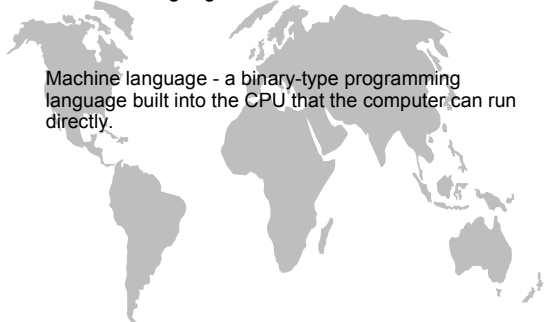
EBCDIC - used with large computers.

Unicode - uses two bytes for each character rather than one byte (8 bits).



Machine Language

Machine language - a binary-type programming language built into the CPU that the computer can run directly.



The Computer Case: Bays, Buttons & Boards

Bay - a shelf or opening used for the installation of electronic equipment.

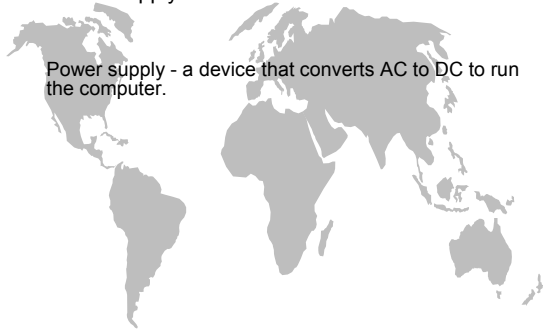
System unit - houses the motherboard, power supply, and storage devices.

Case - the empty box with just power supply.



Power Supply

Power supply - a device that converts AC to DC to run the computer.

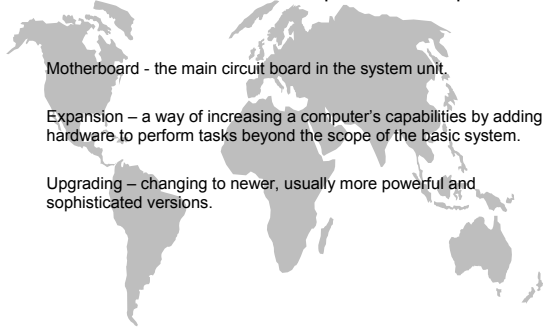


The Motherboard & the Microprocessor Chip

Motherboard - the main circuit board in the system unit.

Expansion – a way of increasing a computer’s capabilities by adding hardware to perform tasks beyond the scope of the basic system.

Upgrading – changing to newer, usually more powerful and sophisticated versions.

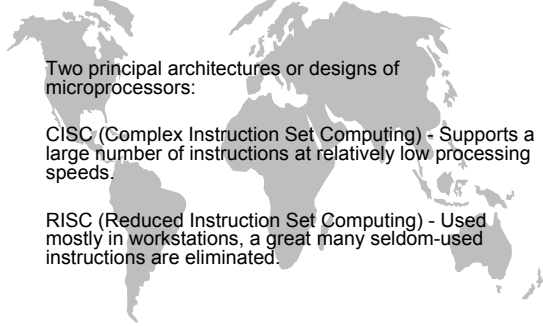


The Motherboard & the Microprocessor Chip

Two principal architectures or designs of microprocessors:

CISC (Complex Instruction Set Computing) - Supports a large number of instructions at relatively low processing speeds.

RISC (Reduced Instruction Set Computing) - Used mostly in workstations, a great many seldom-used instructions are eliminated.

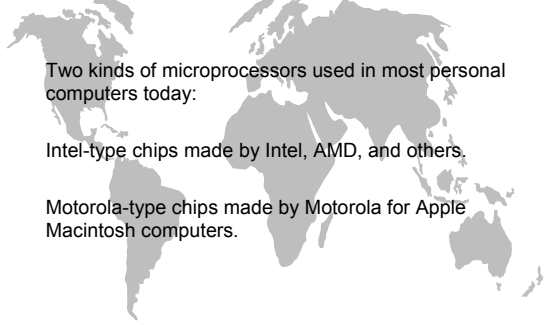


The Motherboard & the Microprocessor Chip

Two kinds of microprocessors used in most personal computers today:

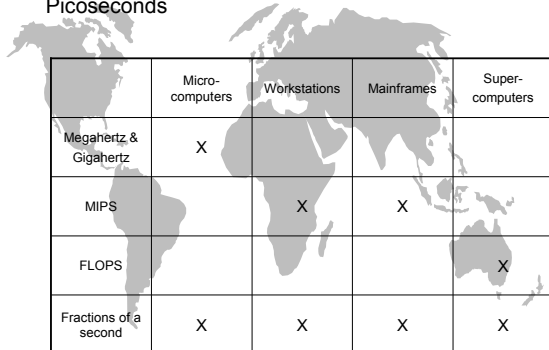
Intel-type chips made by Intel, AMD, and others.

Motorola-type chips made by Motorola for Apple Macintosh computers.

