Code:

#include <stdio.h>

#include <stdlib.h>

#define size 3

int deque[size];

int front = -1;

int rear = -1;

// Function prototypes

int isFull();

int isEmpty();

void insertFront(int element);

void insertRear(int element);

void deleteFront();

void deleteRear();

void display();

int main() {

int choice, element;

while (1) {

printf("\nMain Menu\n");

printf("1. Insert at Front\n2. Insert at Rear\n3. Delete from Front\n4. Delete from Rear\n5. Display\n6. Exit\n");

printf("Enter your choice: ");

scanf("%d", &choice);

switch (choice) {

case 1:

printf("Enter the element to insert at front: ");

scanf("%d", &element);

if (isFull()) {

printf("Queue is full - Cannot insert\n");

} else {

insertFront(element);

}

break;

case 2:

printf("Enter the element to insert at rear: ");

scanf("%d", &element);

if (isFull()) {

printf("Queue is full - Cannot insert\n");

} else {

insertRear(element);

}

break;

case 3:

deleteFront();

break;

case 4:

deleteRear();

break;

case 5:

display();

break;

case 6:

exit(0);

default:

printf("\nInvalid choice\n");

}

}

return 0;

}

// Check if the deque is full

int isFull() {

return ((front == 0 && rear == size - 1) || (front == rear + 1));

}

// Check if the deque is empty

int isEmpty() {

return (front == -1);

}

void insertFront(int element) {

if (isEmpty()) {

front = rear = 0;

} else if (front == 0) {

front = size - 1;

} else {

front--;

}

deque[front] = element;

printf("Element %d inserted at front\n", element);

}

void insertRear(int element) {

if (isEmpty()) {

front = rear = 0;

} else if (rear == size - 1) {

rear = 0;

} else {

rear++;

}

deque[rear] = element;

printf("Element %d inserted at rear\n", element);

}

void deleteFront() {

if (isEmpty()) {

printf("Queue is empty\n");

} else {

printf("Element %d deleted from front\n", deque[front]);

if (front == rear) {

front = rear = -1;

} else if (front == size - 1) {

front = 0;

} else {

front++;

}

}

}

void deleteRear() {

if (isEmpty()) {

printf("Queue is empty\n");

} else {

printf("Element %d deleted from rear\n", deque[rear]);

if (front == rear) {

front = rear = -1;

} else if (rear == 0) {

rear = size - 1;

} else {

rear--;

}

}

}

void display() {

if (isEmpty()) {

printf("Queue is empty\n");

} else {

int i = front;

printf("Queue elements: ");

while (i != rear) {

printf("%d ", deque[i]);

i = (i + 1) % size;

}

printf("%d\n", deque[i]);

}

}

/\* Output :

Main Menu

1. Insert at Front

2. Insert at Rear

3. Delete from Front

4. Delete from Rear

5. Display

6. Exit

Enter your choice: 1

Enter the element to insert at front: 10

Element 10 inserted at front

Main Menu

1. Insert at Front

2. Insert at Rear

3. Delete from Front

4. Delete from Rear

5. Display

6. Exit

Enter your choice: 2

Enter the element to insert at rear: 20

Element 20 inserted at rear

Main Menu

1. Insert at Front

2. Insert at Rear

3. Delete from Front

4. Delete from Rear

5. Display

6. Exit

Enter your choice: 3

Element 10 deleted from front

Main Menu

1. Insert at Front

2. Insert at Rear

3. Delete from Front

4. Delete from Rear

5. Display

6. Exit

Enter your choice: 4

Element 20 deleted from rear

Main Menu

1. Insert at Front

2. Insert at Rear

3. Delete from Front

4. Delete from Rear

5. Display

6. Exit

Enter your choice: 5

Queue is empty \*/