

## PROGRAMMING IN C

### what is computer language?

A computer language is **a method of communication with a computer.**

A Computer language includes **various languages that are used to communicate with a computer machine.** Some of the languages like programming language which is a set of codes or instructions used for communicating the machine. Machine code is also considered as a computer language that can be used for programming.

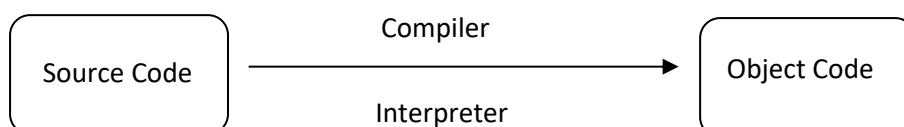
The computer language is defined as code or syntax which is used to write programs or any specific applications. The computer language is used to communicate with computers. Broadly the computer language can be classified into three categories **assembly language, machine language, and high-level language.**

### What is program in Computer?

In computing, a program is a specific set of ordered operations for a computer to perform. The computer gets one instruction and performs it and then gets the next instruction. Computer program, **detailed plan or procedure for solving a problem with a computer**; more specifically, an unmistakable, ordered sequence of computational instructions necessary to achieve such a solution.

In computing, a program is a specific set of ordered operations for a computer to perform. Typically, the program is put into a storage area accessible to the computer. The computer gets one instruction and performs it and then gets the next instruction. The storage area or memory can also contain the data that the instruction operates on. (Note that a program is also a special kind of "data" that tells how to operate on "application or user data.")

To create a program, write it using some kind of computer language. Language statements or code are the source program then "compile" the source program (with a special program called a language compiler) and the result is called an object program (not to be confused with object-oriented programming). There are several synonyms for object program, including object module and compiled program. The object program contains the string of 0s and 1s called machine language that the logic processor works with.



## **Compiler and Interpreter**

Compilers and interpreters are programs that help convert the high-level language (Source Code) into machine codes to be understood by the computers. Computer programs are usually written on high level languages. A high-level language is one that can be understood by humans. To make it clear, they contain words and phrases from the languages in common use – English or other languages for example. However, computers cannot understand high level languages as we humans do. They can only understand the programs that are developed in binary systems known as a machine code. To start with, a computer program is usually written in high level language described as a source code. These source codes must be converted into machine language and here comes the role of compilers and interpreters.

### **Compiler**

To start with, a compiler creates the program. It will analyze all the language statements to check if they are correct. If it comes across something incorrect, it will give an error message. If there are no errors spotted, the compiler will convert the source code into machine code. The compiler links the different code files into programs that can be run such as exe. Finally the program runs.

### **Interpreter**

An interpreter creates the program. It neither links the files nor generates machine code. The source statements are executed line by line while executing the program.

### **Difference Between**

Interpreter translates just one statement of the program at a time into machine code.	Compiler scans the entire program and translates the whole of it into machine code at once.
An interpreter takes very less time to analyze the source code. However, the overall time to execute the process is much slower.	A compiler takes a lot of time to analyze the source code. However, the overall time taken to execute the process is much faster.
An interpreter does not generate an intermediary code. Hence, an interpreter is highly efficient in terms of its memory.	A compiler always generates an intermediary object code. It will need further linking. Hence more memory is needed.

## **Introduction to C Programming Language**

### **What is C programming?**

C is a general-purpose programming language that is extremely popular, simple and flexible. It is machine-independent, structured programming language which is used extensively in various applications.

C was the basic language to write everything from operating systems (Windows and many others) to complex programs like the Oracle database, Git, Python interpreter and more.

It is said that 'C' is a mother of all programming languages. One can say, C is a base for the programming. If you know 'C,' you can easily grasp the knowledge of the other programming languages that uses the concept of 'C'

### **History of C language**

The base or father of programming languages is 'ALGOL.' It was first introduced in 1960. 'ALGOL' was used on a large basis in European countries. 'ALGOL' introduced the concept of structured programming to the developer community. In 1967, a new computer programming language was announced called as 'BCPL' which stands for Basic Combined Programming Language. BCPL was designed and developed by Martin Richards, especially for writing system software. This was the era of programming languages. Just after three years, in 1970 a new programming language called 'B' was introduced by Ken Thompson that contained multiple features of 'BCPL.' This programming language was created using UNIX operating system at AT&T and Bell Laboratories. Both the 'BCPL' and 'B' were system programming languages.

