

Database Answers

A Tourist Guide to Qatar



The Museum of Islamic Art, Doha, Qatar

Barry Williams

4. Tourist Guide to Qatar	2
4.1 What is This?	2
4.2 Why is it Important?	2
4.3 What Will I Learn?	2

4. Tourist Guide to Qatar

4.1 What is This?

This is a tutorial on data modeling for young people that represents a typical data modeling project and illustrates the basic principles involved.

In this tutorial, we will follow two young tourists as they visit Qatar, which is a country with a tremendous history and is very popular with tourists looking for something special.

Our tourists are Nadia, a young girl who likes sightseeing and ice cream, and Omar, Nadia's older brother, who likes sightseeing and designing data models.

4.2 Why is it Important?

Data modeling is important because it is the foundation for so many activities:

It provides a vehicle for communication among a wide variety of interested parties, including management, developers, data analysts, DBAs and more.

A physical database can easily be generated from a data model using a commercial data modeling tool.

4.3 What Will I Learn?

You will learn:

- How to create a data model, starting from scratch
- The important design principles involved
- What a typical data model looks like

4.4 Topics

In this chapter, we will cover some basic concepts in data modeling:

- Primary and Foreign Keys
- One-to-Many and Many-to-Many Relationships
- Hierarchies and Inheritance
- Reference Data

4.5 Let's Get Started

[Omar]: We have just arrived in Qatar. What would you like to do today?

[Nadia]: Omar, It's great being in Qatar, which has so many things to see and enjoy.



[Omar]: I'm glad you like it, Nadia. What would you like to do today?



[Nadia]: Omar, we have come to Qatar, and I would like to see some of the interesting tourist attractions, then I would like to do some shopping, get a feeling for the Qatari culture and history.

I would like to finish up at Starbucks for a muffin.

[Omar]: OK. Let's go.

4.6 Arriving in Qatar

[Nadia] Wow, Omar, look at the people.

[Omar] Yes, Nadia, when we look around there are lots of stores, people and so on!

In fact, shopping is a very popular way to relax, especially for families and young people.

So we can start thinking about our data model.

This photo show the Qatar City Shopping Complex.



And here is a different view of Qatari society, showing men in traditional clothing

- <http://kids.britannica.com/elementary/art-87204/Most-men-in-Qatar-wear-traditional-clothing>



4.7 Starting our Data Model

[Nadia]: How do we get started?

[Omar]: Well, we know that we have people and places.

The simplest start is to call all these places **establishments**.

Then we have different kinds of establishments.

And we have people - local people, tourists, students, people passing through, people working here, people here on business and so on.

[Nadia]: Hmmm - so how do we translate what we know to help us get started with our data model?

[Omar]: Let's start a diagram with people and establishments.

This simple diagram is going to grow into a data model.



4.8 Identifiers and Primary Keys

[Nadia]: Omar, I am one of these people so how do I create a unique identity for myself to make me different from everybody else?

[Omar]: We will give every person a **unique identifier** and every establishment its own unique identifier.

When we use these we call them **Primary Keys**, and show them in the diagram with a **PK** on the left-hand side.

[Nadia]: That sounds good, Omar, but I don't know what it means.

[Omar]: Well, Nadia, let's look at how we use these identifiers...



Our photo shows a family shopping in Qatar.

So, in other words, we have one customer, and one establishment, which is the store.

So we can create a people record with a person ID of 1 and an establishments record for the store, with an establishment ID of 1.



Family shopping in Qatar

4.9 Relationships and Foreign Keys

[Omar]: Nadia, now we can add some interesting details because we know that one person can visit many establishments.

We also know that one establishment is visited by many tourists.

Then we call this a **many-to-many relationship** between people and establishments.

To make it easier for you to understand I have expanded the **many-to-many relationship** into two different things, which are called **one-to-many relationships**.

[Nadia]: So Omar, is that like saying that one person can make many visits to many establishments?

[Omar]: Yes, Nadia - that's great - and we can also say that one establishment can have visits from many people.

At this point, we can show how all these boxes are related, and that is a very big step, because it takes us to the idea of 'relationships'.

We can call these boxes **tables** - or **entities** if we want to speak to professional data modelers.

A table simply stores data about one particular kind of 'Thing of Interest'.

For example, people or establishments.

Each record in a table will be identified by its own unique identifier, which we call the *Primary Key*.

It is not usually easy to find a specific item of data already in the table that will always be unique.

For example, in the States, social security numbers (SSNs) are supposed to be unique, but (for various legitimate reasons) that is not always the case.

Also, foreign visitors and tourists will not have SSNs.

Therefore, it is best practice to create a new field just for this purpose.

This will be what is called an **auto-increment** data type, which will be generated automatically by the Database Management System (DBMS) at run-time.

This is called a **surrogate key** and it does not have any other purpose.

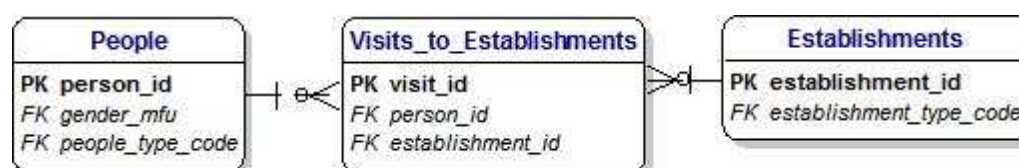
It is simply a key that stands for something else.

It is a meaningless integer that is generated automatically by the database management software, such as Oracle or SQL Server. The values are usually consecutive integers, starting with 1,2,3,4 and so on.

Now we can see how useful our identifiers can be because we can include the person and establishment identifiers in our visits table.

Then the Person_ID field becomes a link to a record for a person in the Person Table.

This link is what is called a **Foreign Key** and we can see it's shown with '**FK**' on the left-hand side.



4.10 Staff, Establishments and Derived Fields

[Nadia]: Omar, how do we specify that staff must work in some establishment?

[Omar]: Nadia, that's a very good question.

Fortunately, the answer is very easy.

We add a one-to-many relationship between the staff and establishment entities

In English, we would say that every member of staff must work in one establishment and every establishment can employ many members of staff.

In the diagram, we show this with a **Foreign Key** by the Establishment_ID field in the staff entity.

So if we look closely at the staff entity, we will see '**FK**' by the Establishment_ID field.

[Nadia]: OK, that sounds good, and I can see how the identifiers are very important.

[Omar]: I am glad to hear it, Nadia.

There is one more thing I have to say.

We are learning data modeling and one important thing about data modeling is that it has to follow a set of **rules**.

These rules help us to produce good data models and so they are very important.

One of the rules is that we cannot include any bits of data that can be derived from any other bits of data.

For example, we usually want to know how many people work in a store or cafe.

Therefore we include a **staff count** field with the establishment.

But when it comes to finding the value that goes in here, we will count the records in the Staff Table for each establishment.

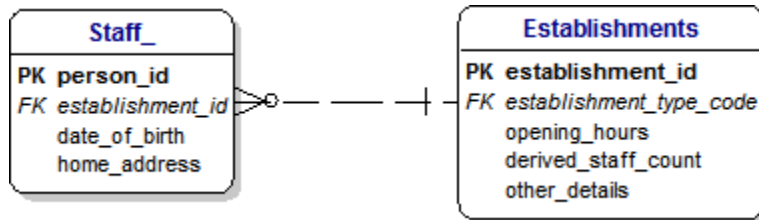
Therefore, it's a **derived field** and we call it a name that starts with 'derived_' to make things clear.

This is because, according to the rules, we should not include derived fields in our data model at this early stage.

I have shown it here simply as an example because it is a situation that occurs quite often so it's good to recognize it when you see it.

Does that sound sensible, Nadia?

[Nadia]: I suppose so, Omar. But I've got a headache, can we go to Starbucks now?



4.11 Products and Product Types

[Nadia]: Omar, when we go into a store we want to buy something.

There are often hundreds and hundreds of possibilities.

How do we deal with all that in our little data model?

[Omar]: Well Nadia, it's really quite easy. It's like all our modeling where we look for simple patterns that cover many situations.

[Nadia]: Hmm - I don't know what that means. Maybe if you showed me I might understand it.

[Omar]: OK.

Everything that we buy is called a product, and all we have to do is simply define the type of each product - such as a coffee, muffin or a newspaper.

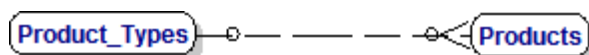
Then we draw a little box called *Products* and say that every product has a type.

In other words, there is a relationship between the *Products* and *Product_Types* boxes.

The lines are called **relationships** and they are very important in data modeling.

We are now creating an **Entity-Relationship Diagram** or 'ERD'.

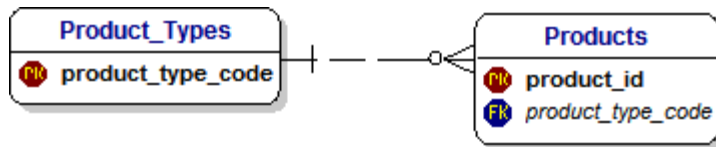
This diagram shows only a line for the relationship:



The symbol at the products end is called *crow's feet* and it shows the *many* end.

The short straight line at the Product_Types end shows the *one* end.

In other words, this line shows a one-to-many relationship.



Nadia, let me explain about the dotted line. It means that the relationship results in a foreign key in the Products Table. This is shown by the 'FK' symbol next to the **product_type_code** field and it means that there is a link back to the Product_Types.

However, the primary key is only the Product_ID, and of course, this is shown by the 'PK' symbol next to the **Product_ID** field.

Later, when we talk about inheritance, we will use a straight line, in contrast to this dotted line here. This is to show that the foreign key field is also a primary key.

I have to say something a bit difficult about primary keys right now.

In the Products Table, we have to allow for a very large number of products being stored.

Therefore we use an ID field for the primary key.

We then create this ID field automatically as a number (called an auto-increment integer).

This number has no meaning and is simply used to identify each record uniquely among possibly millions or hundreds of millions.

However, things are different for **type** fields.

These are what we call enumerated data and are typically reference data.

They are always relatively small in number and we choose a code for the primary key because we can create them and review them manually.

It also helps us to create a code that we can use and refer to, in contrast to the ID fields that have no meaning.

Typical examples would be:

Sizes – Small, Medium and Large where we are accustomed to seeing S,M and L.

Gender – Male and Female, where we use M, F and U for Unknown.

4.12 Products and Hierarchies

Starbucks has quite a few coffee shops in Qatar.

This menu board at Starbucks shows lots of products.

We know that they are organized into groups, like food and drink, and each of these has more groups and so on, right down to the particular product, like caramel macchiato or a panini.

This top-down organization is called a **hierarchy** and appears all over the place.

Luckily we can show this very easily and neatly in our data model.



[Nadia]: Omar, when we look closely at the menu board to try to decide what to order we can see lots of possibilities. But after a while we can see a pattern that helps us decide.

How do we deal with all that in our little data model?

[Omar]: Well Nadia, it's really quite easy.

We define something called a **hierarchy**.

Hierarchies are very common and simply mean any situation where there are parents, children, grandchildren and so on.

If we look at the Starbucks menu board on the right-hand side we can see a simple example of 'espresso' and under it a number of different drinks.

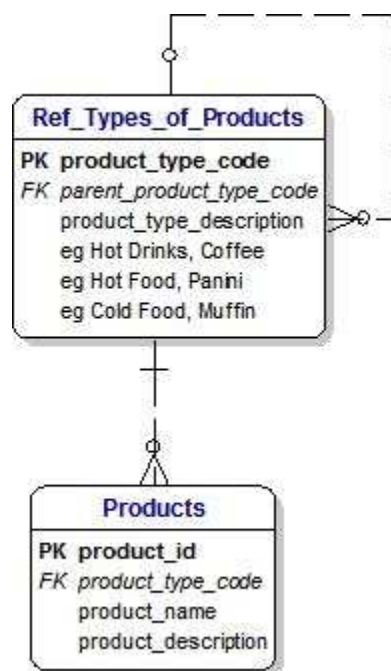
My favorite is caramel macchiato.

So in this case, the top-level of our hierarchy is a product category called espresso, and the next level down is a product called caramel macchiato.

[Nadia]: OK. That sounds logical.

[Omar]: Finally, we show this hierarchy by a dotted line in the top-right hand corner in the entity called 'Ref_Types_of_Products'.

This is formally called a *recursive* or *reflexive* relationship and is informally called **rabbit ears**.



4.13 Types of People and Establishments

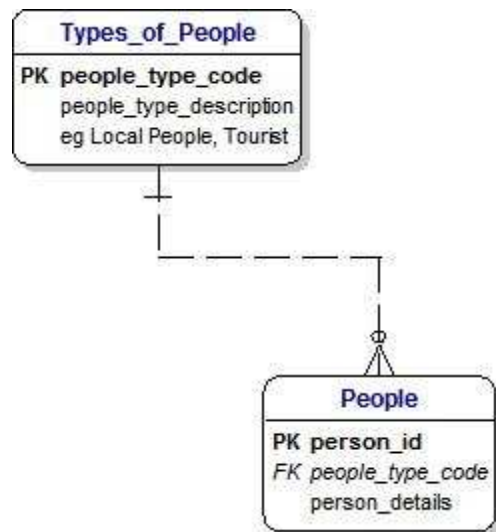
[Nadia]: Omar, that looks OK.

I guess we can deal with types of people the same way, can we?

[Omar]: Yes, Nadia, and types of establishments as well.

[Nadia]: OK, that sounds sensible. And do they use these identifiers in a database?

[Omar]: Yes, and what is even better is that the database will automatically generate a new unique identifier for you and your visits and purchases if you want to get a refund later.



[Nadia]: Omar, that looks OK.

I guess we can deal with types of establishments the same way, can we?

[Omar]: Yes, Nadia.

[Nadia]: OK, that sounds sensible. And do they use these identifiers in a database?

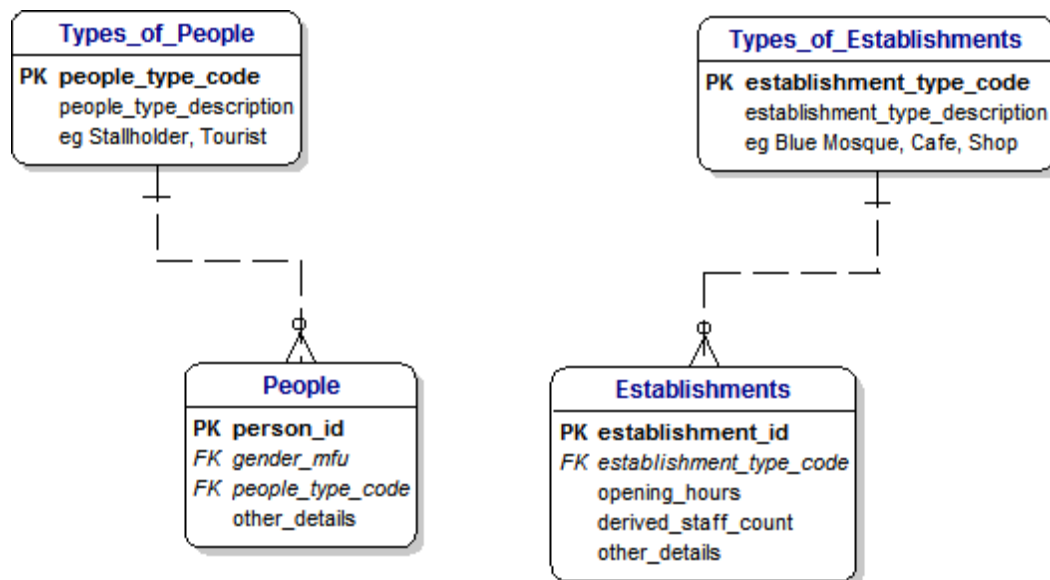
[Omar]: Yes, and we can use our new unique identifier for you and your visits and purchases in case we want to keep track of things.

Like maybe you want to get a refund later so we need to get your details from the database.

[Omar]: Before we move on, let's talk about establishments.

In Qatar, there are many different kinds of establishments, like stores, banks, cafes, restaurants, hotels, hospitals, garages and so on.

But when we think about these things, we find that we can simply fit them into our definition of establishments and identify them as different types of establishments.



4.14 Visits and Purchases

Here we can see the Viagio Shopping Mall in Dohar :-



[Nadia]: Omar, with so many tourists, stalls, stores and things to buy, how do we keep track of everything?

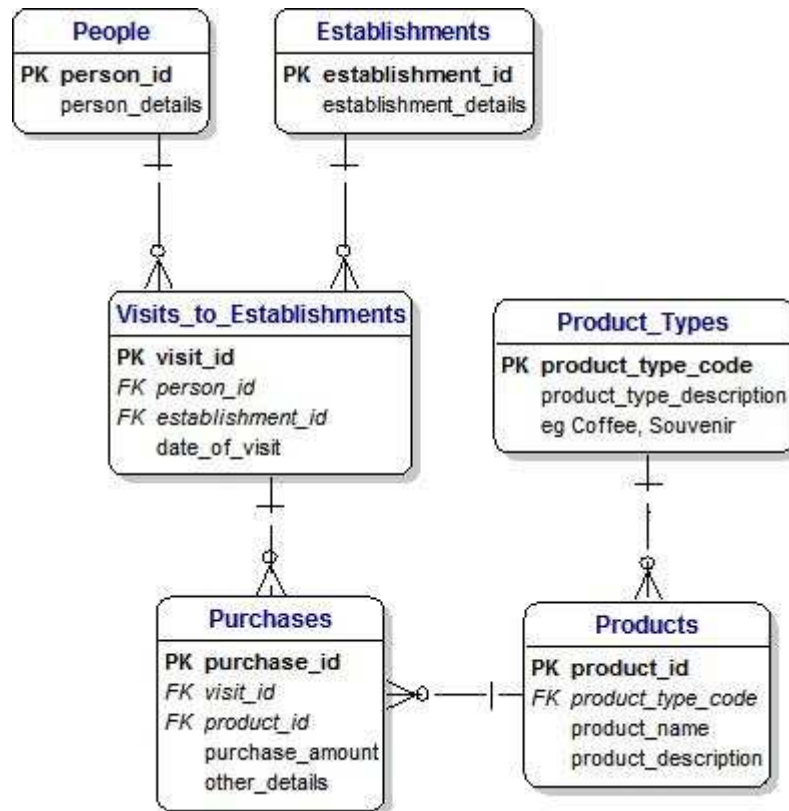
[Omar]: Well, Nadia, by this time, everything has its own identifier that we can use whenever we need to keep track of individual people or purchases or products.

