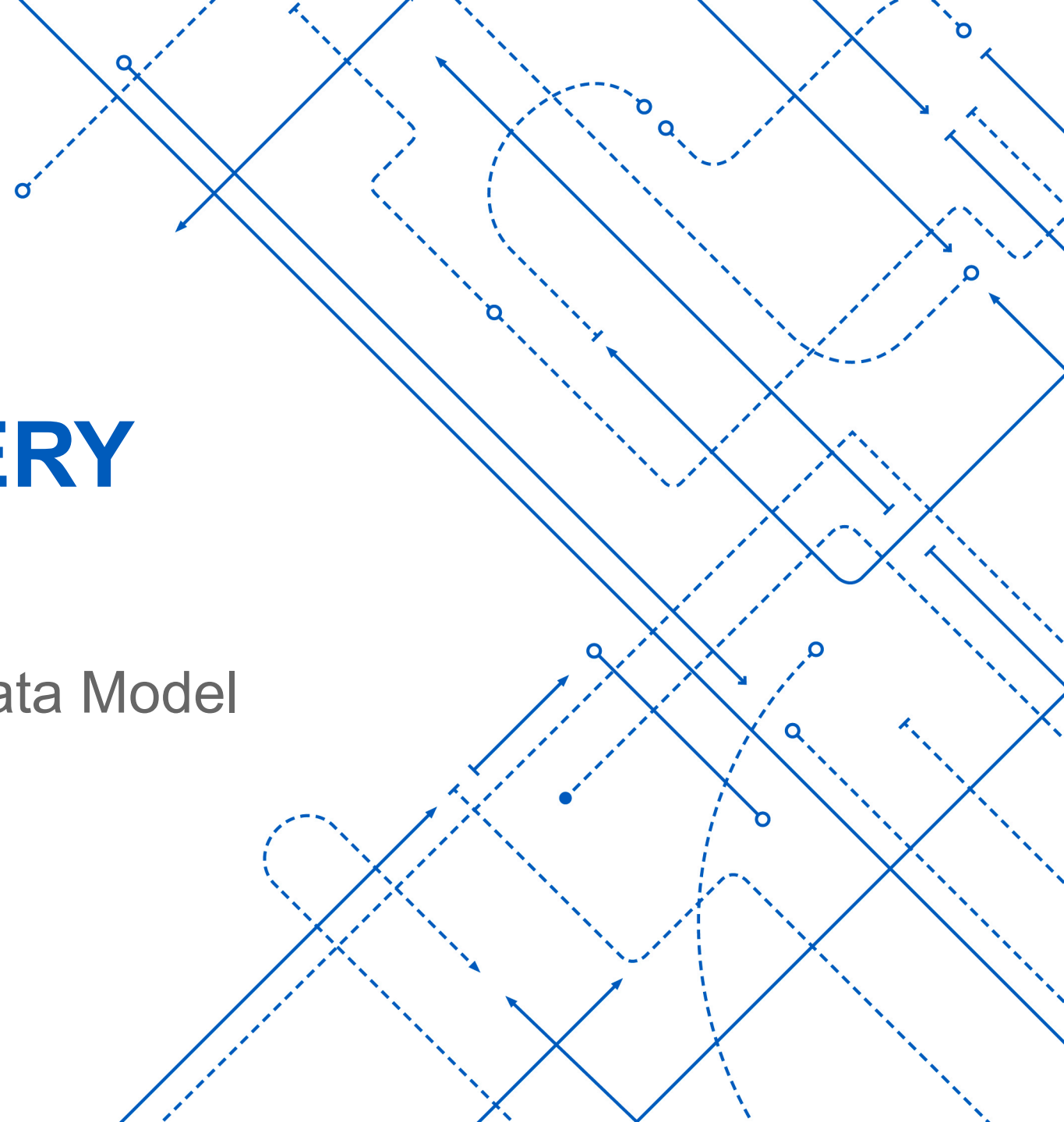


CSE460/560 DATA MODELS AND QUERY LANGUAGES

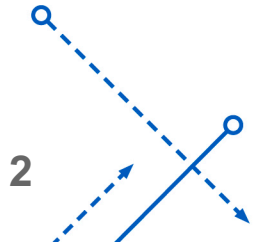
From ER Model to Relational Data Model

Cheng-En Chuang
(Slides Adopted from Jan Chomicki and Ning Deng)

