Database Design

Relational Database Technology

Objectives

This lesson covers the following objectives:

- Define and give an example of a relational database
- Identify table-key terms, including row, column, field, primary key, and foreign key
- Relate the importance of databases to everyday life

Purpose

Databases are part of our everyday lives even though most of the time we don't even think about them. If you have ever made an airline reservation, used an ATM machine, or made a mobile-phone call, you've used a database. In fact, many cities use intelligent traffic guiding system databases to control stoplights. So the next time you're waiting at a red light, it may be a database that is responsible for your delay!

In this lesson, you will learn more about databases and how they're organized and created.

Relational Databases

A relational database allows tables to be related by means of a common field. As few as two tables can be considered a relational database if they share a common field.

ID	TITLE	ARTIST
45	Its Finally Over	The Hobbits
46	I'm Going to Miss My Teacher	Jane Pop
47	Hurrah for Today	The Jubilant Trio
48	Meet Me at the Altar	Bobby West
49	Lets Celebrate	The Celebrants
50	All These Years	Diana Crooner

Relational Databases (cont.)

Realistically, databases used in business have many tables, each table sharing a common field with another table. The D_SONGS table shown is one of several tables in the DJs On Demand database and just one example of the many tables that will be used in this course.

ID	TITLE	ARTIST
45	Its Finally Over	The Hobbits
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47	Hurrah for Today	The Jubilant Trio
48	Meet Me at the Altar	Bobby West
49	Lets Celebrate	The Celebrants
50	All These Years	Diana Crooner

Relational Databases (cont.)

To understand how important databases have become in today's world, consider the following statistics:

- Currently 20% of the world's data resides in RDBMSs.

- In the next two years, databases are expected to grow larger than 100 terabytes. A database this big would be able to store 100,000 copies of the Encyclopedia Britannica or 200,000 hours of music or about 10 billion web pages.

Relational Databases (cont.)

- Some of the top 10 world's largest databases using the Oracle RDBMS are:
  - France Telecom, 29.2TB -- a communications company (a TB is a terabyte equivalent to 1,000 gigabytes)
  - Amazon.com with, 13 TB -- selling books and merchandise
  - The Claria Corporation,12TB -- Internet behavioral marketing company tracking Internet user behavior

Review Key Terms

Let's review the following key terms:

- table -- basic storage structure

- column -- one kind of data in a table

- primary key -- unique identifier for each row

- foreign key -- column that refers to a primary-key column in another table

- row -- data for one table instance

- field -- the one value found at the intersection of a row and a column

Properties of Tables

There are six properties of tables in a relational database:

Property 1: Entries in columns are single-valued

Property 2: Entries in columns are of the same kind

Property 3: Each row is unique

Property 4: Sequence of columns is insignificant

Property 5: Sequence of rows is insignificant

Property 6: Each column has a unique name

Accessing Data in an RDBMS

A relational database-management system (RDBMS) organizes data into related rows and columns.

To access the data in a database, you do not need to know where the data is located physically, nor do you need to specify an access route to the tables.

You simply use structured query language (SQL) statements and operators.

Communicating with Databases

Working with the database is very similar to calling up and talking to a friend on the phone. First, you must choose a method to communicate (the phone). Once connected, you ask your friend a question (a query). In response to your question, your friend answers (return of data). Pretty simple, and most of us are experts at this.

In this class, our method of communication with the database will be through Oracle Application Express. When you ask a question using SQL, the application will return an answer.
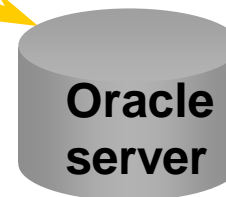
Communicating With Databases (cont.)

As shown in the diagram, communicating with an RDBMS is accomplished by entering a SQL statement in Oracle Application Express.

SQL statement is entered.

Statement is sent to the Oracle Server.

```
SELECT department_name
FROM   departments;
```

DEPARTMENT_NAME
Administration
Marketing
Shipping
IT
Sales
Executive
Accounting
Contracting

Oracle server
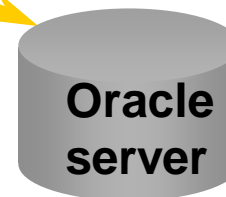
Data is returned from the Oracle Server.

Communicating With Databases (cont.)

The request is then sent to the Oracle Server (a database running on a computer), the request is processed and the data returned is displayed. In very large database systems, many users, servers, and tables make up the RDBMS.

SQL statement is entered.

Statement is sent to the Oracle Server.

```
SELECT department_name
FROM    departments;
```

Oracle server

DEPARTMENT_NAME
Administration
Marketing
Shipping
IT
Sales
Executive
Accounting
Contracting

Data is returned from the Oracle Server.

Categories of SQL Statements

SQL statements are grouped into several categories depending on the functions they perform. During this course, you will learn how to use SQL to execute these statements. The data retrieval statement retrieves data from the database using the keyword SELECT.

There are four categories of SQL statements:

- Data manipulation language (DML)
- Data definition language (DDL)
- Transaction control language (TCL)
- Data control language (DCL)

Categories of SQL Statements (cont.)

Data manipulation language (DML)

DML statements begin with INSERT, UPDATE, DELETE, or MERGE and are used to modify the table data by entering new rows, changing existing rows, or removing existing rows.

Data definition language (DDL)

DDL statements create, change, and remove data structures from the database. The keywords CREATE, ALTER, DROP, RENAME, and TRUNCATE begin DDL statements.

Categories of SQL Statements (cont.)

Transaction control language (TCL)

TCL statements are used to manage the changes made by DML statements. Changes to the data are executed using COMMIT, ROLLBACK, and SAVEPOINT. TCL changes can be grouped together into logical transactions.

Data control language (DCL)

DCL keywords GRANT and REVOKE are used to give or remove access rights to the database and the structures within it.

Terminology

Key terms used in this lesson included:

- Data control language (DCL)

- Data definition language (DDL)

- Data manipulation language (DML)

- Field

- Foreign key

Terminology (cont.)

Key terms used in this lesson included:

- Primary key

- Relational database

- Row

- Table

- Transaction control (TCL)

Summary

In this lesson, you should have learned how to:

- Define and give an example of a relational database
- Identify table-key terms, including row, column, field, primary key, and foreign key
- Relate the importance of databases to everyday life