BIL2205 – Computer Programming -1

2019 – 2020

Alper VAHAPLAR

General Information of the Course

Course Code	BIL2205
Course Name	Computer Programming – 1
Course Level	Undergraduate
Course Status	Compulsory
Language of Instruction	English
Weekly Course Hours	2+2 (Theory + Application)
National Credit	2+2
ECTS Credit	6

General Information of the Course

Course Code	BIL2205
Course Name	Computer Programming – 1
Course Days	Monday 3 – 4 (10:20 – 12:00) Thursday 5 – 6 (13:00 – 14:40)
Classroom	Comp. Lab. – 1
Course Web Page	http://alpervahaplar.com – BIL2205

Learning Outcomes of the Course

1	Describing the syntax of the programming language,
2	Using control structures,
3	Writing computer program for an algorithm,
4	Developing function and procedure,
5	Debugging,
6	Developing applications for essential statistical methods.

Course Contents

1	Algorithms and Their History Origin of the word Algorithms by the ancients The basic features of the algorithm
2	Number Systems and Basic Structures in Algorithms Binary, octal, hexadecimal etc. number systems
3	Flow-Chart Diagrams Start and end symbols Arrows Input and output symbols Conditional symbol, Pseudocode
4	Introduction to Python Programming Language, Programming environment
5	Data Types, Variables
6	Operators and Expressions Arithmetic operators Relational operators
7	Logical operators, Control Statements

Course Contents

8	Mid-term exam
9	Conditional statements, Select statements
10	Loop statements
11	Data Import-Export
12	Functions
13	Functions
14	Modules and Packages

Course Material

- Textbook:
  - Think Python, 2nd edition, Allen B. Downey, 2016
- Supplementary Book(s):
  - 1 - CS for All, Christine Alvarado, Zachary Dodds, Geoff Kuenning, Ran Libeskind-Hadas, 2013
  - 2 - Introduction to Computation and Programming Using Python, Second Edition, John V. Guttag, MIT Press, 2013

Course Evaluation

- 1 Midterm Exam (MTE)
- Assignments (ASG)
  - Homeworks
  - Quizes
- Final Exam (FIN)
- Score = MTE * 0.40 + ASG * 0.10 + FIN * 0.50

"Computer" & "Programming"

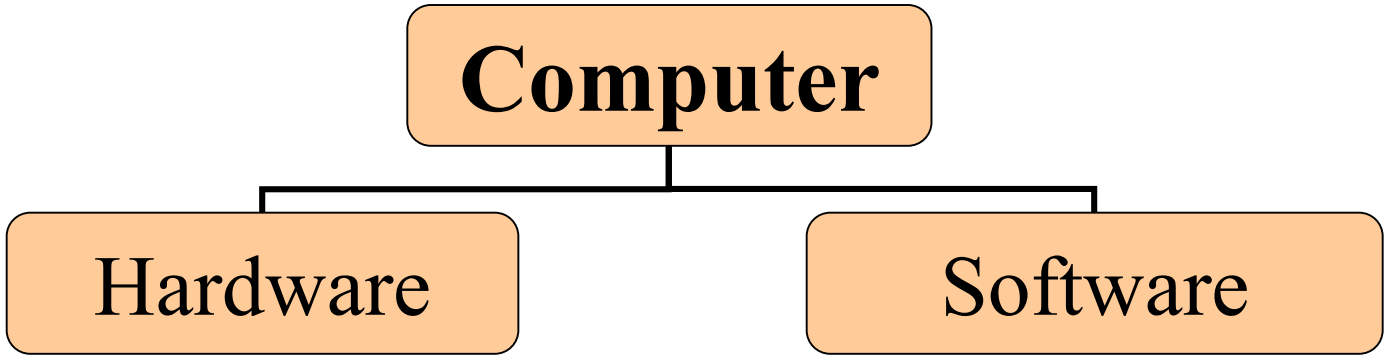
Computer

- What is computer?
  - It is an electronical device.
  - It is used
    - to facilitate our work in daily life,
    - to carry out logical and arithmetic operations with the data received by the user,
    - to keep records, analyze data, do research, and manage projects…

