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
- 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?

```
Shape
\arrow{->}
Sphere
\arrow{->}
Ball
```

---

**Ball vs. Sphere vs. Shape**

What is the relationship?

```
Ball
\arrow{->}
Shape
\arrow{->}
Sphere
```

---

**Ball vs. Moving**

What is the relationship?

---

**Shape vs. Moving**

What is the relationship?

```
Ball
\arrow{->}
velocity
```

ball doesn’t move?
set velocity to 0
Shape vs. Moving
What is the relationship?

Shape
- Static shape
- Moving shape

Moving ball

Static ball

sphere
triangle
sphere
triangle

Shape vs. Moving
What is the relationship?

Shape
- Moving thing

Moving shape

Shape vs. Moving
What is the relationship?

Moving thing

Shape

Inheritance vs. Composition
white-box reuse
black-box reuse

design heuristic
favor composition over inheritance
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

walls can be made of triangles

collision handler
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.

(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.
Exercise

Construct a sequence diagram for Triangle World.

(30 minutes)