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Lesson 04 Demo 05

Implementing the Quick Sort Algorithm

Objective: To sort data using the quick sort algorithm in JavaScript for optimizing tasks like processing search results or product listings

Tools required: Visual Studio Code and Node.js

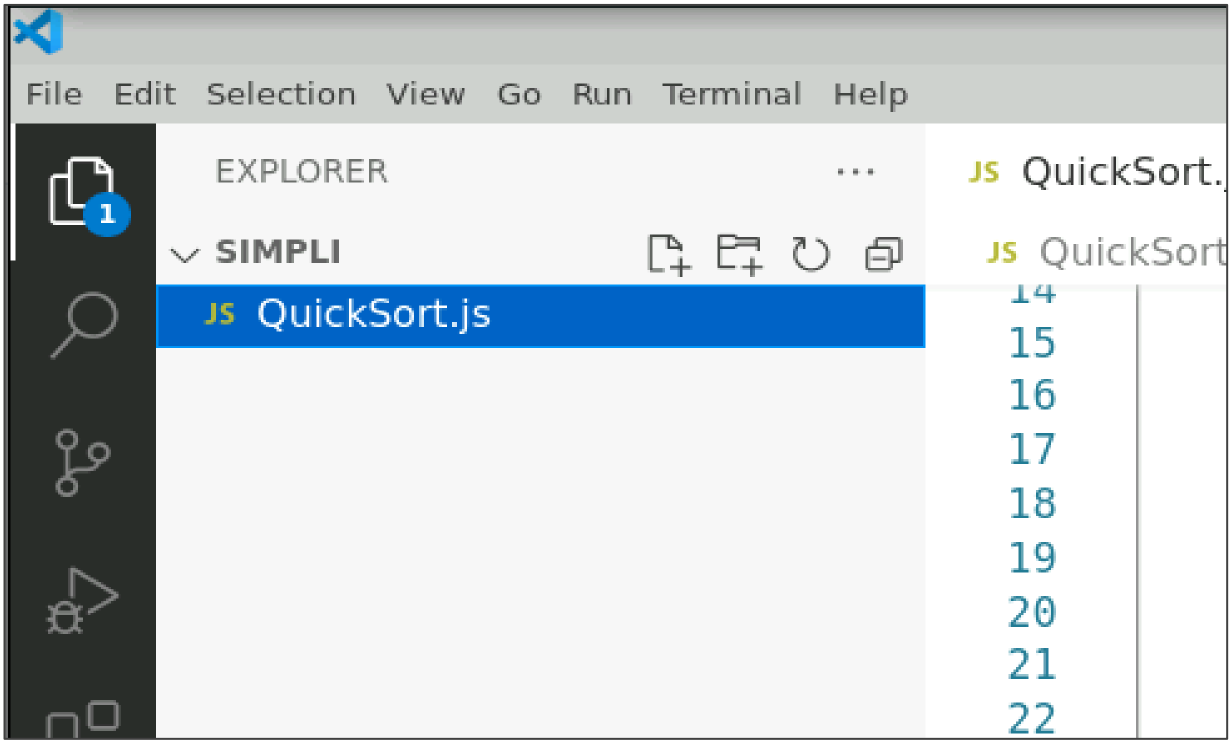
Prerequisites: A basic understanding of arrays and loops in JavaScript

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 **QuickSort.js**



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1.2 Add the following code to the file:

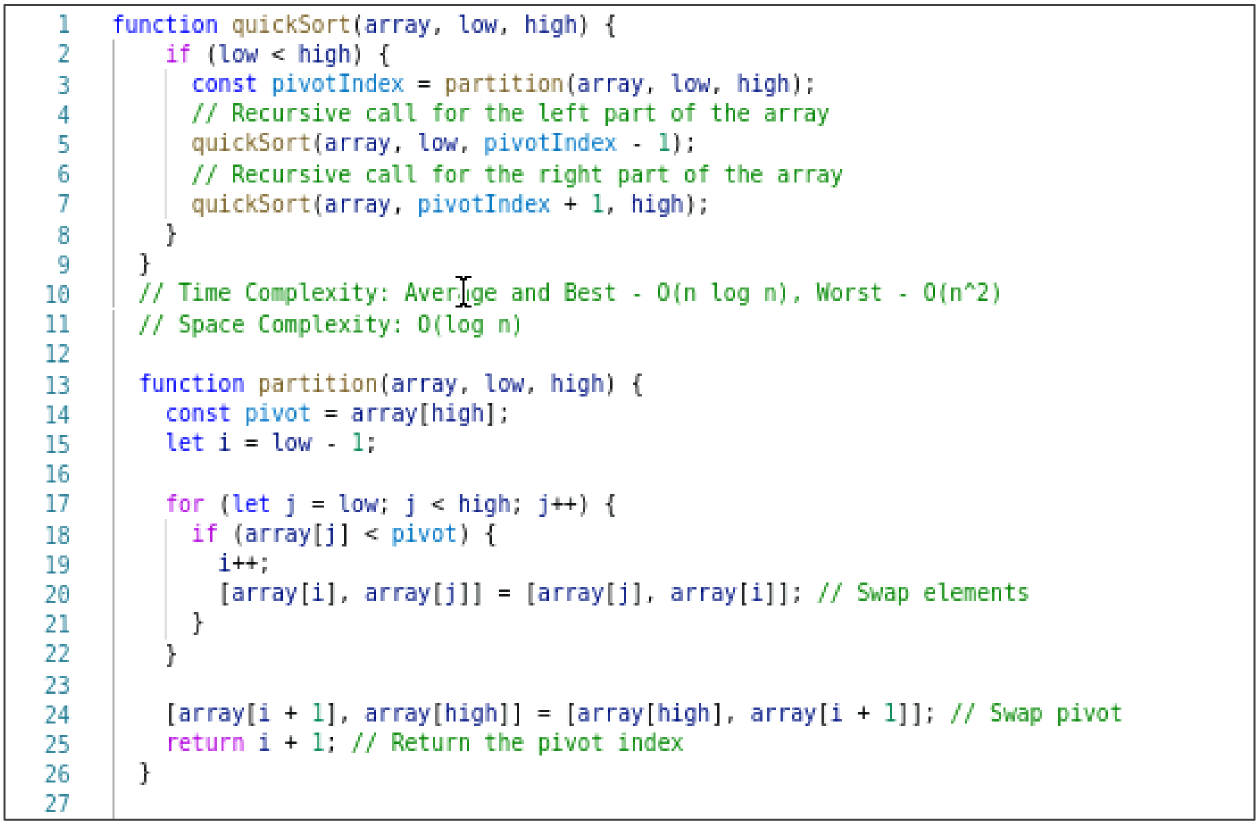
```
function quickSort(array, low, high) {
  if (low < high) {
   const pivotIndex = partition(array, low, high);
   // Recursive call for the left part of the array
   quickSort(array, low, pivotIndex - 1);
   // Recursive call for the right part of the array
   quickSort(array, pivotIndex + 1, high);
  }
 }
 // Time Complexity: Average and Best - O(n log n), Worst - O(n^2)
 // Space Complexity: O(log n)

 function partition(array, low, high) {
  const pivot = array[high];
  let i = low - 1;

  for (let j = low; j < high; j++) {
   if (array[j] < pivot) {
    i++;
    [array[i], array[j]] = [array[j], array[i]]; // Swap elements
   }
  }

  [array[i + 1], array[high]] = [array[high], array[i + 1]]; // Swap pivot
  return i + 1; // Return the pivot index
 }

 const unsortedArray = [5, 2, 4, 1, 3];
 console.time("quickSort");
 quickSort(unsortedArray, 0, unsortedArray.length - 1);
 console.timeEnd("quickSort"); // Measures and logs the time taken for sorting
 console.log(unsortedArray);
```



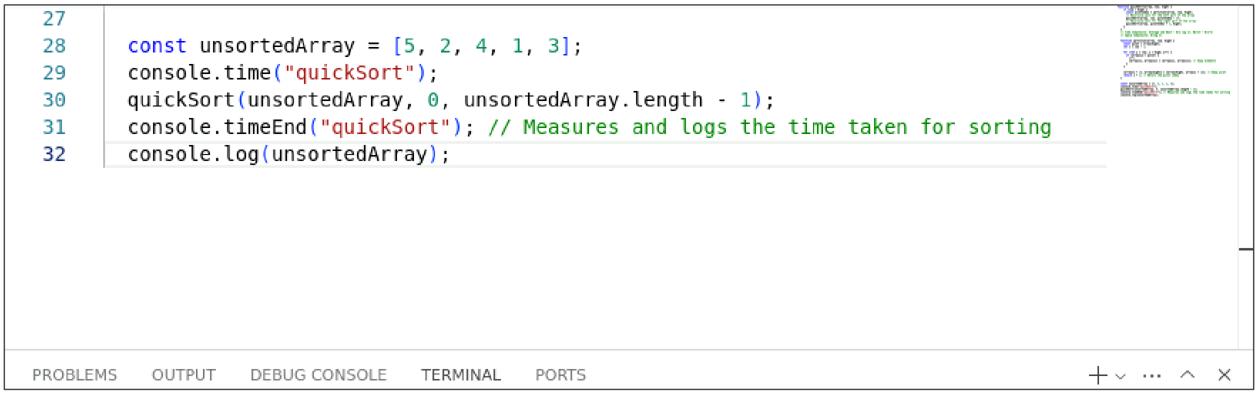
```javascript
function quickSort(array, low, high) {
    if (low < high) {
      const pivotIndex = partition(array, low, high);
      // Recursive call for the left part of the array
      quickSort(array, low, pivotIndex - 1);
      // Recursive call for the right part of the array
      quickSort(array, pivotIndex + 1, high);
    }
  }
  // Time Complexity: Average and Best - O(n log n), Worst - O(n^2)
  // Space Complexity: O(log n)

  function partition(array, low, high) {
    const pivot = array[high];
    let i = low - 1;

    for (let j = low; j < high; j++) {
      if (array[j] < pivot) {
        i++;
        [array[i], array[j]] = [array[j], array[i]]; // Swap elements
      }
    }

    [array[i + 1], array[high]] = [array[high], array[i + 1]]; // Swap pivot
    return i + 1; // Return the pivot index
  }

