Domain Model Refinement, continued

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Q1

Looking Ahead

Final Exam

- Monday, Feb. 22, 8am
- **Optional**
  - If you don't take the exam, we'll use your exam 1 grade as your final exam grade
  - Sign-up for exam during 10th week
  - If you sign-up, you have to take the exam
  - Taking the exam can lower your grade

Design Studio: An Experiment

- A chance to get more help on your projects
- A chance to participate in more design sessions without taking more of your time
- 20 minutes in each session, starting Thursday

- Format:
  - ~5 minutes: team describes problem and current solution (if any)
  - ~3 min.: class thinks about questions, alternative approaches
  - ~12 min.: on-board design

Suggestions for Design Studio Topics

- Look for problems where there are lots of “which class should be responsible for X” questions
- Challenging design problems you’ve already faced and how you solved them
- Current design problems that you haven't solved yet
- Future extensions that will need to be considered

Design Studio Sign-up

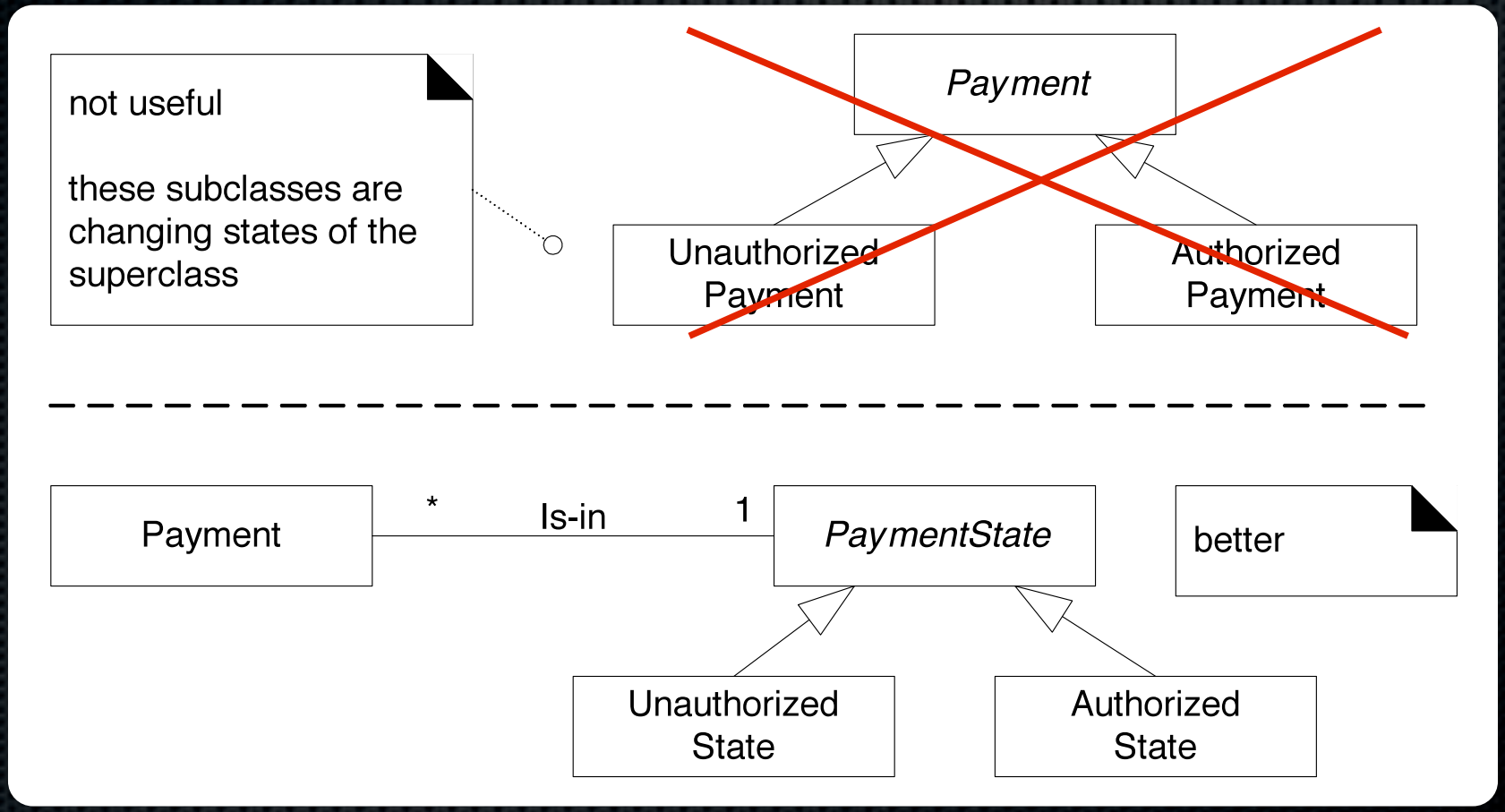
	Monday	Tuesday	Thursday
8th week	Yesterday	Today	
9th week			
10th week			Course Wrap-up

