Exam Software Engineering (400071)
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. Draw the V-model representing one of the software life cycles we studied. What specific aspects of the software life cycle does it emphasise? [0.5 point]

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

3. Give the definitions of 'procedural abstraction' and 'data abstraction' in software design. Explain how using one or the other influences the structure of the resulting design solution. [1 point]

4. Indicate which of the following statements about requirements engineering is true [0.5 point] (select one or more answers from the following possible answers):
    4.a) Requirements validation always assumes that the end-user is directly involved in the software development process, together with the software developer.
    4.b) Requirements engineering (including all its processes) typically consumes about 20% of the total effort spent for the whole software development process.
    4.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.

5. Indicate which of the following statements about design documentation is true? [0.5 point] (select one answer from the following possible answers):
    5.a) The goal of design documentation is to describe only what the targeted documentation readers need to know.
    5.b) The goal of design documentation is to describe everything about the developed design solution.
    5.c) The goal of design documentation is to describe only how the functional requirements have been fulfilled in a design solution.

[Text continues on next page]

6. With which design criteria is "information hiding" strongly related? Why? [0.5 point] (select one or more answers from the following possible answers):

        6.a) It is strongly related with "abstraction", because if you hide something, the user may abstract from that fact.

        6.b) It is strongly related with "coupling", because the hidden information decreases the dependency between a module and its environment.

        6.c) It is strongly related with "cohesion", because the secret is the reason including the parts in its module.

7. Describe the following categories of test technique: coverage-based testing, fault-based testing, and error-based testing. [1 point]

Questions related to the case study

8. Use a UML use case diagram to describe the functionality in the e-health system. Where needed, use additional text. [1.5 points].

9. Use a UML component 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. Where needed, use additional text. [2.5 points].

10. Classify the components of your design solution as: (a) user interface management, (b) data management, (c) elaboration/business logics, (d) general mechanisms (like distributed communication, security, third-party interaction management). Explain for each component the rationale for your classification. [1 point]

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