Introduction to Programming and Data Structures

Introduction to Programming

Learning Objectives

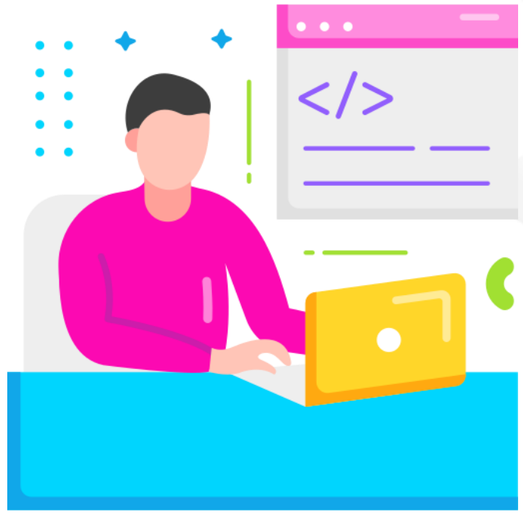
By the end of this lesson, you will be able to:

- Describe computer programming
- Comprehend the basics of programming
- Classify the basic elements of programming languages
- Apply basic computer programming language

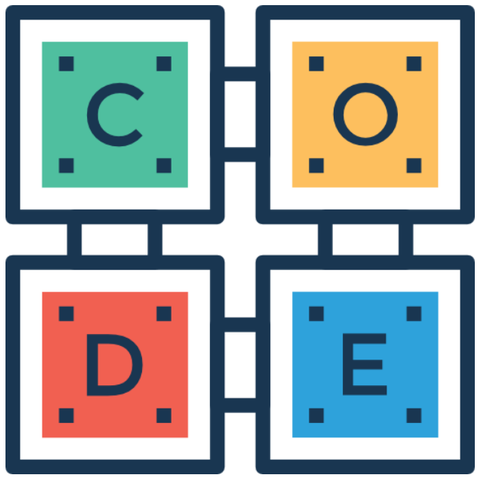
What Is Computer Programming?

Computer Programming

A computer programming is a set of instructions (code) that are run on a computer to do specific tasks. Programmers are involved in the creation of this code.



Computer Programming



- Programming is the process of providing a set of instructions to computers that specify how to carry out a task.
- Programmers will devote their entire careers to mastering a wide range of programming languages and tools in order to create effective computer applications.

Computer Programming

To operate computers, computer programmers implement a variety of languages, such as Python, JavaScript, Java, and C programming languages.

- Users of computers communicate with programs on a regular basis.
- For example, web browsers are specialized computer programs.
- Front-end areas support the user-facing applications.
- Back-end development, on the other hand, produces coding for tasks that the user does not see, including server communication.

Basics of Computer Programming Language

Computer Programming Language

Computer programmers use languages like JavaScript, Python, and C++ to write code. They employ multiple languages depending on their primary area: web development, mobile application development, software engineering, and so on.

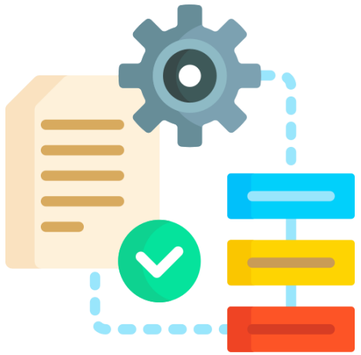
Computer Programming Language

The following are the basics of computer programming language:

- Basic syntax in the programming environment
- Data types
- Keyword
- Variables
- Variables
- Basic Operators
- Decision making(conditional statements)
- Loop
- Characters
- Arrays
- Strings
- Functions
- Input-output of a file

Computer Programming Language

To begin computer coding in any programming language, a programmer needs:



- A **text editor** to write computer programs
- A **compiler** to compile the programs into binary format
- An **interpreter** to directly execute the programs

Syntax

Syntax in computer programming provides a set of rules that define the structure of a programming language's symbols, punctuations, and words.

Syntax

Consider **my first coding**, which is a **C program** that prints the sentence. All C commands are written in lowercase letters.

Syntax:

```
#include
int main() {
printf( “My first coding” );
}
```

The printf function is called, followed by the text to be printed. The text to be printed must be wrapped in parenthesis and surrounded by quote marks.

The main() function must be followed by a left curly bracket ({) in all C applications.

A semicolon must be used at the end of every statement (;).

The commencement of the program is indicated by this convention. The end is indicated by a right curly bracket (}).

Data Types

A data type is a classification of data that informs the compiler or interpreter how the programmer wants to execute the information.

Integer, real, character or string, and Boolean data are supported by most computer languages.

