

**THE BCS PROFESSIONAL EXAMINATIONS
Diploma**

April 2006

EXAMINERS' REPORT

Systems Analysis

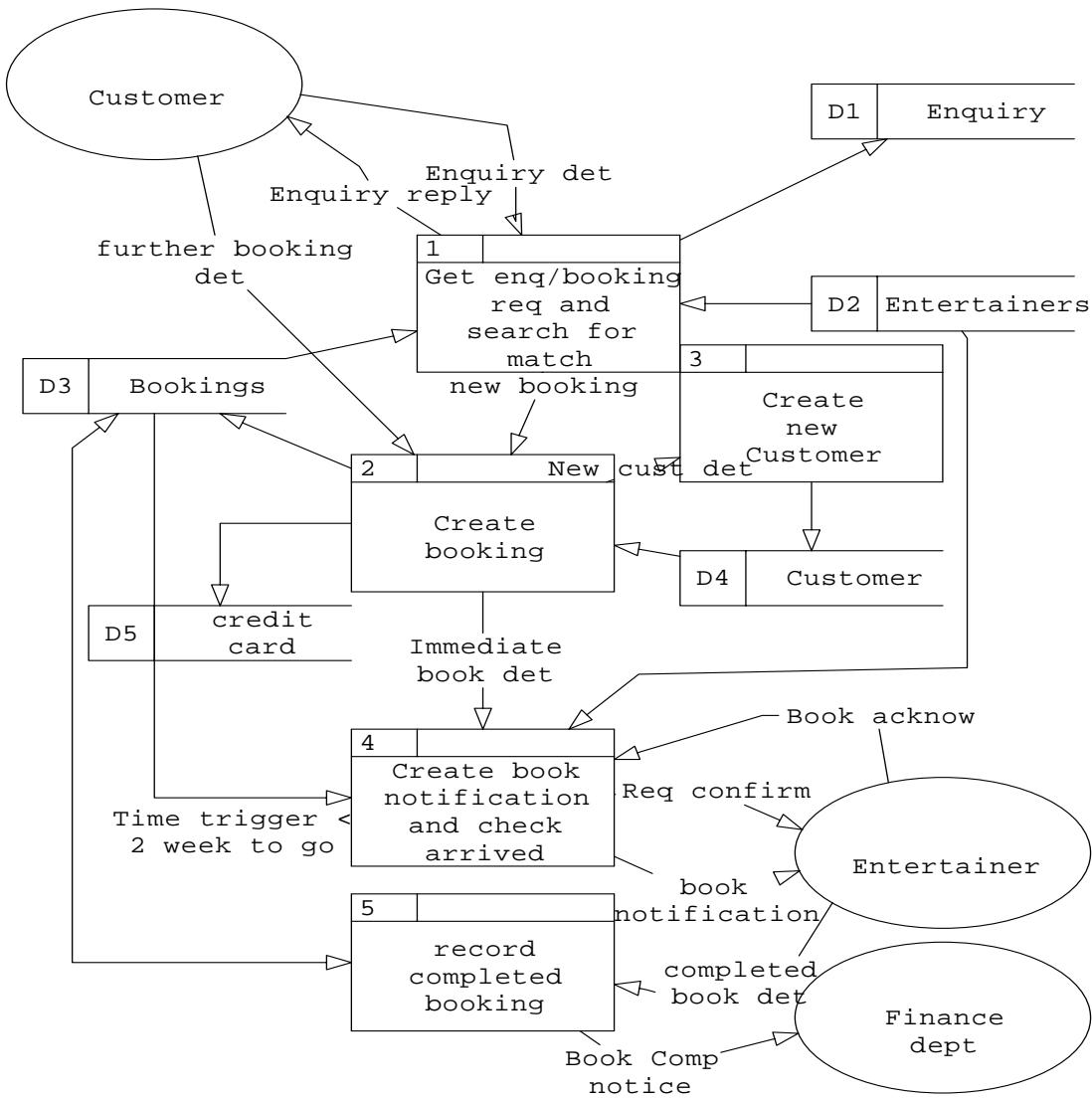
Question 1

Question 1a, 1b and 1c are based on the following scenario:

1. "Entertainers Incorporated" (EI) is a successful agency that manages the bookings for more than 100 entertainers. They provide entertainers for an increasing range of events such as children's and adult parties, corporate events, small theatre productions, clubs and restaurants. As the business has increased the task of matching entertainers to events has become difficult. They have requested a new information system to support the 'booking system'. A booking is usually carried out in the following manner:
- Someone telephones with a request for one or more entertainers. We get the details of the number and types of entertainers they want, the date, location, start and end times. We record the name, address and telephone number of the enquirer so that we can call them back.
 - Then we search through our files for entertainers that meet their needs.
 - If we find suitable entertainers we check the list of current bookings to see if they are available. If they are not available, we look for other entertainers that may be available.
 - If we do have an entertainer that meets the customer requirements we telephone the customer and give them the details of the entertainment packages and the cost.
 - If we cannot find suitable entertainers we call the enquirer to tell them that we cannot meet their needs. We keep their details for marketing purposes.
 - If the booking is agreed we then check if the client has booked with us before. For new customers we create a new customer form with their full name, address and contact details.
 - We record the details of the new booking on a 'Booking' form which includes details of which entertainers are assigned to the booking, client details, agreed cost, date, time, location and details of any special requirements. Bookings are guaranteed by a credit card, the details of which we store securely and separately from the other forms.
 - Two weeks before the booking is scheduled take place, or straight away if the event date is less than two weeks away, we print and send the 'Booking Notification' form to all the entertainers who then confirm receipt of the notification. If we do not get confirmation we telephone the entertainer to confirm that they received the form.
 - When the entertainers have finished the booking they get the 'Booking Notification' form signed to confirm that the service has been provided. They then return this form to the office so that payment can be arranged.
 - Once we are in receipt of the signed 'Booking Notification' we set the booking to completed and pass a notice to our finance department so that payment can be sought.
- a) Draw a Top Level Current Logical Data Flow Diagram for the above scenario. **(20 marks)**
- b) Produce an Entity Relationship Diagram (Logical Data Structure) and a set of normalised tables for the above scenario. You **DO NOT** have to show evidence of the normalisation process. **(20 marks)**
- c) The two models developed in response to Q1a and Q1b above are known as the process and data models respectively. What is the third model that the systems analyst may develop to compliment the process and data models? How can it be used to check the process and data models? **(10 marks)**

Question 1 a) Answer pointers

Q1a) Data Flow Diagram – Suggested solution (other notation used consistently will be accepted)

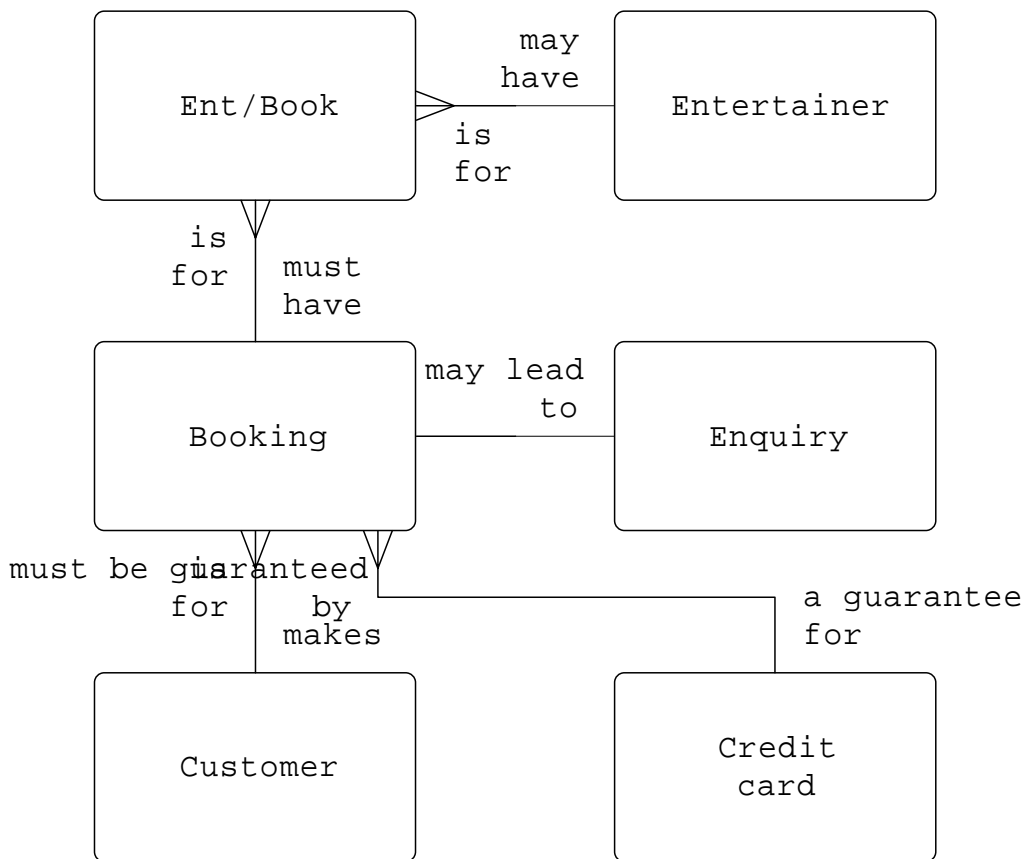


Q1a Marking scheme:

- Processes: 1 each up to 5
- Data Stores: 1 each up to 3
- Data Flows: 0.5 each up to 4
- External Entities: 1 each up to 3
- Logical/not physical Up to 5 marks

Total 1a: 20 marks

Q1b) ERD (LDS) (other suitable notation will be accepted).



