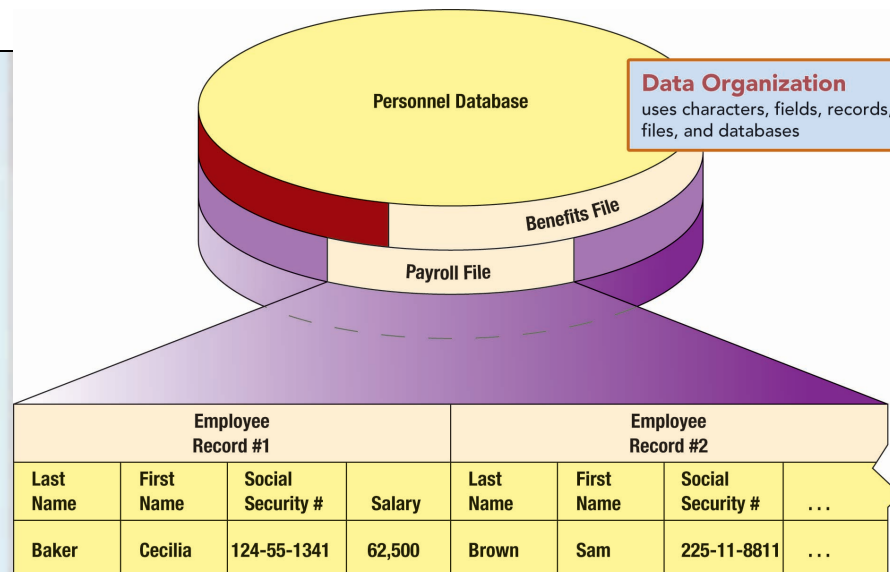


# Chapter 12

## 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

**Database Dictionary** describes the structure of the database

**Proprietary Databases** provide access to specialized databases for a fee

**Relational Databases** store data in tables that can be related to one another

Name	License Number	Street Address	City	State	Zip
Aaron, Linda	FJ1987	10032 Park Lane	San Jose	CA	95127
Abat, John	D12372	1349 Oak St	Lakeville	CA	94128
Abell, Jack	LK3457	95874 State St	Stone	CA	95201
.	.	.	.	.	.
.	.	.	.	.	.

Name	Plate Number
Abell, Jack	ABK241
Abrams, Sue	LMJ198
Abri, Pat	ZXA915
.	.
.	.

License Number	Citation Code	Violation
T25476	00031	Speed
D98372	19001	Park
LK3457	89100	Speed
.	.	.
.	.	.

