UML Class Diagram Exercises

Imane Fouad, UK6P

Introduction

This document presents four UML class diagram exercises covering different domains including library management, restaurant systems, academic institutions, and flight booking systems. Each exercise includes the problem statement and its corresponding class diagram solution.

1 Exercise 1: Library Management System

Problem Statement

Create a class diagram for a library management system with the following requirements:

- 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

Class Diagram Solution

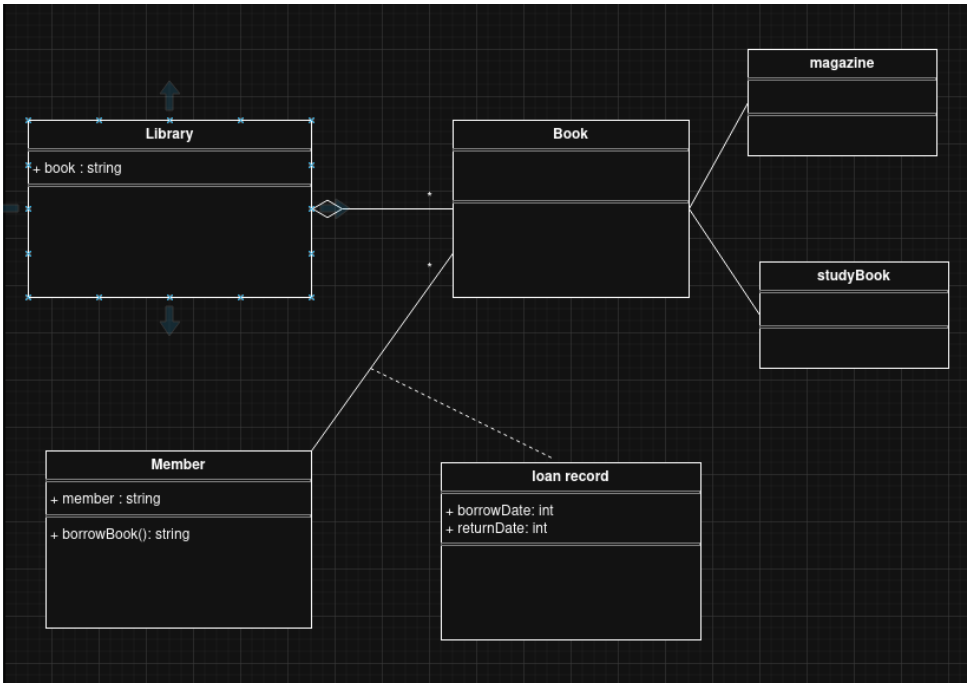

Figure 1: Library Management System Class Diagram

2 Exercise 2: Restaurant Management System

Problem Statement

Design a class diagram for a restaurant information system with the following requirements:

- Each ingredient has a name, unit of measurement, and quantity in stock
- Each dish is composed of several ingredients (ingredients can be used in different dishes)
- Each dish has a name and an ID
- Tables have an ID and maximum capacity
- Multiple dishes can be consumed during each meal (same dish can be consumed multiple times)
- Each meal has a date, start/end time, and a responsible waiter
- Waiters have ID, name, address, and phone number
- Customers have tax identification number, name, and address