Tables:

- Entertainer (**ent#**, ename, eadd, etel, email, ecodes, ecost)
- Ent/book (**ent#**, **book#**, booknoticesentdate, confirmedrecdate)
- Booking (**book#**, bdatemade, beventdate, beventtype, bstime, betime, bspecreq, bcompleted, bagreedcost, bspecrequire, *cust#*, *enq#*, *ccard#*)
- Enquiry (**enq#**, eqname, eqadd, eqtel)
- Customer (**cust#**, cname, cadd, ctel, cemail)
- Credit card (**ccard#**, ccard#, cstartdate, cenddate, cname, ccardtype)

Notes:

- The use of an internally created primary key for the CC table allows for the posting of a non-confidential key instead of posting the CC number to a table that will have less security applied to it than the CC table.
- ecodes allows for the storing of up to 10 types of entertainment packages a particular entertainer provides, e.g. 'm' - magic, 'c' – clown, etc. As the scenario does not refer to codes or an entertainer having more than one skill or show candidates will not lose marks for omitting this.
- An enquirer may be a different person to the person that eventually makes to booking.
- It may be reasonable to link the customer to credit card tables but given the desire to maintain confidentiality of the card table this model seeks to reduce the number of relationships between the CC table and other tables.

Q1b Marking Scheme

- Entity types: 1 mark each to max of 6
- Relationships with appropriate degrees & membership classes: 1 mark each to max of 5
- Table types, consistency with LDS + appropriate PK: 0.5 each to max of 3

FK postings: 0.5 each to max of 3
Other attributes placed to result in normalised
tables and support processing: to max of 3

Total 1b: 20 marks

Q1c Answer Pointers
What is?

The third model is the ELH, which gives a time/event perspective.

It can be used to check that there are enough processes to support all events that affect entities.

It can also be used to check that there are enough entities and that they contain sufficient attributes.

Provides the analyst with a tool to model all the states an entity can be in during its life in the system and the events that change an entity from one state to another.

Describing it ...

Most likely done using a model/diagram.

Expect to see Boss module with birth, life and death sub-modules.

Expect to see sequence, selection and iteration structures with correct notation.

Q1c Marking Scheme

2 marks for identifying the ELH 2 marks

5 marks for a description that includes its uses and features 5 marks

1 mark each for sequence, selection and iteration 3 marks

Total 1c: 10 marks

Examiner's Comments

Overall, there was a wide range in the standard achieved by candidates, with excellent work from some while that from others was disappointing.

a) Many candidates constructed a data flow diagram (DFD) that effectively represented the business processing of the system. In some cases a context diagram was provided, either in addition to or instead of the top-level DFD; it should be noted that no extra marks are obtainable by providing a model that was not asked for. It was pleasing to see that many candidates included a brief explanation of their assumptions that underpinned their models. Specific errors that future candidates should seek to avoid included:

- i. All processes must have at least one input and one output and not just to or from a store.
- ii. Process naming could be improved. Using the name of the organisation or a business unit within it as a process name is to be avoided, 'reception' is not a process name.
- iii. Data flows were often not named at all or mis-named as processes.
- iv. Too many candidates continue to use physical terms to describe logical data, for example, many solutions included a 'booking form' as a logical data store.

b) The entity-relationship diagrams (ERDs) were generally of a better standard than the table types. Many-to-many relationships were often not decomposed on the ERD and, more seriously, not represented by a table type. Those that did decompose M:M relationships were usually accurate in their posting of keys. It was disappointing to note this year that many candidates simply did not know the posting rules that accompany standard cardinality, ie. 1:1, 1:M and M:M and as such they failed to gain the available marks. Pleasingly many candidates identified the specific data items that were expected to be present in solution, ie. 'booking special requirements' and 'booking completed' data or flag.

c) This was the weakest part of question 1 and in many cases candidates simply did not know the answer and guessed at 'use case model', class models' and 'sequence models'. However, most candidates that did correctly identify the ELH time model went on to present good answers covering its use in validating the other two models and supported their answers with appropriate

diagrams that are always welcome in this subject. A small number of candidates successfully identified the ELH but did not provide any description of its role in validating the other models.

