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SAP	55691
SEC	SE 3-2

LAB_14:

TASK:01.

INPUT:

```
#include <iostream>
```

```
#include <string>
```

```
using namespace std;
```

```
template <typename T>
```

```
class Stack {
```

```
private:
```

```
    T* elements;
```

```
    int topIndex;
```

```
    int capacity;
```

```
    void resize(int newCapacity) {
```

```

    T* newElements = new T[newCapacity];

    for (int i = 0; i <= topIndex; ++i) {

        newElements[i] = elements[i];

    }

    delete[] elements;

    elements = newElements;

    capacity = newCapacity;

}

```

public:

```
// Constructor
```

```
Stack(int initialCapacity = 10)
```

```
: elements(new T[initialCapacity]), topIndex(-1), capacity(initialCapacity) {}
```

```
// Destructor
```

```
~Stack() {
```

```
    delete[] elements;
```

```
}
```

```
void add(const T& item) {
```

```
    if (topIndex + 1 == capacity) {
```

```
        resize(capacity * 2);
```

```
    }
```

```
    elements[++topIndex] = item;
```

```
}
```

```
void remove() {
```

```
    if (isEmpty()) {
```

```
        cerr << "Error: Stack is empty. Cannot remove an element.\n";
```

```
        return;
```

```
    }
```

```
    --topIndex;
```

```
}
```

```
T getTop() const {
```

```
    if (isEmpty()) {
```

```
        cerr << "Error: Stack is empty. Cannot get the top element.\n";
```

```
        return T();
```

```
    }
```

```
    return elements[topIndex];
```

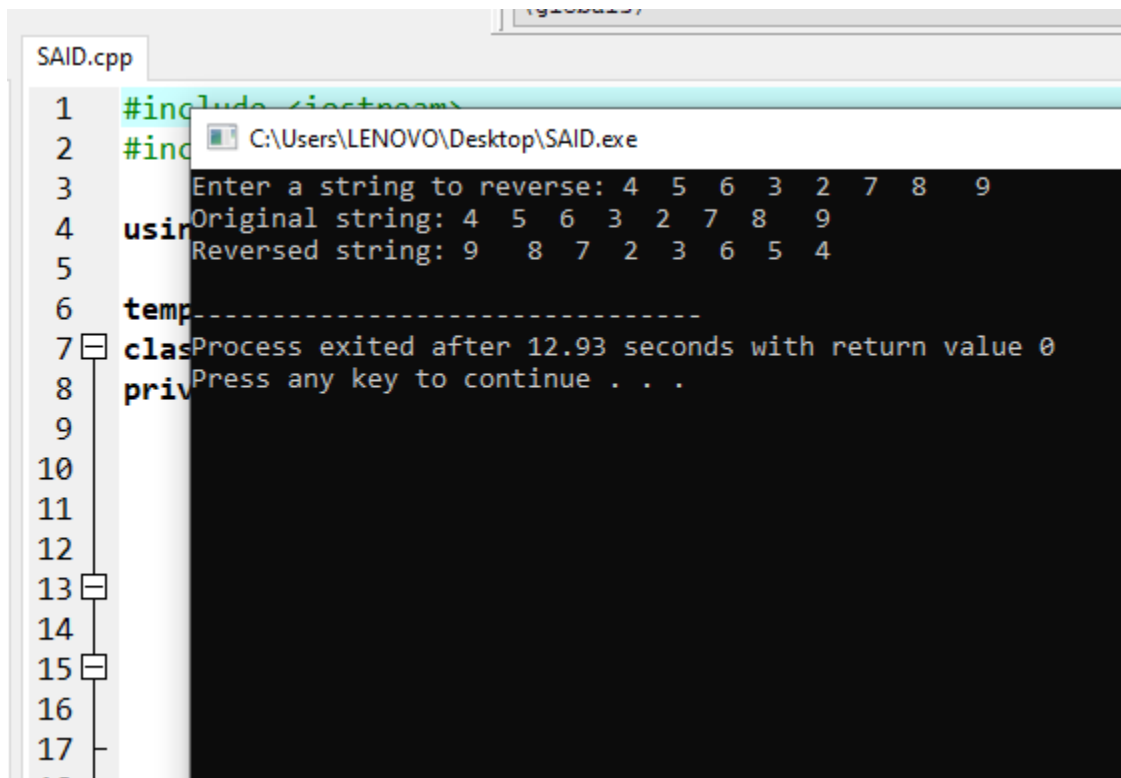
```
}
```

```
void clearAll() {
```

```
    topIndex = -1;
```

```
}
```

OUTPUT:



The screenshot shows a code editor window titled 'SAID.cpp' on the left and a terminal window titled 'C:\Users\LENOVO\Desktop\SAID.exe' on the right. The code in the editor includes `<iostream>` and `using namespace std;`. The terminal output shows the program prompting for a string to reverse, displaying the original string '4 5 6 3 2 7 8 9', and then displaying the reversed string '9 8 7 2 3 6 5 4'. The program then prints 'Process exited after 12.93 seconds with return value 0' and 'Press any key to continue . . .'. The code in the editor is as follows:

```
1 #include <iostream>
2 #include <string>
3 using namespace std;
4 class Node {
5     public:
6     Node* next;
7     int data;
8     Node(int value) {
9         next = NULL;
10    }
```

TASK:02.

