

1. Write a c program for Implementation of array in Queue.

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```
main.c
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <stdbool.h>
4 #define MAX 100
5 typedef struct {
6     int front, rear, size;
7     int capacity;
8     int* array;
9 } Queue;
10 Queue* createQueue(int capacity) {
11     Queue* queue = (Queue*)malloc(sizeof(Queue));
12     queue->capacity = capacity;
13     queue->front = 0;
14     queue->rear = capacity - 1;
15     queue->size = 0;
16     queue->array = (int*)malloc(queue->capacity * sizeof(int));
17     return queue;
18 }
19 bool isEmpty(Queue* queue) {
20     return (queue->size == 0);
21 }
22 bool isFull(Queue* queue) {
23     return (queue->size == queue->capacity);
24 }
25 void enqueue(Queue* queue, int item) {
26     if (isFull(queue)) {
27         printf("Queue is full!\n");
28         return;
29     }
30     queue->rear = (queue->rear + 1) % queue->capacity;
31     queue->array[queue->rear] = item;
32     queue->size++;
33 }
34 int dequeue(Queue* queue) {
35     if (isEmpty(queue)) {
```

Output

```
/tmp/S4bGNTHwvB.o
Dequeued: 10
Front item is: 20

=== Code Execution Successful ===
```

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```
main.c
32 queue->size++;
33 }
34 int dequeue(Queue* queue) {
35     if (isEmpty(queue)) {
36         printf("Queue is empty!\n");
37         return -1;
38     }
39     int item = queue->array[queue->front];
40     queue->front = (queue->front + 1) % queue->capacity;
41     queue->size--;
42     return item;
43 }
44 int peek(Queue* queue) {
45     if (isEmpty(queue)) {
46         printf("Queue is empty!\n");
47         return -1;
48     }
49     return queue->array[queue->front];
50 }
51 void freeQueue(Queue* queue) {
52     free(queue->array);
53     free(queue);
54 }
55 int main() {
56     Queue* queue = createQueue(MAX);
57     enqueue(queue, 10);
58     enqueue(queue, 20);
59     enqueue(queue, 30);
60     printf("Dequeued: %d\n", dequeue(queue));
61     printf("Front item is: %d\n", peek(queue));
62     freeQueue(queue);
63     return 0;
64 }
65
```

Output

```
/tmp/S4bGNTHwvB.o
Dequeued: 10
Front item is: 20


=== Code Execution Successful ===
```

2. Write a c program for Implementation of Linked List in Queue.



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main.c

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <stdbool.h>
4 typedef struct Node {
5     int data;
6     struct Node* next;
7 } Node;
8 typedef struct Queue {
9     Node* front;
10    Node* rear;
11    int size;
12 } Queue;
13 Node* createNode(int data) {
14     Node* newNode = (Node*)malloc(sizeof(Node));
15     newNode->data = data;
16     newNode->next = NULL;
17     return newNode;
18 }
19 Queue* createQueue() {
20     Queue* queue = (Queue*)malloc(sizeof(Queue));
21     queue->front = NULL;
22     queue->rear = NULL;
23     queue->size = 0;
24     return queue;
25 }
26 bool isEmpty(Queue* queue) {
27     return (queue->size == 0);
28 }
29 void enqueue(Queue* queue, int data) {
30     Node* newNode = createNode(data);
31     if (isEmpty(queue)) {
32         queue->front = newNode;
33         queue->rear = newNode;
34     } else {
35         queue->rear->next = newNode;
```

Output


```
./tmp/0je570chjx.o
Front item is: 10
Dequeued: 10
Front item is: 20

=== Code Execution Successful ===
```



C Online Compiler

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main.c

