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Course-   C Programming

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Topic-   Introduction of C Programming Language

 Sub-Topics-   C Language ,Characteristics of C, Application of C, History of c language,
Functions -C's Building Blocks, Language Fundamentals, Comments inC.

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UNIT-I

Introduction to 'C' Language

- ❖ **C Language: -** C language was developed in 1972 by Dennis Ritchie at AT&T Bell Laboratory in USA. It is not a low level language and high level language. It is middle level language because it has some features of low level language and high level language.

- ❖ **Characteristics of C**
1. It provides expression for manipulation of data.
2. It allows manipulation of internal processor registers.
3. It Supports rich set of data types.
4. It is Very less number of reserved words.
5. This has pointer arithmetic and pointer manipulation
6. Ability to extend itself by adding function to its library.
7. C is structural programming language (Procedural).
8. It has rich set of operators.

- ❖ **Application of C**

C is used to develop system as well as application software.

1. **System Software**
   - Operating system
   - Interpreters
   - Compilers
   - Assemblers
   - Editors
   - Loaders
   - Linkers

2. **Application Software**
   - Database system
   - Graphic packages
   - Spread sheet
   - CAD/CAMapplication

- ❖ **History of c language**

Dennis Ritchie is the **founder of c language**. It 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
Algo	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

❖ Functions - C's Building Blocks

Functions known as building block in C Programming. C Programming is known as procedure oriented programming language not object oriented. It contains different procedures or functions which perform some specified task.

Any C program contains a function named main(), which actually acts as an entry point or it is the first program to be executed.

Functions can share and exchange some data.

Functions are of two types:

(1) Library functions

(2) User defined functions

(1) **Library functions**

Library functions are the pre-defined functions provide by C compiler.

To use them we need to include the specific library file in which that function has been defined.

(2) **User defined functions**

User defined functions are created by programmer for some specific

requirement. A user defined function need to be declared, used and defined.

A simple code that would print the words "Hello World" –

```c
#include <stdio.h>
#include <conio.h>

 void main()
{
  /* first program in C */
```
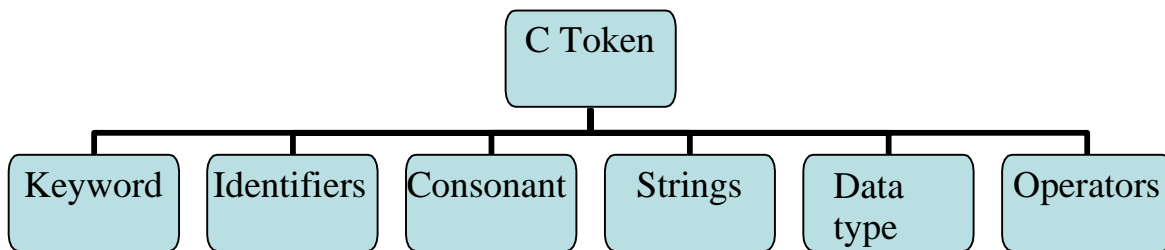
```c
    printf("Hello World……?");
    getch();
}
```

❖ **Language Fundamentals**

Character set:-There are following type of character set like Numeric characters (0 to 9), Alphabets characters (a to z) or (A to Z) and Special symbols (@, #, $ % etc.).

C Tokens

There are following c tokens like identifiers, keywords, constants, string literals, operators.

```
                          ┌──────────┐
                          │ C Token  │
                          └────┬─────┘
   ┌────────┬──────────┬───────┼────────┬──────────┬──────────┐
┌──────┐ ┌──────────┐ ┌──────────┐ ┌────────┐ ┌──────┐ ┌──────────┐
│Keyword│ │Identifiers│ │Consonant │ │Strings │ │ Data │ │Operators │
└──────┘ └──────────┘ └──────────┘ └────────┘ │ type │ └──────────┘
                                              └──────┘
```

Keywords:-
Keywords are reserved words which have pre-defined meaning in any programming language.
Its meaning can not be changed the during execution of program.

auto	double	int	struct
Break	else	long	switch
Case	enum	register	typedef
Char	extern	return	union
Const	float	short	unsigned
Continue	for	signed	Void
Default	goto	sizeof	volatile
Do	if	static	While

Identifiers:-
An identifier is a sequence of letters and digits. The first character must be a letter or the underscore _ counts as a letter. Because upper and lower case letters are different.

Constants:-
There are several kinds of constants.

(a) Integer Constants
An integer constant consisting of a sequence of digits is taken to be octal if it begins with 0 (digit zero).

An integer constant may be suffixed by the letter u or U, to specify that it is unsigned. It may also be suffixed by the letter l or L to specify that it is long.

(b) Character Constants

A character constant is a sequence of one or more characters enclosed in single quotes as in 'x'. The value of a character constant with only one character is the numeric value of the character in the machine's character set at execution time.

newline	"\n"
horizontal tab	"\t"
vertical tab	"\v"
backspace	"\b"
carriage return	"\r"

Floating Constants

A floating constant consists of an integer part, a decimal part, a fraction part, an e or E, an optionally signed integer exponent and an optional type suffix, one of f, F, l, or L.

