Databases Project – Spring 2019

Team No:

Names:

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# Deliverable 1

## Assumptions

<In this section write down the assumptions you made about the data. Write a sentence for each assumption you made>

## Entity Relationship Schema

<In this section you should have figure of the ER schema as well as descriptions about entities and relations>

### Schema

<Add the figure of the ER schema>

### Description

<Describe all the choices you made for Entities and Relationships>

1. Justification of the design choices

Listing/ House:

House Details

Host

Venue

Price

Calendar

Review(weak entity)

Policy

Score

Amenity

1. Description of the data constraints

Relationship: (统一名词/动词形态？)

* Possesses (no attribute): an association among two entities *Listing* and *House Details.* It represents that house(Listing) possesses its house details. *Listing* and *House Details* both have a key constraint and total participation, i.e. exactly one relationship. Every house (listing) possesses exactly one set of house details, and every set of house details is possessed by exactly one house.
* Owns (no attribute): an association among entities *Listing* and *Host*. This relationship represents that host owns house(s). *Listing* has a key constraint and total participation, i.e. exactly one relationship, while *Host* has total participation, which makes *Host* and *Listing* a one-to-many relationship. This means every house must have and only can have one host, and every host must have at least one house to make them a host in this system.
* Locates (n a): an association among entities *Listing* and *Venue*. It represents that house locates at certain venue. *Listing* has a key constraint as well as total participation, i.e. exactly one relationship. Every house locates at exactly one venue, which means house must have and can only have one venue to be located at. *Venue* has no constraints such that a venue can be not located by any house, or be located by one to many houses. These make *Venue* and *Listing* a one-to-many relationship.
* Incurs (n a): an association among entities *Listing* and *Price*. This represents a relationship that listing(house) incurs price in this Airbnb system. *Listing* and *Price* both have a key constraint and total participation, i.e. exactly one relationship. Every house must incur and can only have one price, and a certain price must and can only be incurred by one house.
* Reserves(min max DDL): an association among entities *Listing* and *Calendar*. This represents the relationship that house is reserved on certain date shown on calendar. *Listing* and *Calendar* both have a total participation, while Calendar also has a key constraint, which makes *Listing* and *Calendar* a one-to-many relationship. Every house must be reserved on at least one certain date, and can be reserved on more than one date. Every date on calendar must and can only be chosen for once by customer to reserve house. ?
* Receives(n a): an association among entities *Listing* and *Review*. It represents that house receives review from tenants. *Review* has a key constraint as well as total participation, i.e. exactly one relationship, while *Listing* has no constraint. This makes *House* and *Review* a one-to-many relationship. Every house can attain no review, or can attains one to many reviews. Since review is a weak entity of house, if there exists a review, there must have a house and only one house for it to review.
* Has(n a): an association among entities *Listing* and *Policy*. This represents a relationship that house has policy for tenants to obey. *Listing* and *Policy* both have a key constraint and total participation, i.e. exactly one relationship. Every house has exactly one policy for its tenant, and every policy must and only can be owned by one house.
* Evaluates(n a): an association among entities *Listing* and *Score*. It represents that house be evaluated by tenants and receives a score. *Listing* and *Score* both have a key constraint and total participation, i.e. exactly one relationship. Every house is evaluated exactly once to achieve a score. Every score must and can only be given to one house after tenants’ evaluation.
* Contains(listing\_id, amenity\_id): an association among entities *Listing* and *Amenity*. This relationship represents that house contains amenities inside. There is no constraint for both entities, which makes *Listing* and *Amenity* a many-to-many relationship. Every house can contain no amenity at all, also can have one or many amenities inside. Every kind of amenity can be not contained by any house, or can be contained by one to many house.

## Relational Schema

### ER schema to Relational schema

<Describe the transition from ER schema to Relational schema>

### DDL

## CREATE TABLE Listing

## (

## listing\_id INTEGER(10),

## listing\_url VARCHAR(255) NOT NULL,

## name VARCHAR(255),

## summary VARCHAR(255),

## space VARCHAR(255),

## description VARCHAR(255),

## neighborhood\_overview VARCHAR(255),

## notes VARCHAR(255),

## transit VARCHAR(255),

## access VARCHAR(255),

## interaction VARCHAR(255),

## house\_rules VARCHAR(255),

## pricture\_url VARCHAR(255),

host\_id INTEGER(10) NOT NULL,

venue\_id INTEGER(10) NOT NULL***,***

## PRIMARY KEY(listing\_id),

FOREIGN KEY(host\_id) REFERENCES Host(host\_id),

FOREIGN KEY(venue\_id) REFERENCES Venue(venue\_id),

UNIQUE(listing\_url)

)

The Listing Entity is translated into a table with one primary key, listing\_id, and two foreign keys, host\_id and venue\_id. With the two foreign keys, we combined the relationship Owned\_by and Located\_at with Listing since each listing will have one unique host and one unique venue. As a result, these two columns have NOT NULL constraint on their entry values.

Also, the listing\_url is set to be unique for all instances to ensure proper display of the listing items on the website.

