Why This Model Achieves 3NF

- **1NF**: All fields are atomic (no lists or arrays)
- **2NF**: Each non-key field depends on the entire key (no partial dependencies)
- **3NF**: No transitive dependencies; all attributes depend only on the key

Normalization Across All Entities:

- address: All attributes (city, street, street_num, zip_code) are fully dependent on address_id, no derived fields.
- personal_info: Each personal attribute (name, email, personnummer) is dependent on person_id only. No fields are derived from each other.
- person_role: Consists only of person_id and a single role field. There is no additional metadata or repeating group that would violate 3NF.
- school: Contains school_name and foreign key address_id. Each non-key attribute is directly related to school_id.
- program: References school_id. The program name and relationship to school are stored separately to avoid redundancy.
- teacher: Connects a person to a school. Teacher role-specific data is stored in permanent_teacher and consult, avoiding transitive dependencies.
- permanent_teacher: Extends teacher, and includes only the teacher_id. There are no non-key attributes, so it is trivially in 3NF.
- consult: Attributes like company_name, org_num, and hourly rate are related directly to the consultant's identity, avoiding derived or duplicate data.
- course: Attributes like course_code, credits, and description are all dependent on course_id. No fields depend on each other.
- programcourse: A bridge table with only foreign keys and no additional attributes — it is always in 3NF.
- course_coordinator: Stores coordinator-school links, with personal info isolated in personal_info, ensuring no transitive dependency.

- class: Attributes like class_name, program_id, and courseco_id all depend on the primary key class_id.
- student: References class_id and person_id. The one-to-one mapping with personal_info ensures data consistency without duplication.
- enrollment: Another bridge table with a composite PK. It has no other attributes, so it naturally satisfies all normal forms.