

CONSTRAINTS

P R E P A R E D B Y : L U I S M E I N G

OBJECTIVES:

01

Definition

02

Arcs

03

Arcs, Supertypes, and Subtypes

03

Hierarchies and Recursive Relationships





Constraints

- Every business has restrictions on which attribute values and which relationships are allowed.





Constraints

- for example, every EMPLOYEE must work in one and only one DEPARTMENT.
- They may refer to a single attribute of an entity, or to relationships between entities.

1.1 Definition

Exclusive OR Relationship

- Mutually exclusive relationships sometimes exist between entities

Exclusive OR Relationship

- An Exclusive OR relationship is a relationship between one entity and two (or more) other entities where only one of the relationships can exist at a time

2.1 Arcs



Arcs

- In ERDs, we model Exclusive OR Relationships with an Arc



2.1 Arcs

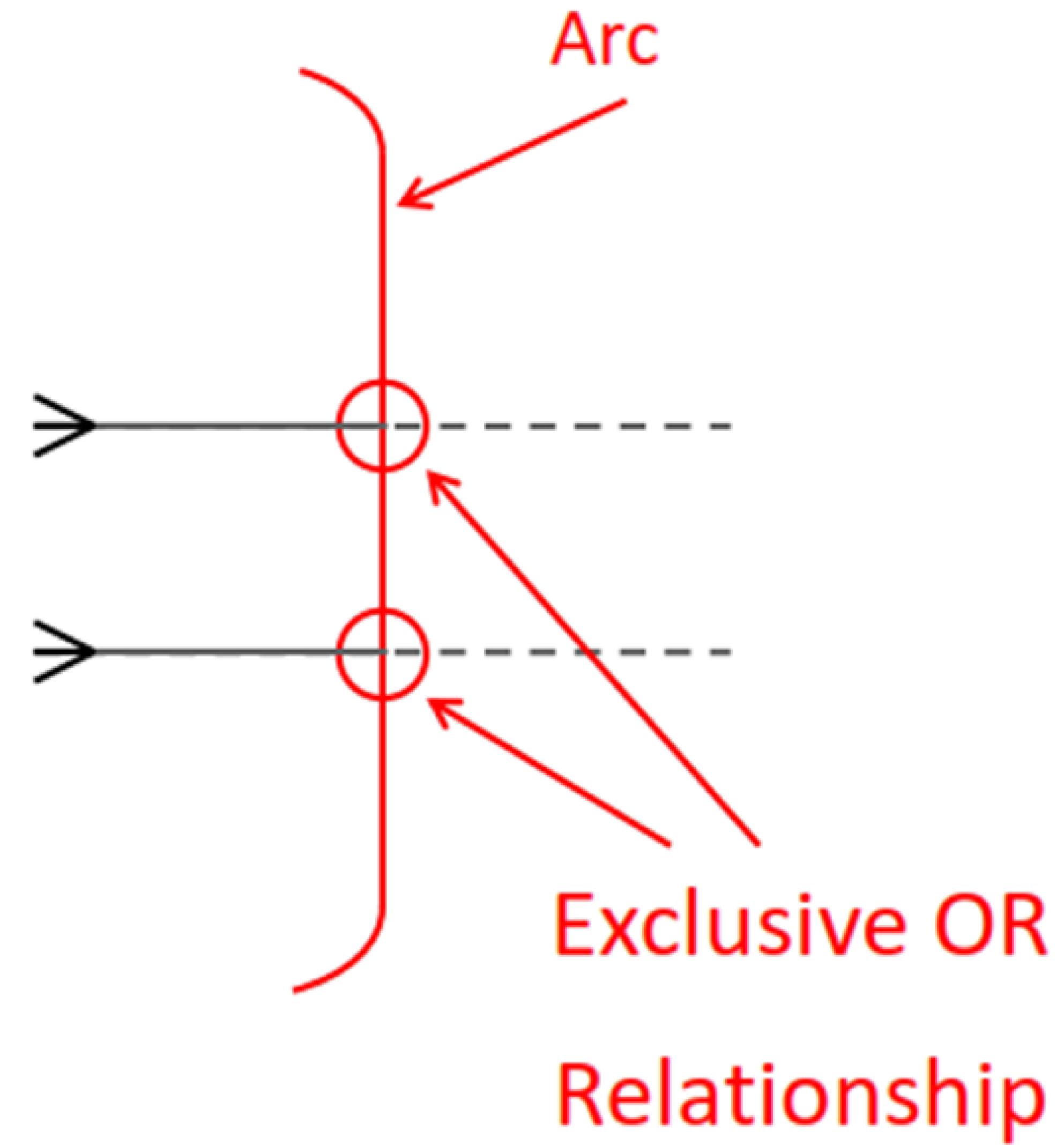
Arcs

- An arc is represented on an ERD as a solid line with curved ends.



2.1 Arcs

Arcs

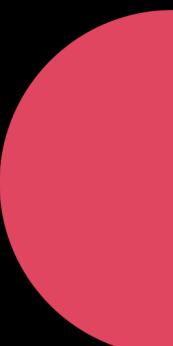
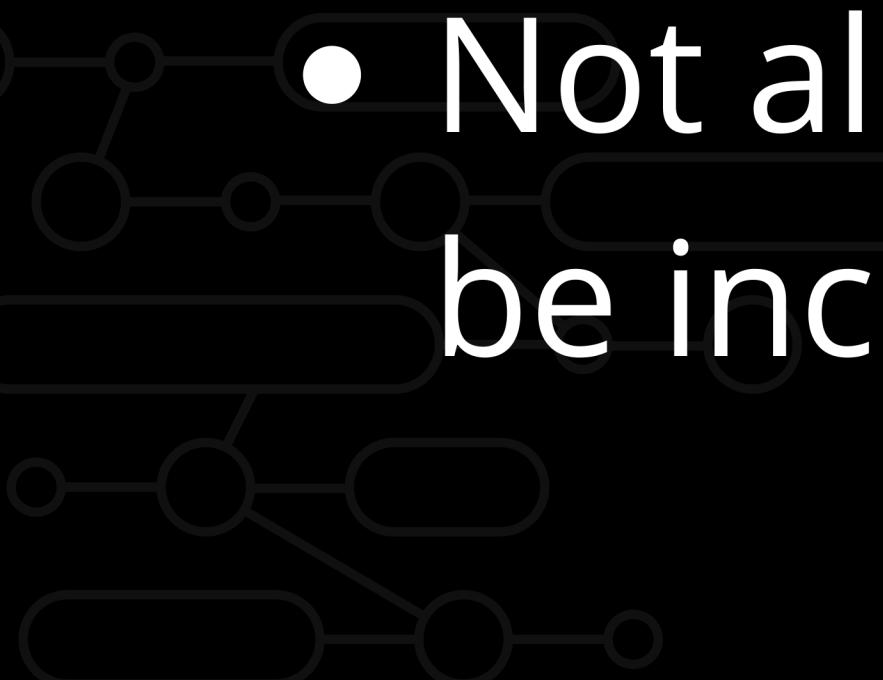


2.1 Arcs

Arcs



- A circle is drawn on the arc for every relationship that is part of the arc.
- An arc always belongs to one entity.
 - Not all relationships of an entity need to be included in an arc.



