SUPPORTING SOCIAL NETWORKS: A CUSTOMIZED OPEN-SOURCE APPLICATION WITH ENHANCED GROUPWARE FEATURES

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ABSTRACT: *Groupware technology enables users to communicate and cooperate during problem solving process. This leads to providing confident solutions and more reliable data which supports the improvements in network and database technologies. Social networks technologies play important roles in exchanging and maintaining data in various types of communities. However, as the data provided through most social networks is typically not fully trusted it raises reliability and accuracy concerns. In this paper, we discuss how to improve data credibility in social networks by using groupware technologies and find the strengths and weaknesses of current methods. In this paper, we propose a framework of a groupware tool supporting awareness and concept of tailoring to the extreme, a friendly environment for collaborative work is shown, and also we illustrate how our framework provides a powerful basis for supporting social networks.*

KEYWORDS: Web 2.0, Groupware Applications, Social Networks, Online Communities,

1. INTRODUCTION

People are quite successful in getting ideas to each other and respond appropriately. This is due to several factors containing the richness of the language they use, the excellent understanding of how world works, and the embedded understanding of everyday situations. Using information of one type of idea obviously fosters some information of another idea. For example, to improve people's talks, the apparent information of people's daily talks when they talk to each other can be used to increase the capacity, accuracy and usefulness of their talks. In contrast, the ability of conveying ideas between people and computers could be difficult to some extent, at least not as easily as conveying ideas among people themselves. As a result, some information and technologies must be explicitly provided to computers to produce the highest quality and the most effectiveness way of exchanging ideas and/or data between people and computers or even between people themselves using computers. By looking to the internet which has become increasingly more popular and widely used and it helps users to acquire a significant amount of information and makes this information available globally, it would be easy to see the development that occurred between people and computers. Moreover, Web 2.0 which refers to a number of technologies that enable users to create and share content on the Web shows how the interaction between people and computers has become more effective and efficient. According to Mogan and Wang [1] the best description of Web 2.0 can be as "a collection of technologies, business strategies and social trends". Web 2.0 [2] has many important features, and one of these is creating communities and social networks. Online communities such as Orkut, MySpace, Facebook, Friendster, and LinkedIn attract millions of users who like to create networks of contacts and use these networks for various purposes [3-4].

Currently, social networks appear as one of the most efficient technologies in the modern world. Development of these networks could be reached by providing new methods or mechanisms in analyzing and storing data inside their database systems. One area of focus in this paper is the importance of groupware that tends to improvement in the reliability, quality and accuracy of data. Information in scientific communities, for example, is constantly changing; therefore it is necessary to work to find appropriate ways to make this information more accurate and more reliable with the highest quality. Additionally, social networks have become the target of many users on the web with a significant number of uncertain data that has been stored by individuals which may weaken these communities [5]. As a result, the quality of data in these communities should be of great value which can be reached by groupware technology.

People who want to complete a project together but are separated by geography or time probably need to meet each other in small or large groups. However, the lack of available and suitable groupware applications makes it difficult to cooperate and achieve their specific goals [6-7]. Cooperative systems provide various features for people who work together at the same or different times and even in the same or different places. Therefore, cooperative systems can be divided into four categories [8]: (1) systems working at the same time and same place, such as electronic meeting rooms and electronic whiteboards; (2) applications operating at the same time and different place like teleconferencing and application sharing; (3) applications running at the different time and same place such blackboards and desktop computers; and (4) systems operating at the different time and different place, such as voice-mail and email.

2. A NEW GENERATION OF GROUPWARE TOOLS

There are many groupware tools that support collaboration appear as new generations of groupware tools. Quilt [9] which was developed at Bellcore is one of these tools. This system manages some cooperative aspects of group authoring, such as information sharing and coordination. Some major mechanisms are available to its users, such as representing documents with annotations together, recording audits and integrated conferencing systems and electronic mail. Users can post comments to each other about specific document using annotation method. Also, user's activities can be reviewed by using recorded audit. Moreover, conferencing systems and electronic mail appear as communication mechanisms upon users.

