These slides are for use with

Database Systems
## Concepts, Languages and Architectures

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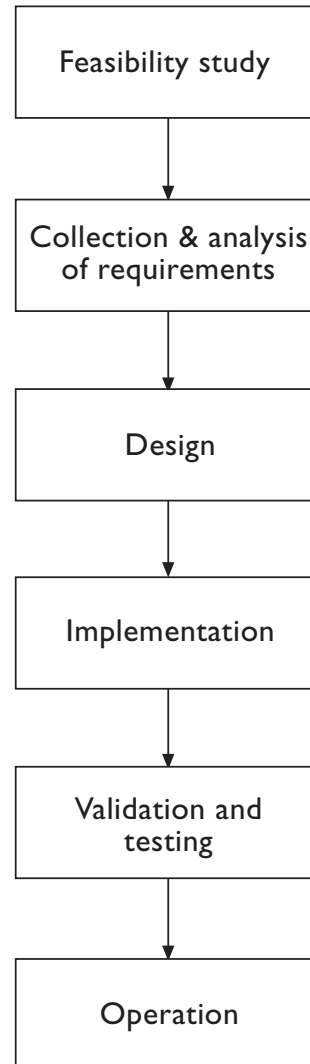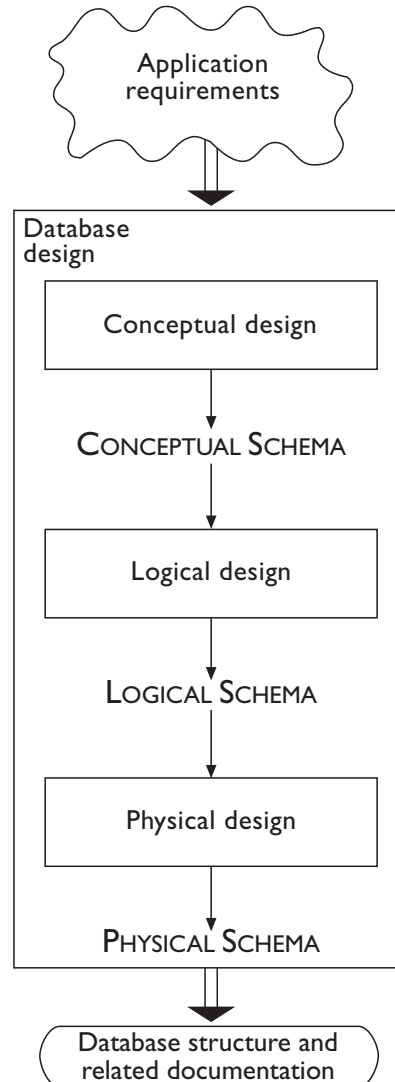
Press the 'return' or 'enter' key to continue . . .
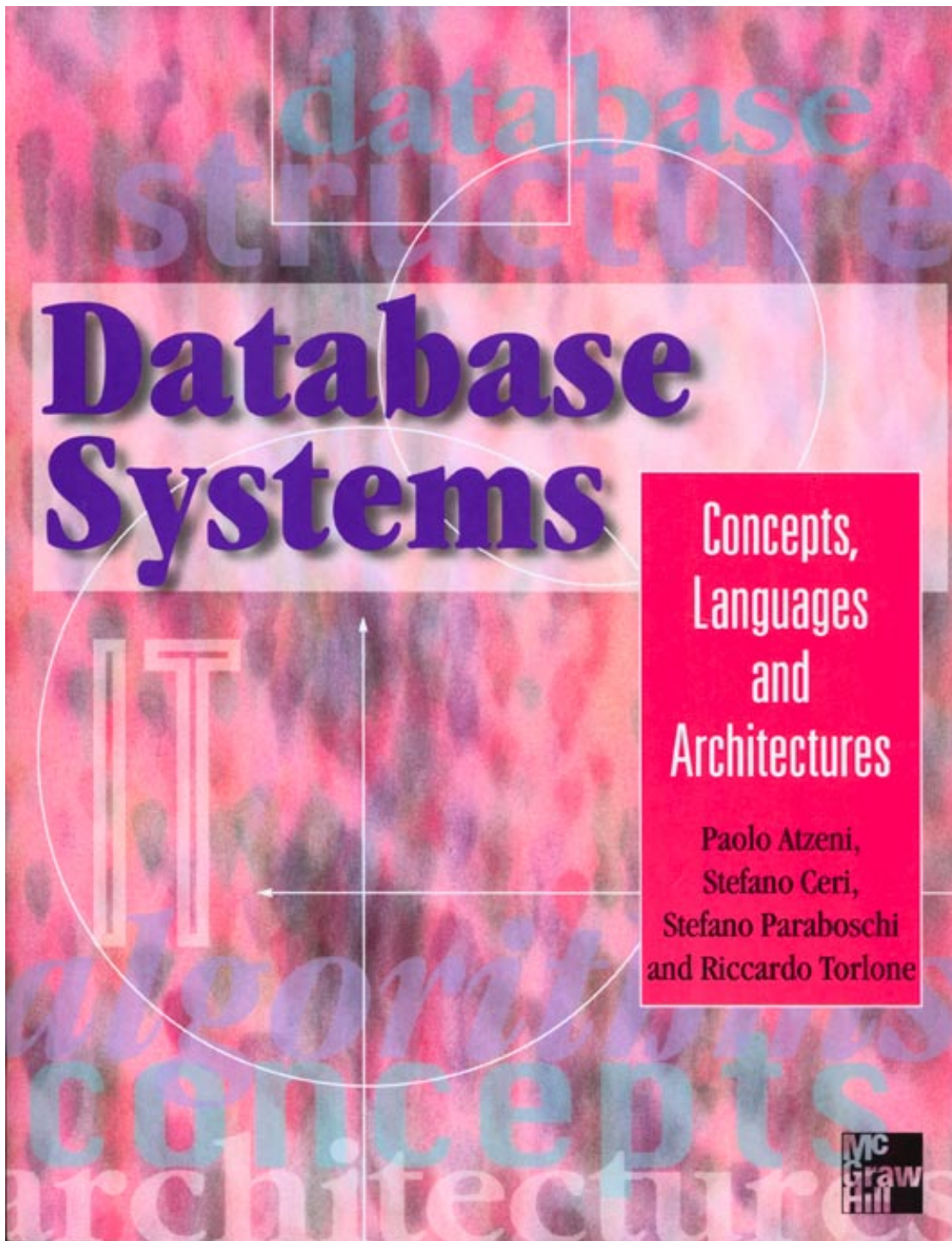
Chapter 5

Design techniques and models

Click here for help

Life cycle of an information system

```
┌─────────────────────┐
│   Feasibility study  │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│  Collection & analysis │
│    of requirements   │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│        Design        │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│    Implementation    │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│    Validation and    │
│       testing        │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│      Operation       │
└─────────────────────┘
```

The phases of database design

The products of the various phases of a relational database with the E-R model

Conceptual design

Logical design

Physical design
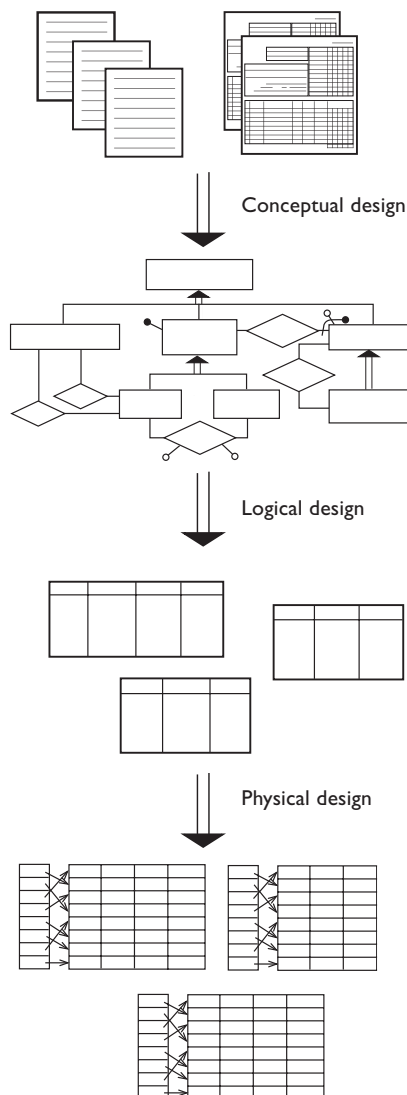
The constructs of the E-R model and their graphical representation

