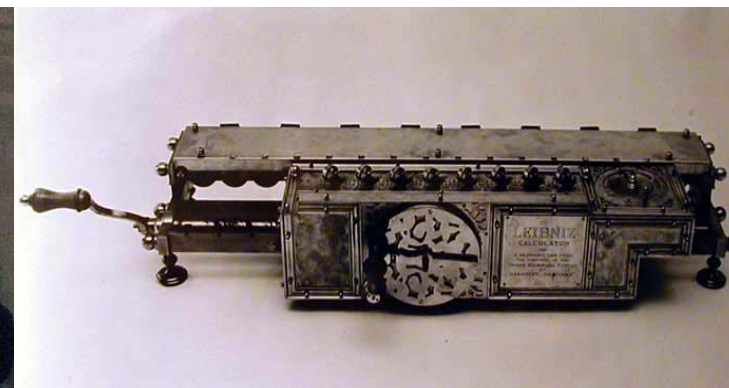
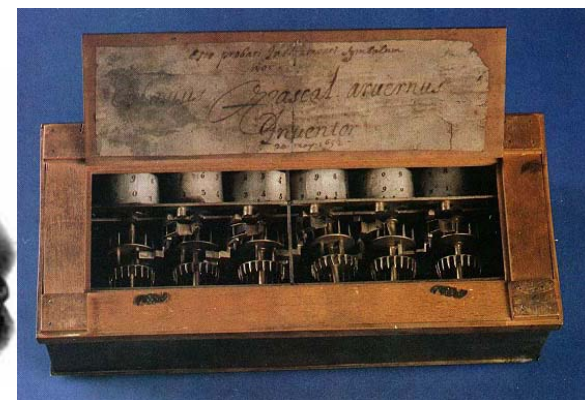
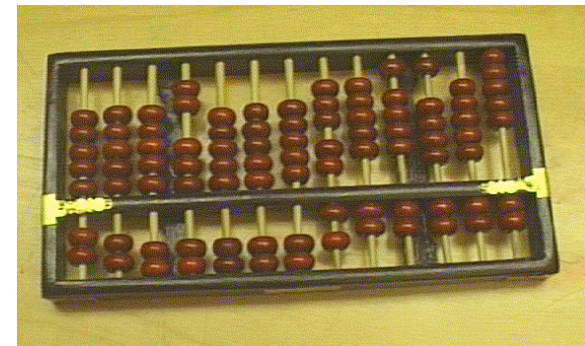


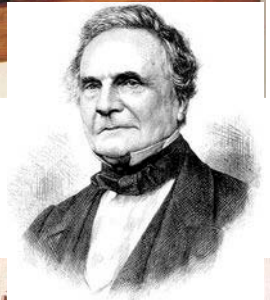
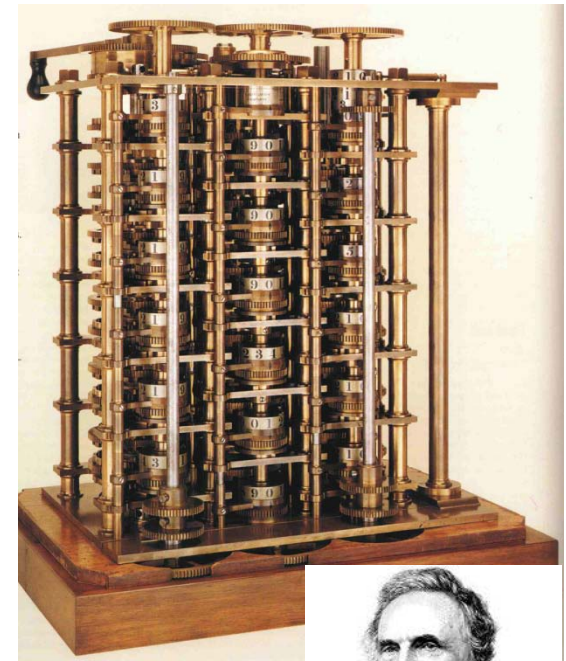
- Before the 1500s, in Europe, calculations were made with an **abacus**, Invented around 500BC, in Babylonia.
- 300-600 AD, The first use of the **number 0**, and **negative numbers** (first appeared in India).
- In 1642, Pascal (French mathematician) invented a **mechanical calculator** called the Pascaline (The Arithmetic Machine could only add and subtract, while multiplication and division operations were implemented by performing a series of additions or subtractions), Initially used to help Pascal's father with Tax computations !
- In 1671, Gottfried von Leibniz (German mathematician) extended the Pascaline to do multiplications, divisions, square roots.



