Database Design

Hierarchies and Recursive Relationships

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

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

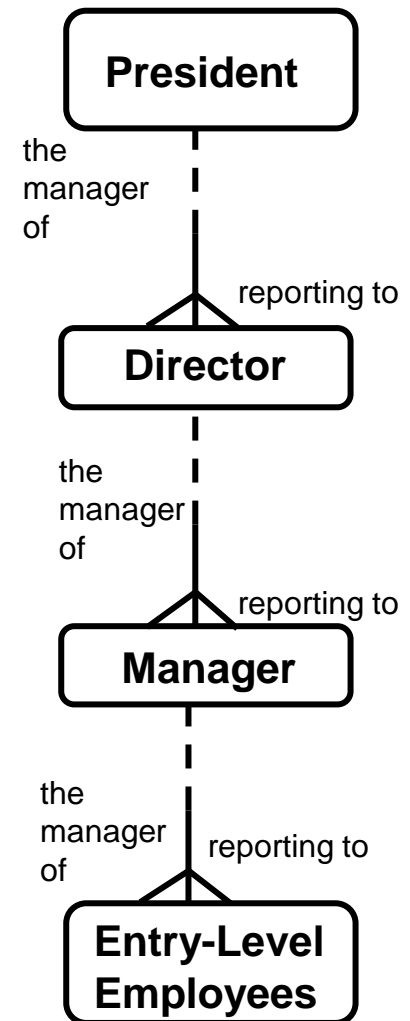and many other hierarchies found in the real world.

Relationships in an Organizational Chart

An organizational chart can be represented by this data model. What are the UIDs for each entity?
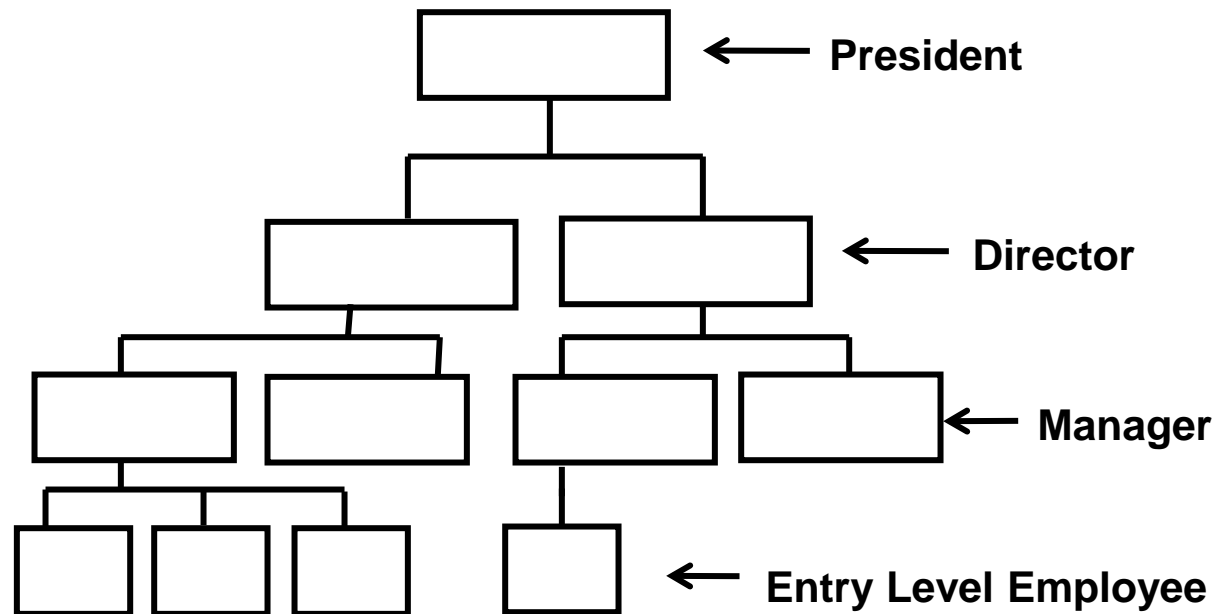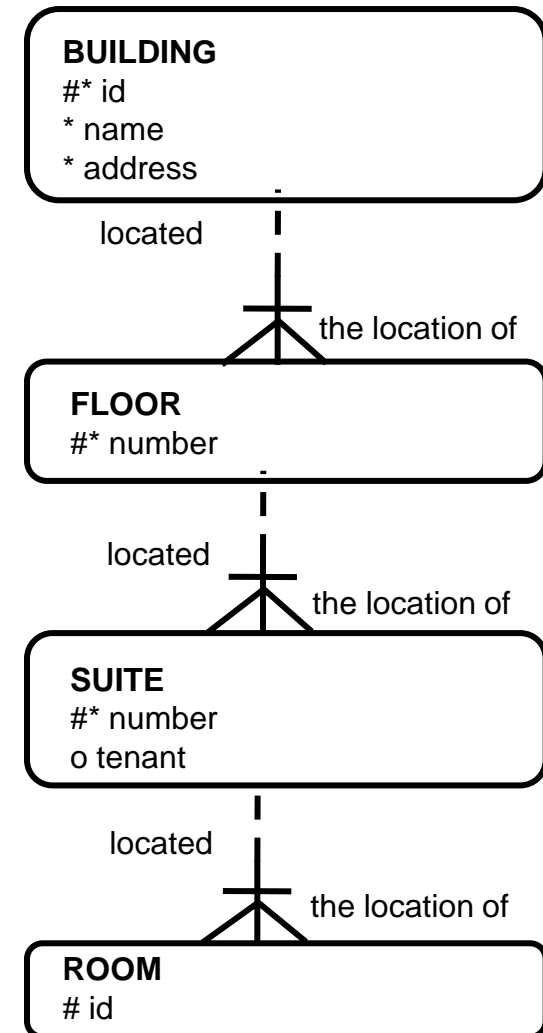
Relationships in an Organizational Chart (cont.)

