Project Phase 3 Documentation
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Indexes

- booking_flight_no_index
    - This index is used to search for all bookings on a specific flight on a specific day which will increase the search speed of FindNumberOfAvailableSeatsForFlight(...) function.
- passenger_passport_no_index
    - There are several functions that use the passport to find a passenger. Creating an index on the passport number will increase the lookup time to find that passenger.
- flight_dest_orig_index
    - used by the two functions where we check the flight destination
- ratings_pid_flightNum_index
    - used for when a customer creates a rating; quickly checks to see if the customer has already rated a flight

NOTE: All primary keys are automatically indexed in PSQL so we didn't need to index on these keys.

Indexes aren't useful in GROUP BY statements in PSQL because it will probably just use a hash-based grouping to calculate aggregate values.

Function Implementations:

1. AddPassenger()
    a. The function asks for a passenger's information and uses an insert to insert the passenger into the database.
    b. Add passenger validates user input as it's entered.
    c. The pID is generated by getting the MAX value of pID at the time and adding one to it.
2. BookFlight()
    a. Book Flight asks for a passenger's passport number to find their passenger ID
        i. This search is optimized using a btree index on passNum
    b. Book Flight asks for the flight number of the flight they'd like to book on
        i. Book flight executes a query on the Flight table to find out if the flight exists or not. Since flight number is the primary key of this table, there is an index on this column by default.

    c. Bookflight uses java random numbers to generate a random string of 10 characters A-Z, then it checks to see if the generated reference is already in the database or not by executing a query on Booking
        i. Query searches using an index created on Booking on the column bookRef to make this check very fast
    d. Bookflight asks what day the passenger would like to book on
    e. Bookflight inserts a row into the booking table with the corresponding info
3. TakeCustomerReview()
    a. Asks for customer's passport number
        i. verifies this is a valid passport number and get passenger ID with a query on the Passenger table
    b. Asks for the flight number of the route the customer is reviewing
        i. Verifies this is a valid flight by executing a query on the Flight table
    c. Checks that this customer hasn't already rated this flight
        i. There is an index in Rating on (pID, flightNums) to make this check fast
    d. Asks for a rating for this flight, verifying it's between 0 and 5
    e. Asks if they would like to leave a comment and if they would asks for the text of the comment
    f. Generates a rating ID the same way AddPassenger generates a passenger ID
    g. Inserts into the rating table
4. ListAvailableFlightsBetweenOriginAndDestination()
    a. Asks for the destination
    b. Asks for the origin
    c. Searches the flights table for flight between these two locations, and prints out the results
        i. There is an index in the Flight table on (origin, destination) to make this search fast
5. ListMostPopularDestination()
    a. Asks for how many destinations the agent would like to see
    b. Performs a group by destination on Flight and then orders by COUNT(*) in descending order to get the most popular destinations
    c. Prints the number of destinations requested
6. ListHighestRatedRoutes()
    a. Asks for how many routes the agent would like to see
    b. Performs a group by flight number on Rating then orders by AVG(score) in descending order
    c. Prints the number of routes requested
7. ListFlightFromOriginToDestinationInOrderOfDuration()
    a. Works the same as ListAvailableFlightsBetweenOriginAndDestination() but it orders the query by duration in ascending order
8. FindNumberOfAvailableSeatsForFlight()
    a. Asks the agent for a flight number
    b. Executes a query to check if the flight exists and how many seats the flight offers

    i. Uses an index on the primary key (flight number) of Flight to find the requested flight quickly
c. Requests the date the customer wants to book on from the agent
    i. Gets the count of bookings on that day for the given flight number
d. Subtracts the number of bookings that day from the number of seats available to get the number of seats available