Administrivia

- Reminder: Homework 1 code due Thursday.

- (Review minute essay from last time.)

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More Administrivia

- Two options for transferring files between machines:

  - Simple, not particularly smart: Just copy `.java` files between machines. Several options.

  - More complicated to get started, more professional: Use CVS (versioning software, Eclipse has built-in support).

- (I will add some instructions to project description . . .)

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Multiple Inheritance Versus Interfaces

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- What if you want a class to inherit from multiple classes? C++ allows this ("multiple inheritance"). To avoid possible confusion/ambiguity, Java doesn't.

- Instead, define "interfaces" — classes in which *all* methods are abstract.

- In `Account` example, we could define a `HasPersonName` interface with method `getPersonName`. Not obviously useful — unless there's another kind of object that could have a person's name but shouldn't be a subclass of `Account`. (A prospective customer?)

- A class can "implement" as many interfaces as you like.

Interfaces and Types

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- Interfaces also define types. So if `Account` implements interface `HasPersonName`, we can use a `Account` anywhere a `HasPersonName` is required.

  `HasPersonName o = new Account();`

- This is "inclusion polymorphism" — and is what will allow your project code to plug neatly into Dr. Lewis's framework. (The framework is written in terms of interfaces such as `Block` and `Screen`; your classes will implement those interfaces.)

Packages and Importing

- Library classes grouped into "packages" — e.g., `java.util`, `java.net`.

- For classes in `java.lang` and "default package", reference using their names only. For other classes, can use full name or `import`. (`import` looks like `#include`, but works differently.)

- Tip: When writing code with Eclipse, if it can't find a particular class because it needs an `import`, select the reference to the class and press shift-control-M, and it will try to generate an appropriate `import`.

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Packages, Continued

- You can define your own packages. Convention is to use your e-mail/Web address, in reverse order (e.g., Dr. Lewis's framework is `edu.trinity.cs.gamecore`). For your game, I'm recommending `edu.trinity.cs.yourusername.yourgame` (`yourgame` is something descriptive). Call the main class something with `Main` in its name.

- Packages and filesystem hierarchy are related — after creating a package, look in your Eclipse workspace directory for an example.

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"Generics" in Java

- Java library includes classes for collections of things (`ArrayList`, e.g. — like an expandable array). Originally, could put any kind of `Object` in one of these. Nice, except that then there's no way to know anything about types of objects inside except by using reflection (*much* later, if at all) or `instanceof` operator. Must also use explicit casts to do much with objects retrieved from collection.

- So Java 1.5 (a.k.a 5.0) introduced "generics" — Java's answer to C++ template classes, though not exactly the same. Idea is to allow you to specialize a collection — so, a `ArrayList` of `Integer` objects only, or a `ArrayList` of `Account` objects only, etc., etc. Syntax uses angle brackets, e.g., a `ArrayList` that can hold only `Account`s:

  ```
  ArrayList<Account> list = new
  ArrayList<Account>();
  ```

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- Also look at API for `MainFrame` in the game framework . . .

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Minute Essay

- What problems did you have doing the design phase of Homework 1?