



Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

Module 6

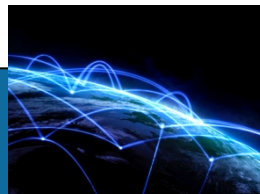
Notation for Entity Relationship Diagrams

Lesson 1: Database Development Goals

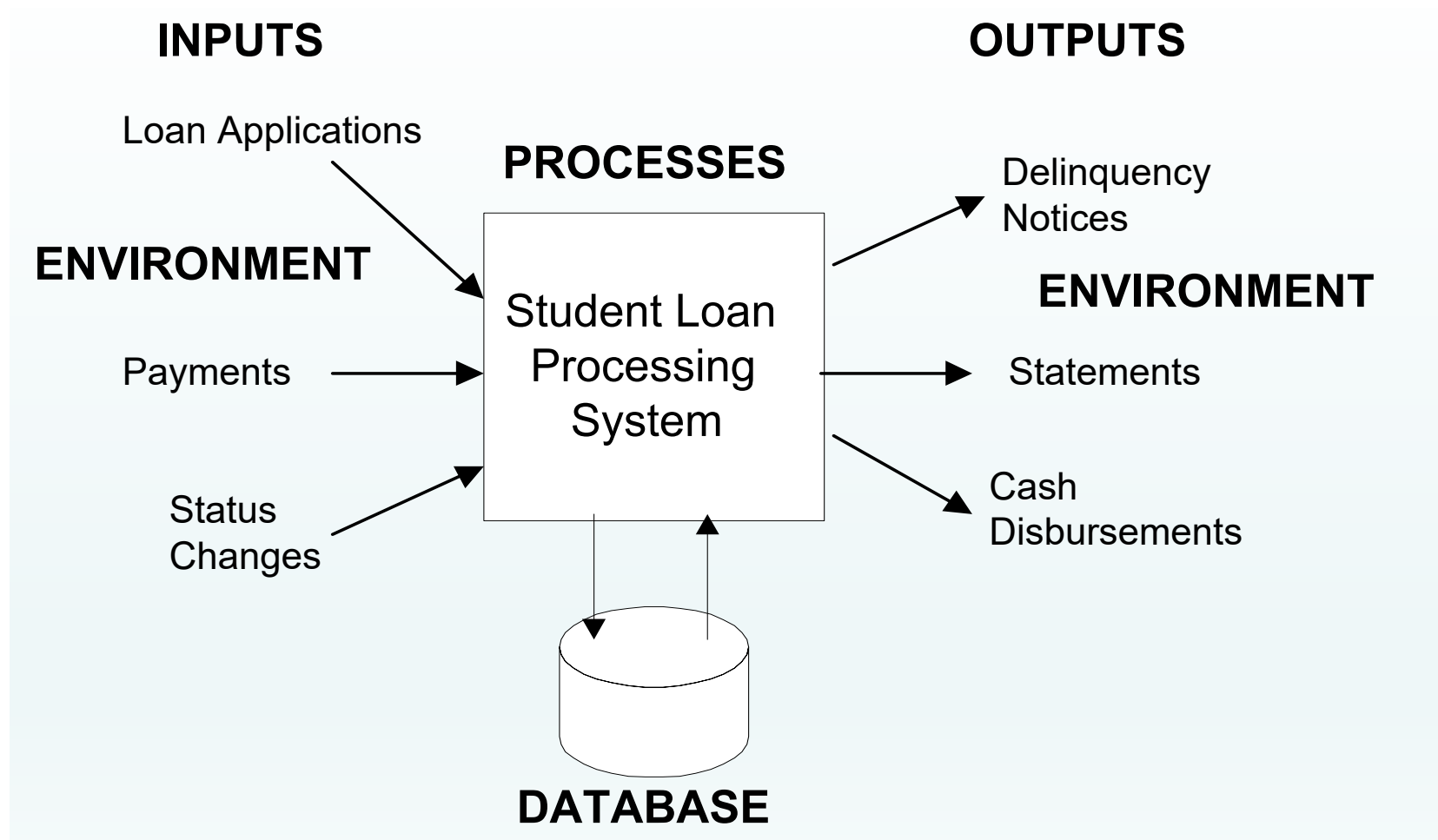


Lesson Objectives

- Gain context for other database development modules
- Explain goals of database development
- Explain the position of this module in the database development process



