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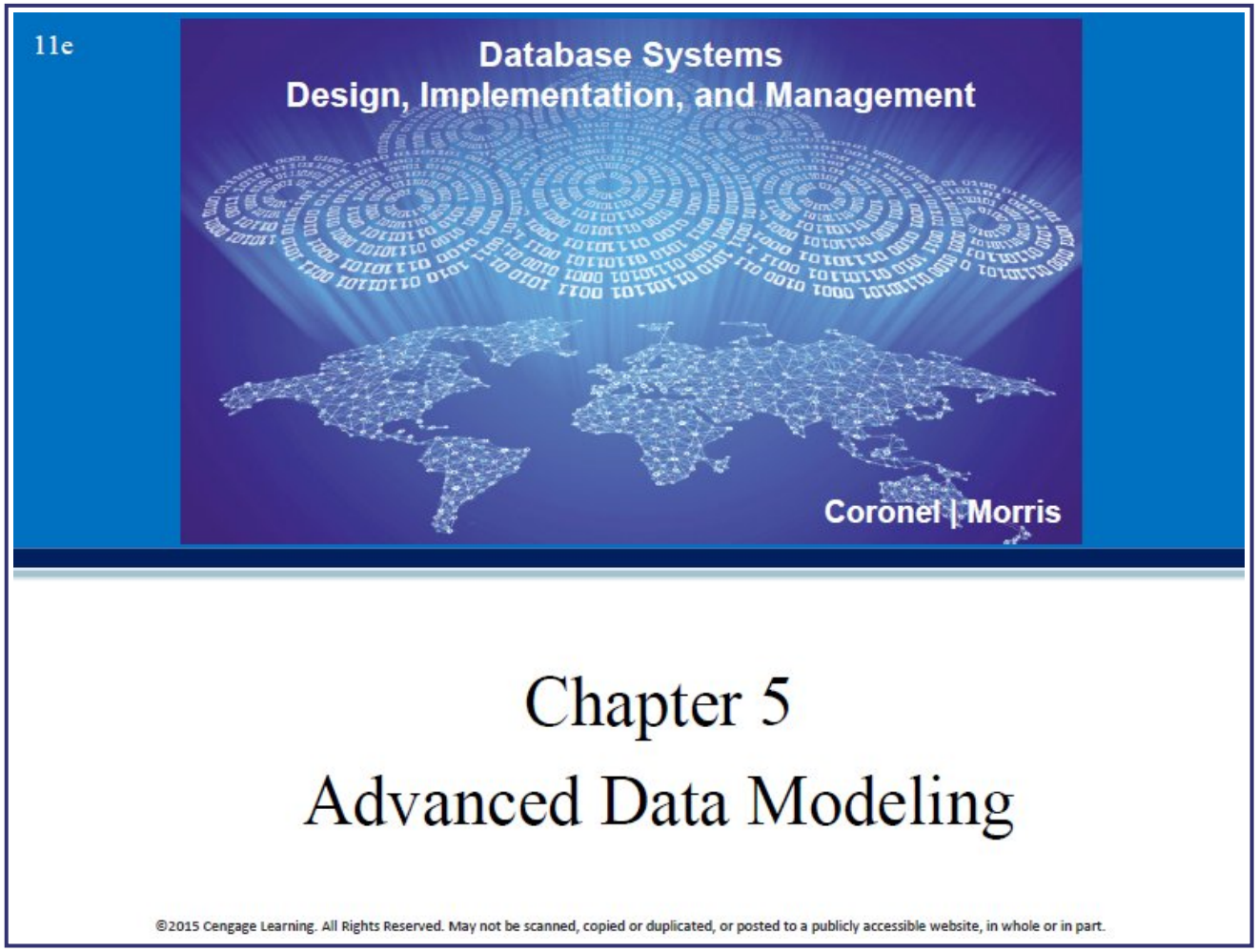
← →

Extended ER ("EER")



Chapter 5
Advanced Data Modeling

Extended Entity Relationship Model (EERM)

- Result of adding more semantic constructs to the original entity relationship (ER) model
- **EER diagram (EERD)**: Uses the EER model

