SE3DB3 TUTORIAL

Lucia Cristiano

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Introduction

- Expectations:
  - I will repeat the questions that students in the room ask before I answer
  - I will pause occasionally to look at the chat, please unmute yourself or ask questions at these points

Outline

- Review of Keys
- Referential Integrity
- ER Terms
- ER Diagram Notations
- Relationship Types
- Relationship Degree
- Participation Constraints
- ER Design Example
- Assignment 1 Tips
- Contact

Review of Keys

Employee Relation

Employee ID	Name	DOB	Department No
123	John Smith	02/25/1978	5
456	Alice Doe	04/06/1984	3
789	John Smith	09/17/1990	3

List candidates key(s), super key(s) and designate a primary key:

Referential Integrity

- Referential integrity is used to guarantee that attributes in one relation refer to existing tuples in another relation referenced in a relationship

Employee ID	Name	DOB	Department No
123	John Smith	02/25/1978	5
456	Alice Doe	04/06/1984	3
789	John Smith	09/17/1990	3

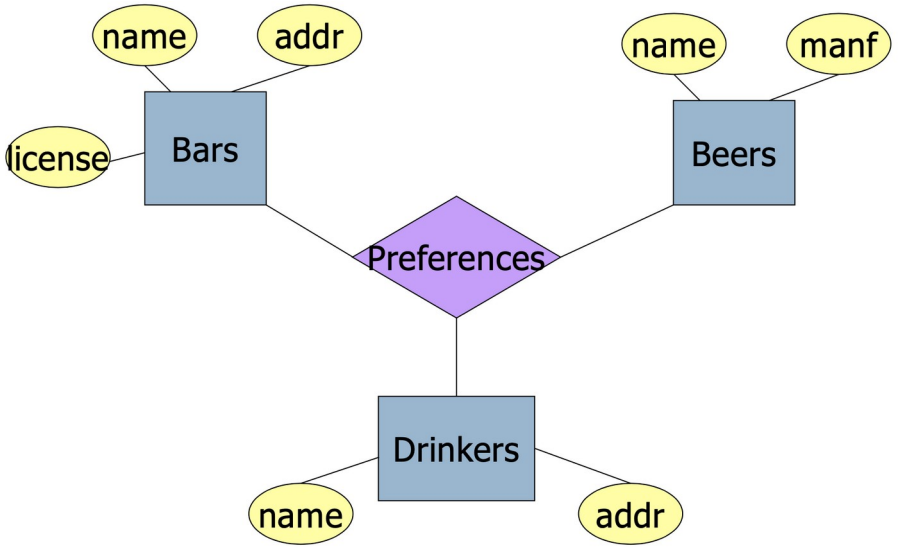
Department No	Name	Manager	# employees
5	Finance	Jane Mae	10
2	Sales	Bob Brown	15
4	Development	Sally Roe	30

Is there a foreign key or referential integrity violation between these relations?

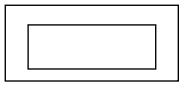
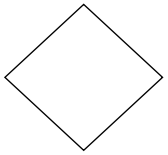
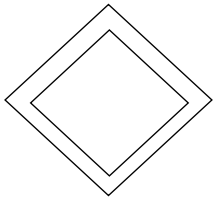
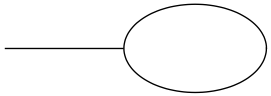
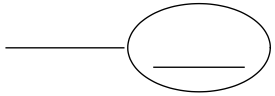
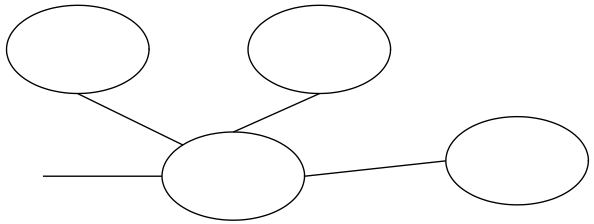
ER Terms

- Entity: Is a “thing” or object
- Attribute: Is a property of an entity set. Usually, a simple value
  - Has a domain: a list of values under the that attribute
- Relationship: Association between entity sets

List entities, attributes and relationships:



ER Diagram Notations

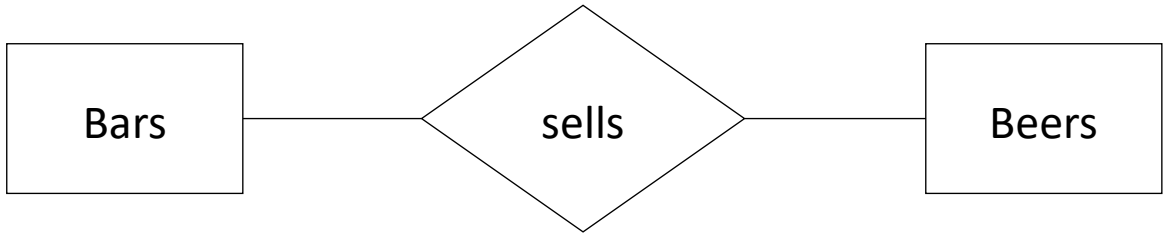
- Entity 
- Weak Entity 
- Relationship 
- Identifying Relationship 
- Attribute 
- Key Attribute 
- Composite Attribute 

One-to-One Relationship

- Each entity of either entity set is related to at most one entity of the other set.
  - E.g., an manufacturer has exactly one best-seller beer.

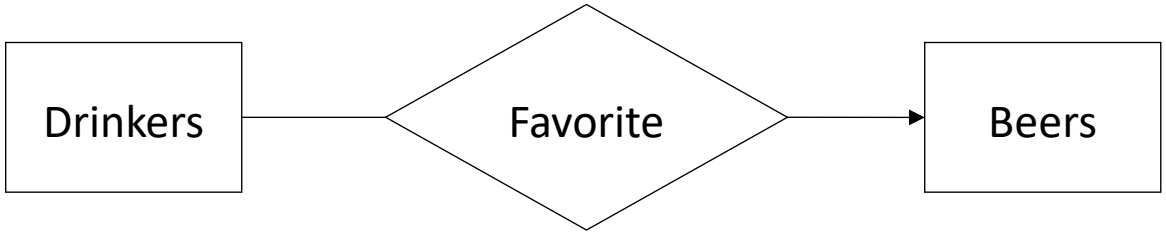
Many-to-Many Relationship

- An entity of either set can be connected to many entities of the other set.
  - E.g., a bar sells many beers, and a beer is sold by many bars.



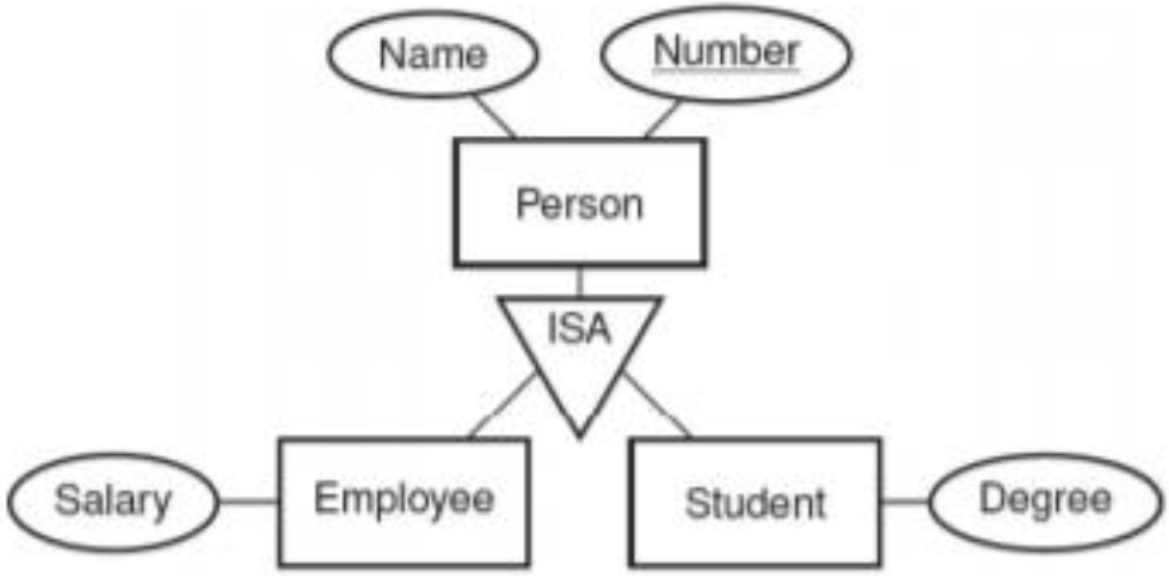
Many-to-One Relationship

- Each entity of the first set is connected to at most one entity of the second set. But an entity of the second set can be connected to zero, one, or many entities of the first set.
  - E.g., a drinker has only one most favorite beer, and a beer can be the most favorite of many drinkers.



