

Design

Plans are worthless.

Planning is priceless.

(misquote of Eisenhower

-- but what he meant)

Designs are worthless.

Designing is priceless.

(don't quote me!)

# Triangle World

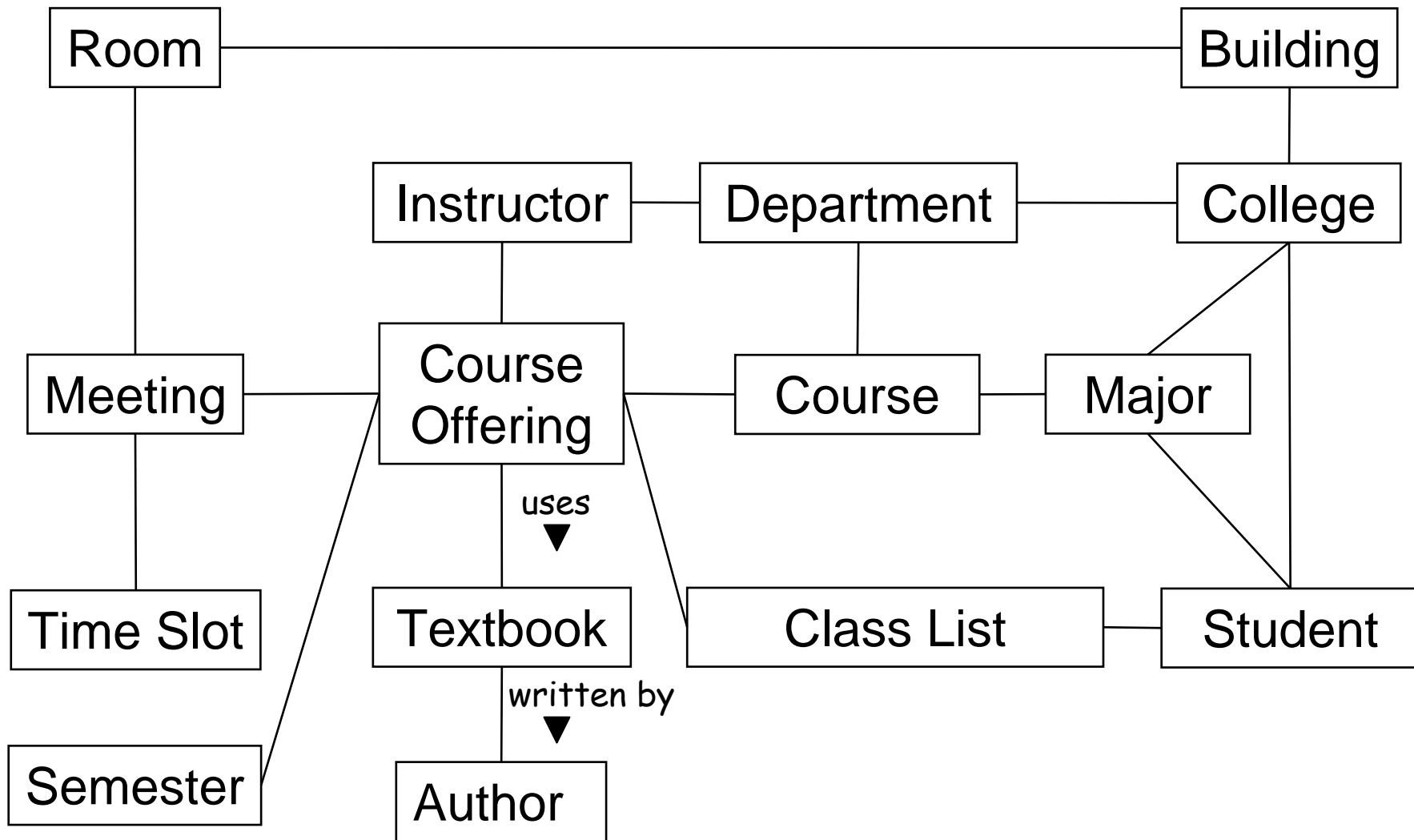
**I have a sealed room in which some triangles are magically suspended in the air. Their position and orientation is random. There is also a ball in the room. It has some position and velocity at time  $t$ . (It does not intersect any triangles at time  $t$ .)**

**Describe the room and the ball's movement between time  $t$  and  $t+\Delta t$ . (In other words, write the dt-timestep use case.)**

# Triangle World

Build a domain model for triangle world.

