

## Lesson 02 Demo 04

### Implementing CRUD Operations on a Singly Linked List

**Objective:** To create a singly linked list in JavaScript with CRUD functionalities such as node addition, traversal, value modification, and node deletion to enhance your understanding of dynamic data structures

**Tools required:** Visual Studio Code (VS Code) and JavaScript

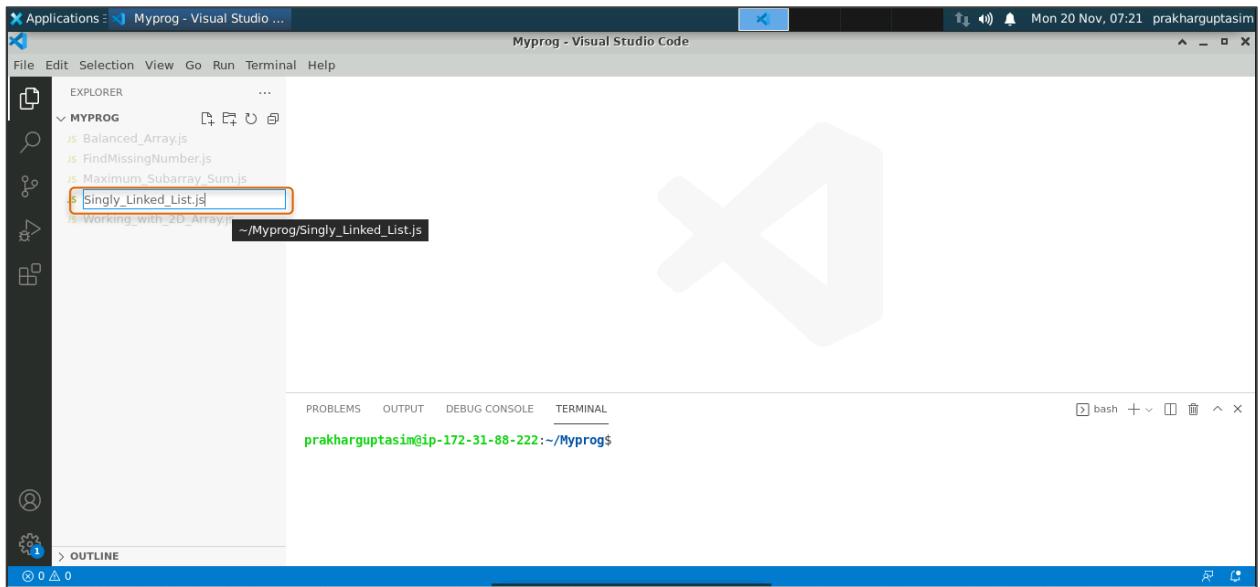
**Prerequisites:** Completion of Lesson 02 Demo 01

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 **Singly\_Linked\_List.js**



1.2 Add the following code to the file:

```
class ListNode {  
    constructor(data) {  
        this.data = data;  
        this.next = null;  
    }  
}  
  
class SinglyLinkedList {  
    constructor() {  
        this.head = null;  
    }  
  
    // Create: Add a new node to the end of the list  
    add(data) {  
        const newNode = new ListNode(data);  
        if (!this.head) {  
            this.head = newNode;  
        } else {  
            let current = this.head;  
            while (current.next) {  
                current = current.next;  
            }  
            current.next = newNode;  
        }  
    }  
  
    // Read: Traverse and display elements of the list  
    read() {  
        let current = this.head;  
        while (current) {  
            console.log(current.data);  
            current = current.next;  
        }  
    }  
}
```

```
// Update: Modify the value of a node at a given position
update(position, data) {
    let current = this.head;
    let count = 0;
    while (current) {
        if (count === position) {
            current.data = data;
            return;
        }
        current = current.next;
        count++;
    }
    console.log("Position not found");
}

// Delete: Remove a node from the list at a specified position
delete(position) {
    if (position === 0) {
        this.head = this.head.next;
        return;
    }

    let current = this.head;
    let previous = null;
    let count = 0;

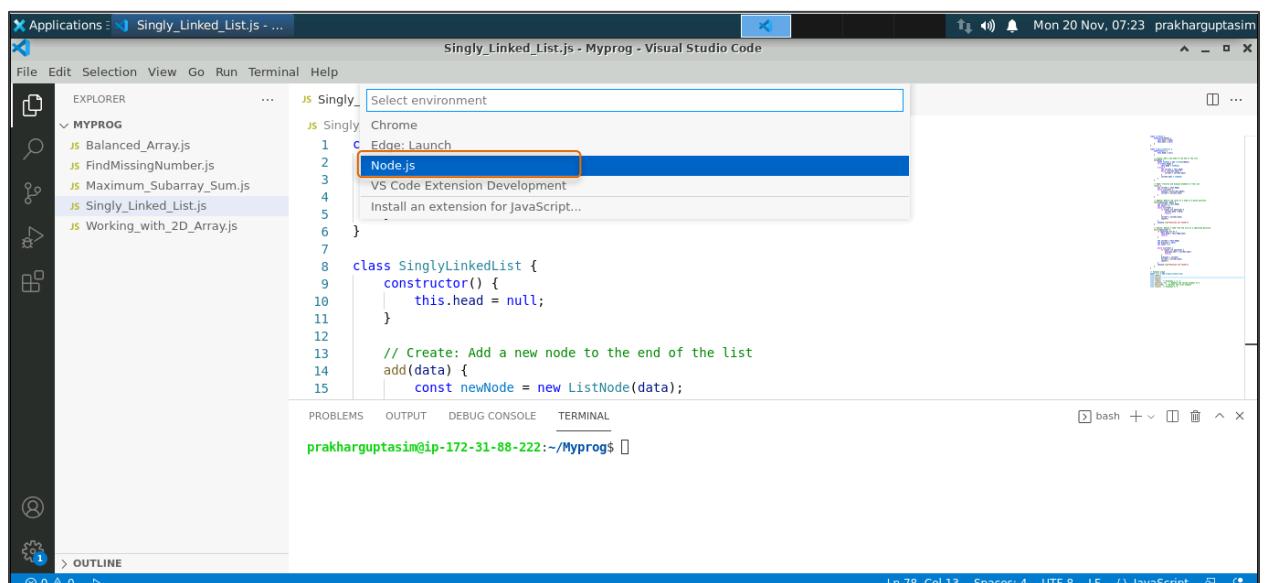
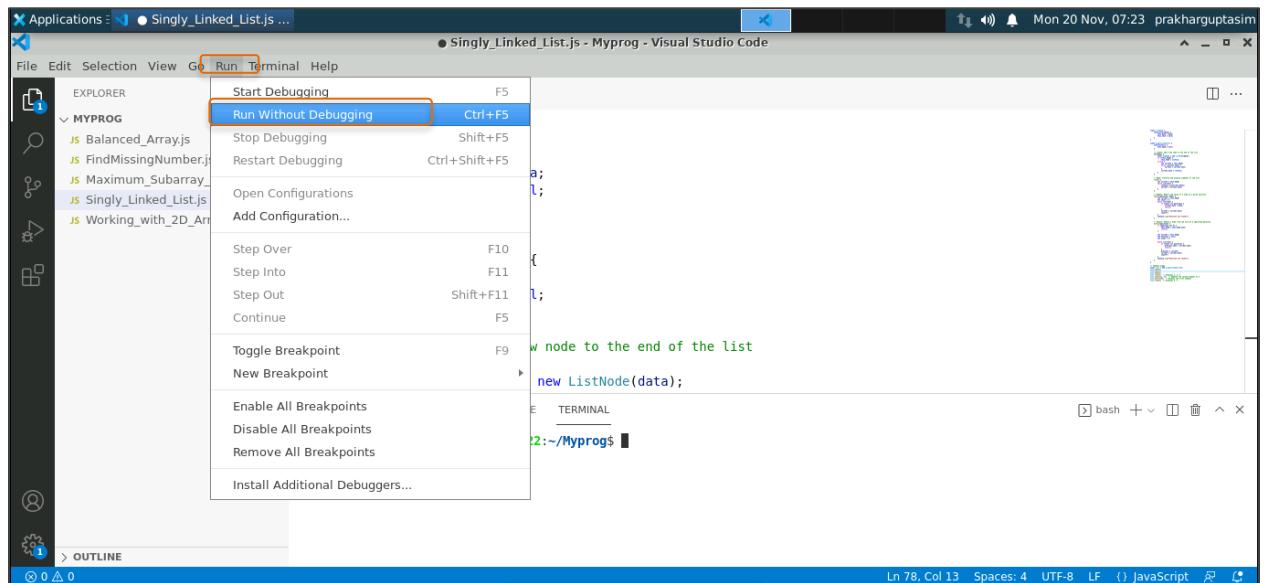
    while (current) {
        if (count === position) {
            previous.next = current.next;
            return;
        }
        previous = current;
        current = current.next;
        count++;
    }
    console.log("Position not found");
}
```

```
// Example usage
const list = new SinglyLinkedList();
list.add(1);
list.add(2);
list.add(3);
list.read(); // Displays 1, 2, 3
list.update(1, 4); // Updates the second element to 4
list.delete(0); // Deletes the first element
list.read(); // Displays 4, 3
```

