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DEPARTMENT OF AIML

PROBLEM SOLVING AND C PROGRAMMING

I YEAR - I SEM

UNIT 2 – C Programming Basics

TOPIC 4 –Data Types

is rich in its data types.

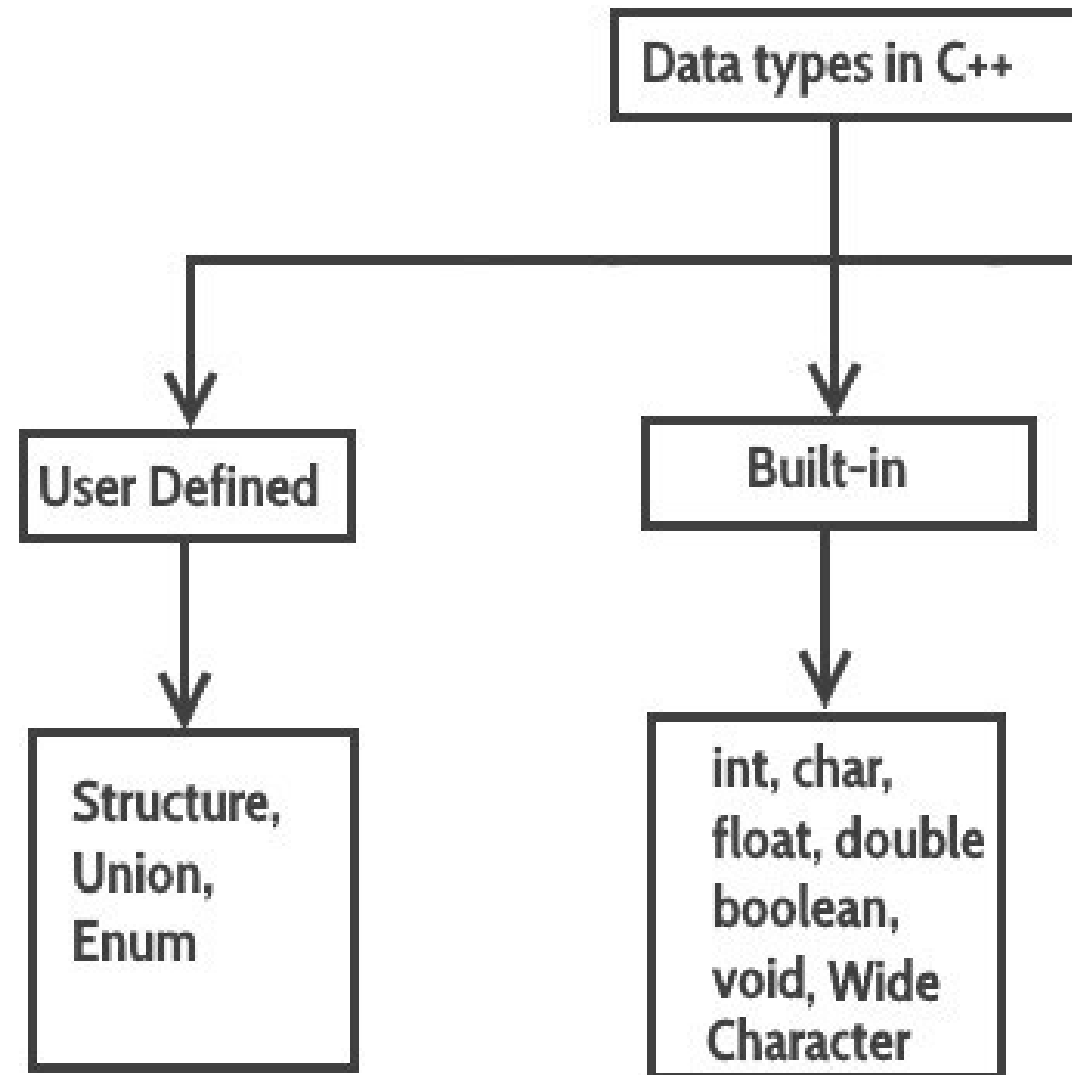
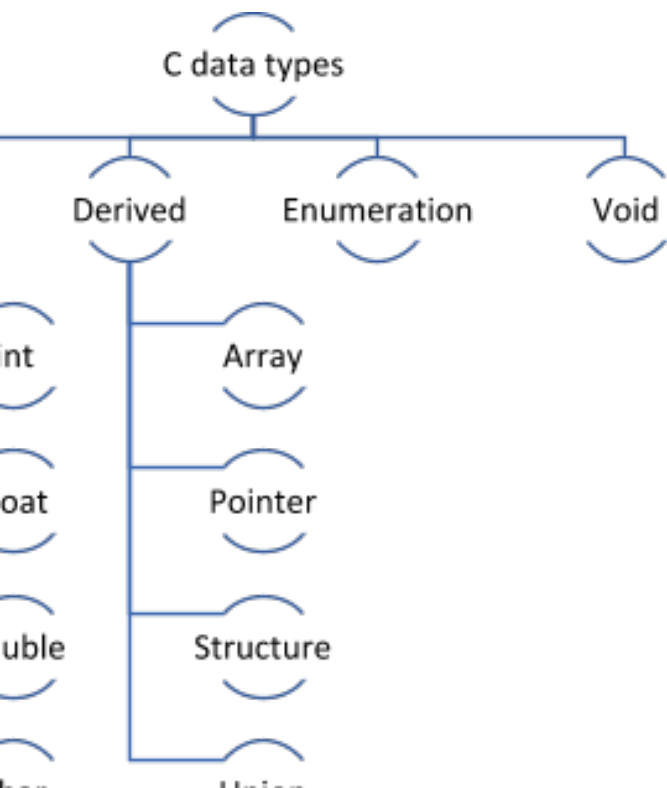
Many of the data types available allow the programmer to select the type for the application as well as the machine.

