Relational Model
Part one

Database Management - CIS 386 01 FA17

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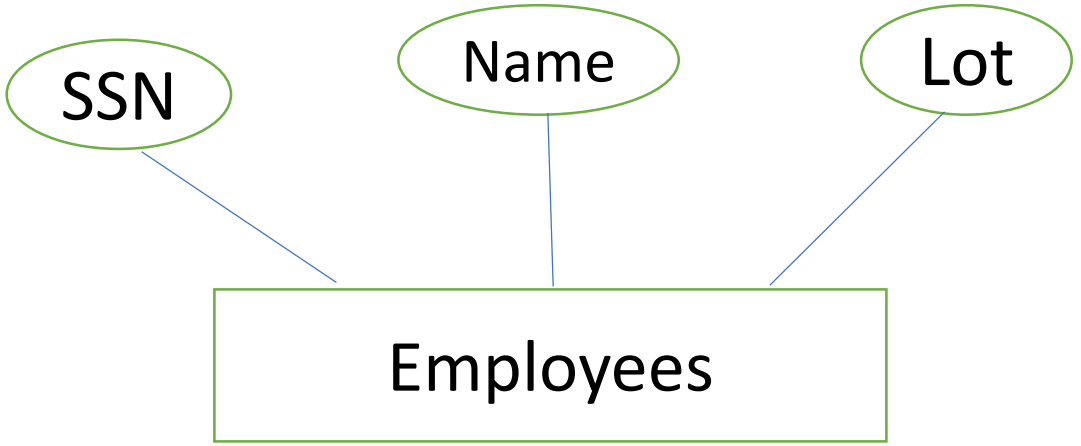
Entity Relational Model Basics

- Entity: Real-world object distinguishable from other objects.
- An entity is described in DB using a set of attributes.
- Attributes: are descriptive properties possessed by each member of an entity set.
  - Attributes type (simple, composite, single valued, multivalued, derived).



Entity Relational Model Basics (Cont.)

- Entity Set: A collection of similar entities. (E.g., all employees).
  - All entities in an entity set have the same set of attributes.
  - Each attribute has a domain.
    - Domain: is the set of allowable values for one or more attributes.

Entity Sets: customer and loan

Customer-id	Customer Name	Customer Street	Customer City
321-12-321	Jones	Main	Harrison
019-28-3746	Smith	North	Rye
677-98-9011	Hayes	Main	Harrison
555-55-5555	Jackson	Dupont	Woodside
244-66-8800	Curry	North	Rye
963-96-3963	Williams	Nassau	Princeton
355-57-7991	Adams	Spring	Pittsfield

Customer

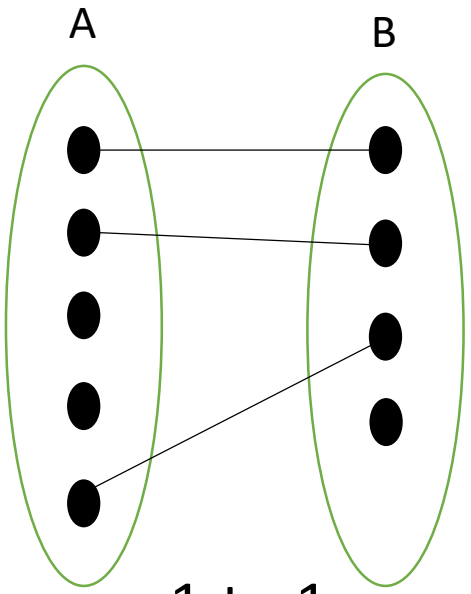
Laon Number	Amount
L-17	1000
L-23	2000
L-15	1500
L-14	1500
L-19	500
L-11	900
L-16	1300

Loan

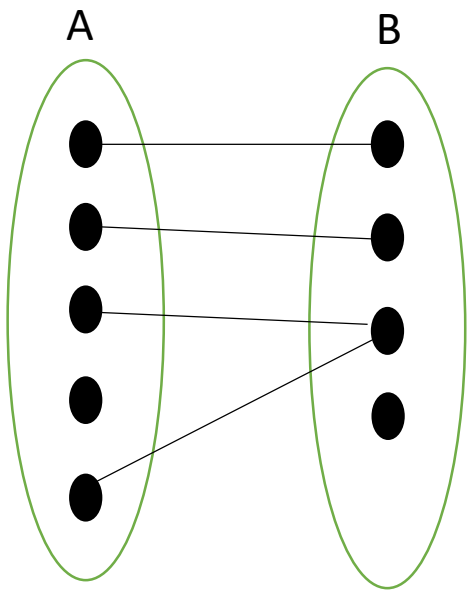
Keys

- Super key: An attribute, or set of attributes, that uniquely identifies a tuple within a relation.
- Candidate key: A super key such that no proper subset is super key within the relation.
- Primary key: The candidate key that is selected to identify tuples within the relation.
- Foreign key: An attribute, or set of attributes, within one relation that matches the candidate key of some (possibly the same) relation.

