

Higher Information Systems

2004 q.1 Relational Databases Normalisation

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.

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. **(17)**

Course Details

Course No	Course Title	Duration
OP1	Outdoor pursuits	5 days
OP2	Water sports	3 days

Instructor and Class Details

Instructor ID	653992		
Instructor Name	Jack Thomson		
Address	12 Grange Road		
Town	Perth		
Post Code	PE45 6HG		
Class ID	Class Title	Course No	Maximum number
RC216	Rock Climbing	OP1	8
AB338	Abseiling	OP1	6
SA499	Sailing	OP2	5
CA996	Canoeing	OP3	5

Instructor ID	761299		
Instructor Name	Hilary Bews		
Address	98 Blair Crescent		
Town	Invergowrie		
Post Code	DD12 3RT		
Class ID	Class Title	Course No	Maximum number
SK891	Skiing	OP1	6
CA997	Canoeing	OP2	5
WS775	Wind Surfing	OP2	4
SA500	Sailing	OP3	5

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2005 q.1 Relational Databases Normalisation

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. All team names, staff and coach names and facility names are unique. Each coach has responsibility for one sport. Data 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. **(17)**

Team Details	
Team Name	Broomhill Bullets
Sport	Basketball
Coach Name	Alison Hughes
Coach Contact No.	01265 777123
Day	Tuesday
Time	5 - 7 pm

Facility Booking Details			
Facility Name	Cost per hour	Capacity	
Games hall 1	£10	250	
Team Name	Date	Payment Method	Duty Staff
Broomhill Bullets	07/06/08	Cheque	A Young
Firrhill Fliers	10/06/08	Direct Debit	D Graham
Westfield	11/06/08	Cash	A Young
Facility Name	Cost per hour	Capacity	
Games hall 2	£20	600	
Team Name	Date	Payment Method	Duty Staff
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

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2006 q.14 Relational Databases Normalisation

Invergordon Electrical is a small company supplying electrical goods to a few shops in the local area. Customer orders are recorded on a customer's order card as shown below.

Details of all items offered for sale are stored on stock cards. Each item is obtained from a single supplier. Part of a stock card is shown below.

a. The system can be represented in un-normalised form as:

Customer no

Customer name

Customer address

Customer telephone

Order date

Item number

Number ordered

Description

Supplier name

Supplier address

Supplier telephone

Price

Using Customer 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.

Customer no: 1324	Customer no: 1411																
Customer name: John Andrews	Customer name: Electric City																
Address: 27 High St., Abervally	Address: Dunton Lane, Inverdon																
Telephone: 01234567890	Telephone: 01321222333																
Date: 29/05/06	Date: 30/05/06																
<table border="1"><thead><tr><th>Item Number</th><th>Number Ordered</th></tr></thead><tbody><tr><td>555666</td><td>14</td></tr><tr><td>556789</td><td>5</td></tr><tr><td>144690</td><td>8</td></tr></tbody></table>	Item Number	Number Ordered	555666	14	556789	5	144690	8	<table border="1"><thead><tr><th>Item Number</th><th>Number Ordered</th></tr></thead><tbody><tr><td>554321</td><td>4</td></tr><tr><td>176888</td><td>15</td></tr><tr><td>555666</td><td>9</td></tr></tbody></table>	Item Number	Number Ordered	554321	4	176888	15	555666	9
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556789	5																
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Item Number	Number Ordered																
554321	4																
176888	15																
555666	9																

Stock Card					
Item number	Description	Supplier name	Supplier address	Supplier telephone	Price
554321	FineLine portable DVD Player	Acme Artifacts	Industrial Zone, Byway	01998232234	£124.99
555666	Megatone MP3 Player 128 MB	Consolidated Inc	Manufacture St, Grayton	01232657244	£62.99
144690	FineLine DVD Player	Acme Artifacts	Industrial Zone, Byway	01998232234	£26.49
176888	Background stereo Headphones	Weimakem	Well Road, Blackferry	01987654321	£11.75

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2007 13 Relational Databases Normalisation

Discovery Gym Club keeps records of members' fitness and performance levels on record cards. Each gym member has a trainer who recommends exercises for them. When an exercise is carried out, the equipment used calculates a performance score based on how well the user performed. The member writes the date and performance scores for each exercise on a record card as shown. Only registered trainers are permitted to devise exercise programs for members. Details of trainers are also shown below.

- Each exercise has a unique Exercise ID and is for a fixed duration and level.
- Trainers insist that performance score for each exercise is recorded only once per day.

