

## Outline

### ❑ ER model

- Overview
- Entity types
  - ✓ Attributes, keys
- Relationship types
- Weak entity types

### ❑ EER model

- Subclasses
- Specialization/Generalization

### ❑ Schema Design

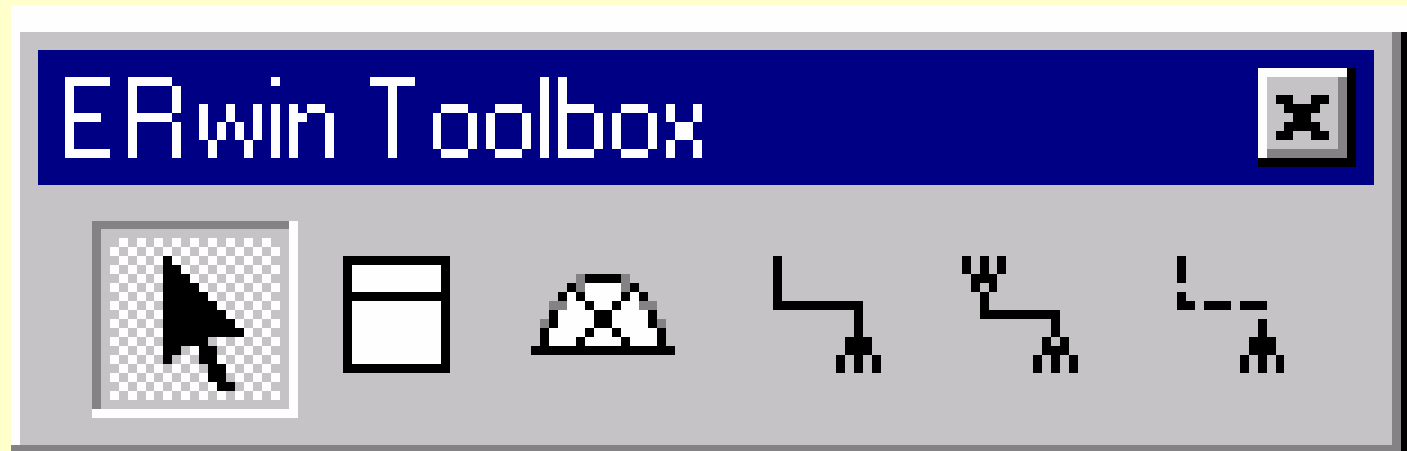
- Single DB
- View integration in IS

### ❑ Uses Crows feet notation for ER Diagrams in ERwin

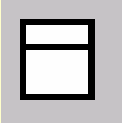
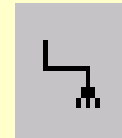


### Uses Crows feet notation for ER Diagrams

- ☐ This is an alternative to the diamond representation of relationships.
- ☐ Diamond icons are replaced with lines, simplifying the ER schema.
- ☐ In ERwin , select IE -- ‘Information Engineering’  
Notation