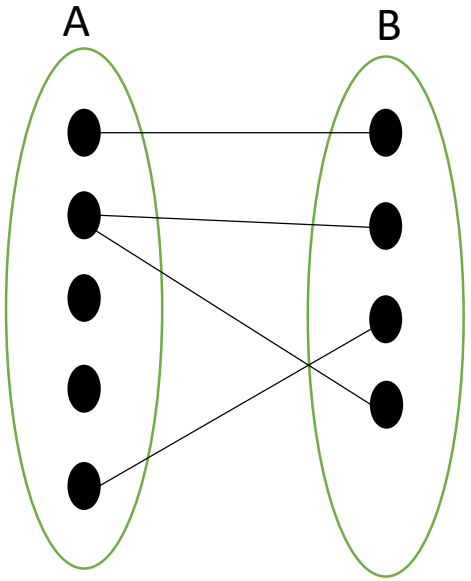
Mapping Cardinalities



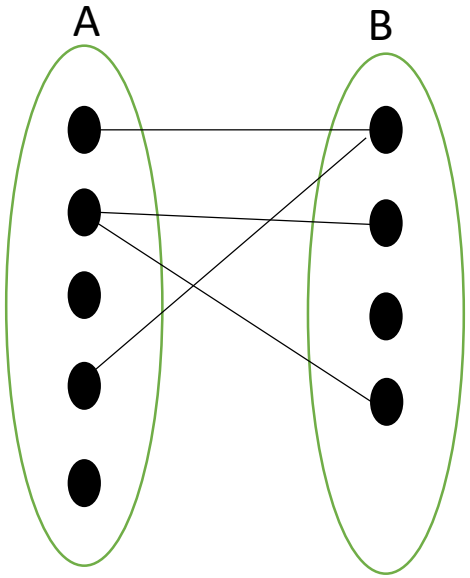
1-to-1



Many-to-1



1-to-Many



Many-to-Many

Relationship and Relationship Set

- Relationship: association among two or more entities.
- Relationship Set: collection of similar relationships.
  - Relationship set R relates n entity sets
    - Entity sets: $E_1 \ldots . E_2$
    - Relationship set $R = \{(e_1, e_2, \ldots., e_3) / \in E_1, e_2 \in E_2, \ldots., e_n \in E_n\}$
  - Same entity set could participate in different relationships sets.
  - Relationship can be binary, ternary, and n-ary.

Relationship and Relationship Set (Cont.)

- A relationship can also have descriptive attributes.
  - Record information about the relationship, rather than any participating entities.

- A relationship can only be identified by the participating entities.

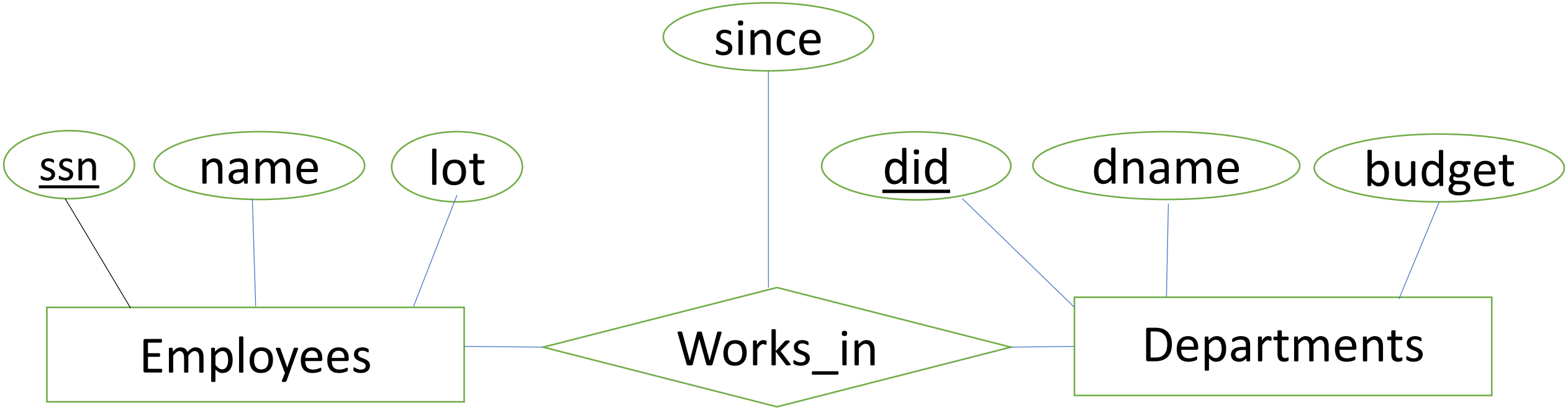
Relation vs Relationship

- Relation
  - Set of tuples; table
- Relationship
  - Describe relationship between entities
- Both entity sets and relationship sets (ER model) may be represented as relations

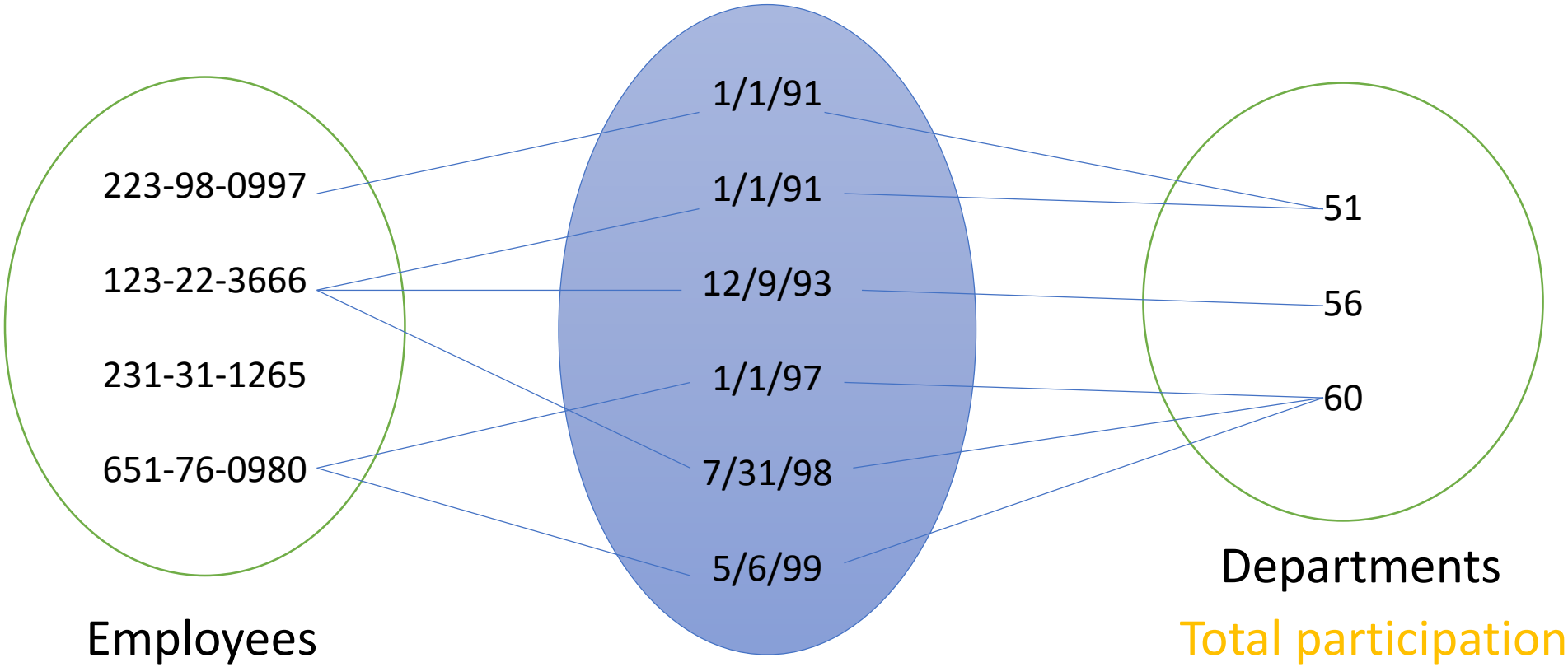
Entity Relationship Diagram

- Entity Relationship Diagram (E-R Diagram): can express the overall logical structure of a database graphically.
  - E-R Diagram consist of following major components:
  1. Rectangles
  2. Ellipse
  3. Diamonds
  4. Lines
  5. Double Ellipses
  6. Dashed Ellipses
  7. Double Lines
  8. Double Rectangles

