ITM1010
Computer and Communication Technologies

Course Information

The Instruction Team

- Instructor
  - Prof. PUN Kong Pang
  - Office: SHB 326; Tel: 2609 8293
  - Email: kppun@ee.cuhk.edu.hk
- Tutors
  - Mable Fok, HSH 310, 8257, mpfok@ee.cuhk.edu.hk
  - Tsui Ping Tim, HSH 304, 8251, pttsui@ee.cuhk.edu.hk

Course Information

- Lectures
  - Tuesday, 10:30am-12:15noon, ICS 204 (no class on Sept. 16)
  - Friday, 8:30am-9:15am, LSB LT5
- Tutorials
  - To be decided today
- Course web page
  - http://www.ee.cuhk.edu.hk/~kppun/itm1010
- Course assessment
  - 20% Assignments
  - 30% Midterm test, to be held on October 10 (Fri), 2003
  - 50% Final Examination

Reference Books

- *Digital Electronics: A Simplified Approach,* 2001 Edition, by Robert D. Thompson, Prentice Hall, 2001.

- *Using Information Technology,* 5th Edition by Brian Williams and Stacey Sawyer, McGraw-Hill, 2003.

- *Telecommunications Essentials,* by Lillian Goleniewski, Addison Wesley, 2002

- *Digital and Analog Communication Systems,* by Leon W. Couch, Prentice Hall, 2001.

What will you learn in this course?

- Part I: Introduction to Computer Technologies
  - Number systems
  - Boolean algebra and combination logic circuits
  - Sequential logic circuits
  - Computer organization

- Part II: Introduction to Communication Technologies
  - Information and signals
  - Bandwidth and modulation
  - Multiplexing and compression
  - Communication systems: fixed link, optical, wireless and satellite

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Lecture #1

Part I: Introduction to Computer Technologies

A brief history of computers

Activity

- Form groups of about 4

- Discuss the question "What are the basic functions of computers?"

- One person from each group should list the group's opinions on chart-paper

- Time allocation ~ 10 minutes

Ancient times

- The abacus, which emerged about 5,000 years ago and is still in use today, may be considered the first computer. The abacus as we know it today, appeared around 1200 in China; in Chinese, it is called 算盘.
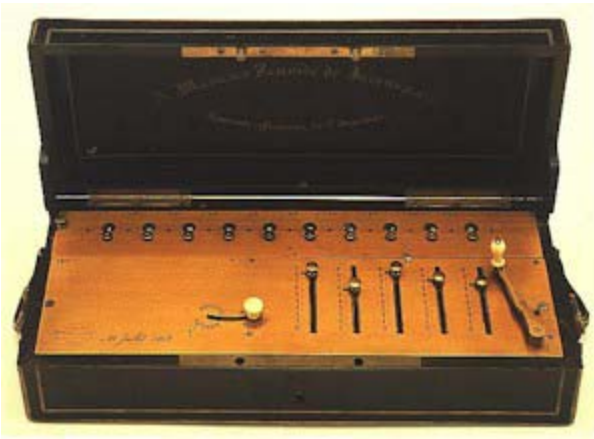
- It is manual.
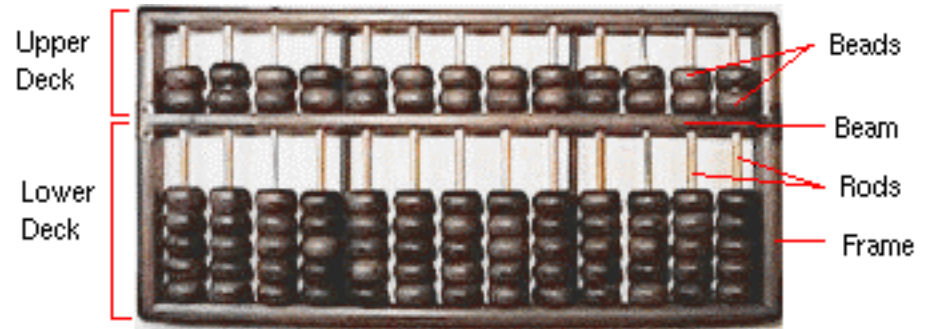
1600-1945

