

CSSE 374: Introduction to Object- Oriented Analysis and Design



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Learning Outcomes: O-O Design

Demonstrate object-oriented design basics like domain models, class diagrams, and interaction (sequence and co diagrams).



<http://enterprisegeeks.com/blog/2009/07/>

- **Understand OOA to OOD transition**
- **Examine elaboration & refinement in design**
- **Walkthrough OOD example**
- **Explain model structure for UML**

As we discussed yesterday, design organizes things for implementation.

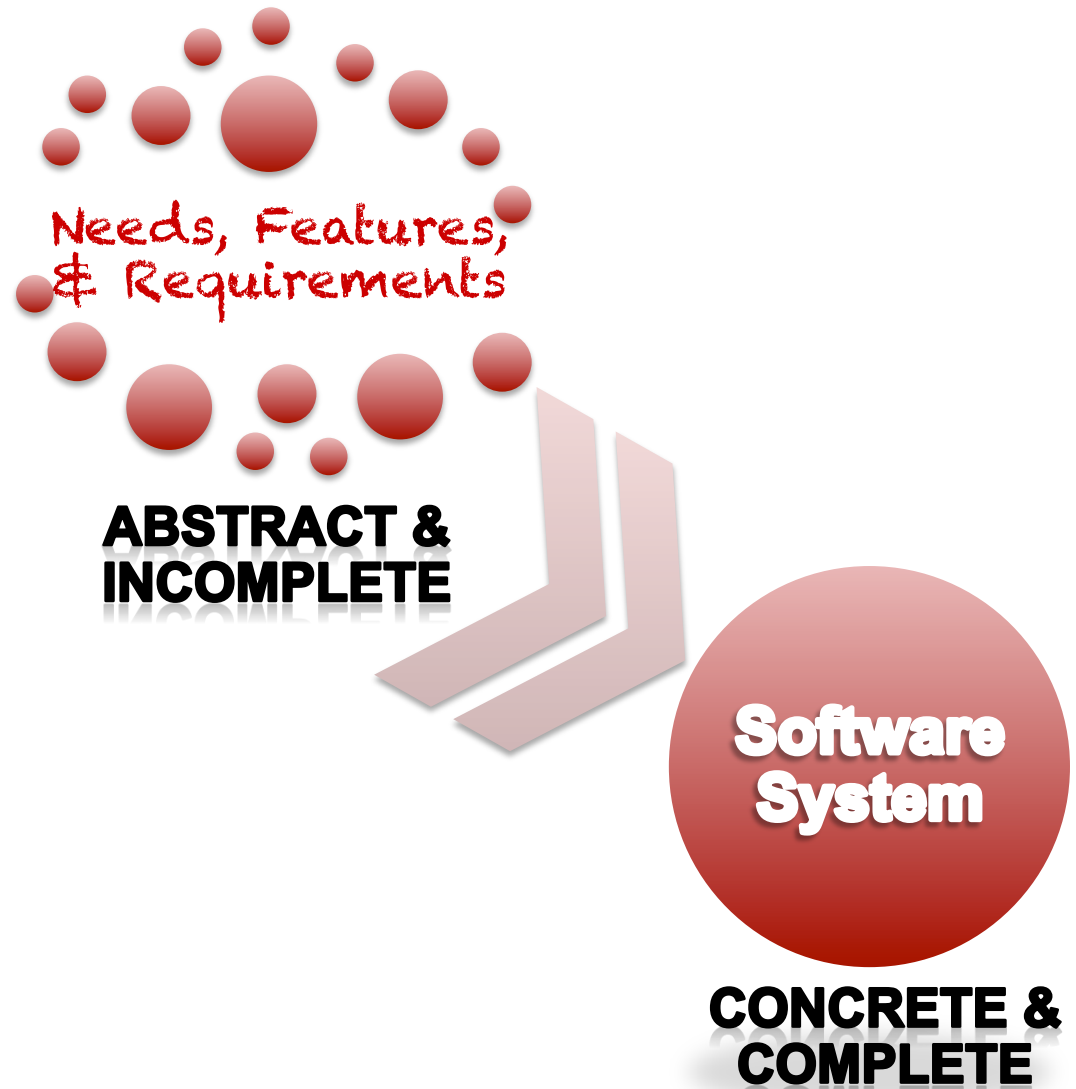
So, what makes software design different than other engineering disciplines?

