DELIVERY OF LECTURES USING VIDEO ON DEMAND

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ABSTRACT

The use of Video on Demand (VOD) in teaching and learning have become widely use. It is one of the most desirable ways to deliver lecture especially in distance education. This paper review issues relating delivery lectures using VOD. Among the issues is the need of using VOD lectures as alternative to conventional face-to-face lecture. Technical requirements for different approaches of VOD such as bandwidth, capacity and reliability will be highlighted in this paper. The effectiveness and the challenge of VOD in education also been discussed.

INTRODUCTION

The rapid growth of technology and the demand for more information at a faster pace is making learning as a key component of education technology in the current education phenomenon. Today, numerous of higher education institutions offer their students the online events associated with different aspects of their learning experience with most focused on giving physically present students access to replays of lectures and seminars. Some of these events are also made available live to enfranchise remote and distance learning students. This emerging has transformed the way of teaching and learning method from the traditional way (face-to-face) into the digital video-recorded technology.

On the increase custom of computer’s network, as well as broadband services, resulting the major impact of web-based learning (e-learning). In conjunction with the explosive growth of Web, which is almost double the rate of growth of the Internet as a whole, one concept in particular has been receiving a great deal of attention: webcasting. Concisely, webcasting is the transport of audio or video streams across the internet or intranet, to be served from, and viewed within a web browser. There are essentially three types of webcasting technology such as live streaming, pre-recorded streaming and video-on-demand (VOD).

Face to face communication between lecturers and students was the normally route in the traditional method of lectures delivery. Unfortunately, this may result the left out to any absentee. The usage of VOD technology could be the solution to lessen this difficulty. Depends on chosen method, VOD’s technology allows students to view the recorded lectures either by using television or computer.

Before the emerging of VOD technology, lectures were recorded and stored in the analog sequence (i.e. VHS tape). It can be borrowed from the library and view it on television. The recorded quality will be decreased as the result of frequently usage. Nowadays, for more reliable transmission, lectures can be easily found in digitize format either in VCD format, DVD format or it could be possibly stored in a server by using several formats. In most cases, VOD technology provides students the pleasant accessibility to profound for any suitable online information.
VIDEO ON DEMAND

VOD systems allow students to select and watch video content over a network. VOD systems are either "streaming", in which viewing can start as the video streams over the Internet, or "download", in which the file is brought in its entirety to a computer before viewing starts. All download and some streaming video on demand systems allow the student to pause, forward and rewind to previous/future frame. For streaming systems this requires more effort on the part of the server, and may also require greater network bandwidth.

A Video on Demand system provides video services in which a students can request a specific piece of video information such as movie-on-demand, remote learning and interactive news at any time. Thus, it is a major challenge to design a video delivery system that can maximize students' perceived quality of service while achieving high resource utilization in the Internet environment. The main requirements for such systems are high-speed, high capacity, reliability, and the ability to provide video data to a large number of distributed students interactively. The growing demands of such services suggest the design of VOD system that satisfies these requirements in bandwidth, availability and capacity.

It is possible to put video servers on LANs, in which case they can provide very rapid response to students. Streaming video servers also can serve a wider community via a WAN, in which case the responsiveness may be reduced. Nevertheless, it is possible to provide streaming VOD services over a wide area network. Download VOD services are practical to homes equipped with Asymmetrical Digital Subscriber Line (ADSL).

ADSL technology, which has demonstrated its capability to deliver VHS-quality video over existing unshielded telephone lines, has the potential to drastically reshape the way distance education will be delivered in the future. ADSL increases the capacity of existing telephone lines with its ability to facilitate the high-speed transmission of data. Combined with video-compression algorithms, ADSL can produce video on demand to virtually anywhere there is a telephone line -- thus bringing interactive-distance learning into every living room.

VOD PRACTICE AT HIGHER LEARNING INSTITUTIONS

VOD system had been used widely in many higher learning institutions. For example, University of California, Berkeley thru Berkeley Multimedia Research Center (BMRC) has developed The Berkeley Distributed Video-on-Demand system. The system is the product of a research project that is designed to provide access to a large quantity of video information over computer networks. Clients across the Internet can submit requests to the VOD system to view audio, video and graphical streams. Playback is accomplished by streaming data from a media file server through the network to the client's computer. They are currently working on web-based front-end tools for the VOD System. These will include tools for on demand web playback, and a graphical student interface to the database for remote video content authoring. These tools will allow any student to add media elements to the storage system and access them later.
Nanyang Technological University (NTU) in Singapore offers its 22,000 students and staff an innovative video-on-demand service that lets them view video clips and movie segments at one of 500 Intranet PC portals dispersed throughout the campus. Students who want to watch a video clip browse NTU’s Media Resource Library, via one of the university’s Intranet Portals - i-Gateway to Educational and Media Services (iGEMS) - located throughout the campus. Students and staff can browse through lists of pre-defined categories or conduct a search of available titles. They then send a message to a librarian who selects the requested clip, encodes it in real-time and stream it to the student over the university’s local network. The entire process takes just a few minutes. The beauty of the system is that students don’t have to be in the library to view the video clips. They can access NTU’s digital media library from 500 iGEMS located throughout campus.

**IMPLEMENTING VIDEO ON DEMAND**

There are many approaches and techniques to implement VOD. From the basic to the advance system depending on the requirement and budget allocation. Many approaches have been proposed to deliver video over internet effectively. A common architecture is the single server model. However, the single-server approach suffers from lack or reliability and scalability. A single-server cannot survive server failures and lacks the capacity to support large number of concurrent students.

For commercial VOD system, the requirements can be in form of video servers, video software, service management, middleware, streaming software, routers and set-top boxes. For the simple VOD setup, it just needs a streaming server, a personal computer and a highspeed bandwidth to connect between the server and clients.

The researcher from Institute of Multimedia and Software, Universiti Putra Malaysia (UPM) had experienced in setup the VOD system while conducting the research study called “Effectiveness of Webcast Lecture in Higher Education”. The research was carried out to study the effectiveness of webcast mode compare to the traditional face-to-face class. Different modes of lecture delivery namely Live Streaming, Video on Demand and Pre Recorded was used in the research. The VOD system using the available resource and equipment within the Universiti Putra Malaysia campus.

To ensure the research are running smoothly, the selected subject should be identified and then being transfer into the PowerPoint slide presentation. After all the materials were firmly set up, video recording will be the next process which is showing a lecturer delivering the module(s) using those completed presentation(s).

Any superfluous scene(s) will be deleted during editing phase, meanwhile the superimpose technique could be added when it is necessary. This is due to help student(s) who had hearing problem (i.e. in the noisy room). The combination between text and video recording could provide much solid explanations. (Chisholm, Vanderheiden and Jacobs, 1999).

The recorded lectures were stored in Information Technology Division’s server. From the Faculty of Education Studies laboratory, students are able to access those lectures through UPMNET’s network, which upholds Gigabit Ethernet technology with the bandwidth of 1000 Mbps. Each laboratory’s computer was connected to switch with 100 Mbps capability of data transmission. The setup for the system is described in Figure 1.
Once a VOD session started, it is usually supposed to last until the video is ended. To efficiently utilize the network bandwidth, a VOD server often employs certain mechanisms to explore the sharing among sessions. As a result, a VOD client usually obtains data by both sharing from other sessions and receiving a particular transmission from a server for its request. Because many students often share a UPMNET, there is a great opportunity that some students request the same lectures video around the same time. Due to the broadcast nature of a network, common data of different requests on the network can be easily shared among VOD sessions through presetting/prefetching and caching. However, because videos last long periods, when many students access the VOD service on a UPMNET for various videos simultaneously, their requests may be delayed or dropped due to the limited network bandwidth. How to efficiently serve as many VOD requests as possible with the limited network bandwidth is a critical issue in the VOD service.
ISSUE AND CHALLENGES FOR A VOD SYSTEM

There are several challenges and issue when setup a VOD system. A VOD solution is more than a video server. While the video server is a key component, a comprehensive solution also includes the management and automation software to run the system efficiently, to provide performance information, and to automate the distribution of videos across the network. It must be flexible to support bandwidth requirements and smart enough to anticipate bottlenecks and conserve resources. It should include all the tools to allow you to evaluate performance and to troubleshoot problems.

The system must be able to deliver 100% service uptime to their clients. So the VOD system must be highly resilient to faults. The video server should be designed with no single point of failure and must have access to video files regardless of failure. At the management automation system level, there must be built-in safeguards, and remote monitoring capabilities for the entire system. In term of system scalability, the system should be able to scale in a linear fashion in three areas: (1) increasing the number of video streams; (2) increasing the amount of storage; (3) increasing the number of interactive applications and/or services. One VOD platform should be able to provide this without forklift upgrades or re-architecting the system. And it must be able to do this incrementally and economically.

CONCLUSION

This new technology is being developed all the time, because VOD has so many different applications to offer to the customers and economical possibilities have been seen. Many companies, organizations and universities are developing products and standards. UPM is one of a university which is involved in research on the effectiveness of VOD technology for student.

The overall analysis result from the research that has been mentioned earlier showed that the students who went through the VOD group showed the most gain in the tests. Lecture via VOD technology gave positive impact towards students’ learning as compared to the other two webcast technologies used. It could be due to the interactive features of VOD technology. Students are able to control the lecture video sequences and suit the sequence to their needs. For example, they can decide when to play, pause, stop and others.

This study has showed the effectiveness of VOD mode of delivery as compared to pre-recorded and live streaming webcast deliveries and face to face delivery. However, more studies need to conduct especially to ascertain the effectiveness of Webcast technology in delivery of lectures for content such as mathematics, and for courses that involves demonstration or laboratory work.
REFERENCES


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