Usmanu Danfodiyo University, Sokoto

FACULTY OF PHYSICAL & COMPUTING SCIENCES

CMP 101: Introduction to Computer Science

Part 1: Historical Background of Computer System

Course Structure

- 3 Units (2L + 1P)
- Lecture Attendance ➔ 70% of Lecture attendance
- Assessment
  - ✓ Practical sessions
  - C.A test
  - ✓ Final Examination

Course Contents

- Historical Background of Computer
- The Concept of Computer System
- Introduction to Computer Network
- Introduction to Database Systems
- Introduction to Human-Computer Interaction
- Practical session

PART 1:
HISTORICAL BACKGROUND OF A COMPUTER

CONTENTS

- ✓ Early Counting Devices
- ✓ History of a Computer
- ✓ First Generation of Computers
- ✓ Second Generation of Computers
- ✓ Third Generation of Computers
- ✓ Fourth Generation of Computers
- ✓ Fifth Generation of Computers

Early Counting Devices

- Early counting devices are devices that were used in the early days to perform arithmetic operations such as addition of numbers, subtraction, and multiplication.
- These devices were used for the usual barter trade of the early days.
- The history and development of computers can be traced back to the **studies of Mathematics** which started with counting.

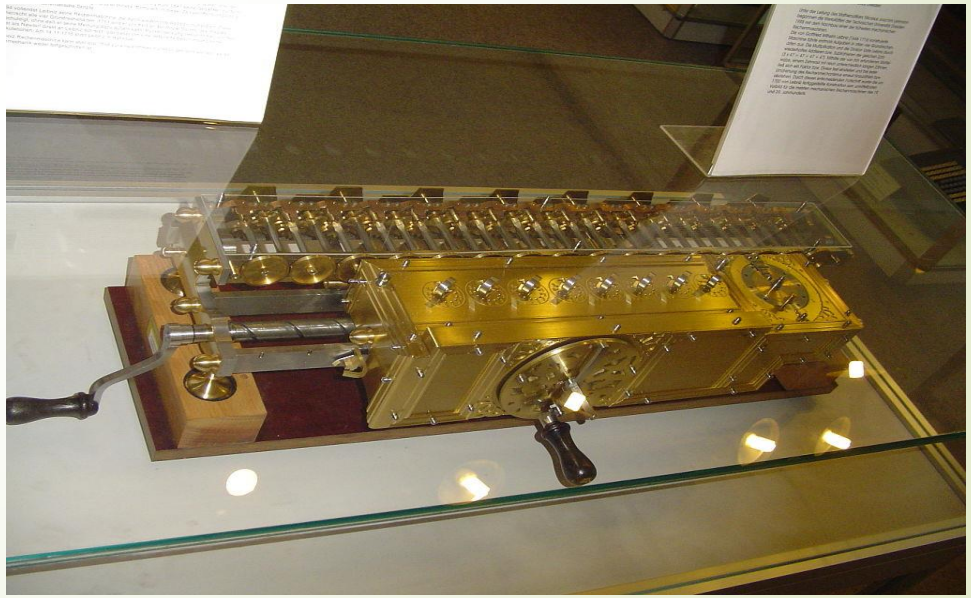
  The history of Mathematics is the **history of civilization.**
- These have led to various computing inventions in search of a tool that could enable man to meet his computational and data processing needs until we have the computer today.

Early Counting Devices (Cont)…

- It was in the process of finding solutions to the problem of counting that early counting devices emerged
- Examples of early counting devices are fingers, toes, stones, sticks, pebbles, and cowries among others.

