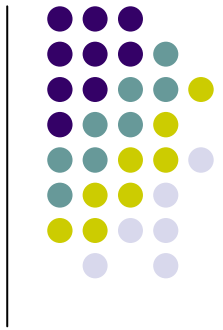
Unified Modeling Language (UML), v. 1.3

- Standard notation to
  - specify, visualize and document

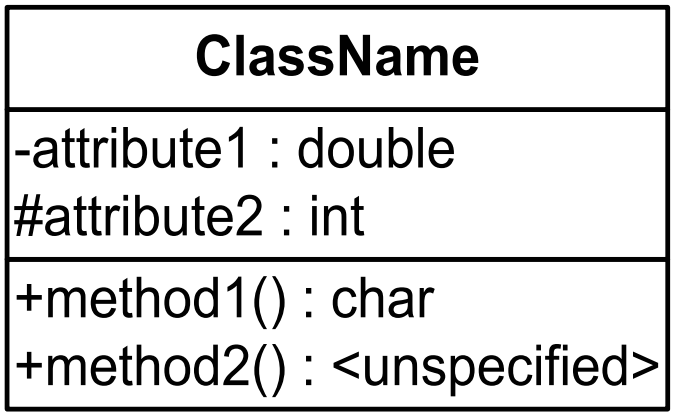
  developing models
  - including their structure and design
- Class Diagram Notation
  - shows classes and
  - relationships between them

Classes



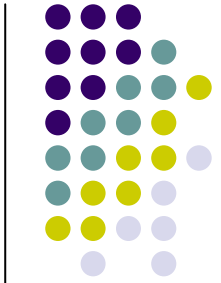
- Attributes are presented as

  global variables
- Operations are presented as methods
- Accessing attribute values
  - get method to return the value
  - set method to set the value

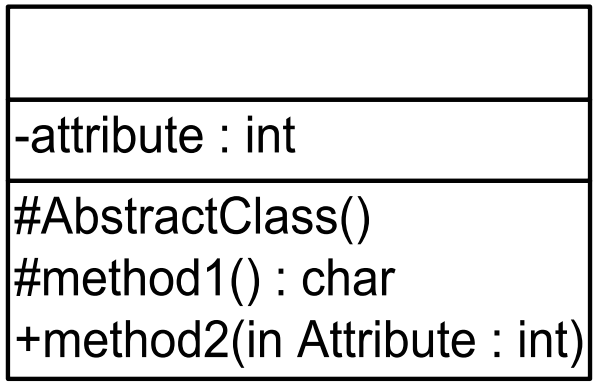


- Visibility
  - \+ *public* (for everybody)
  - \- *private* (for itself only)
  - \# *protected* (for subclasses)
  - ~ *package* (inside package)

Abstract Classes

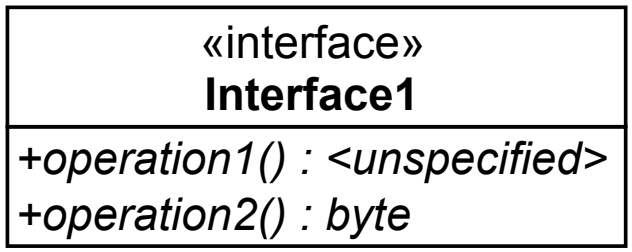


- Are not fully implementation
  - needs to be extended with final implementation
- Notation
  - class name written in *Italic*

