Introduction to Computer Science

Advanced Program

Nguyen Thi Thu Huong-SoICT-HUST

WHAT IS THIS CLASS ABOUT?

- An introduction to Computer Science
- Algorithmic problem solving
- The C programming language
- Prerequisites: basic computer skills

TEXTBOOKS

- Nguyen Thi Thu Huong. Introduction to Computer Science – Textbook Draft
- Nell Dale, John Lewis. Computer Science Illuminate. John and Bartlet
- Brookshear.J.G., Computer Science. An Overview, Benjamin/Cummings, 1993.
- Kernighan.B.W., Ritchie. D.M., The C Programming Language, Prentice Hall, 1995.

Introduction to Computer Science

Part I

Fundamental of Information Technology

Part II

The C Programming Language

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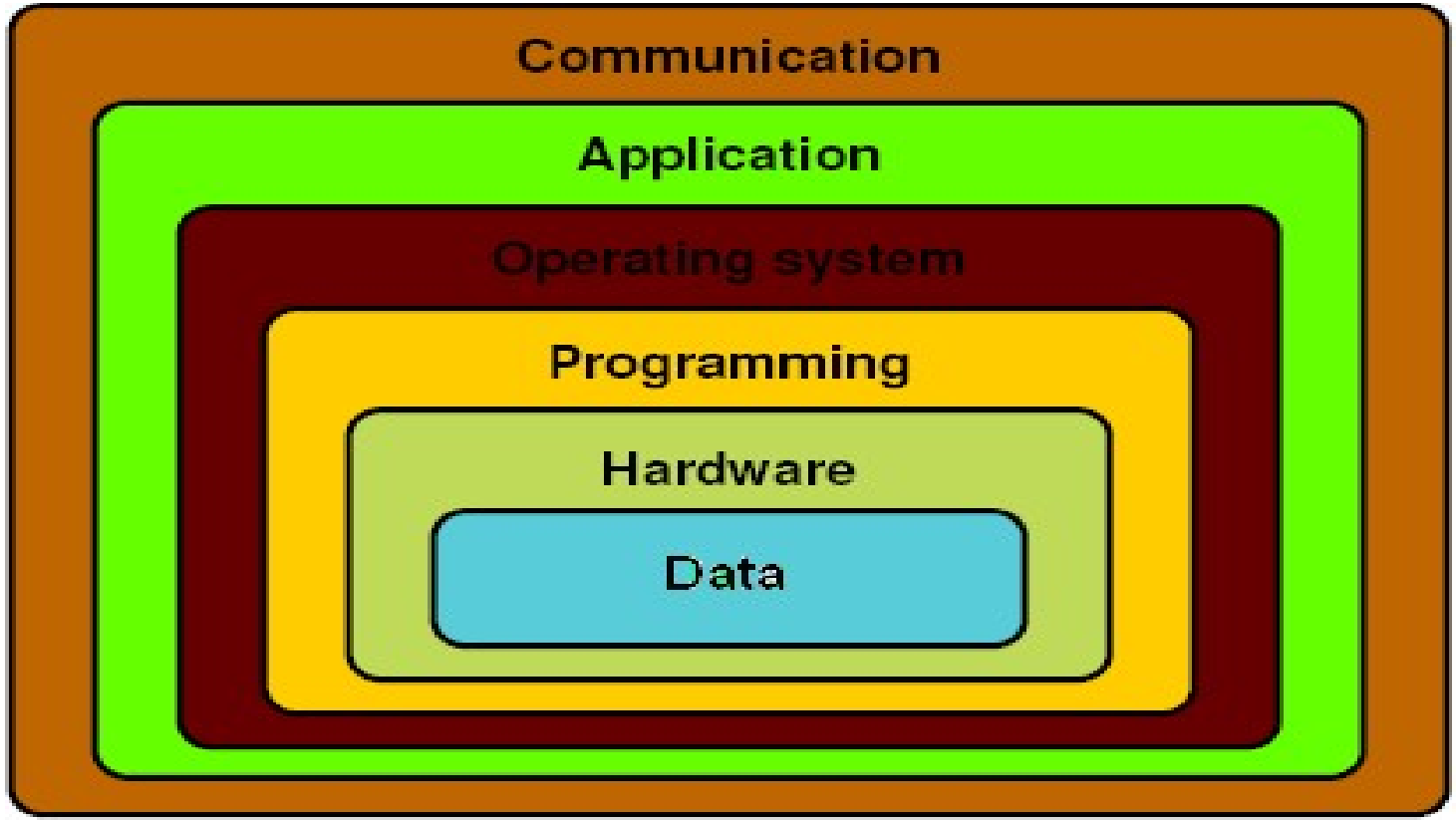
PART I : FUNDAMENTALS OF INFORMATION TECHNOLOGY



