Chapter 6

Data Modeling and Analysis

Data Modeling Concepts: Foreign Keys

Foreign key – a primary key of an entity that is used in another entity to identify instances of a relationship.

- A foreign key is a primary key of one entity that is contributed to (duplicated in) another entity to identify instances of a relationship.
- A foreign key always matches the primary key in the another entity
- A foreign key may or may not be unique (generally not)
- The entity with the foreign key is called the child.
- The entity with the matching primary key is called the parent.

Data Modeling Concepts: Foreign Keys

Primary Key →

Student ID	Last Name	First Name	Dorm
2144	Arnold	Betty	Smith
3122	Taylor	John	Jones
3843	Simmons	Lisa	Smith
9844	Macy	Bill	
2837	Leath	Heather	Smith
2293	Wrench	Tim	Jones

Primary Key →

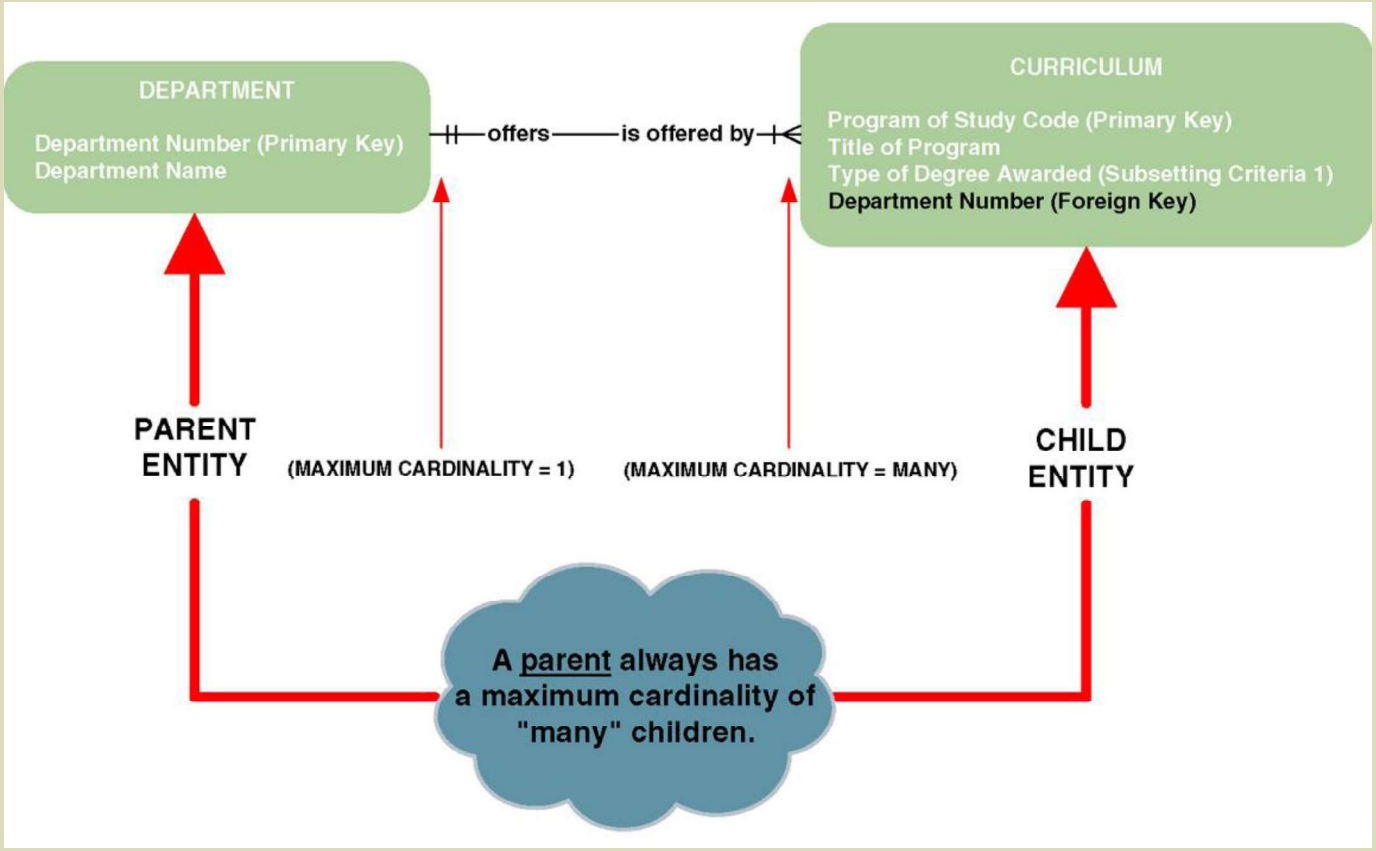
Dorm	Residence Director
Smith	Andrea Fernandez
Jones	Daniel Abidjan

