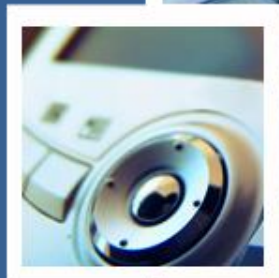# System Unit Components

Chapter2

ITBIS105

The System Unit

- What is the system unit?

  ➢ Case that contains electronic components of the computer used to process data

  ▪ Sometimes called the chassis

system unit

system unit

system unit

system unit

The System Unit

What are common components inside the system unit?

- ➢ **Processor**
- ➢ **Memory**
- ➢ **Adapter cards**
  - ▪ Sound card
  - ▪ Modem card
  - ▪ Video card
  - ▪ Network card
- ➢ **Ports**
- ➢ **Drive bays**
- ➢ **Power supply**

power supply

drive bays

intel pentium 4

processor

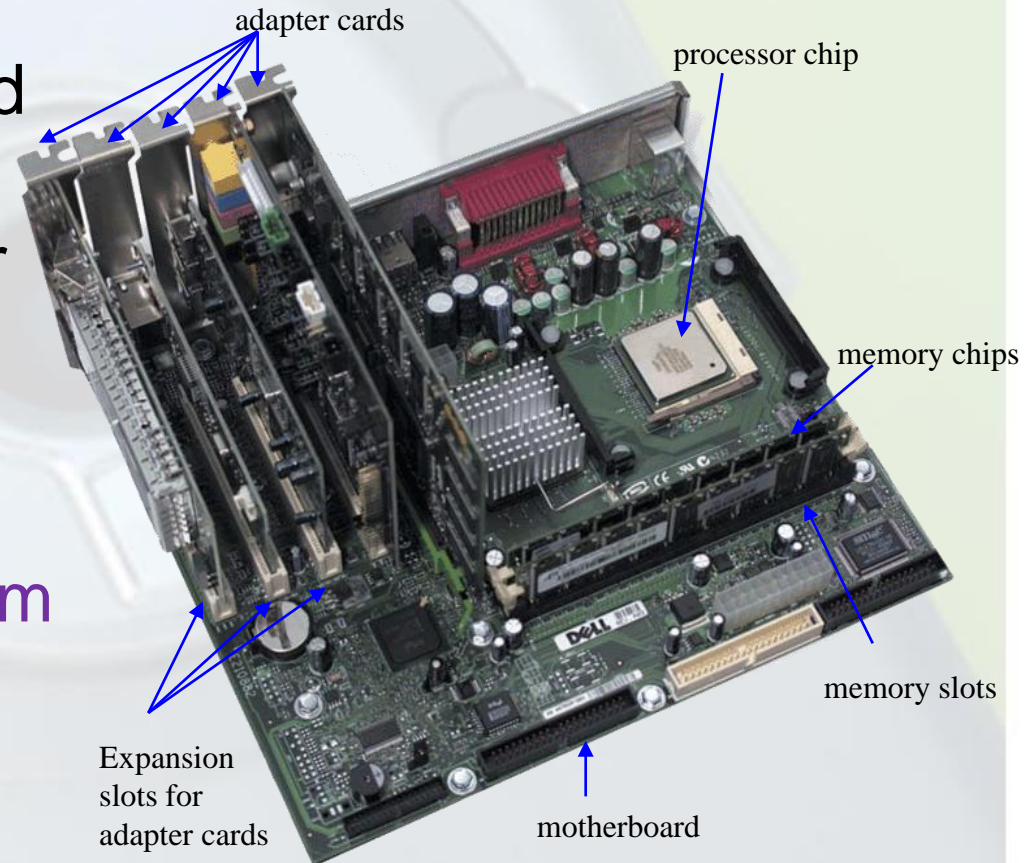memory

ports

sound card

network card

modem card

video card
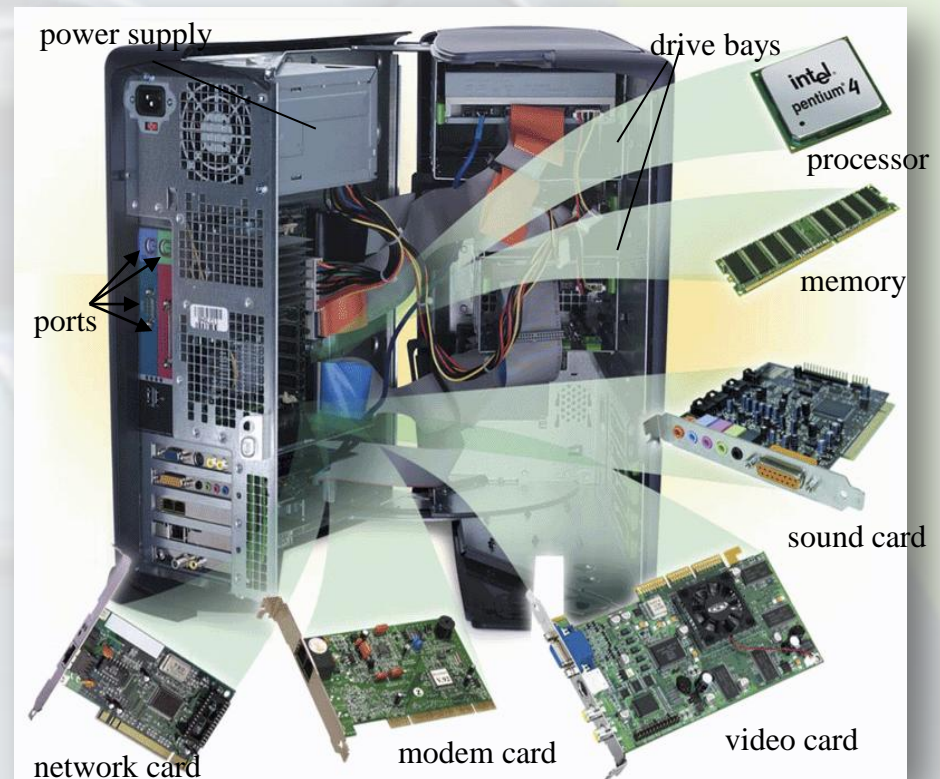
The System Unit

What is the motherboard?

- Main circuit board in system unit
- Contains adapter cards, processor chips, and memory chips
- Also called system board

adapter cards

processor chip

memory chips

Expansion slots for adapter cards

memory slots

motherboard

The System Unit

- ## What is a chip?

  ➢ Small piece of semi-conducting material on which integrated circuits are etched

    ▪ Integrated circuits contain many microscopic pathways capable of carrying electrical current

