Technische Hochschule Rosenheim

Chapter 6 – Weak entities

Databases lectures

Winter semester 2018/19

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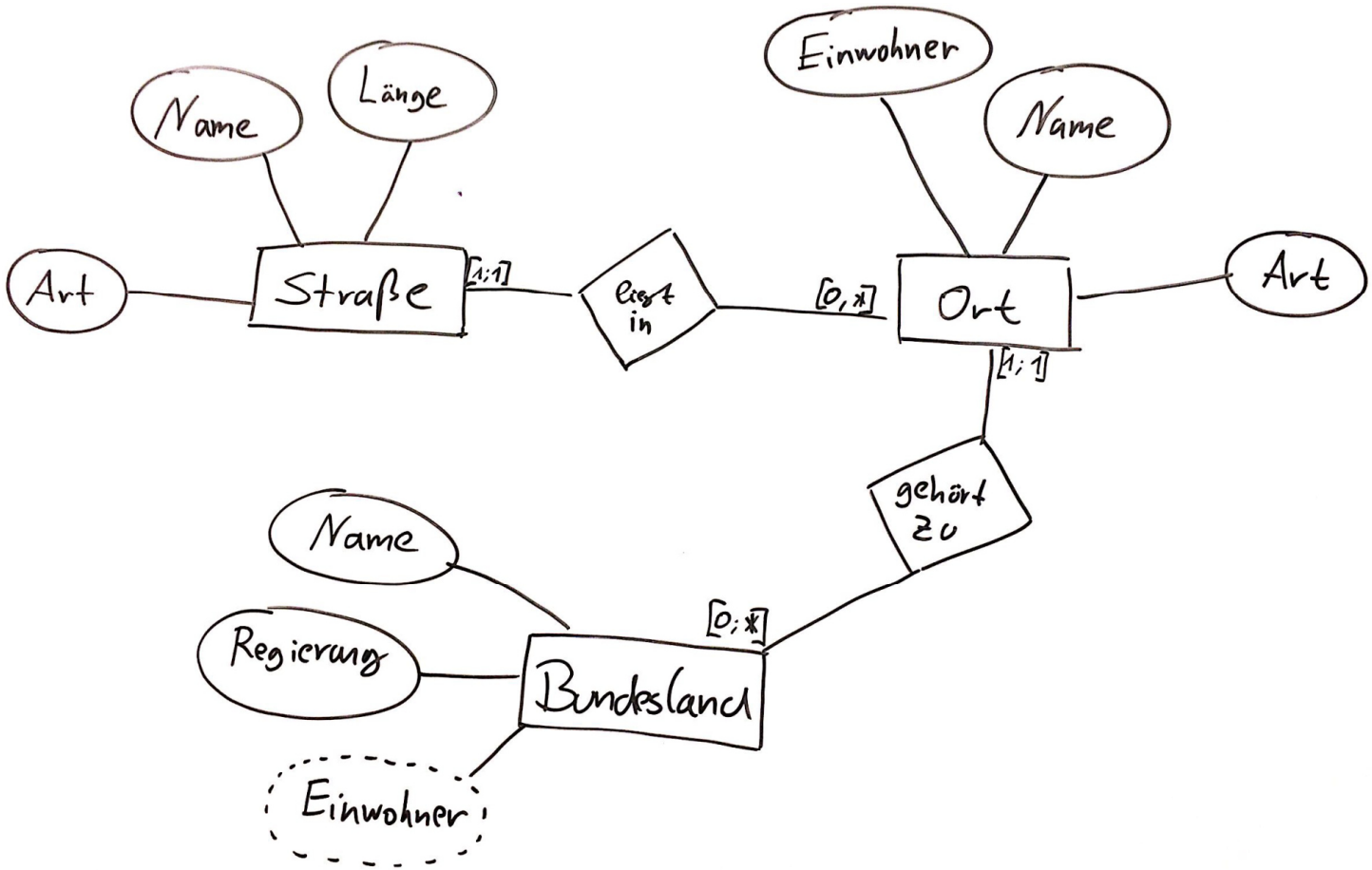
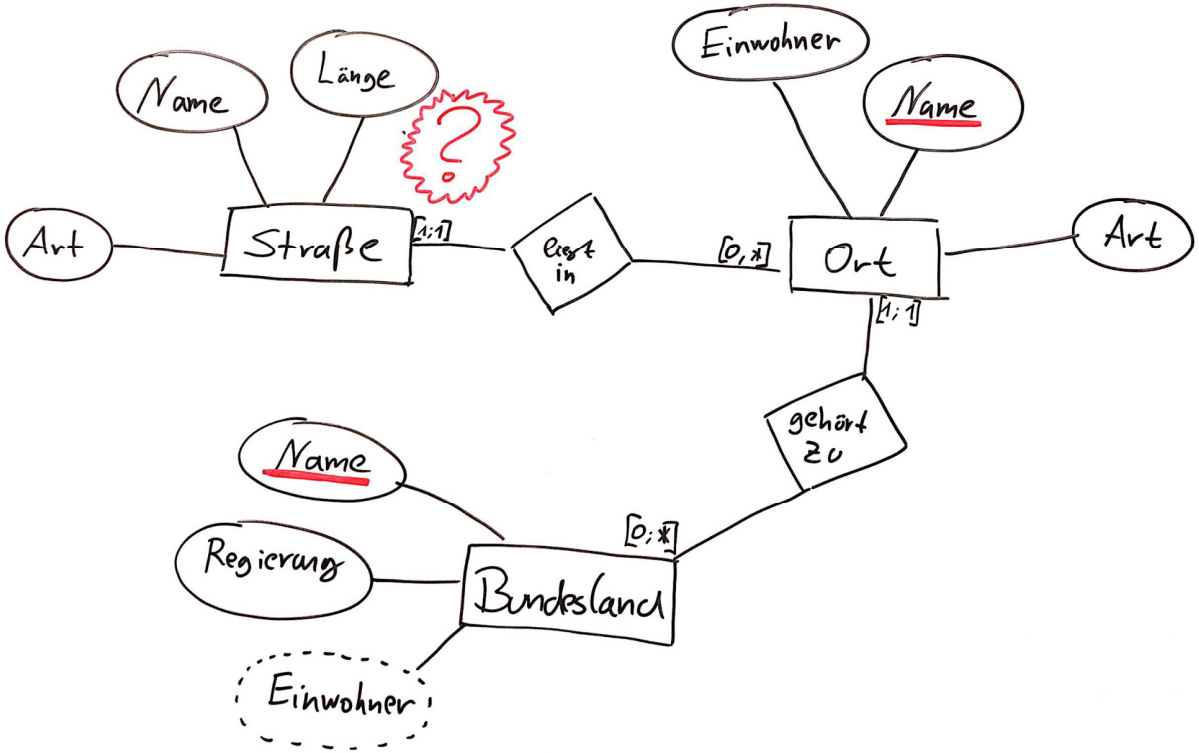
How do we get to weak entities and supporting relationships?

