Relational Database Design

Module 9: Other ER Methods

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pluralsight
hardcore developer training

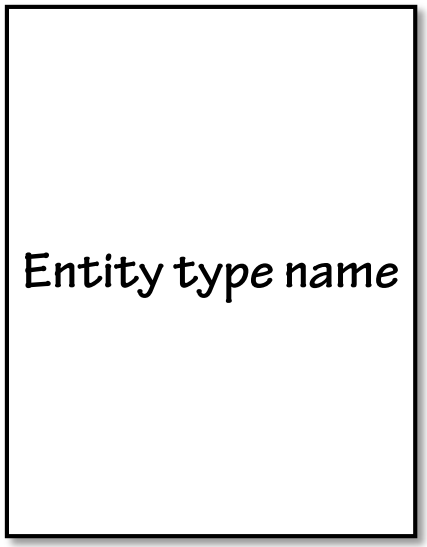
Outline

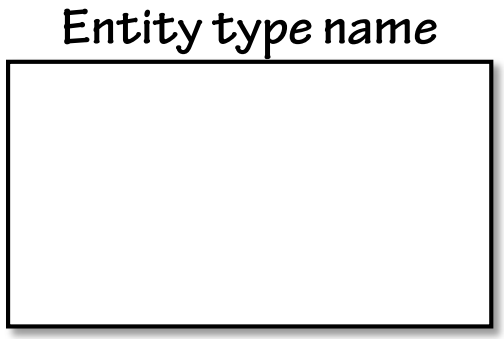
- **Alternative ER representations**
  - Entity types
    - Weak / strong
    - Subtypes
  - Attributes
    - Omitted
    - Compact
    - Elaborate
    - Special types
  - Relationships
    - Identifying
    - Subtype relationship
    - Cardinalities
    - What is allowed?

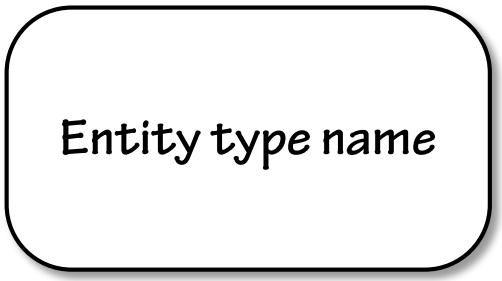
ER diagramming methods

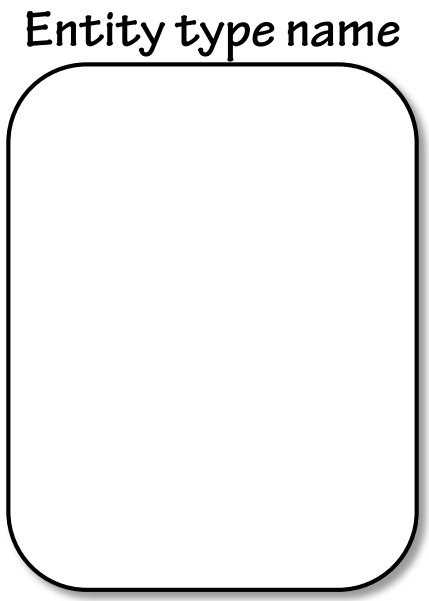
- **Lots of methods**
  - IDEF1X: Popular (for now…)
- **Impossible to cover all**
  - Too many
  - Variations
- **Common base**
  - Entity types
  - Attributes
  - Relationships
- **Look past differences, see similarities**

Entity types



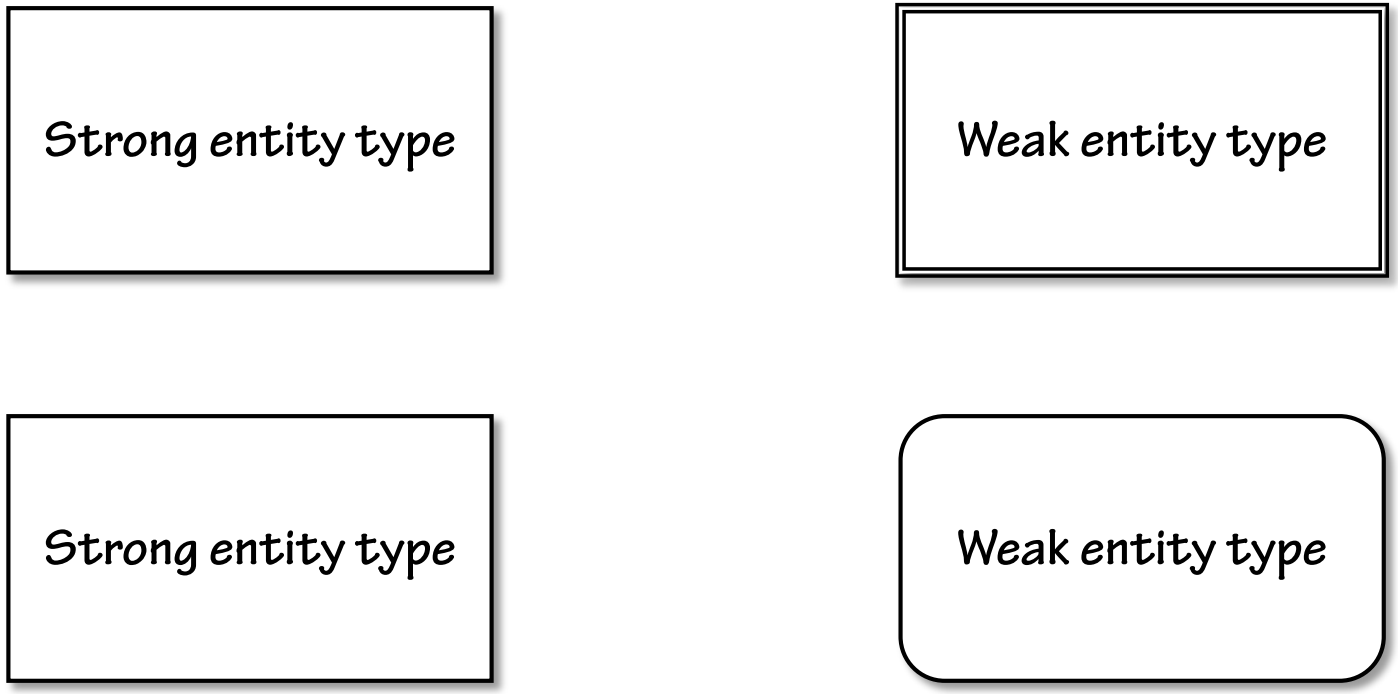






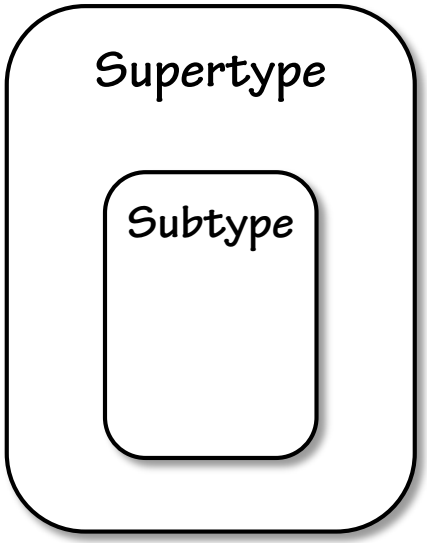
Entity type

- **Strong or weak**
  - Sometimes represented the same
  - Sometimes represented different



Entity type

- **Subtypes**
  - No specific notation
  - As normal entity type, but with special “subtype” relationship
  - As nested entity types