University at Buffalo
Department of Computer Science and Engineering
School of Engineering and Applied Sciences

Outline

1. Basic Rules
2. Handling Weak Entity Sets
3. Handling ISA Hierarchies



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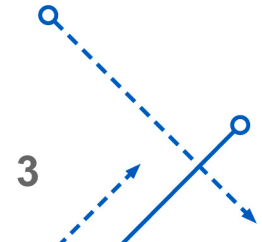
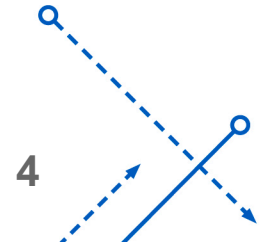


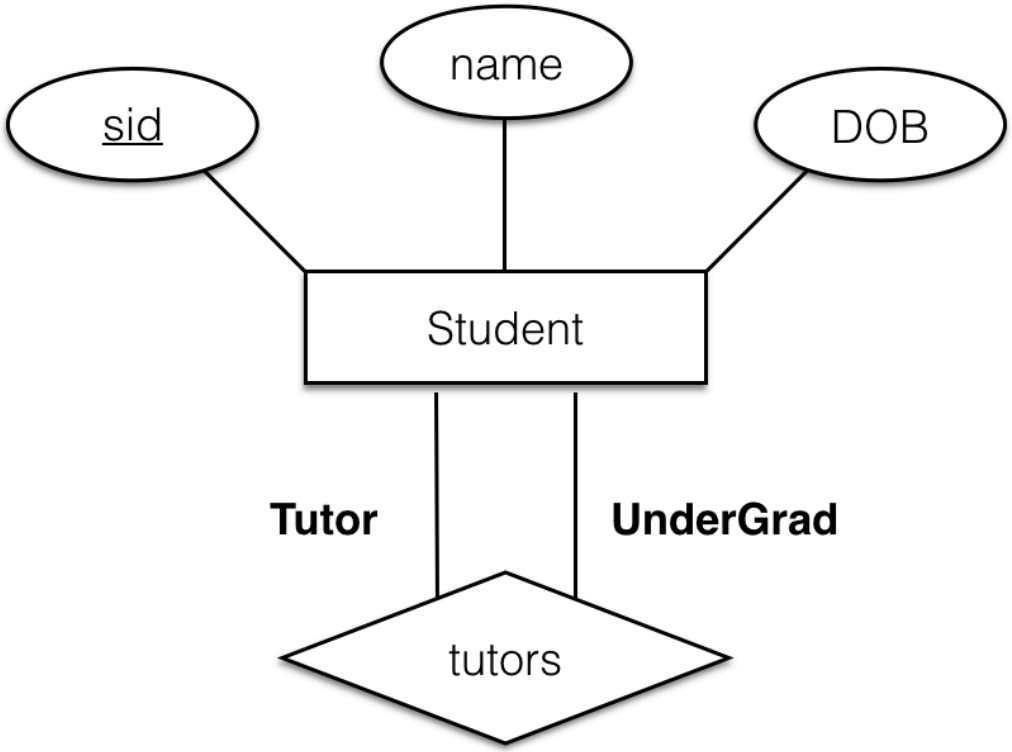
Basic Rules: Entity Set / Relationship Set

- Turn each entity set into a relation
  - With same set of attributes
- Turn each relationship set into a relation
  - Keys from connected entity set
  - Attributes from the relationship set



Basic Rules: Entity Set / Relationship Set

- Example



Basic Rules: Combining Relations

- Always translating relationships into a relation may not be the best choice
- A common situation: many-to-one relationship
  - Instead of translating into a relation, make it as an attribute on many-side
  - E.g.
    - A student can have at most one professor
    - But a professor can advise many students
    - Adding an attribute to Student to reference the PK in relation Professor
- What is the pros and cons?