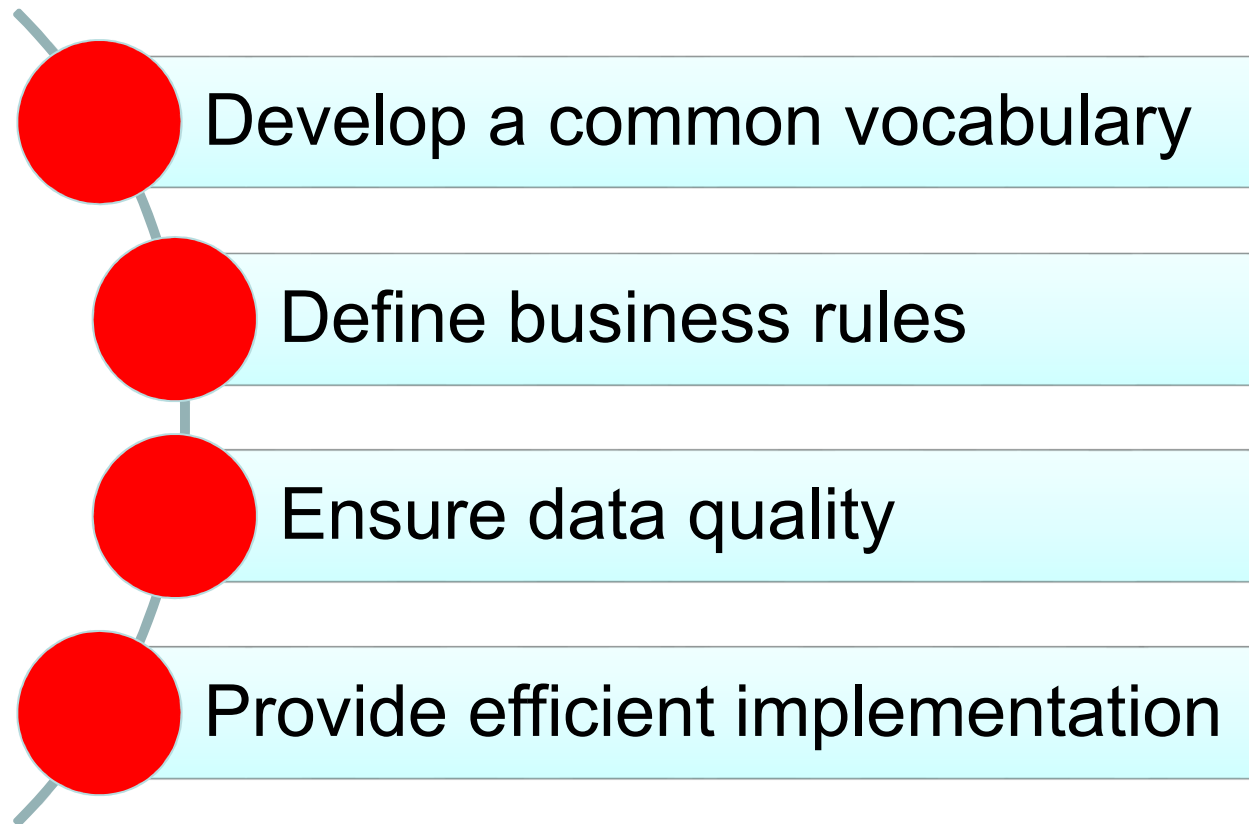
Information System



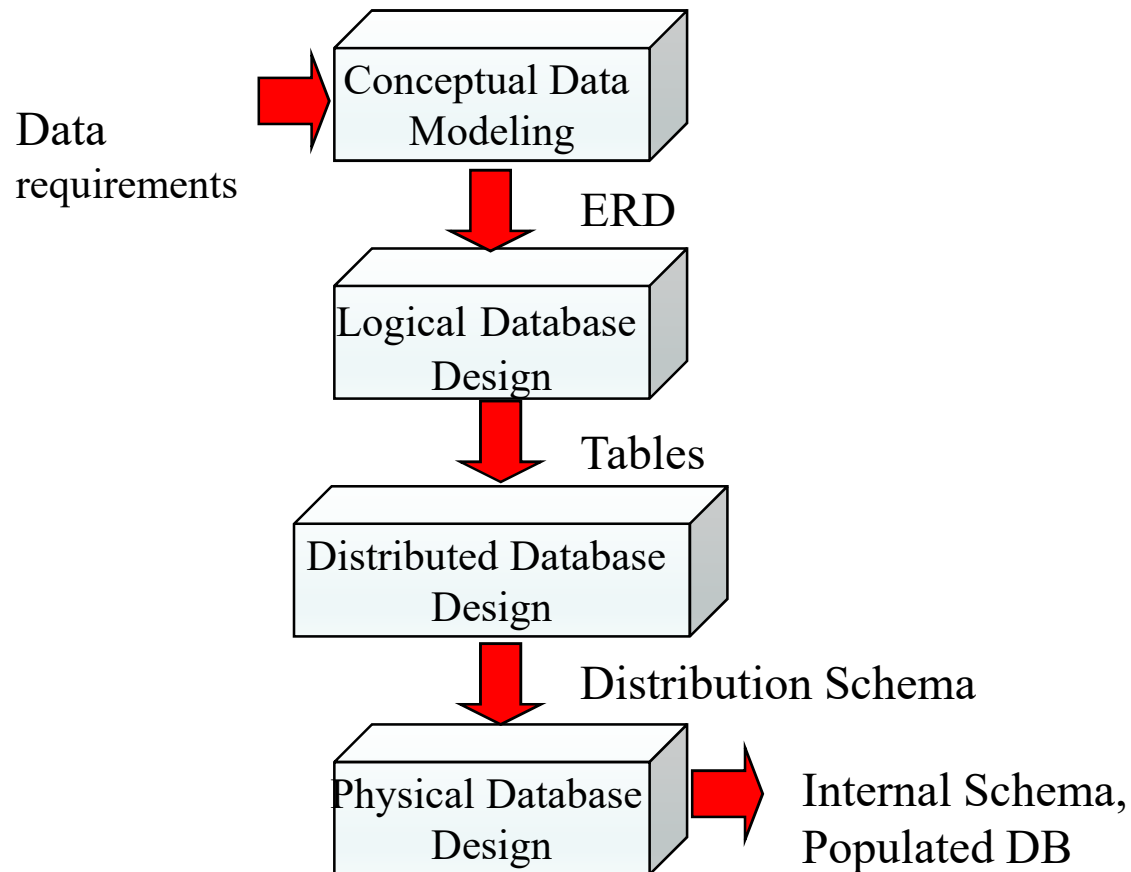
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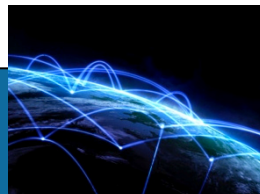
Broad Goals of Database Development



Database Development Phases

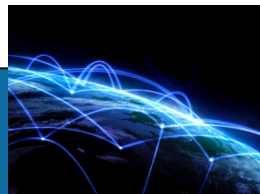


5



Summary of Database Development

- Essential part of information systems development
- Focus on development goals
- Complex team development process
- Initial emphasis on data modeling notation





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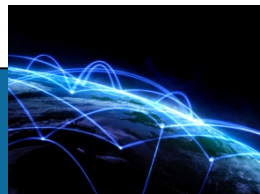
Notation for Entity Relationship Diagrams

