

# Master in Software Engineering

## Software Methodologies Course

### Part 5: Object-Oriented Methodology

## Homework 5

### Exercises

1. Draw the class diagram for an object that represents a document organized as follows: The document has a number of pages. The pages in the document are ordered and they all have the same format (margins, width and height). Each page contains graphic objects such as ellipses, rectangles, polylines, and text boxes. A graphic object is positioned on the screen at one point. The ellipses and rectangles are delimited by a invisible "box" that fits perfectly the figure and also fixes the position of the figure on the screen. A polyline is a set of ordered points formed by the ends of the component segments. A text box has a font and text color. A group of objects is a graphical object.
2. A digital watch has a display and two buttons A and B for the setting. The watch has two operating modes: "view" and "set". In the "view" state the watch displays the hours and minutes, separated by ":". In the "set" state the watch has two sub-modes: "set time" and "set minutes." The A button is used for selecting the mode of operation. Each time when you press it forwards in the same sequence: "view", "set hour", "set minute", "view" etc. In each sub-mode, the button B is used to increase the hours and the minutes respectively, every time when it is pressed. The buttons must be issued prior to the generation of a new event.

Describe the operation of the watch with a diagram of state transitions.

3. Model an information system which supports the management of inputs and outputs of goods in a dispatching center. In the followings you can find a brief presentation of the dispatching center behavior.

Following a phone call, the dispatching center sends a truck to a provider (client) to take a certain amount of goods. The goods are made of a set of packages, each having a destination (common or not) and a dispatching priority. The content of the packages is also important as some packages might contain dangerous materials.

When the truck arrives at the dispatching center, an evidence paper is released and the packages are stored temporarily in a depot.

The recipients are grouped (geographically) in more than one logical zones (sectors, districts). It is possible for a recipient to appear in more than one zone, having more that one address.

When a delivery is planned, the goods are selected according to the delivery priority and will be grouped according to the delivery zone and the transport capacity of the available trucks. After the grouping is done, route papers are given to each driver containing information related to the transported goods, quantity, destination etc.

After returning from a delivery round, based on the completed route paper and the content of the truck, the following papers will be released:

- (a) For the delivered goods, bills are released which are sent to the clients.
- (b) For returned goods, reports are released stating the reason ( refused or not able to deliver).

In conclusion, the system should generate the following documents:

- reception papers for goods taken from the provider
- bills for delivered goods
- route papers for the drivers
- reports for returned goods.

Develop:

- the domain model,
- the business use-case diagram,
- the activity diagram of the main business process (from the client request to goods delivery). Separate the manual and automated activities,
- the model of interactions between the operators and the software system supporting the business during the main business process,
- the dynamic model of the client request.