2.1 Arcs



Arcs

- An entity may have several arcs.
- An arc should always consist of relationships of the same optionality.



2.1 Arcs



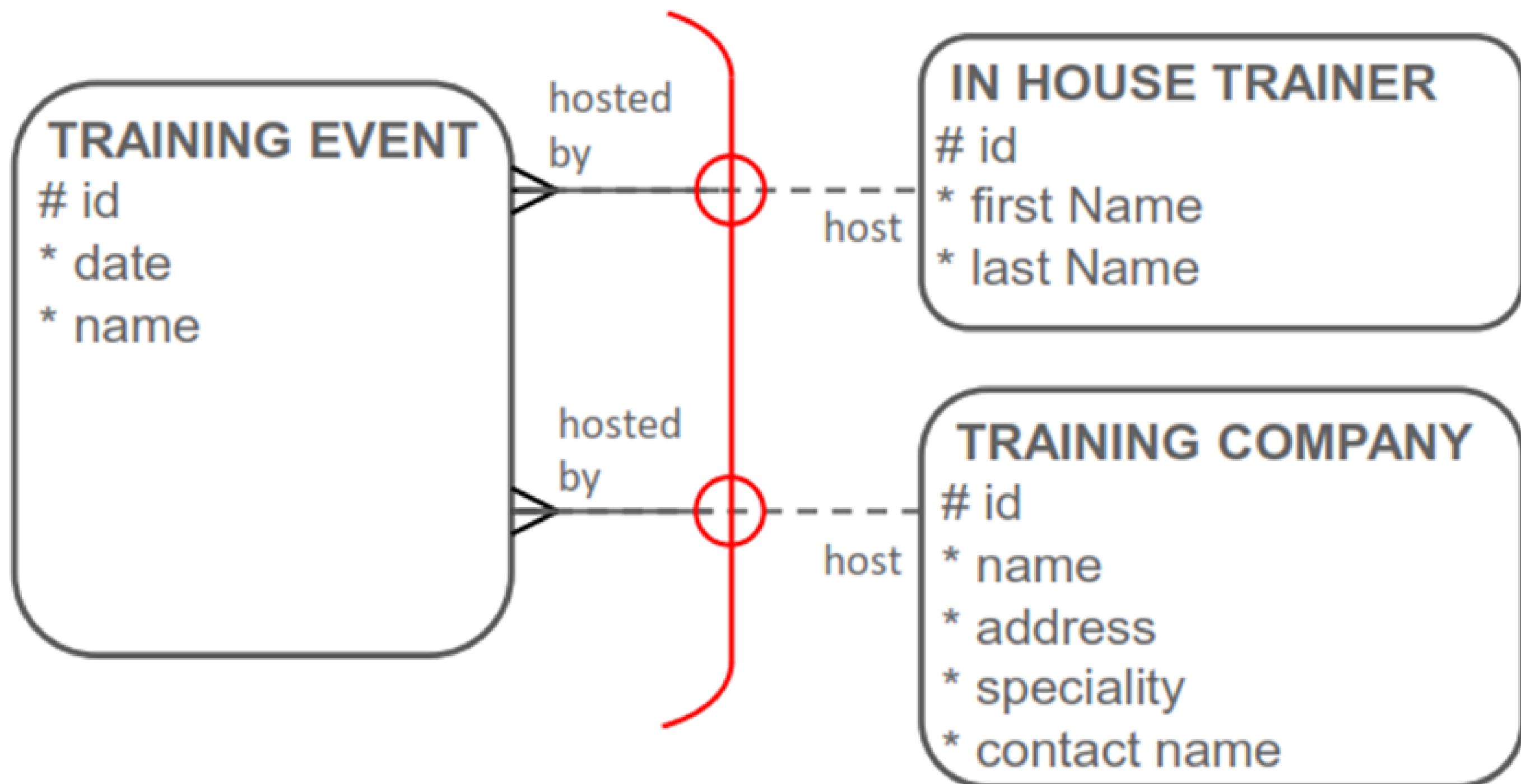
Arcs Example

- A TRAINING EVENT can be hosted by either an IN HOUSE TRAINER or an external TRAINING COMPANY.



2.1 Arcs

Arcs





Arcs Example

- Each TRAINING EVENT must be hosted by one and only one IN HOUSE TRAINER OR one and only one TRAINING COMPANY.
 - It cannot be both, so only one of the relationships can exist at a time. This is an example of an Exclusive OR Relationship.