None of these machines had memory, and they required human intervention at each step.

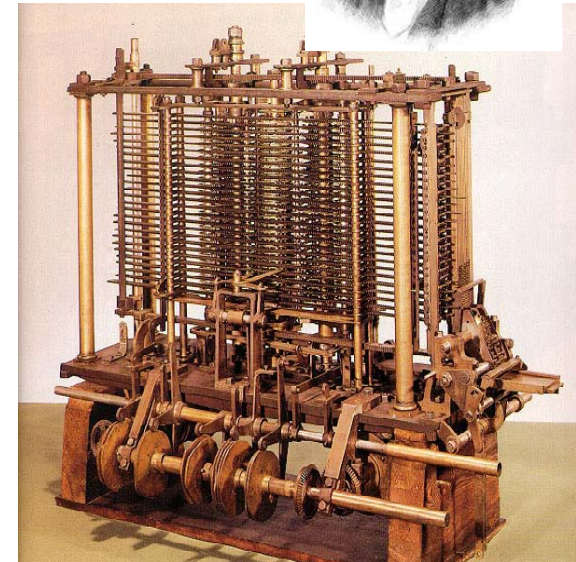
- In 1822 Charles Babbage (English mathematician), sometimes called the “father of computing” built the Difference Engine, Machine designed to automate the computation of polynomial functions, Implements some storage, All internal and temporary, the user doesn't store anything.

The **Difference Engine**, consisted of 4,000 components, weighed three tons, and was 10 feet wide and 6½ feet tall. In Babbage's time, mathematical tables, such as logarithmic and trigonometric functions, were generated by teams of mathematicians working day and night on primitive calculators. Due to the fact that these people performed computations they were referred to as "**computers**". In fact the term "computer" was used as a job description (rather than referring to the machines themselves) well into the 1940s. This term later became associated with machines that could perform the computations on their own.



- In 1833 Babbage designed the **Analytical Engine**, but he died before he could build it, It was built after his death, powered by steam!, It was much more general than the difference engine, and could in theory perform “any” mathematical operation. This is really the first machine that somewhat resembles our computers

- ◆ An arithmetic processing unit (the mill).
- ◆ A memory (the store).
- ◆ Input/output devices (punched metal cards).



- In 1842, Ada Lovelace (English mathematician, daughter of Lord Byron) wrote instructions for the Analytical Engine to compute the Bernoulli numbers: the **first computer program** !. A programming language is named after her.



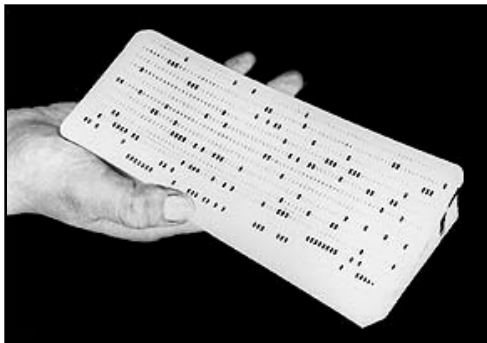
Generation 1 : Vacuum Tubes

The vacuum tube is the first known device to amplify, switch, or modify a signal (by controlling the movements of electrons).

Memory was made up of hundreds of vacuum tubes.

These tubes produce so much heat, high energy consumption, large.

Input and output media were punched cards and magnetic tapes.



