# Introduction to Programming

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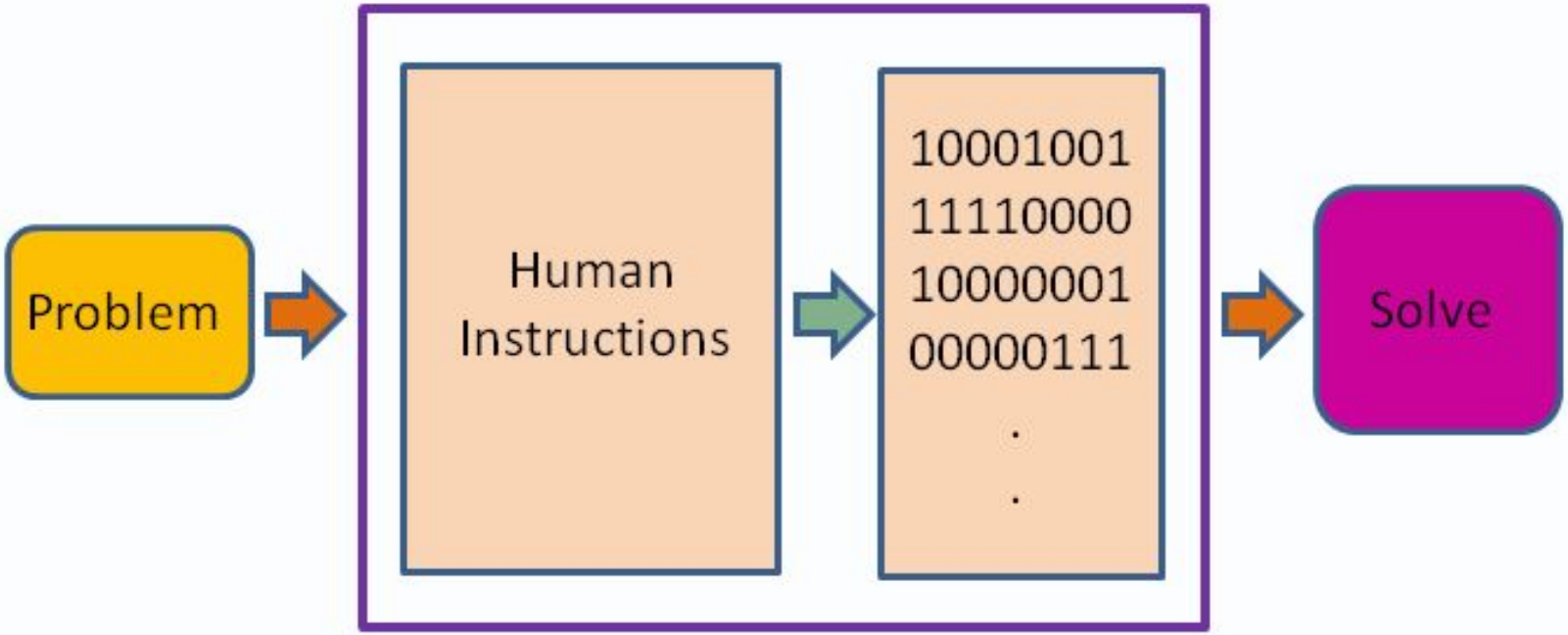



Programming language

(Basic , VB , C , C++ , C# , Java , Perl , ...)

# Part1. What is Programming?

A simple answer would be, “Programming is the act of instructing computers to carry out tasks.” It is often referred to as **coding**.

So then, what is a **computer program**? A computer program is a sequence of instructions that the computer executes.

**The Natural Language of the Computer**

Machines have their natural language like humans do. Computers do not understand the human language. The natural language of computers is the binary code — 1 and 0. These represent two states: **on (1)** and **off (0)**.

