Arrays Day 1 – Classwork

What is an array?

An array is a data structure that can store many of the same kind of data together at once. For example, an array can store 2500 String characters representing all your individual student numbers, or an array can store 2500 integer values representing each student's age. Each array can only store one type of data; it cannot, for example, store both integers and Strings. Arrays are an important and useful programming concept because it allows programmers to store a large amount of data without having to name and declare more than one variable. An array has a fixed length and can only contain as many data items as its length allows. For example, the following is an example of an array that stores the names of five students in our class:

0	1	2	3	4
Tina	Valentina	Jimmina	Cloudina	Karsina

An **array element** is one of the data items in an array. For example, in the above array, Tina is an element. Each element has an **index value**, with 0 being the index of the first item (does it remind you of something else that also starts with 0?), 1 being the index of the second item, etc. So, continuing with our example, Karsina is the fifth element in the array and has an index value of 4.

Key: Array is a collection of data that you choose.

Making an Array

Making an array in Java involves 3 steps:

1. Declare the array
    - This is exactly the same as declaring a variable. To indicate that it is an array, we use [].
    - Ie.
      int [] myScores;
      String [] studentNames;
      double [] distances;
2. Create the array
    - Next, we need to tell the computer how much space (how many elements) we need
    - Similar to classes, we use the word **new**
    - Ie.
      myScores = new int[30];
      studentNames = new String[10];
      distances = new double[15];
    - The **length** of the array is accessed by array.length (PLEASE DO NOT GET MIXED UP WITH STRINGS! THEY ARE DIFFERENT!)
    - Ie.
      myScores.length

studentNames.length

3. Initialize the elements in the array
    - Creating the array is like declaring variables – space is made, but no value is given
    - Ie.
      myScores[3] = 10;
      student Names[9] = “Willina”;
    - Another way is to pre-set the values
    - myScores = {30,80,89,55};
    - studentNames = {“Tina”,”Abdina”,”Jimmina”,”Yorkina”};

Using Elements in an Array

You cannot use an array as is. In order to use it, you have to access individual elements

Ie.

```
public static void demoArray() {
    int [] myScore = {30,80,89,55};
    System.out.println(myScore.length);
    System.out.println(myScore[3]);
    myScore[2] = myScore[2]++;
    System.out.println(myScore[2]);
}
```

Questions to Be Taken Up for Tomorrow (Counts as part of your lab anyways… do it)

1. What is the difference between declaring a variable vs. declaring an array?
2. What is similar/different about declaring and initializing arrays vs. objects?
3. What is the difference between getting the sizes of Strings vs. arrays?
4. When would we want to pre-set array vs. one that isn’t?
5. Explain in words what this line is doing:
    a. int [] myScores;
    b. String [] myNames = new String [10];
    c. myNames[0] = “Jimina”;
    d. public static void main (String [] args)

Program

1. Write a method that takes an array of integers. Return the sum of the first and the last element. (Assume that there will be at least 1 element in the array)
2. Write a method that takes an array of strings. Return 1 String that is a combination of all of them
3. Write a method that takes a String of exactly 4 characters, and return an array of char
4. Write a method that returns a random day of the week (Monday, Tuesday, Wednesday….) without using conditionals.
5. Write a method that returns a random poker card as a String. (ie. “Ace of Spades”, “2 of Diamonds”, “3 of Clubs”, “Jack of Hearts”…)

Quiz: Wednesday
When you are done, please read textbook page 246-256. Focus especially on the cards example. This will be our topic tomorrow.