

COMP421 - Project Deliverable 3

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1 Relational Schema

1.1 Entities:

Users (user ID, name, email, phone number, address, credit card information)

- NOT NULL: name, email, phone number, address, credit card information

Registered (user ID, username, password, language, totalspent)

- Foreign Key: user ID references Users
- NOT NULL: username, password, language, totalspent

Cities (city name, country) DepartureCity (departure city, departure country, airport departure name)

- Foreign Key: departure city references Cities (city name), departure country references Cities (country)
- NOT NULL: airport departure name

ArrivalCity (arrival city, arrival country, airport arrival name)

- Foreign Key: arrival city references Cities (city name), arrival country references Cities (country)
- NOT NULL: airport arrival name

Flights (flight number, departure date time, airline policy, airline, economy seats, premium economy seats, business seats, first class seats, economy cost, premium economy cost, business cost, first class cost, departure city, departure country, arrival city, arrival country, departure date time, arrival date time, flight duration)

- Foreign Key: departure city and arrival city reference Cities (city name); departure country and arrival country reference Cities (country) (all related through *route*)
- NOT NULL: airline policy, airline, airplane model, economy seats, economy cost, departure city, departure country, arrival city, arrival country, arrival date time, flight duration

Car (car license plate, number of seats, car rental agency, transmission type, car model, car engine type, car daily cost, city name, country, company policy, AC, carplay)

- Foreign Key: city name and country reference Cities (related through *belongs to*)
- NOT NULL: number of seats, car rental agency, transmission type, car model, car engine type, car daily cost, city name, country, company policy, AC, carplay

Hotel (brand affiliation, hotel address, hotel policy, airport shuttle, business facilities, restaurants, listing name, fitness center, on-site parking, pet allowance, pool, city name, country)

- Foreign Key: city name and country reference Cities (related through *located in*)
- NOT NULL: hotel policy, listing name, city name, country

Flight Booking (flight reference number, user ID, passenger names, flight number, departure date time, flight total cost, fare class, seat numbers, plane ticket cost, plane ticket surcharge, plane ticket tax, flight booking fees, flight booking date)

- Foreign Key: user ID references Users (related through *flight reservation*), flight number and departure date time references Flights (related through *flight booked*)
- NOT NULL: user ID, passenger names, flight number, departure date time, flight total cost, fare class, seat numbers, plane ticket cost, plane ticket surcharge, plane ticket tax, flight booking fees, flight booking date

Hotel Booking (hotel reference number, user ID, room number, brand affiliation, hotel address, checkin date, checkout date, hotel total cost, hotel tax, hotel booking fees, hotel booking date)

- Foreign Key: user ID references Users (related through *hotel reservation*), room number references Room (related through *room booked*), brand affiliation and hotel address reference Hotel (weak entity relation)
- NOT NULL: room cost, hotel tax, hotel booking date, hotel booking fees, hotel total cost, user ID, room number, brand affiliation, hotel address

Car Rental Booking (car rental reference number, user ID, car license plate, pickup location, return location, pickup date time, return date time, car rental booking date, car rental cost, car rental tax, car rental booking fees, car rental total cost, insurance)

- Foreign Key: car license plate references Car (related through *car booked*), user ID references Users (related through *car rental reservation*)
- NOT NULL: user ID, car license plate, pickup location, return location, pickup date time, return date time, car rental booking date, car rental cost, car rental tax, car rental booking fees, car rental total cost, insurance

1.2 Weak Entity:

Room (hotel address, brand affiliation, room number, room name, room capacity, beds, room price, size, free wifi, view, minibar, private bathroom, smoking)

- Foreign Key: brand affiliation and hotel address reference Hotel (related through *part of*)
- NOT NULL: room name, room capacity, beds, room price, size, view, minibar, private bathroom, smoking

1.3 Relationships:

Route (departure city, departure country, arrival city, arrival country)

- Foreign Key: departure city and departure country reference DepartureCity, arrival city and arrival country reference ArrivalCity

2 Stored Procedure

2.1 Informal description

The stored procedure we have created takes as input a user ID and then uses three cursors to traverse the tables that stores the bookings for flights, hotel rooms and car rentals (filtering out the ones not created by the user). At each row retrieved by the cursor, the total cost of that booking will be added up. Once all the rows have been summed, the procedure will check if the user is registered. If so, it will store the total spending value in the appropriate column of the registered users table. If the user is not registered, the information is simply discarded.

2.2 Listing of the program code

```
CREATE PROCEDURE userSpending(IN p_user_id INT)
LANGUAGE SQL
BEGIN
    DECLARE done INT DEFAULT 0;
    DECLARE flight_cost DECIMAL(15, 2);
    DECLARE hotel_cost DECIMAL(15, 2);
    DECLARE car_cost DECIMAL(15, 2);
    DECLARE total DECIMAL(15, 2);
    DECLARE found_results INT DEFAULT 0;
    DECLARE flight_booking_cursor CURSOR FOR SELECT flight_total_cost FROM
        FlightBooking WHERE user_id = p_user_id;
    DECLARE hotel_booking_cursor CURSOR FOR SELECT hotel_total_cost FROM
        HotelBooking WHERE user_id = p_user_id;
    DECLARE car_rental_booking_cursor CURSOR FOR SELECT car_rental_total_cost
        FROM CarRentalBooking WHERE user_id = p_user_id;

    DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = 1;
    SET total = 0;
    OPEN flight_booking_cursor;
    OPEN hotel_booking_cursor;
    OPEN car_rental_booking_cursor;

    FETCH flight_booking_cursor INTO flight_cost;
    FETCH hotel_booking_cursor INTO hotel_cost;
    FETCH car_rental_booking_cursor INTO car_cost;

    IF flight_cost IS NOT NULL AND hotel_cost IS NOT NULL AND car_cost IS NOT
        NULL THEN
        SET total = total + flight_cost + hotel_cost + car_cost;
        SET found_results = 1;
    END IF;
    WHILE done = 0 DO
        FETCH flight_booking_cursor INTO flight_cost;
        FETCH hotel_booking_cursor INTO hotel_cost;
        FETCH car_rental_booking_cursor INTO car_cost;
        SET total = total + flight_cost + hotel_cost + car_cost;
    END WHILE;
    CLOSE flight_booking_cursor;
    CLOSE hotel_booking_cursor;
    CLOSE car_rental_booking_cursor;
    IF found_results = 0 THEN -- If no results found, set total to 0
        SET total = 0;
    END IF;
    IF EXISTS (SELECT * FROM Registered WHERE user_id = p_user_id) THEN
        UPDATE Registered SET totalspent = total WHERE user_id = p_user_id;
    END IF;
END@
```

2.3 Screenshot and proof of intended effect

The following screenshot shows the Registered table before and after the stored procedure was called on user ID 1 with the updated spending information:

```
[db2 => db2 => db2 => cs421g118@winter2024-comp421:~/project2$ db2 "SELECT * from REGISTERED;"

USER_ID    USERNAME    PASSWORD    LANGUAGE    TOTALSPENT
-----
1 jdoe      1234        en          0.00
2 janed     4321        en          0.00
3 jsmith    1111        fr          0.00
4 janes     2222        fr          0.00
5 jj        3333        en          0.00
6 janej     4444        en          0.00

6 record(s) selected.

[cs421g118@winter2024-comp421:~/project2$ db2 "CALL userSpendings(1);"

Return Status = 0
[cs421g118@winter2024-comp421:~/project2$ db2 "SELECT * from REGISTERED;"

USER_ID    USERNAME    PASSWORD    LANGUAGE    TOTALSPENT
-----
1 jdoe      1234        en          16514.00
2 janed     4321        en          0.00
3 jsmith    1111        fr          0.00
4 janes     2222        fr          0.00
5 jj        3333        en          0.00
6 janej     4444        en          0.00

6 record(s) selected.
```

Figure 1: Input and output of the stored procedure and proof of the intended effect.

