

Aigaion: A Web-based Open Source Software for Managing the Bibliographic References

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Abstract

Publishing research papers is an integral part of a researcher's professional life. Every research article will invariably provide large number of citations/bibliographic references of the papers that are being cited in that article. All such citations are to be rendered in the citation style specified by a publisher and they should be accurate. Researchers, over a period of time, accumulate a large number of bibliographic references that are relevant to their research and cite relevant references in their own publications. Efficient management of bibliographic references is therefore an important task for every researcher and it will save considerable amount of researchers' time in locating the required citations and in the correct rendering of citation details. In this paper, we are reporting the features of Aigaion, a web-based, open-source software for reference management.

1. Introduction

A citation or bibliographic citation is a reference to a book, article, web page, or any other published item. The reference will contain adequate details to facilitate the readers to locate the publication. Different citation systems and styles are being used in different disciplines like science, social science, humanities, etc. Referencing is also a standardised method of acknowledging the original source of information or idea.

Bibliography (originally from Greek, *bibliographia* which literally means *book writing*) is essentially a list of books. However, a bibliographic reference can be

to any published content, including a web page. In the rest of the paper, a generic term, *reference*, is being used to mean bibliographic reference or citation.

Reference management can be at individual or departmental or institution level. The Reference Management System can be manual, electronic or a combination of both. Manual reference management systems involve recording of reference details of articles on index cards and storing them in a filing cabinet. Electronic reference management systems make use of specialized software for the purpose. Some may use a combination of both manual and electronic systems to manage their references.

In this paper, we are sharing our initial experiences with Aigaion, a web-based, open-source software for managing the references in an institutional environment.

2. Need for Reference Management

Research works are communicated through journal or conference papers. During the course of writing research papers, authors acknowledge several other research works that are being referred in the paper. The style in which the references are listed is governed by the publishers. Different publishers expect the references to be listed in different styles. It could also vary across the journals published by the same publisher. Also, there should be integrity in the bibliographic details of references. Since active researchers publish periodically and each publication invariably will have many references, researchers need to make use of a tool for managing the references efficiently.

A systematic means of organizing the references is termed as reference management. The benefits of systematic reference management include:

- Re-use of references
- Consistency in rendering of references
- Easy to locate the publication details
- If the reference management is done using software then the references can

be

easily generated in different styles as needed by a publisher or learned journal.

Also, the references can be shared with others

Reference management process basically involves the following three steps:

1. Capturing of bibliographic details – The first step is to record and store the required bibliographic details.
2. Retrieval of references – When required, the stored references are retrieved using some mechanism appropriate to the system in which references are being maintained.
3. Rendering of references – The retrieved references are formatted according to the style prescribed by a publisher

3. Referencing styles

In the course of writing a scholarly article, the author(s) may refer to various types of literature, which may include:

- Books/Chapters of books
- Journal articles
- Conference papers
- Manuscripts
- Personal communications
- E-mails
- Web pages
- Unpublished articles, etc.

The bibliographic citations for each of these documents have to be furnished in different sequence within a reference style.

There are many ‘proper’ different ways of citing references. This is because, different publishers insist on different types of citation styles. Each of these styles will be appropriate for the specific publication. One can find many instances where a publisher insists on different types of citation styles for different journals in the same discipline. Many a times, conference organizers prescribe their own citation styles.

There are two major styles of referencing:

1. Harvard (author-date) system

2. Vancouver (numerical) system

3.1 Harvard (author-date) system

In this style of referencing, the source of information/idea is acknowledged in two places in the publication:

- in the text of a publication by including the name of the first author followed by the year of publication

e.g. "The author has discussed the implications of these proposals on the National Health Service in another paper (Loft, 1991). Other writers have commented on related issues, notably Lane (1992, 1994) and Lewis (1995, p.54). "

- in a reference list at the end of the text, which gives the full bibliographic details of the works referred to or cited.

3.2 Vancouver (numerical) system

This system differs from Harvard system by using a number series to indicate references. Bibliography lists these in numerical order as they appear in the text.

e.g. "The author has discussed the implications of these proposals on the National Health Service in another paper (1). Other writers have commented on related issues, notably Lane (2, 3) and Lewis (4)."

