I'm not a robot

InformaticsModern computer era owes much to the great technological advances that took place during World War II. Thus, the invention of electronic circuits, vacuum tubes and capacitors replace the generation of mechanical components while numerical calculation replaces analog calculation. The computers and products of this era constitute the so-called first generation ofcomputers.The first generation of computers generated in the mid-twentieth century had the first indication or antecedent of modern computers, but among its main characteristics were its large size as well as its high cost of acquisition, and the recurrent theme of failures and errors for being experimental.The computers counted with the use of vacuum tubes to process the information, punched cards for data entry and exit and programs, and used magnetic cylinders to store information and internal instructions.The first ones on the market cost approximately $10,000. Due to their large size, their use implied a great amount of electricity, generating an overheating in the system, requiring special auxiliary air conditioning systems (in order to avoid this overheating). For example, the large ENIAC computer weighing up to 30 tons.The first-generation computers used magnetic drums as data storage elements to be changed later in the second generation by ferrite memories.History of the first generation of computersThe historical development of the first generation of computers does not have an exact beginning, since it is the result of previous discoveries and experimentation from different authors, but in this case would begin to take its development since the twentieth century.The design of Charles Babbages analytical machine collected ideas as a primitive way of giving orders to the machine for the automatic performance of calculations and the introduction of data storage systems. These ideas were incorporated into the design of the ENIAC, the first electronic computer to be built. In it, they were later based for the UNIVAC I, which was the first computer to be manufactured commercially, as well as being the first to use a compiler to change the language from program to machine language.Its main advances were the system of magnetic tapes, which were read back and forth, and the possibility of checking errors. The introduction of integrated circuits allowed the appearance of the first desktop computer in 1974. This immediate success led to the appearance of the IBM PC in 1981.Howard Aiken (1900- 1973), developed the Automatic Sequence Controller Calculator (ASCC), where, at the same time, he relied on Babbages work with the analytical machine, managing to build the Mark 1, the first electro-mechanical computer (1944), which had a speed of a couple of tenths of seconds to add or subtract, two seconds to multiply two numbers of 11 digits and divide in a term of more or less 4 seconds.Eckert and Mauchly contributed to the development of first-generation computers by forming a private company and building UNIVAC I, which the Census Committee used to evaluate the 1950 census. IBM had a monopoly on punch card data processing equipment.Von Neumann, the first to use a binary or double arithmetic in an electronic computer. Although his greatest contribution occurs with the collaboration with Arthur W. Burks and Herman. H. They write Discussion of the logical design of an electronic computing instrument, which served as a basis (even today) for computer construction. Ideas such as: the central concept, which allowed programs and data to be organized in the same medium (memory) and the use of the first machine to use magnetic tapes, such as the EDVAC design, Electronic discrete variable automatic computer.Atanasoff Berry Computer (ABC): The first automatic electronic digital computer developed between 1937 and 1942, which was named in honor of its two authors, John Vicent Atanasoff and his assistant, Clifford Berry. It was able to perform with a high level of accuracy equations of up to 29 unknowns.MARK I: The first electro-mechanical order, which was the product of Howard Aiken, who based his research in the field, such as Babbages work. Which leads him to be the founder of the ASCC, Automatic Sequence Controller Calculator. This computer had a magnitude of 15 meters long x 2.4 meters high, as it was made up of about 800,000 pieces and more than 804 km of wiring. Its speed was not the best, however, was a breakthrough for the time and later came to build the MARK II and MARK III.UNIVAC: Universal Automatic Computer opened the way for the explosive development and improvement of computers that would be produced. It first appeared in 1951, being the first digital computer for commercial Its creators were John Mauchly and John Presper Eckert, taking around 5 years for its realization. It was characterized, like all computers of this generation, by its magnitude because it weighed 7,257 kg, consisting of 5,000 vacuum tubes and could perform about 1,000 calculations per second, being quite fast for his time.ENIAC (Electronic Numerical Integrator And Computer): created in 1943 by John W. Mauchly and John Presper Eckert, with the purpose of providing help or facilitating problems in the military field, since it required an instrument that was used as a medium. Its implementation took about 3 years and still generated a good number of problems apart from its enormous size and energy consumption required for its operation. In addition to that, it also presented problems with the programming as it was very complex to modify, being a model quickly surpassed.Written by Gabriela Briceo V. Click play on the following audio player to listen along as you read this section. Basic TermsVacuum tube an electronic device that controls the flow of electrons in a vacuum. It used as a switch, amplifier, or display screen in many older model radios, televisions, computers, etc. Transistor an electronic component that can be used as an amplifier or as a switch. It is used to control the flow of electricity in radios, televisions, computers, etc. Integrated circuit (IC) a small electronic circuit printed on a chip (usually made of silicon) that contains many its own circuit elements (e.g. transistors, diodes, resistors, etc.). Microprocessor an electronic component held on an integrated circuit that contains a computers central processing unit (CPU) and other associated circuits. CPU (central processing unit) It is often referred to as the brain or engine of a computer where most of the processing and operations take place (CPU is part of a microprocessor). Magnetic drum a cylinder coated with magnetic material, on which data and programs can be stored. Magnetic core uses arrays of small rings of magnetized material called cores to store information. Machine language a low-level programming language comprised of a collection of binary digits (ones and zeros) that the computer can read and understand. Assembly language is like the machine language that a computer can understand, except that assembly language uses abbreviated words (e.g. ADD, SUB, DIV) in place of numbers (0s and 1s). Memory a physical device that is used to store data, information and program in a computer. Artificial intelligence (AI) an area of computer science that deals with the simulation and creation of intelligent machines or intelligent behave in computers (they think, learn, work, and react like humans).First Generation of Computers The evolution of computer technology is often divided