

Appendix

B

Other Case Studies

Objectives

In this appendix you will learn:

- The *University Accommodation Office* case study, which describes the data and transaction requirements of a university accommodation office.
- The *EasyDrive School of Motoring* case study, which describes the data and transaction requirements of a driving school.
- The *Wellmeadows Hospital* case study, which describes the data and transaction requirements of a hospital.

This appendix describes the *University Accommodation Office* case study in Section B.1, The *EasyDrive School of Motoring* in Section B.2, and the *Wellmeadows Hospital* case study in Section B.3. The interested reader should note that additional case studies are available in Connolly and Begg (2003).

B.1

The *University Accommodation Office* Case Study

The Director of the *University Accommodation Office* requires you to design a database to assist with the administration of the office. The requirements collection and analysis phase of the database design process has provided the following data requirements specification for the *University Accommodation Office* database followed by examples of query transactions that should be supported by the database.

B.1.1 Data Requirements

Students

The data stored on each full-time student includes: the matriculation number, name (first and last name), home address (street, city, postcode), date of birth, sex, category of student (for example, first year undergraduate, postgraduate), nationality, smoker (yes or no),

special needs, any additional comments, current status (placed/waiting), and what course the student is studying on.

The student information stored relates to those currently renting a room and those on the waiting list. Students may rent a room in a hall of residence or student flat.

When a student joins the University, he or she is assigned to a member of staff who acts as his or her Advisor of Studies. The Advisor of Studies is responsible for monitoring the student's welfare and academic progression throughout his or her time at University. The data held on a student's Advisor includes full name, position, name of department, internal telephone number, and room number.

Halls of residence

Each hall of residence has a name, address, telephone number, and a hall manager who supervises the operation of the hall. The halls provide only single rooms, which have a room number, place number, and monthly rent rate.

The place number uniquely identifies each room in all halls controlled by the Accommodation Office and is used when renting a room to a student.

Student flats

The Accommodation Office also offers student flats. These flats are fully furnished and provide single-room accommodation for groups of three, four, or five students. The information held on student flats includes a flat number, address, and the number of single bedrooms available in each flat. The flat number uniquely identifies each flat.

Each bedroom in a flat has a monthly rent rate, room number, and a place number. The place number uniquely identifies each room available in all student flats and is used when renting a room to a student.

Leases

A student may rent a room in a hall or student flat for various periods of time. New lease agreements are negotiated at the start of each academic year with a minimum rental period of one semester and a maximum rental period of one year, which includes Semesters 1, 2, and the Summer Semester. Each individual lease agreement between a student and the Accommodation Office is uniquely identified using a lease number.

The data stored on each lease includes the lease number, duration of the lease (given as semesters), name and matriculation number of the student, place number, room number, address details of the hall or student flat, and the date the student wishes to enter the room, and the date the student wishes to leave the room (if known).

Invoices

At the start of each semester each student is sent an invoice for the following rental period. Each invoice has a unique invoice number.

The data stored on each invoice includes the invoice number, lease number, semester, payment due, student's full name and matriculation number, place number, room number, and the address of the hall or flat. Additional data is also held on the payment of the invoice and includes the date the invoice was paid, the method of payment (cheque, cash, Visa, etc.), the date the first and second reminder is sent (if necessary).

Student flat inspections

Student flats are inspected by staff on a regular basis to ensure that the accommodation is well maintained. The information recorded for each inspection is the name of the member of staff who carried out the inspection, the date of inspection, an indication of whether the property was found to be in a satisfactory condition (yes or no), and any additional comments.

Accommodation staff

Some information is also held on members of staff of the Accommodation Office and includes the staff number, name (first and last name), home address (street, city, postcode), date of birth, sex, position (for example, Hall Manager, Administrative Assistant, Cleaner) and location (for example, Accommodation Office or Hall).

Courses

The Accommodation Office also stores a limited amount of information on the courses run by the University including the course number, course title (including year), course leader, internal telephone number, room number, and department name. Each student is associated with a single course.

Next-of-kin

Whenever possible, information on a student's next-of-kin is stored which includes the name, relationship, address (street, city, postcode), and contact telephone number.

Query Transactions (Sample)

B.1.2

Listed below are some examples of query transactions that should be supported by the *University Accommodation Office* database system.

- (a) Present a report listing the Manager's name and telephone number for each hall of residence.
- (b) Present a report listing the names and matriculation numbers of students with the details of their lease agreements.
- (c) Display the details of lease agreements that include the Summer Semester.
- (d) Display the details of the total rent paid by a given student.

- (e) Present a report on students that have not paid their invoices by a given date.
- (f) Display the details of flat inspections where the property was found to be in an unsatisfactory condition.
- (g) Present a report of the names and matriculation numbers of students with their room number and place number in a particular hall of residence.
- (h) Present a report listing the details of all students currently on the waiting list for accommodation, that is, not placed.
- (i) Display the total number of students in each student category.
- (j) Present a report of the names and matriculation numbers for all students who have *not* supplied details of their next-of-kin.
- (k) Display the name and internal telephone number of the Advisor of Studies for a particular student.
- (l) Display the minimum, maximum, and average monthly rent for rooms in halls of residence.
- (m) Display the total number of places in each hall of residence.
- (n) Display the staff number, name, age, and current location of all members of the accommodation staff who are over 60 years old today.

B.2

The *EasyDrive School of Motoring* Case Study

The *EasyDrive School of Motoring* was established in Glasgow in 1992. Since then, the School has grown steadily and now has several offices in most of the main cities of Scotland. However, the School is now so large that more and more administrative staff are being employed to cope with the ever-increasing amount of paperwork. Furthermore, the communication and sharing of information between offices, even in the same city, is poor. The Director of the School, Dave MacLeod, feels that too many mistakes are being made and that the success of the School will be short-lived if he does not do something to remedy the situation. He knows that a database could help in part to solve the problem and has approached you and your team to help in creating a database system to support the running of the *EasyDrive School of Motoring*. The Director has provided the following brief description of how the *EasyDrive School of Motoring* operates.

B.2.1 Data Requirements

Each office has a Manager (who tends to also be a Senior Instructor), several Senior Instructors, Instructors, and administrative staff. The Manager is responsible for the day-to-day running of the office. Clients must first register at an office and this requires that they complete an application form, which records their personal details. Before the first lesson, a client is requested to attend an interview with an Instructor to assess the needs of

the client and to ensure that the client holds a valid provisional driving license. A client is free to ask for a particular Instructor or to request that an Instructor be changed at any stage throughout the process of learning to drive. After the interview, the first lesson is booked. A client may request individual lessons or book a block of lessons for a reduced fee. An individual lesson is for one hour, which begins and ends at the office. A lesson is with a particular Instructor in a particular car at a given time. Lessons can start as early as 8am and as late as 8pm. After each lesson, the Instructor records the progress made by the client and notes the mileage used during the lesson. The School has a pool of cars, which are adapted for the purposes of teaching. Each Instructor is allocated to a particular car. As well as teaching, the Instructors are free to use the cars for personal use. The cars are inspected at regular intervals for faults. Once ready, a client applies for a driving test date. To obtain a full driving license the client must pass both the practical and theoretical parts of the test. It is the responsibility of the Instructor to ensure that the client is best prepared for all parts of the test. The Instructor is not responsible for testing the client and is not in the car during the test but should be available to drop off and pick up the client before and after the test at the Testing Centre. If a client fails to pass, the Instructor must record the reasons for the failure.

Query Transactions (Sample)

B.2.2

The Director has provided some examples of typical queries that the database system for the *EasyDrive School of Motoring* must support.

- (a) The names and the telephone numbers of the Managers of each office.
- (b) The full address of all offices in Glasgow.
- (c) The names of all female Instructors based in the Glasgow, Bearsden office.
- (d) The total number of staff at each office.
- (e) The total number of clients (past and present) in each city.
- (f) The timetable of appointments for a given Instructor next week.
- (g) The details of interviews conducted by a given Instructor.
- (h) The total number of female and male clients (past and present) in the Glasgow, Bearsden office.
- (i) The numbers and name of staff who are Instructors and over 55 years old.
- (j) The registration number of cars that have had no faults found.
- (k) The registration number of the cars used by Instructors at the Glasgow, Bearsden office.
- (l) The names of clients who passed the driving test in January 2000.
- (m) The names of clients who have sat the driving test more than three times and have still not passed.
- (n) The average number of miles driven during a one hour lesson.
- (o) The number of administrative staff located at each office.

B.3 The *Wellmeadows Hospital* Case Study

This case study describes a small hospital called *Wellmeadows*, which is located in Edinburgh. The *Wellmeadows Hospital* specializes in the provision of health care for elderly people. Listed below is a description of the data recorded, maintained, and accessed by the hospital staff to support the management and day-to-day operations of the *Wellmeadows Hospital*.

