IT 775
Database Technology

ER Modeling
Attributes

Relationships

- **Relationship attributes**
  - In some cases M:N relationships can actually have attributes of their own

Relationships

Is a

Has a

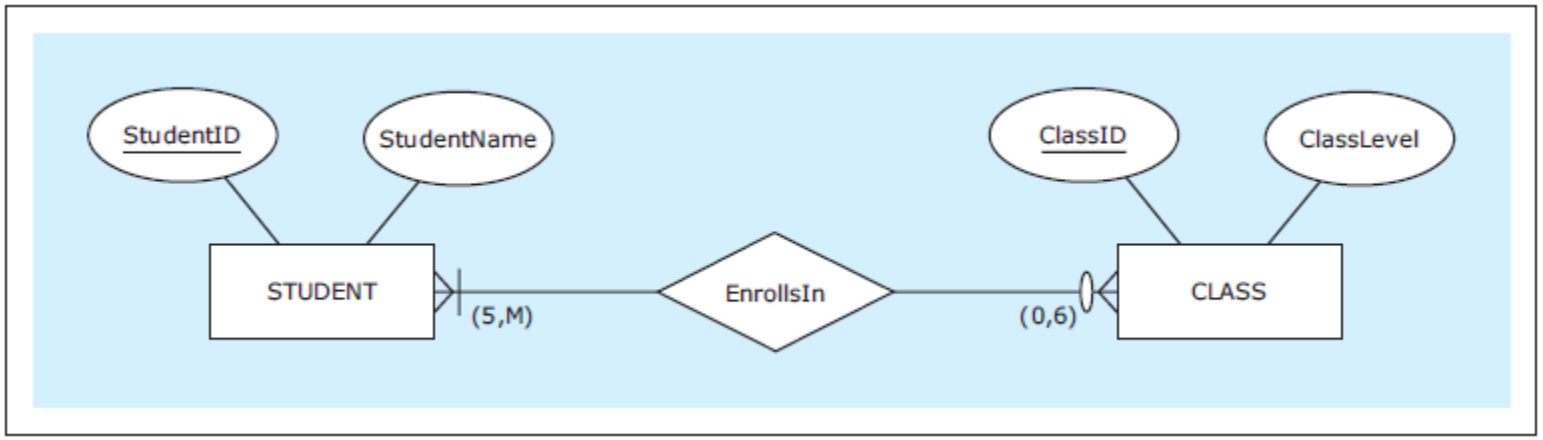
Goes inta (is a part of)

RELATIONSHIPS

- **Exact minimum and maximum cardinality in relationships**
  - In some cases the exact minimum and/or maximum cardinality in relationships is known in advance
  - Exact minimum/and or maximum cardinalities can be depicted in ER diagrams

RELATIONSHIPS

A relationship with a mixture of specific and non-specific cardinalities

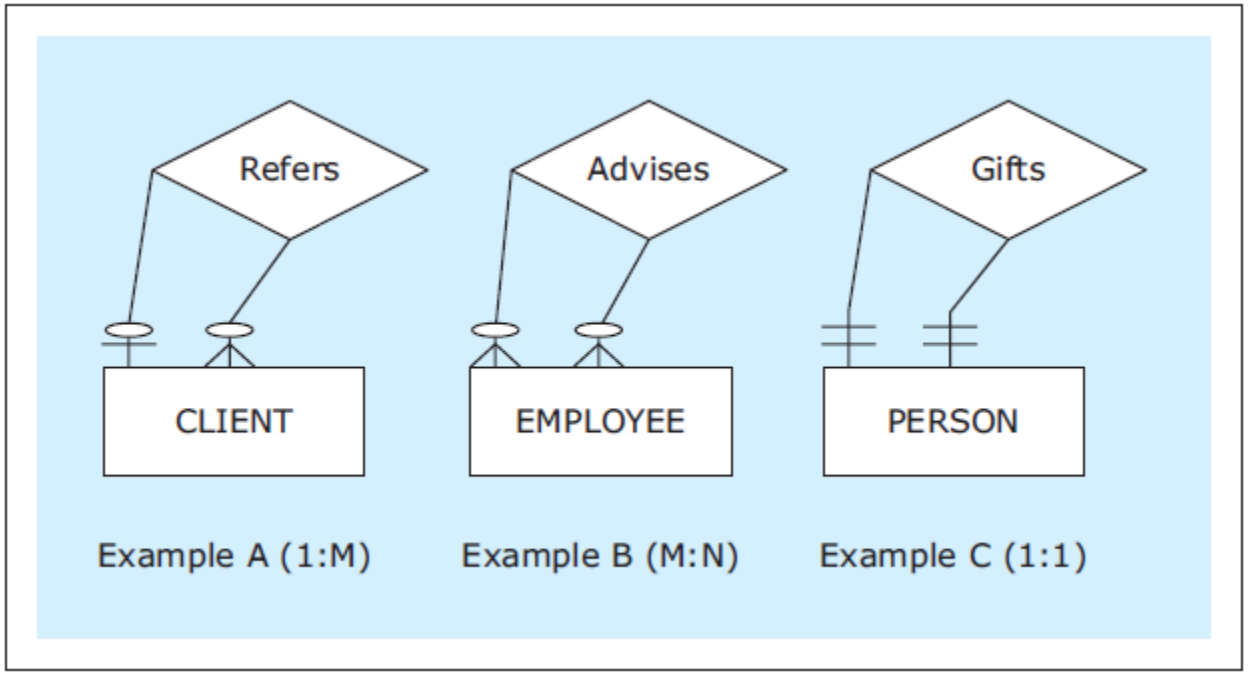


RELATIONSHIPS

- **Degree of a relationship -** reflects how many entities are involved in the relationship
- **Binary relationship** - relationship between two entities
  (*degree 2 relationship*)
- **Unary relationship (recursive relationship)** - occurs when an entity is involved in a relationship with itself
  (*degree 1 relationship*)

RELATIONSHIPS

Unary relationship examples

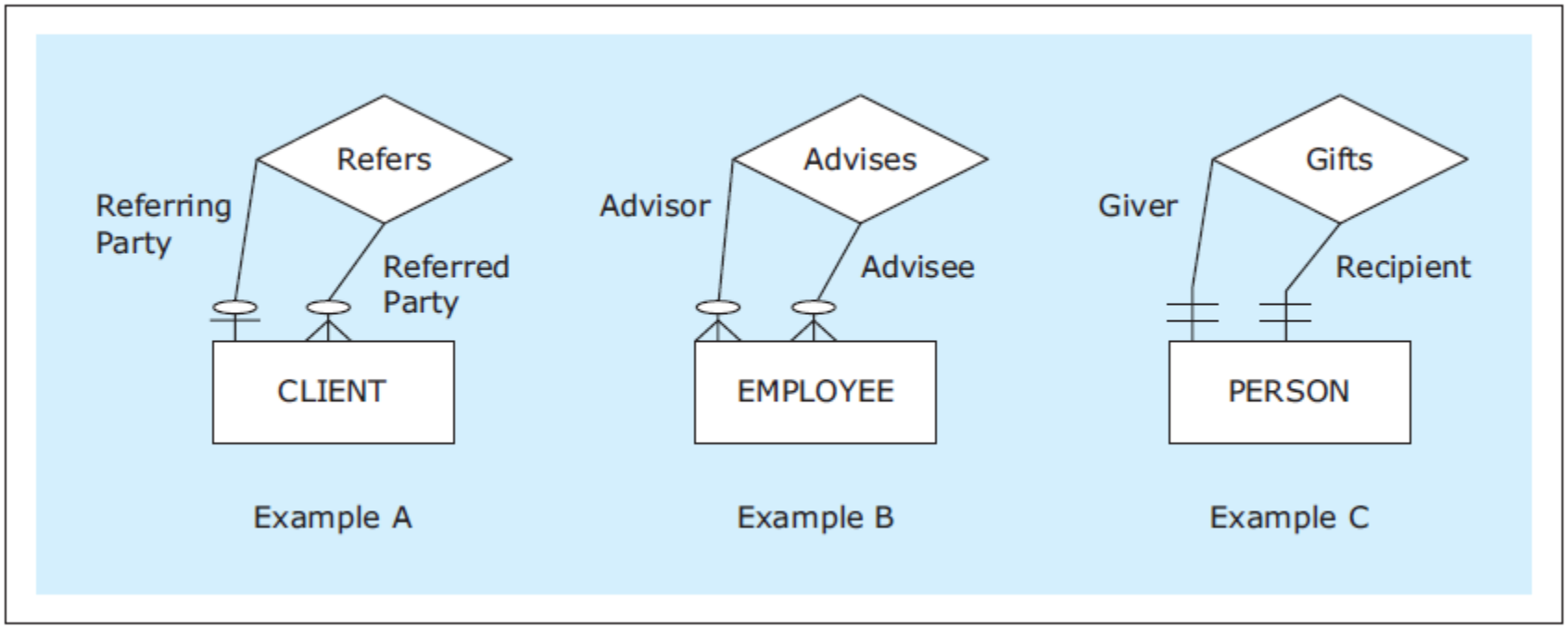


RELATIONSHIPS

- **Relationship roles -** additional syntax that can be used in ER diagrams at the discretion of a data modeler to clarify the role of each entity in a relationship

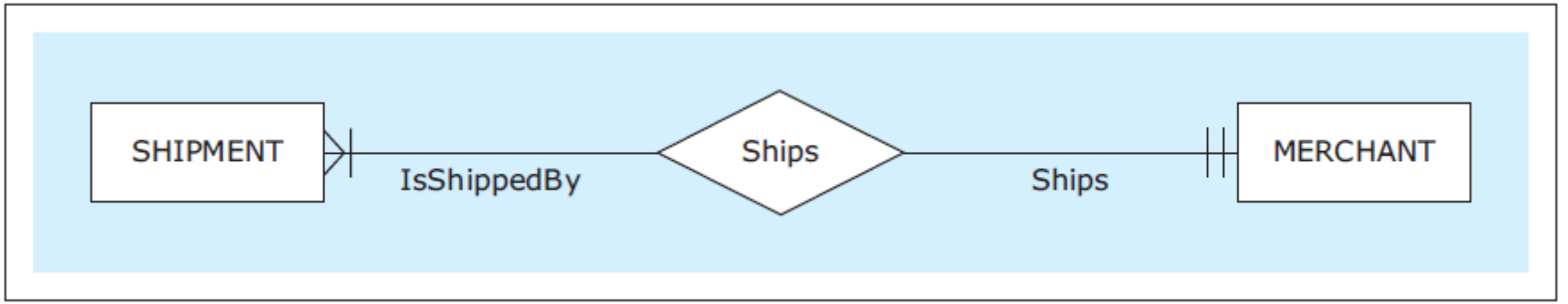
RELATIONSHIPS

Unary relationships with role names



RELATIONSHIPS

A binary relationship with role names

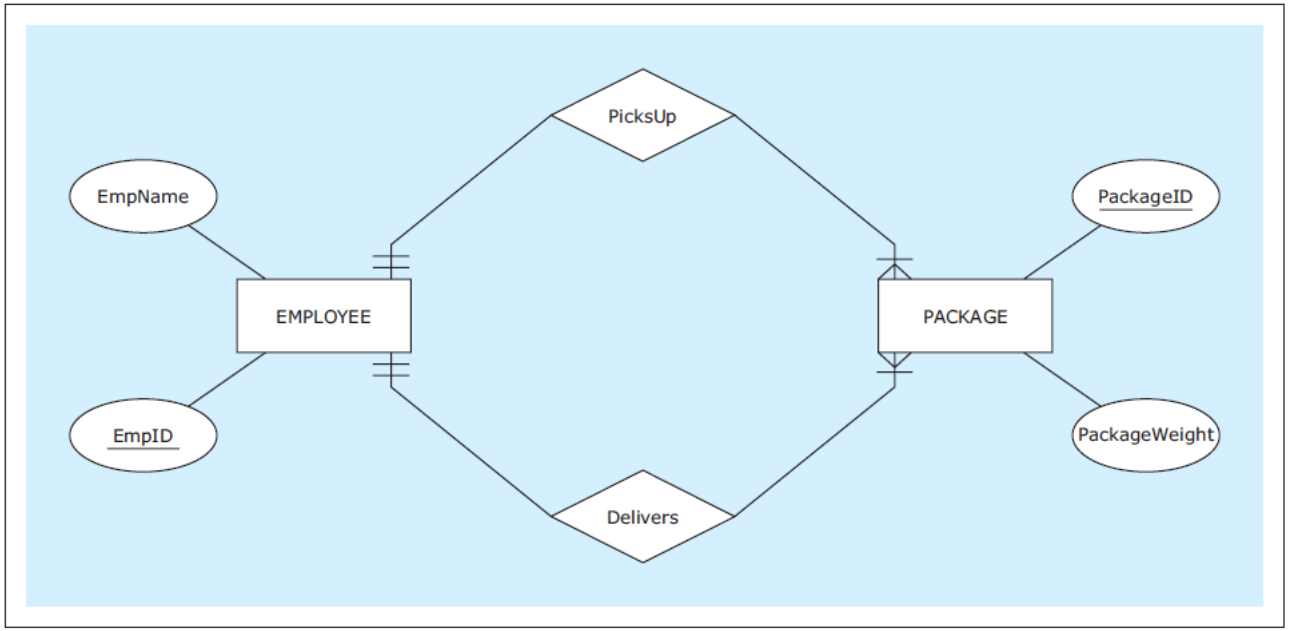


RELATIONSHIPS

- **Multiple relationships between same entities**
  - Same entities in an ER diagram can be related via more than one relationship