IBM Punched Card (input)



Magnetic Tapes (output)



Vacuum Tubes (memory)

■ The ENIAC (Electronic Numerical Integrator and Calculator) was unveiled in 1946 University of Pennsylvania : **the first all-electronic, general-purpose digital computer**. (17,468 vacuum tubes, 1,800 ft², 30 tons, 174 KW of power, 1,000-bit memory, Punched card)

(By comparison, Modern Laptop computer may use around 30W, nearly six thousand times less. ENIAC able to process between 5 and 100 operations per second. A modern microprocessor (as of 2007) can process billions of operations per second).

It could do nuclear physics calculations (in two hours) which it would have taken 100 engineers a year to do by hand.

■ The use of binary: In the 30s Claude Shannon (the father of “information theory”) had proposed that the use of **binary arithmetic** and **boolean logic** should be used with electronic circuits.

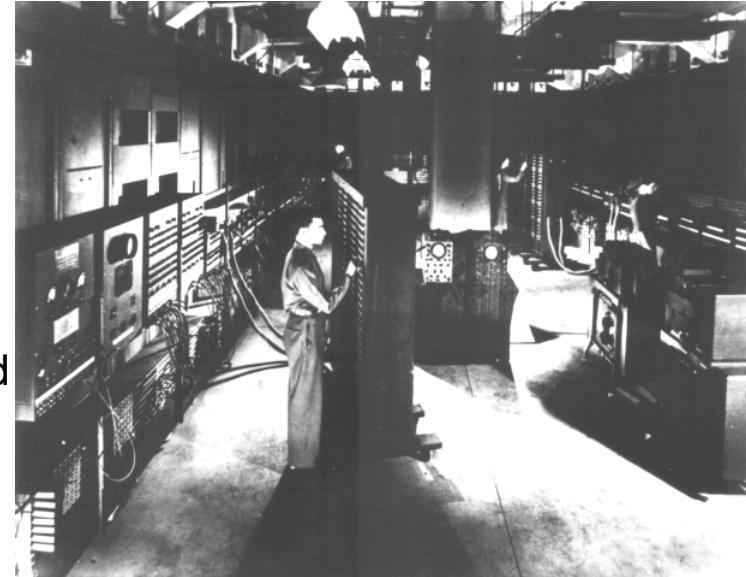
■ The Von-Neumann architecture: In 1944, John von Neumann wrote a memo about **computer architecture**,

▶ A **memory** containing both data and instructions. Also to allow both data and instruction memory locations to be read from, and written to, in any desired order.

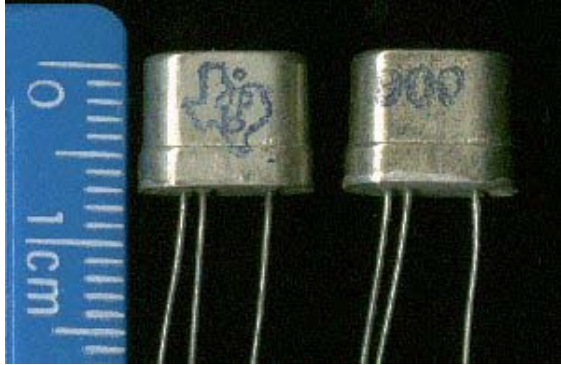
▶ A **calculating unit** capable of performing both arithmetic and logical operations on the data.

▶ A **control unit**, which could interpret an instruction retrieved from the memory and select alternative courses of action based on the results of previous operations.

This is called **von Neumann Machine**, and virtually all digital computers from that time forward have been based on this architecture.



Generation 2 : Transistor



■ In 1948, AT&T Bell Laboratories scientists invent the "transfer resistor"; later labeled the **transistor**. An electronic switch that alternately allow or disallow electronic signal to pass, replaces vacuum tubes. These transistors were made of solid material, some of which is silicon, therefore they were very cheap to produce. Much smaller than vacuum tubes, draw less power, and generate less heat, conduct electricity faster.

- Evolution from Machine Language to **Assembly Language** (which were also called Symbolic Languages).
- Estimates say that there are around 100 computers in the world in 1953.
- 1959 It was the beginning of big computer vendors (**IBM**).
- Computers were still bulky and expensive, and so there were only in universities, government agencies, and large businesses.

