

# 2022 - Data Analytics for Immersive Environments - CA4 - RDBMS & Linear Regression Project

## CA4 Part 2 - Querying Database

Joe O'Regan

2023-01-11

```
query.function <- function(data) {  
  data %>%  
    { if (is_html_output()) {kbl(., table.attr="class='query-striped query-hover'")}  
      else if (is_latex_output()) {kbl(.)}} %>%  
      kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%  
      row_spec(0, background = "#FF0000")  
}
```

## ER Diagram

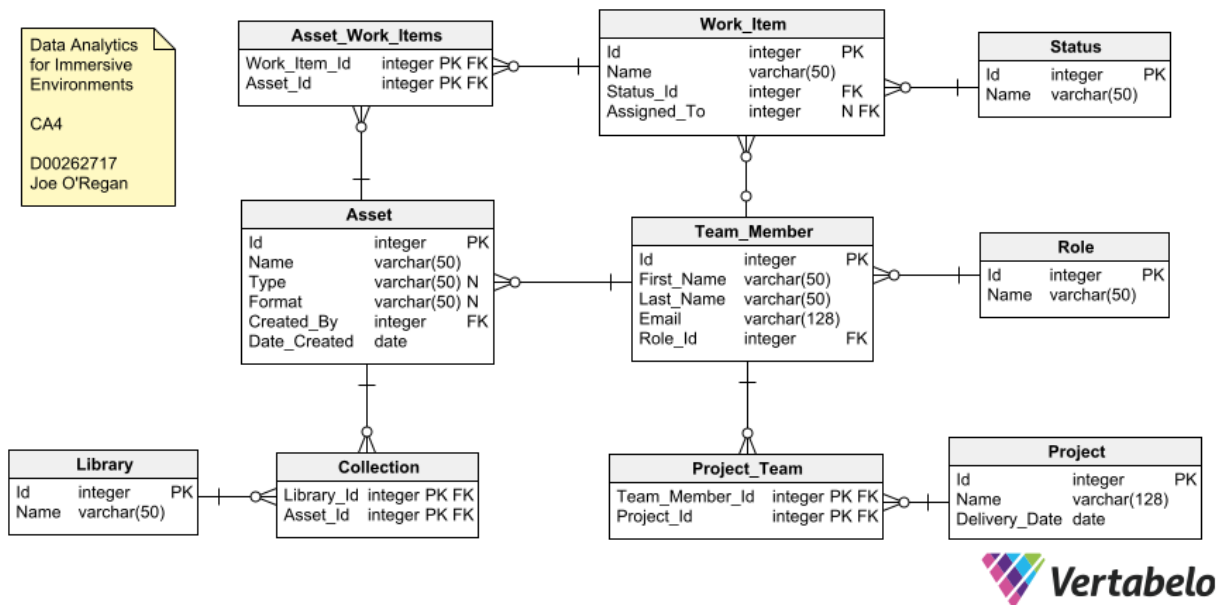


Figure 1: Entity Relationship Diagram

## Make Database Connection

Connect to the sqlite database file.

```
# connect to the sqlite database file
conn <- dbConnect(RSQLite::SQLite(), "daie_ca4_data.sqlite")
```

---

## TABLE CONTENTS

Contents of tables to check queries against.

### Status

Get all rows in Status table.

```
SELECT * FROM Status
```

---

Display table using knitr library kable function.

```
#if (is_html_output()) {
#  status_data %>%
#  kbl(table.attr="class='table-striped table-hover'", format="html") %>%
#    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
#    row_spec(0, background = "#28B3F9")
#} else if (is_latex_output()) {
#  kable(status_data) %>%
#    kable_styling("striped", "hold_position") %>%
#    row_spec(0, background = "#28B3F9")
#}

# using . to place status_data depending on the result of if else statement
status_data %>%
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover'")}
  else if (is_latex_output()) {kbl(.)}} %>%
  kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
  row_spec(0, background = "#28B3F9")
```

Id	Name
1	To Do
2	In Progress
3	Review
4	Done

---

## Role

Get all rows in Role table.

```
SELECT * FROM Role
```

Display Role table data.

```
#if (is_html_output()) {  
#  kable(role_data, table.attr = "class=\"table-striped table-hover\"", format="html") %>%  
#    kable_styling("striped", "hover") %>%  
#    row_spec(0, background = "#28B3F9")  
#}  
  
role_data %>%  
  { if (is_html_output()) {kbl(., table.attr="class=\"table-striped table-hover\"")}  
    else if (is_latex_output()) {kbl(.)}} %>%  
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%  
    row_spec(0, background = "#28B3F9")
```

Id	Name
1	Project Manager
2	Programmer
3	Tester
4	Artist
5	3D Modeller
6	Environment Modeller
7	Animator
8	Shading Artist
9	Concept Artist

---

## Team\_Member

Get all rows in Team\_Member table.

```
SELECT * FROM Team_Member
```

Display Team\_Member table data.

```
team_member_data %>%  
  { if (is_html_output()) {kbl(., table.attr="class=\"table-striped table-hover\"")}  
    else if (is_latex_output()) {kbl(.)}} %>%  
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%  
    row_spec(0, background = "#28B3F9")
```

Id	First_Name	Last_Name	Email	Role_Id
1	Joe	O'Regan	joe.oregan@daie.ca4	2
2	Derp	McDerp	derpmcderp@daie.ca4	1
3	Herpderp	Derpderpenson	hd.derpderpenson@daie.ca4	3
4	Herpa	Derpderp	herpa.derpderp@daie.ca4	4
5	De	Rpderp	de.rpderp@daie.ca4	5
6	Pred	Prehpred	predprehpred@daie.ca4	6
7	Derpa	Derpa	derpaderpa@daie.ca4	9
8	Herpa	Derpa	herpaderpa@daie.ca4	8
9	HerpaDerpa	McDerpa	herpaderpa.mcderpa@daie.ca4	7
10	Joe	Derp	j.derp@daie.ca4	2
11	Jon	Herpaderp	jherpaderp@daie.ca4	7
12	Joblot	O'Stuff	joblot.ostuff@daie.ca4	3
13	Joderp	Herpderpenson	j.herpderpenson@daie.ca4	4
14	Jo	McQueryfiller	j.mcqueryfiller@daie.ca4	1

## Work\_Item

Get all rows in Work\_Item table.

```
SELECT * FROM Work_Item
```

Display Work\_Item table data.

```
work_item_data %>%
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover\')"}
  else if (is_latex_output()) {kbl(.)}} %>%
  kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
  row_spec(0, background = "#28B3F9")
```

Id	Name	Status_Id	Assigned_To
1	Art Thingy	2	4
2	Art Test Thingy	3	3
3	Environment Model Thingy	2	6
4	Art Concept Thingy	4	7
5	Art Shading Thingy	4	8
6	Random 3D Model	2	5
7	3D Model Test Obj	2	3
8	Random Blueprint	2	1
9	Blueprint Thingy	2	2
10	Blueprint Test	3	2
11	Art Test	1	12
12	Query Model Thingy	3	11
13	Another Test	4	13

## Project

Get all rows in Project table.

```
SELECT * FROM Project
```

Display Project table data.

```
project_data %>%  
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover\\'")}  
    else if (is_latex_output()) {kbl(.)}} %>%  
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%  
    row_spec(0, background = "#28B3F9")
```

Id	Name	Delivery_Date
1	Art Proj	2023-01-11
2	DAIE CA4	2023-01-20
3	New Project	2023-01-24
4	Old Project	2022-12-14
5	Christmas 2022 Project	2022-12-25
6	Date Range Project	2023-01-17
7	Another Date Range Project	2023-02-01
8	Project Filler	2023-03-01
9	Derp Project	2023-03-17
10	Hmmm I Ran Out of Names	2023-01-20

## Project\_Team

Get all rows in Project\_Team table.

```
SELECT * FROM Project_Team
```

Display Project\_Team table data.

```
project_team_data %>%  
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover\\'")}  
    else if (is_latex_output()) {kbl(.)}} %>%  
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%  
    row_spec(0, background = "#28B3F9")
```

## Asset

Get all rows in Asset table.

```
SELECT * FROM Asset
```

Display Asset table data.

Team_Member_Id	Project_Id
1	1
2	1
3	1
4	1
5	1
2	2
6	2
7	2
8	2
9	2
2	3
10	3
11	3
14	4
12	4
13	5
14	6
14	7

```
asset_data %>%
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover'")}
    else if (is_latex_output()) {kbl(.)}} %>%
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
    row_spec(0, background = "#28B3F9")
```

Id	Name	Type	Format	Created_By	Date_Created
1	Random Blueprint Asset	Combination of Blueprints	Zip file	1	2023-01-11
2	Random Art Asset	NA	NA	4	2023-01-10
3	Art Asset Thingy	NA	NA	4	2023-01-10
4	Environment Asset Thingy	Tree for use in Environment	NA	4	2023-01-02

## Asset\_Work\_Items

Get all rows in Asset\_Work\_Items table.

```
SELECT * FROM Asset_Work_Items
```

Display Asset\_Work\_Items table data.

```
asset_work_items_data %>%
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover'")}
    else if (is_latex_output()) {kbl(.)}} %>%
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
    row_spec(0, background = "#28B3F9")
```

Work_Item_Id	Asset_Id
8	1
9	1
10	1
1	2
2	2
4	3
5	3
3	4
6	4
7	4

## Library

Get all rows in Library table.

```
SELECT * FROM Library
```

Display Library table data.

```
library_data %>%
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover'")}
    else if (is_latex_output()) {kbl(.)}} %>%
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
    row_spec(0, background = "#28B3F9")
```

Id	Name
1	Programming
2	Models
3	Scenery
4	Characters

## Collection

Get all rows in Collection table.

```
SELECT * FROM Collection
```

Display Collection table data.

```
collection_data %>%
  { if (is_html_output()) {kbl(., table.attr="class='table-striped table-hover'")}
    else if (is_latex_output()) {kbl(.)}} %>%
    kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
    row_spec(0, background = "#28B3F9")
```

Library_Id	Asset_Id
1	1
2	2
2	3
3	4

## Database Querying

1. SELECT with WHERE, LIKE, and OR
2. SELECT with DISTINCT and ORDER BY
3. Inner Join
4. Subquery with SELECT
5. SELECT across a date range

### 1. SELECT with WHERE, LIKE, and OR

**Select with WHERE** Find Team Members who have the first name Joe.

```
SELECT * FROM Team_Member WHERE First_Name = 'Joe';
```

```
#query1_select_with_where %>%
# { if (is_html_output()) {kbl(., table.attr="class='query-striped query-hover'")}
#   else if (is_latex_output()) {kbl(.)}} %>%
#     kable_styling("striped", ifelse(is_html_output(), "hover", "hold_position")) %>%
#     row_spec(0, background = "#FF0000")

query.function(query1_select_with_where)
```

Id	First_Name	Last_Name	Email	Role_Id
1	Joe	O'Regan	joe.oregan@daie.ca4	2
10	Joe	Derp	j.derp@daie.ca4	2

---

**SELECT with LIKE** Find Team Members with first name with 3 characters beginning with “jo” using ‘\_’ wildcard.

```
SELECT * FROM Team_Member WHERE First_Name LIKE "jo_";
```

```
query.function(query2a_select_with_like)
```

Id	First_Name	Last_Name	Email	Role_Id
1	Joe	O'Regan	joe.oregan@daie.ca4	2
10	Joe	Derp	j.derp@daie.ca4	2
11	Jon	Herpaderp	jherpaderp@daie.ca4	7



Find Team Members with last name containing the string “derp” using ‘%’ wildcard.

```
SELECT * FROM Team_Member WHERE Last_Name LIKE "%derp%";
```

```
query.function(query2b_select_with_like)
```

Id	First_Name	Last_Name	Email	Role_Id
2	Derp	McDerp	derpmcderp@daie.ca4	1
3	Herpderp	Derpderpenson	hd.derpderpenson@daie.ca4	3
4	Herpa	Derpderp	herpa.derpderp@daie.ca4	4
5	De	Rpderp	de.rpderp@daie.ca4	5
7	Derpa	Derpa	derpaderpa@daie.ca4	9
8	Herpa	Derpa	herpaderpa@daie.ca4	8
9	HerpaDerpa	McDerpa	herpaderpa.mcderpa@daie.ca4	7
10	Joe	Derp	j.derp@daie.ca4	2
11	Jon	Herpaderp	jherpaderp@daie.ca4	7
13	Joderp	Herpderpenson	j.herpderpenson@daie.ca4	4

---

Find Team Members with first name beginning with “jo” with at least 3 characters, i.e. excludes “Jo”.

```
SELECT * FROM Team_Member WHERE First_Name LIKE "jo_%";
```

```
query.function(query2c_select_with_like)
```

Id	First_Name	Last_Name	Email	Role_Id
1	Joe	O'Regan	joe.oregan@daie.ca4	2
10	Joe	Derp	j.derp@daie.ca4	2
11	Jon	Herpaderp	jherpaderp@daie.ca4	7
12	Joblot	O'Stuff	joblot.ostuff@daie.ca4	3
13	Joderp	Herpderpenson	j.herpderpenson@daie.ca4	4

---

```
SELECT * FROM Team_Member WHERE Role_Id = 2 OR Role_Id = 7;
```

```
query.function(query3_select_with_or)
```

**SELECT with OR.**

---

**SELECT with WHERE, LIKE and OR** Find work items with Name beginning with a string like “art” or have a Status\_Id of 3.

Id	First_Name	Last_Name	Email	Role_Id
1	Joe	O'Regan	joe.oregan@daie.ca4	2
9	HerpaDerpa	McDerpa	herpaderpa.mcderpa@daie.ca4	7
10	Joe	Derp	j.derp@daie.ca4	2
11	Jon	Herpaderp	jherpaderp@daie.ca4	7

```
SELECT * FROM Work_Item WHERE Name LIKE "art%" OR Status_Id = 3;
```

```
query.function(query4_select_with_where_like_or)
```

Id	Name	Status_Id	Assigned_To
1	Art Thingy	2	4
2	Art Test Thingy	3	3
4	Art Concept Thingy	4	7
5	Art Shading Thingy	4	8
10	Blueprint Test	3	2
11	Art Test	1	12
12	Query Model Thingy	3	11

## 2. SELECT with DISTINCT and ORDER BY

**SELECT with DISTINCT** Find the unique status IDs currently in the Work\_Item table.

```
SELECT DISTINCT Status_Id FROM Work_Item;
```

```
query.function(query5_select_distinct)
```

Status_Id
2
3
4
1

**SELECT with ORDER BY** Display work items ordered by assigned\_to (Team\_Member.Id).

```
SELECT * FROM Work_Item ORDER BY Assigned_To;
```

```
query.function(query6_select_order_by)
```

Id	Name	Status_Id	Assigned_To
8	Random Blueprint	2	1
9	Blueprint Thingy	2	2
10	Blueprint Test	3	2
2	Art Test Thingy	3	3
7	3D Model Test Obj	2	3
1	Art Thingy	2	4
6	Random 3D Model	2	5
3	Environment Model Thingy	2	6
4	Art Concept Thingy	4	7
5	Art Shading Thingy	4	8
12	Query Model Thingy	3	11
11	Art Test	1	12
13	Another Test	4	13

**SELECT with ORDER BY ASC** Display work items ordered by Status\_Id (Status.Id) in ascending order.

```
SELECT * FROM Work_Item ORDER BY Status_Id ASC;
```

```
query.function(query7_select_order_by_asc)
```

Id	Name	Status_Id	Assigned_To
11	Art Test	1	12
1	Art Thingy	2	4
3	Environment Model Thingy	2	6
6	Random 3D Model	2	5
7	3D Model Test Obj	2	3
8	Random Blueprint	2	1
9	Blueprint Thingy	2	2
2	Art Test Thingy	3	3
10	Blueprint Test	3	2
12	Query Model Thingy	3	11
4	Art Concept Thingy	4	7
5	Art Shading Thingy	4	8
13	Another Test	4	13

---

**SELECT with ORDER BY DESC** Display work items ordered by Assigned\_To (Team\_Member.Id) in descending order.

```
SELECT * FROM Work_Item ORDER BY Assigned_To DESC;
```

```
query.function(query8_select_order_by_desc)
```

Id	Name	Status_Id	Assigned_To
13	Another Test	4	13
11	Art Test	1	12
12	Query Model Thingy	3	11
5	Art Shading Thingy	4	8
4	Art Concept Thingy	4	7
3	Environment Model Thingy	2	6
6	Random 3D Model	2	5
1	Art Thingy	2	4
2	Art Test Thingy	3	3
7	3D Model Test Obj	2	3
9	Blueprint Thingy	2	2
10	Blueprint Test	3	2
8	Random Blueprint	2	1

**SELECT with DISTINCT and ORDER By** Display work items ordered by Assigned\_To (Team\_Member.Id) in descending order.

```
SELECT DISTINCT Assigned_To FROM Work_Item ORDER BY Assigned_To;
```

```
query.function(query9_select_distinct_order_by)
```

Assigned_To
1
2
3
4
5
6
7
8
11
12
13

### 3. Inner Join

Inner Join Team\_Member and Role tables via foreign key Team\_Member.Role\_id corresponding to Role.Id.

First name and last name are concatenated with the || operator as Concat() doesn't work in Sqlite. Using Alias (AS) for column headings and t for Team\_Member and r for Role table aliases.

```
-- no Concat() in sqlite, || = concat operator
SELECT t.Id as "Team Member Id",
t.First_Name || ' ' || t.Last_Name AS 'Full Name',
r.Name AS 'Project Role'
From Team_Member t
Inner Join Role r
ON t.Role_Id = r.Id
```

```
query.function(query10a_select_inner_join)
```

Team Member Id	Full Name	Project Role
1	Joe O'Regan	Programmer
2	Derp McDerp	Project Manager
3	Herpderp Derpderpenson	Tester
4	Herpa Derpderp	Artist
5	De Rpderp	3D Modeller
6	Pred Prehpred	Environment Modeller
7	Derpa Derpa	Concept Artist
8	Herpa Derpa	Shading Artist
9	HerpaDerpa McDerpa	Animator
10	Joe Derp	Programmer
11	Jon Herpaderp	Animator
12	Joblot O'Stuff	Tester
13	Joderp Herpderpenson	Artist
14	Jo McQueryfiller	Project Manager

---

**Inner Join 2** Get Projects with no Project Manager.

---

Part 1: Select Project Managers from Team Members

```
SELECT * FROM Team_Member WHERE Role_id = 1;
```

```
query.function(query10b_part1)
```

Id	First_Name	Last_Name	Email	Role_Id
2	Derp	McDerp	derpmcderp@daie.ca4	1
14	Jo	McQueryfiller	j.mcqueryfiller@daie.ca4	1

---

Part 2: Show Project Manager and their projects

```
SELECT First_Name || ' ' || Last_Name as "Name", r.name, r.Id, pt.Project_Id
FROM Team_Member tm
INNER JOIN Project_Team pt
ON pt.Team_Member_Id = tm.Id
INNER JOIN Role r
ON tm.Role_Id = r.Id
WHERE tm.Role_Id IN
(SELECT Role_Id FROM Team_Member WHERE Role_id = 1);
```

query.function(query10b\_part2)

Name	Name	Id	Project_Id
Derp McDerp	Project Manager	1	1
Derp McDerp	Project Manager	1	2
Derp McDerp	Project Manager	1	3
Jo McQueryfiller	Project Manager	1	4
Jo McQueryfiller	Project Manager	1	6
Jo McQueryfiller	Project Manager	1	7

Part 3: Get Projects with no Project Manager.

```
Select Name as "Projects with no Manager:" from Project
WHERE Id NOT IN
(SELECT DISTINCT pt.Project_Id
FROM Team_Member tm
INNER JOIN Project_Team pt
ON pt.Team_Member_Id = tm.Id
INNER JOIN Role r
ON tm.Role_Id = r.Id
WHERE tm.Role_Id IN
(SELECT Role_Id FROM Team_Member WHERE Role_id = 1));
```

query.function(query10b\_part3)

Projects with no Manager:
Christmas 2022 Project
Project Filler
Derp Project
Hmmm I Ran Out of Names

```
SELECT t.Id as "Team Member Id",
t.First_Name || ' ' || t.Last_Name AS 'Full Name',
r.Name AS 'Project Role'
From Team_Member t
Inner Join Role r
ON t.Role_Id = r.Id
```

query.function(query10b\_select\_inner\_join\_2)

Team Member Id	Full Name	Project Role
1	Joe O'Regan	Programmer
2	Derp McDerp	Project Manager
3	Herpderp Derpderpenson	Tester
4	Herpa Derpderp	Artist
5	De Rpderp	3D Modeller
6	Pred Prehpred	Environment Modeller
7	Derpa Derpa	Concept Artist
8	Herpa Derpa	Shading Artist
9	HerpaDerpa McDerpa	Animator
10	Joe Derp	Programmer
11	Jon Herpaderp	Animator
12	Joblot O'Stuff	Tester
13	Joderp Herpderpenson	Artist
14	Jo McQueryfiller	Project Manager

#### 4. Subquery with SELECT

**Subquery part 1, inner query** Select the work items that are at least in Review (Review, or Done), i.e. with a status greater than 2.

```
SELECT * FROM Work_Item
WHERE Status_Id > 2
```

```
query.function(query11_subquery_part_1)
```

Id	Name	Status_Id	Assigned_To
2	Art Test Thingy	3	3
4	Art Concept Thingy	4	7
5	Art Shading Thingy	4	8
10	Blueprint Test	3	2
12	Query Model Thingy	3	11
13	Another Test	4	13

**Subquery part 2, outer query** Select work items that contain the string "test".

```
SELECT * FROM Work_Item
WHERE Name LIKE "%test%"
```

```
query.function(query12_subquery_part_2)
```

**Subquery with SELECT** Select work items that contain the string "test" and have a Status\_Id greater than 2.

Id	Name	Status_Id	Assigned_To
2	Art Test Thingy	3	3
7	3D Model Test Obj	2	3
10	Blueprint Test	3	2
11	Art Test	1	12
13	Another Test	4	13

```
SELECT * FROM Work_Item
WHERE Name LIKE "%test%"
AND Status_Id IN
(SELECT Status_Id FROM Work_Item
WHERE Status_Id > 2)
```

```
query.function(query13_subquery_with_select)
```

Id	Name	Status_Id	Assigned_To
2	Art Test Thingy	3	3
10	Blueprint Test	3	2
13	Another Test	4	13

**Subquery with SELECT and NOT IN** Select work items that contain the string “test” and have a Status\_Id less than 3.

```
SELECT * FROM Work_Item
WHERE Name LIKE "%test%"
AND Status_Id NOT IN
(SELECT Status_Id FROM Work_Item
WHERE Status_Id > 2)
```

```
query.function(query13b_subquery_with_select_not_in)
```

Id	Name	Status_Id	Assigned_To
7	3D Model Test Obj	2	3
11	Art Test	1	12

## 5. SELECT across a date range

Select delivery dates from Project table to compare query against. And order them to make it that much easier to find.

```
SELECT Delivery_Date FROM Project
ORDER BY Delivery_Date
```



```
query.function(query14_check_dates)
```

Delivery_Date
2022-12-14
2022-12-25
2023-01-11
2023-01-17
2023-01-20
2023-01-20
2023-01-24
2023-02-01
2023-03-01
2023-03-17

---

**Select across a date range** Select projects with a delivery date in the range 16/01/2023 to 25/01/2023.

```
SELECT * FROM Project
WHERE Delivery_Date
BETWEEN "2023-01-16" AND "2023-01-25";
```

```
query.function(query15_select_across_date_range)
```

Id	Name	Delivery_Date
2	DAIE CA4	2023-01-20
3	New Project	2023-01-24
6	Date Range Project	2023-01-17
10	Hmmm I Ran Out of Names	2023-01-20

---

**Disconnect Database**

```
dbDisconnect(conn)
```