# Domain Model Example



# Example

Which did you have?

- Ball
- Sphere
- Triangle
- Polygon
- Thing
- Shape
- Moving shape
- Moving object
- Velocity
- Walls
- Floor
- World
- Force
- Gravity
- Collision
- Position
- Item

# Ball vs. Sphere vs. Shape

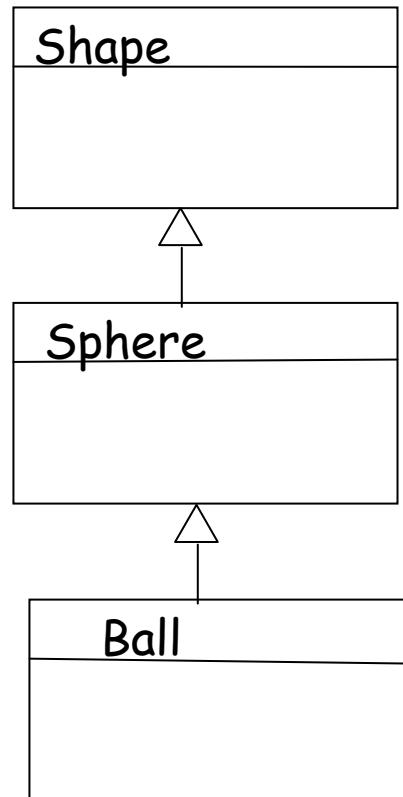
What is the relationship?

design heuristic

think like an object

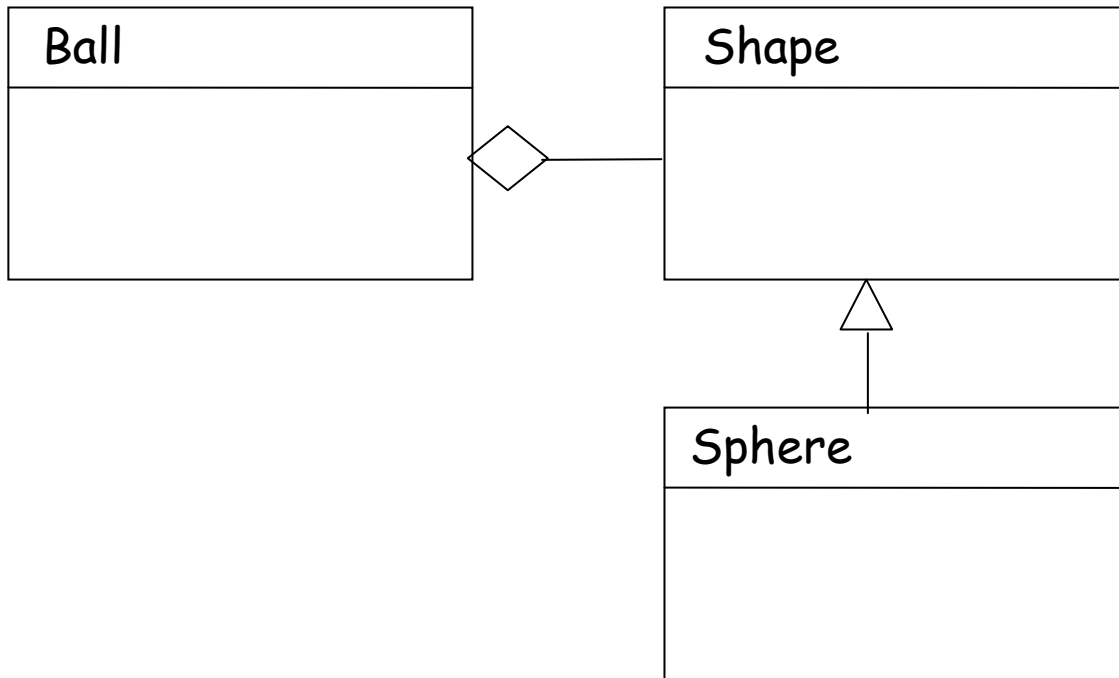
# Ball vs. Sphere vs. Shape

What is the relationship?