RELATIONSHIPS

Multiple relationships between the same entities



WEAK ENTITY

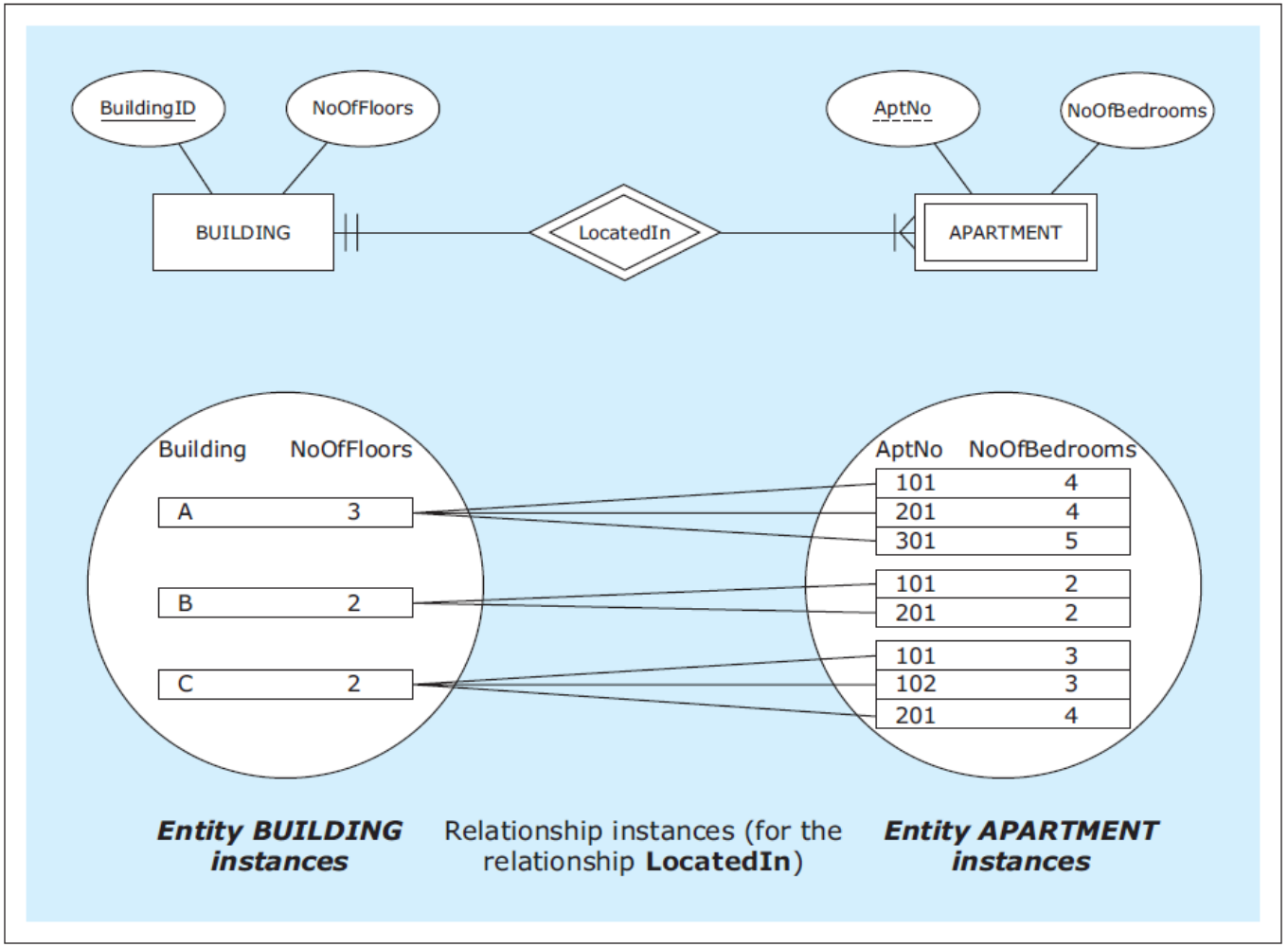
- **Weak entity -** ER diagram construct depicting an entity that does not have a unique attribute of its own
- **Owner entity** - entity whose unique attribute provides a mechanism for identifying instances of a weak entity
- **Identifying relationship** - relationship between a weak entity and its owner entity in which each instance of a weak entity is associated with exactly one instance of an owner entity
  - Each weak entity must be associated with its owner entity via an identifying relationship
  - Unique attribute from the owner entity uniquely identifies every instance of the weak entity via an identifying relationship

WEAK ENTITY

- **Partial key -** attribute of a weak entity that combined with the unique attribute of the owner entity uniquely identifies the weak entity's instances
  - Combination of the partial key and the unique attribute from the owner entity uniquely identifies every instance of the weak entity