Entity type

- **Subtypes**
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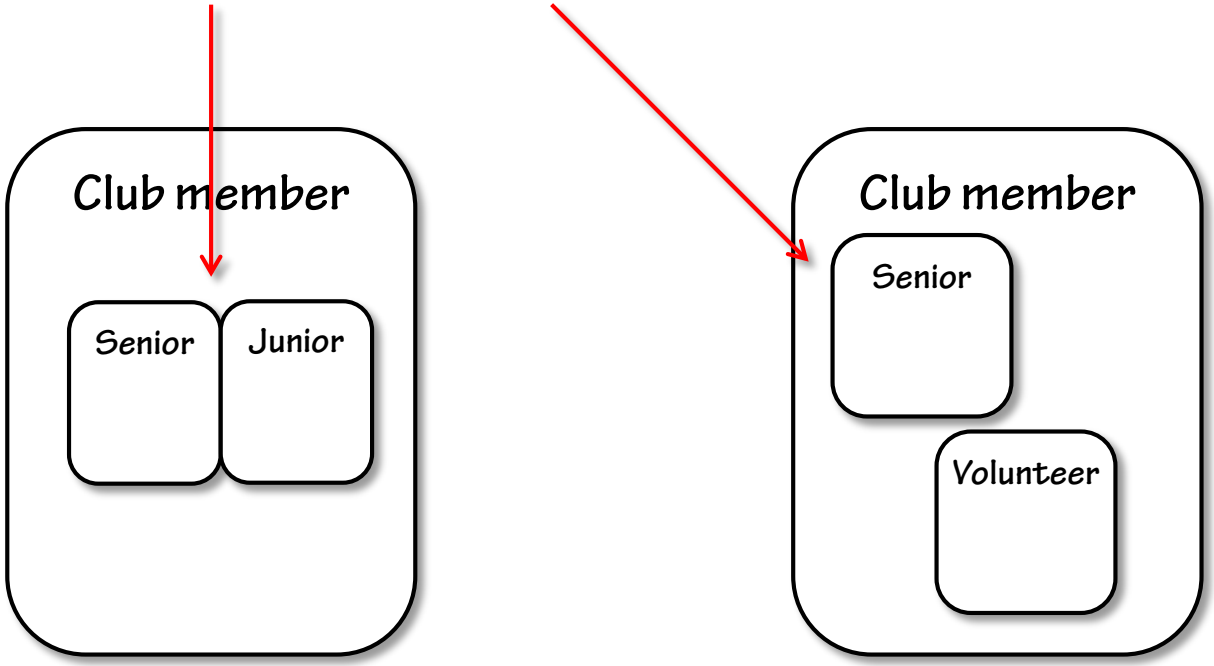
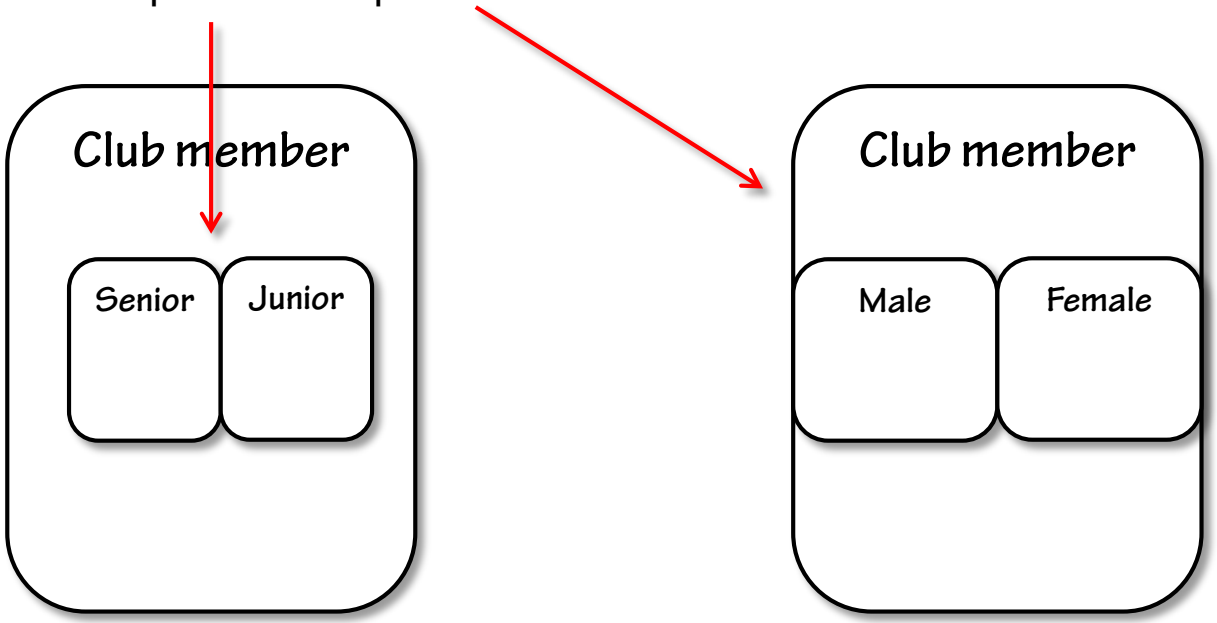
  - As nested entity types
    - Mutually exclusive or independent?



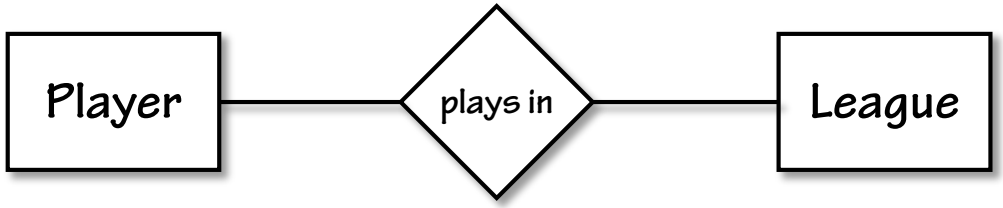
Entity type

- **Subtypes**
  - No specific notation
  - As normal entity type, but with special “subtype” relationship
  - As nested entity types
    - Mutually exclusive or independent?
    - Incomplete or complete?



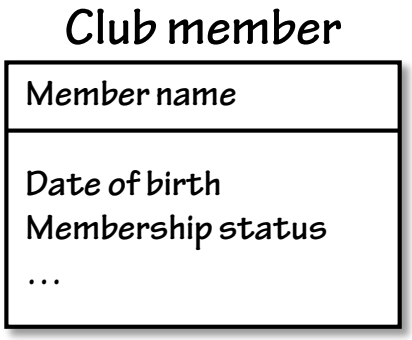
Attributes

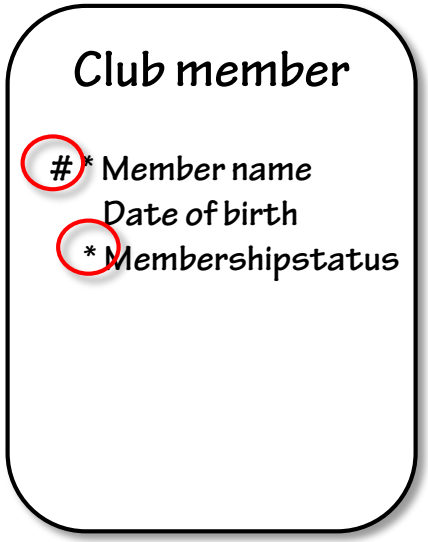
- Leave out



Attributes

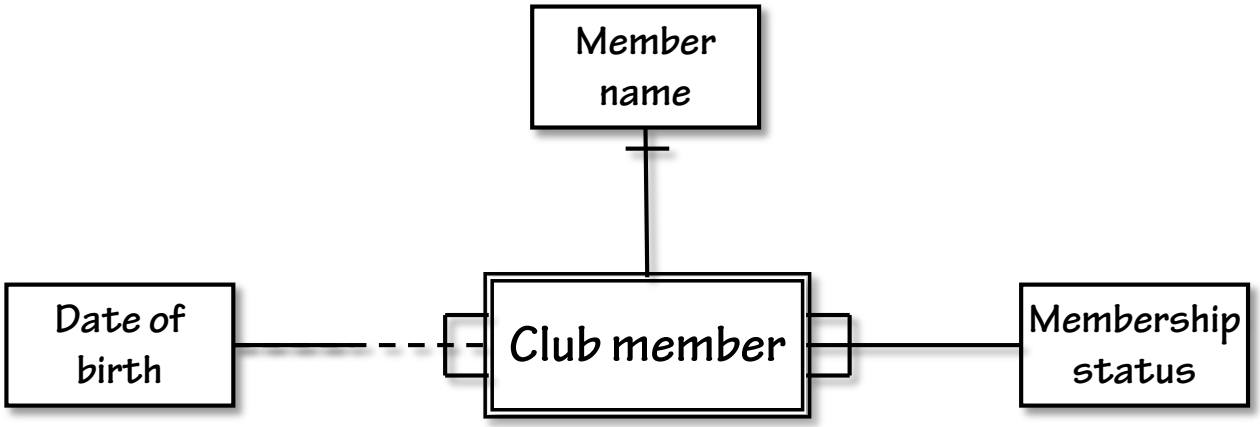
- Leave out
- List attributes inside entity type