Entity Supertypes and Subtypes

- **Entity supertype**: Generic entity type related to one or more entity subtypes
  - Contains common characteristics
- **Entity subtype**: Contains unique characteristics of each entity subtype
- Criteria to determine the usage
  - There must be different, identifiable kinds of the entity in the user's environment
  - The different kinds of instances should each have one or more attributes that are unique to that kind of instance

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Specialization Hierarchy

- Depicts arrangement of higher-level entity supertypes and lower-level entity subtypes
- Relationships are described in terms of "is-a" relationships
- Subtype exists within the context of a supertype
- Every subtype has one supertype to which it is directly related
- Supertype can have many subtypes

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Specialization Hierarchy

- Provides the means to:
  - Support attribute inheritance
  - Define a special supertype attribute known as the subtype discriminator
  - Define disjoint/overlapping constraints and complete/partial constraints

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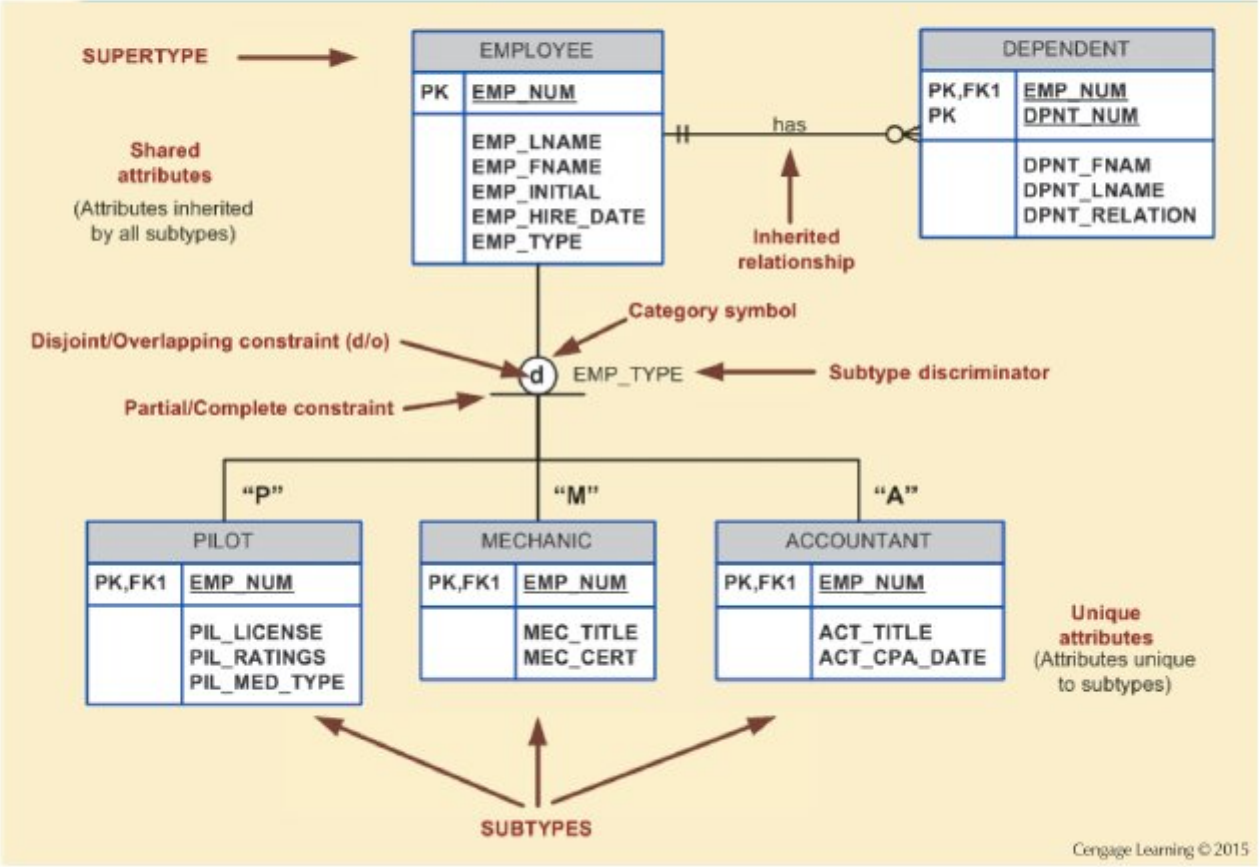
Figure 5.2 - Specialization Hierarchy



