

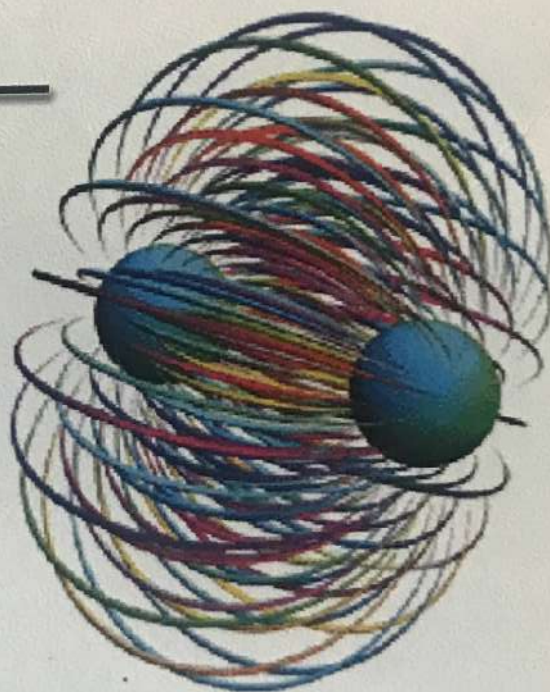
**PROCEEDINGS OF THE 30-th JUBILEE INTERNATIONAL CONFERENCE
APPLICATIONS OF MATHEMATICS IN ENGINEERING AND ECONOMICS**

Dedicated to the memory of Georgi Delchev Bradistilov



Organized by the Faculty of Applied Mathematics and Informatics
Technical University of Sofia

- AMEE'04 -



EDITORS:

MARIN MARINOV and GEORGI VENKOV



APPLICATIONS OF MATHEMATICS IN ENGINEERING AND ECONOMICS

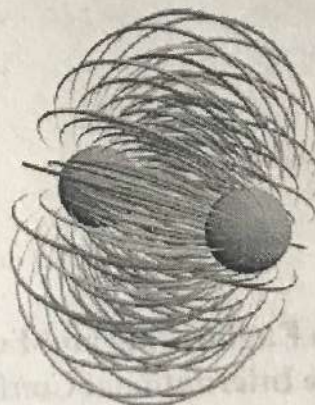
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PREFACE

The present volume of proceedings consists of the papers which were presented in the 30th Jubilee International Conference Application of Mathematics in Engineering and Economics, held in Sozopol, Bulgaria, on 7–11 June, 2004. The conference is organized every year by the Faculty of Applied Mathematics and Informatics, Technical University of Sofia.

The 30th Jubilee Conference was dedicated to the memory of Georgi Bradistilov on occasion of his birthday centenary. Professor Georgi Bradistilov (12.10.1904–18.17.1977) is known around the world for his famous and pioneering works in the fields of Nonlinear Partial Differential Equations, Nonlinear Oscillations and Stability, Electrostatic Potential Theory and their applications in Mechanics and Engineering.

The aim of the conference is to bring together senior scientists and young researchers from all the fields of applied mathematics who discuss recent achievements and future work. Thus, the conference provides with a perfect ground for cultivation of new ideas and the development of new initiatives in the fields of interest. Moreover, the participation of young researchers is especially encouraged. The papers are presented in five sections, which cover the subjects Algebra and Geometry, Differential Equations, Numerical Methods and Mathematical Modeling, Mathematical Statistics and Computer Science and Simulations.

All participants have submitted their papers prior to the conference, those are reviewed and finally the papers are delivered to be included in this volume. We thank the authors for their efforts to meet our manuscript deadlines and also thank our colleague Assistant Professor Yana Stoyanova, who put the volume together, compiled the contents and index and made all the necessary technical corrections.

