Day -2

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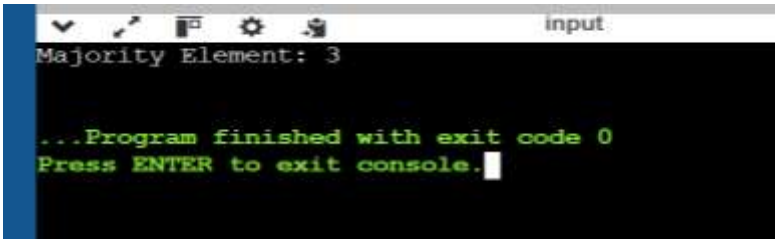
Q1. Majority Element.

Code: //majority Element

```
#include <stdio.h>
int majorityElement(int* nums, int numsSize) {
    int candidate = 0, count = 0;
  for (int i = 0; i < numsSize; i++) {
        if (count == 0) {
            candidate = nums[i];
        }
        count += (nums[i] == candidate) ? 1 : -1;
    }
 return candidate;
}
int main() {
    int nums[] = {3, 2, 3};
    int numsSize = sizeof(nums) / sizeof(nums[0]);
    printf("Majority Element: %d\n", majorityElement(nums, numsSize));
    return 0;
}
```

Output:

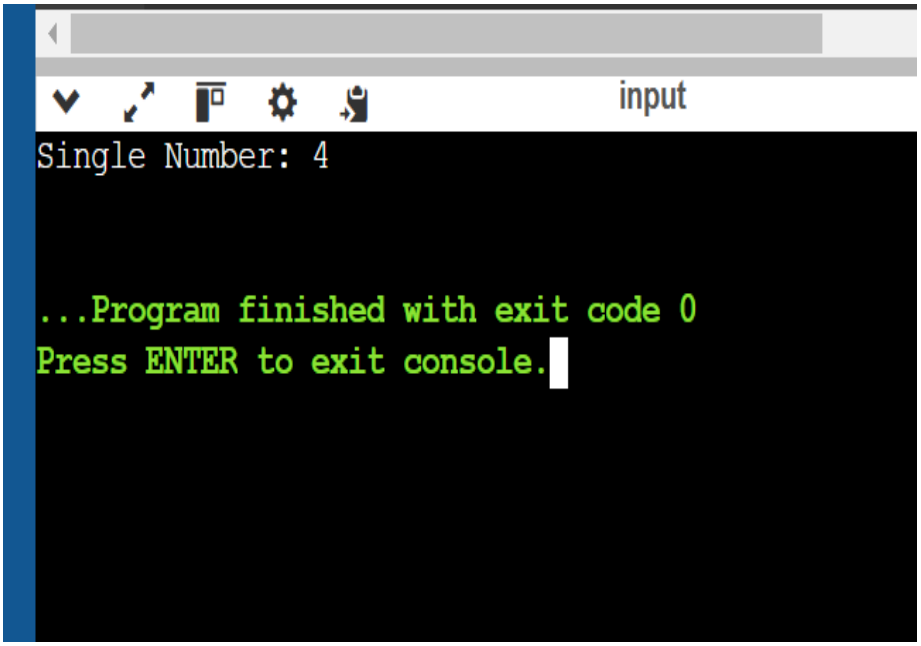


Q2. Single Number .

Code:

```
#include <stdio.h>
int singleNumber(int* nums, int numsSize) {
    int result = 0;
   for (int i = 0; i < numsSize; i++) {
        result ^= nums[i];
    }
return result;
}
int main() {
    int nums[] = {4, 1, 2, 1, 2};
    int numsSize = sizeof(nums) / sizeof(nums[0]);
    printf("Single Number: %d\n", singleNumber(nums, numsSize));
    return 0;
}
```

Output:



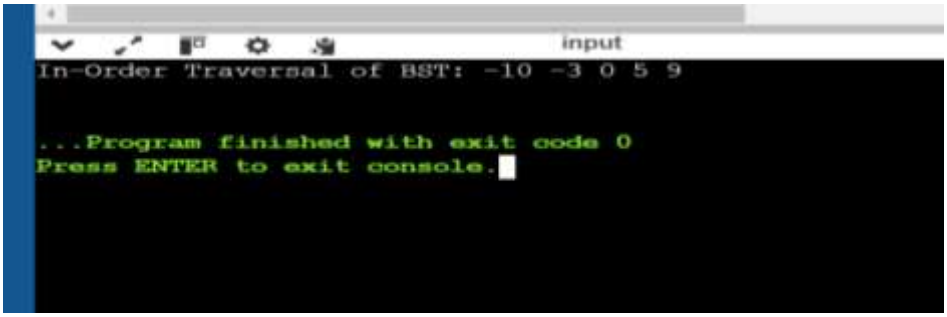
Q3. Convert sorted Array to Binary Search Trees .

