University of British Columbia, Vancouver
Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: ___4_____

Date: ___Nov 25, 2022_____

Group Number: _____60_____

Name	Student Number	CS Alias (Userid)	Preferred E-mail Address
Sam Dai	69249357	z8p4i	samdai01@student.ubc.ca
Phillip Dumitru	64422678	o3j3b	pdumitru@student.ubc.ca
Sidaarth Santhosh	72460215	e5v3k	sidaarth@student.ubc.ca

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

University of British Columbia, Vancouver
Department of Computer Science

Project Description:

In this project we have implemented a simple web application to keep track of and view an alternative version of Translink's transport network. Our app was intended to have two portions, a set of views that the user can see (stops, lines, which lines a user has visited and their bus cards), and a set of views that operators can see (operator history, vehicle data, garage data). Creating proper authentication for these two separate views was greater than the scope of the project itself, but the two different sets of views are delivered in our web application.

(Minor) Schema Changes:

We had to make some minor schema changes from milestone 2. These mostly included increasing the length of VARHCAR fields in PointOfInterest address attribute (and in the relevant Attraction, Restaurant, Park and School POI subtypes) to suit the data we needed to insert. Our biggest change was deprecating the TypeFrequency Table. We realized that TypeFrequency was basically a direct copy of VehicleType, except that it also contained one extra attribute for the frequency. We decided to merge these two tables, and therefore had to update VehicleType to have the new frequency attribute, and Garage had its type attribute changed to be the foreign key of VehicleType instead of the old TypeFrequency Table. We also broke up the address attribute of stop into latitude and longitude, because we were able to get that data from a call to the Translink API for developers, and we found that that was a good way of getting data for our INSERT statements.

Repo Link: https://github.students.cs.ubc.ca/CPSC304-2022W-T1/project_e5v3k_o3j3b_z8p4i

Schema and Proof of Population:

It was unclear if we needed to paste the schema in the document or not. For an easier to read version, please check the file in our repo src/PROJECT-SQL-SETUP.sql

```
CREATE TABLE Account(
    ID NUMBER(10) NOT NULL, email VARCHAR(50) NOT NULL, name VARCHAR(50),
    CONSTRAINT Account_pk PRIMARY KEY (ID),
    CONSTRAINT Account_uq UNIQUE (email)
);

CREATE SEQUENCE add_account_id MINVALUE 1 MAXVALUE 9999999999 START WITH 1 INCREMENT
BY 1 NOCACHE;

CREATE TABLE BusCard(
    cardNum NUMBER(10) NOT NULL,balance BINARY_DOUBLE,
    cardType VARCHAR(6),ID NUMBER(10) NOT NULL,
    CONSTRAINT BusCard_pk PRIMARY KEY (ID, cardNum),
    CONSTRAINT BusCard_fk FOREIGN KEY (ID) REFERENCES Account(ID) ON DELETE CASCADE
);

CREATE TABLE Stop(
    num NUMBER(10) NOT NULL, lat BINARY_DOUBLE,
    lon BINARY_DOUBLE, name VARCHAR(50),
    CONSTRAINT Stop_pk PRIMARY KEY (num)
);

CREATE TABLE Visited(
    accountID NUMBER(10) NOT NULL,
    stopNum NUMBER(10) NOT NULL,
    visitedDate DATE,
    CONSTRAINT Visited_pk PRIMARY KEY (accountID, stopNUM, visitedDate),
    CONSTRAINT Acct_fk FOREIGN KEY (accountID) REFERENCES Account(ID) ON DELETE
CASCADE,
    CONSTRAINT VisitedStop_fk FOREIGN KEY (stopNum) REFERENCES Stop(num) ON DELETE
CASCADE
);

CREATE TABLE PointOfInterest(
    poiAddr VARCHAR(70), poiName VARCHAR(50), rating BINARY_DOUBLE,
    CONSTRAINT POI_pk PRIMARY KEY (poiAddr,poiName)
);

CREATE TABLE School(
    poiAddr VARCHAR(70),
    poiName VARCHAR(50),
    schoolType VARCHAR(20),
    numStudents NUMBER(10),
    CONSTRAINT School_pk PRIMARY KEY (poiAddr, poiName),
    CONSTRAINT POI_scl_fk FOREIGN KEY (poiAddr, poiName) REFERENCES
PointOfInterest(poiAddr,poiName) ON DELETE CASCADE
);

CREATE TABLE HasPlayground(
```

```
    parkStatus VARCHAR(20), hasPlayground CHAR(1),
    CONSTRAINT HasPg_pk PRIMARY KEY (parkStatus)
);

CREATE TABLE Park(
    poiAddr VARCHAR(70), poiName VARCHAR(50), parkStatus VARCHAR(20),
    CONSTRAINT Park_pk PRIMARY KEY (poiAddr, poiName),
    CONSTRAINT POI_Park_fk FOREIGN KEY (poiAddr, poiName) REFERENCES
PointOfInterest(poiAddr,poiName) ON DELETE CASCADE,
    CONSTRAINT ParkSt_fk FOREIGN KEY (parkStatus) REFERENCES
HasPlayground(parkStatus)
);

CREATE TABLE Restaurant(
    poiAddr VARCHAR(70), poiName VARCHAR(50), capacity NUMBER(10), cuisine
VARCHAR(20),
    CONSTRAINT Restaurant_pk PRIMARY KEY (poiAddr, poiName),
    CONSTRAINT POI_Rest_fk FOREIGN KEY (poiAddr, poiName) REFERENCES
PointOfInterest(poiAddr,poiName) ON DELETE CASCADE
);

CREATE TABLE Attraction(
    poiAddr VARCHAR(70), poiName VARCHAR(50), price NUMBER(10), capacity NUMBER(10),
    CONSTRAINT Attr_pk PRIMARY KEY (poiAddr, poiName),
    CONSTRAINT POI_Attr_fk FOREIGN KEY (poiAddr, poiName) REFERENCES
PointOfInterest(poiAddr,poiName)  ON DELETE CASCADE
);

CREATE TABLE POIClosestTo(
    poiAddr VARCHAR(70), poiName VARCHAR(50), stopNum NUMBER(10), distanceFrom
NUMBER(10),
    CONSTRAINT POIClosest_pk PRIMARY KEY (poiAddr, poiName),
    CONSTRAINT POI_Closest_fk FOREIGN KEY (poiAddr, poiName) REFERENCES
PointOfInterest(poiAddr,poiName) ON DELETE CASCADE,
    CONSTRAINT stop_fk FOREIGN KEY (stopNum) REFERENCES Stop(num)
);

CREATE TABLE VehicleType(
    type VARCHAR(8), topSpeed NUMBER(10), capacity NUMBER(10), frequency NUMBER(10),
    CONSTRAINT VehicleType_pk PRIMARY KEY (type)
);

CREATE TABLE Garage(
    name VARCHAR(50) NOT NULL, capacity NUMBER(10), type VARCHAR(8),
    CONSTRAINT Garage_pk PRIMARY KEY (name),
    CONSTRAINT Type_fk FOREIGN KEY (type) REFERENCES VehicleType(type)
);

CREATE TABLE TransitLine(
    lineCode VARCHAR(20) NOT NULL, lineName VARCHAR(50),garageName VARCHAR(50),
startStop NUMBER(10), endStop NUMBER(10),
    CONSTRAINT transitLine_pk PRIMARY KEY (lineCode),
    CONSTRAINT LineGarage_fk FOREIGN KEY (garageName) REFERENCES Garage(name),
    CONSTRAINT startStop_fk FOREIGN KEY (startStop) REFERENCES Stop(num),
```

```
    CONSTRAINT endStop_fk FOREIGN KEY (endStop) REFERENCES Stop(num)
);

CREATE TABLE LineStops(
    lineCode VARCHAR(20), stopNum NUMBER(10), stopOrder NUMBER(10),
    CONSTRAINT LineStops_pk PRIMARY KEY (lineCode, stopNum),
    CONSTRAINT line_fk FOREIGN KEY (lineCode) REFERENCES TransitLine(lineCode) ON
DELETE CASCADE,
    CONSTRAINT LineStop_fk FOREIGN KEY (stopNum) REFERENCES Stop(num) ON DELETE
CASCADE
);

CREATE TABLE Vehicle(
    ID NUMBER(10) NOT NULL, type VARCHAR(20) NOT NULL, enteredService DATE,
serviceFrequency NUMBER(10), lastServiceDate DATE, garageName VARCHAR(50),
    CONSTRAINT Vehicle_pk PRIMARY KEY (ID, type),
    CONSTRAINT VehicleGarage_fk FOREIGN KEY (garageName) REFERENCES Garage(name),
    CONSTRAINT VehicleType_fk FOREIGN KEY (type) REFERENCES VehicleType(type)
);

CREATE TABLE Operator(
    ID NUMBER(10) NOT NULL, name VARCHAR(50),  garageName VARCHAR(50), vehicleID
NUMBER(10), vehicleType VARCHAR(20), workingLine VARCHAR(20),
    CONSTRAINT Operator_pk PRIMARY KEY (ID),
    CONSTRAINT Garage_fk FOREIGN KEY (garageName) REFERENCES Garage(name),
    CONSTRAINT OperatorVehicle_fk FOREIGN KEY (vehicleID, vehicleType) REFERENCES
Vehicle(ID, type),
    CONSTRAINT OperatorLine_fk FOREIGN KEY (workingLine) REFERENCES
TransitLine(lineCode),
    CONSTRAINT VehicleTypeOperator_fk FOREIGN KEY (vehicleType) REFERENCES
VehicleType(type)
);

CREATE TABLE VehicleLicense(
    vehicleID NUMBER(10), vehicleType VARCHAR(20), licensedType VARCHAR(50),
    CONSTRAINT VehicleLicense_pk PRIMARY KEY (vehicleID, vehicleType),
    CONSTRAINT Vehicle_fk FOREIGN KEY (vehicleID, vehicleType) REFERENCES Vehicle(ID,
type) ON DELETE CASCADE
);

CREATE TABLE HasWorked(
    lineCode VARCHAR(20), operatorID NUMBER(10),
    CONSTRAINT HasWorked_pk PRIMARY KEY (lineCode, operatorID),
    CONSTRAINT HasWorkedline_fk FOREIGN KEY (lineCode) REFERENCES
TransitLine(lineCode)  ON DELETE CASCADE,
    CONSTRAINT Operator_fk FOREIGN KEY (operatorID) REFERENCES Operator(ID) ON DELETE
CASCADE
);
```

