Session 1: Overview of computer and IT

FACULTY OF INFORMATION TECHNOLOGY
UNIVERSITY OF SCIENCE - HO CHI MINH CITY

Content

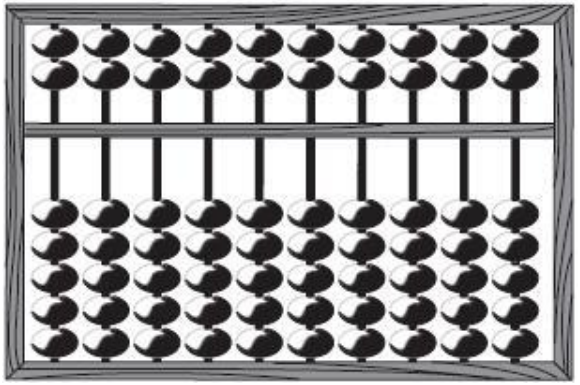
- History of Computing
- Categorization of Computers
- Hardware
- Software
- IT and Applications
- IT in Vietnam
- FIT-HCMUS

HISTORY OF COMPUTING

Computers

- The oldest computing device was the Roman abacus
- The most familiar version is the Chinese abacus.

$10^9 10^8 10^7 10^6 10^5 10^4 10^3 10^2 10^1 10^0$

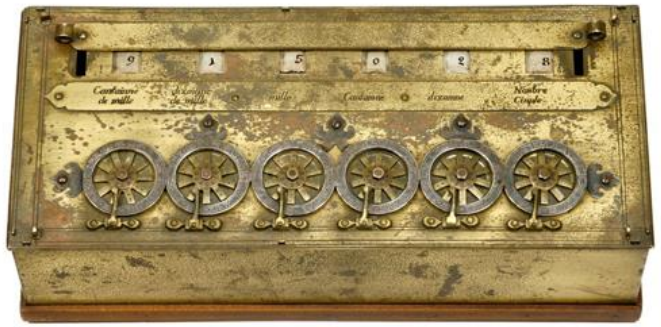


Chinese abacus

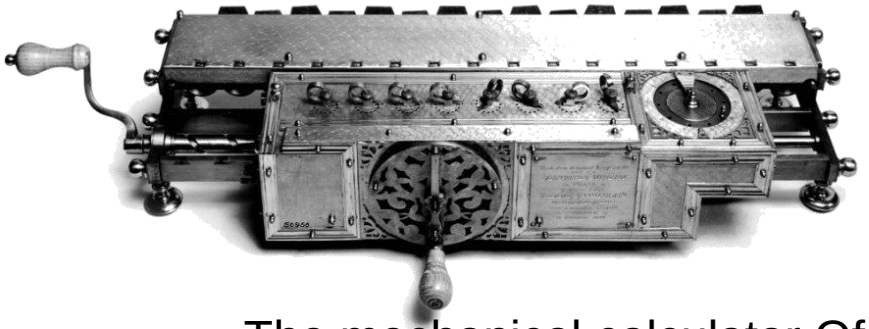
Computers

- In 1641, Blaise Pascal (1623 - 1662) built the first mechanical calculator for addition
- In 1671, Gottfried Leibritz (1646 - 1716) improved Pascal's calculator for addition, subtraction, multiplication and division.

Blaise Pascal



Pascal's mechanical Calculator for addition



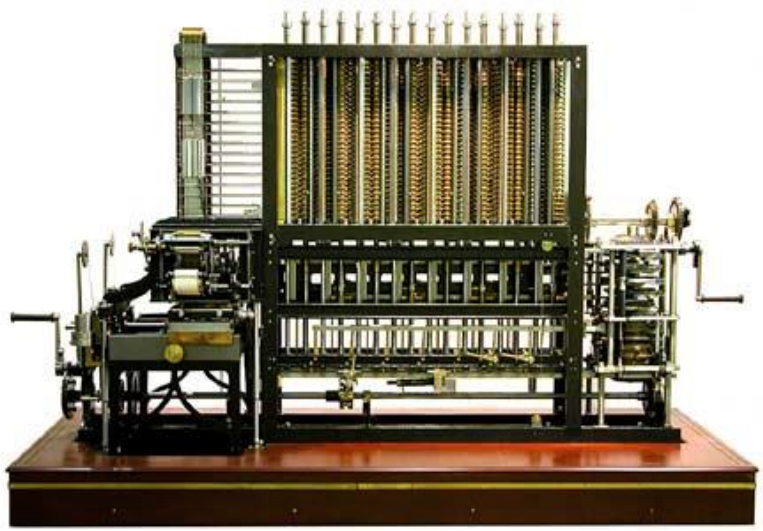
The mechanical calculator Of Gottfried Wilhelm Leibniz for addition, subtraction, multiplication and division.

Nguồn : computerhistory.org

Computers

- In 1833, Charles Babbage (1792 - 1871) suggested that mechanical calculators should not be developed and proposed computers with external programs (on punched cards).

Charles Babbage



Charles Babbage ‘s computer

Nguồn : *wikipedia*

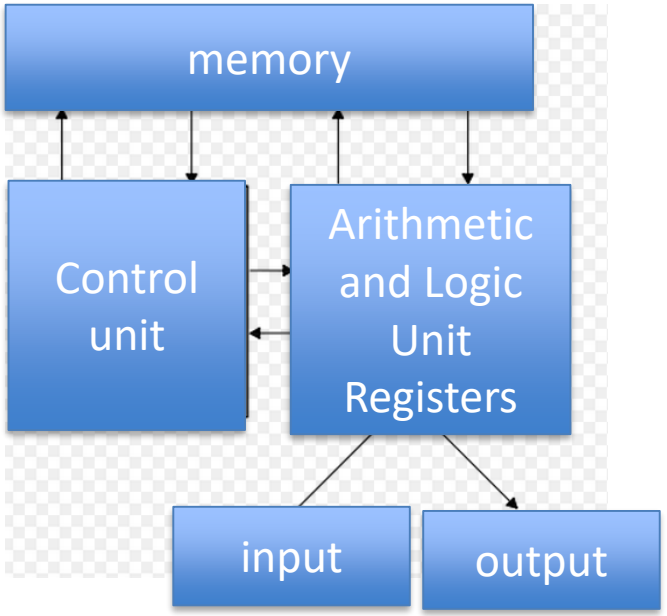
Computers

- punched card

Computers

- In 1945, John Von Neumann introduced a significant principle: the program must be stored in the computers and execute the program's instructions sequentially (one instruction at a time).

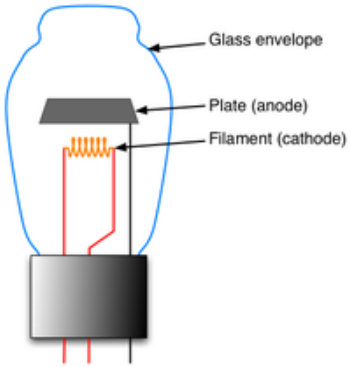
John Von Neumann

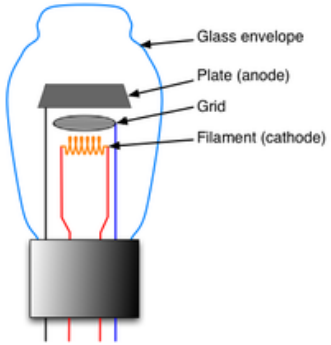


The Architecture of J.V. Neumann (1947)
https://vi.wikipedia.org/wiki/John_von_Neumann

Generations

- First generation (1945 - 1959)
  - Using vacuum tubes
  - ENIAC machine (USA) is 30.5m long, weighs 30 tons, 18000 vacuum tubes, uses punch cards, performs 1900 additions / second, serves for defense purposes (ballistic, making atomic bombs , ...)
  - UNIVAC machine is 10 times faster than ENIAC machine, using more than 5000 vacuum tubes