- Blaise Pascal's Adding Machine (1642)
  - Adopt partly the principle of abacus
  - Worked by a system of gears and dials (mechanical)
  - The principle is still being used today (odometers).
- Leibniz improved the Pascal's machine (1674)
  - It could also multiply.
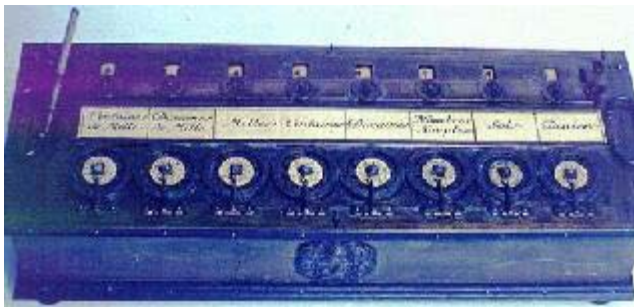
1960-1945 (Cont')

Arithometer

- It wasn't until 1820 that mechanical calculators gained widespread use.

- Charles Xavier Thomas de Colmar, a Frenchman, invented a machine, called arithometer that could perform the four basic arithmetic functions: add, subtract, multiply and divide.

- The arithometer was widely used until the First World War.

1600-1945 (Cont')

- Analytical Engine

  – Proposed by Babbages in 1822.

  – Perform all mathematical calculations, store values in its memory, perform logical comparisons among values and print results automatically.

  – Steam powered.

  – Never been built because it lacked one thing – electronics.

  – However, it outlined the basic elements of a modern general purpose computer and was a breakthrough concept.

Analytical Engine
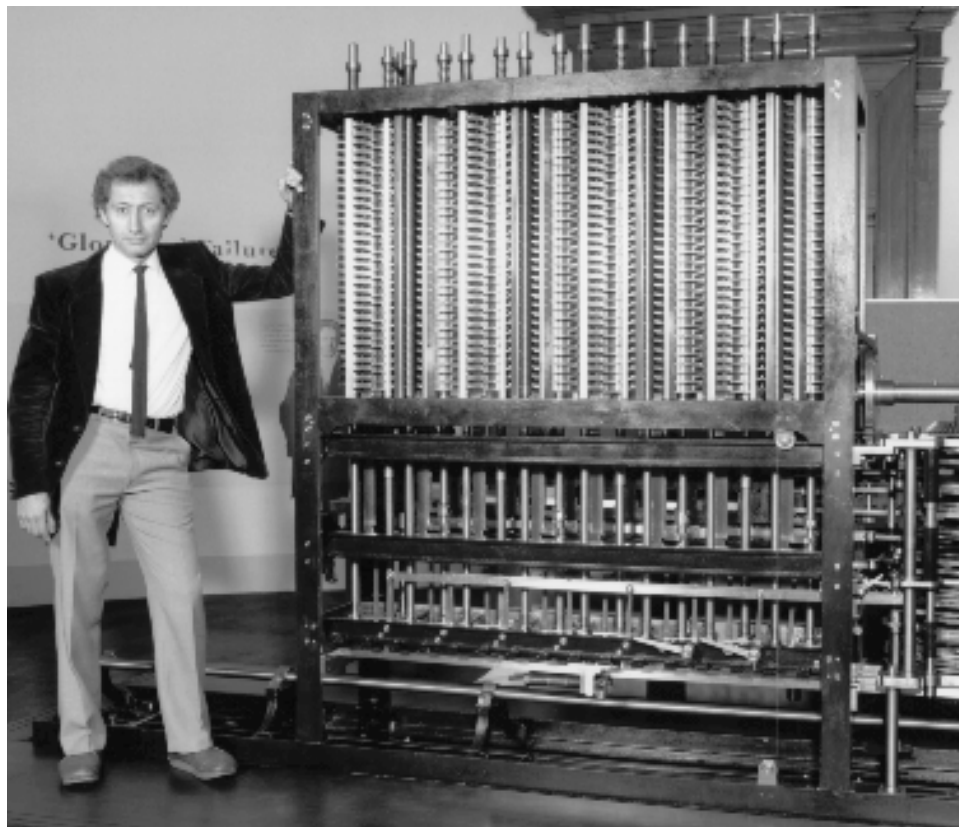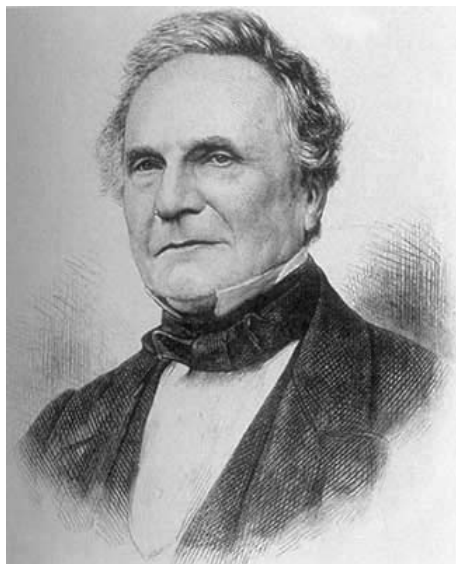
1600 – 1945 (Cont')

