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BORANG PENGESAHAN STATUS TESIS[♦]

JUDUL : NETWORK MONITORING AND REPORTING SYSTEM
FOR TELEKOM MALAYSIA STREAMYX LINKS.

SESI PENGAJIAN: 20032004-2

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Alamat Tetap:

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BUKIT GAMBIR, 84800 MUAR,

JOHOR

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Date :

Signature :
Industrial Mentor : EN. YUSUF B. AHMAD
Date :

NETWORK MONITORING AND REPORTING SYSTEM FOR TELEKOM
MALAYSIA STREAMYX LINKS.

ASWAN ELIAS

A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Computer Science (Real Time Software Engineering)

Faculty of Computer Science and Information System
Universiti Teknologi Malaysia

FEBRUARI, 2004

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For my beloved family, father and mother.

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Finally, thanks to all who have involved directly or indirectly in this project and during the thesis writing.

ABSTRACT

Network Monitoring and Reporting System (NEMORS) is a web-based network monitoring system. This project development is an industrial attachment project for a MSc. in Real-Time Software Engineering course in University of Technology Malaysia, Kuala Lumpur. The project was attached in the Department of Corporate Information Superhighway (COINS) in Telekom Malaysia Berhad (TMB), supervised by the Head of Value Added Network Services (VANS).

The system is providing a performance analysis data of the selected Streamyx links used for analysis and planning. The government through the Communication and Multimedia Commission (CMC) are also benefit with the analyzed data used to monitor the quality of the Streamyx services given to customer throughout the country.

NEMORS can measure availability, latency, utilization and packet loss in a network. It uses RRDtool to maintain a longterm datastore and to draw pretty graphs, giving up to the minute information on the state of each network connection. It has a smart alarm system which triggered by latency or loss patterns values. It can also notify operator by sending e-mail to alert actions when machines become unavailable, or network response times become too long while all are being recorded in log files.

During the project, Extreme Programming was applied as the software methodology throughout the development life cycle. The project adopt the DoD 2167A standard documentation and using the state-of-the-art open source technology used for the operating system, system application and the database system.

ABSTRAK

Network Monitoring and Reporting System (NEMORS) adalah sistem pemantauan rangkaian berasaskan web. Pembangunan system ini adalah untuk projek kursus MSc. in Real-Time Software Engineering di Universiti Teknologi Malaysia, Kuala Lumpur. Projek ini dijalankan dan ditadbir di Bahagian Corporate Information Superhighway (COINS) di Telekom Malaysia Berhad (TMB), yang di seliakan oleh Ketua Bahagian Value Added Network Services (VANS).

Sistem ini dapat memberikan analisis prestasi data terhadap sesuatu rangkaian Streamyx yang ada untuk tujuan analisis and perancangan. Pihak kerajaan melalui badan Communication and Multimedia Commission (CMC) juga mendapat munafaat daripada analisis data tersebut yang digunakan untuk memantau kualiti perkhidmatan Streamyx yang diberikan kepada pelanggan di seluruh negara.

NEMORS berupaya mengukur *availability, latency, utilization* dan *packet loss* terhadap sesuatu rangkaian. Ia menggunakan RRDtool untuk menyelenggara data yang tersimpan untuk masa yang panjang dan juga untuk melukis graf, memberitahu maklumat status rangkaian untuk ke minit-minit tertentu. Ia juga mempunyai sistem *alarm* bistari yang dijana oleh nilai bacaan *latency* atau *loss patterns*. Ia juga boleh mengingatkan operator dengan menghantar email untuk bertindak sekiranya system tidak berfungsi ataupun tindakbalas rangkaian terlalu lama yang mana semuanya ini direkod di dalam fail log.

Sepanjang projek ini, kaedah Extreme Programming telah digunapakai sebagai *software methodology* di dalam pembangunan system. Projek ini juga menggunakan standard DoD 2167A sebagai dokumen and menggunakan teknologi sumber terbuka dalam system pengurusan, system aplikasi dan system pengkalan data.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	BORANG PENGESAHAN STATUS TESIS	i
	SUPERVISOR'S DECLARATION	iii
	TITLE	iv
	DECLARATION	v
	DEDICATION	vi
	ACKNOWLEDGEMENT	vii
	ABSTRACT	viii
	ABSTRAK	ix
1	INTRODUCTION	1
	1.1 Project Background	1
	1.2 Project Domain	2
	1.3 Project Objectives	3
	1.4 Project Scope	3
	1.5 Project Development Structure	4
	1.6 Project Essential	6
2	LITERATURE STUDY	7
	2.1 Overview of Network	7
	2.2 Network Architecture	8
	2.3 Open System Interconnection	9
	2.4 Transmission Control Protocol/Internet Protocol	12
	2.5 A Comparison of the OSI and TCP Reference Models	15

