CSCA0101
COMPUTING BASICS

Chapter 1
History of Computers

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.

Definition of Computer

Three principles characteristic 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.

History of Computers

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

History of Computers

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.

## History of Computers
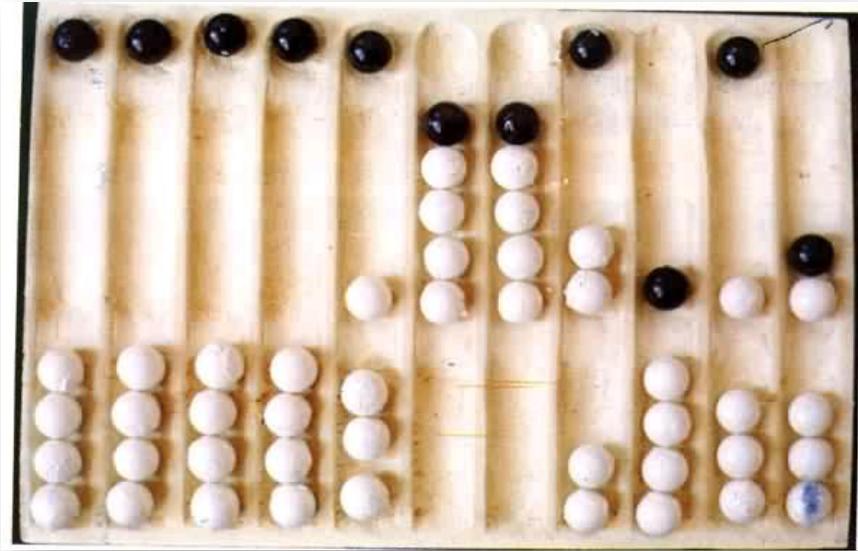
Abacus

Earlier Abacus

Modern Abacus

Napier's Bones

- Invented by **John Napier i**n 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.
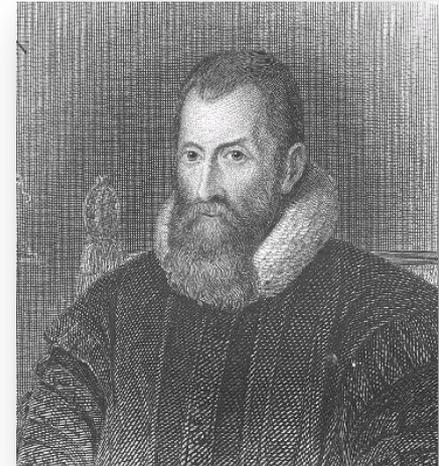
John Napier

Napier's Bones

History of Computers

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**.

William Oughtred

Slide Rule

History of Computers

Pascaline

- Invented by **Blaise Pascal** in 1642.

- It was its limitation to addition and subtraction.

- It is too expensive.

Blaise Pascal


Pascaline

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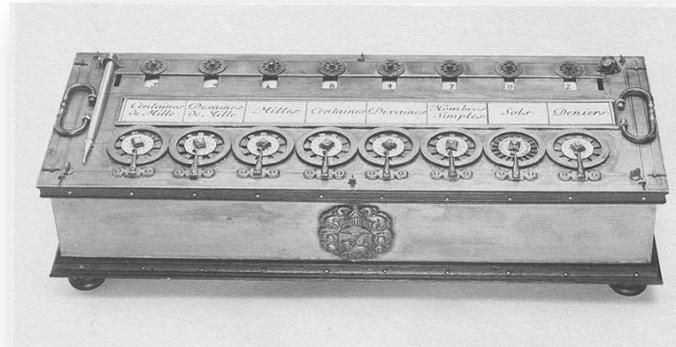
Stepped Reckoner

- Invented by **Gottfried Wilhelm Leibniz i**n 1672.

- The machine that can add, subtract, multiply and divide automatically.

