Phase 1: Conception
Build-a-Data-Mart-in-SQL

Introduction

Airbnb is one of the most talked-about among the sharing hospitality companies. Airbnb is an online marketplace and a platform connecting worldwide travelers with local hosts somewhere. At one end, the platform enables suppliers (hosts) to list their available space and earn extra income in the form of a short-term rental. At the other end, Airbnb allows customers to book real homestays from local hosts, saving money on staying and sometimes giving customers a chance to interact with hosts, for example, by chatting and cooking.

In an era where data is generated at an unprecedented rate, databases have become a fundamental component of modern technology and business operations. They serve as the backbone for various applications, enabling organizations to manage and utilize data effectively. Databases are indispensable, they not only provide a systematic and efficient means of managing data but also enhance security, support decision-making, and drive operational efficiency. Creating a database is not a straightforward task, as it requires a deep understanding and comprehensive knowledge of the concepts being addressed. Any overlooked details can negatively impact the final outcome.

Project Objectives

1. Design and Implement a Comprehensive Relational Database Schema
2. Populate the Database with Representative Dummy Data
3. Develop and Execute Test Queries for Core Functionalities
4. Generate an Entity-Relationship (ER) Diagram
5. Compile a Detailed Data Dictionary

Requirements:

The system supports three primary user roles:

1. **Hosts**
   Hosts are individuals or entities that list their properties for rent on the platform, responsible for managing their listings, which includes creating, updating, and deleting properties, managing bookings, responding to reviews, and viewing earnings.
2. **Guests**

Guests are individuals seeking accommodations for short-term stays; they can search for listings using various filters, book properties, leave reviews, manage their bookings, and communicate with hosts for inquiries.

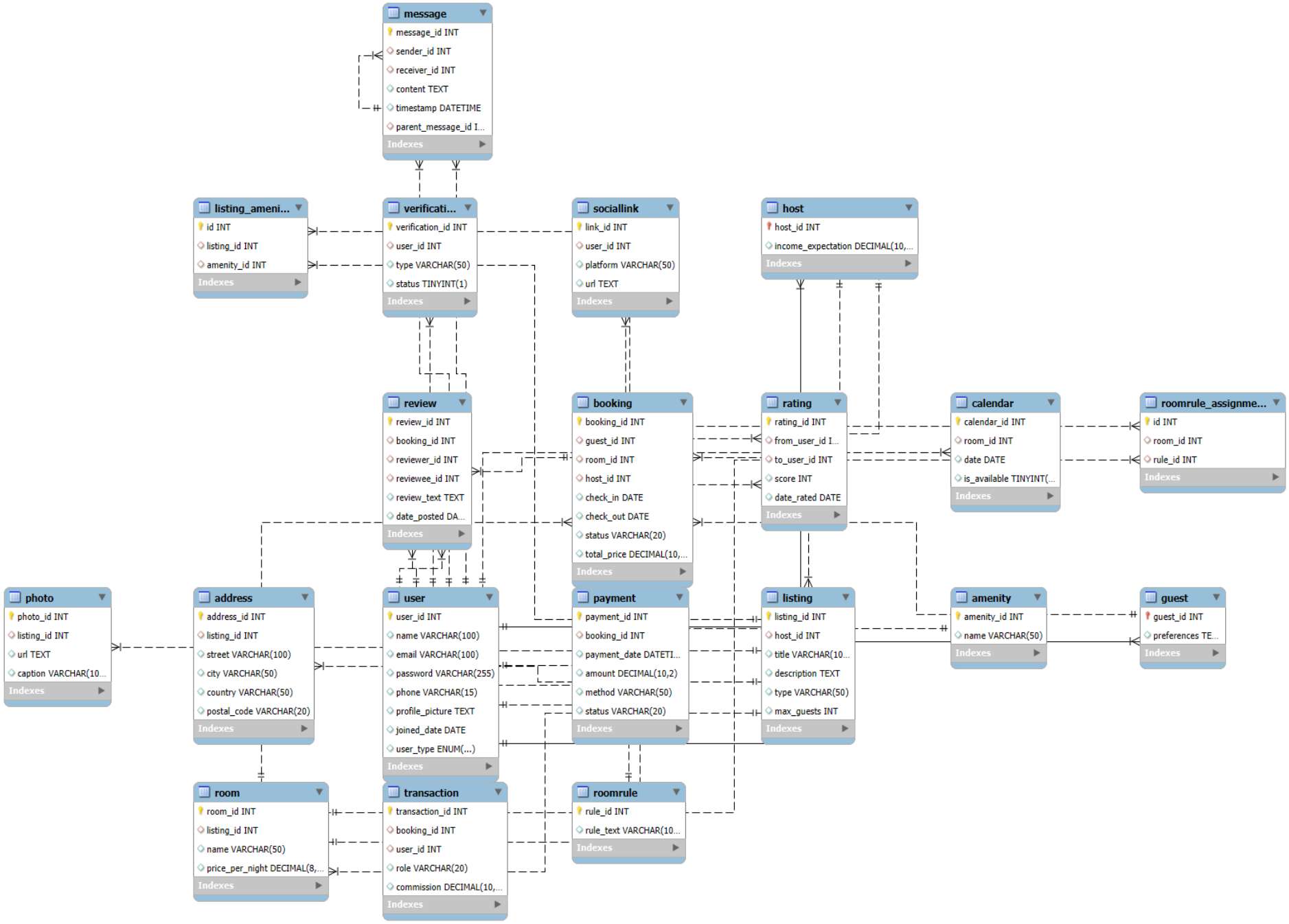
3. **Administrators**
   Administrators have elevated privileges to manage the platform, overseeing user activities, resolving disputes, monitoring listings for compliance, generating reports, and ensuring system integrity.

Other important requirements:

- The system must store comprehensive property information, including descriptions, features, and photos, as well as host and guest account details.
- Search results should clearly indicate whether a property is already reserved for the requested dates.
- All fees, including extra charges, must be displayed upfront to guests.
- All host-guest interactions must be logged to ensure transparency during bookings.
- Guests should receive a refund if the property doesn't match its advertised details.
- Both guests and hosts must leave reviews to help others make well-informed choices.
- The platform charges hosts a 3% fee and guests a 10% fee (VAT excluded) on each transaction.
- A complete record of past reservations is necessary for tracking transactions.
- Users should be able to reach administrators for help or to report misconduct, maintaining a trustworthy community environment.

Data modelling:

1. **ER Diagram**


message
message_id INT
sender_id INT
receiver_id INT
content TEXT
timestamp DATETIME
parent_message_id I...
Indexes
listing_ameni...
id INT
listing_id INT
amenity_id INT
Indexes
verificati...
verification_id INT
user_id INT
type VARCHAR(50)
status TINYINT(1)
Indexes
sociallink
link_id INT
user_id INT
platform VARCHAR(50)
url TEXT
Indexes
host
host_id INT
income_expectation DECIMAL(10,...
Indexes
review
review_id INT
booking_id INT
reviewer_id INT
reviewee_id INT
review_text TEXT
date_posted DA...
Indexes
booking
booking_id INT
guest_id INT
room_id INT
host_id INT
check_in DATE
check_out DATE
status VARCHAR(20)
total_price DECIMAL(10,...
Indexes
rating
rating_id INT
from_user_id I...
to_user_id INT
score INT
date_rated DATE
Indexes
calendar
calendar_id INT
room_id INT
date DATE
is_available TINYINT(...
Indexes
roomrule_assignme...
id INT
room_id INT
rule_id INT
Indexes
photo
photo_id INT
listing_id INT
url TEXT
caption VARCHAR(10...
Indexes
address
address_id INT
listing_id INT
street VARCHAR(100)
city VARCHAR(50)
country VARCHAR(50)
postal_code VARCHAR(20)
Indexes
user
user_id INT
name VARCHAR(100)
email VARCHAR(100)
password VARCHAR(255)
phone VARCHAR(15)
profile_picture TEXT
joined_date DATE
user_type ENUM(...)
Indexes
payment
payment_id INT
booking_id INT
payment_date DATETI...
amount DECIMAL(10,2)
method VARCHAR(50)
status VARCHAR(20)
Indexes
listing
listing_id INT
host_id INT
title VARCHAR(10...
description TEXT
type VARCHAR(50)
max_guests INT
Indexes
amenity
amenity_id INT
name VARCHAR(50)
Indexes
guest
guest_id INT
preferences TE...
Indexes
room
room_id INT
listing_id INT
name VARCHAR(50)
price_per_night DECIMAL(8,...
Indexes
transaction
transaction_id INT
booking_id INT
user_id INT
role VARCHAR(20)
commission DECIMAL(10,...
Indexes
roomrule
rule_id INT
rule_text VARCHAR(10...
Indexes

2. Data Dictionary

1. Table: Host

Field Name	Data Type	Description	Constraints
user_id	INT	Unique identifier for each user	Primary Key, Auto Increment
name	VARCHAR(100)	Full name of the user	Not Null
email	VARCHAR(100)	Email address of the user	Unique, Not Null
password	VARCHAR(255)	Encrypted user password	Not Null
phone	VARCHAR(15)	Contact phone number	Nullable
profile_picture	TEXT	URL to the user's profile picture	Nullable
joined_date	DATE	Date the user joined	Nullable
user_type	ENUM('guest','host')	Defines whether user is a guest or host	Not Null

2. Table: Guest

Field Name	Data Type	Description	Constraints
guest_id	INT	Unique identifier, linked to User	Primary Key, Foreign Key → User(user_id)
preferences	TEXT	Guest preferences or interests	Nullable

Table: Host

Field Name	Data Type	Description	Constraints
host_id	INT	Unique identifier, linked to User	Primary Key, Foreign Key → User(user_id)
income_expectation	DECIMAL(10,2)	Expected income per listing or monthly/yearly	Nullable

3. Table: SocialLink

Field Name	Data Type	Description	Constraints
link_id	INT	Unique identifier for each social link	Primary Key, Auto Increment
user_id	INT	User associated with the social link	Foreign Key → User(user_id)
platform	VARCHAR(50)	Name of the social media platform (e.g., LinkedIn, Facebook)	Not Null
url	TEXT	URL to the user's profile on the platform	Nullable

4. Table: Verification

Field Name	Data Type	Description	Constraints
verification_id	INT	Unique identifier for each verification entry	Primary Key, Auto Increment
user_id	INT	User being verified	Foreign Key → User(user_id)
type	VARCHAR(50)	Type of verification (e.g., ID, Email, Phone)	Not Null

status	BOOLEAN	Verification status: `TRUE` = verified, `FALSE` = not verified	Not Null

5. Table: Listing

Field Name	Data Type	Description	Constraints
listing_id	INT	Unique identifier for each listing	Primary Key, Auto Increment
host_id	INT	Reference to the host who owns the listing	Foreign Key → Host(host_id)
title	VARCHAR(100)	Title or name of the listing	Not Null
description	TEXT	Detailed description of the listing	Nullable
type	VARCHAR(50)	Type of listing (e.g., apartment, house)	Nullable
max_guests	INT	Maximum number of guests allowed	Nullable

6. Table: Address

Field Name	Data Type	Description	Constraints
address_id	INT	Unique identifier for each address	Primary Key, Auto Increment
listing_id	INT	Reference to the listing this address belongs to	Foreign Key → Listing(listing_id)
street	VARCHAR(100)	Street name and number	Nullable
city	VARCHAR(50)	City where the listing is located	Nullable
country	VARCHAR(50)	Country of the listing	Nullable
postal_code	VARCHAR(20)	Postal or ZIP code	Nullable

7. Table: Room

Field Name	Data Type	Description	Constraints
room_id	INT	Unique identifier for each room	Primary Key, Auto Increment
listing_id	INT	Reference to the listing this room belongs to	Foreign Key → Listing(listing_id)
name	VARCHAR(50)	Name or label of the room (e.g., "Master Room")	Nullable
price_per_night	DECIMAL(8,2)	Price charged per night for the room	Nullable

8. Table: Photo

Field Name	Data Type	Description	Constraints
photo_id	INT	Unique identifier for each photo	Primary Key, Auto Increment
listing_id	INT	Reference to the listing this photo belongs to	Foreign Key → Listing(listing_id)
url	TEXT	URL to the photo resource	Nullable
caption	VARCHAR(100)	Description or caption for the photo	Nullable

9. Table: Amenity

Field Name	Data Type	Description	Constraints
amenity_id	INT	Unique identifier for each amenity	Primary Key, Auto Increment
name	VARCHAR(50)	Name of the amenity (e.g., Wi-Fi, Parking)	Not Null

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10. Table: Listing_Amenity

Field Name	Data Type	Description	Constraints
id	INT	Unique identifier for each listing-amenity assignment	Primary Key, Auto Increment
listing_id	INT	Reference to the listing that has the amenity	Foreign Key → Listing(listing_id), Not Null
amenity_id	INT	Reference to the amenity	Foreign Key → Amenity(amenity_id), Not Null

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11. Table: RoomRule

Field Name	Data Type	Description	Constraints
rule_id	INT	Unique identifier for each room rule	Primary Key, Auto Increment
rule_text	VARCHAR(100)	Description of the rule (e.g., No smoking)	Not Null

12. Table: RoomRule_Assignment

Field Name	Data Type	Description	Constraints
id	INT	Unique identifier for each rule-room assignment	Primary Key, Auto Increment
room_id	INT	Reference to the room the rule applies to	Foreign Key → Room(room_id), Not Null
rule_id	INT	Reference to the rule being assigned	Foreign Key → RoomRule(rule_id), Not Null

