Lesson 04 Demo 07

Implementing Count Sort Algorithm

Objective: To use count sort in JavaScript for sorting non-negative data like survey results using frequency counts

Tools required: Visual Studio Code and Node.js

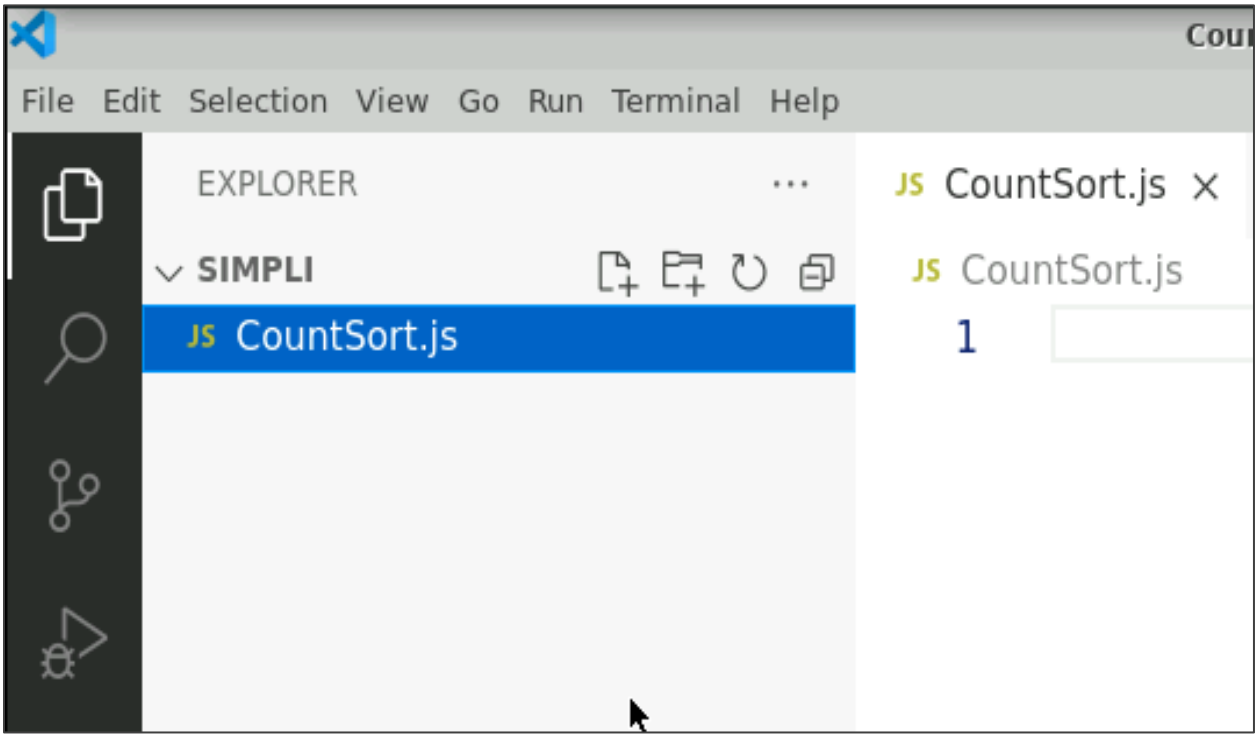
Prerequisites: A basic understanding of arrays and loops in JavaScript

Steps to be followed:

1. Create a JavaScript file and execute it

Step 1: Create a JavaScript file and execute it

1.1 Open the Visual Studio Code editor and create a JavaScript file named **CountSort.js**



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1.2 Add the following code to the file:

```
function countingSort(array) {
  // Find the maximum element in the array
  let max = Math.max(...array);

  // Create an auxiliary array to store the counts of each element
  let countArray = new Array(max + 1).fill(0);

  // Count the occurrences of each element in the input array
  for (let element of array) {
   countArray[element]++;
  }

  // Calculate the prefix sums of the count array
  let prefixSums = [];
  prefixSums[0] = countArray[0];
  for (let i = 1; i <= max; i++) {
   prefixSums[i] = prefixSums[i - 1] + countArray[i];
  }

  // Create an empty output array to store the sorted elements
  let outputArray = new Array(array.length);

  // Place each element in its correct position in the output array
  for (let i = array.length - 1; i >= 0; i--) {
   let element = array[i];
   let index = prefixSums[element] - 1;
   outputArray[index] = element;
   prefixSums[element]--;
  }

  return outputArray;
}

// Example usage and time measurement
let inputArray = [4, 2, 10, 1, 5, 3, 7];
console.time('countingSort');
let sortedArray = countingSort(inputArray);
console.timeEnd('countingSort');

console.log('Sorted Array:', sortedArray)
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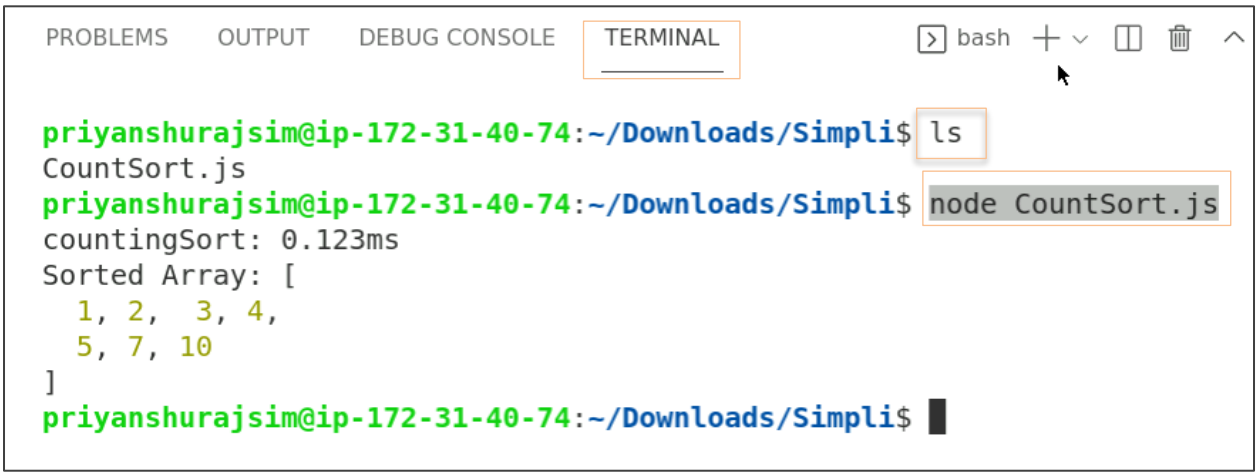
1.3 Press **Ctrl** + **S** to save the file and then execute it in the **TERMINAL** using the following commands:

ls

node CountSort.js



By following these steps, you have successfully implemented and executed the count sort algorithm in JavaScript, efficiently sorting an array while analyzing its time complexity of O(n + k) and space complexity of O(n).