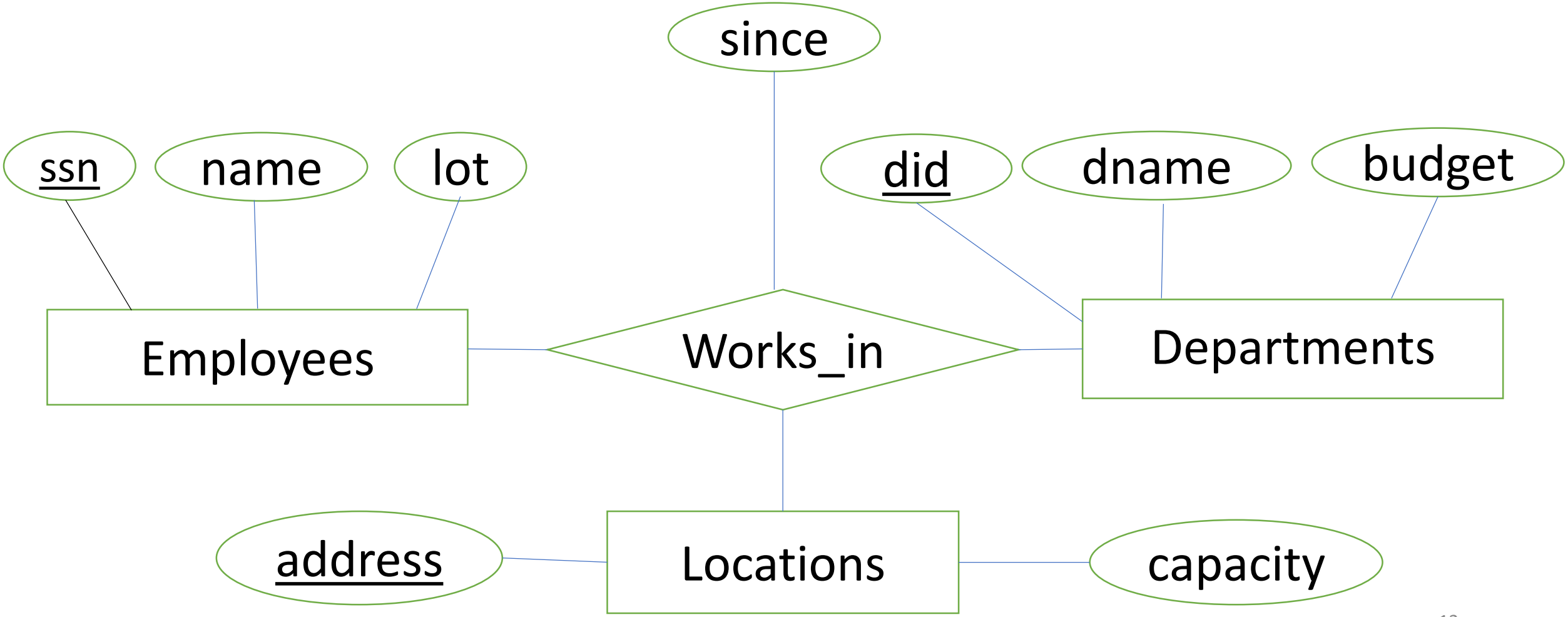
Entity Relationship



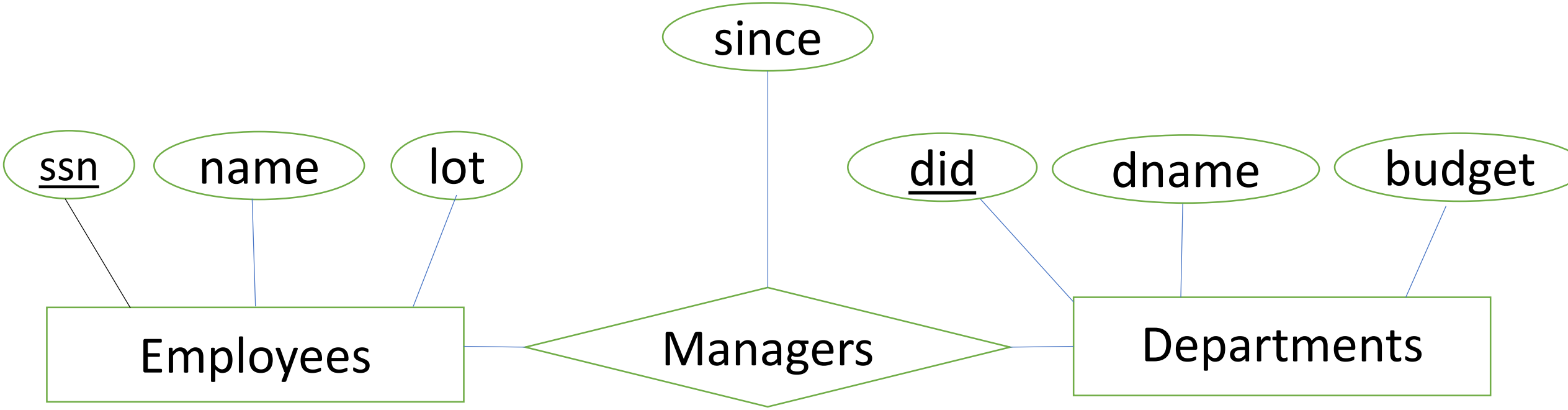
An Instance of *Works_in*



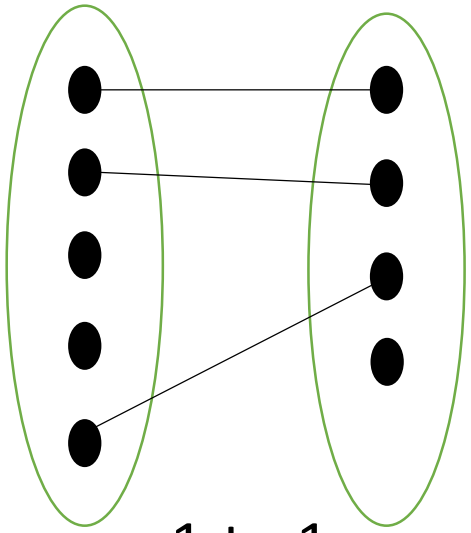
