CS 103 Computer Programming
Spring 2018

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Week 02

- Basic Pillars of OOP
- Objects & Classes
- Abstraction
- Encapsulation
- Structures vs Classes

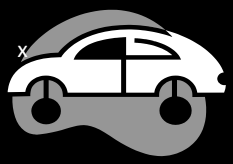
Lecture 04

- Objects and Classes

Basic Pillars of OOP

- Abstraction
- Encapsulation
- Inheritance
- Polymorphism

Everything is an Object



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Object

Everything in thing world is an *object*.

In general we say :

" Any tangible or intangible thing for which we want to save Information".

Classify tangible or intangible objects

- Cup
- BankAccount
- Time
- Desk
- Fan
- TeamPlayer
- Date

Object-Oriented Programming

An object is anything that can be represented by data.

Defining an Object

*An **object*** is a self-contained entity
with attributes and behaviors

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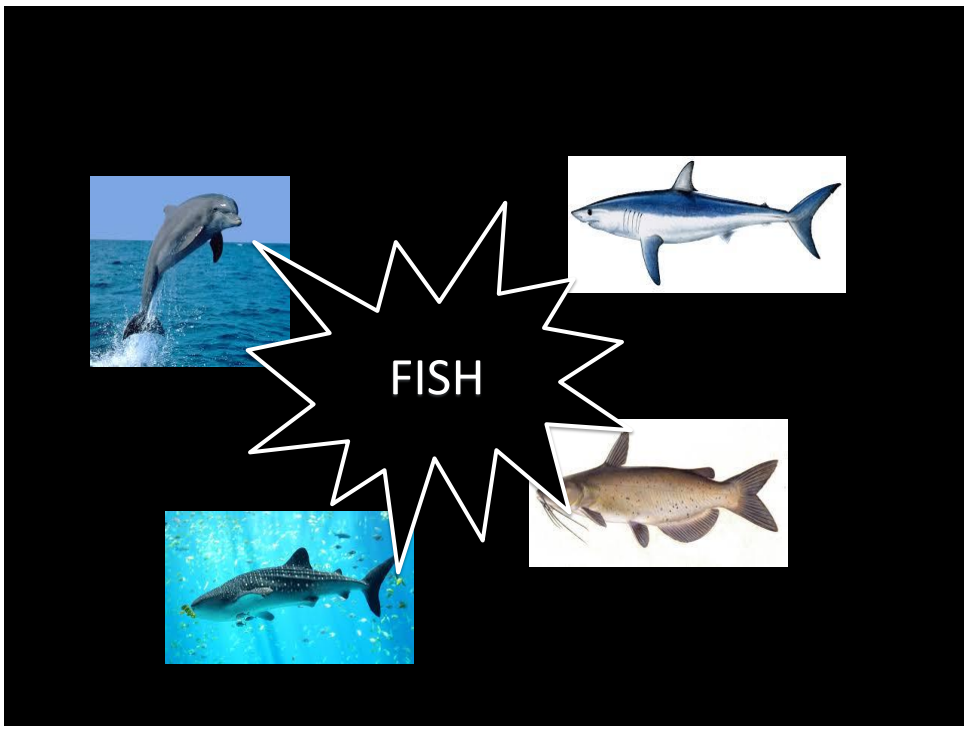
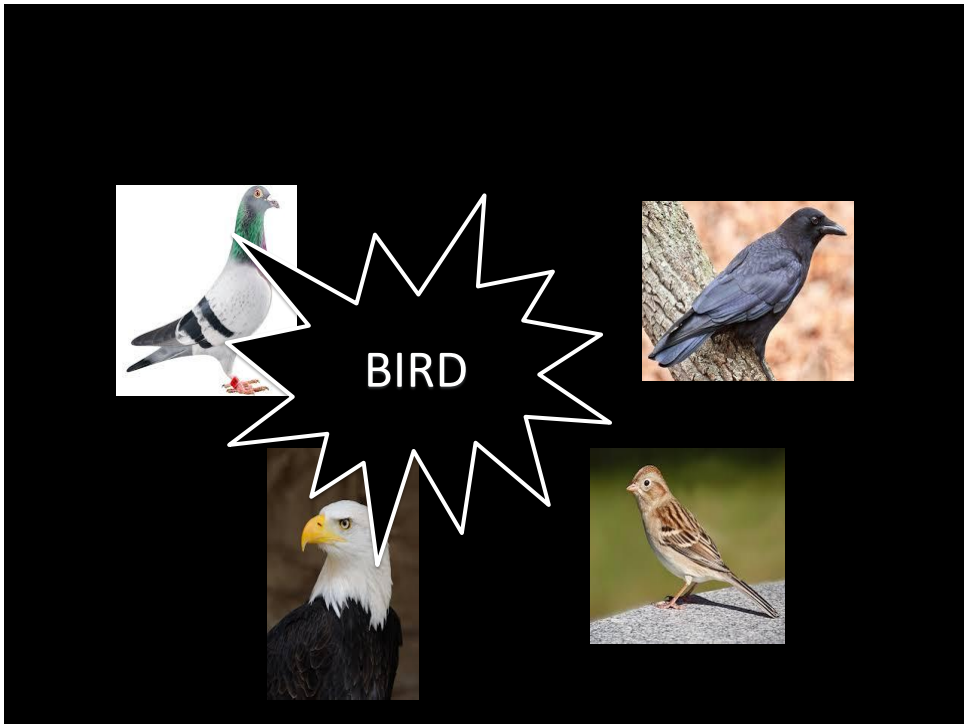
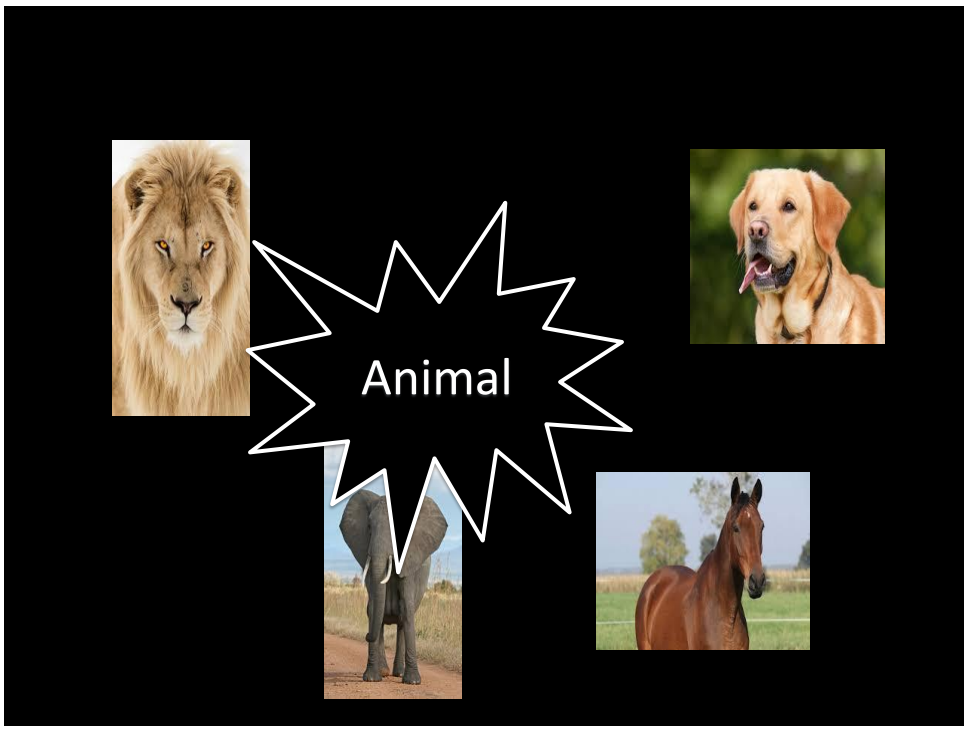
Some Examples


Humans


FISH


BIRD


Animal

Discussion

- Object belongs to a group.
- Which are similar.
- Have some common attributes.
- Have some common behaviors.
- We can categorized objects on some basic features …. ?

Shoe – An Object

Properties

- Size (a number)
- Width (C, D, EEEE, etc.)
- Style (Sneaker, High Heel, Golf, etc.)
- Brand (Nike, etc.)
- Color (Black, etc.)
- Owner (Mine, yours, etc.)

Behavior

- Put on
- Take off
- Tie
- Lace
- Polish
- Buy
- Throw
- Put Away

Your Turn

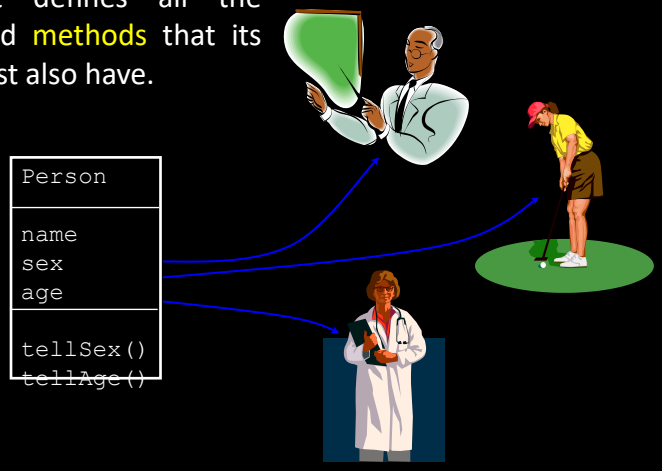
- Phone
- Humans
- Fish
- Bird
- Animals
- Fan

Object

- Technical Definition:
  - "An Object is an Instance of a class"
  - "An Object is the implementation of a class"

Class

- A class is an abstraction of its instances. It defines all the attributes and methods that its instances must also have.



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Class

- Collection of Similar object.
  - The objects that share some common features.
  - It is the a design of an object.
  - It is a detail of an object.
  - It tell us what an object contains in it.

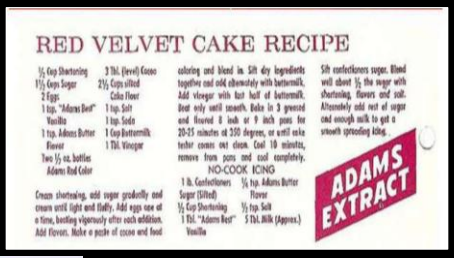
Class

- Technical Definition:
  - " A class is blueprint of an object"
  - " A class is a template of an object"
  - A ***class*** is a group of objects with the same properties and the same behavior.

Instance and Instantiation

- Each copy of an object from a particular class is called an ***instance*** of the class.
- The act of creating a new instance of a class is called ***instantiation*****.**

Classes & Objects



Class Vs Instance-Example

- A class is like a recipe for red velvet cake.
- The recipe itself is not a cake.
- You can't eat the recipe (or at least wouldn't want to).
- If you correctly do what the recipe tells you to do (instantiate it) then you have an edible cake.
- That edible cake is an instance of the red velvet cake class.

Class Vs Object

- Class Bicycle:

Bicycle
Speed Gear
ChangeGear() SpeedUp() ApplyBrake()

- Object: Ali's Bicycle

Instances of a Class- Bicycle

Two different instances of the same class will have the same properties, but different values stored in those properties.

Summarize

- A class :
  - It's a blue print .
  - It's a design or template.

An Object:

- Its an instance of a class.
- Implementation of a class.

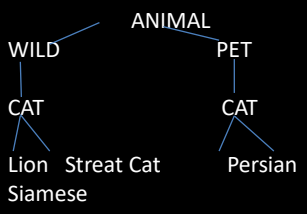
NOTE: Classes are invisible, object are visible

Generalized Class

- The class that only exhibits the common features of its objects.
- Examples:
  - ANIMAL
  - BIRDS
  - HUMAN
  - No object of generalized class is found.

Specialized Class

- The class that exhibits different or unique features (behaviors)
- ANIMAL (Generalized)
  - Specialized:
    - Mammals
    - Cats
    - Dog



Review

Quiz coming next week