PART I : FUNDAMENTALS OF INFORMATION TECHNOLOGY

- Unit 1. Basic Concepts
- Unit 2. Data Representation in a Computer
- Unit 3. Computer Systems
- Unit 4. Computer Network
- Unit 5. Operating Systems

UNIT 1

Basic Concepts

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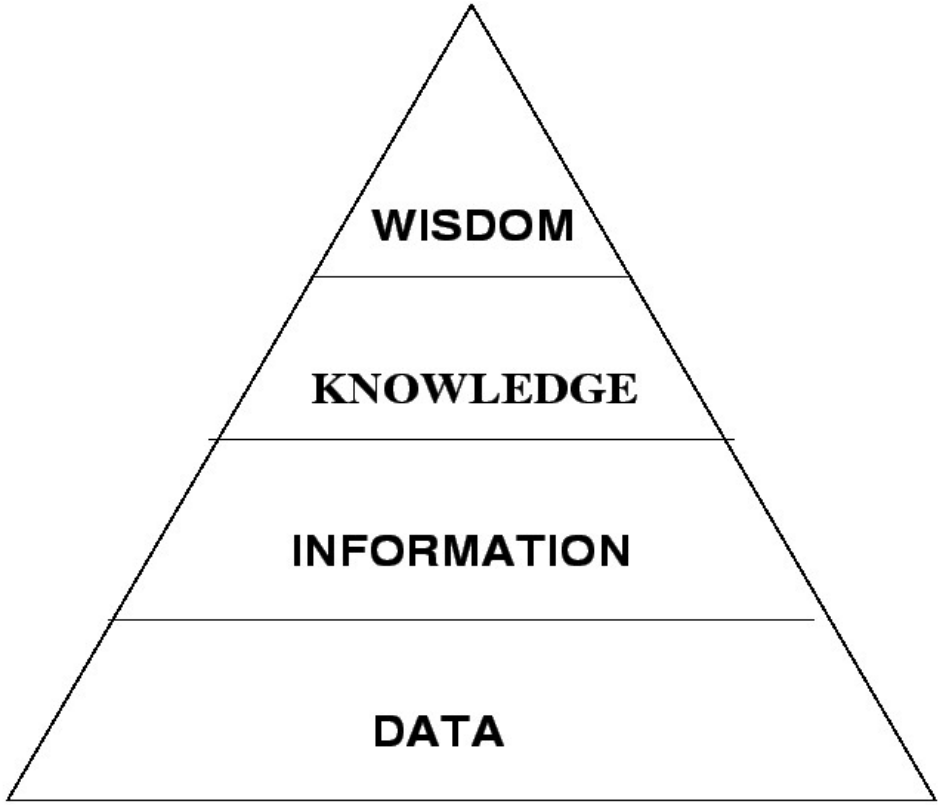
UNIT 1. BASIC CONCEPTS

- Information and Information Processing
  - Data – Information – Knowledge
  - Information Processing
- Computers and Classification of Computers
  - History of Computers
  - Classification of Computers
  - Computer Science and Relevant Sciences

Information and Information Processing

- Data – Information – Knowledge
- Information Processing

DATA – INFORMATION – KNOWLEDGE



DATA

Data represents unorganized and unprocessed facts.

- Usually data is static in nature.
- It can represent a set of discrete facts about events.
- Data is a prerequisite to information.
- An organization has to decide on the nature and volume of data that is required for creating the necessary information.

INFORMATION

- Information can be considered as an aggregation of data (processed data) which makes decision making easier.

- Information has usually got some meaning and purpose.

Data & Information

DATA

7:00	130/80
7:30	140/90
8:00	150/95
8:30	160/100

INFORMATION

Time	Blood Pressure
7:00	130/80
7:30	140/90
8:00	150/95
8:30	160/100

INFORMATION = DATA + CONTEXT + MEANING

KNOWLEDGE

- Human understanding of a subject matter that has been acquired through proper study and experience.
- Usually based on learning, thinking, and proper understanding of the problem area.
- Understanding of information based on its perceived importance or relevance to a problem area.
- Integration of human perceptive processes that helps them to draw meaningful conclusions.

