MANAGEMENT INFORMATION SYSTEMS 8/E

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Chapter 9

The Database and Database Management System

Objectives

- Be familiar with the essentials of data management.
- Understand how applications determine the type of information processing.
- Understand file organization.
- Know the impact of technology on the advances of data management and database management systems.
- Be able to explain the relationship between organizations with few managerial levels and the need for widespread understanding of database concepts.
- Know the benefits of database management systems

OBJECTIVES

- Be familiar with the ingredients of data management – how data is organized, stored, accessed and used
- Be familiar with how the database concept evolved and its influence on computer

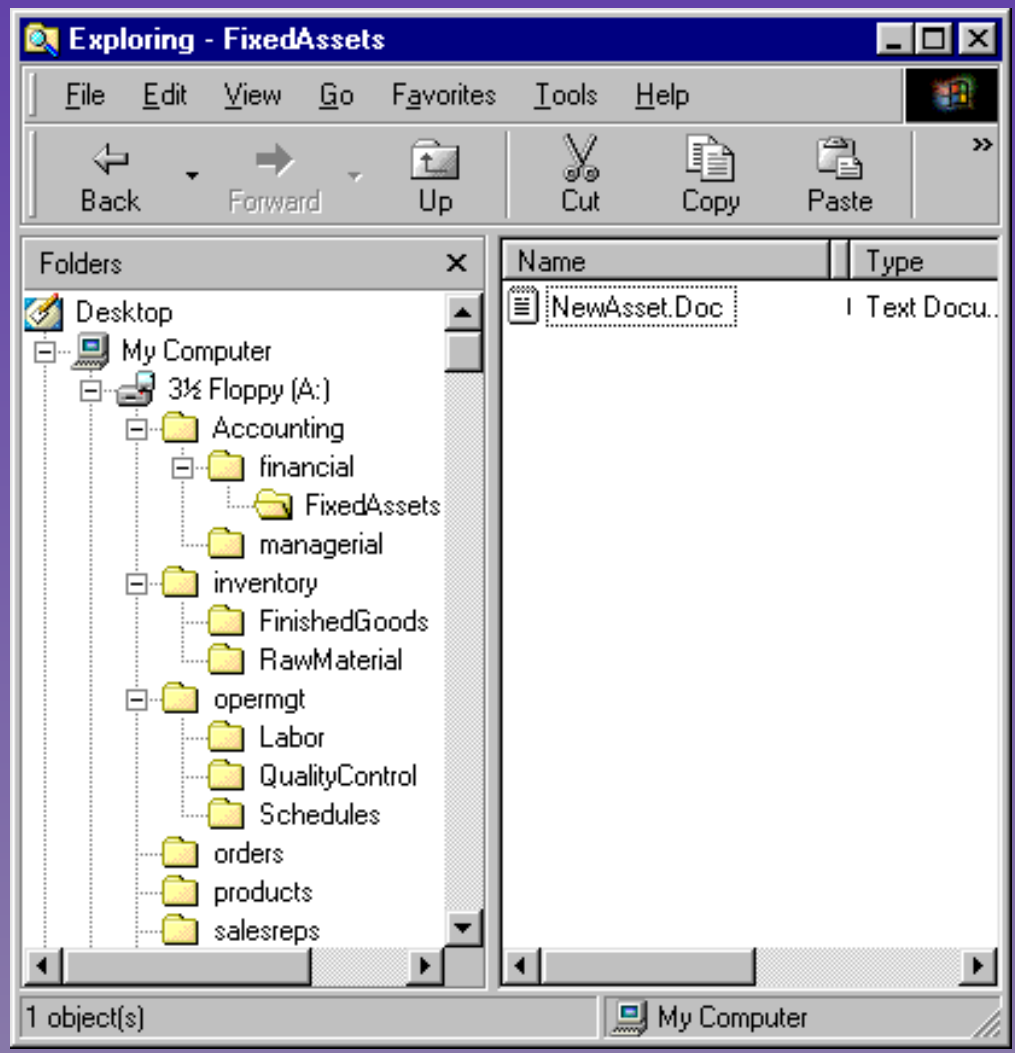
Data Organization

- Data Field
  - Smallest unit of data
- Record
  - Collection of related fields
- File
  - Collection of related records

Data Organization (cont.)

- Folders
  - Collection of related files
  - Conceptually similar to a branch of the tree
- Subfolder
  - A folder within a folder
- Movement of folders using GUI

Organization of Data into Folders



Common Models for Organizing Data Files

1. Function
2. Frequency of Use
3. Users
4. Projects

Fundamental Building Blocks for Database Structures

1. Data Value
2. Data Field
3. Data Record
4. Data File

Spreadsheet as a Simple Database

- Rows and columns of a spreadsheet can be regarded as a simple database
- Flat files
  - Does not have repeating columns
  - Spreadsheet table is a file and column is a field
- Key fields
  - Contains a value to uniquely identify each record in a table

Data Structure vs. Spreadsheet Terminology

Spreadsheet Term	Data Structure Term
Table	File
Column	Field
Row	Record

Database Structures

- Database
  - All data stored on computer-based resources of the organization
- Database Management System (DBMS)
  - Software application that stores the structure of the database, the data itself, relationships among the data in the database, as well as forms and reports pertaining to the database

Database Structures (cont.)

