



# **NORTH SOUTH UNIVERSITY**

Department of Electrical and Computer Engineering

## **Assignment – 01**

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Course No.	: CSE 225
Course Title	: Data Structures and Algorithm
Section	: 06
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## **Code:**

```
#include <iostream>
using namespace std;

//Declaration
template <class T>
class SortedList{
private:
    T *dataList = NULL;
    int maxSize;
    int currentSize;
public:
    SortedList(int);
    ~SortedList();
    bool isFull();
    int getLength();
    bool insertItem(T);
    bool deleteItem(T);
    bool searchItem(T, int&);
    void printList();
};

//implementation
template <class T>
SortedList<T>::SortedList(int mS){
    dataList = new T[mS];
    maxSize = mS;
    currentSize = 0;
}

template <class T>
SortedList<T>::~~SortedList(){
    delete[] dataList;
```

```
}
```

```
template <class T>  
bool SortedList<T>::isFull(){  
    return (maxSize == currentSize);  
}
```

```
template <class T>  
int SortedList<T>::getLength(){  
    return currentSize;  
}
```

```
template <class T>  
bool SortedList<T>::insertItem(T item){  
    int index = 0;  
    bool moreToSearch = (index < currentSize);  
    while(moreToSearch && item > dataList[index]){  
        index++;  
        moreToSearch = (index < currentSize);  
    }
```

```
    if(!isFull()){  
        for(int i = currentSize; i > index; i--){  
            dataList[i] = dataList[i-1];  
        }  
        dataList[index] = item;  
        currentSize++;  
        return true;  
    }  
    else  
        return false;  
}
```

```
template <class T>  
bool SortedList<T>::searchItem(T item, int &index){
```

```

int midpoint, firstIndex = 0, lastIndex = currentSize-1;
while(firstIndex <= lastIndex){
    midpoint = (firstIndex + lastIndex)/2;
    if(dataList[midpoint] == item){
        index = midpoint;
        return true;
    }
    else if(item > dataList[midpoint])
        firstIndex = midpoint + 1;
    else
        lastIndex = midpoint - 1;
}
return false;
}

```

```

template <class T>
bool SortedList<T>::deleteItem(T item){
    int index;
    if(searchItem(item, index)){
        for(int i = index; i < currentSize - 1; i++){
            dataList[i] = dataList[i+1];
        }
        //dataList[--currentSize] = NULL;
        currentSize--;
        return true;
    }
    else
        return false;
}

```

```

template <class T>
void SortedList<T>::printList(){
    for(int i = 0; i < currentSize; i++){
        cout << dataList[i] << " ";
    }
}