Gottfried Wilhelm Leibniz

Stepped Reckoner

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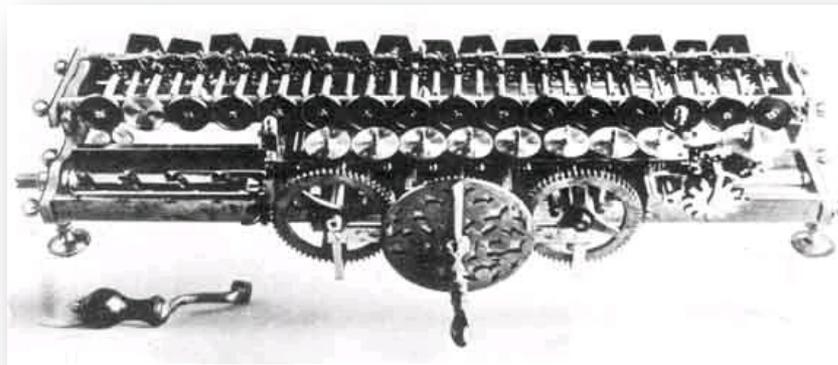
Jacquard Loom

- The **Jacquard loom** is a mechanical loom, invented by **Joseph-Marie Jacquard** in 1881.

- It an automatic loom controlled by punched cards.
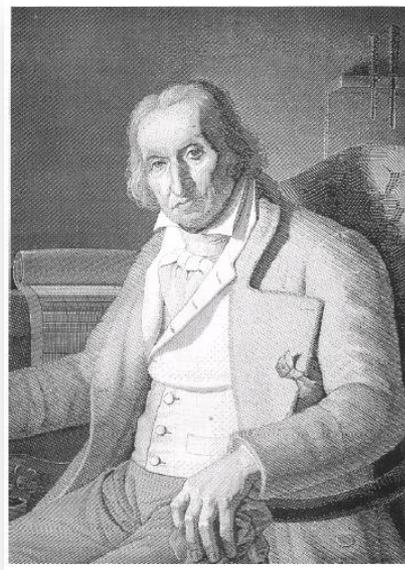
Joseph-Marie Jacquard   Jacquard Loom

History of Computers
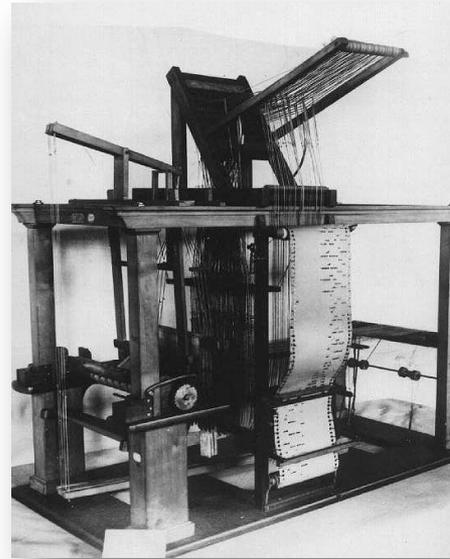
Arithmometer

- 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.

Thomas de Colmar

Arithmometer

History of Computers
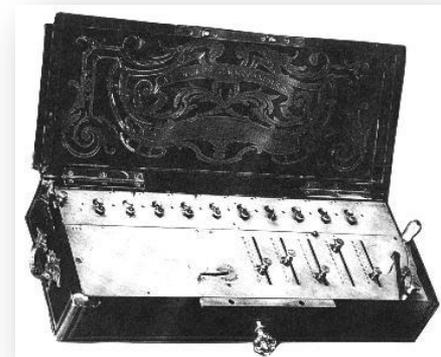
Difference Engine and Analytical Engine

- It an automatic, mechanical calculator designed to tabulate polynomial functions.

- Invented by **Charles Babbage** in **1822 and 1834**

- It is the first mechanical computer.
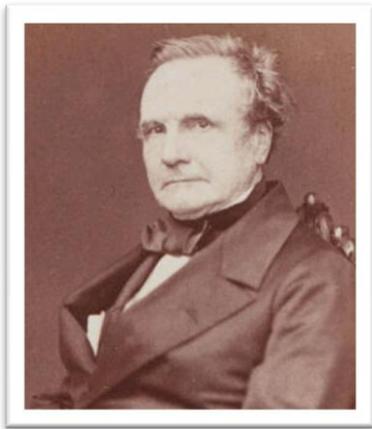
Charles Babbage
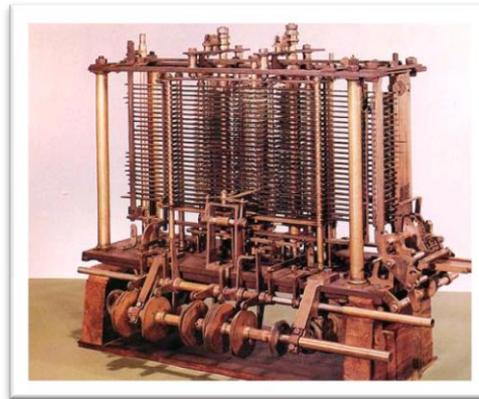
Difference Engine