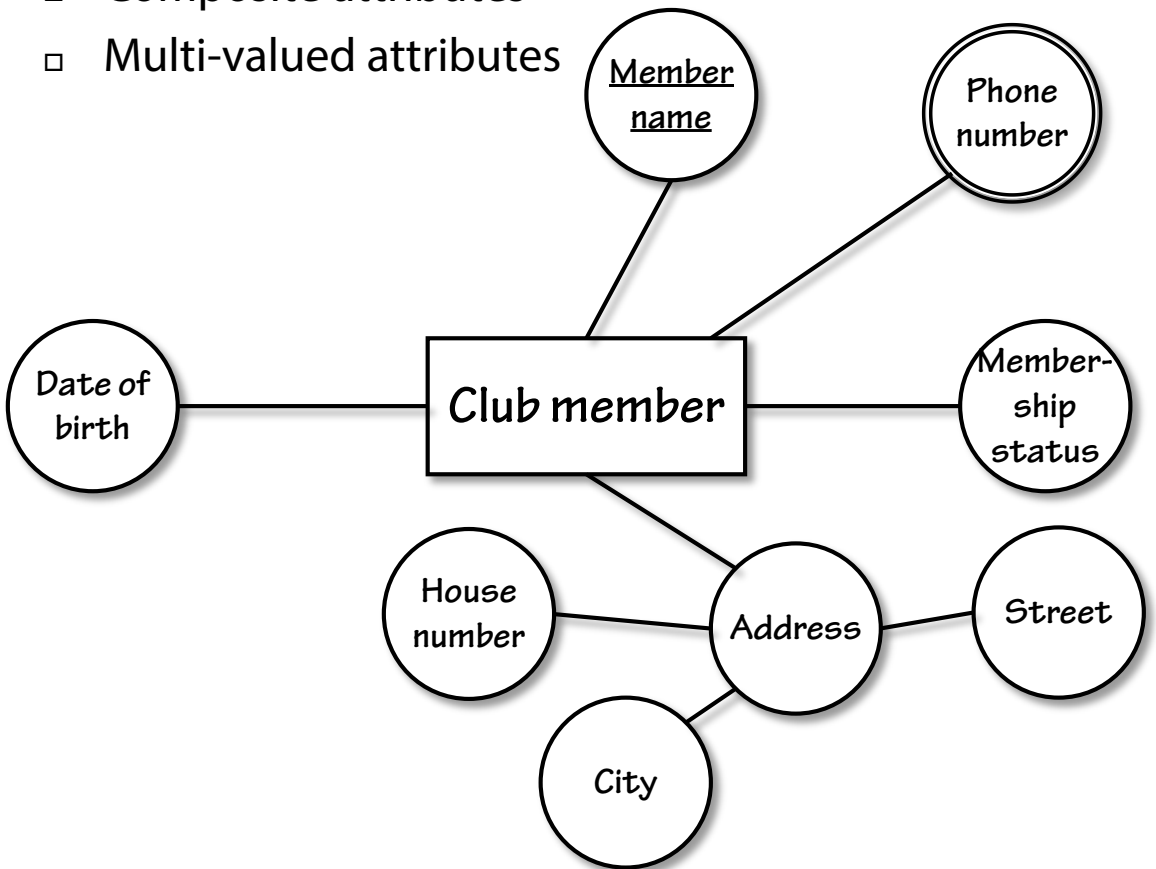
Attributes

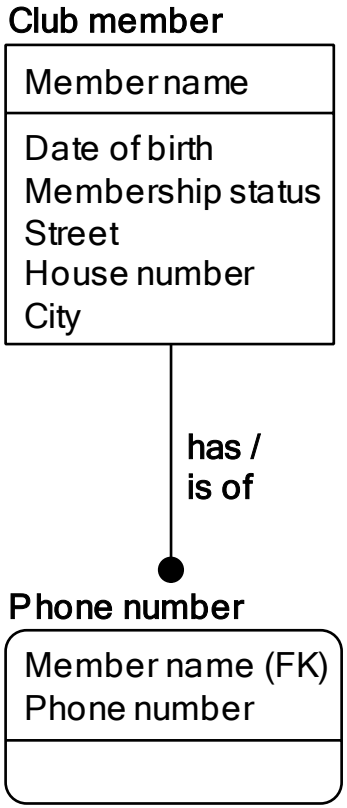
- Leave out
- List attributes inside entity type
- Represent with specific symbols



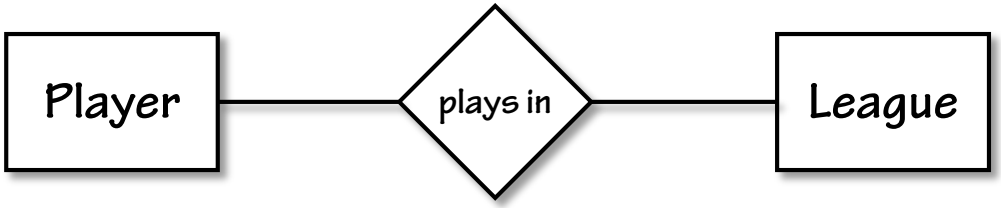
Attributes

- **Leave out**
- **List attributes inside entity type**
- **Represent with specific symbols**
  - Composite attributes
  - Multi-valued attributes



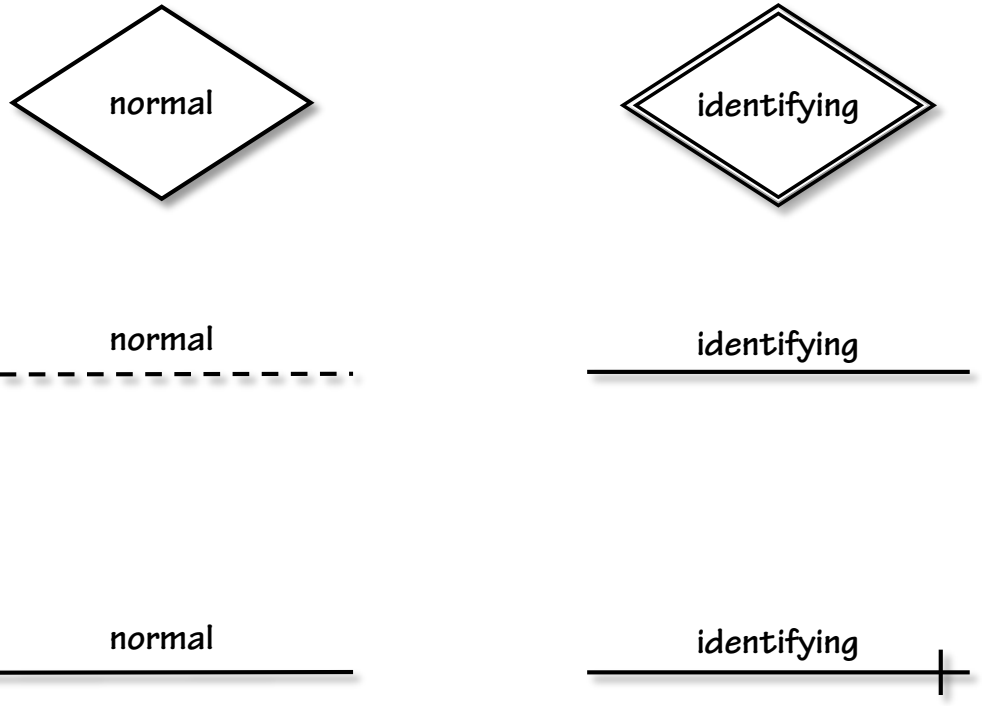


Relationship types



Relationships

- **Normal or identifying**
  - Sometimes represented the same

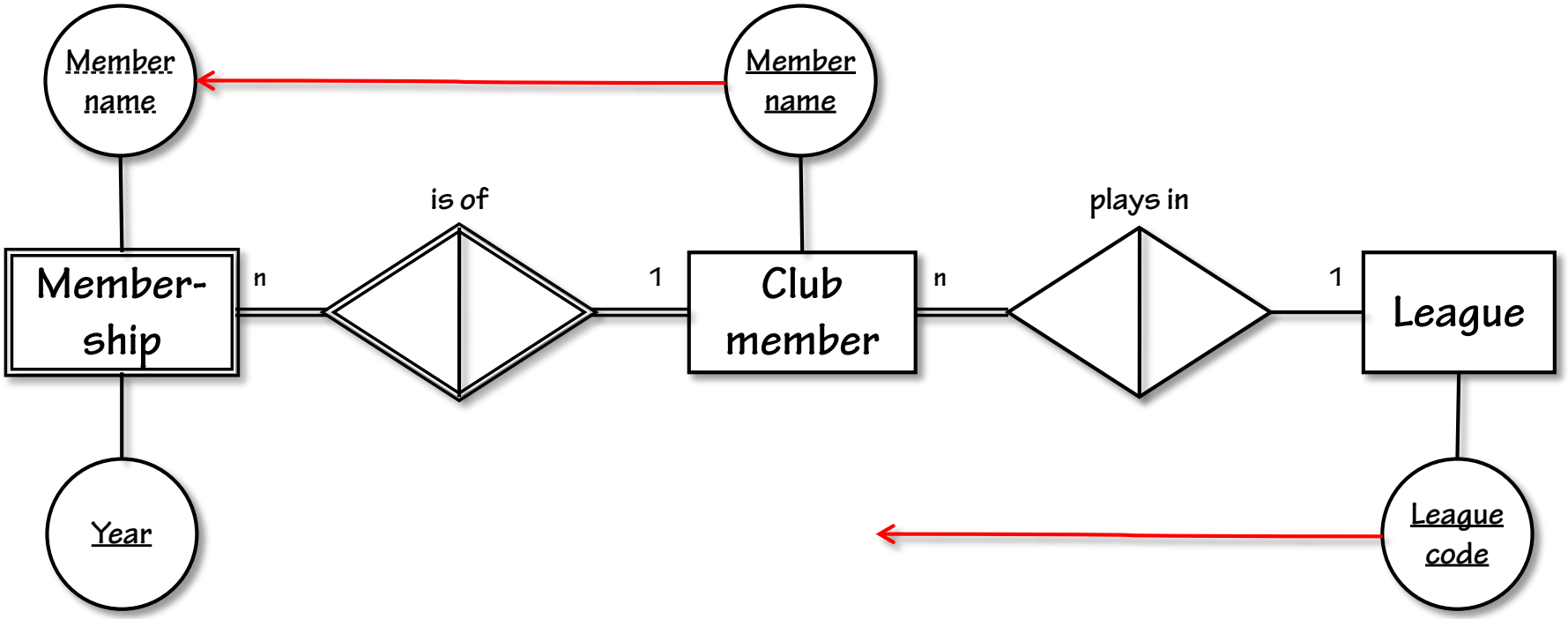


Relationships

- **Subtype relationships**
  - Omitted with nested subtypes
  - Large variety of symbols
    - Complete?
    - Mutually exclusive?

