**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**CHEMICAL ENGINEERING DEPARTMENT**

**CHE 158: INTRODUCTION TO INFORMATION TECHNOLOGY**

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LECTURE 1

**Learning Objectives**

At the end of the lecture the student is expected to understand the following:

* Explain the parts of an information system: people, procedure, software hardware, data and the internet.
* Distinguish between system software and application software.
* Differentiate between the three kinds of system software programs.
* Define and compare general-purpose, specialized and mobile applications.
* Identify the four types of computers and the four types of personal computers.
* Describe the different types of computer hardware, including system unit, input, output, storage, and communication devices.
* Define data and describe document, worksheet, database, and presentation files.
* Explain computer connectivity, the wireless revolution, the internet, and cloud computing.

**1.1 INTRODUCTION**

20 years ago, most people had little to do with computers directly. The work with computers was handled by specialists like programmers, data entry clerks, and computer operators.

The advancement of microcomputer changed everything. Today, it is easy for nearly everybody to use a computer.

* Microcomputers are common tools in all areas of life. We write, draw, calculate, communicate, etc on it.
* New forms of learning have been developed by the use of microcomputers (e.g. distance learning).
* New ways of communication are available: electronic mail, electronic commerce, Internet to meet and share ideas and product.

Many interesting and practical uses have recently surfaced to make our personal lives richer and more entertaining. These applications range from recording digital video clips to creating personalized Web sites. People who use microcomputers are called “end users” and they use prewritten programs (videogames, word processing and spreadsheet programs) rather than them writing the programs themselves. Competent end users need to know the parts of an information system; they need to understand connectivity, the wireless revolution, the Internet, and the Web and to recognize the role of information technology in their professional and personal lives.

In the 21st century, computer literacy will become prerequisite in whatever career a student chooses. The aim of this course is to provide students with the basic understanding of the concepts necessary for success in the Information age.

**1.2 Information system**

An information system has 5 parts: people, procedures, software, hardware, and data.

(1) **People:** It is easy to overlook people as one of the five parts of a microcomputer system. Yet this is what microcomputers are all about—making **people, end users** like you, more productive.

(2) **Procedures:** Procedures are rules for people to follow when using software, hardware, and data. These procedures are documented in manuals. Software and hardware manufactures provide manuals with their products.

(3) **Software:** Software is another name for a program or programs. A program is the step-by-step instructions that tell the computer how to do its work. The purpose of software is to convert data (unprocessed facts) into information (processed facts).

(4) **Hardware:** The hardware consists of the equipment (keyboard, mouse, monitor, system unit, and other devices). Hardware is controlled by software. It actually processes the data to create information.

(5) **Data:** Data consists of the raw, unprocessed facts, including text, numbers, images, and sounds. After data is processed through the computer, it is called information.

**1.2.1 Software**

There are 2 kinds of software: system software (the kind the computer uses) and application software (the kind we use).

**a.** **System software**

The user interacts with application software. System software enables the application software to interact with the computer hardware.

System software is not a single program. Rather, it is a collection of programs:

* **Operating system:** The most important system software is the operating system, which interacts between the application software and the computer. It coordinates computer resources, provides an interface between users and computer resources, and runs (executes) applications. Microsoft’s Windows 8 and Apple’s Mac OS X are two of the best known operating systems for today’s microcomputer users.
* **Utilities or service programs:** perform specific tasks related to managing computer resources. For example, the Windows utility called Disk Defragmenter locates and eliminates unnecessary file fragments and rearranges files and unused disk space to optimize computer operation.
* **Device drivers:** are specialized programs designed to allow particular input or output devices to communicate with the rest of the computer system.

**b. Application software**

Application software is used by the end user. It performs useful work on general-purpose tasks. Three types of application are *general-purpose*, *specialized*, and *mobile* apps.

* **General-purpose applications** are widely used in nearly all career areas. They are the kinds of programs you have to know to be considered computer competent. Popular ones include:

*Word processor* – used to prepare written documents

*Spreadsheet* – used to analyze and summarize numerical data

*Database managers* – used to organize and manage data and information

*Presentation graphics* – used to visually analyze and present data and information to other people

*Browsers* – used to navigate, explore, and find information on the Internet. Three most widely used explorers include Mozilla’s Firefox, Microsoft’s Internet Explorer, and Google’s Chrome.

*Integrated programs* – combine several separate application programs within a single program. They provide limited capability at low cost.

* **Special-purpose applications** include thousands of other programs that are more specialized and widely used within certain career areas. Some of the best known are:

*Multimedia* – used to integrate video, music, voice, and graphics to create interactive presentations

*Web publishers* – used to create interactive multimedia Web pages

*Graphic programs* – used to create professional publications: draw, edit, and modify images

*Virtual reality* – used to create realistic 3-dimensional virtual or simulated environment

*Artificial intelligence* – used to simulate human thought processes and actions

*Project agers* – used to plan projects, schedule people, and control man-resources

* **Mobile apps** are small programs designed for mobile devices such as smartphones, tablet computers, palm top devices, etc. The most popular apps are for text-messaging, Internet browsing, and connecting to social networks.

**1.2.2 Hardware**

Computers are electronic devices that can follow instructions to accept input, process that input, and produce information.

There are 4 types of computers:

(1) **Supercomputers** are the most powerful type of computers. They are typically one-of-a-kind custom designs, special, high-capacity computers used by very large organizations. For example, NASA use supercomputers to track and control space exploration; simulations; worldwide weather forecasting; ……

(2) **Mainframe computers** occupy specially wired air-conditioned rooms. Although not nearly as powerful as supercomputers, mainframe computers are capable of great processing speeds and data storage. They are used by large organizations like banks, insurance companies, universities, government agencies, ….