Analytical Engine

History of Computers
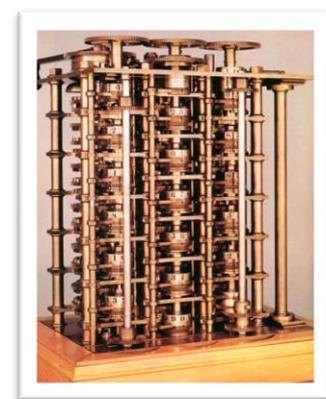
First Computer Programmer

- In 1840, **Augusta Ada Byron** suggests to Babbage that he use the binary system.

- She writes programs for the **Analytical Engine**.

Augusta Ada Byron

Scheutzian Calculation Engine

- Invented by **Per Georg Scheutz** in 1843.

- Based on Charles Babbage's difference engine.

- The first **printing calculator.**

Per Georg Scheutz
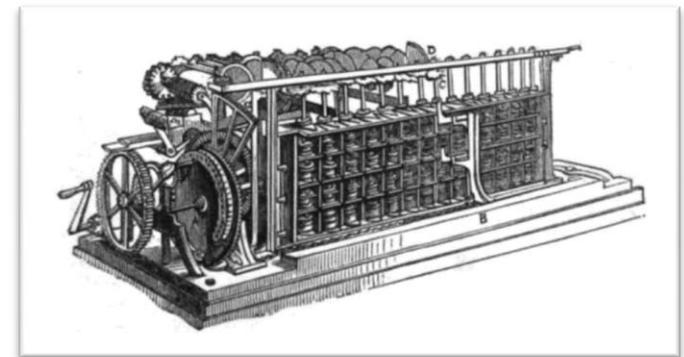
Scheutzian Calculation Engine

Tabulating Machine

- Invented by **Herman Hollerith** in 1890.

- To assist in summarizing information and accounting.
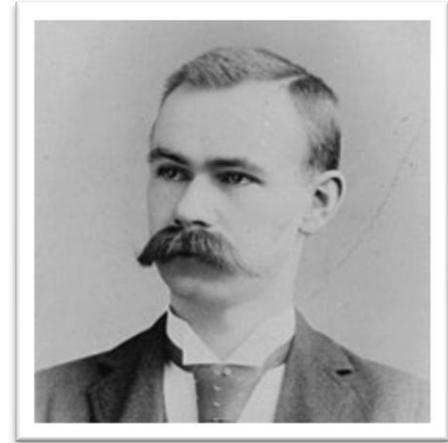
Herman Hollerith
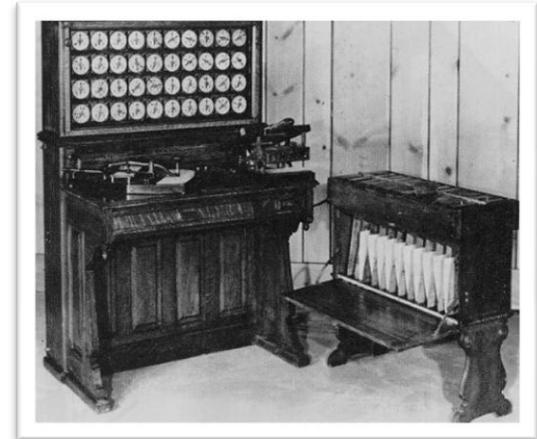
Tabulating Machine

History of Computers

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

History of Computers

Z1

- The first programmable computer.

