JMI, Vol 10 (2) (2023) pp. 13-18

Published by: Institute of Computer Science (IOCS)

JMI (Jurnal Manajemen Informatika) Medicom

Journal homepage: www. journals.joninstitute.org/index.php/jmi

Video Streaming Implementation for Open Source Based Online Learning

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ARTICLE INFO

Article history:

Received Aug 25, 2023
Revised Sep 11, 2023
Accepted Sep 25, 2023

Keywords:

Video Learning
Server
Video Streaming
Delay
Packet Loss
Throughput Jitter

ABSTRACT

The very rapid development of information and communication technology encourages various users, institutions and agencies to utilize video learning systems or video tutorials as learning media to increase the effectiveness and flexibility of learning. The advantages that can be obtained with video learning are in terms of flexibility and mobility. Through video learning learning material or video tutorials can be accessed anytime and from anywhere and the material can be enriched with various learning resources. Through video-learning, tutors or instructors can make their own video tutorials as learning materials for students or employees which can be accessed directly via their own server or website so they can add more value to their practice. The results of implementing video streaming for Online Learning using the Linux Ubuntu Server operating system and the Ostube application with internet network infrastructure using TelkomSpeedy Internet Service Provider (ISP) with a bandwidth of 1 Mbps obtained the results of measuring the delay parameter with an average delay value of 6.6 ms so that it can be concluded that it is included in the very good category. The results of measuring the packet loss parameter obtained an average packet loss value of 0%, which is included in the Tiphon version of the very good category. For the measurement of Throughput values obtained an average value of 3987 kbit/sec. While measuring the peak jitter value, the average value of jitter time is 2,909 ms. From the calculation of the jitter value, the category of jitter degradation according to Tiphon's version is very good. 6 ms so that it can be concluded that it is in the very good category..

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1. INTRODUCTION

Currently, multimedia technology, especially video content, is widely implemented in computer networks, both LAN and internet-based. With the rapid development of video streaming applications which are widely used by people in Indonesia in their daily lives. With video streaming, users can use it for various activities such as streaming or downloading learning video tutorials and also as a monitoring tool that is applied to CCTV and IP cameras.

Video streaming is a term that is often used when viewing videos on the internet through a browser where the user does not need to download the video file to be able to play it. This term consists of two syllables, namely video and streaming, in terms of video means technology for capturing, recording, processing, transmitting and rearranging moving images, while streaming means the process of delivering data in a continuous and fixed stream that allows users to access and use files. before the data is completely transmitted. So video streaming can be interpreted as a continuous

transmission of video files which allows the video to be played without waiting for the video file to be delivered in its entirety. Video streaming is widely implemented in the television world to broadcast from websites or send live broadcast images through websites or also called live streaming. So the images obtained from the live broadcast are transmitted as soon as possible and can be played via the internet.

The very rapid development of information and communication technology encourages various users, institutions and agencies to utilize video learning systems or video tutorials as learning media to increase the effectiveness and flexibility of learning. The advantages that can be obtained with video learning are in terms of flexibility and mobility. Through video learning learning material or video tutorials can be accessed anytime and from anywhere and the material can be enriched with various learning resources. Through video-learning, tutors or instructors can make their own video tutorials as learning materials for students or employees which can be accessed directly via their own server or website so they can add more value to their practice. Based on this background, the author is interested in making a final project entitled "Implementation of Video Streaming for Opensource-based Online Learning

2. RESEARCH METHOD

Research schedule

Table 1. Research Schedule Table

ACTIVITY	Month year															
	APRIL 2015				MAY 2015				JUNE 2015				JULY 2015			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Problem/Requirement Analysis	■	■	■	■												
Design / Simulation					■	■	■	■								
System Testing							■	■	■	■	■	■				
Results Analysis											■	■	■	■	■	■
Report Generation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Source: Self-Managed

Data collection technique

According to Hidayat (2011:73). In collecting data, the authors use two ways, namely:

Observation (observation)

To get clear data about this research, the writer directly took data on the object under study.

Literature review

The data the writer got from theoretical knowledge and through lectures and reading books that have something to do with the preparation of this thesis.

3. RESULTS AND DISCUSSIONS

User Needs Analysis

The need for video streaming can be used for various activities such as streaming or downloading learning video tutorials and also as a monitoring tool that is applied to CCTV and IPcamera. Video streaming is widely implemented in the television world to broadcast from websites or send live broadcast images through websites or also called live streaming. So the images obtained from the live broadcast are transmitted as soon as possible and can be played via the internet network.

Utilization of video streaming systems through video learning or video tutorials as learning media to increase the effectiveness and electability of learning. The advantages that can be obtained with video learning are in terms of flexibility and mobility. Through video learning learning material or video tutorials can be accessed anytime and from anywhere and the material can be enriched with various learning resources. Through video-learning, tutors or instructors can make their own video tutorials

as learning materials for students or employees which can be accessed directly via their own server or website so they can add more value to their practice.

Problem Analysis

The Online Video Streaming Server which will be implemented uses a public IP-based speedy internet connection using a bandwidth of 1Mbps where the modem is connected directly to the video streaming server device then the author measures the QoS of video streaming for Opensource-based Online Learning with parameters Delay, Packet Loss, Throughput and jitter by using the Axence Nettools application and iperf tools. The number of measurements was carried out 10 times by taking the minimum, maximum and average values for measurements with a measurement time of 3 minutes and the number of data packets varied.

Measurement of the Delay server parameters for video streaming

At this measurement stage, the author measures video streaming QoS for Opensource-based Online Learning with Delay, Packet Loss, Throughput and jitter parameters. The number of measurements was carried out 10 times by taking the minimum, maximum and average values for measurements with a measurement time of 3 minutes and the number of data packets varied.

For the delay parameter, it uses milliseconds (ms) where the smaller the value obtained, the better the QoS, while the packet loss parameter uses the percentage loss, the greater the percentage loss value obtained, the worse the QoS value means the number of data packets lost (loss). when measuring, Finally, the throughput parameter uses kbps units, the bigger it is, the better the QoS value

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Table 2. Delay Measurement

Testing	Delay min (ms)	Delay max (ms)	Average Delays (ms)
1	2	314	9
2	2	85	5
3	2	92	5
4	2	82	5
5	2	127	7
6	2	102	5
7	2	52	4
8	2	496	6
9	2	986	14
10	2	213	6
Average			6.6

Source: Self-Managed

Measurement of Packet Loss parameters for video streaming servers

The results of measuring packet loss parameters on video streaming for Opensource-based Online Learning in Table 5.2 with 10x measurements obtained an average packet loss value of 0% with an average number of data packets sent by 351 packets. The Packet Loss measurement results are in the very good category of the Tiphon version. Factors causing packet loss can occur due to collisions or collisions between data on the network. Generally, network devices have a buffer to accommodate received data. If there is an overload on the network for a long time, the buffer will be full which can cause packet loss.

Table 3. Packet Loss Measurements

Testing	Data That Sent	Loss Data	% Packets *loss*
1	202	0	0
2	231	0	0
3	203	0	0
4	334	0	0
5	232	0	0
6	210	0	0
7	253	0	0
8	594	0	0
9	826	0	0
10	432	0	0
Average			0

Source: Self-Managed

Measurement of throughput parameters of streaming video servers

From Table 3 the results of measuring the Throughput value on video streaming for Opensource-based Online Learning with an average value (average) of 3987 kbit/sec, a minimum average throughput value of 131 kbps and a maximum average of 5711 kbps with time measurement of approximately 3 minutes, as well as the number of packages sent (sent) varies.

Table 4. Throughput Measurement Results

Testing	Min (kbps)	Max (kbps)	Average (kbps)
1	186	5614	4147
2	72	5812	4031
3	47	5678	3717
4	234	5831	4126
5	98	5782	3938
6	144	5678	3947
7	135	5680	4054
8	134	5649	3784
9	141	5803	4145
10	120	5590	3989
Average			3987

Source: Self-Managed

Measurement of Jitter parameters of streaming video servers

From Table 4 the results of measuring the peak jitter value in the test obtained the smallest time value of 1,251 ms while the largest time value was 6,892 ms with an average jitter time value of 2,909 ms. From the calculation of the jitter value, the jitter degradation category according to the TIPHON version is very good because the peak jitter is between the smallest range of 0 ms to 75 ms. the smaller the jitter value, the better the resulting QoS, the greater the value, the worse the QoS of the internet network.

The factors that affect the Jitter value are caused by variations in the queue length, in the data processing time, and also in the reassembly time of the packets at the end of the jitter trip. Jitter is usually called delay variation, closely related to latency, which indicates the amount of delay variation in data transmission in the network.

Table 5. Jitter Measurements

Interval(s)	Transfer (KBytes)	Bandwidth (Mbps)	Jitters (ms)
0.0-0.5	63.2	1.03	1.133
0.5- 1.0	64.6	1.06	3,776
1.0 – 1.5	63.2	1.03	1975
1.5 – 2.0	64.6	1.06	1,523
2.0 – 2.5	64.6	1.06	2,611
2.5 – 3.0	64.6	1.06	1,702
3.0 – 3.5	63.2	1.03	3,775
3.5 – 4.0	64.6	1.06	1,725

Interval(s)	Transfer (KBytes)	Bandwidth (Mbps)	Jitters (ms)
4.0 – 4.5	60.3	0.98	3,314
4.5 -5.0	66.0	1.08	2,230
5.0 – 5.5	64.6	1.06	2,384
5.5 – 6.0	64.6	1.06	1,251
6.0 – 6.5	60.3	0.98	6,892
6.5 – 7.0	67.5	1.11	3,983
7.0 – 7.5	64.6	1.06	4,888
7.5 – 8.0	63.2	1.03	2,396
8.0 – 8.5	61.7	1.01	5,099
8.5 – 9.0	66.0	1.08	3,344
9.0 – 9.5	64.6	1.06	2,746
9.5 - 10	64.6	1.06	1,450
		Average	**2,909**

The quality of the signal received is usually measured subjectively and objectively. The subjective measurement method that is commonly used in measuring the quality of speech coders is the ACR (Absolute Category Rating) which will produce a MOS (Mean Opinion Score) value. Sound and video quality has a minimum value equivalent to MOS 4.0. The data used in this study was in the form of a questionnaire using 20 Palcomtech students. In this study, variables were measured using a questionnaire with a value scale 5, namely the lowest score of 1 and the highest 5 states the question.

Bad answers are represented by number 1, poor answers are represented by number 2, Adequate answers are represented by number 3, Good answers are represented by number 4 while Very good are represented by number 5. As shown in the table below:

Table 6. MOS Parameters (Mean Opinion Scores)

/Video and Sound Quality	Mark	Index
Very good	5	4
Well	4	3
Enough	3	2
Not good	2	1
Bad	1	0

Source: Tiphon Project

Questions in the questionnaire contain respondents' opinions about the quality of video and sound produced by video streaming based on online learning using the scores on the questionnaire added to the number of respondents who are there after that take the number and average value and MOS index (Mean Opinion Scores). Based on the survey results in table 5.6 from 20 respondents it is known that the results of the MOS (Mean Opinion Scores) survey are as follows

Table 7. Survey Results

Quality Voice	Amount Respondents	MOS value	Index
Very good	15	5	4
Well	5	4	3
Enough	0	3	2
Not good	0	2	1
Bad	0	1	0

Source: Self-Managed

From the results of the survey table above, it was obtained that as many as 15 respondents or 75% answered very well while 5 respondents or 25% answered well from the results of the video and sound quality produced by video streaming with an average MOS value of 4.75 and an MOS index of 3.75 included in category close to Very Good.

4. CONCLUSION

The results of packet loss parameter measurements on video streaming for Online Learning with 10x measurements obtained an average packet loss value of 0% with an average number of data packets sent of 351 packets. The Packet Loss measurement results are in the very good category of the Tiphon version. The results of measuring the Throughput value on video streaming for Opensource-based Online Learning with an average value of 3987 kbit/sec, a minimum average

throughput value of 131 kbps and a maximum average of 5711 kbps. The results of measuring the peak jitter value in the test obtained the smallest time value of 1,251 ms while the largest time value was 6,892 ms with an average jitter time value of 2,909 ms. From the calculation of the jitter value, the jitter degradation category according to Tiphon's version is very good because the peak jitter is between the smallest range of 0 ms to 75 ms

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