Applying UML and Patterns

**An Introduction to
Object-oriented Analysis
and Design
and Iterative Development**

Part III Elaboration Iteration I – Basic^2

Chap 14
On to Object Design

Three Ways to Develop Programs 1

- How do developers design objects? Here are three ways
  - **Code.** Design-while-coding (Java, C#, …), ideally with power tools such as refactoring.
  - **Draw, then code.** Drawing some UML on a whiteboard or UML CASE tool, then switching to #1 with a text-strong IDE (e.g., Eclipse or Visual Studio).
  - **Only draw.** Somehow, the tool generates everything from diagrams.
  - "Only draw" is a misnomer, as this still involves a text programming language attached to UML graphic elements.
- This chapter introduces object design and lightweight drawing before coding, suggesting ways to make it pay off.

Three Ways to Develop Programs 2

- Some aims of agile modeling are to reduce drawing overhead and model to understand and communicate, rather than to document though documenting is easy with digital photos
- Three ways to apply UML [Fowler03].
  - using lots of whiteboards (ten in a room, not two) or special white plastic static cling sheets (that work like whiteboards) covering large wall areas, using markers, digital cameras, and printers to capture "UML as sketch"
  - Modeling with others
  - Creating several models in parallel. For example, five minutes on a wall of interaction diagrams, then five minutes on a wall of related class diagrams

Tips

- More tips of using Agile modeling
- It's easy to upload digital photos of wall drawings to an internal wiki (see www.twiki.org) that captures your project information.

Write On Cling Sheets

- Popular brands of white plastic static cling sheets:
  - Write On Cling Sheets
  - Magic-Chart

Magic-Chart

UML Tools

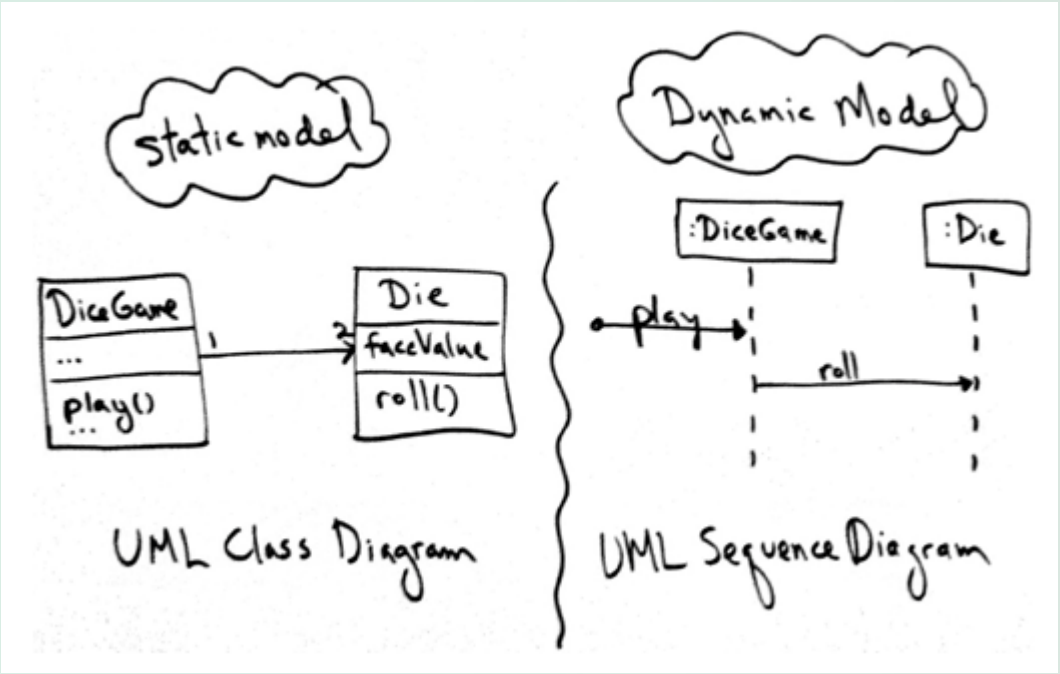
- **Guidelines**
  - Choose a UML CASE tool that integrates with popular text-strong IDEs, such as Eclipse or Visual Studio.
  - Choose a UML tool that can reverse-engineer (generate diagrams from code) not only class diagrams (common), but also interaction diagrams (more rare, but very useful to learn call-flow structure of a program).
- Agile modeling on the walls and using a UML CASE tool integrated into a text-strong IDE can be complementary. Try both during different phases of activity.

