

Enhanced Entity Relationship Modeling

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Basic concept: Subset/Superset

- Examples:
 - Some Employees are Hourly
 - Some Employees are Managers
 - All Employees are either technical, clerical, or managerial
 - All employees are either Hourly or Salaried

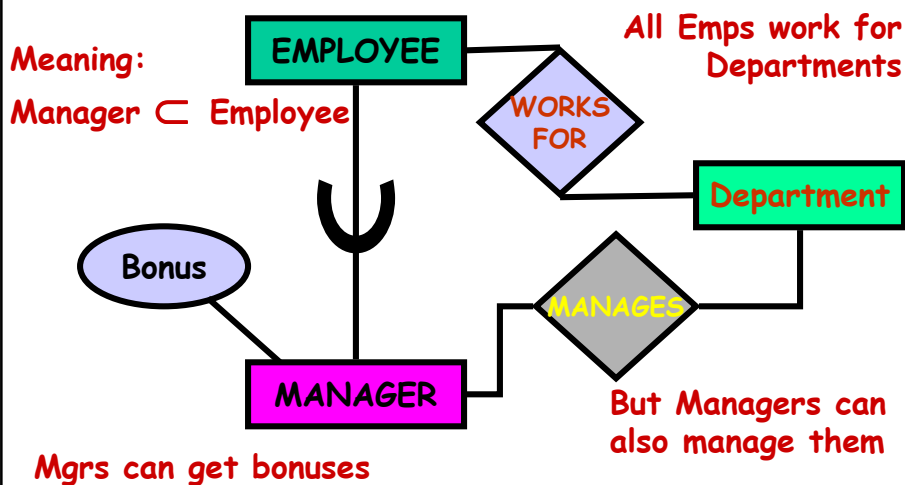
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Why is this Important?

- Subsets may have different attributes:
 - tech employee has SPECIALTY
 - Hourly employee has OVERTIME
- Subsets may participate in different relationships:
 - managerial employee manages unit
 - hourly employee belongs to a union

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MANAGER "IS-A" EMPLOYEE.



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ISA = Inheritance

- MANAGER gets all attribs of EMPLOYEE
- can participate in all relations EMPLOYEE participates in.
- this is called INHERITANCE:
- every MANAGER is also an EMPLOYEE.
- All of this is idea of "ISA" or "Superclass/Subclass"

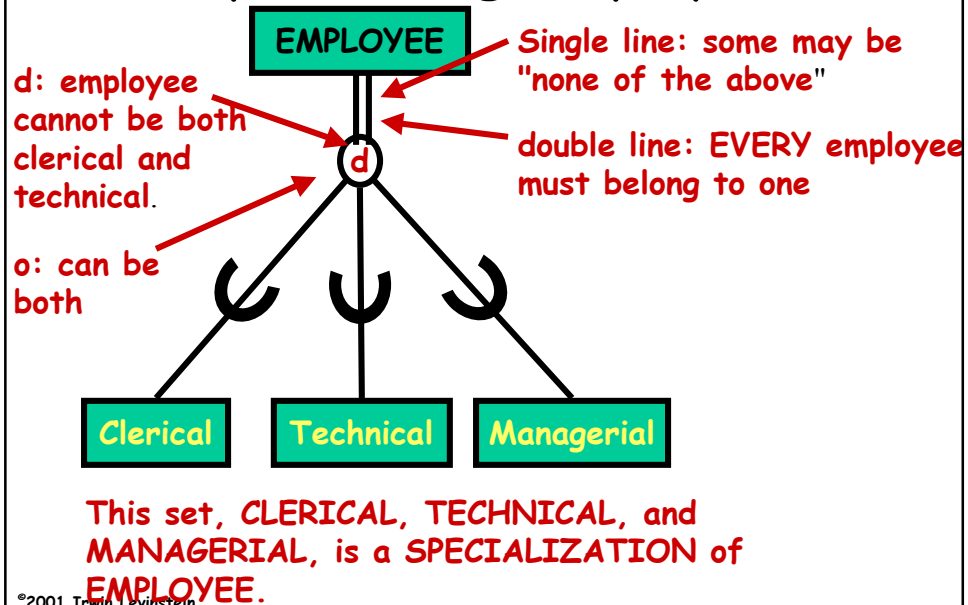
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Specialization and Generalization

