NAME	**SAID RASOOL**
SAP	**55691**
SCE	**SE 3-2**

LAB_13.

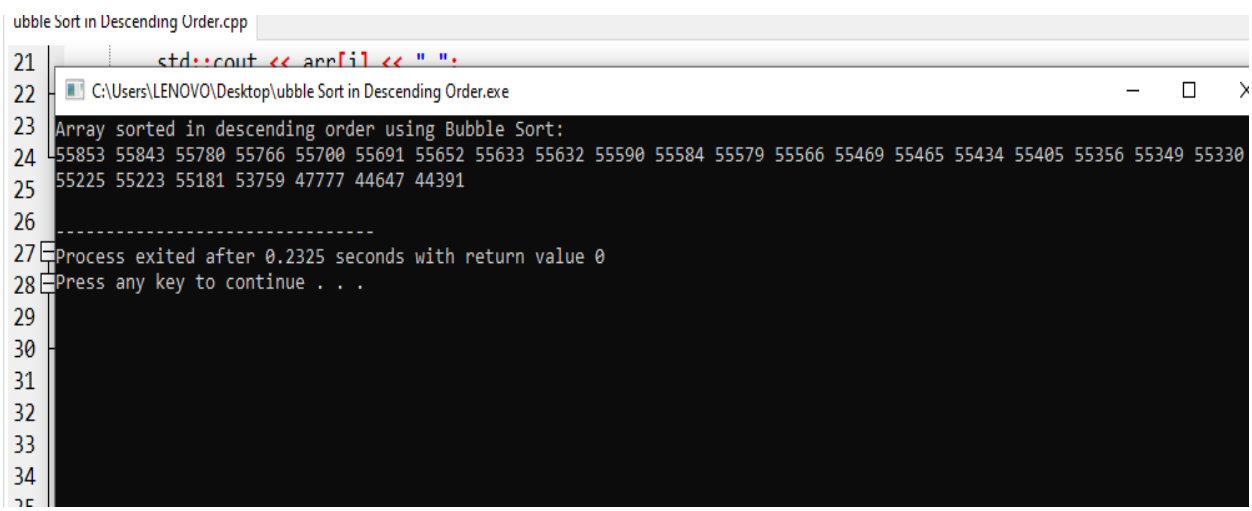
TASK.01:

INPUT:

```
#include <iostream>

using namespace std;


void bubbleSortDescending(int arr[], int n)

{

    for (int i = 0; i < n - 1; i++) {

        for (int j = 0; j < n - i - 1; j++) {

            if (arr[j] < arr[j + 1]) {


                int temp = arr[j];

                arr[j] = arr[j + 1];

                arr[j + 1] = temp;

            }

        }

    }

}


void printArray(int arr[], int n)

{

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

        std::cout << arr[i] << " ";
```

```
    }
    std::cout << std::endl;
}

int main()
{
    int arr[] = {44391, 44647, 47777, 53759, 55181, 55223, 55225, 55330, 55349, 55356,
                 55405, 55434, 55465, 55469, 55566, 55579, 55584, 55590, 55632, 55633,
                 55652, 55691, 55700, 55766, 55780, 55843, 55853};
    int n = sizeof(arr) / sizeof(arr[0]);

    bubbleSortDescending(arr, n);
    std::cout << "Array sorted in descending order using Bubble Sort:\n";
    printArray(arr, n);

    return 0;
}
```

OUTPUT:



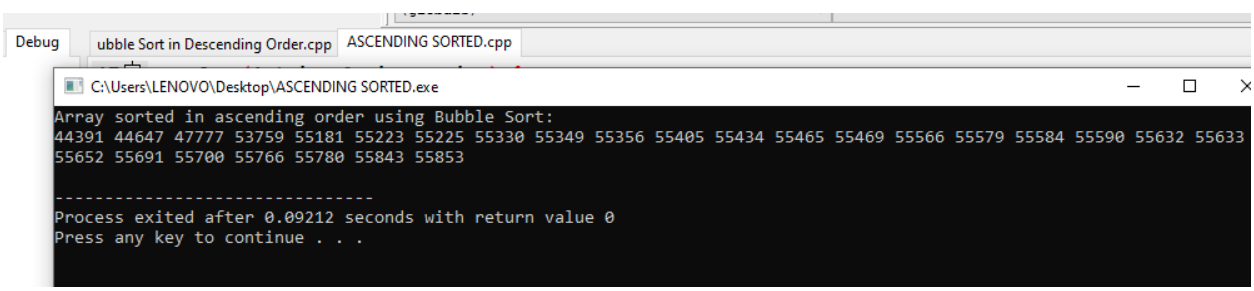
TASK.02:

INPUT:

```
#include <iostream>


void bubbleSortAscending(int arr[], int n) {
    for (int i = 0; i < n - 1; i++) {
        for (int j = 0; j < n - i - 1; j++) {
            if (arr[j] > arr[j + 1]) {
                // Swap arr[j] and arr[j+1] to arrange in ascending order
                int temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
            }
        }
    }
}


void printArray(int arr[], int n) {
    for (int i = 0; i < n; i++) {
        std::cout << arr[i] << " ";
    }
    std::cout << std::endl;
}


int main() {
```

```
    int arr[] = {44391, 44647, 47777, 53759, 55181, 55223, 55225, 55330, 55349, 55356,
                 55405, 55434, 55465, 55469, 55566, 55579, 55584, 55590, 55632, 55633,
                 55652, 55691, 55700, 55766, 55780, 55843, 55853};
    int n = sizeof(arr) / sizeof(arr[0]);


    bubbleSortAscending(arr, n);
    std::cout << "Array sorted in ascending order using Bubble Sort:\n";
    printArray(arr, n);


    return 0;
}
```

OUTPUT:



Task.02:

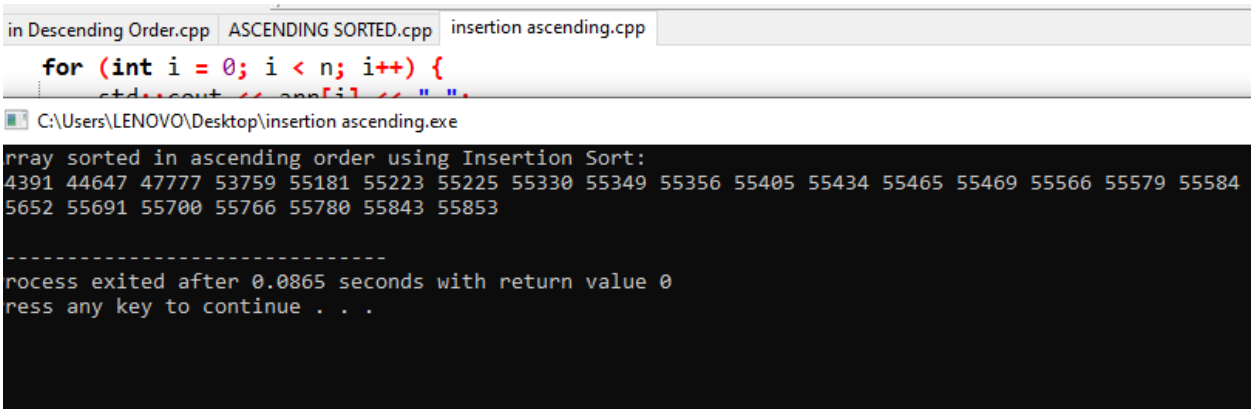
Input:

```
#include <iostream>


void insertionSortAscending(int arr[], int n) {
    for (int i = 1; i < n; i++) {
        int key = arr[i];
```

```
        int j = i - 1;
        // Move elements of arr[0..i-1] that are greater than key
        // to one position ahead of their current position
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
    }
}

void printArray(int arr[], int n) {
    for (int i = 0; i < n; i++) {
        std::cout << arr[i] << " ";
    }
    std::cout << std::endl;
}

int main() {
    int arr[] = {44391, 44647, 47777, 53759, 55181, 55223, 55225, 55330, 55349, 55356,
                 55405, 55434, 55465, 55469, 55566, 55579, 55584, 55590, 55632, 55633,
                 55652, 55691, 55700, 55766, 55780, 55843, 55853};
    int n = sizeof(arr) / sizeof(arr[0]);

    insertionSortAscending(arr, n);
```

```
    std::cout << "Array sorted in ascending order using Insertion Sort:\n";

    printArray(arr, n);


    return 0;

}
```

