.NET PROGRAMMING **OVERVIEW**

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COMPUTERS IN A NUTSHELL

Nowadays everybody knows computers (unless you have born in cuba or North Korea). Although not everybody knows how they really work.

The **Computers** are machines (in these days are elecronic machines) which are designed for humans and to be used by humans, they are designed to make our life more easy.

MSI GT60 0NE

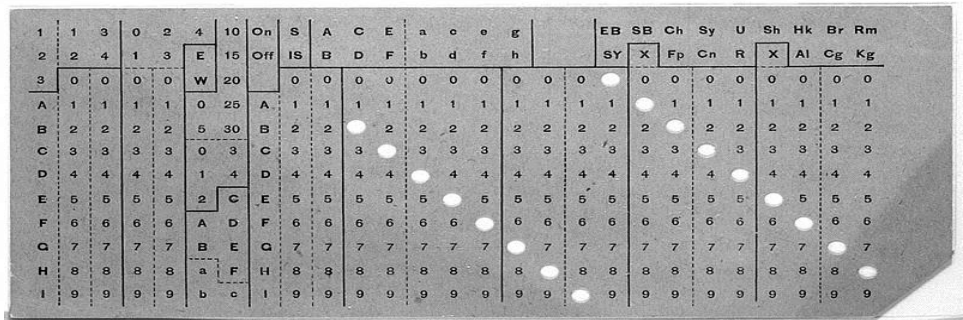
A computer is a general-purpose device that can be programmed to carry out a set of arithmetic or logical operations automatically. Since a sequence of operations can be readily changed, the computer can solve more than one kind of problem.

- Wikipedia

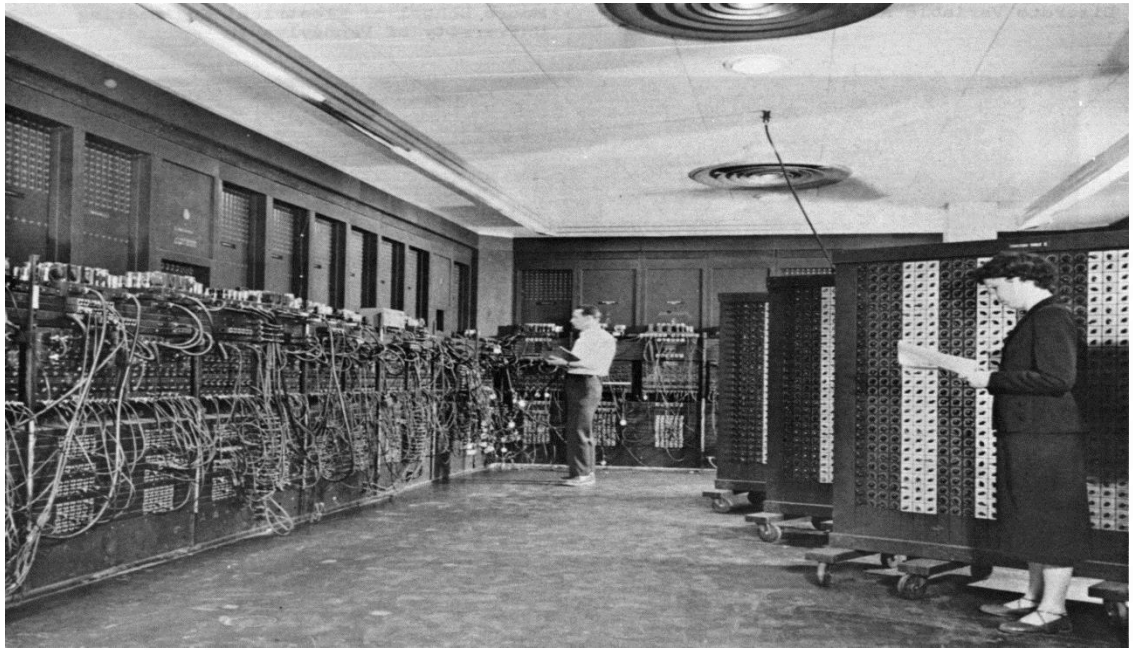
JUST HISTORY

First computers where created by the necessity to calculate large quantities of mathematical operations, most of them repetitive operations.