- Hierarchical structure
  - Uses the ‘parent / children’ concept
  - Limitation: Cannot handle ad hoc requests
  - First DBMS was IDS by GE in 1964
  - CODASYL
- Network structure
  - Allow given record to point back to any other record in the database
  - Specification released by CODASYL in 1971
  - Solves problem of having to backtrack through data

Database Structures (cont.)

- Relational structure
  - Rows and columns
  - Frees designers from need to specify relationships prior to building the database
  - Date and Codd described structure
  - Does not rely on physical relationships
  - Easy to understand

Relational Database Vendors

1. IBM
2. Informix Software, Inc.
3. Microsoft
4. Oracle
5. Sybase

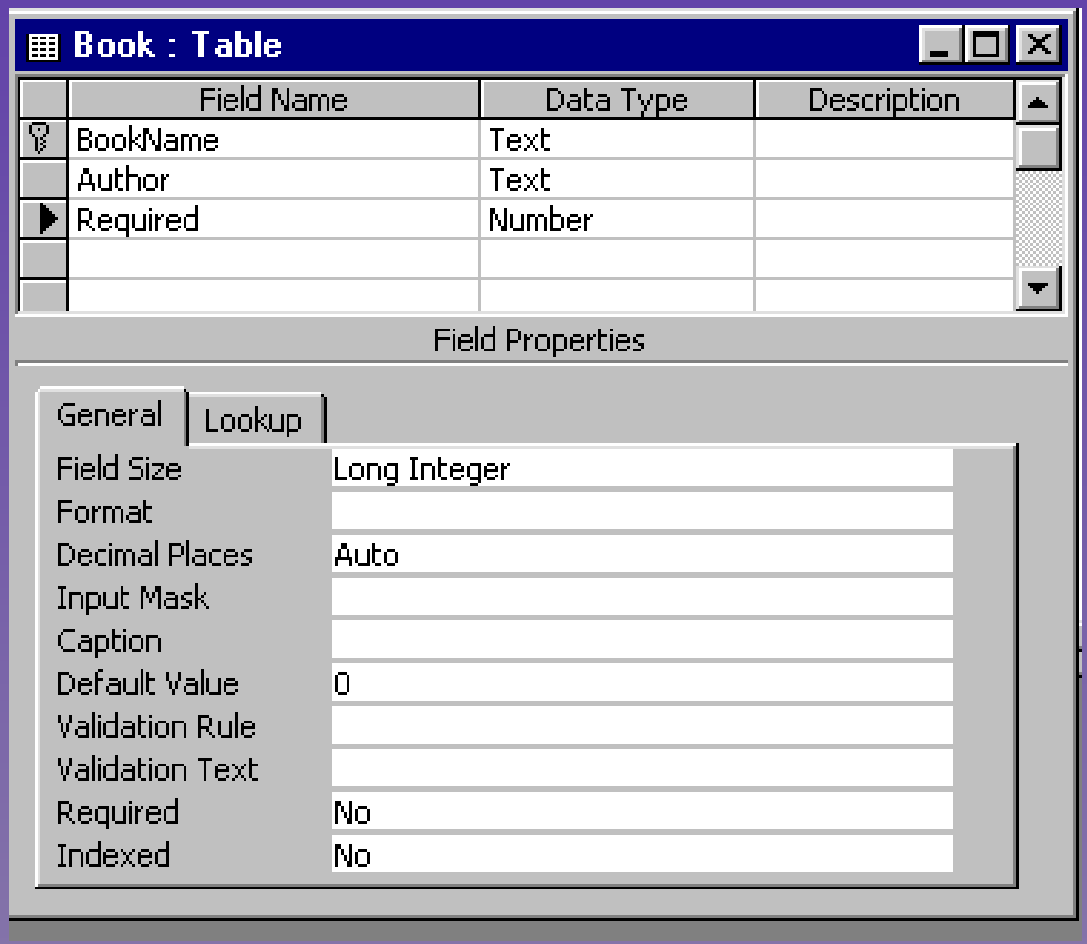
The Database Concept

- Database concept
  - Logical integration of records in multiple files
- Data redundancy
  - Duplication of data
- Data inconsistency
- Data independence
  - Keep data specifications separate from programs, in tables and indexes

Tables

Book Name	Author	Required
Banking Principles	Knox	25
Management Information Systems 8E	McLeod and Schell	75
Personal Sales Techniques	Wei	70
Quality Service, Quality Customer	Brutus	54