- Again, think for 15 seconds...
- Turn to a neighbor and discuss it for a minute



Why is Software Design Important?

- Size
- Complexity
- Constraints
- Performance
- Communication



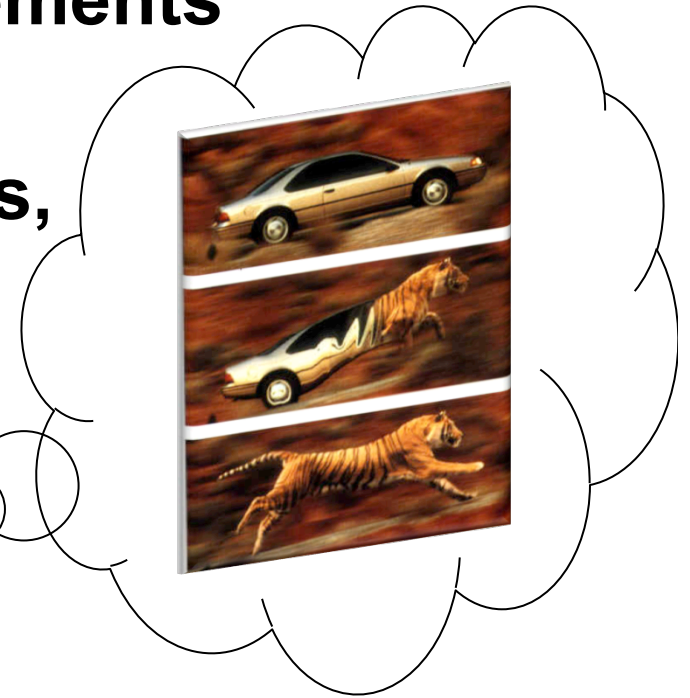
Thinking at the Right Level

- **Abstraction** - hiding irrelevant details to focus attention at right level
- Process of component identification is top-down, **decomposing** the system into successively smaller, less complex components
- Process of integration, which is bottom-up, building (**composing**) the target system by combining components in useful ways



Elaboration and Refinement...

- Starting with *Abstract* Requirements
- Successively *Elaborate* and *Refine* them into specifications, models, and ultimately implementation





Key Questions for Object-Oriented Design

Responsibility-Driven Design

1. What classes do we get from the application domain?
2. How should responsibilities be allocated to classes?
3. What classes should do what?
4. How should objects collaborate?

Guided by design patterns

Topics Covered in Book

OOA/D

Patterns

UML notation

Principles and
guidelines



Requirements
analysis

Iterative
development with
an agile Unified
Process

Assigning responsibilities to software objects is a critical ability in Object-Oriented development. Why?

