Unit-2 Pointers

The pointer in C language is a variable which stores the address of another variable. This variable can be of type int, char, array, function, or any other pointer. The size of the pointer depends on the architecture. However, in 32-bit architecture the size of a pointer is 2 byte.

Consider the following example to define a pointer which stores the address of an integer.

```
1. int n = 10;
2.
```

int* p = &n; // Variable p of type pointer is pointing to the address of the var iable n of type integer.

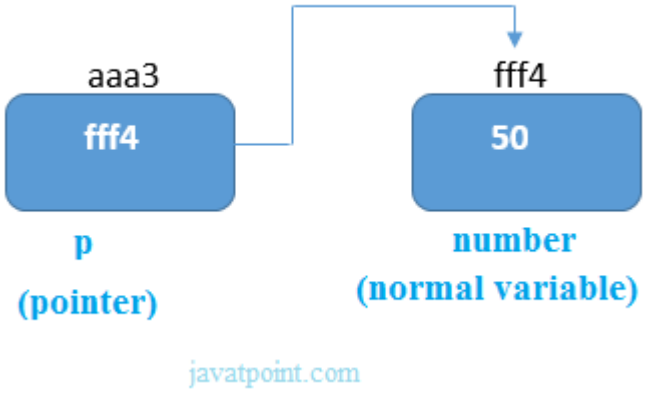
Declaring a pointer

The pointer in c language can be declared using * (asterisk symbol). It is also known as indirection pointer used to dereference a pointer.

```
1. int *a;//pointer to int
2. char *c;//pointer to char
```

Pointer Example

An example of using pointers to print the address and value is given below.



As you can see in the above figure, pointer variable stores the address of number variable, i.e., fff4. The value of number variable is 50. But the address of pointer variable p is aaa3.

By the help of * (**indirection operator**), we can print the value of pointer variable p.

Let's see the pointer example as explained for the above figure.

```
#include<stdio.h>

int main(){

int number=50;

int *p;

p=&number;//stores the address of number variable

printf("Address of p variable is %x \n",p); // p contains the address of the number t
herefore printing p gives the address of number.

printf("Value of p variable is %d \n",*p); // As we know that * is used to dereferen
ce a pointer therefore if we print *p, we will get the value stored at the address c
ontained by p.

return 0;

}
```

Output

```
Address of number variable is fff4
Address of p variable is fff4
Value of p variable is 50
```

Example 2:

```
#include <stdio.h>

int main () {

   int  var = 20;   /* actual variable declaration */
   int  *ip;        /* pointer variable declaration */
```

```
   ip = &var;  /* store address of var in pointer variable*/

   printf("Address of var variable: %x\n", &var  );

   /* address stored in pointer variable */
   printf("Address stored in ip variable: %x\n", ip );

   /* access the value using the pointer */
   printf("Value of *ip variable: %d\n", *ip );

   return 0;
}
```

Output:

```
Address of var variable: bffd8b3c
Address stored in ip variable: bffd8b3c
Value of *ip variable: 20
```

- **NULL Pointers**

It is always a good practice to assign a NULL value to a pointer variable in case you do not have an exact address to be assigned. This is done at the time of variable declaration. A pointer that is assigned NULL is called a **null** pointer.

The NULL pointer is a constant with a value of zero defined in several standard libraries. Consider the following program −

Live Demo

```
#include <stdio.h>

int main () {

   int  *ptr = NULL;

   printf("The value of ptr is : %x\n", ptr  );

   return 0;
}
```

When the above code is compiled and executed, it produces the following result −

```
The value of ptr is 0
```

Example 3:

Example: Working of Pointers

Let's take a working example.

```
#include <stdio.h>
int main()
{
  int* pc, c;

  c = 22;
  printf("Address of c: %p\n", &c);
  printf("Value of c: %d\n\n", c);  // 22

  pc = &c;
  printf("Address of pointer pc: %p\n", pc);
  printf("Content of pointer pc: %d\n\n", *pc); // 22

  c = 11;
  printf("Address of pointer pc: %p\n", pc);
  printf("Content of pointer pc: %d\n\n", *pc); // 11

  *pc = 2;
  printf("Address of c: %p\n", &c);
  printf("Value of c: %d\n\n", c); // 2
  return 0;
}
```

Output

```
Address of c: 2686784
Value of c: 22

Address of pointer pc: 2686784
Content of pointer pc: 22

Address of pointer pc: 2686784
Content of pointer pc: 11

Address of c: 2686784
Value of c: 2
```