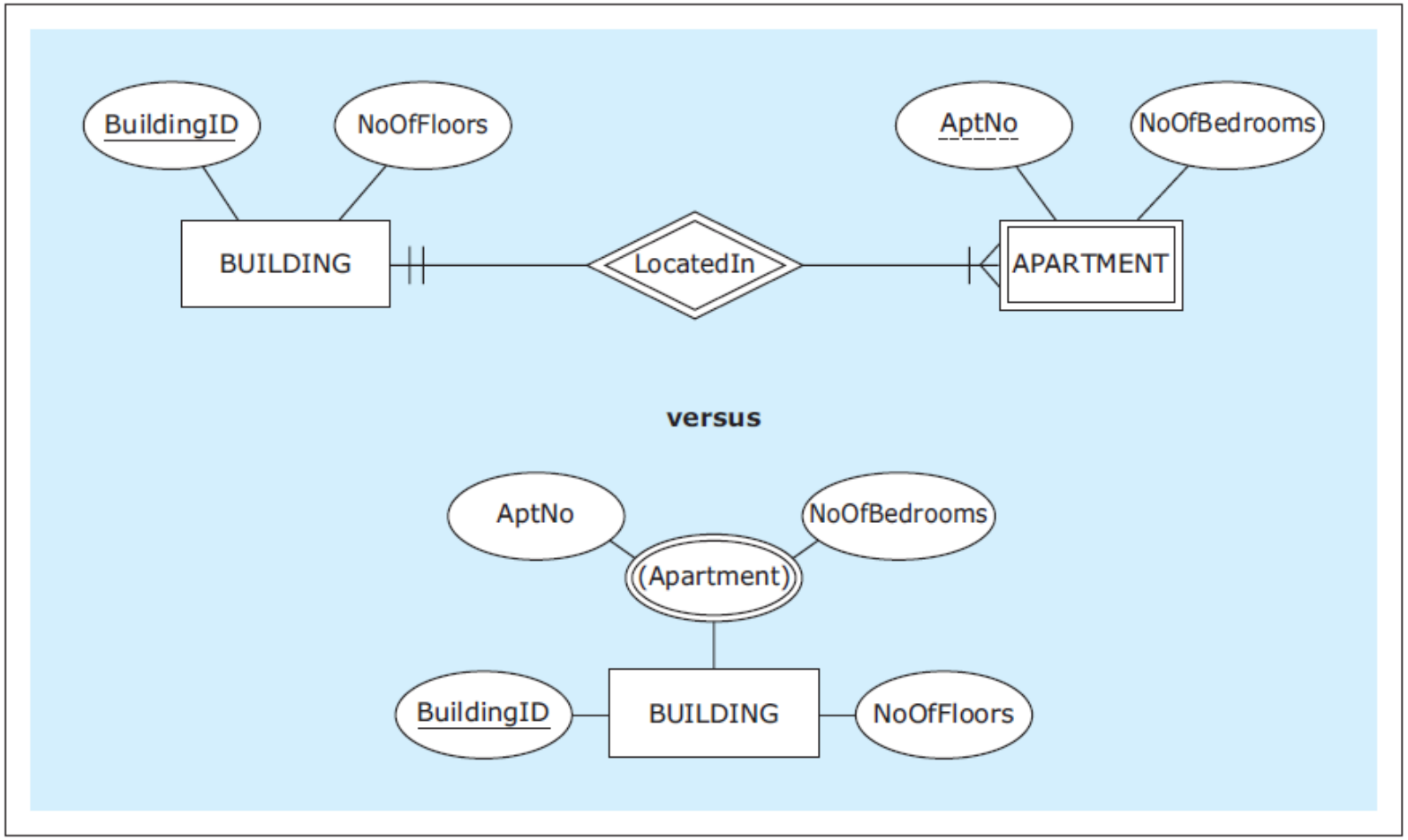
WEAK ENTITY

A weak entity example with entity instances



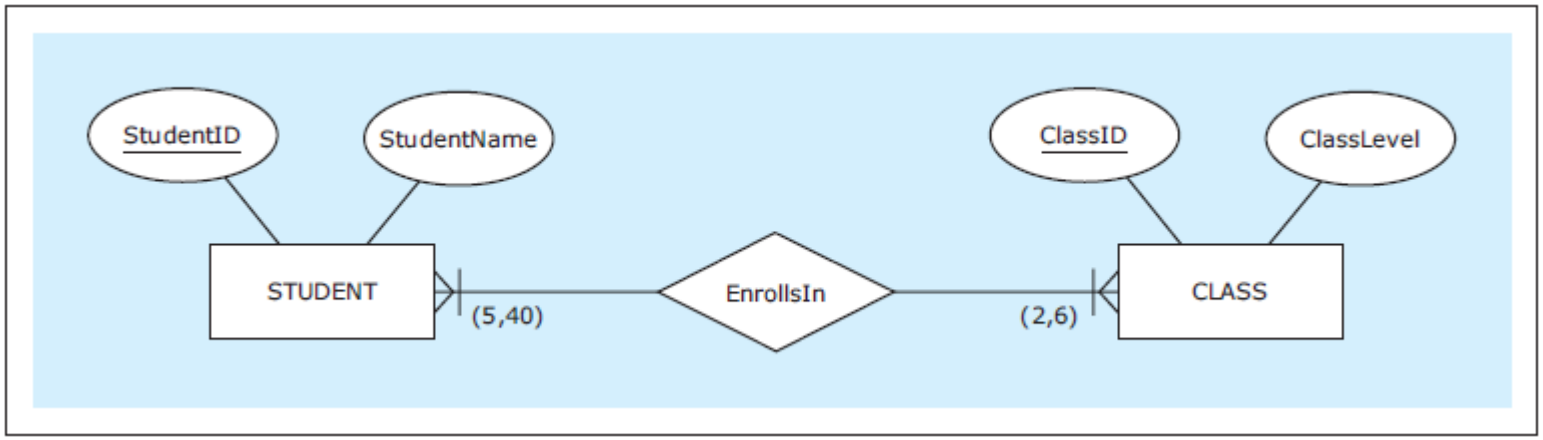
WEAK ENTITY

A weak entity versus a multivalued composite attribute



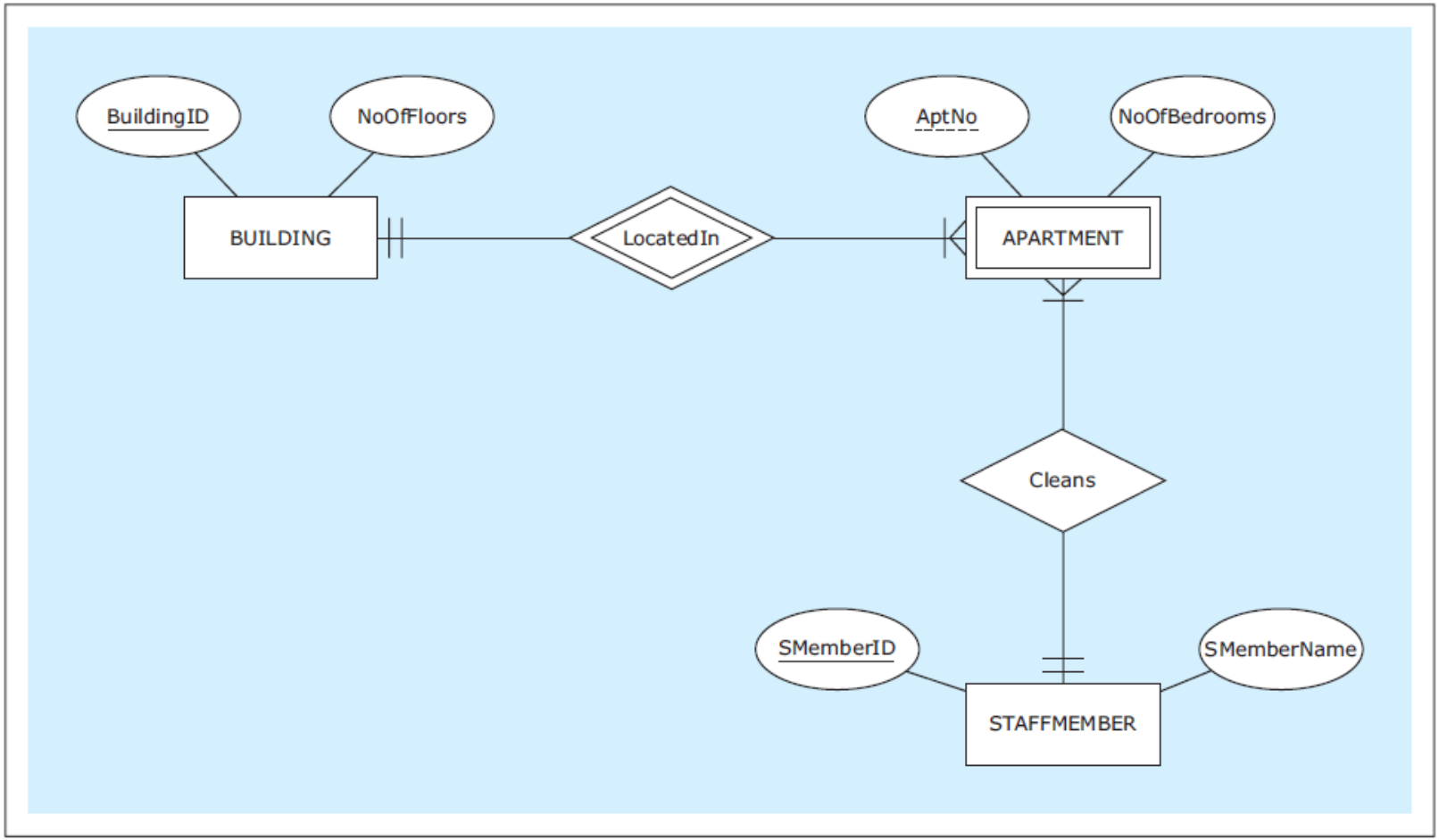
RELATIONSHIPS

A relationship with specific minimum and maximum cardinalities



WEAK ENTITY

A weak entity with an identifying and regular relationship

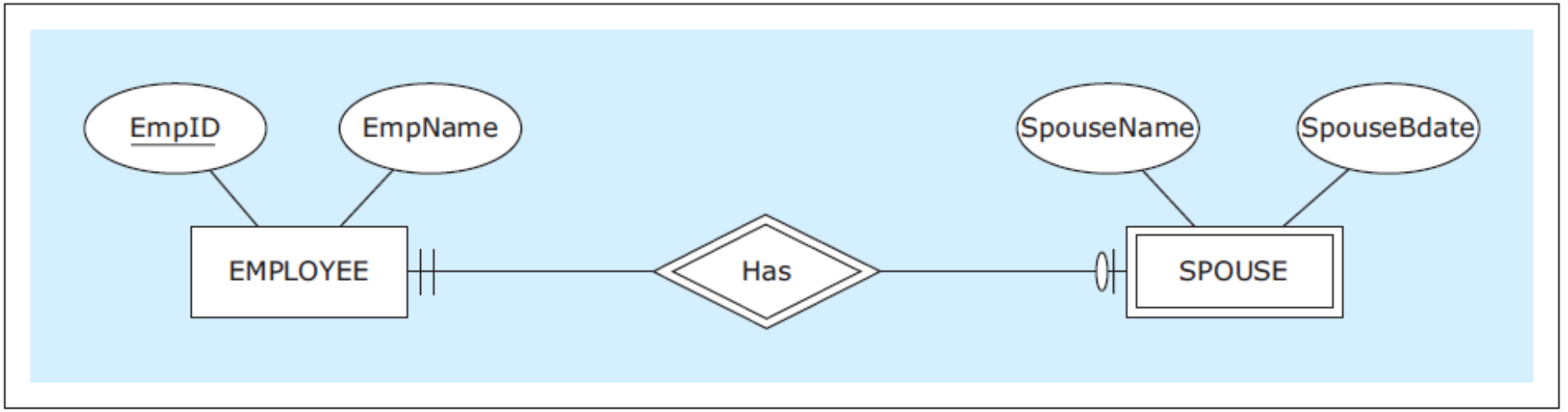


WEAK ENTITY

- Identifying relationship is either 1:M or 1:1 relationship
  - In case of 1:M identifying relationship, a weak entity must have a partial key attribute
  - In case of 1:1 identifying relationship, a weak entity doesn't need to have a partial key attribute

