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Course Name: O Level (2nd Sem B1 Batch)   **Subject:** C Language
**Topic: Pointers in C**   **Date:** 13-April-2020

What is Pointer?

It is a variable that stores/points the address of another variable. A Pointer in C is used to allocate memory dynamically i.e. at run time. Pointers are represented by '*'. It is a derive data type in C. Pointer returns the value of stored address. The pointer variable might be belonging to any of the data type such as int, float, char, double, short etc.
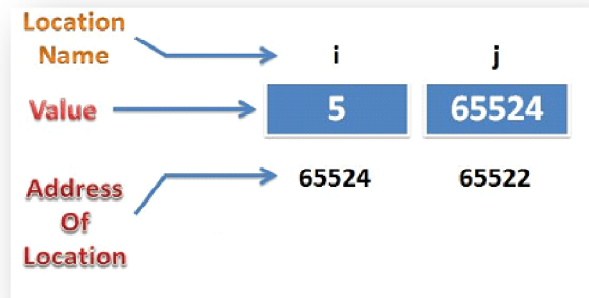
C Pointer

Address of Operator (&)

Indirection Operator (*)
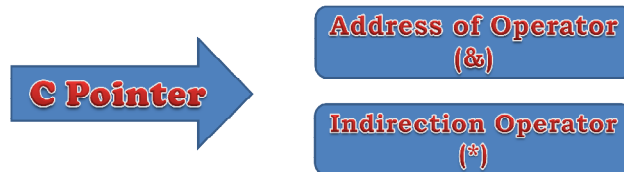
Syntax:

            <data_type> *pointer_name;

Ex:

            int *j;
            int i = 5;

In above syntax,

* = variable pointer_name is a pointer variable.
pointer_name requires memory location
pointer_name points to a variable of type data type.

Location Name	→	i	j
Value →		5	65524
Address Of Location →		65524	65522

There are two C operators that are necessary when using pointer variables.

& the address operator returns the address of a variable

Ex:

            int x;
            int *ptr = &x;

The declaration of ptr initializes the variable ptr = &x;
Suppose the address of the variable x is 65524.
ptr holds the address of x.
We say ptr "points" to x.
We will apply the & operator only to variables.
e.g. &77 or &(x+1) are not valid.

x

ptr

65524

* means **"a pointer to"** and is called an indirection operator or dereferencing operator, since a pointer **"indirectly"** references a value in a storage location.

Ex:

            int x;
            int *ptr;
            ptr=&x ;
To assign the value "5" to the variable x in C:
            x = 5;
We can use the " * " operator to indirectly reference x.
We can assign "5" to x by:
            *ptr=5;
Here we use the fact that "ptr" points to integer values.

x

5

ptr

65524

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Key points to remember about pointers in C:

➢ Normal variable stores the value whereas pointer variable stores the address of the variable.
➢ The content of the C pointer always be a whole number i.e. address.
➢ Always C pointer is initialized to null, i.e. int *p = null.
➢ The value of null pointer is 0.
➢ & symbol is used to get the address of the variable.
➢ * symbol is used to get the value of the variable that the pointer is pointing to.

Benefit of using pointers

➢ Pointers are more efficient in handling Array and Structure.
➢ Pointer allows references to function and thereby helps in passing of function as arguments to other function.
➢ It reduces length and the program execution time.
➢ It allows C to support dynamic memory management.

Types of Pointers

Null Pointer

NULL Pointer is a pointer which is pointing to nothing. NULL pointer points the base address of segment. In case, if you don't have address to be assigned to pointer then you can simply use NULL, Pointer which is initialized with NULL value is considered as NULL pointer.

Wild Pointer

A pointer which is not initialized with any address is called wild pointer. The wild pointer is by default stored with the garbage value. Be clear that there is difference among the NULL pointer and wild pointer. NULL pointer is assigned with the address 0 where as wild pointer is not assigned with any address.

Dangling pointer

While programming, we use pointers that contain memory addresses of data objects. Dangling pointer is a pointer that points to the memory location even after its de-allocation. Or we can say that it is pointer that does not point to a valid data object of the appropriate type. The memory location pointed by dangling pointer is known as dangling reference. In short A pointer pointing to a memory location that has been deleted (or freed) is called dangling pointer.

Try Yourself:

1. What is Pointer ?
2. Write some advantages of pointer.
3. What is NULL pointer? How it differ from Wild pointer.
4. What is dangling Pointer?
5. Difference between Wild pointer and Dangling Pointer.