# **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.**

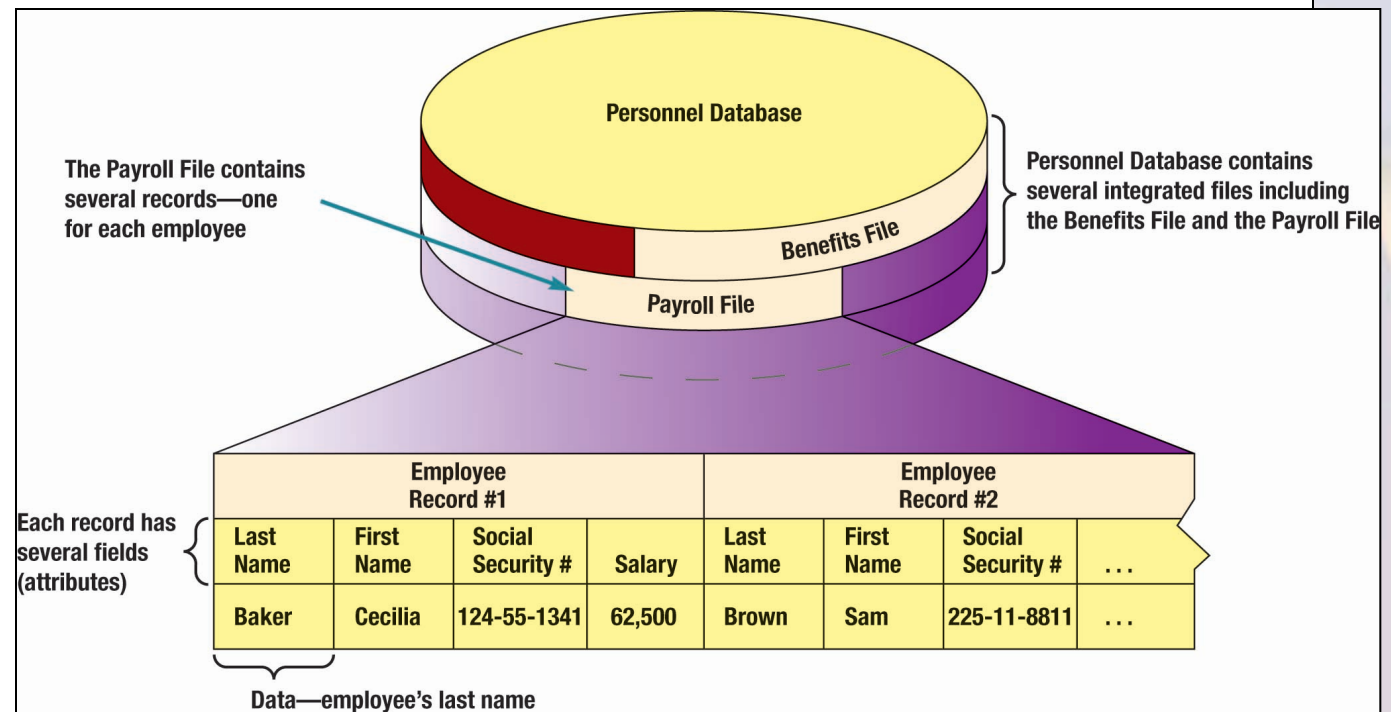
# Data

- **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**



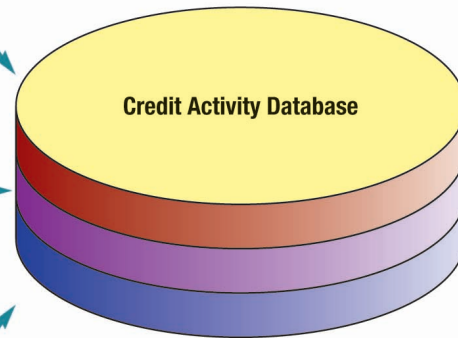
# Batch Versus Real-time Processing (Page 1 of 2)

