

### 2003: Normalisation

A credit Reference Agency is updating its method of storing customers' bank and account details.

At present it stores the bank details in one file and the customer account details in another file.

Each branch of each bank is uniquely identified by its sort code. It is possible for an account number in one bank to be the same as an account number in another bank. An account ID is used to identify the type and rate of interest of each account. Account IDs are unique, irrespective of the bank offering the account.

One example of Bank details and two examples of Customer Account details are shown below.

#### Bank Details

<b>Bank Sort Code</b>	860773
<b>Name</b>	HCBS
<b>Address</b>	1 Queen Street
<b>Town</b>	Glasgow
<b>Post Code</b>	GL67 9PR
<b>Telephone No</b>	0141 123 123

#### Customer Account Details

<b>Customer ID</b>	<b>Customer Name</b>		<b>Address</b>		<b>Town</b>	<b>Post Code</b>
761997	John Murray		46 Fenwick Lane		Glasgow	GL64 9YT
<b>Account No</b>	<b>Bank Sort Code</b>	<b>Account ID</b>	<b>Type of Account</b>	<b>Interest Rate</b>	<b>Date Opened</b>	
675298	806773	1101	Current	0.3%	07/06/98	
776598	860773	1837	Postal	1.2%	12/10/98	
761298	839912	6153	Internet	1.5%	21/10/99	
653910	860773	3219	Savings	1.5%	14/01/05	

<b>Customer ID</b>	<b>Customer Name</b>		<b>Address</b>		<b>Town</b>	<b>Post Code</b>
448221	Sally Mutch		23 Grange Road		Clydebank	GL34 3KN
<b>Account No</b>	<b>Bank Sort Code</b>	<b>Account ID</b>	<b>Type of Account</b>	<b>Interest Rate</b>	<b>Date Opened</b>	
458724	806773	3219	Savings	1.5%	12/04/03	
499821	823895	2054	Current	0.7%	24/11/03	
619985	839912	6153	Internet	1.5%	12/02/06	

(Question Continued Over)

The unnormalised data can be represented as shown below:

Customer ID

Customer name

Address

Town

Post code

Account no

Bank sort code

Bank name

Bank address

Bank town

Bank post code

Bank phone number

Account ID

Type of account

Interest rate

Date opened

a. Convert the information in the unnormalised form to third normal form, using Customer ID as the key.

You must show the intermediate stages of first normal and second normal form and identify all primary and foreign keys at each stage of normalisation.

b. Create an entity relationship diagram to show the relationships that exist between all **three** entities.

### 2003: Relational Databases

Holidays UK is in the process of implementing a new database system to store details of the holidays they sell through six travel agents. The company has decided to trial this new system with holidays they offer in the summer season only. The summer season runs from 1 April 2003 to 30 September 2003. The new database system has a number of requirements. These requirements are listed below.

1. Holidays are sold by travel agents, each having a unique 4 digit agent code.
2. Each holiday has a unique holiday code and can be sold by many agents.
3. Each airport has a unique number which determines the name of the airport.
4. All holidays cost over £90 but less than £2000.
5. Monthly reports are required on how much revenue each agent has generated for the company.
6. Reports are required on how much revenue has been generated by each holiday.

The data has been normalised. Some sample data is shown below.

#### Travel Agent

#### Booking

Agent Code	Agent Name	Booking No	Agent Code	Holiday Code	Quantity
6573	Travelwide	356	6573	C657	10
3492	World Wide Travel	147	6573	G584	34
8916	Duncan's Travel	138	6573	F764	13
		129	8916	C657	15
		276	8916	F764	20
		249	3492	H611	27

#### Airport

#### Holiday

Airport No	Airport Name	Holiday Code	Cost	Airport No	Departure Date
1	Luton	C657	£399	8	24/06/03
4	Glasgow	G584	£299	4	15/07/03
8	Edinburgh	F764	£625	1	20/08/03
6	Newcastle	H611	£350	8	16/08/03

**(Question Continued Over)**

The table of data characteristics to be used for the implementation of the new system is shown below. It has a number of missing entries which are highlighted as A, B, C and D.