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Inheritance

- Enables an entity subtype to inherit attributes and relationships of the supertype
- All entity subtypes inherit their primary key attribute from their supertype
- At the implementation level, supertype and its subtype(s) maintain a 1:1 relationship
- Entity subtypes inherit all relationships in which supertype entity participates
- Lower-level subtypes inherit all attributes and relationships from its upper-level supertypes

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Subtype Discriminator

- Attribute in the supertype entity that determines to which entity subtype the supertype occurrence is related
- Default comparison condition is the equality comparison

Disjoint vs overlapping subtypes

Disjoint and Overlapping Constraints

- **Disjoint subtypes**: Contain a unique subset of the supertype entity set
  - Known as **nonoverlapping subtypes**
  - Implementation is based on the value of the subtype discriminator attribute in the supertype
- **Overlapping subtypes**: Contain nonunique subsets of the supertype entity set
  - Implementation requires the use of one discriminator attribute for each subtype

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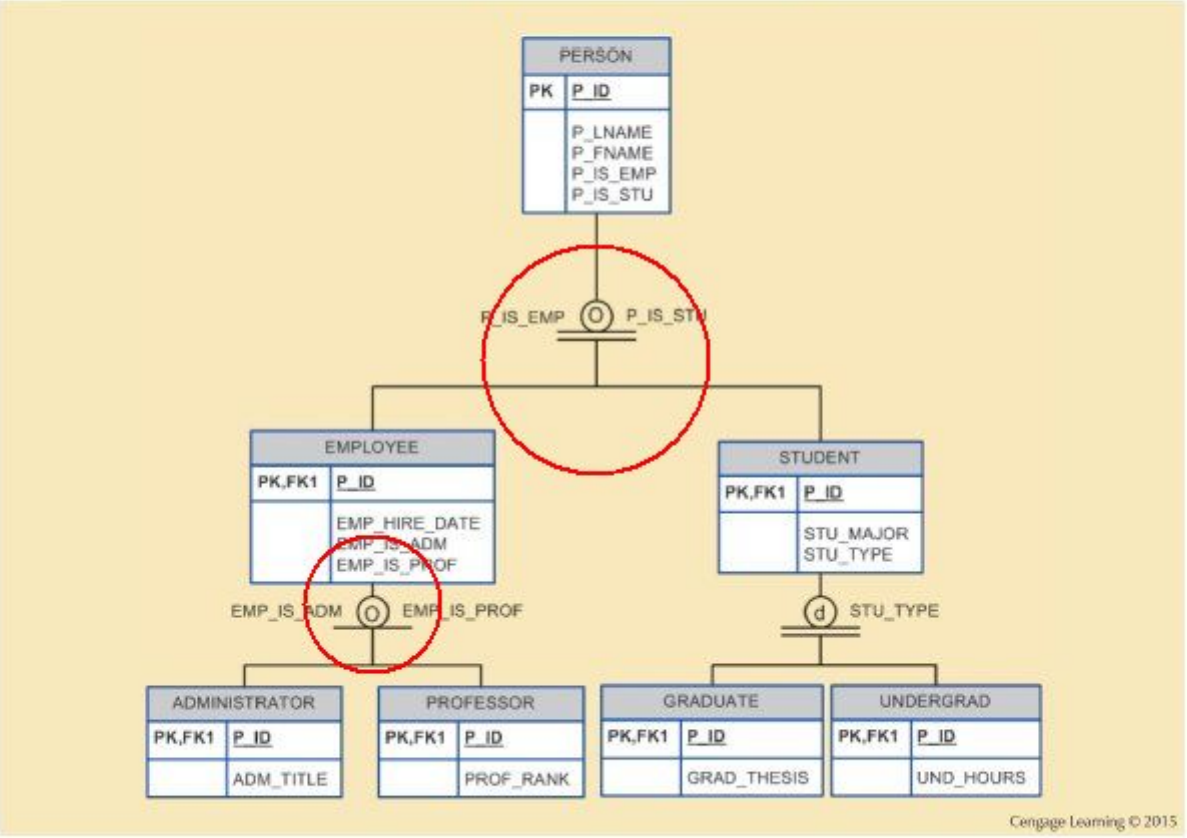
Figure 5.4 - Specialization Hierarchy with Overlapping Subtypes