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

1. You use your credit card to make several purchases throughout the month.



2. The credit card company records your and all other card holders' purchases.



3. Once a month, the credit card company produces monthly statements for each of its card holders.

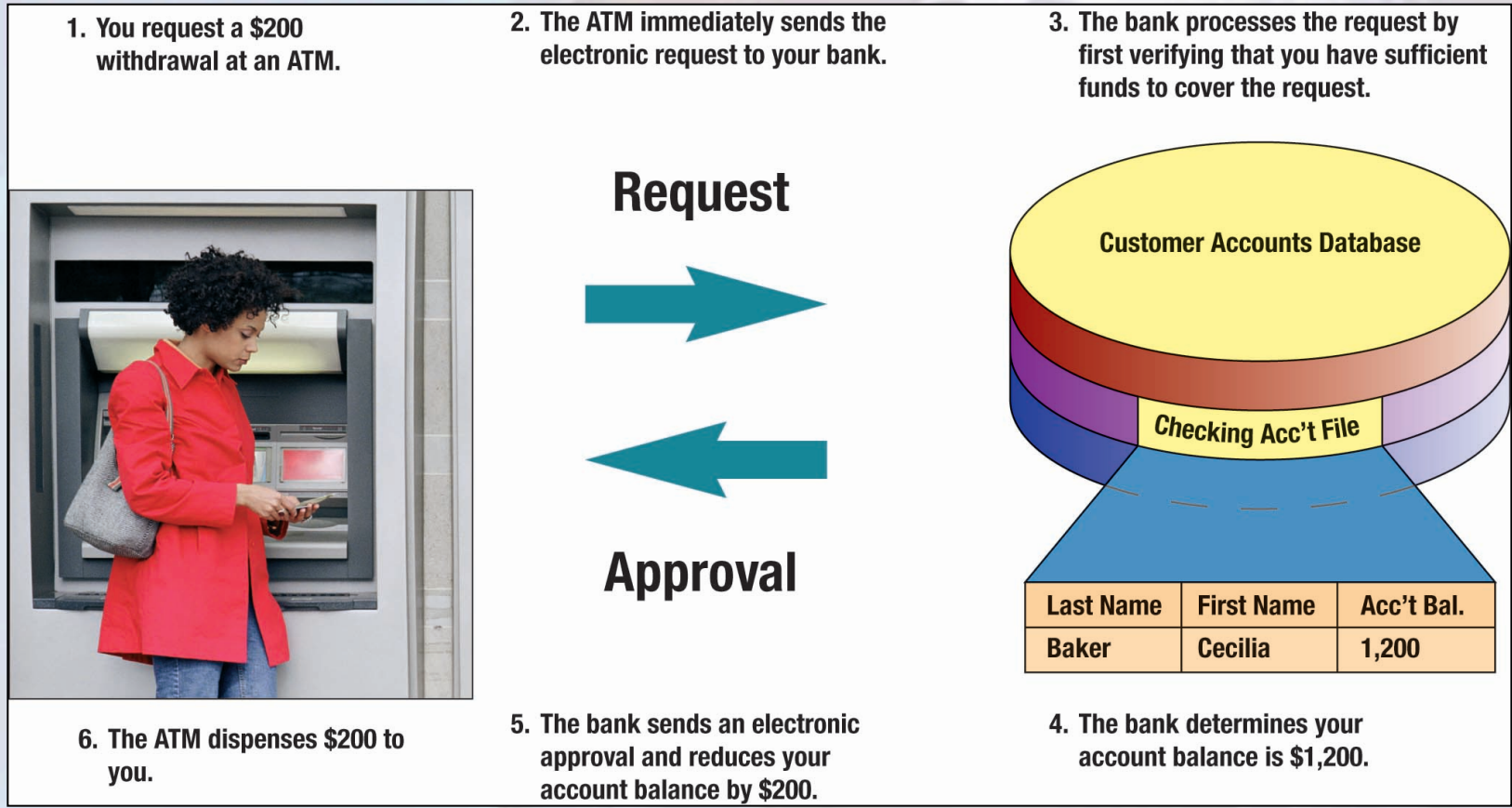
## Your Monthly Statement

<u>Date</u>	<u>Purchase</u>	<u>Amount</u>
3/3	shoes	47.50
3/10	books	45.13
3/25	dinner	32.50
	total charges	125.13



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

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

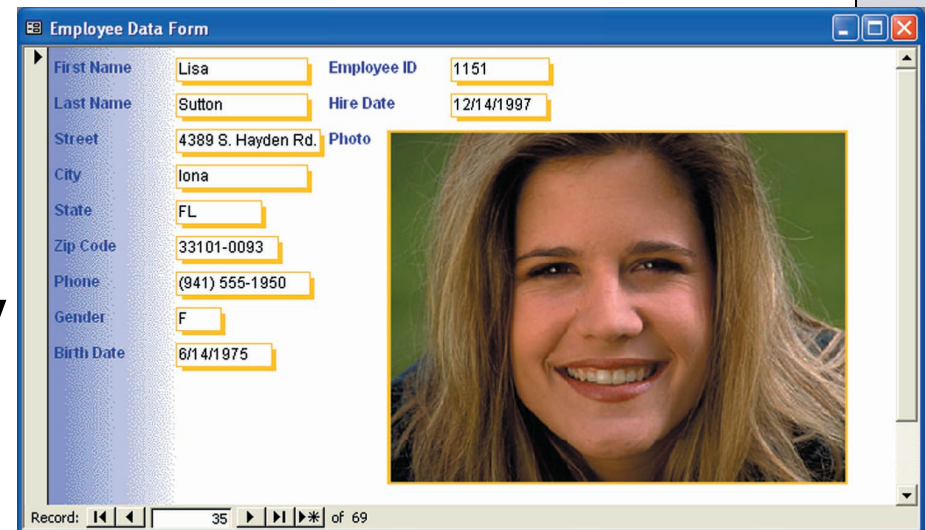


# Databases

- **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**



The screenshot shows a web-based form titled "Employee Data Form". The form contains the following fields and values:

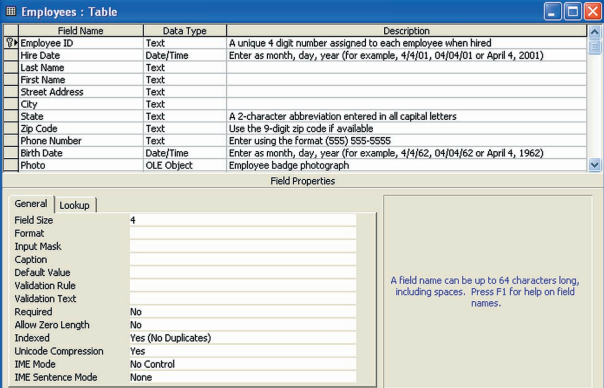
Field	Value
First Name	Lisa
Last Name	Sutton
Street	4389 S. Hayden Rd.
City	Iona
State	FL
Zip Code	33101-0093
Phone	(941) 555-1950
Gender	F
Birth Date	6/14/1975
Employee ID	1151
Hire Date	12/14/1997

A photo of a woman with long blonde hair is displayed next to the form fields. The form is part of a record set, with the current record being 35 of 69.

[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**



Field Name	Data Type	Description
Employee ID	Text	A unique 4 digit number assigned to each employee when hired
Hire Date	Date/Time	Enter as month, day, year (for example, 4/4/01, 04/04/01 or April 4, 2001)
Last Name	Text	
First Name	Text	
Street Address	Text	
City	Text	
State	Text	A 2-character abbreviation entered in all capital letters
Zip Code	Text	Use the 9-digit zip code if available
Phone Number	Text	Enter using the format (999) 999-9999
Birth Date	Date/Time	Enter as month, day, year (for example, 4/4/62, 04/04/62 or April 4, 1962)
Photo	OLE Object	Employee badge photograph

Field Properties

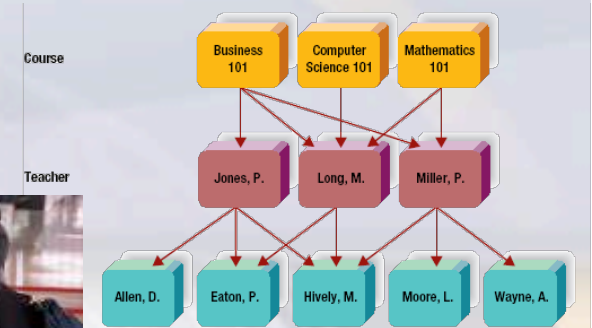
Field Size: 4

Indexed: Yes (No Duplicates)

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

# 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](#)



Name	License Number
Aaron, Linda	FJ1987
Abar, John	D12372
Abell, Jack	LK3457
•	•
•	•

key fields linked

Name	Plate Number
Abell, Jack	ABK241
Abrams, Sue	LMJ198
Abril, Pat	ZXA915
•	•
•	•

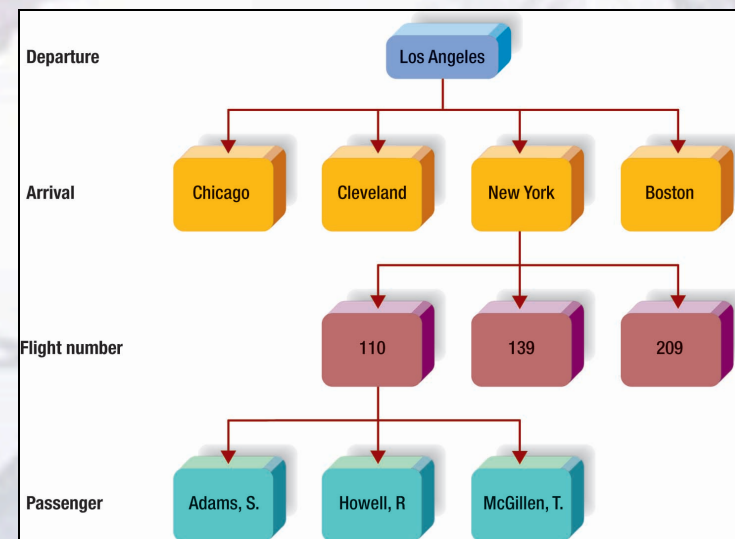
key fields linked

License Number	Citation Code	Violation
T25476	00031	Speed
D98372	19001	Park
LK3457	89100	Speed
•	•	•
•	•	•