Output:



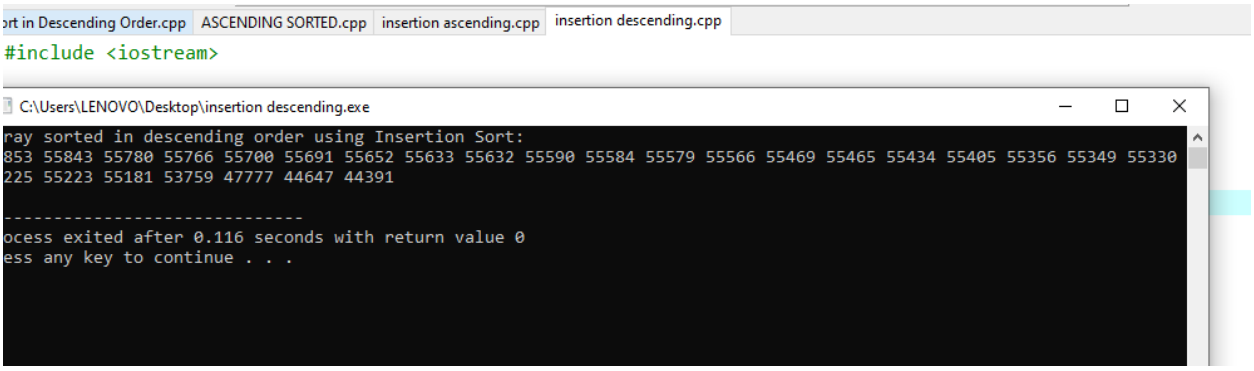
Task.04:

Input:

```
#include <iostream>


void insertionSortDescending(int arr[], int n) {

    for (int i = 1; i < n; i++) {

        int key = arr[i];

        int j = i - 1;


        while (j >= 0 && arr[j] < key) {

            arr[j + 1] = arr[j];

            j = j - 1;
```

```
        }
        arr[j + 1] = key;
    }
}

void printArray(int arr[], int n) {
    for (int i = 0; i < n; i++) {
        std::cout << arr[i] << " ";
    }
    std::cout << std::endl;
}

int main()
{
    int arr[] = {44391, 44647, 47777, 53759, 55181, 55223, 55225, 55330, 55349, 55356,
                 55405, 55434, 55465, 55469, 55566, 55579, 55584, 55590, 55632, 55633,
                 55652, 55691, 55700, 55766, 55780, 55843, 55853};
    int n = sizeof(arr) / sizeof(arr[0]);

    insertionSortDescending(arr, n);
    std::cout << "Array sorted in descending order using Insertion Sort:\n";
    printArray(arr, n);

    return 0;
}
```

Output:



Task.05:

Input:

```
#include <iostream>

#include <string>


using namespace std;


class Person {

private:

    int per_id;

    string per_name;

    int per_age;


public:


    Person(int id = 0, string name = "", int age = 0)

        : per_id(id), per_name(name), per_age(age) {}
```