B.3.1 Data Requirements

Wards

The *Wellmeadows Hospital* has 17 wards with a total of 240 beds available for short- and long-stay patients, and an outpatient clinic. Each ward is uniquely identified by a number (for example, ward 11) and also a ward name (for example, Orthopaedic), location (for example, E Block), total number of beds, and telephone extension number (for example, Extn 7711).

Staff

The *Wellmeadows Hospital* has a Medical Director, who has overall responsibility for the management of the hospital. The Medical Director maintains control over the use of the hospital resources (including staff, beds, and supplies) in the provision of cost-effective treatment for all patients.

The *Wellmeadows Hospital* has a Personnel Officer who is responsible for ensuring that the appropriate number and type of staff are allocated to each ward and the out-patient clinic. The information stored on each member of staff includes a staff number, name (first and last), full address, telephone number, date of birth, sex, National Insurance number (NIN), position held, current salary, and salary scale. It also includes each member's qualifications (which includes date of qualification, type, and name of institution), and work experience details (which includes the name of the organization, position, and start and finish dates).

The type of employment contract for each member of staff is also recorded, including the number of hours worked per week, whether the member of staff is on a permanent or temporary contract, and the type of salary payment (weekly/monthly). An example of a *Wellmeadows Hospital* form used to record the details of a member of staff called Moira Samuel working in ward 11 is shown in Figure B.1.

Each ward and the outpatient clinic has a member of staff with the position of Charge Nurse. The Charge Nurse is responsible for overseeing the day-to-day operation of the ward/clinic. The Charge Nurse is allocated a budget to run the ward and must ensure that all resources (staff, beds, and supplies) are used effectively in the care of patients. The Medical Director works closely with the Charge Nurses to ensure the efficient running of the hospital.

Wellmeadows Hospital Staff Form Staff Number: <u>9011</u>	
Personal Details	
First Name <u>Moira</u> Address <u>49 School Road</u> <u>Broxburn</u> Tel. No. <u>01506-45633</u>	Last Name <u>Samuel</u> Sex <u>Female</u> Date of Birth <u>30-May-61</u> NIN <u>WB123423D</u>
Position <u>Charge Nurse</u> Current Salary <u>18,760</u> Salary Scale <u>1C scale</u> Paid Weekly or Monthly (Enter W or M) <u>M</u>	Allocated to ward <u>11</u> Hours/Week <u>37.5</u> Permanent or Temporary (Enter P or T) <u>P</u>
Qualification(s)	Work Experience
Type <u>BSc Nursing Studies</u> Date <u>12-Jul-87</u> Institution <u>Edinburgh University</u>	Position <u>Staff Nurse</u> Start Date <u>23-Jan-90</u> Finish Date <u>1-May-93</u> Organization <u>Western Hospital</u>
Note: Please enter additional qualifications/work experience overleaf	

Figure B.1

Wellmeadows
Hospital staff form.

A Charge Nurse is responsible for setting up a weekly staff rota, and must ensure that the ward/clinic has the correct number and type of staff on duty at any time during the day or night. In a given week, each member of staff is assigned to work an early, late, or night shift.

As well as the Charge Nurse, each ward is allocated senior and junior nurses, doctors and auxiliaries. Specialist staff (for example, consultants, physiotherapists) are allocated to several wards or the clinic. An example of a *Wellmeadows Hospital* report listing the details of the staff allocated to ward 11 is shown in Figure B.2.

Figure B.2

The first page of the *Wellmeadows Hospital* report listing ward staff.

Page 1

Wellmeadows Hospital
Ward Staff Allocation

Week beginning 9-Jan-04

Ward Number Ward 11

Charge Nurse Moira Samuel

Ward Name Orthopaedic

Staff Number S011

Location Block E

Tel Extn 7711

Staff No.	Name	Address	Tel No.	Position	Shift
S098	Carol Cummings	15 High Street Edinburgh	0131-334-5677	Staff Nurse	Late
S123	Morgan Russell	23A George Street Broxburn	01506-67676	Nurse	Late
S167	Robin Plevin	7 Glen Terrace Edinburgh	0131-339-6123	Staff Nurse	Early
S234	Amy O'Donnell	234 Princes Street Edinburgh	0131-334-9099	Nurse	Night
S344	Laurence Burns	1 Apple Drive Edinburgh	0131-334-9100	Consultant	Early

Patients

When a patient is first referred to the hospital he or she is allocated a unique patient number. At this time, additional details of the patient are also recorded including the name (first and last name), address, telephone number, date of birth, sex, marital status, date registered with the hospital, and the details of the patient’s next-of-kin.

