

Domain Modeling

CSSE 374: Class 3

Shawn Bohner
Office: Moench Room F212
Phone: (812) 877-8685
Email: bohner@rose-hulman.edu

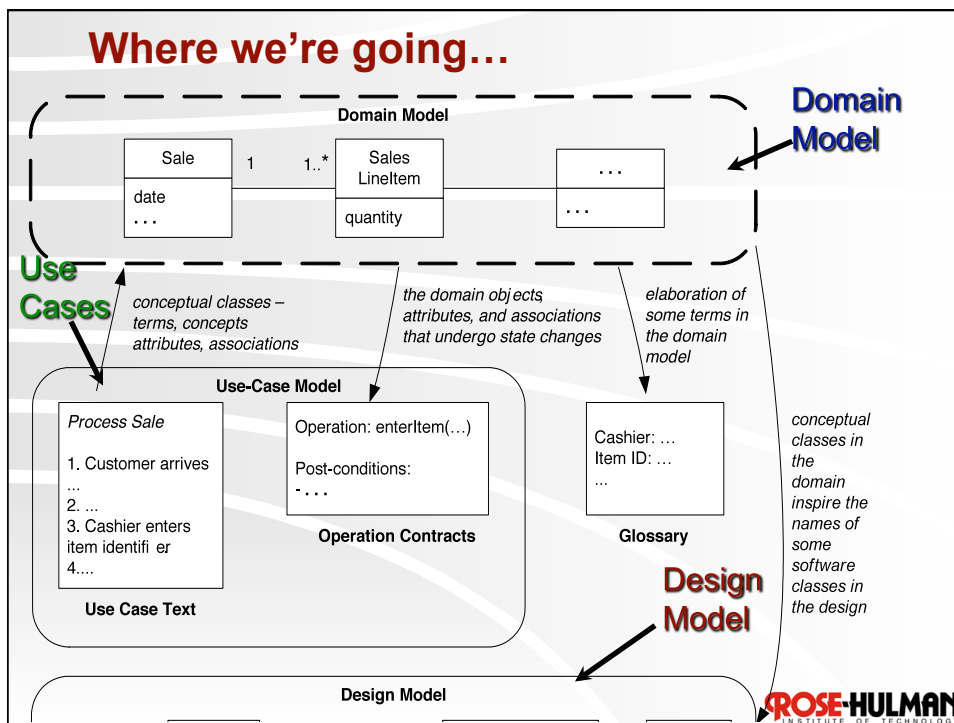


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Q1

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Where we're going...



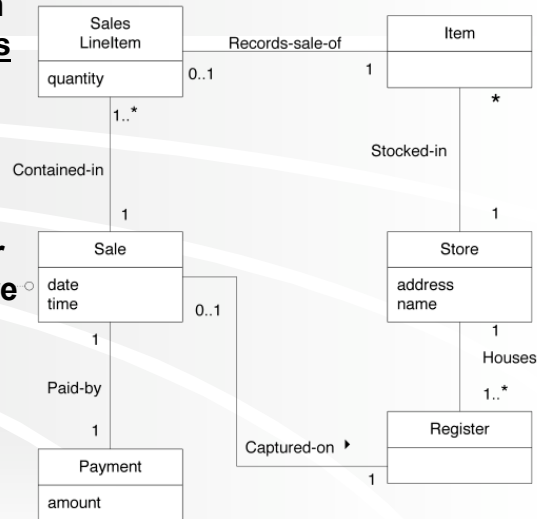
Domain Model – An Abstraction of Conceptual Classes

- ❖ Most important model in Object-Oriented Analysis

- ❖ Illustrates noteworthy concepts in a domain

- ❖ Source of inspiration for designing some software objects

- ❖ Basic notation is trivial, but it takes practice to build a useful model

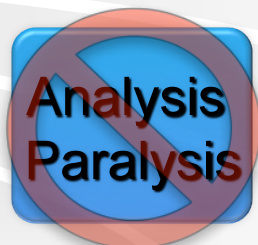


Q2, 3

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Conflicting/Competing Demands

- ❖ Want rich set of conceptual classes to support understanding and communication
- ❖ Want a short time investment



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What is a Domain Model?

- ❖ Visual representation of conceptual classes and their relationships
- ❖ Focuses on one domain
- ❖ Illustrated using UML class diagrams without operations

Q4, 5

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Avoiding Pitfalls

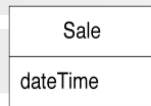


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Avoid Premature Design

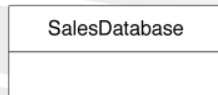


Good



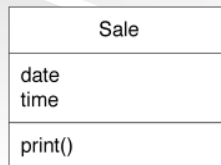
visualization of a real-world concept in the domain of interest
it is a *not* a picture of a software class

Avoid



software artifact; not part of domain model

Avoid



software class; not part of domain model



Domain Model versus Domain Layer



User Interface



application logic layer



other layers or components



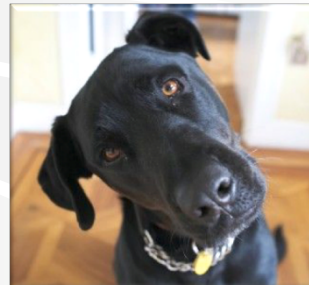
Confusion with Databases



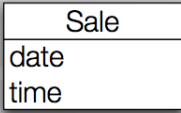
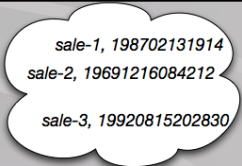
- ❖ Domain model \neq data model
- ❖ Data models:
 - Only show persistent data
 - Exclude classes that don't have attributes
- ❖ Domain models may include:
 - External actors, transient data, any real-world classes
 - Also classes without attributes/data that have a purely behavioral role

