



COMPUTER PROGRAMMING

WEEK 6

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INHERITANCE

A child inherits characteristics of its parents

Besides inherited characteristics, a child may have its own unique characteristics

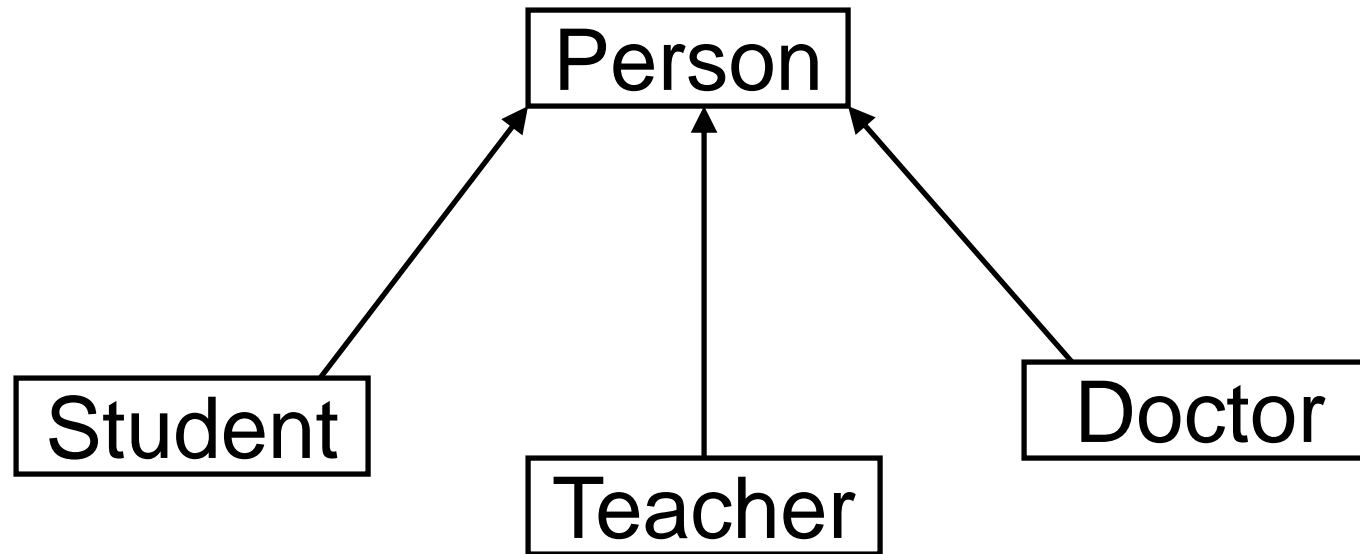
INHERITANCE IN CLASSES

If a class B inherits from class A then it contains all the characteristics (information structure and behaviour) of class A

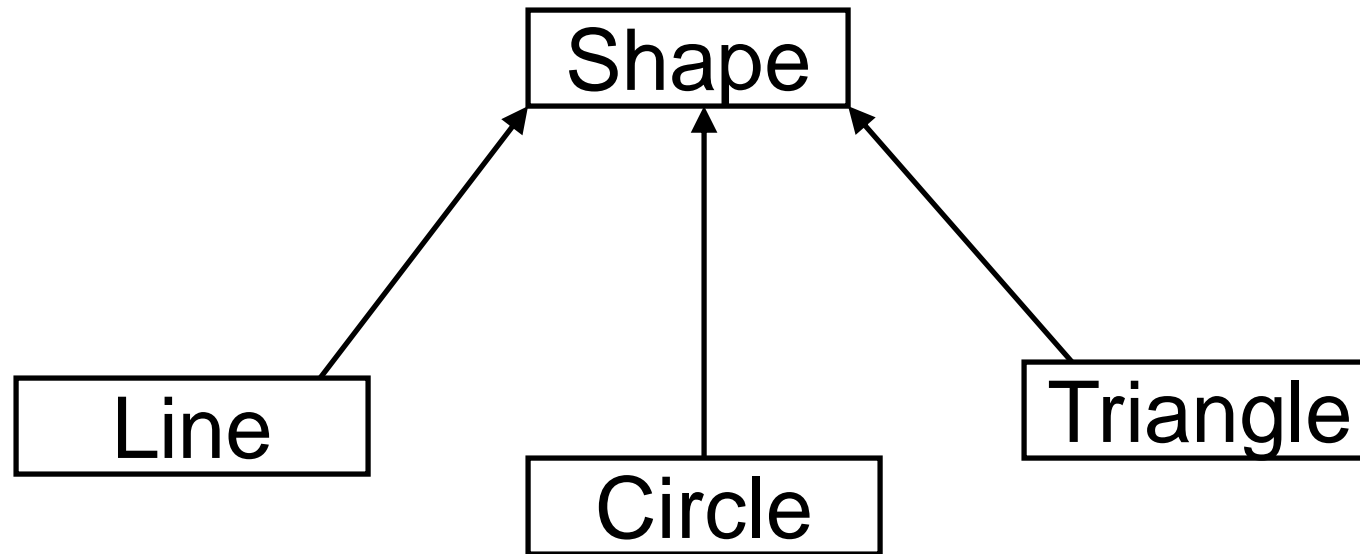
The parent class is called *base* class and the child class is called *derived* class

Besides inherited characteristics, derived class may have its own unique characteristics

