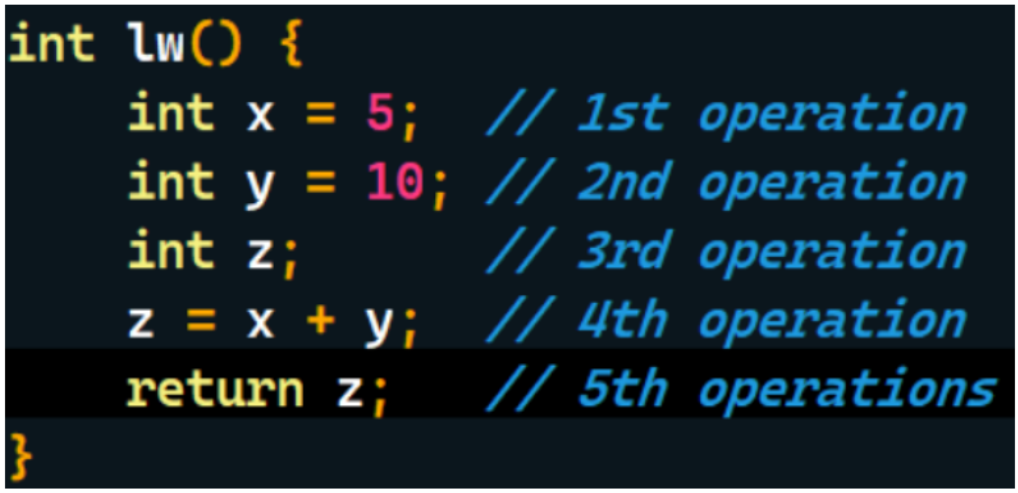
Summary DSA

Sessions No 04(01-12-2022)

- In the code we can see we have total 5 lines and we consider that 5 lines is 5 operations. And if we try to calculate the time complexity of the function then we can consider 1 operation will take 1 CPU unit time. Therefore we can say we need total 5 CPU unit time ie. O(5)



- Above code has a fixed statement. They doesn't depend on user input therefore we need constant/fixed time for running the above code. Therefore in computer science world we can say time complexity is O(constant) ie. O(1)

```
int lw(int n) {
    int x = 5;          // 1st operation
    int y = 10;         // 2nd operation
    int z;              // 3rd operation
    z = x + y + n;      // 4th operation
    return z;           // 5th operations
}
```

- Now in the above code we will take input from the user but still time complexity is O(1). Because that user input doesn't affect on no. of statement.

- Now when we use any kind of loop in code then code will be dependent on user input.

```
int lw(int n) {
    int x = 5;          // 1st operation
    int y = 10;         // 2nd operation
    int z;              // 3rd operation
    for (int i = 0; i < n; i++) {
        cout << i << endl;          // nth operation - depend on value of n
    }
    z = x + y + n;  // 4th operation
    return z;       // 5th operations
}
```

- As we can see in above code, we have total 5 fixed statement ie. operation and for loop will depend on n value. So if n=4 then for loop will run 4 times. Therefore total operation is 5 + 4 = 9 CPU unit time.

- But in above code n will be vary. It is not fixed. Therefore time complexity is O(n+5) . But 5 is constant, it doesn't change at any time therefore we can neglect that part. Hence time complexity is O(n).

- When code will depend on user input and that input will decide no. of operations that time asymptotic analysis makes sense.

- Any function returns something either a success code or failure code. In the computer science world success code represents 0 and failure code represents -1.
  Eg. return 0 : Success or achieve goal
  return -1: failure or not achieve goal

- There are two main types of search algorithm
  1) Linear Search
  2) Binary Search

- Linear search is a sequential searching algorithm where we start from one end and check every element of the list until the desired element is found.