RELATIONSHIP TYPES

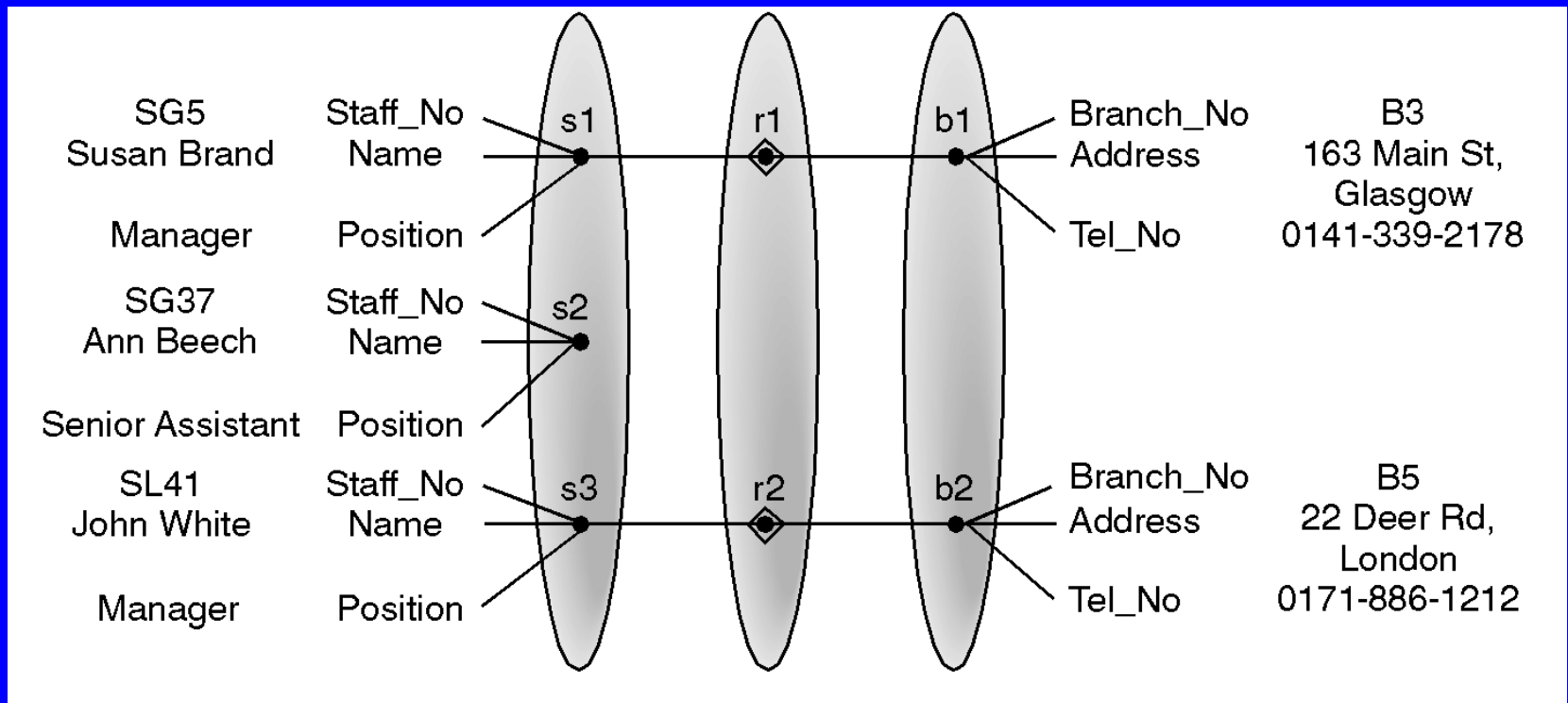
Relationship type: a meaningful association among entity types.

Relationship: an association of entities where the association includes one entity from each participating entity type.

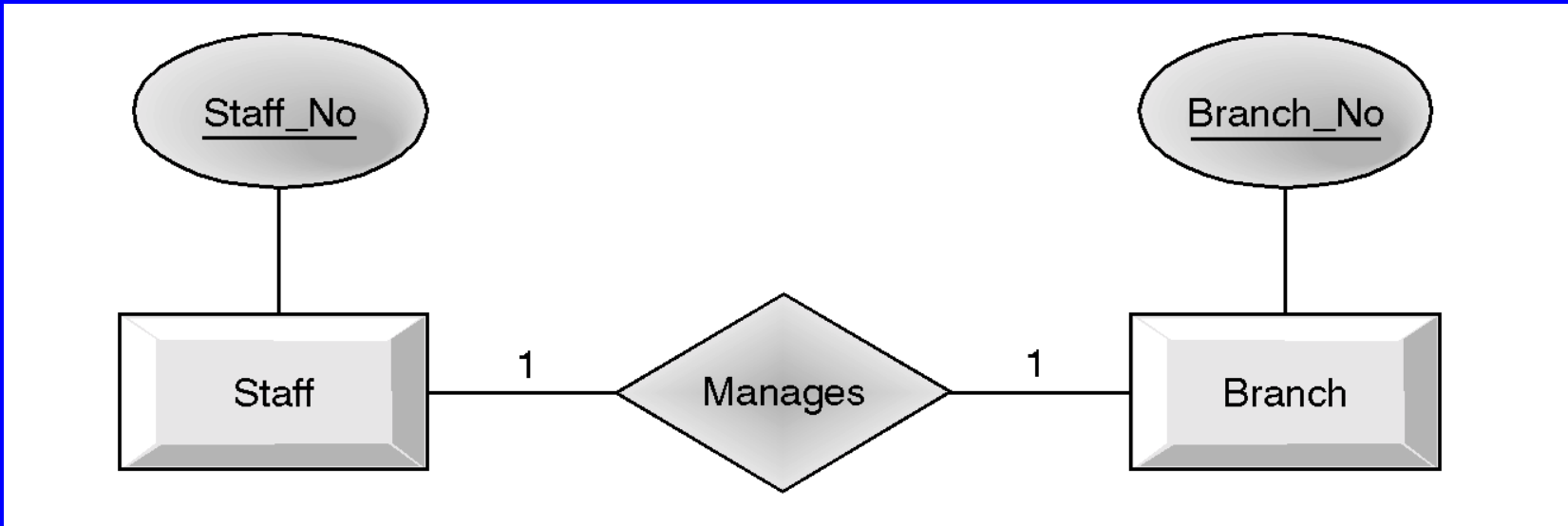
Each uniquely identifiable occurrence of a relationship type is referred to as a relationship.

A relationship indicates the particular entities that are related.

