Abstract

The Airbnb database is designed to handle various functionalities essential for the platform, including user management, property listings, booking processes, and review systems. The database must accommodate the needs of different user roles, ensuring seamless interaction and data management.

Some of the Key features include user management which handles the data and interactions of hosts, guests, and administrators, property listings which manages information regarding property details, amenities, availability, and tags, booking processes which facilitates booking management, including payment processing and status tracking and review System which enables users to leave and manage reviews for properties.

Development Approach:

Requirement Gathering: The initial phase involved identifying and documenting the entities within the Airbnb platform. This include understanding the relationships and cardinalities between these entities which was crucial for designing a robust schema.

Conceptual Design: An Entity-Relationship (ER) diagram was created to represent the conceptual design of the database. This diagram illustrated the entities, their attributes, and the relationships between them.

Logical Design: In the logical design phase, the ER diagram was translated into a relational schema. Normalization techniques were applied to eliminate data redundancy and ensure data integrity.

Implementation with PostgreSQL: The final phase involved implementing the logical design in PostgreSQL. The database schema was created using SQL scripts to define tables, relationships, and constraints..

USE CASE : The Host and Guest tables manage user information specific to hosts and guests. The host table includes details about property owners, ensuring that each listing is linked to a responsible party. The guest table tracks information about individuals booking stays, facilitating user management and personalized experiences. The Location and Photo tables serve as foundational data repositories. The location table stores geographical data essential for pinpointing properties, while the photo table manages image data, supporting property listings and user profiles.

The Place, Property and Amenities tables describe the properties listed on the platform. The place table outlines basic property characteristics, while the property table adds more detailed descriptions, such as house rules and additional services. The amenities table lists features like the number of bedrooms and availability of Wi-Fi, enhancing property profiles for potential guests. The Availability table tracks when properties are available for booking, ensuring accurate scheduling. The Listing table aggregates data from place, property, amenities, and availability tables, providing a comprehensive view of each property available for rent.

The Wishlist and Review tables enhance user experience and feedback. The wishlist table allows guests to save and manage their favourite properties, while the review table captures guest feedback, contributing to quality assurance and service improvement. The Tag table categorizes properties with descriptive tags, improving searchability. The Tags table links tags to specific places, facilitating better filtering and discovery of properties based on user preferences.

The administrator and administration tables manage administrative functions. The administrator table stores data on platform administrators, while the administration table links administrators to hosts and guests, supporting issue resolution and user management. The Booking table handles reservation details, tracking guest stays and associated costs. The Payment table records financial transactions, ensuring accurate billing and financial management.

The UPI, Net banking and credit/debit card tables detail payment methods. They extend the payment table by providing specific information for different payment types, ensuring secure and efficient transaction processing. Then, The Complain table records user complaints, linking them to administrative actions. It supports the platform's commitment to resolving issues promptly and maintaining high service standards.

