

HISTORY OF COMPUTERS

CC1/L
INTRODUCTION TO COMPUTING

Topics:

1. Definition of computer
2. Earliest computer
3. Computer History
4. Computer Generations

Definition of Computer

- Computer is a programmable machine.
- Computer is a machine that manipulates data according to a list of instructions.
- Computer is any device which aids humans in performing various kinds of computations or calculations.

Three principle characteristics of computer:

- It responds to a specific set of instructions in a well-defined manner.
- It can execute a pre-recorded list of instructions.
- It can quickly store and retrieve large amounts of data.

Earliest Computer

- Originally calculations were computed by humans, whose job title was computers.
- These human computers were typically engaged in the calculation of a mathematical expression.
- The calculations of this period were specialized and expensive, requiring years of training in mathematics.
- The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued to be used in that sense until the middle of the 20th century.

Tally Sticks

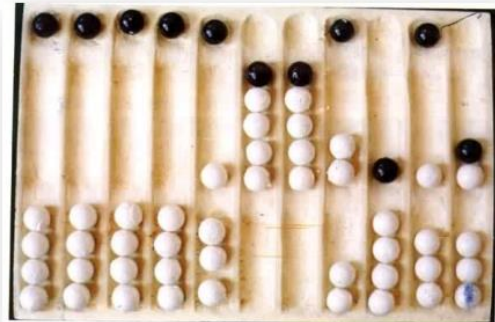
A tally stick was an ancient memory aid device to record and document numbers, quantities, or even messages.



Tally sticks

Abacus

- An abacus is a mechanical device used to aid an individual in performing mathematical calculations.
- The abacus was invented in Babylonia in 2400 B.C.
- The abacus in the form we are most familiar with was first used in China in around 500 B.C. It used to perform basic arithmetic operations.



Earlier Abacus



Modern Abacus



John Napier

Napier's Bones

- Invented by John Napier in 1614.
- Allowed the operator to multiply, divide and calculate square and cube roots by moving the rods around and placing them in specially constructed boards.



Napier's Bones



William Oughtred

Slide Rule

- Invented by William Oughtred in 1622.
- Is based on Napier's ideas about logarithms.
- Used primarily for – multiplication – division – roots – logarithms – Trigonometry
- Not normally used for addition or subtraction.



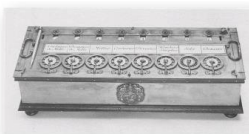
Slide Rule



Blaise Pascal

Pascaline

- Invented by Blaise Pascal in 1642.
- It has its limitation to addition and subtraction.
- It is too expensive.



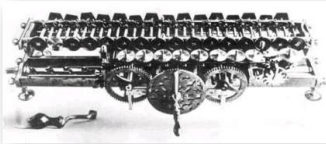
Pascaline



Gottfried Wilhelm Leibniz

Stepped Reckoner

- Invented by Gottfried Wilhelm Leibniz in 1672.
- The machine that can add, subtract, multiply and divide automatically.



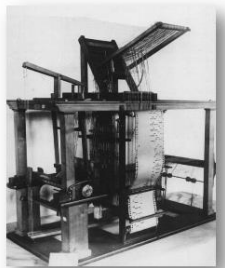
Stepped Reckoner



Joseph-Marie Jacquard

Jacquard Loom

- The Jacquard loom is a mechanical loom, invented by Joseph-Marie Jacquard in 1801.
- It is an automatic loom controlled by punched cards.



Jacquard Loom



Thomas de Colmar



Arithmometer

Arithmometer

- A mechanical calculator invented by Thomas de Colmar in 1820.
- The first reliable, useful and commercially successful calculating machine.
- The machine could perform the four basic mathematic functions.
- The first mass-produced calculating machine.

Difference Engine and Analytical Engine

- It an automatic, mechanical calculator designed to
- tabulate polynomial functions.
- Invented by Charles Babbage in 1822 and 1834
- It is the first mechanical computer.



Charles Babbage



Difference
Engine



Analytical
Engine



Augusta Ada Byron

First Computer Programmer

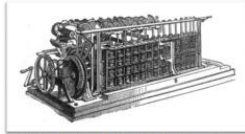
- In 1840, Augusta Ada Byron suggests to Babbage that he use the binary system.
- She writes programs for the Analytical Engine.

Scheutian Calculation Engine

- Invented by Per Georg Scheutz in 1843.
- Based on Charles Babbage's difference engine.
- The first printing calculator.



Per Georg Scheutz



Scheutian Calculation Engine

Tabulating Machine

- Invented by Herman Hollerith in 1890.
- To assist in summarizing information and accounting.



Herman Hollerith



Tabulating Machine

Havard Mark 1

- Also known as IBM Automatic Sequence Controlled Calculator (ASCC).
- Invented by Howard H. Aiken in 1943
- The first electro-mechanical computer.