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Completeness Constraint

- Specifies whether each supertype occurrence must also be a member of at least one subtype
- Types
  - **Partial completeness**: Not every supertype occurrence is a member of a subtype
  - **Total completeness**: Every supertype occurrence must be a member of any

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Table 5.2 - Specialization Hierarchy Constraint Scenarios

TYPE	DISJOINT CONSTRAINT	OVERLAPPING CONSTRAINT
Partial 	Supertype has optional subtypes. Subtype discriminator can be null. Subtype sets are unique.	Supertype has optional subtypes. Subtype discriminators can be null. Subtype sets are not unique. 
Total 	Every supertype occurrence is a member of only one subtype. Subtype discriminator cannot be null. Subtype sets are unique.	Every supertype occurrence is a member of at least one subtype. Subtype discriminators cannot be null. Subtype sets are not unique. 

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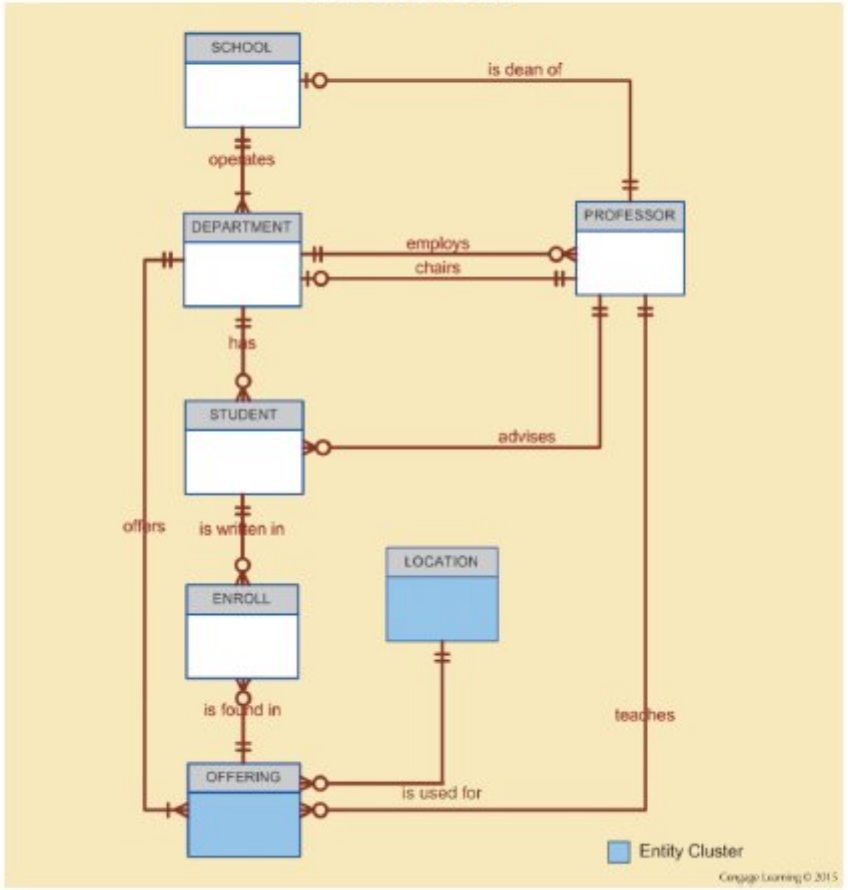
Figure 5.5 - Tiny College ERD Using Entity Clusters



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