Oblig-I 2025:
Service for remote coaching of physical exercises

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General

- 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. You are free to make assumptions if they are stated explicitly by you in your solution-paper.
- The solution-paper in the form of a single pdf-document should be ***be submitted via Devilry*** by midnight (24:00) September 23. 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.**

General

- 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://app.diagrams.net/ (light weight)
  - VISIO with UML stencil
- **PLEASE NOTE THE FOLLOWING REGULATIONS: https://www.uio.no/english/studies/examinations/compulsory-activities/mn-ifi-guidelines.html**

Service for remote coaching of physical exercises

- Remote coaching of physical exercises uses digital tools for customized training, communication, and progress tracking from a distance, offering flexibility and accessibility for clients with busy schedules or those who prefer home-based workouts.
- We consider a company offering remote coaching of physical training.
- Their speciality is close monitoring and evaluation of the execution of physical exercises. The evaluation is based on remote video-recordning of exercise execution.
- Each client is assigned to a coach. Based on diagnosis and client wishes a training program is set up. The exercises are recorded live by the service via a video recorder. The session may be followed live by the coach. The coach is supported by a training exercise evaluator measuring how well the exercise is performed or functions based on angles of joints etc.

Task I

- Make a class-diagram describing the relevant concepts. The class-diagram should **at least** represent the following concepts: coaching service, repetition number, video recorder, execution evaluator, database as well as client, coach, and administrator.
- The class-diagram **must contain** the generalization relation and illustrate correct use of both composition and aggregation. All associations **must** be decorated with multiplicities.

Task II

- Make one main sequence diagram describing an exercise session. There **must at least** be lifelines for client, coach, video recorder, exercise evaluator and database.
- The sequence diagram **must** illustrate correct use of at least referencing (the referenced sequence diagrams **must** also be specified in full), loop, lifeline creation and termination, and opt. The sequence diagram should also describe some negative behavior. Please avoid excessive complexity. The sequence diagram being made in this task will be used further in the next task.
- Describe the first ten events of at least one positive trace represented by your sequence diagram. They should be represented in the form <e_1, …, e_10>

Task III

- Make a communicating state-machine that correctly reflects all the traces specified by the sequence diagram for the coach lifeline.
- Make a communicating state-machine that correctly reflects all the traces specified by the sequence diagrams for the exercise evaluator lifeline.
- The two state-machines must allow any positive trace allowed by the respective lifelines in the sequence diagrams but may have additional traces.
- Remember that the machines should communicate the messages specified by the sequence diagrams. Hence, for a lifeline, an input **signal (output signal)** in a state machine should be the **reception (sending)** of a message in the sequence diagram.