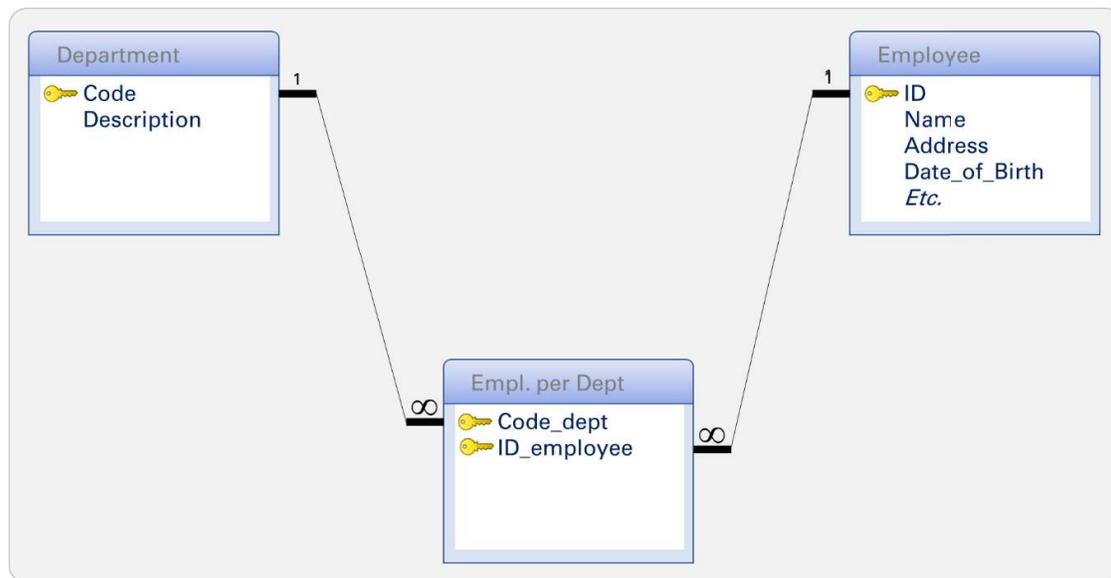


### 33 FPA-TABLE WITH N:M-RELATION

#### Problem description

Within an application there is an entity *Department* with the characteristics of a FPA-table with an N:M-relation with another entity *Employee*. This relation is in the third normal form in a 'key-key-entity' *Employee per Department*. If an *Employee* is deleted, then all the linked departments are deleted from *Employee per Department*.



How many ILFs should be identified in this situation?

#### Discussion

The following denormalization rules are described (see section 4.21.2):

1. Determine which entity types in the data model are FPA tables. FPA tables are valued in a specific way. See section 4.20 and guidelines 5.2.k and 6.2.g.
2. Determine which entity types are a "key-key entity" without other attributes. These represent an n:m relationship in the normalized data model and are not valued at all. The referring attribute (foreign key) is identified as a data element type for both logical files connected by this key-key entity.
3. Determine which entity types are a "key-key entity" *with* other attributes. Note that two situations can arise here as a result:
  - a. The additional attributes are technical by nature (not requested by the user; e.g., a date/time stamp) are not identified as data element types. If they are the only data element types, then the entity type should be dealt with as indicated in step 2 above.
  - b. The additional attributes are functional in nature (required by the user), in which case, they should be treated as indicated in step 4.

4. Examine the remaining entity types as to whether they are a logical file on their own or whether together, with one or more related entity types, they make up a logical file. Determining factors are:
  - The nature of the relationship(s) with another entity type (cardinality and optionality)
  - The dependence or independence of the entity type's existence

Both of these ideas are examined further below. See sections 4.21.3 and 4.21.4.

After the nature of the relationship(s) has been determined, you can assess how the entity types involved should be considered using the table in section 4.21.5. In a data model as described here two denormalization rules come together with another outcome if carried out in a different order.

Step 1 of the denormalization rules describes that the FPA-tables must be identified. In this example the entity *Department* is a FPA-table, according to the rules of section 4.20.

Step 2 of the denormalization rules describes the determination of the 'key-key-entities' without other attributes. These are not valued at all. The referring attribute (foreign key) is counted as a data-element-type for both logical files connected by this key-key entity.

In this example the entity *Employee per Department* is a key-key entity without additional attributes. The attribute *Department-Code* is to be added as a reference attribute to the entity *Employee* and the attribute *ID-Employee* is to be added as a reference attribute to the entity *Department*. By addition of this attribute the entity *Department* does not meet the criteria of a FPA table.

However if the logical files are determined based on a third normal form data model, the denormalization rules (section 4.21.2) must be applied in the exact order as described.

Notwithstanding all the other rules in the manual section 4.21.2 is only applied to an entity in third-normal form. In this example it means that in the first step the entity *Department* is earmarked as a FPA-table. And therefore only the entities *Employee per department* and *Employee* go through the next steps.

For both the entities (*Employee per department* and *Employee*) the steps 2 and 3 are not relevant. Step 4 is important. Examine if both the entities are separate logical files. The nature of the relationship (section 4.21.3) and the dependence (section 4.21.4) are key for this determination. All possibilities are mentioned in section 4.21.5.

## Solution

Count the entity *Department* as a FPA-table. It will become a RET within the FPA-tables-ILF.

Count the entities *Employee* and *Employee per department* together as one Internal Logical file (ILF). There is entity dependence because *Employee per department* and *Employee* are deleted in the same action.

## References to the standard

4.20, 4.21, 5.2.k and 6.2.g