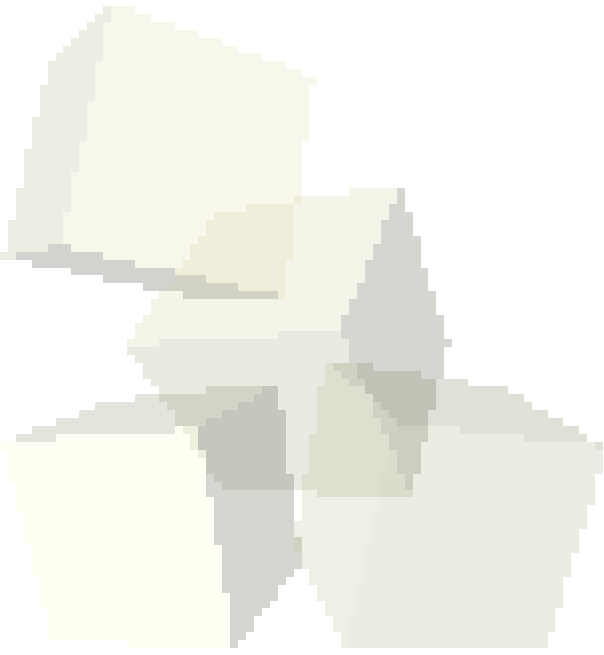




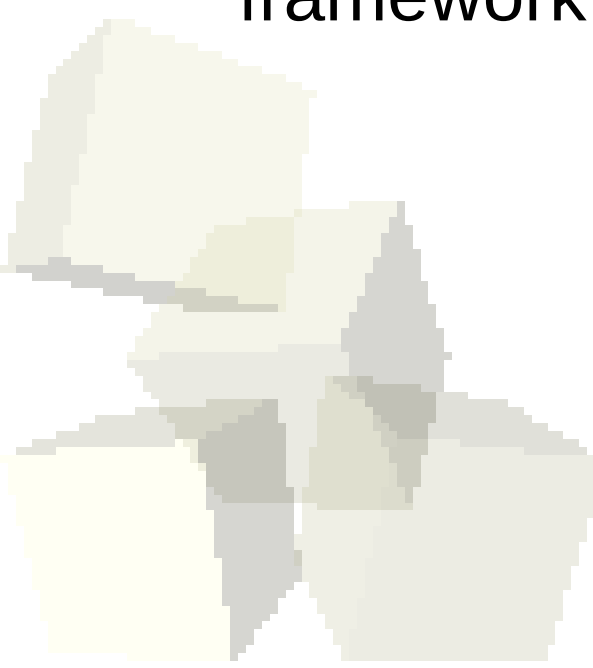
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Opening Discussion

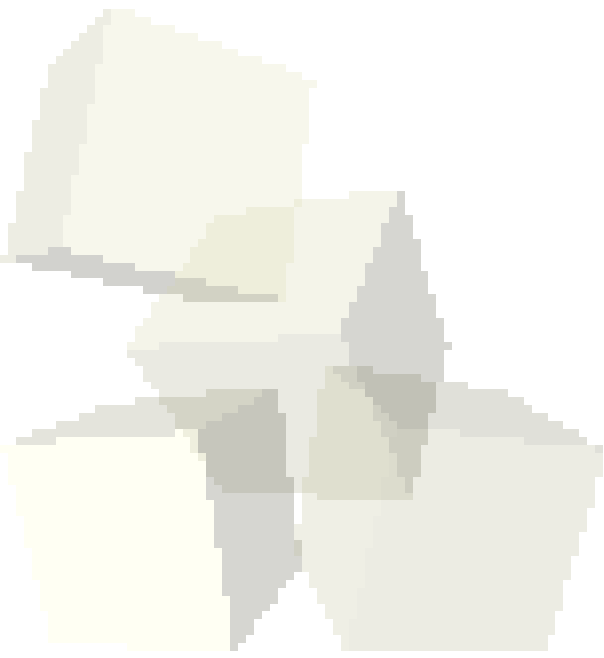
- Let's look at solutions to the interclass problem.
- What did we talk about last class?
- What happens when you “remove” an object in BlueJ?
- Do you have any questions about the reading?
 - ◆ What is the project that will be developed in the text?
 - ◆ What are the main components in the game framework?



- We want to continue our bank example that we worked on last time.
 - ♦ Adjusting the account balance with deposit and withdraw.
 - ♦ Have a bank class that can make an account and try doing some things with it.
 - ♦ Add customer information. Instead of adding that straight to the account, we should create a Customer class and have the account reference it.
- Let's put in proper documentation comments on the code as well.