EXAMPLE — INHERITANCE



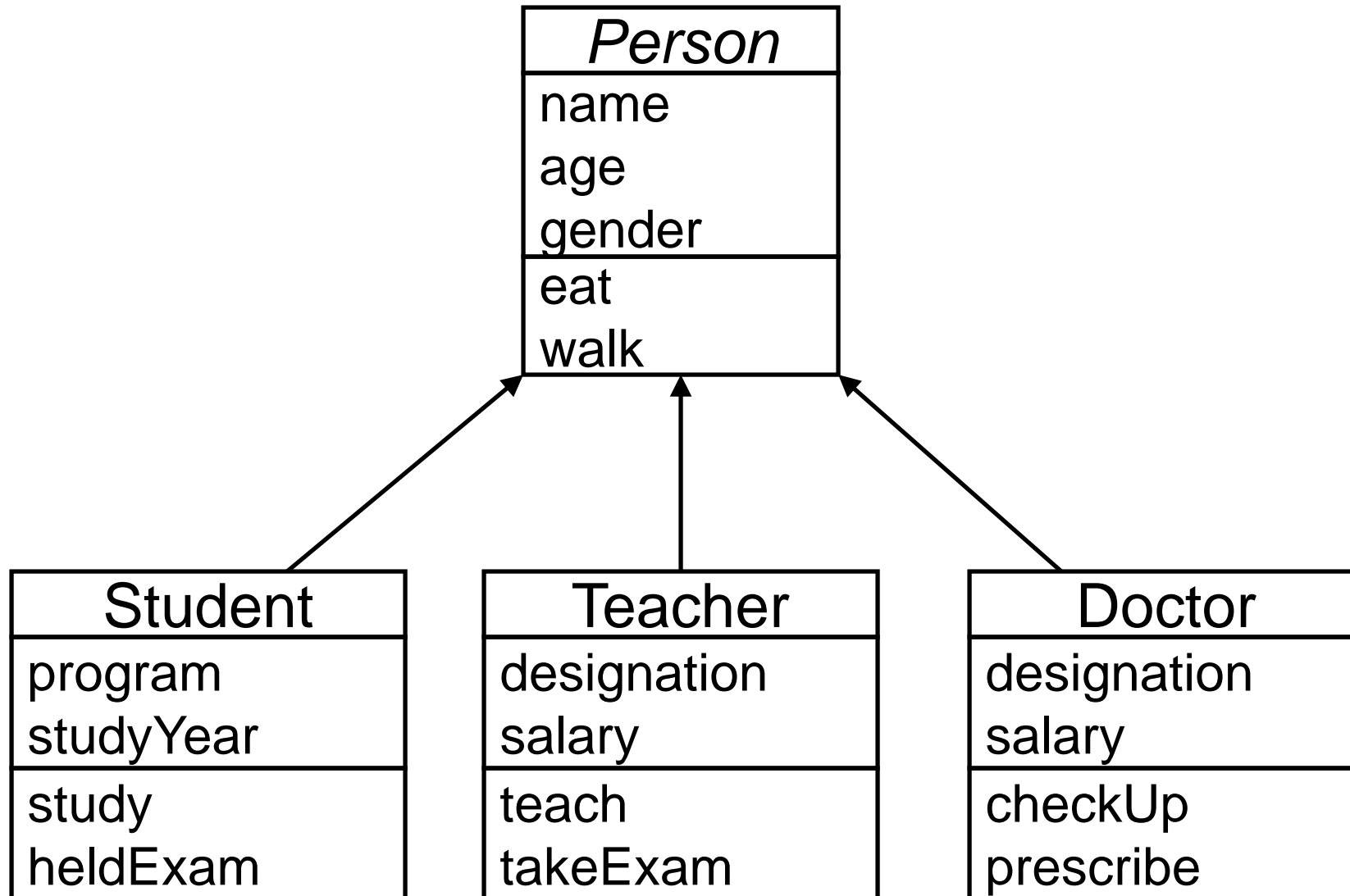
EXAMPLE — INHERITANCE



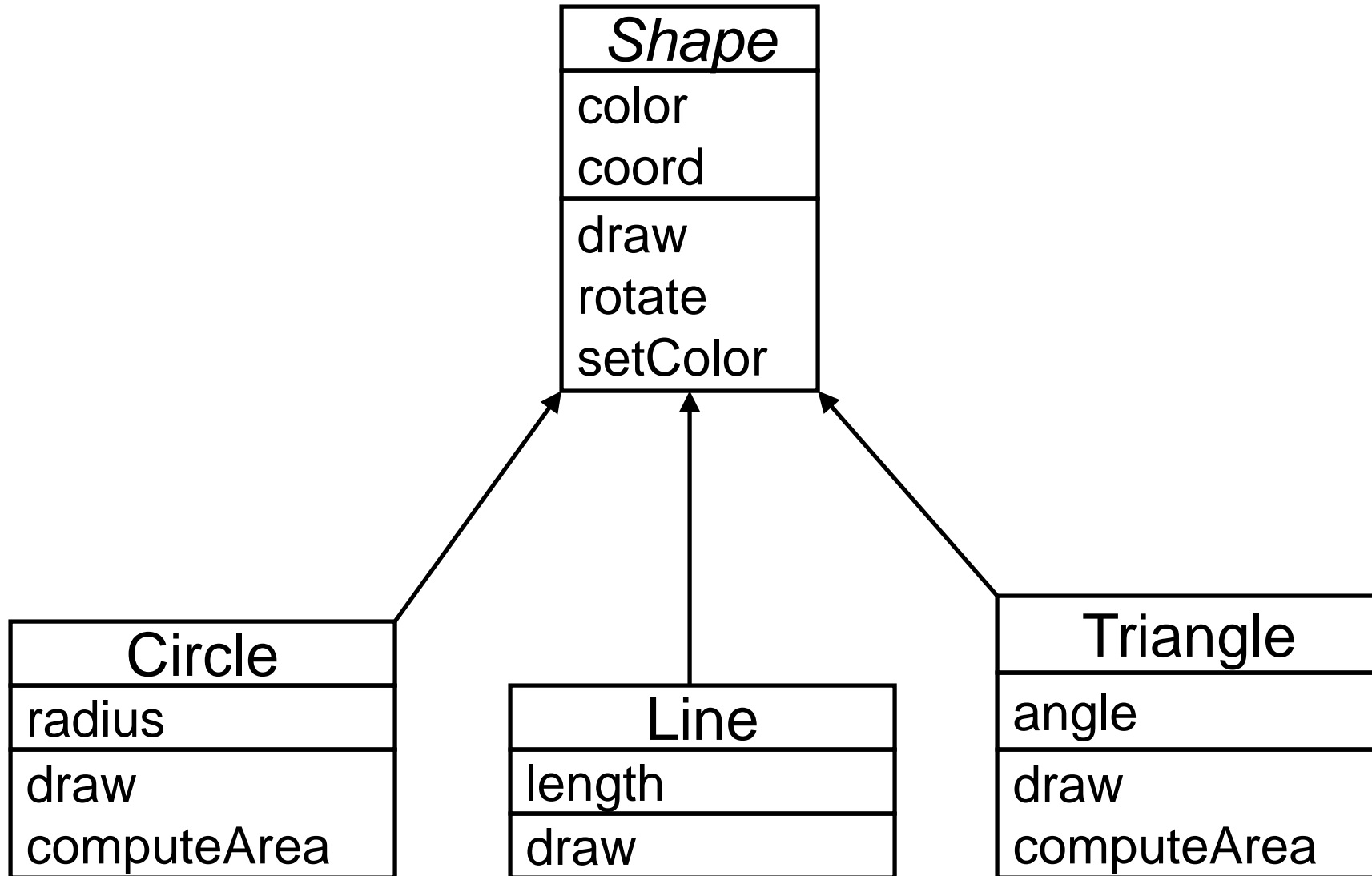
INHERITANCE — “IS A” OR “IS A KIND OF” RELATIONSHIP