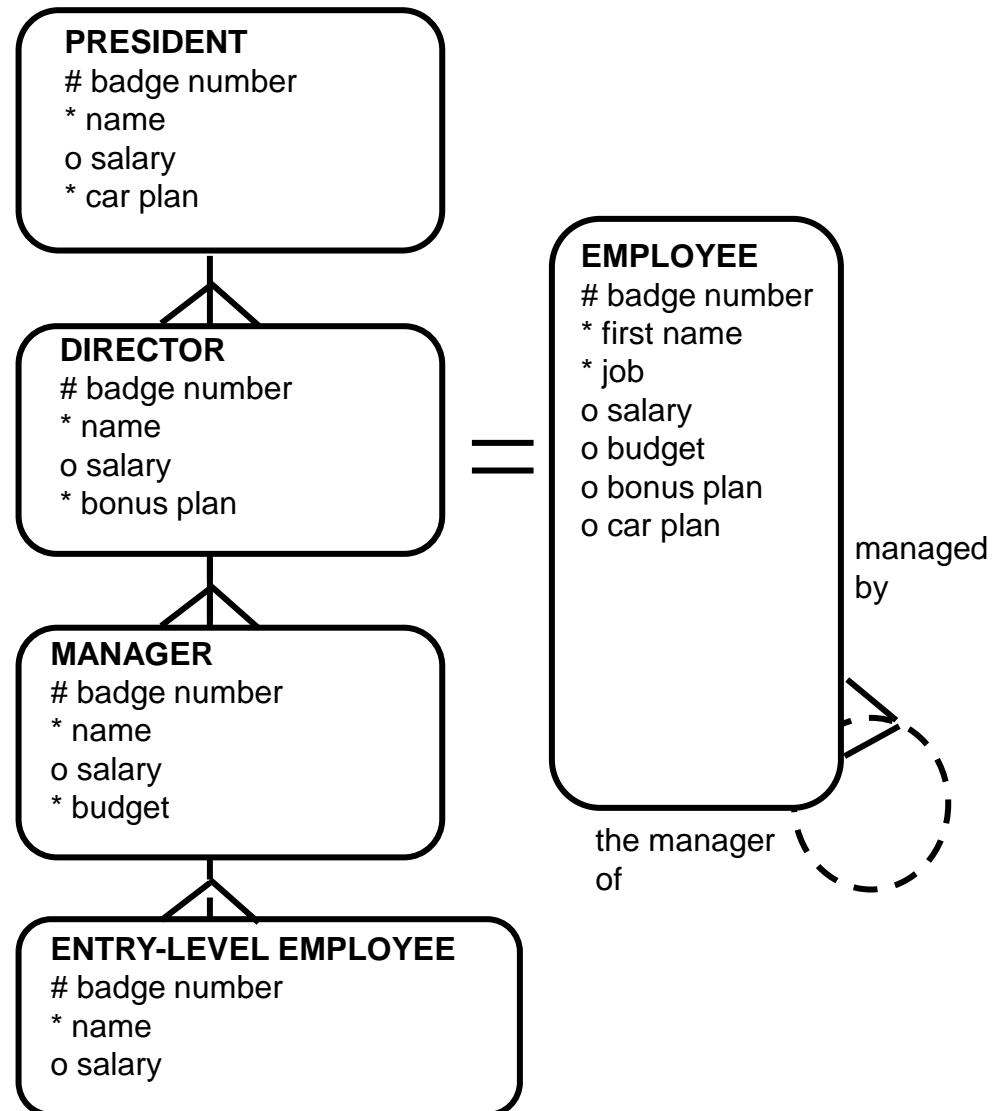An organizational chart can be represented by this data model. What are the UIDs for each entity?

```
                                    President
                          the
                          manager
                          of
                                       reporting to
                                    Director

                          the
                          manager
                          of
                                       reporting to
                                    Manager

                          the
                          manager
                          of        reporting to
                                    Entry-Level
                                    Employees
```

