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

REPOSITORY URL:
https://github.students.cs.ubc.ca/CPSC304-2022W-T1/project_j7x9t_s3y2b_u6i2b

Deliverables
Commit the deliverables below to the CPSC 304 provided repository and submit a link to your repository on Canvas.

1. Your completed cover page, as usual.
2. ~~A single SQL script that can be used to create all the tables and data in the database. If you are using multiple scripts while developing, ensure you concatenate them and hand in only a SINGLE SQL script. [done]~~
    a. ~~Non-trivial size: make sure that your queries have some non-trivial answers (e.g., division for only 2 products is trivial) and the same idea with aggregation (Group By), in general, because you need to have a reasonable number of groups), and you need to have some groups that have more than one row.~~
    b. ~~b. This SQL script should be runnable as is (i.e., if we transferred this file to the undergrad servers, we should be able to run it as is without further tweaking).~~
3. A PDF file (this document) containing:
    a. A short description of the final project, and what it accomplished.
    b. A description of how your final schema differed from the schema you turned in.
        i. If the final schema differed, explain why. Note that turning in a final schema that's different from what you planned is fine, we just want to know what changed and why.
    c. A copy of the schema and screenshots that show what data is present in each relation after the SQL script from item #2 is run.
    d. A list of all SQL queries used. For SQL query requirements, check the rubric listed on Canvas for Milestone 4.
    e. Screenshots of the sample output of the queries using the GUI (for example, you can show what data is in your table before you run the query, and then show another screenshot after running the query, from some kind of GUI input like a button).
        i. 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.
4. Lastly, include a README.txt file if there's anything you want to add that's not included in your PDF file.

Single SQL Script:

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

Description of final project:

Our project allows users to view different information about a transit system, including:

- The bus model information for a specific bus given the bus ID

- 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

Our project also allows users to add, update, and delete compass taps

Description of final schema differences:

We only made minor changes that simply resulted from typing when creating the tables:

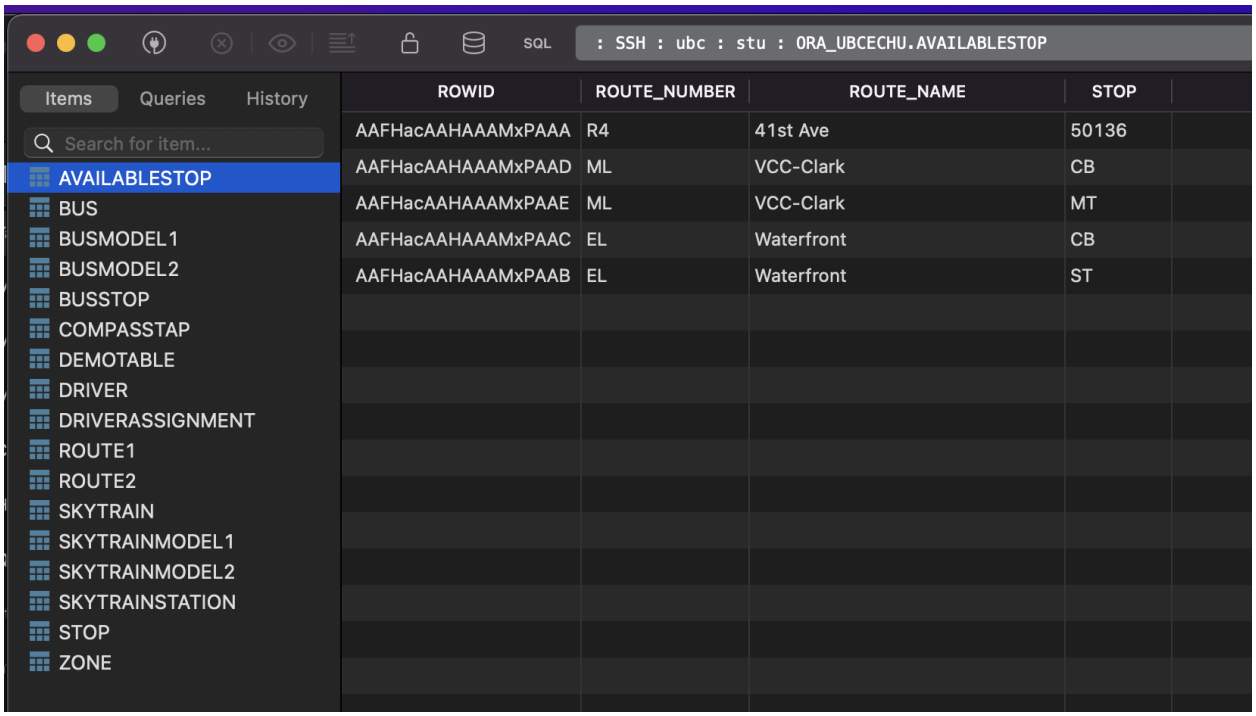
- We changed the order of the attributes in each schema
- We changed the naming convention for the attributes from capitalizing the first letter every word with no space to only lowercase with underscores between words

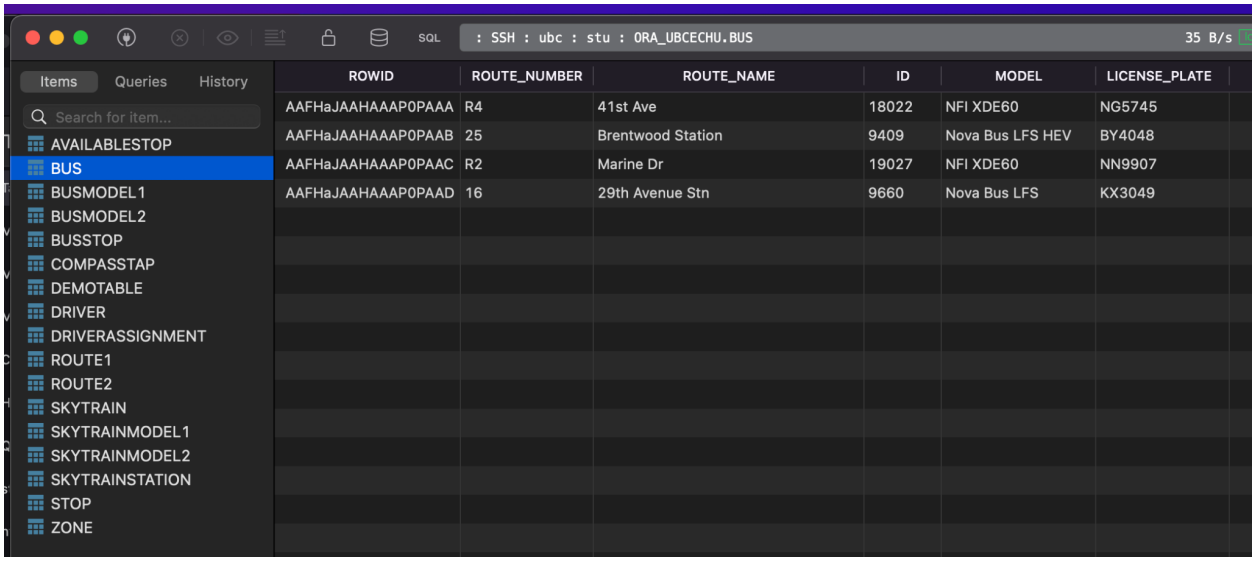
Schema:

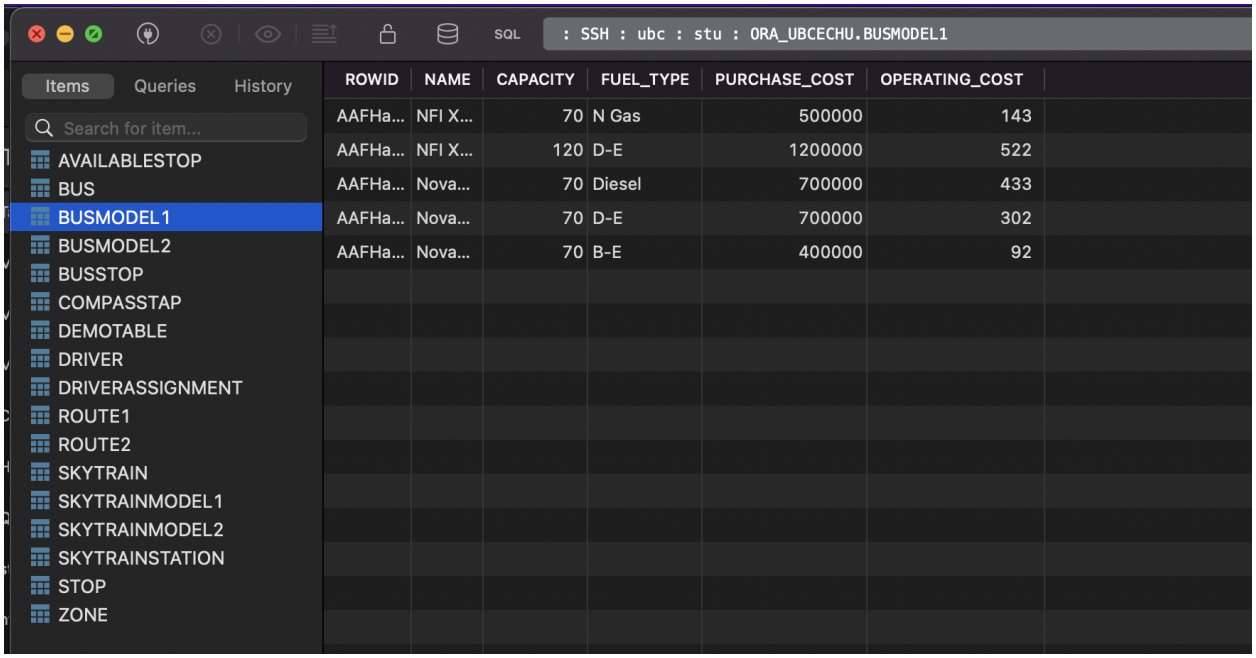
- Bus(**route_number: CHAR(3)**, **route_name: CHAR(50),** id CHAR(10), **model: CHAR(20),** license_plate: CHAR(6))
- Driver(id: CHAR(8), first_name: CHAR(30), last_name: CHAR(30))
- Skytrain(**route_number**: **CHAR(3), route_name**: **CHAR(50),** id: CHAR(6), **model**: **CHAR(25)**)
- SkytrainStation(**stopid**: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



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BUSMODEL2
BUSSTOP
COMPASSTAP
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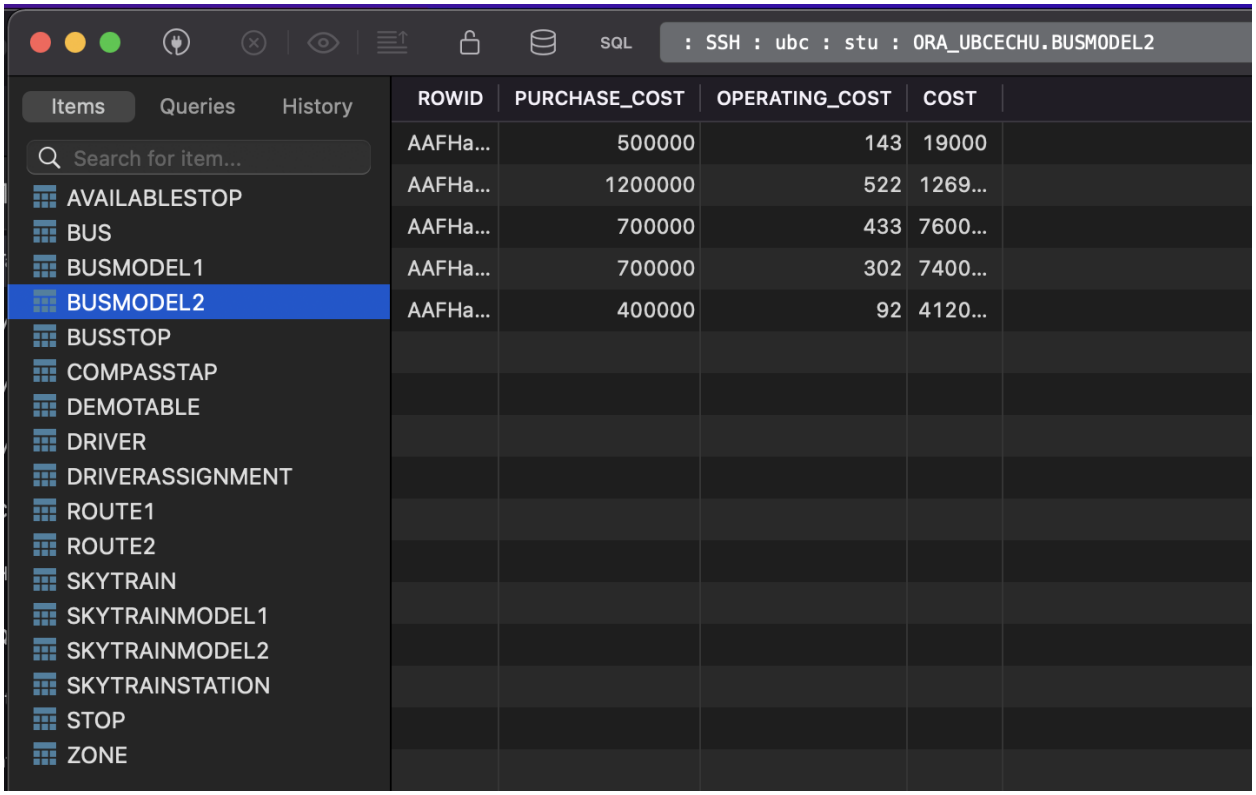
DRIVER
DRIVERASSIGNMENT
ROUTE1
ROUTE2
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID NAME CAPACITY FUEL_TYPE PURCHASE_COST OPERATING_COST
AAFHa... NFI X... 70 N Gas 500000 143
AAFHa... NFI X... 120 D-E 1200000 522
AAFHa... Nova... 70 Diesel 700000 433
AAFHa... Nova... 70 D-E 700000 302
AAFHa... Nova... 70 B-E 400000 92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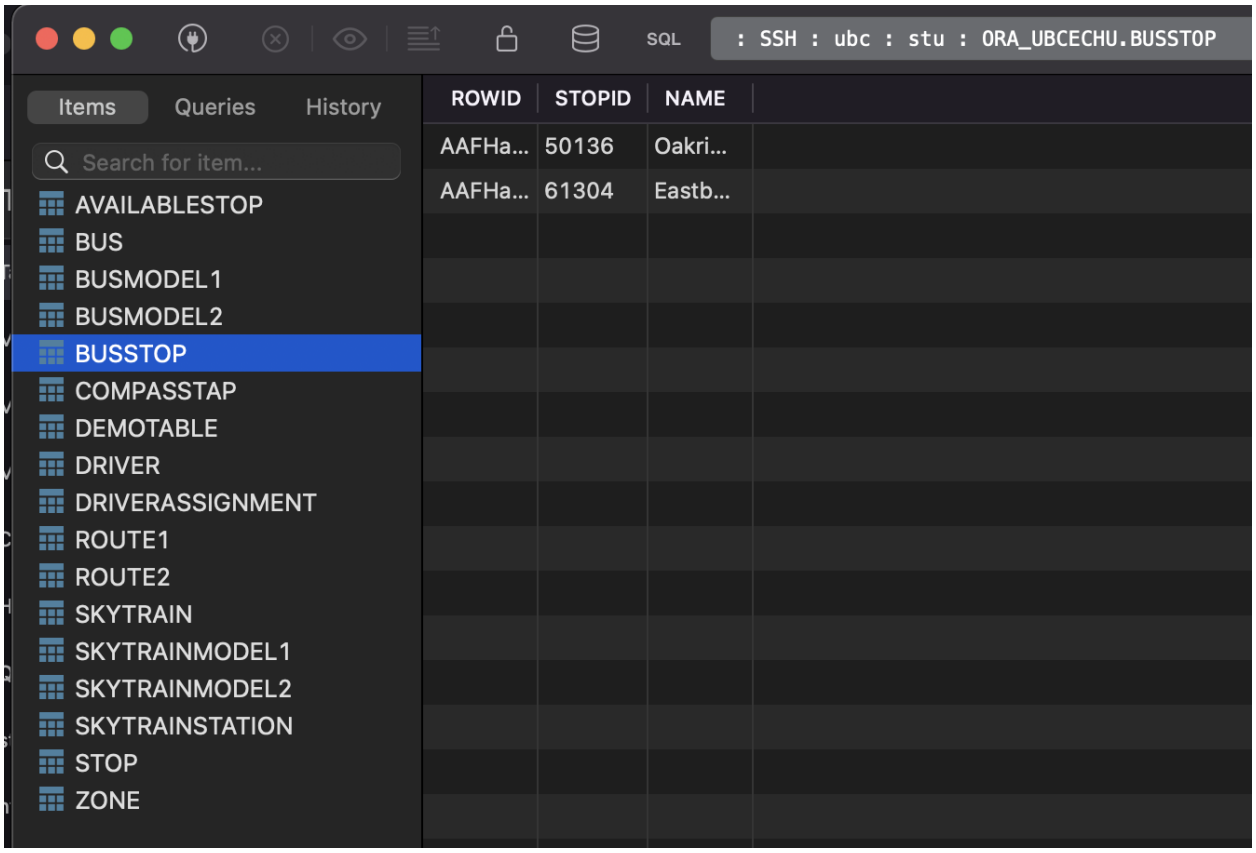
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID PURCHASE_COST OPERATING_COST COST
AAFHa... 500000 143 19000
AAFHa... 1200000 522 1269...
AAFHa... 700000 433 7600...
AAFHa... 700000 302 7400...
AAFHa... 400000 92 4120...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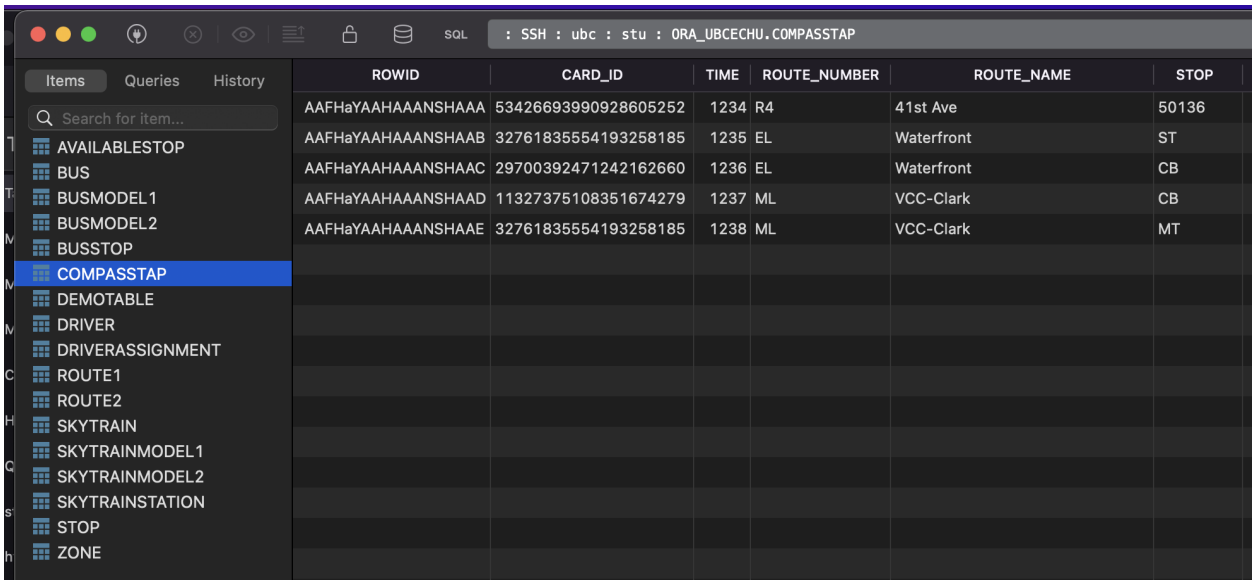
Oakri...
AAFHa...
61304
Eastb...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SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID
CARD_ID
TIME
ROUTE_NUMBER
ROUTE_NAME
STOP
AAFHaYAAHAAANSHAAA
53426693990928605252
1234
R4
41st Ave
50136
AAFHaYAAHAAANSHAAB
32761835554193258185
1235
EL
Waterfront
ST
AAFHaYAAHAAANSHAAC
29700392471242162660
1236
EL
Waterfront
CB
AAFHaYAAHAAANSHAAD
11327375108351674279
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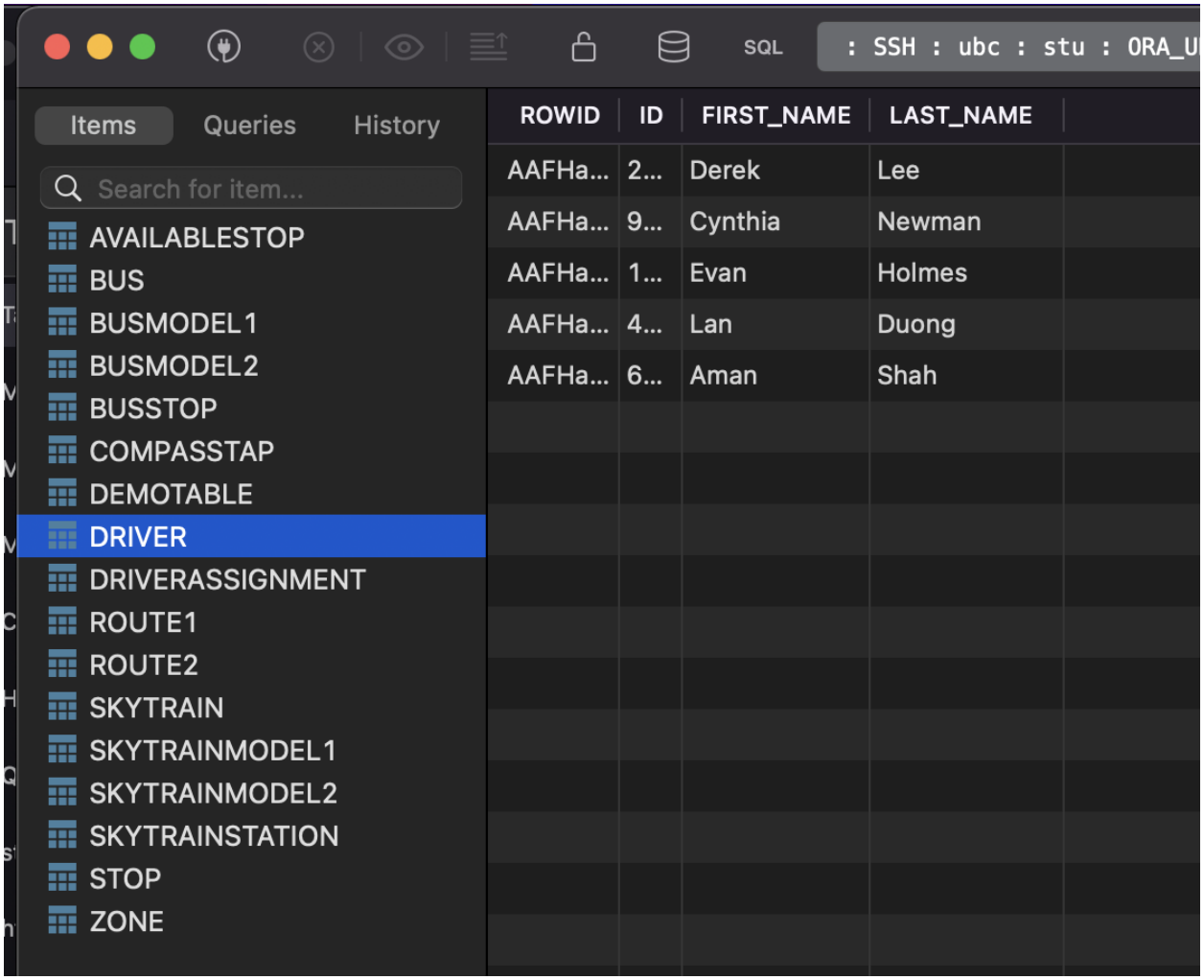
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SKYTRAINMODEL1
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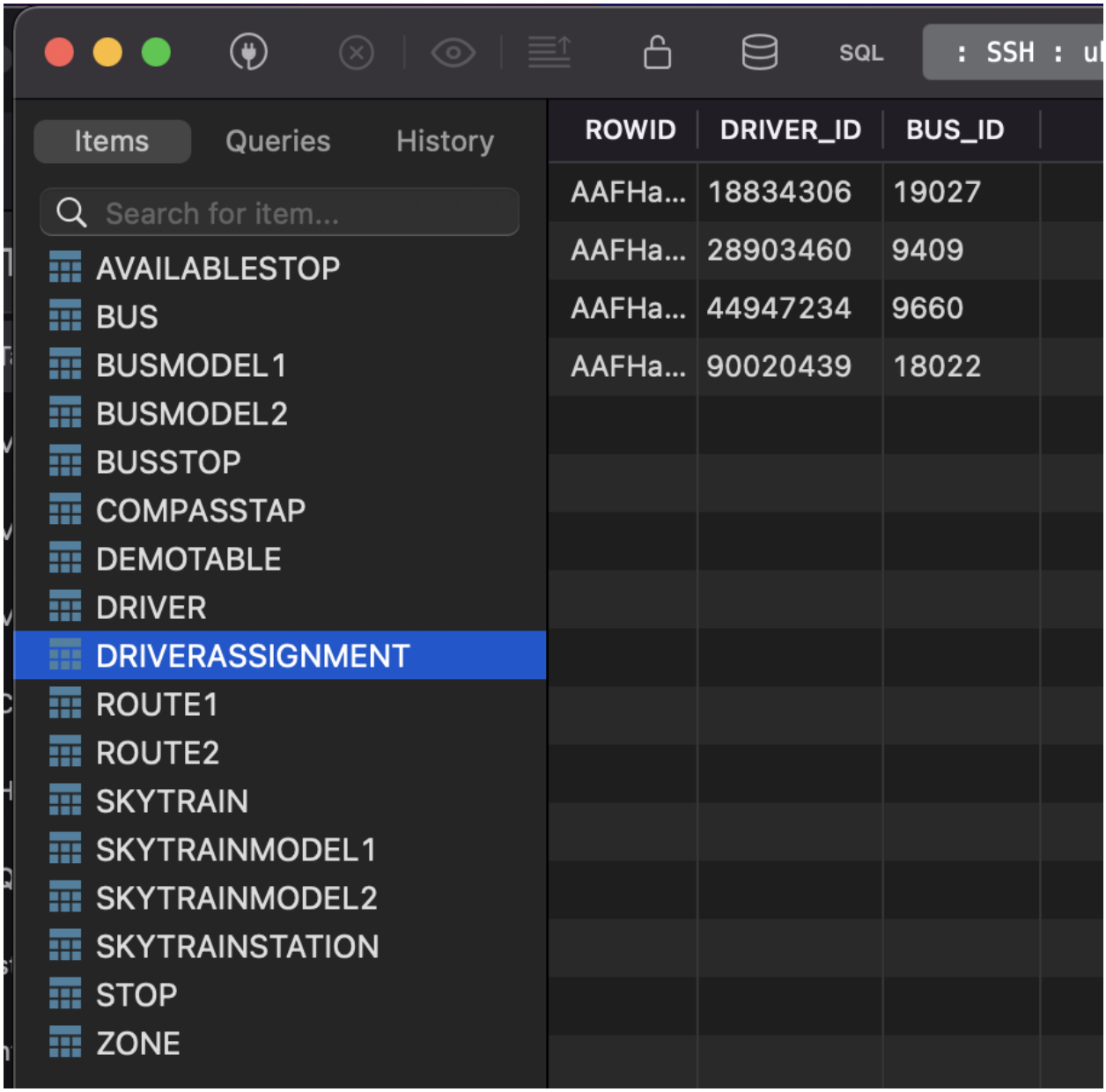
SKYTRAINSTATION
STOP
ZONE
ROWID
ID
FIRST_NAME
LAST_NAME
AAFHa... 2... Derek Lee
AAFHa... 9... Cynthia Newman
AAFHa... 1... Evan Holmes
AAFHa... 4... Lan Duong
AAFHa... 6... Aman Shah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SKYTRAINSTATION
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ROWID
DRIVER_ID
BUS_ID
AAFHa...
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19027
AAFHa...
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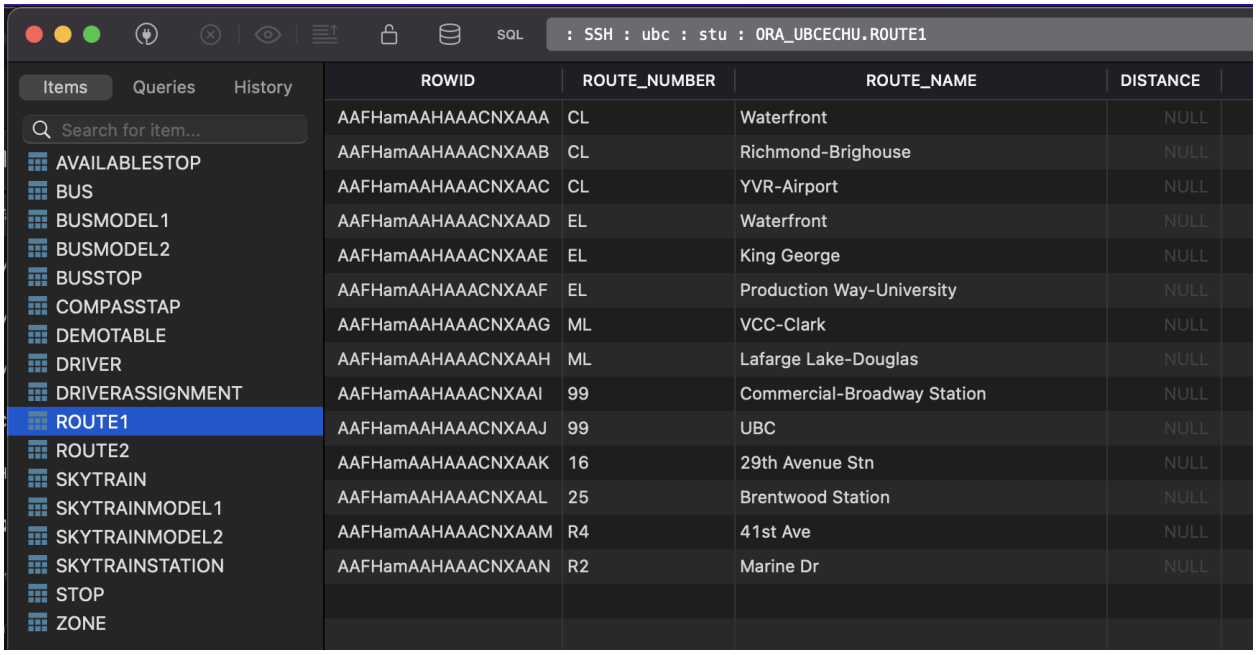
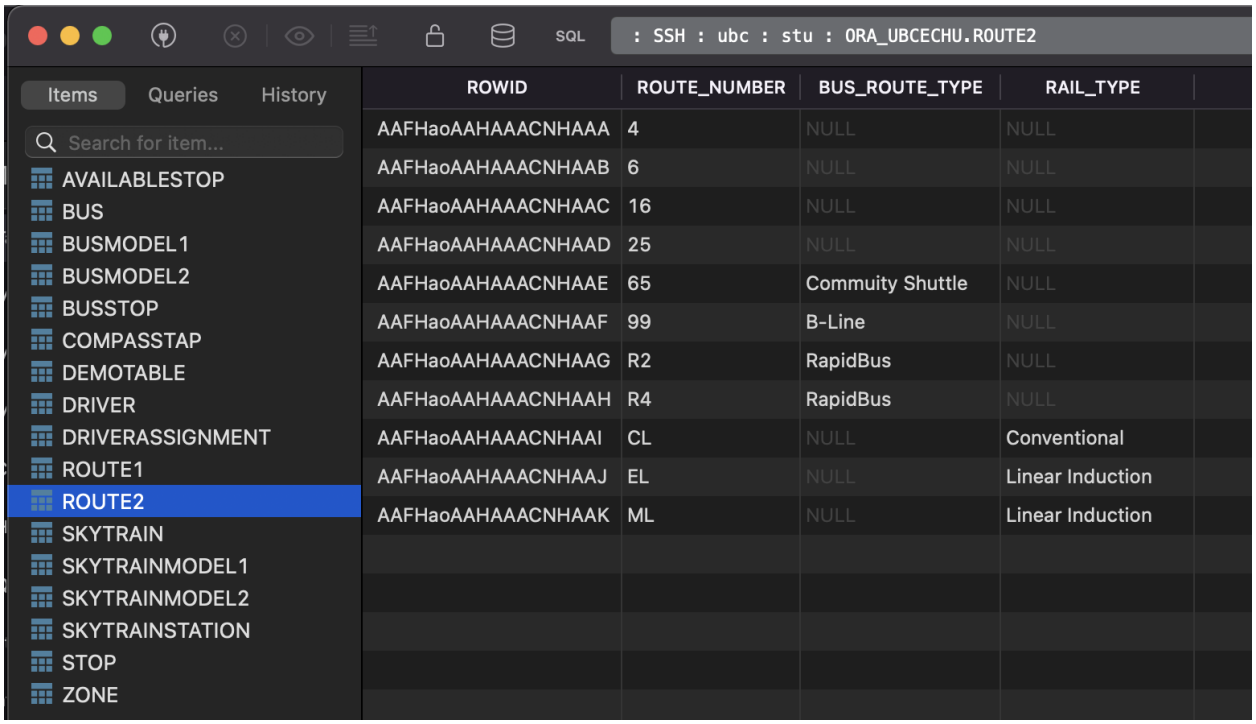
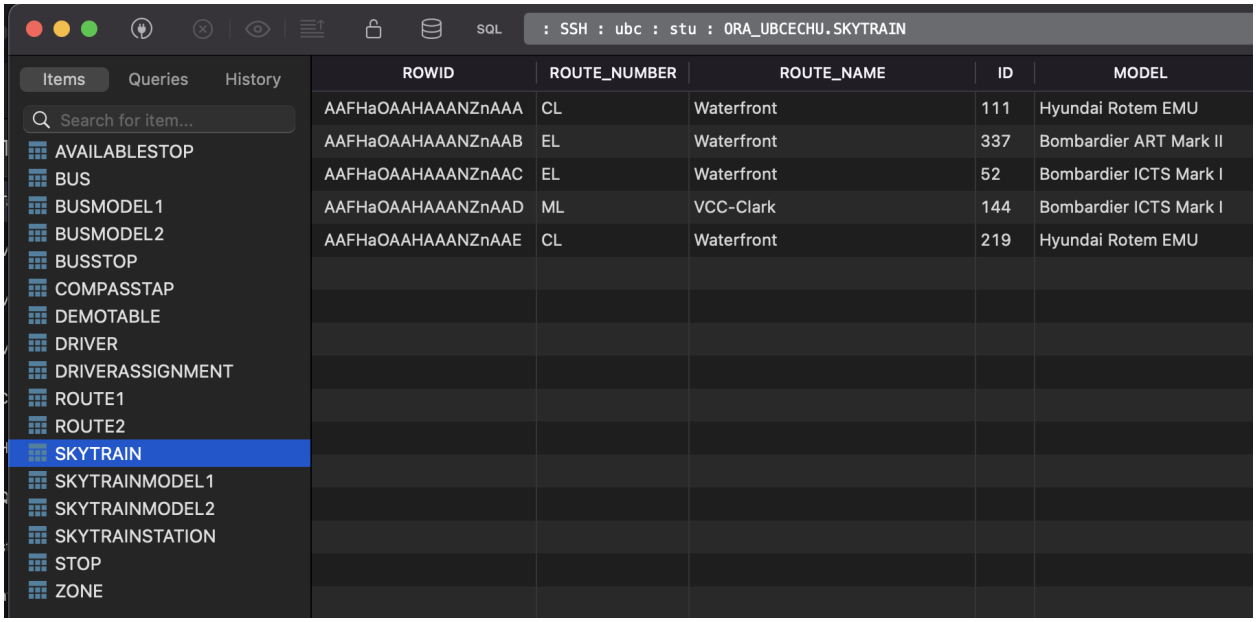
9409
AAFHa...
44947234
9660
AAFHa...
90020439
18022



