One & half hours - on line

The exam will be taken on line.
This is the paper format, which will be available as a backup.

QUESTION PAPER MUST NOT BE REMOVED FROM THE EXAM ROOM

UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE

Software Engineering

Date: Monday 21st May 2012

Time: 09:45 - 11:15

Answer Section A
and EITHER Question B1 OR Question B2

This is a CLOSED book examination

The use of electronic calculators is NOT permitted

Section A
Answer All Questions

a) What is the name of the software architecture used in your IBMS project? Provide a general description of its constituent parts and then relate these parts to the specific components in your project.

(2 marks)

b) What are the two main roles played by a physical architecture?

(2 marks)

c) In the context of object-oriented design, what are design abstraction and refinement?

(2 marks)

d) Concisely and critically describe the purpose of partitions and layers in software organization.

(2 marks)

e) Give two non-functional requirements that you have learned from this course and briefly explain their implications to architectural design.

(2 marks)

f). Briefly explain the GRASP principles of **high cohesion** and **low coupling**. Your answer should differentiate between the two kinds of coupling explained in the lectures.

(3 marks)

g). Explain in terms of cohesion and coupling whether in the IBMS scenario it would have been a good idea to have a single class which integrates the roster and the driver timetables it produces.

(2 marks)

h) What is the key idea of Test-Driven Development (TDD). (1 mark)

i). State two advantages of TDD. (2 marks)

j). State two disadvantages, or limitations, of TDD. (2 marks)

Section B

Please answer either B1 or B2

Question B1

a). Clearly and concisely describe:

i). The components of the MVC software architecture

(3 marks)

ii). The interactions between these components

(3 marks)

iii). The mapping from this architecture to the client-server computing architecture.

(3 marks)

One additional mark will be awarded for overall clarity and conciseness.

b). A doctor appointment system contains the following classes: Patient, Appointment, PatientTable, AppointmentTable, PatientUI, AppointmentUI, PatientDataAccess, and AppointmentDataAccess. Your task is to arrange these classes into a layered architecture.

i) State which class is placed in which layer (you do not need to explain why each class is placed where it is)

(3 marks)

ii) Draw a diagram which shows the dependency relationships between these classes and annotate it to briefly explain those relationships. (6 marks)

Question B2

a). Briefly explain the role of GRASP patterns in object-oriented software development.

(2 marks)

b). You are designing a system to test students in English language skills in order to find people who need to take remedial English classes. You have elicited the following requirements about the structure of the tests.

A test consists of one or more sections, each of which is timed separately. Each section contains one or more subsections, each of which is on a particular topic. Each subsection contains one or more questions. Questions are of three different types: Multiple choice questions, "fill in the blank" (FIB) questions and essay questions. Multiple choice questions have two or more options.

Draw a class diagram which BOTH captures all and only the information given in the above description AND leads directly to a design which adheres to GRASP principles. Hint: you should have exactly 8 classes, of which one is abstract.

(6 marks)

c). For each of the following GRASP principles, explain how the design you showed is consistent with it. Hint: if you cannot answer these questions you may wish to revise your design.

(2 marks each = 10 marks).

i). High Cohesion

ii). Low Coupling

iii). Information Expert

iv). Polymorphism

v). Protected Variations

d). Suggest two pure fabrications which could be added to the domain-inspired classes to help complete the design.

(2 marks)

END OF EXAMINATION