

S SDN

PRINCE WADHWA

5336

C LANGUAGE NOTES

BANGALORE ComPUTERS

PROF. RAJESH BANSAL

C - LANGUAGE

* C is a Procedural language. It was initially developed by Dennis Ritchie in the year 1972. It was mainly developed as a System Programming language to write an operating system. The main features of C language include low-level access to memory, a simple set of keywords, and clean style, these features makes C language suitable for programming like an operating system or compiler development.

* Features of C language :-

- ① Procedural Language.
- ② Fast and Efficient.
- ③ Modularity.
- ④ Statistically type.
- ⑤ General Purpose Language.
- ⑥ Rich set of built-in operators.
- ⑦ Libraries with rich functions.
- ⑧ Middle level language
- ⑨ Portability
- ⑩ Easy to Extend.

History

Before 1972, Some Languages also going in world (like BCPL, B, Fortran, Cobol) when 'C' language coming in market (in 1972, by Dennis Ritchie) everyone gone made in C (means using C language). When 'C' is used in wide range and then same complexity come and then in 1979 C++ came (by Bjarne Stroustrup) firstly (जहां तक कि C will classes) then it will be C++ mean ("one higher than C").

Example :-

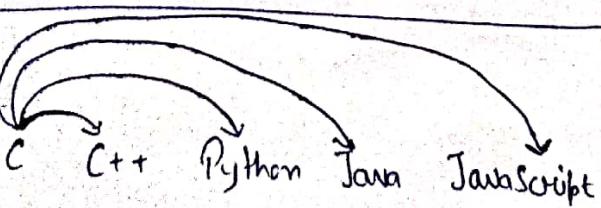
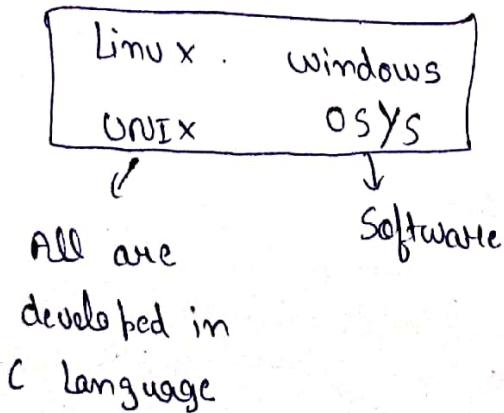
$x = 2$
 $x++;$ (+ + mean increment by one)

1995

↳ JAVA

By

James
Gosling



"C is called mother Language."

C++ is (OOPS)

Object oriented Programming

JAVA (World no.1 Language)

Python (World no.2 Language)

Facebook is developed in PHP.

Android

JAVA

'C' Libraries

Linux (C)

Today we will study nothing (Joking).

Coding Scheme

int main () → A function

keyword

opening Braces

Block

Body
of
main()

Closing Braces

printf ("Name\n"); double quotes

printf ("College\n\n");

printf ("In City\n\n");

printf ("It Is I Love ("India")");

printf ("In\nI got 99/100");

Output

1 NAME
2 College

3
4
5 City

I love "India".

9 got 99/100

We all know that for writing we need to open from our body this is true (yes sir) so in Coding (means for writing in a computer (LOL)) we also need what, what [from, Gby] oh really (In program (from, Gby कीजे करते हैं)). int main () { Question what is int main(). It is a function int is a keyword (For new line \n is used) if we use \n\n\n it means 3 next line (It is used for gap). one thing, if I want to some word in a double quotes this syntax used " — " and other thing if I want to print 99/100 we need to write in a program like 99/100 then 99/100 will be print.

* Back slash character Constants, Escape Sequence :-

\n → New / Next line

\t → Tab (Jump 8 spaces)

\" → To print @ double quotes on Screen

\\" → To print \ (back slash) on Screen

\0 → Null character (represent End of string)
zero

* Constants | Literals :-

The values or quantities that never change are known as constants.

- Types :-
- (i) Integer Constants
 - (ii) Real | floating Constants
 - (iii) Character Constants
 - (iv) String Constants.

⇒ Integer Constants :- A Numeric values without decimal points.

Types of integer Constants :-

- (A) Decimal Integer Constant :- It can have digits from 0-9.
Eg:- 26, 37, 867, etc.

