

11.3 Fact-Finding Techniques

A database developer normally uses several fact-finding techniques during a single database project. There are five commonly used fact-finding techniques:

- examining documentation;
- interviewing;
- observing the enterprise in operation;
- research;
- questionnaires.

In the following sections we describe these fact-finding techniques and identify the advantages and disadvantages of each.

11.3.1 Examining Documentation

Examining documentation can be useful when we are trying to gain some insight as to how the need for a database arose. We may also find that documentation can help to provide information on the part of the enterprise associated with the problem. If the problem relates to the current system, there should be documentation associated with that system. By examining documents, forms, reports, and files associated with the current system, we can quickly gain some understanding of the system. Examples of the types of documentation that should be examined are listed in Table 11.2.

11.3.2 Interviewing

Interviewing is the most commonly used and normally the most useful fact-finding technique. We can interview to collect information from individuals face-to-face. There can be several objectives to using interviewing, such as finding out

TABLE 11.2 Examples of types of documentation that should be examined.

PURPOSE OF DOCUMENTATION	EXAMPLES OF USEFUL SOURCES
Describes problem and need for database	Internal memos, emails, and minutes of meetings Employee complaints and documents that describe the problem Social media such as blogs and tweets Performance reviews/reports
Describes the part of the enterprise affected by problem	Organizational chart, mission statement, and strategic plan of the enterprise Objectives for the part of the enterprise being studied Task/job descriptions Samples of completed manual forms and reports Samples of completed computerized forms and reports
Describes current system	Various types of flowcharts and diagrams Data dictionary Database system design Program documentation User/training manuals

TABLE 11.3 Advantages and disadvantages of using interviewing as a fact-finding technique.

ADVANTAGES	DISADVANTAGES
Allows interviewee to respond freely and openly to questions	Very time-consuming and costly, and therefore may be impractical
Allows interviewee to feel part of project	Success is dependent on communication skills of interviewer
Allows interviewer to follow up on interesting comments made by interviewee	Success can be dependent on willingness of interviewees to participate in interviews
Allows interviewer to adapt or reword questions during interview	
Allows interviewer to observe interviewee's body language	

facts, verifying facts, clarifying facts, generating enthusiasm, getting the end-user involved, identifying requirements, and gathering ideas and opinions. However, using the interviewing technique requires good communication skills for dealing effectively with people who have different values, priorities, opinions, motivations, and personalities. As with other fact-finding techniques, interviewing is not always the best method for all situations. The advantages and disadvantages of using interviewing as a fact-finding technique are listed in Table 11.3.

There are two types of interview: unstructured and structured. **Unstructured interviews** are conducted with only a general objective in mind and with few, if any, specific questions. The interviewer counts on the interviewee to provide a framework and direction to the interview. This type of interview frequently loses focus and, for this reason, it often does not work well for database analysis and design.

In **structured interviews**, the interviewer has a specific set of questions to ask the interviewee. Depending on the interviewee's responses, the interviewer will direct additional questions to obtain clarification or expansion. **Open-ended questions** allow the interviewee to respond in any way that seems appropriate. An example of an open-ended question is: "Why are you dissatisfied with the report on client registration?" **Closed-ended questions** restrict answers to either specific choices or short, direct responses. An example of such a question might be: "Are you receiving the report on client registration on time?" or "Does the report on client registration contain accurate information?" Both questions require only a "Yes" or "No" response.

To ensure a successful interview includes selecting appropriate individuals to interview, preparing extensively for the interview, and conducting the interview in an efficient and effective manner.

11.3.3 Observing the Enterprise in Operation

Observation is one of the most effective fact-finding techniques for understanding a system. With this technique, it is possible to either participate in or watch a person perform activities to learn about the system. This technique is particularly useful when the validity of data collected through other methods is in question or when the complexity of certain aspects of the system prevents a clear explanation by the end-users.

TABLE 11.4 Advantages and disadvantages of using observation as a fact-finding technique.

ADVANTAGES	DISADVANTAGES
Allows the validity of facts and data to be checked	People may knowingly or unknowingly perform differently when being observed
Observer can see exactly what is being done	May miss observing tasks involving different levels of difficulty or volume normally experienced during that time period
Observer can also obtain data describing the physical environment of the task	Some tasks may not always be performed in the manner in which they are observed
Relatively inexpensive	May be impractical
Observer can do work measurements	

As with the other fact-finding techniques, successful observation requires preparation. To ensure that the observation is successful, it is important to know as much about the individuals and the activity to be observed as possible. For example, “When are the low, normal, and peak periods for the activity being observed?” and “Will the individuals be upset by having someone watch and record their actions?” The advantages and disadvantages of using observation as a fact-finding technique are listed in Table 11.4.

11.3.4 Research

A useful fact-finding technique is to research the application and problem. Computer trade journals, reference books, and the Internet (including user groups and bulletin boards) are good sources of information. They can provide information on how others have solved similar problems, plus on whether software packages exist to solve or even partially solve the problem. The advantages and disadvantages of using research as a fact-finding technique are listed in Table 11.5.

11.3.5 Questionnaires

Another fact-finding technique is to conduct surveys through questionnaires. Questionnaires are special-purpose documents that allow facts to be gathered from a large number of people while maintaining some control over their responses.

TABLE 11.5 Advantages and disadvantages of using research as a fact-finding technique.

ADVANTAGES	DISADVANTAGES
Can save time if solution already exists	Requires access to appropriate sources of information
Researcher can see how others have solved similar problems or met similar requirements	May ultimately not help in solving problem because problem is not documented elsewhere
Keeps researcher up to date with current developments	

TABLE 11.6 Advantages and disadvantages of using questionnaires as a fact-finding technique.

