Computer Language Hierarchy

Windows 7, 10,
Mac OSx

Flow of Compilation and Dissasembly

Scripting/Interpreted Languages

Perl, Python, Shell, Java

Compiling

High/Middle Level Languages

C, C++
(What Most Malware Is Written In)

Assembly Language

Intel X86, etc.
(First Layer of Human Readable Code)

Machine Code

Hexadecimal representations of Binary Code Read By The Operating System

Binary code

Binary code read by hardware
Not Human Readable

Dissasemble

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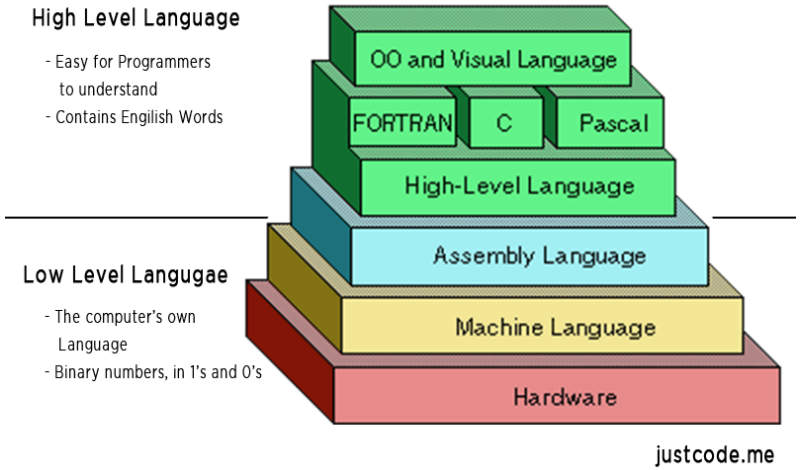

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Binary Code

a coding system using the binary digits 0 and 1 to represent a letter, digit, or other character in a computer or other electronic device.

```
0110101001101010001011011001001010110010101010101001010101
01111000101011110001101110111000101010010101001101010100
0101010001001001011010100010100101110001100101010100100110
0011010101010111101011011110100100100010110101010100000101
0011010100110101000101101100100101011001010101010100101010
10111100010101111000110111011100010101001010100110101010
00101010001001001011010100010100101110001100101010010011
00011010101011110101101111010010010001011010101010000010
0011010100110101000101101100100101011001010101010100101010
10111100010101111000110111011100010101001010100110101010
00101010001001001011010100010100101110001100101010010011
00011010101011110101101111010010010001011010101010000010
0011010100110101000101101100100101011001010101010100101010
10111100010101111000110111011100010101001010100110101010
00101010001001001011010100010100101110001100101010010011
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10111100010101111000110111011100010101001010100110101010
00101010001001001011010100010100101110001100101010010011
00011010101011110101101111010010010001011010101010000010
0011010100110101000101101100100101011001010101010100101010
10111100010101111000110111011100010101001010100110101010
```

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Machine Language

a computer programming language consisting of binary or hexadecimal instructions that a computer can respond to directly.

```
0000000 0000 0001 0001 1010 0010 0001 0004 0128
0000010 0000 0016 0000 0028 0000 0010 0000 0020
0000020 0000 0001 0004 0000 0000 0000 0000 0000
0000030 0000 0000 0000 0010 0000 0000 0000 0204
0000040 0004 8384 0084 c7c8 00c8 4748 0048 e8e9
0000050 00e9 6a69 0069 a8a9 00a9 2828 0028 fdfc
0000060 00fc 1819 0019 9898 0098 d9d8 00d8 5857
0000070 0057 7b7a 007a bab9 00b9 3a3c 003c 8888
0000080 8888 8888 8888 8888 288e be88 8888 8888
0000090 3b83 5788 8888 8888 7667 778e 8828 8888
00000a0 d61f 7abd 8818 8888 467c 585f 8814 8188
00000b0 8b06 e8f7 88aa 8388 8b3b 88f3 88bd e988
00000c0 8a18 880c e841 c988 b328 6871 688e 958b
00000d0 a948 5862 5884 7e81 3788 1ab4 5a84 3eec
00000e0 3d86 dcb8 5cbb 8888 8888 8888 8888 8888
00000f0 8888 8888 8888 8888 8888 8888 8888 0000
0000100 0000 0000 0000 0000 0000 0000 0000 0000
*
0000130 0000 0000 0000 0000 0000 0000 0000
000013e
```