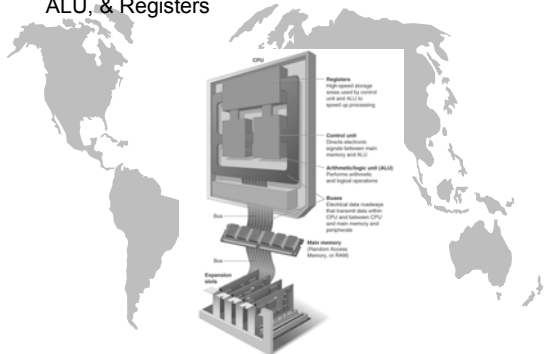


Processing Speeds: From Megahertz to Picoseconds

	Micro-computers	Workstations	Mainframes	Super-computers
Megahertz & Gigahertz	X			
MIPS		X	X	
FLOPS				X
Fractions of a second	X	X	X	X



How the Processor or CPU works: Control Unit, ALU, & Registers



How Memory Works: RAM, ROM, CMOS, & Registers

The CPU follows the instructions of the software to manipulate data into information.

The CPU consist of:

The control unit – for directing electronic signals.

The arithmetic/logic unit – for arithmetic and logical operations and to control the speed of those operations.

How Memory Works: RAM, ROM, CMOS, & Flash

Types of memory chips:

- 1 RAM – to temporarily store program instructions and data
- 2 ROM – to store fixed start-up instructions
- 3 CMOS – to store flexible start-up instructions
- 4 Flash – to store flexible programs

How Cache Works: Level 1 (Internal) & Level 2 (External)

Cache - temporary storage for instructions and data that the processor is likely to use frequently, thus speeding up processing.

Level 1 (L1) cache – part of the processor chip

Level 2 (L2) cache – not part of the microprocessor chip

Virtual memory - free hard-disk space used to extend the capacity of RAM

Ports & Cables

A port is a connecting socket or jack on the outside of the system unit into which are plugged different kinds of cables.

1. Serial port - sends bits one at a time, one after another
2. Parallel port
3. SCSI port
4. USB port
5. FireWire port
6. Dedicated port
7. Infrared port

Ports & Cables

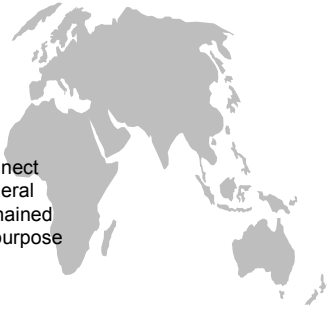
1. Serial port
2. Parallel port - transmits 8 bits simultaneously
3. SCSI port
4. USB port
5. FireWire port
6. Dedicated port
7. Infrared port

Ports & Cables

1. Serial port
2. Parallel port
3. SCSI port - allows data to be transmitted in a "daisy chain" to up to 7 devices
4. USB port
5. FireWire port
6. Dedicated port
7. Infrared port

Ports & Cables

1. Serial port
2. Parallel port
3. SCSI port
4. USB port - can theoretically connect up to 127 peripheral devices daisy-chained to one general-purpose port
5. FireWire port
6. Dedicated port
7. Infrared port



Ports & Cables

1. Serial port
2. Parallel port
3. SCSI port
4. USB port
5. FireWire port – for camcorders, DVD players, and TVs
6. Dedicated port
7. Infrared port



Ports & Cables

1. Serial port
2. Parallel port
3. SCSI port
4. USB port
5. FireWire port
6. Dedicated port - special-purpose ports
7. Infrared port



Ports & Cables

1. Serial port
2. Parallel port
3. SCSI port
4. USB
5. FireWire port
6. Dedicated port
7. Infrared port – allows a computer to make a cableless connection with infrared-capable devices

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Expandability: Buses & Cards

Expansion slots - sockets on the motherboard into which you can plug expansion cards.

Expansion cards - circuit boards that provide more memory or that control peripheral devices.

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Expandability: Buses & Cards

ISA bus - for ordinary low-speed uses; the most widely used expansion bus

PCI bus - for higher-speed uses; used to connect graphics cards, sound cards, modems, and high-speed network cards

AGP bus - for even higher speeds and 3D graphics

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Expandability: Buses & Cards

Graphics cards - for monitors

Sound cards - for speakers and audio output

Modem cards - for remote communication via phone lines

Network interface cards - for remote communication via cable

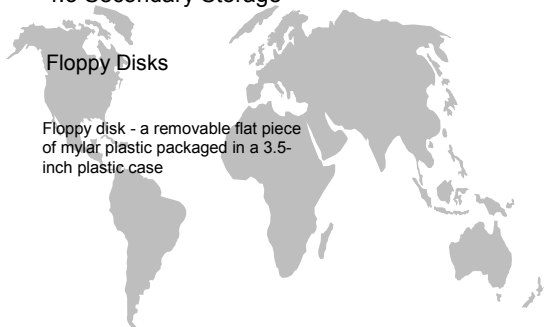
PC cards - for laptop computers



4.3 Secondary Storage

Floppy Disks

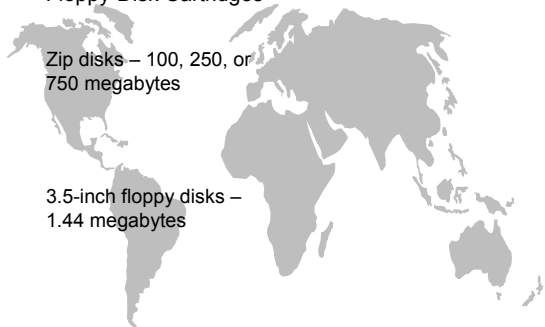
Floppy disk - a removable flat piece of mylar plastic packaged in a 3.5-inch plastic case