Patient’s next-of-kin

The details of a patient’s next-of-kin are recorded, which includes the next-of-kin’s full name, relationship to the patient, address, and telephone number.

Local doctors

Patients are normally referred to the hospital by their local doctor. The details of local doctors are held, including their full name, clinic number, address, and telephone number. The clinic number is unique throughout the United Kingdom. An example of a *Wellmeadows Hospital* patient registration form used to record the details of a patient called Anne Phelps is shown in Figure B.3.

Patient appointments

When a patient is referred by his or her doctor to attend the *Wellmeadows Hospital*, the patient is given an appointment for an examination by a hospital consultant. Each

Wellmeadows Hospital Patient Registration Form Patient Number: <u>P10234</u>	
Personal Details	
First Name <u>Anne</u> Address <u>44 North Bridges</u> <u>Cannonmills</u> <u>Edinburgh, EH1 5GH</u> DOB <u>12-Dec-33</u> Date Registered <u>21-Feb-04</u>	Last Name <u>Phelps</u> Sex <u>Female</u> Tel No. <u>0131-332-4111</u> Marital Status <u>Single</u>
Next-of-Kin Details	
Full Name <u>James Phelps</u> Address <u>145 Rowlands Street</u> <u>Paisley, PA2 5FE</u> Tel No. <u>0141-848-2211</u>	
Local Doctor Details	
Full Name <u>Dr Helen Pearson</u> Address <u>22 Cannongate Way,</u> <u>Edinburgh, EH1 6TY</u> Tel No. <u>0131-332-0012</u>	

Figure B.3

Wellmeadows
Hospital patient
registration form.

appointment is given a unique appointment number. The details of each patient's appointment are recorded and include the name and staff number of the consultant undertaking the examination, the date and time of the appointment, and the examination room (for example, Room E252).

As a result of the examination, the patient is either recommended to attend the out-patient clinic or is placed on a waiting list until a bed can be found in an appropriate ward.

Outpatients

The details of out-patients are stored and include the patient number, name (first and last name), address, telephone number, date of birth, sex, and the date and time of the appointment at the outpatient clinic.

In-patients

The Charge Nurse and other senior medical staff are responsible for the allocation of beds to patients on the waiting list. The details of patients currently placed in a ward and those on the waiting list for a place on a ward are recorded. This includes the patient number, name (first and last name), address, telephone number, date of birth, sex, marital status, the details of the patient’s next-of-kin, the date placed on the waiting list, the ward required, expected duration of stay (in days), date placed in the ward, date expected to leave the ward, and the actual date the patient left the ward, when known.

When a patient enters the ward, he or she is allocated a bed with a unique bed number. An example of a *Wellmeadows Hospital* report listing the details of patients allocated to ward 11 is shown in Figure B.4.

Patient medication

When a patient is prescribed medication, the details are recorded. This includes the patient’s name and number, drug number and name, units per day, method of administration (for example, oral, intravenous (IV)), start and finish date. The medication (pharmaceutical supplies) given to each patient is monitored. An example of a *Wellmeadows Hospital* report used to record the details of medication given to a patient called Robert MacDonald is shown in Figure B.5.

Figure B.4
The first page of the *Wellmeadows Hospital* report listing ward patients.

Page 1

Wellmeadows Hospital
Patient Allocation

Week beginning 16-Jan-04

Ward Number Ward 11

Charge Nurse Moira Samuel

Ward Name Orthopaedic

Staff Number 5011

Location Block E

Tel Extn 7711

Patient Number	Name	On Waiting List	Expected Stay (Days)	Date Placed	Date Leave	Actual Leave	Bed Number
P10451	Robert Drumtree	12-Jan-04	5	12-Jan-04	17-Jan-04	16-Jan-04	84
P10480	Steven Parks	12-Jan-04	4	14-Jan-04	18-Jan-04	18-Jan-04	79
P10563	David Black	13-Jan-04	14	13-Jan-04	27-Jan-04		80
P10604	Ian Thomson	14-Jan-04	10	15-Jan-04	25-Jan-04		87
P10787	Peter Smith	17-Jan-04	5	17-Jan-04	22-Jan-04		84

Wellmeadows Hospital Patient Medication Form							
Patient Number: <u>P10034</u>							
Full Name <u>Robert MacDonald</u>				Ward Number <u>Ward 11</u>			
Bed Number <u>84</u>				Ward Name <u>Orthopaedic</u>			
Drug Number	Name	Description	Dosage	Method of Admin	Units per Day	Start Date	Finish Date
10223	Morphine	Pain killer	10mg/ml	Oral	50	24-Mar-04	24-Apr-04
10334	Tetracycline	Antibiotic	0.5mg/ml	IV	10	24-Mar-04	17-Apr-04
10223	Morphine	Pain killer	10mg/ml	Oral	10	25-Apr-04	2-May-04

Figure B.5

Wellmeadows
Hospital patient's
medication report.