## CREATE TABLE Host

## (

## host\_id INTEGER(10),

## host\_url VARCHAR(255) NOT NULL,

## host\_name VARCHAR(255) NOT NULL,

## host\_since DATE,

## host\_about VARCHAR(255),

## host\_response\_rate FLOAT(10),

## host\_response\_time VARCHAR(255),

## host\_thumbnail\_url VARCHAR(255),

## host\_neighborhood VARCHAR(255),

## host\_verifications VARCHAR(255),

## PRIMARY KEY(host\_id),

## UNIQUE(host\_url),

## )

## CREATE TABLE Venue

## (

## venue\_id INTEGER(10),

## neighborhood VARCHAR(255) ,

## city VARCHAR(255),

## country\_code VARCHAR(255),

## latitude DOUBLE(20),

## longtitude DOUBLE(20),

## PRIMARY KEY(venue\_id)

## )

## CREATE TABLE Review

## (

## review\_id INTERGER(10),

## listing\_id INTEGER(10) NOT NULL,

## date DATE NOT NULL,

## reviewer\_id INTERGER(10),

## reviewer\_name VARCHAR(255),

## comments VARCHAR(255),

PRIMARY KEY(review\_id, listing\_id),

FOREIGN KEY (listing\_id) REFERENCES Listing(listing\_id)

ON DELETE CASCADE

## )

The relationship Receives is combined with the Reviews table as each Reviews corresponds to a unique listing item. As Reviews is designed to be a weak entity of Listing, when one instance of Listing is deleted, the corresponding Reviews instances will be deleted as well.

## CREATE TABLE Score

## (

## score\_id INTERGER(10),

listing\_id INTEGER(10) NOT NULL,

## review\_scores\_accuracy INTEGER(10),

## review\_scores\_clean INTEGER(10),

## reciew\_scores\_checkin INTERGER(10),

## review\_scores\_communication INTERGER(10),

## review\_scores\_location INTERGER(10),

## review\_scores\_value INTERGER(10),

PRIMARY KEY(score\_id),

FOREIGN KEY (listing\_id) REFERENCES Listing(listing\_id)

)

The relationship Evaluated is combined with the Score table as each Score corresponds to a unique listing item.

## CREATE TABLE Policy

## (

## policy\_id INTEGER(10),

## is\_business\_travel\_ready BIT,

## cancellation\_policy VARCHAR(255),

## require\_guest\_profile\_picture BIT,

## require\_guest\_phone\_verification BIT,

listing\_id INTEGER(10) NOT NULL,

## PRIMARY KEY(policy\_id),

## FOREIGN KEY (listing\_id) REFERENCES Listing(listing\_id)

## )

The relationship Has is combined with the Policy table as each Policy instance corresponds to a unique Listing instance.

## CREATE TABLE Price

## (

## price\_id INTEGER(10),

## price FLOAT(10),

## weekly\_price FLOAT(10),

## monthly\_price FLOAT(10),

## security\_deposit FLOAT(10),

## cleaning\_fee FLOAT(10),

## guests\_included INTEGER(10),

## extra\_people INTERGER(10),

listing\_id INTEGER(10) NOT NULL,

## PRIMARY KEY(price\_id),

## FOREIGN KEY (listing\_id) REFERENCES Listing(listing\_id)

## )

The relationship Incurs is combined with the Price table as each Price instance corresponds to a unique Listing instance.

## CREATE TABLE House\_Details

## (

## detail\_id INTEGER(10),

## property\_type VARCHAR(255),

## room-type VARCHAR(255),

## accommodates VARCHAR(255),

## bathrooms INTEGER(10),

## bedrooms INTEGER(10),

## beds INTERGER(10),

## bed\_type VARCHAR(255),

## amenities VARCHAR(255),

## square\_feet INTEGER(10),

listing\_id INTEGER(10) NOT NULL,

## PRIMARY KEY(detail\_id),

FOREIGN KEY (listing\_id) REFERENCES Listing(listing\_id)

)

The relationship Pocesses is combined with the House\_Details table as each House\_Details instance corresponds to a unique Listing instance.

## CREATE TABLE Amenities

## (

## amenity\_id INTERGER(10),

## amenity\_name varchar(255),

## PRIMARY KEY(amenity\_id)

## )

## CREATE TABLE Contains

## (

## listing\_id INTEGER(10),

## amenitty\_id INTEGER(10),

## PRIMARY KEY(amenity\_id),

## FOREIGN KEY(listing\_id) REFERENCES Listing(listing\_id)

## )

The table Contains is created to store the many-to-many relationship between Amenities and Listing.

CREATE TABLE Calender

{

listing\_id INTEGER(10),

date DATE,

available BIT,

price FLOAT(10),

PRIMARY KEY(listing\_id, date),

FOREIGN KEY(listing\_id) REFERENCES Listing(listing\_id)

}

The relationship Reserves is combined with the Calendar table as each Calendar instance corresponds to exactly one Listing instance.

## General Comments

<In this section write general comments about your deliverable (comments and work allocation between team members>

# Deliverable 2

## Assumptions

<In this section write down the assumptions you made about the data. Write a sentence for each assumption you made>

## Data Loading

## Query Implementation

<For each query>

### Query a:

#### Description of logic:

<What does the query do and how do I decide to solve it>

#### SQL statement

<The SQL statement>

## Interface

### Design logic Description

<Describe the general logic of your design as well as the technology you decided to use>

### Screenshots

<Provide some initial screen shots of your interface>

## General Comments

<In this section write general comments about your deliverable (comments and work allocation between team members>

# Deliverable 3

# Assumptions

<In this section write down the assumptions you made about the data. Write a sentence for each assumption you made>

## Query Implementation

<For each query>

### Query a:

#### Description of logic:

<What does the query do and how do I decide to solve it>

#### SQL statement

<The SQL statement>

## Query Analysis

### Selected Queries (and why)

#### Query 1

<Initial Running time:

Optimized Running time:

Explain the improvement:

Initial plan

Improved plan>

#### Query 2

<Initial Running time:

Optimized Running time:

Explain the improvement:

Initial plan

Improved plan>

#### Query 3

<Initial Running time:

Optimized Running time:

Explain the improvement:

Initial plan

Improved plan>

# Interface

### Design logic Description

<Describe the general logic of your design as well as the technology you decided to use>

### Screenshots

<Provide some initial screen shots of your interface>

# General Comments

<In this section write general comments about your deliverable (comments and work allocation between team members>