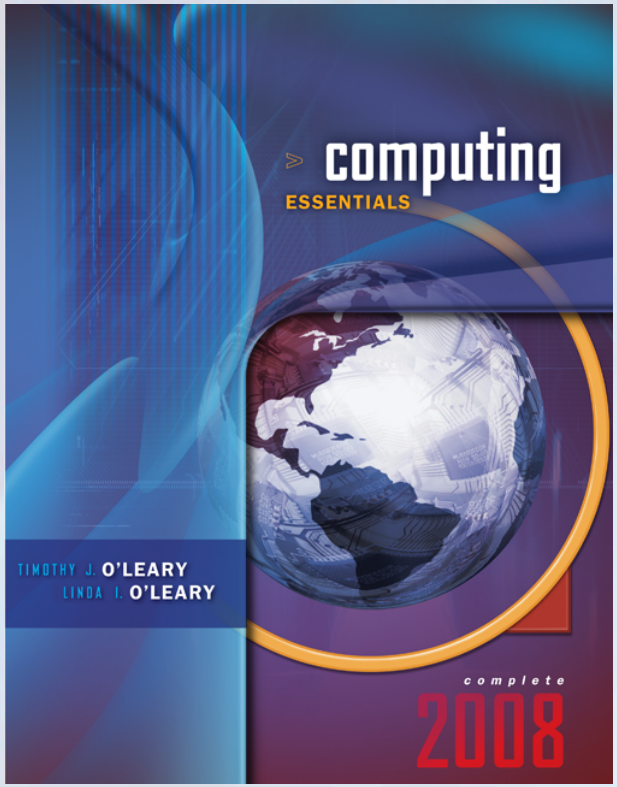
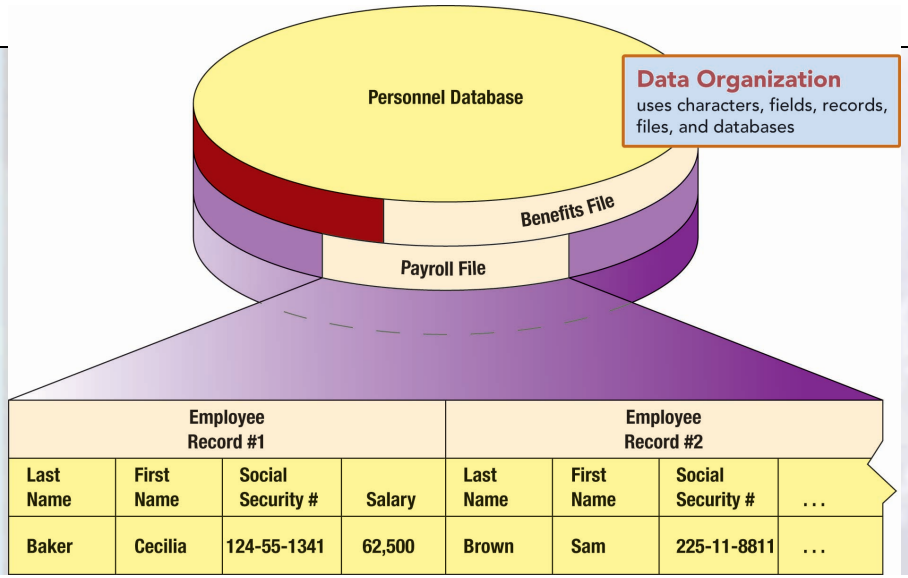