Computer

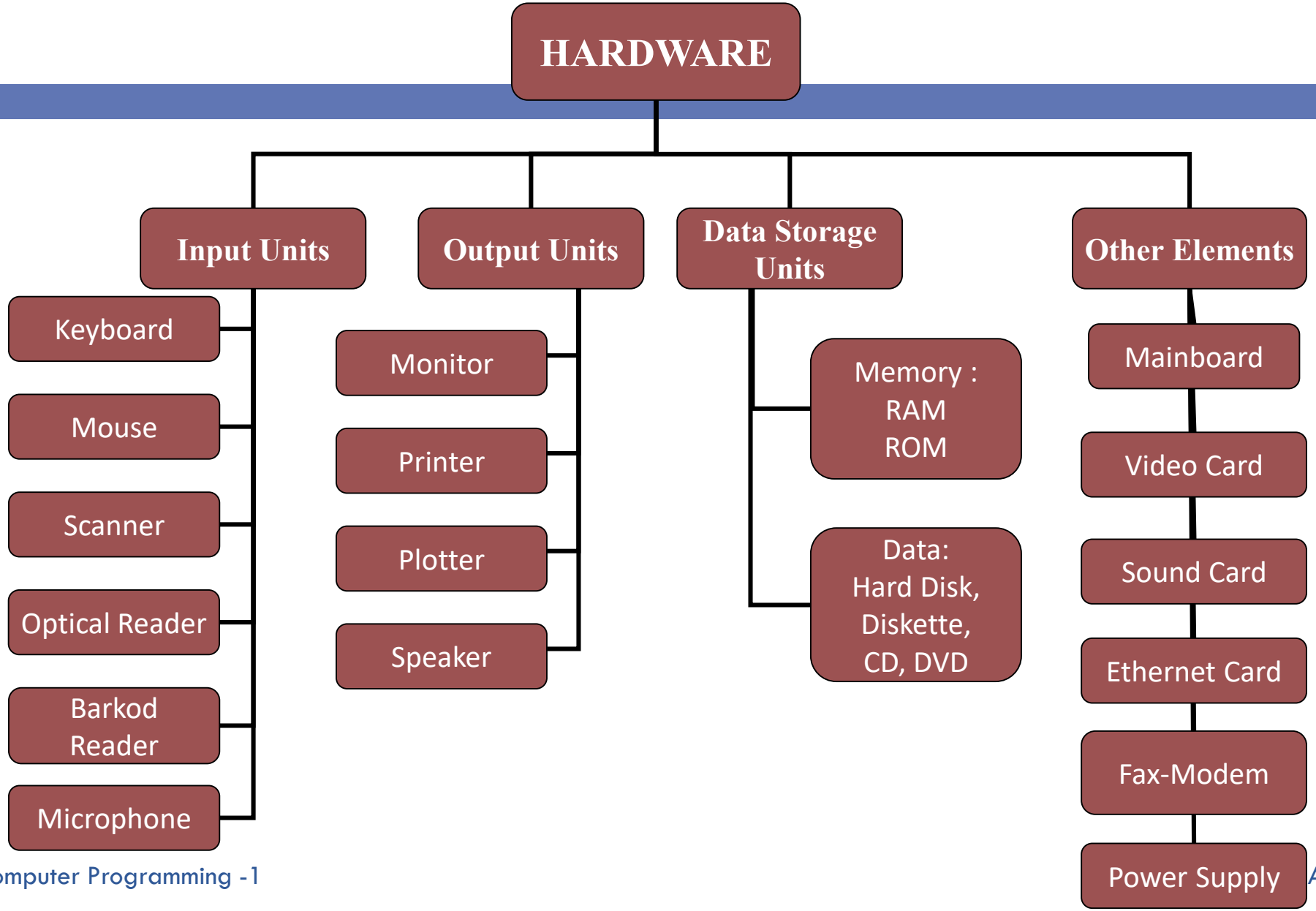
- Monitor,
- Keyboard,
- Mouse,
- Computer Case,
- Modem,
- Camera,
- Scanner
- Windows,
- Facebook, Twitter, Instagram
- Office (Word, Excel,...)
- MP3,
- Media Player
- Antivirus

Hardware & Software



The mechanical and electronical parts of a computer.

Software is any set of machine-readable instructions that directs a computer's processor to perform specific operations.


HARDWARE
Input Units
Keyboard
Mouse
Scanner
Optical Reader
Barkod Reader
Microphone
Output Units
Monitor
Printer
Plotter
Speaker
Data Storage Units
Memory : RAM ROM
Data: Hard Disk, Diskette, CD, DVD
Other Elements
Mainboard
Video Card
Sound Card
Ethernet Card
Fax-Modem
Power Supply