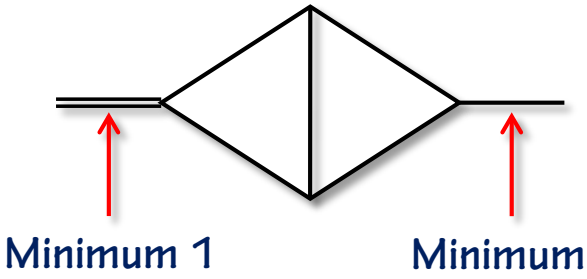
Relationships

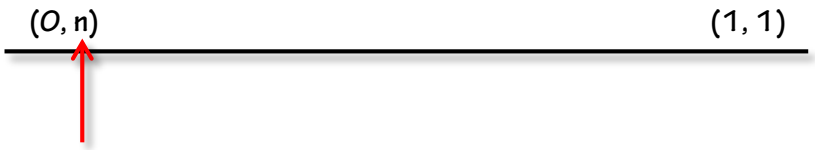
- **One-to-many (and one-to-one)**
  - Referencing attributes included in child entity type
    - Explicitly marked as foreign key
  - Referencing attributes not include in child entity type
    - Implied by the relationship



Relationships

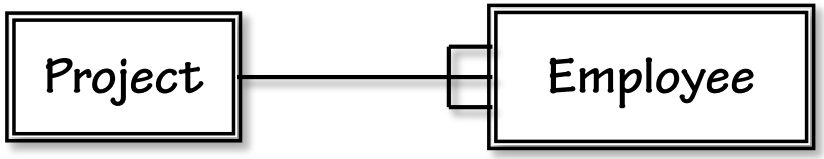
- **Cardinality**
  - Minimum / maximum (cardinality pair)
  - Symbols
  - Textual
    - (min, max)
    - min = 0 or 1
    - max = 1 or m, n, …
  - What side?
    - "left" can be related to many "right"
    - many "left" can be related to a "right"
  - Variations used
    - Min and max on far end
    - Min and max on near end
    - Min on near end; max on far end

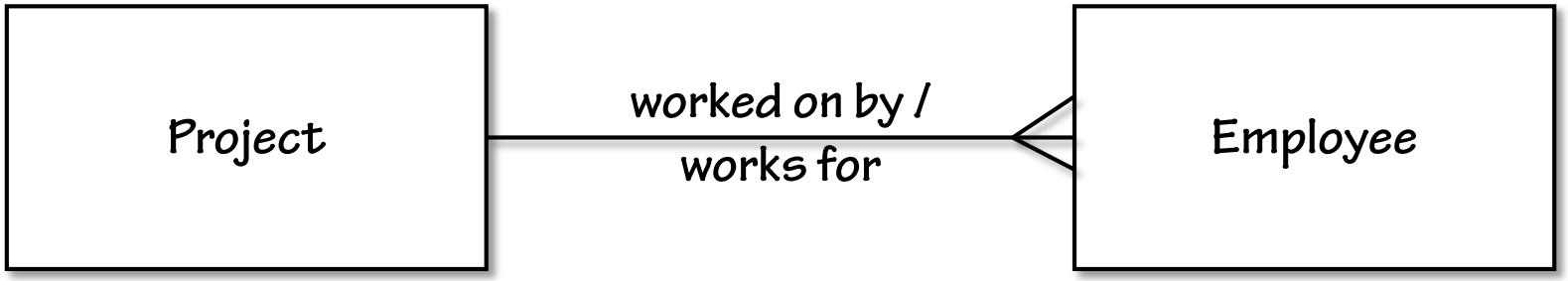




Crow's foot notation

- **Method for representing cardinality**
  - Intuitive symbols





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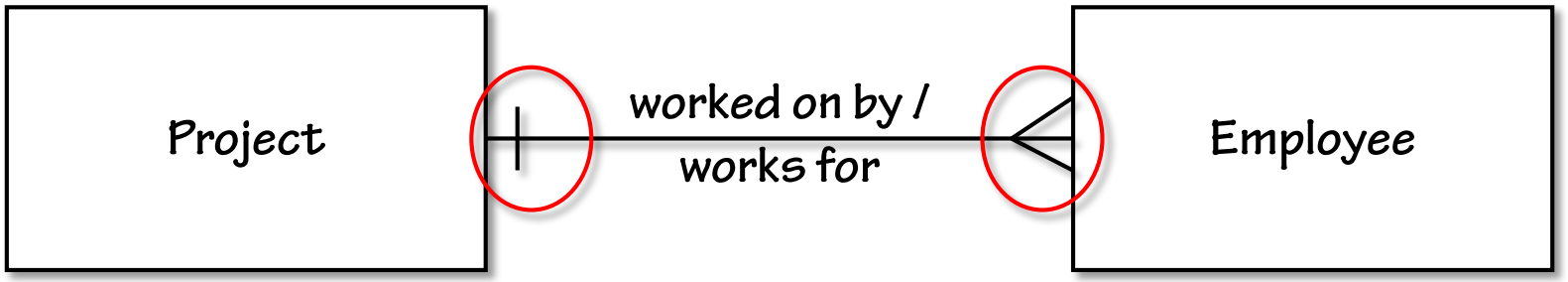

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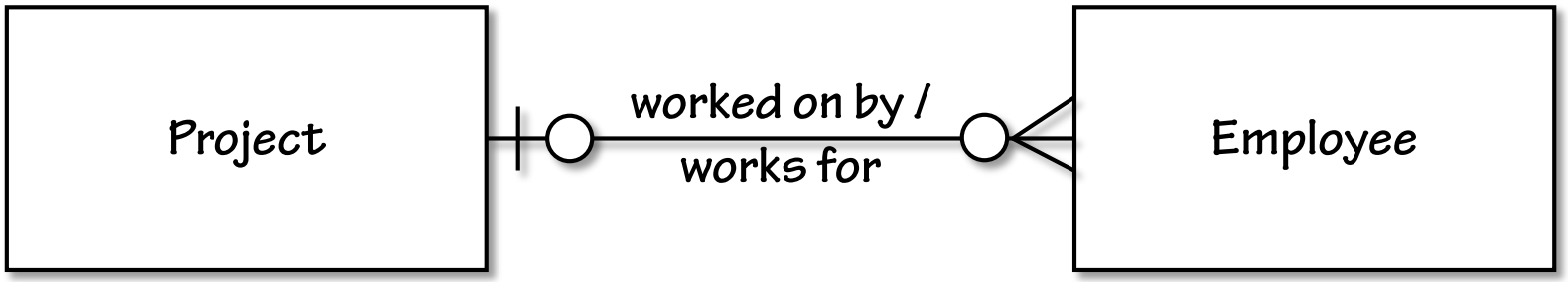

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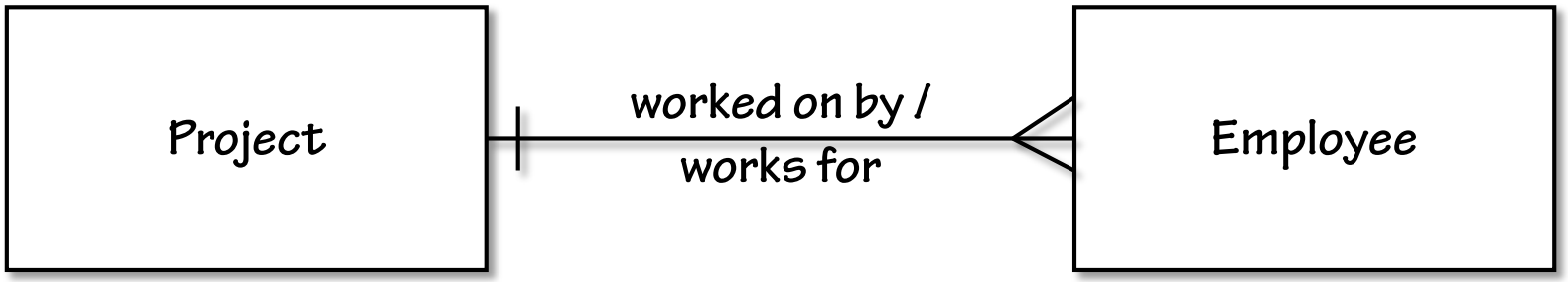

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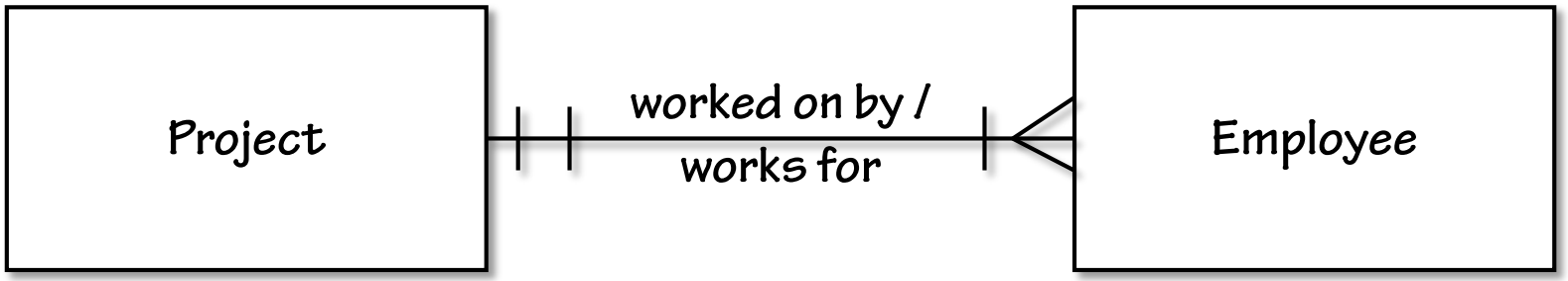