  ➢ **Chips are packaged so they can be attached to a circuit board**

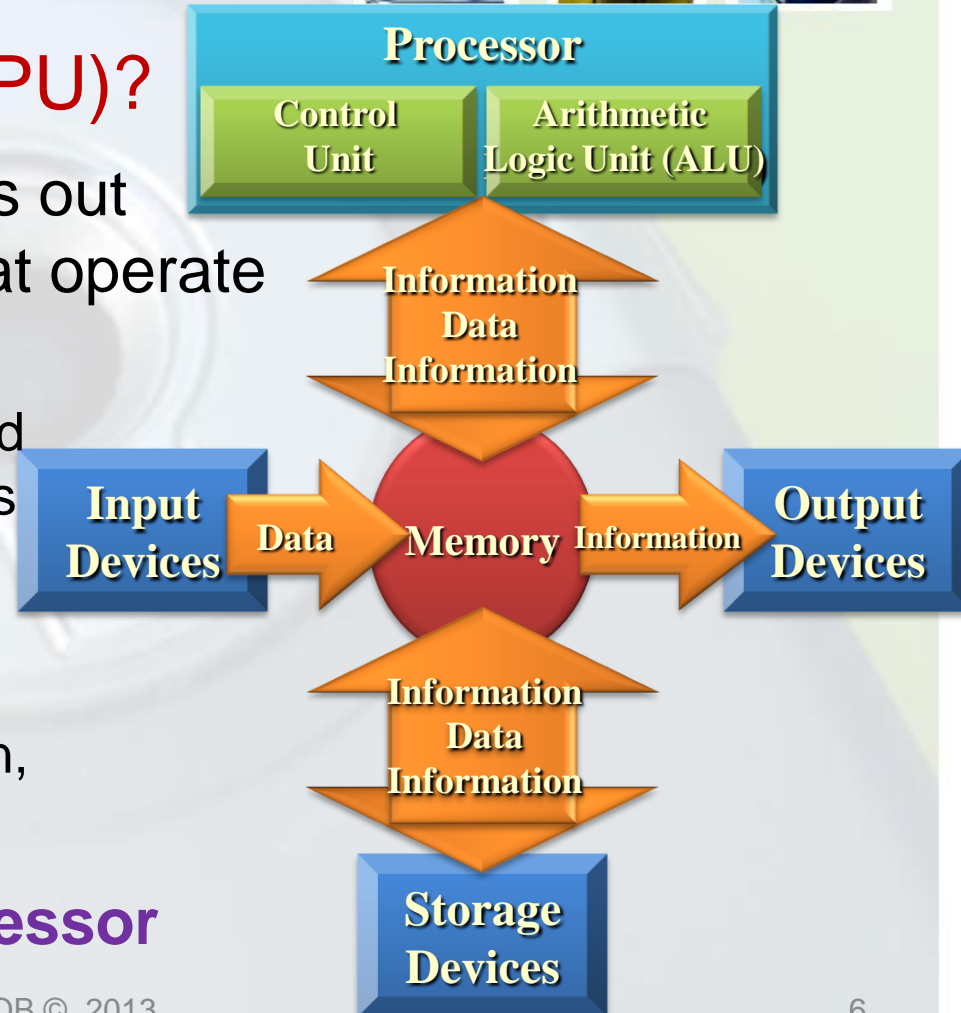dual inline packages (DIP) holds memory chips

pin grid array (PGA) package holds processor chips

Central Processing Unit

What is the central processing unit (CPU)?

➢ Interprets and carries out basic instructions that operate a computer

- Control unit directs and coordinates operations in computer
- Arithmetic logic unit (ALU) performs arithmetic, comparison, and logical operations
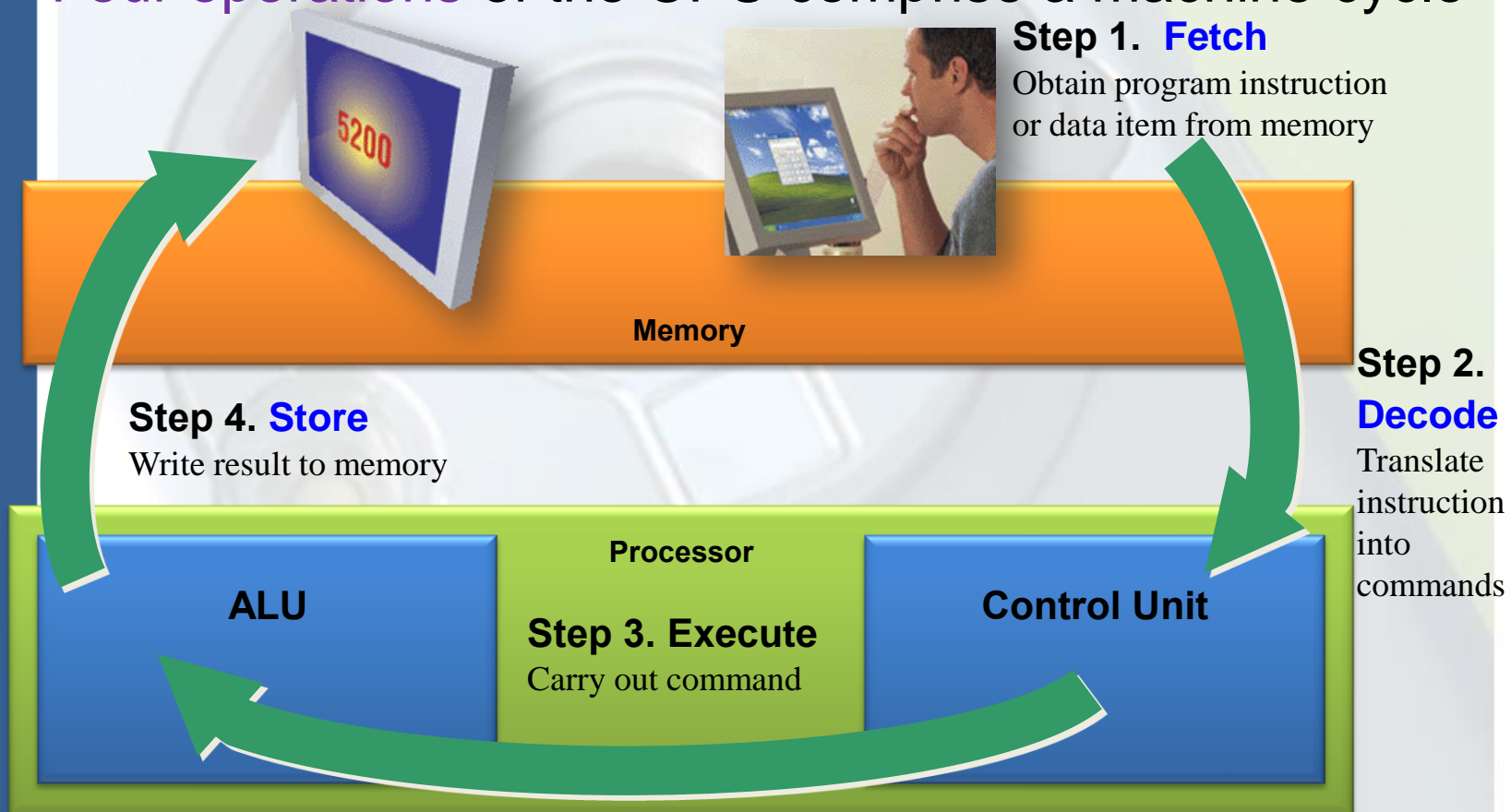
➢ Also called the **processor**

Processor

Control Unit	Arithmetic Logic Unit (ALU)

Information
Data
Information

Input Devices → Data → Memory → Information → Output Devices

Information
Data
Information

Storage Devices

Central Processing Unit

What is a machine cycle?