Another Relationship Example

What are the UIDs for each entity in this ERD? (Notice the barred relationships.)

BUILDING
#* id
* name
* address

located

the location of

FLOOR
#* number

located

the location of

SUITE
#* number
o tenant

located
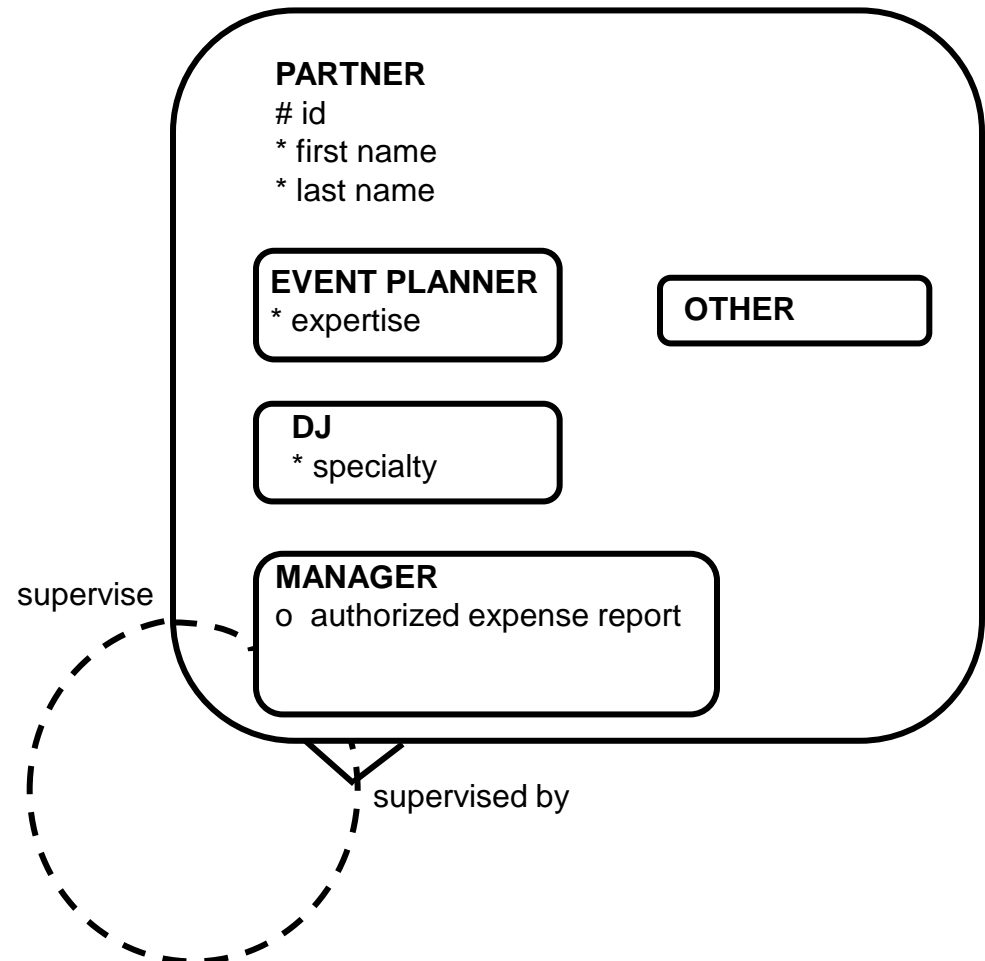
the location of

ROOM
id

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

PRESIDENT
badge number
* name
o salary
* car plan

DIRECTOR
badge number
* name
o salary
* bonus plan

MANAGER
badge number
* name
o salary
* budget

ENTRY-LEVEL EMPLOYEE
badge number
* name
o salary

=

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

managed by

the manager of

# DJs on Demand Business Scenario

In the DJ model, the project manager has overall responsibility for an event and manages the other employees (event planner, DJ) working on the event. We chose to represent the hierarchy with a recursive relationship.

