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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 3

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Write a program to implement a queue using an array and pointers. The program should provide the following functionalities:

Insert an element into the queue.Delete an element from the queue.Display the elements in the queue.

The queue has a maximum capacity of 5 elements. If the queue is full and an insertion is attempted, a "Queue is full" message should be displayed. If the queue is empty and a deletion is attempted, a "Queue is empty" message should be displayed.

Input Format

Each line contains an integer representing the chosen option from 1 to 3.

Option 1: Insert an element into the queue followed by an integer representing the element to be inserted, separated by a space.

Option 2: Delete an element from the queue.

Option 3: Display the elements in the queue.

Output Format

For option 1 (insertion):-

1. The program outputs: "<data> is inserted in the queue." if the data is successfully inserted.
2. "Queue is full." if the queue is already full and cannot accept more elements.

For option 2 (deletion):-

1. The program outputs: "Deleted number is: <data>" if an element is successfully deleted and returns the value of the deleted element.
2. "Queue is empty." if the queue is empty no elements can be deleted.

For option 3 (display):-

1. The program outputs: "Elements in the queue are: <element1> <element2> ... <elementN>" where <element1>, <element2>, ..., <elementN> represent the elements present in the queue.
2. "Queue is empty." if the queue is empty no elements can be displayed.

For invalid options, the program outputs: "Invalid option."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1 10

```
3
5
Output: 10 is inserted in the queue.
Elements in the queue are: 10
Invalid option.
```

Answer

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

#define max 5

int queue[max];
int front = -1, rear = -1;

// You are using GCC
#include <iostream>
using namespace std;

#define MAX 5

int queue[MAX];
int* front = nullptr;
int* rear = nullptr;


void insert(int value) {
    if (rear == &queue[MAX - 1]) {
        cout << "Queue is full." << endl;
        return;
    }

    if (front == nullptr) {
        front = rear = queue;
    } else {
        rear++;
    }

    *rear = value;
    cout << value << " is inserted in the queue." << endl;
}
```

```
void deleteElement() {
    if (front == nullptr) {
        cout << "Queue is empty." << endl;
        return;
    }

    cout << "Deleted number is: " << *front << endl;

    if (front == rear) {
        front = rear = nullptr;
    } else {
        front++;
    }
}


void display() {
    if (front == nullptr) {
        cout << "Queue is empty." << endl;
        return;
    }

    cout << "Elements in the queue are: ";
    for (int* i = front; i <= rear; i++) {
        cout << *i << " ";
    }
    cout << endl;
}

int main() {
    int option, value;

    while (cin >> option) {
        switch (option) {
            case 1:
                if (cin >> value)
                    insert(value);
                else {
                    cout << "Invalid input." << endl;
                    return 1;
                }
                break;

            case 2:
                deleteElement();
                break;

            case 3:
                display();
                break;

            default:
                cout << "Invalid option." << endl;
        }
    }

    return 0;
}

int main()
{
    int data, reply, option;
    while (1)
    {
        if (scanf("%d", &option) != 1)
            break;
        switch (option)
        {
            case 1:
                if (scanf("%d", &data) != 1)
                    break;
                reply = insertq(&data);
                if (reply == 0)
                    printf("Queue is full.\n");
                else
                    printf("%d is inserted in the queue.\n", data);
                break;
            case 2:
                delq();  //    Called without arguments
                break;
            case 3:
                display();
                break;
            default:
                printf("Invalid option.\n");
                break;
        }
    }
    return 0;
}
```

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