Four operations of the CPU comprise a machine cycle

Step 1. Fetch
Obtain program instruction or data item from memory

Memory

Step 2. Decode
Translate instruction into commands

Step 4. Store
Write result to memory

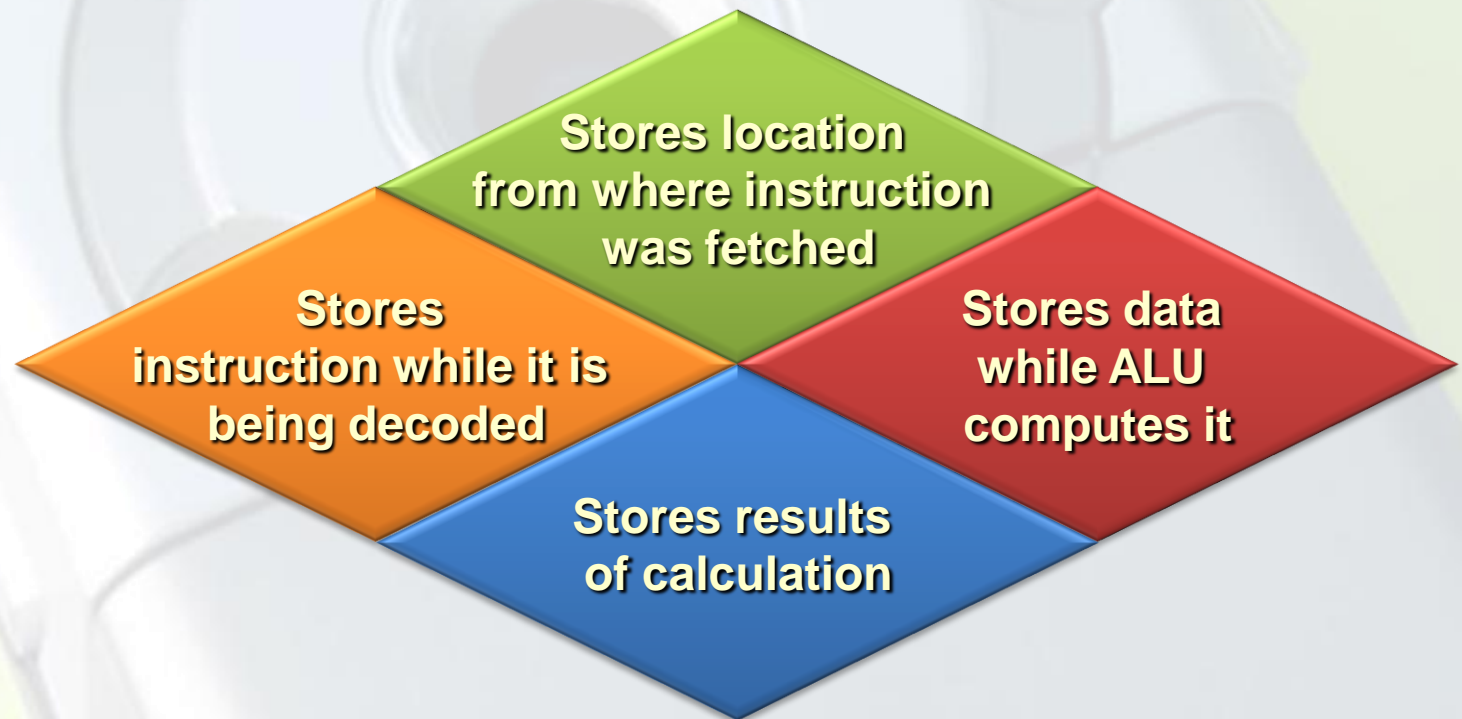**Processor**

ALU

Step 3. Execute
Carry out command

Control Unit

5200

Central Processing Unit

- What is a register?

Temporary high-speed storage area that holds data and instructions

Stores location from where instruction was fetched

Stores instruction while it is being decoded

Stores data while ALU computes it

Stores results of calculation

Central Processing Unit

Comparison of Widely Used Personal Computer Processors		
Name	**Date Introduced**	**Clock Speed**
Itanium® 2	2002	1 GHz and up
Xeon™	2001	1.4–2.4 GHz
Itanium®	2001	733–800 MHz
Pentium® 4	2000	1.4–2.53 GHz
Pentium® III Xeon ™	1999	500–900 MHz
Pentium® III	1999	400 MHz–1.2 GHz
Celeron®	1998	266 MHz–1.8 GHz
Operon™	2003	To come
Athlon™ MP	2002	1.53–1.6 GHz
Athlon™ XP	2001	1.33–1.73 GHz
Athlon™	1999	500 MHz–1.4 GHz

Data Representation

- How do computers represent data?
  - ➢ **Most computers are digital**

| BINARY DIGIT (BIT)	ELECTRONIC CHARGE	ELECTRONIC STATE
1		ON
0		OFF

- Recognize only two discrete states: on or off
- Use a **binary system** to recognize two states
- Use Number system with two unique digits: 0 and 1, called **bits** (short for binary digits)

Data Representation

- ## What is a byte?

➢ **Eight bits grouped together as a unit**

➢ **Provides enough different combinations of 0s and 1s to represent 256 individual characters**

