Chapter 16

Database Administration and Security

Discussion Focus

The following discussion sequence is designed to fit the chapter objectives:
- Illustrate the value of data as a corporate asset to be managed.
- Explain the data-information-decision cycle and demonstrate how this cycle may be supported through the use of a DBMS.
- Emphasize the role of databases within an organization and relate this role to the data-information-decision cycle; then show how this role is essential at all managerial levels.
- Discuss the evolution of the data administration (DA) function, starting with the DP department and ending with the MIS department. During this discussion, emphasize the change in managerial emphasis from an operational orientation to a more tactical and strategic orientation. Illustrate how a DBMS can foster a company's success; examples from companies involved in banking, air services, and financial services are particularly illustrative.
- Show the different ways of positioning the DBA function within an organization; emphasize how such positioning is a function of the company's internal organization.
- Contrast the DBA and DA functions.
- Discuss the DBA's technical and managerial roles.
- Explain the importance of data security and database security.
- Show how data dictionaries and CASE tools fit into data administration.

Answers to Review Questions

Note: To ensure in-depth chapter coverage, most of the following questions cover the same material that we covered in detail in the text. Therefore, in most cases, we merely cite the specific section, rather than duplicate the text presentation.

1. **Explain the difference between data and information. Give some examples of raw data and information.**

   Given the importance of the distinction between data and information, we addressed the topic in several chapters. This question was first addressed in Chapter 1, "Database Concepts," Section 1-1, "Data vs. Information." Emphasize that one of the key purposes of having an information system is to facilitate the transformation of data into information. In turn, information becomes the basis for decision making. (See Figure 16.1, "The data-information-decision making cycle")

We revisit the data/information transformation in Chapter 13, "Business Intelligence and Data Warehouses," Section 13-1, "The Need for Data Analysis." Section 13-2, "Business Intelligence," addresses the Decision Support System (DSS)," addresses the use of a comprehensive, cohesive, and integrated framework , which is designed to assist managerial decision making within an organization and which, therefore, includes an extensive data-to-information transformation component. Figures 13.1 (Business Intelligence Framework) and 13.2 (Business Intelligence Components) illustrate the BI's main components, so use these figures as the focus for discussion. Finally, review the operational data transformation to decision support data, using Figure 13.3, "Transforming Operational Data into Decision Support Data," as the basis for discussion.

Data are raw facts of interest to an end user. Examples of data include a person's date of birth, an employee name, the number of pencils in stock, etc. Data represent a *static* aspect of a real world object, event, or thing.