- Again, think for 15 seconds...
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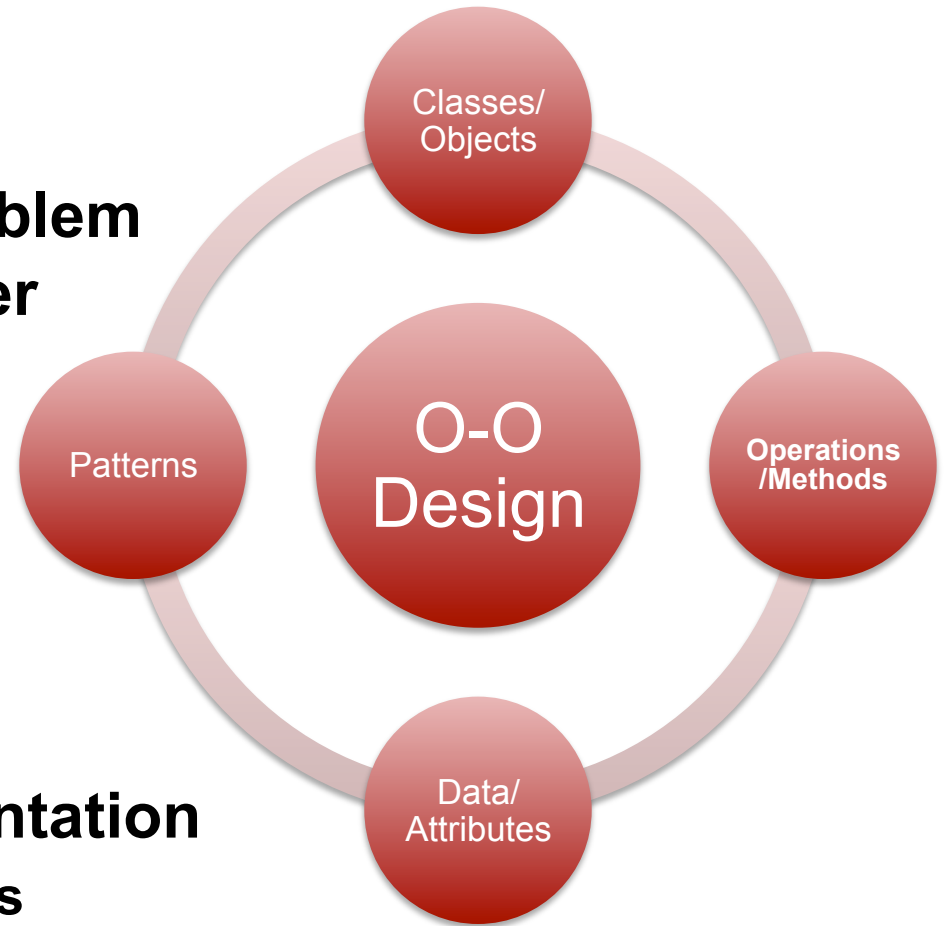
Analysis versus Design

■ Analysis

- Investigation of the problem and requirements, rather than a solution
- Do the right thing...

■ Design

- A conceptual solution, rather than its implementation
 - Excludes low level details
- Do the thing right...



Analysis and Design Concepts

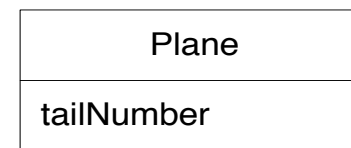
Analysis Concept



domain concept

representation in an
object-oriented
programming language

Design Concept



visualization of
domain concept

```
public class Plane
{
  private String tailNumber;

  public List getFlightHistory() {...}
}
```



Unified Modeling Language (UML)