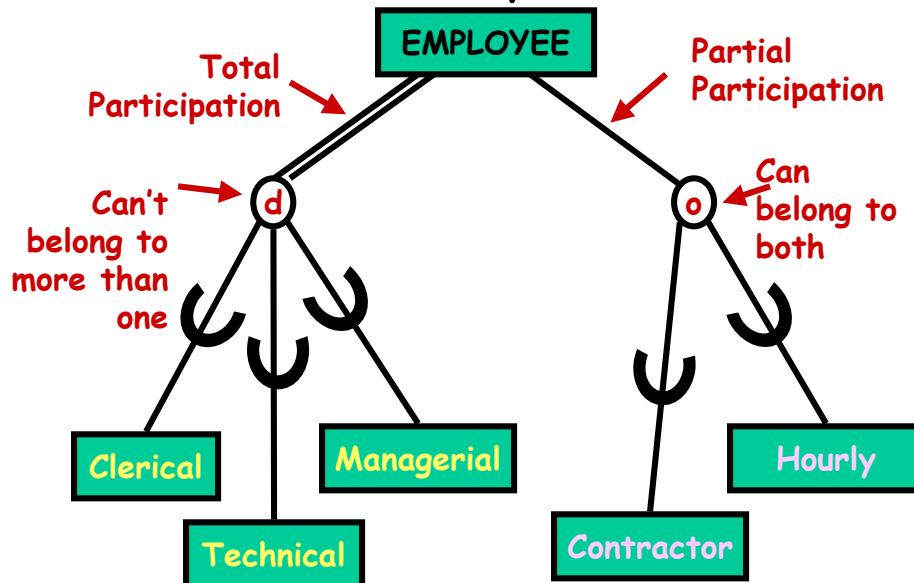
- Specialization defines SETS of Subclasses on a Class.
 - Each SET called a Specialization
- Generalization unites several entities into a Set of Sub-Classes, making a new class.
- Subclasses in a Specialization may be disjoint or overlap
- Entities in class may be total or partial members of the specialization

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Specializing Employee



More than 1 Specialization



Kinds Of Specialization

- Condition (Predicate) defined involves several attributes
 - EX: (Job_type='Managerial' and Salary > 100K \Rightarrow 'Upper_Management' subclass)
- Attribute Defined: only one Attribute involved \Rightarrow 'Clerical' subclass)
 - EX: (Job_type in ('Secretary, Receptionist, Clerk))
- User Defined
 - User places entity in subclass when entity is created

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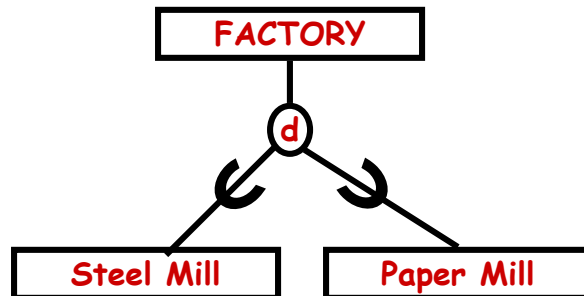
Generalization

- Build Up Superclass from SubClasses
- Diagram Looks the same as in Specialization
- Process goes in reverse direction

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Generalization

- Ex: Company buys Steel and Paper Mills and merges Databases
- Attributes of FACTORY: INTERSECTION of attributes of the Subclasses.



