DSA Week 5 activities

This week, you are required to complete two questionnaires and one lab.

a. In your DSA textbook 1, answer questions 1, 2, 3, 4, 5 and 8.
b. In this print out, answer all week 5 questions.
c. Also, in this print out, complete week 5 lab 1 & 2 using the lab computers.

Note: You can complete the activities in any order, however, make afford to complete and understand everything which prepares you for well for test 1, test 2, Major Assignment, Mid Semester Exam & Final Exam.

DSA Textbook 1: chapter review questions

1. Inserting an item into an unordered array
   - **d. takes the same time no matter how many items there are**

2. When you delete an item from an unordered array, in most cases you shift other items to fill in the gap **– true**

3. In an unordered array, allowing duplicates
   - **b. increases search times in some situations**

4. In an unordered array, it's generally faster to find out an item is not in the array than to find out it is **- false**

5. Creating an array in Java requires using the keyword **new**

8. Ordered arrays, compared with unordered arrays are
   - **d. quicker in searching**

DSA Week 5 Questions

1. What is an array?

Any of the three definitions are correct:

I. An array is a collection of items stored at contiguous memory locations.
II. An array is a data structure commonly used to store multiple values in a single variable instead of declaring separate variables for each value.
III. An array is a data structure used to store multiple elements.

2. List two advantages and disadvantages of using Array in programming.
   Advantages: arrays have quick insertion of elements and very fast access to index
   Disadvantages: arrays are slow at searching, deleting and have a fixed size.

3. What are the two ways of declaring an array?

Using the explain of Array called myArray

I. int myArray [4]; - first way of declaring an array follows the syntax: datatype arrayName [size of the array];
II. int myArray = {1, 2, 3, 5, 9} – second way of declaring an array follows the syntax: datatype arrayName [] = {list the element in the array}

Both ways provide an array declaration and initialise the array size (fixed size) within the Java Program.

4. Explain the two methods of declaring an array's size (the number of elements)?

I. After declaring an array, use the method .length to identify the size of the array. For example, myArray.length;
II. Second way is declaring the size of the array like in answer 3.i. int myArray[4] declares the array's size is 4.

5. What is an out of bound error?

Out of bound error is attempt or mistake trying to access an index of array outside of the array's index range. For example, in answer 3 the array (int myArray [5]) the index range is between 0 and 4, if you try to access index 5 of above or -1 and below, this is an out of bound error.

6. Explain two sorting algorithms used by Arrays.

Insertion sort – the algorithm that proceeds by considering one element at a time, placing the element in the correct order relative to those before it. Lowest element moves to left upon comparison of the element to the right.

Bubble sort – the algorithm makes the highest values bubble up to end of the array until the array is sort. This algorithm compares one value at a time, moving the higher values or elements to end of the array.

Selection sort – the algorithm goes through the array again and again, moving the next lowest values or elements to the front until the array is sorted.

Quick sort – the algorithm takes an array of values chooses one of values as a pivot element. The pivot element then moves lower values to the left and higher values to the right.

7. What is a multi-dimensional array? When should it be used instead of an array?

A multi-dimensional is an array of arrays or two-dimensional array. Multi-dimensional arrays are useful in storing data in tabular form or a matrix.

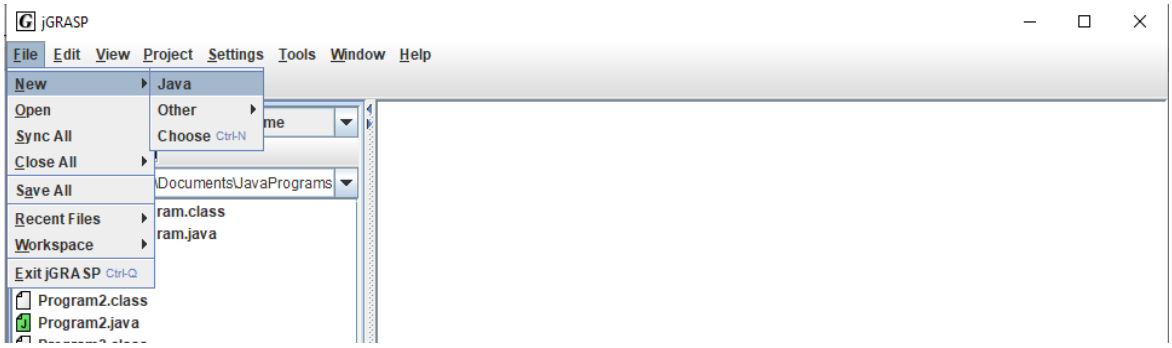
8. Explain the difference between an array and multi-dimensional array declaration?