ADVANTAGES	DISADVANTAGES
People can complete and return questionnaires at their convenience	Number of respondents can be low, possibly only 5% to 10%
Relatively inexpensive way to gather data from a large number of people	Questionnaires may be returned incomplete
People more likely to provide the real facts as responses can be kept confidential	May not provide an opportunity to adapt or reword questions that have been misinterpreted
Responses can be tabulated and analyzed quickly	Cannot observe and analyze the respondent's body language

When dealing with a large audience, no other fact-finding technique can tabulate the same facts as efficiently. The advantages and disadvantages of using questionnaires as a fact-finding technique are listed in Table 11.6.

There are two types of questions that can be asked in a questionnaire: free-format and fixed-format. **Free-format questions** offer the respondent greater freedom in providing answers. A question is asked and the respondent records the answer in the space provided after the question. Examples of free-format questions are: “What reports do you currently receive and how are they used?” and “Are there any problems with these reports? If so, please explain.” The problems with free-format questions are that the respondent’s answers may prove difficult to tabulate, and in some cases, may not match the questions asked.

Fixed-format questions require specific responses from individuals. Given any question, the respondent must choose from the available answers. This makes the results much easier to tabulate. On the other hand, the respondent cannot provide additional information that might prove valuable. An example of a fixed-format question is: “The current format of the report on property rentals is ideal and should not be changed.” The respondent may be given the option to answer “Yes” or “No” to this question, or be given the option to answer from a range of responses including “Strongly agree,” “Agree,” “No opinion,” “Disagree,” and “Strongly disagree.”

11.4 Using Fact-Finding Techniques: A Worked Example

In this section we first present an overview of the *DreamHome* case study and then use this case study to illustrate how to establish a database project. In particular, we illustrate how fact-finding techniques can be used and the documentation produced in the early stages of the database system development lifecycle—namely, the database planning, system definition, and requirements collection and analysis stages.





11.4.1 The *DreamHome* Case Study—An Overview of the Current System

The first branch office of *DreamHome* was opened in 1992 in Glasgow in the UK. Since then, the Company has grown steadily and now has several offices in most of the main cities of the UK. However, the Company 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 Company, Sally Mellweadows, feels that too many mistakes are being made and that the success of the Company will be short-lived if she does not do something to remedy the situation. She knows that a database could help in part to solve the problem and has requested that a database system be developed to support the running of *DreamHome*. The Director has provided the following brief description of how *DreamHome* currently operates.

DreamHome specializes in property management, taking an intermediate role between owners who wish to rent out their furnished property and clients of *DreamHome* who require to rent furnished property for a fixed period. *DreamHome* currently has about 2000 staff working in 100 branches. When a member of staff joins the Company, the *DreamHome* staff registration form is used. The staff registration form for Susan Brand is shown in Figure 11.1.

Each branch has an appropriate number and type of staff including a Manager, Supervisors, and Assistants. The Manager is responsible for the day-to-day running of a branch and each Supervisor is responsible for supervising a group of staff called Assistants. An example of the first page of a report listing the details of staff working at a branch office in Glasgow is shown in Figure 11.2.

<i>DreamHome</i> Staff Registration Form	
Staff Number <u>SG5</u> Full Name <u>Susan Brand</u> Sex <u>F</u> DOB <u>3-Jun-70</u>	Branch Number <u>B003</u> Branch Address <u>163 Main St, Glasgow</u> Telephone Number(s) <u>0141-339-2178 / 0141-339-4439</u>
Position <u>Manager</u> Salary <u>24000</u>	
Enter details where applicable Supervisor Name _____	Manager Start Date <u>01-Jun-99</u> Manager Bonus <u>2350</u>

Figure 11.1 The *DreamHome* staff registration form for Susan Brand.

DreamHome Staff Listing		
Branch Number	<u>B003</u>	Branch Address
Telephone Number(s)	<u>0141-339-2178 / 0141-339-4439</u>	<u>103 Main St, Glasgow</u> <u>G11 9QX</u>
Staff Number	Name	Position
SG5	Susan Brand	Manager
SG14	David Ford	Supervisor
SG37	Ann Beech	Assistant
SG112	Annet Longhorn	Supervisor
SG126	Chris Lawrence	Assistant
SG132	Sofie Walters	Assistant

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Figure 11.2 Example of the first page of a report listing the details of staff working at a *DreamHome* branch office in Glasgow.

Each branch office offers a range of properties for rent. To offer property through *DreamHome*, a property owner normally contacts the *DreamHome* branch office nearest to the property for rent. The owner provides the details of the property and agrees an appropriate rent for the property with the branch Manager. The registration form for a property in Glasgow is shown in Figure 11.3.

Once a property is registered, *DreamHome* provides services to ensure that the property is rented out for maximum return for both the property owner and, of course, *DreamHome*. These services include interviewing prospective renters (called clients), organizing viewings of the property by clients, advertising the property in local or national newspapers (when necessary), and negotiating the lease. Once rented, *DreamHome* assumes responsibility for the property including the collection of rent.

Members of the public interested in renting out property must first contact their nearest *DreamHome* branch office to register as clients of *DreamHome*. However, before registration is accepted, a prospective client is normally interviewed to record personal details and preferences of the client in terms of property requirements. The registration form for a client called Mike Ritchie is shown in Figure 11.4.

Once registration is complete, clients are provided with weekly reports that list properties currently available for rent. An example of the first page of a report listing the properties available for rent at a branch office in Glasgow is shown in Figure 11.5.

