Classes and Arrays

Nov 15
equality
and memory

• Strings and all instances of classes have two ways to compare to each other
  • ==
    • compares pointers!
  • .equals()
    • compares strings

```java
public class Equality {
    public static void main(String[] args) {
        String s = new String("this");
        String t = new String("that");
        System.out.println("s == t " + (s == t));
        System.out.println("s.equals(t) " + s.equals(t));

        String ss = s;
        System.out.println("s==ss " + (s == ss));
        System.out.println("s.equals(ss) " + s.equals(ss));

        ss = new String("this");
        System.out.println("s==ss " + (s == ss));
        System.out.println("s.equals(ss) " + s.equals(ss));
    }
}
```
Aliases

• Alias: When 2 things point at the same thing
  * String ss = new String("this is");
    String tt = ss;

• Strings are immutable
  * The internal memory (state) is not allowed to change
  * so aliases are not very obvious

• Arrays are a lot like object instances
  * int[] ss = new int[3];  // [0,0,0]
    int[] tt = ss;          // tt points to same memory as ss
    tt[0]=42;
    ss[1]=99;               // [42,99,0] for both ss and tt
substring()
Activity

• What is the longest prefix shared by any two strings on the command line?
• Simpler: what is the longest prefix shared by the first string on the command line with any other string?
  • Does the first string have the same first letter as any other?
  • Does the first string have the same first 2 letters?

Look at the methods on String. There is a handy one: startsWith

java Activity17 abcdef sdfg adfga absdfg abcfff sdfghy
Just first: 3
ALL: 4
```java
public class CArray {
    public static void main(String[] args) {
        double dd;
        double dd0 = 0.0; // does this mean "I do not know yet?"
        System.out.println("dd" + dd);

        double[] dA = new double[3];
        for (int i = 0; i < dA.length; i++) {
            System.out.println("dA + " + i + " " + dA[i]);
        }

        String ss;
        String ssb = ""; // does this mean "I do not know yet
        System.out.println("ss <<" + ss + ">>");
        String[] ssA = new String[3];
        for (int i = 0; i < ssA.length; i++) {
            System.out.println("ssA " + i + " " + ssA[i]);
        }
    }
}
```

Java: definite assignment
Null

the default

• Null is
  • a default value for class instances
  • String aaa = null;
  • Any variable holding an instance of a class can be set to "null"
• Why??
  • temporary value for a variable before it’s initialized
  • to indicate that the object does not exist (yet)
  • a method can return null to signal that there was no result from the operation
  • we can pass null to a method that takes an object as a parameter to indicate “no object”
Null

is evil??

• But null is literally Nothing
  • You cannot do anything with it
  • if you try you will get a "Null Pointer Exception"
• One of the most common runtime errors.
• Tony Hoare originated the idea (and named it null) in 1964
  • "my billion dollar mistake"
    • underestimate
Static and non Static
the demise of the blueprint analogy

• static methods belong to the class itself
  • you do not need an instance to run them!
    • for instance every method you have written for this class
    • Math.pow(2,3)
• Non static methods must be run on an instance of a class
  • FileReader fr = new FileReader("file.txt");
    while (fr.ready()) { ....

It only makes sense to ask if a file is ready to be read if the FileReader knows what file is being asked about