

Name

CWID

Homework Assignment 3

November 11th, 2014
Due on November 25th, 12:30pm
(noon)

CS425 - Database Organization Results

Please leave this empty!

3.1

3.2

Sum

Instructions

- Try to answer all the questions using what you have learned in class
- Some questions are marked as bonus. You do not have to answer these questions to get full points for the assignment. However, you can get bonus points for these questions!

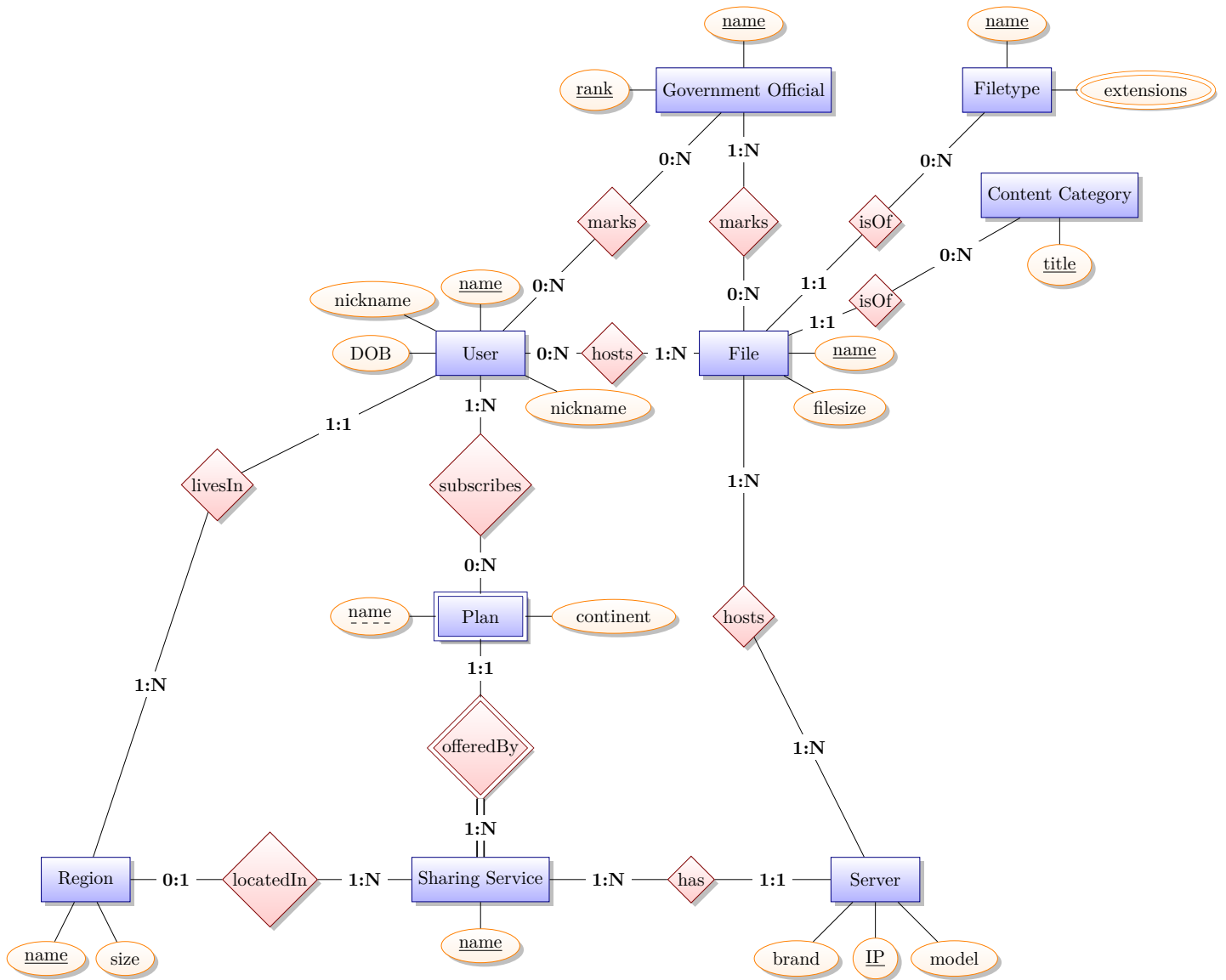
Part 3.1 Modelling (Total: 60 Points)

Question 3.1.1 (60 Points)

Build a conceptual model for file hosting service database. The solution should be presented as an ER-diagram. Base your design on the following requirements.

- The database should record information about users, sharing services, plans, regions, servers, files, file types, content categories, and government officials.
- A region (e.g., USA, south america, europe) has a name and size (in square miles).
- For each user, we want to store the user's name, a nickname, the age, the date of birth, and the user's credit score. We assume that each user can be uniquely identified by his/her name and date of birth.
 - Each user lives in one region.
- Content categories have a unique title.
- Filetypes have a name and one or more associated file extensions. File types are uniquely identified by their name.
 - Each file is of a particular file type and stores a particular type of content (content category).
- Files has a name and a file size.
 - Each file is of a particular file type.
- Government official has a rank and a name. The combination of name and rank uniquely identifies each official.
 - Government officials can mark users and files for copyright infringement (we want to store in the database which files/users have been marked by which official).
- Each hosting service has a name that uniquely identifies the service.
 - Each hosting service is located in one or more regions.
 - Each hosting service has one of more plans.
- A plan belongs to a particular hosting service. A plan has a title, a price, an upload limit, and a download limit. Plans are uniquely identified by their title and the hosting service they belong to.
 - A plan belongs to exactly one hosting service.
 - Users can subscribe to one or more plans.
- A server has an IP, a brand, and a model. The IP uniquely identifies a server.
 - A server belongs to one hosting service.
 - Each server stores one or more files. A file can be stored at multiple servers.

Solution

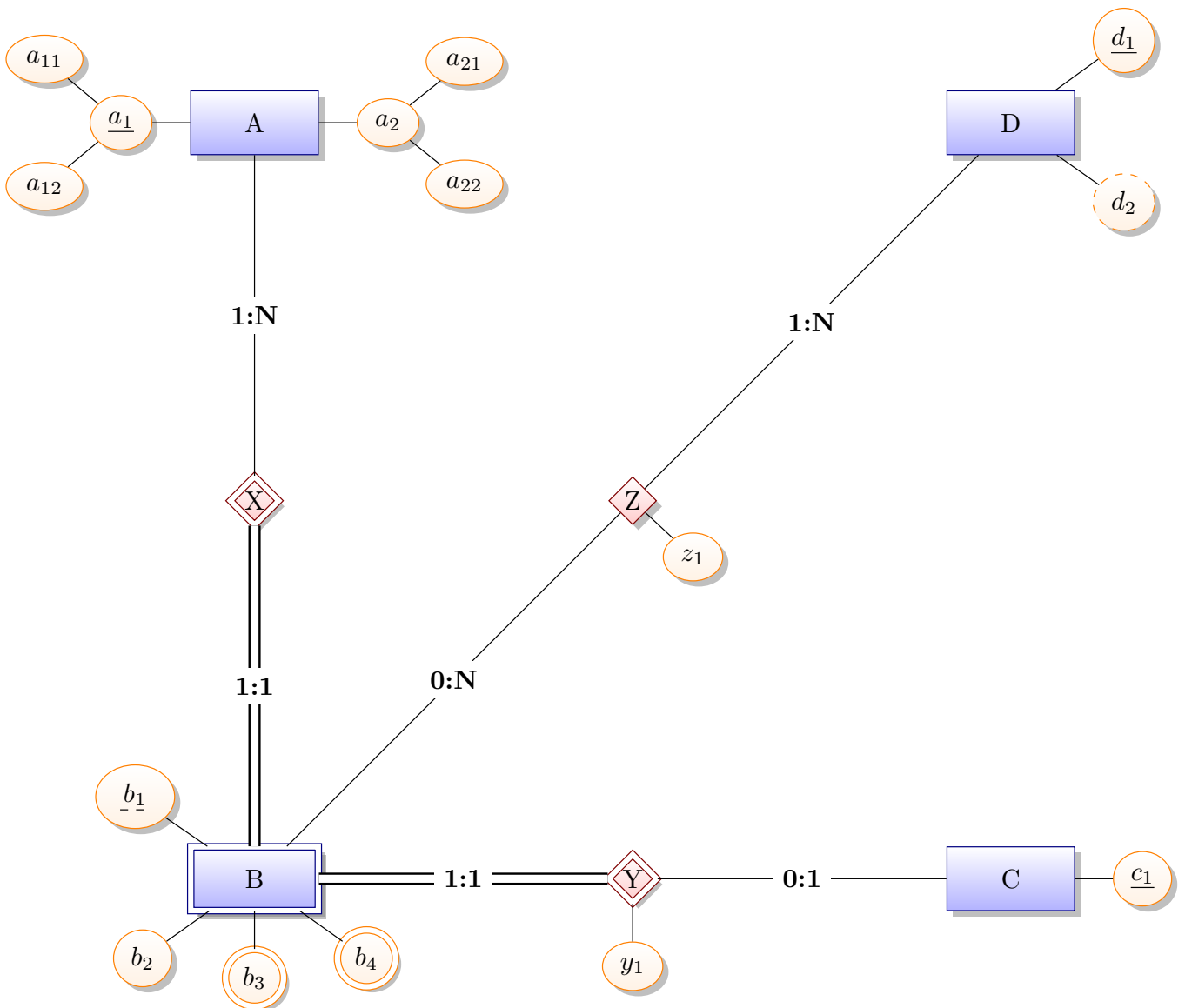


Part 3.2 Translation of ER into Relational Model (Total: 40 + 10 BONUS Points)

Question 3.2.1 (40 Points)

Take the following ER-model and translate it into a relational schema using the rules presented in class. Present the relational schema as an SQL script (assume that all attributes are of data type INT). Present the results of the following intermediate steps in this order:

1. Translate strong entities + unnest composite attributes
2. Translate weak entities
3. Translated multi-valued attributes
4. Translate relationships



Solution

1st Step

```
CREATE TABLE A (  
  a11 INT,  
  a12 INT,  
  a21 INT,  
  a22 INT,  
  PRIMARY KEY (a11, a12)  
);
```

```
CREATE TABLE C (  
  c1 INT PRIMARY KEY  
);
```

```
CREATE TABLE D (  
  d1 INT PRIMARY KEY  
);
```

2nd Step

```
CREATE TABLE A (  
  a11 INT,  
  a12 INT,  
  a21 INT,  
  a22 INT,  
  PRIMARY KEY (a11, a12)  
);  
  
CREATE TABLE B (  
  a11 INT,  
  a12 INT,  
  c1 INT,  
  b1 INT,  
  b2 INT,  
  PRIMARY KEY (a11, a12, c1, b1),  
  FOREIGN KEY a11, a12 REFERENCES a,  
  FOREIGN KEY c1 REFERENCES c  
);  
  
CREATE TABLE C (  
  c1 INT PRIMARY KEY  
);  
  
CREATE TABLE D (  
  d1 INT PRIMARY KEY  
);
```

3rd Step

```
CREATE TABLE A (  
    a11 INT,  
    a12 INT,  
    a21 INT,  
    a22 INT,  
    PRIMARY KEY (a11, a12)  
);
```

```
CREATE TABLE B (  
    a11 INT,  
    a12 INT,  
    c1 INT,  
    b1 INT,  
    b2 INT,  
    PRIMARY KEY (a11, a12, c1, b1)  
    FOREIGN KEY (a11, a12) REFERENCES a,  
    FOREIGN KEY (c1) REFERENCES c  
);
```

```
CREATE TABLE B3 (  
    a11 INT,  
    a12 INT,  
    c1 INT,  
    b1 INT,  
    b3 INT,  
    FOREIGN KEY (a11, a12, c1, b1) REFERENCES b,  
    PRIMARY KEY (a11, a12, c1, b1, b3)  
);
```

```
CREATE TABLE B4 (  
    a11 INT,  
    a12 INT,  
    c1 INT,  
    b1 INT,  
    b3 INT,  
    FOREIGN KEY (a11, a12, c1, b1) REFERENCES b,  
    PRIMARY KEY (a11, a12, c1, b1, b4)  
);
```

```
CREATE TABLE C (  
    c1 INT PRIMARY KEY  
);
```

```
CREATE TABLE D (  
    d1 INT PRIMARY KEY  
);
```


4th Step

```
CREATE TABLE A (  
  a11 INT,  
  a12 INT,  
  a21 INT,  
  a22 INT,  
  PRIMARY KEY (a11, a12)  
);
```

```
CREATE TABLE B (  
  a11 INT,  
  a12 INT,  
  c1 INT,  
  b1 INT,  
  b2 INT,  
  PRIMARY KEY (a11, a12, c1, b1)  
  FOREIGN KEY (a11, a12) REFERENCES a,  
  FOREIGN KEY (c1) REFERENCES c  
);
```

```
CREATE TABLE B3 (  
  a11 INT,  
  a12 INT,  
  c1 INT,  
  b1 INT,  
  b3 INT,  
  y1 INT,  
  FOREIGN KEY (a11, a12, c1, b1) REFERENCES b,  
  PRIMARY KEY (a11, a12, c1, b1, b3)  
);
```

```
CREATE TABLE B4 (  
  a11 INT,  
  a12 INT,  
  c1 INT,  
  b1 INT,  
  b3 INT,  
  FOREIGN KEY (a11, a12, c1, b1) REFERENCES b,  
  PRIMARY KEY (a11, a12, c1, b1, b4)  
);
```

```
CREATE TABLE C (  
  c1 INT PRIMARY KEY  
);
```

```
CREATE TABLE D (  
  d1 INT PRIMARY KEY  
);
```

```
CREATE TABLE Z (  
  a11 INT,  
  a12 INT,  
  c1 INT,  
  b1 INT,
```

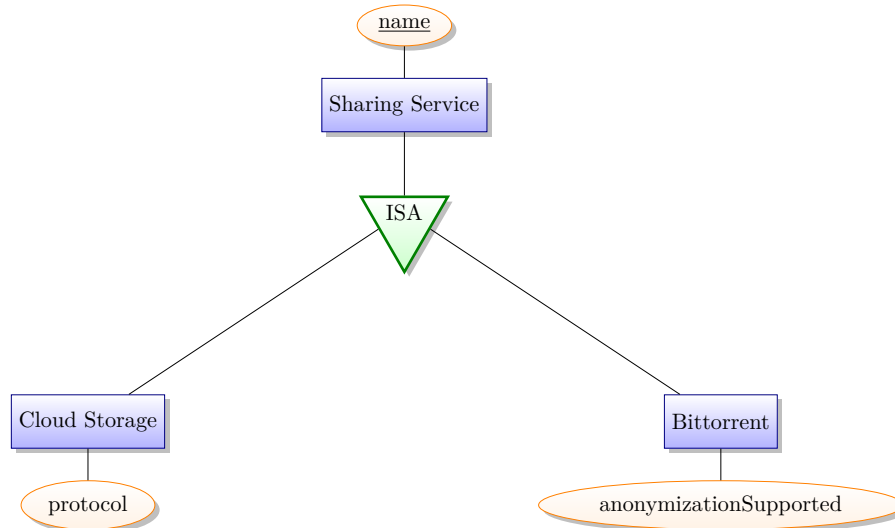
```
d1 INT ,  
PRIMARY KEY (a11 , a12 , c1 , b1 , d1) ,  
FOREIGN KEY (a11 , a12 , c1 , b1) REFERENCES b ,  
FOREIGN KEY (d1) REFERENCES d  
);
```


Question 3.2.2 (10 (BONUS) Points)

Consider that file sharing services can be of two types: cloud storage and bit torrent. For cloud services we store the file protocol and for bit torrent sharing services we store whether they support anonymization. Every sharing service is either a cloud storage service or a bit torrent service. Some sharing service may be both.

Show the affected part of the ER model and show all possible ways of translating the affected part of the ER-model into a relational schema (show SQL code).

Solution



Method 1:

```
CREATE TABLE sharingService (
    name VARCHAR(20),
    PRIMARY KEY (service),
);
```

```
CREATE TABLE cloudStorage (
    name VARCHAR(20) PRIMARY KEY REFERENCES sharingService ,
    fileProt VARCHAR(20)
);
```

```
CREATE TABLE bittorrentService (
    name VARCHAR(20) PRIMARY KEY REFERENCES sharingService ,
    supportsAnon CHAR(1)
);
```

Method 2:

Is the same since “sharingService” has only primary key attributes.

```
CREATE TABLE sharingService (
    name VARCHAR(20),
    PRIMARY KEY (service),
);
```

```
CREATE TABLE cloudStorage (
    name VARCHAR(20) PRIMARY KEY REFERENCES sharingService ,
    fileProt VARCHAR(20)
);
```

```
CREATE TABLE bittorrentService (  
    name VARCHAR(20) PRIMARY KEY REFERENCES sharingService ,  
    supportsAnon CHAR(1)  
);
```

Method 3:

```
CREATE TABLE sharingService (  
    name VARCHAR(20) PRIMARY KEY ,  
    isCloud CHAR(1),  
    isBittorrent CHAR(1),  
    fileProt VARCHAR(20),  
    supportsAnon CHAR(1)  
);
```