ROWID	ROUTE_NUMBER	ROUTE_NAME	DISTANCE
AAFHamAAHAAACNXAAA	CL	Waterfront	NULL
AAFHamAAHAAACNXAAB	CL	Richmond-Brighouse	NULL
AAFHamAAHAAACNXAAC	CL	YVR-Airport	NULL
AAFHamAAHAAACNXAAD	EL	Waterfront	NULL
AAFHamAAHAAACNXAAE	EL	King George	NULL
AAFHamAAHAAACNXAAF	EL	Production Way-University	NULL
AAFHamAAHAAACNXAAG	ML	VCC-Clark	NULL
AAFHamAAHAAACNXAAH	ML	Lafarge Lake-Douglas	NULL
AAFHamAAHAAACNXAAI	99	Commercial-Broadway Station	NULL
AAFHamAAHAAACNXAAJ	99	UBC	NULL
AAFHamAAHAAACNXAAK	16	29th Avenue Stn	NULL
AAFHamAAHAAACNXAAL	25	Brentwood Station	NULL
AAFHamAAHAAACNXAAM	R4	41st Ave	NULL
AAFHamAAHAAACNXAAN	R2	Marine Dr	NULL



ROWID	ROUTE_NUMBER	BUS_ROUTE_TYPE	RAIL_TYPE
AAFHaoAAHAAACNHAAA	4	NULL	NULL
AAFHaoAAHAAACNHAAB	6	NULL	NULL
AAFHaoAAHAAACNHAAC	16	NULL	NULL
AAFHaoAAHAAACNHAAD	25	NULL	NULL
AAFHaoAAHAAACNHAAE	65	Commuity Shuttle	NULL
AAFHaoAAHAAACNHAAF	99	B-Line	NULL
AAFHaoAAHAAACNHAAG	R2	RapidBus	NULL
AAFHaoAAHAAACNHAAH	R4	RapidBus	NULL
AAFHaoAAHAAACNHAAI	CL	NULL	Conventional
AAFHaoAAHAAACNHAAJ	EL	NULL	Linear Induction
AAFHaoAAHAAACNHAAK	ML	NULL	Linear Induction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DRIVER
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ROUTE1
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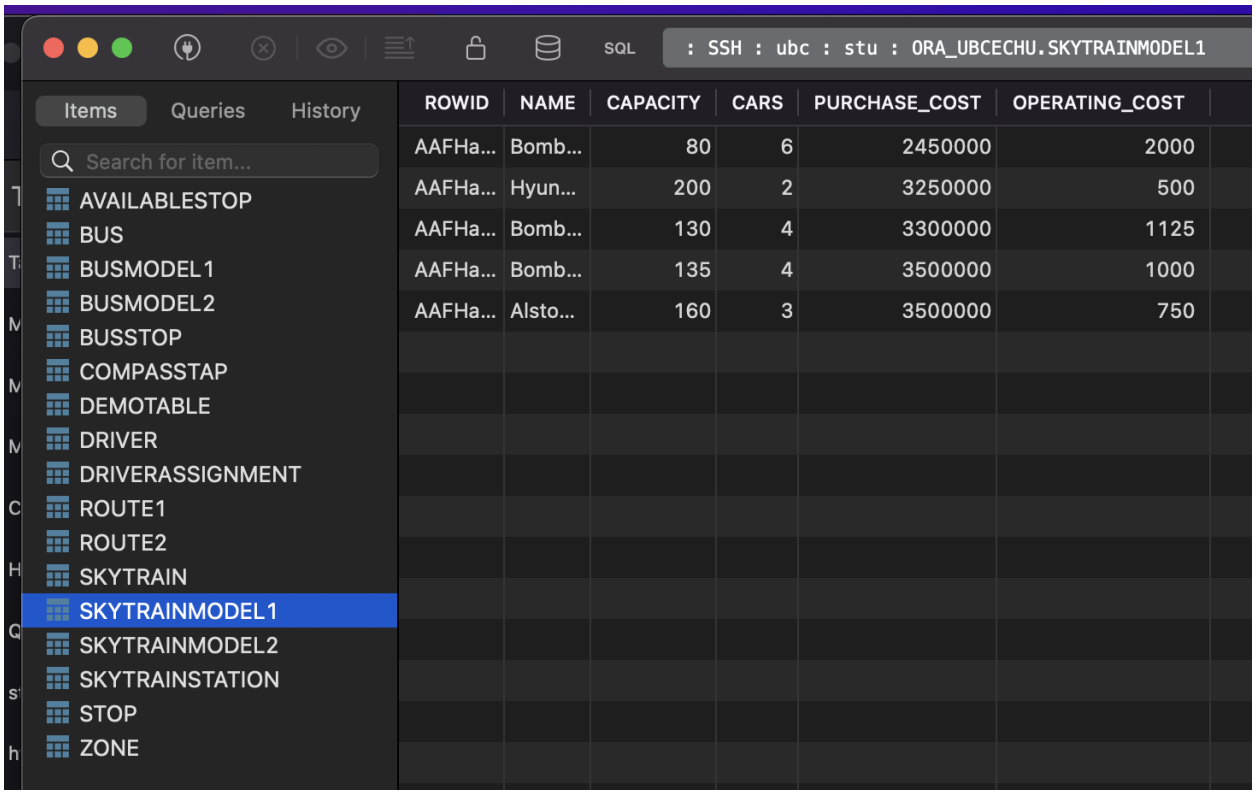
SKYTRAIN
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID ROUTE_NUMBER ROUTE_NAME ID MODEL
AAFHaOAAHAAANZnAAA CL Waterfront 111 Hyundai Rotem EMU
AAFHaOAAHAAANZnAAB EL Waterfront 337 Bombardier ART Mark II
AAFHaOAAHAAANZnAAC EL Waterfront 52 Bombardier ICTS Mark I
AAFHaOAAHAAANZnAAD ML VCC-Clark 144 Bombardier ICTS Mark I
AAFHaOAAHAAANZnAAE CL Waterfront 219 Hyundai Rotem EMU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ROUTE1
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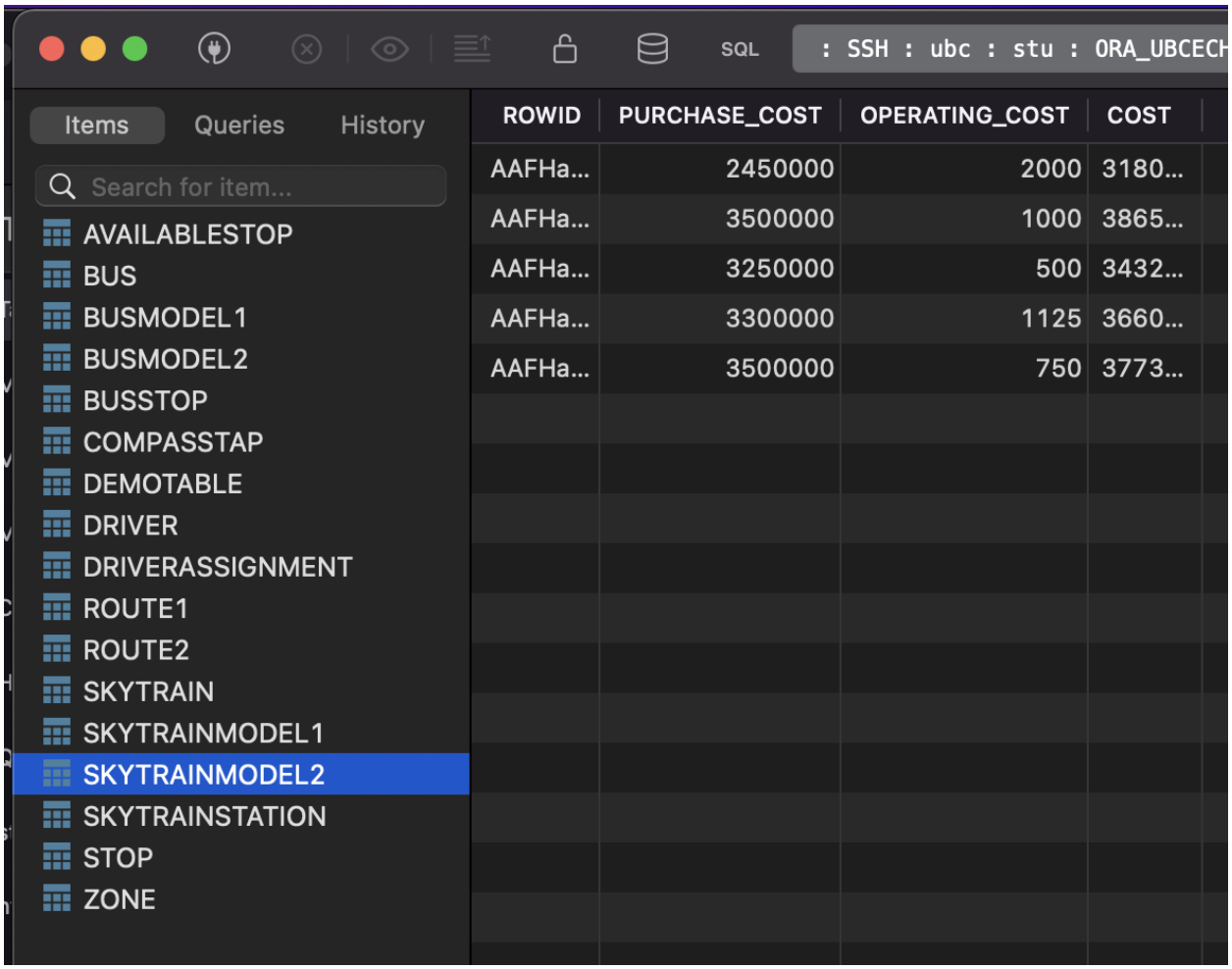
SKYTRAINMODEL1
SKYTRAINMODEL2
SKYTRAINSTATION
STOP
ZONE
ROWID NAME CAPACITY CARS PURCHASE_COST OPERATING_COST
AAFHa... Bomb... 80 6 2450000 2000
AAFHa... Hyun... 200 2 3250000 500
AAFHa... Bomb... 130 4 3300000 1125
AAFHa... Bomb... 135 4 3500000 1000
AAFHa... Alsto... 160 3 3500000 750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SKYTRAINSTATION
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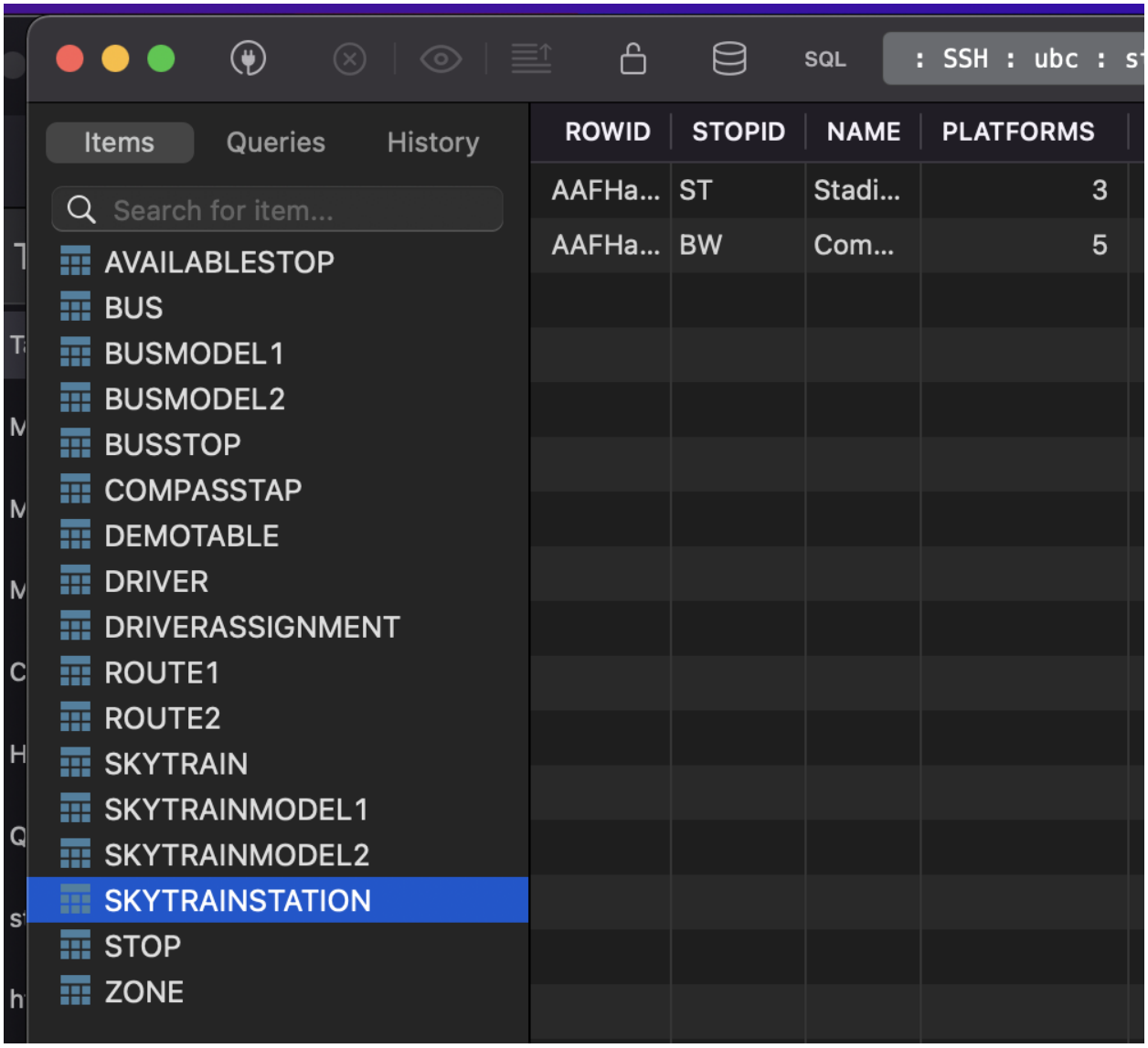
