CSC 430/530 – DBMS/DT

Lecture 7: ALTERNATIVE NOTATIONS IN ER

(Min, Max) Notation

231

Alternative diagrammatic notation

- ER diagrams is one popular example for displaying database schemas
- Many other notations exist in the literature and in various database design and modeling tools
- UML class diagrams is representative of another way of displaying ER concepts that is used in several commercial design tools

232

Alternative (min, max) notation for relationship structural constraints:

- Specified on each participation of an entity type E in a relationship type R
- Specifies that each entity e in E participates in at least *min* and at most *max* relationship instances in R
  - Default(no constraint): min=0, max=n (signifying no limit)
- Must have min≤max, min≥0, max ≥1
  - Derived from the knowledge of mini-world constraints

237

The (min,max) notation for relationship constraints

- An employee can work for exactly one department but a department can have any number of employees.

239

The (min,max) notation for relationship constraints

- An employee can work for exactly one department but a department can have any number of employees.

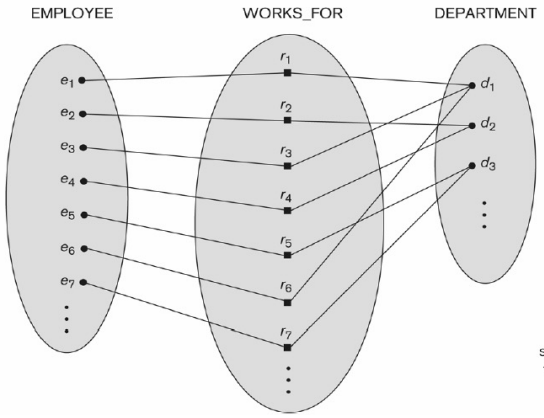


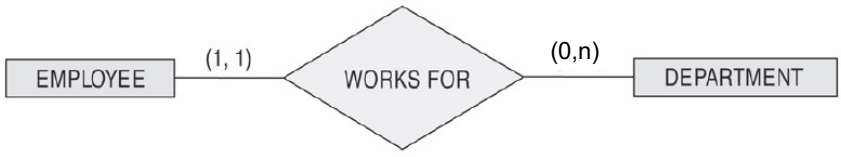
Figure 3.9
Some instances in the WORKS_FOR relationship set, which represents a relationship type WORKS_FOR between EMPLOYEE and DEPARTMENT.

240

The (min,max) notation for relationship constraints

- An employee can work for exactly one department but a department can have any number of employees.
  - Specify (1,1) for participation of EMPLOYEE in WORKS_FOR
  - Specify (0,n) for participation of DEPARTMENT in WORKS_FOR

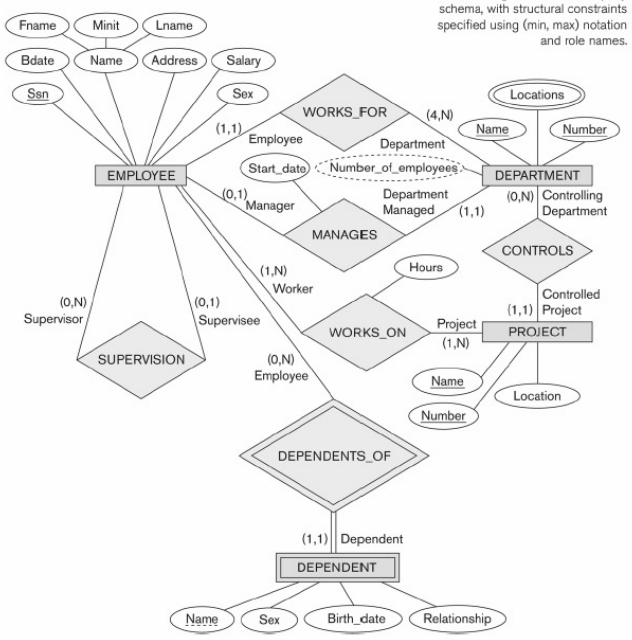
Read the min,max numbers next to the entity type and looking **away from** the entity type



241

COMPANY ER Schema Diagram using (min, max) notation

Figure 3.15
ER diagrams for the company schema, with structural constraints specified using (min, max) notation and role names.



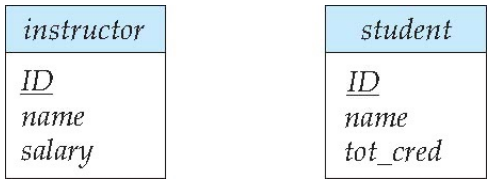
242

SIMPLIFYING ER DIAGRAMS

243

Entity Sets

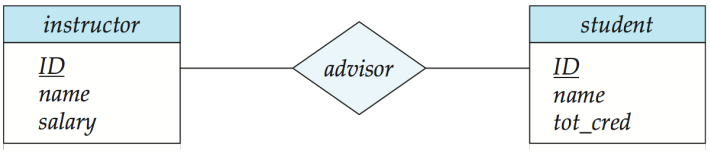
- Entities can be represented graphically as follows:
  - Rectangles represent entity sets.
  - Attributes listed inside entity rectangle
  - Underline indicates primary key attributes



244

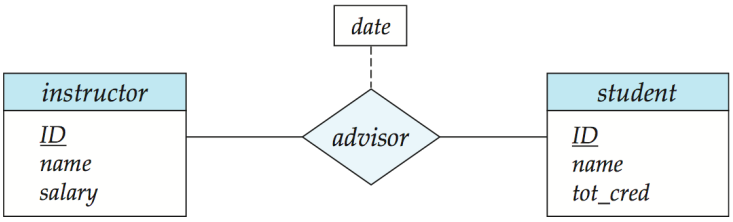
Relationship Sets

- Diamonds represent relationship sets.