More on Domain Modeling

Modeling Changing States

- Suppose a concept X has multiple states
  - E.g., Draft vs. Sent Email
- Do not model the states as subclasses of X!
- Instead:
  - Define a State hierarchy and associate X with State
  - Or, ignore the states in the domain model

State Example



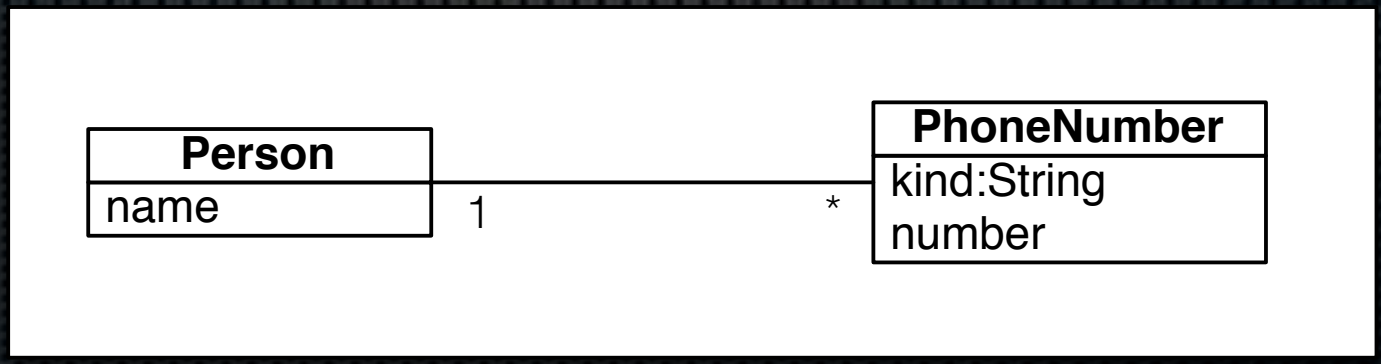
Association Classes, Consider…

- In NextGen POS:
  - Authorization services assign a *merchant ID* to each store
  - Payment authorization request from store to service must use the *merchant ID*
  - A store has a different *merchant ID* for each service

Where should the *merchant ID* appear in the domain model?

Guideline

- If a class C can simultaneously have many values for the same attribute A, put A in another class associated with C
- Example:



Guideline

- Association class might be useful in a domain model if:
  - The association has a related attribute
  - Instances of the association class can only last as long as the association does
  - There is a many-to-many association between two concepts and information is needed to distinguish the pairs

