UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

SCHOOL OF INFORMATICS

INFR11038 SOFTWARE ARCHITECTURE, PROCESS AND MANAGEMENT (LEVEL 11)

Saturday 30th April 2016

09:30 to 11:30

Year 4 Courses

Convener: I. Stark
External Examiners: A. Burns, A. Cohn, P. Healey, T. Field, T. Norman

INSTRUCTIONS TO CANDIDATES

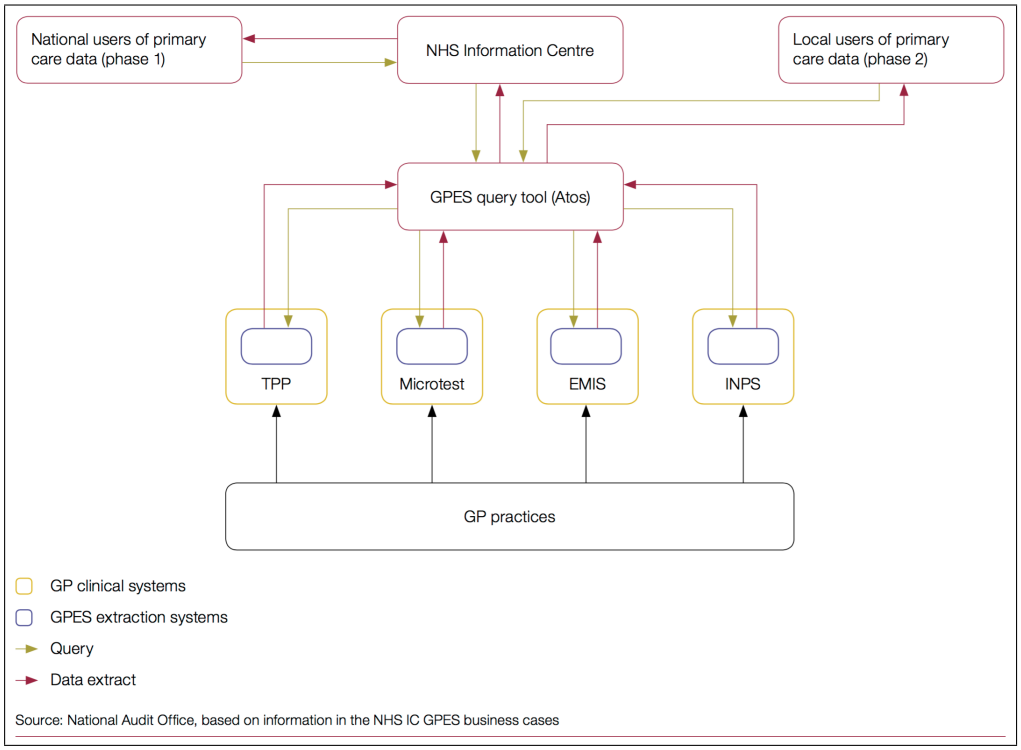
Answer any TWO questions.

All questions carry equal weight.

This is an OPEN BOOK examination.
You may consult any books or other documents during this examination.

CALCULATORS MAY NOT BE USED IN THIS EXAMINATION

1. Consider the high-level diagram of the General Practitioner Extraction System (GPES) provided in the National Audit Office report on the system. In the deployed version of the system the *query tool* component integrates the results from data provided by specific queries implemented in the business logics of each of the four different types of GP Clinical systems. Using this diagram and your knowledge of the system from the course, answer the following questions:



(a) List two Quality Attributes, other than Testability, that are important for this system and provide a justification of their importance. [*6 marks*]

(b) Develop a Testability Architectural Scenario for the GPES system that the system could fail. Provide a justification that your scenario is relevant to GPES stakeholders and that GPES failing the scenario is plausible. [*8 marks*]

(c) Identify two architectural tactics for Testability that could improve the GPES architecture and show how they could be applied to the GPES architecture in order to improve the likelihood that it could pass your scenario described in Part 1b. [*6 marks*]

(d) For one of the two Quality Attributes identified in Part 1a identify one strength and one weakness of the GPES architecture with respect to that Quality Attribute. [*5 marks*]

2. You have been asked to develop the architecture for a web-based system emergency response system. The system is intended to support coordination between multiple responders to the emergency (e.g. services like police, fire, ambulance but potentially the military and utilities such as electricity, gas, telecom). The goal of the system is to provide a single integration point to inform all the responders of the current situation in the emergency.

   (a) Suggest an architectural pattern that is a good match for this system. You should justify your answer by pointing out two 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 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) Identify two potential architectural changes that could improve security of your architecture, justify your choice of changes and briefly discuss how they might affect the availability of the system. [*8 marks*]

3. You are acting as a consultant for a company that produces internal combustion engine controllers for a wide range of manufacturers including several automotive companies. The controllers all provide more or less the same functionality but there is considerable variability in the size of engines, the sensors and actuators available on the engines and the level of criticality of the availability and performance of the controlled engine. The controllers are developed by several different teams working in different market sectors. Some markets the company operates in are quite dynamic with new products appearing frequently. You have been asked to provide brief notes on:

   (a) two potential approaches to adopting Software Architecture based working in the company; [*6 marks*]

   (b) the potential advantages and disadvantages of the approach you think is most promising; [*6 marks*]

   (c) the potential impact of your most promising approach on the company's development lifecycle — the company currently uses a V-model approach to lifecycle structure; [*6 marks*]

   (d) the extent to which your most promising approach could support the adoption of agile practices; [*4 marks*]

   (e) the impact of your most promising approach on ensuring the quality of the product; [*3 marks*]