CPSC 304

Milestone #4

Date: November 25th, 2022

Group Number: 72

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

Single SQL Script:

Found in project_j7x9t_s3y2b_u6i2b/304-app/sql/**reset-autogen.sql**

Description of final project:

Our project allows users to to add, update, and delete compass taps, and view different information about a transit system, including:

- The bus model information for a specific bus given the bus ID
- The bus/skytrain stop information
- The bus drivers that have driven every bus
- The max capacity of bus models grouped by their fuel type
- The max capacity of bus models grouped by their fuel type where there is more than one of that bus model
- The max capacity of bus models grouped by their fuel type where the max capacity is larger than the average capacity of all bus models
- Information on drivers that have driven every bus at least once

Description of final schema differences:

Minor changes we made that simply resulted from actually creating the tables in SQL:

- We changed the order of the attributes in each schema
- We changed the naming convention for the attributes from capitalizing the first letter every word with no space to only lowercase with underscores between words
- We increased the CHAR(n) length for some fields

Other changes we made to the schema include

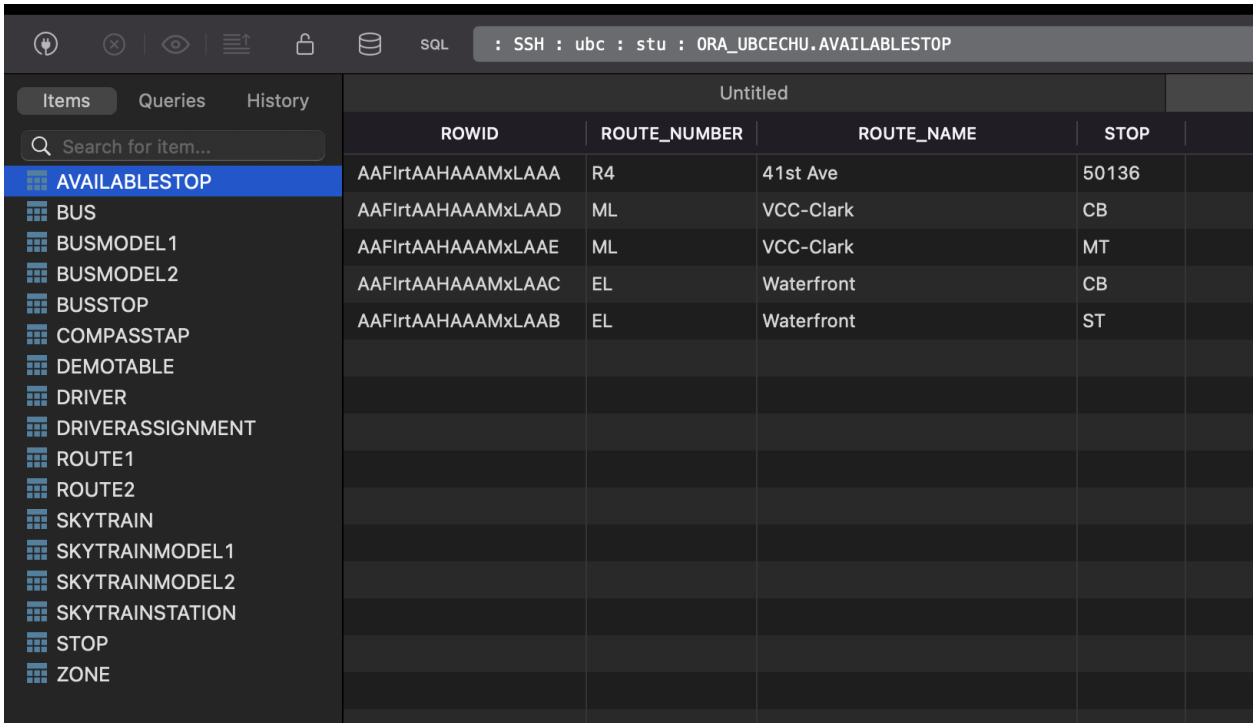
- Removed origin and destination from route because it was unused
- Moved the attribute rail_type from route1 to route2 because bus_route_type is in route2, so there is more cohesion between the types of attributes in each table
- Added attributes route_number CHAR(3), route_name CHAR(50), to as foreign keys that reference AvailableStop to CompassTap because without the new foreign keys, there would be no way to tell what bus route the compass tap was on

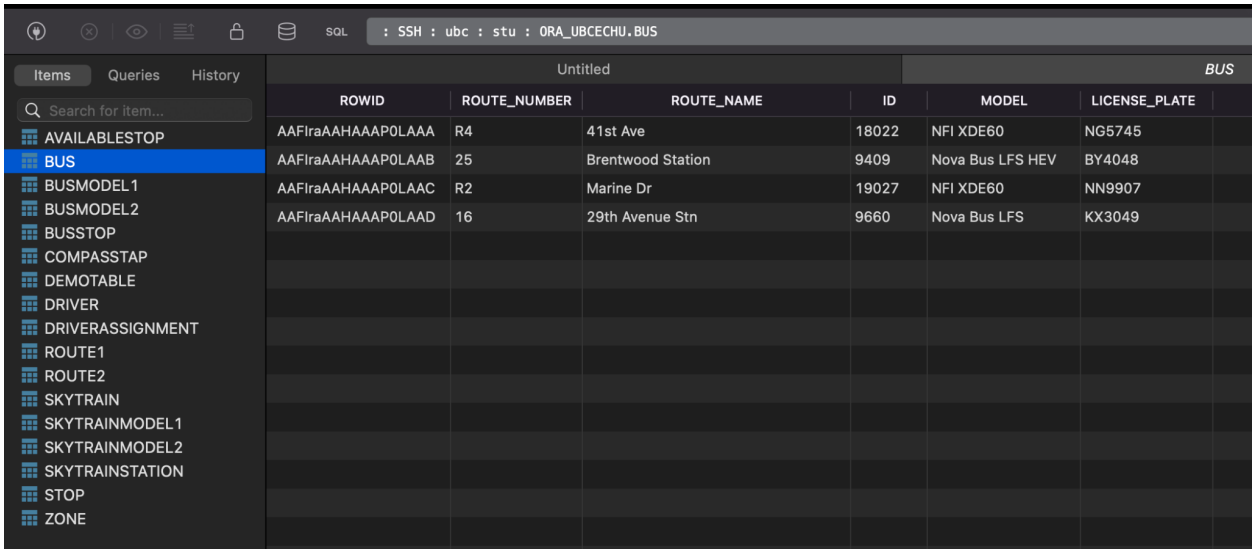
Schema:

