CSC111
Introduction to Computer Science

Course Instructors:

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- Lectures:
Venue:
Tuesdays: 8-10am

Course Outlines

Historical Development of Computers and their Generations.

- The Definition of Computer

- Historical Development of Computers

  - The Abacus

  - Adding Machines

  - Charles Babbage's Machines

- Characteristics of Computers

At the end of this topic, you should be able to:

- Define computer

- Know the historical development of computers

- State the characteristics of a computer

- Recognise a computer set

Definition of computer

☐ A computer is an ***electronic data processing*** machine that can follow instructions to accept input, process the input and then produce information.

☐ A computer is a ***programmable machine*** that receives input, stores and automatically manipulates data, and provides output in a useful format.

☐ A computer is an ***electronic machine*** that accepts information and instructions from a user, manipulates the information according to the instructions, displays the information in some way, and stores the information for retrieval later.

Early History of Computing

- The history of computers begins with the people's need to calculate and keep records.

- From ancient times, people have being working to invent a computing device to assist them in calculating and processing data.

All the **data processing** equipment can be categorized under three types:-

1- Mechanical devices: Which are hand-operated such as the "*ABACUS*" and the "*Slide rule*".

2- Electro-mechanical devices: Which are powered by an electric motor and use switches and relays, e.g. "*Card reader*" and "*Card stored*".

3- Electronic devices: Which have such components as "*Transistors, Circuits, Chips*", e.g. "*Modern Computer*".

We outline historical **evolution/development** of the computer in three stages:

1- The dark (earliest) ages: (3000 B.C – 1890 A.D)

2- The middle ages: (1890 – 1944)

3- The modern ages: (1944 till now)

• *B.C (Before Christ)*

• *A.D (After Death or Anno Domini)*

1- The Dark Ages: (3000 B.C – 1890 A.D)

This stage refers to the period in which only manual "Mechanical devices" were used:
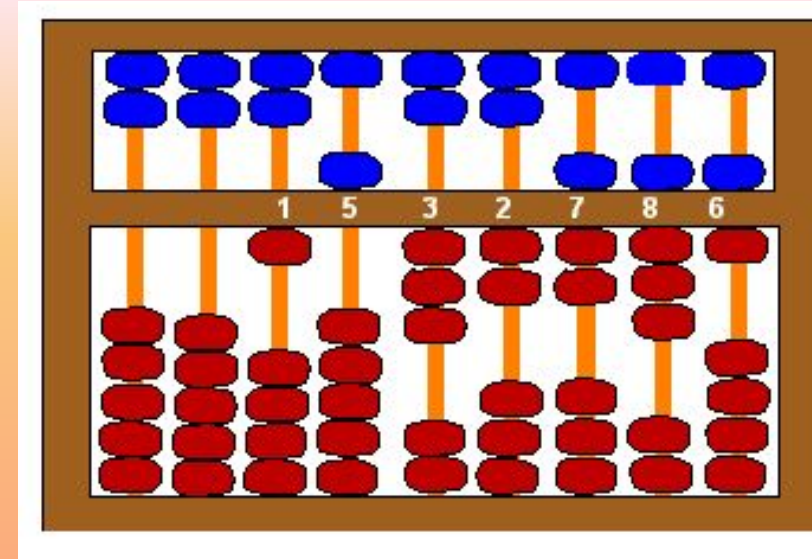
The Abacus

Date of development:

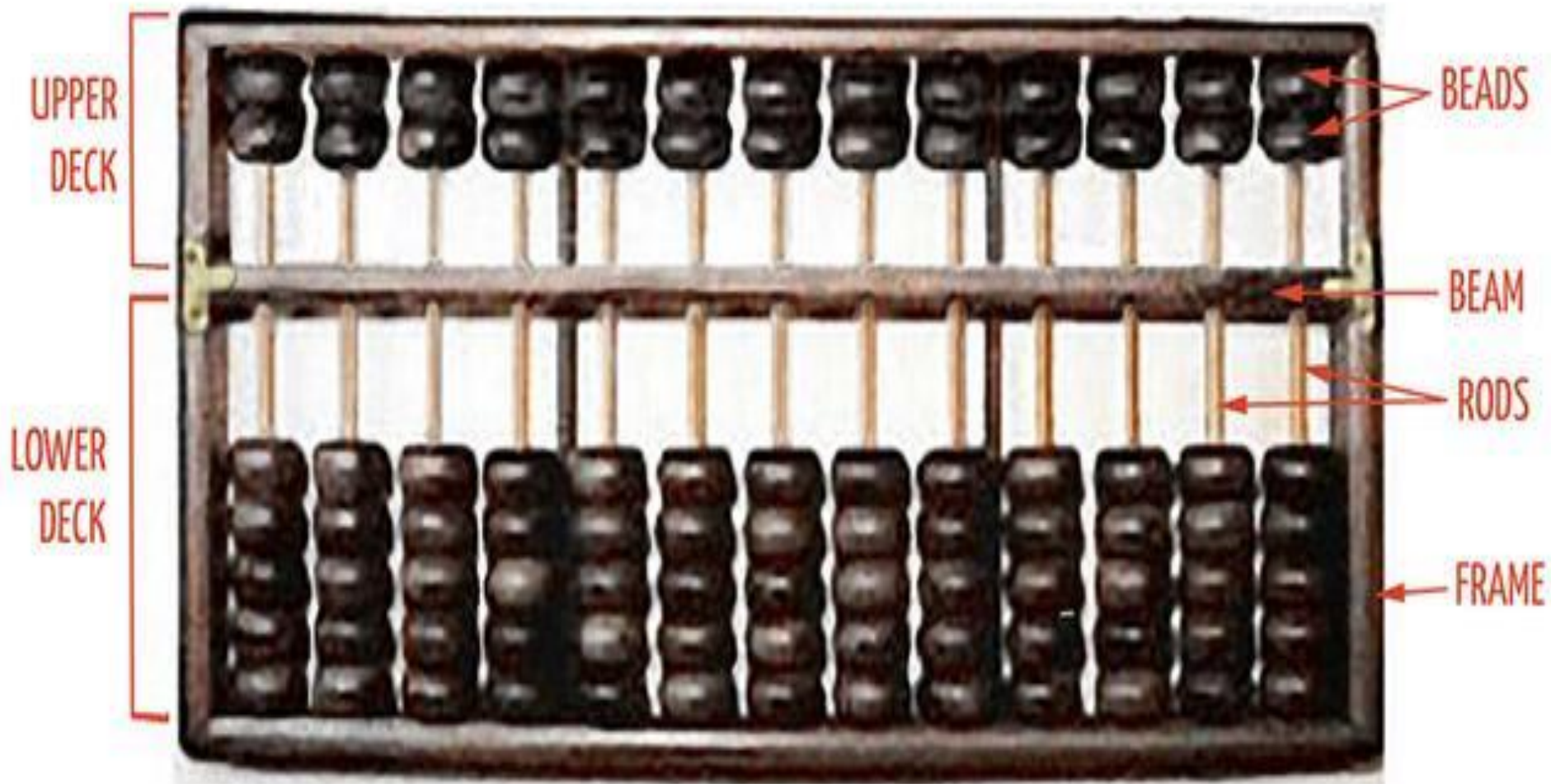3000 B.C (5000 years ago)

Place: China

Function: Arithmetic calculation

Abacus: An early device to record numeric values

Use today: Soroban Abacus training enhances the essential element of learning Mental Math better and faster calculation skills and improves problem-solving abilities.
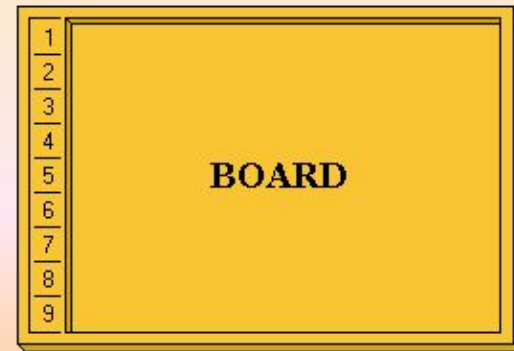
The Abacus