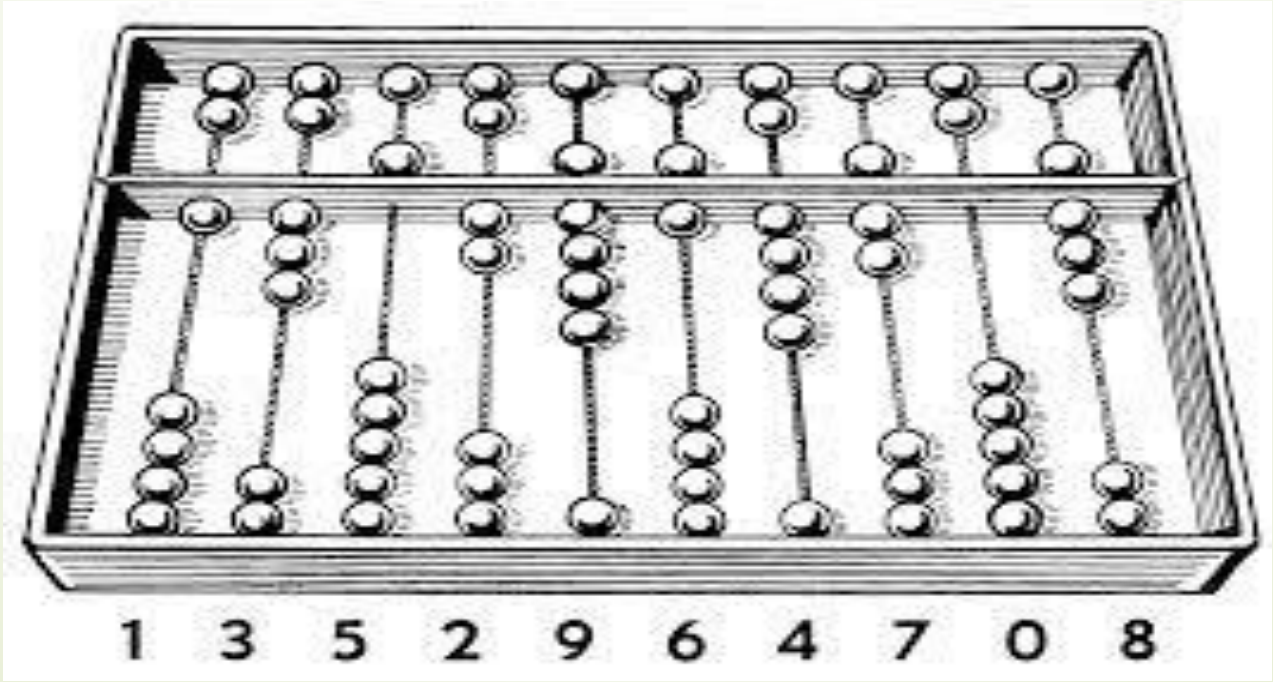
History of a Computer

- The history of computers dates back to the period of the scientific revolution (i.e. 1543 – 1678). The calculating machine invented by **Blaise Pascal (Pascal's calculator)** in 1642 and that of Goffried Liebnits marked the genesis of the application of machines in industry



