Milestone 4

Description

Nature Nexus is a National Park management database platform created for park rangers to track information about animals, habitats, plants, park equipment, facilities, and more. It can model familial relationships between animals, plant/animal health, habitat quality, and also find park statistics like a breakdown of animal health across the park, animals that live in particular habitats, a list of all plant species that have at least one plant in poor health, and more.

How our final schema differed from the schema we turned in

Our final schema did not change - the only difference is that our final schema uses VARCHAR instead of CHAR so that we could use parameterized inputs.

Copy of the schema and screenshots to show the data populated after SQL script is run

Copy of the schema

Animal(animalId: INT, health: VARCHAR(30), age: INT, animalName: VARCHAR(30) UNIQUE, **speciesName**: VARCHAR(30), lastSeen: DATE)

Species(speciesName: VARCHAR(30), **taxonomicalFamily**: VARCHAR(30))

Family(taxonomicalFamily: VARCHAR(30), taxonomicalOrder: VARCHAR(30))

Rabbit(**animalId**: INT, furPattern: VARCHAR(30))

Owl(**animalId**: INT, plumage: VARCHAR(30))

Wolf(**animalId**: INT, furPattern: VARCHAR(30))

Frog(**animalId**: INT, skinPattern: VARCHAR(30))

Mom(**animalId_mom**: INT**,** **animalId_child**: INT)

Dad(**animalId_dad**: INT, **animalId_child**: INT)

LivesIn(**animalId**: INT, **habitatName**: VARCHAR(30))

Habitat(habitatName: VARCHAR(30), **coordinates**: VARCHAR(30))

Pond(**habitatName**: VARCHAR(30), waterQuality: VARCHAR(30))

Forest(**habitatName**: VARCHAR(30), soilQuality: VARCHAR(30))

Plant(plantId: INT, species: VARCHAR(30), coordinates: VARCHAR(30), health: VARCHAR(30), **habitatName**: VARCHAR(30) NOT NULL)

PlantedBy(**plantId**: INT, **rangerId**: INT, datePlanted: DATE)

Monitors(**habitatName**: VARCHAR(30), **rangerId**: INT)

ParkRanger(rangerId: INT, rangerName: VARCHAR(30), dateJoined: DATE)

Manages(**rangerId**: INT, **facilityName**: VARCHAR(50))

Facility(facilityName: VARCHAR(50), **coordinates**: VARCHAR(30))

Equipment(equipmentId: INT, equipmentType: VARCHAR(50), **facilityName**: VARCHAR(50))

Visitor(passId: INT, dateVisited: DATE, **rangerId**: INT NOT NULL)

Area(coordinates: VARCHAR(30), areaName: VARCHAR(30))

Screenshots of data

1. Animal table:

```
[SQL> SELECT * FROM ANIMAL;

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
         1 good                                            2
Violet                         European Rabbit                20-JUL-24

         2 unknown                                         1
                               European Rabbit                15-JUL-24

         3 poor                                            2
Tinny                          Cottontail Rabbit              03-JAN-23

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
         4 good                                            4
                               Cottontail Rabbit              20-JUL-24

         5 poor                                            9
                               Cottontail Rabbit              15-JUL-24

         6 excellent                                       3
Kip                            British Columbia Wolf          15-JUL-24

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
         7 good                                            2
                               Coastal Wolf                   20-JUL-24

         8 mid                                             8
Wolfie                         Red Wolf                       15-JUL-24

         9 poor                                           12
                               British Columbia Wolf          15-JUL-24

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
        10 unknown                                         3
                               British Columbia Wolf          20-JUL-24

        11 good                                            2
Whoo                           Great Horned Owl               20-JUL-24

        12 unknown                                         2
                               Barn Owl                       15-JUL-24

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
        13 poor                                            2
                               Barn Owl                       03-JAN-23

        14 excellent                                       3
                               Long-eared owl                 20-JUL-24

        15 poor                                            5
                               Barn Owl                       15-JUL-24

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
        16 poor                                            2
Rock                           Common frog                    15-JUL-24

        17 poor                                            2
Woody Jr                       Wood frog                      20-JUL-24

        18 mid                                             1
Rick                           Common frog                    15-JUL-24

  ANIMALID HEALTH                           AGE
---------- ------------------------------ ----------
ANIMALNAME                     SPECIESNAME                    LASTSEEN
------------------------------ ------------------------------ ---------
        19 poor                                            1
Roll                           Common frog                    15-JUL-24

        20 poor                                            3
Woody                          Wood frog                      20-JUL-24

20 rows selected.
```

