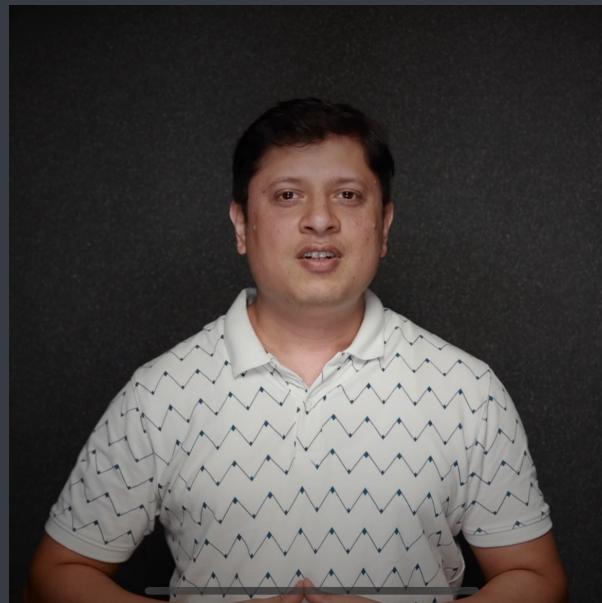


C Language

Operators in C Language



Saurabh Shukla (MySirG)

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.

Operands (data)

↙ ↓
3 + 4
↑
operator

3 + 4 * 5
3 + 20
23

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
- ② Binary
- ③ Ternary

Unary Operators

$+, -, ++, --$

$+3, -5$

Increment Operator $++$

`int x=5;`

$\frac{x}{786}$

$x+1$
 $x++$

$++x \uparrow$

$x++ \downarrow$

`printf("%d", x); 5`

$x++; \rightarrow$ post increment $\rightarrow x = x+1$

`printf("%d", x); 6`

$x++; \rightarrow$ pre increment

`printf("%d", x); 7`

Decrement Operator $--$

$x--; \text{ post decrement} \Downarrow x = x-1$

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

Find Output of the following program?

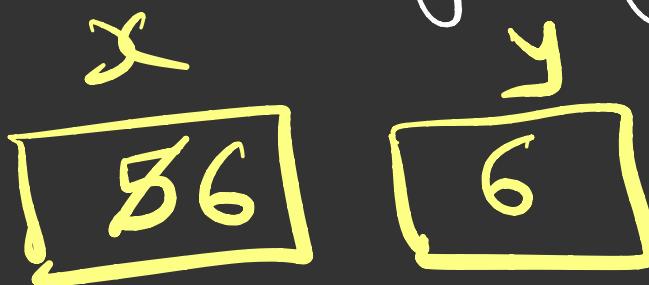
```
#include<stdio.h>
int main()
{
    int x=5, y;
    y=x++;
    printf("%d %d", x, y);
}
```



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
double type
character constants are by default
of type int

Integer
constants are
by default of
type int
=

Arithmatic Operators (L to R)

* / %

$a * b / c$

*

float x;

+ -

$a + b * c$

/

$x = 3 / 4;$

3+4 7

$a + b * c$

*

x
0.00

3-4 -1

Integer operator Integer

3*4 12

= Integer

3/4 0

25 % 3 1

$\sqrt{4}(0)$

7/3 2

17 % 5 2

$\frac{0}{4}$

3/4.0 0.75

4 % 7 4

modulus (%) operator

3.0/4 0.75

$a \% b \rightarrow a$

cannot be applied on Real constants

3.0/4.0 0.75

$a < b$

$a / 10 \rightarrow$ a without last digit

$a \% 10 \rightarrow$ Last digit of a

Bitwise Operators

8 | ^ ~ , >>, <<
 AND 'OR' XOR NOT Right Shift Left Shift

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

0 & 0 → 0	0 0 → 0	0 ^ 0 → 0	~ 0 → 1
0 & 1 → 0	0 1 → 1	0 ^ 1 → 1	~ 1 → 0
1 & 0 → 0	1 0 → 1	1 ^ 0 → 1	
1 & 1 → 1	1 1 → 1	1 ^ 1 → 0	

int x = 25 & 72; ≤ 8

25 = 00000000 00000000 00000000 00011001
 72 = 00000000 00000000 00000000 01001000
 8 = 00000000 00000000 00000000 00001000

$x = 35 \& 12;$

100011
1100

0

$x = 23 | 47;$

16 4 2 1

32 8 4 2 1

32 + 16 + 8 + 4 + 2 + 1

63

10111
101111
111111

$x = 257 \gg 2;$

0 - - - - 011001
6



$x = 12 \ll 3;$

0011000000 = 96

int x = ~5;

$$K = b_1 \leftarrow 2's$$
$$-K = b_2 \leftarrow$$

$$K=6$$

$$x = -6$$

MSB

0 → +ve

→ -ve

Relational Operators (L to R)

$<$, $>$, $<=$, $>=$. (Comparison operators)

$==$, $!=$ True \rightarrow 1
 False \rightarrow 0

$x = 5 > 6; \quad 0$

$x = 4 != 3; \quad 1$

$x = 4 > 3 < 2; \quad 1$

$x = 3 > 4 < 2; \quad 1$

$x = 5 > 4 > 3; \quad 0$

Logical Operators

! NOT(unary)

&& AND

|| OR

Every non-zero value
is True

zero is False

! True \rightarrow False

! False \rightarrow True

$x = ! 5 ; 0$

$x = ! 5 \& -2 ;$
 $0 > -2$

1

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

Exp1 || Exp2

Exp1 && Exp2

T && T → T
T && F → F
F && X → F

F || F → F
F || T → T
T || X → T

Assignment Operators R to L

=

$x = 4;$

= Assignment

$4 = x;$ error

== equal to

variable = anything

$y = x = 3;$

int $x=5;$

x
5

$x = x + 3;$

↑
Container

↑
Content

Compound Assignment Operators

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

int $x = 5;$

$x += 4;$

$x = x + 4$

$x -= 3;$

$x = x - 3$

$x *= 2;$

$x = x * 2$

$x /= 6;$

$x = x / 6$

$x \% = 5;$

$x = x \% 5$

int $x = 5;$
 $x *= 3 + 4;$
 $x *= 7$
 $x = x * 7$

int $x = 5;$
 $x = x * 3 + 4;$
 $15 + 4$
 $x = 19$

35