Entity	Attribute	PK/FK	Data Type	Unique	Req'd	Validation	Format
Agent	Agent Code	PK	Text (4)	Yes	Yes	A	9999
	Agent Name		Text (25)	No	Yes		
Airport	Airport No.	PK	Integer	Yes	Yes		Auto-number
	Airport Name		Text (20)	No	Yes		
Holiday	Holiday Code	PK	Text (4)	Yes	Yes		X999
	Cost		Real	No	Yes	>90and<2000	Currency
	Airport No	FK	Integer	No	Yes	Look up from Airport entity	Drop down list
	Departure Date		Date	No	Yes	B	dd/mm/yy
Booking	Booking No	PK	Integer	Yes	Yes		Yes
	Agent Code	D	Text (4)	No	Yes	C	Drop down list
	Holiday Code	FK	Text (4)	No	Yes	Look up from Airport entity	Drop down list
	Quantity		Integer	No	Yes	> 0	

- (a) Create an entity relationship diagram for the normalised system.
- (b) Suggest a suitable entry for each of the **four** missing values in the data dictionary above.
- (c) In order to meet the requirements of Holidays UK, processes are necessary to produce the two reports (numbered 7 and 8) in the requirements list.

State the **entities** involved in:

- (i) producing report 7
- (ii) producing report 8.

## 2004 SQA Paper (Amended) – Relational Databases

I. Strathcraig Outdoor Centre employs a number of specialist instructors to run training courses.

A course is made up of a number of classes. Each class has a unique class ID. A class cannot belong to more than one course. Each class is taught by a specialist instructor who can teach more than one class for a particular course.

The centre currently uses cards for recording data about the courses and classes. Samples of course details and instructor and class details are shown below.

### Course Details

Course No	Course Title	Duration
OPI	Outdoor pursuits	5 days
OP2	Water sports	3 days

### Instructor and Class Details

<b>Instructor ID</b>	653992		
<b>Instructor Name</b>	Jack Thomson		
<b>Address</b>	12 Grange Road		
<b>Town</b>	Perth		
<b>Post Code</b>	PE45 6HG		
Class ID	Class Title	Course No	Maximum number
RC216	Rock Climbing	OPI	8
AB338	Abseiling	OPI	6
SA499	Sailing	OP2	5
CA996	Canoeing	OP3	5

<b>Instructor ID</b>	761299		
<b>Instructor Name</b>	Hilary Bews		
<b>Address</b>	98 Blair Crescent		
<b>Town</b>	Invergowrie		
<b>Post Code</b>	DD12 3RT		
Class ID	Class Title	Course No	Maximum number
SK891	Skiing	OPI	6
CA997	Canoeing	OP2	5
WS775	Wind Surfing	OP2	4
SA500	Sailing	OP3	5

**(Question Continued Over)**

(a) Data from these records can be represented in un-normalised form as:

Instructor ID  
Instructor Name  
Address  
Town  
Post Code  
Class ID  
Class Title  
Course No  
Course Title  
Duration  
Maximum number

Using Instructor ID as the primary key, transform this un-normalised data to third normal form.

You **must** show the intermediate stages of first normal form and second normal form and identify all primary and foreign keys at each stage of normalisation.

## 2005 SQA Paper (Amended) – Normalisation

1. Hilltown Sports Centre has a number of facilities available for booking including a swimming pool, 3 games halls, 3 Astroturf pitches and a climbing wall. Local teams can make regular bookings for these facilities at the start of each season. These bookings must be on the same day and at the same time every week.

One example of Team Details and two examples of Facility Bookings Details are shown below:

<b>Team Details</b>	
Team Name	Broomhill Bullets
Sport	Basketball
Coach Name	Alison Hughes
Coach Contact No.	01265 777123
Day	Tuesday
Time	5 – 7 pm

<b>Facility Booking Details</b>			
<b>Facility Name</b>	<b>Cost per hour</b>	<b>Capacity</b>	
Games hall 1	£10	250	
<b>Team Name</b>	<b>Date</b>	<b>Payment Method</b>	<b>Duty Staff</b>
Broomhill Bullets	07/06/08	Cheque	A Young
Firrhill Fliers	10/06/08	Direct Debit	D Graham
Westfield	11/06/08	Cash	A Young
<b>Facility Name</b>	<b>Cost per hour</b>	<b>Capacity</b>	
Games hall 2	£20	600	
<b>Team Name</b>	<b>Date</b>	<b>Payment Method</b>	<b>Duty Staff</b>
Cranford Colts	08/06/08	Cash	F Hardie
Broomhill Bullets	21/06/08	Cheque	R Lawson
Duthie Park Thistle	22/06/08	Direct Debit	R Lawson
Renfield Rangers	03/07/08	Direct Debit	D Graham

All team names, staff and coach names and facility names are unique. Each coach has responsibility for one sport.

