Lesson 02 Demo 01

Finding the Missing Number

Objective: To identify the missing integer in an array of unique numbers from 1 to n and create an algorithm for this program

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

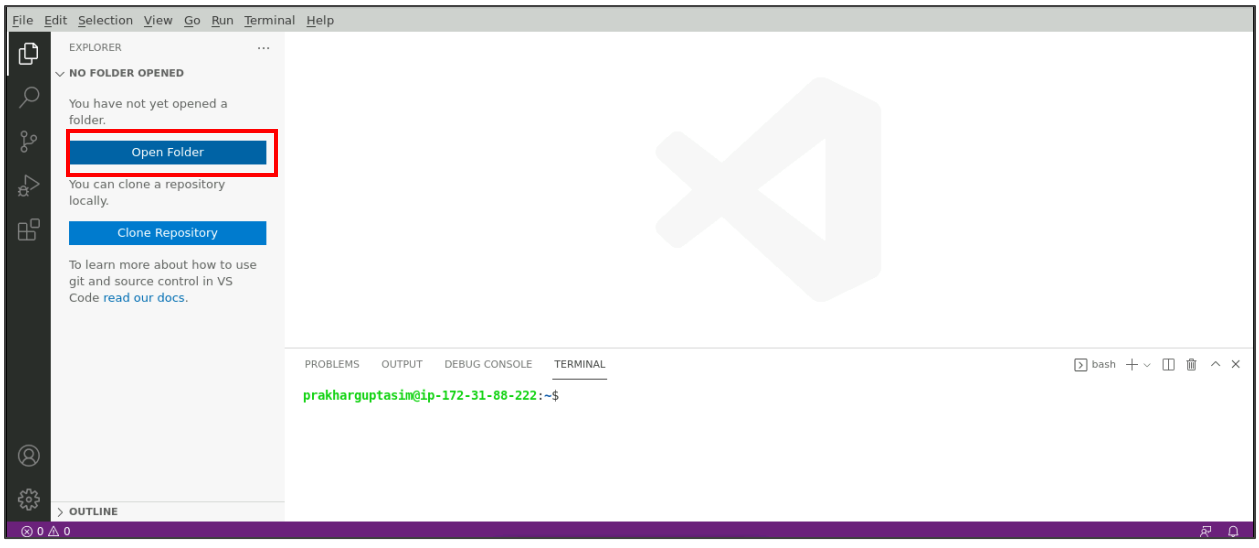
Prerequisites: None

Steps to be followed:

1. Configure the working directory within the lab environment
2. Create and execute the JS file

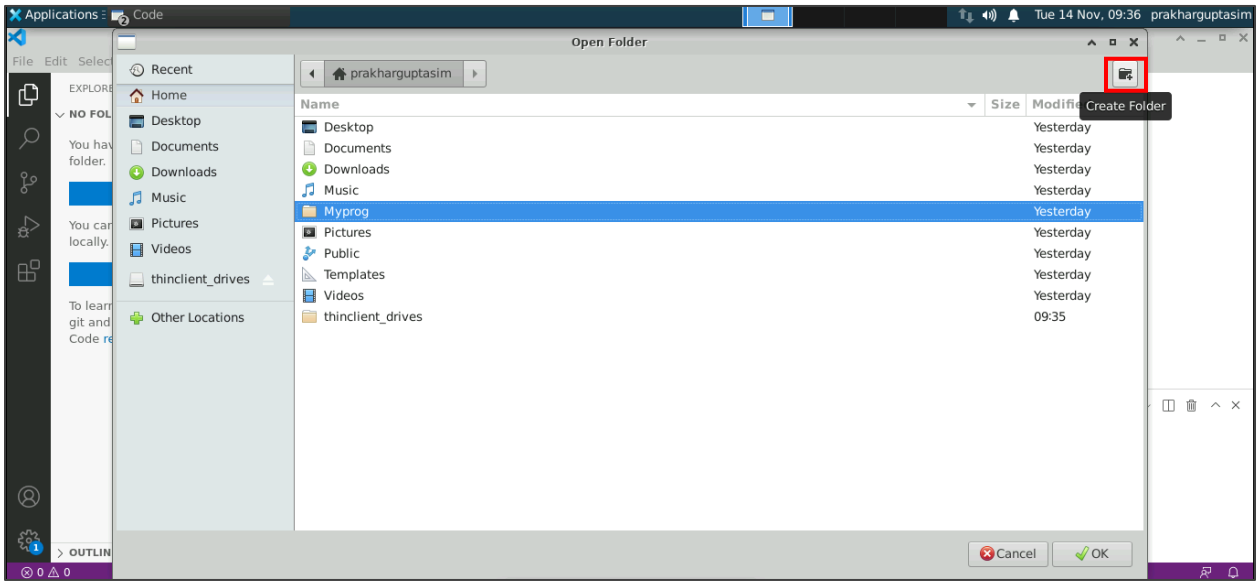
Step 1: Configure the working directory within the lab environment

