

C Language

Short Notes On C Language

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C – Language History

C language is a structure oriented programming language, was developed at Bell Laboratories in 1972 by Dennis Ritchie

C language features were derived from earlier language called “B” (Basic Combined Programming Language – BCPL)

C language was invented for implementing UNIX operating system

In 1978, Dennis Ritchie and Brian Kernighan published the first edition “The C Programming Language” and commonly known as K&R C

In 1983, the American National Standards Institute (ANSI) established a committee to provide a modern, comprehensive definition of C. The resulting definition, the ANSI standard, or “ANSI C”, was completed late 1988.

Features of C language:

- Reliability
- Portability
- Flexibility
- Interactivity

Uses of C language:

C language is used for developing system applications that forms major portion of operating systems such as Windows, UNIX and Linux. Below are some examples of C being used.

- Database systems
- Graphics packages
- Word processors
- Spread sheets
- Operating system development
- Compilers and Assemblers
- Network drivers
- Interpreters

Key points to remember:

C language is structured, middle level programming language developed by Dennis Ritchie

Operating system programs such as Windows, Unix, Linux are written by C language

C89/C90 and C99 are two standardized editions of C language

C has been written in assembly language

C – Basic Program

We are going to learn a simple “Hello World” C program in this section. Also, all the below topics are explained in this section which are the basics of a C program.

C basic program with output and explanation

Steps to write C programs and get the output

Creation, Compilation and Execution of a C program

How to install C compiler and IDE

Basic structure of a C program

Let’s see all the sections of the above simple C program line by line.

```
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("welcome to Super vision computer");
getch();
}
```

Output of this program is

welcome to Super vision computer

C – printf and scanf

printf() and scanf() functions are inbuilt library functions in C which are available in C library by default. These functions are declared and related macros are defined in “stdio.h” which is a header file.

We have to include “stdio.h” file as shown in below C program to make use of these printf() and scanf() library functions.

C printf() function:

printf() function is used to print the “character, string, float, integer, octal and hexadecimal values” onto the output screen.

We use printf() function with

%d format specifier to display the value of an integer variable.

Similarly %c is used to display character,

%f for float variable,

%s for string variable,

%lf for double

and %x for hexadecimal variable.

To generate a newline, we use “\n” in C printf() statement.

Note:

C language is case sensitive. For example, printf() and scanf() are different from Printf() and Scanf().

All characters in printf() and scanf() functions must be in lower case.

C scanf() function:

scanf() function is used to read character, string, numeric data from keyboard

Consider below example program where user enters a character. This value is assigned to the variable “ch” and then displayed.

Then, user enters a string and this value is assigned to the variable ”str” and then displayed.

C – Data Types

C data types are defined as the data storage format that a variable can store a data to perform a specific operation.

Data types are used to define a variable before to use in a program.

Size of variable, constant and array are determined by data types.

Basic data types in C:

1.1. Integer data type:

Integer data type allows a variable to store numeric values.

“int” keyword is used to refer integer data type.

The storage size of int data type is 2 or 4 or 8 byte.

It varies depend upon the processor in the CPU that we use. If we are using 16 bit processor, 2 byte (16 bit) of memory will be allocated for int data type.

Like wise, 4 byte (32 bit) of memory for 32 bit processor and 8 byte (64 bit) of memory for 64 bit processor is allocated for int data type.

int (2 byte) can store values from -32,768 to +32,767

int (4 byte) can store values from -2,147,483,648 to +2,147,483,647.

If you want to use the integer value that crosses the above limit, you can go for “long int” and “long long int” for which the limits are very high.

Note:

We can't store decimal values using int data type.

If we use int data type to store decimal values, decimal values will be truncated and we will get only whole number.

In this case, float data type can be used to store decimal values in a variable.

1.2. Character data type:

Character data type allows a variable to store only one character.

Storage size of character data type is 1. We can store only one character using character data type.

“char” keyword is used to refer character data type.

For example, ‘A’ can be stored using char data type. You can't store more than one character using char data type.

1.3. Floating point data type:

Floating point data type consists of 2 types. They are,

float

double

1. float:

Float data type allows a variable to store decimal values.