1946
ENIAC

Nguồn : computerhistory.org

1951
UNIVAC

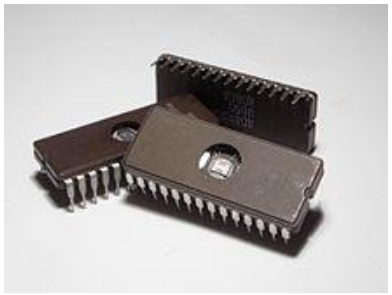
Nguồn : *computerhistory.org*

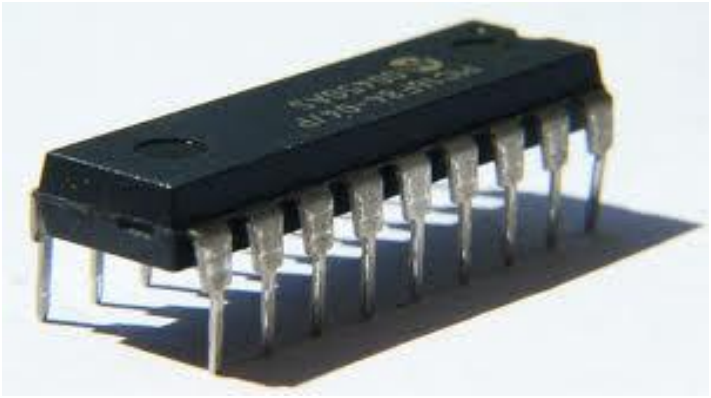
Generations

- Second generation (1960 - 1964)
  - Using semiconductors - transistors (smaller and cheaper, consume less power and generate less heat than vacuum tubes)
  - IBM 7090 reached 2 million calculations / second; participated in Mercury Project (USA) (put the first American astronaut in space); calculated the largest prime number at that time (1961) with 1332 digits
  - M-3, Minsk-1, Minsk-2 (Soviet Union)
  - NNLT: COBOL, FORTRAN

Generations

- Third generation (1964 - 1970)
  - Using Integrated Circuit (smaller, faster, cheaper, ...)
  - IBM360 (USA) performs 500,000 additions / second (250 times more than ENIAC)

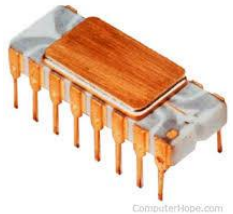


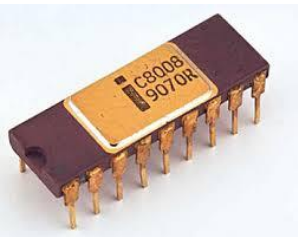


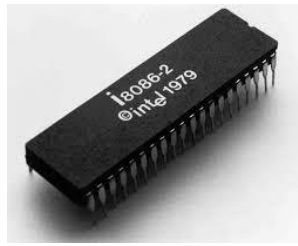
Generations

- Fourth generation (1970 - present)
  - Using large-scale integrated circuit (LSI) and very large-scale integrated circuit (VLSI)
  - Intel 4004 in 1971 (4-bit processor)
  - Intel 8008 in 1972 (8-bit processor)
  - Intel 8086 in 1978 (16-bit processor)
  - Intel Core i7 (1,170,000,000 transistors, 6 cores, 12 threads working simultaneously)
  - Other (Snapdragon 855, Apple A11 Bionic)
  - Parallel processing

Intel 4004





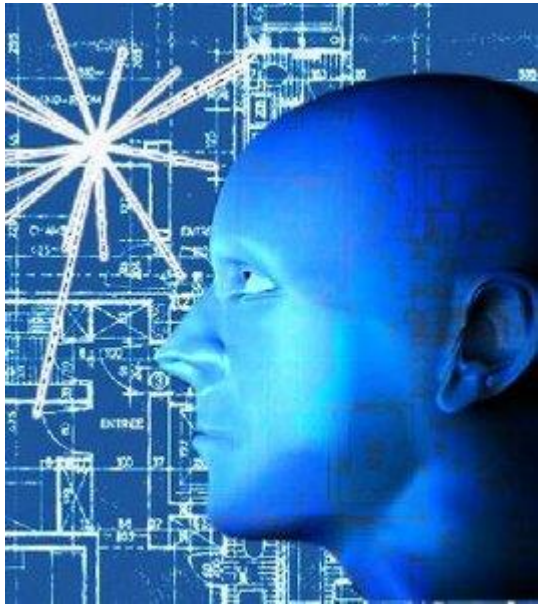


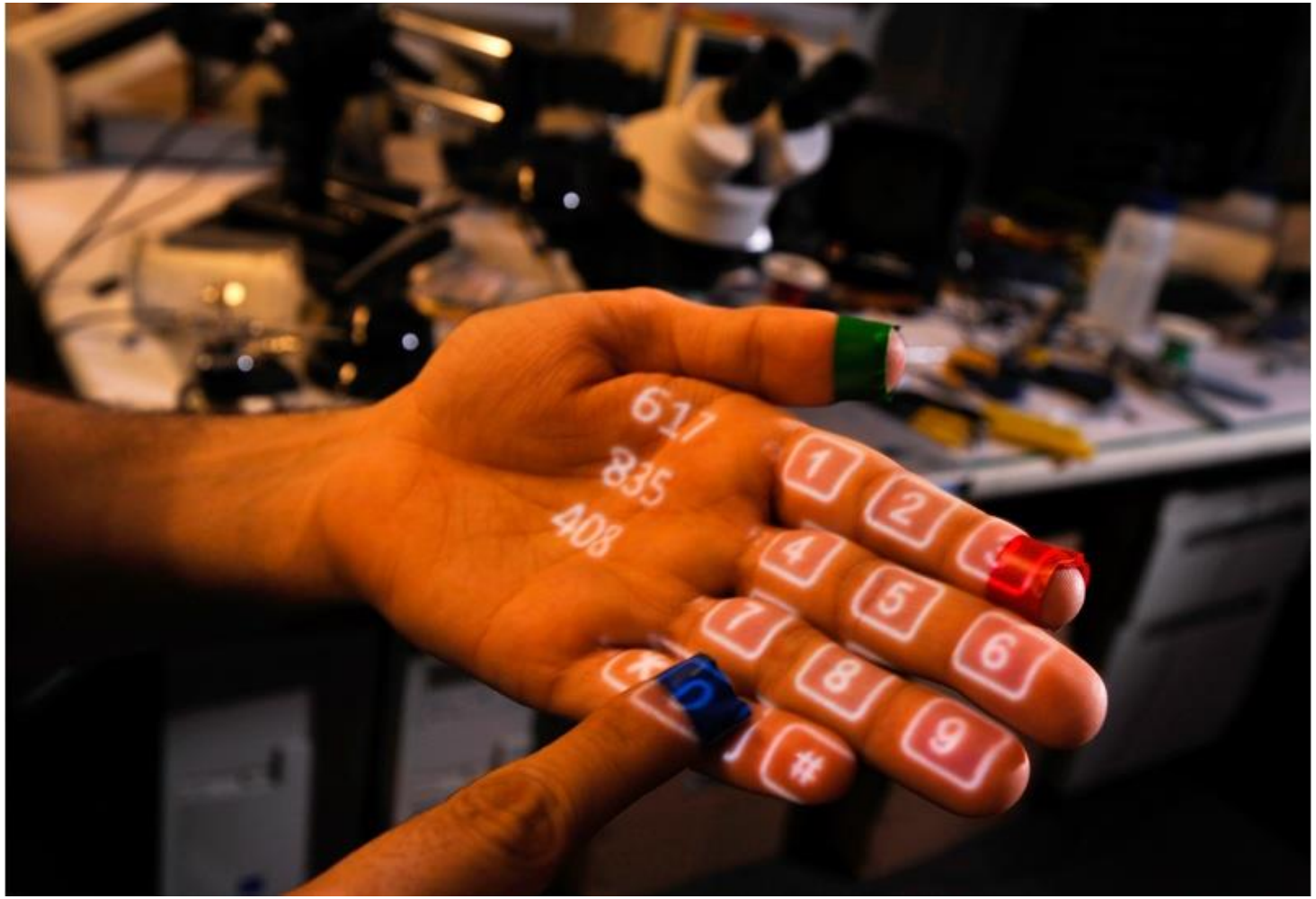
1973
Personal Computer - Micral N.
François Gernelle

