

UNIVERSITETET I OSLO

Det matematisk-naturvitenskapelige fakultet

Exam in - INF5150 – Unassailable IT-systems

Day of exam: 5. December 2005

Exam hours: 14.30 – 17.30

This examination paper consists of 4 page(s).

Appendices: 0

Permitted materials: All written documents can be applied

Make sure that your copy of this examination paper is complete before answering.

NB: This exam text is only given in English since the course has been given in English this year. The candidate may, however, choose to answer in Bokmål or Nynorsk if he or she wants.

Santa's Xmas Breaks

A company has the following business idea. They see that people need a break in their Christmas preparations and shopping efforts. They have also seen that people often fear that the nice cafes are crammed when they finally decide to take a break. They have decided to offer customers scheduled breaks in the vicinity of where they are. They agree with a number of nice cafes and restaurants to arrange such breaks, and guarantee a minimum number of participants.

The following is the context of Santa's Xmas Breaks:

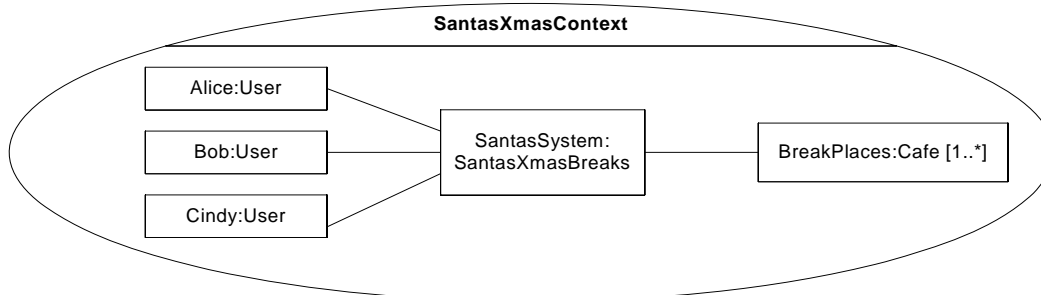


Figure 1 Santa's Context

For simplicity we have omitted the ports in the collaboration composite structure in Figure 1.

The following details the usage of the Xmas Break service.

