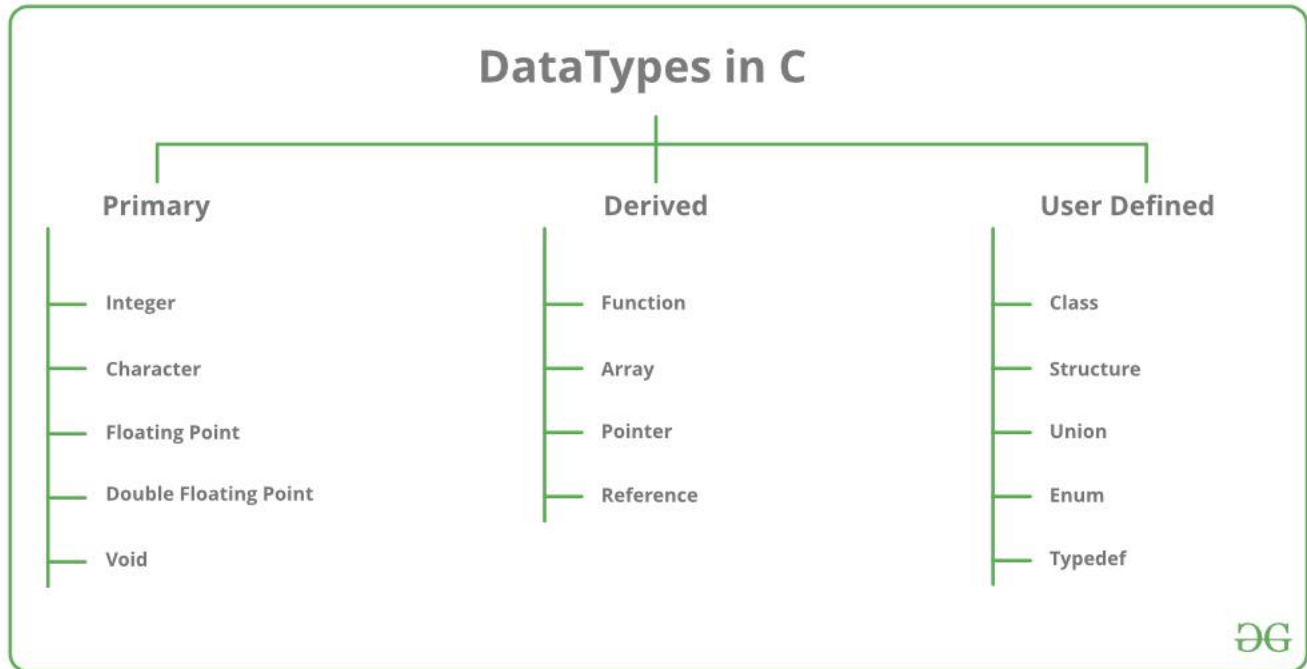


Data Types

Data type determines the type and size of data associated with variables. C language is rich in its data types. The variety of data types available allows the programmer to select the type appropriate to the needs of the application as well as the machine. ANSI C supports three classes of data types



1. Primary (or fundamental) data types

Primitive data types are the most basic data types that are used for representing simple values such as integers, float, characters, etc.

Integer Types

Integers are whole numbers with a range of values supported by a particular machine. Generally, integers occupy one word of storage, and since the word sizes of machines vary (typically, 16 or 32 bits) the size of an integer that can be stored depends on the computer. If we use a 16 bit word length, the size of the integer value is limited to the range -32768 to $+32767$ (that is, -2^{15} to $+2^{15}-1$). A signed integer uses one bit for sign and 15 bits for the magnitude of the number. Similarly, a 32 bit word length can store an integer ranging from $-2,147,483,648$ to $2,147,483,647$.

Floating Point Types

Floating point (or real) numbers are stored in 32 bits (on all 16 bit and 32 bit machines), with 6 digits of precision. Floating point numbers are defined in C by the keyword `float`. When the accuracy provided by a float number is not sufficient, the type double can be used to define the number. A double data type number uses 64 bits giving a precision of 14 digits. These are known as double precision numbers.

Void Types

The void type has no values. This is usually used to specify the type of functions. The type of a function is said to be void when it does not return any value to the calling function. It

can also play the role of a generic type, meaning that it can represent any of the other standard types.

Character Types

A single character can be defined as a character (char) type data. Characters are usually stored in 8 bits (one byte) of internal storage. The qualifier signed or unsigned may be explicitly applied to char. While unsigned chars have values between 0 and 255, signed chars have values from -128 to 127.

2. Derived data types

The data types that are derived from the primitive or built-in data types are referred to as Derived Data Types.

Example: - structure union, arrays

3. User-defined data types

The user-defined data types are defined by the user himself.

Example :- enumerated data type , typedef

Size and Range of Data Types on 16-Bit machine:

Type	Size (bits)	Size (bytes)	Range
char	8	1	-128 to 127
unsigned char	8	1	0 to 255
int	16	2	-2^{15} to $2^{15}-1$
unsigned int	16	2	0 to $2^{16}-1$
short int	8	1	-128 to 127
unsigned short int	8	1	0 to 255
long int	32	4	-2^{31} to $2^{31}-1$
unsigned long int	32	4	0 to $2^{32}-1$
float	32	4	3.4E-38 to 3.4E+38
double	64	8	1.7E-308 to 1.7E+308
long double	80	10	3.4E-4932 to 1.1E+4932