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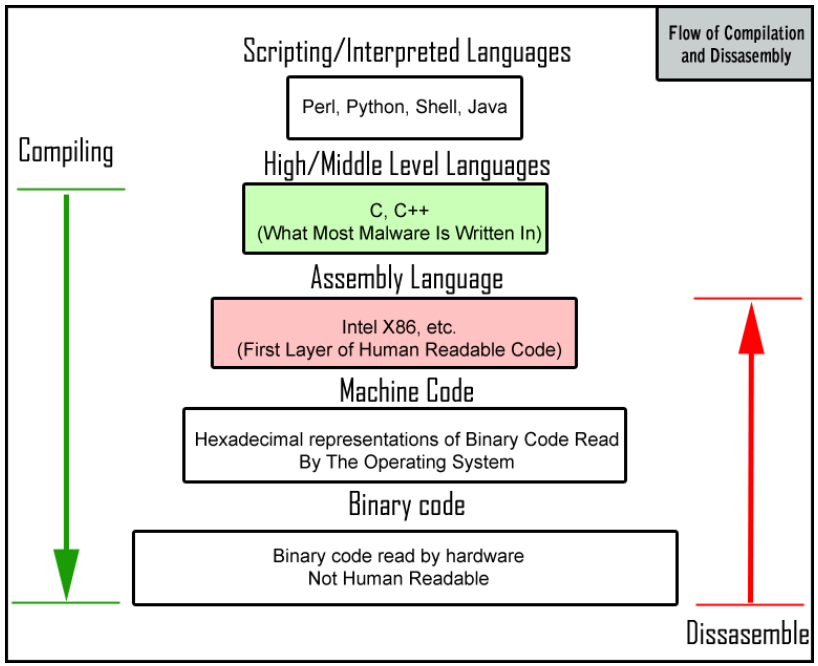

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Assembly Language

a low-level symbolic code converted by an assembler.

```
Process 17143 stopped
* thread #1: tid = 0x1004a4, 0x0000000100000f65 program`
com.apple.main-thread', stop reason = EXC_BAD_ACCESS (c
00fa3)
    frame #0: 0x0000000100000f65 program`main + 37
program`main:
->  0x100000f65 <+37>: movb   $0x6c, 0x1(%rax)
    0x100000f69 <+41>: movq   -0x10(%rbp), %rsi
    0x100000f6d <+45>: movb   $0x0, %al
    0x100000f6f <+47>: callq  0x100000f82
```

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High Level Language

In computer science, a high-level programming language is a programming language with strong ***abstraction*** from the details of the computer.

A high-level language (HLL) is a programming language such as C, FORTRAN, or Pascal that enables a programmer to write programs that are more or less independent of a particular type of computer. Such languages are considered high-level because they are closer to human languages and further from machine languages.

Abstract

- existing in thought or as an idea but not having a physical or concrete existence.

"abstract concepts such as love or beauty"

A computer does not "know" what you want to do, it follows commands via electrical "on and offs". High level languages let the human user turn those basic functions (on/off) into something useful (abstract to the computer).

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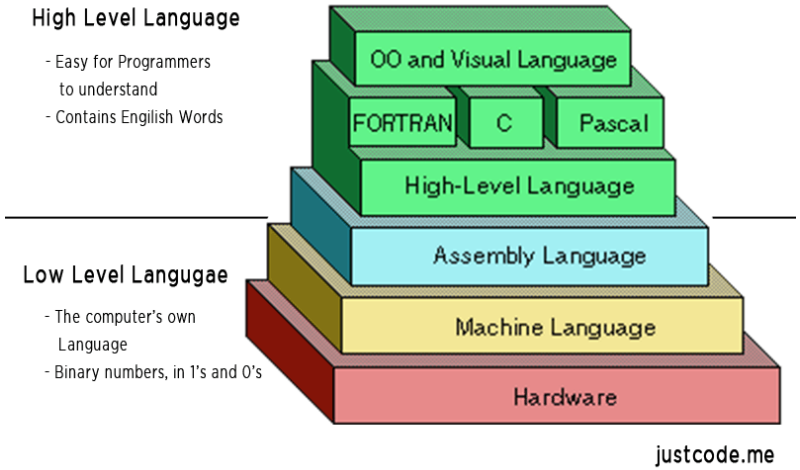

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Laptop Setup

F1 - enters BIOS mode

BIOS (basic input/output system) is the program a personal computer's microprocessor uses to get the computer system started after you turn it on. It also manages data flow between the computer's operating system and attached devices such as the hard disk, video adapter, keyboard, mouse and printer.

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When BIOS boots up (starts up) your computer, it first determines whether all of the attachments are in place and operational and then it loads the operating system (or key parts of it) into your computer's random access memory (RAM) from your hard disk or diskette drive.

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Demo - Restoring from Disk - Windows 7

F12 - interupts boot process

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Laptop Tasks:

- engage wifi, get on the internet

- download the following:

Microsoft Security Essentials for Windows7

Microsoft Office 365

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