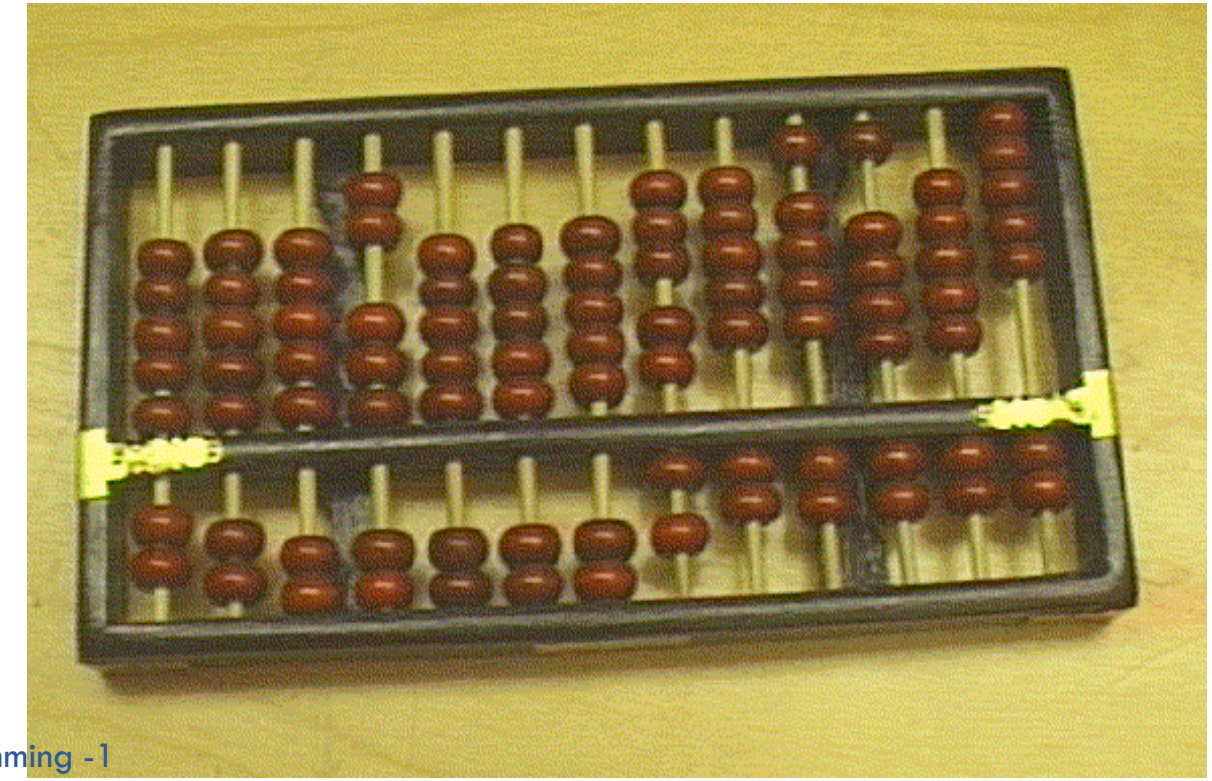
Software

Software is any set of machine-readable instructions that directs a computer's processor to perform specific operations.

- System Software:
  - Operating Systems(Windows, Linux, Unix, etc.)
  - Drivers
- Application Software:
  - Office Programs,
  - Games,
  - Media Players,
  - Web Browsers,
  - Antivirus Programs,
  - …

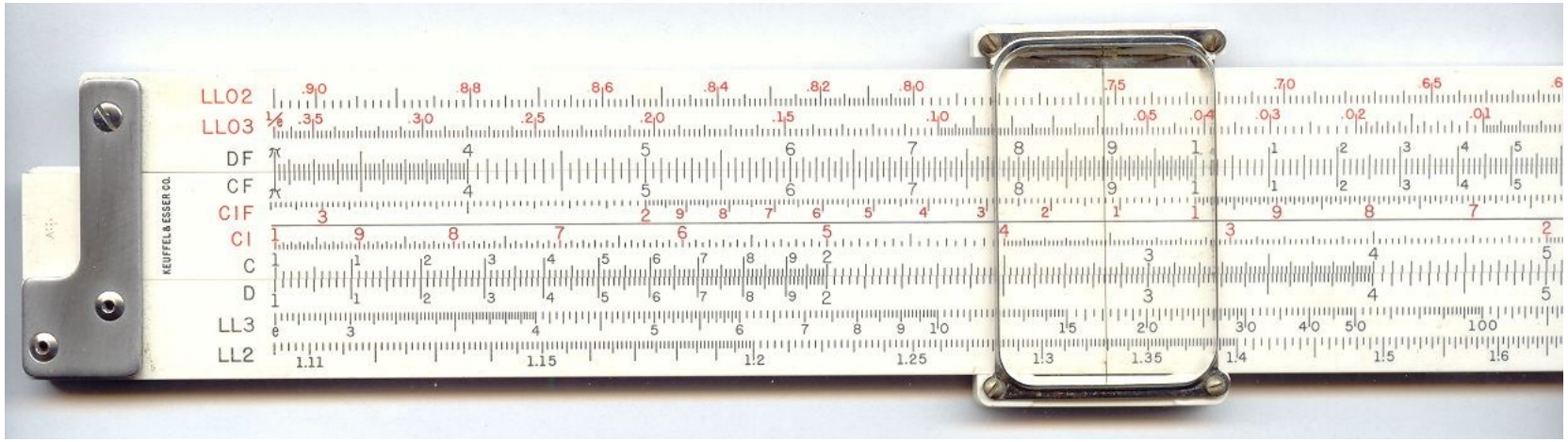
History of Computers

- **2600 (BC)– Abacus**
- Simple addition and subtraction



1621 – Slide Rule

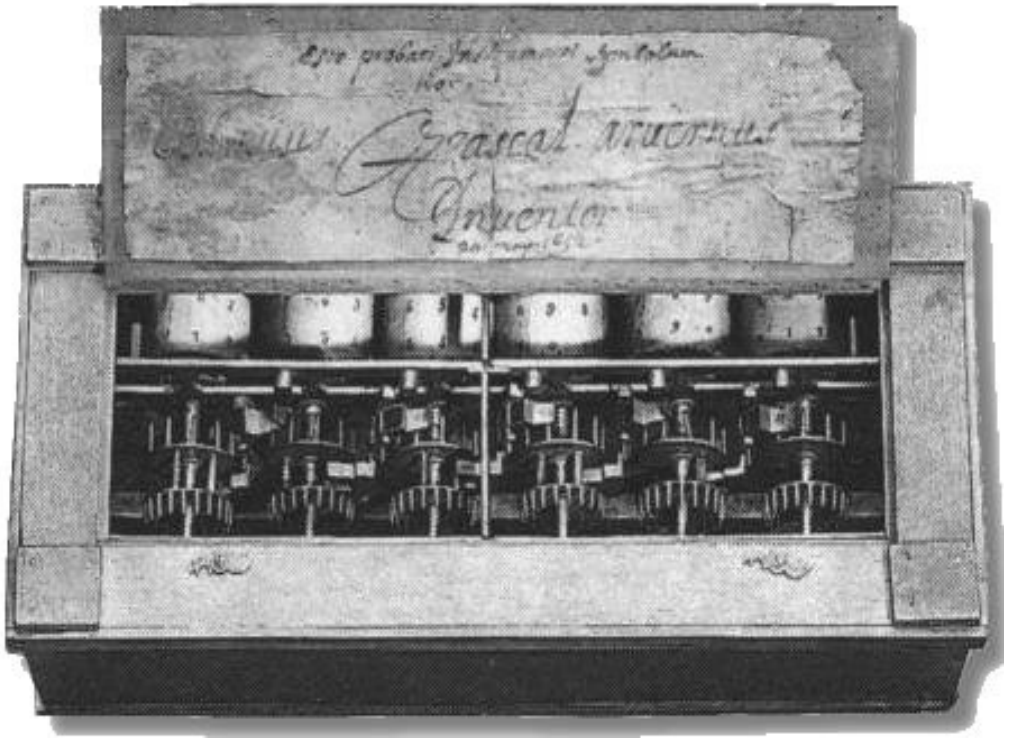
The slide rule is used primarily for multiplication and division, and also for functions such as roots, logarithms and trigonometry, but is not normally used for addition or subtraction.