[Nadia]: OK, that sounds sensible. And do we use these identifiers in a database?

[Omar]: Yes, Nadia, and in this diagram, we can see that we can use the unique identifiers that are shown as 'PK,' for primary keys.

We can see that we have a PK for every entity or table so we can be pretty sure we can get from any table to any other table.

This is called *navigating* around the data model and is a good test for a well-designed data model.



4.15 Qatar Royal Family

The royal family plays a very important part in Qatar society.

4.15.1 The Emir and his wife

This photo shows Emir Sheikh Hamad bin Khalifa al Thani and his wife.



4.15.2 Royal Family with the Queen of England

Qatar's Emir Sheik Hamad bin Khalifa al Thani (centre) meets Queen Elizabeth II

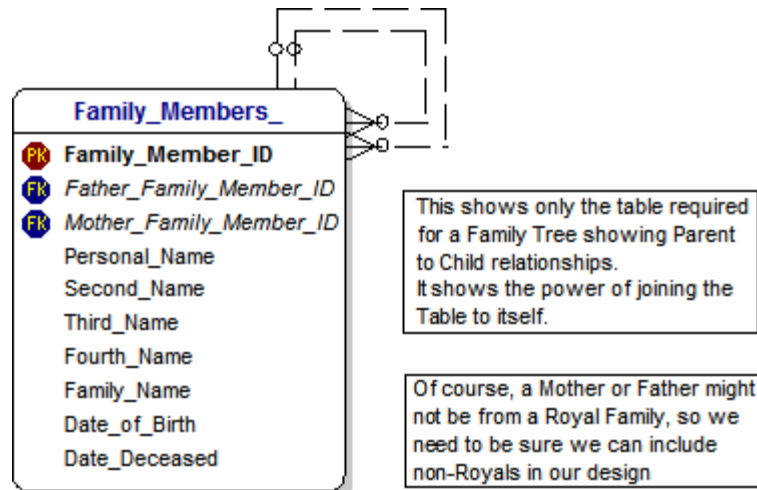
Read more: <http://www.dailymail.co.uk/sport/football/article-1360043/Qatari-royal-family-1-5bn-bid-buy-Manchester-United-Glazers.html#ixzz1wRFkJsEe>



4.15.3 Data Model for a Royal Family

The royal family can be shown in a data model as a **hierarchy**.

This means we can show it very simply in one table with a relationship to itself.



You can check out the Genealogy and Family Tree data model on our Database Answers Web site:

- http://www.databaseanswers.org/data_models/genealogy/index.htm
-

4.16 Qatar Foundation

The Qatar Foundation plays a very important part in Qatar society.

- <http://www.qf.org.qa/home>

4.16.1 Arab and Islamic Heritage Library

Qatar Foundation's mission is to prepare the people of Qatar and the region to meet the challenges of an ever-changing world, and to make Qatar a leader in innovative education and research. To achieve that mission, QF supports a network of centers and partnerships with elite institutions, all committed to the principle that a nation's greatest natural resource is its people. Education City, Qatar Foundation's flagship project is envisioned as a Center of Excellence in education and research that will help transform Qatar into a knowledge-based society.

- <http://www.qf.edu.qa/community-development/protecting-qatar-heritage/the-heritage-library>

4.16.1.1 A Book from the Library

This is an example of a book from the library, which is cared for by Mohammed Hammam Fikri, the Assistant Manager.



4.16.1.2 Sections

The Arab and Islamic Heritage Library has 2 main sections:

Arabic Section: About 85000 items includes manuscripts, books, magazines and newspapers in different fields of research and arts, some dating to the fifteenth century till the Mid-twentieth century.

Foreign Section: About 25000 items includes books, periodicals and maps reflect on the whole interest of the Orientalists and European travelers and explorers of the Arab and Islamic heritage, some dating to the Mid-fifteenth century.

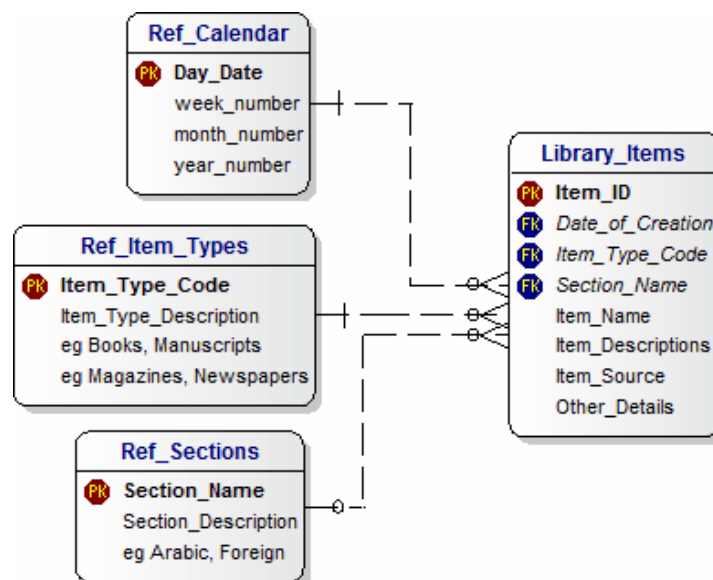
4.16.1.3 Plans for the Library

The Heritage Library will occupy a specially designed space within the new Central Library of the Qatar Foundation in 2013.



4.16.1.4 Data Model for the Library

This Data Model reflects the conditions described above.



4.16.2 Qatar Diabetes Association

The Qatar Diabetes Association became part of the Qatar Foundation in 1999.

The aim of Qatar Diabetes Association is to help people with diabetes as well as those who are at risk of developing it.

Dr Abdulla Al-Hamaq
Executive Director, QDA

Diabetes is a common chronic disease that affects all levels of society worldwide. Through its variety of **healthy** and education activities and programs, QDA provides information, outreach and support to help people with diabetes to lead full and productive lives.

QDA works closely with health and sports authorities to raise awareness of the causes of this chronic condition and to highlight means of prevention. Huge emphasis is placed on the importance of regular exercise and healthy eating. QDA holds youth camps for children with diabetes and offers a hotline that provides information and assistance for all diabetes patients.

QDA is committed to research into the condition, both in Qatar and the region. Its staff work with key stakeholders, the community and partners to ensure the organization can assist everyone living with diabetes in the region to live a healthy and fulfilling life.

This photo shows research workers discussing their results.



4.16.3 Qatar Foundation Organization and Events

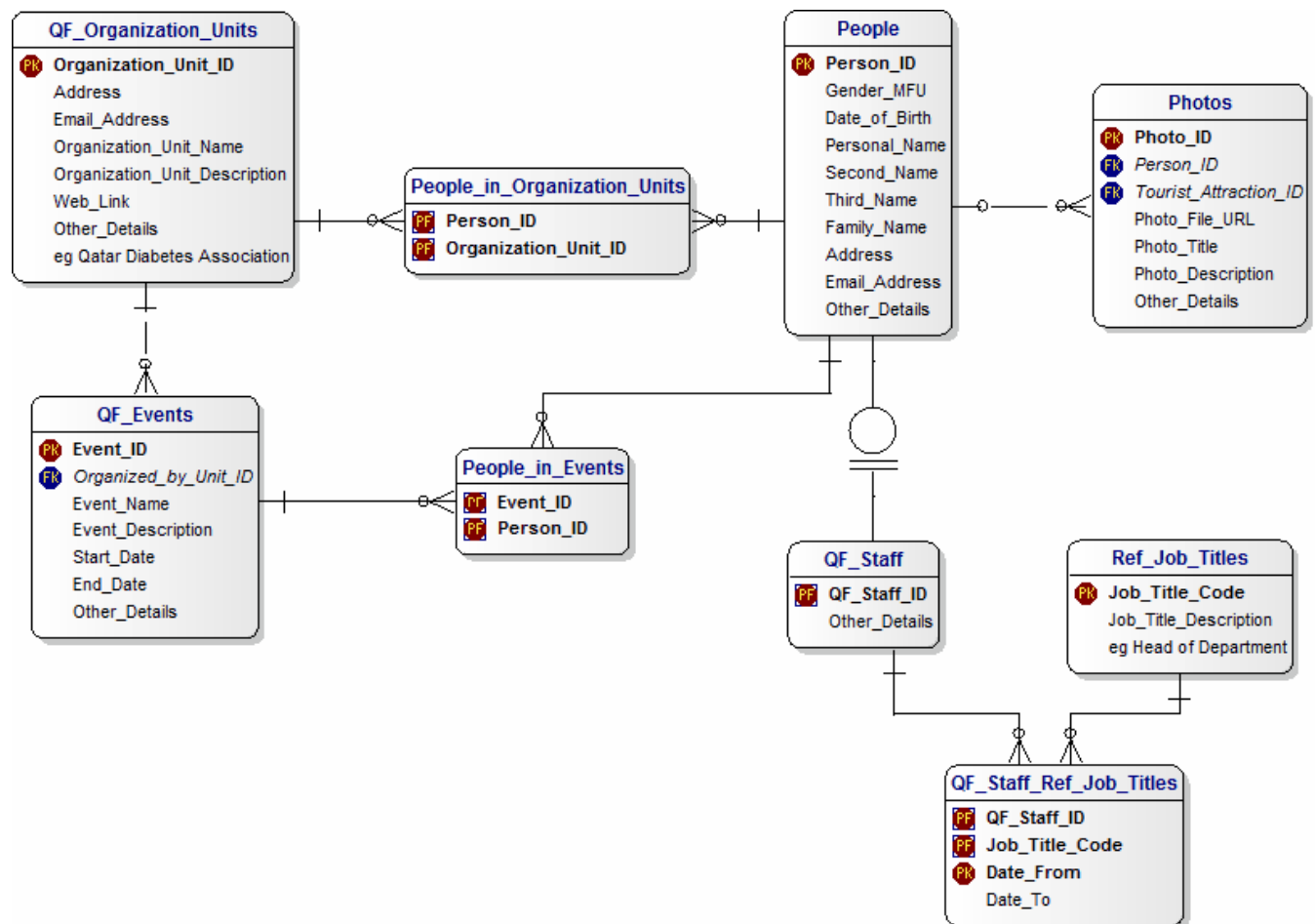
The Qatar Foundation is a large and complex organisation which employs many members of Staff.

