Chapter 11A

Database Management Systems

Database Management Systems

• Database management system (DBMS)
• Store large collections of data
• Organize the data
• Becomes a data storage system

The Database

• Stores a collection of related items
• Collection is arranged in a structure
  – Organizes and describes the data
• Often includes helper documents
• Two different types
The Database

Field Name
Field
Record

Database Structure

The Database

• Fields
  – Hold an individual piece of data
  – Are named descriptively
  – Often called a column
  – Phone book examples
    • Name, address, e-mail, phone number
  – Fields may contain no data

• Records
  – One full set of fields
  – Often called a row
  – Phone book example
    • Smith, Joe, 123 Some Street, 412-555-7777
  – Databases may have unlimited rows
The Database

- **Tables**
  - One complete collection of records
  - Databases may have thousands of tables

Database Helper

- **Forms**
  - Present one record to the user
  - Often used to change or view data

- **Reports**
  - Produce printed results from the database
  - Includes tools to summarize data
Flat-file Databases

- Typically has only one table
  - If multiple, each has a separate file
- Useful for simple data storage needs
- Hard to manage large data needs
- Can waste disk space

Relational Databases

- Made of two or more tables
- Tables are related by a common field
  - Called a relationship or join
  - Can help organize data
- Most common form of database
- Maintaining data is easier than flat-file
- No wasted disk space

The DBMS

- Programs that control the database
- Allows
  - Entering data
  - Querying data
  - Printing reports
- Supports thousands of users
- Includes tools to protect the data
Working with a Database

- Creating tables
  - List the necessary fields
  - Steps to define a field
    - Descriptively name the field
    - Specify the field type
    - Determine the field size

- Field types
  - Describes the type of data stored
  - Most DBMS use the same types
    - Text fields store letters and numbers
    - Numeric field store numbers
    - Date and time field
    - Logical field stores yes or no
    - Binary field stores images or sounds
    - Counter field generates sequential numbers
    - Memo fields store large amounts of data

- Entering data into a table
  - Users type data into a field
  - Data must be entered accurately
    - Constraints help to verify data
  - Forms are typically used for data entry
Working with a Database

• Viewing records
  – Datasheet view shows all records
  – Filters can limit the records shown
    • Display only records matching a criteria
  – Forms allow viewing one record

• Sorting records
  – Order records based on a field
  – Multiple sub sorts resolve ‘ties’
  – Several types of sorts
    • Alphabetic
    • Numeric
    • Chronological
    • Ascending
    • Descending

• Querying a database
  – Statement that describes desired data
  – List of fields can be modified
  – Uses of querying
    • Find data
    • Calculate values per record
    • Delete records
  – Most important DBMS skill
Working with a Database

• Query languages
  – All DBMS use a query language
    • Most DBMS modify the language
  – Structured Query Language (SQL)
    • Most common query language
  – xBase
    • Query language for dBase systems
  – Query by example (QBE)
    • Interface to SQL or xBase
    • Interactive query design

Query Examples

• SQL
  Select FirstName, LastName, Phone
  From tblPhoneNumbers
  Where LastName="Norton";

• xBase
  Use tblPhoneNumbers
  List FirstName, LastName, Phone
  For LastName="Norton"

Working with a Database

• Generating reports
  – Printed information extracted from a database
  – Can calculate data
    • Calculate data per row
    • Calculate for entire table
  – Pictures and formatting can be included
Enterprise Software

- Enterprise definitions
  - Systems throughout the entire organization
  - Very large scale computer systems
  - Historically found on mainframes
  - Modern enterprise runs on PC servers
Enterprise Software

- Suite of programs
- Handles thousands of users at once
- Access to millions of records
- Looks and acts like a DBMS

Enterprise Software

- Distributed applications
  - Software installed on several machines
  - Data stored on several machines
    - Data placed closest to appropriate users
  - Work load is balanced among machines

Enterprise Software

- Tiers
  - Software between user and data
  - Tiers control one part of enterprise
  - Two tier systems
    - Data storage
    - Client interface
  - Three tier systems
    - Add calculation
  - There is no limit to the tiers
Enterprise Software

- Meet the needs of many users
  - Applications are very complex
  - Support many types of users
  - Supports many different nationalities
  - Must support large data flow

Enterprise Software

- Electronic document management
  - EDM
  - Tracks and organizes documents
  - Collaboration between team members
  - Database tracks all changes

Enterprise Software

- Disconnected databases
  - Connections are given a copy of data
  - Reduces the number of open connections
  - Reduces the data flow needs
  - May result in different versions of data
Databases at Work

- Required in nearly every business
- Can automate tasks
  - Increases business efficiency

Databases at Work

- Knowledge discovery
  - Technique of databases
  - Generates questions for the database
    - Those you did not think to ask

Databases at Work

- Data mining
  - Type of knowledge discovery
  - Searches for trends and patterns
  - Makes predictions on events
  - Supplies ideas for improving business
Databases at Work
• Internet uses
  – Commercial websites use databases
  – Supply image and price information
  – Specialty databases exist online
  – Search engines track links

Databases at Work
• Databases for individuals
  – Manage aspects of your life
  – Organizes hobbies for school
  – Microsoft Access is the most popular

Common Corporate DBMS
• Oracle
  – Most popular enterprise-level DBMS
  – Very flexible storage system
  – Can be very complex
  – Platform independent
  – Offers a wide range of solutions
Common Corporate DBMS

- **DB2**
  - Venerable IBM database
  - Platform independent
  - Only database using pure SQL

Common Corporate DBMS

- **Microsoft SQL Server**
  - Fastest growing DBMS
  - Only runs on Microsoft platforms
  - Eight different versions exist
  - Extremely scalable architecture
    - Software can grow with the data

Common Corporate DBMS

- **MySQL**
  - Leading DBMS for Linux
  - Very inexpensive
  - Features are those needed in business
  - Often faster than other DBMS
  - Platform independent
Chapter 11B

End of Chapter