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Exam 2

The exam consists of four parts:

- 1) Testing of general knowledge 25%. Each right question counts 1. Each wrong counts – 0.5. Empty counts zero. See below note about Task 1.
- 2) Planning 20%. All sub-questions count equally.
- 3) Requirements and modelling 35%. All sub-questions count equally.
- 4) Testing 20%. All sub-questions count equally.

1. True or false questions.

- A. [good software] Dependability is one of the essential attributes of good software. True False
- B. [good software] Security is one of the essential attribute of good software. True False
- C. [general] The fundamental activities in software processes are: specification, development, and validation. True False
- D. [general] The software engineering code of ethics is a set of principles that prescribes, in a general way, standards of expected behaviour for professional software engineers. True False
- E. [process models] In Incremental development, increments serve as examples to explore requirements. True False
- F. [agile] In agile development, contract negotiation is of foremost importance. True False
- G. [agile] In agile development, responding to change is more important than following a plan. True False
- H. [requirements] The principal requirements engineering activities are: Feasibility study; Requirements elicitation and analysis; Requirements validation True False
- I. [requirements] Consider the following requirement specification fragment for a ticket-issuing system "Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued." This is a functional requirement. True False
- J. [requirements] Consider the following requirement specification fragment for a ticket-issuing system "Between 0600 and 2300 in any one day, the recovery time after a system failure should not exceed 2 minutes". This is an availability requirement. True False
- K. [modeling] Activity diagrams show object interactions arranged in time sequence True False
- L. [modeling] A class diagram gives a view about the structural connections between classes in the system. True False

Comment [LJ1]: Maintainability, dependability and security, efficiency and acceptability

Comment [LJ2]: It should contain evolution phase which is the most consistent. Development can also be design and implementation.

Comment [LJ3]: (lacks specification)

Comment [LJ4]: False this is the purpose of sequence diagrams.

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M. [modeling] A textual use-case description describes: a) the actors involved; b) interactions; c) The data that is exchanged; d) The stimulus that triggers the use case; e) The response of the system; f)

Comments. True False

N. [architecture] According to Krutchen's 4+1 model, the logical view shows the key dynamic interactions of the system. True False

Comment [LJ5]: false it should be abstractions

O. [CM] One of the aims of Configuration Management is to support system integration so that all developers can access the project code and documents in a controlled way True False

P. • Testdata is defined as input data used to execute the system during a test. True False

Q. [OSS] In open-source development, the source code of a software system is made publicly available. True False

R. In open-source development only volunteers and not professional developers can participate in the further development of the system. True False

S. [testing] Testing can detect the presence of errors as well as their absence. True False

T. During acceptance testing, customers test a system to check that it is ready for deployment. True False

U. [evolution] New technologies which become available may impose that software systems must change to take advantage of them. True False

V. [evolution] In general, effort of maintenance to adapt the software to a different environment can be estimated to be the 18% of all maintenance effort. True False

W. Program structure improvement is one possible re-engineering activity True False

X. Communication ability is one of the important factors to consider when selecting people for a software project True False

Y. Project estimates must include either the effort required to complete each project activity or the time required to complete each activity True False

Comment [LJ6]: false it should be "both" not "or"

2. Planning

- a) When would you argue against the use of an agile method for developing a software system? List at least two main situations.

Situation 1 Agile methods should not be used when the software is being developed by teams who are not co-located. If any of the individual teams use agile methods, it is very difficult to coordinate their work with other teams. Furthermore, the informal communication which is an essential part of agile methods is difficult to maintain.

Situation 2 Agile methods should be avoided for critical systems where the consequences of a specification error are serious. In those circumstances, a system specification that is available before development starts makes a detailed specification analysis possible.

However, some ideas from agile approaches such as test first development are certainly applicable to critical systems.

Other situations may involve very large systems; lack of customer involvement; unstable development teams; low skills level of the developers.

Assume that, for a given project, the following facts are known:

- A simple process, inspired by the Waterfall model, which consists of specification&design, development, and integration&testing is chosen.
- it will start the 1st week January 2013
- up to four persons can work on the project
- the project can last up to five months
- the project cost should be between 60 and 70 man week

- b) give start and finish date for the three main tasks and make a WBS. Specify duration of tasks in weeks or days. Be clear about which unit you use.

- specification&design start week 1 finish week 9 duration 9
- development start week 7 finish week 15 duration 9
- integration&testing validation week 13 finish week 20 duration 8

- c) Make a Gantt chart, each column should represent a week. Each row should represent one of the three activities.

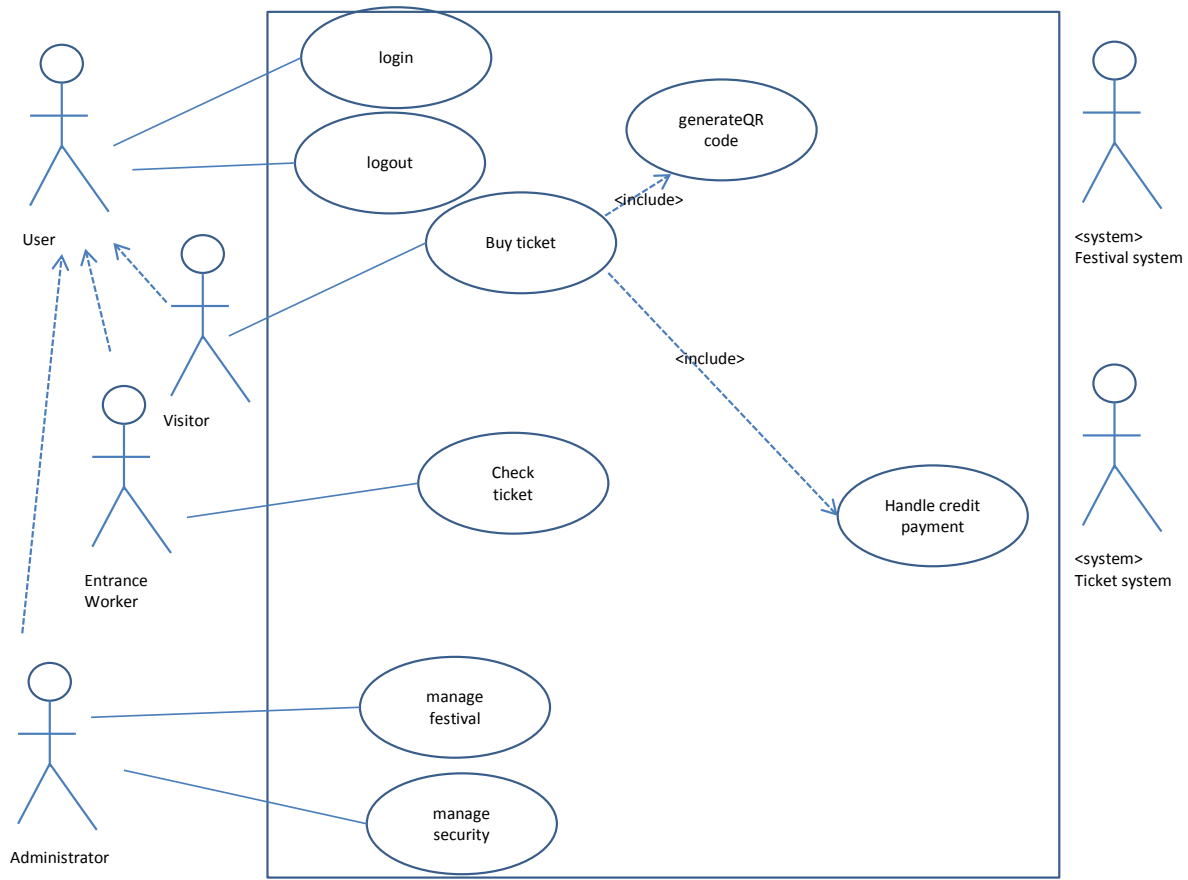
Week/activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
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Specification& Design	3	3	3	3	3	3	1	1	1											21	
Development							2	2	2	3	3	3	2	2	2					21	
Integration& Testing													2	2	2	4	4	4	4	4	26
TOTAL	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	68

3. Requirements

Company X will develop a Festival ticket system (FTS) to be used to manage tickets and access to festivals in the town of Trondheim. The system includes a server computer and software to manage the operations of the system. The system provides a mobile interface to enable festival visitors to buy tickets. Moreover the system provides a mobile interface to enable festival personnel to check tickets at the entrance. Last, the system provides a web based interface for administration functions, such as declaration of new festivals and statistics generation. The most basic functions are to handle ticket sales and to check tickets at entrance. When a visitor wants to buy a ticket, he logs in the system, the FTS starts a transaction, checks that there are enough available tickets for the given festivals. When the sale transaction is over, the visitor can pay in cash or credit card. After the payment is successful, the visitor gets a Quick Response (QR) code sent to his mobile. Only credit card payment is supported. Only mobile based sales are supported. When a visitor arrives at a festival, the festival worker in charge uses his mobile to scan the QR CODE of the visitor, then FTS will retrieve the name of the visitor from the backend visitor system and interact with ticket system to update the number of visitors to this festival. The users of the FTS system are festival visitors, festival workers, and the administrator. The administrator can access the system management functions of the FTS system including festival management and security configuration.

- a) Make use case diagrams for all functions in the system



b) Given that one of the main functional requirements is “F1 Buy Ticket” and one of its sub functional requirements is “F1.1 Retrieve availability and price of festival”, list the other functional requirements of the system.

Requirement ID	Description
F1	Buy ticket
F1.1	Retrieve availability and price of festival
F1.2	Handle credit payment
F1.3	Generate QR CODE
F1.4	Decrease available places of festival
F2	Check Ticket
F2.1	Retrieve QR CODE
F2.2	Retrieve name of visitor and of festival
F2.3	Check validity of ticket for the festival
F3	Manage users
F3.1	Handle login
F3.2	Handle logout
F3.3	Define festival, define available tickets, price

c) Make the text description structural text specification of the functional requirements “F1.1 Retrieve availability and price of festival”.

Name	F1.1 Retrieve availability and price of festival
Input	Name of festival
Output	Price

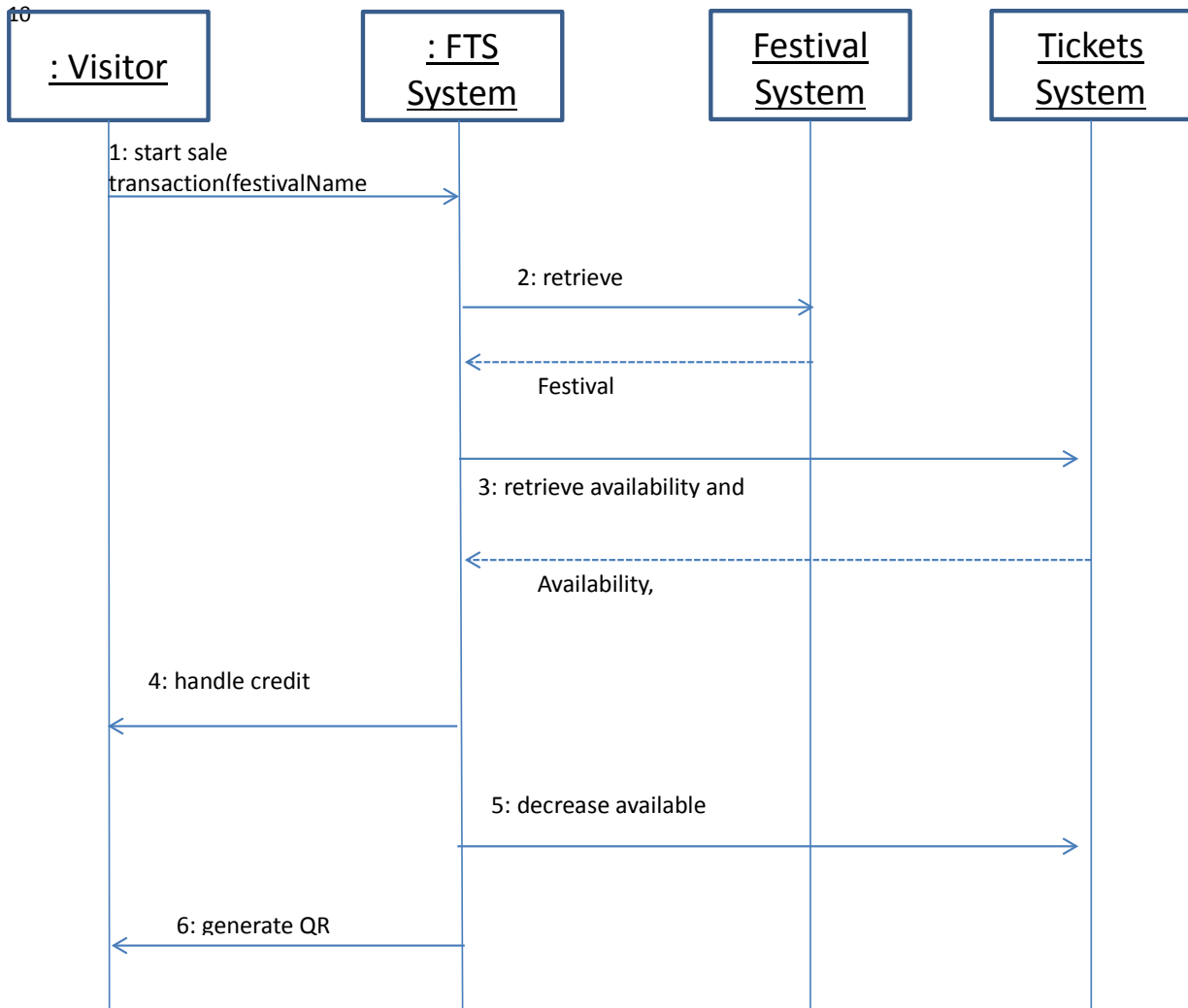
Action	Access backend catalogue system and retrieves festival description from name
Precondition	Valid festival name
Postcondition	name and description available