Integer and fraction parts both consist of a sequence of digits. Either the integer part, or the fraction part (not both) may be missing either the decimal point or the e and the exponent (not both) may be missing.

String Literals

A string literal, also called a string constant, is a sequence of characters surrounded by double quotes as in "...". A string has type "array of characters" and storage class static and is initialized with the given characters.

Data Types in C

A data type specifies the type of data that a variable can store such as integer, floating, character etc. There are 4 types of data types in C language.

Types	Data Types
Basic Data Type	int, char, float, double
Derived Data Type	array, pointer, structure, union
Enumeration Data Type	enum
Void Data Type	void

Basic Data Types The basic data types are integer-based and floating-point based. C language supports both signed and unsigned literals.The memory size of basic data types may change according to 32 or 64 bit operating system.

Let's see the basic data types. Its size is given according to 32 bit OS.

Data Types	Memory Size	Range

Char	1 byte	−128 to 127
signed char	1 byte	−128 to 127
unsigned char	1 byte	0 to 127
Short	2 byte	−32,768 to 32,767
signed short	2 byte	−32,768 to 32,767
unsigned short	2 byte	0 to 32,767
Int	2 byte	−32,768 to 32,767
signed int	2 byte	−32,768 to 32,767
unsigned int	2 byte	0 to 32,767
short int	2 byte	−32,768 to 32,767
signed short int	2 byte	−32,768 to 32,767
unsigned short int	2 byte	0 to 32,767
long int	4 byte	
signed long int	4 byte	
unsigned long int	4 byte	
Float	4 byte	
Double	8 byte	
long double	10 byte	

Operators

In the c programming, we use many type of symbol they each performed specified work. The any kind of symbol which are doing any action perform they called Operator. These are as here under.

1. Arithmetic Operator
2. Logical Operator
3. Relational Operator
4. Increment & Decrement Operator
5. Assignment Operator
6. Bitwise Operator
7. Conditional Operator
8. Special Operator

1. **Arithmetic Operators: -** Arithmetic Operators are used to performing mathematical calculations like addition (+), subtraction (-), multiplication (*), division (/) and modulus(%).

Operator	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulus

2. **LogicalOperator:-**

C provides three logical operators when we test more than one condition to make decisions. These are && (meaning logical AND), || (meaning logical OR) and! (meaning logical NOT).

Operator	Description
&&	*And* operator. It performs logical conjunction of two expressions. (If both expressions evaluate to True, result is True. If either expression evaluates to False, the result is False)
||	*Or* operator. It performs a logical disjunction on two expressions. (if either or both expressions evaluate to True, the result is True)
!	*Not* operator. It performs logical negation on an expression.

3. **RelationalOperator:-**

These operators are used to comparing two quantities or values.

Operator	Description
==	Is equal to
!=	Is not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

4. Increment & DecrementOperator:-

Increment and Decrement Operators are useful operators generally used to minimize the calculation, i.e.++x and x++ means x=x+1 or -x and x−−means x=x-1.

But there is a slight difference between ++ or −− written before or after the operand. Applying the pre-increment first add one to the operand and then the result is assigned to the variable on the left whereas post-increment first assigns the value to the variable on the left and then increment the operand.

Operator	Description
++	Increment
−−	Decrement

5. AssignmentOperator:-

Assignment operators applied to assign the result of an expression to a variable. C has a collection of shorthand assignment operators.

Operator	Description
=	Assign
+=	Increments then assign
-=	Decrements then assign
*=	Multiplies then assign
/=	Divides then assign
%=	Modulus then assign
<<=	Left shift and assign
>>=	Right shift and assign
&=	Bitwise AND assign
^=	Bitwise exclusive OR and assign
|=	Bitwise inclusive OR and assign

6. Bitwise Operator:-

C provides a special operator for bit operation between two variables.

Operator	Description
<<	Binary Left Shift Operator
>>	Binary Right Shift Operator
~	Binary Ones Complement Operator
&	Binary AND Operator
^	Binary XOR Operator
|	Binary OR Operator

7. Conditional Operator:-

C language provides a ternary operator which is the conditional operator (? : in combination) to construct conditional expressions.

Operator	Description
? :	Conditional Expression

8   SpecialOperator:-

C supports some special operators

Operator	Description
sizeof()	Returns the size of a memory location.
&	Returns the address of a memory location.
*	Pointer to a variable.

❖ Comments inC

Comments in C language are used to provide information about lines of code for understanding. It is widely used for documenting code. There are two types of comments in the C language.

1. Single LineComments
2. Multi-LineComments

Single Line Comments:-

Single line comments are represented by double slash \\. Let's see an example of a single line comment in C.

```
#include<stdio.h>

void main()

{

//printing information    Single Line Comments

printf("Hello C");

}
```

Multiline Comments:-

Multi-Line comments are represented by slash asterisk * ... *\. It can occupy many lines of code, but it can not be nested.

Let's see an example of a single line comment in C.

```
#include<stdio.h>

void main()

    {

        /* printing information with c program

        And it provides Hello C

        Multi-Line Comment */

        printf("Hello C");

    }
```