PARTNER
id
* first name
* last name

EVENT PLANNER
* expertise

OTHER

DJ
* specialty

MANAGER
o authorized expense report

supervise

supervised by

# 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.

A part of

COMPONENT
identifier
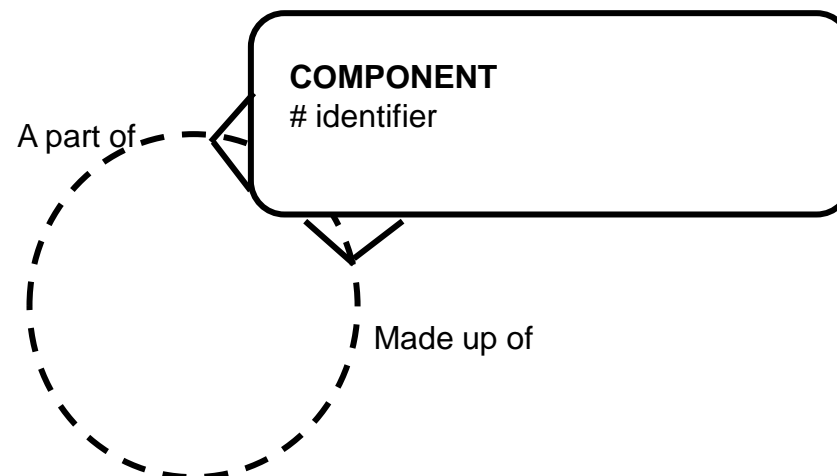
Made up of

Automobile Manufacturing Business Scenario (cont.)

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.

COMPONENT
identifier

A part of

Made up of
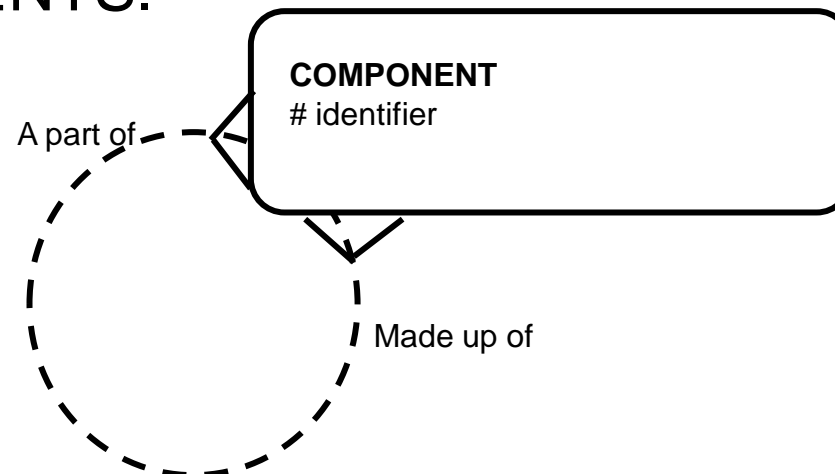
Terminology

Key terms used in this lesson included:

- Hierarchal relationship
- Recursive relationship

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
- Define and give an example of a recursive relationship
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- Construct a model using both recursion and hierarchies to express the same conceptual meaning