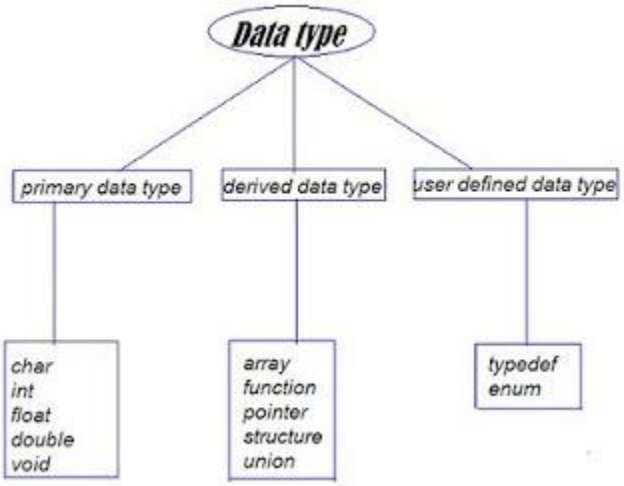
C Data Types and Sizes

- In a C program, the programmer has to tell the system before, the type of numbers or characters he is using in his program. These specification of data is called data type.
- C language data types can be classified in to 3 types as shown in figure



Primary Data type:

No	Data Type	Full form	Range of Values
1	char	Character	-128 to 127
2	int	Integer	-32768 to +32767
3	float	single precision floating point	$3.4e^{-38}$ to $3.4e^{+38}$
4	double	Double precision floating point	$1.7e^{-308}$ to $1.7e^{+308}$
5	void	Void	

- void data type used in functions to specify the return value or the arguments.
- There are number of qualifiers such as short,long,signed,unsigned can be applied to these primary data types.
- The possible qualifiers for the basic type are shown in the table

No	Data Type	Qualifier
1	char	Signed,Unsigned
2	int	short,long,signed,unsigned
3	float	No qualifier
4	double	long
5	void	No qualifier

- Each compiler is free to choose appropriate size for its own hardware with restrictions that short and int are atleast 16 bits and longs are atleast 32 bits and size of short < int < long.
- qualifier signed or unsigned may be applied to char or any integer.
- unsigned numbers are always positive or zero and obey the laws of arithmetic modulo 2^n, where n is the number of bits in the type.For example char is 8 bits so unsigned char variables have values between 0 and 2^8 ie values between 0 and 255.

Data Type	16 bit machine		32 bit machine	
	size(bytes)	Range	Size(bytes)	Range
Char or Signed Char	1	-128 to 127	1	-128 to 127
Unsigned Char	1	0 to 255	1	0 to 255
Short int or Signed short int	1	-128 to 127	2	-32768 to 32767
unsigned short int	1	0 to 255	2	0 to 65535
int or Signed int	2	-32768 to 32767	4	-2147483648 to 2147483647
Unsigned int	2	0 to 65535	4	0 to 4294967295
Long int or Signed long int	4	-2147483648 to 2147483647	4	-2147483648 to 2147483647
Unsigned long int	4	0 to 4294967295	4	0 to 4294967295
Float	4	$3.4e^{-38}$ to $3.4e^{+38}$	4	$3.4e^{-38}$ to $3.4e^{+38}$
Double	8	$1.7e^{-308}$ to $1.7e^{+308}$	8	$1.7e^{-308}$ to $1.7e^{+308}$
Long Double	10	$3.4e^{-4932}$ to $3.4e^{+4932}$	16	

- If we do not specify either signed or unsigned, most compiler will assume the type to be signed. so signed int x; can be written as int x;
- short and long can be used alone as type specifiers.

  short=short int
  long=long int
  Short int x; can be wriiten as short x;
- signed and unsigned can also be used alone as type specifiers.

  signed int=signed
  unsigned int=unsigned
  unsigned int x; can be wriiten as unsigned x;

Source:

http://datastructuresprogramming.blogspot.in/2010/02/c-data-types-and-sizes.html