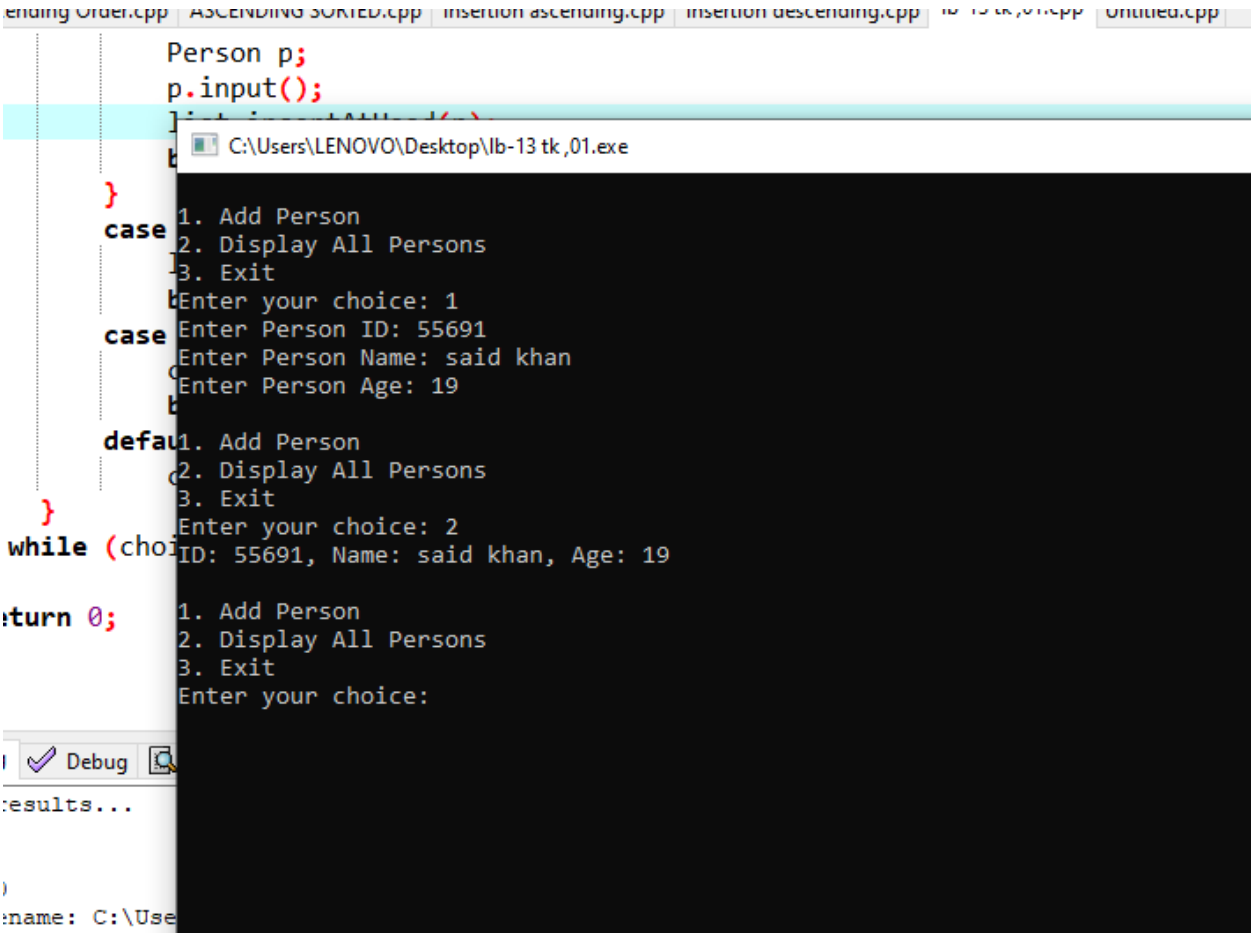
```
    // Input function
    void input() {
        cout << "Enter Person ID: ";
        cin >> per_id;
        cout << "Enter Person Name: ";
        cin.ignore();
        getline(cin, per_name);
        cout << "Enter Person Age: ";
        cin >> per_age;
    }

    void output() const {
        cout << "ID: " << per_id << ", Name: " << per_name << ", Age: " << per_age << endl;
    }
};


class LinkedList {
private:
    struct Node {
        Person person;
        Node* next;
        Node(const Person& p) : person(p), next(NULL) {}
    };
```

```
    Node* head;

public:
    LinkedList() : head(NULL) {}

    ~LinkedList() {
        while (head) {
            Node* temp = head;
            head = head->next;
            delete temp;
        }
    }

    void insertAtHead(const Person& p) {
        Node* newNode = new Node(p);
        newNode->next = head;
        head = newNode;
    }

    void display() const {
        Node* current = head;
        while (current) {
            current->person.output();
```

```
            current = current->next;
        }
    }
};

int main() {
    LinkedList list;
    int choice;

    do {
        cout << "\n1. Add Person\n2. Display All Persons\n3. Exit\nEnter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1: {
                Person p;
                p.input();
                list.insertAtHead(p);
                break;
            }
            case 2:
                list.display();
                break;
            case 3:
                cout << "Exiting..." << endl;
```

```
            break;
        default:
            cout << "Invalid choice! Please try again." << endl;
    }
  } while (choice != 3);

  return 0;
}
```

