Best Practice: Streaming Server for educational videos at Universities

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Abstract—In this paper we present a video streaming solution. It describes the functionality of streaming server at our university and the workflow to embed videos into the learning platform Moodle. By the server-side role management teachers can get access to upload their recorded lectures to the server. Videos will be converted into different streaming formats and embed into the learning platform with provided embed code. The number of teachers who use this proposal is continuously growing at our university. Beside the lecture scripts the videos watched often by the students what the numbers of video accesses in the Moodle course and the streaming server traffic significantly show.

Index Terms—Educational Video, Streaming, Servers, Distant Learning, Educational technology

I. INTRODUCTION

Video media is an extremely powerful teaching resource, especially for engineering education. It has been observed that, use of video resources is increasing in departments of all disciplines [1]. In recent years, online video technology has increasingly found their way into the teaching at universities. Streaming video can enrich the courses necessary for this are stable, strong and at the same time easy to use performance streaming media services. We present a practically proven possible solution.

Since March 2012 a project supported by BMBF (Federal Ministry of Education and Research) for improving of the quality of education and blended learning was started and some new improvements in the topic eLearning are done at our university. Behind improvements in the learning platform and online tests at the last period, especially in the subject of lecture recording and learning videos was investigated. As an important base it was recognized early to install an own efficient video server. After research an exempt from charges solution was found and implemented. In addition to the free video server solution, there is also a commercial solution, here we speak only about the non-commercial community solution.

II. TECHNICAL BASIS SYSTEM

Four hardware servers were purchased to run virtual machines. Two different server types Dell PowerEdge R620 and R720 for video streaming and eLearning were purchased to store all data 16 TB storage for eLearning, video server and data protection. The servers are connected with a hardware bridge, in case of a server is going down all virtual machines move to the second server without time delay or even failure. The server software as well as the virtualizations are based on Linux Server operating system. The administration of the virtual servers occurs about Virtual Machine Monitor (VMM) with the open source virtualization platform XEN [2]. The administrator is able to control, start and stop the virtual servers. The streaming service based on the HTTP protocol. Adaptive streaming based on HTTP enables the client to dynamically adapt the quality of requested video according to the available bandwidth, thus providing a better user experience and quality of service [3].

III. UPLOAD AND PUBLISHING VIDEOS

The streaming server bases on the free system Kaltura Community Edition Video Platform (Kaltura CE) [4][6]. Beside the administration (See Fig. 1) and the monitoring, three main functionalities are available to the user with publisher rights.

Fig. 1. Administration and Management Console
First one is the uploading function for recorded video files to the server. The publisher has the functionality to upload videos from the desktop directly to the server (See Fig. 2). During the Upload the videos are converted equally automatically into the desired formats. According to size of the video, the number of videos converting at the same time, number of the formats to be converted and server capacity, the process last some minutes up to hours. The users who watch videos notice nothing of the process because the conversion is independent of the streaming process.

Second the transcoding settings is the functionality to convert videos in different formats for automatically streaming (See Fig. 3) and the third function to generate embed code for Moodle [5][7]. (See Fig. 4) In addition, different video players can still be created and integrated to the server. Publishers can design their own player with own design with color, size, special buttons and a list with branch marks to the different subjects in the videos. Therefore it is easier for the user to reach the desired part in the video.

Since current year teachers of our university upload videos to the server and embed into Moodle. There are two ways to embed videos into Moodle. The first one uses text field in Moodle and embed code from the server (See Fig. 5, 6), second worked with a direct link to the player at server (See Fig. 7). Students can watch the videos in the Moodle course with PC and mobile devices. The player embed code at the moment is only for Flash Player, the next upgrade to a newer version will bring HTML5 Player functionality, then all mobile device can get easy access to the videos.

Students can easily open and close the videos in the Moodle course. The player automatic detects the bandwidth according to Internet connection for the transmission and could be enlarged infinitely variable depending on the screen size.
IV. EXAMPLE COURSE AND ACCESS STATISTICS

As an example we cited a course of civil engineering with 35 students from the actual semester. For every lecture unit and practice in this course on the learning platform we can find videos retrieve from video server (See Fig. 8).

In this course learning videos are almost as often called as lecture scripts. In Figure 9 at the left side are the different activities in the course and on the right side the access to the activities.

For monitoring the administrator has access to the streaming server up- and download statistic. In Figure 10 we can see the inbound and outbound traffic in bits per second for a period of ten days from the beginning of the actual semester. Green color is when the teacher (content manager) or administrator upload new videos to the streaming server and blue color are the streaming access when students watch the videos. After uploading a new video there’s a big increase in access to the streaming server what the blue graphs clearly show.

V. CONCLUSION

In this paper a video streaming server solution was introduced. The practical application at our university was shown by the role management on the server lecturers that can upload videos and embed in their courses. The connection between video server and learning platform is produced with embed code and direct linking. At the moment we test the direct binding of the server to Moodle with the help of the Kaltura Moodle module; with this we enable the lecturers to load videos directly from Moodle to the server. By the Community the development of this server software continuously goes on. So next time an upgrade of the actual video server for a newer Kaltura version around even more functionalities and a better performance will be carried out.

We ascertain that learning videos are as important as lecture scripts. Whether learning videos are more popular or better than scripts for learning, we cannot say yet, this could be found out in an extensive study.

REFERENCES

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