C Programming Language

C Programming Language

- C programming is considered as the base for other programming languages, that is why it is known as mother language.
- It can be defined by the following ways:

1. Mother language
2. System programming language
3. Procedure-oriented programming language
4. Structured programming language
5. Mid-level programming language

C Programming Language

1) C as a mother language

C language is considered as the mother language of all the modern programming languages because **most of the compilers, JVMs, Kernels, etc. are written in C language**, and most of the programming languages follow C syntax, for example, C++, Java, C#, etc.

It provides the core concepts like the array, strings, functions, file handling, etc. that are being used in many languages like C++, Java, C#, etc.

2) C as a system programming language

A system programming language is used to create system software. C language is a system programming language because it **can be used to do low-level programming (for example driver and kernel)**. It is generally used to create hardware devices, OS, drivers, kernels, etc. For example, Linux kernel is written in C.

It can't be used for internet programming like Java, .Net, PHP, etc.

C Programming Language

3) C as a procedural language

A procedure is known as a function, method, routine, subroutine, etc. A procedural language **specifies a series of steps for the program to solve the problem**.

A procedural language breaks the program into functions, data structures, etc.

C is a procedural language. In C, variables and function prototypes must be declared before being used.

4) C as a structured programming language

A structured programming language is a subset of the procedural language. **Structure means to break a program into parts or blocks** so that it may be easy to understand.

5) C as a mid-level programming language

C is considered as a middle-level language because it **supports the feature of both low-level and high-level languages**. C language program is converted into assembly code, it supports pointer arithmetic (low-level), but it is machine independent (a feature of high-level).

History of C Language

- A **Low-level language** is specific to one machine, i.e., machine dependent. It is machine dependent, fast to run. But it is not easy to understand.
- A **High-Level language** is not specific to one machine, i.e., machine independent. It is easy to understand.
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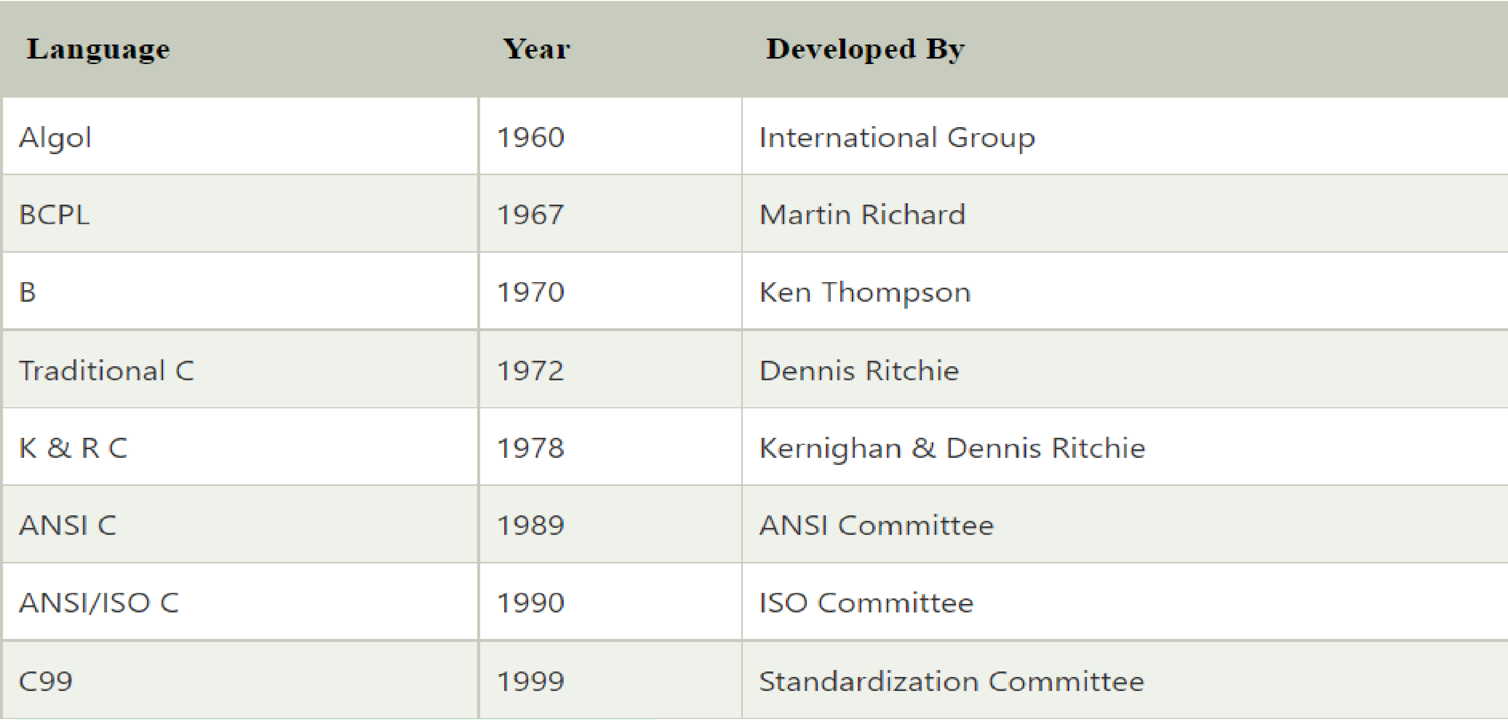
History of C Language

- **History of C language** is interesting to know. Here we are going to discuss a brief history of the c language.
- **C programming language** was developed in 1972 by Dennis Ritchie at bell laboratories of AT&T (American Telephone & Telegraph), located in the U.S.A.
- **Dennis Ritchie** is known as the **founder of the c language**.
- It was developed to overcome the problems of previous languages such as B, BCPL, etc.

