

Examination

Software Architecture and Software Engineering

Monday May 2006

This is an *open book* examination, you are allowed to use notes, lecture slides, books, or print-outs to answer the questions.

Before start answering, read the case and the questions carefully and plan your time as good as possible.

Use a separate sheet of paper *per* question.

When you are asked to draw a diagram, first make a draft version of the diagram on a separate piece of paper, and then copy it neatly on your answer sheets. Diagrams that are too sloppy will get a lower score. Use the notations as provided on the separate UML sheets.

There are four questions.

FIMSE: Free Internet Music Sharing Environment

All questions are on a single case. You are asked to design a new music-exchange program “FIMSE” for the internet. The program should allow legal exchange of music between users. It means, for instance, that people can listen to the music, but not copy it on a CD or on an MP3-player. Users can upload their own music and search for music that other users have uploaded. The program should store the music centrally and allow the users to listen online to their selection of music.

Moreover, the program should allow *groups of users* to be creatively involved together in the music.

One example is that they should be able to mix songs or samples that are brought together in the group and play the mix to all group members. It should even allow online mixing and changing the music while listening. Think of users having a party at the same time at several places over the world, all listening to the same music and all mixing in samples and effects simultaneously.

Another example is that users should be able to create an internet *jam session*: they should be able to sing along or play an instrument together with the music – at the same time listening to the contribution of other users in the same jam-session.

Finally, to fund the free program, it should enable music companies to advertise their new records in the program. Preferably, users should only be confronted with commercials on music they really like.

Questions 1 to 4 ask you to design parts of this system. Since designing is a creative discipline, there is not a single good answer to the questions. The answers are judged on the correct application of knowledge and skills.

Question 1

Based on the very informal scenarios in the case description:

- a) Provide a list of 5 additional functional requirements and 5 non-functional requirements
- b) List all types of users of the FIMSE program
- c) Per user type in this list, name at least one use case
- d) Create a UML use case diagram for the FIMSE system

Question 2

Concerning the system design for FIMSE:

- a) Draw a UML deployment diagram that pictures the system architecture – the system should use a three-tier client-server architecture
- b) Assume that we use a class “JamSession” that represents jam session in which users can join, play music together, and leave the session. Draw a UML state diagram for this class.

Question 3

Now we are going into the detailed design.

FIMSE will have several types of sessions (e.g., listen-sessions, party-sessions, jam-sessions). There will also be several classes that represent music: e.g., a record, a sample, an online music-stream (in a jam session), etc.

Create a UML class diagram that represents the types of sessions and their relation with user-classes and classes that represent music.

Question 4

Assume you will develop the program in a team of 5 students.

- a) Which software development model is most suited for this project and why?
- b) Which parts of the program have the highest risk for a successful project and what are these risks?
- c) Sketch a development plan for the project.