



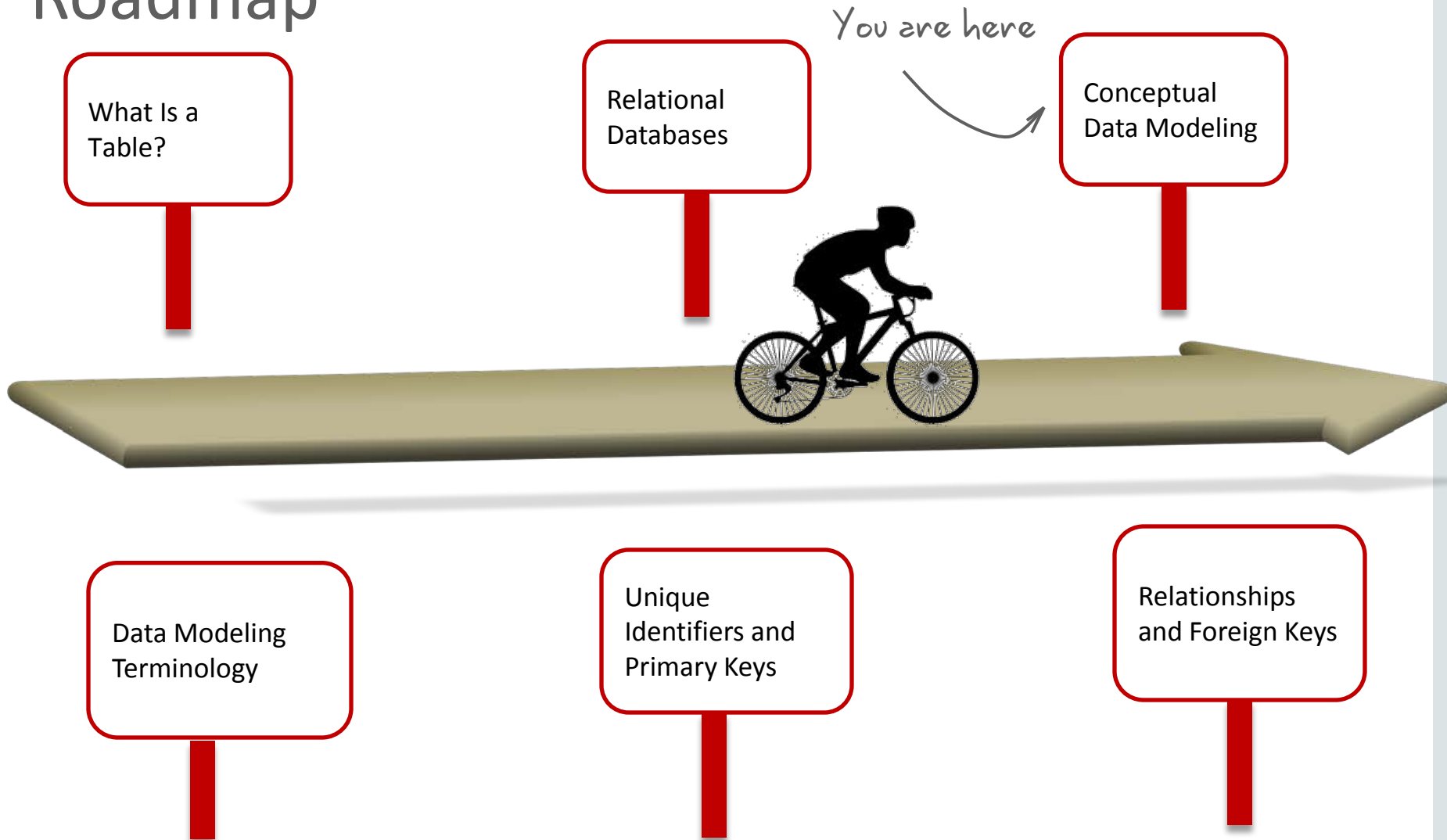
Database Foundations

2-3

Conceptual Data Modeling



Roadmap



Objectives

This lesson covers the following objectives:

- Describe a conceptual data model
- Explain "implementation-free" as it relates to data models and database design implementation
- List the four goals of entity relationship modeling
- Identify an entity relationship diagram (ERD)
- Construct ERD components that represent entities and attributes according to diagramming conventions



Purpose of Conceptual Modeling

When you design a house, you eventually want to see the house built. Even if you don't do the actual construction, you need to understand the builder's terms to help them take your conceptual design and make it a physical reality.