Conceptual Classes

- ❖ A conceptual class is an idea, thing, or object
- ❖ Formally, a conceptual class can be represented as:
 - a symbol,
 - it's intension, or
 - it's extension



Conceptual Class, More Formally

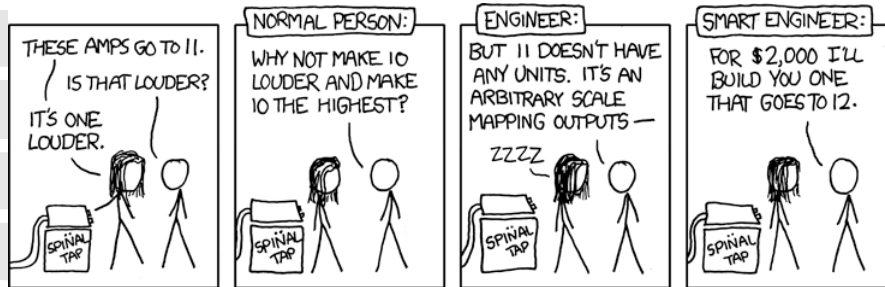
	Example	Not Just an OO Idea
Symbol		\mathbb{N}
Intension	“A sale represents the event of a purchase transaction. It has a date and time.”	$\{x \in \mathbb{Z} \mid x \geq 0\}$
Extension		$\{0, 1, 2, 3, \dots\}$

Why Create a Domain Model?

- ❖ Domain Model Easier for Users to Understand
- ❖ Names from domain model move into the domain layer in the software
- ❖ Goal: lower representational gap
- ❖ Helps us:
 - Understand the software
 - Maintain the software

How?

It's important to understand your customer's domain...



Wow, that's less than \$200 per ... uh ... That's a good deal!

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How to Create a Domain Model

1. Find the conceptual classes
2. Draw them as classes in a UML class diagram
3. Add associations and attributes (but not operations)

Bounded by
the current
requirements

Q7

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Strategies to Find Conceptual Classes

1. Reuse or modify existing models
2. Identify noun phrases; linguistic analysis
3. Use a category list

Q8

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Category Lists for Conceptual Classes

Conceptual Class Category	POS Examples
Business transactions <i>Here's where the \$ is!</i>	Sale, Payment
Physical objects <i>Important for control systems, simulations</i>	Item, Register
Containers of things	Store, Aisle, Bin
...	...

Q9

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Some Guidelines

Modeling the Unreal World

- ❖ **Some domains are inherently abstract**
 - Telecommunications
 - Server Management
 - Log File Analysis

- ❖ **Guideline: listen carefully to the vocabulary and concepts used by the domain experts**

Common Mistake



Your programmer's intuition helps here

int, double String

- ❖ Sending an attribute to do a conceptual classes job
- ❖ Guideline: if some "attribute" isn't a number or text in the real world, then it probably should be a conceptual class not an attribute
- ❖ Examples...

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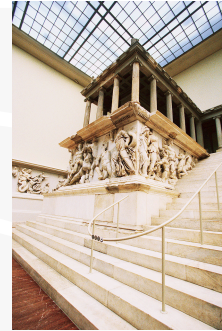
Attribute or Class?



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Creating a Domain Model

- ❖ Identify Candidate Conceptual classes
- ❖ Draw them in the initial Domain Model
- ❖ Add requisite associations to record key relationships
- ❖ Add attributes to preserve relevant information
- ❖ Apply existing Analysis Patterns
 - Use existing names for things, the vocabulary of the domain
 - Exclude irrelevant features
- ❖ Rules of thumb for Conceptual Classes
 - If it takes up space, then it is probably a conceptual class.
 - If you can't think of a thing as a number or text, then it is probably a conceptual class.



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Description Classes

- ❖ A description class contains information that describes something else, e.g., *ProductDescription*
- ❖ Example...

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Consider...

Item
description
price
serial number
itemID

- ❖ Assume an *Item* instance represents a physical item in a store
- ❖ Item data only recorded within *Item* instances
- ❖ When a real-world item is sold, we remove the software *Item* from a collection and it's garbage collected

Amps that go to 11
are sold out!

How much for an Amp
that goes to 11?

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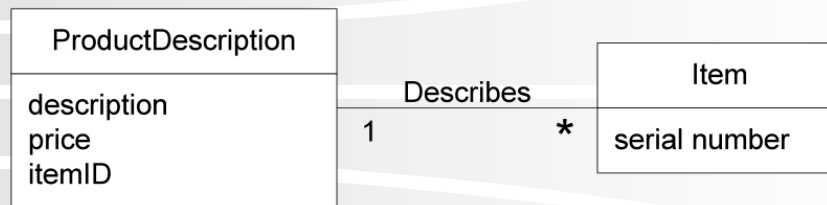
Problems

Item
description
price
serial number
itemID

- ❖ Lose memory of the price, etc., if no *Item* instances remain in the system
- ❖ Duplicate data
 - Wasted space
 - Error-prone

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Solution: Use Description Class



- ❖ When information must be retained independent of existence of instances of the described item
- ❖ When deleting the described item could result in information loss
- ❖ When it reduces redundant information

Homework and Milestone Reminders

- ❖ Read Rest of Chapter 9
- ❖ Milestone 1
 - Due by 11:59pm on Friday, December 4th, 2009
- ❖ Homework 2 – Dog-eDoctor Domain Model
 - Due by 5:00pm on Tuesday, December 8th, 2009
- ❖ Milestone 2 – Junior Project Domain Model
 - Due by 11:59pm on Friday, December 11th, 2009