1.1 Launch the VS Code editor and then click on **Open Folder** as shown below:

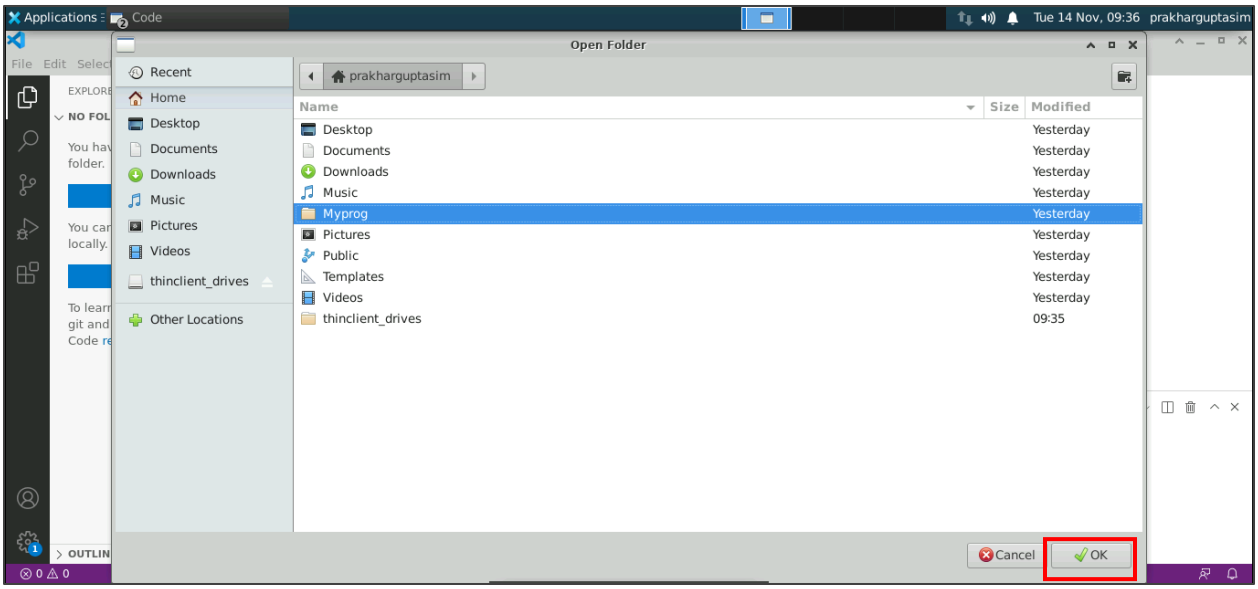


1.2 Create an arbitrary folder, which will be used as your working directory:

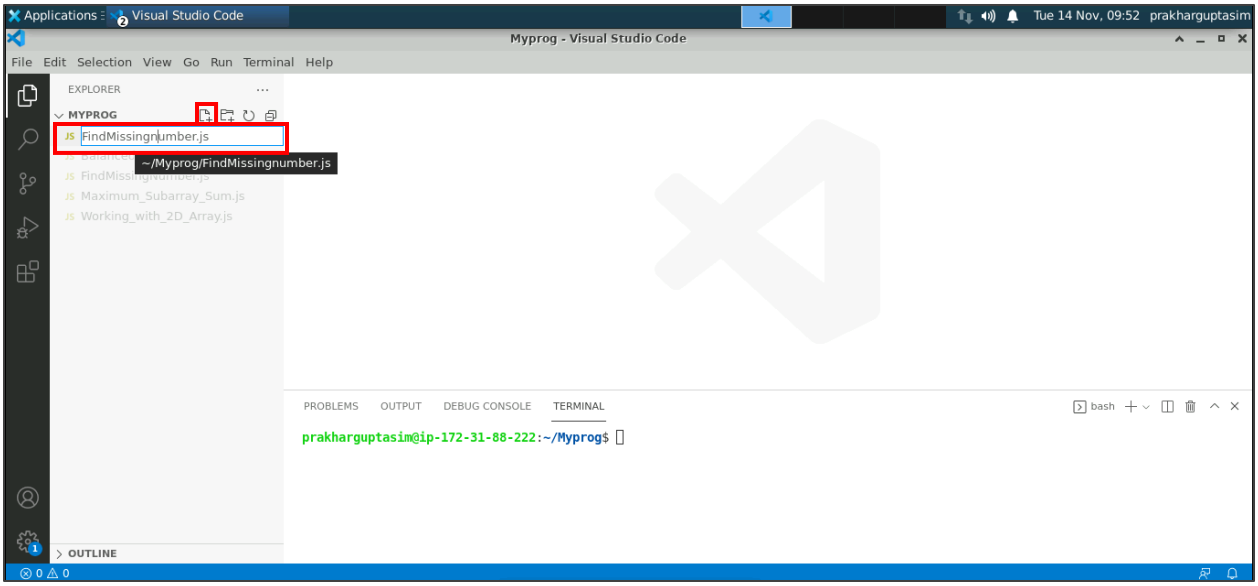
- Click on the **Create Folder** icon as shown below:



- Create a folder named **Myprog** and then click on **OK**



1.3 Now create a JavaScript file **FindMissingnumber.js** by clicking on the **New File** icon as shown below:



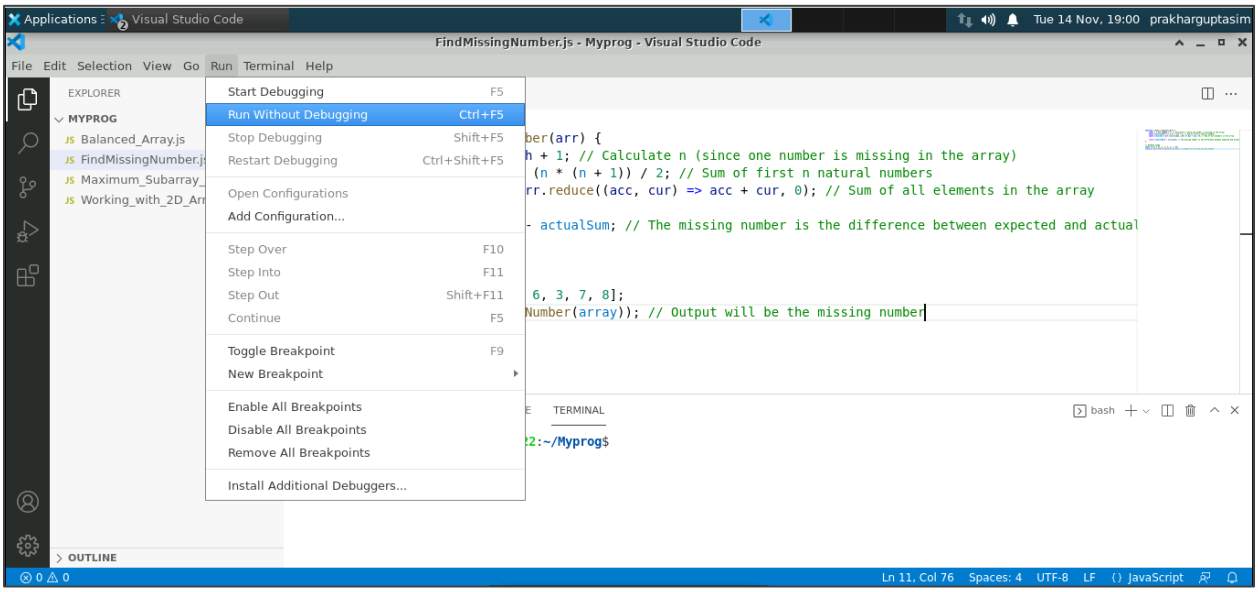
Note: You can give any arbitrary name to the JavaScript file created in the above step.