Class Diagram Solution

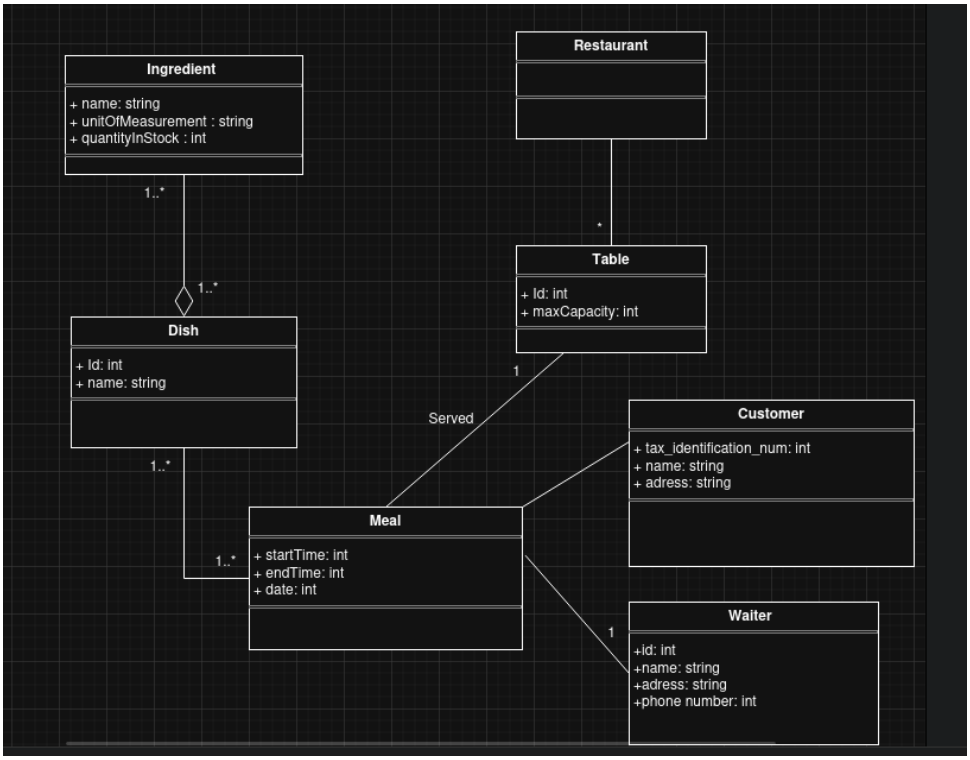

Figure 2: Restaurant Management System Class Diagram

3 Exercise 3: Academic Institution Management

Problem Statement

Create a class diagram for an academic institution with the following requirements:

- Each college has a name and website
- Colleges are organized into departments with teachers (one teacher is department head)
- Teachers have last name, first name, phone number, email, and start date
- Each teacher teaches only one subject
- Students take several subjects and receive grades for each
- Students have last name, first name, phone number, email, and entry year
- Subjects can be taught by several teachers but always in the same classroom
- Classrooms have a determined number of seats
- System should be able to print personal records of teachers and students

