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

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- 9,223,372,036,854,775,807
long long	8	9,223,372,036,854,775,808- 9,223,372,036,854,775,807	8	9,223,372,036,854,775,808- 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 I character back

- \a   Adds beep/alert

- \f   Adds form feed

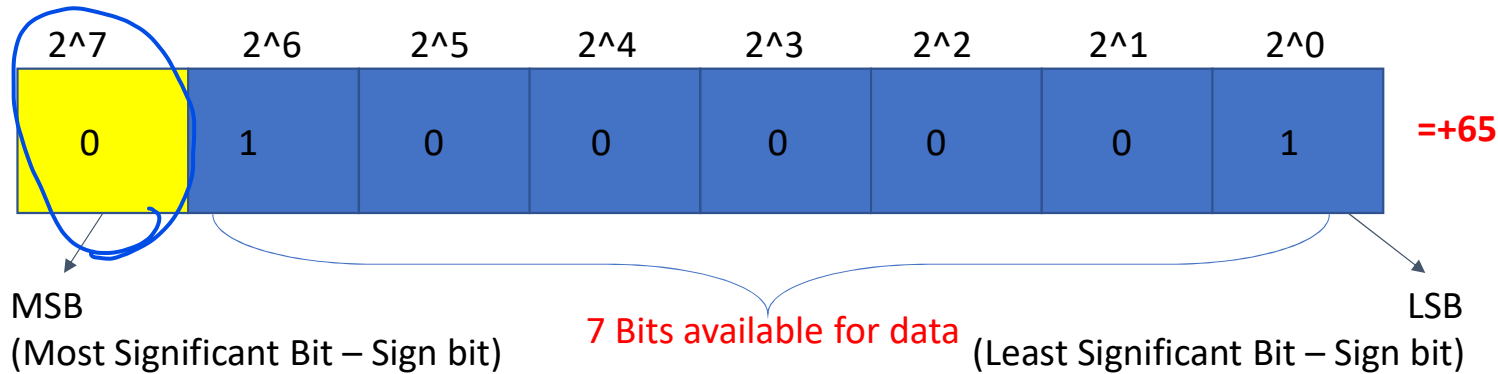- \v   Adds vertical tab space. Result can be seen on printer

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
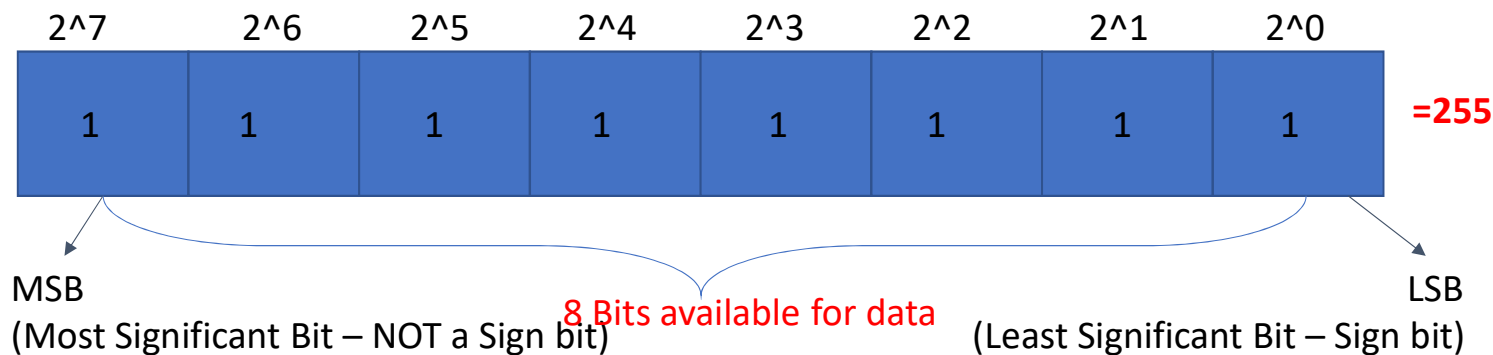
- void type – represent no value.

signed character / unsigned char

Signed Character

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	1	0	0	0	0	0	1

=+65

MSB
(Most Significant Bit – Sign bit)

7 Bits available for data

LSB
(Least Significant Bit – Sign bit)

unsigned Character

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	1	1	1	1	1	1	1

=255

MSB
(Most Significant Bit – NOT a Sign bit)

8 Bits available for data

LSB
(Least Significant Bit – Sign bit)

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

- GIT Bash Installation
  - Refer pdf shared

Thank you!

Smita Kadam – email - smita@sunbeaminfo.com