

Задание 3

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Задача 1

According to the definition, relation is a set of tuples. Thus, existence of at least 1 key results from the definition of set.

Задача 2

Задача 1

Category: {[Name: string, Super category name: string]}

Book and category relation: {[Category name: string, Book ISBN: integer]}

Book: {[ISBN: integer, Name: string, Publisher name: string, Year: integer, Author: string, Quantity of pages: integer]}

Publisher: {[Name: string, Address: string]}

Copy: {[ID: integer, ISBN: integer, Shelf position: integer]}

Reservation: {[Copy ID: integer, ISBN: integer, Reader ID: integer, Date of return: datetime]}

Reader: {[ID: integer, Surname: string, Name: string, Address: string, Date of birth: datetime]}

In this relation scheme copy is identified by ISBN of its book and by ID, which can be the same for different ISBN-s. Another possible variant: making copy's ID unique independently of its ISBN. In this case, ISBN is no longer a key attribute.

Задача 2.1

Country: {[Name: string]}

City: {[Name: string, Country name: string]}

Street: {[Name: string, City name: string, Country name: string]}

House: {[Number: integer, Street name: string, City name: string, Country name: string]}

Apartment: {[Number: integer, House number: integer, Street name: string, City name: string, Country name: string]}

As for country, everything is clear: it is identified by its name. City cannot be identified by its name only, as cities with the same names exist in different countries (a well-known fact: there are several "Moscow" and "Saint-Petersburg" cities in the USA; nevertheless, in this scheme we suppose that all the cities have unique names within one country). Furthermore, street is identified not only by its name, but also by the city it is located in, while city (as described before) is identified by its own name and its country name, therefore, street is identified by 3 attributes. Moving further and following the same idea, we have to increase the number of key attributes by 1 (giving own name) with every step.

Задача 2.2

Referee: {[ID: integer]}

Team: {[Name: string]}

Match: {[Team 1 name: string, Team 2 name: string, Referee ID: integer]}

In the ER diagram there was no entity "Match", as it was possible to relate team to team with a relation "Many to many". In relation schemes additional entities are used for these purposes, such as "Match" in this task or "Book and category relation" in task 1.

Задача 2.3

Male: {[ID: integer, Father ID: integer, Mother ID: integer]}

Female: {[ID integer, Father ID: integer, Mother ID: integer]}

In the scheme, we suppose that two persons could have the same IDs in case they have different genders.

Задача 3

Entity: {[Name: string]}

Attribute: {[Name: string, Entity name: string, Key or not: boolean]}

Relation: {[Entity 1 name: string, Entity 2 name: string, Name: string, Role: string, Minimum: integer, Maximum: integer]}

In this scheme we suppose that only 1 relation could be placed between 2 entities, therefore, we can identify a relation by its entities. Herewith, it is not obligatory to make name of relation a key attribute.

Задача 3

Задача 1

City: {[Name: string, Region: string]}

Station: {[Name: string, City name: string, City region: string, #Tracks: integer]}

Train: {[TrainNr: integer, Length: double, Start: string, End: string]}

Connected: {[TrainNr: integer, Current station name: string, Current station city name: string, Current station city region: string, Next station name: string, Next station city name: string, Next station city region: string, Arrival: datetime, Departure: datetime]}

Задача 2

Station: {[StatNr: integer, Name: string]}

StationPersonell: {[PersNr: integer, StatNr: integer, #Name: string]}

Caregiver: {[PersNr: integer, Qualification: string]}

Doctor: {[PersNr: integer, Area: string, Rank: string]}

Room: {[RoomNr: integer, StatNr: integer, #Beds: integer]}

Admission: {[RoomNr: integer, PatientNr: integer, from: datetime, to: datetime]}

Patient: {[PatientNr: integer, Name: string, Disease: string, PersNr: integer]}