## Uses Crows feet notation for ER Diagrams



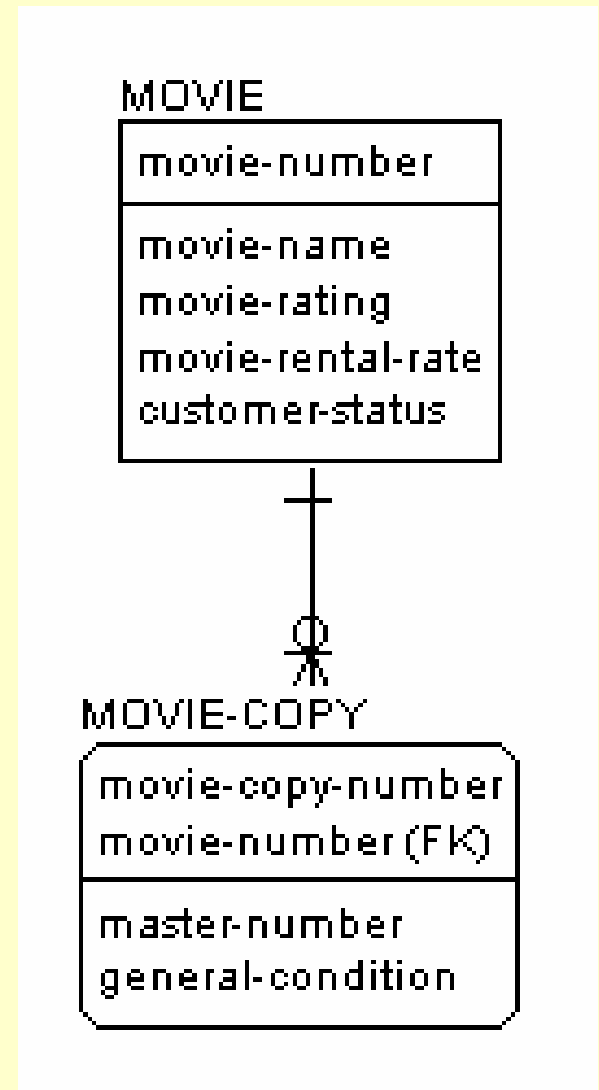
### □ Intuition

-  means “Entity”
-  means “Identifying relationship” (one or zero to many)
-  means “Many-to –many relationship”
-  means “Non-identifying relationship” (one or zero to many)

### Uses Crows feet notation for ER Diagrams in ERwin

An identifying relationship is a relationship between two entities in which an instance of a child entity is identified through its association with a parent entity, which means the child entity is dependent on the parent entity for its identify and cannot exist without it. In an identifying relationship, one instance of the parent entity is related to multiple instances of the child.

In IE notation, ERwin draws an identifying relationship line as a solid line with crows feet.

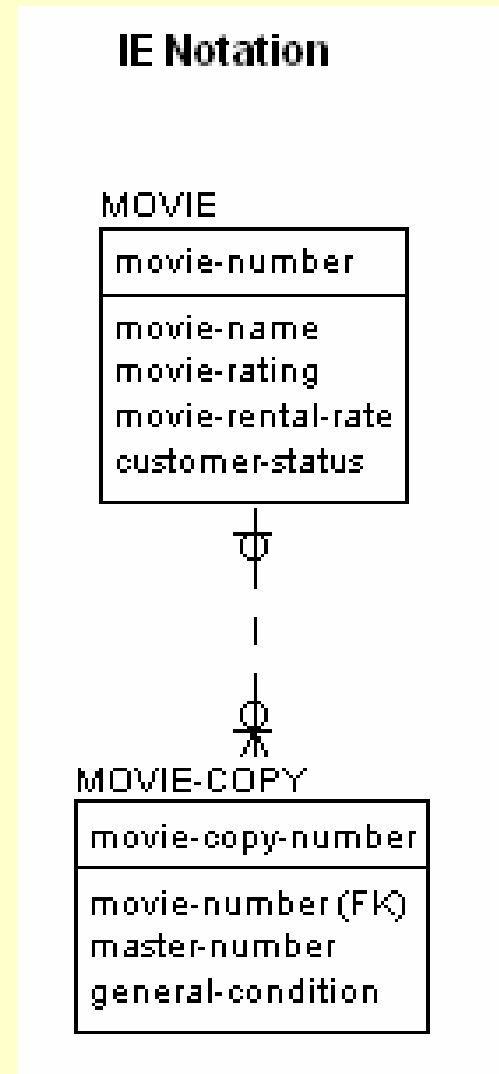


## Uses Crows feet notation for ER Diagrams in ERwin

A non-identifying relationship is a relationship between two entities in which an instance of the child entity is not identified through its association with a parent entity, which means the child entity is not dependent on the parent entity for its identify and can exist without it. In a non-identifying relationship, one instance of the parent entity is related to multiple instances of the child.

## Uses Crows feet notation for ER Diagrams in ERwin

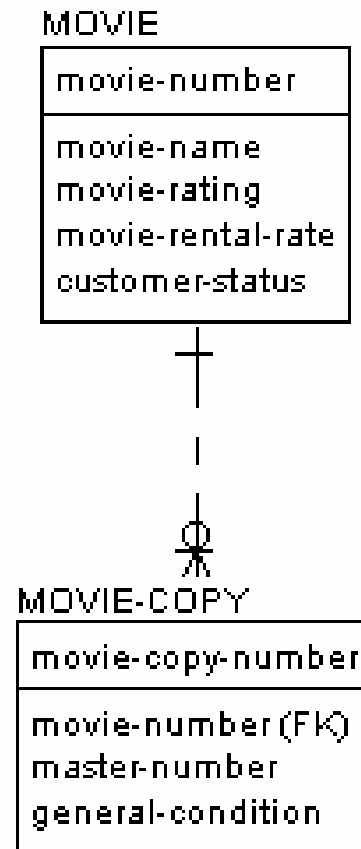
In an optional non-identifying relationship, the attributes that are migrated into the non-key area of the child entity are not required in the child entity. Therefore, nulls are allowed in the foreign key.



