



Datenbanksysteme I

WS 2021/22

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Assignment #11

Submission Deadline: January 26, 2022 - 10:00

Exercise 1: Verbalizing an ER Diagram

(5 Points)

Consider the entity relationship diagram in Figure 1. Turn this ER diagram into an accurate verbal description that reads similar to the one found in Assignment #10, Exercise 2. In particular, carefully verbalize the relationship cardinalities. Each sentence should meaningfully describe the ER model such that a board game collector could comprehend the general idea the ER model represents without the help of Figure 1. Please keep your descriptions brief and concise.

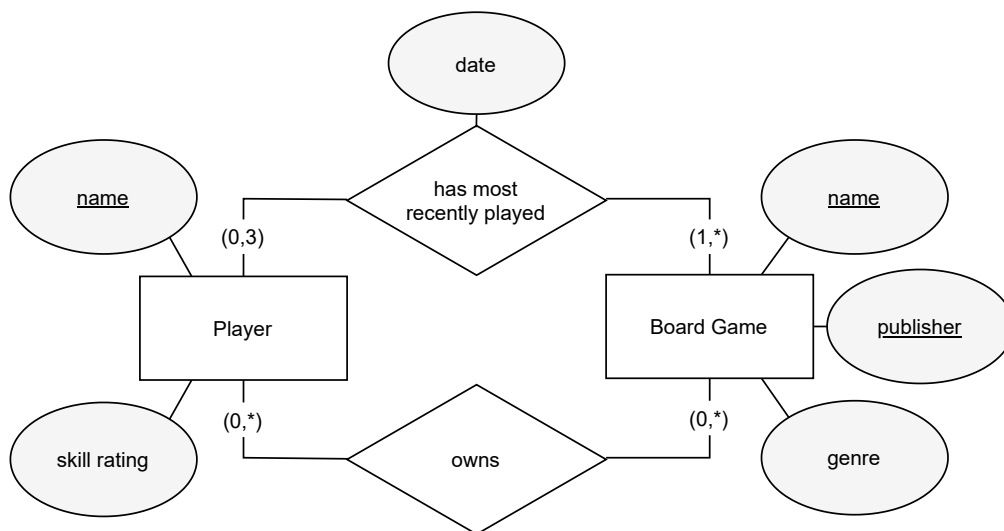


Figure 1: Entity relationship model of a board game collection

Exercise 2: ER → SQL

(15 Points)

Recall the hospital ER in Assignment #10. We provided you with a possible ER diagram in Figure 2 created from the information given.

1. Translate the ER diagram in Figure 2 into a SQL database schema. Make use of the translation rules presented in the lectures. Provide the resulting SQL DDL commands.
2. Populate the SQL database schema with one hospital, two wards, three employees of which one is **not** a doctor and four patients. Provide the resulting SQL DDL commands.
3. Are there any constraints in the ER diagram that cannot be enforced by your SQL database schema? Explain briefly!

Note: Translate relationship cardinalities as faithfully as relational constraints permit. In this exercise, disregard EER inheritance but do consider weak entities as shown in the diagram.