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Specialization Lattice

- Overlapping Specialization
- Specializations of Specializations
- Multiple Inheritance

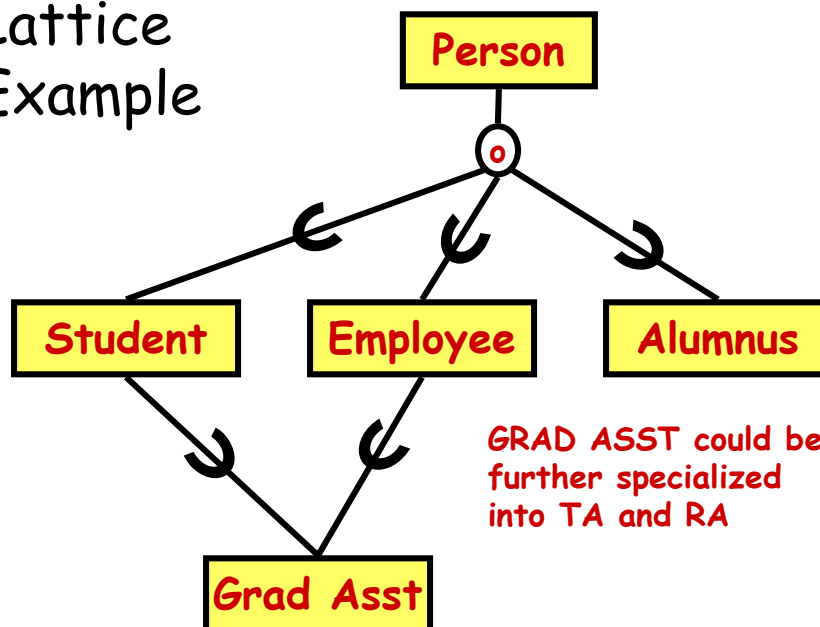
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Lattice Example

- Student graduates and so is Alumnus
- Returns to School and so is a Student too
- Gets TA position and so is an Employee

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Lattice Example

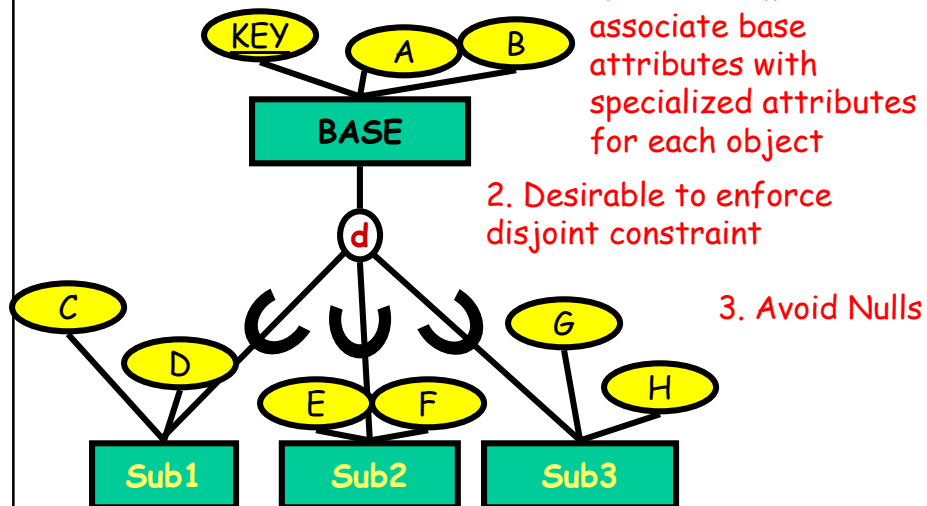


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Converting an EER-Diagram To a Relational Schema