(3) **Minicomputers** are desk-sized machines. They fall between microcomputers and mainframe in their processing speeds and data-storing capacities. Medium-sized companies or departments of large companies use them for specific purposes. For example, they might be used to do research or to monitor a particular manufacturing process.

(4) **Microcomputers** are the least powerful, yet the most widely used and fastest growing type of computers. There are 4 types of microcomputers:

* **Desktop computers** or **Personal Computers** (**PC**) are small enough to fit on the desk yet are too big to carry around.
* **Notebook/laptop computers** are portable, lightweight and can fit into a briefcase.
* **Tablet PC** is a type of notebook (smaller, lighter, and less powerful than notebook) computer that accepts your handwriting. This input is digitized and converted to standard text that can be further processed by a word processor. Thus, it has a virtual keyboard that appears on the screen and it is touch-sensitive. The best known tablet is ***Apple’s iPad***.
* **Handheld computers** or **palm computers** are the smallest and are designed to fit into the palm of one hand. ***Personal digital assistants*** (**PDA**) and ***Smartphones*** are the most widely used handheld computers.

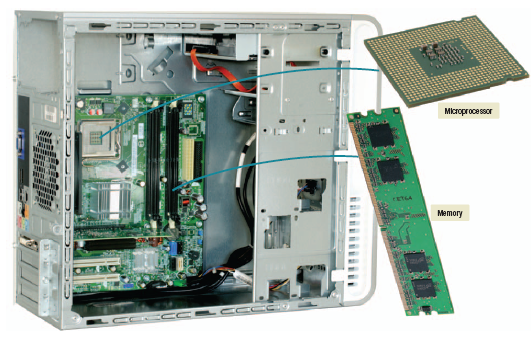


**Figure 1.1 Microcomputers**

Microcomputer hardware falls into 4 categories:

(1) **System units**: The system unit is a container that houses most of the electronic components that make up the computer system. It has 2 important components:

* **Microprocessor** controls and manipulates data to produce information.
* **Memory** or **primary storage** or **random access memory (RAM):** It is a holding area for data, instructions, and information. Memory is also referred to as **temporary storage** because its contents will be lost if the electrical power to the computer is disrupted. It is located in the system unit on a tiny memory chip.



**Figure 1.2: System unit**

(2) **Input/output devices:** Input devices translate data and programs that humans can understand into a form that the computer can process. The most common input devices are the **keyboard** and **mouse**. Output devices translate the processed information from the CPU into a form that humans can understand. The most common output devices are **monitors** and **printers**.

(3) **Secondary storage devices** hold data and programs permanently even after the electrical power to the computer is turned off. They are located outside of the CPU, and are built into the system unit cabinet. The most important kinds of secondary storage media are as follows:

* **Floppy disks** or **diskettes** were widely used to store and transport data from one computer to another. They are called floppy because data is stored on a very thin flexible, or floppy, plastic disk.
* **Hard disk** contains 1 or more metallic disk (platters) encased within a disk drive. It is used to store programs and very large data files. It has a much greater capacity and is able to access information much faster than floppy disks.
* **Solid-state storage** does not have any moving parts, is more reliable, and requires less power. It saves data and information electronically similar to RAM except that it is not volatile. The types of **solid-state drives (SSDs)** that are used much the same way as an internal hard disk, **flash memory cards** that are widely used in portable devices, and **USB drives** that are a widely used compact storage medium for transporting data and information between computers and a variety of specialty devices.
* **Optical discs** use laser technology and have the greatest capacity. Three types of optical discs are **compact discs (CDs), digital versatile** (or **video** ) **discs (DVDs) ,** and **blu-ray discs.**

(4) **Communication devices** send and receive data and programs from one computer or secondary storage device to another. The most widely used communication device is a **modem**, which converts electronic signals from the computer into electronic signals that can travel over a telephone line and onto the Internet.

**1.2.3 Data**

Data are unprocessed facts about something. When stored electronically in files, data can be used directly as input for the information system.

4 common types of files are:

* **Document files**, created by word processor to save documents such as memos, letters, assignments, project report, etc
* **Worksheet files,** created by electronic spreadsheets to analyze things like budget, predict salaries, etc
* **Database files,** created by database management programs to contain highly structured and organized data. For example, an employee database file might contain all the worker’s names, social security numbers, job titles, and other related pieces of information.
* **Presentation files,** created by presentation graphics programs to save presentation materials. For example, a file might contain audience handouts, speaker notes, and electronic slides.

**1.3 Connectivity**

Connectivity is the capability of your microcomputer to share information with other computers. Data and information can be sent over telephone lines or cables and through the air. Thus, your microcomputer can be connected to other computers. It can connect you to the Internet and many other computerized data banks and other sources of information.

Central to the concept of connectivity is the **computer network**. A network is a communication system connecting two or more computers. The largest network in the world is the **Internet**. It is a huge computer network available to nearly everyone with a microcomputer and a means to connect to it. The **Web**, or **World Wide Web** or **WWW**, is an Internet service that provides a multimedia interface to the numerous resources available on the Internet.

The two most dramatic changes in connectivity in the past few years has been the widespread use of **mobile** or **wireless communication devices** and **cloud computing**.

**Cloud computing** uses the Internet and the Web to shift many computer activities from a user’s computer to computers on the Internet.