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Database Design

7-2

Hierarchies and Recursive Relationships

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Objectives

- This lesson covers the following objectives:
  - Define and give an example of a hierarchical relationship
  - Identify the UIDs in a hierarchical model
  - Define and give an example of a recursive relationship
  - Represent a recursive relationship in an ERD given a scenario
  - Construct a model using both recursion and hierarchies to express the same conceptual meaning

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Purpose

- Often, roles are organized by hierarchy -- at work (manager, crew chief, front-counter clerk, food preparers), or in school (headmaster or principal, assistant headmaster or assistant principal, teachers, staff)
- Hierarchical data is very common
- Understanding it will help you model:
  - Business organizational charts
  - Building structures
  - Family trees
  - and many other hierarchies found in the real world

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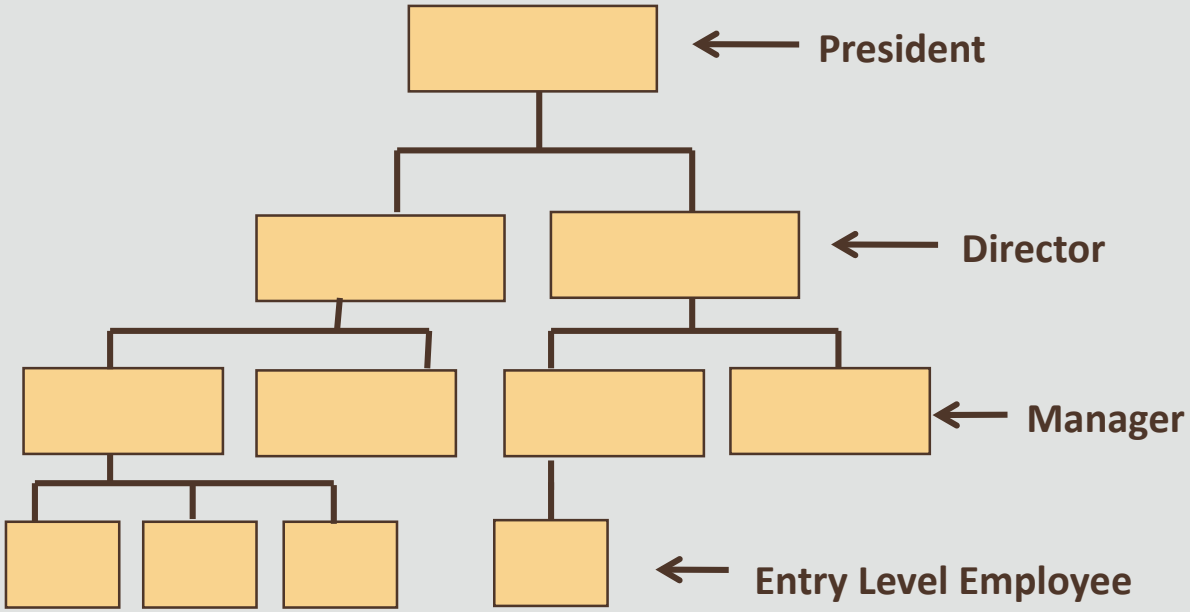
Relationships in an Organizational Chart

- An Organization's reporting hierarchy can be represented by this organizational chart



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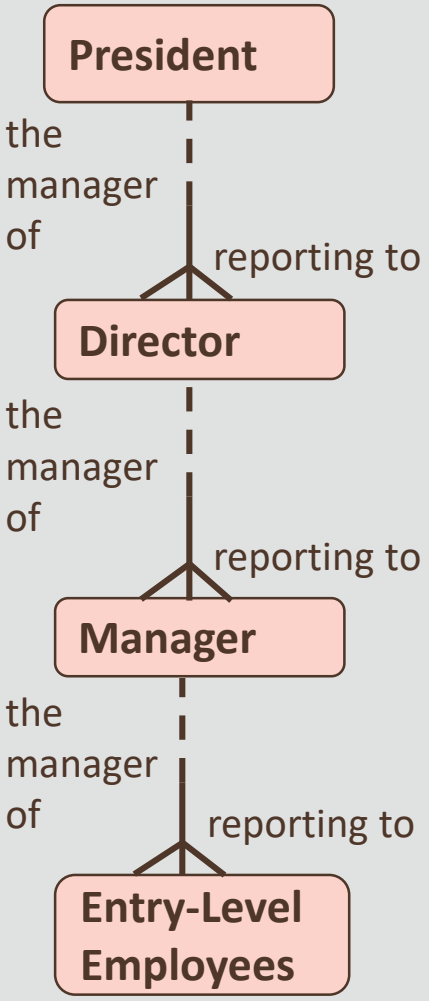
Relationships in an Organizational Chart

- An organizational chart can be represented by this data model
- We create an entity for each level, with a relationship to the next level
- What are the UIDs for each entity?



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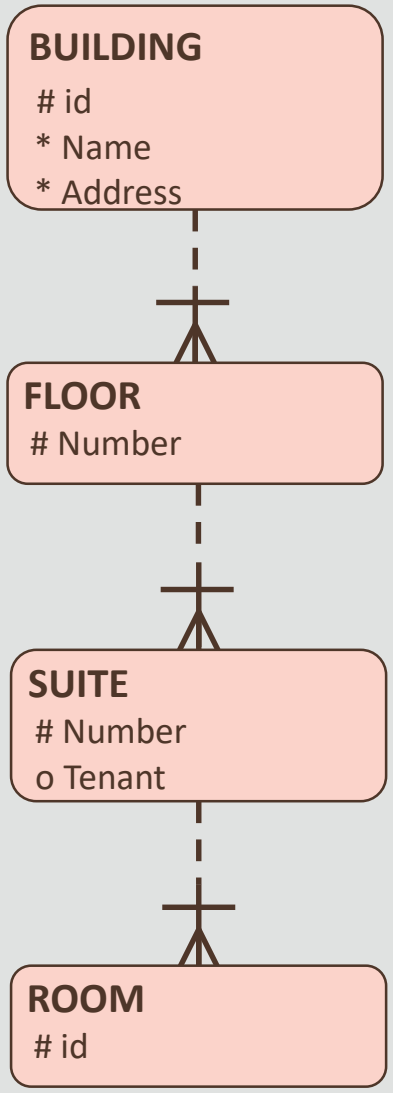
Another Relationship Example

- Notice the barred relationships
- Here you have a case of the cascading UIDs:
  - 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