We had some tables with nearly 1k entries. For Proof of Population, if the table size was greater than 6, we only showed a subset of the data, and then the total number of entries in the table.

```
        ID EMAIL
---------- --------------------------------------------------
NAME
--------------------------------------------------
         1 pdumitru@student.ubc.ca
Phil

         2 craig@email.com
Craig

         3 emily@email.com
Emily


        ID EMAIL
---------- --------------------------------------------------
NAME
--------------------------------------------------
         4 jason@email.com
Jason

         5 maddy@email.com
Maddy

         6 megan@email.com
Megan


        ID EMAIL
---------- --------------------------------------------------
NAME
--------------------------------------------------
         7 nathaniel@email.com
Nathaniel

         8 elizabeth@email.com
Elizabeth

         9 samuel@email.com
Samuel


9 rows selected.
```

Table 1: Account

```
SQL> select * from buscard;

   CARDNUM    BALANCE CARDTY          ID
---------- ---------- ------ ----------
         1            UPASS           1
         2   1.0E+002 1ZONE           1
         3   3.0E+001 2ZONE           1
         1   3.0E+002 1ZONE           2
         2   1.0E+001 3ZONE           2
         1          0 1ZONE           3
         1   2.5E+001 1ZONE           4
         1   2.5E+001 1ZONE           5
         1   2.5E+001 1ZONE           6
         1   2.5E+001 1ZONE           7
         1   2.5E+001 1ZONE           8

   CARDNUM    BALANCE CARDTY          ID
---------- ---------- ------ ----------
         1   2.5E+001 1ZONE           9

12 rows selected.
```

Table 2: Bus Card

```
       NUM        LAT        LON
---------- ---------- ----------
NAME
--------------------------------------------------
     58133 4.921E+001 -1.23E+002
Northbound Granville St @ W 64 Ave

     50948 4.928E+001 -1.23E+002
Eastbound E Hastings St @ Kamloops St

     50949 4.928E+001 -1.23E+002
Eastbound E Hastings St @ Slocan St


       NUM        LAT        LON
---------- ---------- ----------
NAME
--------------------------------------------------
     50950 4.928E+001 -1.23E+002
Eastbound E Hastings St @ Kaslo St

     50951 4.928E+001 -1.23E+002
Eastbound E Hastings St @ Renfrew St

     50956 4.928E+001 -1.23E+002
Westbound E Hastings St @ Skeena St


       NUM        LAT        LON
---------- ---------- ----------
NAME
--------------------------------------------------
     59317 4.922E+001 -1.23E+002
Eastbound E 49 Ave @ Kerr St


937 rows selected.
```

Table 3:Stop

```
 ACCOUNTID    STOPNUM VISITEDDA
---------- ---------- ---------
         5      57893 22-SEP-19
         5      57944 22-SEP-19
         5      57960 22-SEP-19
         5      57964 22-SEP-19
         5      61394 22-SEP-19
         7      50035 26-APR-21
         7      57893 26-APR-21
         7      57944 26-APR-21
         7      57960 26-APR-21
         7      57964 26-APR-21
         7      61394 26-APR-21

 ACCOUNTID    STOPNUM VISITEDDA
---------- ---------- ---------
         8      50035 19-JUN-22
         8      57893 19-JUN-22
         8      57944 19-JUN-22
         8      57960 19-JUN-22
         8      57964 19-JUN-22
         8      61394 19-JUN-22

50 rows selected.
```

Table 4: Visited

```
POIADDR
--------------------------------------------------------------------------------
POINAME                                                          RATING
---------------------------------------------------------------- ----------
Vancouver, BC V6G 1Z4
Stanley Park                                                    4.4E+000

2901 E Hastings St, Vancouver, BC V5K 5J1
Play Land                                                       4.1E+000

1455 Quebec St, Vancouver, BC V6A 3Z7
Science World                                                   4.6E+000


POIADDR
--------------------------------------------------------------------------------
POINAME                                                          RATING
---------------------------------------------------------------- ----------
800 Griffiths Way, Vancouver, BC V6B 6G1
Rogers Arena                                                    1.1E+000

111 W Hastings St, Vancouver, BC V6B 0E6
Public Piano                                                    3.8E+000

4151 Hazelbridge Way #2180, Richmond, BC V6X 0A4
Aberdeen Center                                                 4.0E+000


24 rows selected.
```

Table 5: PointOfInterest

```
SQL> select * from School;

POIADDR
--------------------------------------------------------------------------------
POINAME                                                          SCHOOLTYPE
---------------------------------------------------------------- ----------
NUMSTUDENTS
-----------
Vancouver, BC V6T 1Z4
UBC                                                              University
      80000

8888 University Dr, Burnaby, BC V5A 1S6
SFU                                                              University
      30000

POIADDR
--------------------------------------------------------------------------------
POINAME                                                          SCHOOLTYPE
---------------------------------------------------------------- ----------
NUMSTUDENTS
-----------

SW 3, White Ave, Burnaby, BC V5G 3H2
BCIT                                                             University
      48224

2055 Purcell Way, North Vancouver, BC V7J 3H5
Capilano University                                              University

POIADDR
--------------------------------------------------------------------------------
POINAME                                                          SCHOOLTYPE
---------------------------------------------------------------- ----------
NUMSTUDENTS
-----------
       7552

100 W 49th Ave, Vancouver, BC V5Y 2Z6
Langara                                                          University
      22606
```

Table 6: School

```
SQL> select * from HasPlayground;

PARKSTATUS          H
-------------------- -
CITY                1
REGIONAL            0
PROVINCIAL          0
```

Table 7:HasPlayground

```
SQL> select * from Park;

POIADDR
----------------------------------------------------------------
POINAME                                          PARKSTATUS
------------------------------------------------ --------------------
2845 W 3rd Ave, Vancouver, BC V6K 1M8
Tatlow Park                                      CITY

5495 Chancellor Blvd, Vancouver, BC V6T 1E4
Pacific Spirit Park                              REGIONAL

4600 Cambie St, Vancouver, BC V5Z 2Z1
Queen Elizabeth Park                             CITY


POIADDR
----------------------------------------------------------------
POINAME                                          PARKSTATUS
------------------------------------------------ --------------------
Mt Seymour Rd, North Vancouver, BC V7G 1L3
Mount Seymor Provincial Park                     PROVINCIAL

Vancouver, BC V6G 1Z4
Stanley Park                                     CITY
```

Table 8:Park

```
6025 University Blvd, Vancouver, BC V6T 0C5

POIADDR
----------------------------------------------------------------------------------
POINAME                                          CAPACITY
------------------------------------------------ ---------
CUISINE
--------------------
Tacomio                                                50
Mexican

6045 University Blvd, Vancouver, BC V6T 0C5
Uncle Fatih Pizza                                      50
Italian


POIADDR
----------------------------------------------------------------------------------
POINAME                                          CAPACITY
------------------------------------------------ ---------
CUISINE
--------------------
6005 University Blvd, Vancouver, BC V6T 0C4
JJ Bean Coffee Roasters                                50
generic

6001 University Blvd, Vancouver, BC V6T 0C5
Rain Or Shine                                          50
Italian

POIADDR
----------------------------------------------------------------------------------
POINAME                                          CAPACITY
------------------------------------------------ ---------
CUISINE
--------------------


9 rows selected.
```

Table 9:Restaurant

```
SQL> select * from Attraction;

POIADDR
----------------------------------------------------------------
POINAME                                          PRICE   CAPACITY
------------------------------------------------ ---------- ----------
2901 E Hastings St, Vancouver, BC V5K 5J1
Play Land                                            35       9000

1455 Quebec St, Vancouver, BC V6A 3Z7
Science World                                        20       2000

800 Griffiths Way, Vancouver, BC V6B 6G1
Rogers Arena                                        150      18000


POIADDR
----------------------------------------------------------------
POINAME                                          PRICE   CAPACITY
------------------------------------------------ ---------- ----------
111 W Hastings St, Vancouver, BC V6B 0E6
Public Piano                                          0          1

4151 Hazelbridge Way #2180, Richmond, BC V6X 0A4
Aberdeen Center                                      30       5000
```

Table 10:Attraction

```
POIADDR
----------------------------------------------------------------
POINAME                                          STOPNUM DISTANCEFROM
------------------------------------------------ ---------- ----------
5495 Chancellor Blvd, Vancouver, BC V6T 1E4
Pacific Spirit Park                                61702         10

4600 Cambie St, Vancouver, BC V5Z 2Z1
Queen Elizabeth Park                               61100          5

Mt Seymour Rd, North Vancouver, BC V7G 1L3
Mount Seymor Provincial Park                       57961         60


POIADDR
----------------------------------------------------------------
POINAME                                          STOPNUM DISTANCEFROM
------------------------------------------------ ---------- ----------
Vancouver, BC V6G 1Z4
Stanley Park                                       50031         10

2901 E Hastings St, Vancouver, BC V5K 5J1
Play Land                                          50951          5

1455 Quebec St, Vancouver, BC V6A 3Z7
Science World                                      50181          5


POIADDR
----------------------------------------------------------------
POINAME                                          STOPNUM DISTANCEFROM
------------------------------------------------ ---------- ----------
800 Griffiths Way, Vancouver, BC V6B 6G1
Rogers Arena                                       57967          5

111 W Hastings St, Vancouver, BC V6B 0E6
Public Piano                                       50036          4

4151 Hazelbridge Way #2180, Richmond, BC V6X 0A4
Aberdeen Center                                    61382          1


24 rows selected.
```

Table 11:POIClosestTo

```
LINECODE             STOPNUM  STOPORDER
-------------------- ---------- ----------
Millenium Line          60809          9
Expo Line               57964          1
Expo Line               57973         10
Expo Line               57974         11
Expo Line               57975         12
Expo Line               57976         13
Expo Line               57977         14
Expo Line               57978         15
Expo Line               57979         16
Expo Line               60801         17
Expo Line               60803         18

LINECODE             STOPNUM  STOPORDER
-------------------- ---------- ----------
Expo Line               60804         19
Expo Line               60826          2
Expo Line               60806         20
Expo Line               57966          3
Expo Line               57967          4
Expo Line               57968          5
Expo Line               57969          6
Expo Line               57970          7
Expo Line               57971          8
Expo Line               57972          9
SeaBus                  57960          1

LINECODE             STOPNUM  STOPORDER
-------------------- ---------- ----------
SeaBus                  57961          2

1057 rows selected.
```

Table 12:LineStops

```
SQL> select * from VehicleType;

TYPE       TOPSPEED   CAPACITY  FREQUENCY
-------- ---------- ---------- ----------
TROLLEY          80         75         14
BUS             120         85         12
SEABUS           30        175         15
RAIL            130        375         60
METRO            80        200          3
RAPIDBUS         90        120          4

6 rows selected.
```

Table 13:Type

```
SQL> select * from Garage;

NAME                                               CAPACITY TYPE
-------------------------------------------------- ---------- --------
Vancouver Trolley                                         300 TROLLEY
Vancouver Bus                                             300 BUS
Vancouver Harbor                                            3 SEABUS
Coquitlam Rail Yard                                        20 RAIL
Burnaby Metro                                             100 METRO
Richmond Metro                                             20 METRO
Burnaby Long Bus                                          200 RAPIDBUS
Burnaby Bus                                               300 BUS
Richmond Bus                                              200 BUS
Richmond Long Bus                                         100 RAPIDBUS

10 rows selected.
```

Table 14:Garage

```
        ID NAME
---------- --------------------------------------------------
GARAGENAME                                           VEHICLEID
-------------------------------------------------- ----------
VEHICLETYPE          WORKINGLINE
-------------------- --------------------
        15 Robert Quinn
Burnaby Metro                                                37
METRO                Millenium Line

        16 Maria Reily
Richmond Long Bus                                             4
RAPIDBUS             049

        ID NAME
---------- --------------------------------------------------
GARAGENAME                                           VEHICLEID
-------------------------------------------------- ----------
VEHICLETYPE          WORKINGLINE
-------------------- --------------------

        17 David Smith
Richmond Long Bus                                             5
RAPIDBUS             049

        18 Mary Trott
Burnaby Long Bus                                             13

        ID NAME
---------- --------------------------------------------------
GARAGENAME                                           VEHICLEID
-------------------------------------------------- ----------
VEHICLETYPE          WORKINGLINE
-------------------- --------------------
RAPIDBUS             084

        19 Walter White
Burnaby Long Bus                                             14
RAPIDBUS             099

19 rows selected.
```

Table 15:Operator

```
LINECODE             LINENAME
-------------------- --------------------------------------------------
GARAGENAME                                           STARTSTOP   ENDSTOP
-------------------------------------------------- ---------- ----------
144                  SFU/Metrotown Station
Burnaby Bus                                             60214      53064

401                  Richmond-Brighouse Station/One Road
Richmond Bus                                            56421      56429

402                  Two Road/Brighouse Station
Richmond Bus                                            56421      56525


LINECODE             LINENAME
-------------------- --------------------------------------------------
GARAGENAME                                           STARTSTOP   ENDSTOP
-------------------------------------------------- ---------- ----------
403                  Bridgeport Station/Three Road
Richmond Bus                                            56647      56600

WCE                  West Coast Express
Coquitlam Rail Yard                                     57944      57949

Canada Line          Canada Line
Richmond Metro                                          61386      61370


LINECODE             LINENAME
-------------------- --------------------------------------------------
GARAGENAME                                           STARTSTOP   ENDSTOP
-------------------------------------------------- ---------- ----------
Millenium Line       Millennium Line
Burnaby Metro                                           60825      60889

Expo Line            Expo Line
Burnaby Metro                                           57964      57972

SeaBus               SeaBus
Vancouver Harbor                                        57960      57961


36 rows selected.
```

Table 16:TransitLine

```
        ID TYPE                 ENTEREDSE SERVICEFREQUENCY LASTSERVI
---------- -------------------- --------- ---------------- ---------
GARAGENAME
--------------------------------------------------
        31 SEABUS               28-FEB-94               24 30-APR-97
Vancouver Harbor

        32 SEABUS               28-FEB-94               24 30-APR-97
Vancouver Harbor

        33 METRO                03-AUG-08               11 17-MAR-09
Richmond Metro


        ID TYPE                 ENTEREDSE SERVICEFREQUENCY LASTSERVI
---------- -------------------- --------- ---------------- ---------
GARAGENAME
--------------------------------------------------
        34 METRO                03-AUG-08               12 17-MAR-09
Richmond Metro

        35 METRO                03-AUG-08               16 17-MAR-09
Richmond Metro

        36 METRO                03-AUG-08               15 17-MAR-09
Burnaby Metro


        ID TYPE                 ENTEREDSE SERVICEFREQUENCY LASTSERVI
---------- -------------------- --------- ---------------- ---------
GARAGENAME
--------------------------------------------------
        37 METRO                03-AUG-08               11 17-MAR-09
Burnaby Metro

        38 RAIL                 03-AUG-08               19 17-MAR-09
Coquitlam Rail Yard


38 rows selected.
```

Table 17:Vehicle

```
LINECODE             OPERATORID
-------------------- ----------
084                          18
084                          19
099                          17
099                          18
099                          19
406                           5
408                           7
414                           5
Canada Line                  15
Expo Line                    15
Millenium Line               14

LINECODE             OPERATORID
-------------------- ----------
Millenium Line               15
R4                           17
R4                           18
R4                           19
R5                           17
R5                           18
R5                           19
SeaBus                       10

41 rows selected.
```

Table 18:HasWorked

```
SQL> select * from VehicleLicense;

 VEHICLEID VEHICLETYPE
---------- --------------------
LICENSEDTYPE
--------------------------------------------------
         1 BUS
Class 1 Bus

        24 RAPIDBUS
Class 1 Long Bus

        26 TROLLEY
Class 1 Trolley


 VEHICLEID VEHICLETYPE
---------- --------------------
LICENSEDTYPE
--------------------------------------------------
        31 SEABUS
Passenger Vessel - Captain
```

Table 19:VehicleLicense

Implemented Queries:

SELECT Query:

```
"SELECT ".$attributes." FROM ".$table." WHERE
".$filter_attr."".$filter_condition."'".$filter_value."' AND
".$filter_attr2."".$filter_condition2."'".$filter_value2."'"
```

Implemented code for the SELECT query is located in the executeSELECT function in src/garage.php. For the GUI, a list of possible data selections is provided so the user can copy the data that they want to see into the input list. The user can select from a number of vehicle and garage related tables and they can provide some “filters” which trim the data based on a number of conditions. For example if the user wanted to view all the buses with a service frequency of less than 10 months they would input:

id: 1	type:	BUS	enteredservice:	10-JAN-15	servicefrequency:	7	lastservicedate:	15-AUG-15	garagename:	Richmond Bus
id: 2	type:	BUS	enteredservice:	10-JAN-15	servicefrequency:	8	lastservicedate:	15-AUG-15	garagename:	Richmond Bus
id: 3	type:	BUS	enteredservice:	10-JAN-15	servicefrequency:	8	lastservicedate:	15-AUG-15	garagename:	Richmond Bus
id: 4	type:	RAPIDBUS	enteredservice:	09-FEB-15	servicefrequency:	6	lastservicedate:	05-AUG-15	garagename:	Richmond Long Bus
id: 5	type:	RAPIDBUS	enteredservice:	09-FEB-15	servicefrequency:	6	lastservicedate:	05-AUG-15	garagename:	Richmond Long Bus
id: 6	type:	RAPIDBUS	enteredservice:	09-FEB-15	servicefrequency:	6	lastservicedate:	05-AUG-15	garagename:	Richmond Long Bus
id: 7	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename:	Vancouver Bus
id: 8	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename:	Vancouver Bus
id: 9	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename:	Vancouver Bus
id: 10	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename:	Vancouver Bus
id: 11	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename:	Vancouver Bus
id: 12	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename:	Vancouver Bus
id: 13	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename:	Burnaby Long Bus
id: 14	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename:	Burnaby Long Bus
id: 15	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename:	Burnaby Long Bus
id: 16	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename:	Burnaby Long Bus
id: 17	type:	BUS	enteredservice:	07-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Vancouver Bus
id: 18	type:	BUS	enteredservice:	07-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Vancouver Bus
id: 19	type:	BUS	enteredservice:	07-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Vancouver Bus
id: 20	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Vancouver Bus
id: 21	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Vancouver Bus
id: 22	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Burnaby Bus
id: 23	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename:	Burnaby Bus
id: 24	type:	RAPIDBUS	enteredservice:	29-APR-19	servicefrequency:	6	lastservicedate:	21-DEC-19	garagename:	Burnaby Long Bus
id: 25	type:	RAPIDBUS	enteredservice:	29-APR-19	servicefrequency:	6	lastservicedate:	21-DEC-19	garagename:	Burnaby Long Bus
id: 26	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename:	Vancouver Trolley
id: 27	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename:	Vancouver Trolley
id: 28	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename:	Vancouver Trolley
id: 29	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename:	Vancouver Trolley
id: 30	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename:	Vancouver Trolley
id: 31	type:	SEABUS	enteredservice:	28-FEB-94	servicefrequency:	24	lastservicedate:	30-APR-97	garagename:	Vancouver Harbor
id: 32	type:	SEABUS	enteredservice:	28-FEB-94	servicefrequency:	24	lastservicedate:	30-APR-97	garagename:	Vancouver Harbor
id: 33	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	11	lastservicedate:	17-MAR-09	garagename:	Richmond Metro
id: 34	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	12	lastservicedate:	17-MAR-09	garagename:	Richmond Metro
id: 35	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	16	lastservicedate:	17-MAR-09	garagename:	Richmond Metro
id: 36	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	15	lastservicedate:	17-MAR-09	garagename:	Burnaby Metro
id: 37	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	11	lastservicedate:	17-MAR-09	garagename:	Burnaby Metro
id: 38	type:	RAIL	enteredservice:	03-AUG-08	servicefrequency:	19	lastservicedate:	17-MAR-09	garagename:	Coquitlam Rail Yard

Figure 1: Data of Vehicles Before

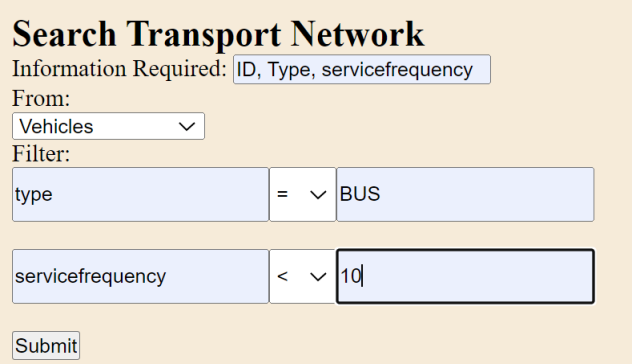


Figure 2: Example User Input For a Select Query

id:	1	type:	BUS	servicefrequency:	7
id:	2	type:	BUS	servicefrequency:	8
id:	3	type:	BUS	servicefrequency:	8
id:	7	type:	BUS	servicefrequency:	8
id:	8	type:	BUS	servicefrequency:	8
id:	9	type:	BUS	servicefrequency:	8
id:	10	type:	BUS	servicefrequency:	8
id:	11	type:	BUS	servicefrequency:	8
id:	12	type:	BUS	servicefrequency:	8
id:	17	type:	BUS	servicefrequency:	8
id:	18	type:	BUS	servicefrequency:	8
id:	19	type:	BUS	servicefrequency:	8
id:	20	type:	BUS	servicefrequency:	8
id:	21	type:	BUS	servicefrequency:	8
id:	22	type:	BUS	servicefrequency:	8
id:	23	type:	BUS	servicefrequency:	8

Figure 3: Output of the Sample Query

Nested Aggregation with Group By:

```
"SELECT V.garageName, AVG (V.serviceFrequency) as avgserv FROM Vehicle V GROUP BY V.garageName HAVING 1 < (SELECT COUNT(*) FROM Vehicle S WHERE V.garageName = S.garageName)"
```

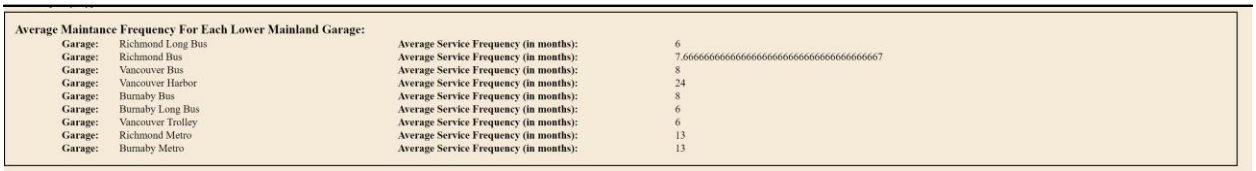
This is a hardcoded query that allows the garage user (usually an employee) to instantly view key information such as the average turnaround for the Translink garages around the lower mainland that service more than one vehicle. The location of the query can be found in the executeNestedAggro() function in src/garage.php.

id: 1	type:	BUS	enteredservice:	10-JAN-15	servicefrequency:	7	lastservicedate:	15-AUG-15	garagename: Richmond Bus
id: 2	type:	BUS	enteredservice:	10-JAN-15	servicefrequency:	8	lastservicedate:	15-AUG-15	garagename: Richmond Bus
id: 3	type:	BUS	enteredservice:	10-JAN-15	servicefrequency:	8	lastservicedate:	15-AUG-15	garagename: Richmond Bus
id: 4	type:	RAPIDBUS	enteredservice:	09-FEB-15	servicefrequency:	6	lastservicedate:	05-AUG-15	garagename: Richmond Long Bus
id: 5	type:	RAPIDBUS	enteredservice:	09-FEB-15	servicefrequency:	6	lastservicedate:	05-AUG-15	garagename: Richmond Long Bus
id: 6	type:	RAPIDBUS	enteredservice:	09-FEB-15	servicefrequency:	6	lastservicedate:	05-AUG-15	garagename: Richmond Long Bus
id: 7	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename: Vancouver Bus
id: 8	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename: Vancouver Bus
id: 9	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename: Vancouver Bus
id: 10	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename: Vancouver Bus
id: 11	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename: Vancouver Bus
id: 12	type:	BUS	enteredservice:	15-FEB-15	servicefrequency:	8	lastservicedate:	19-OCT-15	garagename: Vancouver Bus
id: 13	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename: Burnaby Long Bus
id: 14	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename: Burnaby Long Bus
id: 15	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename: Burnaby Long Bus
id: 16	type:	RAPIDBUS	enteredservice:	23-JAN-16	servicefrequency:	6	lastservicedate:	09-SEP-16	garagename: Burnaby Long Bus
id: 17	type:	BUS	enteredservice:	07-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Vancouver Bus
id: 18	type:	BUS	enteredservice:	07-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Vancouver Bus
id: 19	type:	BUS	enteredservice:	07-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Vancouver Bus
id: 20	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Vancouver Bus
id: 21	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Vancouver Bus
id: 22	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Burnaby Bus
id: 23	type:	BUS	enteredservice:	17-NOV-16	servicefrequency:	8	lastservicedate:	05-APR-17	garagename: Burnaby Bus
id: 24	type:	RAPIDBUS	enteredservice:	29-APR-19	servicefrequency:	6	lastservicedate:	21-DEC-19	garagename: Burnaby Long Bus
id: 25	type:	RAPIDBUS	enteredservice:	29-APR-19	servicefrequency:	6	lastservicedate:	21-DEC-19	garagename: Burnaby Long Bus
id: 26	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename: Vancouver Trolley
id: 27	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename: Vancouver Trolley
id: 28	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename: Vancouver Trolley
id: 29	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename: Vancouver Trolley
id: 30	type:	TROLLEY	enteredservice:	11-MAR-12	servicefrequency:	6	lastservicedate:	25-OCT-12	garagename: Vancouver Trolley
id: 31	type:	SEABUS	enteredservice:	28-FEB-94	servicefrequency:	24	lastservicedate:	30-APR-97	garagename: Vancouver Harbor
id: 32	type:	SEABUS	enteredservice:	28-FEB-94	servicefrequency:	24	lastservicedate:	30-APR-97	garagename: Vancouver Harbor
id: 33	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	11	lastservicedate:	17-MAR-09	garagename: Richmond Metro
id: 34	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	12	lastservicedate:	17-MAR-09	garagename: Richmond Metro
id: 35	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	16	lastservicedate:	17-MAR-09	garagename: Richmond Metro
id: 36	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	15	lastservicedate:	17-MAR-09	garagename: Burnaby Metro
id: 37	type:	METRO	enteredservice:	03-AUG-08	servicefrequency:	11	lastservicedate:	17-MAR-09	garagename: Burnaby Metro
id: 38	type:	RAIL	enteredservice:	03-AUG-08	servicefrequency:	19	lastservicedate:	17-MAR-09	garagename: Coquitlam Rail Yard

Figure 4: Data of Vehicles Before

Press the button below to view average turnover/productivity for all Translink Service Centers:
View Average Service Frequency For All Lower Mainland Garages

Figure 5: UI Button For the User to Press To Display Data



Average Maintance Frequency For Each Lower Mainland Garage:

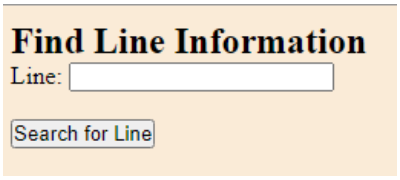
Garage:	Richmond Long Bus	**Average Service Frequency (in months):**	6
Garage:	Richmond Bus	**Average Service Frequency (in months):**	7.666666666666666666666666666666667
Garage:	Vancouver Bus	**Average Service Frequency (in months):**	8
Garage:	Vancouver Harbor	**Average Service Frequency (in months):**	24
Garage:	Burnaby Bus	**Average Service Frequency (in months):**	8
Garage:	Burnaby Long Bus	**Average Service Frequency (in months):**	6
Garage:	Vancouver Trolley	**Average Service Frequency (in months):**	6
Garage:	Richmond Metro	**Average Service Frequency (in months):**	13
Garage:	Burnaby Metro	**Average Service Frequency (in months):**	13

Figure 6: Output of The Query

Projection:

```
"SELECT linecode,name,stopnum FROM LineStops LS, Stop S WHERE lineCode='".
$lineCode ."' AND LS.stopnum = s.num ORDER BY stopOrder ASC"
```

This is a query where the user has the option to insert a linecode, and gets a list of stops which that line has in return. This query joins our Line table with our LineStop table, and then takes the projection of lineCode, name and stopNum in order to hide other information from the end user. The location of the query can be found in the getLineRequest() function in src/line.php.

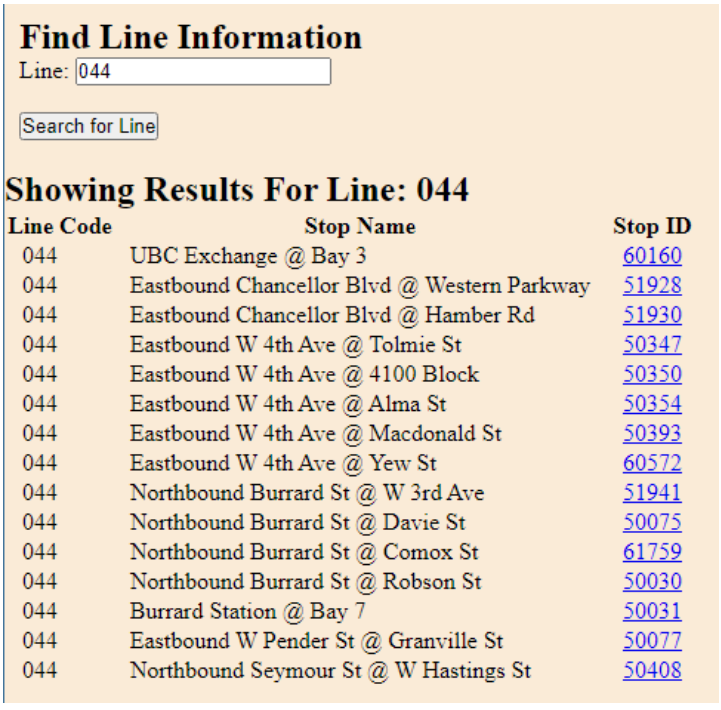


Find Line Information

Line:

Search for Line

Figure 8: Line input



Find Line Information

Line: 044

Search for Line

Showing Results For Line: 044

Line Code	Stop Name	Stop ID
044	UBC Exchange @ Bay 3	60160
044	Eastbound Chancellor Blvd @ Western Parkway	51928
044	Eastbound Chancellor Blvd @ Hamber Rd	51930
044	Eastbound W 4th Ave @ Tolmie St	50347
044	Eastbound W 4th Ave @ 4100 Block	50350
044	Eastbound W 4th Ave @ Alma St	50354
044	Eastbound W 4th Ave @ Macdonald St	50393
044	Eastbound W 4th Ave @ Yew St	60572
044	Northbound Burrard St @ W 3rd Ave	51941
044	Northbound Burrard St @ Davie St	50075
044	Northbound Burrard St @ Comox St	61759
044	Northbound Burrard St @ Robson St	50030
044	Burrard Station @ Bay 7	50031
044	Eastbound W Pender St @ Granville St	50077
044	Northbound Seymour St @ W Hastings St	50408

Figure 7: Line Output

Insert

```
"INSERT INTO Account VALUES(add_account_id.NEXTVAL,'".$email."', '".$name."')"
```

This is a query where the user creates a new account using their email. Once the account is created, the user can then log in with their provided email to get their "user" view. This view will be empty, as a brand new account has not visited any stops. The location of the query can be found in the createAccount() function in src/create_acc.php. In this example, a sample user "Daniel Sedin" was created with email danielsedin@canucks.com.

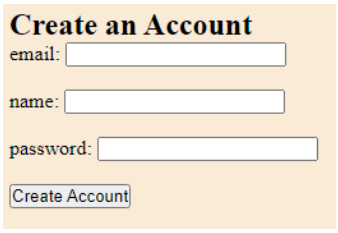


Figure 10: Creating an account

Figure 9: New Created Account

Join

```
"SELECT linecode, linename, frequency
            FROM (((TransitLine NATURAL INNER JOIN Linestops)
            INNER JOIN Garage ON TransitLine.garagename=Garage.name)
            INNER JOIN VehicleType ON garage.type=vehicletype.type)
            WHERE LineStops.stopNum=". $stopCode . ""
```

This is a query where the user searches for a stop by the stop code. Because we want to give the user information about all lines that leave that stop, as well as what service frequency they can expect, we need to join TransitLine with LineStops with Garage and finally with VehicleType. The result of this 4 table join gives us all the information we need to give the user information about the Stop, the Lines that the stop services, and the frequency. The location of this query can be found in the getAllLinesFromStop() function in src/stop.php.

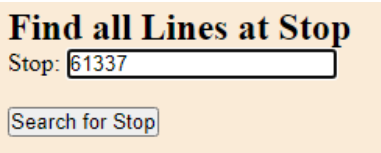


Figure 11: Input for stop

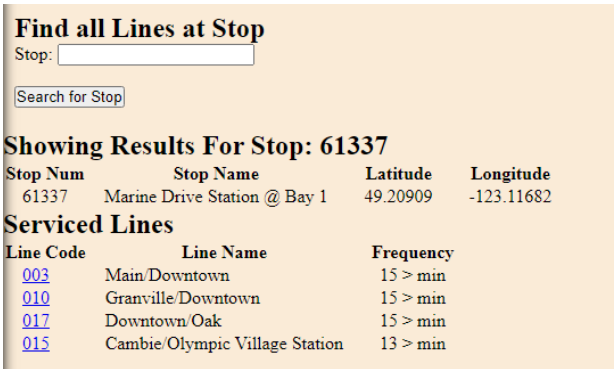


Figure 12: Output for stop – Two tables are returned. One for stop metadata, and one for the lines the stop services

---

Aggregation with GROUP BY

```
"SELECT Transitline.lineName, Transitline.lineCode, TransitLine.garageName
                        FROM Operator INNER JOIN HasWorked on ID=operatorID INNER
JOIN TransitLine on HasWorked.Linecode=Transitline.Linecode
                        WHERE Operator.ID = ".$opID
```

This query allows operators to see how many lines each operator has worked. It achieves this by grouping all the records in HasWorked (recall schema for HasWorked is <operatorID, lineCode>) by operatorID, and counting the amount of entries in each group. The query does not have any dynamic filtering, but is executed by an operator by clicking a button. In return, we get the Operator ID, and the number of lines they have previously worked. This query can be found in the function getTotalWorkedLines() in src/hasworked.php

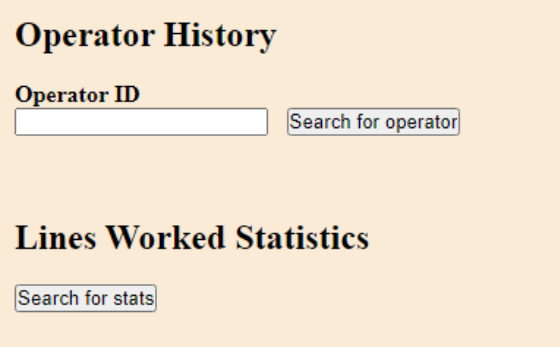


Figure 14: Search for statistics button to trigger the Query

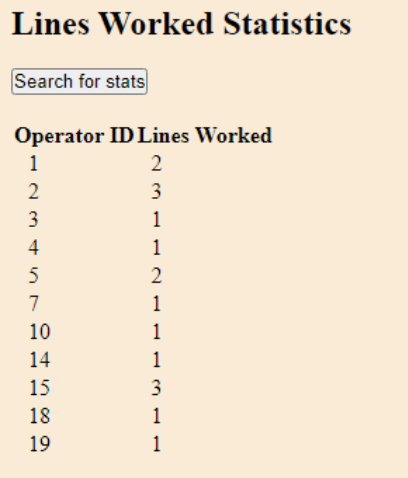


Figure 13: Result of the query

Aggregation with HAVING

```
"SELECT name, visitedDate
                    FROM (SELECT ID, visitedDate
                    FROM Account INNER JOIN Visited on ID = accountID INNER JOIN
Stop on stopNum=num
                    WHERE UPPER(Stop.name) LIKE '%".$stopNameIncludes."%'
                    GROUP BY ID, visitedDate
                    HAVING COUNT(*) = (SELECT COUNT(*) FROM Stop WHERE
UPPER(name) LIKE '%".$stopNameIncludes."%')) NATURAL INNER JOIN Account
                    ORDER BY visitedDate ASC"
```

Our idea behind this query was to let the user specify part of a stop name, and then the query would return all users who had visited every single stop containing that substring in a single day. This query works best for stops at major terminuses like “UBC”, as there are many stops that contain “UBC” in their name, and therefore gives us an interesting things to group by. We achieved this by joining Account, Visited and Stop tables together, and then grouping by Account ID and Visited Date. This divides our data into groups for every single combination of user and date present in the database. We then use the HAVING to check that the number of elements in the grouping matches the number of stops that contain the passed in substring, and if it does, we return the name and visited date. This query can be found in the getUsersRequest() function, in the src/users.php file.

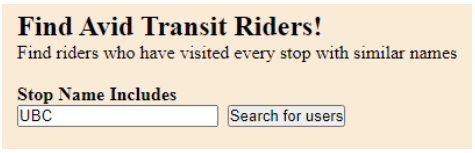


Figure 16: Input for all stops containing "UBC" in their name

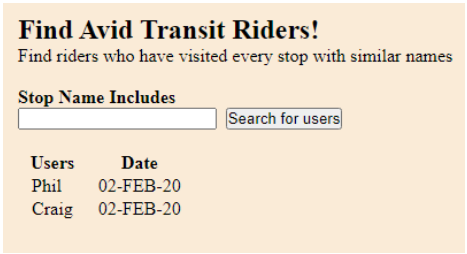


Figure 15:Output for the query

Division

```
"SELECT o.name
 FROM Operator o
 WHERE NOT EXISTS(
    SELECT lineCode from TransitLine INNER JOIN Garage on garageName=name WHERE
type='".$type."'
MINUS
SELECT lineCode from hasWorked hw WHERE hw.operatorID = o.ID)
```

This query is used by operators to find operators who have worked on all Lines of a specified type. The operator is presented with a series of radio buttons, and needs to select one which matches the type they are interested in querying by. Afterwards, they get a list of operator names which have worked all lines of that given type. This query can be found in the operatorsWorkedAllLines() function, in src/operator.php

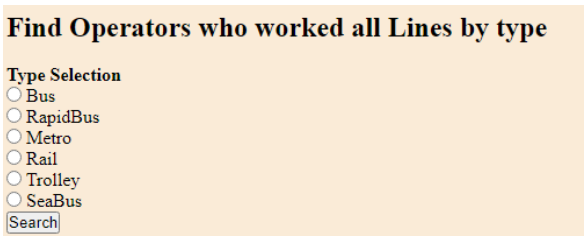


Figure 18: Radio Button selection for type

Figure 17: A selection for Metro type. Only Robert Quinn has worked every Metro Line

Find Operators who worked all Lines by type

Type Selection
- ○ Bus
- ○ RapidBus
- ◉ Metro
- ○ Rail
- ○ Trolley
- ○ SeaBus

Search

Operators
Robert Quinn

Update

```
"UPDATE Operator SET workingLine='".$lineCode."' WHERE ID=".$operatorID
```

This query updates the assigned Transit Line for an operator. The admin is provided with an input box for Operator ID and Line ID and then the webpage refreshes with the updated database showing the new assigned line. The old line is then added to operator history. This query is found in the handleUpdateRequest() function of the operator.php file.

