信息管理系列教程

信息管理专业英语

Professional Readings in Information Management

祁延莉 主编

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简　介

本书为北京大学信息管理系信息资源管理系列教程的一本。全书遴选国外知名学者信息管理领域的经典篇目 11 篇，内容涉及信息技术、信息组织与检索、信息用户与服务、企业知识管理、知识产权等。编者对所选篇目加以注释，配以适当的练习和作业，并在书后提供原文篇目的中译文作为参考，目的是帮助读者提高阅读专业文献的能力。本书选材宽泛，练习附答案，篇目附中译文，既可以作为高校信息管理专业的专业英语教材，也可作为信息管理从业人员提高英文水平的学习读物。

目　录

Lesson 1

Database

1. Introduction

1 The past two decades have witnessed enormous growth in the number and importance of database applications. Databases are used to store, manipulate, and retrieve data in nearly every type of organization including business, health care, education, government, and libraries. Database technology is routinely used by individuals on personal computers, by workgroups accessing databases on network servers, and by all employees using enterprise-wide distributed applications.

2 Following this period of rapid growth, will the demand for databases and database technology level off? Certainly not. In the highly competitive environment of the late 1990s there is every indication that database technology will assume even greater importance. Managers are seeking to use knowledge derived from databases for competitive advantage. For example, detailed sales databases can be mined to determine customer buying patterns as a basis for advertising and marketing campaigns. Many organizations today are building separate databases, called "data warehouses," for this type of decision support application (Lambert, 1996).

3 Although the future of databases is assured, much work remains to be done. ①Many organizations have a proliferation of incompatible databases that were developed to meet immediate needs, rather than based on a planned

① 本句中 a proliferation of incompatible databases 是指分散的互不兼容的数据库，that 引导的从句修饰 databases。许多组织只为满足一时的需要，而不是基于规划或精心控制其发展，开发了许多分散的互不兼容的数据库。

strategy or a well-managed evolution. Much of the data are trapped in older, "legacy" systems, and the data are often of poor quality. New skills are required to design data warehouses, and there is a critical shortage of skills in areas such as database analysis, database design, data administration, and database administration. We address these and other important issues in this textbook.

4 A course in database management has emerged as one of the most important courses in the information systems curriculum today. As an information system's professional, you must be prepared to analyze database requirements and design and implement databases within the context of information systems development. You must be prepared as well to consult with end users and show them how they can use databases (or data warehouses) to build decision support systems and executive information systems for competitive advantage.

5 In this chapter we introduce the basic concepts of databases and database management systems (DBMS). We describe traditional file management systems and some of their shortcomings that led to the database approach. We describe the range of database applications, from personal computers to workgroup, departmental, and enterprise databases. Next we consider the benefits, costs, and risks of using the database approach. We conclude the chapter with a summary of the evolution of database systems and of the range of technologies used to build, use, and manage databases. This chapter is intended to serve as a preview of the topics in the remainder of the text.

2. Basic Concepts and Definitions

6 We define a database as an organized collection of logically related data. A database may be of any size and complexity. For example, a salesperson may maintain a small database of customer contacts on her laptop computer that consists of a few megabytes of data. A large corporation may build a very large database consisting of several terabytes of data (a terabyte is a trillion bytes) on a large mainframe computer that is used for decision support applications (Winter, 1997). (We assume throughout the text that all databases are computer-based.)

2.1 Data

7 Historically, the term data referred to known facts that could be recorded and stored on computer media. For example in a salesperson's database, the data would include facts such as customer name, address, and telephone number. This definition now needs to be expanded to reflect a new reality. Databases today are used to store objects such as documents, photographic images, sound, and even video segments, in addition to conventional textual and numeric data. For example, the salesperson's database might include a photo image of the customer contact. It might also include a sound recording or video clip of the most recent conversation with the customer. To reflect this reality, we use the following broadened definition: **Data** consist of facts, text, graphics, images, sound, and video segments that have meaning in the users' environment.

8 We have defined a database as an organized collection of related data. By *organized* we mean that the data are structured so as to be easily stored, manipulated, and retrieved by users. By *related* we mean that the data describe a domain of interest to a group of users and that the users can use the data to answer questions concerning that domain. For example a database for an automobile repair shop contains data identifying customers (the data items it lists include each customer's name, address, work phone number, home phone number, and preferred credit card number), automobiles belonging to those customers (the data items include make, model, and year), and repair histories for each of those automobiles (e.g., date of service, name of person who worked on vehicle, type of repair performed, and dollar amount of work performed).