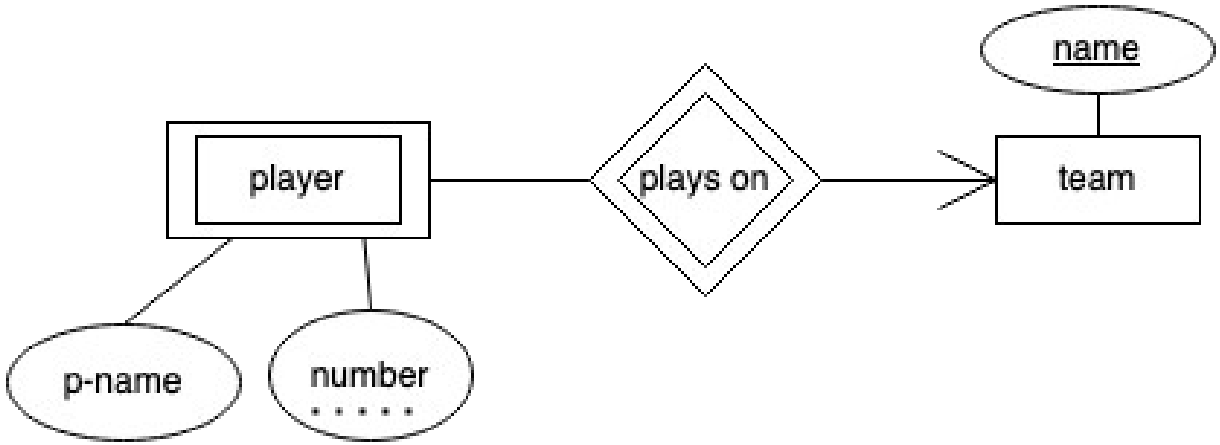
Subclasses/ISA Relationship

- Subclass are a special type of entity set that inherit properties from a parent entity
- The subclass must have all attributes of the parent as well as having additional properties



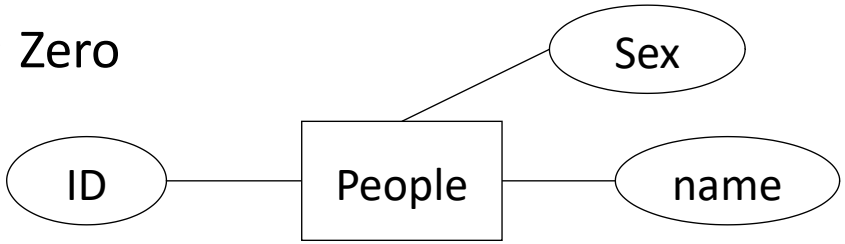
Weak Entity Sets

- Weak entities do not have enough information to have its own primary key
- The weak entity relies on the supporting entity for its identification
  - The key of the weak entity is a composite key made of the primary key of the supporting entity and the partial key of the weak entity

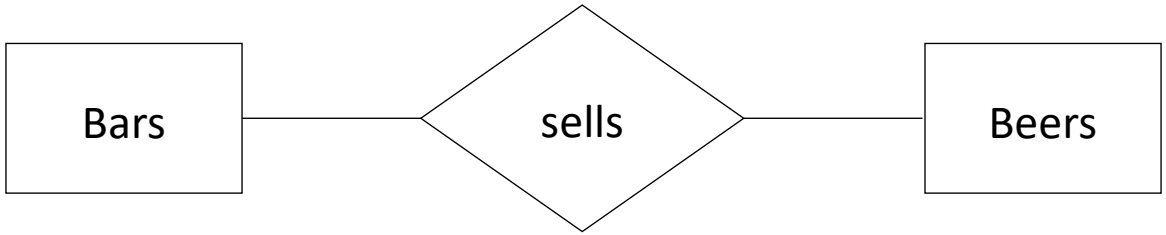


Relationship Degree(1)

