# Remove All Duplicates from a String

**Problem Statement:** Given a String remove all the duplicate characters from the given String.

**Examples:**

```
Example 1:

Input: s = "bcabc"

Output: “bca"



Explanation: Duplicate Characters are removed

Example 2:

Input: s = "cbacdcbc"

Output: "cbad"

Explanation: Duplicate Characters are removed
```

**Solution:**

***Disclaimer****: Don’t jump directly to the solution, try it out yourself first.*

**Solution 1: Brute Force**

Keep two pointers I, j.

i – > For traverse through the string

j – > to check if the character is already present on the left side of the string.

Traverse through the string and for every index i check if str[i] is already present on the left side of the curr idx by looping through (j —> 0 – i -1).

if the same character is found, break through the loop. Now if(i == j) which means we haven’t found the same character add it to the res string. At any point, if the same character is found then i and j will not be the same.

**Code:**

- C++ Code
- Java Code

```
#include<bits/stdc++.h>


using namespace std;


string removeDuplicateLetters(string s) {

  string ans = "";

  for (int i = 0; i < s.length(); i++) {

    int j = 0;

    for (j = 0; j < i; j++) {

      if (s[i] == s[j]) //same character found
      {
        break;
      }
    }
    if (i == j) {
      ans += s[i];
    }
  }
  return ans;
}
int main() {
  string str = "cbacdcbc";
  cout<<"Original String: "<<str<<endl;
  cout <<"After removing duplicates: " <<removeDuplicateLetters(str) << endl;
  return 0;
}
```

**Output:**

```
Original String: cbacdcbc
After removing duplicates: cbad
```

**Time Complexity:** O(N^2)

**Space Complexity:** O(1)

**Solution 2: Using a boolean array**

The input string will only contain lowercase alphabets. So let’s create a boolean array of size 26 initialized to false.

Consider the index as the ASCII value of the character.

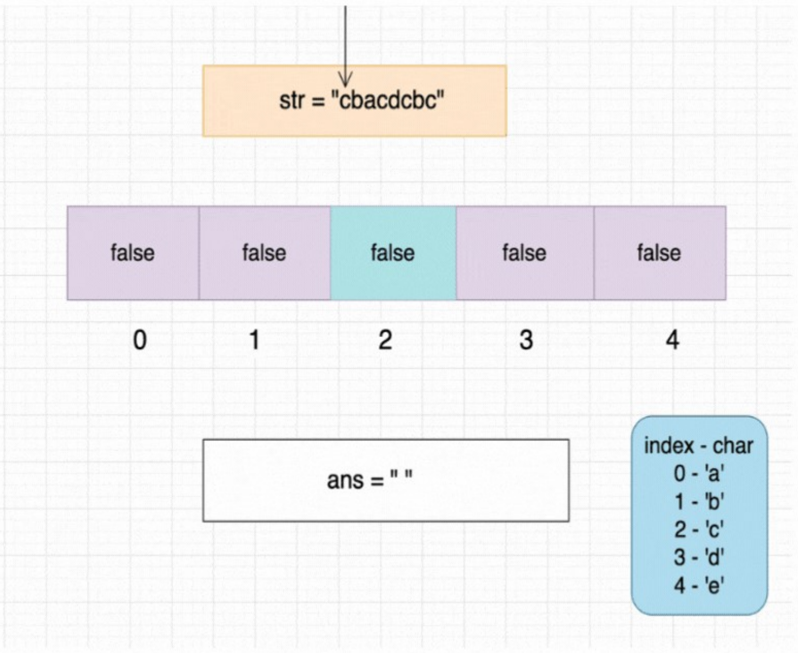
For example: for character ch = ‘c’. The index value will be 2.this can be achieved by doing s[i] – ‘a’ => 99 – 97 = 2 (Since ascii value of ‘c’ = 99 and ‘a’ = 97).

Keep a pointer i at the starting of the string. check if the character is already visited or not. if(s[i] – ‘a’) is false then add that character to ans and make it true.

Repeat it till we reach the end of the string.

**Dry Run:**

For the dry run let’s consider the size of the boolean map to be 5.



**Code:**

- C++ Code
- Java Code

```
#include<bits/stdc++.h>


using namespace std;

```

```
string removeDuplicateLetters(string s) {

  string ans = "";

  vector < bool > map(26, false);

  for (int i = 0; i < s.length(); i++) {

    if (map[s[i] - 'a'] == false) {

      ans += s[i];

      map[s[i] - 'a'] = true;

    }

  }

  return ans;

}

int main() {

  string str = "cbacdcbc";

  cout << "Original String: "<<str<<endl<<"After removing duplicates: "

  <<removeDuplicateLetters(str) << endl;

  return 0;

}
```

**Output:**

```
Original String: cbacdcbc
After removing duplicates: cbad
```

**Time Complexity:** O(N)

**Space Complexity:** O(1)