Lesson 2: Basic ERD Notation

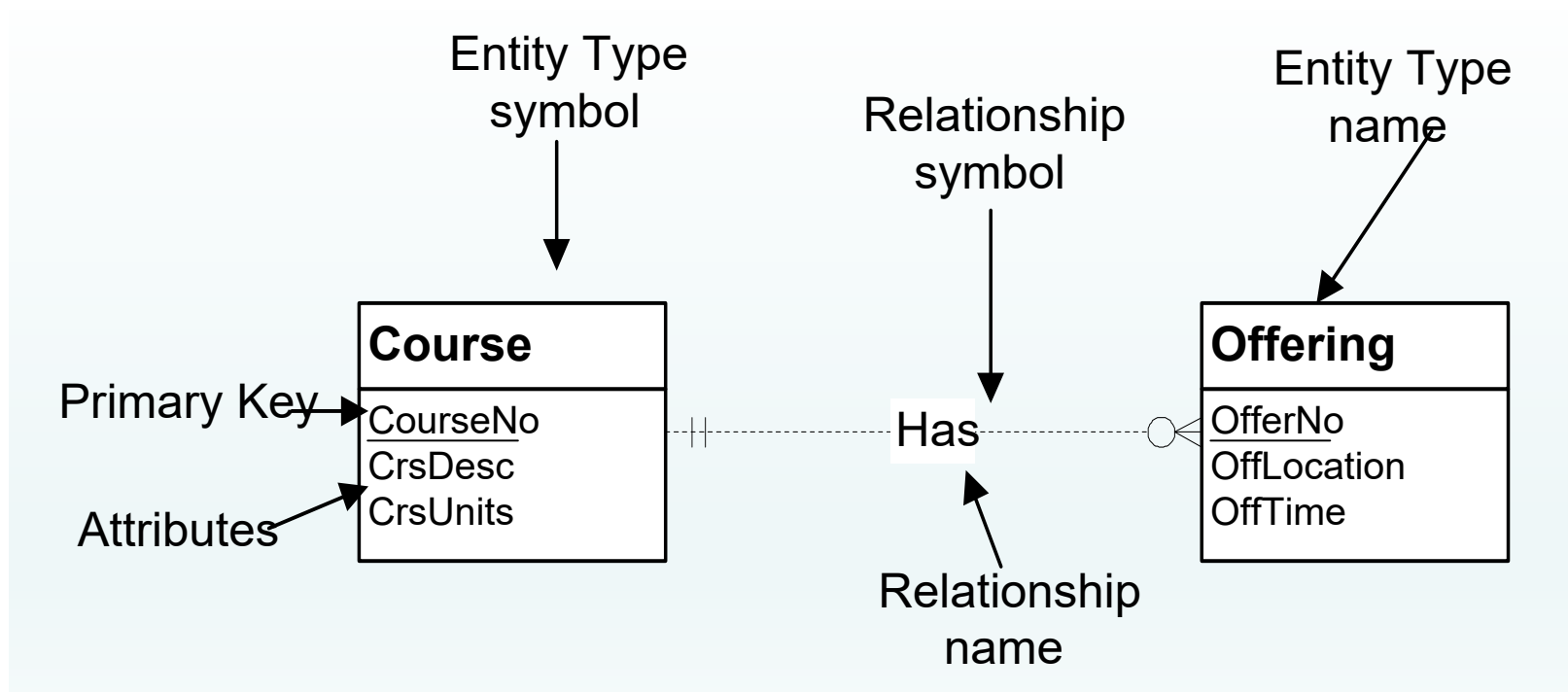


Lesson Objectives

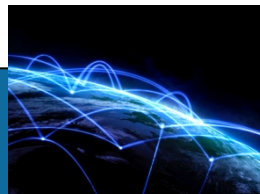
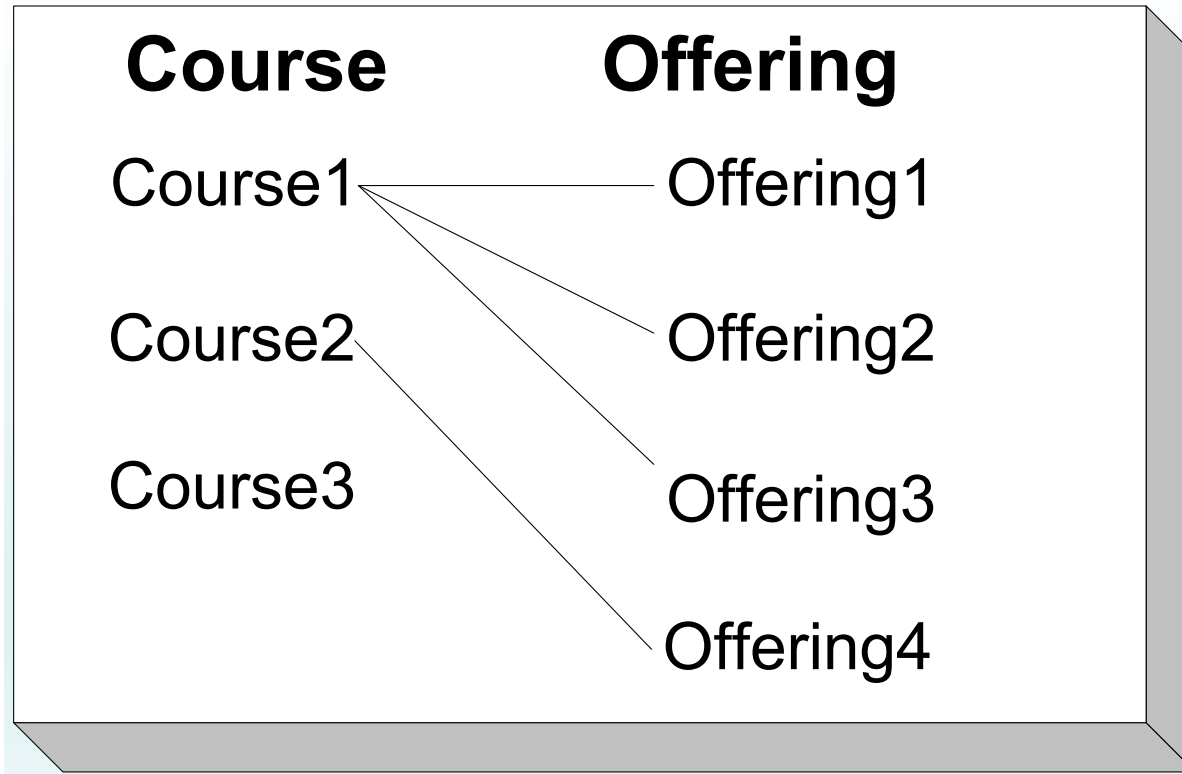
- Explain cardinality notation in an ERD
- Explain differences between ERD notation and relational database diagram