into five generations.Five Generations of ComputersGenerations of computersGenerations timelineEvolving hardwareFirst generation1940s-1950sVacuum tube basedSecond generation1950s-1960sTransistor basedThird generation1960s-1970sIntegrated circuit basedFourth generation1970s-presentMicroprocessor basedFifth generationThe present and the futureArtificial intelligence basedThe main characteristics of first generation of computers (1940s-1950s)Main electronic component vacuum tubeMainmemory magnetic drums and magnetic tapesProgramming language machine languagePower consume a lot of electricity and generate a lot of heat.Speed and size very slow and very large in size (often taking up entire room).Input/output devices punched cards and paper tape.Examples ENIAC, UNIVAC1, IBM 650, IBM 701, etc.Quantity there were about 100 different vacuum tube computers produced between 1942 and1963.Second Generation of Computers Main electronic component transistorMemory magnetic core and magnetic tape / diskProgramming language assembly languagePower and size low power consumption, generated less heat, and smaller in size (in comparison with the first generation computers).Speed improvement of speed and reliability (in comparison with the first generation computers).Input/output devices punched cards and magnetic tape.Examples IBM 1401, IBM 7090 and 7094, UNIVAC 1107, etc.Main electronic component integrated circuits (ICs)Memory large magnetic core, magnetic tape / diskProgramming language high level language (FORTRAN, BASIC, Pascal, COBOL, C, etc.)Size smaller, cheaper, and more efficient than second generation computers (they were called minicomputers).Speed improvement of speed and reliability (in comparison with the second generation computers).Input / output devices magnetic tape, keyboard, monitor, printer, etc.Examples IBM 360, IBM 370, PDP-11, UNIVAC 1108, etc.Main electronic component very large-scale integration (VLSI) and microprocessor.VLSI thousands of transistors on a single microchip.Memory semiconductor memory (such as RAM, ROM, etc.)RAM (random-access memory) a type of data storage (memory element) used in computers that temporary stores of programs and data (volatile: its contents are lost when the computer is turned off).ROM (read-only memory) a type of data storage used in computers that permanently stores data and programs (non-volatile: its contents are retained even when the computer is turned off).Programming language high level language (Python, C#, Java, JavaScript, Rust, Kotlin, etc.).A mix of both third- andfourth-generationlanguagesSize smaller, cheaper and more efficient than third generation computers.Speed improvement of speed, accuracy, and reliability (in comparison with the third generation computers).Input / output devices keyboard, pointing devices, optical scanning, monitor, printer, etc.Network a group of two or more computer systems linked together.Examples IBM PC, STAR 1000, APPLE II, Apple Macintosh, etc.Fifth Generation of Computers Main electronic component: based on artificial intelligence, uses the Ultra Large-Scale Integration (ULSI) technology and parallel processing method.ULSI millions of transistors on a single microchipParallel processing method use two or more microprocessors to run tasks simultaneously.Language understand natural language (humanlanguage).Power consume less power and generate less heat.Speed remarkable improvement of speed, accuracy and reliability (in comparison with the fourth generation computers).Size portable and small in size, and have a huge storage capacity.Input / output device keyboard, monitor, mouse, trackpad (or touchpad), touchscreen, pen, speech input (recognise voice / speech), light scanner, printer, etc.Example desktops,laptops, tablets, smartphones, etc.The computer this amazing technology went from a government/business-only technology to being everywhere from peoples homes, work places, to peoples pockets in less than 100 years.definitionan electronic device that controls the flow of electrons in a vacuum. It used as a switch, amplifier, or display screen in many older model radios, televisions, computers, etc.an electronic component that can be used as an amplifier or as a switch. It is used to control the flow of electricity in radios, televisions, computers, etc.a small electronic circuit printed on a chip (usually made of silicon) that contains many its own circuit elements (e.g. transistors, diodes, resistors, etc.).an electronic component held on an integrated circuit that contains a computer's central processing unit (CPU) and other associated circuits.The brain or engine of a computer, where most of the processing and operations take place.a cylinder coated with magnetic material, on which data and programs can be stored.uses arrays of small rings of magnetized material called cores to store information.a low-level programming language comprised of a collection of binary digits (ones and zeros) that the computer can read and understand.a physical device that is used to store data, information, and programs in a computer.an area of computer science that deals with the simulation and creation of intelligent machines or intelligent behave in computers (they think, learn, work, and react like humans).Earliest electronic computer designReplica of the AtanasoffBerry computer at Iowa State UniversityThe 1946 ENIAC computer used more than 17,000 vacuum tubesA vacuum-tube computer, now termed a first-generation computer, is a computer that uses vacuum tubes for logic circuitry. While the history of mechanical aids to computation goes back centuries, if not millennia, the history of vacuum tube computers is confined to the middle of the 20th century. Lee De Forest invented the triode in 1906. The first example of using vacuum tubes for computation, the AtanasoffBerry computer, was demonstrated in 1939. Vacuum-tube computers were initially one-of-a-kind designs, but commercial models were introduced in the 1950s and sold in volumes ranging from single digits to thousands of units. By the early 1960s vacuum tube computers were obsolete, superseded by second-generation transistorized computers.Much of what we now consider part of digital computing evolved during the vacuum tube era. Initially, vacuum tube computers performed the same operations as earlier mechanical computers, only at much higher speeds. Gears and mechanical relays operate in milliseconds, whereas vacuum tubes can switch in microseconds. The first departure from what was possible prior to vacuum tubes was the incorporation of large memories that could store thousands of bits of data and randomly access them at high speeds. That, in turn, allowed the storage of machine instructions in the same memory as datathe stored program concept, a breakthrough which today is a hallmark of digital computers.Other innovations included the use of magnetic tape to store large volumes of data in compact form (UNIVAC I) and the introduction of random access secondary storage (IBM RAMAC 305), the direct ancestor of all the hard disk drives we use today. Even computer graphics began during the vacuum tube era with the IBM 740 CRT Data Recorder and the Whirlwind light pen. Programming languages originated in the vacuum tube era, including some still used today such as Fortran & Lisp (IBM 704), Algol (Z22) and COBOL. Operating systems, such as the GM-NAA I/O, also were born in this era.The use of cross-coupled vacuum-tube amplifiers to produce a train of pulses was described by Eccles and Jordan in 1918. This circuit became the basis of the flip-flop, a circuit with two states that became the fundamental element of electronic binary digital computers.The AtanasoffBerry computer, a prototype of which was first demonstrated in 1939, is now credited as the first vacuum-tube computer.