Based on the two reference systems mentioned above there are number of variations which are adapted and adopted by various publishers. Some of the prominent style manuals include:

1. The ACS Style Guide of the American Chemical Society.
2. APA style by the American Psychological Association.
3. The Chicago Manual of Style published by the University of Chicago Press
4. IEEE Style Guide of Institute of Electrical and Electronics Engineers, America
5. MLA Style Manual by the Modern Language Association of America.

It is quite evident from the facts stated above that reference management can be quite challenging and time consuming, especially if it has to be done manually.

4. Reference Management Software

The Reference Management System can be manual, electronic or a combination of both. Manual reference management systems involve recording of reference details of articles on index cards and storing them in a filing cabinet. Electronic reference management systems use specialized software for the purpose. Reference management software packages can help in managing the references effectively and efficiently. These software packages usually maintain a back-end database of reference details and provide a user interface, which facilitates in searching and rendering of references in the desired styles. Typical functions of reference management software include:

- import references from a variety of sources like bibliographic databases
- search, edit, sort and share references
- render references in a variety of formats
- select references to incorporate them in a word-processed document and format them automatically
- store links to documents or copies of them within database

4.1. Trends in reference management software

From a review of literature about the reference management software, it is clear that, the task of managing references with computers is not a new agenda.

Klyce and Rózsa (1983) describe a set of programs which implemented a personal reference management and information retrieval system on a UNIX-based minicomputer which operates in a multi-user configuration with a host of user-friendly utilities that assist entry of reference material, its retrieval, and formatted printing for associated tasks.

Kunin (1985) illustrates how to set up a bibliographic system using dBASE II and how to prepare citations for storage and retrieval using combinations of key words and Boolean operators, how to prepare selected lists of references and arrange them in alphabetic order or by subject heading, and how to print tailored lists of citations. Sato et. al (1996) describe development of MacRefer, a reference management system, using HyperTalk on Macintosh personal computers. Using this program, one can

automatically acquire data from databases created by EndNote Plus and from OVID or Medlars formatted records downloaded via an online use of Medline. Leung and Peng (2000) state that the management of the shared bibliographic information, including the hyperlinks to online papers, was identified as an important issue for collaborative research in their research projects. Although the use of free software such as BibDB was suggested, to reduce cost, the personal use of BibDB cannot meet all the requirements for bibliographic management of collaborative projects. To facilitate the sharing of bibliographic information among the project collaborators who are scattered over the world, the authors have started to build a bibliography management Web site and databases. Haase et. al. (2004) describes the design and implementation of Bibster, a Peer-to-Peer system for exchanging bibliographic data among researchers. Bibster exploits ontologies in data storage, query formulation, query routing and answer presentation. Kessler and Van Ullen (2005) discuss about free or inexpensive Web-based tools that have been developed to create citations and format bibliographies.

4.2 Software Tools for Reference Management

A quick search on the Internet reveals that there are many tools to choose from. These tools can be broadly categorized into commercial software and open-source software. Amongst the commercial software, the most popular ones are EndNote (<http://www.endnote.com>), Reference Manager (<http://www.risinc.com>), and ProCite (<http://www.procite.com>). There are several open-source tools for reference management. These include Aigaion (<http://www.aigaion.nl>), Basilic (<http://artis.imag.fr/Software/Basilic>), Pubs Online (<http://pubsonline.indiana.edu>), refBASE (<http://refbase.sourceforge.net>), Wikindx (<http://wikindx.sourceforge.net>), etc. We had carried out a comparative study of these tools and found that Aigaion has all the essential features needed in a reference management tool.

4.3. Aigaion

Aigaion is a web-based reference management system that allows users to classify publications in a self-chosen (overlapping) topic structure (Aigaion, n.d.). It offers BibTex and RIS import and export. It is hosted at <http://www.aigaion.nl/> and is

downloadable from Sourceforge at <http://www.sourceforge.net/projects/aigaion>. Aigaion is distributed under GNU General Public License (GPL). Aigaion is written in PHP/MySQL and requires a web server. The latest release of the project is Aigaion 2.0.1.beta on January 10, 2008. The name *Aigaion* is taken from the Greek mythological god of sea storms who had fifty heads and hundred hands. For the purpose of exploring this software, we have installed Aigaion version 1.3.4 on a GNU Linux platform. A screenshot of the homepage of the software installed and customized for Indian Institute of Science, Bangalore, can be seen in figure 1. Brief description of various features of Aigaion follows:

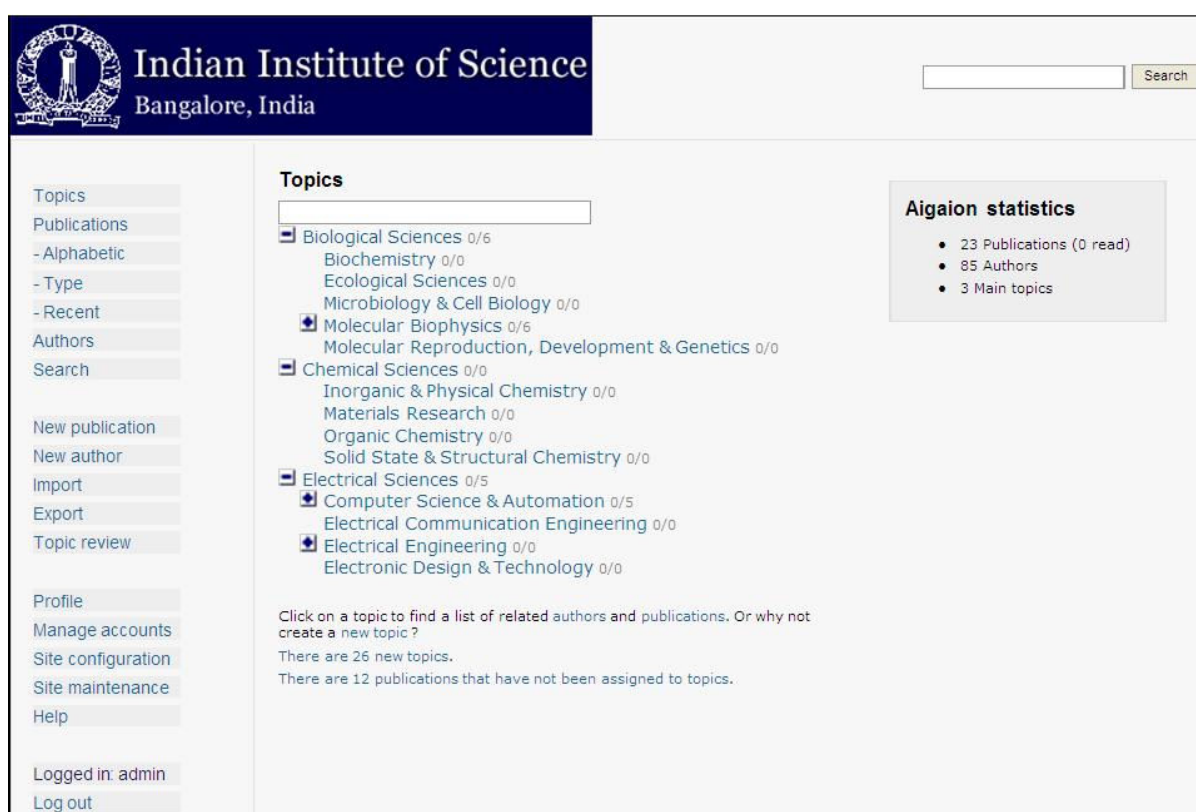


Figure 1: Homepage of Aigaion.

4.3.1 Categorization of References

The references in the Aigaion database can be assigned to relevant topic/s. The topics are customizable. A reference can be assigned to multiple topics, if needed. If a topic is not available in the list, the user can create one. Topics can be hierarchical and it can be displayed in a fully decomposed or partially decomposed manner. There is, however, no compulsion that a reference has to be assigned to any topic at all.

As it is a multi-user system, Aigaion database will accumulate a lot of references, which are likely to be categorized under different topics. Aigaion allows the users to subscribe to - or unsubscribe from - any topic. This will facilitate in the quick retrieval of references by the users. By default, a new user will not be subscribed to any of the topics. To review the topics that already exist in Aigaion, users have to go to the topic review page, and subscribe to the topics that they are interested in. Such topic/s will then appear in their topic tree.

4.3.2 Publication lists

Aigaion offers multiple ways to browse through the references it holds. The default listing sorts all publications in the database by year. Users can also browse the publications sorted by title, by publication type (like journal article, conference proceedings, etc.) or by topic. Each item in the topic list provides the citation details of a particular publication and is hyperlinked to its complete bibliographic details.

Upon clicking an item in the topic list, full bibliographic details are shown. The item can also be edited provided the user has enough rights to do so. The actual full-text document/s can be attached to the bibliographic entries, either through uploading or by providing the URI. A publication can have more than one attachment in different formats. One of the attachments can be selected as the default. Attachments can be downloaded by users who are logged in with the appropriate user rights by clicking on the file icons.

4.3.3 Adding new references

References can be added in two ways, entering it manually or by importing from an external source in BibTeX or RIS format. One can enter a new reference manually only if the author already exists in the Aigaion database. If an author name does not exist then it should be added. In the generation of formatted bibliography, rendering of the author name is a critical factor. Aigaion takes care of this by providing a separate interface for entering different parts of author names, first name, surname, middle name and von part (e.g. da in Vasco da Gama). This will facilitate in rendering author names in the required sequence.

Manual entry of references ensures quality of metadata. On the other hand, if references are being imported, the user has to take care of the accuracy of bibliographic details and duplicate entries. The system does give a caution notice about these while importing from an external source. A Mozilla Firefox extension is available for easy importing of BibTeX or RIS. This will help users of Firefox browser to import references directly from the external databases into Aigaion.

4.3.4 Annotating the references with notes

Where a publication abstract is a purely descriptive summary of a publication, an annotation can be both descriptive and critical. Annotations are commonly used to:

- place a publication in a context
- describe the relevance of a publication
- summarize the strengths and weaknesses of a publication

Aigaion offers the 'note' facility to create annotations. This will help users to comment on the publications for future references and share their opinion about a particular publication among peers in a collaborative environment.

4.3.5 Generating a bibliography in different formats

Aigaion supports formatted export to text, html or rtf in common citation styles. It uses OSBib style formatting. OSBib is an open source bibliographic formatting engine written in PHP that uses XML style files to store formatting data for in-text citations/footnotes and bibliographic lists. Styles bundled with the download include APA, MLA, Chicago, Turabian, Harvard, British Medical Journal and IEEE. All the publications in a topic or database or only selected references can be exported to make a formatted bibliography. There are options for exporting bibliography in HTML, RTF and text formats. Users can also export the selected or all references in BibTeX and RIS formats. This supports interoperability between systems which uses same formats and is helpful when migrating from Aigaion to some other reference management system.

4.3.6 Search

There are several ways to search Aigaion for publications. The most straightforward method is using the quick-search box in the top-right corner. One can enter one or more keywords in the quick-search box. When searching for a specific combination of keywords, quotes can be used for grouping the keywords. The second method is by following the 'Search' link from the menu. Here, one can restrict search results to publications that are assigned or not assigned to one or more topics and search for keywords, using the same syntax as above.

4.3.7 User profile

Users can set their profiles according to their preferences. The administrator can set individual user rights, from read-only to administrator. Administrator can also assign users to different user groups. Aigaion can also be set for customizable anonymous access.

4.3.8 Limitations of Aigaion

One of the limitations of Aigaion is the lack of registration by email for the prospective users. If somebody wants an account to use Aigaion they have to contact the administrator to acquire one. Another noticeable limitation is the lack of the privacy setting of a reference. Since it is primarily meant for sharing of references, this feature was not incorporated in the initial versions. But Aigaion 2.0 is supporting the setting of permission for publications. One can set the access level to private or public. It can be specified whether a particular reference is only for reading or it can be edited as well by others.

5. Conclusions

We are exploring the possibility of implementing web-based reference management software for the benefit of researchers of our Institute. To this end, we are experimenting with different options.

Based on the limited experience that we have gained with Aigaion, to us, it looks a useful tool for electronic reference management in an institutional environment. Shortly, we intend to conduct a user study to see what the users have to say about the product. Based on the outcome of the user study, a final decision can be taken.

Also, creating awareness amongst the researchers about the existence and availability of reference management tools is very essential

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