

Experiment 03\double-ended_queue.c

```
1 #include <stdio.h>
2 #define MAX 100
3
4 int deque[MAX];
5 int front = -1, rear = -1;
6
7 int isFull() {
8     return (front == 0 && rear == MAX - 1) || (front == rear + 1);
9 }
10
11 int isEmpty() {
12     return front == -1;
13 }
14
15 void insertFront(int value) {
16     if (isFull()) {
17         printf("Deque Overflow\n");
18         return;
19     }
20     if (isEmpty()) {
21         front = rear = 0;
22     } else if (front == 0) {
23         front = MAX - 1;
24     } else {
25         front--;
26     }
27     deque[front] = value;
28     printf("%d inserted at front\n", value);
29 }
30
31 void insertRear(int value) {
32     if (isFull()) {
33         printf("Deque Overflow\n");
34         return;
35     }
36     if (isEmpty()) {
37         front = rear = 0;
38     } else if (rear == MAX - 1) {
39         rear = 0;
40     } else {
41         rear++;
42     }
43     deque[rear] = value;
44     printf("%d inserted at rear\n", value);
45 }
46
47 void deleteFront() {
48     if (isEmpty()) {
```

```
49     printf("Deque Underflow\n");
50     return;
51 }
52 printf("%d deleted from front\n", deque[front]);
53 if (front == rear) {
54     front = rear = -1;
55 } else if (front == MAX - 1) {
56     front = 0;
57 } else {
58     front++;
59 }
60 }
61
62 void deleteRear() {
63     if (isEmpty()) {
64         printf("Deque Underflow\n");
65         return;
66     }
67     printf("%d deleted from rear\n", deque[rear]);
68     if (front == rear) {
69         front = rear = -1;
70     } else if (rear == 0) {
71         rear = MAX - 1;
72     } else {
73         rear--;
74     }
75 }
76
77 void display() {
78     if (isEmpty()) {
79         printf("Deque is empty\n");
80         return;
81     }
82     printf("Deque: ");
83     int i = front;
84     while (1) {
85         printf("%d ", deque[i]);
86         if (i == rear)
87             break;
88         i = (i + 1) % MAX;
89     }
90     printf("\n");
91 }
92
93 int main() {
94     int choice, value;
95     while (1) {
96         printf("\n1. Insert Front  2. Insert Rear  3. Delete Front  4. Delete Rear  5.
Display  6. Exit\n");
97         printf("Enter choice: ");
```

```
98     scanf("%d", &choice);
99     switch(choice) {
100         case 1:
101             printf("Enter value: ");
102             scanf("%d", &value);
103             insertFront(value);
104             break;
105         case 2:
106             printf("Enter value: ");
107             scanf("%d", &value);
108             insertRear(value);
109             break;
110         case 3:
111             deleteFront();
112             break;
113         case 4:
114             deleteRear();
115             break;
116         case 5:
117             display();
118             break;
119         case 6:
120             return 0;
121         default:
122             printf("Invalid choice\n");
123     }
124 }
125 }
```