

HISTORICAL DEVELOPMENT OF COMPUTERS

INTRODUCTION

The modern computer with the power and speed of today was not a solitary invention that sprang completed from the mind of a single individual. It is the end result of countless inventions, ideas, and developments contributed by many people throughout the last several decades. The history of automatic data processing begins with Charles Babbage's attempt to build an automatic mechanical calculator at Cambridge, England, in 1830. By the 1930's punched cards were in wide use in large business, and various types of punched card handling machines were available. In 1937, Howard Aiken, at Harvard, proposed to IBM that a machine could be constructed which would automatically sequence the operations and calculations performed. This machine used a combination of Electro-mechanical devices, including relays.

First Generation computers

UNIVAC (Universal Automatic Computer) was the first general purpose electrical computer to be available and marks the beginning of the first generation of electrical computers. The first generation electrical computers employed vacuum tubes. These computers were large in size and required air conditioning. The input and output units were the punched card reader and the card punches. Because of the inherently slow speed of these input/output units, the power of the CPU was subjugated to their speed. IBM-650 was however, the most popular first generation computer and was introduced in 1950 with magnetic drum memory and punched cards for input and output. It was intended for both business and scientific applications.

Second generation computers

These computers employed transistors and other solid state devices. Their circuits were smaller than the vacuum tubes, and generated less heat. Hence the second-generation computers required less power, were faster and more reliable. IBM 1401 was the most popular second-generation computer. There were two distinct categories of the second-generation computers for business and scientific applications. They employed magnetic tape as the input/output media. Second generation computers successfully displaced the unit record equipment on cost benefit grounds in many installations.

Third generation computers

These employed integrated circuits in which all the elements of an electronic circuit are contained in a tiny silicon wafer. The third generation computers are much cheaper and more reliable than the second-generation computers. They are speedier with much vaster capacity and admit connection of a wide variety of peripherals particularly magnetic disk units. They are based on the principles of standardization and compatibility. The core storage of a given model of a computer can be expanded by adding modules and it still permits the use of order program. The third generation computers can be used for both scientific and business applications.

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Third generation computers

The third generation computers permit multi-programming which is interleaved processing of several programmes to enhance the productivity of the computer, time-sharing which is the use of the computer by several customers at a time, operating systems which optimize the man-machine capabilities and such data communications facilities as remote terminals. They also permit use of such high level languages as FORTRAN and COBOL. The mini computers are also one of the developments in the third generation computers.

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Third generation computers

Each generation of computers has an effect on the MIS centralization and decentralization issue. The first generation computers were high in costs and large in size; therefore information systems were sought to be centralized to serve benefits of hard ware economies. The second-generation computers were substantially cheaper and the trend was towards MIS decentralization. Third generation computers however, offered communication capabilities and the use of remote terminals and the trend was reversed to centralization.

Fourth Generation Information Systems

Fourth generation machines appeared in 1970's utilizing still newer electronic technology which enabled them to be even smaller and faster than those of the third generation. Many new types of terminals and means of computer access were also developed at this time.

One of the major inventions, which led to the fourth generation, was the large scale Integrated Circuit (LSI) The LSI is a small "chip" which contains thousands of small electronic components which function as a complete system. In effect an entire computer can be manufactured on a single chip of size less than $\frac{1}{3}$ inch square. A single chip may perform the functions of the entire computer, calculator or control device. Research into future developments promises the manufacture of large computer systems with enormous memory capacity on small chips. This will reduce the cost and increase the speed of new systems still further.

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Micro computers

In July, 1977, at National Computer Conference in Dallas, Commodore Ltd. startled the computing world by announcing a fully assembled microcomputer in a single housing called the Personal electronic Transactor (PET). The machine consisted of keyboard, processor unit, CRT and built in cassette tape recorder for \$595. The programming language BASIC was built into the system. Thus, for less than \$600, a fully programmable, powerful computer system was available for home or personal use. Later in 1977, Radio Shack Corporation announced the TRS 80 computer.

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The IBM family of personal computers

In [1981] International Business Machines (IBM) made its first appearance in the field of microcomputer with the announcement of the IBM Personal Computers. The term personal computer captured the notion that an individual can have her or his own computer. With the advent of IBM PC, computers had stepped out of large organizations and entered into the home. However, instead of adopting 8-bit microprocessor, IBM selected Intel 8088 - a 16 - bit microprocessor which made the IBM PC "an overnight success". In [1983], IBM's first addition to the PC-family - XT model was introduced, which added a high capacity hard disk storage facility to the PC.