It puts on a number of Events during the course of the year which involve both Staff and outside people.

4.16.4 Data Model

This Model includes Events, Organizations and People and shows how the 'Rules' defined above are interpreted in the logic that underlies the design.

The Qatar Diabetes Association is an example of an Organization Unit.



4.17 Qatar Tourism Authority

The Qatar Tourism Authority has a well-designed Web Site which makes it very easy to find a wide range of useful information about Qatar :-

- <http://www.qatartourism.gov.qa/>

Here's a beautiful photo of the Katara Cultural Village on the QTA Web Site :-



4.18 Tourist Attractions and Inheritance

[Omar]: Nadia, let's take a closer look at the different types of tourist attractions we can find in Qatar.

[Nadia]: OK, Omar. I hope I don't have to think too much because I might get a headache?

[Omar]: No, Nadia, I will do the thinking and talking and all you have to do is nod your head when you understand.

[Nadia]: OK, Omar. I promise to do that.

[Omar]: We already said that we have a lot of people visiting the tourist attractions.

There are lots of different tourist attractions and it is interesting to think about what they have in common and what they have that makes them different.

[Nadia]: OK, Omar. How do we get started.

In data modeling we have a very powerful approach that we call **inheritance** that we can use here.

In this section we look at different kinds of tourist attractions and how we can use them to talk about inheritance.

All attractions have some characteristics in common, such as:

- Name
- Description
- Location
- Address
- Contact Details
- Directions for how to get there

In addition, specific categories of attractions have some additional data of their own.

Some of these can simply be included in the description, but some others justify being added as specific names fields.

For example:

- Hotels
 - Are on-smoking Rooms available ?
 - Number of Rooms
- Mosques
 - Are non-Muslims admitted ?
- Qatar Foundation
 - Events from Time to Time
- Restaurants
 - No-Smoking Area (Yes/No)
 - Star Rating

4.18.1 Camel Racing

This picture shows proud owners leading their Camels before a race.



This shows a victory ceremony at the Camel Races in Qatar.

- <http://members.virtualtourist.com/m/aaed6/bb7/d/>

Camel racing is a very popular sport amongst Qatar's elite, and a good racing camel will fetch many thousands of riyals. Until recently young boys from poor third-world countries were used as jockeys, but international pressure has put an end to this practice, and the camels are now ridden by robots! The owners drive around the outside of the track in their four-wheel-drives, egging on their camels and controlling the whip held by the robot with a remote control.

The racing season lasts through the winter until April or May, culminating at the 10 km Emir's race, which is where these photos were taken. The Emir himself was even in attendance.

For smaller races you can follow the camels around the track as the owners do, but for the Emir's race you will probably have to sit in the grandstand, from where you can see the start and finish live and watch the rest of the race on the TV screens.

Directions:

Just north of Al Shahaniya on the North Road about 20-30km from Doha. If the road is still closed at Al Shahaniya, follow the detour signs pointing you to the left to head towards Dukhan. Soon after you will see lots of camel stables on the right-hand side of the road. The racetrack is not signposted; turn right onto the dirt track at the second red and white camel-crossing road sign and it will lead you to the parking lot in front of the grandstand.

Read more:

- <http://members.virtualtourist.com/m/aaed6/bb7/d/#ixzz1v4GGXXwN>

4.18.2 Fishing Village

This shows boats at Al Khor Fishing Village following a tradition that has been established for many generations.



Al Khor is a small city on the northeast coast of Qatar, about a 45 minute drive from Doha. While there's not too much happening there, it's a pleasant contrast to the noise of traffic of so-eager-to-modernize Doha. Having said that, bulldozers were actually digging up the road just behind the Corniche when I was there, so my peaceful escape was filled with the now-familiar sound of jackhammers. Still, there was no traffic and it's a pleasant place to visit for a day. The Corniche has a beach with amenities such as a children's playground and a volleyball net, and on the day we visited a few South Asian expat workers were playing cricket on the beach. Unfortunately, as with much of Qatar's coastline, the waters of the bay

are much too shallow for swimming.

There's an active fishing port with lots of colourful dhows. The town is also scattered with several old watchtowers.

If you're here in the evening, try to find out where Hard Khor are playing. They're an expat cover band that made quite a splash at the Dunestock 2006 music festival, mostly just because everyone liked their name.

There are two roads that lead to Al Khor from Doha. The inland highway is an extension of Doha's D-Ring Road. While the coast road is better and faster (no large trucks are allowed), depending on your starting point you may have to sit through lots of city traffic in Doha before you reach it, thus negating its advantages. By the way, you can't actually see the coast for much of the journey on the "coast road."

Read more: <http://members.virtualtourist.com/m/aaed6/bb7/6/#ixzz1v4LwAG2J>

Here is a useful link for the Embassy in London - <http://www.qatarembassy.info/>

4.18.3 Fort at Zubara

This is a spectacular old building with a great history.



4.18.4 Fortress at Uum Salal Mohammed



If you're looking for info on Doha, please see this page :-

- <http://members.virtualtourist.com/m/aaed6/bb7/#ixzz1v49wARM9>

Uum Salal Mohammed is a small town about 22km north of Doha. It's a very quiet, backwater town, but it holds a few examples of traditional architecture that make it worth a visit.

One is a fort which appears to have been recently renovated. The fort is walled in and both times I've been there the gates have been locked, but there are places where the wall is low enough to jump over it quite easily. Inside there are two large towers, a small mosque, and another small rectangular building, all made from traditional mud construction techniques.

From the top of the towers you will be able to see another set of mud-brick towers in the distance. One belongs to a mosque and the others belong to what appears to be a still-inhabited home next door to the mosque. Next to this dwelling there is a very green oasis on one side with lots of palm trees and grass, and on the other side are the bare stalks of very dead palm trees. I guess the irrigation system didn't extend that far!

To get there from Doha take D-Ring Road north. This becomes the inland northbound highway, though at the time of writing (April 3rd, 2006) there was a stretch on the outskirts of town where this road was under construction. If that's still the case then you'll be forced to take a detour left, then you should turn right a block or two further and try to get back onto the highway once you've passed the construction. From the highway you will see road signs marking the left turn for Uum Salal Mohammed. Once you're heading into the town,

take a right at the first roundabout, and then the first right again. You'll see the fort straight in front of you.

- <http://members.virtualtourist.com/m/aaed6/bb7/6/#ixzz1v4N54VLm>

4.18.5 Hotel Al Bustan

This is a very historic hotel which has been established for many years.



Here is the hotel Web site

- <http://www.albustanhotel.info/index.aspx>

4.18.6 Mosques

Here is an evening view of the Mosque at Souq Al Wafid, Doha.



4.18.7 Restaurants

4.18.7.1 The Place

You can check out this page on Virtual Tourist :-

- http://www.virtualtourist.com/travel/Middle_East/Qatar/Restaurants-Qatar-TG-C-1.html



4.18.7.2 Pa Macrobiotic Restautrant, Doha

When you are visiting or shopping in Villagio Mall you will find a food court with many restaurants to choose from - none of them too appealing. You'll find your usual range of KFC and MD, as well as many fake Italian, French, Chinese and so on restaurants. We chose Pa because it sells natural food and seemed to have healthy snacks rather than fatty meals.

It has a shop attached, too - so that you can buy natural fruit juices, jams and marmalades, olives, bread and sun-dried tomatoes. They are all imported from Tunisia.

Favorite Dish: Pa is more a cafeteria than a restaurant so the menu is limited to soups, salads and some sandwiches. They offer delicious salmon sandwiches (homemade

wholewheat bread) and a rocket salad.

Here is what the Virtual Tourist has to say:

- http://www.virtualtourist.com/travel/Middle_East/Qatar/Baladiyat_ad_Dawhah/Doha-1806039/Restaurants-Doha-TG-C-1.html#ixzz1v43HOFTD



4.18.8 Shopping Malls

Shopping is a very popular activity, especially with visitors to Qatar.

4.18.8.1 Landmark Shopping Mall

This shows the Landmark Shopping Mall in Qatar.

- <http://www.aboutqatar.info/forum/landmark-shopping-mall/>



4.18.8.2 Qatar Shopping Complex

This shows Qatar City Shopping Complex which shows us that shopping is a very popular activity anywhere in the world.