William Oughtred

1642 – Pascaline Calculator

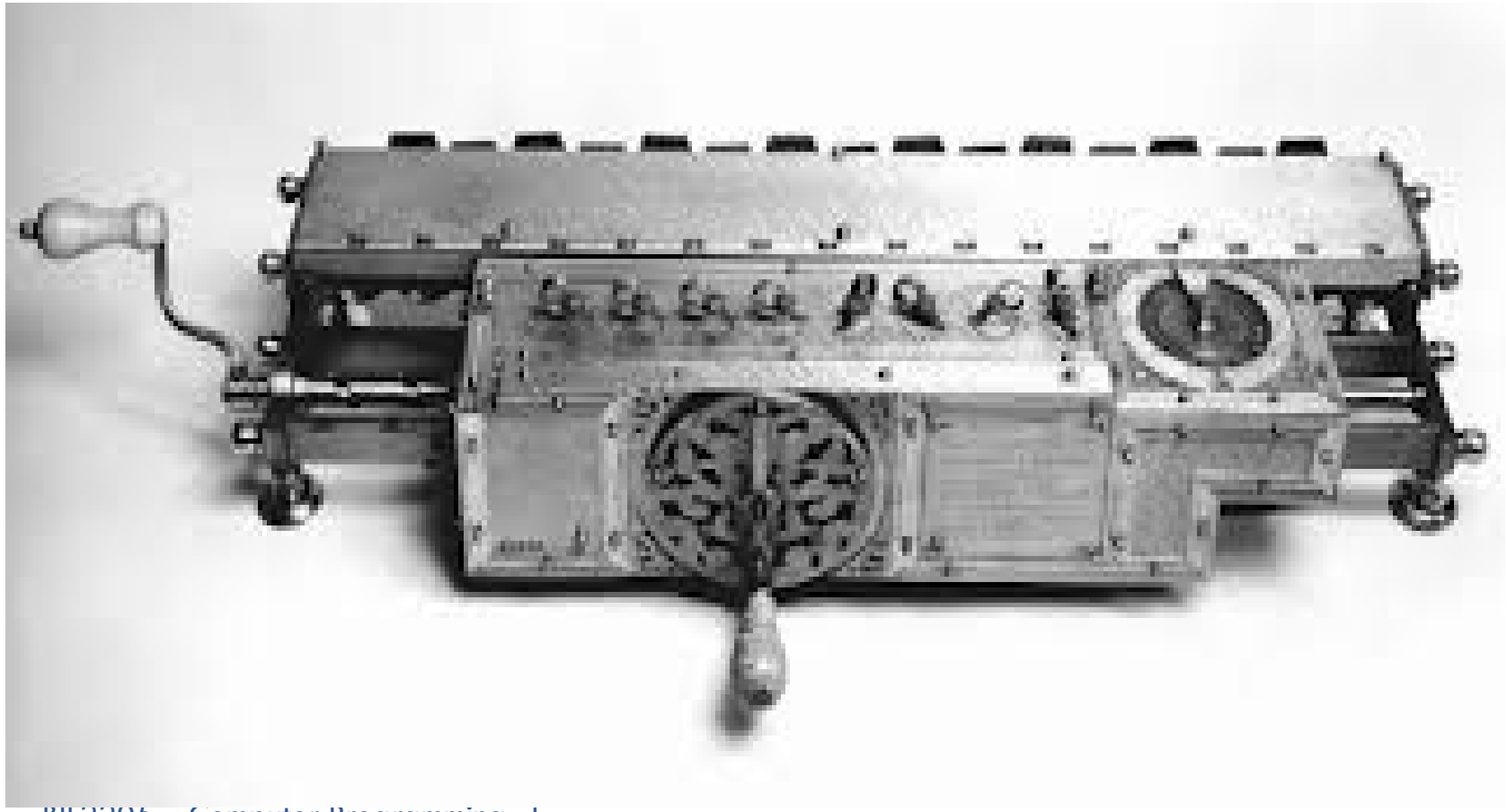
Addition with *"carry"*, subtraction with *"borrow"*