How Much Time Spent Drawing UML Before Coding

- For a three-week timeboxed iteration,
  - spend **a few hours or at most one day** (with partners) near the start of the iteration "at the walls" (or with a UML CASE tool)
  - Then stop - and if sketching - perhaps take digital photos, print the pictures, and transition to coding for the remainder of the iteration
  - Using the UML drawings for inspiration as a starting point, but recognizing that the **final design in code will diverge and improve**.
  - Shorter drawing/sketching sessions may occur throughout the iteration.

Designing Objects

- There are two kinds of object models: dynamic and static.
- Spend a short period of time on interaction diagrams (dynamics), then switch to a wall of related class diagrams (statics).



Dynamic Object Modeling

- Most of the challenging, interesting, useful design work happens while drawing the UML dynamic-view interaction diagrams
- Spend significant time doing interaction diagrams (sequence or communication diagrams), not just class diagrams.
- Ignoring this guideline is a very common worst-practice with UML.

Static Object Modeling

- After first covering dynamic modeling with interaction diagrams, we then do the static object modeling
- If the developers are applying the agile modeling practice of *Create several models in parallel*, they will be drawing both interaction and class diagrams concurrently.

Object Design Skill

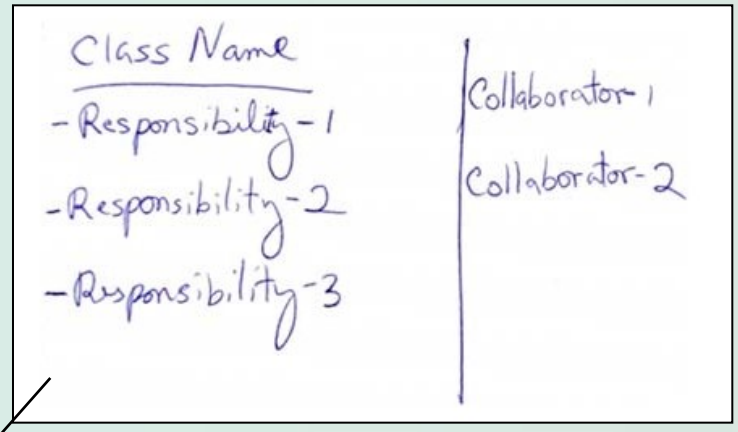
- The importance of object design skill is over UML notation skill
  - What's important is knowing how to think and design in objects, and **apply object design best-practice patterns**, which is *much more valuable skill than knowing UML notation*
  - Drawing UML is a reflection of making decisions about the design
- While drawing a UML object diagram, we need to answer key questions:
  - What are the responsibilities of the object?
  - Who does it collaborate with?
  - What design patterns should be applied?
  - Far more important than knowing the difference between UML 1.4 and 2.0 notation! Therefore, the emphasis of the following chapters is on these principles and patterns in object design.

