

**BORANG PENGESAHAN STATUS TESIS\***

JUDUL: VIDEO STREAMING PERFORMANCE ANALYSIS

SESI PENGAJIAN: II / 2008

Saya MAHATHIR MOHAMAD BIN LAZIM

mengaku membenarkan tesis (~~PSM/Sarjana/Doktor—Falsafah~~) ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. \*\* Sila tandakan (/)

\_\_\_\_\_ SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

\_\_\_\_\_ TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

  ✓   TIDAK TERHAD

*Mahathir*  
(TANDATANGAN PENULIS)

*Marliza*  
(TANDATANGAN PENYELIA)

Alamat tetap :

84, Felda Sungai Tekam Utara.

27060, Jerantut, Pahang Darul Makmur

Tarikh : 02 May 2008

Puan Marliza Binti Ramly

Nama Penyelia

Tarikh: 02 May 2008

CATATAN:

\* Tesis dimaksudkan sebagai Laporan Projek Sarjana Muda (PSM)

\*\* Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa.

# VIDEO STREAMING PERFORMANCE ANALYSIS

MAHATHIR MOHAMAD BIN LAZIM

This report is submitted in partial fulfillment of the requirements for the  
Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2008



## DEDICATION

*To my lovely bonda Yasimah Abdullah  
and supportive ayahanda Lazim Ali..*

## ACKNOWLEDGEMENTS

First and foremost, I would like to thank Allah S.W.T, for letting me go through this period of time to finish my *Projek Sarjana Muda II*. I would also take this opportunity to thank Universiti Teknikal Malaysia Melaka (UTeM) for giving me this chance and to fulfill the requirement of completing Bachelor of Science Computer (Computer Network).

I would also take this chance to give special thanks to Puan Marliza Binti Ramly as my supervisor to give me full commitment and guidance through all this time. Without her advices, this project would not be complete and good as before. I would to show my appreciation to her because her patient to guide me anytime without any complains. Beside that, I would like to thank my assessor Encik Mohammad Radzi Bin Motsidi and Cik Zurina Binti Saaya of *Project Sarjana Muda II*.

I also want to express thanks to all lectures who guide me all through the project. I will appreciate the commitments and advices. Not forgetting to all family members who give full support to me to finish my project. The thanks wishes also goes to my classmates, house mates and anybody who help me and give full commitment to me with their concern and information regarding to my project. Thanks a lot to all of you.

## ABSTRACT

Video Streaming Performance Analysis is a project of analyze the performance of video streaming software over the network. This project will give so many benefits to user that want to enable video streaming services at their network. The performance of video streaming software will be test on analyzer tools Ethereal Network Analyzer. Ethereal Network Analyzer will be used to test the ability of video streaming software especially from aspects of protocol and byte. Some of the objectives of this project are such as to configure, implement, testing and aspect affecting performance of video streaming performance. Besides that, the scopes of the system are the analysis will be done for main aspects including protocol and byte. This project will determine the best streaming performance software. Then, this project also will cover on Local Area Network (LAN) network environment using video on demand application. The project methodology is using Top-Down Design Approach method. The video streaming software requirements for the project are Windows Media Player and Real Player in LAN environment. This project must be carry on because it will give so many benefits especially for intranet users in the future.

## ABSTRAK

Analisa Pelaksanaan Penghantaran Video melalui rangkaian setempat adalah projek untuk menganalisa persembahan perisian penghantaran video melalui rangkaian. Projek ini akan memberi banyak faedah kepada pengguna yang mahu menggunakan perkhidmatan penghantaran video dalam rangkaian mereka. Untuk menguji persembahan perisian penghantaran video, pelajar perlu menggunakan alat menganalisis seperti *Ethereal Network Analyzer*. *Ethereal Network Analyzer* akan digunakan untuk menguji kebolehan perisian penghantaran video terutama dari aspek protokol dan byte. Antara objektif-objektif projek adalah seperti untuk konfigurasi, implementasi, pengujian dan analisis aspek yang boleh mempengaruhi persembahan perisian penghantaran video. Selain itu, skop bagi projek ini ialah analisis akan dilakukan berdasarkan aspek utama iaitu protokol dan byte akan meliputi rangkaian setempat dengan menggunakan applikasi permintaan video. Projek ini akan mengenalpasti perisian terbaik untuk penghantaran video. Projek ini menggunakan metodologi *Top-Down Design Approach*. Keperluan perisian bagi projek ini ialah seperti *Windows Media Player* dan *Real Player* dalam persekitaran rangkaian setempat. Projek ini mesti diteruskan kerana ianya akan memberi begitu banyak kebaikan terutamanya kepada pengguna rangkaian dalaman pada masa hadapan.

## TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	<b>DECLARATION</b>	ii
	<b>DEDICATION</b>	iii
	<b>ACKNOWLEDGEMENTS</b>	iv
	<b>ABSTRACT</b>	v
	<b>ABSTRAK</b>	vi
	<b>TABLE OF CONTENTS</b>	vii-xi
	<b>LIST OF TABLES</b>	xii
	<b>LIST OF FIGURES</b>	xiii
	<b>LIST OF ABBREVIATIONS</b>	xv
	<b>LIST OF APPENDICES</b>	xvi
<b>CHAPTER I</b>	<b>INTRODUCTION</b>	<b>1-5</b>
	1.1 Project Background	1
	1.2 Problem Statement	2
	1.3 Objective	3
	1.4 Scopes	3
	1.5 Project Significance	4
	1.6 Expected Output	4
	1.7 Conclusion	4



<b>CHAPTER II LITERATURE REVIEW AND PROJECT METHODOLOGY</b>	<b>6-27</b>
2.1 Introduction	6
2.2 Fact and Finding	7
2.2.1 Domain	7
2.2.2 Existing System	7
2.2.2.1 Network Performance	7
2.2.2.2 Video Streaming	8
2.2.2.3 Network Architecture	9
2.2.2.4 Video Streaming Software	11
2.2.2.4.1 Windows Media Player	11
2.2.2.4.2 Real Player	12
2.2.2.5 Video Streaming Server	12
2.2.2.5.1 Windows Media Service	13
2.2.2.5.2 Helix Server	13
2.2.2.5.3 Darwin Streaming Server	14
2.2.2.6 Analyzer Tools	14
2.2.2.6.1 Ethereal Network Analyzer	14
2.2.2.7 Aspect Effecting Video Streaming Performance	15
2.2.2.6.1 Protocol	15
2.2.2.6.2 Byte	16
2.2.2.8 Video on-Demand Application	17
2.2.2.9 Video Format	17
2.2.3 Technique	20
2.3 Project Methodology	20
2.4 Project Requirement	23
2.4.1 Software Requirements	23
2.4.1.1 Video Streaming Software	23
2.4.1.2 Video Streaming Server	23
2.4.1.3 Analyzer Tools	24
2.4.1.4 Documentation Software	24

2.4.1.5 Operating System	24
2.4.2 Hardware Requirement	24
2.4.3 Network Requirement	25
2.5 Project Schedule and Milestones	25
2.6 Conclusion	27
<b>CHAPTER III ANALYSIS</b>	<b>28-36</b>
3.1 Introduction	28
3.2 Problem Analysis	29
3.3 Software Analysis	30
3.3.1 Video Streaming Software	30
3.4 Requirement Analysis	32
3.4.1 Quality of Data (Simulation Data)	32
3.4.2 Software Requirement	34
3.4.3 Hardware Requirement	36
3.5 Conclusion	36
<b>CHAPTER IV DESIGN</b>	<b>37-42</b>
4.1 Introduction	37
4.2 Network Architecture	37
4.2.1 Video Streaming Architecture	38
4.3 Logical Design	39
4.4 Physical Design	41
4.5 Conclusion	42
<b>CHAPTER V IMPLEMENTATION</b>	<b>43-61</b>
5.1 Introduction	43
5.2 Network Configuration Management	43
5.2.1 Configuration Environment Setup	43
5.2.1.1 Windows Media Services	44
5.2.1.2 Helix Server	47
5.2.2 Analyzer Tool	51