- Numbers
- Uppercase and lowercase letters
- Punctuation marks
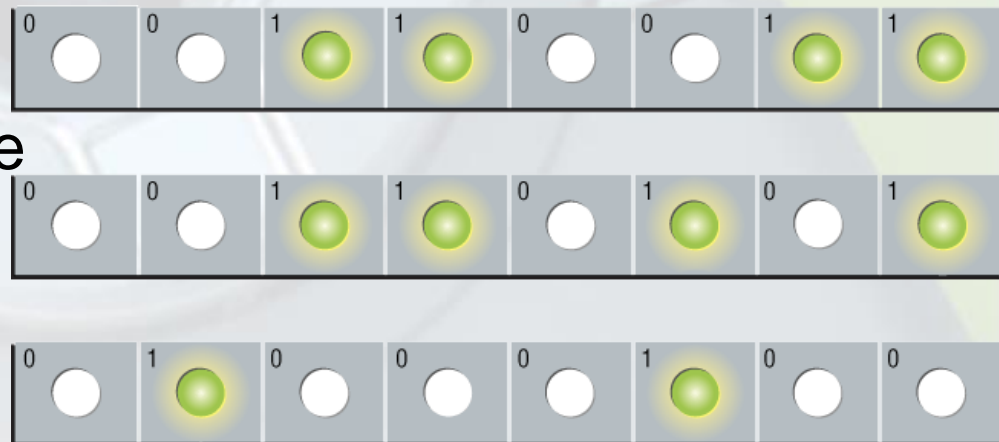
Data Representation

How is a letter converted to binary form and back?

Step 1.
The user presses the capital letter **D** (shift+D key) on the keyboard.

Step 2.
An electronic signal for the capital letter **D** is sent to the system unit.

Step 3.
The signal for the capital letter **D** is converted to its ASCII binary code (01000100) and is stored in memory for processing.

Step 4.
After processing, the binary code for the capital letter **D** is converted to an image, and displayed on the output device.
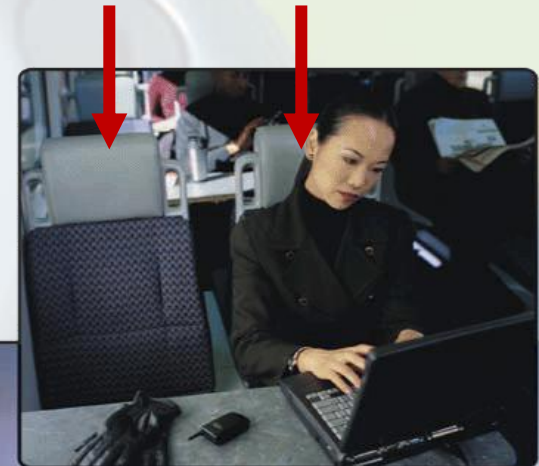
Memory

- ## What is memory?

  ➢ Electronic components that store instructions, data, and results

  ➢ Consists of one or more chips on motherboard or other circuit board

  ➢ Each byte stored in unique location called an address, similar to addresses on a passenger train

Seat #2B4   Seat #2B3

Memory

- How is memory measured?
  - By number of bytes available for storage

Term	Abbreviation	Approximate Size
Kilobyte	KB or K	1 thousand bytes
Megabyte	MB	1 million bytes
Gigabyte	GB	1 billion bytes
Terabyte	TB	1 trillion bytes

Memory

(1) Random access memory (RAM)