History of a Computer (Cont)…

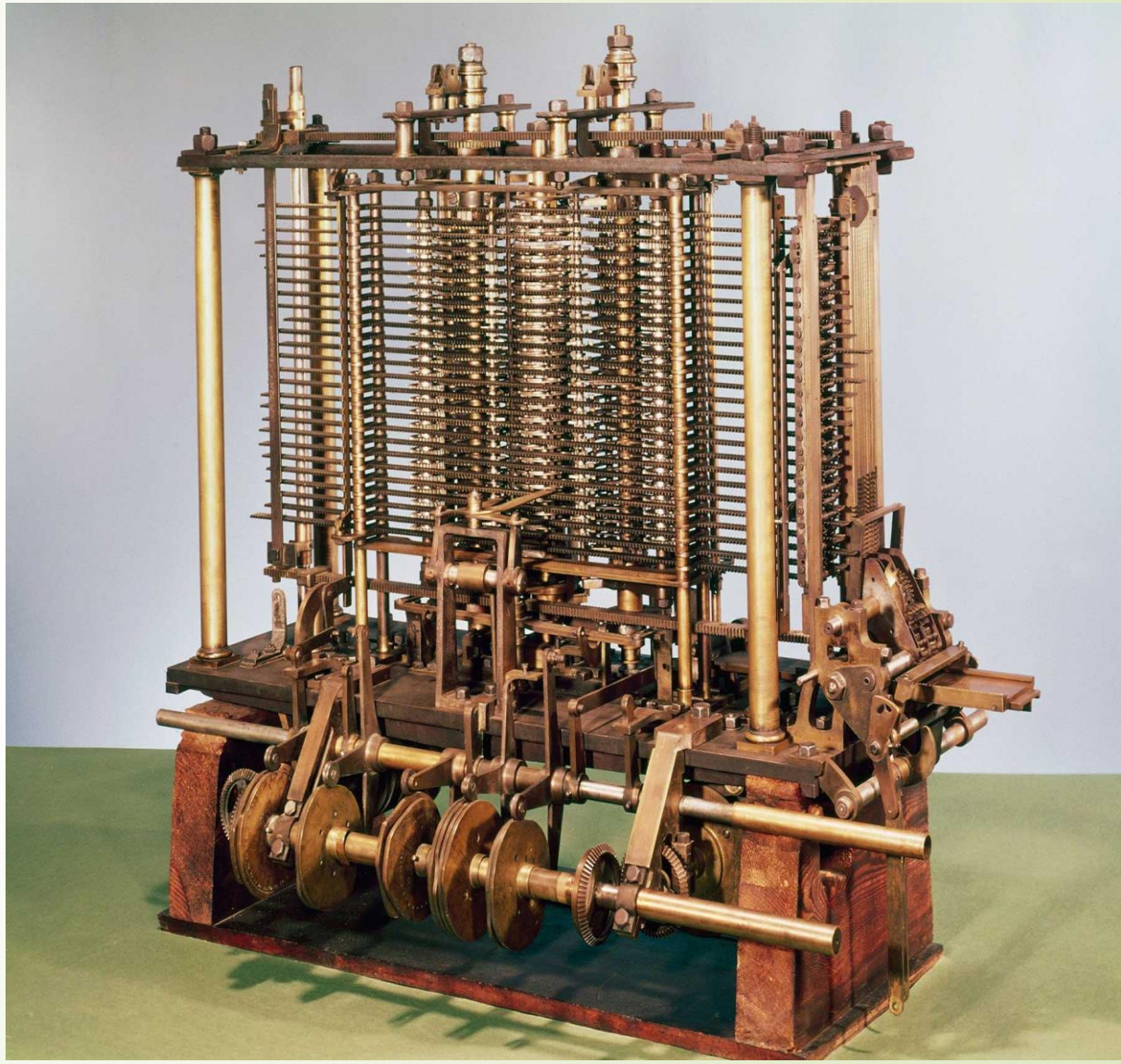
- An abacus is a calculation tool used by sliding counters along rods or grooves, used to perform mathematical functions. In addition to calculating the basic functions of addition, subtraction, multiplication and division, the abacus can calculate roots up to the cubic degree.



History of a Computer (Cont)…

- In 19th century English mathematics professor name **Charles Babbage** referred as a "**Father of Computer".**

- He designed the **Analytical Engine** and it was this design that the basic framework of the computers of today are based on.



History of a Computer (Cont)…

- The computer was born not for entertainment or email but out of a need to solve a serious number-crunching crisis.
- By 1880, the United State (U.S) population had grown so large that it took more than **seven years** to tabulate the U.S. Census results.
- The government sought a faster way to get the job done, giving rise to punch-card based computers that took up entire rooms.

