FOR INTERNAL SCRUTINY (date of this version: 20/4/2016)

UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

SCHOOL OF INFORMATICS

SOFTWARE ARCHITECTURE, PROCESS AND MANAGEMENT (LEVEL 11)

Tuesday 1st April 2014

00:00 to 00:00

INSTRUCTIONS TO CANDIDATES

Answer any TWO questions.
All questions carry equal weight.
This is an OPEN BOOK examination.
You may consult books and other documents during this examination.
The use of calculators is NOT permitted.

Year 4 Courses

Convener: ITO-Will-Determine
External Examiners: ITO-Will-Determine

THIS EXAMINATION WILL BE MARKED ANONYMOUSLY

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1. Please read all of this question before commencing to answer. Note that the inclusion of irrelevant information in answers may be penalised.

   Choose one large-scale software project you are familiar with.

   (a) Provide a brief description of the project. You should explain why you consider this to be a large scale project, explain the main purpose of the project and identify the main stakeholder groups in the project. [*6 marks*]

   (b) Identify two Quality Attributes of the system that you consider to be important. You should justify your choice by providing an argument that the Quality Attributes are valuable to particular stakeholder groups. [*8 marks*]

   (c) Provide a quality attribute scenario for your chosen system for one of your two chosen quality attributes. The scenario should be *realistic* in the sense that you can argue some of the stakeholders might require the system should pass the scenario. [*8 marks*]

   (d) Would the system you have described pass or fail the scenario you described? Justify your answer. [*3 marks*]

2. You have been asked to develop the architecture for a web based system that is intended to help coordinate activities in emergencies (e.g. in severe flooding, or after an earthquake or other natural disaster). Users include the emergency services (police, fire, ambulance), volunteers and people in need of help. The system allows requests for tasks to be entered and these can be split into subtasks to be carried out by different people and so on so that each task can be carried out in a coordinated way.

   (a) Suggest an architectural pattern that is a good match for this system. You should justify your answer by pointing out two or three features that are well matched with your chosen pattern. [*6 marks*]

   (b) Provide a diagram of your high-level architecture with a brief description of the role of each component. [*6 marks*]

   (c) After an exercise in which the system failed for an hour at a critical point in the exercise it has been identified that *availability* of the system is critical. Identify an appropriate *architectural tactic* that could be used to improve availability of your system. Justify your answer. [*4 marks*]

   (d) Provide brief notes, illustrated by diagrams if you feel this is appropriate, on how you would apply your chosen tactic to the architecture to ensure 99.9% availability (i.e. no more than around 1.4 minutes of down time in 24 hours of operation.) [*5 marks*]

   (e) Provide an argument to justify that your chosen approach could achieve the required availability. [*4 marks*]

3. You are working for a company that produces staff training systems for large organisations. The systems are tailored to the needs of different organisations on the basis of a complex set of options that are chosen when the requirements specification is put together. The company has asked you to produce a report on the impact of adopting a more architectural approach to the production of their systems. To answer this question you should provide an outline of the content of the report, two to three pages in length, covering the potential impact on:

   (a) the development lifecycle used by the company – what alternatives are opened up in adopting a more architectural approach; [*5 marks*]

   (b) the potential for architectural approaches to manage a large collection of similar systems [*5 marks*]

   (c) the key Quality Attributes for this class of systems (you should identify them what you see as the key QAs for this class of systems); [*5 marks*]

   (d) the approach to ensuring the quality of the product; [*5 marks*]

   (e) the capability of the company to deliver incremental changes to systems to match evolving training programmes undertaken by customers of the company. [*5 marks*]