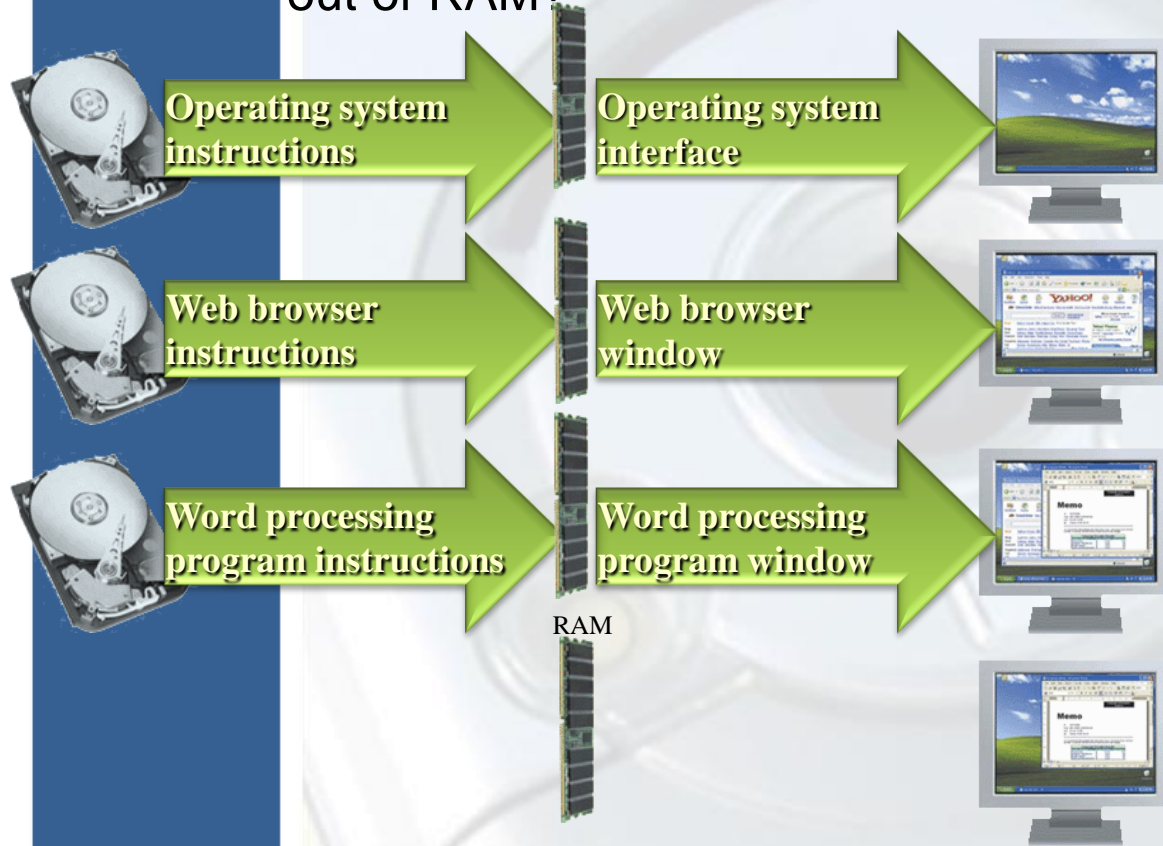Memory chips that can be read from and written to by processor

Also called **main memory** or **primary storage**

Most RAM is **volatile**, it is lost when computer's power is turned off

The more RAM a computer has, the faster it responds

Memory

How do program instructions transfer in and out of RAM?

Operating system instructions → **Operating system interface** →

Web browser instructions → **Web browser window** →

Word processing program instructions → **Word processing program window** →

RAM

Web browser program instructions are removed from RAM

Web browser window no longer is displayed on desktop

Step 1. When you start the computer, certain operating system files load into RAM from the hard disk. The operating system displays the user interface on the screen.

Step 2. When you start a Web browser, the program's instructions load into RAM from the hard disk. The Web browser window is displayed on the screen.

Step 3. When you start a word processing program, the program's instructions load into RAM from the hard disk. The word processing program, along with the Web Browser and certain operating system instructions are in RAM. The word processing program window is displayed on the screen.

Step 4. When you quit a program, such as the Web browser, its program instructions are removed from RAM. The Web browser no longer is displayed on the screen.

Memory

How much RAM do you need?

➢ **Depends on type of applications you intend to run on your computer**

RAM	128 to 256 MB	256 to 1 GB	1 GB and up
Use	• Home and business users managing personal finance • Using standard application software such as word processing • Using educational or entertainment CD-ROMs • Communicating with others on the Web	• Users requiring more advanced multimedia capabilities • Running number-intensive accounting, financial, or spreadsheet programs • Using voice recognition • Working with videos, music, and digital imaging • Creating Web sites • Participating in video conferences • Playing Internet games	• Power users creating professional Web sites • Running sophisticated CAD, 3D design, or other graphics-intensive software

Memory

(2) Read-only memory (ROM)

Memory chips that store permanent data and instructions

Nonvolatile memory, **it is not lost when computer's power is turned off**

Three types:

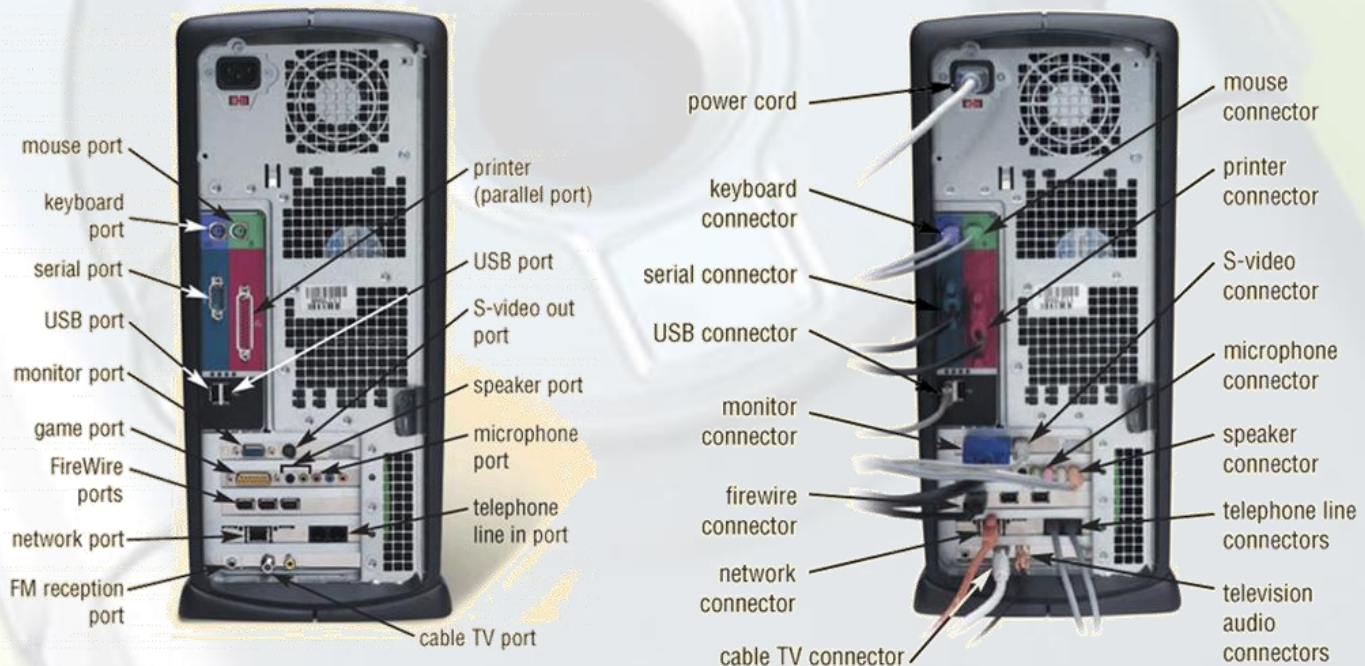**Firmware—** Manufactured with permanently written data, instructions, or information

PROM (programmable read-only memory)— Blank ROM chip onto which a programmer can write permanently

EEPROM (electrically erasable programmable read-only memory)— Type of PROM containing microcode programmer can erase

Ports

- What are ports and connectors?
  - Port connects external devices to system unit
  - Connector joins cable to peripheral

mouse port
keyboard port
serial port
USB port
monitor port
game port
FireWire ports
network port
FM reception port

printer (parallel port)
USB port
S-video out port
speaker port
microphone port
telephone line in port
cable TV port

power cord
keyboard connector
serial connector
USB connector
monitor connector
firewire connector
network connector

mouse connector
printer connector
S-video connector
microphone connector
speaker connector
telephone line connectors
television audio connectors
cable TV connector

IS-IT-UOB © 2013

Buses

- ## What is a bus?

  ➤ Channel that allows devices inside computer to communicate with each other

  ▪ **System bus** connects processor and RAM

  ▪ **Bus width** determines number of bits transmitted at one time

  ▪ **Word size** is the number of bits processor can interpret and execute at a given time

processor

memory chips