First Round Challenge for Hash Agile Internship/Freshers Drive

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Problem Statement:

HATFD1020
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, 4], 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.

```
#include <stdio.h>

// Function to find the candidate for the majority element
int findCandidate(int arr[], int n) {
    int count = 0, candidate;

    // Find a candidate for majority element
    for (int i = 0; i < n; i++) {
        if (count == 0) {
            candidate = arr[i];
        }
        count += (arr[i] == candidate) ? 1 : -1;
    }
    return candidate;
}

// Function to verify if the candidate is indeed the majority
int isMajority(int arr[], int n, int candidate) {
    int count = 0;

    // Verifying whether candidate is the majority
    for (int i = 0; i < n; i++) {
        if (arr[i] == candidate) {
            count++;
        }
    }
    // Check if element appears more than n/2
    return (count > n / 2);
}
```

```
// To use the previous 2 functions and return the majority element if one exists
int findMajorityElement(int arr[], int size) {
    int candidate = findCandidate(arr, size);

    if (isMajority(arr, size, candidate)) {
        return candidate;
    } else {
        return -1; // No majority element found
    }
}

// The main function to drive the code
int main() {
    int n;
    int t;

    // Taking input for the array size
    printf("Enter the number of test cases: ");
    scanf("%d", &t);

    while(t--){
    printf("Enter the number of elements in the array: ");
    scanf("%d", &n);

    if (n <= 0) {
        printf("Array size should be greater than 0.\n");
        return 0;
    }

    int arr[n];

    // Taking input for array elements
    printf("Enter the elements of given array: \n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

    // Calculating and printing the majority element
    int majorityEle = findMajorityElement(arr, n);
    if (majorityEle != -1) {
        printf("The Majority element present in the given array is: %d\n", majorityEle);
    } else {
        printf("Majority element doesn't exist.\n"); // Corrected quotation marks
    }
}
    return 0;
}
```

Sample test cases:

```
Enter the number of test cases: 3
Enter the number of elements in the array: 9
Enter the elements of given array:
3 3 4 2 4 4 2 4 4
The Majority element present in the given array is: 4
Enter the number of elements in the array: 7
Enter the elements of given array:
1 1 2 1 3 1 1
The Majority element present in the given array is: 1
Enter the number of elements in the array: 5
Enter the elements of given array:
1 2 3 4 5
Majority element doesn't exist.
```

Case 1:
Enter the number of elements in the array: 9
Enter the elements of given array:
3 3 4 2 4 4 2 4 4
Output: The Majority element present in the given array is: 4

Case 2:
Enter the number of elements in the array: 7
Enter the elements of given array:
1 1 2 1 3 1 1
Output: The Majority element present in the given array is: 1

Case 3:
Enter the number of elements in the array: 5
Enter the elements of given array:
1 2 3 4 5
Output: Majority element doesn't exist.