[1] However, it was not a general-purpose computer, being able to only solve a system of linear equations, and was also not very reliable.The Colossus computer at Bletchley ParkDuring World War II, special-purpose vacuum-tube digital computers such as Colossus were used to break German machine (teleprinter) ciphers known as Fish. The military intelligence gathered by these systems was essential to the Allied war effort. By the end of the war 10 Mark II COLOSSI were in use at Bletchley Park; they superseded the Heath Robinson. Each COLOSSI used 1,600 vacuum tubes (Mark I) or 2,400 vacuum tubes (Mark II).[1] The wartime codebreaking at BP was kept secret until the 1970s.[1]Also during the war, electro-mechanical binary computers were being developed by Konrad Zuse. The German military establishment during the war did not prioritize computer development. An experimental electronic computer circuit with around 100 tubes was developed in 1942, but destroyed in an air raid.In the United States, work started on the ENIAC computer late in the Second World War. The machine was completed in 1945. Although one application which motivated its development was the production of firing tables for artillery, one of the first uses of ENIAC was to carry out calculations related to the development of a hydrogen bomb. ENIAC was initially programmed with plugboards and switches instead of an electronically stored program. A post-war series of lectures disclosing the design of ENIAC, and a report by John von Neumann on a foreseeable successor to ENIAC, First Draft of a Report on the EDVAC, were widely distributed and were influential in the design of post-war vacuum-tube computers.Early machines which were used to tabulate punch cards could only add and subtract. In 1931 IBM introduced an electromechanical multiplying punch, the IBM 601. After World War II, IBM made a version, the 603, that used vacuum tubes to perform the calculations.[2] Surprised by market demand for it, IBM introduced in 1948 a more compact version, the 604, using 1250 miniature vacuum tubes in removable plug-in modules. Much faster than the 601, it could divide and perform up to 60 program steps in one card cycle. Some 5400 units were leased or sold, making it the first successful commercial application of electronic computation.The Ferranti Mark 1 (1951) is considered the first commercial stored program vacuum tube computer. The first mass-produced computers were the Bull Gamma 3 (1952, 1,200 units) and the IBM650 (1954, 2,000 units).Vacuum-tube technology required a great deal of electricity. The ENIAC computer (1946) had over 17,000 tubes and suffered a tube failure (which would take 15minutes to locate) on average every two days. In operation the ENIAC consumed 150kilowatts of power,[3] of which 80kilowatts were used for heating tubes, 45kilowatts for DC power supplies, 20kilowatts for ventilation blowers, and 5kilowatts for punched-card auxiliary equipment.An IBM 650 at Texas A&M UniversityBecause the failure of any one of the thousands of tubes in a computer could result in errors, tube reliability was of high importance. Special quality tubes were built for computer service, with higher standards of materials, inspection and testing than standard receiving tubes.One effect of digital operation that rarely appeared in analog circuits was cathode poisoning. Vacuum tubes that operated for extended intervals with no plate current would develop a high-resistivity layer on the cathodes, reducing the gain of the tube. Specially selected materials were required for computer tubes to prevent this effect. To avoid mechanical stresses associated with warming the tubes to operating temperature, often the tube heaters had their full operating voltage applied slowly, over a minute or more, to prevent stress-related fractures of the cathode heaters. To avoid thermal cycling, heater power could be left on during standby time for the machine, with high-voltage plate supplies switched off. Marginal testing was built into sub-systems of a vacuum-tube computer; by lowering plate or heater voltages and testing for proper operation, components at risk of early failure could be detected. To regulate all the power-supply voltages and prevent surges and dips from the power grid from affecting computer operation, power was derived from a motor-generator set that improved the stability and regulation of power-supply voltages.[citation needed]Two broad types of logic circuits were used in construction of vacuum-tube computers. The "asynchronous", or direct, DC-coupled type used only resistors to connect between logic gates and within the gates themselves. Logic levels were represented by two widely separated voltages. In the "synchronous", or "dynamic pulse", type of logic, every stage was coupled by pulse networks such as transformers or capacitors. Each logic element had a "clock" pulse applied. Logic states were represented by the presence or absence of pulses during each clock interval. Asynchronous designs potentially could operate faster, but required more circuitry to protect against logic "races", as different logic paths would have different propagation time from input to stable output. Synchronous systems avoided this problem, but needed extra circuitry to distribute a clock signal, which might have several phases for each stage of the machine. Direct-coupled logic stages were somewhat sensitive to drift in component values or small leakage currents, but the binary nature of operation gave circuits considerable margin against malfunction due to drift.[4] An example of a "pulse" (synchronous) computer was the MIT Whirlwind. The IAS computers (ILLIAC and others) used asynchronous, direct-coupled logic stages.Tube computers primarily used triodes and pentodes as switching and amplifying elements. At least one specially designed gating tube had two control grids with similar characteristics, which allowed it to directly implement a two-input AND gate.[4] Thyratrons were sometimes used, such as for driving I/O devices or to simplify design of latches and holding registers. Often vacuum-tube computers made extensive use of solid-state ("crystal") diodes to perform AND and OR logic functions, and only used vacuum tubes to amplify signals between stages or to construct elements such as flip-flops, counters, and registers. The solid-state diodes reduced the size and power consumption of the overall machine.The 1950 reference High-Speed Computing Devices describes various ways of storing numbers using contemporary technology, with the goal of minimizing the number of (expensive) vacuum tubes (optimal radix choice). Numbers can be stored as the state of a ring counter composed of several triodes.Large ring counters with r states required 2r triodes arranged as r flip-flops, as in ENIAC's decimal counters,[5]:2325which use 20 triodes per decimal digit.Small ring counters with r less than about 7 states require r triodes.