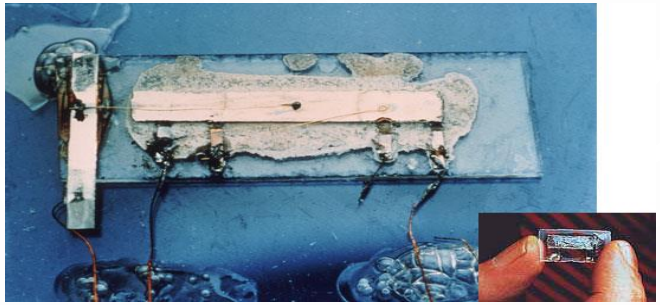
- In the USA, for the national census in 1880 it was necessary to employ hundreds of employees working for 7 years only for calculating the final result.
- In 1890 Herman Hollereith designed a computing system which stored “programs” and information based un holes in a paper, it was made only using electromechanical relays and switches. These system had a huge success because a national census could now be calculated in 1 year. In 1911 he founded the IBM company.

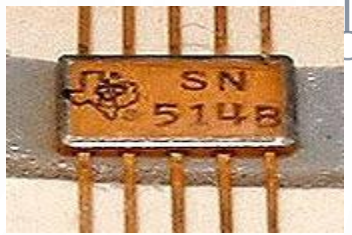


1943 – 1944 John Mauchly y J. Presper Eckert professors at the University of Pennsylvania USA created the **ENIAC (Electronic Numerical Integrator and Calculator)**. A “computer” considered as the father of all computers made with vacuum tubes, it was the size of a full room and had 18k vacuum tubes.



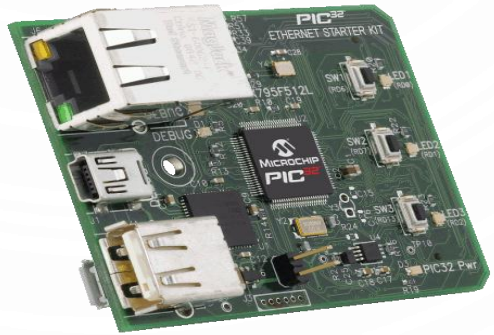
1958 – Jack Kilby y Robert Noyce created the **Integrated Circuit** when they worked for National Instruments.
Nowadays any electronic device has a IC inside, CPU's are a type of IC itselfs.



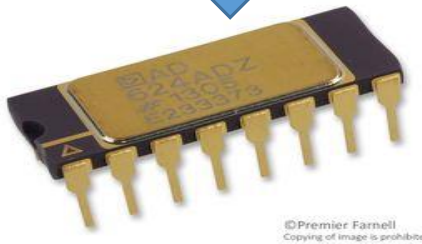


El SN514B was a type of voltaje regulator, one of the first IC ever created.

Motherboard witj **Intel i7** processor.



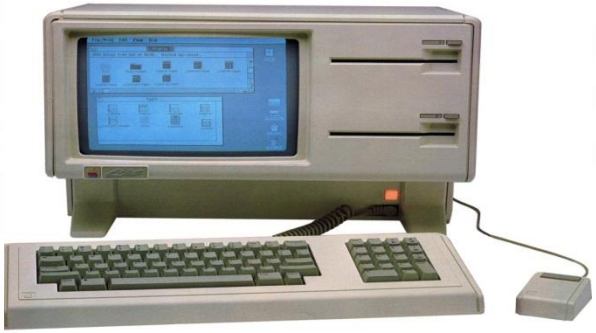
Microcontroller PIC32



Instrument Amplifier AD624.
Used in Medical Devices.

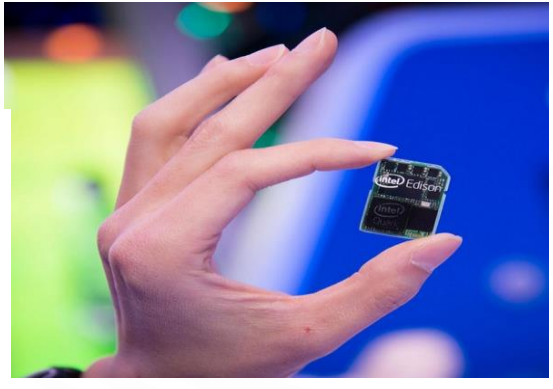
1981 – IBM launches the first computer with **MS-DOS** de **Microsoft** as operative system, it uses an **Intel** processor and floppy discs.