Description of Book Table



Description of Student Table

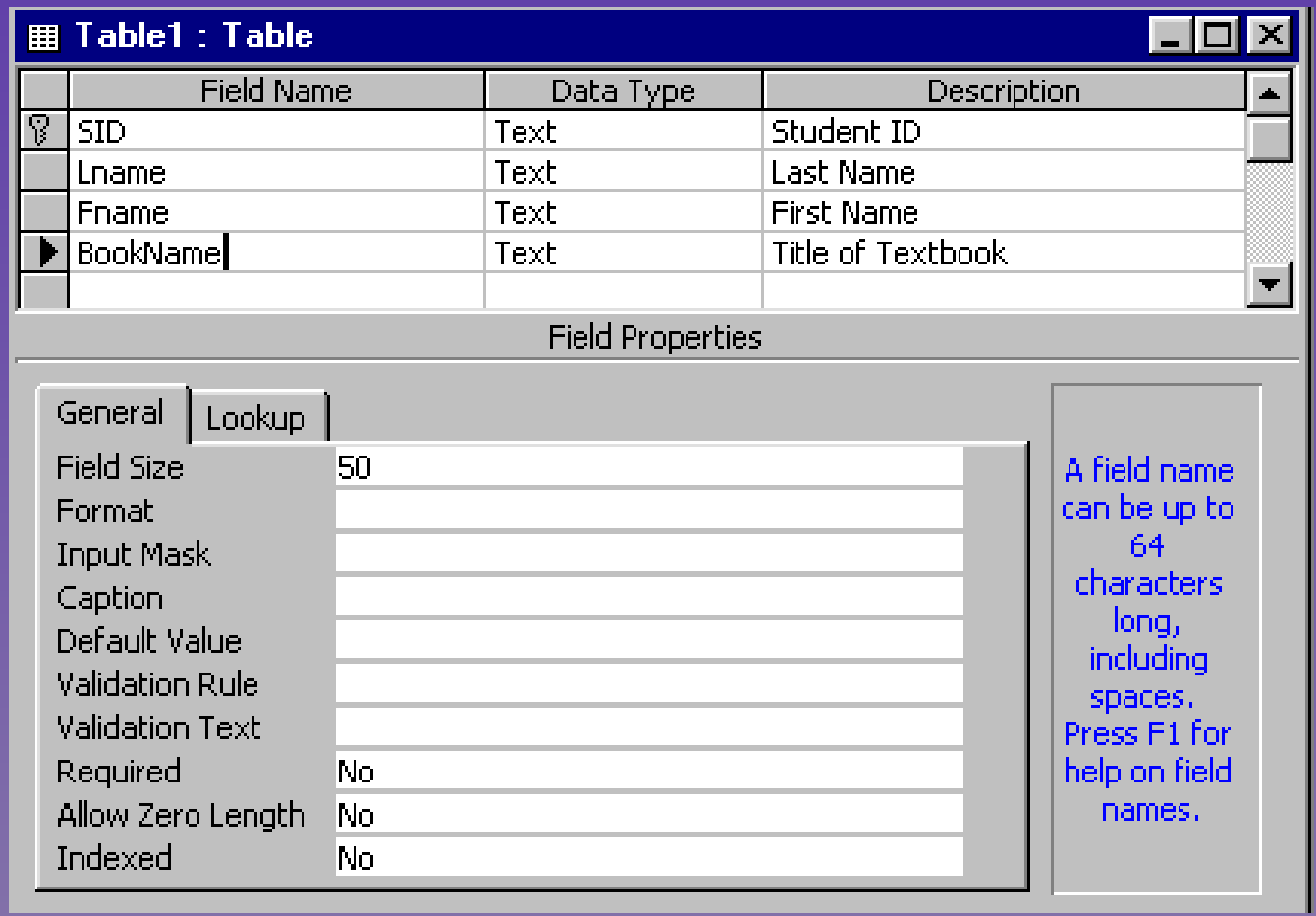
