Assignment 1 is available and due at 11:59pm Monday September 11th

See schedule for link to assignment description

Reading for next class
- *Java Foundations*, by Lewis, DePasquale and Chase, 2nd edition. (Denoted as LDC on the schedule)
- See Chapters 1 and 2 for more information about today's topics
- Read Chapters 3 and 4 (3.6 and 3.7 are optional)

You will learn the “big picture” of programming
- Data abstraction
- Modularity
- Performance Analysis
- Basic abstract data types (ADTs)

You will become a more competent programmer
- You will also become a designer, tester, analyzer, debugger, team member
- You will develop a project worth showing off
- You will have fun in the process!
- Allows you to write complex programs more easily
- To keep mental track of complex data interaction
- To reuse code
- To improve code performance
- Allows modularity of large projects
- Easier to understand large chunks of code
- Easier to collaborate with large teams

- Basic ADTs
  - Collections
  - Linked List
  - Stack
  - Queue
  - Hash Table
  - Priority Queue
- Less basic:
  - Tree
  - Set
  - Graph

You can study data structures using any language, but in this course we will use Java.

You can write and execute Java programs in many ways, on the command line or with an IDE, but in this course we will use a simple IDE called DrJava.

Java is a statically typed language
- You must explicitly define the type of each variable when it is declared

Unlike Python, not all variables in Java are objects
- Some are primitive data types

<table>
<thead>
<tr>
<th>Primitive</th>
<th>Object</th>
</tr>
</thead>
<tbody>
<tr>
<td>int</td>
<td>Integer</td>
</tr>
<tr>
<td>float</td>
<td>Float</td>
</tr>
<tr>
<td>double</td>
<td>Double</td>
</tr>
<tr>
<td>char</td>
<td>Char</td>
</tr>
<tr>
<td>boolean</td>
<td>Boolean</td>
</tr>
</tbody>
</table>
A variable must be declared once before it can be used
The type of a variable cannot be changed after declaration
The value of a variable can be changed any number of times

```java
int x;
int y;
x = 7;
y = 5;
z = x + y;
System.out.println(z);
```

Variables declared and initialized in single statement

```java
int x = 7;
int y = 5;
int z = x + y;
System.out.println(z);
```

Variables declared and initialized in separate statements

```java
double num = 5.2;
num = 1.4;
num = num * 2.0;
System.out.println(num);
```

```java
double fahrenheit = 98.6;
double celsius = (fahrenheit - 32) * 5 / 9;
System.out.println(celsius);
```

Strings in Java and Python are quite similar.
Like Python, Java strings are immutable.
The difference is that Java uses method calls where Python uses Operators.

<table>
<thead>
<tr>
<th>Python</th>
<th>Java</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>str[3]</td>
<td>str.charAt(3)</td>
<td>Return character in 3rd position</td>
</tr>
<tr>
<td>str[2:5]</td>
<td>str.substring(2,4)</td>
<td>Return substring from 2nd to 4th</td>
</tr>
<tr>
<td>len(str)</td>
<td>str.length()</td>
<td>Return the length of the string</td>
</tr>
<tr>
<td>str.find('x')</td>
<td>str.indexOf('x')</td>
<td>Find the first occurrence of x</td>
</tr>
<tr>
<td>str.split()</td>
<td>str.split('\s')</td>
<td>Split the string on whitespace into a list/array of strings</td>
</tr>
<tr>
<td>str.split(',')</td>
<td>str.split(',')</td>
<td>Split the string at ',' into a list/array of strings</td>
</tr>
<tr>
<td>str + str</td>
<td>str.concat(str)</td>
<td>Concatenate two strings together</td>
</tr>
<tr>
<td>str.strip()</td>
<td>str.trim()</td>
<td>Remove any whitespace at the beginning or end</td>
</tr>
</tbody>
</table>
String s1 = new String("Grace Hopper");
String s2 = "CU L8R";
String s3 = ":)";
System.out.println(s1.toLowerCase());
System.out.println(s1.length());
System.out.println(s2.length());
System.out.println(s2.equals(s3));
System.out.println(s2.equals("CU L8R"));
System.out.println(s2.charAt(1));
System.out.println(s1.substring(7,11));
System.out.println(s2.substring(0,2).toLowerCase());

// This program has at least 5 errors. Can you // find them all?
public class Errors {
    public static void main(String[] args)
        String temperature = 80.3;
        int n = 100
        n = "Wait, what?";
        print("This is fine.");
    }

* Find a group and a board

* Write your own Java program to calculate some value and print it out

* Some ideas (or make your own!):
  * Area of a circle (or other shapes) given its radius (or other necessary dimensions)
  * Volume of a box/sphere/cylinder of some given dimensions
  * Simple interest given amount, rate, time