[6]:2223Some later tube computers take advantage of this fact and use 7 triodes per decimal digit, using bi-quinary coded decimal (a 5-state ring counter and a 2-state ring counter).A few tube computers -- such as the Harwell Dekatron Computer -- use a single Decatron tube per decimal digit.Early systems used a variety of memory technologies prior to finally settling on magnetic-core memory. The AtanasoffBerry computer of 1942 stored numerical values as binary numbers in a revolving mechanical drum, with a special circuit to refresh this "dynamic" memory on every revolution. The war-time ENIAC could store 20 numbers, but the vacuum-tube registers used were too expensive to build to store more than a few numbers. A stored-program computer was out of reach until an economical form of memory could be developed.In 1944, J.Presper Eckert proposed using mercury delay-line memory in a successor to the ENIAC which would become the EDVAC. Eckert had earlier worked with delay line memory for radar signal processing. Maurice Wilkes built EDSAC in 1947, which had a mercury delay-line memory that could store 32words of 17bits each. Since the delay-line memory was inherently serially organized, the machine logic was also bit-serial as well.[7] Eckert and John Mauchly used the technology in the 1951 UNIVAC I and received a patent for delay-line memory in 1953. Bits in a delay line are stored as sound waves in the medium, which travel at a constant rate. The UNIVACI (1951) used seven memory units, each containing 18 columns of mercury, storing 120bits each. This provided a memory of 1,000 12-character words with an average access time of 300microseconds.[8] This memory subsystem formed its own walk-in room.Williams tube from an IBM701 at the Computer History MuseumWilliams tubes were the first true random-access memory device. The Williams tube displays a grid of dots on a cathode-ray tube (CRT), creating a small charge of static electricity over each dot. The charge at the location of each of the dots is read by a thin metal sheet just in front of the display. Frederic Calland Williams and Tom Kilburn applied for patents for the Williams tube in 1946. The Williams tube was much faster than the delay line, but suffered from reliability problems. The UNIVAC1103 used 36 Williams tubes with a capacity of 1,024bits each, giving a total random access memory of 1,024words of 36bits each. The access time for Williams-tube memory on the IBM701 was 30microseconds.[8]Magnetic drum memory was invented in 1932 by Gustav Tauschek in Austria.[9][10] A drum consisted of a large rapidly rotating metal cylinder coated with a ferromagnetic recording material. Most drums had one or more rows of fixed read-write heads along the long axis of the drum for each track. The drum controller selected the proper head and waited for the data to appear under it as the drum turned. The IBM650 had a drum memory of 1,000 to 4,000 10-digit words with an average access time of 2.5milliseconds.Core memory from Project Whirlwind, circa 1951Magnetic-core memory was patented by A Wang in 1951. Core uses tiny magnetic ring cores, through which wires are threaded to write and read information. Each core represents one bit of information. The cores can be magnetized in two different ways (clockwise or counterclockwise), and the bit stored in a core is zero or one depending on that core's magnetization direction. The wires allow an individual core to be set to either a one or a zero and for its magnetization to be changed by sending appropriate electric current pulses through selected wires. Core memory offered random access and greater speed, in addition to much higher reliability. It was quickly put to use in computers such as the MIT/IBM Whirlwind, where an initial 1,024 16-bit words of memory were installed replacing Williams tubes. Likewise the UNIVAC1103 was upgraded to the 1103A in 1956, with core memory replacing Williams tubes. The core memory used on the 1103 had an access time of 10microseconds.[8]The 1950s saw the evolution of the electronic computer from a research project to a commercial product, with common designs and multiple copies made,[11] thereby starting a major new industry. The early commercial machines used vacuum tubes and a variety of memory technologies, converging on magnetic core by the end of the decade.Many of the early commercial machines carried on from the one-off machines and were designed for rapid mathematical calculations needed for scientific, engineering and military purposes. But some were designed for data-processing workloads generated by the large, existing punch card ecosystem. IBM in particular divided its computers into scientific and commercial lines, which shared electronic technology and peripherals but had completely incompatible instruction set architectures and software. This practice continued into its second-generation (transistorized) machines, until reunification by the IBM System/360 project. See IBM 700/7000 seriesBelow is a list of these first generation commercial computers.ComputerDateUnitsNotesIBM 60419485,600First all-electronic calculator for use with unit record equipment. Could multiply and divide data from punched cards. Had 1,250 tubes.IBM CPC1949700Combined an IBM 604 with other unit record machines to carry out a sequence of calculations defined by instructions on a deck of punched cards.Ferranti Mark 119519First commercially available stored program computer, based on Manchester Mark 1.UNIVAC I195146First mass-produced stored-program computer. Used delay-line memory.LEO I19511First computer for commercial applications. Built and used by J. Lyons and Co., a restaurant and bakery chain. Based on EDSAC design.IBM 701195219Built by IBM, also known as the Defense Calculator, based on the IAS computer, with Williams tube memory. The head of IBM famously expected to sell 5 units, but got orders for 18 on the first sales trip.[12] First machine in the IBM 700/7000 series.Bull Gamma 31952~1,200Made by Compagnie des Machines Bull, one of the first mass-produced electronic digital computers. Initially designed to supplement punched card machines.[13][14]IBM 702195314Similar technology to 701 but built for business computing.Strela computer19537Built in the Soviet Union.Datatron1954~120Scientific/commercial computer built by ElectroData Corporation.IBM 6501954~2,000The world's first computer with sales in the thousands. Used drum memory with 10-digit decimal words.IBM 7041954123The first mass-produced computer with floating-point arithmetic hardware for scientific use. Used magnetic-core memory and 36-bit binary words.ES19541First commercial vacuum-tube computer in Germany built by Heinz Nixdorf's Labor fr Impulstechnik.IBM 7051954160Mostly compatible with the IBM 702, for business use. There is one that is not in operating condition at Computermuseum Mnchen.SEA CAB 200019554First commercial computers from SEA. 22-bit serial computers with diode logic and both core and drum memory.UNIVAC 110219543A variation of the UNIVAC 1101 built for the US Air Force.Zuse Z22195555An early commercial computer.IBM 305 RAMAC1956>1,000The first commercial computer to use a moving-head hard-disk drive for secondary storage.Bendix G-151956>400A small computer for scientific and industrial purposes by the Bendix Corporation. It had a total of about 450 tubes (mostly dual triodes) and 300 germanium diodes.LGP-301956~500Desk-size computer made by Librascope; bit-serial drum machine with only 113 tubes, along with 1,450 diodes.[15]Ferranti Pegasus195638Vacuum tube computer with magnetostrictive delay line memory intended for office usage. Second oldest surviving computer in the world.