

VISUAL SUMMARY

The System Unit

SYSTEM UNIT



System unit (system chassis) contains electronic components. There are four basic categories of system units: desktop, notebook (laptop), tablet, and handheld.

Desktop

Desktop system units are located in a separate case; tower unit (tower computer) has vertical system unit; system unit is housed with monitor in all-in-one computers.

Notebook

Notebook (laptop) system units contain secondary storage devices and input devices. Netbooks are a smaller, less powerful, and less expensive type of notebook.

Tablet

Tablet system units are located behind the monitor. Tablets are smaller, lighter, and generally less powerful than laptops and use a virtual keyboard.

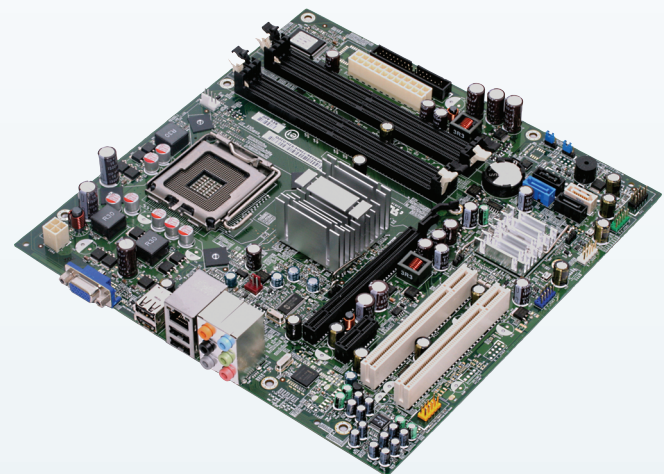
Handheld computer

Smartphones are most popular handheld computer. System unit is located behind the display screen and keypad.

Components

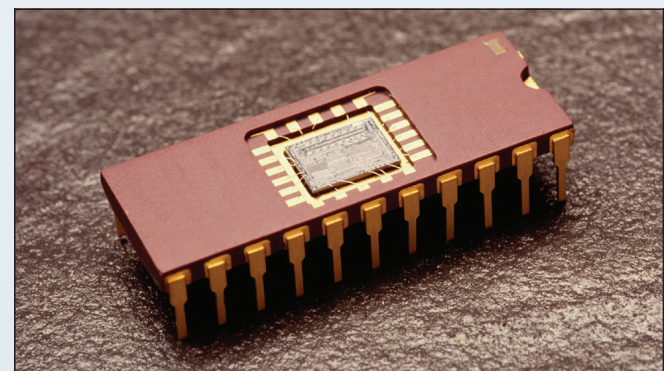
Each type of system unit has the same basic components including system board, microprocessor, and memory.

SYSTEM BOARD



The system board (mainboard or motherboard) connects all system components and allows input and output devices to communicate with the system unit.

- Sockets provide connection points for chips (silicon chips, semiconductors, integrated circuits). Chips are mounted on carrier packages.
- Slots provide connection points for specialized cards or circuit boards.
- Bus lines provide pathways to support communication.



To be a competent end user, you need to understand the functionality of the basic components in the system unit: system board, microprocessor, memory, expansion slots and cards, bus lines, and ports and cables. Additionally, you need to understand how data and programs are represented electronically.

MICROPROCESSOR

The microprocessor is a single chip that contains the central processing unit (CPU) or microprocessor. It has two basic components: a control unit and ALU.

Microprocessor Chips

A **word** is the number of bits that can be accessed by the microprocessor at one time. **Clock speed** represents the number of times the CPU can fetch and process data or instructions in a second.

Multicore chips can provide multiple independent CPUs. **Parallel processing** requires programs that allow multiple processors to work together to run large complex programs.

Specialty Processors

Specialty processors include **graphics coprocessors**, also known as **GPU** or **graphics processing unit** (processes graphic images), and processors in automobiles (monitor fuel efficiency, satellite entertainment, and tracking systems).