KNOWLEDGE

Time	Blood Pressure
7:00	130/80
7:30	140/90
8:00	150/95
8:30	160/100

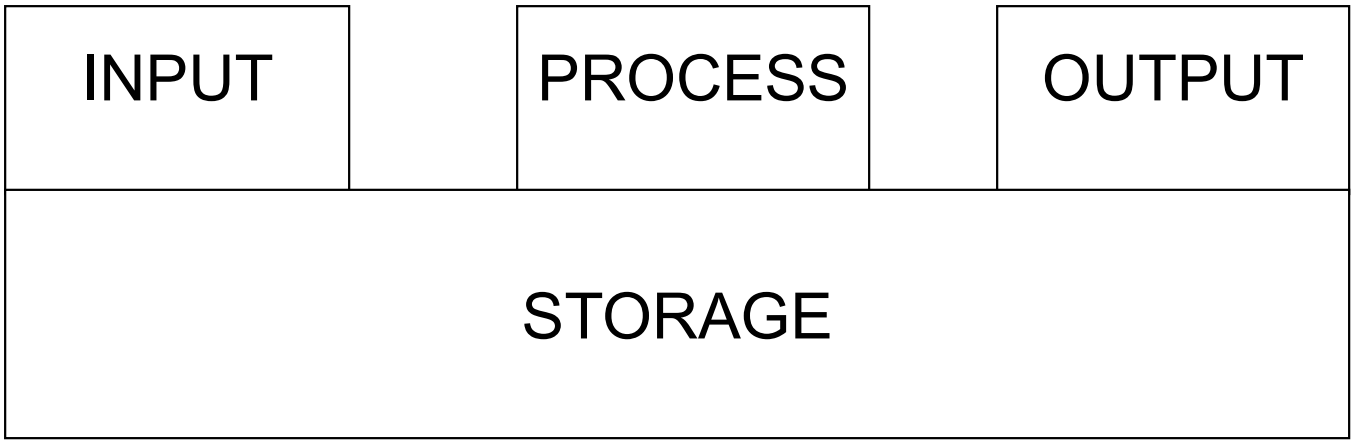
Normal	130/80
Slightly Raised	150/90
High	170/100

- Through knowledge and experiences, the doctor discover a rule of blood pressure increment -> knowledge.
- Prescribe medicines, or other treatment to help the patient to control blood pressure

Information Processing

The electronic capture, collection, storage, manipulation, transmission, retrieval, and presentation of information in the form of data, text, voice, or image and includes telecommunications and office automation functions.

Model of Information Processing



Computers . Classification of Computers

- History of Computers
- Classification of Computers
- Computer Science and Relevant Sciences

History of Computers

- The abacus
- Blaise Pascal invents the first commercial calculator, a hand powered adding machine
- In 1801 Joseph-Marie Jacquard builds a loom that weaves by reading punched holes stored on small sheets of hardwood
- Charles Babbage : a programmable machine

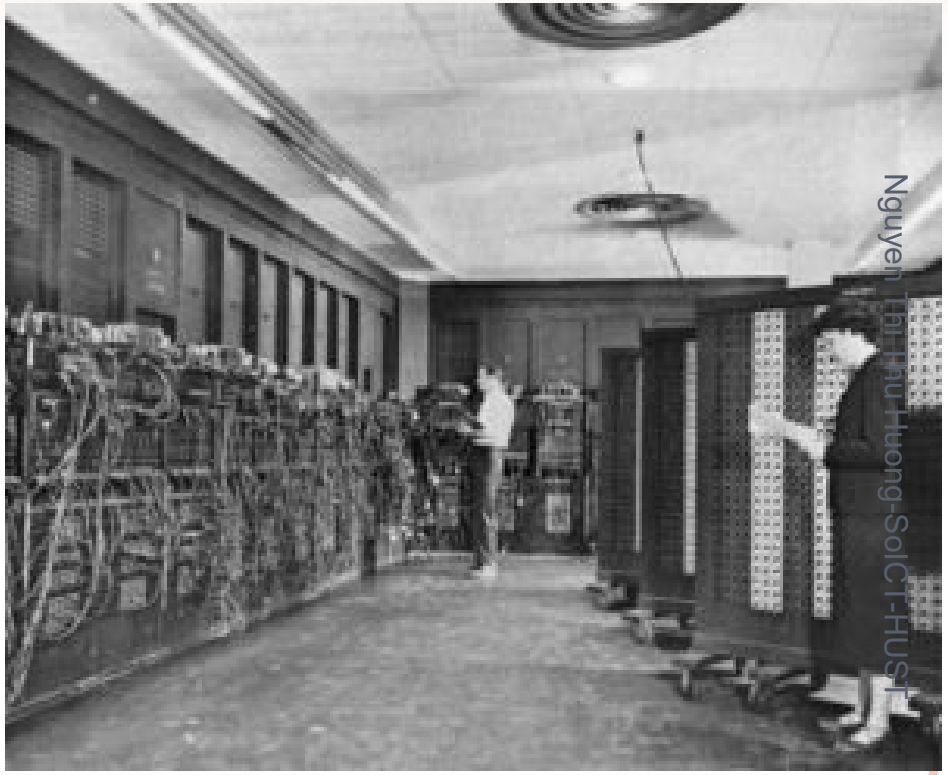
Ada Lovelace uses the machine to mechanically translate a short written work. She is generally regarded as the first programmer