Each derived class is a special kind of its base class

EXAMPLE — “IS A” RELATIONSHIP



EXAMPLE — “IS A” RELATIONSHIP





INHERITANCE — ADVANTAGES

Reuse

Less redundancy

Increased maintainability

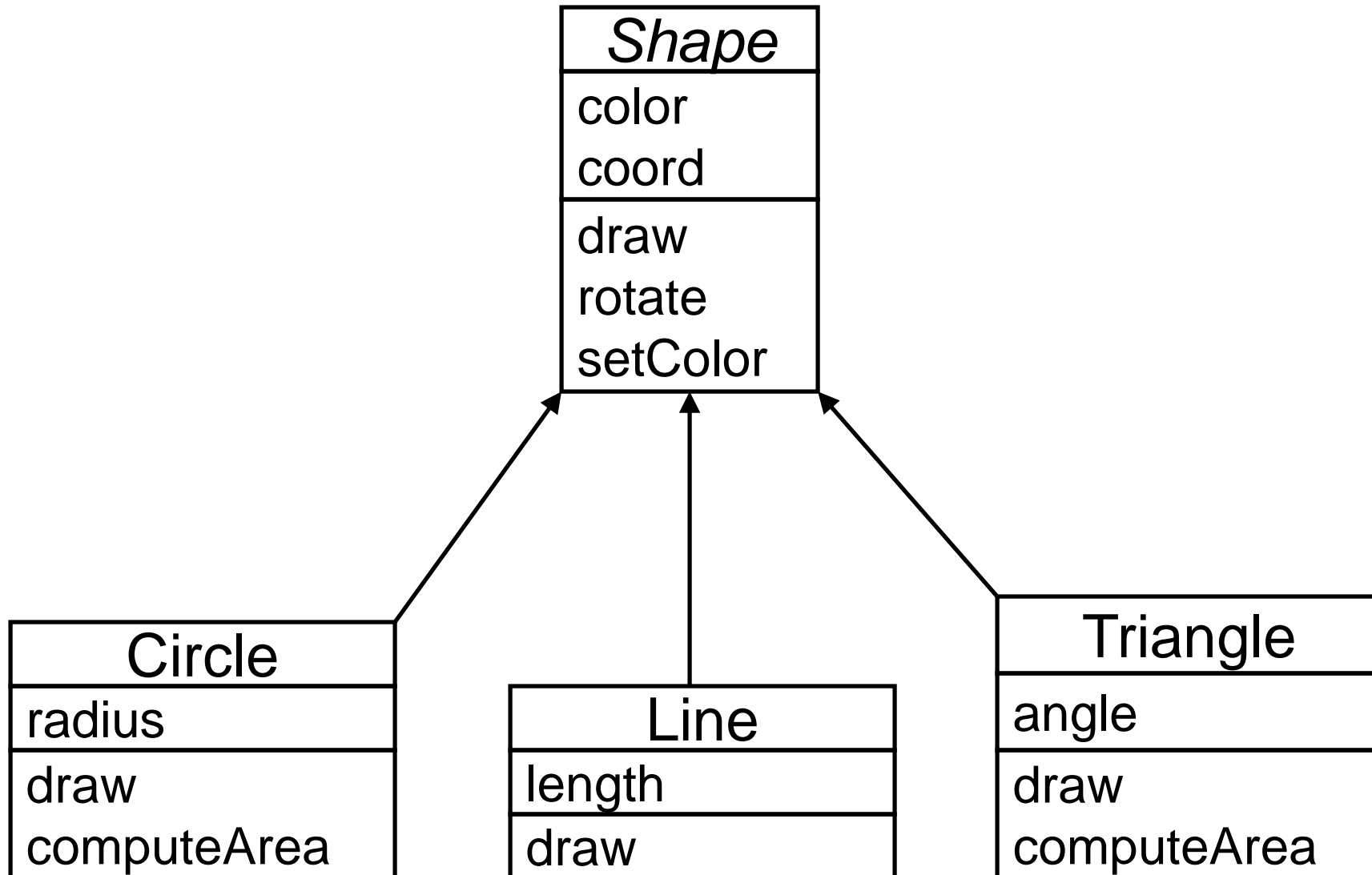
REUSE WITH INHERITANCE

Main purpose of inheritance is reuse

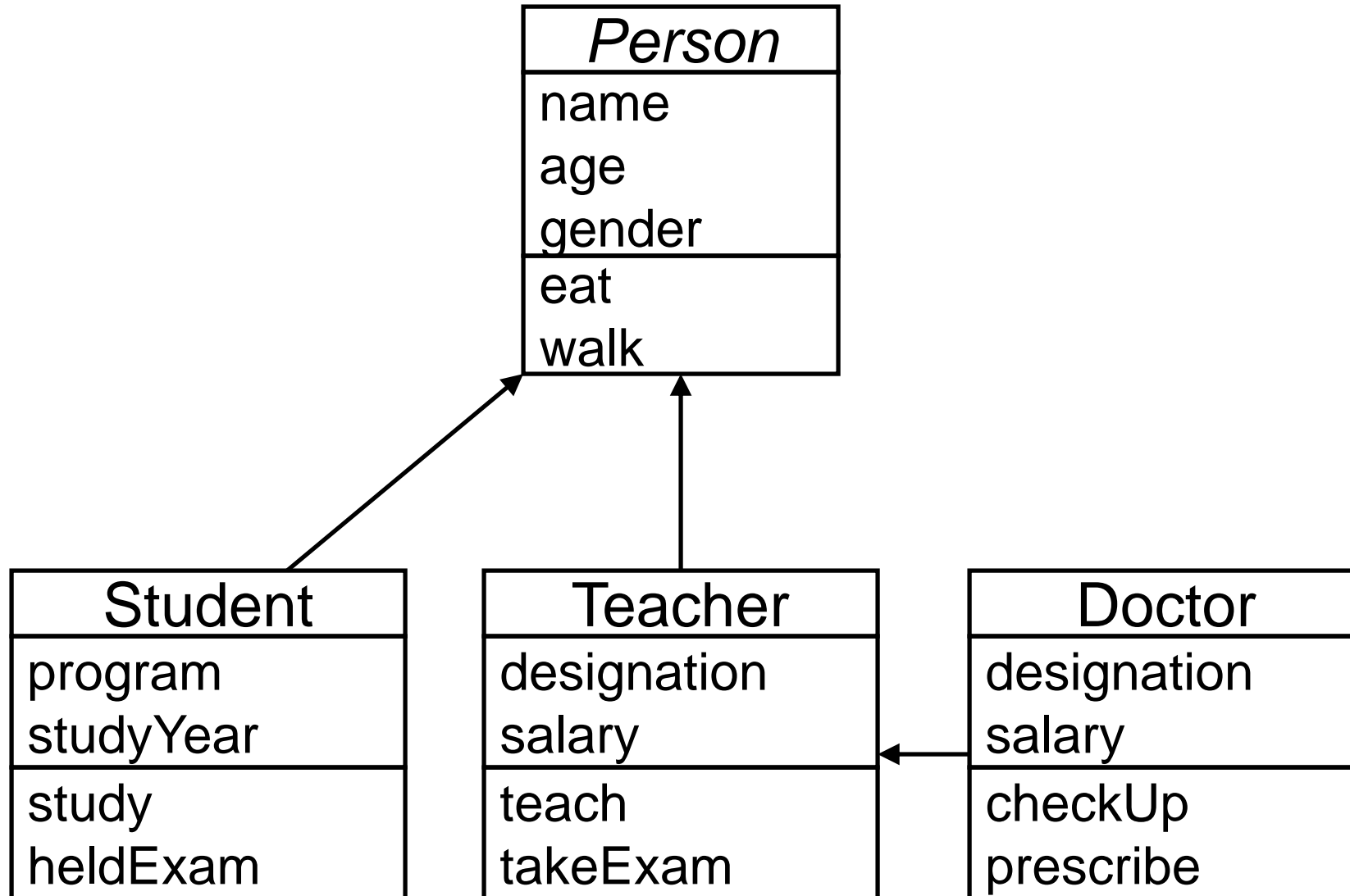
We can easily add new classes by inheriting from existing classes

- Select an existing class closer to the desired functionality
- Create a new class and inherit it from the selected class
- Add to and/or modify the inherited functionality