INPUT: `#include<iostream>`

`using namespace std;`

`class Node {`

`public:`

`Node* next;`

`int data;`

`Node(int value) {`

`next = NULL;`

```
        data = value;
    }
};
```

```
class Queue {
    Node* front;
    Node* rear;
    int size;
    int maxSize;

public:
    Queue(int capacity) {
        front = rear = NULL;
        size = 0;
        maxSize = capacity;
    }

    bool isFull() {
        return size == maxSize;
    }

    bool isEmpty() {
        return size == 0;
    }
}
```

```
void enqueue(int value) {  
  
    if (isFull()) {  
  
        cout << "Queue Overflow! Cannot enqueue " << value << endl;  
  
        return;  
  
    }  
  

```

```
    Node* newNode = new Node(value);  
  
    if (rear == NULL) {  
  
        front = rear = newNode;  
  
    } else {  
  
        rear->next = newNode;  
  
        rear = newNode;  
  
    }  
  
    size++;  
  
}
```

```
int dequeue() {  
  
    if (isEmpty()) {  
  
        cout << "Queue Underflow! Cannot dequeue." << endl;  
  
        return -1;  
  
    }  
  

```

```
    Node* temp = front;  
  
    int value = front->data;  
  
    front = front->next;
```

```
    if (front == NULL) {  
        rear = NULL;  
    }
```

```
    delete temp;  
    size--;  
    return value;  
}
```

```
int count() {  
    return size;  
}
```

```
void clear() {  
    while (!isEmpty()) {  
        dequeue();  
    }  
    cout << "Queue cleared." << endl;  
}
```

```
void display() {  
    if (isEmpty()) {  
        cout << "Queue is empty!" << endl;  
        return;  
    }
```

```
}
```

```
Node* temp = front;
```

```
cout << "Queue contents: ";
```

```
while (temp != NULL) {
```

```
    cout << temp->data << " ";
```

```
    temp = temp->next;
```

```
}
```

```
cout << endl;
```

```
}
```

```
};
```

```
int main() {
```

```
    Queue q(5);
```

```
    q.enqueue(10);
```

```
    q.enqueue(20);
```

```
    q.enqueue(30);
```

```
    q.enqueue(40);
```

```
    q.enqueue(50);
```

```
    q.display();
```

```
    cout << "Queue size: " << q.count() << endl;
```



```
q.enqueue(60);

cout << "Dequeuing: " << q.dequeue() << endl;

q.display();

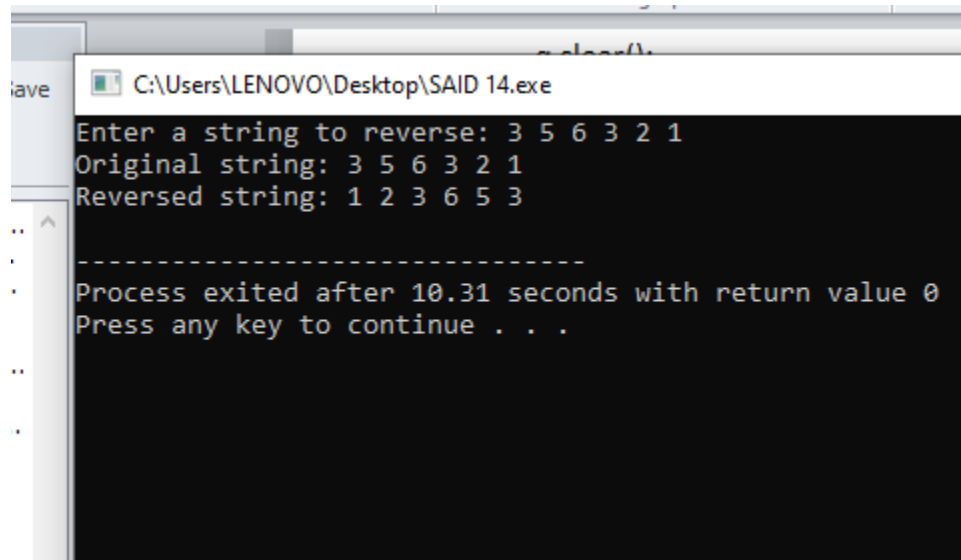
q.clear();

q.display();

return 0;

}
```

OUTPUT:



```
C:\Users\LENOVO\Desktop\SAID 14.exe
Enter a string to reverse: 3 5 6 3 2 1
Original string: 3 5 6 3 2 1
Reversed string: 1 2 3 6 5 3

-----
Process exited after 10.31 seconds with return value 0
Press any key to continue . . .
```