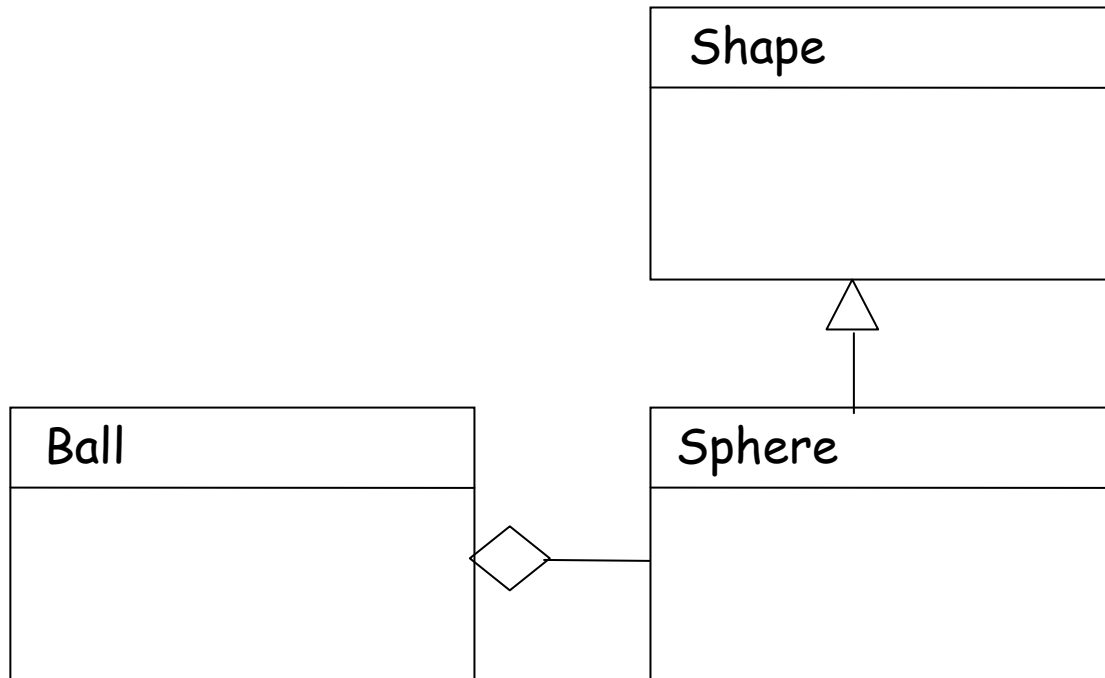
# Ball vs. Sphere vs. Shape

What is the relationship?



# Ball vs. Sphere vs. Shape

What is the relationship?