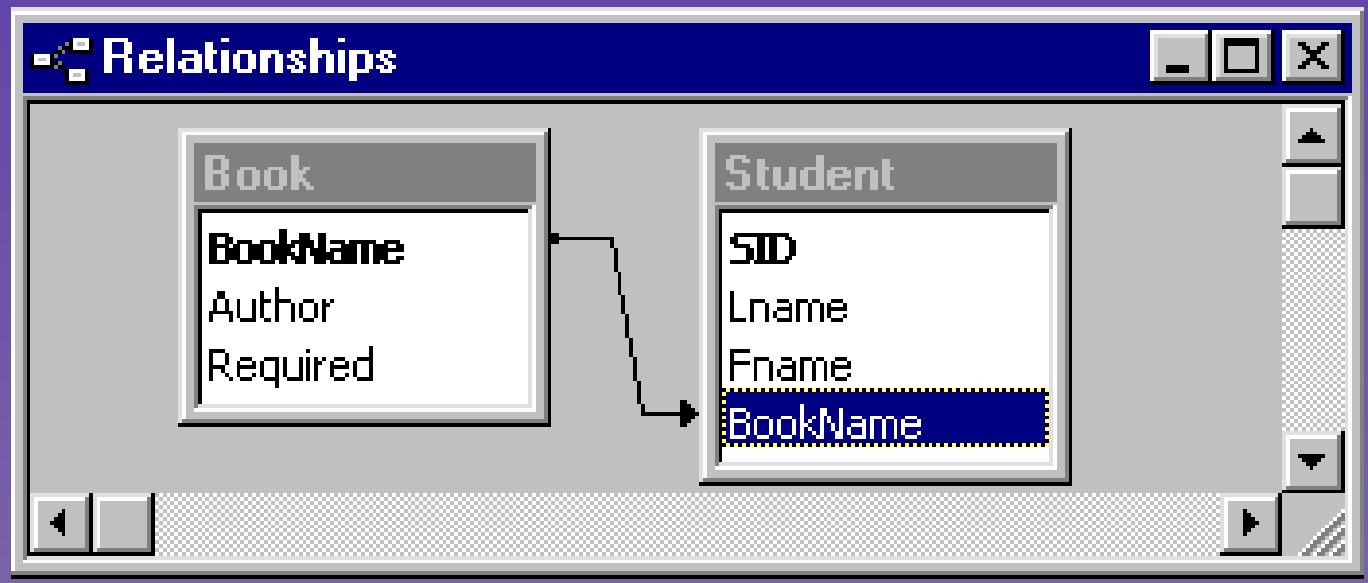
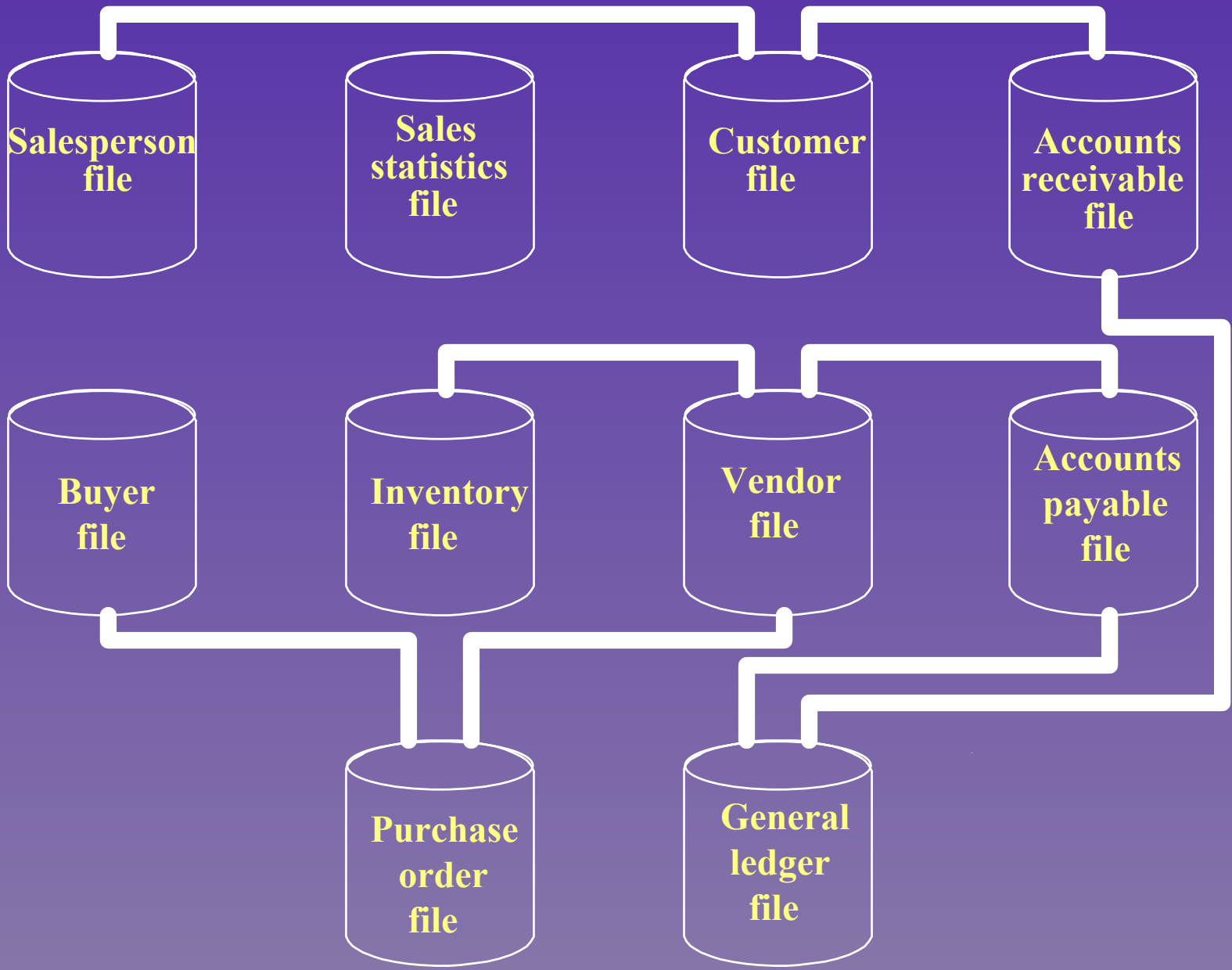


