

Database

1. Db models aspects of the real world
(*miniworld, universe of discourse*)
2. Collection of *data*
 - logically coherent → *Information*
 - Meaningful
3. Designed for specific purpose

Uses of Database

- Traditional (Employee, student, product database)
- Online Shopping
- Search Engines
- Data Warehousing (OLAP)
- Data Mining
- Genetic Databases
- Geographical Information Systems

Types of Database

- Traditional
- Deductive Databases
- Multimedia Databases
- Distributed Databases
- Spatial Databases
- Object-Oriented Databases

Sizes of Database

- Personal (1 User), Megabytes
- Workgroup (<25 Users), Megabytes
- Department (25-100 Users), Gigabytes
- Enterprise (100-1000s), Gigabytes
- Internet (100-1000s), Terabytes

Database Management System (DBMS)

Software to

1. Define a database
(data types, structures, constraints)
2. Construct a database
(populate database with data)
3. Manipulate database
(query and update data in database)

Database People

- ✦ Database designers
- ✦ Application developers
- ✦ Database administrators
- ✦ Users

Database Environment

- Users
 - Administrators
 - System Developers
 - End Users
- Interface
 - Applications
 - User Interface
 - CASE tools
- Database System
 - Repository
 - DBMS
 - Database

See Figure 1.5 (page 17)

Sample Database

See Figure 2-12 (page 61)
Pine Valley Furniture (available from DLweb)

User Data

- Records, Fields (Columns)
- Data elements

Meta Data

- Data Types
- Relationships
- Indexes
- Application Metadata (Forms, Reports, etc.)

File Processing

File system is backbone of operating system

Example (file system for data storage):
Figure 1-3 (page 11)

Disadvantages of File Processing

- Program-Data Dependence
- Redundancy (Duplication of Data)
- Limitation on data sharing
- Development time
- Maintenance

Advantages of Databases

- Program-Data Independence
- Control of Data Redundancy
- Data Consistency
- Data Quality (constraints)
- Data Sharing (customized access through views)
- Improved Data Access
- Program Maintenance

Three Schema Architecture

Describe structure of data (relationships, behavior) at different levels of abstraction.

External

high-level user view

Conceptual

view of data administrator

Internal

Logical: structure of data for DBMS

Physical: storage details (indexes) for DBMS

Data Models

Conceptual/External
ER-model (Entity-Relationship)

Logical
Relational data model
Object data model
Network data model
Hierarchical data model

Physical
Frame-memory model

ER-modeling

Describes **entities**, their **relationships**, and **attributes**

Used for designing and analyzing a database

Examples: Figure 1-4, page 13
Figure 2-16, page 68

Relational Data Model

Data in tables (extensional representation of relation)
Models relationship between data in tables

Example: Figures 5-3, 5-4, pp 191/192

Database Languages

DDL: Data definition language
defines data types, tables
includes DSL (Data storage language)
DML: Data Manipulation Language
language for retrieving and manipulating data

Types:
high-level (nonprocedural, declarative): SQL
low-level (procedural)

Class Outline

Intro to Databases (Chapter 1)
Relational Database Model (Chapter 5)
SQL (Chapters 7 and 8)
ER Model (3 and 4)
Forms and Reports
Advanced Topics
