

Structure of C Language

"The Basic structure of C language is divided in 6 Parts which Make it easy to read & modify documents in a Particular format".

- ① The Documentation Section consists of set of Comment lines giving Name Programme, Author of Programme & other details, which user would like to use latter.

- 2 types of Comment lines.

Single Line Comments - // -----;

Multi Line Comments - /* */

- ② Link Section Provide instructions To Compiler To Link function from system library, such as using #include Directive. directives are of Various Type
Ex. #include<stdio.h> - Header file

printf("____");

Compiler will understand printf Memory from <stdio.h>

- ③ Definition Section defines all symbolic constants such as using # define directive.

Ex. #define max 200

(Pure Programme main Taha thi
max hoga wha 200 ho Jayega.)

④ Global Declarations

There are some variables that are used in more than one function. Such variables are called as global variable & are declared in global declaration that is outside of all function. This section also defines user defined functions.

- It is always use before Main function.

Ex. int a; ← global declaration Variable
main()

{ int a; ← Local Variable (Because it is declared in Main function.)
}

⑤ Main function.

Every C Programme Must Have One Main Function
Contain 2 Parts

Declaration

Part

- Declaration part

declares all variables

used in Executable part

main()

Executable

Part

- There is at least one statement in Executable part.

statement in Executable part

part.

{ → declaration Part

$x = x + 10 ; \rightarrow$ Executive Part

}

⑥ Sub Programme

If Programme is a Multifunction Programme Then
 Sub Programme section contain all user defined function
 that are called in main() function.

Ex. main()

```
{ --;
} fund1();
{ --;
}
}
```

Documentation // short info of Program

Link → #include <stdio.h>

Definition → #define PI 3.14

Global d. → void add();
 int x = 100;
 int main()

Main
 function → { { int a = 13;
 :
 : a = a + 13;
 } }

function1()

Sub
 Programme { { --;
 } }

(features of C)

1. Procedural Language

- C is a Procedural Programming Language .
- C Programme may Contain More Than one function to Perform a particular Task .
- New People to Programming will Think that this is only a Particular way in which Programming language works .
- There are other Programming Paradigms as well in the Programming World .
- Most of the Commonly used Paradigm is an object oriented Programming language .

2. Fast & Efficient .

- Newer language like Java & Python offer More feature than C , but due to additional Processing in These languages , their Performance rate gets down effectively .
- C language as a Middle Level language provides programmers access to direct manipulation with Computer hardware but higher level language do not allow this .
- That's why C is first choice while Learning Programming language .

- It's fast Because statically Typed language is faster than dynamically Typed language.

3) Modularity

- "The Concept of storing C's code in the form of Libraries for future use is Known as Modularity."
- This programming language can do very little on its own most of its power is held by its library.
- C has its own library to solve common problem.

4. Statically Type

- C Programme is statically Type language.
- Here the Type of Variable is check at time of compilation but not at run Time.
- This Means each Type a programmer types a program They have to mention Variables.

5. General Purpose Programming Language

- from System Programming to photo editing software, C language is used in various applications.

Ex. OS: Windows

- Linus: iOS

6. Reach Rich Set of Built-in Operators-

- It is a diversified language with a rich set of built-in operators which are used in writing complex or simplified C Programs.

7. Libraries with rich function.

- Robust Libraries & functions in C help even a beginner coder to code with ease.

8. Middle Level Language

- It has combined form of both, capabilities of assembly language and features of high level language.

9. By Portability

- It is highly portable language, means C Program written for one computer can be run on another computer with little.

10. Easy to Extend

- If a program is already written in it some more features & operations can be included.

* (Advantages of C language)

- C language is easy to learn & understand for Novice.
- It divide problem into Sub Problem using function.
- C has variety of datatypes & operators.
- C is highly Portable language.
- C is Structure Programming language.
- C language support System Programming.
- Middle level language.

* (Disadvantages of C language)

- No run Type checking
- C does Not support concept of Constant
- C does Not support for Name space like C++.
- Jack of object orientation
- Inefficient Memory Management
- No garbage collection
- Run Time or Absence of Exception Handling.

(Basic Elements and ~~L~~ Operators)

* Character set

- A character set in C language is set of all valid characters which is used to form words, numbers and expressions in source programme.

- The character set is fundamental raw material of an language and they are use to represent info. like natural language, computer language will also have well defined character set, that is useful to built a programme.

↳ Categories of character set

1) Letter

Upper - A-Z (26)

Lower - a-z (26)

2) Digits

All Decimal digit

[0-9]

3) White Spaces

- Blank space (W)

- Horizontal tab (I+)

- Carriage return (V)

- New line (In)

- Form feed (If)

- Vertical tab (W)

4) Special Characters -

;- Semicolumn

{ } - Curly Bracket

[] - Square "

() - normal "

= - Equal

== - is Equal To

' - Single inverted coma

" - Double inverted coma

< < - Less Than

> - Greater Than

_ - Under Score .

