University of Liverpool
Department of Computer Science
COMP201: Software Engineering
Session 2000–2001 Exam

Examiner: M. Wooldridge

Instructions to Candidates

Attempt *all* questions in Section A.
Attempt *any one* question from Section B.

SECTION A — Answer *both* questions in this section.

Both of the questions in this section make use of the following case study:

> A simple automated diary system is to be developed for a university department. This diary assumes that each person's day is divided into 16 half-hour slots (i.e., 9.00 to 9.30, 9.30 to 10.00, and so on). Days in the calendar are identified by natural numbers in the range 0 to 364 inclusive. Each slot in the diary may be associated with an *event* (e.g., a meeting). Each event is associated with a (non-empty) set of people (e.g., the people taking part in the meeting). Nobody can simultaneously be at more than one event at any given time, although more than one event can take place simultaneously.
>
> The diary system will allow members of the department to carry out the following main operations:
>
> - create a new event for the system;
> - delete an event from the system;
> - for a given person, find out all the events they are involved in;
> - for a given person, find out all the free slots in their diary;
> - for a given date, find out all the events that are scheduled for that date.
>
> Users of the system are each assigned a user id and password. One user has "super user" status. Access to the database is restricted so that only the super user can add new events to the system or delete events. Access to information about the events that a user is involved with is restricted to that user and the super user.

Question 1

With reference to the diary system case study described above, using the Z specification language:

a) Define an appropriate state-space schema for the diary system. Clearly state any simplifying assumptions that you make.

(20 marks)

b) Define a *NewEvent* operation, which adds the details of a new event (i.e., date, slot, event, people) to the diary system.

(10 marks)

c) Define an operation *PersonSummary*, which will takes as input a person and a date, and for that person will output the set of all events that person is involved with on the input date.

(10 marks)

Question 2

With reference to the diary system case study described above, using the Unified Modelling Language (UML):

a) Give use case diagrams and schemas for the system.

(10 marks)

b) Derive a conceptual model for the system.

(20 marks)

c) Develop a collaboration diagram for the "create new event" operation.

(10 marks)

SECTION B — Answer *any one* question in this section.

Question 3

a) Bertrand Meyer proposed five criteria that should be satisfied by modular design methods. With the aid of examples to illustrate your answer, explain what you understand by these criteria.

(10 marks)

b) Meyer also proposed five criteria that should be satisfied by modular designs. With the aid of examples to illustrate your answer, explain what you understand by these criteria.

(10 marks)

Question 4

a) Explain what you understand by the terms “requirements definition document” and “requirements specification document”, with particular reference to the intended readership of these documents.

(4 marks)

b) With the aid of examples, explain the distinction between a functional and a non-functional requirement.

(4 marks)

c) Implementation bias in specifications is regarded as a bad thing. With the aid of examples, explain what you understand by implementation bias, and why it is regarded as a bad thing.

(4 marks)

d) An important part of software project management is determining the risks involved in carrying out the project. With the aid of examples, briefly explain the key categories of risk in software projects.

(8 marks)