The Napier's Bones

Date: 1617

Place: Scotland

Inventor: John Napier

Function: Multiplication and Division

$7 \times 1 =$ 7

$7 \times 2 =$ 1 / 4

$7 \times 3 =$ 2 / 1

$7 \times 4 =$ 2 / 8

$7 \times 5 =$ 3 / 5

$7 \times 6 =$ 4 / 2

$7 \times 7 =$ 4 / 9

$7 \times 8 =$ 5 / 6

$7 \times 9 =$ 6 / 3

BOARD

SET OF RODS

Slide Rule
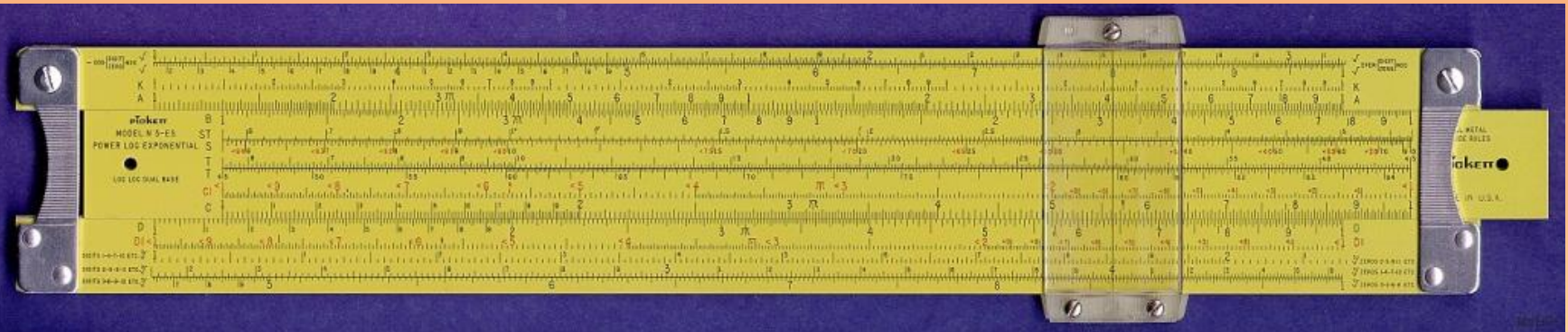
Date: 1632

Place: England

Inventor: William Oughtred

Components: Two movable rules

Function: Multiplication and Division

Pascal Arithmetic Machine

Date: 1642

Place: France

Inventor: Blasé Pascal

Function: All the arithmetic operations but it required considerable manual effort for Multiplication and Division

Blasé Pascal

Jacquard Loom

Date: 1801

Place: France

Inventor: Joseph Marie Jacquard

Components: Loom, threads and control cards (punched cards)

Punched Card: Jacquard's Loom, the punched card
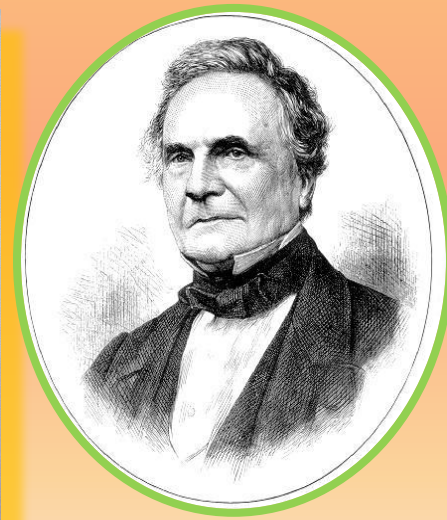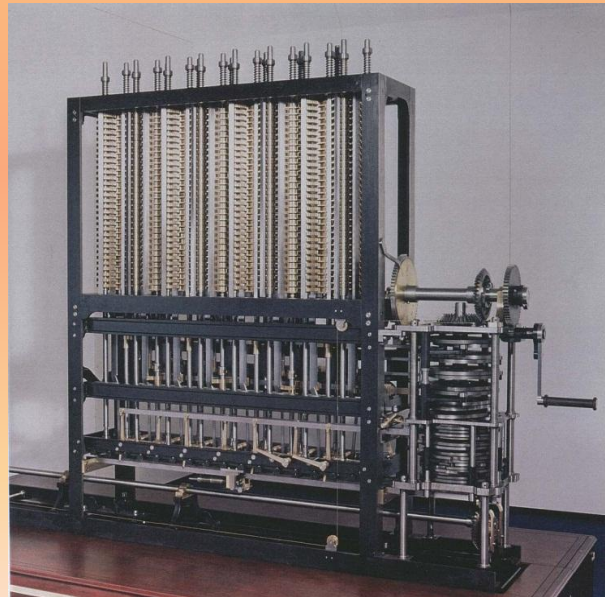
Babbage's Analytical Engine