Fundamental object design

- The object design skills are what matter, not knowing how to draw UML. Fundamental object design requires knowledge of:
  - principles of responsibility assignment
  - design patterns

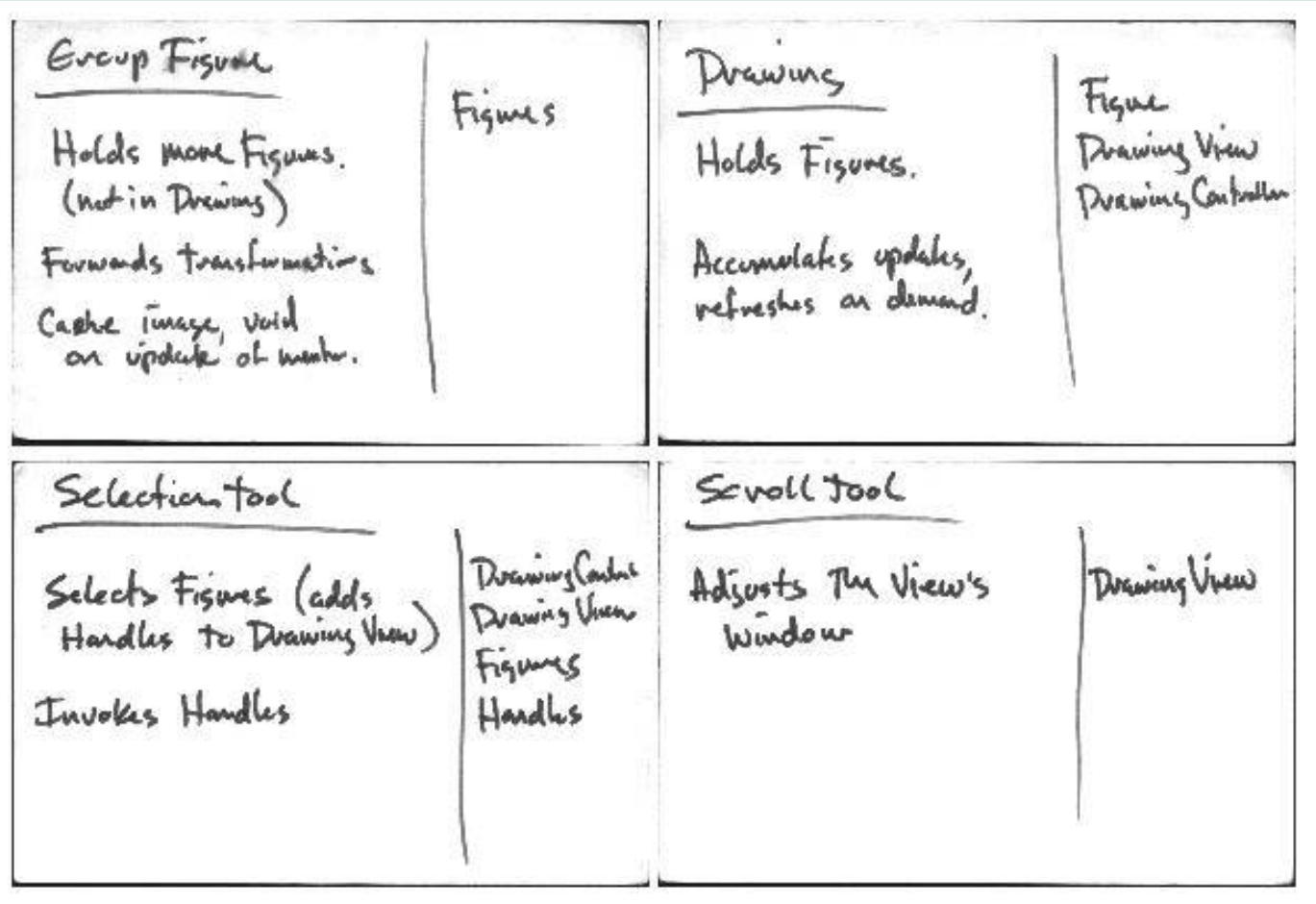
Class Responsibility Card

- A CRC modeling session involves a group sitting around a table, discussing and writing on the cards as they play "what if" scenarios with the objects, considering what they must do and what other objects they must collaborate with.



Each card represents one class

CRC Examples



More detailed: http://c2.com/doc/crc/draw.html