Surgical and non-surgical supplies

The *Wellmeadows Hospital* maintains a central stock of surgical (for example, syringes, sterile dressings) and non-surgical (for example, plastic bags, aprons) supplies. The details of surgical and non-surgical supplies include the item number and name, item description, quantity in stock, reorder level, and cost per unit. The item number uniquely identifies each type of surgical or non-surgical supply. The supplies used by each ward are monitored.

Pharmaceutical supplies

The hospital also maintains a stock of pharmaceutical supplies (for example, antibiotics, painkillers). The details of pharmaceutical supplies include drug number and name, description, dosage, method of administration, quantity in stock, reorder level, and cost per unit. The drug number uniquely identifies each type of pharmaceutical supply. The pharmaceutical supplies used by each ward are monitored.

Ward requisitions

When required, the Charge Nurse may obtain surgical, non-surgical, and pharmaceutical supplies from the central stock of supplies held by the hospital. This is achieved by ordering supplies for the ward using a requisition form. The information detailed on a requisition form includes a unique requisition number, the name of the member of staff placing the requisition, and the number and name of the ward. Also included is the item or drug number, name, description, dosage and method of administration (for drugs only), cost per unit, quantity required, and date ordered. When the requisitioned supplies are delivered to the ward, the form must be signed and dated by the Charge Nurse who initiated the order. An example of a *Wellmeadows Hospital* requisition form used to order supplies of morphine for ward 11 is shown in Figure B.6.

Figure B.6
Wellmeadows
Hospital ward
requisition form.

Wellmeadows Hospital
Central Store
Requisition Form

Requisition Number: 034567712

Ward Number Ward 11Requisitioned By Moira Samuel

Ward Name OrthopaedicRequisition Date 15-Feb-04

Item/Drug Number	Name	Description	Dosage (Drugs Only)	Method of Admin	Cost per Unit	Quantity
10223	Morphine	Pain killer	10mg/ml	Oral	27.75	50

Received By:

Date Received:

Suppliers

The details of the suppliers of the surgical, non-surgical, and pharmaceutical items are stored. This information includes the supplier’s name and number, address, telephone, and fax numbers. The supplier number is unique to each supplier.

B.3.2 Transaction Requirements (Sample)

The following transactions are undertaken to ensure that the appropriate information is available to enable the staff to manage and oversee the day-to-day running of the *Wellmeadows Hospital*. Each transaction is associated with a specific function within the hospital. These functions are the responsibility of members of staff with particular job titles (positions). The main user or group of users of each transaction is given in brackets at the end of the description of each transaction.

- (a) Create and maintain records recording the details of members of staff (Personnel Officer).
- (b) Search for staff who have particular qualifications or previous work experience (Personnel Officer).
- (c) Produce a report listing the details of staff allocated to each ward (Personnel Officer and Charge Nurse).
- (d) Create and maintain records recording the details of patients referred to the hospital (all staff).

- (e) Create and maintain records recording the details of patients referred to the out-patient clinic (Charge Nurse).
- (f) Produce a report listing the details of patients referred to the out-patient clinic (Charge Nurse and Medical Director).
- (g) Create and maintain records recording the details of patients referred to a particular ward (Charge Nurse).
- (h) Produce a report listing the details of patients currently located in a particular ward (Charge Nurse and Medical Director).
- (i) Produce a report listing the details of patients currently on the waiting list for a particular ward (Charge Nurse and Medical Director).
- (j) Create and maintain records recording the details of medication given to a particular patient (Charge Nurse).
- (k) Produce a report listing the details of medication for a particular patient (Charge Nurse).
- (l) Create and maintain records recording the details of suppliers for the hospital (Medical Director).
- (m) Create and maintain records detailing requisitions for supplies for particular wards (Charge Nurse).
- (n) Produce a report listing the details of supplies provided to specific wards (Charge Nurse and Medical Director).