Here is the Web Site :-

- http://www.visualphotos.com/image/1x7808258/qatar_city_center_shopping_mall_of_doha



4.18.8.3 Viagio

The Viagio Mall in Dohar is very attractive and here is an informative Web site:

- <http://www.onlineqatar.com/shopping/the-villagio-mall.aspx>



Located between the Hyatt Plaza and Sport City on Al Waab Street of Doha, the Villagio mall is the latest shopping mall in Doha, and is also hoped to be one of the largest malls.

The mall has an Italian theme, with cool fake sky interiors, representing the dusk in Tuscany. Each portion of the mall signifies different times of the day. There is a small canal running through the centre of the mall, complete with gondola. You can use the bridges to cross the canal, or the comfortable chairs lined on the sides to rest your feet, or even travel in the Venetian style up and down the canal by shelling out a few riyals.

4.18.8.3.1 Entertainment

The amenities for entertainment within the mall include a 3-D Cinema, ice-skating rink, roller coaster and a food court. There are a range of restaurants, cafes, and a superb Thai restaurant, apart from fast food joints.

On the whole, Villagio is the mall where you can do anything, from riding a little boat, to getting video games, purchasing books, shopping for clothes, shoes and much more.

4.18.8.3.1 Shops

The mall has several shops, including the famous brands in the UK, Italian, US and German markets. The shops are yet to be completed, but, there will be a total of 220 stores, spread across 130,000 square meters of retail space.

Few of the shops already in there, are virgin megastore – offering good music and computer selection and a wide range of books, boots with good range of boots of the same quality as available in the UK, Hallmark, NEXT, Mango, Claire's, and Haagen Daaz . There is also the leading Carefour hypermarket, apart from other stores such as Oasis, Topman, and Topshop.

[Nadia]: Omar, with so many tourists, stores and things to buy, how do we keep track of everything?

[Omar]: Well, Nadia, by this time, everything has its own identifier that is used wherever they need to keep track.

[Nadia]: OK, that sounds sensible. And do we use these identifiers in a database?

[Omar]: Yes, Nadia, and in this diagram, we can see that we can use the unique identifiers, which are shown as 'PK', for Primary Keys

There are always lots and of people visiting Qatar.

When we look at this typical street scene, we can see shoppers, stallholders, workers and local people.

We usually know different things about the stallholders and workers than the things we know about the tourists.

For example, we will probably know the gender of everybody just by looking at them.

For workers, we will might also know things related to their employment, such as their date of birth and their home address.

In data modeling we have a very powerful approach that we call **inheritance** that we can use here.

If we want to describe this in English, we would say that staff inherit the People_Type_Code and gender from the parent entity of people and, in addition, they have a date of birth and home address.

For tourists, we don't know much, except for the date of their visit and, if they buy something in a store using a credit card, then the store would know the credit card details.

Does that make sense, Nadia?

[Nadia]: I think so, Omar.

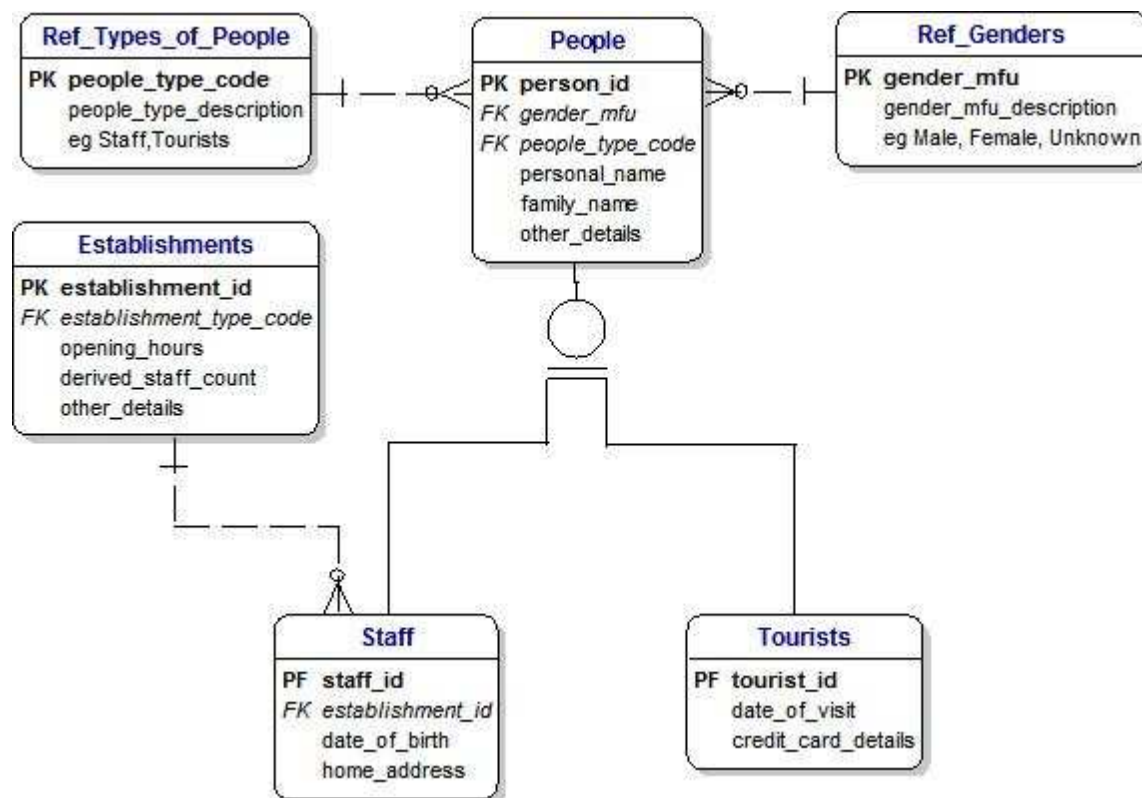
Is it like saying that we inherit having two arms and two legs from our parents because they have two arms and two legs, but that we have also have things that are just us?

[Omar]: Yes, Nadia - that's great - let's take a break and do some shopping!

[Nadia]: I like the sound of that, Omar. Can I have an ice cream?

[Omar]: Yes, of course, Nadia - this diagram shows we are doing well.

It show inheritance between people and the two different types of people:



4.18.9 The Sidra Tree

This tree has a tremendous history.

- <http://www.qf.org.qa/discover-qf/about-qf/sidra-tree-story>



Everyone in Qatar knows the Sidra tree. Native to Qatar, it flourishes in the country's harsh desert climate.

From the shade came the light

Traditionally, poets, scholars and travelers would gather in the shade of the Sidra's spreading branches to meet and talk. As well as being a naturally comfortable and convenient place at which to gather and exchange knowledge and opinions, it was also a very healthy location since the tree's fruit, flowers and leaves provide the ingredients for many traditional medicines.



- **A perfect symbol**

The tree occupies a special position in the hearts of the Qatari people, which is why it is the perfect symbol for the Qatar Foundation (QF).

- **The mission grows in strength**

Featured as the QF logo, the three sections of the tree's trunk reflect QF's three key pillars of Education, Science and Research, and Community Development. The branches represent the diverse partners that make up QF's community, while the leaves, flowers and fruits equate to the individual lives that the tree nourishes, with the fruits going on to produce seeds that guarantee sustainability and a healthy future. At the same time, the sidra's deep roots are seen as a strong anchor, connecting contemporary learning and growth with the country's culture and heritage.

- **Reaching upwards towards perfection**

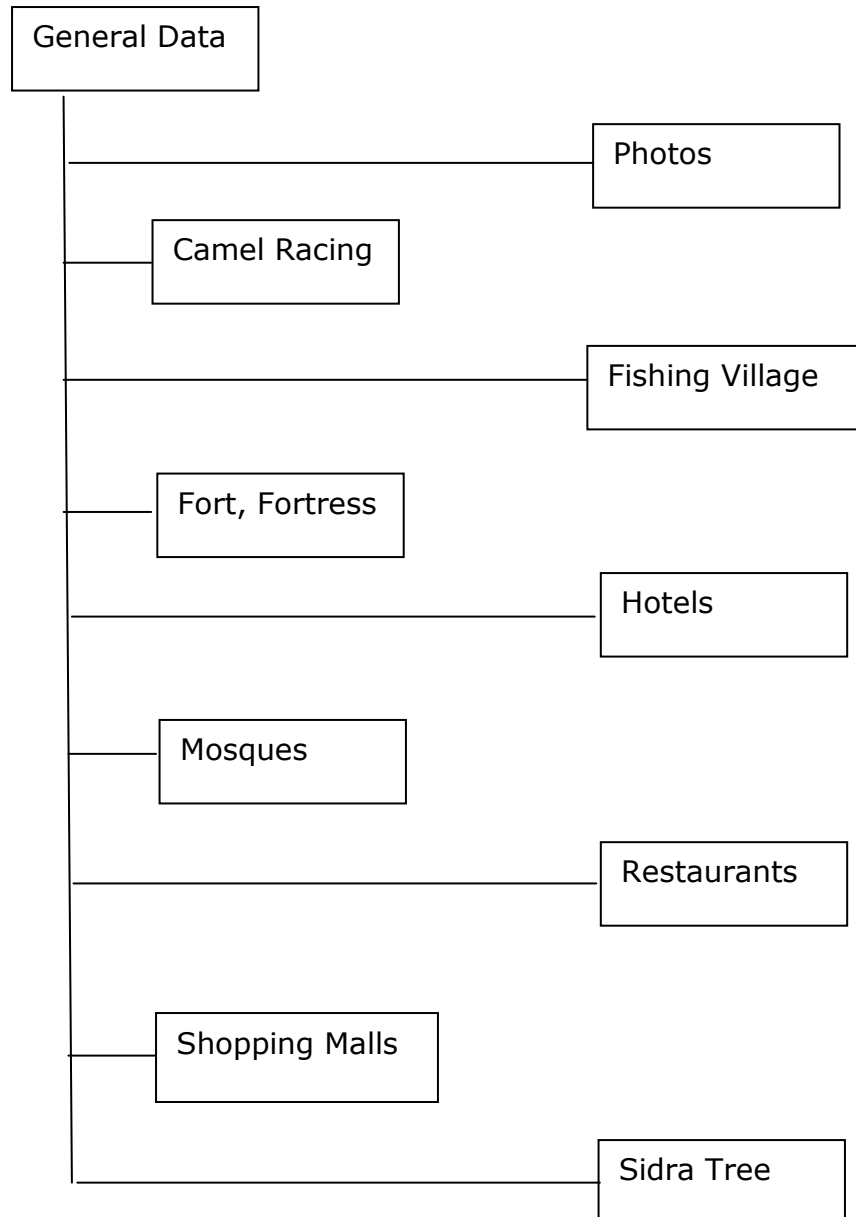
The Sidra tree, growing strong and proud in the harshest of environments, has been a symbol of perseverance and nourishment across the borders of the Arab world. What is the significance of this glorious tree? With its roots bound in the soil of this world and its branches reaching upwards toward perfection, it is a symbol of solidarity and determination; it reminds us that goals of this world are not incompatible with the goals of the spirit.