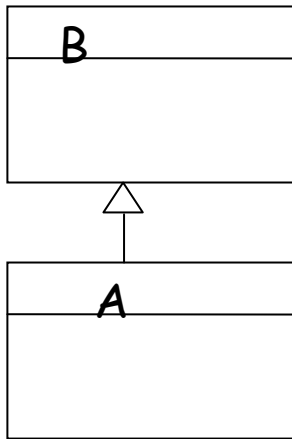
design heuristic

think like an object

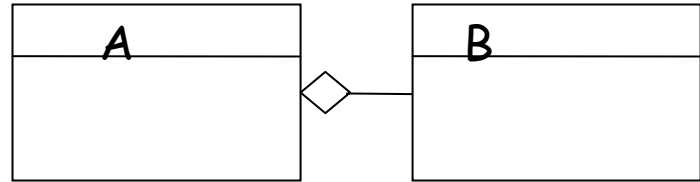
# design heuristic

favor composition over inheritance

# Inheritance vs. Composition

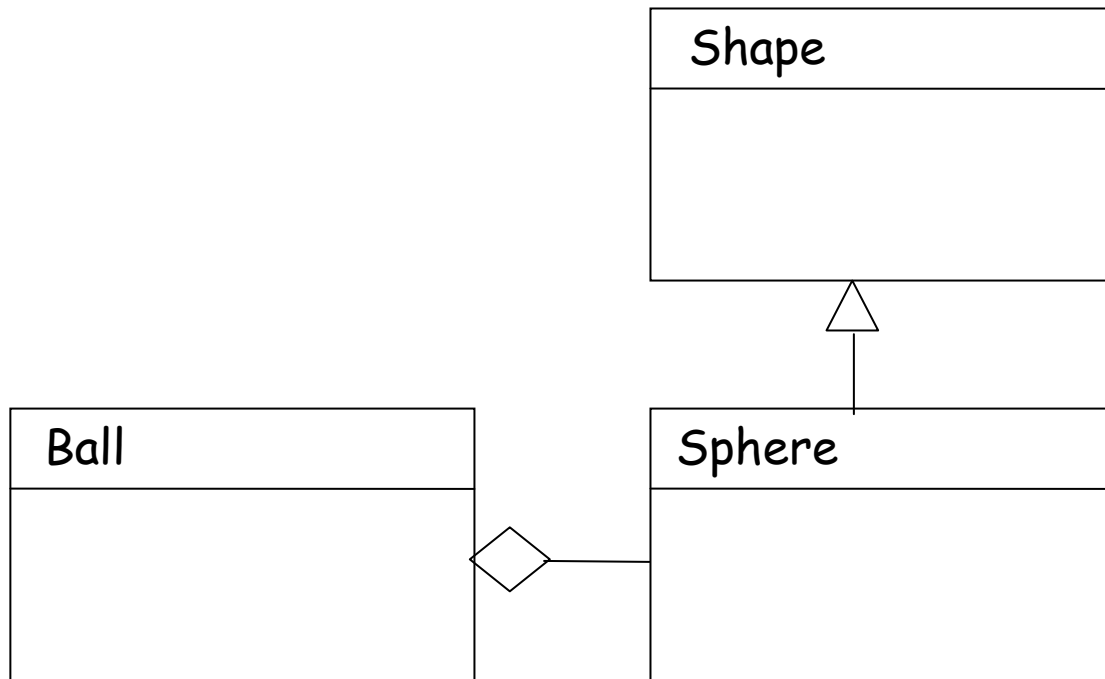


white-box reuse



black-box reuse

# Ball vs. Sphere vs. Shape



# Ball vs. Moving

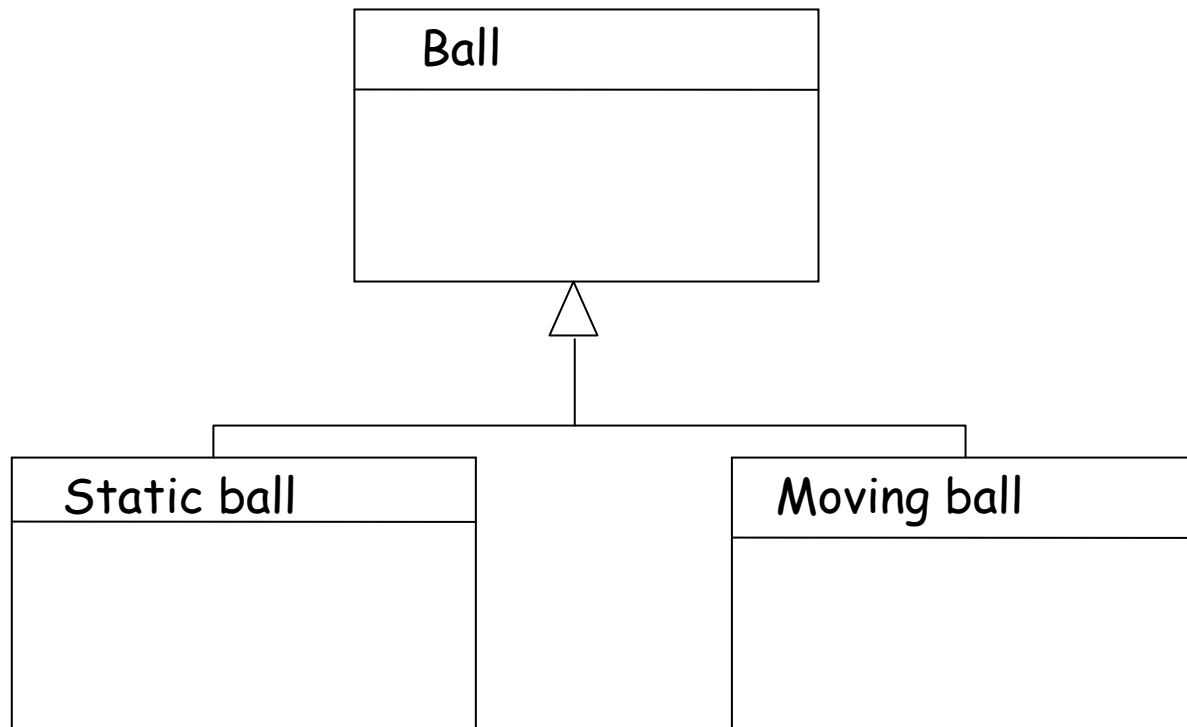
What is the relationship?

Ball
velocity

Should we anticipate static balls?