- Step 1: Create the ER diagram as usual.



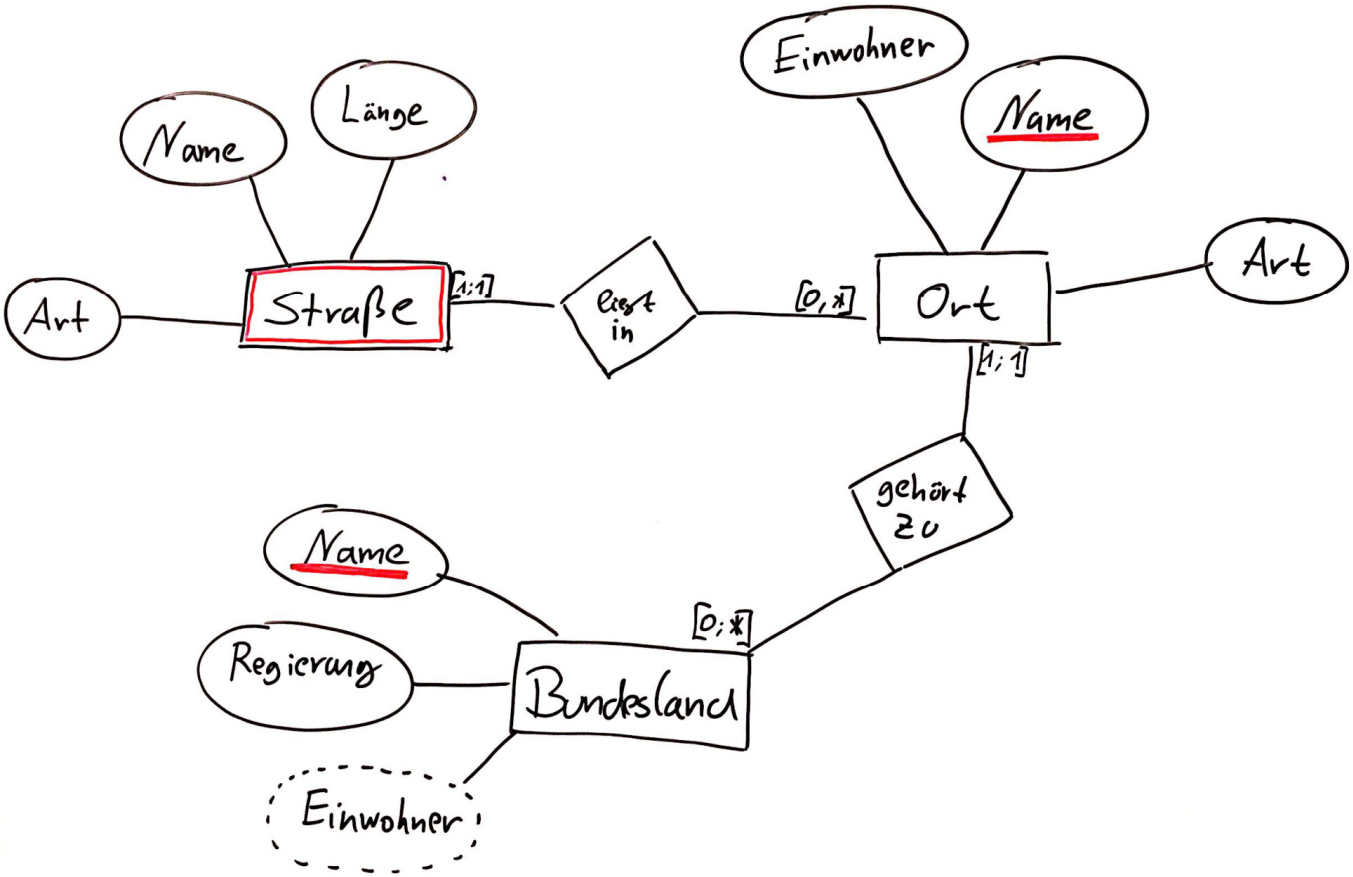
How do we get to weak entities and supporting relationships?

- Step 2: Specify the key attributes by underlining them.
  - In this example, this works well with state, because the name attribute uniquely identifies a state, so it is a key.
