

Oblig I: Modelling

In this compulsory exercise (Oblig I) you will be trained in modelling the structure and behaviour of processes and technology focusing particularly on interaction and communication. We have selected a case that should be easy to grasp without prior domain knowledge. In a later compulsory exercise (Oblig III) you will be asked to conduct a security risk assessment of the same case.

The description is underspecified, and there are many ways to do the tasks. This is intentional and reflects how things are in practise. You are free to make assumptions as long as they are stated explicitly by you in your solution-paper.

The solution-paper in the form of a single pdf-document should be sent to kst@sintef.no by midnight September 24. You may work in groups of **maximum three students** or **you may work alone**. Hence, one solution may have up to three names. There should be no collaboration or copying **between different groups. Hence, each group should solve the exercise independently.**

You may use the tool of your preference. Some alternatives:

- <https://www.eclipse.org/papyrus/> (powerful but involves a lot to install and use)
- <https://www.draw.io> app (light weight)
- VISIO with UML stencil

Remember to put your real names (not usernames) in the solution-paper so that I can see who wrote it when it is printed on paper.

Case description

As I tried to explain in Lecture I, modellers need to be aware of the theory of Gestalt psychology. Gestalt psychology implies that the mind understands external stimuli as wholes rather than as the sums of their parts. Gestalt psychology has proposed principles or laws that governs the workings of human perception. In Lecture I we briefly mentioned the following laws:

1. Law of proximity: objects that are close are perceived to form a group
2. Law of similarity: objects are perceptually grouped together if similar
3. Law of closure: objects are perceived as complete ignoring gaps
4. Law of symmetry: symmetrical objects are perceptually connected to form a coherent shape

There are many more and they are well documented and explained both in the literature and on the internet. See for example:

- <https://www.toptal.com/designers/ui/gestalt-principles-of-design>
- <https://www.usertesting.com/blog/gestalt-principles>

Assume we have decided to make a tool to guide modellers on the impact of gestalt principles. The idea is to offer a service that allows modellers to submit models to get them analysed with respect to gestalt principles. The service will not grasp the intended semantics of the models. Hence, it does not know what the models it gets means, but it can nevertheless

identify potential "gestalt-traps" and communicate them back to the modellers. When receiving a model, the service will analyse the model and present the result in the form of a report that is sent back to the service user.

Task I

Make a class-diagram describing the case relevant concepts. The class-diagram should at least represent the following concepts: Service, Service User, Report, Model, Law of Proximity, Law of Similarity, Law of Closure, Law of Symmetry. The class-diagram should contain the generalization relation and illustrate correct use of both composition and aggregation. All associations should be decorated with multiplicities.

Task II

Make sequence diagrams describing the interaction between the service user and the various components of the service. There should at least be lifelines for Service User, Service Controller, Report Generator, Proximity Analyser, Similarity Analyser, Closure Analyser, Symmetry Analyser. The sequence diagrams should illustrate correct use of referencing (the referenced sequence diagrams should also be specified in full), loop, lifeline creation and termination, lifeline decomposition, alt and veto.

Task III

- a) Make a state-machine that correctly reflects the behaviour of the lifeline for the Service User.
- b) Make a state-machine correctly reflects the behaviour of the lifeline for the Service Controller.

The lifelines for the Service User and the Service Controller must be consistent with their state machines.