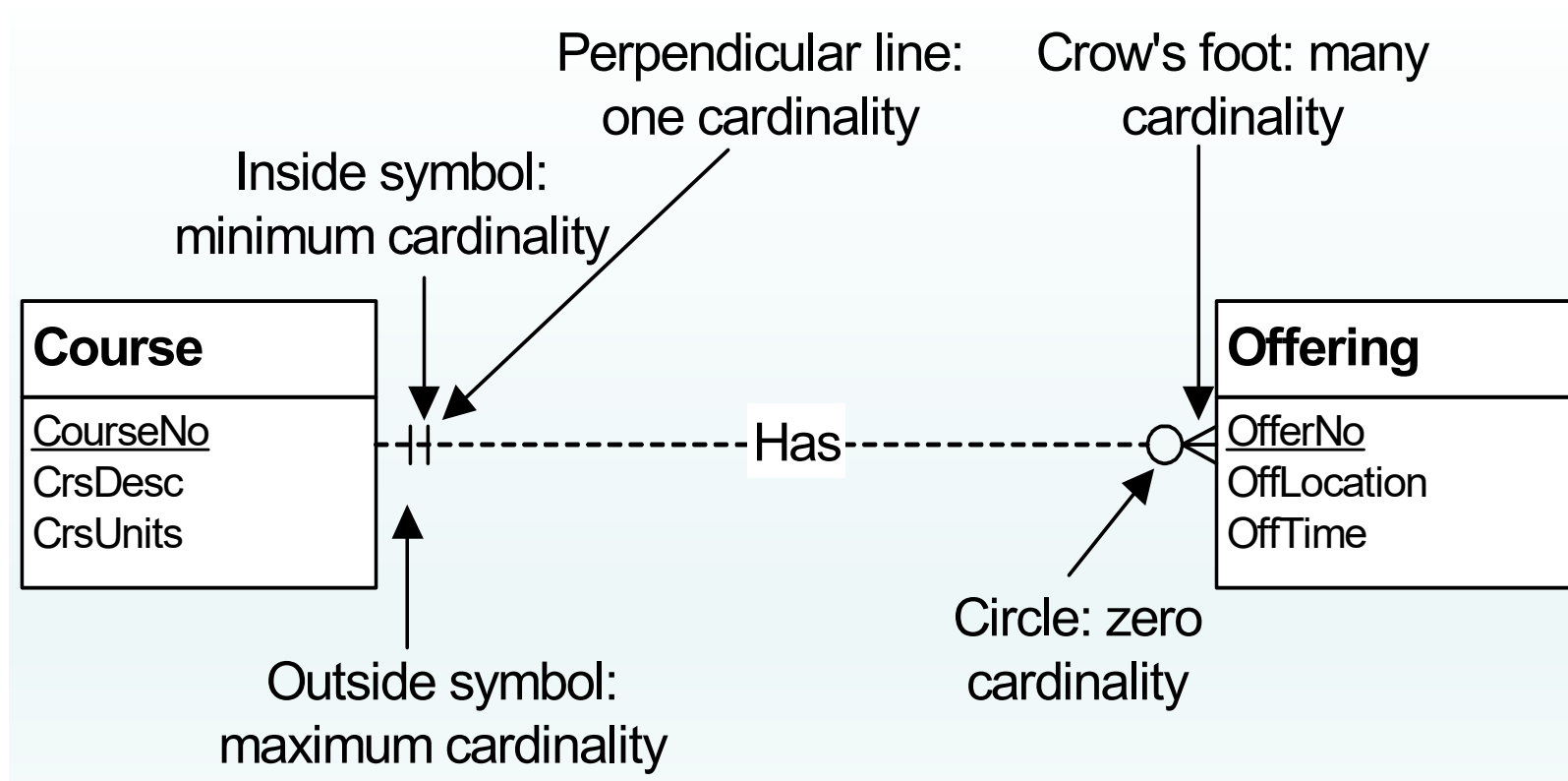
Basic Symbols



Cardinalities



Cardinality Notation

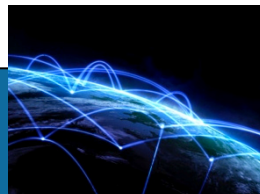
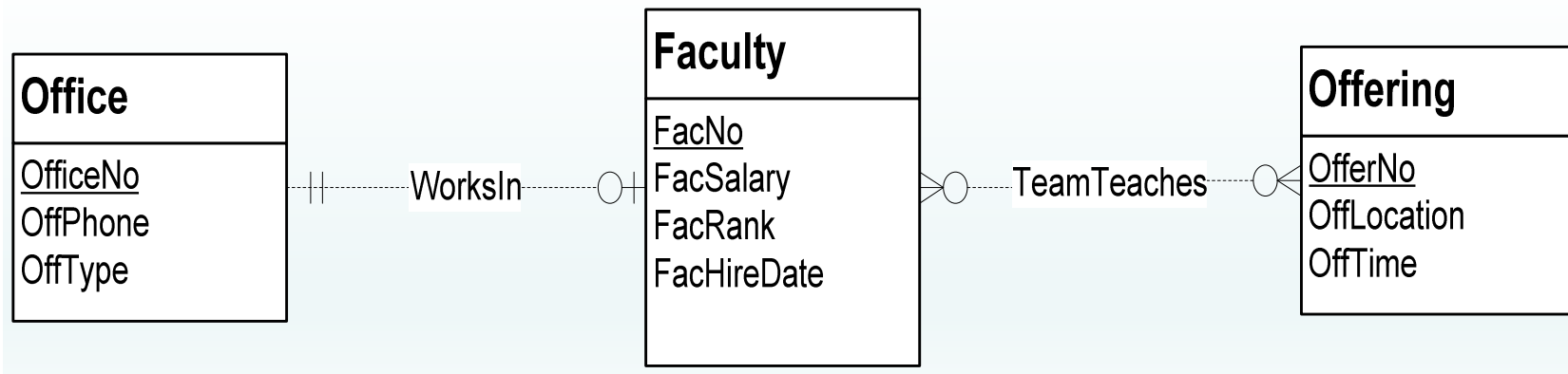


