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Computer Components

- Datapath
- Control
- Memory
- Input
- Output
- Operation

Components of a Computer

The five classic components of a computer are briefly described below. Each component is discussed in more detail in its own section. The operation of the processor is best understood in terms of these components.

Datapath - manipulates the data coming through the processor. It also provides a small amount of temporary data storage.

Control - generates control signals that direct the operation of memory and the datapath.

Memory - holds instructions and most of the data for currently executing programs.

Input - external devices such as keyboards, mice, disks, and networks that provide input to the processor.

Output - external devices such as displays, printers, disks, and networks that receive data from the processor.

There are five main hardware **components** in a **computer** system: Input, Processing, Storage, Output and Communication devices. Are devices used for entering data or instructions to the central processing unit. Are classifie according to the method they use to enter data.

The main **components** of the **computer system and its function** are Processor Main memory Additional memory Input devices Output devices, the processor, auxiliary memory, power supply, and auxiliary equipment. Many **components** are connected to the main **computer** board, called the motherboard.

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What is a computer What are its characteristics?
A **computer** is a machine that can be programmed to manipulate symbols. **Its** principal **characteristics** are: It responds to a specific set of instructions in a well-defined manner. It can execute a prerecorded list of instructions (a program). It can quickly store and retrieve large amounts of data.
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Characteristics of computer means its qualities or features.

Although the computer are of various types depending on their size and capacity but all the computers have some common characteristics.

As you all knows that a computer has a lot of features or characteristics but in all those characteristics 5 are the most popular.

Therefore the five Major characteristics of computers are given below:

1. Speed
2. Accuracy
3. Consistency
4. Data Storage Capacity

5. Flexibility

Now let's briefly describe about all the above listed 5 characteristics of computers.

Speed

Speed is the first major from all the five major characteristics of computer.

Speed of a computer device is very fast as it can perform in a few seconds, the amount of calculation or anything that we are human being can do in an entire year or more.

2 gigahertz to 4 gigahertz is the speed range of computer device.

Accuracy

Accuracy of a computer is consistent. Computer gives us accurate result or calculation.

Error occurs in result for any calculation in a computer are only due to wrong program or instruction, inaccuracy in input data etc.

You can directly says that errors in computers can happen only due to human beings. Otherwise the accuracy of a computer device is constantly high.

Consistency

Computer is a consistent machine, it means that computer never gets tired of working more. You can use computer to perform your task without any error for any number of hours, any number of hours means you can use your computer system continuously for 24 hours a day and 365 days a year.

Data storage capacity

Computer can store huge amount of data in a small sized storage disk such as hard disk, CD, DVD, PenDrive, memory card etc.

Let's give you an idea that now a computer can store huge amount of data in a small storage disk. For example a Pen drive of 16 GB is enough to store the entire Encyclopaedia Britannica.

Flexibility

It is the fifth major characteristics of computer.

Flexibility means that a computer can work in many areas like you can use your computer system to:

- Watch movies or videos
- Listen sounds or musics
- Play games
- See pictures
- Write textual documents and save
- Open and read anything
- and many more

Some More Characteristics of Computer

Here are the list of 3 more common characteristics of a computer system, that are:

- Versatility
- Automation
- Remembrance Power

Versatility

The computer system is very versatile machine. The most wonderful feature of the activities of different types from simple calculation to the complex scientific operations and computations and is also capable of preparing the examination marks sheets, bills, letters, documents, and also the design and modelling of navigating missiles and satellites.

Automation

The word automation is conjoint with the computer for a particular task, the computer does not fully depend on the user, but it proceeds the task in forward direction automatically till its completion.

Computers can be easily programmed to perform a series of task according to the requirements. The computer automatically executes these instructions sequentially, if any error occurs, it produces the appropriate error message.

Remembrance Power

The computer can store and recall the information at any time because of the presence of the secondary storage devices, But this is not possible with the human beings.

Although the brain of human being can store unlimited data.

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Difference Between Manual And Automated System - Manual System vs Automated System

[<< Prerequisite]

What is Manual System ?

Definition: " A manual system is like a bookkeeping system in which records maintanance is done by hand, without using a computer system or any automatic system. In this type of system transactions are written in journals, from which the information is manually retrieved into a set of financial statements. These systems suffer from higher rate of inaccuracy, and they are much slower than computerized systems. "

Manual systems can waste both money and time. For example, administrators can spend a breathtaking amount of time searching for misplaced documents in a manual system, costing U.S. companies up to $89 billion each year. It's not just money lost, but people, too. The research reports that searching for lost and misplaced documents accounts for nearly 38 working hours per year for each employee. This has a big, negative ripple effect on professional perception, workplace productivity and organizational morale. Employees tend to leave disorganized organizations, and the frustration of working with manual systems can be a primary driver of employee turnover.

The effect on service delivery is also quite obvious, since customer frustration grows and company reputations diminish whenever documents generated by manual processes are misplaced. Automated systems reduce paper and make data storable, retrievable and searchable. Once automated systems are implemented, the time your employees waste searching for misplaced documents can be spent on more strategic, value-generating activities.

Topics You May Be Interested In

Basic Principles Of Successful System	Case Study: The World Wide Web
Enforcing Documentation Discipline In An Organization	Pine Valley Furniture Company Background-managing The Information Systems Project

What is Automated System ?

Definition: " Automated system is a combination of both software and hardware which is designed and programmed to work automatically without the need of any human operator to provide inputs and instructions for each operation. "

Automated systems allow you to monitor your processes in real time and identify problems as they arrive, enabling quick adjustments along the way. While manual systems can be difficult to coordinate, similar to the old cliche that "the right hand doesn't know what the left hand is doing," automated systems work in tandem on their own.

For instance, according to hotels, they could experience significant gains after automating their inventory and procurement systems. First, there are big cost savings and shorter fulfillment cycles. Second, hotels could experience significant time savings that free up staff to do more client-centric functions that enhance the overall business. Third, an automated system could bring better accuracy because staff members are no longer required to reenter data from paper documents. This dramatically reduces clerical errors. Fourth, automation would deliver an increased ability to negotiate better deals with suppliers. In any negotiation, it's essential to know exactly how much volume of supply is needed, allowing the purchaser to more accurately estimate volumes and purchase accordingly. The bottom line is that informed buyers have more leverage

Manual System Vs Automated System

Speed

The main difference between manual and computerized systems is speed. Accounting software processes data and creates reports much faster than manual systems. Calculations are done automatically in software programs, minimizing errors and increasing efficiency. Once data is input, you can create reports literally by pressing a button in a computerized system.