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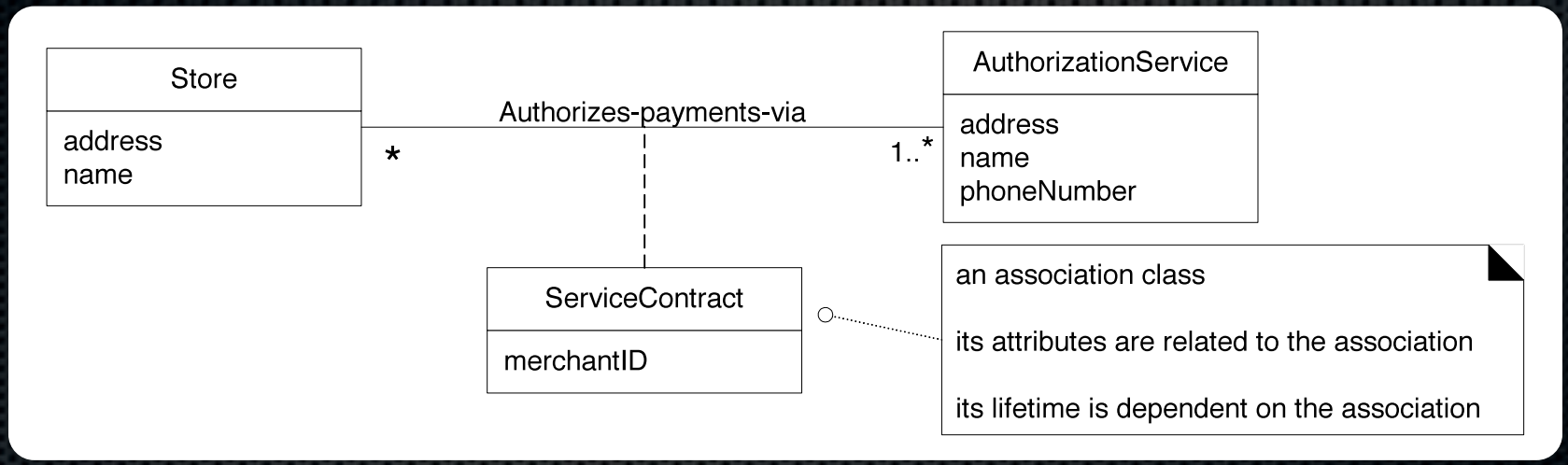
Example Association Class



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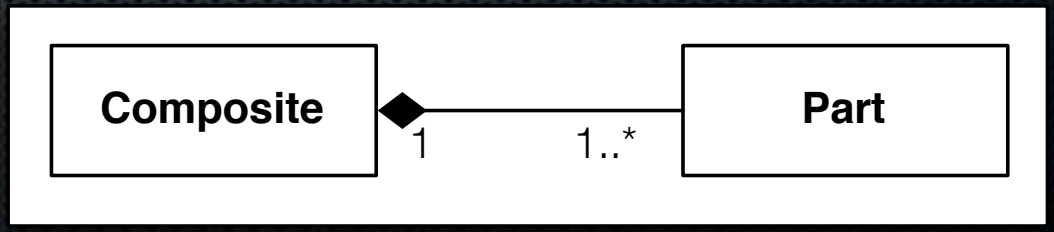
Recall, Composition

Not to be confused with the composite pattern, which is similar. (sigh)

- A composition relationship implies:
  - An instance of the part belongs to only *one* composite instance at a time
  - The part must *always belong* to a composite
  - The composite is responsible for creating/deleting the parts



Composition in Domain Models

- Guideline: **If in doubt, leave it out.**
- But, consider showing composition when:
  - The lifetime of the part is bounded within the lifetime of the composite
  - There is an obvious whole-part physical assembly
  - Properties of the composite propagate to the parts
  - Operations on composite propagate to the parts