2. Species table

```
SQL> SELECT * FROM SPECIES;

SPECIESNAME                    TAXONOMICALFAMILY
------------------------------ ------------------------------
European Rabbit                Leporidae
Cottontail Rabbit              Leporidae
British Columbia Wolf          Canidae
Coastal Wolf                   Canidae
Red Wolf                       Canidae
Great Horned Owl               Strigidae
Barn Owl                       Tytonidae
Long-eared owl                 Strigidae
Common frog                    Ranidae
Wood frog                      Ranidae

10 rows selected.
```

3. Family table

```
SQL> SELECT * FROM FAMILY;

TAXONOMICALFAMILY              TAXONOMICALORDER
------------------------------ ----------------------
Leporidae                      Lagomorpha
Canidae                        Carnivora
Strigidae                      Strigiformes
Tytonidae                      Strigiformes
Ranidae                        Anura
```

4. Rabbit table

```
SQL> SELECT * FROM RABBIT;

  ANIMALID FURPATTERN
---------- ----------------
         1
         2 brown speckled
         3 solid brown
         4 grey mottled
         5
```

5. Owl table

```
SQL> SELECT * FROM OWL;

  ANIMALID PLUMAGE
---------- ----------------
        11 brown speckled
        12 white and gray
        13
        14 brown striped
        15
```

6. Wolf table

```
SQL> SELECT * FROM WOLF;

  ANIMALID FURPATTERN
---------- ----------------
         6 grey speckled
         7 solid brown
         8
         9
        10 grey speckled
```

7. Frog table

```
SQL> SELECT * FROM FROG;

  ANIMALID SKINPATTERN
---------- --------------------
        16 solid brown
        17
        18 spotted brown and green
        19 brown speckled
        20
```

8. Mom table

```
SQL> SELECT * FROM MOM;

ANIMALID_MOM ANIMALID_CHILD
------------ -------------
           5             4
           4             3
           1             2
           8             6
           8            10
```

9. Dad table

```
SQL> SELECT * FROM DAD;

ANIMALID_DAD ANIMALID_CHILD
------------ -------------
          15            13
          15            12
          20            17
          16            18
          16            19
```

10. LivesIn table

```
SQL> SELECT * FROM LIVESIN;

  ANIMALID HABITATNAME
---------- ----------------------
         1 Lakeside Forests
         2 Lakeside Forests
         3 Lakeside Forests
         4 Based Forests
         5 Based Forests
         6 Lakeside Forests
         7 Seqwel Woods
         8 Seqwel Woods
         9 A.J.C Forests
        10 Based Forests
        11 Paddlewheel Forests

  ANIMALID HABITATNAME
---------- ----------------------
        12 Paddlewheel Forests
        13 Paddlewheel Forests
        14 Based Forests
        15 Based Forests
        16 Becker Lake
        17 Paddlewheel Pond
        18 Becker Lake
        19 Arrow Lake
        20 Arrow Lake
```

11. Habitat table

```
SQL> SELECT * FROM HABITAT;

HABITATNAME                    COORDINATES
------------------------------ ------------------------
Becker Lake                    49.303974, -123.140523
Paddlewheel Pond               49.312442, -123.143080
Syilx Lake                     49.312442, -123.143080
Arrow Lake                     49.312442, -123.143080
Ellison Pond                   49.312442, -123.143080
Lakeside Forests               49.303974, -123.140523
Paddlewheel Forests            49.312442, -123.143080
A.J.C Forests                  49.295886, -123.146101
Seqwel Woods                   49.312442, -123.143080
Based Forests                  49.303969, -123.156437

10 rows selected.
```