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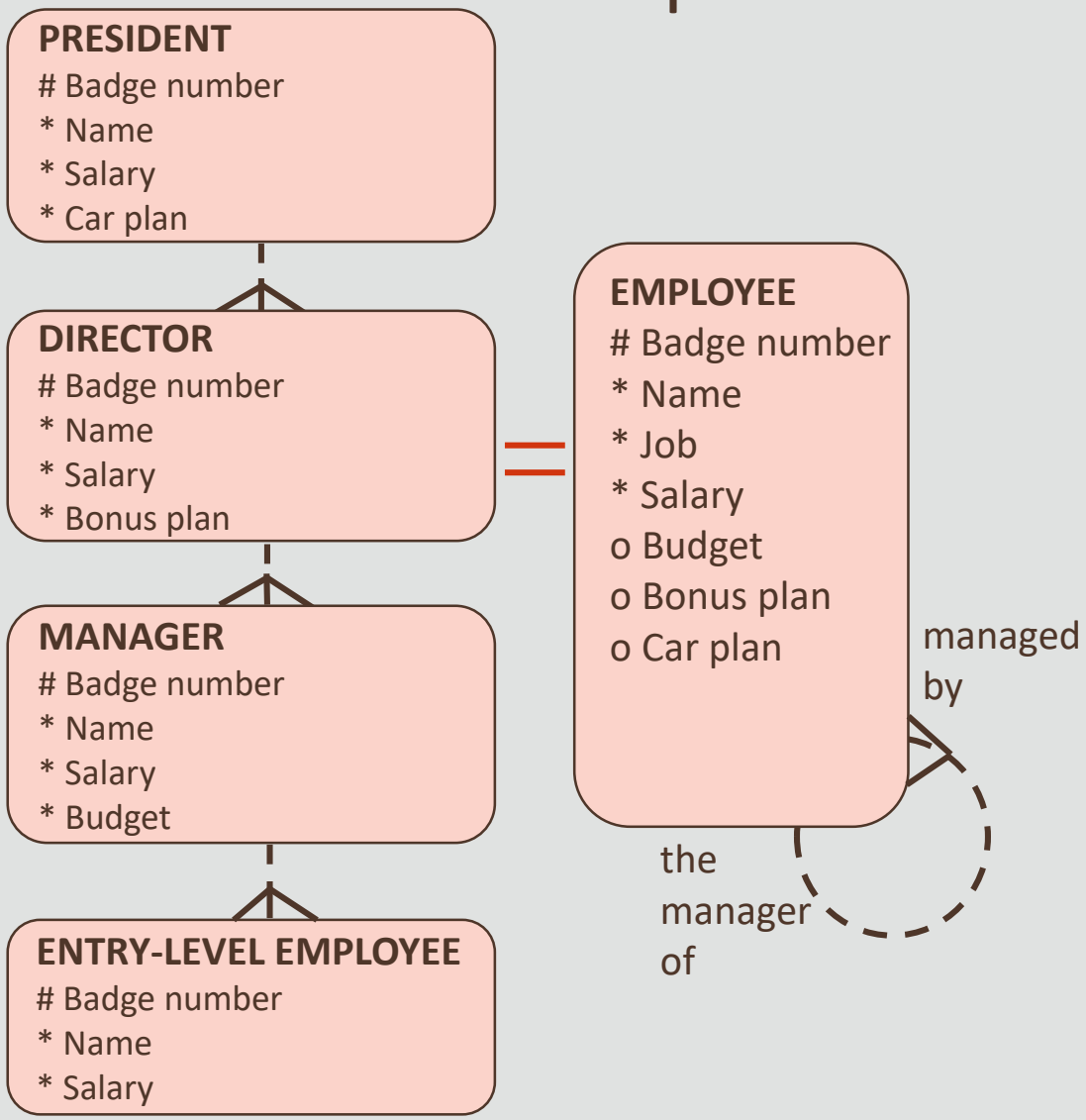
Hierarchy Versus Recursive Relationship

- Both of these models represent all employees
- The one on the left is a hierarchical structure
- The one on the right uses a recursive relationship



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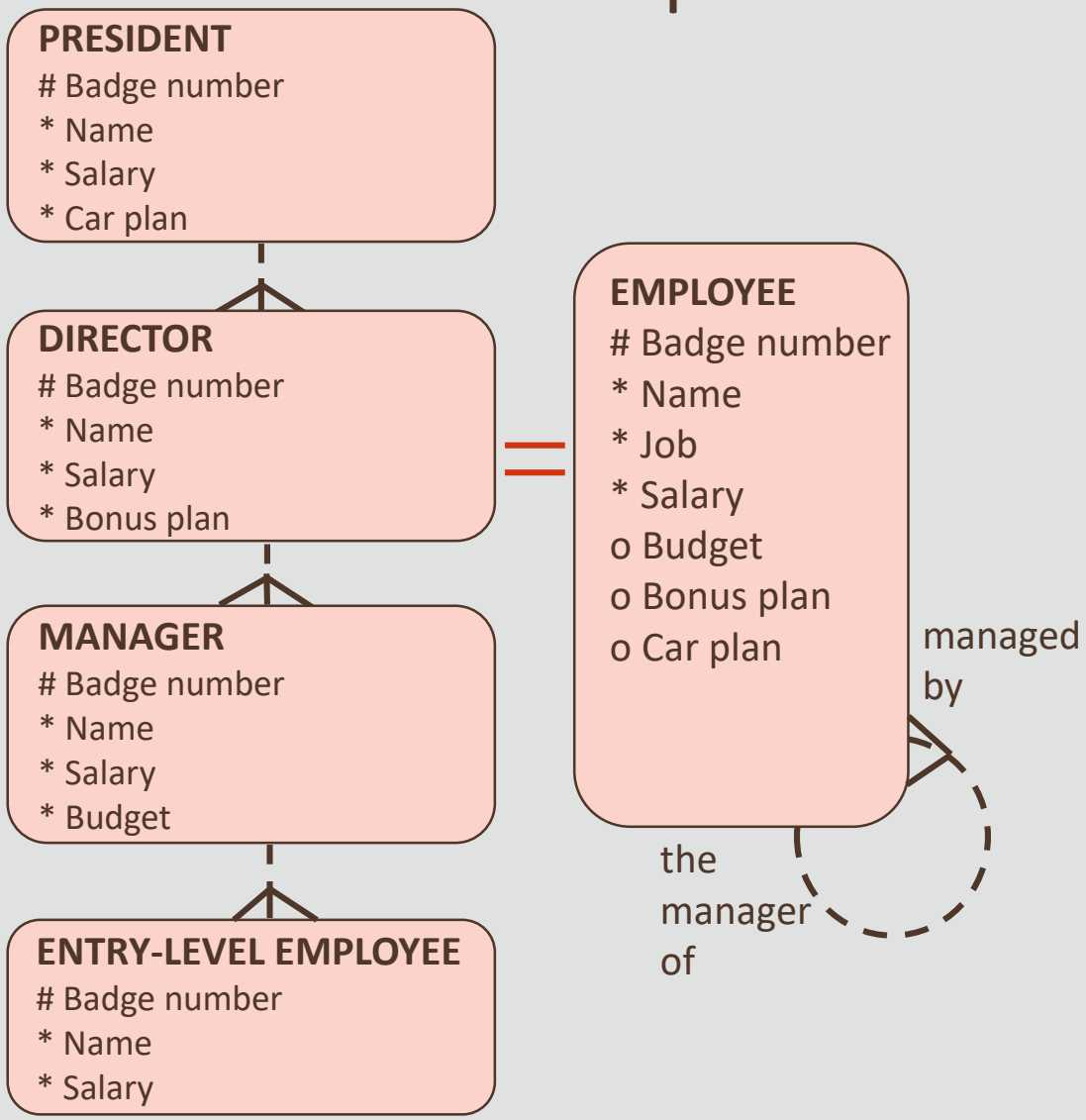
Hierarchy Versus Recursive Relationship