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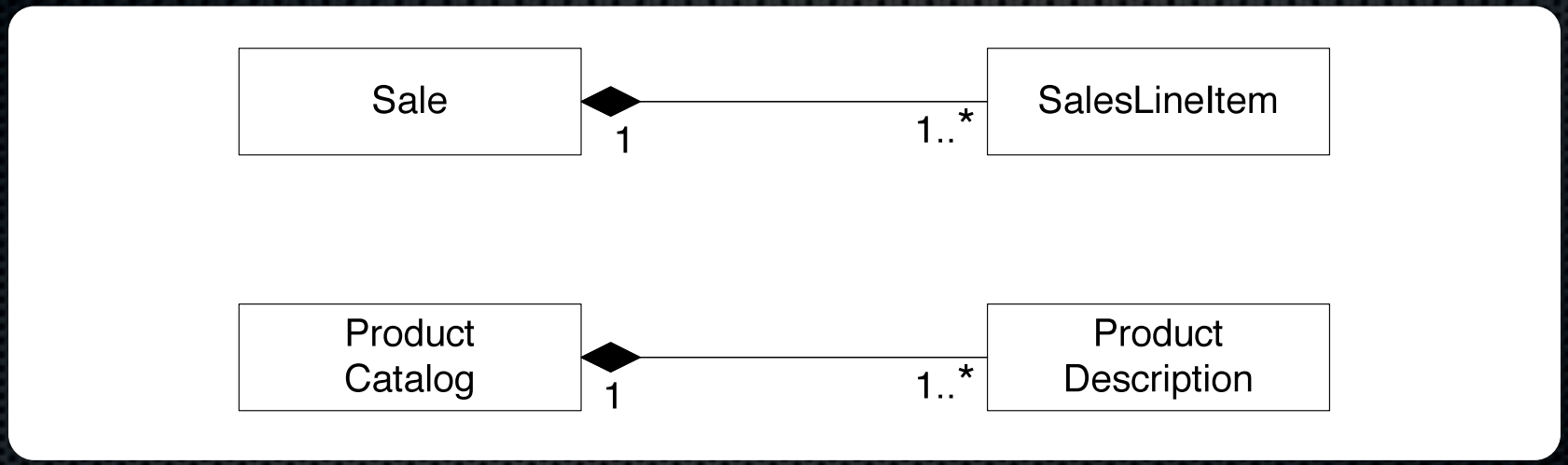
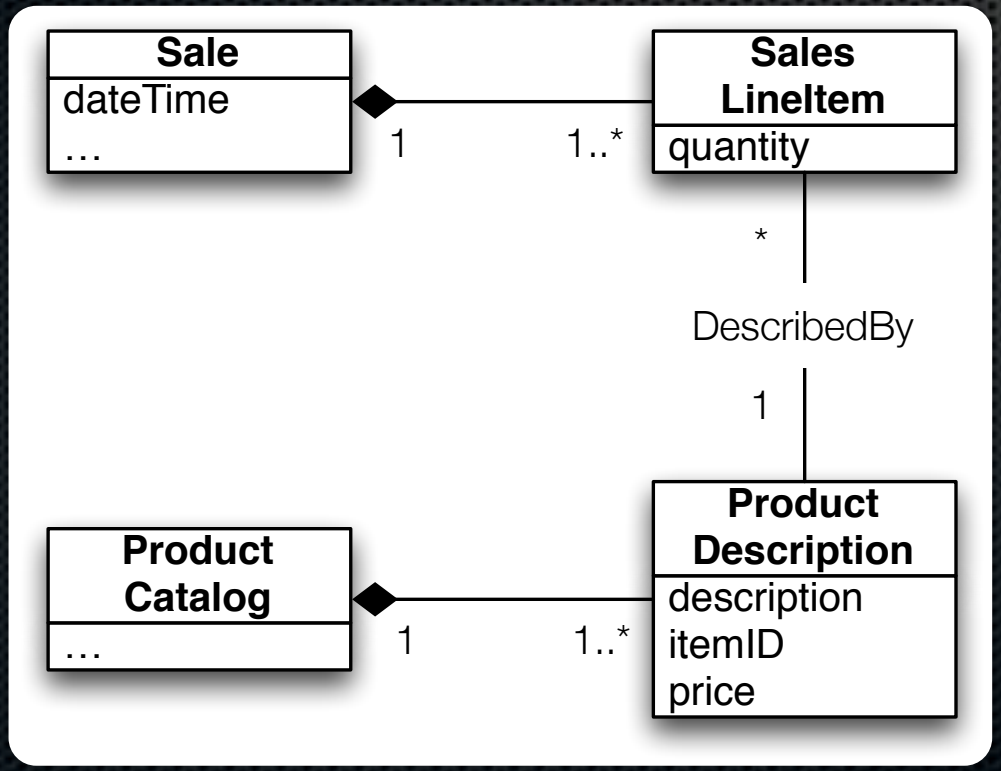
Composition in NextGen Domain Model