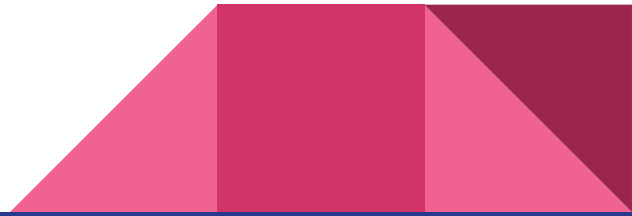
# Part1. What is Programming?

The computer needs a way to understand our human language. To do this, we'll need a translator.

Translators have the responsibility of converting your source code to the machine language. This is also known as **binary**. Remember ones and zeros.

Translators can be any of:

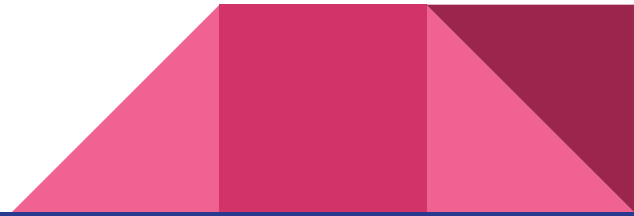
- Interpreters
- Compilers
- A hybrid of Interpreters and Compilers
- Assemblers



# Interpreters

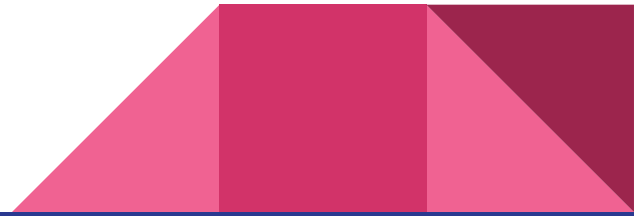
Some languages are interpreted. The translator processes the source code line by line and runs every line in the final program or app. This means that interpreted source code starts running until it encounters an error. Then the interpreter stops to report such errors.

Python is a good example of an interpreted programming language.



# Compilers

Compilers function differently. They convert the source code in its entirety via a compilation process to binary. The binary is then executed. If there were errors in the source code, they are detected during the compilation time and flagged. This interrupts the compilation process, and no binary is generated.



# Hybrid Translators and Assemblers

A hybrid translator is a combination of the Interpreter and Compiler. A popular hybrid programming language is **Java**. Java first compiles your source code to an intermediate format known as the **Bytecode**.

The Bytecode is then interpreted and executed by a runtime engine also known as a Virtual machine. This enables the hybrid translators to run the bytecode on various operating systems.

An assembler is **a program that takes basic computer instructions and converts them into a pattern of bits that the computer's processor can use to perform its basic operations**. Some people call these instructions assembler language and others use the term assembly language.

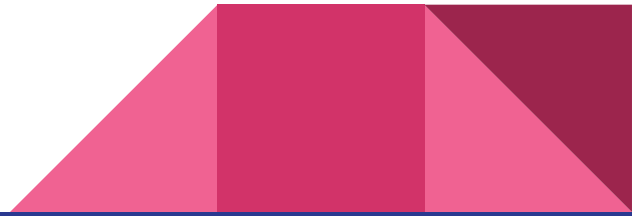
# Examples

Examples of pure compiled languages are C, C++, Erlang, Haskell, Rust, and Go.

Examples of common interpreted languages are PHP, Ruby, Python, and JavaScript.

C/C++ code can access variables and call functions defined in assembly language, and assembly code can access C/C++ variables and call C/C++ functions.

Just to mention a few; Python, Java, C++11, and Swift are hybrid programming languages.