Construct	Graphical representation
Entity	
Relationship	
Simple attribute	
Composite attribute	
Cardinality of a	(m_1,M_1) (m_2,M_2)
Cardinality of an attribute	(m,M)
Internal identifier	
External identifier	
Generalization	
Subset	

Examples of entity of the E-R model

EMPLOYEE

DEPARTMENT

CITY

SALE
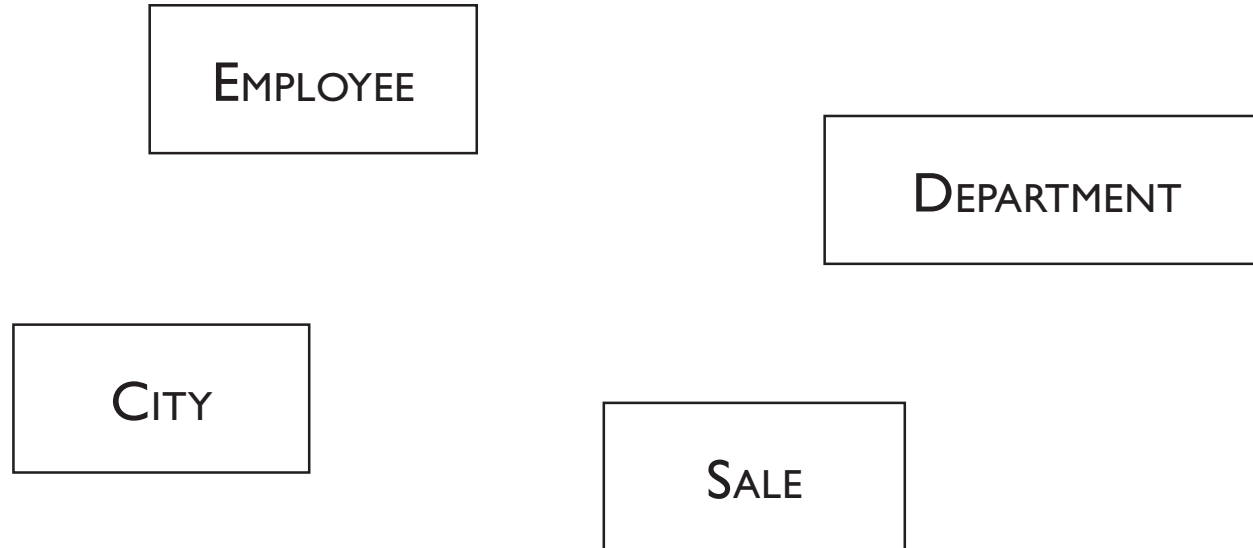
Example of occurrences of the EXAM relationship
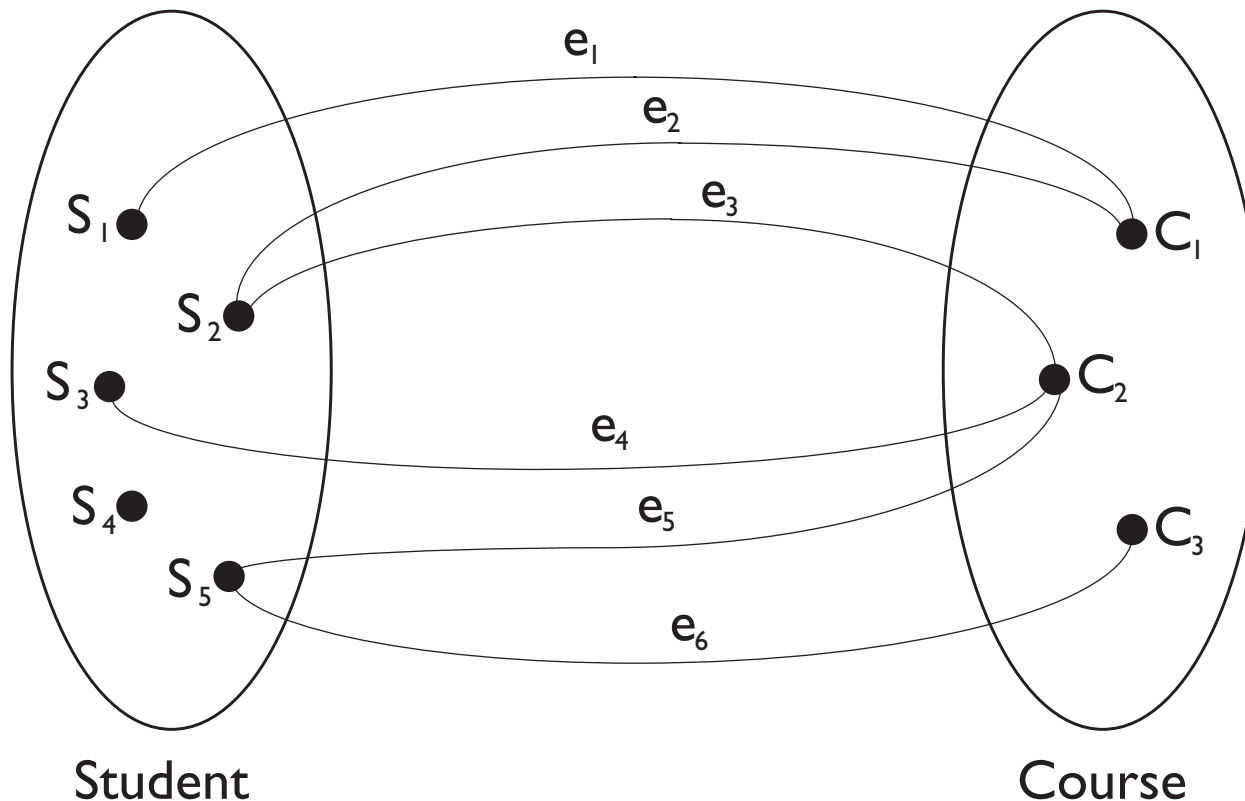
Examples of relationships in the E-R model

STUDENT — EXAM — COURSE

WORKPLACE

EMPLOYEE — RESIDENCE — CITY
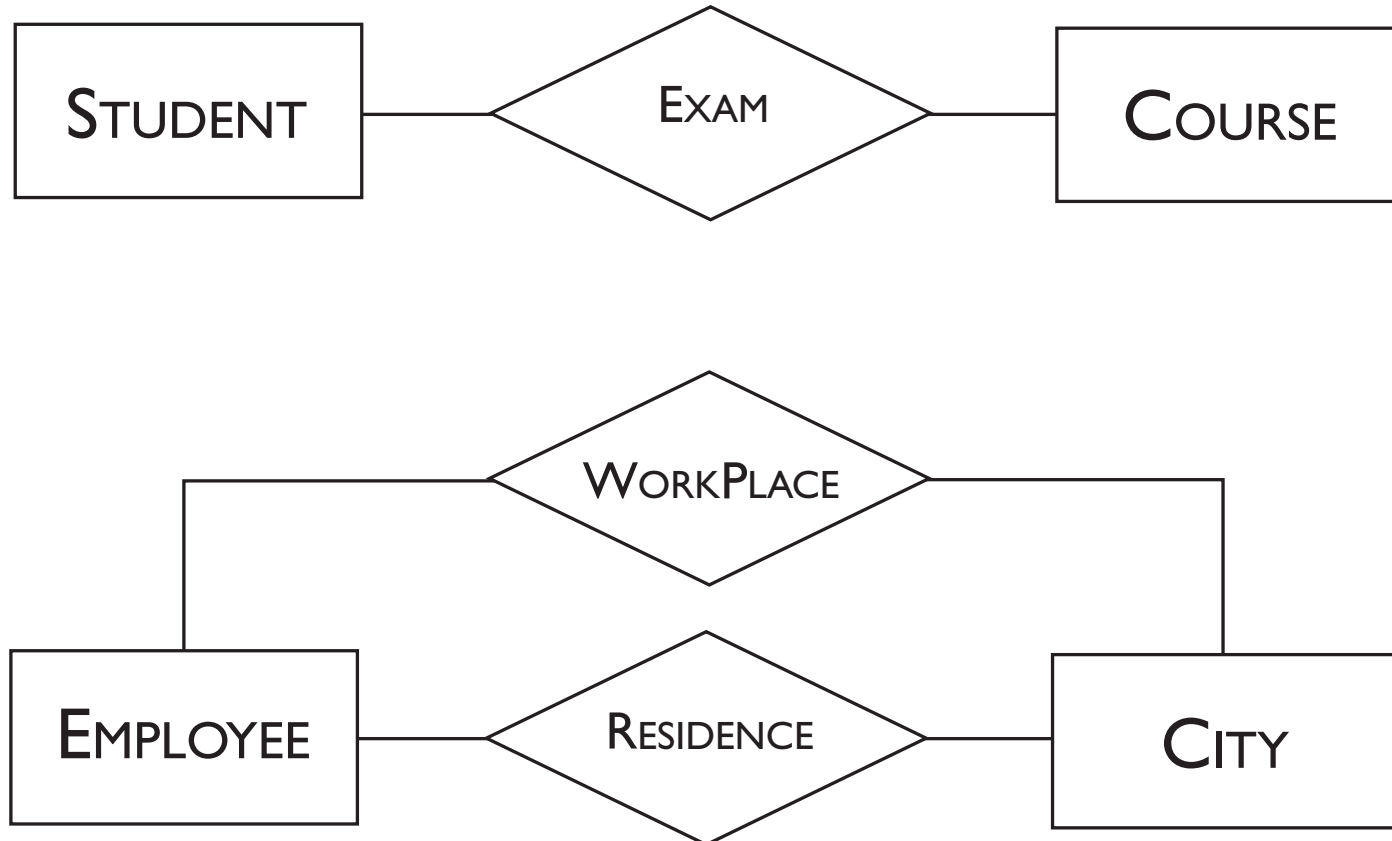
Examples of recursive relationships in the E-R model
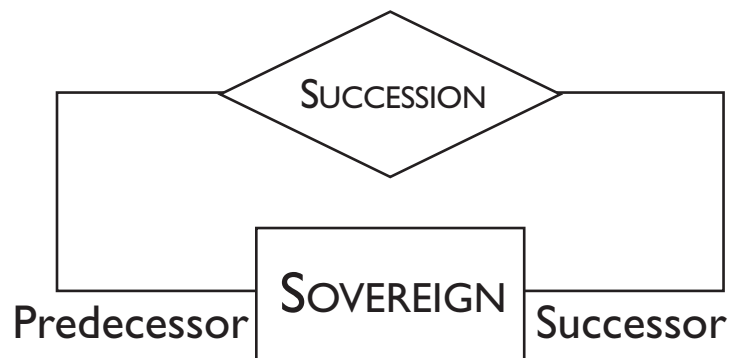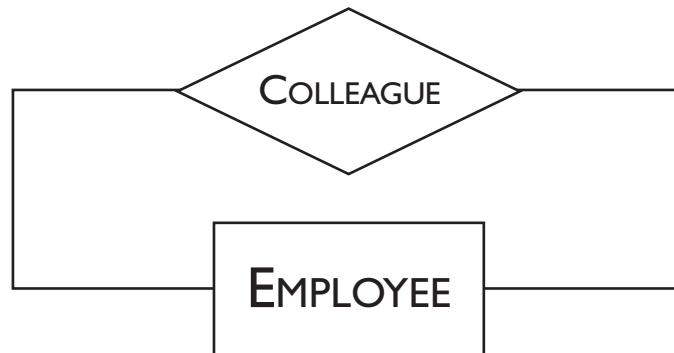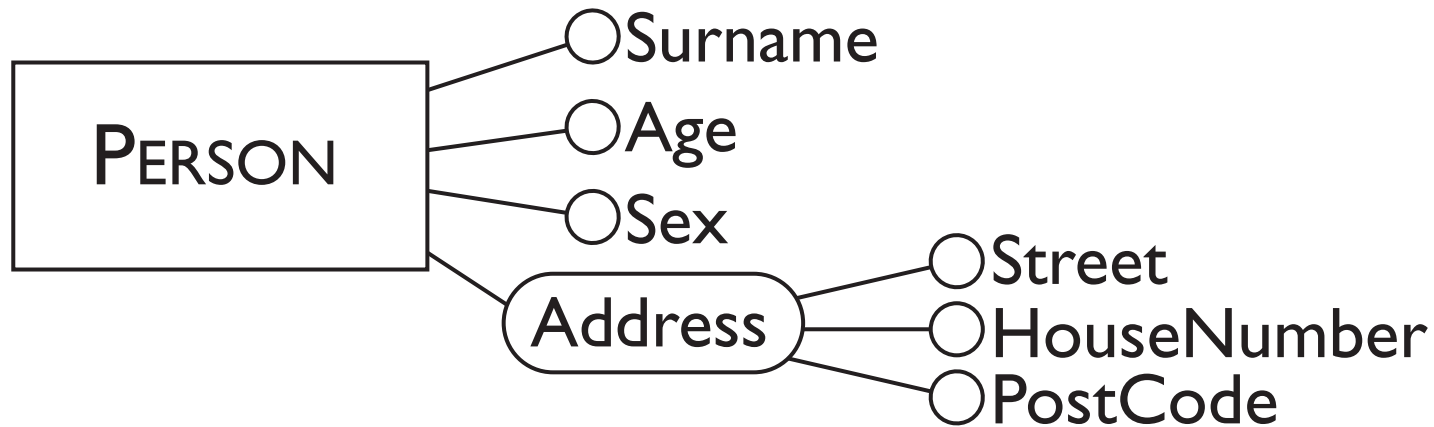
Example of a ternary relationship in the E-R model
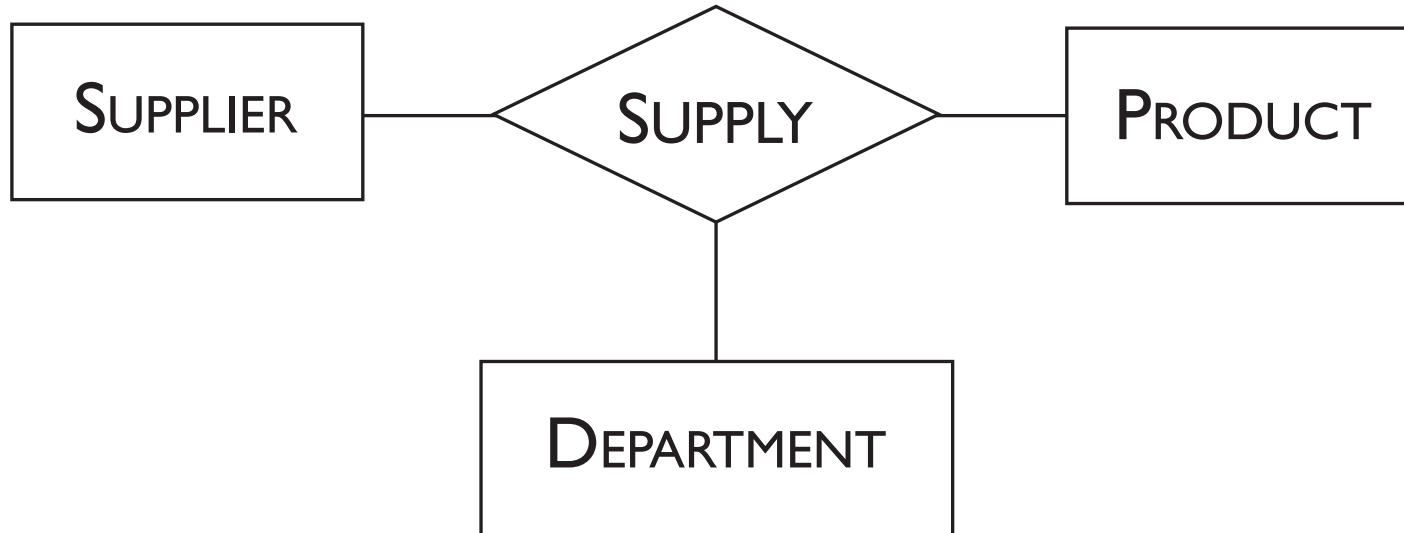
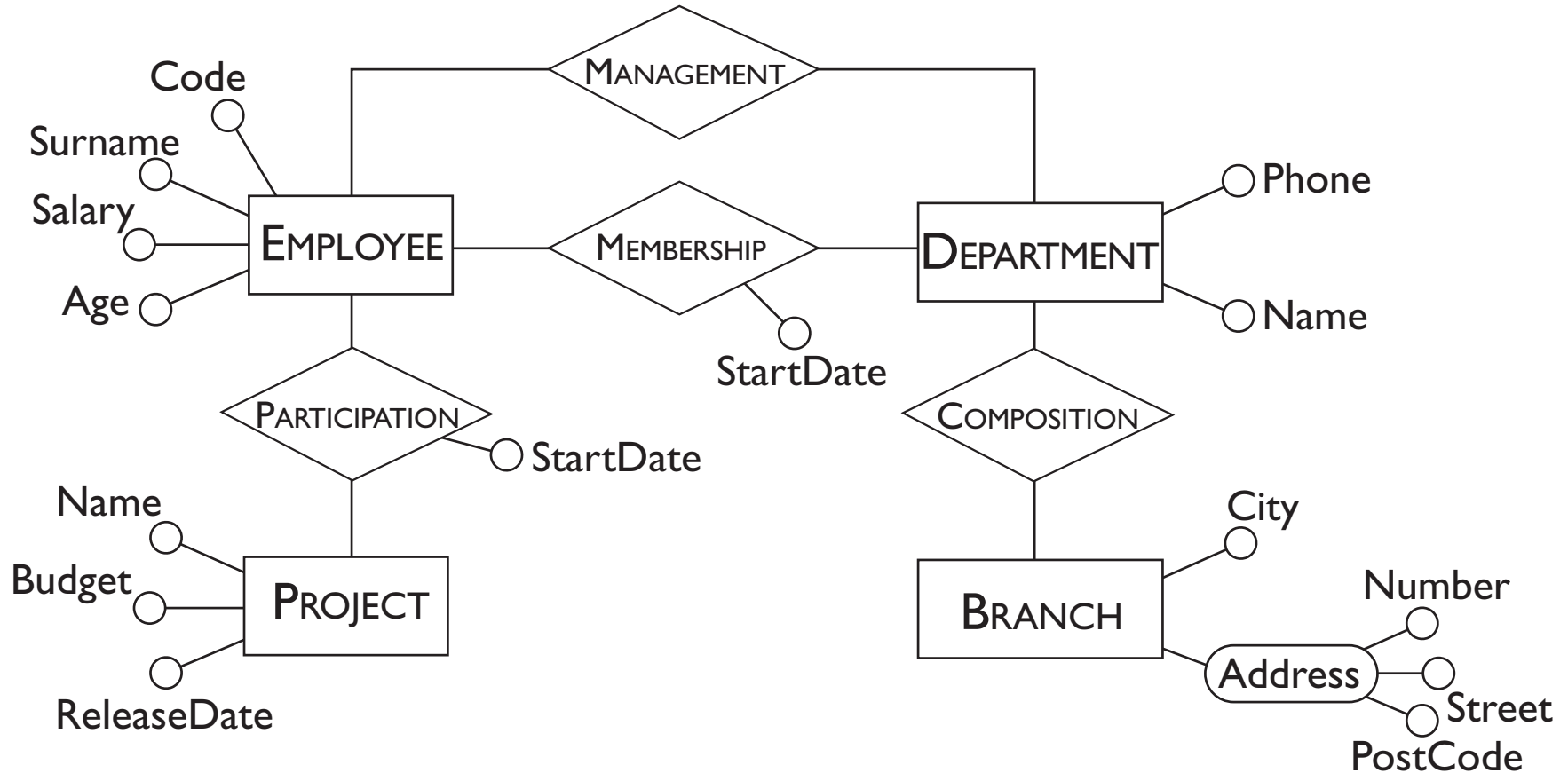# Example of occurrences of the SUPPLY relationship
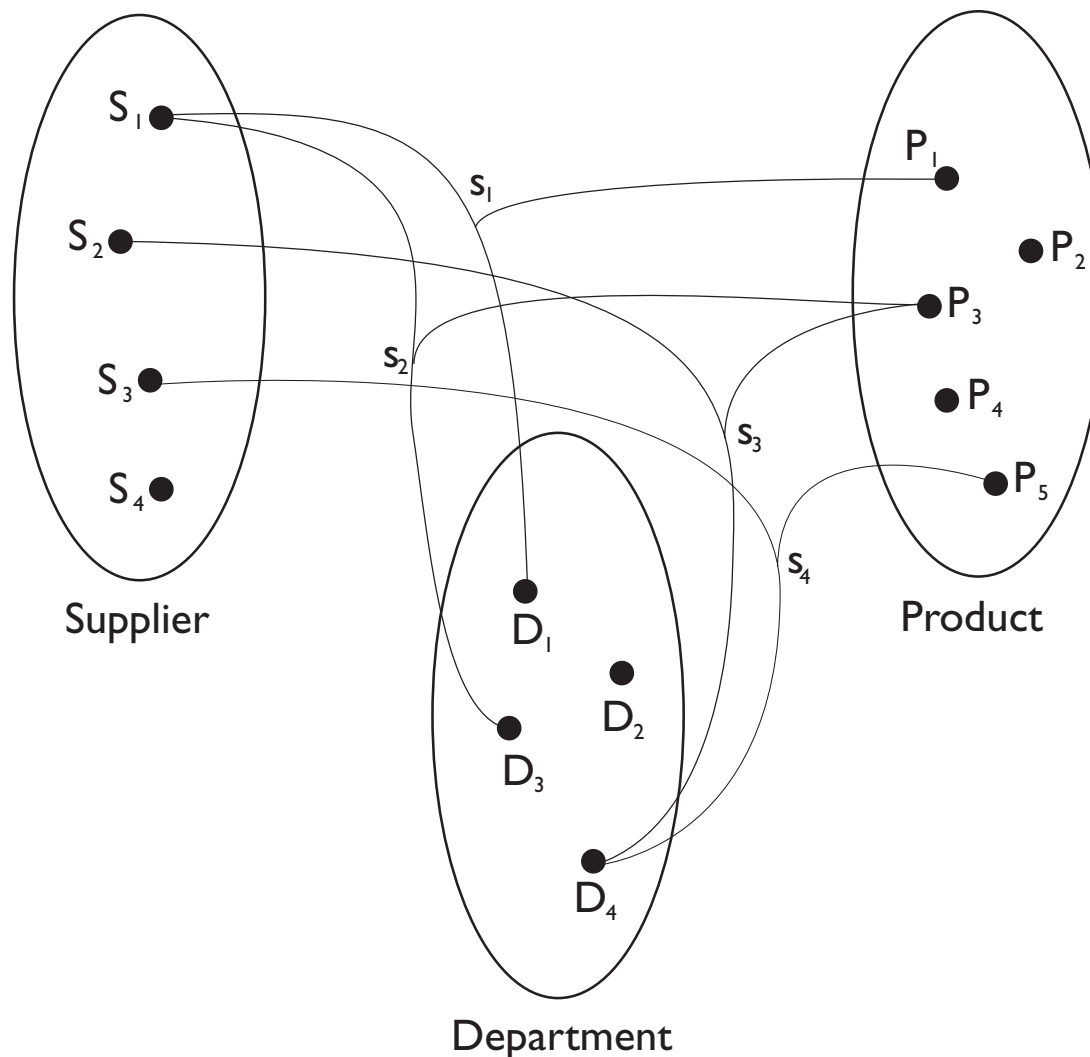
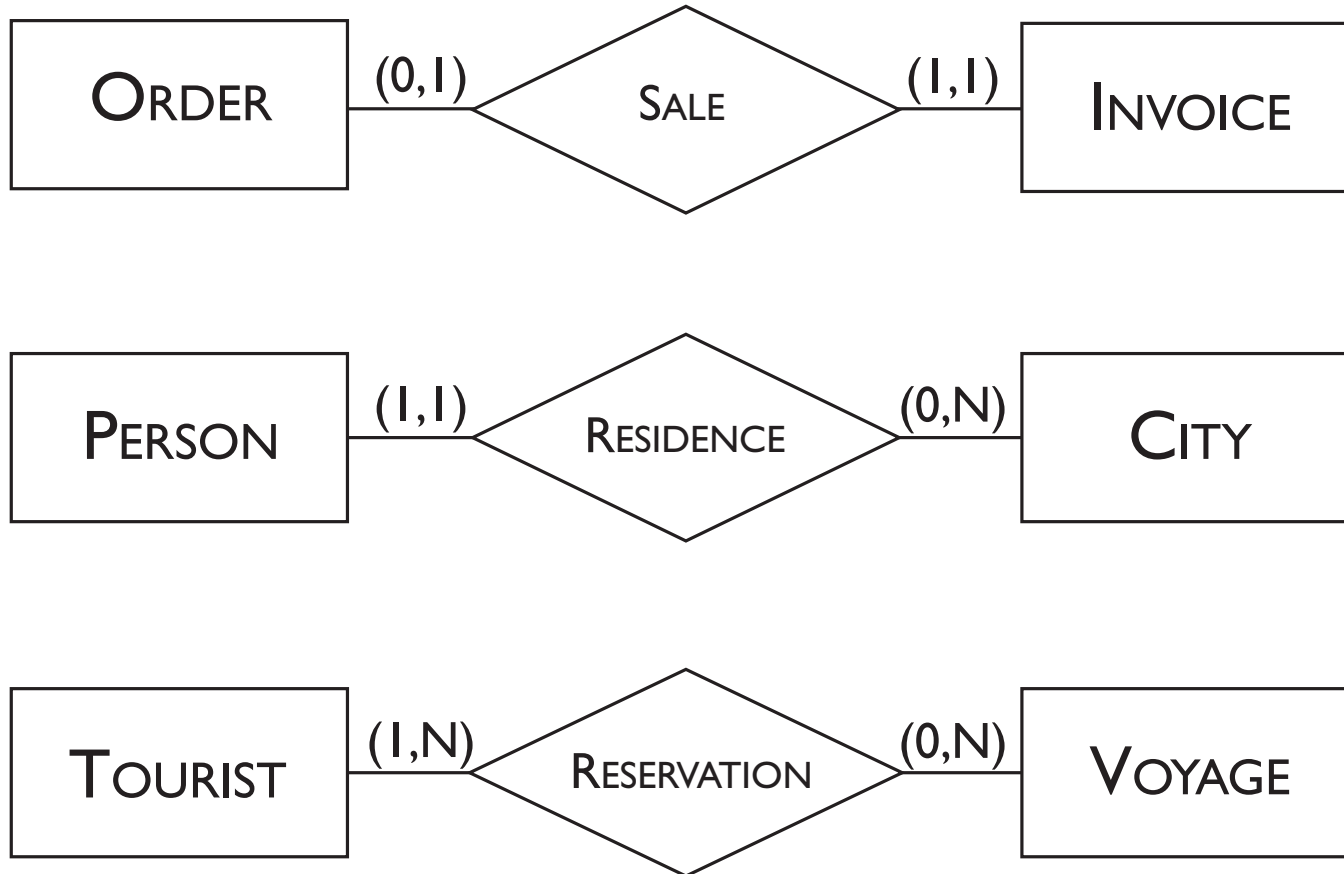# E-R schemas with relationships, entities and attributes
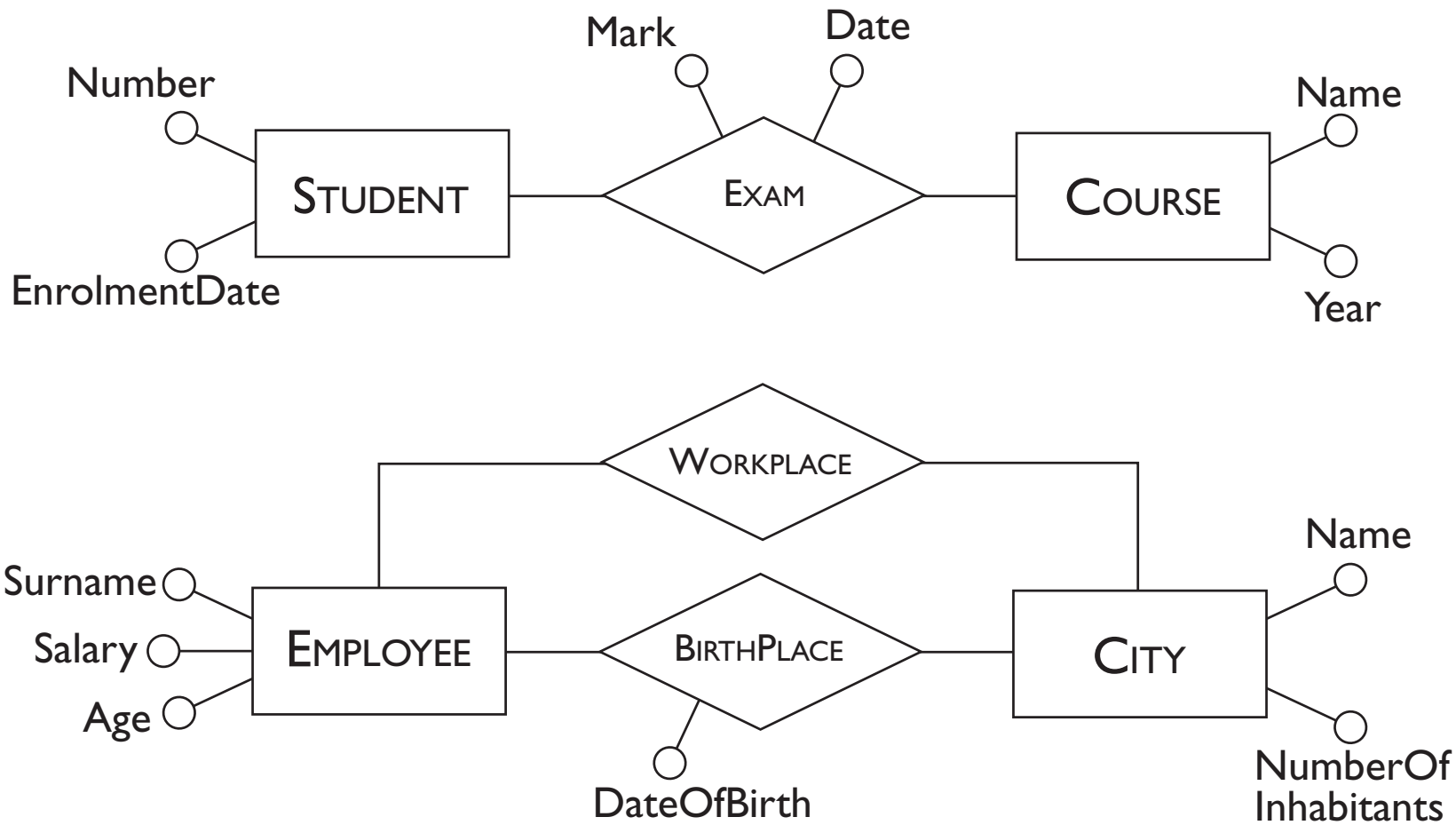
An example of an entity with a composite attribute