5.2.2.1	Ethereal Network Analyzer	51
5.3	Hardware Configuration Management	57
5.3.1	Hardware Setup	57
5.4	Development Status	59
5.5	Conclusion	60
<b>CHAPTER VI</b>	<b>TESTING</b>	<b>62-81</b>
6.1	Introduction	62
6.2	Test Plan	63
6.2.1	Test Environment	63
6.2.2	Test Schedule	63
6.3	Test Strategy	64
6.3.1	Streaming Server Testing	64
6.3.1.1	Windows Media Player Testing	64
6.3.1.2	Real Player Testing	65
6.3.2	Analyzer Tool Testing	66
6.3.3	Information of Data Testing	67
6.4	Test Result and Analysis	70
6.4.1	Protocol	70
6.4.1.1	Protocol used by Windows Media Player	70
6.4.1.2	Protocol used by Real Player	74
6.4.2	Byte	78
6.5	Conclusion	80
<b>CHAPTER VII</b>	<b>PROJECT CONCLUSION</b>	<b>82-84</b>
7.1	Observation on Weaknesses and Strengths	82
7.1.1	Project Weaknesses	82
7.1.2	Project Strengths	83
7.2	Propositions for Improvement	83
7.3	Contribution	83
7.4	Conclusion	84

<b>REFERENCES</b>	<b>85</b>
<b>BIBLIOGRAPHY</b>	<b>86</b>
<b>APPENDICES</b>	<b>87</b>

## LIST OF TABLES

TABLE	TITLE	PAGE
2.1	List of Video Streaming Software	23
2.2	List of Video Streaming Server	23
2.3	List of Analyzer Tool	24
2.4	List of Documentation Software	24
2.5	List of Operating System	24
2.6	List of Hardware Requirement	25
2.7	List of Network Requirement	25
2.8	PSM I Milestones	26
2.9	PSM II Milestones	26
3.1	List Comparison of Software	31
3.2	Hardware Requirements	36
5.1	Implementation Status	60
6.1	Windows Media Player Data Testing of Scenario 1	67
6.2	Real Player Data Testing of Scenario 1	68
6.3	Windows Media Player Data Testing of Scenario 2	69
6.4	Real Player Data Testing of Scenario 2	69
6.5	Protocol used by Windows Media Player (Scenario 1)	70
6.6	Protocol used by Windows Media Player (Scenario 2)	73
6.7	Protocol used by Real Player (Scenario 1)	74
6.8	Protocol used by Real Player (Scenario 2)	76
6.9	Byte Windows Media Player and Real Player in Scenario 1	78
6.10	Byte Windows Media Player and Real Player in Scenario 2	79

## LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Video Streaming Architecture over LAN	9
2.2	Video Streaming Works	10
2.3	Top-Down Design Approach Phases	22
3.1	The Process Model for Analyze Video Streaming	33
4.1	Video Streaming Basic Architecture	38
4.2	Video Streaming on Client/Server	39
4.3	Video Streaming using video on demand application	40
4.4	Video Streaming Software on Client/Server side over LAN	40
4.5	Video Streaming Physical Design	41
5.1	Publishing Point	44
5.2	Add Publishing Point	45
5.3	Browse File	45
5.4	Test Stream	46
5.5	Windows Media Service stream video file	46
5.6	Helix Server Authentication	47
5.7	Helix Server Mount Points	48
5.8	Helix Server Content Management	48
5.9	Helix Server Content Browser	49
5.10	Helix Server Content Browser select file	49
5.11	Helix Server File URL	50
5.12	Real Player buffering	50
5.13	Real Player play the video streaming	50
5.14	Ethereal to options of capture	51
5.15	Ethereal to Interface of capture	52

