Phase II. Relational Schema

Jingwen Chen
jchen3@patriots.uttyler.e
du

Abdul Rafay
amohammed6@patriots.uttyler.
edu

Lalith Cheruku
lcheruku@patriots.uttyl
er.
edu

0. Pre-Illumination

For clearly describing the relational schema design, we separate this report into four sections. In Section 1 we modify the original EER diagram and explain what are changed, respect to our Phase I EER diagram. And then, in Section 2 we give the relational schemas converted from our Phase I EER diagram with detailed mapping step by step. Section 3 is the documentation of relational schemas. This documentation mainly describes data type and format for each attribute in each relational schema. We also explain our assumptions for the documentation in this section. Finally, a short summary is given at the end of this report.

1. Modified EER diagram

Put any modification here. If you don't have any modification, just put your EER diagram here so that I can check whether your relation model is correct.

1. We changed the State and City as the attribute of the destination.
2. We changed the Destination Description from an attribute of the destination to a separate and marks an "owns" relationship between them.
3. We moved some common attributes of "sight, restaurant, shops/Mall" to the entity "Destination" and set them as a union.
4. We set the relationship between "Restaurant", "Shops/Mall", and "Business Partner", as the "Associate" relationship.

5. We changed "Rating" from derived attribute to regular attribute and move to the "rates" relationship as an attribute.
6. We changed the name of the entity "Member" to "Authorized Members".
7. We changed the name of "Destination comment" to "comment" and give it a unique ID, "comment id".
8.   We changed the relationship of privilege, to separate into different groups of members: preferred members and Regular members.
9. We changed the number of followers, the number of people followed, and the number status from derived entities to regular entities.
10. We changed the reply as the one relationship to comments, coming from the comments and back to comments.
11. We deleted the entity "Preference" and put the "like/dislike", as an attribute to comment.
12. We changed wish destinations and visited destinations to multi-value attributes.
13. We set a relationship between the images and the destination.
14. We set a muti-value attribute of "ways of travel" to the destination.

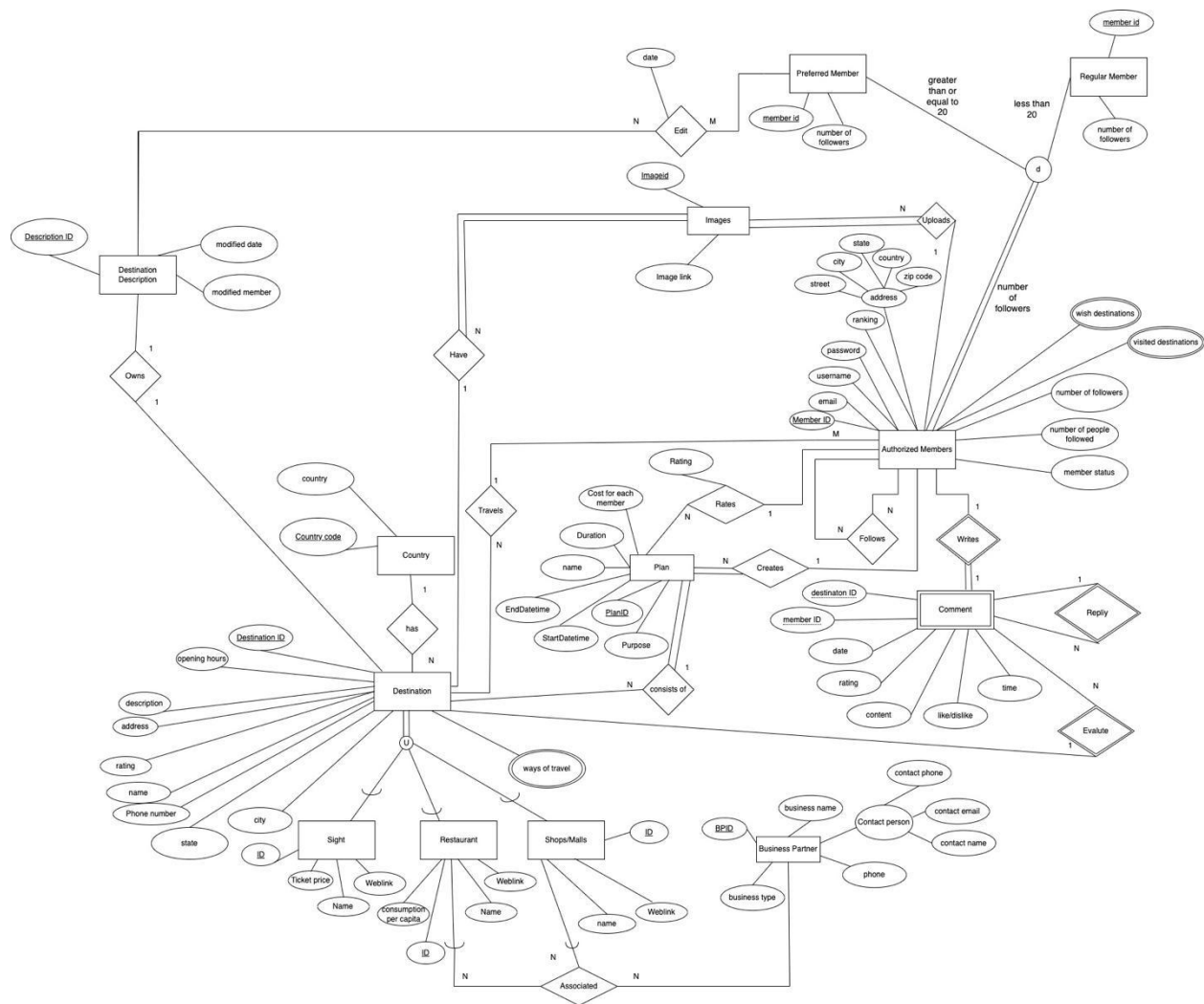The modified EER diagram is shown in Figure 1.