Generation 3 : Integrated Circuit

■ **Integrated Circuit** developed in 1958 by Jack Kilby an engineer with Texas Instruments. An electronic circuit that packages transistors and other electronic components into one small silicon chip called semiconductor. Computers became ever smaller as more components were squeezed onto the chip.

■ The use of an **operating system** that allowed machines to run many different programs at once with a central program that monitored and coordinated the computer's memory.

■ **Keyboards** and **monitors** were used. **Magnetic disks** were used widely as secondary storage.

■ IBM System/360 were the first computers to be built entirely with ICs.

■ In 1965 **BASIC** (Beginners All Purpose Symbolic Instruction Code) was developed at Dartmouth College.



■ In 1965, the first **mouse** was invented by Douglas Englebart, but did not become popular until the mid 80's by Apple.

■ **Intel** was founded in 1968. Also in 1970, the **UNIX** operating system was started.

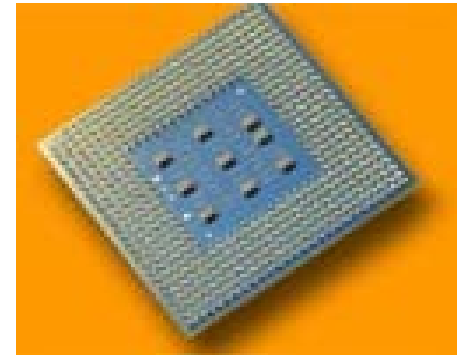
■ In 1969 ARPANET was started by the US Dept. of Defense for research into networking. It was the original basis for what we now call the **internet**.

Generation 4 : Microprocessor

■ A silicon chip on which transistors are integrated onto it. Microprocessor can do all the processing of a full scale computer (smaller in size , faster in speed). These circuit integrations are known as Large-scale integrated (LSI) and Very Large-scale integrated (VLSI) circuits. Computers built after 1972 considered fourth generation computers.

Improvements to IC technology made it possible to integrate more and more transistors in a single chip:

SSI (Small Scale Integration):	10-100
MSI (Medium Scale Integration):	100-1,000
LSI (Large Scale Integration):	1,000-10,000
VLSI (Very Large Scale Integration):	>10,000



■ Intel produced the first **RAM chip** in 1970, capacity of 1 K-bit, 1024 bits.



■ In 1971 the **first microprocessor**, the 4004 (4-bit, 108KHz RAM chip), was developed for Intel.

■ In 1972 Nolan Bushnell founded Atari and Pong, Pong is widely recognized as the first popular arcade **video game**.

■ **C programming language** developed. C++, which allowed for Object-Orientated Programming, was introduced in early 1980s.

■ **First scientific calculator** developed by Hewlett-Packard.

■ **Microsoft** is founded by Bill Gates and Paul Allen (1975).

- The Cray 1 is the first commercially developed **Supercomputer**.
- Introduction of the 8086 by Intel (1978), the first commercially successful **16 bit processor**.
- IBM started to develop their own PC. On August 12, 1981 IBM announced its own **personal computer** (which is use in home, office, school). Using the 16 bit Intel 8088 microprocessor, allowed for increased speed and huge amounts of memory.
- 1981 Microsoft provides the Disk Operating System (**DOS**) for the IBM Personal Computer.
- **TCP/IP Protocol** established.
- Domain Name Server (**DNS**) introduced to the Internet.
- 1979: **CD-ROM**, invented by Phillips, produced in collaboration with Sony.
- **Microsoft Windows** is launched (1985). 
- World Wide Web (**WWW**) (1989). Invented by Tim Berners-Lee. 
- **Linux** born (1991).
- Intel's **Pentium** is released (1993). Over 3.1 million transistors.
- **Netscape** 1.0 written (1994).
- **Windows '95** was launched by Microsoft. This is an entire operating system and does not rely on MS-DOS.