ZONE
ROWID
PURCHASE_COST
OPERATING_COST
COST
AAFHa... 2450000 2000 3180...
AAFHa... 3500000 1000 3865...
AAFHa... 3250000 500 3432...
AAFHa... 3300000 1125 3660...
AAFHa... 3500000 750 3773...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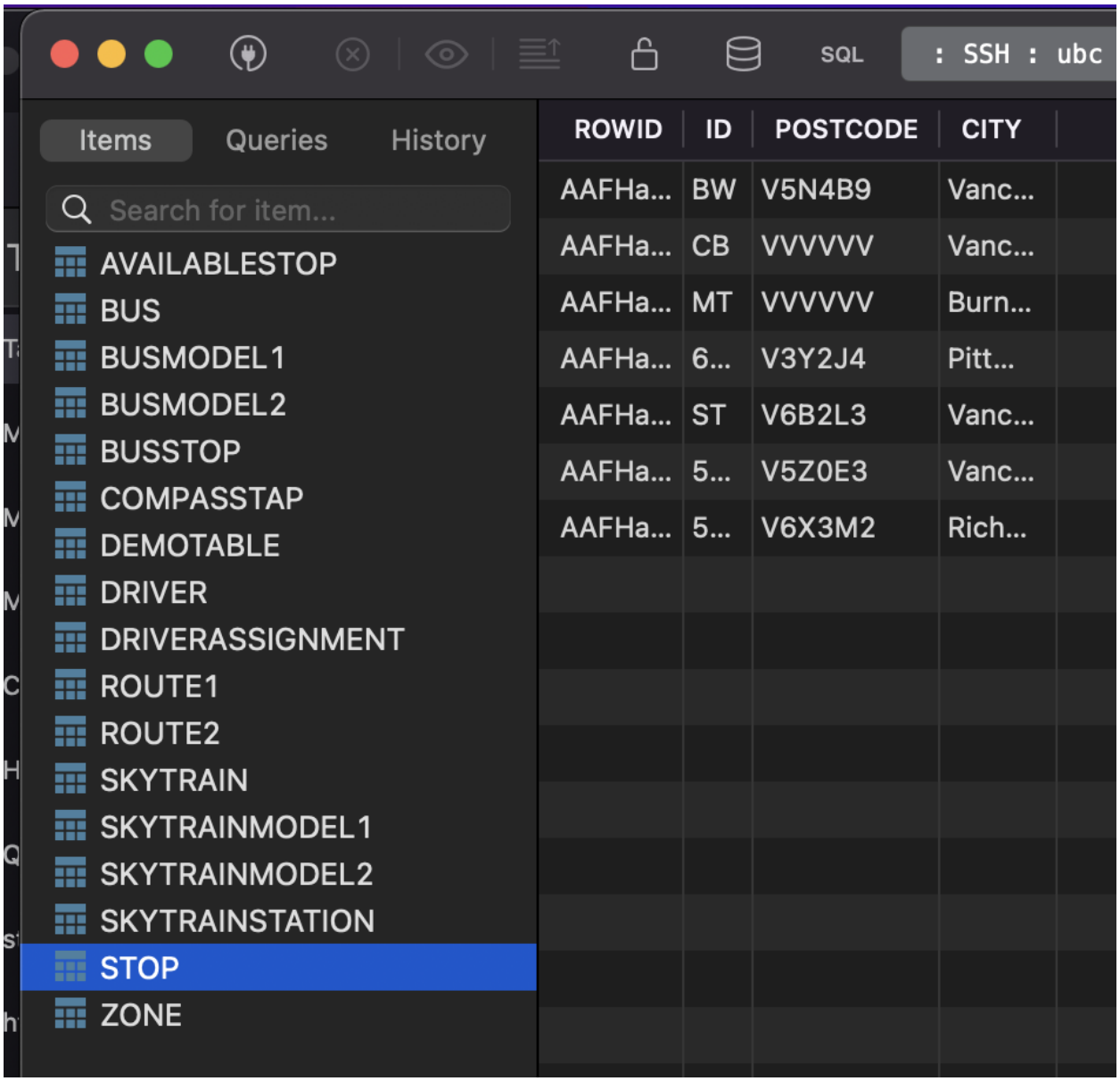
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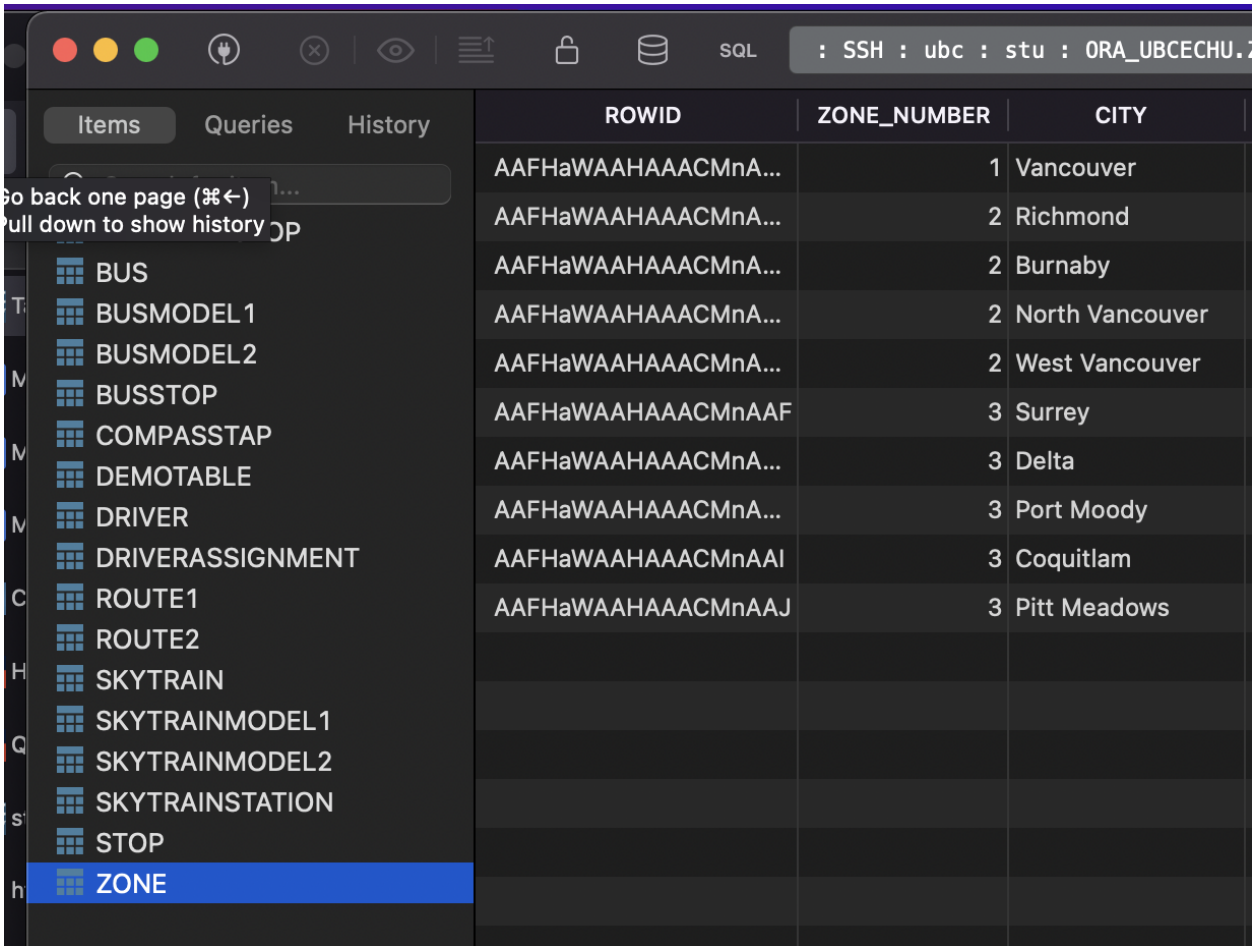
POSTCODE
CITY
AAFHa... BW V5N4B9 Vanc...
AAFHa... CB VVVVVV Vanc...
AAFHa... MT VVVVVV Burn...
AAFHa... 6... V3Y2J4 Pitt...
AAFHa... ST V6B2L3 Vanc...
AAFHa... 5... V5Z0E3 Vanc...
AAFHa... 5... V6X3M2 Rich...



SQL queries used:

INSERT Operation

DELETE Operation

UPDATE Operation

Selection

Projection

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

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

Selection

Projection

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

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	70
D-E	120
N Gas	70
B-E	70

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

Nested Aggregation with Group By

< Go home

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