Output:



Task.06:

Input:

```
#include <iostream>

#include <string>


using namespace std;


class Node {

public:

   int data;

   bool insertedAtHead;

   Node* next;


   Node(int value, bool insertedAtHead) {

      data = value;

      this->insertedAtHead = insertedAtHead;

      next = NULL;

   }

};



class LinkedList {

private:

   Node* head;

   Node* tail;

   bool insertAtHeadNext;
```

```
public:
    LinkedList() : head(NULL), tail(NULL), insertAtHeadNext(true) {}

    // Destructor to delete all nodes and free memory
    ~LinkedList() {
        while (head) {
            Node* temp = head;
            head = head->next;
            delete temp;
        }
    }

    void insert(int value) {
        if (insertAtHeadNext) {
            // Insert at head
            Node* newNode = new Node(value, true);
            newNode->next = head;
            head = newNode;
        } else {
            // Insert at tail
            Node* newNode = new Node(value, false);
            if (tail) {
                tail->next = newNode;
```

```
            tail = newNode;
        } else {

            head = newNode;
            tail = newNode;
        }
    }
    insertAtHeadNext = !insertAtHeadNext;
  }

  void display() const {
    Node* current = head;
    while (current) {
        cout << "Data: " << current->data
             << " | Inserted from: " << (current->insertedAtHead ? "Head" : "Tail") << endl;
        current = current->next;
    }
  }
};

int main() {
  LinkedList list;
  int choice;

  do {
```

```
        cout << "\n1. Insert Node\n2. Display All Nodes\n3. Exit\nEnter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1: {
                int value;
                cout << "Enter value to insert: ";
                cin >> value;
                list.insert(value);
                break;
            }
            case 2:
                list.display();
                break;
            case 3:
                cout << "Exiting..." << endl;
                break;
            default:
                cout << "Invalid choice! Please try again." << endl;
        }
    } while (choice != 3);

    return 0;
}
```

OUTPUT:

ew Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 32-bit Release

(globals)

ubble Sort in Descending Order.cpp | ASCENDING SORTED.cpp | insertion ascending.cpp | insertion descending.cpp | lb-13 tk ,01.cpp | Untitled.cpp

```
            cout << "Enter value to
            cin >> value;
            list.insert(value);
            break;
        }
        case 2:
            list.display();
            break;
        case 3:
            cout << "Exiting..." <<
            break;
        default:
            cout << "Invalid choice!
    }
} while (choice != 3);

return 0;
}
```

C:\Users\LENOVO\Desktop\Untitled.exe

```
1. Insert Node
2. Display All Nodes
3. Exit
Enter your choice: 1
Enter value to insert: 23

1. Insert Node
2. Display All Nodes
3. Exit
Enter your choice: 2
Data: 23 | Inserted from: Head

1. Insert Node
2. Display All Nodes
3. Exit
Enter your choice:
```

ources | Compile Log | Debug | Find Results | Close

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\LENOVO\Desktop\Untitled.
- Output Size: 1.30417251586914 MiB
```

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