Outline of the course:

Hardware

Architecture

Algorithm

Operating Systems

Network

Databases

Intelligent Systems

Programming languages

Software Engineering

Role of algorithm

Representation of an algorithm is a program

The example below shows a "classic" algorithm to find GCD of two numbers:

Figure 0.2 The Euclidean algorithm for finding the greatest common divisor of two positive integers

Description: This algorithm assumes that its input consists of two positive integers and proceeds to compute the greatest common divisor of these two values.

Procedure:

Step 1. Assign M and N the value of the larger and smaller of the two input values, respectively.

Step 2. Divide M by N, and call the remainder R.

Step 3. If R is not 0, then assign M the value of N, assign N the value of R, and return to step 2; otherwise, the greatest common divisor is the value currently assigned to N.

Figure 0.5   The central role of algorithms in computer science
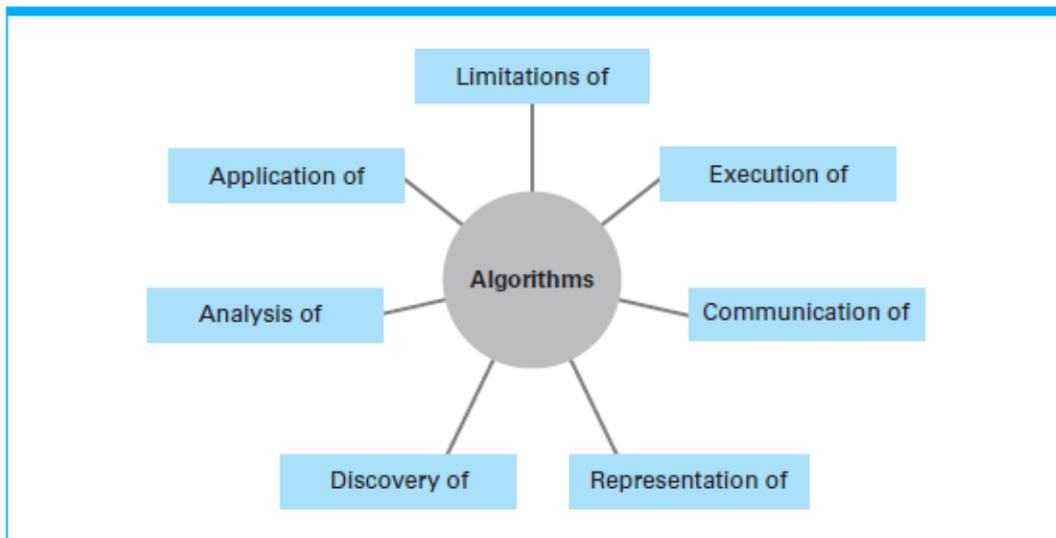
Computer Systems

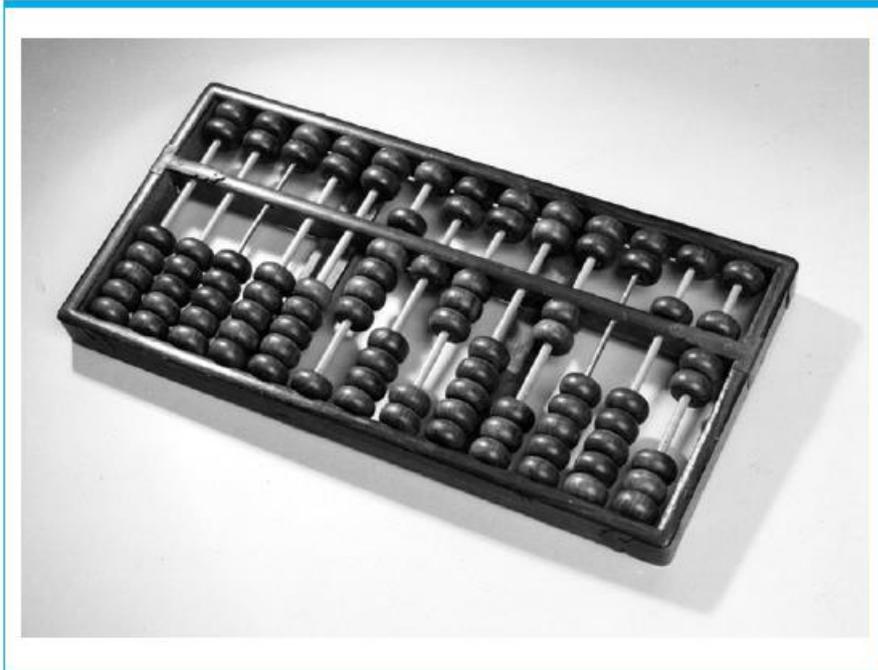Computer systems can be regarded as layers of abstraction:

Applications

Operating system

Instruction set

Functional units

Finite state machine

Logic gates

Electronics

Figure the level of description of computer systems

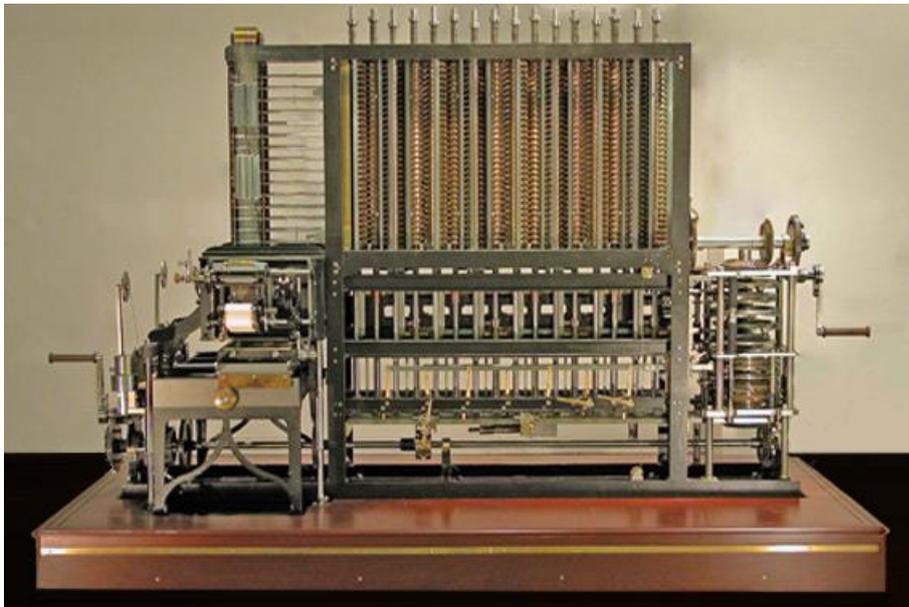# History of computing machines

Mechanical calculators

Charles Babbages: Difference Engine number 2

Howard Aiken: Electro-mechanics, Mark I

Anatasoff and Berry: Electronics, ABC computer (Iowa University)
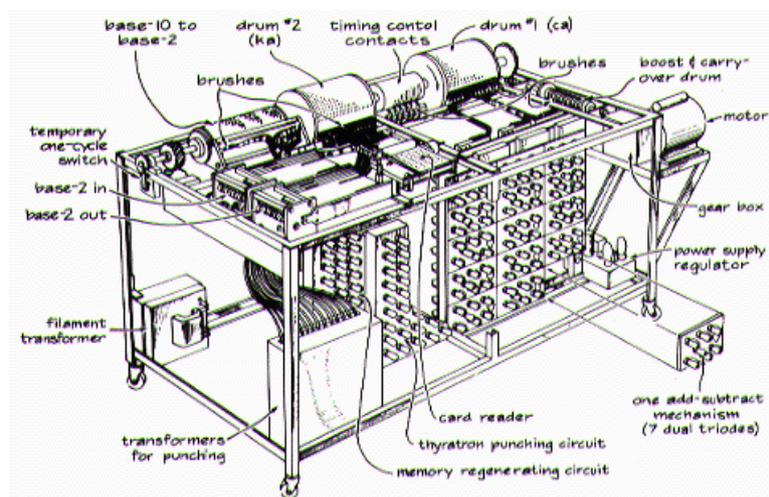
Figure   the ABC diagram
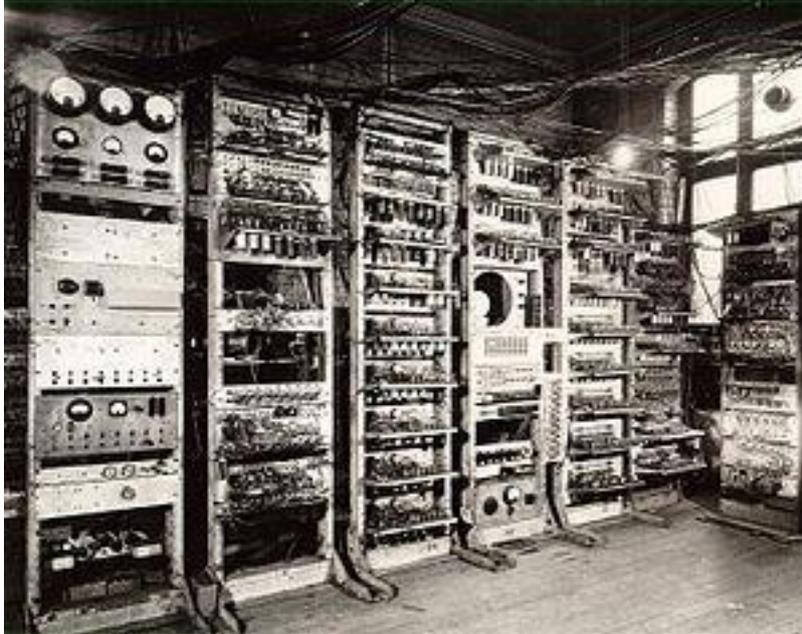
The Manchester Mark 1 was one of the world's first stored-program computers.

