Serverless Web-Multicast Chat System for Multi-users

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Abstract. In this paper, we present the use of a Web-multicast chat system for collaborative work environment. Web-multicast is a concept that uses a Web-browser to communicate between multiple users. No Web server is needed for the communication. The system has the advantages of availability, portability, scalability, and performance. This paper describes the concept, implementation and some performance results.

1 Introduction

CSCW (Computer-Supported Cooperative Work) is a study on how people work together using computer technologies. CSCW applications have the potential to provide the environment needed for groups of diverse users to jointly accomplish their goals by sharing applications and exchanging messages [1]. CSCW have faced a number of issues such as:

- the applications are supported only for limited sets of users and limited range of platforms [2] [3],
- the applications are not scalable [4],
- the applications require adequate performance to support users' activities [5].

In this paper, we present the use of a Web-multicast chat system for the collaborative work environment. The system has the advantages of availability, portability, scalability, and performance. Web-multicast is a concept that uses a Web-browser to communicate between multiple users. The web-browser uses the multicasting method, and no Web server is needed for the communication. The rest of the paper is organised as follows. Section II explained the related work. Section III describes the implementation of CSCW application in Web-multicasting. Section IV describes some performance result. Lastly, Section V covers the conclusion and future work.

2 Related Works

In this section, we briefly review several related works that use multicasting on web browser for different applications. The Multicast Backbone (MBone) [6], the set of multicast-capable routers on the Internet, provides the infrastructure for efficient multipoint data delivery in the Internet. mMosaic [7] was one of the first tools for sharing web documents over the MBone. mMosaic is based on a modified version of the NCSA Mosaic browser, which processes incoming resources and multicasts them along with formatting instructions. WebCanal [8] is a proxy-based synchronous browser program written in Java. Changes in the current URL displayed by the master browser are detected by a proxy, which parses files to identify inline image, and transmits the data to the set of receivers. Since WebCanal operates only as a proxy, local control operations (such as Back and Forwards browser commands, and loading of local files) present difficulties. mWeb [10] is an ongoing project that uses the web browser as a multimedia slide presentation medium. mWeb is similar to WebCanal in that it is proxy-based and uses IP multicast to distribute web resources. Although, much work has been done with Web browsers, most has concentrated on real-time stream transmission using multicasting on the WWW. Little discussion has been found using the Web browser for cooperative work, especially in a learning environment. Thus, this paper has developed a prototype Web-multicast Chat System to increase the efficiency in a collaborative environment.

3 Implementation of CSCW Application

The application was developed using Java programming language to take advantage of its platform-independent capability. Developing this application using multicast technology disassociates it from the need of a central server, thus preventing the situation of paralysing the whole system when the server breaks down. The system is built as a Java Swing applet. This application has used protocol LRMP [9] that provides a good choice for multicast environment. The benefits with the application implementation are it was reduced the network traffic by reducing the bandwidth consumption on the link from the server to the network and within the network.

4 Performance Result

The prototype was tested in order to test the efficiency of Web-multicasting to the collaborative work. All the testing have been done on open network using Windows 98 SE operating system and IE web browser. Fifteen PCs single processor with speed of 500MHz. The purpose of the testing is to show the factor that effect the response time to the end-user. The factors that affect the performance of Web-multicasting are size of the packet, number of recipient, network traffic, and capabilities of end-user's machine. In this paper, we show only the effect of packet size and number of user to the system. The factor has been

chosen because these factors can be controlled more easier in the collaborative environment either by limiting the number of participant or limiting the size of packets.

Fig. 1. Time Delay vs. Number of users with different packet size

Figure 1 shows the effect of number of users on the time delay with different packet size. It shows that the delay time is increasing with the increasing number of users. The graph also shows that the size of packet does not have much effect on the time delay at receivers. The packet size that tested is up to 1300 bytes. This size is approximately equal to 160 words. In chat system, the messages are normally small and 160 words are reasonable for the testing.

5 Conclusion

In this paper, we are concerned with the use of World Wide Web (WWW) in collaborative works environment. We present the concept of Web-multicast in this environment by developing Web-multicast chat system as a CSCW application prototype. Web-multicast is a concept that uses a Web-browser to communicate between multi-users. Some experiments have been done to test the implementation of a CSCW application in Web-multicast. The experiment also has carried out with the performance testing. In performance testing, two features are tested i.e. effect on time delay by data size and client size. From the testing, it shows

that the delay time is increasing gradually with the increasing number of users. But, the size of data does not much effect on the time delay at receivers. From the test result, it shows that the Web-multicast method has a potential to provide an implementation of the collaborative work environment. The system gives a number of advantages such as providing an easy environment without need training, can be used in any platform, and give an adequate performance. As a summary, Web-multicast gives the advantages of availability, portability, scalability, and performance to the collaborative learning. In future work, this method can be used to implement the collaborative work for wider spectrum such as using different data types as a mean of communication, for example using video, audio, simulation, and images.

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