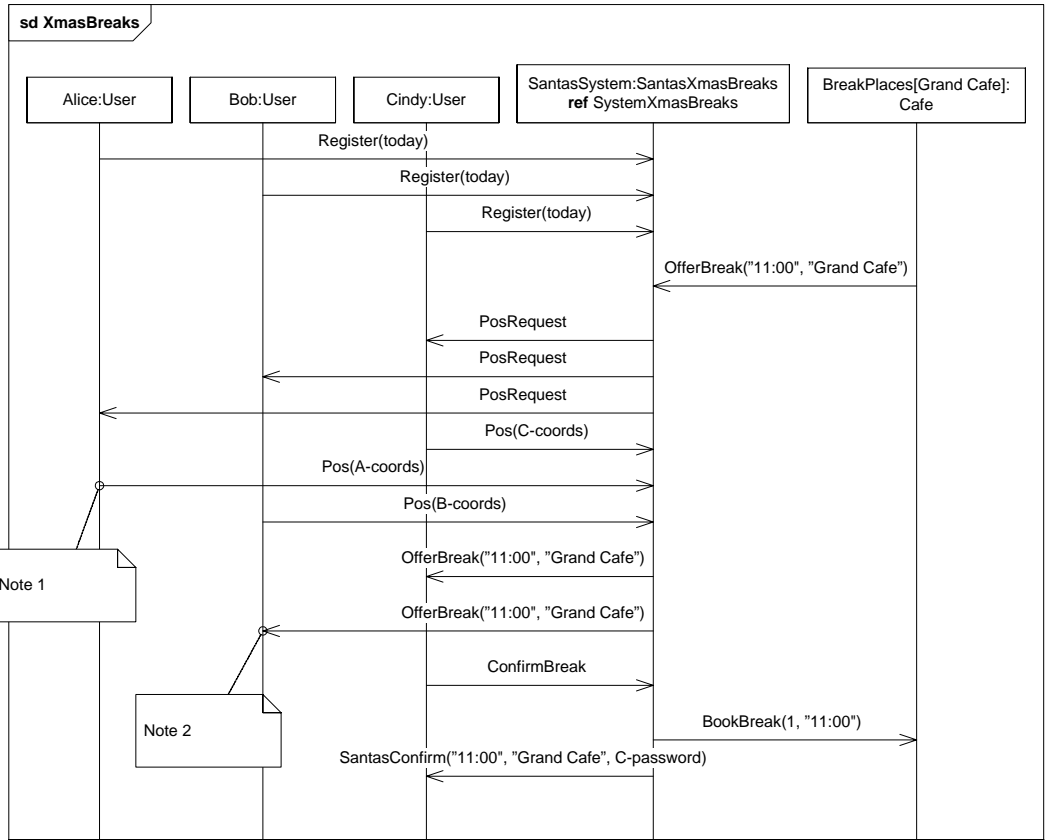


Figure 2 Xmas Breaks service

Alice, Bob and Cindy are just three examples of users of this system. In reality there may be hundreds of users.

The implementation of SantasSystem will detail the service provider class with the following composite structure.

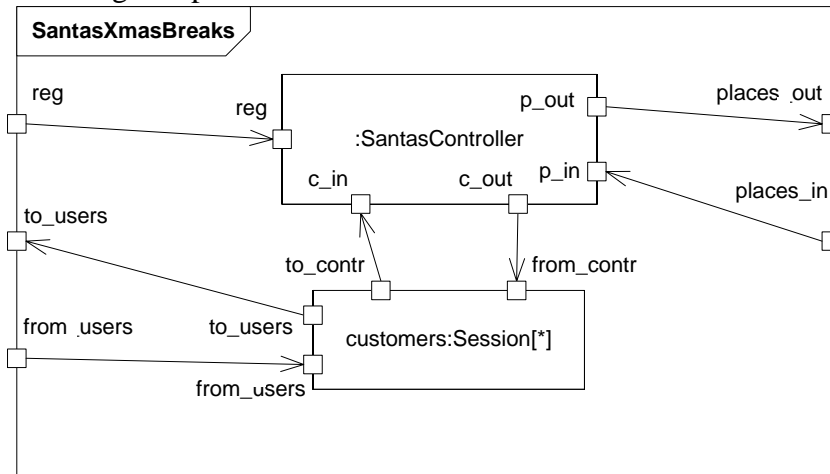


Figure 3 The composite structure of the service provider SantasXmasBreaks

Exercise 1 Modeling (35 %)

- a) Give a textual explanation of what happens in Figure 2

- b) In Figure 2 there are two Notes in the diagram. Give suggestions to what the designers would write in each of the two notes. The notes are supposed to give information about what makes Alice, Bob and Cindy different from each other.
- c) Model the sequence diagram SystemXmasBreaks. (You find the identifier SystemXmasBreaks in the XmasBreaks diagram in Figure 2)
- d) Model a state machine for Session (which you may find used in Figure 3). You should use the vocabulary from JFrame inside the transitions. Please also add explanatory comments when appropriate.

Exercise 2 Verification (30 %)

- a) Give explicitly one trace included in the positive traces defined by XmasBreaks in Figure 2. above.

