Rajalakshmi Engineering College

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 3_COD_Question 3

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Sharon is developing a programming challenge for a coding competition. The challenge revolves around implementing a character-based stack data structure using an array.

Sharon's project involves a stack that can perform the following operations:

Push a Character: Users can push a character onto the stack.Pop a Character: Users can pop a character from the stack, removing and displaying the top character.Display Stack: Users can view the current elements in the stack.Exit: Users can exit the stack operations application.

Write a program to help Sharon to implement a program that performs the given operations.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Push the character onto the stack. If the choice is 1, the following input is a space-separated character, representing the character to be pushed onto the stack.

Choice 2: Pop the character from the stack.

Choice 3: Display the characters in the stack.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the stack:

1. If the choice is 1, push the given character to the stack and display the pushed character having the prefix "Pushed: ".
2. If the choice is 2, undo the character from the stack and display the character that is popped having the prefix "Popped: ".
3. If the choice is 2, and if the stack is empty without any characters, print "Stack is empty. Nothing to pop."
4. If the choice is 3, print the elements in the stack having the prefix "Stack elements: ".
5. If the choice is 3, and there are no characters in the stack, print "Stack is empty."
6. If the choice is 4, exit the program.
7. If any other choice is entered, print "Invalid choice"

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 2
4
Output: Stack is empty. Nothing to pop.

Answer

```
#include <stdio.h>
```

```
#include <stdbool.h>

#define MAX_SIZE 100

char items[MAX_SIZE];
int top = -1;

void initialize() {
    top = -1;
}
bool isFull() {
    return top == MAX_SIZE - 1;
}

bool isEmpty() {
    return top == -1;
}
// You are using GCC
// Function to push a character onto the stack
void push(char value) {
    // Check for stack overflow
    if (top >= MAX_SIZE - 1) {
        printf("Stack Overflow\n"); // Message for array overflow
        return;
    }

    // Increment top and add the element
    top++;
    items[top] = value;

    // Print the push confirmation message as per the sample output format
    printf("Pushed: %c\n", value);
}

// Function to pop a character from the stack
void pop() {
    // Check for stack underflow
    if (top == -1) {
        printf("Stack is empty. Nothing to pop.\n"); // Output format for empty pop
        return;
    }
    // Get the character from the top
    char poppedValue = items[top];

    // Decrement top
    top--;

    // Print the pop confirmation message as per the sample output format
    printf("Popped: %c\n", poppedValue);
}

// Function to display the characters in the stack
void display() {
    // Check if the stack is empty
    if (top == -1) {
        printf("Stack is empty.\n"); // Output format for empty display
        return;
    }

    // Traverse the array from top down to the first element (index 0)
    printf("Stack elements: "); // Output format for non-empty display
    for (int i = top; i >= 0; i--) {
        printf("%c ", items[i]); // Print character followed by a space
    }
    printf("\n"); // Newline after displaying elements
}

int main() {
    initialize();
    int choice;
    char value;

    while (true) {
        scanf("%d", &choice);
        switch (choice) {
            case 1:
                scanf(" %c", &value);
                push(value);
                break;
            case 2:
                pop();
                break;
            case 3:
                display();
                break;
            case 4:
                return 0;
            default:
                printf("Invalid choice\n");
        }
    }
    return 0;
}
```

Status : Correct ***Marks : 10/10***