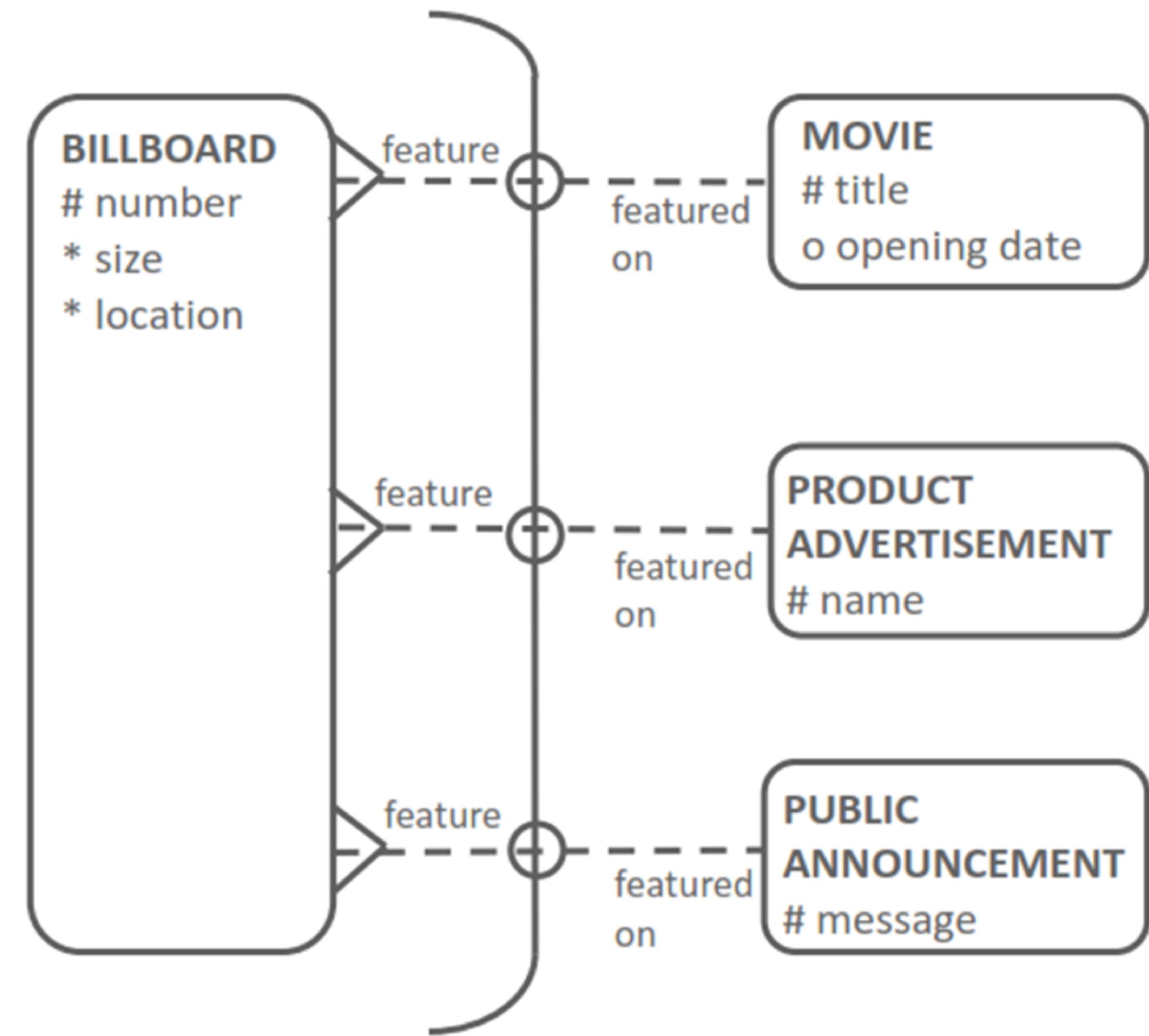


Arcs Example

- A billboard is an advertising space that can feature a movie, a product, or a public announcement. It may contain advertising about only one of these at a time.

2.1 Arcs

Arcs





Arcs Example

- Each “feature” has its own characteristics or attributes.
- The arc tells the reader of the diagram that only one of these “features” will have a relationship with each instance of a BILLBOARD.

2.1 Arcs



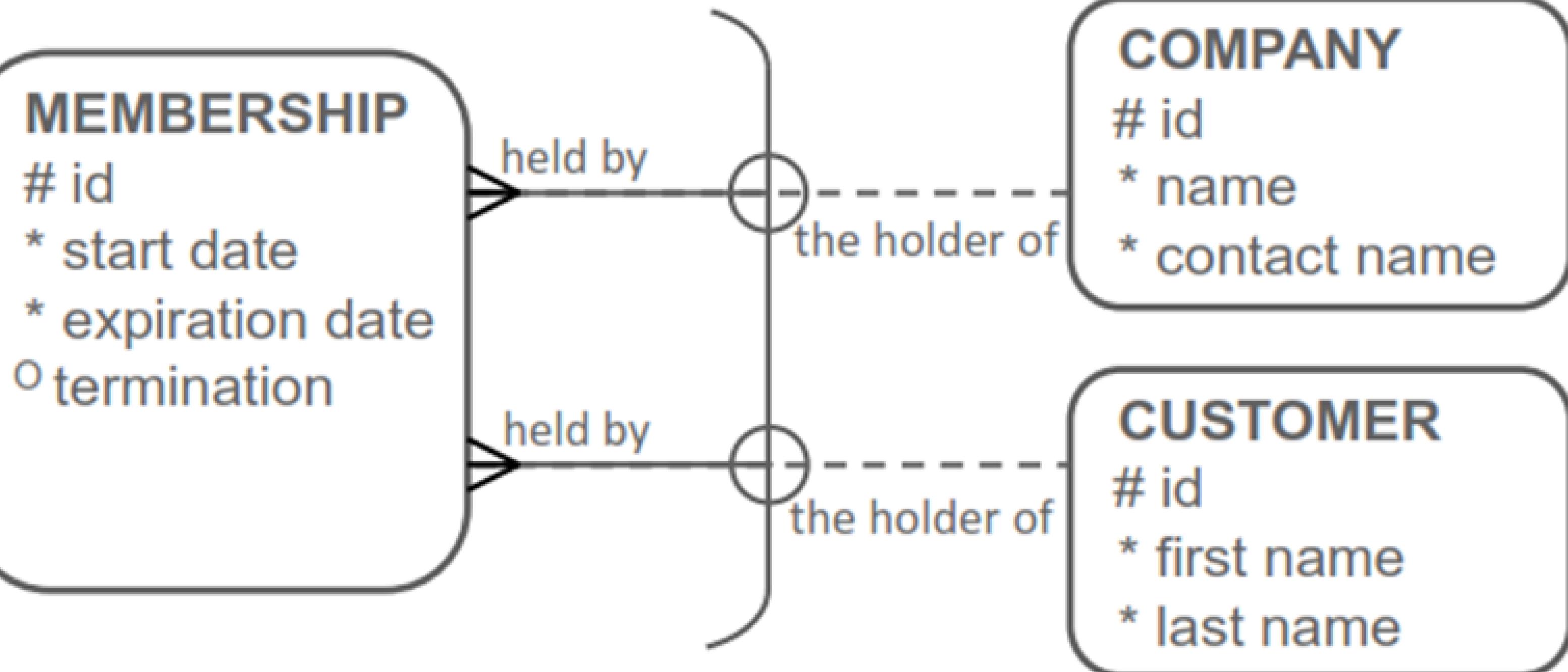
Arcs Example

- A gym MEMBERSHIP must be held by one and only one COMPANY OR one and only one CUSTOMER.



2.1 Arcs

Arcs





Arcs Example

- This arc represents the exclusive OR relationship - each MEMBERSHIP must be held by one COMPANY or must be held by one CUSTOMER, but not both.

3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes

- Arcs and Super/subtypes both model mutual exclusiveness.
- Certain situations are best modeled as an arc, and others as supertype and subtypes.