Table Relationships





A Database Consists of One or More Files

Evolution of Database Software

- GE's IDS first example
  - Used with COBOL
- IBM's IMS
  - Apollo project
- Interface Issues
  - Intel's System 2000, RAMIS, IDMS, Inquire
  - Query language interface

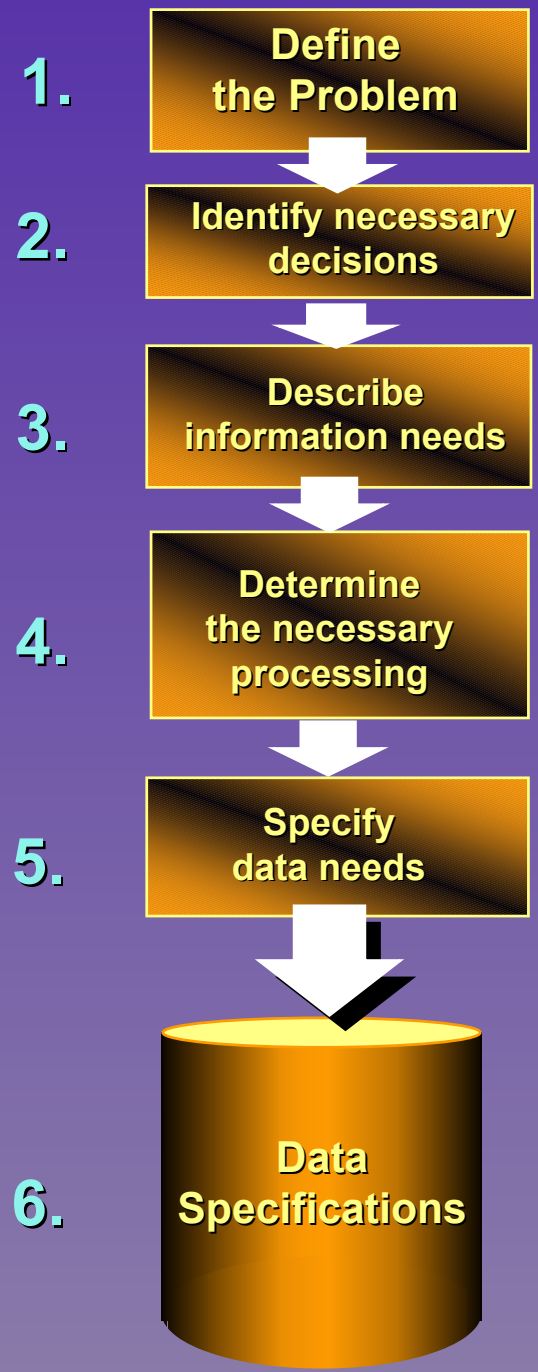
Evolution of Database Software (cont.)

- SEQEL from IBM
  - Continuation of IMS
- Renamed SQL
  - Structured Query language
  - Embedded within traditional language
  - Standalone
- PC database packages
  - dBase II
  - MS-Access

Creating a Database

- Two approaches:

1. Process oriented approach (problem-solving)
2. Enterprise modeling



Data Needs Can Be Defined by Taking a Problem-Oriented Approach

Strategic Planning for Information Resources

1. Create enterprise data model

2.

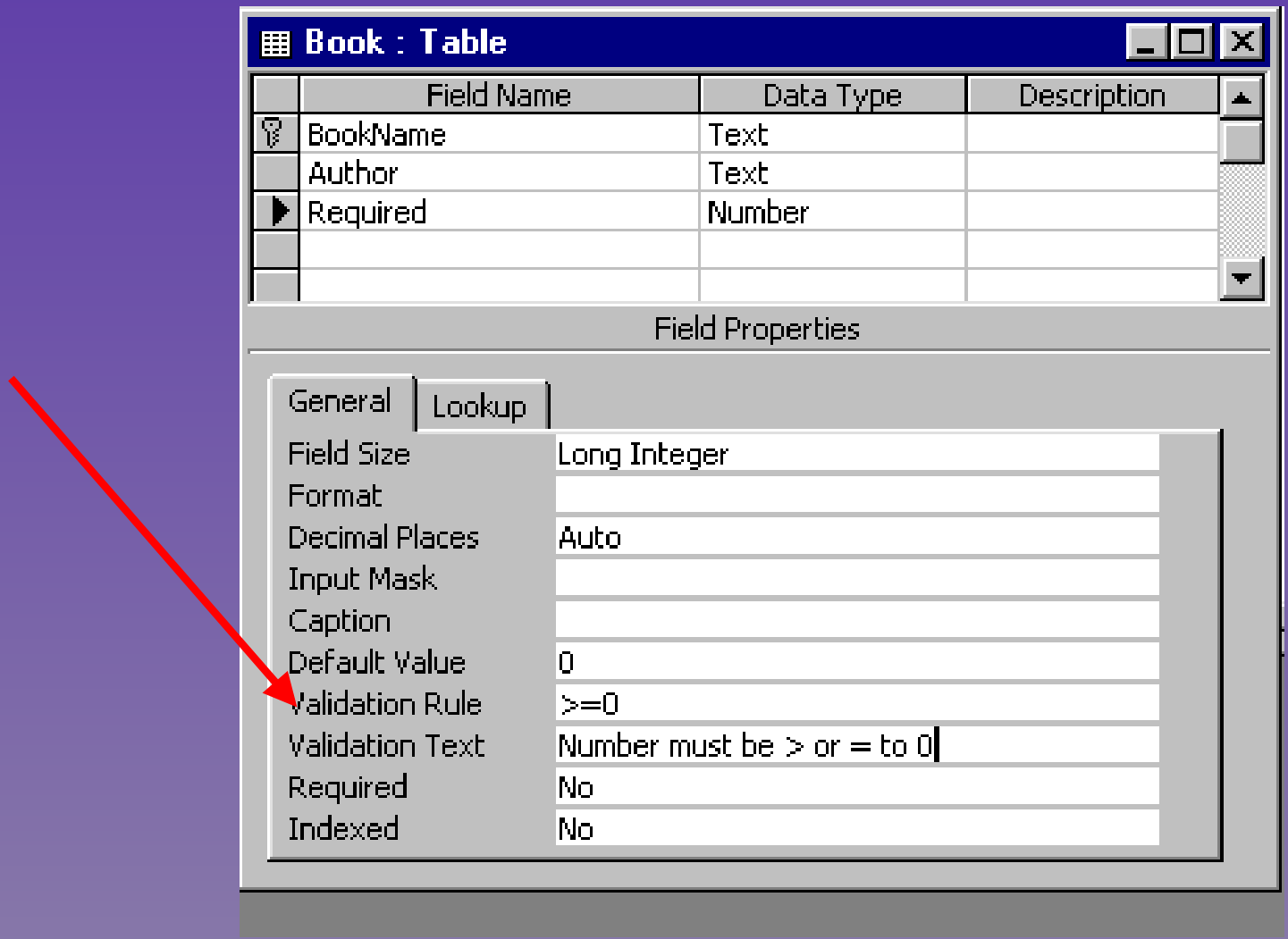
Data Needs Can Be Defined by Creating an Enterprise Model

