

Conceptual database design



EXERCISES

Exercise 1: electric company



An electric company has several plants in various cities. Each plant has a different name and may have one or more reactors. Each reactor has a model, a manufacturer and should use a specific type of fuel (carbon, oil,...). Each type of fuel has a different cost per Kg. Every day are collected the following informations about each reactor: fuel consumption and KW/h produced.

Exercise 2: internet service provider



An internet service provider (ISP) wants to collect informations about the revenues obtained from advertising. For each page of the web portal, identified by an URL, are collected a set of daily informations:

- page views (number of page visualizations);
- impressions (number of times that a banner is displayed on a page)

Page views count is stored on a “per IP” basis. Each banner refers to a brand, has its own size (height x width, in pixels) and generates a different revenue for each impression.

Exercise 3: university courses



Design the conceptual schema for a DB to store information about university courses. Each course has a code and a title, belongs exactly to one professor and is followed by a set of students. A student may follow many courses. In the DB should be stored the name, the social security number and the identification number of professors and students. Professors can be full or associated. At the end of each course, students can take a final exam. For each exams are stored the date, the grade and the examiner (can be different from the professor of the course).

Exercise 4: computer shop



A computer shop sells laptop and desktop PCs. Each computer, identified by a serial number, has its own price and the following technical specifications: type of operating system, type of CPU, amount of RAM.

Desktop PCs have various types of case: mini, middle and big. Laptop PCs have different display size (width x height, in pixels). Computers are sold with different type of warranties, each with a specific price. For each customer are important the following information: name, social security number, which PCs he bought and which type of warranty was applied.

Exercise 5: departments



A company wants to store information about people working in its departments. Each department has a name and an address. Each person may work in more than one departments with different roles. For each person the company cares about the social security number and the name. For employees is also stored the career level. Managers don't have a career level, but have a set of benefits and a special pass ID to access reserved informations. Benefits have a name and a value.

Exercise 6: public transport by train



A railway company serves a set of cities with its trains. In each city can be more than one station, each one identified by its name. Trains are identified by the “train number”. Each train has a start station and a stop station. Express trains may have additional services on board: restaurant and cinema. A train makes a set of runs. Each run is identified by the date, the departure time and the arrival time.

Exercise 7: cardiology clinic



A cardiology clinic is specialized in two types of exams: electrocardiogram (ECG) and coronary angiography (CA). Each patient is visited by a doctor who annotates in a diagnosis a list of the diseases found and the date of the visit. Patients are identified by their social security number and their name.

For each exam is recorder the date and the doctor who executed it. For ECGs are stored the heart size, the defect found and if there are problems with the valves. For CAs are stored the number of blocked arteries and the percentage of blood flow blocked.

Exercise 8: library



A library loans books and rare books. For rare books loans it asks for a security deposit. Books are catalogued by the ISBN, the author and the title. For each book is recorded the shelf in which it is stored. Each shelf has an ID and is located in a room of the library. Each loan has a start date and an end date. The library has an archive of its clients with their names, social security numbers and membership card number.

Exercise 9: meteorological office



The english meteorological office (Met Office) wants to manage informations about the weather conditions around the UK. They have a set of meteorological stations placed around the country, each identified by its location (latitude and longitude). For ground stations is important the nearest city, while for sea stations is important to know if they are floating or placed on rigs. Both ground and sea stations send hourly data about temperature, humidity percentage, wind direction and wind speed. Sea stations send also the detected water temperature.

Exercise 10: car rental company



A car rental company wants to store information about its customers activity. For each rental are important the start date, the end date, the car and the person who rented it. For each person is recorded the social security number, the name and the driver's license number. To rent a sports car is requested a "high-speed driving" certification, while to rent a luxury car the customer must leave e security deposit. Luxury cars have a set of optional accessories and sports cars have a safety certificate number. Each car is identified by its plate and has a model and a manufacturer name.