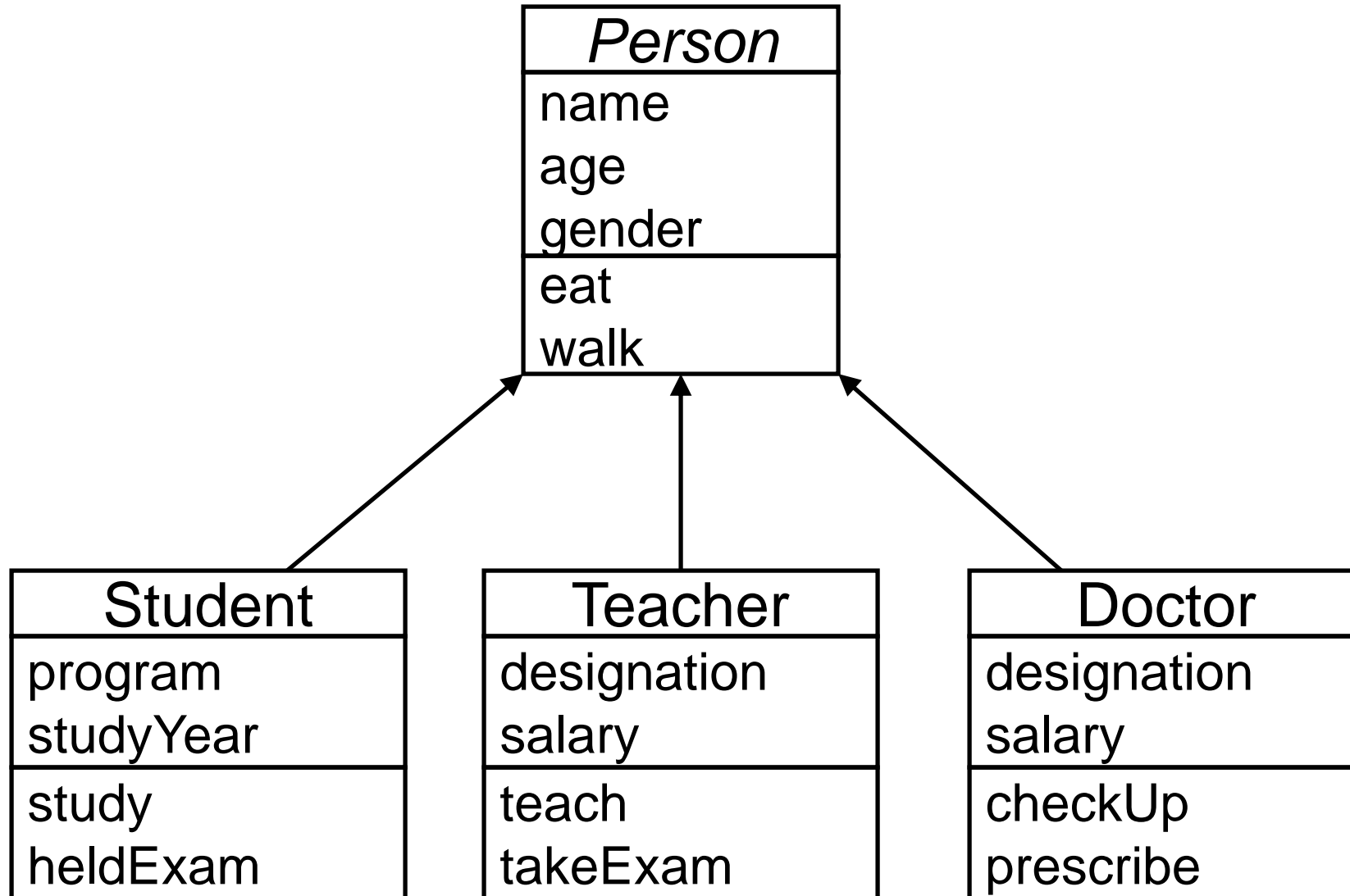
EXAMPLE REUSE



EXAMPLE REUSE

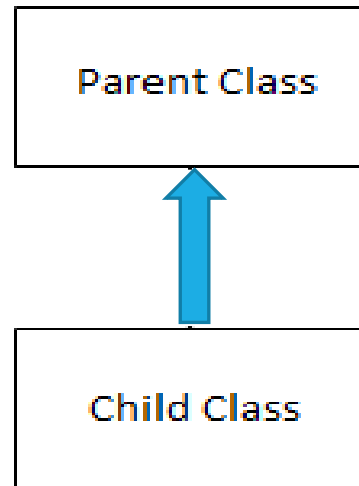


EXAMPLE REUSE

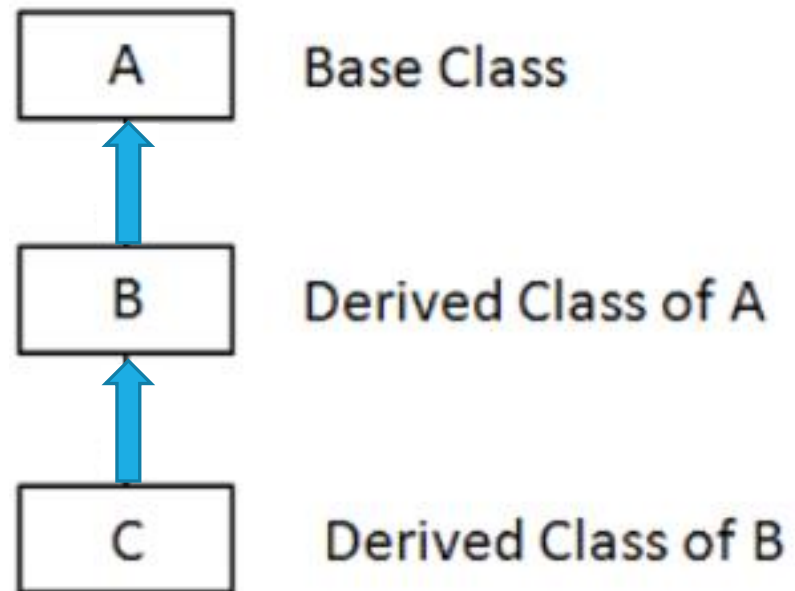