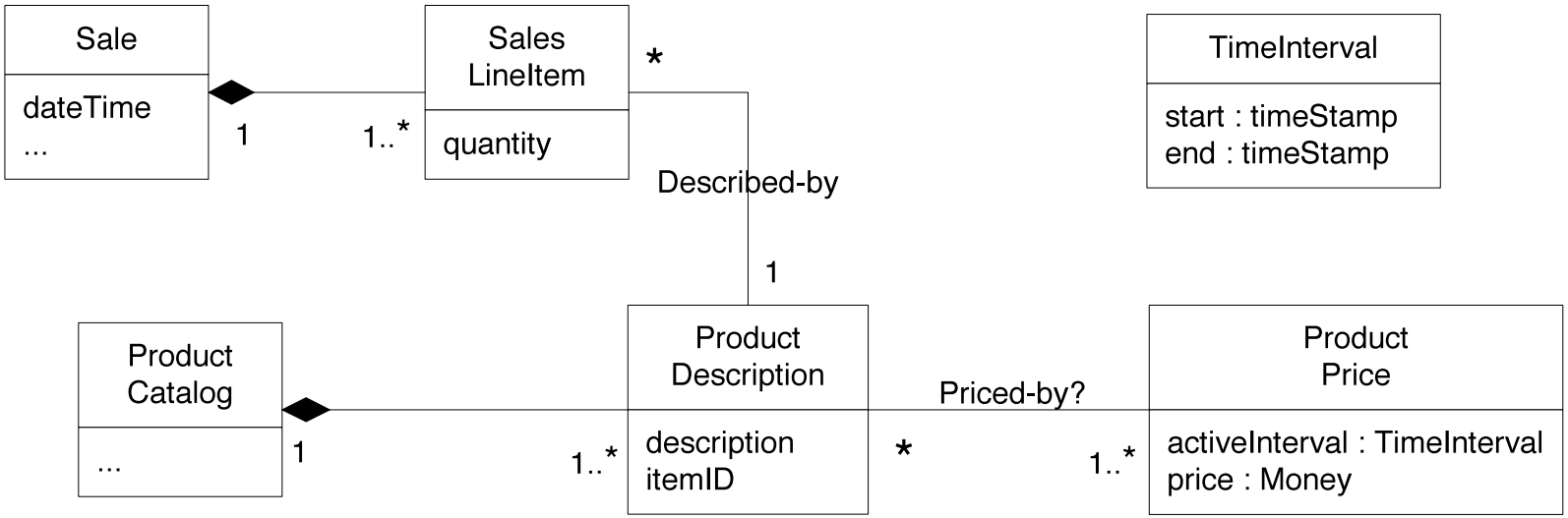
Problem

- What happens to old Sales when a product's price changes?



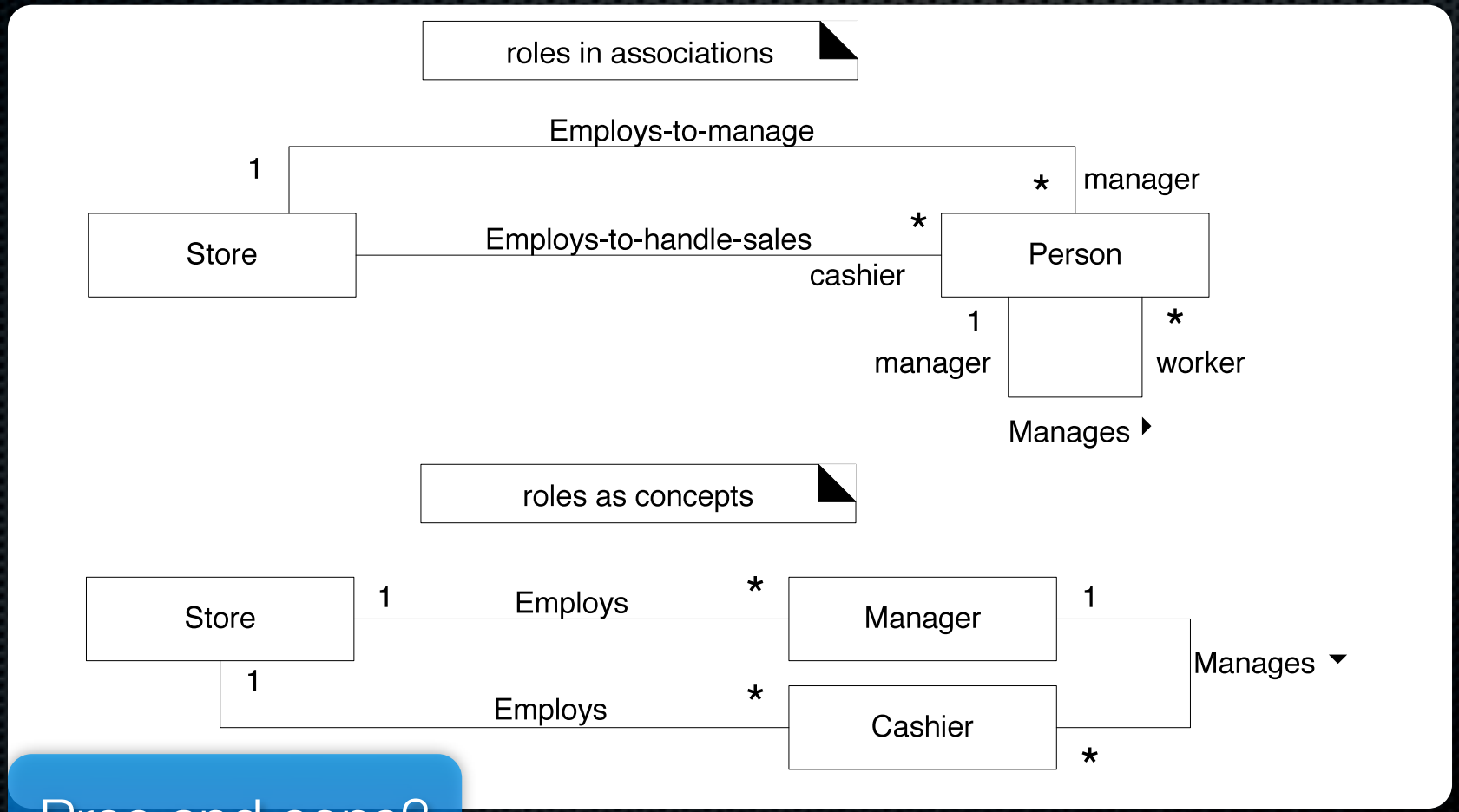
Solutions?

