

SQL – SQL Joins

Andrea Villanes

Questions

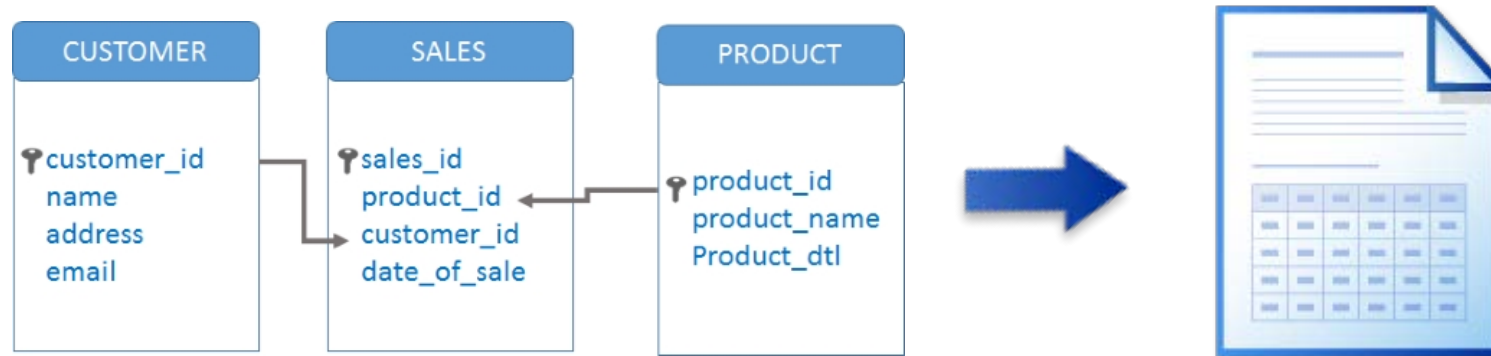
Q10 – Q15

Adding the new database Practice to
SQLiteStudio

Introduction to SQL Joins

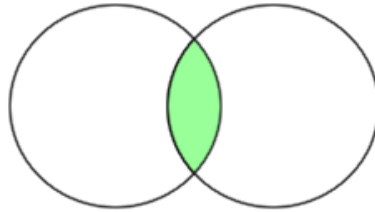
Combining Tables

SQL uses *joins* to combine tables horizontally. Requesting a join involves matching data from one row in one table with a corresponding row in a second table. Matching is typically performed on one or more columns in the two tables.

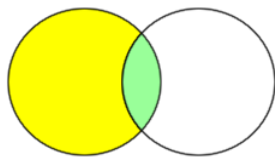


Types of Joins: two types

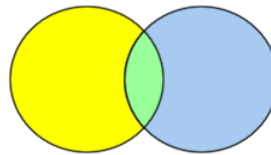
- *Inner joins* return only matching rows.



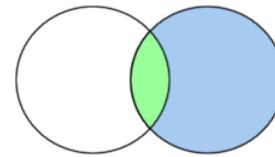
- *Outer joins* return all matching rows, plus nonmatching rows from one or both tables.



Left



Full



Right

Cartesian Product

A query that lists multiple tables in the FROM clause without a WHERE clause **produces all possible combinations of rows from all tables**. This result is called a *Cartesian product*.

```
select *  
from customers, transactions;
```

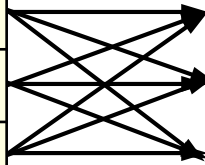
Cartesian Product

customers

ID	Name
101	Smith
104	Jones
102	Blank

transactions

ID	Action	Amount
102	Purchase	\$100
103	Return	\$52
105	Return	\$212



Result Set

**Non-
matching
IDs**

ID	Name	ID	Action	Amount
101	Smith	102	Purchase	\$100
101	Smith	103	Return	\$52
101	Smith	105	Return	\$212
104	Jones	102	Purchase	\$100
104	Jones	103	Return	\$52
104	Jones	105	Return	\$212
102	Blank	102	Purchase	\$100
102	Blank	103	Return	\$52
102	Blank	105	Return	\$212

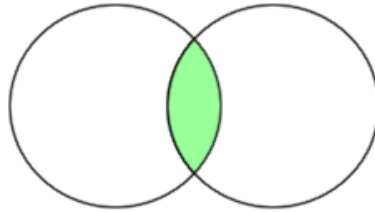
9 rows

The Cartesian Product is rarely what we want to produce...

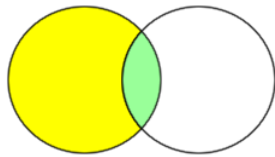
Inner Joins

Types of Joins: two types

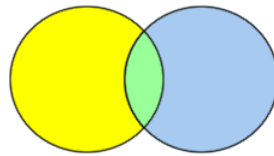
- *Inner joins* return only matching rows.



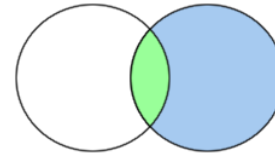
- *Outer joins* return all matching rows, plus nonmatching rows from one or both tables.



Left



Full



Right

Inner Join

Generate a report showing all valid order information:

ID	Name	ID	Action	Amount
101	Smith	102	Purchase	\$100
101	Smith	103	Return	\$52
101	Smith	105	Return	\$212
104	Jones	102	Purchase	\$100
104	Jones	103	Return	\$52
104	Jones	105	Return	\$212
102	Blank	102	Purchase	\$100
102	Blank	103	Return	\$52
102	Blank	105	Return	\$212

Inner Join

The inner join clause links two (or more) tables by a relationship between two columns.

```
select *  
from customers, transactions  
where customers.ID=transactions.ID;
```

```
SELECT object-item<, ...object-item>  
FROM table-name, ... table-name  
WHERE join condition  
         <AND sql-expression>  
         <other clauses>;
```

Abbreviating the Code

- A *table alias* is a temporary, alternative name for a table. You can make the query easier to read by using table aliases.

```
SELECT alias-1.object-item<, ...alias-2.object-item>  
  FROM table-name <AS> alias-1,  
        table-name <AS> alias-2  
  WHERE join-condition(s)  
  <other clauses>;
```

- The AS keyword is optional in the table alias syntax.

Abbreviating the Code

```
proc sql;  
select c.ID, Name, Action, Amount  
       from customers as c, transactions as t  
       where c.ID=t.ID;  
quit;
```



ID	Name	Action	Amount
102	Blank	Purchase	\$100

Alternative Join Syntax

This alternative syntax names the join type and includes an ON clause

```
select c.ID, Name, Action, Amount
  from customers as c
    inner join
  transactions as t
   on c.ID=t.ID;
```

```
SELECT object-item <, ...object-item>
FROM table-name <<AS> alias>
INNER JOIN
       table-name <<AS> alias>
ON join-condition(s)
WHERE sql-expression
      <other clauses>;
```



Tables: `jupiter.employees`
`jupiter.employee_addresses`
Display: Employee_ID, Gender, Employee_Name

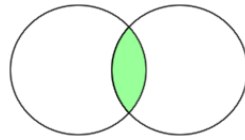


Tables: `practice.movies`
`practice.genres`
Display: movie_name, genre

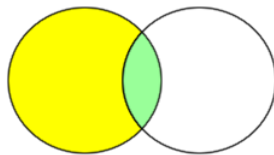
Outer Joins

Outer Joins

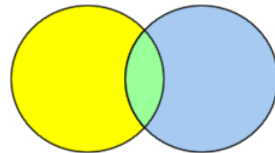
- *Inner joins* return only matching rows.



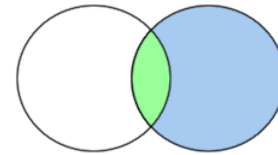
- *Outer joins*: you can retrieve both non-matching and matching rows using an outer join. Many tables can be referenced in outer joins. The tables are processed two tables at a time.



Left



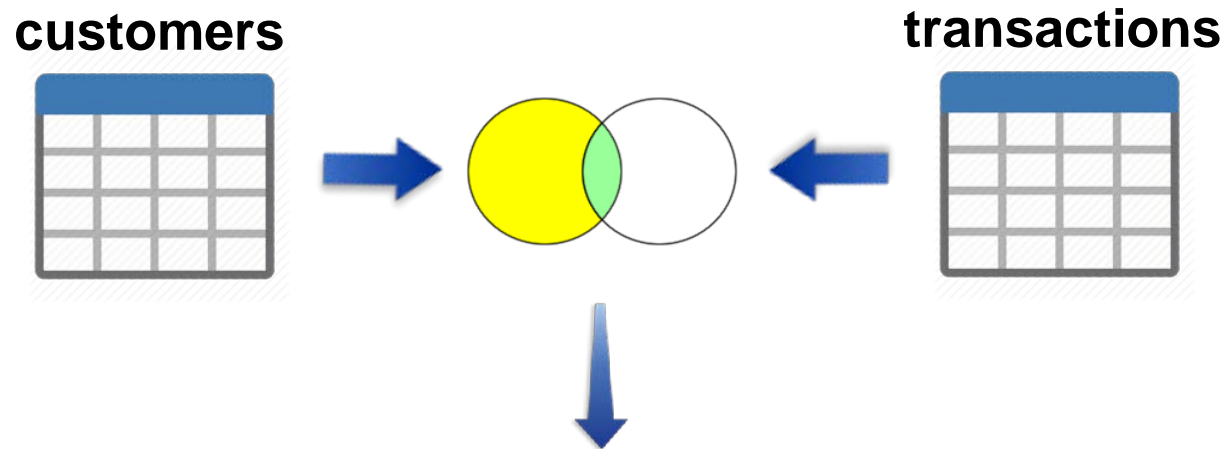
Full



Right

Outer Joins

Generate a report that displays ***all*** customers and any transactions that they have completed.



ID	Name	ID	Action	Amount
101	Smith	.		.
102	Blank	102	Purchase	\$100
104	Jones	.		.

Outer Joins

Outer join syntax is similar to the alternate inner join syntax.

```
select *  
  from customers as c  
    left join  
    transactions as t  
  on c.ID=t.ID;
```

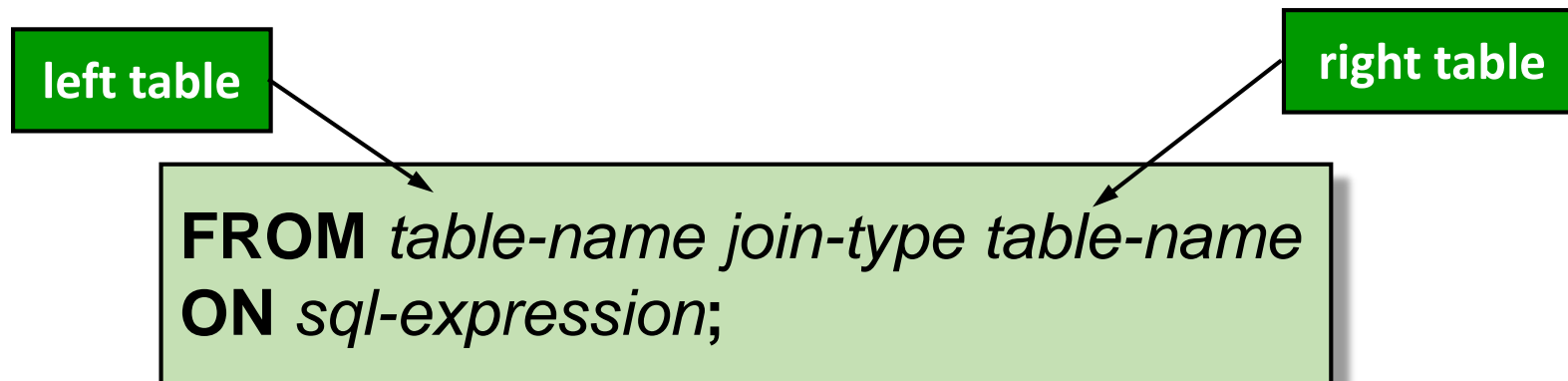
The ON clause
specifies the join
criteria in outer
joins.

```
SELECT object-item <, ...object-item>  
FROM table-name <<AS> alias>  
      LEFT|RIGHT|FULL JOIN  
      table-name <<AS> alias>  
ON join-condition(s)  
    <other clauses>;
```

Determining Left and Right

Consider the position of the tables in the FROM clause.

- Left joins return all matching and non-matching rows from the *left* table and the matching rows from the *right* table.
- Right joins return all matching and non-matching rows from the *right* table and the matching rows from the *left* table.
- Full joins return all matching and non-matching rows from all of the tables.



Left Join

customers

ID	Name
101	Smith
104	Jones
102	Blank

transactions

ID	Action	Amount
102	Purchase	\$100
103	Return	\$52
105	Return	\$212

```
select *  
  from customers c left join transactions t  
    on c.ID = t.ID;
```

ID	Name	ID	Action	Amount
101	Smith	.	.	.
102	Blank	102	Purchase	\$100
104	Jones	.	.	.

Includes all rows from the left table, even if there are no matching rows in the right table.

Right Join

customers

ID	Name
101	Smith
104	Jones
102	Blank

transactions

ID	Action	Amount
102	Purchase	\$100
103	Return	\$52
105	Return	\$212

```
select *  
  from customers c right join transactions t  
    on c.ID = t.ID;
```

ID	Name	ID	Action	Amount
102	Blank	102	Purchase	\$100
.		103	Return	\$52
.		105	Return	\$212

Includes all rows from the right table, even if there are no matching rows in the left table.

Full Join

customers

ID	Name
101	Smith
104	Jones
102	Blank

transactions

ID	Action	Amount
102	Purchase	\$100
103	Return	\$52
105	Return	\$212

```
select *  
  from customers c full join transactions t  
    on c.ID = t.ID;
```

ID	Name	ID	Action	Amount
101	Smith	.	.	.
102	Blank	102	Purchase	\$100
.		103	Return	\$52
104	Jones	.	.	.
.		105	Return	\$212

Includes all rows
from both tables,
even if there are no
matching rows in
either table

For the lab...

