

Lab 4 - ER Modelling

Task 1: Database for Port

You are hired by a port company to develop a database for managing container and yard data. In this port, containers are placed in different container stows (stow = container stacking area). Each stow has an identifier, a maximum number of containers supported. A stow has several slots for containers, each slot is associated with a slot id. Each container has its container identifier, current stow, current slot in the stow, weight and size. A container transport task involves transporting one or two containers from their initial position to a same target position. The target position is described using a target stow identifier and a target stow position.

Task 1.1: Draw the entity relationship diagram for the port company's database.

Task 1.2: Based on your solution to Task 1 above, write the SQL code to create the tables for the database. You should include all the specified attributes and specify the appropriate primary and foreign keys.

Task 2: Database for Car Company

You have been hired by a large, multi-branch car sales company to design a database capable of storing the company's information. You are asked to develop a database system capable of storing the company's Offices, Inventory and Staff information. The requirements for the database are provided below:

- There are several Offices in different locations across the United Kingdom.
- Each Office has its own Name, Address and Telephone number.
- Each Office will have a unique Telephone number.
- Each Office employs many sales-persons. A sales-person can only be employed by a single Office.
- A sales-person has a Name, Age, Salary and a unique ID number.
- Each Office will have many cars associated to it. A car may only be associated to a single Office.
- Information relating to each Car is also stored. This information includes: Manufacturer, Model, Production Year and Number of Doors and a unique ID number.
- A car may be sold by a single sales-person. A sales-person may sell many cars.

Task 2.1: Draw the entity relationship diagram for the car sales company's database.

Task 2.2: Based on your solution to Task 1 above, write the SQL code to create the tables for the database. You should include all the specified attributes and specify the appropriate primary and foreign keys.

Task 3: Past Resit Coursework – Room Cleaning Service Database Design

In this coursework, you are required to design a database for supporting the room cleaning service for a hotel. The requirements are as follow:

Task 3.1: Database Design

The hotel has 9 floors where each floor has a different amount of guest rooms. The floors of this hotel use three different types of materials:

1. 1st to 3rd floors use granite tiles.
2. 4th to 6th floors use hardwood planks.
3. 7th to 9th floors use carpets that changes based on the season. The materials of the carpets are also not the same in each season.

Different carpet materials require different methods of cleaning. As a result, the floor materials must be recorded in the database.

Each room has a room number, an associated floor number and a list of registered electronic appliances (fridge, cooker, TV etc.). Each electronic appliance is associated with its manufacturer name and the phone number of its manufacturer. Phone number for the same manufacturer is always the same.

Each cleaner hired by this hotel has a cleaning staff ID and the cleaner's name. Cleaners are formed into teams of three people when cleaning rooms. Each cleaning team has a team ID (integers) and a team leader who is in charge of making records of room cleaning.

The manager of this hotel has already hired other people to put all past room clean records into the database. These records are saved in a table called "room_service_records". This table does not have any primary key or foreign keys. The table structure is shown below:

team_leader_name	room_no	service_date
Bob Johnson	4003	2016-1-13

...

Each team has its own set of working days in a week and is assigned to service a fixed set of floors. For example:

1. Team 1: Monday to Wednesday. Services floors 1, 2 and 3.
2. Team 2: Wednesday, Friday, Sunday. Services floors 4, 5 and 6.
3. Team 3: Thursday to Sunday. Services floors 9 to 12.

Your database design should accommodate all possible weekly work schedules for all these teams.

Your task:

1. Draw an E/R diagram for the whole database. The final database design should be in the third normal form (3NF). You also need to write a short paragraph (less than one page) to explain your database design and why it is in the 3NF. You do not have to consider “room_service_records” in this task. **Both the E/R diagram and the explanation should be put into a Word or PDF document called “Report 1”.**
2. Based on your database design, write a working SQL script consisting of CREATE TABLE statements that match the E/R diagram you designed. The SQL script should function on either MySQL or Microsoft Access. In your report, you must explicitly state which database your script is written for. The tables you designed should have proper primary keys and foreign keys. You do not have to consider “room_service_records” in this task. **Your SQL script file should be called “cw1.sql”.**
3. Write a few INSERT or UPDATE statements for each table to prove that your design works as intended. You should prove your design by showing both successful insertions/updates of correct data and unsuccessful insertions/updates of incorrect data. You do not have to consider “room_service_records” in this task. **You should put all these INSERT or UPDATE statements into a separate script file called “cw1_tests.sql”.**

Task 3.2: Database Queries

Once you have finished designing your database, complete the following tasks:

1. Apart from the requirements above, the manager of the hotel has encountered a problem. The names of team leaders are not unique. Two team leaders have the same name “Gordon” but fortunately, they work on different floors. One Gordon works on floors 1, 2 and 3 while the other works on floors 7, 8 and 9. Write SQL scripts to differentiate the room cleaning records from these two team leaders. Assume that the Gordon who works on floors 1, 2 and 3 belongs to team 5 while the other belongs to team 12. Write two UPDATE statements so that the first Gordon is changed to “Gordon_5” and the second Gordon is changed to “Gordon_12”.
2. Alter the “room_service_records” so that the new design fixes the issue with duplicate team leader names and also prevents similar issues from happening in the future. The new design should have a proper primary key and also correctly references the information to other parts of the database using foreign keys. Put your ALTER statements or other necessary statements into “cw2.sql”. Once done, you are required to insert a few example tuples into the database to prove that the new design works.
3. The room cleaning activities in this hotel can be classified into two types: room cleaning is required as soon as a customer leaves the hotel (no longer staying), and regular room cleaning every 2 days when a guest is staying in that room. The manager wants to check

whether cleaners are strictly following the rule for the first type of room cleaning. Write a SELECT statement to find out any cleaning staffs who are not following this rule.

4. When winter season arrives, all the carpets on floors 7 to 9 will need to be replaced with fluffy red carpets, providing a warmer and cosier experience for the guests. We call this carpet material “Red cosy carpet”. Write an UPDATE statement to update your database so that the tables reflect such a change.
5. As 4K TV shows are now becoming popular, the manager wants to upgrade all the hotel rooms’ TVs. A manufacturer known as “TVStar” produces a model of 4K TV called “BrightHDR4k”, which is capable of providing high-quality viewing experience. The manager thus purchased enough of them to replace all the old TVs in the rooms on floors 4 to 9. Write one or more UPDATE statements to update the database with the information of the new TVs.