In 1972, a great computer scientist Dennis Ritchie created a new programming language called 'C' at the Bell Laboratories. It was created from 'ALGOL', 'BCPL' and 'B' programming languages. 'C' programming language contains all the features of these languages and many more additional concepts that make it unique from other languages.

### **Where is C used? Key Applications**

1. 'C' language is widely used in embedded systems.
2. It is used for developing system applications.
3. It is widely used for developing desktop applications.
4. Most of the applications by Adobe are developed using 'C' programming language.
5. It is used for developing browsers and their extensions. Google's Chromium is built using 'C' programming language.
6. It is used to develop databases. MySQL is the most popular database software which is built using 'C'.

7. It is used in developing an operating system. Operating systems such as Apple's OS X, Microsoft's Windows, and Symbian are developed using 'C' language. It is used for developing desktop as well as mobile phone's operating system.
8. It is used for compiler production.
9. It is widely used in IOT applications.

### **Why learn 'C'?**

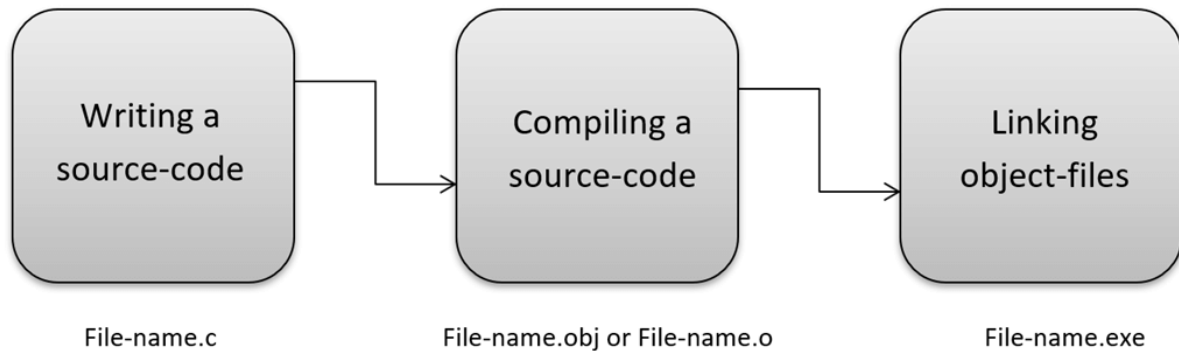
As we studied earlier, 'C' is a base language for many programming languages. So, learning 'C' as the main language will play an important role while studying other programming languages. It shares the same concepts such as data types, operators, control statements and many more. 'C' can be used widely in various applications. It is a simple language and provides faster execution. There are many jobs available for a 'C' developer in the current market.

### **Some Main Features of C Programming Language**

- 1) 'C' is a structured programming language in which program is divided into various modules. Each module can be written separately and together it forms a single 'C' program. This structure makes it easy for testing, maintaining and debugging processes.
- 2) 'C' contains 32 keywords, various data types and a set of powerful built-in functions that make programming very efficient.
- 3) Another feature of 'C' programming is that it can extend itself. A 'C' program contains various functions which are part of a library. We can add our features and functions to the library. We can access and use these functions anytime we want in our program. This feature makes it simple while working with complex programming.
- 4) Various compilers are available in the market that can be used for executing programs written in this language.
- 5) It is a highly portable language which means programs written in 'C' language can run on other machines. This feature is essential if we wish to use or execute the code on another computer.

### **How 'C' Works?**

C is a compiled language. A compiler is a special tool that compiles the program and converts it into the object file which is machine readable. After the compilation process, the linker will combine different object files and creates a single executable file to run the program. The following diagram shows the execution of a 'C' program



Nowadays, various compilers are available online, and you can use any of those compilers. The functionality will never differ and most of the compilers will provide the features required to execute both 'C' and 'C++' programs.

Following is the list of popular compilers available online:

- Clang compiler
- MinGW compiler (Minimalist GNU for Windows)
- Portable 'C' compiler
- Turbo C

### Summary

- 'C' was developed by Dennis Ritchie in 1972.
- It is a robust language.
- It is a low programming level language close to machine language
- It is widely used in the software development field.
- It is a procedure and structure-oriented language.
- It has the full support of various operating systems and hardware platforms.
- Many compilers are available for executing programs written in 'C'.
- A compiler compiles the source file and generates an object file.
- A linker links all the object files together and creates one executable file.
- It is highly portable.