Topic: Historical Development of Computers

Lesson Objectives

By the end of this lesson, students should be able to:

- Define **computing devices**

- Describe the **evolution of computing devices** from early tools to modern computers

- Identify **key inventors** and their contributions

- Compare **early computing devices** with **modern computers**

---

1. What is a Computing Device?

Definition:

A **computing device** is any tool, machine, or instrument that is used to **perform calculations, process data, or solve problems**.

Simple Explanation:

Anything that can help in **counting, calculating, storing, or processing information** is a computing device.

---

2. Pre-Computing Age Devices (Manual and Mechanical Devices)

Before modern electronic computers, humans used various **manual and mechanical devices** to perform calculations.

a) The Abacus

- **Origin:** Around **3000 BC** in **China, Egypt, and Greece**

- **Structure:** A wooden frame with **rods and movable beads**

- **Function:** Used for addition, subtraction, multiplication, and division

- **Significance:** Considered the **first mechanical calculator**

---

b) Napier's Bones

- **Inventor: John Napier** (1617, Scotland)

- **Structure:** Set of **rods made from bones or wood**, engraved with numbers

- **Function:** Simplified multiplication, division, and square roots

- **Importance:** First step toward **manual computing aids**

---

c) The Slide Rule

- **Inventor: William Oughtred** (1622, England)

- **Structure: Rulers with sliding parts** marked with logarithmic scales

- **Function:** Used for multiplication, division, and scientific calculations

- **Used by:** Scientists, engineers until calculators replaced it in the 1970s

---

d) Pascal's Calculator (Pascaline)

- **Inventor: Blaise Pascal** (1642, France)

- **Function:** Could **add and subtract** automatically using gears and wheels

- **Significance:** First **mechanical calculator** for daily use (e.g., tax calculations)

---

e) The Analytical Engine

- **Inventor: Charles Babbage** (1837, England)

- **Structure:** Designed to have **input, processor, memory, and output**

- **Importance:** Considered the **first general-purpose computer design**

- **Nickname: "Father of the Computer"**

- **Limitation:** Never fully built due to lack of advanced technology at the time

---

f) Ada Lovelace

- **Contribution:** Wrote the **first algorithm (computer program)** for Babbage's Analytical Engine

- **Importance:** Recognized as the **world's first computer programmer**

---

3. The Era of Electronic Computers (20th Century Onwards)

First Generation Computers (1940s – 1950s)

Computer	Details
ENIAC (Electronic Numerical Integrator and Computer)	Built in **1946** by **John Presper Eckert & John Mauchly** in the USA. It was the **first electronic general-purpose computer**.
Size:	Took up an entire room and weighed over **30 tons**
Components:	Used **vacuum tubes** (about 18,000)
Function:	Solved complex mathematical problems for military use

---

| EDSAC (Electronic Delay Storage Automatic Calculator) | Built in **1949** by **Maurice Wilkes** in Cambridge, UK. First computer to **store and execute programs from memory**. |

| EDVAC (Electronic Discrete Variable Automatic Computer) | Introduced the idea of **storing both data and programs** in memory (Stored Program Concept). |

Second Generation Computers (1950s – 1960s)

- **Technology:** Used **transistors** (replaced vacuum tubes)

- **Advantages:** Smaller, faster, less heat, more reliable

- **Example: IBM 1401**

Third Generation Computers (1960s – 1970s)

- **Technology:** Used **Integrated Circuits (ICs)**

- **Features:** Even smaller and faster, began using **monitors and keyboards**

- **Example: IBM System/360**

Fourth Generation Computers (1970s – Present)

- **Technology:** Use of **Microprocessors** (thousands of circuits in one chip)

- **Features:** Introduction of **Personal Computers (PCs)**, **Laptops**, **Tablets**, and **Smartphones**

- **Example: Apple Macintosh**, **IBM PCs**, **Dell Computers**

Fifth Generation Computers (Present and Future)

- **Technology:** Use of **Artificial Intelligence (AI)**, **Robotics**, **Quantum Computing**

- **Features:** Voice recognition, natural language processing, smart assistants

- **Examples: AI systems** (Siri, Alexa, ChatGPT), **Quantum computers**

---

4. Comparing Early Computing Devices with Modern Computers

Aspect	Early Devices (Abacus, ENIAC, etc.)	Modern Computers (PCs, Laptops, Smartphones)
Size	Large, bulky, filled entire rooms	Small, portable, handheld
Speed	Slow, manual or mechanical	Extremely fast (billions of operations per second)
Energy	High power consumption	Energy efficient
User Interface	Complex, for specialists	User-friendly (mouse, touchscreen, apps)
Functionality	Single-purpose	Multi-purpose
Storage	Minimal or none	Gigabytes to Terabytes
Maintenance	Difficult, needed experts	Easier to use and maintain

---

5. Timeline of the Development of Computers

Year	Device/Innovation	Inventor/Contributor
3000 BC	Abacus	Ancient Chinese, Egyptians
1617	Napier's Bones	John Napier
1622	Slide Rule	William Oughtred
1642	Pascaline	Blaise Pascal
1837	Analytical Engine	Charles Babbage
1843	First computer program	Ada Lovelace
1946	ENIAC	John Eckert & John Mauchly
1949	EDSAC	Maurice Wilkes
1950s	Transistor computers	Bell Labs
1970s	Microprocessor computers	Intel Corporation
Present	AI and Quantum Computers	Global contributions

---

6. Importance of the Historical Development of Computers

- **Appreciation of Technology Growth:** Understand how far computing has evolved

- **Learning from the Past:** New inventions build upon older technologies

- **Encouragement of Innovation:** Inspires creativity and new ideas

- **Knowledge of Evolution:** Helps students see the connection between simple tools and modern devices

---

7. Uses of Modern Computers

Field	Examples of Use
Education	e-Learning, research, virtual classrooms
Business	Online banking, record keeping

Field	Examples of Use
Medicine	Patient records, medical research
Communication	Emails, social media, video calls
Entertainment	Games, movies, music
Science and Engineering	Simulations, data analysis

---

8. Summary of Key Points

- A **computing device** is any tool that helps with calculations and data processing.

- Early devices include the **Abacus, Napier's Bones, Slide Rule, Pascaline, and Analytical Engine**.

- **Charles Babbage** is the **Father of the Computer**.

- **Ada Lovelace** is the **First Computer Programmer**.

- Computers have evolved from **mechanical devices** to **artificial intelligence systems**.