

Lecture 5

Relational Operators

Chapter 3

The Relational Database Model



Department of
Software Engineering
BAHRIA UNIVERSITY
Discovering Knowledge

Relational Set Operators

- Relational algebra
 - Defines theoretical way of manipulating table contents using relational operators
 - Use of relational algebra operators on existing relations produces new relations:
 - SELECT
 - PROJECT
 - JOIN
 - INTERSECT
 - UNION
 - DIFFERENCE
 - PRODUCT
 - DIVIDE

**FIGURE
3.4**

SELECT

Original table

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

SELECT ALL yields

New table

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

SELECT only PRICE less than \$2.00 yields

P_CODE	P_DESCRIPT	PRICE
213345	9v battery	1.92
254467	100W bulb	1.47

SELECT only P_CODE = 311452 yields

P_CODE	P_DESCRIPT	PRICE
311452	Powerdrill	34.99

SOURCE: Course Technology/Cengage Learning

**FIGURE
3.5**

PROJECT

Original table

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

PROJECT PRICE yields

New table

PRICE
5.26
25.15
10.99
1.92
1.47
34.99

PROJECT P_DESCRIPT and PRICE yields

P_DESCRIPT	PRICE
Flashlight	5.26
Lamp	25.15
Box Fan	10.99
9v battery	1.92
100W bulb	1.47
Powerdrill	34.99

PROJECT P_CODE and PRICE yields

P_CODE	PRICE
123456	5.26
123457	25.15
123458	10.99
213345	1.92
254467	1.47
311452	34.99

SOURCE: Course Technology/Cengage Learning

**FIGURE
3.6**

UNION

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

UNION

P_CODE	P_DESCRIPT	PRICE
345678	Microwave	160.00
345679	Dishwasher	500.00
123458	Box Fan	10.99

yields

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99
345678	Microwave	160
345679	Dishwasher	500

SOURCE: Course Technology/Cengage Learning

**FIGURE
3.7**

INTERSECT

STU_FNAME	STU_LNAME
George	Jones
Jane	Smith
Peter	Robinson
Franklin	Johnson
Martin	Lopez

INTERSECT

EMP_FNAME	EMP_LNAME
Franklin	Lopez
William	Turner
Franklin	Johnson
Susan	Rogers

yields

STU_FNAME	STU_LNAME
Franklin	Johnson

SOURCE: Course Technology/Cengage Learning

FIGURE 3.8 DIFFERENCE

STU_FNAME	STU_LNAME	DIFFERENCE	EMP_FNAME	EMP_LNAME	yields	STU_FNAME	STU_LNAME
George	Jones		Franklin	Lopez		George	Jones
Jane	Smith		William	Turner		Jane	Smith
Peter	Robinson		Franklin	Johnson		Peter	Robinson
Franklin	Johnson		Susan	Rogers		Martin	Lopez
Martin	Lopez						

SOURCE: Course Technology/Cengage Learning

FIGURE 3.9 PRODUCT

P_CODE	P_DESCRIPT	PRICE	PRODUCT	STORE	aisle	shelf	yields	P_CODE	P_DESCRIPT	PRICE	STORE	aisle	shelf
123456	Flashlight	5.26		23	W	5		123456	Flashlight	5.26	23	W	5
123457	Lamp	25.15		24	K	9		123456	Flashlight	5.26	24	K	9
123458	Box Fan	10.99		25	Z	6		123456	Flashlight	5.26	25	Z	6
213345	9v battery	1.92						123457	Lamp	25.15	23	W	5
254467	100W bulb	1.47						123457	Lamp	25.15	24	K	9
311452	Powerdrill	34.99						123457	Lamp	25.15	25	Z	6
								123458	Box Fan	10.99	23	W	5
								123458	Box Fan	10.99	24	K	9
								123458	Box Fan	10.99	25	Z	6
								213345	9v battery	1.92	23	W	5
								213345	9v battery	1.92	24	K	9
								213345	9v battery	1.92	25	Z	6
								311452	Powerdrill	34.99	23	W	5
								311452	Powerdrill	34.99	24	K	9
								311452	Powerdrill	34.99	25	Z	6
								254467	100W bulb	1.47	23	W	5
								254467	100W bulb	1.47	24	K	9
								254467	100W bulb	1.47	25	Z	6

SOURCE: Course Technology/Cengage Learning

Relational Set Operators (cont'd.)

- Natural join
 - Links tables by selecting rows with common values in common attributes (join columns)
- Equijoin
 - Links tables on the basis of an equality condition that compares specified columns
- Theta join
 - Any other comparison operator is used

Relational Set Operators (cont'd.)

- Inner join
 - Only returns matched records from the tables that are being joined
- Outer join
 - Matched pairs are retained, and any unmatched values in other table are left null

**FIGURE
3.10**

Two tables that will be used in join illustrations

Table name: CUSTOMER

CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE
1132445	Walker	32145	231
1217782	Adares	32145	125
1312243	Rakowski	34129	167
1321242	Rodriguez	37134	125
1542311	Smithson	37134	421
1657399	Vanloo	32145	231

Table name: AGENT

AGENT_CODE	AGENT_PHONE
125	6152439887
167	6153426778
231	6152431124
333	9041234445

SOURCE: Course Technology/Cengage Learning

Relational Set Operators (cont'd.)

- Left outer join
 - Yields all of the rows in the CUSTOMER table
 - Including those that do not have a matching value in the AGENT table
- Right outer join
 - Yields all of the rows in the AGENT table
 - Including those that do not have matching values in the CUSTOMER table

**FIGURE
3.16**

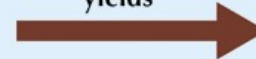
DIVIDE

CODE	LOC
A	5
A	9
A	4
B	5
B	3
C	6
D	7
D	8
E	8

DIVIDE

CODE
A
B

yields



LOC
5

SOURCE: Course Technology/Cengage Learning

Lecture 5

Relational Model

(Relationships) and Degree of abstraction

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