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JUDUL: **NETWORK ALARM REPORTING SYSTEM**

SESI PENGAJIAN: **2004/2005**

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NETWORK ALARM REPORTING SYSTEM

HOH SONG EN

This report is submitted in partial fulfillment of the requirements for the
Bachelor of Information and Communication Technology
(Computer Network)

FAKULTI TEKNOLOGI MAKLUMAT DAN KOMUNIKASI
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DEDICATION

First and foremost, I want to dedicate this thesis to my Supervisor who has always guided me in the right direction. Next, I would like to dedicate this thesis to my dearest parents, without whose support I could have never completed this thesis and my study. My parents have always been a constant source of energy and encouragement for me. I must also thank my younger brother, Song Sing, who have always given his constant support to me and being the coolest brother that help me to relax during my hard time.

ACKNOWLEDGEMENT

This thesis is written for the Fakulti Teknologi Maklumat dan Komunikasi, Kolej Universiti Teknikal Kebangsaan Malaysia. I would like to acknowledge especially KUTKM for providing the possibility to do my PSM on this subject. This project would not have been possible without the following people, who I would like to thank heartily:

Mr. Mohd Fuad Ahmad, thesis supervisor, for being so supportive and cooperative. Without her guidance, this project would have been impossible and would never finish on time. Thanks for leading the way throughout the whole course of the project.

Special thank to Dr. Amir Akramin Shafie, researcher from SIRIM Berhad for his willingness to become my project expert consultant. Without his help, research about this project will not able to be done so smoothly.

Lastly but not least, my dearest parents and brother, for everything that they have done. And a word of thanks goes also to all others who have supported me during this process. Thank you.

ABSTRACT

The purpose of this Bachelor's Project was to study Network Alarm Reporting System in the market along with its limiting factors and functionality. This project was to developed a light and portable system that can improved the limitation of the current system yet can easily being integrated into any network and start working as other NARS system that use big hardware and heavy load software. The main problem of this project was how to develop a system that can work alone as a complete system yet still can be integrated into other system to work together. This problem occurred because most of the systems in the market are not compatible with other vendors system. To totally solve this problem, a deep research about NARS in the market has been done so that a system that can best work together with other NARS in the market can be developed. This system has the ability to work on campus or company Ethernet data networks. It means that the scope for this project is only limited to Ethernet network. As conclusion, system that has been developed is a system that can easily being implement on any Ethernet network and can be classify as a portable Network Alarm Reporting System.

ABSTRAK

Tujuan PSM (Projek Sarjana Muda) ini adalah untuk menyelidiki dan menggaji fungsi-funsi serta kekurangan Sistem Penggera dan Pelapor Rangkaian Komputer (Network Alarm Reporting System) yang sedia ada di pasaran. Projek ini terlah membangunkan sebuah sistem yang ringan dan mudah alih yang dapat memperbaikikan kekurangan sistem di pasaran. Sistem tersebut juga boleh diintegrasikan pada mana-mana rangkaian komputer dan berfungsi sebagaimana sistem lain yang terdiri daripada perkakasan besar-besaran dan program rumit yang digunakan untuk mengawasi rangkaian komputer. Masalah utama semasa membangunkan sistem tersebut adalah bagaimanakah untuk membangunkan sesuatu sistem yang dapat berfungsi sebagai Sistem Penggera dan Pelapor Rangkaian Komputer (*NARS*) dan dapat diintegrasikan ke sistem yang sedia ada untuk meningkatkan lagi fungsi sistem tersebut. Masalah tersebut timbul disebabkan kebanyakan sistem yang terdapat di pasaran tidak sepadan sesama system-sistem yang dibangunkan oleh pembangun berlainan. Kajian yang mendalami telah dijalankan untuk membangunkan satu sistem yang dapat berfungsi sesama sistem lain. Sistem ini amat sesuai dipakai pada rangkaian kampus dan syarikat. Skop projek ini terhad kepada rangkaian *Ethernet* sahaja. Sebagai kesimpulan, sistem yang dibangukan mempunyai kelebihan untuk digunakan pada rangkaian *Ethernet* dan juga boleh dikatakan sebagai sebuah sistem yang ringan dan mudah alih.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