- (B) Octal Integer Constants :- It can have digits from 0 to 7.
Eg:- 026, 037, 041, 072

It Starts with zero (0).

c) Hexadecimal Integer Constant :- It can have 0-9 and A-F and starts with 0x or 0X.

Eg :- 0x26, 0x37, 0xAB23, etc.

⇒ Real or floating Constants :- A numeric value having decimal points. Eg :- .07, 3.6, 3.14, etc.

Decimal type

$$= 78.96$$

Exponential type

$$\Rightarrow 5.6 e 5$$

$$\Rightarrow 5.6 \times 10^5$$

$$\Rightarrow 56\ 0000$$

⇒ Character Constant :- A Single Alphabet (Capital / Small any digit, or any Special Symbol enclosed with in Single Quotes.)

Eg :- 'A', '6', '*', '\$', etc.

There are 256 characters constants in C/C++ ; each having a preassigned decimal value called ASCII value. (American Standard Code for Information Interchange)

Range :- [0 to 255].

$$'A' \rightarrow (65)_{10} \rightarrow (101001)_2 \rightarrow \text{binary}$$

	ASCII
'A' - 'Z'	65 - 90
'A' - 'B'	97 - 122
'0' - '9'	48 - 57
'\$', '\$', etc.

2	'2'
Integer Constant	Character Constant
$(2) \rightarrow ()_2$	$'2' \rightarrow (50)_{10} \rightarrow (...)_2$
$2+2 = 4$	$'2' + 2 = 50 + 2 = 52$

A character
Constantly occupy
1 Byte Space
in memory.

$$'A' + 2 = 65 + 2 = 67$$

$$'A' + 'B' = 65 + 66 = 131$$

=>

String Constant :-

A group of characters or a single character or no character enclosed with double quotes is known as String Constant.

Eg :- "A", "f", "A12", "", etc.

"BCE" \Rightarrow

B	C	E	10
---	---	---	----

 \Rightarrow 4 Bytes
Memory.

It terminates with null character.

- * Variable :-
- A Storage Location in Memory.
 - Its value can be changed

```
int main()
{
    int x = 5;           // Creation & initialization of variable
    float y = 2.5;       // Integer Constant
    char z = 'A';        // Float Constant
}
```

Data types

Creation of Variable

[=] → assignment operator.

int x = 5; // Creation & initialization of variable

float y = 2.5; // Integer Constant

char z = 'A'; // Character Constant

int b; // Declaration of variable takes garbage value by default.

b = 6

```
printf("x = %d", x);
      // format specifier
printf("In floating value = %f", y);
printf("In %f is the value", y);
printf("In char value = %c", z);
```

}

```
int main()
{
    // int x = 5; // Declaration of variable takes garbage value by default.
    // int y = 6;
    int x = 5, y = 6;
    printf("x = %i & y = %d", x, y);
}
```

we learn how to declare a value to variable, Now we talk with printf and tell that it print x & y value print out.

117 Mood Mantras for Error Free Project :-

- ① Clean / Find the Problem.
- ② Write formula.
- ③ Declare Variables from formula.
- ④ Think about Empty Variables in Memory.
- ⑤ Assign / Input Value of Variables.
- ⑥ Apply Formula.
- ⑦ Output.

11 Program for Area of Rectangle.

$$11 A = L \times B$$

```
int main ()
```

```
{
```

```
float A, L, B;
```

```
printf (" Enter Length : %f");
```

```
scanf ("%f", &L);
```

```
printf (" Enter Breadth : %f");
```

```
scanf ("%f", &B);
```

```
printf (" Area = %f", L * B);
```

①

②

→ address of operation.

Home Work

Q - ① :- Input Price of Laptop , mobile and book and find out total Price and average Price.

```
A - ① :- int main ()  
{    float L, M, B;  
    printf (" Input price of Laptop : \n");  
    scanf ("%f", &L);  
    printf (" Input price of Mobile : \n");  
    scanf ("%f", &M);  
    printf (" Input price of Book : \n");  
    scanf ("%f", &B);  
    printf (" Total Price = %.f \n", (L+M+B));  
    printf (" Average Price = %.f \n", (L+M+B)/3);  
}
```