Topics You May Be Interested In

Basic Principles Of Successful System	Architectural Elements
Trends In Distributed Systems	Choosing Off-the-shelf Software-systems Acquisition
Mobile And Ubiquitous Computing	Calculating Expected Time Durations Using Pert-representing And Scheduling Project Plans
Heterogeneity	Using Project Management Software
Transparency	Performing Requirements Determination

Cost

Another difference between manual and computerized systems is cost. Manual accounting with paper and pencil is much cheaper than a computerized system, which requires a machine and software. Other expenses associated with accounting software include training and program maintenance. Expenses can add up fast with costs for printers, paper, ink and other supplies.

Backup

A third difference between manual and computerized systems is the ease of backup of a computerized system. All transactions can be saved and backed up, in case of fire or other mishap. You cannot do this with paper records, unless you make copies of all pages--a long and inefficient process.

What is the difference between manual and automated system?
A **manual system** implies human interaction is needed to operate or react to input. **Automated** implies the machine operates or reacts to input on its own. An example is automobile transmissions. A **manual** transmission's gears must be shifted by the human driver as engine speed and the torque required changes.১৯ জুন, ২০১৯

A manual system implies human interaction is needed to operate or react to input. Automated implies the machine operates or reacts to input on its own.

An example is automobile transmissions. A manual transmission’s gears must be shifted by the human driver as engine speed and the torque required changes. An automatic transmission shifts gear itself at predetermined speed and torque levels.

In production systems that manufacture things, they are said to be “automated” as fewer workers are needed and more robots or computer controlled machinery is used to make the product.

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"Napier's bones" is a manually-operated calculating device created by John Napier of Merchiston, Scotland for the calculation of products and quotients of numbers. The method was based on lattice multiplication, and was also called 'rabdology', a word invented by Napier himself. Napier published his version in 1617 in *Rabdologiæ*[1], printed in Edinburgh, Scotland, dedicated to his patron Alexander Seton.

Using the multiplication tables embedded in the rods, multiplication can be reduced to addition operations and division to subtractions. More advanced use of the rods can even extract square roots. Napier's bones are not the same as logarithms, with which Napier's name is also associated, but are based on dissected multiplication tables.

The complete device usually includes a base board with a rim; the user places Napier's rods inside the rim to conduct multiplication or division. The board's left edge is divided into 9 squares, holding the numbers 1 to 9. In Napier's original design, the rods are made of metal, wood or ivory and have a square cross-section. Each rod is engraved with a multiplication table on each of the four faces. In some later designs, the rods may be flat and have two tables or only one table engraved on them, and may be made of plastic or heavy cardboard. A set of such bones might be enclosed in a convenient carrying case.

A rod's face is marked with 9 squares. Each square except for the top one is divided into two halves by a diagonal line from the bottom left corner to the top right one. The squares contain a simple multiplication table. The first square holds a single digit, which Napier called the 'single'. The other squares hold the multiples of the single, namely twice the single, three times the single and so on up to the ninth square containing nine times the number in the top square. Single-digit numbers are written in the bottom right triangle leaving the other triangle blank, while double-digit numbers are written with a digit on either side of the diagonal.

If the tables are held on single-sided rods, 40 rods are needed in order to multiply 4-digit numbers - since numbers may have repeated digits, four copies of the multiplication table for each of the digits 0 to 9 are needed. If square rods are used, the 40 multiplication tables can be inscribed on 10 rods. Napier himself gave details of a scheme for arranging the tables so that no rod has two copies of the same table, enabling every possible four-digit number to be represented by 4 of the 10 rods. A set of 20 rods, consisting of two identical copies of Napier's 10 rods, allows calculation with numbers of up to 8 digits, and a set of 30 rods can be used for 12-digit numbers.

- Site...
- Subjects...
- Articles...
- Collections...
- Simple math...

Napier Bones in Various Bases

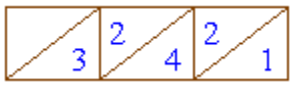
John Napier (1550-1617), a Scottish mathematician, is mostly known for his invention of *logarithms* - a device that revolutionized calculations by reducing difficult and tedious multiplication to addition of table entries. In 1617, three years after appearance of *Mirifici logarithmorum canonis descriptio* (A Description of the Wonderful Law of Logarithms), he published *Rabdologiae* which was recently reproduced as *Rabdology* by the Charles Babbage Institute in the Reprint Series for the History of Computing. The *Elementary Latin Dictionary* offered two entries:

1. **Rab-** - *raving, mad, rage, be mad, ...*
2. **Dolo** - *pike, pointed stuff, sword-stick, ...*

(my son David who takes Latin in high school, claims that the last part *logo* has to do with the word "study".) The difficulty of putting the three together would explain why the Institute decided to anglicize the title instead of translating it. Trusting several accounts, it appears that in their day the sticks described in the book and later known as Napier's rods or Napier's bones, were indeed a rave among merchants who carried them along and used them to speed up calculations.

[Richard Persky from University of Texas diverges: Actually, it looks like Latinized Greek to me - *rhabdos* ("staff, stick") plus *logos* ("speech," "reason," "knowledge," "study" - it's a slippery little word with a broad range of meanings). So "Rabdologiae" would be the science of sticks, which seems a bit more reasonable than "the science of going berserk with a pointed object".]

Each bone is a multiplication table for a single digit. The digit appears at the top of its bone. Below one carves consecutive products of this digit by all non-zero digits in the system (decimal in *Rabdology*). Each product occupies a single cell. Digits in a 2-digit number are separated, the first is written above while the second below the bottom-left top-right diagonal. To multiply 187 by 3, put three bones corresponding to digits 1,8, and 7 alongside each other. The third row looks like



The product is evaluated diagonally,

5 (= 3 + 2) 6 (= 4 + 2) 1, 187 × 3 = 561.

That simple. (Of course, from time to time you will have to carry 1.)

Among other wonderful things John Napier was also the discoverer of the *binary system*. So it's appropriate that in the applet below the base may change from 3 through 20.

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UNIVAC I

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UNIVAC I operator 's console

UNIVAC I at Franklin Life Insurance Company

The **UNIVAC I** (**UNIVersal Automatic Computer I**) was the first general purpose electronic digital computer design for business application produced in the United States.[1] It was designed principally by J. Presper Eckert and John Mauchly, the inventors of the ENIAC. Design work was started by their company, Eckert–Mauchly Computer Corporation (EMCC), and was completed after the company had been acquired by Remington Rand (which later became part of Sperry, now Unisys). In the years before successor models of the UNIVAC I appeared, the machine was simply known as "the **UNIVAC**".[2]

The first Univac was accepted by the United States Census Bureau on March 31, 1951, and was dedicated on June 14 that year.[3][4] The fifth machine (built for the U.S. Atomic Energy

Commission) was used by CBS to predict the result of the 1952 presidential election. With a sample of just 1% of the voting population it famously predicted an Eisenhower landslide.[5]

Contents

History

Market positioning

Remington Rand employees, Harold E. Sweeney (left) and J. Presper Eckert (center) demonstrate the U.S. Census Bureau's UNIVAC for CBS reporter Walter Cronkite (right)

UNIVAC I operator's console closeup

The UNIVAC I was the first American computer designed at the outset for business and administrative use with fast execution of relatively simple arithmetic and data transport operations, as opposed to the complex numerical calculations required of scientific computers. As such, the UNIVAC competed directly against punch-card machines, though the UNIVAC originally could neither read nor punch cards. That shortcoming hindered sales to companies concerned about the high cost of manually converting large quantities of existing data stored on cards. This was corrected by adding offline card processing equipment, the UNIVAC Card to Tape converter and the UNIVAC Tape to Card converter, to transfer data between cards and UNIVAC magnetic tapes.[6] However, the early market share of the UNIVAC I was lower than the Remington Rand Company wished.