```
35     queue->rear->next = newNode;
36     queue->rear = newNode;
37 }
38 queue->size++;
39 }
40 int dequeue(Queue* queue) {
41     if (isEmpty(queue)) {
42         printf("Queue is empty!\n");
43         return -1;
44     }
45     Node* tempNode = queue->front;
46     int data = tempNode->data;
47     queue->front = queue->front->next;
48     if (queue->front == NULL) {
49         queue->rear = NULL;
50     }
51     free(tempNode);
52     queue->size--;
53     return data;
54 }
55 int peek(Queue* queue) {
56     if (isEmpty(queue)) {
57         printf("Queue is empty!\n");
58         return -1;
59     }
60     return queue->front->data;
61 }
62 void freeQueue(Queue* queue) {
63     while (!isEmpty(queue)) {
64         dequeue(queue);
65     }
66     free(queue);
67 }
68 int main() {
```

Output

```
./tmp/0je570chjx.o
Front item is: 10
Dequeued: 10
Front item is: 20

=== Code Execution Successful ===
```

```

main.c
46 int data = tempNode->data;
47 queue->front = queue->front->next;
48 if (queue->front == NULL) {
49     queue->rear = NULL;
50 }
51 free(tempNode);
52 queue->size--;
53 return data;
54 }
55 int peek(Queue* queue) {
56     if (isEmpty(queue)) {
57         printf("Queue is empty!\n");
58         return -1;
59     }
60     return queue->front->data;
61 }
62 void freeQueue(Queue* queue) {
63     while (!isEmpty(queue)) {
64         dequeue(queue);
65     }
66     free(queue);
67 }
68 int main() {
69     Queue* queue = createQueue();
70     enqueue(queue, 10);
71     enqueue(queue, 20);
72     enqueue(queue, 30);
73     printf("Front item is: %d\n", peek(queue));
74     printf("Dequeued: %d\n", dequeue(queue));
75     printf("Front item is: %d\n", peek(queue));
76     freeQueue(queue);
77     return 0;
78 }
79
Output
/tmp/0jeS70chJx.o
Front item is: 10
Dequeued: 10
Front item is: 20

=== Code Execution Successful ===

```

3. Write a c program for Queue Operation of Enqueue and display.

```

main.c
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <stdbool.h>
4 #define MAX 100
5 typedef struct {
6     int front, rear, size;
7     int capacity;
8     int* array;
9 } Queue;
10 Queue* createQueue(int capacity) {
11     Queue* queue = (Queue*)malloc(sizeof(Queue));
12     queue->capacity = capacity;
13     queue->front = 0;
14     queue->rear = capacity - 1;
15     queue->size = 0;
16     queue->array = (int*)malloc(queue->capacity * sizeof(int));
17     return queue;
18 }
19 bool isEmpty(Queue* queue) {
20     return (queue->size == 0);
21 }
22 bool isFull(Queue* queue) {
23     return (queue->size == queue->capacity);
24 }
25 void enqueue(Queue* queue, int item) {
26     if (isFull(queue)) {
27         printf("Queue is full!\n");
28         return;
29     }
30     queue->rear = (queue->rear + 1) % queue->capacity;
31     queue->array[queue->rear] = item;
32     queue->size++;
33     printf("Inserted %d\n", item);
34 }
35 void displayQueue(Queue* queue) {

```

```

/tmp/tALC630G50.o

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 1
Enter value to enqueue: 10
Inserted 10

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 1
Enter value to enqueue: 20
Inserted 20

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 2
Queue elements are:
10 20

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 3
Exiting...

=== Code Execution Successful ===

```

main.c

Share

Run

```
35- void displayQueue(Queue* queue) {
36-     if (isEmpty(queue)) {
37-         printf("Queue is empty!\n");
38-         return;
39-     }
40-     printf("Queue elements are:\n");
41-     for (int i = 0; i < queue->size; i++) {
42-         int index = (queue->front + 1) % queue->capacity;
43-         printf("%d ", queue->array[index]);
44-     }
45-     printf("\n");
46- }
47- void freeQueue(Queue* queue) {
48-     free(queue->array);
49-     free(queue);
50- }
51- int main() {
52-     Queue* queue = createQueue(MAX);
53-     int choice, item;
54-     while (1) {
55-         printf("\nQueue Operations Menu:\n");
56-         printf("1. Enqueue\n");
57-         printf("2. Display\n");
58-         printf("3. Exit\n");
59-         printf("Enter your choice: ");
60-         scanf("%d", &choice);
61-         switch (choice) {
62-             case 1:
63-                 printf("Enter value to enqueue: ");
64-                 scanf("%d", &item);
65-                 enqueue(queue, item);
66-                 break;
67-             case 2:
68-                 displayQueue(queue);
```

Output

Clear

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 1
Enter value to enqueue: 10
Inserted 10

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 1
Enter value to enqueue: 20
Inserted 20

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 2
Queue elements are:
10 20

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 3
Exiting...

=== Code Execution Successful ===

main.c

Share

Run