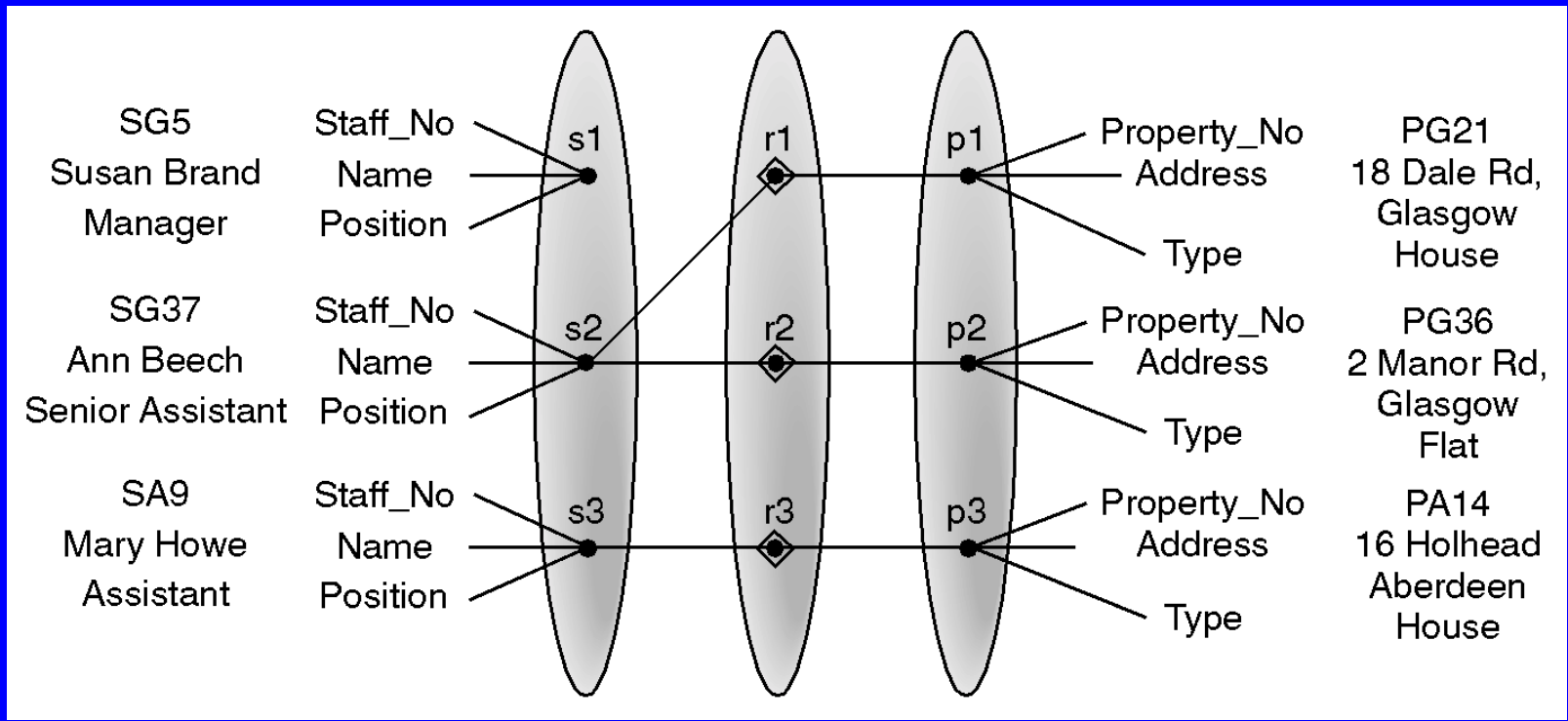
A Semantic Net Model of Staff *Manages* Branch Relationship



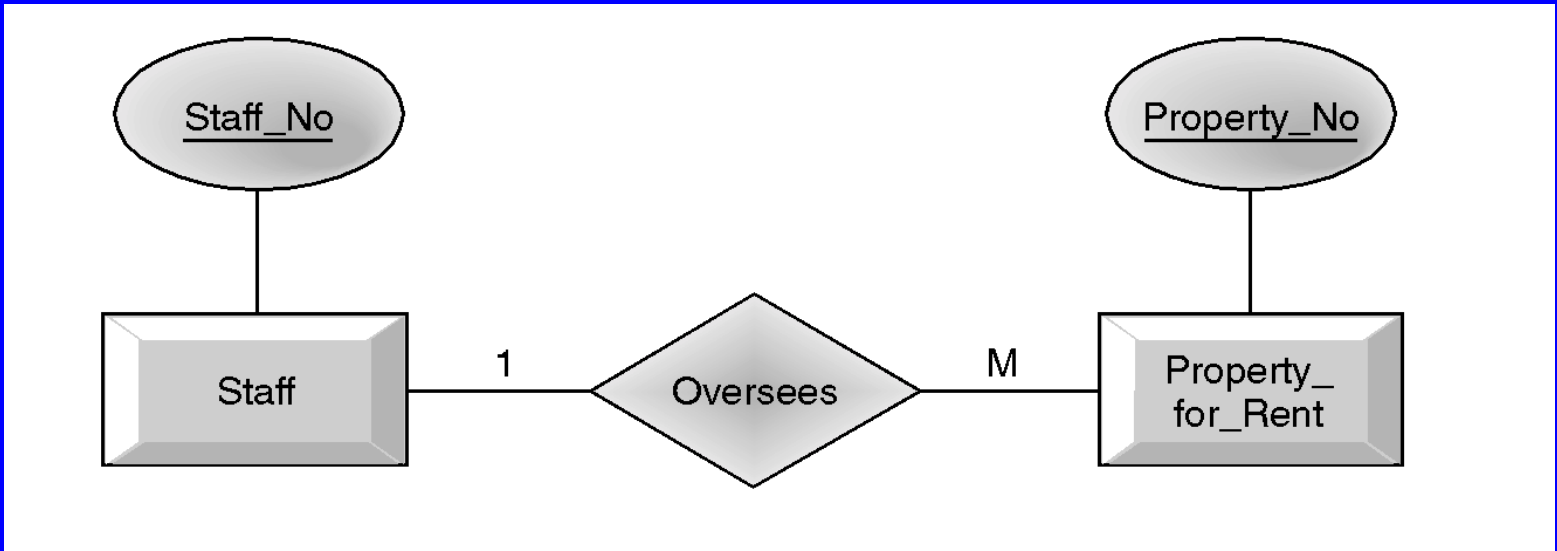
Staff *Manages* Branch (1:1) Relationship



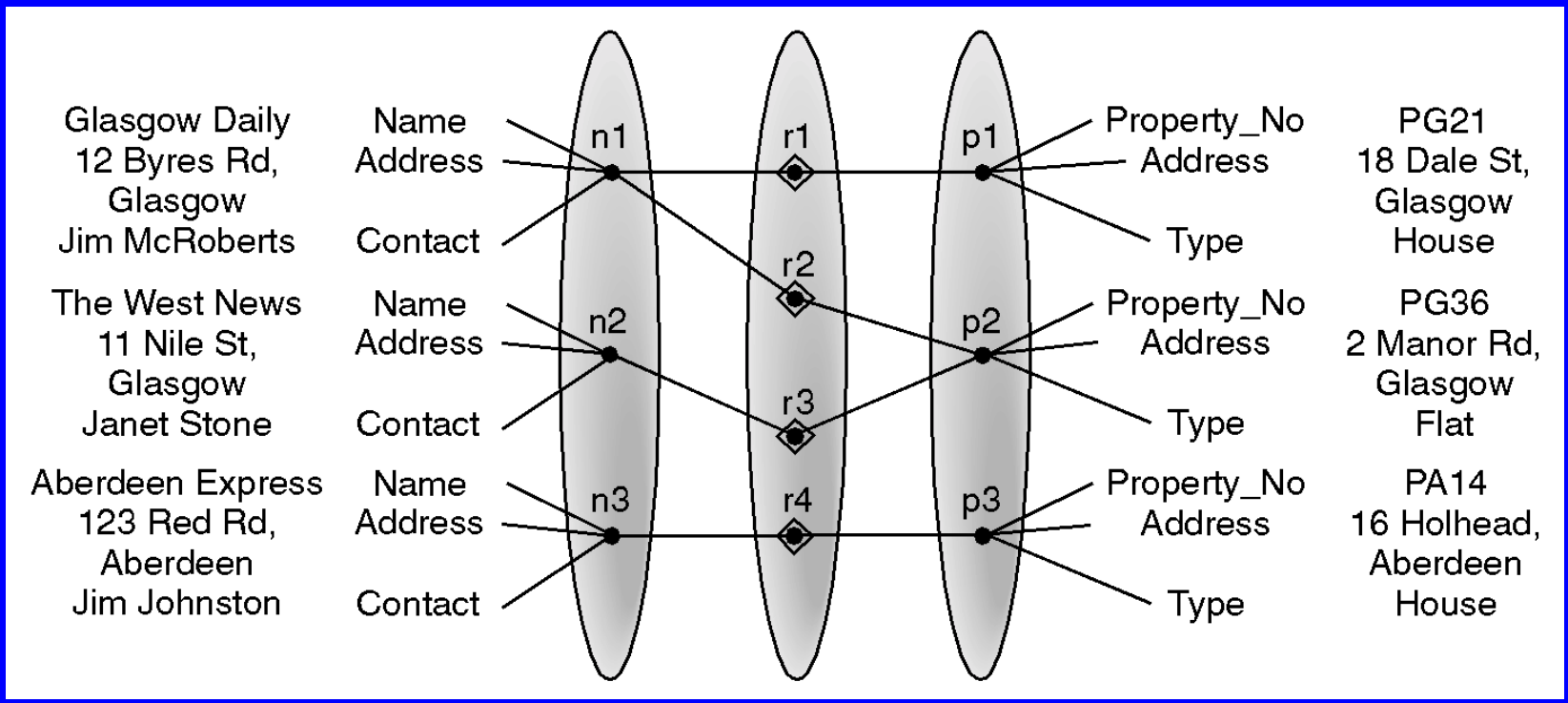
Semantic Net Diagram of Staff *Oversees* Property_for_Rent Relationship



