

Database Course Exercises 3

AM Day 2: Data modelling of described scenarios

These exercises are best discussed in small groups. **For each** of the scenarios given:

1. Decide what entities we need to consider in a data model
2. Create an ERD
3. Determine what values need to be stored for each entity, and determine suitable primary keys.
4. What assumptions does your model make?
What information in the text was irrelevant to your design?
What further restrictions might you want to apply to the data?

Scenario 1 – Sites and Swords:

An archaeologist is working on the swords found at various burial sites. She wants to be able to analyse the details of the swords and compare them to the age of the site, and its location. Locations are specified by grid reference - a 3-digit easting and a 3-digit northing.

The archaeologist wants to store the following data:

site name, site location, age of site, sword length, blade material, handle material

Scenario 2 – Car pool:

A company operates a car pool of various vehicles. They decide to keep records of all cars reserved or currently booked out in a relational database.

Each car has a make, model, registration number, and number of seats

Each employee has a name, employee id and contact number

Company policy says an employee may loan out a car for up to 7 days. If a car is taken out by several employees who all intend to drive the vehicle, they must all be logged in the database for insurance purposes. At any given time, we want to know which cars are out, and what reservations have been made.

You may assume that we don't need to keep a log of past rentals.

Scenario 3 – Families

(taken from <http://www.databasedesign.co.uk/bookdatabasesafirstcourse/chap3/chap3.htm>)

Draw an entity-relationship diagram and list all attributes including the primary key for each entity type, for a database suitable for showing fatherhood, motherhood, brotherhood, sisterhood, cousins, nephews, nieces and nephews, grandparents, in short *all* family relationships. Remember that it is possible to reproduce without marriage and that marriage does not imply reproduction. It is possible to model this with *one* entity type.

Show how the model changes if we wish to keep a record of marriage and spouse relationships. Keep the model as simple as possible. There should be no redundant data. It would be redundant for example, to state that persons A and B were brothers and also that they shared a mother; sharing a mother and the fact that they are both male *implies* that they are brothers (or half-brothers).

The secret in this example is to isolate the most fundamental fact about human reproduction, divorced from artificial social constructions.

Scenario 4 – Coach schedule

Again, attempt the questions at the top with this scenario. Disclaimer – this is rather involved. You will not get a definitive answer!

Bloodhound Coaches runs daily scheduled services all over the country. Customers want to check the

schedules and prices online, so a first step is to put the schedule into a database.

The company runs services to many towns. Some towns have depots, and some do not.

For each depot we want to record a contact telephone number and street name.

All services run between two depots, stopping at a number of stops in between. Each route has a number, and buses will drive that route several times a day.

Ticket costs are calculated as a simple sum of prices between each pair of stops visited.

However, there may be special prices from time to time, between two specific towns.

Children go for half price.

Customers want to be able to check the price of any direct journey, and to find out all the route numbers that visit a given stop.

The time taken to drive a direct route between any two stops is also known.

This is assumed to be constant throughout the day.

Currently - a sample printed timetable looks like this:

<i>Route</i>	<i>101</i>			<i>Price</i>
Oxford	09:00:00	11:00:00	13:00:00	<i>From Oxford:</i>
Greater Tew	09:15:00	11:15:00	13:15:00	€5
Westward Ho!	10:30:00	12:30:00	14:30:00	€12
Peebles	11:20:00	13:20:00	15:20:00	€17
Marsh Gibbon	11:45:00	13:45:00	15:45:00	€20
Dunkirk	13:00:00	15:00:00	17:00:00	€25
Edinburgh	14:00:00	16:00:00	18:00:00	€35
Edinburgh	11:00:00	13:00:00	17:00:00	<i>From Edinburgh:</i>
Dunkirk	12:00:00	14:00:00	18:00:00	€10
Marsh Gibbon	13:15:00	15:15:00	19:15:00	€15
Peebles	13:40:00	15:40:00	19:40:00	€18
Westward Ho!	14:30:00	16:30:00	20:30:00	€23
Greater Tew	15:45:00	17:45:00	21:45:00	€30
Oxford	16:00:00	18:00:00	22:00:00	€35