Experiment No.4
Implementation of Queue menu driven program using arrays
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Experiment No. 4: Simple Queue Operations

Aim: To implement a Linear Queue using arrays.

Objective:

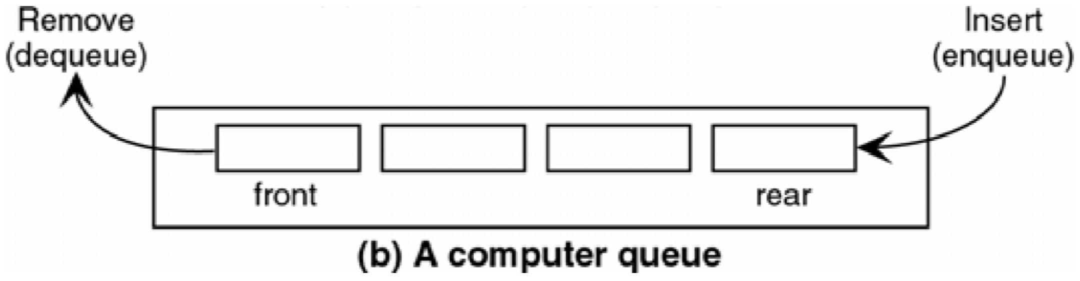
1 Understand the Queue data structure and its basic operations.

2. Understand the method of defining Queue ADT and its basic operations.

3. Learn how to create objects from an ADT and member functions are invoked.

Theory:

A queue is an ordered collection where items are removed from the front and inserted at the rear, following the First-In-First-Out (FIFO) order. The fundamental operations for a queue are "Enqueue," which adds an item to the rear, and "Dequeue," which removes an item from the front.



(b) A computer queue

Typically, a one-dimensional array is used to implement a queue, and two integer values, FRONT and REAR, track the front and rear positions in the array. When an element is removed from the queue, FRONT is incremented by one, and when an element is added to the queue, REAR is increased by one. This ensures that items are processed in the order they were added, maintaining the FIFO principle.

Algorithm:

```
ENQUEUE(item)

1.  If (queue is full)
    Print "overflow"
2.  if (First node insertion)
     Front++
3.  rear++
Queue[rear]=value


DEQUEUE()

1.  If (queue is empty)
    Print "underflow"
2.  if(front=rear)
         Front=-1 and rear=-1
3.  t = queue[front]
4.  front++
5.  Return t


ISEMPTY()
```

```
1. If(front = -1)then
        return 1
2. return 0
```

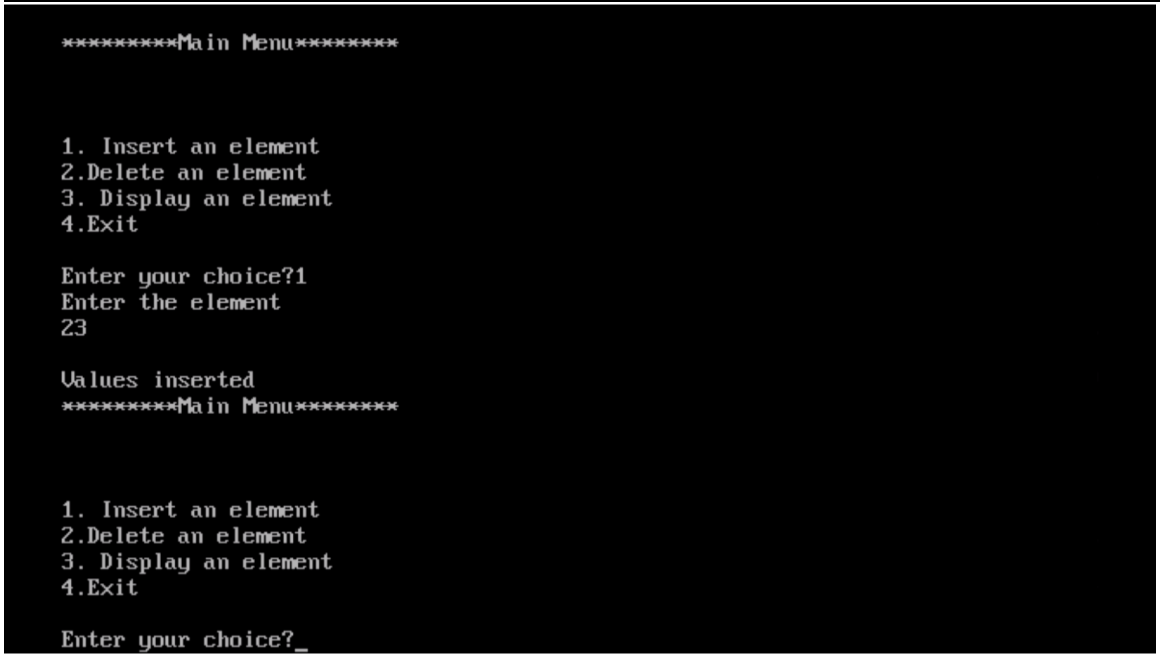
```
ISFULL()
1. If(rear = max)then
        return 1
2. return 0
```

Code:

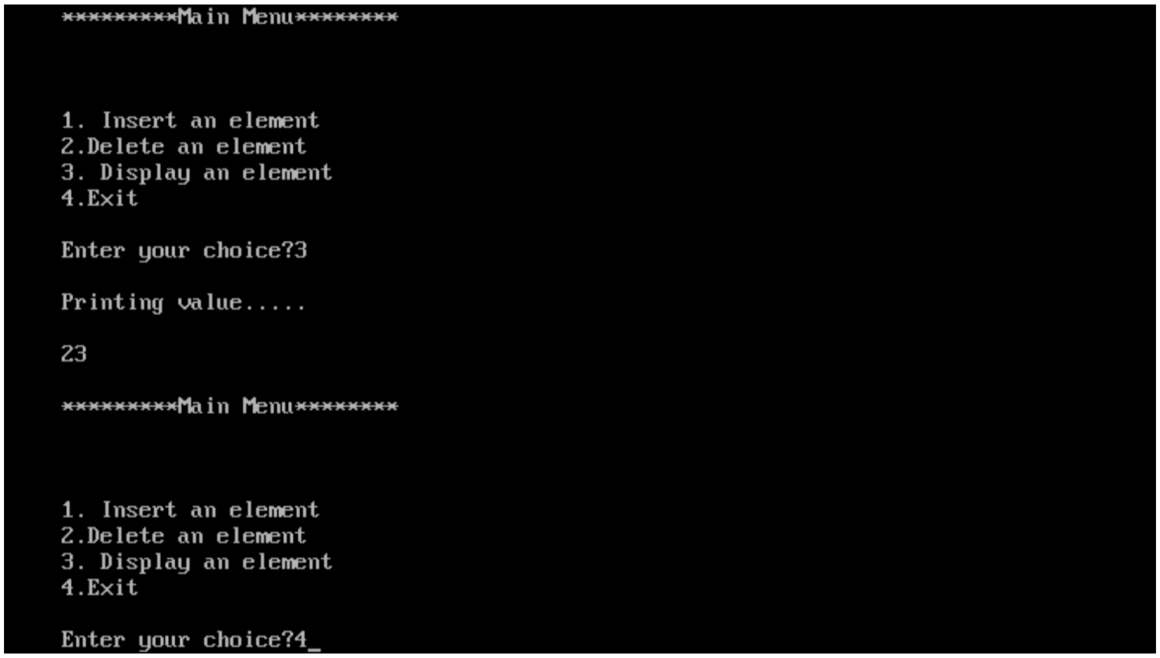
```
#include <stdio.h>
#include <stdlib.h>
#include <conio.h>
#define maxsize 5

void insert();
void deleted();
void display();
int front=-1,rear=-1;
int queue[maxsize];

void main()
{
        int choice;

        clrscr();

        while(choice!=4)

        {

                printf("\n*********Main Menu********\n");

                printf("\n                                        \n");

                printf("\n1. Insert an element\n2.Delete an element\n3. Display an element\n4.Exit\n")
;

                printf("\nEnter your choice?");

                scanf("%d",&choice);

                switch(choice)

                {

                        case 1:

                        insert();

                        break;

                        case 2:

                        deleted();

                        break;

                        case 3:

                        display();

                        break;

                        case 4:

                        exit(0);

                        break;

                        default:
```

```
                        printf("\nEnter valid choice??\n");
                }
        }
        getch();
}
void insert()
{
        int item;
        printf("\Enter the element\n");
        scanf("\n%d",&item);
        if(rear==maxsize-1)
        {
                printf("\nOVERFLOW\n");
                return;
        }
        else if(front==-1 && rear==-1)
        {
                front=0;
                rear=0;
        }
        else
        {
                rear=rear+1;
        }
        queue[rear]=item;

        printf("\nValues inserted");

}


void deleted()

{

        int item;

        if(front==-1||front>rear)

        {

                printf("\nUNDERFLOW\n");

                return;

        }

        else

        {

                item=queue[front];


                if(front==rear)

                {

                        front=-1;

                        rear=-1;

                }

                else

                {

                        front=front+1;
                }
                printf("\n value deleted");
        }
}

void display()
{
        int i;
        if(rear==-1)
        {
                printf("\nEmpty queue\n");
        }
        else
        {
                printf("\nPrinting value.....\n");
                for(i=front;i<=rear;i++)
                {
                        printf("\n%d\n",queue[i]);
                }
        }
}
```

Output:



```
*********Main Menu*********



1. Insert an element
2.Delete an element
3. Display an element
4.Exit

Enter your choice?1
Enter the element
23

Values inserted
*********Main Menu*********



1. Insert an element
2.Delete an element
3. Display an element
4.Exit

Enter your choice?_
```



```
*********Main Menu*********



1. Insert an element
2.Delete an element
3. Display an element
4.Exit

Enter your choice?3

Printing value.....

23

*********Main Menu*********



1. Insert an element
2.Delete an element
3. Display an element
4.Exit

Enter your choice?4_
```

Conclusion:

1)What is the structure of queue ADT?

The Queue Abstract Data Type (ADT) represents a linear data structure that follows the First-In, First-Out (FIFO) principle. It has a specific structure and a set of operations for managing data. The basic structure of a queue ADT consists of the following components:

Elements: A queue is composed of a collection of elements, often referred to as items or nodes. These elements can be of any data type, depending on the application.

Front: This is the front end of the queue, where removal (dequeuing) of elements occurs. The front element is the one that has been in the queue the longest.

Rear (or Back): This is the rear end of the queue, where insertion (enqueuing) of elements occurs. The rear element is the one most recently added to the queue.

Size: The size of the queue represents the number of elements currently stored in the queue

2)List various applications of queues?

Breadth first taking

Order processing

Task scheduling

Call center system

3)Where is queue used in a computer system proceesing?

Cache mangement

Web server

Print spooling