

CS 348: Introduction to Database Systems

(Spring 2018)

Assignment 3 (due 5pm on Tuesday, July 3rd)

1 Overview

You are to use your accounts and DB2 to implement the **BIBsearch** system. **BIBsearch** consists of two or three 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 submissions must use this schema. Either C or C++ must be used together with SQL and the static embedded SQL protocol to implement **BIBsearch**.

2 Applications Programs

2.1 Program `bibauthor`

This application is to print a list of publication records for each publication by an author with a name supplied as a string argument on the command line. In the case of articles, the publication identified by the `pubid` for the publication in which the article appears should be added to the list of requested publications so that a record for this publication is also printed. Note that a record for any publication should appear at most once in the output. Also, the publication information records should be printed to standard output.

The publications should appear according to a major sort on the year of the publication (latest first) and a minor sort on the name of the *first* author for the publication. In the case of publications without an author, the name of the first author should be assumed to be the zero-length string for sorting purposes.

The output format for each publication record is as follows.

```
Pubid:  pubid
Type:   { book | journal | proceedings | article }
Title:  title
```

In addition, for each particular type of publication, the following information should also be printed.

- For books:

```
Authors:  author1, ..., authork
Publisher: publisher
Year:     year
```

- For journals:

```
Volume:   volume
Number:   number
Year:     year
```

- For proceedings:

```
Year:     year
```

- For articles:

Authors: $\text{author}_1, \dots, \text{author}_k$
 In: appearsin
 Pages: startpage--endpage

2.2 Program `bibcontent` (for extra 20% credit)

This application is to print a list of publication records for each article appearing in a proceedings or journal identified by a `pubid` supplied as a string argument on the command line. The articles should appear according to a major sort on their starting page numbers, and should be printed with an output format matching that of `bibauthor`.

2.3 Program `bibmaint`

This application inserts new publications into the database. The input is given to the application as a list of insertion 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)
```

NOTE: You can assume that insertions requested are originating from a reliable source, and that there is therefore no need to check for any errors in the input, e.g., such as checking if a `pubid` already exists.

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

```
proceedings(SIGMOD02#Proc. ACM SIGMOD Conference 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)
```

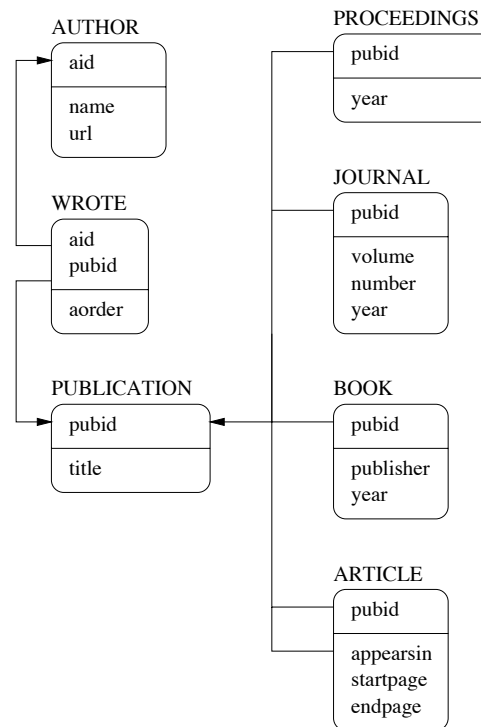
You can assume that all string constants in the input will not contain any of the characters “#”, “;”, “(” or “)”. (HINT: read “`man strtok(3)`” for a way to help with parsing input commands.)

When an insertion succeeds for publications, the application must print out the newly inserted data in the same format used in the reporting applications. Again, note that you are free to assume error checking of input data is unnecessary.

3 Database Schema

(attribute domains and class diagram)

Attribute	SQL Domain
aid	integer not null
name	char(22) not null
url	char(42)
pubid	char(10) not null
aorder	integer not null
title	char(70) not null
publisher	char(50) not null
year	integer not null
volume	integer not null
number	integer not null
appearsin	char(10) not null
startpage	integer not null
endpage	integer not null



(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`.) Let Pu , B , J , Pr and A denote the set of values for attribute “pubid” in tables PUBLICATION, BOOK, JOURNAL, PROCEEDINGS and ARTICLE, respectively, and let In denote the set of values for attribute “appearsin” in table ARTICLE. Then each of the following conditions is always true:

- $Pu \subseteq (B \cup J \cup Pr \cup A)$;
- $In \subseteq (J \cup Pr)$; and
- $|Pu| = (|B| + |J| + |Pr| + |A|)$,

where $|x|$ denotes a count of the number of elements in x . The last constraint ensures, for example, that B and J are disjoint. Finally, note that “pubid” values occurring in table WROTE will always refer to publications that are either books or articles.

4 Assignment Submission

A submission of the following items should be made by the assignment due date:

1. Source listings of each of the two or three application programs comprising **BIBsearch**. These should be submitted online in two or three files with names beginning with `bibauthor`, `bibmaint` and optionally `bibcontent`, with each ending with the appropriate suffix (i.e., `*.sqc`).
2. A shell script named `compile`. Typing “`./compile`” should suffice to compile all submitted application programs.
3. A short design document that outlines the design of your **BIBsearch** system consisting of just one page. The purpose of this document is to assist graders in understanding how your system is implemented.