12. Pond table

```
SQL> SELECT * FROM POND;

HABITATNAME                    WATERQUALITY
------------------------------ -------------
Paddlewheel Pond               poor
Arrow Lake                     poor
Becker Lake                    poor
Syilx Lake                     good
Ellison Pond                   fair
```

13. Forest table

```
SQL> SELECT * FROM FOREST;

HABITATNAME                    SOILQUALITY
------------------------------ -------------
Lakeside Forests               good
Paddlewheel Forests            poor
A.J.C Forests                  excellent
Seqwel Woods                   good
Based Forests                  excellent
```

14. Plant table

```
SQL> SELECT * FROM PLANT;

   PLANTID SPECIES                        COORDINATES
---------- ------------------------------ ------------------------------
HEALTH                         HABITATNAME
------------------------------ ------------------------------
         1 White Water Lily               50.311342, -124.143080
poor                           Paddlewheel Pond

         2 White Water Lily               48.311342, -122.143080
poor                           Paddlewheel Pond

         3 White Water Lily               47.311342, -123.143080
good                           Paddlewheel Pond


   PLANTID SPECIES                        COORDINATES
---------- ------------------------------ ------------------------------
HEALTH                         HABITATNAME
------------------------------ ------------------------------
         4 Oak Tree                       50.311342, -123.143080
good                           Paddlewheel Forests

         5 Maple Tree                     51.311342, -123.143080
excellent                      Paddlewheel Forests
```

15. PlantedBy table

```
SQL> SELECT * FROM PLANTEDBY;

   PLANTID   RANGERID DATEPLANT
---------- ---------- ---------
         1          5 08-APR-22
         2          5 09-APR-22
         3          1 05-MAY-21
         4          2 10-SEP-22
         5          3 10-APR-22
```

16. Monitors table

```
SQL> SELECT * FROM MONITORS;

HABITATNAME                    RANGERID
------------------------------ ----------
A.J.C Forests                           5
Arrow Lake                              5
Based Forests                           1
Becker Lake                             3
Ellison Pond                            1
Lakeside Forests                        4
Paddlewheel Forests                     2
Paddlewheel Pond                        1
Seqwel Woods                            3
Syilx Lake                              2
```

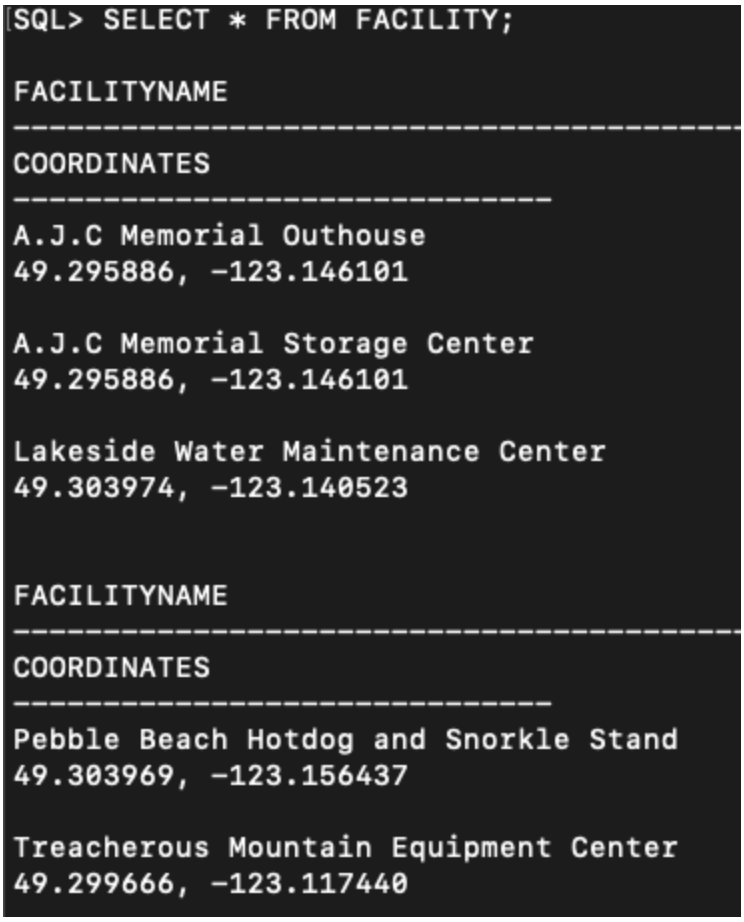
17. ParkRanger table

```
SQL> SELECT * FROM PARKRANGER;

  RANGERID RANGERNAME                     DATEJOINE
---------- ------------------------------ ---------
         1 Aiden Kerr                     01-MAR-20
         2 Cindy Cui                      05-JUL-21
         3 Joel Bonnie                    21-NOV-21
         4 Seva Lynov                     03-JAN-20
         5 Jessica Bator                  07-APR-22
```

18. Manages table

```
SQL> SELECT * FROM MANAGES;

  RANGERID FACILITYNAME
---------- ----------------------------------------
         1 A.J.C Memorial Storage Center
         2 A.J.C Memorial Outhouse
         3 Lakeside Water Maintenance Center
         4 Pebble Beach Hotdog and Snorkle Stand
         5 Treacherous Mountain Equipment Center
```

19. Facility table



20. Equipment table

```
SQL> SELECT * FROM EQUIPMENT;

EQUIPMENTID EQUIPMENTTYPE
----------- ------------------------------
FACILITYNAME
----------------------------------------
          1 Snorkle
Pebble Beach Hotdog and Snorkle Stand

          2 Rope
Treacherous Mountain Equipment Center

         23 Water Treatment Kit
Lakeside Water Maintenance Center


EQUIPMENTID EQUIPMENTTYPE
----------- ------------------------------
FACILITYNAME
----------------------------------------
         22 Grill
Pebble Beach Hotdog and Snorkle Stand

         33 Ranger Uniforms
A.J.C Memorial Storage Center
```

21. Visitor table

```
SQL> SELECT * FROM VISITOR;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         6 07-APR-24          4
```

22. Area table

```
SQL> SELECT * FROM AREA;

COORDINATES                  AREANAME
---------------------------- --------------------------
49.303969, -123.156437       Pebble Beach
49.312442, -123.143080       Northernmost Natures
49.303974, -123.140523       Lakeside
49.295886, -123.146101       A.J.C Memorial Sanctuary
49.299666, -123.117440       Treacherous Tip
```

SQL queries and their locations in code

Insert

```
INSERT INTO {tableName} ({columns}) VALUES ({values})
```

Delete

```
DELETE FROM {tableName} WHERE {primary key condition}
```

Update

```
UPDATE {tableName} SET {changes} WHERE {primary key condition}
```

Selection

with WHERE clause

```
SELECT * FROM {tableName} WHERE {primary key condition}
```

without WHERE clause

```
SELECT * FROM {tableName}
```

Projection

```
SELECT {attributes} FROM {tableName} WHERE {primary key conditio
```

Join

```
SELECT A.ANIMALID,A.ANIMALNAME
FROM ANIMAL A,LIVESIN L,HABITAT H
WHERE A.animalid = L.animalid AND H.habitatname = L.habitatname
```

Aggregation with Group By

```
SELECT HEALTH, COUNT(ANIMALID) FROM ANIMAL GROUP BY HEALTH
```

Aggregation with Having

```
SELECT SPECIESNAME, COUNT(*)
FROM ANIMAL
GROUP BY SPECIESNAME
HAVING COUNT(*) > 1
```

Nested Aggregation with Group By

```
SELECT CEIL(AVG(ANIMALCOUNT)) FROM (
    SELECT COUNT(A.animalid) AS ANIMALCOUNT, H.habitatname HABI
    FROM ANIMAL A,LIVESIN L,HABITAT H
  WHERE A.animalid = L.animalid AND H.habitatname = L.habitatnam
```

```
  GROUP BY H.habitatname
}
```

Division

```
SELECT DISTINCT P.species
    FROM Plant P
    WHERE NOT EXISTS
    ((SELECT DISTINCT 'poor' FROM Plant P2)
    MINUS
    (SELECT trim(P1.health)
    FROM Plant P1
    WHERE P.species=P1.species))
```

Functionality Screenshots

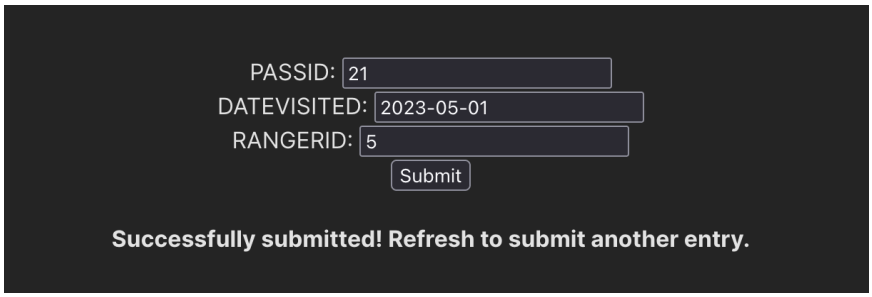
1. **Screenshots demonstrating the functionality of each query using the GUI. We want to see a before/during/after progression of events. For example, the before screenshot would be what data is in the table before you run the query, the during screenshot(s) is how the query is triggered using the GUI, and the after screenshot is what data is in your table afterwards. Please label each set of screenshots with the name of the query it is meant to address (e.g., "Insert Operation").**
    a. You need only to include screenshots for the required queries – if you implemented more than what was required, screenshots are not needed for those extra queries.

Insert

Before

```
select * from visitor;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         6 07-APR-24          4

6 rows selected.
```

During



After

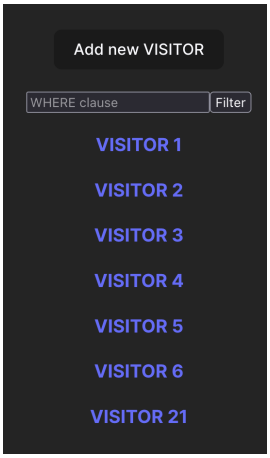
```
select * from visitor;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         6 07-APR-24          4
        21 01-MAY-23          5

7 rows selected.
```

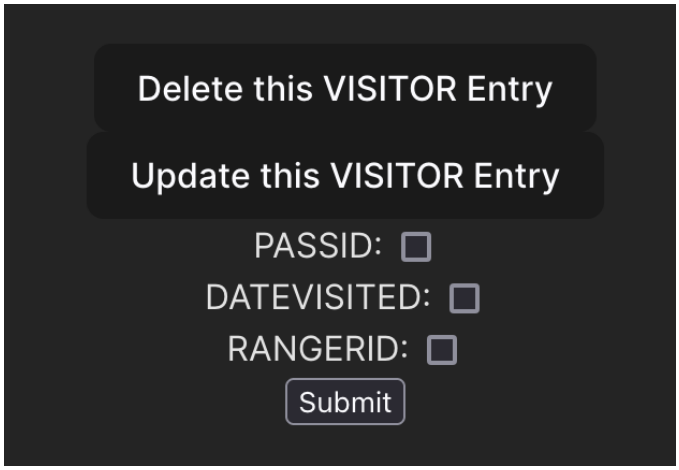
Delete

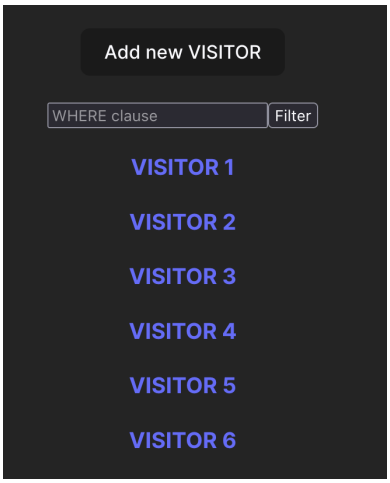
Before

```
select * from visitor;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         6 07-APR-24          4
        21 01-MAY-23          5

7 rows selected.
```