- Hollerith's Tabulating Machine (1889)
  - Hollerith adopted Jacquard punched cards concept to process US census data.
  - He used cards to store census data which he fed into a machine that compiled the results mechanically.
  - It cut by two thirds the computing time.

- The Birth of IBM
  - Hollerith brought his punch card reader into the business world, founding Tabulating Machine Company in 1896, later to become International Business Machines (IBM) in 1924 after a series of mergers.

Hollerith's Tabulating Machine
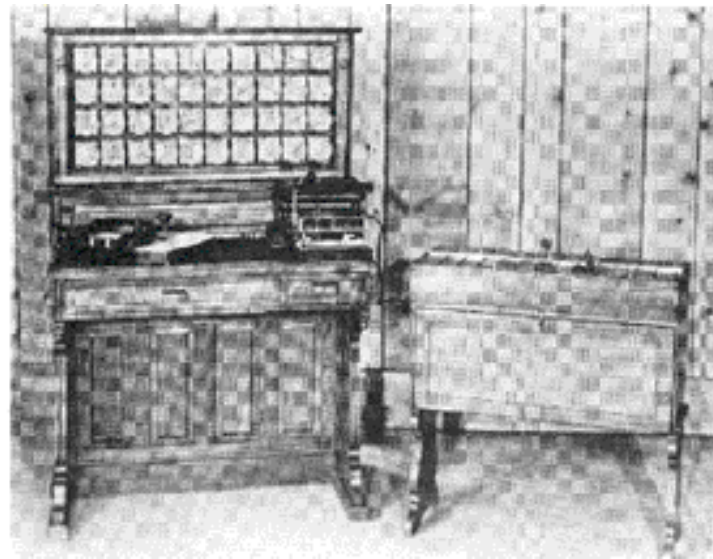
# Modern computers

- First Generation (1946-1956)
  - The first modern computer is ENIAC (Electronic Numerical Integrator and Computer) (1946)
  - No moving parts
  - Programmable
  - Had the capability to store problem calculations
  - Built with vacuum tubes (ENIAC has 18,000 VTs)

 - Large size (ENIAC occupied 1,500 square feet of floor space).

