Griffin's OH Spring Break

COMS 1004 Introduction to Computer Science and Programming in Java

Quick Announcements

Announcements for the week of March 13th 2022

- For the first time all semester there is no announcements
- You are now halfway through the semester as we are done with the main midterms week
- Keep working hard!

Topics for the Week

1. Introduction to Arrays
2. Using Arrays
3. Introduction to ArrayLists
4. Using ArrayLists

1

Introduction to Arrays

Introduction to Arrays

In Java, and essentially all other programming languages, we need to be able to store data … lots of data, we store data using data structures. The first major data structure you will learn about is an array. Arrays allow us to store data of an individua type and perform operations on it.

```
int[] myFirstIntArray = new int[5];
```

From the above line of code we can determine a few things, first the object type which is int[], secondly the name which is ”myFirstIntArray” the other key aspect is that when we use the above line’s format we must designate a length, arrays are immutable meaning this length can never change for this particular object, you can always declare another object.

Introduction to Arrays

Another way to declare an array is to populate it with predetermined values such as the following:

int[] mySecondIntArray = {1,2,3,4,5,6,7,8};

To access elements within an array we use indices, in Java indices start at 0 , so if we wanted to access the 4 in the array above we would use the following line of code:

int fourthElement = mySecondIntArray[3];

For an array of length n the valid indices are from 0 to n-1, if you go below 0 and above n-1 you will receive an ArrayIndexOutOfBoundsException.

2

Using Arrays

Using Arrays

There are two key things you should know how to do with arrays, that is searching and sorting. You have already learned about insertion sort and selection sort. You have also learned about the linear search algorithm as well as binary search. If you have forgotten about these algorithms, please go review these concepts from previous lectures and previous office hour presentations. A new notes session will be posted over spring break, and I will keep you updated on that.

Now onto some concrete coding practice!

Using Arrays

Given an array of ints, with n being greater than or equal to 2, write a program that can determine if there is a pair of ints that meet a passed in targetValue, if there is return true, otherwise return false .

Let’s jump into codio and write the solution but let’s first ask ourselves some questions:

1. What kind of parameters if any does this method need to work properly
2. What will the return type of the method be
3. What will be the main structure we use to achieve our goal

3

Introduction to ArrayLists

Introduction to ArrayLists

Another introductory data structure that is useful to know is the ArrayList, which is actually built using arrays, it is often referred to as the “mutable array” this is because the number of elements we can fit into an ArrayList can be changed, just like arrays you can specify an initialCapacity, but this is rare, and we usually declare and instantiate ArrayLists as follows:

```
ArrayList<Integer> myFirstArrayList = new ArrayList<Integer>();
```

Notice how we use the wrapper class Integer rather than the primitive type int, ArrayLists and more advanced data structures use the wrapper class types. Another important note, the explicit use of the data type on the right-hand side is unnecessary and can be removed but you always need the <>

Introduction to ArrayLists

A key question that may be on your mind is why? Why does the ArrayList exist?

Well most of the time, you will not know upfront how much space you need to store your data, and it is really inefficient to have several arrays of different names and lengths so the ArrayList exists to simplify the handling of data (honestly not entirely true but for you right now it is)

Most operations that you can perform on an array, you can do on an arraylist, so it really depends on what you need a program to do.

4

Using ArrayLists

Using ArrayLists

Now we will head into codio, and demonstrate a good use case for ArrayLists when compared to arrays and hopefully whenever you are writing code and you actually have a choice between using an array or an ArrayList, you will be able to make the right choice.

Let us pretend we are school administrators and we need a way to keep track of individual Students, with Students being separate objects, how would we effectively store and be able to distinguish amongst them?

Link to Video Drive and Other Resources

Link to Video Drive:
Video Drive

Link to My Office Hour Materials:
Useful Files