Question 2

2. a) Explain what is meant by the term 'stakeholder' in the context of Information Systems Development. (5 marks)
- b) Identify the key stakeholders in the scenario presented for Question 1 and discuss the ways in which the project manager can ensure that they are involved in the systems analysis stage of the project. (20 marks)

Answer Pointers

- (a) All those likely to be affected by the system: 2
May not only be those directly affected by also indirectly, public at large: 3 (5 marks)
- (b) Stakeholders include: Manager of EI; administrative staff of EI; the entertainers; customers. 2 per key stakeholder to max of 8
Interview them; include them in questionnaires; hold JAD sessions; use prototypes to help elicit requirements: up to 3 marks each to max of 12. (20 marks)

Examiner's Comments

This was the least popular question. Some candidates provided a disappointingly narrow definition of 'stakeholder' that emphasised those involved in the development at the expense of those who will be in some way affected by it. Weaker solutions tended to simply assert that stakeholders *should* be involved, rather than answer the question by explaining *how* that involvement could be achieved.

Question 3

3. a) Identify what you would expect to find in a Requirements Specification. (12 marks)
- b) Explain the role that a Computer Aided Software Engineering (CASE) tool can play during the systems analysis phase of a project. (13 marks)

Answer Pointers

- a) Background; description of current system/identified problem(s); objectives of investigation/proposed new system; details of all functional and non-functional requirements; models produced during systems analysis phase; appropriate appendices.
Up to 2 marks for each relevant feature identified to max of 12.
- b) Production of models; ability to update the latter as understanding is refined; keep multiple versions of models; consistency checks; completeness checks; provide a means for communication between members of the analysis team; aid communication with user.
Up to 2 marks for each relevant feature explained to max of 13.

Examiner's Comments

While there were some excellent answers to this question, there were also a number that, for example, tended to explain how requirements could be gathered rather than describe *the contents of a Requirements Specification*. Similarly, for part b, the weaker answers tended to make general points about CASE tools (such as their advantages and disadvantages), rather than *explain their role during the systems analysis phase* of a project. The weakness here, therefore, was to not answer the question.

Question 4

4. a) Describe the kinds of situation in which it might be appropriate to use Soft Systems Methodology (SSM). (5 marks)
- b) Two key techniques used in SSM are the Rich Picture and Root Definitions. For each technique:
- i) explain its purpose; and
 - ii) provide a description of the technique. (20 marks)

Answer Pointers

- (a) Where goals are unclear; messy, complex situations involving human activity systems: up to 2 each for these or equivalent + 1 for mentioning human activity system. (5 marks)
- (b) RP: purpose to provide the richest possible picture of a problem situation; = the problem expressed.
RD: to express the view of each stakeholder/group of stakeholders about the purpose of the human activity system concerned.
Up to 2 each = 4.
RP: description/illustration, with key elements of the picture: up to 2 per feature to a max. of 10.
RD: description, including role of CATWOE to arrive at a definition: up to 6. (20 marks)

Examiner's Comments

Some candidates lost marks because they *described the stages* of Soft Systems Methodology (SSM) instead of stating *when it might be appropriate to use it* – once again, not answering the question. Others noted that SSM could be used for 'soft problems' without explaining what this type of problem is. On the whole, Root Definitions were less well understood than Rich Pictures.

Question 5

5. Briefly explain, using an example or a diagram where appropriate, any FIVE of the following terms as applied to object oriented analysis models:
- a) Class
 - b) Object
 - c) Inheritance
 - d) Aggregation
 - e) Actor
 - f) Association
 - g) Operation. (5 x 5 marks)

Answer Pointers

a) Class

A collection of objects with the same data (attributes) and same behaviour (operations).
Up to 3 for this or equivalent + 2 for an accurate diagram in UML notation.

b) Object

An object is something of relevance in the application domain; it has identity, state (represented by the value of its attributes) and behaviour (operations).
Up to 5 marks for this or equivalent; 2 may be allocated for an example OR for a diagram if candidate has not answered a) – no marks for duplicating diagram of a class.

c) Inheritance

A generalisation/specialisation association between classes; a subclass inherits the attributes and operations of the superclass.
Up to 3 marks for this or equivalent; 2 for an accurate UML diagram.

d) Aggregation

A whole/part association between two or more classes; one class represents the whole, the others parts of that whole.
Up to 3 marks for this or equivalent; 2 for an accurate UML diagram.

e) Actor

An external entity that interacts with the system; could be humans playing a particular role (e.g. Administrative Assistant) or another system or a device.
Up to 3 marks for this or equivalent; up to 2 for appropriate example(s).

f) Association

A connection between 2 classes (or a class could have a connection to itself); represents the potential for message passing.
Up to 3 marks for this or equivalent; up to 2 for appropriate example.

g) Operation

A piece of system functionality that is provided by a class; an element of the services provided by a class.
Up to 3 marks for this or equivalent; up to 2 for appropriate example.

(5 marks each x 5 = 25 marks)

Examiner's Comments

This was the most popular question and on the whole was well-answered. Understanding of object-oriented techniques has increased in recent years, although a number of candidates still equate associations between classes on a class diagram with relationships between entities on an ERD. A general point to note is that when asked to choose FIVE terms this is what candidates should do: only five answers will be marked, so answering more than this number is a waste of candidates' time and effort.