History of Computers (cont'd)

- George Boole writes An Investigation of the Laws of Thought(1854)
- In 1935, Konrad Zuse, builds mechanical calculator to handle th math involved in his profession.
- The Enigma, a complex mechanic encoder is used by the Germans
- Alan Turing proposes a "Universal Machine" capable of "computing" any algorithm in 1937.

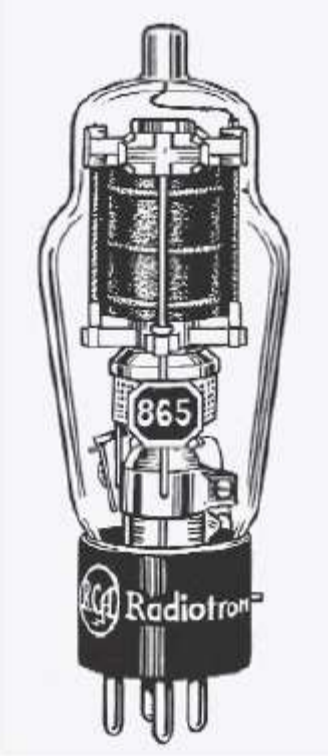
History of Computers (cont'd)

- In 1946, ENIAC, completes.
- The first commercially successful computer is IBM 701
- 1969 UNIX operating system,
- Internet, ARPANet
- "Personal Computer"
- 1981:MS-DOS Operating System
- 1985 : MS Windows



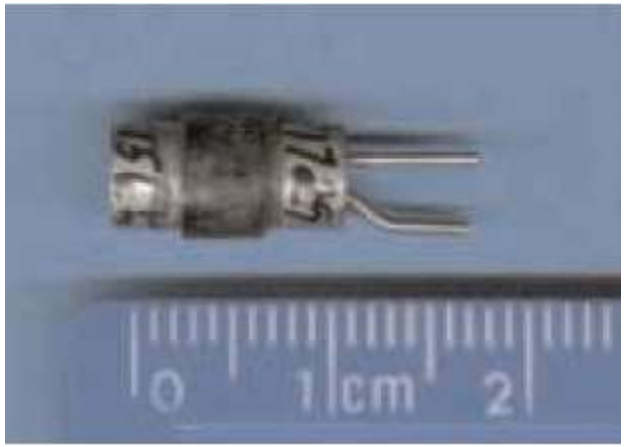
First generation of computing (1950-1959)

- Used vacuum tubes to store data and programs
- Memory: Magnetic drums
- Input device: Punched cards
- Each computer was multiple rooms in size
- Computers were not very reliable



SECOND GENERATION OF COMPUTING (1959-1965)

- Replaced vacuum tubes by transistors and magnetic cores
- Dramatic reduction in size
  - Computer could fit into a single room
- Increase in reliability of computers
- Reduced costs of computers
- High-level programming languages



THIRD GENERATION OF COMPUTING (1965-1975)

- Used integrated circuits rather than individual electronic components
- Further reduction in size and cost of computers
  - Computers became desk-sized
  - First minicomputer developed
- Software industry formed

FOURTH GENERATION OF COMPUTING (1975-1985)

