CP 363 Assignment 10

Tourism Agency Booking System DBMS

Group 37

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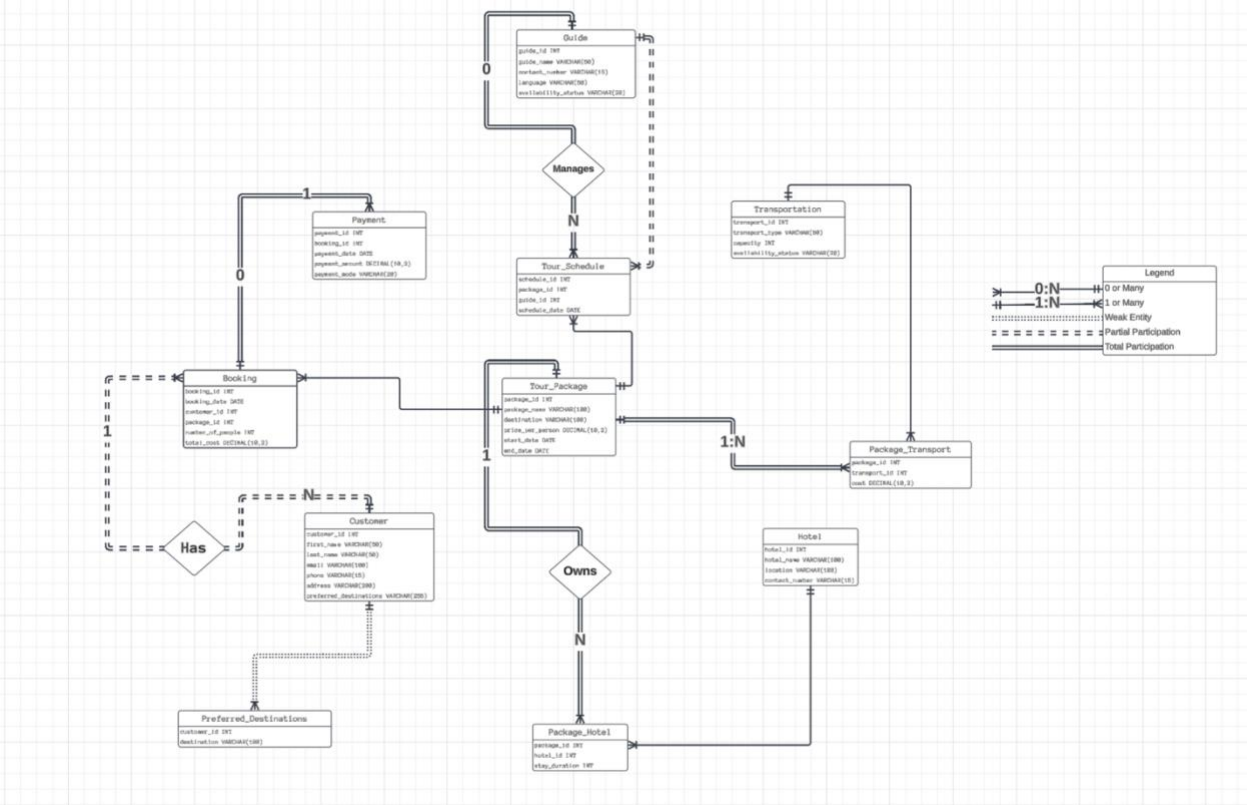
System Overview:

Our Tourism Agency Booking System DBSM is intended to streamline and improve the operations of a tourism agency. It enables the management of clients, tour packages, bookings, payments, guides, accommodations, and transportation. The system assures data integrity, offers normalization to BCNF, and has an easy-to-use GUI for interface.

ER Model:

The ER diagram was created in Lucidchart and models the relationships between entities such as Customer, Booking, Tour_Package, Guide, Hotel, Transportation, and linking entities like Package_Hotel and Package_Transport.



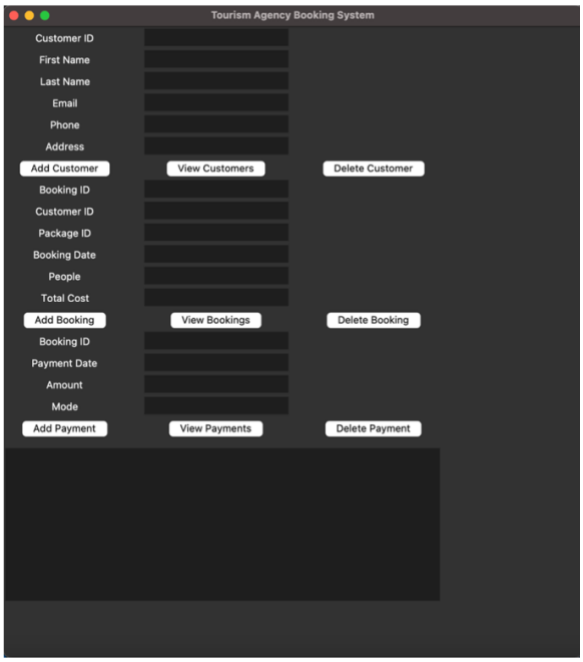
Final Table Schemas (BCNF):