An Entity-Relationship schema
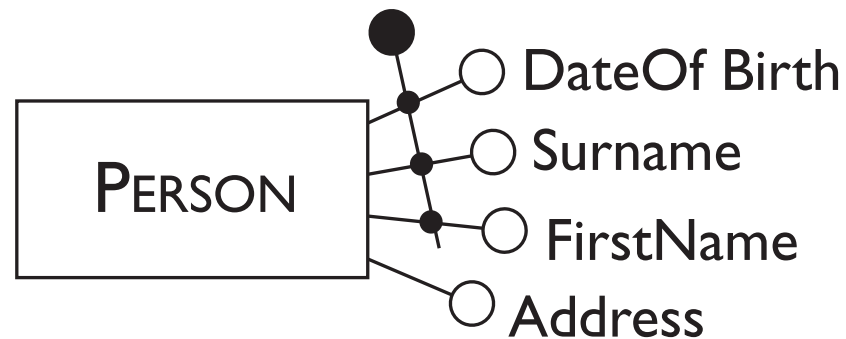
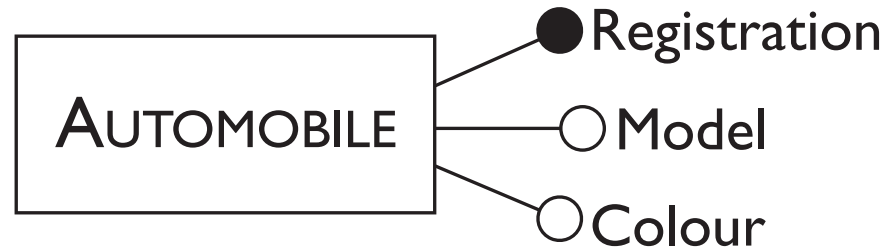# Cardinality of a relationship in the E-R model
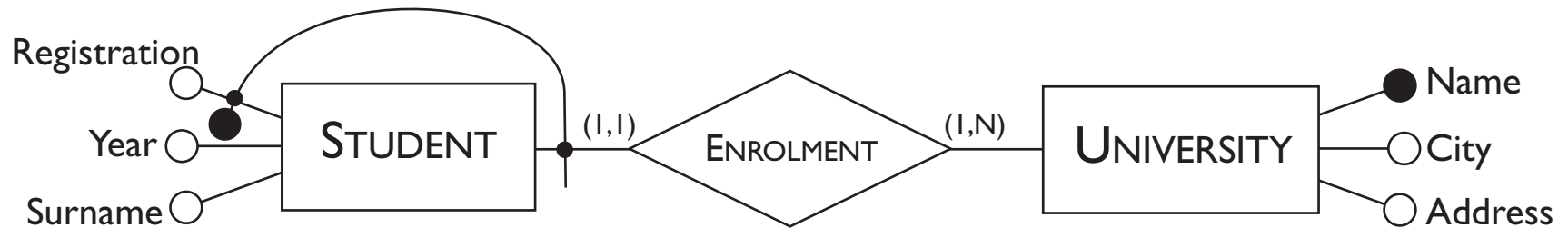
Examples of cardinality of relationships
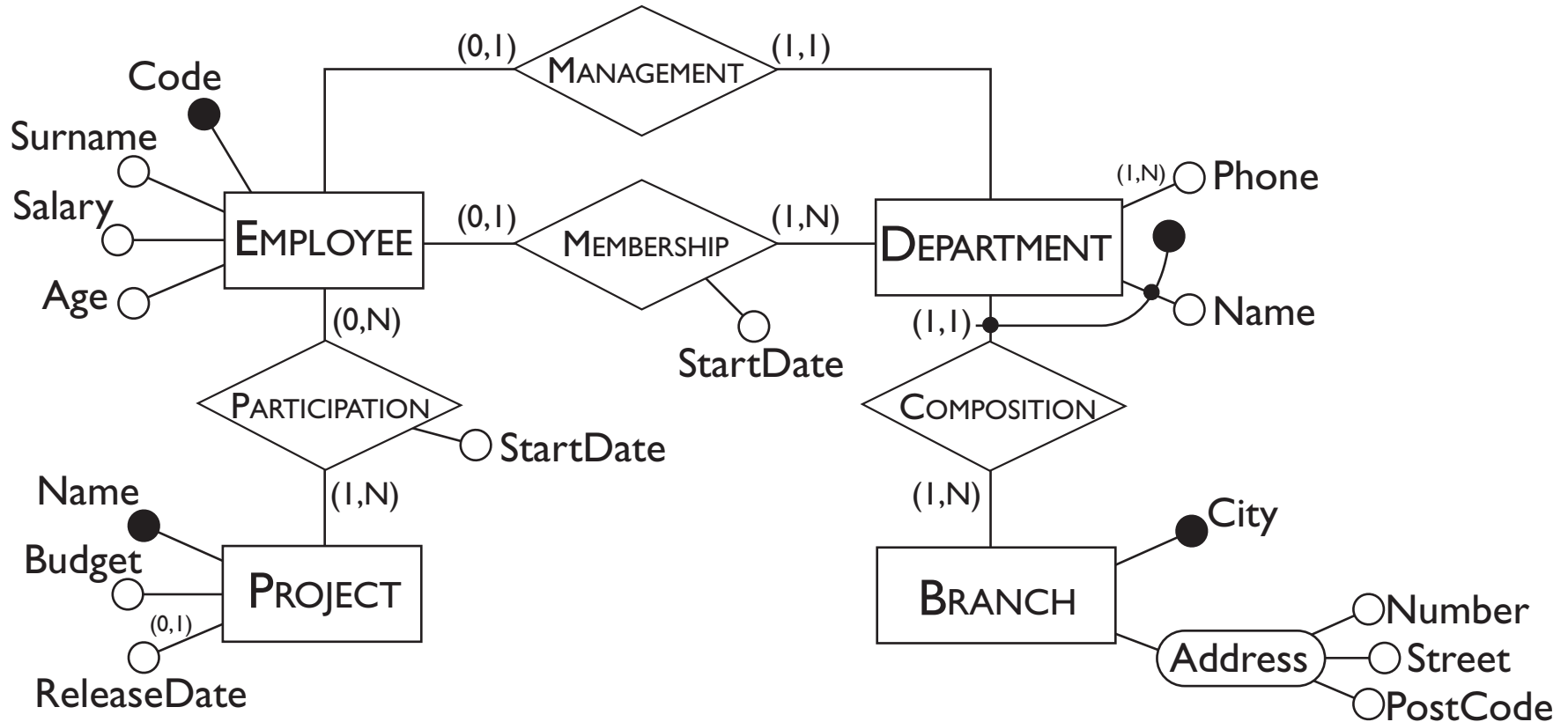
Example of entity attributes with cardinality
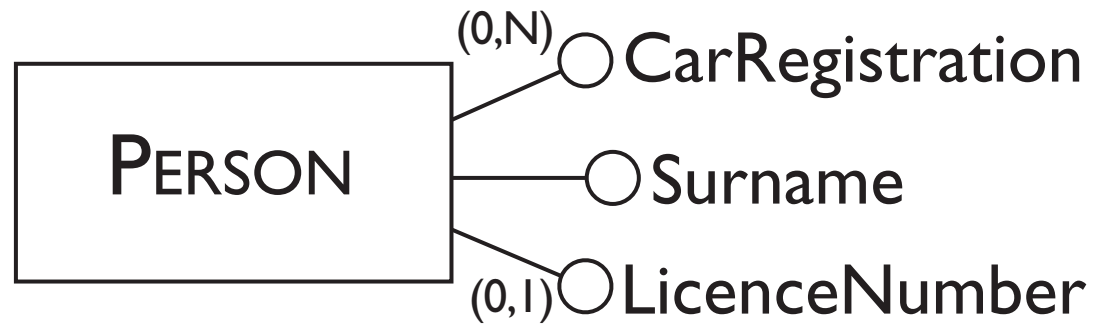
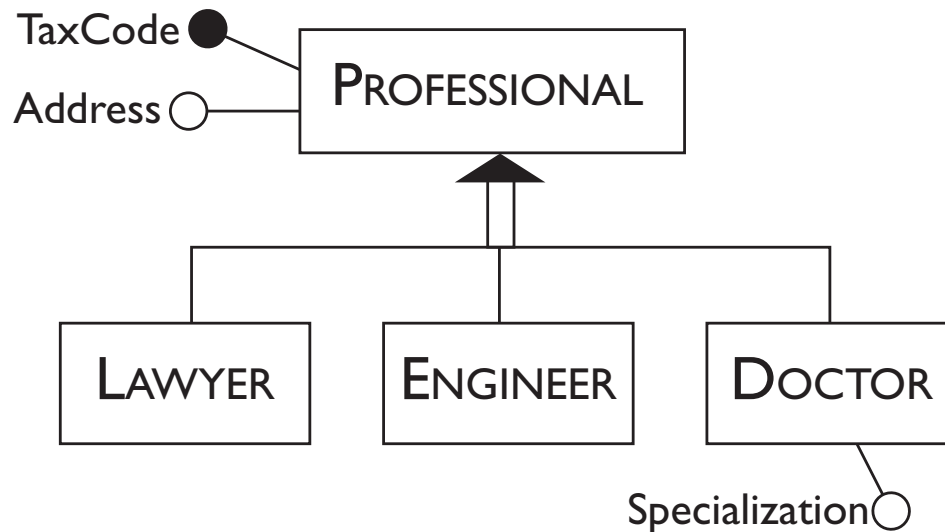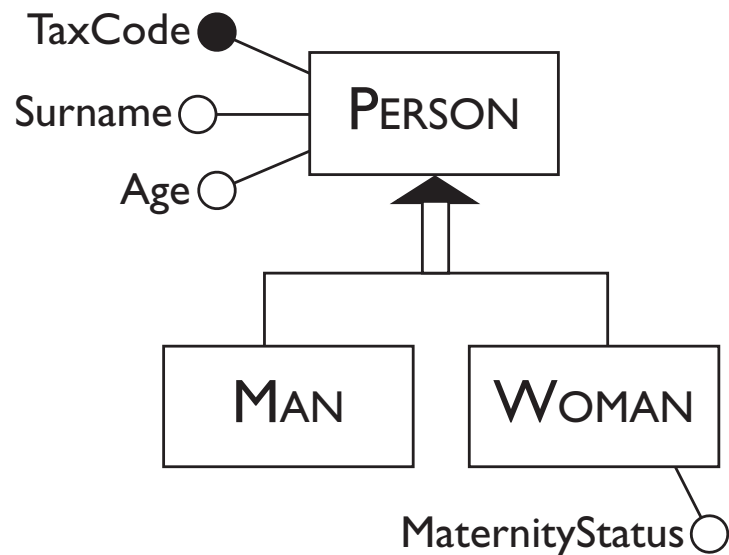# Examples of internal and external identifiers

