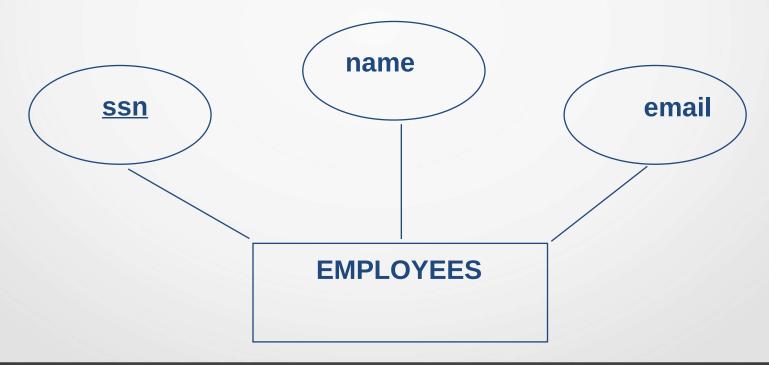
Why we need ER diagram

"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.
- <u>Entity</u>: Real-world object distinguishable from other objects. An entity is described using a set of <u>attributes</u>.
- 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

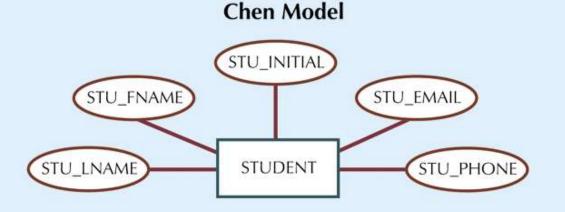
Attributes

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



Crow's Foot Model

| STUDENT |
|---|
| STU_LNAME STU_FNAME STU_INITIAL STU_EMAIL STU_PHONE |

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

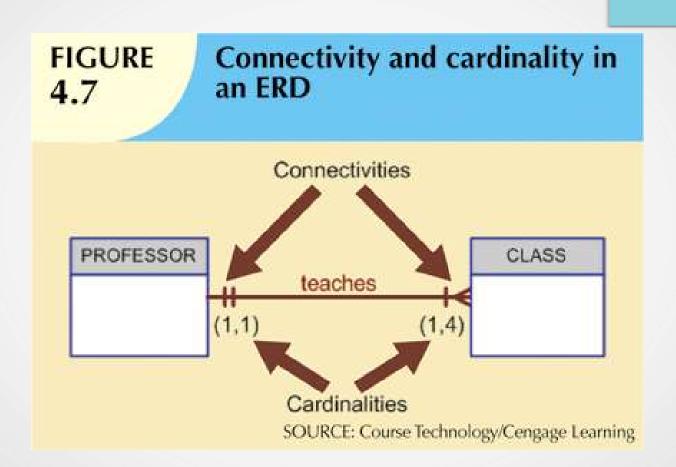
- A single-valued attribute is an attribute that can have only a single value. For example, a person can have only one Social Security number, and a manufactured part can have only one serial number
- Multivalued attributes are attributes that can have many values. For instance, a person may have several 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.





The ninth Tiny College ERD segment

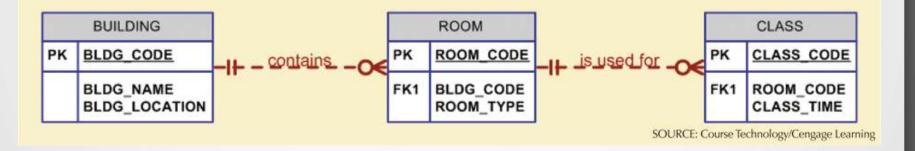


TABLE 4.4

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."