Figure 1. EER Design for Trip Share Database

2. Mapping Relational Schemas

We use the seven-step algorithm to convert the basic EER model constructs into relations. The following are detailed mapping processes.

2.1 Mapping of Regular Entity Types, Specializations.

- Since preferred members, regular members are a subgroup of members, and they don't have overlap, thus we put the "disjoint union" for them.

- The sights, restaurants, shops/malls are all attractions of destinations, and they may have overlap thus we use regular union.
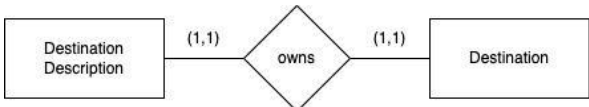
2.2 Mapping of Weak Entity Types

We don't have any weak entity.

2.3 Mapping of Binary 1:1 Relationship Types

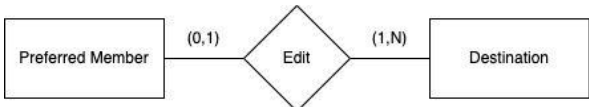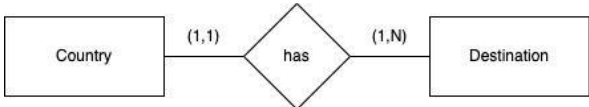The mapping method is exhibited in Table 1.
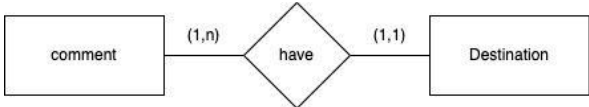
Table 1. Mapping Method to Binary 1:1 Relationship
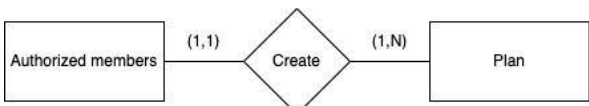
Relation	Mapping Method
(0,1) writes (1,1) Authorized Members — writes — comments	We used a *foreign key approach* to map this relationship. Since on the comment side, the relationship is total participation, we include Member ID as a foreign key in Comments, which is the primary key of Authorized Members.
(1,1) owns (1,1) Destination Description — owns — Destination	We used a *foreign key approach* to map this relationship. Both destination descriptions and destination are total participation, we include destination ID as a foreign key in destination description, which is the primary key of Authorized Members.

2.4 Mapping of Binary 1: N Relationship Types
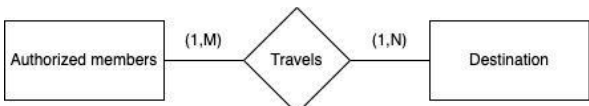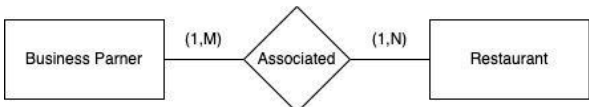
The mapping method is exhibited in Table 2.
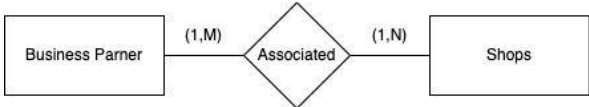
Table 2. Mapping Method to Binary 1: N Relationship

Relation	Mapping Method
(0,1) Edit (1,N) Preferred Member — Edit — Destination	The *N-side* of this relationship type is Destination. Thus, we include the primary key Member ID of the relation Preferred Member as the foreign key in relation to Destination.
(1,1) has (1,N) Country — has — Destination	The *N-side* of this relationship type is Destination. Thus, we include the primary key

	country ID of the relation country as the foreign key in the relation destination.
comment (1,n) have (1,1) Destination	The *N-side* of this relationship type is comment. Thus, we include the primary key destination ID of the relation comment as foreign key in the relation destination.
Authorized members (1,1) Create (1,N) Plan	The *N-side* of this relationship type is the plan. Thus, we include the primary key Member ID of the relation comment as foreign key in the relation plan.