Describing the Database Contents

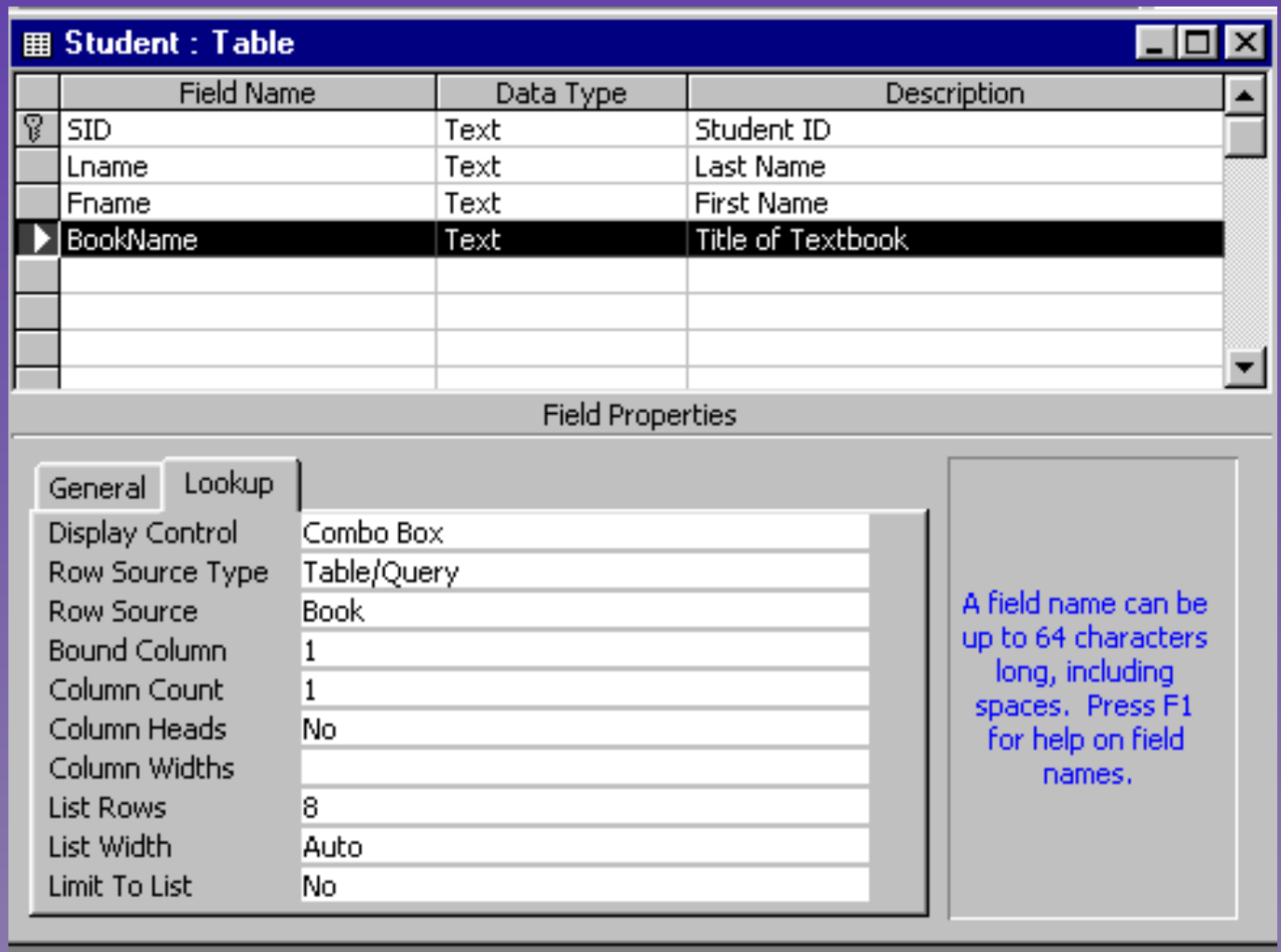
Schema

- Data field name
- Aliases (other names used for same data field)
- Type of data (numeric alphabetic)
- Number of positions
- Number of decimal positions
- Various integrity rules

