Suggested Exercises for Relational Databases

Exercise One

Possible activity for session plan three in the suggested scheme of work.

Use brainstorming to discuss various field properties and their appropriate uses in a database. Follow this with a session discussing the reasons for producing more than one table relating to a similar theme.

Take the following table as an example and discuss with your students the following notes:

STU#	STNAME	COURSE	SUB#	SUB NAME	TEACHER	ROOM	RESULT
1794	SMITH	COMP	100	CS1	JONES	10	P
			200	DBSW	WILSON	16	C
			300	SP	JONES	10	P
2843	BROWN	ACCT	100	CS1	JONES	10	P
			400	CS2	JONES	10	P
4117	CLARK	COMP	450	CO	WILSON	16	C
			300	SP	JONES	10	P
			325	BF	GRIEG	38	N
1942	GREEN	COMP	400	CS2	JONES	10	F
			450	CO	WILSON	16	F
			300	SP	JONES	10	P
			200	DBSW	WILSON	16	C

Imagine it is written out on paper. From reading it, you know that student 1794 (Smith) is taking courses 100, 200, and 300. However, if you were to enter this into a computer exactly as it is, the computer would know that student 1794 was taking course 100, as the entries are on the same line. It would not know that student 1794 was also taking courses 200 and 300, as the entries on those course lines are blank.

To remedy this, we could fill in the blanks:

STU#	STNAME	COURSE	SUB#	SUB NAME	TEACHER	ROOM	RESULT
1794	SMITH	COMP	100	CS1	JONES	10	P
1794	SMITH	VOMP	200	DBSW	WILSON	16	C
1794	SMOTH	COMP	300	SP	JONES	10	P
2843	BROWN	ACCT	100	CS1	JONES	10	P
2843	BROWN	ACCT	400	CS2	JONES	10	P
4117	CLARK	COMP	450	CO	WILSON	16	C
4117	CLARKE	COMP	300	SP	JONES	10	P
4117	CLARK	ACCT	325	BF	GRIEG	38	N
1942	GREEN	COMP	400	CS2	JONES	10	F
1942	GREEN	COMP	450	CO	WILSON	16	F
1942	GREEN	COMP	300	SP	JONES	10	P
1942	GREEN	COMP	200	DBSW	WILSON	16	C

In doing this though we are repeating Information (we are recording the fact that Smith is taking course “COMP” every time we record what course he is on). This is a waste of disk space.

The chances that information is entered inconsistently are increased, as we are keying information in more than once (as above example).

How do we split this up to make best use of space and to reduce possible inconsistencies?

We can split up the table, so that the information is held in several tables. Each table should contain only those attributes that relate directly to the table.

We reduce the tables so that each record is listed only once:

Student Details

STU #	**STNAME**	**COURSE**
1794	SMITH	COMP
2843	BROWN	ACCT
2843	BROWN	ACCT
4117	CLARK	COMP
1942	GREEN	COMP

Subject Details

SUB #	**SUB NAME**	**TEACHER**	**ROOM**
100	CS1	JONES	10
200	DBSW	WILSON	16
300	SP	JONES	10
325	BF	GRIEG	38
400	CS2	JONES	10
450	CO	WILSON	16

Results

STU #	SUB #	**RESULT**
1794	100	P
1794	200	C
1794	300	P
2843	100	P
2843	400	P
4117	450	C
4117	300	P
4117	325	N
1942	400	F
1942	450	F
1942	300	P
1942	200	C

You can now use all three tables to extract and sort information about student, courses, results, rooms, teachers, etc.

Create various queries, using one criterion and multiple criteria; and/or create reports using the tables selecting specific fields only, grouping or summarising data.

Exercise Two

Possible activity for session plan one in the suggested scheme of work.

- create a database, and a table using the **original** files ENGINES.CSV, RECEIVERS.CSV, do not include a field for the total sold in January

- include the following data in the table:

Description	Price
Ready-Built Trainers	
Jumper 25	£89.95
Bobcat 30	£62.95
Arising Star	£69.95
Bobcat 30	£62.95
Thunder Tiger 2000	£72.95
Thunder Tiger 40	£69.95
Thunder Tiger 60	£119.95
Ready-Built Sports/Scale	
Extra 300	£78.95
Space Walker	£78.95
Seagull 40	£68.95
Travelair	£69.95
Fairchild PT 19	£79.95
Aviator	£69.95

- ensure that every item has a unique stock number, which must be used as the primary key

- create an additional table called Customers, and create 10 fictitious customer names and addresses using the following fields:
  - customer number (primary key)
  - name
  - address line 1
  - address line 2
  - town/city
  - post code

- save each table as a CSV file

- produce a report containing a list of all customers in alphabetical order, and obtain a printout

- create a folder/directory in your storage area in which to store a copy all of the files used in this exercise

- obtain a printout of the contents of the folder/directory

Exercise Three

Possible activity for session two in the suggested scheme of work.

- open the database from exercise two

- create a new table called Invoices and add the following fields:
  - invoice number
  - date
  - customer number
  - invoice item no
  - stock number
  - quantity
  - total
  - grand total

- create the appropriate relationships between the tables

- create a report to be used as an invoice, based on the following information which will be extracted from the tables:

Invoice Number:	*XXXXX*			**Customer Number:**	*XXXXXXX*	
Date:	*XX-XX-XX*			**Customer Name:**	*XXXXXXX*	
				Address:	*Address Line 1*	
					Address Line 2	
				Town/City:	*Town/City*	
				Post Code:	*Post Code*	
Invoice Item No	**Stock Number**	**Description**	**Price**	**Quantity**	**Total**	
XXXXX		*XXXXXXXXXX*	*£XX.XX*	*XX*	*£ XXXXX*	
					Grand Total:	*£XXX.XX*

- insert five fictitious records, which must each contain two or more 'Invoice Items', into the Invoices table

- save the file, and obtain a printout of each Invoice

Exercise Four

- produce two tables based on Library Records Systems:

  Table 1 – Book Information
  Field Names: Title, Author, Publisher, ISBN, Price, Edition

  Table 2 – Catalogue Details
  Field Names: Catalogue Number, ISBN

For tables 1 and 2:

- set the data types as you think appropriate
- choose appropriate primary keys

You are to create a one to many relationship between the two tables

- choose appropriate attributes to base the relationship on
- on creation of the tables, enter relevant data - an example is given below

Example of the type of data to be input:

Table 1

Title	Author	Publisher	ISBN	Price	Edition
Highly Parallel Computing	George S. Almasi	Benjamin / Cummings Publishing Co.	0-8053-0443-6	£31.99	2
If Only	Geri Halliwell	Bantam Press	0-5930-4583-1	£16.99	1
The Code Book	Simon Singh	Fourth Estate	1-8570-2879-1	£8.66	3
The Fifth Elephant	Terry Pratchett	Doubleday	0-3854-0995-8	£16.99	1

Table 2

Catalogue Number	ISBN
1000	0-8053-0443-6
1001	0-5930-4583-1
1002	0-5930-4583-1
1003	0-3854-0995-8
1004	0-8053-0443-6
1005	0-3854-0995-8
1006	0-3854-0995-8
1007	1-8570-2879-1

As with the previous tables you can:

- now use both tables to extract and sort information about Books, Publishers, Authors, Catalogue Numbers, etc
- create various queries, using one criterion and multiple criteria; and/or
- create reports using the tables selecting specific fields only, grouping or summarising data