

**University of London International Programmes**  
**CO2226 Software engineering, algorithm design and analysis**

**Coursework assignment 1 (2016–17)**

**Black box testing and test case prioritization**

**Note:** You may need to undertake some background reading on Test Case Prioritization (TCP) (also spelt 'Test case prioritisation') 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 one fifth and one third of the time you devote to this coursework assignment 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:

FamilyName\_SRN\_COxxxxcw#.pdf (e.g. Zuckerberg\_920000000\_CO2226cw1.pdf)

- **FamilyName** is your family name (also known as last name or surname) as it appears in your student record (check your student portal)
- **SRN** is your Student Reference Number, for example 920000000
- **COXXXX** is the course number, for example CO1108, and
- **cw#** is either cw1 (coursework 1) or cw2 (coursework 2).

**The scenario:** Gareeno-Leake is a building contractor that provides building services to a variety of customers, ranging from residential customers, requiring small projects to improve, extend and/or renovate their houses, to small and medium size companies with large building projects. Gareeno-Leake specialises in roofing of all kinds; flat roofs, pitched roofs, conservatories, balconies, waterproofing, renovation and loft conversion. More recently, they branched out into general building work.

Gareeno-Leake is managed by Matheus Assuncao, a building restructuring consultant who began trading approximately 15 years ago as a sole trader. Matheus is now the director of a substantially larger company, Gareeno-Leake, which employs 50 building workers (30 full-time and 20 part-time), each with different skills. Gareeno-Leake also employs a full-time administrative manager to manage the office, Ms Naaproblem and her deputy Adam J. Smith.

Ms Naaproblem has recommended that Gareeno-Leake should procure a bespoke software system to manage the growing business. The system will need to deal with the order, stocking and use of building materials, including (but not limited to): electrical, plumbing, construction and timber products used in the construction of domestic houses and small businesses.

The system should also keep track of customers' contact details, invoices and payments, tax and finances. Since Gareeno-Leake is increasingly taking on staff, both full-time, part-time and on specific short term contracts, it will be important for the system also to keep track of staff employed, their payment, work undertaken, and the skills and competences that they offer to Gareeno-Leake.

After graduating with first class honours, you have recently joined Usable Computing Ltd. (UCL), a small software house, specialising in test-driven software development. UCL has been approached by Gareeno-Leake to estimate the cost of development and deployment of an integrated computer-based system for managing the business. Gareeno-Leake is in the process of growing, so that Ms Naaproblem will be the office manager of an office team of for

(including herself and Adam Smith). The two other staff to be hired will handle reception and customer relations, employee management, ordering stock and finances. Each of these three people should have access to their own dedicated 'area' within the proposed system.

The employees of Gareeno-Leake, are often required to work at the customer site, and therefore it has been decided to give each of them an Android phone, allowing them to download a bespoke app (to be developed by Usable Computing Ltd. as part of the overall project). This bespoke app will allow Gareeno-Leake employees to communicate securely with the central Gareeno-Leake server at the head office. With this app they should be able to order materials (subject to the specific ordering permissions, determined by Ms Naaproblem), update estimates, and record progress on building projects.

More senior full-time employees have greater permission to order materials (and of greater value and in larger quantities), while more junior employees can only order small relatively inexpensive items of materials (and in smaller quantities). The more junior employees need to seek permission for larger, more expensive, orders, or for those orders that involve items for which they are prohibited from ordering. Part-time employees have no permission for ordering any materials themselves, and have to request any material orders they may need from a full-time employee with the relevant permissions.

Your manager at UCL, Dr Thaina Guizzo, has opted for a test-driven development model for the Gareeno-Leake 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 Gareeno-Leake software system.

**[10 marks]**

### **Task 2**

Design a set of black box test cases for the Gareeno-Leake project. Your test cases should include the input, expected output, 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 Guizzo 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 to execute in its entirety every time a commit is made to the project repository. She recently attended a conference, CBSoft, in Maringa, Brazil, where she heard presentations about Test Case Prioritization.

She has asked you to write a short report about TCP techniques. She is interested to learn how TCP could be applied to obtain an ordering of the Gareeno-Leake project test suite, such that the maximum value will be gained from testing, should it turn out that the overall test process has to be prematurely terminated.

Write a Report for Dr Guizzo, explaining the concept of Test Case Prioritization, and two different techniques for Test Case Prioritization, illustrating how each of the two techniques could be applied to the Gareeno-Leake project test suite you constructed in answer to Task 2.

**[40 marks]**

**[Total 100 marks]**

**[END OF COURSEWORK ASSIGNMENT 1]**