

# Database Design (Lecture 2)

## Database Design: What it consists of

1. Requirements Analysis (What do they need to do?)
2. Conceptual Design (high level description)
3. Logical Design (Translate Entity Relationship into DBMS data model)
4. Schema Refinement (consistency/normalization; designing a good database)

## Conceptual Database Design

**ER:** Entities, relationships

*Informally:* Entities are typically relevant nouns; Relationships are statements about 2 or more objects and can typically be verbs.

For example: A professor teaches a course.

The word “teaches” is a potential relationship.

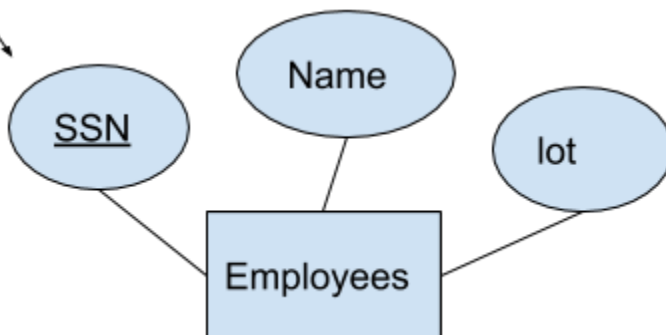
## Entities

**Entity:** Real-world object, distinguishable from other objects. This is used to describe a set of attributes (which is commonly known as metadata)

Each entity set has a key.

## ER Diagram

This is known as a key.



**Superkey:** A set of attributes which, taken collectively, identify uniquely an entity in an entity set.

**A set of ALL attributes of the entity set is ALWAYS a superkey.**

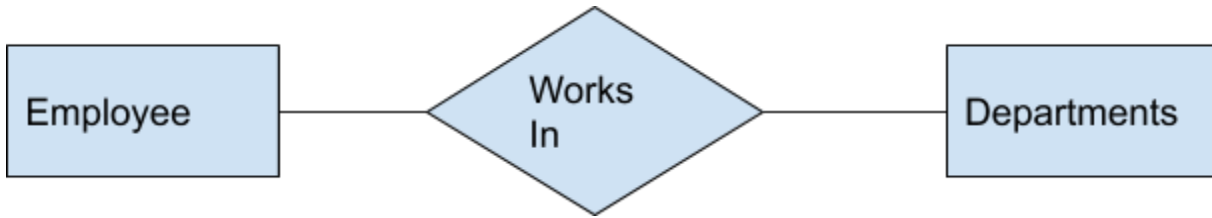
**Key:** A key, also known as a candidate key, is a super key for which no proper subset is a superkey. This means that it is a minimal super key. Each entity set must have a key and a key can have multiple attributes.

**Primary Key:** The primary key is chosen as the principal means to identify entities in an entity set. This is the key that is underlined. In the diagram above, SSN is the primary key.

The primary key must be a candidate key and the candidate key must be a super key.

## Relationship Sets

This is the association among two or more entities. For instance, Alan works in the pharmacy department and Alice works in the HR department. The connecting relationship between the two of them is “works\_in”.



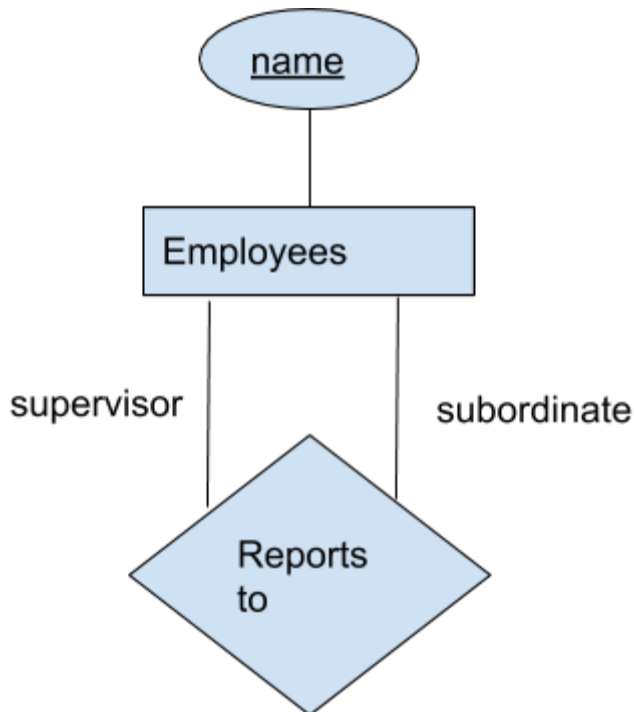
**Relationship Set:** Collection of similar relationships.

**Degree:** Number of participating entities. (binary, ternary, etc.) We typically see binary relationships.

*Relationships are usually verbs, but can be nouns.*

If an attribute describes an entity, connect the attribute with the entity set. If the attribute describes the relationship, connect it with the relationship, not with the entity.

### Roles in Relationships



This is a recursive relationship.

### **Reports\_To Table**

Supervisor	Subordinate
Alice	Bob
Bob	Caro