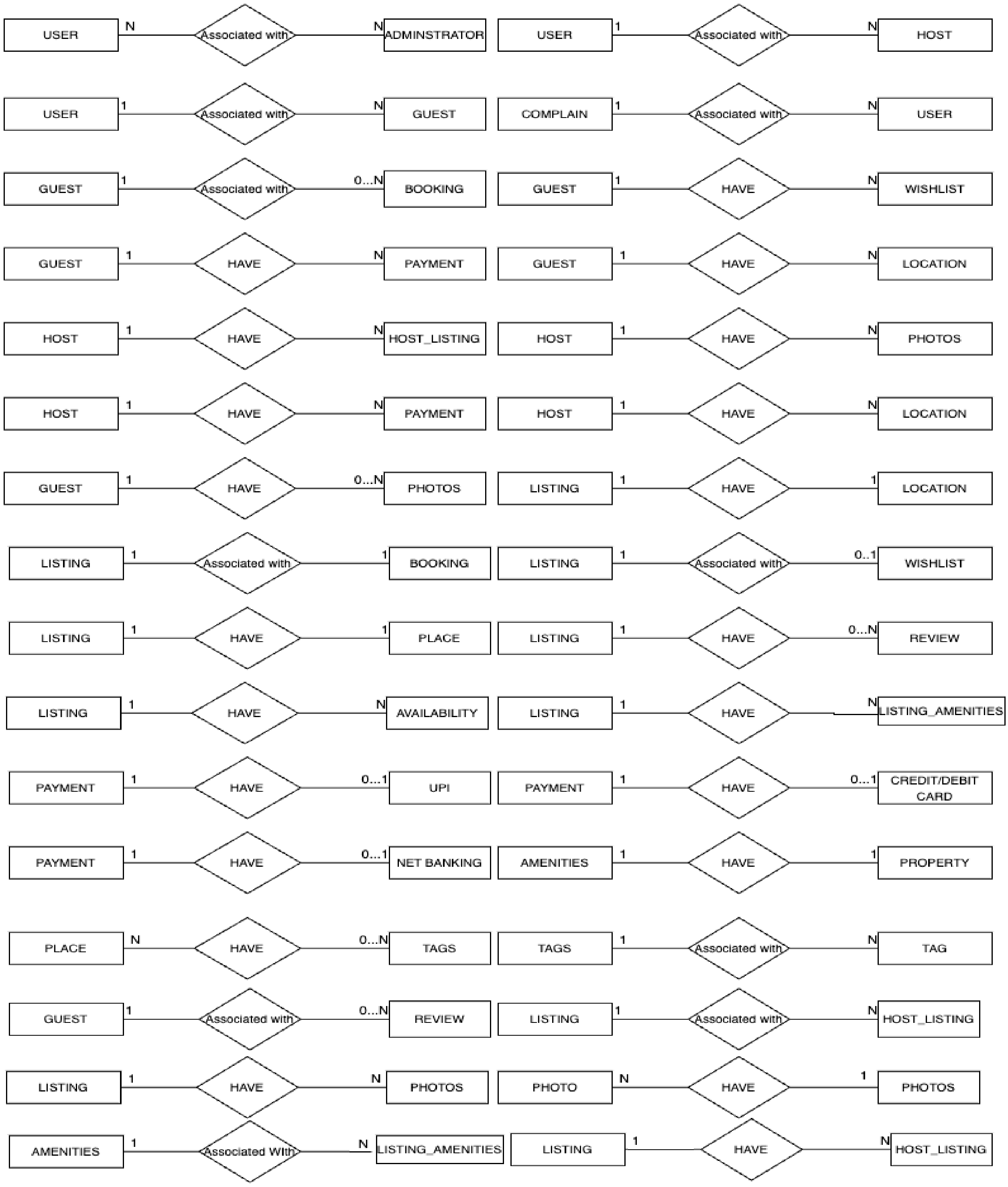
Conclusion

The development of the Airbnb database schema followed a structured approach, starting with requirement gathering and moving through conceptual and logical design phases to implementation with PostgreSQL. This comprehensive design ensures that the platform can effectively manage its diverse data needs, from user profiles and property details to bookings and payments, thereby enhancing overall functionality and user satisfaction.

TECHNOLOGIES CHOICE

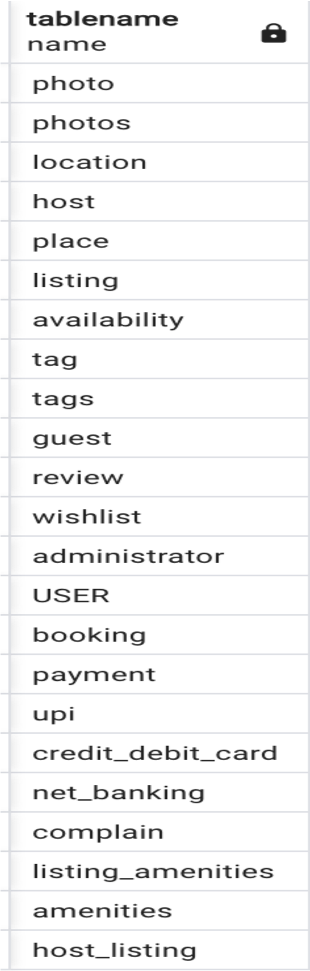
1. PostgreSQL 16.3
2. SQL Shell(psql) 16.3
3. pyAdmin 4