  - In the same way, we now initially assume that every place only exists once. Then the name of the place uniquely identifies a place, so it is a key.
  - **That doesn't work for street.** Because the name of a street is not unique. There can be a Hindenburgstrasse in Hamburg, but there can also be one in Munich.



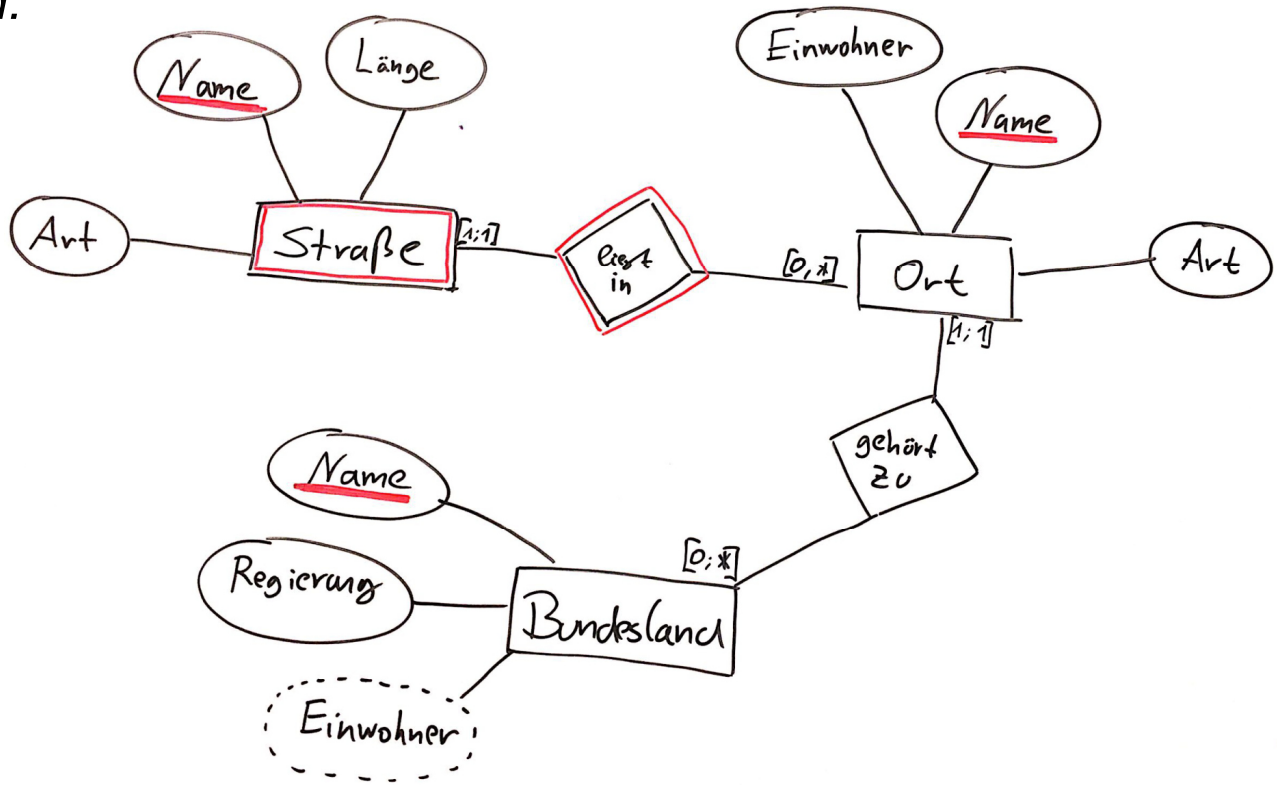
How do we get to weak entities and supporting relationships?

- Step 3: Specify the weak entities.
  - All entities that do not have a key yet are weak.



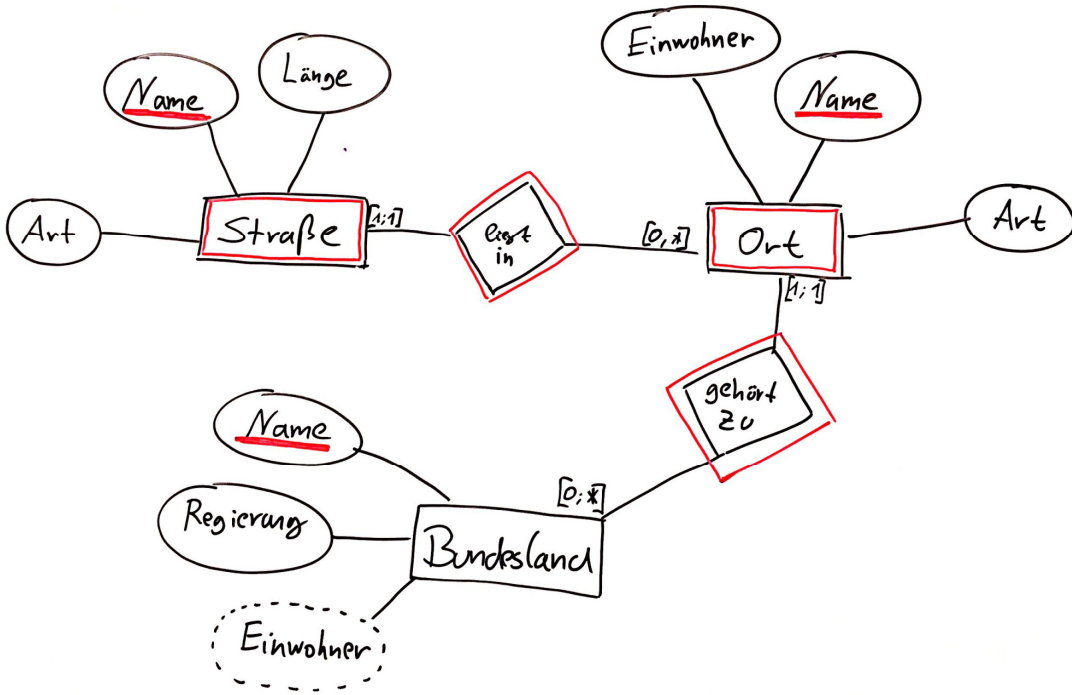
How do we get to weak entities and supporting relationships?

- Step 4: Search for keys via supporting relationships
  - In this case, we assume that a place does not have two streets with the same name. As the place name is unique, the combination of street name and place name is also unique. Through the "located in" supporting relationship, we can determine further key attributes which create a key in combination with the name of the street. *Finished.*



What if...?

