

## Research on Enterprise Virtual Video Communication System Based on WEB Technology

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**Abstract** — In this paper, the author studies on the enterprise virtual video communication system based on WEB technology. After researching and analysis of the two typical system modes (C/S Mode and B/S Mode) of information system development, we design a new mode combined with these two. Nowadays, many companies are using the OA system implemented by Lotus Domino, in the other hand, as one of typical web application server IBM Web Sphere is undoubtedly the first choice of conformity with Lotus Domino Server. Therefore, the key skills include the conformity of Domino Server and Web Sphere Server and skills of web development of Domino. To be detailed, the key skills include object mode, automatic workflow and security mode of Domino, OSE remote connection, servlet redirector and security strategy of SSO in multi-server environment.

**Keywords** - enterprise; visual video communication system; web technology.

### I. INTRODUCTION

Electronic data communications and Internet media technology in the world of electronic information technology has made rapid development background is also rapidly enhance the wave of the information industry, coupled with the increasing demand for multimedia information; it leads directly to the enthusiasm of videoconferencing technology to study the development and application. As video conferencing is mainly relying on the transmission of interactive multimedia information, the specific requirements related to data compression, and protocol standards [1-2]. Currently, the popularity of Gigabit Ethernet introduction of videoconferencing technology for the company to provide the basic conditions, further building on the company intranet, mainly concentrated in the optimized network services, multimedia teaching and training in the use of technology, and the use of multimedia data auxiliary research and so on [3].

With the formal entrance of China into WTO, how to increase competency of local companies has become the focus of every aspect [4]. A large number of enterprises recognize that to implement information system is the only to be success. However, information system development of local companies faced many problems, such as low level development and slow process of e-business. To seek the reasons, besides slow development, high cost of software development and faulty market economy, we found that problems in implement of information system are one of the key points, such as slow process of system implement, big difficulty in system maintenance, conformity of different business systems, and so on. Especially, the conformity of different business systems has become troublesome issue of system implement [5-7]. This paper begins with putting

forward of those problems above, aims at resolving conformity of different business systems. After researching and analysis of Groupware, Web technology and the application of integration of these two skills, this paper comes out the meaning and intention to build an enterprise information system based on groupware and web technology. Then, two main aspects of enterprise information system, that is, OA and Business System, are considered. Following the ideas, two main aspects that this paper is trying to resolve are put forward, that is, OA based on Web and conformity of different business systems. After researching and analysis of the two typical system modes (C/S Mode and B/S Mode) of information system development, we design a new mode combined with these two. Nowadays, many companies are using the OA system implemented by Lotus Domino, in the other hand, as one of typical web application server IBM Web Sphere is undoubtedly the first choice of conformity with Lotus Domino Server. Therefore, the key skills include the conformity of Domino Server and Web Sphere Server and skills of web development of Domino. To be detailed, the key skills include object mode, automatic workflow and security mode of Domino, OSE remote connection, servlet redirector and security strategy of SSO in multi-server environment.

### II. WEB DATA MINING

Data mining from large-scale data found potential rules, extracting useful knowledge and skills. Because the database is closely related to, also are known as knowledge discovery in databases (KDD). Data mining will not only learn knowledge, knowledge and be able to identify the unknown given knowledge is "explicit", both being understood, and

easy to store and apply, it appeared to get widespread attention.

Knowledge discovery is a process of integrated systems, and data mining is just one link. Data mining is just one step in the whole knowledge discovery system, but it is one of the most important and most critical steps. We can say that data mining is the core technology of knowledge discovery; data mining algorithms directly affects the quality of knowledge discovery. Good data mining algorithms can be quickly and efficiently mining data because internal rules so as to enable the whole system more useful knowledge, and speed of data mining or knowledge discovery or eventually found inadequate for effective knowledge. Knowledge discovery in databases was identified from the database effectively, novel, potentially useful and understandable model of advanced process [8].

Web data mining generally can be defined as: from www-related resources and extract interesting, useful patterns and hidden information. In general, web data mining can be divided into three categories: web content mining and web usage mining, web structure mining.

Web content mining is the mining of web page content. Includes: (1) intelligently extract information from the www search tools. (2) The database methods: reconstruction of semi-structured web more structured, we can then use standard database query mechanism analysis and data mining methods. (3) Mining the content of HTML pages, the text in the page text mining, multimedia information mining of multimedia information on the page including the content of the page classification, clustering and association rules.

