From Domain to Design Models

Triangle World

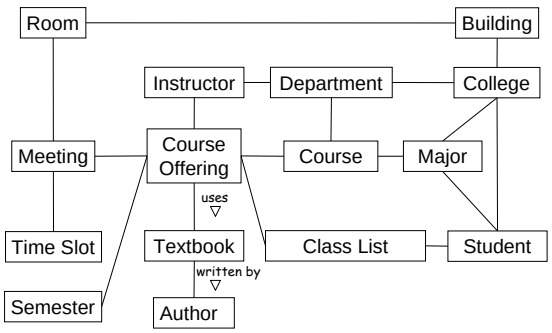
I have a sealed room in which some triangles are magically suspended in the air. Their position and orientation is random. There is also a ball in the room. It has some position and velocity at time t. (It does not intersect any triangles at time t.)

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

Triangle World

Build a domain model for triangle world.

Domain Model Example



Domain Model → Design Model

Assign "responsibilities" to classes

Method: CRC Cards

CRC Cards Technique (Responsibility-Driven Design)

- Informal, non-detailed
- Used for group brain-storming
- End result is a first cut at **classes** for an object-oriented model
- Not intended to provide a **complete** design

CRC

- **C:** **C**lasses
- **R:** **R**esponsibilities
- **C:** **C**ollaborations

The Basic Idea

- Develop set of index cards.
- Each card represents one class.
- A card contains:
  - The name of the class.
  - The responsibilities of the class.
  - Collaborations: other classes with which this class interacts and its responsibilities in the interaction

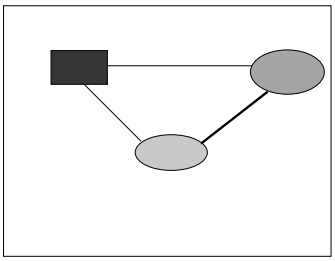
Image of CRC cards

Class Name	super class sub-classes
Responsibilities	Collaborations

Limiting the size of a card is an attempt at preventing the class from becoming too complex.

Sample Application:
A drawing program

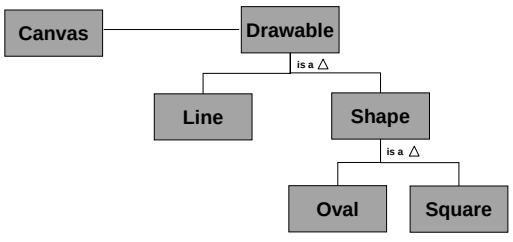
Possible screen image



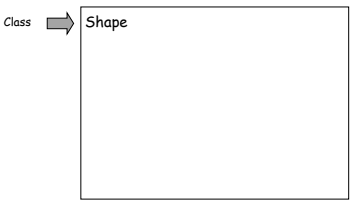
Typical Application Use-Cases:

- **Draw shape**
- **Move shape**
- **Resize shape**
- **Connect shapes**
- **Erase shape**
- **Erase connector**

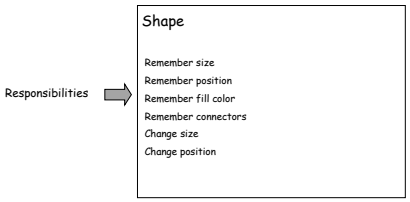
Possible Domain Model



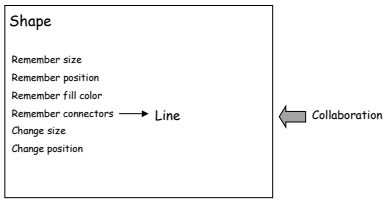
Example of CRC card
for a graph-drawing program (1)



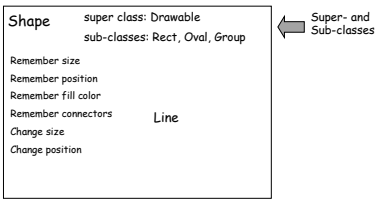
Example of CRC card
for a graph-drawing program (2)



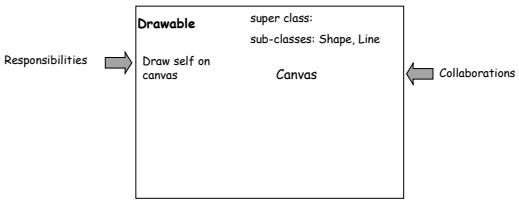
Example of CRC card
for a graph-drawing program (3)



Example of CRC card
for a graph-drawing program (4)

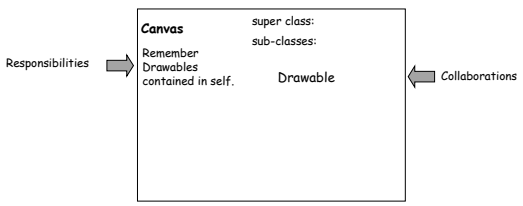


Example of CRC card
for a graph-drawing program (5)



Note: The Drawable doesn't necessarily need to *remember* a Canvas, since the Canvas could be passed as an argument to the *draw* method.

Example of CRC card
for a graph-drawing program (6)



Note:

- Responsibilities are usually for instances of the class rather than the class itself, although …
- Class-wide responsibility is possible (corresponding to **static** method)

Attribute Value vs. Object

- An object of a class typically has one or more ***attributes***.
- Attributes have ***values*** that specify or describe the object.
- A value might or might not deserve the distinction of being an object itself.
- A would-be attribute that is object-valued is actually a ***collaboration***.

Once the CRC cards are constructed …

- Team can engage in **role-playing** to verify that use-case **scenarios** make sense for chosen CRC.
- Each person can role-play one or more class cards.
- If something doesn't work, change the class accordingly.
- Revision of use-cases might also be indicated.

Triangle World

Build CRC cards for Triangle World.