* Keywords

- Keywords are reserved words that have special meaning to Compiler.
- These are Part of Syntax and Cannot be used as Identifiers in the Programme.
- 32 Keywords

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
char	extern	return	union
const	float	short	unsigned
contin	for	signed	void
default	goto	sizeof	volatile
do	if	static	while

* C Identifiers

- Identifiers are building block of Programme
- Identifiers are unique name that are assigned to Variable, struct, function, other entities.
- They are used to uniquely Identify an Entity in programme.
- Ex. char Section = 'A'

"Section" is an identifier assigned to string type Value.

- Rules To Name an Identifiers.

1. Identifiers can include letter & digits.
2. Identifiers cannot include special character except the '_' underscore.
3. Space are not allowed while naming an Identifier.
4. An Identifier can only begin w/ with underscore or letter.
5. We cannot Name Identifiers as Keywords Because They are reserved word to perform specific Task.
6. Identifier Must be unique in its Namespace.
7. C language is Case Sensitive Hence the name & Var NAME are different Identifiers.

Internal Identifiers

- Internal Identifiers are declared within a function or That of code and have local variables they are only visible at declare function or Block.

External Identifiers

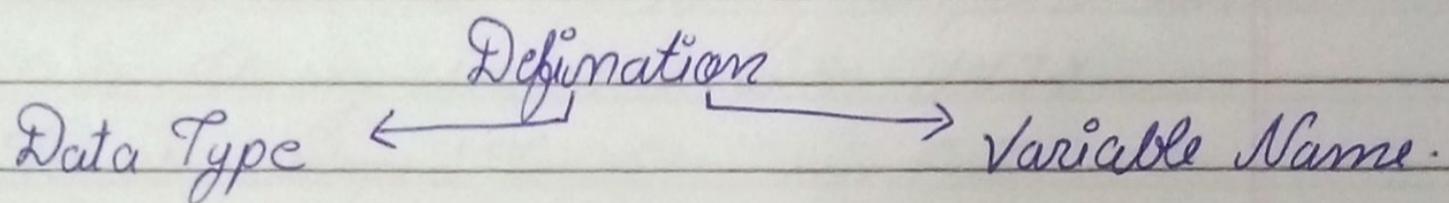
- External Identifiers are those that are declared outside any function
- All block of code & have global Variable.
- They are visible to all function within the same file if a

External Identifier is declared with Keyword It can also be occur by function in other files.

* Variables.

"A Variable in C is a Memory Location with Some Name that helps to store Some form of data and retrieved it when required."

- We can store different Types of data in Variable and reuse the same Variable for storing Some other data any number of Times.



Three Types Of Variables

1. **Variable Declaration :** Variable Declaration in C tells The Compiler about The Variable with given Name and Data Type , The Variable is declared, and entry in Symbol Table is created on Memory will be allocated at The Time Initialization of Variable.

2. **Variable Initialization :** Initialization of a Variable is a process where The User Assign some meaningful Value To Variable , When creating The Variable.

Variable Definition:

The Compiler allocates some Memory and some Values to it, Defined Variable will contain some random Garbage Value till it is not initialized.

Ex:

Int Var;

Char Var;

* C- Programming (Introduction).

Q. What is C?

- Ans - It is a General Purpose Programming Language Created by Denis Ritchie at AT&T Bell Laboratories 1972 (USA)
- It is very popular language. Despite Being Old. The main reason for its Popularity - It is fundamental language in The field Of Computer Science.
 - C is strongly associated with UNIX.
 - It is developed To write Unix O.S.

Q. Why Learn C?

- Ans - It is Most Popular Programming Languages in The World.
- If you Know 'C' you have no Issue in learning other Programming Languages like Java, Python, C++, C#, as Their Syntax is similar.
 - It can be used in Both Application & Technology.

Q. C Vs C++

- Ans - C++ was developed as Extension of C language, Both languages almost have same Syntax.
- C++ supports classes & objects.
 - C doesn't.

*

History of 'C'.

- 1957 - Fort (formula Translation)
 - It was used for Mathematical & Scientific Applicat.
- 1960 - COBOL (Common Business Oriented Language)
 - Business, softwares, Tally, formal limitations
 - Do Application softwares.
 - Do Not Work successfully.
- 1967 - BCPL (Basic Combin Programming Language)
 - Inventor Thomas 1970.
 - He updated BCPL By sorting Out its Some Issues and Rename It as 'B'.
- 1972 - 'C'
 - They do further sorted out issues in 1972 by updating B language, so dennis Ritchie has peak its second later C To BCPL, Thats why C is Called C.
 - Because It was Invented from BCPL.

*

Benefits Of 'C' Language.

- 'C' Language Develops Mathematical & Scientific Applications.
- C Language Develops Business application, If you want to Develop School Management system that was possible in C Language, It could also develop O.S.

