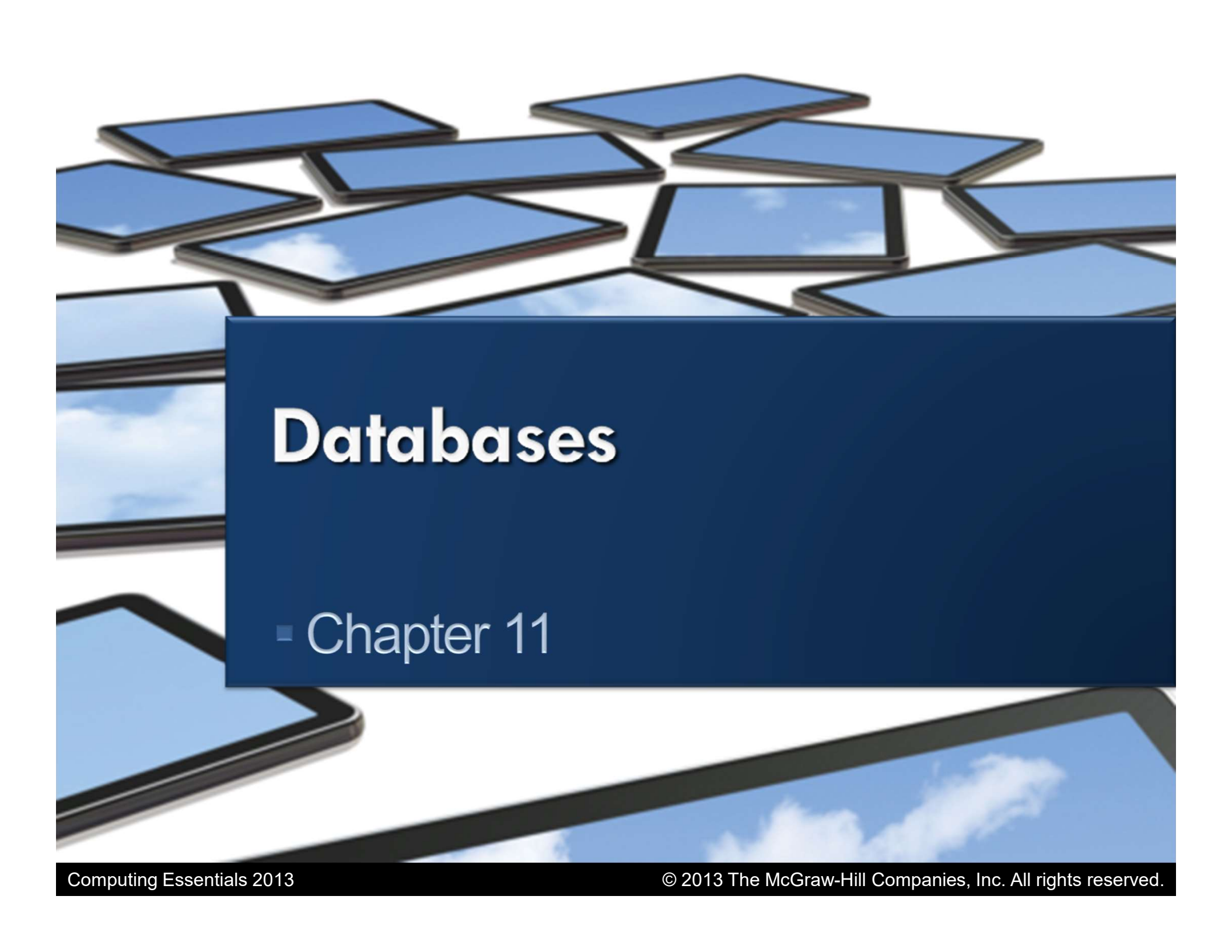




Databases

■ Chapter 11

Competencies (Page 1 of 2)

- Distinguish between the **physical** and **logical views** of **data**.
- Describe how data is organized: **characters**, **fields**, **records**, **tables**, and **databases**.
- Define **key fields** and how they are used to integrate data in a database.
- Define and compare **batch processing** and **real-time processing**.

Competencies (Page 2 of 2)

- Describe the five common database models: hierarchical, network, relational, multidimensional, and object-oriented.
- Distinguish among individual, company, distributed, and commercial databases.
- Discuss strategic database uses and security concerns.