Her Highness Sheikha Moza bint Nasser
Qatar Foundation Chairperson, at the inauguration of Education City, 13 October 2003

4.18.10 Data Models

4.18.10.1 Data Analysis

When we look at the data for our tourist attractions this is what we find:



4.18.10.2 Data Model for Tourist Attractions

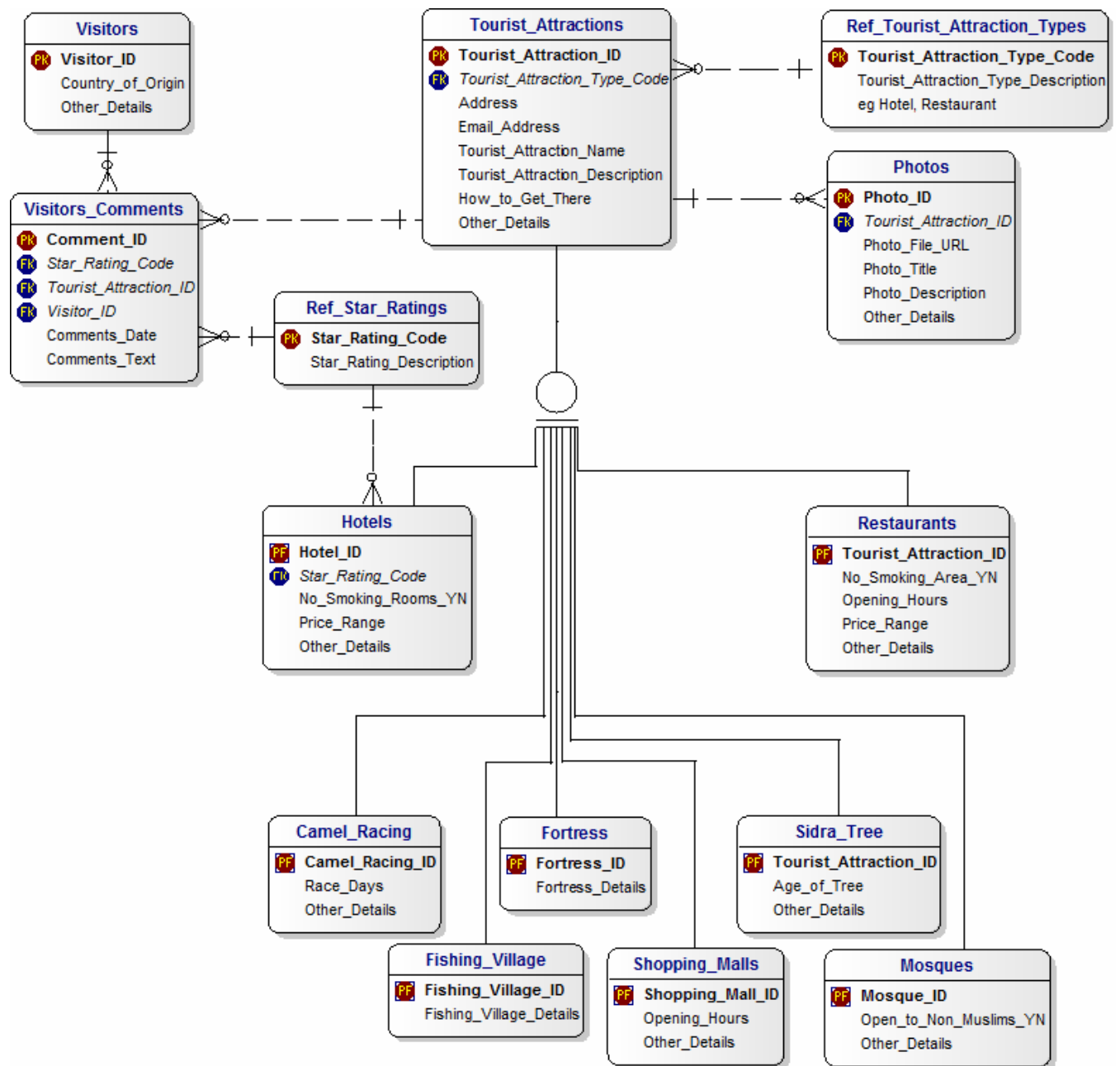
This is how the analysis above looks in a data model, showing attributes for each table:-

Inheritance means that the specific Attractions will inherit all the characteristics of the Tourist Attraction Entity.

However, when we look closely, we realise some conditions apply :-

- we cannot put Opening Hours in Tourist Attractions because it does not apply to all Attractions.
- Camel Races occur on specific days
- Hotels are usually open 24 hours a day
- Some Mosques are not open to non-Muslims.
- The Sidha Tree does not have Opening Hours.

Therefore, we have to show specific data items explicitly as they occur for specific 'Sub-Type' Entities.



-

You can see that the model is much more compact and when you are accustomed to looking at data models and know what to look for, it tells you a lot in a small diagram.

If we want to describe this in English, we would say that staff inherit the `People_Type_Code` and gender from the parent entity of people, and in addition, they have a date of birth and home address.

For tourists, we don't know much, except for the date of their visit, and maybe, if they buy something in a store using a credit card, then the store would know the credit card details.

Does that make sense, Nadia?

[Nadia]: I think so, Omar.

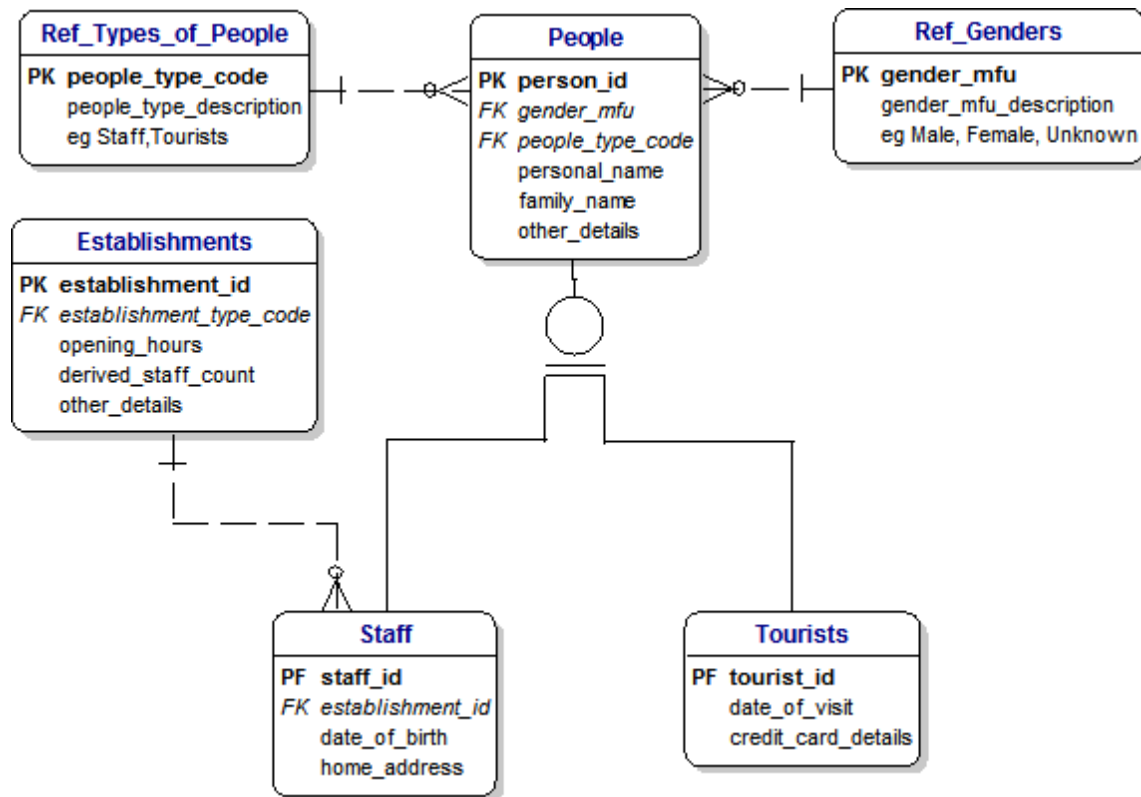
Is it like saying that we inherit having two arms and two legs from our parents because they have two arms and two legs, but that we have also have things that are just us?

