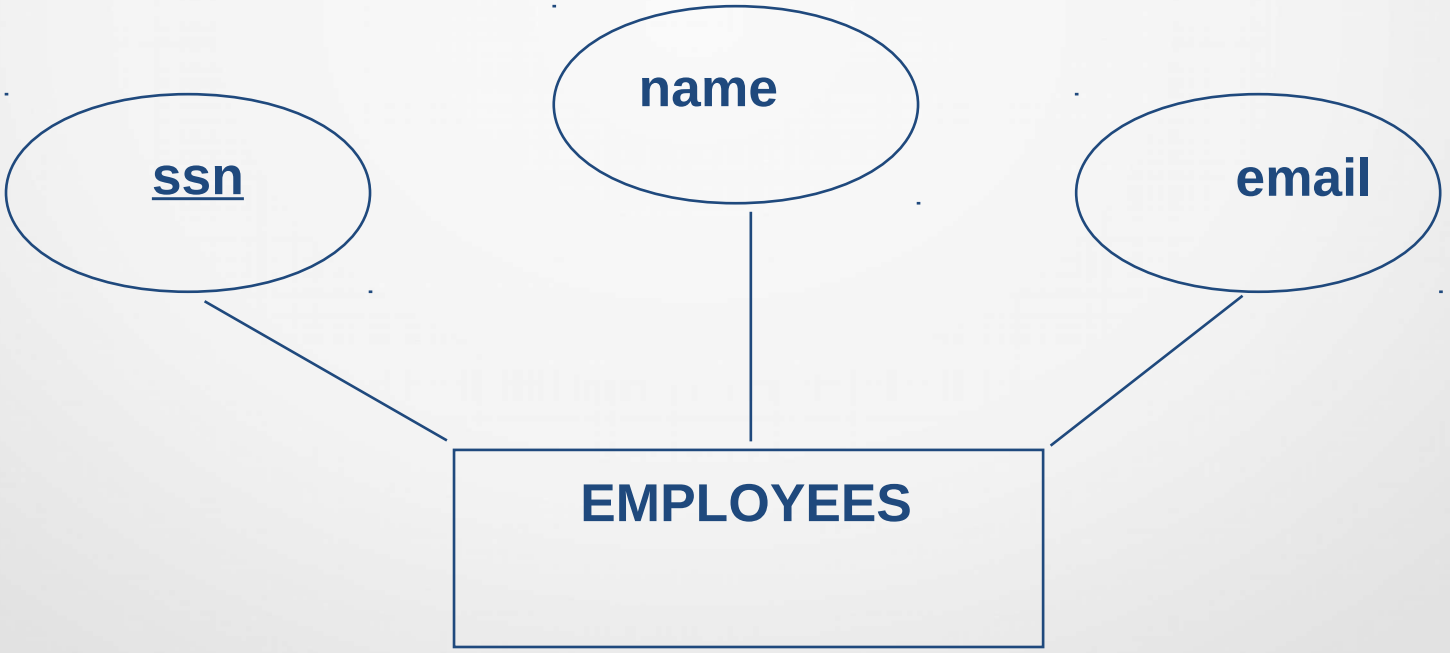
Why we need ER diagram

“ER diagrams are easy for non-technical people to understand, and thus are typically used by database designers before the schema ever exists”

Entity

- An **entity** is something that exists by itself.
- *Entity:* Real-world object distinguishable from other objects. An entity is described using a set of *attributes*.
- The entity name, a noun, is written in capital letters.



Examples of entities

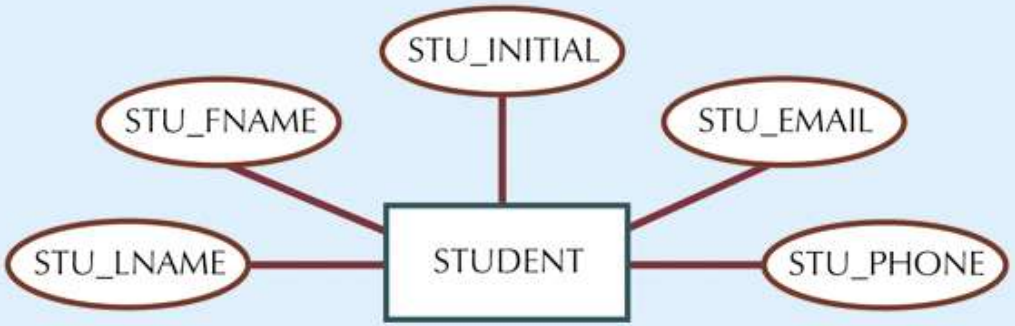
- **Person: EMPLOYEE, STUDENT, PATIENT**
- **Place: STORE, WAREHOUSE**
- **Object: MACHINE, PRODUCT, CAR**
- **Event: SALE,REGISTRATION, RENEWAL**
- **Concept: ACCOUNT, COURSE**