The database conceptual model can be used for further discussion between designers, database administrators, and application developers.

Conceptual Modeling

- A conceptual data model identifies the highest-level relationships between the different entities.
- It contains relationships between entities, but may or may not include cardinality and nullability.
- It does not specify the primary key, but it does determine a unique identifier for each entity.

Conceptual Modeling Components: Entities

- Real-world object or thing that has an independent existence and that is distinguishable from other objects
- Examples: person, car, customer



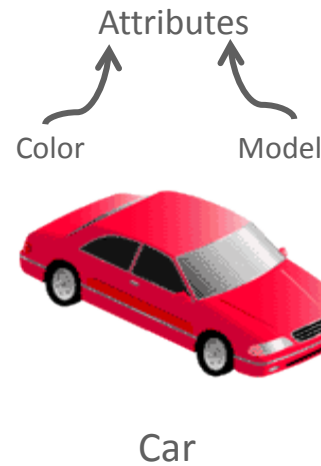
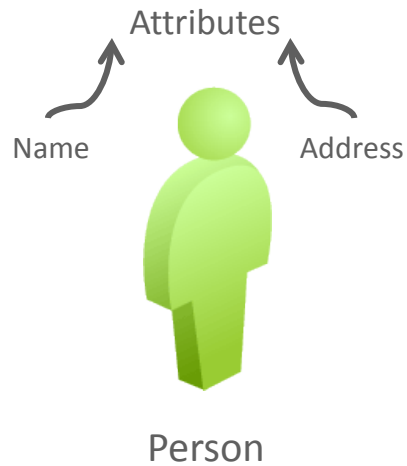
Person



Car

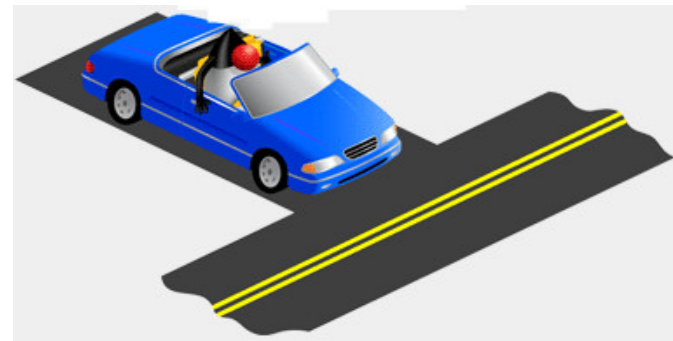
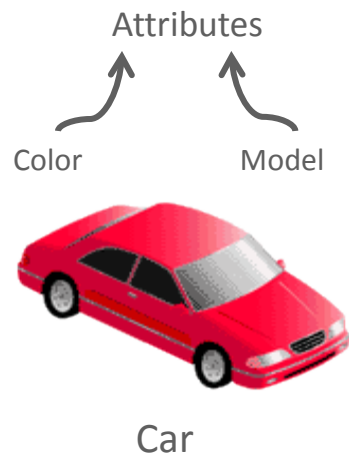
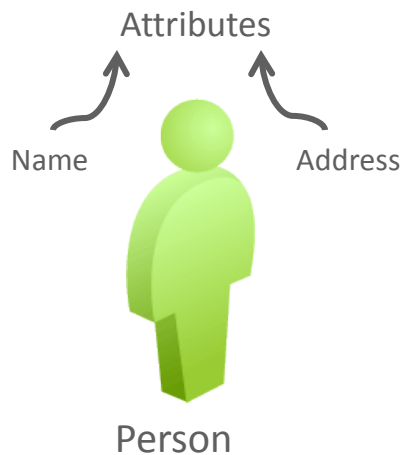
Conceptual Modeling Components: Attributes

