Introductory Computer Science
Week 5 – Object Oriented Programming (cont'd)

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Administrative items

- You're probably wondering why this week is a PowerPoint instead of a pdf
- Exercises
- New Problem Set
- Assignment
- Test next week

Itinerary

1. ~~Introduction and Git~~
2. ~~Programming With Python*~~
3. ~~Memory Model and Debugging*~~
4. ~~Object Oriented Programming~~
5. Object Oriented Programming
6. Test day
7. Linked Lists

* = What will be tested

Let's take the Person example from last lecture

But let's change it up a bit more. A person has…

- A name
- An age
- A greeting when a Person object is printed
- A method to get the age of a person

Let's extend a bit more

You are asked to make a Professor class, and a Student class. Remember that

- A Professor is a Person
- A Student is a Person

Professor	Student
Has a Salary	Has a Student ID
	Doesn't like being called 17 or under

Two important concepts in OOP

- **Encapsulation:** As long as the output is what I wanted, I do not care about any implementation details
- **Inheritance:** Class A "IS A" Class B

Another example

- A rectangle has a length and a width
- A rectangle has a get_area method
- The rectangle can be changed by either a set_length method or a set_width method

Extend this!

- ~~A rectangle has a length and a width~~
- ~~A rectangle has a get_area method~~
- ~~The rectangle can be changed by either a set_length method or a set_width method~~
- A Square has sides of equal length
- A Square has a get_area method
- A Square can change its side

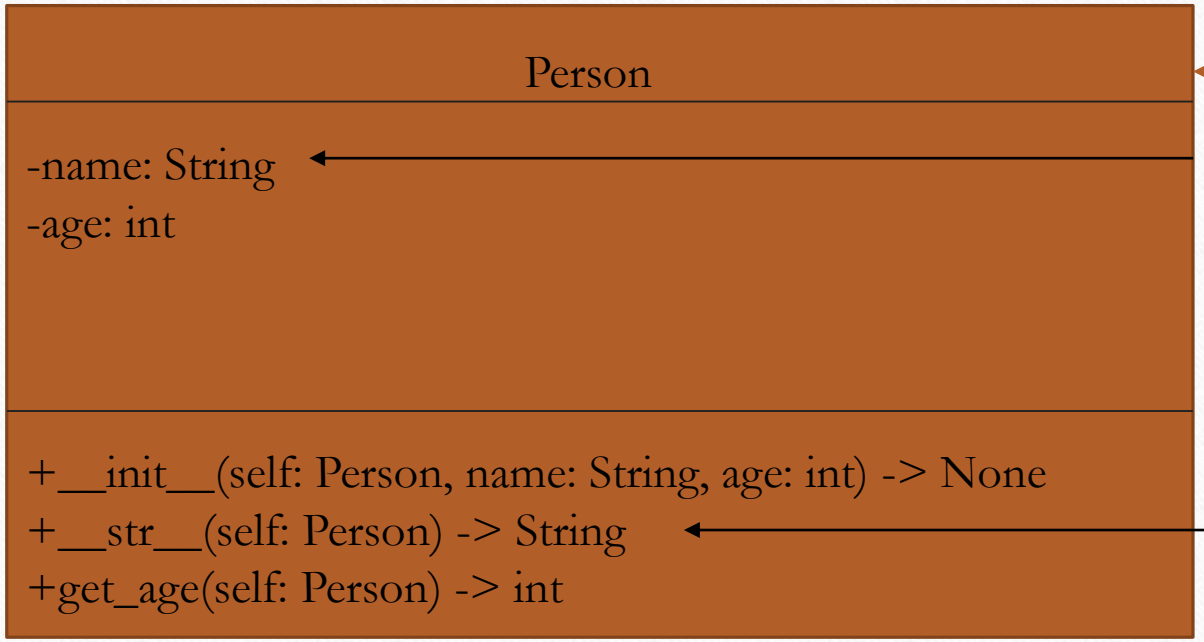
Additional important concepts

- **Association**: Class A "HAS-A" Class B
- **Composition:** Class A "PART-OF" Class B

Differences:

- Association: Let Class A use Class B (that's already instantiated)
- Composition: Instantiate Class B inside of Class A

Unified Modelling Language



Name of class

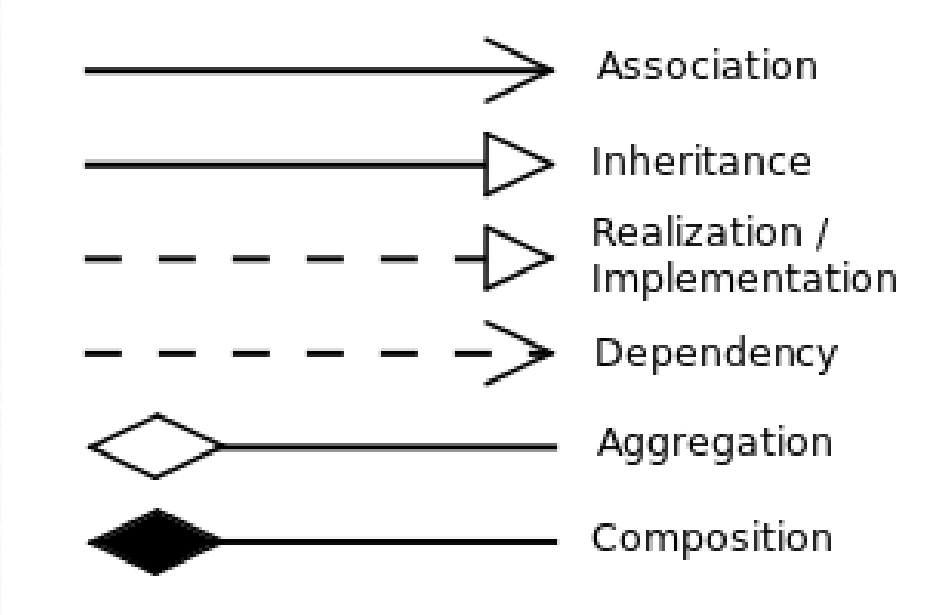
Attributes of the class

- '-' in the beginning means private
- name_of_class_variable: type

Methods of the class

- '+' in the beginning means public
- Parameters are listed, specifying types
- An arrow followed by the type is what is returned

Relationships between classes



For simplicity