Rule for Required Field



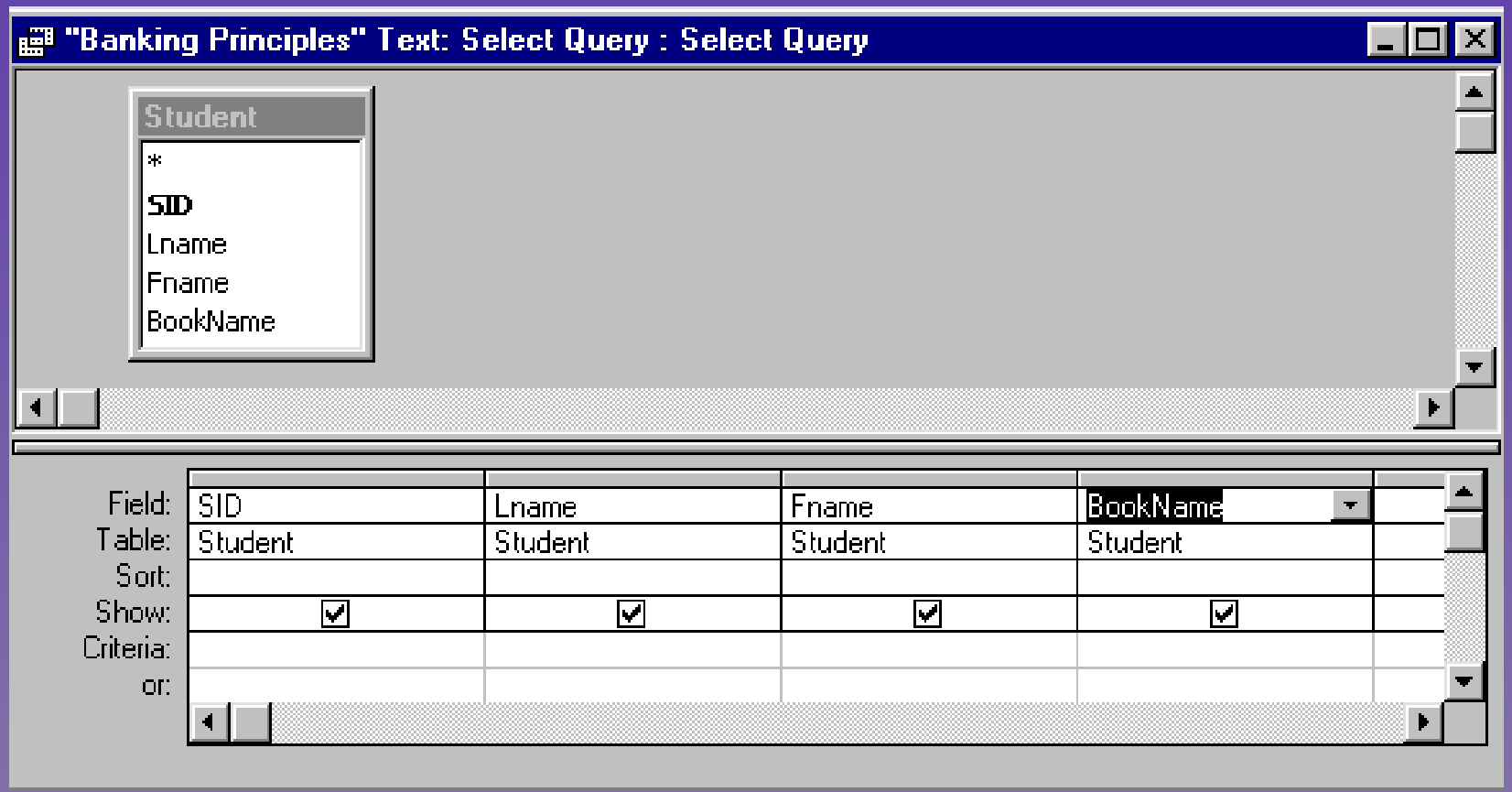
Enforcing Value of BookName



Creating a Database

- 1) Describe the data
- 2) Enter the data
- 3) Use the database
  - Query language
  - Query-by-example
  - Data manipulation language (DML)

Query-by-Example



On-Line Analytical Processing (OLAP)

- Feature to enable data analysis similar to statistical cross-tabulation
- Information can be generated from within DBMS
- No need for separate statistical software