Foreign Key Duplicated from primary key of Major entity (not unique)

Data Modeling Concepts: Nonidentifying Relationships

Nonidentifying relationship – a relationship in which each participating entity has its own independent primary key

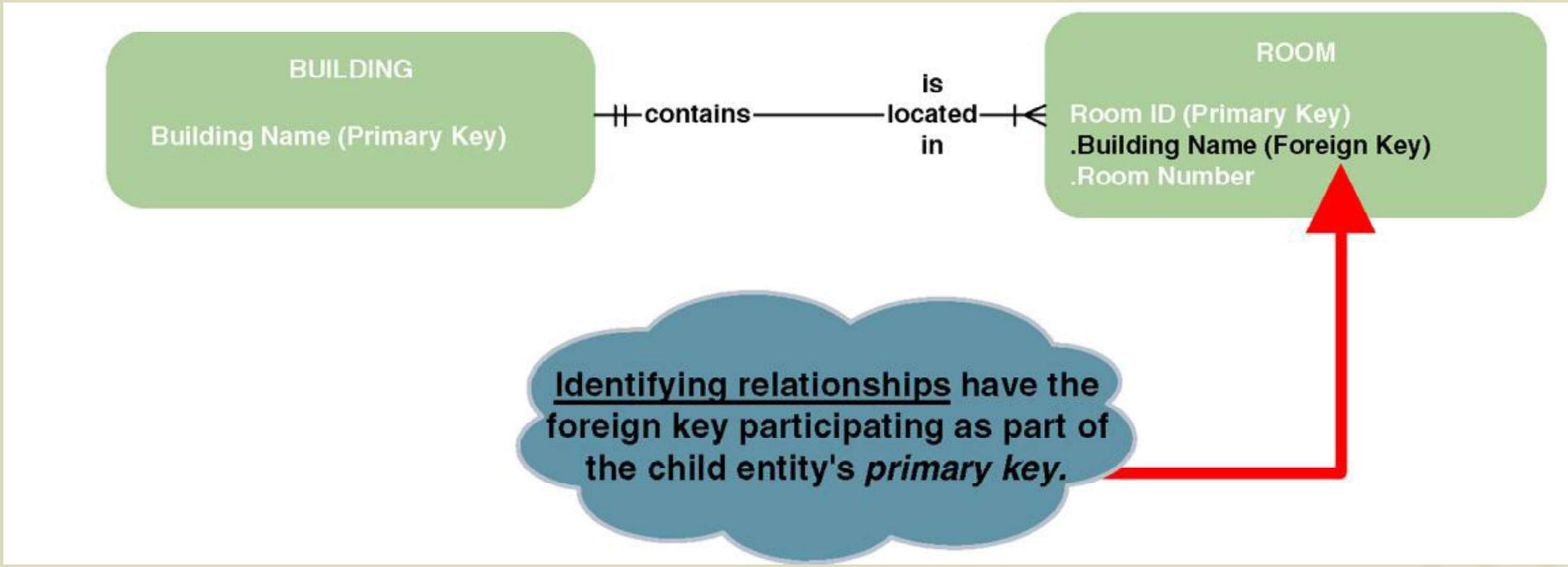
- Primary key attributes are not shared.
- The entities are called *strong* entities