Blaise Pascal

1671 – Leibniz Wheel

- Multiplication, Division, Square Root operations



Gottfried Wilhelm Leibniz

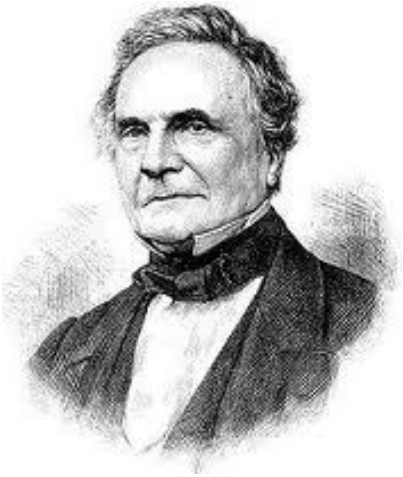
1801 – Weaving Loom

- Punched Cards

Joseph Marie Jacquard

Charles Babbage 1791-1871

- English mathematician, engineer, philosopher and inventor.
- Originated the concept of the programmable computer, and designed one.

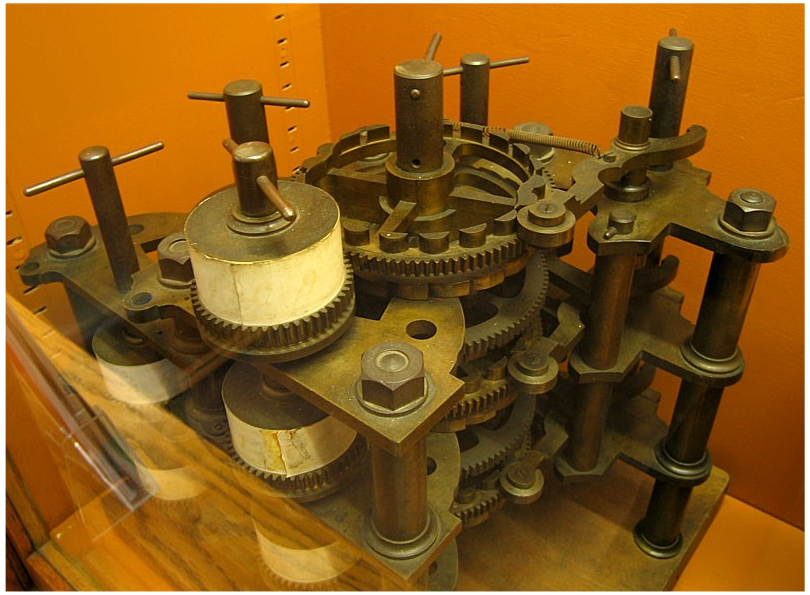


Charles Babbage
"Grand Father" of the computer.

1822 – Difference Engine

- Numerical tables were constructed by hand using large numbers of human "computers" (one who computes). Annoyed by the many human errors this produced, Charles Babbage designed a "difference engine" that could calculate values of polynomial functions.

It was never completed, although much work was done and money spent.



Augusta Ada Byron King, Countess of Lovelace 1815-1852

- Created a program for the (theoretical) Babbage analytical engine which would have calculated Bernoulli numbers.

- Widely recognized as the first programmer.