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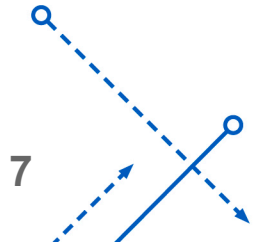
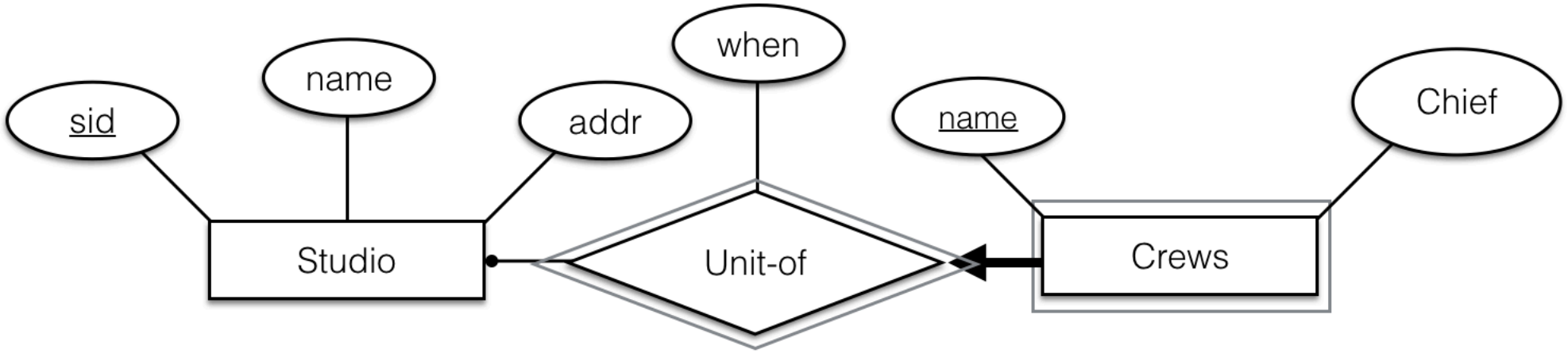


Hanlding Weak Entity Sets

- Suppose *W* is a weak entity, construct for *W* a relation R_W whose schema consists of
  - All attributes of *W*
  - All attributes of supporting relationships for *W*
  - For each supporting relationship for *W*
    - Add the key attibutes(s) of E where E is the entity set on the other end of relationship
  - Rename attributes if necessary to avoid name conflict
  - Do not construct a relation for any supporting relationship for *W*

Hanlding Weak Entity Sets

- Example



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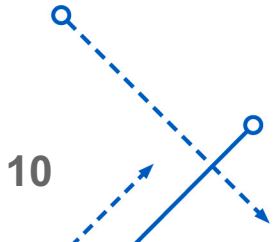
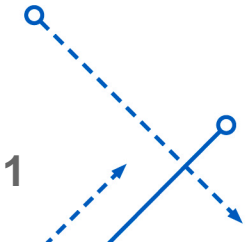


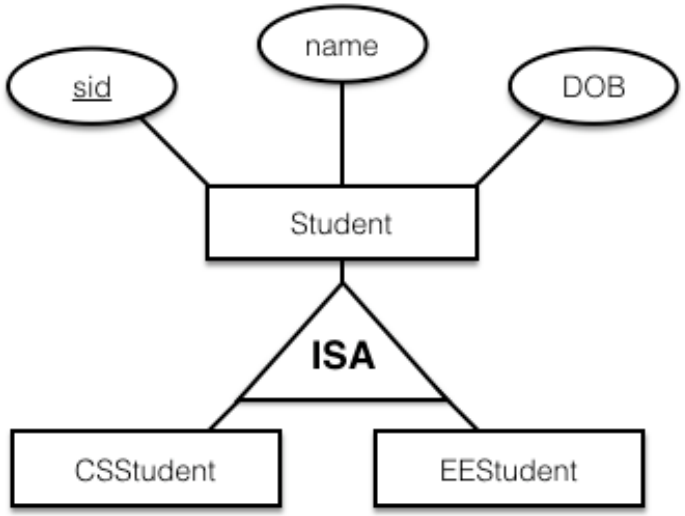
Handling ISA Hierarchies

- Strategies
  - ER-style conversion
  - Object-oriented approach
  - Using null values to combine relations



