**Tutorial 5: Class Diagram**

**Ex1**: Draw a class diagram for the single class Employee. An Employee object has a private passport number, a name (of type String), a date of birth (of type Date) and can perform getter/setter, show details and calculate age.

**Ex2**: Draw a UML class diagram that models the relationships between the classes in the following lists. Focusing on using aggregation, association, composition and inheritance relationships, you are not required to list any attributes and methods for the classes.

Bank, Customer, Savings Account, Loan, Checking Account. Checking, savings and loan have some attributes as following:

* Checking: Acct-no, Date-opened, Balance, Service-charge
* Savings: Acct-no, Date-opened, Balance, Interest-rate
* Loan: Acct-no, Date-opened, Balance, Acct-limit

**Ex3.** Develop a class diagram based on the following problem statement

**Problem 1:**

Hanu keeps track of each student's name, student number, passport number, address and phone, date of birth, gender, class (1C18, 2C18, etc), major department, and degree program (B.A., MSC, Ph.D.). Both passport number and student number are unique.

Each department is described by a name, department code, office number, office phone and website. Both name and code have unique values for each department.

Each course is described by code, course name, description, number of credits, required units, and offering department. The value of code number is unique for each course.

Each section is decribed by semester (ex: 1, 2), school year (ex: 2019-2020), and section number. Each section has a teacher and belong to 1 course. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are from 1 to 15.

Each teacher is described by teacher code, name, passport number, email, phone. Both passport number and teacher code are unique. Each teacher belongs to 1 department, 1 department has many teachers.

A grade report has a student, course, attendance mark, midterm mark and final mark.

**Problem 2:**

We want to model a system for management of flights and pilots.

An airline operates flights. Each airline has an ID.

Each flight is described by an ID a departure airport and an arrival airport: an airport as a unique identifier.

Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; a flight has also a departure time and an arrival time.

An airline owns a set of aircrafts of different types.

An aircraft can be in a working state or it can be under repair.

In a particular moment an aircraft can be landed or airborne.

A company has a set of pilots: each pilot has an experience level: 1 is minimum, 3 is maximum.

A type of aero plane may need a few pilots, with a different role (e.g.: captain, co-pilot, navigator): there must be at least one captain and one co-pilot, and a captain must have a level 3.

**Problem 3:**

Design a system for a movie-shop, in order to handle ordering of movies and browsing of the catalogue of the store, and user subscriptions with rechargeable cards.

- Only subscribers are allowed hiring movies with their own card. Assume that a subscriber has only 1 card to purchase

- Credit is updated on the card during rent operations.

- Both users and subscribers can buy a movie and their data are saved in the related order, no need to use credit card at this point.

- When a movie is not available it is ordered.

***\*There can be different solutions for one problem.***