Objects - Instances of Classes

Classes and Objects

Objects

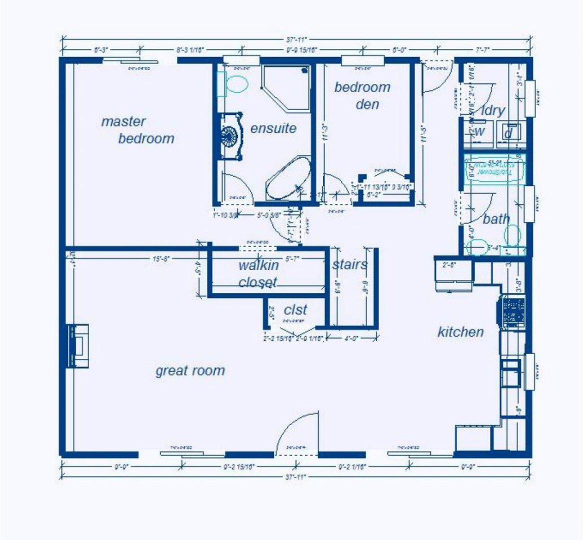
Class

Classes and Objects

Objects are **instances** of **classes.**

Class	**Object**
● Human	● Man, Woman, Child
● Fruit	● Banana, Apple, Peach
● Animal	● Cat, Dog, Bear, etc.

Class



Object

Class

Object

Class

```
String
```

Object

```
String greeting = “Hello world!”

String favoriteClass = “AP Computer Science”

String bestTeacher = “Ms. Molina”
```

Attributes (instance variable) and Behaviors (methods)

An **attribute** or **instance variable** is data the object knows about itself. For example a turtle object knows the direction it is facing or its color.

A **behavior** or **method** is something that an object can do. For example a turtle object can go forward 100 pixels.

Classes and Objects

CLASS	OBJECT
A class is a blueprint from which you can create the instance, i.e., objects.	An object is the instance of the class, which helps programmers to use variables and methods from inside the class.
Classes have logical existence.	Objects have a physical existence.
A class doesn't take any memory spaces when a programmer creates one. (The “idea” of a cat)	An object takes memory when a programmer creates one. (A real, live cat)
The class has to be declared only once. (i.e. “Cat”)	Objects can be declared several times depending on the requirement. (i.e. “Buttons”, “Mr. Bigglesworth”, “Garfield”)

Classes and Objects

```java
import java.util.*;
import java.awt.*;

public class TurtleTest
{
  public static void main(String[] args)
  {
      World habitat = new World(300,300);
      Turtle yertle = new Turtle(habitat);

      int yertlesWeight = yertle.weight;
      System.out.println("Yertle's weight is " + yertlesWeight);

      yertle.forward();
      yertle.turnLeft();
      yertle.forward();
  }
}
```

Class: World

Object: habitat

Class: Turtle

Object: yertle

Object Variable Declaration

<variable name> = new <Class name> (<parameter1>, <parameter2>, …) ;

variable name	**identifier that describe the content of variable**
new	Java keyword stating to create on object of type <Class name>
<Class name>	name of class to create new object
(<parameter1>, <parameter2>,…)	parameter list dependent on the class constructor

`String` Constructor

The `String` class is special class in Java. There are two ways to create a `String` object.

```
1. String s = new String(“Hasta manana”);
2. String s = “Hasta manana”;
```

Attributes (instance variable) and Behaviors (methods)

```
import java.util.*;
import java.awt.*;

public class TurtleTest
{
  public static void main(String[] args)
  {
      World habitat = new World(300,300);
      Turtle yertle = new Turtle(habitat);

      int yertlesWeight = yertle.weight;
      System.out.println("Yertle's weight is " + yertlesWeight);

      yertle.forward();
      yertle.turnLeft();
      yertle.forward();
  }
}
```

Instance variable: weight

method: forward()

method: turnLeft()

Quick Exercise

What are the **instance variables** and what are the **methods** in this class?

```java
public class Dog {
   String breed;
   int age;
   String color;

   void bark() {
   }

   void eat() {
   }

   void sleep() {
   }
}
```

Creating an Object from a Class

- Classes are always defined outside of the main method
- Objects are created inside the main method
- There are 3 steps when creating an object from a class:
    - Declaration: A variable declaration with a variable name and object type
    - Instantiation: The “new” keyword is used to create the object
    - Initialization: The “new” keyword is followed by a call to the constructor

Quick Exercise

On your own, write a quick program that creates a Dog object, prints out it's age, breed, and color (in one line), and then makes it sleep, bark, and then eat.

```
public class Dog {
   public String breed;
   public int age;
   public String color;

   public void bark() {
      System.out.println("Woof!");
   }

   public void eat() {
      System.out.println("Om nom nom nom nom");
   }

   public void sleep() {
      System.out.println("Zzzzzzz");
   }
}
```