[Omar]: Yes, Nadia - that's great - let's take a break and do some shopping!

[Nadia]: I like the sound of that, Omar. Can I have an ice cream?

[Omar]: Yes, of course, Nadia – this diagram shows we are doing well.

It shows inheritance between people and the two different types of people:



We can see a field marked as 'PF' in the tables for staff and tourists.

This is unusual because it means a field that is a **P**imary Key in the three tables and also a **F**oreign Key to the People Table.

Therefore, if your first record was a member of staff, then we would have a record in the People Table with a Person_ID of 1 and a record in the staff table with a Staff_ID of 1.

Similarly, if our second record was a tourist, we would have a record in the Person Table with a Person_ID of 2 and a record in the tourist table with a Staff_ID of 2.

4.19 Design Patterns and Reservations

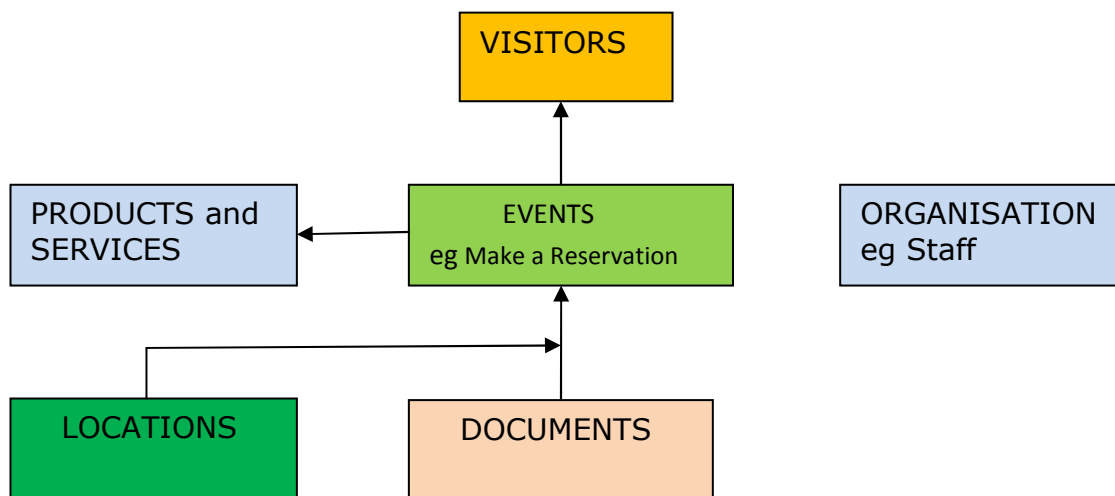
Design patterns are a very powerful technique when creating data models because they represent a common solution to a range of similar requirements.

In this example, we use a canonical data model to implement the design patterns.

We will look at the specific example of making reservations that we might make to visit tourist attractions during our visit to Qatar.

4.19.1 Canonical Data Model

This is our starting point, which is designed to be a universal model for a wide range of situations.



4.19.2 A Hotel Telephone Reservation

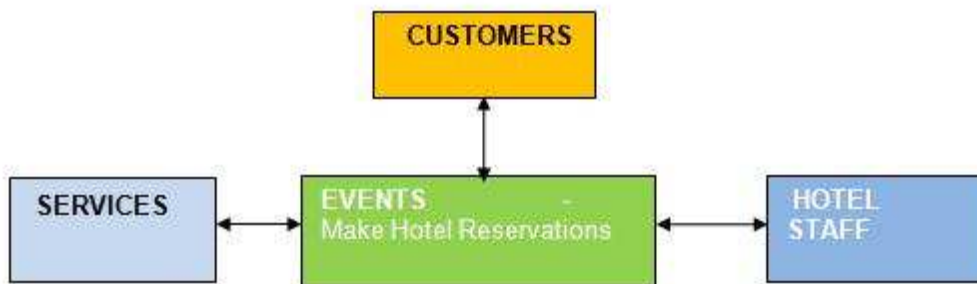
Our first example is making a hotel reservation over the phone.

This involves talking to a member of the hotel staff and will not generate any documents.

For a hotel, of course, you would book for a specific night (or nights) and maybe a non-smoking room but that is about all.

In this user scenario, a member of the hotel staff responds to our phone call and makes a reservation for us.

Therefore the Design Pattern based on the Canonical Data Model will look like this -



4.19.3 Reservation to visit the Qatar Foundation

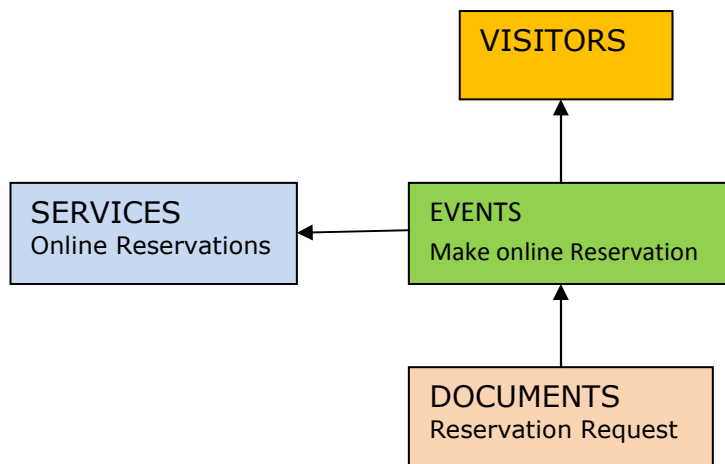
Our second example is making an online reservation over the Internet to visit the Qatar Foundation :-

- <http://www.qf.org.qa/join-us/visit-qf>

This does not involve talking to any member of staff but it will allow us to print our reservation.

Therefore, the staff of the organization does not appear in this version of the design pattern but the Documents entity does appear.

Arrows go from Children to Parents.

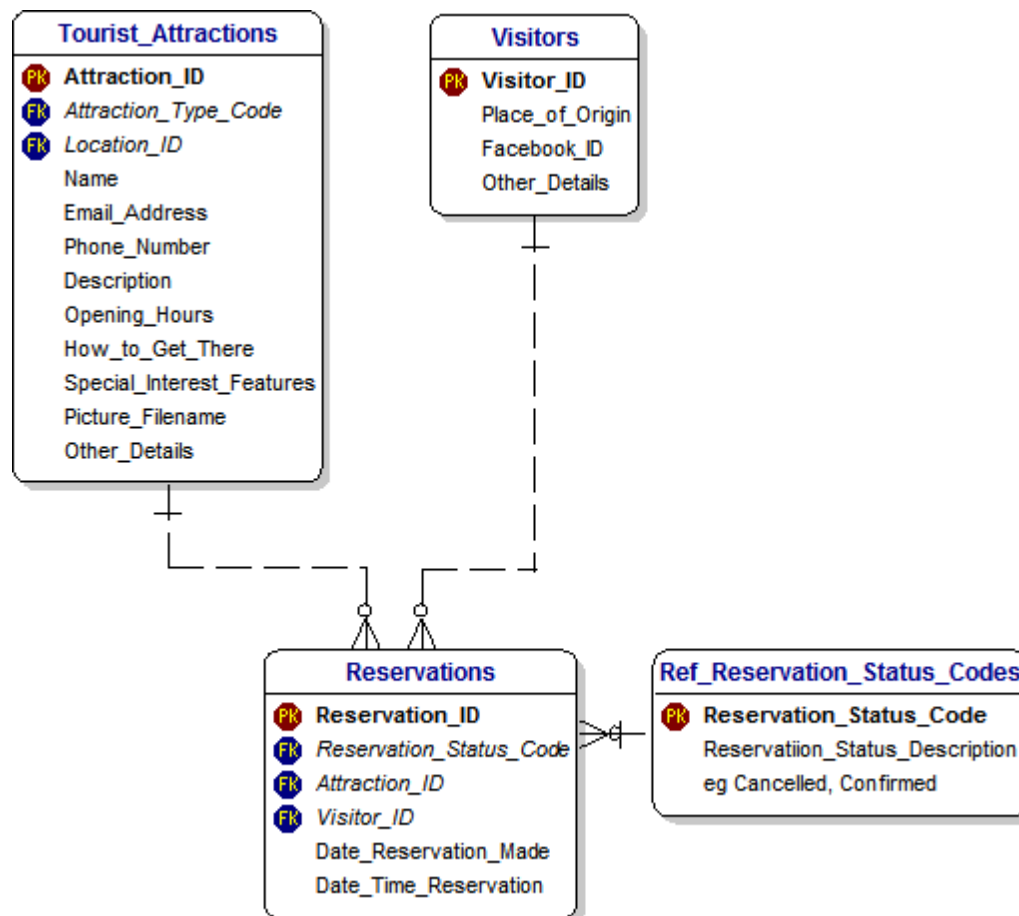


4.19.4 Generic Data Model for Reservations

In this model, we define a facility to be what we are making a reservation for.