# Hierarchical Database

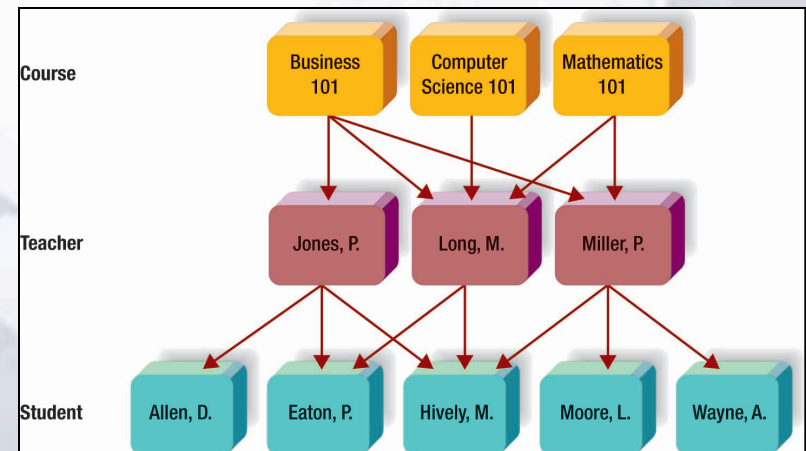
- Fields or records are structured in **nodes**
- Nodes are points connected like branches
- One parent per node
- Parent has several **child nodes (one-to-many relationship)**



*Airline reservation system*

# Network Database

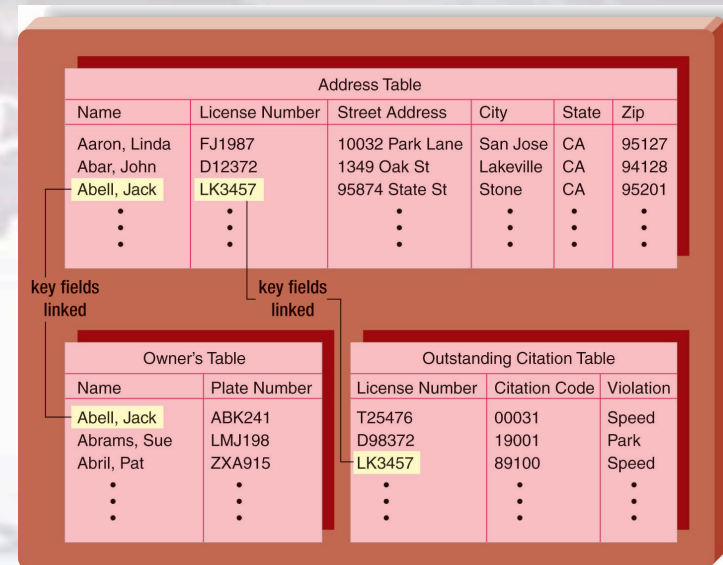
- Hierarchical node arrangement
- Each child node may have more than one parent node (**Many-to-many relationship**)
- Additional nodes are called **pointers**
- Nodes can be reached through more than one path