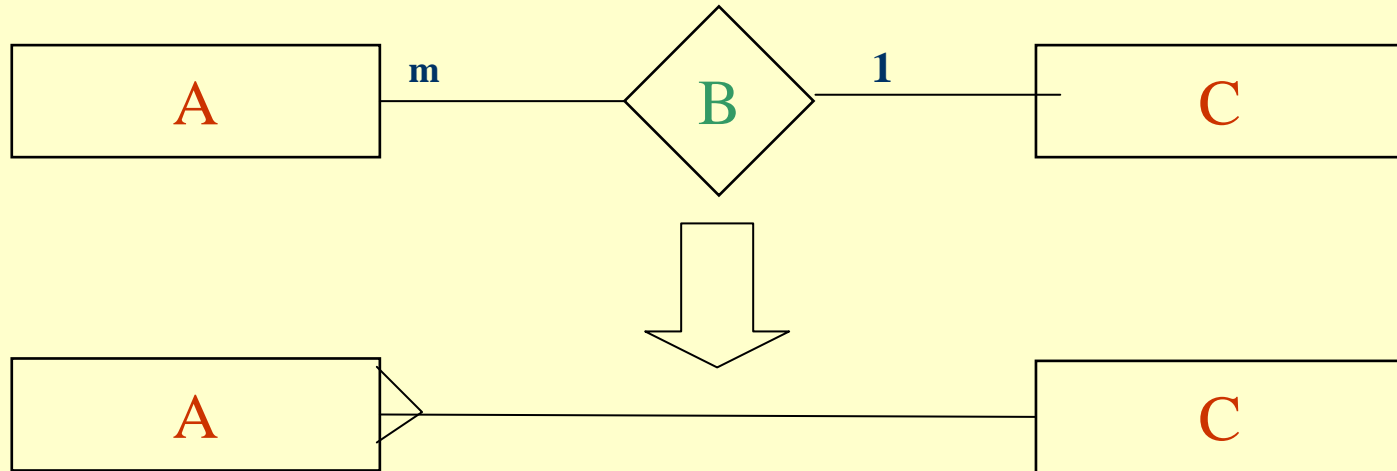
## Uses Crows feet notation for ER Diagrams in ERwin

In a mandatory non-identifying relationship, the attributes that are migrated into the non-key area of the child entity are required in the child entity. Therefore, the foreign key cannot be null.

