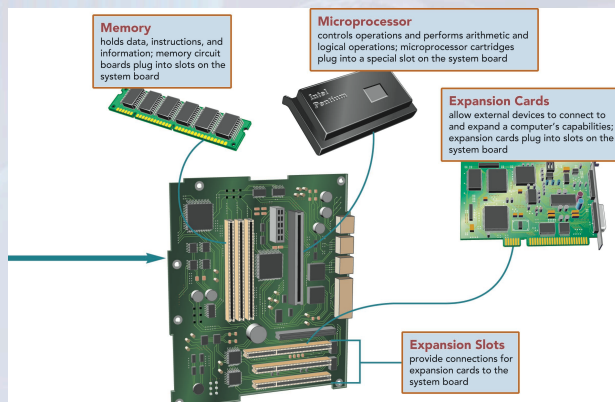# Chapter 6

The System Unit

1

Introduction

Speed, capacity, and flexibility determine the power of microcomputers. Knowledge of a computer's power allows you to make good buying decisions and to determine if your current system will run new applications. Competent end users need to understand the basic principles of how microcomputers are put together. These principles will be covered in this chapter.
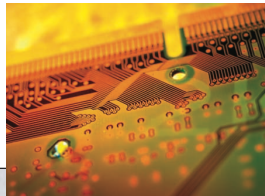
6-

2

System Unit

Memory
holds data, instructions, and information; memory circuit boards plug into slots on the system board

Microprocessor
controls operations and performs arithmetic and logical operations; microprocessor cartridges plug into a special slot on the system board

Expansion Cards
allow external devices to connect to and expand a computer's capabilities; expansion cards plug into slots on the system board

Expansion Slots
provide connections for expansion cards to the system board

6-

3

System Unit Types

- **Desktop System Units**

- **Notebook System Units**

- **Tablet PC System Units**

- **Handheld Computer**

  System Units

Desktop (tower model)   PDA

Notebook   Tablet PC

Electronic Data and Instructions

- **Data and instructions are represented electronically**
- **Two-state system or Binary System**
  - **Off/on electrical states**
  - **Characters represented by 0s (off) and 1s (on)**
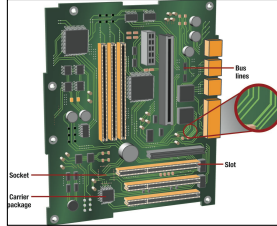 - **Bits**
  - **Bytes**

Binary Coding Schemes

- **Three types of binary coding schemes**
  - **ASCII - American Standard Code for Information Exchange**
  - **EBCDIC - Extended Binary Coded Decimal Interchange Code**
  - **Unicode – handles languages with large numbers of characters**

Code	Uses
ASCII	Microcomputers
EBCDIC	Large computers
Unicode	International languages

System Board

- **Connects all components**
- **Allows communication between devices**
- Main board or **motherboard**
- **Circuit board**
  electronic components
  - **Sockets**
  - **Slots**
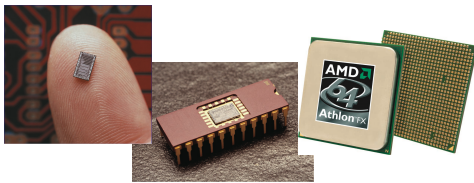 - **Bus lines**

6- 7

Microprocessor

- **Central Processing Unit (CPU)**
- **Two Basic Components**
  - **Control unit**
  - **Arithmetic-logic unit (ALU)**

Unit	Speed
Microsecond	Millionth of a second
Nanosecond	Prepare written documents
Picosecond	Trillionth of a second

6- 8

Microprocessor Chips

- **Chip capacities are expressed in word sizes**
- **Two Recent Significant Developments**
  - **64**-bit **processors**
    - **Becoming more commonplace**
    - **Windows XP Professional X64 Edition**
  - **Dual-Core Chips**
    - **Can provide two separate and independent CPUs**
    - **Parallel processing**

Processor	Manufacturer	Description
Pentium 4	Intel	32-bit
Core 2	Intel	64-bit, dual-core
Xeon	Intel	64-bit, dual-core
Athlon 64	AMD	64-bit, dual-core
Opteron	AMD	64-bit, dual-core
PowerPC	IBM	64-bit, dual-core

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New Chips

- **Apple's new chip from Intel Core Technology**
  - **The Intel Core 2 Duo is actually two processors (cores) engineered onto a single chip http://www.apple.com/intel/**
- **Intel announced multi-core chips available with 6 microprocessors on 9/13 http://afp.google.com/article/ALeqM5ic7yenB9Jvd8KRmQHk6IRIL63pdQ**
- **New chip from Intel : code-named Larrabee, will be available in late 2009 or early 2010. (may have 16-48 cores!)**

6- 10

Specialty Processors

- **Coprocessors**
  - **Designed to improve specific computing operations**
  - **Graphics coprocessors**

- **Smart cards**
  - **Credit card sized with an embedded chip**
  - **Used by many universities**