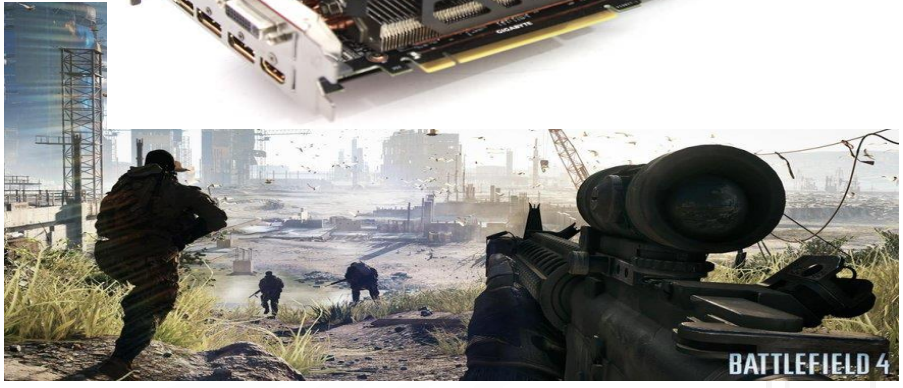
1983 – Apple launches Lisa, the first computer with a graphical user interface.



2015

- Intel launches the Atom processor for Embedded devices, now you can have all the power of a computer inside your washing machine.
- **NVIDIA** launches the graphic card **GeForce GTX 980 Ti.** Now you can play Battlefield 4 in High definition.
- The IoT (Internet of Things) is in its boom!





THE PROGRAMMING FLOW

As a programmer you should know that computers don't understand our language, things like: Sit down, walk, print or turn off.

The computer only understand very specific instructions and these instructions are just electric pulses 1 and 0.

The job for the developer is take that basic instructions that the computers know to do and put them in the correct order so at the end the computer will know how to do complicated stuff like Stand up, Sit down or walk.

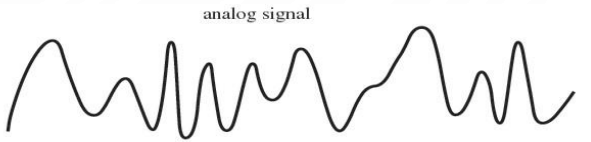
For example, taking the next analogy **"go there and sit down"**, the programmer must write all the next instructions in order for the computer to perform:

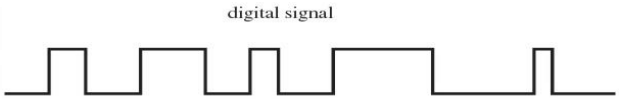
1. Bend the legs
2. Stand up
3. One step front
    1. Repeat until reach "there"
4. Bend he legs
5. Sit down

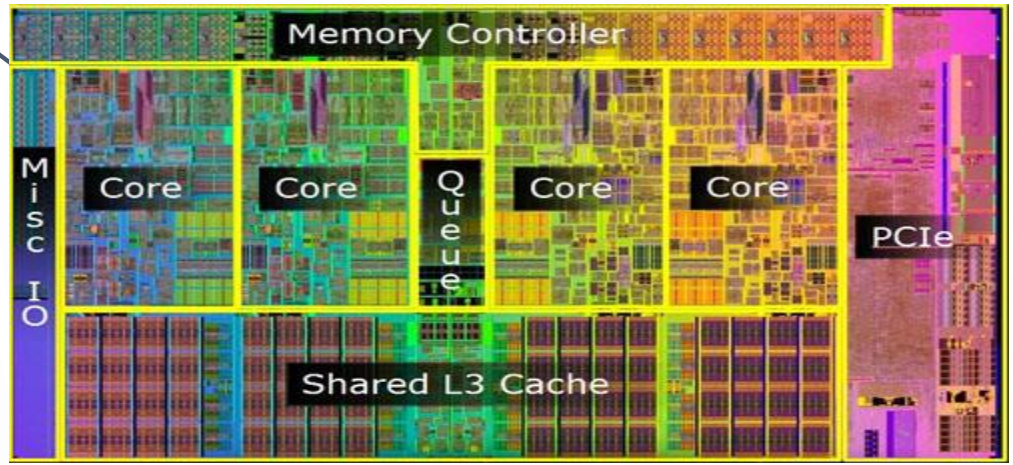
EL MICROPROCESADOR

The **microprocessor** as we know it nowadays is a digital electronic device whic is in charge of the “processing” (reception, operation and deliver) of digital signals inside a machine called computer.