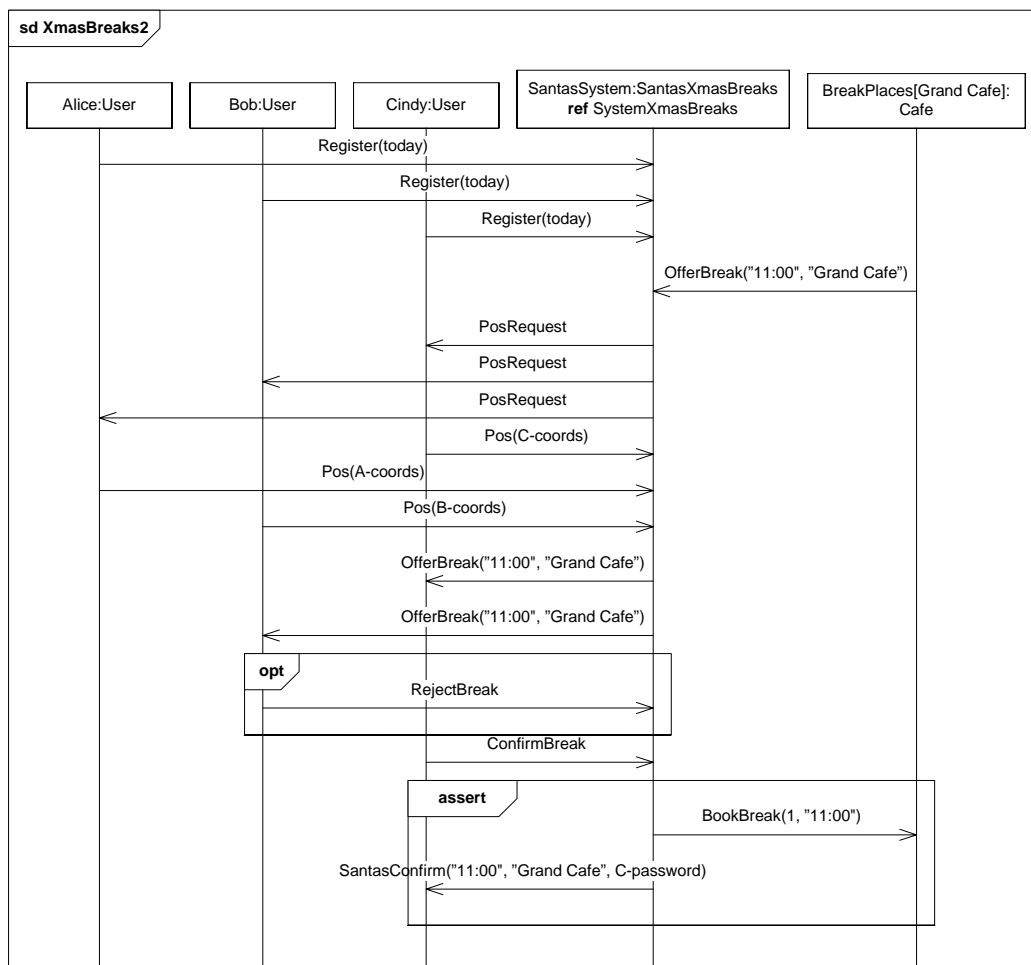


Figure 4 Modified XmasBreaks2

The definition of the **assert** combined fragment is given by the following explanation in the UML 2.0 standard:

“The interactionOperator **assert** designates that the CombinedFragment represents an assertion. The sequences of the operand of the assertion are the only valid

continuations. All other continuations result in an invalid trace.” By “invalid trace” we understand the same as we in STAIRS call a negative trace.

- b) Describe one negative and one inconclusive trace of XmasBreaks2.
- c) XmasBreaks2 (Figure 4) is a refinement of XmasBreaks (Figure 2). Is it a supplementing, a narrowing or a combination? Motivate your answer.
- d) Is XmasBreaks a refinement of XmasBreaks2?
- e) Propose a change to XmasBreaks2 so that XmasBreaks2 is no longer a refinement of XmasBreaks.
- f) Explain in words (or by fragments of diagrams) how you would modify your Session state machine to cope with XmasBreaks2.

Exercise 3: Security Analysis (35%)

- a) What is the purpose of asset identification from the perspective of the risk analysis client?
- b) Identify four assets of the Xmas Breaks provider with respect to the Xmas Breaks service.
- c) Use XmasBreaks2 to identify four different threat scenarios – one for each asset identified under b). Specify the threat scenarios using the CORAS language.
- d) Explain whether the identified threat scenarios compromise confidentiality, integrity, availability or neither.