```

```
    cout << endl;
}
```

```
//main driver file
```

```
int main()
```

```
{
```

```
    int maxSize, i, item, index;
```

```
    bool isFound;
```

```
    cout << "Enter array size: ";
```

```
    cin >> maxSize;
```

```
    SortedList<int> integerList(maxSize);
```

```
    cout << "Current length: " << integerList.getLength() << endl;
```

```
    cout << "insert 5 item: ";
```

```
    for(i = 0; i < 5; i++){
```

```
        cin >> item;
```

```
        integerList.insertItem(item);
```

```
    }
```

```
    cout << endl << "Printing List: ";
```

```
    integerList.printList();
```

```
    for(i = 0; i < 3; i++){
```

```
        cout << "Insert item for Search: ";
```

```
        cin >> item;
```

```
        if(integerList.searchItem(item, index)){
```

```
            cout << "Item is found in the index: " << index << endl << endl;
```

```
        }
```

```
        else{
```

```
            cout << "Item is not found." << endl << endl;
```

```
        }
```

```
    }
```

```
cout << "List is Full(1) or Not(0): " << integerList.isFull() << endl << endl;

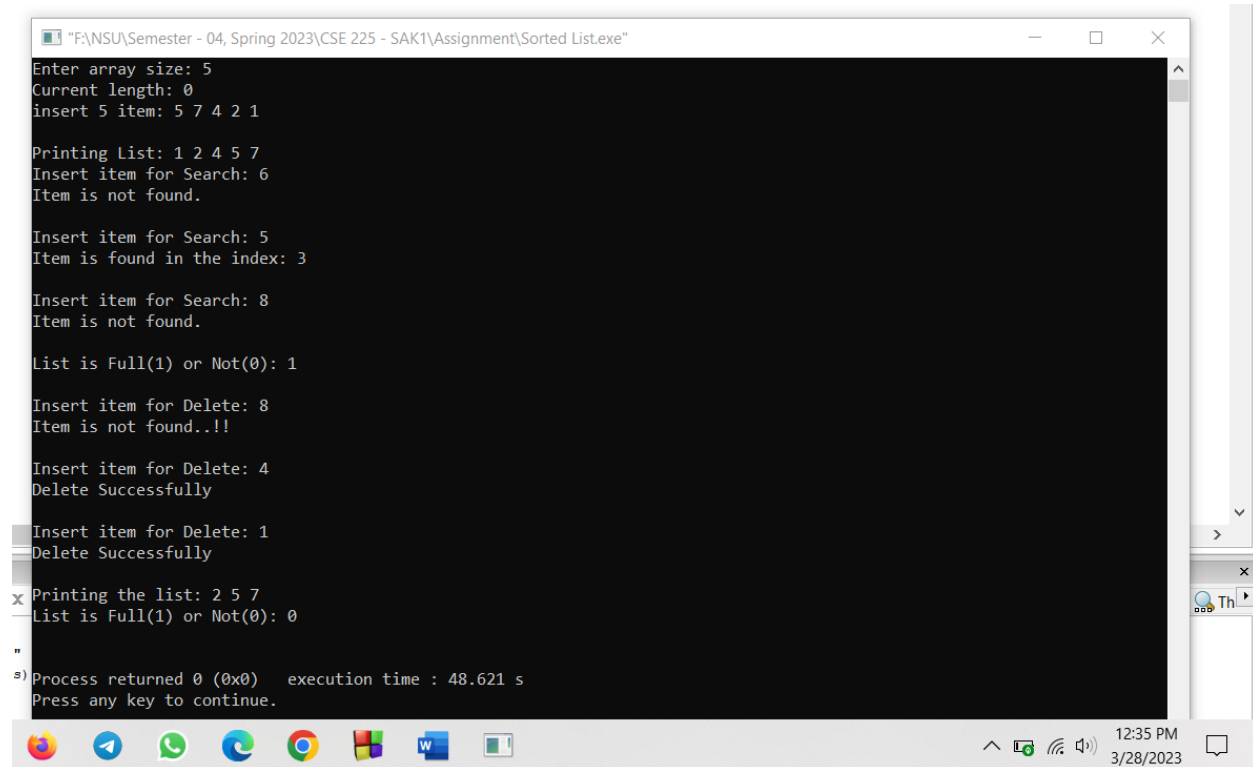
for(i = 0; i < 3; i++){
    cout << "Insert item for Delete: ";
    cin >> item;
    if(integerList.deleteItem(item)){
        cout << "Delete Successfully" << endl << endl;
    }
    else{
        cout << "Item is not found..!!" << endl << endl;
    }
}

cout << "Printing the list: ";
integerList.printList();

cout << "List is Full(1) or Not(0): " << integerList.isFull() << endl << endl;

return 0;
}
```

## Screenshot:



```
"F:\NSU\Semester - 04, Spring 2023\CSE 225 - SAK1\Assignment\Sorted List.exe"
Enter array size: 5
Current length: 0
insert 5 item: 5 7 4 2 1

Printing List: 1 2 4 5 7
Insert item for Search: 6
Item is not found.

Insert item for Search: 5
Item is found in the index: 3

Insert item for Search: 8
Item is not found.

List is Full(1) or Not(0): 1

Insert item for Delete: 8
Item is not found..!!

Insert item for Delete: 4
Delete Successfully

Insert item for Delete: 1
Delete Successfully

X Printing the list: 2 5 7
List is Full(1) or Not(0): 0

"
s) Process returned 0 (0x0)   execution time : 48.621 s
Press any key to continue.
```