- **RFID tags**
  - **Information chips**
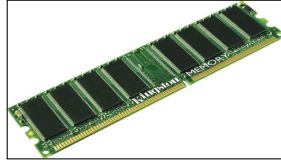 - **Used for tracking purposes**

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Memory

- **Holding area for data, instructions, and information**
- **Memory is contained on chips connected to the system board**
- **Types of memory chips**
  - **RAM**
  - **ROM**
  - **CMOS**

Type	Use
RAM	Programs and data
ROM	Fixed start-up instructions
CMOS	Flexible start-up instructions

6- 12

RAM

- **Random Access Memory (RAM) chips hold the program and data**
  - Cache memory **or RAM cache**
  - **Flash RAM or** flash memory
- **Other types of RAM**
  - **DRAM**
  - **SDRAM**
  - **DDR**
  - **Direct RDRAM**

6- 13

ROM

- **Read-only memory (ROM) chips are not volatile and cannot be changed by the user**
- **CPU can read, or retrieve data and programs but the computer cannot write**
- **Contain special instructions**
  - **Needed to start a computer**
  - **Give keyboard keys their special capabilities**
  - **Put characters on screen**

6- 14

CMOS

- **Complementary metal-oxides semiconductor (CMOS) chips provide flexibility for a computer system**
- **Contains essential information every time the computer is turned on**
  - **Date and time**
  - **Amount of RAM**
  - **Type of keyboard**
- **Content can be changed to reflect changes in the computer system**
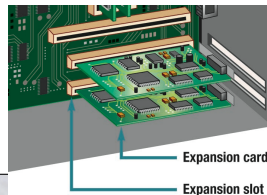
6- 15

System Clock

- **Important measurement indicating speed**
  - **Located on a small chip**
  - **Produces electrical beats**
- **Synchronizes operations**
- **Expressed in gigahertz (GHz) (billions of beats per second)**
- **Faster clock speed, faster computer**

6- 16

Expansion Slots and Cards

- **Allow for new devices to be added**
  - **Open architecture**
  - **Slots provide for expansion**
- **Expansion cards are also called …**
  - **Plug-in boards**
  - **Controller cards**
  - **Adapter cards**
  - **Interface cards**

Expansion card

Expansion slot

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Commonly Used Expansion Cards

- **Graphics cards**
- **Sound cards**
- **Modem cards**
- **Network interface cards (NIC)**
- **PC cards (PCMCIA cards)**
- **TV tuner cards**

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TV Tuner Cards And Video Clips

- **Allows you to view your favorite TV shows while running other applications such as Excel**
- **Video can be captured to a file, added to a Web page, attached to an email, or added to a class presentation**
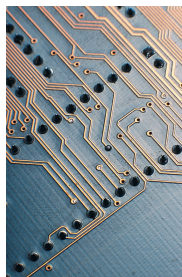- **Relatively inexpensive and easy to install**

6-19

Plug and Play

- **Set of hardware and software standards developed by Intel, Microsoft, and others**

- **Creating devices that are able to configure themselves when installed**

6-20

Bus Lines

- **Connect parts of the CPU to each other**
- **Data roadway for traveling bits**
  - **Measured as bus width**
  - **More lanes, faster traffic**
- **Two basic categories**
  - **System buses**
  - **Expansion buses (also known as external bus**

6-21

Expansion Buses

- **Connects the CPU to other components on the system board, including expansion slots**
- **Principal types**
  - **Industry Standard Architecture (ISA)**
  - **Peripheral Component Interconnect (PCI)**
  - **Accelerated Graphics Port (AGP)**
  - **Universal serial bus (USB)**
  - **FireWire buses (HPSB)**

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22

Ports

- **Socket for connecting external devices**
- **Ports can connect directly to the system board or they can connect to cards that are inserted into slots on the system board**
- **Two Types**
  - **Standard Ports**
  - **Specialized Ports**

Ports

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Cables

- **Used to connect exterior devices to the system unit via the ports**
- **One end of the cable is attached to the device and the other end has a connector that is attached to a matching connector on the port**

6-
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Power Supply

- **Computers require direct current (DC)**
- **DC power provided by converting alternating current (AC) from wall outlets or batteries**
- **Desktop computers use power supply units**
- **Notebooks and handhelds use AC adapters**

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Careers In IT

- **Computer technicians repair and install computer components and systems**
- **Employers look for**
  - **Certification in computer repair**
  - **Good communication skills**
- **Continued education is required**
- **Computer technicians can expect to earn an hourly wage of $13.00 to $22.00**

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A Look to the Future
Xybernaut Corporation

- **Wearable computers**
- **Send and receive email**
- **Maintain your personal schedule book**
- **Play interactive games and surf the Web from anywhere**

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New and Cool

- **Diamonds offer cool computer solution**
  - **http://www.abc.net.au/science/articles/ 2008/06/20/2278896.htm**
- **Tiny wind engines cool computers**
  - **ionic wind that blows over chips**
  - **http://news.bbc.co.uk/2/hi/technology/ 6946042.stm**

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