Figure   the first program, on Baby computer

Time line of the history of computer

Mechanical era

1642 Blaise Pascal invented a machine that can add/subtract numbers

1666 Samuel Morland invented a machine that can multiply by repeated addition.

1671 Gottfried Leibniz, an adding and multiplying machine

1820 Charles Babbage, Difference engine

1830 Charles Babbage, Analytical engine (Father of modern computer)

Electro-mechanical era (relays)

1880 Herman Hollerith, punch card machine

1924 Thomas J. Watson founded IBM

1930 Beginning of computer age

     Howard H. Aiken, Harvard university (MARK I)

     John V. Anatasoff, Iowa State univ.

     George R. Stibitz, Bell telephone lab.

     Konrad Zuse, Technische Hochschule in Berlin, ZUSE 1

1943 Flowers, Colossus

1946 Eckert & Mauchly, ENIAC

Electronics era

1948 Manchester SSEM

1949 Manchester Mark I

1950 John Von Neumann, EDVAC

1950 Alan Turing, ACE
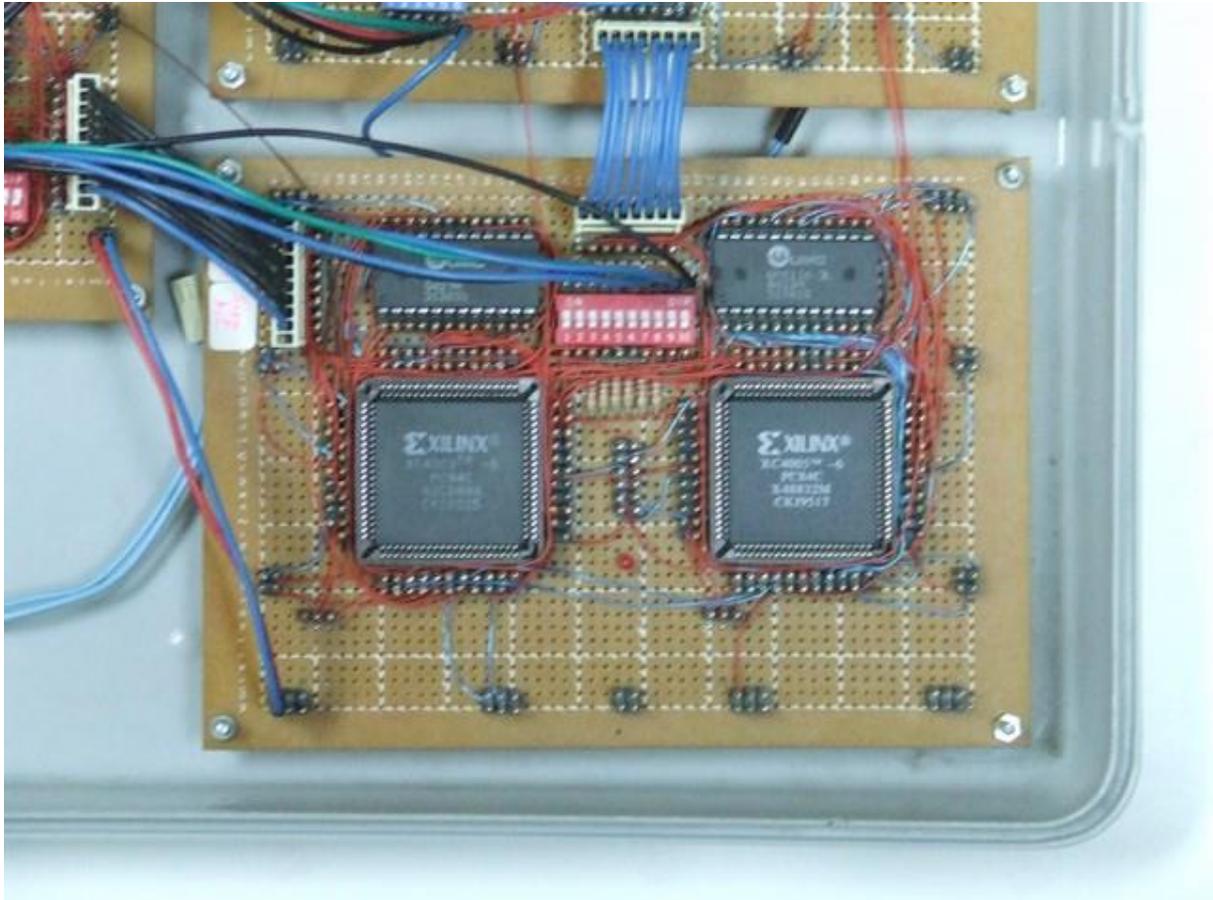
1951 Forrester (MIT), Whirlwind

1952 Goldstine and Neumann, IAS

Computer industry era

1951 Remington Rand, UNIVAC

1952 IBM 701

Microelectronics

A board of Field Programmable Gate Arrays (FPGA) that functions as a real-time edge detection of video signals (Master Thesis circa 1996) Ref: Sukitti Punak, A hardware design of modified Canny edge detection algorithm, MSc thesis, Computer Engineering, Chulalongkorn, 1996.

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