Grady Booch



Ivar Jacobson



Jim Rumbaugh

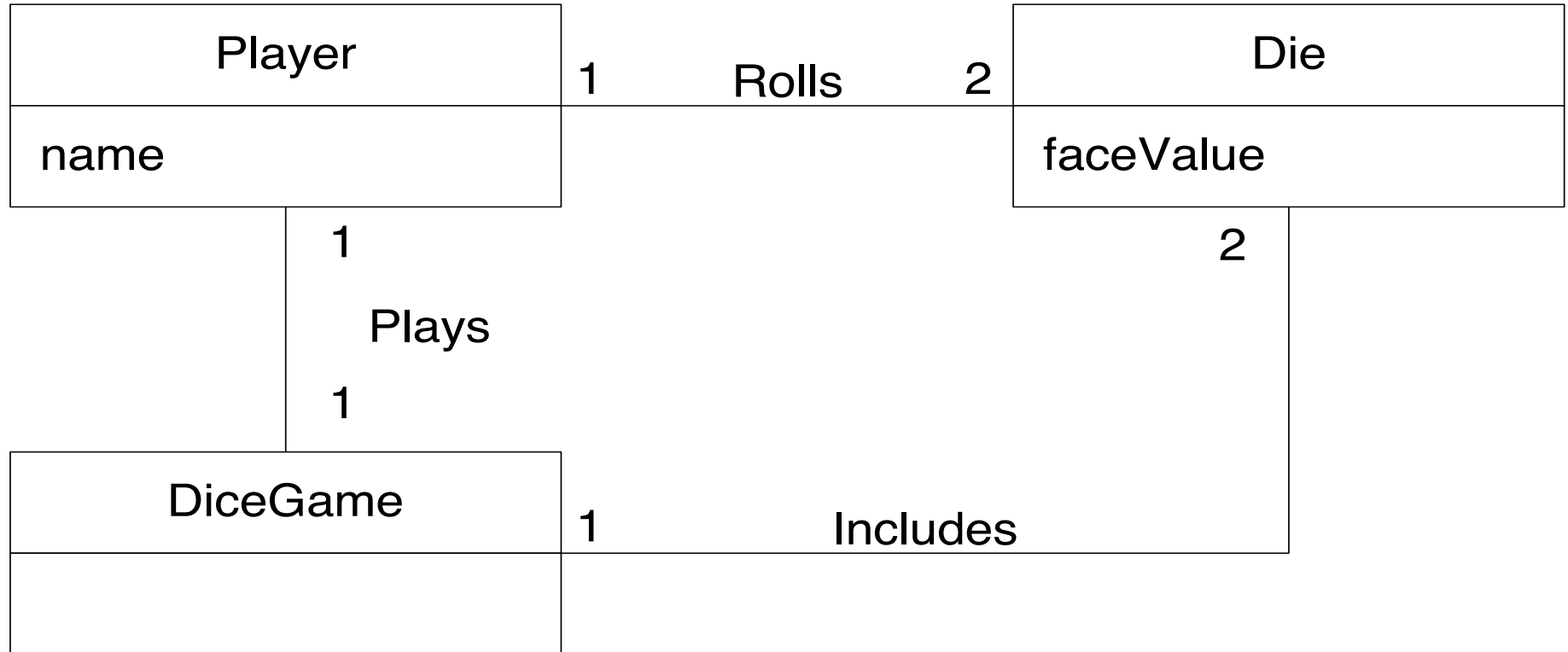
Let's do a Quick Example: **Dice**

- **Define Use Cases**
 - **Play a dice game: Players requests to roll the dice. System presents results: If the dice face value totals seven, player wins; otherwise player loses**
- **Define a Domain Model**
- **Assign Object Responsibilities, Draw Interaction Diagrams**
- **Define Design Class Diagrams**