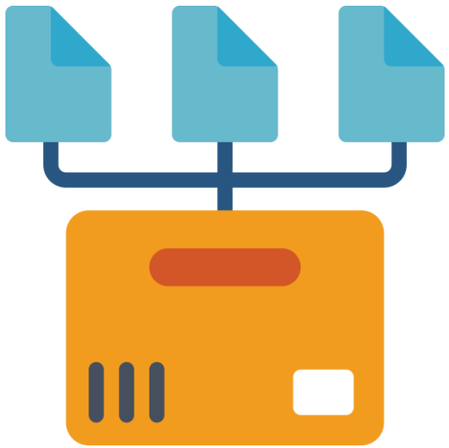
Data Types

The common data types are the following:

Data type	Description	Example
integer	Whole numbers	-5, 0, 1, 2
floating point (real)	Fractional numbers	-87.58, 0.0, 3.14
string	A sequence of characters	"Hello world!"
Boolean	Logical true or false	true, false
nothing	No data	null

Variables

Variables are used to keep data that may be accessed and updated in a computer program. They also allow to label data with a descriptive name, making the program easier to understand for readers and others.



Variables can be thought of as information containers. They exist just to categorize and store data in memory.

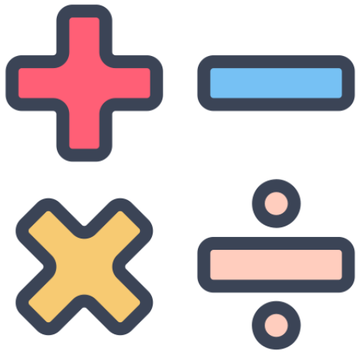
Variables

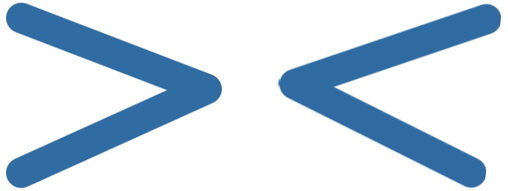
A keyword is a word that a program reserves because it has a specific meaning, such as commands or arguments. Keywords are used in a variety of languages, yet they always serve the same duties and aims.

They make it easier for programmers to create code by allowing them to use words instead of having to spell out each command.

Operators

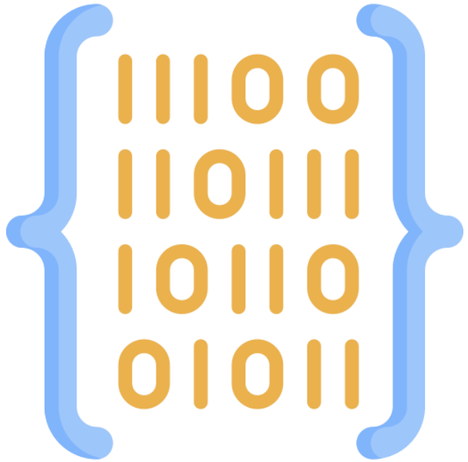
In a programming language, an operator is a symbol that instructs the compiler or interpreter to carry out a specified mathematical, relational, or logical operation and return a result.





Array

An array is a data structure that contains a collection of elements (values or variables), each of which is identified by an array index or key.



Array types may overlap (or be identified with) other data types that express aggregates of values, such as lists and strings, depending on the language. Array data structures are commonly used to implement array types, but other methods such as hash tables, linked lists, and search trees are also used.

Characters

A character data type utilizes 8 bits of memory, allowing a user to store anything in a character whose ASCII value ranges from -127 to 127, allowing it to hold any of the 256 possible values.

Input

```
#include <stdio.h>
Int main ()
{
char ch1;
char ch2;

ch1 = ‘a’ ;
ch2 = ‘@’ ;

printf( "ch1: %c\n", ch1);
printf( "ch2: %c\n", ch2);
}
```

Output

```
ch1: a
ch2: @
```

Applications of Basic Computer Programming Languages

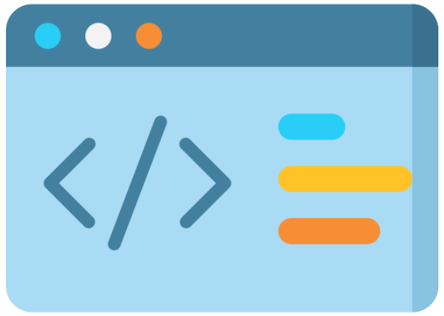
C Programming Language

In 1972, the C programming language was released for the first time. It is a high-level procedural language that has become one of the most popular languages.

It is still a relatively complicated language, despite its age, and its impact may be observed in many others. C#, C++, Java, Python, and other programming languages take inspiration from C.

C Programming Language

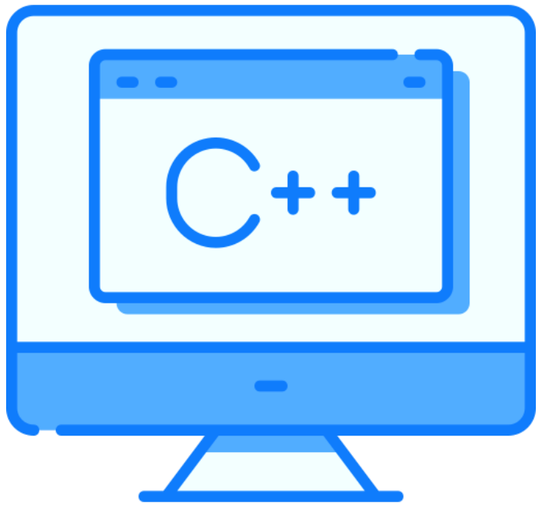
C is a versatile programming language can be used to:



- Create system programs
- Make games and graphics

C++ Programming Language

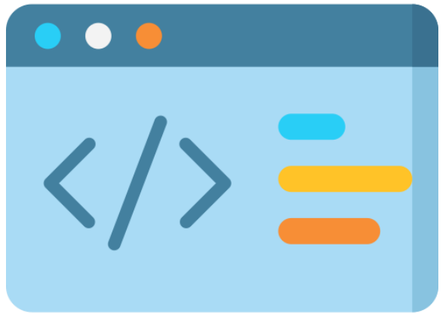
C++ is a general-purpose, object-oriented, middle-level programming language that is an extension of C, allowing C++ to be coded in the C style.



