
OpenCourseWare

Database

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Evaluation test 1 Solution



PROBLEM 1 Refugee host families (1,5 p.)

We want to design a database in order to store information about families who wish to host refugees coming from conflict zones, as well as information about refugees who are seeking host families. The purpose is to serve as an intermediary between families and refugees. The following scenarios are a simplification of the real situation.

Information about the volunteers who wish to provide assistance will be stored (identifier, name, telephone number, street address, postal code, email address and date of birth). Furthermore, we want to include the municipality in which the volunteer lives, as they only live in one single city or town. We will also need to store the languages the volunteers speak. Each language is categorised by an identifier and a name (e.g., the language identified by "001" is named "English").

Each volunteer, who represents a family, can only offer two types of assistance: housing (providing lodging in a host home) or monetary aid. Both types of assistance have an identifier and the date they are registered in the system. For housing assistance, the number of available rooms the home has, the length of time refugees can be provided lodging (1 month, 3 months, 1 year, or the amount of time needed), and the number of family members living in the home must also be included. A volunteer may provide multiple offers of either type of assistance. However, only one offer of assistance is included for each single volunteer entry.

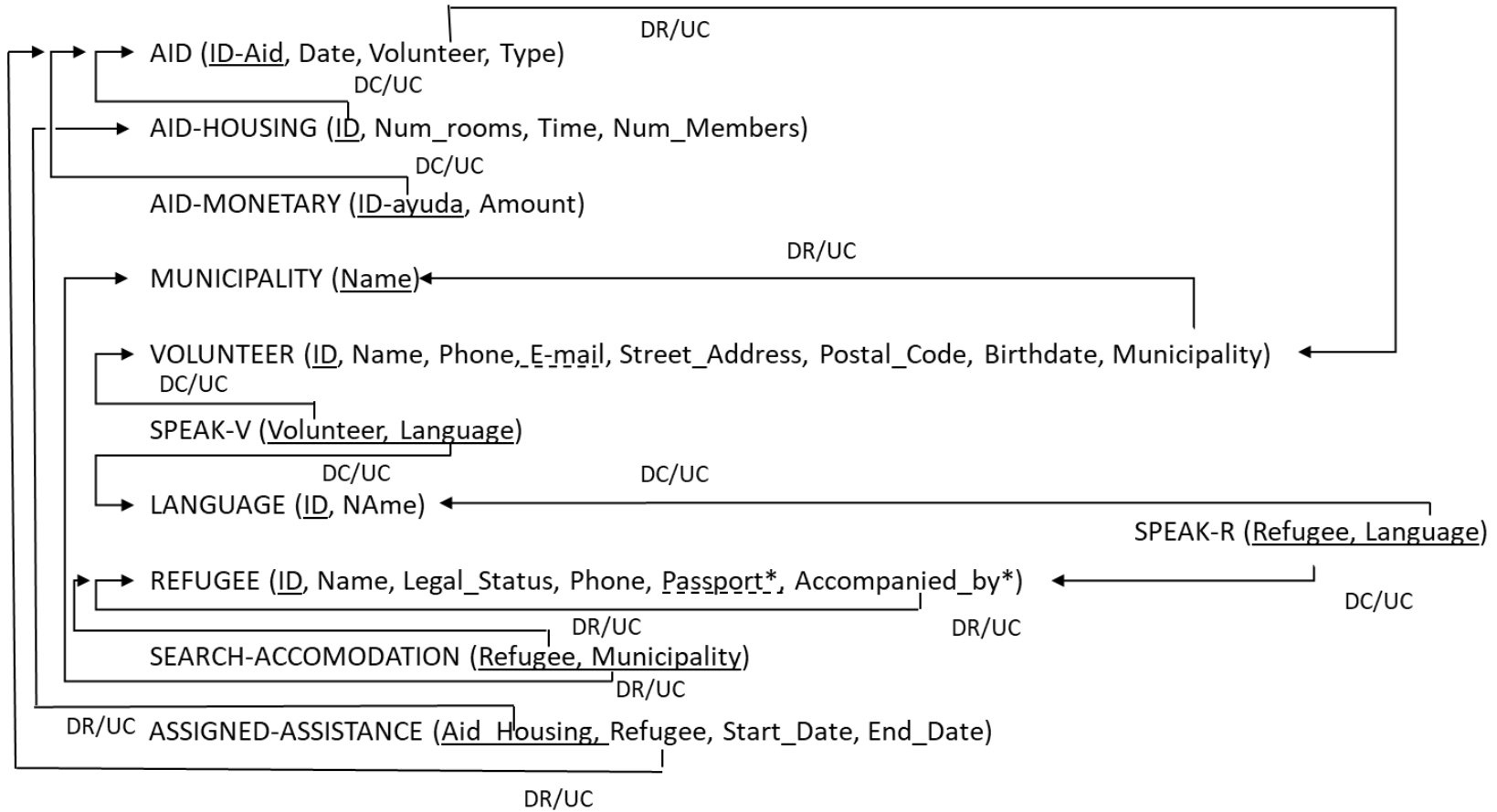
On the other hand, the refugees need to be entered into the database by their name and include a telephone number (optional), a passport number (if available) and their legal status (which may be undocumented, asylum seeker, with a Spanish residence permit, or with a residence permit for another country). Additionally, the languages they speak must also be noted as this will facilitate finding a host family who speaks the same language. Generally speaking, refugees do not arrive alone, so the family members accompanying him or her should also be included in the database. This means one refugee may, or may not, accompany another and one refugee may be accompanied by several other refugees.

When a refugee is registered in the database, the municipalities in which they are seeking lodging are indicated. It is possible that the same refugee may be looking in more than one municipality. When housing aid has been assigned to a refugee, this information, including the length of time to be spent in the host home (start date and end date), must also be entered. A refugee may have received several housing allowances over time. However, each offer for housing aid may only be assigned to a one single refugee.

You must:

- Obtain the relational schema/diagram according to requirements with the primary and alternative keys. Indicate the foreign keys with their delete and update options.
- Write additional semantic assumptions to the statement, if needed
- Write additional semantic assumptions to the scheme, if needed

Solution Proposed:



Semantic assumptions:

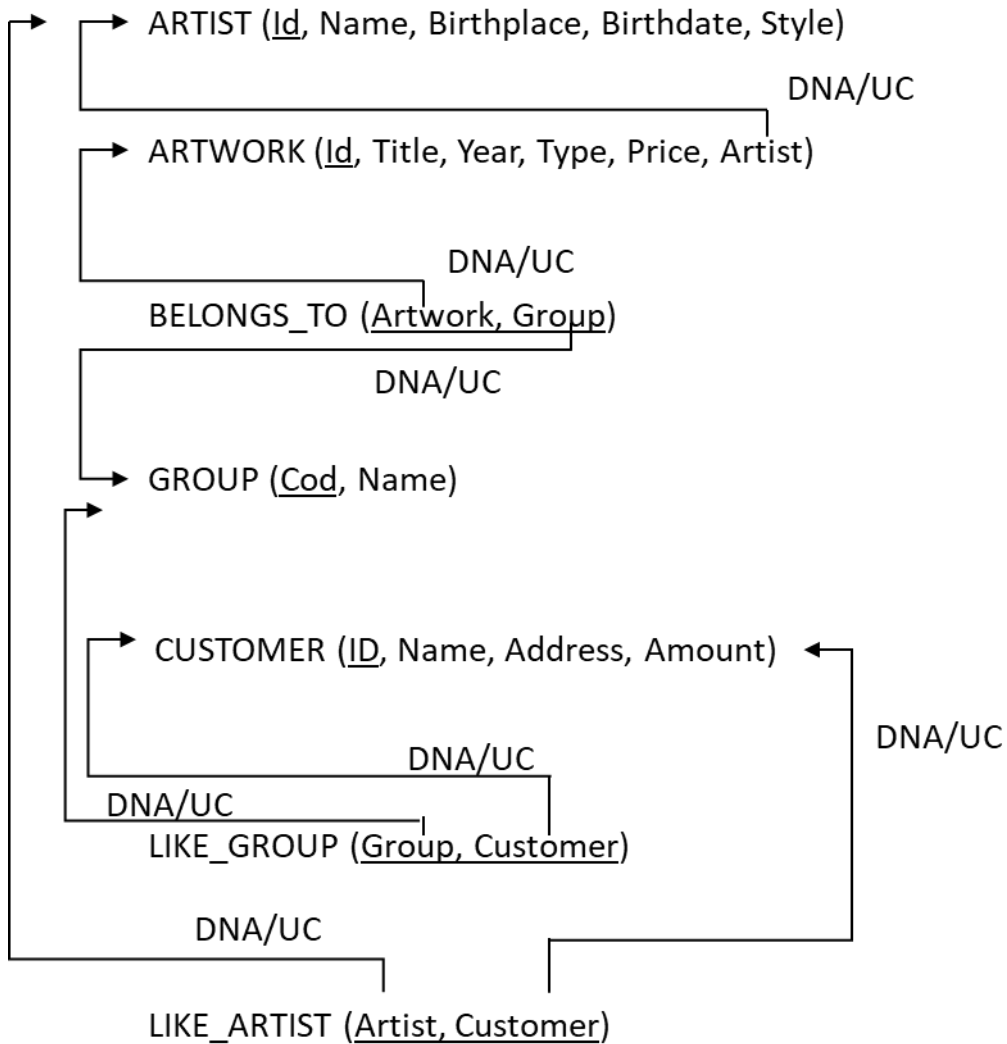
Type= {housing, monetary}

Legal_status={undocumented, asylum_seeker, Spanish_Residence_permit, country_residence_permit}

PROBLEM 2. SQL QUERIES: ART DATABASE (1,5 p.)

The following scheme collects the following semantic assumptions of a database that captures the information about art galleries.

- The database keeps information about artists, an identifier, name, birthplace, birthdate, and style of art (impressionism, modern, etc.)
- The information of a piece of artwork such as the year each piece was made, an identifier, title, the type of art (e.g., painting, lithograph, sculpture, photography) and the price for each piece of artwork must be stored.
- Pieces of artwork are also classified into groups of various kinds, such as, for example, portraits, still life, or works of the 19th century; any given piece may belong to more than one group. Each group is identified by a code and a name that describes the group.
- Finally, the database keeps information about customers. For each customer, the database stores that person's unique name, an identifier, an address, the total amount of dollars spent in the gallery and the artists and groups of art that the customer tends to like.



ARTWORK. Type={painting, lithograph, sculpture, photography}

Following last scheme, make the following queries:

1. Names of artists that produced some artwork between 1990 and 2010.

Sol.

```
SELECT Name
FROM ARTWORK AW, ARTIST AR
WHERE AW.Artist=AR.Id AND Year BETWEEN 1990 AND 2010
```

2. Average age of artists in the group "works of the 19th century"

Sol.

```
SELECT AVG(Sysdate-Birthdate)
FROM ARTIST AR, ARTWORK AW, GROUP G, BELONGS_TO BE
WHERE AR.Id=AW.Artist AND AW.Id=B.Artwork AND B.Group=G.Cod
AND G.Name = ' works of the 19th century '
```

3. Average number of artwork per group.

Sol.

```
SELECT AVG(COUNT(*)) AS "Average artworks per group"
FROM BELONGS_TO
GROUP BY Group
```

4. Number of artists that have produced some artwork of group 'portraits'.

Sol.

```
SELECT COUNT(DISTINCT (AW.Id)) AS "Artists portraits"
FROM GROUP G, ARTWORK AW, BELONGS_TO B
WHERE AW.Id=B.Artwork AND B.Group=G.Cod AND G.Name = 'portrait'
```

5. Names of customers' names and addresses for those customers that like more than one group.

Sol.

```
SELECT Name, Address
FROM CUSTOMER
WHERE ID IN (SELECT Customer
             FROM LIKE_GROUP
             GROUP BY Customer
             HAVING COUNT(*) > 1)
```

PROBLEM 3: NoSQL Document Databases (0,5 p.)

A publishing company has decided to use a NoSQL Document Database to store the contents of their website. The website includes articles, which have a title, a summary (the first paragraph in the article), a body, an author and a set of categories (sports, economy, international, etc.), a publication date.

For the authors, the system stores the name, surname, birthdate and a short bio. One author writes several articles and, sometimes, one article can have more than one author.

Considering that the company uses the contents in the NoSQL Document Database to generate the HTML content for the website, specify (using JSON) the format of the documents that would be stored in the database.

Sol.:

```
//Articles collection
{
  "title": "Title 1",
  "summary": "summary 1",
  "body": "body 1",
  "authors": [{
    "name" : "name 1",
    "surname" : "surname 1",
    "birthdate" : "date 1",
    "short bio" : "short bio 1"
  },
  {
    "name" : "name 2",
    "surname" : "surname 2",
    "birthdate" : "date 2",
    "short bio" : "short bio 2"
  }
],
  "categories": ["tag1", "tag2"],
  "publication_date" : "12/15/2021"
}
```