

(Free) Sample 12

Taken from:

Further Examples 2: Conceptual Data Models

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The full *Further Examples 2* contents are:

Example 1: The *Optician* Model

Example 2: The *Department Store* Model

Example 3: The *Supermarket Express* Model

Example 4: The *Help-Desk* Model

Example 5: The *Factory* Model

Example 6: The *Safari* Model

Solutions

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Below is an example...

Example: The Optician Model

A single optician runs a high street practice called '**Single Vision**' (this is not a group practice) and needs a database to support her clinical work (eye testing, laser correction, and other ophthalmic work). Her commercial interests (selling lenses and glasses) are not to be included in this database. Below is the background to her clinical optician work.

A record is kept of each customer name, address and telephone number as well as all appointments a customer makes. Each appointment comprises one or more 'consultation units' (30 minute slots). Each appointment must last between 30 minutes and 90 minutes (1 to 3 slots). Appointments and slots are identifiable via their data and start time.

Examples would be:

- 10-April-2006 10.00
- 10-April-2006 10.30
- 10-April-2006 11.00

Each 30 minute slot will therefore be recorded as 'occupied' or 'free'. The optician must not work for more than two hours without a break (in other words, the database should not have more than four consecutive 'occupied' slots on any given day).

Each form of clinical treatment has both a treatment code and a description - for example:

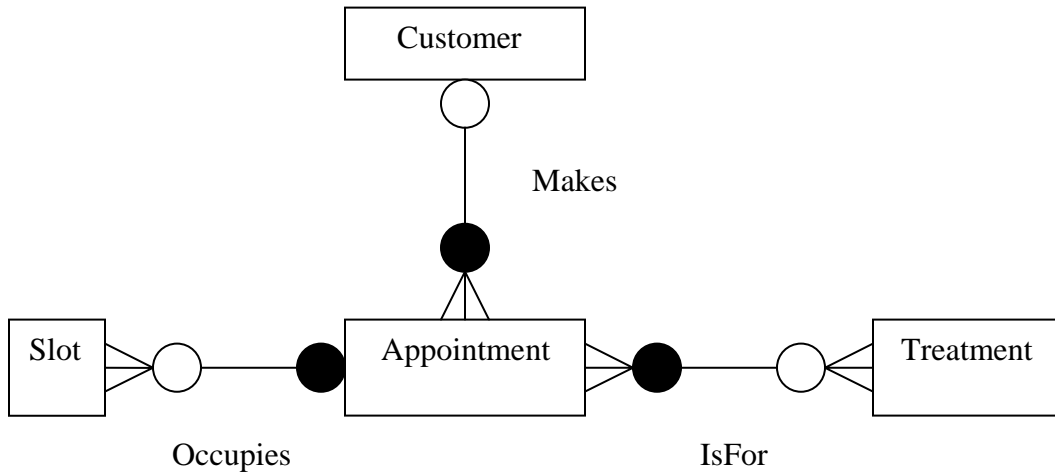
- Annual Eye Test (Code T10)
- Laser Correction (Code T12)
- Retina Scan (Code T18)

Each form of treatment has a standard cost. A given treatment may occupy a single appointment or span several appointments while each appointment may involve either one or more treatments. For clinical reasons, it is important that the optician can enter notes about each customer's treatment and prescriptions.

Your task is to construct a conceptual data model for this scenario.

One possible model is supplied below:

Optician Data Model – Initial Version

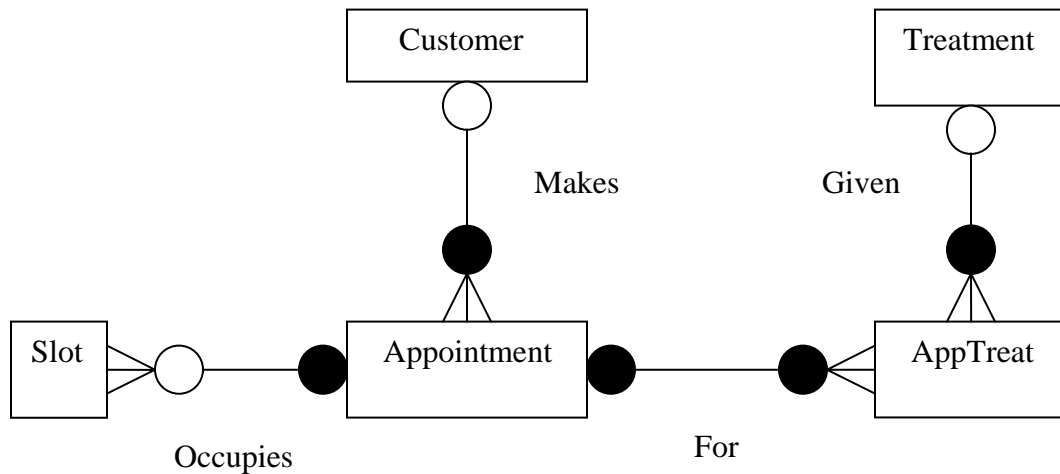


Points to Note:

- All entity types have singular names, not plural names (Slot, not Slots etc).
- Some slots may not be used (they remain 'free') – hence, the optional participation.
- Some (available) treatments may not be requested or needed – hence, the optional participation.
- Some customers may not have outstanding appointments or, if they are a newly registered customer, they may never have had an appointment (yet) – hence, the optional participation.
- The relationship between *Appointment* and *Treatment* is many-to-many (each treatment may occupy one or more appointments and each appointment may involve one or more treatments).
- We need to store additional data about the *IsFor* relationship – so we need to decompose this many-to-many relationship down – see final version below.

The updated version is below...

Optician Data Model – Final Version



Now add the remaining components of the ER model:

Entity Types (primary keys underlined)

Slot (Date, StartTime, Status)

Appointment (Date, StartTime)

Treatment (TreatmentCode, Description, Cost)

AppTreat (Date, StartTime, TreatmentCode, Notes)

Customer (CustomerID, Name, Address, Telephone)

** notice the composite key

Constraints

- Slot status is either 'occupied' or 'free'
- The maximum number of consecutive 'occupied' slots is four
- No appointment can exceed 90 minutes (3 slots)
- StartTime must be between 9.00 and 16.30
- The optician's notes (clinical comments) cannot exceed 1000 words

Assumptions

- Customer names are not assumed to be unique (hence the use of an ID)
- The practice is open Monday to Saturday (inclusive)
- The same treatment cannot be given more than once within the same appointment

Additional notes

Because we have converted the original many-to-many relationship (IsFor) into a relation (AppTreat) we need to create a primary key for this new relation. This primary key is normally a composite (hybrid) of the two primary keys from the related relations (Treatment and Appointment) – hence, a primary key of Date, StartDate, TreatmentCode.

When creating these so-called *intersection* entities (such as AppTreat), try and pick a meaningful name but if you cannot think of one take the easy option and simply concatenate the names of the two related entities (so here, Appointment and Treatment gives AppTreat) – not very original but it gets the job done. In some senses, it may be a good thing to have these ‘artificial’ names for intersection entities as they then stand out from the normal entities on the model.

Because there is only one optician involved in this domain of discourse there is no need to include the optician in the model. If we had been modelling a group practice with several opticians then we would have included an entity called *Optician* because the need to identify individual opticians would be important.

Activity

Suppose the optician wants to extend the above model to include:

- (a) Prescriptions
- (b) The sale of contact lenses, glasses and other eye-products (eye drops etc)

Draw an updated ER Model (including any new entity types) to incorporate these additional features.

Some possible solutions are at the end.