

IS664 Database Programming

Fall 2022

Fundamentals



Database Programming

LECTURE 4: MULTI-TABLE QUERIES

Professor HG Locklear

Summary Queries

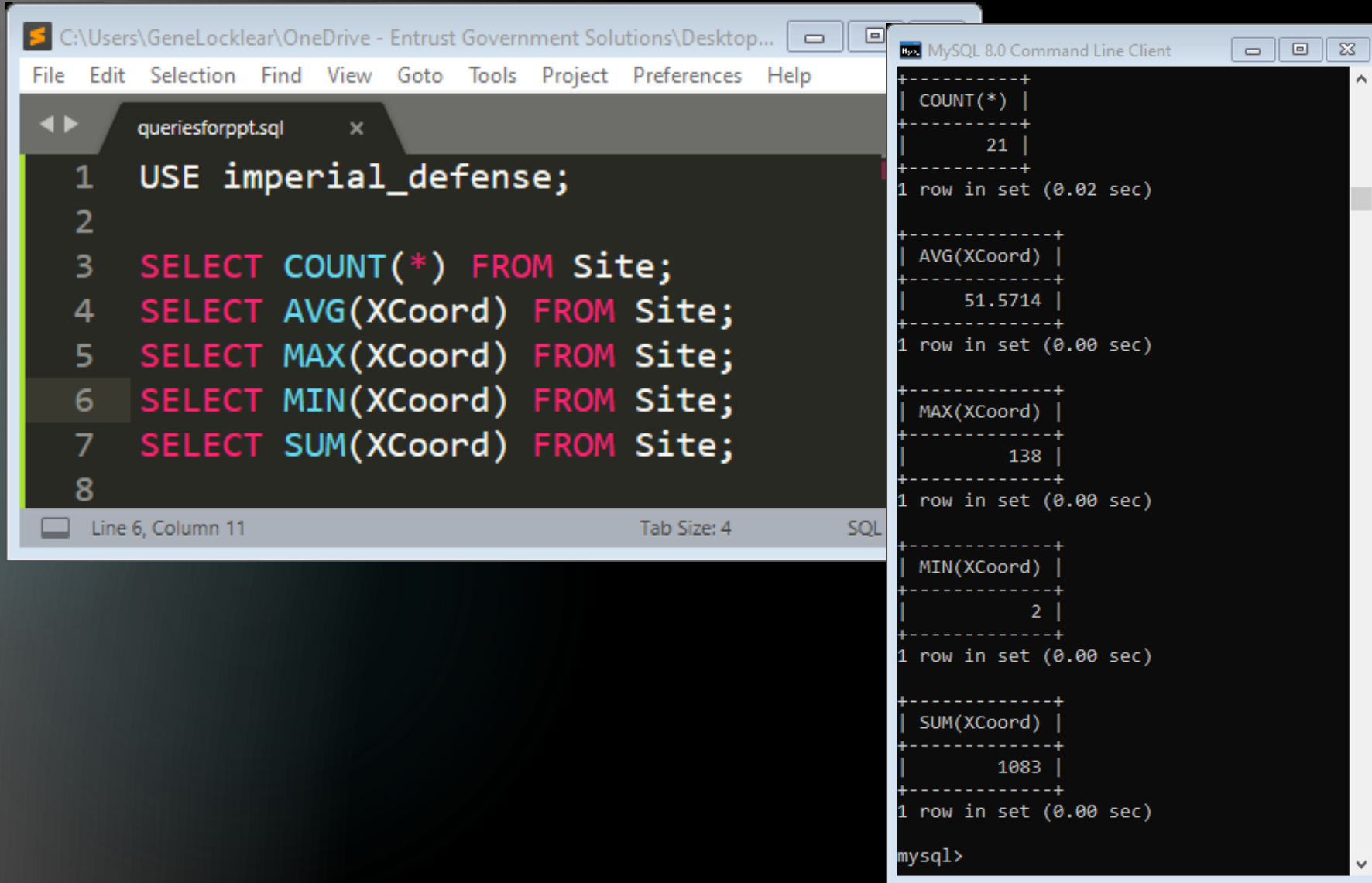
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- ▶ **Summary Queries** are queries which use aggregate functions.
- ▶ MySQL **aggregate functions** (GROUP BY) let you calculate a single value for a group of rows in a result set.
- ▶ MySQL aggregate functions can be referenced:
 - ▶ <https://dev.mysql.com/doc/refman/8.0/en/group-by-functions.html>
- ▶ Common aggregate functions are:
 - ▶ **AVG()**
 - ▶ Returns the average value of the argument.
 - ▶ **COUNT()**
 - ▶ Returns a count of the number of rows returned.
 - ▶ **MAX()**
 - ▶ Returns the maximum value
 - ▶ **MIN()**
 - ▶ Returns the minimum value
 - ▶ **SUM()**
 - ▶ Returns the sum

Name	Description
<u>AVG ()</u>	Return the average value of the argument
<u>BIT_AND ()</u>	Return bitwise AND
<u>BIT_OR ()</u>	Return bitwise OR
<u>BIT_XOR ()</u>	Return bitwise XOR
<u>COUNT ()</u>	Return a count of the number of rows returned
<u>COUNT (DISTINCT)</u>	Return the count of a number of different values
<u>GROUP_CONCAT ()</u>	Return a concatenated string
<u>JSON_ARRAYAGG ()</u> (introduced 5.7.22)	Return result set as a single JSON array
<u>JSON_OBJECTAGG ()</u> (introduced 5.7.22)	Return result set as a single JSON object
<u>MAX ()</u>	Return the maximum value
<u>MIN ()</u>	Return the minimum value
<u>STD ()</u>	Return the population standard deviation
<u>STDDEV ()</u>	Return the population standard deviation
<u>STDDEV_POP ()</u>	Return the population standard deviation
<u>STDDEV_SAMP ()</u>	Return the sample standard deviation
<u>SUM ()</u>	Return the sum
<u>VAR_POP ()</u>	Return the population standard variance
<u>VAR_SAMP ()</u>	Return the sample variance
<u>VARIANCE ()</u>	Return the population standard variance

Summary Queries

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The image shows a code editor window on the left and a MySQL command line client window on the right. The code editor contains a file named 'queriesforppt.sql' with the following SQL queries:

```
1 USE imperial_defense;
2
3 SELECT COUNT(*) FROM Site;
4 SELECT AVG(XCoord) FROM Site;
5 SELECT MAX(XCoord) FROM Site;
6 SELECT MIN(XCoord) FROM Site;
7 SELECT SUM(XCoord) FROM Site;
8
```

The MySQL command line client shows the output of these queries:

```
mysql>
+-----+
| COUNT(*) |
+-----+
|        21 |
+-----+
1 row in set (0.02 sec)

+-----+
| AVG(XCoord) |
+-----+
|      51.5714 |
+-----+
1 row in set (0.00 sec)

+-----+
| MAX(XCoord) |
+-----+
|          138 |
+-----+
1 row in set (0.00 sec)

+-----+
| MIN(XCoord) |
+-----+
|           2 |
+-----+
1 row in set (0.00 sec)

+-----+
| SUM(XCoord) |
+-----+
|         1083 |
+-----+
1 row in set (0.00 sec)

mysql>
```

Subqueries

- ▶ A subquery is a SELECT expression that you embed inside one of the clauses of a SELECT statement to form the final query statement.
- ▶ There are three types of subqueries:
 - ▶ **Row Subquery**
 - ▶ Returns more than one column but only one row.
 - ▶ **Table Subquery**
 - ▶ Returns one or more columns and one or more rows.
 - ▶ **Scalar Subquery**
 - ▶ Returns a calculated value from another table and does not have to be in the FROM clause of the main query.

Subqueries

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesfo...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT RID, RType, RouteFinding,
4     (SELECT CONCAT(NetName, '-', NetStatus)
5      FROM Network
6      WHERE NetName LIKE 'brore01%') AS NetInfo
7 FROM Router
8 WHERE AssignedTo LIKE 'brore01%';
9

Line 10, Column 1
```

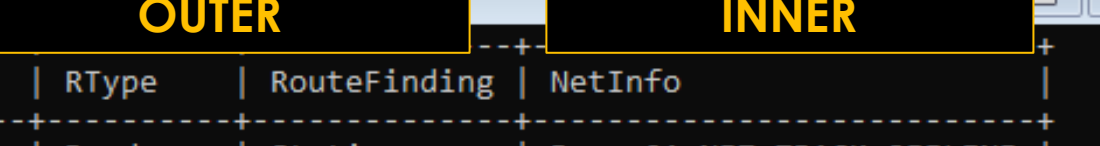
Subquery must only return single row

```
MySQL 8.0 Command Line Client

+----+-----+-----+-----+
| RID | RType | RouteFinding | NetInfo |
+----+-----+-----+-----+
| RTR1 | Border | Static | Brore01wNET_TRACK-OFFLINE |
| RTR12 | Exterior | Static | Brore01wNET_TRACK-OFFLINE |
| RTR23 | Border | Static | Brore01wNET_TRACK-OFFLINE |
+----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>
```

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The screenshot shows a MySQL terminal window with a query result. The result is a table with 4 columns. The first two columns, 'OUTER' and 'INNER', are highlighted with yellow boxes. The table contains 3 rows of data. The status bar at the bottom indicates '3 rows in set (0.00 sec)' and the prompt 'mysql>' is visible.

OUTER	INNER
RTR1	Border
RTR12	Exterior
RTR23	Border

Network							
NetName	NetType	Bandwidth	OptimumBW	MaxBW	MinBW	CSwitched	NetStatus

Subqueries

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesfo...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 -- OUTER QUERY
4 SELECT RID, RType, RouteFinding
5 FROM Router
6 WHERE AssignedTo LIKE 'brore01%';
7
8 -- INNER QUERY
9 SELECT CONCAT(NetName, '-', NetStatus) AS NetInfo
10 FROM Network
11 WHERE NetName LIKE 'brore01%';
12
13 -- INNER QUERY AND OUTER QUERY
14 SELECT RID, RType, RouteFinding,
15        (SELECT CONCAT(NetName, '-', NetStatus)
16         FROM Network
17         WHERE NetName LIKE 'brore01%') AS NetInfo
18 FROM Router
19 WHERE AssignedTo LIKE 'brore01%';
20
```

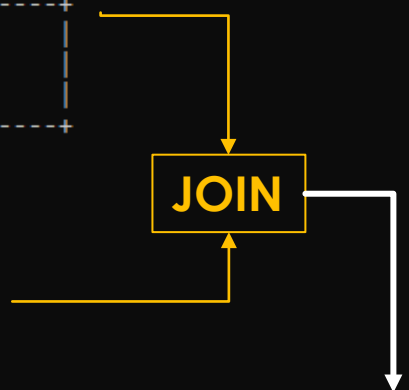
Line 6, Column 25 Tab Size: 4

```
MySQL 8.0 Command Line Client
+-----+-----+-----+
| RID   | RType | RouteFinding |
+-----+-----+-----+
| RTR1  | Border | Static      |
| RTR12 | Exterior | Static      |
| RTR23 | Border | Static      |
+-----+-----+-----+
3 rows in set (0.00 sec)

+-----+
| NetInfo |
+-----+
| Brore01wNET_TRACK-OFFLINE |
+-----+
1 row in set (0.00 sec)

+-----+-----+-----+-----+
| RID   | RType | RouteFinding | NetInfo |
+-----+-----+-----+-----+
| RTR1  | Border | Static      | Brore01wNET_TRACK-OFFLINE |
| RTR12 | Exterior | Static      | Brore01wNET_TRACK-OFFLINE |
| RTR23 | Border | Static      | Brore01wNET_TRACK-OFFLINE |
+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>
```



Subqueries

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - Sublime ...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1  USE imperial_defense;
2
3  SELECT RID, RType
4  FROM Router
5  WHERE AssignedTo IN
6      (SELECT NetName FROM Network WHERE NetName LIKE 'B%')
7  LIMIT 10;
```

Subquery in WHERE clause

Subquery returns multiple rows

MySQL 8.0 Command Line ...

RID	RType
RTR1	Border
RTR10	Exterior
RTR12	Exterior
RTR2	Border
RTR20	Border
RTR23	Border
RTR29	Border
RTR6	Border
RTR8	Border

9 rows in set (0.00 sec)

Subqueries

9

```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT RID, RType, Connectivity,
4     (SELECT NetStatus
5      FROM Network
6      WHERE NetName = AssignedTo AND NetStatus = "OFFLINE") AS Net_S
7 FROM Router
8 ORDER BY Net_S DESC
9 LIMIT 10;
```

This statement show us OFFLINE routers

Conditions which effect the Result of the Query **must be applied** to the Outer Query ...this is known as a '**Correlated**' subquery

MySQL 8.0 Command Line Client

RID	RType	Connectivity	Net_S
RTR1	Border	Edge	OFFLINE
RTR9	Exterior	Edge	OFFLINE
RTR23	Border	Port Forwarding	OFFLINE
RTR12	Exterior	Edge	OFFLINE
RTR6	Border	Port Forwarding	OFFLINE
RTR21	Interior	Port Forwarding	OFFLINE
RTR3	Interior	Edge	OFFLINE
RTR24	Interior	Port Forwarding	OFFLINE
RTR20	Border	Backbone	OFFLINE
RTR2	Border	Backbone	OFFLINE

10 rows in set (0.00 sec)

mysql>

Subqueries

10

```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1  USE imperial_defense;
2
3  SELECT RID, RType, Connectivity,
4      (SELECT NetStatus
5       FROM Network
6       WHERE NetName = AssignedTo AND NetStatus = "OFFLINE") AS Net_S
7  FROM Router
8  LIMIT 10;
```

Null values do not meet the conditions of the subquery...so in this case these are routers that are **ONLINE**

MySQL 8.0 Command Line Client

RID	RType	Connectivity	Net_S
RTR1	Border	Edge	OFFLINE
RTR10	Exterior	Backbone	NULL
RTR11	Exterior	Port Forwarding	NULL
RTR12	Exterior	Edge	OFFLINE
RTR13	Exterior	Backbone	NULL
RTR14	Exterior	Backbone	NULL
RTR15	Exterior	Backbone	NULL
RTR16	Exterior	Edge	NULL
RTR17	Exterior	Backbone	NULL
RTR18	Border	Port Forwarding	NULL

10 rows in set (0.00 sec)

mysql>

- ▶ **Joins** are most often used to accomplish the following:
 - ▶ Combine data from two or more tables into one result.
 - ▶ Select data from one table based on a search condition involving one or more columns from a different table.
- ▶ Join can be simply coded by listing more than one table and/or view name in the FROM clause.
 - ▶ Names are separated by commas.
 - ▶ Aliases can be used to quantify column names whenever ambiguity is a possibility.
- ▶ A search condition which limits data appearing in the result set of the rows in the joined tables which correspond to one another is called the **join condition**.

Types of Joins

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- ▶ Joins are classified into several different types.
- ▶ **Theta Join**
 - ▶ Any join in which the join condition has the form:
 - ▶ **WHERE** attribute_1 **relation_operator** attribute_2
 - ▶ The relational operator may be = <> > < <= >=
- ▶ **Equijoin**
 - ▶ Any join where the join condition is based on a comparison for equality and the join columns are **all** included in the result set.
- ▶ **Natural Join**
 - ▶ Any join where the join condition is based on a comparison for equality and **only one** of the join columns is included in the result set.
- ▶ **Non-Equijoin**
 - ▶ Any Theta join which does not test for equality.
 - ▶ The relational operator may be > < <= >=

Joins (Inner)

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queriesforppt.sql

```
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, N.NetName
4 FROM Router R
5 JOIN Network N ON R.AssignedTo = N.NetName
6 LIMIT 10;
7
```

Line 5, Column 27

Table Aliases make queries simpler to write when we are using fully qualified attributes

Join Condition

Tab Size: 4

MySQL 8.0 Command Line Client

RID	RType	NetName
RTR1	Border	Brorre01wNET_TRACK
RTR10	Exterior	Brorre03yNET_SAT
RTR11	Exterior	Trerth01wNET_CIV
RTR12	Exterior	Brorre01wNET_TRACK
RTR15	Exterior	Trerth01wNET_CIV
RTR16	Exterior	Ginda02xNET_SAT
RTR17	Exterior	Zebetis05uNET_CIV
RTR18	Border	Trerth01wNET_CIV
RTR19	Exterior	Zebetis05uNET_CIV
RTR2	Border	Brorre06vNET_SURV

10 rows in set (0.00 sec)

mysql>

Joins (Inner)

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1  USE imperial_defense;
2
3  SELECT R.RID, R.RType, N.NetName, W.WType
4  FROM Router R
5  JOIN Network N ON R.AssignedTo = N.NetName
6  JOIN Widget W ON N.NetName = W.AssignedTo
7  LIMIT 10;
8

Line 3, Column 42 Tab Size: 4
```

MySQL 8.0 Command Line Client

RID	RType	NetName	WType
RTR10	Exterior	Brore03yNET_SAT	Device
RTR29	Border	Brore03yNET_SAT	Device
RTR8	Border	Brore03yNET_SAT	Device
RTR1	Border	Brore01wNET_TRACK	Pad
RTR12	Exterior	Brore01wNET_TRACK	Pad
RTR23	Border	Brore01wNET_TRACK	Pad
RTR2	Border	Brore06vNET_SURV	Pad
RTR20	Border	Brore06vNET_SURV	Pad
RTR6	Border	Brore06vNET_SURV	Pad
RTR2	Border	Brore06vNET_SURV	Device

10 rows in set (0.01 sec)

mysql>

Joins (Inner)

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, N.NetName, W.WType
4 FROM Router R
5 JOIN Network N ON R.AssignedTo = N.NetName
6 JOIN Widget W ON N.NetName = W.AssignedTo
7 WHERE W.WType <> 'Pad'
8 LIMIT 10;
9

Line 7, Column 22 Tab Size: 4
```

```
MySQL 8.0 Command Line Client
+-----+-----+-----+-----+
| RID   | RType  | NetName          | WType  |
+-----+-----+-----+-----+
| RTR10 | Exterior | Brore03yNET_SAT  | Device |
| RTR29 | Border  | Brore03yNET_SAT  | Device |
| RTR8  | Border  | Brore03yNET_SAT  | Device |
| RTR2  | Border  | Brore06vNET_SURV | Device |
| RTR20 | Border  | Brore06vNET_SURV | Device |
| RTR6  | Border  | Brore06vNET_SURV | Device |
| RTR16 | Exterior | Ginda02xNET_SAT  | Terminal |
| RTR28 | Exterior | Ginda02xNET_SAT  | Terminal |
| RTR7  | Exterior | Ginda02xNET_SAT  | Terminal |
| RTR11 | Exterior | Trerth01wNET_CIV | Terminal |
+-----+-----+-----+-----+
10 rows in set (0.00 sec)

mysql>
```

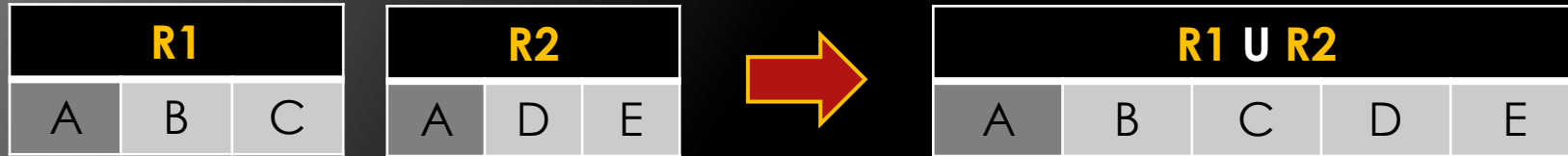
Inner and Outer Joins

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- ▶ An **Inner Join** is an equijoin whose final result set shows only the matching rows from both join tables.
- ▶ **Most all joins are inner joins.**
 - ▶ Because we rarely want to see unmatched rows from either table.
- ▶ An **Outer Join** is a join in which the result set contains not only the rows that were specified in the join condition but also the rows from either one or both sides (sets) of the join.
 - ▶ **LEFT OUTER JOIN** ...all rows from the left table and all rows that match from the right table
 - ▶ **RIGHT OUTER JOIN** ...all rows from the right table and all rows that match from the left table.
 - ▶ **FULL OUTER JOIN**...all rows from the left and right tables.
- ▶ Outer Joins are most useful for :
 - ▶ Determining which rows in one table do not have matching rows in another table.
 - ▶ Determining rows which have a few but not all corresponding matching rows in another table.
 - ▶ Display reports where you want to show all 'categories' regardless if the category has a matching row in another table.

Inner and Full Outer Joins

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INNER JOIN: if **R1** and **R2** have a corresponding attribute then we can create an inner join that would return the attributes A B C D E.



FULL OUTER JOIN: Tables are joined, and all rows are connected whether there is a corresponding attribute or not.

MySQL **does not support** Full Outer Join

Left and Right Outer Joins

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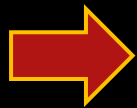
R1			R2			R1 LU R2					
A	B	C	K	D	E	A	B	C	K	D	E



LEFT OUTER JOIN: if **R1** and **R2** have a corresponding attribute then our left outer join will return all values. **If there are no corresponding attributes**, then all specified attributes will be returned from the LEFT table and nothing from the RIGHT table

Only what corresponds with **LEFT** table

R1			R2			R1 RU R2					
A	B	C	K	D	E	A	B	C	K	D	E



RIGHT OUTER JOIN: if **R1** and **R2** have a corresponding attribute then our right outer join will return all values. **If there are no corresponding attributes**, then all specified attributes will be returned from the RIGHT table and nothing from the LEFT table

Only what corresponds with **RIGHT** table

OUTER JOINS

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - Sublim...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, N.NetName, N.NetStatus
4 FROM Router R
5 LEFT OUTER JOIN Network N ON R.AssignedTo = N.NetName
6 LIMIT 3;
7

Line 5, Column 26 Tab Size: 4
```

MySQL 8.0 Command Line Client

RID	RType	NetName	NetStatus
RTR1	Border	Brore01wNET_TRACK	OFFLINE
RTR10	Exterior	Brore03yNET_SAT	ONLINE
RTR11	Exterior	Trerth01wNET_CIV	ONLINE

3 rows in set (0.00 sec)

mysql>

```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - Sublim...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, N.NetName, N.NetStatus
4 FROM Router R
5 RIGHT OUTER JOIN Network N ON R.AssignedTo = N.NetName
6 LIMIT 3;
7

Line 5, Column 6 Tab Size: 4 SQL
```

MySQL 8.0 Command Line Client

RID	RType	NetName	NetStatus
RTR1	Border	Brore01wNET_TRACK	OFFLINE
RTR12	Exterior	Brore01wNET_TRACK	OFFLINE
RTR23	Border	Brore01wNET_TRACK	OFFLINE

3 rows in set (0.00 sec)

mysql>

OUTER JOINS

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - Sublim...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1  USE imperial_defense;
2
3  SELECT R.RID, R.RType, N.NetName, N.NetStatus
4  FROM Network N
5  LEFT OUTER JOIN Router R ON R.AssignedTo = N.NetName
6  LIMIT 3;
7
8  SELECT R.RID, R.RType, N.NetName, N.NetStatus
9  FROM Network N
10 RIGHT OUTER JOIN Router R ON R.AssignedTo = N.NetName
11 LIMIT 3;
12
```

Line 10, Column 6 Tab Size: 4

MySQL 8.0 Command Line Client

RID	RType	NetName	NetStatus
RTR1	Border	Brore01wNET_TRACK	OFFLINE
RTR12	Exterior	Brore01wNET_TRACK	OFFLINE
RTR23	Border	Brore01wNET_TRACK	OFFLINE

3 rows in set (0.00 sec)

RID	RType	NetName	NetStatus
RTR1	Border	Brore01wNET_TRACK	OFFLINE
RTR10	Exterior	Brore03yNET_SAT	ONLINE
RTR11	Exterior	Trerth01wNET_CIV	ONLINE

3 rows in set (0.00 sec)

OUTER JOINS

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Router			
<u>RID</u>	RType	...	AssignedTo

Network		
NetName	...	NetStatus



Router is **LEFT** table

Network		
NetName	...	NetStatus

Router			
<u>RID</u>	RType	...	AssignedTo



Network is **LEFT** table

OUTER JOINS

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - ...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, H.HID
4 FROM Router R
5 LEFT OUTER JOIN Hub H ON R.AssignedTo = H.AssignedTo
6 LIMIT 3;
7
8 SELECT R.RID, R.RType, H.HID
9 FROM Router R
10 LEFT OUTER JOIN Hub H ON R.AssignedTo <> H.AssignedTo
11 LIMIT 5;
12
```

Line 11, Column 8 Tab Size: 4 SQL

MySQL 8.0 Command Line Client

RID	RType	HID
RTR1	Border	HB-12
RTR1	Border	HB-19
RTR1	Border	HB-2

3 rows in set (0.00 sec)

RID	RType	HID
RTR1	Border	HB-1
RTR1	Border	HB-10
RTR1	Border	HB-11
RTR1	Border	HB-13
RTR1	Border	HB-14

5 rows in set (0.00 sec)

Router and Hub **in** same Network

Router and Hub **not in** same Network

OUTER JOINS

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - ...
File Edit Selection Find View Goto Tools Project Preferences Help
queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, R.AssignedTo, H.HID, H.AssignedTo
4 FROM Router R
5 LEFT OUTER JOIN Hub H ON H.HID = R.RID
6 LIMIT 10;
_
Line 5, Column 34 Tab S
```

Router				
<u>RID</u>	RType	RouteFinding	Connectivity	AssignedTo

Hub				
<u>HID</u>	Ports	EntryPort	ExitPort	AssignedTo

MySQL 8.0 Command Line Client

RID	RType	AssignedTo	HID	AssignedTo
RTR1	Border	Brore01wNET_TRACK	NULL	NULL
RTR10	Exterior	Brore03yNET_SAT	NULL	NULL
RTR11	Exterior	Trerth01wNET_CIV	NULL	NULL
RTR12	Exterior	Brore01wNET_TRACK	NULL	NULL
RTR13	Exterior	Zebetis04zNET_CIV	NULL	NULL
RTR14	Exterior	Zebetis04zNET_CIV	NULL	NULL
RTR15	Exterior	Trerth01wNET_CIV	NULL	NULL
RTR16	Exterior	Ginda02xNET_SAT	NULL	NULL
RTR17	Exterior	Zebetis05uNET_CIV	NULL	NULL
RTR18	Border	Trerth01wNET_CIV	NULL	NULL

10 rows in set (0.00 sec)

No matches in Right Table

OUTER JOINS

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```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesforppt.sql - ...
File Edit Selection Find View Goto Tools Project Preferences Help
queriesforppt.sql x
1 USE imperial_defense;
2
3 SELECT R.RID, R.RType, R.AssignedTo, H.HID, H.AssignedTo
4 FROM Router R
5 RIGHT OUTER JOIN Hub H ON H.HID = R.RID
6 LIMIT 10;
7
Line 5, Column 6 Tab Size: 4
```

Router				
<u>RID</u>	RType	RouteFinding	Connectivity	AssignedTo

Hub				
<u>HID</u>	Ports	EntryPort	ExitPort	AssignedTo

MySQL 8.0 Command Line Client

RID	RType	AssignedTo	HID	AssignedTo
NULL	NULL	NULL	HB-1	Zebetis02xNET_SAT
NULL	NULL	NULL	HB-10	Ginda02xNET_SAT
NULL	NULL	NULL	HB-11	Ginda02xNET_SAT
NULL	NULL	NULL	HB-12	Brore01wNET_TRACK
NULL	NULL	NULL	HB-13	Zebetis04zNET_CIV
NULL	NULL	NULL	HB-14	Brore03yNET_SAT
NULL	NULL	NULL	HB-15	Zebetis04zNET_CIV
NULL	NULL	NULL	HB-16	Brore06vNET_SURV
NULL	NULL	NULL	HB-17	Brore03yNET_SAT
NULL	NULL	NULL	HB-18	Zebetis05uNET_CIV

10 rows set (0.00 sec)

No matches in Left Table

- ▶ A **UNION** allows you to select rows from two or more similar result sets and combine them into a single result set.
- ▶ A UNION interleaves the rows from one result set with the rows from another result set and you can define each result set as its own independent query.
- ▶ To perform a UNION, the two result sets must:
 - ▶ Each of the two SELECT statements must have the same number of output columns.
 - ▶ Each of the output columns must be '**comparable**'
 - ▶ Comparable refers to like values ...compare numbers with numbers etc.
 - ▶ **MySQL automatically converts.**

Union

26

```
C:\Users\GeneLocklear\OneDrive - Entrust Government Solutions\Desktop\CourseWork\IS664_Fall2021\queriesfor...
File Edit Selection Find View Goto Tools Project Preferences Help

queriesforppt.sql x
1  USE imperial_defense;
2
3  (SELECT R.RID, R.AssignedTo FROM Router R LIMIT 3)
4  UNION
5  (SELECT H.HID, H.AssignedTo FROM Hub H LIMIT 5);
6
7  (SELECT R.RID, R.AssignedTo FROM Router R LIMIT 3)
8  UNION
9  (SELECT H.HID, H.AssignedTo
10     FROM Hub H
11     WHERE H.AssignedTo LIKE 'b%'
12     LIMIT 5);
13

Line 5, Column 39 Tab Size: 4 SQL
```

```
MySQL 8.0 Command Line Client

+-----+-----+
| RID   | AssignedTo |
+-----+-----+
| RTR1  | Brore01wNET_TRACK |
| RTR10 | Brore03yNET_SAT   |
| RTR11 | Trerth01wNET_CIV  |
| HB-1  | Zebetis02xNET_SAT |
| HB-10 | Ginda02xNET_SAT   |
| HB-11 | Ginda02xNET_SAT   |
| HB-12 | Brore01wNET_TRACK |
| HB-13 | Zebetis04zNET_CIV |
+-----+-----+
8 rows in set (0.00 sec)

+-----+-----+
| RID   | AssignedTo |
+-----+-----+
| RTR1  | Brore01wNET_TRACK |
| RTR10 | Brore03yNET_SAT   |
| RTR11 | Trerth01wNET_CIV  |
| HB-12 | Brore01wNET_TRACK |
| HB-14 | Brore03yNET_SAT   |
| HB-16 | Brore06vNET_SURV  |
| HB-17 | Brore03yNET_SAT   |
| HB-19 | Brore01wNET_TRACK |
+-----+-----+
8 rows in set (0.00 sec)

mysql>
```



Only 'B'