Introduction

- Like a library, secondary storage is designed to store information
- End users need to understand
 - How information is organized in fields, records, tables and databases
 - The different types of databases and structures
- Competent end users need to be able to find information that is stored in databases

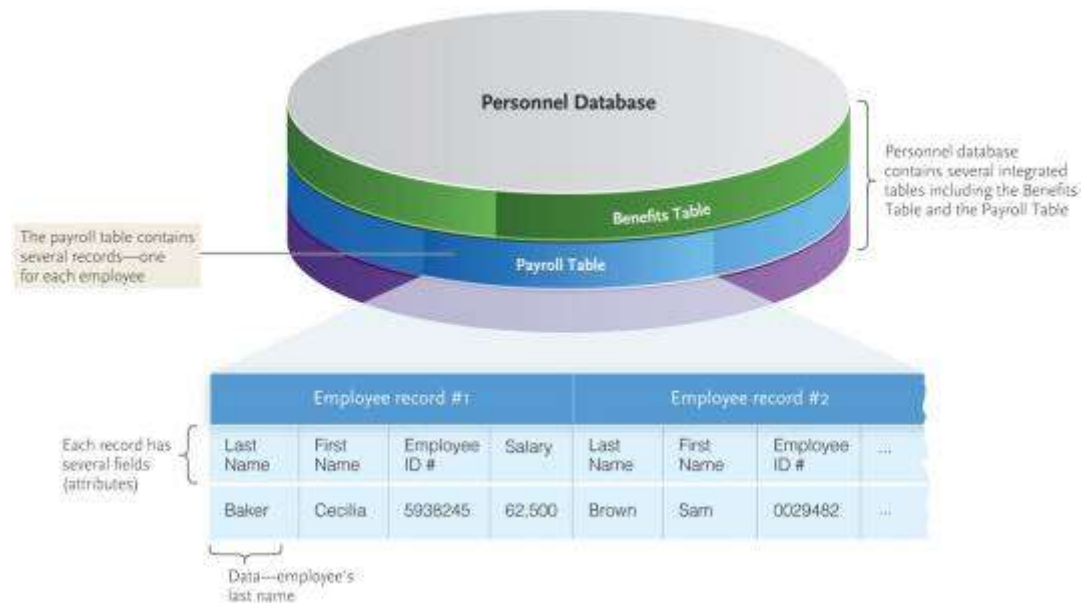


Data

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

Data Organization

- Character
- Field
- Record
- Table
- Database