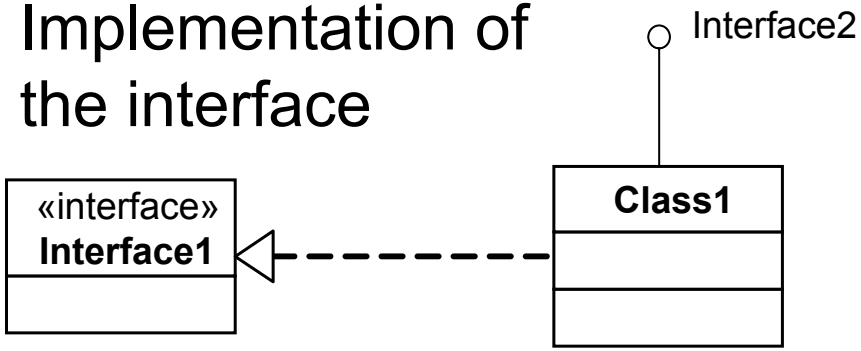


Interface

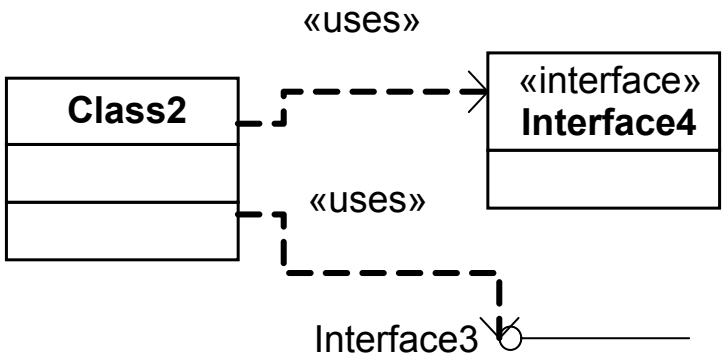
- Same notation as class except:
  - has word “interface”
  - does not have attributes
  - all methods are public
- Additional notation for implementation



Implementation of the interface



Using the interface



Association

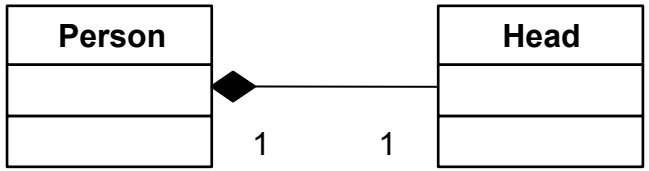
- Relationship between the instances of two classes (Class1, Class2)
  - Class1 containing link to Class2
  - Class1 creating an instance of Class2
  - Class1 sending message to Class2
  - Class1 receiving a message containing Class2

- Multiplicity or Cardinality

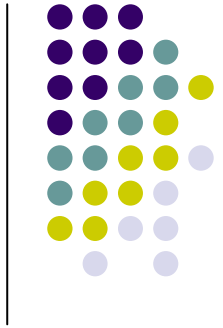
1	0..1	0..*	*
n	1..n	1..*	

Aggregation and Composition

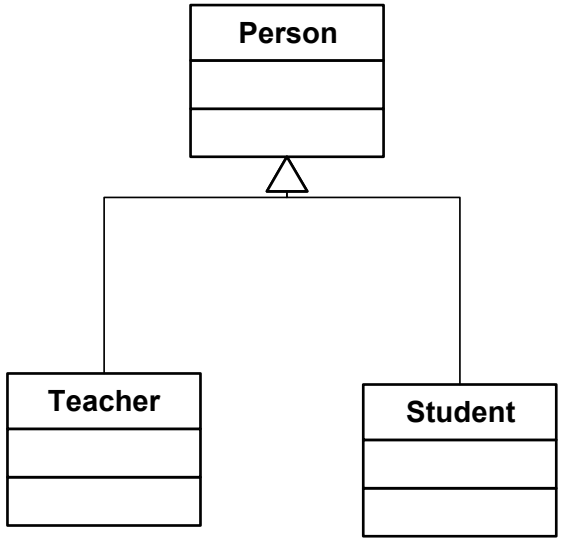
- Whole-part relationship
  - “whole” class contains “part” class
- Aggregation: instances of both classes can exist independently
- Composition: both instances need each other to exist



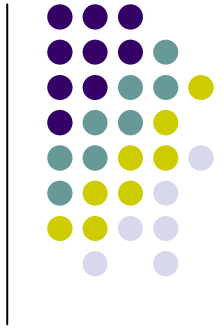
Inheritance



- Is-a relationship (Generalization)
  - Mountain bike is a bicycle
  - Superclass is a general class
  - Subclass is instance of/extends Superclass
- Subclass inherits from Superclass
  - all attributes and operations
  - except private



Useful links



- UML official pages
  http://www.omg.org/uml/
- Specification of UML standard
  http://**www.omg.org**/technology/documents/formal/uml.htm
- Non-commercial drawing program
  http://www.gnome.org/projects/dia/
- Tutorials
  http://**www.smartdraw.com**/resources/centers/uml/uml.htm
  http://www.auldenfire.com/aitpncc/resources/uml.shtml
- Books
  - B. Oestereich: Developing Software with UML