Tikrit University

College of Computer Sciences & Mathematics

Computer Science Department

First Stage

Lecture -1

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Computer Organization

Computer Organization Fundamentals

- This class has been prepared for the beginners as well as advanced learners who want to deal with computers.
- This tutorial is also very useful for the undergraduate students of computer science, engineering, business administration, management, science, commerce and arts where an introductory course on computers is a part of curriculum.
- The Computer Fundamentals subject covers a foundational understanding of computer hardware, software, operating systems, peripherals etc.

Computer Overview

- Today's world is an information-rich world and it has become a necessity for everyone to know about computers. Purpose of this tutorial is to introduce you about computer and its fundamentals.
- Computer is an advanced electronic device that takes data as input from the user and processes it under the control of set of instructions (called program), gives the result (output), and saves it for the future use.

Computer Generations

- There are totally five computer generations known till date. Each generation has been discussed in detail along with their time period and characteristics.

1. **First Generation (1946-1959):**. Based on vacuum tube.
2. **Second Generation (1959-1965):** Transistor based.
3. **Third Generation (1965-1971):** Integrated Circuit based.
4. **Fourth Generation (1971-1980):** VLSI microprocessor based.
5. **Fifth Generation (1980-onwards):** ULSI microprocessor based.

Computer - First Generation

- The period of first generation was 1946-1959. The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit).
- In this generation mainly batch processing operating system were used. Punched cards, paper tape, and magnetic tape were used as input and output devices.
- The computers in this generation used machine code as programming language.

Features of First Generation

The main features of first generation are:

- Vacuum tube technology
- Unreliable
- Supported machine language only
- Very costly
- Generated lot of heat
- Slow input and output devices
- Huge size
- Non-portable
- Consumed lot of electricity

Computer - Second Generation

- In this generation transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes.
- Magnetic cores were used in this generation as primary memory and magnetic tape and magnetic disks as secondary storage devices.
- Assembly language and high-level programming languages like FORTRAN, COBOL were used.
- The computers used batch processing and multiprogramming operating system.

Features of Second Generation

- The main features of second generation are:
- Use of transistors
- Reliable in comparison to first generation computers
- Smaller size as compared to first generation computers
- Generated less heat as compared to first generation computers
- Consumed less electricity as compared to first generation computers
- Faster than first generation computers
- Still very costly
- Supported machine and assembly languages

Computer – Third Generation

- The computers of third generation used integrated circuits (IC's) in place of transistors.
- In this generation remote processing, time-sharing, multi-programming operating system were used.
- This development in this generation made computers smaller in size, reliable and efficient.
- High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.

Features of Third Generation

The main features of third generation are:

- IC used
- More reliable in comparison to previous two generations
- Smaller size
- Generated less heat
- Faster
- Lesser maintenance
- Still costly
- Consumed lesser electricity
- Supported high-level language

Computer – Fourth Generation

- The computers of fourth generation used Very Large Scale Integrated (VLSI) circuits.
- Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution.
- In this generation time sharing, real time, networks, distributed operating system were used.
- All the high-level languages like C, C++, DBASE etc., were used in this generation.

Features of Fourth Generation

The main features of fourth generation are:

- VLSI technology used
- Very cheap
- Portable and reliable
- Use of PC's
- Very small size
- Pipeline processing
- Concept of internet was introduced
- Great developments in the fields of networks
- Computers became easily available

Computer – Fifth Generation

- In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology.
- This generation is based on parallel processing hardware and AI (Artificial Intelligence) software.
- AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings.
- All the high-level languages like C and C++, Java, .Net etc., are used in this generation.

Features of Fifth Generation

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates