

# **Classes and Objects**

**CS 8: Introduction to Computer Science**  
**Lecture #16**

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# Administrative

- 2 MORE CLASSES TO GO! 😊

M	T	W	Th	F
6/5	6/6 <b>LECTURE 16</b> HW7 due	6/7  Work on your Project2 in lab	6/8 <b>REVIEW</b> HW8 due Project2 due	6/9 <i>Review session</i> <i>Last day of</i> <i>Spring classes</i> <i>at UCSB</i>
6/12	6/13	6/14	6/15  <b>FINAL EXAM</b> <b>at 4PM</b>	6/16

# IMPORTANT NOTE!

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**NO** assignment (hwk, lab, project) will be accepted to be turned in **AFTER** the **LAST** lecture/class on **THURSDAY 6/8!**

(“late” assignments policy will not apply – we simply will not accept them)

# Review Sessions

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- Review sessions next week with T.A. Sourav
  - See announcements on Piazza
- In-class review for the final exam on Thursday, 6/8.

# Lecture Overview

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- Classes and Objects

# Object Oriented Programming

- OOP is a style of programming that focuses on using **objects** to design and build applications.
- An object is akin to a **model** of the concepts, processes, or things in the real world that are meaningful to your application
- These concepts can be defined in a computer language and are called **classes**.

# OOP and Python *classes*

## *Essence of object-oriented programming:*

- An **object** is an **instance** of a class
- The **class** defines what data an object knows (or what it is), and what operations an object can carry out
  - Instance data – what an object knows: its state
  - Methods – what an object can do

# Examples on the Concept

- A person has multiple characteristics about him/her
  - Name
  - Age
  - Height
  - Date of birth
  - Favorite music
  - Least favorite member of the Rolling Stones
  - Etc...

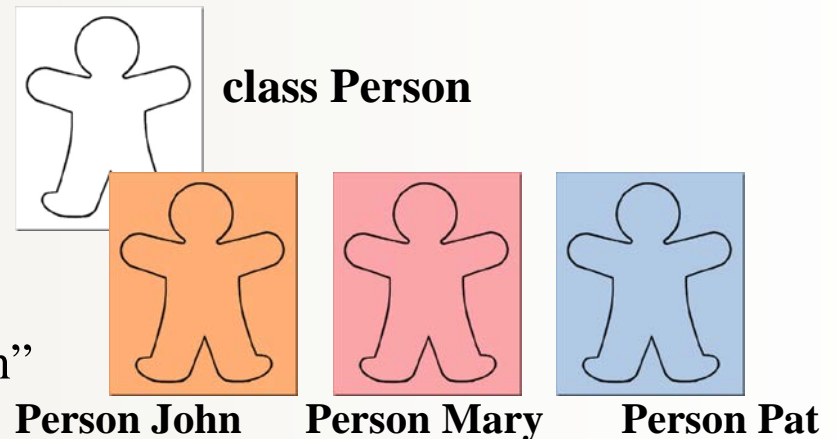


# Examples on the Concept

- I can create a class of “Person” that has *instance data* on:
  - Name
  - Age
  - Height
  - Date of birth
  - Favorite music
  - Least favorite member of the Rolling Stones
  - Etc...

# Examples on the Concept

- I can create a class of “Person” that has *methods* of:
  - Calculates how many days until next birthday
  - Prints out a statement on how much he/she hates their least favorite member of the Rolling Stones
  - Etc...



- So I create a class called “Person”
- Then I make instances of this class:
  - These are objects of the class “Person”
- So, **John.age** = 40 while **Mary.age** = 22, etc...
- Or, **John.height** = 5.8 while **Mary.height** = 6.2, etc...
- Note the use of the “.” to access the member variable
  - Called the “dot operator”

# Where Have We Seen Classes Before in CS8?

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- Objects of Python's class **Turtle** for example:
  - Instance data include **color, heading, position**
  - Methods include **forward, backward, penup**

# Example: class Planet

- In Python – a class's *constructor* defines what an object of the class will know

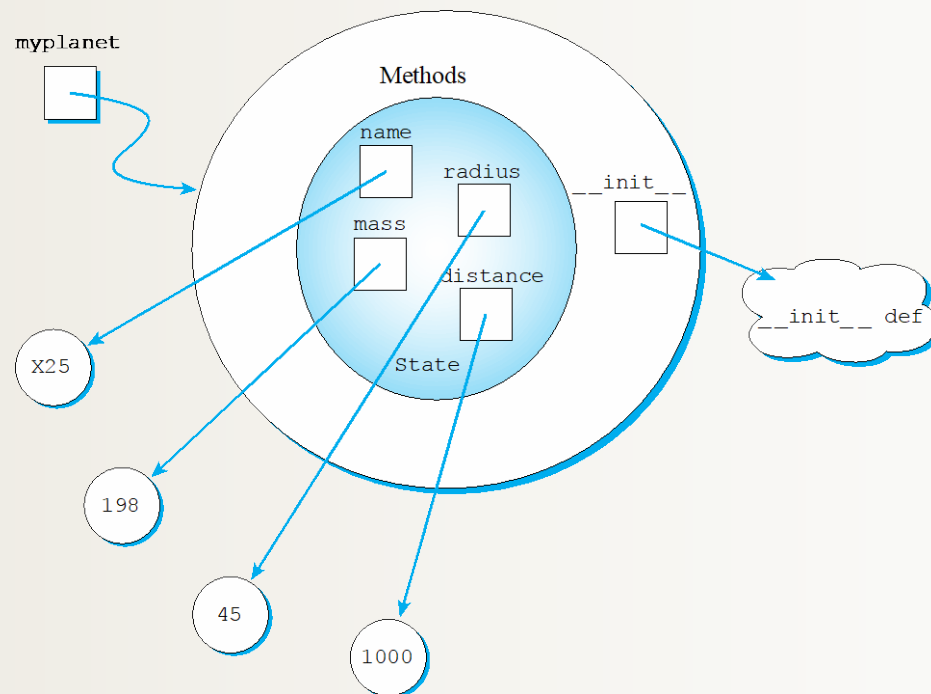
```
class Planet:
    def __init__(self, iname, irad, im, idist):
        self.name = iname
        self.radius = irad
        self.mass = im
        self.distance = idist
    ...
```

- A Planet object will know its own name, radius, mass, and distance from the sun

# Constructing a Planet Object

- Creating an object invokes the constructor

```
>>> myplanet = Planet('X25', 45, 198, 1000)
```



# Adding Some Planet Methods

- **Accessor methods** access the data values

```
def getName(self):  
    return self.name
```

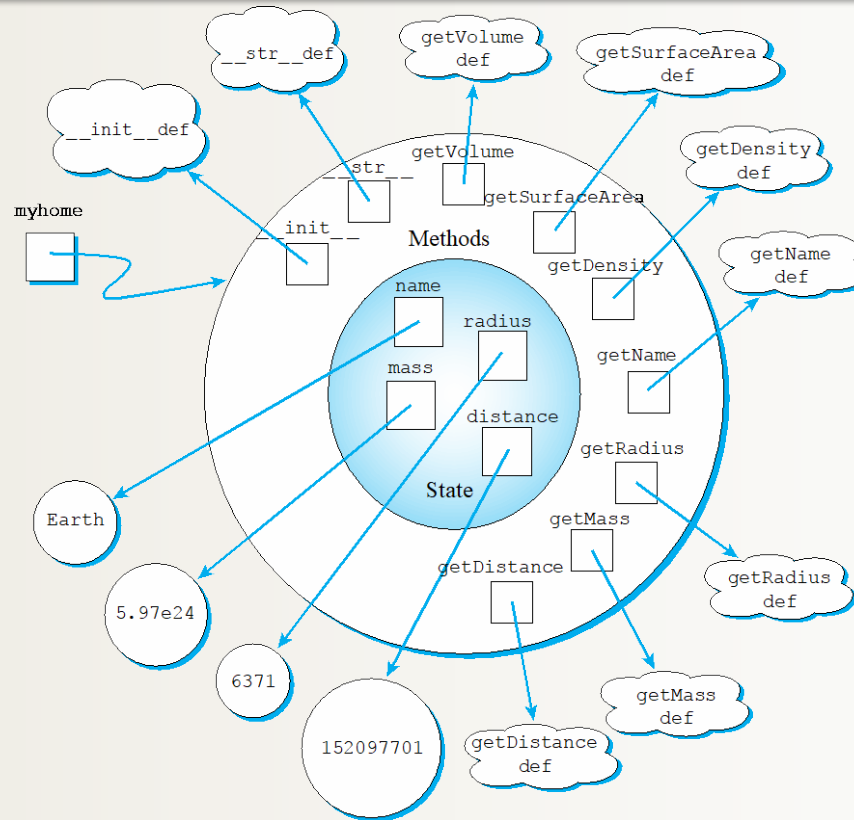
- Also `getRadius`, `getMass`, `getDistance`

- **Mutator methods** change the data values

```
def setName(self, newname):  
    self.name = newname
```

- Also `setRadius`, `setMass`, `setDistance`

# A more complete Planet object



**DEMO  
TIME!**

See class Planet (Planet.py) and animation example (animatedPlanets.py) in the course demo directory online

# CS 8 is done! What do I do now? ☹️

- Lots more Python techniques to learn about
  - Keep reading the textbook, and see <http://www.python.org/>
- Many other programming languages to learn
  - CS 16 and 24 are mostly C++, and later CS courses include C, Java, ...
  - VisualBasic, C#, Ruby ... at UC Extension, SBCC, and tech schools like SB Business College
- BTW, you *can* learn new programming languages by yourself now!
  - Specifics: get a book, and/or look for online tutorial

**And don't  
forget to  
play  
around  
with code!  
It's a skill!**



**</LECTURE>**