Chapter 12

Databases

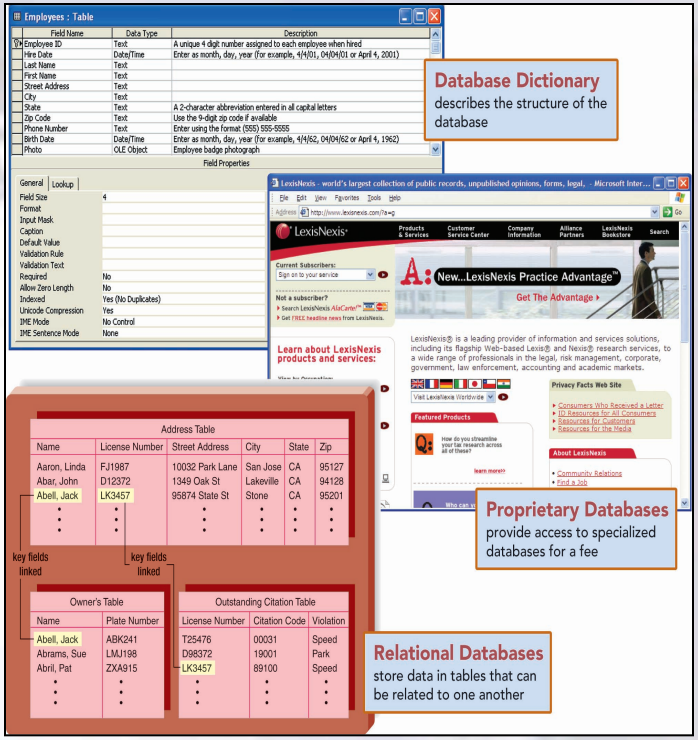
Competencies (Page 1 of 2)

- Distinguish between the physical and logical view of data
- Describe how data is organized: characters, fields, records, files, and databases
- Describe databases, database issues, and database management systems (DBMS)



Competencies (Page 2 of 2)

- Describe five data models: hierarchical, network, relational, multidimensional, and object-oriented
- Distinguish among individual, company, distributed, proprietary, and Web databases
- Recognize strategic database uses and security concerns



Introduction to Databases

Much like a library, secondary storage is designed to store information.

End users need to understand how such stored information is organized using data field, records, files and databases.

There are different types of databases and structures.

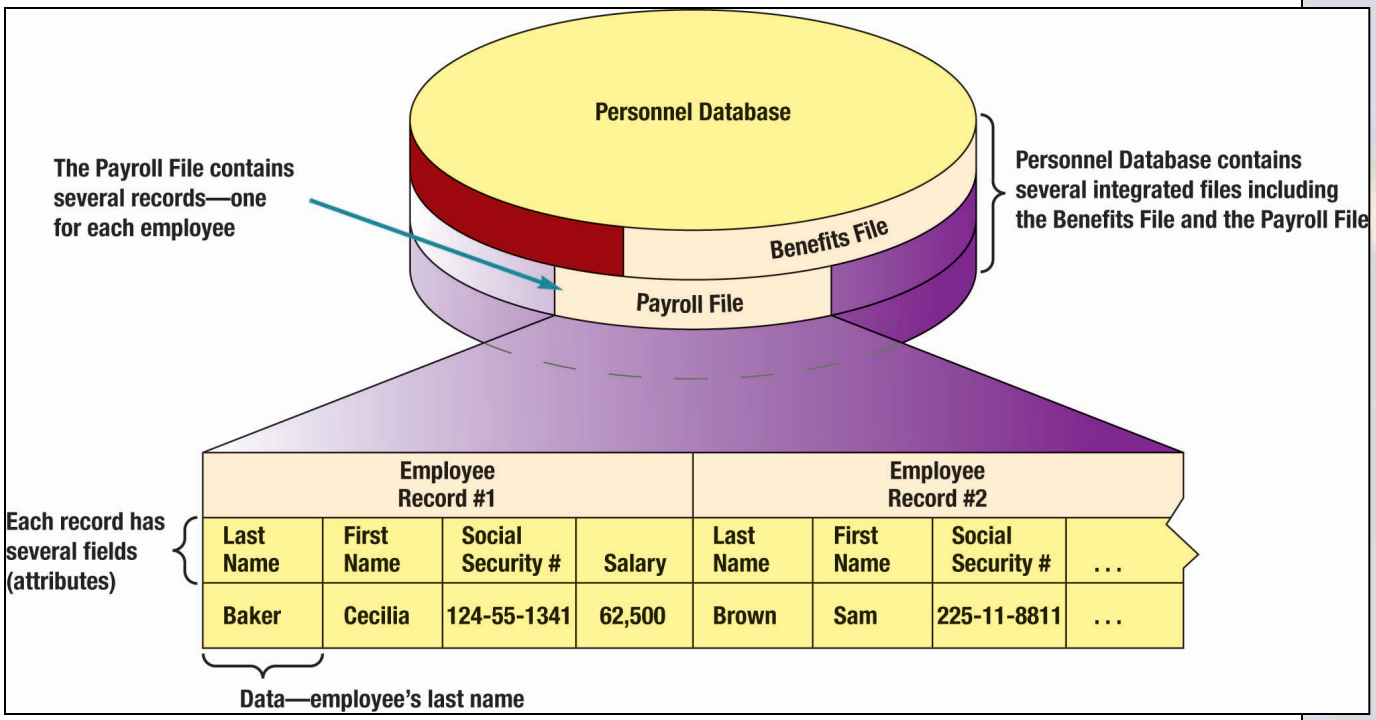
To be a competent user of information in the information age end users need to be able to find information that is stored in databases.

