Find the Majority Element in an Array

Write a program to find the majority element in an array (an element that appears more than n/2 times). For example, in the array [3, 3, 4, 2, 4, 4, 2, 4, 41, the output should be 4. Do not use any built-in functions for array manipulation or counting.

Instructions: Implement a manual count and comparison logic to find the majority element

Program code:

```java
import java.util.*;
public class MajorityElementFinder {

    public static void main(String[] args) {
        int[] array = {3, 3, 4, 2, 4, 4, 2, 4, 4};
        int majorityElement = findMajorityElement(array);

        if (majorityElement != -1) {
            System.out.println("The majority element is: " + majorityElement);
        } else {
            System.out.println("There is no majority element.");
        }
    }

    public static int findMajorityElement(int[] array) {
        int n = array.length;
        int candidate = -1;
        int count = 0;

        // Step 1: Find a candidate for the majority element
        for (int num : array) {
            if (count == 0) {
```

```java
                candidate = num;

                count = 1;

            } else if (num == candidate) {

                count++;

            } else {

                count--;

            }

        }


        // Step 2: Verify if the candidate is indeed the majority element

        count = 0;

        for (int num : array) {

            if (num == candidate) {

                count++;

            }

        }


        // Check if the count of the candidate is greater than n/2

        if (count > n / 2) {

            return candidate;

        } else {

            return -1; // No majority element found

        }

    }

}
```

Input:

int[] array = {3, 3, 4, 2, 4, 4, 2, 4, 4};

Output:

The majority element is: 4

Input:

int[] array = {1, 2, 3, 4, 5, 6};

Output:

The majority element is: 4

Input:

int[] array = {2, 2, 1, 1, 1, 2, 2};

Output:

The majority element is: 2