

Chapter

1

Introduction to Computer Science

Learning Summary

In this chapter you will learn about:

- **An overview of chapters 2 to 12**
- **Components of a typical computer system**

1.1 An overview of chapters 2 to 12

Computer systems are now a very common part of our everyday lives. Nearly every application used at school/college or at work involves a computer system to some extent. Historically, not everybody has been an advocate of computer advancement. Look at the following three famous quotes and decide whether any of them have true merit.

Rich Cook

Programmers are in a race with the Universe to create bigger and better idiot-proof programs; while the Universe is trying to create bigger and better idiots. So far, the Universe is winning!!!

Pablo Picasso

Computers are useless. They only give you answers!

Popular 1997 joke

There's word in business circles that the computer industry likes to measure itself against the Big Three (USA) car-makers. The comparison goes this way: If automotive technology had kept pace with Silicon Valley, motorists could buy a V-32 engine that does 10,000 m.p.h. or a 30-pound car that gets 1,000 miles to the gallon — both at a selling price of less than \$50. Detroit's response: "OK. But who would want a car that crashes twice a day?"

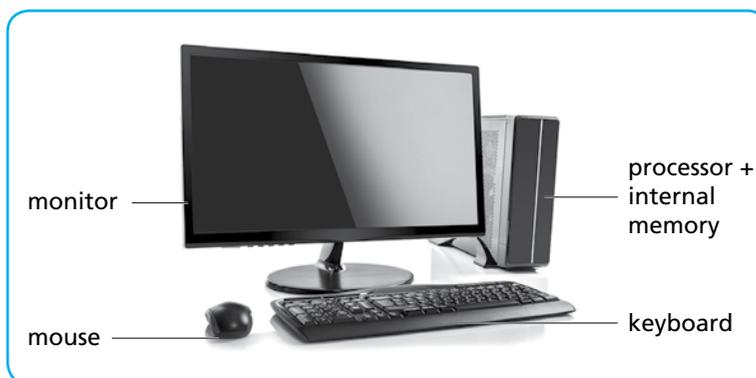
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Whatever any of us may think, computers are here to stay. We have come a long way since the Manchester 'baby' computer of 1948 – this machine could make about 700 instructions per second and used about 3.5 kilowatt of power. Sixty years later, a typical embedded computer can make 200 million instructions per second and uses only 20 milliwatts of power. The computer in 1948 nearly filled a room, whereas now a computer occupies only about 0.5 m² – a considerable size reduction! These advancements continue at an amazing rate and will be further discussed in chapter 12 as part of the future predictions.

Chapters 2 to 12 of this book will take the reader through a number of applications, discuss the impact of the Internet, look at problem-solving tools, give an insight into hardware and software currently available and how computer systems operate. The final chapter will discuss some of the possible advancements we all might see in the coming decades.

1.2 Components of a typical computer system

A typical modern computer system is a combination of hardware and software.



Computer system



Printer

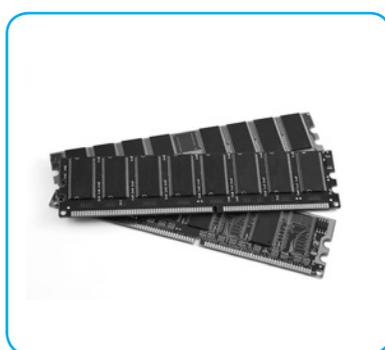
The function of the above components will be discussed in greater depth in the following chapters.

The hardware usually comprises the following.

- Input devices (such as keyboard, mouse, microphone)
- Output devices (such as monitor, printer, speakers)
- Secondary storage (such as DVD/CD reader/writer).



Hard drive



Random access memory

There are also internal components such as the following.

- Random access memory (RAM)
- Read only memory (ROM)
- Internal hard drive
- Central processing unit (CPU) or microprocessor.

These are covered in several sections of chapter 11.

Key Point

The CPU interprets and executes commands from the computer hardware and software; it is now usually on a single integrated circuit.

Software is usually of two types.

- Systems software which are programs that allow the hardware to run properly (for example, operating systems)
- Applications software which are programs that allow users to perform specific tasks (for example, using spreadsheets and wordprocessors).

Refer to chapter 11.

It is worth mentioning here that most input/output devices use buffers and interrupts to communicate with the CPU allowing efficient use of all devices and the CPU itself.

A **buffer** is a temporary store where data is held until it is ready to be processed. For example, data will be held in a printer buffer until the printer is ready to print out the buffer contents; a keyboard buffer will store key presses until they can be processed, etc.

They prevent slower devices holding up faster devices.

Since input/output devices work more slowly than the CPU, buffers allow the data to be stored until it can be processed (for example, printed) enabling the CPU to do other tasks in the meantime.

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Also refer to
chapter 12.

Key Point

Buffers compensate for the different operational speeds of the various components that make up a typical computer system.

Interrupts also allow for more efficient operation of a computer system. A device will send an interrupt signal to the CPU indicating that it needs attention (for example, a printer is out of paper or out of ink and a CD is almost full). The CPU will suspend what it is doing to service the interrupt and then return to its task once the problem is cleared.

Interrupts can also be generated by software, for example, division by zero and out of data error – these interrupts again will need to be serviced and the system cannot return to normal until the issue is resolved.