Q - ② :- Input the marks of Physics, chemistry and maths and find out the total and Percentage .

```
A - ② :- int main ()  
{    float P, C, M;  
    printf (" Enter the marks of Physics : \n");  
    scanf ("%f", &P);
```

```
Pointf ("Enter the marks of chemistry : %f");
```

```
Scarf ("%f", &c);
```

```
Pointf ("Enter the marks of maths : %f");
```

```
Scarf ("%f", &m);
```

```
Pointf ("Total marks = %f", P + C + M);
```

```
Pointf ("Percentage = %f", ((P + C + M) / 300) * 100));
```

```
}
```

C - ③ Program for volume of cylinder

$$\text{Formula} \Rightarrow \text{val} = 3.14 * r * r * h$$

```
A - ③ int main()
```

```
{
```

```
float r, v, h;
```

```
Pointf ("Enter the value of radius : %f");
```

```
Scarf ("%f", &r);
```

```
Pointf ("Enter the value of height : %f");
```

```
Scarf ("%f", &h);
```

```
Pointf ("Volume of cylinder = %f", 3.14 * r * r * h);
```

```
}
```

Q-④ :- Program for volume of Cone

$$\text{formula} \Rightarrow V = \pi r^2 h / 3$$

A-④ :- int main()

```
{ float v, r, h;
```

```
printf ("Enter radius of Cone : %f");
```

```
scanf ("%f", &r);
```

```
printf ("Enter height of Cone : %f");
```

```
scanf ("%f", &h);
```

```
printf ("Volume of Cone = %f %m", (3.14 * r * r) * (h / 3));
```

Q-⑤ :- Program for area of circle & square.

A-⑤ :- int main()

```
{ float s, r;
```

```
printf ("Enter the measurement of side : %f");
```

```
scanf ("%f", &s);
```

```
printf ("Enter the measurement of radius : %f");
```

```
scanf ("%f", &r);
```

```
printf ("Area of Square = %f %m", s * s);
```

```
printf ("Area of Circle = %f %m", 3.14 * r * r);
```

```
}
```

Q-⑥ :- Temperature of a city in Fahrenheit degree is input through the keyboard write a program to convert this temperatures into Centigrade degrees

$$\text{formula} :- {}^{\circ}\text{C} = ({}^{\circ}\text{F} - 32) * \frac{5}{9}$$

A-⑥ :-

```
int main()
```

```
{
```

```
float C, F;
```

```
printf ("Enter Fahrenheit degrees : ");
```

```
scanf ("%f", &F);
```

```
printf ("Temperature in Celsius = %f\n", C = (F - 32) * 5/9);
```

Q-⑦ :-

Write a note on Variable.

A-⑦ :-

A Variable is nothing but a name given to a storage area that our programs can manipulate. Each variable in 'C' has a specific type, which determines the size & layout of the variables memory; the range of values that can be stored within that memory and the set of operations that can be applied to variable. The name of a variable can be composed of letters, digits and the underscore character. It must begin with either a letter or an underscore. Upper and Lower Case are distinct because 'C' is Case-Sensitive. Based on the basic types, Basic Variable types :-

- ① char ② int ③ float ④ double ⑤ void

A Variable definition tells the compiler where and how much storage to create for the variable.

II Swap | Exchange of two variables :-

```
int main()
```

```
{ int A, B, temp;
```

```
printf (" Exchange A & B : \n");
```

```
scanf ("%d %d", &A, &B);
```

```
temp = A;
```

```
A = B;
```

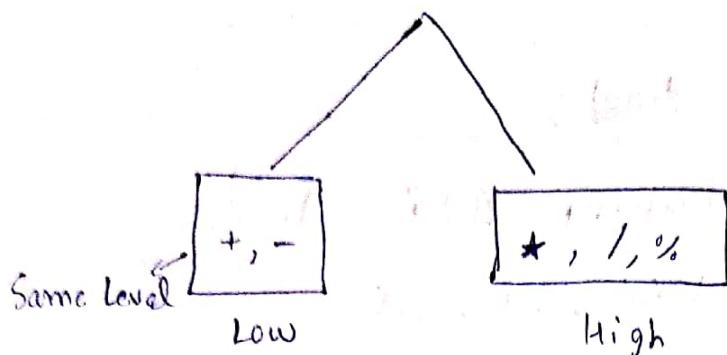
```
B = temp;
```

```
printf (" Now, A = %d , B = %d \n", A, B);
```

```
}
```



