

FOR INTERNAL SCRUTINY (date of this version: 29/4/2016)

UNIVERSITY OF EDINBURGH
COLLEGE OF SCIENCE AND ENGINEERING
SCHOOL OF INFORMATICS

**SOFTWARE ARCHITECTURE, PROCESS AND MANAGEMENT
(LEVEL 10)**

**SOFTWARE ARCHITECTURE, PROCESS AND MANAGEMENT
(LEVEL 11)**

Thursday 1st April 2010

00:00 to 00:00

Year 4 Courses

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

MSc Courses

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

INSTRUCTIONS TO CANDIDATES

Answer any TWO questions.

All questions carry equal weight.

This is an OPEN BOOK examination.

You may consult any books or other documents during this examination.

1. Taking account of the following questions, choose two large-scale systems with architectures that share similar requirements for some Quality Attributes but have contrasting requirements for some other Quality attributes:
 - (a) Provide a brief description of each architecture. This should focus on the aspects of the projects you will discuss in your answers below. [6 marks]
 - (b) Choose two Quality Attributes that apply to both of your architectures, one where the requirements are similar between the two architectures and the other where they are contrasting. Then do the following:
 - i. An architectural scenario for the Quality Attribute that has similar requirements across your two architectures. You should justify that your scenario captures an important requirement for the two systems. [8 marks]
 - ii. An architectural scenario for the Quality Attribute that has contrasting requirements across your two architectures. You should justify that your scenario captures an important requirement for one of the two systems. [8 marks]
 - iii. For the Quality Attribute with contrasting requirements you should justify that one architecture can satisfy the scenario while the other fails. [3 marks]

2. You have been asked to develop the architecture for a system that keeps track of sensor data coming from houses occupied by old people in need of some support to live independently. The system has three broad sets of users: older people who experience interventions initiated in response to their behaviour in the house, call centre workers that monitor data from many houses responding to alerts generated by the system; emergency workers that attend to the older people if directed to by the call centre. The call centre workers can pass on relevant information to the emergency workers as they see fit in order to let the emergency workers respond appropriately.
- (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) Suggest an architectural pattern that is a poor match for this system. You should justify your answer by pointing out two or three features that are poorly matched with your chosen pattern. [6 marks]
 - (c) Provide a diagram of your high level architecture with a brief description of the role of each component. [5 marks]
 - (d) The company providing the service has decided that privacy and security are important issues in the selling of the system. Purchasers of the system are concerned about what information is passed around and who has access to the information under what circumstances. Choose two security architectural tactics and point out how they would require you to modify your chosen architecture. [8 marks]

3. You are working in a company that produces Enterprise Resource Planning software. This is a large, complex, highly configurable system that controls resource management in organisations that purchase the product. The company uses a traditional waterfall based development model. This software is used across many different types of enterprise from Universities to Oil Companies. The enterprises buy components depending on their business needs. The company is reviewing its approach to its architecture and process in order to decrease costs and increase configurability. You have been asked to prepare a short summary for decision makers in the company on approaches to re-architecting the system. To answer this question you should use your knowledge of Software Architecture Process and Management to provide an outline draft of the report (i.e. bullet points for each of the sections), covering:
- (a) suggestions on the high-level approach to the system architecture, provide at least two alternative approaches; [6 marks]
 - (b) the strengths and weaknesses of the approaches you have identified; [8 marks]
 - (c) your company is also concerned that the release of new components and configurations of their systems are taking too long to develop and roll out. Your report should explore potential processes that could help improve this feature of the company's processes.; [7 marks]
 - (d) Identify two key stakeholder groups that might be affected by any proposed changes in process and suggest how their practice would need to change to accommodate your proposed changes. [4 marks]