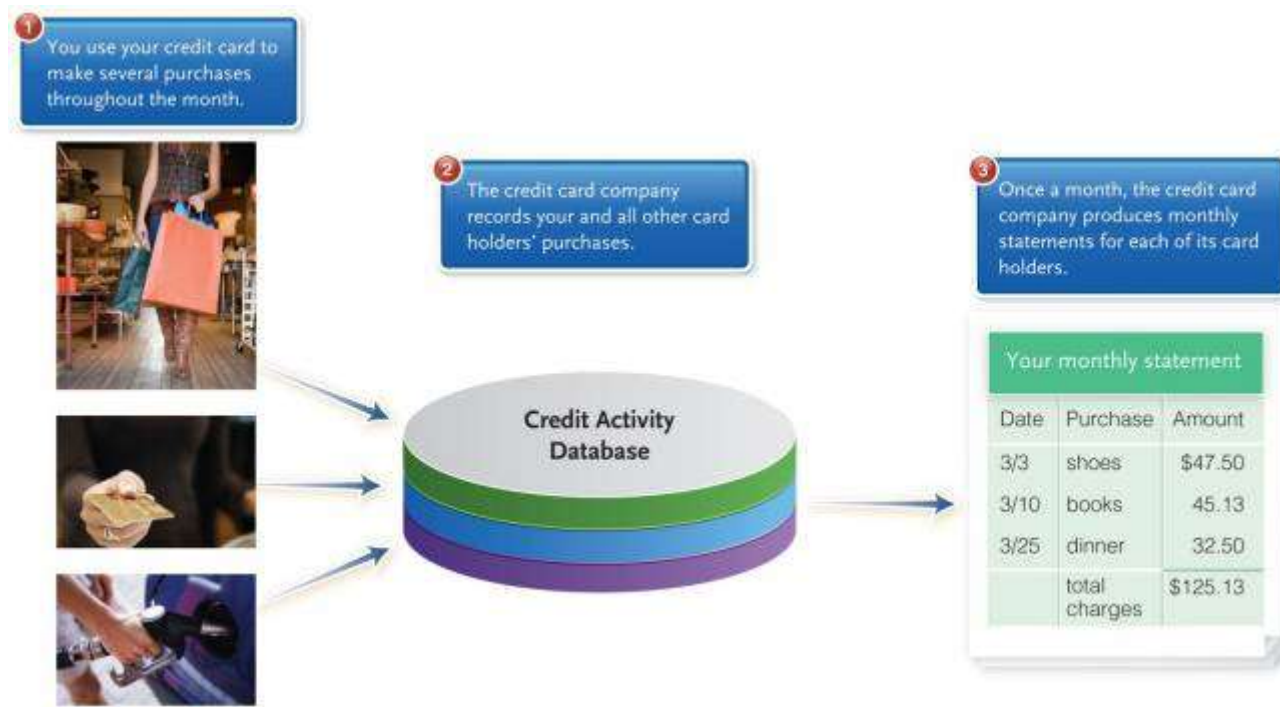


Key Field

- Unique identifier also known as **primary key**
- Common examples
 - Social Security Number
 - Student Identification Numbers
 - Employee Identification Numbers
 - Part Numbers
 - Inventory Numbers

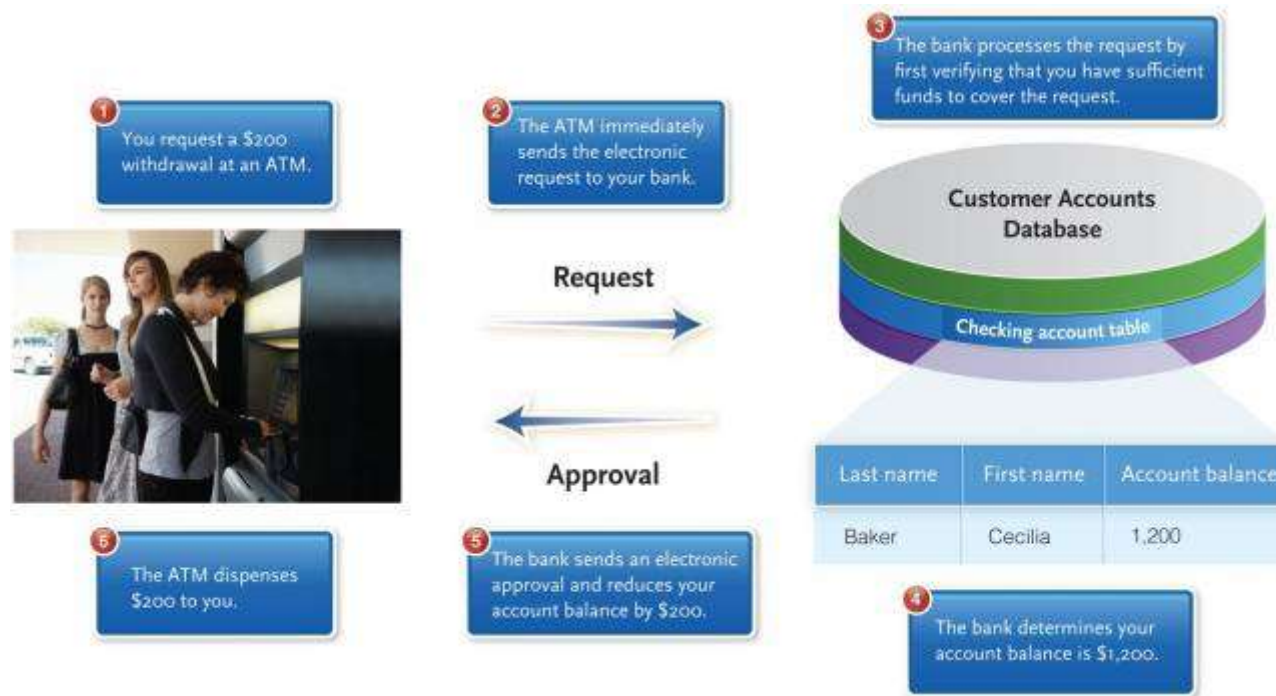
Batch Processing

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



Real-Time Processing

- Real-time processing
 - Also known as online processing because it happens immediately during the transaction