Time Intervals



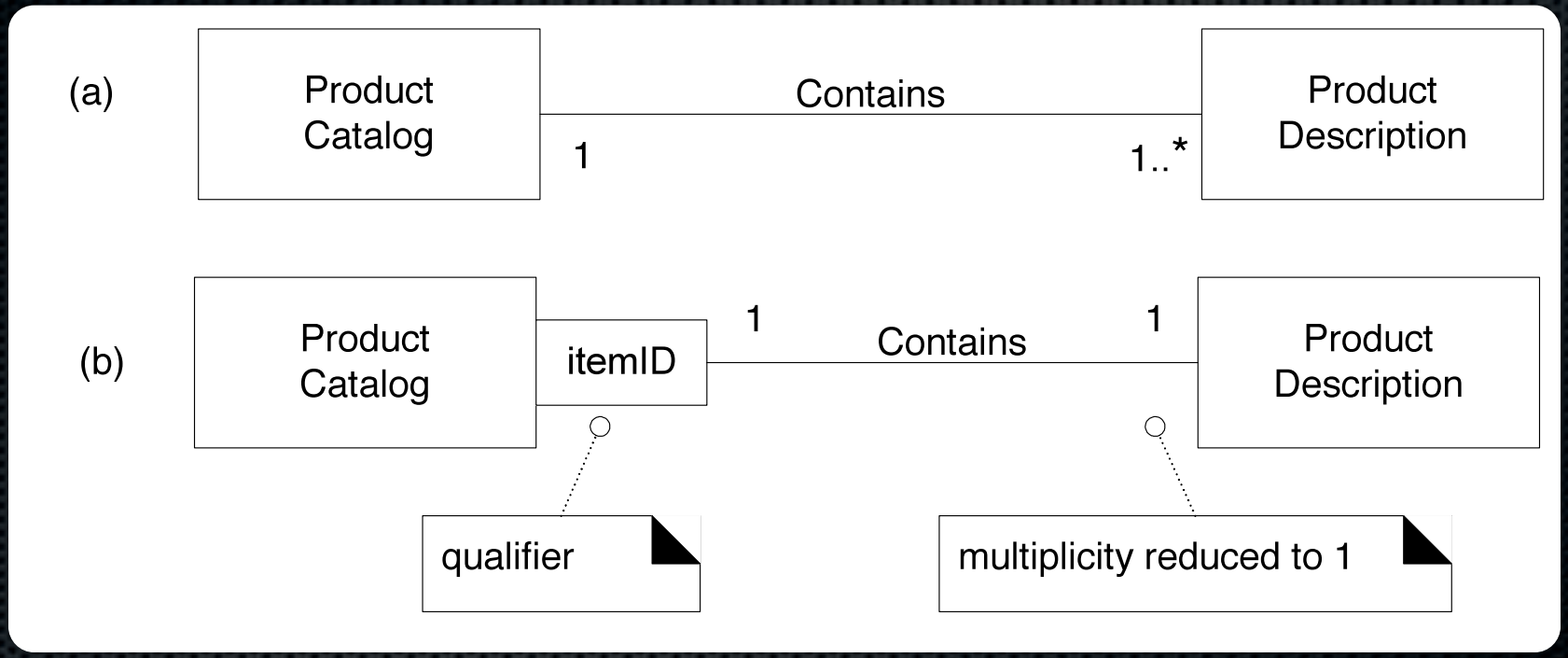
Rolls…

Er, Roles…



Pros and cons?