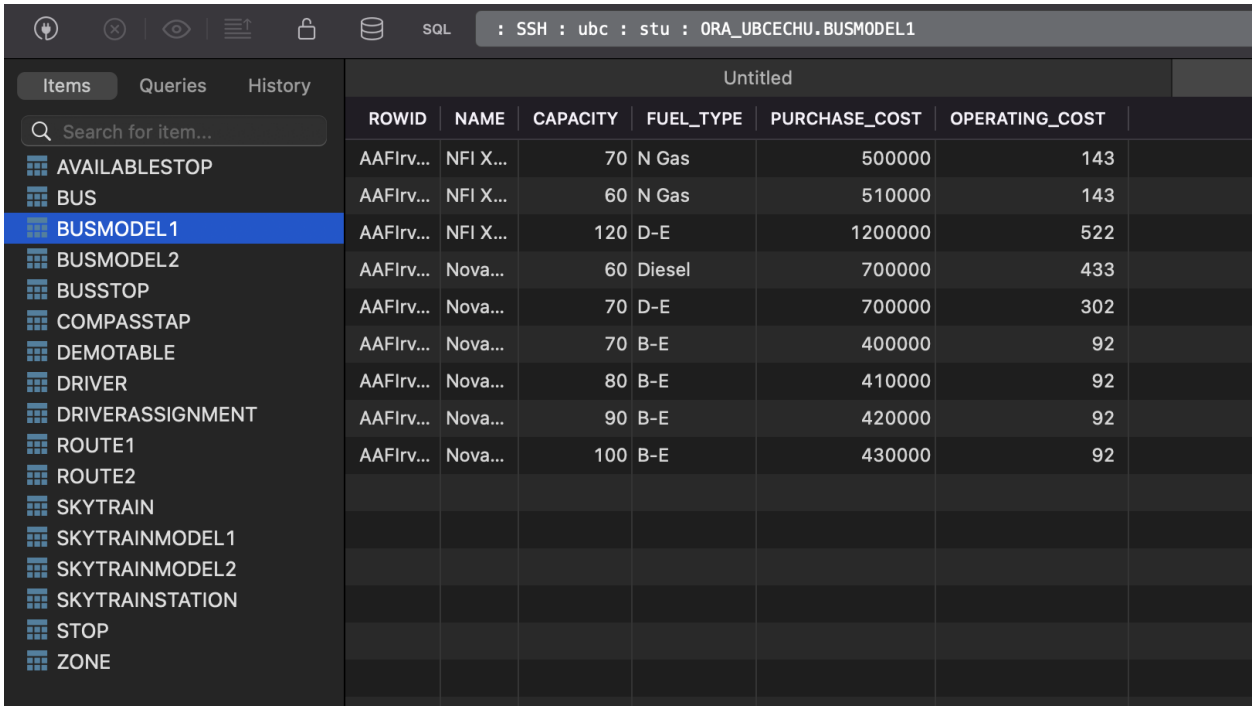
- Bus(**route_number: CHAR(3)**, **route_name: CHAR(50),** id CHAR(10), **model: CHAR(20),** license_plate: CHAR(6))
- Driver(id: CHAR(8), first_name: CHAR(30), last_name: CHAR(30))
- Skytrain(**route_number**: **CHAR(3), route_name**: **CHAR(50),** id: CHAR(6), **model**: **CHAR(25)**)
- SkytrainStation(**stopid**: **CHAR(10),** name: CHAR(50), platforms: INT)

- BusStop(**stopid: CHAR(10)**, name: CHAR(50))
- Stop(id: CHAR(10), postcode: CHAR(6), **city: CHAR(20)**)
- Zone(zone_number: INT, city: CHAR(20))
- CompassTap(card_id: CHAR(20), time: INT, **route_number CHAR(3), route_name CHAR(50)**, **stop: CHAR(50)**)
- DriverAssignment(**driver_id: CHAR(8)**, **bus_id: CHAR(10)**)
- AvailableStop(**route_number: CHAR(3), route_name: CHAR(50)**, **stop: CHAR(20)**)
- BusModel(Name: CHAR(20), Cost: INT, Capacity: INT, FuelType: CHAR(6), Cost: INT, PurchaseCost: INT, OperatingCost: INT)
- BusModel1(name: CHAR(20), capacity: INT, fuel_type: CHAR(6), **purchase_cost: INT, operating_cost: INT**)
- BusModel2(purchase_cost: INT, operating_cost: INT, cost: INT)
- SkytrainModel1(name: CHAR(20), capacity: INT, cars: INT, **purchase_cost: INT**, **operating_cost: INT**)
- SkytrainModel2(purchase_cost: INT, operating_cost: INT, cost)
- Route1(**route_number: CHAR(3),** route_name: CHAR(50), distance: REAL, **Origin: CHAR(10)**, **Destination: CHAR(10)**)
- Route2(route_number:CHAR(3), bus_route_type: CHAR(20), rail_type: CHAR(20))

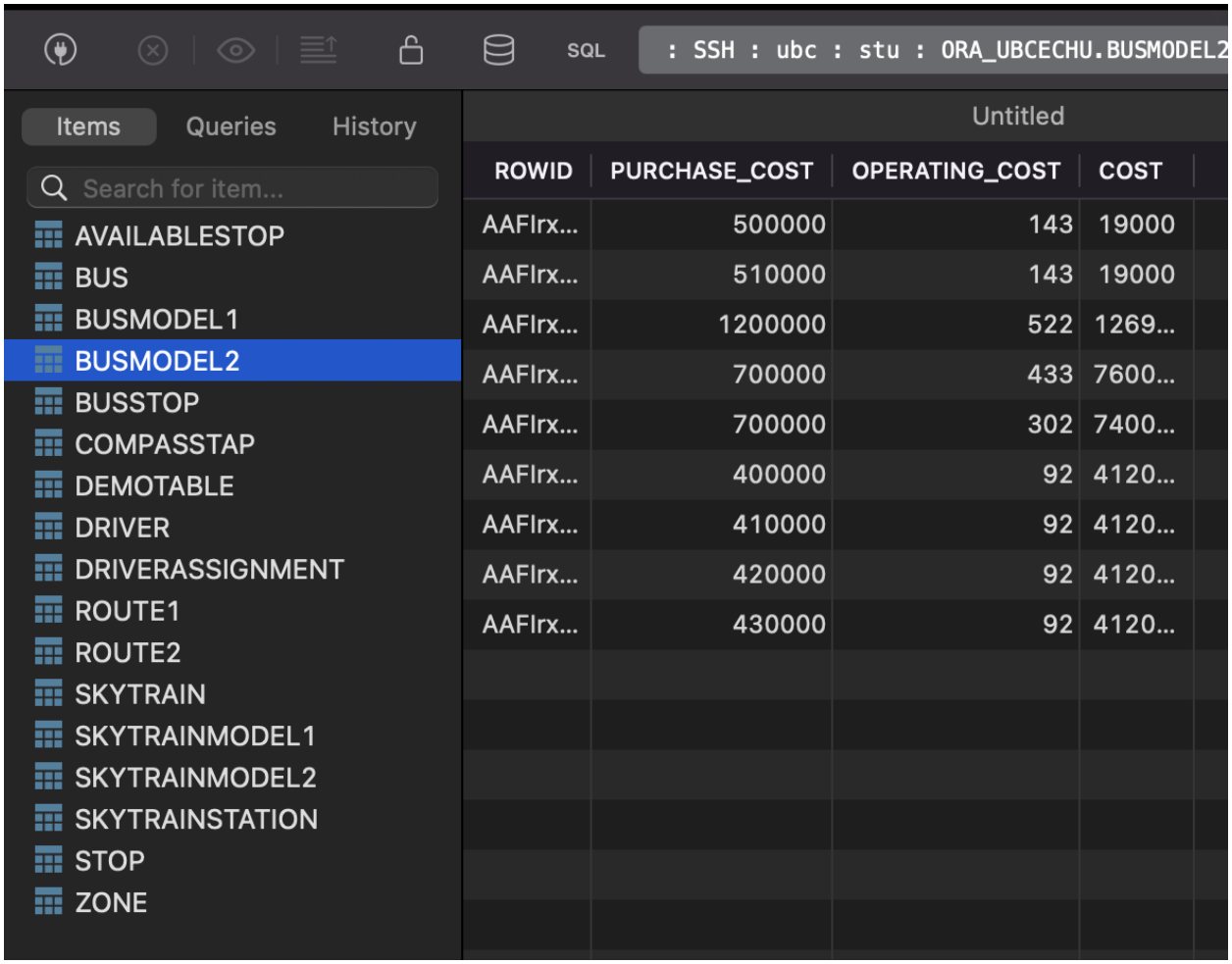
Data After Insert:



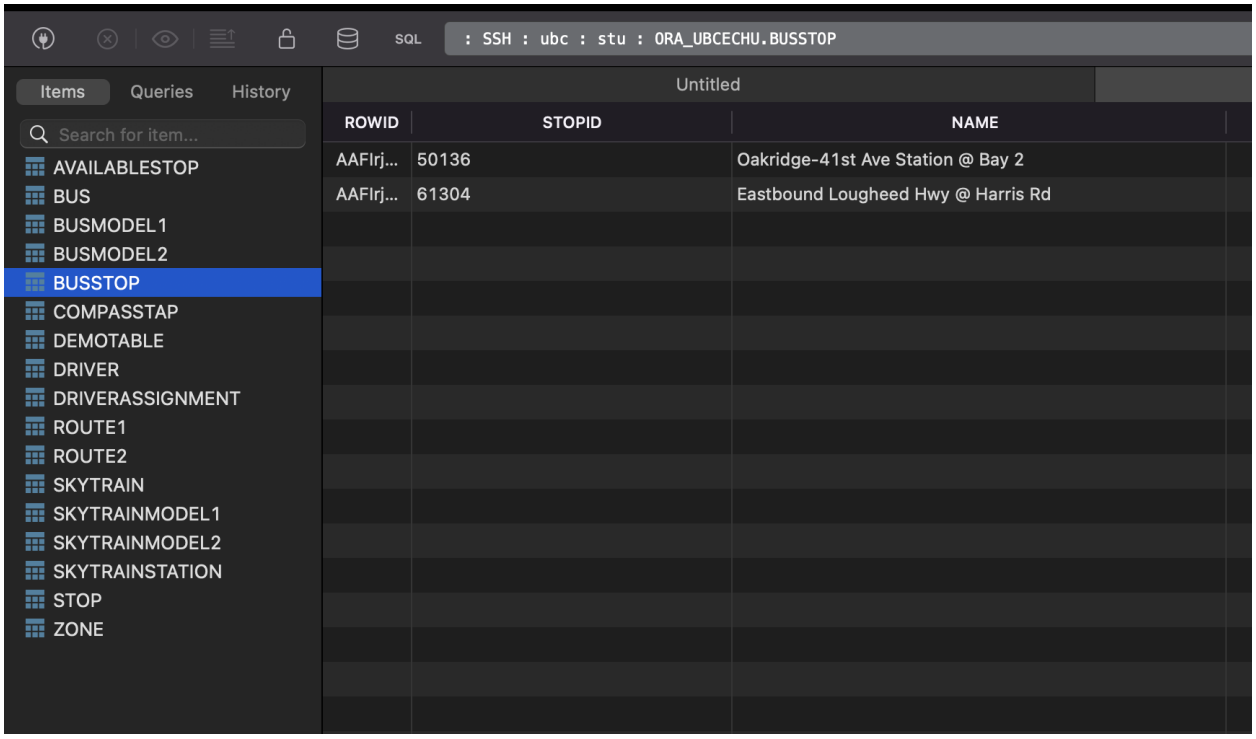


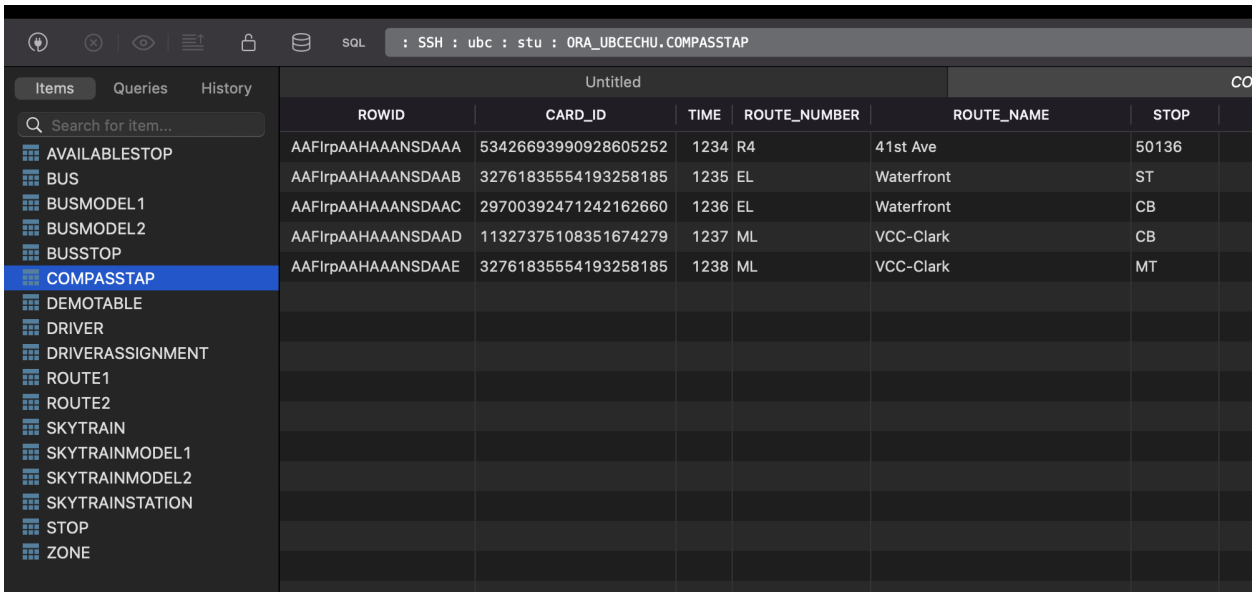


ROWID	NAME	CAPACITY	FUEL_TYPE	PURCHASE_COST	OPERATING_COST
AAFIrv...	NFI X...	70	N Gas	500000	143
AAFIrv...	NFI X...	60	N Gas	510000	143
AAFIrv...	NFI X...	120	D-E	1200000	522
AAFIrv...	Nova...	60	Diesel	700000	433
AAFIrv...	Nova...	70	D-E	700000	302
AAFIrv...	Nova...	70	B-E	400000	92
AAFIrv...	Nova...	80	B-E	410000	92
AAFIrv...	Nova...	90	B-E	420000	92
AAFIrv...	Nova...	100	B-E	430000	92



ROWID	PURCHASE_COST	OPERATING_COST	COST
AAFIrx...	500000	143	19000
AAFIrx...	510000	143	19000
AAFIrx...	1200000	522	1269...
AAFIrx...	700000	433	7600...
AAFIrx...	700000	302	7400...
AAFIrx...	400000	92	4120...
AAFIrx...	410000	92	4120...
AAFIrx...	420000	92	4120...
AAFIrx...	430000	92	4120...