Clients may request to view one or more properties from the list and after viewing will normally provide a comment on the suitability of the property. The first page of a report describing the comments made by clients on a property in Glasgow is shown in Figure 11.6. Properties that prove difficult to rent out are normally advertised in local and national newspapers.

<i>DreamHome</i> Property Registration Form	
Property Number <u>PG16</u> Type <u>Flat</u> Rooms <u>4</u> Rent <u>450</u> Address <u>5 Novar Drive,</u> <u>Glasgow, G12 9AX</u> 	Owner Number <u>C093</u> (If known) Person/Business Name <u>Tony Shaw</u> Address <u>12 Park Pl,</u> <u>Glasgow G4 0QR</u> Tel No <u>0141-225-7025</u>
Managed by staff <u>David Ford</u>	Registered at branch <u>163 Main St, Glasgow</u>

Figure 11.3 The *DreamHome* property registration form for a property in Glasgow.

<i>DreamHome</i> Client Registration Form	
Client Number <u>CR74</u> (Enter if known) Full Name <u>Mike Ritchie</u>	Branch Number <u>B003</u> Branch Address <u>163 Main St, Glasgow</u> Registered By <u>Ann Beech</u> Date Registered <u>16-Nov-11</u>
Enter property requirements Type <u>Flat</u> Max Rent <u>750</u>	

Figure 11.4 The *DreamHome* client registration form for Mike Ritchie.

DreamHome
Property Listing for Week beginning 01/06/13

If you are interested in viewing or renting any of the properties in this list, please contact our branch office as soon as possible.

Branch Address **Telephone Number(s)**

163 Main St, Glasgow 0141-339-2178 / 0141-339-4439

G11 9QX

Property No	Address	Type	Rooms	Rent
PG4	6 Lawrence St, Glasgow	Flat	3	350
PG36	2 Manor Rd, Glasgow	Flat	3	375
PG21	18 Dale Road, Glasgow	House	5	600
PG16	5 Novar Drive, Glasgow	Flat	4	450
PG77	100A Apple Lane, Glasgow	House	6	560
PG81	781 Greentree Dr, Glasgow	Flat	4	440

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Figure 11.5 The first page of the *DreamHome* property for rent report listing property available at a branch in Glasgow.

DreamHome
Property Viewing Report

Property Nummer PG4 **Property Address**

Type Flat 6 Lawrence St, Glasgow

Rent 350

Client No	Name	Date	Comments
CR76	John Kay	20/04/13	Too remote.
CR56	Aline Stewart	26/05/13	
CR74	Mike Ritchie	11/11/13	
CR62	Mary Tregear	11/11/13	OK, but needs redecoration throughout.

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Figure 11.6 The first page of the *DreamHome* property viewing report for a property in Glasgow.

<i>DreamHome</i> Lease Number 00345810	
Client Number <u>CR74</u> (Enter if known) Full Name <u>Mike Ritchie</u> (Please print) Client Signature _____	Property Number <u>PG16</u> Property Address <u>5 Novar Dr, Glasgow</u>
Enter payment details Monthly Rent <u>450</u> Payment Method <u>Cheque</u> Deposit Paid (Y or N) <u>Yes</u>	Rent Start <u>01/06/12</u> Rent Finish <u>31/05/13</u> Duration <u>1 year</u>

Figure 11.7 The *DreamHome* lease form for a client called Mike Ritchie renting a property in Glasgow.

Once a client has identified a suitable property, a member of staff draws up a lease. The lease between a client called Mike Ritchie and a property in Glasgow is shown in Figure 11.7.

At the end of a rental period a client may request that the rental be continued; however, this requires that a new lease be drawn up. Alternatively, a client may request to view alternative properties for the purposes of renting.



11.4.2 The *DreamHome* Case Study—Database Planning

The first step in developing a database system is to clearly define the **mission statement** for the database project, which defines the major aims of the database system. Once the mission statement is defined, the next activity involves identifying the **mission objectives**, which should identify the particular tasks that the database must support (see Section 10.3).

Creating the mission statement for the *DreamHome* database system

We begin the process of creating a mission statement for the *DreamHome* database system by conducting interviews with the Director and any other appropriate staff, as indicated by the Director. Open-ended questions are normally the most useful at this stage of the process. Examples of typical questions we might ask include:

- “What is the purpose of your company?”
- “Why do you feel that you need a database?”
- “How do you know that a database will solve your problem?”

For example, the database developer may start the interview by asking the Director of *DreamHome* the following questions:

Database Developer: *What is the purpose of your company?*

Director: We offer a wide range of high-quality properties for rent to clients registered at our branches throughout the UK. Our ability to offer quality properties, of course, depends upon the services we provide to property owners. We provide a highly professional service to property owners to ensure that properties are rented out for maximum return.

Database Developer: *Why do you feel that you need a database?*

Director: To be honest, we can't cope with our own success. Over the past few years we've opened several branches in most of the main cities of the UK, and at each branch we now offer a larger selection of properties to a growing number of clients. However, this success has been accompanied with increasing data management problems, which means that the level of service we provide is falling. Also, there's a lack of cooperation and sharing of information between branches, which is a very worrying development.

Database Developer: *How do you know that a database will solve your problem?*

Director: All I know is that we are drowning in paperwork. We need something that will speed up the way we work by automating a lot of the day-to-day tasks that seem to take forever these days. Also, I want the branches to start working together. Databases will help to achieve this, won't they?

Responses to these types of questions should help formulate the mission statement. An example mission statement for the *DreamHome* database system is shown in Figure 11.8. When we have a clear and unambiguous mission statement that the staff of *DreamHome* agree with, we move on to define the mission objectives.