CARDINALITY



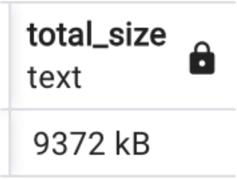
USER N Associated with N ADMINSTRATOR
USER 1 Associated with N HOST
USER 1 Associated with N GUEST
COMPLAIN 1 Associated with N USER
GUEST 1 Associated with 0...N BOOKING
GUEST 1 HAVE N WISHLIST
GUEST 1 HAVE N PAYMENT
GUEST 1 HAVE N LOCATION
HOST 1 HAVE N HOST_LISTING
HOST 1 HAVE N PHOTOS
HOST 1 HAVE N PAYMENT
HOST 1 HAVE N LOCATION
GUEST 1 HAVE 0...N PHOTOS
LISTING 1 HAVE 1 LOCATION
LISTING 1 Associated with 1 BOOKING
LISTING 1 Associated with 0..1 WISHLIST
LISTING 1 HAVE 1 PLACE
LISTING 1 HAVE 0...N REVIEW
LISTING 1 HAVE N AVAILABILITY
LISTING 1 HAVE N LISTING_AMENITIES
PAYMENT 1 HAVE 0...1 UPI
PAYMENT 1 HAVE 0...1 CREDIT/DEBIT CARD
PAYMENT 1 HAVE 0...1 NET BANKING
AMENITIES 1 HAVE 1 PROPERTY
PLACE N HAVE 0...N TAGS
TAGS 1 Associated with N TAG
GUEST 1 Associated with 0...N REVIEW
LISTING 1 Associated with N HOST_LISTING
LISTING 1 HAVE N PHOTOS
PHOTO N HAVE 1 PHOTOS
AMENITIES 1 Associated WIth N LISTING_AMENITIES
LISTING 1 HAVE N HOST_LISTING

LIST OF TABLES.



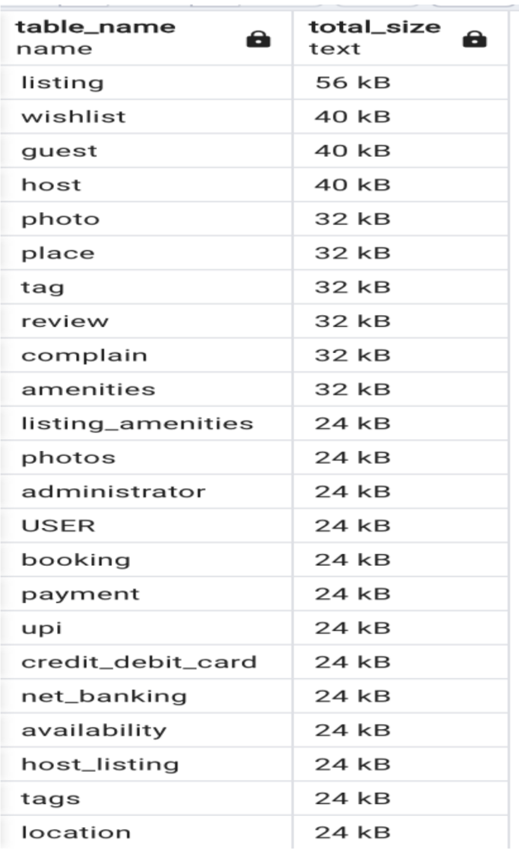
tablename name
photo
photos
location
host
place
listing
availability
tag
tags
guest
review
wishlist
administrator
USER
booking
payment
upi
credit_debit_card
net_banking
complain
listing_amenities
amenities
host_listing

TOTAL SIZE OF DATABASE



total_size text
9372 kB

TOTAL SIZE OF EACH TABLE.