- A relationship cannot be both hierarchical and recursive at the same time
- Which one do you think is better?



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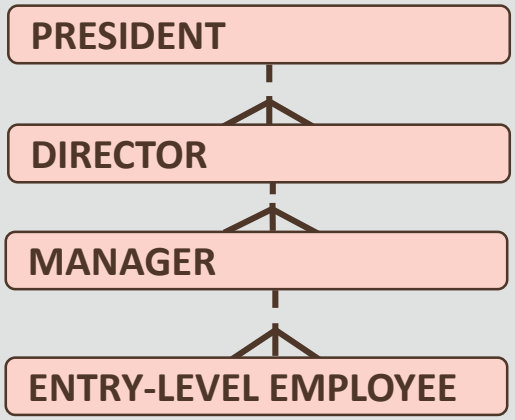
Hierarchy Versus Recursive Relationship

- Hierarchical:
  - Hierarchical structures are more explicit and are easier for most people to understand because they are very similar to an organizational chart
  - Each entity can have its own mandatory attributes and relationships, if the business requires this (instead of all optional attributes and relationships, as you would have in a recursive)
  - In this way, your data model truly reflects the business rules



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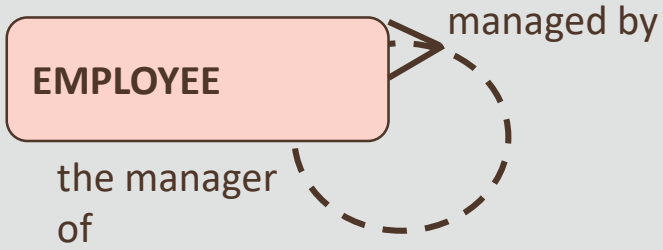
Hierarchy Versus Recursive Relationship

- Recursive:
  - Recursive relationships tend to be simpler because you are using only one entity
  - Your diagram will be less “busy”
  - However, they are less specific – you cannot have mandatory attributes or relationships unless they are mandatory in all instances of the entity