2.2 Data Versus Information

9 The terms *data* and *information* are closely related, and in fact are often used interchangeably. However, it is often useful to distinguish between data

and information. ①We define **information** as data that has been processed in such a way that it can increase the knowledge of the person who uses it. For example, consider the following list of facts:

Baker, Kenneth D.	324917628
Doyle, Joan E.	476193248
Finkle, Clive R.	548429344
Lewis, John C.	551742186
McFerran, Debra R.	409723145
Sisneros, Michael	392416582

10 These facts satisfy our definition of data, but most persons would agree that the data are useless in their present form. Even if we guess that this is a list of persons' names together with their Social Security numbers, the data remain useless since we have no idea what the entries mean. Notice what happens when we place the same data in a context, as shown in Figure 1a. By adding a few additional data items and providing some structure, we recognize a class roster for a particular course. This is useful information to some users, such as the course instructor and the registrar's office.

11 Another way to convert data into information is to summarize it or otherwise process and present it for human interpretation. For example, Figure 1b shows summarized student enrollment data presented as graphical information. This information could be used as a basis for deciding whether to add new courses or to hire new faculty members.

① 第一个 that 引导的定语从句修饰 data，第二个 that 是同位语从句，修饰 way，句中的 it 指 information。我们定义信息为以能够增加用户知识的方式处理后的数据。

Class Roster

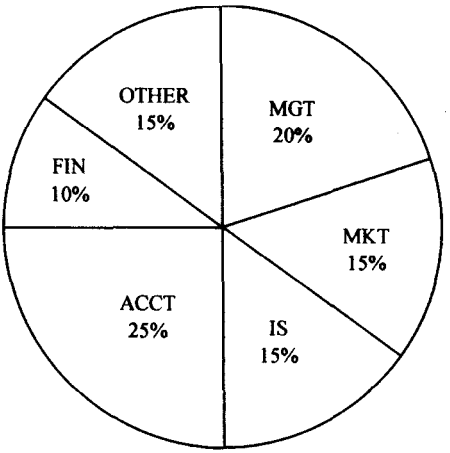
Course: MGT500 Semester: Spring 199X

Business Policy

Section: 2

Name	ID	Major	GPA
Baker, Kenneth D.	324917628	MGT	2.9
Doyle, Joan E.	476193248	MKT	3.4
Finkle, Clive R.	548429344	PRM	2.8
Lewis, John C.	551742186	MGT	3.7
McFerran, Debra R.	409723145	IS	2.9
Sisneros, Michael	392416582	ACCT	3.3

(a) Data in context



Percent Enrollment by Major (199X)

(b) Summarized data

Figure 1 Converting data to information

12 In practice, databases today may contain either data or information (or both), according to our definitions. For example, a database may contain an image of the class roster document shown in Figure 1a. Also, data are often preprocessed and stored in summarized form in databases that are used for

decision support. Throughout this text we use the term *database* without distinguishing its contents as data or information.

2.3 Metadata

13 As we have indicated, data only become useful when placed in some context. The primary mechanism for providing context for data is metadata. **Metadata** are data that describe the properties or characteristics of other data. Some of these properties include data definitions, data structures, and rules or constraints.

14 Some sample metadata for the Class Roster (Figure 1a) are listed in Table 1. For each data item that appears in the Class Roster, the metadata show the data item name, the data type, length, minimum and maximum allowable values (where appropriate), and a brief description of each data item. Notice the distinction between data and metadata: Metadata are once removed from data. That is, metadata describe the properties of data but do not include that data. Thus, the metadata shown in Table 1 do not include any sample data from the Class Roster of Figure 1a. Metadata allow database designers and users to understand what data exist, what the data mean, and what the fine distinctions are between seemingly similar data items. The management of metadata is at least as crucial as managing the associated data since data without clear meaning can be confusing, misinterpreted, or erroneous.

Table 1 Example Metadata for Class Roster

Data Item		Value			
Name	Type	Length	Min	Max	Description
Course	Alphanumeric	30			Course ID and name
Section	Integer	1	1	9	Section number
Semester	Alphanumeric	10			Semester and year
Name	Alphanumeric	30			Student name
ID	Integer	9			Student ID (SSN)
Major	Alphanumeric	4			Student major
GPA	Decimal	3	0.0	4.0	Student grade point average

3. The Range of Database Applications

15 Databases range from those for a single user with a desktop computer to those on mainframe computers with thousands of users. The range of database applications can be divided into four categories, from simplest to most complex: personal computer (or PC) databases, workgroup databases, department databases, and enterprise databases. We introduce each category with a typical example, followed by some issues that generally arise within the category of use.

