

Translating Subclasses

Physical Data Modeling

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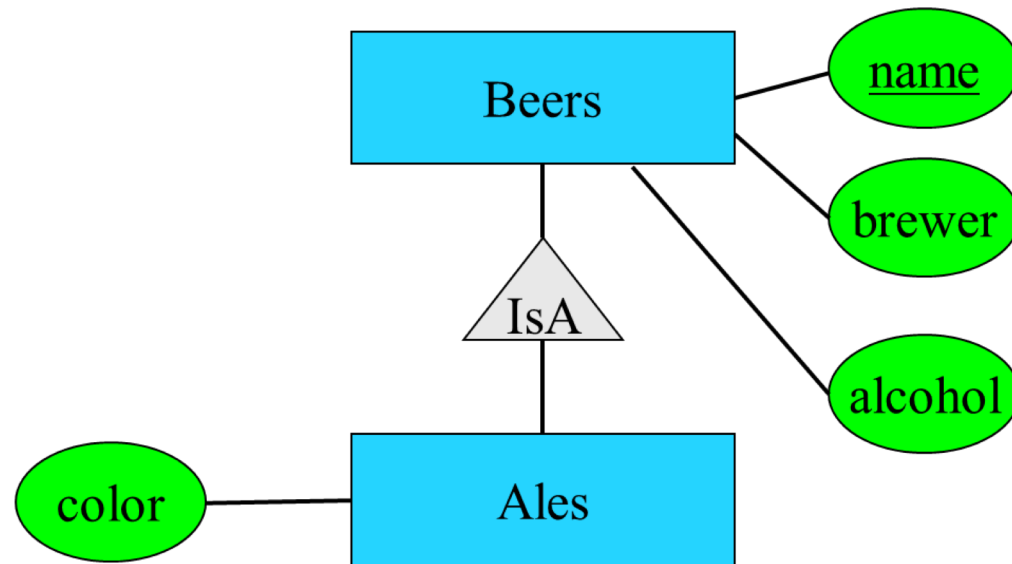
Learning Objectives

By the end of this video, you will be able to:

- Translate subclasses in an ER diagram to a relational schema.
- Identify the options for such translation and their differences.

Expressing Subclasses in Relations

- Relational model is not object-oriented.
- Object features were motivation for new models.
 - Object-oriented.
 - Object-relational.



Example subclass

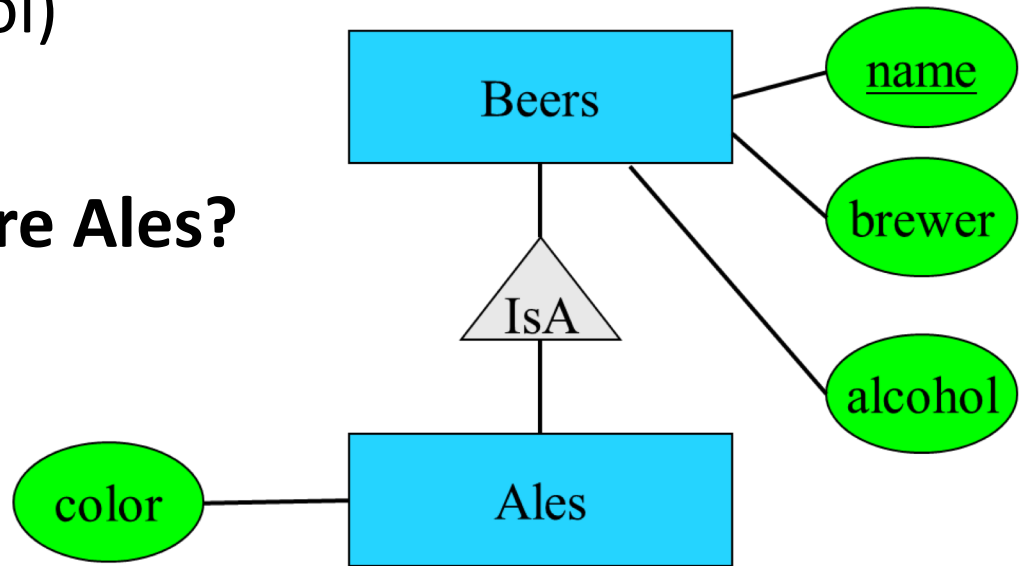
How to Express a Subclass Entity-Set?