```
46- }
47- void freeQueue(Queue* queue) {
48-     free(queue->array);
49-     free(queue);
50- }
51- int main() {
52-     Queue* queue = createQueue(MAX);
53-     int choice, item;
54-     while (1) {
55-         printf("\nQueue Operations Menu:\n");
56-         printf("1. Enqueue\n");
57-         printf("2. Display\n");
58-         printf("3. Exit\n");
59-         printf("Enter your choice: ");
60-         scanf("%d", &choice);
61-         switch (choice) {
62-             case 1:
63-                 printf("Enter value to enqueue: ");
64-                 scanf("%d", &item);
65-                 enqueue(queue, item);
66-                 break;
67-             case 2:
68-                 displayQueue(queue);
69-                 break;
70-             case 3:
71-                 freeQueue(queue);
72-                 printf("Exiting...\n");
73-                 return 0;
74-             default:
75-                 printf("Invalid choice! Please try again.\n");
76-         }
77-     }
78- }
79- }
```

Output

Clear

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 1
Enter value to enqueue: 10
Inserted 10

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 1
Enter value to enqueue: 20
Inserted 20

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 2
Queue elements are:
10 20

Queue Operations Menu:
1. Enqueue
2. Display
3. Exit
Enter your choice: 3
Exiting...

=== Code Execution Successful ===

4. Write a c program for Queue operation of Dequeue and display.

```
main.c
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <stdbool.h>
4 #define MAX 100
5 typedef struct {
6     int front, rear, size;
7     int capacity;
8     int* array;
9 } Queue;
10 Queue* createQueue(int capacity) {
11     Queue* queue = (Queue*)malloc(sizeof(Queue));
12     queue->capacity = capacity;
13     queue->front = 0;
14     queue->rear = capacity - 1;
15     queue->size = 0;
16     queue->array = (int*)malloc(queue->capacity * sizeof(int));
17     return queue;
18 }
19 bool isEmpty(Queue* queue) {
20     return (queue->size == 0);
21 }
22 bool isFull(Queue* queue) {
23     return (queue->size == queue->capacity);
24 }
25 void enqueue(Queue* queue, int item) {
26     if (isFull(queue)) {
27         printf("Queue is full!\n");
28         return;
29     }
30     queue->rear = (queue->rear + 1) % queue->capacity;
31     queue->array[queue->rear] = item;
32     queue->size++;
33     printf("Inserted %d\n", item);
34 }
35 int dequeue(Queue* queue) {
36     if (isEmpty(queue)) {
37         printf("Queue is empty!\n");
38         return -1;
39     }
40     int item = queue->array[queue->front];
41     queue->front = (queue->front + 1) % queue->capacity;
42     queue->size--;
43     return item;
44 }
45 void displayQueue(Queue* queue) {
46     if (isEmpty(queue)) {
47         printf("Queue is empty!\n");
48         return;
49     }
50     printf("Queue elements are:\n");
51     for (int i = 0; i < queue->size; i++) {
52         int index = (queue->front + i) % queue->capacity;
53         printf("%d ", queue->array[index]);
54     }
55     printf("\n");
56 }
57 void freeQueue(Queue* queue) {
58     free(queue->array);
59     free(queue);
60 }
61 int main() {
62     Queue* queue = createQueue(MAX);
63     int choice, item;
64     while (1) {
65         printf("\nQueue Operations Menu:\n");
66         printf("1. Enqueue\n");
67         printf("2. Dequeue\n");
68         printf("3. Display\n");
69         printf("4. Exit\n");
70         printf("Enter your choice: ");
71         scanf("%d", &choice);
72         switch (choice) {
73             case 1:
74                 printf("Enter value to enqueue: ");
75                 scanf("%d", &item);
76                 enqueue(queue, item);
77                 break;
78             case 2:
79                 dequeue(queue);
80                 break;
81             case 3:
82                 displayQueue(queue);
83                 break;
84             case 4:
85                 return 0;
86             default:
87                 printf("Invalid choice!\n");
88         }
89     }
90 }
```

Output