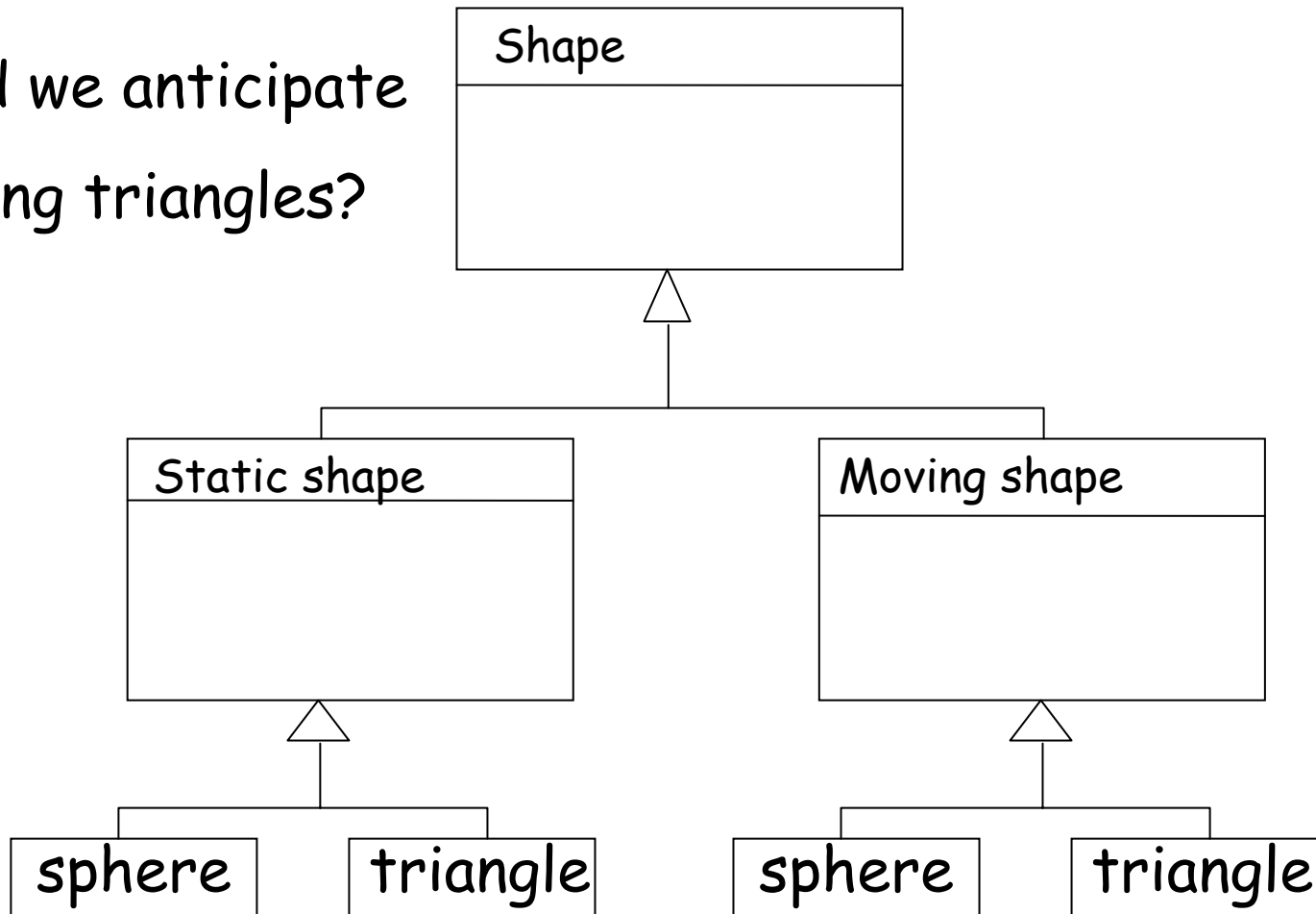
# Ball vs. Moving

What is the relationship?



