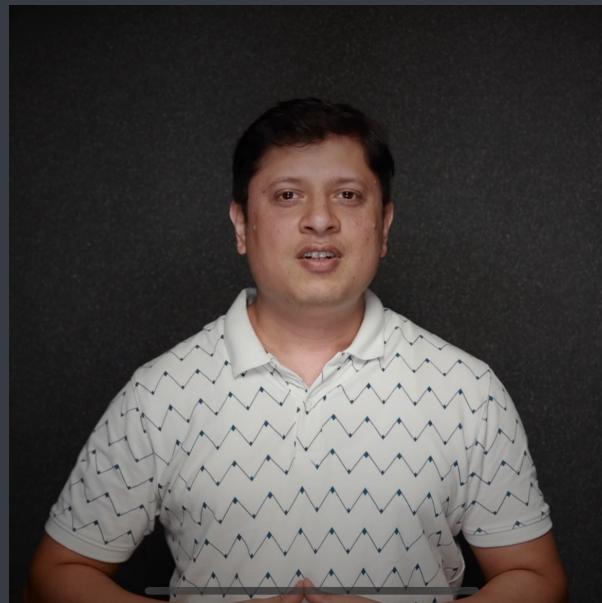


C Language

Operators in C Language



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Agenda

- ① Arithmetic Instruction
- ② Classification of operators
- ③ Unary operators
- ④ Arithmetic operators
- ⑤ Bitwise operators
- ⑥ Relational operators
- ⑦ Logical operators
- ⑧ Assignment operators

Arithmetic Instruction

An instruction which is used to manipulate data using operators, is known as Arithmetic Instruction.

$3 + 4$
↑ ↑
Data/Operands

Operator

BODMAS

$3 + 4 * 5$

35 23
X ✓

Classification of Operators

- ① Unary operators +, -, ++, --, sizeof()
- ② Arithmetic operators *, /, %, +, -
- ③ Bitwise Operators &, |, ^, ~, >>, <<
- ④ Relational Operators <, >, <=, >=, ==, !=
- ⑤ Logical Operators !, &&, ||
- ⑥ Conditional Operator ?:
- ⑦ Assignment Operators =, +=, -=, *=, /=, %=

operands

- ① unary - 1 operand
- ② Binary - 2 operands
- ③ Ternary - 3 operands

Unary Operators

$+, -, ++, --$

$+5 \quad -7$

Increment Operator

$\text{int } x = 5;$ x
 $| \underline{\hspace{2cm}} 567$

$\text{printf}("y.d", x); \quad 5$
 $++x; \quad \rightarrow \quad x = x + 1$

$\text{printf}("y.d", x); \quad 6$

$x++; \quad \rightarrow \quad x = x + 1$

$\text{printf}("y.d", x); \quad 7$

↳ Preincrement

↳ postincrement

Decrement operator

$\text{int } x = 5;$

$x--; \quad \text{post decrement}$

$--x; \quad \text{pre decrement}$

$x = x - 1$

Find Output of the following program?

```
#include<stdio.h>
int main()
{
    int x=5, y;
    y=x++;
    printf("%d %d", x, y);
}
```

x y
6 5

6 5

Find Output of the following program?

```
#include<stdio.h>
int main()
{
    int x=5, y;
    y=++x;
    printf("%d %d", x, y);
}
```



6 6

Unary Operators

sizeof()



- ① Data type
- ② variable
- ③ Constant

int x;

x = sizeof(float);

printf("%d", x); 4

x = sizeof(double); ^

printf("%d", x); 8

x = sizeof(char);

printf("%d", x); 1

```
int x, y;  
float m;  
char ch;  
double d1;  
8 x = sizeof(d1);  
1 x = sizeof(ch);  
4 x = sizeof(y);  
4 x = sizeof(m);
```

```
4 x = sizeof(35);  
8 x = sizeof(4.7);  
4 x = sizeof('A');
```

Real constants are by default of double type
Integer constant is int
Character constant is int

Arithmatic Operators (L to R)

* / %

$a * b / c$ *

+ -

$a / b + c$ /

$3 + 4$ 7

$a + b * c$ *

$3 - 4$ -1

$10 \% 4$ 2

$3 * 4$ 12

$25 \% 7$ 4

$3 / 4$ 0

$3 \% 4$ 3

$3.0 / 4$ 2 } 0.75

0.5%2 error

$3 / 4.0$ 2 }

$3.0 / 4.0$

$25 / 8$ 3

{ $243 \% 10$ 3
 $243 / 10$ 24 }

Bitwise Operators

$\&$ | ^ ~ , >>, <<
AND 'OR' XOR NOT Right Shift Left Shift

Binary digit is called
a bit.
 $0 \& 1$ are bits

$$0 \& 0 \rightarrow 0$$

$$0 \& 1 \rightarrow 0$$

$$1 \& 0 \rightarrow 0$$

$$1 \& 1 \rightarrow 1$$

$$0 | 0 \rightarrow 0$$

$$0 | 1 \rightarrow 1$$

$$1 | 0 \rightarrow 1$$

$$1 | 1 \rightarrow 1$$

$$0 \wedge 0 \rightarrow 0$$

$$0 \wedge 1 \rightarrow 0$$

$$1 \wedge 0 \rightarrow 0$$

$$1 \wedge 1 \rightarrow 1$$

$$\sim 0 \rightarrow 1$$

$$\sim 1 \rightarrow 0$$

$x = 35 \& 12;$

$$35 = 100011$$

$$\begin{array}{r} 12 = \\ 001100 \\ \hline 0 = 000000 \end{array}$$

$x = 23 | 47;$

$$23 = 0010111$$

$$\begin{array}{r} 47 = \\ 010111 \\ \hline 63 = 111111 \end{array}$$

$$\frac{x}{6} = 25722;$$

00 0000000 000000000 00000000 000 | 100

6

Relational Operators (L to R)

$<$, $>$, \leq , \geq . (Comparison operators)

$==$, $!=$

Result of relational operator is always either 0 or 1

$=$ assignment $x = 4;$

$==$ equal to $x == 4;$



True $\rightarrow 1$
False $\rightarrow 0$

1 $x = 5 > 4;$

0 $x = 3 != 3;$

1 $x = 5 \leq 5;$

0 $x = \underline{5 > 4 > 3};$
1 > 3

1 $x = 6 == 6.0;$

Logical Operators

! NOT(unary)

! True \rightarrow False

&& AND

! False \rightarrow True

|| OR

$x = !5 > -2;$

Every non-zero value
is True

zero is False

$x > 0 \& \& y > 0$

Exp1 || Exp2

Exp1 && Exp2

T && T → T
T && F → F
F && X → F

F || F → F
F || T → T
T || X → T

```
int x=4,y;  
y=5>4 || x++;  
printf("%d %d",x,y);
```

4 1

Assignment Operators R to L

=

$x = 4;$ \boxed{x}
 4

$4 = x;$ error

variable = anything
int $x = 5;$ \boxed{x}
 $x = x + 3;$ 5

↓ ↑
Container Content

$x = y = 4;$
 $y = 4$

$x = y$

Compound Assignment Operators

$+ = , - = , * = , / = , \% =$

int $x = 5$

$x += 4;$

$x = x + 4$

$x -= 3;$

$x = x - 3$

$x *= 2;$

$x = x * 2$

$x /= 6;$

$x = x / 6$

$x \% = 5;$

$x = x \% 5$