Obligatory Exercise No. 1

The exercise should be solved _**individually**_ by each student.

The solution must be sent by email to oystein.haugen@sintef.no and kst@sintef.no _**before**_ 9.00 AM October 15.

Weather service

The business idea behind this service is that people send weather reports from wherever they are, and in return they immediately get weather forecasts for their spot based on all the collected weather reports. The collected weather reports also include data received from weather sensors that periodically send weather reports via SMS to the central database.

The weather forecast is given to the requester by SMS and the collected reports can possibly be viewed on GoogleEarth since the observations are optionally placed in a KML-file.

It is not important for this exam, but we imagine that the weather forecast is done by calculating the routes of the weather and projecting the weather by what is before the requester. For example if the weather seems to flow to Oslo from the west over Drammen we can project that the weather in Oslo will in a few hours be like the weather is now in Drammen. Thus the requester in Oslo takes advantage of the reporters in Drammen.

The exercises may be answered in any order as they should be reasonably independent, but they do refer to the Weather service and Figure 1 for context.

In Figure 1 there is a sequence diagram specifying a situation of the Weather Context. Please notice that the uppermost combined fragment has the operator **par**.
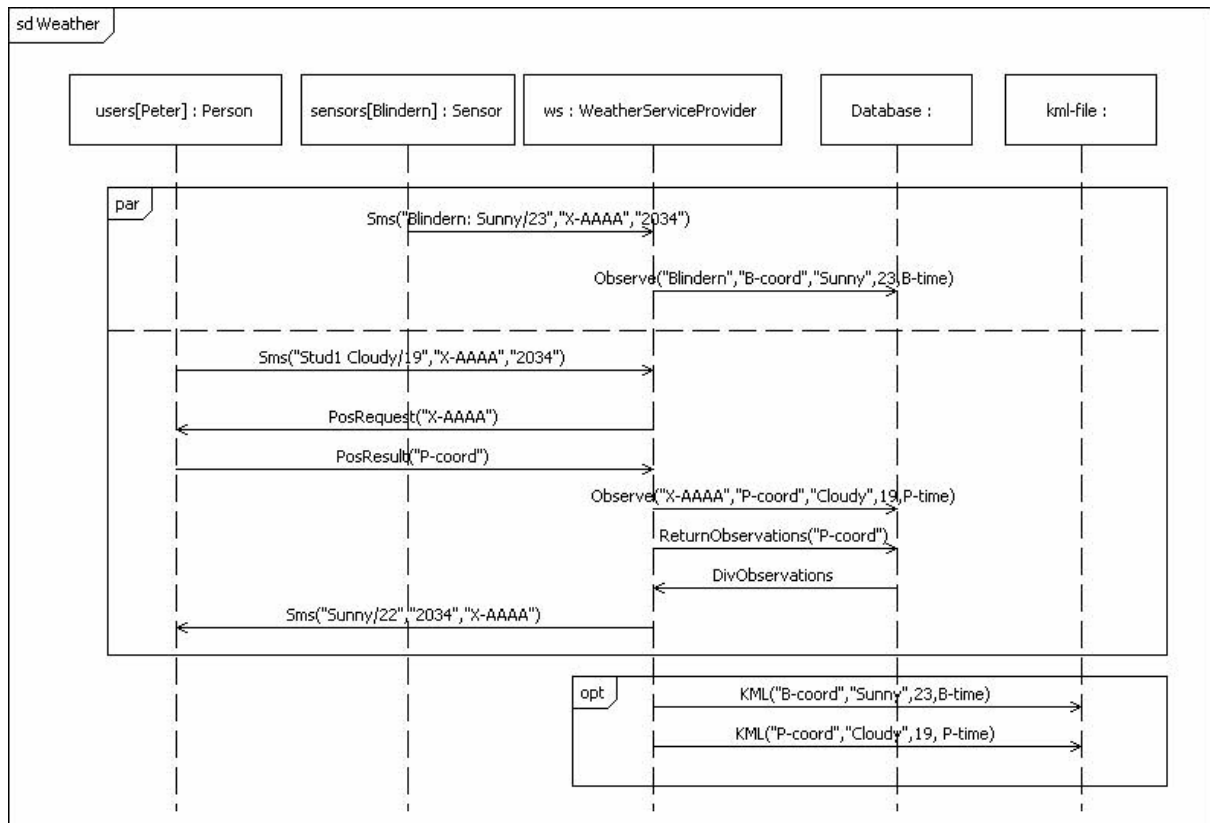
Figure 1 Weather reporting and forecasting scenario

a) Events

STAIRS Tutorial associates two events with each message, a send event and a reception event.

I. What is the first event(s) of Figure 1. Explain your answer.

II. What is the last event(s)? Again explain your answer.

b) Traces

I: How many positive traces are captured by the first operand of the **par**-construct of Figure 1.

II: How many positive traces are captured by the second operand of the **par**-construct of Figure 1.

III: How many traces are negative with respect to the diagram in Figure 1. Explain your answer.

IV: How many traces are inconclusive with respect to the diagram in Figure 1. Explain your answer.

c) Refinement

I: Draw a sequence diagram that is a (pure) supplementing of the diagram in Figure 1. Explain your answer.

II: Draw a sequence diagram that is a (pure) narrowing of the diagram in Figure 1.

III: Draw a sequence diagram that fulfils all of the following requirements:

- It **is** a refinement of the diagram in Figure 1,
- It is **not** a (pure) narrowing of the diagram in Figure 1,

2

- It is **not** a (pure) supplementing of the diagram in Figure 1.
- It has **not** the exact same semantics as the diagram in Figure 1.

d) Refinement (continued)

Consider a sequence diagram consisting of an **xalt** where the first operand is the sequence diagram in Figure 1 and the second operand can be selected arbitrarily.

I: Is this diagram a general refinement of the diagram in Figure 1? Explain your answer.

II: Is this diagram a limited refinement of the diagram in Figure 1? Explain your answer.