# Basis of Computer Programming (java A) Tutorial 5

#### [Experimental Objective]

- Learn array initializer (Declare, create, and initialize).
- Learn how to copy and print array by for loop
- Learn how to using array to realize some simple algorithms

### [Before Exercises]

(1) Type following code, try to create two arrays and use two different ways to print them.

```
int[] array1 = {1,2,3,4,5};
int[] array2 = new int[5];
array2[0] = 6;
array2[1] = 7;
array2[2] = 8;
array2[3] = 9;
array2[4] = 10;

for(int i = 0; i<array1.length; i++){
    System.out.print(array1[i] + "\t");
}
System.out.println();
for(int e:array2){
    System.out.print(e + "\t");
}
System.out.println();</pre>
```

(2) Continue typing, create another array without giving it an address, and then finding what is the difference between two arrays.

```
int[] array3 = null;
System.out.println(array3);
array3=array2;
System.out.println(array3);
```

(3) Why the first loop cannot change the value of array3? The second loop can change the value.

```
for(int e:array3){
    e=1;
}
System.out.println("array3: " + Arrays.toString(array3));
for(int i = 0; i<array3.length; i++){
    array3[i] = 1;
}
System.out.println("array3: "+Arrays.toString(array3));</pre>
```

(4) We change the value of elements in array3, why are the elements in array2 changed accordingly?

```
System.out.println("array2: " + Arrays.toString(array2));
```

```
[Advanced]Try following code:
        char[] Array4 = {'a', 'b', 'c'};
        System.out.println(Array4);
(5) Type following code, try to create two 2D arrays and initialize them.
        int[][] array0 = new int[2][4];
        int[][] array1 = {{1,2,3,4},{0,1,2,3}};
        int[][] array2 = new int[2][];
        array2[0] = new int[3];
        array2[1] = new int[4];
        for(int i = 0; i<array1.length; i++){</pre>
            for(int j = 0; j<array1[0].length; j++){</pre>
                System. out.print(array1[i][j] + "\t");
            System.out.println("");
        System. out.println("----");
        for(int i = 0; i<array2.length; i++){</pre>
            for(int j = 0; j<array2[i].length; j++){</pre>
                array2[i][j]=1;
            }
        }
        for(int i = 0; i<array2.length; i++){</pre>
            for(int j = 0; j<array2[i].length; j++){</pre>
                System.out.print(array2[i][j] + "\t");
            System.out.println();
```

#### [Exercises]

}

1. Suppose there are 10 students in a class, and we want the average score of these 10 students. Input 10 scores ([0, 100]) from the keyboard. Then after removing the highest score and the smallest score, please find the average score of the other 8 scores.

```
Please input 10 scores of these students:88.3 99 45 78 67.5 98.4 23.5 65.5 82 85.4 Average score is 76.26
```

- 2. Write a program to compare two arrays.
  - (1) Let user input the array size,
  - (2) Let user input the two arrays,
  - (3) Output the result.

For example, the result may be

C:\untitled2\src>java Lab5P3

Enter the length of array:4

Enter the 1st integer array of size 4:1 2 3 4

Enter the 2nd integer array of size 4:1 2 3 4

The two arrays have the same value.

C:\untitled2\src>java Lab5P3

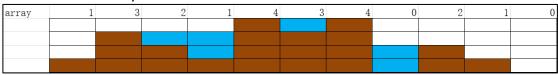
Enter the length of array:3

Enter the 1st integer array of size 3:1 2 3

Enter the 2nd integer array of size 3:3 2 1

The two arrays have different values.

3. Given a one-dimensional array containing n positive integers (0<n<100), the number of the array represents the height of the column, and the depressed portion between the columns can store water. As the figure shown below, you can store 6 units of water. Write a program to calculate how many units of water an array can store.



## Sample:

```
11
1 3 2 1 4 3 4 0 2 1 0
6
```

4. Write a program that reads the integers between 1 and 100 and counts the occurrences of each. Assume the input ends with 0. Here is a sample run of the program

Enter the integers between 1 and 100: 22 33 35 34 99 87 45 34 23 78 45 33

- 11 23 87 34 76 0
  11 occurs 1 time
  22 occurs 1 time
  23 occurs 2 times
  33 occurs 2 times
  34 occurs 3 times
  35 occurs 1 time
  45 occurs 1 time
  46 occurs 1 time
  47 occurs 1 time
  48 occurs 1 time
  49 occurs 1 time
  49 occurs 1 time
  40 occurs 1 time
  41 occurs 1 time
  42 occurs 1 time
  43 occurs 1 time
- 5. Write a program to get students' grades of many courses and print scores and average scores in a grade table.
  - 1) Get the number of students *sNum*(less than 10) and the number of courses *cNum*(less than 10) from the console
  - 2) Get scores from console. The scores are inputted by *cNum* lines. In each line, there are *sNum* students' scores of one course in order.
  - 3) Print a grade table of *cNum*+2 columns and *sNum*+2 rows , of which the first row are course names, the first column are student names, the last row are the average scores of each course and the last column are the average scores of each students.

Sample:

```
Please enter the number of subjects: 3
Please enter the number of students: 4
32 44 52 32
89 92 80 94
11 22 32 23
           Course1
                       Course2
                                   Course3
                                               Average
Student1
              32
                          89
                                    11
                                               44.00
Student2
               44
                           92
                                      22
                                                52.67
Student3
               52
                           80
                                      32
                                                54.67
Student4
               32
                          94
                                      23
                                                49.67
Average
              40.00
                         88.75
                                     22.00
```