3.1 Personal Computer Databases

16 Personal computer (PC) databases are designed to support one user with a standalone personal computer (for example, a desktop or laptop computer). For example, consider a company that has a number of salespersons who call on actual or prospective customers. Each salesperson might carry a laptop computer with a simple database application to record customer information and the details of contacts with each customer. A typical user view of data from that application is shown in Figure 2.

Customer Name: **Multi Media, Inc.**	
Address: **1000 River Road**	
City: **San Antonio**	
State: **TX**	
Zip: **76235**	
Phone: **(219) 864-2000**	
Next Contact Date: **10/17/1998**	Time: **10:30 AM**

Customer

Date	Time	Contact	Comments
08/04/97	10:00 AM	Roberts	Review proposal
08/19/97	08:00 AM	Roberts	Revise schedule
09/10/97	09:00 AM	Pearson	Sign contract
09/21/97	02:00 AM	Roberts	Follow up

Contact History for Customer

Figure 2 Typical data from a personal computer database

17 Some of the key decisions that must be made in developing personal computer databases are the following:

1. Should the application be purchased from an outside vendor or developed within the organization?

2. If the database application is developed internally, should it be developed by the end user or by a professional within the information systems (IS) department?

3. What data are required by the user and how should the database be designed?

4. What commercial DBMS product should be used for the application?

5. How should data in the personal computer database be synchronized with data in other databases?

6. Who is responsible for the accuracy of the data in the personal computer database?

18 Personal computer databases are widely used because they can often improve personal productivity. However, they entail a risk: the data cannot easily be shared with other users. For example, suppose the sales manager wants a consolidated view of customer contacts. This cannot be quickly or easily provided from an individual salesperson's databases. This illustrates a very common problem: if data are of interest to one person, they probably are (or will soon become) of interest to others as well. For this reason, personal computer databases should be limited to those rather special situations (such as in a very small organization) where the need to share the data among users of the personal computer database is unlikely to arise.

3.2 Workgroup Databases

19 A *workgroup* is a relatively small team of people who collaborate on the same project or application or on a group of similar projects or applications. A workgroup typically comprises fewer than 25 persons. These persons might be engaged (for example) with a construction project or with developing a new computer application. A workgroup database is designed to support the collaborative efforts of such a team.

20 Consider a workgroup that develops both standard and custom objects (or software components) that are sold to software vendors as well as to end users. Table 2 is a list of some of the software objects that have been developed recently. Typically one or more persons work on a given object or component at a given time. ① The group needs a database that will track each item as it is developed and allow the data to be easily shared by the team members.

Table 2 List of Software Objects in an Example Workgroup Database

Object Place, Inc.
400 Magnolia St.
Atlanta, GA 02103

Name	Language	Description	Price
123Xtender	Visual Basic	Spreadsheet wrapper	595
DSS Objects	C ++	Decision support generator	595
Object Suite	Smalltalk	Set of 6 generic objects	5000
Order Object	Smalltalk	Generic order object	1000
Patient Object	Smalltalk	Generic patient object	1000

21 The method of sharing the data in this database is shown in Figure 3. Each member of the workgroup has a desktop computer and the computers are linked by means of a local area network (LAN). The database is stored on a central device called the *database server*, which is also connected to the network. Thus each member of the workgroup has access to the shared data. Different types of group member (e. g., developer or project manager) may have different user

① that 引导的从句修饰 database, as 引导状语从句,其中的 it 指 item。工作组需要一个数据库来跟踪开发出来的每一个项目,并允许团队成员便利地共享其中的数据。

views of this shared database. Notice that this arrangement overcomes the principal objection to PC databases, which is that the data are not easily shared (at least data are easily shared within the workgroup). This arrangement, however, introduces many data management issues not present with personal computer (single-user) databases, such as data security and data integrity with concurrent user data updating. Also, since an organization is composed of many workgroups, and individual may be part of many different workgroups at the same or different times, it is possible to generate many databases, just as in the situation of personal computer databases.