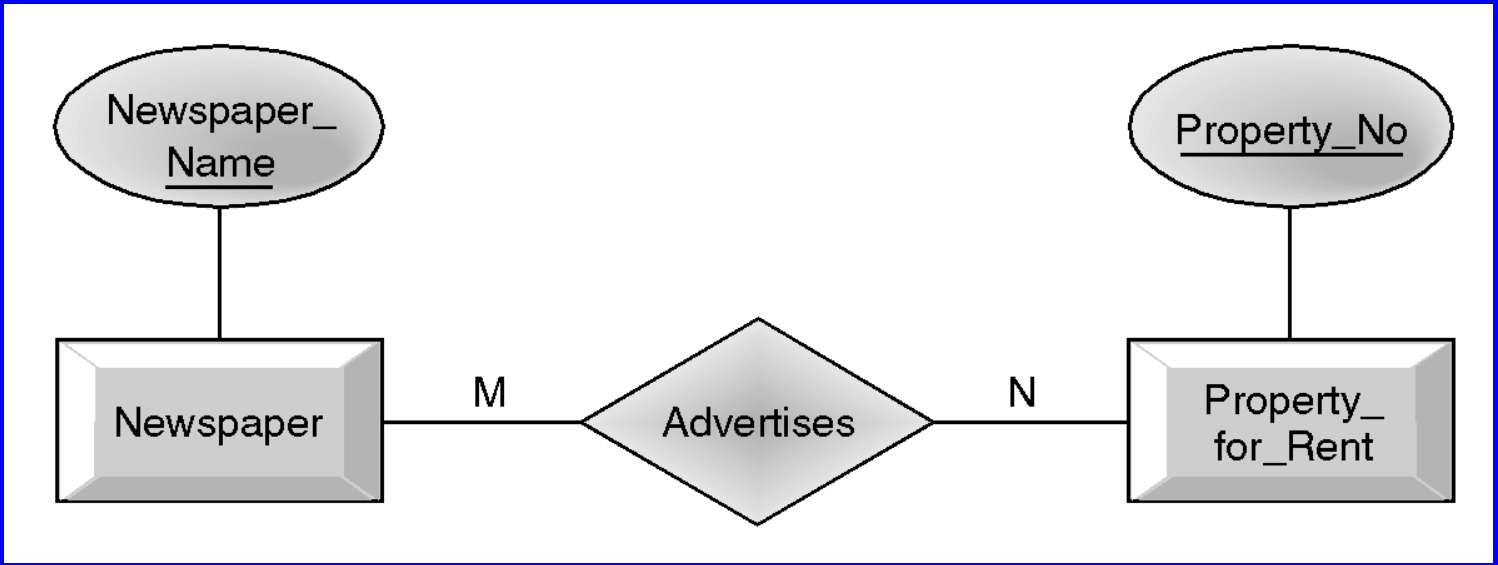
Staff *Oversees* Property_for_Rent (1:M) Relationship



Semantic Net Diagram of Newspaper *Advertises* Property_for_Rent Relationship



Newspaper *Advertises* Property_for_Rent (M:N) Relationship



Problems with ER Models

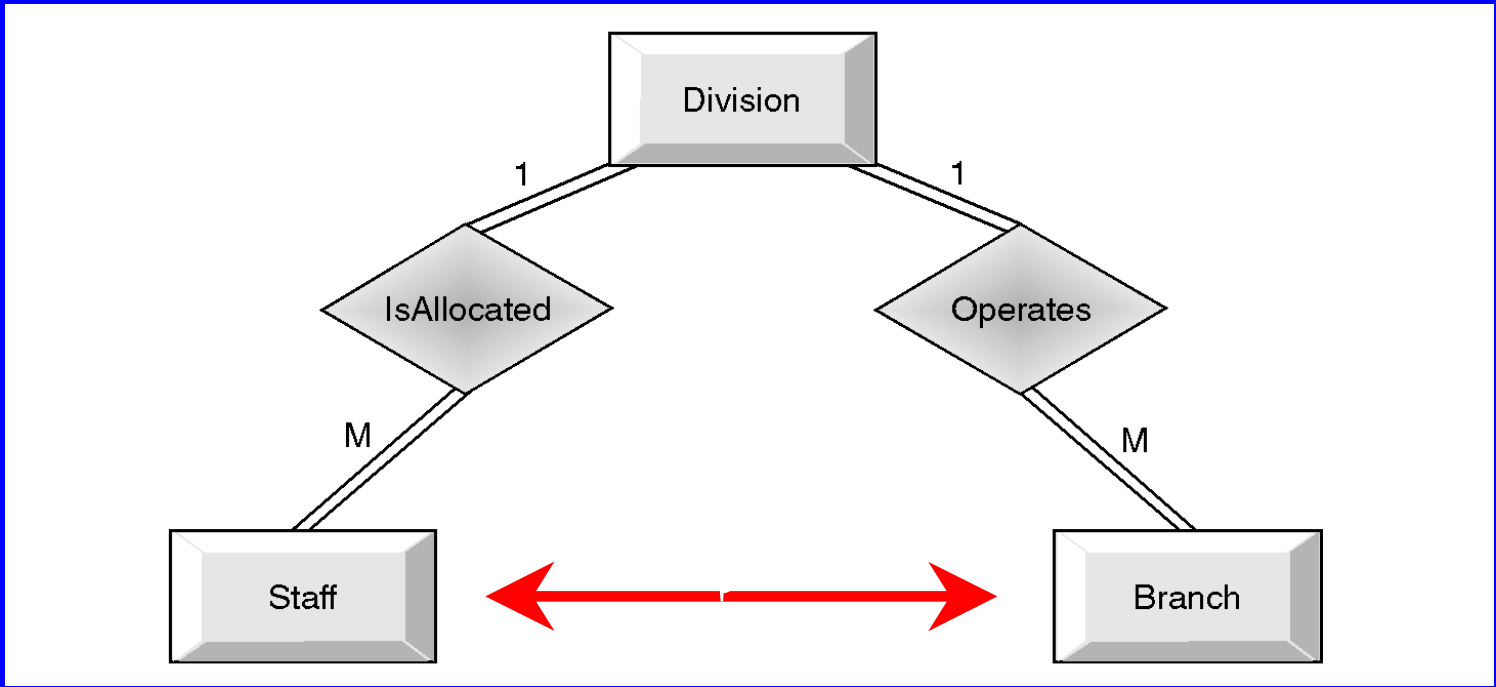
- Problems may arise when designing a conceptual data model called connection traps.
- Often due to a misinterpretation of the meaning of certain relationships.
- Two main types of connection traps are called *fan* traps and *chasm* traps.

Problems with ER Models

- “Fan Trap”
  - When a model shows a relationship between entity types, but the pathway between certain entity occurrences is “ambiguous”.