During







After

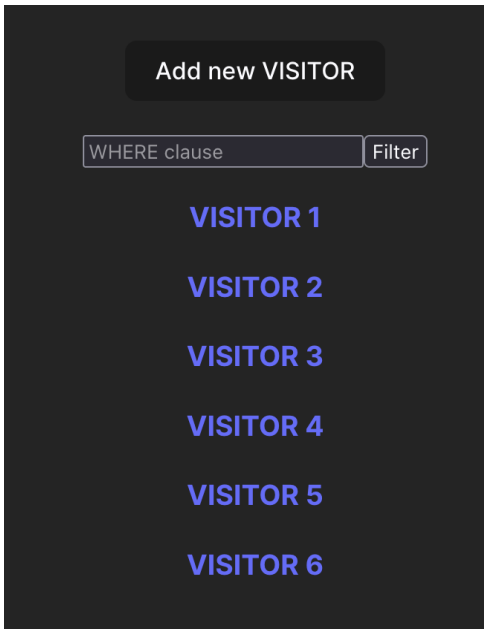
```
select * from visitor;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         6 07-APR-24          4

6 rows selected.
```

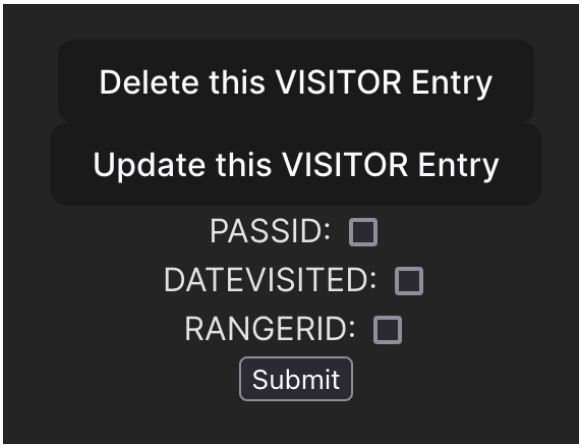
Update

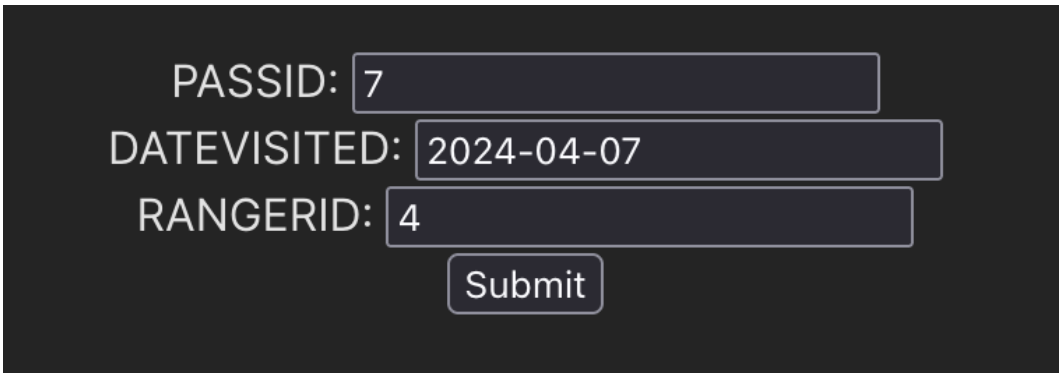
Before

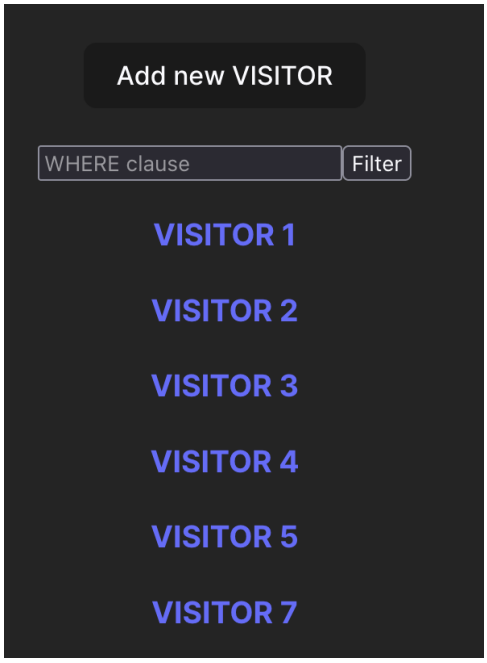
```
select * from visitor;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         6 07-APR-24          4

6 rows selected.
```