WEAK ENTITY

A weak entity with a 1:1 identifying relationship



NAMING CONVENTIONS FOR ER DIAGRAMS

- Entities and attributes
  - Use singular (rather than plural) nouns
- Relationships
  - Use verbs or verb phrases, rather than nouns

NAMING CONVENTIONS FOR ER DIAGRAMS

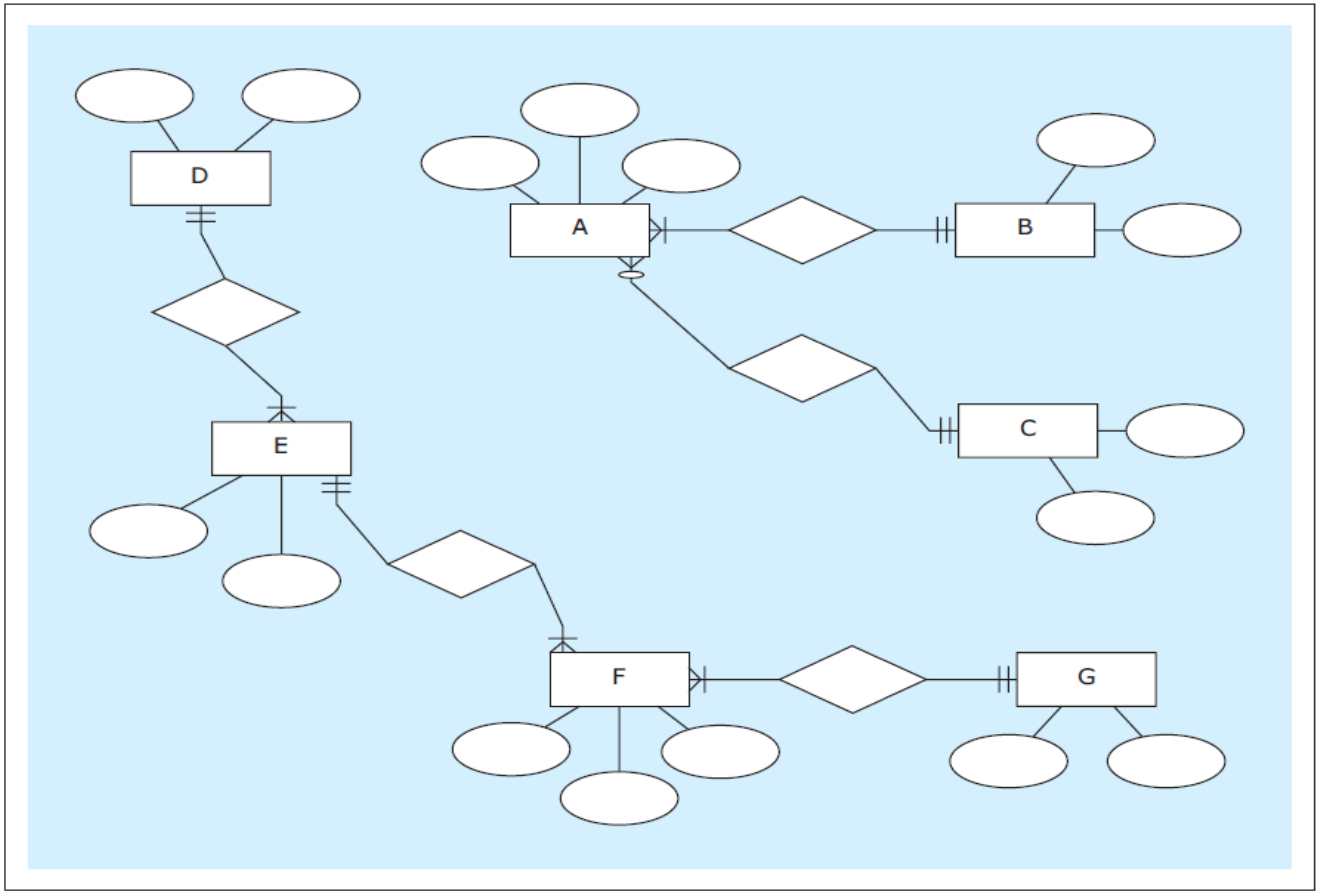
- Names should be as brief as possible, without being too condensed as to obscure the meaning of the construct
- If possible, give all attributes in the entire ER diagram different names

MULTIPLE ER DIAGRAMS

- When depicting multiple ER diagrams, each diagram should be visualized separately
- Instead of multiple ER diagrams in one schema a better choice is to present each ER diagram separately