[16]RCA BIZMAC19566RCA's first commercial computer, it contained 25,000 tubes.BESM-21957>20Built in the Soviet Union. General purpose computer in the BESM series.IBM 6101957180A small computer designed to be used by one person with limited experience.SEA CAB 300019574Designed with 32-bit serial logic alongside a parallel binary multiplier, intended for both scientific and business uses.IBM 709195845An improved version of the IBM 704, it was succeeded by the program-compatible, transistorized IBM 7090 series.UNIVAC II1958An improved, fully compatible version of the UNIVAC I.UNIVAC 110519583A follow-up to the UNIVAC 1103 scientific computer.AN/FSQ-7195852Largest vacuum tube computer ever built. 52 were built for U.S Project SAGE.ZEBRA195855Designed in Holland and built by Britain's Standard Telephones and Cables.[17]Burroughs 2201959~50Scientific/commercial computer, successor to ElectroData Datatron.History of computing hardwareList of vacuum-tube computersComputer vacuum tubesStored-program computer^ a b c Jack, Copeland, B. "The Modern History of Computing". plato.stanford.edu. Retrieved 2018-04-29.{{cite web}}: CS1 maint: multiple names: authors list (link)^ "IBM 603 The First Commercial Electronic Calculator, IBM History". IBM. 7 March 2012. Retrieved October 13, 2023.^ "Press release: PHYSICAL ASPECTS, OPERATION OF ENIAC ARE DESCRIBED" (PDF). Smithsonian National Museum of American History. WAR DEPARTMENT Bureau of Public Relations. Retrieved Dec 30, 2017.^ a b Edward L. Braun, Digital Computer Design: Logic, Circuitry, and Synthesis. Academic Press, 2014, ISBN1483275736, pp.116126.^ Engineering Research Associates Staff (1950). "3-7 The 2r-triode Counter, Modulo r". High-Speed Computing Devices. McGraw-Hill. pp.2325. Retrieved 2008-08-27.^ Engineering Research Associates Staff (1950). "3-6 The r-triode Counter, Modulo r". High-Speed Computing Devices. McGraw-Hill. pp.2223. 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Retrieved September 10, 2023.^ Research, United States Office of Naval (1953). A survey of automatic digital computers. Office of Naval Research, Dept. of the Navy. p.39.^ Tatnall, Arthur; Blyth, Tilly; Johnson, Roger (2013-12-06). Making the History of Computing Relevant: IFIP WG 9.7 International Conference, HC 2013, London, UK, June 1718, 2013, Revised Selected Papers. Springer. p.124. ISBN9783642416507.^ LGP 30, technikum 29: Living Museum{{citation}}: CS1 maint: publisher location (link)^ Pegasus at the V&A, Computer Conservation Society, June 2016, retrieved 29 August 2016^ "Computer History Museum - Standard Telephones and Cables Limited, London - Stantec Zebra Electronic Digital Computer". Computerhistory.org. Retrieved April 24, 2017.Retrieved from " Imagine a time before smartphones, laptops, or even calculators as we know them. That's the era when the very first electronic computers were born, during the 1940s and 1950s. These machines, known as first-generation computers, were truly groundbreaking, even though they seem very different from the computers we use today.The first generation of computers (1940s-1950s) used vacuum tubes.What were First-Generation Computers?The technology behind the first-generation computers was a fragile glass device, which was called a vacuum tube. These computers were very heavy and really large. They are not reliable, programming on them was a tedious task as they used low-level programming language and used no Operating System. First-generation computers were used for calculation, storage, and control purposes. Punch cards were used to improve the information for external storage.What is a Vacuum Tube?A vacuum tube, also sometimes called an electron tube or valve, is a device that controls the flow of electrical current within a sealed glass enclosure where most of the air has been removed (creating a "vacuum"). By applying electrical signals to different parts of the tube (called electrodes), the flow of electrons can be controlled. In first-generation computers, vacuum tubes acted as electronic switches, enabling the machines to perform calculations.Examples of First Generation Computer1. ENIAC (Electronic Numerical Integrator and Computer - 1945)What it was: The very first general-purpose electronic computer. It was initially built for military calculations. Imagine a machine with around 17,000 vacuum tubes that filled an entire room!Why it was important: ENIAC showed the world the potential of programmable digital computers. It was a huge leap forward.2. UNIVAC I (Universal Automatic Computer I1951)What it was: The first computer that was made and sold commercially. It was designed for both business and scientific uses.Why it was important: UNIVAC I marked the beginning of computers being used in everyday business operations.3. Colossus (1943)What it was: A secret British machine built during World War II to help break German codes.Why it was important: Colossus played a vital role in the Allied efforts during the war by helping to decipher enemy messages.4. IBM Harvard Mark I (1944)What it was: A large computer that used both electrical and mechanical parts. It was used for military and scientific calculations.Why it was important: The Mark I was an important step in the development of computing, particularly for scientific and defense applications.5. ABC (Atanasoff-Berry Computer) (1937-1942)What it was: One of the earliest attempts at building an electronic digital computer. It was designed to solve algebraic equations.Why it was important: The ABC introduced some key ideas that would be used in later computerCharacteristics of First-Generation ComputersCharacteristicDescriptionCore TechnologyUtilizedvacuum tubesfor processing and switchingPhysical SizeMassivemachines, often filling entire roomsPower ConsumptionHigh power usagewith significant heat generationProcessing SpeedSlowoperation due to the limitations of vacuum tube technologyProgramming MethodProgrammed usingmachine language(binary code) and punched cardsInput/Output MethodRelied onpunch cardsfor input and outputReliabilityUnreliabledue to frequent breakdowns of vacuum tubesCostExtremely expensiveto build, maintain, and operateMemory StorageMagnetic drum memoryfor temporary data storagePrimary UseUsed formilitary calculations, scientific research, and cryptographyExamples of the first generationIBM 650, IBM 701, ENIAC, UNIVAC1, etc.Advantages of First Generation ComputerComputers can process large amounts of data quickly.They help in automating tasks, saving time and effort.They offer accurate results and minimize human errors.Computers can store vast amounts of information in digital form.They allow easy access to information and communication through the internet.They have made various tasks like calculations, research, and design more efficient.Disadvantages of First-Generation of ComputersThey can be expensive to purchase and maintain.Computers can become slow or malfunction due to software or hardware issues.Prolonged use of computers can cause health problems like eye strain and poor posture.They are dependent on electricity, so power outages can cause interruptions.Computers can be vulnerable to viruses and hacking, leading to data loss.Excessive reliance on computers might reduce face-to-face communication skills.Conclusion Even though first-generation computers had more drawbacks than advantages, their importance cannot be overstated. They were the very first steps in the digital revolution! Because of the lessons learned from these early machines, the second generation of computers was developed, which used smaller, more reliable components called transistors. The first