TYPES OF INHERITANCE

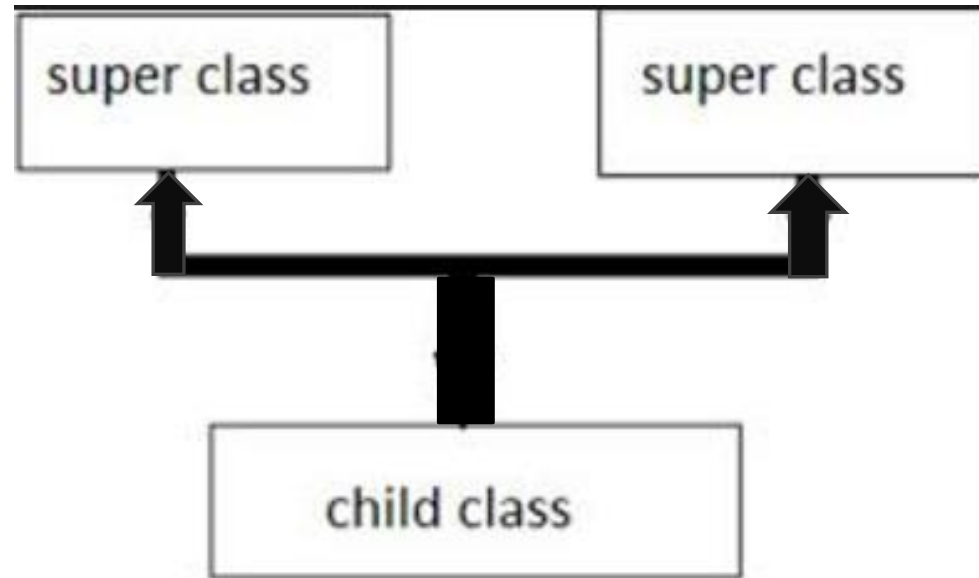
1 – Single Inheritance



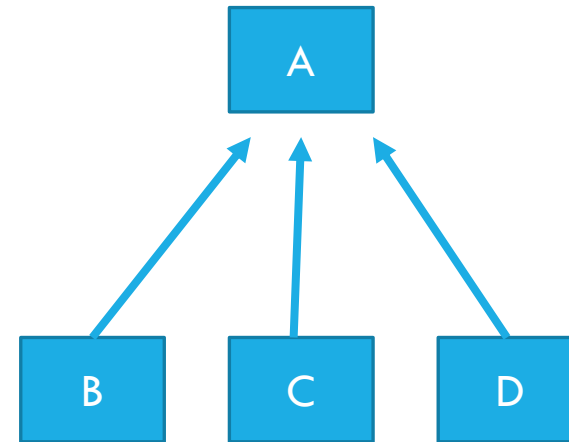
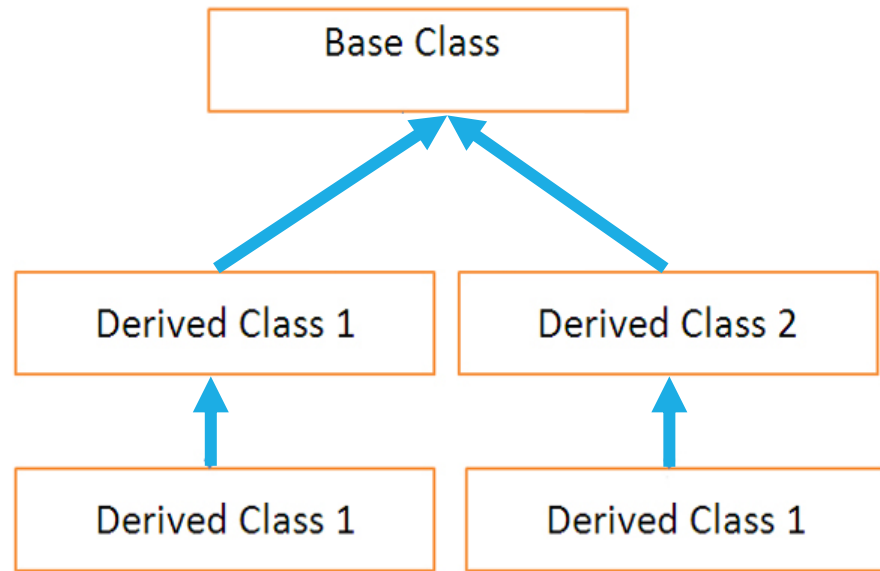
2 – Multi Level