During







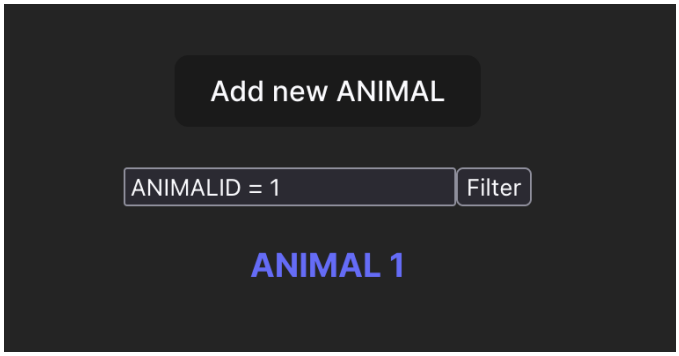


After

```
select * from visitor;

    PASSID DATEVISIT   RANGERID
---------- --------- ----------
         1 01-APR-23          5
         2 01-APR-23          4
         3 01-APR-23          1
         4 21-OCT-23          2
         5 12-NOV-23          3
         7 07-APR-24          4

6 rows selected.
```

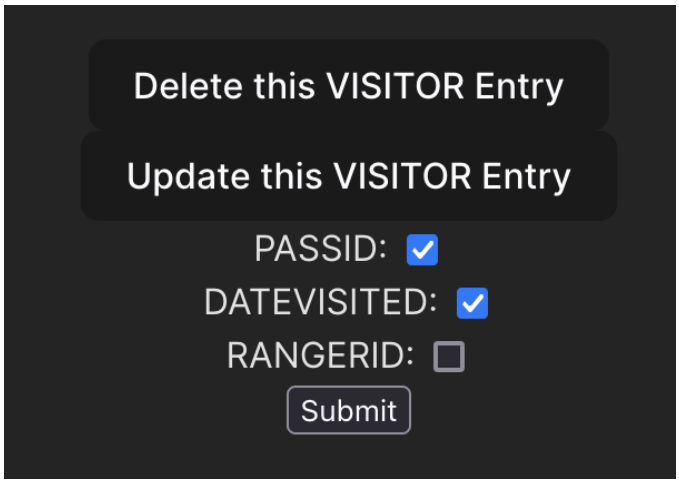
Selection

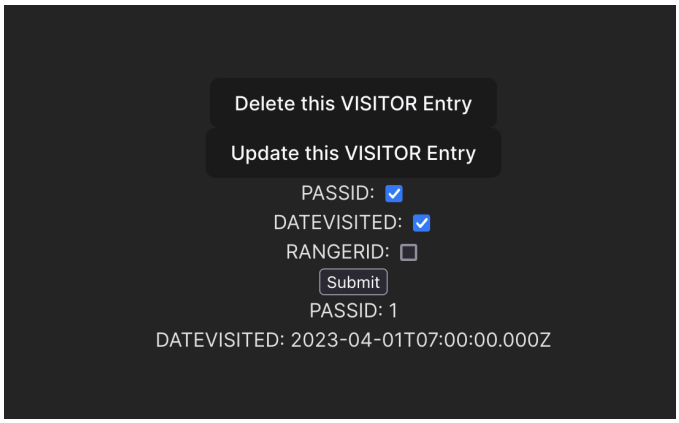
During (This query does not modify the data)