Important Cardinalities

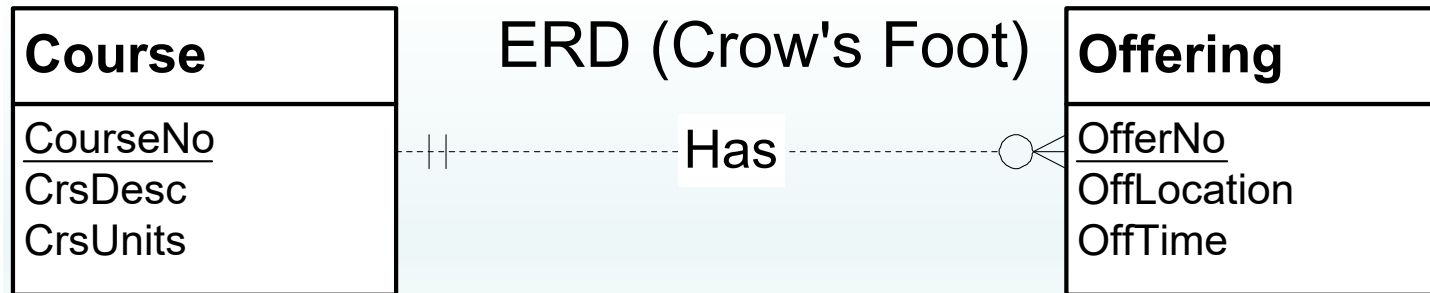
Classification	Cardinality Restrictions
Mandatory	Minimum cardinality ≥ 1
Optional	Minimum cardinality = 0
Functional or single-valued	Minimum cardinality = 1
1-M	Maximum cardinality = 1 in one direction; maximum cardinality > 1 in the other direction
M-N	Maximum cardinality > 1 in both directions
1-1	Maximum cardinality = 1 in both directions



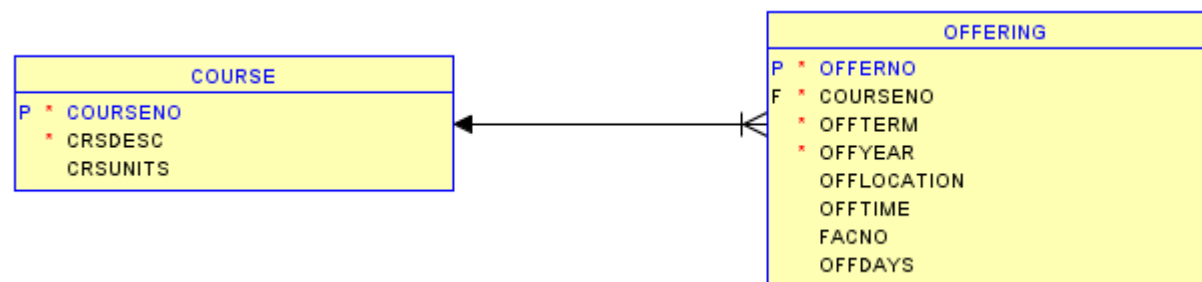
More Relationship Examples



Comparison to Oracle Notation



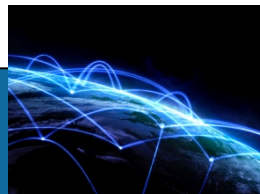
Oracle Relational Model Diagram



14

Summary

- Crow's Foot ERD notation is widely used
- Use notation precisely
- Differentiate ERD notation from Relational Data Model
- Understanding the ERD notation is a prerequisite to applying the notation on business problems





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Notation for Entity Relationship Diagrams

Part 3: Relationship Variations I



Lesson Objectives

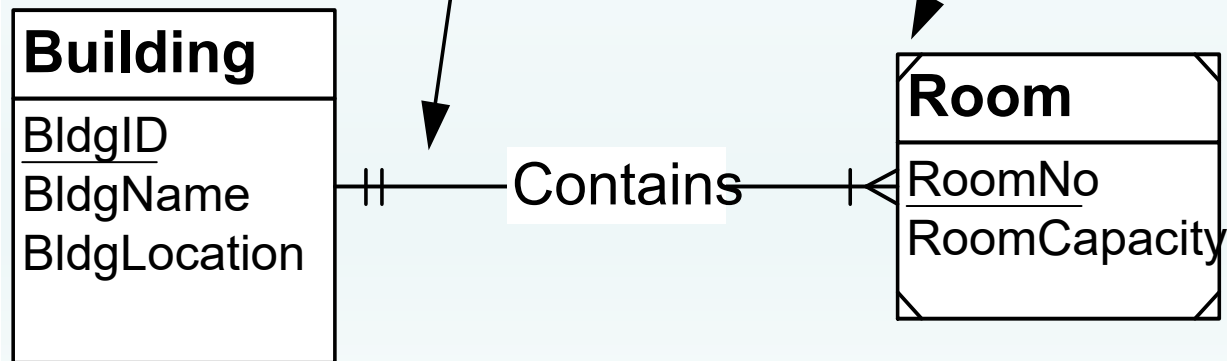
- Explain an example involving identification dependency
- Apply relationship equivalency between M-N relationship and associative entity type
- Appreciate specialized relationships but resist temptation to overuse them



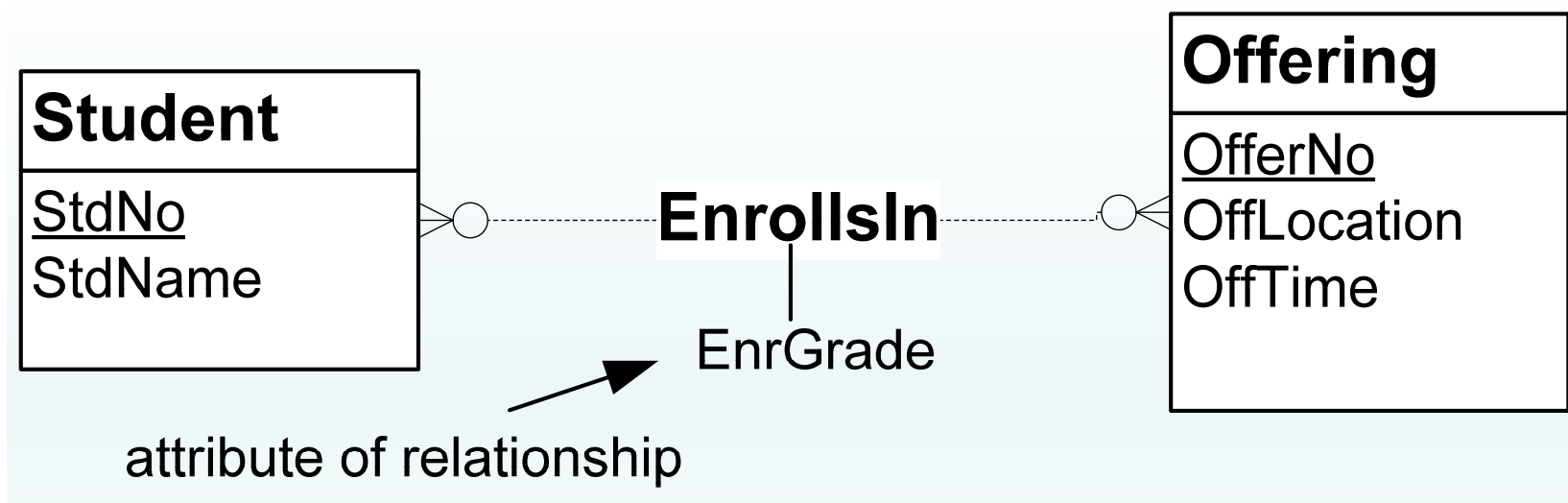
Identification Dependency

Identification Dependency Symbols:

- Solid relationship line for identifying relationships
- Diagonal lines in the corners denote weak entities.

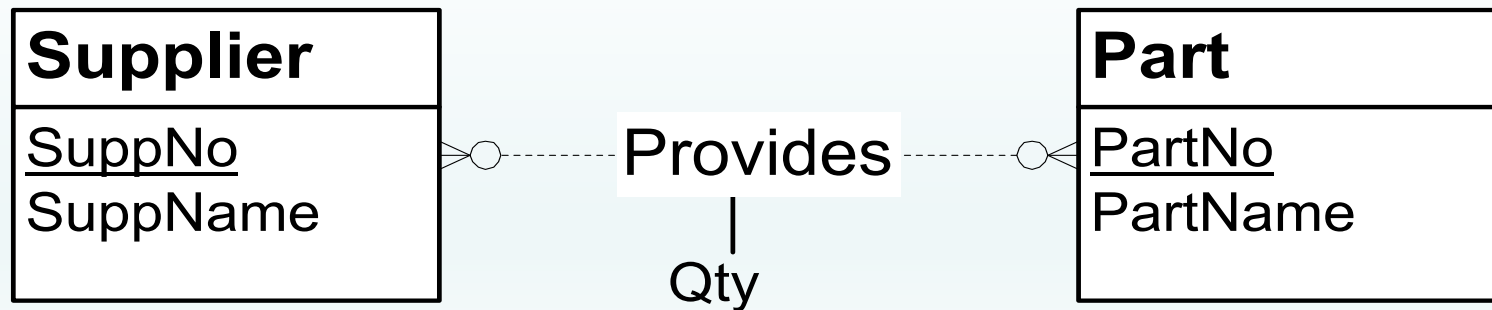


M-N Relationships with Attributes

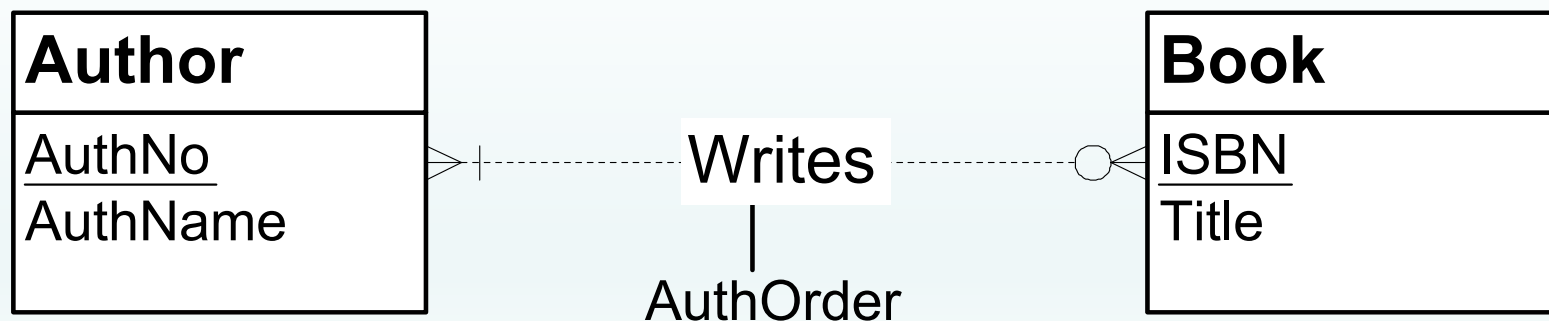


M-N Relationships with Attributes (II)

