TOSHKENT SHAHRIDAGI INHA UNIVERSITETI
INHA UNIVERSITY IN TASHKENT

Database Application and Design (SOC-3060) -- Spring 2019

Database System Report

for

<Project Title: *MountHelp*>

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<Team-name: Dream-Chasers>

<Date: 06/05/2019>

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1. Introduction and Scope

Introduce the DB application of your choice (approved by Project Proposal) and describe it in plain English. The length of this "narrative" should be more or less one page written in a classic, regular font type (e.g., Arial or Times), font-size 12pt, single spacing, about 1.5cm margins. Introduce the basic functionalities, goals, entities and relationships among the data concerned. In particular, this section should: (a) Identify the software product to be produced by name (e.g., Host DBMS, Report Generator, etc.); (b) Explain what the software product will, and, if necessary, will not do; (c) Describe the application of the software being specified, including relevant benefits, objectives, and goals.

Tourism industry in Uzbekistan is growing in a fast way. Most tourists visit the oldest and greatest places in Uzbekistan such as Rome of the East (Samarkand), Town Museum (Bukhara), Caravans city (Khiva), Karakalpakstan and other places. [1] The area of mountains of Uzbekistan make up 96 thousand kilometers, which in total 21,3% of the territory of Uzbekistan. [2] Mountains are important assets for the tourism industry. They take up an estimated share of 15-20% of the global tourism market, generating between 100 and 140 billion US$ per year. [3] Observing these statistics and knowing the fact that Uzbekistan does not concede a ranking in global tourism, we have decided to design software product called "*MountHelp*" that will attract attention of all tourists and make tours much easier.

The main problems in Mountain tourism of Uzbekistan are: lack of information about the mountains, their locations and routes; very few and expensive hotels; slow and uncomfortable transportation (public transport); Our software product provides solution to all of these problems. Our application consists of three main branches: finding house to stay, joining the tour, booking a place in a car. Our application is very helpful for international tourists as most of Uzbek people have their own cars and cottages in mountains.

Tourists will be registered as TOURISTs. They can BOOK and REVIEW the HOUSE that is owned by HOST. Moreover, TOURIST can JOIN and REVIEW CAR_DRIVERs who own CARS. As was mentioned above, TOURISTs can join to the TOURs that can be PUBLIC or INDIVIDUAL. The additional features of software product is EMERGENCY SERVICES and RESTROOMS. International tourists can have difficulties finding hospitals or police departments. Therefore, our application will store the information related to POLICE, FIRE STATION, HOSPITALS (first aid) and GENERAL SERVISES (car repair and etc.) The other additional feature is RESTROOMS. One of the biggest problems is finding restrooms in the mountains. Therefore, with our application it is easy to find it.

2. Product Perspective

This section should: (a) Compare the proposed software product with other similar products existing in the market; provide precise references (e.g., names and web links) of those similar products; highlight why or in which features and functionalities the proposed product should be distinguished from other comparable products. (b) Put the product into perspective with other related products. If the product is independent and totally self-contained, it should be so stated here. If the product is a component of a larger system, as frequently occurs, then this section should relate the requirements of that larger system to functionality of the software and should identify interfaces between that system and the software. Note: A block diagram showing the major components of the larger system, interconnections, and external interfaces can be helpful; it will be considered a plus.

As it was written above, the software product that we have generated is devoted to the development of mountain tourism. It can also be used in the big cities if needed. The three main components of our application are hosting, ride sharing, and joining to the tours assembled by organizers. Host families of mountain areas accommodate their houses, tourists can find and join the ride shared by car drivers, people (organizers) publish their tours (events) so that anyone can join them (There are public and individual tours that can be distinguished by type). There are no alternative applications for our product, however, there some applications that has almost similar functionality of the only part of our software product that is still used not in the mountains. They are: Airbnb (for housing), Uber (for ride share) and Travello (for tours).

Our software product is combination of those three programs plus additional features that has the main goal of attracting tourists to the mountains of Uzbekistan and make their trip comfortable.

Similarities:

Airbnb [4]: http://www.airbnb.com/
Functionalities: host a home or become a host. User inserts the location, check-in and checkout dates with number of guests. Selects the needed one and pays for that. User can see the ranking and the reviews of host. User can become a host and earn money.

Uber [5]: https://www.uber.com/
Functionalities: Uber has a lot of functions like delivery, carrier, shipper, business travel, but the main function is ride share. User can be a driver or join a ride. User signs up by entering name, email and other necessary information to drive or taps phone number to ride. User can check the ratings for drivers and riders as well.

Travello [6]: https://www.travelloapp.com/
Functionalities: Travello is social networking application for travelers. It doesn’t offer the tours directly, but searches for people nearby to join the travel. User can discover the tour, post travel updates, join groups and match travel plans.

Differences:

Our software product merges modified versions of all these three applications and adds additional features in it:

- User can be registered as tourist and use the services: hosting, ride sharing and tour organizing.
- User can be registered as car driver, offer the ride and earn money.
- User can be registered as organizer, offer individual or public tours for money or free as well.
- User can be registered as host, offer the house and earn money.
- User can see the photos and reviews of houses and the ranks of hosts. Airbnb doesn’t offer house photos
- User can earn money by offering tours indicating all the schedule and activities that is not supported in Travello.
- User can access the additional features: restrooms and emergency services that are crucial in the mountains and get all the information needed.

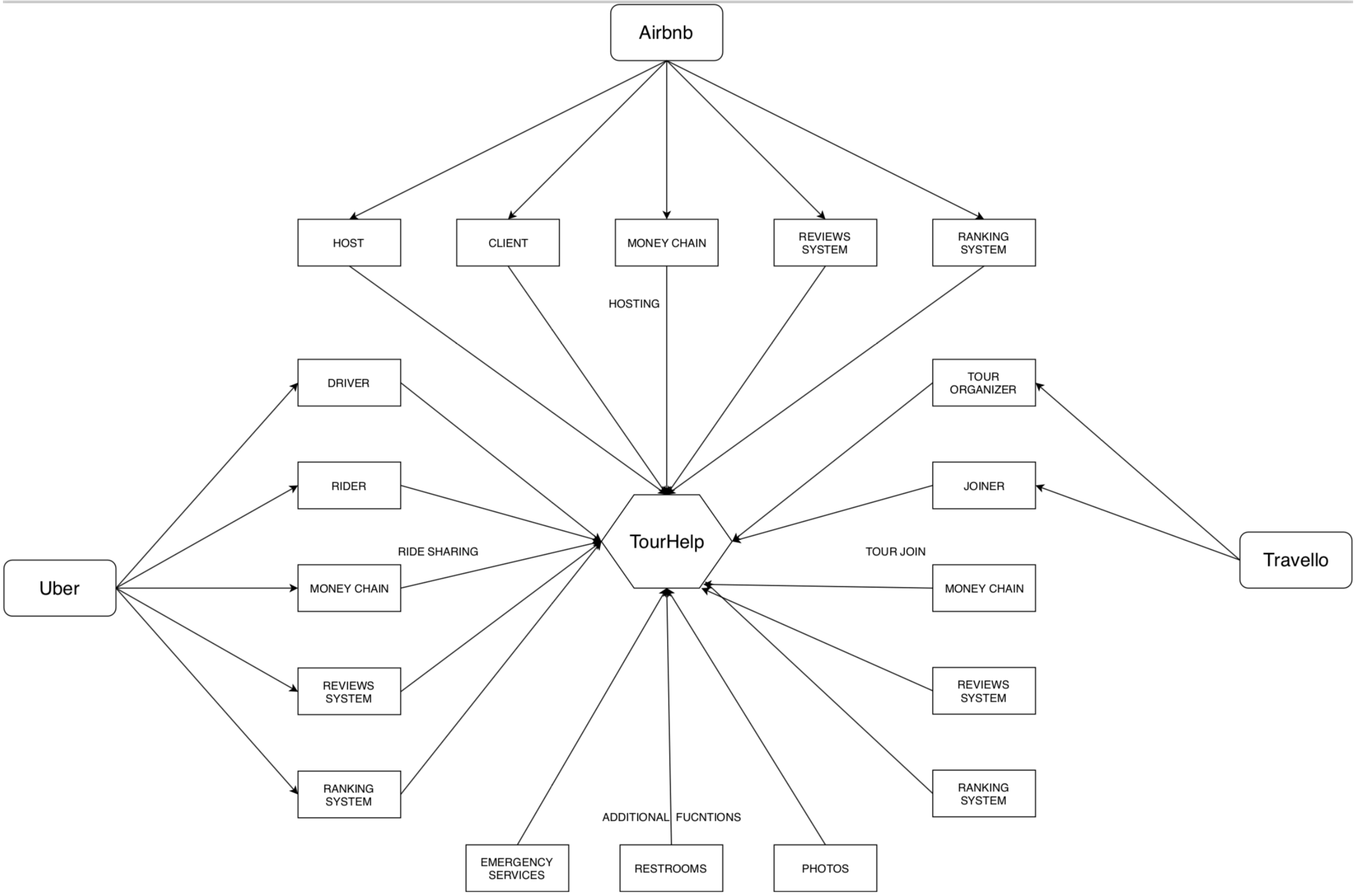


Figure 1: Product Perspective Diagram

3. Specific Requirements

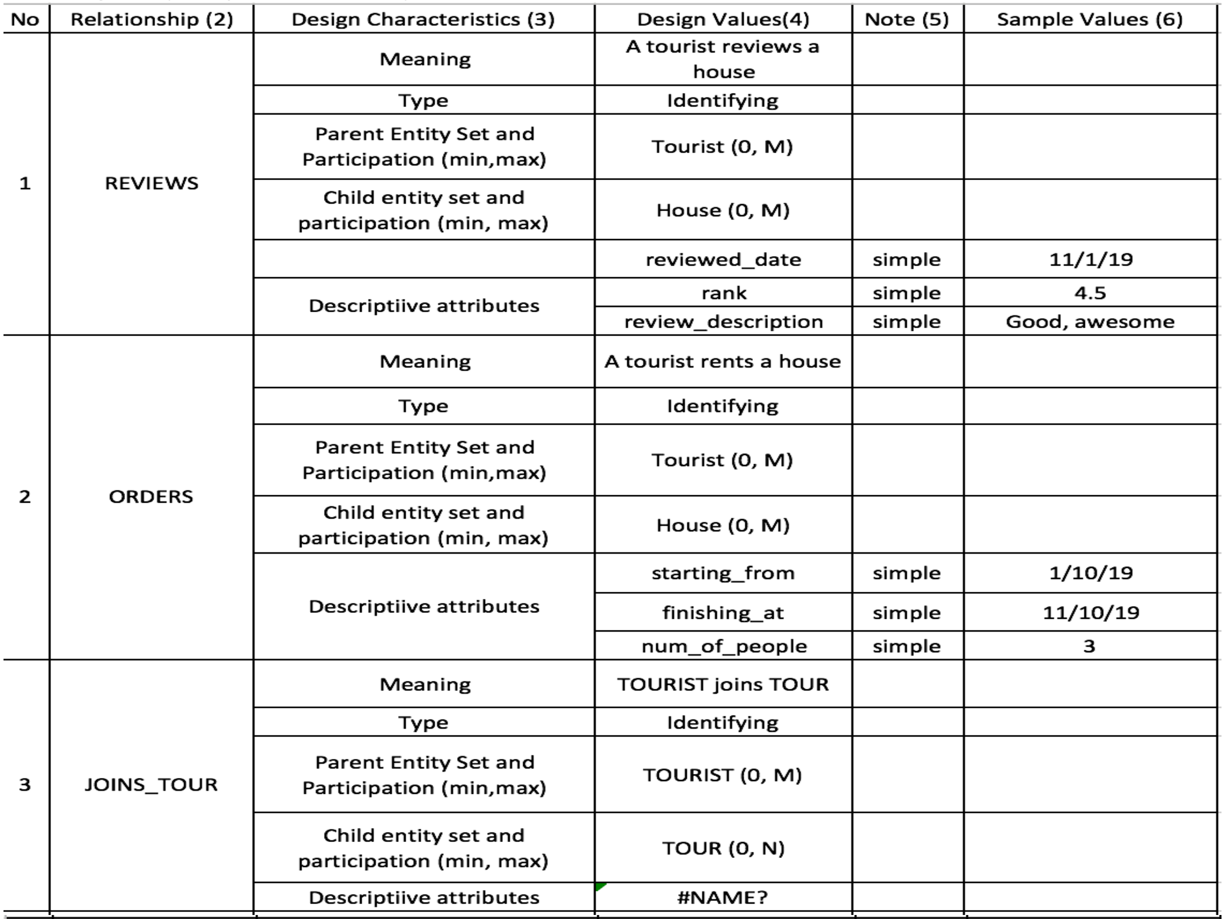
This section should contain all of the software requirements to a level of detail sufficient to enable designers to design a system to satisfy those requirements, and testers to test that the system satisfies those requirements. For a (simplified) database application, this section should include at the very least the following:

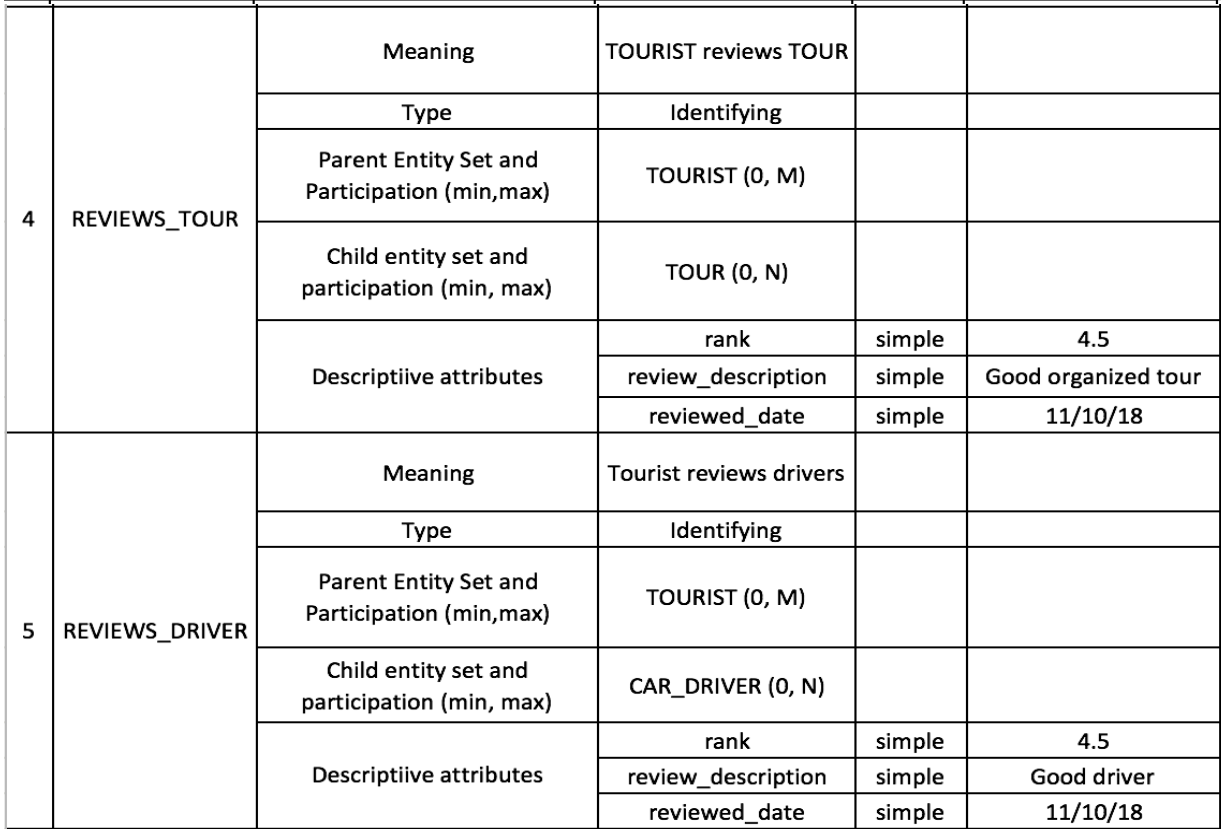
3.1 Logical Database Requirements

(a) Logical database requirements (3.1). Define ("specify') the logical requirements for any data (information) that is to be placed into a database. For a simple database application as that considered here, this may include the following: a) Data entities and their relationships; (*) b) Integrity constraints. (*) IMPORTANT: Data entities and relationships must be specified by using a kind of tables of the form discussed in class for entity set and relationship sets, respectively. The tables can possibly be modified to deal with relationships of degree higher than two, classes and aggregations. Simplified tables are also accepted, provided that they containing the fundamental elements of original tables. In doubt, ask.