Creating the mission objectives for the *DreamHome* database system

The process of creating mission objectives involves conducting interviews with appropriate members of staff. Again, open-ended questions are normally the most useful at this stage of the process. To obtain the complete range of mission

"The purpose of the *DreamHome* database system is to maintain the data that is used and generated to support the property rentals business for our clients and property owners and to facilitate the cooperation and sharing of information between branches."

Figure 11.8 Mission statement for the *DreamHome* database system.

objectives, we interview various members of staff with different roles in *DreamHome*. Examples of typical questions that we might ask include:

- “What is your job description?”
- “What kinds of tasks do you perform in a typical day?”
- “What kinds of data do you work with?”
- “What types of reports do you use?”
- “What types of things do you need to keep track of?”
- “What service does your company provide to your customers?”

These questions (or similar) are put to the Director of *DreamHome* and members of staff in the role of Manager, Supervisor, and Assistant. It may be necessary to adapt the questions as required, depending on whom is being interviewed.

Director

Database Developer: *What role do you play for the company?*

Director: I oversee the running of the company to ensure that we continue to provide the best possible property rental service to our clients and property owners.

Database Developer: *What kinds of tasks do you perform in a typical day?*

Director: I monitor the running of each branch by our Managers. I try to ensure that the branches work well together and share important information about properties and clients. I normally try to keep a high profile with my branch Managers by calling into each branch at least once or twice a month.

Database Developer: *What kinds of data do you work with?*

Director: I need to see everything, well at least a summary of the data used or generated by *DreamHome*. That includes data about staff at all branches, all properties and their owners, all clients, and all leases. I also like to keep an eye on the extent to which branches advertise properties in newspapers.

Database Developer: *What types of reports do you use?*

Director: I need to know what’s going on at all the branches and there are lots of them. I spend a lot of my working day going over long reports on all aspects of *DreamHome*. I need reports that are easy to access and that let me get a good overview of what’s happening at a given branch and across all branches.

Database Developer: *What types of things do you need to keep track of?*

Director: As I said before, I need to have an overview of everything; I need to see the whole picture.

Database Developer: *What service does your company provide to your customers?*

Director: We aim to provide the best property rental service in the UK. I believe that this will be achieved with the support of the new database system, which will allow

my staff to deal more efficiently with our customers and clients and better marketing of our properties through the development of a new *DreamHome* Web site. This site will allow our current and new renting clients to view our properties on the Web.

Manager

Database Developer: *What is your job description?*

Manager: My job title is Manager. I oversee the day-to-day running of my branch to provide the best property rental service to our clients and property owners.

Database Developer: *What kinds of tasks do you perform in a typical day?*

Manager: I ensure that the branch has the appropriate number and type of staff on duty at all times. I monitor the registering of new properties and new clients, and the renting activity of our currently active clients. It's my responsibility to ensure that we have the right number and type of properties available to offer our clients. I sometimes get involved in negotiating leases for our top-of-the-range properties, although due to my workload, I often have to delegate this task to Supervisors.

Database Developer: *What kinds of data do you work with?*

Manager: I mostly work with data on the properties offered at my branch and the owners, clients, and leases. I also need to know when properties are proving difficult to rent out so that I can arrange for them to be advertised in newspapers. I need to keep an eye on this aspect of the business, because advertising can get costly. I also need access to data about staff working at my branch and staff at other local branches. This is because I sometimes need to contact other branches to arrange management meetings or to borrow staff from other branches on a temporary basis to cover staff shortages due to sickness or during holiday periods. This borrowing of staff between local branches is informal and thankfully doesn't happen very often. Besides data on staff, it would be helpful to see other types of data at the other branches such as data on property, property owners, clients, and leases, you know, to compare notes. Actually, I think the Director hopes that this database project is going to help promote cooperation and sharing of information between branches. However, some of the Managers I know are not going to be too keen on this, because they think we're in competition with each other. Part of the problem is that a percentage of a Manager's salary is made up of a bonus, which is related to the number of properties we rent out.

Database Developer: *What types of reports do you use?*

Manager: I need various reports on staff, property, owners, clients, and leases. I need to know at a glance which properties we need to lease out and what clients are looking for.

Database Developer: *What types of things do you need to keep track of?*

Manager: I need to keep track of staff salaries. I need to know how well the properties on our books are being rented out and when leases are coming up for renewal. I also need to keep eye on our expenditure on advertising in newspapers.

Database Developer: *What service does your company provide to your customers?*

Manager: Remember that we have two types of customers; that is, clients wanting to rent property and property owners. We need to make sure that our clients find the property they're looking for quickly without too much legwork and at a reasonable rent, and, of course, that our property owners see good returns from renting out their properties with minimal hassle. As you may already know from speaking to our Director, as well as from developing a new database system, we also intend to develop a new *DreamHome* Web site. This Web site will help our clients view our properties at home before coming into our branches to arrange a viewing. I need to ensure that no matter how clients contacts us—either by email through using our Web site, by phone, or in person—that they receive the same efficient service to help them find the properties that they seek.

Supervisor

Database Developer: *What is your job description?*

Supervisor: My job title is Supervisor. I spend most of my time in the office dealing directly with our customers; that is, clients wanting to rent property and property owners. I'm also responsible for a small group of staff called Assistants and making sure that they are kept busy, but that's not a problem, as there's always plenty to do—it's never-ending actually.