- Characteristics of entities or relationships that provide descriptive details about them
- Examples: person's name, address



Conceptual Modeling Components: Relationships

Association among two or more entities

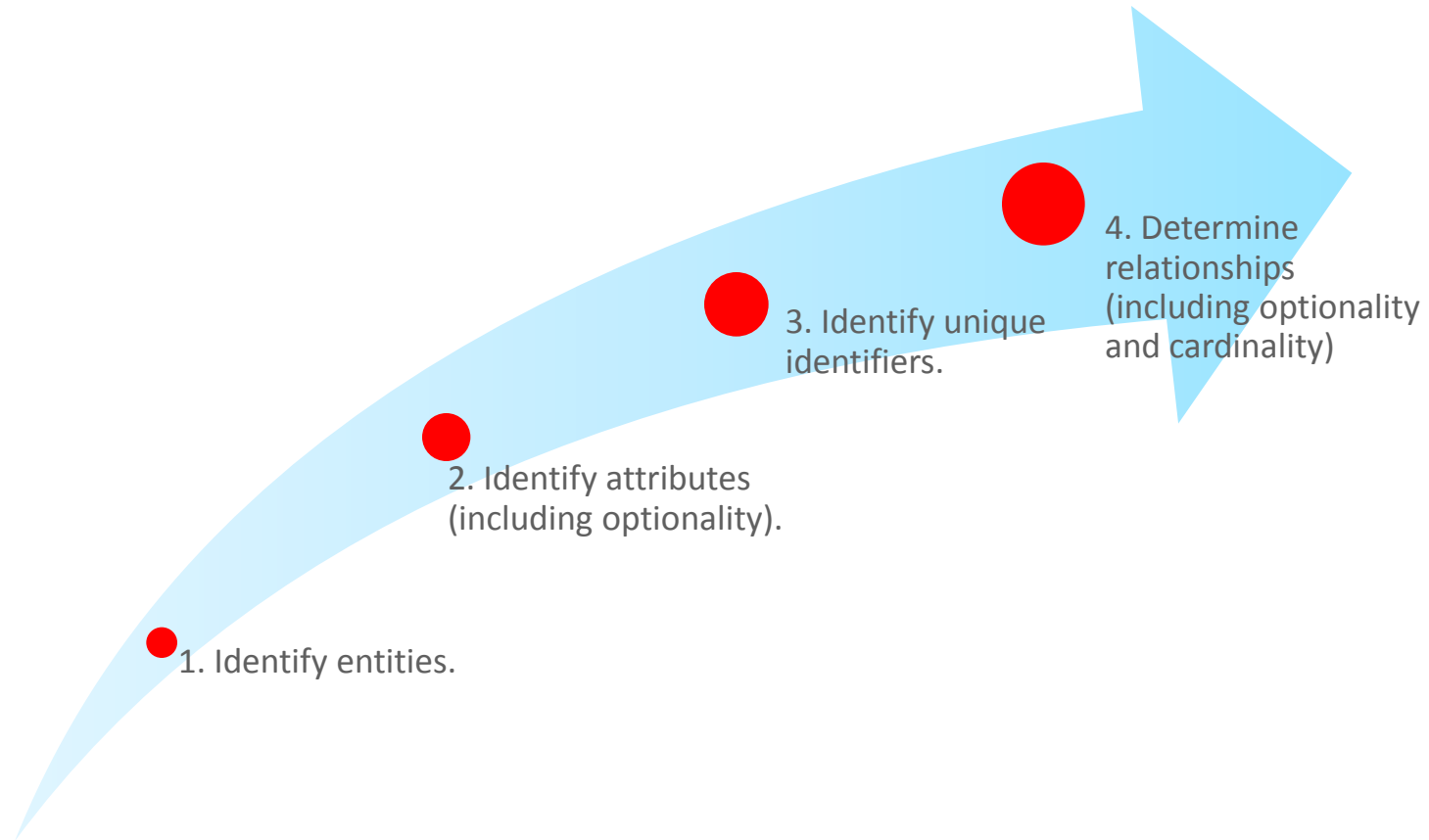


Person drives a car.