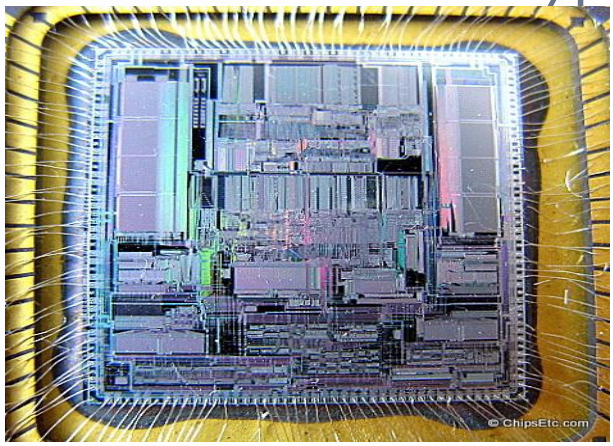
The microprocessor only understand digital signals, that means 1 and ceros, high or low voltaje. I know must of you are not interested in the hardware begind the lines of code but is good practice to know what’s behind.



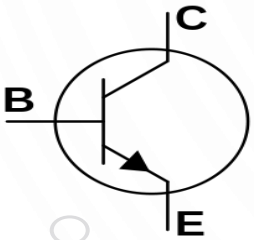


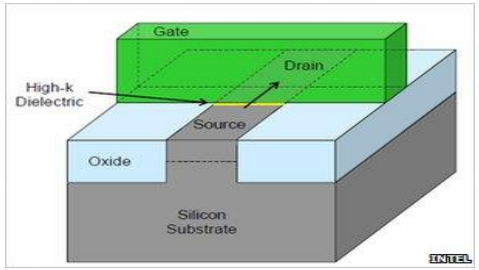


Intel Core i7 con 7M de transistores

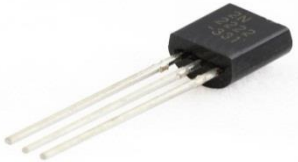


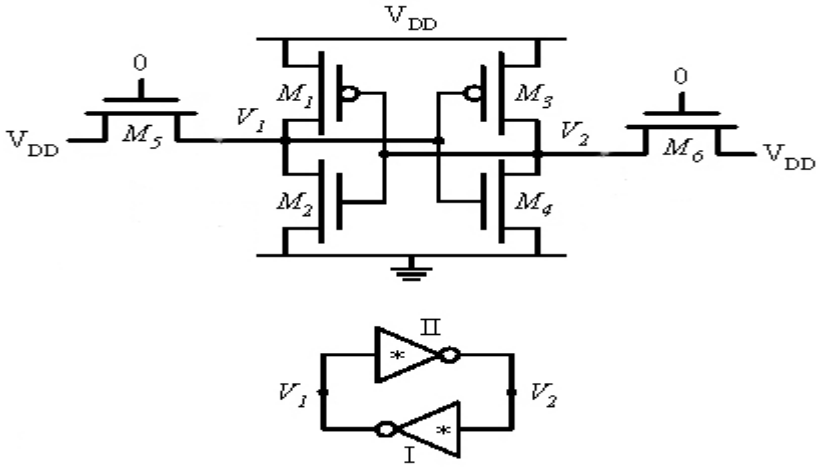
Inside a Microprocessor





Transistores





SRAM schematic 1 bit

PROGRAMMING LANGUAGES

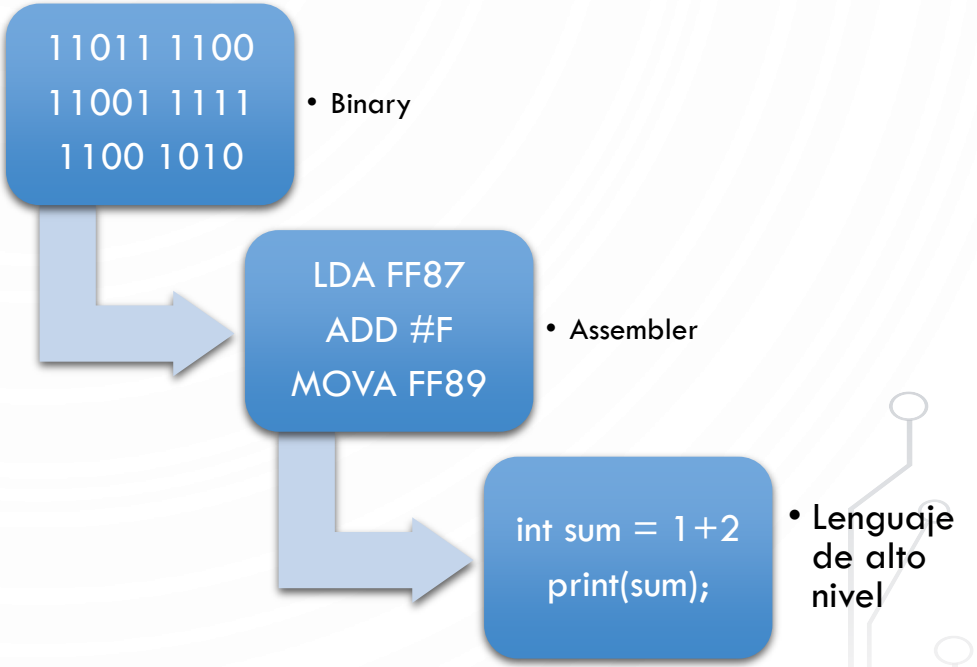
The **high level programming languages** make that instructions like **"go there and sit down"** be more easily to build, they come must of the time with a lot of routines and frameworks that do a lot of stuff for us.

```
switch (k) {
  case 0: f = i + j; break;
  case 1: f = g + h; break;