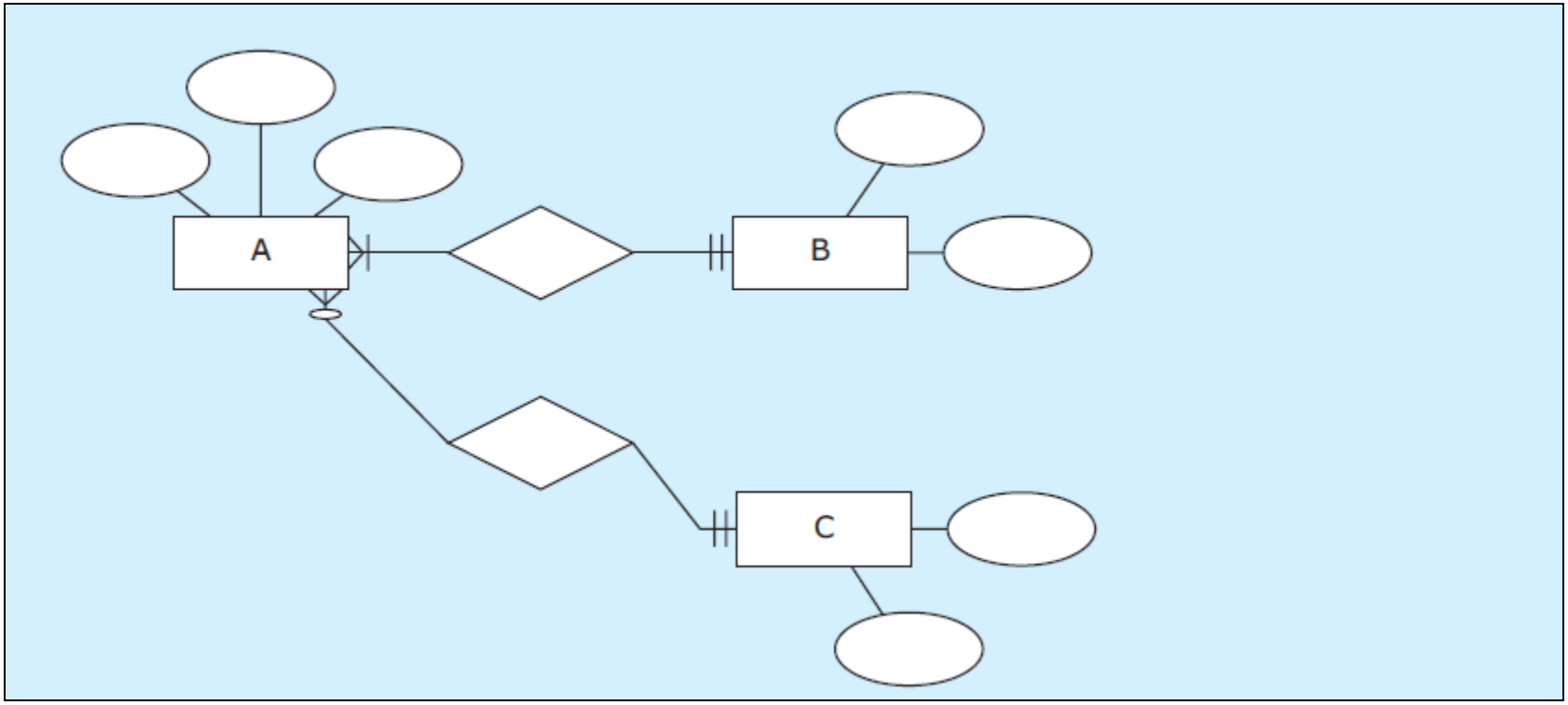
MULTIPLE ER DIAGRAMS

A schema with two separate ER diagrams (potentially misleading)