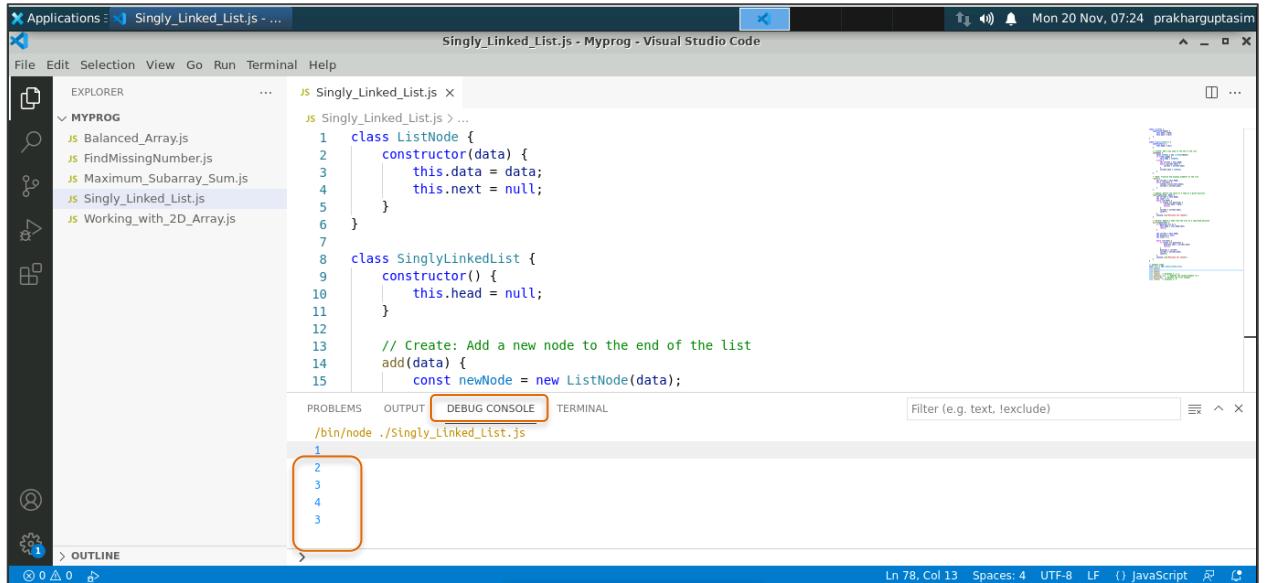
The screenshot shows a Visual Studio Code interface with the following details:

- Title Bar:** Applications: Singly\_Linked\_List.js ... | Singly\_Linked\_List.js - Myprog - Visual Studio Code | Mon 20 Nov, 07:22 prakharguptasim
- File Menu:** File Edit Selection View Go Run Terminal Help
- Explorer:** Shows a folder named "MYPROG" containing several JavaScript files: Balanced\_Array.js, FindMissingNumber.js, Maximum\_Subarray\_Sum.js, Singly\_Linked\_List.js (selected), and Working\_with\_2D\_Array.js.
- Code Editor:** Displays the content of "Singly\_Linked\_List.js". The code defines a `ListNode` class and a `SinglyLinkedList` class. It includes methods for adding nodes, updating values, and deleting nodes.
- Terminal:** Shows the command prompt: prakharguptasim@ip-172-31-88-222:~/Myprog\$
- Bottom Bar:** PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

**1.3 Click Run and then Run Without Debugging.** Select **Node.js** to check the output in the DEBUG CONSOLE.



#### 1.4 View the output in the **DEBUG CONSOLE** as shown below:



The screenshot shows a Visual Studio Code interface with the following details:

- Title Bar:** Applications - Singly\_Linked\_List.js - ...
- File Menu:** File Edit Selection View Go Run Terminal Help
- Explorer:** Shows a folder named "MYPROG" containing several JavaScript files: Balanced\_Array.js, FindMissingNumber.js, Maximum\_Subarray\_Sum.js, Singly\_Linked\_List.js (selected), and Working\_with\_2D\_Array.js.
- Code Editor:** Displays the contents of "Singly\_Linked\_List.js". The code defines a ListNode class and a SinglyLinkedList class, and includes a main add() function.
- Debug Console:** The tab labeled "DEBUG CONSOLE" is highlighted. It shows the command "/bin/node ./Singly\_Linked\_List.js" and the resulting output:

```
1
2
3
4
3
```
- Status Bar:** Shows Ln 78, Col 13, Spaces: 4, UTF-8, LF, JavaScript.

By following these steps, you have successfully performed CRUD operations on a singly linked list. The **add()** method adds a new node at the end of the list, the **read()** method traverses and prints the list, the **update()** method changes the value at a given position, and the **delete()** method removes a node at a specified position. These are essential operations when working with dynamic data structures.