Database Foundations

3-3
Entities

Roadmap

You are here

Conceptual and Physical Data Models

Business Rules

Entities

Attributes

Unique Identifiers

Relationships

Validating Relationships

Tracking Data Changes over Time

Validating Data Using Normalization

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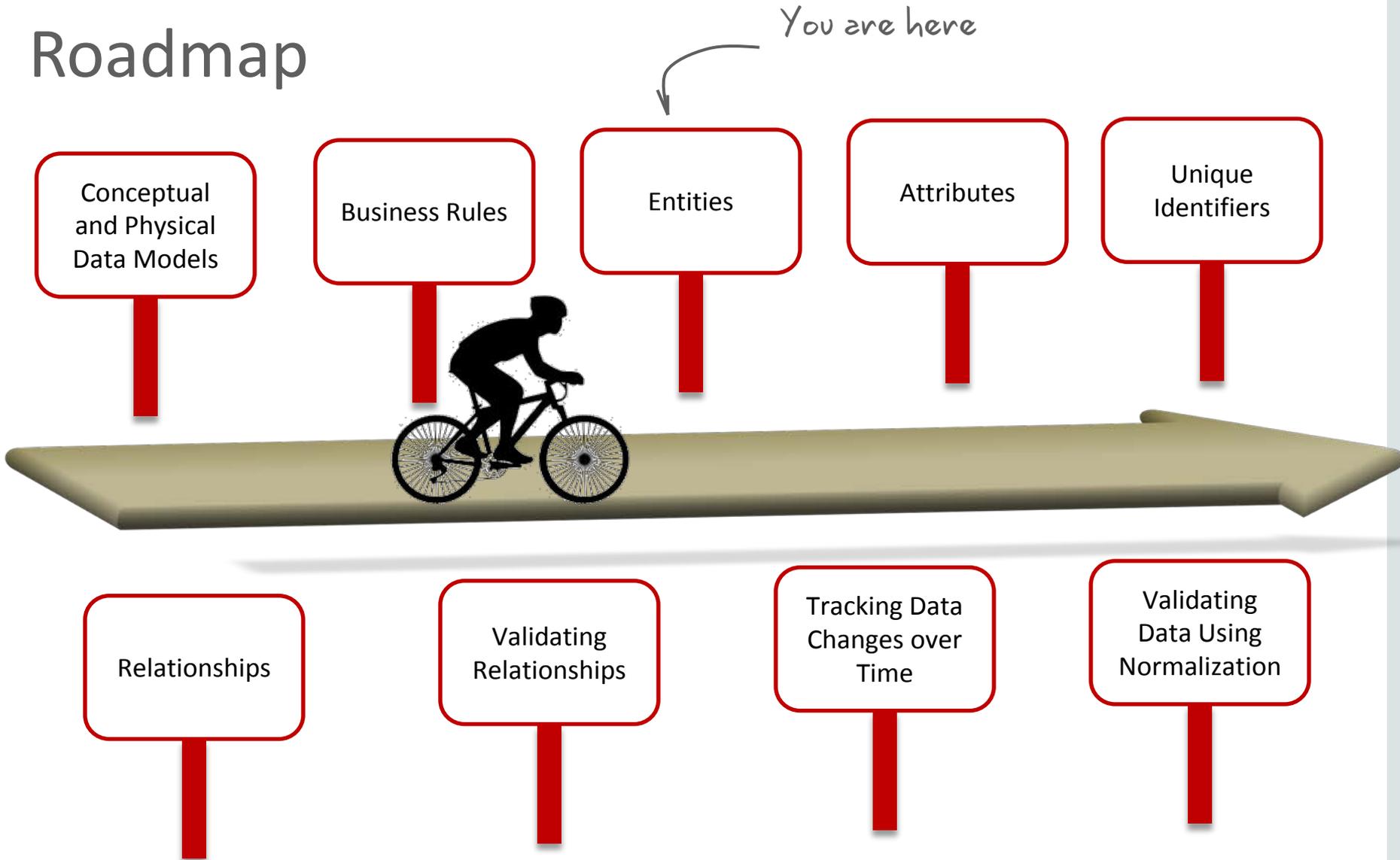
Objectives

This lesson covers the following objectives:

- Identify entities
- Identify and draw supertype and subtype entities

Entity

- Information that must be tracked
- Name for things that you can list (usually in noun form)

EMPLOYEE

DEPARTMENT

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Identifying Entities: Example

District Hotel Manager Sharon Ferguson wants to manage the information that her company keeps about their hotels, guests, and rooms. Sharon is responsible for multiple hotels in various locations. She wants to know what rooms she has in each hotel and what the price is for each room. She also wants to know which rooms have been reserved for a particular date by a guest.

