Chapter 7: E-R D Last Part

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Constraints on Generalization/Specialization

Based on: Attribute of higher-level entity determines lower-level entity membeship

- **Condition-defined:** Example: all customers over 65 years are members of senior-citizen entity set; senior-citizen ISA person. Since all the lower-level entities are evaluated on the basis of the same attribute (in this case, on age), this type of generalization is said to be **attribute-defined.**
- **User-defined:** Not constrained by a membership condition, rather, the **database user assigns** entities to a given entity set. **For instance,** let us assume that, after 3 months of employment, university employees are assigned to one of four work teams.

Constraints on Generalization/Specialization (cont.)

Based on: The number of branching in its lower-level entity

- **Disjoint.** A disjointness constraint requires that an entity belong to no more than one lower-level entity set. **For example,** Student entity can satisfy only one condition for the student type attribute; an entity can be either a graduate student or an undergraduate student, **but cannot be both.**
- **Overlapping.** The same entity **may belong to more than one lower-level entity set** within a single generalization. **For instance,** consider the employee work-team example, and assume that certain employees participate in more than one work team.

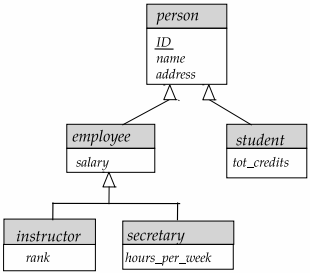
Constraints on Generalization/Specialization (cont.)

Based on: Completeness

- **Total generalization or specialization.** Each higher-level entity must belong to a lower-level entity set
- **Partial generalization or specialization.** Some higher-level entities may not belong to any lower-level entity set

Representation of Generalization: 2 Ways

Consider the following E-R Diagram (ingore last 2 entities)



Representation of Generalization: Method 1

Method 1

- Create a schema for the higher-level entity set.
- For each lower-level entity set create it and link it with its upper-level schema.
- The primary-key attributes of the higher-level entity set become primary-key attributes of the higher-level entity set as well as all lower-level entity sets.
- We create foreign-key constraints on the lower-level entity sets.

Representation of Generalization: Method 1 (Cont.)

Entities should look like:

person (ID , name, street, city)

employee (ID , salary)

student (ID , totalcredit)

Strength and Weakness of Method 1

Strengh: Natural in design and reduces redundancies.
Weakness: Getting information requires joining 2 entities.

Representation of Generalization: Method 2

It can be applied if:

- If the generalization is **disjoint**
- If the generalization is **complete**

It implies:

If no entity is a member of two lower-level entity sets directly below a higher-level entity set, and if every entity in the higher-level entity set is also a member of one of the lower-level entity sets

Its ERD should look like:

employee (ID , name, street, city, salary)
student (ID , name, street, city, totalcredit)

Method 2: Strength and weakness

- **Strength:** Data can be obtained directly, quick access (since no joining is done).
- **Weakness:** Data validation is failed (since no Foreign Key constraint can be imposed).
- **Weakness:** With **overlapping generalization**, some values would be stored multiple times, introduces **redundancies.** For instance, if a person is both an employee and a student, values for street and city would be stored twice.