Date: 1833

Place: England / Cambridge University

Inventor: English inventor Charles Babbage/Professor of mathematics invented a viable mechanical computer equivalent to modern digital computers

Created a mechanical, steam-powered computing machine

First machine was the **Difference Engine**, a mechanical calculator. This was partially realized

Second machine was the **Analytical Engine**, a

Charles Babbage

Components:

The organization of the engine was remarkably similar to that of the modern digital computer.

built in early 1800's

Major innovation:

- special purpose calculator
- naval navigation charts

- Arithmetic unit

- Punched-card input

- Printing unit and control system

- Storage unit (1000 numbers of 50 decimal digits each)

Ada Lovelace

Birth: 10/Dec./1815 in London, England

Death: 27/Nov./1852 in London, England

Nationality: British

Noun: Computer program in punched cards
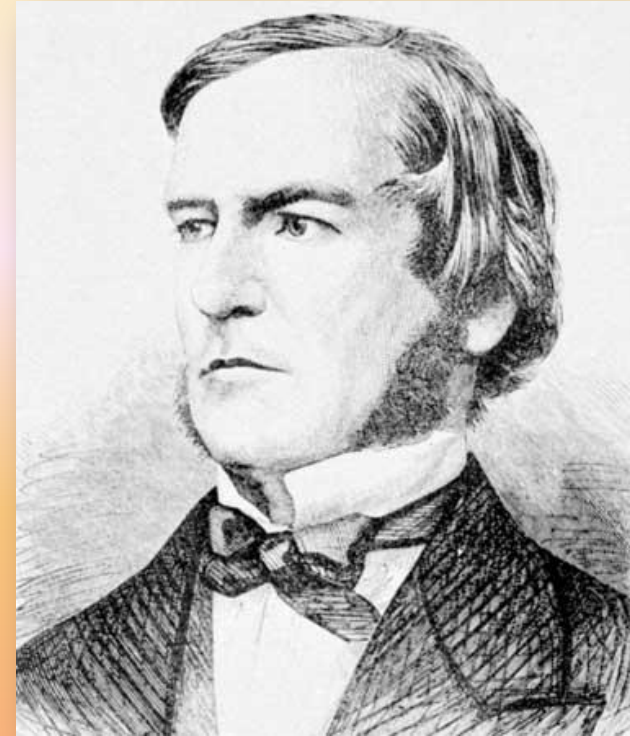**Invention:** Computer programming in 1843
Inventor: Augusta Ada Lovelace
First Programmer, the loop

Definition: In computer science, a sequence of instructions that a computer can interpret and execute; "the program required several hundred lines of code"

Boolean Logic

In 1854, George BOOLE, a British mathematician performed a mathematical system named "Boolean Logic", that is the mathematics of variables with values that can be only "True" or "False".

2- The middle ages: (1890 – 1944)

The major feature of this stage was the use of "Electro-Mechanical Device" to process data recorded on punched cards.

Punched-card Tabulating Machine

Date: 1890

Place: USA Bureau Census

Inventor: Dr. Herman Hollerith

Major innovation:

a punched device for recording information by punching holes on cards.