No	Entity(1)	Explanation(2)	Identity(3)	Attributes(4)	Note(5)	Sample value (6)	Relationship with (7)
1	USER	Stores base information about users, parent class	Strong	ssn	simple, primary	12345678	
				languages	multivalued	en	
				phone_numbber	multivalued	(99897) 500-0609	
				name	composite	John Doe	
				gender	simple	M	
				nationality	simple	English	
				address	simple	3 Farogon, Tashkent	
2	HOST	Derived from USER , storing data about hosts	Strong	ranking (other attrs are same as USER)	simple	4.5	
3	TOURIST	Derived from USER , storing data about TOURISTS	Strong	*Attributes are inherited from USER			
4	ORGANIZER	Derived from USER , storing data about ORGANIZERS	Strong	*Attributes are inherited from USER			
5	CAR_DRIVER	Derived from USER , storing data about ride sharers	Strong	lic_number	simple	KA456112	
				* other attributes are same as USER			

6	HOUSE	Stores information about the houses to be rent	Strong	address	simple, primary	3 Farogon, Tashkent	
				price	simple	500	
				region	simple	Chavak	
				mountain_range	simple	Pomir	
				postal_code	simple	230201	
				num_of_available_rooms	simple	4	
				max_num_of_guests	simple	5	
				has_internet	simple	1	
				is_available		1	
				photos	multivalued	https://abc.jpg	
7	TOUR	Stores information about the tours to be orginized	Strong	price	simple	200	
				type	simple	p	
				starting_from	simple	11/12/19	
				ending_at	simple	11/12/19	
				location	simple	Tashkent, Chirchiq	
				mountain_range	simple	Tyanshan	
				includes_meal	simple	true	
				id	primary	1	
				available_spots	simple	5	
				ssn	simple	123456789	ORGANIZER
8	RIDE	RIDES to be shared with tourists in order to get the place they want	Weak	start_time	primary	11/12/19	
				ssn_driver	primary	123456789	CAR_DRIVER
				serial_number	primary	KA1234567	CAR_DRIVER
				ssn	simple	123456789	TOURIST
				from_location	simple	Tashkent, Chirchiq	
				to_location	simple	Tashkent, Chirchiq	
				num_of_seats	simple	2	
9	CAR	Stores information about the cars of car drivers	Strong	serial_numer	primary	A235BB5	
				ssn_driver	simple	123456789	CAR_DRIVER
				color	simple	Black	
				type	simple	sedan	
				num_of_seats	simple	4	
				plate_number	simple	S365EA	
				manufactured_year	simple	2015	
				manufacturer	simple	Chevrolet	
				model	simple	Spark	
10	RESTROOMS	Storing locations of restrooms	Strong	location	primary	Tashkent, Chirchiq	
				price	simple	1	
				type	simple	Man and Woman	





No	Relationship (2)	Design Characteristics (3)	Design Values(4)	Note (5)	Sample Values (6)
1	REVIEWS	Meaning	A tourist reviews a house		
		Type	Identifying		
		Parent Entity Set and Participation (min,max)	Tourist (0, M)		
		Child entity set and participation (min, max)	House (0, M)		
			reviewed_date	simple	11/1/19
		Descriptiive attributes	rank	simple	4.5
			review_description	simple	Good, awesome
2	ORDERS	Meaning	A tourist rents a house		
		Type	Identifying		
		Parent Entity Set and Participation (min,max)	Tourist (0, M)		
		Child entity set and participation (min, max)	House (0, M)		
		Descriptiive attributes	starting_from	simple	1/10/19
			finishing_at	simple	11/10/19
			num_of_people	simple	3
3	JOINS_TOUR	Meaning	TOURIST joins TOUR		
		Type	Identifying		
		Parent Entity Set and Participation (min,max)	TOURIST (0, M)		
		Child entity set and participation (min, max)	TOUR (0, N)		
		Descriptiive attributes	#NAME?		
4	REVIEWS_TOUR	Meaning	TOURIST reviews TOUR		
		Type	Identifying		
		Parent Entity Set and Participation (min,max)	TOURIST (0, M)		
		Child entity set and participation (min, max)	TOUR (0, N)		
		Descriptiive attributes	rank	simple	4.5
			review_description	simple	Good organized tour
			reviewed_date	simple	11/10/18
5	REVIEWS_DRIVER	Meaning	Tourist reviews drivers		
		Type	Identifying		
		Parent Entity Set and Participation (min,max)	TOURIST (0, M)		
		Child entity set and participation (min, max)	CAR_DRIVER (0, N)		
		Descriptiive attributes	rank	simple	4.5
			review_description	simple	Good driver
			reviewed_date	simple	11/10/18

3.2 Functional Requirements

(b) Functional requirements (3.2). Define ("specify") the fundamental actions that must take place in the software in accepting and processing the inputs and in processing and generating the outputs. The specification format is an enumerated list of functions expressed by the English statement: "The system shall...".

The system will:

- Get location as input and show all the available houses accommodated hosts as output
- Get location as input and show all the available tours assembled by organizers as output
- Get location as input and show all the available rides shared by car drivers as output
- Get the house address as input and show reviews and photos related to that house as outputs
- Get the ride id as input and show reviews related to the car driver as output
- Get tour id as input and show reviews related to tours as output
- Filter drivers, hosts and organizers by their spoken languages, nationality and gender
- Show and compare the prices and ranking of houses, tours and rides
- Search and show restrooms near your location
- Search and show the information about emergency services near your location

4. Design

This section should contain the design elements for a complete software design description (SDD; cf. IEEE standard n.1016-2009). For a simple database application as that considered here, this section should include at the very least the following:

4.1 Conceptual Database Design

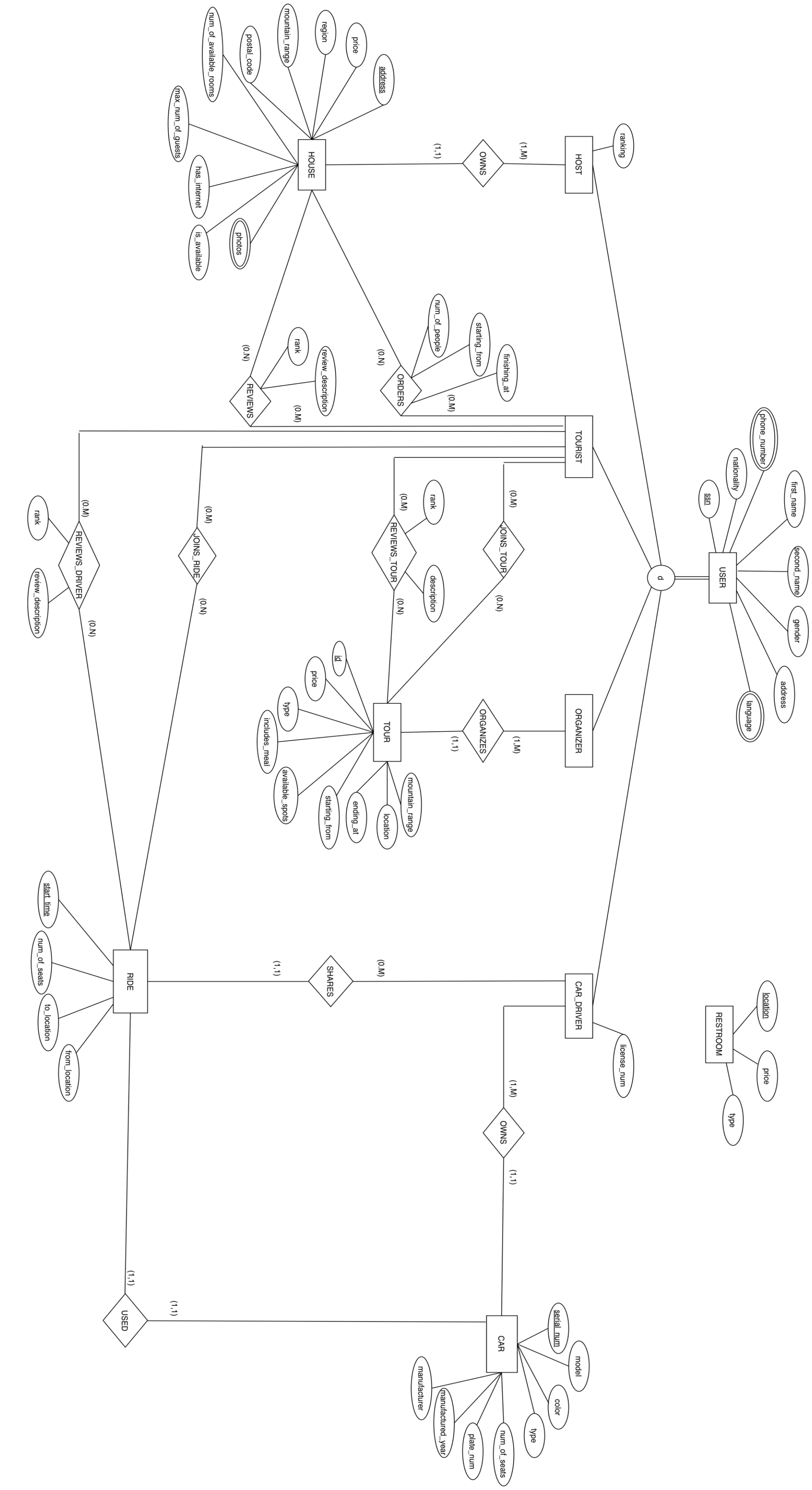
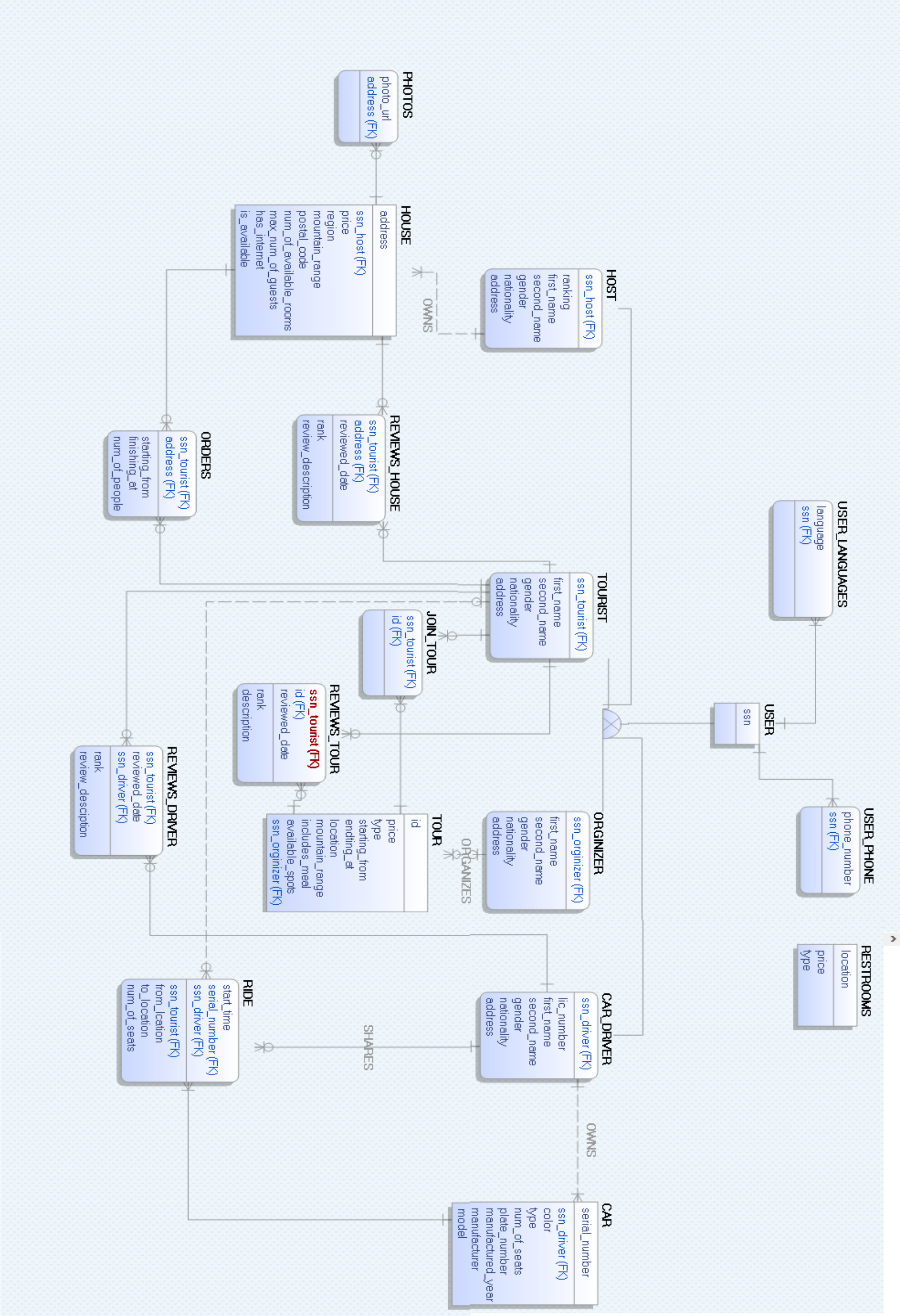
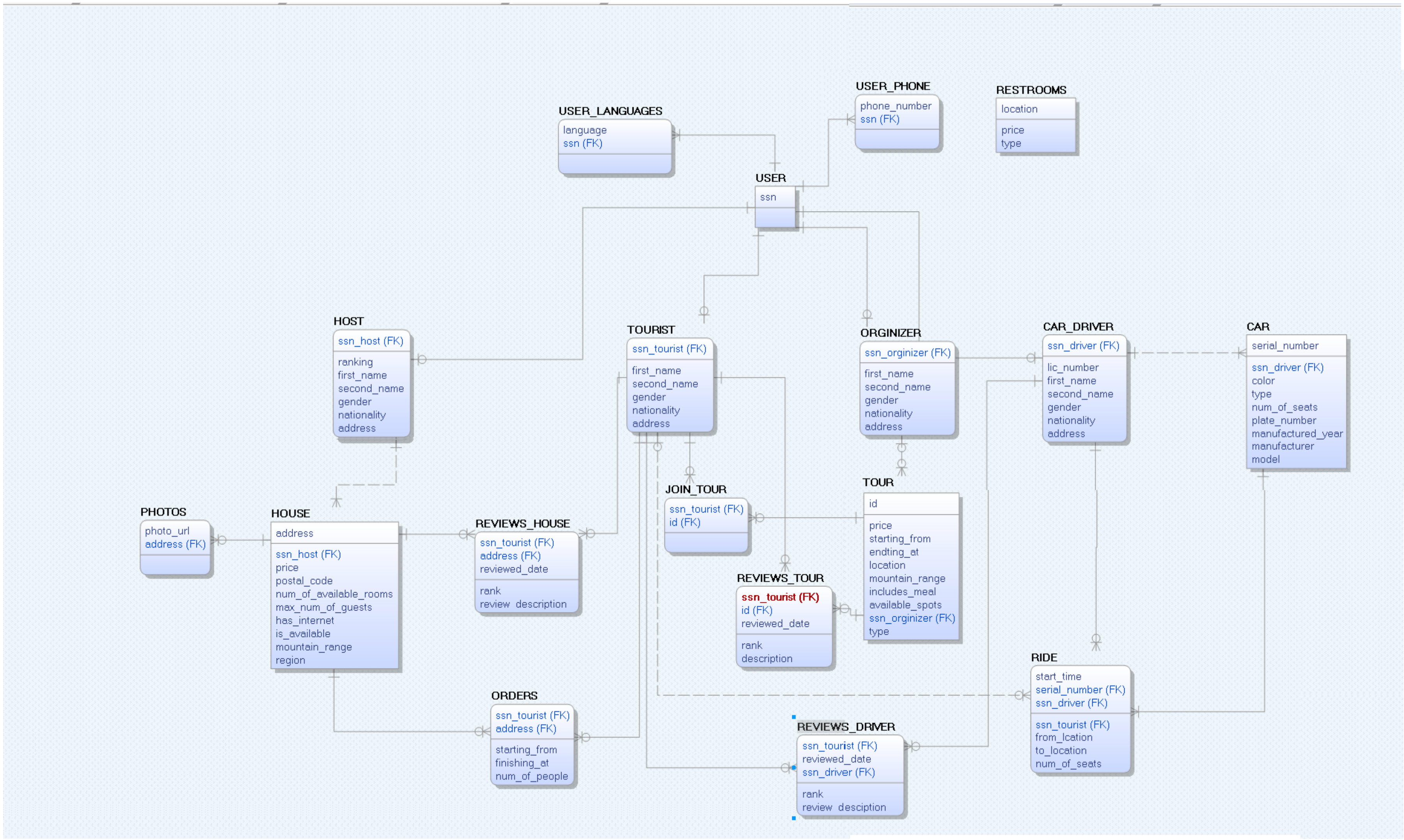


Figure 2: EER Conceptual database design

4.2 Logical Database Design by ERWin



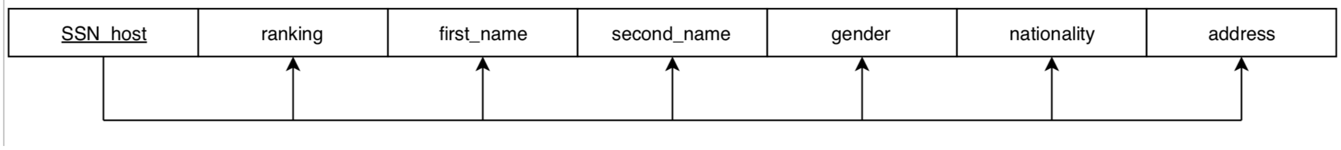
4.3 Physical Database Design by ERWin



5. Dependency Design

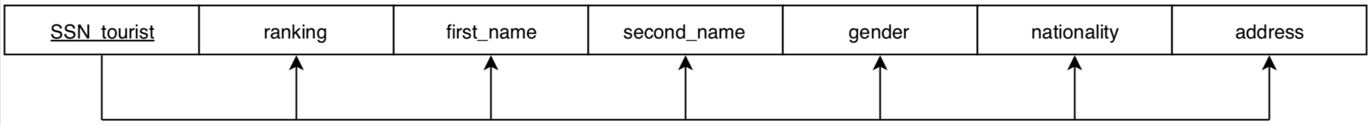
Define ("design", "validate") the relationships of interconnection and access ('attribute dependencies') among entities. Validation of the logical design shall be conducted by using functional dependency theory and normal forms.[7] *In particular, for each logical schema, i.e., SQL table, produced by Physical design in ERWin, follow these requirements: (a) Rewrite it with its proper unique name ("EMP PROJ") and primary key (underlined at- tribute(s)) by using the standard notation as indicated here as a sample; (b) Indicate all functional dependencies defined on the schema; (c) Indicate the highest normal form (among those discussed in class) that the schema satisfies. (d) For the five most important schemas, write (below the schema) the SQL table generated from Physical level design (Physical Diagram) by ERWin's forwarding engineering.*

HOST



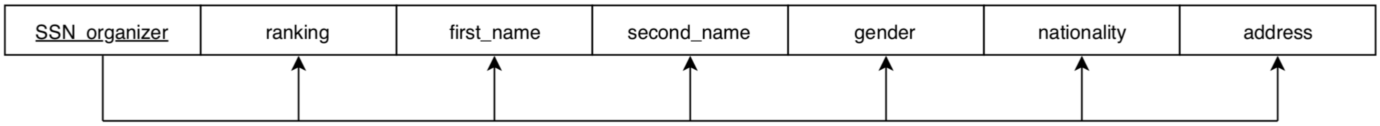
FD1: {SSN_host}->{ranking, first_name, second_name, gender, nationality, address}

TOURIST



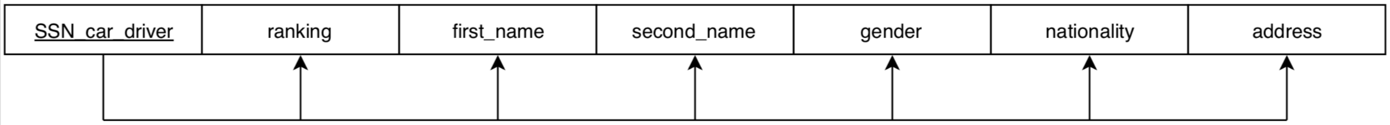
FD1:{SSN_tourist} ->{ ranking, first_name, second_name, gender, nationality, address }

ORGANIZER



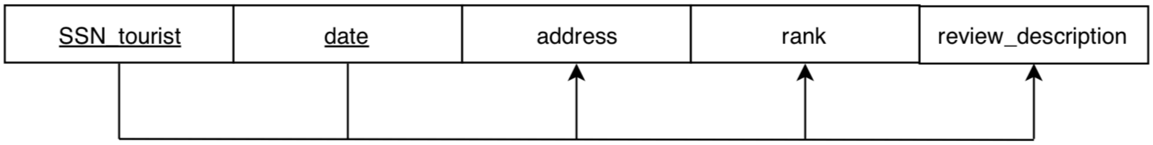
FD1:{SSN_organizer} ->{ ranking, first_name, second_name, gender, nationality, address }

CAR_DRIVER



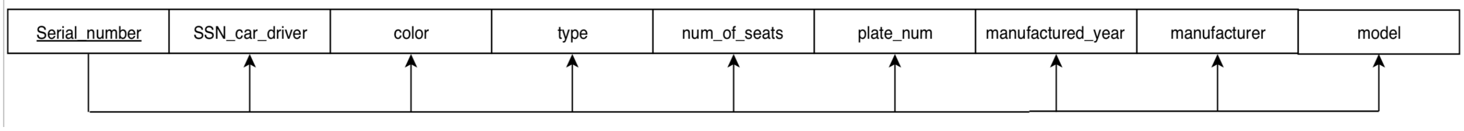
FD1:{SSN_car_driver} ->{ ranking, first_name, second_name, gender, nationality, address, lic_number }

REVIEW_HOUSE



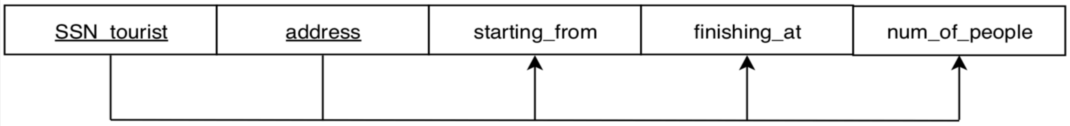
FD1:{SSN_tourist,date}->{address, rank, review_description}

CAR



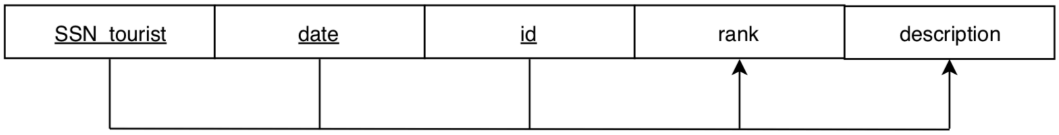
FD1:{serial_number}->{SSN_car_driver,color,type,num_of_seats,plate_num,manufactured_year,manufacturer,model};

ORDERS



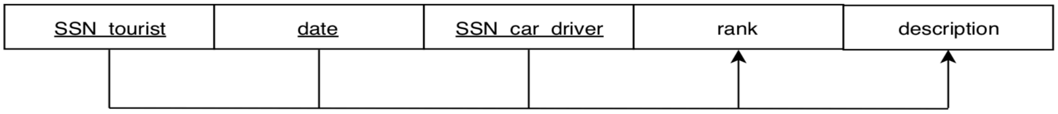
FD1:{SSN_tourist, address}->{starting_from, finishing_at,num_of_people};

REVIEW_TOUR



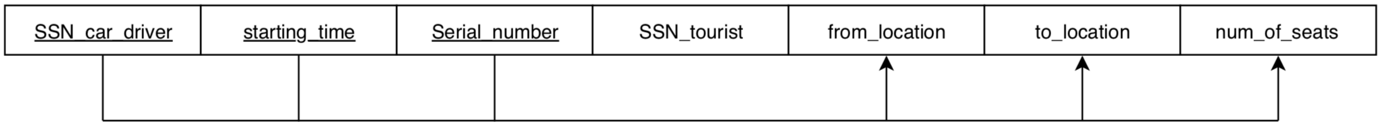
FD1:{SSN_tourist,date,id}->{rank, description};

REVIEW_DRIVER

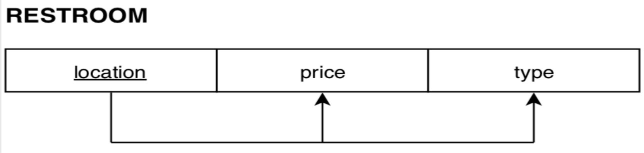


FD1:{SSN_tourist, date, SSN_car_driver}->{rank, description};

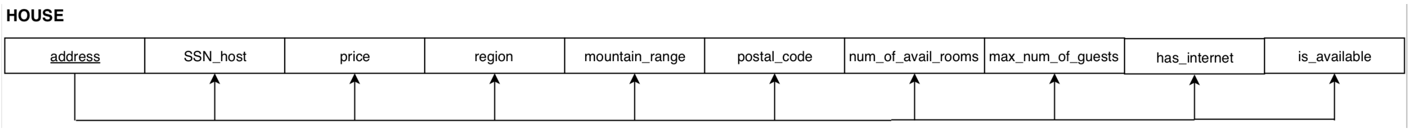
RIDE



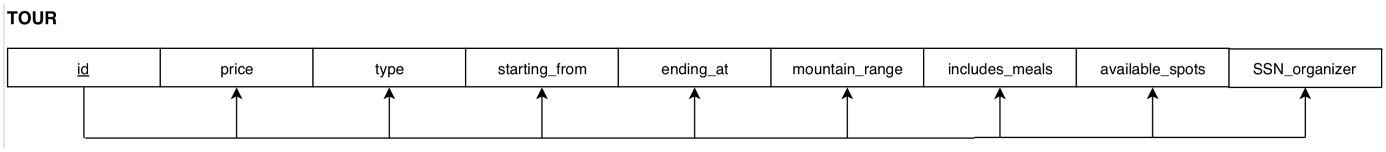
FD1:{starting_time,SSN_car_driver,serial_number}->{SSN_tourist,from_location,to_location,num_of_seats}
Note: here primary key of the table does not determine SSN_tourist, so that SSN_tourist can have many different values for one primary key (or for one ride).



FD1:{location}->{price, type};



FD1:{address}->{SSN_host, price, region, mountain_range,postal_code,num_of_available_rooms,max_num_of_guests,has_internet,is_available}



FD1:{id}->{price,type,starting_from,ending_at,mountain_range,includes_meals,available_spots,SSN_organizer}

5.1 Normalization

USER

SSN	{Phone_number}	{Language}

Since this table holds multivalued attribute, we should use 1NF technique.

USER

SSN

USER_PHONE

SSN	Phone_number

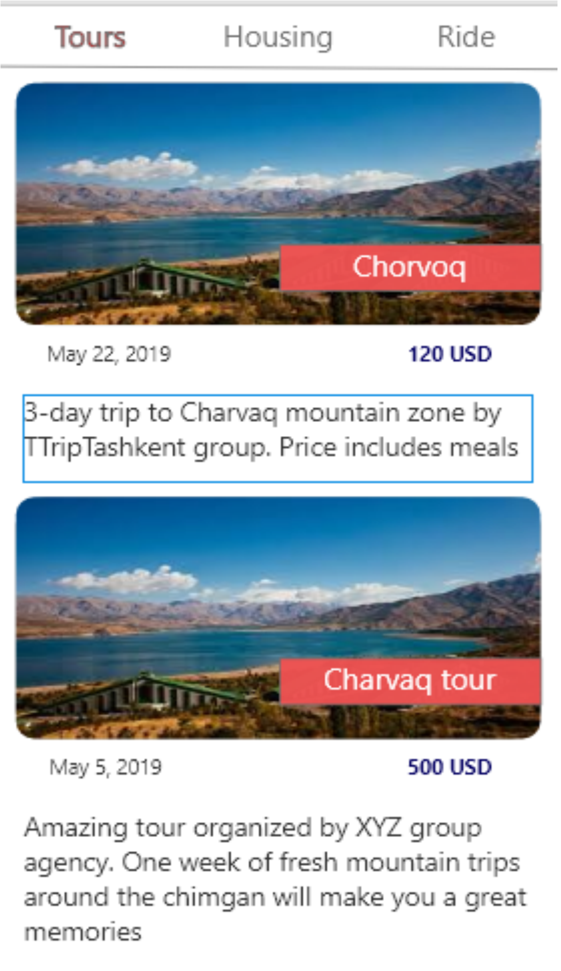
USER_LANGUAGE

SSN	languages

Having normalized USER table, we got these tables above.
Other tables are correct and already meet the requirements of NF1, NF2, NF3, BCNF

6. Interface

Introduce and describe the (design of the) basic elements of the application developed on top of the database designed above. Briefly explain the technical elements of the application's function- alities and user interface. Embed some screen-shots representing the main functionalities listed in 3(b) above. In particular, (a) Embed a screen-shot showing an "Insert" of some data. (b) Embed a screen-shot showing an "Deletion" of some data. (c) Embed a screen-shot showing a "Search" (query) over some data. (d) Embed a screen-shot showing the specific functionalities of the system (if any). "Specific" here means functionalities that go far beyond the typical transactions of dabatabase systems like add/delete/update/select. For example, data analysis, learning, interactive/game-based interface, etc.) Note: The definition ("design") of the UML component diagram for the proposed software in- terface is considered a plus.



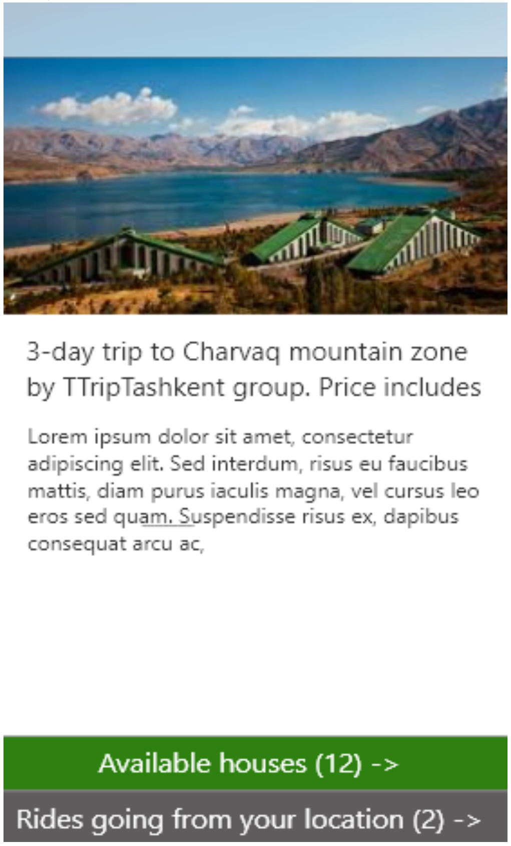
May 22, 2019 120 USD

3-day trip to Charvaq mountain zone by TTripTashkent group. Price includes meals

May 5, 2019 500 USD

Amazing tour organized by XYZ group agency. One week of fresh mountain trips around the chimgan will make you a great memories

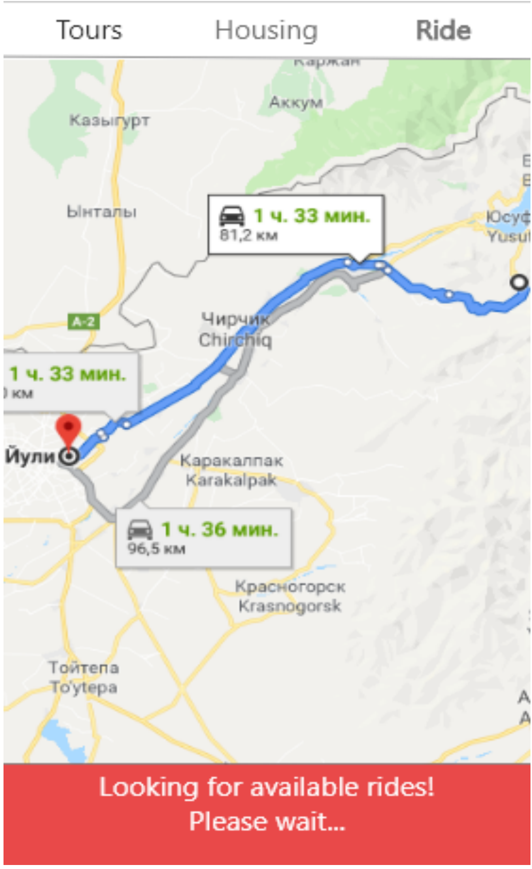
The first screenshot is the flag page. In the second window, it can be seen that there are two three sections: Tours, Housing and Ride. All these three sections are buttons that will navigate through their window. So, Tours window lists the available tours with their dates, price and tour description. User will slide down the window and choose the one that he/she likes.



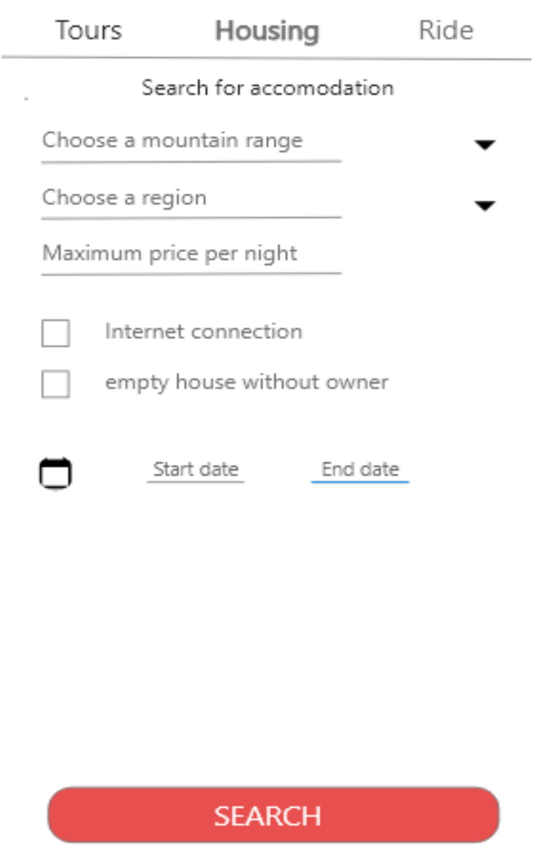
3-day trip to Charvaq mountain zone by TTripTashkent group. Price includes

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed interdum, risus eu faucibus mattis, diam purus iaculis magna, vel cursus leo eros sed quam. Suspendisse risus ex, dapibus consequat arcu ac,

As the user chooses the tour, he/she will be offered the available houses and shared rides from that location. As the user presses those buttons, application will navigate next windows.



Looking for available rides!
Please wait...



Search for accomodation

Choose a mountain range ▾

Choose a region ▾

Maximum price per night

□ Internet connection

□ empty house without owner

Start date End date

To search housing, user taps housing button, where will be asked to enter the mountain range, region in dropdown box and maximum price per night into input fields. Also, internet and house without owner (owner will live in a separate house) can be chosen using a tick. Dates are indicated in the input fields to check the availability of the house.

The ride choice has the same principle as Google Maps. The location from and to are indicated in the map. After, all the available rides will be shown with the detailed information.

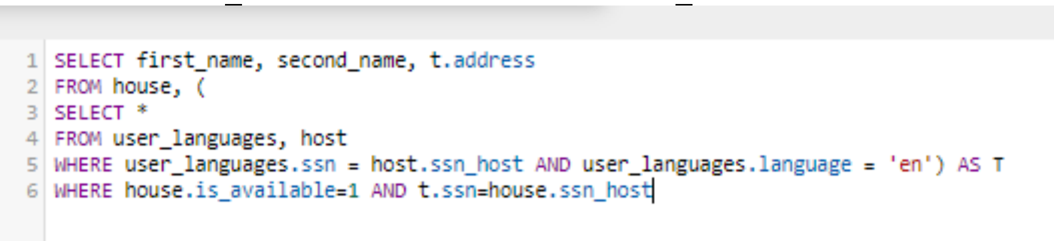
7. Testing of Database

This section should contain an enumerated list in increasing order of complexity of the five most representative queries that a user might run on the database by using the proposed application. For each item of the list, i.e., for each query, do: (a) Write it in plain English. (b) Write it by SQL standard (Silberschatz'SQL; preferred) or by SQL you executed within phpMyAdmin of your DBMS. (Note: you are free to use any relational DBMS, provided you can run phpMyAdmin on top of it as interface.) (c) Embed phpMyAdmin' screen-shot of the query and its result after execution. (*) (d) Embed Interface' screen-shot of the query and its result after execution (if any). (*) The DB have to be "populated" with data in order to test the queries. The amount of sample data necessary depends on the type and complexity of the queries.

1. Show all hosts of available houses who can speak English

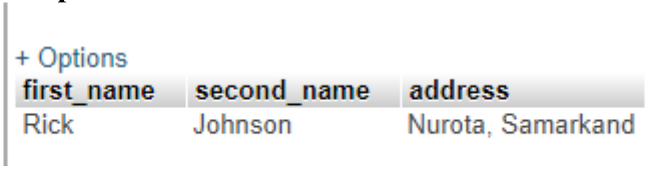
SQL:

```
SELECT first_name, second_name, t.address
FROM house, (
  SELECT *
  FROM user_languages, host
  WHERE user_languages.ssn = host.ssn_host AND user_languages.language = 'en') AS T
WHERE house.is_available=1 AND t.ssn=house.ssn_host
```



```
SELECT first_name, second_name, t.address
FROM house, (
SELECT *
FROM user_languages, host
WHERE user_languages.ssn = host.ssn_host AND user_languages.language = 'en') AS T
WHERE house.is_available=1 AND t.ssn=house.ssn_host
```

Output:

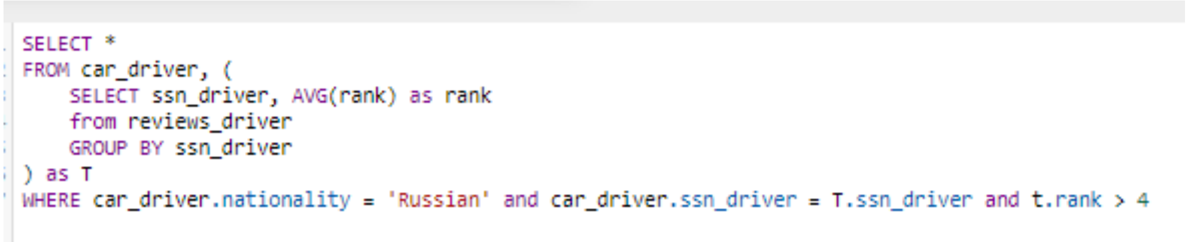


first_name	second_name	address
Rick	Johnson	Nurota, Samarkand

2. Show all the rides whose shared by Russian speaking drivers with at least 4.0 ranking

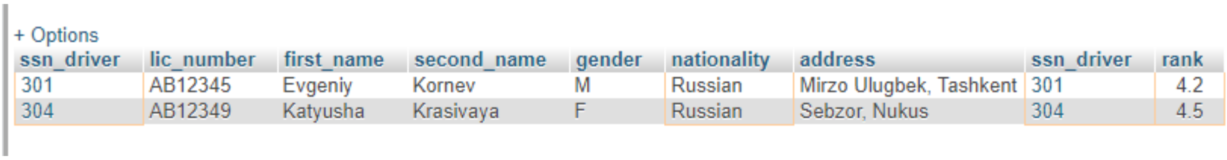
SQL:

```
SELECT *
FROM car_driver, (
   SELECT ssn_driver, AVG(rank) as rank
   from reviews_driver
   GROUP BY ssn_driver
) as T
WHERE car_driver.nationality = 'Russian' and car_driver.ssn_driver = T.ssn_driver and t.rank>4
```



```
SELECT *
FROM car_driver, (
    SELECT ssn_driver, AVG(rank) as rank
    from reviews_driver
    GROUP BY ssn_driver
) as T
WHERE car_driver.nationality = 'Russian' and car_driver.ssn_driver = T.ssn_driver and t.rank > 4
```

OUTPUT:



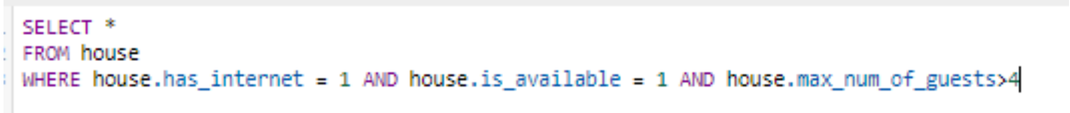
+ Options

ssn_driver	lic_number	first_name	second_name	gender	nationality	address	ssn_driver	rank
301	AB12345	Evgeniy	Kornev	M	Russian	Mirzo Ulugbek, Tashkent	301	4.2
304	AB12349	Katyusha	Krasivaya	F	Russian	Sebzor, Nukus	304	4.5

3. Show all available houses that have internet and can accommodate at least 5 people

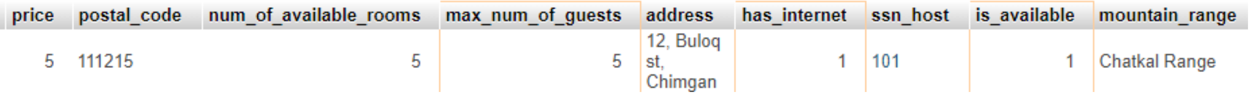
SQL:

```
SELECT *
FROM house
WHERE house.has_internet = 1 AND house.is_available = 1 AND house.max_num_of_guests>4
```



```
SELECT *
FROM house
WHERE house.has_internet = 1 AND house.is_available = 1 AND house.max_num_of_guests>4
```

OUTPUT:

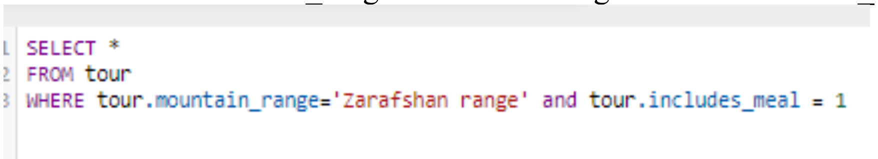


price	postal_code	num_of_available_rooms	max_num_of_guests	address	has_internet	ssn_host	is_available	mountain_range
5	111215	5	5	12, Buloq st, Chimgan	1	101	1	Chatkal Range

4. Show tours in Zarafshan range that includes meal

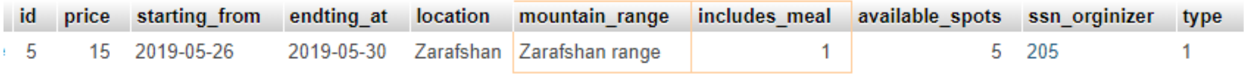
SQL:

```
SELECT *
FROM tour
WHERE tour.mountain_range='Zarafshan range' and tour.includes_meal = 1
```



```
SELECT *
FROM tour
WHERE tour.mountain_range='Zarafshan range' and tour.includes_meal = 1
```

OUTPUT:

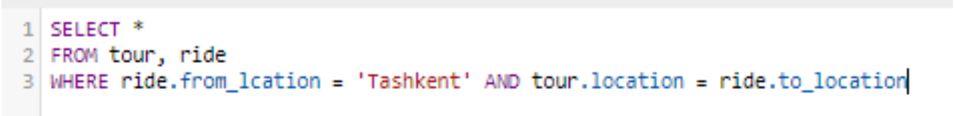


id	price	starting_from	endting_at	location	mountain_range	includes_meal	available_spots	ssn_orginizer	type
5	15	2019-05-26	2019-05-30	Zarafshan	Zarafshan range	1	5	205	1

5. Show tours that has corresponding rides leaves from Tashkent

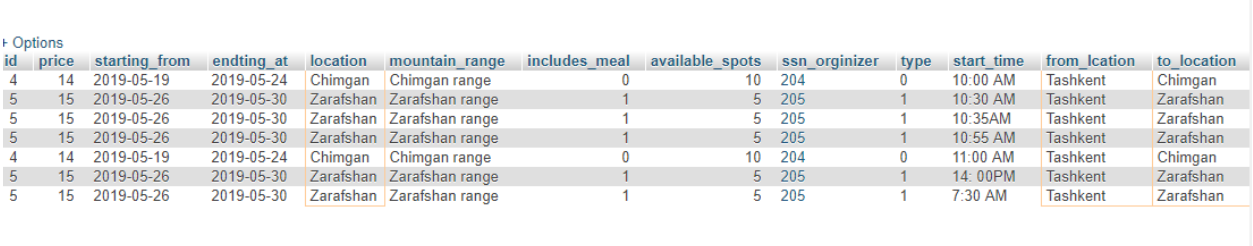
SQL:

```
SELECT *
FROM tour, ride
WHERE ride.from_lcation = 'Tashkent' AND tour.location = ride.to_location
```



```
SELECT *
FROM tour, ride
WHERE ride.from_lcation = 'Tashkent' AND tour.location = ride.to_location
```

OUTPUT:

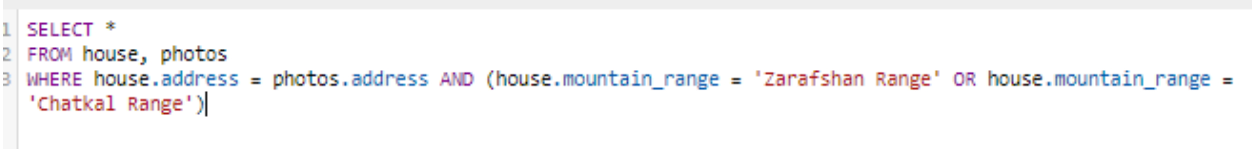


id	price	starting_from	endting_at	location	mountain_range	includes_meal	available_spots	ssn_orginizer	type	start_time	from_lcation	to_location
4	14	2019-05-19	2019-05-24	Chimgan	Chimgan range	0	10	204	0	10:00 AM	Tashkent	Chimgan
5	15	2019-05-26	2019-05-30	Zarafshan	Zarafshan range	1	5	205	1	10:30 AM	Tashkent	Zarafshan
5	15	2019-05-26	2019-05-30	Zarafshan	Zarafshan range	1	5	205	1	10:35AM	Tashkent	Zarafshan
5	15	2019-05-26	2019-05-30	Zarafshan	Zarafshan range	1	5	205	1	10:55 AM	Tashkent	Zarafshan
4	14	2019-05-19	2019-05-24	Chimgan	Chimgan range	0	10	204	0	11:00 AM	Tashkent	Chimgan
5	15	2019-05-26	2019-05-30	Zarafshan	Zarafshan range	1	5	205	1	14: 00PM	Tashkent	Zarafshan
5	15	2019-05-26	2019-05-30	Zarafshan	Zarafshan range	1	5	205	1	7:30 AM	Tashkent	Zarafshan

6. Show houses at Chatkal or Zarafshan range that are with photos

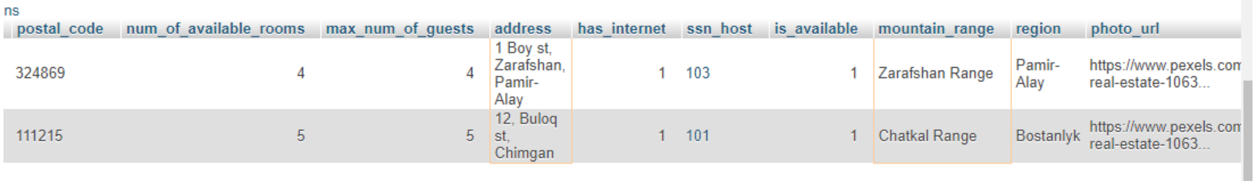
SQL:

SELECT *
FROM house, photos
WHERE house.address = photos.address AND (house.mountain_range = 'Zarafshan Range' OR house.mountain_range = 'Chatkal Range')



```
SELECT *
FROM house, photos
WHERE house.address = photos.address AND (house.mountain_range = 'Zarafshan Range' OR house.mountain_range =
'Chatkal Range')
```

OUTPUT

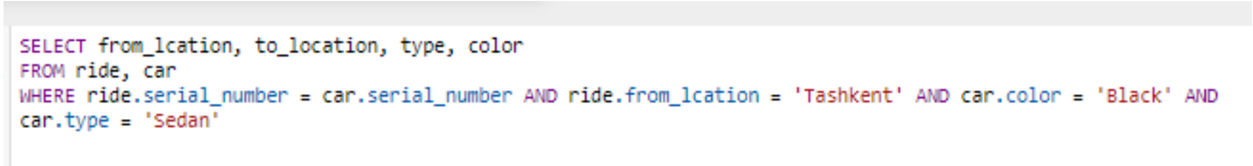


postal_code	num_of_available_rooms	max_num_of_guests	address	has_internet	ssn_host	is_available	mountain_range	region	photo_url
324869	4	4	1 Boy st, Zarafshan, Pamir-Alay	1	103	1	Zarafshan Range	Pamir-Alay	https://www.pexels.com real-estate-1063...
111215	5	5	12, Buloq st, Chimgan	1	101	1	Chatkal Range	Bostanlyk	https://www.pexels.com real-estate-1063...

7. Show rides from Tashkent with black sedans

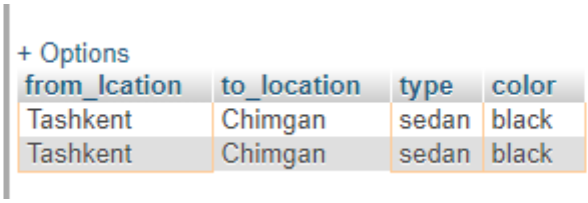
SQL:

SELECT from_lcation, to_location, type, color
FROM ride, car
WHERE ride.serial_number = car.serial_number AND ride.from_lcation = 'Tashkent' AND car.color = 'Black' AND car.type = 'Sedan'



```
SELECT from_lcation, to_location, type, color
FROM ride, car
WHERE ride.serial_number = car.serial_number AND ride.from_lcation = 'Tashkent' AND car.color = 'Black' AND
car.type = 'Sedan'
```

OUTPUT:



from_lcation	to_location	type	color
Tashkent	Chimgan	sedan	black
Tashkent	Chimgan	sedan	black

8. Bibliography

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[7] [Online]. Available: https://slideplayer.com/slide/6021012/.