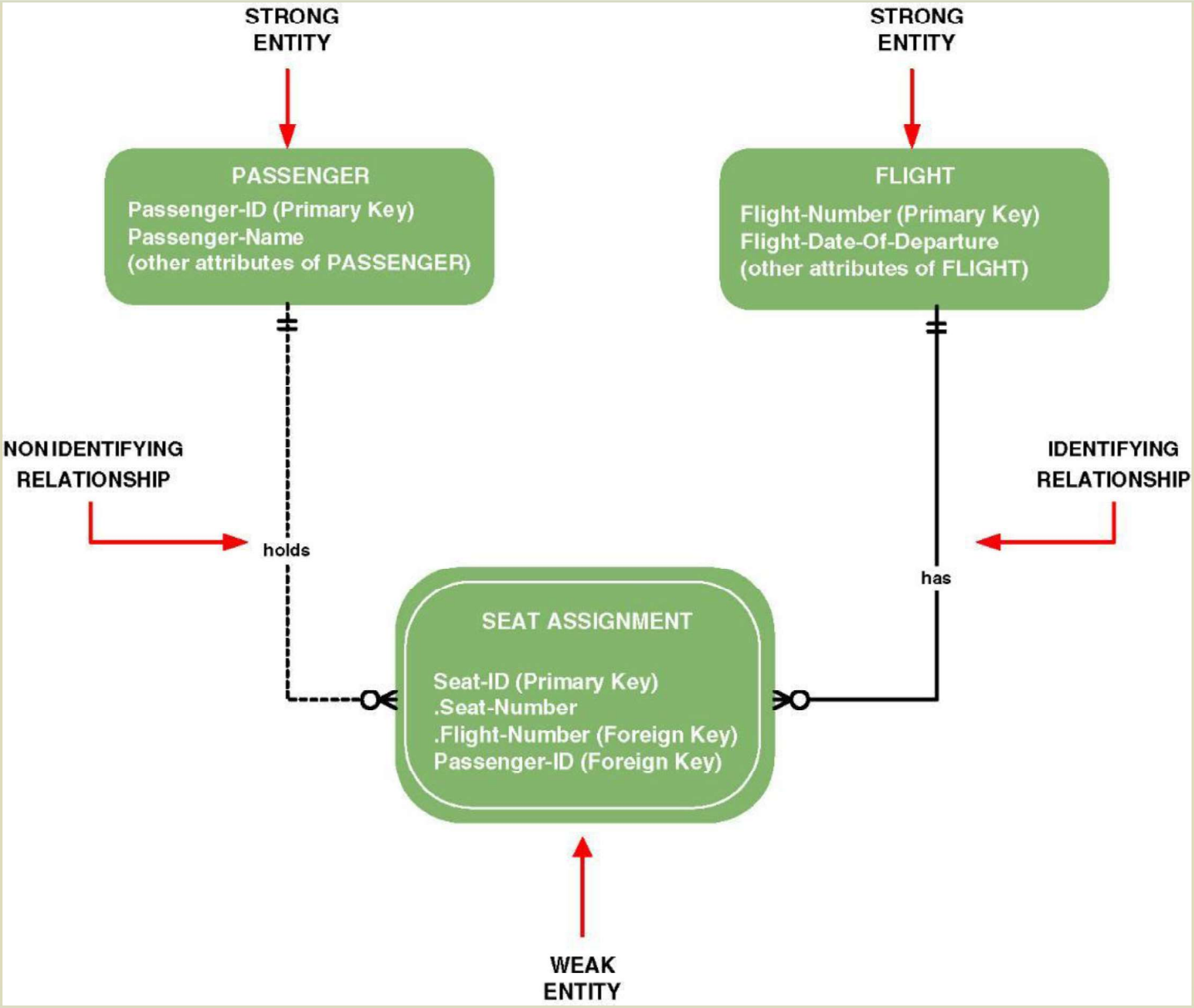
Data Modeling Concepts: Identifying Relationships

Identifying relationship – a relationship in which the parent entity' key is also part of the primary key of the child entity.

- The child entity is called a *weak* entity.