Qualified Associations



Don’t over do it

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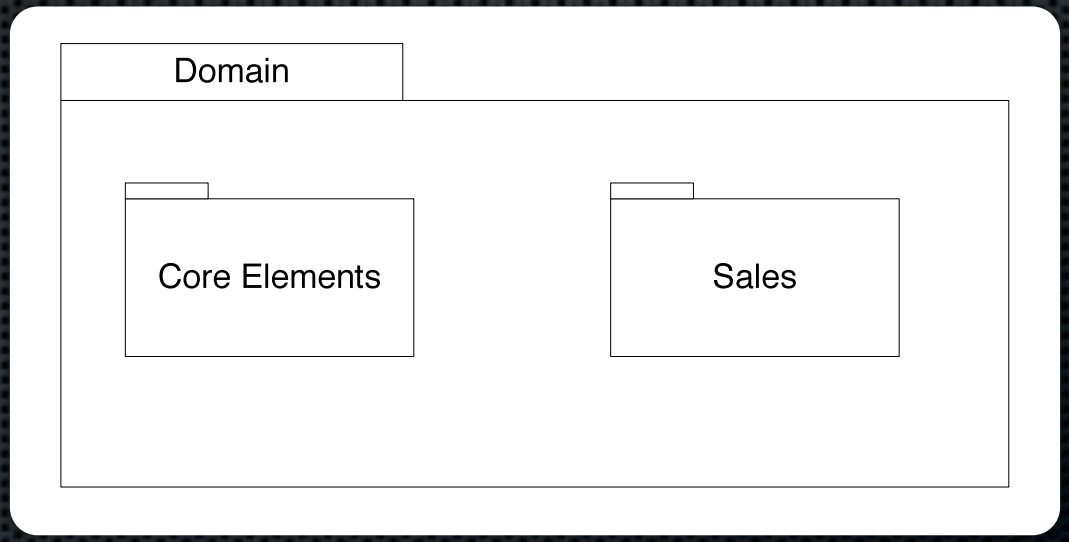
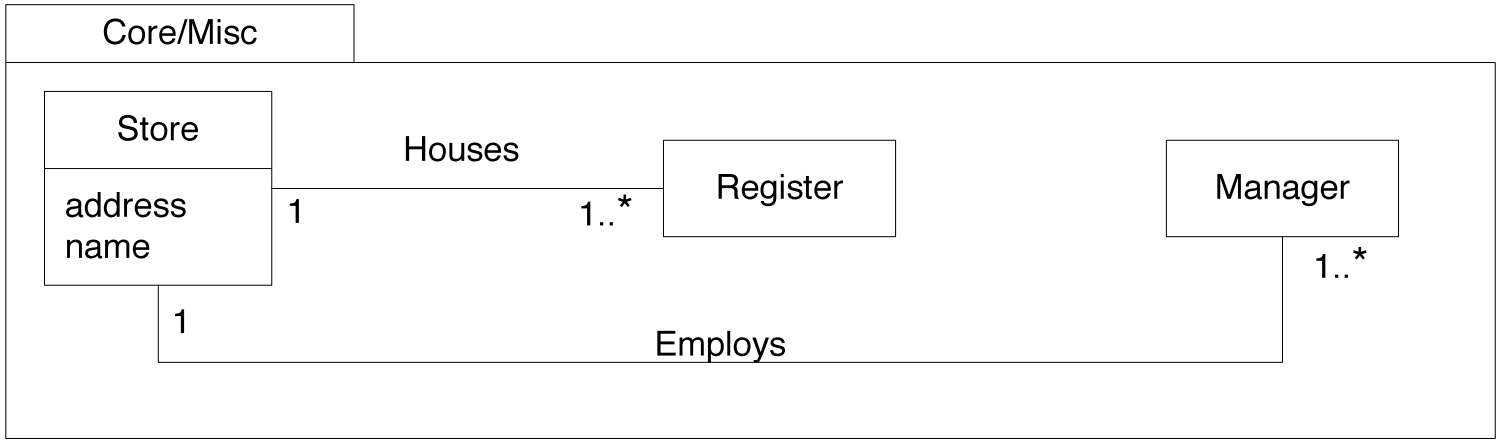
Splitting Domain Model into Packages