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

Member no

Member name

Member address

Member telephone

Date

Exercise ID

Equipment

Duration

Level

Performance score

Trainer ID

Trainer name

Trainer address

Trainer telephone

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

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. **(17)**

Member Performance Record					
Member name: Andrew Johnstone		Member no: 97842			
Member address: 27 High Street, Craigbank		Trainer: W Lennon			
Member telephone: 01235 457632					
Date	Exercise ID	Equipment	Duration	Level	Performance Score
26/06/07	EB21	Exercise Bike	10	5	13
26/06/07	ST04	Stepper	15	4	15
28/06/07	EB21	Exercise Bike	10	5	14
28/06/07	ST04	Stepper	15	4	16
28/06/07	ST05	Stepper	15	5	14
28/06/07	EB22	Exercise Bike	12	6	15

Member Performance Record					
Member name: Chris Lee		Member no: 41845			
Member address: 42 Low Road, Craigbank		Trainer: C Kent			
Member telephone: 01235 439582					
Date	Exercise ID	Equipment	Duration	Level	Performance Score
26/06/07	EB21	Exercise Bike	10	5	16
26/06/07	ST04	Stepper	15	4	15
26/06/07	CT17	Cross Trainer	15	3	16
27/06/07	ST04	Stepper	15	4	16
27/06/07	TM27	Treadmill	25	6	17
28/06/07	EB22	Exercise Bike	12	6	12

Discovery Gym Club Registered Trainers List

Trainer ID	Trainer name	Trainer address	Trainer telephone
01231	W Lennon	42 Wilson Avenue, Doonbrae	01233 665571
01245	C Lamont	11 The Glebe, Strathcraig	01222 699123
01249	L Lamont	11 The Glebe, Strathcraig	01222 699123
01258	C Kent	42 Willow Place, Doonbrae	01233 423145

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2008 05 Relational Databases Normalisation

State **one** characteristic of data in first normal form. **(2)**

2008 13 Relational Databases Normalisation

Northbank High School stores details of pupils' attainment. An example is shown below. Details of Form Classes are also stored.

This data can be represented in un-normalised form as

Pupil ID

Pupil name

Form class

Form teacher

Room

Telephone

Course code

Subject Level

Grade

Using pupil ID as the primary key, transform this un-normalised data to third normal form. 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. **(17)**

Pupil Name	Tom Jones	Pupil ID	12132
Form Class	5C		
Form Teacher	Mr Lee	Telephone	143
Course Code	Subject	Level	Grade
5MAA1	Maths	Higher	C
FRC12	French	Intermediate 2	A
5EN12	English	Higher	B
SR11	RE	School-based	Ungraded
SP22	PE	School-based	Ungraded
DI332	PE	Higher	B

Form class	1A
Form teacher	Ms Simpson
Room	G13
Telephone	132

Form class	5C
Form teacher	Mr Lee
Room	A22
Telephone	143

Form class	3D
Form teacher	Mr Macgregor
Room	G14
Telephone	132

Form class	1D
Form teacher	Ms Mahdi
Room	D9
Telephone	261

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2008P q.14 Relational Databases Normalisation

Northshire College runs a series of Easter study schools every year to help local school pupils studying for SQA Examinations. Over a period of weeks the College holds a number of masterclasses. Schools send the names of pupils attending to the College where they are recorded as shown below. Each pupil can attend a number of masterclasses.

A separate list of schools is kept so that they can be contacted if necessary. All of the schools are shown in the table below.

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

Masterclass

Title

Room

Speaker

Visitor number

Name

School

Address

Telephone

Using Masterclass 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. **(17)**

Masterclass: HIS3		
Title:	Normalisation Tips	Room: L212
Speaker:	Mrs J Liu	
Visitor Number	Name	School
1	J Bidmead	Ashdown High School
2	R Michaels	Hightrees Academy
3	A Akhtar	Ashdown High School

School	Address	Telephone
Ashdown High School	Howard Street, Ashdown	01632 960114
Hightrees Academy	Forest Drive	01632 960992
Wilmington High School	Bond Road	0113 4960010

Describe the purpose of normalising from 2NF to 3NF. **(2)**

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2009 13 Relational Databases Normalisation

Employees at StrathTrust Bank are required to undertake regular training. An employee can attend two courses on the same day. Courses are always taught by the same trainer although a trainer can teach more than one course. If an employee fails a course they can re-take the course at a later date. An employee record and two training certificates are shown below.

The data can be represented in un-normalised form as shown below.

Employee no

Name

Address

Date of birth

Branch Manager

Branch address

Date

Course title

Trainer

Grade achieved

Using Employee 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.