  Punch-card a common way to enter data into computers from the 1950s to 1970
- Today, we carry more computing power on our smartphones than was available in these early models

History of a Computer (Cont)…

- The history of computers is considered with the generations of a computer from **first generation to fifth generation**
- Generally speaking, computers can be classified into five generations.
- Each generation lasted for a certain period of time and each gave us either a new and improved computer or an improvement to the existing computer
- In the next section, we will see how Computers evolved from First Generation upto the Fifth Generation

GENERATIONS OF COMPUTER SYSTEM

First Generation Computers (1937-1946)

- In 1937 the first electronic digital computer was built ***by Dr. John V. Atanasoff and Clifford Berry.***
- It was called the ***Atanasoff-Berry Computer (ABC).***
- In 1943 an electronic computer name the ***Colossus was built for the military.***
- Other developments continued until in 1946 the ***first general–purpose digital computer***, the Electronic Numerical Integrator and Calculator ***(ENIAC)*** was built.
- It is said that this computer ***weighed 30 tons, and had 18,000 vacuum tubes*** which was used for processing.

  When this computer was turned on for the first time lights dim in sections of Philadelphia.
- Computers of this generation could only perform ***single task, and they had no operating system.***

Characteristics of First Generation Computers

- The sizes of these computers were as large as the size of a room.
- Possession of **Vacuum Tubes** to perform calculation.
- They used an internally stored instruction called a program.
- Use capacitors to store binary data and information.
- They use punched cards for communication of input and output data and information
- They generated a lot of heat.
- They have about One Thousand 1000 circuits per cubic foot.

Examples of First Generation Computers

- Mark I was developed by Aiken in 1944.

- Electronic Numerical Integrator and Calculator (ENIAC) was built at the Moore School for Engineering of the University of Pennsylvania in 1946 by J. Presper Eckert and William Mauchley.

- Electronic Discrete Variable Automatic Computer (EDVAC) was also developed in 1947 by Eckert and Mauchley.

Second Generation Computers (1947-1962)

- Second generation of computers used ***transistors instead of vacuum tubes*** which were more reliable.
- In 1951 the first computer for commercial use was introduced to the public; the ***Universal Automatic Computer (UNIVAC 1).***
- In 1953 the International Business Machine (IBM) 650 and 700 series computers made their mark in the computer world.

  During this generation of computers ***over 100 computer programming languages were developed***
- Computers had **memory and operating systems**.
- Storage media such as tape and disk were in use also were printers for output.

Characteristics of Second Generation Computers

- The computers were still large, ***but smaller than*** the first generation of computers.
- They use ***transistors*** in place of Vacuum Tubes to perform calculations.
- They were produced at a reduced cost compared to the first generation of computers.
- Possession of ***magnetic tapes for data storage***.
- They were using punch cards as input and output of data and information.
- The use of a keyboard as an input device was also introduced.
- These computers were still generating a lot of heat which an air conditioner is needed to maintain a cold temperature.
- They have about one thousand circuits per cubic foot.

Examples of Second Generation Computers

- Leprechaun, IBM built by Bell Laboratories in 1947
- Transis produced by philco, GE and RCA.
- UNIVAC 1107, UNIVAC III.
- RCA 501.

Third Generation Computers (1963-1975)

- The invention of ***integrated circuits*** brought us the third generation of computers.
- With this invention computers became smaller, more powerful more reliable
- They are able to run ***many different programs*** at the same time.

CHARACTERISTICS

- They used ***large-scale integrated circuits***, which were used for both data processing and storage.

  Computers were miniaturized, that is, ***they were reduced in size*** compared to the previous generation.
- ***Keyboard and mouse*** were used for input while the monitor was used as an output device.
- Use of programming languages like ***COBOL and FORTRAN*** were developed.

Examples of Third Generation Computers

- Burroughs 6700, Mini computers
- Honeywell 200
- IBM system 360
- UNIVAC 9000 series.

Fourth Generation Computers (1975-Current)

- At this time of technological development, the size of computer was redivided to what we called ***Personal Computers, PC.***

- This was the time the ***first Microprocessor*** was created **by Intel**.

- The ***microprocessor*** was a very large-scale (VLS) integrated circuit that contained thousands of **transistors**.

- ***Transistors on one chip*** were capable of performing all the functions of a computer's central processing unit.