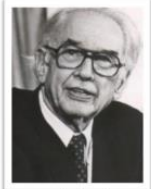
Howard H. Aiken



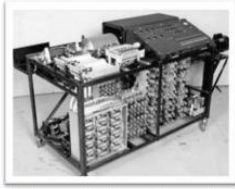
Mark 1

Atanasoff-Berry Computer (ABC)

- It was the first electronic digital computing device.
- Invented by Professor John Atanasoff and graduate student Clifford Berry at Iowa State University between 1939 and 1942.



Professor John Atanasoff



Atanasoff-Berry Computer

ENIAC

- ENIAC stands for Electronic Numerical Integrator and Computer.
- It was the first electronic general-purpose computer.
- Completed in 1946.
- Developed by John Presper Eckert and John W. Mauchly.



ENIAC

UNIVAC 1

- The UNIVAC I (UNIVersal Automatic Computer 1) was the first commercial computer.
- Designed by J. Presper Eckert and John Mauchly.



UNIVAC 1

EDVAC

- EDVAC stands for Electronic Discrete Variable Automatic Computer
- The First Stored Program Computer
- Designed by Von Neumann in 1952.
- It has a memory to hold both a stored program as well as data.



EDVAC

The First Portable Computer

- Osborne 1 – the first portable computer.
- Released in 1981 by the Osborne Computer Corporation.



Osborne 1

The First Computer Company

- The first computer company was the Electronic Controls Company.
- Founded in 1949 by J. Presper Eckert and John Mauchly.



Computer Generations There are five generations of computer:

- First generation – 1946 - 1958
- Second generation – 1959 - 1964
- Third generation – 1965 - 1970
- Fourth generation – 1971 – today
- Fifth generation – Today to future

The First Generation

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

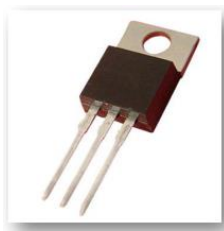


Vacuum tube

- 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.
- Input was based on punched cards and paper tape, and output was displayed on printouts.

The Second Generation

- Transistors replaced vacuum tubes and ushered in the second generation of computers.
- One transistor replaced the equivalent of 40 vacuum tubes.
- Allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable.
- Still generated a great deal of heat that can damage the computer.



Transistor

- Second-generation computers moved from cryptic binary machine language to symbolic, or assembly, languages, which allowed programmers to specify instructions in words.
- Second-generation computers still relied on punched cards for input and printouts for output.
- These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

The Third Generation

- 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.
- Much smaller and cheaper compare to the second generation computers.
- It could carry out instructions in billionths of a second.

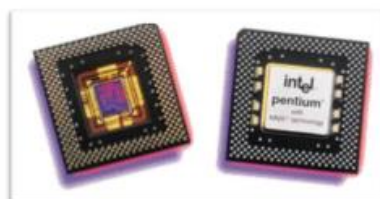


Integrated Circuit

- 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.

The Fourth Generation

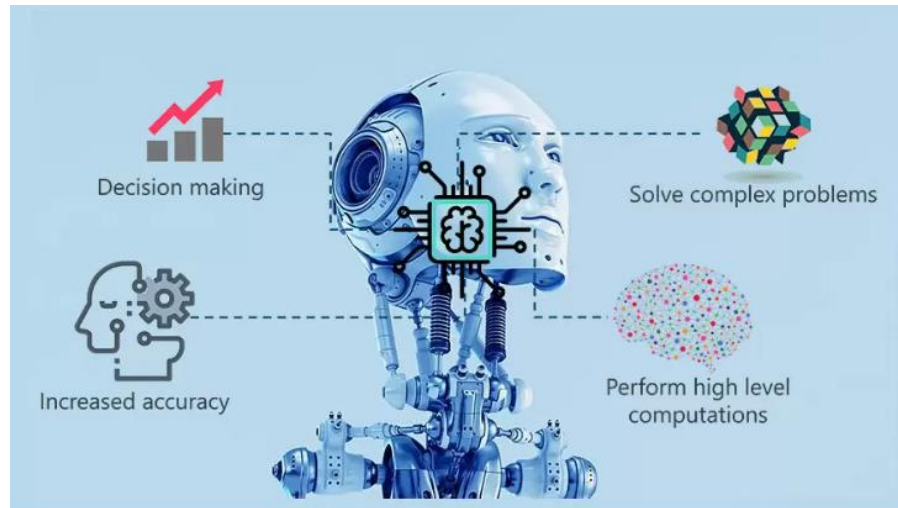
- The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip.
- As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet.
- Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.



Microprocessor

The Fifth Generation

- Based on Artificial Intelligence (AI).
- Still in development.
- The use of parallel processing and superconductors is helping to make artificial intelligence a reality.
- The goal is to develop devices that respond to natural language input and are capable of learning and self-organization.
- There are some applications, such as voice recognition, that are being used today.



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