- Created by **Konrad Zuse** in Germany from **1936 to 1938.**

- To program the Z1 required that the user insert punch tape into a punch tape reader and all output was also generated through punch tape.
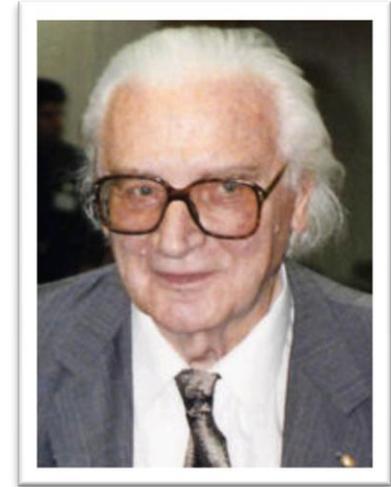

Konrad Zuse

Z1

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.
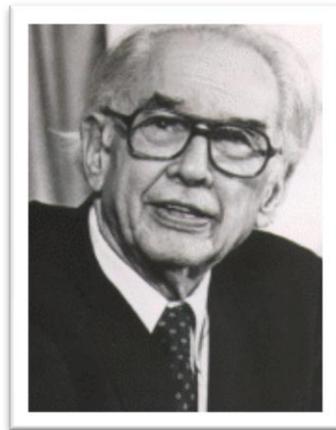
Professor John Atanasoff

Atanasoff-Berry Computer

History of Computers
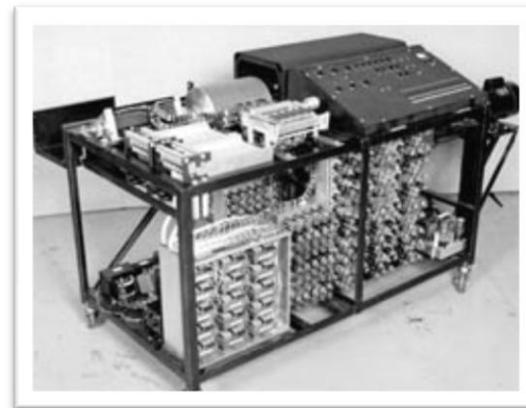
ENIAC

- **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. Mauchl**.

ENIAC

History of Computers

UNIVAC 1

- The **UNIVAC I** (**UNIV**ersal **A**utomatic **C**omputer 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

History of Computers

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

History of Computers

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

History of Computers

The First Generation

- 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.
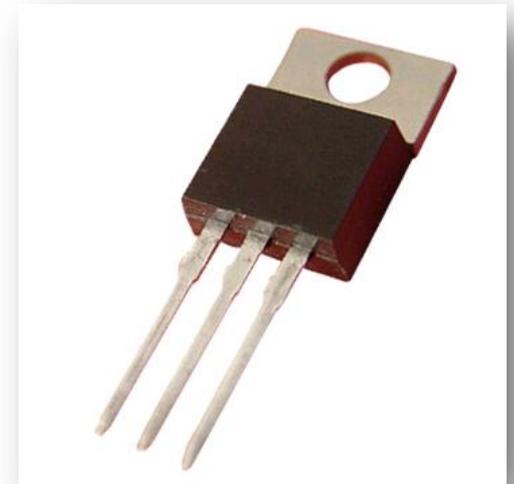
Transistor

The Second Generation

- 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.

History of Computers

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.

Integrated Circuit

- Much smaller and cheaper compare to the second generation computers.

- It could carry out instructions in billionths of a second.
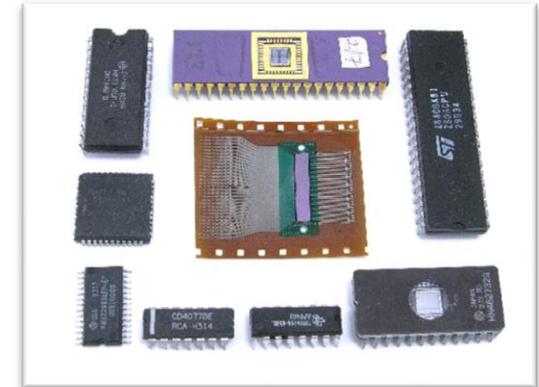
The Third Generation

- 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.
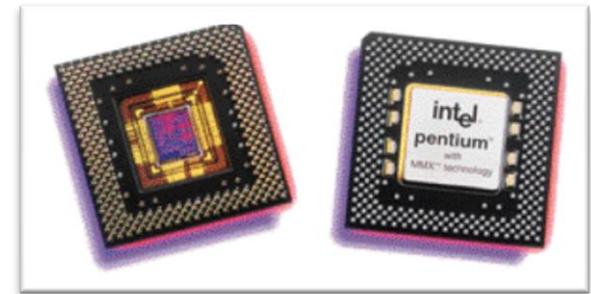
Microprocessor

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.