University of London International Programmes

Computing and Information Systems/Creative Computing

CO2226 Software engineering, algorithm design and analysis

Coursework assignment 1 2017–18

Automated testing and test case prioritization

***Note**: You should expect to undertake some background reading on Automated Testing (AT) as part of this coursework assignment. This is factored into the time you are expected to spend on thinking, developing test cases and writing and checking your answers to the questions. It is recommended that you devote between 6 and 10 hours on targeted background reading, primarily focused on the answer to Task 3.*

Submission details

Please submit **one** PDF document which is named using the following convention:

YourName_SRN_COxxxxcw#.pdf (*e.g.* MarkZuckerberg_920000000_CO2226cw1.pdf)

- **YourName** is your full name as it appears on your student record (check your student portal)
- **SRN** is your Student Reference Number, for example 920000000
- **COXXXX** is the course number, for example CO2226, and
- **cw#** is either cw1 (coursework 1) or cw2 (coursework 2).

It is important that your submitted assignment is your own individual work and, for the most part, written in your own words. You must provide appropriate in-text citation for both paraphrase and quotation, with a detailed reference section at the end of your assignment. It is important that your submitted assignment is your own individual work and, for the most part, written in your own words. Copying, plagiarism and unaccredited and/or wholesale reproduction of material from books online sources, *etc.* is unacceptable, and will be penalised (see How to avoid plagiarism).

The scenario.

Cabs4All is a new project, funded by local councils, aiming at providing an easy, secure and quick way for finding a taxi for everyone with an Internet connection. The aim is to develop an Internet application as well as apps running on all mobile platforms drawing data from the same database that will provide information on the whereabouts of cabs, as well as allowing customers to provide feedback on the car, the driver and the ride and even be able to pay for it either through a loyalty account or through existing payment gateways.

Cabs4All has Frank Adekeye as the senior oversight manager, an IT consultant who began working in IT about five years ago, switching from a logistics background. Frank is now the senior partner and head of Business Services of Business Solutions Limited, employing around eighty people (on different work patterns – full-time, part-time, on demand, flexible contracts, *etc.*), each with different skills. Business Solutions Limited also employs one full-time administrative manager to manage the Business Services

section, Ms Beatrice, and another one to manage the project, Ben Adams.

Ms Beatrice is liaising with Ben in order to ensure the quality of Cabs4All, making sure that the expectations of the councils are met and extensive testing is being carried out in order to make sure the application runs without problems, meeting all functional and non-functional requirements put forward.

The system should allow customers to: find a taxi using searches such as location, time, car brand, driver's name, *etc*.), to pay using credit cards or Paypal or via a customer/corporate account, and to review their journey.

It should allow new cab drivers who wish to join the scheme to create an account and input the required information.

The application should also operate as a forum as well as a real-time chat application, where users can use any form of authentication for signing in (*e.g.* local account, social media account, *etc*.) and use the chat facility to hold private conversations with the cabs they are about to book or have already booked (*e.g.* in the case of unexpected traffic).

The system should also keep track of customers' contact details as well as invoices and payments. Both the general public as well as cab drivers should be able to open a customer or merchant account respectively. Cabs4All wants to give all its users (customers and cab drivers) the option of setting up a "hold account" where customers can top-up money and pay for their taxi rides this way or for cab drivers to build up their payments and transfer them to their bank account whenever they want, to increase security. Since Cabs4All is a growing and ambitious project, it will be taking on new staff, both full-time, part-time and on specific short-term contracts.

After graduating with First Class Honours, you have recently joined Ubiquitous Computing Ltd. (UCL), a small software house, specialising in test-driven software development. UCL has been approached by Cabs4All to estimate the cost of development and deployment of an integrated computer-based system for running the project. Cabs4All is in the process of growing, so that Ben Adams will be the office manager of an office team of five, including himself and Ms Beatrice. The three other staff to be hired will handle customer relations, marketing, HR administration, project support and finances. Each member of staff should have access to their own dedicated 'area' within the proposed system.

More senior full-time employees have greater permission to review and make changes in all sections, while more junior employees can only look at their section and have more limitations in what they can change. The more junior employees need to seek permission for larger, more elaborate changes, or for changes in the areas that they do not have permission to access. Part-time employees have no permission for changes, and have to request any changes they may need from a full-time employee with the relevant permissions.

Your manager at UCL, Dr Alice Garrett, has opted for a test-driven development model for the Cabs4All project, since UCL has a great deal of experience and expertise in test driven development. She has asked you to develop an initial set of black box test cases.

Task 1

Identify the stakeholders and the relationships between them. Explain, briefly, how each will interface to the Cabs4All software system.

[10 marks]

Task 2

Design a set of black box test cases for the Cabs4All project. Your test cases should, at least, include the input, expected output, prerequisites, steps for conducting the test and an explanation of the purpose of each test case. Please also provide a rationale for the overall choice of test cases.

[50 marks]

Task 3

Dr Garrett is concerned that the project will grow and that, with this growth, the number of test cases will rise, resulting in an overall pool of test cases that may be too large, complex and inter-dependent to execute in its entirety every time a commit is made to the project repository. She recently attended a conference, Google Test Automation Conference (GTAC), where she heard some presentations about Automated Testing (AT).

She has asked you to write a short report about AT techniques and tools. She is interested to learn how AT could be applied to the Cabs4All project test suite and in which parts, such that the maximum value will be gained from testing, should it turn out that the overall test process has to be prematurely terminated or shortened.

Write a report for Dr Garrett, explaining the concept of Automated Testing, presenting the tools and techniques that may be used, discussing which areas from the project test suite it might be applicable to, and illustrating how the techniques could be applied to the Cabs4All project test suite you constructed in answer to Task 2.

[40 marks]

[Total 100 marks]

[END OF COURSEWORK ASSIGNMENT 1]