

# UML: Class Diagram

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## Exercise 1 (Warming up)

Create the following class diagrams:

### 1. Library

- A library includes several books.
- A book can be either a magazine or a study book.
- A member may borrow any number of books they wish.
- For each book a member borrows, a loan record is created that stores the borrow date and the return date.

### 2. Laptops

- A laptop has a keyboard.
- A keyboard has keys.
- A laptop may optionally have an owner, who has a name and a first name.
- A laptop has a purchase price.

## Exercise 2

The owner of a small restaurant wants to implement a new information system to store data about all meals consumed on-site and to maintain a record of ingredients in stock. After some research, the following requirements were defined:

- Each ingredient has a name, a unit of measurement (for example, olive oil is measured in liters, while eggs are measured in units), and a quantity in stock.
- Each dish is composed of several ingredients. An ingredient can, of course, be used in different dishes.
- A dish has a name and an ID.
- There are several tables in the restaurant. Each table has an ID and a maximum number of people that can sit there.
- During each meal, multiple dishes are consumed. The same dish can be consumed multiple times during the same meal.
- A meal occurs on a given date and has a start and end time. Each meal has a responsible waiter.

- A waiter has an ID, a name, an address, and a phone number.
- In some cases, it is important to store information about the customer who consumed the meal. A customer has a tax identification number, a name, and an address.

### Exercise 3

An academy wants to manage the courses offered in several colleges. For this, the following information is available:

- Each college has a name, and a website.
- Each college is organized into departments, and each department has a group of teachers. Among these teachers, one is designated as the head of the department.
- A teacher is defined by their last name, first name, phone number, email, and start date.
- Each teacher teaches only one subject.
- Students, for their part, take several subjects and receive a grade for each of them.
- For each student, we want to manage their last name, first name, phone number, email, as well as their year of entry into the college.
- A subject can be taught by several teachers but always takes place in the same classroom (each having a determined number of seats).
- Finally, we must be able to print the personal record (last name, first name, phone number, email) of a teacher or a student.

Develop the corresponding class diagram.

### Exercise 4

We want to manage flights booked through an agency. Based on interviews conducted with agency staff, we know that:

- Airlines offer different flights.
- A client can book one or multiple flights.
- A reservation concerns a single flight and a single passenger.
- A reservation can be confirmed or canceled.
- A flight has a departure airport and an arrival airport.
- A flight has a departure date and time and an arrival date and time.
- A flight may include one or more stopovers at different airports.
- A stopover has a departure time and an arrival time.
- Each airport serves one or more cities.