SQL
: SSH : ubc : stu : ORA_UBCECHU.BUSSTOP
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
Untitled
ROWID
STOPID
NAME
AAFIrj...
50136
Oakridge-41st Ave Station @ Bay 2
AAFIrj...
61304
Eastbound Lougheed Hwy @ Harris Rd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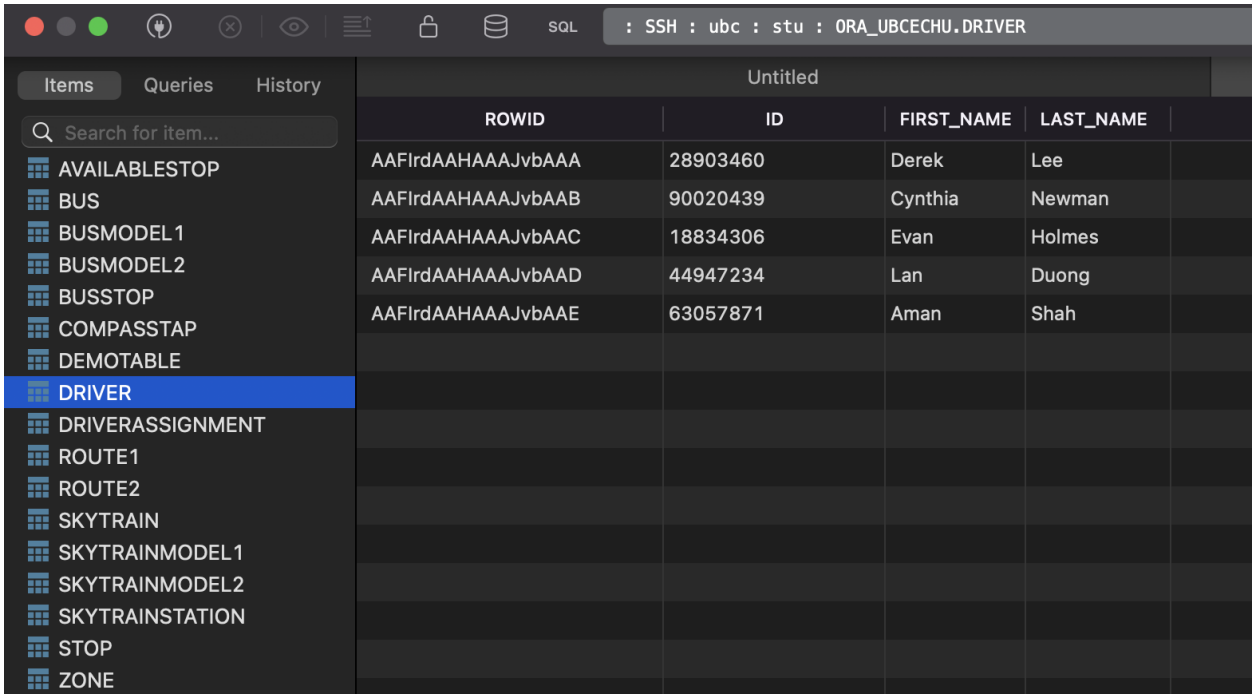
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
Untitled
ROWID
CARD_ID
TIME
ROUTE_NUMBER
ROUTE_NAME
STOP
AAFIrpAAHAAANSDAAA
5342669399092860525 2
1234
R4
41st Ave
50136
AAFIrpAAHAAANSDAAB
3276183555419325818 5
1235
EL
Waterfront
ST
AAFIrpAAHAAANSDAAC
2970039247124216266 0
1236
EL
Waterfront
CB
AAFIrpAAHAAANSDAAD
1132737510835167427 9
1237
ML
VCC-Clark
CB
AAFIrpAAHAAANSDAAE
3276183555419325818 5
1238
ML
VCC-Clark
MT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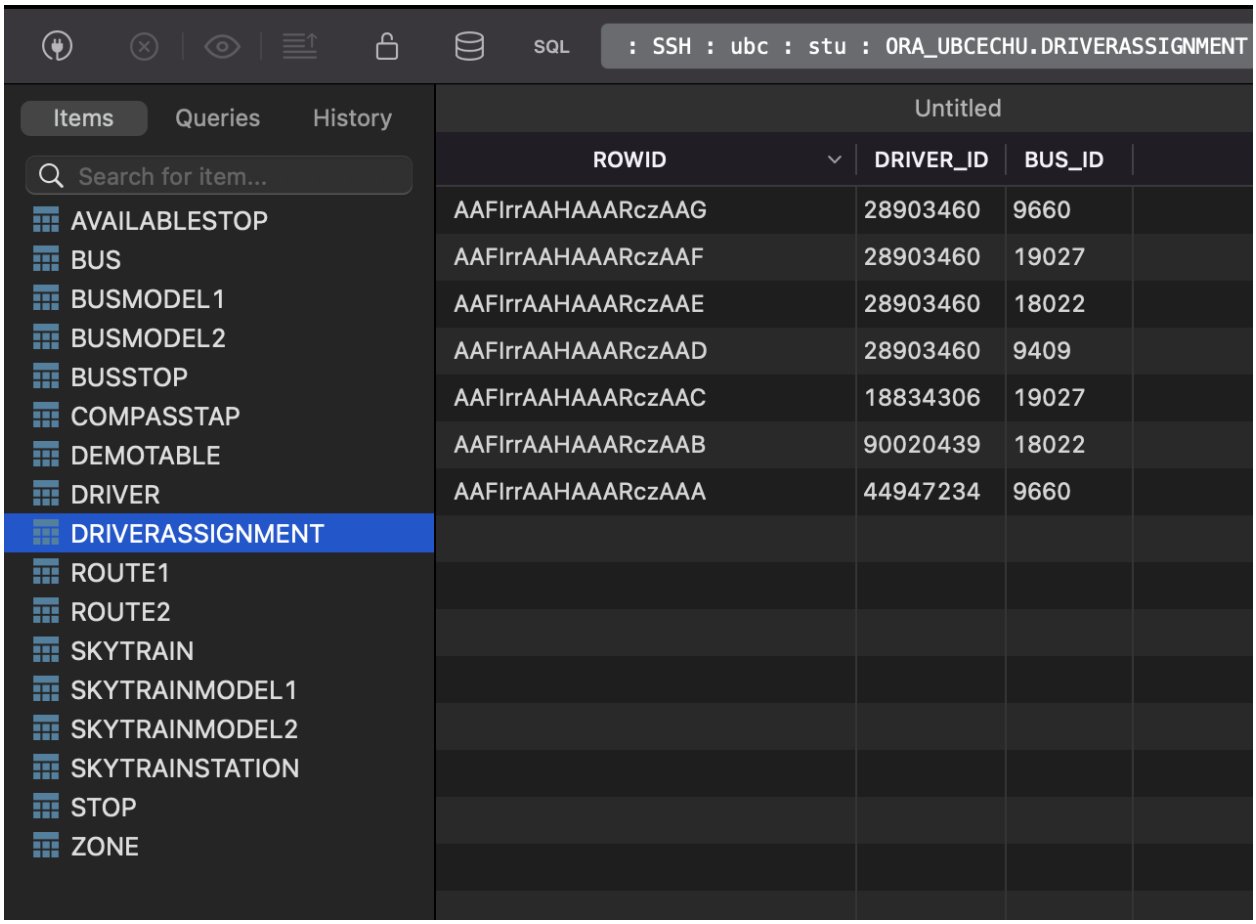
: SSH : ubc : stu : ORA_UBCECHU.DRIVER
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
Untitled
ROWID
ID
FIRST_NAME
LAST_NAME
AAFIrdAAHAAAJvbAAA
28903460
Derek
Lee
AAFIrdAAHAAAJvbAAB
90020439
Cynthia
Newman
AAFIrdAAHAAAJvbAAC
18834306
Evan
Holmes
AAFIrdAAHAAAJvbAAD
44947234
Lan
Duong
AAFIrdAAHAAAJvbAAE
63057871
Aman
Shah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: SSH : ubc : stu : ORA_UBCECHU.DRIVERASSIGNMENT
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
Untitled
ROWID
DRIVER_ID
BUS_ID
AAFIrrAAHAAARczAAG
28903460
9660
AAFIrrAAHAAARczAAF
28903460
19027
AAFIrrAAHAAARczAAE
28903460
18022
AAFIrrAAHAAARczAAD
28903460
9409
AAFIrrAAHAAARczAAC
18834306
19027
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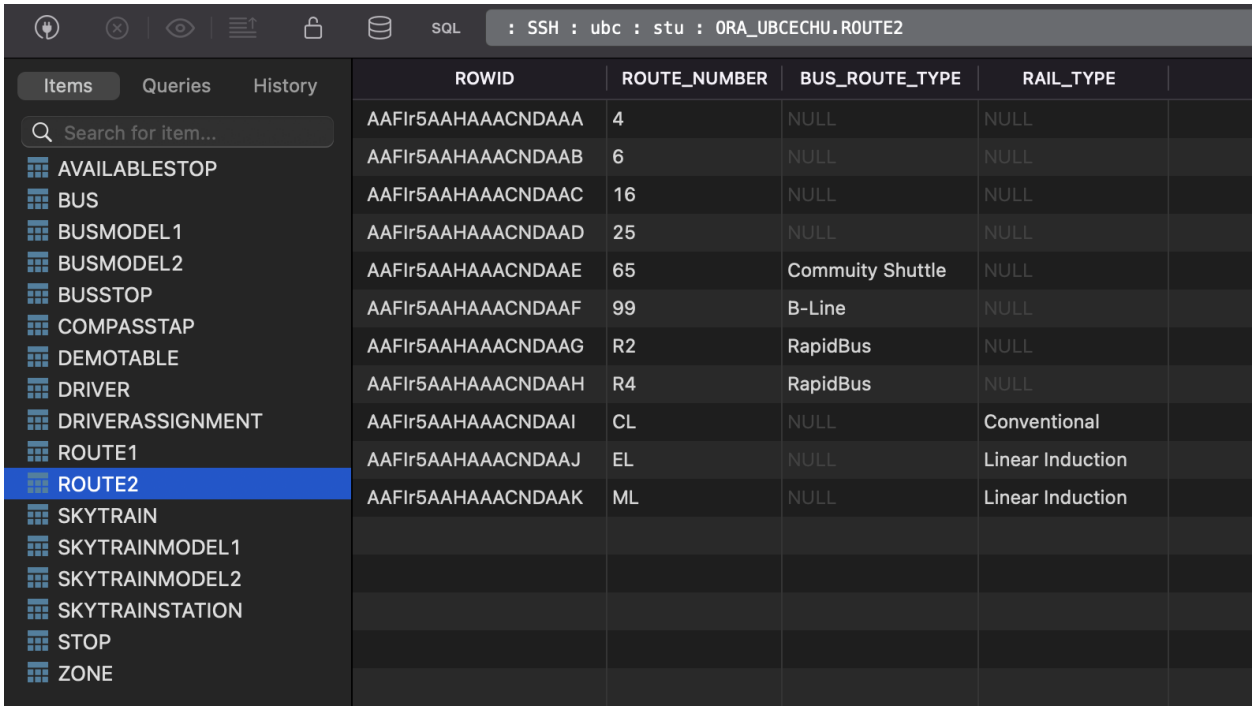
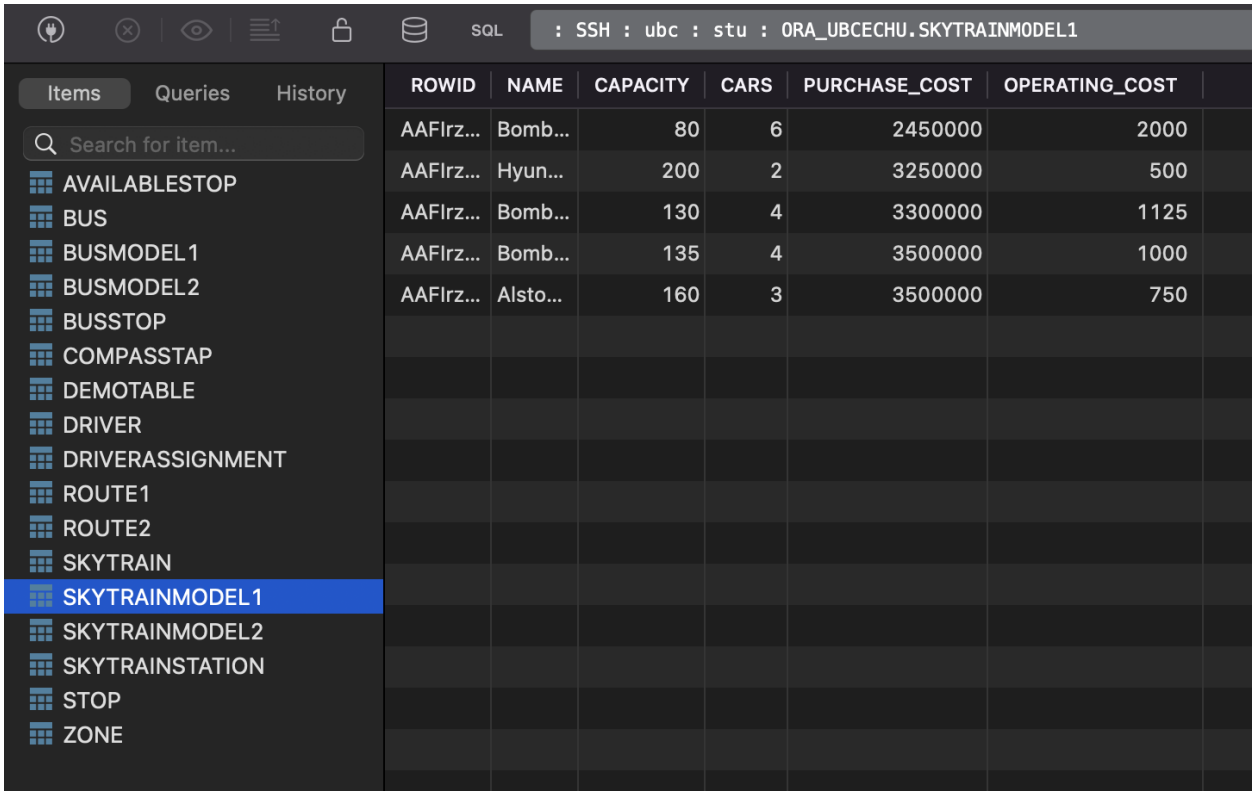
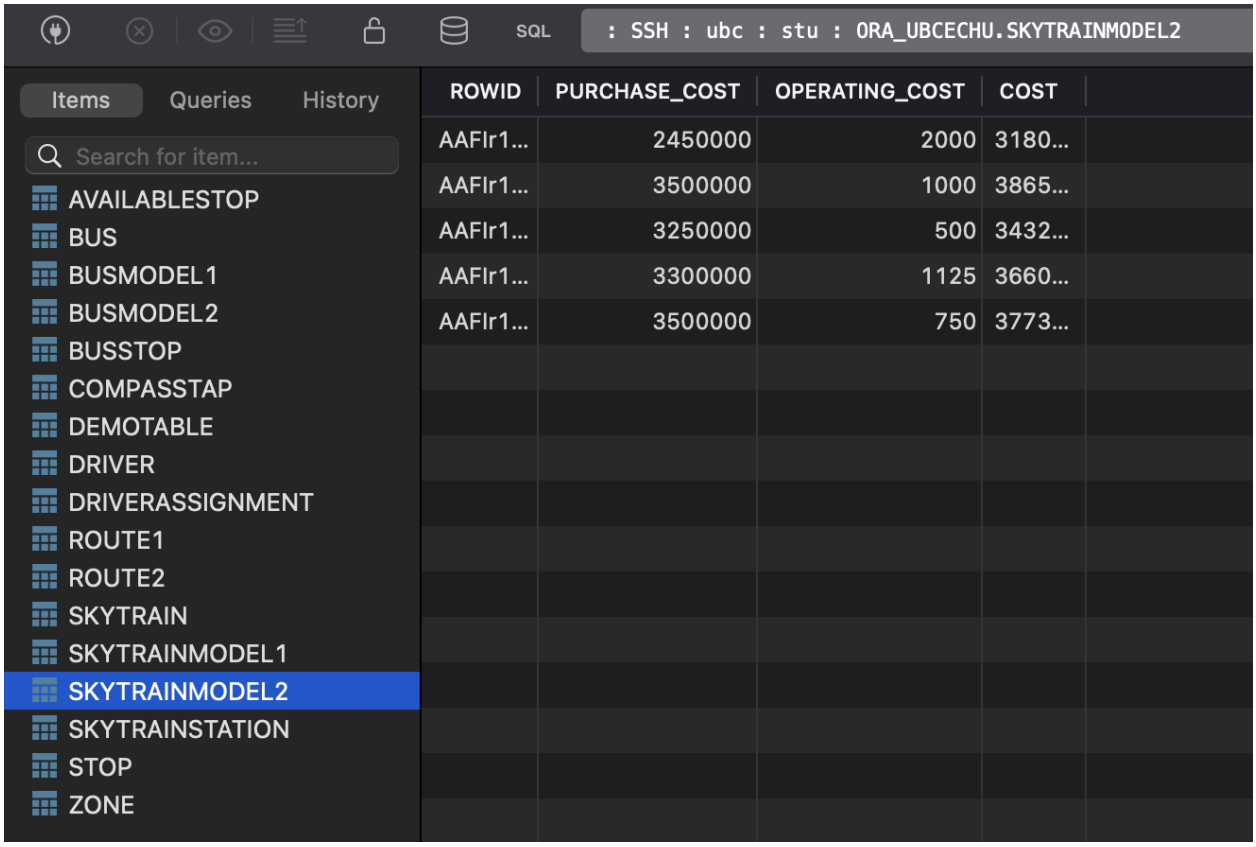
90020439
18022
AAFIrrAAHAAARczAAA
44947234
9660


SQL
: SSH : ubc : stu : ORA_UBCECHU.ROUTE2
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID ROUTE_NUMBER BUS_ROUTE_TYPE RAIL_TYPE
AAFIr5AAHAAACNDAAA 4 NULL NULL
AAFIr5AAHAAACNDAAB 6 NULL NULL
AAFIr5AAHAAACNDAAC 16 NULL NULL
AAFIr5AAHAAACNDAAD 25 NULL NULL
AAFIr5AAHAAACNDAAE 65 Commuity Shuttle NULL
AAFIr5AAHAAACNDAAF 99 B-Line NULL
AAFIr5AAHAAACNDAAG R2 RapidBus NULL
AAFIr5AAHAAACNDAAH R4 RapidBus NULL
AAFIr5AAHAAACNDAAI CL NULL Conventional
AAFIr5AAHAAACNDAAJ EL NULL Linear Induction
AAFIr5AAHAAACNDAAK ML NULL Linear Induction


SQL
: SSH : ubc : stu : ORA_UBCECHU.SKYTRAINMODEL1
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID NAME CAPACITY CARS PURCHASE_COST OPERATING_COST
AAFIrz... Bomb... 80 6 2450000 2000
AAFIrz... Hyun... 200 2 3250000 500
AAFIrz... Bomb... 130 4 3300000 1125
AAFIrz... Bomb... 135 4 3500000 1000
AAFIrz... Alsto... 160 3 3500000 750


SQL
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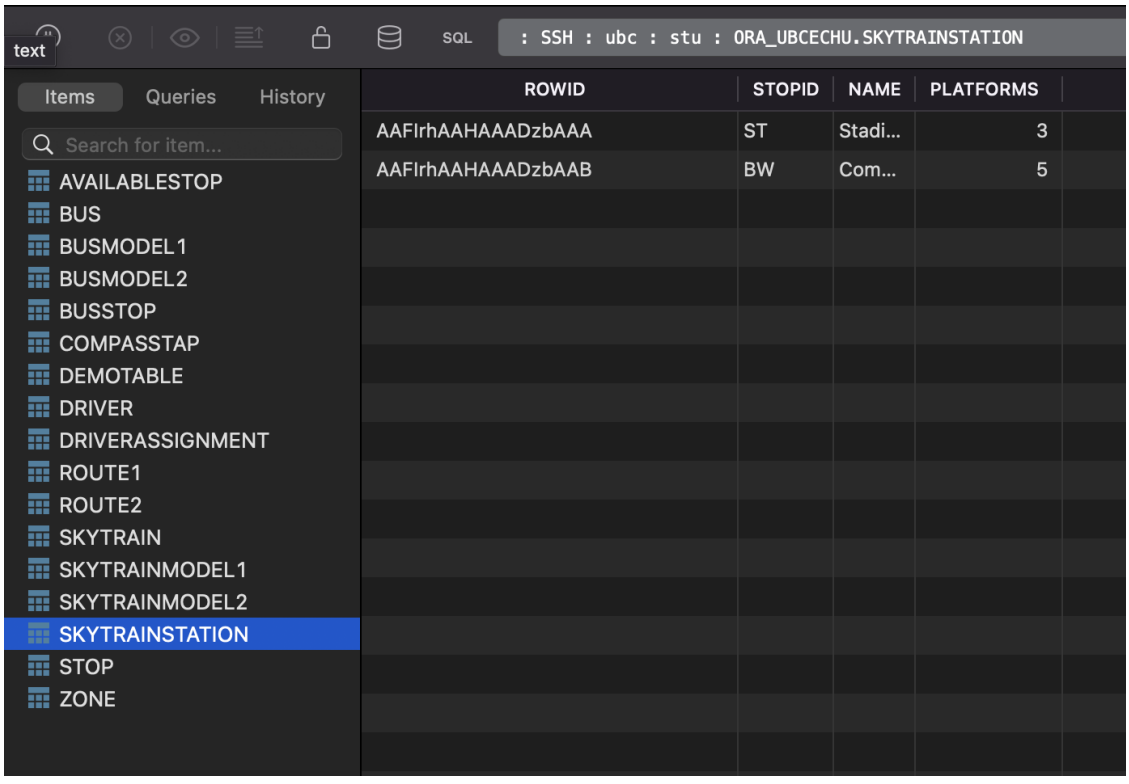
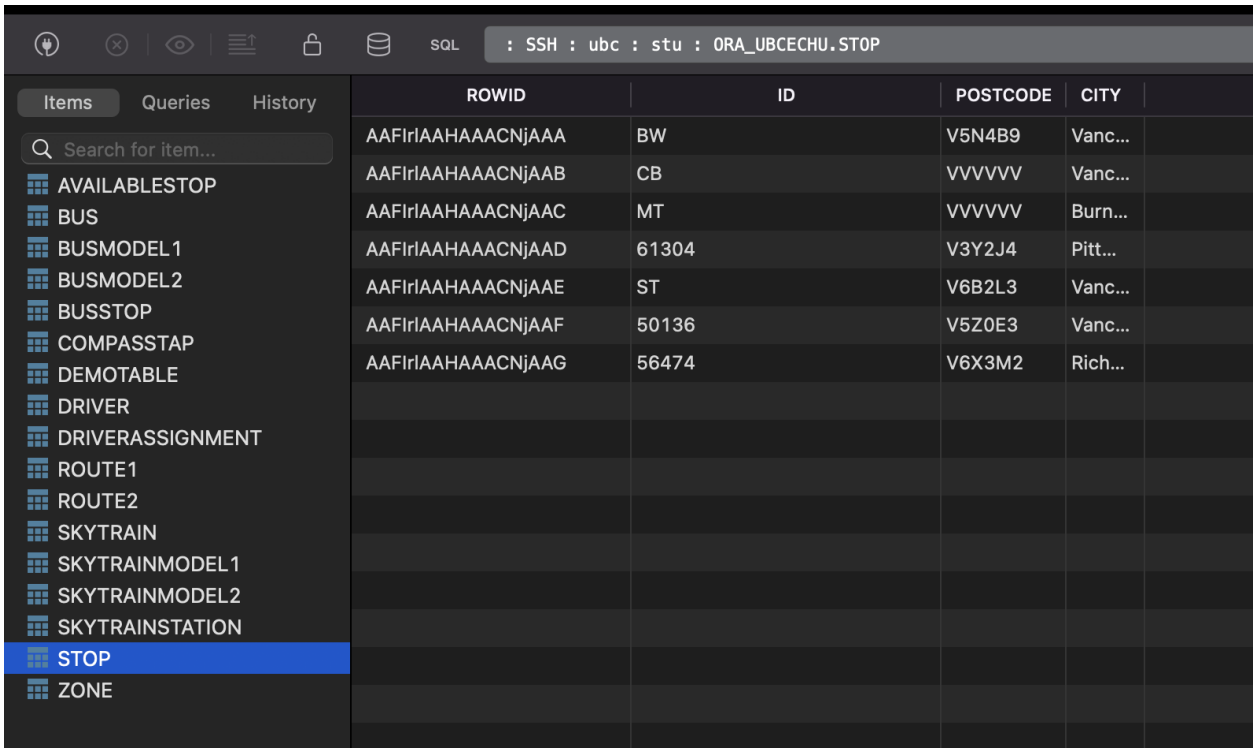
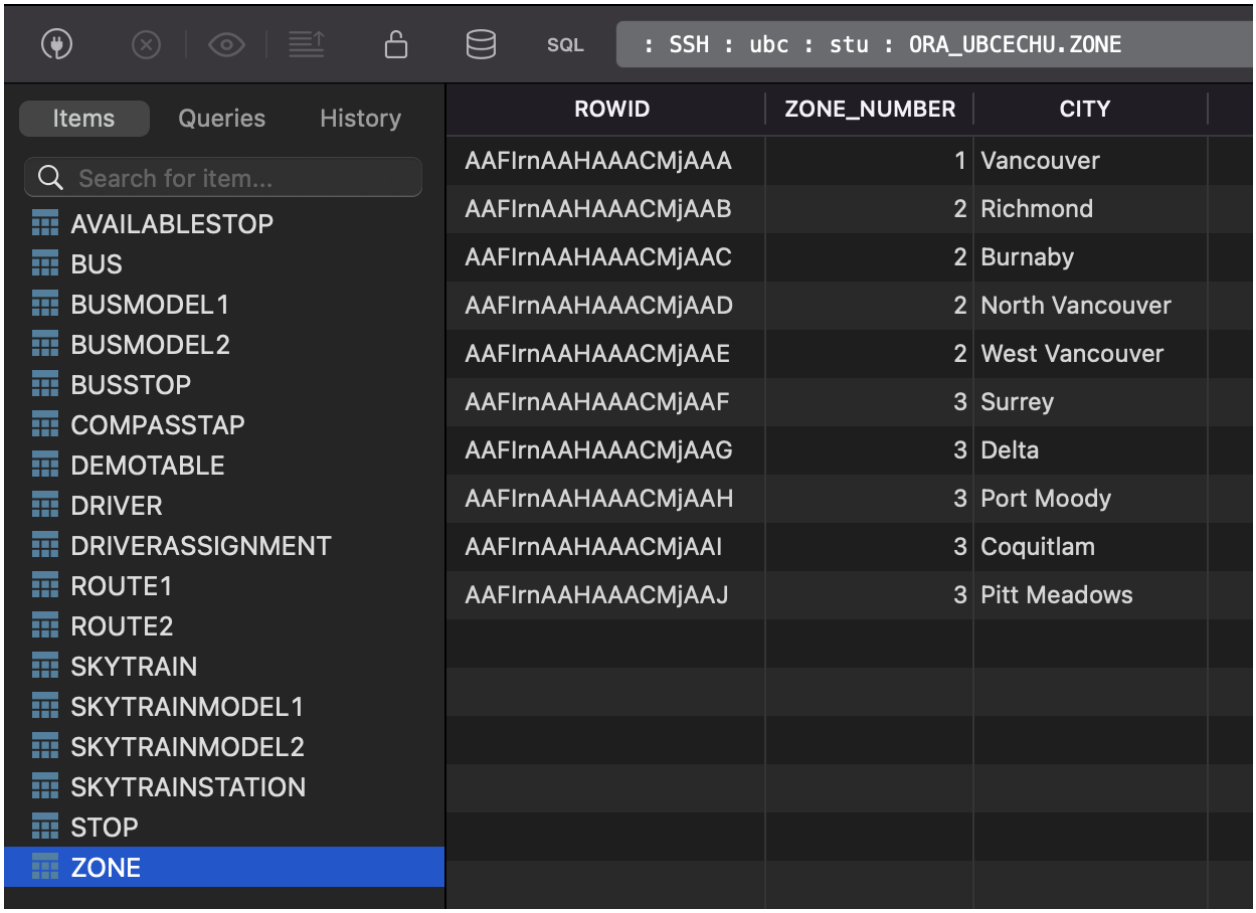
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID
PURCHASE_COST
OPERATING_COST
COST
AAFIr1...
2450000
2000
3180...
AAFIr1...
3500000
1000
3865...
AAFIr1...
3250000
500
3432...
AAFIr1...
3300000
1125
3660...
AAFIr1...
3500000
750
3773...