  case 2: f = g - h; break;
  case 3: f = i - j; break;
}
```

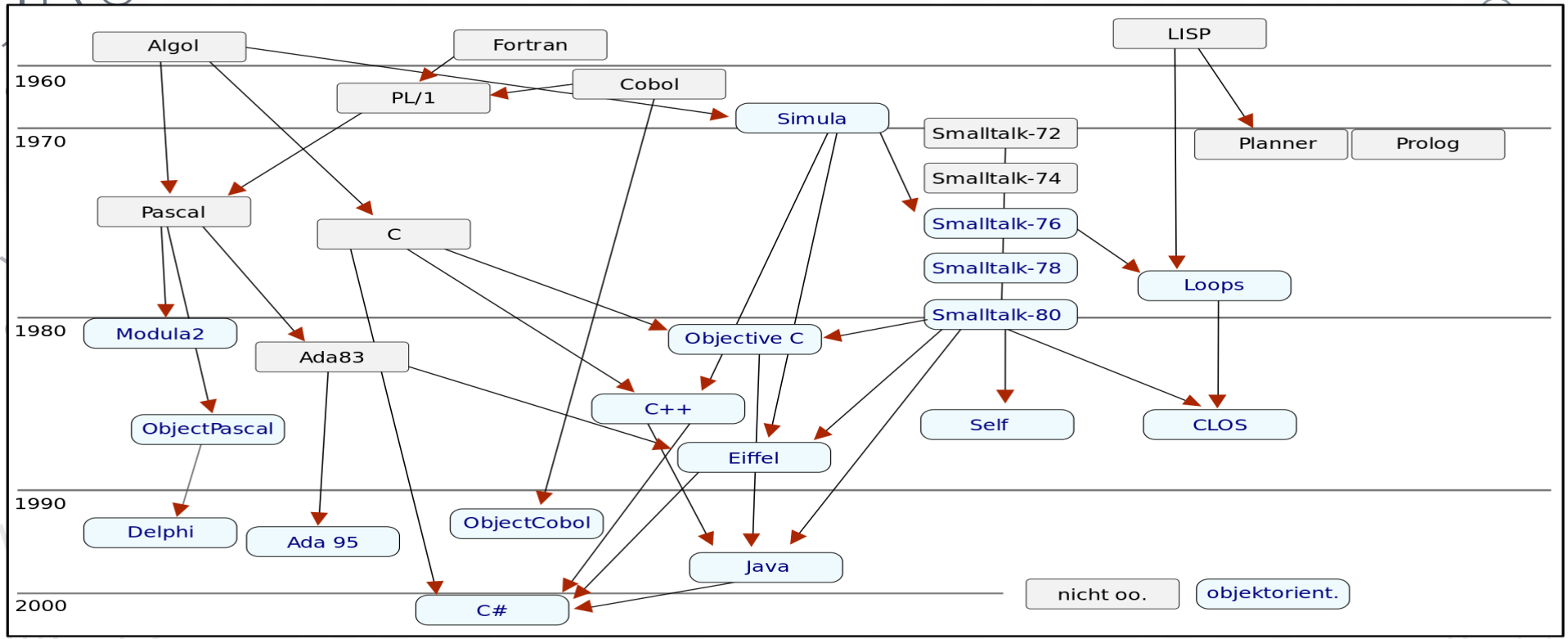
```
if (k==0) f = i + j;
  else if (k==1) f = g + h;
    else if (k==2) f = g - h;
      else if (k==3) f = i - j;
```

```
#  f: $s0; g: $s1; h: $s2; i: $s3; j: $s4; k:$s5

     bne   $s5, $0, L1        # branch k != 0
     add   $s0, $s3, $s4      # f = i + j
     j     Exit               # end of case
L1:  addi  $t0, $s5, -1       # $t0 = k - 1
     bne   $t0, $0, L2        # branch k != 1
     add   $s0, $s1, $s2      # f = g + h
     j     Exit               # end of case
L2:  addi  $t0, $s5, -2       # $t0 = k - 2
     bne   $t0, $0, L3        # branch k != 2
     sub   $s0, $s1, $s2      # f = g - h
     j     Exit               # end of case
L3:  addi  $t0, $s5, -3       # $t0 = k - 3
     bne   $t0, $0, Exit      # branch k != 3
     sub   $s0, $s3, $s4      # f = i - j
Exit:
```