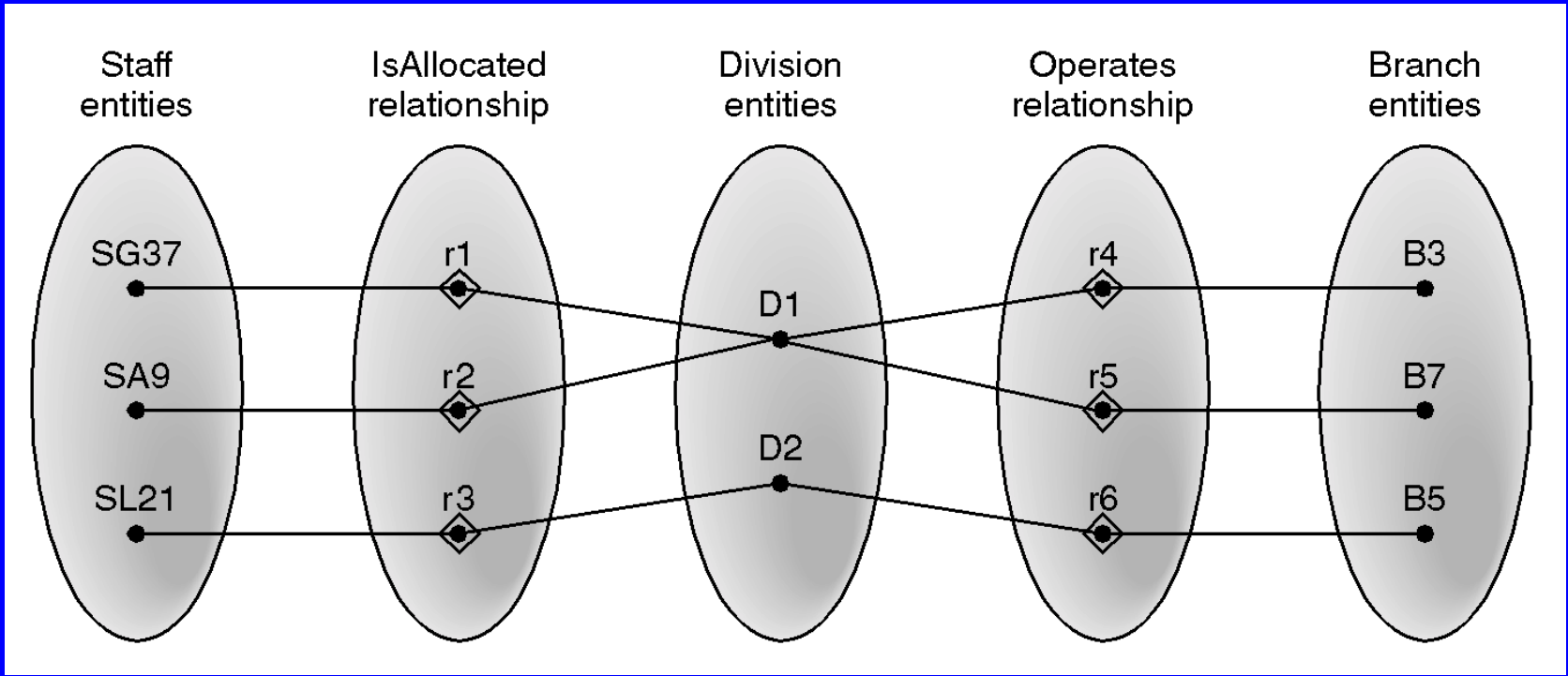
- “Chasm Trap”
  - When a model “suggests” the existence of a relationship between entity types, but no pathway between certain entity occurrences does exist.

An Example of a “Fan Trap”

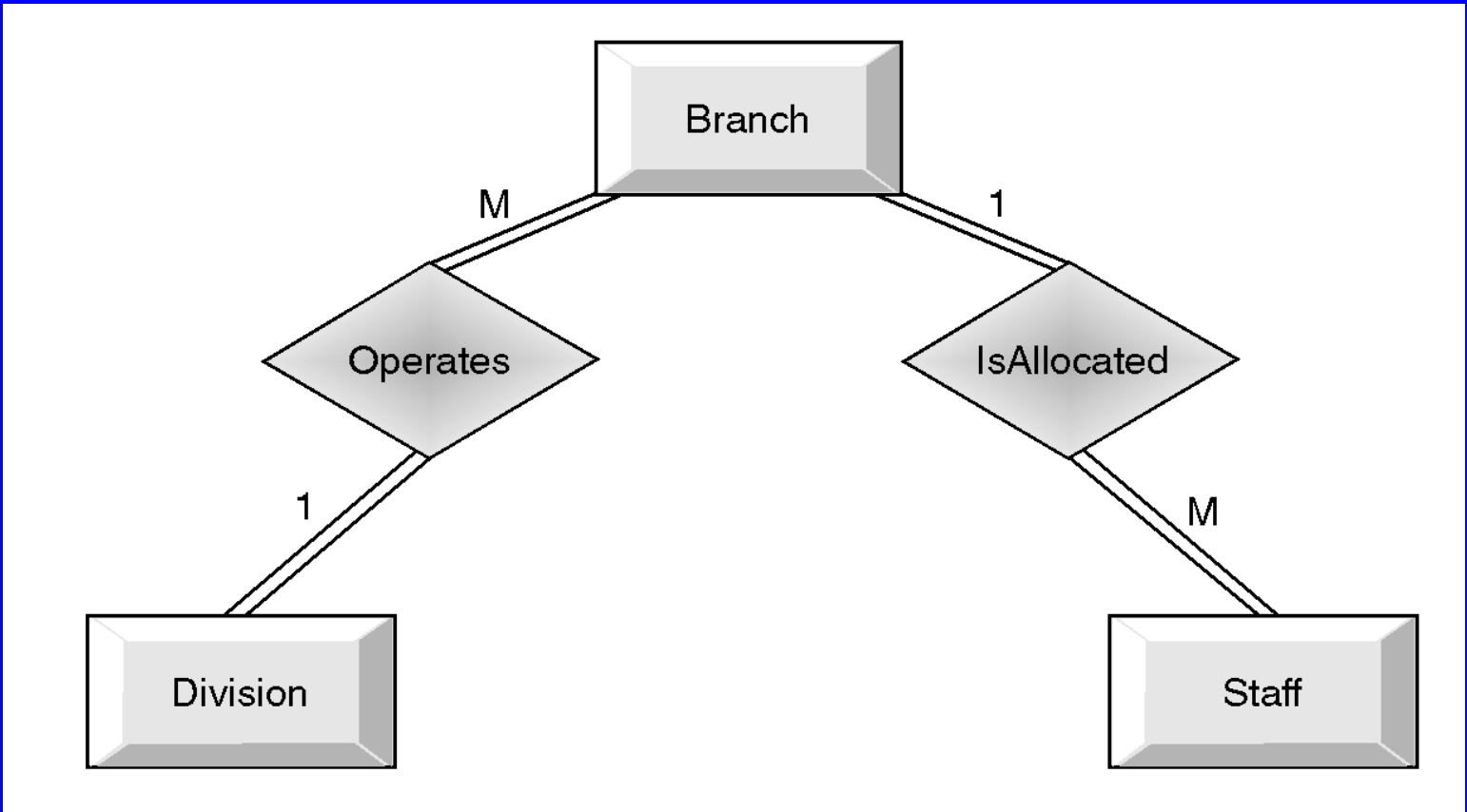


- Where is the assignment of Staff to (unique) Branches?