Data

- Examples of data include:
  - Facts or observations about people, places, things, and events
  - Audio captured, music captured, photographs and video
- Two ways to view data
  - Physical view
  - Logical view

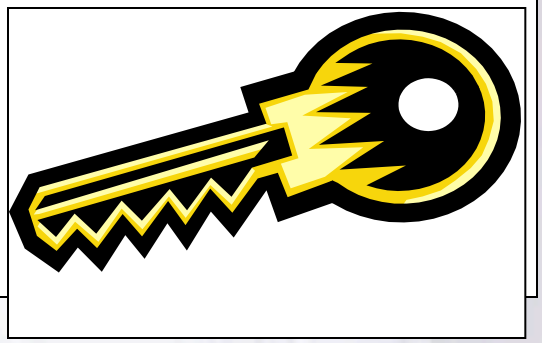
Data Organization

- Character
- Field
- Record
- File
- Table
- Database
- Key Field
- Batch Versus Real-Time Processing



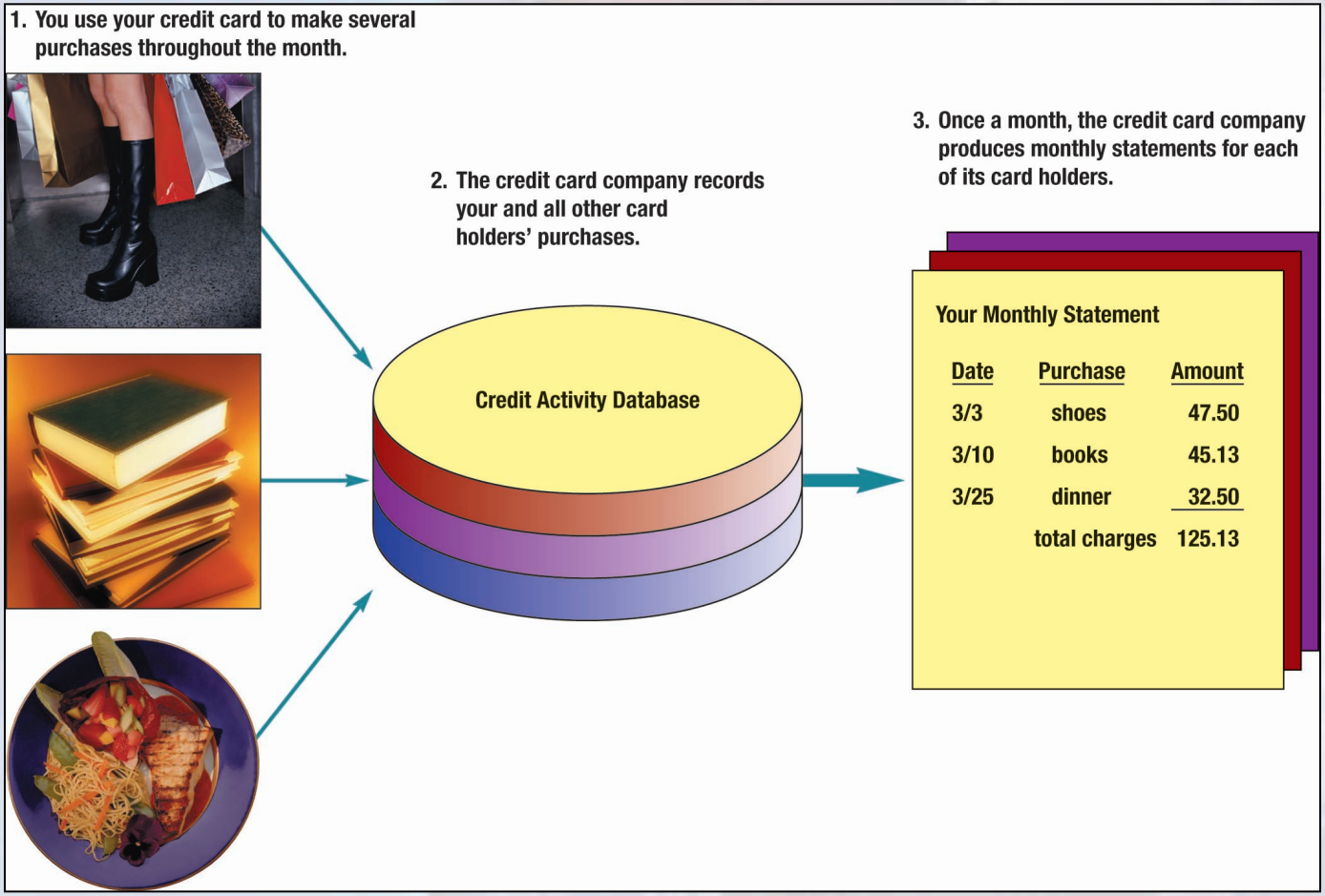
Key Field

- Unique identifier also known as primary field
- Common examples
  - Social security number
  - Student Identification Numbers
  - Employee Identification Numbers
  - Part Numbers
  - Inventory Numbers



Batch Versus Real-time Processing (Page 1 of 2)

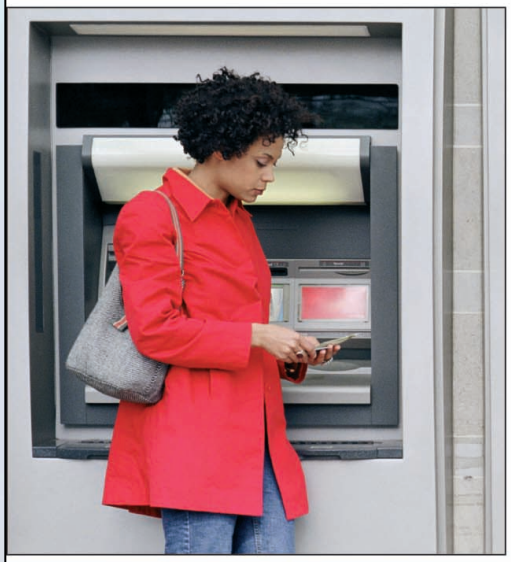
Batch processing -- data is collected over a period of time and the processing happens later all at one time



Batch Versus Real-Time Processing (Page 2 of 2)

Real-time processing -- happens immediately when the transaction occurs

1. You request a $200 withdrawal at an ATM.

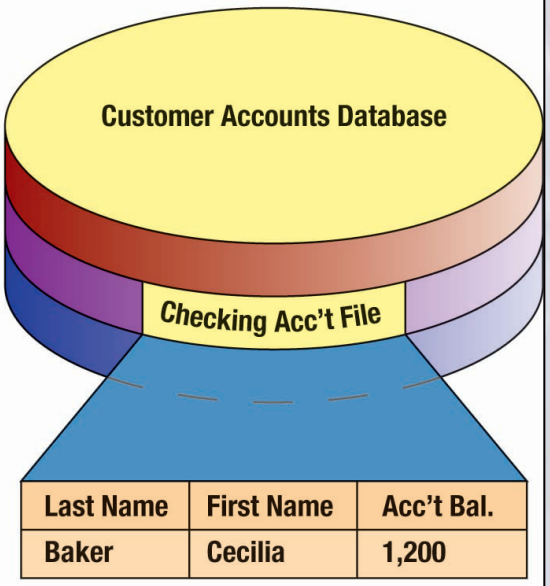


2. The ATM immediately sends the electronic request to your bank.

Request

Approval

3. The bank processes the request by first verifying that you have sufficient funds to cover the request.



Last Name	First Name	Acc't Bal.
Baker	Cecilia	1,200

4. The bank determines your account balance is $1,200.

5. The bank sends an electronic approval and reduces your account balance by $200.

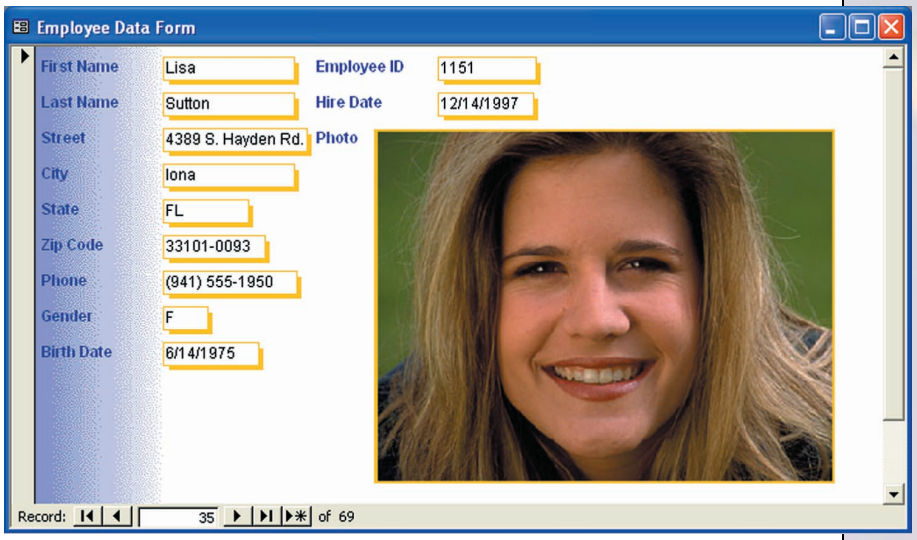
6. The ATM dispenses $200 to you.

Databases

- Collection of integrated data – logically related files and records
- Databases address data redundancy and data integrity
- Need for databases
- Database Management

Need for Databases

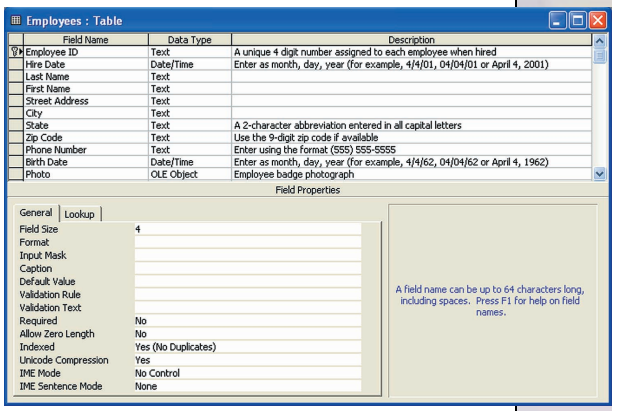
- Sharing
- Security
- Less data redundancy
- Data integrity
  - Accurate updating of info



Access data entry form

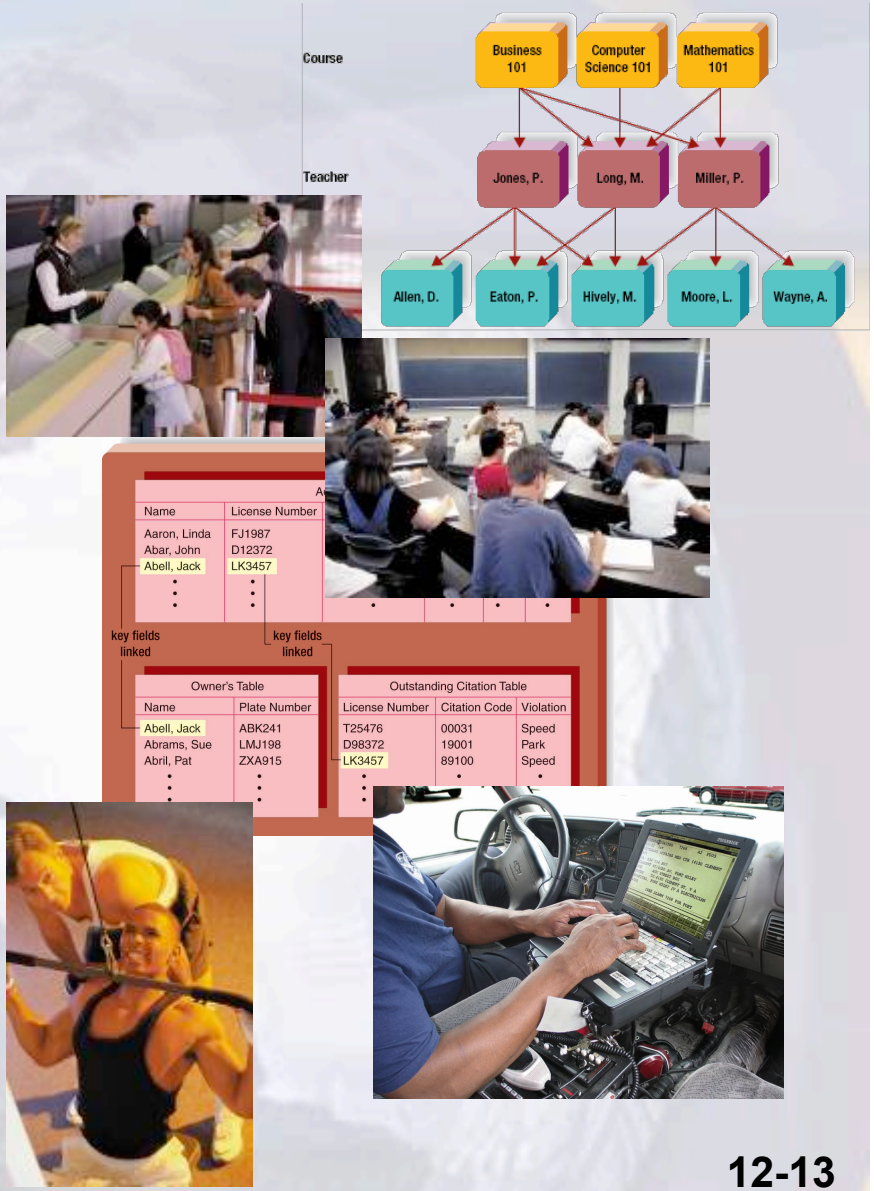
Database Management

- DBMS engine
- Data definition subsystem
- Data manipulation subsystem
  - Query-by-example
  - Structured query language (SQL)
- Application generation subsystem
- Data administration subsystem



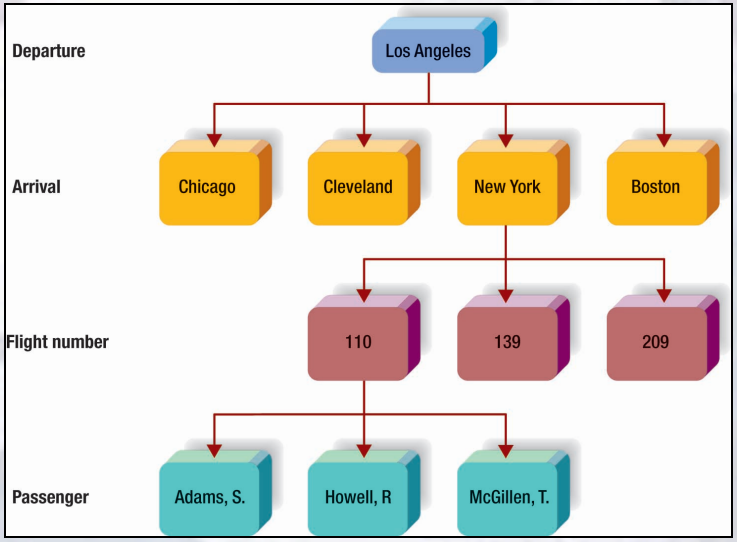
DBMS Structure

- DBMS programs are designed to work with data that is logically structured or arranged
