|  |  |
| --- | --- |
| **Sort Colors in C++** | |
| #include <iostream>  #include <vector>  using namespace std;  class SortColors {  public:  void sortColors(vector<int>& nums) {  int n = nums.size();  int i = 0, j = 0, k = n - 1;  while (j <= k) {  if (nums[j] == 0) {  swap(nums[i], nums[j]);  i++;  j++;  } else if (nums[j] == 1) {  j++;  } else {  swap(nums[j], nums[k]);  k--;  }  }  }  void swap(int& a, int& b) {  int temp = a;  a = b;  b = temp;  }  };  int main() {  // Hardcoded input vector  vector<int> arr = {0, 1, 2, 0, 1, 2, 1, 0, 2, 1};  // Print the original array  cout << "Original array: ";  for (int num : arr) {  cout << num << " ";  }  cout << endl;  // Create an instance of SortColors class  SortColors solution;  // Call sortColors to sort the array  solution.sortColors(arr);  // Print the sorted array  cout << "Sorted array: ";  for (int num : arr) {  cout << num << " ";  }  cout << endl;  return 0;  } | **Input**  vector<int> arr = {0, 1, 2, 0, 1, 2, 1, 0, 2, 1};  **📌 Initial Setup**   * i = 0 (position to place next 0) * j = 0 (current index) * k = 9 (position to place next 2) * Size n = 10   **🔍 Dry Run Table**   | **Step** | **i** | **j** | **k** | **nums[j]** | **Action** | **Resulting Array** | | --- | --- | --- | --- | --- | --- | --- | | 1 | 0 | 0 | 9 | 0 | swap(i,j), ++i, ++j | 0 1 2 0 1 2 1 0 2 1 | | 2 | 1 | 1 | 9 | 1 | ++j | 0 1 2 0 1 2 1 0 2 1 | | 3 | 1 | 2 | 9 | 2 | swap(j,k), --k | 0 1 1 0 1 2 1 0 2 2 | | 4 | 1 | 2 | 8 | 1 | ++j | 0 1 1 0 1 2 1 0 2 2 | | 5 | 1 | 3 | 8 | 0 | swap(i,j), ++i, ++j | 0 0 1 1 1 2 1 0 2 2 | | 6 | 2 | 4 | 8 | 1 | ++j | 0 0 1 1 1 2 1 0 2 2 | | 7 | 2 | 5 | 8 | 2 | swap(j,k), --k | 0 0 1 1 1 2 1 0 2 2 | | 8 | 2 | 5 | 7 | 2 | swap(j,k), --k | 0 0 1 1 1 0 1 2 2 2 | | 9 | 2 | 5 | 6 | 0 | swap(i,j), ++i, ++j | 0 0 0 1 1 1 1 2 2 2 | | 10 | 3 | 6 | 6 | 1 | ++j | 0 0 0 1 1 1 1 2 2 2 |   **🎉 Final Sorted Output**  Sorted array: 0 0 0 1 1 1 1 2 2 2 |
| Original array: 0 1 2 0 1 2 1 0 2 1  Sorted array: 0 0 0 1 1 1 1 2 2 2 | |