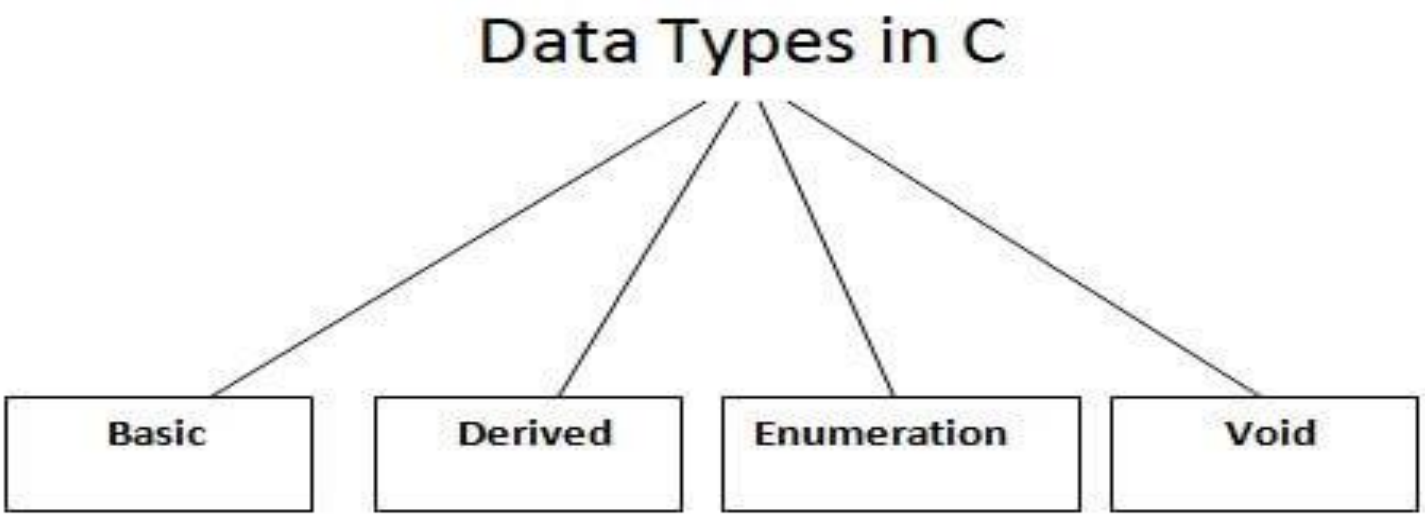
Data Types

- A data type specifies the type of data that a variable can store such as integer, floating, character, etc.
- Data Type is a Data Storage Format that can contain a **Specific Type or Range of Values**.
- When computer programs store data in variables, each variable must be assigned a **specific data type**.



Data Types Cont..

- Whenever we declare variable in Computer's memory, Computer must know the **type of the data to be stored inside the memory**.
- If we need to store the single character then the size of memory occupied will be different than storing the single integer number.
- The memory in our computers is organized in bytes. A **byte is the minimum amount of memory** that we can manage in C.
- A byte can store a relatively small amount of data one single character or a small integer (generally an integer between 0 and 255).

Types	Data Types
Basic Data Type	int, char, float, double
Derived Data Type	array, pointer, structure, union
Enumeration Data Type	enum
Void Data Type	void

Size Required to Store Variable of Different Data Types

Data Type	Borland C/C++ Compiler	Visual C++
Integer	2 Bytes	4 bytes
Float	4 Bytes	4 Bytes
Character	1 Byte	1 Byte
Long	4 Byte	8 Byte

Operators in C

- An operator is simply a symbol that is used to perform operations. There can be many types of operations like arithmetic, logical, bitwise, etc.
- There can be Unary and Binary Operators.

Unary: Those operators that perform operations on single operand are called Unary operators. E.g ++ and –

Binary: Those operators that need at least two operands to perform operation are called Binary operators. E.g +,-,/,* etc.

