

CS348: Introduction to Database Systems (S'17)

Assignment 2 (due by 5pm on Friday, June 23rd, 2017)

1 Overview

You are to use your accounts and DB2 to implement the **BIBsearch** system. **BIBsearch** consists of two application programs with simple command line interfaces. The requirements for the programs are given in the following sections. A specification of the underlying schema for the database is also given and includes a schema diagram that indicates primary and foreign key constraints. Note that all projects must use this schema. Either C or C++ must be used together with SQL and the static embedded SQL protocol to implement **BIBsearch**. NOTE: As an aid to reducing the scope of the assignment, you are free to assume that none of the application programs is required to check for possible errors in input.

2 Applications Programs

2.1 Program bibauthorsummary

This application is to print a list of summary publication records for each author with a name supplied as a string argument on the command line.

For each such author with the given name, the summary should contain pairs $(m : n)$ whenever the author has written m publications with exactly n coauthors ($n = 0$ means that the author is a sole author of a publication and we only seek answers in which $m > 0$). For example, the output

```
John Doe (aid=1)
(5:0)
(3:2)
(1:3)
```

says that the author named *John Doe* with author id 1 has written 5 publications alone, 3 publications with two other people (not necessarily the same), and 1 publication with

3 others. Note also, that this author has no publications coauthored with one additional author and thus there are no pairs of the form $(0 : 1)$, $(0 : 4)$, etc.

Solutions should maximize the use of static embedded SQL.

2.2 Program `bibmaint`

This application inserts new publications into the database or modifies existing publications already in the database. The input is given to the application as a list of insertion or update requests on the standard input in the following format (depending on the publication type):

```
author(aid#name)
authorurl(aid#url)
book(pubid#title#aid1;...;aidk#publisher#year)
journal(pubid#title#volume#number#year)
proceedings(pubid#title#year)
article(pubid#title#aid1;...;aidk#appearsin#startpage#endpage)
```

An update request is distinguished from an input request when the primary key values for the respective table already occur in the table. Note that, in the case of an update request for articles or books, the new list of authors completely replaces the old list of authors.

Sample input data for an execution of `bibmaint` is as follows:

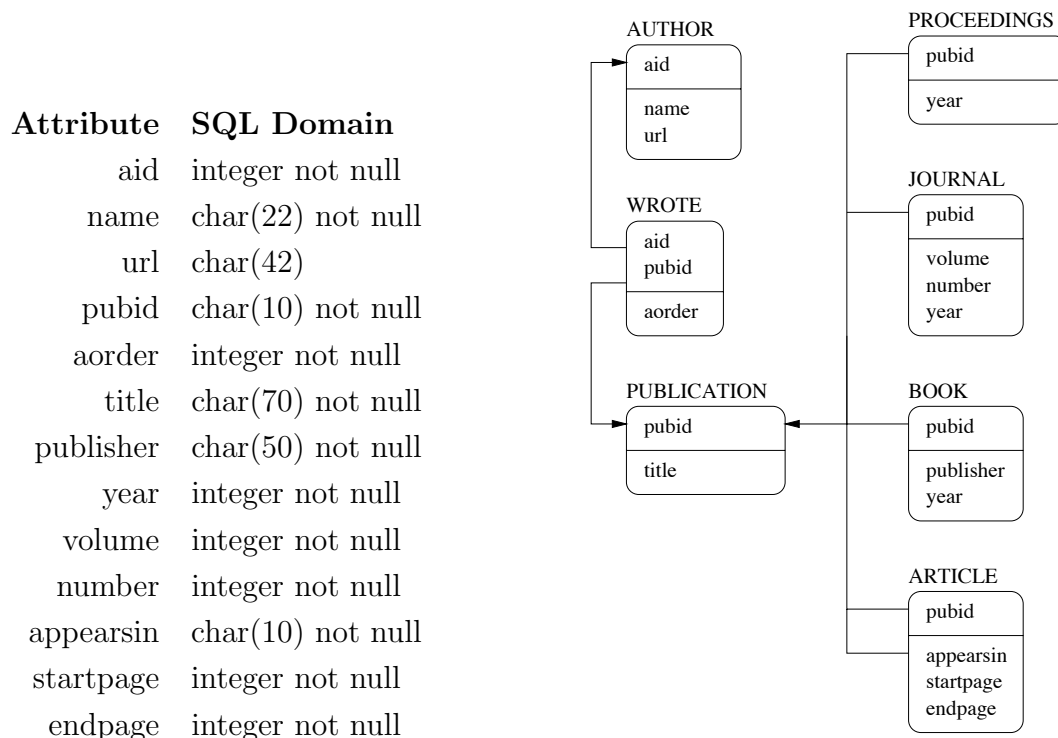
```
proceedings(SIGMOD02#Proc. ACM SIGMOD Conf. on the Management of Data#2002)
author(1#Peter Bumbulis)
author(2#Ivan T. Bowman)
authorurl(2#http://db.uwaterloo.ca/itbowman)
article(BB02#A Compact B-Tree#1;2#SIGMOD02#533#541)
```

You can assume that all string constants in the input will not contain any of the characters “#”, “;”, “(” or “)”. (HINT: read “`man strtok(3)`” for a way to help with parsing input commands.)

When an modification request fails (e.g., due to violation of integrity constraints), the application should report reasons why the particular request failed.

3 Database Schema

(attribute domains and class diagram)



(additional constraints)

There are a number of additional constraints that are always satisfied by a given bibliography. (Your programs may assume these constraints are always true, including `bibmaint`.) Then each of the following conditions is always true:

- Every publication is exactly one of *book*, *journal*, *proceedings*, and *article*.
- Every *article* must appear in a *journal* or a *proceedings*.

Your program is responsible for maintaining these constraints.

4 Assignment Submission

A submission of the following items should be made:

1. Source listings of each of the two or three application programs comprising **BIB-search**. These should be submitted online in two files with names `bibauthorsummary.sqc` and `bibmaint.sqc`.
2. A shell script named `compile` should be submitted online. Typing “`./compile`” should suffice to compile all the application programs (this may be patterned after the `Makefile` available on the course web page).