Databases

- Collection of integrated data
 - Logically related files and records
- Databases address data redundancy and data integrity

Need for Databases

- Sharing
- Security
- Less data redundancy
- Data integrity



The screenshot shows a web application window titled "Employee Records2". Inside, there's a form titled "Employee Records" with two columns of input fields. The left column contains fields for Employee ID, Hire Date, Last Name, First Name, Street, City, and State. The right column contains fields for Zip, Phone, Gender, Birth Date, and a Photo. The data entered in the fields is as follows:

Field	Value
Employee ID	02731
Hire Date	8/19/1999
Last Name	Marchant
First Name	Roberta
Street	564 Palm Avenue
City	Landis
State	CA
Zip	92120-3741
Phone	(507) 555-6707
Gender	F
Birth Date	5/13/1980
Photo	

At the bottom of the form, there is a status bar that says "Record: 5 of 70" and a "Search" button.

Database Management (Page 1 of 2)

- DBMS engine
- Data definition subsystem
 - Data dictionary / schema

The screenshot displays a database design window titled 'Employee Records'. It contains a table with three columns: 'Field Name', 'Data Type', and 'Description'. The fields are defined as follows:

Field Name	Data Type	Description
Employee ID	Text	Unique 5-digit number assigned to each employee.
Hire Date	Date/Time	Enter as month, day, year (for example, 1/4/03).
Last Name	Text	
First Name	Text	
Street	Text	
City	Text	
State	Text	A 2-character abbreviation entered in capital letters.
Zip	Text	Include 4-digit extension, if available (for example 07739-1010).
Phone	Text	Enter as (555) 555-5555.
Gender	Text	Enter F for female or M for male.
Birth Date	Date/Time	Enter as month, day, year (for example, 5/2/74, 05/02/74, or May 2, 1974).
Photo	OLE Object	

Below the table is a 'Field Properties' section with a 'General' tab. It lists various properties for the selected field:

Property	Value
Field Size	5
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
OLE Mode	No Control
OLE Sendance Mode	None
Smart Tags	

A note on the right side of the properties section states: 'The field description is optional. It helps you describe the field and is also displayed in the status bar when you select this field on a form. Press F1 for help on descriptions.'

Database Management (Page 2 of 2)

- Data manipulation subsystem
 - Query-by-example
 - Structured query language (SQL)
- Application generation subsystem
- Data administration subsystem
 - Database Administrators (DBAs)
 - Processing rights

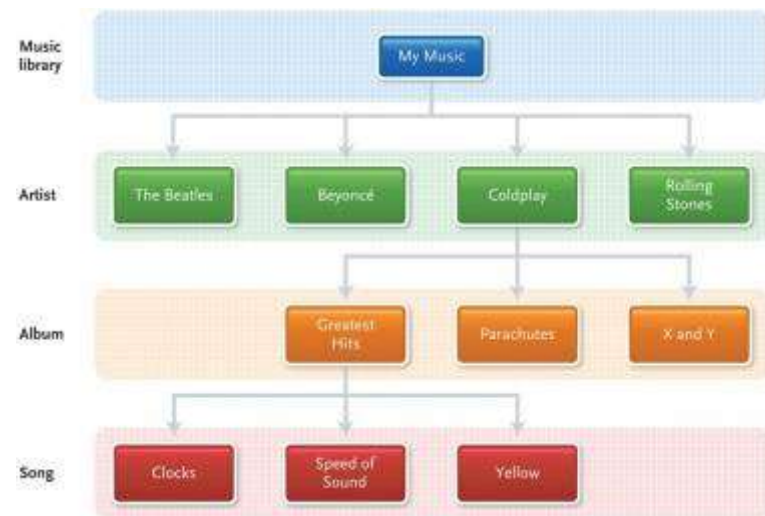
DBMS Structure

- Database model
 - DBMS programs work with data that is logically structured or arranged
 - Model defined rules and standards for data in a database
- Five common data models
 - Hierarchical database
 - Network database
 - Relational database
 - Multidimensional database
 - Object-oriented database