To promote sales, the company joined with CBS to have UNIVAC I predict the result of the 1952 Presidential election. UNIVAC I predicted Eisenhower would have a landslide victory over Adlai Stevenson whom the pollsters favored. The CBS crew was so certain that UNIVAC was wrong that they pretended it was not working. As the election continued and it became clear it was correct all along, the announcer admitted their sleight of hand and the machine became famous. The result was a greater public awareness of computing technology,[7] and from then on computerized predictions were a must-have part of election night broadcasts.

Installations

Univac I at Census Bureau with two operators ca. 1960

The first contracts were with government agencies such as the Census Bureau, the U.S. Air Force, and the U.S. Army Map Service.[2] Contracts were also signed by the ACNielsen Company, and the Prudential Insurance Company. Following the sale of Eckert–Mauchly Computer Corporation to Remington Rand, due to the cost overruns on the project, Remington Rand convinced Nielsen and Prudential to cancel their contracts.

The first sale, to the Census Bureau, was marked with a formal ceremony on March 31, 1951, at the Eckert–Mauchly Division's factory at 3747 Ridge Avenue, Philadelphia. The machine was not actually shipped until the following December, because, as the sole fully set-up model, it was needed for demonstration purposes, and the company was apprehensive about the difficulties of dismantling, transporting, and reassembling the delicate machine.[8] As a result, the first installation was with the second computer, delivered to the Pentagon in June 1952.

UNIVAC installations, 1951–1954[9]

Date	Customer	Comments
1951	U.S. Census Bureau, Suitland, MD	Not shipped until 1952[10][11]
1952	U.S. Air Force	Pentagon, Arlington, VA[12]
1952	U.S. Army Map Service	Washington, DC.[13] Operated at factory April–September 1952
1953	New York University (for the Atomic Energy Commission)	New York, NY[14]
1953	Atomic Energy Commission	Livermore, CA
1953	U.S. Navy	David W. Taylor Model Basin, Bethesda, MD[14]
1954	Remington Rand	Sales office, New York, NY
1954	General Electric	Appliance Division, Louisville, KY. First business sale.[15]
1954	Metropolitan Life	New York, NY[16]
1954	U.S. Air Force	Wright-Patterson AFB, Dayton, OH
1954	U.S. Steel	Pittsburgh, PA
1954	Du Pont	Wilmington, DE
1954	U.S. Steel	Gary, IN
1954	Franklin Life Insurance	Springfield, IL[17]

1954 Westinghouse	Pittsburgh, PA
1954 Pacific Mutual Life Insurance	Los Angeles, CA
1954 Sylvania Electric	New York, NY
1954 Consolidated Edison	New York, NY

Originally priced at US$159,000, the UNIVAC I rose in price until they were between $1,250,000 and $1,500,000. A total of 46 systems were eventually built and delivered.

The UNIVAC I was too expensive for most universities, and Sperry Rand, unlike companies such as IBM, was not strong enough financially to afford to give many away. However, Sperry Rand donated UNIVAC I systems to Harvard University (1956), the University of Pennsylvania (1957), and Case Institute of Technology in Cleveland, Ohio (1957); the UNIVAC I at Case was still operable in 1965 but had been supplanted by a UNIVAC 1107.

A few UNIVAC I systems stayed in service long after they were made obsolete by advancing technology. The Census Bureau used its two systems until 1963, amounting to 12 and nine years of service, respectively. Sperry Rand itself used two systems in Buffalo, New York until 1968. The insurance company Life and Casualty of Tennessee used its system until 1970, totaling over 13 years of service.

Technical description

This section **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.
Find sources: "UNIVAC I" – news · newspapers · books · scholar · JSTOR *(March 2015) (Learn how and when to remove this template message)*

Major physical features

7AK7 vacuum tubes in a 1956 UNIVAC I computer

UNIVAC I used about 5,000 vacuum tubes,[18] weighed 16,686 pounds (8.3 short tons; 7.6 t),[19] consumed 125 kW, and could perform about 1,905 operations per second running on a 2.25 MHz clock. The Central Complex alone (i.e. the processor and memory unit) was 4.3 m by 2.4 m by 2.6 m high. The complete system occupied more than 35.5 m² (382 ft²) of floor space.

Main memory details

Mercury delay line memory of UNIVAC I

The main memory consisted of 1000 words of 12 characters. When representing numbers, they were written as 11 decimal digits plus sign. The 1000 words of memory consisted of 100 channels of 10-word mercury delay line registers. The input/output buffers were 60 words each, consisting of 12 channels of 10-word mercury delay line registers. There are six channels of 10-word mercury delay line registers as spares. With modified circuitry, seven more channels control the temperature of the seven mercury tanks, and one more channel is used for the 10 word "Y" register. The total of 126 mercury channels is contained in the seven mercury tanks mounted on the backs of sections MT, MV, MX, NT, NV, NX, and GV. Each mercury tank is divided into 18 mercury channels.

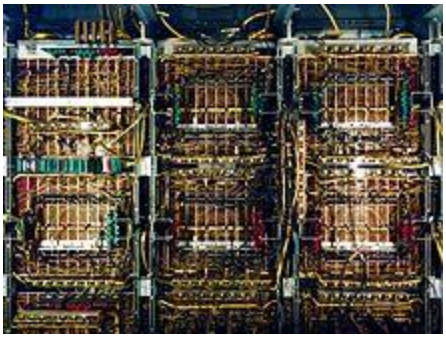
Each 10-word mercury delay line channel is made up of three sections:

1. A channel in a column of mercury, with receiving and transmitting quartz piezo-electric crystals mounted at opposite ends.
2. An intermediate frequency chassis, connected to the receiving crystal, containing amplifiers, detector, and compensating delay, mounted on the shell of the mercury tank.
3. A recirculation chassis, containing cathode follower, pulse former and retimer, modulator, which drives the transmitting crystal, and input, clear, and memory-switch gates, mounted in the sections adjacent to the mercury tanks.

