

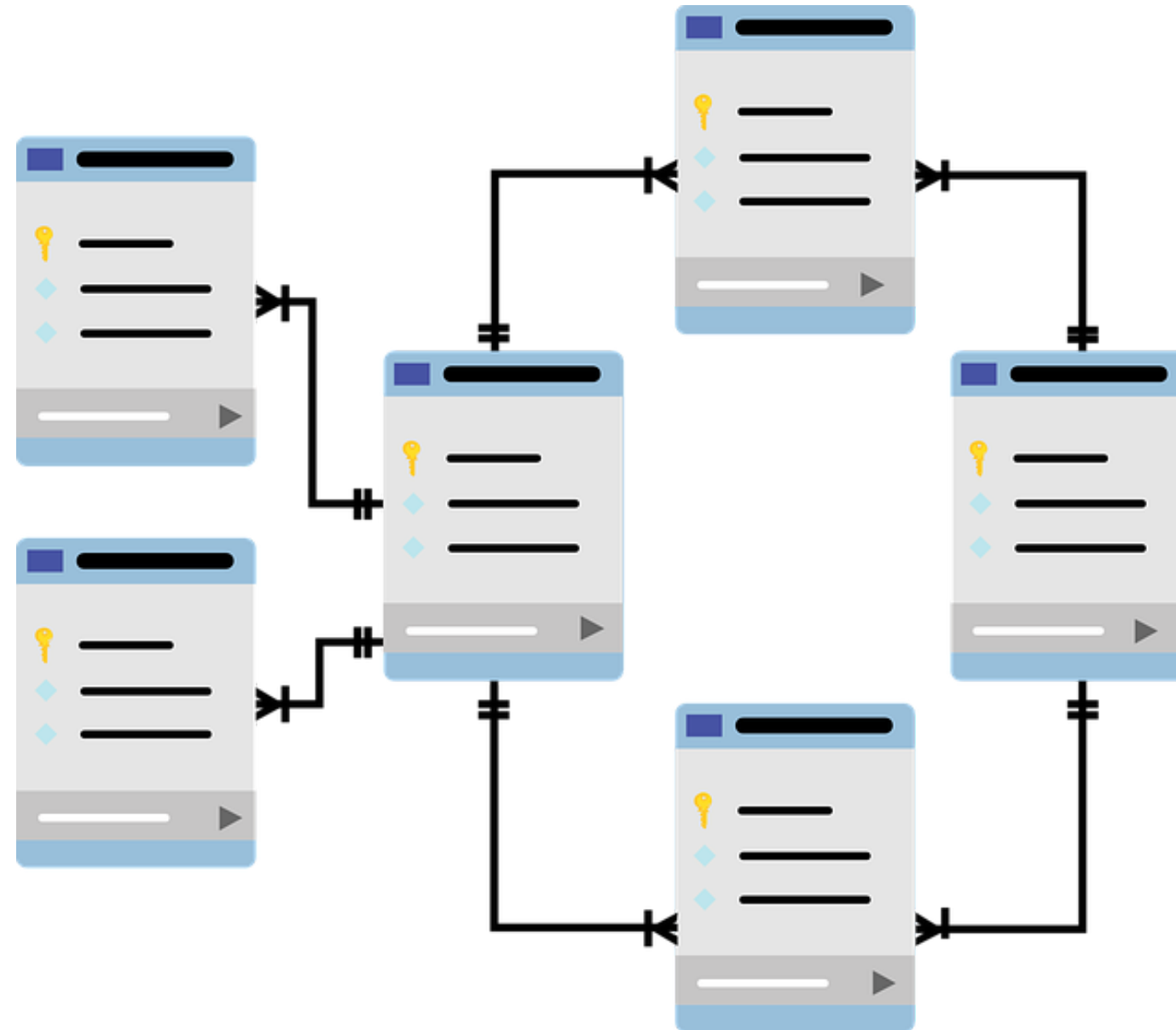
Joining tables

INTRODUCTION TO SQL SERVER



John MacKintosh
Instructor

Relational Databases



Primary Keys

- Primary keys: Uniquely identify each row in a table

```
+-----+-----+
| artist_id | name      |
+-----+-----+
| 1          | AC/DC     |
| 2          | Accept    |
| 3          | Aerosmith |
| 4          | Alanis Morissette |
| 5          | Alice In Chains |
+-----+-----+
```

- Primary key: `artist_id`

```

+-----+-----+-----+
| album_id | title                | artist_id |
+-----+-----+-----+
| 1         | For Those About To Rock | 1         |
| 2         | Balls to the Wall       | 2         |
| 3         | Restless and Wild       | 2         |
| 4         | Let There Be Rock       | 1         |
| 5         | Big Ones                | 3         |
+-----+-----+-----+

```

- Primary key: `album_id`
- What about `artist_id` ?

Foreign keys

- `artist` table

```
+-----+-----+
| artist_id | name          |
+-----+-----+
| 1          | AC/DC         |
| 2          | Accept        |
| 3          | Aerosmith     |
| 4          | Alanis Morissette |
| 5          | Alice In Chains |
+-----+-----+
```

- `album` table

```
+-----+-----+-----+
| album_id | title          | artist_id |
+-----+-----+-----+
| 1         | For Those About To Rock | 1         |
| 2         | Balls to the Wall      | 2         |
| 3         | Restless and Wild      | 2         |
| 4         | Let There Be Rock      | 1         |
| 5         | Big Ones              | 3         |
+-----+-----+-----+
```

- `artist_id` : Foreign key to `artist`

Joining album and artist

- `artist` table

```
+-----+-----+
| artist_id | name           |
+-----+-----+
| 1         | AC/DC          |
| 2         | Accept         |
| 3         | Aerosmith      |
| 4         | Alanis Morissette |
| 5         | Alice In Chains |
+-----+-----+
```

- AC/DC has `artist_id` = 1

- `album` table

```
+-----+-----+-----+
| album_id | title           | artist_id |
+-----+-----+-----+
| 1         | For Those About To Rock | 1         |
| 2         | Balls to the Wall      | 2         |
| 3         | Restless and Wild      | 2         |
| 4         | Let There Be Rock      | 1         |
| 5         | Big Ones             | 3         |
+-----+-----+-----+
```

- Rows 1 and 4 have `artist_id` = 1

Joining album and artist

```
+-----+-----+-----+-----+
| album_id | title                | artist_id | artist_name |
+-----+-----+-----+-----+
| 1        | For Those About To Rock | 1         | AC/DC       |
| 4        | Let There Be Rock       | 1         | AC/DC       |
+-----+-----+-----+-----+
```

- Return album details from `album` table
- Return corresponding artist details from `artist` table
- Joined using `artist_id` column

INNER JOIN

```
SELECT
  album_id,
  title,
  album.artist_id,
  name AS artist_name
FROM album
INNER JOIN artist ON artist.artist_id = album.artist_id
WHERE album.artist_id = 1;
```

```
+-----+-----+-----+-----+
| album_id | title                | artist_id | artist_name |
+-----+-----+-----+-----+
| 1        | For Those About To Rock | 1         | AC/DC       |
| 4        | Let There Be Rock      | 1         | AC/DC       |
+-----+-----+-----+-----+
```


INNER JOIN syntax

SELECT

```
table_A.columnX,  
table_A.columnY,  
table_B.columnZ
```

FROM table_A

INNER JOIN table_B **ON** table_B.foreign_key = table_A.primary_key;

```
SELECT
  album_id,
  title,
  album.artist_id,
  name AS artist_name
FROM album
INNER JOIN artist on artist.artist_id = album.artist_id;
```

```
+-----+-----+-----+-----+
| album_id | title                | artist_id | artist_name |
+-----+-----+-----+-----+
| 1        | For Those About To Rock | 1        | AC/DC       |
| 4        | Let There Be Rock      | 1        | AC/DC       |
| 2        | Balls To The Wall      | 2        | Accept      |
| 3        | Restless and Wild      | 2        | Accept      |
+-----+-----+-----+-----+
```

- Returns **all** combinations of **all** matches between `album` and `artist`

Multiple INNER JOINS

SELECT

```
table_A.columnX,  
table_A.columnY,  
table_B.columnZ table_C columnW
```

FROM table_A

INNER JOIN table_B **ON** table_B.foreign_key = table_A.primary_key

INNER JOIN table_C **ON** table_C.foreign_key = table_B.primary_key;

Let's join some tables!

INTRODUCTION TO SQL SERVER

Mix n match - LEFT & RIGHT joins

INTRODUCTION TO SQL SERVER



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The rationale for LEFT and RIGHT joins

- Why do we need LEFT and RIGHT joins?
- One table may not have an exact match in another:
 - Customer order history for marketing campaign
 - Product list and returns history
 - Patients admitted but not yet discharged

The rationale for LEFT and RIGHT joins

- Why do we need LEFT and RIGHT joins?
- One table may not have an exact match in another:
 - Customer order history for marketing campaign
 - Product list and returns history
 - **Patients admitted but not yet discharged**

Admissions table

```
+-----+-----+
| Patient_ID | Admitted |
+-----+-----+
| 1          | 1        |
| 2          | 1        |
| 3          | 1        |
| 4          | 1        |
| 5          | 1        |
+-----+-----+
```

Discharges table

```
+-----+-----+
| Patient_ID | Admitted |
+-----+-----+
| 1          | 1        |
| 3          | 1        |
| 4          | 1        |
+-----+-----+
```

INNER JOIN:

```
+-----+-----+-----|
| Patient_ID | Admitted | Discharged |
+-----+-----+-----|
| 1          | 1        | 1          |
| 3          | 1        | 1          |
| 4          | 1        | 1          |
+-----+-----+-----+
```

LEFT JOIN:

```
+-----+-----+-----|
| Patient_ID | Admitted | Discharged |
+-----+-----+-----|
| 1          | 1        | 1          |
| 2          | 1        | NULL       |
| 3          | 1        | 1          |
| 4          | 1        | 1          |
| 5          | 1        | NULL       |
+-----+-----+-----+
```

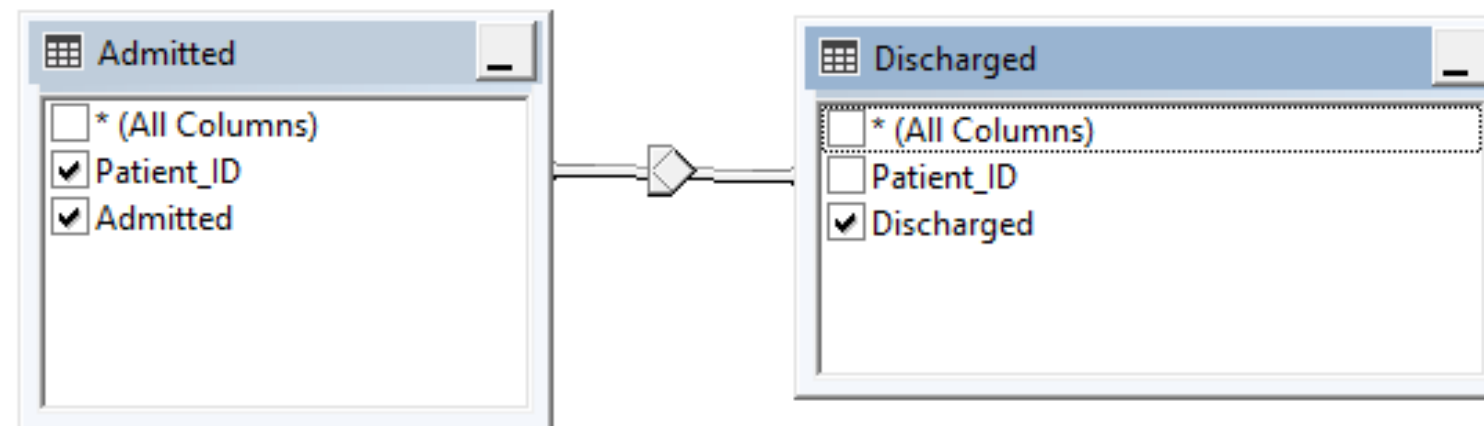

LEFT JOIN SYNTAX

SELECT

```
Admitted.Patient_ID,  
Admitted,  
Discharged
```

FROM Admitted

LEFT JOIN Discharged **ON** Discharged.Patient_ID = Admitted.Patient_ID;



SELECT

Admitted.Patient_ID,
Admitted,
Discharged

FROM Admitted

LEFT JOIN Discharged **ON** Discharged.Patient_ID = Admitted.Patient_ID;

Patient_ID	Admitted	Discharged
1	1	1
2	1	NULL
3	1	1
4	1	1
5	1	NULL

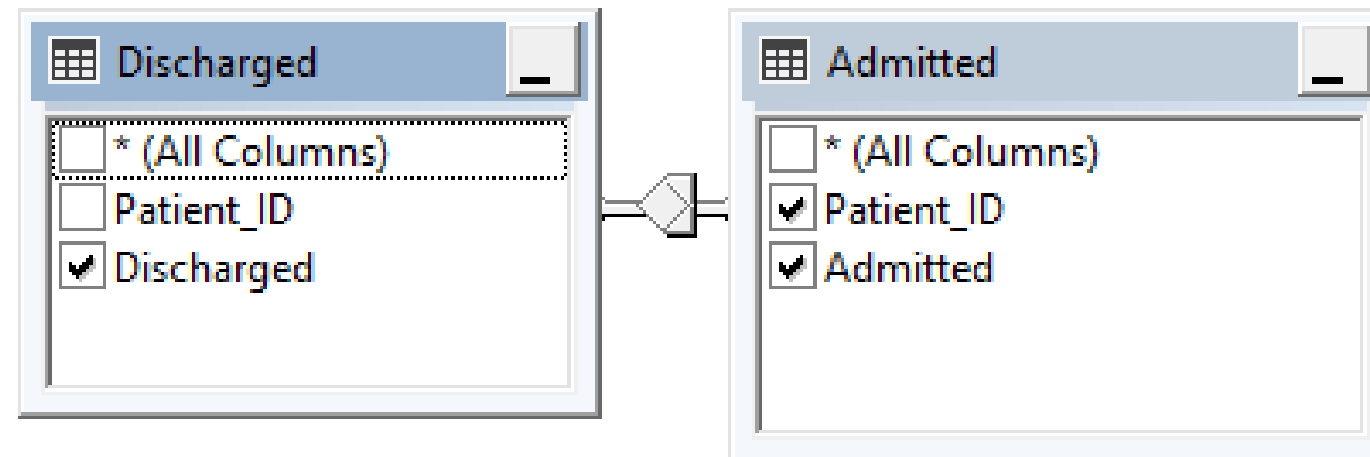
RIGHT JOIN

SELECT

```
Admitted.Patient_ID,  
Admitted,  
Discharged
```

FROM Discharged

RIGHT JOIN Admitted **ON** Admitted.Patient_ID = Discharged.Patient_ID;



RIGHT JOIN results

```
SELECT
    Admitted.Patient_ID,
    Admitted,
    Discharged
FROM Discharged
RIGHT JOIN Admitted ON Admitted.Patient_ID = Discharged.Patient_ID;
```

Patient_ID	Admitted	Discharged
1	1	1
2	1	NULL
3	1	1
4	1	1
5	1	NULL

Summary

- `INNER JOIN` : Only returns matching rows
- `LEFT JOIN` (or `RIGHT JOIN`): All rows from the main table plus matches from the joining table
- `NULL` : Displayed if no match is found
- `LEFT JOIN` and `RIGHT JOIN` can be interchangeable

INNER JOIN

LEFT TABLE	RIGHT TABLE
MATCHES RETURNED, NON MATCHES DISCARDED	MATCHES RETURNED, NON MATCHES DISCARDED

LEFT JOIN

LEFT - MAIN TABLE	RIGHT - JOINING TABLE
ALL ROWS RETURNED	MATCHES RETURNED, NON MATCHES RETURN NULL

RIGHT JOIN

LEFT - JOINING TABLE	RIGHT - MAIN TABLE
MATCHES RETURNED, NON MATCHES RETURN NULL	ALL ROWS RETURNED

Let's Practice!

INTRODUCTION TO SQL SERVER

UNION & UNION ALL

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```
SELECT
  album_id,
  title,
  artist_id
FROM album
WHERE artist_id IN (1, 3)
```

```
+-----+-----+-----+
| album_id | title                | artist_id |
+-----+-----+-----+
| 1        | For Those About To Rock | 1         |
| 4        | Let There Be Rock      | 1         |
| 5        | Big Ones               | 3         |
+-----+-----+-----+
```

```
SELECT
  album_id,
  title,
  artist_id
FROM album
WHERE artist_id IN (1, 4, 5)
```

```
+-----+-----+-----+
| album_id | title                | artist_id |
+-----+-----+-----+
| 1        | For Those About To Rock | 1         |
| 4        | Let There Be Rock      | 1         |
| 6        | Jagged Little Pill     | 4         |
| 7        | Facelift               | 5         |
+-----+-----+-----+
```

Combining results

```
SELECT
  album_id,
  title,
  artist_id
FROM album
WHERE artist_id IN (1, 3)

UNION

SELECT
  album_id,
  title,
  artist_id
FROM album
WHERE artist_id IN (1, 4, 5);
```

album_id	title	artist_id
1	For Those About To Rock	1
4	Let There Be Rock	1
5	Big Ones	3
6	Jagged Little Pill	4
7	Facelift	5

- Duplicate rows are excluded

UNION ALL

```
SELECT
  album_id,
  title,
  artist_id
FROM album
WHERE artist_id IN (1, 3)
UNION ALL
SELECT
  album_id,
  title,
  artist_id
FROM album
WHERE artist_id IN (1, 4, 5);
```

album_id	title	artist_id
1	For Those About To Rock	1
4	Let There Be Rock	1
5	Big Ones	3
1	For Those About To Rock	1
4	Let There Be Rock	1
6	Jagged Little Pill	4
7	Facelift	5

- Includes duplicate rows

Creating new column names for final results

```
SELECT
  album_id AS ALBUM_ID,
  title AS ALBUM_TITLE,
  artist_id AS ARTIST_ID
FROM album
WHERE artist_id IN(1, 3)
UNION ALL
SELECT
  album_id AS ALBUM_ID,
  title AS ALBUM_TITLE,
  artist_id AS ARTIST_ID
FROM album
WHERE artist_id IN(1, 4, 5)
```

```
+-----+-----+-----+
| ALBUM_ID | ALBUM_TITLE           | ARTIST_ID |
+-----+-----+-----+
| 1         | For Those About To Rock | 1         |
| 4         | Let There Be Rock       | 1         |
| 5         | Big Ones                | 3         |
| 1         | For Those About To Rock | 1         |
| 4         | Let There Be Rock       | 1         |
| 6         | Jagged Little Pill      | 4         |
| 7         | Facelift                | 5         |
+-----+-----+-----+
```

Summary

- `UNION` or `UNION ALL` : Combines queries from the same table or different tables

If combining data from different tables:

- Select the same number of columns in the same order
- Columns should have the same data types

If source tables have different column names

- Alias the column names

`UNION` : Discards duplicates (slower to run)

`UNION ALL` : Includes duplicates (faster to run)

Let's practice!

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