



FACULTY OF INFORMATION TECHNOLOGY  
END OF SEMESTER EXAMINATION  
ICS 2201: SOFTWARE ENGINEERING

DATE: 13<sup>th</sup> December 2017

Time: 2 Hours

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**Instructions**

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

**Question 1 (Case Study, 30 marks)**

JazzN!ghts is a famous Jazz festival, held in Zurich every year. Since its first edition in 1986, it has gone through several major changes regarding its structure, length and location, but the tickets have always been sold in a traditional way: through two events agencies. The organizers decided to completely modernize the tickets selling system and created the following concept.

From this year on, the tickets will be sold in three distinct ways: traditionally, i.e. by the two events agencies, in electronic format directly on the festival website, and through SBB. All parties will have access to the same unique tickets database of the new system, to avoid double selling. A partnership with the SBB railway company needs to be set up, such that SBB can sell combi-tickets including both the festival admission fee and the train ride to the festival venue at reduced price, from anywhere in Switzerland. This way, more music fans would have easier and cheaper access to JazzN!ghts. Moreover, the system will have to be extended to support not only German, but also English, French and Italian. Since tickets will also be sold online, SecurePayment Inc. will be contracted to provide and ensure the security of the online payment service. The JazzN!ghts event manager will take care and negotiate all these details with the involved parties.

Additionally, upon arrival at the festival venue, each participant has to self-check in at a touch screen terminal, which scans the barcodes on his/her ticket and issues a bracelet with an electronic chip. This can be used to load money, such that whenever (s)he wants to purchase snacks or beverages, (s)he does not have to use cash any more, thus reducing waiting times. This measure was initiated by the program manager and will be deployed by Wrist Solutions Inc. Lastly, according to the cantonal laws, the way the payment transactions are performed has to be audited by an external company at the end of the festival, since this is a public event, where the municipality of Zurich is also involved - allowing free use of the public space.

**From the JazzN!ghts Case study, answer the following questions**

- a. Identify and name all the stakeholders of the JazzN!ghts new tickets selling system.  
Name at least 8 stakeholders **(4 Points)**
- b. Identify one goal, two functional requirements and two non-functional requirements in the case study. **(5 Points)**
- c. How can you gather further requirements that help you build the JazzN!ghts new tickets selling system? Mention **four** different requirements elicitation methods.

**For each, explain**

- (i) Why you think the method is suitable in the context of the JazzN!ghts case study
- (ii) What stakeholders the method is appropriate for, and
- (iii) How you would implement the method in practice, for JazzN!ghts. **(12 Points)**
- d. Identify all the use cases in the JazzN!ghts case study and represent them in a UML use case diagram. Note: Do not forget to document your assumptions, if you make any. **(9 Points)**

**Question 2 (15 marks)**

a. Testing is an important element in the software development life cycle. This is because the problems caused by software bugs can be expensive and/or dangerous to human life in the life cycle of the software application. In detail discuss the testing techniques below:

- i. White box testing **(2 marks)**
- ii. Black box testing **(2 marks)**
- iii. Unit testing **(2 marks)**

- b. A program is seeded with 25 faults. During testing, 18 faults are detected, 13 of which are seeded faults and 5 of which are indigenous faults. What is Mill's estimate of the number of indigenous faults remaining undetected in the program? **(3marks)**
- c. State 3 distinct benefits of writing tests before writing the code. Is this approach more applicable to black-box tests, more applicable to white-box tests, or equally applicable to both? **(3 marks)**
- d. It is cheaper and faster to fix known bugs before you write new code. Why? In one phrase or sentence, explain three distinct reasons. **(3 marks)**

**Question 3 (15 marks)**

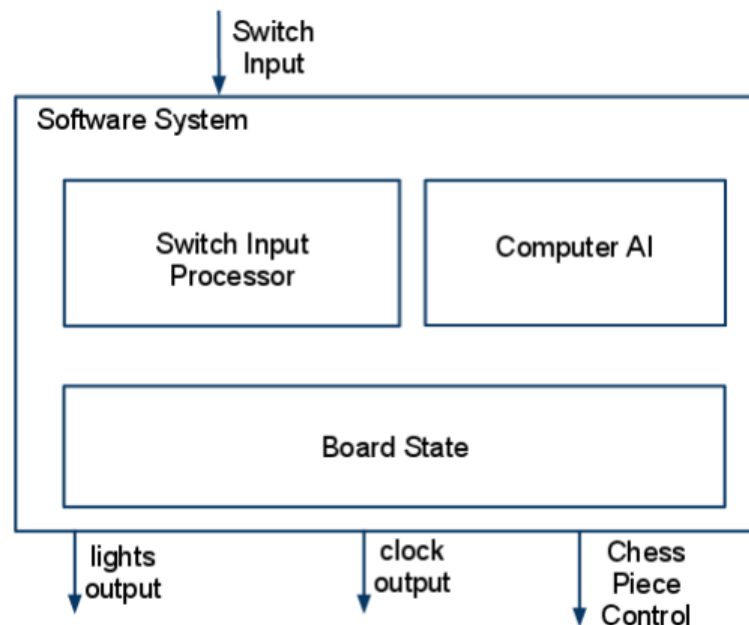
- a. Describe four of the main principles of agile methods. Indicate how these are mapped (reflected) into the principles or practices of extreme programming. **(8 marks)**
- b. In detail, describe three ways in which the Spiral process model is superior to the Waterfall model.**(3 marks)**
- c. Consider a task you are not familiar with, such as designing a zero-emissions car. How would you solve the task?**(4 marks)**

**Question 4 (15 marks)**

- a. Briefly discuss the difference between quality control and quality assurance. **(4 marks)**
- b. The developer's view of user-friendliness is likely to be determined by technical properties of the interface: use of windows, buttons, scrollbars, pop-up menus, etc. The developer is inclined to look at user-friendliness from the inside. On the other hand, the user's main concern is to get his job done in the most effective way. User interfaces should not be friendly; they should effectively support the user at work. What are the important ways to measure the usability of a system? **(4 marks)**
- c. Why are standards important in the quality management process? Give 4 reasons with detailed explanation **(4 marks)**
- d. Quality management team uses their judgement to determine whether or not software is fit for its intended purpose. Give THREE examples of questions related to the system's quality characteristics you would ask as a member of the quality management team to determine whether or not the software is fit for its intended purpose. **(3 marks)**

### Question 5 (15 marks)

- a. The Model view controller pattern divides the system into three components.
  - i. Discuss the three components of the MVC pattern **(3 marks)**
  - ii. Outline one advantage and one disadvantage of MVC pattern **(2 marks)**
- b. When describing a system, explain why you may have to design the system architecture before the requirements specification is complete. **(6 marks)**
- c. In the following diagram, the system uses a layered architecture. The bottom layer is the Board State component which provides the current state of the board to the Switch Input Processor and Computer AI components. Implicit Invocation can be used to communicate board state changes to the other components and to the outputs of the system



- i. Give the advantages and disadvantages of a layered architecture **(4marks)**