Database Developer: *What kinds of tasks do you perform in a typical day?*

Supervisor: I normally start the day by allocating staff to particular duties, such as dealing with clients or property owners, organizing for clients to view properties, and filing paperwork. When a client finds a suitable property, I process the drawing up of a lease, although the Manager must see the documentation before any signatures are requested. I keep client details up to date and register new clients when they want to join the Company. When a new property is registered, the

Manager allocates responsibility for managing that property to me or one of the other Supervisors or Assistants.

Database Developer: *What kinds of data do you work with?*

Supervisor: I work with data about staff at my branch, property, property owners, clients, property viewings, and leases.

Database Developer: *What types of reports do you use?*

Supervisor: Reports on staff and properties for rent.

Database Developer: *What types of things do you need to keep track of?*

Supervisor: I need to know what properties are available for rent and when currently active leases are due to expire. I also need to know what clients are looking for. I need to keep our Manager up to date with any properties that are proving difficult to rent out. I need to ensure that clients who contact us by email requesting to view properties are given a quick response from us inviting them to call into their nearest *DreamHome* branch office. As part of the service we provide to our property owners, we need to interview all clients first before they are allowed to view our properties. There is nothing unusual about this, as we have always interviewed our clients on their first visit to a *DreamHome* branch, and it's during this time that we note their details and their property requirements.

Assistant

Database Developer: *What is your job description?*

Assistant: My job title is Assistant. I deal directly with our clients.

Database Developer: *What kinds of tasks do you perform in a typical day?*

Assistant: I answer general queries from clients about properties for rent. You know what I mean: "Do you have such and such type of property in a particular area of Glasgow?" I also register new clients and arrange for clients to view properties. When we're not too busy, I file paperwork, but I hate this part of the job—it's so boring.

Database Developer: *What kinds of data do you work with?*

Assistant: I work with data on property and property viewings by clients and sometimes leases.

Database Developer: *What types of reports do you use?*

Assistant: Lists of properties available for rent. These lists are updated every week.

Database Developer: *What types of things do you need to keep track of?*

Assistant: Whether certain properties are available for renting out and which clients are still actively looking for property.

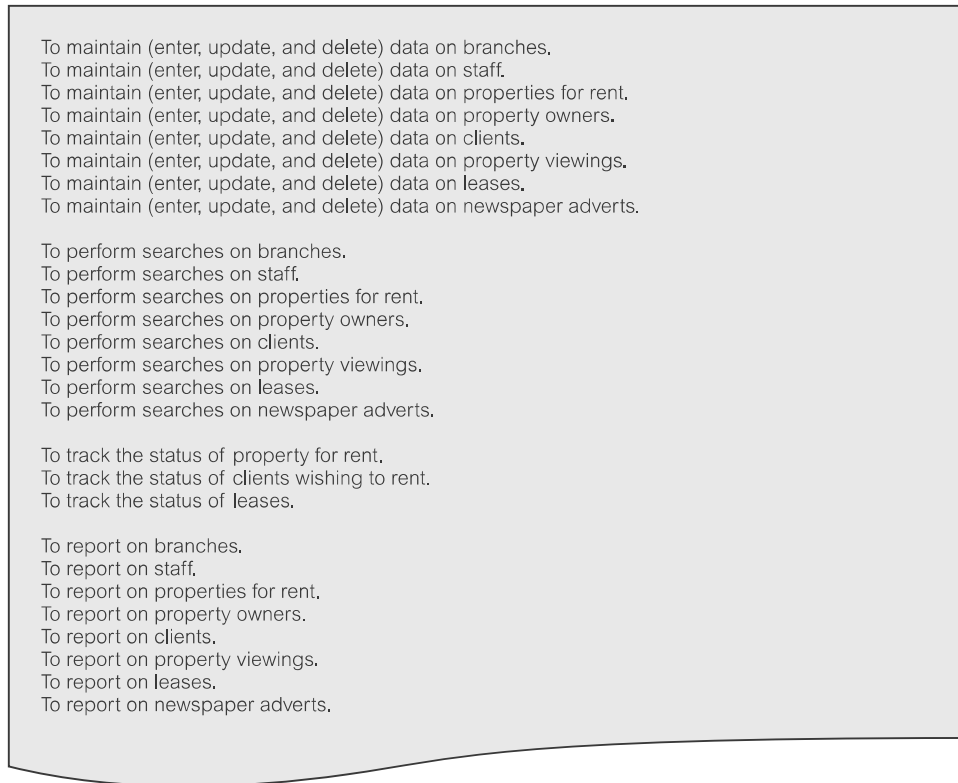


Figure 11.9 Mission objectives for the *DreamHome* database system.

Database Developer: *What service does your company provide to your customers?*

Assistant: We try to answer questions about properties available for rent such as: “Do you have a two-bedroom flat in Hyndland, Glasgow?” and “What should I expect to pay for a one-bedroom flat in the city center?”

Responses to these types of questions should help to formulate the mission objectives. An example of the mission objectives for the *DreamHome* database system is shown in Figure 11.9.



11.4.3 The *DreamHome* Case Study—System Definition

The purpose of the system definition stage is to define the scope and boundary of the database system and its major user views. In Section 10.4.1 we described how a user view represents the requirements that should be supported by a database system as defined by a particular job role (such as Director or Supervisor) or business application area (such as property rentals or property sales).