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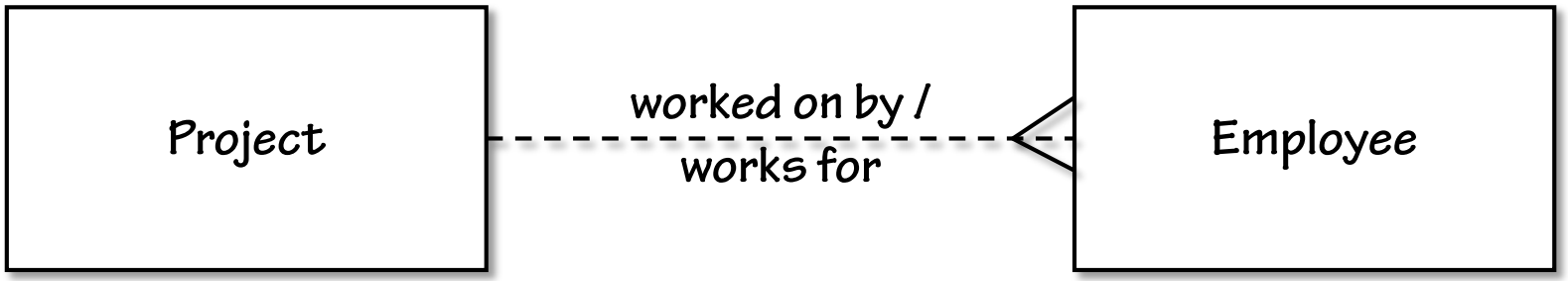

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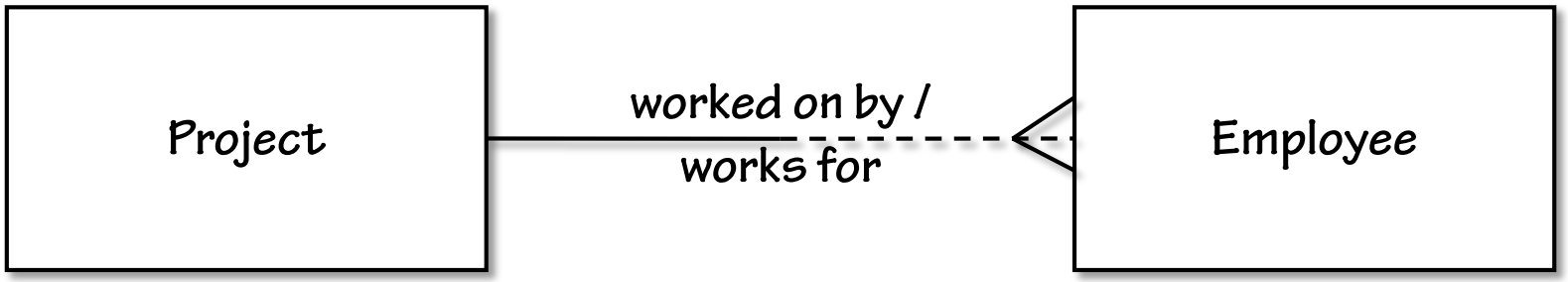
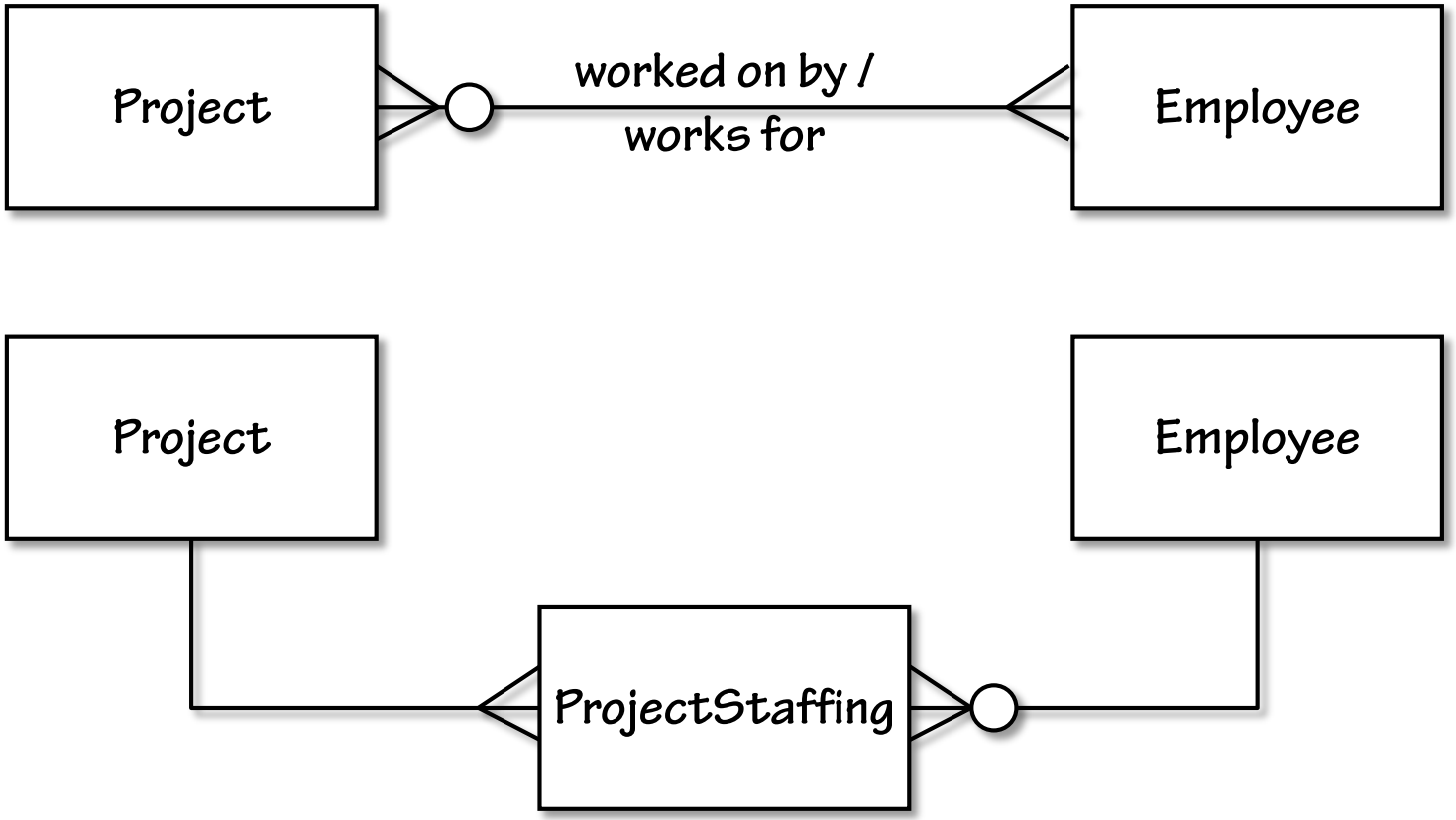


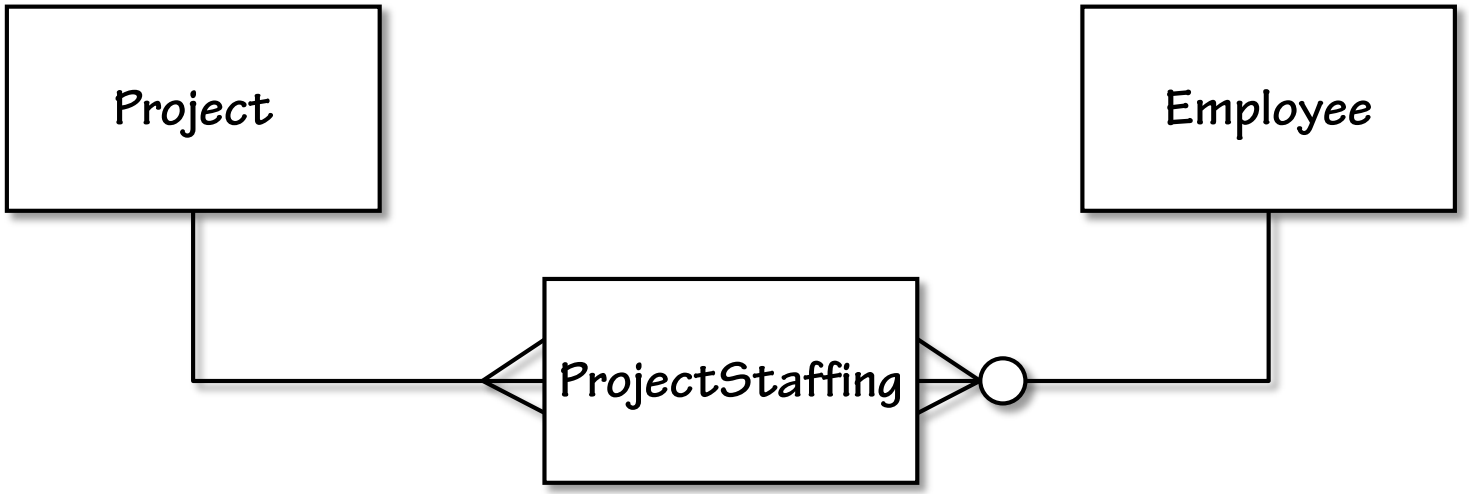
Special relationships

- **Some relationships not permitted in some methods**
  - Many-to-many relationship
  - Use extra entity type instead