generation of computers, using their amazing vacuum tubes, truly changed the world of technology forever. Understanding the computer generations and their evolution is not only captivating but also essential for comprehending the technological advancements that shaped the modern digital world. Now, its hard to imagine a world without computers, isnt it? From supercomputers and sophisticated smartphones to tablets and other devices, computers are everywhere and have become vital to our lives. In this article, Ill talk about all five computer generations, how they evolved, each of their characteristics, and the predictions for the highly anticipated sixth generation of computers. Lets dive in! Generations of Computers and Their Evolution Here is an overview of the 5 generations of computers and their evolution. In the 1940s, a remarkable event unfolded before the worlds eyes the birth of the first generation of computers. These pioneer machines relied on vacuum tubes, large electronic components that controlled the flow of electricity. However, vacuum tubes had significant drawbacks. They were power-hungry, produced substantial heat, and often encountered frequent failures. The ENIAC (Electronic Numerical Integrator and Computer), as a prominent example from this era, vividly illustrates these challenges. In the late 1950s, computing experienced a remarkable advancement through the development of transistors. These small, solid-state devices replaced vacuum tubes, resulting in more compact and reliable computers. The introduction of transistors, led to significant improvements in size reduction, power efficiency, and heat generation. This breakthrough marked the emergence of the second generation of computers, exemplified by notable models like IBM 1401 and UNIVAC 1107. During the 1960s, computers entered their third generation by introducing integrated circuits (ICs). The ICs transformed computer technology by consolidating numerous transistors and electronic components onto a single silicon chip. This innovative development significantly reduced computer sizes while simultaneously enhancing computational power. Some outstanding examples from this era of computers include the IBM System/360 series and DEC PDP-8. In the late 1970s, a significant development occurred in the field of computing the emergence of microprocessors. It marked the fourth generation of computers. As a result, personal computers (PCs) and graphical user interfaces (GUIs) were born, transforming computing and making it accessible to both individuals and businesses alike. Some notable machines from this era include the Apple II, IBM PC, and Commodore 64. In the 1990s, computers witnessed a significant transformation with the emergence of the fifth generation. This era was characterized by the development of artificial intelligence (AI) and parallel processing. It signaled the arrival of supercomputers equipped with enormous processing capabilities, driving progress in weather prediction, scientific exploration, and data interpretation. Now that we know what advancements paved the way for transitioning one computer generation to another, lets understand each generation in detail. Source: Computer History Museum During the 1940s to the mid-1950s, a significant milestone in history unfolded with the emergence of the first generation of computers. These machines, fueled by vacuum tubes, announced the beginning of digital computing. Vacuum tube computers, or first-generation computers, relied on delicate and bulky vacuum tubes for processing and storing data. The electronic components controlled the flow of electrical signals. While these machines may seem primitive by todays standards, they were at the forefront of technology during their time. Size: Vacuum tube computers were massive. They occupied entire rooms and required special cooling systems to prevent overheating. Computational Power: While these computers may seem slow by todays standards, they marked significant progress in automating calculations. This advancement allowed for the execution of complex computations that were unimaginable before. Memory: In the early stages of memory development, magnetic drums, and punched cards were utilized to establish basic data storage and retrieval capabilities. Programming: Programming these machines was an uphill task that involved physically rewiring the circuits. This made software development time-consuming. The vacuum tube computers paved the way for subsequent generations. They showcased the potential of automated computing despite their size and limitations. These early machines demonstrated the feasibility of digital calculations, inspiring researchers to explore ways to make computers more efficient, compact, and accessible. To overcome the limitations of vacuum tube computers, such as their large size, high heat generation, and frequent failures, researchers began searching for alternatives. This pursuit led to the development of transistors in the late 1950s, which marked the beginning of the second generation of computing. Source: General Note As the 1950s transitioned into the 1960s, a remarkable shift occurred in the computing landscape. This transformative era introduced the second generation of computers. With the emergence of transistors, these sleek devices replaced bulky vacuum tubes and ushered in an era of enhanced efficiency and accessibility in computing technology. The second generation of computers utilized transistors, compact solid-state devices that replaced the energy-consuming vacuum tubes of the initial generation. This transition resulted in significant advancements across various computing aspects, progressing the way for notable progress. Size: Transistor-based computers revolutionized the computing landscape by being significantly smaller and more space-efficient. This breakthrough liberated computing from the constraints of large, cumbersome rooms. Computational Power: Transistors have transformed computing, empowering computers to perform calculations faster and significantly enhancing their processing capabilities. Reliability: Transistors, unlike vacuum tubes, offered increased reliability and durability. This significant improvement resulted in reduced breakdowns and maintenance requirements. Energy Efficiency: Transistors are an efficient alternative to vacuum tubes. By consuming considerably less power, they reduce energy consumption and generate less heat. Programming: During this era, the development of high-level programming languages such as FORTRAN and COBOL brought about a significant change. These languages simplified software development and made it more accessible to a wider audience. The adoption of transistors brought about a monumental shift in computing. It enhanced the overall efficiency of computers and paved the way for diverse applications across various fields. This pivotal generation set the stage for the development of smaller, more versatile, and commercially viable computers. However, the limitations of transistors eventually led to the third generation of computers, driven by the emergence of integrated circuits (ICs). During the 1960s, computers experienced a remarkable leap in their evolution. It was the emergence of the third generation that marked this era, characterized by groundbreaking innovation in integrated circuits (ICs). ICs are tiny electronic components, carefully carved onto silicon chips that further revolutionized the world of computing. ICs not only minimized