### IE Notation



## Many-To-One Relationship

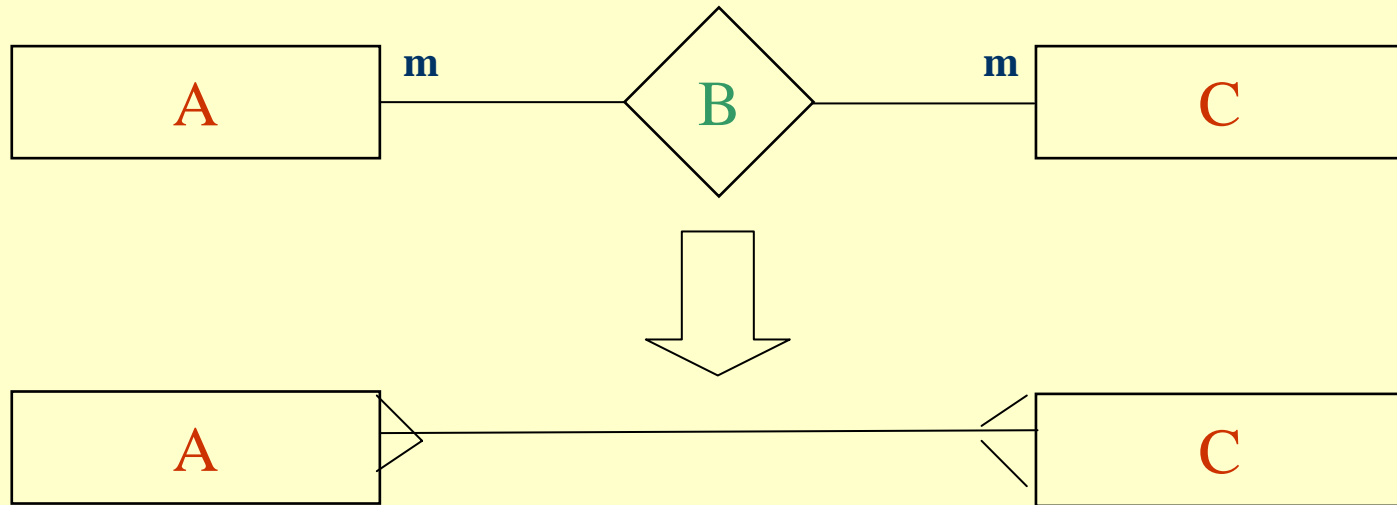


□ The crow can be seen as a pictorial representation of "many".

- Each instance of the entity type **A** is associated with 0 or 1 instances of the entity type **C**.
- Each instance of the entity type **C** is associated with 0 to many instances of the entity type **A**.



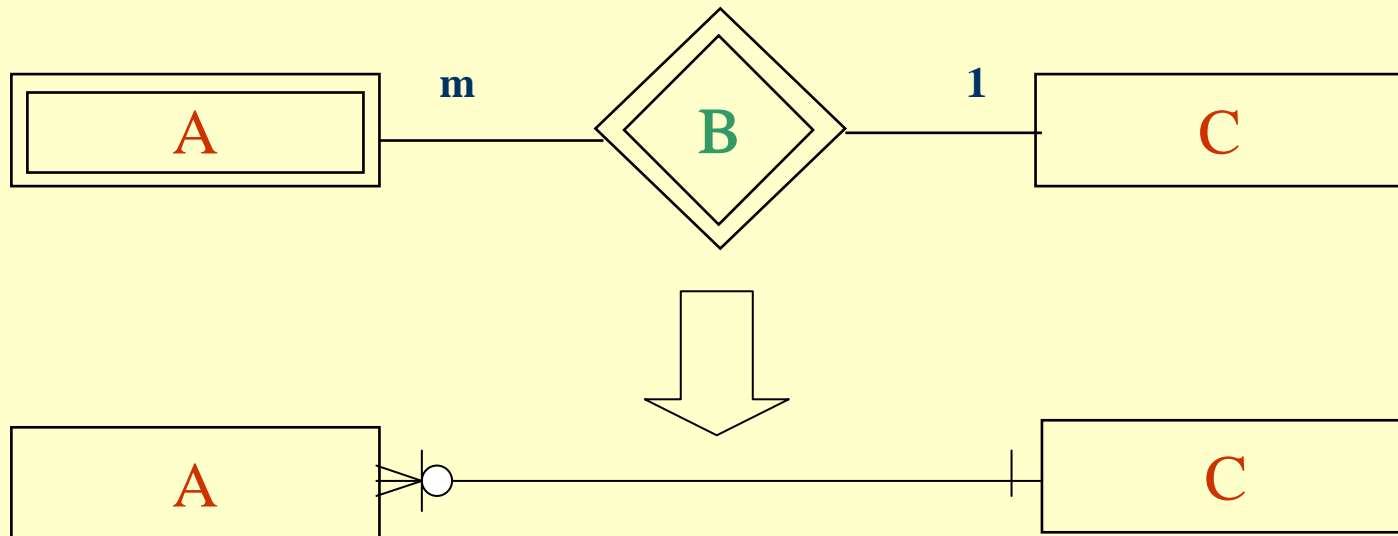
## Many-To-Many Relationship



- ❑ **An instance of the entity type A is associated with possibly several instances of the entity type C. An instance of the entity type C is associated with possibly several instances of the entity type A.**

