Introduction to SQL

Introduction to SQL

Language to communicate with database!

- SQL is relatively easy to learn

- Basic command set has a vocabulary of less than 100 words

- Nonprocedural language

- American National Standards Institute (ANSI) prescribes a standard SQL

- Several SQL dialects exist

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

SQL Data Definition Commands

Commands to create database objects and to define access rights to those database objects

COMMAND OR OPTION	DESCRIPTION
CREATE SCHEMA AUTHORIZATION	Creates a database schema
CREATE TABLE	Creates a new table in the user's database schema
NOT NULL	Constraint that ensures that a column will not have null values
UNIQUE	Constraint that ensures that a column will not have duplicate values
PRIMARY KEY	Defines a primary key for a table
FOREIGN KEY	Defines a foreign key for a table
DEFAULT	Defines a default value for a column (when no value is given)
CHECK	Constraint used to validate data in a column
CREATE INDEX	Creates an index for a table
CREATE VIEW	Creates a dynamic subset of rows/columns from one or more tables
ALTER TABLE	Modifies a table's definition (adds, modifies, or deletes attributes or constraints)
CREATE TABLE AS	Creates a new table based on a query in the user's database schema
DROP TABLE	Permanently deletes a table (and thus its data)
DROP INDEX	Permanently deletes an index
DROP VIEW	Permanently deletes a view

Index: Utilized for fast operation of ordering, searching, etc.

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Data Manipulation Commands

To insert, update, delete, and retrieve data within the database tables

COMMAND OR OPTION	DESCRIPTION
INSERT	Inserts row(s) into a table
SELECT	Selects attributes from rows in one or more tables or views
WHERE	Restricts the selection of rows based on a conditional expression
GROUP BY	Groups the selected rows based on one or more attributes
HAVING	Restricts the selection of grouped rows based on a condition
ORDER BY	Orders the selected rows

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Creating the Database

- Two tasks must be completed
  - create the database structure
  - create the tables that will hold the end-user data

- Create the database structure
  - RDBMS creates the physical files that will hold the database
  - Interact with the operating system and the file systems
  - Tends to differ substantially from one RDBMS to another

The Database Schema

- Schema
  - Group of database objects—such as tables and indexes—that are related to each other
  - Logical grouping of database objects

- Authentication
  - Process through which the DBMS verifies that only registered users are able to access the database
  - Log on to the RDBMS using a user ID and a password created by the database administrator

Database name: Ch07_SaleCo

Table name: **VENDOR**

	V_CODE	V_NAME	V_CONTACT	V_AREACODE	V_PHONE	V_STATE	V_ORDER
▶ +	21225	Bryson, Inc.	Smithson	615	223-3234	TN	Y
+	21226	SuperLoo, Inc.	Flushing	904	215-8995	FL	N
+	21231	D&E Supply	Singh	615	228-3245	TN	Y
+	21344	Gomez Bros.	Ortega	615	889-2546	KY	N
+	22567	Dome Supply	Smith	901	678-1419	GA	N
+	23119	Randsets Ltd.	Anderson	901	678-3998	GA	Y
+	24004	Brackman Bros.	Browning	615	228-1410	TN	N
+	24288	ORDVA, Inc.	Hakford	615	898-1234	TN	Y
+	25443	B&K, Inc.	Smith	904	227-0093	FL	N
+	25501	Damal Supplies	Smythe	615	890-3529	TN	N
+	25595	Rubicon Systems	Orton	904	456-0092	FL	Y

Table name: **PRODUCT**

	P_CODE	P_DESCRIPT	P_INDATE	P_QOH	P_MIN	P_PRICE	P_DISCOUNT	V_C
▶ +	1QER/31	Power painter, 15 psi., 3-nozzle	03-Nov-05	8	5	109.99	0.00	2
+	13-Q2/P2	7.25-in. pwr. saw blade						

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Table name: **PRODUCT**

P_CODE	P_DESCRIPT	P_INDATE	P_QOH	P_MIN	P_PRICE	P_DISCOUNT	V_CODE
11QER/31	Power painter, 15 psi., 3-nozzle	03-Nov-05	8	5	109.99	0.00	25595
13-Q2/P2	7.25-in. pwr. saw blade	13-Dec-05	32	15	14.99	0.05	21344
14-Q1/L3	9.00-in. pwr. saw blade	13-Nov-05	18	12	17.49	0.00	21344
1546-QQ2	Hrd. cloth, 1/4-in., 2x50	15-Jan-06	15	8	39.95	0.00	23119
1558-QW1	Hrd. cloth, 1/2-in., 3x50	15-Jan-06	23	5	43.99	0.00	23119
2232/QTY	B&D jigsaw, 12-in. blade	30-Dec-05	8	5	109.92	0.05	24288
2232/QWE	B&D jigsaw, 8-in. blade	24-Dec-05	6	5	99.87	0.05	24288
2238/QPD	B&D cordless drill, 1/2-in.	20-Jan-06	12	5	38.95	0.05	25595
23109-HB	Claw hammer	20-Jan-06	23	10	9.95	0.10	21225
23114-AA	Sledge hammer, 12 lb.	02-Jan-06	8	5	14.40	0.05	
54778-2T	Rat-tail file, 1/8-in. fine	15-Dec-05	43	20	4.99	0.00	21344
89-WRE-Q	Hicut chain saw, 16 in.	07-Feb-06	11	5	256.99	0.05	24288
PVC23DRT	PVC pipe, 3.5-in., 8-ft.	20-Feb-06	188	75	5.87	0.00	
SM-18277	1.25-in. metal screw, 25	01-Mar-06	172	75	6.99	0.00	21225
SW-23116	2.5-in. wd. screw, 50	24-Feb-06	237	100	8.45	0.00	21231
WR3/TT3	Steel matting, 4'x8'x1/6", .5" mesh	17-Jan-06	18	5	119.95	0.10	25595

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Creating a Table

Design view, SQL view, etc.

```
CREATE TABLE VENDOR (                                         Sample Data
    V_CODE          INTEGER       NOT NULL    UNIQUE,         21266
    V_NAME          VARCHAR(35)   NOT NULL,                   SuperLoo, Inc.
    V_CONTACT       VARCHAR(15)   NOT NULL,                   Flushing
    V_AREACODE      CHAR(3)       NOT NULL,                   904
    V_PHONE         CHAR(8)       NOT NULL,                   215-8995
    V_STATE         CHAR(2)       NOT NULL,                   FL
    V_ORDER         CHAR(1)       NOT NULL,                   N
    PRIMARY KEY (V_CODE));
```

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Data Manipulation Commands

- Adding table rows

- Listing table rows

- Updating table rows

- Saving table changes

- Restoring table contents

- Deleting table rows

- Inserting table rows with a select subquery

Common SQL Data Manipulation Commands

COMMAND	DESCRIPTION
INSERT	Lets you insert data into a table, one row at a time. Used to make the initial data entries into a new table structure or to add data to a table that already contains data.
SELECT	Lists the table contents.
COMMIT	Lets you permanently save your work to disk.
UPDATE	Enables you to make changes to column values in one or more data rows.
ROLLBACK	Restores the database table contents to their original condition (since the last COMMIT).
DELETE	Enables you to delete one or more data rows.

Adding Table Rows

- ## INSERT

  - Used to list contents of table

- ## Syntax

  - INSERT INTO *tablename VALUES* (value 1, value 2, ..., value n);

- ## In MS Access

  - INSERT INTO VENDOR VALUES (21227, "B Inc.", "B", "512", "222-2222", "FL", "N");

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Listing Table Rows

- SELECT
  - Used to list contents of table

- Syntax
  - SELECT *columnlist*
    FROM *tablename;*   SELECT P_DESCRIPT, P_INDATE, P_PRICE, V_CODE FROM tblPRODUCT;

- Columnlist represents one or more attributes, separated by commas

- Asterisk can be used as wildcard character to list all attributes   SELECT *

Selecting Rows with Conditional Restrictions

- Select partial table contents by placing restrictions on rows to be included in output

  – Add conditional restrictions to the SELECT statement, using WHERE clause

- Syntax

  – SELECT *columnlist*
  FROM *tablename*
  [WHERE *conditionlist*] ;

FIGURE 7.4 Selected PRODUCT table attributes for vendor code 21344

P_DESCRIPT	P_INDATE	P_PRICE	V_CODE
7.25-in. pwr. saw blade	13-Dec-05	14.99	21344
9.00-in. pwr. saw blade	13-Nov-05	17.49	21344
Rat-tail file, 1/8-in. fine	15-Dec-05	4.99	21344

SELECT P_DESCRIPT, P_INDATE, P_PRICE, V_CODE
FROM PRODUCT
WHERE V_CODE = 21344;

Selecting Rows with Conditional Restrictions

SELECT P_DESCRIPT, P_QOH, P_MIN, P_PRICE, P_INDATE
FROM PRODUCT
WHERE P_INDATE >= #20-Jan-2006#;

In MS Access # delimiters for dates.

SELECT P_DESCRIPT, P_QOH, P_PRICE, [P_QOH] * [P_PRICE]
AS TOTALVALUE
FROM PRODUCT;

| FIGURE 7.9 | Selected PRODUCT table attributes: date restriction |

P_DESCRIPT	P_QOH	P_MIN	P_PRICE	P_INDATE
B&D cordless drill, 1/2-in	12	5	38.95	20-Jan-06
Claw hammer	23	10	9.95	20-Jan-06
Hicut chain saw, 16 in.	11	5	256.99	07-Feb-06
PVC pipe, 3.5-in., 8-ft.	188	75	5.87	20-Feb-06
1.25-in. metal screw, 25	172	75	6.99	01-Mar-06
2.5-in. wd. screw, 50	237	100	8.45	24-Feb-06

| FIGURE 7.11 | SELECT statement with a computed column and an alias |

P_DESCRIPT	P_QOH	P_PRICE	TOTVALUE
Power painter, 15 psi., 3-nozzle	8	109.99	879.92
7.25-in. pwr. saw blade	32	14.99	479.68
9.00-in. pwr. saw blade	18	17.49	314.82
Hrd. cloth, 1/4-in., 2x50	15	39.95	599.25
Hrd. cloth, 1/2-in., 3x50	23	43.99	1011.77
B&D jigsaw, 12-in. blade	8	109.92	879.36
B&D jigsaw, 8-in. blade	6	99.87	599.22
B&D cordless drill, 1/2-in.	12	38.95	467.40
Claw hammer	23	9.95	228.85
Sledge hammer, 12 lb.	8	14.40	115.20
Rat-tail file, 1/8-in. fine	43	4.99	214.57
Hicut chain saw, 16 in.	11	256.99	2826.89
PVC pipe, 3.5-in., 8-ft.	188	5.87	1103.56
1.25-in. metal screw, 25	172	6.99	1202.28
2.5-in. wd. screw, 50	237	8.45	2002.65
Steel matting, 4'x8'x1/6", .5" mesh	18	119.95	2159.10

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Updating Table Rows

- ## UPDATE

  - Modify data in a table

- ## Syntax

  - UPDATE *tablename*
    SET *columnname = expression* [, *columname = expression*]
    [WHERE *conditionlist*];

- ## If more than one attribute is to be updated in the row, separate corrections with commas

Saving Table Changes

- COMMIT

  - Changes made to table to table contents are not physically saved on disk until

    - Database/Program is closed

    - COMMIT command is used

- Syntax

  - COMMIT;

Restoring Table Contents

- ROLLBACK
  - Used restore the database to its previous condition
  - Only applicable if COMMIT command has not been used to permanently store the changes in the database
- Syntax
  - ROLLBACK;
- COMMIT and ROLLBACK only work with data manipulation commands that are used to add, modify, or delete table rows

Deleting Table Rows

- DELETE

  - Deletes a table row

- Syntax

  - DELETE FROM *tablename*
    [WHERE *conditionlist*] ;

- WHERE condition is optional

- If WHERE condition is not specified, all rows from the specified table will be deleted

Inserting Table Rows with a Select Subquery

- INSERT

  - Inserts multiple rows from another table (source)

  - Uses SELECT subquery

    - Query that is embedded (or nested) inside another query

    - Executed first

- Syntax

  - INSERT INTO *tablename* SELECT *columnlist* FROM *tablename;*

Logical Operators

LOGICAL "OR"

SELECT P_DESCRIPT, P_INDATE, P_PRICE, V_CODE

FROM PRODUCT

WHERE V_CODE=21344 OR V_CODE=24288;

FIGURE 7.12	Selected PRODUCT table attributes: the logical OR		
P_DESCRIPT	P_INDATE	P_PRICE	V_CODE
7.25-in. pwr. saw blade	13-Dec-05	14.99	21344
9.00-in. pwr. saw blade	13-Nov-05	17.49	21344
B&D jigsaw, 12-in. blade	30-Dec-05	109.92	24288
B&D jigsaw, 8-in. blade	24-Dec-05	99.87	24288
Rat-tail file, 1/8-in. fine	15-Dec-05	4.99	21344
Hicut chain saw, 16 in.	07-Feb-06	256.99	24288

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Logical Operators (2)

LOGICAL "AND"

SELECT P_DESCRIPT, P_INDATE, P_PRICE, V_CODE

FROM PRODUCT

WHERE P_INDATE>#15-JAN-2004# AND PRODUCT.P_PRICE<50;

Indication of table. 여러 개의 테이블이 있을 경우 꼭 명시해야 함!

FIGURE 7.13 Selected PRODUCT table attributes: the logical AND

P_DESCRIPT	P_INDATE	P_PRICE	V_CODE
B&D cordless drill, 1/2-in.	20-Jan-06	38.95	25595
Claw hammer	20-Jan-06	9.95	21225
PVC pipe, 3.5-in., 8-ft.	20-Feb-06	5.87	
1.25-in. metal screw, 25	01-Mar-06	6.99	21225
2.5-in. wd. screw, 50	24-Feb-06	8.45	21231

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Special Operators

- **BETWEEN**
  - Used to check whether attribute value is within a range
- **IS NULL**
  - Used to check whether attribute value is null
- **LIKE**
  - Used to check whether attribute value matches a given string pattern
- **IN**
  - Used to check whether attribute value matches any value within a value list
- **EXISTS**
  - Used to check if a subquery returns any rows

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Advanced Data Definition Commands

- All changes in the table structure are made by using the ALTER command

  - Followed by a keyword that produces specific change

  - Three options are available

    - ADD

    - MODIFY

    - DROP

Copying Parts of Tables

- SQL permits copying contents of selected table columns so that the data need not be reentered manually into newly created table(s)

- First create the PART table structure

- Next add rows to new PART table using table rows from the existing table

Ordering a Listing

ORDER BY

    SELECT P_CODE, P_DESCRIPT, P_INDATE, P_PRICE

    FROM PRODUCT

    ORDER BY P_PRICE;

FIGURE 7.17 Selected PRODUCT table attributes: ordered by (ascending) P_PRICE

P_CODE	P_DESCRIPT	P_INDATE	P_PRICE
54778-2T	Rat-tail file, 1/8-in. fine	15-Dec-05	4.99
PVC23DRT	PVC pipe, 3.5-in., 8-ft.	20-Feb-06	5.87
SM-18277	1.25-in. metal screw, 25	01-Mar-06	6.99
SW-23116	2.5-in. wd. screw, 50	24-Feb-06	8.45
23109-HB	Claw hammer	20-Jan-06	9.95
23114-AA	Sledge hammer, 12 lb.	02-Jan-06	14.40
13-Q2/P2	7.25-in. pwr. saw blade	13-Dec-05	14.99
14-Q1/L3	9.00-in. pwr. saw blade	13-Nov-05	17.49
2238/QPD	B&D cordless drill, 1/2-in.	20-Jan-06	38.95
1546-QQ2	Hrd. cloth, 1/4-in., 2x50	15-Jan-06	39.95
1558-QW1	Hrd. cloth, 1/2-in., 3x50	15-Jan-06	43.99
2232/QWE	B&D jigsaw, 8-in. blade	24-Dec-05	99.87
2232/QTY	B&D jigsaw, 12-in. blade	30-Dec-05	109.92
11QER/31	Power painter, 15 psi, 3-nozzle	03-Nov-05	109.99
WR3/TT3	Steel matting, 4'x8'x1/6", .5" mesh	17-Jan-06	119.95
89-WRE-Q	Hicut chain saw, 16 in.	07-Feb-06	256.99

Ordering a Listing (2)

ORDER BY

SELECT EMP_LNAME, EMP_FNAME, EMP_INITIAL, EMP_AREACODE, EMP_PHONE

FROM EMPLOYEE

ORDER BY EMP_LNAME, EMP_FNAME, EMP_INITIAL;

FIGURE 7.18 Telephone list query results

EMP_LNAME	EMP_FNAME	EMP_INITIAL	EMP_AREACODE	EMP_PHONE
Brandon	Marie	G	901	882-0845
Diante	Jorge	D	615	890-4567
Genkazi	Leighla	W	901	569-0093
Johnson	Edward	E	615	898-4387
Jones	Anne	M	615	898-3456
Kolmycz	George	D	615	324-5456
Lange	John	P	901	504-4430
Lewis	Rhonda	G	615	324-4472
Saranda	Hermine	R	615	324-5505
Smith	George	A	615	890-2984
Smith	George	K	901	504-3339
Smith	Jeanine	K	615	324-7883
Smythe	Melanie	P	615	324-9006
Vandam	Rhett		901	675-8993
Washington	Rupert	E	615	890-4925
Wiesenbach	Paul	R	615	897-4358
Williams	Robert	D	615	890-3220

From Rob and Coronel ... ent

A Query Based on Multiple Restrictions
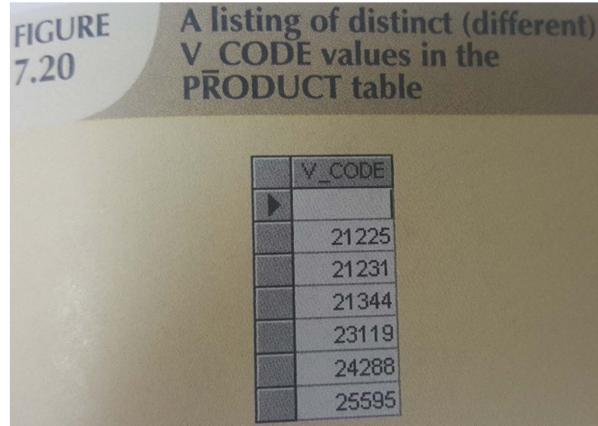
SELECT P_DESCRIPT, V_CODE, P_INDATE, P_PRICE

FROM PRODUCT

WHERE P_INDATE<#21-JAN-2004# AND P_PRICE<=50

ORDER BY V_CODE, P_PRICE DESC;

FIGURE 7.19 — A query based on multiple restrictions

P_DESCRIPT	V_CODE	P_INDATE	P_PRICE
Sledge hammer, 12 lb.		02-Jan-06	14.40
Claw hammer	21225	20-Jan-06	9.95
9.00-in. pwr. saw blade	21344	13-Nov-05	17.49
7.25-in. pwr. saw blade	21344	13-Dec-05	14.99
Rat-tail file, 1/8-in. fine	21344	15-Dec-05	4.99
Hrd. cloth, 1/2-in., 3x50	23119	15-Jan-06	43.99
Hrd. cloth, 1/4-in., 2x50	23119	15-Jan-06	39.95
B&D cordless drill, 1/2-in.	25595	20-Jan-06	38.95

Listing Unique Values

SELECT DISTINCT V_CODE

FROM PRODUCT;

FIGURE 7.20 A listing of distinct (different) V_CODE values in the PRODUCT table

V_CODE
21225
21231
21344
23119
24288
25595

Some Basic SQL Aggregate Functions

FUNCTION	OUTPUT
COUNT	The number of rows containing "non null" values
MIN	The minimum attribute value encountered in a given column
MAX	The maximum attribute value encountered in a given column
SUM	The sum of all values for a given column
AVG	The arithmetic mean (average) for the specified column

COUNT Function

SELECT COUNT(DISTINT V_CODE)

FROM PRODUCT; *Answer: 6*

SELECT COUNT(*)

FROM PRODUCT

WHERE P_PRICE <= 10.00;

Answer: 5

MAX and MIN Function

SELECT P_CODE, P_DESCRIPT, P_PRICE

FROM PRODUCT

WHERE P_PRICE = (SELECT MAX(P_PRICE) FROM PRODUCT);

Answer:

P_CODE	P_DESCRIPT	P_PRICE
89-WRE-Q	Hicut chain saw, 16 in.	256.99

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

SUM Function

SELECT SUM(CUS_BALANCE) AS TOTBALANCE

FROM CUSTOMER;

Answer:
TOTBALANCE
2089.28

SELECT SUM([P_QOH]*[P_PRICE]) AS TOTVALUE

FROM CUSTOMER;

Answer:
TOTVALUE
15084.52

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

AVG Function

SELECT P_DESCRIPT, P_ONHAND, P_PRICE, V_CODE
FROM PRODUCT
WHERE P_PRICE > (SELECT AVG(P_PRICE) FROM PRODUCT)
ORDER BY P_PRICE DESC;

Joining Database Tables

- Ability to combine (join) tables on common attributes is most important distinction between a relational database and other databases

- Join is performed when data are retrieved from more than one table at a time

- Join is generally composed of an equality comparison between the foreign key and the primary key of related tables

Creating Links Through Foreign Keys

TABLE	ATTRIBUTES TO BE SHOWN	LINKING ATTRIBUTE
PRODUCT	P_DESCRIPT, P_PRICE	V_CODE
VENDOR	V_COMPANY, V_PHONE	V_CODE

Joining Tables

SELECT PRODUCT.P_DESCRIPT, PRODUCT.P_PRICE,
  VENDOR.V_NAME, VENDOR.V_CONTACT,
  VENDOR.V_AREACODE, VENDOR.V_PHONE

FROM PRODUCT, VENDOR

WHERE PRODUCT.V_CODE = VENDOR.V_CODE;

P_DESCRIPT	P_PRICE	V_NAME	V_CONTACT	V_AREACODE	V_PHONE
Claw hammer	9.95	Bryson, Inc.	Smithson	615	223-3234
1.25-in. metal screw, 25	6.99	Bryson, Inc.	Smithson	615	223-3234
2.5-in. wd. screw, 50	8.45	D&E Supply	Singh	615	228-3245
7.25-in. pwr. saw blade	14.99	Gomez Bros.	Ortega	615	889-2546
9.00-in. pwr. saw blade	17.49	Gomez Bros.	Ortega	615	889-2546
Rat-tail file, 1/8-in. fine	4.99	Gomez Bros.	Ortega	615	889-2546
Hrd. cloth, 1/4-in., 2x50	39.95	Randsets Ltd.	Anderson	901	678-3998
Hrd. cloth, 1/2-in., 3x50	43.99	Randsets Ltd.	Anderson	901	678-3998
B&D jigsaw, 12-in. blade	109.92	ORDVA, Inc.	Hakford	615	898-1234
B&D jigsaw, 8-in. blade	99.87	ORDVA, Inc.	Hakford	615	898-1234
Hicut chain saw, 16 in.	256.99	ORDVA, Inc.	Hakford	615	898-1234
Power painter, 15 psi., 3-nozzle	109.99	Rubicon Syste	Orton	904	456-0092
B&D cordless drill, 1/2-in.	38.95	Rubicon Syste	Orton	904	456-0092
Steel matting, 4'x8'x1/6", .5" mesh	119.95	Rubicon Syste	Orton	904	456-0092

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

An Ordered and Limited Listing After a JOIN

SELECT PRODUCT.P_DESCRIPT, PRODUCT.P_PRICE,
  VENDOR.V_NAME, VENDOR.V_CONTACT,
  VENDOR.V_AREACODE, VENDOR.V_PHONE

FROM PRODUCT, VENDOR

WHERE PRODUCT.V_CODE = VENDOR.V_CODE

AND PRODUCT.P_INDATE > #15-JAN-2004#;

P_DESCRIPT	P_PRICE	V_NAME	V_CONTACT	V_AREACODE	V_PHONE
1.25-in. metal screw, 25	6.99	Bryson, Inc.	Smithson	615	223-3234
2.5-in. wd. screw, 50	8.45	D&E Supply	Singh	615	228-3245
Claw hammer	9.95	Bryson, Inc.	Smithson	615	223-3234
B&D cordless drill, 1/2-in.	38.95	Rubicon Systems	Orton	904	456-0092
Steel matting, 4'x8'x1/6", .5" mesh	119.95	Rubicon Systems	Orton	904	456-0092
Hicut chain saw, 16 in.	256.99	ORDVA, Inc.	Hakford	615	898-1234

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Left Outer Join

SELECT PRODUCT.P_CODE, VENDOR.V_CODE, VENDOR.V_NAME

FROM VENDOR LEFT JOIN PRODUCT ON VENDOR.V_CODE = PRODUCT.V_CODE;

With just JOIN operation, null values are ignored.
(e.g., no matching V_CODE between PRODUCT & VENDOR)

In this LEFT JOIN,
Show all VENDOR rows and all matching PRODUCT rows

FIGURE 7.33 The left outer join results

P_CODE	V_CODE	V_NAME
23109-HB	21225	Bryson, Inc.
SM-18277	21225	Bryson, Inc.
	21226	SuperLoo, Inc.
SW-23116	21231	D&E Supply
13-Q2/P2	21344	Gomez Bros.
14-Q1/L3	21344	Gomez Bros.
54778-2T	21344	Gomez Bros.
	22587	Dome Supply
1546-QQ2	23119	Randsets Ltd.
1558-QW1	23119	Randsets Ltd.
	24004	Brackman Bros.
2232/QTY	24288	ORDVA, Inc.
2232/QWE	24288	ORDVA, Inc.
89-WRE-Q	24288	ORDVA, Inc.
	25443	B&K, Inc.
	25501	Damal Supplies
11QER/31	25595	Rubicon Systems
2238/QPD	25595	Rubicon Systems
WR3/TT3	25595	Rubicon Systems

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

Right Outer Join

SELECT PRODUCT.P_CODE, VENDOR.V_CODE, VENDOR.V_NAME

FROM VENDOR RIGHT JOIN PRODUCT ON VENDOR.V_CODE = PRODUCT.V_CODE;

In this RIGHT JOIN,
Show all PRODUCT rows and all matching VENDOR rows

FIGURE 7.34 The right outer join results

P_CODE	V_CODE	V_NAME
23114-AA		
PVC23DRT		
23109-HB	21225	Bryson, Inc.
SM-18277	21225	Bryson, Inc.
SW-23116	21231	D&E Supply
13-Q2/P2	21344	Gomez Bros.
14-Q1/L3	21344	Gomez Bros.
54778-2T	21344	Gomez Bros.
1546-QQ2	23119	Randsets Ltd.
1558-QW1	23119	Randsets Ltd.
2232/QTY	24288	ORDVA, Inc.
2232/QWE	24288	ORDVA, Inc.
89-WRE-Q	24288	ORDVA, Inc.
11QER/31	25595	Rubicon Systems
2238/QPD	25595	Rubicon Systems
WR3/TT3	25595	Rubicon Systems

From Rob and Coronel (2004), Database Systems: Design, Implementation, and Management

SQL EXERCISE