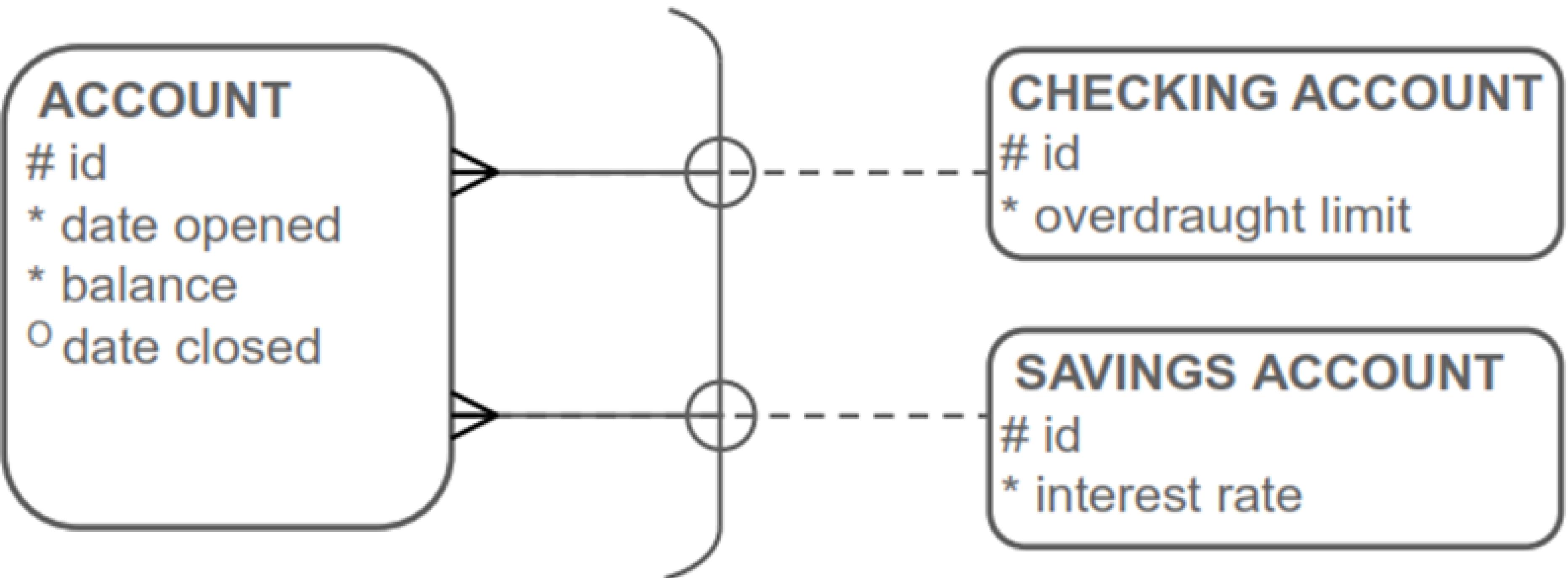
3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example

- CHECKING ACCOUNT and SAVINGS ACCOUNT are “types” of ACCOUNT in a bank.

3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example



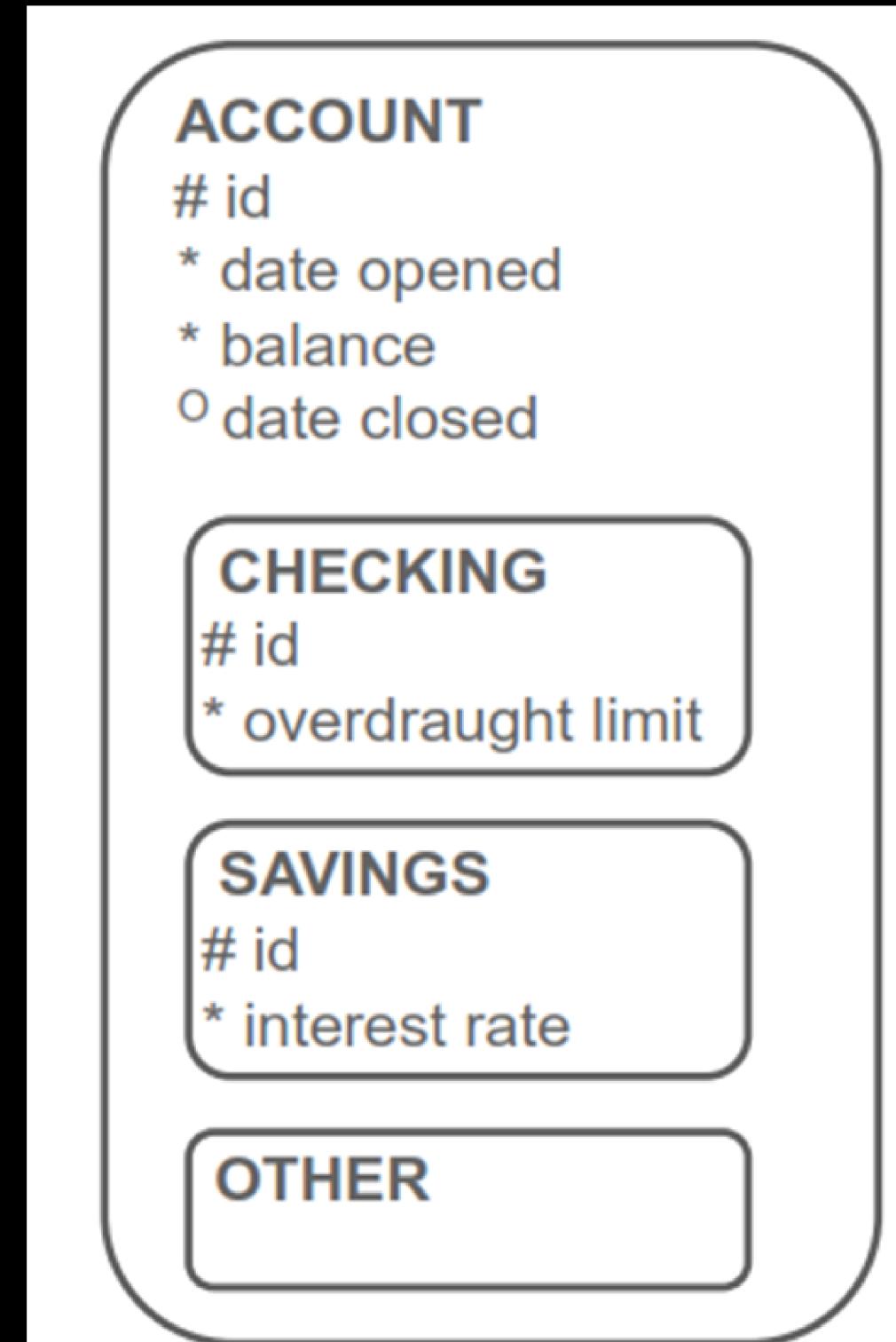
3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example

- This should be modeled as supertype and subtypes.
- Use supertypes/subtypes when you want to represent classifications or types of things.