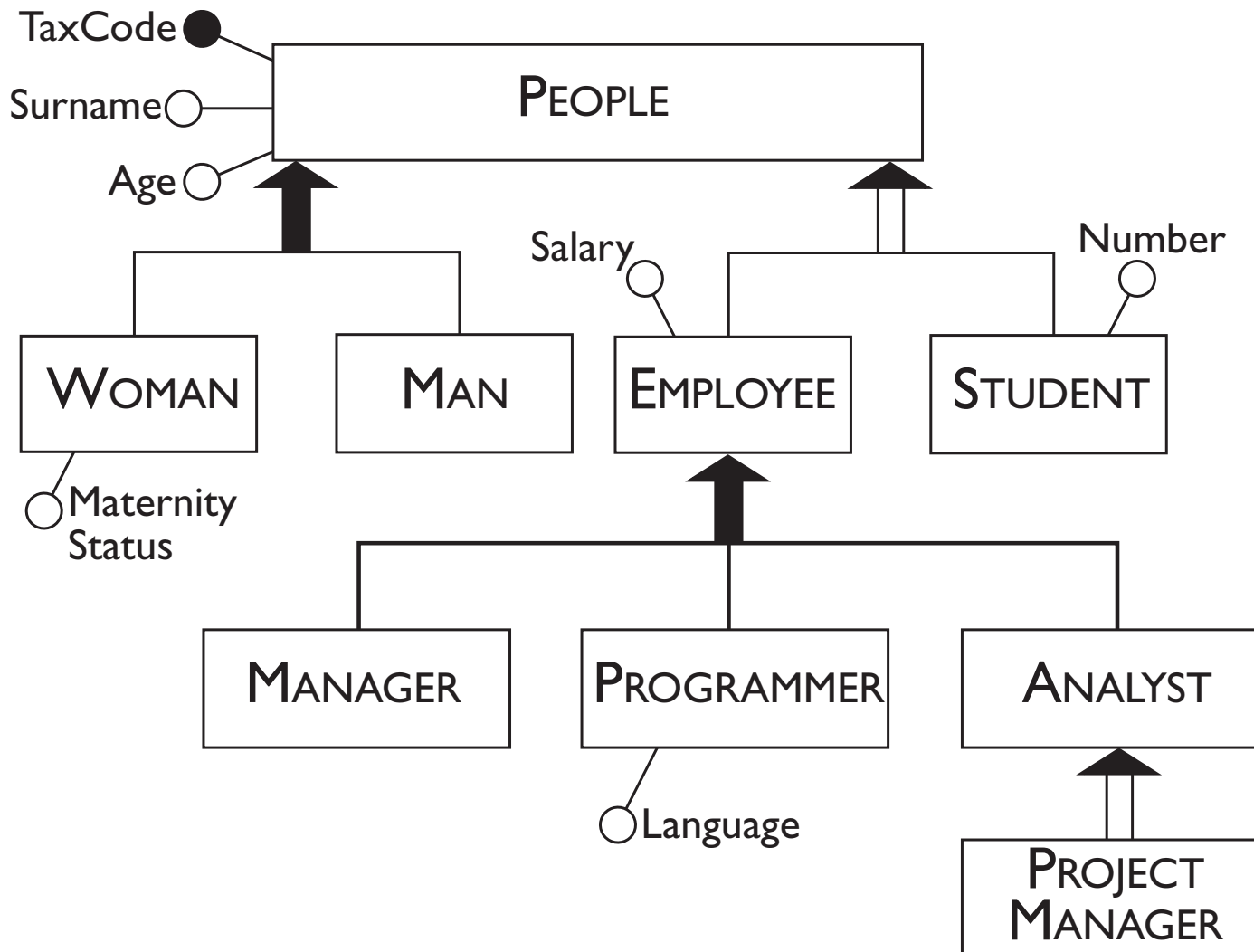# Example of an external entity identifier