Ternary Relationship



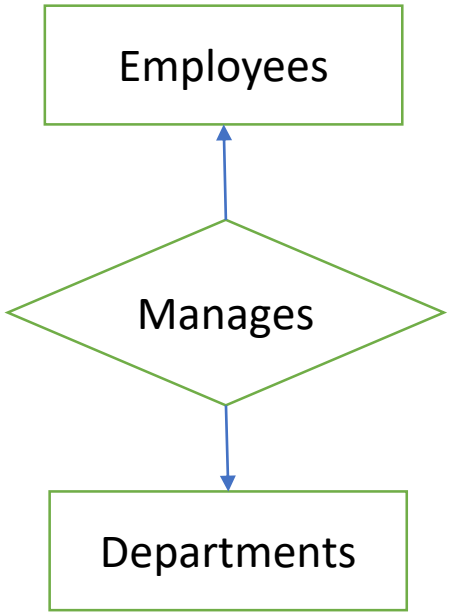
Key Constraints Example

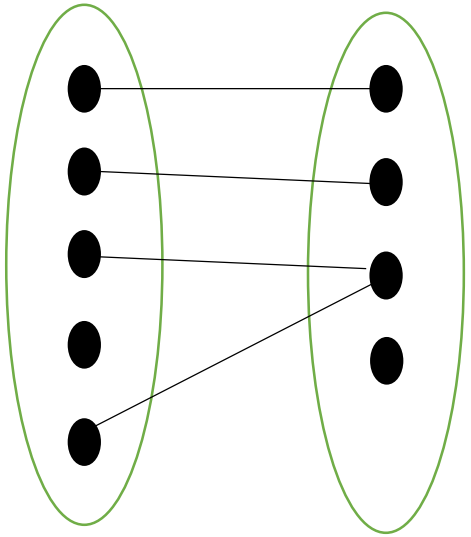


Key Constraints Example (Cont.)