3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example



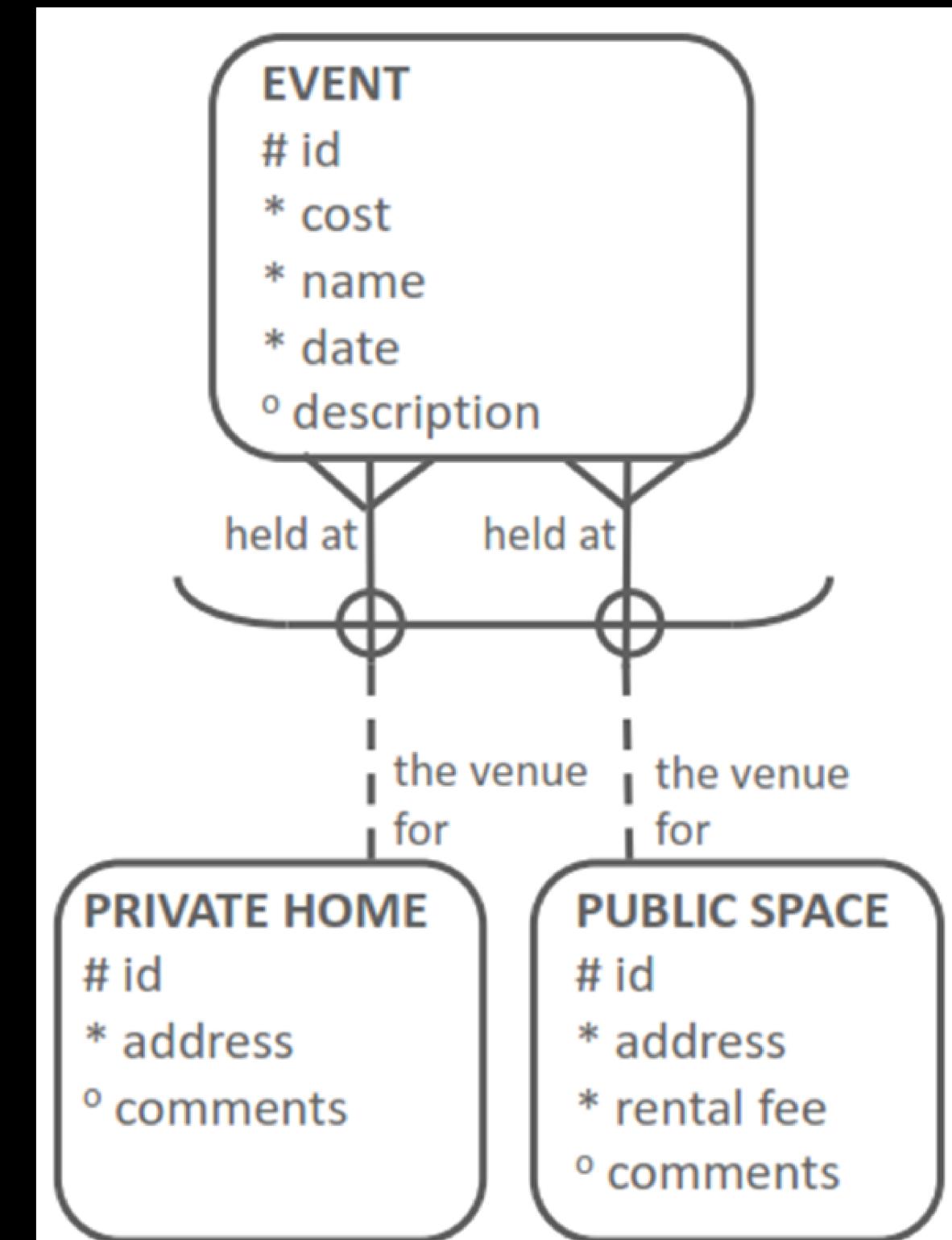
3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example

- An EVENT can be held at either a PRIVATE HOME or a PUBLIC SPACE.

3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example



3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example

- If the entities that are related through the arc are similar, there may be a case for creating a super/subtype without an arc.

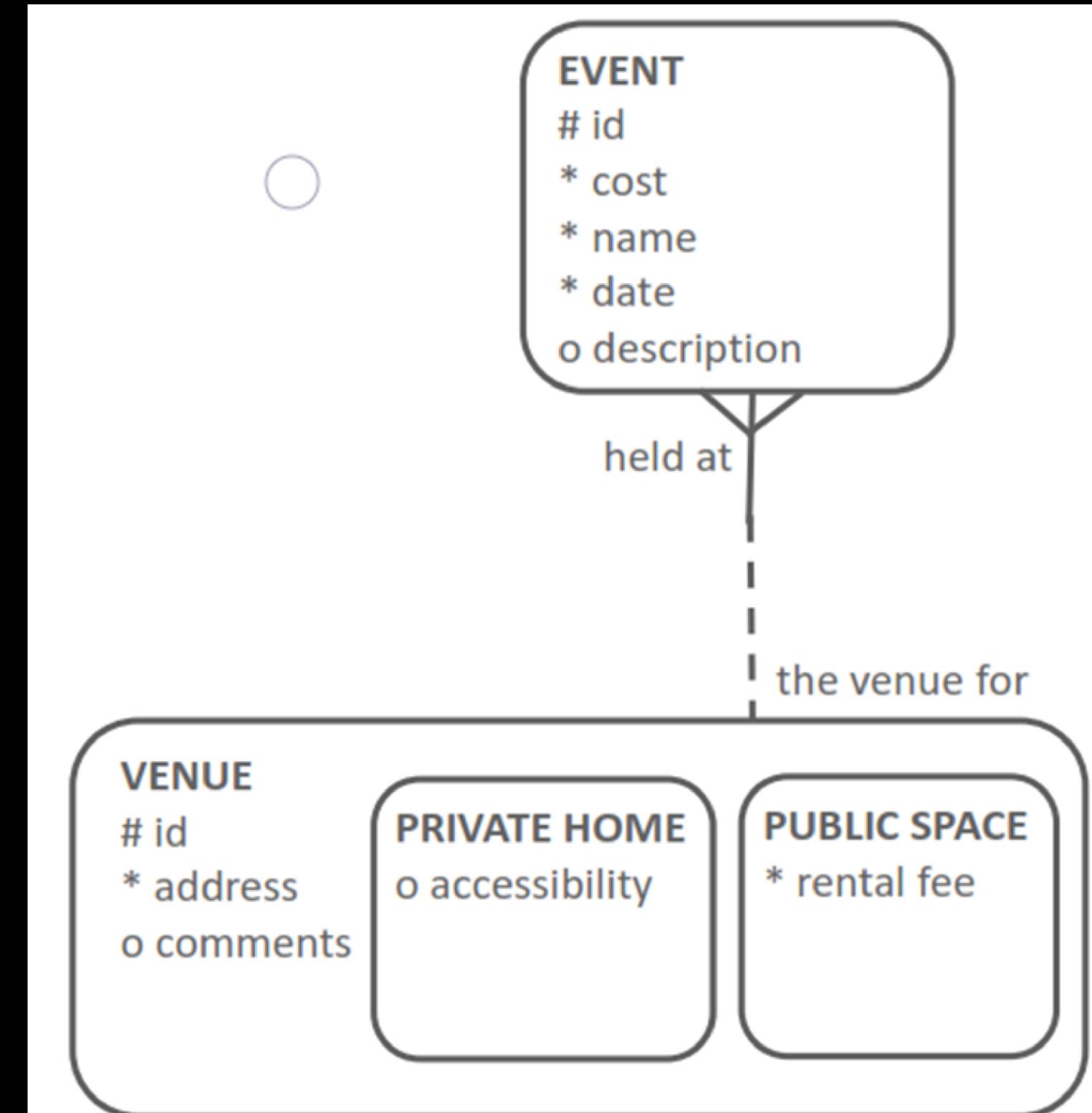
3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example