Modern Computers (Cont')

- Second Generation (1956-1963)
  - Transistor-based
  - Smaller & Faster
- Third Generation (1964-1971)
  - Integrated Circuits (IC) based
  - Further miniaturized
- Fourth Generation (1971- present)
  - Characterized by Large Scale Integration (LSI), VLSI, ULSI
  - Speed ever increases
- Fifth Generation (Present and beyond)
  - AI, thinking machines, intelligent machines, & superconductors.
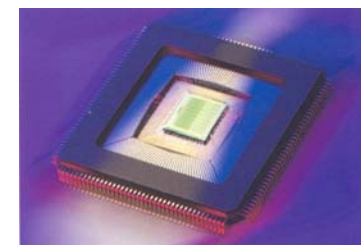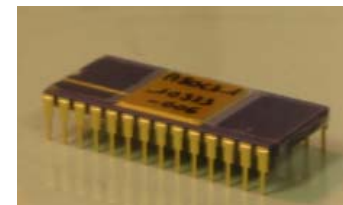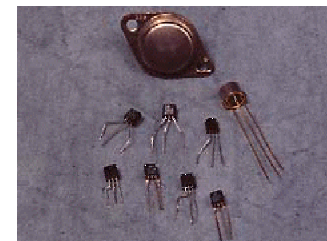
MOORE'S LAW
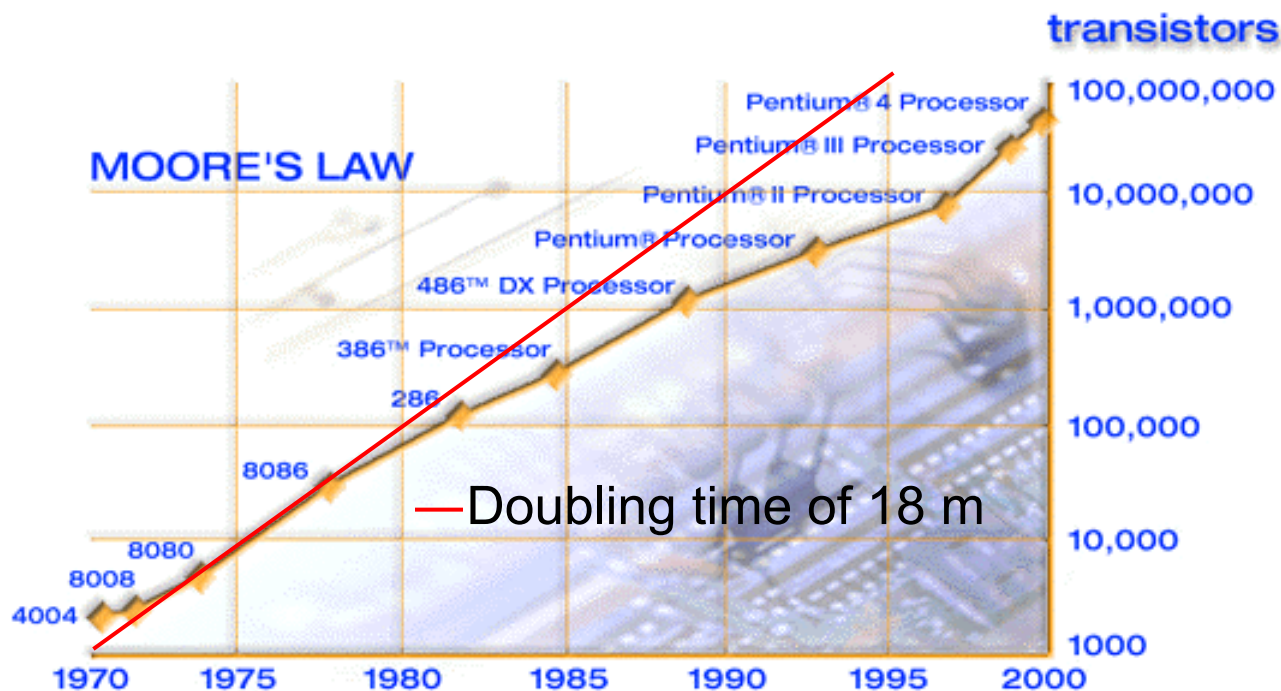
Courtesy of Intel

The number of transistors per silicon chip doubles every 18-24 months.