- Reduced to the size of a typewriter
- First microcomputer developed
- Desktop and personal computers common
- Appearance of
  - Computer networks
  - Electronic mail
  - User-friendly systems (Graphical user interfaces)

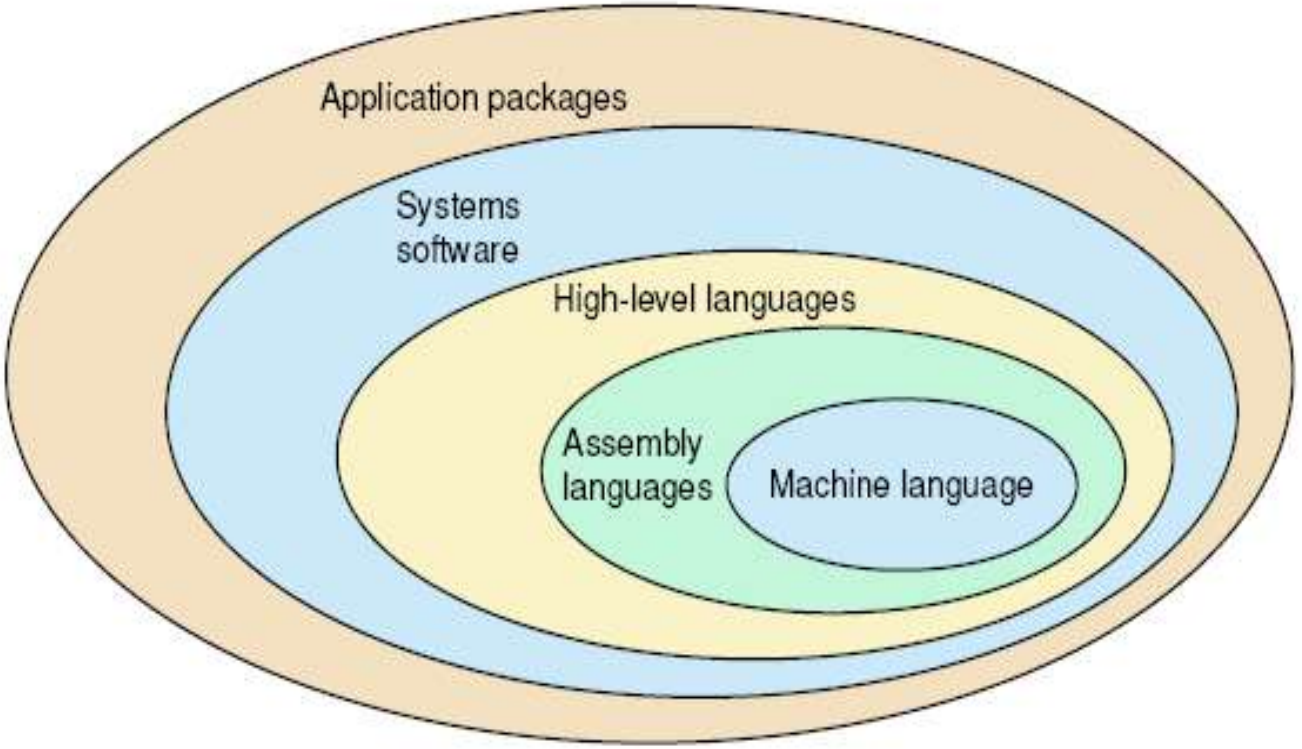
FIFTH GENERATION OF COMPUTING (1985-NOW)

- Artificial Intelligence
- Massively parallel processors
- Handheld devices and other types of personal digital assistants (PDAs)
- High-resolution graphics
- Powerful multimedia user interfaces incorporating sound, voice recognition, touch, photography, video, and television

FIFTH GENERATION OF COMPUTING (1985-NOW)(CONT'D)