- Supports parallel analysis work
- NextGen POS example:

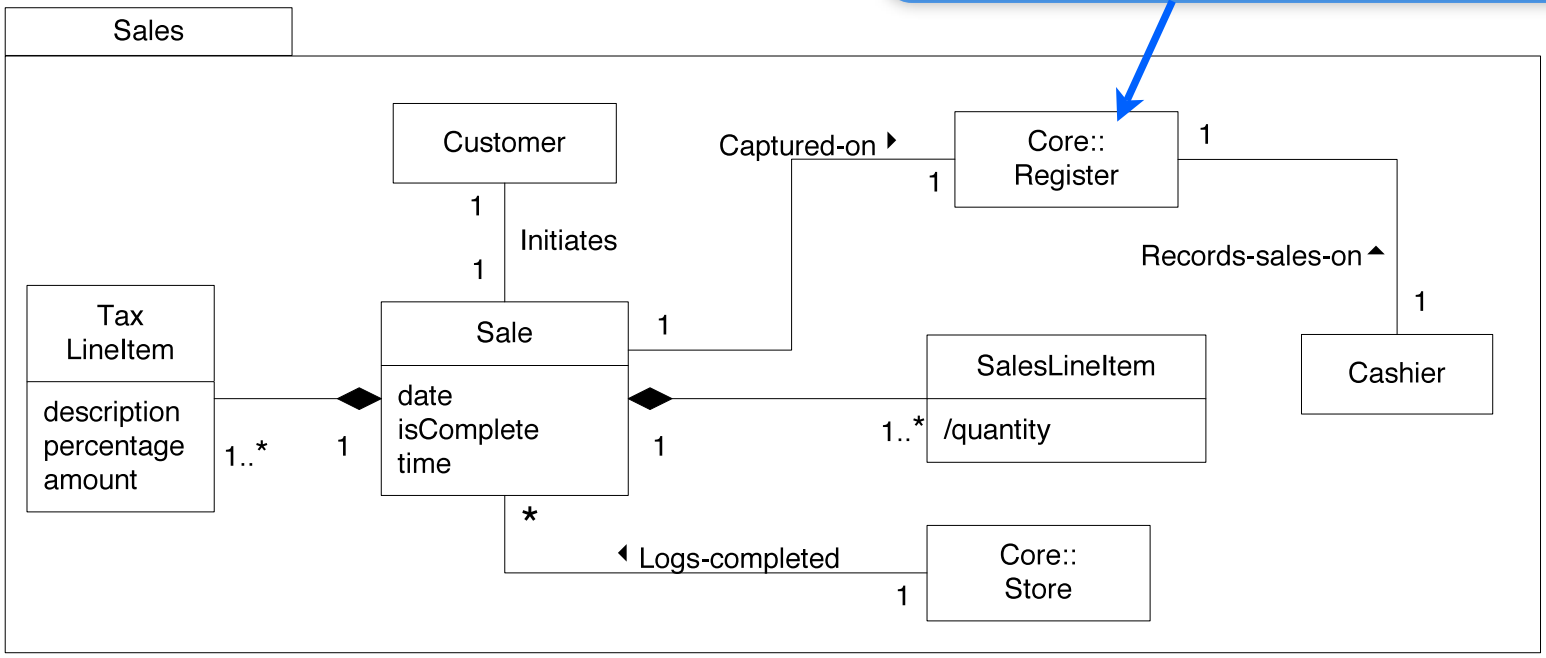


NextGen POS
Core Package



NextGen POS Sales Package

Register is “owned” by Core package, but also shown here to illustrate associations



If Domain is big enough to partition into packages…

- Group conceptual classes that:
  - are in the same subject area
  - are in the same class hierarchy
  - participate in the same use cases
  - are strongly associated