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The IBM family of personal computers

In [1984], IBM introduced two new high powered models of PC *viz* Compaq Desk Pro, the first member of the PC family to have more basic computing power than the original PC and the IBM PC AT model, which had a much greater computing speed than the PC and XT or even the new Desk Pro. When software vendors began to orient their products to the IBM PC, many microcomputer manufacturers created and sold clones of it. These clones called IBM PC compatibles, run most or all the software designed for the IBM PC. Therefore, whatever IBM does in the personal computer arena has immediate and far-reaching effects on PC market. The successor to the IBM PC, the IBM personal system/2, or IBM PS/2 (introduced in 1987), have almost certainly become a milestone in PC history. With IBM's products, the microcomputer took its place as an important tool for use in solving the information processing needs of both large and small businesses.

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Other Significant Contributions

Several other personal computers have established their place in PC history. Introduced in [1982], the Commodore-64 was significant because it signaled the buying public that powerful micros could be manufactured and sold at a reasonable cost \$599. In the same year, Compaq Computer Corporation bundled the equivalent of an IBM PC in a transportable case and named it the Compaq Portable. Thus began the era of the portable computer. In [1984], Apple Computer introduced the Macintosh with a very “friendly” graphical user interface - proof that computers can be easy and fun to use.

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Other Significant Contributions

Microcomputers have many of the features and capabilities of the larger system. The cost of microcomputers has dropped substantially since their introduction. Many now sell a microcomputer for as low as Rs. 15,000. This reduction in cost will bring about a significant increase in the number of microcomputers in use. The major application for microcomputer lies in the field of industrial automation, where they are used to monitor and control various manufacturing processes. Their low cost and lightweight make it feasible to carry them on site or into a field or to package them with other portable equipments as part of larger system.

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Other Significant Contributions

The second decade (1986- present) of the fourth generation observed a great increase in the speed of microprocessors and the size of main memory. The speed of microprocessors and the size of main memory and hard disk went up by a factor of 4 every 3 years. Many of the mainframe CPU features became part of the microprocessor architecture in 90s. In 1995 the most popular CPUs were Pentium, Power PC etc. Also RISC (Reduced Instruction Set Computers) microprocessors are preferred in powerful servers for numeric computing and file services.

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Other Significant Contributions

The hard disks are also available of the sizes up to 80 GB. For larger disks RAID technology (Redundant Array of Inexpensive Disks) gives storage up to hundreds of GB. The CDRoms (Compact Disk-Read Only Memory)and DVDs(Digital Video Disks) are have become popular day by day. The DVDs of today can store up to 17 Giga bytes of information.

The computer networks came of age and are one of the most popular ways of interacting with computer chains of millions of users. The computers are being applied in various areas like simulation, visualization, Parallel computing, virtual reality, Multimedia etc.

Fifth Generation computers

Defining the fifth generation of computers is somewhat difficult because the field is in its infancy. The most famous example of a fifth generation computer is the fictional HAL9000 from Arthur C. Clarke's novel, 2001: A Space Odyssey. HAL performed all of the functions currently envisioned for real-life fifth generation computers. With artificial intelligence, HAL could reason well enough to hold conversations with its human operators, use visual input, and learn from its own experiences. *(Unfortunately, HAL was a little too human and had a psychotic breakdown, commandeering a spaceship and killing most humans on board)*

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Fifth Generation computers

Though the wayward HAL9000 may be far from the reach of real-life computer designers, many of its functions are not. Using recent engineering advances, computers are able to accept spoken word instructions (voice recognition) and imitate human reasoning. The ability to translate a foreign language is also moderately possible with fifth generation computers. This feat seemed a simple objective at first, but appeared much more difficult when programmers realized that human understanding relies as much on context and meaning as it does on the simple translation of words.

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Fifth Generation computers

Many advances in the science of computer design and technology are coming together to enable the creation of fifth-generation computers. Two such engineering advances are parallel processing, which replaces von Neumann's single central processing unit design with a system harnessing the power of many CPUs to work as one. Another advance is superconductor technology, which allows the flow of electricity with little or no resistance, greatly improving the speed of information flow. Computers today have some attributes of fifth generation computers. For example, expert systems assist doctors in making diagnoses by applying the problem-solving steps a doctor might use in assessing a patient's needs. It will take several more years of development before expert systems are in widespread use.