1981
IBM PC

Generations

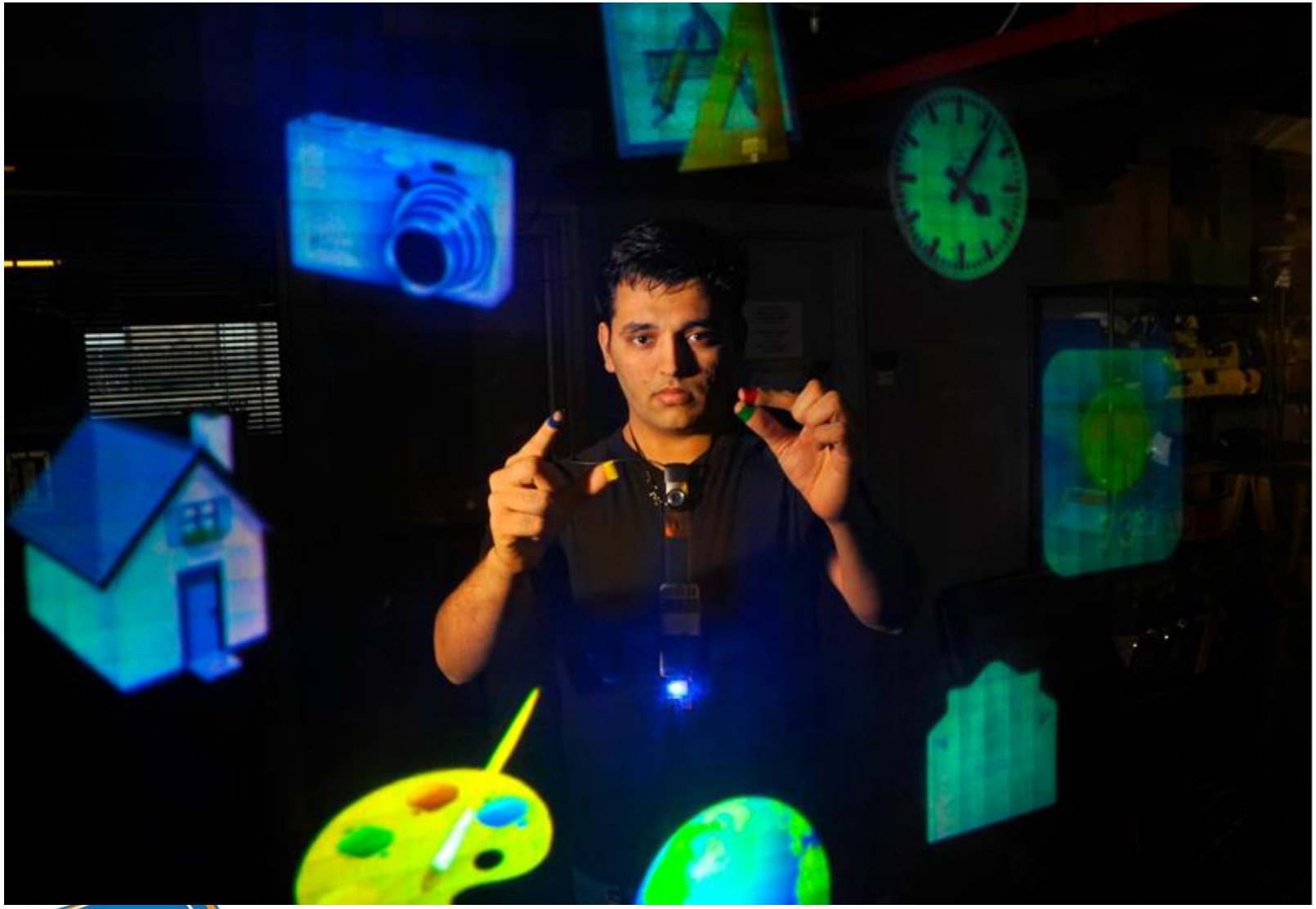
- Fifth generation (near future?)
  - Working on artificial intelligence
  - Communicating directly with people in natural language,
  - Learning the knowledge
  - Expressing emotions ...

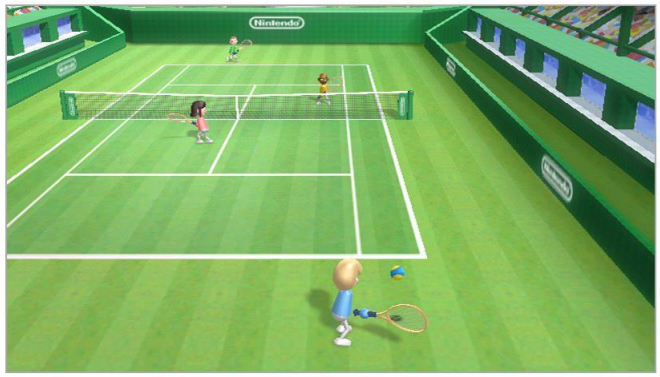



617
835
408

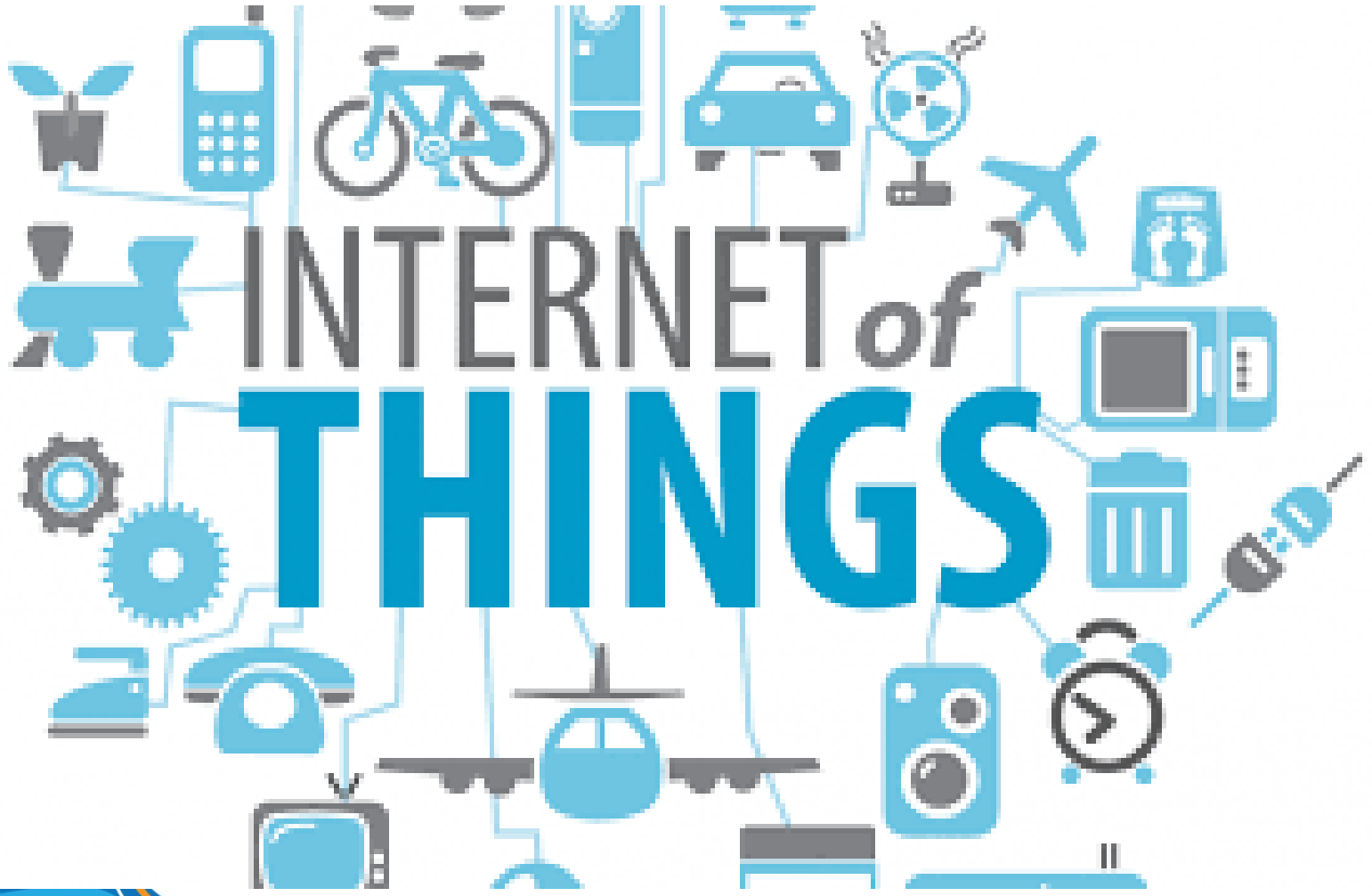

In the news
Boston Globe
MONDAY, JANUARY 5, 2009
Deadly Conflict
Linda Rentala
FOR THE PRIVATE PURPOSE ONLY
Israelis split Gaza in two amid calls for a cease-fire
By Ethan Bronner
Obama Cabinet nominee pulls out
First bump in proce
for president-elect


Delayed: 20 Minutes




Nintendo


Strand Books
Paul is 402 ft away
from Strand Books
jessica wants
to talk to you.
Accept


INTERNET of
THINGS

Virtual Reality (VR)