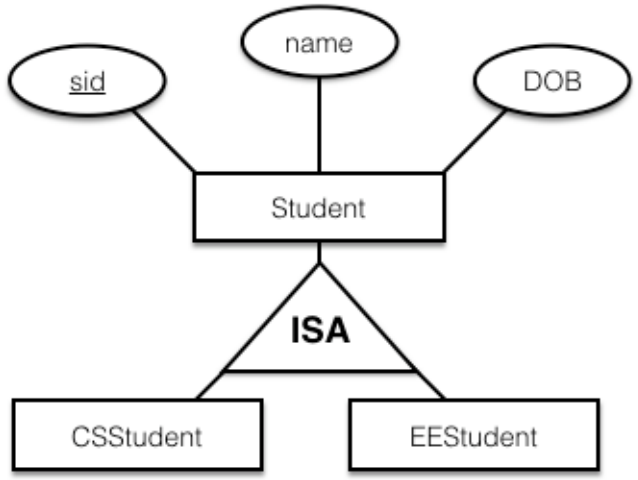
Handling ISA Hierarchies – ER-style Conversion

- For each entity **E** in the hierarchy
  - Create a relation that includes the key attributes from root
  - All other attributes belongs to **E**
- Example



Handling ISA Hierarchies – An Object-oriented Approach

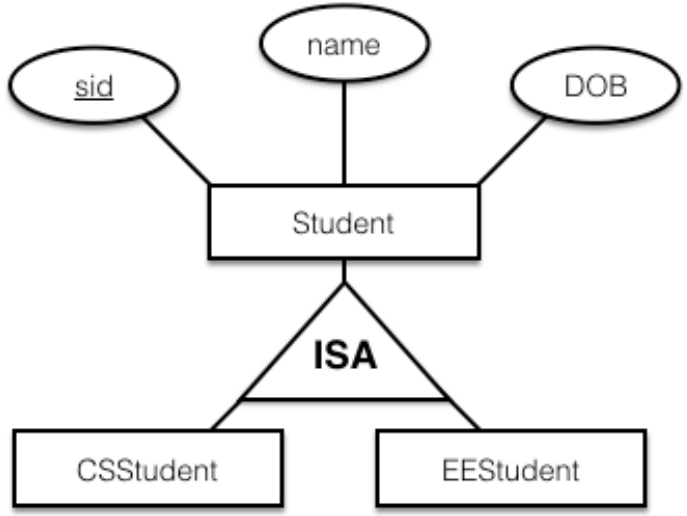
- What is the possible semantics in such ISA hierarchy?



- Enumerate all the possible subtrees of the hierarchy
  - Create a relation for each subtree
    - Represents the entities having components in exactly that subtree

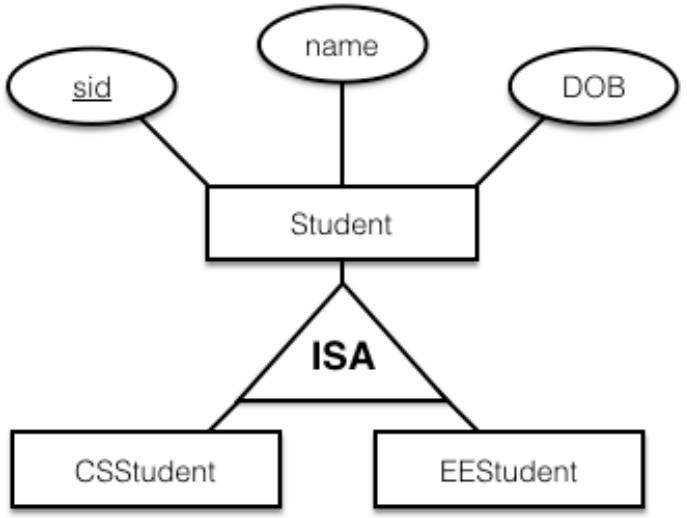
Handling ISA Hierarchies – Using Nulls to Combine Relations

- Handle a hierarchy of entity sets with a single relation
  - With NULLs switch as attributes
- 🍭 It seems convinent, but any disadvanges?



Justification of Approaches

- What is the workload of the application?
- Do they join frequently?
  - DoB of students
  - DoB of CSStudents
- Do we concern about space?
- How often the updates are?
- …



Recommended Reading

Database Systems: The Complete Book
Chapter 4.5, 4.6