MEMORY

Memory holds data, instructions, and information. There are three types of memory chips.

RAM

RAM (random-access memory) chips are called temporary or volatile storage because their contents are lost if power is disrupted.

- **Cache memory** is a high-speed holding area for frequently used data and information.
- **DIMM** (dual in-line memory module) is used to expand memory.
- **Virtual memory** divides large programs into parts that are read into RAM as needed.

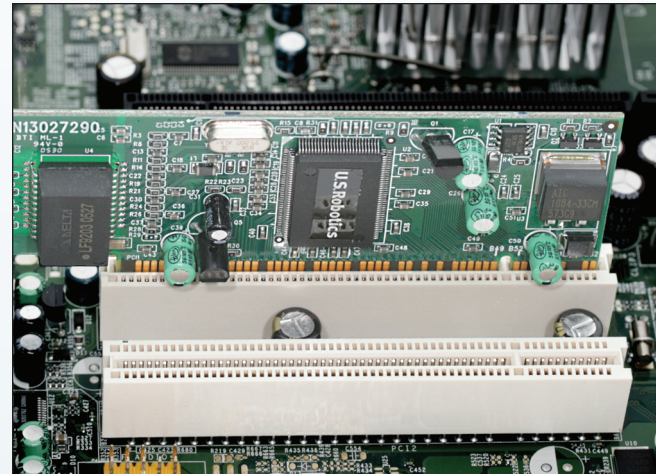
ROM

ROM (read-only memory) chips are nonvolatile storage and control essential system operations.

Flash Memory

Flash memory does not lose its contents when power is removed.

EXPANSION SLOTS AND CARDS



Most computers allow users to expand their systems by providing expansion slots on their system boards to accept expansion cards.

Examples of expansion cards include **graphics cards**, **sound cards**, **network interface cards** (NIC; network adapter cards), and **wireless network cards**.

Plug and Play is the ability for a computer to recognize and configure a device without human interaction.

PC cards *plug into* **PCMCIA slots**, and **ExpressCard** slots accept credit card-sized expansion cards.

BUS LINES

Bus lines, also known as **buses**, provide data pathways that connect various system components. **Bus width** is the number of bits that can travel simultaneously.

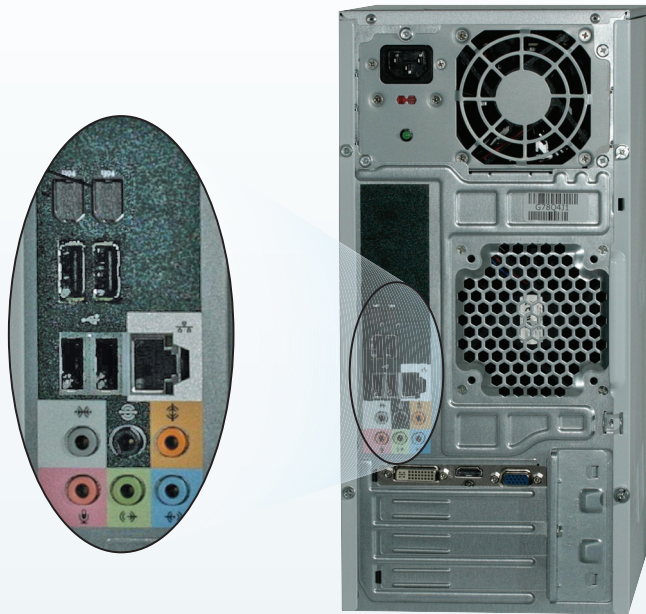
System buses connect CPU and memory. **Expansion buses** connect CPU and slots.

Expansion Buses

Three principal expansion bus types are

- **USB** (universal serial bus) can connect from one USB device to another or to a common point (hub) and then onto the system board.
- **FireWire** bus is similar to USB bus but more specialized.
- **PCIe** (PCI Express) bus is widely used; provides a single dedicated path for each connected device.

PORTS



Ports are connecting sockets on the outside of the system unit.