2.6	Network Management System	16
2.7	ISO Network Management Model	16
2.8	Network Management Architecture	19
2.9	Network management components	20
2.10	Simple Network Monitoring Protocol	22
2.10.1	SNMP Version	24
2.10.2	SNMP Basic Commands	25
2.11	Management Information Base	26
2.12	Structure of Management Information	29
2.13	Fundamental of Internet Measurement	31
2.13.1	Latency	31
2.13.2	Availability	32
2.13.3	Utilization	32
2.13.4	Packet Loss	33
2.13.5	Throughput	33
2.14	Network Monitoring Propose Solution	34
2.15	Development Tools	35
2.15.1	Macromedia Dreamweaver 4.0	35
2.15.2	Rational Rose 2000	36
2.15.3	Red Hat 9.0	36
2.15.4	Apache 1.3.28	37
2.15.5	RRDTool	37
2.15.6	Perl Programming	39
3	SOFTWARE METHODOLOGY	40
3.1	Software Development Methodology	40
3.1.1	User Stories and Architectural Spike	42
3.1.2	Release Planning	42
3.1.3	Iteration	43
3.1.4	Acceptance Test	43
3.1.5	Configuration Management	44
3.1.6	Project Management	44

3.2	NEMORS Software Process	45
3.2.1	User Stories and Architectural Spike	45
3.2.1.1	Use Case - Setting Process	47
3.2.1.2	Use Case - Setting Process extends Authenticate User	47
3.2.1.3	Use Case - Setting Process invokes Streamyx Nodes	48
3.2.1.4	Use Case - Setting Process includes View Result.	48
3.2.1.5	Use Case - View Result	49
3.3	Release Planning	49
3.3.1	Htdocs Descriptions	50
3.3.2	Etc Description	51
3.3.3	Bin Description	51
3.3.4	Lib Description	52
3.4	Iteration	53
3.5	Acceptance Test	53
4	PROJECT DISCUSSION	55
4.1	Output Analysis	55
4.1.1	Latency	56
4.1.2	Packet Loss	57
4.2	Deliverables	58
4.3	Constraints	58
4.4	Recommendations	59
5	CONCLUSION	60
	REFERENCES	62
	APPENDICES	
APPENDIX A	OSI 7 Layers Reference Models	A
APPENDIX B	Extreme Programming Methodology	B
APPENDIX C	Software Requirement Specifications	C
APPENDIX D	Software Design Descriptions	D
APPENDIX E	NEMORS Graphical User Interface	E
APPENDIX F	PERL SCRIPTS	F

LIST OF TABLES

TABLE NO.	TITLE	PAGE
1.1	Project task details	5
2.1	Sample of network monitoring tools available in the world.	35

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
1.1	Streamyx Network Architecture.	3
1.2	NEMORS Solutions organizational structure.	4
2.1	OSI Reference 7 Layer Model.	9
2.2	Header being append/strips off in every layer transaction.	10
2.3	The OSI Reference Model of seven layers with related functions	11
2.4	“Some protocols in the TCP/IP protocol suite (Stallings,1997).”	13
2.5	Protocol data units in TCP/IP architecture.	13
2.6	A sample perl script code.	38
2.7	Shell script (collects data, updates database)	39
3.1	Use Case Diagram of CSCI NEMORS.	46
3.2	Use Case Setting Process.	47
3.3	Use Case of Setting Process and Authenticate User.	47
3.4	Use Case Setting Process invoking the Streamyx Node.	48
3.5	Use Case Setting Process invoking the View Result use case.	48
3.6	The User invokes the View Result use case.	49
3.7	NEMORS architecture	50
3.8	NEMORS related design class.	53
4.1	Menu to select link for monitoring.	56
4.2	A sample data for link connected to server.	56

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	OSI 7 Layers Reference Models	A
B	Extreme Programming Methodology	B
C	Software Requirement Specifications	C
D	Software Design Descriptions	D
E	NEMORS Graphical User Interface	E
F	PERL SCRIPTS	F

LIST OF ABBREVIATIONS

ARPANET	-	Advanced Research Projects Agency network
BER	-	Basic Encoding Rules
CDMA	-	Code Division Multiple Access
CMC	-	Communications and Multimedia commission
COINS	-	Corporate Information Superhighway
DSL	-	Digital Subscriber Line.
GUI	-	Graphical User Interface
HTP	-	Hypertext Transfer Protocol
ISDN	-	Integrated Services Digital Network.
ISP	-	Internet Service Provider
MIB	-	Management Information Base
OSI	-	Open Systems Interconnection
QA	-	Quality Assurance
RED	-	Random Early Detection
RFC	-	Request For Comment
RTT	-	Round-Trip Time
RUP	-	Rational Unified Process
SDD	-	Software Design Description
SME	-	Small and Medium Enterprise
SMI	-	Structure of Management Information
SNMP	-	Simple Network Management Protocol
SOHO	-	Small Office Home Office
TBD	-	To Be Define
TCP/IP	-	Transmission Control Protocol/Internet Protocol
VoIP	-	Voice Over IP
XP	-	Extreme Programming

CHAPTER I

INTRODUCTION

1.1 Project Background

This project is a second industrial attachment training project for a MSc. in Real-Time Software Engineering course. It was organized by the Centre of Advance Software Engineering (CASE) under the Faculty of Computer Science and Information Technology of University of Technology Malaysia, Kuala Lumpur. The project duration is 5 months and student is expected to win the opportunities during the period in gaining as much as the industrial exposure, trend and working environments. The project was attached in Telekom Malaysia Berhad, one of the incumbent telecommunications operators in Malaysia and it was conducted at the Information Technology Division in the Department of Corporate Information Superhighway (COINS) supervised by the Head of Value Added Network Services (VANS).

The project task is to develop a Network Monitoring and Reporting System for the *Streamyx* (a Digital Subscriber Line broadband data services) links. The system was designed to provide a performance analysis data of the selected *Streamyx* link in order to achieve the company's vision which is "...to be the Communications Company of choice - focused on delivering Exceptional Value to our customers and other stakeholders" (<http://www.telekom.com.my>). It was expected that from the project, the company would enhance the offering for a total business solution for both Voice and Data via broadband communications network ranging from Frame Relay & IP services, Bandwidth Services, Hosting Services to Global Services.

1.2 Project Domain

In the business world as speed is everything, broadband communications is vital for the success of businesses. While the use of Data is also increasingly important, Voice's key role in businesses is undeniable. In supporting both Voice and Data Services, Telekom Malaysia introduced a Fast Internet Access services i.e. the Digital Subscriber Line (DSL) for the customers end. It is a communication technology uses modem with the existing twisted-pair telephone lines connecting to a high-bandwidth data, such as multimedia and video, to service subscribers. The product was named with Streamyx that is served through TMnet, one of the major ISP in Malaysia. Since launched on 24 Apr 2001, TMnet Streamyx DSL subscriber has reached over 10,000 residential customers at the end of Q3 2002.

In March and April 2003, TMnet's DSL services throughout Malaysia suffered from poor connection and occasional service disruption. Many subscribers who are connected with the service complained to Telcos. Most of them are companies, universities, and government agencies as well as individuals. A government organizations, Communications and Multimedia commission (CMC), who are in charge on the telecommunication services throughout the country were very much consent on the quality of the services. According to CMC there were about 2.1 million Internet subscribers in Malaysia at yearend 2001. TMnet has launched a bandwidth expansion program to counter and mitigate the problem. It was aimed to ensure the current state of the service is good enough to meet the customer satisfactions.

1.3 Project Objectives

The objectives of NEMORS project are:

- (a) To develop a system that can monitor the performance of Streamyx services. Figure 1.2 shows the network diagram for the services.
- (b) To capture the performance of the link for all Steamyx nodes and provide an analysis result of the quality of the relative links as well as the reporting features.

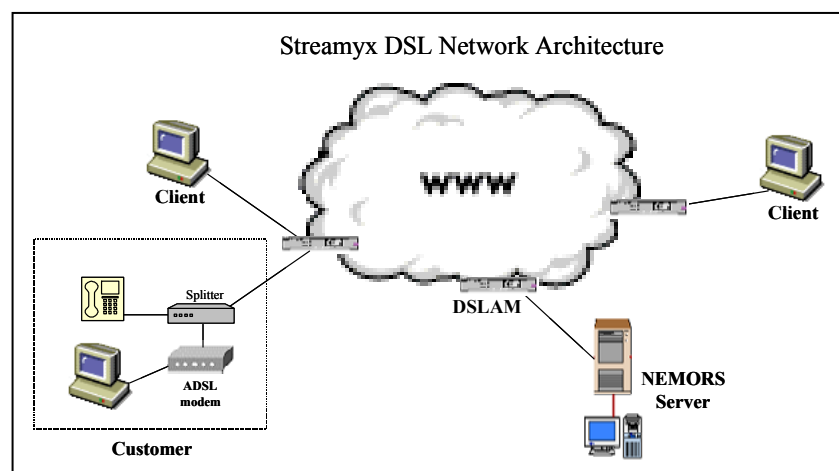


Figure 1.1: Streamyx Network Architecture.

1.4 Project Scope

The scopes of the project will cover the following:

- (a) Analysis of the domain problem focusing on the path loss and network latency of the Streamyx links.
- (b) Develop a system which adapt the state-of-the-art open source technology to be used particularly on the operating system, application system including the database system.
- (c) Design and develop the system by following a standard method/model and software process in Software Engineering principle.