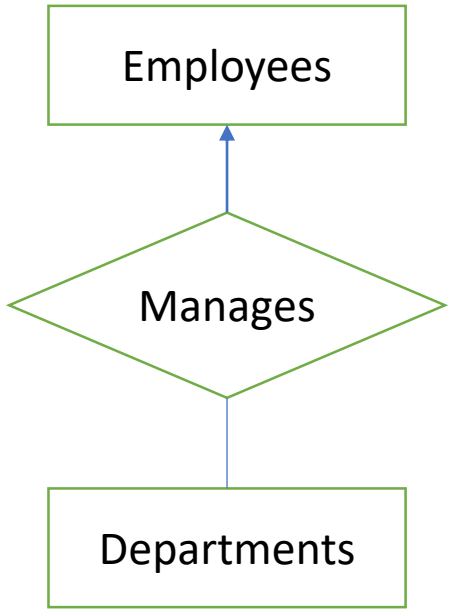


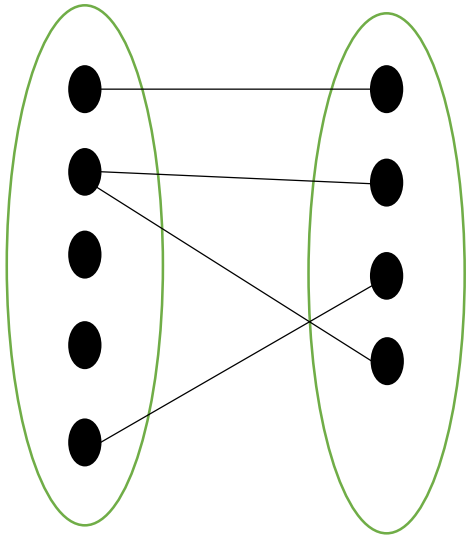
1-to-1



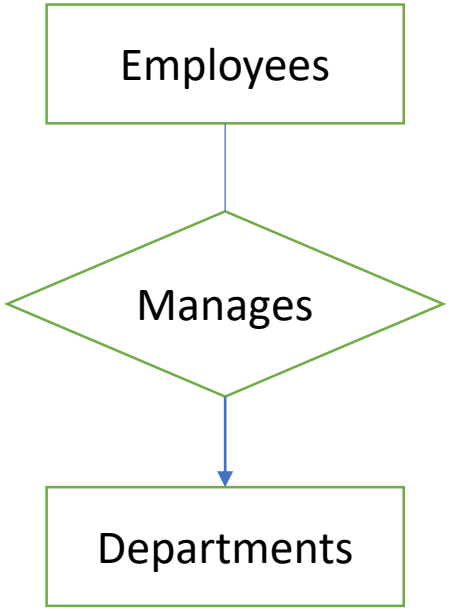


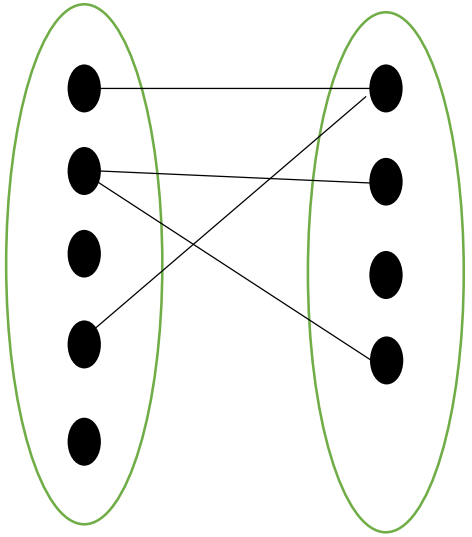
Many-to-1



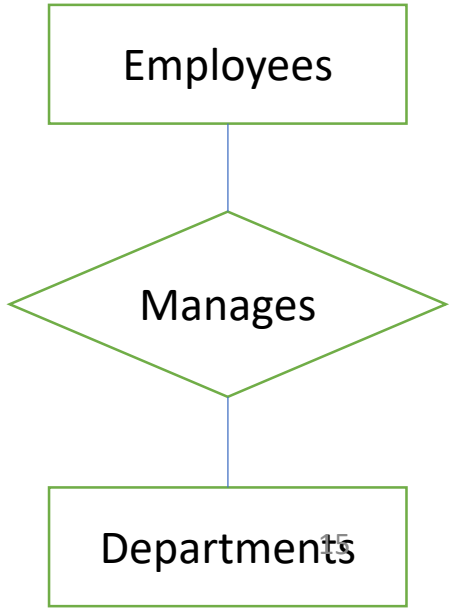


1-to-Many





Many-to-Many



Question Time!

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