- Data models define rules and standards for data in a database – the five widely used data models are:
  - Hierarchical database
  - Network database
  - Relational database
  - Multidimensional database
  - Object-oriented database



Hierarchical Database

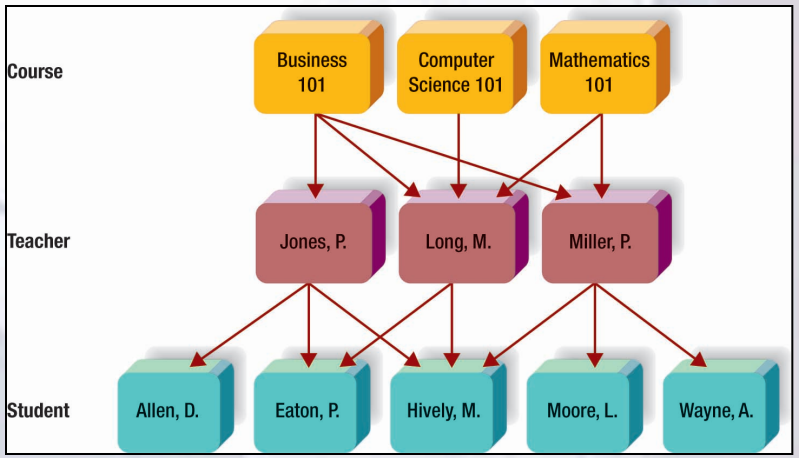
- Fields or records are structured in nodes
- Nodes are points connected like branches
- One parent per node
- Parent has several child nodes (one-to-many relationship)



Airline reservation system

Network Database

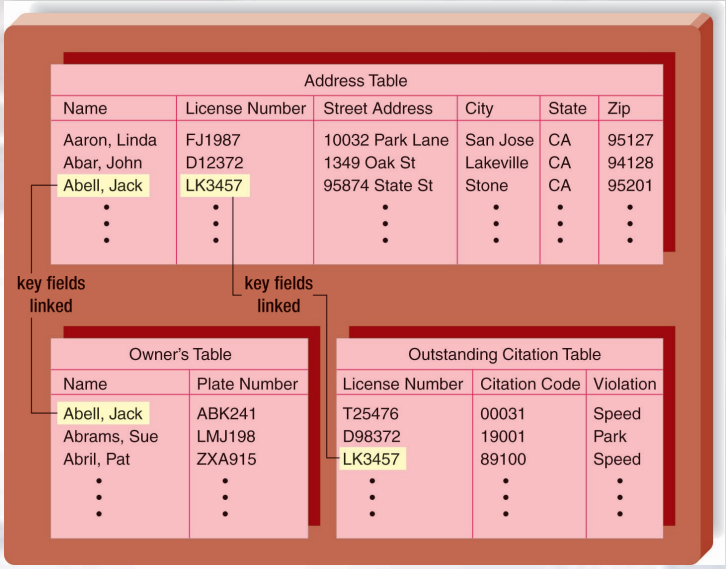
- Hierarchical node arrangement
- Each child node may have more than one parent node (Many-to-many relationship)
- Additional nodes are called pointers
- Nodes can be reached through more than one path



University Student System

Relational Database

- More flexible
- Data stored in table called a relation
- Tables consist of rows and columns
- Tables related via a common data item
- Easy to use

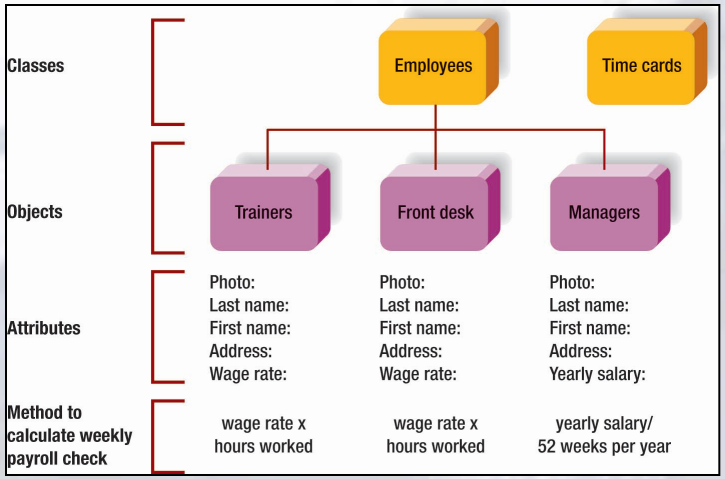


Multidimensional Database

- A variation and an extension of the relational model
- Includes a hyper cube
- Good for representing complex relationships
- Advantages over relational
  - Conceptualization
  - Processing speed

Object-Oriented Database

- **Works with unstructured data**
  - **Photographs**
  - **Audio**
  - **Video**
- **Objects contain both data and instructions**
- **Organize using objects, classes, entities, attributes, and methods**



Types of Databases

- Individual
- Company or shared
- Distributed
- Proprietary
- Web

Individual Databases

- Also called a microcomputer database
- Integrated file collection for one person usually under the person's direct control
- Generally stored on the user's hard-disk drive or on a LAN file server