UPDATE:

Assign Operator to New Line

Operator ID: 3

Line ID: 3

Update

BEFORE:

Operator Information

Operator ID	Name	Assigned Vehicle ID	Assigned Vehicle Type	Assigned Transit Line	GarageName
1	James Adams	26	TROLLEY	003	Vancouver Trolley
2	Michael Baker	27	TROLLEY	004	Vancouver Trolley
3	Robert Clark	28	TROLLEY	007	Vancouver Trolley
4	Maria Evans	29	TROLLEY	010	Vancouver Trolley
5	David Frank	1	BUS	408	Richmond Bus
6	Mary Ghosh	2	BUS	414	Richmond Bus
7	James Hills	3	BUS	406	Richmond Bus
8	Michael Irwin	7	BUS	033	Vancouver Bus
9	Robert Jones	31	SEABUS	SeaBus	Vancouver Harbor
10	Maria Klein	38	RAIL	WCE	Coquitlam Rail Yard
11	David Lopez	33	METRO	Canada Line	Richmond Metro
12	Mary Mason	34	METRO	Canada Line	Richmond Metro
13	James Nalty	35	METRO	Canada Line	Richmond Metro
14	Michael Ochoa	36	METRO	Expo Line	Burnaby Metro
15	Robert Quinn	37	METRO	Millenium Line	Burnaby Metro
16	Maria Reily	4	RAPIDBUS	049	Richmond Long Bus
17	David Smith	5	RAPIDBUS	049	Richmond Long Bus
18	Mary Trott	13	RAPIDBUS	084	Burnaby Long Bus
19	Walter White	14	RAPIDBUS	099	Burnaby Long Bus

Operator History

Operator ID

3 Search for operator

Line Code	Line Name	Garage
010	Granville/Downtown	Vancouver Trolley

AFTER:

Operator Information

Operator ID	Name	Assigned Vehicle ID	Assigned Vehicle Type	Assigned Transit Line	GarageName
1	James Adams	26	TROLLEY	003	Vancouver Trolley
2	Michael Baker	27	TROLLEY	004	Vancouver Trolley
3	Robert Clark	28	TROLLEY	003	Vancouver Trolley
4	Maria Evans	29	TROLLEY	010	Vancouver Trolley
5	David Frank	1	BUS	408	Richmond Bus
6	Mary Ghosh	2	BUS	414	Richmond Bus
7	James Hills	3	BUS	406	Richmond Bus
8	Michael Irwin	7	BUS	033	Vancouver Bus
9	Robert Jones	31	SEABUS	SeaBus	Vancouver Harbor
10	Maria Klein	38	RAIL	WCE	Coquitlam Rail Yard
11	David Lopez	33	METRO	Canada Line	Richmond Metro
12	Mary Mason	34	METRO	Canada Line	Richmond Metro
13	James Nalty	35	METRO	Canada Line	Richmond Metro
14	Michael Ochoa	36	METRO	Expo Line	Burnaby Metro
15	Robert Quinn	37	METRO	Millenium Line	Burnaby Metro
16	Maria Reily	4	RAPIDBUS	049	Richmond Long Bus
17	David Smith	5	RAPIDBUS	049	Richmond Long Bus
18	Mary Trott	13	RAPIDBUS	084	Burnaby Long Bus
19	Walter White	14	RAPIDBUS	099	Burnaby Long Bus

Operator History

Operator ID

3 Search for operator

Line Code	Line Name	Garage
007	Nanaimo Station/Dunbar	Vancouver Trolley
010	Granville/Downtown	Vancouver Trolley

Delete

```
"DELETE FROM Operator WHERE ID=" . $ID
```

This query deletes an operator. The admin is provided with an input box for Operator ID and then the webpage refreshes with the updated database showing that the Operator has been deleted. The deleted line is then also dropped from operator history due to ON DELETE CASCADE. This query is found in the handleDeleteRequest() function of the operator.php file.

BEFORE:

Operator Information

Operator ID	Name	Assigned Vehicle ID	Assigned Vehicle Type	Assigned Transit Line	GarageName
1	James Adams	26	TROLLEY	003	Vancouver Trolley
2	Michael Baker	27	TROLLEY	004	Vancouver Trolley
3	Robert Clark	28	TROLLEY	003	Vancouver Trolley
4	Maria Evans	29	TROLLEY	010	Vancouver Trolley
5	David Frank	1	BUS	408	Richmond Bus
6	Mary Ghosh	2	BUS	414	Richmond Bus
7	James Hills	3	BUS	406	Richmond Bus
8	Michael Irwin	7	BUS	033	Vancouver Bus
9	Robert Jones	31	SEABUS	SeaBus	Vancouver Harbor
10	Maria Klein	38	RAIL	WCE	Coquitlam Rail Yard
11	David Lopez	33	METRO	Canada Line	Richmond Metro
12	Mary Mason	34	METRO	Canada Line	Richmond Metro
13	James Nalty	35	METRO	Canada Line	Richmond Metro
14	Michael Ochoa	36	METRO	Expo Line	Burnaby Metro
15	Robert Quinn	37	METRO	Millenium Line	Burnaby Metro
16	Maria Reily	4	RAPIDBUS	049	Richmond Long Bus
17	David Smith	5	RAPIDBUS	049	Richmond Long Bus
18	Mary Trott	13	RAPIDBUS	084	Burnaby Long Bus
19	Walter White	14	RAPIDBUS	099	Burnaby Long Bus

Operator History

Operator ID

15 Search for operator

Line Code	Line Name	Garage
Canada Line	Canada Line	Richmond Metro
Millenium Line	Millennium Line	Burnaby Metro
Expo Line	Expo Line	Burnaby Metro

DELETE:

Delete an Operator

Operator ID: 15

Delete

AFTER:

Operator Information

Operator ID	Name	Assigned Vehicle ID	Assigned Vehicle Type	Assigned Transit Line	GarageName
1	James Adams	26	TROLLEY	003	Vancouver Trolley
2	Michael Baker	27	TROLLEY	004	Vancouver Trolley
3	Robert Clark	28	TROLLEY	003	Vancouver Trolley
4	Maria Evans	29	TROLLEY	010	Vancouver Trolley
5	David Frank	1	BUS	408	Richmond Bus
6	Mary Ghosh	2	BUS	414	Richmond Bus
7	James Hills	3	BUS	406	Richmond Bus
8	Michael Irwin	7	BUS	033	Vancouver Bus
9	Robert Jones	31	SEABUS	SeaBus	Vancouver Harbor
10	Maria Klein	38	RAIL	WCE	Coquitlam Rail Yard
11	David Lopez	33	METRO	Canada Line	Richmond Metro
12	Mary Mason	34	METRO	Canada Line	Richmond Metro
13	James Nalty	35	METRO	Canada Line	Richmond Metro
14	Michael Ochoa	36	METRO	Expo Line	Burnaby Metro
16	Maria Reily	4	RAPIDBUS	049	Richmond Long Bus
17	David Smith	5	RAPIDBUS	049	Richmond Long Bus
18	Mary Trott	13	RAPIDBUS	084	Burnaby Long Bus
19	Walter White	14	RAPIDBUS	099	Burnaby Long Bus

Operator History

Operator ID

15 Search for operator

No operator match found