Special relationships

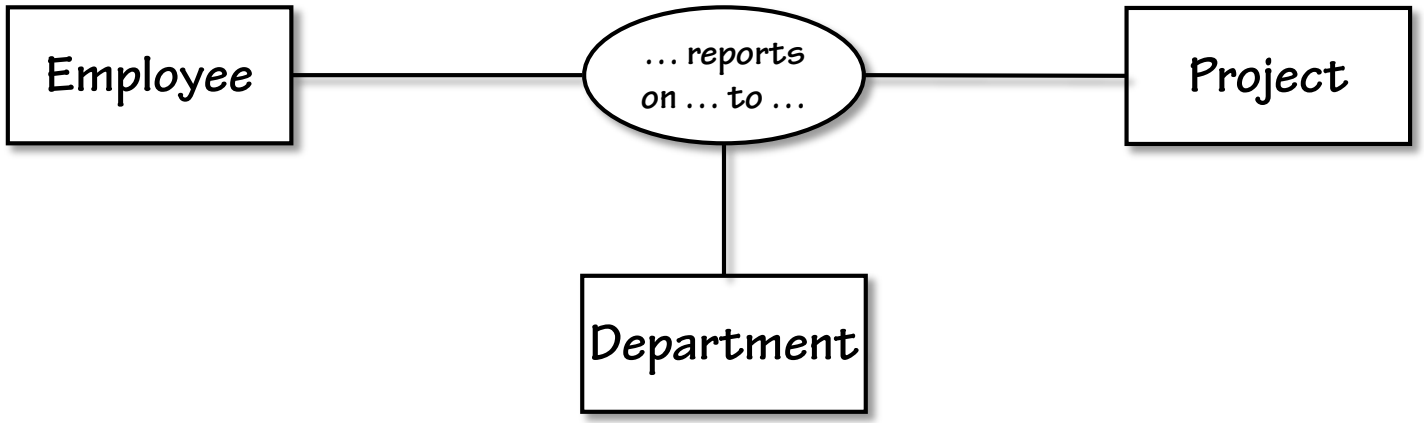
- **Some relationships not permitted in some methods**
  - Many-to-many relationship
  - Use extra entity type instead
  - Closer mapping to relational database design
  - Less expressiveness



Special relationships

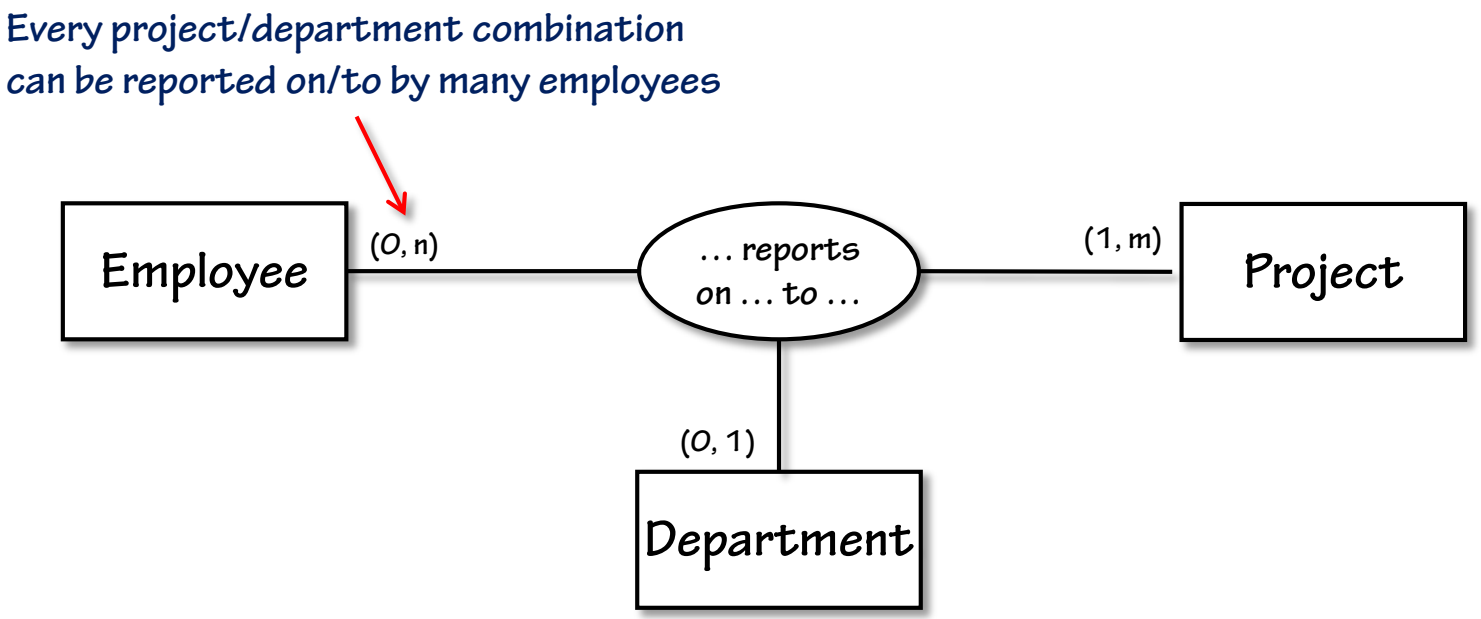
- **Arity / grade**
  - Binary / grade 2 → relationship between 2 entity types
  - Ternary / grade 3 → relationship between 3 entity types
  - Quaternary / grade 4 → relationship between 4 entity types
  - (…)
  - *n*-ary / grade *n* → relationship between *n* entity types

- **"Higher" grade (3 or more)**
  - Not supported in many methods
  - But some methods do allow them



Special relationships

- **"Higher" grade (3 or more)**
  - Cardinalities?
    - Minimum cardinality
    - Maximum cardinality



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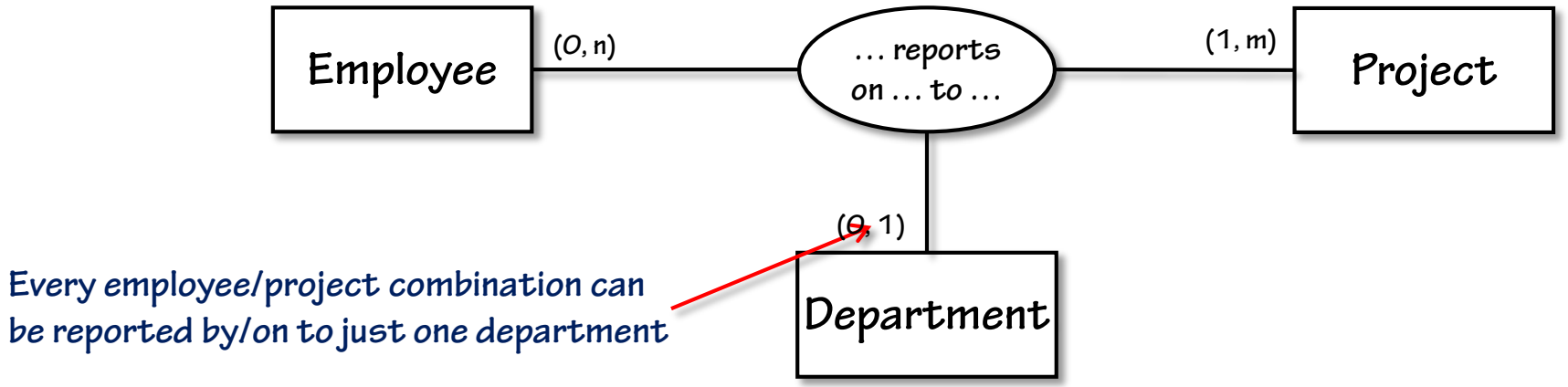