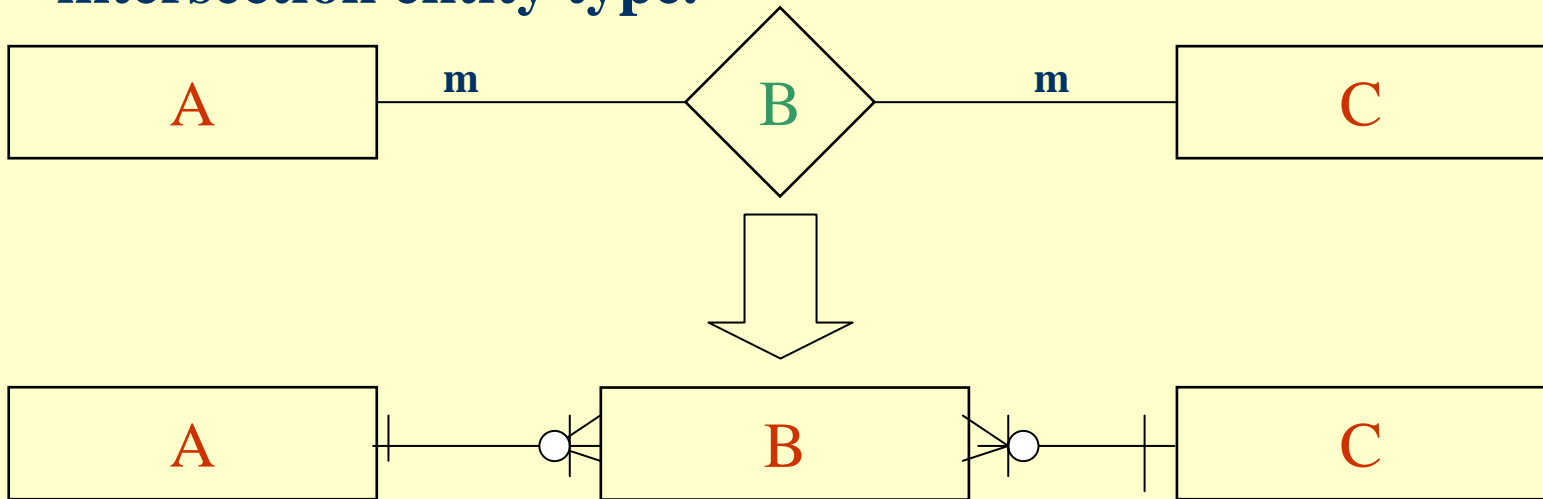
## Dependence

- ❑ An entity type that *borrow*s a key is dependent.
- ❑ Needed for weak entity types



### Many-To-Many Relationship, cont.

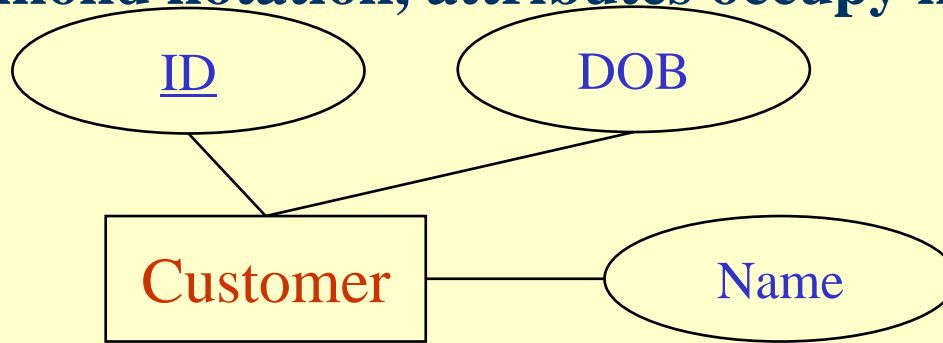
- ❑ Often many-to-many relationship types are resolved to two many-to-one relationship types by inserting an intersection entity type.



- ❑ Here, **B** is the intersection entity type. Note, it needs keys!
- ❑ This makes the conversion to tables easier, but can confuse the logical design.