GUEST

HOTEL

ENTITIES

ROOM

RESERVATION
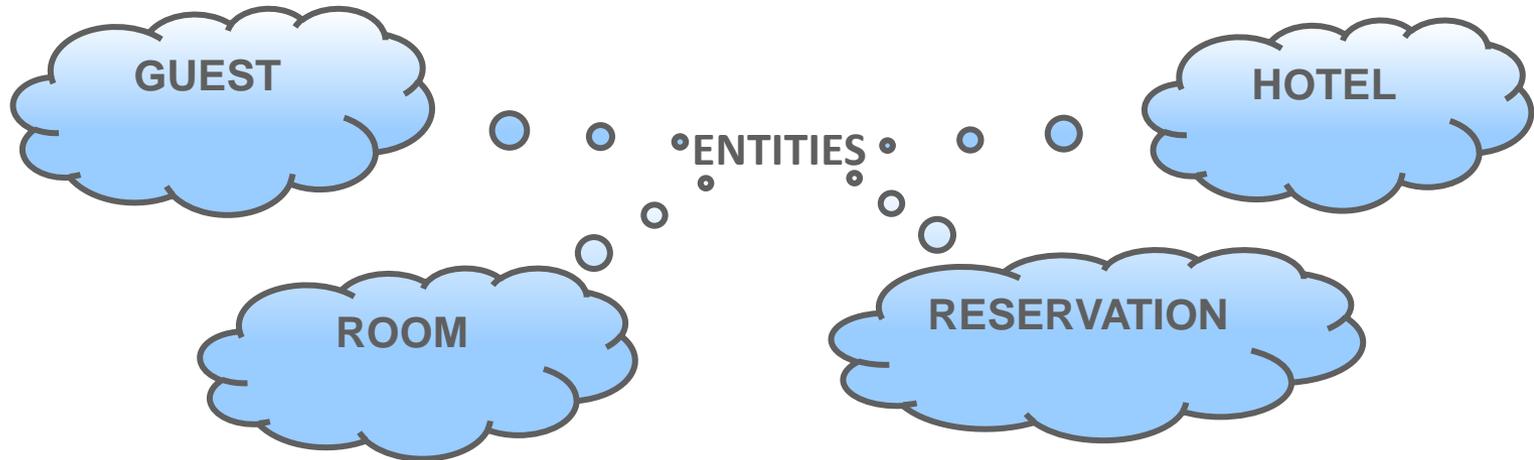
Entity Types

An entity can be classified as one of the following types:

Name	Description	Example
Prime	Exists independently	CUSTOMER, INSTRUCTOR
Characteristic	Exists because of another (prime) entity	ORDER, CLASS OFFERING
Intersection	Exists because of two or more entities	ORDER ITEM, CLASS ENROLLMENT

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Entities and Instances

- Entities contain instances.
- An entity instance is a single occurrence of an entity.
- Entities represent a set of instances that are of interest to a particular business.

Entity	Instance
PERSON	John Smith
PRODUCT	2.5 x 35 mm copper nail
PRODUCT TYPE	Nail
JOB	Violinist

JOB

clerk
violinist
financial controller
accountant
waitress
manager
teacher

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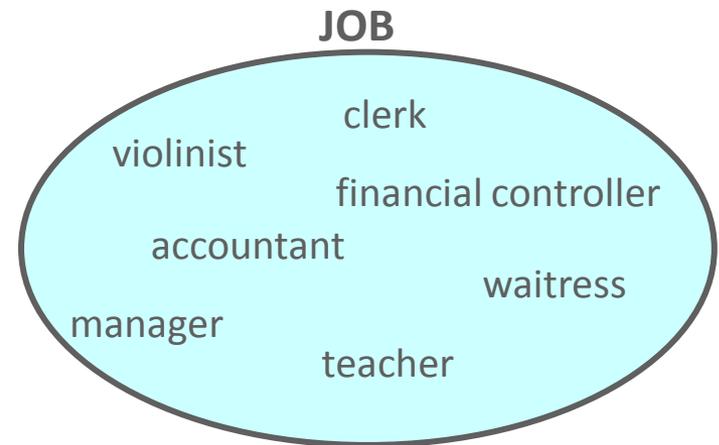
Supertype and Subtype Entities

- Supertype has a parent-child relationship with one or more subtypes.

- Subtype is a subgrouping of the entity in an entity type which has attributes that are distinct from those in other subgroupings.