<b>5.16</b>	<b>Ethereal capture options in 1 minute</b>	<b>52</b>
<b>5.17</b>	<b>Process data capture</b>	<b>52</b>
<b>5.18</b>	<b>Process data capture</b>	<b>53</b>
<b>5.19</b>	<b>Ethereal capture options in 2 minute</b>	<b>53</b>
<b>5.20</b>	<b>Process data capture</b>	<b>54</b>
<b>5.21</b>	<b>Process data capture</b>	<b>54</b>
<b>5.22</b>	<b>Ethereal capture options in 5 minute</b>	<b>55</b>
<b>5.23</b>	<b>Process data capture</b>	<b>55</b>
<b>5.24</b>	<b>Process data capture</b>	<b>56</b>
<b>5.25</b>	<b>Ethereal IO Graphs in Statistic tab</b>	<b>56</b>
<b>5.26</b>	<b>Ethereal Summary in Statistic tab</b>	<b>56</b>
<b>5.27</b>	<b>Ethereal capture packets</b>	<b>57</b>
<b>5.28</b>	<b>Server connection IP address</b>	<b>58</b>
<b>5.29</b>	<b>Client connection IP address</b>	<b>58</b>
<b>5.30</b>	<b>Server pinging client</b>	<b>59</b>
<b>5.31</b>	<b>Client pinging server</b>	<b>59</b>
<b>6.1</b>	<b>Streaming over Run method</b>	<b>64</b>
<b>6.2</b>	<b>Streaming over Open URL method</b>	<b>65</b>
<b>6.3</b>	<b>Streaming over Run method</b>	<b>65</b>
<b>6.4</b>	<b>Streaming over Open URL method</b>	<b>66</b>

## LIST OF ABBREVIATIONS

<b>PSM</b>	<b>Projek Sarjana Muda</b>
<b>LAN</b>	<b>Local Area Network</b>
<b>VOD</b>	<b>Video on Demand</b>
<b>UDP</b>	<b>User Datagram Protocol</b>
<b>TCP</b>	<b>Transport Control Protocol</b>
<b>MB</b>	<b>Mega Byte</b>
<b>MMS</b>	<b>Microsoft Media Server</b>
<b>RTSP</b>	<b>Real Time Streaming Protocol</b>
<b>HTTP</b>	<b>Hypertext Transfer Protocol</b>
<b>RTP</b>	<b>Real Time Protocol</b>
<b>ICT</b>	<b>Information and Communication Technology</b>
<b>CD</b>	<b>Compact Disk</b>



**LIST OF APPENDICES**

<b>APPENDIX</b>	<b>TITLE</b>	<b>PAGE</b>
<b>A</b>	<b>Gantt Chart</b>	<b>87</b>
<b>B</b>	<b>Installation and Setup</b>	<b>90</b>
<b>C</b>	<b>Graph and Output</b>	<b>110</b>

# CHAPTER I

## INTRODUCTION

### 1.1 Project Background

Internet technology is changing at a rapid pace and the faster the technology changes, the more people expect from the Internet. Users were once satisfied with text and still images on their web pages. Now they want to see video and want it fast. Users want the quality to be as good as what they see on their television.

Video streaming is one way to deliver video over the Internet. Though far from a perfect solution, streaming video technology is becoming more powerful all the time. With video streaming, designers can broadcast lectures, make announcements, deliver seminars, or show exactly how something is supposed to work. Users can see it anytime, quenching some of their thirst for fast, high-quality video. Video streaming provides flexibility as well. Users can view what they want and when they want.

This project is all about video streaming performance analysis. This project will research aspect behind video streaming from the beginning until it analyze in Microsoft Windows Server 2003. The video streaming will implemented on Local Area Network (LAN) environment using video on-demand application. This project will be focused on two (2) video streaming software includes Windows Media Player and Real Player.

This software will be setup in two (2) streaming servers. The servers are Windows Media Service (Windows Media Player) and Helix Server (Real Player). This project will analyze of video streaming software using Ethereal Network Analyzer tool to test the ability of video streaming software and the aspect will be analyze are protocol and byte.

## 1.2 Problem Statements

There are problem statements that cause and this project must be done and how this project can solve those problems. From the analysis that has been made, some problem has been occurs on current video streaming. The problem statements are as the following:

1. Different network architecture.

Different network architecture may need the different technique to implement video streaming. The implement and configure video streaming on Local Area Network (LAN) need different technique to other network environment.

2. Aspect affecting performance of video streaming.

Most streaming video users don't emphasize the aspect affecting the performance behind video streaming such as protocol and byte.