- Zero

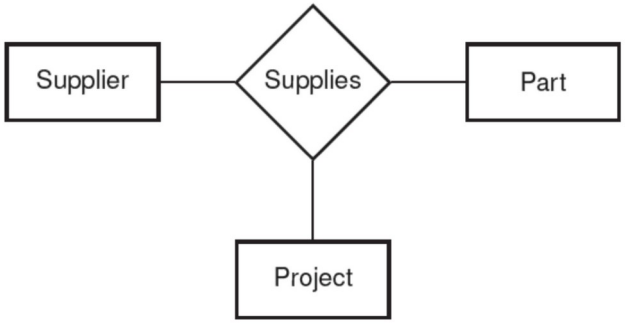


- Binary

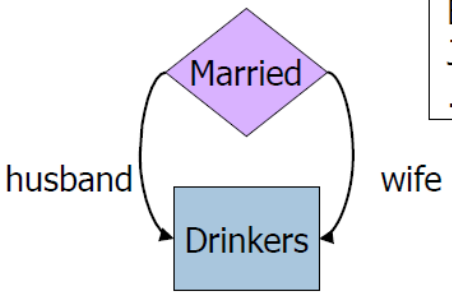


Relationship Degree(2)

- Ternary



- Roles(Cyclical or recursive relationship)

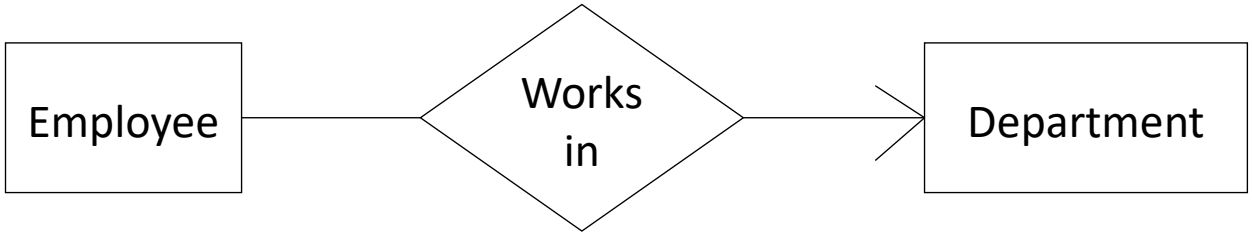


Relationship Set

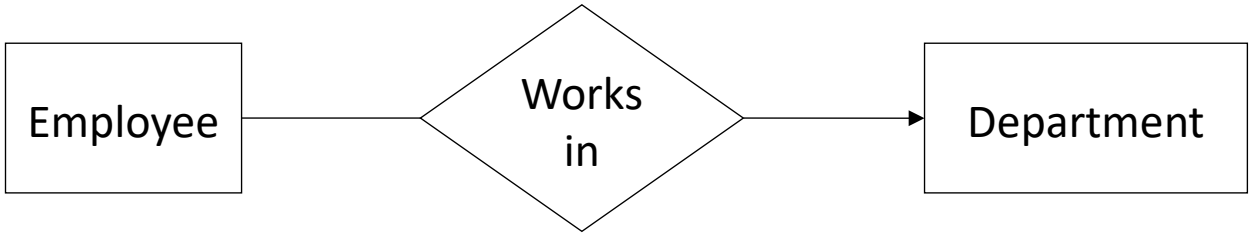
Husband	Wife
Bob	Ann
Joe	Sue
...	...

Participation

- Totally participation: At least one or more entities are in the relationship. Mandatory

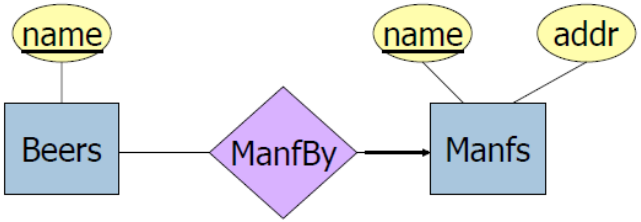


- Partially participation: zero or more entities are in the relationship. Optional

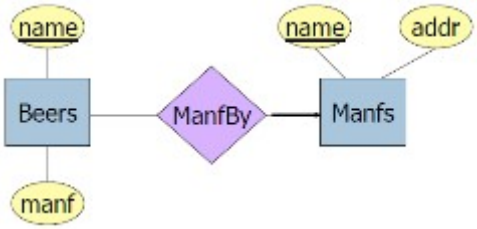


ER Schema Mapping(4)

