

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: Wednesday 18th January 2012

Time: 09:45 - 11:15

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**Answer all multiple choice questions in Section A  
and ONE Questions from Section B**

**For full marks your answers should be concise as well as accurate.  
Marks will be awarded for reasoning and method as well as being correct.**

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This is a CLOSED book examination

The use of electronic calculators is NOT permitted

[PTO]

*Section A is  
restricted and  
cannot be  
published*

**Section B**

Answer one of the two questions in this part.

2. a) A traditional paper based exam is set by an examiner, who thinks of a question that fits the syllabus of his or her course and appropriately tests its knowledge. The exam and its rubric (instructions) are written and a marking scheme created. The draft exam is passed to a moderator that reviews the exam and gives feedback in the form of comments. The examiner then updates his or her exam to comply with the comments. After the exam is taken by the students, the scripts are collected and passed back to the examiner, who then marks each of them according to the marking scheme. Once all the scripts are marked, the examiner reviews the scripts to ensure consistency of marking.

Draw an activity diagram that captures the business process for the setting, sitting and marking of such an exam. Use sufficient details so that you could use your diagram to explain elements of techniques used in sitting an exam to another student. State any assumptions you make in order to draw your activity diagram.

(10 marks)

- b) What is the definition of an *actor*? (3 marks)

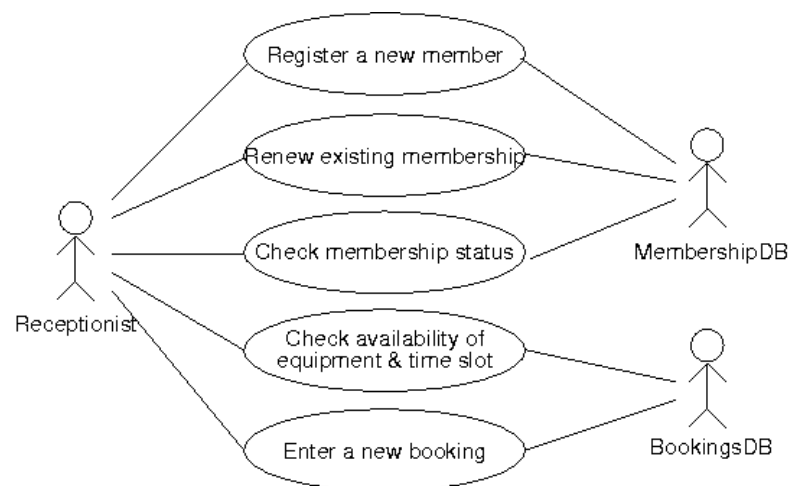
- c) Make a list of the use cases and their participating actors for the process described in part 2a. State any assumptions you make in deciding upon actors and use cases — either positive or negative. (7 marks)

3. a) i) Briefly explain what a structural model is. (2 marks)  
 ii) Briefly explain what a behavioural model is. (3 marks)

b) Consider the following scenario:

A private gym is considering to install a software system to help run its business. The gym charges a membership fee for a fixed period. Each member gets a membership card, and has to produce the card on every visit. The gym offers two types of equipment: rowing machines and treadmills. Members with valid cards can book sessions on any equipment as long as it is available. The gym wants to use the software system to manage its membership and equipment booking systems. When a new member joins, the receptionist registers him and issues him a card. Every time a member visits the gym, the receptionist checks his card to see if his membership has expired. An expired card can be renewed upon payment of a renewal fee. A member with a valid membership card can book a piece of equipment for a specified time slot. The receptionist has to first check that the equipment is available for the chosen period. If it is available, the receptionist enters the booking in the booking system.

The use case diagram is as follows:



- i) Identify domain classes that realise the use cases, and draw the class diagram for the domain model. Explain and justify your answer. (5 marks)  
 ii) Suggest suitable system classes that refine the domain classes. Draw a class diagram for the system classes. (5 marks)  
 iii) Draw a sequence diagram to show how the use case 'Check availability of equipment and time slot' is realised by your system classes. (5 marks)