Programming Exercises - PRO1 - Session 05

Exercise 5.01

Design classes for a reservation system.

A reservation system allows a faculty member to reserve rooms. When a faculty member comes to the administrator to reserve a room in a given time period, he is shown a list of all available room numbers, sorted by their block and floor number. If needed, then more info can be shown about each room, specifically the number of seats in the room, and whether the room has a projector. The faculty member chooses a room, and the administrator fills out a reservation receipt with the room number, the name of the faculty member, and the time period.

a) Find the nouns in the above description that you could use as a class or attribute name.
b) Find the classes and attributes among the nouns.
c) Design your classes and draw a UML class diagram with them.

Exercise 5.02

Create a class called Job

a) Implement three instance variables: a job title, a monthly salary and an employee. Call the variables title, salary and employee, where title should be of type String, salary of type double, and employee of type Person (use one of the Person classes you have already implemented in the previous exercises).
b) Add a 3-argument constructor setting all three instance variables.
c) Add a 2-argument constructor with job title and salary as argument. Set the employee to *null*, a person with the name "No one", or similar.
d) Add get and set methods for all the instance variables.
e) Add a method givePercentageRaise(double percentage) that takes a percentage as argument and increases the salary with this percentage. An example: the salary is 200 and after calling givePercentageRaise(20) the new salary is increased by 20%, i.e. 200*1,2 = 240.

Now create a test class (JobTest) with a main method and test the class Job

f) Create at least two Job-objects
g) Call the methods you made in class Job, i.e. both constructors, all get and set methods, and the givePercentageRaise method.
h) Print out all information of each Job-object.

Exercise 5.03

Create a class Point representing a point (x,y) of integers in a coordinate system. The class should have:

a) Two instance variables x and y both of type int.
b) A constructor with two arguments setting both x and y.
c) Get and set methods for both instance variables.
d) A method moveTo(int newX, int newY) that sets the point (x,y) to a new position represented by (newX, newY).
e) A method move(int xDistance, int yDistance) that sets the point (x,y) to the position (x + xDistance, y + yDistance).
f) A method toString() that returns a string with the point in the format "(x,y)". An example: calling the toString-method on a point with x=3 and y=4 should return the string "(3, 4)".

Now create a test class (PointTest) with a main method to test the Point class

g) Create two Point objects.
h) Test the methods in the Point class.
i) Print out the two points using the toString-method.
j) Calculate and print out the distance between the two points. The distance between two points (x_1, y_1) and (x_2, y_2) in a coordinate system is given by the following: dist = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Hint: in Java the square root of a number is found by: `Math.sqrt(number)`.