computer size but also enhanced computational abilities. Furthermore, ICs combined multiple transistors and electronic components on a single silicon chip. This opened the way for groundbreaking advancement in computing. Size: The integration of components onto silicon chips profoundly impacted computer size. This advancement enabled computers to be housed on a single desk or occupy an even smaller space. Computational power: The use of integrated circuits significantly enhanced computational power. This allowed computers to efficiently and swiftly execute complex tasks with greater efficiency. Reliability: Youll find that integrated circuits are more reliable than previous technologies. This leads to reduced downtime and maintenance requirements. Energy efficiency: These circuits consumed significantly less power, contributing to a reduction in energy costs and heat generation. Memory: During the third generation, advanced forms of memory emerged. These included core memory and semiconductor memory, revolutionizing data storage and retrieval capabilities. This allowed for more efficient and effective handling of information. Programming: High-level programming languages have constantly evolved, resulting in increased accessibility and efficiency in software development. The integration of circuits was an inventive move. It transformed the field of computing, replacing large and complex machines into smaller, more powerful, and user-friendly systems. With this development, computers became widely accessible for various purposes, including business, research, and personal tasks, expanding beyond their initial use in scientific or military applications. Due to changing demands and the rapid pace of technological advancements led to the evolution of the fourth generation of computers. It was marked by the arrival of microprocessors, which brought together the central processing unit (CPU) onto just one chip. In the late 1970s, a pioneering advancement in computing emerged as the fourth generation arrived. This era brought a sophisticated technology known as microprocessors. Microprocessors are integrated circuits that host the central processing unit (CPU) on a single chip and bring innovative computer design. They achieved this by integrating the CPU, memory, and control circuits onto a single chip. This miniaturization provided benefits in terms of processing power, energy efficiency, and portability. Consequently, it paved the way for personal computers and transformed the digital landscape. Size: The CPU being integrated onto a single chip had a tremendous impact on reducing the size of computers. This made them compact enough to fit on a desktop conveniently. Computational power: Microprocessors offered efficiency in computing by significantly enhancing computational capabilities. This breakthrough allowed computers to execute tasks more swiftly and handle increasingly intricate calculations. Energy efficiency: Microprocessors were designed to be more energy-efficient than their predecessors. Therefore, they consume less power and generate less heat. Personal computing: Personal computers (PCs) emerged during the fourth generation. It changed the way we used to do computing. This is also where computer accessibility increased. Even individuals and smaller businesses could easily access computers to run their operations. Graphical User Interfaces (GUIs): Graphical User Interfaces (GUIs) changed how people interacted with computers by replacing complex command-line interfaces with intuitive visual interactions. The introduction of microprocessors transformed computing, making it accessible beyond research labs. Individuals and businesses both started using personal computers in their homes and offices. This technological breakthrough laid the foundation for a digital revolution. Advancements in microprocessor technology, along with the increasing demand for enhanced connectivity and networking capabilities, played a significant role in introducing the fifth generation of computers. The fifth generation of computers spans from the 1990s to today. The 1990s era was marked by the emergence of the fifth generation of computers. It introduced innovative, highly sophisticated concepts like artificial intelligence (AI) and machine learning (ML) and merged them with other digital technologies like parallel processing, natural language processing (NLP), etc. This profoundly influenced the modern computing landscape in ways that were previously unforeseen. This phase also transformed human interactions with machines and ignited an unprecedented wave of innovation across multiple industries. As a result of integrating AI and other advanced computational technologies resulted in the emergence of supercomputers, high-performance computing, and the internet. And now, you can enjoy computing faster with energy efficiency while accessing the internet to perform various tasks. Size: Computers have undergone significant advancements, becoming smaller and more portable. This has led to enhanced accessibility of technology for both individuals and businesses. Computational power: Integrating AI and advancements in hardware has resulted in a remarkable surge in processing power. This increased capacity has facilitated the execution of intricate calculations and thorough data analysis. Memory: Storage capacities have experienced significant growth, enabling the seamless collection and analysis of vast amounts of data. Programming: AI-driven applications and tools have emerged, making complex coding processes simpler and enabling automation in various tasks. The era is witnessing the usage of programming languages like Python, Java, C, etc. The integration of AI in the fifth generation has brought a great technological shift in various industries. It has opened up the way for advancements in machine learning, natural language processing, and robotics, reshaping both professional and personal lives. So, are you prepared to witness the unfolding of a remarkable future? The anticipation surrounding the sixth generation of computers is immense. The dawn of the sixth generation of computers is upon us, indicating a technological revolution that holds the power to reshape our very existence. This innovative era promises to revolutionize computing through quantum technology, advanced nanotechnology, and increasingly sophisticated artificial intelligence. This will open the door to unimaginable possibilities. Quantum Computing: Quantum computers are extraordinary machines that have the power to perform calculations at mind-boggling speeds, surpassing what traditional computers can achieve. They open pathways toward tackling intricate scientific problems, revolutionizing cryptography, and much more. Nanotechnology: Did you know that manipulating matter at the atomic and molecular scale can provide extraordinary results? It would allow us to create computer components so small yet incredibly powerful, enhancing miniaturization and efficiency. Biocomputing: Integrating computers with biological systems has the potential to benefit various fields, including medicine, data storage, and processing. The innovations of the sixth generation could offer immense opportunities across various fields, including IT, manufacturing, cybersecurity, healthcare, climate modeling, and artificial intelligence. The potential is boundless, from simulating molecular behavior for drug discovery to fortifying cybersecurity with quantum encryption. Final Words