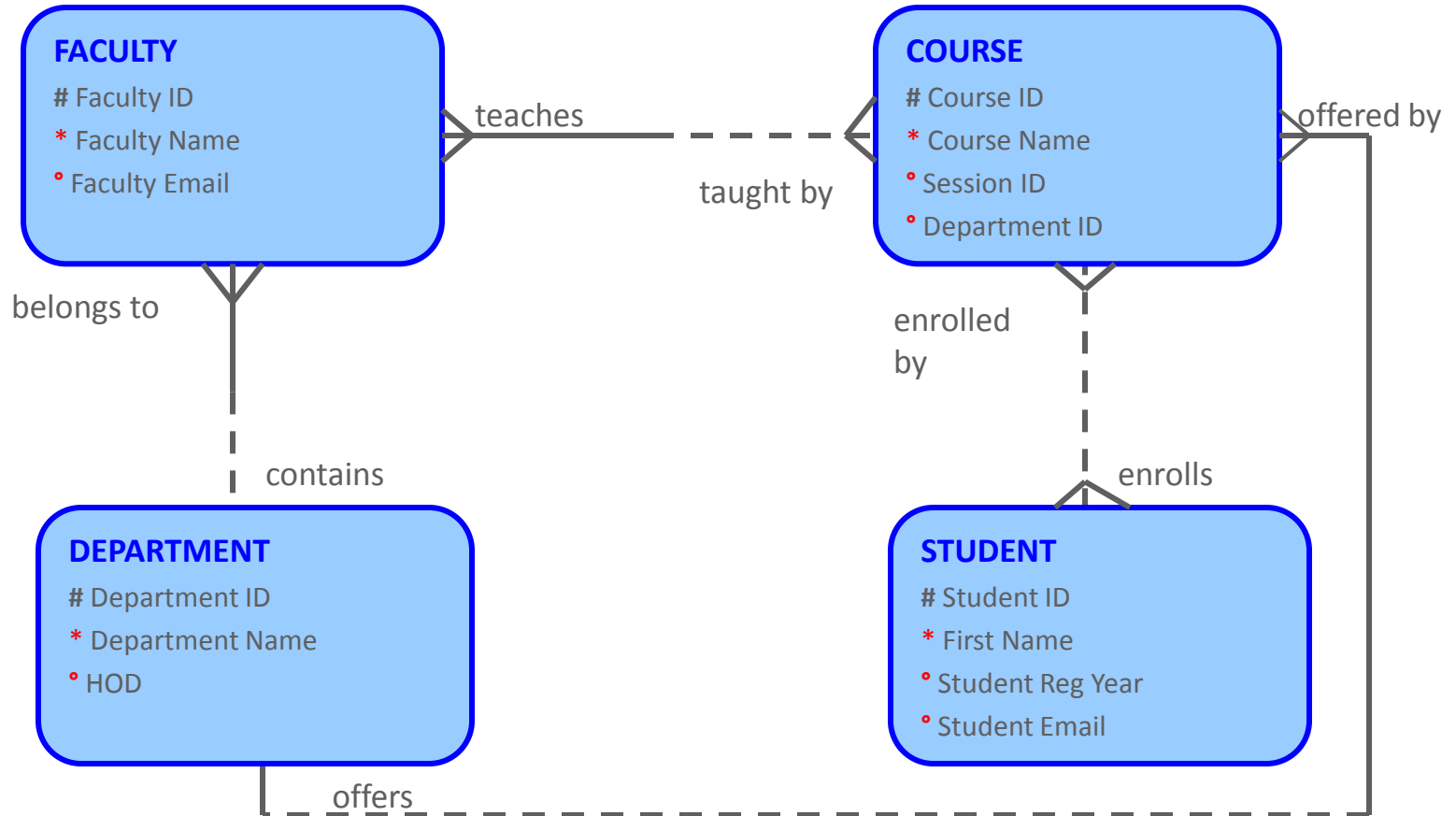


Relationship

Steps to Create a Conceptual Model



Conceptual Modeling: Example

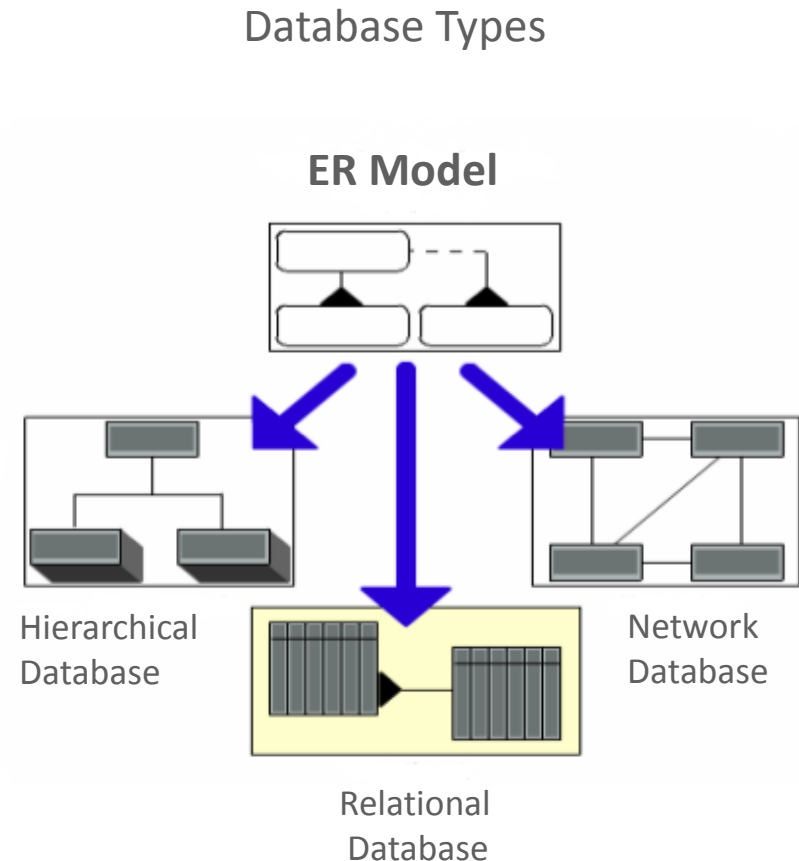


Entity Relationship Diagram

- A consistent tool that can be used to represent the data requirements of a business, regardless of the type of database that is used, and even in the absence of one.
- A graphical representation of entities and their relationships to each other, and it is used to organize data within databases or information systems.

Implementation-Free Models

- A good conceptual data model stays the same regardless of the type of database system that is eventually built—or implemented—on.
- This is what “implementation-free” model means.



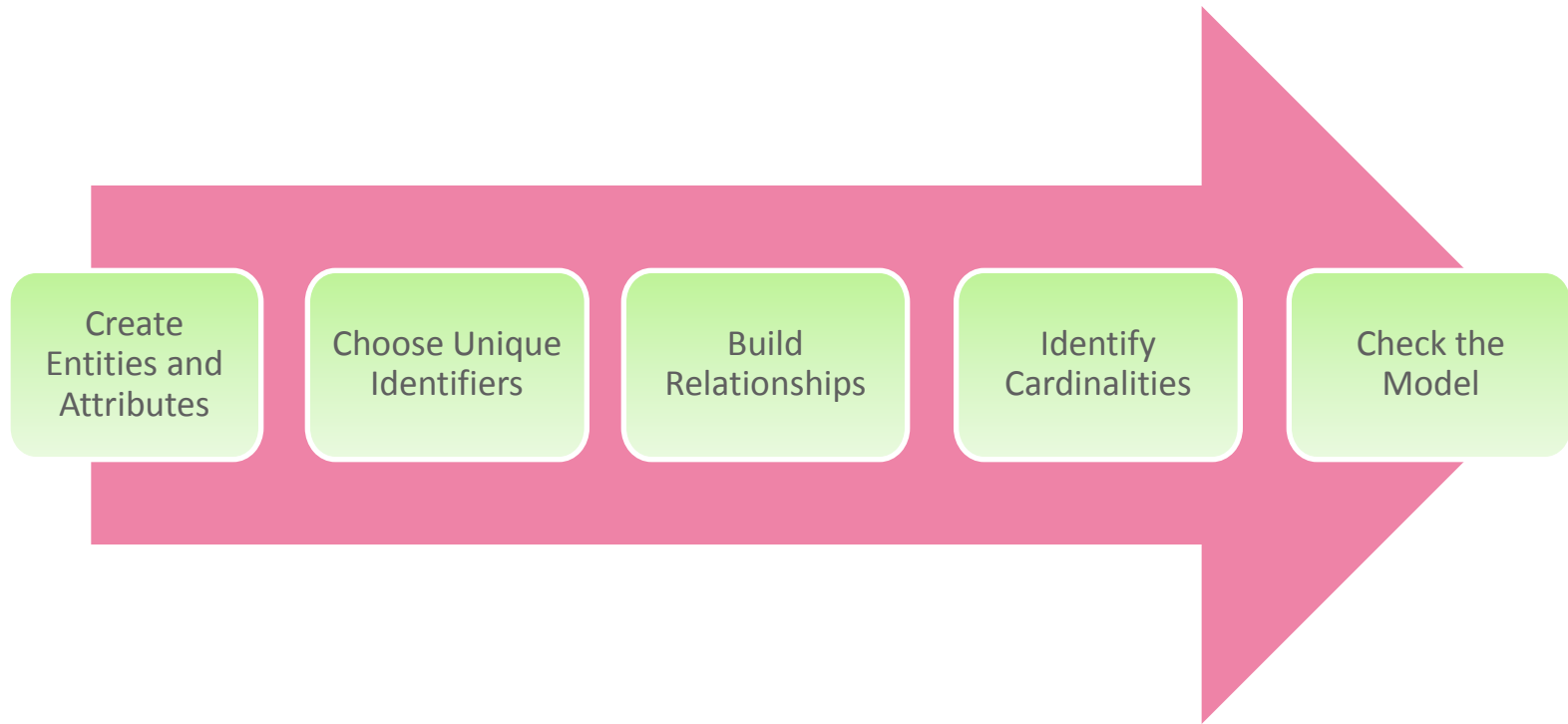
Entity Relationship Model

- Is a list of all entities and attributes as well as all relationships between the entities that are of importance.
- Provides background information such as entity descriptions, data types, and constraints.
- Does not require a diagram, but the diagram is typically a very useful tool.

Goals of ER Modeling

- Capture all required information.
- Ensure that information appears only once.
- Model no information that is derivable from other information that is already modeled.
- Locate information in a predictable, logical place.

Steps to Build an ERD



Sporting Goods Business Scenario

I'm a manager of a sporting goods wholesale company that operates worldwide to fill orders of retail sporting goods stores. The stores are our customers (some of our people prefer to call them our clients).

Right now we have fifteen customers worldwide, but we're trying to expand our customer base by about 10% each year starting this year. Our two biggest customers are in the United States: Big John's Sports Emporium in San Francisco, California, and Women's Sports in Seattle, Washington.

Sporting Goods Business Scenario

For each customer, we must track an ID and a name. We may also track an address (including the city, state, zip code, and country) and a phone number.