UNIVAC 1 Recirculation Chassis Board

Instructions and data

Instructions were six alphanumeric characters, packed two instructions per word. The addition time was 525 microseconds and the multiplication time was 2150 microseconds. A non-standard modification called "Overdrive" did exist, that allowed for three four-character instructions per word under some circumstances. (Ingerman's simulator for the UNIVAC, referenced below, also makes this modification available.)



Internal view of UNIVAC I

Digits were represented internally using excess-3 ("XS3") binary coded decimal (BCD) arithmetic with six bits per digit using the same value as the digits of the alphanumeric character set (and one parity bit per digit for error checking), allowing 11-digit signed magnitude numbers. But with the exception of one or two machine instructions, UNIVAC was considered by programmers to be a decimal machine, not a binary machine, and the binary representation of the characters was irrelevant. If a non-digit character was encountered in a position during an arithmetic operation the machine passed it unchanged to the output, and any carry into the non-digit was lost. (Note, however, that a peculiarity of UNIVAC I's addition/subtraction circuitry was that the "ignore", space, and minus characters were occasionally treated as numeric, with

values of –3, –2, and –1 respectively, and the apostrophe, ampersand, and left parenthesis were occasionally treated as numeric, with values 10, 11, and 12.)

Input/output

Besides the operator's console, the only I/O devices connected to the UNIVAC I were up to 10 UNISERVO tape drives, a Remington Standard electric typewriter and a Tektronix oscilloscope. The UNISERVO was the first commercial computer tape drive commercially sold. It used data density 128 bits per inch (with real transfer rate 7,200 characters per second) on magnetically plated phosphor bronze tapes. The UNISERVO could also read and write UNITYPER created tapes at 20 bits per inch. The UNITYPER was an offline typewriter to tape device, used by programmers and for minor data editing. Backward and forward tape read and write operations were possible on the UNIVAC and were fully overlapped with instruction execution, permitting high system throughput in typical sort/merge data processing applications. Large volumes of data could be submitted as input via magnetic tapes created on offline card to tape system and made as output via a separate offline tape to printer system. The operators console had three columns of decimal coded switches that allowed any of the 1000 memory locations to be displayed on the oscilloscope. Since the mercury delay line memory stored bits in a serial format, a programmer or operator could monitor any memory location continuously and with sufficient patience, decode its contents as displayed on the scope. The on-line typewriter was typically used for announcing program breakpoints, checkpoints, and for memory dumps.

Operations

A typical UNIVAC I installation had several ancillary devices. There were, typically: a printer that read a magnetic tape and printed output on continuous-form paper; a card-to-tape converter, that read punched cards and recorded their images on magnetic tape; and a tape-to-card converter, that read a magnetic tape and produced punched cards. There was no UNIVAC provided operating system. Operators loaded on a UNISERVO a program tape which could be loaded automatically by processor logic. The appropriate source and output data tapes would be mounted and the program started. Results tapes then went to the offline printer or typically for data processing into short term storage to be updated with the next set of data produced on the offline card to tape unit. The mercury delay line memory tank temperature was very closely controlled as the speed of sound in mercury varies with temperature. In the event of a power failure, many hours could elapse before the temperature stabilized.

Reliability

Eckert and Mauchly were uncertain about the reliability of digital logic circuits and little was known about them at the time. The UNIVAC I was designed with parallel computation circuits and result comparison. In practice, only failing components yielded comparison faults as their circuit designs were very reliable. Tricks were used to manage the reliability of tubes. Prior to use in the machine, large lots of the predominant tube type 25L6 were burned in and carefully tested. Often half of a production lot would be thrown away. Technicians installed a tested and burned-in tube in an easily diagnosed location such as the memory recirculate amplifiers. Then, when aged further, this "golden" tube was sent to stock to be used in a difficult to diagnose logic

position. It took about 30 minutes to turn on the computer as all filament power supplies were stepped up to operating value over that time, to reduce in-rush current and thermal stress on the tubes. As a result, uptimes (MTBF) of many days to weeks were obtained on the processor. The UNISERVO did not have vacuum columns but springs and strings to buffer tape from the reels to the capstan. These were a frequent source of failures.

See also


Wikimedia Commons has media related to ***UNIVAC I***.

- List of UNIVAC products
- History of computing hardware
- List of vacuum tube computers
- Ferranti Mark 1
- Grace Hopper

Notes

1.

• The first commercial computer in the world was the BINAC built by the Eckert–Mauchly Computer Corporation and delivered to Northrop Aircraft Company in 1949.

• • Johnson, L.R., "Coming to grips with Univac," IEEE Annals of the History of Computing , vol.28, no.2, pp.32,42, April–June 2006. doi: 10.1109/MAHC.2006.27

• • Reference: CNN's feature on the 50th anniversary of the UNIVAC.

• • *Norberg, Arthur Lawrence (2005). Computers and Commerce: A Study of Technology and Management at Eckert-Mauchly Computer Company, Engineering Research Associates, and Remington Rand, 1946-1957. MIT Press. pp. 190, 217. ISBN 9780262140904.*

• • *Lukoff, Herman (1979). From Dits to Bits: A personal history of the electronic computer. Portland, Oregon, USA: Robotics Press. pp. 127–131. ISBN 0-89661-002-0. LCCN 79-90567.*

• • Univac i. (2003). In Encyclopedia of computer science. Retrieved from http://literati.credoreference.com/content/entry/encyccs/univac_i/0

• • Brinkley, Alan. American History: A Survey. 12th Ed.

• • UNIVAC conference, Charles Babbage Institute, University of Minnesota. 171-page transcript of oral history with computer pioneers involved with the Univac computer, held on 17–18 May 1990, Washington DC. The meeting involved 25 engineers, programmers, marketing representatives, and salesmen who were involved with the UNIVAC, as well as representatives from users such as General Electric, Arthur Andersen, and the U.S. Census.

• • Ceruzzi, Paul E. *A history of modern computing*, MIT, 1998. The source notes that the list is compiled from a number of sources and does not include UNIVACs that were completed not delivered in the period 1951–54. In some cases the dates are approximate. Depending on the definition of "installed" the order may be slightly different.

