Tentamen Software Architecture
21 February 2012

This exam is centered around the case study "*supermarket online*" (SOL). All questions refer to the SOL case study.
The system needs to manage the storage of goods and the price lists: for each good, identified by a code, the system manages the total number of available units and their price.
Further, the system includes a cashier subsystem that:

1. manages each payment session for each customer and issues a receipt detailing the code of each purchased unit, its price and quantity, and the total amount of the purchase; for each unit, the storage management functionality is involved to update the actual status of stored units.
2. manages the daily session, that is it computes the total amount purchased that day, it shows the unit that has been sold most, and it updates the status of the storage.

The SOL will be made available on the public Internet; hence each user must be authenticated before granting access to the storage and/or cashier subsystems. The login information is also logged in the SOL system on a "users' registry", and is maintained for statistical purposes only.

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: Software Life Cycle and Architecture

a) Give **your** definition of Software Architecture. Motivate your answer.
b) Give two reasons why architecture is important in the software life cycle. Shortly explain why these are important reasons.

Question 2: Architecture representation

a) What is the main characteristic difference between module views and component-and-connector views.
b) Give one viewpoint specification for the SOL case study. Explain why and for whom the viewpoint you chose is relevant.
c) Give the architectural view of the case study for the viewpoint defined under point b). Present adequate documentation of your view.

Question 3: Design

a) Give the definition of "design issue" and "design option". Draw an example using elements from the case study showing how these two notions are related.
b) Give five elements of design decisions that one needs to document. Motivate your choice.
c) Give three reasons why it is hard to make purely rational design decisions.
d) Concisely explain the generalized software architecture design model of Hofmeister et al.

Question 4: Software quality

a) Explain the difference between a tactic and a pattern.
b) Describe the parts of a quality attribute scenario.
c) Provide an example of a security tactic **relevant** for the case study. Explain why this tactic is relevant.
d) Give an example of a concrete quality attribute scenario for the case study which addresses usability.

Question 5: Architecture Analysis

a) Give the definition of "sensitivity point" in architecture assessment.
b) Explain two benefits of using ATAM.

c) Explain the notion "utility tree".
d) Concisely explain the notion of a question set as used in an architecture design review.

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

Final mark = (#points + 10) / 10

The weight of each question is as follows:

1a: 5	b: 5			= 10
2a: 2	b: 5	c: 8		= 15
3a: 5	b: 5	c: 5	d: 10	= 25
4a: 4	c: 4	d: 6	e: 6	= 20
5a: 5	b: 5	c: 5	d: 5	= 20