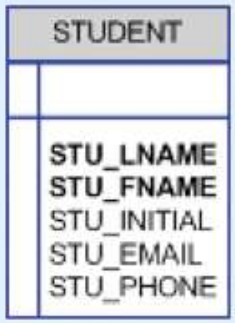
Attributes

- Example of entity types and associated attributes:

  STUDENT: Student_ID, Student_Name, Home_Address, Phone_Number, Major

FIGURE 4.1 The attributes of the STUDENT entity: Chen and Crow's Foot





SOURCE: Course Technology/Cengage Learning

Attribute types

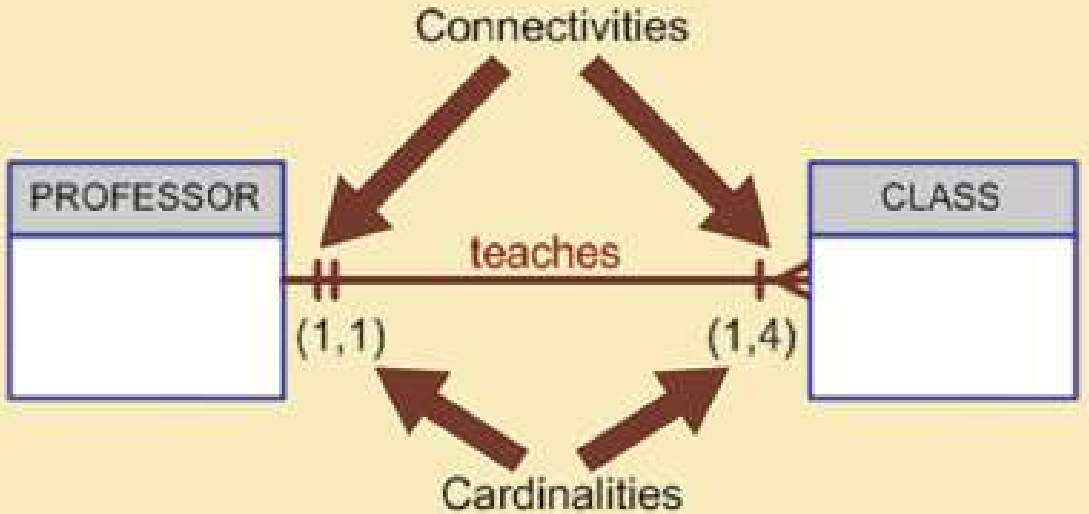
- ***Simple* and *composite* attributes.**
  - A **simple attribute** is an attribute that cannot be subdivided. For example, age, sex, and marital status would be classified as simple attributes
  - A **composite attribute**, not to be confused with a composite key is an attribute that can be further subdivided to yield additional attributes. For example,
  - the attribute ADDRESS can be subdivided into street, city, state, and zip code. Similarly,
  - the attribute PHONE_NUMBER can be subdivided into area code and exchange number.

- ***Single-valued* and *multi-valued* attributes**
  - A **single-valued** attribute is an attribute that can have only a single value. For example, a person can have only one Social Security number, and a manufactured part can have only one serial number
  - **Multivalued attributes** are attributes that can have many values. For instance, a person may have several college degrees, and a household may have several different phones, each with its own number
- ***Derived* attributes**
  - **Can be computed from other attributes**
  - Example: age, given date_of_birth

Connectivity and Cardinality

- Connectivity is used to describe the relationship classification.
- Cardinality expresses the minimum and maximum number of entity occurrences associated with one occurrence of the related entity.

FIGURE 4.7 Connectivity and cardinality in an ERD



SOURCE: Course Technology/Cengage Learning

FIGURE 4.34 The ninth Tiny College ERD segment

SOURCE: Course Technology/Cengage Learning

TABLE 4.4 Components of the ERM

ENTITY	RELATIONSHIP	CONNECTIVITY	ENTITY
SCHOOL	operates	1:M	DEPARTMENT
DEPARTMENT	has	1:M	STUDENT
DEPARTMENT	employs	1:M	PROFESSOR
DEPARTMENT	offers	1:M	COURSE
COURSE	generates	1:M	CLASS
PROFESSOR	is dean of	1:1	SCHOOL
PROFESSOR	chairs	1:1	DEPARTMENT
PROFESSOR	teaches	1:M	CLASS
PROFESSOR	advises	1:M	STUDENT
STUDENT	enrolls in	M:N	CLASS
BUILDING	contains	1:M	ROOM
ROOM	is used for	1:M	CLASS

Note: ENROLL is the composite entity that implements the M:N relationship "STUDENT enrolls in CLASS."