Punched-card Tabulating Machine

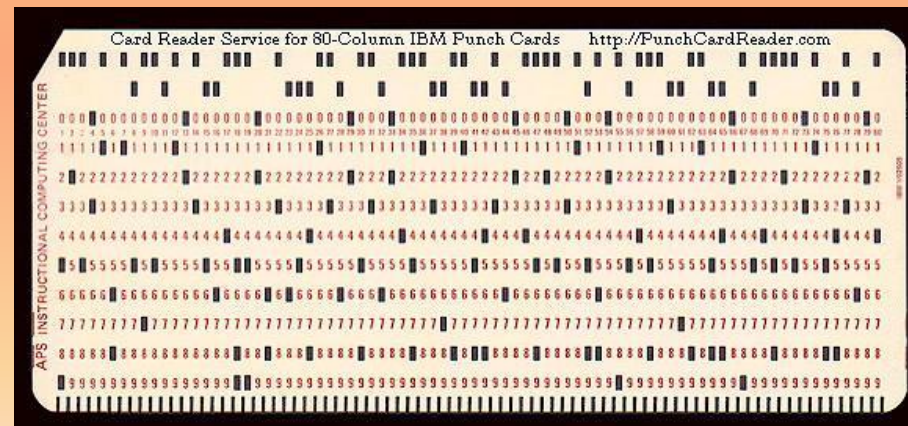# The Simultaneous Punched Machine

Date: 1910

Place: USA Bureau Census

Inventor: James Power

Major innovation:

An earlier card-punched equipment to cheek and correct data before it was actually punched onto cards.
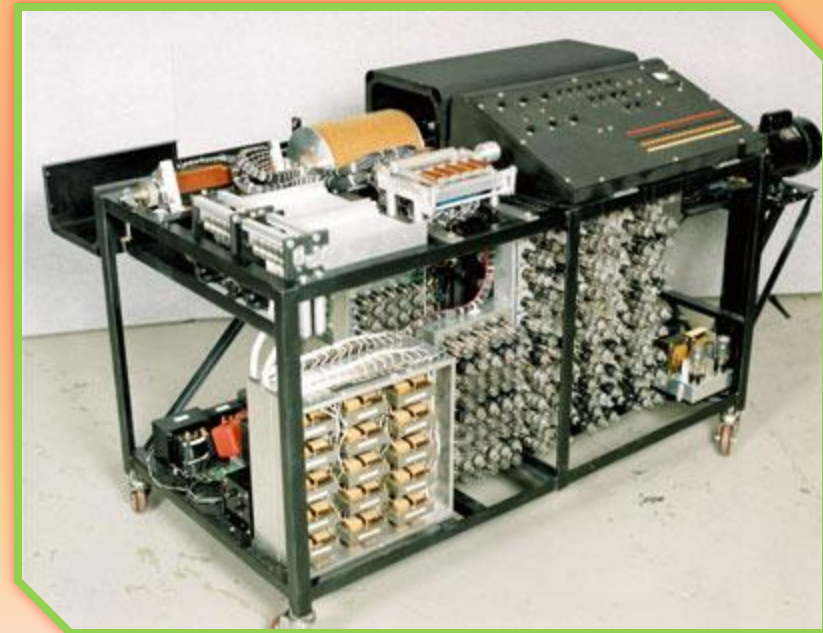

Punched card

ABC (Atanasoff Berry Computer)

Date: 1938

Place: Iowa State College

Inventor: Dr. John Vincent Atanasoff and Clifford Berry

Major innovation: a special purpose computer

3- The Modern Ages: (1944 till now)

The major feature of this stage was the use of "**Computers**" to process data and storage.