Storage size of float data type is 4. This also varies depend upon the processor in the CPU as “int” data type.

We can use up-to 6 digits after decimal using float data type.

For example, 10.456789 can be stored in a variable using float data type.

C – Constant

C Constants are also like normal variables. But, only difference is, their values can not be modified by the program once they are defined.

Constants refer to fixed values. They are also called as literals

Constants may be belonging to any of the data type.

Syntax:

const data type variable name; (or) const data type variable name;

Types of C constant:

- Integer constants
- Real or Floating point constants
- Octal & Hexadecimal constants
- Character constants
- String constants

C – Variable

C variable is a named location in a memory where a program can manipulate the data. This location is used to hold the value of the variable.

The value of the C variable may get change in the program.

C variable might be belonging to any of the data type like int, float, char etc.

Rules for naming C variable:

Variable name must begin with letter or underscore.

Variables are case sensitive

They can be constructed with digits, letters.

No special symbols are allowed other than underscore.

sum, height, _value are some examples for variable name

Declaring & initializing C variable:

Variables should be declared in the C program before to use.

Memory space is not allocated for a variable while declaration. It happens only on variable definition.

Variable initialization means assigning a value to the variable.

C – Operators and Expressions

The symbols which are used to perform logical and mathematical operations in a C program are called C operators.

These C operators join individual constants and variables to form expressions.

Operators, functions, constants and variables are combined together to form expressions.

Consider the expression $A + B * 5$. where, +, * are operators, A, B are variables, 5 is constant and $A + B * 5$ is an expression.

Types of C operators:

C language offers many types of operators. They are,

- Arithmetic operators
- Assignment operators
- Relational operators
- Logical operators
- Bit wise operators
- Conditional operators (ternary operators)
- Increment/decrement operators

Sr.no	Types of Operators	Description
1	Arithmetic_operators	These are used to perform mathematical calculations like addition, subtraction, multiplication, division and modulus
2	Assignment_operators	These are used to assign the values for the variables in C programs.
3	Relational operators	These operators are used to compare the value of two variables.
4	Logical operators	These operators are used to perform logical operations on the given two variables.
5	Bit wise operators	These operators are used to perform bit operations on given two variables.

6	Conditional (ternary) operators	Conditional operators return one value if condition is true and returns another value if condition is false.
7	Increment/decrement operators	These operators are used to either increase or decrease the value of the variable by one.

C – Loop control statements

Loop control statements in C are used to perform looping operations until the given condition is true. Control comes out of the loop statements once condition becomes false.

Types of loop control statements in C:

There are 3 types of loop control statements in C language. They are,

for

while

do-while

S.no	Loop Name	Syntax	Description
1	for	for (exp1; exp2; expr3) { statements; }	Where, exp1 – variable initialization (Example: i=0, j=2, k=3) exp2 – condition checking (Example: i>5, j<3, k=3) exp3 – increment/decrement (Example: ++i, j-, ++k)
2	while	while (condition) { statements; }	where, condition might be a>5, i<10
3	do while	do { statements; } while (condition);	where, condition might be a>5, i<10

switch case statement in C:

Switch case statements are used to execute only specific case statements based on the switch expression.

Below is the syntax for switch case statement.

```
switch (expression)
{
    case label1: statements;
                break;
    case label2: statements;
                break;
    default:    statements;
                break;
}
```

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C Language Programming

1. Wap (Write A Program) to print your name

```
#include<stdio.h>
#include<conio.h>
void main()
{
Clrscr();
Printf(“Super vision computer”);
Getch();
}
```

2. Wap to make addition of two no

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,c;
clrscr();
printf("Enter first no");
Scanf ("%d",&a);
printf("enter second no");
scanf("%d",&b);
c=a+b;
printf("Total of your entered no is= %d",c);
getch();
}
```

3. Wap to find out area of rectangle

```
#include<stdio.h>
#include<conio.h>
void main()
{
int area, length,width;
clrscr();
printf("enter length of rectangle");
scanf("%d",&length);
printf("enter width of rectangle");
scanf("%d",&width);
area=length*width;
printf("area of rectangle is = %d",area);
getch();
}
```

4. Wap to find out area of circle.