Example OLAP Output

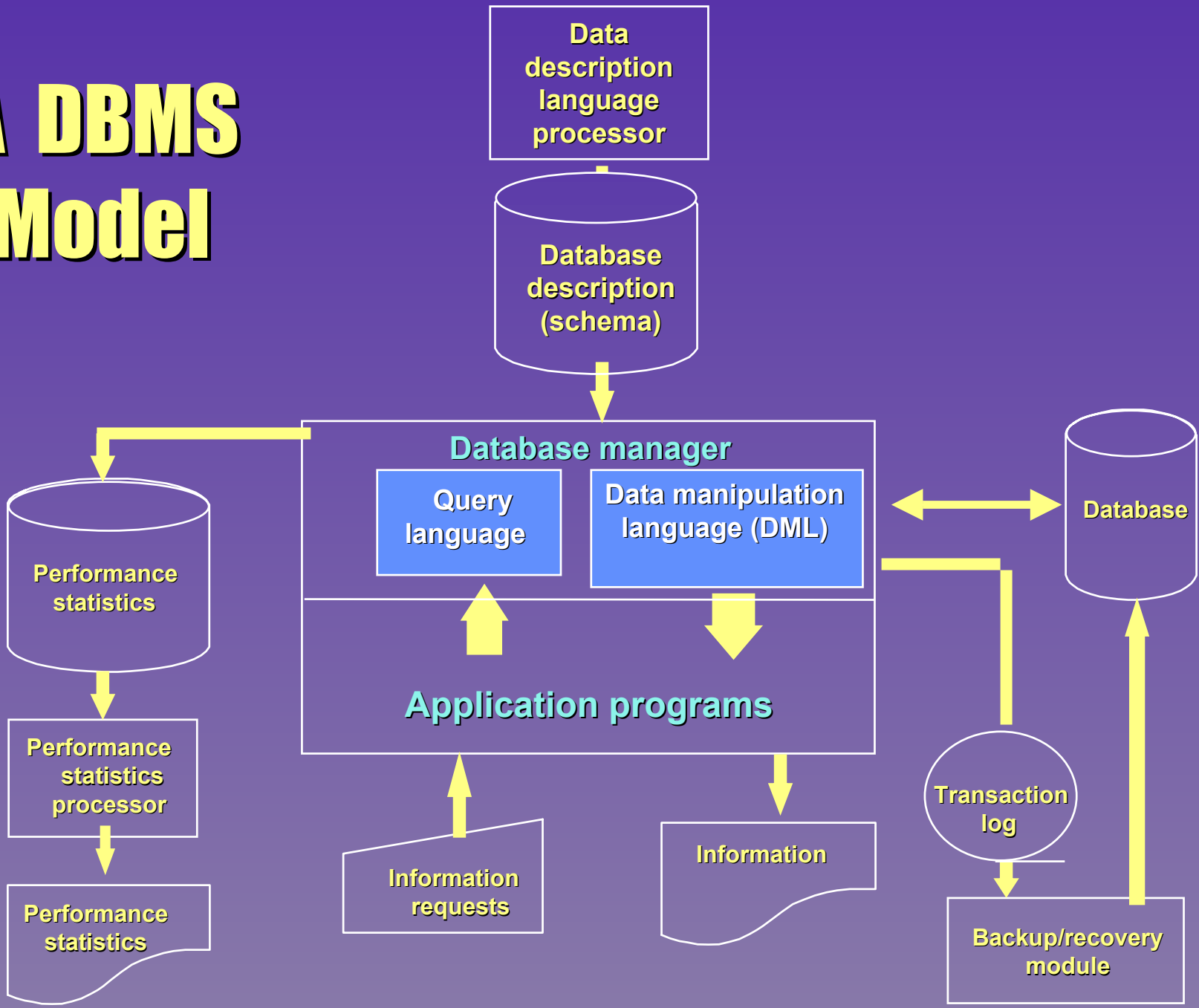
		Marital Status	
		Married	Single
Payment Method	Cash	$752	$849
	Credit	$1,277	$2,019
	Check	$283	$165

The Database Administrator (DBA)

D B A Duties

- Database planning; work with users and others, define schema, etc.
- Database implementation; creating the database and enforcing policies and procedures
- Database operations
- Database security

A DBMS Model


Data description language processor
Database description (schema)
Database manager
Query language
Data manipulation language (DML)
Application programs
Database
Performance statistics
Performance statistics processor
Performance statistics
Information requests
Information
Transaction log
Backup/recovery module

Knowledge Discovery in Databases (KDD)

- Data warehousing
  - refinement in the database concept to make it
    - » very large
    - » very pure
    - » ***very retrievable***
- Data mart
  - a more modest approach than data warehousing, generally only one segment of the firm

Knowledge Discovery in Databases (KDD) (cont.)

- Data mining
  - the process of finding relationships in data that are unknown to the user
  - may be for
    - » verification
    - » discovery
    - » combination of verification and discovery

The Knowledge Discovery in Database (KDD) Process

1. Define the data and the task
2. Acquire the data
3. Clean the data
4. Develop the hypothesis and search model
5. Mine the data
6. Test and verify
7. Interpret and use

DBMS Advantages

- Reduce data redundancy
- Achieve data independence
- Enable integration of data from multiple files
- Retrieve data and information quickly
- Improve security

DBMS Disadvantages

Requires a firm to:

- Obtain expensive software
- Obtain a large hardware configuration
- Hire and maintain a DBA staff

Summary

- Organizations are storing vast amounts of data
- Organization and structures in database
  - Dominated by relational
- Staff positions
  - DBA
- Knowledge discovery in databases
- Database management systems

Case Study

1. Key fields uniquely identify a record.

A)TRUE B)FALSE

2. A query language enables users to access a database without needing a traditional computer programming language.

A)TRUE B)FALSE