22 In establishing a workgroup databases, the organization must answer the same questions that applied to personal computer databases. In addition, the following database management questions arise:

1. How can the design of the database be optimized for a variety of group members' information requirements?

2. How can the various members use the database concurrently without compromising the integrity of the database?

3. Which database processing operations should be performed at a workstation and which should occur on the server?

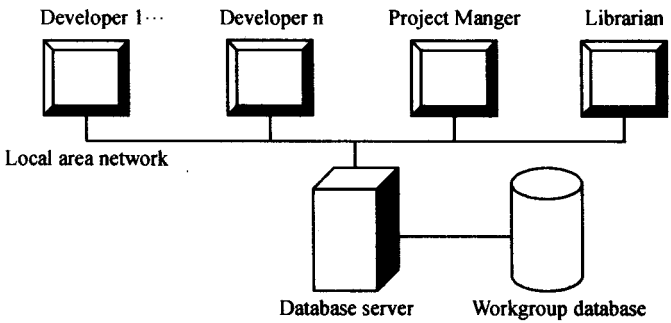


Figure 3 Workgroup database with Local area network

3.3 Department Databases

23 A *department* is a functional unit within an organization. Typical examples of departments are personnel, marketing, manufacturing, and accounting. A

department is generally larger than a workgroup (typically between 25 and 100 persons) and is responsible for a more diverse range of functions.

24 Department databases are designed to support the various functions and activities of a department. They are the most common of the four types of databases described in this section. For example, consider a personnel database that is designed to track data concerning employees, jobs, skills, and job assignments. A simplified diagram of this database is shown in Figure 4. With the data entities and relationships shown in this diagram, users can query the databases to obtain answers to questions such as the following:

1. For a particular job classification (such as Software Engineer), what job opportunities exist in the company at the present time?

2. For that same job classification, what skill (or skills) are required?

3. What skills are possessed by a particular employee? Conversely, which employees possess a particular skill (such as C ++ programming)?

4. Which employees have held a particular job assignment? Conversely, what is the job history for a particular employee?

5. Which employees are supervised by a particular manager?

25 Typical questions that must be addressed when designing and implementing department databases (besides those already described) include the following:

1. How can the database and its environment be designed to produce adequate performance, given the large number of users and user transactions?

2. How can adequate security be provided to protect against unauthorized disclosure or distribution of sensitive data?

3. What database and application development tools should be used in this complex environment?

4. Do other departments maintain the same type of data, and if so, how can data redundancy and consistency of data and metadata best be managed?

5. Are the users of the database geographically dispersed or the size of the database so great that data must be stored on several computer systems, thus creating a *distributed database*?

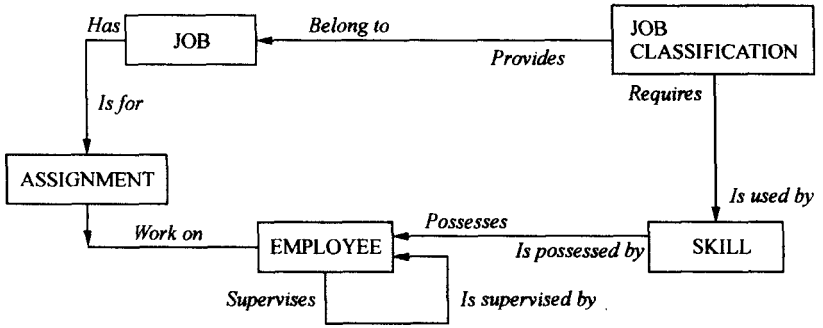


Figure 4 An example departmental database (Personnel Department)

3.4 Enterprise Databases

26 An enterprise database is one whose scope is the entire organization or enterprise (or, at least, many different departments). Such databases are intended to support organization-wide operations and decision making. Note that an organization may have several enterprise databases, so such a database is not inclusive of all organizational data. A single, operational, enterprise database is impractical for many medium to large organizations due to difficulties in performance for very large databases, diverse needs of different users, and the complexity of achieving a single definition of data (metadata) for all database users. An enterprise database does, however, support information needs from many departments. Arguably the most important type of enterprise database today is called a data warehouse. A **data warehouse** is an integrated decision support database whose content is derived from the various operational databases (such as personal computer, workgroup, and department databases). We describe data warehouses in detail in Chapter 14.

27 Consider a large health care organization that operates a group of medical centers including hospitals, clinics, and nursing homes. As shown in Figure 5, each of these medical centers has a separate database (or databases) to support the various operations at that facility. These databases contain data concerning patients, physicians, medical services, business operations, and other related entities.