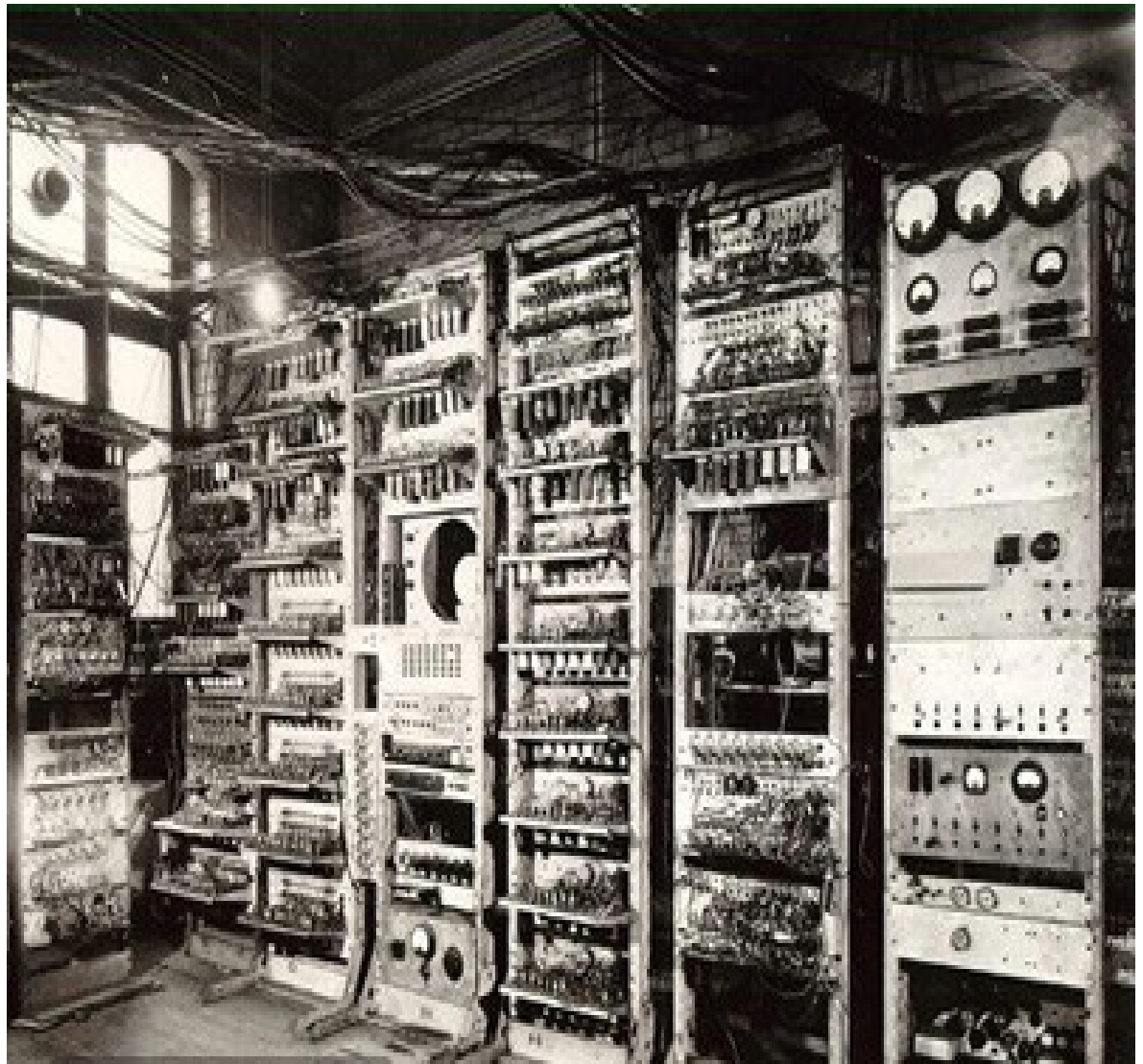
Alan Turing 1912-1954

- British mathematician and cryptographer.
- Father of theoretical computer science.
- Contributions include:
  - Turing Machine
  - Turing Test (for AI)
  - First detailed design of a stored program computer (never built)
- The Turing Machine is a simpler version of Kurt Gödel's formal languages.
- Halting problem is undecidable.

Alan Turing 1912-1954

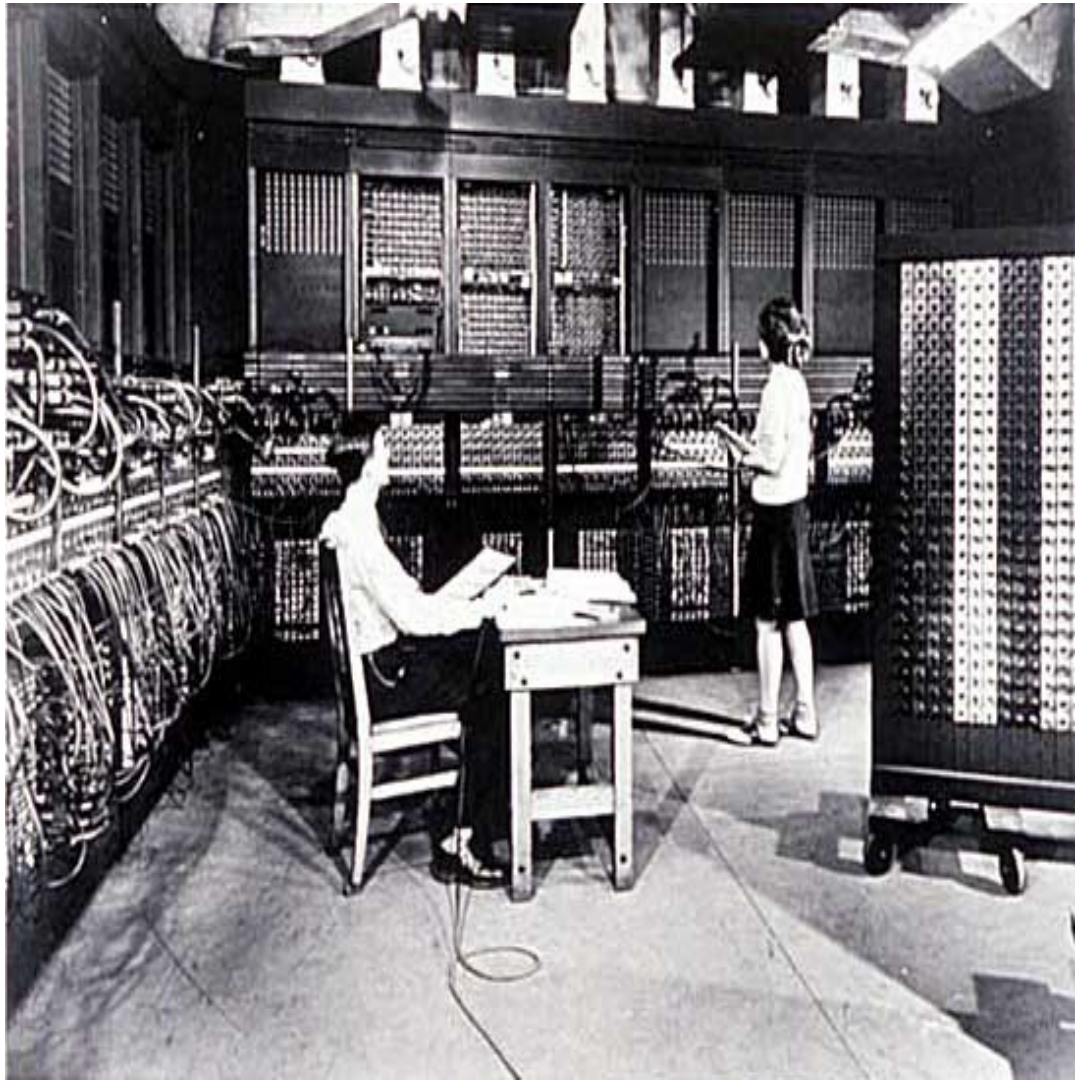
1944 – MARK-1

- First digital computer
- Logarithm/ Trigonometry
- Slow-80 hertz/sec.
- Multiplication – 6 sec.
- Divide – 15 sec.
- Log /Trigonometry – more than 60 sec.