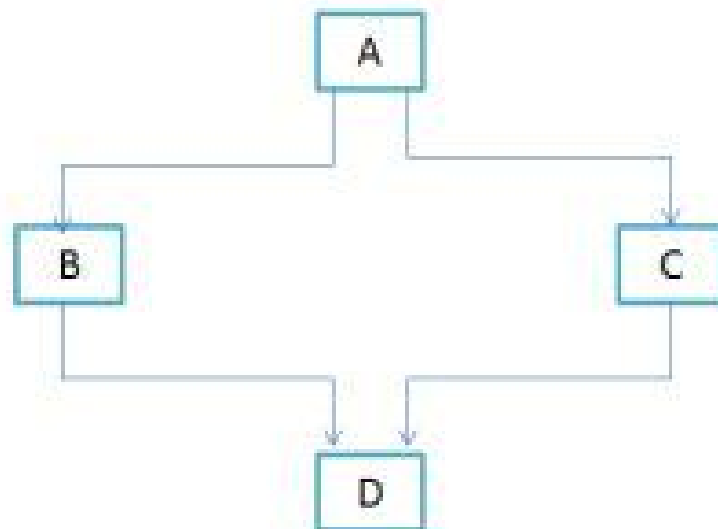
3 - Multiple



4 – Hierarchical

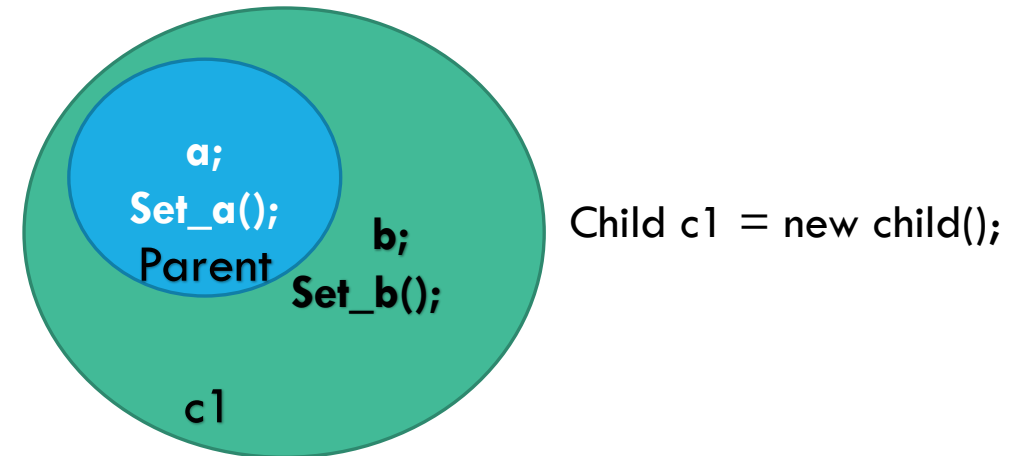
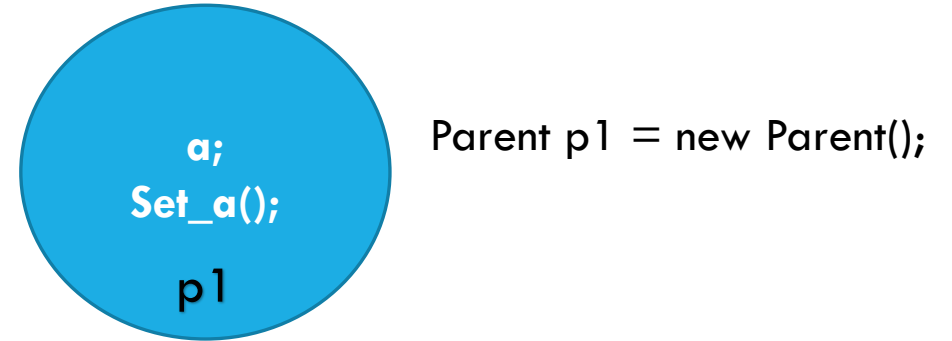
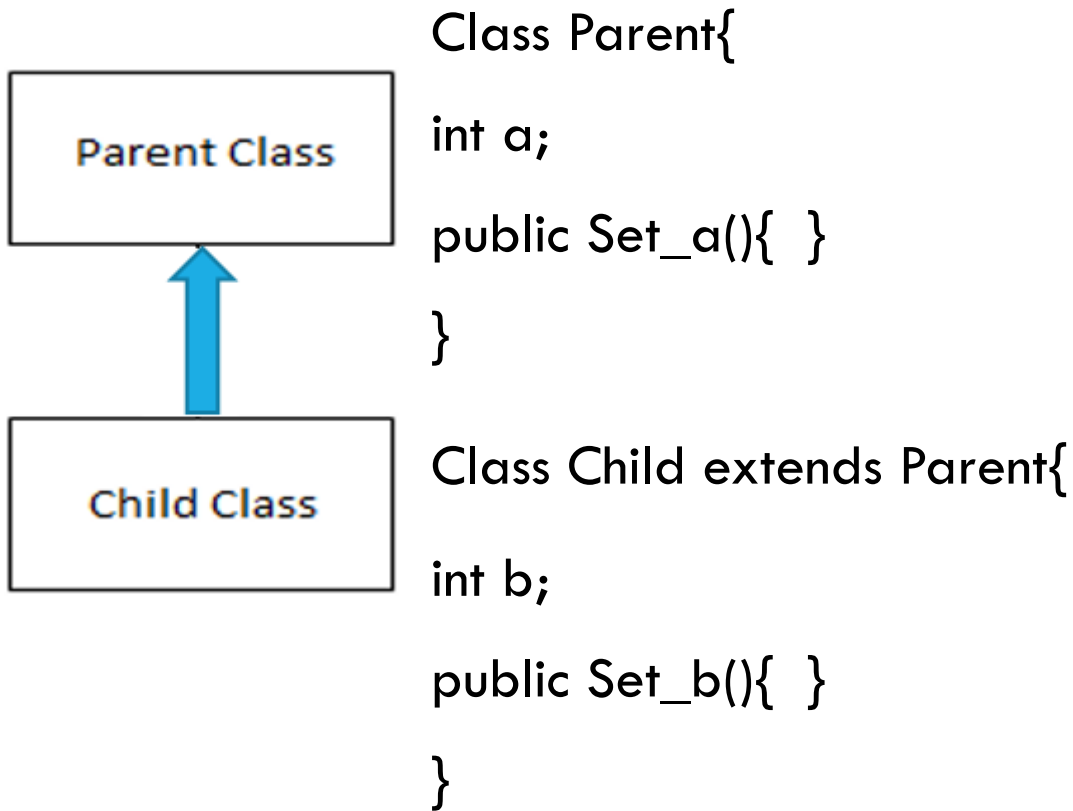


5 - Hybrid



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MEMORY MAPPING OF CLASSES IN INHERITANCE



VISIBILITY MODES IN INHERITANCE

- private — private members are accessible only inside their own class.