Hierarchy | Priority | Precedence of Arithmetic Operations



(Here in 'C' Bodmas is not applied)

$$= A + B * C$$

② ①

$= A / B * C \Rightarrow$ If Same level, then work left to right called associativity.

$$= A - B * C / D + E \quad \text{11 3 1 2 4}$$

③ ① ② ④

(Default order)

$$\Rightarrow A * (B - C) / D$$

① ②

$$\Rightarrow \text{Simplify } (b * b - 4 * a * c) / (2 * a)$$

⑤ ① ④ ③ ⑦ ⑥



" / " (Division) :-

$$\text{int } x = 5 / 2; \rightarrow 2$$

$$\text{float } y = 5 / 2; \rightarrow 2.0$$

int / int \rightarrow int

float / int \rightarrow float

int / float \rightarrow float

float / float \rightarrow float

$$\text{float } y = 5.0 / 2$$

$$= 5 / 2.0$$

2.5

$$= 5.0 / 2.0$$

$$= 1.0 \times 5 / 2$$

int n = 7, y = 2;

float z = (float) n / y;

↓

Explicit type casting

(%) \rightarrow Modulare Für Rest Wert

int x = 5 % 2;

1

int y = 158 % 100;

58

int y = 136 % 100;

36

int y = 136 / 100;

1

int a = 8.0 % 3;

20

int a = (int) 8.0 % 3;

2

↓
Explicit type
casting

int x = (-5) % 10

-1

int y = 5 % 2

1

int z = -5 % -2

-1

Sign of result depends
upon sign of numerator.

11. Program for Reverse of 3 digit Number

```
int main ()  
{  
    int N, R1, R2, Rev, Sum;  
    printf ("Enter 3 digit Number : ");  
    scanf ("%d", &N); // 123
```

$$\boxed{3} \quad R_1 = N \% 10;$$

$$N = N / 10;$$

$$\boxed{2} \quad R_2 = N \% 10;$$

$$\boxed{1} \quad N = N / 10;$$

$$Rev = R_1 \times 100 + R_2 \times 10 + N \times 1$$

```
printf ("In Reverse = %d", Rev);
```

$$Sum = R_1 + R_2 + N;$$

```
printf ("In Sum = %d", Sum);
```

Note :- % → Returns Remainder

 / → Returns Quotient.

Home Work

Q - Input time in Minutes and convert it to valid hours & minutes

A -

```
int main ()  
{  
    int m, H; int mins  
    printf (" Enter time in minutes: \n");  
    scanf ("%d", &mins);  
  
    H = mins / 60;  
    m = mins % 60;  
    printf (" H : %d M : %d", H, m);  
}
```

G - Input a five digit Number through keyboard, write a Program to calculate the sum of its digits.

A \Rightarrow

```
int main ()  
{  
    int N, R1, R2, R3, R4, sum;  
    printf (" Enter five digit no.: \n");  
    scanf ("%d", &N); // 12345  
  
    R1 = N % 10;  
    N = N / 10;  
    R2 = N % 10;  
    N = N / 10;  
    R3 = N % 10;  
    N = N / 10;
```

$$R_1 = N \% 10;$$

$$N = N / 10;$$

$$\text{Sum} = R_1 + R_2 + R_3 + R_4 + N;$$

printf (" Sum = %d , sum");

}

Q- If a five digit no. is input through keyboard, write a program to reverse the no.

A - int main ()

{

$$\text{int } n, R_1, R_2, R_3, R_4, REV; .$$

printf (" Enter five digits no: \n ");

scanf ("%d", &n);

$$R_1 = n \% 10;$$

$$n = n / 10;$$

$$R_2 = n \% 10;$$

$$n = n / 10;$$

$$R_3 = n \% 10;$$

$$n = n / 10;$$

$$R_4 = n \% 10;$$

$$n = n / 10;$$

$$REV = R_1 * 10000 + R_2 * 1000 + R_3 * 100 + R_4 * 10 + n * 1;$$

printf (" reverse = %d ", REV);

}

Q - If a six digit number is input through key board , write a program to obtain the sum of first and last digit of this number .

⇒ int main ()

{

int n, H₁, H₂; int sum;

printf (" Enter a Six digit number : %d ");

scanf ("%d", &n);

~~H₁ = n % 10;~~

~~n = n / 1000000;~~

Sum = H₁ + n;

printf (" sum = %d ", sum);

92456
100000