- In this case, both PRIVATE HOME and PUBLIC SPACE are types of VENUE, and they have broadly similar attributes, so they could be supertype and subtypes.

3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example



3.1 Arcs, Supertypes, and Subtypes

Arcs, Supertypes, and Subtypes Example

- If the mutually exclusive entities on the “one” end of the 1:M relationship can be (and should be) combined into a single entity with subtypes, then clearly we don’t need an arc. This would actually be a good choice here since many common attributes exist between the entities PRIVATE HOME and PUBLIC SPACE, so there is no overriding need to model them as two distinct entities.

4.1 Hierarchies and Recursive Relationships

Hierarchies

- Often, roles in the workplace are organized by hierarchy
- Hierarchical data is very common.

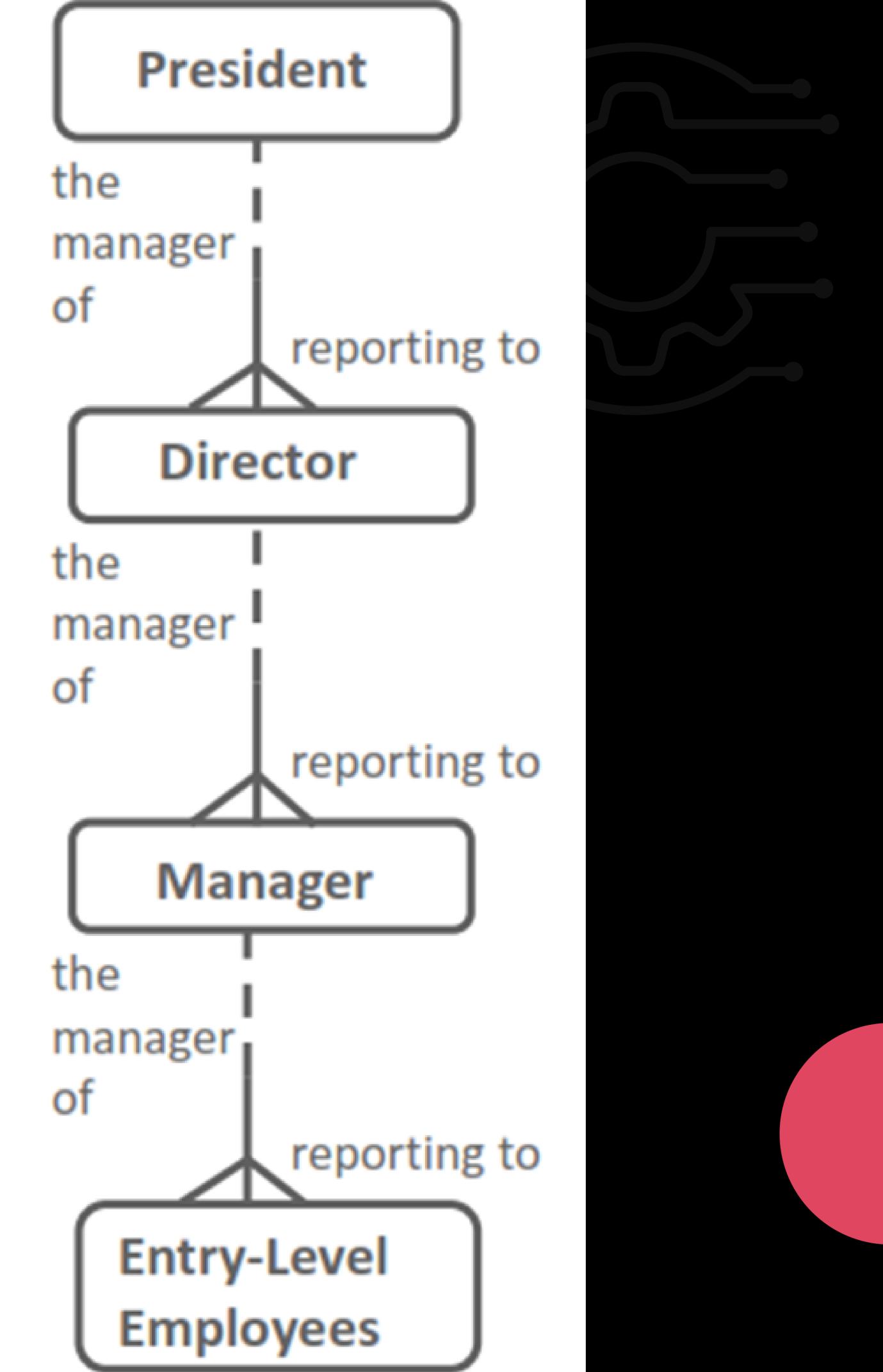
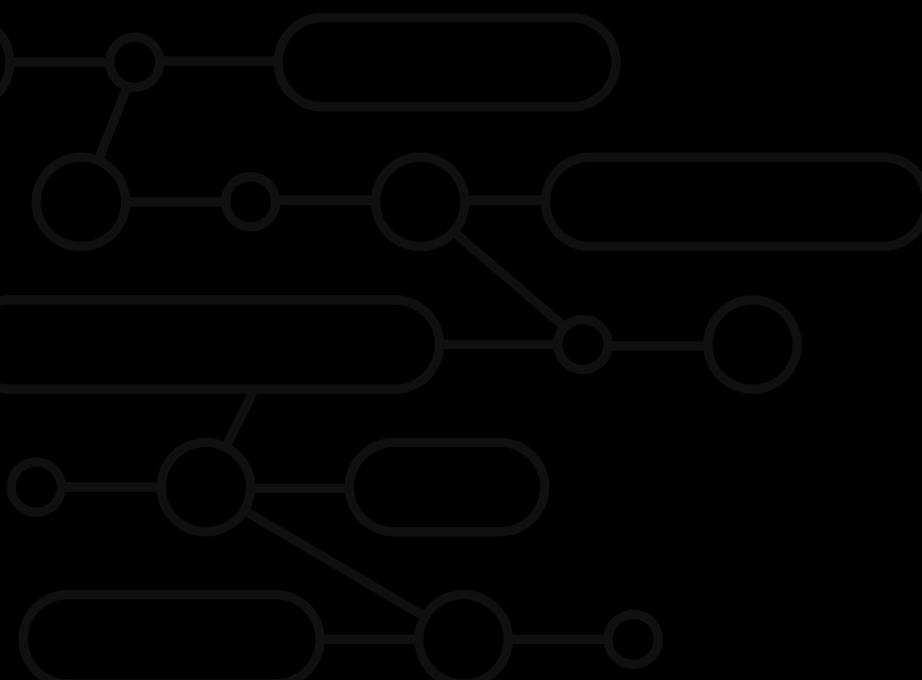
4.1 Hierarchies and Recursive Relationships

