

Chapter 2 : Instructions and Operators

A C program is a set of instructions. Just like a recipe - which contains instructions to prepare a particular Dish.

Types of Instructions

- 1> Type declaration Instruction
- 2> Arithmetic Instruction
- 3> Control Instruction

Type declaration Instruction

```
int a;  
float b;
```

Other Variations :

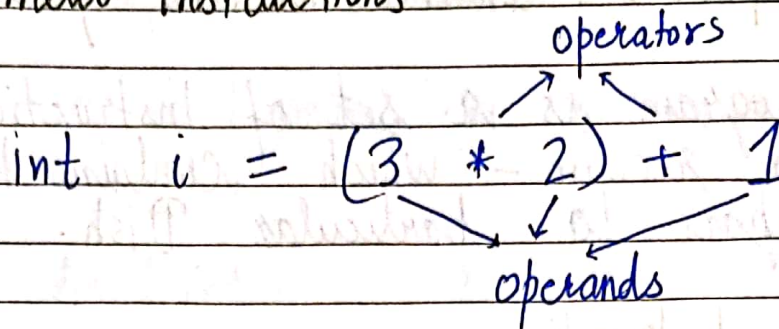
```
int i = 10; int j = i; int a = 2  
int j1 = a + j - i;
```

`float b = a + 3; float a = 1.1` \Rightarrow ERROR! as we are trying to use `a` before defining it.

```
int a, b, c, d;
```

`a = b = c = d = 30;` \Rightarrow Value of `a, b, c` & `d` will be 30 each.

Arithmetic Instructions



Operands can be int/float etc.
`+` `-` `*` `/` are arithmetic operators

`int b = 2, c = 3;`

`int z; z = b * c;` ✓ legal

`int z; b * c = z;` ✗ Illegal (Not allowed)

IMP

- `%` → Modular division operator
- `%` → Returns the remainder
- `%` → Cannot be applied on float
- `%` → Sign is same as of numerator ($-5 \% 2 = -1$)

$5 \% 2 = 1$ $-5 \% 2 = -1$

Note :-

17 No operator is assumed to be present

`int i = ab` → Invalid

`int i = a * b` → valid

27 There is no operator to perform exponentiation in C
 However we can use `pow(x, y)` from `<math.h>` (More later)

Type Conversion

An Arithmetic operation between

Int and Int \rightarrow Int

Int and float \rightarrow Float

Float and float \rightarrow Float

$$5/2 \rightarrow 2$$

$$5.0/2 \rightarrow 2.5$$

$$2/5 \rightarrow 0$$

$$2.0/5 \rightarrow 0.4$$

} Important!!

Note :

int a = 3.5;

In this case 3.5 (float) will be demoted to 3 (int) because a is not able to store floats.

float a = 8;

a will store 8.0
 $8 \rightarrow 8.0$ (promotion to float)

Quick Quiz:

Q int k = 3.0/9 Value of k? and why?

S $3.0/9 = 0.333$ but since k is an int, it cannot store floats & value 0.33 is demoted to 0.

Operator precedence In C

$3 * x - 8 y$ is $(3x) - (8y)$ or $3(x - 8y)$?

In C language simple mathematical rules like BODMAS, no longer applies.

The answer to the above question is provided by operator precedence & associativity.

Operator precedence ÷ The following table lists the operator priority in C

Priority	Operators
1 st	$*$ $/$ $\%$
2 nd	$+$ $-$
3 rd	$=$

Operators of higher priority are evaluated first in the absence of parenthesis.

Operator Associativity ÷ When operators of equal priority are present in an expression, the tie is taken care of by associativity.

$$x * y / z \Rightarrow (x * y) / z$$

$$x / y * z \Rightarrow (x / y) * z$$

$*$, $/$ follows Left to right associativity

Control Instructions

Determines the flow of control in a program

Four types of control instructions in C are:

1. Sequence Control Instruction
2. Decision Control Instruction
3. Loop Control Instruction
4. Case Control Instruction