HISTORY OF HIGH LEVEL LANGUAGES



MICROSOFT .NET WHY?

.Net is a group of libraries, binaries and tools that make the developing of desktop, web and mobile applications a far way more easy, the disadvantage is that they only work in Windows.

Recently Microsoft have made open source the .Net source code and Visual Studio, it's main IDE is now cross-platform (WEB only), Microsoft is changing its business model to Service focused instead of product focused.

Advantages

1. .Net offers a stable developing environment, it is very robust and must of the tools are very powerful and trustworthy.
2. In average 60% of the industry in Monterrey uses .Net (Web mainly), the other uses Java and a minor uses another languages.
3. If you learn .Net, you will be able to learn a lot more of others languages, like Java, PHP or C++.
4. Programming skills are part of the basic stuff an engineer must know in these days.
5. For the next years Forbes say the next new rich guys will be IT people.

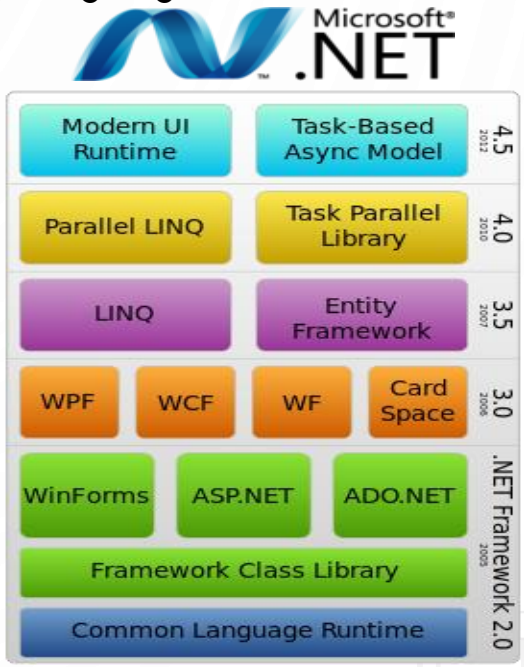
Screenshot de la OCC (19/06/2015)