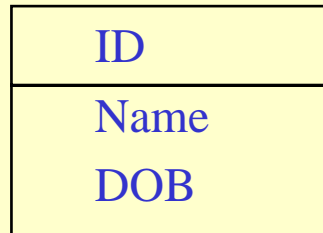
### Reducing Clutter on Entity Types

- ❑ In diamond notation, attributes occupy much space



- ❑ Using ERwin, can extend entity type with attributes

Customer

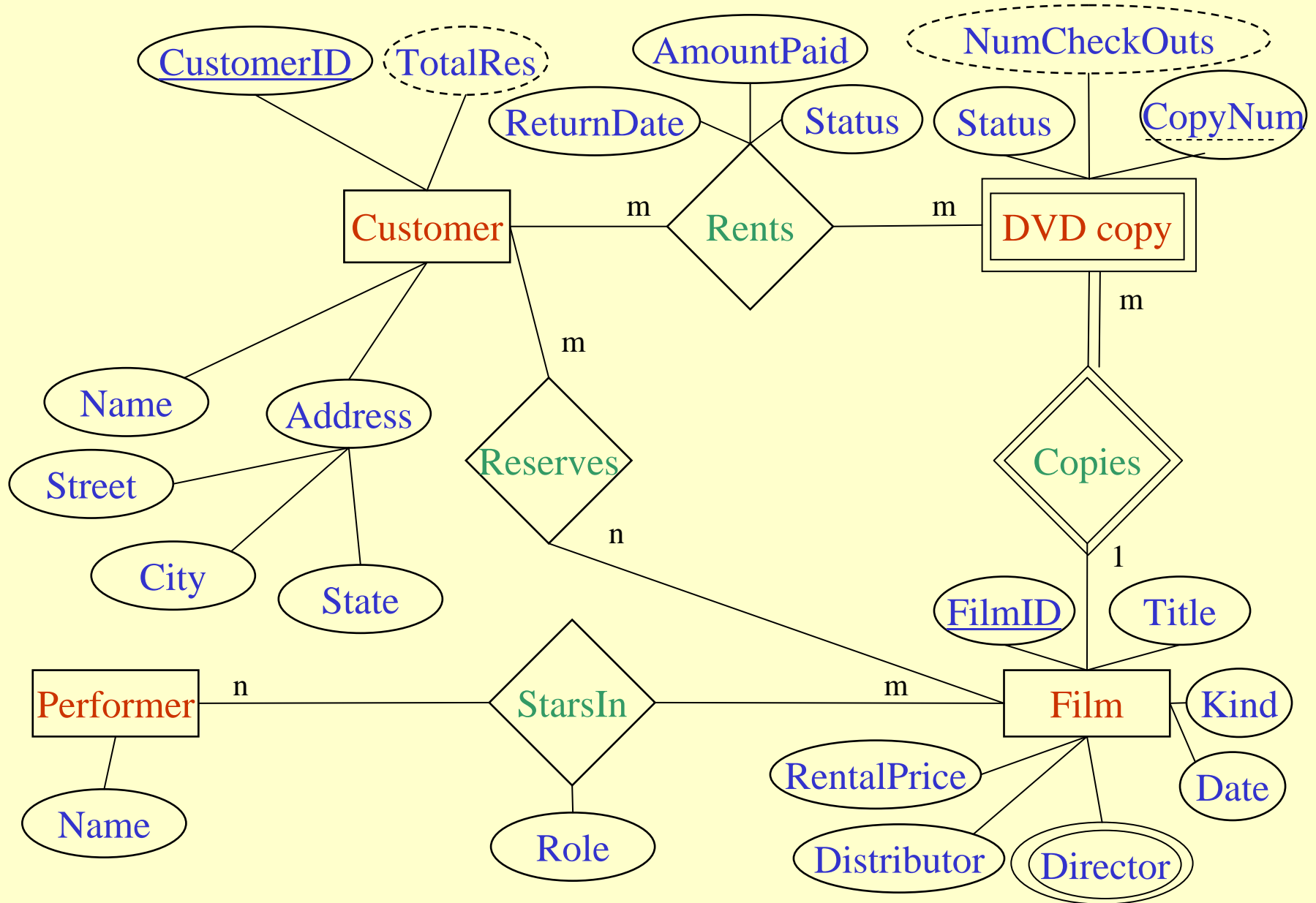


- ❑ Note: have lost ability to model multi-valued, derived, and composite attributes explicitly.