About 'C'

- C is high Level Language & also supports low Level Language features, so it is also called Middle Level Language.
- 'C' is Case Sensitive Language, what is Case sensitive
→ Upper Case & Lower Case letter yet differentiated.

*

C is function Oriented language.

- There are 2 Types of function in C.

Predefined functions (Library functions)

- Predefined functions are already defined in System Lib, serving as a Prime Example of different Type of Function of C.

User Defined functions (Defined by Users)

- User Defined functions are defined by Users & highlight what are Type of functions in C Lang.

* Why 'C' To Implement System & Application Software

Ans Because It is Base for High Level Languages like C++, PHP, Java, etc ..!

- So it is also for solving Mathematical Calculations.

* Print f() function: output function

- It is a inbuilt library function that is declared in <stdio.h> header file.
- Print f function is used to print any type of message & values on console (screen).
- We use Print f function with format Specifiers like. %d, %s, %f, %c etc.
- This all are called format strint.
- We can also use Escape Sequences in Print f function like \n, \t etc.

Syntax : printf(" ");

printf("Format strint", & Variable);

Scan f() function : Input function.

- It is a inbuild library function that is declared in <stdio.h> header file.
- Scan f function is use to take Input from User.
- In Scan f function It is Must To Use , format Specifier like. %d, %s, %f, %c etc.

Syntax : scanf ("format strint", & Variable);

*

Operators.

Unary Operator	Binary Operator	Ternary Operator
- Increment & Decrement $(++)$ & $(--)$	- Arithmetic O. - Relational O. - Logical O. - Assignment O. - Bitwise O.	- Conditional Operator.

Operator -

"An Operator is a symbol that tells Computer to perform certain Mathematical or Logical operations,

Operators are used in data programme to Manipulate data & Variables.

Operant - "It is an entity on which operation is performed."

Unary O. - "It is an operator which require only one Operant to perform its operation."

Binary O. - "It is an operator which require on two Operant to perform its operation."

Trinary O.- "It is Operator which require atleast three Operants To perform its operation."

* Increment & Decrement Operators -

- In C, '`++`' & '`--`' are called Increment & Decrement Operators respectively.
- Both of this are Unary Operators.
- '`++`' adds 1 to Operand.
- '`--`' subtracts 1 from Operand.
- They can be represent in 2 forms Prefix & Postfix

(1) Arithmetic Operator -

"These are used to perform Mathematical Calculations like, addition, subtraction, multiplication, division & Modulus."

Operators	Description (Name)
+	Addition
-	Subtraction
*(x)	Multiplication
/	Division
%	Modulus (reminder)

(2) Assignment Operator -

"In C Programmes, Values for the Variables are assigned using assignment operators."

Operators	Description
=	Simple Assignment Operator
+ =	Add & Assignment operator
- =	Subtract & Assignment operator
/ =	Divide & Assignment operator
* =	Multiply & Assignment Operator
% =	Modulus & Assignment Operator.

(3) Relational Operators -

"These operators are used to compare the value of two variables."

Operator	Description
= =	is equal to
!=	Not Equal to
<	Less Than
<=	Less Than or Equal To
>	Greater Than
>=	Greater Than or Equal To

(4) Logical Operator -

"This operators are used to perform logical operation on given two variables".

Operator	Description
ff	Logical And
	Logical OR
!	Logical NOT

(3) Bitwise Operator -

- "Bitwise operator works on bits and perform bit by bit operation.
- Bitwise operators are used in bit level programming.
- These operators can operate upon int & char.
But not on float and double.

Operator	Description
&	Bitwise AND
	Bitwise OR
^	Bitwise Exclusive OR
<<	shift Left
>>	shift Right.

* Conditional Operators -

"Conditional Operators are used in C programming in decision Making."

Ex. Executes different statements according to test conditions, whether it is either True or False.

Syntax -

Conditional-Expression? expression1 : expression2

* Special Operators.

These are few other operators supported by C language.

Operator	Description
- size of () —	It is unary operator which is used in finding size of data types, Constant arrays, structures etc.
- & —	Returns The address of Variable
- * —	pointer To Variable.

* Tokens In 'C'

"The Tokens of C can be classified into 6 types based on function they are used to perform."

1. Keywords
2. Identifiers
3. Constant
4. Strings
5. Special symbols
6. Operators.

Token - "It is defined as smallest individual element of C Programming Language that is meaningful to Compiler.

It is basic component of a C Programme."

- Constant - The Constant refers to Variables with fix values.
 - They are like Normal Variables but with the difference that their values can not be modified in programme once they are defined.

- Strings

- Strings are nothing but an array of characters ended with a null character ('\0').
- This Null character indicates the end of string.
- Strings are always enclosed in double quotes.
- Whereas, a character is enclosed in single quotes.