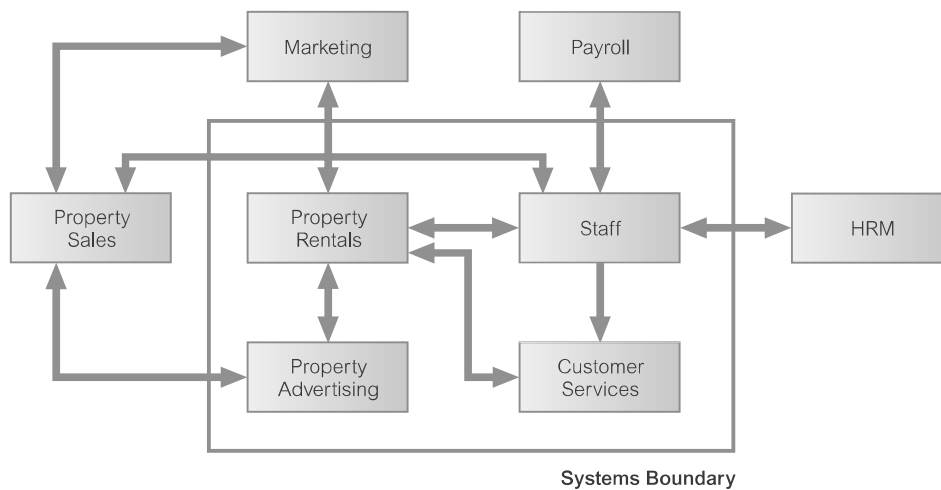


Figure 11.10 Systems boundary for the *DreamHome* database system.

Defining the systems boundary for the *DreamHome* database system

During this stage of the database system development lifecycle, further interviews with users can be used to clarify or expand on data captured in the previous stage. However, additional fact-finding techniques can also be used, including examining the sample documentation shown in Section 11.4.1. The data collected so far is analyzed to define the boundary of the database system. The systems boundary for the *DreamHome* database system is shown in Figure 11.10.

Identifying the major user views for the *DreamHome* database system

We now analyze the data collected so far to define the main user views of the database system. The majority of data about the user views was collected during interviews with the Director and members of staff in the role of Manager, Supervisor, and Assistant. The main user views for the *DreamHome* database system are shown in Figure 11.11.

11.4.4 The *DreamHome* Case Study—Requirements Collection and Analysis



During this stage, we continue to gather more details on the user views identified in the previous stage, to create a **users' requirements specification** that describes in detail the data to be held in the database and how the data is to be used. While gathering more information on the user views, we also collect any general requirements for the system. The purpose of gathering this information is to create a **systems specification**, which describes any features to be included in the new database system, such as networking and shared access requirements, performance requirements, and the levels of security required.

As we collect and analyze the requirements for the new system, we also learn about the most useful and most troublesome features of the current system. When

Data	Access Type	Director	Manager	Supervisor	Assistant	Client
All Branches	Maintain					
	Query	X	X			
	Report	X	X			
Single Branch	Maintain		X			
	Query		X			
	Report		X			
All Staff	Maintain					
	Query	X	X			
	Report	X	X			
Branch Staff	Maintain		X			
	Query		X	X		
	Report		X	X		
All Property	Maintain					
	Query	X				X
	Report	X	X			X
Branch Property	Maintain		X	X		
	Query		X	X	X	
	Report		X	X	X	
All Owners	Maintain					
	Query	X				
	Report	X	X			
Branch Owners	Maintain		X	X		
	Query		X	X	X	
	Report		X			
All Clients	Maintain					X
	Query	X				X
	Report	X	X			
Branch Clients	Maintain		X	X		
	Query		X	X	X	
	Report		X			
All Viewings	Maintain					
	Query					
	Report					
Branch Viewings	Maintain			X	X	
	Query			X	X	
	Report			X	X	
All Leases	Maintain					
	Query	X				
	Report	X	X			
Branch Leases	Maintain		X	X		
	Query		X	X	X	
	Report		X	X		
All Newspapers	Maintain					
	Query	X				
	Report	X	X			
Branch Newspapers	Maintain		X			
	Query		X			
	Report		X			

Figure 11.11 Major user views for the *DreamHome* database system.

building a new database system, it is sensible to try to retain the good things about the old system while introducing the benefits that will be part of using the new system.

An important activity associated with this stage is deciding how to deal with situations in which there are more than one user view. As we discussed in Section 10.6, there are three major approaches to dealing with multiple user views: the **centralized** approach, the **view integration** approach, and a combination of both approaches. We discuss how these approaches can be used shortly.

Gathering more information on the user views of the *DreamHome* database system

To find out more about the requirements for each user view, we may again use a selection of fact-finding techniques, including interviews and observing the business in operation. Examples of the types of questions that we may ask about the data (represented as X) required by a user view include:

“What type of data do you need to hold on X?”

“What sorts of things do you do with the data on X?”

For example, we might ask a Manager the following questions:

Database Developer: *What type of data do you need to hold on staff?*

Manager: The types of data held on a member of staff is his or her full name, position, gender, date of birth, and salary.

Database Developer: *What sorts of things do you do with the data on staff?*

Manager: I need to be able to enter the details of new members of staff and delete their details when they leave. I need to keep the details of staff up to date and print reports that list the full name, position, and salary of each member of staff at my branch. I need to be able to allocate staff to Supervisors. Sometimes when I need to communicate with other branches, I need to find out the names and telephone numbers of Managers at other branches.

We need to ask similar questions about all the important data to be stored in the database. Responses to these questions will help identify the necessary details for the users' requirements specification.

Gathering information on the system requirements of the *DreamHome* database system

While conducting interviews about user views, we should also collect more general information on the system requirements. Examples of the types of questions that we might ask about the system include:

“What transactions run frequently on the database?”

“What transactions are critical to the operation of the organization?”

“When do the critical transactions run?”