- protected — protected members are accessible inside their own class, classes within the package and subclasses.
- public — public members are accessible in all the classes.

DEFINING A DERIVED CLASS WITH VISIBILITY MODE

Visibility Mode

1- Public

2- Private

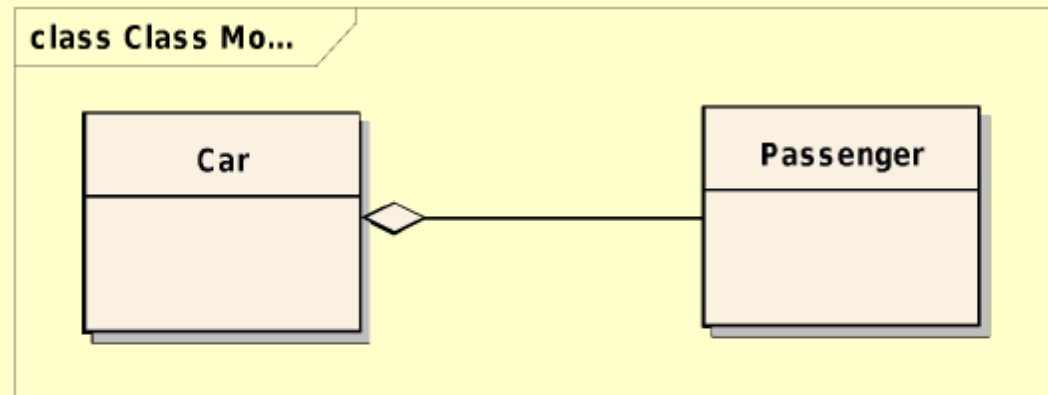
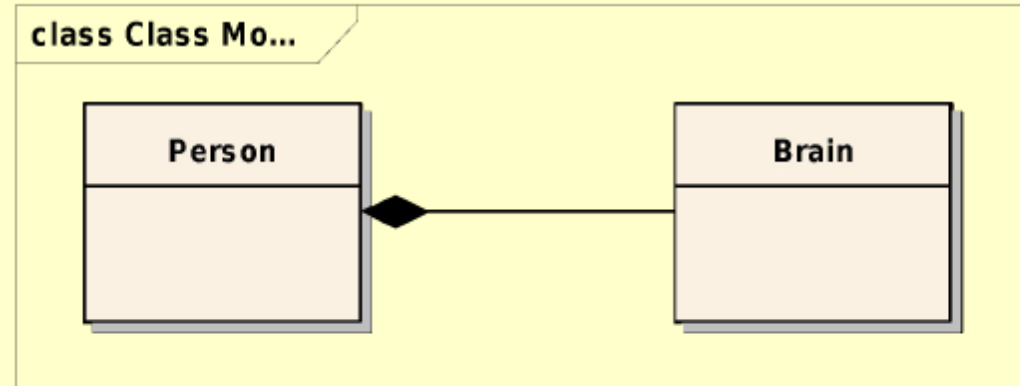
3- Protected

