

Programming language :

It provides a way of communication between user and computer. A computer program is written in programming language. Programming language provides a set of rules for writing computer programs.

Programming language are divided into two main categories:

- Low level programming language
- High level programming language.

Low Level Programming Language

"The programming language that are close to machine language."

Program instruction are written in Binary form (0, 1) and symbols language.

- Programming written in machine language is faster in execution.
- Deep knowledge of hardware is required to learn and use the low level - language.
- Errors are difficult to trace out.
- Statement written in this language is very lengthy.
- It is mainly used for developing system software.

⇒ It has two types:

- * Machine language
- * Assembly language.

High Level Programming Language "The programming language that are close to human language is called high level language".

Program instructions are similar to English language. Every high level language has its own sets of rules. These rules are called Syntax of language.

Some commonly used high level languages:

C/C++ It is used as system software as operating system and as application software.

FORTRAN It is used for Formula translation. It develop software to solve mathematical problems.

COBOL It stands for Common Business oriented language. It develop software for business and commerce.

JAVA It is used for network programming and web page designing.

PASCAL It develop software for scientific and business purposes.

BASIC It stands for Beginner All purpose Symbolic instruction code. It develops for Basic concept of programming.

It is easy to learn and use. It is not machine dependent.

It is slower in execution. No deep knowledge of hardware is required.

Errors are easy to trace out.

statements written in high level language are very short.

It is normally used for developing application software.

Program Source Code

Programs instructions written by following the rules in high level language.

Program object code

A source code written in high level language or assembly language must be translated into machine language is called program Object code.

Keywords:

The predefined words of the C-language that are used for special purpose in the program are called keywords.

Example:

double , int , float , char

Token: "A source program consists of keywords, variables, constants, operators, punctuation. The elements of a program are known as Token."

Identifier: "The unique names used in a program to represent the variables, constants, functions and labels are called Identifier."

Types:

- Standard Identifier
- User-defined identifier

Standard Identifier:

"The predefined identifiers that are used for special purposes in the C-program are called standard identifiers."

- Scanf() For input operation
- Printf() For output operation

User defined identifier:

"The user can define its own Identifier in the C-program such as variables and user-defined functions"

Variable :

"A quantity whose value may change during the execution of program is called variable."

Declaration of Variables :

"Specifying the variable names and their data type in the program is called declaration of variable."

General Syntax :

type variable;

type: indicate data type of variable - int, float
double, char.

variable: It indicates the name of variable. more than one variable of some data type can be declared with single statement.

- int sum;
- int a, b, c;

Variable Initialization

"Assigning a value at the time of its declaration is called variable initialization."

type variable = Value ;

Constant

"A quantity whose values cannot be changed during the execution of program."

Types:

- Numeric Constant
- Character constant
- String constant.

Numeric Constant:

Numeric constant consist of numbers. These may be positive or negative.

Integer Constant

The numeric values that have no decimal part are called integer constant.

Example: 10, -16, 87

Floating constant

The numeric values that have decimal part are called floating-point constant.

Example:

1.609, 4.0, -6.2.

Character Constant:

A single character enclosed in a single quotation marks is called character constant.

'x', 'y', 'z', '+', 'g'

String Constant:

A sequence of characters enclosed in a double quotation mark is known as string constant.

“my First program”

Data Type

"The values given to the program to perform various operations on it is called data. The data type defines the set of values and set of operations that can be performed on those values."

- Standard data type
- User-defined data type

Standard data Type

The data type have been defined as a part of language.

Pre-defined data types are used for special purpose.

⇒ int, float, double
char

User-defined data Type.

C language also allows the users to define his/her own data types. It is defined by user.

INTEGER DATA

It is a whole numeric value with no decimal point.

Types:

- (i) int
- (ii) short int
- (iii) long int
- (iv) unsigned int
- (v) unsigned long int.

int datatype:

It is used to store integer value. It takes 2 bytes in a memory. 'int' type variable can store values from -32768 to 32767
(-2^{15} to $2^{15}-1$)

The short "int" data type: It also takes 2 bytes in memory for storing integer value. It also store values from -32768 to 32767 (-2^{15} to $2^{15}-1$). It is written as "short".

The long "int" data type: It takes 4 bytes in memory for storing large integer value.

-2147483648 to 2147483647
(-2^{31} to $2^{31}-1$). It is written as "long int".

The unsigned int data type: It takes 2 bytes in memory. It stored unsigned integer value only \rightarrow positive value.

0 to 65535 $(2^{16}-1)$

The unsigned long data type: It takes 4 bytes in memory. It is used to store large integer value \rightarrow positive values.
(0 to 4294967295.)

Floating Point Data

The numeric values that have decimal point in them are called floating point data.

0.1, 0.0002

The Char Data Type

It is used to store single character such as 'a', '\$', 'q'. It takes one byte in a memory.

OPERATORS

These are special symbols that are used to perform certain operations on data.

- Arithmetic Operators
- Logical Operators
- Assignment Operators
- Increment and decrement operators,
- compound assignment operators.

Arithmetic Operator

These are used to perform arithmetic operations on numeric values.

+ , - , * , / , %

Expression:-

It is the combination of operators and operands. The operands are the value on which operators perform the operations. The operands may be variable.

Arithmetical Expression :-

It is the combination of numeric, variables and arithmetic operators is called Arithmetical expression -

$$(i) a + b$$

$$(ii) a * 5 + 5$$

BDMAS

Operator Precedence

Order in which arithmetic operations are performed to evaluate an expression is called operator precedence.

Assignment Statement

It is used to assign a value to a variable is called assignment statement.

$$\text{variable} = \text{Expression}$$

Assignment operator

"equal sign" is called assignment operator.

$$c = a + b ;$$

" $=$ " is assignment operator.

Compound assignment Statement

An assignment statement that is used to assign the same value to multiple variables.

$$a = b = c = 18$$

Increment Operator (++)

It is used to add 1 to the value of a variable is called increment operation.

- Postfix increment operator
- Prefix increment operator

Postfix increment operator

When the increment operation is written after the variable name:

$$\begin{aligned} a &= 10 \\ c &= a++ \\ a &= 11 \\ c &= 10 \end{aligned}$$

Prefix increment Operator (-)

When increment operator is written before the variable.

$$\begin{aligned} a &= 10 \\ c &= ++a \\ &= \end{aligned}$$

$$11 \qquad c = 11$$