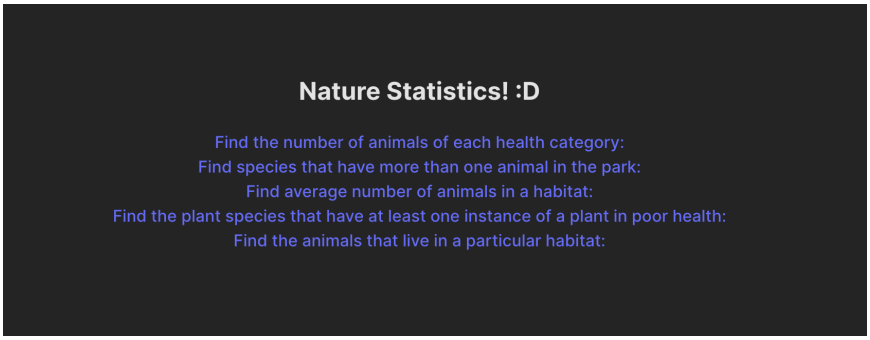
Projection

During (This query does not modify the data)



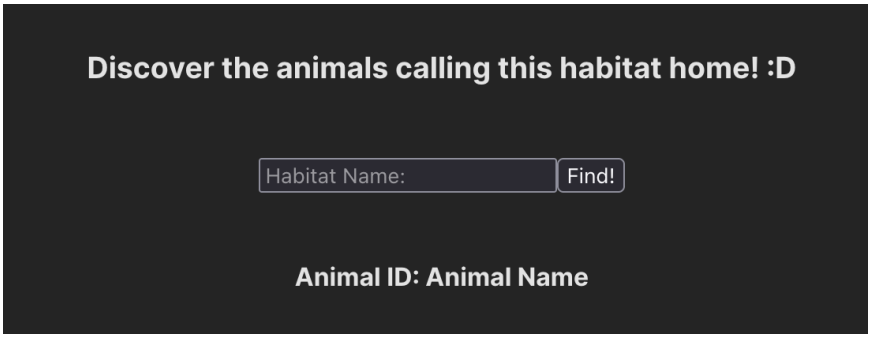


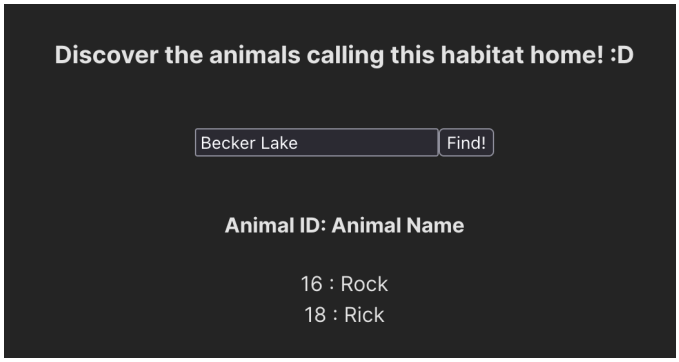
Miscellaneous Queries:



Join

During (This query does not modify the data)





Aggregation with GroupBy

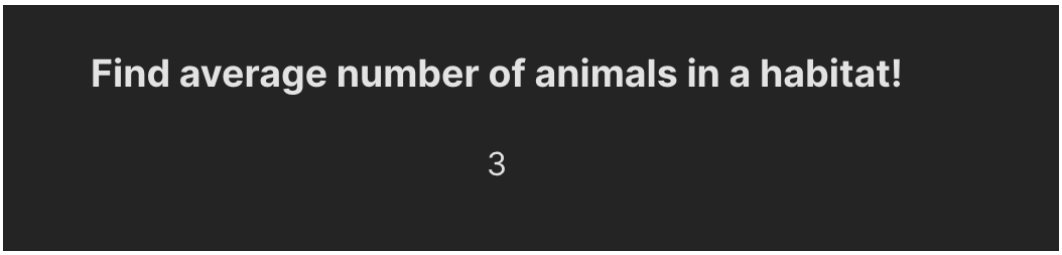
During (This query does not modify the data)

Aggregation with Having

During (This query does not modify the data)

Nested Aggregation with GroupBy

During (This query does not modify the data)



Division

During (This query does not modify the data)