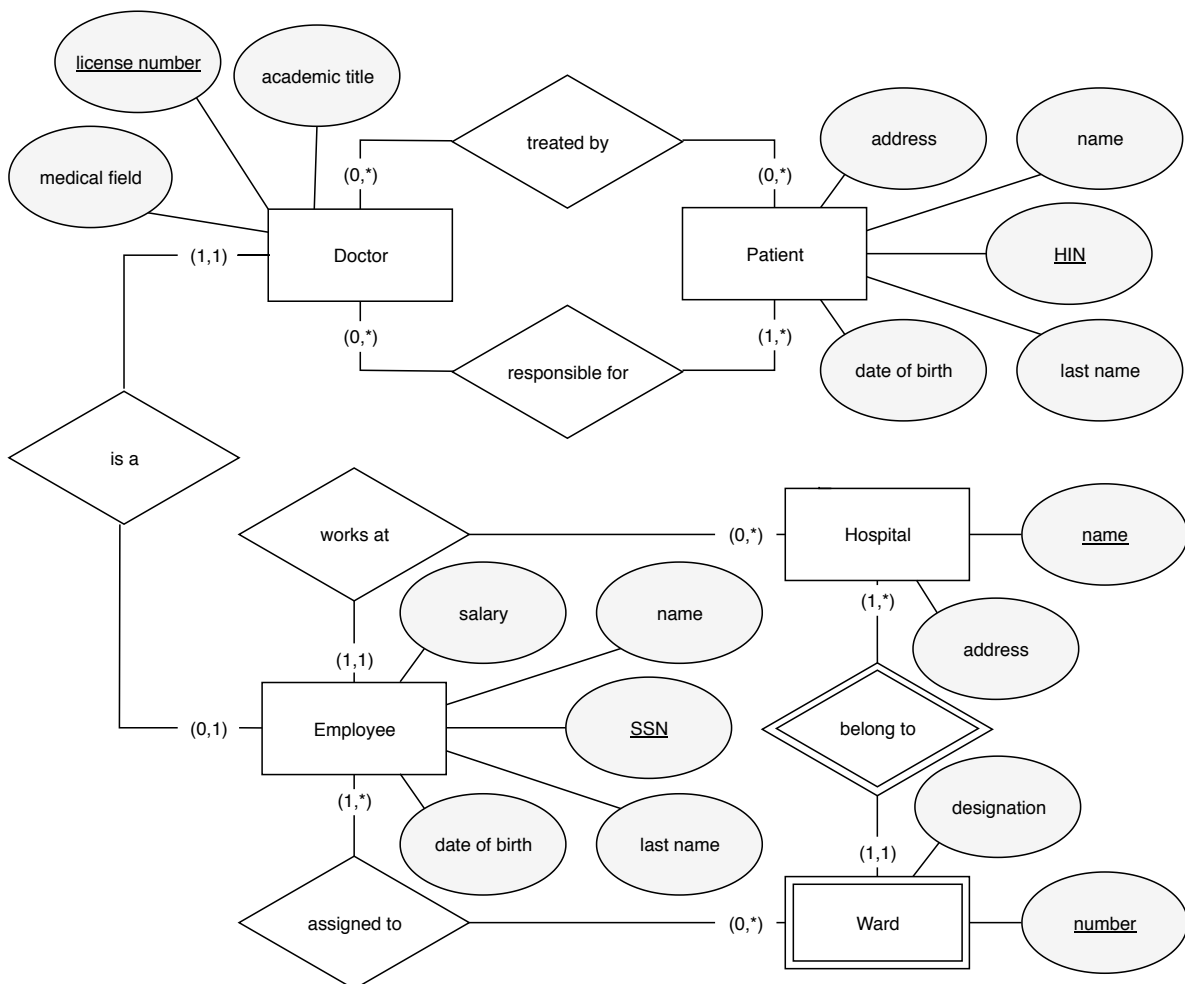


Figure 2: EER of the hospital description of assignment #10

Exercise 3: SQL → ER**(10 Points)**

The SQL DDL commands listed in Figure 3 were generated from an EER diagram by applying the mapping steps discussed in the lectures (slides 20 - 32, chapter 11 "The Entity-Relationship Model").

Reengineer the EER diagram from these SQL DDL commands. Make sure to model **all** entity types, relationship types, attributes and do not forget to underline key attributes in your diagram.

```
CREATE TABLE countries (  
    code        varchar(2),  
    name        varchar(50),  
    population  int  
);  
ALTER TABLE countries ADD PRIMARY KEY (code);  
  
CREATE TABLE cities (  
    name varchar(50),  
    lat  float,  
    lon  float  
);  
ALTER TABLE cities ADD COLUMN located_in varchar(2) NOT NULL;  
ALTER TABLE cities ADD COLUMN __id__ integer GENERATED ALWAYS AS IDENTITY;  
ALTER TABLE cities ADD PRIMARY KEY (located_in, __id__);  
ALTER TABLE cities ADD FOREIGN KEY (located_in)  
    REFERENCES countries(code) ON DELETE CASCADE;  
  
ALTER TABLE countries ADD COLUMN capital int;  
ALTER TABLE countries ADD CONSTRAINT unique_capital UNIQUE (capital);  
ALTER TABLE countries ADD FOREIGN KEY (code, capital)  
    REFERENCES cities(located_in, __id__);  
  
CREATE TABLE languages (  
    language varchar(50)  
);  
ALTER TABLE languages ADD PRIMARY KEY (language);  
  
CREATE TABLE speaks (  
    code        varchar(2),  
    language    varchar(50),  
    percent     decimal(5, 2)  
);  
ALTER TABLE speaks ADD PRIMARY KEY (code, language);  
ALTER TABLE speaks ADD FOREIGN KEY (code)  
    REFERENCES countries(code) ON DELETE CASCADE;  
ALTER TABLE speaks ADD FOREIGN KEY (language)  
    REFERENCES languages(language) ON DELETE CASCADE;
```

Figure 3: SQL DDL commands generated by EER diagram translation.