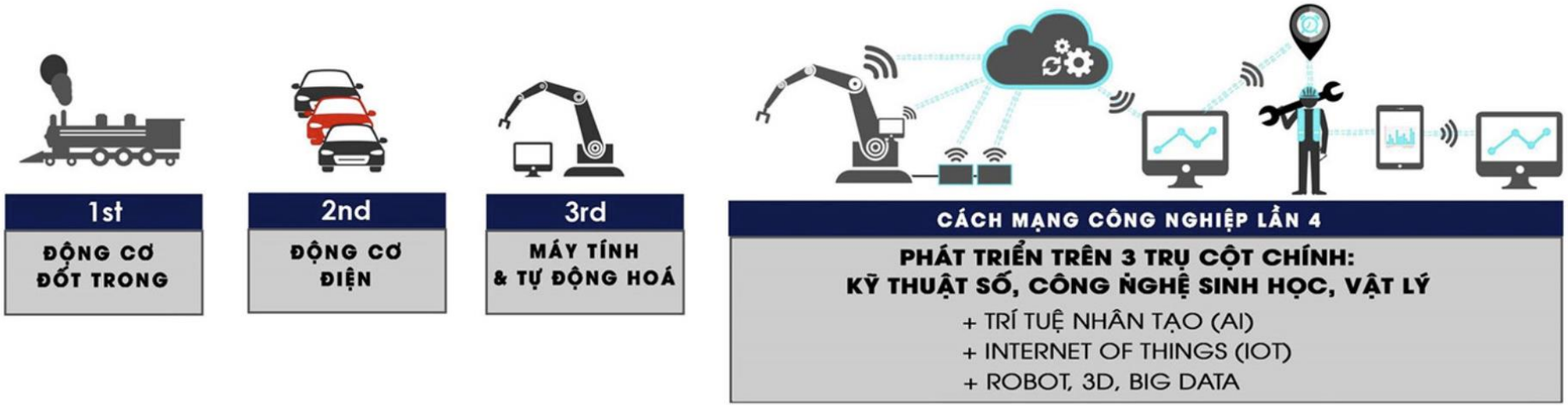
Augmented Reality (AR)

Hologram

Industry 4.0

- The 1st industrial revolution marked by transition from hand production methods to machines through the use of steam power and water power.
- The 2nd revolution took place thanks to the application of electricity for mass production.
- The 3rd revolution used electronic and information technology to automate the production.
- Now, the 4th Industrial Revolution is a range of new technologies that are fusing the physical, digital and biological worlds, impacting all economies and industries, and even challenging ideas about what it means to be human. (Klaus Schwab)

Industry 4.0



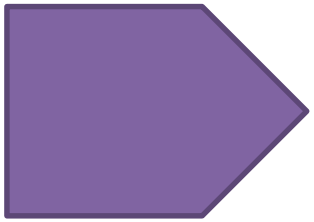
(Nguồn Internet)

Components of Industry 4.0

- AI - Artificial Intelligence
- IoT - Internet of Things (Everything connected via the Internet)
- 3D technology: Virtual reality, Augmented reality, 3D printing
- Social networks, mobile networks, big data analytics, cloud computing (SMAC: Social, Mobile, Analytic, Cloud)

Industry 4.0

- Which factors will play a decisive role in the 4.0 industrial revolution?



The answer is still ahead,
Maybe they could be inventions of IT!

CATEGORIZATION OF COMPUTERS

Supercomputer

- The most powerful today, it is integrated from hundreds to thousands of processors.
- Designed for simulations of global climate change, nuclear explosion, ...

Mainframe

- Designed for multitasking
- Powerful input and output, focusing on processes of big data, such as financial transactions, insurance business, …

Minicomputer

- Computers are between mainframes and microcomputers

Microcomputer

- Computers are suitable for most users, including three main types:
  - Desktop
  - Laptop
  - Handheld

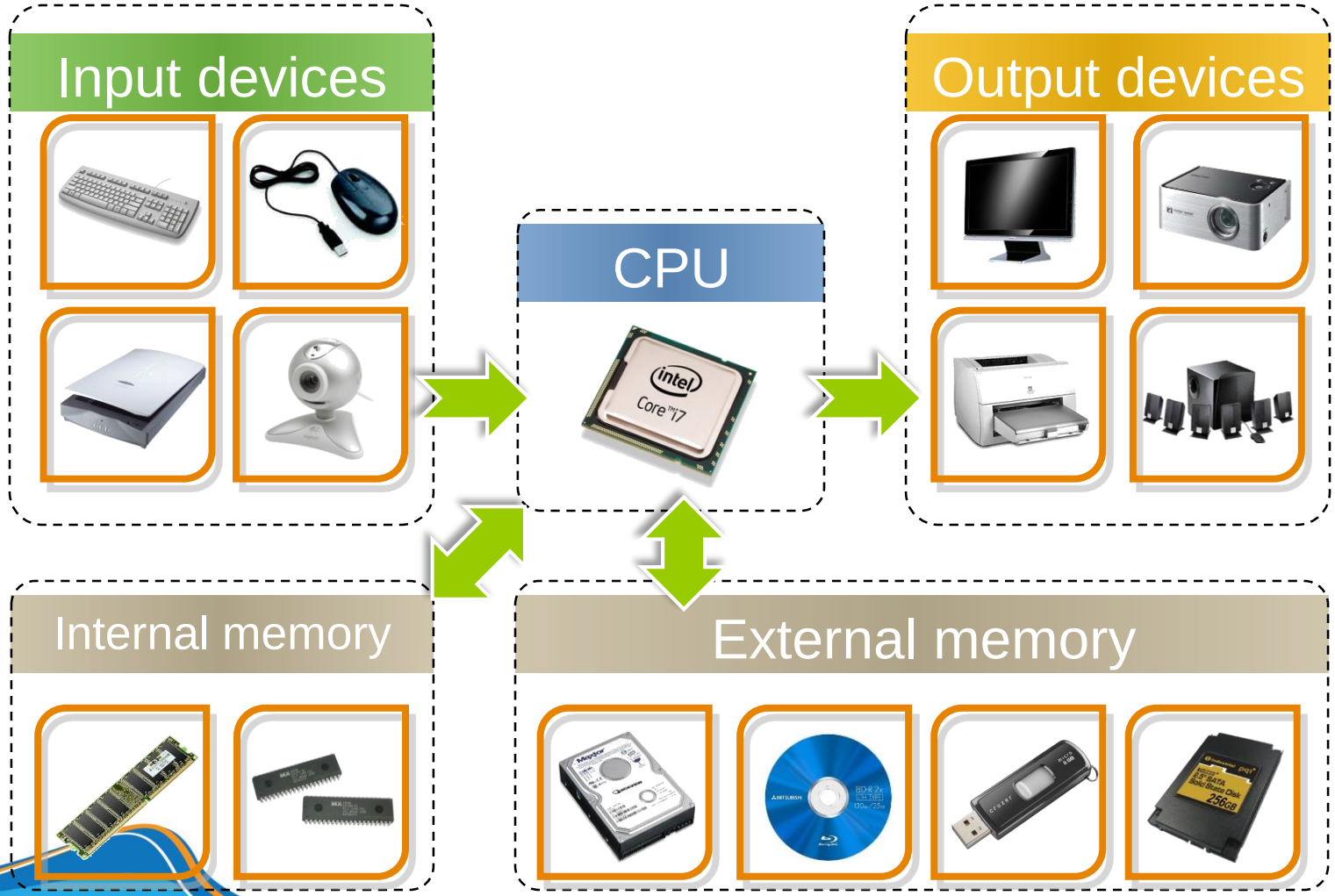
Desktop

Laptop

Handheld

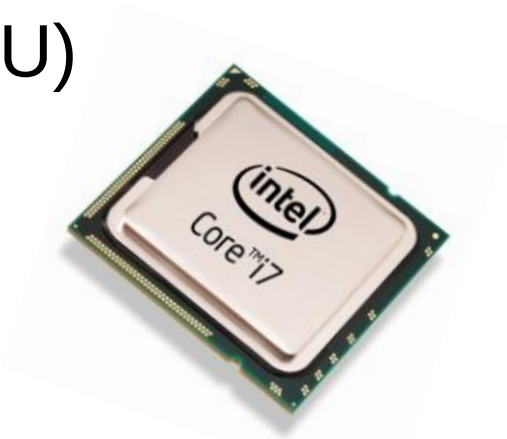
COMPUTER ARCHITECTURE - HARDWARE

Computer Architecture



CPU

- Central Processing Unit - CPU
  - The CPU controls all computer operations.
- Include:
  - Control Unit (Control Unit - CU)
  - Arithmetic Logic Unit (ALU)
  - Registers
  - Bus line
  - Clock



Intel Core i7 CPU

Internal memory

- ROM (Read Only Memory)
  - Storing the system program.
  - Data is always maintained even when the power supply is interrupted.