3 Application Program

Please note that for testing purposes, the admin password requested for option 4 in the menu is admin000. Please also note that we have not populated our tables as fully as they could be. Thus, to be able to test useful outputs: for anything Flight related, only the month of May has flights available. In regards to registered users, the username and passwords can be found in the Registered table (an easy one to use when testing is username: jdoe and password: 1234)

```
cs421g118@winter2024-comp421:~/project2$ db2 "select * from registered;"
USER_ID  USERNAME  PASSWORD  LANGUAGE  TOTALSPENT
-----
1 jdoe      1234      en        0.00
2 janed     4321      en        0.00
3 janith    1111      fr        0.00
4 janes     2222      fr        0.00
5 jj        3333      en        0.00
6 janej     4444      en        0.00
6 record(s) selected.

cs421g118@winter2024-comp421:~/project2$ db2 "select * from users;"
USER_ID  NAME          EMAIL              PHONE_NUMBER  ADDRESS                                     CREDIT_CARD_INFORMATION
-----
1 John Doe   jdoe@gmail.com    +1(514)123-4567  1234 Rue Saint-Catherine, Montreal, QC, Canada 123412341234, 12/23, 123
2 Jane Doe   janed@gmail.com    +1(438)123-4567  1234 Rue Saint-Catherine, Montreal, QC, Canada 432143214321, 11/25, 321
3 John Smith jsmith@yahoo.com   +1(514)345-6789  321 Blvd Saint-Jean, Pointe-Claire, QC, Canada 1234432112344321, 06/26, 456
4 Jane Smith janes@yahoo.com    +1(438)345-6789  321 Blvd Saint-Jean, Pointe-Claire, QC, Canada 4321123443211234, 07/24, 789
5 John Johnson jjohn@gmail.com    +1(514)567-8901  1111 Blvd Saint-Charles, Montreal, QC, Canada 1234123443214321, 06/27, 555
6 Jane Johnson janej@gmail.com     +1(438)567-8901  1111 Blvd Saint-Charles, Montreal, QC, Canada 4321123412344321, 07/25, 666
7 John Jackson jjackson@gmail.com +1(514)678-9012  2222 Rue Saint-Catherine, Montreal, QC, Canada 1234432143211234, 06/28, 777
8 Jane Jackson jajackson@gmail.com +1(438)678-9012  2222 Rue Saint-Catherine, Montreal, QC, Canada 4321123412344321, 07/26, 888
8 record(s) selected.
```

```
cs421g118@winter2024-comp421:~/project2$ java bookingapp

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit

Please Enter Your Option Number: 1
Enter your name: Jack Joe
Registered name: Jack Joe
Enter your email: jack@gmail.com
Registered email: jack@gmail.com
Enter your phone number: +1(514)111-1111
Registered phone number: +1(514)111-1111
Enter your address: 1212 Rue Sainte-Catherine, Montreal, QC, Canada
Registered address: 1212 Rue Sainte-Catherine, Montreal, QC, Canada
Enter your credit card info: 12345678123456789, 12/24, 000
Invalid credit card info length. Please try again.
Enter your credit card info: 1234567, 12/24, 000
Registered credit card info: 1234567, 12/24, 000
Choose a username: jjoe
Choose a password: 1111
Re-enter password: 1111
Choose a language:
1. English
2. French
Please Enter Your Option Number: 1
User registered successfully

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit

Please Enter Your Option Number: █
```

```

USER_ID   USERNAME   PASSWORD   LANGUAGE   TOTALSPENT
-----
1 jdoe      1234       en         0.00
2 janed     4321       fr         0.00
3 jsmith    1111       fr         0.00
4 james     2222       fr         0.00
5 j         3333       en         0.00
6 janej     4444       en         0.00
9 jjoe      1111       en         0.00

7 record(s) selected.

```

USER_ID	NAME	EMAIL	PHONE_NUMBER	ADDRESS	CREDIT_CARD_INFORMATION
1	John Doe	idoegmail@gmail.com	+1(514)123-4567	1234 Rue Saint-Catherine, Montreal, QC, Canada	1234123412341234, 12/23, 123
2	Jane Doe	jane@gmail.com	+1(438)123-6547	1234 Rue Saint-Catherine, Montreal, QC, Canada	4321423123412321, 11/25, 234
3	John Smith	johnsmith@yahoo.com	+1(514)345-6789	1234 Rue Saint-Catherine, Montreal, QC, Canada	1234123412341234, 12/23, 123
4	Jane Smith	jane@yahoo.com	+1(514)345-6789	3111 Blvd Saint-Jean, Pointe-Claire, QC, Canada	4321123443211234, 11/24, 789
5	John Johnson	johnjohn@gmail.com	+1(514)567-8901	1234 Rue Saint-Catherine, Montreal, QC, Canada	1234123412341234, 12/23, 123
6	Jane Johnson	jane@gmail.com	+1(514)567-8901	1111 Blvd Saint-Charles, Montreal, QC, Canada	4321123412341234, 11/25, 676
7	John Jackson	jackson@gmail.com	+1(514)678-9012	2222 Rue Saint-Catherine, Montreal, QC, Canada	1234432123412321, 12/24, 676
8	Jane Jackson	janejackson@gmail.com	+1(514)678-9012	1234 Rue Saint-Catherine, Montreal, QC, Canada	4321123412341234, 11/25, 888
9	Jack Joe	jackjoe@gmail.com	+1(514)111-1111	1212 Rue Saint-Catherine, Montreal, QC, Canada	1234567, 12/24, 000

9 records(s) selected.

[illegible]

```

chil@shere020-comall:~/proj15$ java bookings

Bookings Main Menu:
1. Register a new user
2. Update a registered user's profile information
3. Flight Reservation (for admin only)
4. Add all bookings for a given user (bookings history)
5. Add all bookings (for admin only) for a given user
6. Exit

Please enter Your Option Number: 1
New user is registered user?
1. Yes
2. No

Please enter Your Option Number: 1
Enter the username: jdoe
Enter the password: 1234
Enter the email: jdoe@gmail.com
Enter the phone: 1234567890
Enter the address: 123 Main St, New York, NY 10001
Enter the date of birth: 1990-01-01
Enter the gender: M
Enter the role: User

Please enter Your Option Number: 1
Update user
Enter the username: jdoe
Enter the password: 1234
Enter the email: jdoe@gmail.com
Enter the phone: 1234567890
Enter the address: 123 Main St, New York, NY 10001
Enter the date of birth: 1990-01-01
Enter the gender: M
Enter the role: User

Please enter Your Option Number: 0203
Flight Reservation
1. January
2. February
3. March
4. April
5. May
6. June
7. July
8. August
9. September
10. October
11. November
12. December

Please enter Your Option Number: 0
New Flight
1. New Flight
2. Update Flight
3. Cancel Flight
4. Add all flights for a given user (bookings history)
5. Add all flights (for admin only)
6. Exit

Please enter Your Option Number: 1
Enter the flight number: 1001
Enter the departure date: 2024-01-15
Enter the arrival date: 2024-01-16
Enter the departure time: 08:00
Enter the arrival time: 12:00
Enter the departure airport: LAX
Enter the arrival airport: JFK
Enter the flight class: Economy
Enter the fare type: Non-refundable
Enter the baggage allowance: 23kg
Enter the meal service: Standard
Enter the cabin class: Economy
Enter the seat number: 12A
Enter the ticket price: 450.00
Enter the tax: 45.00
Enter the total price: 495.00
Enter the booking status: Confirmed
Enter the booking reference: 1001-2024-01-15-08:00-12:00-495.00
Enter the user ID: 1
Enter the user name: John Doe
Enter the user email: john.doe@gmail.com
Enter the user phone: 1234567890
Enter the user address: 123 Main St, New York, NY 10001
Enter the user date of birth: 1990-01-01
Enter the user gender: M
Enter the user role: User

Please enter Your Option Number: 1
Flight Reference No.: user ID | Passenger Name | Flight Number | Departure Date Time | Flight Total Cost | Fare Class | Seat Numbers | Plane Ticket Cost | Plane Ticket Surcharge | Plane Ticket Tax | Flight Booking Fee | Flight Booking Date
1 | 1 | John Doe, Jane Doe | AC456 | 2024-01-01 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-01
2 | 2 | Jane Doe, John Doe | AC456 | 2024-01-02 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-02
3 | 3 | John Doe, Jane Doe | AC456 | 2024-01-03 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-03
4 | 4 | Jane Doe, John Doe | AC456 | 2024-01-04 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-04
5 | 5 | John Doe, Jane Doe | AC456 | 2024-01-05 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-05
6 | 6 | Jane Doe, John Doe | AC456 | 2024-01-06 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-06
7 | 7 | John Doe, Jane Doe | AC456 | 2024-01-07 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-07
8 | 8 | Jane Doe, John Doe | AC456 | 2024-01-08 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-08
9 | 9 | John Doe, Jane Doe | AC456 | 2024-01-09 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-09
10 | 10 | Jane Doe, John Doe | AC456 | 2024-01-10 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-10
11 | 11 | John Doe, Jane Doe | AC456 | 2024-01-11 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-11
12 | 12 | Jane Doe, John Doe | AC456 | 2024-01-12 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-12
13 | 13 | John Doe, Jane Doe | AC456 | 2024-01-13 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-13
14 | 14 | Jane Doe, John Doe | AC456 | 2024-01-14 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-14
15 | 15 | John Doe, Jane Doe | AC456 | 2024-01-15 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-15
16 | 16 | Jane Doe, John Doe | AC456 | 2024-01-16 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-16
17 | 17 | John Doe, Jane Doe | AC456 | 2024-01-17 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-17
18 | 18 | Jane Doe, John Doe | AC456 | 2024-01-18 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-18
19 | 19 | John Doe, Jane Doe | AC456 | 2024-01-19 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-19
20 | 20 | Jane Doe, John Doe | AC456 | 2024-01-20 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-20
21 | 21 | John Doe, Jane Doe | AC456 | 2024-01-21 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-21
22 | 22 | Jane Doe, John Doe | AC456 | 2024-01-22 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-22
23 | 23 | John Doe, Jane Doe | AC456 | 2024-01-23 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-23
24 | 24 | Jane Doe, John Doe | AC456 | 2024-01-24 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-24
25 | 25 | John Doe, Jane Doe | AC456 | 2024-01-25 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-25
26 | 26 | Jane Doe, John Doe | AC456 | 2024-01-26 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-26
27 | 27 | John Doe, Jane Doe | AC456 | 2024-01-27 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-27
28 | 28 | Jane Doe, John Doe | AC456 | 2024-01-28 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-28
29 | 29 | John Doe, Jane Doe | AC456 | 2024-01-29 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-29
30 | 30 | Jane Doe, John Doe | AC456 | 2024-01-30 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-30
31 | 31 | John Doe, Jane Doe | AC456 | 2024-01-31 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-01-31
32 | 32 | Jane Doe, John Doe | AC456 | 2024-02-01 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-02-01
33 | 33 | John Doe, Jane Doe | AC456 | 2024-02-02 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.00 | 0.00 | 2024-02-02
34 | 34 | Jane Doe, John Doe | AC456 | 2024-02-03 13:00:00 | 220.00 | Economy | A33, B33 | 180.00 | 30.00 | 27.
```

[illegible]

```

Bookings Main Menu:
  1. Register a new user
  2. Add a new booking for a user
  3. Update a registered user's profile information
  4. Flight Cancellation (for admins only)
  5. Find all bookings for a given user (booking history)
  6. Find all booking total costs for a given user
  7. Quit
[Please Enter Your Option Number: 2
Are you a registered user?
  1. Yes
  2. No
[Please Enter Your Option Number: 1
[Enter the username: jdoe
[Enter the password: 1234
Choose the booking type:
  1. Flight
  2. Hotel
  3. Car Rental
[Please Enter Your Option Number: 3
Choose the pickup date:
  2024
[Please Enter Your Option Number: 2024
Choose the month:
  1. January
  2. February
  3. March
  4. April
  5. May
  6. June
  7. July
  8. August
  9. September
  10. October
  11. November
  12. December
[Please Enter Your Option Number: 5
[Choose the day: 1
Choose the return date:
  2024
[Please Enter Your Option Number: 2024
Choose the month:
  1. January
  2. February
  3. March
  4. April
  5. May
  6. June
  7. July
  8. August
  9. September
  10. October
  11. November
  12. December
[Please Enter Your Option Number: 5
[Choose the day: 10
Choose the pickup location:
  1. Montreal, Canada
  2. Tokyo, Japan
[Please Enter Your Option Number: 2
Choose the return location:
  1. Montreal, Canada
  2. Tokyo, Japan
[Please Enter Your Option Number: 2
There are no available cars for that date. Please try again.
Choose the pickup date:

```

[illegible]

```
cs42ig18@winter2024-comp4211-:project2$ java BookingApp

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit

Please Enter Your Option Number: 3
Enter the username: jlee
Enter the password: 1111
User Info:



| User ID | Language | Name     | Email          | Phone Number    | Address                                         | Credit Card Information |
|---------|----------|----------|----------------|-----------------|-------------------------------------------------|-------------------------|
| 9       | en       | Jack Joe | Jack@gmail.com | +1(514)111-1111 | 1212 Rue Sainte-Catherine, Montreal, QC, Canada | 1234567, 12/24, 000     |



Which information would you like to update?
1. Language
2. Name
3. Email
4. Phone Number
5. Address
6. Credit Card Information
7. Quit

Please Enter Your Option Number: 1
Choose the new language:
1. English
2. French

Please Enter Your Option Number: 2
Data updated successfully
Which information would you like to update?
1. Language
2. Name
3. Email
4. Phone Number
5. Address
6. Credit Card Information
7. Quit

Please Enter Your Option Number: 2
Enter the new name: Johnny Joe
Data updated successfully
Which information would you like to update?
1. Language
2. Name
3. Email
4. Phone Number
5. Address
6. Credit Card Information
7. Quit

Please Enter Your Option Number: 3
Enter the new email: jackjohnny@gmail.com
Data updated successfully
Enter the new phone number: 314-567-8900
Data updated successfully
```



```

[Please Enter Your Option Number: 3
[Enter the new email: jackjohnny@gmail.com
Data updated successfully
Which information would you like to update?
    1. Language
    2. Name
    3. Email
    4. Phone Number
    5. Address
    6. Credit Card Information
    7. Quit
[Please Enter Your Option Number: 4
[Enter the new phone number: +2(514)222-2222
Data updated successfully
Which information would you like to update?
    1. Language
    2. Name
    3. Email
    4. Phone Number
    5. Address
    6. Credit Card Information
    7. Quit
[Please Enter Your Option Number: 5
[Enter the new address: 2323 Rue Sainte-Catherine, Montreal, QC, Canada
Data updated successfully
Which information would you like to update?
    1. Language
    2. Name
    3. Email
    4. Phone Number
    5. Address
    6. Credit Card Information
    7. Quit
[Please Enter Your Option Number: 6
[Enter the new credit card information: 09876, 30/23, 7777
Data updated successfully
Which information would you like to update?
    1. Language
    2. Name
    3. Email
    4. Phone Number
    5. Address
    6. Credit Card Information
    7. Quit
[Please Enter Your Option Number: 7
Updates Done

Bookings Main Menu:
    1. Register a new user
    2. Add a new booking for a user
    3. Update a registered user's profile information
    4. Flight Cancellation (for admins only)
    5. Find all bookings for a given user (booking history)
    6. Find all booking total costs for a given user
    7. Quit
Please Enter Your Option Number: █

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```
cs421g18@winter2024-comp421:~/project2$ db2 "select * from users;"

USER_ID      NAME      EMAIL      PHONE_NUMBER      ADDRESS      CREDIT_CARD_INFORMATION

1 John Doe      jdoe@gmail.com      +1(514)123-4567      1234 Rue Saint-Catherine, Montreal, QC, Canada      1234123412341234, 12/23, 123
2 Jane Doe      jane@gmail.com      +1(438)123-4567      1234 Rue Saint-Catherine, Montreal, QC, Canada      4321432143214321, 11/25, 321
3 John Smith      smith@yahoo.com      +1(514)345-6789      321 Blvd Saint-Jean, Pointe-Claire, QC, Canada      1234432112344321, 06/26, 456
4 Jane Smith      janes@yahoo.com      +1(438)345-6789      321 Blvd Saint-Jean, Pointe-Claire, QC, Canada      4321123443211234, 07/24, 789
5 John Johnson      jj@gmail.com      +1(514)567-8901      1111 Blvd Saint-Charles, Montreal, QC, Canada      1234123443214321, 06/27, 565
6 Jane Johnson      jane@gmail.com      +1(438)567-8901      1111 Blvd Saint-Charles, Montreal, QC, Canada      4321123412344321, 07/25, 466
7 John Jackson      jackson@gmail.com      +1(514)678-9012      2222 Rue Sainte-Catherine, Montreal, QC, Canada      1234432143211234, 06/28, 777
8 Jane Jackson      jajackson@gmail.com      +1(438)678-9012      2222 Rue Sainte-Catherine, Montreal, QC, Canada      4321123412344321, 07/26, 888
9 Johnny Joe      jackson@gmail.com      +1(514)122-2222      2323 Rue Sainte-Catherine, Montreal, QC, Canada      99876, 30/23, 7777
10 Jerry Joe      jerry@gmail.com      +1(438)111-1111      1212 Rue Sainte-Catherine, Montreal, QC, Canada      12345678, 12/25, 9191

10 record(s) selected.

cs421g18@winter2024-comp421:~/project2$ db2 "select * from registered;"

USER_ID      USERNAME      PASSWORD      LANGUAGE      TOTALSPENT

1 jdoe      1234      en      0.00
2 jmed      4321      en      0.00
3 jsmith      1111      fr      0.00
4 janes      2222      fr      0.00
5 jj      3333      en      0.00
6 janej      4444      en      0.00
9 jjoe      1111      fr      0.00

7 record(s) selected.

cs421g18@winter2024-comp421:~/project2$
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cs421g18@winter2024-comp421:~/project2$ db2 "select * from flightbookings;"

FLIGHT_NUMBER      USER_ID      PASSENGER_NAMES      FLIGHT_NUMBER      DEPARTURE_DATE_TIME      FLIGHT_TOTAL_COST      FAIR_CLASS      SEAT_NUMBERS      PLANE_TINNY_COST      PLANE_TINNY_BURNING_COST      PLANE_TINNY_FUEL_COST      FLIGHT_BOOKING_FEE      FLIGHT_BOOKING_DAYS

1 AC803 on 2024-05-01      1 jdoe      Jane Doe, Jane Doe      AC803 on 2024-05-01      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
2 AC803 on 2024-05-02      2 janej      Jane Smith, Jane Smith      AC803 on 2024-05-02      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
3 AC803 on 2024-05-03      3 jsmith      John Smith, John Smith      AC803 on 2024-05-03      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
4 AC803 on 2024-05-04      4 janes      Jane Smith, Jane Smith      AC803 on 2024-05-04      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
5 AC803 on 2024-05-05      5 jj      John Johnson, John Johnson      AC803 on 2024-05-05      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
6 AC803 on 2024-05-06      6 janej      Jane Johnson, Jane Johnson      AC803 on 2024-05-06      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
7 AC803 on 2024-05-07      7 johnj      John Jackson, John Jackson      AC803 on 2024-05-07      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
8 AC803 on 2024-05-08      8 janej      Jane Jackson, Jane Jackson      AC803 on 2024-05-08      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
9 AC803 on 2024-05-09      9 jjoe      John Johnson, John Johnson      AC803 on 2024-05-09      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
10 AC803 on 2024-05-10      10 jjoe      John Johnson, John Johnson      AC803 on 2024-05-10      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
11 AC803 on 2024-05-11      11 jjoe      John Johnson, John Johnson      AC803 on 2024-05-11      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
12 AC803 on 2024-05-12      12 jjoe      John Johnson, John Johnson      AC803 on 2024-05-12      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
13 AC803 on 2024-05-13      13 jjoe      John Johnson, John Johnson      AC803 on 2024-05-13      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
14 AC803 on 2024-05-14      14 jjoe      John Johnson, John Johnson      AC803 on 2024-05-14      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
15 AC803 on 2024-05-15      15 jjoe      John Johnson, John Johnson      AC803 on 2024-05-15      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
16 AC803 on 2024-05-16      16 jjoe      John Johnson, John Johnson      AC803 on 2024-05-16      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
17 AC803 on 2024-05-17      17 jjoe      John Johnson, John Johnson      AC803 on 2024-05-17      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
18 AC803 on 2024-05-18      18 jjoe      John Johnson, John Johnson      AC803 on 2024-05-18      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
19 AC803 on 2024-05-19      19 jjoe      John Johnson, John Johnson      AC803 on 2024-05-19      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
20 AC803 on 2024-05-20      20 jjoe      John Johnson, John Johnson      AC803 on 2024-05-20      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
21 AC803 on 2024-05-21      21 jjoe      John Johnson, John Johnson      AC803 on 2024-05-21      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
22 AC803 on 2024-05-22      22 jjoe      John Johnson, John Johnson      AC803 on 2024-05-22      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
23 AC803 on 2024-05-23      23 jjoe      John Johnson, John Johnson      AC803 on 2024-05-23      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
24 AC803 on 2024-05-24      24 jjoe      John Johnson, John Johnson      AC803 on 2024-05-24      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
25 AC803 on 2024-05-25      25 jjoe      John Johnson, John Johnson      AC803 on 2024-05-25      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
26 AC803 on 2024-05-26      26 jjoe      John Johnson, John Johnson      AC803 on 2024-05-26      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
27 AC803 on 2024-05-27      27 jjoe      John Johnson, John Johnson      AC803 on 2024-05-27      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
28 AC803 on 2024-05-28      28 jjoe      John Johnson, John Johnson      AC803 on 2024-05-28      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
29 AC803 on 2024-05-29      29 jjoe      John Johnson, John Johnson      AC803 on 2024-05-29      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
30 AC803 on 2024-05-30      30 jjoe      John Johnson, John Johnson      AC803 on 2024-05-30      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
31 AC804 on 2024-05-01      31 jjoe      John Johnson, John Johnson      AC804 on 2024-05-01      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
32 AC804 on 2024-05-02      32 jjoe      John Johnson, John Johnson      AC804 on 2024-05-02      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
33 AC804 on 2024-05-03      33 jjoe      John Johnson, John Johnson      AC804 on 2024-05-03      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
34 AC804 on 2024-05-04      34 jjoe      John Johnson, John Johnson      AC804 on 2024-05-04      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
35 AC804 on 2024-05-05      35 jjoe      John Johnson, John Johnson      AC804 on 2024-05-05      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
36 AC804 on 2024-05-06      36 jjoe      John Johnson, John Johnson      AC804 on 2024-05-06      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
37 AC804 on 2024-05-07      37 jjoe      John Johnson, John Johnson      AC804 on 2024-05-07      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
38 AC804 on 2024-05-08      38 jjoe      John Johnson, John Johnson      AC804 on 2024-05-08      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
39 AC804 on 2024-05-09      39 jjoe      John Johnson, John Johnson      AC804 on 2024-05-09      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
40 AC804 on 2024-05-10      40 jjoe      John Johnson, John Johnson      AC804 on 2024-05-10      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
41 AC804 on 2024-05-11      41 jjoe      John Johnson, John Johnson      AC804 on 2024-05-11      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
42 AC804 on 2024-05-12      42 jjoe      John Johnson, John Johnson      AC804 on 2024-05-12      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
43 AC804 on 2024-05-13      43 jjoe      John Johnson, John Johnson      AC804 on 2024-05-13      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
44 AC804 on 2024-05-14      44 jjoe      John Johnson, John Johnson      AC804 on 2024-05-14      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
45 AC804 on 2024-05-15      45 jjoe      John Johnson, John Johnson      AC804 on 2024-05-15      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
46 AC804 on 2024-05-16      46 jjoe      John Johnson, John Johnson      AC804 on 2024-05-16      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
47 AC804 on 2024-05-17      47 jjoe      John Johnson, John Johnson      AC804 on 2024-05-17      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
48 AC804 on 2024-05-18      48 jjoe      John Johnson, John Johnson      AC804 on 2024-05-18      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
49 AC804 on 2024-05-19      49 jjoe      John Johnson, John Johnson      AC804 on 2024-05-19      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
50 AC804 on 2024-05-20      50 jjoe      John Johnson, John Johnson      AC804 on 2024-05-20      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
51 AC804 on 2024-05-21      51 jjoe      John Johnson, John Johnson      AC804 on 2024-05-21      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
52 AC804 on 2024-05-22      52 jjoe      John Johnson, John Johnson      AC804 on 2024-05-22      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
53 AC804 on 2024-05-23      53 jjoe      John Johnson, John Johnson      AC804 on 2024-05-23      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
54 AC804 on 2024-05-24      54 jjoe      John Johnson, John Johnson      AC804 on 2024-05-24      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
55 AC804 on 2024-05-25      55 jjoe      John Johnson, John Johnson      AC804 on 2024-05-25      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
56 AC804 on 2024-05-26      56 jjoe      John Johnson, John Johnson      AC804 on 2024-05-26      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
57 AC804 on 2024-05-27      57 jjoe      John Johnson, John Johnson      AC804 on 2024-05-27      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
58 AC804 on 2024-05-28      58 jjoe      John Johnson, John Johnson      AC804 on 2024-05-28      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
59 AC804 on 2024-05-29      59 jjoe      John Johnson, John Johnson      AC804 on 2024-05-29      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
60 AC804 on 2024-05-30      60 jjoe      John Johnson, John Johnson      AC804 on 2024-05-30      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
61 AC804 on 2024-05-31      61 jjoe      John Johnson, John Johnson      AC804 on 2024-05-31      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
62 AC805 on 2024-05-01      62 jjoe      John Johnson, John Johnson      AC805 on 2024-05-01      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
63 AC805 on 2024-05-02      63 jjoe      John Johnson, John Johnson      AC805 on 2024-05-02      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
64 AC805 on 2024-05-03      64 jjoe      John Johnson, John Johnson      AC805 on 2024-05-03      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
65 AC805 on 2024-05-04      65 jjoe      John Johnson, John Johnson      AC805 on 2024-05-04      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
66 AC805 on 2024-05-05      66 jjoe      John Johnson, John Johnson      AC805 on 2024-05-05      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
67 AC805 on 2024-05-06      67 jjoe      John Johnson, John Johnson      AC805 on 2024-05-06      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
68 AC805 on 2024-05-07      68 jjoe      John Johnson, John Johnson      AC805 on 2024-05-07      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
69 AC805 on 2024-05-08      69 jjoe      John Johnson, John Johnson      AC805 on 2024-05-08      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
70 AC805 on 2024-05-09      70 jjoe      John Johnson, John Johnson      AC805 on 2024-05-09      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
71 AC805 on 2024-05-10      71 jjoe      John Johnson, John Johnson      AC805 on 2024-05-10      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
72 AC805 on 2024-05-11      72 jjoe      John Johnson, John Johnson      AC805 on 2024-05-11      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
73 AC805 on 2024-05-12      73 jjoe      John Johnson, John Johnson      AC805 on 2024-05-12      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
74 AC805 on 2024-05-13      74 jjoe      John Johnson, John Johnson      AC805 on 2024-05-13      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
75 AC805 on 2024-05-14      75 jjoe      John Johnson, John Johnson      AC805 on 2024-05-14      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
76 AC805 on 2024-05-15      76 jjoe      John Johnson, John Johnson      AC805 on 2024-05-15      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
77 AC805 on 2024-05-16      77 jjoe      John Johnson, John Johnson      AC805 on 2024-05-16      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
78 AC805 on 2024-05-17      78 jjoe      John Johnson, John Johnson      AC805 on 2024-05-17      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
79 AC805 on 2024-05-18      79 jjoe      John Johnson, John Johnson      AC805 on 2024-05-18      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
80 AC805 on 2024-05-19      80 jjoe      John Johnson, John Johnson      AC805 on 2024-05-19      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
81 AC805 on 2024-05-20      81 jjoe      John Johnson, John Johnson      AC805 on 2024-05-20      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
82 AC805 on 2024-05-21      82 jjoe      John Johnson, John Johnson      AC805 on 2024-05-21      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
83 AC805 on 2024-05-22      83 jjoe      John Johnson, John Johnson      AC805 on 2024-05-22      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
84 AC805 on 2024-05-23      84 jjoe      John Johnson, John Johnson      AC805 on 2024-05-23      1200.00      1200.00      120.00      120.00      120.00      120.00      120.00      120.00
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cs421g18@winter2024-comp421:~/project2$ java bookingsapp

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit

Please Enter Your Option Number: 4
FOR ONGOING PURPOSES ONLY, THE PASSWORD FOR ADMIN IS 'admin@'
Enter the password: admin@
Choose the flight number and departure date of the flight to be cancelled:
Available Flights:
1. AC803 on 2024-05-01
2. AC803 on 2024-05-02
3. AC803 on 2024-05-03
4. AC803 on 2024-05-04
5. AC803 on 2024-05-05
6. AC803 on 2024-05-06
7. AC803 on 2024-05-07
8. AC803 on 2024-05-08
9. AC803 on 2024-05-09
10. AC803 on 2024-05-10
11. AC803 on 2024-05-11
12. AC803 on 2024-05-12
13. AC803 on 2024-05-13
14. AC803 on 2024-05-14
15. AC803 on 2024-05-15
16. AC803 on 2024-05-16
17. AC803 on 2024-05-17
18. AC803 on 2024-05-18
19. AC803 on 2024-05-19
20. AC803 on 2024-05-20
21. AC803 on 2024-05-21
22. AC803 on 2024-05-22
23. AC803 on 2024-05-23
24. AC803 on 2024-05-24
25. AC803 on 2024-05-25
26. AC803 on 2024-05-26
27. AC803 on 2024-05-27
28. AC803 on 2024-05-28
29. AC803 on 2024-05-29
30. AC803 on 2024-05-30
31. AC804 on 2024-05-01
32. AC804 on 2024-05-02
33. AC804 on 2024-05-03
34. AC804 on 2024-05-04
35. AC804 on 2024-05-05
36. AC804 on 2024-05-06
37. AC804 on 2024-05-07
38. AC804 on 2024-05-08
39. AC804 on 2024-05-09
40. AC804 on 2024-05-10
41. AC804 on 2024-05-11
42. AC804 on 2024-05-12
43. AC804 on 2024-05-13
44. AC804 on 2024-05-14
45. AC804 on 2024-05-15
46. AC804 on 2024-05-16
47. AC804 on 2024-05-17
48. AC804 on 2024-05-18
49. AC804 on 2024-05-19
50. AC804 on 2024-05-20
51. AC804 on 2024-05-21
52. AC804 on 2024-05-22
53. AC804 on 2024-05-23
54. AC804 on 2024-05-24
55. AC804 on 2024-05-25
56. AC804 on 2024-05-26
57. AC804 on 2024-05-27
58. AC804 on 2024-05-28
59. AC804 on 2024-05-29
60. AC804 on 2024-05-30
61. AC804 on 2024-05-31
62. AC805 on 2024-05-01
63. AC805 on 2024-05-02
64. AC805 on 2024-05-03
65. AC805 on 2024-05-04
66. AC805 on 2024-05-05
67. AC805 on 2024-05-06
68. AC805 on 2024-05-07
69. AC805 on 2024-05-08
70. AC805 on 2024-05-09
71. AC805 on 2024-05-10
72. AC805 on 2024-05-11
73. AC805 on 2024-05-12
74. AC805 on 2024-05-13
75. AC805 on 2024-05-14
76. AC805 on 2024-05-15
77. AC805 on 2024-05-16
78. AC805 on 202
```

77. AC005 on 2024-05-16
78. AC005 on 2024-05-17
79. AC005 on 2024-05-18
80. AC005 on 2024-05-19
81. AC005 on 2024-05-20
82. AC005 on 2024-05-21
83. AC005 on 2024-05-22
84. AC005 on 2024-05-23
85. AC005 on 2024-05-24
86. AC005 on 2024-05-25
87. AC005 on 2024-05-26
88. AC005 on 2024-05-27
89. AC005 on 2024-05-28
90. AC005 on 2024-05-29
91. AC005 on 2024-05-30
92. AC006 on 2024-05-01
93. AC006 on 2024-05-02
94. AC006 on 2024-05-03
95. AC006 on 2024-05-04
96. AC006 on 2024-05-05
97. AC006 on 2024-05-06
98. AC006 on 2024-05-07
99. AC006 on 2024-05-08
100. AC006 on 2024-05-09
101. AC006 on 2024-05-10
102. AC006 on 2024-05-11
103. AC006 on 2024-05-12
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496. SELECT * FROM FLIGHT;
497. SELECT * FROM HOTEL;
498. SELECT * FROM CAR;
499. SELECT * FROM USER;
500. SELECT * FROM ADMIN;
```

```
cs421g118@winter2024-comp421:~/project2$ java bookingapp

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit

Please Enter Your Option Number: 5
Enter username:
jdoo
Enter password:
1234
User ID: 1

+-----+-----+
| Flight Booking Reference Number | Flight Number |
+-----+-----+
| 1 | AC005 |
| 6 | AC005 |
+-----+-----+

+-----+-----+
| Hotel Booking Reference | Brand Affiliation |
+-----+-----+
| 1 | APA Hotel |
+-----+-----+

+-----+-----+
| Car Rental Reference | Car License Plate |
+-----+-----+
| 1 | EMSBAI |
| 6 | ZU21 |
+-----+-----+

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit

Please Enter Your Option Number: █
```

```

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit
Please Enter Your Option Number: 6
Enter the user id: 1
+-----+-----+-----+-----+
| User ID | Flight Total Cost | Hotel Total Cost | Car Rental Total Cost |
+-----+-----+-----+-----+
| 1       | 7035.00          | 2727.00          | 4360.00                |
+-----+-----+-----+-----+

Bookings Main Menu:
1. Register a new user
2. Add a new booking for a user
3. Update a registered user's profile information
4. Flight Cancellation (for admins only)
5. Find all bookings for a given user (booking history)
6. Find all booking total costs for a given user
7. Quit
Please Enter Your Option Number: █

```

4 Indexing

4.1 Index 1

4.1.1 Script and Result

```
CREATE INDEX idx_flights_routes
ON FLIGHTS (departure_city, arrival_city);
```

Here is a screenshot of executing the create index statement:

```

[db2 => CREATE INDEX idx_flights_routes
[db2 (cont.) => ON FLIGHTS (departure_city,arrival_city);
DB20000I The SQL command completed successfully.
db2 => █

```

Figure 2: Executing the create index statement in DB2.

4.1.2 Relevant queries

This index would speed up queries for flights with a specific departure city and arrival city. In the case of our application, for instance, if a user is looking for a flight from Montreal to Tokyo, the search using the concerning query will be much faster.

4.2 Index 2

4.2.1 Script and Result

```
CREATE INDEX idx_flights_on_departure_date  
ON FLIGHTS (departure_date_time);
```

Here is a screenshot of executing the create index statement:

```
db2 => CREATE INDEX idx_flights_on_departure_date ON FLIGHTS (departure_date_time);  
DB20000I The SQL command completed successfully.  
db2 => █
```

Figure 3: Executing the create index statement in DB2.

4.2.2 Relevant queries

This index would speed up queries for flights within a specific range of dates. Therefore, user searches for flights after a specific date will be faster. Specifically, when a user of our application tries to book a flight, they need to specify a month and day first, which will be much faster using this index.

5 Visualization

5.1 Vis 1

The first chart below visualizes the average money spent by a user on flights for the year 2024.

5.2 SQL

Below are the data entries added to FlightBooking used for the visualization.