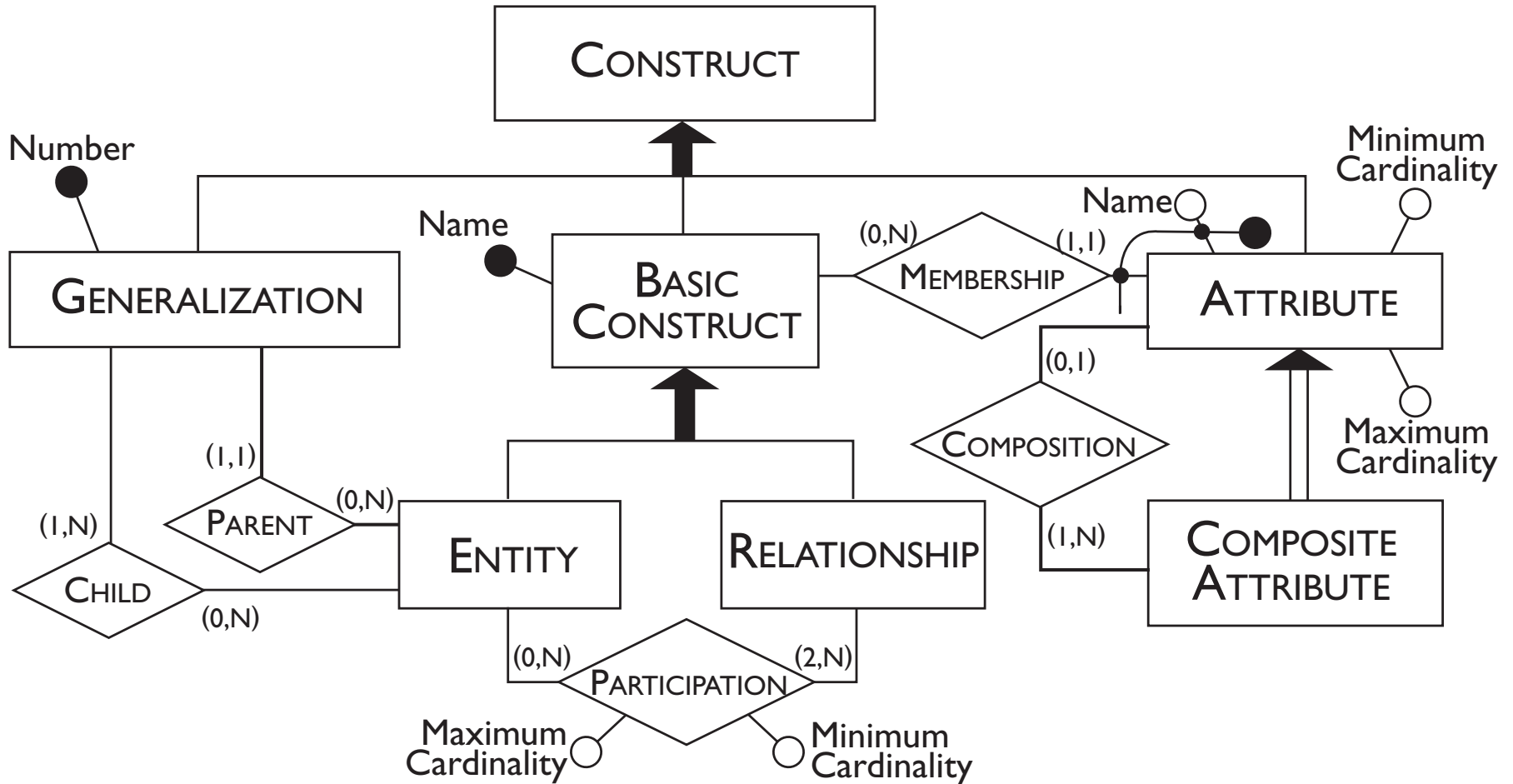# A schema completed by identifiers and cardinality