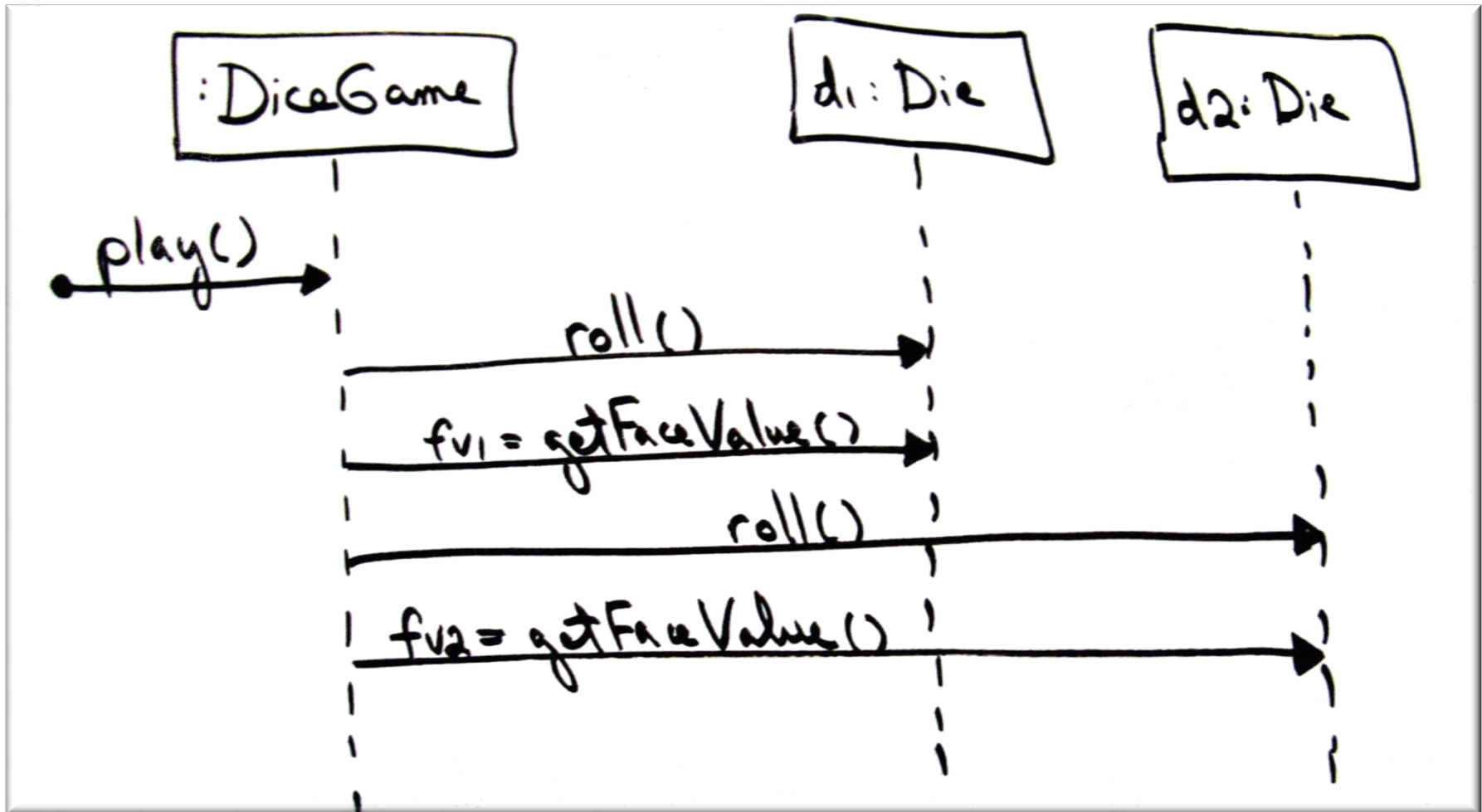




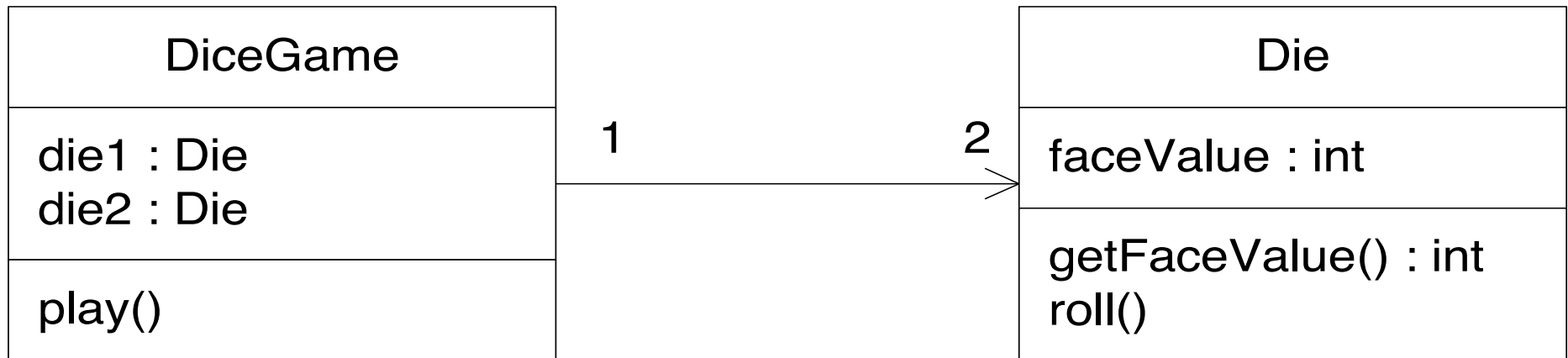
Domain Model for a Dice Game



Sequence Diagram for Play Dice Game



Design Class Diagram for Dice Game



How does it differ from the domain model?