```



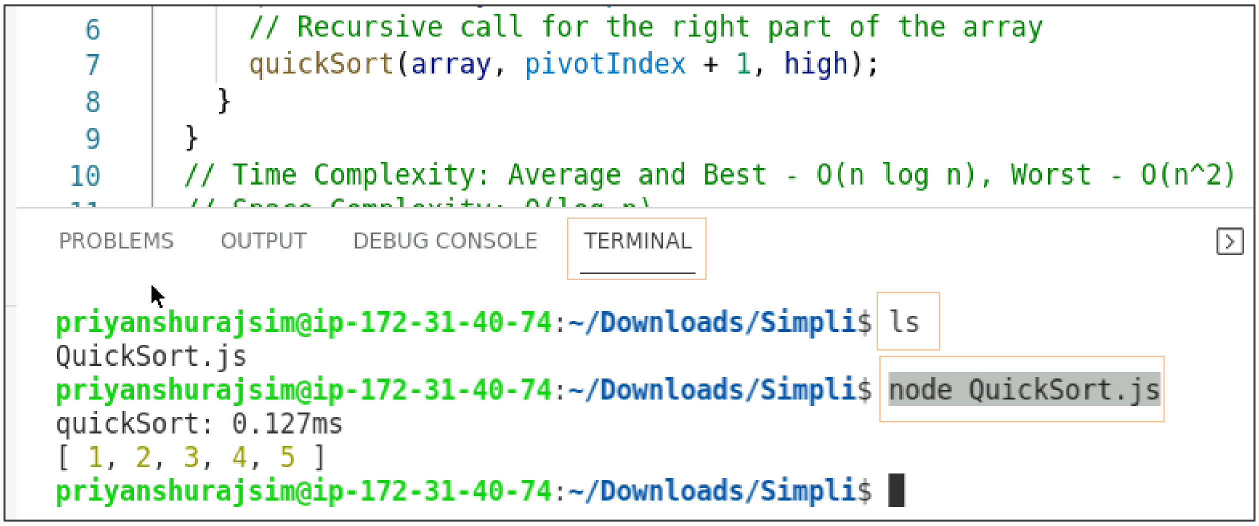
```javascript

const unsortedArray = [5, 2, 4, 1, 3];
console.time("quickSort");
quickSort(unsortedArray, 0, unsortedArray.length - 1);
console.timeEnd("quickSort"); // Measures and logs the time taken for sorting
console.log(unsortedArray);
```

1.3 Press **Ctrl** + **S** to save the file and then execute it in the **TERMINAL** using the following commands:

ls

node QuickSort.js



```
    // Recursive call for the right part of the array
    quickSort(array, pivotIndex + 1, high);
  }
}
// Time Complexity: Average and Best - O(n log n), Worst - O(n^2)
// Space Complexity: O(log n)
```

```
priyanshurajsim@ip-172-31-40-74:~/Downloads/Simpli$ ls
QuickSort.js
priyanshurajsim@ip-172-31-40-74:~/Downloads/Simpli$ node QuickSort.js
quickSort: 0.127ms
[ 1, 2, 3, 4, 5 ]
priyanshurajsim@ip-172-31-40-74:~/Downloads/Simpli$ 
```

By following these steps, you have successfully used the quick sort algorithm in JavaScript to organize data such as search results or product listings efficiently, and learned that it has a worst-case time complexity of O(n^2) and space complexity of O(log n).