Harvard Mark I, ENIAC, UNIVAC I
Early computers launch new era in mathematics, physics, engineering and economics

MARK 1

Date: 1944

Type: The first electro-mechanical computer "automatically performing of arithmetical and logical operations"

Inventor: IBM Company/ Howard G. Aiken, Professor of Math's at Harvard University
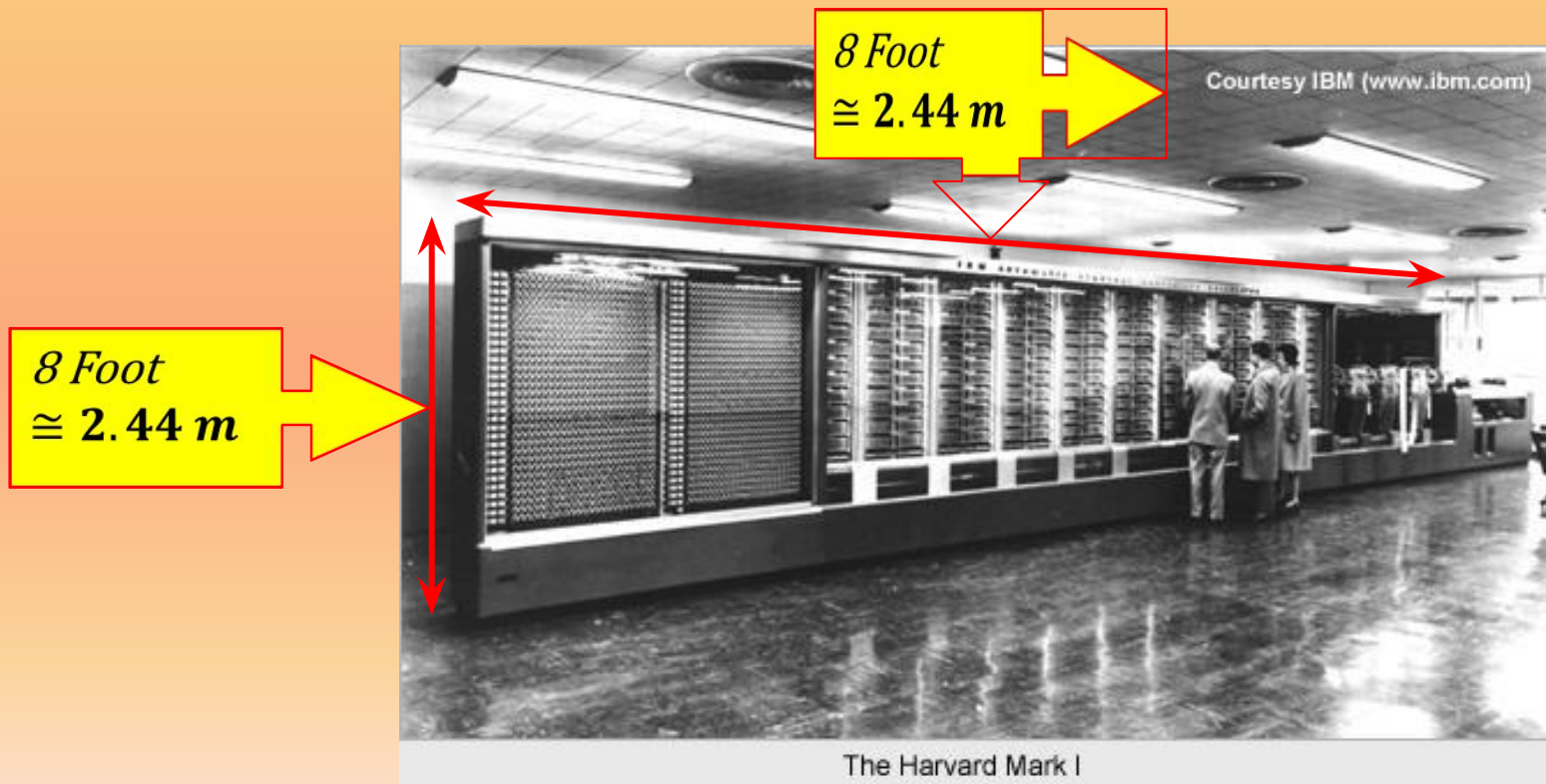
Size: 50 foot long, 8 foot high

Speed:

3 additions per second

1 multiplication in 5 seconds

1 division in 12 seconds

8 Foot ≅ 2.44 m

Courtesy IBM (www.ibm.com)

