DATA TYPES

Data type determines the type of value we are going to store in our computer. To store anything in our computer, we should have to allocate the memory. This memory allocation is depended on the data type we are using.

Data type determines the properties such as

1. No of bytes
2. Range
3. Type of value

In C language we are having 3 **basic** data types

1. Int – To store non-decimal numbers
2. Float – To store decimal numbers
3. Char – To stores alphabets, numbers and special char

Total data types are divided into 3 types.

1. Primitive data types
2. Derived data types
3. User defined data types

PRIMITIVE DATA TYPES:

These are the regular data types we are using in our c programs.

Data type	Bytes	Conversion Character / format specifier	Storage Range
int / signed int / short int	2	%d	-32768 to +32767
unsigned int	2	%u	0 to 65535
long int	4	%ld	-2147483648 to 2147483647
unsigned long int	4	%lu	0 to 4294967295
float	4	%f	$3.4 * 10^{-38}$ to $3.4 * 10^{+38}$
double	8	%lf	$1.7 * 10^{-308}$ to $1.7 * 10^{+308}$
long double	10	%Lf	$3.4 * 10^{-4932}$ to $1.1*10^{+4932}$
char	1	%c	1 character Signed char [-128 to +127] Unsigned char [0 to 255]
char[10] (STRING)	10	%s	9 char + 1 null char
void [empty data type]			nothing

DERIVED DATA TYPES:

They are derived from primitive data types.

1. Array [non-primitive]
2. Pointer

3. Function

These are the data types created by the user.

1. structure
2. union
3. enum

DATA TYPES

To store anything in our system, we should have to allocate the memory. The memory comes with 3 properties.

1. Type of data we want to store
2. No of bytes
3. Value range

These 3 properties decided by the data type.

C & C++ working in 16 bit compilers

2^{16} - 65536

Int/short /signed ➔ 2 bytes ➔ %d ➔ -32768 to +32767

Unsigned int ➔ 2 bytes ➔ %u ➔ 0 to 65535

Signed long int ➔ 4 bytes ➔ %ld➔ -2147483648 to +2147483647

Unsigned long int ➔ 4 bytes ➔ %lu ➔ 0 to 4294967295

Float ➔ 4 bytes ➔ %f ➔ $3.4*10^{-38}$ to $3.4*10^{38}$

Long float / double ➔ 8 bytes ➔ %lf ➔ $1.7*10^{-308}$ to $1.7*10^{+308}$

Long double ➔ 10 bytes ➔ %Lf ➔ $3.4*10^{-4932}$ to $1.1*10^{4932}$

Char name[20] ="Kishore.p"; ⬅ string

Char gender='M';

Void – nothing / empty

Derived data types: Created from primitive data types.

1. Array - int   a[20];   ⬅   int array variable
2. Pointer -   int * a;   ⬅   int pointer variable
3. Function -   int a(); ⬅ int function

User defined data type: created by the user using both primitive and derived data types.

1. Structure

2. union

3. enumeration / enum

```
struct   stu

{

int  id

char name[20]

float fee;
```

C & C++ 2^{16} ==> 65536

signed int ==> -32768 to +32767

2 bytes

unsigned int ==> 0 to 65535

signed long int

signed int ==> -2147483648 to +2147483647

4 bytes

Java / .Net / Py 2^{32} ==> 4294967296

unsigned int ==> 0 to 4294967295

unsigned long int

short / signed int / int / unsigned int / singed long int / unsigned long int