StrathTrust Employee Record	
Employee No	AA10037
Name	Donald McBruce
Address	17 Garden Crescent Glasgow
Date of Birth	17th Dec 1989
Branch	Strathkelvin
Manager	Susan Newlands
Branch Address	107 Partick Drive Glasgow

StrathTrust Training Certificate			
Employee No		AA10037	
Name		Donald McBruce	
Date	Course Title	Trainer	Grade Achieved
12/03/07	Customer Relations 1	H Samrai	B
21/07/07	Internet Accounts 1	C Trueman	B
21/07/07	Investments 1	G Miller	C
23/02/08	Customer Relations 2	G Miller	A
04/07/08	Foreign Exchange 1	D Black	D
10/11/08	ATMs	G Singh	B

StrathTrust Training Certificate			
Employee No		AA10512	
Name		Karen Tsang	
Date	Course Title	Trainer	Grade Achieved
24/02/08	Customer Relations 1	H Samrai	A
10/05/08	Customer Relations 2	G Miller	D
10/11/08	ATMs	G Singh	A
17/11/08	Customer Relations 2	G Miller	B

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2009P q.15 Relational Databases Normalisation

Garvine Yacht Club keeps records of its members' racing information on record cards. After each race the details of that race and the member's position in it are entered along with the points gained. The winner receives 25 points, 2nd gets 24 points and so on until the 25th finisher gets 1 point. Each member owns one yacht. On some race days there may be more than one race and several races last more than 24 hours. Data from these records can be represented in un-normalised form as:

Member no
Name
Address
Telephone no
Year joined
Boat
Race name
Date
Distance
Conditions
Time
Position
Points
Type
Length(ft)
Builder
Year built

Using Member 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. **(17)**

Member no : 078			Year joined : 1994			
Name : Toby Smythe			Boat : Amethyst			
Address : Harbour View, Garvine			Telephone no : 01411 672086			
Race name	Date	Distance	Conditions	Time	Position	Points
Adam Isle	5/6/07	6.5 miles	Windy	2 hr 18min	6	20
Lighthouse Run	12/8/07	22.3 miles	Calm	8 hr 2 min	1	25
Mull Sprint	23/9/07	67.8 miles	Windy	16 hr 7 min	18	8
Championship	1/10/07	4.9 miles	Breezy	2 hr 25 min	31	0

Member no : 156			Year joined : 2004			
Name : Jessie Duguid			Boat : Broomstick			
Address : 17 Holly Drive, Dirvel			Telephone no : 01413 147620			
Race name	Date	Distance	Conditions	Time	Position	Points
Adam Isle	5/6/07	6.5 miles	Windy	3 hr 6 min	21	5
Clyde-Ulster	9/8/07	88.4 miles	Breezy	23hr 44 min	12	14
Hebridean Loop	23/9/07	135.8 miles	Breezy/Windy	43hr 49 min	9	17
Local Circuits	30/9/08	4.9 miles	Calm	2hr 40 min	2	24

Boat name	Type	Length(ft)	Builder	Year Built
Far Runner	Sloop	63	J Steinmann, Plymouth	2002
Amethyst	Class 40	59	Lexcen Boatyard, Cork	1999
Alicia	Yawl	62	J Steinmann, Plymouth	1994
Tropicana	Sloop	64	Harris Boatbuilders, Kyle	2004

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2010 q.13 Relational Databases Normalisation

Inspire Conference Centre hires rooms to local businesses for meetings and functions. All rooms provide similar facilities and the price changes only according to the capacity. Data is currently stored in the following way.

This data can be represented in un-normalised form as

Customer name

Customer address

Customer contact

Customer telephone

Room

Date

Time

Room telephone

Capacity

Price

Using Customer name 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. **(17)**

Customer Name	Woods Electrical
Address	27 High Street
Contact	K Lindsay
Customer Telephone	01411 267314

Room	Date	Time
A1	12/05/2009	<input checked="" type="radio"/> am <input type="radio"/> pm
A1	12/05/2009	<input type="radio"/> am <input checked="" type="radio"/> pm
C6	19/12/2009	<input type="radio"/> am <input checked="" type="radio"/> pm
C7	19/12/2009	<input type="radio"/> am <input checked="" type="radio"/> pm
A4	22/02/2010	<input checked="" type="radio"/> am <input type="radio"/> pm
A2	22/02/2010	<input checked="" type="radio"/> am <input type="radio"/> pm
C3	14/03/2010	<input type="radio"/> am <input checked="" type="radio"/> pm

**Inspire Conference Centre
Room Information**

Room	Room Telephone	Capacity	Price
A1	131	80	£240
A4	145	80	£240
A2	332	60	£175
C6	612	60	£175
A3	132	40	£125
C3	144	30	£125

Higher Information Systems

2010 q.3 Relational Databases Normalisation

Describe how data is transformed from *first normal form* to *second normal form*. **(2)**