1946 – ENIAC (Electrical Numerical Integrator And Computer)

- Military use
- Can perform in 1 sec.
  - 5000 addition/subtraction
  - 385 multiplication
  - 40 divide
  - 3 square root
- 30 tons
- 167 m^2



Grace Hopper 1906-1992

- Developed the first compiler (A-0, later ARITH-MATIC, MATH-MATIC and FLOW-MATIC) while working at the Remington Rand corporation on the UNIVAC I.

Grace Hopper 1906-1992

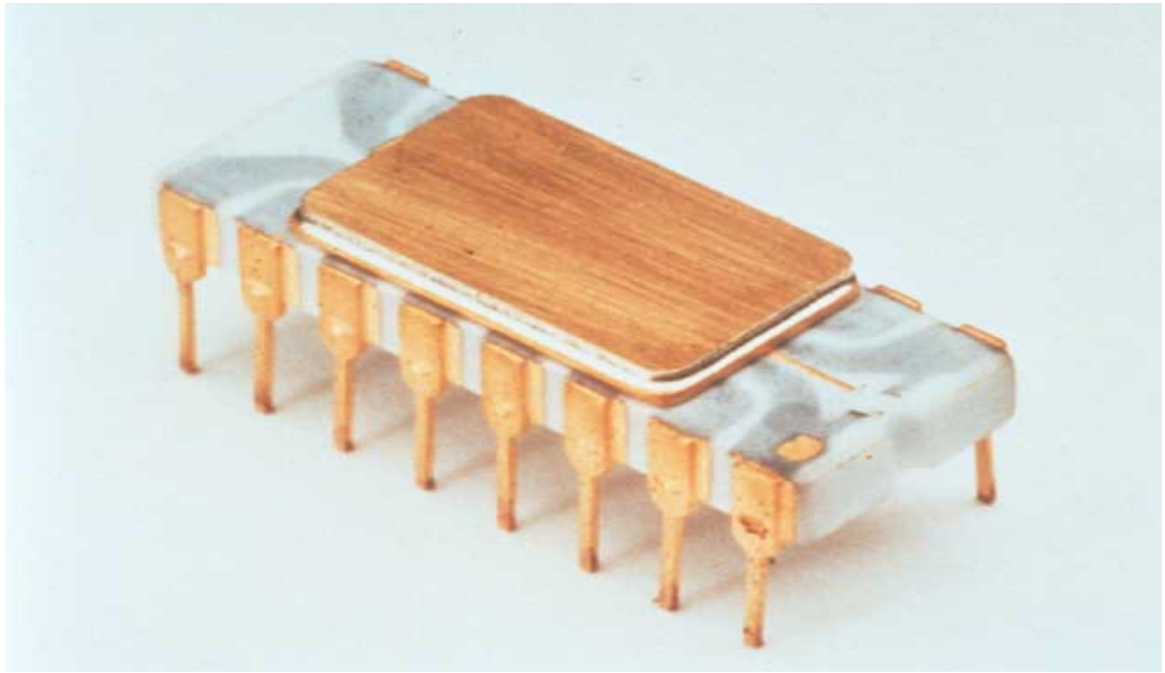
Grace Hopper 1906-1992

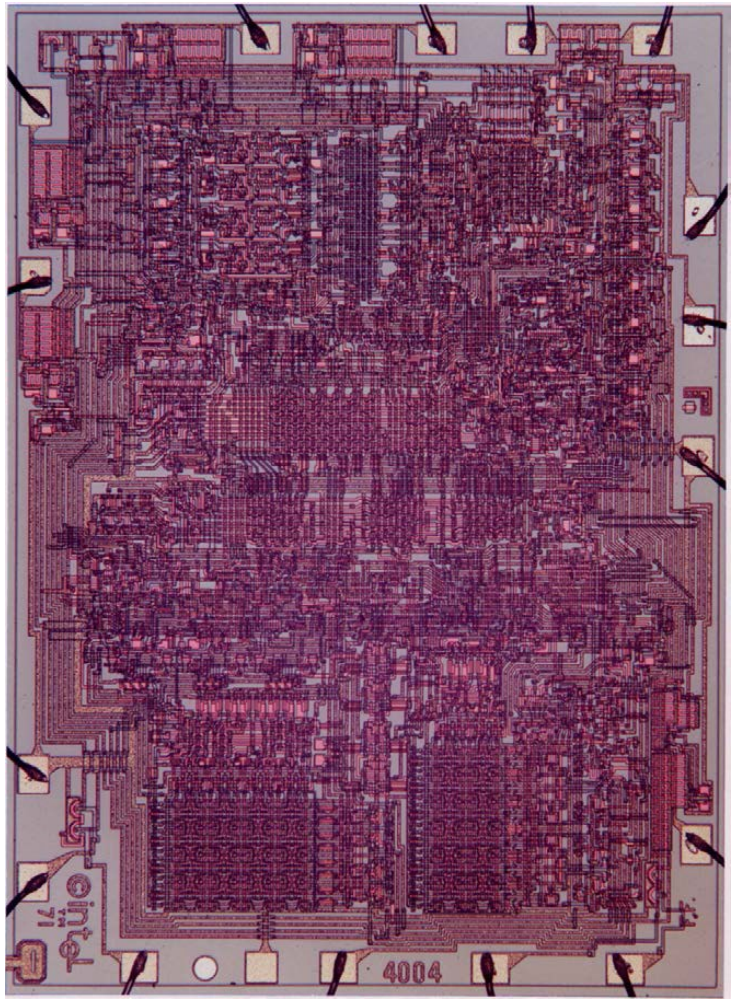
Grace Hopper (January 1984)