• • *"Automatic Computing Machinery: News - UNIVAC Acceptance Tests". Mathematics of Computation.* ***5*** *(35): 176–177. 1951. doi:10.1090/S0025-5718-51-99425-2. ISSN 0025-5718.*

• • *"Automatic Computing Machinery: News - Eckert-Mauchly Division, Remington Rand Inc". Mathematics of Computation.* ***5*** *(36): 245. 1951. doi:10.1090/S0025-5718-51-99416-1. ISSN 0025-5718.*

• • *"Automatic Computing Machinery: News - UNIVAC Acceptance Tests". Mathematics of Computation.* ***6*** *(38): 119. 1952. doi:10.1090/S0025-5718-52-99400-3. ISSN 0025-5718.*

• • *"Automatic Computing Machinery: News - UNIVAC Acceptance Tests". Mathematics of Computation.* ***6*** *(40): 247. 1952. doi:10.1090/S0025-5718-52-99384-8. ISSN 0025-5718.*

• • *. Digital_Computer_Newsletter_V05N03_Jul53.pdf. "1. UNIVAC". Digital Computer Newsletter.* ***5*** *(3): 2. July 1953.*

• • *"THE UNIVAC". Digital Computer Newsletter.* ***6*** *(1): 2. Apr 1954.*

• • *"7. UNIVAC". Digital Computer Newsletter.* ***6*** *(3): 4–5. Jul 1954.*

• • *"2. The UNIVAC". Digital Computer Newsletter.* ***6*** *(2): 2. Jan 1954.*

• • The vacuum tubes used in the UNIVAC I were mostly of type 25L6, but the machine also used tubes of type 6AK5, 7AK7, 6AU6, 6BE6, 6SN7, 6X5, 28D7, 807, 829B, 2050, 5545, 5651, 5687, 6AL5, 6AN5, 6AH6, 5V4, 5R4, 4D32, 3C23, and 8008.

19. • *Weik, Martin H. (March 1961). "UNIVAC I". ed-thelen.org. A Third Survey of Domestic Electronic Digital Computing Systems.*

External links

- UNIVAC Conference Oral history on 17–18 May 1990. Charles Babbage Institute, University of Minnesota, Minneapolis. 171-page transcript of oral history with computer pioneers, including Jean Bartik, involved with the Univac computer, held on 17–18 May 1990. The meeting involved 25 engineers, programmers, marketing representatives, and salesmen who were involved with the UNIVAC, as well as representatives from users such as General Electric, Arthur Andersen, and the U.S. Census.
- Margaret R. Fox Papers, 1935–1976, Charles Babbage Institute, University of Minnesota. collection contains reports, including the original report on the ENIAC, **UNIVAC**, and many early in-house National Bureau of Standards (NBS) activity reports; memoranda on and histories of SEAC, SWAC, and DYSEAC; programming instructions for the **UNIVAC**, LARC, and MIDAC; patent evaluations and disclosures relevant to computers; system descriptions; speeches and articles written by Margaret Fox's colleagues; and correspondence of Samuel Alexander, Margaret Fox, and Samuel Williams.
- UNIVAC I documentation – From computer documentation repository www.bitsavers.org

- UNIVAC 1: The First Mass-Produced Computer - Unisys History Newsletter, Volume 5, Number 1 at the Wayback Machine (archived April 22, 2017)
- The UNIVAC and the Legacy of the ENIAC – From the University of Pennsylvania Library (PENN UNIVERSITY/exhibitions)
- UNIVAC 1 Computer System – By Allan G. Reiter, formerly of the ERA division of Remington Rand
- UNIVAC I & II Simulator – By Peter Zilahy Ingerman; Shareware simulator of the UNIVAC I and II. Archived download
- Core memory slide show – This slide show contains a photo of a 1951 core memory module for a UNIVAC I
- Remington-Rand Presents UNIVAC – Promotional film from the collection of the Computer History Museum, Mountain View, California
- *"Winky Blinky Lights « Off The Broiler". archive.is. Pictures and video in flash of UNIVAC main console; sales and marketing documents. 10 December 2012. Archived from the original on 10 December 2012.*
- "Want To Buy A Brain", May 1949, *Popular Science* early illustrated article on the UNIVAC for the general public
- YouTube Video: 1951 UNIVAC 1 Computer Basic System Components – Computer History Archives Project

It utilized serial circuitry, 2.25 MHz bit rate, and had an internal storage capacity 1,000 words or 12,000 characters. It utilized a Mercury delay line, magnetic tape, and typewriter output. The **UNIVAC** was used for general purpose computing with large amounts of input and output. Power consumption was about 120 kva.

The most famous **UNIVAC** product was the **UNIVAC** I mainframe **computer** of 1951, which became **known** for predicting the outcome of the U.S. presidential election the following year. This incident is noteworthy because the **computer** predicted an Eisenhower landslide when traditional pollsters all called it for Adlai Stevenson.

1951

June 14

UNIVAC, the first commercially produced digital computer, is dedicated

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-
-
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On June 14, 1951, the U.S. Census Bureau dedicates UNIVAC, the world's first commercially produced electronic digital computer. UNIVAC, which stood for Universal Automatic Computer, was developed by J. Presper Eckert and John Mauchly, makers of ENIAC, the first general-purpose electronic digital computer. These giant computers, which used thousands of vacuum tubes for computation, were the forerunners of today's digital computers.

The search for mechanical devices to aid computation began in ancient times. The abacus, developed in various forms by the Babylonians, Chinese, and Romans, was by definition the first digital computer because it calculated values by using digits. A mechanical digital calculating machine was built in France in 1642, but a 19th century Englishman, Charles Babbage, is credited with devising most of the principles on which modern computers are based. His "Analytical Engine," begun in the 1830s and never completed for lack of funds, was based on a mechanical loom and would have been the first programmable computer.

By the 1920s, companies such as the International Business Machines Corporation (IBM) were supplying governments and businesses with complex punch-card tabulating systems, but these mechanical devices had only a fraction of the calculating power of the first electronic digital computer, the Atanasoff-Berry Computer (ABC). Completed by John Atanasoff of Iowa State in 1939, the ABC could by 1941 solve up to 29 simultaneous equations with 29 variables. Influenced by Atanasoff's work, Presper Eckert and John Mauchly set about building the first general-purpose electronic digital computer in 1943. The sponsor was the U.S. Army Ordnance Department, which wanted a better way of calculating artillery firing tables, and the work was done at the University of Pennsylvania.

ENIAC, which stood for Electronic Numerical Integrator and Calculator, was completed in 1946 at a cost of nearly $500,000. It took up 15,000 feet, employed 17,000 vacuum tubes, and was programmed by plugging and replugging some 6,000 switches. It was first used in a calculation for Los Alamos Laboratories in December 1945, and in February 1946 it was formally dedicated.

Following the success of ENIAC, Eckert and Mauchly decided to go into private business and founded the Eckert-Mauchly Computer Corporation. They proved less able businessmen than they were engineers, and in 1950 their struggling company was acquired by Remington Rand, an office equipment company. On June 14, 1951, Remington Rand delivered its first computer, UNIVAC I, to the U.S. Census Bureau. It weighed 16,000 pounds, used 5,000 vacuum tubes, and could perform about 1,000 calculations per second. On November 4, 1952, the UNIVAC achieved national fame when it correctly predicted Dwight D. Eisenhower's unexpected landslide victory in the presidential election after only a tiny percentage of the votes were in.