ASCII	American Standard Code for Information Interchange
ASN.1	Abstract Syntax Notation One
CPU	Central Processing Unit
FTMK	Faculty Teknology Maklumat dan Kommunikasi
IP	Internet Protocol
KUTKM	Kolej Universiti Teknikal Kebangsaan Malaysia
LAN	Local Area Network
NARS	Network Alarm Reporting System
OS	Operating System
PSM	Projek Sarjana Muda
RAM	Random Access Memory
SMS	Short Message Service
TCP	Transmission Control Protocol
USB	Universal Serial Bus
WAN	Wide Area Network

LIST OF APPENDIXES

CHAPTER I

INTRODUCTION

The project was started with the purpose of developed a Network Alarm Reporting System that could be use by anyone that would like to monitor their Ethernet network devices. It aimed to provide a light and easy system for network monitoring purpose.

1.1 Preamble/Overview

Nowadays in the market, most of the Network Alarm Reporting System (NARS) will be found on big hardware in a box and/or heavy load software as a system. Once users setup the NARS on site, that's no way to move it to other site or even if it is possible, it will be a massy job. This project is to develop a system that can easily being adopted into any Ethernet network and start working as other system that uses big hardware and heavy load software that act as NARS. Beside that, this system is also able to work together with the current system as an enhancement to the current system. This system is to be design to takes the error messages from a network and sends to a selected mobile phone, and/or selected e-mail address about the error message. NARS will have the ability to work on campus or company Ethernet data networks.

The intent of this system is that a communications network after hour's the network admin will be able to receive any faults without being required on site. The software is to be designed and lift the alarms using ICMP signal, choose only the

alarms selected by the user to be reported and send the message to the mobile phone and also specific e-mail account. This is a project that develops mainly for the ICT industry and is suitable for all company that owns Ethernet network to use the system for network maintenance and monitoring purpose. The main advantage of this system is to reduce the cost and the size of NARS and also make the installation process become simple and try to make it be able to install and setup by non-professional personnel without facing any problem. This is due to most of the NARS in the market today are big in the size and not portable, yet still need specially trained personnel to setup the system for the users. So, if a small and simple yet easy to install system being introduced to the market, it will give the market an alternative choice when selecting NARS.

1.2 Problem Statements

The idea for doing this project came from the industrial training period when taking the subject BITU3946 at SIRIM Berhad, Shah Alam for about 20 weeks. During that period, the company faces problems on the network including network devices especial switches shut off by itself without any reason. SIRIM Berhad IT department always need a person to be on the monitoring node in the server room to monitor the network and once the device went down, that person will try to contact the technical people thru walkie-talkie if technical support team are in the company or thru mobile phone when technical support team are away. There is no way to alert the technical support team automatically without sitting in front of the monitoring node.

To solve this problem without changing the entire set of monitoring tools, develop a new set of Network Alarm Reporting System (NARS) that can send alarm to mobile phone once the network devices turn down and this system can also work together with the concurrent system will be the best way for user and company because they doesn't need to remove the entire monitoring system yet can enhance the concurrent system functionality.

The main problem of this project is how to develop a system that can work alone as a complete system yet still can be integrated to other system to work together. This problem occurs because most of the system in the market is not compatible with other vendor's system. To totally solve this problem, a deep research about NARS in the market has been done so that a system that can best work together with other monitoring system in the market can be developed.

The methodology which will use to build up the software for this project is Waterfall Methodology. The waterfall methodology is very powerful because of the linear sequential model suggested a systematic, sequential approach to software development that begins at the system level and progresses through analysis, design, coding, testing, and support. It simply states that first one should think about what is being built, then establish the plan for how it should be built, and then build it.

1.3 Objective

A company Ethernet network will always down due to the imperfectness of network devices after a long period of usage and also some other technical problem. To monitor the network, special network monitoring tools is needed to monitor the network and also send us the alarm message when the devices is down to alert the user to up the devices as fast as possible, that why NARS is introduce to the market.

The main objectives to develop the system are:

- To produce a light and portable system that can send selected error message to the user.
- To send error message to cell phone or e-mail to the user regarding the error message.
- To reduce the cost of NARS and make it possible to be afford by medium or even small company.

