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Assignment NO 1 –

1. Write a program to perform stack and queue

Stack

```
#include <bits/stdc++.h> using  
namespace std;
```

```
#define MAX 1000
```

```
class Stack {
```

```
    int top;
```

```
public:
```

```
    int a[MAX];
```

```
    Stack() { top = -1; }
```

```
    bool push(int x);
```

```
    int pop();        int peek();
```

```
    bool isEmpty();
```

```
};
```

```
bool Stack::push(int x)
```

```

{
    if (top >= (MAX - 1)) {
        cout << "Stack Overflow";
    return false;
    }
    else {
a[++top] = x;
        cout << x << " pushed into stack\n";
        return true;
    }
}

```

```

int Stack::pop()
{
    if (top < 0) {
        cout <<
"Stack Underflow";
        return 0;
    }
    else {
        int x =
a[top--];
        return x;
    }
}

```

```

int Stack::peek()

```

```

{
    if (top < 0) {
        cout << "Stack is Empty";
        return 0;
    }
    else {
        int x
= a[top];
        return x;
    }
}

bool Stack::isEmpty()
{
    return (top < 0);
}

int main()
{
    class Stack s;
    s.push(10);
    s.push(20);
    s.push(30);
    cout << s.pop() << " Popped from stack\n";
    cout << "Top element is : " << s.peek() << endl;
}

```

```

        cout << "Elements present in stack : ";
while(!s.isEmpty())
{
    cout << s.peek() << " ";
    s.pop();
}

return 0;
}

```

The screenshot shows a web browser window with the URL `programiz.com/cpp-programming/online-compiler/`. The page title is "Programiz C++ Online Compiler". The code editor contains the following C++ code:

```

1 // Online C++ compiler to run C++ program online
2 /* C++ program to implement basic stack
3 operations */
4 #include <bits/stdc++.h>
5
6 using namespace std;
7
8 #define MAX 1000
9
10 class Stack {
11     int top;
12
13 public:
14     int a[MAX]; // Maximum size of Stack
15
16     Stack() { top = -1; }
17     bool push(int x);
18     int pop();
19     int peek();
20     bool isEmpty();
21 };
22
23 bool Stack::push(int x)

```

The output window shows the following results:

```

/tmp/7n34d52958.o
10 pushed into stack
20 pushed into stack
30 pushed into stack
30 Popped from stack
Top element is : 20
Elements present in stack : 20 10

```

2) queue

```

#include <bits/stdc++.h>

using namespace std;

class Queue { public:
    int front, rear, size;

```

```

        unsigned capacity; int*
        array;
    };

Queue* createQueue(unsigned capacity)
{
    Queue* queue = new Queue(); queue-
>capacity = capacity;    queue->front = queue-
>size = 0;

    queue->rear = capacity - 1;    queue-
>array = new int[queue->capacity];    return
queue;
}

int isFull(Queue* queue)
{
    return (queue->size == queue->capacity);
}

int isEmpty(Queue* queue)
{
    return (queue->size == 0);
}

void enqueue(Queue* queue, int item)
{

```

```

        if (isFull(queue))
            return;
        queue->rear = (queue->rear + 1)
                        % queue->capacity;
        queue->array[queue->rear] = item;
        queue->size = queue->size + 1; cout << item <<
        " enqueued to queue\n";
    }
    int dequeue(Queue* queue)
    {
        if (isEmpty(queue))
            return INT_MIN;
        int item = queue->array[queue->front];
        queue->front = (queue->front + 1)
                        % queue->capacity;
        queue->size = queue->size - 1;
        return item;
    }
    int front(Queue* queue)
    {
        if (isEmpty(queue))
            return INT_MIN;
        return queue->array[queue->front];
    }
}

```

```

int rear(Queue* queue)
{
    if (isEmpty(queue))
        return INT_MIN;
    return queue->array[queue->rear];
}

int main()
{
    Queue* queue = createQueue(1000);

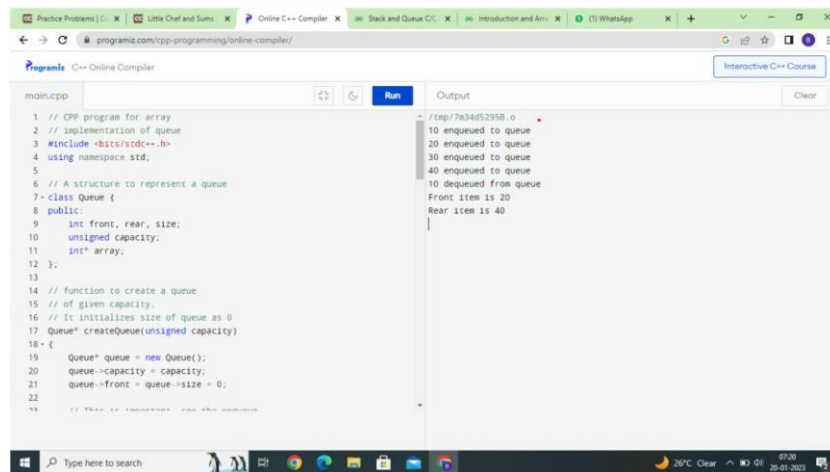
    enqueue(queue, 10);
    enqueue(queue, 20);    enqueue(queue, 30);
    enqueue(queue, 40);

    cout << dequeue(queue)
         << " dequeued from queue\n";

    cout << "Front item is "
         << front(queue) << endl;
    cout << "Rear item is "
         << rear(queue) << endl;

    return 0;
}

```



The screenshot shows a web browser with multiple tabs. The active tab is 'Online C++ Compiler'. The URL is 'programiz.com/cpp-programming/online-compiler/'. The page title is 'Programiz C++ Online Compiler'. There is a 'Run' button and an 'Output' section. The code in the editor is a C++ program for a queue implemented using an array. The output shows the results of enqueueing and dequeueing operations.

```
main.cpp
1 // CPP program for array
2 // implementation of queue
3 #include <bits/stdc++.h>
4 using namespace std;
5
6 // A structure to represent a queue
7 * class Queue {
8 public:
9     int front, rear, size;
10    unsigned capacity;
11    int* array;
12 };
13
14 // function to create a queue
15 // of given capacity.
16 // It initializes size of queue as 0
17 Queue* createQueue(unsigned capacity)
18 {
19     Queue* queue = new Queue();
20     queue->capacity = capacity;
21     queue->front = queue->size = 0;
22
23     // This is supposed to be the array
24 }
```

Output

```
10 enqueued to queue
20 enqueued to queue
30 enqueued to queue
40 enqueued to queue
10 dequeued from queue
Front item is 20
Rear item is 40
```

2. write a program to create linklist

// traversal of a linked list #include <bits/stdc++.h> using namespace

std; class Node { public:

int data;

Node* next;

};

void printList(Node* n)

{

while (n != NULL) {

cout << n->data << " ";

n = n->next;

}

}

int main()

{


```
Node* head = NUL
```