```
/tmp/fAaKB3tnPx.o
Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 323
Inserted 323

Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 123
Inserted 123

Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 2
Dequeued item: 323

Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 3
Queue elements are:
```

```
main.c
35 int dequeue(Queue* queue) {
36     if (isEmpty(queue)) {
37         printf("Queue is empty!\n");
38         return -1;
39     }
40     int item = queue->array[queue->front];
41     queue->front = (queue->front + 1) % queue->capacity;
42     queue->size--;
43     return item;
44 }
45 void displayQueue(Queue* queue) {
46     if (isEmpty(queue)) {
47         printf("Queue is empty!\n");
48         return;
49     }
50     printf("Queue elements are:\n");
51     for (int i = 0; i < queue->size; i++) {
52         int index = (queue->front + i) % queue->capacity;
53         printf("%d ", queue->array[index]);
54     }
55     printf("\n");
56 }
57 void freeQueue(Queue* queue) {
58     free(queue->array);
59     free(queue);
60 }
61 int main() {
62     Queue* queue = createQueue(MAX);
63     int choice, item;
64     while (1) {
65         printf("\nQueue Operations Menu:\n");
66         printf("1. Enqueue\n");
67         printf("2. Dequeue\n");
68         printf("3. Display\n");
69         printf("4. Exit\n");
70         printf("Enter your choice: ");
71         scanf("%d", &choice);
72         switch (choice) {
73             case 1:
74                 printf("Enter value to enqueue: ");
75                 scanf("%d", &item);
76                 enqueue(queue, item);
77                 break;
78             case 2:
79                 dequeue(queue);
80                 break;
81             case 3:
82                 displayQueue(queue);
83                 break;
84             case 4:
85                 return 0;
86             default:
87                 printf("Invalid choice!\n");
88         }
89     }
90 }
```

Output

```
/tmp/fAaKB3tnPx.o
Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 323
Inserted 323

Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 123
Inserted 123

Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 2
Dequeued item: 323

Queue Operations Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 3
Queue elements are:
```

main.c

Share

Run

63

int choice, item;

64

while (1) {

65

printf("\nQueue Operations Menu:\n");

66

printf("1. Enqueue\n");

67

printf("2. Dequeue\n");

68

printf("3. Display\n");

69

printf("4. Exit\n");

70

printf("Enter your choice: ");

71

scanf("%d", &choice);

72

switch (choice) {

73

case 1:

74

printf("Enter value to enqueue: ");

75

scanf("%d", &item);

76

enqueue(queue, item);

77

break;

78

case 2:

79

item = dequeue(queue);

80

if (item != -1) {

81

printf("Dequeued item: %d\n", item);

82

}

83

break;

84

case 3:

85

displayQueue(queue);

86

break;

87

case 4:

88

freeQueue(queue);

89

printf("Exiting...\n");

90

return 0;

91

default:

92

printf("Invalid choice! Please try again.\n");

93

}

94

}

95

}

96

Output

Clear

2. Dequeue

3. Display

4. Exit

Enter your choice: 1

Enter value to enqueue: 123

Inserted 123

Queue Operations Menu:

1. Enqueue

2. Dequeue

3. Display

4. Exit

Enter your choice: 2

Dequeued item: 323

Queue Operations Menu:

1. Enqueue

2. Dequeue

3. Display

4. Exit

Enter your choice: 3

Queue elements are:

123

Queue Operations Menu:

1. Enqueue

2. Dequeue

3. Display

4. Exit

Enter your choice: 4

Exiting...

=== Code Execution Successful ===