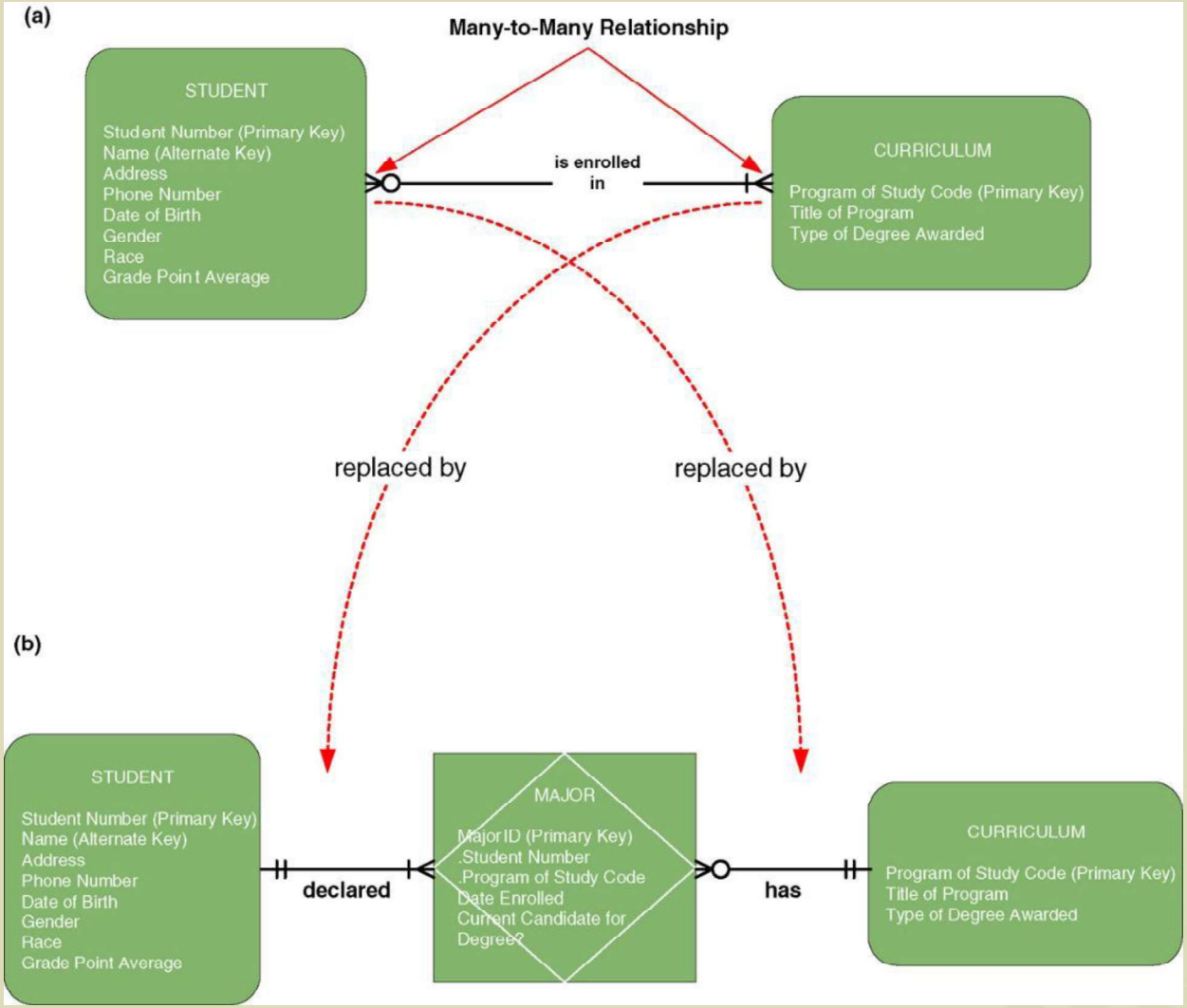
Data Modeling Concepts: Sample CASE Tool Notations



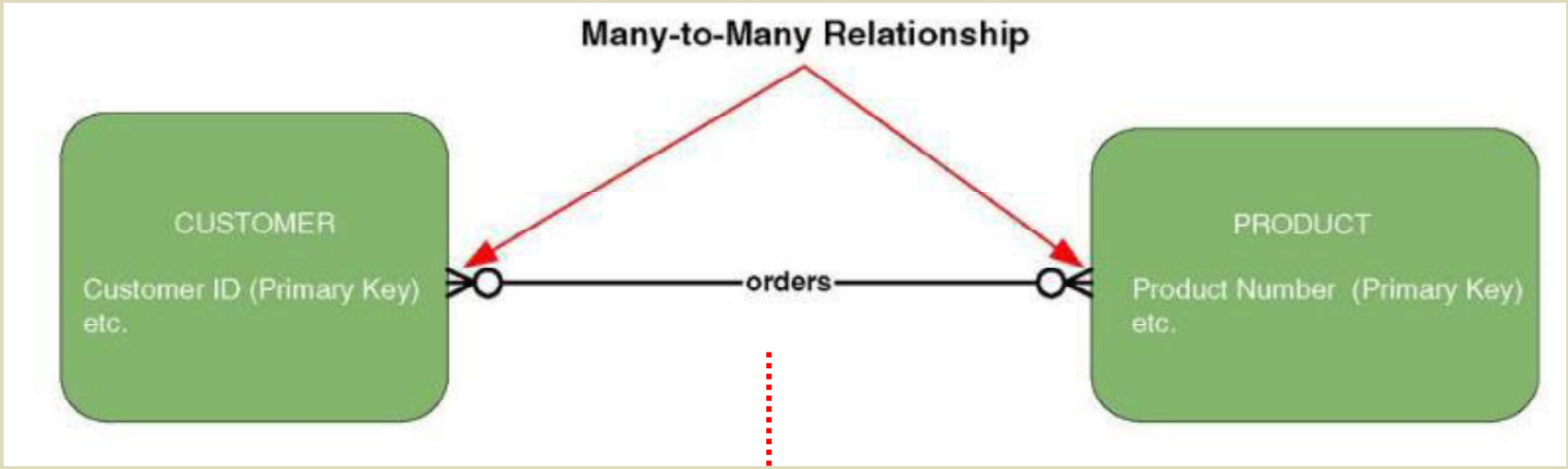
Data Modeling Concepts: Nonspecific Relationships