UNIVAC and other first-generation computers were replaced by transistor computers of the late 1950s, which were smaller, used less power, and could perform nearly a thousand times more operations per second. These were, in turn, supplanted by the integrated-circuit machines of the mid-1960s and 1970s. In the 1980s, the development of the microprocessor made possible small, powerful computers such as the personal computer, and more recently the laptop and hand-held computers

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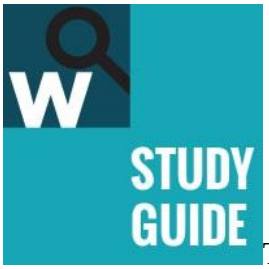
The Five Generations of Computers

By Vangie Beal

Related Terms

- ENIAC - First Computer in the Unites States
- first sale doctrine
- fps / FPS
- millennials (millennial generation)
- OSPF - Open Shortest Path First
- fourth-generation language
- CRT - cathode-ray tube
- EDSAC
- Compaq Computer Corporation
- tweening

Learn about each of the five generations of computers and major technology developments that have led to the computing devices that we use today.



The history of computer development is a computer science topic that is often used to reference the different *generations of computing devices*.

Each one of the five generations of computers is characterized by a *major technological development* that fundamentally changed the way computers operate.

Most major developments from the 1940's to present day have resulted in increasingly smaller, cheaper, more powerful and more efficient computing devices.

What Are the Five Generations of Computers?

In this Webopedia Study Guide, you'll learn more about each of the five generations of computers and the advances in technology that have led to the development of the many computing devices that we use today. Our journey of the five generations of computers starts in 1940 with vacuum tube circuitry and goes to the present day — and beyond — with artificial intelligence (AI) systems and devices.

Let's take a look...

Five Generations of Computers Checklist

Getting Started: Key Terms to Know

The following technology definitions will help you to better understand the five generations of computing:

- computer
- microprocessor
- magnetic drums
- binary
- integrated circuit
- semiconductor
- nanotechnology
- machine language
- assembly language
- artificial intelligence

Modern Batch-Who Said Batch Is Old School

First Generation: Vacuum Tubes (1940-1956)

The first computer systems used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. These computers were very expensive to operate and in addition to using a great deal of electricity, the first computers generated a lot of heat, which was often the cause of malfunctions.

First generation computers relied on machine language, the lowest-level programming language understood by computers, to perform operations, and they could only solve one problem at a time. It would take operators days or even weeks to set-up a new problem. Input was based on punched cards and paper tape, and output was displayed on printouts.

The UNIVAC and ENIAC computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to a business client, the U.S. Census Bureau in 1951.

A UNIVAC computer at the Census Bureau.
Image Source: *United States Census Bureau*

Recommended Reading: *Webopedia's ENIAC definition*

Second Generation: Transistors (1956-1963)

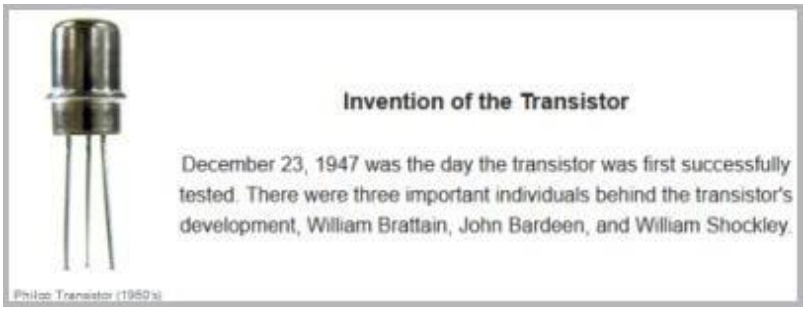
The world would see transistors replace vacuum tubes in the second generation of computers. The transistor was invented at Bell Labs in 1947 but did not see widespread use in computers until the late 1950s.

The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a vast improvement over the vacuum tube. Second-generation computers still relied on punched cards for input and printouts for output.

From Binary to Assembly

Second-generation computers moved from cryptic binary machine language to symbolic, or assembly, languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

The first computers of this generation were developed for the atomic energy industry.



An early Philco Transistor (1950's)
Image Source: *Vintage Computer Chip Collectibles*

Third Generation: Integrated Circuits (1964-1971)

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers.

Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

Did You Know... ? *An integrated circuit (IC) is a small electronic device made out of a semiconductor material. The first integrated circuit was developed in the 1950s by Jack Kilby of Texas Instruments and Robert Noyce of Fairchild Semiconductor.*

Fourth Generation: Microprocessors (1971-Present)

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. The Intel 4004 chip, developed in 1971, located all the components of the computer—from the central processing unit and memory to input/output controls—on a single chip.

In 1981 IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh. Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.

Intel's first microprocessor, the 4004, was conceived by Ted Hoff and Stanley Mazor.
Image Source: *Intel Timeline (PDF)*

Fifth Generation: Artificial Intelligence (Present and Beyond)

Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality.

Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.

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This article was last updated on February 01, 2019

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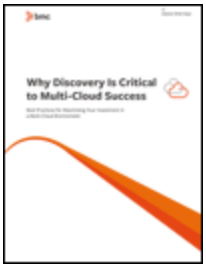

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- Q
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First Generation: Vacuum Tubes (1940-1956)

It would take operators days or even weeks to set-up a new problem. Input was based on punched cards and paper tape, and output was displayed on printouts. The UNIVAC and ENIAC **computers** are examples of **first-generation computing**

First Generation (1945–1959) The vacuum tube was **invented** in 1906 by an electrical engineer named Lee De Forest (1873–1961).

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Advantages And Disadvantages of First Generation Computer

Advantages

1. Made use of vacuum tubes which are the only electronic component available during those days.
2. Use of vacuum tube technology made possible to make an electronic digital computer.
3. These computers could calculate in milliseconds.

Disadvantages

1. The computers were very larger in size
2. They consumed a large amount of energy.
3. They heated very soon due to thousands of vacuum tubes.
4. They were not very reliable.
5. Air conditioning is required.
6. Constant maintenance was required.
7. Not-portable.
8. Costly commercial production.
9. Very slow speed.
10. Limited programming capabilities.
11. Used machine language only.
12. Used punch card for input.
13. Not versatile and less accurate.

As the invention of first generation computers involves vacuum tubes, so another disadvantage of these computers was, vacuum tubes require a large cooling system. Very less work **efficiency**. Limited programming capabilities and punch cards were used to take inputs. Large amount of energy consumption.