Disadvantages

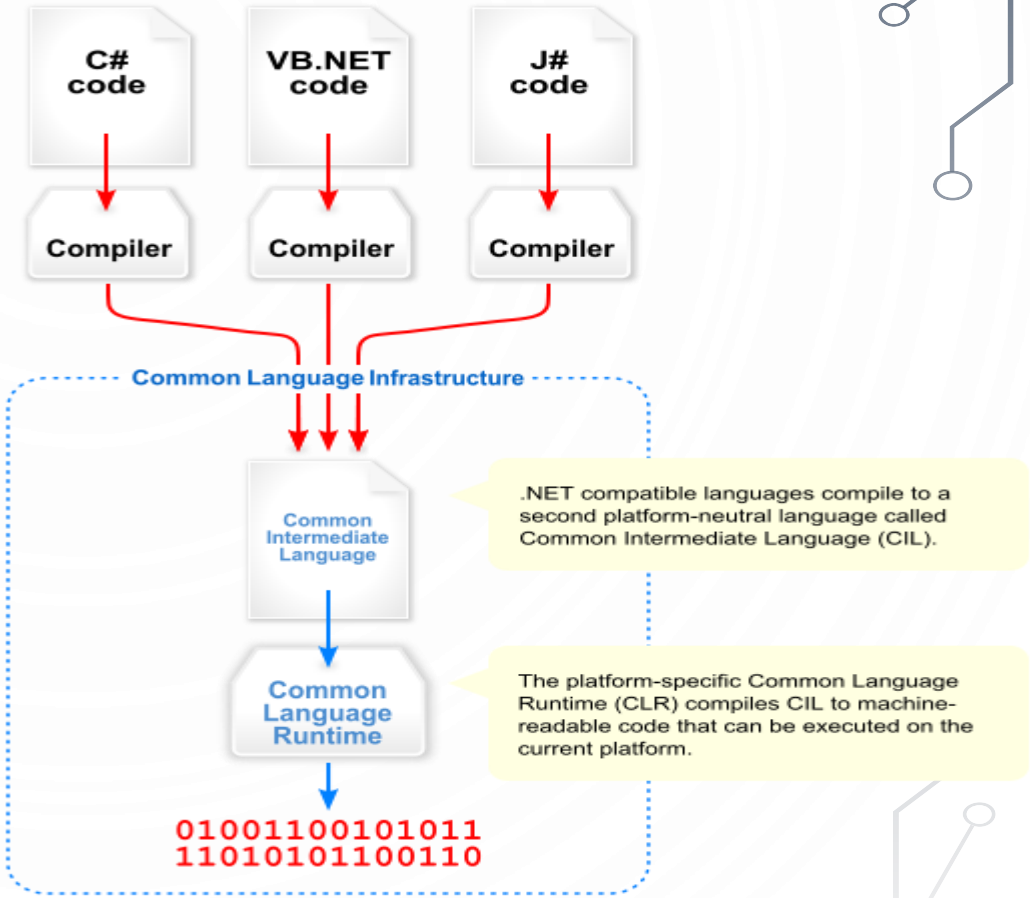
1. .Net only runs on Windows and it will continue that way a long time.
2. In order to run an **IIS** server for commercial purpose you need a licensed Windows Server machine (which cost a lot of money).
3. Working on Windows generates more Windows, when programmers get use to the windows environment they tend to stick with it and don't want to change. In the other side, programmers in other platforms like Linux tend to know a wide variety of OS's and have no much complain if a change of OS is needed.

The .NET Framework (pronounced dot net) is a proprietary, partially open source freeware software framework developed by Microsoft that runs primarily on Microsoft Windows. It includes a large class library known as **Framework Class Library (FCL)** and provides language interoperability (each language can use code written in other languages) across several programming languages.