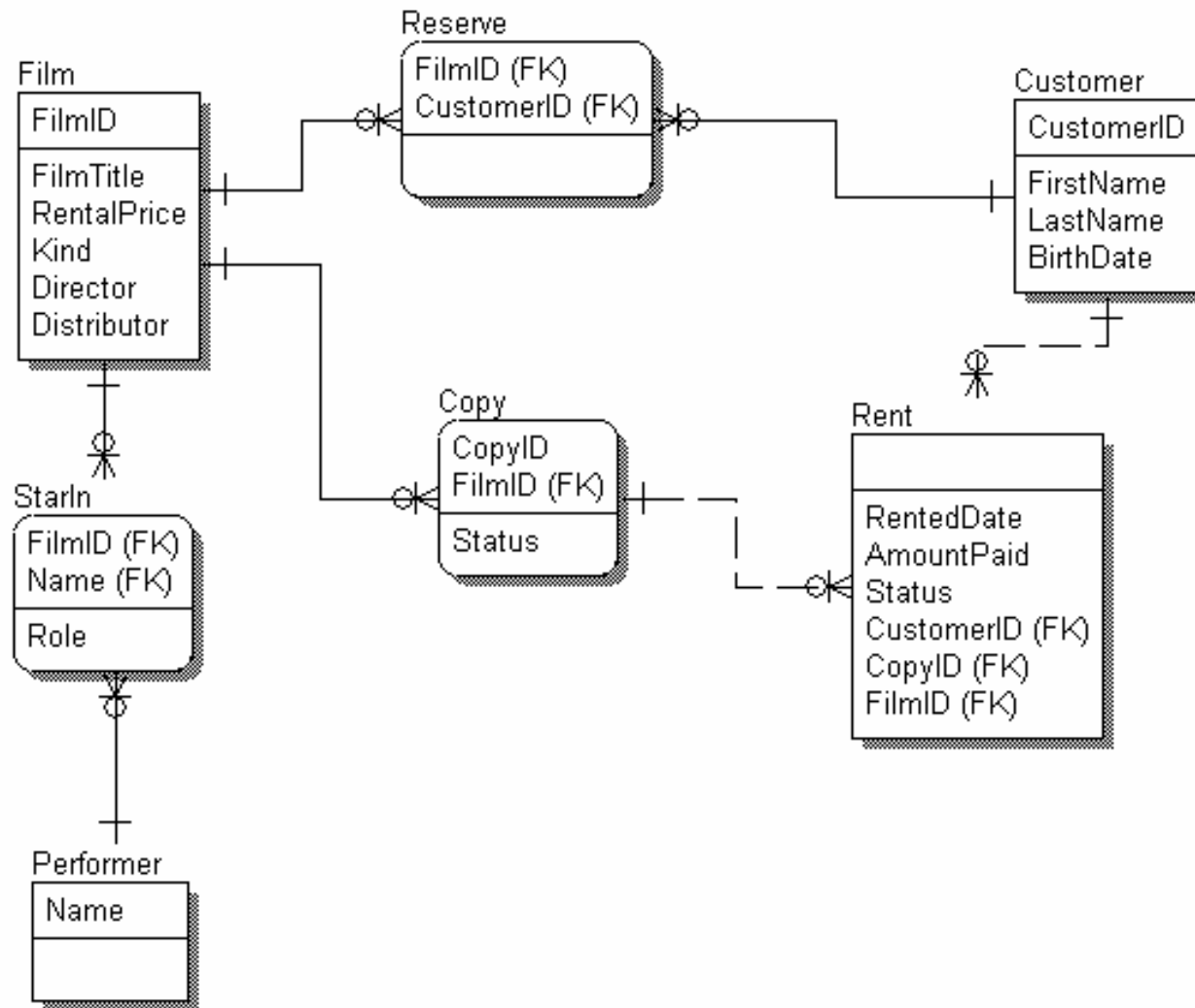
### Other Notational Aspects

- ❑ Relationship types that have associated attributes must be represented with intersection entity types.
- ❑ Details differ among the various tools supporting variants of the Entity-Relationship schemas. For example,
  - Sometimes optional a dashed line is denoted with ("zero or") a circle.
  - Cardinalities can sometimes be placed at either end of a relationship arc.
  - Other icons, such as small diamonds, have specialized meanings.

## A DVD Store ER Schema



## Same Schema convert to Erwin style



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