

C language

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Outline of this lecture

- Introduction
- Your first program
- Variables and expressions
- Repetition and Looping
- Array Subtasks
- Structures
- Strings
- Pointers / Dynamic memory allocation
- File input / output

Introduction

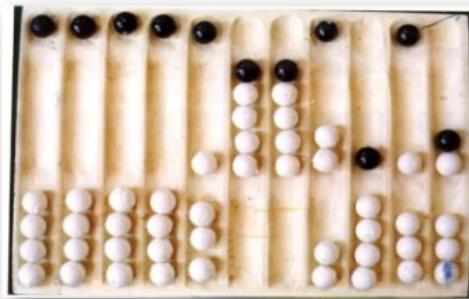
Definition of Computer

- Definition:
 - Computer is a programmable machine.
 - Computer is a machine that manipulates data according to a list of instructions.
 - Computer is any device which aids humans in performing various kinds of computations or calculations.
- Three principles characteristic of computer:
 - It responds to a specific set of instructions in a well defined manner.
 - It can execute a pre-recorded list of instructions.
 - It can quickly store and retrieve large amounts of data.

Introduction

The Abacus

- The abacus, a simple counting aid, may have been invented in Babylonia (now Iraq) in the fourth century B.C.
- It used to perform basic arithmetic operations.



Earlier Abacus



Modern Abacus

Introduction

Jacquard Loom

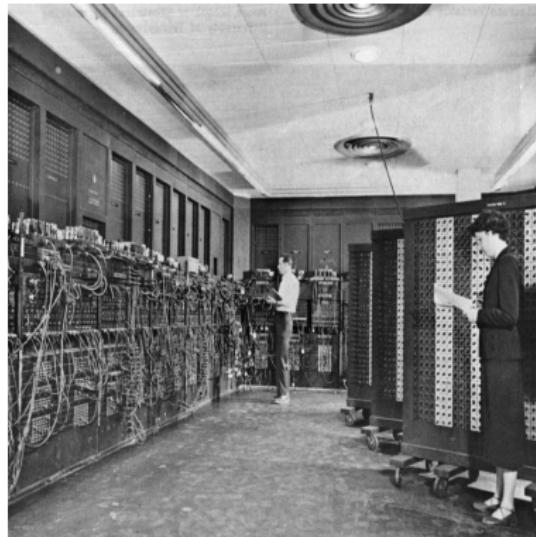
- The Jacquard loom is a mechanical loom, invented by Joseph-Marie Jacquard in 1801.
- It is an automatic loom controlled by punched cards.



Introduction

The ENIAC

- ENIAC stands for Electronic Numerical Integrator and Computer.
- It was the first electronic general purpose computer.
- Completed in 1946.
- Developed by John Presper Eckert and John W. Mauchly.



Introduction

The IBM 360

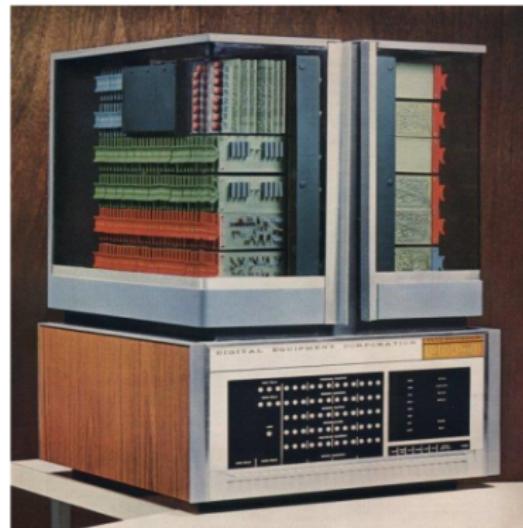
- Developed by Gene Amdahl in 1965.
- It was the first family of computers designed to cover both commercial and scientific applications



Introduction

The PDP-8

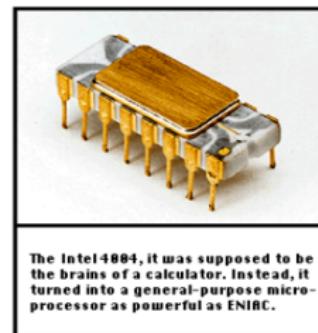
- Was introduced on 22 March 1965
- 12-bit minicomputer Produced by Digital Equipment Corporation (DEC).
- Priced at \$18,500 (equivalent to about \$150,000 in 2020)