1st ---5th generations and it's advantages and

1. 1. 1st----5th Generations and it's Advantages and Disadvantages
2. 2. First Generation • The first generation of computers is said by some to have started in 1946 with ENIAC, the first 'computer' to use electronic valves (ie. vacuum tubes). Others

would say it started in May 1949 with the introduction of EDSAC, the first stored program computer.

3. 3. First Generation • Advantages: • That was the only electronic during those old days. • Those computers were very fast to calculate. • Vacuum tube technology made possible the advent of electronic digital computers. • Disadvantages: • It is not really a reliable device. • No portable • It is required to be air conditioned.
4. 4. In May 1949 with the introduction of EDSAC, the first stored program computer.
5. 5. Second Generation • The transition from first generation to second generation of computers was not abrupt. There was all round development in technology, designs and programming languages. Diode and transistor technology formed the basis of the electronic switches and the switching time came down to around 0.3 microseconds.
6. 6. Second Generation • Advantages: • Smaller in size compared to the first generation of computer • The second generations computers were more reliable. • Used less energy and were not heated as much as the first one. • Wider commercial use. • Better portability as compared to the first generation. • Better speed and could calculate data in microseconds. • Used faster peripherals. • Used assembly language as well. • Accuracy improved.
7. 7. Second Generation • Disadvantages • Cooling system was required. • Constant maintenance was require. • Costly and not versatile. • Commercial production was difficult. • Only used for specific purposes. • Punch cards were used for input.
8. 8. Third Generation • In this era, there were several innovations in various fields of computer technology. These include Integrated Circuits (ICs), Semiconductor Memories, Microprogramming, various patterns of parallel processing and introduction of Operating Systems and time-sharing. In the Integrated Circuit, division there was gradual progress. Firstly, there were small-scale integration (SSI) circuits (having 10 devices per chip), which evolved to medium scale integrated (MSI) circuits (having 100 devices per chip). There were also developments of multi-layered printed circuits.
9. 9. Third Generation • Advantages: • Less energy • Easily portable • Maintenance cost is low because hardware failures are rare. • Disadvantages: • There are a lot of cases required for air conditioning. • Highly sophisticated production was easier and cheaper.
10. 10. Fourth Generation • After 1971 the fourth generation computers were built. The fourth generation computers were the extension of third generation technology. The fourth generation computers emerged with development of the VLSI (Very Large Scale Integration).With the help of VLSI technology microprocessor came into existence. The computers were designed by using microprocessor, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. The fourth generation computers became more powerful, compact, reliable and affordable. As a result, they give rise to personal computer (PC) revolution. For the first time in 1981 IBM introduced its computer for the home user and in 1984 Apple introduced Macintosh Microprocessor.
11. 11. Fourth Generation • Advantages: • Less energy • Easily portable • Maintenance cost is low because hardware failures are rare. • Disadvantages: • There are a lot of cases required for air conditioning. • Highly sophisticated production was easier and cheaper.
12. 12. Fifth Generation • Fifth generation computers are in developmental stage which is based on the artificial intelligence. The goal of the fifth generation is to develop the device which could respond to natural language input and are capable of learning and self- organization. Quantum computation and molecular and nanotechnology will be used

in this technology. So we can say that the fifth generation computers will have the power of human intelligence.

13. 13. Fifth Generation • Advantages: • It is more reliable and works faster. • Available in different sizes with unique features. • Disadvantages: • The disadvantages of fifth generation computers have yet to be agreed upon, but many feel that they are two of its advantages: AI and the overall advanced technology. The addition of AI worries many due to the computers possibly becoming smart enough to replace humans altogether, and many people are becoming reliant on the advanced technology for tasks that they can do without computers.

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Second Generation: Transistors (1956-1963)

The world would see transistors replace vacuum tubes in the second generation of computers. The transistor was invented at Bell Labs in 1947 but did not see widespread use in computers until the late 1950s.

The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a vast improvement over the vacuum tube. Second-generation computers still relied on punched cards for input and printouts for output.

First Generation: Vacuum Tubes (1940-1956)

The **first computer** systems **used** vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms.১ ফেব, ২০১

Second generation (1956 - 1963)

The second generation of computers saw the use of transistors instead of vacuum tubes. Transistors were widely used in computers from 1956 to 1963. Transistors were smaller than vacuum tubes and allowed computers to be smaller in size, faster in speed, and cheaper to build.

The first computer to use transistors was the TX-0 and was introduced in 1956. Other computers that used transistors include the IBM 7070, Philco Transac S-1000, and RCA 501.

Generations of Computer

Introduction:
A computer is an electronic device that manipulates information or data. It has the ability to store, retrieve, and process data.
Nowadays, a computer can be used to type documents, send email, play games, and browse the Web. It can also be used to edit or create spreadsheets, presentations, and even videos. But the evolution of this complex system started around 1940 with the first Generation of Computer and evolving ever since.

There are five generations of computers.

1. FIRST GENERATION

- ***Introduction:***
    1. 1946-1959 is the period of first generation computer.
    2. J.P.Eckert and J.W.Mauchy invented the first successful electronic computer called ENIAC, ENIAC stands for “Electronic Numeric Integrated And Calculator”.
- ***Few Examples are:***
    1. ENIAC
    2. EDVAC
    3. UNIVAC
    4. IBM-701
    5. IBM-650

    …

- ***Advantages:***
    1. It made use of vacuum tubes which are the only electronic component available during those days.
    2. These computers could calculate in milliseconds.
- ***Disadvantages:***
    1. These were very big in size, weight was about 30 tones.
    2. These computers were based on vacuum tubes.
    3. These computers were very costly.

4. It could store only a small amount of information due to the presence of magnetic drums.
5. As the invention of first generation computers involves vacuum tubes, so another disadvantage of these computers was, vacuum tubes require a large cooling system.
6. Very less work efficiency.
7. Limited programming capabilities and punch cards were used to take inputs.
8. Large amount of energy consumption.
9. Not reliable and constant maintenance is required.

2. SECOND GENERATION

- ***Introduction:***
    1. 1959-1965 is the period of second-generation computer.
    2. 3.Second generation computers were based on Transistor instead of vacuum tubes.
- ***Few Examples are:***
    1. Honeywell 400
    2. IBM 7094
    3. CDC 1604
    4. CDC 3600
    5. UNIVAC 1108

    … many more

- ***Advantages:***
    1. Due to the presence of transistors instead of vacuum tubes, the size of electron component decreased. This resulted in reducing the size of a computer as compared to first generation computers.
    2. Less energy and not produce as much heat as the first genration.
    3. Assembly language and punch cards were used for input.
    4. Low cost than first generation computers.
    5. Better speed, calculate data in microseconds.
    6. Better portability as compared to first generation
- ***Disadvantages:***
    1. A cooling system was required.
    2. Constant maintenance was required.
    3. Only used for specific purposes.