Web structure mining the link structure of the web document reveals useful pattern structure contained in these documents is a web of data processed data. Hyperlinks between documents reflect a link between documents, such as contains, subordination, references, etc. More representatives of these tools is the page rank and clever, they use the link information between documents to find relevant web pages.

Web usage mining is on the left by the user when accessing the web server access logs for mining, namely access to the user access to the Web site for mining. Mining object is included on the server, such as server log data log. Mining methods are including as follows: (1) path analysis; (2) discovery of association rules and sequence patterns; (3) cluster and classification. Web usage mining can automatically discover users access web pages from the web server mode that group of users or an individual user access patterns and interests.

Data mining based on web general includes the process: data acquisition, pre-processing, patterns, pattern analysis and the application. Web mining process consistent with the preceding data mining process can be divided into business objects, data preparation, data mining, analysis and validation of results in several stages. (1) Business objects: data mining in the first before exploring issues of evaluation, prediction, goals and basic structure of set mining, not blindly process the data. (2) Data preparation: web mining data processed by user background information and Web page consists of two parts.

User background information part from Yu user of registered registration information, this part information records has user of private information, and social background, and work information and interest hobby, but for these information involved personal privacy, many user unwilling to in website Shang registration real content, this on to zhihou of data mining caused has obstacles; another part from user of browse log, this part information can reflected user of using preference, also can in must of side reflect user of social background, information. Web page file is a key component of the site, users through their acquisition of knowledge. Data preparation: background information from the user and Web page files to extract information, pretreatment, have access to the data. (3) Data mining: selecting and designing appropriate data mining algorithms, data analysis and processing to the data preparation phase gets, find the expected pattern. (4) Analysis of authentication: verify the correctness of the data mining phase results. If it is incorrect, the gradually rolled back, amend the preceding steps if the results are correct, then further analysis, interpretation, guide site design and renovation.

Based on remote meeting platform combined web data mining technology, understand and master students learning of interest, and browse mode, and learning status, and need of navigation help, get conducive to remote meeting of fresh mode and rules, guide teaching material of arrangements and courseware of design and improved, improve remote meeting of quality, building a perfect of online virtual teaching system, makes students of remote meeting learning mode more intelligent of, and personalized.

### III. WEB-BASED VISUAL CONFERENCE SYSTEM

Web technology is used for many communication purposes. People post messages on the web board, and do chatting on a web environment. Due to the development of web cameras, nowadays many web surfers engage in multimedia chatting. In other words, people can conduct video conferencing through a web page. This method is definitely cheaper than non-web-based video conferencing which usually utilizes dedicated lines or satellites. This mode is called unicast which cannot be used for multiple presentation of moving images in the same screen. In unicast mode one can only see one screen where a single moving image is projected. Of course it is possible to add multiple screens, however this requires separate lines, i.e., multiple number of unicast video conferencing systems. But it is also true that the unicast method provides high quality picture and no delays in projecting moving images whereas existing web-based multicasting method carries significant delays in showing moving images, which can result in irritation and inconvenience for participants.

Furthermore two-way or interactive conversation in the existing web-based multicasting systems are often slow and limited to just two parties; real-time simultaneous multi-party conversation is usually not available. In this paper, the new web-based multicasting system that overcame the problem of "delay" in projecting moving images and allow real-time simultaneous multi-party video conferencing. This

is possible through a technology called "tunneling" which reduces the delay time at the negligible rate. This web-based interactive multicasting system can replace expensive non-web-based unicast-style video conferencing technology as well as slow web-based existing video conferencing technology. With this system, one can not only do video conferencing but also broadcasting any video over the web page where the whole screen is divided into sections of showing participants' moving images.

