Object Oriented Programming

Week 6 Part 1
Packages

Lecture

- Name collisions and name spaces
- How packages solve name collisions

Name collisions and name spaces

Package Definition

- A *package* is a grouping of related types providing access protection and name space management
  - https://docs.oracle.com/javase/tutorial/java/package/packages.html
- *Types* refer to classes, interfaces, etc, that can be used as types in Java
- *Access protection* means that objects outside the package need to be given access
- *Name space management* means that the names inside the package can be kept separate from names outside the package

Why use packages

- They indicate that the types provide related capabilities.
- Programmers can find types that provide the capabilities.
- The types' names of don't conflict with the type names in other packages.
- Types in the package may have unrestricted access to each other but restricted access to types outside the package.

Related Capabilities

- The animals package indicates that all of the classes and interfaces in the package relate to the animals model
  - E.g. Pack could be a backpack or a verb to pack, but in the animals package it suggest that it is a wolf pack
  - The classes Region and Territory refer to animals

Finding Types

- If we are looking for a class that represents a Wolf, we would look in the animals package.
- If we want to find a class that represents
  - Mathematical functions, we look in java.math
  - Networking capabilities, we look in java.net
  - Security, we look in java.security

Separating Name Spaces

- The package java.awt, the original Java windowing system, contains a class called “rectangle”
- Our shapes package also contains a class called “rectangle.
- We need to be able to distinguish shapes.rectangle from java.awt.rectangle

Package Access

- To give access to a class, method or field from
  - The class, package, subclass and world: use public
  - The class, package and subclass: use protected
  - The class and package: use no modifier
  - The class only: use private
- Only the private modifier restricts access from other classes in the package.

Java Package Naming Protocols

- Package names are written in all lowercase.
- Private packages are kept in directories that correspond to the companies uri.
  - E.g. com.nathanielgmartin.oo.animals would be the name of the animals package if fully qualified.
  - It would reside in com/nathanielgmartin/oo/animals
    - Packages are kept in directories that correspond to the dots in the names
  - In the internet names, '-' is replaced with '_' and java keywords are appended with a '_'

Reason for Naming Protocol

- Companies have a unique URI
  - e.g. java.com, google.com …
- Companies can manage the naming of their classes
- Therefore, people throughout the world can share packages and libraries inside packages