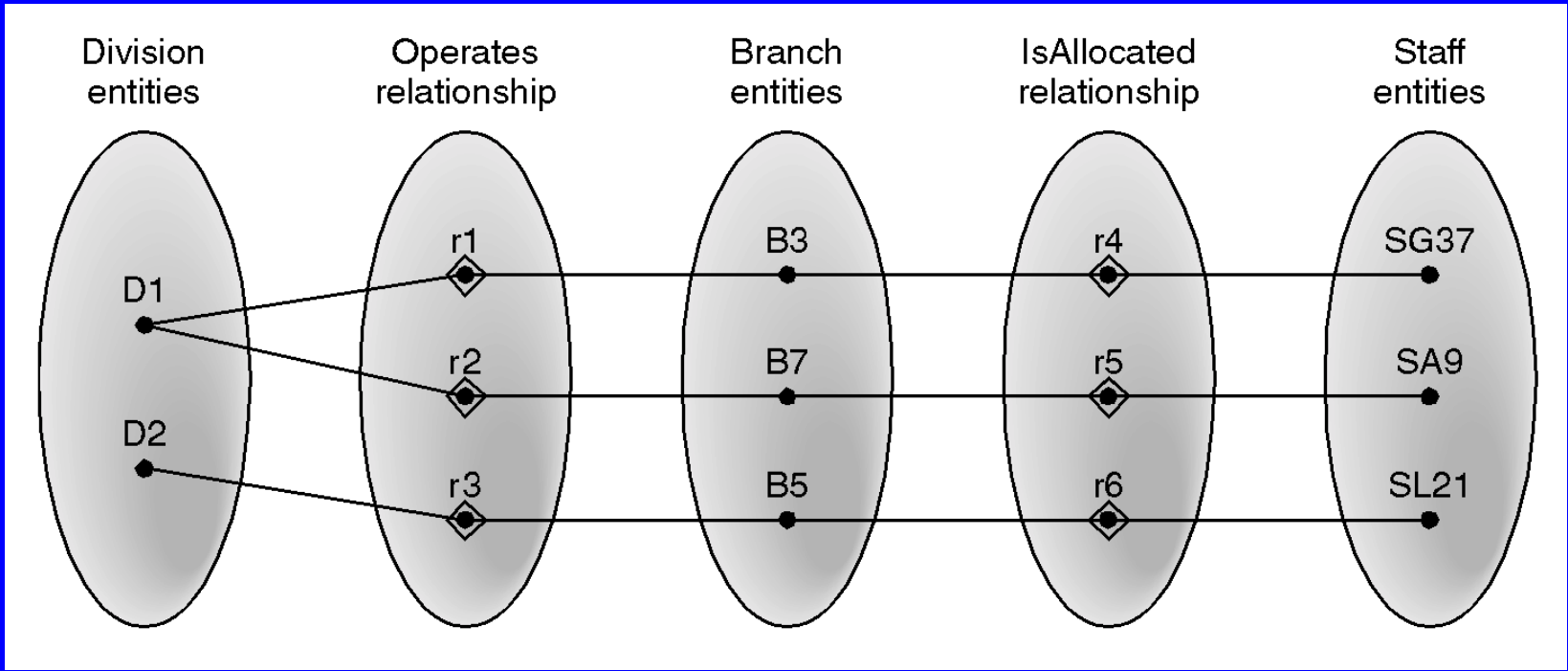
Semantic Net of ER Model with Fan Trap



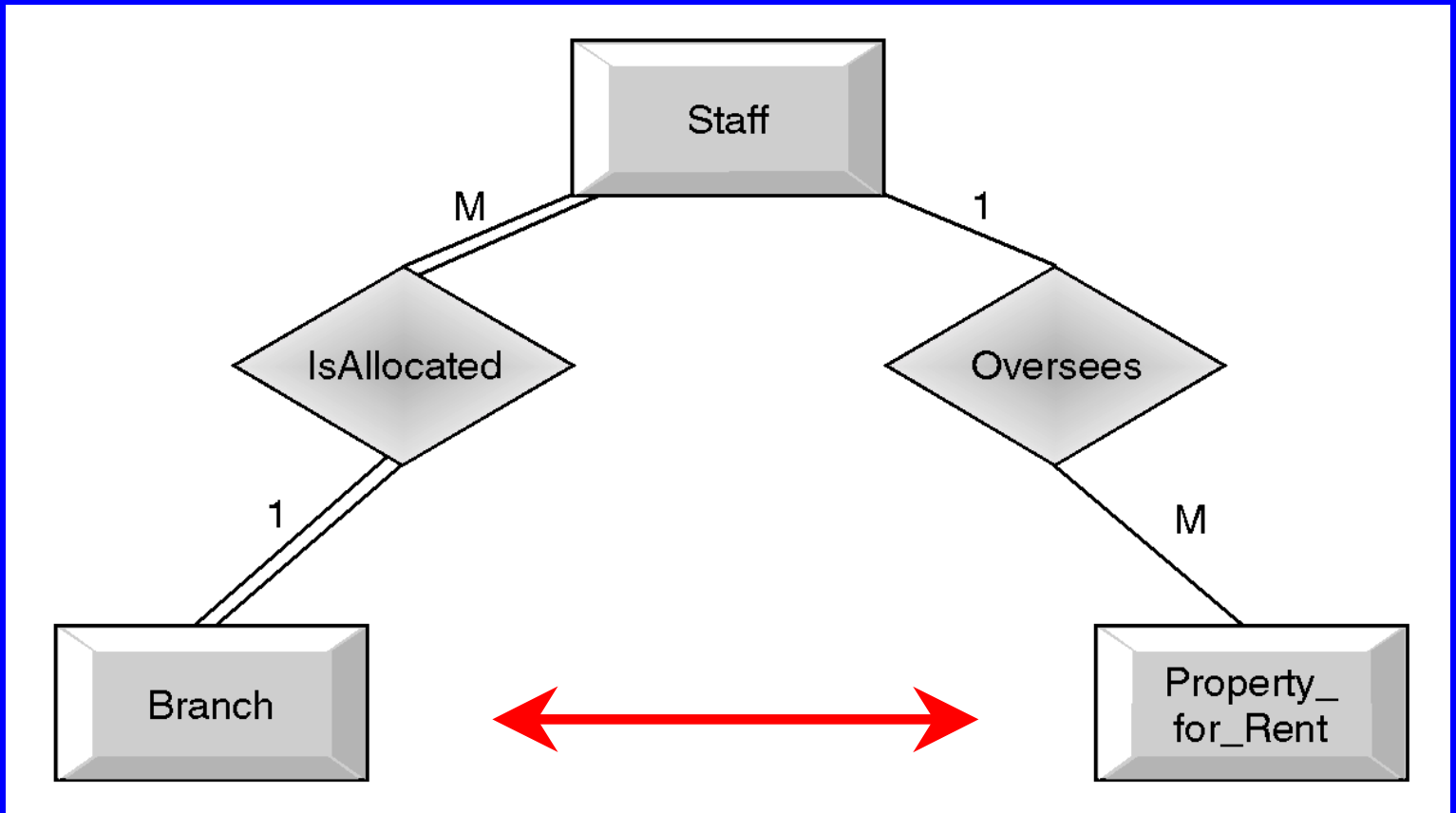
Restructuring ER model to remove Fan Trap



Semantic Net of Restructured ER Model with Fan Trap Removed

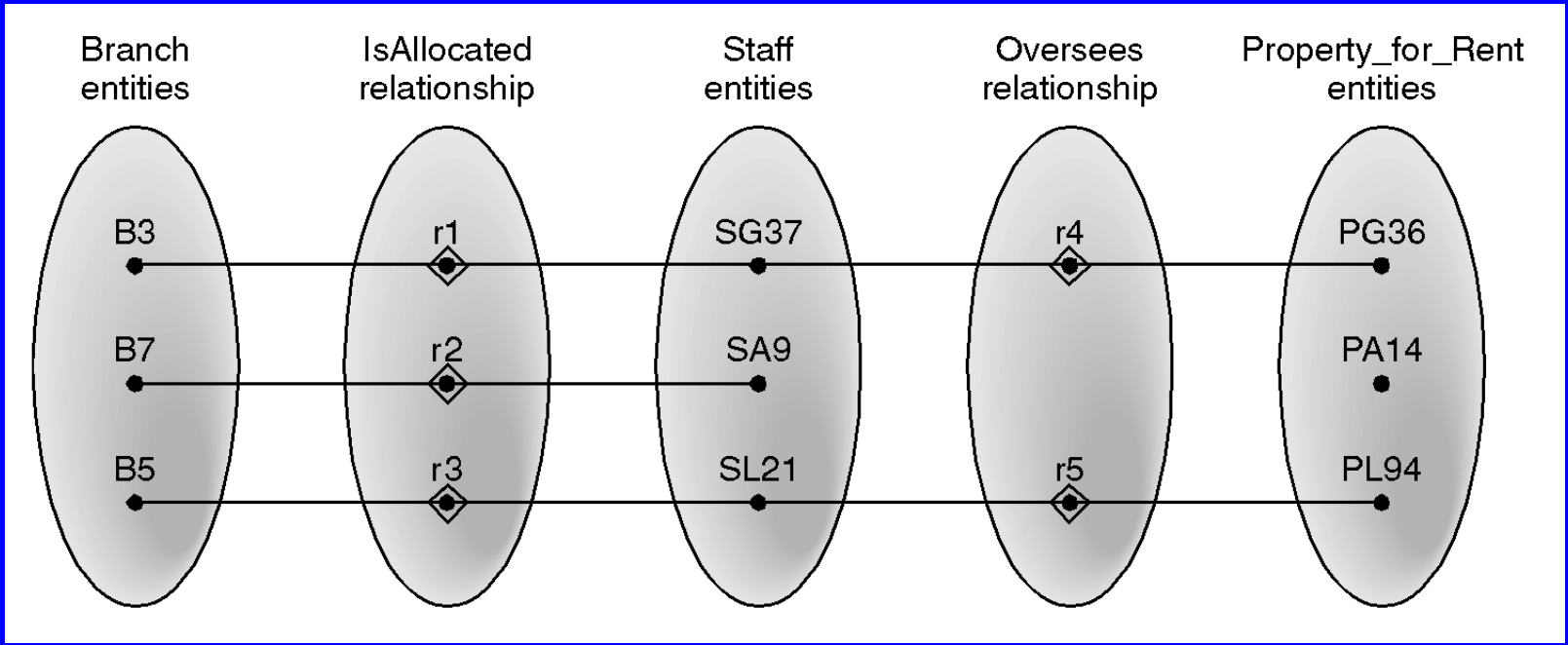


An Example of a "Chasm Trap"

