Birkbeck

(University of London)

BSc/FD EXAMINATION

Department of Computer Science and Information Systems

Information Systems Management (COIY019H5)

CREDIT VALUE: 15 credits

Date of examination: 31st May, 2012
Duration of paper: 2 hours (2:30pm to 4:30pm)

There are **four** questions on this paper.

Answer only **three** of the four questions.

Each question carries **33** marks in total. Some questions indicate marks for sub-questions.

If more than three questions are attempted, only marks from three questions will be reported as your examination mark.

1 extra mark is available for a well-presented paper.

No extra materials are required or allowed.

1. <u>Software reuse</u>

   (a) Discuss the kinds of businesses which are good candidates for developing reusable software components. (**7** marks)

   (b) Discuss the proposals of the appropriate unit of reuse according to the *black-box* approach (Allen & Frost, 1998) and the *white-box* approach (Jacobson et al., 2007). Explain the advantage of the latter over the former. (**11** marks)

   (c) Illustrate the use of the *Façade* pattern in software reuse. Explain which additional costs the introduction of a *Façade* introduces. (**15** marks)

2. <u>Design patterns</u>

   (a) Describe the *Composite* pattern and give an example of its application. (**14** marks)

   (b) Explain the issues surrounding the usage of *creational* patterns. (**5** marks)

   <u>(Design patterns in) data management design</u>

   (c) Explain the use of the *Proxy* pattern in data management design, and why *caches* can be used with such a pattern. (**14** marks)
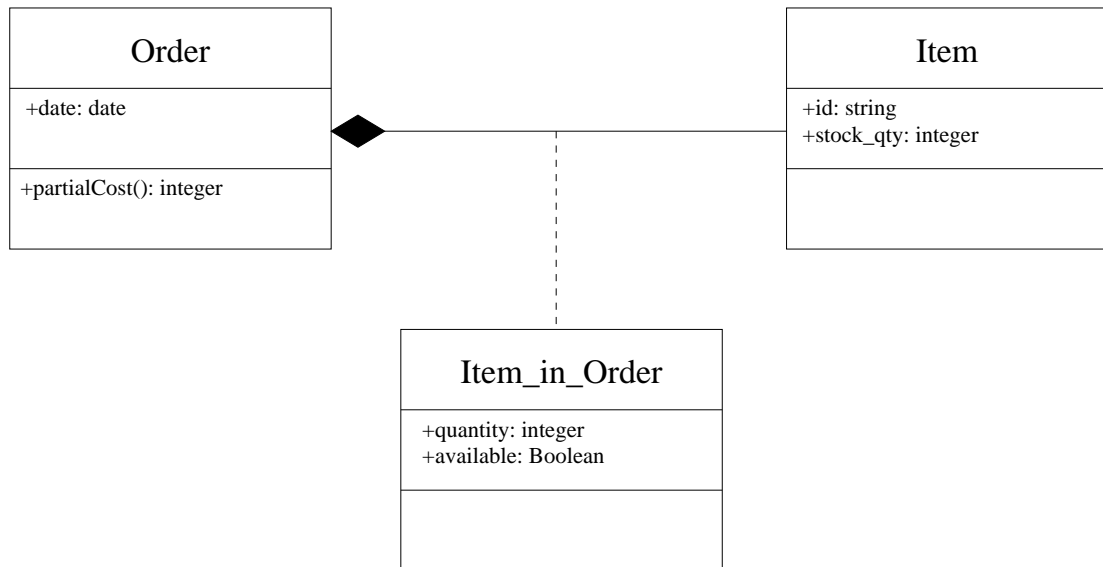
Figure 1: UML class diagram fragment for Question 3(b)

3.　　Specifying operations

(a) Illustrate the use of algorithmic approaches in operation specification. Explain which cases such approaches are suitable to.　　(**13** marks)

(b) Consider a class `Order`, related to a class `Item` with an aggregation, expressing the fact that an order is composed of items, each with its quantity in the order, and with a Boolean field that specifies whether the item (in the specified quantity) is currently available in stock (see Figure 1 above). Consider an operation `partialCost()` of `Order` which computes the total cost of the *available* items for an order, for example to compute the amount of a partial shipment to be done before all items become available. Discuss whether such an operation should be specified with an algorithmic or a non-algorithmic method; justify your answer, and specify the operation with a method of your choice.　　(**14** marks)

Detailed class design

(c) Explain why the different kinds of *visibility* of operations and attributes are useful to class design.　　(**6** marks)

4. <u>System design and architecture</u>

   (a) Explain the definition of *system, architecture, architectural description, architectural view* and *architectural viewpoint* according to the standard IEEE 1471-2000. Discuss briefly why these definitions are important. Define the Rational Unified Process views (*use case, logical, implementation, process* and *deployment*) and explain how they relate to the aforementioned IEEE standard.

   (**18** marks)

   (b) Illustrate the technique of *layering* for dividing systems into subsystems.

   (**15** marks)