Recitation 7 - February 20th A4/GR

Isaac And William

Seed Example:

```
Random rand = new Random(1331);
System.out.println(rand.nextInt(5) + " " + rand.nextInt(5) + " " +
rand.nextInt(5));

Random rand2 = new Random(1331);
System.out.println(rand2.nextInt(5) + " " + rand2.nextInt(5) + " " +
rand2.nextInt(5));
```

Prints:
0 3 4
0 3 4

- This is super useful for testing!

Inheritance

Inheritance

- Object-oriented programming allows classes to inherit commonly used state and behavior from other classes

- This means classes can be *derived* from other classes, thereby *inheriting* fields and methods from those classes.

- Ex. A Mountain Bike can inherit Bicycle, A Dragonite can inherit Pokemon, and a Lion can inherit mammal

Inheritance - Super Class, Sub Class

- **Subclass** - The class that inherits from another class. Also called the child class.

- **Superclass** - the class that is inherited from is called the superclass. Also called the parent class

- Subclass follow the Is-A relationship with the super class!
  - Ex. a Lion Is-A Mammal
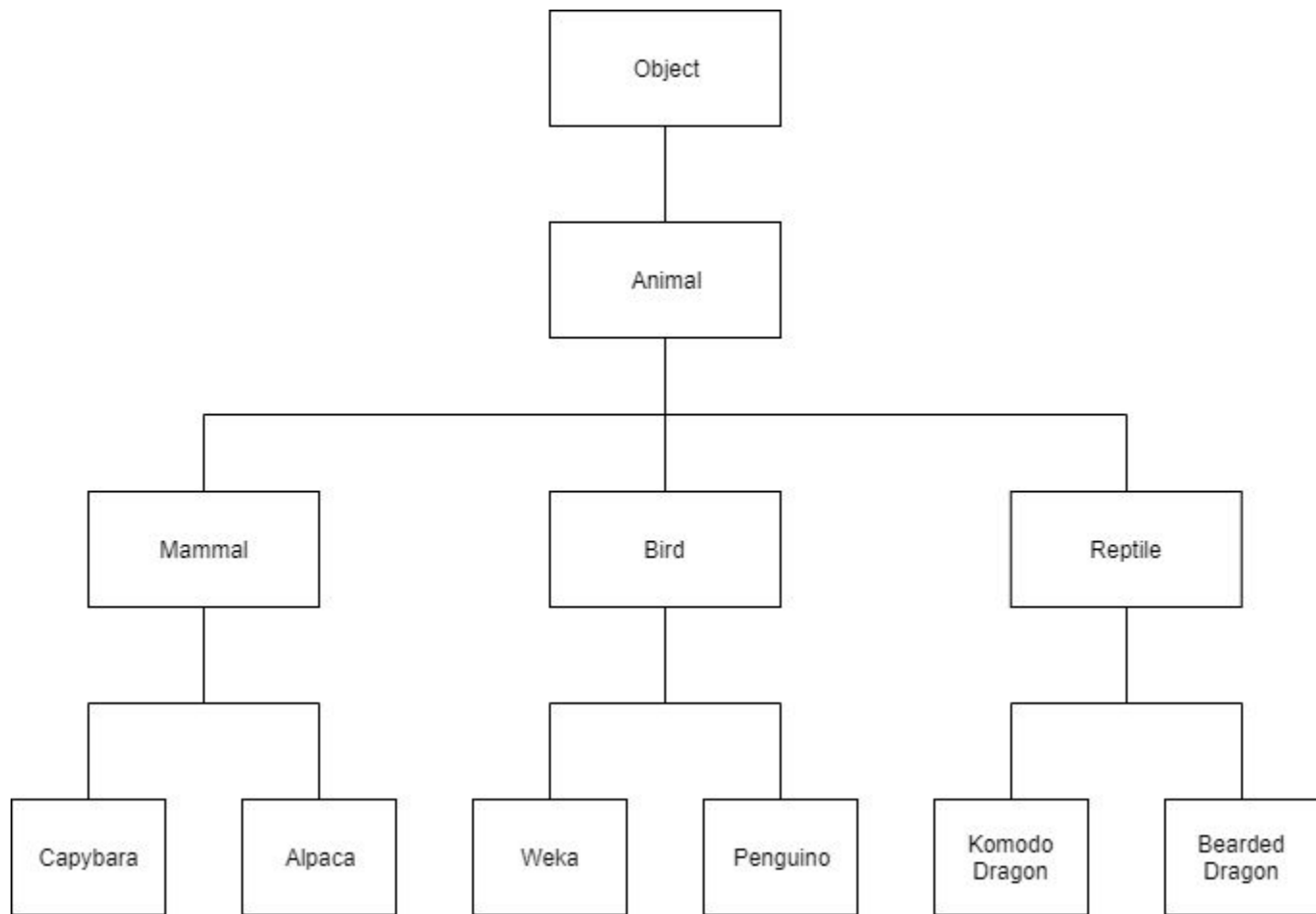
Some Important Trivia

- All objects in Java inherit from the Object class.

Let's Draw A Class Diagram!

- We have the following classes:
  `Animal, Mammal, Bird, Reptile, Alpaca, Penguino, Capybara, KomodoDragon, Weka, BeardedDragon`

```
                        Object
                          |
                       Animal
          _____|_____
         |               |                |
      Mammal            Bird            Reptile
      ___|___          ___|___          ___|___
     |       |        |       |        |       |
  Capybara Alpaca   Weka   Penguino  Komodo  Bearded
                                     Dragon   Dragon
```

The Problem Statement:

The USDA offers food guides, and their current one is from ChooseMyPlate.gov. In this they categorize food into 5 categories, fruits, grains, vegetables, dairy and protein. We want to draw a Class Hierarchy diagram to showcases these classifications.

You have the following classes:

```
Food, Vegetables, Fruits, Grains, Protein, Asparagus, Bread, Spinach, Pasta,
Strawberries, Bananas, Lentils, Dairy, Yogurt, Chickpeas
```

Draw a class diagram that contains all of the above classes.

P.S. Lentils and Chickpeas are totally a protein

P.P.S. Don't forget the Object Class!

Coding Inheritance - Extends Keyword

extends keyword

- Used to establish inheritance between classes
- Can only inherit from a single class

```
public class Alpaca extends Mammal {

}
```

Super Keyword

`super` Keyword can be used for 3 things:

1. Super can refer to the immediate parent class instance variable
2. Super can be used to invoke parent class methods
3. Super can be used to invoke parent class constructors

The `super` keyword

- Used to refer to the superclass instance (similar to this)
- Must be implicitly or explicitly called in the first line of the constructor

Super Continued

1. Super can refer to the immediate parent class instance variable
2. Super can be used to invoke parent class methods
3. Super can be used to invoke parent class constructors

```java
public class Alpaca extends Mammal {
    public Alpaca() {
        super();
    }

    public void printNumHairs() {
        System.out.print(super.getNumHairs());
    }

    public boolean isWarmBlooded() {
        return super.bloodTemp > 80;
    }

}
```

Overriding vs Overloading

- ○ **Overriding:** The ability of a subclass to override a method allows a class to inherit from a superclass whose behavior is "close enough" and then to modify behavior as needed. The overriding method has the same name, number and type of parameters, and return type as the method that it overrides.

- ○ **Overloading:** allows a class to have two or more **methods** having same name, if their argument lists are different.

Overriding Equals and toString

```
@Override
public String toString() {
    return "hello!";
}
```

```
@Override
public boolean equals(Object o) {
    return true;
}
```