

Database System Concepts for Non-Computer Scientist - WiSe 25/26

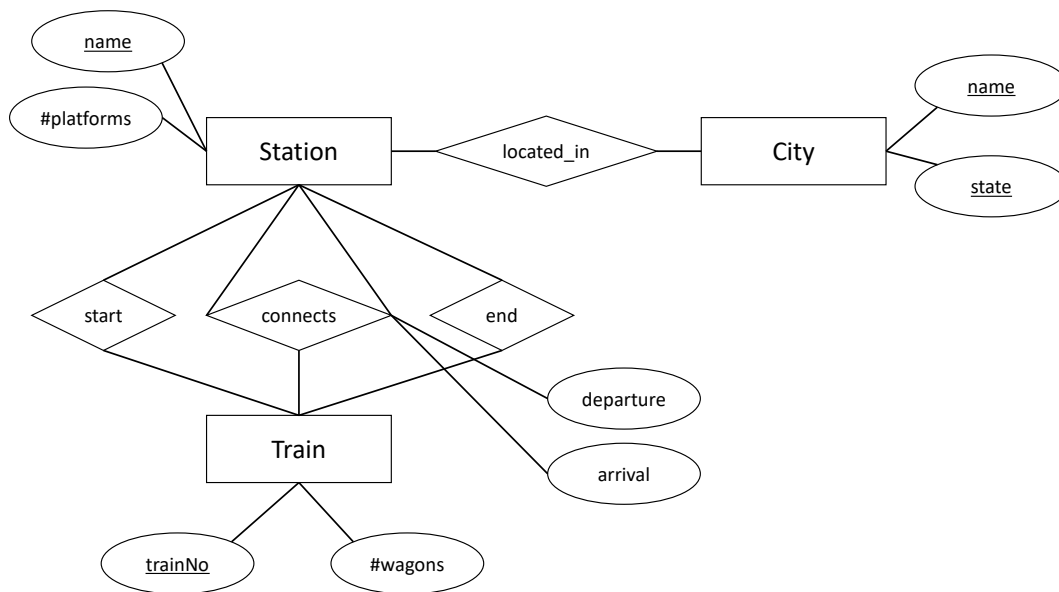
<http://db.in.tum.de/teaching/ws2526/DBSandere/?lang=en>

Sheet 02

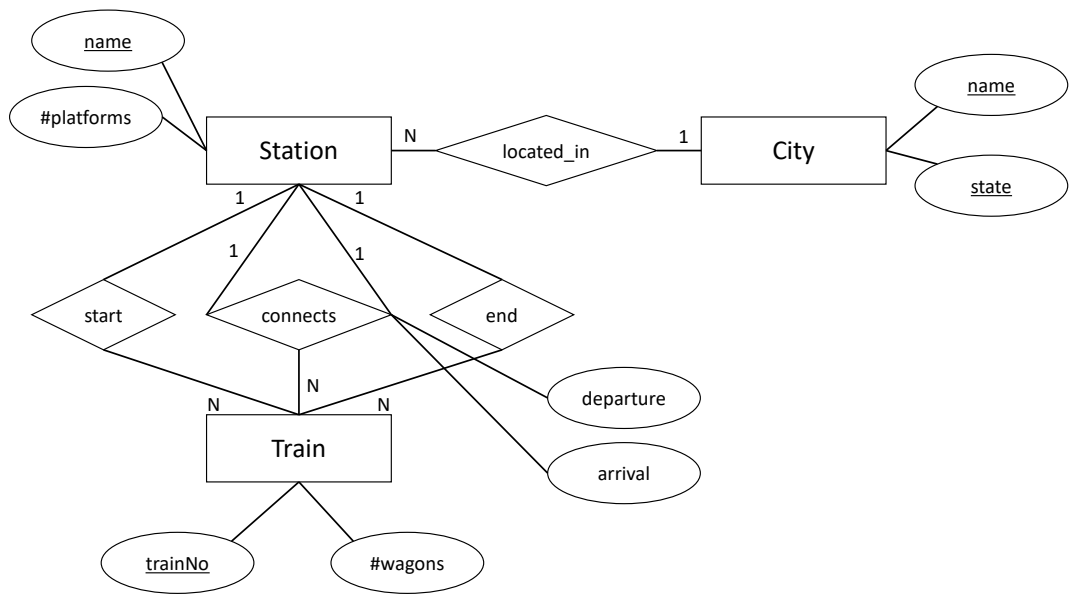
Exercise 1

Consider the entity relationship model of a train connection system (below). Note: The **connects** relationship models a direct connection between two stations. For example, the train starting (**start**) in Munich and ending (**end**) in Hamburg passes through several stations. Each of these route-sections (e.g., Munich → Nürnberg or Nürnberg → Würzburg) has an entry in the **connects** relation. Further, the train entity models a train line: The train line going from Munich to Hamburg, becomes a different train line (different *trainNo*) when returning.