2.5 Mapping of Binary M: N Relationship Types

Authorized members (1,M) Travels (1,N) Destination	There are one-to-many members who could travel to one-to-many destinations. Thus, we include the primary key Member ID of the relation authorized members as the foreign key in relation to Destination and the primary key destination ID of the relation destination as the foreign key in relation to authorized members.
Business Parner (1,M) Associated (1,N) Restaurant	There are one-to-many business partners who could associate with one-to-many restaurants. Thus, we include the primary key BPID of the relation business partner as the

	foreign key in relation to restaurant and the primary key RID of the relation restaurant as the foreign key in relation to business partner.
Business Parner (1,M) Associated (1,N) Shops	There are one-to-many business partners who could associate with one-to-many shops. Thus, we include the primary key BPID of the relation business partner as the foreign key in relation to shops and the primary key SID of the relation shops as the foreign key in relation to business partner.

2.6 Mapping of Multi-valued Attributes

There are three multi-valued attributes:

1. "Ways of traveling" of "destination", we set the primary key Destination ID of the relation Destination as the foreign key in relation to Ways of traveling.

2. "Wish destinations" of "Authorized Member", we set the primary key Member ID of the relation Authorized Member as the foreign key in relation to Wish Destination.

3. "Visited destinations" of "Authorized Member", we set the primary key Member ID of the relation Authorized Member as the foreign key in relation to Visited Destination.

2.7 Mapping of N-ary Relationship Types

Authorized Members can upload images of the destination. We include the primary key Member ID of the relation authorized member as the foreign key in relation toImage and the primary key destination ID of the relation destination as the foreign key in relation to image.

2.8 Final Relation Schema

After seven steps of mapping, we can get the final result of the relation schema.

Besides, we point out foreign keys by arrows from the foreign key to the original keys between two relations.

Figure 2 displays all the relational schemas converted from Phase I EER diagram.

Destination

Destination ID	Destination name	opening hours	contact number	city	state	country	destination rating

Authorized members

Member ID	Member name	username	email address	password	member address	member ranking	date of birth	number of followers	number of people followed	member status

Regular members

member id	number of followers

Sight

ticket price	weblink	destination id

Restaurant

weblink	consumer_per_capita	restaurant rating	destination id	RID

Shopping

weblink	destination id	SID

Description

member id	modified date

Business partners

BPID	Business name	Business type	destination id	contact person	business contact number

Comments

member id	destination id	posted date	posted time	content	rating	like/dislike	reply content	commentid

Images

member id	destination id	destination name	image id	image link

associates

BPID	RID	SID

plan

plan id	member id	destination id	plan name	purpose of visit	start date time	end date time	duration	arrival time	departure time	potential cost

preferred members

member id	number of followers

Rates

member id	destination id	plan id	plan rating	rate id

travels

member id	destination id

ways of travel

destination id	ways of travel

wish destinations

member id	wishlist

visited destinations

member id	visited list

3. Documentation for schemas

3.1 Explanation for format design

After mapping the EER diagram into relation schema that can be implemented in a relational DBMS like Oracle, we should also design the format of each attribute in every relation. Here we suppose that all the assumptions, explanations, and limitations in phase I are also suitable for the design in this phase. Thus, we shall not repeat them. In this section, we only explain our assumptions for the data types and formats in the documentation. The rules are shown as follows:

- Data format for all IDs is XXX-XX-XXXX. All IDs shall have exactly 11 characters. (Just an example)

3.2 Format for Every Relation

Table 3 gives data type and format for each attribute in each relational schema.

Table 3. Format for Each Attribute (example)

Relation Names	Attributes	Date Type
Hospital_Personnel	Person _ID	XXX-XX-XXXX, string = 11 chars
	First_Name	string <= 20 chars
	Middle_Name	string <= 20 chars
	Last_Name	string <= 20 chars
	Birth_Date	MM/DD/YYYY, string = 10 chars
	Phone	XXX-XXX-XXXX, string = 12 chars
	Street_No	integer
	Street_Name	string <= 20 chars
	Apt_No	integer
	City	string <= 20 chars
	State	string <= 20 chars
	Zip	String <= 10 chars

3.3 Implement the Database

Use SQL to create Relation Schema and constraints in Oracle.

4. Conclusion

In this report, we discussed and drew the relational schemas for the Database of Trip Share Management. We also give the data type and format for each attribute in each schema. Then we explain our assumptions in the documentation. This report analyzed the logical model of Database. The next step is to implement this database. In the future, we may change some design when facing practical difficulties and other requests.