a) *Provides* relationship

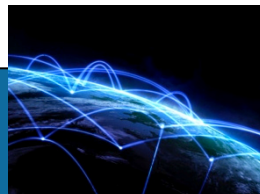


b) *Writes* relationship

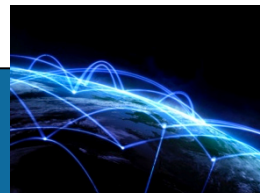
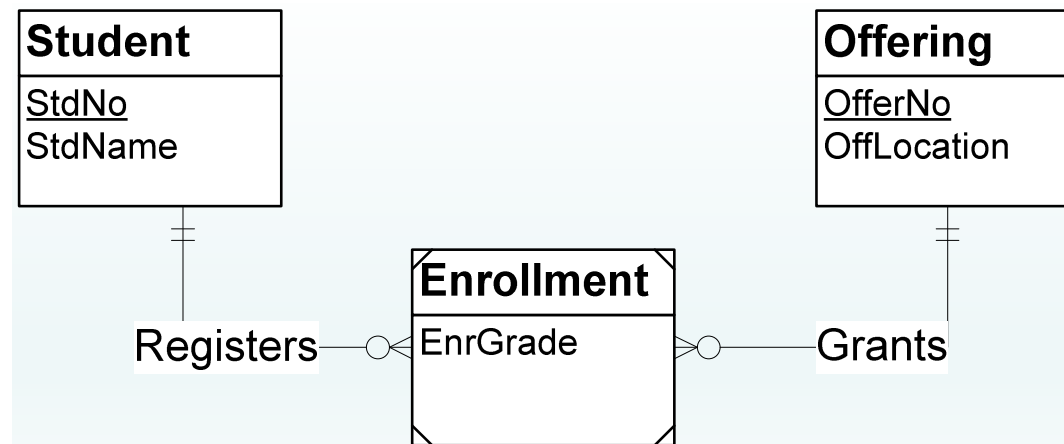
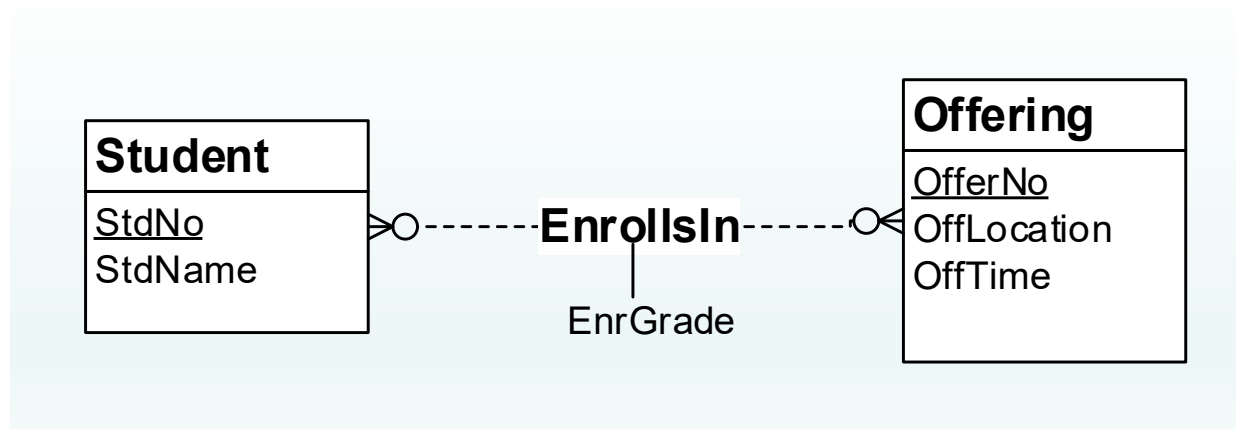


M-N Relationship Equivalency Rule

- Replace M-N relationship
 - Associative entity type
 - Two identifying 1-M relationships
- M-N relationship versus associative entity type
 - Largely preference
 - Associative entity type is more flexible in some situations

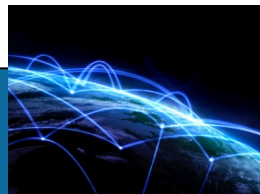


Relationship Equivalency Example



Summary

- Specialized relationships are not common but important when necessary
- Do not overuse specialized relationships
- Avoid notation errors with specialized relationships





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Notation for Entity Relationship Diagrams

Part 4: Relationship Variations II



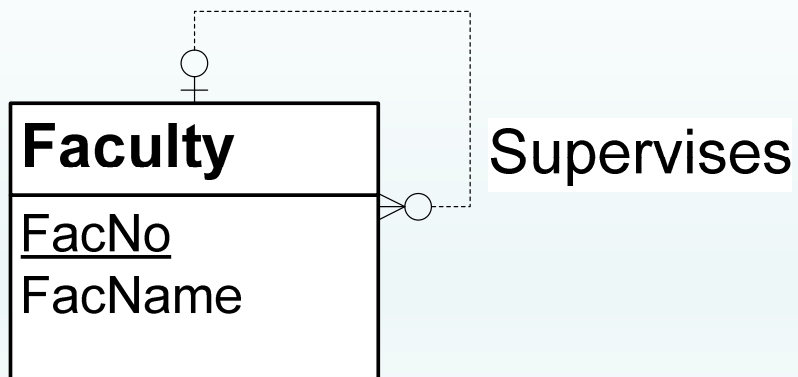
Lesson Objectives

- Draw instance diagrams to depict self-referencing relationships
- Explain an example depicting an M-way relationship
- Appreciate specialized relationships but resist temptation to overuse them

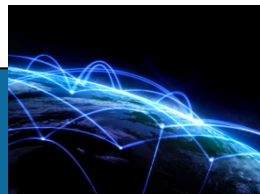
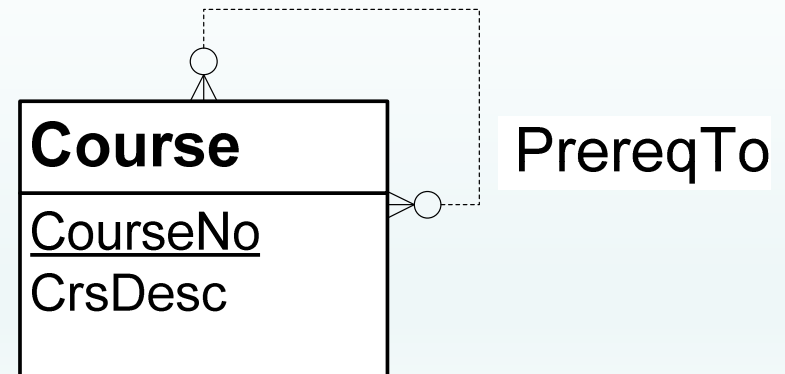