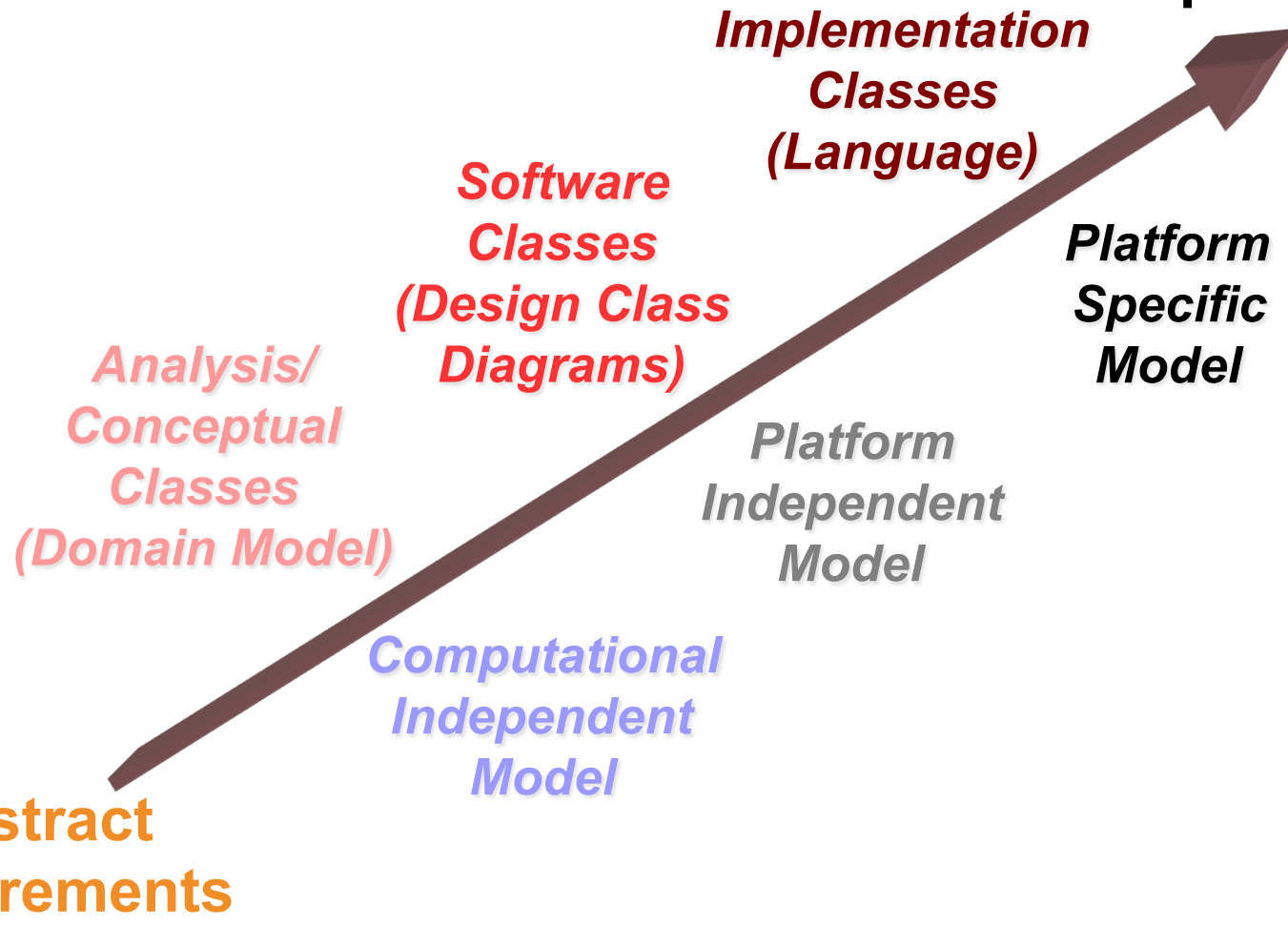


Three Perspectives to Apply UML

- **Conceptual perspective (Sketch)**
- **Software specification perspective (Blueprint)**
- **Software implementation perspective (Executable programming language)**

Abstract Requirements to Concrete Systems

Concrete
Implementation





The Case Studies

- **NextGen Point of Sale (POS) System**
- **Monopoly Game**
- **The case study is organized in three iterations**
 - **Each iteration conducts analysis and design on the features for that current software release**



Homework Assignment for 12/2/10

- **Read Chapters 9 through page 148**
- **Milestone 1**
 - **Set up weekly meetings**
 - **Compile CSSE 371 requirements artifacts into a single, organized document as a starting point.**
 - **Establish Engineering Journal**
 - **Due by 11:59pm on Friday, December 3rd, 2010**