- We assume that there may well be two cities with the same name. However, we assume that there are no cities with the same name within one state. Then city name is not a key of place, and place is therefore a weak entity.
- Then "belongs to" is a supporting relationship, and the combination of state name and place name is a key for place.
- In addition, the key of street is the **street name** and all are keys of the supporting relationship, i.e. **place name** and **state name**!

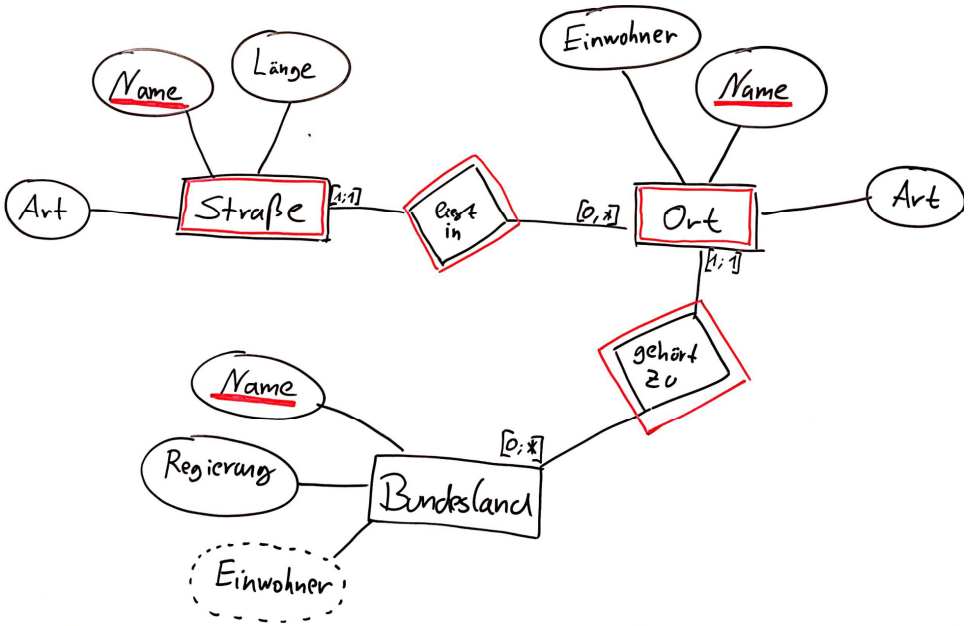


Derivation of relations

- Street is weak, which means
  Street={Name, Length, Type, Place.Name, State.Name}}
  K_{Street}={Name, Place.Name, State.Name}

- Place is weak, which means
  Place={Inhabitants, Name, Type, State.Name}
  K_{Place}={Name, State.Name}

