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Database Programming with SQL

1-2
Relational Database Technology

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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.

COUNTRY_ID	COUNTRY_NAME	REGION_ID
CA	Canada	2
DE	Germany	1
UK	United Kingdom	1
US	United States of America	2

Relational Databases

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

COUNTRY_ID	COUNTRY_NAME	REGION_ID
CA	Canada	2
DE	Germany	1
UK	United Kingdom	1
US	United States of America	2

Relational Databases

- 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

- 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
  - row -- data for one table instance
  - field -- the one value found at the intersection of a row and a column
  - primary key -- unique identifier for each row
  - foreign key -- column that refers to a primary-key column in another table

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

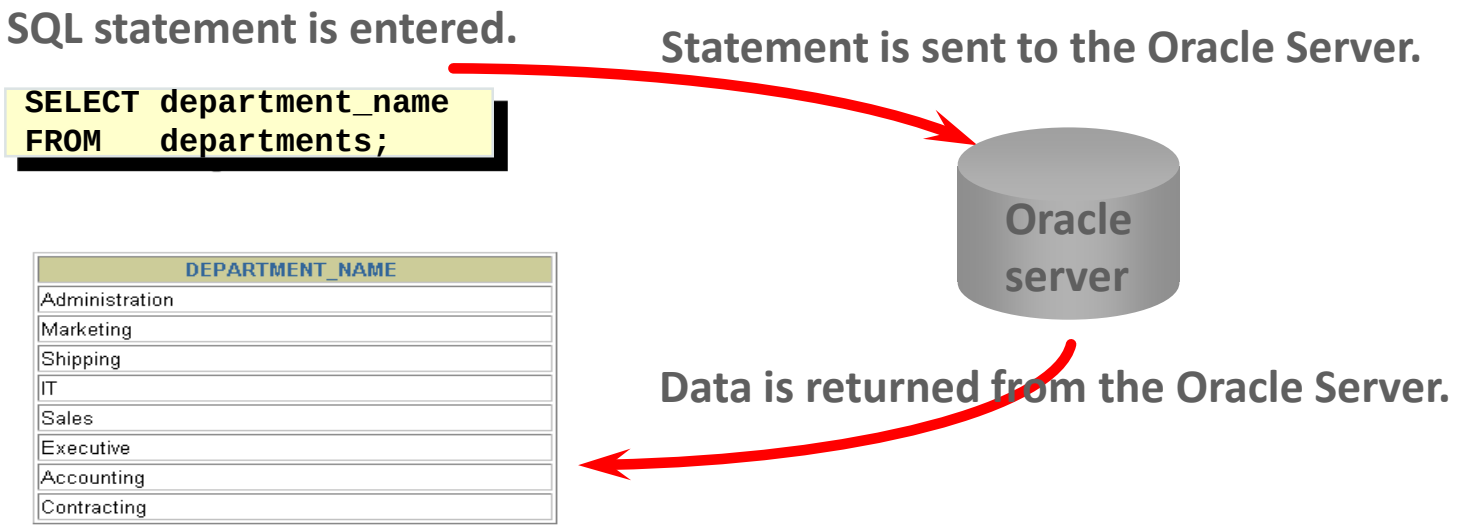
- A relational database-management system (RDBMS) organizes data into related rows and columns.
- To access the data in a database, you do not need to know where the data is located physically, nor do you need to specify an access route to the tables.
- You simply use structured query language (SQL) 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.

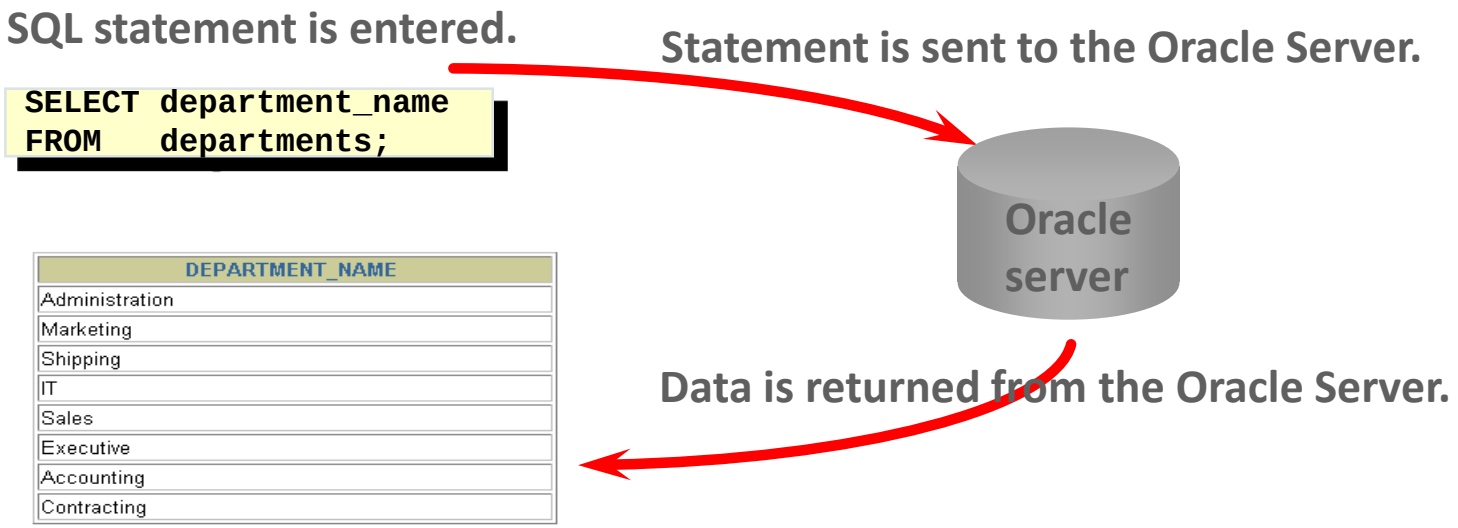
Communicating With Databases

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



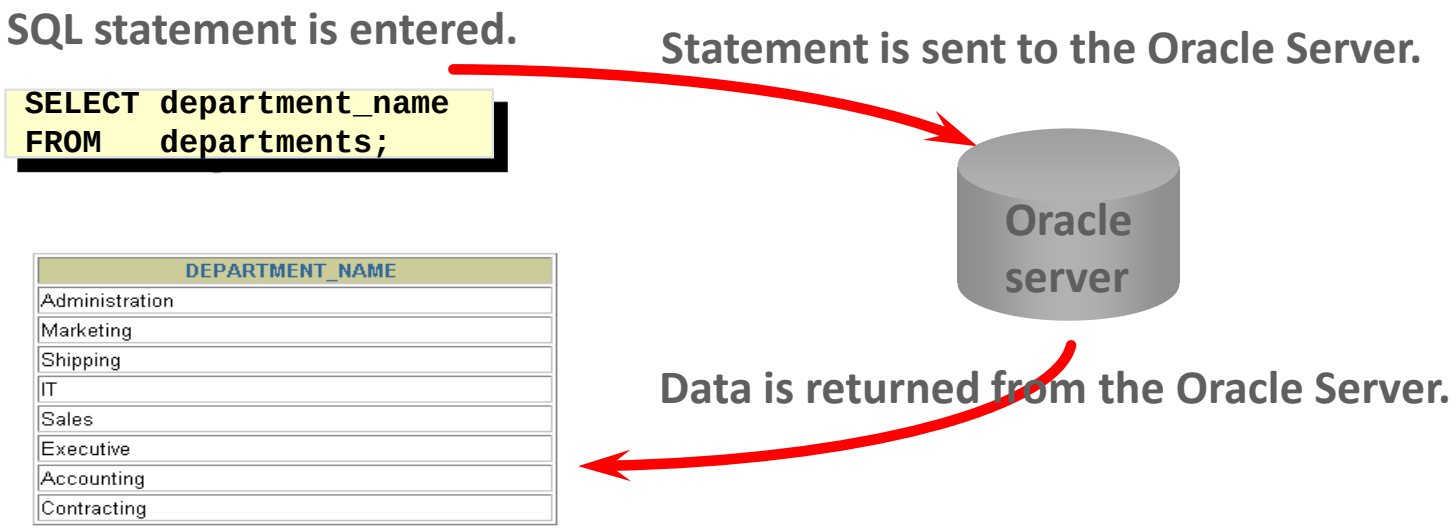
Communicating With Databases

- 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.



Communicating With Databases

- In very large database systems, many users, servers, and tables make up the RDBMS.



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.

Categories of SQL Statements

- There are four main categories of SQL statements:
  - Data manipulation language (DML)
  - Data definition language (DDL)
  - Transaction control language (TCL)
  - Data control language (DCL)

Categories of SQL Statements

- 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

- 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
- RDBMS

Terminology

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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