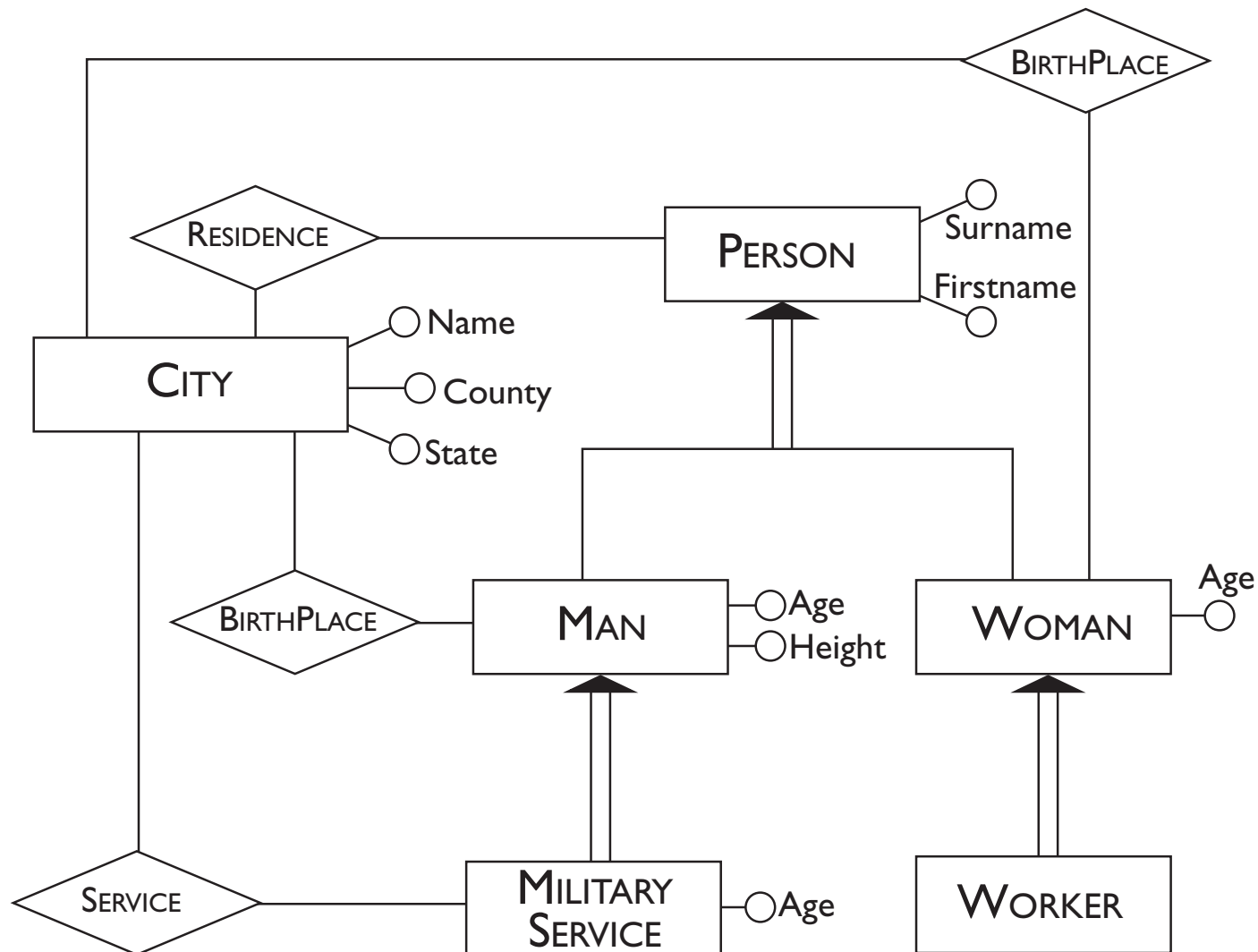# Examples of generalizations among entities

Hierarchy of generalizations between entities

Description of the E-R model using the E-R model

An E-R schema with a few imprecisions

Schema E-R for Exercise 5.6