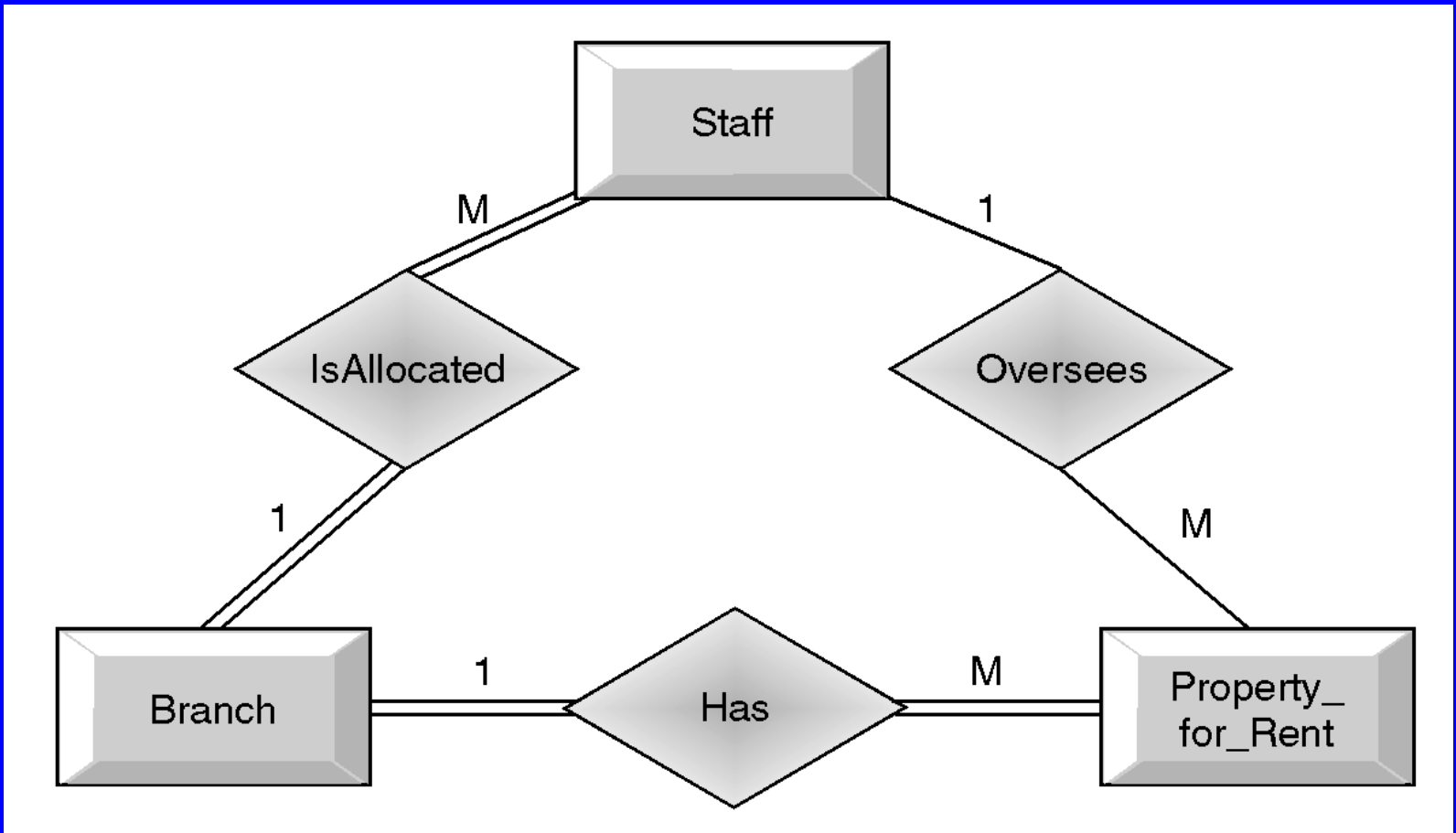


- If a Staff member is not overseeing any Property, how can we know which Properties are managed by a Branch?

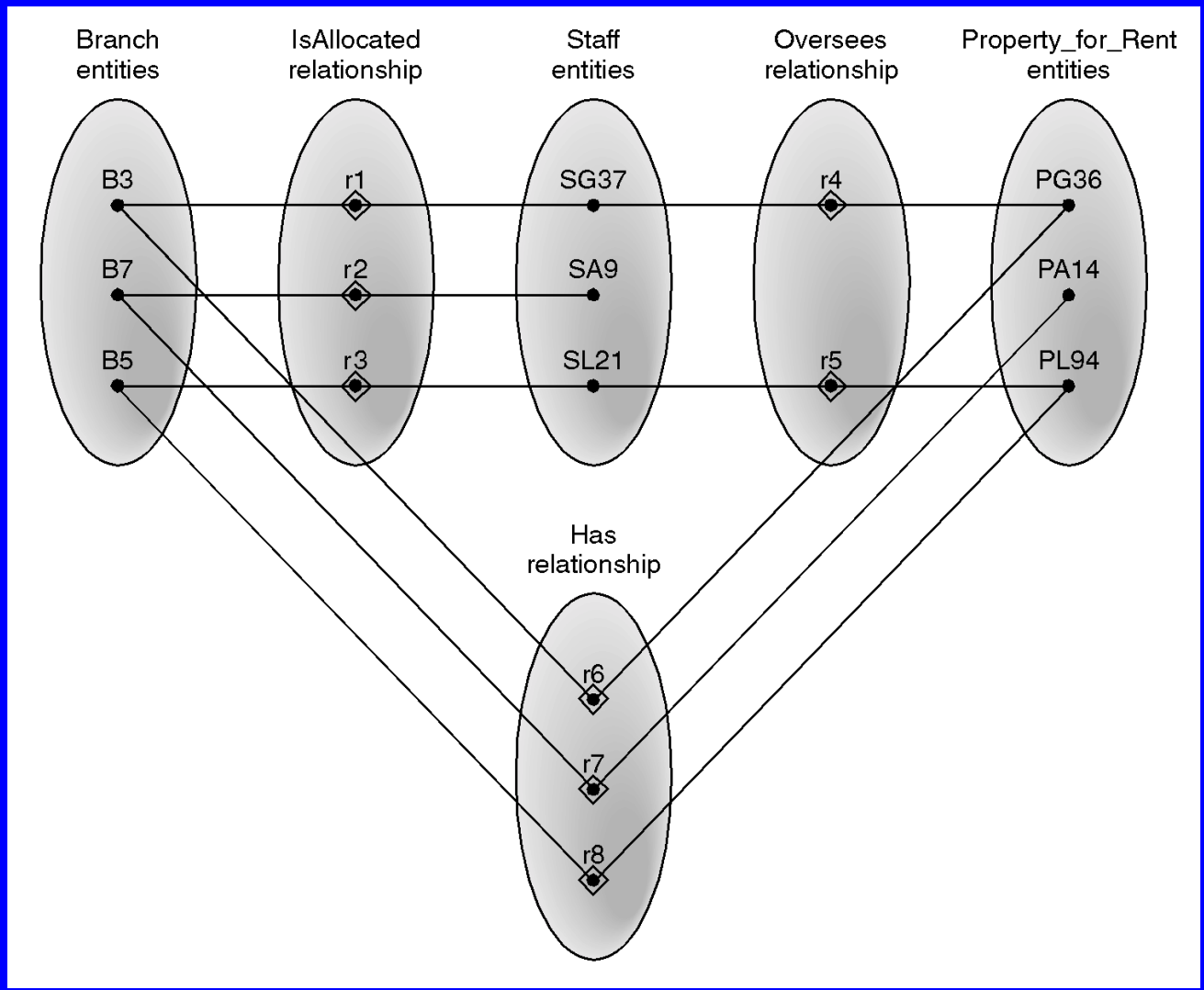
Semantic Net of ER Model with Chasm Trap



ER Model restructured to remove Chasm Trap



Semantic Net of Restructured ER Model with Chasm Trap Removed



The Enhanced Entity-Relationship Model

- Since the 1980s there has been an increase in the emergence of new database applications with more demanding requirements.
- Basic concepts of ER modeling are not sufficient to represent the requirements of the newer, more complex applications.
- Response is development of additional ‘semantic’ modeling concepts.

The Enhanced Entity-Relationship Model

- **Semantic concepts** are incorporated into the original ER model and is called the Enhanced Entity-Relationship (EER) model.