Standard Ports

Four standard ports are

- **VGA (Video Graphics Adapter) and DVI (Digital Video Interface)**—provide connections to monitors.
- **USB (universal serial bus)**—widely used to connect keyboards, mice, printers, and storage devices; one port can connect several devices to system unit.
- **FireWire**—provides high-speed connections to specialized FireWire devices such as camcorders and storage devices.
- **Ethernet**—high-speed networking port that has become a standard for many of today's computers.

Specialized Ports

Five specialty ports are **eSATA (external Serial Advanced Technology Attachment)** for high-speed connections to large secondary storage devices, **HDMI (High Definition Multimedia Interface)** for high-definition digital audio and video, **Mini DisplayPort (MiniDP, mDP)** for large monitors, **MIDI** for digital music, and **S/PDIF (Sony/Philips Digital Interface)** for high-end audio and home theater systems.

Cables

Cables are used to connect external devices to the system unit via ports.

POWER SUPPLY



Power supply units convert AC to DC and power desktops. AC adapters power notebooks and tablets and recharge batteries.

ELECTRONIC REPRESENTATION

Human voices create **analog** (continuous) signals; computers only recognize **digital** electronic signals.

Numeric Representation

Data and instructions can be represented electronically with a two-state or **binary system** of numbers (0 and 1). Each 0 or 1 is called a **bit**. A **byte** consists of 8 bits. **Hexadecimal system (hex)** uses 16 digits to represent binary numbers.

Character Encoding

Character encoding standards assign unique sequences of bits to each character. Three standards are **ASCII (American Standard Code for Information Interchange)**, **EBCDIC (Extended Binary Coded Decimal Interchange Code)**, and **Unicode**.

CAREERS IN IT

Computer technicians repair and install computer components and systems. Certification in computer repair or associate degree from professional schools required. Salary range is \$31,000 to \$46,000.

KEY TERMS

AC adapter (139)	ExpressCard (135)	PCI Express (PCIe) (136)
all-in-one (124)	external Serial Advanced Technology Attachment (eSATA) (137)	PCMCIA slot (135)
analog (140)	FireWire bus (136)	Plug and Play (134)
arithmetic-logic unit (ALU) (131)	FireWire port (137)	port (136)
arithmetic operation (131)	flash memory (133)	power supply unit (139)
ASCII (140)	GPU (132)	processor (130)
binary system (140)	graphics card (134)	random-access memory (RAM) (132)
BIOS (basic input/output system) (133)	graphics coprocessor (132)	read-only memory (ROM) (133)
bit (140)	handheld computer (126)	semiconductor (130)
bus (135)	hexadecimal system (hex) (140)	silicon chip (130)
bus line (130, 135)	High Definition Multimedia Interface (HDMI) (137)	slot (130)
bus width (135)	integrated circuit (130)	smartphone (126)
byte (140)	laptop (125)	socket (130)
cable (137)	logical operation (131)	Sony/Philips Digital Interconnect Format (S/PDIF) (137)
cache memory (132)	mainboard (129)	sound card (134)
carrier package (130)	memory (132)	system board (129)
central processing unit (CPU) (130)	microprocessor (130)	system bus (135)
character encoding standards (140)	Mini DisplayPort (MiniDP, mDP) (137)	system chassis (124)
chip (130)	motherboard (129)	system unit (124)
clock speed (131)	multicore chip (131)	tablet (125)
computer technician (141)	musical instrument digital interface (MIDI) (137)	tablet computer (125)
control unit (131)	netbook (125)	tower computer (124)
coprocessor (132)	network adapter card (134)	tower unit (124)
desktop (124)	network interface card (NIC) (134)	Unicode (141)
digital (140)	notebook (124)	universal serial bus (USB) (135)
DIMM (133)	optical audio connections (137)	universal serial bus (USB) port (137)
DVI (Digital Video Interface) port (137)	parallel processing (131)	VGA (Video Graphics Adapter) port (137)
EBCDIC (140)	PC card (135)	virtual memory (133)
Ethernet port (137)	PC card slot (135)	wireless network card (134)
expansion bus (135)		word (131)
expansion card (134)		
expansion slot (134)		

To test your knowledge of these key terms with animated flash cards, visit our website at www.computing2014.com and enter the keyword [terms5](#). Or use the free *Computing Essentials 2014* app.

