

Logical Data Modelling Exercises

Draw the Entity-Relationship Diagrams for each of the following. Document any assumptions or possible problems. Where necessary, decompose or resolve relationships.

A tree has many leaves; a leaf is on only one tree.

A manager looks after one launderette; a launderette is looked after by only one manager.

A hockey team comprises many players; a player may play for several teams.

An author writes many books; a book may be written by several authors.

The aim of the following exercises is to ensure that you understand how to develop an Entity Relationship Diagram (ERD) based on the information provided with regards to a particular business scenario. Solutions are given for the exercises in a separate document.

You can work on these exercises individually or in groups.

Draw an ERD for each of the scenarios given below. It is recommended that you begin on paper—once you have a fair draft for your ERD, transfer it to a selected drawing tool. Follow the method suggested below:

- (1) Identify possible entities and relationships.
- (2) Draw a draft entity relationship diagram (ERD).
- (3) Resolve 'one-to-one' and 'many-to-many' relationships, and check for further entities and relationships.
- (4) Remove redundant relationships.
- (5) Check optionality of relationships.
- (6) Draw your final entity relationship diagram (ERD).

If the relationships are not self-evident, then label them with suitable Relationship Link Phrases.

Recall that NOT all information is equally helpful—be careful and logical when analysing each scenario. Watch out for synonyms/attributes.

Exercise 1: Factory system:

A worker can produce many kinds of component.

A component can be constructed from several raw materials.

A single worker produces each component.

Exercise 2: Medical practice:

Each GP may (by appointment only) see many patients; each patient is registered with only one practice. A GP can be identified by their Medical Council Number, and a patient by their Patient Number.

Exercise 3: United Broke Artists

United Broke Artists (UBA) is a broker for not-so-famous artists. UBA maintains a small database to track painters, paintings and galleries. A painting is created by a particular artist and then exhibited in a particular gallery. A gallery can exhibit many paintings, but each painting can be exhibited in only one gallery. Similarly, a painting is created by a single painter, but each painter can create many paintings.

Exercise 4: Public lending library system

A public library lends copies of books to its borrowers. The library may have more than one copy of the same book. Each copy will have a different accession number which is used to identify that copy. A borrower can reserve a book if there are no copies of the book available because they are all on loan.

Question: Can you amend your diagram to consider the case of keeping records of completed loans?

Exercise 5: Shoe shop sales and inventory system

A company operates several branches of shoe shops. Various styles of shoes are stocked in different quantities by the branches. Details of stock and weekly sales for each branch are recorded by the stock control system. The company keeps records of sales from previous weeks to help it identify sales trends. Weekly picking lists are produced to request replacement stock for each branch. Each picking list identifies the style, size and quantity of each of the shoes required.

Question: Is a picking list an entity – if not, why not?

Exercise 6: Stock control system for a computer distributor

Stock items are obtained by purchase orders from hardware and software suppliers. Each type of stock item is held in a single warehouse section that may contain more than one type of stock item. Sales orders for various items are received from customers. The items are despatched when available so that one order may result in more than one despatch.

Exercise 7: Electronic equipment manufacturing and inventory system

New Wave Electronics of Newquay manufactures printed circuit boards (PCBs) to order and then assembles the components on to them. Sales orders are received from customers. Each order may be for a number of different types of PCB. Each type of PCB on a customer's order is treated as a separate job. The boards are prepared in batches by the factory. Each batch consists of only one job. Components are ordered from a number of suppliers. The same type of component may be purchased from more than one supplier. A purchase order may contain more than one type of component. The same type of component may be used more than once on the same board as well as being used on other boards.