Data Types

A data type is an attribute (reference) of data which will tell the compiler about the needs of the programmer or user.

There are many different types of data types which we need to understand to get our basic concepts clear on data types and how and when are they used in a program.

So, data types are of many broad types in which there are many subdivisions which vary from language to language, so we will be talking in a broad manner here.

Primitive Data Types

These are the most basic data types in any language that are built-in or basic to language implementation. They are the most used data types in a program.

They are broadly divided into few sub-categories: -

1. **Integer data types –** Integer data types help a programmer to take integer input from users for use in a program. Some common integer data types are *byte, short, int, long int, long long int* (depends upon language to language).
2. **Floating data types –** These data types help programmers to take input in form of real numbers. Some floating data types are *float, double, long double.*
3. **Character data type –** These data type helps programmers to accept and handle character data in a program. It consists of *char.*
4. **String data type –** This data type helps programmers to accept and use string data (sentences or any sequence of alphabets, digits or symbols). *String* is the data type used in it.
5. **Boolean data type –** These data types are used in decision making. They have two values only – *true* and *false.* It forms the basis of conditional statements.

Composite Data Types

These data types are the ones which are derived from primitive data types (from one or more types of data types). The way in which they are combined are known as data structures. When we compose a primitive data type into a composite one, it results in formation of some new data type.

For e.g.: *arrays, vector, stacks, heaps, linked lists, graphs, functions etc.*

These all are derived from one or more data types. ***For e.g.***: an *array* of integers is a data type which is made up of integers.

They have varied applications in many parts of a program. So, we would be studying data structures in detail later.

User Defined Data Types

These are data types which users themselves define in a program. It is like building your own class or any sort of structure.

Some common examples of user defined data types are: - *class, structure, union, enumeration, typedef.* We will not be going into their details as of now.

Range and size of various common data types used in C/C++

We are taking C/C++ as reference here (because some data types may vary and ranges too can vary)

short int	2 bytes	-32768 to 32767
int	4 bytes	-2147483648 to 2147483647
long int	4 bytes	-2147483648 to 2147483647
long long int	8 bytes	-(2^63) to (2^63)-1
char	1 byte	-128 to 127
float	4 bytes	-3.4E+38 to 3.4E+38
double	8 bytes	-1.7E+308 to 1.7E+308
long double	12 bytes	