Floppy-Disk Cartridges

Zip disks - 100, 250, or 750 megabytes

3.5-inch floppy disks - 1.44 megabytes



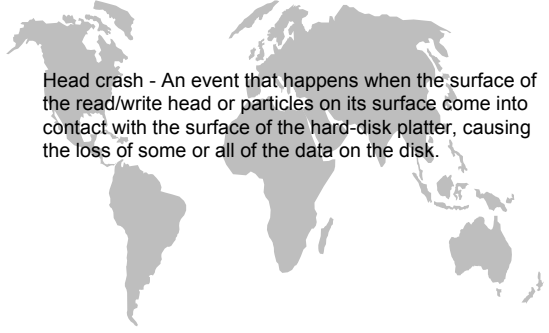
Hard Disks

Hard disks - thin but rigid metal, glass, or ceramic platters covered with a substance that allows data to be held in the form of magnetized spots.



Hard Disks

Head crash - An event that happens when the surface of the read/write head or particles on its surface come into contact with the surface of the hard-disk platter, causing the loss of some or all of the data on the disk.



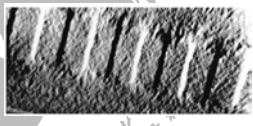
Hard Disks

Nonremovable hard disks - housed in a microcomputer system unit and used to store nearly all programs and most data files.



Hard Disks

Removable hard disks - one or two platters enclosed along with read/write heads in a hard plastic case, which is inserted into the microcomputer's cartridge drive.



Bits on disk - dark stripes are 0 bits and bright stripes are 1 bits

Optical Disks: CDs & DVDs

Optical disk - a removable disk on which data is written and read through the use of laser beams.

Optical Disks: CDs & DVDs

CD-ROM - read only. For pre-recorded text, graphics, and sound

CD-R - for recording on once

CD-RW - for rewriting many times

Optical Disks: CDs & DVDs

DVD-ROM - for reading only

DVD-R - for recording on once

For rewriting many times:

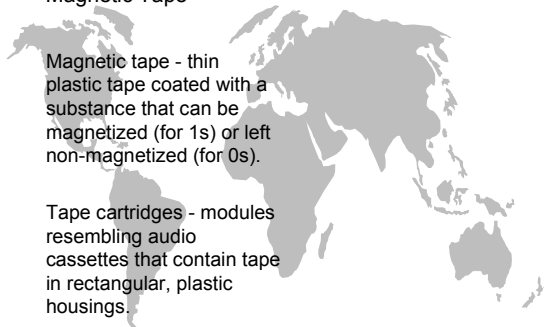
- DVD-RW
- DVD-RAM
- DVD+RW



Magnetic Tape

Magnetic tape - thin plastic tape coated with a substance that can be magnetized (for 1s) or left non-magnetized (for 0s).

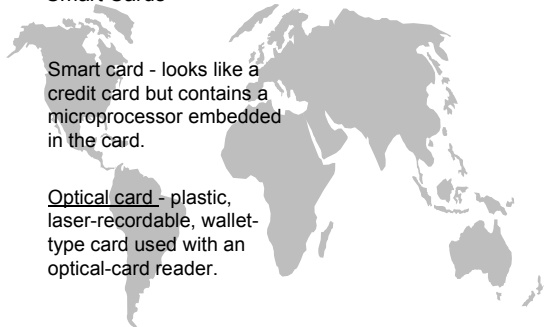
Tape cartridges - modules resembling audio cassettes that contain tape in rectangular, plastic housings.



Smart Cards

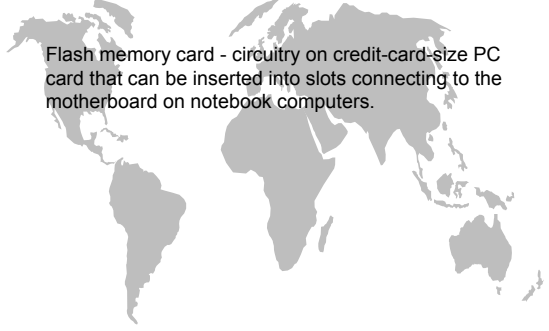
Smart card - looks like a credit card but contains a microprocessor embedded in the card.

Optical card - plastic, laser-recordable, wallet-type card used with an optical-card reader.



Flash Memory Cards

Flash memory card - circuitry on credit-card-size PC card that can be inserted into slots connecting to the motherboard on notebook computers.



Online Secondary Storage

@Backup

Connected Online Backup