In other words, teaching a distance course with this system will cost much less than existing TV-based method. Web based learning has been around already for quite a while. But the problem of lack of interactivity and delays of showing moving images hindered further development in real-time multicasting-based distance meeting. This new technology will contribute a lot to distance meeting area by providing much cheaper and faster solution that can be interactive and multiparty-participation-possible. Web-based distance meeting is one of the most promising areas in electronic commerce. And the success of web-based learning relies on the maturity of information technology infrastructure of the nation. There are studies showing the fact that the information technology infrastructure for electronic commerce is a key factor for the success of electronic commerce. For example, high-speed Internet service available for most of the nation's population is a critical success factor for the rapid rise of electronic commerce in South China. China has been recognized worldwide as one of a few nations with highly developed information technology and Internet infrastructure. As for the high speed Internet usage rate, China is reported as the number one country in the world. More than 10 million users subscribe to high-speed Internet services via such means as ADSL, VDSL, community LAN, and satellite. When taking the total number of Chinese population into consideration, the high-speed Internet subscription rate in China is roughly 21% according to the Chinese government ministry news. This is a remarkably high usage rate when compared to those of other OECD countries since the average rate of high speed Internet subscription in OECD countries is just 1.26%. For many consumers in China, the Internet is just a part of their normal daily life. With the high-speed Internet available at very cheap price for almost all households, many electronic commerce firms flourish. Thus web-based multicasting video conferencing system is workable well in this highly-developed information technology infrastructure and web-based learning industry can be benefited much from this new technology.

Web-based multicasting video conferencing system employs none M-bone router-supporting method. This method makes a different compared to the existing unicast-style video conferencing technology. In the existing technology, the system cannot send multicasting data packet in M-bone supporting network environment. Regardless of support of M-bone by its routers, the web-based multicasting video conferencing system can send multicasting data packet by using tunneling technology. Figure 1 shows how tunneling technology works. In the existing method, data packets are unicast from a server to a router and to a sub

router computer. In this way, two-way IP multicasting is not possible. However with IP tunneling technology the sub-router computer will recover data packets in web based multicasting video conferencing system. This way also allows receiving data packets in reverse direction. Thus two-way IP multicasting is possible in the new system. What makes the new system superior is the fact that the time delay of showing moving images is less than 0.5 second, which means that the time delay is almost negligible. Figure 2 shows an actual example of video conferencing screen using the new system. In this example, 10 people are participating in two-way real-time video conferencing.

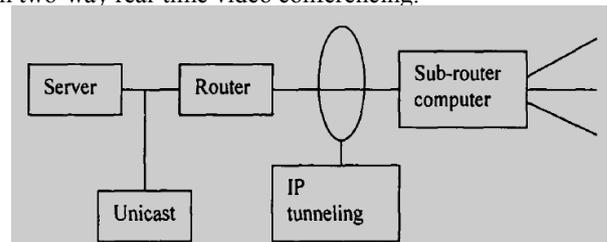


Figure 1. The tunneling technology work ways.



Figure 2. The actual example of video conferencing screen using the new system.

Web based learning has been around already for quite a while. But the problem of lack of interactivity and delays of showing moving images hindered further development in real-time multicasting-based distance meeting. Figure 3 shows the model of web-based visual conference system and figure 4 shows the topology of web-based visual conference system.



Figure 3. The model of web-based visual conference system.

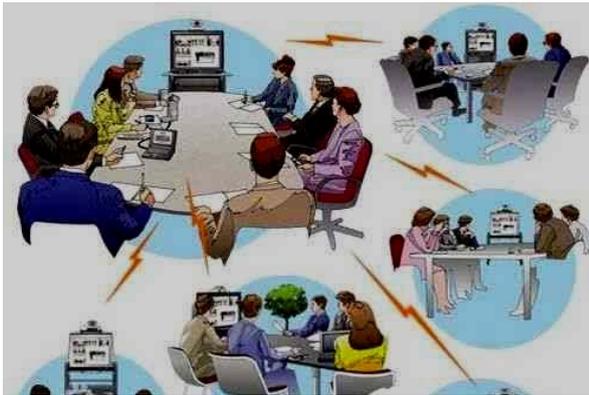


Figure 4. The topology of web-based visual conference system.

#### IV. RESULTS AND DISCUSSION

To give further evidence to prove the reliability and efficiency of the algorithm, we test the operating efficiency of the ASGKA agreement on PC.

The configuration parameters of the PC are:

CPU: AMDTurionX2RM-70@2.OGHz.

Memory: 2G

Operation System: Ubuntu

It should be noteworthy that ASGKA extended agreement is better than the ASGKA when we change the members of the group dynamically. It makes the group members needn't conduct a renegotiation, but based on the established foundation, using the key which is negotiated at the time establishing the group, to simplify the operations. Therefore, the complexity of the algorithm is as same as the original ASGKA algorithm when using the extended agreement to construction group at the beginning.

Expanded dynamic ASGKA is more suitable for video conferencing and some network group communication system, which is mainly performed in the following characteristics:

1. Without a trusted dealer, Consultation process as the agreement does not require third-party service providers, which ensures that confidential information is not compromised. Solve the problem that the video conference service providers do not trust the user.

2. Build self-organizing network, in the situation without central control point and base station case, it is also possible to create self-organizing network to ensure the safety of mobile communication devices to communicate.

3. Making Temporary video conferencing into reality. Asymmetric key do not need distribute key before, each user have their own keys which has a higher security, and it is possible to reach the key agreement and distribute the key during the video meeting to solving the difficult problem of Symmetric key of the temporary meetings.

4. The time complexity of the Algorithm is low, this algorithm need only one round to finish the key agreement on N sides, the number of rounds of the algorithm does not increase with the user increases linearly.

5. Algorithm is Forward Confidentiality, the newly added user cannot decrypt to get the information which before the user joining the group.

Meanwhile, the video conference users can exist in two or more groups at the same time. The system will only distribute a pair of public and private key once, this pair of keys can be used in many groups, which improve the efficiency of the system and reduce the degree of data redundancy.

This system use ASGKA extended agreement constructing the confidential channel, and we deliver the initial value of encryption algorithm through the confidential channel, the system also use the chaotic encryption algorithm based on the logistic map to encrypt it, this encryption algorithm is a lightweight algorithm which is suitable for handling a large amount of media stream data ensure the fluency of the video at the same time, due to the Redundant information in the media stream data, to improve the efficiency of the confidential algorithm, the system select confidential algorithm to further optimization, extract media stream data frame, DC sign bit ,AC sign bit, Motion vector sign bit to do encryption operation.

Though this way, we can combine the ASGKA agreement with the chaotic encryption algorithm. It is constructing of a high security system environment for the video conferencing system. Figure 5 shows the efficient rate of the system. TABLE I shows the comparison events while use the system in the low-speed/unstable Internet environment.

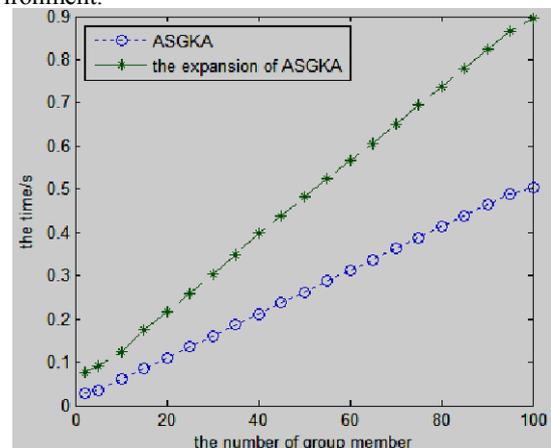


Figure 5. The efficient rate of the system.

TABLE I THE COMPARISON EVENTS WHILE USE THE SYSTEM IN THE LOW-SPEED/UNSTABLE INTERNET ENVIRONMENT

Events	Old system	New system
Annotation delay time	1-2 sec	<1 sec
Video streaming delay time	>1 sec	<1 sec
Voice streaming delay time	>1 sec	<1 sec
Mistake network disconnection occurred	>1 sec	<1 sec
Network connection is coming	N/A	Automatic reconnection

## V. CONCLUSIONS

In this paper, the author studies on the enterprise virtual video communication system based on WEB technology. After researching and analysis of the two typical system modes (C/S Mode and B/S Mode) of information system development, we design a new mode combined with these two. Nowadays, many companies are using the OA system implemented by Lotus Domino, in the other hand, as one of typical web application server IBM Web Sphere is undoubtedly the first choice of conformity with Lotus Domino Server. Web-based distance meeting is one of the most promising areas in electronic commerce. And the success of web-based learning relies on the maturity of information technology infrastructure of the nation. There are studies showing the fact that the information technology infrastructure for electronic commerce is a key factor for the success of electronic commerce. For example, high-speed Internet service available for most of the nation's population is a critical success factor for the rapid rise of electronic commerce in South China.

China has been recognized worldwide as one of a few nations with highly developed information technology and Internet infrastructure. As for the high speed Internet usage rate, China is reported as the number one country in the world. Therefore, the key skills include the conformity of Domino Server and Web Sphere Server and skills of web development of Domino. To be detailed, the key skills include object mode, automatic workflow and security mode of Domino, OSE remote connection, servlet redirector and security strategy of SSO in multi-server environment.

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