Nonspecific relationship – a relationship where many instances of an entity are associated with many instances of another entity. Also called *many-to-many relationship*.

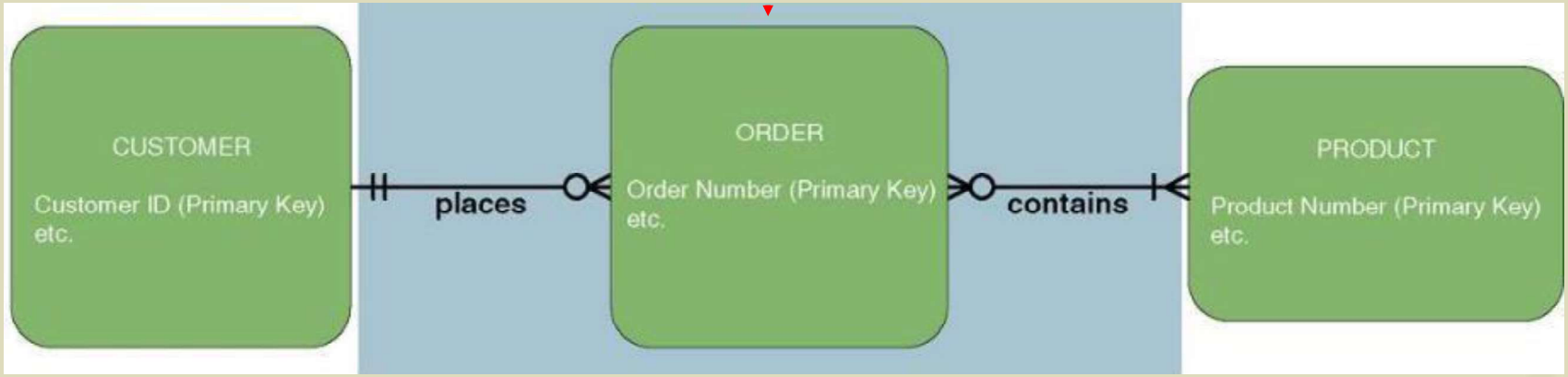
Nonspecific relationships must be resolved. Most nonspecific relationships can be resolved by introducing an associative entity.