Generation 5 : The Future

■ Future developments could be in the following fields:

- ▶ Voice recognition.
- ▶ Artificial intelligence and Expert systems.
- ▶ Quantum computing
- ▶ Bio computing and parallel processing (many CPUs works together).
- ▶ Nano technology and Superconductor technology (which allows the flow of electricity with little or no resistance, greatly improving the speed of information flow).
- ▶ Learning.
- ▶ Natural languages.

Why are Computers so useful?

Storage — Reliability — Speed — Accuracy — Communication

Types of Computer Users:

1. **End Users:** Individuals who uses the product after it has been fully developed and marketed.
2. **Small Business Users:** Small companies.
3. **Mobile Users:** Traveling people.

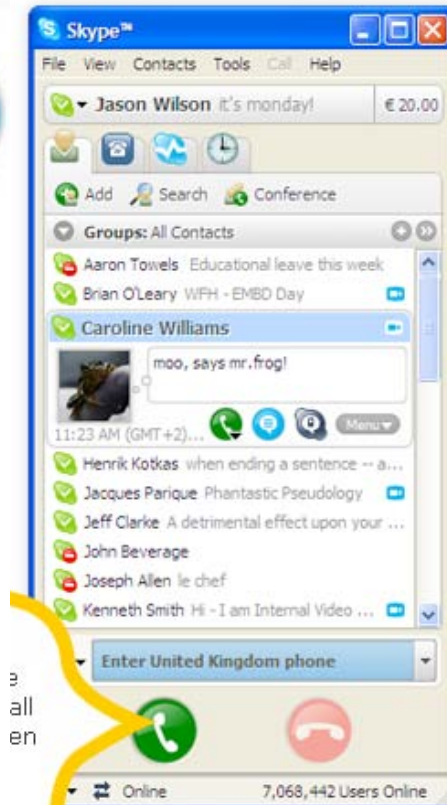
Directions of Computer Development:

- ↓ **Size:** Everything has become **smaller**.
- ↑ **Power:** Miniaturization allowed computer makers to cram more power into their machines, providing **faster processing speeds** and **more data storage capacity**.
- ↓ **Expensive:** The price of the **hardware is getting cheaper**.



How computers change our life?

- ❁ Communication (Long distance phone v.s. Skype).
- ❁ Gathering after school (icq , msn).
- ❁ Entertainment (cinema , DVD / youtube, media).
- ❁ Project/Reports (paper-based , doc / presentations)
- ❁ Activities in daily life: News, Banking, Shopping



all en

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Some Forms of Computers



Desktop Computer



Notebook Computer



Tablet



Game Console



PDA



Embedded
Computer



CNC Milling
machine

The Varieties of Computers

-  Supercomputers
-  Mainframes
-  Workstations
-  Microcomputers
-  Microcontrollers



Supercomputers: Fastest, most powerful, most expensive among the categories. Suitable for intensive calculations & processing, Example Application: weather maps, construction of atom bombs, finding oil, earthquake prediction, etc.



Mainframes support more simultaneous programs. Allows hundreds of people to have simultaneous computer usage. Used in large business environment (e.g. bank).

Workstation:

- Powerful desktop computers.
- Used by engineers and scientists for engineering applications, software development, application that require a high amount of computing power.