- Doing `=` or `==` with object references assigns or compares references. Think of them as pointers without the `*`.
- Use a copy constructor to copy and `equals()` for value comparison.
- No `->` or `*` (deref) operator because things are implicitly dereferenced.





Garbage Collection

- Java has automatic garbage collection. There is no delete operator (no free).
- When you are done using an object and you have no more reachable references to it, the system can determine this and free up the memory for it.
- As a result, you can allocate objects much more freely because you don't have to worry about freeing them.



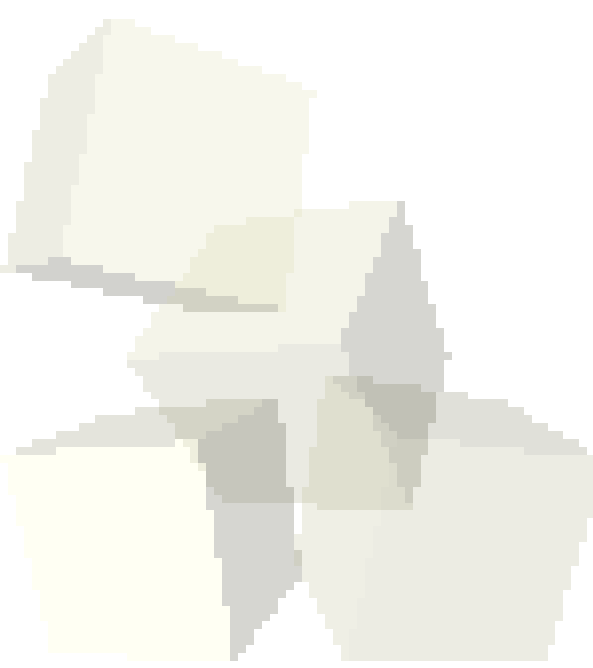


- Arrays in Java are actually objects. An array type is denoted by placing [] after the normal type. When you do a new you are allocating the array object. If the items in it are objects you still have to allocate the individual objects.
- This is really nice for inclusion polymorphism.
- You use them like you would in C/C++, though they do have a length member that you can access to find out how many elements are in an array.





- Like arrays, strings are a class in Java, called String. Literal strings in Java are objects of that class too.
- This class is in the `java.lang` package. Note that `java.lang` is the one package that is implicitly imported so you don't have to use the `import` statement to refer to the classes in it directly.





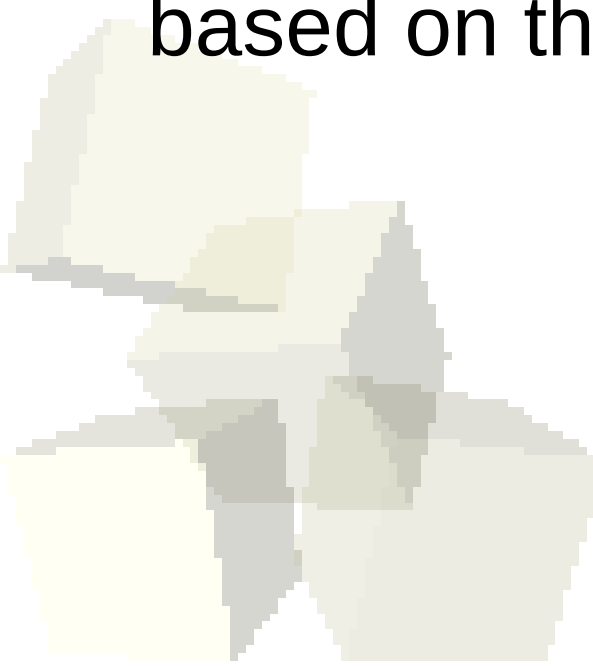
- Java tries to prevent sloppy error handling by providing exceptions instead of requiring programmers to check return codes.
- try blocks surround code that might throw exceptions.
- catch blocks follow a try block and specify what type it is waiting for.
- finally catches everything and always happens.
- If an exception type can be thrown but isn't caught, it must be in the throws clause of that method. Not true for RuntimeExceptions.





Immutable Objects

- In your reading you have inevitably come across the term immutable. What does this mean?
- What are the advantages and pitfalls of immutability?
- How can you write code that takes advantage of immutability?
- The entire paradigm of functional languages is based on the idea that data is immutable.





- Do you have any significant questions about Java at this point? What do you see as the most significant differences between Java and C right now?
- Interclass Problem – Write a class that represents rational numbers or complex numbers and make some code to test it out.

