

Design

Plans are worthless.
Planning is priceless.

(misquote of Eisenhower
-- but what he meant)

Designs are worthless.
Designing is priceless.

(don't quote me!)

Design Practices, Principles, Patterns

Practices: Modeling tools

- CRC Cards
- UML Class Diagrams

Principles: Design heuristics

1. XP- build only what you need now

Triangle world

Which did you have?

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

Ball vs. Sphere vs. Shape

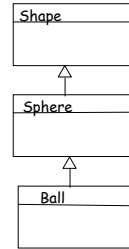
What is the relationship?

design heuristic

think like an object

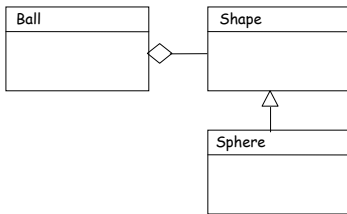
Ball vs. Sphere vs. Shape

What is the relationship?



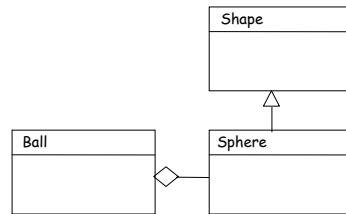
Ball vs. Sphere vs. Shape

What is the relationship?



Ball vs. Sphere vs. Shape

What is the relationship?

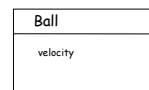


Ball vs. Moving

What is the relationship?

Shape vs. Moving

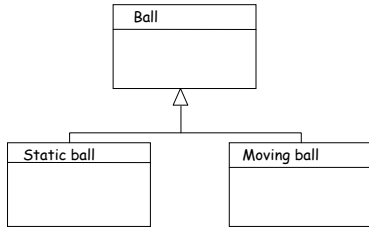
What is the relationship?



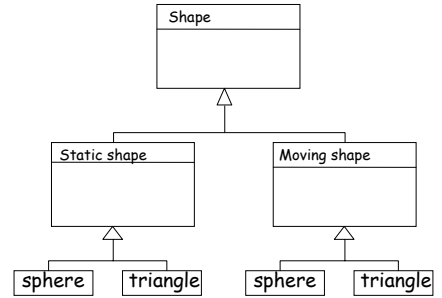
ball doesn't move?
set velocity to 0

Shape vs. Moving

What is the relationship?

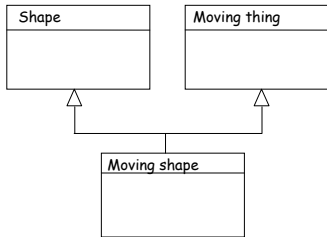


Shape vs. Moving



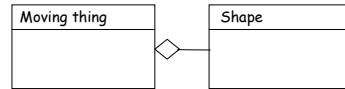
Shape vs. Moving

What is the relationship?

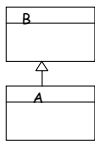


Shape vs. Moving

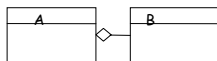
What is the relationship?



Inheritance vs. Composition



white-box reuse

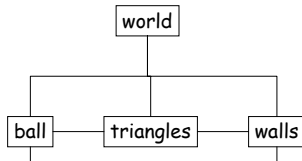


black-box reuse

design heuristic

favor composition over inheritance

Cohesion & Coupling



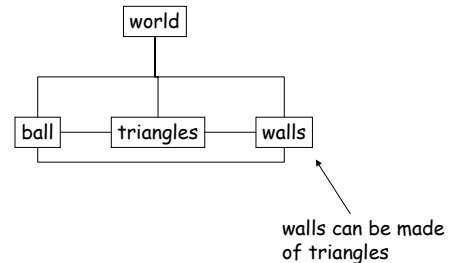
design heuristic

class should have high cohesion and low coupling

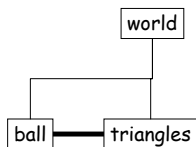
cohesion & coupling

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

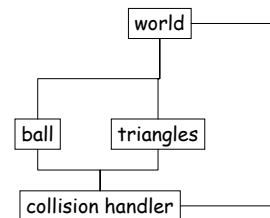
Cohesion & Coupling



Cohesion & Coupling



Cohesion & Coupling



more design principles to come

Design Practices, Principles, Patterns

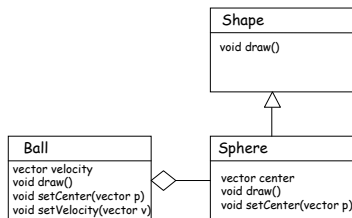
Practices: Modeling tools

- CRC Cards
- UML Class Diagrams

Principles: Design heuristics

1. XP- build only what you need now
2. think like an object
3. favor composition over inheritance
4. high cohesion and low coupling

Elaborated Class Diagram



Exercise

Construct a UML class diagram for Triangle World.

(10 minutes)

Modeling Tools

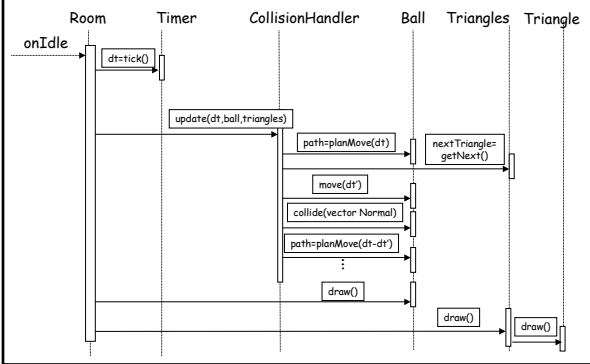
1. CRC Cards
2. UML Class Diagrams
3. UML Sequence Diagrams

UML

Static View:
Class Diagram

Dynamic View:
Sequence Diagram, Activity Diagram, etc.

Sequence Diagram



Exercise

Construct a sequence diagram for Triangle World.

(10 minutes)