# High-level Programming Languages

 A **low-level programming language** is closer to machine languages and less human-readable.

 A **high-level programming language** is closer to human languages and easier to read, write, and maintain.

 C, Pascal, and FORTRAN are considered high-level programming languages, but as newer and easier languages, such as Java, Python, and Processing, become much more maintainable there has been a slow movement of mid-level programming languages [C, Pascal, FORTRAN].

Here is a list of programming languages ranging from very low to very high level:

* **Machine code** could be considered the lowest level programming language. This is probably the most difficult with human-interaction. Example:

ba 0c 01

b4 09

cd 21

b8 00 4c

cd 21

48 65 6c 6c 6f 2c

20 57 6f 72 6c 64

21 0d 0a 24

* **Assembly language** is at the level of telling the processor what to do. As you can see, it is much more readable than machine code but still rather difficult. Example:

mov dx, 010ch

mov ah, 09

int 21h

mov ax, 4c00h

int 21h

db 'Hello, World!', '$'

* **C** is a step up from assembler. You have to be more specific with abstract terms, but nowadays, this would probably be considered a low-level language. // C hello world example:

#include <stdio.h>

int main() {

 printf("Hello world\n");

 return 0;

}

* **C++** can do everything C can do, and adds the capability to abstract things into classes. C++ would probably be considered a mid-level language nowadays. // C++ hello world example:



#include <iostream>

int main() {

 std::cout << "hello world!\n";

 return 0;

}

* **Java/C#** do many similar things as C++, but also including some features from C that C++ could not do, such as pointer manipulation. These languages also have a garbage collection, while this feature had to be done manually in C++.

// Java hello world example:

public class HelloWorld {

 public static void main(String[] args) {

 // Prints "Hello, World" to the terminal window.

 System.out.println("Hello, World");

 }

}

* **Python/Ruby** are high-level languages, and allow you to forget about a lot of the details you would need to specify in other languages like Java and C++.

// Python hello world example:

print("Hello, World!")

As you notice, all these examples are a simple program to print “Hello, World” to the screen. In machine code, this was essentially impossible for a human to read, but as we move into higher languages, the code became shorter, cleaner, and easier to read, write, and maintain.

## Compiler

 A **compiler** is a program that translates from a particular programming language into machine code that a computer’s processor uses. This is necessary for the hardware to process the user program. So the higher the programming language, the more abstractions for the programmer/program.