```
INSERT INTO FlightBooking (flight_reference_number, user_id, passenger_names,  
    flight_number, departure_date_time,  
    flight_total_cost, fare_class, seat_numbers, plane_ticket_cost,  
    plane_ticket_surcharge, plane_ticket_tax,  
    flight_booking_fees, flight_booking_date) VALUES  
    (1, 1, 'John Doe', 'AC005', '2024-05-01 13:05:00',  
    2220.00, 'Economy', 'A33, B33', 1800.00, 100.00, 270.00,  
    50.00, '2024-04-01'),  
    (2, 3, 'John Smith', 'AC005', '2024-05-01 13:05:00',  
    1110.00, 'Economy', 'A34', 900.00, 50.00, 135.00,  
    25.00, '2024-04-01'),  
    (3, 3, 'John Smith', 'AC006', '2024-05-21 18:15:00',  
    1110.00, 'Economy', 'A34', 900.00, 50.00, 135.00,  
    25.00, '2024-04-01'),  
    (4, 4, 'Jane Smith', 'AC405', '2024-05-01 09:10:00',  
    535.00, 'Business', 'A1', 400.00, 50.00, 60.00,  
    25.00, '2024-04-02'),  
    (5, 4, 'Jane Smith', 'AC406', '2024-05-21 10:00:00',  
    535.00, 'Business', 'A1', 400.00, 50.00, 60.00,  
    25.00, '2024-04-02'),  
    (6, 1, 'John Doe', 'AC405', '2024-05-12 09:10:00',  
    159.00, 'Economy', '9C', 120.00, 6.00, 18.00,  
    15.00, '2024-03-18'),  
    (7, 1, 'John Doe', 'AC413', '2024-05-10 13:10:00',  
    195.00, 'Economy', '55E', 150.00, 7.50, 22.50,  
    15.00, '2024-03-18'),  
    (8, 1, 'John Doe', 'NH116', '2024-05-09 21:55:00',  
    5415.00, 'Business', '15C', 4500.00, 225.00, 675.00,
```

15.00, '2024-03-18'),
 (9, 9, 'John Doe2', 'AC406', '2024-05-10 10:00:00',
 159.00, 'Economy', '24J', 120.00, 6.00, 18.00,
 15.00, '2024-03-18'),
 (10, 1, 'John Doe', 'AC301', '2024-05-10 07:10:00',
 1215.00, 'Business', '36E', 1000.00, 50.00, 150.00,
 15.00, '2024-03-18'),
 (11, 1, 'John Doe', 'AC005', '2024-07-02 13:05:00',
 1095.00, 'Economy', '3A', 900.00, 45.00, 135.00,
 15.00, '2024-03-18'),
 (12, 1, 'John Doe', 'AC005', '2024-07-04 13:05:00',
 1095.00, 'Economy', '0J', 900.00, 45.00, 135.00,
 15.00, '2024-03-18'),
 (13, 1, 'John Doe', 'AC005', '2024-07-01 13:05:00',
 4815.00, 'Business', '35H', 4000.00, 200.00, 600.00,
 15.00, '2024-03-18'),
 (14, 1, 'John Doe', 'AC005', '2024-07-02 13:05:00',
 4815.00, 'Business', '35C', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (15, 1, 'John Doe', 'AC005', '2024-08-01 13:05:00',
 4815.00, 'Business', '22B', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (16, 1, 'John Doe', 'AC005', '2024-07-02 13:05:00',
 1095.00, 'Economy', '20D', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (17, 1, 'John Doe', 'AC005', '2024-07-03 13:05:00',
 4815.00, 'Business', '14J', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (18, 1, 'John Doe', 'AC005', '2024-08-01 13:05:00',
 4815.00, 'Business', '58C', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (19, 1, 'john Doe', 'AC005', '2024-08-02 13:05:00',
 1095.00, 'Economy', '42J', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (20, 1, 'john doe', 'AC005', '2024-09-01 13:05:00',
 1095.00, 'Economy', '35D', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (21, 1, 'john doe', 'AC005', '2024-09-02 13:05:00',
 1095.00, 'Economy', '50D', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (22, 1, 'john doe', 'AC005', '2024-09-03 13:05:00',
 4815.00, 'Business', '42D', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (23, 1, 'john doe', 'AC005', '2024-10-01 13:05:00',
 1095.00, 'Economy', '30E', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (24, 1, 'john doe', 'AC005', '2024-10-01 13:05:00',
 1095.00, 'Economy', '58K', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (25, 1, 'john doe', 'AC005', '2024-10-01 13:05:00',
 4815.00, 'Business', '55D', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (26, 1, 'john doe', 'AC005', '2024-11-01 13:05:00',
 1095.00, 'Economy', '13H', 900.00, 45.00, 135.00,
 15.00, '2024-03-19'),
 (27, 1, 'john doe', 'AC005', '2024-11-01 13:05:00',
 4815.00, 'Business', '19K', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (28, 1, 'john doe', 'AC005', '2024-12-01 13:05:00',
 4815.00, 'Business', '14B', 4000.00, 200.00, 600.00,
 15.00, '2024-03-19'),
 (29, 1, 'john doe', 'AC005', '2024-12-03 13:05:00',


```
4815.00, 'Business', '10B', 4000.00, 200.00, 600.00,
15.00, '2024-03-19'),
(30, 1, 'john doe', 'AC005', '2024-12-02 13:05:00',
1095.00, 'Economy', '12A', 900.00, 45.00, 135.00,
15.00, '2024-03-19'),
(31, 1, 'john doe', 'AC005', '2024-12-03 13:05:00',
4815.00, 'Business', '52C', 4000.00, 200.00, 600.00,
15.00, '2024-03-19'),
(32, 1, 'john doe', 'AC005', '2024-12-01 13:05:00',
1095.00, 'Economy', '49J', 900.00, 45.00, 135.00,
15.00, '2024-03-19'),
(33, 1, 'john doe', 'AC005', '2024-06-01 13:05:00',
1095.00, 'Economy', '49E', 900.00, 45.00, 135.00,
15.00, '2024-03-19'),
(34, 1, 'john doe', 'AC005', '2024-06-02 13:05:00',
1095.00, 'Economy', '7C', 900.00, 45.00, 135.00,
15.00, '2024-03-19'),
(35, 1, 'john doe', 'AC005', '2024-06-01 13:05:00',
1095.00, 'Economy', '9B', 900.00, 45.00, 135.00,
15.00, '2024-03-19')
;
```

Here is the SQL statement used to generate the data:

```
EXPORT TO vis1data.csv OF DEL MODIFIED BY NOCHARDEL SELECT * FROM
FLIGHTBOOKING;
```

5.2.1 Image of the Chart

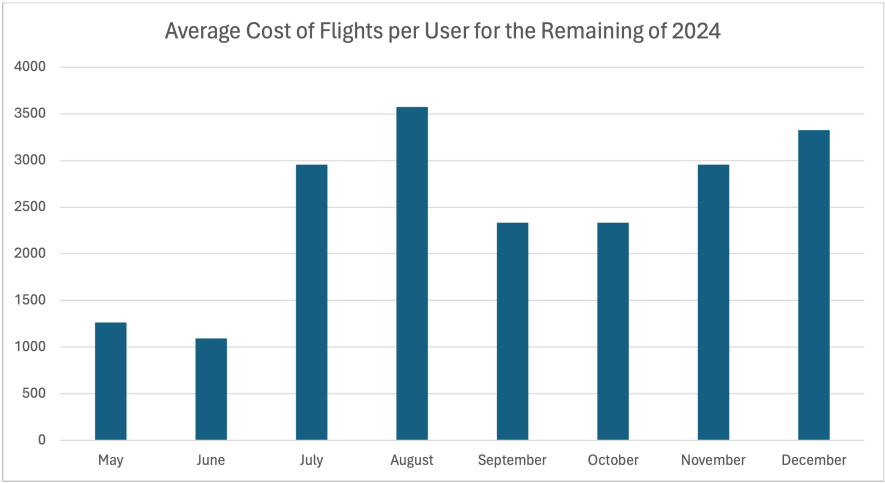


Figure 4: Chart representing the average money spent by a user for remainder of the current year (2024).

The use of a column chart suits this visualization, since we can clearly see the variation in the average money spent by a user for each month on flight bookings.

5.3 Vis 2

The second chart below visualizes the total amount of car rentals per month for the year 2024.

5.4 SQL

Below are the data entries added to CarRentalBooking used for the visualization.