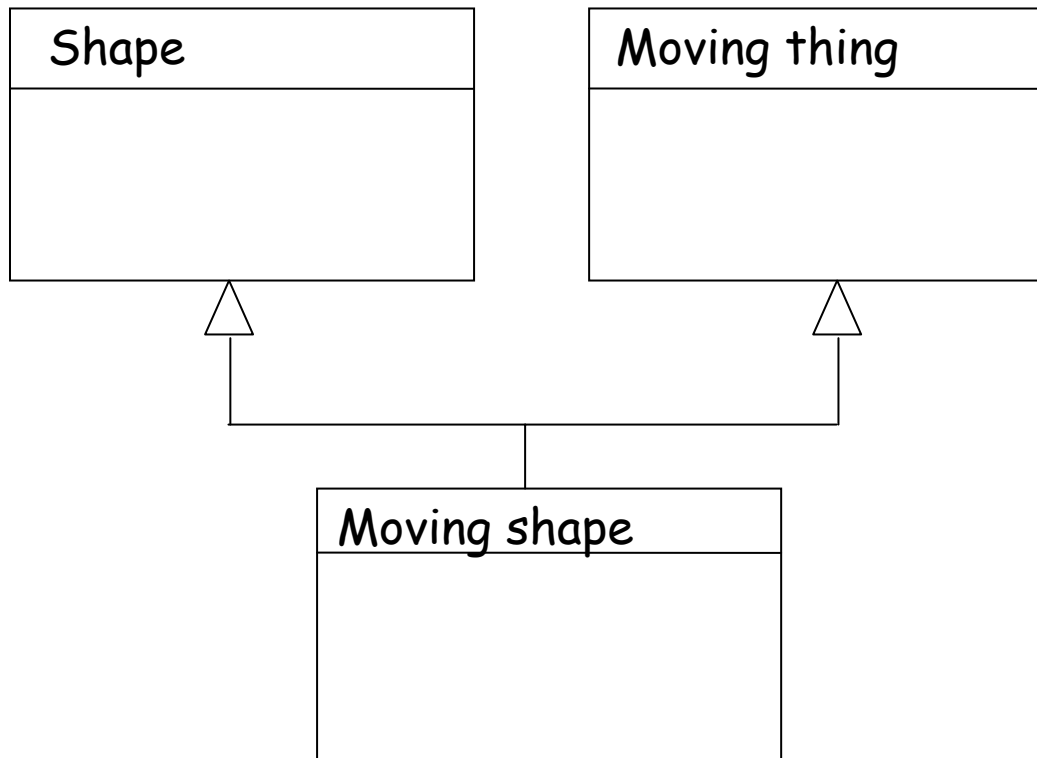
# Shape vs. Moving

Should we anticipate  
moving triangles?