- Design Techniques
  - Avoid redundancy
    - Good



Bad



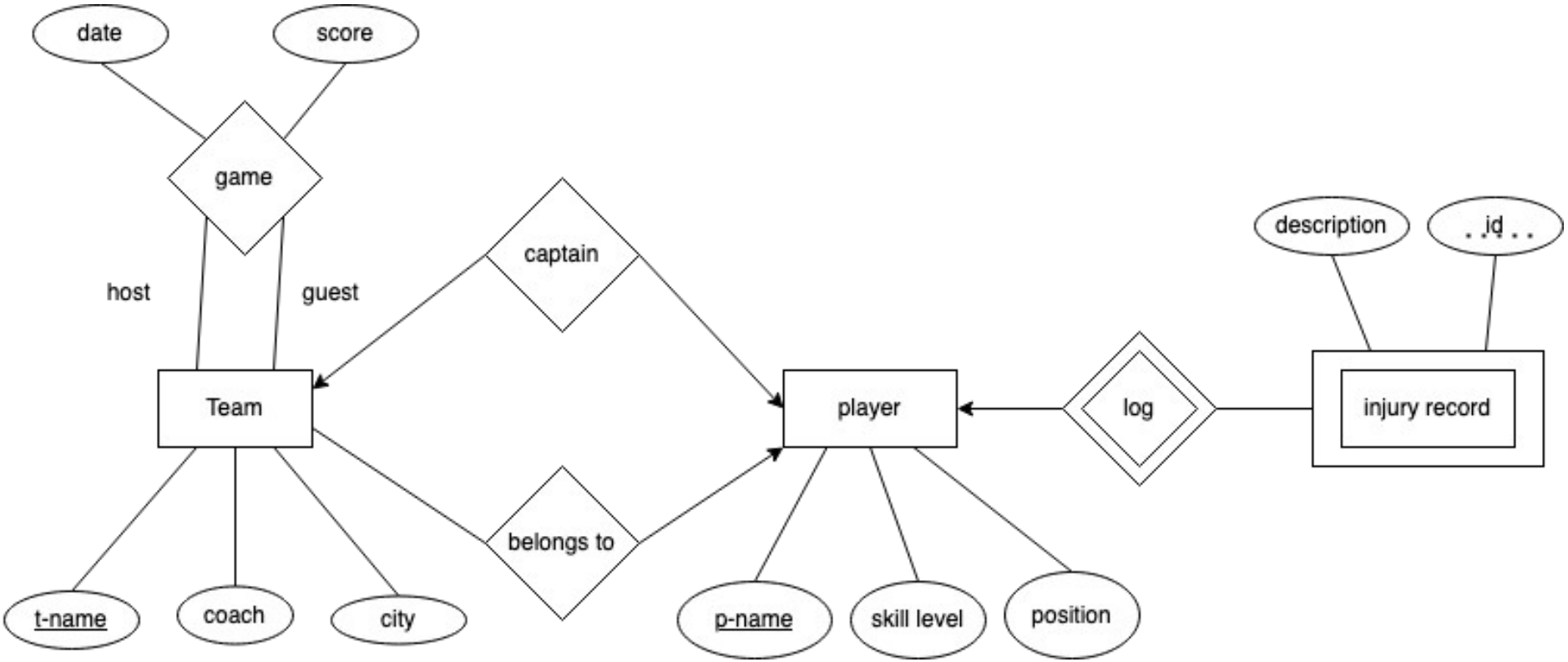
  - Limit the use of weak entity sets
  - Do not use an entity set when an attribute will do

An Example

Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):

- the NHL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2).
- Note: name is the primary key for team and player

Solution


date
score
game
host
guest
captain
Team
player
log
description
id
injury record
belongs to
t-name
coach
city
p-name
skill level
position

Assignment 1 Tips

Suggested drawing software: (some are paid with free trials)

- Lucid Chart
- diagrams.net
- Visual Paradigm
- ERD Plus

- Pay attention to the description, look for words that indicate relationships, constraints, special cases etc.

Contact

If you have any questions or feedback, please email me or attend my office hours:

Lucia Cristiano

- Email: cristial@mcmaster.ca
- Office hours: Tue 3:00pm – 4:00pm on MS Teams