

COURSE CODE: SSC 202

COURSE TITLE: INTRODUCTION TO COMPUTER AND ITS APPLICATION

COURSE UNITS: 3 UNITS

MODULE 1- FOUNDATIONS OF COMPUTING.

Lesson 1: Historical Perspectives of Computing Sciences

Introduction

The field of computing has a rich history that dates back thousands of years, evolving from simple counting tools to today's sophisticated digital systems. Understanding the historical perspectives of computing sciences provides insight into how technology has advanced, the challenges overcome, and the impact of computing on society. This lesson explores the evolution of computing, highlighting key milestones and pioneers who contributed to the development of modern computing.

Learning Outcomes:

- **Describe** the evolution of computing from the pre-mechanical era to modern computing.
- **Identify** key milestones and pioneers in the history of computing.
- **Explain** the impact of historical computing developments on modern technology.

Evolution of Computing

Computing has undergone significant transformations over centuries, progressing through various stages, each marked by remarkable innovations. The evolution of computing can be categorized into several distinct periods:

1. Pre-Mechanical Era (Before 1600s)

The earliest form of computation relied on manual methods and simple tools. These included:

- **Abacus (circa 3000 BC):** One of the first known computing devices, developed by the Babylonians and later refined by the Chinese and Romans. It was used for basic arithmetic operations.
- **Tally Sticks (circa 35,000 BC):** Early humans used tally sticks to record numbers, indicating an elementary form of counting.



- **Napier's Bones (1617):** John Napier developed a system of rods to simplify multiplication and division calculations.

2. Mechanical Era (17th - 19th Century)

This period saw the development of mechanical devices designed to perform calculations more efficiently:

- **Pascaline (1642):** Blaise Pascal invented the Pascaline, an early mechanical calculator that could add and subtract.
- **Leibniz Calculator (1673):** Gottfried Wilhelm Leibniz improved upon Pascal's design by introducing a machine capable of multiplication and division.
- **Jacquard Loom (1801):** Joseph Marie Jacquard developed a loom that used punched cards to control weaving patterns, laying the foundation for programmable machines.
- **Babbage's Difference and Analytical Engines (1822-1837):** Charles Babbage conceptualized and partially built the Difference Engine for polynomial calculations and later designed the Analytical Engine, which had features resembling modern computers, including a control unit and memory.

3. Electromechanical Era (Early 20th Century)

The transition from purely mechanical devices to electromechanical machines led to faster and more reliable computing:

- **Hollerith Tabulating Machine (1890):** Herman Hollerith invented a punch card system used for data processing in the U.S. Census.
- **Zuse Z3 (1941):** Konrad Zuse developed the Z3, considered the first programmable computer, utilizing electromechanical relays.
- **Mark I (1944):** Howard Aiken and IBM collaborated to create the Harvard Mark I, a large electromechanical computer that automated calculations.

4. Electronic Computing Era (1940s - 1950s)

With advancements in electronics, computers transitioned from mechanical to fully electronic designs:



- **ENIAC (1946):** The first general-purpose electronic computer, developed by John Presper Eckert and John Mauchly, used vacuum tubes and performed calculations significantly faster than its predecessors.
- **EDSAC (1949):** Maurice Wilkes designed the first stored-program computer, allowing software programs to be stored electronically.
- **UNIVAC I (1951):** The first commercially available computer, used primarily for business and government applications.

5. Transistor and Integrated Circuit Era (1950s - 1970s)

The invention of the transistor and integrated circuits revolutionized computing, making computers smaller, faster, and more affordable:

- **Transistor (1947):** Invented by John Bardeen, William Shockley, and Walter Brattain, replacing bulky vacuum tubes.
- **IBM 1401 (1959):** One of the first mass-produced transistor-based computers, widely adopted by businesses.
- **Integrated Circuits (1958):** Jack Kilby and Robert Noyce developed the first integrated circuit, leading to further miniaturization of computing components.
- **Microprocessors (1971):** Intel introduced the 4004 microprocessor, the first commercially available processor, paving the way for personal computers.

6. Personal Computing Era (1970s - 1990s)

The rise of personal computing brought technology into homes and businesses:

- **Altair 8800 (1975):** The first personal computer, sparking interest among hobbyists.
- **Apple I & II (1976-1977):** Steve Jobs and Steve Wozniak developed early personal computers that introduced graphical interfaces.
- **IBM PC (1981):** The introduction of the IBM PC standardized personal computing, leading to widespread adoption.
- **Microsoft Windows (1985):** Bill Gates and Microsoft launched Windows, revolutionizing user interfaces with graphical interaction.

7. Modern and Future Computing (2000s - Present)



Modern computing continues to evolve with advancements in artificial intelligence, cloud computing, and quantum computing:

- **Cloud Computing:** Services like Amazon Web Services (AWS), Google Cloud, and Microsoft Azure enable remote storage and processing.
- **Artificial Intelligence (AI):** AI-driven technologies, such as machine learning and neural networks, enhance automation and decision-making.
- **Quantum Computing:** Companies like IBM, Google, and D-Wave are developing quantum computers that promise unprecedented computing power.
- **Internet of Things (IoT):** The expansion of IoT connects devices and sensors for smarter automation and data collection.

Key Milestones and Pioneers

The evolution of computing was driven by key individuals who contributed groundbreaking innovations:

- **Alan Turing (1912-1954):** Developed the concept of a universal machine, laying the theoretical foundation for modern computers.
- **John von Neumann (1903-1957):** Introduced the stored-program architecture, which remains the basis of most modern computers.
- **Grace Hopper (1906-1992):** Developed the first compiler and played a vital role in creating COBOL, an early programming language.
- **Steve Jobs (1955-2011) & Steve Wozniak (1950-):** Co-founded Apple Inc. and pioneered user-friendly personal computers.
- **Bill Gates (1955-) & Paul Allen (1953-2018):** Co-founded Microsoft, shaping the software industry with Windows and Office.
- **Tim Berners-Lee (1955-):** Invented the World Wide Web, revolutionizing internet communication.

Summary

The history of computing sciences demonstrates a continuous progression from simple counting tools to highly advanced computing systems. Key milestones, such as the invention



of transistors, microprocessors, and artificial intelligence, have shaped modern technology. Pioneers like Alan Turing, John von Neumann, and Grace Hopper laid the foundation for today's computing advancements. Understanding these historical perspectives helps appreciate the rapid growth of technology and prepares us for future innovations in computing sciences.

Evaluation Questions:

1. **Describe** the key advancements in the mechanical era of computing.
 - **Suggested Answer:** The development of mechanical calculators like the Pascaline and Leibniz Calculator, the Jacquard Loom, and Babbage's Difference and Analytical Engines.
2. **Who developed the ENIAC, and what was its significance?**
 - **Suggested Answer:** John Presper Eckert and John Mauchly developed the ENIAC, which was the first general-purpose electronic computer.
3. **What was the contribution of Alan Turing to computing?**
 - **Suggested Answer:** He developed the concept of a universal machine, laying the theoretical foundation for modern computers.
4. **What is the significance of the invention of the transistor?**
 - **Suggested Answer:** It replaced bulky vacuum tubes, leading to smaller, faster, and more affordable computers.
5. **What did Tim Berners-Lee invent?**
 - **Suggested Answer:** The World Wide Web.
6. **What was the first commercially available computer?**
 - **Suggested Answer:** UNIVAC I.

