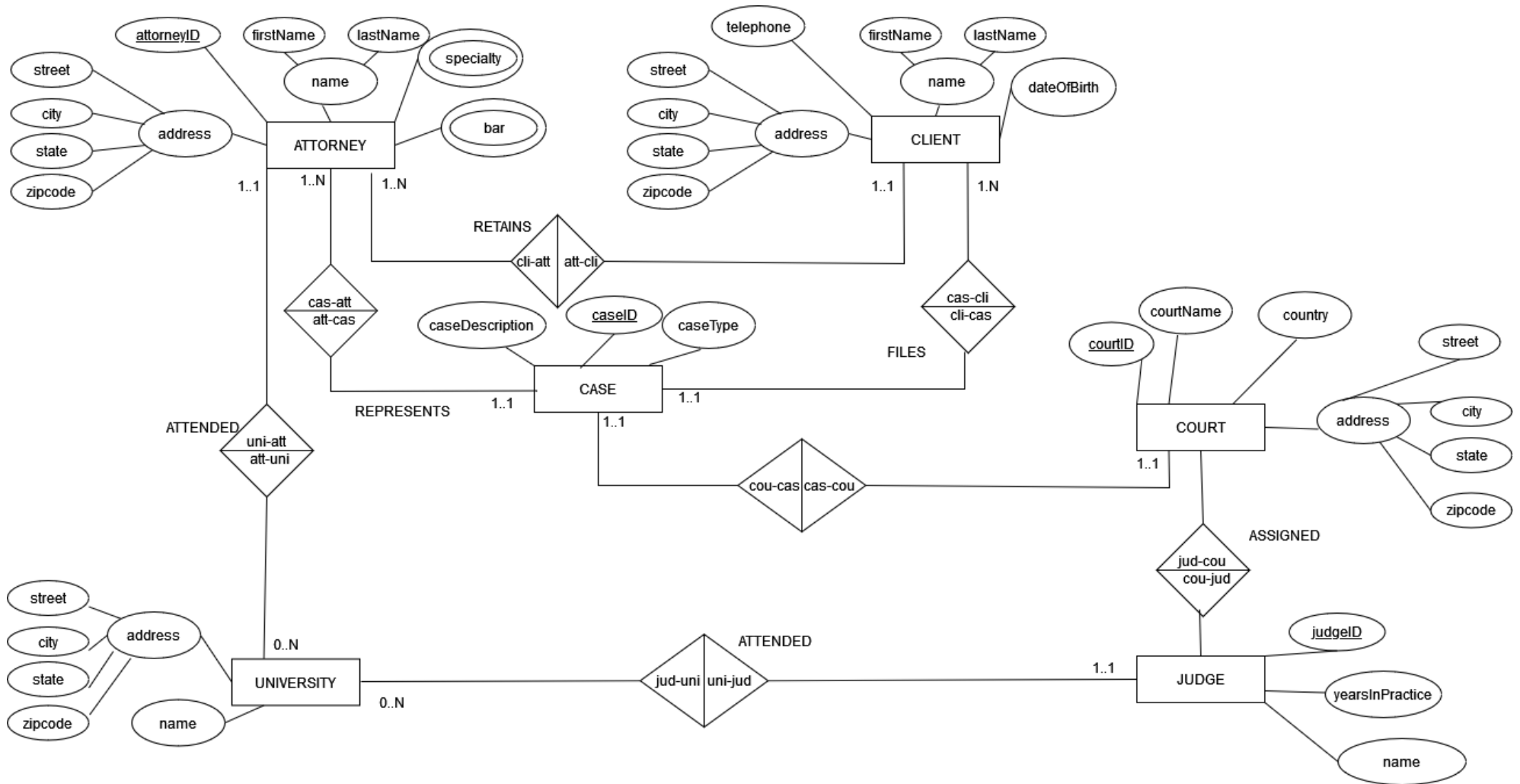# Lab 1. Database Environment

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Question 1: Create an ER model

Question 2: Describe rules for the given ER model

- Attributes of supplier are: address (supaddress), name (supname), number (supnr), city (supcity), and status (supstatus)

- The Supplier number must be unique/identifying

- Attributes of product are: number (prodnr), name (prodname), type (prodtype), and quantity available (available quantity)

- The Product number must be unique/identifying

- Attributes of purchase order are: number (ponr), and date (podate)

- The Purchase Order number must be unique/identifying

- A supplier can supply 0 or more products

- A product can be supplied by 0 or more suppliers

- A supplier can have 0 or more purchase orders on order

- Each purchase order has exactly one supplier

- A purchase order can have 0 or more order line products in it

- A product can be in 0 or more purchase orders

- The relationship between Supplier and Product includes price (purchase_price) and delivery period (deliv_period)

- The relationship between Product and Purchase Order includes quantity of products (quantity)

Question 3A:

The statement "In the case a ternary relationship type is represented as three binary relationship types, then semantics will get lost.

The reasoning to why this statement is correct is that when separating the ternary relationship type as three binary relationship types, the three entities that were originally clearly linked together are now separated which causes confusion about the relationships between the three entities as well as loss of detail while creating the ER model or database. This problem might not be clear when creating ER models can easily be seen when creating example instances. For example, in a situation where a suppliers can supply multiple products for projects, having the example instances created shows that in a ternary relationship type, it can clearly be shown that one supplier can supply two types of products for 1 project while another supplier supplies the second type of product for the second project. However in the examples of the binary relationship type, the suppliers, products, and projects are shown but what is not shown is which suppliers supply which product for which project.

SUPPLY

Supplier	Product	Project
Peters	Pencil	Project 1
Peters	Pen	Project 2
Johnson	Pen	Project 1

SUPPLIES

Supplier	Project
Peters	Project 1
Peters	Project 2
Johnson	Project 1

USES

Product	Project
Pencil	Project 1
Pen	Project 1
Pen	Project 2

CAN SUPPLY

Supplier	Product
Peters	Pencil
Peters	Pen
Johnson	Pen

Figure 3.18 taken from *Principles of Database Management:*
The Practical Guide to Storing, Managing and Analyzing Big and Small Data

Question 3B:

School

Teacher	Subject	Classroom
Teacher A	Math	Classroom 1
Teacher B	Science	Classroom 2
Teacher C	Language Arts	Classroom 3

Location

Teacher	Classroom
Teacher A	Classroom 1
Teacher B	Classroom 2
Teacher C	Classroom 3

Type

Subject	Classroom
Math	Classroom 1
Science	Classroom 2
Language Arts	Classroom 3

Can Teach

Teacher	Subject
Teacher A	Math
Teacher B	Science
Teacher C	Language Arts

Original Ternary Relationship: School

Entities: Teacher, Subject, Classroom

Ternary Relationship:

Each occurrence of the School relationship involves a specific teacher teaching in a specific classroom.

Binary Relationship 1: Teacher-Classroom

Entities: Teacher, Classroom

Relationship: "Assigned to"

Meaning: This binary relationship represents the fact that a teacher teaches in a particular classroom

Binary Relationship 2: Subject-Classroom

Entities: Subject, Classroom

Relationship: "Held in"

Meaning: This binary relationship represents the fact that a subject is taught in a specific classroom.

Binary Relationship 3: Teacher-Subject

Entities: Teacher, Subject

Relationship: "Teaches"

Meaning: This binary relationship represents the fact that a teacher teaches a specific subject

While these three binary relationships capture the individual associations between pairs of entities, they do not fully represent the original "Teaches" relationship. The ternary relationship shows the idea that a teacher teaches a subject in a specific classroom, and decomposing it into three binary relationships may lead to ambiguity of where the teacher teaches or what subject they teach