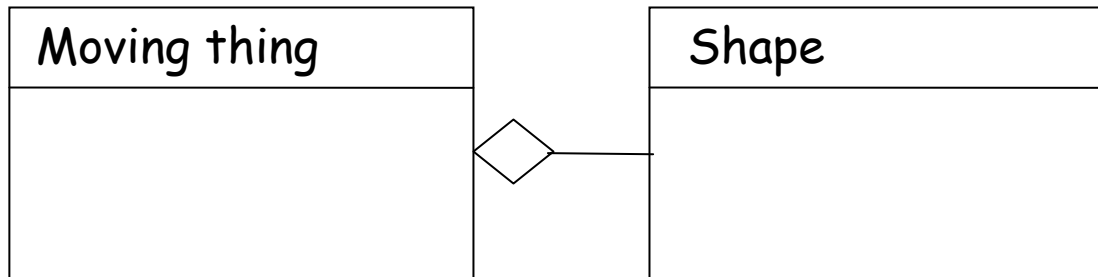
# Shape vs. Moving

What is the relationship?



# Shape vs. Moving

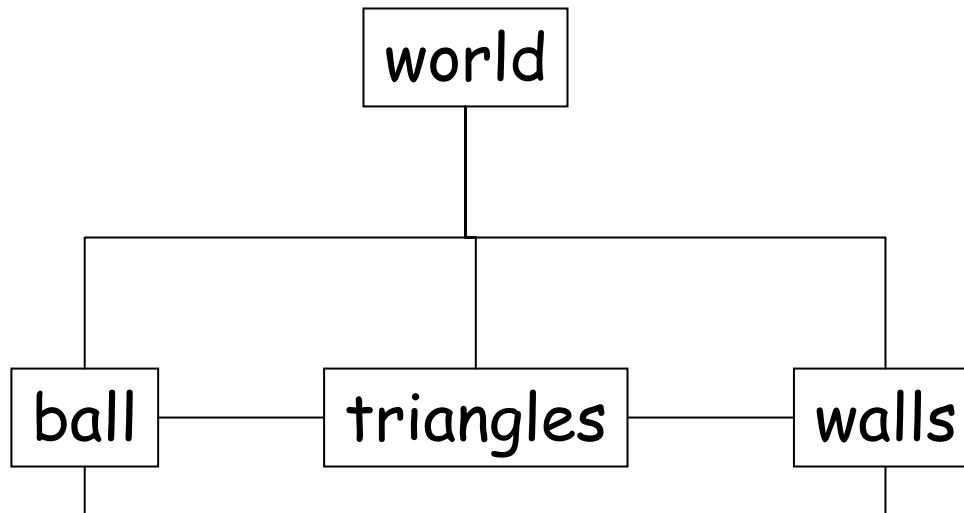
What is the relationship?



# XP Design Principle

- Only build what you need now.