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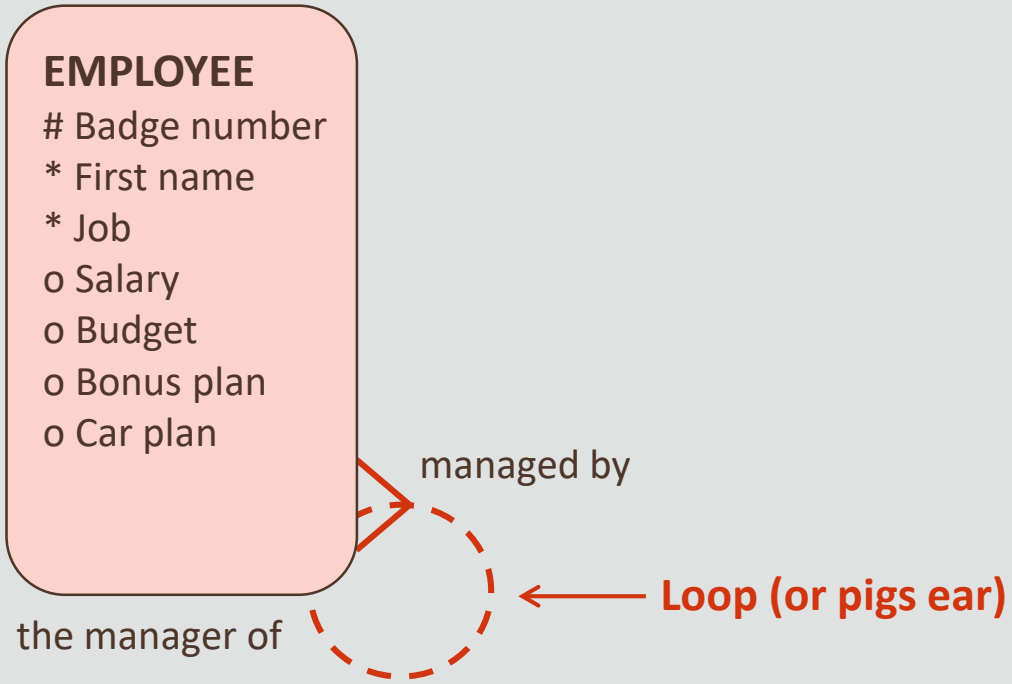
Drawing Convention

- The ERD convention to show a recursive relationship is drawn as a loop, also known as a “pig’s ear”



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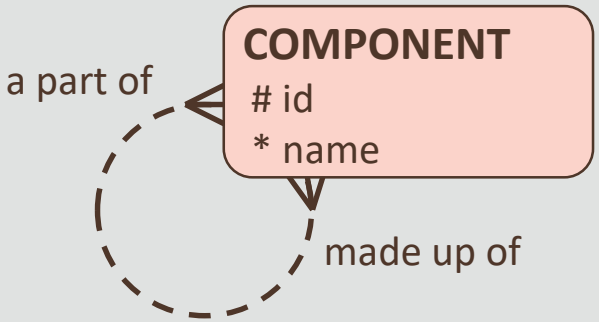
Automobile Manufacturing Business Scenario

- For an automobile manufacturing organization, consider all elementary parts, subassemblies, assemblies, and products as instances of an entity called COMPONENT
- The model can be created as a simple recursive relationship



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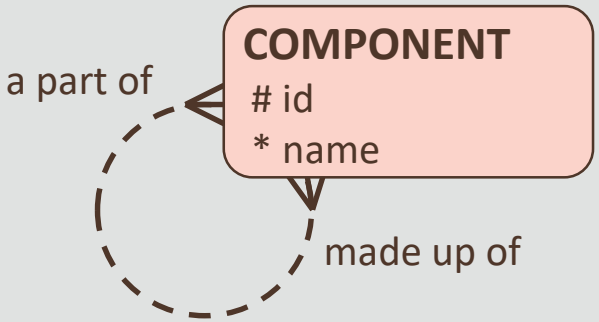
Automobile Manufacturing Business Scenario

- Model Bill of Materials data as a many-to-many recursive relationship:
  - Each COMPONENT may be a part of one or more COMPONENTS
  - Each COMPONENT may be made up of one or more COMPONENTS



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Terminology

- Key terms used in this lesson included:
  - Hierarchal relationship
  - Recursive relationship

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Summary

- In this lesson, you should have learned how to:
  - Define and give an example of a hierarchical relationship
  - Identify the UIDs in a hierarchical model
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