

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 5 Diploma in IT

SYSTEMS DESIGN

26th April 2007, 2.30 p.m.-4.30 p.m.

Answer FOUR questions out of SIX. All questions carry equal marks.

Time: TWO hours

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

Calculators are NOT ALLOWED in this examination.

1. During analysis the following features were selected from the user requirements documentation of an Order Processing system:

- Customers are of two types – individual and corporate.
- Individual customers pay by credit/debit card.
- Corporate customers have a named contact and a status which determines priority level. They are also billed for their orders.
- An order must have at least one order item and if an order is cancelled all order items are cancelled with it.
- For a specified customer a particular order may be found and its total cost calculated.

Figure 1 below shows a 1st draft Class Diagram which was produced during the analysis phase of the system's development.

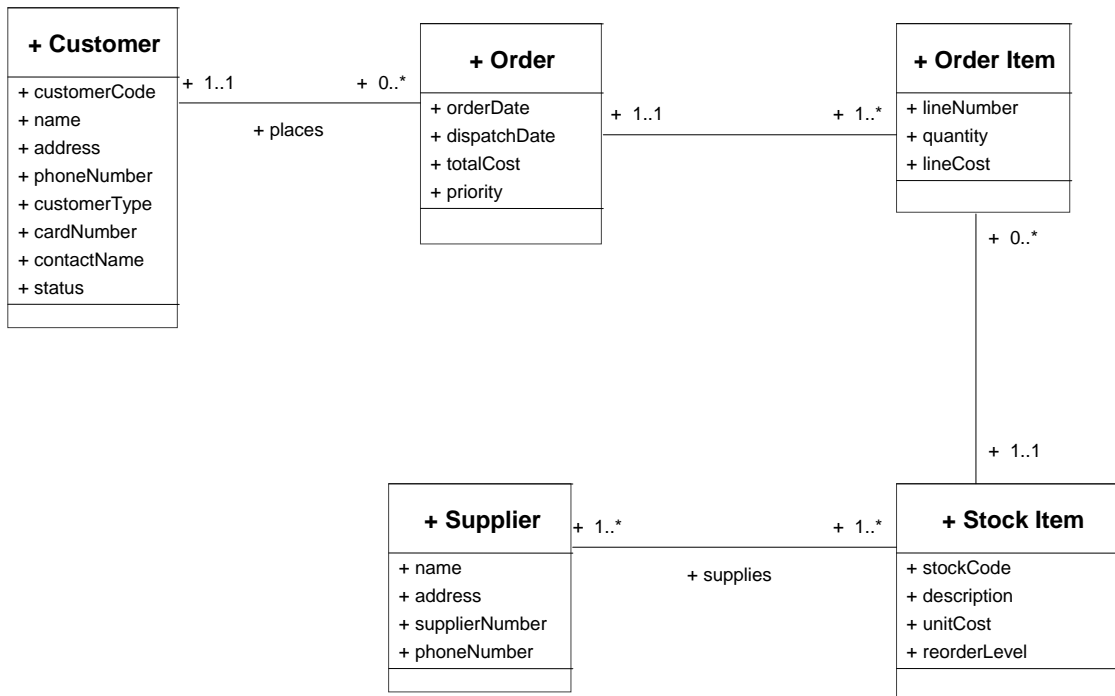


Figure 1

- a) Produce a second draft Class Diagram that includes the following design constructs to support these requirements:
- inheritance
 - aggregation and/or composition
 - operations.
- (16 marks)**
- b) With the aid of appropriate examples *briefly* outline additional design constructs that should be added to this Class Diagram prior to implementation. **(9 marks)**

2. a) Write a *brief* explanation of the following terms in relation to Statechart diagrams in object-oriented design:
- i) state,
 - ii) state transition,
 - iii) event,
 - iv) superstate (nested states),
 - v) concurrent states.

(5 x 2 marks, total 10 marks)

- b) In an order processing system as soon as the order is received its details are recorded. The order will then be queued for assembling. During assembly all ordered items are checked prior to dispatch. If an ordered item is out of stock the order is said to be waiting until that stock item is received. Once all items are checked as available the order may then be packed and dispatched. When the order has been delivered this will be recorded on the system. The order may be cancelled at any point up to the actual delivery but not once it is delivered. Finally, after a twelve month period has passed, all delivered and cancelled orders are archived.

Draw a Statechart Diagram for the ‘**order**’ class.

(15 marks)

3. a) With the aid of a labelled diagram, explain how a Structure Chart is used to describe module architectures in a structured programming environment. **(12 marks)**
- b) Explain how a structure chart may be constructed from the information contained in a data flow diagram. You should make particular reference to the use of transform analysis and transaction analysis. **(13 marks)**

4. Multi-media features are increasingly common at the user interface.

This is happening in offices, shops and public amenities, and involves EPOS tills, ATMs, Kiosks, Self-service Checkouts as well as in more traditional office systems.

- a) Write notes on the suitability of the following features in different situations:

- i) Sound Output
- ii) Colour and Images
- iii) Music and Video Clips
- iv) Touch Screen Input
- v) Voice Input

(5 x 3 = 15 marks)

- b) In a Systems Design and Development tool for your own use, evaluate the suitability of each of the above features. **(10 marks)**

5. Security is an important area to be considered in the design of any distributed system, particularly in the case of a web application.

a) Write notes on how EACH of the following security measures can be used to provide a secure application:

- i) User Authentication
- ii) Data Access Control
- iii) Encryption
- iv) Firewall
- v) Intruder Detection

(5 x 4 = 20 marks)

b) Security and Usability are often said to be incompatible. Evaluate the validity of this statement. **(5 marks)**

6. Many computer systems that were traditionally built as compiled applications written in a 4GL are now being built as web pages, requiring only a browser on the user's machine. For example this is happening with Help Desk Systems, Hardware Configuration and Utilities as well as Company Information Systems.

Discuss the advantages and disadvantages of such a strategic decision from the perspective of:

- i) Designers
- ii) Implementors
- iii) Support Staff
- iv) End Users

(7 marks)

(6 marks)

(6 marks)

(6 marks)