Database Problems 3

Database Design and Normalization

Design databases for the following scenarios. First apply Entity / Attribute analysis and then check the data is normalized by identifying dependencies.

1. A haulage company owns some bulk liquid transporters and employs a number of drivers. They need a database to both record their customers and the jobs they have done for them and to manage the allocation of drivers and transporters to jobs. A job involves the transport of a fluid from a source to a destination site and, if necessary, the cleaning of the bulk liquid container afterwards. Some transporters are used solely for carrying food products, some are used solely for carrying hazardous products and the remainder can be used for any liquid. Drivers need a special licence to drive transporters containing hazardous chemicals.

2. Suppose you had to set up a database to describe the activities of a group of musicians. You need to record the following basic information about everybody: their name, and date and country of birth. Some of these musicians are composers. You need to record, for each composer the title and date of all his or her compositions. You will also need to record when and where (town and country) these compositions have been performed, which ensemble performed them and who conducted the performance. The conductor will always be one of the group of musicians. Some of the musicians are performers and for these you need to know what instrument they play and at what level (i.e. well or badly) and for how long. Some musicians play more than one instrument and they need not play all their instruments at the same level. All musicians who perform do so as part of an ensemble. For each ensemble you need to record its name, who performs in it, what instrument they play and at what level, the country it is based in and the identity of the manager who will himself or herself be a musician and may or may not be one of the performers. These ensembles are the ones that perform the music.

3. Arfur Daley Enterprises runs a high quality car sales operation for which they provide a complete customer after sales service. In order to do this they keep records of the service needs of each type of car that they sell. The information they store includes how often a service is required in terms of the number of months between services and the distance covered. A car is serviced either when a predefined period has elapsed or the vehicle has covered a specific distance, whichever is the sooner. A record is kept of the names and addresses of car owners. For each car that a customer owns a record is kept of the registration number of the car, the type of car, the date it was sold to the customer, the recorded distance travelled by the vehicle and the average distance undertaken by the owner per month. When a customer makes a booking for a service a record is kept of the registration number of the vehicle and the date for which the service has been booked. Finally, a record is kept of the service history of a car which includes the dates upon which the vehicle was serviced, the registration number of the vehicle and the vehicle mileage when the service was carried out. The primary goal of the computer system is to be able to send reminders to customers that a vehicle they own is due for service.