

CS422 Principles of Database Systems  
From ER to Relations

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*Adapted from Jeffrey Ullman's lecture notes at  
<http://www-db.stanford.edu/~ullman/dscb.html>*

### Relation

Attributes (fields)

Name	Manufacturer
Winter Brew	Pete's
Bud Lite	Anheuser-Busch

Beers

Tuples (Records) (Rows)

Relation schema:  
Beers( name, manufacturer )  
or Beers( name:string, manufacturer:string)

### About Relational Model

- ◆ Attributes values must be atomic
- ◆ No order among attributes
- ◆ No order among tuples

### Convert ER Diagram to Relations

- ◆ Entity sets
- ◆ Relationships
- ◆ Weak entity sets
- ◆ Subclasses

### Entity Sets

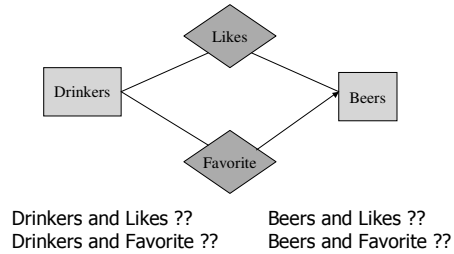
### Relationships

??

## Converting Relationships – General Rules

- ◆ The resulting relation includes
  - All key attributes from the entity sets involved in the relationship
  - All the attributes of the relationship itself

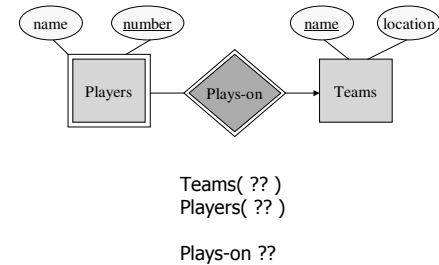
## Combining Relations



## Converting Relationships – Combining Relations

- ◆ The relations converted from *many-to-one* and *one-to-one* relationships can be absorbed into the relation of the “many” side.

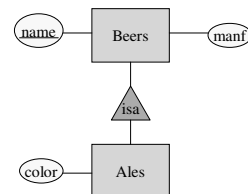
## Weak Entity Set Example



## Weak Entity Sets

- ◆ Relation for a weak entity set includes its *complete key* as well as its own non-key attributes
- ◆ A supporting relationship is redundant and yields no relation

## Subclass Example



## Subclasses

- ◆ Object-oriented approach
  - One relation per class
  - Each entity belongs to exact one relation
- ◆ ER approach
  - One relation per class
  - Each entity may appear in multiple relations
- ◆ NULL approach
  - One relation per class hierarchy

## Object-Oriented Approach

name	manf
Bud	Anheuser-Busch

Beers

name	manf	color
Summerbrew	Pete's	dark

Ales

## ER Approach

name	manf
Bud	Anheuser-Busch
Summerbrew	Pete's

Beers

name	color
Summerbrew	dark

Ales

## NULL Approach

name	manf	color
Bud	Anheuser-Busch	NULL
Summerbrew	Pete's	dark

Beers

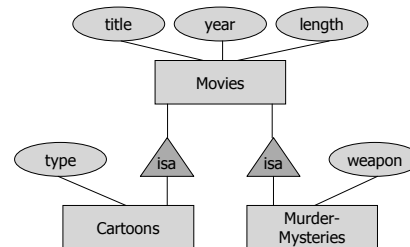
## Discriminator

Discriminator field

name	type	manf	color
Bud	General	Anheuser-Busch	NULL
Summerbrew	Ale	Pete's	dark

Beers

## Another Subclass Example



## Comparison of Subclass Conversion Approaches

- ◆ Constraints and data integrity
- ◆ Query performance

Q1: find all beers made by Pete's  
Q2: find colors of the ales made by Pete's

## Examples

- ◆ Receipt again
  - Items, Customers, Waiters, and Orders
- ◆ Hierarchical categories
- ◆ Price that changes

## Example: Survey Questions

- ◆ Four types of survey questions
  - Single-choice
  - Multiple-choice
  - Single-answer
  - Multiple-answer
- ◆ Database stores information about *users, surveys, questions, and answers*