Exam Software Engineering (400071)
01 April 2008

Part of this exam is centered on the following case study:

A museum requires an automated information system for use by visitors which helps them locate items in the museum and to find out more about items which are on display.
The system is intended for use in a modern art museum which contains many paintings, statues and similar "traditional" pieces of art, but also IT installations allowing for human interaction from the visitors of the museum. Factors which must be taken into account in the development of the information system are:

- The system must be a 'walk up and use' system for visitors who have no training whatsoever in computer system use.
- The system must be able to manage the floor plan of the museum and the location of items on that floor plan. Information about specific items should be accessible by indicating their location.
- The system will have to manage multi-media information - sound, images and video. Accordingly, the visitor can perform a "virtual tour" of the museum by visiting the various floors on the floor plan, selecting art pieces in the various rooms and watching/reading/listening to the associated information.
- It must be possible for the museum staff to change the information in the system and to add information about new exhibits.
- Registered users can subscribe to museum events like upcoming exhibits, film screenings, special guests. Subscribed users are notified via email.

Note: this problem description may be ambiguous and incomplete. In answering the questions, you are free to complete it (if needed) and to briefly motivate your assumptions.

Questions about the theory

1. What is MDA? [0.5 point] (select one or more answers from the following possible answers):
   - 1.a) MDA stands for Model Driven Architecture.
   - 1.b) MDA stands for Model-based Development Approach.
   - 1.c) In MDA maintenance is not done at the source code level, but at the model level.
   - 1.d) In MDA the source code of the software system is automatically generated.
2. What is the Kano model? [1 point] (select one answer from the following possible answers):
   - 2.a) It is a way to order the user functional requirements according to the Moscow classification.
   - 2.b) It is a way to classify user preferences.
   - 2.c) It is a way to relate user satisfaction with quality requirements.
3. Indicate which of the following statements about the Shepperd complexity measure is true. [1 point] (select one or more answers from the following possible answers):
   - 3.a) the Shepperd complexity measure defines the complexity of a module M as complexity(M) = (fan-in(M) x fan-out(M))^2.
   - 3.b) the Shepperd complexity measure is based exclusively on the notion of global data flow occurring between two or more components.
   - 3.c) the Shepperd complexity measure gives an indication about the design properties "procedural abstraction" and "information hiding".
   - 3.d) the Shepperd complexity measure gives an indication about the design properties "cohesion" and "coupling".
4. How can you motivate the use of the 'total number of lines of source code' to measure intra-modular complexity? [1 point] (select one or more answers from the following possible answers):
   - 4.a) Because this is the only concrete measure you can calculate.
   - 4.b) Because it has the same meaning for all companies developing software in a common application domain.
   - 4.c) Because within a certain company standard coding practices are applied and therefore measurements can be used across different software systems.
5. In your application you must use an object made of legacy code. You cannot modify the legacy code and the interface offered by the object is incompatible with the interface needed by your application. Which design pattern will you use to integrate the legacy object? [1 point] (select one answer from the following possible answers):
   - 5.a) Proxy.
   - 5.b) Adapter.
   - 5.c) Observer.

5.d) Strategy.

6. What is a software inspection? [1 point] (select one answer from the following possible answers):
   6.a) A manual evaluation of source code, aimed at identifying problems.
   6.b) A manual simulation of source code.
   6.c) A source code test method using proof checkers.

Questions related to the case study

7. For the case study, select a requirements specification technique to specify the functional requirements. Explain why the technique you chose is in your opinion suitable for the case study. Draw the requirements specification with the chosen technique [2.5 points].
8. Use a UML deployment diagram to describe a possible design solution for the complete case study. Define in a clear way each operation offered by the interface(s) of all components. If needed, use additional text. [2 points].

Exam rules:

- No books or reference material.
- No calculator or similar electronic device.
- No mobile phones.