245

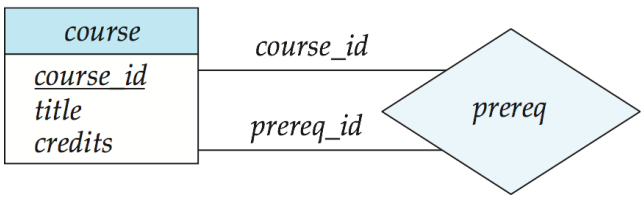
Relationship Sets with Attributes



246

Roles

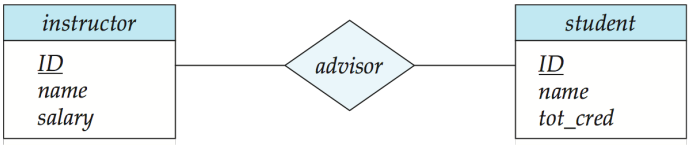
- Entity sets of a relationship need not be distinct
  - Each occurrence of an entity set plays a "role" in the relationship
- The labels "*course_id*" and "*prereq_id*" are called **roles**.



247

Cardinality Constraints

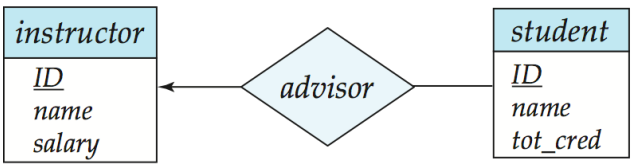
- We express cardinality constraints by drawing either a directed line (→), signifying "one," or an undirected line (—), signifying "many," between the relationship set and the entity set.
- One-to-one relationship between an *instructor* and a *student* :
  - A student is associated with at most one *instructor* via the relationship *advisor*
  - A *student* is associated with at most one *department* via *stud_dept*



248

One-to-Many Relationship

- one-to-many relationship between an *instructor* and a *student*
  - an instructor advises (including 0) students
  - a student is advised by at most one instructor



249

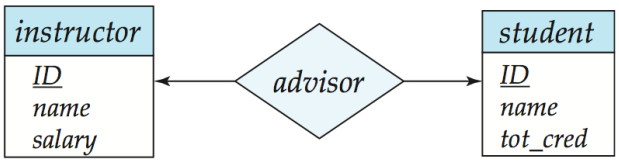
Many-to-One Relationships

- In a many-to-one relationship between an *instructor* and a *student,*
  - an instructor advises at most one student,
  - and a student is advised by (including 0) instructors

250

Many-to-Many Relationship

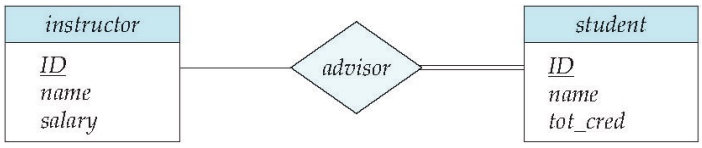
- An instructor advises several (possibly 0) students via *advisor*
- A student is advised by several (possibly 0) instructors via *advisor*



251

Total and Partial Participation

- **Total participation (indicated by double line):** every entity in the entity set participates in at least one relationship in the relationship set



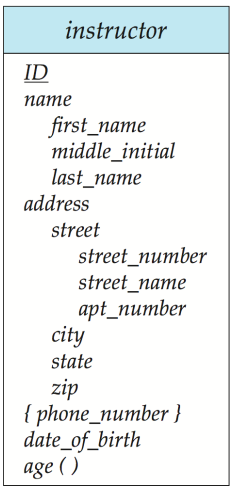
participation of *student* in *advisor* relation is total

- every *student* must have an associated instructor

- **Partial participation:** some entities may not participate in any relationship in the relationship set
  - Example: participation of *instructor* in *advisor* is partial

252

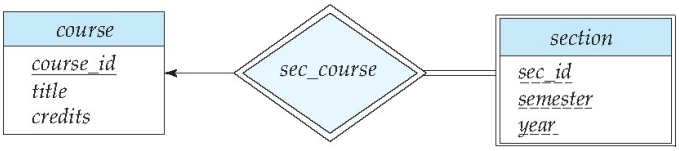
Notation to Express Entity with Complex Attributes



254

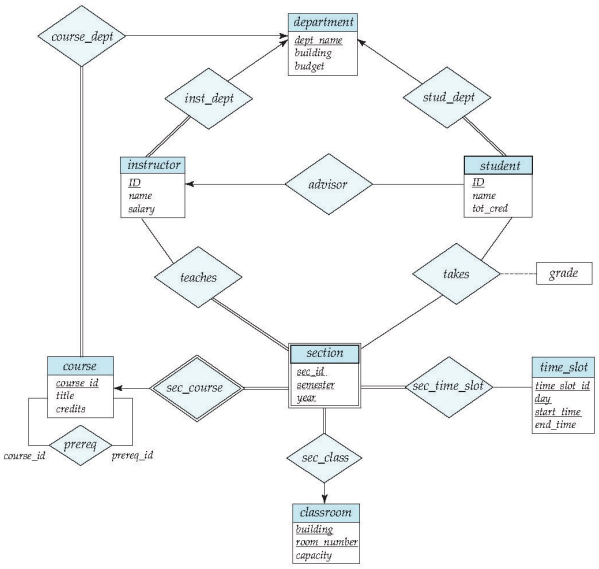
Expressing Weak Entity Sets

- In E-R diagrams, a weak entity set is depicted via a double rectangle.
- We underline the discriminator of a weak entity set with a dashed line.
- The relationship set connecting the weak entity set to the identifying strong entity set is depicted by a double diamond.
- Primary key for *section* – (***course_id***, *sec_id, semester, year*)



255

E-R Diagram for a University Enterprise



256

Questions

257