Hierarchical Database

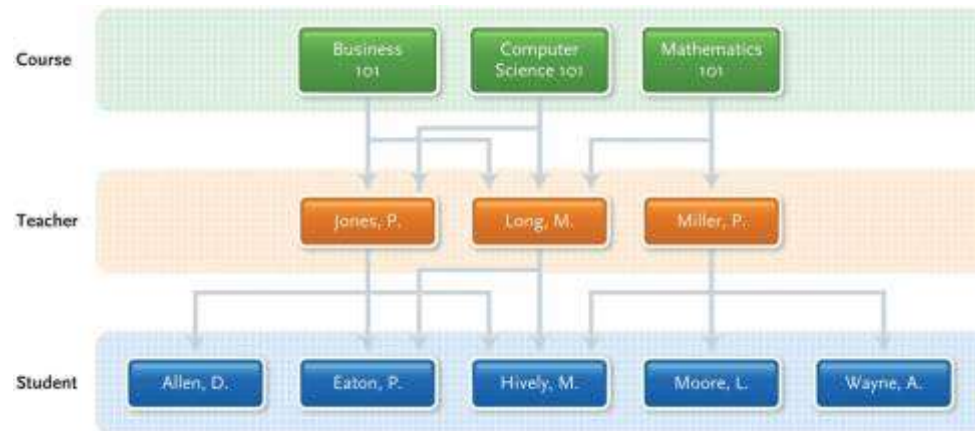
- Fields or records structured in nodes
- Nodes
 - points connected like branches of an upside-down tree
- One parent per node
- Parent can have several **child nodes**
 - **One-to-many relationship**



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Network Database

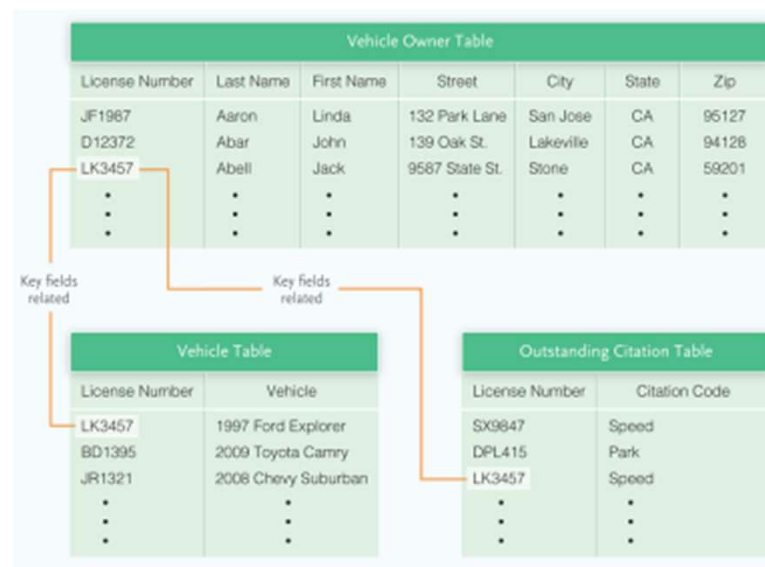
- Hierarchical node arrangement
- Each child node may have more than one parent node (*many-to-many relationship*)
- **Pointers**
 - Additional connections between parent and child
 - Nodes can be reached through multiple paths



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Relational Database

- More flexible
- Data stored in table called a **relation**
- Tables consist of rows and columns
- Tables related via a **common data item / key field**



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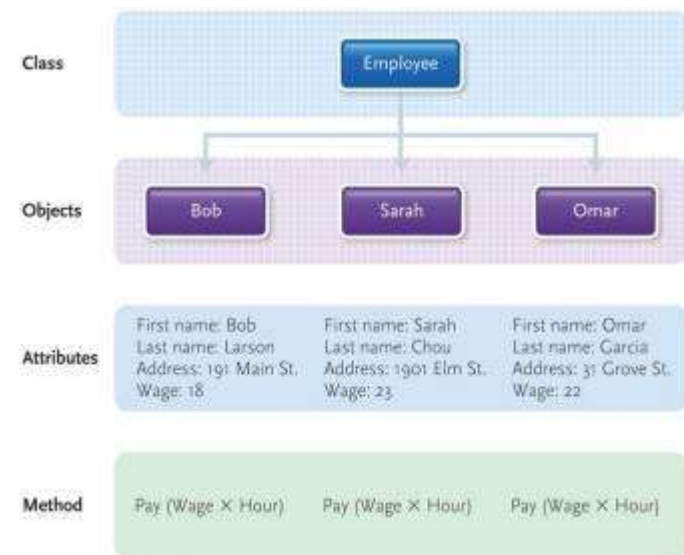
Multidimensional Database