text
SQL
: SSH : ubc : stu : ORA_UBCECHU.SKYTRAINSTATION
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID
STOPID
NAME
PLATFORMS
AAFIrhAAHAAADzbAAA
ST
Stadi...
3
AAFIrhAAHAAADzbAAB
BW
Com...
5


SQL
: SSH : ubc : stu : ORA_UBCECHU.STOP
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID
ID
POSTCODE
CITY
AAFIrlAAHAAACNjAAA
BW
V5N4B9
Vanc...
AAFIrlAAHAAACNjAAB
CB
VVVVVV
Vanc...
AAFIrlAAHAAACNjAAC
MT
VVVVVV
Burn...
AAFIrlAAHAAACNjAAD
61304
V3Y2J4
Pitt...
AAFIrlAAHAAACNjAAE
ST
V6B2L3
Vanc...
AAFIrlAAHAAACNjAAF
50136
V5Z0E3
Vanc...
AAFIrlAAHAAACNjAAG
56474
V6X3M2
Rich...


SQL
: SSH : ubc : stu : ORA_UBCECHU.ZONE
Items
Queries
History
Search for item...
AVAILABLESTOP
BUS
BUSMODEL1
BUSMODEL2
BUSSTOP
COMPASSTAP
DEMOTABLE
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID
ZONE_NUMBER
CITY
AAFIrnAAHAAACMjAAA
1
Vancouver
AAFIrnAAHAAACMjAAB
2
Richmond
AAFIrnAAHAAACMjAAC
2
Burnaby
AAFIrnAAHAAACMjAAD
2
North Vancouver
AAFIrnAAHAAACMjAAE
2
West Vancouver
AAFIrnAAHAAACMjAAF
3
Surrey
AAFIrnAAHAAACMjAAG
3
Delta
AAFIrnAAHAAACMjAAH
3
Port Moody
AAFIrnAAHAAACMjAAI
3
Coquitlam
AAFIrnAAHAAACMjAAJ
3
Pitt Meadows

SQL queries used:

INSERT Operation

insert into CompassTap values (:card_id, :tap_date, :route_number, :route_name, :stop)

Found in tap-manager.php

DELETE Operation

DELETE FROM CompassTap
WHERE (card_id = :old_id and time = :old_time and stop = :old_stop)

Found in tap-manager.php

UPDATE Operation

UPDATE CompassTap
SET card_id = :new_id, time = :new_time, route_number = :new_route_number, route_name = :new_route_name, stop = :new_stop
WHERE (card_id = :old_id and time = :old_time and stop = :old_stop)

Found in tap-manager.php

Selection

```
SELECT (user input)
FROM Stop
WHERE (user input)
```

Found in select.php

Projection

```
SELECT b.id, b.model, b.license_plate, bm.capacity, bm.fuel_type
FROM Bus b, BusModel1 bm
WHERE b.model = bm.name and b.id = (user input)
```

Found in bus-models.php

Join

```
SELECT b.id, b.model, b.license_plate, bm.capacity, bm.fuel_type
FROM Bus b, BusModel1 bm
```

```
WHERE b.model = bm.name and b.id = (user input)
```

Found in bus-models.php

Division

```
SELECT d.id, d.first_name, d.last_name
FROM Driver d
WHERE NOT EXISTS
      ((SELECT b.id FROM Bus b)
      MINUS
      (SELECT da.bus_id FROM DriverAssignment da WHERE d.id =
      da.driver_id))
```

Found in division.php

Aggregation with Group By

```
SELECT Max(capacity), fuel_type
FROM BusModels1
GROUP BY fuel_type
```

Found in groupBy.php

Aggregation with Having

```
SELECT Max(capacity), fuel_type
FROM BusModels1
GROUP BY fuel_type
HAVING Count(*) > 1
```