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



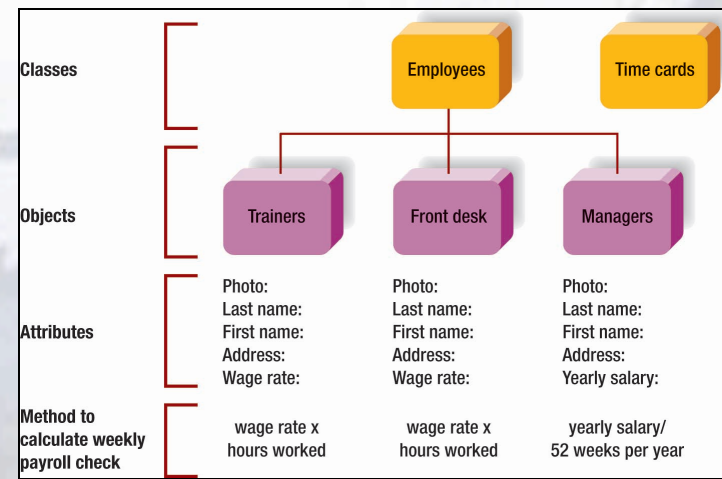


# Multidimensional Database

- 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

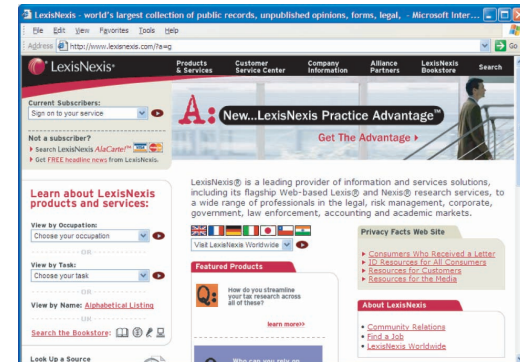
- **May be stored on a mainframe and managed by a database administrator**
- **Provides access to users throughout a company**
- **2 Types of company or shared databases**
  - **Common operational database**
  - **Common user database**

# 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

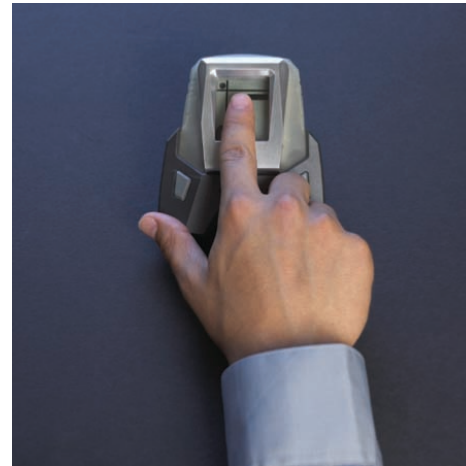
- **Distinguishing feature is that the database is available over the web**
- **Web search engines interact with databases**
- **Web databases incorporate special interface programs that create input forms, accept input, and send the data to the Web database**

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**

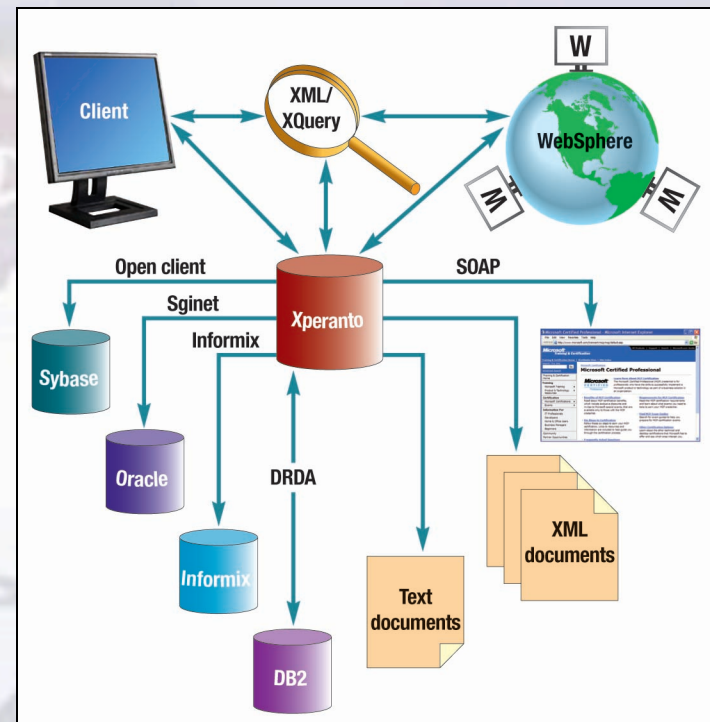
# Careers In IT

- **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?**