Task: Add functionalities to the shown ER diagram.

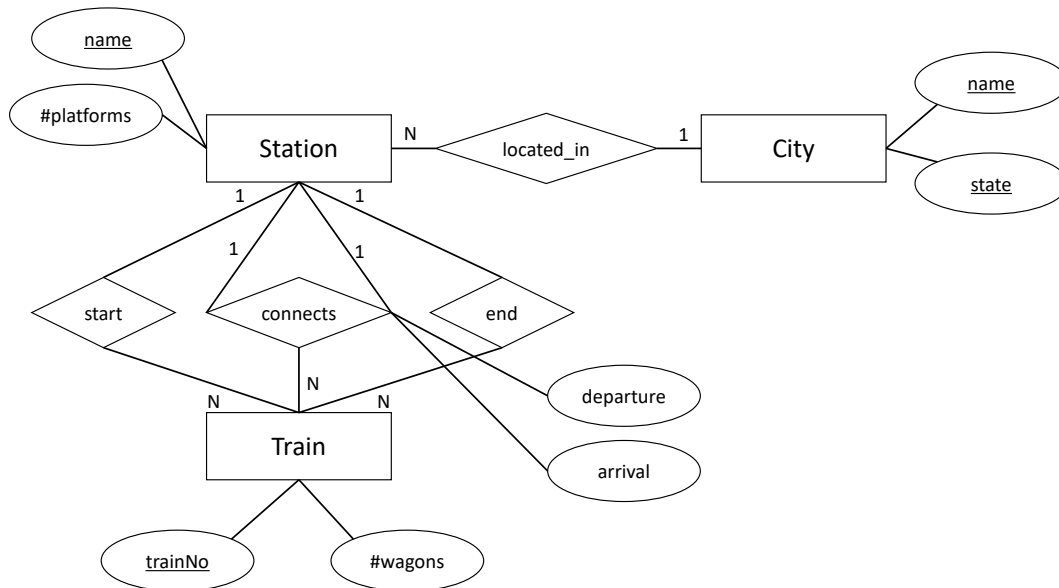


Solution:



Exercise 2

Consider the entity relationship diagram from exercise sheet 2:



Create a relational schema out of the ER-Diagram. Underline keys and find appropriate data types.

Solution:

The un-refined translation yields the following relations for the entities in the model:

City : {[name : string, state : string]}

(1)

Station : {[name : string, #platforms : integer]}

(2)

Train : {[trainNo : integer, #wagons : integer]}

(3)

For the relationships in the model, we create the following relations:

located_in : {[stationName : string, cityName : string, cityState : string]}

(4)

start : {[trainNo : integer, stationName : string]}

(5)

end : {[trainNo : integer, stationName : string]}

(6)

connects : {[fromStationName : string, toStationName : string,
trainNo : integer, departure : date, arrival : date]}

(7)

Exercise 3

Consider the following description of a hospital and create an entity relationship diagram. Use generalization when appropriate.

- Hospitals consist of departments. Each hospital has an address (which can be used to identify it) and a number of beds. Departments have a name, which is unique only within a hospital.

- Departments in turn consist of rooms which are numbered. Such a number is unique within a department.
- Every hospital has employees who receive a salary. Each member of the staff can be employed in various hospitals.
- Employees are identified by a personnel number and can be divided into doctors and nurses. A doctor can supervise several nurses, but a nurse is supervised by only one doctor. A nurse can not be a doctor and vice versa.
- A department can be run by several doctors. A doctor can also run several departments. It is also known whether a doctor has a room and if she does, the room number is known. No doctor has to share her office with another doctor.
- Shifts are used to organize work. A shift can be uniquely identified by date and time period. Employees can work in shifts at a department. An employee can only work in one department in a given shift.

Solution:

