Know Your Personal Computer

1. Introduction to Computers

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This article describes in brief the basics of the organization of the control and processing unit, memory subsystem and peripherals of a computer.

Introduction

Computers are built using semiconductors and other electronic parts, magnetic media and electromechanical devices. Collectively these are called the hardware of the computer. Their organization is subdivided into Control and Processing Unit (CPU), Memory subsystems and peripherals. They come in all sizes and capabilities, ranging from supercomputers to pen-tops, but there is a basic unity in their organization. We will first discuss the organization of computers and follow with a discussion on peripherals and software.

Computation and Memory

Just as humans use a base-10 arithmetic system because they have ten fingers on their two hands, computers use a base-2 arithmetic as digital hardware computes and stores information most reliably in one of two stable states, called OFF and ON. Alternatively they are called 0 and 1. Bit is an abbreviation of binary digit.

Using patterns of bits, computers store integers, rational numbers called floating point numbers which approximate real numbers, characters and many other data types.

Figure 1 is a block diagram of a computer. It consists of a CPU and memory.
About the series “Know Your Personal Computer”

The advent of personal computers in the early 1980s revolutionized the applications of computers. Computers which were expensive and somewhat daunting to the common man suddenly became affordable to many small organizations and individuals. An early decision by IBM (International Business Machines Corporation) to publicize the internal hardware structure and interface details enabled many manufacturers to design 'IBM clones' and price them competitively. Concurrently software companies, particularly Microsoft, designed an operating system called MS-DOS (Microsoft Disk Operating System) which allowed a novice to start using the computer. A host of compilers for popular programming languages (C, FORTRAN, PASCAL, COBOL etc.) appeared. Application programs for word processing, database design, accounting and numerous other areas were developed. These developments are of particular significance to India as computers became affordable to many colleges, schools and individuals. Almost all colleges and many schools now have computer centres with numerous personal computers. Students routinely use them to write programs. As a user one is usually curious to know what is 'inside the personal computer' and learn details not usually found in text books. The intention of this series is to explain in some detail the hardware and software of personal computers. It will include articles on the CPU system, memory system, peripheral systems, PC interfacing, basic input-output system, PC operating systems, PC networking, multimedia and some recent developments related to PCs.

The topics are chosen such that a science graduate will have a reasonably good knowledge of computer basics, applications of computers and future trends if she or he diligently reads the articles in the series. It will assist the teacher in supplementing information found in text books with issues of practical consequence in using personal computers and may even be useful in troubleshooting personal computers.

The series is written by S K Ghoshal who has many years of experience in designing systems using PCs. Readers are welcome to send suggestions on the articles and queries about personal computers.

A CPU can operate on these data types (called operands) and produce results specific to these types. The type of the operation performed is called the op-code. An op-code combined together with the addresses of the operand is called an instruction. An instruction is also represented as a bit pattern.

A collection of instructions is called a computer program, or code. They are kept in memory, which is a collection of memory cells

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