MULTIPLE ER DIAGRAMS

Separate ER diagrams in separate schemas



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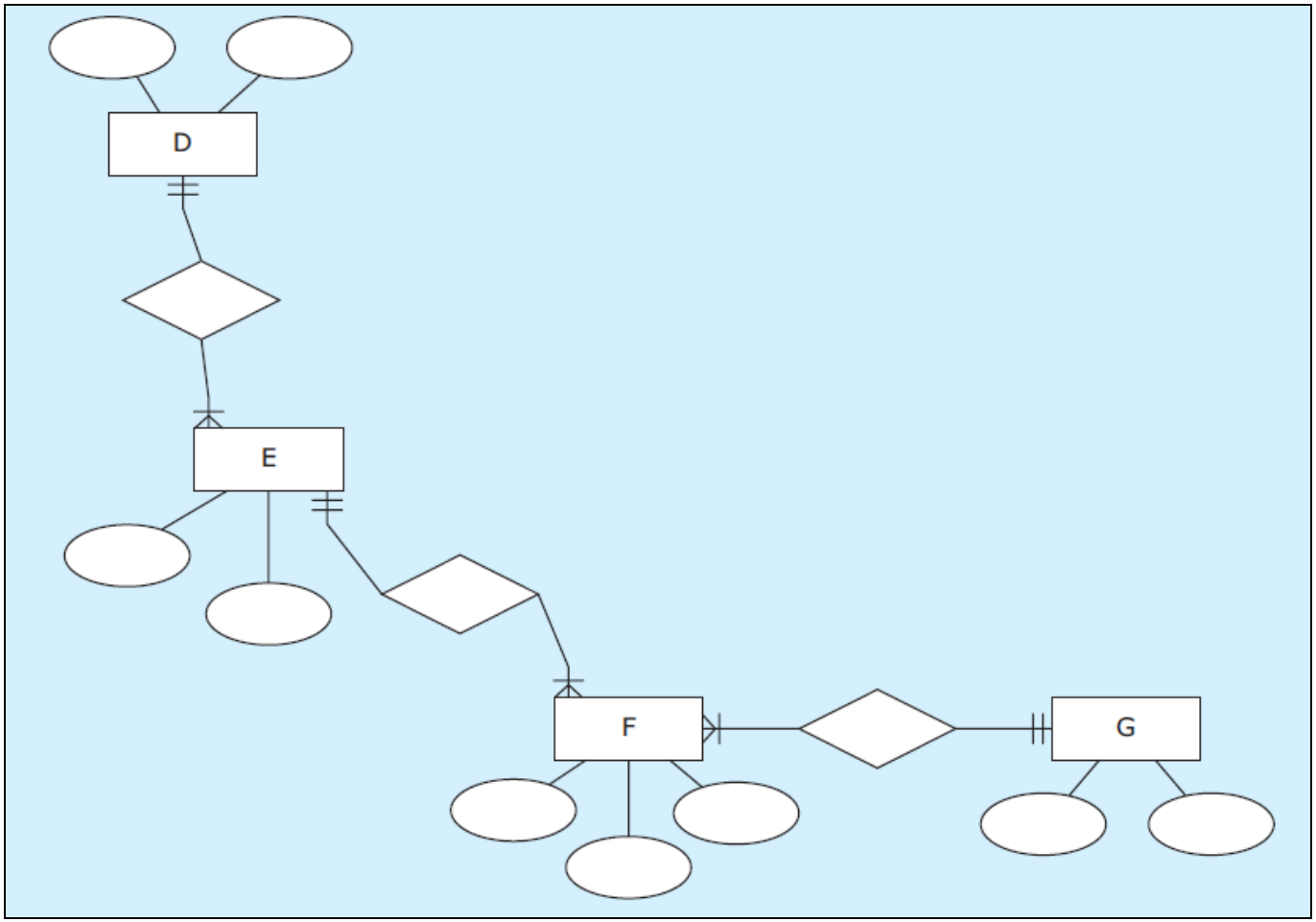
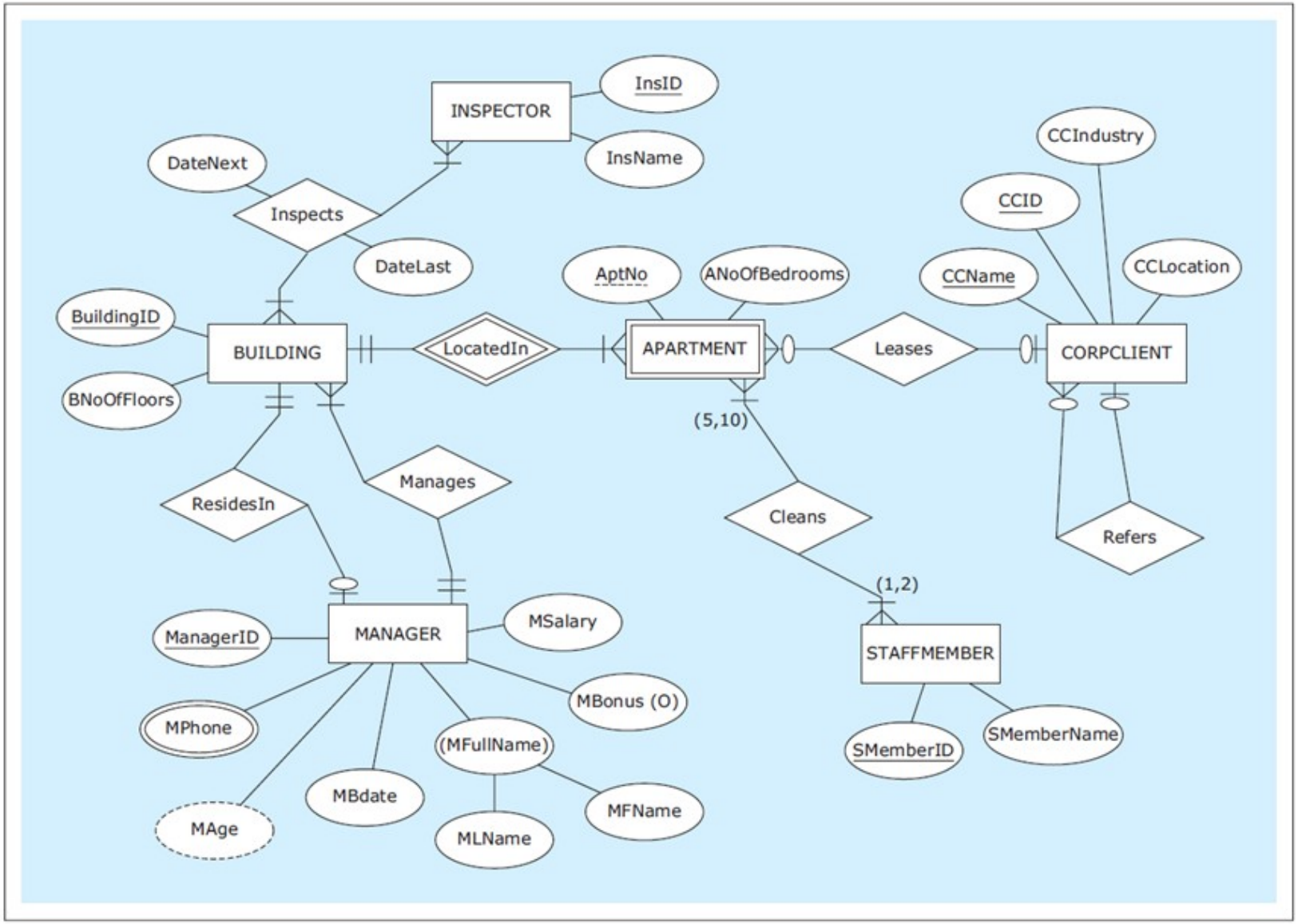


Another ER diagram example: HAFH Realty Company Property Management Database



DATABASE REQUIREMENTS AND ER MODEL USAGE

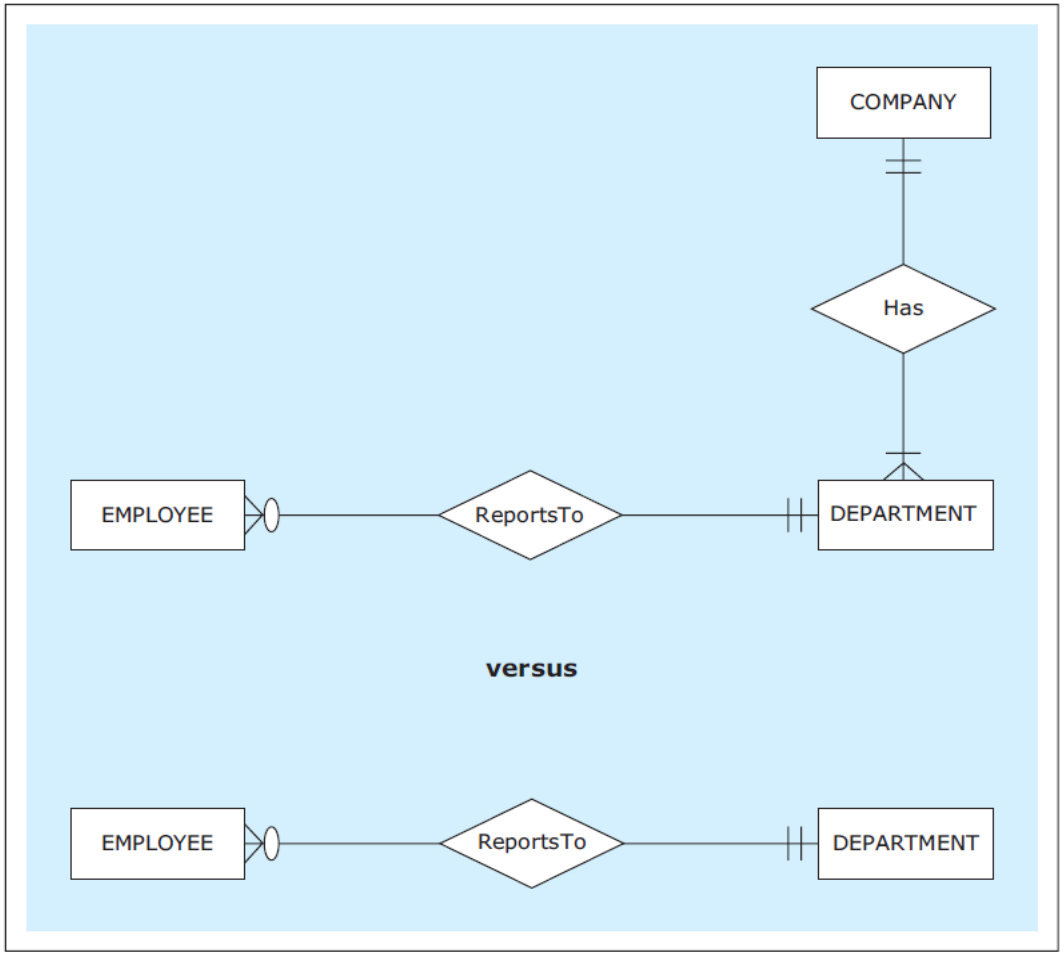
- ER modeling provides a straightforward technique for collecting, structuring, and visualizing requirements
- An understanding of ER modeling is crucial, not just for creating ER models based on the requirements, but also during the requirements collection process itself
- It helps keep the focus on asking or seeking answers to the right questions in order to establish the relevant facts about entities, attributes, and relationships

