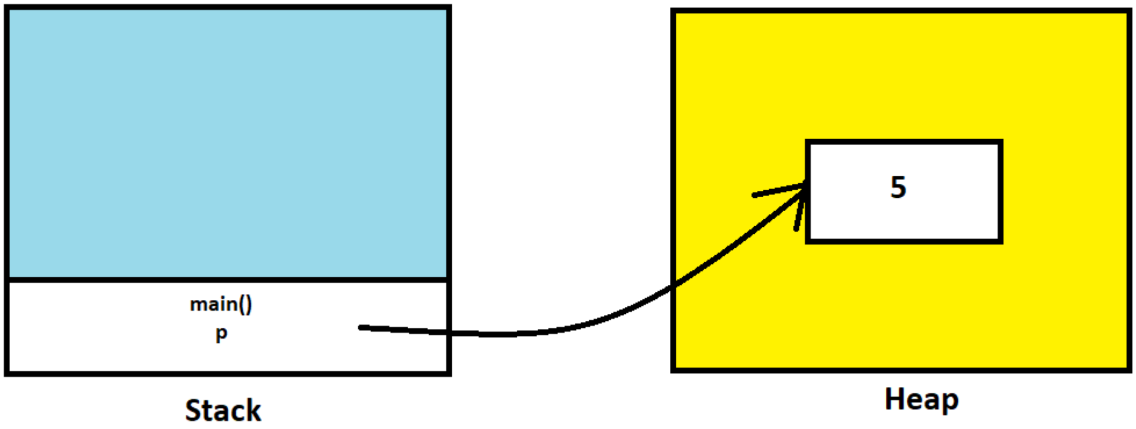
Summary DSA

Sessions No 09(22-12-2022)

- **Dynamic memory example in C++**:

  *Int *p = new int;*

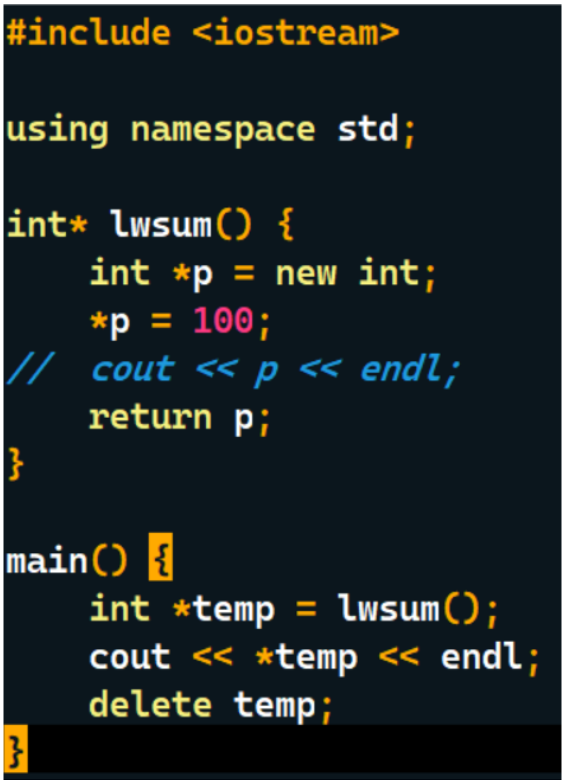
  **p = 5;*



➔ We allocate heap memory and for that we pass int ie. 4 bytes of block is allocated in the heap memory. It returns a pointer that contains the starting address of the block. The 'p' is a pointer variable local to the function so it gets stored in the stack.

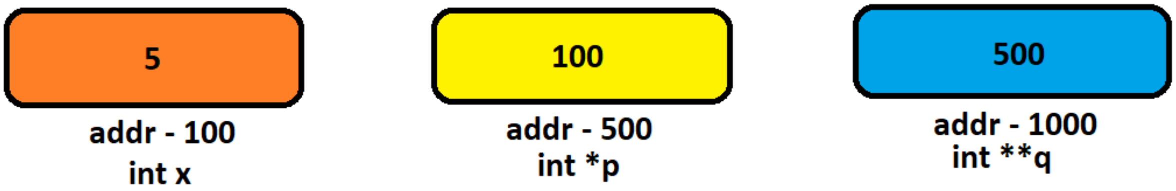
➔ After the function is finished p will remove but heap memory data is still there.