Supertype

PK- SupertypeId
FK1- SubtypeAId
FK2- SubtypeBId

PK, FK1-
SupertypeAId

Subtype A

Subtype B

PK,FK1-
SupertypeBId
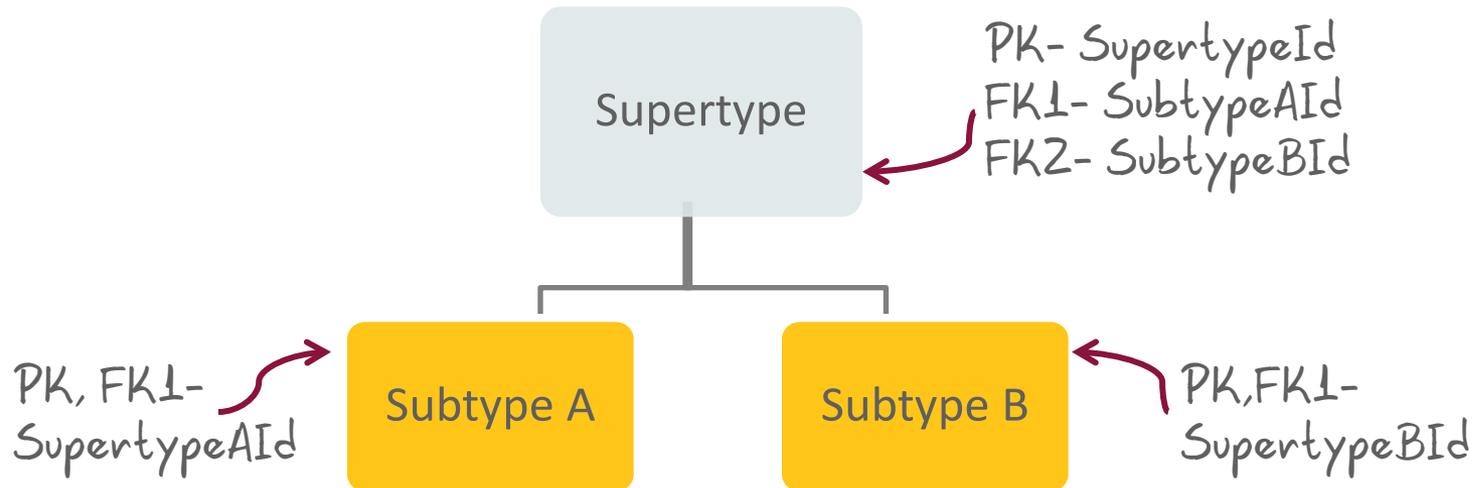
Drawing a Subtype

- Each subtype is a specialization of a supertype and therefore must be enclosed within an entity.

- The common attributes and relationships for all subtypes must be listed only in the supertype, but they are inherited in every subtype.

- A subtype can and would generally have attributes and relationships of its own.

- There can never be just one subtype; another subtype should be created to contain the rest.

SUPERTYPE A
attribute

SUBTYPE B
attribute

OTHER A
attribute

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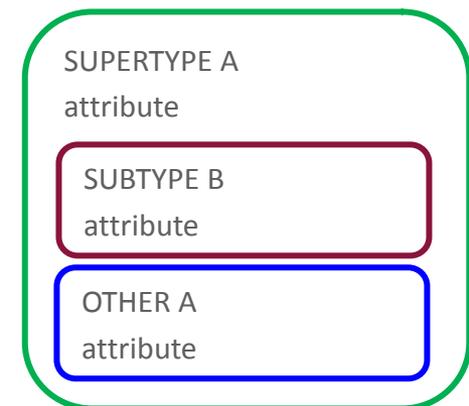
Supertype and Subtype Entity: Example

Sharon wants to include types of room categories to be reserved for the guests. For example:
- Standard
- Club
- Suite

She already has an entity named ROOM that holds room details. This would be a **supertype** entity. The specific room categories would inherit the properties of the supertype entity, in addition to their own specific attributes. The specific room category would be the **subtype** entity.