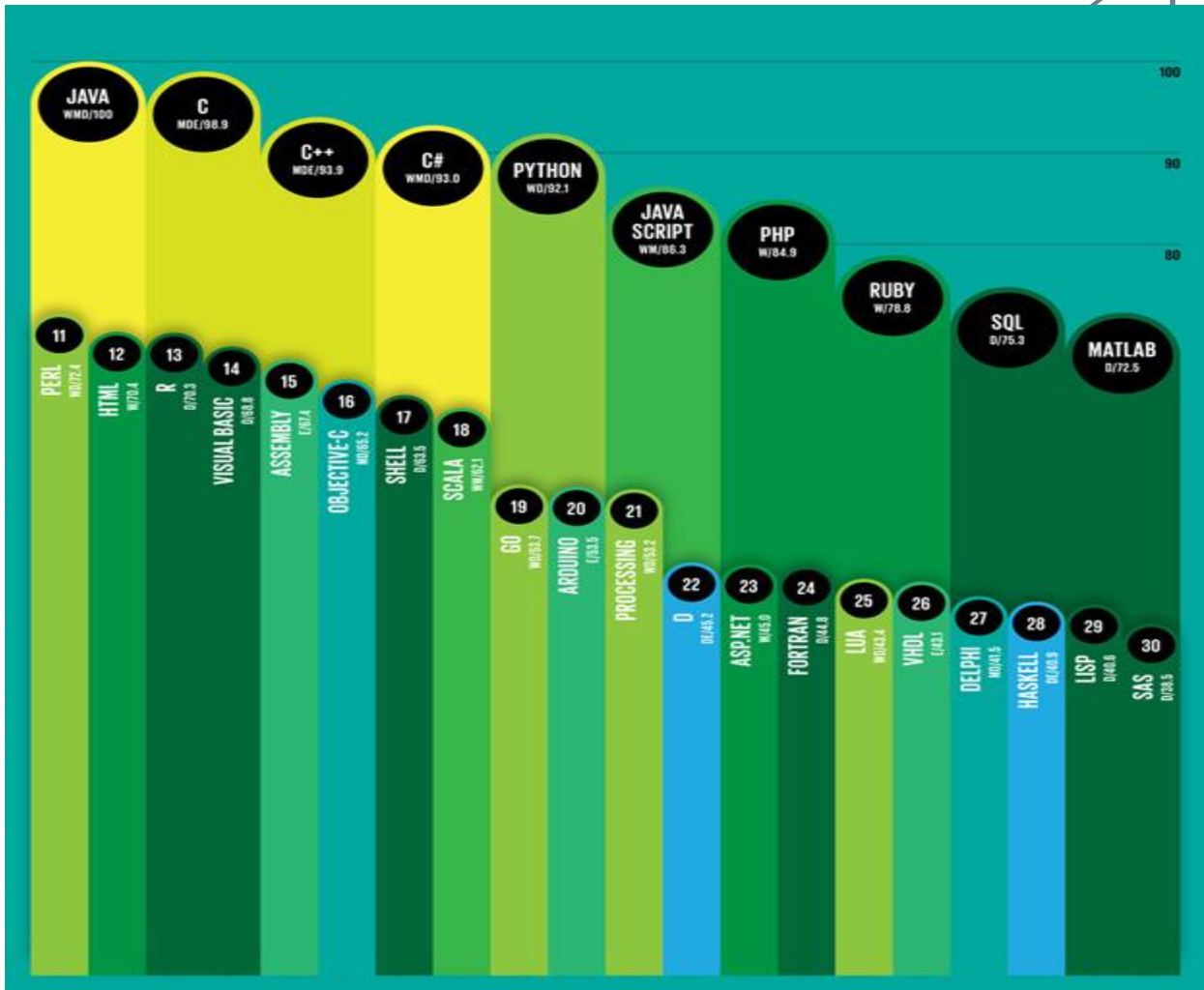
Programs written for .NET Framework execute in a software environment (as contrasted to hardware environment), known as **Common Language Runtime (CLR)**, an application **virtual machine** that provides services such as security, memory management, and exception handling. FCL and CLR together constitute .NET Framework.



Common Language Infrastructure (CLI) provides a language-neutral platform for application development and execution, including functions for exception handling, garbage collection, security, and interoperability. By implementing the core aspects of .NET Framework within the scope of CLI, this functionality will not be tied to a single language but will be available across the many languages supported by the framework.



Most used programming languages in 2014, IEEE Spectrum magazine.



http://spectrum.ieee.org/computing/software/top-10-programming-languages

MY SUGGESTION

In this course we will learn the basics of how to program desktop applications using C# .Net and an introduction to Web development using ASP.Net, furthermore, I don´t think you should fall in love with a language, framework or environment, you should learn a wide variety of them and use the most suitable one for each situation.

Be an entrepreneur, make your hobbies and dreams become true, create your own company and start making cool stuff.