Code:

```
#include <stdio.h>
#include <stdlib.h>
struct TreeNode {
    int val;
    struct TreeNode* left;
    struct TreeNode* right;
};
struct TreeNode* createNode(int val) {
    struct TreeNode* node = (struct TreeNode*)malloc(sizeof(struct TreeNode));
    node->val = val;
    node->left = NULL;
    node->right = NULL;
    return node;
}
struct TreeNode* sortedArrayToBST(int* nums, int left, int right) {
    if (left > right) {
        return NULL;
    }

    int mid = left + (right - left) / 2;
    struct TreeNode* root = createNode(nums[mid]);
    root->left = sortedArrayToBST(nums, left, mid - 1);
    root->right = sortedArrayToBST(nums, mid + 1, right);

    return root;
}
struct TreeNode* convertSortedArrayToBST(int* nums, int numsSize) {
    return sortedArrayToBST(nums, 0, numsSize - 1);
```

```
void printInOrder(struct TreeNode* root) {
    if (root == NULL) return;

    printInOrder(root->left);
    printf("%d ", root->val);
    printInOrder(root->right);
}

int main() {
    int nums[] = {-10, -3, 0, 5, 9};
    int numsSize = sizeof(nums) / sizeof(nums[0]);

    struct TreeNode* root = convertSortedArrayToBST(nums, numsSize);

    printf("In-Order Traversal of BST: ");
    printInOrder(root);
    printf("\n");

    return 0;
}
```

Output :



Q4. Merge Two sorted List .

Code :

```
#include <stdio.h>
#include <stdlib.h>
struct ListNode {
    int val;
    struct ListNode* next;
};
struct ListNode* createNode(int val) {
    struct ListNode* node = (struct ListNode*)malloc(sizeof(struct ListNode));
    node->val = val;
    node->next = NULL;
    return node;
}
struct ListNode* mergeTwoLists(struct ListNode* list1, struct ListNode* list2) {
    // Base cases
    if (!list1) return list2;
    if (!list2) return list1;

    if (list1->val < list2->val) {
        list1->next = mergeTwoLists(list1->next, list2);
        return list1;
    } else {
        list2->next = mergeTwoLists(list1, list2->next);
        return list2;
    }
}
void printList(struct ListNode* head) {
    struct ListNode* current = head;
    while (current) {
```

```
        printf("%d -> ", current->val);
        current = current->next;
    }
    printf("NULL\n");
}
int main() {
    // Create first sorted list: 1 -> 2 -> 4
    struct ListNode* list1 = createNode(1);
    list1->next = createNode(2);
    list1->next->next = createNode(4);

    struct ListNode* list2 = createNode(1);
    list2->next = createNode(3);
    list2->next->next = createNode(4);
   struct ListNode* mergedList = mergeTwoLists(list1, list2);
   printf("Merged Sorted List: ");
    printList(mergedList);

    return 0;
}
```

Output :

}

Q5. Linked list Cycle .

Code:

```
#include <stdio.h>
#include <stdlib.h>
#include <stdbool.h>
struct ListNode {
    int val;
    struct ListNode* next;
};
struct ListNode* createNode(int val) {
    struct ListNode* node = (struct ListNode*)malloc(sizeof(struct ListNode));
    node->val = val;
    node->next = NULL;
    return node;
}
bool hasCycle(struct ListNode* head) {
    if (!head || !head->next) return false;

    struct ListNode* slow = head;
    struct ListNode* fast = head;

    while (fast && fast->next) {
        slow = slow->next;
        fast = fast->next->next;


        if (slow == fast) return true;
    }

    return false;
```

```
// Main function to test the code
int main(){
    struct ListNode* head = createNode(3);
    head->next = createNode(2);
    head->next->next = createNode(0);
    head->next->next->next = createNode(-4);
    head->next->next->next->next = head->next;



    if (hasCycle(head)) {
        printf("The linked list has a cycle.\n");
    } else {
        printf("The linked list does not have a cycle.\n");
    }

    return 0;
}
```

Output: