CMAS: AN ONLINE CONFERENCE MANAGEMENT AND ARCHIVING SYSTEM

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ABSTRACT
Conference management systems (CMS) are now more popular in manipulating and managing single or multiple conferences. The conferences have many activities to be accomplished starting from the call of participation and submission of the paper until the publication of the accepted articles. The huge efforts required to manage the communication channels among the parties of the conference in addition to the mentioned actions motivates chairs and conference organizers to take a brave decision into converting their system from manual system to full or partial automated system. Deciding which CMS is the most suitable system to be used (either free or commercial CMS) requires some investigations, risk and sometimes cost. Therefore, in this paper, a user-friendly and simple online conference system is proposed to manage, organize, and help all of the conference parties to achieve their goals and accomplish their tasks successfully and easily.

Keywords: conference management systems, software engineering, web-based management system.

1 INTRODUCTION

A conference is divided into several phases. The first phase is call for papers, which includes getting the targeted emails such as previous participants of the current conference in addition to many other researchers and institutions. The second phase is submitting articles from the participants to the conference managerial board. Then, these articles are classified and a pre-decision of denying or accepting them is taken. The revision, which is the third phase, comes after receiving the article. Bidding and automatic or manual paper assignments are processes in this phase. Paper assignment to reviewers can be done automatically or manually. The decision is taking on accepting or rejecting the article and the authors are informed after the notification of acceptance date as announced in the conference web-pages or brochures. Authors, which their papers have been accepted, are informed to send their camera-ready (revised and well formatted version of their articles) back to the conference system. Thus the fourth and final phase is collecting the camera-ready articles and produces the conference program. Then, the complete set of camera ready articles is published [2, 3].

The previous mentioned phases can be managed manually, by email, or in an automated way. Traditional or manual conference management systems are hardly seen.

Current conferences are either managed by email or in an automated way.

Figure 1: Main phases of a scientific conference

The non-automated conferences may have some problems such as slowing down the mentioned phases which results in slowing down the whole conference process. Collecting wrong information about authors may be considered another problem. Therefore, several web-based conference management systems have been developed and used such as OpenConf [4], EasyChair [5], CyberChair [1], EDAS [6], Confious [7], ConfSys [8],
ConfTool [9], ConfMaster [10] and Microsoft’s CMT [11]. A comparative study about some the previous mentioned conference management systems (CMS) have been conducted to show their functionality, behavior, and communication [12]. In that survey, they did not measure security level or the level of their user-friendliness of the mentioned CMSs.

Current CMSs are hosted on their own servers. These systems are called “software as a service” SaaS”, where there is no need to by any hardware, to worry about hosting issues, or to have system administrator. Thus, the total conference costs can be reduced. On the other hand, some conference organizers are sensitive to security and privacy issues. Therefore, they prefer to host their own conference on their own server to manage their data locally and privately.

One of the most critical functions in the conference process is the assignment of a paper to a reviewer. A comparative analysis of some existing methods for assigning reviewers to papers is done by Kalmukov and Rachev [13]. In their research, they have proposed an automatic paper-reviewer assignment that depends on matching the keywords of the paper to the topics of interest for the reviewer. The accuracy of paper/reviewer assignment process affects the efficiency of revision process, which in turns affects the conference quality. Three factors affect the efficiency of revision process. The first one is load balancing (i.e. assigns almost the same number of papers for each reviewer). The second one is the accuracy of assignment process that depends on the similarity factor. The last factor is conflict of interest [14].

As mentioned earlier, the paper assignment process can be done automatically (implicit) or manually (explicit). The process of allowing reviewer to browse the conference papers and ask for a paper to revise based on his interest is called bidding. Both assignment techniques have their own challenges. For example, in explicit methods, many factors affect the accuracy. Defining the conference topics appropriately is a challenge. Matching the author’s research interests, the topic of the paper, the keywords of the paper, and finally the topics of the reviewer is also another challenge. On the other hand, in implicit methods, a text analysis of the paper may be required to classify the paper. The title and the abstract of the paper may define the topic of the paper. Looking for previous publications, through bibliographic indexes such as Google Scholar [15] and DBLP [16], of the reviewers may enhance the accuracy of determining his research interests.

Software engineering is the discipline that depicts how to successfully build a system. Thus, in order to design the CMAS (conference management and archiving system) we should go through a development cycle [17]. First, the functional and non-functional requirements should be determined [2, 17]. The system requirements should be clear, consistent and unambiguous [17]. The next phase of the development cycle is designing the system. Depending on the system requirements, the structure of the system should be clear after this phase [18]. The non-functional requirements are incorporated into the system design in order to achieve complete system [19]. In this paper, a new online conference management system (CMAS) is designed in order to assist the conference chair in addition to other parties to accomplish their jobs successfully and easily. CMAS is a web-based system that is built using ASP language over windows operating system and .NET platform.

2 SYSTEM REQUIREMENTS

As mentioned earlier, system requirements is the first phase of the system development life cycle phases. It defines what the system should do to satisfy users’ needs. In this section, both functional and non-functional requirements will be provided. The functional requirements describe the functions of the system or the users’ needs. There are four types of actors/users in the proposed CMAS that interacts with the system: chair, reviewer, keynote speaker, and author. According to the interaction of the previous introduced parties (users), the functional requirements of the CMAS are classified according to the users as follows:

1- Functional requirements for all users:
   a. Access the CMAS: The users should be able to login, logout, create new user account, ask for new password.
   b. Profile related functionalities: the users should be able to edit/modify their own profile information.
   c. Messaging functionalities: author, reviewer, and keynote speaker should be able to send message to chair. Chair should be able to reply to their messages in addition to send messages to author, reviewer, or keynote speaker.

2- Functional requirements for Author
   a. Submission functionalities: the author should be able to submit new paper, edit current submissions, withdraw submission, know the decision on his manuscript.
   b. Registration functionalities: one author for each paper can register to attend the conference. In addition a keynote speaker should register to attend the conference.

3- Functional requirements for Reviewer:
   a. Revision functionalities: the reviewer should be able to view assigned submissions, fill and submit the review form, write his comments on a paper for the author and for the conference chair, download the paper, apologize
reviewing a paper explaining the reason including the conflict of interest.

4- Functional requirements for Chair:
   a. User functionalities: the chair should be able to create new user account, remove (deactivate) user account, reset password, activate user account.
   b. Submission functionalities: The chair should be able to make a final decision on a paper. He also should be able to view/filter/sort/confirm withdraw/delete submissions and view authors information.
   c. Conference configuration functionalities: the chair should be able to edit/change conference configurations such as: conference profile (conference title, logo, important dates, submission status), messaging (manage message templates, send/receive), manage conference topics, manage conference database, manage conference committees, manage conference workshops, produce the required reports.
   d. Reviewer assignment functionalities: the chair should be able to view the revision status/form/comments of each paper. He can also assign/de-assign paper to reviewer.

   Simplicity, User-friendly, Accessibility, Security, Availability, Reliability, Performance, Maintainability are some of the non-functional requirements that should be considered when designing a web-based system. These requirements do not describe what the system will do, but it will describe how the system will do it [17]. The non-functional requirements of the CMAS influence the quality of the system.

   • Simplicity: the activities should be simple and consistent. The activities will be directed through simple links and simple dialogues. The system will also provide some help through error messages, remarks, and documentations.
   • User-friendly: the interface of the system should be user-friendly. It should be easy to use or learn. The interface of the system should also not require expert users to understand.
   • Accessibility: the CMAS will be available for all users through internet. No special features are considered for people with disabilities or special needs.
   • Security: the system will allow permissible information flow after authenticating the identity of the actor on the system. In addition, the users information should be confidential. The system will identify each user by his ID, which will be his email, with a password that is stored in an encrypted way. Authors are not allowed to submit their papers unless they are registered users in the CMAS. The information related to users activities will be stored in Logs that can be exported and stored in files. The backup copies of the conference database should be stored externally and protected by a password.

   • Availability: The CMAS will be functioning properly all time for all users except for cases of failure that could be recovered within 1 hour.
   • Reliability: if the system maintains its performance over time, then it will be considered reliable. The CMAS should recover within not more than 1 hour in case of a system failure during the rush hours.
   • Performance: There are no special constraints on the performance of CMAS. This requirement measures the efficiency, speed, and throughput of the system. The CMAS will make any transaction on the system within less than 10 seconds depending on the internet/machine speed such as:
     o Login to the system
     o Open any of the CMAS pages
     o Sending message to chair, or from chair to registered users.
     o Submit new paper.
     o Submit review form.
     o Make the final decision on a paper.
     o Register for conference.
     o Getting some reports by the chair such as: list of all accepted papers, list of all registered authors, and so on.
     o Many other transactions.

   • Maintainability: creating new system that can be adjusted easily for adopting new technologies or to fix any defect is called maintainability. The CMAS has been analyzed in a way that can handle new or future improvements easily. The database can be exported (as a backup copy) or imported to the system. The system helps the users in reducing usage errors by providing some hints to the users. Moreover, validating the input data before submission make the system more immune against faults.

   Every system should have boundary or limitations. The first limitation of the CMAS is that the papers are not assigned to viewers automatically. The second limitation is that the reviewer cannot bid (request paper to review) for papers which he is interested in. The third limitation is that the system cannot detect the conflict of interest automatically.

2.1 The Use Case Model

   The use case model describes the functional requirements of the system. It represents the interaction between the actor, which is a user of the system such as human or machine, and the system. In other words, the use case model represents the activities or the tasks that the user will perform within the system. The use case diagrams for CMAS conference system are illustrated in the following figures.
Figure 2 represents the tasks that are common among the CMAS users. Figure 3 depicts the tasks that will be accomplished by the Author. The duties of the conference chair are depicted in Figure 4. Finally, Figure 5 shows the reviewers activities within the CMAS.

**Figure 2:** Use case for common tasks among all system users

**Figure 3:** Use case for Author

**Figure 4:** Use case for Chair
2.2 System Characteristics

All conference management systems are information management systems. They all should support online data manipulation. The CMAS is a web-based conference management information system that is dedicated for managing one conference at a time. The system allows the users to accomplish most of their tasks by computer, i.e. automating most of the conference functionalities. For example, the most important tasks for an author are automated such as submitting a paper, contact the chair, see the revision report, and register for attendance. Moreover, the reviewer can see his assigned papers and can fill the revision form online and submit it. He can download the paper for reviewing it.

The user who has largest share of duties and functionalities is the conference chair. He will be able to manage most of the conference functionalities in an automated manner. Some of the distinguished functions of a conference chair are discussed in this paper. For example, for each conference there is only one chair. Committee members can be added by the chair only except for the technical committee. He can extend the deadlines or even allow submitting papers after the deadline is met. The paper life cycle, which is started by submitting the paper, then revising it, after that making a decision and informing the authors about the decision are fully automated.

Various user types such as administrator, conference chair, co-chairs, keynote speaker, reviewer, and author handle the system. The administrator is responsible for the back end management of the CMAS, such as handling runtime errors, backup and restore issues, database related issues, training the other users for using the system, and finally setup/install the system in a new server. The conference chair is the person who creates the conference event. Fill up the required information and settings for the conference, such as the contents of the home page and other pages. He is also responsible for setting the general conference configurations. User management is also one of his duties. Assigning paper to reviewer and taking decision on a paper are one of the important tasks that also should be accomplished by the conference chair.

The third user defined in this system is the reviewer. He is one of the technical committee members. He is responsible of reading and judging the paper content if it is suitable to be published in the conference or not. The fourth user type is the keynote speaker. His duty is only update his profile and speech/talk information to be displayed on the conference pages. The last user type is the author. He is the person who submits his articles to the conference to take a chance for publishing them. Generally, the CMAS provides a reliable and user-friendly service for all parties.

The CMAS has two notification mechanisms for registered users. The first mechanism is achieved by implementing internal messaging system. The second mechanism is by using one of the most common means of communications which is the email system. Many features have been used to compare some CMSs in the survey done by Jain, et al. [12]. According to that survey, Table 1 shows the features of the proposed CMAS system:

<p>| Table 1: Features of the CMAS system |</p>
<table>
<thead>
<tr>
<th>CMAS features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Register (create account) and login to the system</td>
</tr>
<tr>
<td>Profile: edit profile contents such as name, affiliation, photo, area of interest</td>
</tr>
<tr>
<td>Create Conference</td>
</tr>
<tr>
<td>Display/edit conference dates and deadlines</td>
</tr>
<tr>
<td>Set max. no. of reviewers per paper in a conference</td>
</tr>
<tr>
<td>Specify topics for conference, paper, and reviews</td>
</tr>
</tbody>
</table>
Define Roles for Chair, co-chair, Authors, Reviewers, keynote speaker

Committees can be created and members can be added

Submit a paper

View all the papers submitted by the user, including Accepted, Rejected, Published and Withdrawn

View details of submitted paper

Paper Assignment - For review purpose

Review Form

Re-upload a previously uploaded paper in case some changes are made.

Backup Database

Multiple Account Management

Edit Review

Review Papers

Register Dinner Choice

Conference logo

View all attendees

Table 2: Database tables of the CMAS system

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Table Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authors</td>
<td>Contains Author’s Information</td>
</tr>
<tr>
<td>AuthorPapers</td>
<td>Contains the Author ID and the</td>
</tr>
<tr>
<td>Papers</td>
<td>Contains papers related information</td>
</tr>
<tr>
<td>ReviewerResults</td>
<td>Contains the revisions for each paper and its related information</td>
</tr>
<tr>
<td>Topics</td>
<td>Contains the list of the conference topics in the call of papers</td>
</tr>
<tr>
<td>Workshops</td>
<td>Contains the information related to the workshops</td>
</tr>
</tbody>
</table>

2.3 Database and Interface Design

A simple and street forward definition for database is a structured collection of data. Databases may be managed by programs called database management systems. A web-based computer information system usually depends on a database that store data. The relational database model, which is a powerful models, is used in the CMAS database representation. In relational databases, the data is stored within tables which consist of records. A record, which is a data element or an attribute of an entity (table), is composed of fields that describe the lowest level of data structure.

The CMAS uses MS SQL Server 2008 for database construction and manipulation in addition to the .net framework. All the information related to chair, co-chairs, authors, keynote speakers, reviewers, and papers are stored in the constructed database. Table 2 shows some of the database tables that have been constructed for the CMAS.

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Table Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committees</td>
<td>Contains committees information such as their titles and descriptions</td>
</tr>
<tr>
<td>Conf_Config</td>
<td>This files has the general configurations for the conference</td>
</tr>
<tr>
<td>Countries</td>
<td>Contains the list of countries</td>
</tr>
<tr>
<td>Messages</td>
<td>Contains the internally exchanged messages between the CMAS users</td>
</tr>
<tr>
<td>Papers</td>
<td>Contains papers related information</td>
</tr>
<tr>
<td>ReviewerResults</td>
<td>Contains the revisions for each paper and its related information</td>
</tr>
<tr>
<td>Topics</td>
<td>Contains the list of the conference topics in the call of papers</td>
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<td>Workshops</td>
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</tr>
</tbody>
</table>

The functional requirements have been gathered and the user tasks have been analyzed. Thus, after gathering the required information and designing the CMAS database the input, output and user interface is designed, keeping in mind that the users should accomplish their tasks simply and efficiently. The guest can view and access the conference information easily through the home page and its links. For example, the guest can easily access to call for papers, contact us, previous conference, conference location from the home page. Using the left menu, he can also access some important information such as the important dates, workshops, conference program and so on.

For authors who decide to participate, they can directly go to the submission page or access login button in the home page. Both lead to creating new account page. When the author logs to the CMAS, he can easily manage his submissions and can view the reviewer reports from one page. He can also contact the conference chair easily by clicking on the button found in his menu, which also facilitates logging out and changing the user’s profile information.

Other registered users such as keynote speakers or reviewers also have their own pages to manage their related information simply and easily. Finally, the conference chair pages should be carefully designed to facilitate his job as much as possible and give him an interesting experience about the CMAS. The chair in CMAS can view and send messages to individuals or groups easily using the ‘messages’ page in addition to the ‘submissions’ page. Configuring the settings of the conference is one of the critical roles of the conference chair. The settings are grouped in the following categories: conference general configurations, content configurations,
important dates, user issues, committees, and workshops. The following figures: Figure 6, Figure 7, Figure 8, Figure 9, and Figure 10 shows the structure of CMAS pages.

Figure 6: Structure of the homepage

Figure 7: Structure of Author page

Figure 8: Structure of Reviewer page

Figure 9: Structure of keynote speaker page

Figure 10: Structure of chair page
3 CONCLUSIONS

Converting traditional (paper-based) systems into automated systems using information technology aids humans in accomplishing their jobs in easier and more accurate ways. Thus, the CMAS, which is a customized web-based conference management system, aims to help the chair, co-chairs, authors, reviewers and participants to accomplish their tasks with less effort and in correct way. The proposed system fulfilled most of the features that every chair need in his conference. The CMAS used to manage only one conference at a time. In the future, a multi-track or multi-conference system will be considered as a part of the new CMAS.

References