

CS 348
Introduction to Database Management
Assignment 3

Due: 13 November 2012 9:00AM
Returned: 20 November 2012
Appeal deadline: One week after return
Lead TA: Güneş Aluç

1 Overview

You are to use your accounts and DB2 to implement the BIBsearch system. BIBsearch consists of three application programs with simple command line interfaces. The requirements for three programs are given in the following sections. A specification of the underlying schema for the database is also included and includes a schema diagram that indicates primary and foreign key constraints. Note that all projects must use this schema.

The projects themselves can be done by an individual alone or as part of a team consisting of two students. One of the programs is marked for only teams – you should not tackle this as an individual (unless you have time). If you work alone, you need to write two applications (`bibauthor` and `bibmaint`); teams have to write all three applications. Either C or C++ must be used together with **static** embedded SQL to implement BIBsearch.

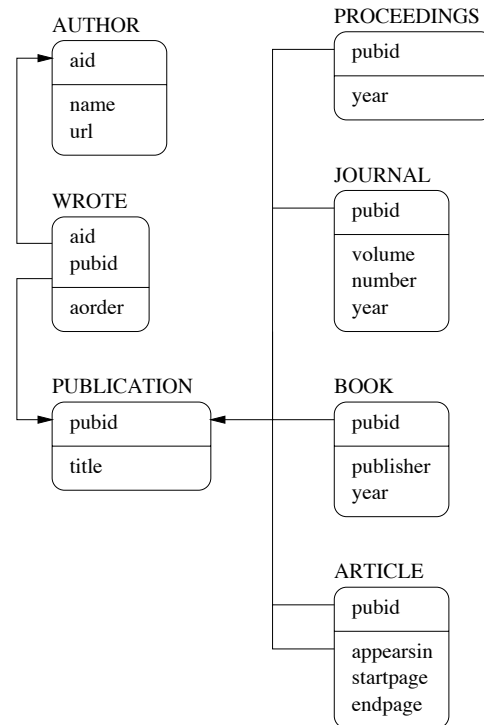
Important notes:

1. The objective of the assignment is to get you to practice writing embedded SQL applications. Therefore, whenever you need a function that is available in SQL, you are expected to use that rather than writing a C program to accomplish the same effect. For example, if you need the output in a particular order, use `ORDER BY` in the SQL statement rather than writing a sort routine in C. Another example is that you should use cursors rather than dumping the SQL output to a C array and manipulating that. Doing stuff in C when there are SQL equivalents is not acceptable.
2. 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.
3. To ensure that everyone starts with the same schema, the DDL statements to create the database is given as a separate file on the web site.

2 Database Schema

2.1 Attribute domains and schema 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



2.2 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:

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

3 Application Programs

3.1 Program bibauthor (by individuals and teams)

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. The publications should appear according to a major ascending sort on the name of the *first* author for the publication and a minor (earliest first) sort on the year of publication. The output format for each publication record is as follows.

```
Pubid: pubid
Type: {book | journal | proceedings | article}
Authors: author-1, ... , author-k
Title: title
```

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

- For books:

```
Publisher: publisher
Year: year
```

- For journals:

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

- For proceedings:

```
Year: year
```

- For articles:

```
In: appearsin
Pages: startpage–endpage
```

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. The year of an article is the same as that of the publication (book, journal etc.) that it appears in. 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.

3.2 Program bibcontent (by teams only)

This application is to print a list of publication records for each article appearing in a proceedings, journal or book 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` above.

3.3 Program bibmaint (by individuals and teams)

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#aid-11;...; aid-k#publisher#year)
journal(pubid#title#volume#number#year)
proceedings(pubid#title#year)
article(pubid#title#aid-11;...; aid-k#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. Sample input data for an execution of `bibmaint` is as follows:

```
proceedings(SIGMOD05#Proc. ACM SIGMOD Conference on the Management
of Data#2005)
author(1#Lukasz Golab)
author(2#M. Tamer Ozsu)
authorurl(1#http://www.engineering.uwaterloo.ca/ lgolab/)
authorurl(2#http://cs.uwaterloo.ca/tozsu)
article(BB02#Update-pattern-aware modeling and processing of continuous
queries#1;2#SIGMOD05#658#669)
```

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 or modification succeeds, the application must print out the newly inserted or updated data in the same format used in the reporting applications. Also, recall that you are free to assume that error checking of input data is unnecessary.

Note that you do not need to verify if the constraints the schema (see next section) are satisfied after modifications are made to the database, e.g., , when a new article is inserted, you can assume that the `pubid` that corresponds to the `appearsin` already exists in the database.

4 Assignment Submission

A submission of the following items should be made by only one user ID in the case of teams.

1. Source listings of each of the two application programs comprising **bibsearch**. These should be submitted online in three files with names **bibauthor.sqc**, **bibcontent.sqc** and **bibmaint.sqc**.
2. A shell script named **compile** should be submitted online. Typing “./**compile**” should suffice to compile all three application programs.
3. A short design document that outlines the design of your **BIBsearch** system consisting of no more than 2 pages. For teams, the document must include an extra page that outlines the division of tasks among the two team members as well as the user ID used for the electronic submission.

This document should be either in plain text format (with .txt extension) or in PDF format (.pdf extension) and submitted online along with the other files mentioned above.