26.02.2005

Marin Marinov and George Venkov

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Web based bibliographic information system

K. Peeva, J. Kiosev and Zl. Zahariev

ABSTRACT. The purpose of web bibliography is to publish and support bibliographic databases on the internet. The system provides the administrator (or the author) means of quick and easy updating the database. The administrator can also edit the publications or delete them if it is necessary. It is possible for the users to fill in the database. To the assistance of the users and the administrator of the bibliography are the possibilities to search, sort, export certain titles (or the whole bibliography) in widely used BibTex format or in plain text, as well as the easy navigation. The system is designed in such a way that it is easy to develop modules to support other formats. The addition of new information can be done by giving BibTex file directly, which provides a possibility of future support of other formats. The administrator can control the titles added by the users. The system is applied for web bibliography on Fuzzy Machines and Fuzzy Relational Calculus. There have been more than 430 titles in the system till now.

Introduction

Publishing bibliographies on the World Wide Web is interesting for both users and editors. These are bibliographic references of literature sources, collected by research teams in a certain field or bibliographic records of the books and monographs issued by the publishers. Covering these two aspects provides twofold benefits – on one side for the Internet users for fast finding of useful and interesting information and on the other side – for the publishers.

The BibTex format

Bibtex format is one of the most common formats for managing bibliographic databases on the Internet. It was created by Oren Patashnik and Leslie Lamport in 1985 [6], [7]. The format is character based, so it can be used by any program. There are plenty of programs which support this format and provide an easier way to work with it. Some systems to publish BibTex files on the Internet are also developed [9], [10], [11], [12].

The BibTex format almost always has the following structure:

```
@entry_type{primary-key,  
field1={value1},  
field2={value2},  
field3={value3},  
...  
}
```

Standard entry types:

@article, @book, @booklet, @conference, @inbook, @incollection, @inproceedings, @manual,
@mastersthesis, @misc, @phdthesis, @proceedings, @techreport, @unpublished.

Other entry types:

Key words and phrases. bibliography, web, BibTex, internet, PHP, MySQL, databases, HTML, fuzzy machines, fuzzy relational calculus.

@collection, @patent.

Standard fields:

address, annotate, author, booktitle, chapter, crossref, edition, editor, howpublished, institution, journal, key, month, note, number, organization, pages, publisher, school, series, title, type, volume, year.

Other fields:

affiliation, abstract, contents, copyright, ISBN, ISSN, keywords, language, location, LCCN, mrnumber, price, size, URL.

The names of the entries and the types in the BibTeX format are standard in general. But sometimes when the standard entries are not enough to describe a certain bibliographic database, the author of the bibliography uses other entries, which he chooses at his discretion.

Some of the other entries and types are mentioned above.

An example of a correct record in BibTeX format is the following:

```
@INPROCEEDINGS{Yuan1993,
  Author = {Yuan, B. and Klir, G.},
  Booktitle = {Proc. Twelfth {NAFIPS} Workshop},
  Editor = {Mc. Allister M.},
  Journal = {Proc. Twelfth NAFIPS Workshop},
  Pages = {237-241},
  Title = {On Approximate Solutions of Fuzzy Relation Equations},
  Year = {1993}
}
```

Realizations

The presented bibliographic information system is realized by using the combination of PHP scripts and MySQL database [1], [2], [3], [4], [5], [8]. This combination is maybe the most common web technology at the moment.

The bibliography is stored in the database and if necessary the scripts calls records or, in other words, bibliographic entries, which can be displayed on the screen or stored in files. The opposite procedure is also possible: while filling the database the scripts try to decode the BibTeX file or the information given directly from the page and distribute it correctly within the database (Fig.1).

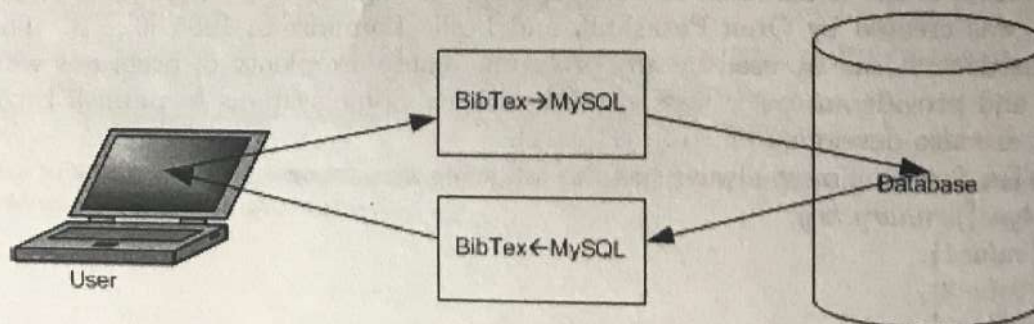


FIGURE 1. System concept

What is the benefit of working with the database instead of directly working with the BibTeX files? First of all, it provides flexibility on dealing with the contents of the bibliography. It is easier to sort and search in a database than to sort and search in a file. There is a certain delay in the process of filling in of the data, which due to the fact that to store a file in the database is necessary the parsing of the whole file content from the scripts and the following saving in the database. This delay, though, occurs during an operation which is performed considerably rarer that the operations of demand and sorting, so that the whole effectivity is many times higher.

Searching in the presented system is performed at all fields of the different publications. The user can search by author's name, title, years as well as by all other available information. It's not necessary to set the whole information when you search, just part of it is enough. For example, if you don't know the whole title of the publication but you know that there is the word 'fuzzy' in the title, you can search writing only the word 'fuzzy'. The result of this search is a list of all the titles where there is the word 'fuzzy'.

This technology has one more advantage which is the possibility for easy develop of the functionality of the system. Although the only format which is supported at the moment is the Bibtex, developing modules of reading and record as well as developing other formats can be easily achieved. The database in some way is an middle form of introducing information, adding new formats is done by adding a module which reads the format and one more which records the data in the previous. Thus, adding some new formats, you can have a whole new system converting from one format to another.

The possibility of adding new titles to the bibliography by the internet users is, of course, a bit risky. If the process of adding titles is not under control, users can add records which are not relevant to the topic or even worse which are nonsense. This could be avoided if the users are not permitted to write directly in the data base, but are given the opportunity to only suggest new titles. A new title is added to the bibliography when the administrator accepts it. That is why the system gives some privileges to the administrators. But to be able to take advantage of these privileges, the administrator has to first log in the system using his user name and password. Administrators can not only examine the data, but they can add titles directly to the data base instead of giving suggestions for new titles. Apart from this, they can delete titles if necessary or edit titles which have already been suggest or entered. They can examine the list with suggestions, from where they refuse or accept them. Administrators can also edit the suggestion before giving their authorization.

New titles can be added to the data base by filling in a form as well as directly uploading a BibTex file. Uploading a BibTex file is convenient when the suggested titles are many and the user already has the bibtex file done, then the only thing he has to do is to upload the file to the system. Filling in a form is used when there are few titles or/and when the bibtex file is not available.

Database structure

Tables in database are organized into three functional groups, Fig.2. The first one is the group where the records are stored. It is composed of four tables. Two of the tables are for the main database and the other two, which are the same in structure as the before mentioned, where the users' suggestions are stored (the so called front and back tables—fig.3). In the table `bib_entries` (analogically `bib_entries_back` in the table with the suggestions) is stored the main information for every record which is primary key, author and year of publishing. Because of the incomplete standardization these fields are not obligatory but recommendable. The primary key is an exception, it is obligatory and it has to be unique for every record. The system accepts a primary key chosen by the user but if it coincides with an already existing key or if the primary key is missing, the system sets a primary key for the record. The other fields are recommendable because they can be used to sort the database in an alphabetical order.

The table `bib_info` (analogically `bib_info_back` in the table with suggestions) includes all the information for the corresponding record. There is a separate record which corresponds to every field in the table. Each separate field corresponds to a separate line, which contains the number of the relevant record, the number of the field and the information stored in it. Sorting these fields is not permitted but searching is permitted.

The second functional group of tables is organized into two tables. It has informational character and the names of the fields are stored in it (in table `bib_fields`) as well as allowed types of

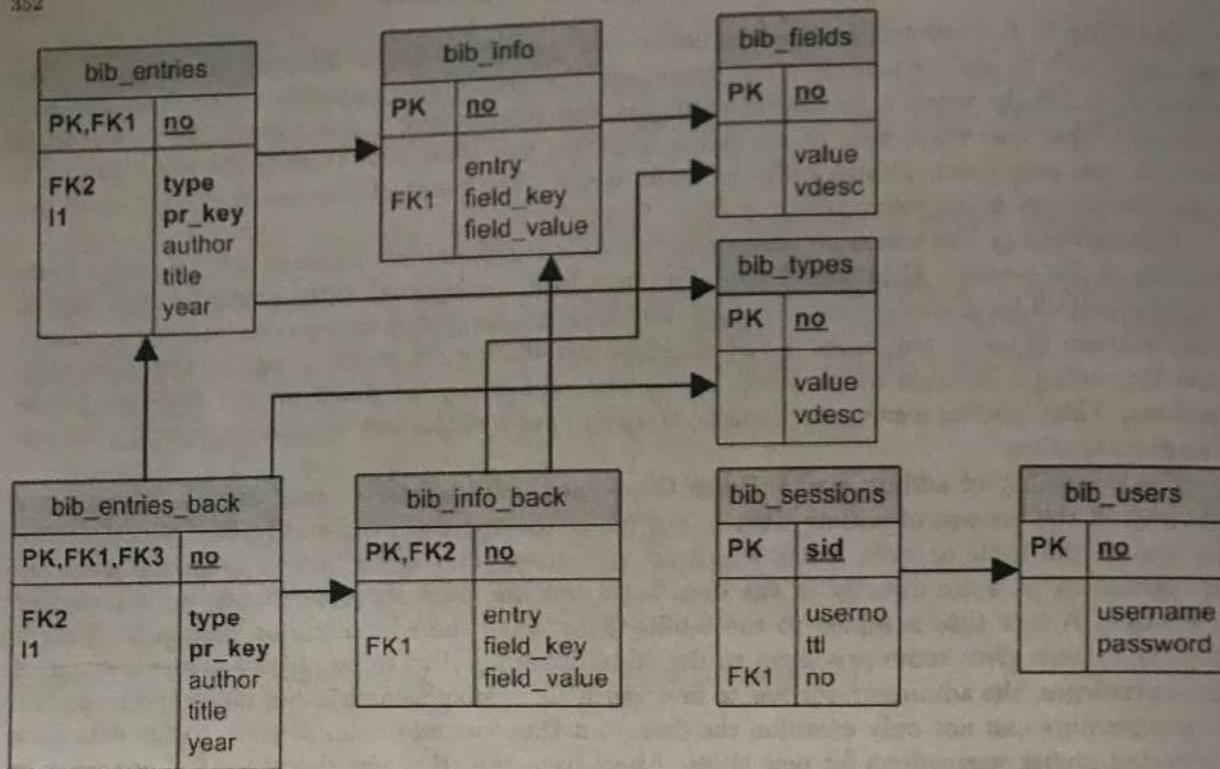


FIGURE 2. Database structure

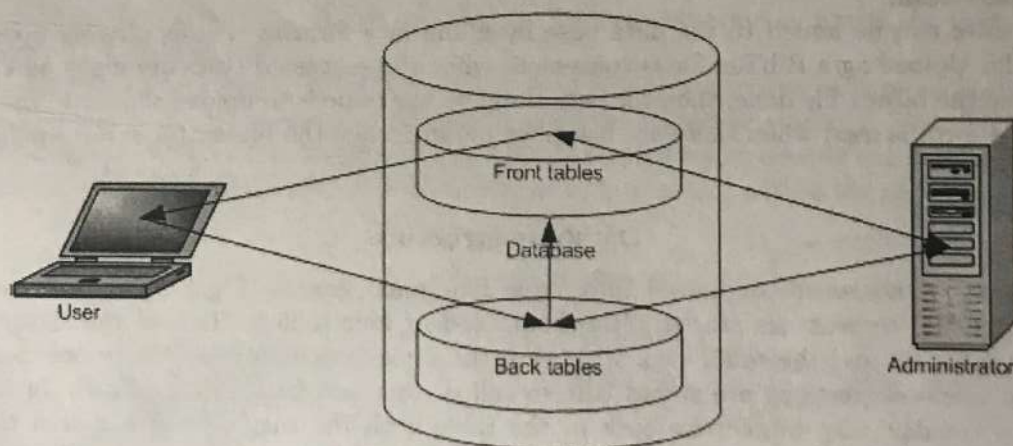


FIGURE 3. Database concept

publications. These tables give the names and types of the fields when different operations in the bibliographic database are performed.

The last functional group is also organized into two tables. Information about the registered administrators of the bibliography is stored in *bib_users*. Information about which of the administrators has logged in the system, the duration of his session and his session number is stored in *bib_sessions*. The information in these two tables gives control to the administrator's tools.

So the model of filling in the database is the following, fig3: when the user tries to fill in the database, his suggestion is recorded in the back tables. When the administrator logged in the system, he examines the suggestion and if he gives his confirmation, the suggestion is transferred to

the front tables. But if the administrator wants to fill in the database, the information is directly recorded in the front tables.

Developing the system

The main trend in the development of the system is to support more formats which present bibliographic databases. Although the BibTex format is most common at the moment, it is not the only one. The method of structuring the program code enables easy addition of modules supporting other formats and this is the main trend in the development of the project. Supporting more formats will be also of great help to users who want to use the bibliographies created by this system, or to users who need parts of the bibliographies to fill in their own bibliographies created in a format different from the BibTex format, and the opposite is also possible—users who want to present bibliographies, which they have already created, in different formats but using the tools of the presented system. Likewise, other tools for operating the web design of the application can be developed to improve the possibilities of integrating into different pages. Another trend in the development of the system is the introduction of a rating system which rates the most examined and demanded titles.

Bibliography "Fuzzy Machines and Fuzzy Relational Calculus"

The bibliography, for which this product was created and by which it is currently supported, contains more than 430 titles with the tendency to increase. It can be seen at: <http://webibtex.acstre.com>. The literature sources include publications on fuzzy sets, fuzzy relations, fuzzy machines, fuzzy expert systems, fuzzy linear programming and etc. related areas from 1965 since now. The number of the publications for five-year periods, from 1970 to 2000, is examined in figure 4, which shows that the interest in the topic is increasing as time passes.

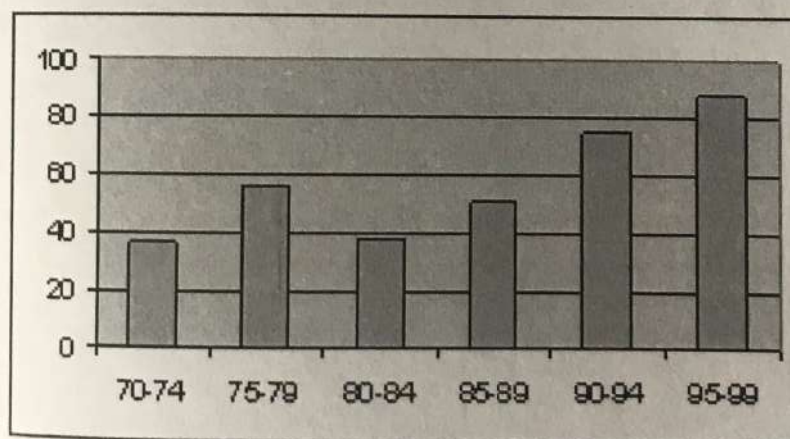


FIGURE 4

Conclusion

Most of the systems for web base publication of bibliographies solve the problem of publishing small personal bibliographies, which cannot be update by the page users ([9], [10], [11], [12]). These bibliographies normally work directly with the BibTex files, which in the majority of cases impedes using other formats as well as converting from one format into another. The reason for developing this system was the necessity to introduce a bigger bibliographic collection including works of many authors. Because of this it enables publishing bigger bibliographic databases and solves the already mentioned problems. In view of the selected web tools, the databases can be supported by many administrators and users regardless of their location.

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