3. Different technologies on software.

Competing technologies among Windows Media Player and Real Player present a problem for users. Different software has different capabilities and own advantage. This will depend on how process to configure and implement video streaming tested on that software.

### 1.3 Objectives

The objectives that will be achieved throughout this project are:

1. Implement video streaming on Local Area Network (LAN) environment using video on-demand application.
2. Analyze the aspect protocol and byte which affecting video streaming performance.
3. Determine the best streaming performance software among Windows Media Player and Real Player.

### 1.4 Scopes

The scopes in this project will cover such as project limitation and project environment. The scopes involves in this project are:

1. This project will research the video streaming performance over Local Area Network (LAN) environment.
2. The analysis of video streaming performance will be done through protocol and byte aspects.
3. This project will use method streaming video on-demand application.
4. This project will determine the best streaming performance software.

## **1.5 Project Significance**

This project is about video streaming performance analysis. This project will research about the architecture of video streaming to understand how video streaming works. From architecture, it is easy to know how video streaming software works in network environment and we will know how to meet the requirements that are needed in video streaming. This project will ensure the video streaming software will meet all the specifications that are needed.

The project significance would give many benefits to the users who want to implement and use video streaming over their network. This is because they can get high quality video streaming if they are using the best video streaming software within the suitable network architecture. This project is important because there is much video streaming software in the market that we are not sure about their performance or ability. With this project, it will determine the best streaming performance software.

## **1.6 Expected Output**

The analysis of video streaming performance will be done through several aspects which are streaming protocol and byte. This project will research on how the video streaming performance over Local Area Network (LAN). This project will test the method of streaming video on-demand application.

## **1.7 Conclusion**

The main purpose of this project is performance analysis of video streaming software. It will focus on the architecture, software, implementation, analysis, and performance of video streaming. For the conclusion, this project will give many

benefits to many users especially for intranet users and important in video streaming industry.

For the next chapter, this project will discuss about the literature review and project methodology. The literature review will identify about the related technology to implement this project while the project methodology is focusing on the way and technique to achieve predetermined objectives.

## CHAPTER II

### LITERATURE REVIEW AND PROJECT METHODOLOGY

#### 2.1 Introduction

Literature review is a research or analysis based on related or passed research, reference, case study and other finding that should be done to identify the approaches while developing and implementing project. The ways that can be used to do literature review are comparison of case study and analysis of theoretical articles. According to University of Wisconsin, a literature review is a critical analysis of a segment of a published body of knowledge through summary, classification and comparison of prior research studies, reviews of literature and theoretical articles. It is important to the one who wants to develop a system, make a research or even the one who analyze network performance. The more reviews the literature, the more knowledge they will gain.

Project methodology is an integrated task, techniques tools, roles, responsibilities and milestones used for delivering the project. Based on Jason Charvat, a methodology is a set of guidelines or principles that can be tailored and applied to specific situation. A methodology could be also be a specific approach, templates, forms and even checklists used over the project life cycle. This chapter will explain the methodology using for this project, focusing on the components that make up a solution and project milestones to measure the time frame taken for its analysis, design, testing and implementation.

## **2.2 Fact and Finding**

Fact-finding technique is the step where one collects and gathers information related to the project. This part will explain the detail about video streaming from aspects of domain, existing system and technique. All collected information from the related thesis, journal, book and website from the internet about video streaming is important to understand.

### **2.2.1 Domain**

The project of Video Streaming Performance Analysis situated in project scope: ICT in Advertising/Edutainment. It included ICT in Advertising/Edutainment because video streaming is part of Multimedia Networking. According to scala.com, the term multimedia describes a number of diverse technologies that allow visual and audio media to be combined in new ways for the purpose of communicating. The applications include entertainment, education and advertising. Multimedia Networking covered network that are used to provide multimedia communication services and multimedia application supported on networks.

### **2.2.2 Existing Research**

Research is important for those who wish to analyze network performance or to get the better ideas on how to start their project or even compares their project with others.

#### **2.2.2.1 Network Performance**

According to Bitpipe.com, network performance is a measure of a network's throughput where the amount of data transferred from one place on the network to another or the amount of data processed in a specified amount of time.