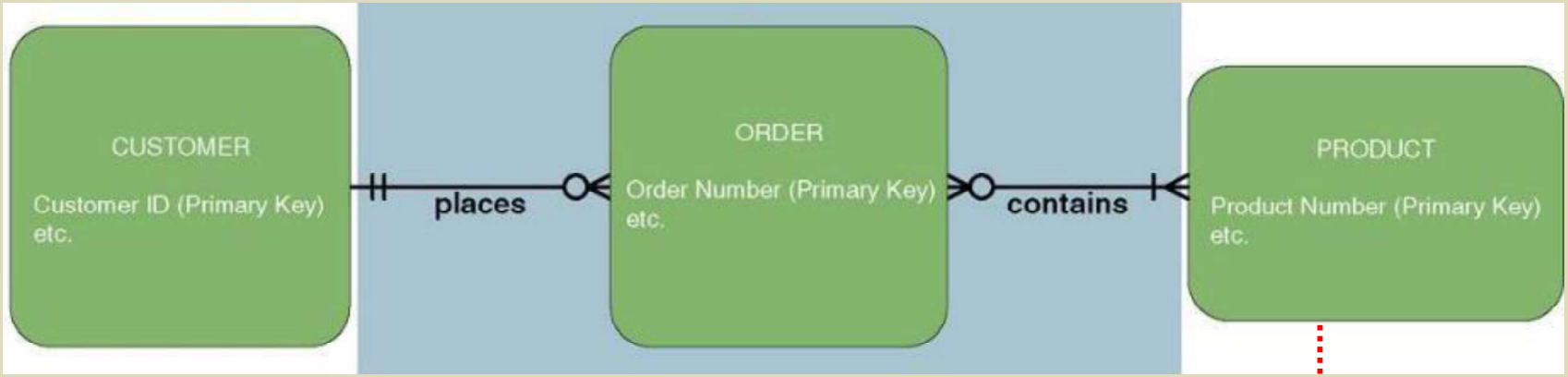
Resolving Nonspecific Relationships



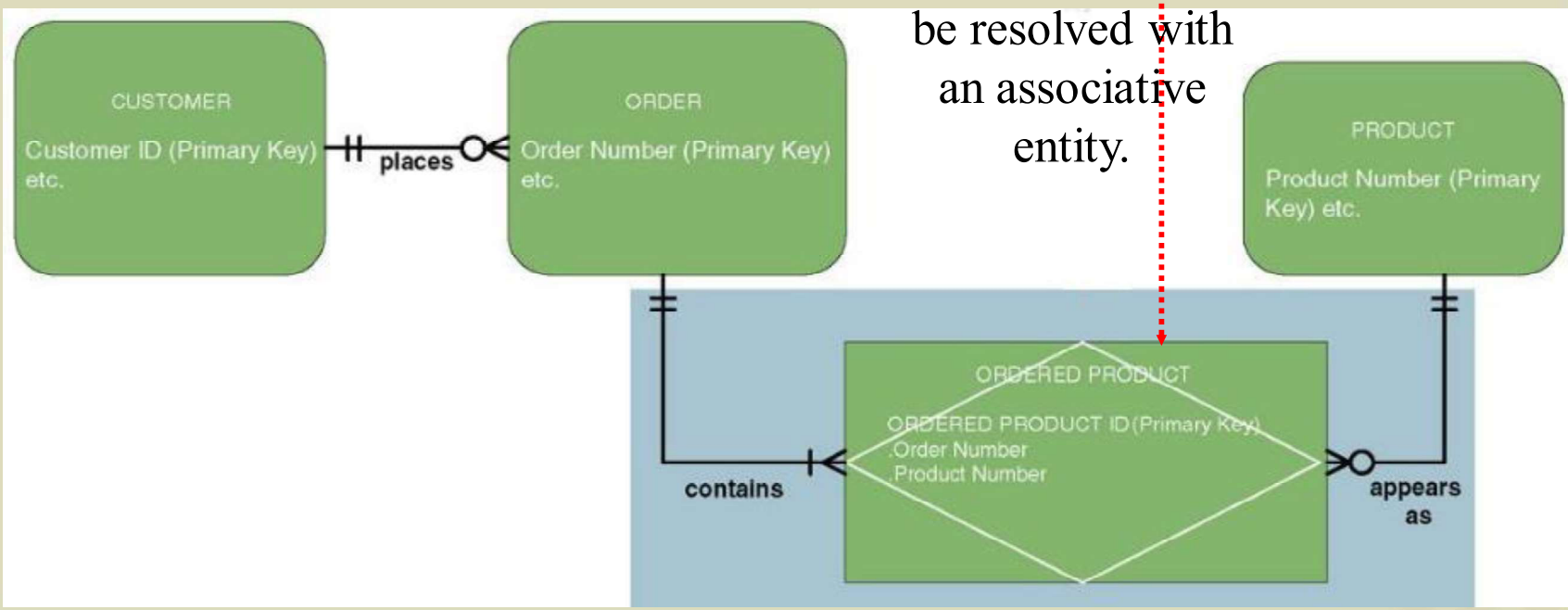
The verb or verb phrase of a many-to-many relationship sometimes suggests other entities.



