Combining Data

LIGHTHOUSE LABS

Steve Mitchell

Agenda

JOINs Review

Multiple JOINs

Subqueries

Exercises

LIGHTHOUSE LABS

JOINs Review

LIGHTHOUSE LABS

Recap on JOINs

`USING (CustomerID)`

`SELECT * FROM vehicles AS V JOIN customers AS C ON V.CustomerID = C.CustomerID`

vehicles

VIN	CustomerID	Make	Model	Year
J314ACK9	C001782	Honda	CRV	2020
VYT4NT42	C000965	Toyota	Corolla	2018
8R91MA8U	C001782	Mazda	RX5	2019
B7X82R41	C001331	Toyota	Corolla	2022
GF328WT9	C001564	Honda	Pilot	2021

customers

CustomerID	FirstName	LastName	Phone
C001782	Brad	Pitt	555-1234
C001331	Albert	Einstein	555-9876
C000748	Homer	Simpson	555-7885
C001564	Edmund	Dantes	555-2880

VIN	CustomerID	Make	Model	Year	CustomerID	FirstName	LastName	Phone
J314ACK9	C001782	Honda	CRV	2020	C001782	Brad	Pitt	555-1234
8R91MA8U	C001782	Mazda	RX5	2019	C001782	Brad	Pitt	555-1234
B7X82R41	C001331	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
GF328WT9	C001564	Honda	Pilot	2021	C001564	Edmund	Dantes	555-2880

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INNER JOIN

`SELECT * FROM vehicles AS V JOIN customers AS C …`

vehicles

VIN	CustomerID	Make	Model	Year
J314ACK9	C001782	Honda	CRV	2020
VYT4NT42	C000965	Toyota	Corolla	2018
8R91MA8U	C001782	Mazda	RX5	2019
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VIN	CustomerID	Make	Model	Year	CustomerID	FirstName	LastName	Phone
J314ACK9	C001782	Honda	CRV	2020	C001782	Brad	Pitt	555-1234
8R91MA8U	C001782	Mazda	RX5	2019	C001782	Brad	Pitt	555-1234
B7X82R41	C001331	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
GF328WT9	C001564	Honda	Pilot	2021	C001564	Edmund	Dantes	555-2880

A B

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FULL OUTER JOIN

```sql
SELECT * FROM vehicles AS V FULL OUTER JOIN customers AS C …
```

vehicles

VIN	CustomerID	Make	Model	Year
J314ACK9	C001782	Honda	CRV	2020
VYT4NT42	C000965	Toyota	Corolla	2018
8R91MA8U	C001782	Mazda	RX5	2019
B7X82R41	C001331	Toyota	Corolla	2022
GF328WT9	C001564	Honda	Pilot	2021

customers

CustomerID	FirstName	LastName	Phone
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C001331	Albert	Einstein	555-9876
C000748	Homer	Simpson	555-7885
C001564	Edmund	Dantes	555-2880

VIN	CustomerID	Make	Model	Year	CustomerID	FirstName	LastName	Phone
J314ACK9	C001782	Honda	CRV	2020	C001782	Brad	Pitt	555-1234
VYT4NT42	C000965	Toyota	Corolla	2018	null	null	null	null
8R91MA8U	C001782	Mazda	RX5	2019	C001782	Brad	Pitt	555-1234
B7X82R41	C001331	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
GF328WT9	C001564	Honda	Pilot	2021	C001564	Edmund	Dantes	555-2880
null	null	null	null	null	C000748	Homer	Simpson	555-7885

LEFT JOIN

`SELECT * FROM vehicles AS V LEFT JOIN customers AS C …`

vehicles

VIN	CustomerID	Make	Model	Year
J314ACK9	C001782	Honda	CRV	2020
VYT4NT42	C000965	Toyota	Corolla	2018
8R91MA8U	C001782	Mazda	RX5	2019
B7X82R41	C001331	Toyota	Corolla	2022
GF328WT9	C001564	Honda	Pilot	2021

customers

CustomerID	FirstName	LastName	Phone
C001782	Brad	Pitt	555-1234
C001331	Albert	Einstein	555-9876
C000748	Homer	Simpson	555-7885
C001564	Edmund	Dantes	555-2880

VIN	CustomerID	Make	Model	Year	CustomerID	FirstName	LastName	Phone
J314ACK9	C001782	Honda	CRV	2020	C001782	Brad	Pitt	555-1234
VYT4NT42	C000965	Toyota	Corolla	2018	null	null	null	null
8R91MA8U	C001782	Mazda	RX5	2019	C001782	Brad	Pitt	555-1234
B7X82R41	C001331	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
GF328WT9	C001564	Honda	Pilot	2021	C001564	Edmund	Dantes	555-2880

RIGHT JOIN

`SELECT * FROM vehicles AS V RIGHT JOIN customers AS C …`

vehicles

VIN	CustomerID	Make	Model	Year
J314ACK9	C001782	Honda	CRV	2020
VYT4NT42	C000965	Toyota	Corolla	2018
8R91MA8U	C001782	Mazda	RX5	2019
B7X82R41	C001331	Toyota	Corolla	2022
GF328WT9	C001564	Honda	Pilot	2021

customers

CustomerID	FirstName	LastName	Phone
C001782	Brad	Pitt	555-1234
C001331	Albert	Einstein	555-9876
C000748	Homer	Simpson	555-7885
C001564	Edmund	Dantes	555-2880

VIN	CustomerID	Make	Model	Year	CustomerID	FirstName	LastName	Phone
J314ACK9	C001782	Honda	CRV	2020	C001782	Brad	Pitt	555-1234
8R91MA8U	C001782	Mazda	RX5	2019	C001782	Brad	Pitt	555-1234
B7X82R41	C001331	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
GF328WT9	C001564	Honda	Pilot	2021	C001564	Edmund	Dantes	555-2880
null	null	null	null	null	C000748	Homer	Simpson	555-7885

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Excluding JOINs

Left Excluding JOIN
- Data in table A but not table B

… `WHERE` `B.key` `IS NULL`
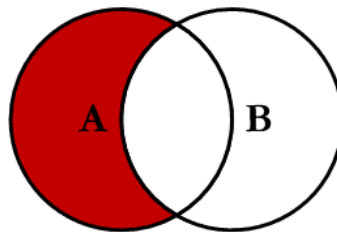
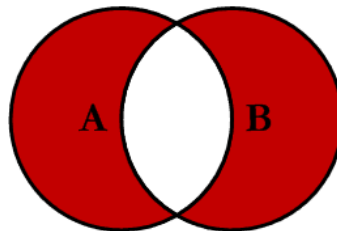**Right Excluding JOIN**
- Data in table B but not table A

… `WHERE` `A.key` `IS NULL`
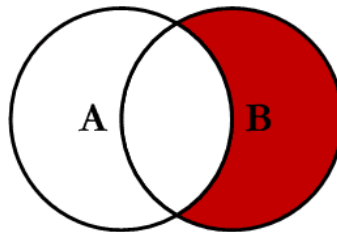
Outer Excluding JOIN
- Data from both tables without intersection

… `WHERE` `A.key` `IS NULL` `OR` `B.key` `IS NULL`

Multiple JOINs

MULTIPLE JOINS

Sometimes we need to combine data from more than two
tables, e.g. combining Customers, Services and Vehicles

customers

CustomerID	FirstName	LastName	Phone
C001782	Brad	Pitt	555-1234
C001331	Albert	Einstein	555-9876
C000748	Homer	Simpson	555-7885
C001564	Edmund	Dantes	555-2880

services

Invoice	Date	VIN	Service	Amount
20220544	2022-02-07	B7X82R41	Oil change	$75.46
20220545	2022-04-10	8R91MA8U	Safety check	$120.51
20220546	2022-05-17	B7X82R41	Brake pads	$309.28
20220547	2022-07-30	VYT4NT42	Oil change	$75.46
20220548	2022-08-27	PF43EW5D	Package 2	$211.73
20220549	2022-11-04	J314ACK9	Winter tires	$58.41

vehicles

VIN	CustomerID	Make	Model	Year
J314ACK9	C001782	Honda	CRV	2020
VYT4NT42	C000965	Toyota	Corolla	2018
8R91MA8U	C001782	Mazda	RX5	2019
B7X82R41	C001331	Toyota	Corolla	2022
GF328WT9	C001564	Honda	Pilot	2021

MULTIPLE JOINS

services

vehicles

customers

Invoice	Date	VIN	Service	Amount	Make	Model	Year	CustomerID	FirstName	LastName	Phone
20220544	2022-02-07	B7X82R41	Oil change	$75.46	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
20220545	2022-04-10	8R91MA8U	Safety check	$120.51	Mazda	RX5	2019	C001782	Brad	Pitt	555-1234
20220546	2022-05-17	B7X82R41	Brake pads	$309.28	Toyota	Corolla	2022	C001331	Albert	Einstein	555-9876
20220547	2022-07-30	VYT4NT42	Oil change	$75.46	Toyota	Corolla	2018	C000965	null	null	null
20220548	2022-08-27	PF43EW5D	Package 2	$211.73	null	null	null	null	null	null	null
20220549	2022-11-04	J314ACK9	Winter tires	$58.41	Honda	CRV	2020	C001782	Brad	Pitt	555-1234
null	null	GF328WT9	null	null	Honda	Pilot	2021	C001564	Edmund	Dantes	555-2880

```
SELECT *
FROM services
FULL OUTER JOIN vehicles ON services.VIN = vehicles.VIN
FULL OUTER JOIN customers ON vehicles.CustomerID = customers.CustomerID
```
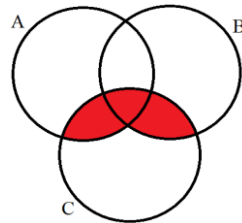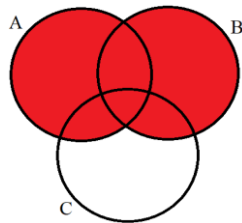
MULTIPLE JOINS

```
SELECT *
FROM A
FULL OUTER JOIN B ON A.key = B.key
FULL OUTER JOIN C ON B.key2 = C.key2
```



```
SELECT *
FROM A
JOIN B ON A.key = B.key
JOIN C ON B.key2 = C.key2
```
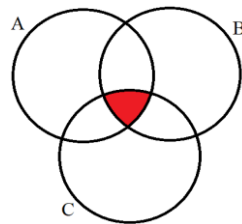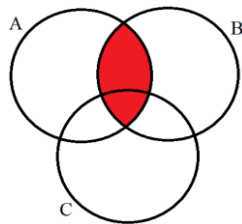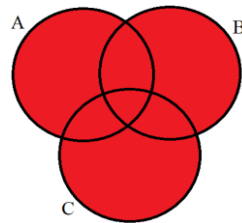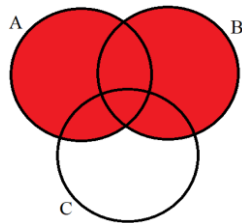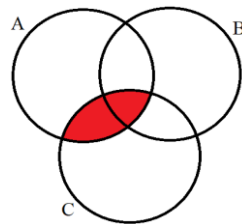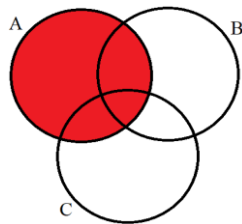
MULTIPLE JOINS

```
SELECT *
FROM A
FULL OUTER JOIN B ON A.key = B.key
JOIN C ON B.key2 = C.key2
```



```
SELECT *
FROM A
LEFT JOIN B ON A.key = B.key
JOIN C ON B.key2 = C.key2
```
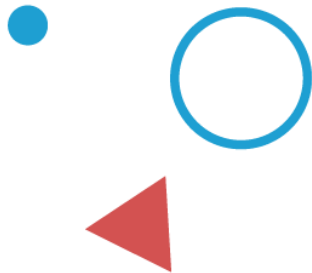
Multiple JOINs – Exercises

Using the Northwind Database:

1. Examine the employees, employeeterritories, and territories tables

2. Show all employeeids and their territoryid (including possible nulls)

3. Show each employee full name and their territorydescription

4. Show each employee full name and their regiondescription

Break Time!

<<10:00>

LIGHTHOUSE LABS

What is a Subquery?

Subquery (or "nested") is a query that is located inside another query

- Used to simplify queries and avoid JOINs
- Returns anything a normal query can: single values, single/multiple rows, single/multiple columns, entire tables
- May be difficult to understand when reading code
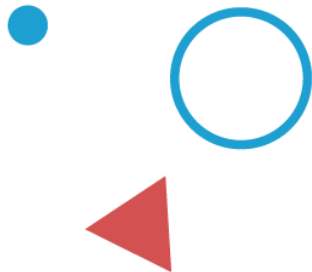- Helps compartmentalize a query into different parts

query

```
SELECT * FROM table WHERE id IN (SELECT id FROM table)
```

subquery

Select Subquery

```
SELECT col1, col2, [SUBQUERY]
FROM table1
```
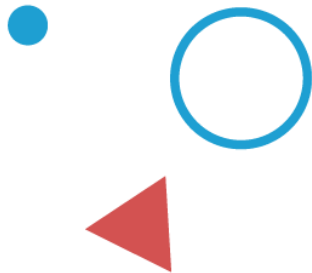
E.g. Make a table with product names, units in stock and average units in stock for all products

Where Subquery

```
SELECT col1, col2
FROM table1
WHERE col3 IN [SUBQUERY]
```
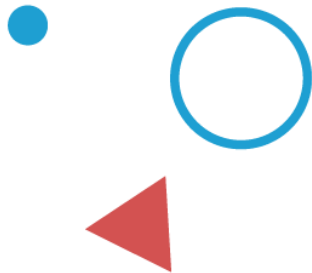
E.g. List information on products that never had a discount > 0.20

From Subquery

```
SELECT col1, col2
FROM [SUBQUERY]
```

E.g. Find average price of products with units in stock above 100

Subqueries – Exercises

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Subqueries - Exercises

Using the Northwind Database (try to avoid JOINs):

1. Show orderid, country and freight difference from overall average freight

2. Compare average freight of orders to Germany with average freight of orders to France

3. Show all products (names) with a supplier from Germany

4. Show orderid and country for orders with higher than average total value (including discount)