



SCRIPT OF TALK

TITLE: Architecture of a MOOC - Low Band-width Scenarios

SPEAKER: Prof. T.V.Prabhakar

NARRATION:

Hi!! Welcome back. Today we're going to look at low bandwidth scenarios. What do we do when the connection between the user and the server is of a low-bandwidth? My name is Prabhakar, I'm with IIT-Kanpur. We have seen in a moocs there are these major aspects. We have resources, interaction, identity assessment, analytics certification and event. And, if you look at the content part the major ones are these, the lessons that are given by the instructor to the student, the interaction that happen between the students and between the instructors TAs and the students and so on, and the assessments that the students submits and are used for certification and also for learning. Now let's see each of one these in detail. Lessons, these lessons are typically video lectures. They are released periodically that means every week or so you get a bunch of them they come in batches and you can view them at your convenience, whenever you're free and wherever you are, you can connect and watch the videos and the bandwidth required to watch this video is typically quite high. If you look at the interactions, interactions are Forums, Hangouts and Chat sessions and so on. They are happening continuously they're not coming in batches. It is on all the time especially, if you have participants who are from around the world from all time zones then, you have the chat rooms and the forums continuously being busy. Now, they happen in real-time on near real-time. Chat sessions happens only when you're there and even forums a question is asked and we expect an answer to come soon enough and then sometimes question may become stale and you may no longer be interested in the question if it doesn't get answered in good time. If you are participating in a textual interaction like let's say a forum or a chat session a textual chat and the bandwidth requirement is not very high but if it's a video hangout then of course the requirements go up. If you look at assessment assessments are a mixed bag. Assessment are basically Tests, Assignments and Quizzes you may talk about these can happen quite frequently

depends on the course and the certification requirements and the kind of certificates that are being given and so on. Sometimes, there may be videos which have questions in between interwoven inside the video. So, the video is playing suddenly it will stop and prompt you to say YES or No to form question or to choose one of the multiple choices. We don't have such videos in our moocs but there are several moocs which use this kind of technology. So, these are the assessments that are possible and normally, the Time window to do an assessment is good enough reasonable they will give you a let's say an exam and say okay you will have to take it in next two days, you will have to submit the assignment in the next three days, except for the inline questions inside the video the Time window is a reasonable and the bandwidth requirement is not very high. Now, so videos require a large amount of bandwidth and how do we get to view them they are streamed from a server our videos are kept on a You Tube. You Tube is the largest video streaming server, there are other services of course and what You Tube does is actually it will chop up the video into small segments and send them part at a part, part at a time and you can actually look at one YouTube video given here which explains how this happens. And they come in resolutions of varying kind 240p lowest resolution 1080 P is high-definition 'P' stand for progressive the problem is when I connect to the internet using let's say my cellular network or whatever then the bandwidth I get may not be enough to support the video streaming. I tried to put together to tables in this slide you can see on the left hand side on this side I have the kinds of networks that are there and the bandwidths that they support. If you look at 2g GSM network its bandwidth is of the order of 10 kilobits per second and you can only do voice calls on it now when you get to 2.5G or Edge or GPRS as they are called you will be able to start doing email and Internet but if you want videos you are looking at 3G networks if you look at the right side this table we have here the various resolutions in the first column and the minimum Bit-rate to support that in the last column. So, if you're looking at 240p then I require 300 kilobits per second which means I need a 3G network. So, now you know actually 3G networks especially in India are not working too well or not present in all over the country so we have issues. So, the question is what do we do when the network connectivity does not support video streaming? Can we use Moocs as a solution for our educational needs in such times So, typically I am talking about what I call them SPOCs you

know what SPOCs is a special online course in development scenario like for example we did a course on Mobiles for development. How do we use mobile phones in developmental challenges? So, a course like that if it has to reach a large number of stakeholders then they need to see the videos and but to see the video you need a 3G network and the 3G network is not present. The videos would take a very long time you keep seeing the 'spinner' that's called the spinner the circle which is seems to go round and round waiting for content to come. But the thing is participants on those courses which may not be able to see the videos streaming but they may be able to participate in textual interactions. Let's say you have an Edge network going then you can see what's happening in the chat room maybe or a follow the forum questions and so on and assignments may be possible because you do your assignment offline and then submit it let us say. So, assessments are also possible, video streaming is an issue. So here are some recommendations on what's possible.

One of the things you can do is you can permit the download of the slides and transcripts of the video. So, these are textual files and these need not be streamed you can start downloading it will take some time but once it is downloaded you can go through them. So, this is one way to handle when the conductivity is poor permit download of slides and transcripts of the actual talk. Sometimes, you may not want to show the video but just the audio along with the slides so the student will be able to hear the lecture he can't see anything but still he will be able to follow what's happening. Of course a very simple solution is to just mail the videos on a DVD we've done that to several of our users in 'The Mobiles for Development' course because YouTube is not reachable from where they are. This is a very efficient and it works you all know it works. There is another way were you can use some technology which is I'm calling it using a local server I have a picture here. So, this is how the connectivity is right now we have lots of users they have various kinds of the devices and they're connecting to the server through the internet the problem is these connections are not good enough. So, what we could do is we could create a local server in the location they are in and make them connect to the local server and content can be brought in from the mother server to the local server through various means. For example, it could be just sent over mail, the DVD can be sent and loaded on this sometimes it may be possible to provide a connection for one server in a village but not for

each one of the individual users. So, through some means you can load the content on your local server and then these end-users the final students will connect to the local server using let's say Wifi. So, this is what we're calling Madhyam. Madhyam means intermediary conceptually this is how it will look this is a Use case of a Madhyam let's say I have my content repository somewhere in New Delhi and there is a school in some village in a remote area of Uttar Pradesh and I want to push some lessons from my server to the school. What I can do is I can put a local server in the school and allow the students of the school to connect into the local server using wifi and the server itself is loaded through a DVD mailed to the school or through a broadband connection that is available for the school or it can be loaded in a cyber cafe or a common service center as we call it and so on. Essentially, these are all intermediaries they come in between by end user and a content repository. You can read more about it in a master's thesis by a student of ours. This is how we manage low bandwidth scenario.

Thank you