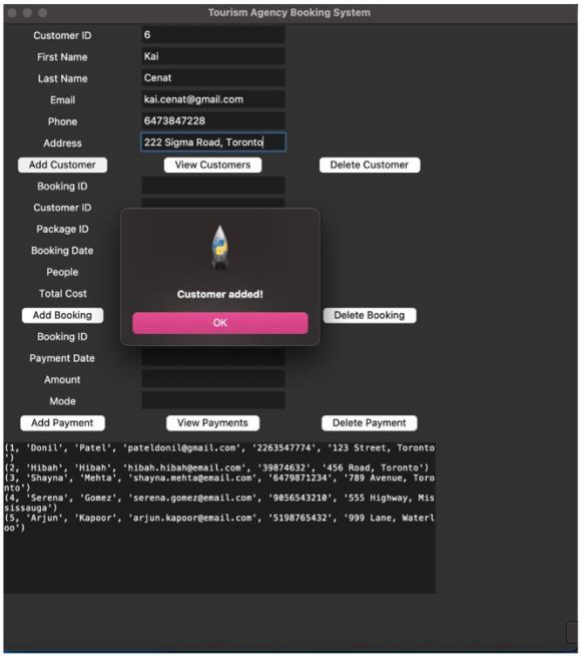
- **Customer** (customer_id, first_name, last_name, email, address)
- **Customer_Phone** (phone, customer_id)
- **Tour_Package** (package_id, package_name, destination, price_per_person, start_date, end_date)
- **Booking** (booking_id, booking_date, customer_id, package_id, number_of_people, total_cost)
- **Payment** (booking_id, payment_date, payment_amount, payment_mode)

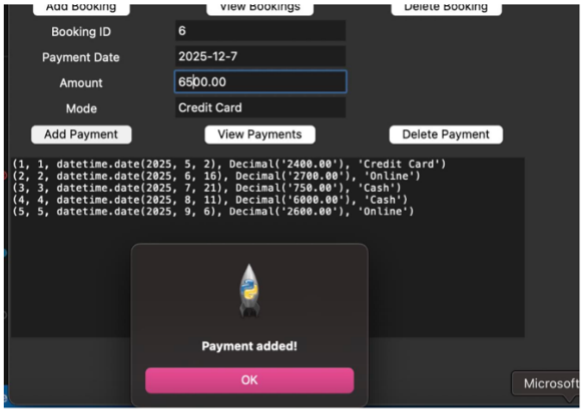
- **Guide** (guide_id, guide_name, language, availability_status)
- **Guide_Contact** (contact_number, guide_id)

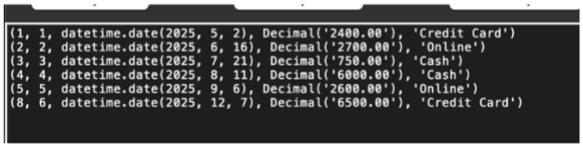
These schemas remove redundancy, eliminate anomalies, and improve performance and maintainability.

GUI:









SQL Queries and Relational Algebra Equivalents:

- **All Bookings for a Specific Customer**
- SELECT * FROM Booking WHERE customer_id = 1001;
    - σ_{customer_id = 1001}(Booking)
- **List All Customers Who Made Bookings**
- SELECT DISTINCT Customer.*
- FROM Customer
- JOIN Booking ON Customer.customer_id = Booking.customer_id;
    - π_{customer_id, first_name, last_name, email, address} (Customer ⋈ Customer.customer_id = Booking.customer_id Booking)
- **Find Booking and Payment Details**
- SELECT Booking.booking_id, customer_id, total_cost, payment_date, payment_amount
- FROM Booking
- JOIN Payment ON Booking.booking_id = Payment.booking_id;
    - π_{Booking.booking_id, customer_id, total_cost, payment_date, payment_amount}(Booking ⋈ Booking.booking_id = Payment.booking_id Payment)

6. Reflection

This project gave us a full experience of building a database system from start to finish, helping us use what we learned in class in a real and practical way. We began by determining a tourist agency's requirements and converting them into a creative design using an ER diagram. This phase strengthened our grasp of real-world things and how they interact. It also underlined the need of documenting business standards and ensuring data correctness from the start. During the normalization process, we obtained practical expertise finding functional relationships and using decomposition techniques to reduce duplication and abnormalities. By converting our tables to BCNF, we increased database integrity, scalability, and query performance. It was very exciting to observe how theoretical stages like 3NF and BCNF might immediately affect the system's usability and maintainability.

Creating SQL queries taught us about the inner workings of relational databases. Converting these queries into relational algebra increased our fundamental understanding of database theory and allowed us to better comprehend the underlying logic that drives SQL operations.

One of the most enjoyable aspects of the project was developing the system using a Python-based GUI. This made the database feel more palpable, allowing users to connect with it through meaningful actions such as booking trips or examining client information. It emphasized the significance of usability and user experience in database systems.

This project and course helped us:

- Develop a structured approach to data modeling.
- Understand the importance of normalization for maintaining data quality.
- Practice relational algebra and SQL for query logic.
- Appreciate the impact of design decisions on database performance.
- Implement real-world database functionality in code.
- Strengthen our collaboration and project management skills.

This was an invaluable learning experience that prepared us for future work in database development and real-world software engineering.