# What is Python?

**Python is an interpreted, object-oriented, high-level programming language with dynamic semantics.**

| Advantages | Disadvantages |
| --- | --- |
| It is easy to learn and use, and it has an extensive library. | Because of its elementary programming, users face difficulty while working with other programming languages. |
| Python increases productivity. | Python is a time-consuming language. It has a low execution speed. |
| It is very flexible. | There are many issues with the design of the language, which only gets displayed during runtime. |
| It has a very supportive community. | It is not suited for memory-intensive programs and mobile applications. |

# Object oriented vs procedural Oriented language

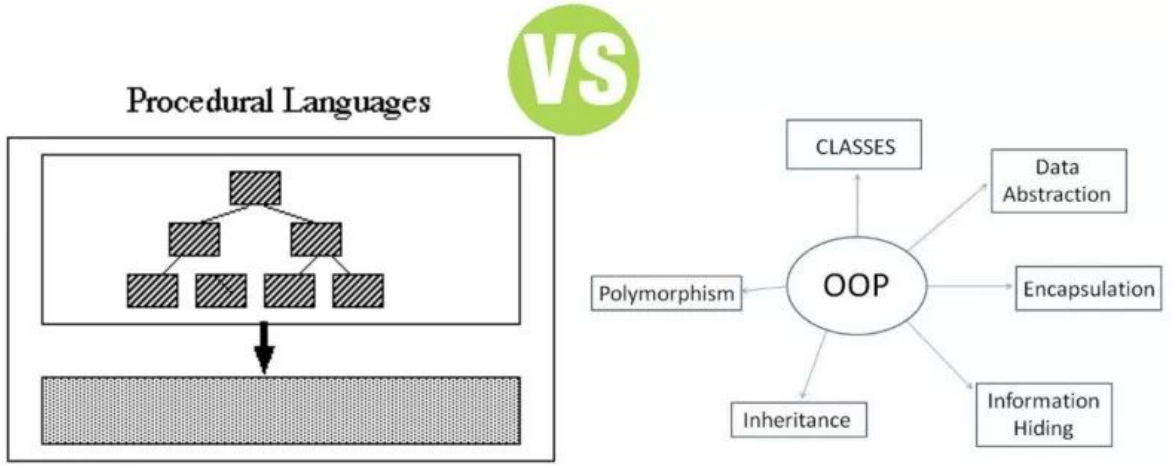
| | |
|---|---|
| In procedural programming, the program is divided into small parts called ***functions***. | In object-oriented programming, the program is divided into small parts called ***objects***. |
| Procedural programming follows a ***top-down approach***. | Object-oriented programming follows a ***bottom-up approach***. |
| There is no access specifier in procedural programming. | Object-oriented programming has access specifiers like private, public, protected, etc. |
| Adding new data and functions is not easy. | Adding new data and function is easy. |
| Procedural programming does not have any proper way of hiding data so it is ***less secure***. | Object-oriented programming provides data hiding so it is ***more secure***. |

| | |
|---|---|
| In procedural programming, overloading is not possible. | Overloading is possible in object-oriented programming. |
| In procedural programming, there is no concept of data hiding and inheritance. | In object-oriented programming, the concept of data hiding and inheritance is used. |
| In procedural programming, the function is more important than the data. | In object-oriented programming, data is more important than function. |
| Procedural programming is based on the ***unreal world***. | Object-oriented programming is based on the ***real world***. |
| Procedural programming is used for designing medium-sized programs. | Object-oriented programming is used for designing large and complex programs. |

# Object oriented vs procedural Oriented language

Examples: C, FORTRAN, Pascal, Basic, etc.

Examples: C++, Java, Python, C#, etc.



# High level vs Low level programming

The main difference between high level language and low level language is that, Programmers can easily understand or interpret or compile the high level language in comparison of machine. On the other hand, Machine can easily understand the low level language in comparison of human beings.

Examples of high level languages are C, C++, Java, Python, etc.

# Resources

For Beginners:

- w3schools python(english)
- programmiz python(english)
- sariq dev python kursi (uzbek)
- Botir Ziyatov python (uzbek)
- stepik python (russian)
- Abbosbek Ibragimov Python asoslari (uzbek/book)
- mosh lessons (english/youtube)
- codecademy(english)

For Middle:

- stepik python (russian)
- programmiz python (english)
- **realpython.com** (english)
- medium (english)
- python cookbook (english/book)
- mosh lessons(english/youtube)
- codecademy(english)