```
#include<stdio.h>
#include<conio.h>
void main()
{
float a,r;
clrscr();
printf("enter the value of radius");
scanf("%f",&r);
a=3.14*r*r;
printf("The area of circle is =%f",a);
getch();
}
```

5. Wap to find out square of any number

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b;
clrscr();
printf("Enter any no");
Scanf ("%d",&a);
B=a*a;
printf("Square of entered number is= %d",b);
getch();
}
```

6. Wap to find out first ten odd no from 1 to 10

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a=1;
clrscr();
while(a<=10)
{
printf("%d",a);
a=a+2;
}

getch();
}
```

7. Wap to print first ten number from 1 to 10

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a=0;
clrscr();
while(a<=10)
{
printf("%d",a);
a=a+1;
}

getch();
}
```

8. Wap to check whether number is even or odd .

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
clrscr();
printf("enter any number");
scanf("%d",&a);
if(a%2==0)
{
printf("Entered number is even");
}
else
{
```

```
printf("entered number is odd");  
}  
getch();  
}
```

9. Wap to check whether year is leap or not

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
int a;  
clrscr();  
printf("enter any year");  
scanf("%d",&a);  
if (a%4==0)  
{  
printf("Entered year is leap");  
}  
else  
{  
printf("entered year is not leap");  
}  
getch();  
}
```


10. Wap to make total of marks in five subjects also calculate percent.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int m1,m2,m3,m4,m5,total;
float percent;
clrscr();
printf("enter your marks in five subject");
scanf("%d%d%d%d%d",&m1,&m2,&m3,&m4,&m5);
total=m1+m2+m3+m4+m5;
percent=total/5;
printf("your total marks in five subject is = %d",total);
printf("\nand your percent is =% f",percent);

getch();
}
```

11. Wap to calculate simple interest.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int p,t;
float r,si;
clrscr();
printf("enter amount,rate of interest,and time");
scanf("%d%f%d",&p,&r,&t);
si=(float)p*r*t/100;
printf("simple interest is = Rs.%f",si);
```

```
`getch();  
}
```

12. Wap to find out square root of any number

```
#include<stdio.h>  
#include<conio.h>  
#include<math.h>  
void main()  
{  
int a,b;  
clrscr();  
printf("enter any one number");  
scanf("%d",&a);  
b=sqrt(a);  
printf(" square root of entered number is = %d",b);  
getch();  
}
```

13. Wap to print table of 5

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
int x,y;  
clrscr();  
x=1,y=0;  
while(x<=10)  
{  
y=5*x;  
x++;  
printf("\n%d",y);  
}  
getch();  
}
```

14. Wap using switch statement.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,c,d;
clrscr();
printf("enter any two no");
scanf("%d%d",&a,&b);
printf("\n1.Addition\n2.Subraction\n3.multiply\n4.division");
printf("\nenter your choice");
scanf("%d",&d);
switch(d)
{
case 1: c=a+b;
        break;
case 2: c=a-b;
        break;
case 3: c=a*b;
        break;
case 4: c=a/b;
        break;
default:printf("\nyou have entered wrong choce");
c= 0;
break;
}
printf("\nyour result is = %d",c);
getch();
}
```

15. Wap to make total of marks in five subjects also calculate percent and result

```
#include<stdio.h>
#include<conio.h>
void main()
{
int m1,m2,m3,m4,m5,total;
float percent;
clrscr();
printf("\nenter your marks in five subject");
scanf("%d%d%d%d%d",&m1,&m2,&m3,&m4,&m5);
total=m1+m2+m3+m4+m5;
percent=(float)total/5;
printf("\nyour total marks in five subject is =%d");
printf("\nyour percent is =%f",percent);
if(percent>=75)
printf("\n you passed with Distinction");
else
if(percent>=60)
printf("\nyou passed with first division");
else
if(percent>=45)
printf("\n you passed with second division");
else
if(percent>=35)
printf("\n you passed with third division");
else
printf("\n Sorry you failed");
getch();
}
```