Users can simultaneously edit an outline document in GROVE [10]. They can even open and manipulate one or more documents that being worked on. GROVE facilitates three different views for its users, private, shared and public views. Only a specific user can see a private view. Also, only a number of allowed users can see a shared view, whereas public view is allowed to everyone. GROVE provides some flexibility for its users for entering or leaving sessions and they can receive updated

documents, unless they choose to receive previous versions.

Another example of groupware tools is XCHIPS which is a java application built using a client-server architecture [1]. It supports collaborative features like group and voice chat, shared whiteboard and project-management features. A basic user interface is provided for user as well as allowing users to move items around on the screen which can be very useful some features like the whiteboard. After brainstorming session, participants can group ideas under descriptive headings.

Many extensively used systems in Web 2.0 have displayed the strong ability to provide interactivity and functions that have a level similar to the normal desktop applications and in the meantime they show the massive capability to have a much bigger user base like YouTube and more participation levels like Facebook and Wikipedia.

3. AWARENESS FEATURES IN GROUPWARE TOOLS

The concept of awareness can be defined as knowing who is around and what, or where, activities are running. It has been demonstrated that awareness is one of the significant elements that enhances groupware usability [11]. It is an important feature in groupware development because it helps to evaluate the performance of collaborators. Collaborative awareness can be defined as the ability to obtain basic collaborative data and to acquire information about on-going activities through a joint collaborative effort. It has several components, such as shared workspace and interpersonal space that enhance the usability of translation groupware for an instance. Context-aware systems have two architecture styles which are centralized and decentralized [12]. Table 1 shows the pros and cons of each style.

In a synchronous system, all modifications are transmitted immediately to users, and thus remote users are aware of the changes in real time. On the other hand, users in asynchronous systems can still track the changes in a different place and at a different time.

Table 1. Comparison Between Centralized and Decentralized Systems [12].

Centralized (Context Server)	***Pros***	• Easier to implement. • Simpler design.
	Cons	• Congestion problem. • Low fault-tolerance.
Decentralized (Peer to Peer)	***Pros***	• No additional server. • No congestion problem. • High fault tolerance.
	Cons	• Hard to handle dynamicity.

4. TAILORING TO THE EXTREME

A tailorable system is a system that provides some facilities for end users to make some modifications [13]. Groupware systems in which the context of a computer application can be modified are referred to as tailorable groupware systems, which give end users the ability to adjust software to personal preferences after software implementation.

The main point in modifying groupware application is that evaluating group's work may need new requirements. Tailoring has three levels: customization, integration, and extension. Firstly, selecting between a set of options is referred to as tailoring by customization. Secondly, tailoring by integration means that a list of functions is available to be selected by end users. Finally, tailoring to the extreme or tailoring to extension means that end users can extend the set of available functions by adding new building blocks to the original system. The set of tailoring options is closed in the first two levels, while the set of tailoring options in the third level is open.

The set of functions of a groupware system can be modified by adding building blocks or removing them. When a tailor wants to design a groupware system, he/she needs to consider whether the system supports composability, extensibility, and openness, which play a significant role in designing tailorable groupware. A composable system is one that can be built by combining separate functional building blocks. An extensible system is one that can have a new functionality without changing the existing parts. Openness has been divided into two forms: horizontal and vertical. Figure 1 below is an example of horizontal openness. CooPS [13] stands for Cooperative People and Systems. Its architecture illustrates the types of groupware applications that have functional building blocks. CooPS has four components that are structured based on the different groupware functions: (1) conference manager (CM), which allows end users to control who is participating, what rules apply, and what tools are in use; (2) conference tools (CT), which provide communication services, such as a shared whiteboard, voting tools, or audio conferencing; (3) coordinator (CO), which coordinates participants' actions in a conference (for example, what actions are allowed based on the state of the conference and the rules of the participants), and (4) conference enablers (CE), which facilitate the start of a conference by giving end users some information about conferences that can be joined or people who can be invited.

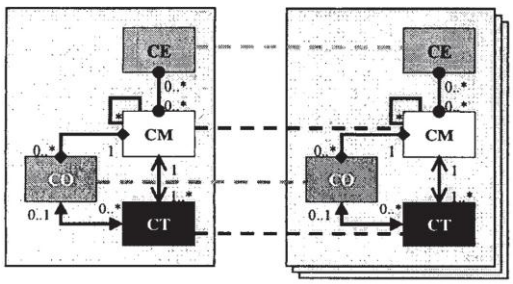

Fig. 1. A Possible Physical Distribution [13].

Fig. 2.

5. COLLABORATIVE ANALYSIS FOR SOCIAL NETWORKS SECURITY

Swami and Sawant [14] believe that the inference vulnerabilities while performing the analysis over the lifetime of social networks databases can be reduced if the detection of vulnerabilities performed at the design time. They developed a Semantic Inference Model (SIM) which can be built by using the related attributes that driven via database schema, knowledge acquisition, semantic related knowledge and data dependency. Based on SIM, the user's query history in this system can be tracked by the violation detection system. The closeness of the relationships between users and the shared knowledge in the tasks they perform can determine the amount of information that flows between them. Therefore, tracking all users' query history with their cooperation levels can derive the collaborative inference for a particular task. As a result, the difficulty of the inference detection system would be increased, as the system changed from a single-user to

multiuser collaborative system. It has been [14] argued that more inferences could be detected during analyzing the stored data. Figure 2 below demonstrates the data level inference detection system.

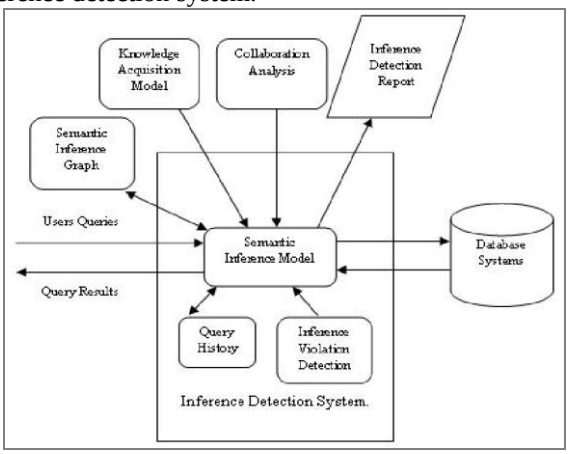

Fig. 3. the Data Level Inference Detection System [14].

The system in the proposed Semantic Inference Model (SIM) which can be deployed in real-time, determines whether user's query associated with the user's query issued previously can access sensitive information or not.

6. APPLYING GROUPWARE TECHNOLOGY TO SOCIAL NETWORKS

The use of collaborative efforts to test and review or insert or extract data from social networks or online communities is probably unheard of in most social networks and even online communities. The purpose of this paper is to provide a system that can help to store and present data that is reviewed, tested, and audited collaboratively in social networks and/or online communities.

Based on social networks that need a method for ensuring reliable and accurate data, our proposed solution is to build an authentication system to be used in these networks. Our approach will be to enable a group of users to communicate with one another and write, review, or edit documents collaboratively. They can also exchange or discuss any ideas they want to process. Moreover, the collaborators in the social networks will be aware of any data and/or the information around that arrives and needs to be processed by the awareness system. Furthermore, any participant who would like to participate in the authentication process will be able to modify the system to his/her preferences including adding new features to the current system instead of replacing the whole old system. Figure 3 shows the structure of our proposed authentication system.

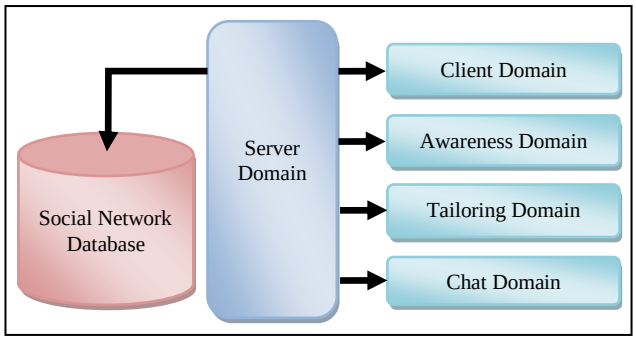

Fig. 4. High Level Architecture of the Proposed Authentication System.

The proposed system provides the associated social network database with four different services which are client domain, awareness domain, tailoring domain and chat domain. For establishing the connection between the system and its users, the server listens to the specified port number of the user in the client domain service and listens to the other ports of the remain services which are chosen randomly from available port numbers. After collecting the port number of each service and making sure that the firewall settings is fine, the client can type in his/her username and password which will be checked to see if the client is authorized or not. Next, we describe the subsections functionalities of the proposed system.

a) Client Domain

When a connection is established between the server and the client, the server stores ClientProxy in the database and with this proxy, the client can maintain his/her view of files directories that stored in the database for collaborative purposes. At this level, some requests can be preformed like creating, opening, editing, deleting or even renaming files. Therefore, each client will have his/her ClientProxy which gives him/her the ability to perform such requests mentioned before. Also, the client domain manages the activated sessions in the system. These sessions consist of at least one or more participants with a new created object called NewSession which has a special proxy called NewSessionProxy constructed by maintaining all participants' proxies within the same session. Figure 4 shows the hierarchy of client domain server.

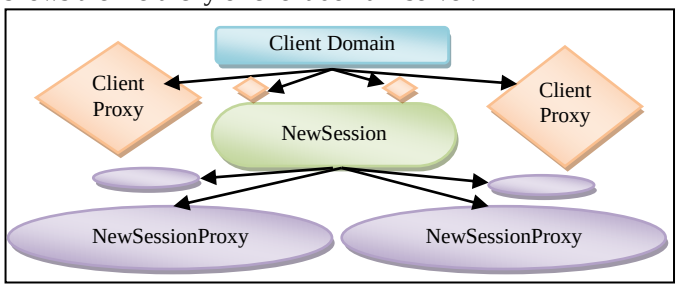

Fig. 5. The Hierarchy of Client Domain Server.

As mentioned previously, ClientProxy can perform several tasks like creating or deleting files and the responsibility for allowing group participation is for NewSessionProxy.

b) Awareness Domain

Awareness element, such as activity summary, update reminder, activity notification and people login status are handled in the database and can be accessible through ClientAwarenessProxy which transfers awareness information between the server and the clients.

c) Tailoring Domain

When a user performs such a modification to his/her own system, a proxy called ClientTailoringProxy created and stored in the database. This proxy sends and receives changing processes information between the server and personal systems of clients.

d) Chat Domain

The proposed system provides chat facilities, which is represented through chat domain. For allowing users to exchange messages between each other, a proxy called ClientChatProxy is created and stored in the database. It transforms messages between the server and the clients depending on whether the message sent to all users, specified groups or a particular user.

7. IMPLEMENTATION AND EVALUATION

We show a prototype of the design using HTML, PHP, JavaScript and MySQL to develop the collaborative tool. These languages use some of Gobby's features, which is an open-source software that support collaborative editing. For example, Gobby supports multiple documents being edited in one session and highlighting the syntax of most programming languages. After a participant logs in, the three main features of the system (e.g., collaboration, awareness, and tailoring) will be available to use. Figure 5 illustrates the major screen of the proposed system.

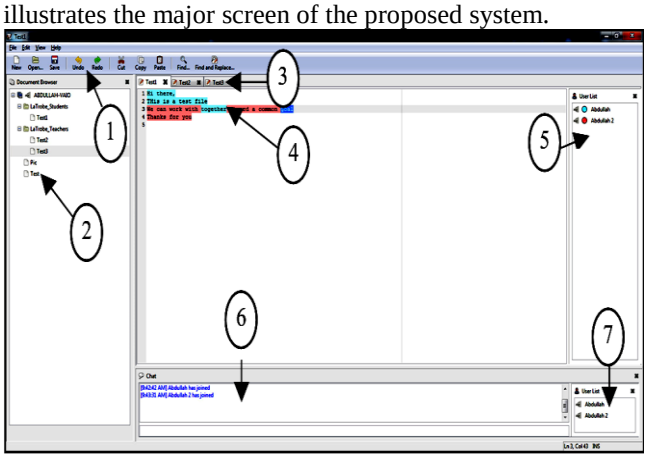

Fig. 6. The Major Screen of the Proposed System.

Fig. 7.

As shown in the figure above, the system supports many functions. We can see the tool bar in 1 which has several materials: to create a new document; open: to open an existing document; save: to save the document manually where the system supports auto-save feature by minutes for who is ever interested; undo and redo: to undo the last operation or to move forward by cancelling the undo operation; cut, copy, and paste: to select what you would like to perform these operations, these buttons will be activated; find and find and replace: for searching and replacing purposes. We can see in 2 the directories of the files stored in the database, if you move over a document with your mouse, a list of collaborators participating in the specified document will be displayed. In 3, the system supports editing multiple documents; 4 displays the main part of the system where collaborators can work together. Lastly, in 5 we can see the list of collaborators participating in 4. The system supports chat facilities in 6; the participants in the chat area are shown in 7.

Collaboration is supported in this system with some awareness features (e.g., people login status in 5 and 6, and search facility in 1). We add more awareness features to the system to improve the environment around users, such as activity summary and activity notification where added to menu bar, and an update reminder that will display system updates to the users in the chat area as system messages. Figure 6 shows one of the added awareness features to the system, which is activity notification. Users can invite others or accept invitations to join collaborative sessions.

As mentioned previously, social networks and online communities suffer from the lack of groupware technologies. Although social networks provide several services in different fields that have varying levels of importance, the need to increase the credibility of the data is still important. Using groupware technologies would support the communications and the interactions between users in the these networks to work collaboratively toward more reliable and accurate information stored in these networks.

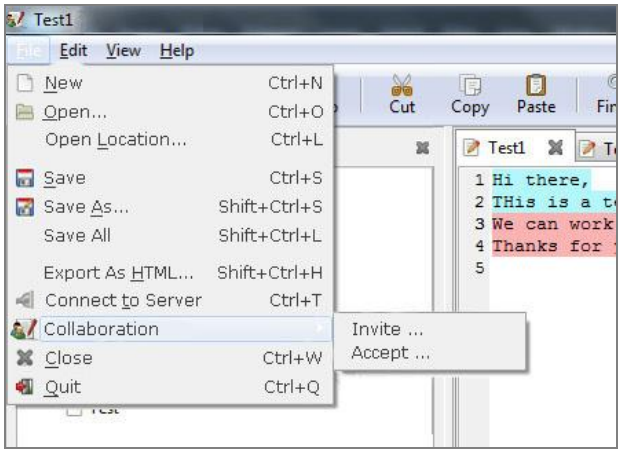

Fig. 8. The Added Awareness Feature to the System.

Fig. 9.

Table 2. Some a Comparison Between Groupware Systems

Tool Features / Tool Name	Cut, Copy, Paste	Undo, Redo	Awareness Features	Centralized / Decentralized
Iteach	√	X	X	Centralized
Habanero	√	X	X	Centralized
MUSE	√	X	X	Centralized
nte	√	X	X	---
OurSystem	√	√	√	Centralized

8. CONCLUSION

The reliability of information has become a major concern of Web users, especially regarding information in social networks and online communities where the number attracted users is growing massively. Although some data in social networks and online communities is greatly significant, users may be reluctant to use these data inside these networks. However, applying groupware technologies to these networks would help to store more reliable data to them. Nevertheless, the lack of groupware applications makes it difficult for any group to work together especially in software development, where a project of any importance requires a group of people. Analysis of current research indicates that using groupware in social networks is limited. We have designed a groupware tool using the concepts of collaboration, awareness and tailoring groupware systems which can be useful to social networks by providing appropriate environments for users to communicate and interact and by improving data credibility in these networks.

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