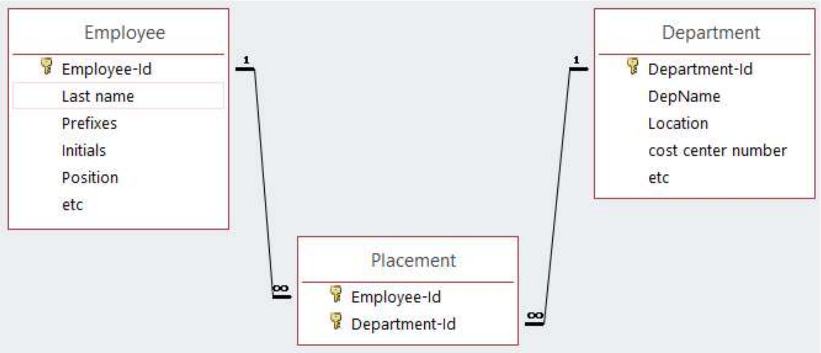
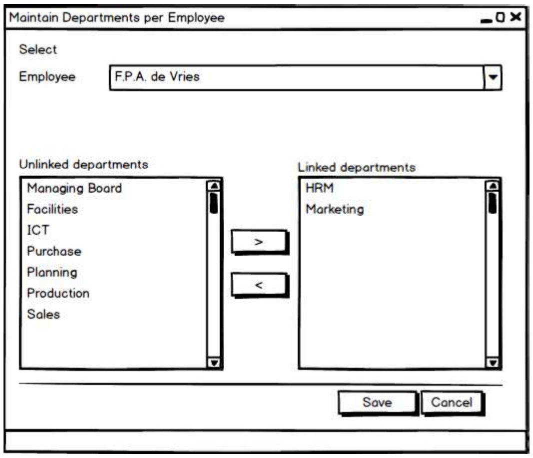
38 MAINTAINING AN N:M-RELATION

Problem description

In a business administration system employee and department data can be maintained. It is also possible to link departments to an employee and link employees to a department. For this purpose, a relationship entity (Placement) has been added, which contains only the keys of the two entities, resulting in an N:M relationship. In the data model of this business administration system the following entities are present:



The possibility to link one or more departments to an employee or break this link is shown in the image below, left. The possibility to link one or more employees to a department or break this link is shown in the image below, right.



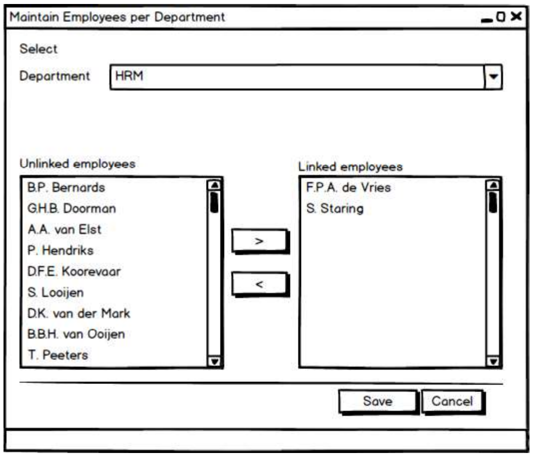
Maintain Departments per Employee

Select

Employee: F.P.A. de Vries

Unlinked departments:
- Managing Board
- Facilities
- ICT
- Purchase
- Planning
- Production
- Sales

Linked departments:
- HRM
- Marketing



Maintain Employees per Department

Select

Department: HRM

Unlinked employees:
- B.P. Bernards
- G.H.B. Doorman
- A.A. van Elst
- P. Hendriks
- D.F.E. Koorevaar
- S. Looijen
- D.K. van der Mark
- B.B.H. van Ooijen
- T. Peeters

Linked employees:
- F.P.A. de Vries
- S. Staring

The function works as follows: The left list shows the names of departments not linked to the selected employee, the right list shows those that are linked to this employee. The user can move department names from one list to the other and vice versa, using the buttons (">", "<") between the lists. These movements can be persisted in the relationship entity using the Save button.

By the way, this is only one example of an implementation of this function.

The question at hand here is, whether external inputs should be identified? And, if so, how many.

The functionality of displaying the lists of departments and employees and the logical files concerned, are not elaborated here. The discussion of this example is limited to the functionality of the linking.

Discussion

A user story for Maintaining Departments per Employee could be:

"As an HR worker I want to be able to link a department to an employee and to break such a link, so I can show for every employee the department(s) they are working for."

A similar user story will exist for Maintaining Employees per Department.

In fact this function adds occurrences to and removes occurrences from the relationship entity Placement.

In the Nesma counting guideline is a section about denormalization (4.21.2 point 2), stating that a relationship entity is not valued at all.

Following this section the data model shown on the previous page results in two ILFs (Department and Employee). Every entity gets an extra data element type (DET) to implement the N:M relation.

Section 7.1 defines an External Input Function. Summarized this is: unique, user recognized, data entered from outside the application, elementary and add, change or delete data in or from one or more ILFs.

Combining these two sections (4.21.2 point 2 and 7.1) excludes identifying one or more EIFs to maintain the relationship entity Placement as this is not a valid ILF.

The entities Department and Employee are valid ILFs. According to section 4.21.2 point 2 these are the ILFs maintained by the function Maintain Departments per Employee.

After denormalization we have the ILFs:

Department (Department-ID, *(Employee-ID_1, Employee-ID_n)*, Name, Location, cost center number, etc.)

Employee (Employee-ID, *(Department-ID_1, Department-ID_n)*, Last name, Prefixes, Initials, etc.)

In *italics* the both ways added attributes. These are repeating groups. They don't have a meaning without the ILF they are part of. For FPA a repeating group is a record element type (RET). Such a RET can be empty (holds no elements).
When linking a department to an employee both an occurrence in the RET in Employee (reference to the department) and the RET in Department (reference to the employee) have to be added.

When breaking such a link the opposite goes and two occurrences (one from the RET of every entity) have to be removed.

So these are two different EIs that always change occurrences in both ILFs.

For linking/delinking of an employee to/from a department, the same reasoning applies.

Solution

Count for every screen 2 EIs (linking and delinking), so in total 4 EIs.

Reference to the standard

4.21.2 *point 2* and 7.1