Umeå University
Department of Computing Science

Introduction to Database Managment 7.5 p
5DV119

Exercises, Chapter/Topic 4

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1 Introduction

The aim of this laboration was to obtain a relational database schema from an 'Entity-Relationshiop' diagram. The description on pages 321–328 of the course book was followed.

2 Mapping Step by Step

Mapping of Regular Entity Types

First, all regular entities were mapped into relations and a primary key was chosen from the candidate keys. The mapped entities are BRANCH, EMPLOYEE and STATE whith their respective simple attributes. Multivalued attributes will be added later. For STATE, the candidate key Abbreviation was chosen as 'S_abbr'.

BRANCH

B_number

EMPLOYEE

E_id	E_name

STATE

S_name	S_abbr

Step 2: Mapping of Weak Entity Types

In the second step, weak entities were mapped. This resulted in the relation CITY. The primary key for CITY was composed from the primary key of it's owner entity, STATE (Abbreviation as 'S_abbr'), and it's partial key 'City Name' as 'C_name'.

CITY

C_name	S_abbr	Pop

Step 3: Mapping of Binary 1:1 Relationship Types

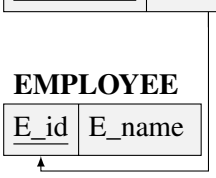
Now all binary 1:1 relationships were mapped. First the relationship 'Manages' was mapped. 'MGR_id' of BRANCH is the foreign key that refers to 'E_id', the primary key of EMPLOYEE. Further the attribute 'MGR_start_date' was also added to the relation BRANCH.

BRANCH

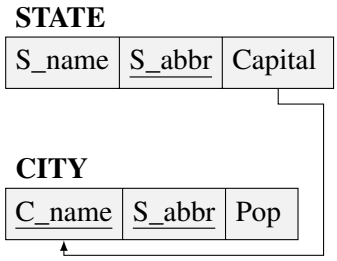
B_number	MGR_id	MGR_start_date

EMPLOYEE

E_id	E_name

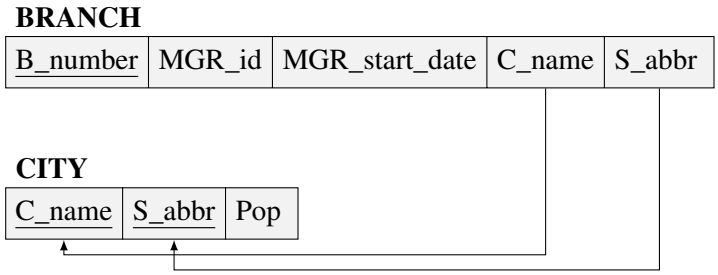


Then the relationship ‘has_capital’ was mapped. ‘Capital’ is the foreign key of STATE that refers to the primary key of CITY, ‘C_name’.

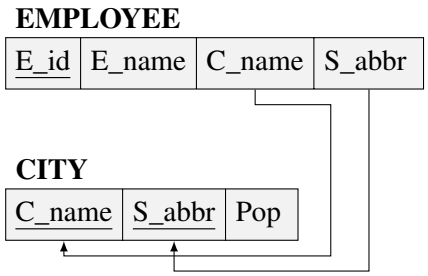


Step 4: Mapping of Binary 1:N Relationship Types

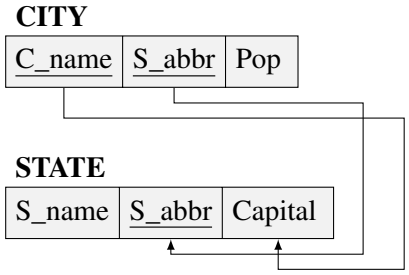
Now the binary 1:N relationships were mapped. First for the relationship ‘located_in’, the primary key ‘C_name’ and ‘S_abbr’ of the CITY relation was added as foreign key to the BRANCH relation.



For the ‘lives_in’ relationship, ‘C_name’ and ‘S_abbr’, the primary key form the CITY relation was added as foreign key to the EMPLOYEE relation.

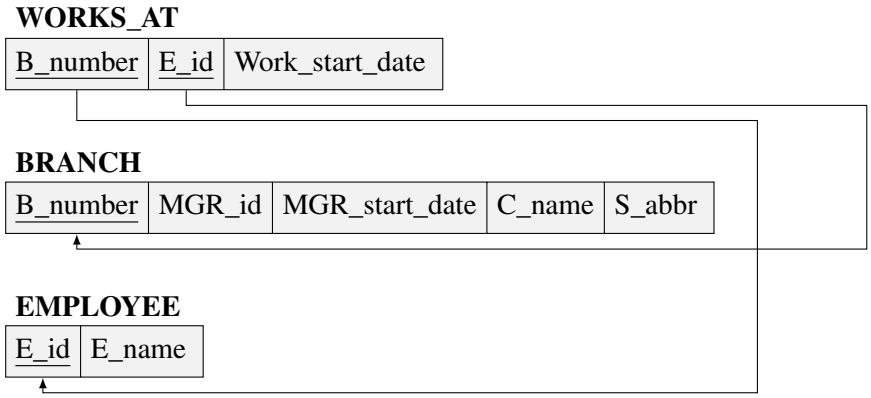


Finally, the ‘located_in’ relationship was mapped from CITY to STATE. Each city is in exactly one state. The ‘has_capital’ relationship added in step three is also visible in the graph below.



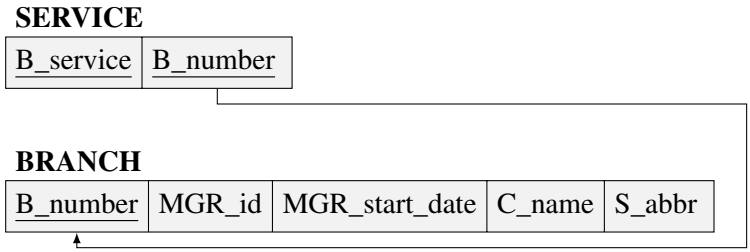
Step 5: Mapping of Binary M:N Relationship Types

To map the binary M:N relationships, a new relation ‘WORKS_AT’ was created. It is composed of the foreign keys ‘B_number’, which is the primary key of the BRANCH relation, and the foreign key ‘E_id’, which is the primary key of the EMPLOYEE relation. Further the attribute ‘Work_start_date’ was included.



Step 6: Mapping of Multivalued Attributes

As last step for the current ER-diagram, a new relation was created for the multivalued attribute SERVICE with the foreign key ‘B_number’, the primary key of the relation BRANCH. Hence a branch can have many different services.



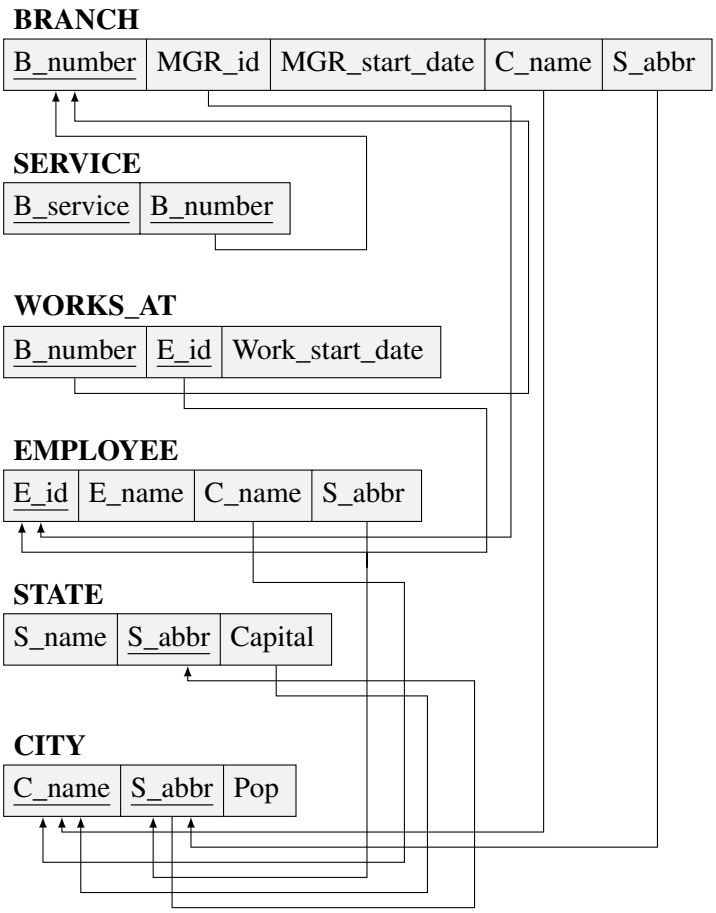
Step 7: Mapping of N-ary Relationship Types

The ER-diagram of the present exercise does not have any N-ary relationsships, hence, there was nothing to do for step 7.

3 Final Results

Finally, the found relations and keys from above were condensed into one combined representation.

4(4)


BRANCH
B_number
MGR_id
MGR_start_date
C_name
S_abbr
SERVICE
B_service
B_number
WORKS_AT
B_number
E_id
Work_start_date
EMPLOYEE
E_id
E_name
C_name
S_abbr
STATE
S_name
S_abbr
Capital
CITY
C_name
S_abbr
Pop