- There are following types of operators to perform different types of operations in C language.
- **Arithmetic Operators**
- **Relational Operators**
- **Shift Operators**
- **Logical Operators**
- **Bitwise Operators**
- **Ternary or Conditional Operators**
- **Assignment Operator**
- **Misc Operator**

Operators

- Assignment Operator
- Arithmetic Operator
- Increment Operator : Pre-Increment / Post-Increment
- Decrement Operator : Pre-Decrement / Post-Decrement
- Relational Operator
- Logical Operator
- Bitwise Operator
- Conditional Operator
- & and * Pointer Operators
- Comma Operator
- Dot Operator
- Arrow Operator
- [ ] and ( ) Operators

Assignment Operator in C

- Assignment Operator is Used to assign value to an variable.
- Assignment Operator is denoted by equal to(=) sign
- Assignment Operator is binary operator which operates on two operands.
- Assignment Operator have Two Values – L-Value and R-Value. Operator copies R-Value into L-Value.
- Assignment Operator have lower precedence than all available operators but has higher precedence than comma Operator.
- **For example:**

  int x=60;
- value 60 is assigned to integer variable x

Shorthand assignment operator

Operator symbol	Name of the operator	Example	Equivalent construct
+=	Addition assignment	x += 4;	x = x + 4;
-=	Subtraction assignment	x -= 4;	x = x – 4;
*=	Multiplication assignment	x *= 4;	x = x * 4;
/=	Division assignment	x /= 4;	x = x / 4;
%=	Remainder assignment	x %= 4;	x = x % 4;

Arithmetic Operator in C

- C Programming Supports **5 Arithmetic Operators**.
- Arithmetic Operators are used for "**Arithmetic Calculation**".

Operator	Meaning	Example
+	Addition Operator	10 + 20 = 30
-	Subtraction Operator	20 – 10 = 10
*	Multiplication Operator	20 * 10 = 200
/	Division Operator	20 / 10 = 2
%	Modulo Operator	20 % 6 = 2

C increment operator

- Increment operator is used to increment the current value of variable by adding integer 1.
- Increment operator can be applied to only variables.
- Increment operator is denoted by ++.

Different Types of Increment Operations

A. Pre Increment Operator

- Pre-increment operator is used to increment the value of variable before using in the expression. In the Pre-Increment value is first incremented and then used inside the expression.

```
b = ++y;
```

- In this example suppose the value of variable ‘y’ is 5 then value of variable ‘b’ will be 6 because the value of ‘y’ gets modified before using it in a expression.

B. Post Increment Operator

- Post-increment operator is used to increment the value of variable as soon as after executing expression completely in which post increment is used. In the Post-Increment value is first used in a expression and then incremented.
- b = x++;
- In this example suppose the value of variable ‘x’ is 5 then value of variable ‘b’ will be 5 because old value of ‘x’ is used.

C decrement operator

- Decrement operator is used to decrease the current value of variable by subtracting integer 1.
- Like Increment operator, decrement operator can be applied to only variables.
- Decrement operator is denoted by --.

Different Types of Decrement Operation :

- When decrement operator used in C Programming then it can be used as pre-decrement or post-decrement operator.

A. Pre Decrement Operator

- Pre-decrement operator is used to decrement the value of variable before using in the expression. In the Pre-decrement value is first decremented and then used inside the expression.

```
b = --var;
```

- Suppose the value of variable var is 10 then we can say that value of variable ‘var’ is firstly decremented then updated value will be used in the expression.

B. Post Decrement Operator

- Post-decrement operator is used to decrement the value of variable immediatly after executing expression completely in which post decrement is used. In the Post-decrement old value is first used in a expression and then old value will be decrement by 1.
- b = var--;
- Value of variable ‘var’ is 5. Same value will be used in expression and after execution of expression new value will be 4.