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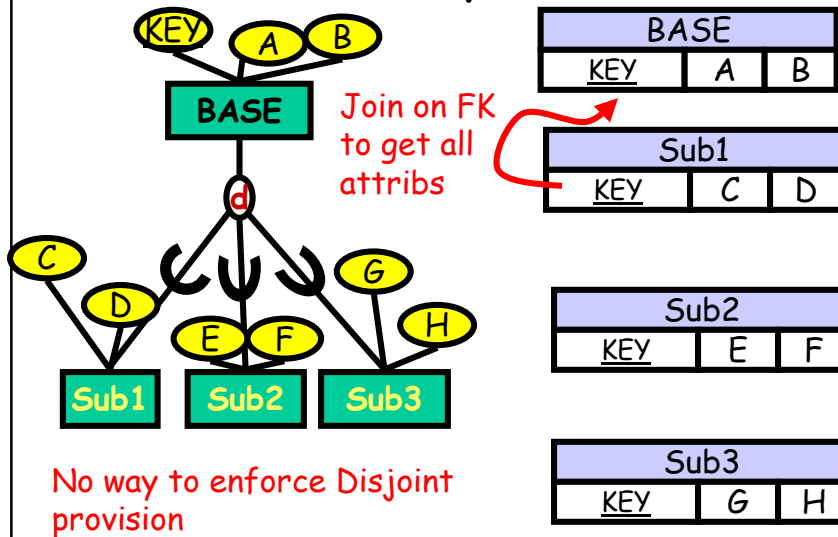
The Problem



- Base class, 3 subclasses in a specialization.
- How to represent in a DB Schema Diagram.

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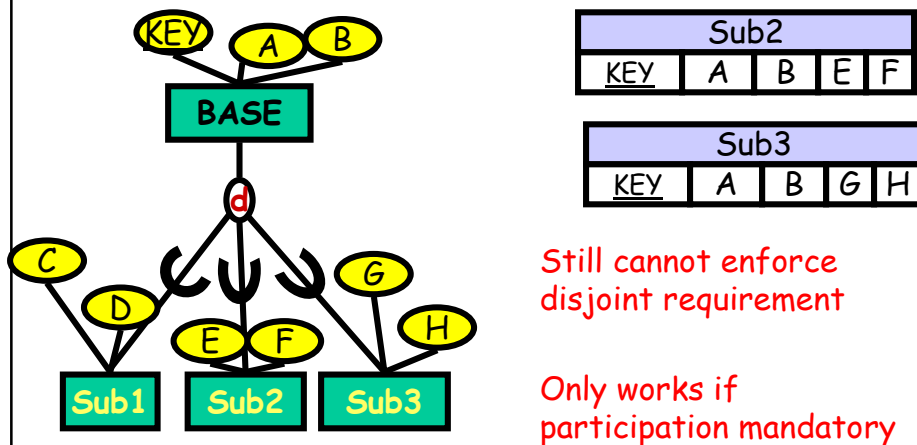
Solution 1: Super/Sub tables



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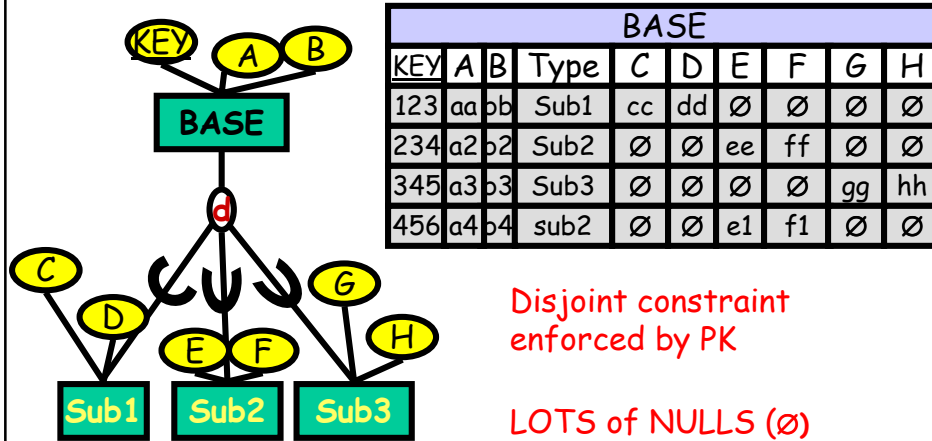
Solution 2: Subtables only

Need UNION to retrieve BASE parts of all objects



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Solution 3: One big table



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Summary

- 3 Solutions
 - super/sub tables
 - subtables only
 - one big table
- None is perfect
- Part of reason for development of Object Relational Databases

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