An array is one-dimensional array that stores data is linear sequence or structure while a multi-dimensional array stores data in a grid or table format. Other differences an array is a list of similar or collection of same datatypes while a multidimensional array is list of lists of variables of the same datatype.

DSA Week 5 Lab Activity (Week5Lab1)

Using the lab computers create the following Java program using jGrasp!

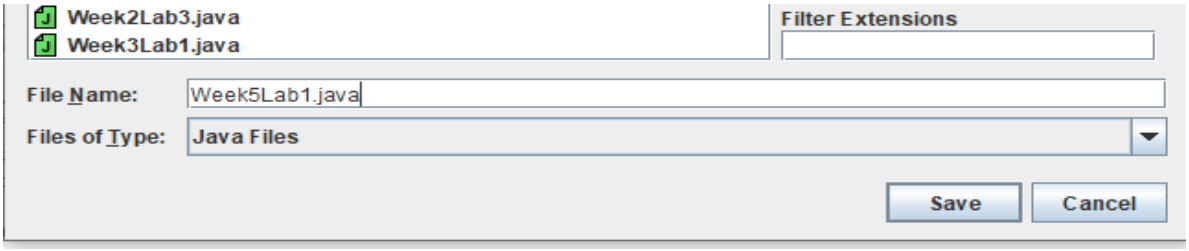
Step 1: Login to your lab computer and create a new java file in jGrasp.



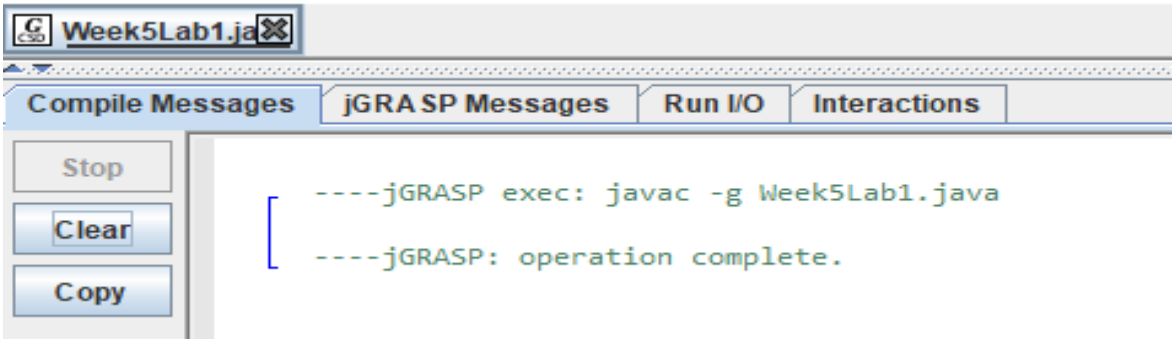
Step 2: When the window below appears. Type the following code into jGrasp.

```
/* DSA Week 5 Lab 1 */

import java.util.Arrays; //import the Arrays class

public class Week5Lab1 {

   public static void main(String []args) {

      //Create an array called intArray
      int intArray[] = {940, 880, 830, 790, 750, 660, 650, 590, 510, 440};


      //print element 0 of the array
      System.out.println("First element of the array is " + intArray[0]);

      //print element 0 of the array
      System.out.println("Length of the Array is " + intArray.length);



      // Loop through the elements of the array
      for (int i = 0; i<intArray.length; i++){
        System.out.println(intArray[i]);
      }
   }
}
```

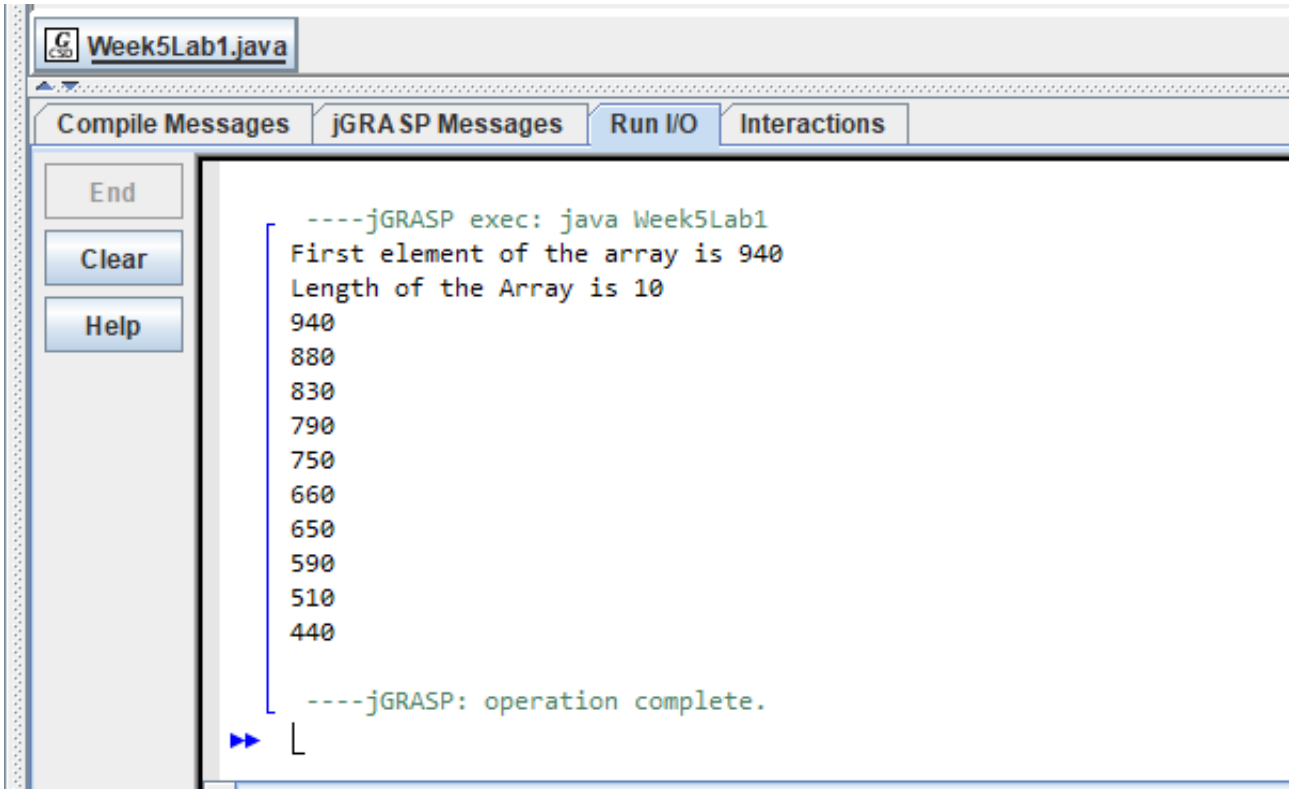
Step 3: Go to **file/save** to save your java program as **Week5Lab1**



Step 4: After saving, compile (**Go to Build/Compile**) to check for syntax errors. If compile is successfully then run (**Go the Build/Run**) your program. **Below is example of the successful compiled program.**



Step 5: Wait for the Java program to compile. If you see the message in the window below, it has successfully compiled.

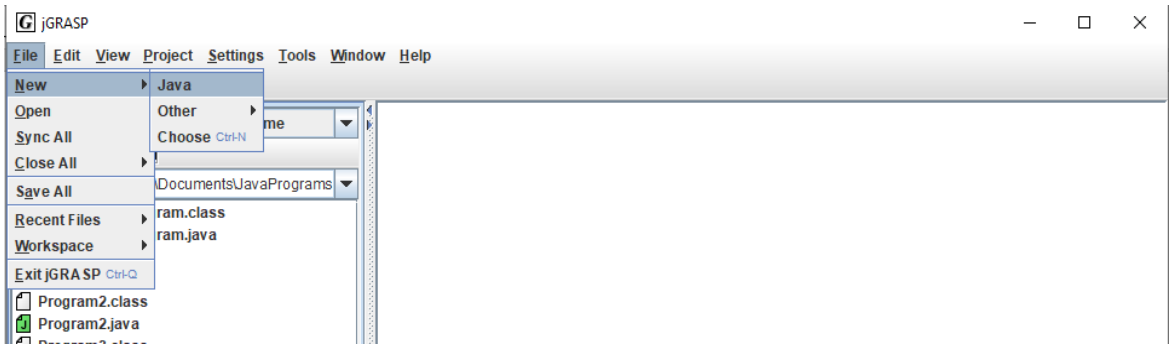


Step 8: Week5Lab1 Completed! Save your file for future Java lab activities.

DSA Week 5 Lab Activity (Week5Lab2)

Using the lab computers create the following Java program using jGrasp!

Step 1: Login to your lab computer and create a new java file in jGrasp.

