

Two hours

**UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE**

Agile Software Engineering

Date: Monday 22nd January 2018

Time: 14:00 - 16:00

Please answer BOTH Questions.

Use a SEPARATE answerbook for each QUESTION.

This is a CLOSED book examination

The use of electronic calculators is NOT permitted

[PTO]

Question 1

- a) Appendix A lists the 12 agile principles. For each of the agile practices given below, state one agile principle that the practice upholds (bearing in mind that most agile practices aim to uphold several of the agile principles). Justify your answer with a brief explanation of the specific aspects of the practice that are relevant to the practice and how those aspects uphold the principle.
- i) Iterative and Incremental development
 - ii) Task board
 - iii) User stories
 - iv) On-site customer
 - v) Test Driven Development (10 marks)
- b) You are a member of an agile team working for VideoNet, a company that provides renting and home delivery of movie DVDs. Currently, to order a DVD, a customer has to phone VideoNet and: a) inquire whether his/her preferred movie is in stock, b) provide his/her home delivery address, and c) pay with his/her credit card by telephone. Furthermore, it is the responsibility of the users to return the DVDs to pre-defined locations in a city.

The company wants to build a complete system where users can order movies online, handle automatic payments, automatize delivery and returns of DVDs, etc.

- i) As a first step to gathering the user stories needed for this application, **suggest 4 contrasting user roles** that might expect to receive **business value** from the system to be developed. Provide a short (one sentence) description for each suggestion. (4 marks)
- ii) As a second step, write **two epic user stories** that will lead the development of the rest of the user stories. (2 marks)
- iii) Your team reports that they are struggling with some aspects of story writing, and in particular in identifying thin end-to-end slices. They ask for your help in identifying stories that represent real value but which are also very small, and so can be delivered to the customer very quickly.

Using the Connextra template that we covered in lectures, **suggest 2 contrasting user stories** that could be developed within a single 1-week iteration by a team of 6 people and that would deliver real value to the client. For each of the user stories, please explain the expected value (or behaviour change) the customer will receive. (4 marks)

(Question 1 continues on the following page)

(Question 1 continues from the previous page)

- iv) Having created an initial backlog of stories, the team starts to estimate them using Planning Poker. Choose one of your stories from your answer to part c). Suppose for this story one team member gives an estimate of 2 story points while the other gives an estimate of 10. Give the justification that each of these team members might give for their estimate in the conversation that follows turning over of the cards. That is, give a justification for the low story point estimate and the high story point estimate. State any assumptions you make about the client's current systems and availability of data. (5 marks)

Question 2

You are a member of an agile team just starting work on a new project to build a management information system for LastBus, a regional bus service provider. LastBus is growing its operations and needs a management information system (MIS) that can help its senior staff to take better decisions about the running of the company. LastBus has commissioned software in the past, but this is its first project using an agile team.

- a) In early meetings, LastBus staff have expressed concerns about whether agile approaches can guarantee the correct processing of the complicated business rules that govern the running of its bus services. Name 3 agile practices you would adopt in the early stages of the project to reassure your customers about this new approach and to ensure you obtain the information you need to create software that accurately models the business rules in use. Give a brief rationale for your choice of each practice, and state any assumptions you are making about LastBus and your team. (6 marks)

- b) Your team starts work on a minimum viable product: a dashboard showing which bus routes throughout the LastBus network are profitable, on a month-by-month basis.

In discussions with LastBus staff, you discover that a bus route is considered profitable if its monthly income exceeds the monthly costs of running it by some threshold. The threshold is set by senior management, and can be adjusted at any time.

There are a couple of exceptions to this general rule, however.

Some routes are considered to be *priority* routes. These are routes that LastBus believes it must run, regardless of the profit to be made. For these routes, the threshold for profitability is always 0.

Some routes are subsidised by local government. These routes are considered profitable if their income plus their subsidy is more than the costs plus the threshold in the past month.

Some routes are both priority routes *and* subsidised, and the rules for both these special cases applies to them.

You are given the task of writing some Gherkin scenarios for the software that will determine whether a given bus route was profitable in the last month. Write down the scenario that you would write first, to cover a happy path case from the business rules described above. (7 marks)

- c) Write 4 more scenarios, covering different cases that might arise based on the business rules given in part b) of this question. The scenarios should each be necessary (that is, no scenario should duplicate the behaviour described by another scenario). (4 marks)

(Question 2 continues on the following page)

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- d) Give the glue code that would be needed to run the simplest of the five scenarios you have written in your answers to parts b) and c) of this question. Indicate clearly which scenario you have selected to implement (e.g. by putting an asterisk next to it).

Give a brief description of any domain objects that you assume the existence of (1-2 sentences), to allow the intent of your glue code to be understood.

You should assume that the scenarios will be run using the Cucumber-JVM, and therefore should write your glue code in Java. Minor syntactic errors will not be penalised, provided the overall intent of the glue code is clear. (8 marks)

END OF EXAMINATION

APPENDIX A: The Agile Manifesto

This appendix lists the twelve Agile Principles that accompany the Agile Manifesto (agilemanifesto.org/principles.html), for use in answering question 1.

Principles behind the Agile Manifesto

We follow these principles:

- A) Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
- B) Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
- C) Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
- D) Business people and developers must work together daily throughout the project.
- E) Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
- F) The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
- G) Working software is the primary measure of progress.
- H) Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
- I) Continuous attention to technical excellence and good design enhances agility.
- J) Simplicity—the art of maximizing the amount of work not done—is essential.
- K) The best architectures, requirements, and designs emerge from self-organizing teams.
- L) At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.