C- Relational Operator

- In C Programming we can compare the value stored between two variables and depending on the result we can follow different blocks using Relational Operator in C.
- In C we have different relational operators such as –

Operator	Meaning
>	Greater than
>=	Greater than or equal to
<=	Less than or equal to
<	Less than

C Logical Operator

- Whenever we use if statement then we can use relational operator which tells us the result of the comparison, But if we want to compare more than one conditions then we need to use logical operators. Suppose we need to execute certain block of code if and only if two conditions are satisfied then we can use Logical Operator in C Programming.

Operator	Name of the Operator
&&	And Operator
||	Or Operator
!	Not Operator

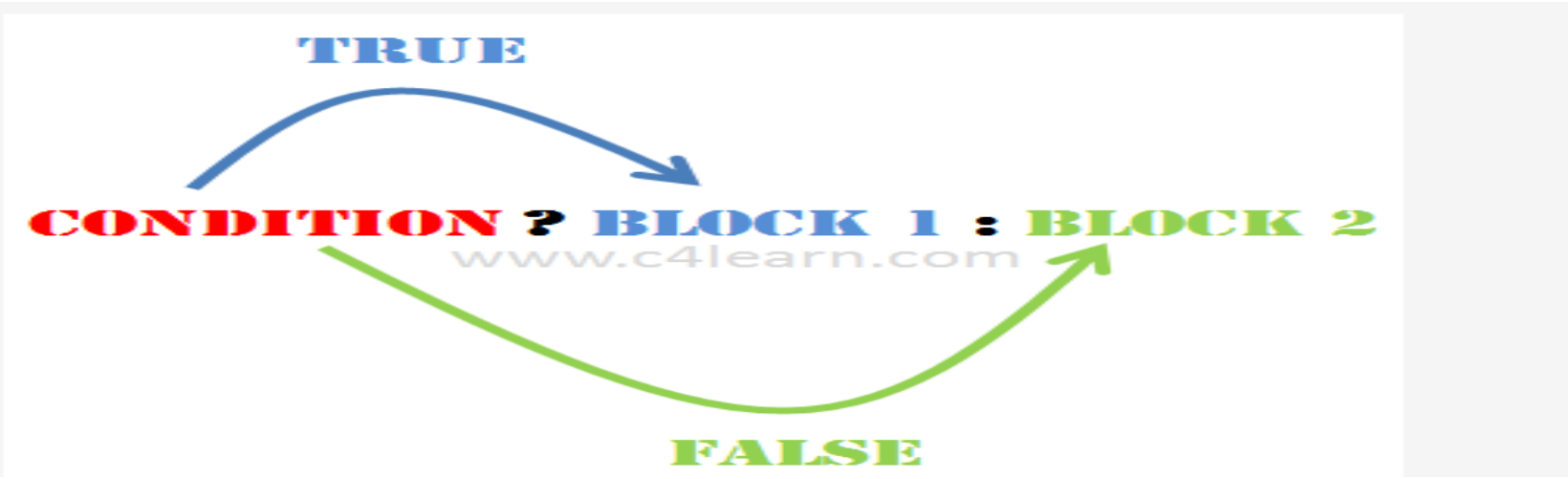
Conditional Operators [?:]

- They are also called as Ternary Operator .
- They also called as ?: operator
- Ternary Operators takes on 3 Arguments
- Syntax :

expression 1 ? expression 2 : expression 3

where

- expression1 is **Condition**
- expression2 is Statement Followed if **Condition is True**
- expression3 is Statement Followed if **Condition is False**



Comma Operator

- It is special kind of operator which is widely used in programming to separate the declaration of multiple variable.
- Comma Operator has Lowest Precedence i.e it is having lowest priority so it is evaluated at last.
- Comma operator returns the value of the rightmost operand when multiple comma operators are used inside an expression.
- Comma Operator Can acts as –
  - **Operator** : In the Expression
  - **Separator** : Declaring Variable , In Function Call Parameter List

Arrow Operator (->)

- Arrow operator is used for accessing members of structure using pointer variable