C++ is an example of a hybrid language because coding can be done in either format in some instances.

C++ Programming Language

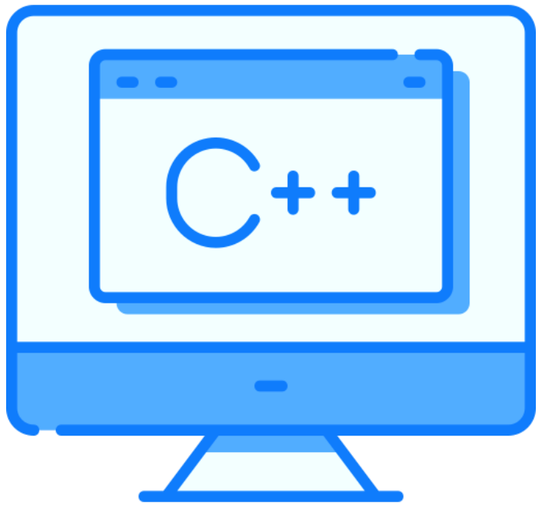
C++ programming language can be used:



- By C++ software engineers, software developers, embedded engineers, and programmer analysts
- By employers in the fields of IT, engineering, professional services, design, quality control, and management.

Python Programming Language

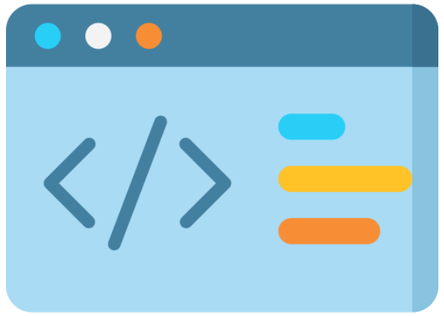
Python is one of the best easy-to-learn programming languages. It is a high-level, object-oriented programming language that was first released in 1992.



It is designed to be simple to write and comprehend, making it excellent for programmers who want to get things done quickly.

Python Programming Language

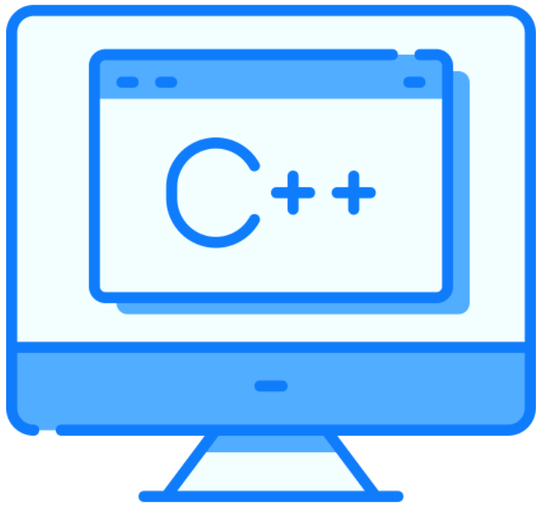
Python programming language uses are:



- It has a wide range of applications due to its versatility.
- It has several areas of specialty in addition to being appropriate for general use, such as web applications.
- Artificial intelligence (AI) and machine learning are two examples of its use.

Java Programming Language

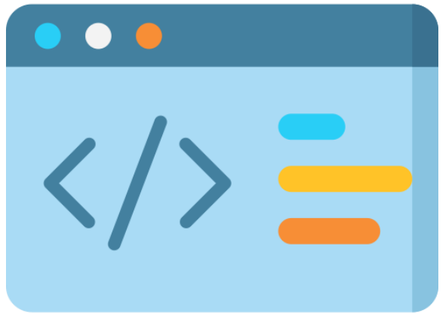
Java is an object-oriented programming language that is extremely popular.



The fact that once a programmer develops a piece of code in Java, it can run on almost any device that supports the Java platform contributes to its popularity.

Java Programming Language

Java programming language uses are:



- Java's core principle of **write once, run anywhere** allows for a wide range of applications.
- Business software, web applications, and mobile apps are among the most common applications.
- For example, Java is the native language of Google's Android operating system.

Key Takeaways

- Computer programming is a set of instructions (code) that are run on a computer to do specific tasks.
- They employ multiple languages depending on their primary area: web development, mobile application development, software engineering, and so on.
- The basics of computer programming language are syntax, data types, keyword, variable, loop, character, input-output file and so on.
- Syntax in computer programming provides a set of rules that define the structure of a programming language's symbols, punctuation, and words.

Thank you