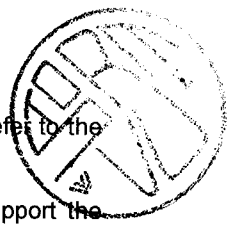
Tentamen Software Engineering (400071)
18 August 2004



This exam is centered on the case study "Flight Booking System" (FBS). All questions refer to the FBS case study.

A travel agency needs to manage flight bookings for its customers. The FBS must support the following requirements:

1. Airline companies offer various flights. It is the airline itself that decides to open and close the bookings for each flight, and that communicates it to the travel agencies.
2. A customer can book multiple flights and for different passengers.
3. A booking concerns a single flight and a single passenger. A booking can be opened, and then cancelled or confirmed.
4. When confirmed, the tickets are issued and delivered to the customer.
5. A flight has a departure airport and an arrival airport. A flight has a departure day and time, and an arrival day and time.
6. A flight may have stopovers in airports; a stopover has an arrival time and a departure time.
7. Each airport serves one or more cities.

The FBS is of course connected to the various airline companies via a network, so that when bookings are inserted or changed, the information is updated on-the-fly. To ensure a good service to the customers, the FBS should be able to get the most up-to-date information so that e.g. errors in the bookings are avoided.

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:
   - Spiral model,
   - Code & fix,
   - Throw-away prototyping.

b) For each model, provide a graphical representation, which shows the specific phases and their interactions.

c) Among the various maintenance activities, which one requires the largest effort, and why?

Question 2: Requirements engineering

a) Provide the list of functional requirements of the FBS case study, and organize them in a MoSCoW list.

b) Formalize the "Must have" requirements of point a) by means of a Use Case diagram.

c) Extract one non-functional requirement from the FBS case study. Provide a short motivation.

d) For the FBS case study, provide the domain (data) model in UML.

e) For the FBS case study, provide the description for one use case represented in the Use Case diagram of point b). 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 design

a) What is software design?

b) Which of the following descriptions apply to temporal cohesion? (select one among the following possible answers):
   - 3b.1) The components inside a module are activated at the same time.
   - 3b.2) The components of a software system communicate at the same time (in parallel).
   - 3b.3) The components inside a module communicate at the same time (in parallel).

c) Which is the main difference between stamp coupling and content coupling? (select one among the following possible answers):
   - 3c.1) With stamp coupling the data passed between modules is labelled with the identifier of the passing module, while with content coupling the data passed is not.

3c.2) with stamp coupling the data passed between modules is simple data (with no information about data formats), while with content coupling the modules exchange complete data structures.

3c.3) With stamp coupling the modules exchange complete data structures, while with content coupling the data passed between modules is simple data (with no information about data formats).

d) Provide one design view (in UML) showing the global structure of the software system for the FBS case study.

e) Give an example of design decision for the FBS case study.

Question 4: Testing

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

4a.1) Verification is a static analysis of the source code without executing it, whereas validation tests a software system during execution.

4a.2) Validation checks the output of one development phase against its input, whereas verification is always against the initial requirements.

4a.3) Verification checks the output of one development phase against its input, whereas validation is always against the initial requirements.

b) Which is the definition of "fault"? (select one among the following possible answers):

4b.1) Fault is a human action that produces an incorrect result.

4b.2) Fault is the consequence of a failure.

4b.3) Fault is the consequence of a human error.

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: 6		
2a: 6	b: 5	c: 4	d: 10	e: 10
3a: 4	b: 5	c: 5	d: 10	e: 5
4a: 5	b: 5			

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.