Information is *processed data*. That is, information is the product of applying some analytical process to data. Typically, we represent the information generation process as shown in Figure R15.1.
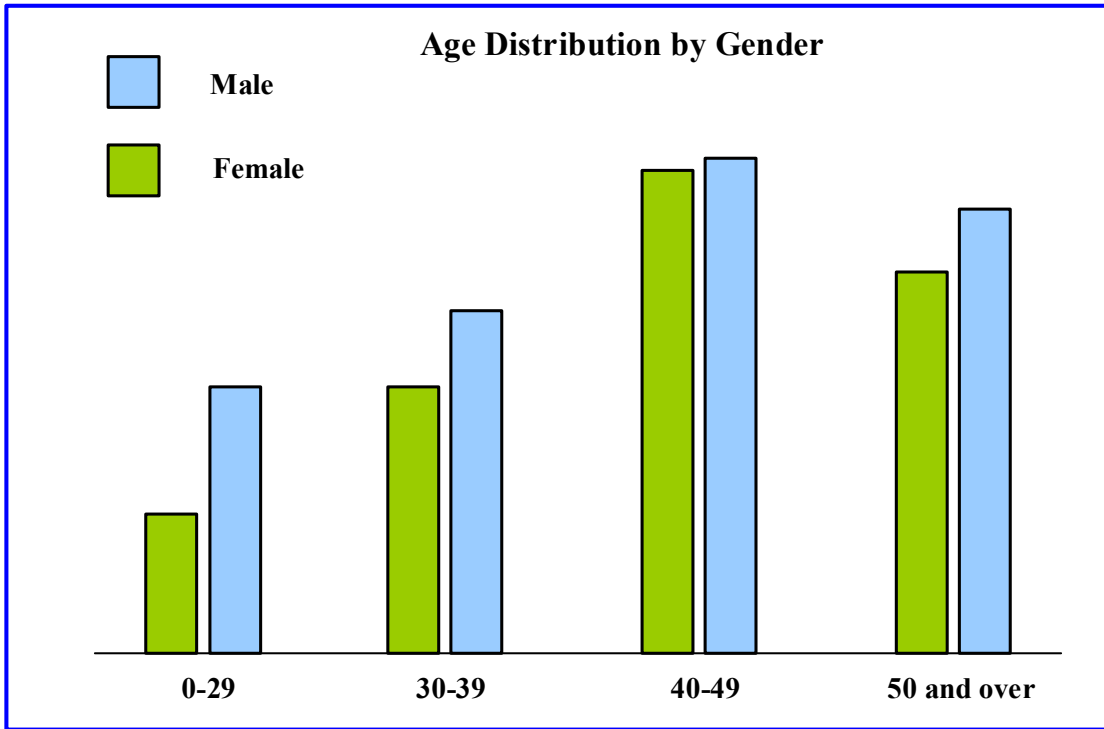
Figure R15.1 Transformation of Data Into Information
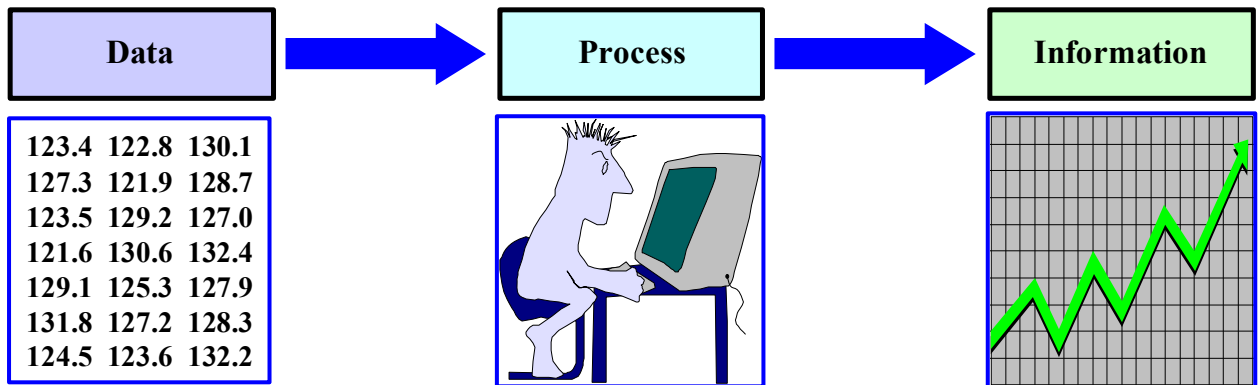
For example, invoice data may include the invoice number, customer, items purchased, invoice total, etc. The end user can generate *information* by tabulating such data and computing totals by customer, cash purchase summaries, credit purchase summaries, a list of most-frequently purchased items, etc.

Since the data-information transformation is crucial, it is important to keep emphasizing that data stored in the database constitute the raw material for the creation of information. For example, data in a CUSTOMER table might be transformed to provide customer information about age distribution and gender as shown in Figure R15.2:

Figure R15.2 Customer Information Summary

Similarly, data in a CAR table might be transformed to provide information that relates displacement to horsepower as shown in Figure R15.3:

Figure R15.3 Engine Horsepower vs. Displacement
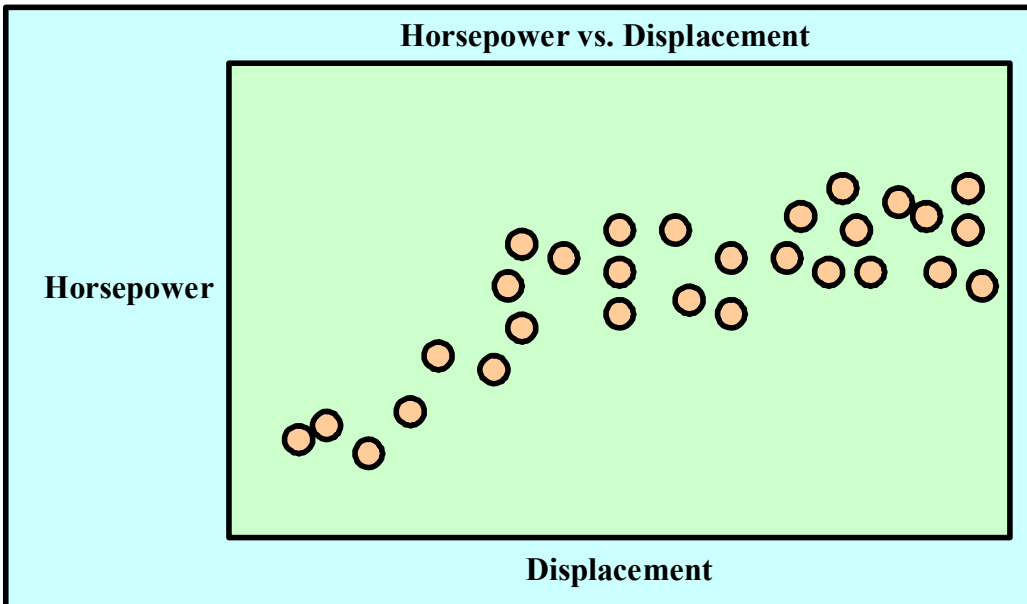
Data transformations into information can be accomplished in many ways, using simple tabulation, graphics, statistical modeling, etc.

2. **Define dirty data and identify some of its sources.**

   Dirty data is data that contains inaccuracies or inconsistencies (i.e. data that lacks integrity). Dirty data may result from a lack of enforcement of integrity constraints, typographical errors, the use of synonyms and homonyms across systems, the use of nonstandard abbreviations, or differences in the decomposition of composite attributes.

3. **What is data quality, and why is it important?**

   Data quality is a comprehensive approach to ensuring the accuracy, validity, and timeliness of the data. Data quality is important because without quality data, accurate and timely information cannot be produced. Without accurate and timely information, it is difficult (impossible?) to make good decisions; and without good decisions, organizations will fail in their competitive environments.

4. **Explain the interactions among end user, data, information, and decision-making. Draw a diagram and explain the interactions.**

   See Section 16-1. The interactions are illustrated in Figure 16.1.

   Emphasize the end user's role throughout the process. It is the end user who must analyze data to produce the information that is later used in decision making. Most business decisions create additional data that will be used to monitor and evaluate the company situation. Thus data will be, or should be, recycled in order to produce feedback concerning an action's effectiveness and efficiency.

5. **Suppose that you are a DBA. What data dimensions would you describe to top-level managers to obtain their support for endorsing the data administration function?**

   The first step will be to emphasize the importance of data as a *company asset*, to be managed as any other asset. Top-level managers must understand this crucial notion and must be willing to commit company resources to manage data as an organizational asset.

   The next step is to identify and define the need for and role of the DBMS in the organization. Refer the student to Section 16-2 and apply the concepts discussed in this section to a teacher-selected organization. Managers and end users must understand how the DBMS can enhance and support the work of the organization at all levels (top management, middle management, and operational.)

   Finally, the impact of a DBMS introduction into an organization must be illustrated and explained. Refer to Section 16-3 to accomplish this task. Note particularly the technical, managerial, and cultural aspects of the process.

6. **How and why did database management systems become the organizational data management standard in organizations? Discuss some of the advantages of the database approach over the file-system approach.**

   Briefly review Chapter 1, Section 1-5, to trace the evolution of file systems into databases. Chapter 1, Section 1-3a covers the advantages of the DBMS approach over the file system approach. Then tie Chapter 1's material to Chapter 16.

   Contrast the file system's "single-ownership" approach with the DBMS's "shared-ownership." Make sure that students are made aware of the change in focus or function when the shift from file system to the DBMS occurs. In other words, show what happens when the data processing (DP) department becomes a management information systems (MIS) department. Using Section 16-3, discuss how the change from DP to MIS shifts data management from an operational level to a tactical or strategic level.

