Logical Data Requirements

■ The company is organized into departments. Each department has a unique name, a unique number, and a particular employee who manages the department. We keep track of the start date when that employee began managing the department. A department may have several locations.
■ A department controls a number of projects, each of which has a unique name, a unique number, and a single location.
■ The database will store each employee's name, Social Security number,2 address, salary, sex (gender), and birth date. An employee is assigned to one department, but may work on several projects, which are not necessarily controlled by the same department. It is required to keep track of the current number of hours per week that an employee works on each project, as well as the direct supervisor of each employee (who is another employee).
■ The database will keep track of the dependents of each employee for insurance purposes, including each dependent's first name, sex, birth date, and relationship to the employee.

Relational Data Model
Headers = Attributes, Row = Tuple, Table = Relations

Relation Schema vs.
Relation State

$R(A_1, A_2, ..., A_m)$

$r(R) = \{t_1, t_2, ..., t_m\}$

What has to be true about v1?

$t_i = <v_1, v_2, ..., v_n>$

v1 has to be in the domain of A1 i.e. dom(A1)

• Model based constraints (implicit)
• Schema based constraints (explicit)
• Application based (semantic)

Domain Constraints
Constraints on NULL values

Key Constraints

Superkey? -

SK subset of attributes such that...
For any distinct tuples t1 and t2 all pairs

$t_1[SK] \neq t_2[SK]$

Key - A superkey in which removing an attribute A results in not a superkey.

Time invariant
Single attributes over composite attributes
Does it have the potential to be unknown? i.e. NULL

Entity Integrity
Primary keys can't have NULL values

Relational Database Schema

$S = \{R_1, R_2, ..., R_m\}$

IC

Relational Database State

$DB = \{r_1, r_2, ..., r_m\}$

IC

Foreign Key

FK subset of attributes of R1 that
• Have the same domain as the primary key of the relation it's referencing R2
• Has to reference an existing tuple in R2 or be NULL.

SQL - Structured Query Language

SEQUEL - Structure English Query Language

Standardized Language for RDBMS?

ANSI (American National Standards Institute)

What is SQL?
DDL & DML

What is a Schema?
• Collection of tables and other constructs that belong to the same database application.

How to create a new relation in SQL

Autumn2024	Schema1
	Schema2
	Schema3

| Spring2025 | Schema1 |

Catalog