MULTIPLE CHOICE

Circle the letter or fill in the correct answer.

1. This container houses most of the electrical components for a computer system.
 - a. carrier package
 - b. system board
 - c. system unit
 - d. Unicode
2. A type of notebook, this computer specializes in on-the-go web browsing and e-mail access.
 - a. chassis
 - b. desktop
 - c. media center
 - d. netbook
3. The mainboard or motherboard is also known as the:
 - a. computer
 - b. board processor
 - c. mobile system
 - d. system board
4. How many bytes can a 32-bit-word computer access at one time?
 - a. 1
 - b. 4
 - c. 8
 - d. 16
5. In a microcomputer system, the central processing unit is contained on a single:
 - a. bus
 - b. chip
 - c. module
 - d. RAM
6. This type of memory divides large programs into parts and stores the parts on a secondary storage device.
 - a. direct
 - b. expanded
 - c. random access
 - d. virtual
7. Also known as NIC, this adapter card is used to connect a computer to a(n):
 - a. AIA
 - b. expansion
 - c. graphics
 - d. network
8. This provides a pathway to connect parts of the CPU to each other.
 - a. bus
 - b. Plug and Play
 - c. wired
 - d. wireless
9. The specialized port that provides very-high-speed connections for large secondary storage devices.
 - a. eSATA
 - b. HDMI
 - c. MIDI
 - d. MiniDP
10. Computers can only recognize this type of electronic signal.
 - a. analog
 - b. bus
 - c. digital
 - d. maximum

For an interactive multiple-choice practice test, visit our website at www.computing2014.com and enter the keyword **multiple5**. Or use the free *Computing Essentials 2014* app.

MATCHING

Match each numbered item with the most closely related lettered item. Write your answers in the spaces provided.

- | | |
|------------------|--|
| a. cache | ___ 1. A type of multiprocessor chip that provides two or more separate and independent CPUs. |
| b. flash | ___ 2. A type of memory that is volatile or loses its contents when power is turned off. |
| c. multicore | ___ 3. System board component that provides a connection point for specialized cards or circuit boards. |
| d. Plug and Play | ___ 4. Provide connection points for chips. |
| e. power supply | ___ 5. A type of memory that improves processing by acting as a temporary high-speed holding area between the memory and the CPU. |
| f. random access | ___ 6. A type of memory that provides a combination of features of RAM and ROM. |
| g. slots | ___ 7. A generic term that is associated with the ability to attach any device onto a computer and have it play or work immediately. |
| h. sockets | ___ 8. This bus connects the CPU to memory on the system board. |
| i. system | ___ 9. This port can be used to connect many USB devices to the system. |
| j. USB | ___ 10. This unit plugs into a standard wall outlet and converts AC to DC. |

For an interactive matching practice test, visit our website at www.computing2014.com and enter the keyword **matching5**. Or use the free *Computing Essentials 2014* app.

OPEN-ENDED

On a separate sheet of paper, respond to each question or statement.

- Describe the four basic types of microcomputers and microcomputer system units.
- Describe system boards including sockets, chips, carrier packages, slots, and bus lines.
- Discuss microprocessor components, chips, and specialty processors.
- Define computer memory including RAM, ROM, and flash memory.
- Define expansion slots, cards, Plug and Play, PC cards, PCMCIA slots, and Express-Card slots.
- Describe bus lines, bus width, system bus, and expansion bus.
- Define ports including standard and specialized ports. Give examples of each.
- Describe power supply including power supply units and AC adapters.
- Discuss electronic data and instructions.