- A variation and an extension of the relational model to include additional dimensions, sometimes called a **data cube**
- Good for representing complex relationships
- Advantages over relational
 - Conceptualization
 - Processing speed

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Object-Oriented Database

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



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Types of Databases

- Individual
- Company or shared
- Distributed
- Commercial

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
Commercial	Information utilities or data banks available to users on a wide range of topics

Individual Databases

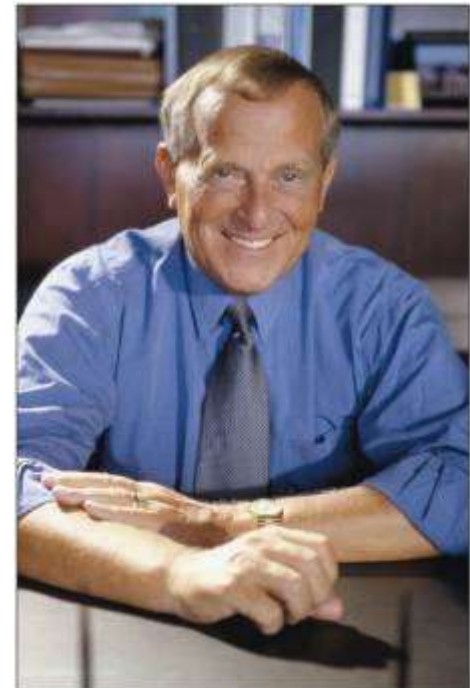
- Also called a **microcomputer database**
- Integrated file collection for one person usually under the person's direct control
- Generally stored on the user's hard-disk drive or on a LAN file server



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Company or Shared Databases

- Usually stored on a central database server and managed by a database administrator
- Users throughout a company can access the database through the company's networks



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Distributed Databases

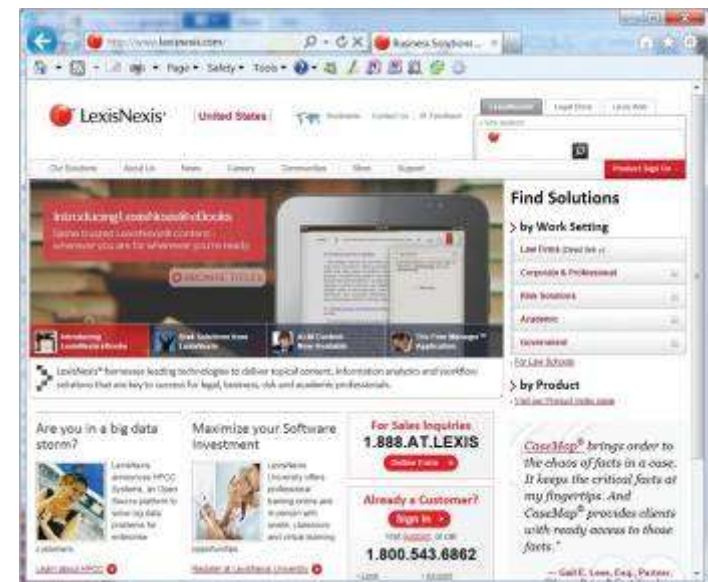
- Database is located in a place or places other than where users are located
- Typically, database servers on a client/server network provide the link between users and the distant data



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Commercial Databases

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



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Database Uses and Issues

- Strategic uses
 - Special type of database called **data warehouse**
 - **Data mining** is used to search databases for information and patterns
- Security
 - Databases are valuable
 - Protection necessary



Security: electronic fingerprint scanner

Careers In IT

- Database administrators
 - Determine the most efficient ways to organize and access a company's data
 - Responsible for database security and backing up the system
- Employers look for
 - Bachelors degree in Computer Science
 - Technical experience
- Database administrators can expect to earn \$48,500 to \$85,000 annually



A Look to the Future

- Every Book Ever Written ... at Your Fingertips
 - Massive amounts of digital storage are now available and affordable
 - Google Book Search contains millions of book



Open-Ended 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 parts of DBMS programs.

Open-Ended Questions (Page 2 of 2)

- Describe each of the five common database models.
- What are some of the benefits and limitations of databases? Why is security a concern?