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Data Structure Lab

CEN-391

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Program 8

Code :-

#include <iostream>

using namespace std;

void isEmpty(int front, int rear)

{

    cout << "isEmpty...\n";

    if (front == -1 && rear == -1)

        cout << "Empty" << endl;

    else

        cout << "Not Empty" << endl;

}

void isFull(int front, int rear, int capacity)

{

    cout << "isFull...\n";

    if ((rear + 1) % capacity == front)

        cout << "Full" << endl;

    else

        cout << "Not Full" << endl;

}

void Display(int queue[], int front, int rear, int capacity)

{

    cout << "Display...\n";

    if (rear == -1 && front == -1)

    {

        cout << "Queue Empty" << endl;

        return;

    }

    if (front <= rear)

    {

        for (int i = front; i <= rear; i++)

        {

            cout << queue[i] << " ";

        }

    }

    else

    {

        for (int i = front; i < capacity; i++)

        {

            cout << queue[i] << " ";

        }

        for (int i = 0; i <= rear; i++)

        {

            cout << queue[i] << " ";

        }

    }

    cout << endl;

}

void Enqueue(int queue[], int &front, int &rear, int capacity)

{

    cout << "Enqueue...\n";

    if (front == -1 && rear == -1)

    {

        front = 0;

        rear = 0;

        cout << "Enter The Element : ";

        cin >> queue[rear];

        Display(queue, front, rear, capacity);

    }

    else if ((rear + 1) % capacity == front)

    {

        cout << "Queue Overflow" << endl;

    }

    else

    {

        rear = (rear + 1) % capacity;

        cout << "Enter The Element : ";

        cin >> queue[rear];

        Display(queue, front, rear, capacity);

    }

}

void Dequeue(int queue[], int &front, int &rear, int capacity)

{

    cout << "Dequeue...\n";

    if (rear == -1 && front == -1)

    {

        cout << "Queue Underflow" << endl;

    }

    else if (front == rear)

    {

        cout << queue[front] << endl;

        front = -1;

        rear = -1;

        Display(queue, front, rear, capacity);

    }

    else

    {

        cout << queue[front] << endl;

        front = (front + 1) % capacity;

        Display(queue, front, rear, capacity);

    }

}

void Front\_Rear(int queue[], int front, int rear)

{

    cout << "Front And Rear...\n";

    if (front == -1 && rear == -1)

    {

        cout << "Queue Is Empty" << endl;

    }

    cout << "Front : " << queue[front] << endl;

    cout << "Rear : " << queue[rear] << endl;

}

void Total\_Element(int front, int rear, int capacity)

{

    if (front == -1 && rear == -1)

        cout << "Total Elements In Queue : " << 0 << endl;

    else if (front <= rear)

        cout << "Total Elements In Queue : " << rear - front + 1 << endl;

    else

        cout << "Total Elements In Queue : " << front - capacity + rear + 1 << endl;

}

void Bars()

{

    cout << "---------------------------------------------------------------\n";

}

bool Options(int queue[], int &front, int &rear, int capacity)

{

    int opt;

    cin >> opt;

    Bars();

    switch (opt)

    {

    case 1:

        Enqueue(queue, front, rear, capacity);

        break;

    case 2:

        Dequeue(queue, front, rear, capacity);

        break;

    case 3:

        Front\_Rear(queue, front, rear);

        break;

    case 4:

        isEmpty(front, rear);

        break;

    case 5:

        isFull(front, rear, capacity);

        break;

    case 6:

        Total\_Element(front, rear, capacity);

        break;

    case 7:

        Display(queue, front, rear, capacity);

        break;

    case 8:

        cout << "Exit...\n";

        return 0;

    default:

        cout << "Invalid Input!\nTry Again!\n";

    }

    Bars();

    return 1;

}

void Menu()

{

    cout << "\_\_\_\_\_Operations\_On\_Circular\_Queue\_\_\_\_\_ \n";

    cout << "1.Enqueue \n";

    cout << "2.Dequeue \n";

    cout << "3.Front And Rear Element \n";

    cout << "4.isEmpty \n";

    cout << "5.isFull \n";

    cout << "6.Total Elements \n";

    cout << "7:Display \n";

    cout << "8.Exit \n";

    cout << "Enter Your Choice : ";

}

int main()

{

    system("cls");

    cout << "\_\_\_\_\_Vicky\_Gupta\_20BCS070\_\_\_\_\_\n\n";

    cout << "Enter The Size Of The Circular Queue : ";

    int capacity, front = -1, rear = -1;

    cin >> capacity;

    int \*queue = (int \*)malloc(sizeof(int) \* capacity);

    cout << "\n\n";

    while (true)

    {

        Menu();

        if (!Options(queue, front, rear, capacity))

            break;

    }

    cout << "Exiting...\n";

    Bars();

    return 0;

}

Output :-

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated