Principles of Object Oriented Programming (CS2012)

Lecture 1

Programming

- Is challenging
- Could be fun
- Could be stressful
- Comes in many forms
- Is an essential knowledge pillar

Have you Done Any Programming?

Let’s Start a Simple Activity

- Simulate your own game
- Read the hand out and suggest a suitable name for the game
- Identify the entities in this simulation
- Fill the character sheet for your warrior

How can We Implement this in Python?

- I.E., only using what you learnt at first semester
- Let’s consider warriors only

```
name = ‘Frodo’
category = ‘warrior’
type = ‘normal’
Immortality = False
inventory = {‘stick’:1, ‘binoculars’:0}
```

How can We Implement this in Python?

```
playerNames = [‘Frodo’, ‘Samwise’, ‘Meriadoc‘]
categories = [‘warrior’, ‘warrior’, ‘warrrior’]
playerTypes = [‘normal’, ‘super’, ‘normal’]
playerInventories = [{‘stick’:1, ‘binoculars’:0},
               {‘stick’:1, ‘binoculars’:1}, {‘stick’:1,
               ‘binoculars’:0}]
```

Object Oriented Programming

- Objects can be used effectively to represent real-world entities
  - Warriors, monsters, trees, binoculars…..
- As another example, an object might represent a particular employee in a company
- Each employee object handles the processing and data management related to that employee
- Think of some other examples

Object Oriented Programming

- An object has:
  - *state* - descriptive characteristics
  - *behaviors* - what it can do (or what can be done to it)
- The state of a bank account includes its account number and its current balance
- The behaviors associated with a bank account include the ability to make deposits and withdrawals
- Note that the behavior of an object might change its state

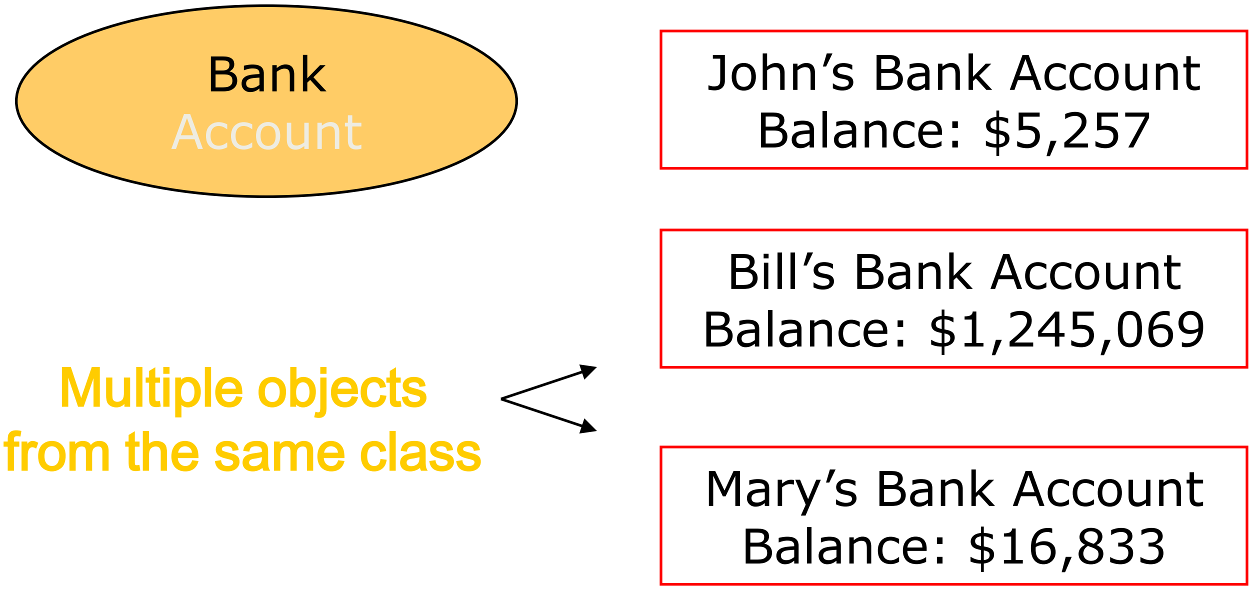
Classes

- An object is defined by a *class*
- A class is the blueprint of an object
- Multiple objects can be created from the same class

Objects vs Classes

A class
(the concept)

An object
(the realization)



Bank
Account

John’s Bank Account
Balance: $5,257

Bill’s Bank Account
Balance: $1,245,069

Mary’s Bank Account
Balance: $16,833

Multiple objects
from the same class

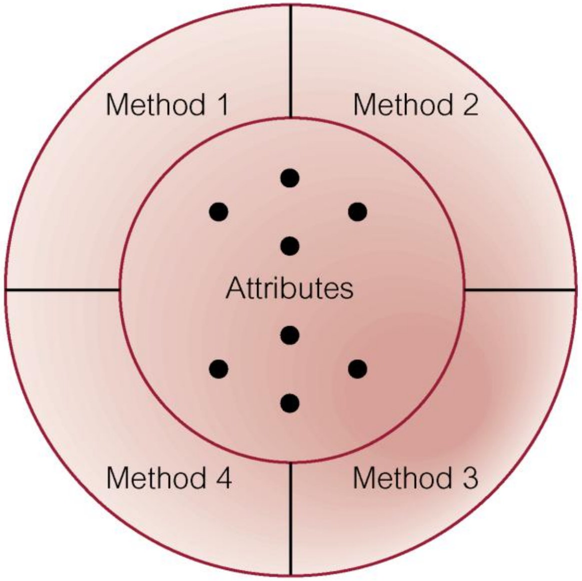
Attributes

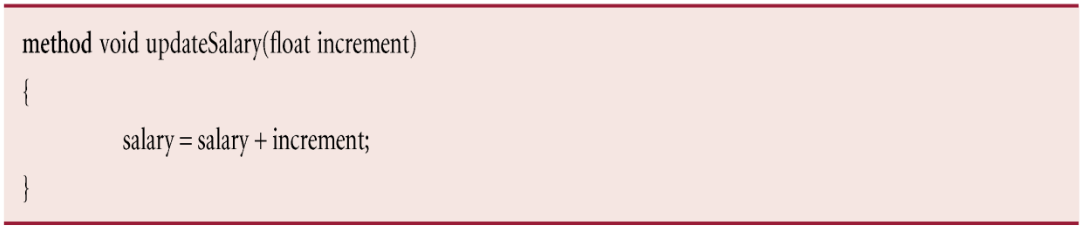
- Contain current state of an object
- Attributes can be classified as simple or complex.
- Simple attribute can be a primitive type such as integer, string, etc., which takes on literal values.
- Complex attribute can contain collections and/or references.

Methods and Messages

Method: Defines behavior of an object.

Message: Request from one object to another asking second object to execute one of its methods.





```
method void updateSalary(float increment)
{
        salary = salary + increment;
}
```

Exercise

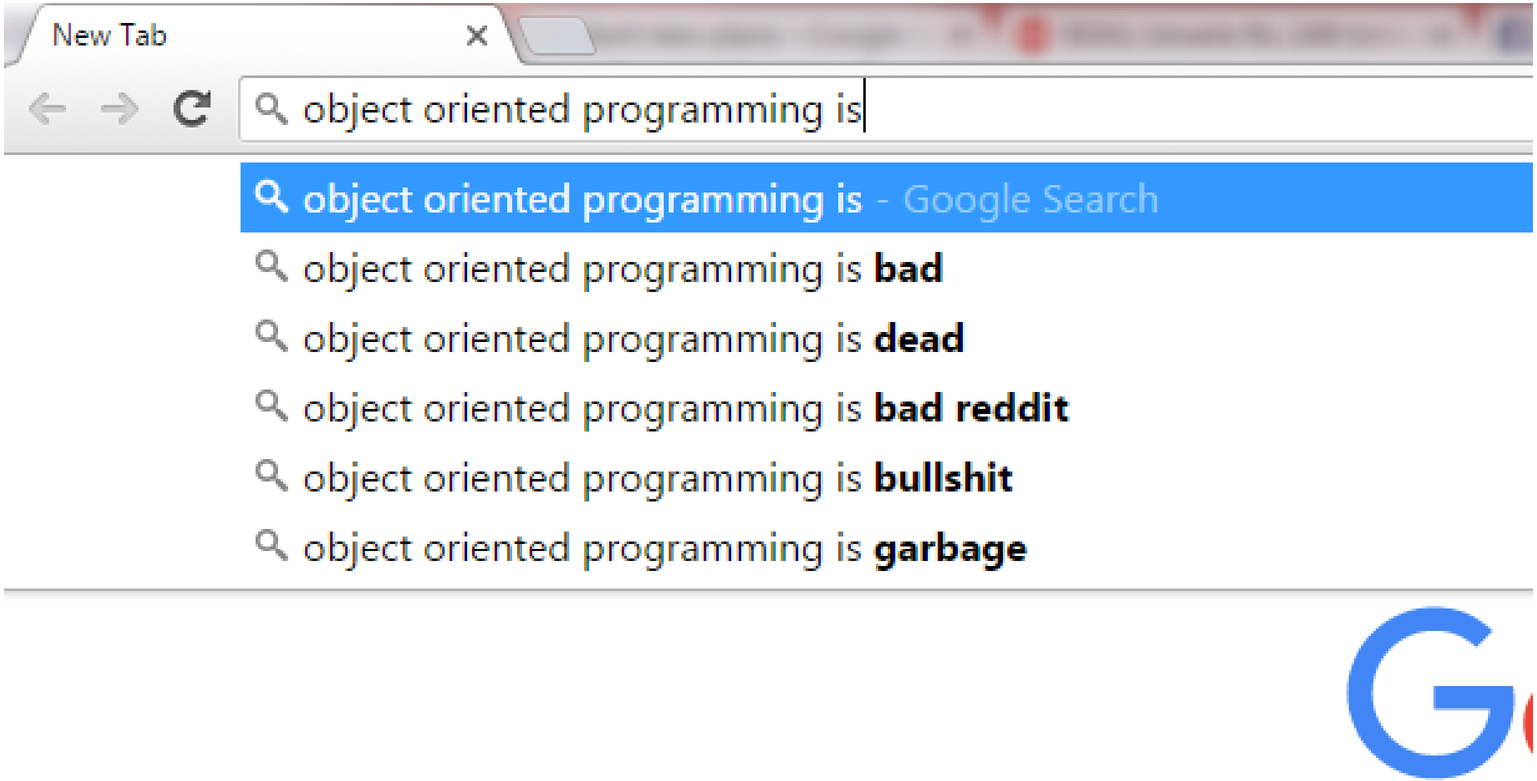
- Think of an object
  - What is the class it belongs to?
  - What are its attributes?
  - What are its methods?

Identifying Objects/Classes

- Look for nouns in the problem description
  - Could be misleading sometimes
- Look for interactions
- How to identify behavior?
  - Look for verbs

When a teacher is conducting a class, he or she will show lecture slides on the projector, write explanations on the whiteboard and verbally discuss study material. The teacher will also ask questions from the class and answer student questions.

Object Oriented Programming is



object oriented programming is

object oriented programming is - Google Search

object oriented programming is **bad**

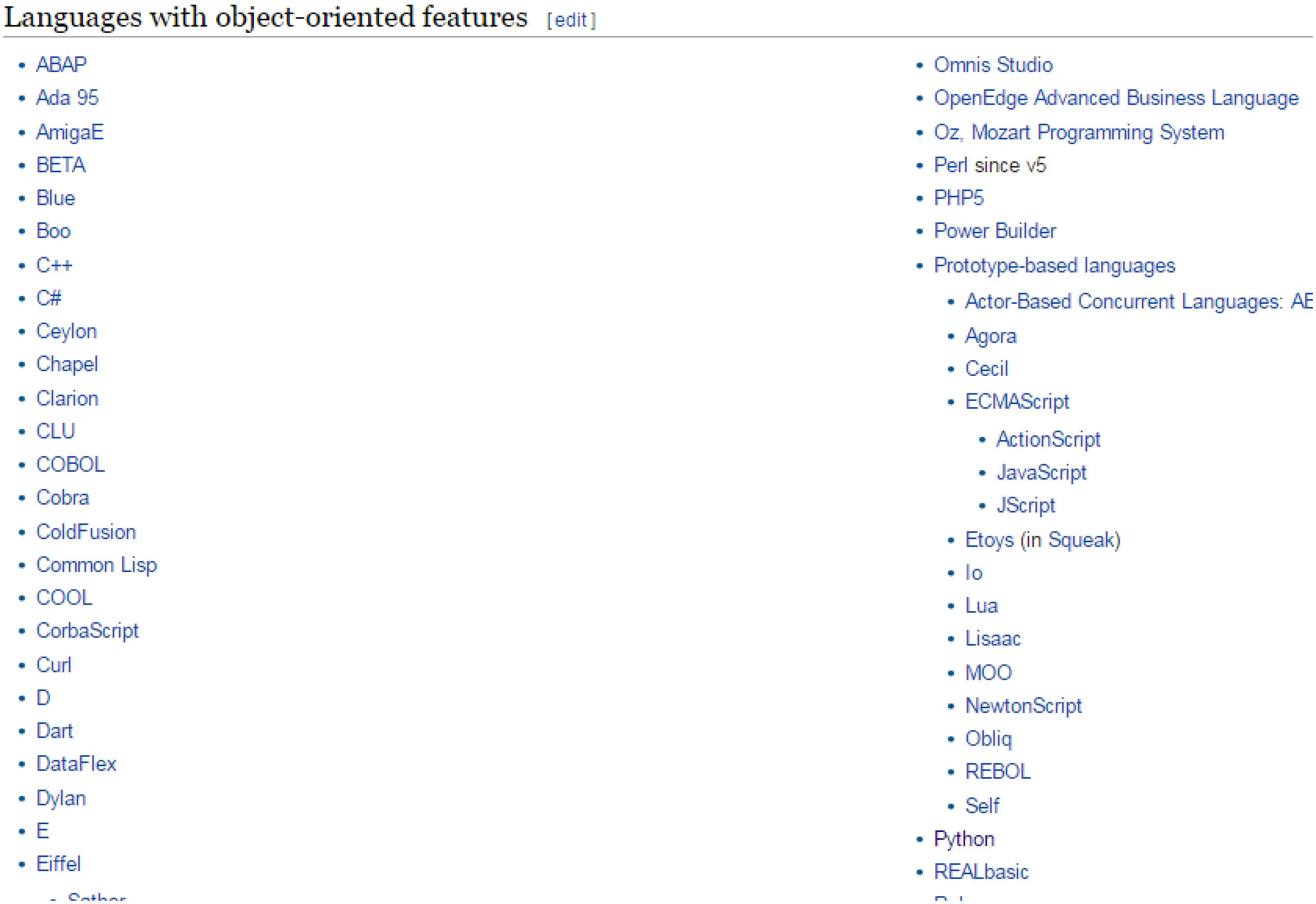
object oriented programming is **dead**

object oriented programming is **bad reddit**

object oriented programming is **bullshit**

object oriented programming is **garbage**

OOP languages

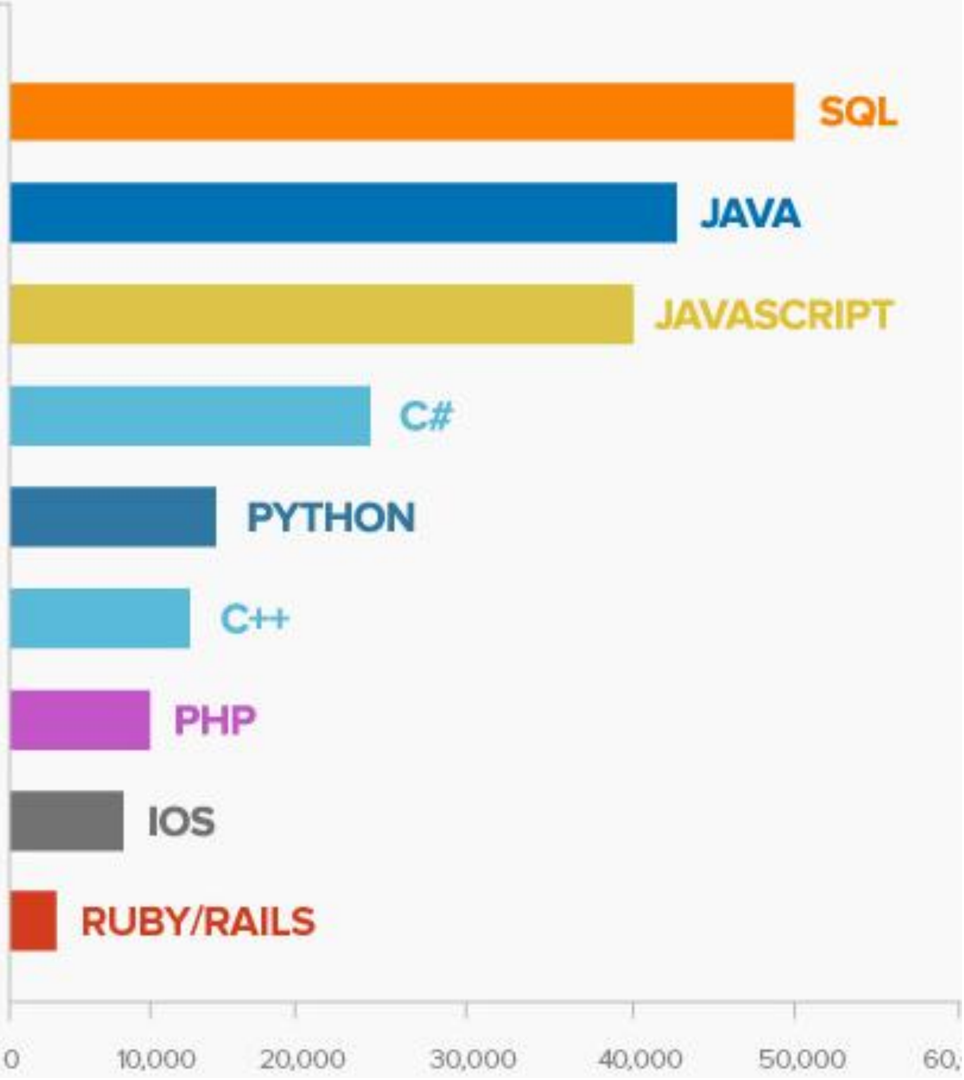


Languages with object-oriented features [edit]

- ABAP
- Ada 95
- AmigaE
- BETA
- Blue
- Boo
- C++
- C#
- Ceylon
- Chapel
- Clarion
- CLU
- COBOL
- Cobra
- ColdFusion
- Common Lisp
- COOL
- CorbaScript
- Curl
- D
- Dart
- DataFlex
- Dylan
- E
- Eiffel
    - Sather
- Omnis Studio
- OpenEdge Advanced Business Language
- Oz, Mozart Programming System
- Perl since v5
- PHP5
- Power Builder
- Prototype-based languages
    - Actor-Based Concurrent Languages: AE
    - Agora
    - Cecil
    - ECMAScript
        - ActionScript
        - JavaScript
        - JScript
    - Etoys (in Squeak)
    - Io
    - Lua
    - Lisaac
    - MOO
    - NewtonScript
    - Obliq
    - REBOL
    - Self
- Python
- REALbasic

Languages ranked by number of programming jobs

Data from Indeed.com 2016



Basic Java Program

```
public class MyFirstJavaProgram {
	Student aStudent;

	public static void main(String []args) {
		aStudent = new Student(0131234);
		int student_id_number = aStudent. getStudentIdNumber();
	}
 }
public class Student{
	int student_id_number;
	public Student(int student_id_number)
	{
		this.student_id_number = student_id_number;
	}
	public int getStudentIdNumber()
	{
		return student_id_number;
	}
}
```