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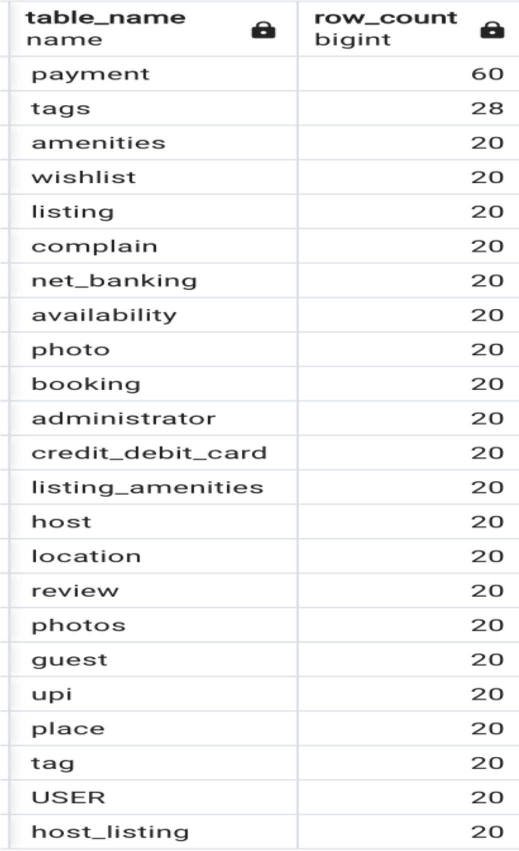
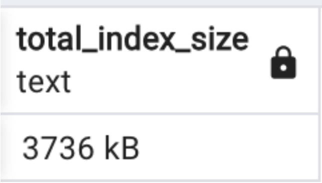
listing	56 kB
wishlist	40 kB
guest	40 kB
host	40 kB
photo	32 kB
place	32 kB
tag	32 kB
review	32 kB
complain	32 kB
amenities	32 kB
listing_amenities	24 kB
photos	24 kB
administrator	24 kB
USER	24 kB
booking	24 kB
payment	24 kB
upi	24 kB
credit_debit_card	24 kB
net_banking	24 kB
availability	24 kB
host_listing	24 kB
tags	24 kB
location	24 kB

NUMBER OF ENTRIES IN EACH TABLE.



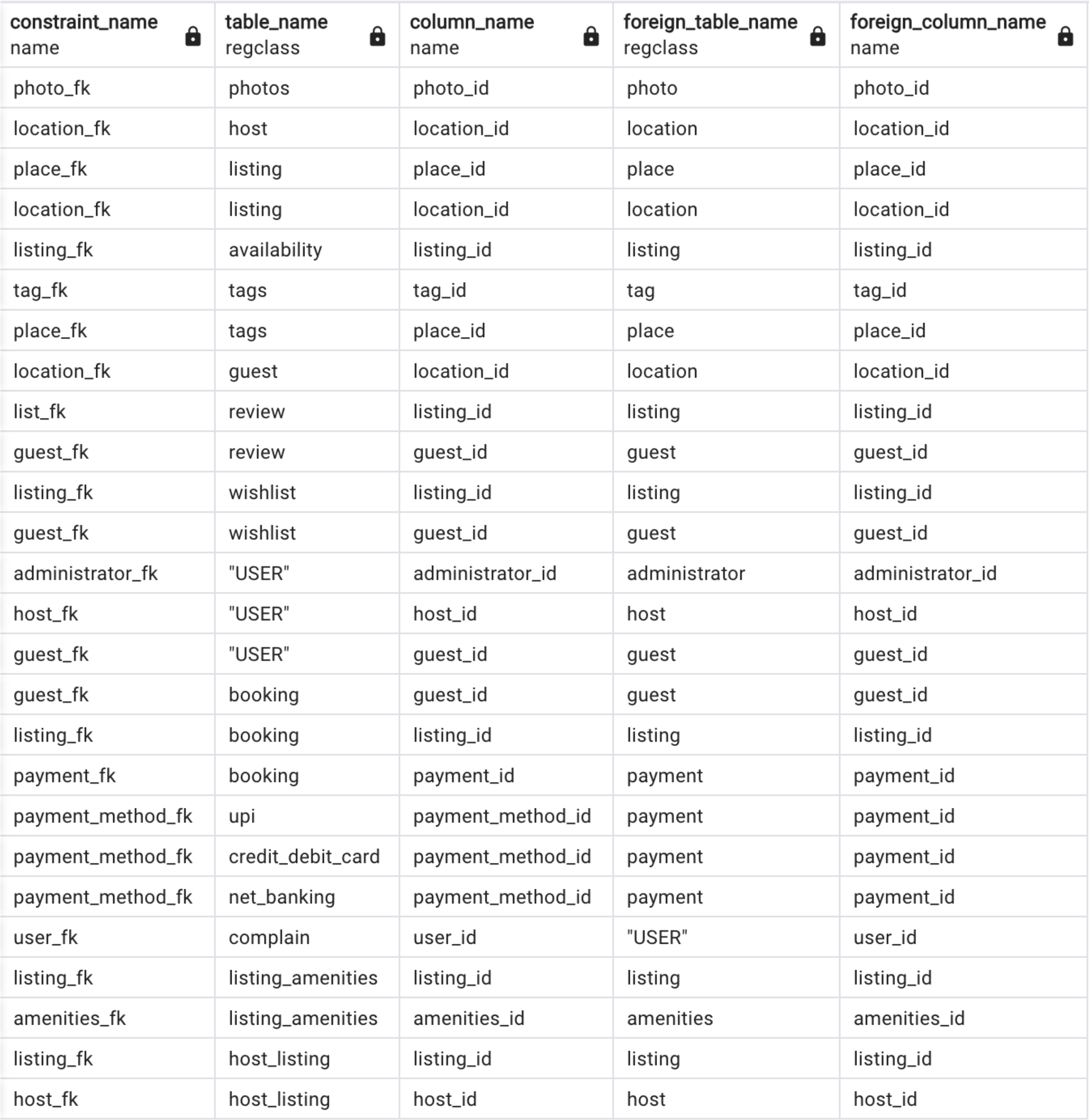
table_name name	row_count bigint
payment	60
tags	28
amenities	20
wishlist	20
listing	20
complain	20
net_banking	20
availability	20
photo	20
booking	20
administrator	20
credit_debit_card	20
listing_amenities	20
host	20
location	20
review	20
photos	20
guest	20
upi	20
place	20
tag	20
USER	20
host_listing	20