1.5 Project Development Structure

Estimating the time to develop an entire project at the beginning of a project is a tricky task because of too many unknown variables. It is believed that projects larger than twenty man days must go through a detailed requirements phase prior to estimating the total cost of the project. However, a rough ballpark estimate upfront based on the project structure can be done. As there is only one student currently assigned to do the project, suitable tasks have been identified and it is the result of each task that will be the input to the development of the system components. Figure 1.1 depicts the structure of the project tasks involved.

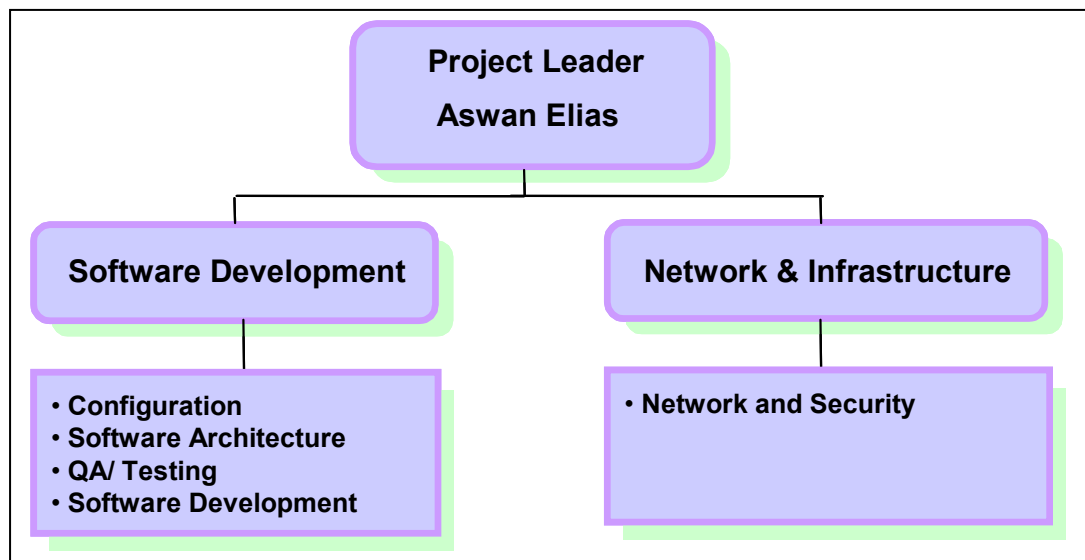


Figure 1.2: NEMORS Solutions organizational structure.

The writer is involved in the whole development of NEMORS. The project requires some deliverables to be produced. The deliverables are:

- (a) Software Development Plan (SDP)
- (b) Software Requirement Specification (SRS)
- (c) Software Design Description (SDD)

Table 1.1: Project task details

Task name	Task Description
Project Leader	The task to allocate resources, shapes priorities, coordinates interactions with the customers and users, establish a set of practices that ensure the integrity and quality of project artifacts as well as project goals.
Configuration Management	The tasks are to supports the product development activity so that development and integrations have appropriate workspaces to build and test their work. Always ensure the environment facilitates product review, and change and defect tracking activities.
Software Architecture	The System Architect task is to define the requirements elicitation and use-case modeling by outlining the system's functionality and delimiting the system; for example, establishing what actors and use cases exist, and how they interact.
Software Development	The Software Development task is to define the responsibilities, operations, attributes, and relationships of design packages, or design subsystems, including any classes owned by the packages or subsystems.
Network and Security	The network and security task is to perform the installation, setup and configure all network requirements for the project.
QA/Testing	<p>The QA/Testing task is involves quality and test advocacy, resource planning and management, and resolution of issues that impede the test effort. This covers:</p> <ul style="list-style-type: none"> • Negotiating the ongoing purpose and deliverables of the test effort, planning and management of the test resources, identify level of quality for the resolution of important Defects • Advocating an appropriate level of testability focus in the software development process. • Identifying testing approach, test execution and verifying result as well as analyzing errors.

1.6 Project Essential

With the high-speed connectivity/bandwidth, the service is ideal to support most broadband application such as, Web Hosting, video streaming, e-commerce, distance learning and others. Basically, the service will benefit mostly the:

- (a) Residential customers with heavy Internet usage who have been using the net via 56kbps dial-up or Integrated Services Digital Network (ISDN).
- (b) Small businesses that have been using analog dial Internet access but actually need higher bandwidth, but not at higher cost. For instance Small and Medium Enterprise (SMEs), Small Office Home Office (SOHOs) and telecommuters that have different applications such as e-commerce, web hosting, distance learning, serious Internet surfing and etc.
- (c) Large businesses that require internet access with high business grade service to support mission critical applications like e-commerce, net-meetings, streaming audio/video, portal service, Web hosting, and access to the company Local Area Network (LAN) for telecommuting employees, extranet for valued customers and business partners.

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APPENDICES