

Database Management System 8

Enhanced ER-Model

Specialization

Generalization

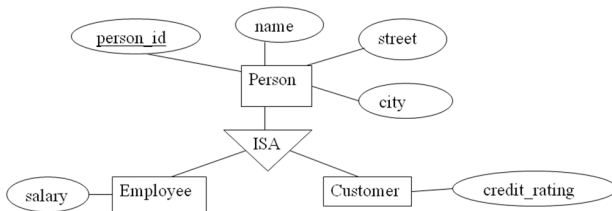
Constraints on
Generalization/Specia-
lization

Aggregation

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Specialization

The process of designating sub groupings within an entity set is called **Specialization**. An entity set may be specialized by more than one distinguishing features. In ER-design, specialization is depicted by a **Triangle** component labeled **ISA** (is a)



Specialization

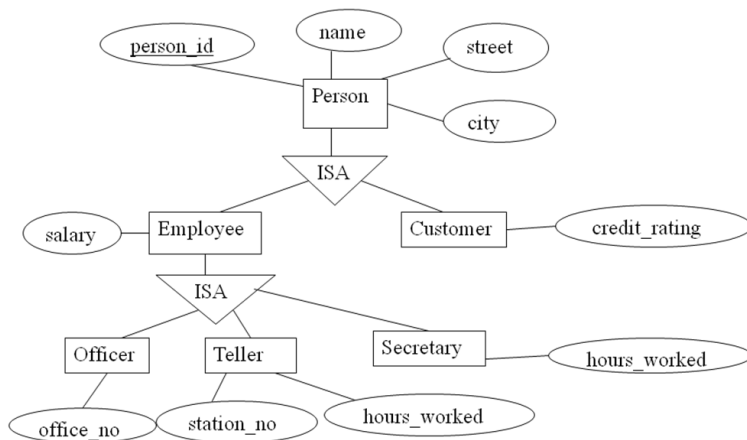
Generalization

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Specialization...

We can apply specialization repeatedly to refine a design scheme



Specialization

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Generalization

The commonality can be expressed by **Generalization**, which is a containment relationship that exists between a higher-level entity set and one or more low-level entity sets

- To create a generalization, the attributes must given a common name and represented with the higher-level entity
- Generalization is a simple inversion of specialization
- Specialization adopts *top-down* approach, while Generalization adopts *bottom-up* approach
- A crucial property of the higher-level and lower-level entities created by specialization and generalization is attribute inheritance
- A lower-level entity set (or subclass) also inherits participation in the relationship sets in which its higher-level entity (or superclass) participates

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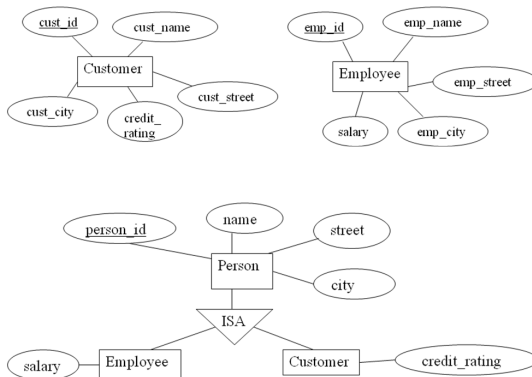
Generalization...

Specialization

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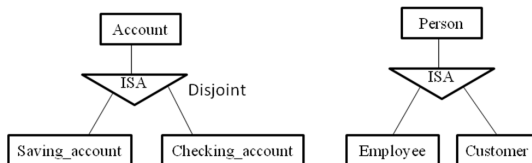


a. Condition defined or not

- **Condition-defined:** In condition defined lower-level entity sets, membership is evaluated on the basis of whether or not an entity satisfies an explicit condition or predicate. Since all the lower-level entities are evaluated on the basis of the same attribute, this type of generalization is also said to be attribute-defined
- **User-defined:** User-defined lower-level entity sets are not constrained by a membership condition; rather, the database user assigns entities to a given entity set

b. Disjoint or Overlapping

- **Disjoint:** A Disjointness constraint requires that an entity belong to only one lower-level entity set
- **Overlapping:** In overlapping generalizations, the same entity may belong to more than one lower-level entity set within a single generalization
- *Lower-level entity overlap is the default case.* A disjointness constraint must be placed explicitly on a generalization. This is done by adding the word **disjoint** next to the ISA symbol



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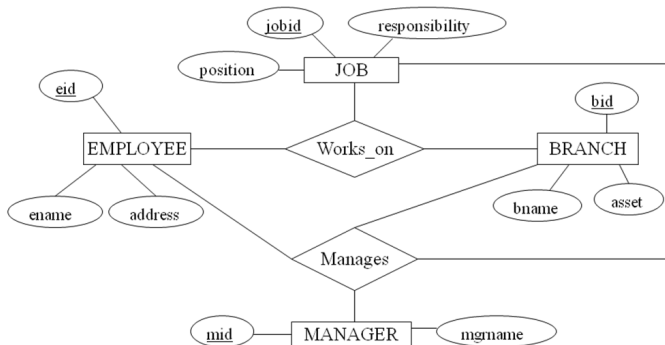
c. Completeness Constraint

Completeness constraint on a generalization/specialization specifies whether or not an entity in the higher-level entity set must belong to at least one of the lower-level entity sets within the generalization/specialization

- **Total generalization/specialization:** Each higher-level entity must belong to a lower-level entity set
- **Partial generalization/specialization:** Some higher-level entities may not belong to any lower-level entity set
- *Partial generalization is the default.* Total generalization in an ER diagram can be specified by using a **double line** to connect the box representing the higher-level entity set to the triangle symbols

Aggregation

One limitation of the ER model is that it can not express relationship among relationships



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Aggregation is an abstraction through which relationships are treated as higher-level entities. Thus, aggregation allows us to treat a relationship set as an entity set for the purposes of participation in (other) relationships

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