ROOM

Standard

Club

Suite
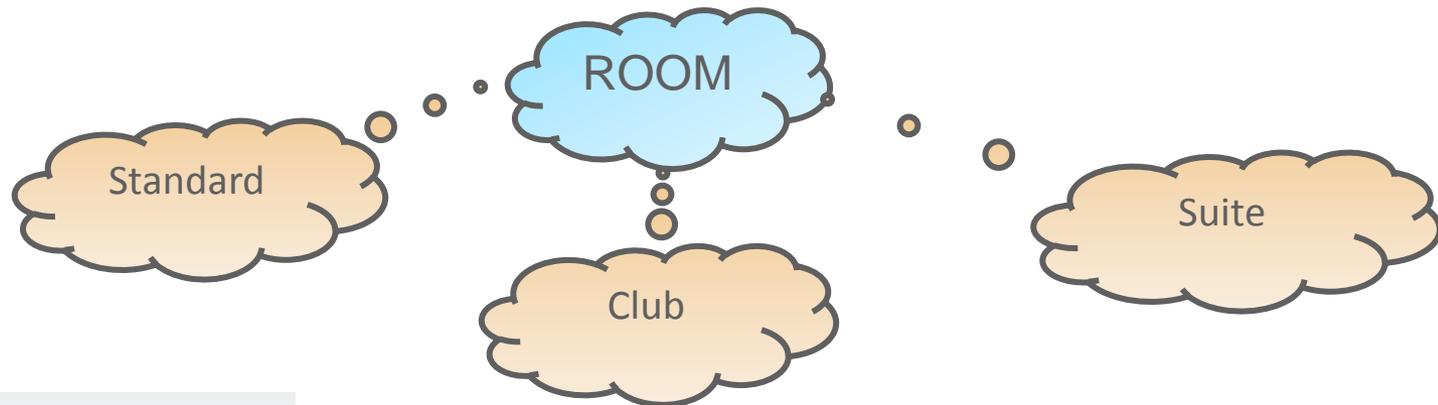
Generalization and Specialization

- **Generalization** is a bottom-up approach where two or more lower level entities are combined to form a higher level entity based on the common features.

- Specialization is a top-down approach where the higher level entity is broken down into lower level entities.

Bottom-Up Approach

VEHICLE

CAR

TRUCK

EMPLOYEE

CURRENT EMPLOYEE

EX-EMPLOYEE

Top-Down Approach

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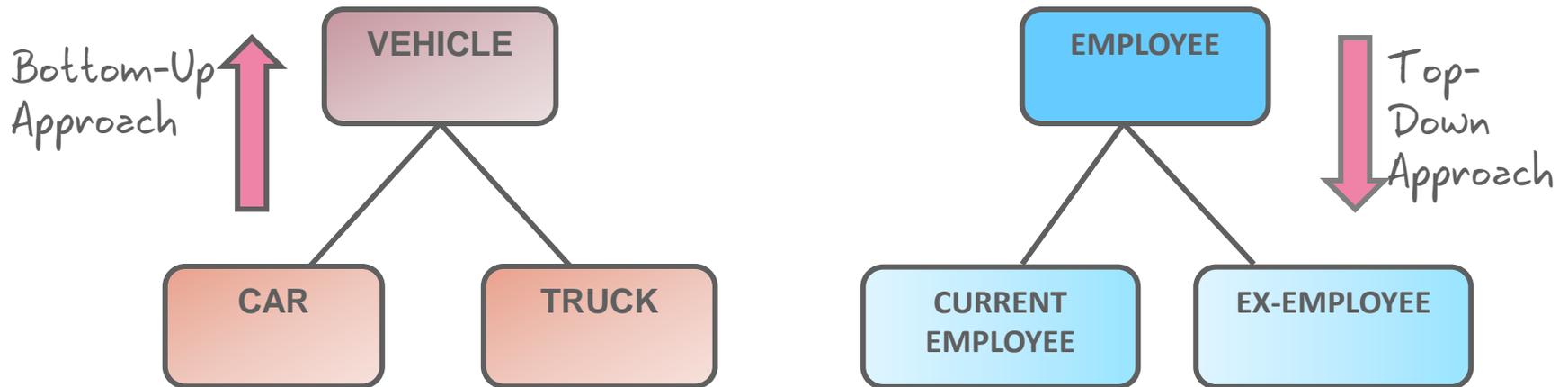
Entity Subtype Rules

- Exhaustive:
  - Every instance of a supertype is also an instance of one of the subtypes.
  - Example: An employee must be full time, part time, or other.

- Mutually Exclusive:
  - Every instance of the supertype is of one and only one subtype.
  - Example: An employee cannot be both full time and part time.