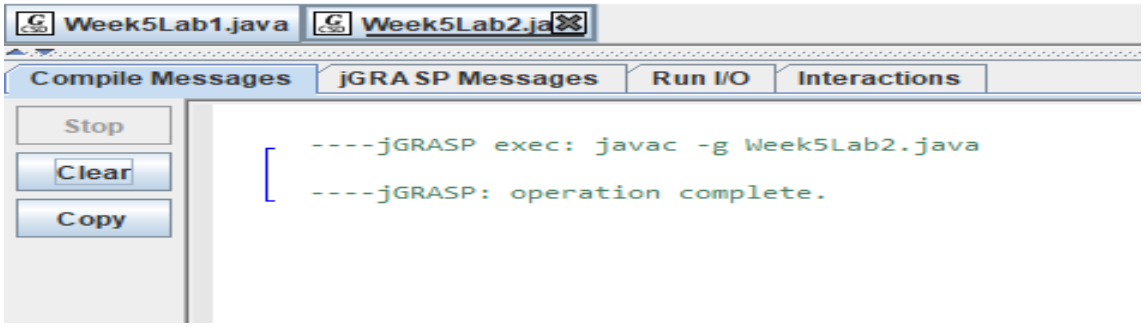


Step 2: When the window below appears. Type the following code into jGrasp.

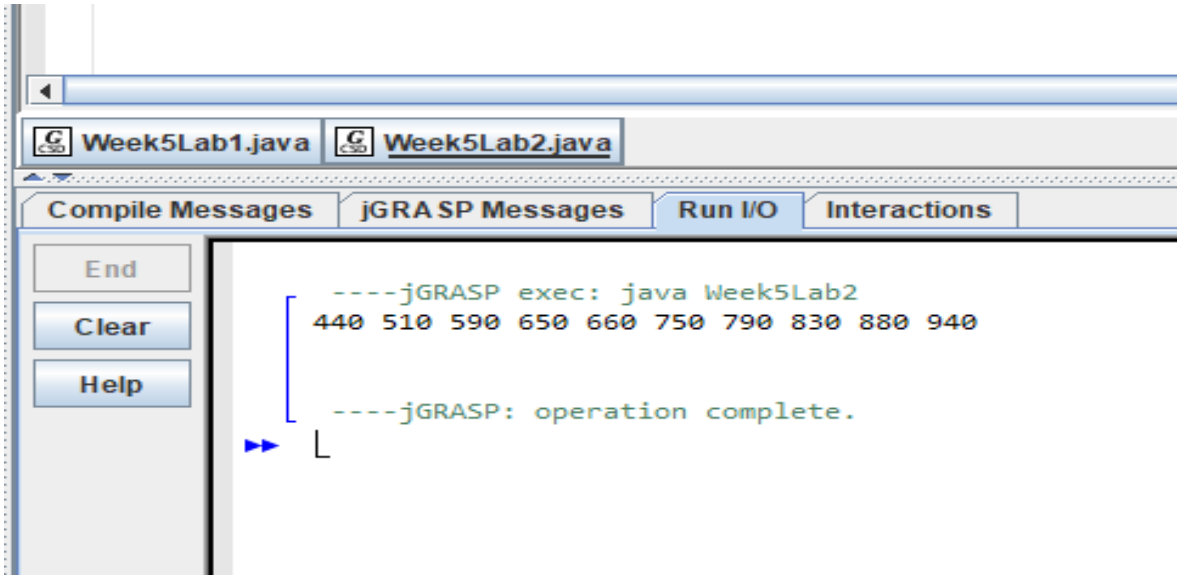
```
/* DSA Week 5 Lab 2 */

import java.util.Arrays; //import the Arrays class

public class Week5Lab2 {

   public static void main(String []args) {

      //Create an array called intArray
      int intArray[] = {940, 880, 830, 790, 750, 660, 650, 590, 510, 440};
      int n = intArray.length;


      //using bubble sort algorithm on the created Array (intArray)
      for (int i = 0; i < n - 1; i++)
         for (int j = 0; j < n - i - 1; j++)
            if (intArray[j] > intArray[j + 1]) {

               // swap temp and intArray[i]
               int temp = intArray[j];
               intArray[j] = intArray[j + 1];
               intArray[j + 1] = temp;
            }

      //print array for smallest to largest number
      for (int i = 0; i < n; i++)
         System.out.print(intArray[i] + " ");
         System.out.println('\n');
   }
}
```

Step 3: Go to **file/save** to save your java program as **Week5Lab2**

Step 4: After saving, compile (**Go to Build/Compile**) to check for syntax errors. Wait for the Java program to compile. If you see the message in the window below, it has successfully compiled.



Step 5: If compile is successfully then run (**Go the Build/Run**) your program. **Below is example of the successful compiled program.**



Step 6: If successful your program should display an output like shown in the screenshot above.

Step 7: Week5Lab2 Completed! Save your file for future Java lab activities.