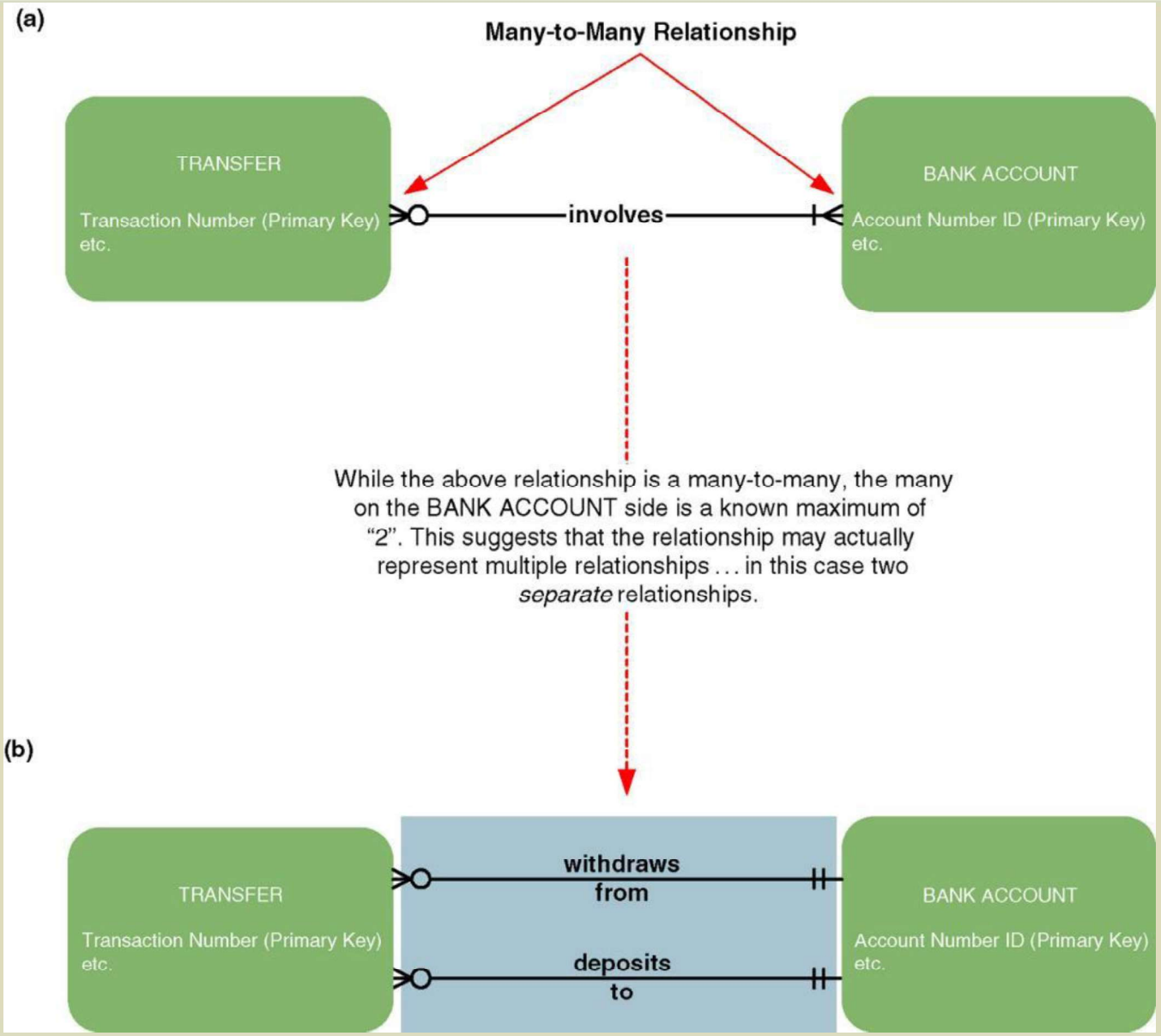
Resolving Nonspecific Relationships (continued)



Many-to-many relationships can be resolved with an associative entity.



Resolving Nonspecific Relationships (continued)



ER Diagram Exercise

A doctor can be scheduled for many appointments, but may not have a schedule at all. Each appointment is scheduled with exactly one doctor. A patient can schedule one or more appointments. One appointment is scheduled with only one patient. An appointment must generate exactly one bill, a bill is generated by only one appointment. One payment is applied exactly to one bill, and one bill can be paid off over time by several payments. A bill can be outstanding, having nothing yet paid on it at all. One patient can make many payments, but a single payment is made by only one patient. Some patients are insured by an insurance company. If they are insured, they can only carry insurance with one company. An insurance company can have many patients carry their policies. For patients who carry insurance, the insurance company will make payments, each single payment is made by exactly one insurance company.

ER Diagram Exercise Solution