Phuong Ho

011056693

CECS277

Lab #3

**public class Student implements Comparable{**

**private** String ID;

**private** String Name;

Student(){

ID = "";

Name = "";

}

Student(String id, String name){

ID = id;

Name = name;

}

**public** **void** setID(String id){

ID = id;

}

**public** **void** setName(String name){

Name = name;

}

**public** String getID(){

**return** ID;

}

**public** String getName(){

**return** Name;

}

**public** String toString(){

**return** (ID + " - " + Name);

}

@Override

**public** **int** compareTo(Object o) {

**int** answer = **this**.ID.compareTo(((Student) o).ID);

**return** answer;

}

}

**public class MySort{**

**public** **static** **void** InsertionSort(Comparable[] theArray, **int** n){

**for** (**int** unsorted = 1; unsorted < n; ++unsorted) {

Comparable nextItem = theArray[unsorted];

**int** loc = unsorted;

**while** ((loc > 0) && (theArray[loc-1].compareTo((Comparable) nextItem) > 0)) {

theArray[loc] = theArray[loc-1];

loc--;

}

theArray[loc] = nextItem;

}

}

}

**public class BinarySearch<T extends Comparable<T>>{**

**private** T[] a;

BinarySearch(T[] array){

a = array;

}

**public** **int** searching(T x){

**int** low = 0;

**int** high = a.length - 1;

**while** (low <= high) {

**int** mid = (low + high) / 2;

T midVal = a[mid];

**int** result = x.compareTo(midVal);

**if** (result < 0) high = mid - 1;

**else** **if** (result > 0) low = mid + 1;

**else** **return** mid;

}

**return** -1;

}

}

import java.util.Arrays;

import java.util.Scanner;

**public class Main {**

public static void main(String[] args){

Integer[] in = {278, 458, 896, 677};

System.out.println("The unsorted Integer array: ");

for (int i = 0; i < in.length; i++){

System.out.println(i + 1 + ". " + in[i]);

}

System.out.println("Sorting...");

MySort.InsertionSort(in, in.length);

for (int i = 0; i < in.length; i++){

System.out.println(i + 1 + ". " + in[i]);

}

Student[] st = new Student[4];

st[0] = new Student("456", "Nguyen, Baby");

st[1] = new Student("234", "Smith, Puppy");

st[2] = new Student("123", "Johnson, Kitty");

st[3] = new Student("345", "Gonzalez, Cubby");

System.out.println("\nThe unsorted Student array: ");

for (int i = 0; i < st.length; i++){

System.out.println(i + 1 + ". " + st[i]);

}

System.out.println("After sorting by ID, the Student array will be: ");

MySort.InsertionSort(st, st.length);

for (int i = 0; i < st.length; i++){

System.out.println(i + 1 + ". " + st[i]);

}

Scanner input = new Scanner(System.in);

System.out.print("\nEnter the Student ID needed to search for a Student item: ");

int i = input.nextInt();

String id = Integer.toString(i);

String name = "";

Student s = new Student(id, name);

BinarySearch bb = new BinarySearch(st);

int n = bb.searching(s);

System.out.print("The item needed is: ");

System.out.println((n + 1) + ". " + st[n].toString());

}

}

**Output:**

The unsorted Integer array:

1. 278

2. 458

3. 896

4. 677

Sorting...

1. 278

2. 458

3. 677

4. 896

The unsorted Student array:

1. 456 - Nguyen, Baby

2. 234 - Smith, Puppy

3. 123 - Johnson, Kitty

4. 345 - Gonzalez, Cubby

After sorting by ID, the Student array will be:

1. 123 - Johnson, Kitty

2. 234 - Smith, Puppy

3. 345 - Gonzalez, Cubby

4. 456 - Nguyen, Baby

Enter the Student ID needed to search for a Student item: 456

The item needed is: 4. 456 - Nguyen, Baby