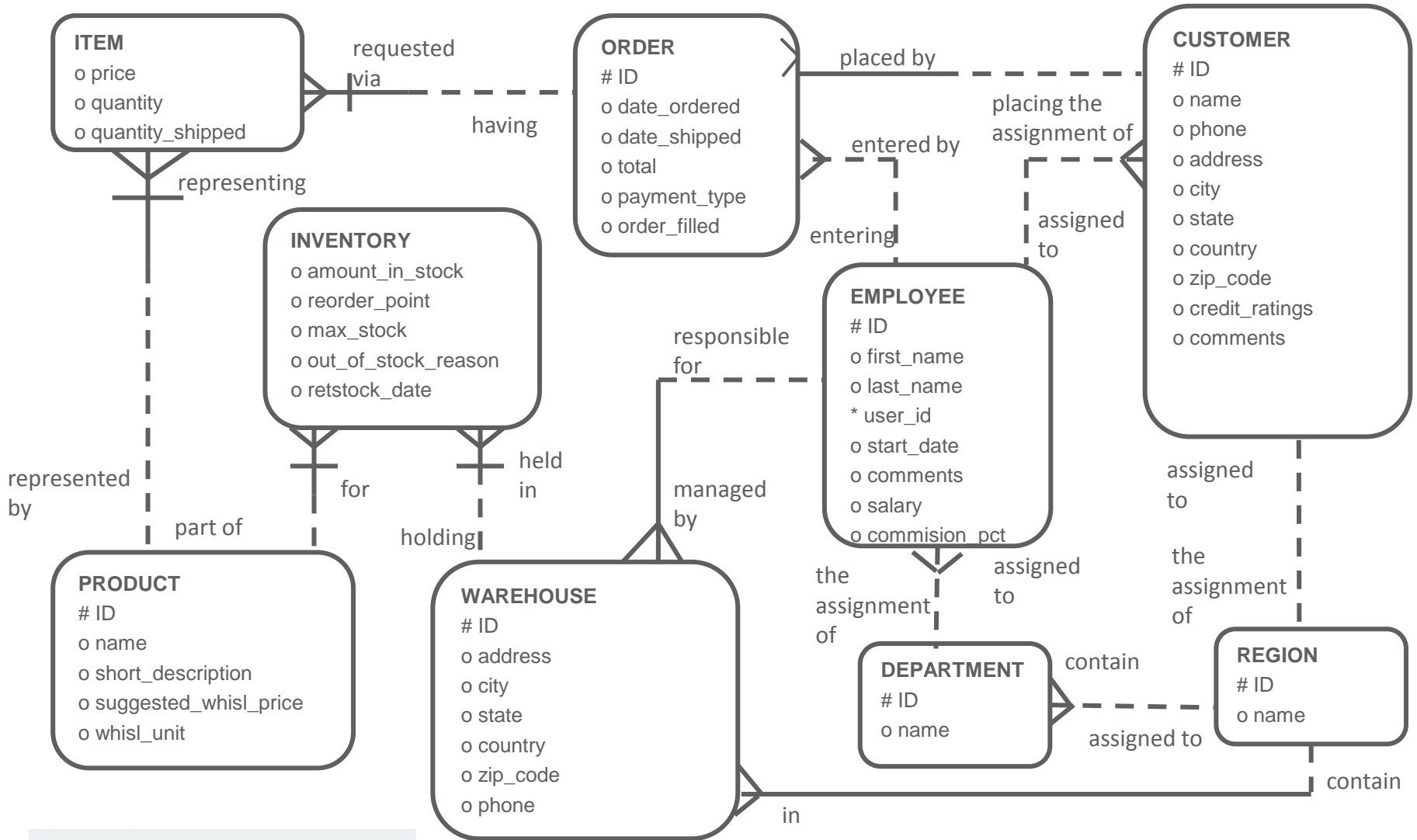
We maintain warehouses in different regions to fill our customer orders. For each order, we must track an ID. We may also track the date ordered, date shipped, and payment type if the information is available.

Sporting Goods Business Scenario

Our order entry personnel are well versed in our product line. We hold frequent meetings with Marketing to learn about new products. The result is better customer satisfaction because we can answer customer questions.

We deal with a few select customers and maintain a specialty product line. For each product, we must know the ID and name. Occasionally we must also know the description, suggested price, and unit of sale. When necessary we also want to be able to track very long descriptions of our products and pictures of our products.

Completed Sporting Goods ERD



Summary

In this lesson, you should have learned how to:

- Describe a conceptual data model
- Explain "implementation-free" as it relates to data models and database design implementation
- List the four goals of entity relationship modeling
- Identify an ERD
- Construct ERD components that represent entities and attributes according to diagramming conventions