ERD Notation for Self-Referencing Relationships

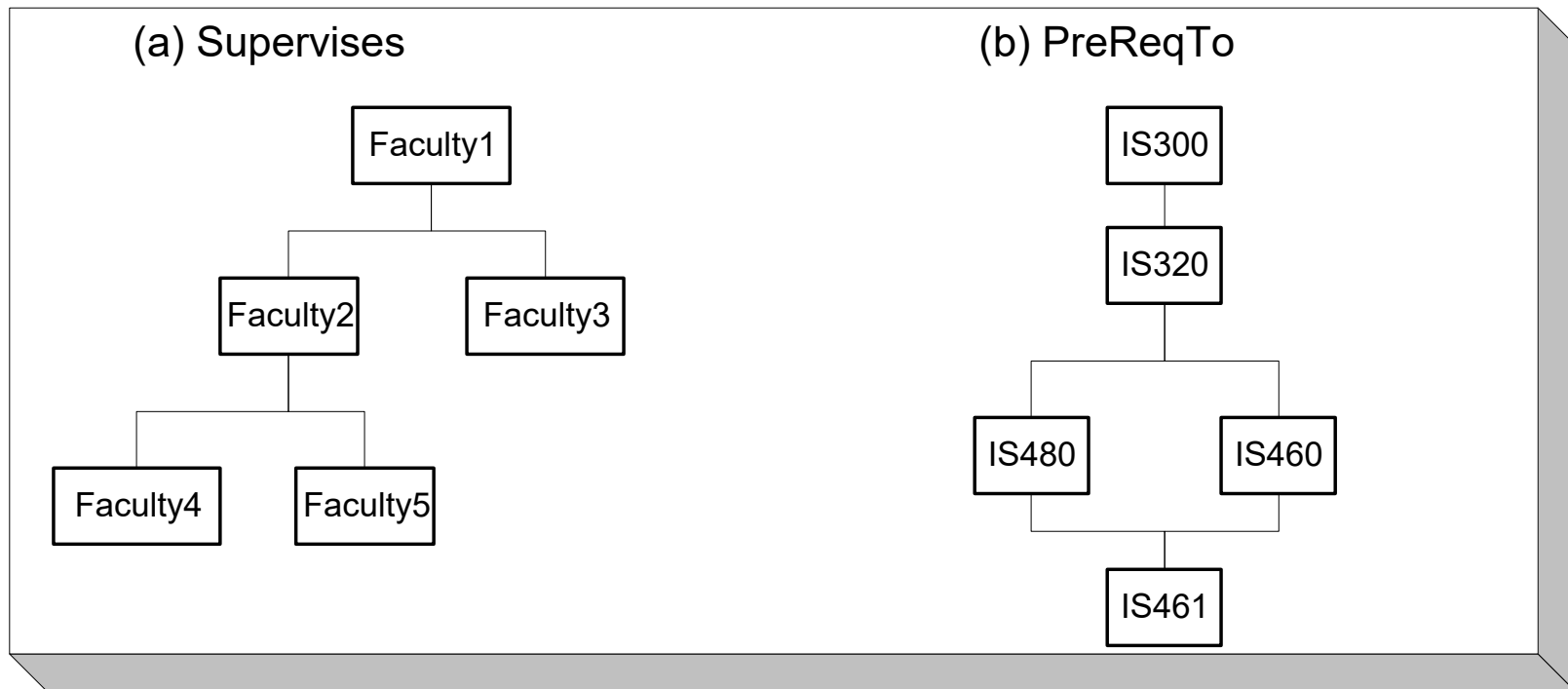
a) manager-subordinate



b) course prerequisites



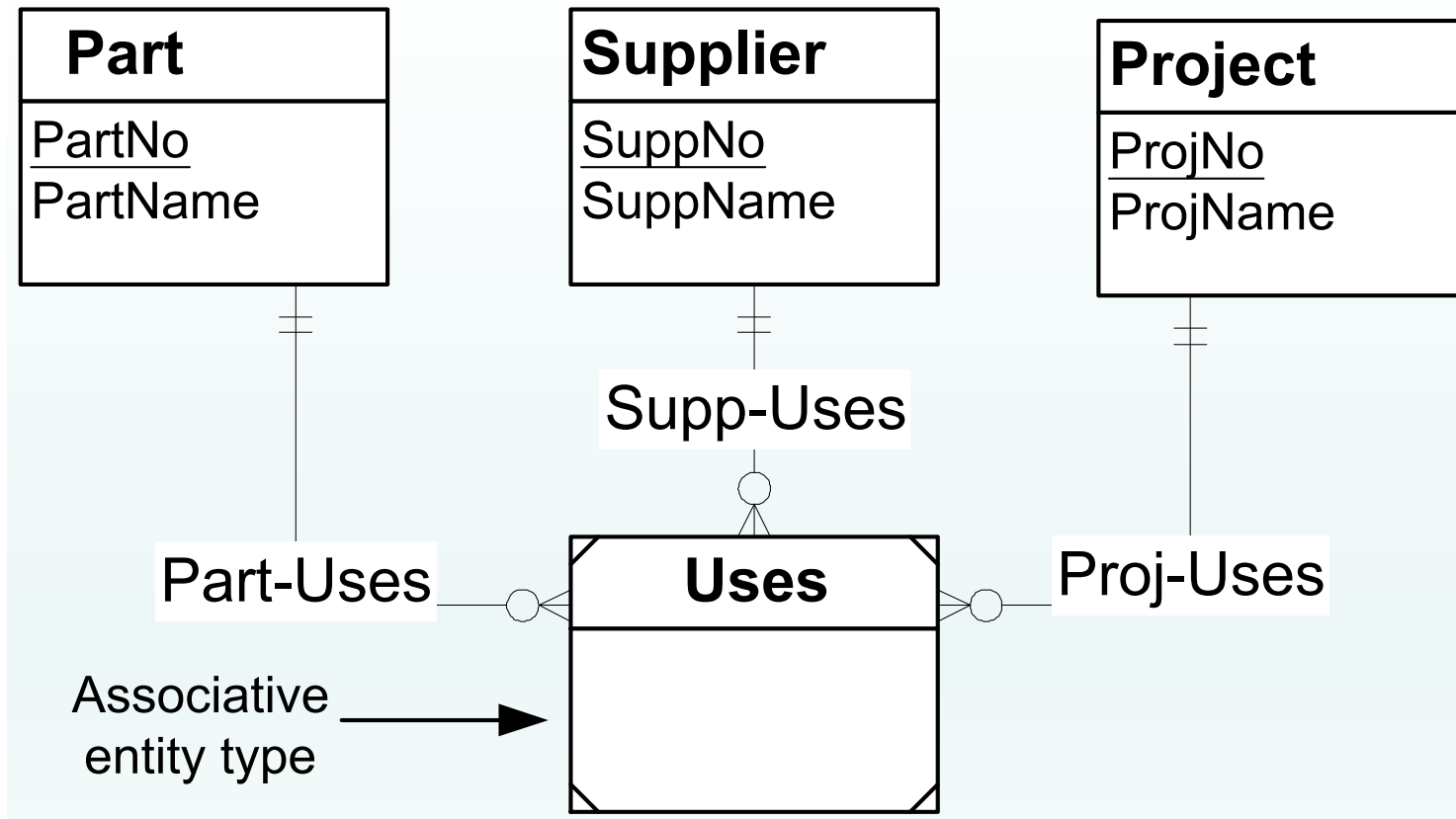
Instance Diagrams for Self-Referencing Relationships



27



Associative Entity Types for M-way Relationships



Summary

- Specialized relationships are not common but important when in some situations
- Do not overuse specialized relationships
- Avoid notation errors with specialized relationships