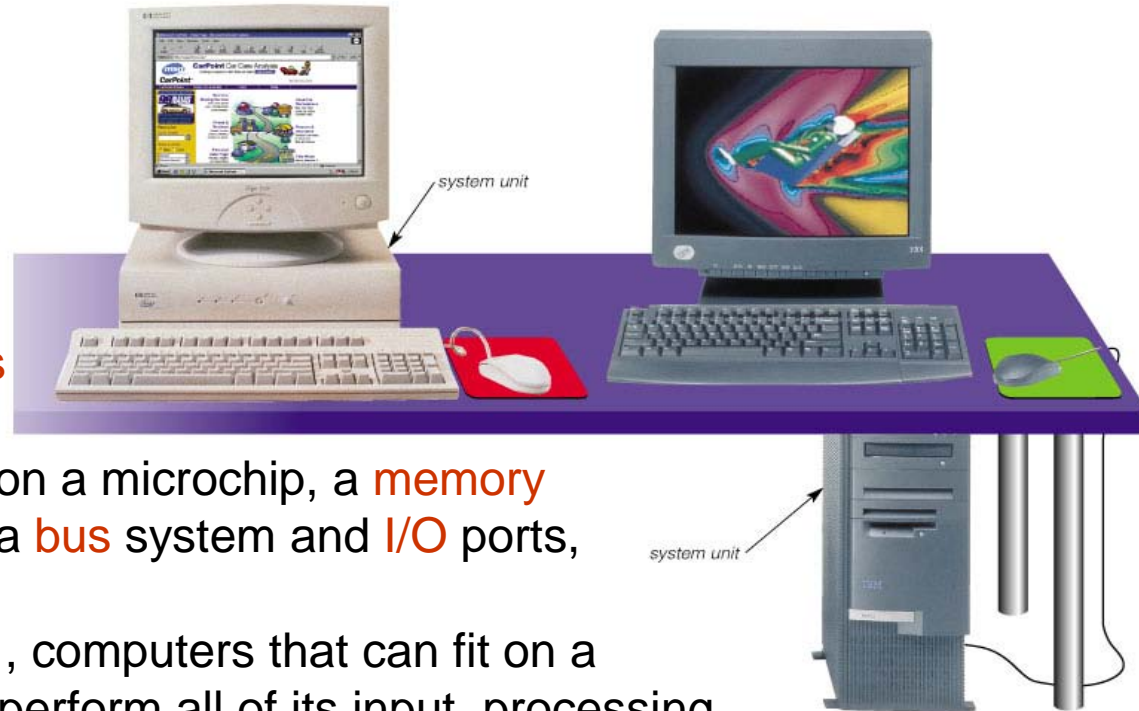


Microcomputer:

Microcomputers are designed to be used by individuals, whether in the form of **PCs** (Mini-tower, Desktop), workstations or **notebook** computers.

A microcomputer contains: a **CPU** on a microchip, a **memory** system (typically **ROM** and **RAM**), a **bus** system and **I/O** ports, typically housed in a **motherboard**.

The most common for **home users**, computers that can fit on a desktop or in one's briefcase. Can perform all of its input, processing, output and storage activities by itself.



Forms of Microcomputer



Tablet computer

Specialized notebook equipped with touch-screen / tablet input. Instead of using keyboard, users could also input via handwriting recognition / virtual keyboard.

Notebooks:

with dimension from 9 inches to 14 inches.

Microcontroller:

Personal Digital Assistant (PDA)

Perform simple tasks, Small screen, Input and output.
Like: Hand-held Personal Digital Assistant.



DSP: Digital Signal Processor



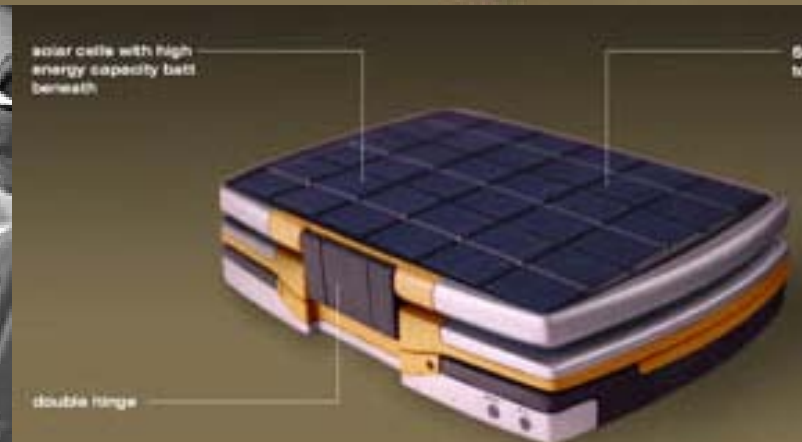
Computers in the future – PC in year 201?



MORE CONVENIENT
E-Book with Dual monitor ?!!



PC anywhere?



More **environment-friendly**:
Solar notebook?