C++ supports three classes of data types:

Primary (or fundamental) data type

Derived data types

User-defined data types



DATA TYPES

Compilers support five fundamental data types, namely:

Integer (int)

Character (char)

Floating Point (float)

Double-precision floating point (double)

Void data type (void).

Compilers also offer extended data types such as long int and long double.

DATA TYPE	TYPE OF DATA	MEMORY	RANGE
int	Integer	2 Bytes	- 32,768 to 32,768
char	character	1 Byte	- 128 to 128
float	Floating point number	4 bytes	$3.4e - 38$ to $3.4e + 38$
double	Floating point number with higher precision	8 bytes	$1.7e - 308$ to $1.7e + 308$

TYPES

PRIMARY DATA TYPES

Integral Type

Integer

signed

int

short int

long int

unsigned type

unsigned int

unsigned short int

unsigned long int

Character

char

signed char

unsigned char

Floating point Type

float

double

Long double

void

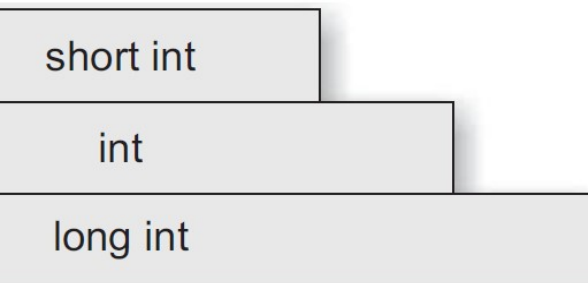
s are whole numbers with a range of values supported by a particular
 ally, integers occupy one word of storage, and since the word size is
 typically, 16 or 32 bits)

the size of an integer that can be stored depends on the computer.

For example, with a 16 bit word length, the size of the integer value is limited to $2^{16} - 1 = 65,535$.

There are three classes of integer storage (both signed and unsigned forms), namely:

t



Integer types

Signed Integer	Unsigned Integer
It represents both positive and negative integers	It represents only positive integers
The data type qualifier is signed int or int . Variables are defined as: signed int a; int b;	The data type qualifier is unsigned int or unsigned . Variables are defined as: unsigned int a; unsigned b;
By default all int are signed	Unsigned int have to be declared explicitly
It reserves 16-bit (2 bytes) in memory	It reserves 16-bit (2 bytes) in memory
Range -2^{15} to $+2^{15}$ i.e. -32,768 to 32,767	Range from 0 to $+2^{16}$ i.e. 0 to 65,535

Integer	Unsigned Integer
Represents both positive and negative integers	It represents only positive integers
The data type qualifier is signed int or int . Variables are defined as: <code>signed int a;</code>	The data type qualifier is unsigned int or unsigned . Variables are defined as: <code>unsigned int a;</code> <code>unsigned b;</code>
By default all int are signed	Unsigned int have to be declared explicitly
Reserves 16-bit (2 bytes) in memory	It reserves 16-bit (2 bytes) in memory
Range from -2^{15} to $+2^{15}$ i.e. -32,768 to 32,767	Range from 0 to $+2^{16}$ i.e. 0 to 65,535
Its conversion character is d	Its conversion character is u

point (or real) numbers are stored in 32 bits (on all 16 b
with 6 digits of precision.

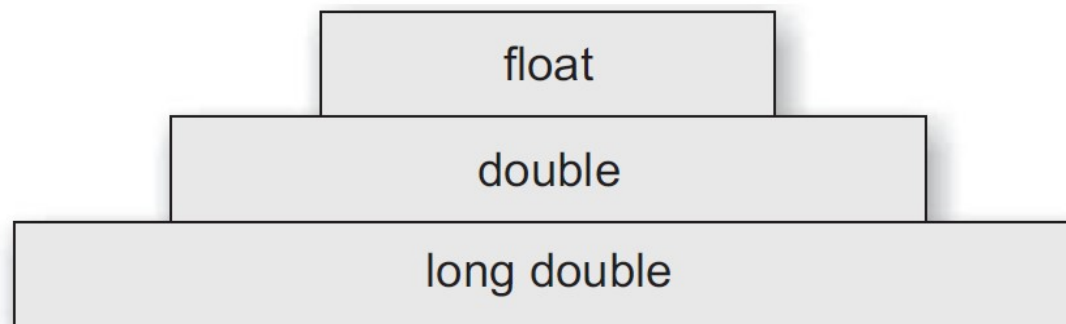
point numbers are defined in C by the keyword **float**.

accuracy provided by a float number is not sufficient, the
d to define the number.

data type number uses 64 bits giving a precision of 14 digit
known as double precision numbers.

oe represents the same data type that float represents, but v

the precision further, we may use **long double** which uses



Data Type:

Character can be defined as a character(**char**) type data.

Chars are usually stored in 8 bits (one byte) of internal storage.

Whether signed or unsigned may be explicitly applied to char.

Unsigned chars have values between 0 and 255, signed chars have values from

Type:

void type has no values.

void is usually used to specify the type of functions.

A function is said to be void when it does not return any value to

Entire Data types in c:

Data type	Size(bytes)	Range	Format string
Char	1	128 to 127	%c
Unsigned char	1	0 to 255	%c
Short or int	2	-32,768 to 32,767	%i or %d
Unsigned int	2	0 to 65535	%u
Long	4	-2147483648 to 2147483647	%ld
Unsigned long	4	0 to 4294967295	%lu
Float	4	3.4 e-38 to 3.4 e+38	%f or %g
Double	8	1.7 e-308 to 1.7 e+308	%lf
Long Double	10	3.4 e-4932 to 1.1 e+4932	%lf