- RAM (Random Access Memory)
  - Storing data temporarily.
  - Data will be lost when power supply is interrupted

External memory

- Advantages and disadvantages compared to internal memory
  - Advantages:
    - Storage capacity is larger
    - High reliability
    - Low cost
  - Disadvantages
    - Access speed is significantly slower

External memory

- Categorization based on technical characteristics:
  - Magnetic system
  - Optical system
  - Flash drive
  - Solid state drive

External memory

- Magnetic system
  - Tape: The first storage device, slow speed, often used to back up data.
  - Floppy Disk: slow speed, not long life.
  - Hard Disk: Multi-layer, up to TBs capacity, fast speed, long life.

External memory

- Optical system
  - CD (Compact Disk): 700MB.
  - DVD disc (Digital Video / Versatile Disk): up to 17GB.
  - Some enhancements from DVD:
    - HD DVD / Blu-ray (30 / 50GB)
    - HVD (500GB up to 3.9TB)
    - 5D DVD (10TB)

External memory

- Flash Drive
  - Developed over the last 10 years, eliminating the mechanical properties of magnetic and optical discs.
  - The small size, convenient communication via USB (Universal Serial Bus) so it has made the floppy disk no longer exist.
  - Common capacity ranges

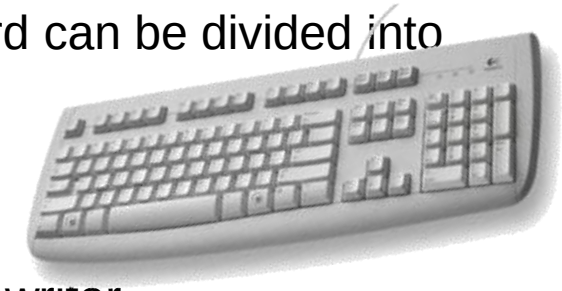
  from 8 GB to 32 GB.

External memory

- Solid State Drive
  - Using solid memory to store data.
  - The read speed is 3 times faster, the write speed is 1.5 times faster than the normal hard drive.
  - Low power consumption, suitable for mobile devices.
  - The price is higher than a normal hard drive.
  - The largest capacity in 2010 is 1 TB and costs about $ 2,200.
  - 1 TB (10-2015) -> 300-400 $
  - 500 GB (08-2018) -> 100 $

Input Devices

- Keyboard: Standard input device. The keys on a keyboard can be divided into several groups based on their functions:



  - Typing (alphanumeric) keys.

    These keys include the same letter, number, punctuation, and symbol keys found on a traditional typewriter.

  - Control keys. These keys are used alone or in combination with other keys to perform certain actions. The most frequently used control keys are Ctrl, Alt, the Windows logo key Picture of the Windows logo key, and Esc.
  - Function keys. The function keys are used to perform specific tasks. They are labeled as F1, F2, F3, and so on, up to F12. The functionality of these keys differs from program to program.
  - Navigation keys. These keys are used for moving around in documents or webpages and editing text. They include the arrow keys, Home, End, Page Up, Page Down, Delete, and Insert.
  - Numeric keypad. The numeric keypad is handy for entering numbers quickly. The keys are grouped together in a block like a conventional calculator or adding machine

Input Devices

- Mouse: A hand-sized device to move the mouse cursor.
- Scanner: Convert documents into digital images.

Mouse

Scanner

Input Devices

- Webcam & Camera: Record images from the real world to your computer.
- Digital Camera: Capture images from the real world and put them on the computer.

Webcam

Digital camera

Input Devices

- Drawing Tablet: Use a stylus to draw on the electronic board
- Barcode Reader (Barcode Reader): Used to read barcodes (encrypted numbers).

Drawing Tablet

Barcode Reader

Output Devices

- Monitor: Standard output device
  - Common types: CRT and LCD.
  - Resolutions: 800x600, 1024x768, ...
  - Sizes: 15 ", 17", 19 ", 22" ...

CRT

LCD

Output Devices

- Projector
- Printer
- Speaker

Projector

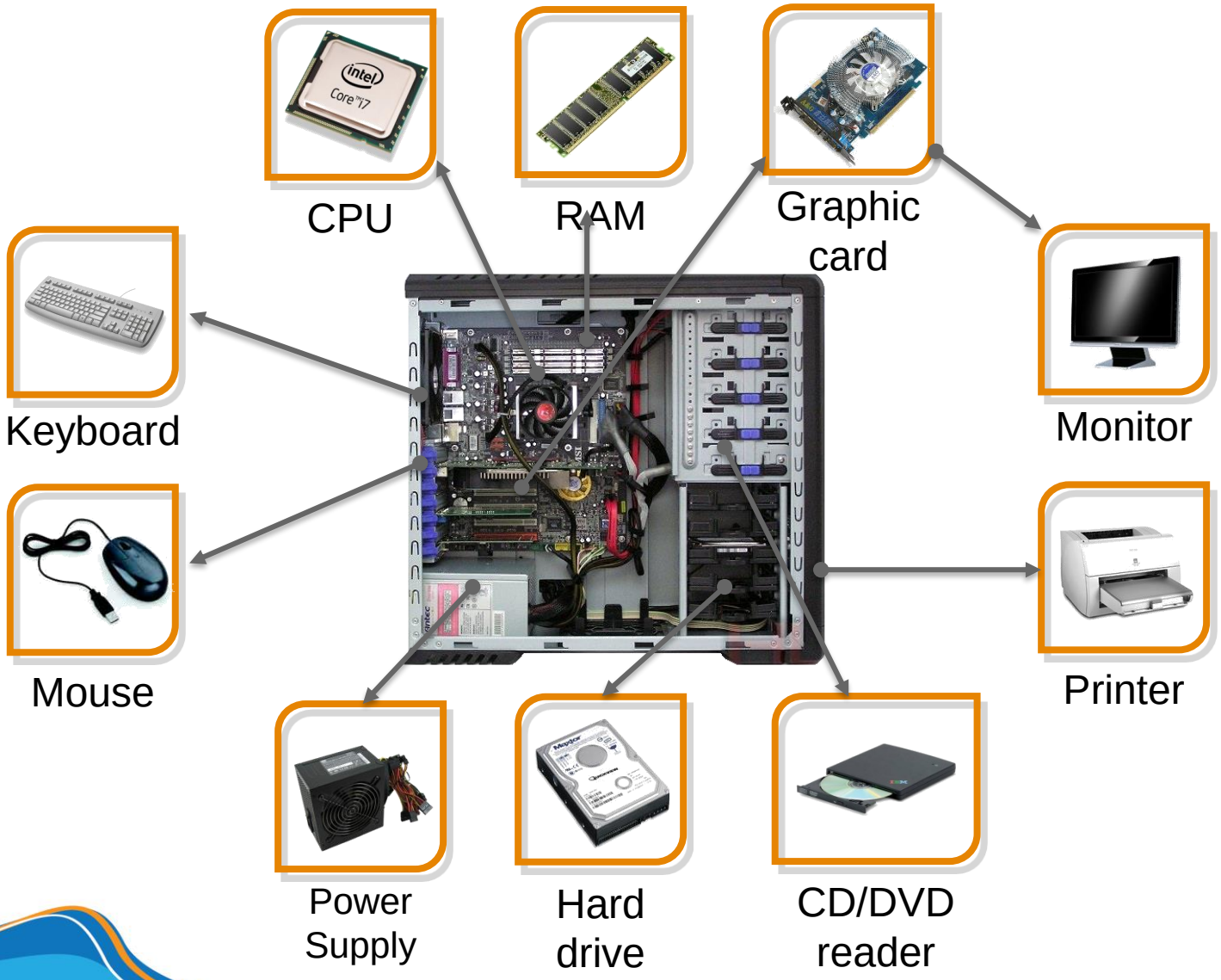
Printer

Speaker

Motherboard

- Motherboard plays an important role and is a bridge for the devices.
- There are many devices mounted on the motherboard such as: computer power, CPU, RAM, control board (graphics, audio, network), hard drive, disk reader (CD, floppy disk), monitor, keyboards, mouse, ...