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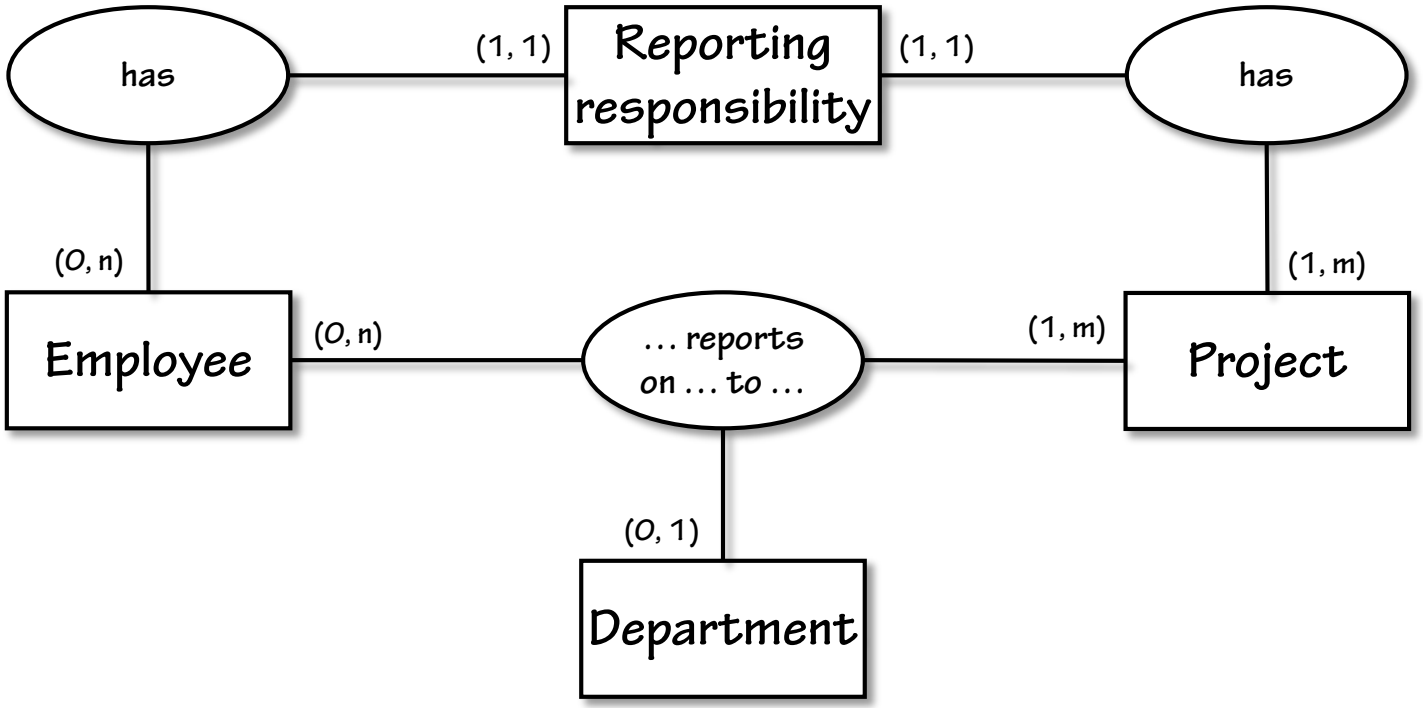

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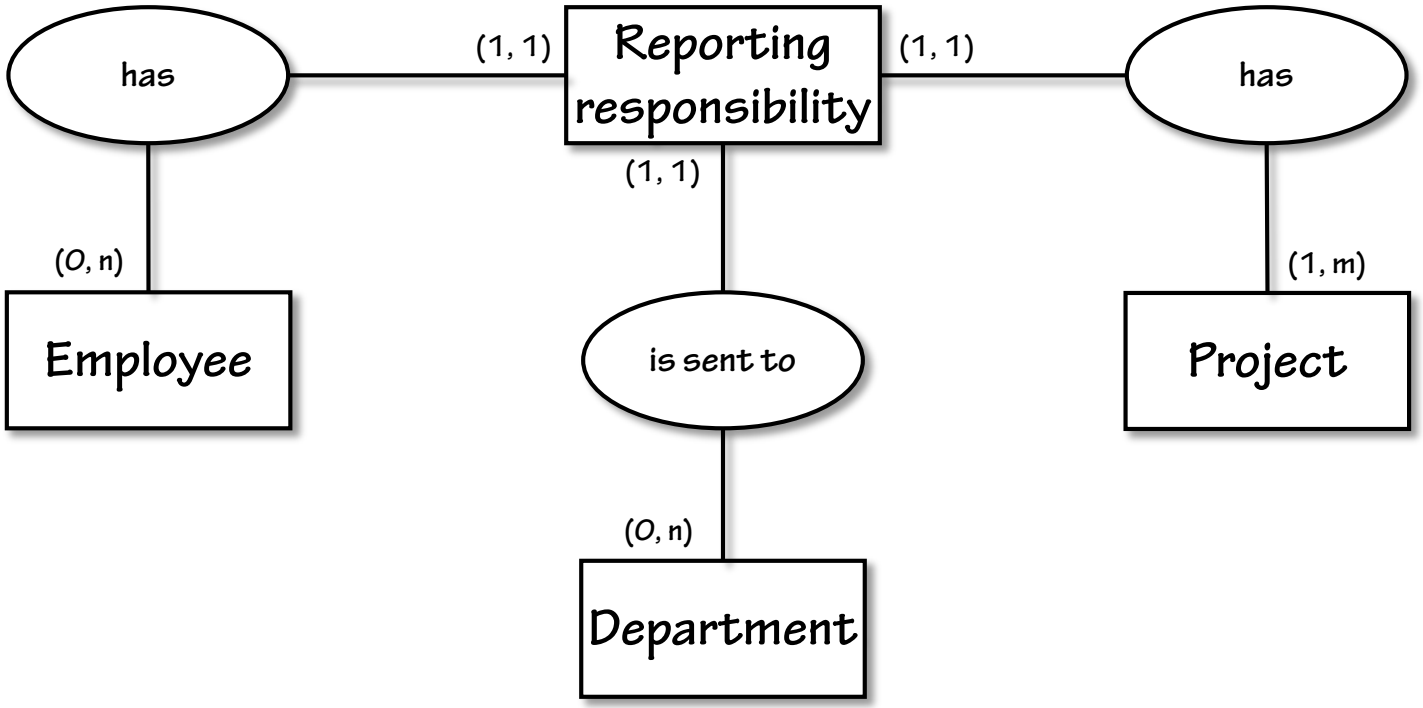
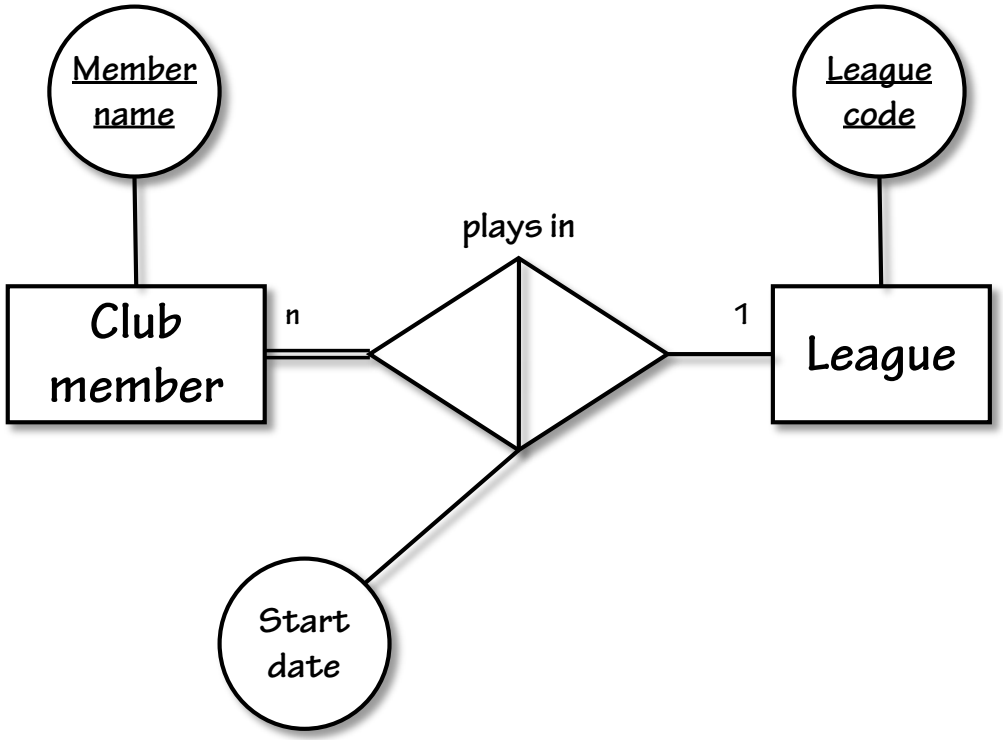


Special relationships

- **“Higher” grade (3 or more)**
  - Cardinalities?
    - Minimum cardinality
    - Maximum cardinality
      - When maximum is 1, deconstruct
      - Fourth and fifth normal form respected?
      - Did you interpret all cardinalities correct?
      - And will the target audience?
  - Always consider transforming to entity type