- State as usual
  State={Name, Government}
  K_{State}={Name}

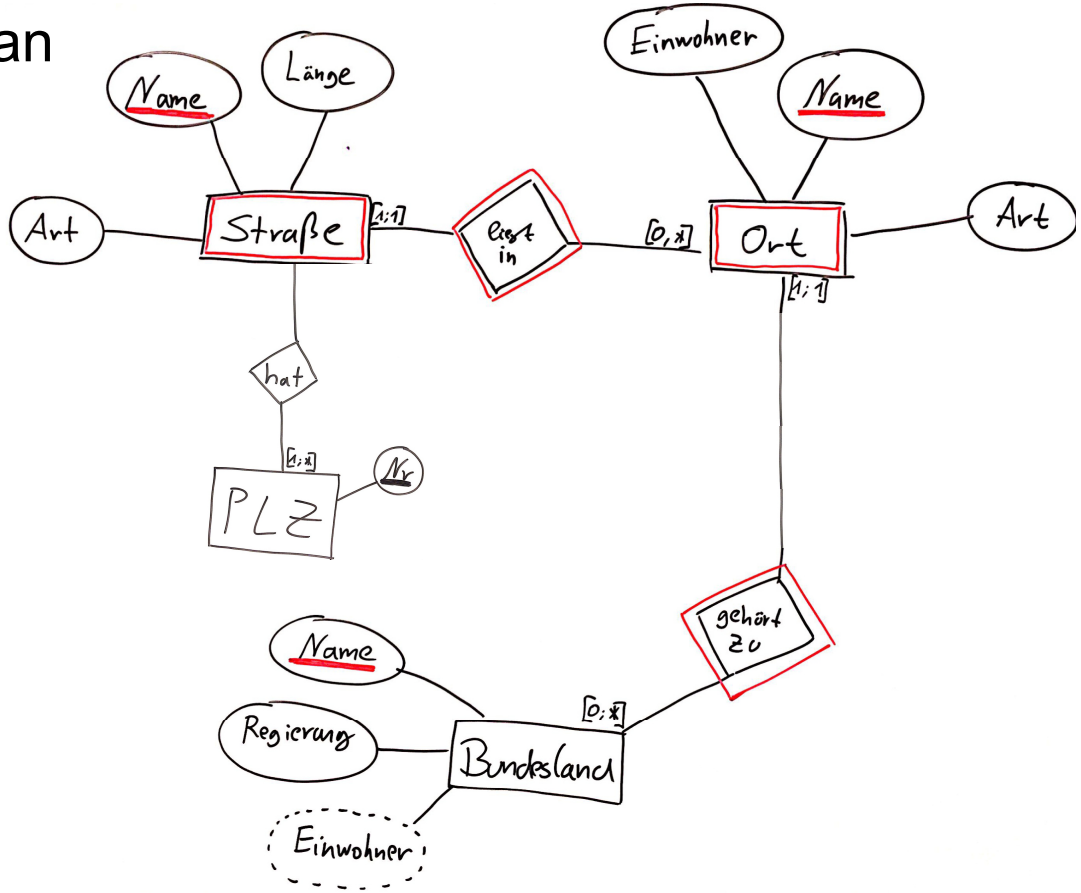


- Thus, the ER diagram alongside is fully mapped.

What if...?

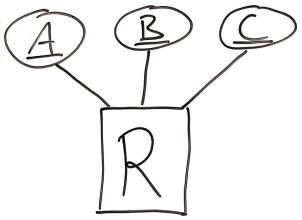
- Why don't we simply include the postcode too?

This doesn’t help: a postcode can span several streets, and at the same time a street can be long enough to have more than one postcode.

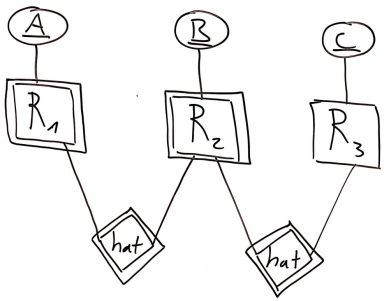


Multiple key attributes can always be distributed via weak entities

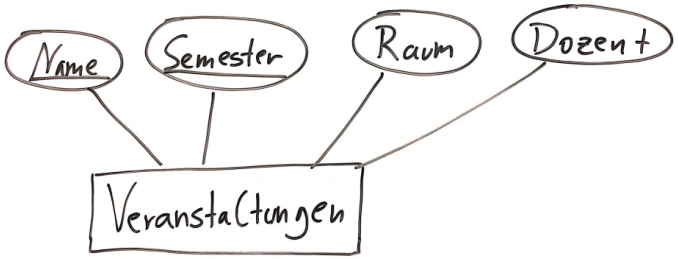
- Suppose we have an entity R with three key attributes A,B,C.

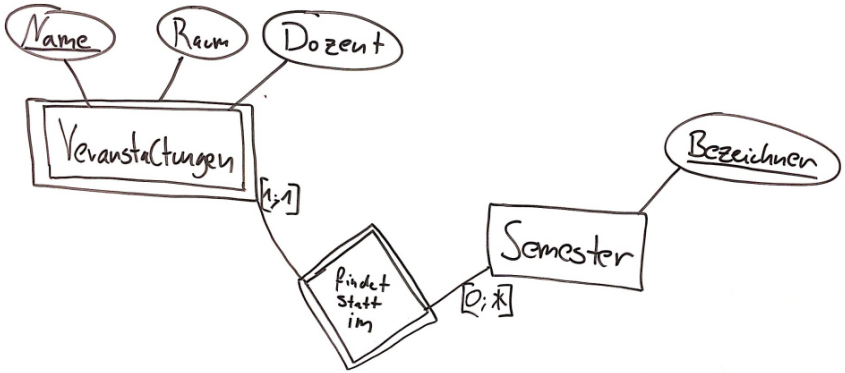


- This entity can also be represented as a weak entity with two supporting relationships



- Example from the exercise. Events had name and semester as their key. We can also model this with a supporting relationship and an additional entity:





Key attributes can also be searched for via multiple supporting relationships

- This means that Student_in_Event has matriculation number, name and semester as its keys (which was also the case in the exercise)
- Student in Event has no key attribute.