Tentamen Software Engineering (400071)
24 June 2004

This exam is centered on the case study "Software Project Management" (SPM). All questions refer to the SPM case study.

A software house needs to manage the information about its software development projects. The SPM system must support the following requirements:
1. Each project is described in terms of its acronym and its description.
2. Developers employed in the software house are described by their employee identifier, first name and family name. The system also manages the assignment of developers to the various projects. Note that each developer can work in multiple projects at the same time.
3. By giving as input the project acronym, the SPM system allows to retrieve all information about the involved developers, including the total number of hours worked in that project.
4. By giving as input the employee identifier, the SPM system generates the list of all projects in which he/she worked, together with his/her total number of worked hours.

The SPM system must be used by administrative personnel with no technical background. Therefore, the user interface must be easy-to-use and intuitive.

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.

Question 1: Life cycle models
a) Provide the definition of the following models:
    *   Waterfall model,
    *   Throw-away prototyping,
    *   JAD.
b) For each model, provide a graphical representation, which shows the specific phases and their interactions.
c) Choose a software life cycle model for the SPM case study. Motivate your answer.

Question 2: Requirements engineering
a) Provide the list of functional requirements of the SPM case study, and organize them in a MoSCoW list. Also, formalize the "Must have" requirements by means of a Use Case diagram.
b) Provide one non-functional requirement for the SPM case study. Provide a short motivation.
c) For the SPM case study, provide the domain (data) model in UML.
d) For the SPM case study, provide the description for one use case represented in the Use Case diagram of point a). The description must include the normal course of events (c.o.e.), one alternative c.o.e. and one exceptional c.o.e.

Question 3: Software architectural/design patterns
a) Which is the difference between architectural styles/patterns and design patterns? (select one among the following possible answers):
    3a.1) None: they are different names for the same concept.
    3a.2) Architectural styles/patterns are used during requirements engineering, whereas design patterns are used during design.
    3a.3) Architectural styles/patterns describe the complete architecture of a software system, whereas design patterns describe a part within a system.
b) Provide one design view showing the global software structure of the system for the SPM case study.
c) Apply an architectural pattern to the design view of point b).

Question 4: Software design
a) What is software design?
b) Which is the main difference between requirements engineering and software design?
c) Give an example of design decision.

Question 5: Testing
a) Which is the difference between verification and validation? (select one among the following possible answers):

    5a.1) Verification is a static analysis of the source code without executing it, whereas validation tests a software system during execution.

    5a.2) Verification checks the output of one development phase against its input, whereas validation is always against the initial requirements.

    5a.3) Validation checks the output of one development phase against its input, whereas verification is always against the initial requirements.

Scoring
With this exam, you can gain 90 points at most. Your final mark is calculated as follows:

    Exam mark = (#points + 10) / 10

If you gained bonus points for the assignments, these will be added to the Exam mark.

The weight of each question is as follows:

1a: 5   b: 5   c: 5
2a: 10   b: 5   c: 10   d: 10
3a: 5   b: 10   c: 5
4a: 3   b: 3   c: 4
5a: 10

Exam language
If possible, you are kindly requested to write your answers in English. In any case, be sure that your handwriting is **clear and understandable**.