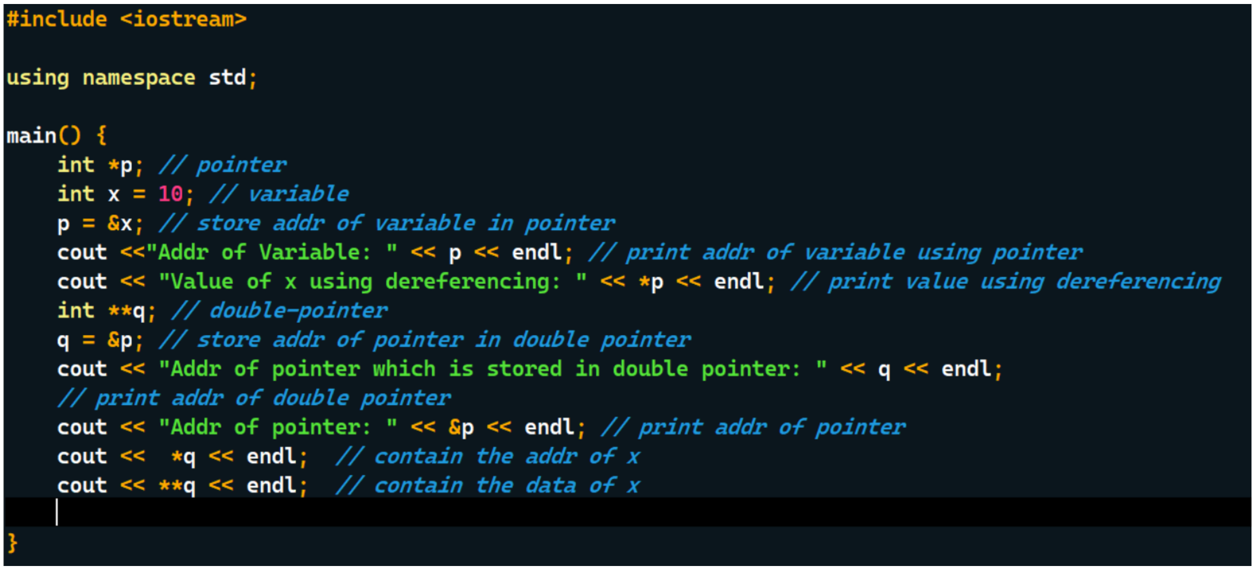
- As we know after the function is finished heap memory data reference will be removed. But data is still there and if we want that data then we can return address of that data and in main function we can store that address in pointer and we can get the data using that pointer.



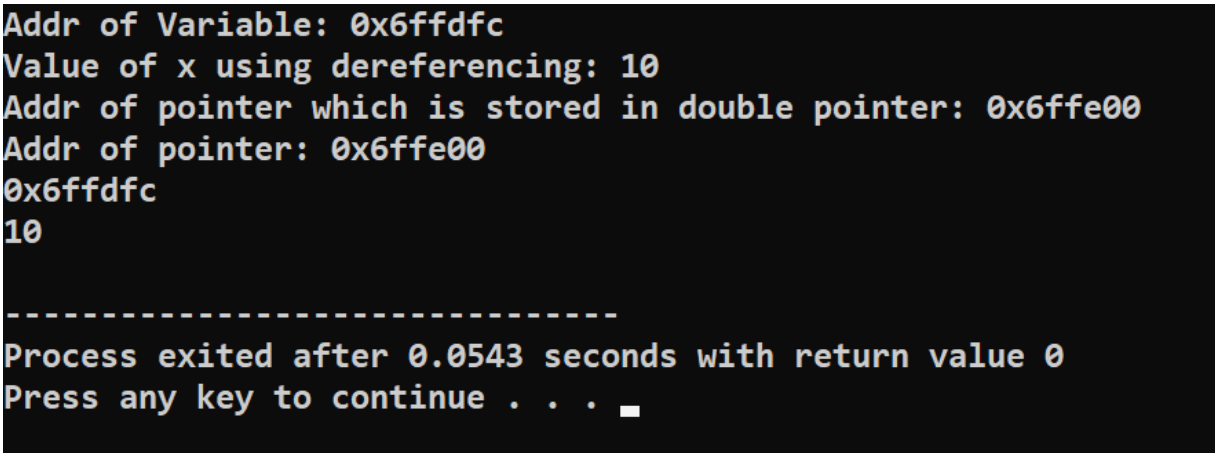
```
#include <iostream>

using namespace std;

int* lwsum() {
    int *p = new int;
    *p = 100;
//  cout << p << endl;
    return p;
}

main() {
    int *temp = lwsum();
    cout << *temp << endl;
    delete temp;
}
```