3. THIRD GENERATION

- ***Introduction:***
    1. 1965-1971 is the period of third generation computer.
    2. These computers were based on Integrated circuits.
    3. IC was invented by Robert Noyce and Jack Kilby In 1958-1959.
    4. IC was a single component containing number of transistors.
- ***Few Examples are:***
    1. PDP-8
    2. PDP-11
    3. ICL 2900
    4. IBM 360
    5. IBM 370

    … and many more

- ***Advantages:***
    1. These computers were cheaper as compared to second-generation computers.
    2. They were fast and reliable.
    3. Use of IC in the computer provides the small size of the computer.
    4. IC not only reduce the size of the computer but it also improves the performance of the computer as compared to previous computers.
    5. This generation of computers has big storage capacity.
    6. Instead of punch cards, mouse and keyboard are used for input.
    7. They used an operating system for better resource management and used the concept of time-sharing and multiple programming.
    8. These computers reduce the computational time from microseconds to nanoseconds.
- ***Disadvantages:***
    1. IC chips are difficult to maintain.
    2. The highly sophisticated technology required for the manufacturing of IC chips.
    3. Air conditioning is required.

4. FOURTH GENERATION

- ***Introduction:***
    1. 1971-1980 is the period of fourth generation computer.
    2. This technology is based on Microprocessor.
    3. A microprocessor is used in a computer for any logical and arithmetic function to be performed in any program.
    4. Graphics User Interface (GUI) technology was exploited to offer more comfort to users.
- ***Few Examples are:***
    1. IBM 4341
    2. DEC 10
    3. STAR 1000
    4. PUP 11

… and many more

- ***Advantages:***
    1. Fastest in computation and size get reduced as compared to the previous generation of computer.
    2. Heat generated is negligible.
    3. Small in size as compared to previous generation computers.
    4. Less maintenance is required.
    5. All types of high-level language can be used in this type of computers.
- ***Disadvantages:***
    1. The Microprocessor design and fabrication are very complex.
    2. Air conditioning is required in many cases due to the presence of ICs.
    3. Advance technology is required to make the ICs.

5. FIFTH GENERATION

- ***Introduction:***
    1. The period of the fifth generation in 1980-onwards.
    2. This generation is based on artificial intelligence.
    3. The aim of the fifth generation is to make a device which could respond to natural language input and are capable of learning and self-organization.
    4. This generation is based on ULSI(Ultra Large Scale Integration) technology resulting in the production of microprocessor chips having ten million electronic component.
- ***Few Examples are:***
    1. Desktop
    2. Laptop
    3. NoteBook
    4. UltraBook
    5. Chromebook

… and many more

- ***Advantages:***
    1. It is more reliable and works faster.
    2. It is available in different sizes and unique features.
    3. It provides computers with more user-friendly interfaces with multimedia features.
- ***Disadvantages:***
    1. They need very low-level languages.
    2. They may make the human brains dull and doomed.
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Advantages and Disadvantages of Second Generation Computer

Advantages

1. Smaller in size as compared to the first generation computer.
2. The second-generation computers were more reliable.
3. Used less energy and were not heated as much as first-generation computer.
4. Wider commercial use.
5. Better portability as compared to the first generation computers.
6. Better speed and could calculate data in microseconds.
7. Used faster peripherals like tape drives, magnetic disk etc.
8. Used assembly language as well as machine language.
9. Accuracy improved.

Disadvantages

1. The cooling system was required.
2. Constant maintenance required.
3. Commercial production was difficult.
4. Only used for specific purposes.
5. Costly and not versatile.
6. Punch cards were used for input.

Advantages

1. Smaller in size as compared to the first generation computer.
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Advantages of second generation computers:

You can see here. Advantages of second generation

- Transistors decreased the size of the electron component.
- The size of the computer was smaller as compared to the first generation computer.
- It used less energy.
- It did not produce much heat.
- Punch cards and assembly language were used for input.
- They were low cost.
- They had better speed.
- They used to calculate data in microseconds.
- Better portability

Disadvantages of the second generation:

- They needed a cooling system.
- The constant maintenance was required.
- These computers were only used for specific purposes.

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Advantages of Third Generation Computer

1. Smaller in size as compared to previous generations.
2. More reliable.
3. Used less energy.
4. Produced less heat as compared to the previous two generations of computers. (First Generation, Second Generation)
5. Better speed and could calculate data in nanoseconds.
6. Used fan for head discharge to prevent damage.
7. Maintenance cost was low because hardware failure is rare.
8. Totally general purpose.
9. Could be used for high-level language.
10. High storage capacity than the previous generation's computer.
11. Versatile to an extent.
12. Less expensive.
13. More accurate than previous.
14. Used mouse and keyboard for input.

Disadvantages of Third Generation Computer

1. Air conditioning was required.
2. The highly sophisticated technology required for the manufacturing of IC chips.

Advantages of third generation computers:

- These computers were cheaper as compared to second generation computers.
- They were fast.
- They were reliable.
- IC reduced the size of commuters.
- Improved performance.
- Big storage capacity.
- Mouse and keyboards were used for input.
- For resource management system Operating system was used.
- They had the concept of time-sharing and multiple programming.
- Computational time reduced from microseconds to nanoseconds.

You can see:

First generation of computer

Click here for: Naukri point

Disadvantages of third generation computers:

- It was difficult to maintain the IC's chips.
- Highly sophisticated technology was needed for IC chips manufacturing.
- Cooling/air conditioning was required.

Third Generation of mordern computer (1965 - 1974)

The period of third generation was 1965-1974.In this generation silicon transistors replaced germanium transistors. Integrated circuits were developed by interconnecting transistors, resistors and capacitors grown on a single chip of silicon. Integrated Circuit (IC) chips were used in computers. ICs were small in size, less power consuming and less expensive than the previous switching technology. Advances in storage technologies resulted in creating large capacity magnetic ,disks and tapes and large magnetic core based random access memory.
On software front, high level languages were improved. Fortran IV and optimising Fortran compilers were developed. Standardisation of COBOL (COBOL 68) was another major development during this period.

Advantages of Third Generatin of Computer:
» Smaller in size as compared to previous generations.
» More reliable as compared to previous generations.
» Used less energy as compared to previous generations.
» Produced less heat as compared to the previous two generations of computers.
» Maintenance cost was low because hardware failure is reare.
» Better speed and could calculate data in nanoseconds.
» Totally general purpose
» Good storage
» Could be used for high-level languages.
» Less expensive and Better accuracy
» Commercial production increased.

» Used mouse and keyboard for input.

Disadvantages of First Generatin of Computer:
» Air conditioning was required.
» Highly sophisticated technology required for the manufacturing of IC chips.
» Tactile sensitivity is decreased