“When are the low, normal, and high workload periods for the critical transactions?”

“What type of security do you want for the database system?”

“Is there any highly sensitive data that should be accessed only by certain members of staff?”

“What historical data do you want to hold?”

“What are the networking and shared access requirements for the database system?”

“What type of protection from failures or data loss do you want for the database system?”

For example, we might ask a Manager the following questions:

Database Developer: *What transactions run frequently on the database?*

Manager: We frequently get requests either by phone or by clients who call into our branch to search for a particular type of property in a particular area of the city and for a rent no higher than a particular amount. We hope that clients using the new *DreamHome* Web site will be able to view our properties at any time of the day or night. We also need up-to-date information on properties and clients so that reports can be run off that show properties currently available for rent and clients currently seeking property.

Database Developer: *What transactions are critical to the operation of the business?*

Manager: Again, critical transactions include being able to search for particular properties and to print out reports with up-to-date lists of properties available for rent. Our clients would go elsewhere if we couldn't provide this basic service.

Database Developer: *When do the critical transactions run?*

Manager: Every day.

Database Developer: *When are the low, normal, and high workload periods for the critical transactions?*

Manager: We're open six days a week. In general, we tend to be quiet in the mornings and get busier as the day progresses. However, the busiest time-slots each day for dealing with customers are between 12 and 2pm and 5 and 7pm. We hope that clients using the new *DreamHome* Web site will be able to search through our properties on their own PCs; this should cut down on the number of property queries that staff have to deal with.

We might ask the Director the following questions:

Database Developer: *What type of security do you want for the database system?*

Director: I don't suppose a database holding information for a property rental company holds very sensitive data, but I wouldn't want any of our competitors to see the data

on properties, owners, clients, and leases. Staff should see only the data necessary to do their job in a form that suits what they're doing. For example, although it's necessary for Supervisors and Assistants to see client details, client records should be displayed only one at a time and not as a report. As far as clients using the new *DreamHome* Web site are concerned, we want them to have access to our properties and their own details—but nothing else.

Database Developer: *Is there any highly sensitive data that should be accessed only by certain members of staff?*

Director: As I said before, staff should see only the data necessary to do their jobs. For example, although Supervisors need to see data on staff, salary details should not be included.

Database Developer: *What historical data do you want to hold?*

Director: I want to keep the details of clients and owners for a couple of years after their last dealings with us, so that we can mail them our latest offers, and generally try to attract them back. I also want to be able to keep lease information for a couple of years, so that we can analyze it to find out which types of properties and areas of each city are the most popular for the property rental market, and so on.

Database Developer: *What are the networking and shared access requirements for the database system?*

Director: I want all the branches networked to our main branch office here in Glasgow so that staff can access the system from wherever and whenever they need to. At most branches, I would expect about two or three staff to be accessing the system at any one time, but remember that we have about 100 branches. Most of the time the staff should be just accessing local branch data. However, I don't really want there to be any restrictions about how often or when the system can be accessed, unless it's got real financial implications. As I said earlier, clients using the new *DreamHome* Web site should have access to our properties and their own details, but nothing else.

Database Developer: *What type of protection from failures or data loss do you want for the database system?*

Director: The best, of course. All our business is going to be conducted using the database, so if it goes down, we're sunk. To be serious for a minute, I think we probably have to back up our data every evening when the branch closes. What do you think?

We need to ask similar questions about all the important aspects of the system. Responses to these questions should help identify the necessary details for the system requirements specification.

Managing the user views of the *DreamHome* database system

How do we decide whether to use the centralized or view integration approach, or a combination of both to manage multiple user views? One way to help make a decision is to examine the overlap in the data used between the user views identified during the system definition stage. Table 11.7 cross-references the Director, Manager, Supervisor, Assistant, and Client user views with the main types of data used by each user view.

We see from Table 11.7 that there is overlap in the data used by all user views. However, the Director and Manager user views and the Supervisor and Assistant user views show more similarities in terms of data requirements. For example, only the Director and Manager user views require data on branches and newspapers, whereas only the Supervisor and Assistant user views require data on property viewings. The Client user view requires access to the least amount of data, and that is only the property and client data. Based on this analysis, we use the *centralized* approach to first merge the requirements for the Director and Manager user views (given the collective name of **Branch** user views) and the requirements for the Supervisor, Assistant, and Client user views (given the collective name of **StaffClient** user views). We then develop data models representing the Branch and StaffClient user views and then use the *view integration* approach to merge the two data models.

Of course, for a simple case study like *DreamHome*, we could easily use the centralized approach for all user views, but we will stay with our decision to create two collective user views so that we can describe and demonstrate how the view integration approach works in practice in Chapter 17.

It is difficult to give precise rules as to when it is appropriate to use the centralized or view integration approaches. The decision should be based on an assessment of the complexity of the database system and the degree of overlap between the various user views. However, whether we use the centralized or view integration approach or a mixture of both to build the underlying database, ultimately we need to re-establish

TABLE 11.7 Cross-reference of user views with the main types of data used by each.

	DIRECTOR	MANAGER	SUPERVISOR	ASSISTANT	CLIENT
branch	X	X			
staff	X	X	X		
property for rent	X	X	X	X	X
owner	X	X	X	X	
client	X	X	X	X	X
property viewing			X	X	
lease	X	X	X	X	
newspaper	X	X			

the original user views (namely Director, Manager, Supervisor, Assistant, and Client) for the working database system. We describe and demonstrate the establishment of the user views for the database system in Chapter 18.

