SQL – SQL Joins

Dr. Villanes

Questions
Q1 – Q6

Question 1

With SQL, how do you select all the columns from a table named "Persons"?

A	SELECT [all] FROM Persons
B	SELECT Persons
C	SELECT * FROM Persons
D	SELECT *.Persons

Question 2

In the following query, what is the number 2 referring to?

```
select ID, Capital_Gain, capital_gain*0.10
from exercise.records
where capital_gain <> 0
order by 2;
```

A	ID
B	Capital_Gain
C	Capital_Gain*0.10

Question 3

With SQL, how can you return all the records from a table named "Persons" sorted descending by "FirstName"?

A	SELECT * FROM Persons ORDER BY FirstName DESC
B	SELECT * FROM Persons ORDER FirstName DESC
C	SELECT * FROM Persons SORT 'FirstName' DESC
D	SELECT * FROM Persons SORT BY 'FirstName' DESC

Question 4

With SQL, how can you return the number of records in the "Persons" table?

A	SELECT COLUMNS(*) FROM Persons
B	SELECT NO(*) FROM Persons
C	SELECT COUNT(*) FROM Persons
D	SELECT LEN(*) FROM Persons

Question 5

If the following query is submitted in the CUSTOMERS table, how many rows would be in the output?

```
SELECT NAME, SUM(SALARY)
FROM CUSTOMERS
GROUP BY NAME;
```

```
+----+----------+-----+-----------+----------+
| ID | NAME     | AGE | ADDRESS   | SALARY   |
+----+----------+-----+-----------+----------+
|  1 | Ramesh   |  32 | Ahmedabad |  2000.00 |
|  2 | Khilan   |  25 | Delhi     |  1500.00 |
|  3 | kaushik  |  23 | Kota      |  2000.00 |
|  4 | Chaitali |  25 | Mumbai    |  6500.00 |
|  5 | Hardik   |  27 | Bhopal    |  8500.00 |
|  6 | Komal    |  22 | MP        |  4500.00 |
|  7 | Muffy    |  24 | Indore    | 10000.00 |
+----+----------+-----+-----------+----------+
```

A 0 rows

B 6 rows

C 7 rows

D 8 rows

Question 6

What about now?

```
SELECT NAME, SUM(SALARY)
FROM CUSTOMERS
GROUP BY NAME;
```

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
2	Ramesh	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	kaushik	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00

A 0 rows

B 4 rows

C 5 rows

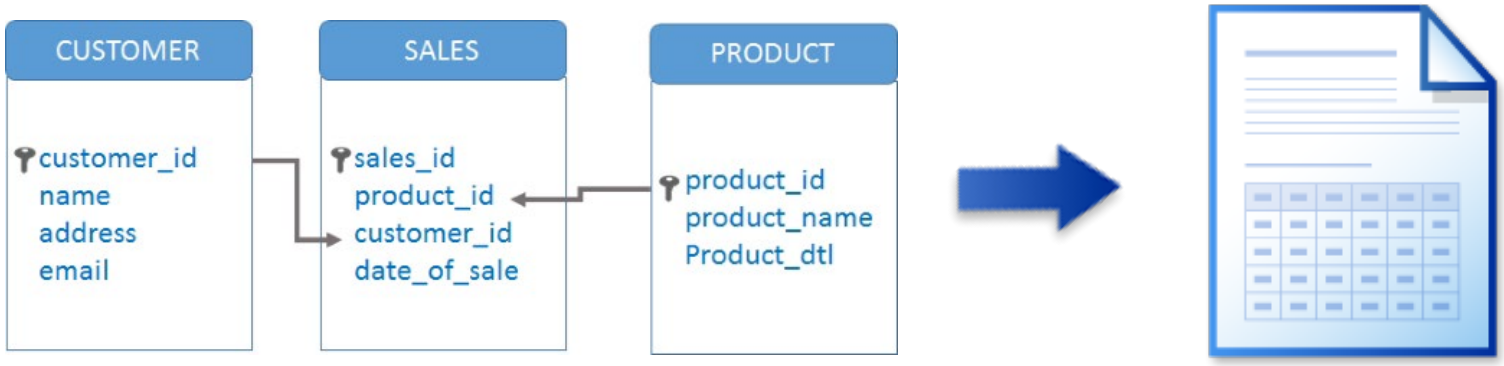
D 7 rows

Adding the new database Practice to DataGrip

SQL Joins

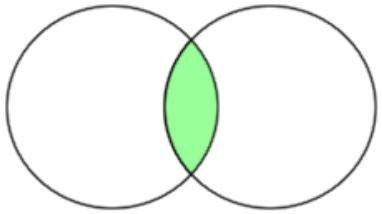
Combining Tables

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.

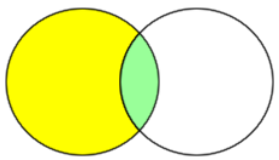


Types of Joins: two types

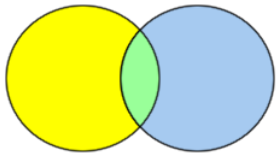
- *Inner joins* return only matching rows.



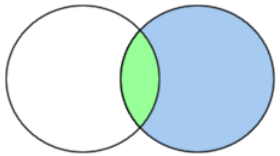
- *Outer joins* return all matching rows, plus nonmatching rows from one or both tables.



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

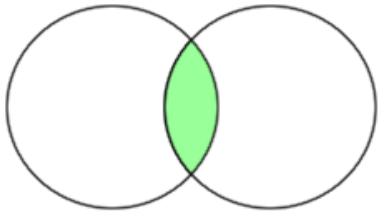
9 rows

The Cartesian Product is rarely what we want to produce…

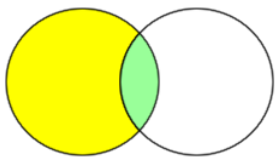
Inner Joins

Types of Joins: two types

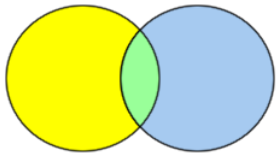
- *Inner joins* return only matching rows.



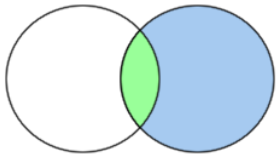
- *Outer joins* return all matching rows, plus nonmatching rows from one or both tables.



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

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

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*>**;**

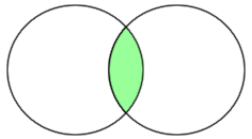
Tables: **`jupiter.employees`**
`jupiter.employee_addresses`
Display: Employee_ID, Gender, Employee_Name

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

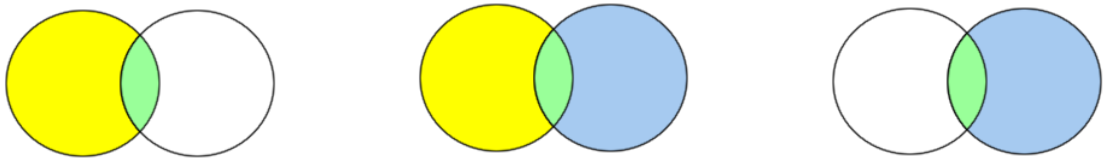
Outer Joins

Outer Joins

- *Inner joins* return only matching rows.

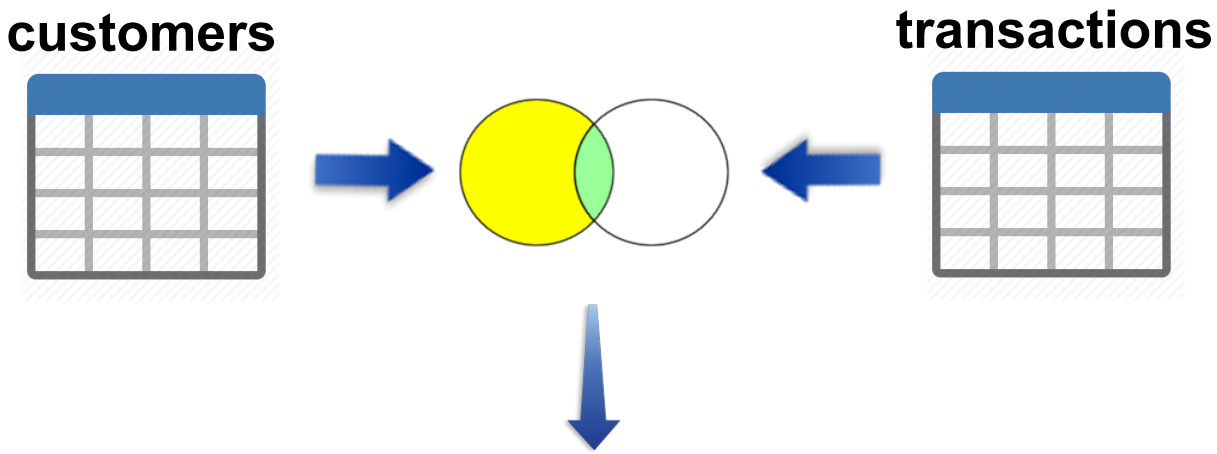


- *Outer joins:* you can retrieve both non-matching and matching rows using an outer join. Many tables can be referenced in outer joins. The tables are processed two tables at a time.



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;
```

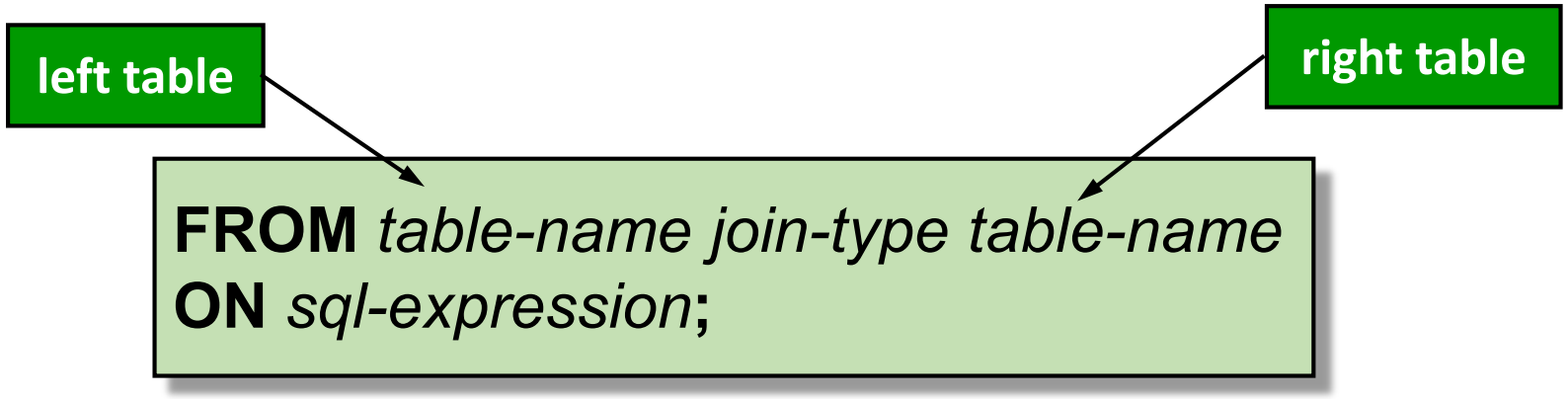
The ON clause specifies the join criteria in outer joins.

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

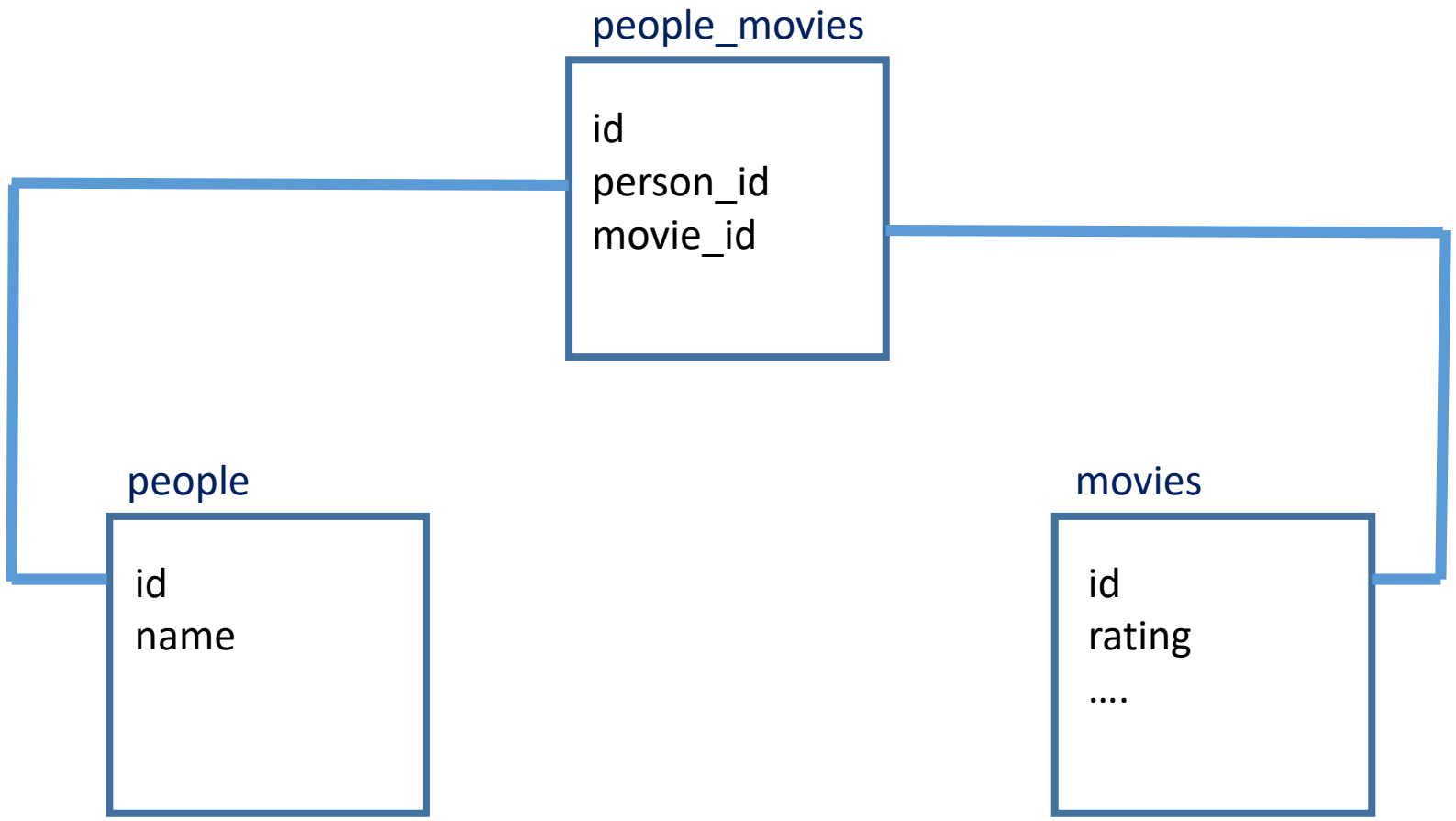
ID	Action	Amount
102	Purchase	$100
103	Return	$52
105	Return	$212

```
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…


people_movies
id
person_id
movie_id
people
id
name
movies
id
rating
….