13. Table: Booking

Field Name	Data Type	Description	Constraints
booking_id	INT	Unique identifier for each booking	Primary Key, Auto Increment
guest_id	INT	Guest who made the booking	Foreign Key → Guest(guest_id), Not Null
room_id	INT	Booked room	Foreign Key → Room(room_id), Not Null
host_id	INT	Host of the listing	Foreign Key → Host(host_id), Not Null
check_in	DATE	Date of check-in	Not Null
check_out	DATE	Date of check-out	Not Null
status	VARCHAR(20)	Status of the booking (e.g., confirmed, cancelled, completed)	Nullable

total_price	DECIMAL(10,2)	Total price of the booking	Nullable

14. Table: Payment

Field Name	Data Type	Description	Constraints
payment_id	INT	Unique identifier for each payment	Primary Key, Auto Increment
booking_id	INT	Booking associated with the payment	Foreign Key → Booking(booking_id), Not Null
payment_date	DATETIME	Date and time when the payment was made	Nullable
amount	DECIMAL(10,2)	Amount paid	Not Null
method	VARCHAR(50)	Payment method (e.g., Credit Card, PayPal)	Nullable
status	VARCHAR(20)	Payment status (e.g., Paid, Pending, Failed)	Nullable

15. Table: Transaction

Field Name	Data Type	Description	Constraints
transaction_id	INT	Unique identifier for each transaction	Primary Key, Auto Increment
booking_id	INT	Related booking	Foreign Key → Booking(booking_id), Not Null
user_id	INT	User involved in the transaction (guest or host)	Foreign Key → User(user_id), Not Null
role	VARCHAR(20)	Role of the user in the transaction (e.g., guest, host)	Nullable
commission	DECIMAL(10,2)	Platform commission charged on the transaction	Nullable

16. Table: Review

Field Name	Data Type	Description	Constraints
review_id	INT	Unique identifier for each review	Primary Key, Auto Increment
booking_id	INT	Booking associated with the review	Foreign Key → Booking(booking_id), Not Null
reviewer_id	INT	User who wrote the review	Foreign Key → User(user_id), Not Null
reviewee_id	INT	User being reviewed (host or guest)	Foreign Key → User(user_id), Not Null
review_text	TEXT	Content of the review	Nullable
date_posted	DATE	Date the review was posted	Nullable

17. Table: Rating

Field Name	Data Type	Description	Constraints
rating_id	INT	Unique identifier for each rating	Primary Key, Auto Increment
from_user_id	INT	User who gave the rating	Foreign Key → User(user_id), Not Null
to_user_id	INT	User who received the rating	Foreign Key → User(user_id), Not Null
score	INT	Rating score from 1 to 5	CHECK (score BETWEEN 1 AND 5), Not Null
date_rated	DATE	Date the rating was given	Nullable

18. Table: Message

Field Name	Data Type	Description	Constraints
message_id	INT	Unique identifier for each message	Primary Key, Auto Increment
sender_id	INT	User who sent the message	Foreign Key → User(user_id), Not Null
receiver_id	INT	User who received the message	Foreign Key → User(user_id), Not Null
content	TEXT	Message content	Nullable
timestamp	DATETIME	Date and time when the message was sent	Nullable
parent_message_id	INT	ID of the parent message (for replies, threading support)	Foreign Key → Message(message_id), Nullable

19. Table: Calendar

Field Name	Data Type	Description	Constraints
calendar_id	INT	Unique identifier for each calendar entry	Primary Key, Auto Increment
room_id	INT	Reference to the room associated with the calendar	Foreign Key → Room(room_id), Not Null
date	DATE	Specific date for the availability	Not Null
is_available	BOOLEAN	Indicates whether the room is available on this date	Not Null (TRUE = available, FALSE = booked)

20. Table: User

Field Name	Data Type	Description	Constraints
user_id	INT	Unique identifier for each user	Primary Key, Auto Increment
name	VARCHAR(100)	Full name of the user	Not Null
email	VARCHAR(100)	Email address of the user	Unique, Not Null
password	VARCHAR(255)	Hashed password for user authentication	Not Null
phone	VARCHAR(15)	Phone number of the user	Nullable
profile_picture	TEXT	URL or path to the user's profile picture	Nullable
joined_date	DATE	The date the user registered	Nullable
user_type	ENUM('guest', 'host')	Defines if the user is a guest or a host	Not Null