DATABASE REQUIREMENTS AND ER MODEL USAGE

- One of the common mistakes that beginners make when engaging in ER modeling for the first time is not recognizing the difference between an entity and the ER diagram itself

DATABASE REQUIREMENTS AND ER MODEL USAGE

An ER diagram incorrectly and correctly interpreting requirements



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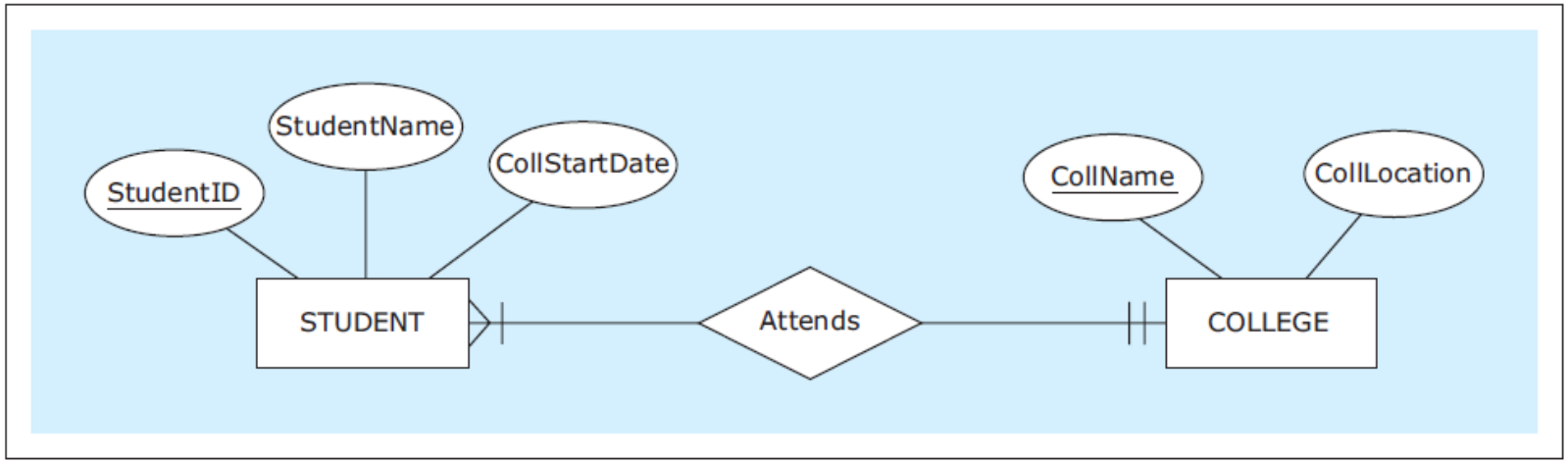


DATABASE REQUIREMENTS AND ER MODEL USAGE

- Another common database requirements collection and ER modeling mistake made by novices is not distinguishing between:

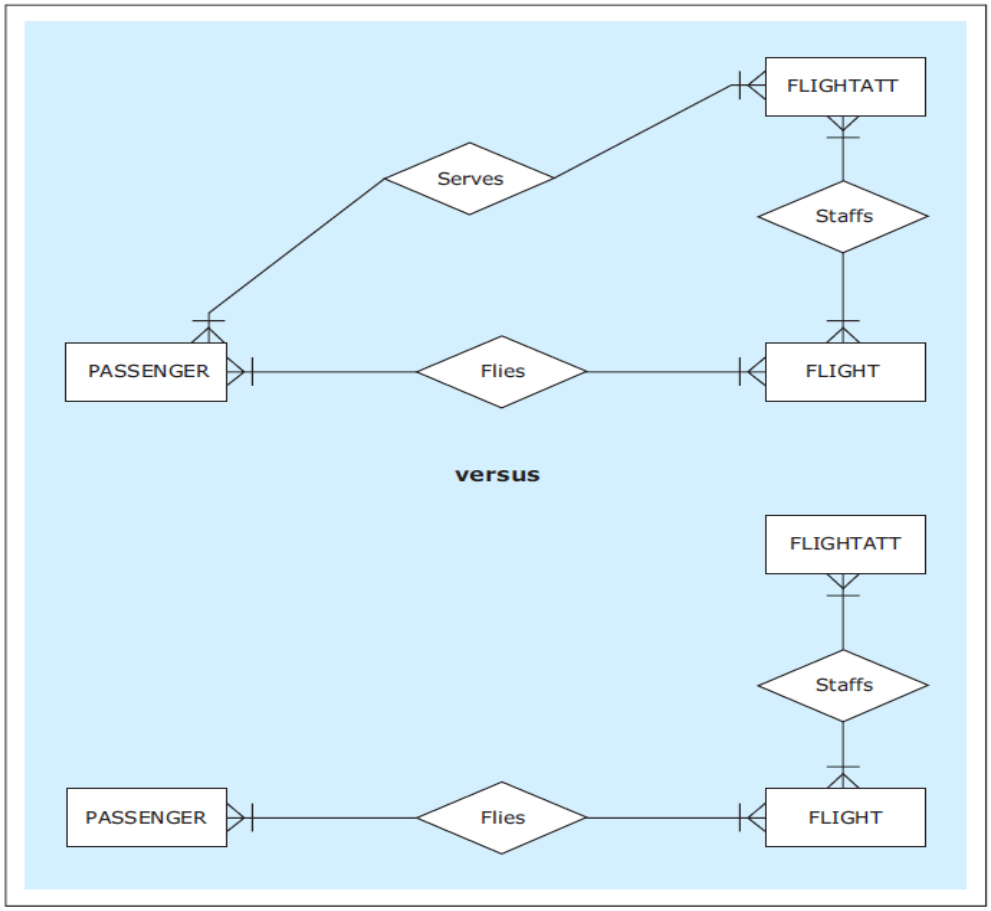
  Modeling of the data that is wanted and can be kept track of

  versus

  Modeling of everything that takes place in an organization

DATABASE REQUIREMENTS AND ER MODEL USAGE

An ER diagram based on unfeasible and proper requirements



VARIOUS ER NOTATIONS

- There is no universally adopted ER notation to which all database projects conform
- Instead, there is a variety of available ER notations in use
- However, if a designer is familiar with one ER notation, other alternative ER notations are easy to understand and use

VARIOUS ER NOTATIONS

Examples of various ER notations