ER Diagram to Relational Schemas

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Reduction of an ER Schema to Relation Schemas

- Entity sets and relationship sets can be expressed uniformly as relation schemas (tables) that represent the contents of the database

- A database which conforms to an ER diagram can be represented by a collection of schemas

- For each entity set and relationship set there is a unique schema that is assigned the name of the corresponding entity set or relationship set

- Each schema has a number of columns (generally corresponding to attributes), which have unique names

- Converting an ER diagram to a table format is the basis for deriving a relational database design from an ER diagram

Representing Entity Sets

- A strong entity set reduces to a schema with the same attributes

student(ID, name, tot_cred)

- A weak entity set becomes a table that includes a column for the primary key of the identifying strong entity set

section(course_id, sec_id, semester, year)

- Example

Representation of Entity Sets with Composite Attributes

- Composite attributes are flattened out by creating a separate attribute for each component attribute

    – **Example:** given entity set ***instructor*** with composite attribute ***name*** with component attributes ***first_name*** and ***last_name***

    – The schema corresponding to the entity set has two attributes ***name_first_name*** and ***name_last_name***

- Prefix omitted if there is no ambiguity (***name_first_name*** could be ***first_name***)

- Ignoring multivalued attributes, extended instructor schema is

    instructor(ID, first_name, middle_initial, last_name, street_number,

    street_name, apt_number, city, state, zip_code, date_of_birth)

instructor

ID
name
    first_name
    middle_initial
    last_name
address
    street
        street_number
        street_name
        apt_number
    city
    state
    zip
{ phone_number }
date_of_birth
age ( )

Representation of Entity Sets with Multivalued Attributes

- A multivalued attribute **M** of an entity **E** is represented by a separate schema **EM**

- Schema **EM** has attributes corresponding to the primary key of **E** and an attribute corresponding to multivalued attribute **M**

- **Example:** Multivalued attribute **phone_number** of **instructor** is represented by a schema:

  inst_phone= (ID, phone_number)

- Each value of the multivalued attribute maps to a separate tuple of the relation on schema **EM**

- For example, an **instructor** entity with primary key **22222** and **phone numbers** *456-7890* and *123-4567* maps to two tuples:

  (22222, 456-7890) and (22222, 123-4567)

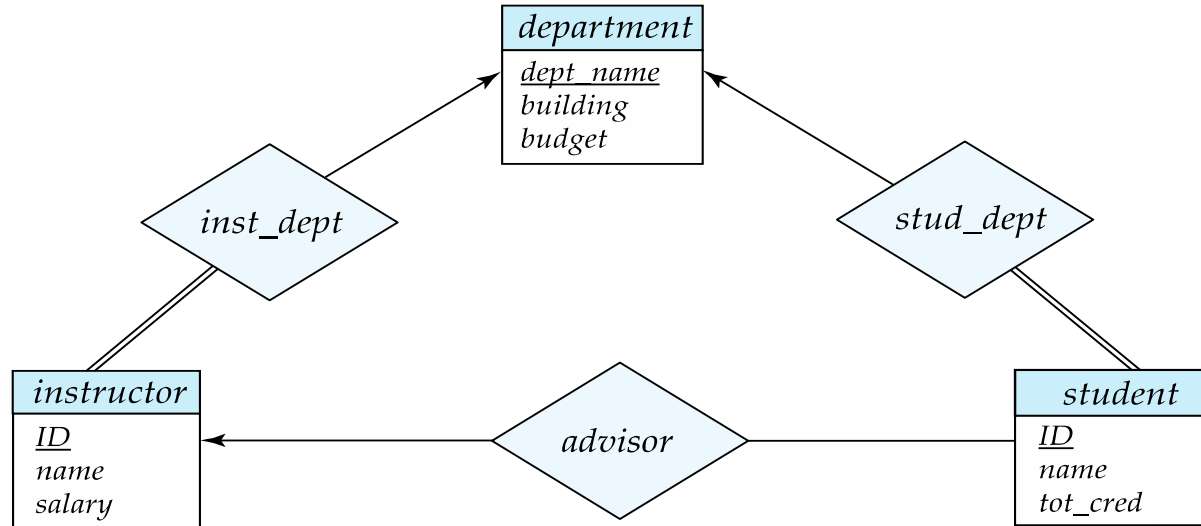# Representing Relationship Sets

- A *many-to-many* relationship set is represented as a schema with attributes for the *primary keys* of the two participating *entity sets*, and any descriptive *attributes* of the *relationship set*

- Example: Schema for relationship set **advisor**

advisor = (s_id, i_id)
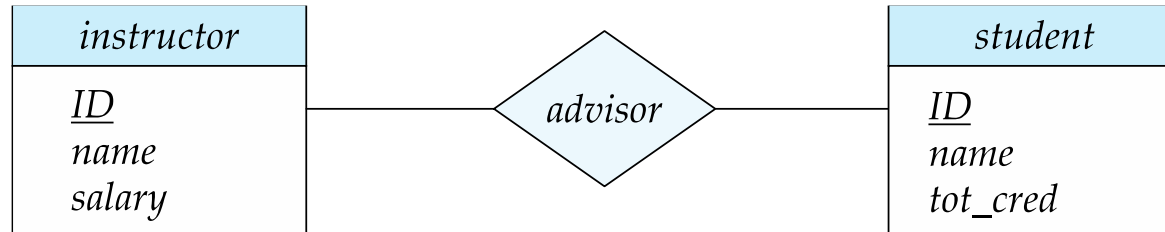
Redundancy of Schemas

- *Many-to-one* and *one-to-many* relationship sets that are total on the many-side can be represented by adding an extra attribute to the "*many*" side, containing the primary key of the "*one*" side

- **Example:** Instead of creating a schema for relationship set **inst_dept**, add an attribute **dept_name** to the schema arising from entity set **instructor**

- **Example:**

Redundancy of Schemas

- For *one-to-one* relationship sets, either side can be chosen to act as the "*many*" side

  – That is, an extra attribute can be added to either of the tables corresponding to the two entity sets

- If participation is partial on the "*many*" side, replacing a schema by an extra attribute in the schema corresponding to the "*many*" side could result in null values

- The schema corresponding to a relationship set linking a *weak entity set* to its *identifying strong entity set* is redundant

- **Example:** The **section** schema already contains the attributes that would appear in the **sec_course** schema

Next Lecture

Extended ER Features

Thank you for your attention...

Any question?

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