All of the information gathered so far on each user view of the database system is described in a document called a **users' requirements specification**. The users' requirements specification describes the data requirements for each user view and examples of how the data is used by the user view. For ease of reference, the users' requirements specifications for the Branch and StaffClient user views of the *DreamHome* database system are given in Appendix A. In the remainder of this chapter, we present the general systems requirements for the *DreamHome* database system.

The systems specification for the *DreamHome* database system

The systems specification should list all the important features for the *DreamHome* database system. The types of features that should be described in the systems specification include:

- initial database size;
- database rate of growth;
- the types and average number of record searches;
- networking and shared access requirements;
- performance;
- security;
- backup and recovery;
- legal issues.

Systems Requirements for *DreamHome* Database System

Initial database size

- (1) There are approximately 2000 members of staff working at over 100 branches. There is an average of 20 and a maximum of 40 members of staff at each branch.
- (2) There are approximately 100,000 properties available at all branches. There is an average of 1000 and a maximum of 3000 properties at each branch.
- (3) There are approximately 60,000 property owners. There is an average of 600 and a maximum of 1000 property owners at each branch.
- (4) There are approximately 100,000 clients registered across all branches. There is an average of 1000 and a maximum of 1500 clients registered at each branch.
- (5) There are approximately 4,000,000 viewings across all branches. There is an average of 40,000 and a maximum of 100,000 viewings at each branch.
- (6) There are approximately 400,000 leases across all branches. There are an average of 4000 and a maximum of 10,000 leases at each branch.
- (7) There are approximately 50,000 newspaper ads in 100 newspapers across all branches.

Database rate of growth

- (1) Approximately 500 new properties and 200 new property owners will be added to the database each month.

- (2) Once a property is no longer available for rent, the corresponding record will be deleted from the database. Approximately 100 records of properties will be deleted each month.
- (3) If a property owner does not provide properties for rent at any time within a period of two years, his or her record will be deleted. Approximately 100 property owner records will be deleted each month.
- (4) Approximately 20 members of staff join and leave the company each month. The records of staff who have left the company will be deleted after one year. Approximately 20 staff records will be deleted each month.
- (5) Approximately 1000 new clients register at branches each month. If a client does not view or rent out a property at any time within a period of two years, his or her record will be deleted. Approximately 100 client records will be deleted each month.
- (6) Approximately 5000 new viewings are recorded across all branches each day. The details of property viewings will be deleted one year after the creation of the record.
- (7) Approximately 1000 new leases will be recorded across all branches each month. The details of property leases will be deleted two years after the creation of the record.
- (8) Approximately 1000 newspaper adverts are placed each week. The details of newspaper adverts will be deleted one year after the creation of the record.

The types and average number of record searches

- (1) Searching for the details of a branch—approximately 10 per day.
- (2) Searching for the details of a member of staff at a branch—approximately 20 per day.
- (3) Searching for the details of a given property—approximately 5000 per day (Monday to Thursday), and approximately 10,000 per day (Friday and Saturday). Peak workloads are 12.00–14.00 and 17.00–19.00 daily. (The workloads for property searches should be reassessed after the *DreamHome* Web site is launched.)
- (4) Searching for the details of a property owner—approximately 100 per day.
- (5) Searching for the details of a client—approximately 1000 per day (Monday to Thursday), and approximately 2000 per day (Friday and Saturday). Peak workloads are 12.00–14.00 and 17.00–19.00 daily.
- (6) Searching for the details of a property viewing—approximately 2000 per day (Monday to Thursday), and approximately 5000 per day (Friday and Saturday). Peak workloads are 12.00–14.00 and 17.00–19.00 daily.
- (7) Searching for the details of a lease—approximately 1000 per day (Monday to Thursday), and approximately 2000 per day (Friday and Saturday). Peak workloads are 12.00–14.00 and 17.00–19.00 daily.

Networking and shared access requirements

All branches should be securely networked to a centralized database located at *DreamHome's* main office in Glasgow. The system should allow for at least two to

three people concurrently accessing the system from each branch. Consideration needs to be given to the licensing requirements for this number of concurrent accesses.

Performance

- (1) During opening hours, but not during peak periods, expect less than a 1-second response for all single record searches. During peak periods, expect less than a 5-second response for each search.
- (2) During opening hours, but not during peak periods, expect less than a 5-second response for each multiple record search. During peak periods, expect less than a 10-second response for each multiple record search.
- (3) During opening hours, but not during peak periods, expect less than a 1-second response for each update/save. During peak periods, expect less than a 5-second response for each update/save.

Security

- (1) The database should be password-protected.
- (2) Each member of staff should be assigned database access privileges appropriate to a particular user view, namely Director, Manager, Supervisor, or Assistant.
- (3) A member of staff should see only the data necessary to do his or her job in a form that suits what he or she is doing.
- (4) A client should see only property data and their own personal details using the *DreamHome* Web site.

Backup and Recovery

The database should be backed up daily at 12 midnight.

Legal Issues

Each country has laws that govern the way that the computerized storage of personal data is handled. As the *DreamHome* database holds data on staff, clients, and property owners, any legal issues that must be complied with should be investigated and implemented. The professional, legal, and ethical issues associated with data management are discussed in Chapter 21.

11.4.5 The *DreamHome* Case Study—Database Design

In this chapter we demonstrated the creation of the users' requirements specification for the Branch and Staff user views and the systems specification for the *DreamHome* database system. These documents are the sources of information for the next stage of the lifecycle called **database design**. In Chapters 16 to 19 we provide a step-by-step methodology for database design and use the *DreamHome* case study and the documents created for the *DreamHome* database system in this chapter to demonstrate the methodology in practice.