- We need a relation for Beers. This is normal.

Beers(name, brewer, alcohol)

- But, **where and how do you store Ales?**

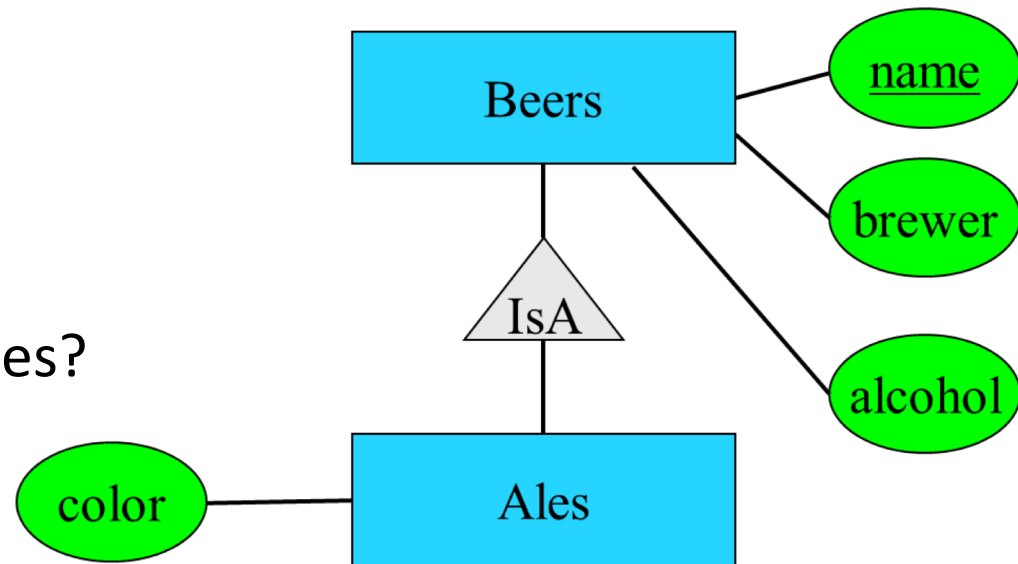
Hint: No, not a refrigerator.



Example subclass

Several Options-- None Perfect

- ER Approach
- Object-oriented approach
- Null-value approach
- Consider them by criteria
 - Performance for common queries?
 - Space need for typical data?

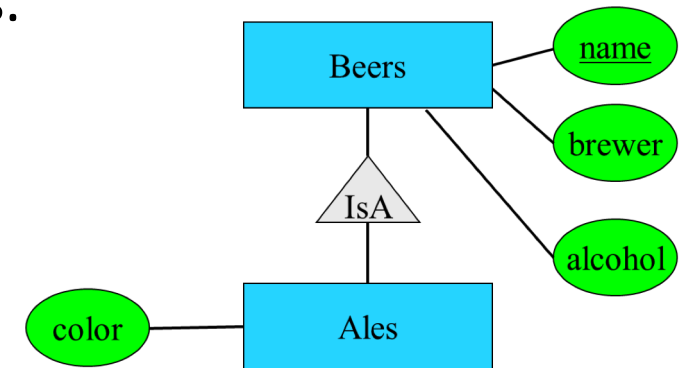


Example subclass

Option 1: The "ER Approach"

Store Subclass Just Like What ER Suggests

- What does the ER model suggest?
 - Subclass entity-set has its own "additional" attributes.
 - Relate to superclass via IsA.
- Storing subclass as a relation:
 - With only the additional attributes.
 - Link to superclass-relation via its key.
- Ex: Beers(name, brewer, alcohol), Ales(name, color)



Example subclass

name	brewer	alcohol
Sam Adams	Boston Beer	4.9
Goose IPA	Goose Island	5.9
Summer Ale	Boston Beer	5.3

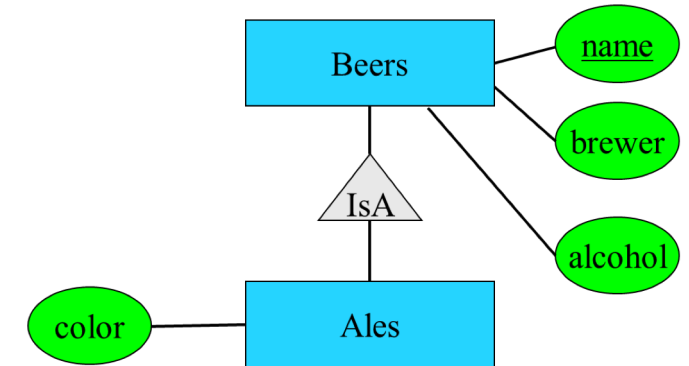
name	color
Goose IPA	Golden
Summer Ale	Dark