Class Diagram Solution

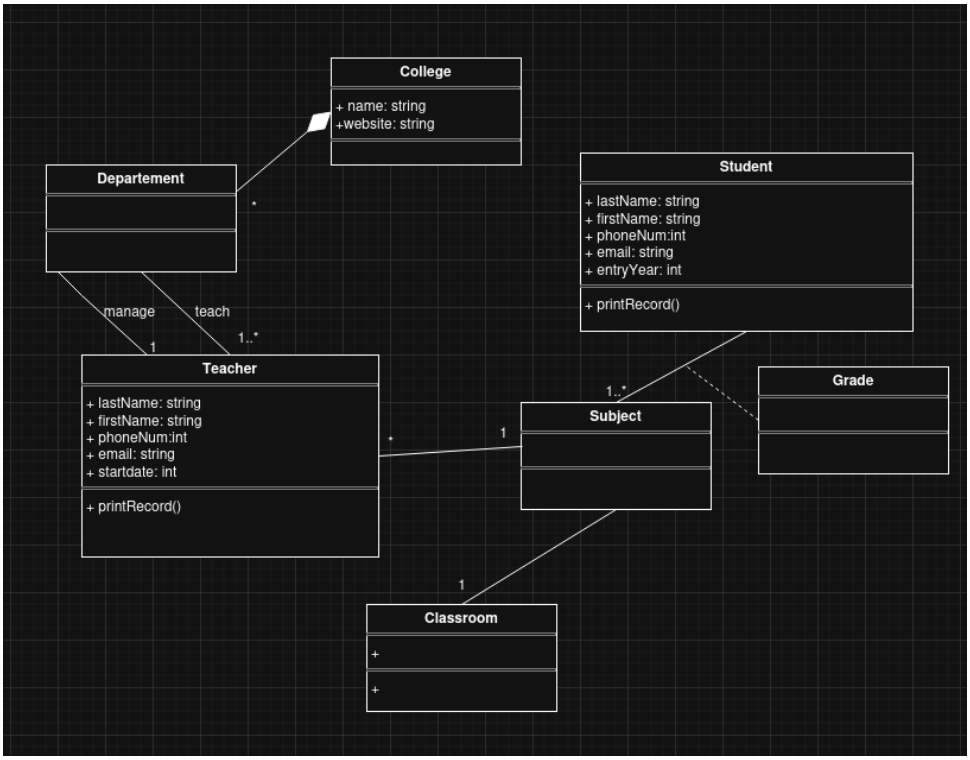

Figure 3: Academic Institution Management Class Diagram

4 Exercise 4: Flight Booking System

Problem Statement

Design a class diagram for a flight booking system with the following requirements:

- Airlines offer different flights
- Clients can book one or multiple flights
- Each reservation concerns a single flight and a single passenger
- Reservations can be confirmed or canceled
- Flights have departure/arrival airports and departure/arrival dates/times
- Flights may include one or more stopovers at different airports
- Each stopover has departure and arrival times
- Each airport serves one or more cities

Class Diagram Solution

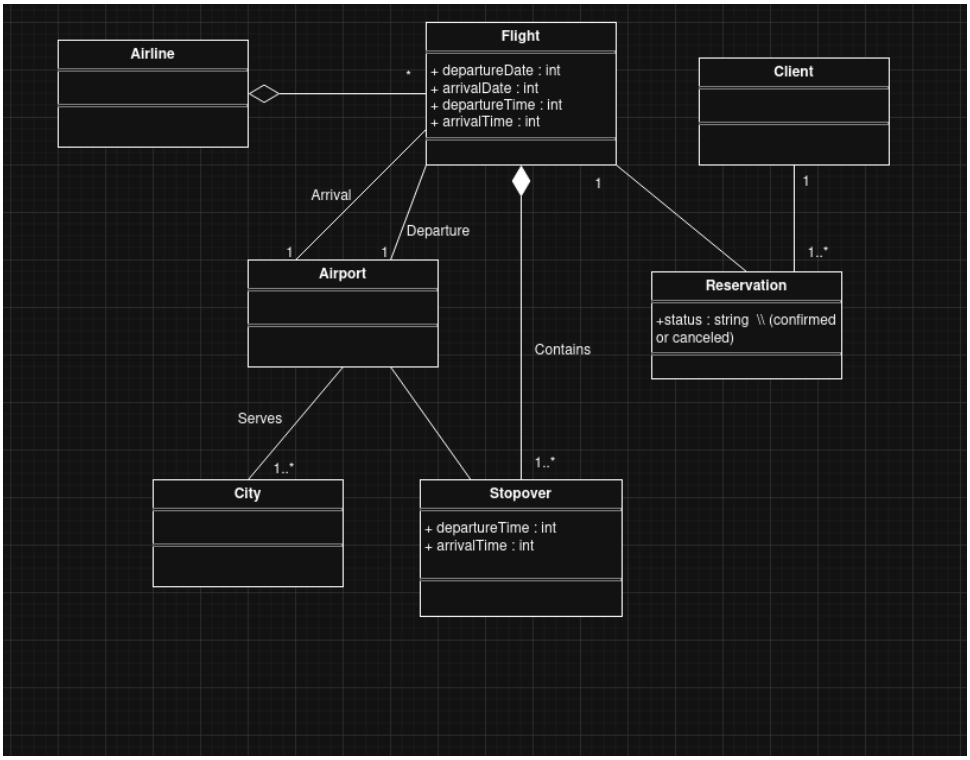

Figure 4: Flight Booking System Class Diagram

Conclusion

These four exercises demonstrate the application of UML class diagrams in various domains. Each diagram captures the essential entities, their attributes, and relationships according to the specified requirements. The diagrams show inheritance, composition, aggregation, and association relationships as appropriate for each domain.