This data model is shown on this page of our Database Answers Web site:

- http://www.databaseanswers.org/data_models/generic_reservations/index.htm



[Omar]: Nadia, this bit is quite hard-going so if you want to take a rest, that's OK.

[Nadia]: OK, Omar, I will just sit quietly and watch the people ;0)

[Omar]: People make reservations every day all around the world.

These reservations have a lot in common:

The basic data include a date and time, a specific facility, like a hotel, an airline seat, a theatre and so on.

This means that we can identify what they have in common and what they have that is different and specific to the type of reservation.

4.20 Reference Data

[Omar]: Nadia, you can see that I am using a Gender Table and People Types Table.

I have given them both names that begin with 'Ref_' to make it clear that they are reference data.

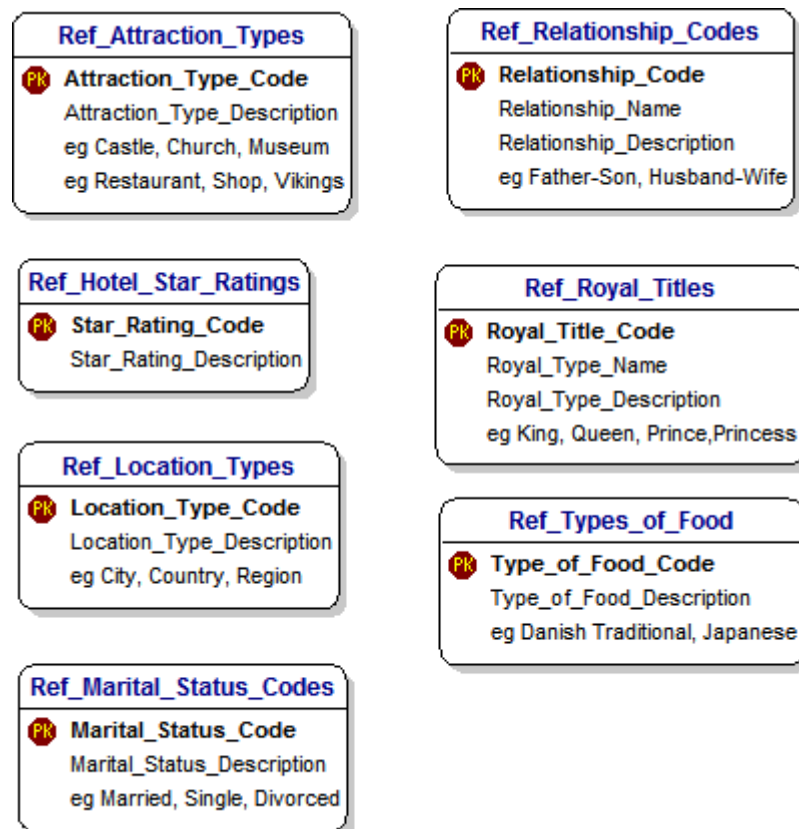
This means that the values don't change much and I can use them to define what the valid values can be.

This is a technique that professional data modelers use but we don't need to worry about it today.

[Nadia]: I'm glad to hear it, Omar!

Although it isn't difficult to understand and it seems like a good idea.

[Omar]: In our small example, we have only four kinds of reference data altogether - gender, types of establishment, people and products.



4.21 Bringing it all Together

[Omar]: Nadia, if we bring together everything we have talked about, we will see that we have quite a good data model that any professional would be proud of.

[Nadia]: OK, Omar. Do you think I will understand it?

[Omar]: Let me help you by making a list of the **business rules** for our model:

- People can be either local residents, staff or tourists.
- There are a number of establishments of different types.
- Tourists can make visits to establishments and make purchases.
- Staff assist the tourists when they make a purchase.
- A purchase involves one or more products.

[Omar]: OK, Nadia - we have a very nice data model and now we can take the break I promised you.

[Nadia]: That's great, Omar - can we go to Starbucks?

[Omar]: Sure, but before we do I should say something about **PF**, which appears in the Staff Table.

It's unusual and it's called **PF** because it means a field that is a **Primary Key** in the Staff Table and a **Foreign Key** to the People Table.

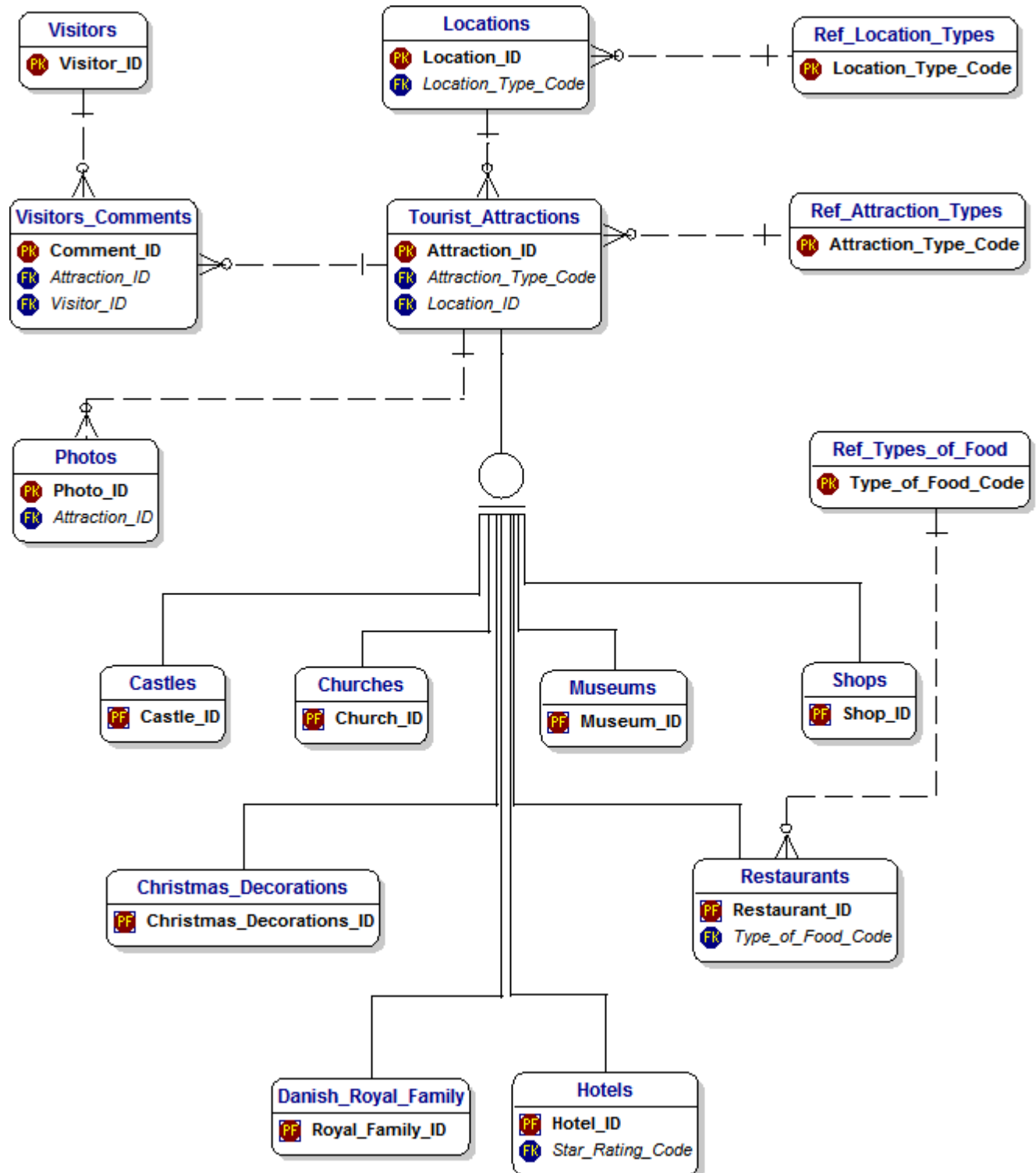
[Nadia]: Hmmm, I've got a headache, Omar - can we please go to Starbucks?

[Omar]: OK, Nadia. You've been a very good girl and you deserve a break.

You can admire what we have created, which is this very professional-looking data model.

4.22 Top-Level Model with Key Fields

This is what our data model looks like if we show key fields only and leave out the Reference Data Tables. This level of display is suitable if we want to confirm to how the tables (or entities) are related.



4.23 Starbucks in Qatar

[Omar]: Nadia, I've got some wonderful news for you.

[Nadia]: I'm glad to hear it, Omar - what is it?

[Omar]: I have found Starbucks here in Qatar, so you can have your favorite things to eat or drink ;)

[Nadia]: Omar, are you teasing me?

[Omar]: No, Nadia – we can make a visit when we take our flight back home after our interesting and enjoyable visit to Qatar.

[Nadia]: Wow - that's great, so I can have my favorite muffin.



4.24 What Have We Learned?

In this "Data Modeler's Tourist Guide to Qatar", we have learned how to think like a data modeler and how to gradually put together a data model in our heads.

We know that if we get in the habit of doing this regularly it gets easier and more natural and soon we will be seeing the world around us as pieces of a data model that we can fit together like a jigsaw puzzle.