Exam Software Modeling (401016)
22 March 2010

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

An E-Health system should be developed to facilitate the management of a diagnostic workflow in an E-Health environment. The system is typically used during a consultation in hospital, where typical activities are carried out. For example, based on the health status of the patient the doctor makes a diagnosis, and plans examinations and treatments. The doctor can also consult with experts for making the diagnosis. The E-Health system should facilitate the aforementioned activities by supporting the following:

- The system provides the doctor and other medical staff (e.g. who are involved in examinations or treatment) with access to previously collected health data of the patient. For instance, during the medical examination, the doctor may need access to patient health data like blood test results, X-ray images, etc.
- The doctor (and other staff) may record data in the system during consultation. In addition, data may be collected in the laboratory or at home during a long-term monitoring.
- To reach a diagnosis during a complex examination, the doctor may need to use several devices in several locations. The devices could be a general-purpose handheld computer or an X-ray device. To cope with this the system must have a notion of a 'session', which can be opened from several devices.
- The doctor might need to call an expert for consultation or to evaluate a given result. To this end, the doctor needs access to telephone directories.

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.Telecom companies continuously monitor the way their customers use mobile devices, for what purposes and for exchanging what types of data. Their objective is to elicit emerging requirements for new software services that can better support the needs of the market. In this way, telecom companies can maintain and strengthen their market position by offering always more appealing features. What type of software life cycle (SLC) model fits better to these types of projects? In explaining your choice use at least 3 of the studied decision points for the selection of a SLC model. [1 point]

2. Select one requirements elicitation technique. Give a concise description of it. [1 point]

3. Indicate which of the following statements about requirements engineering is true [0.5 point] (select one or more answers from the following possible answers):

3.a) Requirements validation always assumes that the end-user is directly involved in the software development process, together with the software developer.

3.b) Requirements engineering (including all its processes) typically consumes about 20% of the total effort spent for the whole software development process.

3.c) In the so-called "40-20-40 rule" about the relative effort spent on the various development activities, requirements engineering alone consumes about 40% of the total effort.

4. Explain the notions of 'cohesion' and 'coupling' in software design. [0.5 point]

5. Define 'cyclomatic complexity'. Explain if cyclomatic complexity is a good indicator of system complexity, and why. [0.5 point].

6. Give the definition of Service Oriented Architecture (SOA). Explain (both in text and with a picture) how service discovery is carried out in service orientation. [1 point]

7. Explain at least two main differences between Service Oriented Software Engineering (SOSE) and traditional software engineering. [0.5 point]

[Text continues on next page]

Questions related to the case study

8. For the case study, select a UML diagram to specify the functional requirements. Explain why the diagram you chose is in your opinion suitable for the case study. Draw the requirements model with the chosen diagram. Use additional text where needed. [1.5 points].

9. Complete the requirements specification (of the previous question) with a diagram of your choice (either UML diagram or classic notation). [1.5 point].

10. Use a UML component diagram to describe the main structural design of the E-Health system. Use additional text to document your design. Also, explain the type of decomposition approach you used (procedural or structural), and why you considered that approach more appropriate for this specific case study. [2 points].

Exam rules:
-No books or reference material.
-No calculator, mobile phones or other electronic device.