```
INSERT INTO CarRentalBooking (car_rental_reference_number, user_id,
    car_license_plate, pickup_location, return_location,
    pickup_date_time, return_date_time, car_rental_booking_date,
    car_rental_cost, car_rental_tax, car_rental_booking_fees,
    car_rental_total_cost, insurance) VALUES
    (1, 1, 'EMSBAI', 'Narita International Airport', 'Narita International
        Airport',
        '2024-05-02 18:00:00', '2024-05-21 10:00:00', '2024-04-01', 3000.00,
        300.00, 10.00,
        3310.00, 'Fully covered'),
    (2, 3, 'GZ2003', 'Narita International Airport', 'Narita International
        Airport',
        '2024-05-02 18:00:00', '2024-05-21 10:00:00', '2024-04-01', 8000.00,
        800.00, 10.00,
        8810.00, 'Fully covered'),
    (3, 4, 'GRTZ', 'AVIS Downtown Montreal', 'AVIS Downtown Montreal',
        '2024-05-01 10:00:00', '2024-05-22 10:00:00', '2024-04-02', 2200.00,
        315.00, 10.00,
        2425.00, 'Fully covered'),
    (4, 4, 'ZU21', 'AVIS Downtown Montreal', 'AVIS Downtown Montreal',
        '2024-05-22 10:00:00', '2024-05-25 10:00:00', '2024-04-02', 400.00,
        60.00, 10.00,
        470.00, 'Fully covered'),
    (5, 4, 'GRETA21', 'Hertz Peel', 'Hertz Peel',
        '2024-05-25 10:00:00', '2024-05-28 10:00:00', '2024-04-02', 600.00,
        90.00, 10.00,
        700.00, 'Fully covered'),
    (6, 1, 'ZRM', 'AVIS Tokyo', 'AVIS Montreal',
        '2024-03-20 10:00:00', '2024-05-10 18:00:00', '2024-03-19', 5100.00,
        765.00, 15.00,
        5880.00, 'No smoking, No pets, Insurance included'),
    (7, 1, 'GRETA21', 'Hertz Montreal', 'Hertz Montreal',
        '2024-04-01 10:00:00', '2024-04-20 18:00:00', '2024-03-19', 2850.00,
        427.50, 15.00,
        3292.50, 'No smoking, No pets, Insurance included'),
    (8, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
        '2024-04-20 10:00:00', '2024-04-20 18:00:00', '2024-03-19', 0.00,
        0.00, 15.00,
        15.00, 'No smoking, No pets, Insurance included'),
    (9, 1, 'ZU21', 'AVIS Montreal', 'AVIS Montreal',
        '2024-04-20 10:00:00', '2024-04-24 18:00:00', '2024-03-19', 400.00,
        60.00, 15.00,
        475.00, 'No smoking, No pets, Insurance included'),
    (10, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
        '2024-04-25 10:00:00', '2024-04-30 18:00:00', '2024-03-19', 500.00,
        75.00, 15.00,
        590.00, 'No smoking, No pets, Insurance included'),
    (11, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',
        '2024-04-10 10:00:00', '2024-04-20 18:00:00', '2024-03-19', 1500.00,
        225.00, 15.00,
        1740.00, 'No smoking, No pets, Insurance included'),
    (12, 1, 'PRNCMCGLL', 'AVIS Tokyo', 'AVIS Tokyo',
        '2024-04-22 10:00:00', '2024-04-23 18:00:00', '2024-03-19', 100.00,
        15.00, 15.00,
```

130.00, 'No smoking, No pets, Insurance included'),
 (13, 1, 'GZ0102', 'Enterprise Tokyo', 'Enterprise Tokyo',
 '2024-04-23 10:00:00', '2024-04-30 18:00:00', '2024-03-19', 700.00,
 105.00, 15.00,
 820.00, 'No smoking, No pets, Insurance included'),
 (14, 1, 'PRNCSMCGLL', 'AVIS Tokyo', 'AVIS Tokyo',
 '2024-04-01 10:00:00', '2024-04-02 18:00:00', '2024-03-19', 100.00,
 15.00, 15.00,
 130.00, 'No smoking, No pets, Insurance included'),
 (15, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
 '2024-04-01 10:00:00', '2024-04-02 18:00:00', '2024-03-19', 100.00,
 15.00, 15.00,
 130.00, 'No smoking, No pets, Insurance included'),
 (16, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
 '2024-06-01 10:00:00', '2024-06-02 18:00:00', '2024-03-19', 100.00,
 15.00, 15.00,
 130.00, 'No smoking, No pets, Insurance included'),
 (17, 1, 'GRT', 'Hertz Tokyo', 'Hertz Tokyo',
 '2024-06-01 10:00:00', '2024-06-03 18:00:00', '2024-03-19', 300.00,
 45.00, 15.00,
 360.00, 'No smoking, No pets, Insurance included'),
 (18, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',
 '2024-06-03 10:00:00', '2024-06-05 18:00:00', '2024-03-19', 300.00,
 45.00, 15.00,
 360.00, 'No smoking, No pets, Insurance included'),
 (19, 1, 'GZ0102', 'Enterprise Tokyo', 'Enterprise Tokyo',
 '2024-06-01 10:00:00', '2024-06-02 18:00:00', '2024-03-19', 100.00,
 15.00, 15.00,
 130.00, 'No smoking, No pets, Insurance included'),
 (20, 1, 'PRNCSMCGLL', 'AVIS Tokyo', 'AVIS Tokyo',
 '2024-06-01 10:00:00', '2024-06-03 18:00:00', '2024-03-19', 200.00,
 30.00, 15.00,
 245.00, 'No smoking, No pets, Insurance included'),
 (21, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',
 '2024-07-01 10:00:00', '2024-07-02 18:00:00', '2024-03-19', 150.00,
 22.50, 15.00,
 187.50, 'No smoking, No pets, Insurance included'),
 (22, 1, 'GZ0102', 'Enterprise Tokyo', 'Enterprise Tokyo',
 '2024-07-01 10:00:00', '2024-07-03 18:00:00', '2024-03-19', 200.00,
 30.00, 15.00,
 245.00, 'No smoking, No pets, Insurance included'),
 (23, 1, 'GRT', 'Hertz Tokyo', 'Hertz Tokyo',
 '2024-07-01 10:00:00', '2024-07-05 18:00:00', '2024-03-19', 600.00,
 90.00, 15.00,
 705.00, 'No smoking, No pets, Insurance included'),
 (24, 1, 'PRNCSMCGLL', 'AVIS Tokyo', 'AVIS Tokyo',
 '2024-07-01 10:00:00', '2024-07-03 18:00:00', '2024-03-19', 200.00,
 30.00, 15.00,
 245.00, 'No smoking, No pets, Insurance included'),
 (25, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
 '2024-07-01 10:00:00', '2024-07-03 18:00:00', '2024-03-19', 200.00,
 30.00, 15.00,
 245.00, 'No smoking, No pets, Insurance included'),
 (26, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
 '2024-08-01 10:00:00', '2024-08-03 18:00:00', '2024-03-19', 200.00,
 30.00, 15.00,
 245.00, 'No smoking, No pets, Insurance included'),
 (27, 1, 'ZU21', 'AVIS Montreal', 'AVIS Montreal',
 '2024-09-01 10:00:00', '2024-09-02 18:00:00', '2024-03-19', 100.00,
 15.00, 15.00,
 130.00, 'No smoking, No pets, Insurance included'),
 (28, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',

```

'2024-09-02 10:00:00', '2024-09-04 18:00:00', '2024-03-19', 300.00,
45.00, 15.00,
360.00, 'No smoking, No pets, Insurance included'),
(29, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',
'2024-09-20 10:00:00', '2024-09-23 18:00:00', '2024-03-19', 450.00,
67.50, 15.00,
532.50, 'No smoking, No pets, Insurance included'),
(30, 1, 'GRT', 'Hertz Tokyo', 'Hertz Tokyo',
'2024-10-20 10:00:00', '2024-10-24 18:00:00', '2024-03-19', 600.00,
90.00, 15.00,
705.00, 'No smoking, No pets, Insurance included'),
(31, 1, 'ZRM', 'AVIS Tokyo', 'AVIS Tokyo',
'2024-10-10 10:00:00', '2024-10-11 18:00:00', '2024-03-19', 100.00,
15.00, 15.00,
130.00, 'No smoking, No pets, Insurance included'),
(32, 1, 'ZRM', 'AVIS Tokyo', 'AVIS Tokyo',
'2024-11-10 10:00:00', '2024-12-19 18:00:00', '2024-03-19', 3900.00,
585.00, 15.00,
4500.00, 'No smoking, No pets, Insurance included'),
(33, 1, 'GZ0102', 'Enterprise Tokyo', 'Enterprise Tokyo',
'2024-11-10 10:00:00', '2024-11-20 18:00:00', '2024-03-19', 1000.00,
150.00, 15.00,
1165.00, 'No smoking, No pets, Insurance included'),
(34, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',
'2024-11-20 10:00:00', '2024-11-23 18:00:00', '2024-03-19', 450.00,
67.50, 15.00,
532.50, 'No smoking, No pets, Insurance included'),
(35, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
'2024-11-20 10:00:00', '2024-11-24 18:00:00', '2024-03-19', 400.00,
60.00, 15.00,
475.00, 'No smoking, No pets, Insurance included'),
(36, 1, 'GZ0102', 'Enterprise Tokyo', 'Enterprise Tokyo',
'2024-12-12 10:00:00', '2024-12-20 18:00:00', '2024-03-19', 800.00,
120.00, 15.00,
935.00, 'No smoking, No pets, Insurance included'),
(37, 1, 'IDK', 'AVIS Tokyo', 'AVIS Tokyo',
'2024-12-30 10:00:00', '2024-12-31 18:00:00', '2024-03-19', 150.00,
22.50, 15.00,
187.50, 'No smoking, No pets, Insurance included'),
(38, 1, 'GRTZ', 'AVIS Montreal', 'AVIS Montreal',
'2024-12-20 10:00:00', '2024-12-23 18:00:00', '2024-03-19', 300.00,
45.00, 15.00,
360.00, 'No smoking, No pets, Insurance included')
;

```

Here is the SQL statement used to generate the data:

```

EXPORT TO vis2data.csv OF DEL MODIFIED BY NOCHARDEL SELECT * FROM
CARRENTALBOOKING;

```

5.4.1 Image of the Chart

Similar to the column chart, a line chart is very effective in showing the variation of the count of car rental bookings throughout the months of 2024. A line chart is more effective in showing the variation, rather than the actual values for each month.

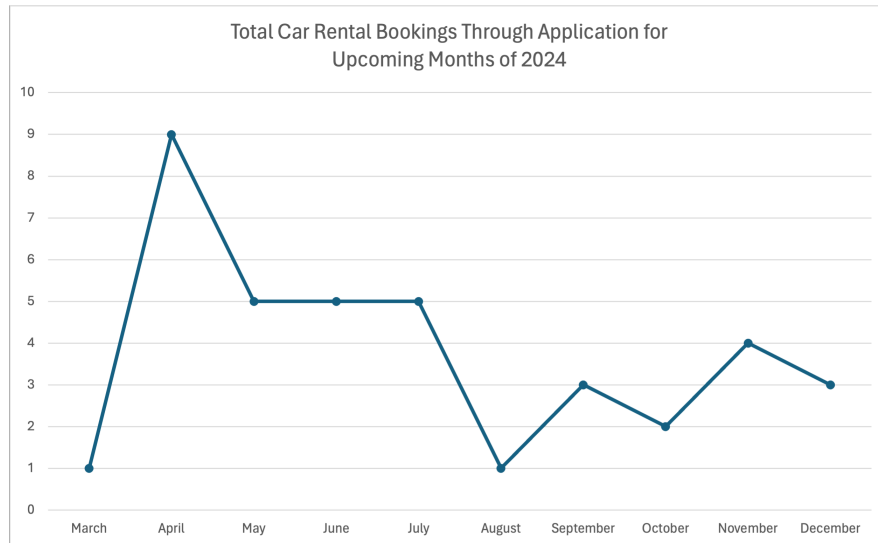


Figure 5: Chart representing the total number of car rental bookings through our application for the remainder of the current year (2024).

6 Creativity - Trigger

6.1 Description

We created a trigger that will activate after an insert operation into the *FlightBooking* table. Once a new flight booking is made, the trigger will go into the *Flights* table to update the remaining number of seats left, according to the fare class and flight booked. The purpose of this trigger is to maintain data consistency and accuracy by automatically updating the remaining seats for each fare class whenever relevant fields are modified, ensuring that users always see the correct number of seats left for the flight they are trying to book, and ensuring there are no overbooked flights.

6.2 Listing of the Program code

```
CREATE OR REPLACE TRIGGER UpdateAvailableSeats
AFTER INSERT ON FlightBooking
REFERENCING NEW AS NewRow
FOR EACH ROW
BEGIN ATOMIC
    -- Update the number of available seats for the fare class of the
    -- booked flight
    UPDATE Flights
    SET economy_seats = economy_seats - CASE WHEN NewRow.fare_class = '
      Economy' THEN 1 ELSE 0 END,
        premium_economy_seats = premium_economy_seats - CASE WHEN NewRow.
      fare_class = 'Premium Economy' THEN 1 ELSE 0 END,
        business_seats = business_seats - CASE WHEN NewRow.fare_class = '
      Business' THEN 1 ELSE 0 END,
        first_class_seats = first_class_seats - CASE WHEN NewRow.
      fare_class = 'First Class' THEN 1 ELSE 0 END
    WHERE flight_number = NewRow.flight_number
    AND departure_date_time = NewRow.departure_date_time;
END@
```

6.3 Screenshot and proof of intended effect

Here is a screenshot of the trigger being executed in DB2 using the command line utility and an insert statement to show the success of the trigger:

```
cs421g118@winter2024-comp421:~/project2$ db2 -td@ -vf creativity.sql
CREATE OR REPLACE TRIGGER UpdateAvailableSeats
AFTER INSERT ON FlightBooking
REFERENCING NEW AS NewRow
FOR EACH ROW
BEGIN ATOMIC
    -- Update the number of available seats for the fare class of the booked flight
    UPDATE Flights
    SET economy_seats = economy_seats - CASE WHEN NewRow.fare_class = 'Economy' THEN 1 ELSE 0 END,
        premium_economy_seats = premium_economy_seats - CASE WHEN NewRow.fare_class = 'Premium Economy' THEN 1 ELSE 0 END,
        business_seats = business_seats - CASE WHEN NewRow.fare_class = 'Business' THEN 1 ELSE 0 END,
        first_class_seats = first_class_seats - CASE WHEN NewRow.fare_class = 'First Class' THEN 1 ELSE 0 END
    WHERE flight_number = NewRow.flight_number
    AND departure_date_time = NewRow.departure_date_time;
END
DB20000I The SQL command completed successfully.

cs421g118@winter2024-comp421:~/project2$ db2 "select flight_reference_number, flight_number, departure_date_time, fare_class from flightbooking;"
FLIGHT_REFERENCE_NUMBER  FLIGHT_NUMBER  DEPARTURE_DATE_TIME  FARE_CLASS
-----
1 AC085             2024-05-01-13.05.00.000000 Economy
2 AC085             2024-05-01-13.05.00.000000 Economy
3 AC086             2024-05-21-10.15.00.000000 Economy
4 AC405             2024-05-01-09.10.00.000000 Business
5 AC406             2024-05-21-10.00.00.000000 Business

5 record(s) selected.

cs421g118@winter2024-comp421:~/project2$ db2 "select flight_number, business_seats, departure_date_time from flights where flight_number = 'AC085' and departure_date_time = '2024-05-01-13.05.00.000000';"
FLIGHT_NUMBER  BUSINESS_SEATS  DEPARTURE_DATE_TIME
-----
AC085          40 2024-05-01-13.05.00.000000

1 record(s) selected.

cs421g118@winter2024-comp421:~/project2$ db2 "insert into flightbooking (flight_reference_number, user_id, passenger_names, flight_number, departure_date_time, flight_total_cost, fare_class, seat_numbers, plane_ticket_cost, plane_ticket_surcharge, plane_ticket_tax, flight_booking_fees, flight_booking_date) VALUES (7, 1, 'John Doe, Jane Doe', 'AC085', '2024-05-01 13:05:00', 2220.00, 'Business', 'A33', 833, 1000.00, 100.00, 270.00, 50.00, '2024-04-01');"
DB20000I The SQL command completed successfully.

cs421g118@winter2024-comp421:~/project2$ db2 "select flight_reference_number, flight_number, departure_date_time, fare_class from flightbooking;"
FLIGHT_REFERENCE_NUMBER  FLIGHT_NUMBER  DEPARTURE_DATE_TIME  FARE_CLASS
-----
1 AC085             2024-05-01-13.05.00.000000 Economy
2 AC085             2024-05-01-13.05.00.000000 Economy
3 AC086             2024-05-21-10.15.00.000000 Economy
4 AC405             2024-05-01-09.10.00.000000 Business
5 AC406             2024-05-21-10.00.00.000000 Business
7 AC085             2024-05-01-13.05.00.000000 Business

6 record(s) selected.

cs421g118@winter2024-comp421:~/project2$ db2 "select flight_number, business_seats, departure_date_time from flights where flight_number = 'AC085' and departure_date_time = '2024-05-01-13.05.00.000000';"
FLIGHT_NUMBER  BUSINESS_SEATS  DEPARTURE_DATE_TIME
-----
AC085          39 2024-05-01-13.05.00.000000

1 record(s) selected.
```

Figure 6: Input and output of the trigger and proof of the intended effect.

7 Work Process

We had a meeting to split our work into different parts, Eric worked on question 3 and parts of question 4, Greta worked on questions 4 and 7, and Gordon and Samuel worked on parts 5 and 6. We then had smaller group meetings to actually work on our parts (around 3-4 meetings). We then met up together once again to go over everything and correct any errors or mistakes and finally, we submitted our work.