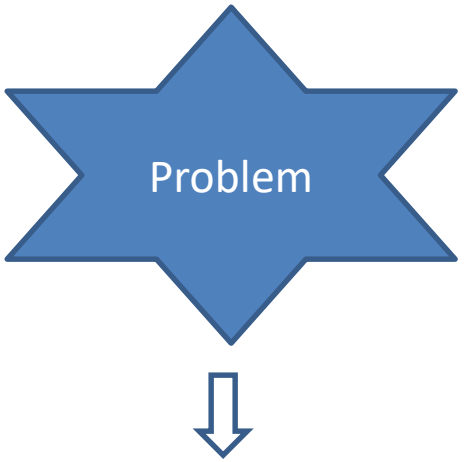
Inside a PC case



SOFTWARE

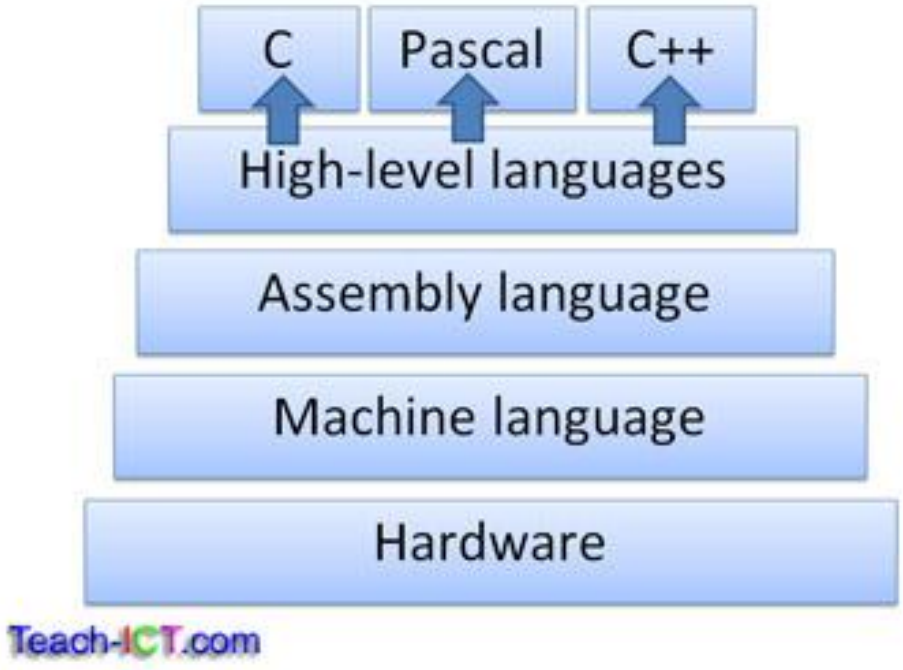
Definition

Software is a set of instructions written in a programming language with a syntax to automatically perform certain tasks or solve a certain problem.



Definition


Simula
Visual C++
Visual Basic
APC
HTML
Cobol
PL/1
Algol
Eiffel
Fortran
Basic
awk
prolog
Lisp
ADA
C++
Icon
Pascal
sed
C
Smalltalk
Modula-2
Snobol
perl
Scheme
Delphi
JAVA


C
Pascal
C++
High-level languages
Assembly language
Machine language
Hardware
Teach-ICT.com

Programming Language Rankings

TIOBE Index and RedMonk

Ranking	2018	2017
1	JavaScrip	JavaScrip
2	Java	Java
3	Python	Python
4	PHP	PHP, C++
5	C#	
6	C++	
7	CSS	CSS, Ruby
8	Ruby	
9	C	C
10	Swift	Objective-C

Software Classification

- System software
  - Operating system (OS): Compile, communicate with hardware, communicate with users, manage resources, control devices, etc.
  - Windows, Linux, MacOS

Microsoft Windows

Fedora

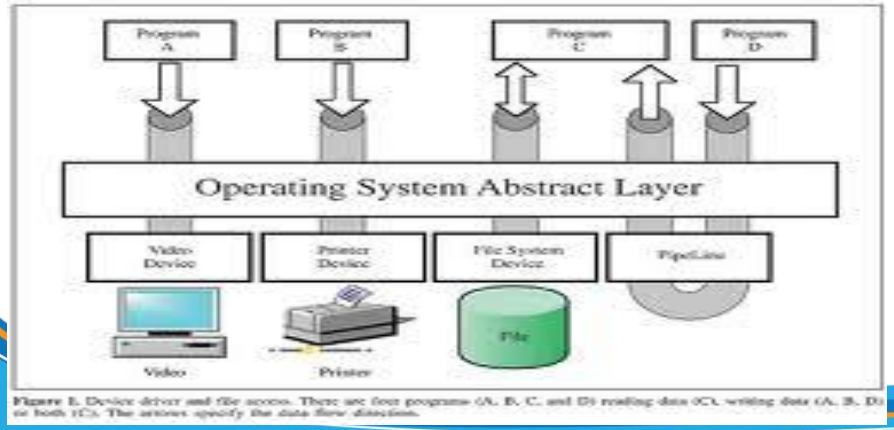
MacOS

Software Classification

- System software
  - Network software.
  - Database management software (system).

Software Classification

- System software
  - Software for controlling peripheral devices (drivers).
    - Drivers are integrated into the system
    - Allow programs to interact devices
    - Each device may have more drivers corresponding to different operating systems

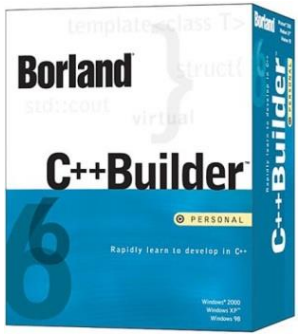


Software Classification

- Software supports developing tools/software
  - Compiler, Interpreter.
  - Debugger.
  - Linkers, Loader.

Microsoft Visual Studio

Eclipse

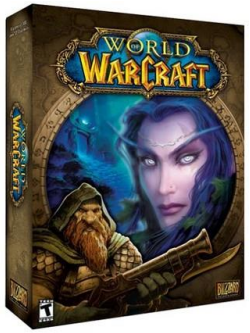


Borland C++ Builder 6

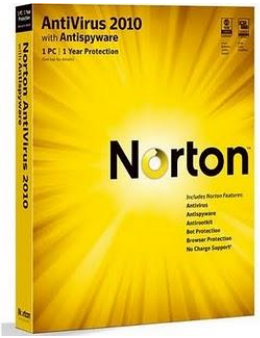
Software Classification

- Application software
  - Working: office applications, business applications, graphic design, ...
  - Entertainment: games, listening to music, watching movies, ...
  - Utility : antivirus, data compression, ...

Microsoft Office



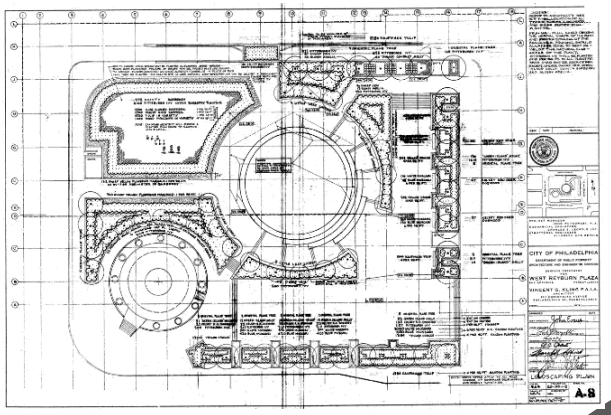
World of Warcraft



Norton Antivirus

IT AND APPLICATIONS

IT and applications



Raw data

Digital data

Software

Hardware

Recording & digitizing data

- Data
- Text
- Image
- Video
- Audio

- Digital devices

Recording

- Data file
- Text file
- Image file
- Video file
- Audio file

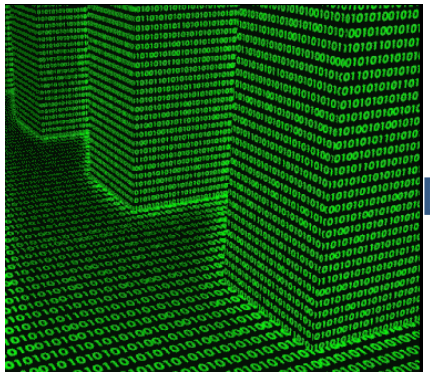
Digitizing

- manual way
- semi-automatic way
- automatic way

Demand for data

- Demand for data storage
- Demand for data search
- Demand for data extraction
- Demand for data visualization
- Demand for data transmission
- Demand for data sharing
- Demand for data security