Introduction

The Microprocessor

- A computer chip that contains on it the entire CPU
 - Mass produced at a very low price
 - Computers become smaller and cheaper
- intel 4004 – the first computer on a chip, more powerful than the original ENIAC.
- Intel 8088 – used in IBM PC



Introduction

Hardware

- Hardware – the physical devices that make up a computer (often referred to as the computer system)



Introduction

Hardware core

- CPU (Central Processing Unit)
 - CPU (machine) cycle – retrieve, decode, and execute instruction, then return result to RAM if necessary
 - CPU speed measured in gigahertz (GHz)
 - + GHz – number of billions of CPU cycles per seconds
- RAM (Random Access Memory)
 - Also called Memory, Main Memory, or Primary Storage
 - Measured in gigabytes (GB, billions of bytes) today
 - + Byte – > Character
 - RAM is volatile
 - + Temporary storage for instructions and data



Introduction

Capacity of Secondary Storage Devices

- Kilobyte (KB or K) – about 1 thousand bytes
- Megabyte (MB or M or Meg) – about 1 million bytes
- Gigabyte (GB or Gig) – about 1 billion bytes
- Terabyte (TB) – about 1 trillion bytes



Introduction

Software

- Programs – instructions that tell the computer what to do
- Categories
 - Application software - enables you to solve specific problems or perform specific tasks.
 - System software - handles tasks specific to technology management and coordinates the interaction of all technology devices
 - Utility software - provides additional functionality to your operating system software

Introduction

System Software

- Operating System
- UNIX / Linux
- Windows
- MAC OS
- Palm OS
- Android
- Language Translators
- C, C++, Basic, Java, ...
- Device Drivers



Introduction

C Programming Language

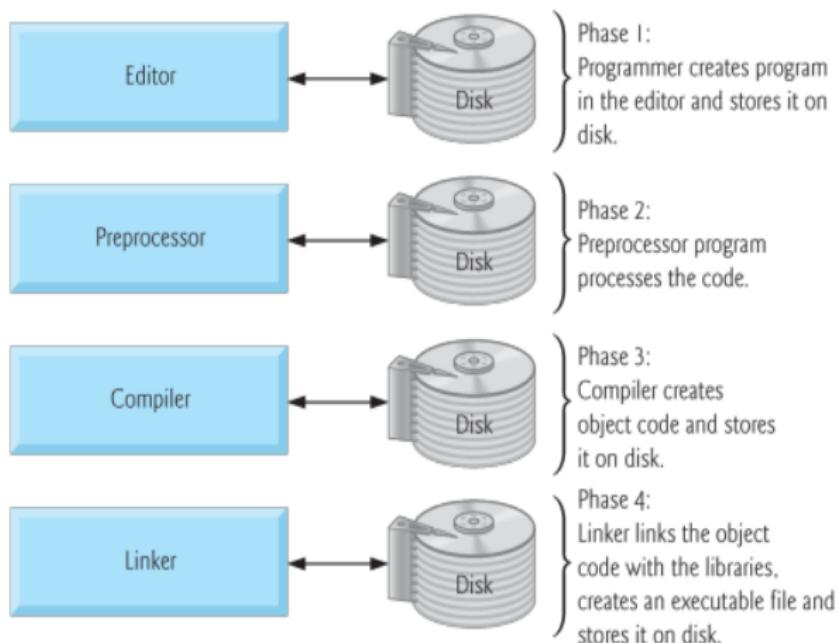
- C was designed in 1972 by Dennis Richie, at AT&T's Bell Laboratory
- It is the culmination of two languages:
 - BPCL developed in 1967 by Martin Richards
 - B developed in 1970 at AT&T by Ken Thompson.
- Standardized by American National Standards Institute (ANSI)
- Compiled language
- Powerful
- High efficiency



Because C is a hardware-independent, widely available language, applications written in C can run with little or no modifications on a wide range of different computer systems.

Introduction

C Development Environment



Introduction

Execution Environment