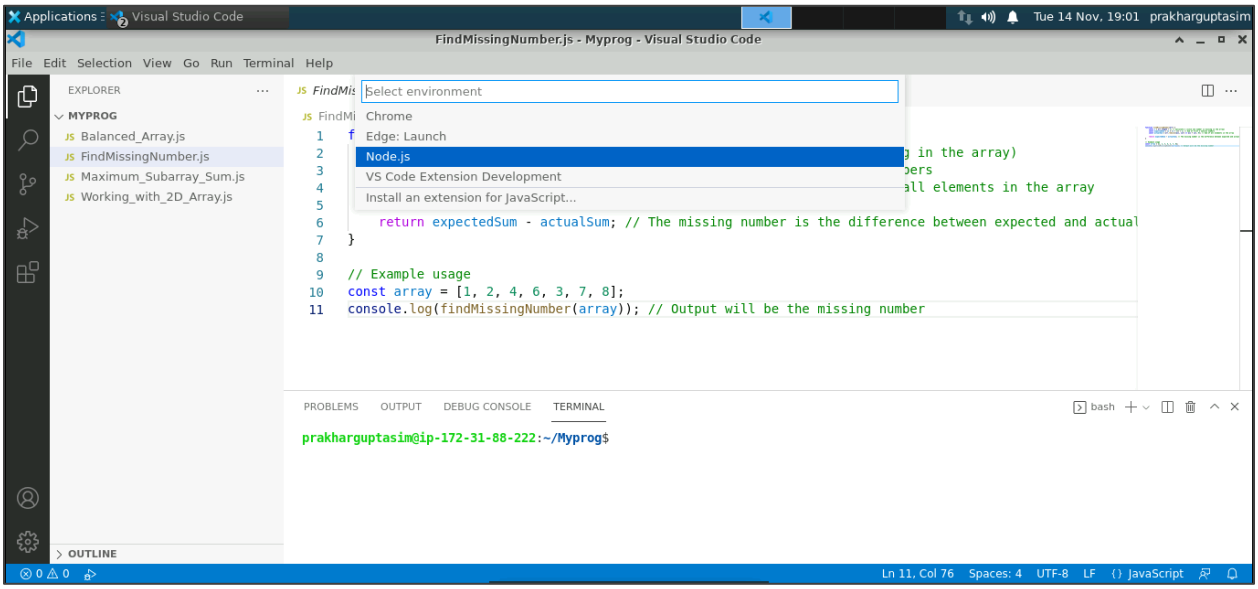
Step 2 Create and execute the JS file

2.1 Write the code given below in the file created in step 1.3:

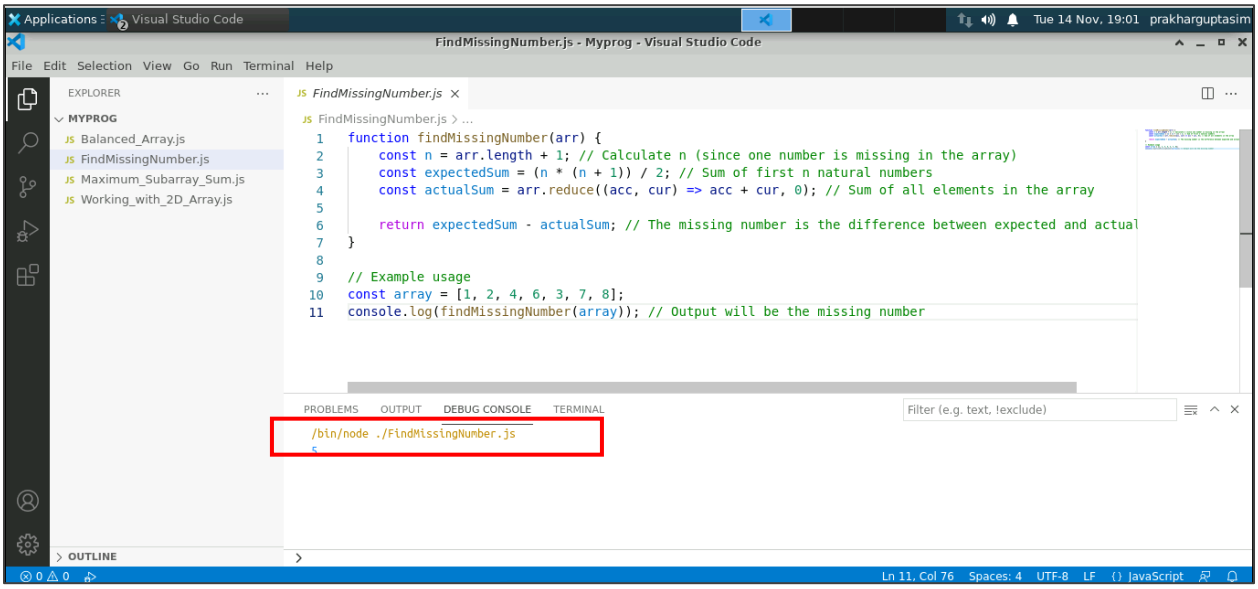
```
function findMissingNumber(arr) {
const n = arr.length + 1; // Calculate n (since one number is missing in the array)
const expectedSum = (n * (n + 1)) / 2; // Sum of first n natural numbers

let actualSum = 0; // Initialize sum of array elements
for (let i = 0; i < arr.length; i++) {
actualSum += arr[i]; // Add each element to the sum
}

return expectedSum - actualSum; // The missing number is the difference between
expected and actual sums
}

// Example usage
const array = [1, 2, 4, 6, 3, 7, 8];
console.log(findMissingNumber(array)); // Output will be the missing number
```

2.2 Now save the code and click on **Run->Run Without Debugging->Node.js**





- Now you see the output in the debug console as shown below:



Explanation:

1. Calculate **n**, the total array length (including the missing number).
2. Use the formula (n * (n + 1)) / 2 to find the sum of the initial **n** natural numbers
3. Sum all elements within the array

The missing number is determined by the difference between the expected sum (sum of the first **n** natural numbers) and the actual sum (sum of array elements).

Assumptions:

1. In this solution approach, we assume the absence of duplicate elements in the array.
2. This solution identifies only a single missing element.
3. Modifying the expected formula sum in the code allows finding missing numbers in various other arithmetic progression (AP) series.

By following the above steps, you have successfully created an algorithm for identifying a missing number from the first **n** natural numbers.