Company or Shared Databases

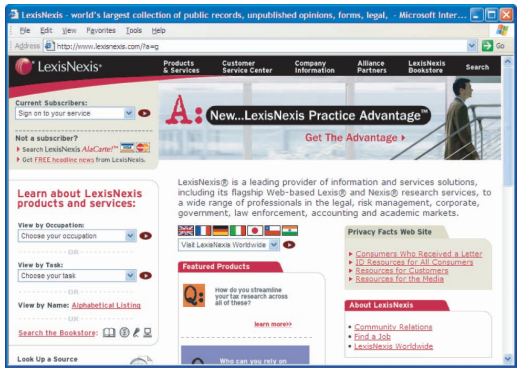
- May be stored on a mainframe and managed by a database administrator
- Provides access to users throughout a company
- 2 Types of company or shared databases
  - Common operational database
  - Common user database

Distributed Databases

- Database is located in a place or places other than where users are located
- Typically database servers on a client/server network provide the link between users and the distant data

Proprietary Databases

- Generally an enormous database developed by an organization to cover particular subjects
- Access is offered to the public or selected outside individuals for a fee
- Most proprietary databases are designed for organizational and individual use
- Also referred to as information utilities or data banks



Web Databases

- Distinguishing feature is that the database is available over the web
- Web search engines interact with databases
- Web databases incorporate special interface programs that create input forms, accept input, and send the data to the Web database

Type	Description
Individual	Integrated files used by just one person
Company	Common operational or commonly used files shared in an organization
Distributed	Database spread geographically and accessed using database server
Proprietary	Information utilities or databanks available to users on a wide range of topics for a fee
Web	Used by Web sites collecting data and search sites providing data

Database Uses and Issues

- **Strategic uses**
  - Special type of database called data warehouse
  - Data mining used to search database
- **Security**
  - Databases are valuable
  - Protection necessary

Electronic fingerprint pads

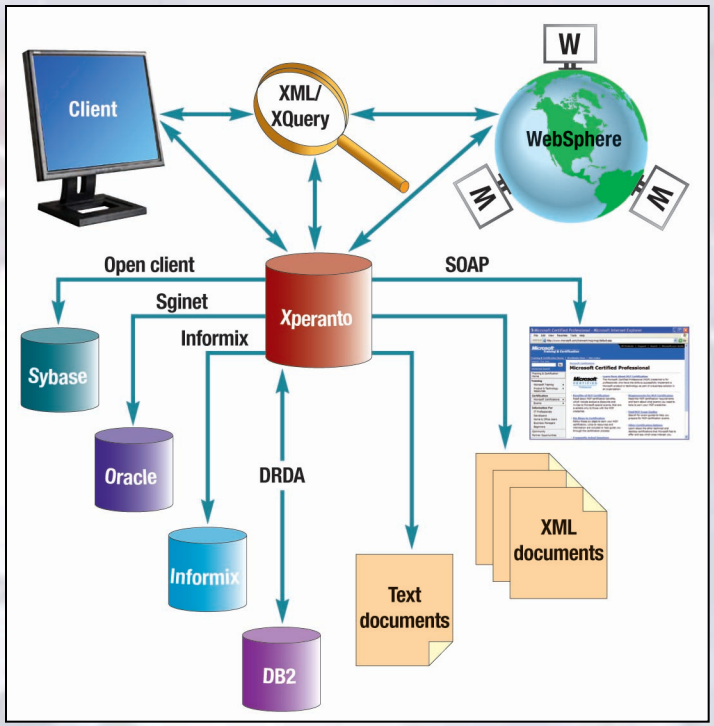
Careers In IT

- **Database administrators** determine the most efficient ways to organize and access a company's data
- Typically responsible for maintaining database security and backing up the system
- Employers look for individuals with a bachelors degree in computer science and technical experience

- Database administrators can expect to earn $44K - $81K annually

A Look to the Future
Xperanto

- Enhancement to searching for data
- Access to structured (relational databases) and unstructured data (word processing and spreadsheet files)



Discussion Questions (Page 1 of 2)

- **Describe the five logical data groups or categories.**
- **What is the difference between batch processing and real-time processing?**
- **Identify and define the five part of DBMS programs.**

Discussion Questions (Page 2 of 2)

- **What are the five types of databases? Why does more than one kind of database exist?**
- **What are some of the benefits and limitations of databases? Why is security a concern?**