TOTAL SIZE OF INDEXES.



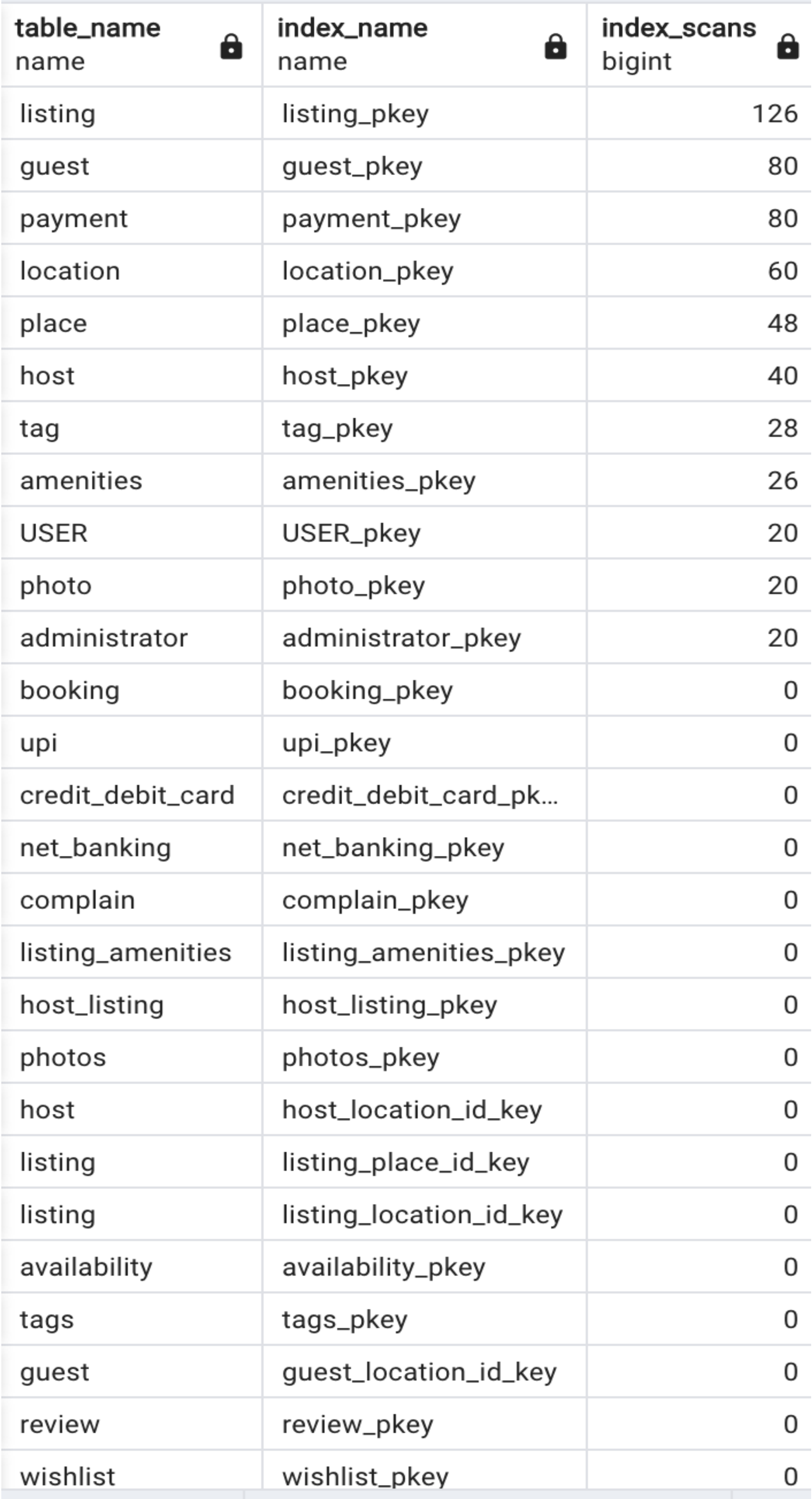
total_index_size
text
3736 kB

LIST OF ALL FOREIGN KEYS



constraint_name	table_name	column_name	foreign_table_name	foreign_column_name
name	regclass	name	regclass	name
photo_fk	photos	photo_id	photo	photo_id
location_fk	host	location_id	location	location_id
place_fk	listing	place_id	place	place_id
location_fk	listing	location_id	location	location_id
listing_fk	availability	listing_id	listing	listing_id
tag_fk	tags	tag_id	tag	tag_id
place_fk	tags	place_id	place	place_id
location_fk	guest	location_id	location	location_id
list_fk	review	listing_id	listing	listing_id
guest_fk	review	guest_id	guest	guest_id
listing_fk	wishlist	listing_id	listing	listing_id
guest_fk	wishlist	guest_id	guest	guest_id
administrator_fk	"USER"	administrator_id	administrator	administrator_id
host_fk	"USER"	host_id	host	host_id
guest_fk	"USER"	guest_id	guest	guest_id
guest_fk	booking	guest_id	guest	guest_id
listing_fk	booking	listing_id	listing	listing_id
payment_fk	booking	payment_id	payment	payment_id
payment_method_fk	upi	payment_method_id	payment	payment_id