Special relationships

- Attach attributes to relationships



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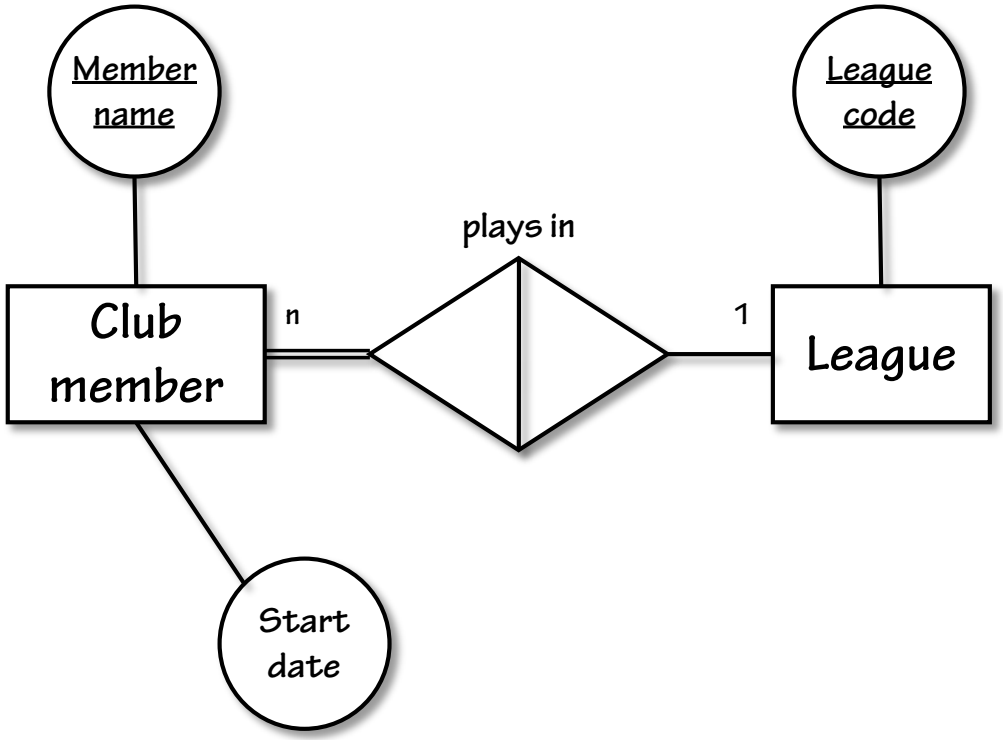

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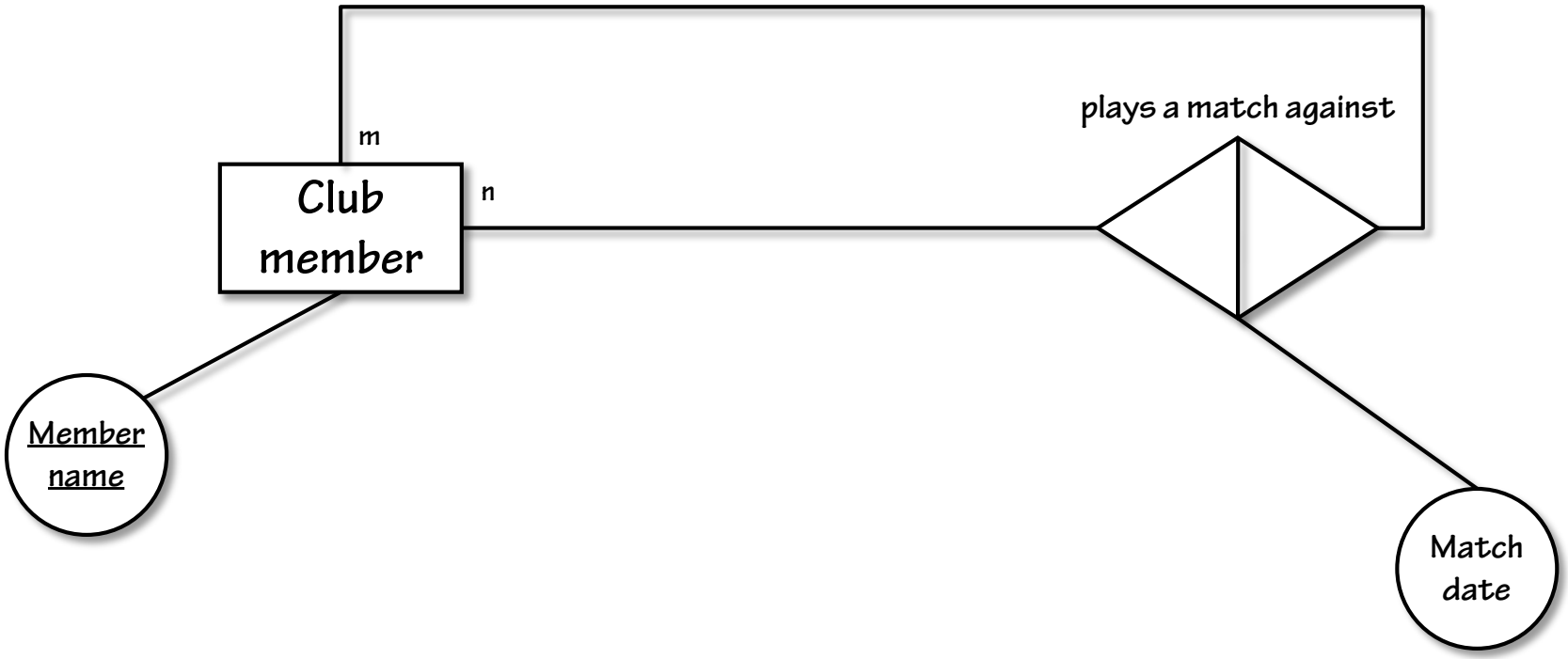

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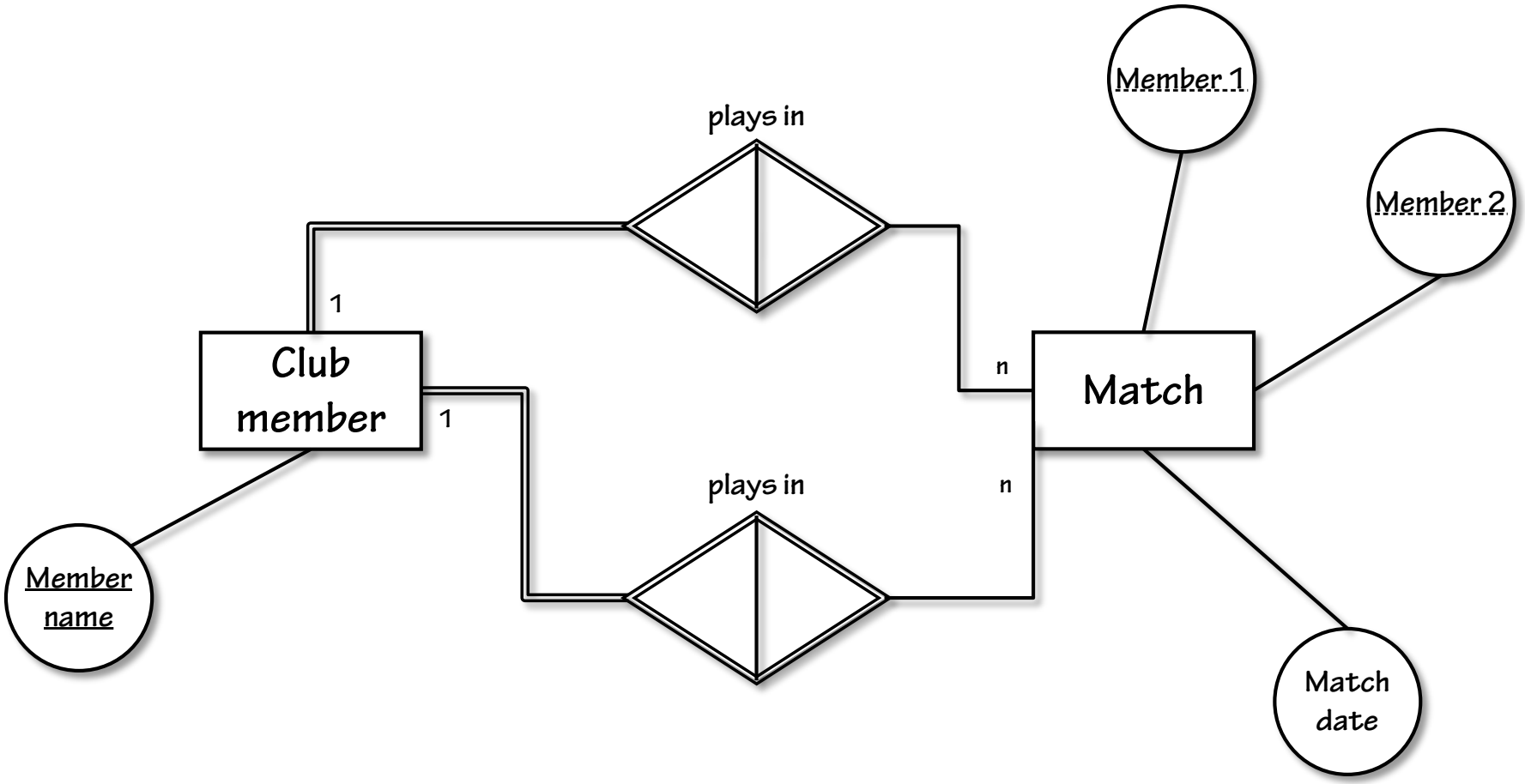

Summary

- **Different symbols**
  - Entity types
  - Attributes
  - Relationships

- **Different constructions allowed**
  - Many-to-many relationships
  - Relationships between more than two entity types

- **Learn one method**
  - Transform other methods to this method