**(Question Continued Over)**

I. (continued)

(a) Data from these records can be represented in un-normalised form as:

team name

sport

coach name

coach contact no

day

time

facility name

cost per hour

capacity

date

payment method

duty staff

Using team name no as the primary key, transform this un-normalised data to third normal form.

You **must** show the intermediate stages of first normal form and second normal form and identify all primary and foreign keys at each stage of normalisation.

## 2005 SQA Paper (Amended) – Relational Databases

2. The data dictionary shown below represents the completed team entity. It has a number of missing entries which are highlighted as A, B, C, D, E and F.

a. State a suitable entry for each of the missing values.

Name	Data Type	Validation	Required	Key
team name	Text (25)	C	Y	PK
sport	Text (20)		Y	
coach name	Text (30)	D	Y	F
day	A	E	Y	
time	B		Y	

b. The centre would like to produce a report detailing the revenue taken in for each team during the month of July 2008. The report would be set out as shown below:

<b>Team</b>	<b>Sessions</b>
Broomhills Bullets	4
Cranford Colts	5
Duthie Park Thistle	3

(i). Which facility would the RDBMS need to have to calculate the number of sessions for each team?

(ii). Write down how this calculation would be created using the RDBMS of your choice.

(iii). List the steps required to create the report shown above for the month of June.

## 2005 SQA Paper Adv H (Amended) – Relational Databases

I. Blue Mountain Zoo keeps paper records containing the following information about each of the animals.

- Animal ID
- Name of animal
- Breed of animal
- Date of birth
- Gender
- Animal diet
- Whether born in zoo
- Mother's name (if known)
- Keeper name
- Keeper pager number
- Medical treatment description
- Date of treatment
- Visiting vet ID
- Visiting vet name
- Vet practice address
- Vet practice postcode
- Vet practice telephone number

a. Using Animal ID as the primary key, transform this un-normalised data to third normal form.

You **must** show the intermediate stages of first normal form and second normal form and identify all primary and foreign keys at each stage of normalisation.

The following should be considered when developing the solution.

No new attributes should be introduced – use only the attributes listed above.

All animals of the same breed have the same diet.

Each animal is the responsibility of one particular keeper.

Sick animals may require several treatments but only receive one treatment per day.

Each time an animal requires medical treatment, one single vet will be called out.

b. If normalization is not carried past first normal form, there may be problems in the resulting implementation. Describe **two** problems that would arise if the Blue Mountain zoo system was implemented at first normal form rather than third normal form.

c. Create an entity-relationship diagram for the 3NF solution.

### 2003: Using Information

The sales representatives of a pharmaceutical company use a laptop computer and a spreadsheet to provide detailed costs to their customers.

The unique item codes, item costs and the formula for calculate discounts and totals are already entered. Sales representatives simply have to enter the number of items in Column C, and various calculations are done automatically. A sample of the spreadsheet is shown below.

A	B	C	D	E	F	G	H
2	Item code	Quantity Ordered	Cost per item	Discount Code	Discount Rate	Cost After Discount	Total Cost of item
3	A100S230		£15.90				£0.00
4	A100S231	35	£10.50	D	10%	£9.45	£330.75
5	A100S232		£20.75				£0.00
6	A100S233	15	£5.90				£88.50
7	A200T420	5	£18.60				£93.00
8	A200T421		£1.50				£0.00
9	A200T423	2	£8.00				£16.00

341	V100S230	20	£15.75	D	10%	£14.98	£283.50
342	V100S231	15	£12.50				£187.50
343	V100S232		£20.75				£0.00
344	V100S233	12	£4.80				£57.60
345	V200T420	25	£18.60	D	10%	£16.74	£418.50
346	V200T421		£1.50				£0.00
347	V200T423	5	£18.00				£90.00
348							
349	<b>Totals</b>	<b>285</b>					<b>£4,835.00</b>

a. If a buyer orders 20 or more of one item they get a 10% discount on the cost of that item. This is indicated by the letter “D” for a discount in Column E of the spreadsheet. Design a formula for cell G3 to show the discounted cost of an item, depending on the value in cell E3.

b. Buyers get a 10% discount on the cost of **every** item if the total amount of units ordered is 300 or more. Only one of the discount options can be given to an item. Describe a formula for cell E3, so that a **D** is entered if a discount should be applied.

c. Describe **two** ways of ensuring the data in the spreadsheet is secure and well managed.

d. When the sales representative was using the spreadsheet package he found that several of the options on the menus were unable to be used and were greyed out. Give **two** examples of options that may not be available to the sales representative and explain your answers.