As we come to the end of our exploration through the different generations of computers, youve seen how these machines have changed over time. From the big computers that used vacuum tubes in the past to the smart ones that use AI today, things have really changed a lot. Computers used to be huge, and now they are much smaller. They can do much more complex tasks now, like helping us talk to each other worldwide. The next generation of computers could use even more sophisticated technologies to make them super powerful, allowing you to do amazing stuff. So, even though weve seen a lot of changes already, theres still more to come. Keep watching because computers will keep getting cooler and doing things we might not even imagine yet! Related Articles Computer Networking Introduction for Beginners 2.15 The Emergence of First Generation Computers 1946-1959In late 1945 researchers at the Moore School of the University of Pennsylvania powered up a machine that was 100 feet long, 10 feet high, and 3 feet deep. It contained 17,000 vacuum tubes, about 70,000 resistors, 10,000 capacitors, and 6,000 switches. The Electronic Numerical Integrator and Calculator (ENIAC) was the first fully electronic computer. Designed and developed by J. Presper Eckert and John W. Mauchly under contractor supervision of Lieutenant Herman Goldstine,25 ENIAC funding came from the Armys Ballistic Research Laboratory at Aberdeen. ENIAC had a serious defect. Although it could compute several hundred times faster than an electro-mechanical or relay-type machine26 , the computer required rewiring with each new problem, consuming from 30 minutes to a full day.27 Nevertheless, in instantiating the first electronic computer, Eckert, Mauchly and Goldstine advanced the trajectory of computers beyond being just an idea. Upon completing the design of ENIAC, the team faced a new challenge: to design the next computer, one to be significantly better, preferably without the impossible constraint of rewiring. In the summer of 1944, Lieutenant Goldstine, by chance, encountered John von Neumann while waiting for a train. Goldstine began to tell von Neumann, the foremost applied mathematician of his time, about ENIAC. Von Neumann was himself involved in a number of secret projects needing more computation than then available, yet did not know of ENIAC. On August 7, 1944, von Neumann visited the Moore School and began contributing ideas immediately. The collaboration between von Neumann, Eckert, Mauchly and Goldstine proved fruitful when they hit upon the concept of storing the logic instructions in memory the stored-program28 computer. Instead of manual resetting of the switches, or worse yet, rewiring, to set-up the calculations of a new problem, the programmer could modify the program arithmetically.29 With these new architectural ideas, they designed the ENIACs successor, the EDVAC (Electronic Discrete Variable Automatic Calculator). Elsewhere, Thomas J. Watson Jr. had rejoined IBM after serving in the Air Force. In early 1946, Eckert and Mauchly gave Watson Jr. a tour of the Moore School and ENIAC. Although Watson Jr. sensed that Eckert and Mauchly thought they had a product with which to best IBM, he was unimpressed. The truth was that I reacted to ENIAC the way some people probably reacted to the Wright brothers airplane: it didnt move me at all. I cant imagine why I didnt think, Good God, thats the future of the IBM company.30 Funding the development of computer systems, such as the ENIAC and EDVAC, represented only one way the government advanced understanding of computer technologies. Government agencies also sponsored meetings and courses, with the objectives of theory development, diffusion of knowledge, and training of personnel needed to explore the computer trajectory. Diffusing the growing knowledge and practice of computers ensured the government a future base of personnel to design and build the computers the military would need. During the summer of 1946, the Moore School held a six-week course entitled, Theory and Techniques for the Design of Electronic Digital Computers, sponsored by the Office of Naval Research and the Army Ordinance Department.31 Six months later, the Navy sponsored a four-day conference at Harvard, 350 people attended.32 Representatives of government agencies, universities and a wide range of companies attended both of these significant events. Although many companies were learning about computers, none of them would be the first to act; that honor belongs to a start-up formed by Eckert and Mauchly in March 1946. In 1946, the University of Pennsylvania dismissed Eckert and Mauchly because of their interests in commercializing the ENIAC and EDVAC. The two perceived an economic opportunity in selling computers and together formed the Electronic Control Company. The Census Bureau awarded them their first contract in June, beating out Raytheon. In 1947, the company changed its name to the Eckert-Mauchly Computer Corporation. Two additional contracts to build computers were signed with A.C. Nielson and Prudential Life Insurance Company with badly needed cash advances to fund continuing product investment. Henry Straus, a Delaware racetrack owner and vice president of American Totalizer, committed to invest half a million dollars for 40 percent of Eckert-Mauchly common stock. But Straus died in an airplane crash, and local financial institutions refused to honor the notes Straus had given the company. By 1949, the company verged on bankruptcy, despite having their three contracts.33 Eckert and Mauchly contacted everyone they knew who might be interested in either funding them, or acquiring them: NCR, Remington Rand, IBM, Philco, Burroughs, Hughes Aircraft, and others. They signed their acquisition by Remington Rand in February 1950. Remington Rand then attempted to cancel the three contracts. Nielson and Prudential agreed reluctantly. But the Census Bureau refused to cancel. They were going to make Remington Rand deliver the agreed upon computer. This act, obviously, influenced the economic history of computers by forcing product instantiation. In the Spring of 1951, the Eckert-Mauchly division of Remington Rand shipped the first UNIVAC I to the Census Bureau. The next five UNIVAC Is shipped to the government as well, to the Atomic Energy Commission (2), Air Force, Army, and Navy.34 Another start-up, however, captured the honors of shipping the first commercial computer. The founders of Engineering Research Associates (ERA), after resigning from the Naval Communications Supplementary Activity, signed a contract with the Navy to develop the Atlas I computer. They had the right to resell the same technology commercially. The Atlas I computer as the ERA 1101 shipped in December 1950. In 1952, Remington Rand, repeating a pattern of organizational development used in the office machinery, acquired their second computer firm, ERA. This time Remington Rand owned the two leading firms, not firms wanting to be acquired because they had trouble competing. Remington Rand controlled the emerging computer market-structure, yet remained a distant second to IBM in office machinery, especially tabulating equipment. In 1954, Remington Rand sold their first UNIVAC to a commercial customer: General Electric.

History of computer from first generation to date. Explain the history of computer generation. History of computer 1st to 5th generation. What is the history of computer and its generation. History of first generation of computer.