- Additional concepts of EER model includes specialization / generalization, and categorization.

Concept of Specialization / Generalization

- Associated with the related concepts of entity types described as superclasses or subclasses and the process of attribute inheritance.

- **Superclass**
  - An entity type that includes distinct subclasses that require to be represented In a data model.

Concept of Specialization / Generalization

- **Subclass**
  - A subclass is an entity type that has a distinct role and is also a member of the superclass.

- Attribute Inheritance
  - An entity in a subclass may possess subclass specific attributes, as well as those associated with the superclass.

Concept of Specialization / Generalization

Specialization

- **The process of maximizing the differences between members of an entity by identifying their distinguishing characteristics.**

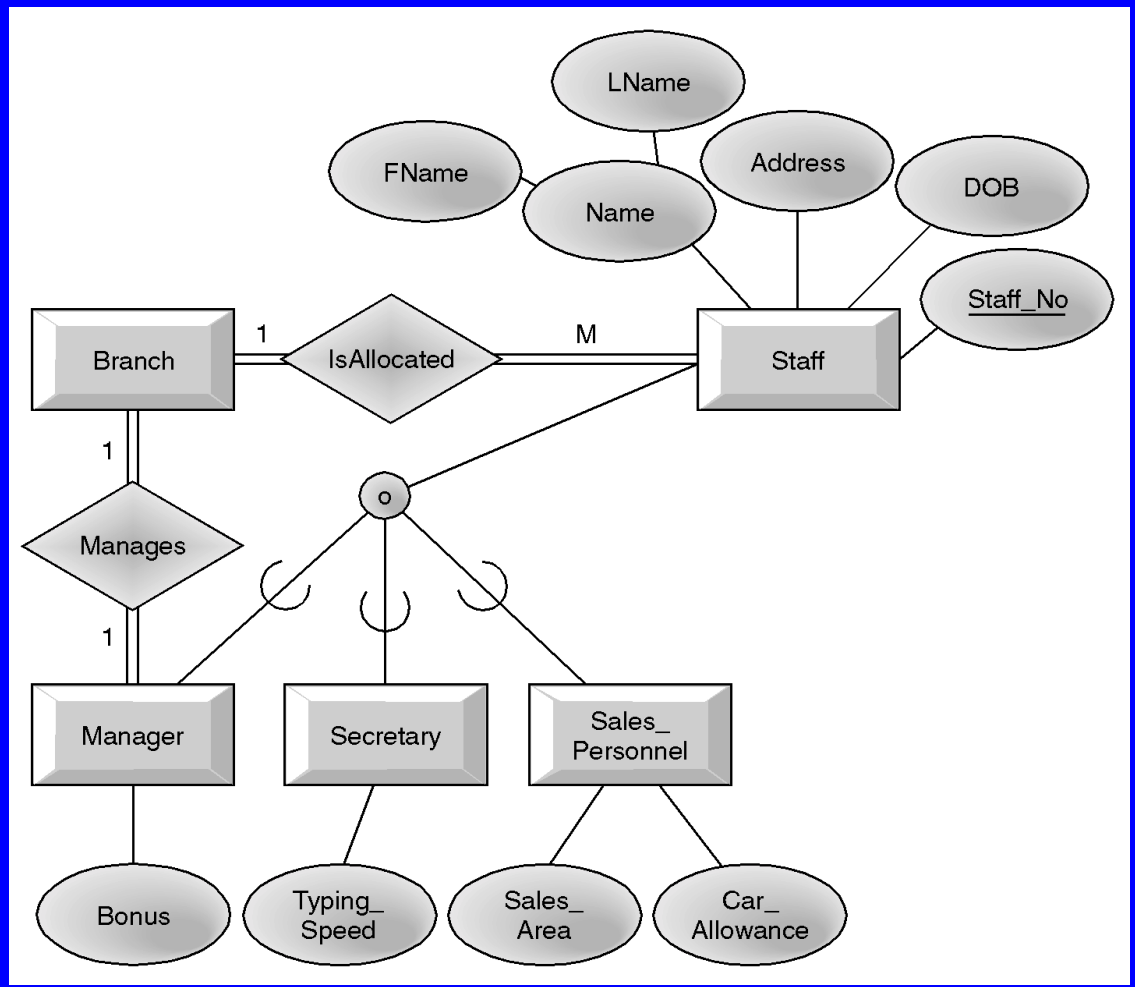
- **Top-down approach to defining a set of superclasses and their related subclasses.**

Concept of Specialization / Generalization

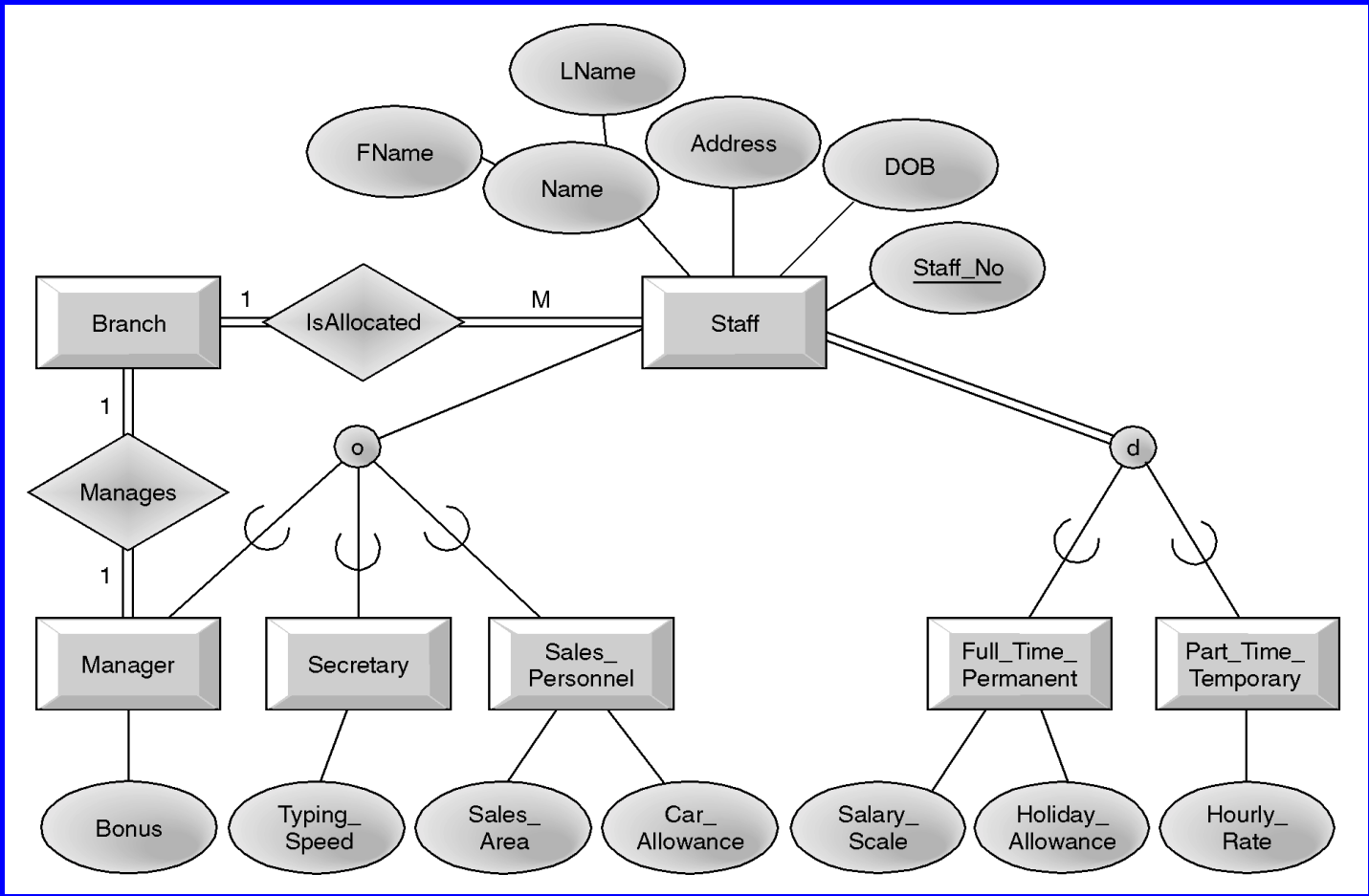
- Generalization
  - The process of minimizing the differences between entities by identifying their common features.