d) Specify the scenario "buy 2 tickets".

0	Start new transaction
1	Give festival name and visitor name
2	Retrieve festival information including availability
3	Handle credit payment
4	Generate QR CODE
5	Decrease available tickets
6	Give festival name and visitor name
7	Retrieve festival information
8	Handle credit payment
9	Generate QR CODE
10	Decrease available places tickets
11	Close transaction

Comment [LJ7]: it is important to have a transaction mechanism to lock the ticket during the payment process.

e) Specify the sequence diagram for buy one ticket.



f) Define the logical entities of the system and their attributes:

User: name, username, passwd

Visitor:

Entrance Worker:

Administrator:

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Festival: name, location, number of places, number of sold tickets, number of visitors

4. Testing

Consider the FTS system.

- a) Briefly describe the main phases you plan to test the system. Make a precise assumption about which software development model is used if necessary.

Development testing, where the system is tested to discover bugs and defects.

Release testing where the system is tested to check that it meets its requirements

User testing where the system is tested in the user's environment.

The student should show understanding of module testing and integration testing. Also black box and white box.

- b) Write 2 scenarios that can be used to help design tests for F1 Buy ticket

There are many possible alternative scenarios here. They should identify the role of the actors involved and should discuss a typical task that might be carried out by that role.

Scenario 1: a tester playing the role of the administrator inserts festival PSTEREO - Trondheim 17. & 18. august 2012 with 7500 tickets available. A tester playing the role of the visitor logs into FTS using a mobile device MA and tries to buy one ticket for festival PSTEREO. He gets a QR CODE on MA. A tester playing the role of the entrance worker uses a mobile device MB to read the QR CODE on mobile deviceA. He gets the name of the visitor.

Scenario 2: a tester playing the role of the administrator inserts festival PSTEREO - Trondheim 17. & 18. august 2012 with 0 tickets available. A tester playing the role of the

visitor logs into FTS using a mobile device MA and tries to buy one ticket for festival PSTEREO. He gets the message “no more tickets available”.

c) Write high level Test cases (Testdata, preconditions and expected results) for testing the functional requirement Retrieve availability and price of festival

Testdata	Preconditions	Expected results
visitorName, festivalName	The given festival has been inserted in the system & tickets available	Price of festival ticket
visitorName, festivalName	The given festival has not been inserted in the system	This festival does not exist
visitorName, festivalName	The given festival has been inserted in the system & no tickets available	No tickets available

Note about task 1

I oppgave 1 står det i oppgaveteksten at feil svar trekkes med -1 poeng. I løsningsforslaget står det derimot at feil svar skal trekkes med -0,5 poeng. Etter å ha rettet så mange oppgaver har vi valgt å kun trekke -0,5 poeng fordi:

- Denne oppgaven er den klart vanskeligste, og det å trekke et helt poeng straffer i overkant mye, spesielt med tanke på at mange av svarene kan diskuteres (det er mer snakk om å krysse av det _riktigste_ svaret, ikke hva som er riktig/galt).
- Gjennomsnittscore når man trekker -0,5 ligger allerede veldig lavt, på ca 15,08. Dersom vi skal trekke hele poeng vil gjennomsnitt rask komme under 10, noe som virker veldig lavt for en oppgave som teller 25 poeng. Så langt er det ingen som har klart å svare alt riktig på denne

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oppgaven, og skal vi trekke mer forsvinner det meste av A og B-karakterer, og i overkant mange vil rykke fra C til D.