Data storage



Data search

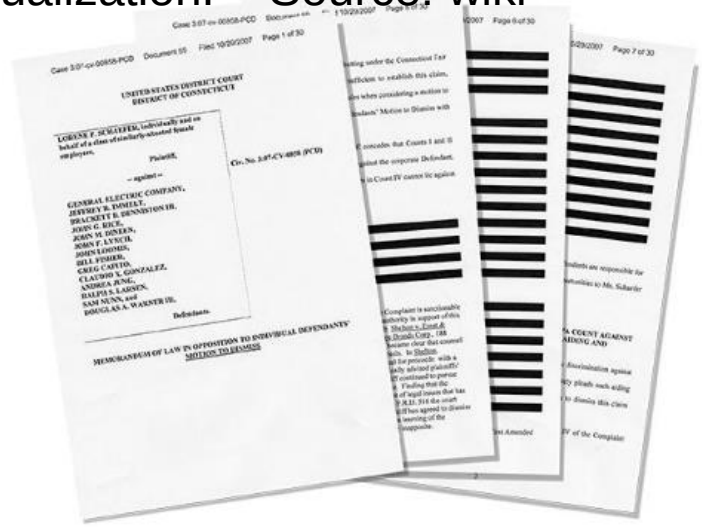
and

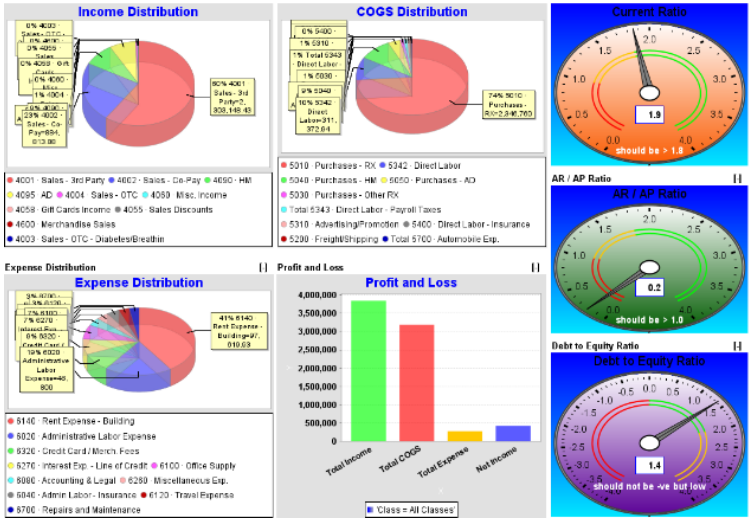
Data extraction

Data extraction is the act or process of retrieving data out of (usually unstructured or poorly structured) data sources for further data processing or data storage (data migration) – source: wiki

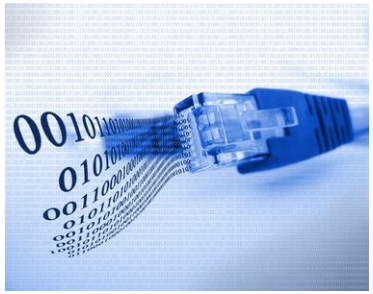
Data visualization

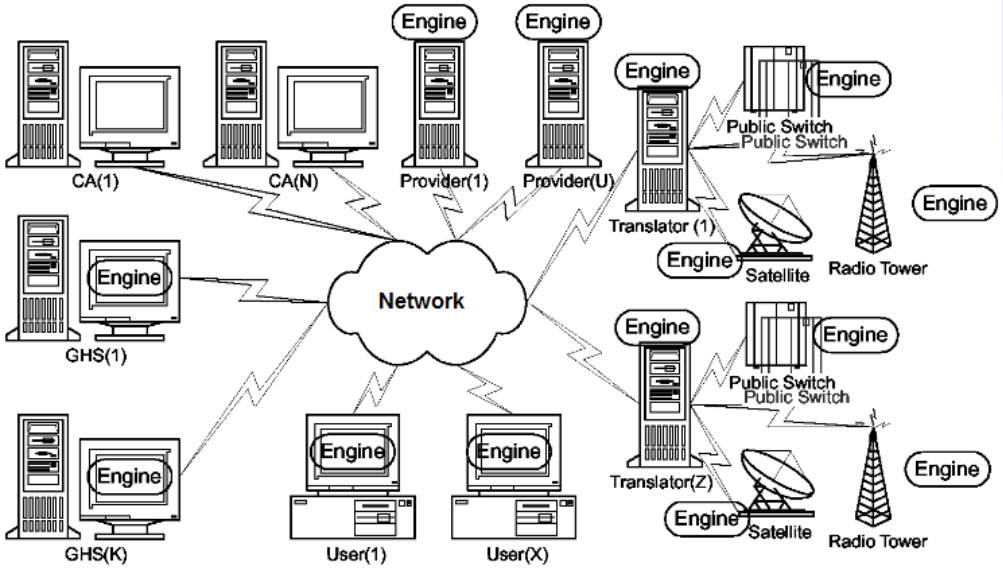
Data visualization is the graphic representation of data. It involves producing images that communicate relationships among the represented data to viewers of the images. This communication is achieved through the use of a systematic mapping between graphic marks and data values in the creation of the visualization. – Source: wiki





Data transmission





Data sharing

Data security

INFORMATION TECHNOLOGY (IT) IN VIETNAM

IT in Vietnam

- Before 1975
  - 1964-1975: The South has the Computer Center used for the US military during the Vietnam War, using the US IBM 360 computer system.
  - 1968-1975: The North has Mathematics Department, using the Minsk-22 computer system of the Soviet Union (Russia).

IT in Vietnam

The US IBM 360 computer system

The Minsk-22 computer system of the Soviet Union (Russia).

IT in Vietnam

- After 1975
  - 1976: The Institute of Computational and Control Sciences was established in Hanoi, later renamed to Vietnam IT Institute.
  - 1988: Vietnam Association for Information Processing (VAIP) was established.
  - 1997: Vietnam officially connects to the internet worldwide.
  - 2002: Vietnam Software Association (VINASA) was established.

IT in Vietnam

- List of software industry and IT services (provided by VINASA). VINASA develops this list based on the Japanese Information Technology Skills Standards (ITSS), and The European Certification of Informatics Professionals (EUCIP).

STT	Ngạch	Phân ngạch	Bậc						
			1	2	3	4	5	6	7
1	Kinh doanh	Tư vấn hệ thống thông tin							
2		Tư vấn sản phẩm CNTT							
3		Kinh doanh qua kênh truyền thông							
4	Tư vấn	Tư vấn chuyển đổi nghiệp vụ							
5		Tư vấn công nghệ thông tin							
6		Tư vấn gói sản phẩm							
7		Tư vấn triển khai hệ thống							
8	Kiến trúc CNTT	Kiến trúc ứng dụng							
9		Kiến trúc hạ tầng							
10		Kiến trúc tích hợp							
11	Quản lý dự án	QLDA phát triển phần mềm							
12		QLDA dịch vụ hạ tầng CNTT							
13		QLDA thầu khoán (outsourcing)							
14		QLDA phát triển hệ thống							
15	Hệ thống	An toàn thông tin							
16		Tính toán phân tán							
17		Mạng							
18		Cơ sở dữ liệu							
19		Quản trị hệ thống							
20		Nền tảng hệ thống							
21	Ứng dụng	Gói sản phẩm nghiệp vụ							
22		Hệ thống ứng dụng nghiệp vụ							
23	Phát triển phần mềm	Phần mềm ứng dụng							
24		Phần mềm lớp giữa (middleware)							
25		Phần mềm nền tảng							
26		Kiểm thử phần mềm							
27	Dịch vụ khách hàng	Quản trị trang thiết bị							
28		Phần mềm							
29		Phần cứng							
30	Dịch vụ CNTT	Quản lý hệ thống CNTT							
31		Vận hành hệ thống CNTT							
32		Vận hành quy trình nghiệp vụ (BPO)							
33		Trợ giúp từ xa							