- Specialization and generalization have disjointness and participation constraints.

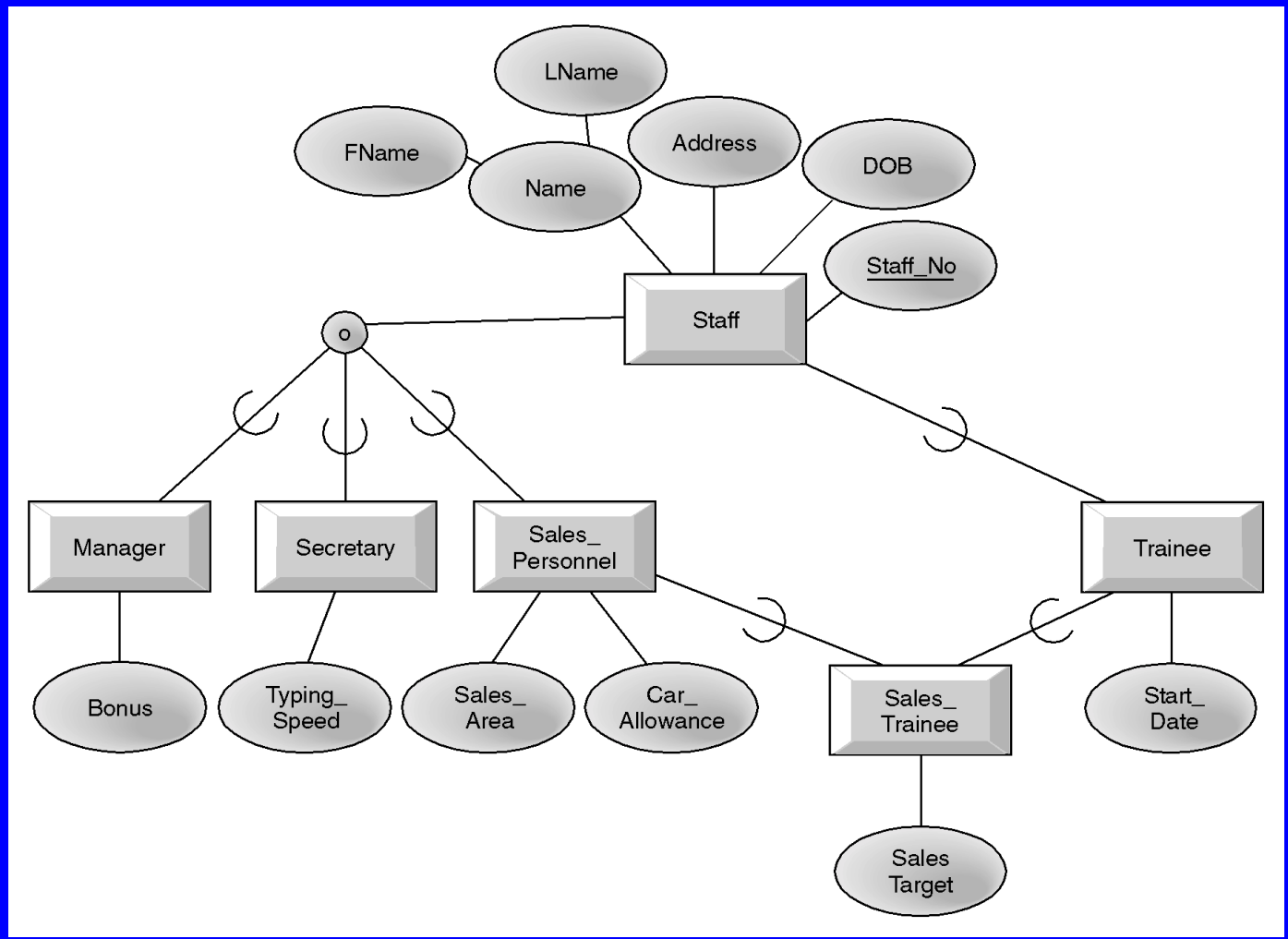
Specialization of Staff Entity into Subclasses by Job Roles



Specialization of Staff Entity by Job Roles and Employment Contracts



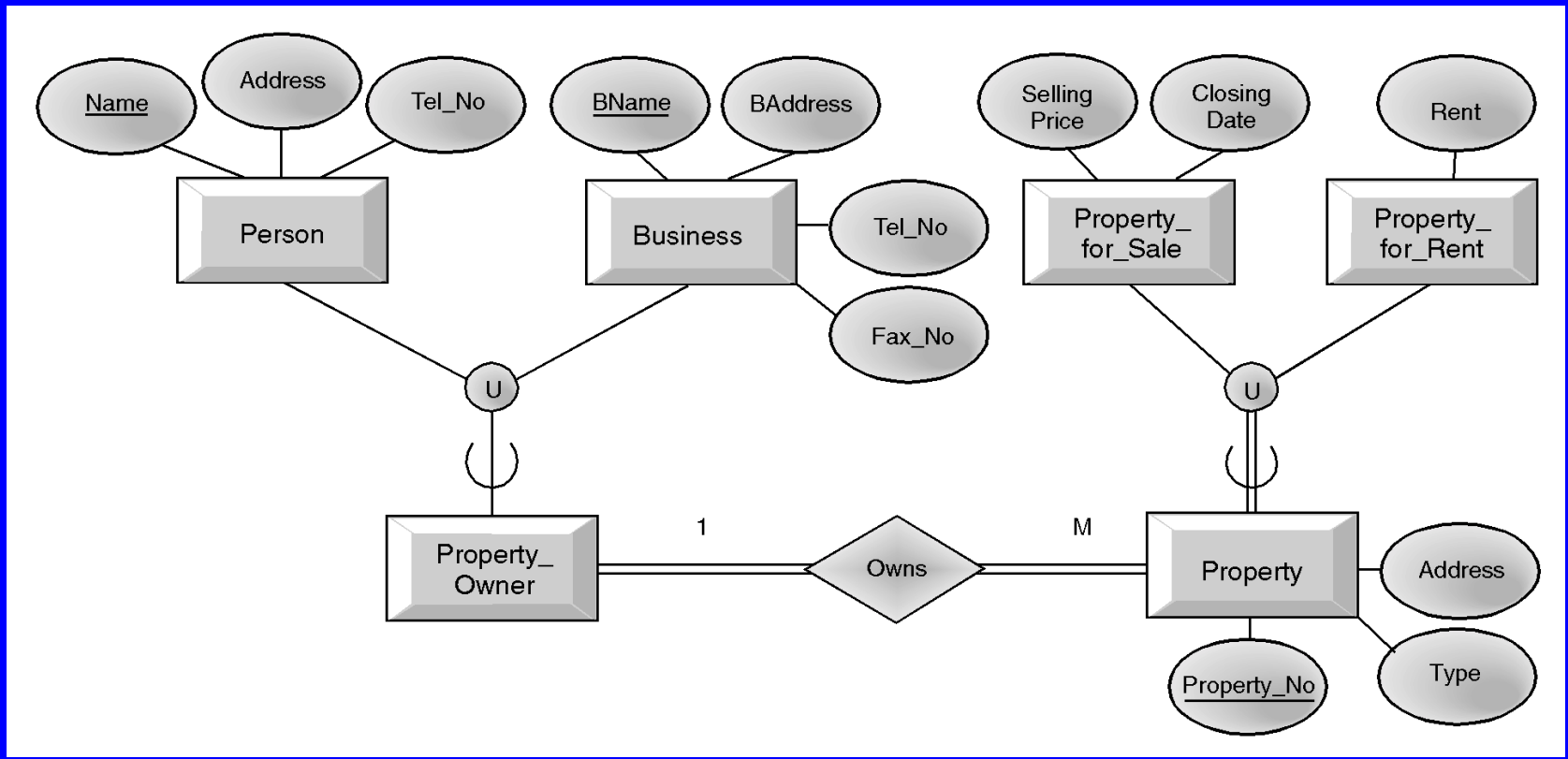
A Shared Subclass called Sales_Trainee



Categorization

- The modeling of a single subclass (called a category) with a relationship that involves more than one distinct superclass.
- A category subclass has selective inheritance.
- Divided based on total or partial participation.
  - Total - every occurrence of all superclasses must appear in the category.
  - Partial - constraint is removed.

Property_Owner and Property Categories



Property represented as a Specialization / Generalization.