7. **Using a single sentence, explain the role of databases in organizations. Then explain your answer.**

   The single sentence will be:

   The database's predominant role is to support managerial decision making at all levels in the organization.

   Refer to section 16-2 for a complete explanation of the role(s) played by an organization's DBMS.

8. **Define *security* and *privacy*. How are these two concepts related?**

   Security means protecting the data against accidental or intentional use by unauthorized users. Privacy deals with the rights of people and organizations to determine who accesses the data and when, where, and how the data are to be used.

   The two concepts are closely related. In a *shared* system, individual users must ensure that the data are protected from unauthorized use by other individuals. Also, the individual user must have the right to determine who, when, where, and how other users use the data. The DBMS must provide the tools to allow such flexible management of the data security and access rights in a company database.

9. **Describe and contrast the information needs at the strategic, tactical, and operational levels in an organization. Use examples to explain your answer.**

   See Section 16-2 to contrast the different DBMS roles at each managerial level. Use Figures 15.3-15.5 as the basis for your discussions.

10. **What special considerations must you take into account when introducing a DBMS into an organization?**

See Section 16-3. We suggest that you start a discussion about the special considerations (managerial, technical, and cultural) to be taken into account when a new DBMS is to be introduced in an organization. For example, focus the discussion on such questions as:

- What about retraining requirements for the new system?
  - ➢ Who needs to be retrained?
  - ➢ What must be the type and extent of the retraining?
- Is it reasonable to expect some resistance to change
  - ➢ from the computer services department administrator(s)?
  - ➢ from secretaries?
  - ➢ from technical support personnel?
  - ➢ from other departmental end users?
- How will the resistance in the preceding question be manifested?
- How will you deal with such resistance?

11. **Describe the DBA's responsibilities.**

The database administrator (DBA) is the person responsible for the control and management of the shared database within an organization. The DBA controls the database administration function within the organization.

The DBA is responsible for managing the overall corporate data resource, both computerized and non-computerized. Therefore, the DA is given a higher degree of responsibility and authority than the DBA. Depending on organizational style, the DBA and DA roles may overlap and may even be combined in a single position or person.

The DBA position requires both managerial and technical skills. Refer to section 16-5 and Table 16.1 to explain and illustrate the general responsibilities of the DA and DBA functions.

12. **How can the DBA function be placed within the organization chart? What effect(s) will such placement have on the DBA function?**

The DBA function placement varies from company to company and may be either a staff or line position. In a staff position, the DBA function creates a consulting environment in which the DBA is able to devise the overall data-administration strategy but does not have the authority to enforce it. In a line position, the DBA function has both the responsibility and the authority to plan, define, implement, and enforce the policies, standards and procedures.

13. **Why and how are new technological advances in computers and databases changing the DBA's role?**

    See Section 16.5, particularly Section 16-5b, "The DBA's Technical Role." Then tie this discussion to the increasing use of web applications.

    The DBA function is probably one of the most dynamic functions of any organization. New technological developments constantly change the DBA function. For example, note how each of the following has an effect on the DBA function:
    - the development of the DDBMS
    - the development of the OODBMS
    - the increasing use of LANs
    - the rapid integration of Intranet and Extranet applications and their effects on the database design, implementation, and management. (Security issues become especially important!)

14. **Explain the DBA department's internal organization, based on the DBLC approach.**

    See Section 16-4, especially Figures 15.4 and 15.5.

15. **Explain and contrast the differences and similarities between the DBA and DA.**

    See Section 16-5, especially Table 16.1.

16. **Explain how the DBA plays an arbitration role for an organization's two main assets. Draw a diagram to facilitate your explanation.**

    See Section 16-5, especially Figure 16.6.

17. **Describe and characterize the skills desired for a DBA.**

    See Section 16-5, especially Table 16.2.

18. **What are the DBA's managerial roles? Describe the managerial activities and services provided by the DBA.**

    See Section 16-5a, especially Table 16.3.

19. **What DBA activities are used to support end users?**

    See Section 16-5a.

20. Explain the DBA's managerial role in the definition and enforcement of policies, procedures, and standards.

See Section 16-5a.