

## Department of Software

## Lecture 9

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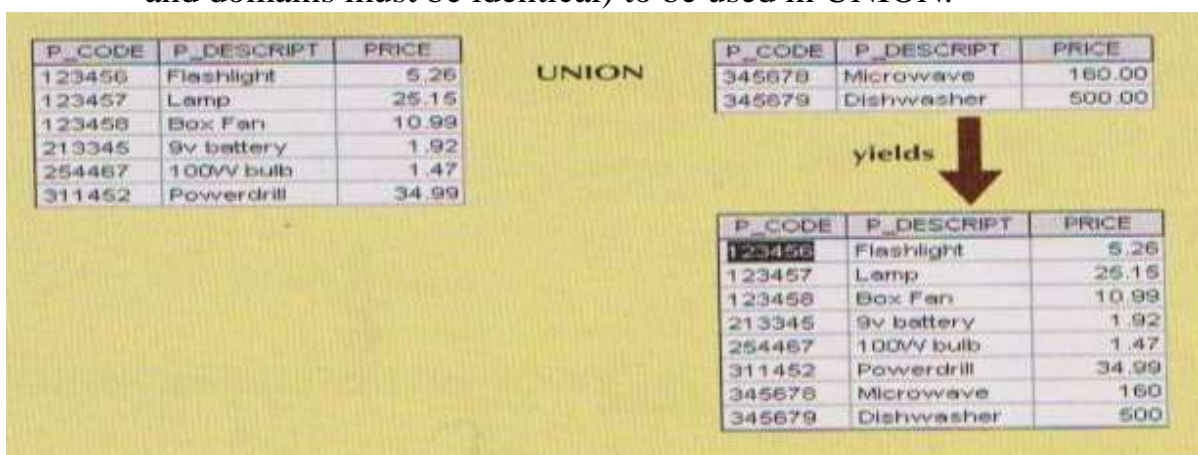
**Relational set operators**

The data in relational tables are of limited value unless can be manipulated to generate useful information. This section describes the basic data manipulation capabilities of the relational model. Relational algebra defines the theoretical way of manipulating table contents using the following operators:

**1. UNION**

Combines all rows from tow tables, excluding duplicate rows.

The tables must have the same attribute characteristics (the columns and domains must be identical) to be used in UNION.

**2. INTERSECT**

Yields only the rows that appear in both tables. Was

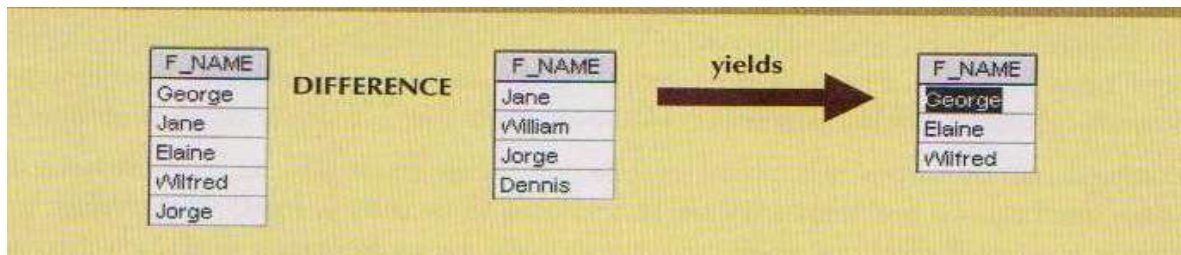
True in the case of UNION, the tables must be union-compatible to yield valid results.

**3. DIFFERENCE**

Yields all rows in one table that are not found in the other

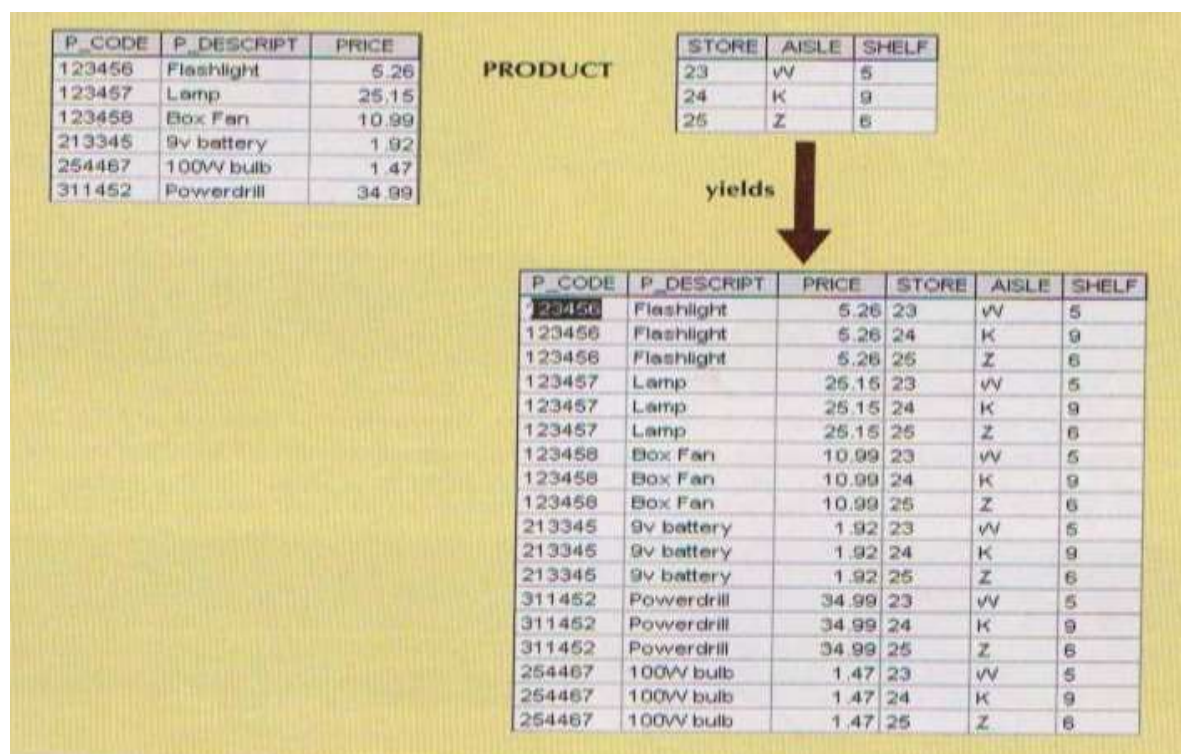
Table; that is subtracts one table from the other, the tables must be Union-compatible to yield valid results.

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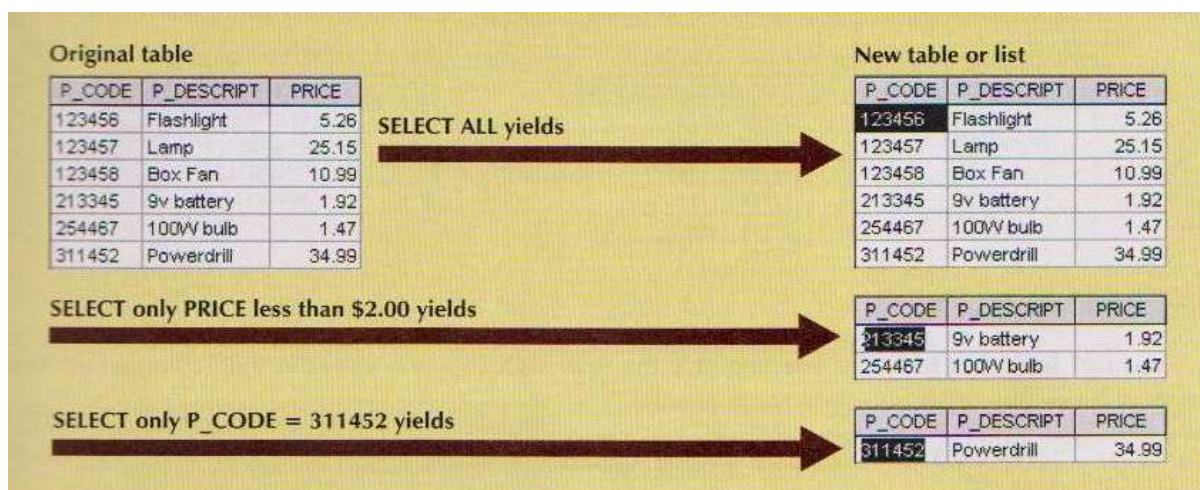
#### 4. PRODUCT

Yields all possible pairs of rows from two tables also known as the Cartesian product.



#### 5. SELECT

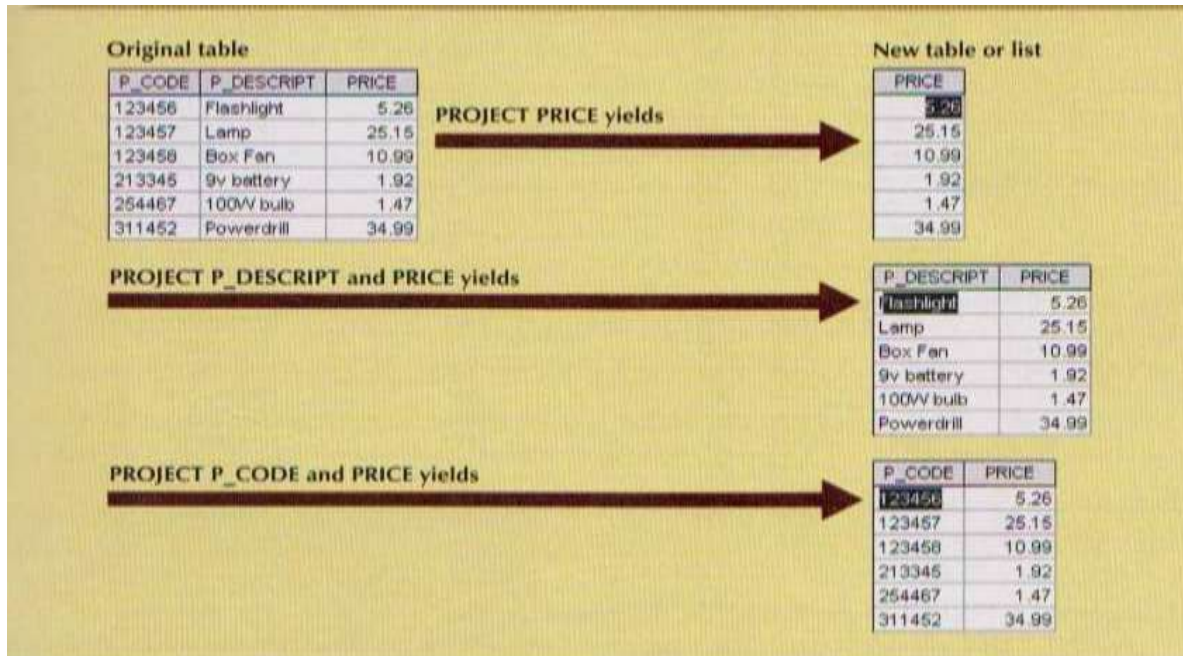
Also known as RESTRICT, yields values for all rows found in a table that satisfy a given condition.





## 6. PROJECT

Yields all values for selected attributes. In other words, PROJECT yields a vertical subset of a table.



## 7. JOIN

Allows information to be combined from two or more tables, there are several types of JOIN:

- **natural join** links tables by selecting only the rows with common values in their common attributes. It is the result of a three-stage process:

### a- PRODUCT

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

AGENT_CODE	AGENT_PHONE
125	6152439887
167	6153426778
231	6152431124
333	9041234445

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b. SELECT on output of step a

CUS_CODE	CUS_LNAME	CUS_ZIP	CUSTOMER.AGENT_CODE	AGENT.AGENT_CODE	AGENT_PHONE
1132445	vWalker	32145	231	125	6152439887
1132445	vWalker	32145	231	167	6153426778
1132445	vWalker	32145	231	231	6152431124
1132445	vWalker	32145	231	333	9041234445
1217782	Adares	32145	125	125	6152439887
1217782	Adares	32145	125	167	6153426778
1217782	Adares	32145	125	231	6152431124
1217782	Adares	32145	125	333	9041234445
1312243	Rakowski	34129	167	125	6152439887
1312243	Rakowski	34129	167	167	6153426778
1312243	Rakowski	34129	167	231	6152431124
1312243	Rakowski	34129	167	333	9041234445
1321242	Rodriguez	37134	125	125	6152439887
1321242	Rodriguez	37134	125	167	6153426778
1321242	Rodriguez	37134	125	231	6152431124
1321242	Rodriguez	37134	125	333	9041234445
1542311	Smithson	37134	421	125	6152439887
1542311	Smithson	37134	421	167	6153426778
1542311	Smithson	37134	421	231	6152431124
1542311	Smithson	37134	421	333	9041234445
1657399	Vanloo	32145	231	125	6152439887
1657399	Vanloo	32145	231	167	6153426778
1657399	Vanloo	32145	231	231	6152431124
1657399	Vanloo	32145	231	333	9041234445

c. A PROJECT on the result of step b yield a single copy of each attribute, thereby eliminating duplicate columns.

CUS_CODE	CUS_LNAME	CUS_ZIP	CUSTOMER.AGENT_CODE	AGENT.AGENT_CODE	AGENT_PHONE
1217782	Adares	32145	125	125	6152439887
1321242	Rodriguez	37134	125	125	6152439887
1312243	Rakowski	34129	167	167	6153426778
1132445	vWalker	32145	231	231	6152431124
1657399	Vanloo	32145	231	231	6152431124

**-equijoin**

Links tables on the basis of an equality condition that compares specified columns of each table. the outcome of the equijoin does not eliminate duplicate columns, and the condition or criterion use to join the tables must be explicitly defined.

CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE	AGENT_PHONE
1217782	Adares	32145	125	6152439887
1321242	Rodriguez	37134	125	6152439887
1312243	Rakowski	34129	167	6153426778
1132445	vWalker	32145	231	6152431124
1657399	Vanloo	32145	231	6152431124



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### -outer join

#### a- 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.

CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE	AGENT_PHONE
1217782	Adares	32145	125	6152439887
1321242	Rodriguez	37134	125	6152439887
1312243	Rakowski	34129	167	6153426778
1132445	Walker	32145	231	6152431124
1657399	Vanloo	32145	231	6152431124
1542311	Smithson	37134	421	

#### b- right outer join

yields all of the rows in the AGENT table, including those that do not have a matching value in the CUSTOMER table .

### 8. DIVID

CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE	AGENT_PHONE
1217782	Adares	32145	125	6152439887
1321242	Rodriguez	37134	125	6152439887
1312243	Rakowski	34129	167	6153426778
1132445	Walker	32145	231	6152431124
1657399	Vanloo	32145	231	6152431124
			333	9041234445

Table1 is divided by table 2 to produce table3 . table 1 and 2 both contain CODE but do not share LOC.

To be included in the table3 ,a value in the unshared column(LOC) must be associated (in the dividing table 2) with every value in the table 1.

The only value associated with both A and B is 5.