Base Class Visibility	Derived class visibility		
	Public derivation	Private derivation	Protected derivation
Private	Not inherited	Not inherited	Not inherited
Protected	Protected	Private	Protected
Public	Public	Private	Protected

Object-oriented programming

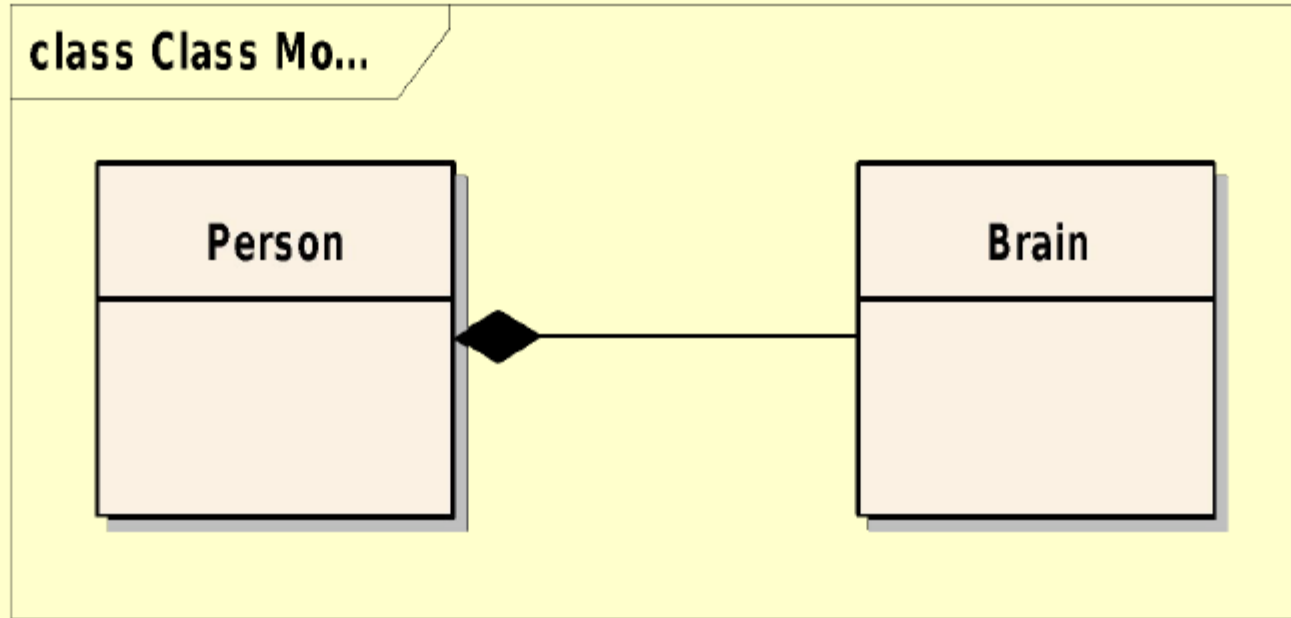
Relationships between classes

- **Association** (containment)
 - Strong – **Composition**
 - Weak – **Aggregation**



Relationships between classes

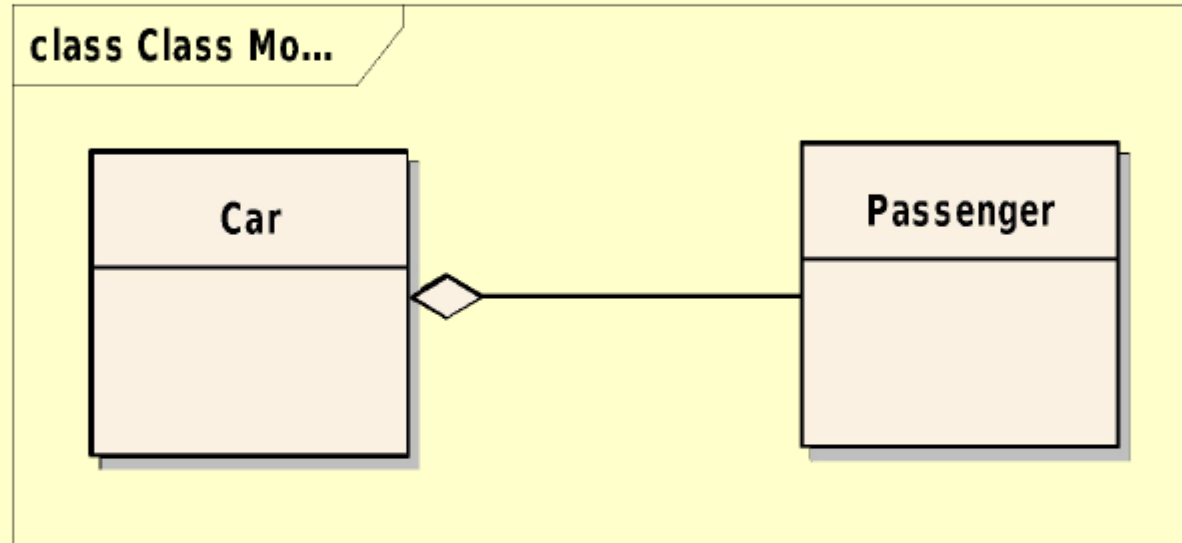
Composition



- Strong type of association
- Full ownership

Relationships between classes

Aggregation



- Weak type of association
- Partial ownership