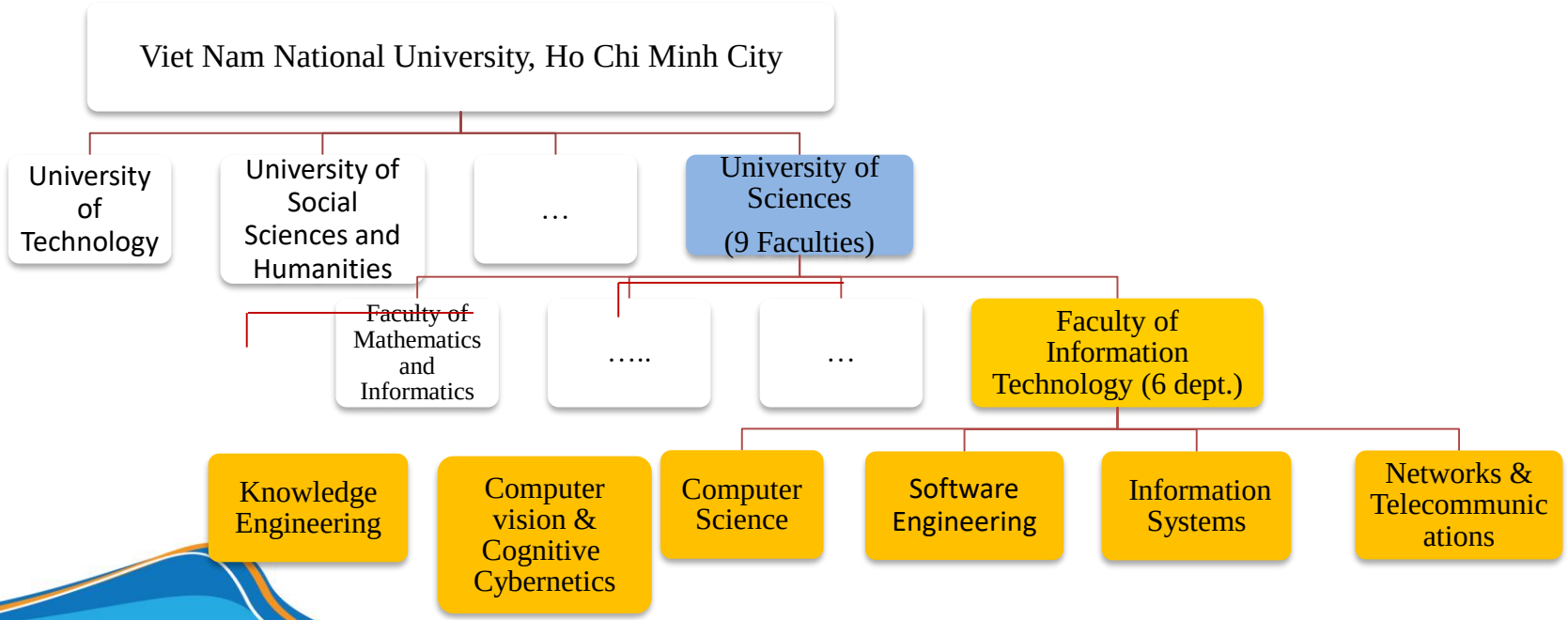
White cell means no existence.

FIT-HCMUS

Introduction to IT faculty

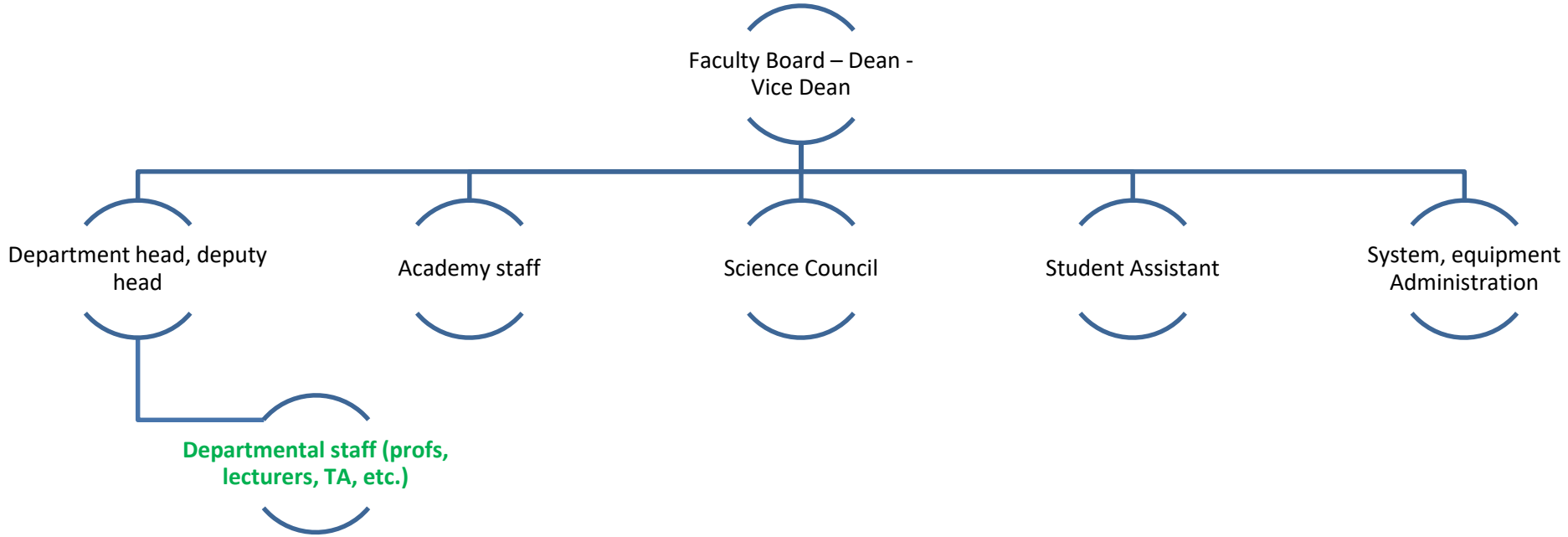
History

- Being one of the top 7 IT faculty of Vietnam
- Established in 1995 with the precursor of the computer science department of the Faculty of Mathematics.



Introduction to the IT faculty

- Organizational chart



Department of Information Systems

- Providing the knowledge for students to implement IS projects, specialized in business applications and data management, etc.
- Focusing on applied technologies in the field of IS such as data modeling, database design, methods of analyzing and designing IS, distributed information systems.
- Research fields:
  - Information retrieval: Text Mining, Indexing Models, Natural Language Processing for IR, Cross Language IR, Question & Answers Systems, Medical Information Retrieval - (Leaded by prof. Ho Bao Quoc and Dr. Le Nguyen Hoai Nam)
  - Mobile IS: Cooperative Caching Method, Location Management, Mobile Databases, Mobile P2P Applications. Internet of Things –(Leaded by Dr. Nguyen Tran Minh Thu)
  - TEL systems, knowledge representation, semantic web, smart services (in education and business) – (Leaded by Dr. Pham Nguyen Cuong)
  - Information and data security: Data Confidentiality, Access Control Mechanisms, User Privacy, Data Privacy – (Leaded by Dr. Pham Thi Bach Huệ)
  - Data mining: Data mining in biomedicine – (Leaded by Dr. Lê Thi Nhàn)

Department of Software Engineering

- Providing knowledge in the development, management and maintenance of software, thereby enabling students to design and implement high quality software products. Graduates of this major will be able to analyze, design, and administrate middle to high-end software projects
- Research fields:
  - Advanced methods in software design, object-oriented programming, teaching support software, cryptography and applications

Department of Computer Networks and Telecommunications

- Providing knowledge in the field of communication between wide area networks, local computer networks and between distributed information systems. Student has a ability to design and implement medium to large computer networks, and communication systems
- Research fields:
  - Advanced network and communication technologies, distributed systems, VoIP, WAP / PKI systems and network security, mobile agent

Department of Computer Science

- Providing advanced knowledge and skills necessary to build integrated applications that are capable of intelligent processing applied in education, training, economics, society, science and technology, natural resource and environmental management. Knowledge includes the foundation of knowledge based systems, human-to-machine interaction, pattern recognition, and data mining.
- Research fields
  - Knowledge base systems, soft calculation, image processing, neural networks, machine learning, pattern recognition, programming evolution, image and signal processing in medicine, semantic web, audio processing

Department of Computer Vision

- Digital image and video processing, computer vision and robotics

Programs

- Doctor of Philosophy in Computer Science (PhD)
- Master of Science in Computer Science or in Information Systems
- Bachelor of Science in Computer Science
  - Regular fulltime program (1995 – present)
  - Talented/honors fulltime program (2002 - present)
  - Advanced fulltime program (2013 - present)
  - English advanced fulltime program (2006 - present)
  - French advanced fulltime program (1994 - present); from 2010 to double degree with Claude Bernard University - Lyon1 (France)
  - Inter-college program for students who have graduated from IT college
  - Distance learning program (2006 - present)