Characteristics Fourth Generation Computers

- Possession of ***microprocessor*** which performs all the tasks of a computer system used today.
- The size of computers and cost was reduced.
- Increase in speed of computers.
- Very large-scale (VLS) integrated circuits were used.
- They have millions of circuits per cubic foot.

- **Examples include**: IBM system 3090, IBM RISC6000, IBM RT; ILLIAC IV; Cray 2 XMP; HP 9000.

Fifth Generation Computers (Present and Beyond)

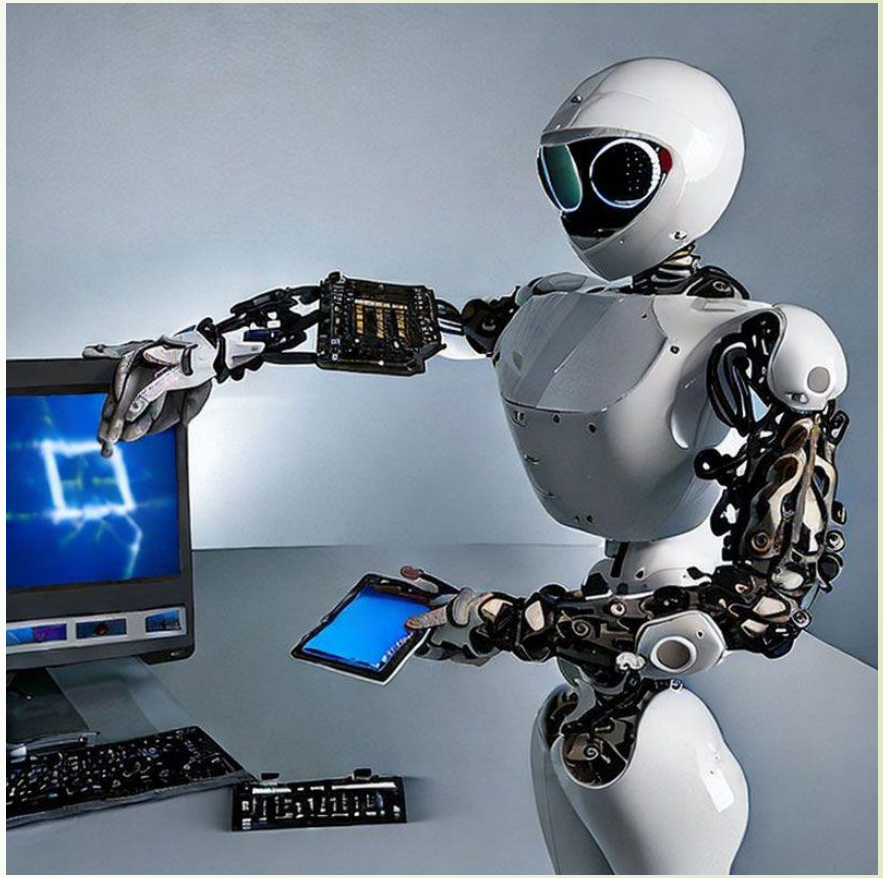
- Fifth generations computing devices, based on ***artificial intelligence (AI)*** are still in development, although there are some application such as ***voice recognition, facial face detector and thumb print that are used today.***

CHARACTERISTICS

- ✓ Consist of extremely large-scale integration.
- ✓ Parallel processing
- ✓ Possession of high-speed logic and memory chips.
- ✓ High performance, micro-miniaturization.
- ✓ Ability of computers to mimic human intelligence, e.g. voice recognition, facial face detector, thumbprint.
- ✓ Satellite links, virtual reality.
- ✓ They have billions of circuits per cubic.

Examples of Fifth Generation Computers

- Super computers
- Robots
- Facial face detector
- Thumb print.



Class Activity

1. Explain all the generations of a computer by identifying the following:
    a. Years
    b. Technology used for processing
    c. Major Characteristics
    d. Key examples of computers developed during the generation