Example database

Option 2: The "OO Approach"

Store Subclass with OO Inheritance

- What would an "object-oriented approach" suggest?
 - Inheritance: Subclass would inherit attributes from superclass.
- Storing subclass as a relation:
 - With also attributes from the superclass.
- Ex:
 - Beers(name, brewer, alcohol)
 - Ales(name, brewer, alcohol, color)



Example subclass

name	brewer	alcohol
Sam Adams	Boston Beer	4.9

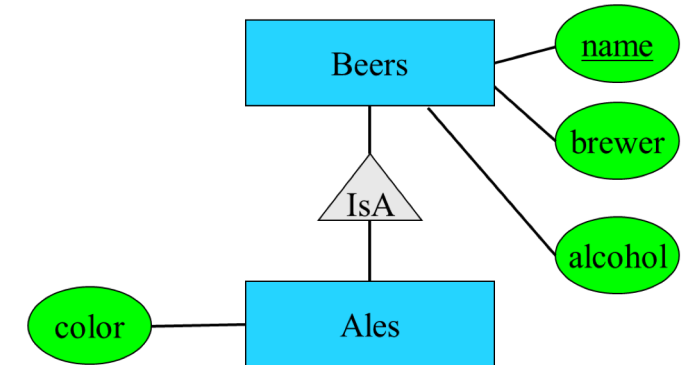
name	brewer	alcohol	color
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

Example database

Option 3: The "Null-Value Approach"

One Table for Both Super/Subclasses

- Use one relation for both, i.e., "one size fits all".
- Storing super/subclass in the same relation:
 - With all attributes.
- Use null values to say "N/A".
- Ex: Beers(name, brewer, alcohol, aleColor)



Example subclass

name	brewer	alcohol
Sam Adams	Boston Beer	4.9
Goose IPA	Goose Island	5.9
Summer Ale	Boston Beer	5.3

name	color
Goose IPA	Golden
Summer Ale	Dark

ER approach

name	brewer	alcohol
Sam Adams	Boston Beer	4.9

name	brewer	alcohol	color
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

OO approach

name	brewer	alcohol	aleColor
Sam Adams	Boston Beer	4.9	Null
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

Example database

Q: What would work faster?

- Find the colors of ales made by some company, say, Boston Beer.

name	brewer	alcohol
Sam Adams	Boston Beer	4.9
Goose IPA	Goose Island	5.9
Summer Ale	Boston Beer	5.3

name	color
Goose IPA	Golden
Summer Ale	Dark

1. ER approach

name	brewer	alcohol
Sam Adams	Boston Beer	4.9

name	brewer	alcohol	color
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

2. OO approach

name	brewer	alcohol	aleColor
Sam Adams	Boston Beer	4.9	Null
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

3. Null-value approach

Q: What would work faster?

- Find all beers made by Boston Beer.

name	brewer	alcohol
Sam Adams	Boston Beer	4.9
Goose IPA	Goose Island	5.9
Summer Ale	Boston Beer	5.3

name	color
Goose IPA	Golden
Summer Ale	Dark

1. ER approach

name	brewer	alcohol
Sam Adams	Boston Beer	4.9

name	brewer	alcohol	color
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

2. OO approach

name	brewer	alcohol	aleColor
Sam Adams	Boston Beer	4.9	Null
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

3. Null-value approach

*Is the Null-Value Approach any good?
Help me find some arguments.*

Performance-wise? Space-wise?

name	brewer	alcohol	aleColor
Sam Adams	Boston Beer	4.9	Null
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

Null-value approach

name	brewer	alcohol
Sam Adams	Boston Beer	4.9
Goose IPA	Goose Island	5.9
Summer Ale	Boston Beer	5.3

name	color
Goose IPA	Golden
Summer Ale	Dark

name	brewer	alcohol
Sam Adams	Boston Beer	4.9

name	brewer	alcohol	color
Goose IPA	Goose Island	5.9	Golden
Summer Ale	Boston Beer	5.3	Dark

ER approach

OO approach