- **Pointer to Pointer(Double Pointer)**: Pointer stores the memory address of other variables. So, when we define a pointer to a pointer, the first pointer is used to store the address of the variables, and the second pointer stores the address of the first pointer.



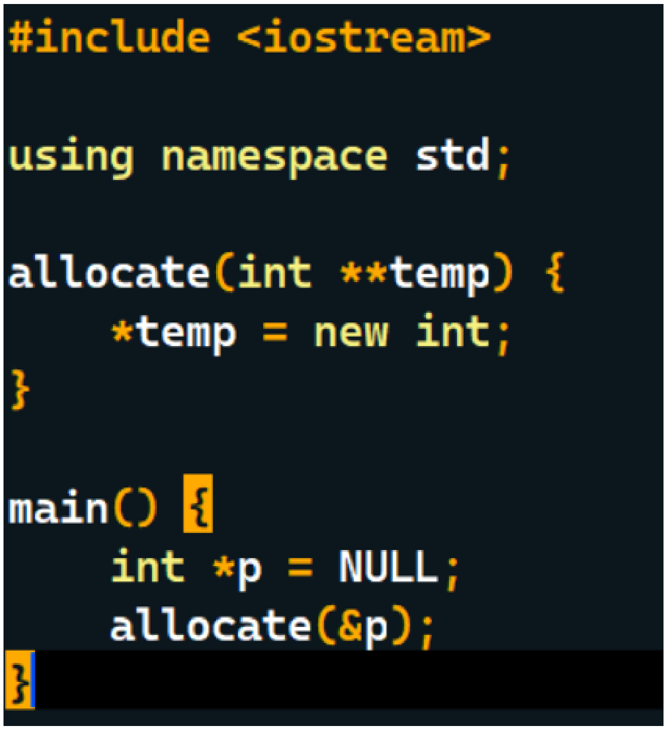


```cpp
#include <iostream>

using namespace std;

main() {
    int *p; // pointer
    int x = 10; // variable
    p = &x; // store addr of variable in pointer
    cout <<"Addr of Variable: " << p << endl; // print addr of variable using pointer
    cout << "Value of x using dereferencing: " << *p << endl; // print value using dereferencing
    int **q; // double-pointer
    q = &p; // store addr of pointer in double pointer
    cout << "Addr of pointer which is stored in double pointer: " << q << endl;
    // print addr of double pointer
    cout << "Addr of pointer: " << &p << endl; // print addr of pointer
    cout <<  *q << endl;  // contain the addr of x
    cout << **q << endl;  // contain the data of x
    
}
```



```
Addr of Variable: 0x6ffdfc
Value of x using dereferencing: 10
Addr of pointer which is stored in double pointer: 0x6ffe00
Addr of pointer: 0x6ffe00
0x6ffdfc
10

--------------------------------
Process exited after 0.0543 seconds with return value 0
Press any key to continue . . .
```

- Allocate heap memory using function :



```
#include <iostream>

using namespace std;

allocate(int **temp) {
    *temp = new int;
}

main() {
    int *p = NULL;
    allocate(&p);
}
```