Rear Admiral Grace Hopper, US Navy, and other programmers at a UNIVAC console - 1957

1971 – Intel 4004 Microprocessor

Worlds first microprocessor with 2,300 transistors, had the same processing power as the 3,000 cubic-foot ENIAC.





1981 – IBM PC

The IBM PC is introduced running the Microsoft Disk Operating System (MS-DOS) along with CP/M-86. The IBM PC's open architecture made it the de-facto standard platform, and it was eventually replaced by inexpensive clones.

CPU: Intel 8088 @ 4.77 MHz
RAM: 16 kB ~ 640 kB
Price: $5,000 - $20,000

1984 – Apple Macintosh

Apple introduces the first successful consumer computer with a WIMP user interface (Windows Icons Mouse & Pointer), modelled after the unsuccessful Xerox Alto computer.

Motorola 68000 @8Mhz
128KB Ram
US$1,995 to US$2,495

History of Computers

- 1980 – IBM PC (Personal Computer)
- Microprocessor
- 8086
- 80286
- 80386
- 80486
- 80586 (Pentium)
- PII, PIII, PIV…
- Core2 Duo, i5, i7,…

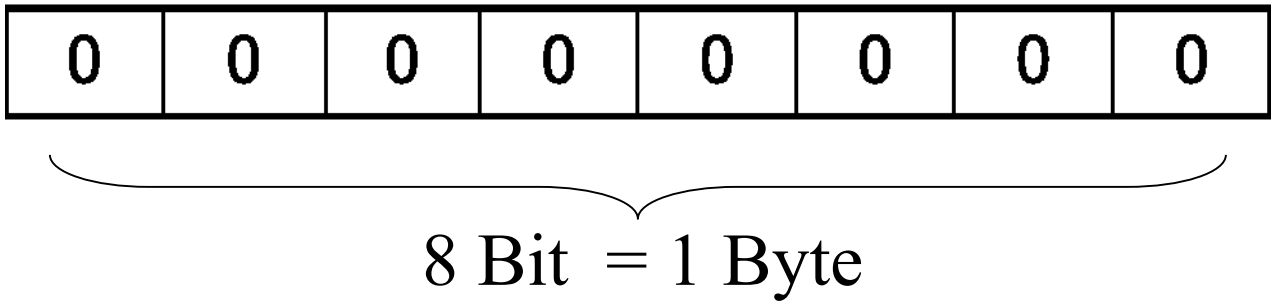
Buying a Computer

- 1993…
- 80386 DX 40 MHz
- 512 KByte RAM
- 100 MByte Hard Disk
- 14“ CRT Monitor
- 32 KByte Display Adapter
- 56 Kbit/sn Modem
- Floppy Disk Driver
- MS DOS + Windows 3.1

- 2019
- Intel i7 3.6 GHz
- 16 GByte RAM
- 1 TByte Hard Disk – 512 Gbyte SSD
- 22“ LCD Monitor
- 6 Gbyte Display Adapter
- Wireless Modem
- Blu-Ray Disc
- Windows 10 or Mac OS X Lion

Computer

- What does a computer use to operate?
  - Electric
- What is the language of computer?
  - Binary system
  - 0 or 1 → Bit (Binary digit)



Binary System

- 1 **Byte** = 8 **bits**
- 2^{10} Bytes = 1024 Byte = 1 **KiloByte** = 1 KByte
- 2^{20} Bytes = 1024 Kbyte = 1 **MegaByte** = 1 MByte
- 2^{30} Bytes = 1024 MByte = 1 **GigaByte** = 1 GByte
- 2^{40} Bytes = 1024 GByte = 1 **TeraByte** = 1 TByte
- 2^{50} Bytes = 1024 Tbyte = 1 **PetaByte** = 1 PByte
- 2^{60} Bytes = 1024 Pbyte = 1 **ExaByte** = 1 EByte

Binary System

- $(00000001)_2 = (\ 1\ )_{10}$
- $(00000010)_2 = (\ 2\ )_{10}$
- $(00000100)_2 = (\ 4\ )_{10}$
- $(00000101)_2 = (\ 5\ )_{10}$
- $(00000111)_2 = (\ 7\ )_{10}$
- $(11111111)_2 = (255)_{10}$
- $(10000000)_2 = (128)_{10}$

Exercises

- 3 Byte = **24** Bit
- 5 MByte = **5120** KByte
- 10 MByte = **10x1024x1024x8** Bit