

## Directed Work Series N°1

**Exercise 1:** A university wishes to model the following information:

- Students are identified by a number and have a name and a date of birth.
- Teachers have an employee ID, a name, and a specialty.
- Students enroll in courses, which are characterized by a code and a title.
- Each course is taught by only one professor.
- A student can take several courses and a course can be taken by several students.
- A student obtains a grade in each course.

**Questions:**

1. Propose a detailed E/A model.
2. Transform it into relational relations.

### **Exercise 2: Management of a Public Transportation Network**

A public transportation company wishes to set up a management system for its buses, drivers, transport lines, and passengers.

Here are the system rules:

- Buses are identified by an ID\_Bus, a registration number, a capacity, and a brand.
- Drivers are identified by an ID\_Driver, a last name, a first name, a license number, and a hiring date.
- Transport lines are identified by an ID\_Line, a line name, a distance (in km), and an average duration (in minutes).
- A bus can be assigned to several lines, and a line can have several buses operating on it.
- A driver can drive several buses (by rotation), and a bus can be driven by several drivers.
- Passengers are identified by an ID\_Passenger, a last name, a first name, and a subscription type (Monthly, Annual, Single Ticket).
- A passenger can use several lines, and a line is used by several passengers.
- When a passenger uses a line, the boarding date and time and the departure station are recorded.
- Drivers can be permanent or temporary. A permanent driver has a fixed salary, while a temporary driver is paid by the hour.

**Questions:**

1. Model this situation using an Entity–Association (E/A) schema.
2. Transform the E/A model into a relational model (relations, primary keys, and foreign keys).