Identifying Subtypes Correctly

1. Is this subtype a kind of supertype?

2. Have I covered all possible cases? (exhaustive)

3. Does each instance fit into one and only one subtype? (mutually exclusive)

STAFF
#id
* first name
* last name
* date of birth
* salary

MANAGER
* budget
* target revenue

ORDER TAKER
* overtime rate

COOK
* training

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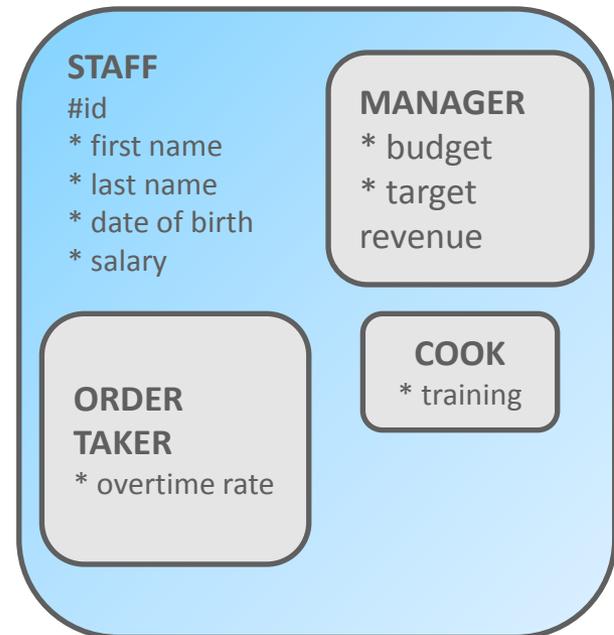
Nested Subtypes

You can nest subtypes.

Nested HOTEL supertype

HOTEL

STAFF
#id
* first name
* last name
* date of birth
* salary

MANAGER
* budget
* target revenue

ORDER TAKER
 * overtime rate

COOK
* training

NON STAFF
#id
* first name
* last name
* date of birth
* salary
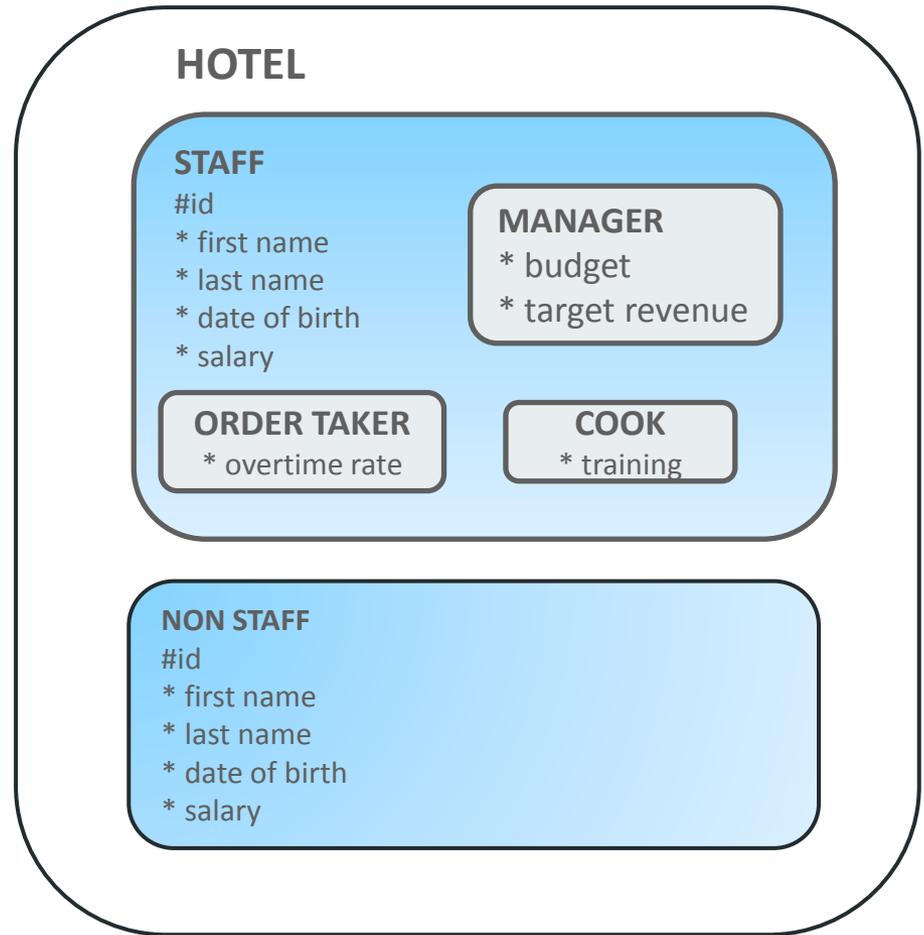
Summary

In this lesson, you should have learned how to:

- Identify entities
- Identify and draw supertype and subtype entities