Hierarchies

- at work (manager, crew chief, front-counter clerk, food preparers), or in school (headmaster or principal, assistant headmaster or assistant principal, teachers, staff).

4.1 Hierarchies and Recursive Relationships

Hierarchies

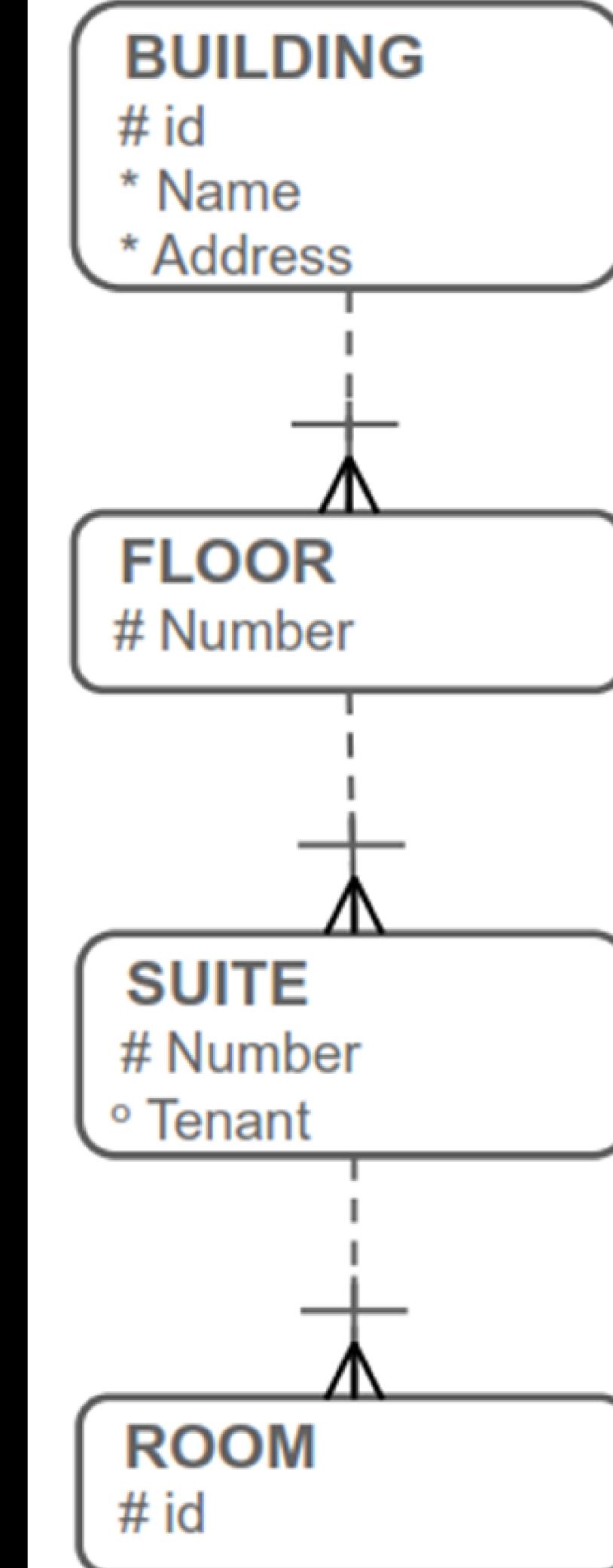


4.1 Hierarchies and Recursive Relationships

Hierarchies

- A chart for rooms in a hotel chain can look like this:

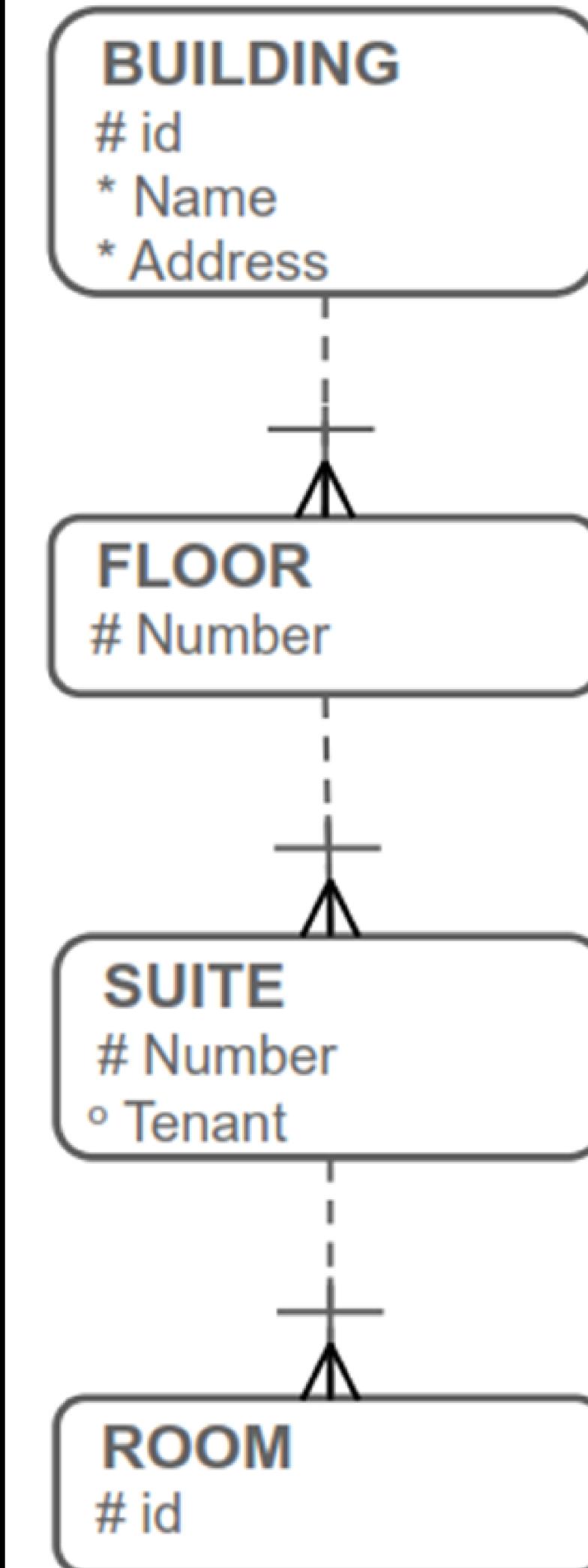
- Notice the barred relationships?



