

Data Types, Type Modifiers, Format Specifiers, Escape Sequence Characters, sizeof, Typecasting

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Data Types, Variables & Constants

- C allows computations to be performed on various types of data (facts and figures).
 - Numerical: Whole numbers, Real numbers
 - Character: Single character, Strings
- Fixed data values are said to be constants.
 - 12, -45, 0, 2.3, 76.9, 1.23456e+2, 'A', "Sunbeam", etc.
- Memory location identified with some name whose nature is modifiable is called as variable.
 - Variable must be declared before its use in the program.
 - As per need, variable have some data type.
- Simple C data types are: char, int, float, double
 - Data type represents amount of space assigned to the variable.
 - It also defines internal storage of the data.



Data Types, Variables & Constants

C Basic Data Types	32-bit CPU		64-bit CPU	
	Size (bytes)	Range	Size (bytes)	Range
char	1	-128 to 127	1	-128 to 127
short	2	-32,768 to 32,767	2	-32,768 to 32,767
int	4	-2,147,483,648 to 2,147,483,647	4	-2,147,483,648 to 2,147,483,647
long	4	-2,147,483,648 to 2,147,483,647	8	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
long long	8	9,223,372,036,854,775,808 to 9,223,372,036,854,775,807	8	9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
float	4	3.4E +/- 38	4	3.4E +/- 38
double	8	1.7E +/- 308	8	1.7E +/- 308



printf()

- Arbitrary strings and variable values can be printed using printf() function. Use following format specifiers to format data in specific type

%d	- to format data in signed integer
%u	- to format data in unsigned int
%c	- to format data in character
%f	- to format data in float
%s	- to format data in string
%ld	- to format data in long integer
%x	- to format data in hexadecimal
%o	- to format data in octal

- Examples:

- `printf("Hello PreCAT @ Sunbeam");`
- `printf("%d", roll_number);`
- `printf("%d %lf %c", number, basic_salary, letter);`
- `printf("Book price is %lf", price);`



Escape Sequence character \

- Can be used with string
- Escapes the meaning of followed by character

List of Escape Sequence characters available in C:

- `\n` Helps to add new line
- `\r` Helps to add carriage return. Moves carriage to the beginning of same line
- `\t` Adds horizontal tab space
- `\b` Moves carriage 1 character back
- `\a` Adds beep/alert
- `\f` Adds form feed
- `\v` Adds vertical tab space. Result can be seen on printer



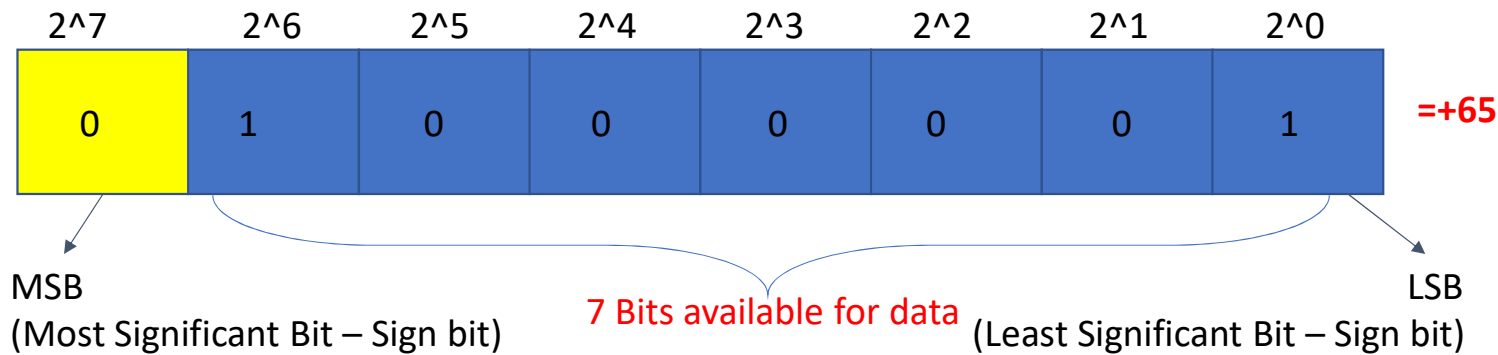
Data Types

- Data type defines storage space and format of variable.
- Primitive types
 - char
 - int
 - float
 - double
- Integer types can be signed/unsigned
- Derived types
 - Array
 - Pointer
 - Function
- Type Modifiers
 - signed
 - unsigned
 - short
 - long
- User defined types
 - struct
 - union
 - Enum
- void type – represent no value.

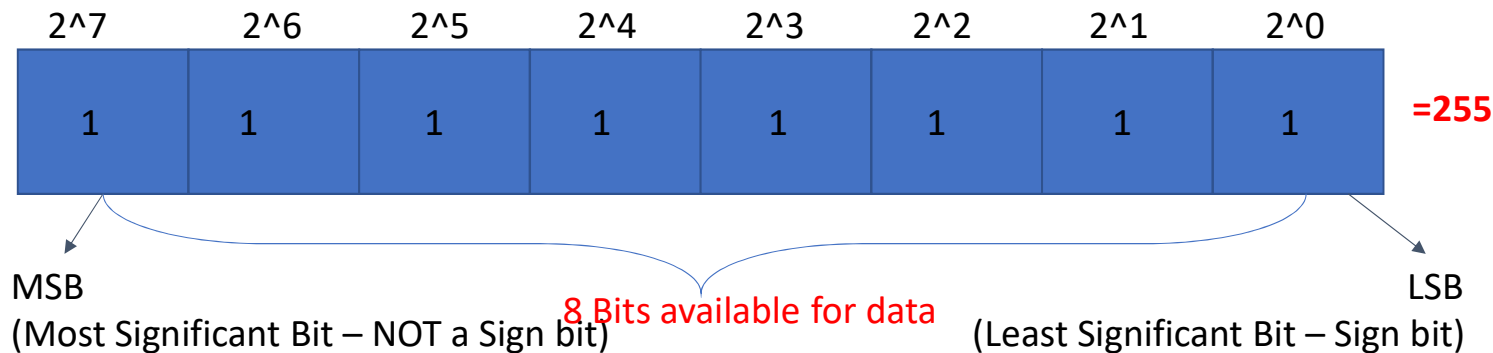


signed character / unsigned char

Signed Character



unsigned Character



Data Types, Variables & Constants

- Variable examples
 - `int number = 10;`
 - `double basic_salary = 20000.0;`
 - `char letter = 'A';`
 - `int roll_number;`
 - `roll_number = 20;`
 - `double price = 200.0;`
 - `price = 300.0;`
- Constant examples
 - `-23, 1L, 34U, 3UL, 0x41, 0101,`
 - `1.234f, 1.234567e+2, ...`
 - `'A', '\101', '\x41'`
 - `"SunBeam", "A\101\x41"`
- Each variable is assigned some memory location.
- Size of data type of given variable or constant is found by `sizeof()` operator.



Typecasting

- **Implicit Typecasting**

- e.g. `int num = 45.67; //double type value is narrowed down to integer`

- **Explicit Typecasting**

- e.g. `float fval = (float)5 / 3 ;`



sizeof

- Is operator
- Processed at Compile Time
- Determines memory require by operand type

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- GIT Bash Installation
 - Refer pdf shared

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Thank you!

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