8 Foot ≅ 2.44 m

The Harvard Mark I

ENIAC (Electronic Numerical Integrator and Computer)

Date: 1946

Type: The first electronics digital computer "automatically performing of arithmetical and logical operations"

Inventor: Dr. John Mauchly in USA

Weight: 30 Ton

 ENIAC - details
- Decimal (not binary)
- 20 accumulators of 10 digits
- Programmed manually by switches
- 18,000 vacuum tubes
- 30 tons
- 15,000 square feet
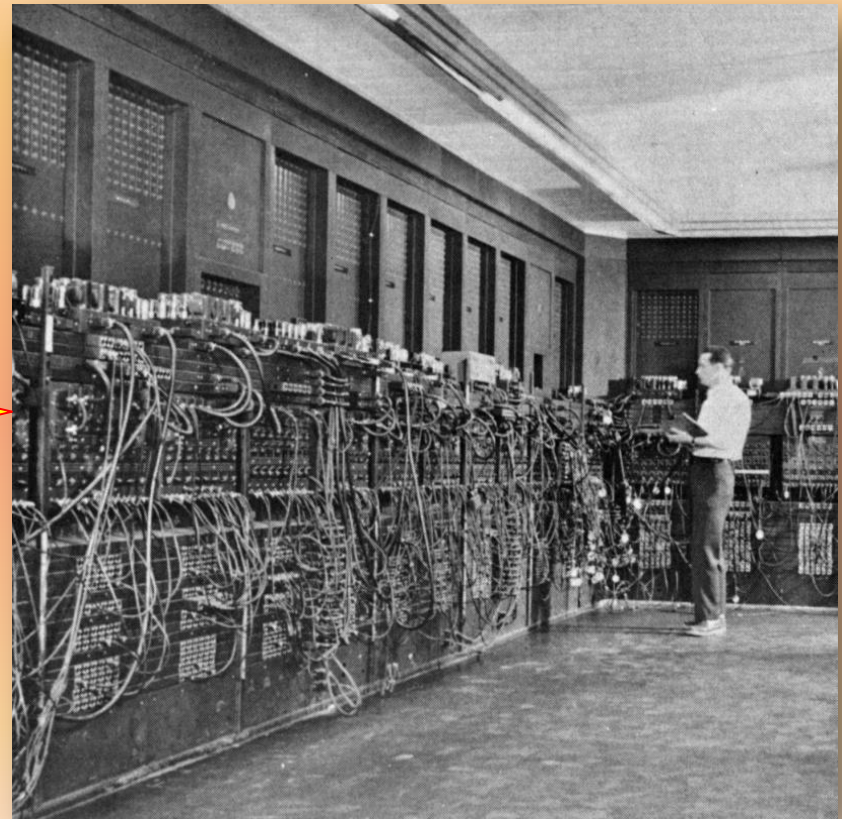- 140 kW power consumption
- 5,000 additions per second

Speed:

5000 additions per second

350 multiplications per second

40 divisions per second

E
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C

Characteristics of Computers

The characteristics of computers that have made them so powerful and universally useful are speed, accuracy, diligence, versatility and storage capacity.

Speed

Computers work at an incredible speed. A powerful computer is capable of performing about 3-4 million simple instructions per second.

Accuracy

Computers are also accurate. Errors that may occur can almost always be attributed to human error (inaccurate data, poorly designed system or faulty instructions/programs written by the programmer)

Characteristics of Computers cont..

Diligence

Unlike human beings, computers are highly consistent. They do not suffer from human traits of boredom and tiredness resulting in lack of concentration. Computers, therefore, are better than human beings in performing voluminous and repetitive jobs.

Versatility

Computers are versatile machines and are capable of performing any task as long as it can be broken down into a series of logical steps. The presence of computers can be seen in almost every sphere – Railway/Air reservation, Banks, Hotels, Weather forecasting and many more.

Characteristics of Computers cont..

Storage Capacity

Today's computers can store large volumes of data. A piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously.