

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

CA4 Part 2 - Querying Database

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2023-01-11

ER Diagram

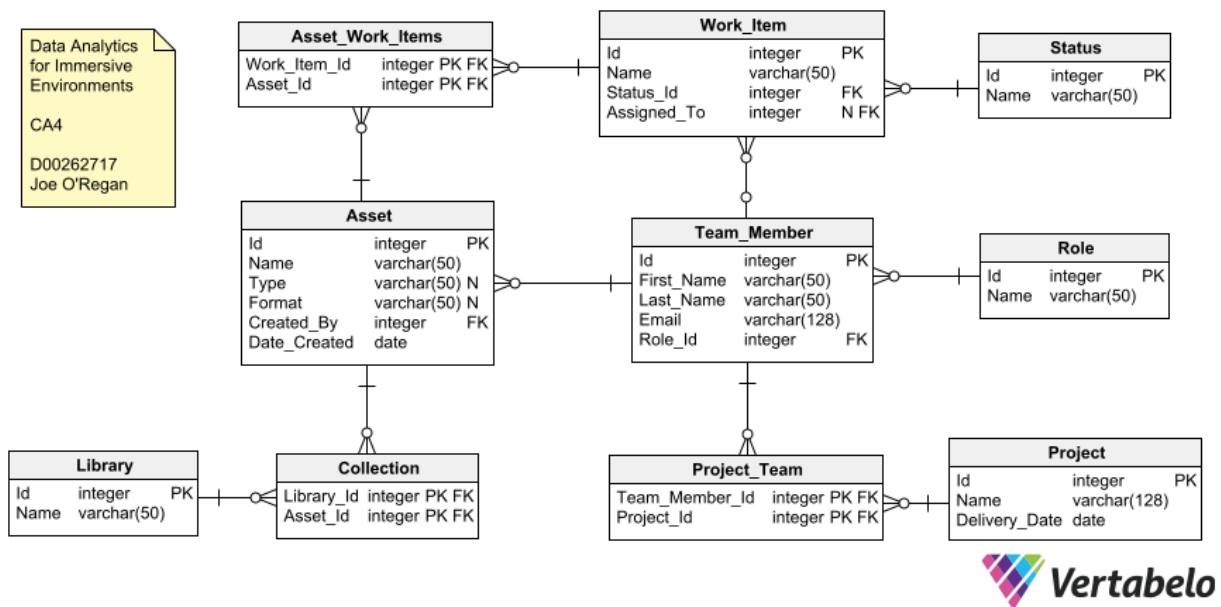


Figure 1: Entity Relationship Diagram

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.

Function to format tables for HTML and PDF output. Display tables using knitr library's kable function and kableExtra to format tables.

```
data_format.function <- function(data, type="table", bgcolour="#28B3F9") {
  data %>%
  {
    if (is_html_output()) { # if the output is HTML add class attribute
      kbl(., table.attr= paste("class='",type,"-striped ",type,"-',", "hover'", sep=""))}
    else if (is_latex_output()) { # if the output is PDF ignore class attribute
      kbl(.)
    }
  } %>% # pdf output keep tables in position
  kable_styling("striped", ifelse(is_html_output(),"hover","hold_position")) %>%
  row_spec(0, background = bgcolour)
}
```

Status

Get all rows in Status table.

```
SELECT * FROM Status
```

Display Status table using above data format function.

```
data_format.function(status_data)
```

| 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.

```
data_format.function(role_data)
```

| 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.

```
data_format.function(team_member_data)
```

| 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.

```
data_format.function(work_item_data)
```

| 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.

```
data_format.function(project_data)
```

| 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.

```
data_format.function(project_team_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

Get all rows in Asset table.

```
SELECT * FROM Asset
```

Display Asset table data.

```
data_format.function(asset_data)
```

| 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.

```
data_format.function(asset_work_items_data)
```

| 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.

```
data_format.function(library_data)
```

| Id | Name |
|----|-------------|
| 1 | Programming |
| 2 | Models |
| 3 | Scenery |
| 4 | Characters |

Collection

Get all rows in Collection table.

```
SELECT * FROM Collection
```

Display Collection table data.

```
data_format.function(collection_data)
```

| 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';
```

```
data_format.function(query1_select_with_where, "query", "#FF0000")
```

| 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_";
```

```
data_format.function(query2a_select_with_like, "query", "#FF0000")
```

| 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%";
```

```
data_format.function(query2b_select_with_like, "query", "#FF0000")
```

| 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_%";
```



```
data_format.function(query2c_select_with_like, "query", "#FF0000")
```

| 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 with OR.

Select Team Members where the Role_Id is 2 OR 7.

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

```
data_format.function(query3_select_with_or, "query", "#FF0000")
```

| 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 with WHERE, LIKE and OR

Find work items with Name beginning with a string like "art" or have a Status_Id of 3.

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

```
data_format.function(query4_select_with_where_like_or, "query", "#FF0000")
```

| 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;
```

```
data_format.function(query5_select_distinct, "query", "#FF0000")
```

| 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;
```

```
data_format.function(query6_select_order_by, "query", "#FF0000")
```

| 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;
```

```
data_format.function(query7_select_order_by_asc, "query", "#FF0000")
```

SELECT with ORDER BY DESC

Display work items ordered by Assigned_To (Team_Member.Id) in descending order.

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

```
data_format.function(query8_select_order_by_desc, "query", "#FF0000")
```

| 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;
```

```
data_format.function(query9_select_distinct_order_by, "query", "#FF0000")
```

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

3. Inner Join

Inner Join 1

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
```

```
data_format.function(query10a_select_inner_join, "query", "#FF0000")
```

| 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;
```

```
data_format.function(query10b_part1, "query", "#FF0000")
```

| Id | First_Name | Last_Name | Email | Role_Id |
|----|------------|---------------|--------------------------|---------|
| 2 | Derp | McDerp | derpmmcderp@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);
```

```
data_format.function(query10b_part2, "query", "#FF0000")
```

| 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));
```

```
data_format.function(query10b_part3, "query", "#FF0000")
```

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

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
```

```
data_format.function(query11_subquery_part_1, "query", "#FF0000")
```

| 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%"
```

```
data_format.function(query12_subquery_part_2, "query", "#FF0000")
```

| 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 |

Subquery with SELECT

Select work items that contain the string “test” and have a Status_Id greater than 2.

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

```
data_format.function(query13_subquery_with_select, "query", "#FF0000")
```

Subquery with SELECT and NOT IN

Select work items that contain the string “test” and have a Status_Id less than 3.

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

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

```
data_format.function(query13b_subquery_with_select_not_in, "query", "#FF0000")
```

| 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
```

```
data_format.function(query14_check_dates, "query", "#FF0000")
```

| 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";
```

```
data_format.function(query15_select_across_date_range, "query", "#FF0000")
```

| 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)
```