History of C Language

- Initially, C language was developed to be used in **UNIX operating system**. It inherits many features of previous languages such as B and BCPL.
- Let's see the programming languages that were developed before C language.



Language	Year	Developed By
Algol	1960	International Group
BCPL	1967	Martin Richard
B	1970	Ken Thompson
Traditional C	1972	Dennis Ritchie
K & R C	1978	Kernighan & Dennis Ritchie
ANSI C	1989	ANSI Committee
ANSI/ISO C	1990	ISO Committee
C99	1999	Standardization Committee

Features of C Language

- **Features of C Language**
- C is the widely used language. It provides many **features** that are given below.

1. Simple
2. Machine Independent or Portable
3. Mid-level programming language
4. structured programming language
5. Rich Library
6. Memory Management
7. Fast Speed
8. Pointers
9. Recursion
10. Extensible

Features of C Language

1) Simple

C is a simple language in the sense that it provides a **structured approach** (to break the problem into parts), **the rich set of library functions**, **data types**, etc.

2) Machine Independent or Portable

Unlike assembly language, c programs **can be executed on different machines** with some machine specific changes. Therefore, C is a machine independent language.

3) Mid-level programming language

Although, C is intended to do low-level programming. It is used to develop system applications such as kernel, driver, etc. It also supports the features of a high-level language. That is why it is known as mid-level language.

Features of C Language

4) Structured programming language

C is a structured programming language in the sense that **we can break the program into parts using functions**. So, it is easy to understand and modify. Functions also provide code reusability.

5) Rich Library

C **provides a lot of inbuilt functions** that make the development fast.

6) Memory Management

It supports the feature of **dynamic memory allocation**. In C language, we can free the allocated memory at any time by calling the **free()** function.

7) Speed

The compilation and execution time of C language is fast since there are lesser inbuilt functions and hence the lesser overhead.

8) Pointer

C provides the feature of pointers. We can directly interact with the memory by using the pointers. We **can use pointers for memory, structures, functions, array**, etc.

Features of C Language

9) Recursion

In C, we **can call the function within the function**. It provides code reusability for every function. Recursion enables us to use the approach of backtracking.

10) Extensible

C language is extensible because it **can easily adopt new features**.

First C Program

Before starting the abcd of C language, you need to learn how to write, compile and run the first c program.

To write the first c program, open the C console and write the following code:

```
#include <stdio.h>
int main(){
printf("Hello C Language");
return 0;
}
```

Features of C Language

- **#include <stdio.h>** includes the **standard input output** library functions. The printf() function is defined in stdio.h .
- **int main()** The **main() function is the entry point of every program** in c language.
- **printf()** The printf() function is **used to print data** on the console.
- **return 0** The return 0 statement, returns execution status to the OS. The 0 value is used for successful execution and 1 for unsuccessful execution.

Features of C Language

- printf() and scanf() in C
- The printf() and scanf() functions are used for input and output in C language. Both functions are inbuilt library functions, defined in stdio.h (header file).
- printf() function
- The **printf() function** is used for output. It prints the given statement to the console.
- The syntax of printf() function is given below:

1. printf("format string",argument_list);

- The **format string** can be %d (integer), %c (character), %s (string), %f (float) etc.

Variables in C

- **Variables in C**
- A **variable** is a name of the memory location. It is used to store data. Its value can be changed, and it can be reused many times.
- It is a way to represent memory location through symbol so that it can be easily identified.
- Let's see the syntax to declare a variable:

1. type variable_list;

- The example of declaring the variable is given below:

1. **int** a;
2. **float** b;
3. **char** c;

- Here, a, b, c are variables. The int, float, char are the data types.
- We can also provide values while declaring the variables as given below:

1. **int** a=10,b=20;//declaring 2 variable of integer type
2. **float** f=20.8;
3. **char** c='A';

Rules for defining variables

Rules for defining variables

- A variable can have alphabets, digits, and underscore.
- A variable name can start with the alphabet, and underscore only. It can't start with a digit.
- No whitespace is allowed within the variable name.
- A variable name must not be any reserved word or keyword, e.g. int, float, etc.
- **valid variable names:**

1. int a;

2. int _ab;

3. int a30;

- **Invalid variable names:**

1. int 2;

2. int a b;

3. int long;