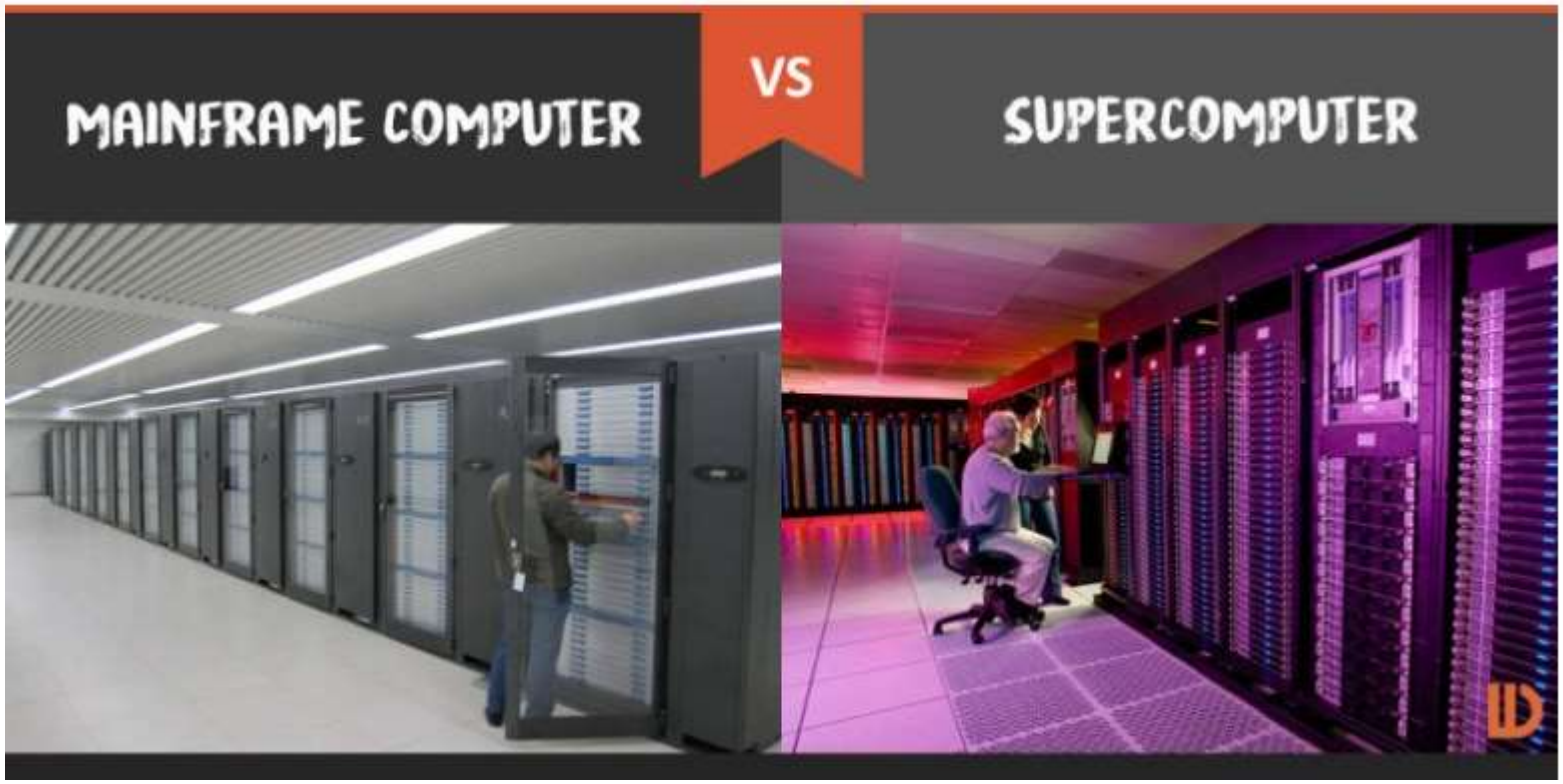
- Integrated global telecommunications incorporating data, television, telephone, FAX, the Internet, and the World Wide Web
- Wireless data communications
- Massive storage devices
- Ubiquitous computing
- Embedded systems

The Layers of Software



Classification of Computers

- Available in different shapes, sizes and weights
- Perform different sorts of jobs from one another.
  - Mainframe Computer
  - Supercomputers
  - Minicomputers
  - Microcomputers


MAINFRAME COMPUTER
VS
SUPERCOMPUTER

Mini computer

Computer Science and Relevant Sciences

- Information Technology
- Information and Communication Technology

Definitions of Computer Science

The study of computers, including both hardware and software design. Computer science is composed of many broad disciplines, including artificial intelligence and software engineering.

INFORMATION TECHNOLOGY

Includes all matters concerned with the furtherance of computer science and technology and with the design, development, installation, and implementation of information systems and applications

Information and Communication Technology

- Any communication device or application, encompassing:
  - Radio
  - Television
  - Cellular phones
  - Computers
  - Network hardware and software,
  - Satellite systems . . .
- The various services and applications associated with them, such as videoconferencing and distance learning.