# Cohesion & Coupling



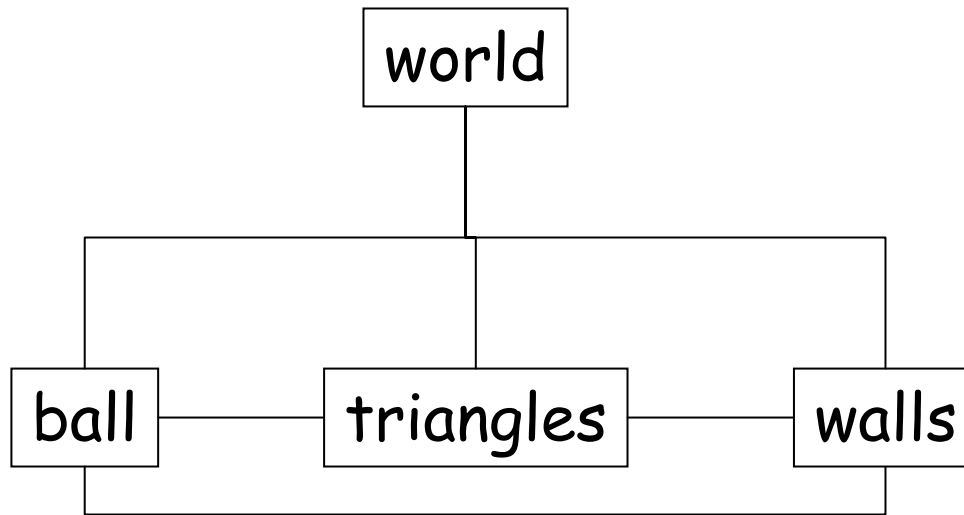
# design heuristic

class should have high cohesion and low coupling

# cohesion & coupling

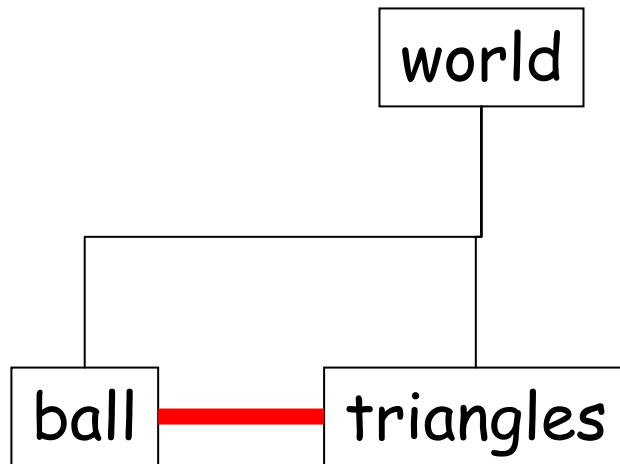
- cohesion: how closely the operations in a class or method are related
- coupling: the strength of a connection between two classes or methods

# Cohesion & Coupling



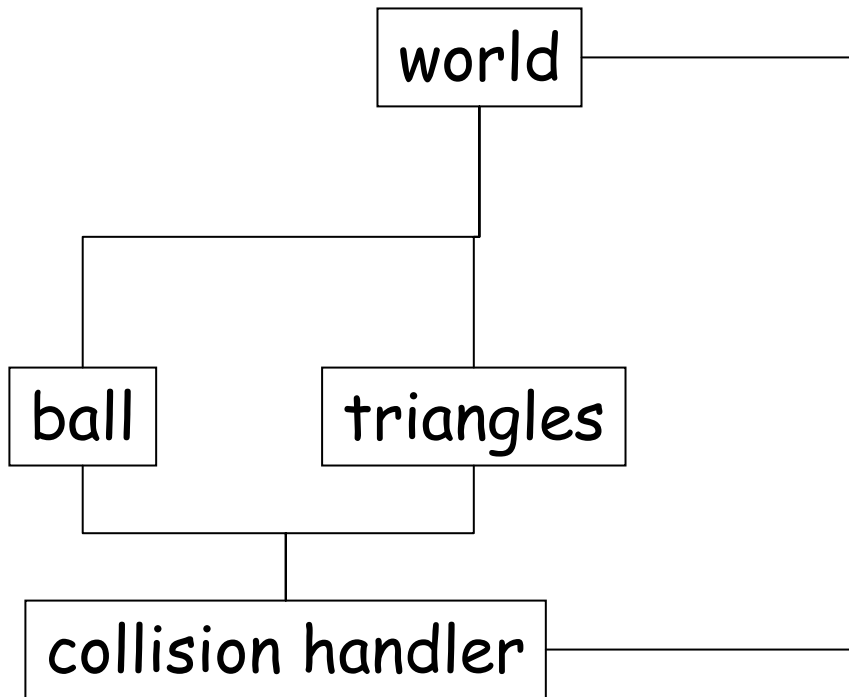
walls can be made  
of triangles

# Cohesion & Coupling



Who handles collisions?

# Cohesion & Coupling



Exercise: UML for a preliminary triangle world design