4.1 Hierarchies and Recursive Relationships

Hierarchies

- the UID of FLOOR is the combination of FLOOR number and the BUILDING id
- the UID of SUITE is the combination of SUITE number and the FLOOR number and the BUILDING id
- the UID of ROOM is the combination of ROOM id and SUITE number and FLOOR number and the BUILDING id



4.1 Hierarchies and Recursive Relationships

Recursive Relationship

- a relationship between an entity and itself
 - The ERD convention to show a recursive relationship is drawn as a loop, also known as a “pig's ear”

EMPLOYEE
badge number
• first name
• job
• salary
o budget
o bonus plan
o car plan

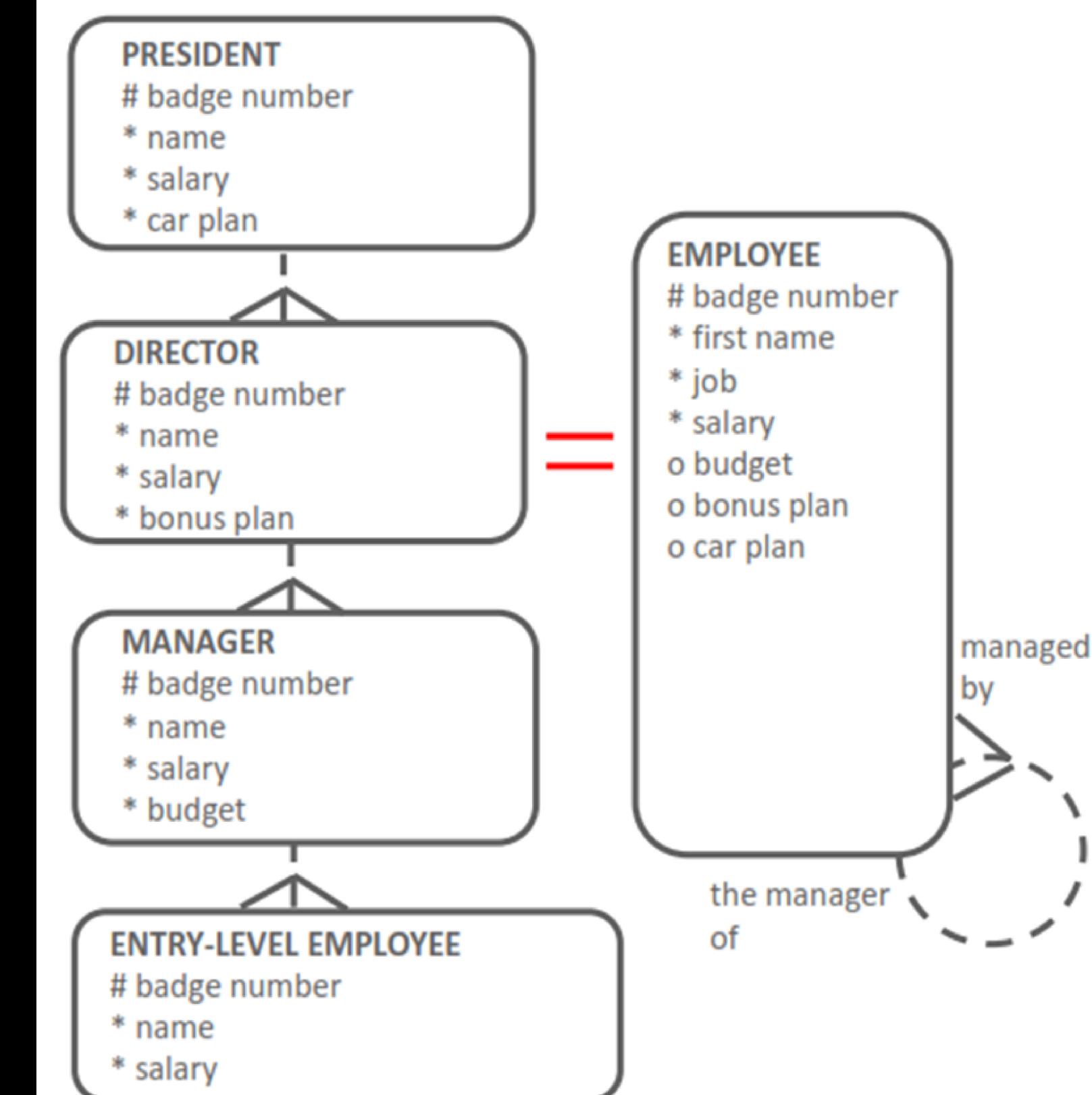
managed
by

the manager
of

4.1 Hierarchies and Recursive Relationships

Hierarchies and Recursive Relationships

- Both models represent all employees.
- The one on the left is a hierarchical structure.
- The one on the right uses a recursive relationship.
- A relationship cannot be both hierarchical and recursive at the same time.



4.1 Hierarchies and Recursive Relationships

Hierarchies and Recursive Relationships

- Hierarchical structures are more explicit and are easier for most people to understand because they are very similar to an organizational chart.
- In this way, your data model truly reflects the business rules.

4.1 Hierarchies and Recursive Relationships

Hierarchies and Recursive Relationships

- Recursive relationships tend to be simpler because you are using only one entity.
Your diagram will be less “busy.”
However, they are less specific.

4.1 Hierarchies and Recursive Relationships

Hierarchies and Recursive Relationships Example

- For an automobile manufacturing organization, consider all elementary parts, subassemblies, assemblies, and products as instances of an entity called COMPONENT.

4.1 Hierarchies and Recursive Relationships

Hierarchies and Recursive Relationships Example

- Each COMPONENT may be a part of one or more COMPONENTS.
- Each COMPONENT may be made up of one or more COMPONENTS

