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.)

Domain Model Example

![Diagram of 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: Classes
• R: Responsibilities
• C: Collaborations

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

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)

Shape
- Remember size
- Remember position
- Remember fill color
- Remember connectors
- Change size
- Change position

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

Shape
- Remember size
- Remember position
- Remember fill color
- Remember connectors
- Change size
- Change position

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

Shape
- super-class: Drawable
- sub-classes: Rect, Oval, Group
- Remember size
- Remember position
- Remember fill color
- Remember connectors
- Change size
- Change position

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

Drawable
- super-class: super-class: Shape, Line
- Draw self on canvas
- Canvas

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)

Canvas
- super-class: super-class: Drawable
- Remember size contained in self
- Drawable

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.

Triangle World

Build CRC cards for Triangle World.

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.