

Assignment no: 13

Write C++ program to simulate deque with functions to add and delete elements from either end of the deque.

```
#include<iostream>
using namespace std;
#define MAX_SIZE 10
int arr[MAX_SIZE];
int front, rear;
class Deque
{
public:
    Deque()
    {
        front = -1;
        rear = -1;
    }
    void insertFront(int value)
    {
        if ((front == 0 && rear == MAX_SIZE - 1) || front == rear + 1)
        {
            cout << "Deque is full. Cannot insert at the front." << endl;
        }
        if (front == -1) {
            front = rear = 0;
        }
        else if (front == 0)
        {
            front = MAX_SIZE - 1;
        } else {
            front--;
        }

        arr[front] = value;
        cout << "Inserted " << value << " at the front." << endl;
    }

    void insertRear(int value)
    {
        if ((front == 0 && rear == MAX_SIZE - 1) || front == rear + 1)
        {
            cout << "Deque is full. Cannot insert at the rear." << endl;
            return;
        }

        if (front == -1)
```

```

        {
            front = rear = 0;
        }
        else if (rear == MAX_SIZE - 1)
        {
            rear = 0;
        }
        else
        {
            rear++;
        }

        arr[rear] = value;
        cout << "Inserted " << value << " at the rear." << endl;
    }

void deleteFront()
{
    if (front == -1)
    {
        cout << "Deque is empty. Cannot delete from the front." << endl;
        return;
    }

    cout << "Deleted " << arr[front] << " from the front." << endl;

    if (front == rear)
    {
        front = rear = -1;
    }
    else if (front == MAX_SIZE - 1)
    {
        front = 0;
    }
    else
    {
        front++;
    }
}

void deleteRear()
{
    if (front == -1)
    {
        cout << "Deque is empty. Cannot delete from the rear." << endl;
        return;
    }
    cout << "Deleted " << arr[rear] << " from the rear." << endl;
    if (front == rear)

```

```

        {
            front = rear = -1;
        }
        else if (rear == 0)
        {
            rear = MAX_SIZE - 1;
        }
        else
        {
            rear--;
        }
    }
}

void display()
{
    if (front == -1)
    {
        cout << "Deque is empty." << endl;
        return;
    }

    cout << "Deque elements: ";
    int i = front;
    do
    {
        cout << arr[i] << " ";
        i = (i + 1) % MAX_SIZE;
    } while (i != (rear + 1) % MAX_SIZE);
    cout << endl;
}

};

int main(){
    int c,i;
    Deque d;
    do{
        //perform switch operation {
        cout<<"\n 1.insert at beginning";
        cout<<"\n 2.insert at end";
        cout<<"\n 3.show";
        cout<<"\n 4.deletion from front";
        cout<<"\n 5.deletion from rear";
        cout<<"\n 6.exit";
        cout<<"\n enter your choice:";
        cin>>c;
        switch(c)
        {
            case 1:
                cout<<"enter the element to be inserted";

```

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        cin>>i;
        d.insertFront(i);
        break;
    case 2:
        cout<<"enter the element to be inserted";
        cin>>i;
        d.insertRear(i);
        break;
    case 3:
        d.display();
        break;
    case 4:
        d.deleteFront();
        break;
    case 5:
        d.deleteRear();
        break;
    case 6:
        exit(1);
        break;
    default:
        cout<<"invalid choice";
        break;
    }
}while(c!=7);}

```

-----OUTPUT-----

```

1.insert at beginning
2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:1
enter the element to be inserted23
Inserted 23 at the front.

```

```

1.insert at beginning
2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:1
enter the element to be inserted56
Inserted 56 at the front.

```

```

1.insert at beginning

```

2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:1
enter the element to be inserted:89
Inserted 89 at the front.

1.insert at beginning
2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:2
enter the element to be inserted:90
Inserted 90 at the rear.

1.insert at beginning
2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:3
Deque elements: 89 56 23 90

1.insert at beginning
2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:4
Deleted 89 from the front.

1.insert at beginning
2.insert at end
3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:5
Deleted 90 from the rear.

1.insert at beginning
2.insert at end

3.show
4.deletion from front
5.deletion from rear
6.exit
enter your choice:5
Deleted 23 from the rear.