Found in having.php

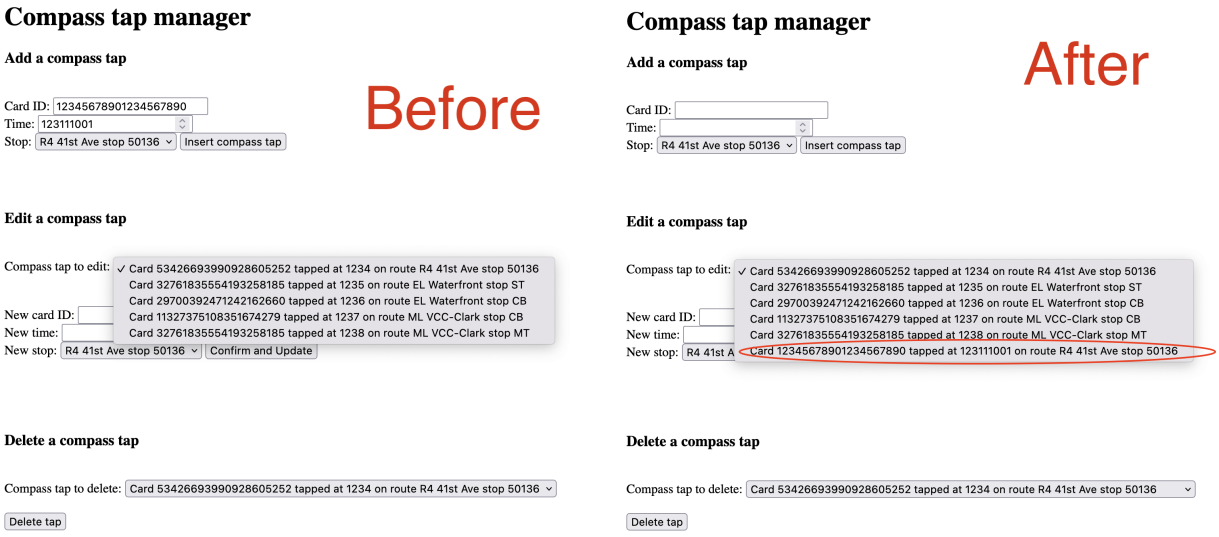
Nested Aggregation with Group By

```
SELECT Max(capacity), fuel_type
FROM BusModels1
GROUP BY fuel_type
HAVING Max(capacity) > (SELECT Avg(capacity) FROM BusModel1)
```

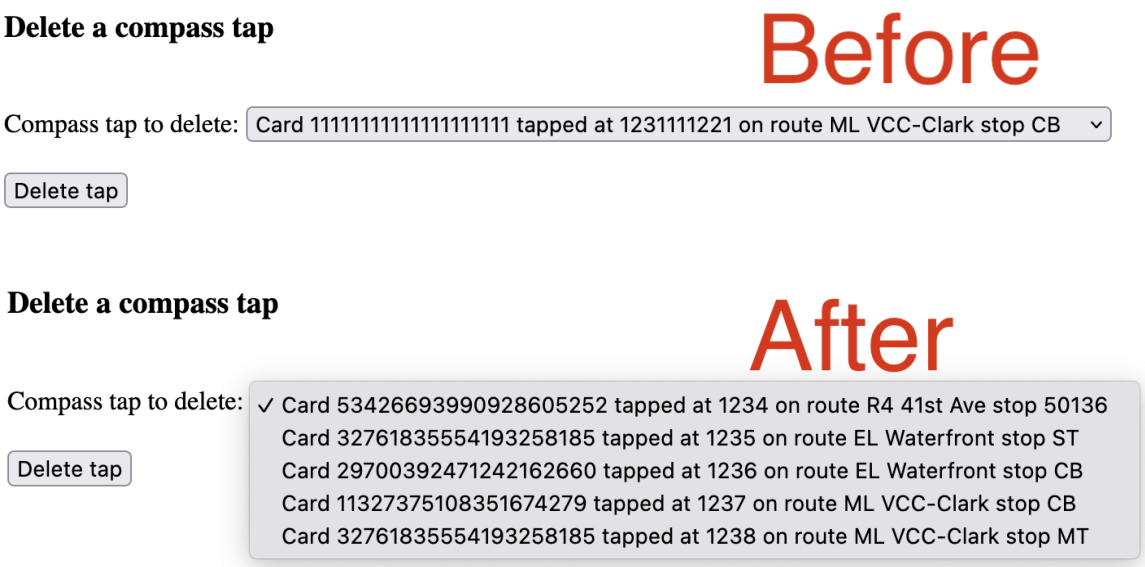
Found in nestedAggregation.php

Sample Output:

INSERT Operation



DELETE Operation



UPDATE Operation

Edit a compass tap

Compass tap to edit: Card 12345678901234567890 tapped at 123111001 on route R4 41st Ave stop 50136

New card ID: 11111111111111111111
New time: 1231111221
New stop: ML VCC-Clark stop CB Confirm and Update

Before

Edit a compass tap

After

Compass tap to edit:
- ✓ Card 53426693990928605252 tapped at 1234 on route R4 41st Ave stop 50136
- Card 32761835554193258185 tapped at 1235 on route EL Waterfront stop ST
- Card 29700392471242162660 tapped at 1236 on route EL Waterfront stop CB
- Card 11327375108351674279 tapped at 1237 on route ML VCC-Clark stop CB
- Card 32761835554193258185 tapped at 1238 on route ML VCC-Clark stop MT
- Card 11111111111111111111 tapped at 1231111221 on route ML VCC-Clark stop CB

New card ID:
New time:
New stop: R4 41st A

Selection

< Go home

Select values from Stop Table

You must use proper semantics when entering your selection.

SELECT city, id (ie. id, postcode, city)

FROM Stop

WHERE city = 'Vancouver' (ie. city = 'Vancouver', id = 'BW', postcode = 'V5N4B9')

select

SELECT city, id FROM Stop WHERE city = 'Vancouver'

Select Table

city	id
Vancouver	BW
Vancouver	CB
Vancouver	ST
Vancouver	50136

Projection

< Go home

Bus model finder

Existing bus IDs: 18022, 9409, 19027, 9660

Bus ID: 18022 select

SELECT b.id, b.model, b.license_plate, bm.capacity, bm.fuel_type FROM Bus b, BusModel1 bm WHERE b.model = bm.name and b.id = 18022

Join Table

id	license plate	model	model capacity	model fuel type
18022	NFI XDE60	NG5745	120	D-E

Join

< Go home

Bus model finder

Existing bus IDs: 18022, 9409, 19027, 9660

Bus ID: 18022 select

SELECT b.id, b.model, b.license_plate, bm.capacity, bm.fuel_type FROM Bus b, BusModel1 bm WHERE b.model = bm.name and b.id = 18022

Join Table

id	license plate	model	model capacity	model fuel type
18022	NFI XDE60	NG5745	120	D-E

Division

< Go home

Find all the drivers that have driven every bus

```
SELECT d.id, d.first_name, d.last_name
FROM Driver d
WHERE NOT EXISTS
    ((SELECT b.id FROM Bus b)
    MINUS
    (SELECT da.bus_id FROM DriverAssignment da WHERE d.id = da.driver_id))
```

Submit

Group By Table

Driver ID	First Name	Last Name
28903460	Derek	Lee

Aggregation with Group By

< Go home

Find the max capacity of bus models by fuel type

```
SELECT Max(capacity), fuel_type
FROM BusModels1
GROUP BY fuel_type
```

Submit

Group By Table

Fuel Type	Max Capactiy
Diesel	60
D-E	120
N Gas	70
B-E	100

Aggregation with Having

< Go home

Find the max capacity of bus models by fuel type that have more than 1

```
SELECT Max(capacity), fuel_type
FROM BusModels1
GROUP BY fuel_type
HAVING Count(*) > 1
```

Submit

Group By Table

Fuel Type	Max Capactiy
D-E	120
N Gas	70
B-E	100

Nested Aggregation with Group By

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Find the max capacity of bus models by fuel type that are larger than the average capacity of all bus models

```
SELECT Max(capacity), fuel_type
FROM BusModels1
GROUP BY fuel_type
HAVING Max(capacity) > (SELECT Avg(capacity) FROM BusModel1)
```

Submit

Group By Table

Fuel Type	Max Capactiy
D-E	120
B-E	100