payment_method_fk	credit_debit_card	payment_method_id	payment	payment_id
payment_method_fk	net_banking	payment_method_id	payment	payment_id
user_fk	complain	user_id	"USER"	user_id
listing_fk	listing_amenities	listing_id	listing	listing_id
amenities_fk	listing_amenities	amenities_id	amenities	amenities_id
listing_fk	host_listing	listing_id	listing	listing_id
host_fk	host_listing	host_id	host	host_id

INDEX USED STATISTICS



table_name name	index_name name	index_scans bigint
listing	listing_pkey	126
guest	guest_pkey	80
payment	payment_pkey	80
location	location_pkey	60
place	place_pkey	48
host	host_pkey	40
tag	tag_pkey	28
amenities	amenities_pkey	26
USER	USER_pkey	20
photo	photo_pkey	20
administrator	administrator_pkey	20
booking	booking_pkey	0
upi	upi_pkey	0
credit_debit_card	credit_debit_card_pk...	0
net_banking	net_banking_pkey	0
complain	complain_pkey	0
listing_amenities	listing_amenities_pkey	0
host_listing	host_listing_pkey	0
photos	photos_pkey	0
host	host_location_id_key	0
listing	listing_place_id_key	0
listing	listing_location_id_key	0
availability	availability_pkey	0
tags	tags_pkey	0
guest	guest_location_id_key	0
review	review_pkey	0
wishlist	wishlist_pkey	0