1.4 Scopes

The new system that has been develop has the ability to send alarm or alert message to the user instantly after detected the network devices failure or stop serving unexpectedly. User will have the ability to turn off the monitoring function on specific devices if the user doesn't need to monitor the device or need to turn off the device of maintenance or any other special purpose. Once the monitoring functions on the particular device is turn off, user will not getting the alarm about the device and this can avoid any unwanted disturbance when users perform their job.

This project mainly focuses on developing a NARS in low cost that can be afford and use by any medium even small company that owns Ethernet network. The limitation of this system is it is only suitable for Ethernet network or packet network but not for ATM or Shell Switching Network. The system is to be designed and lift the alarms using ICMP signal, choose only the alarms selected by the user to be reported. This project has developed a system that lifts alarm and use SMS gateway to automatically send alert message to selected mobile phone. Besides that, alarm will also be send to selected monitoring node and selected e-mail account.

1.5 Contributions

NARS that has been developed by this project will be an alternative for company that doesn't want to purchase or couldn't afford to purchase expensive device monitoring tools to monitor the network. After the development stage being completed, NARS will have the ability to work with any other system that are currently installed because it can easily being integrated to most of the network monitoring tools in the market and being use together with product that currently available in the market. If user doesn't want to purchase expensive GSM modem as SMS Gateway, they can also use a mobile phone with build in GSM modem as an alternative. Beside that, this product will also have very high commercial value because the final product can be commercialized for use by industry.

1.6 Expected output

A full functional NARS is expected at the end of the development. The system will meet the user requirements and solve the problems that occur in the existing system by achieving its objectives. By using the system, user is expected to have the opportunity to reduce the network load because NARS is a light and simple monitoring system and it doesn't use much CPU processing power and network bandwidth. Beside that, it wills also act as a user friendly system where user can easily learn how to use it.

1.7 Conclusion

The objective and scope of the system has been clearly identified before the development processes started. This will be a guideline for developer to develop NARS. NARS that being introduced will be a low cost system that can easily being setup by any user. To make full use of the system, at least user need to have a monitoring node, internet connection and a GSM modem or mobile phone that support GSM modem.

CHAPTER II

LITERATURE REVIEW

This section will cover the literature review on similar existing system that available in the market, the development methodology, tools and hardware that will be used in the development. This review was done by collecting the information using fact and finding techniques and also site visitation.

2.1 Introduction

Literature review is a must before any development processes being started. To develop a well working system, researches need to be done to get more information and more understanding about the current technology that can be use to develop NARS and the market needs. Developer need to collect as many information and fact before begin the development processes. So, the first thing need to be done is system analysis. Through system analysis process, all information will be collect by using different method. Information that needed for this project will be gathering using the fact-finding techniques including the system problem, opportunities and directives. This information is very important for us to determine the business and functional requirement of the system at the early phase.

2.2 Fact and finding

Two fact-finding techniques that will be use to develop this project are sampling of existing documentation, reports, and research during site visits. The sampling technique started by collecting documentations of related system through the Internet. The documentation includes article, journal, product review and thesis that have been done before. It is one of the effective ways to study the system that was developed and use in real working environment, to understand the problem and requirement that has been determined after system analysis, and to know the strength and weaknesses of the current system. The second fact finding method is research during site visitation. To complete this stage, research and side visit has been done at SIRIM Berhad, Shah Alarm at Block 24, Electronics and Computer Application Department, a place where experienced similar network problem. A deep research about the network problem has been done during few times of visitation to SIRIM Berhad. Through the visitation, valuable information has been obtained and this is the significant of doing literature research and review.

2.2.1 Software Development Methodology Review

Many methodologies has been introduced for software development and the most popular development model that will be use during software development life cycle are Waterfall model and Spiral model. Below are reviews about different methodologies that use during software development life cycle.

2.2.1.1 Waterfall Model

Waterfall Model is a traditional model and most basic model in software development. Waterfall model also know as "*Linear Sequential Model*". It suggests a

systematic, sequential approach to software development that begins at the system level and progresses through analysis, design, coding, testing and maintenance.

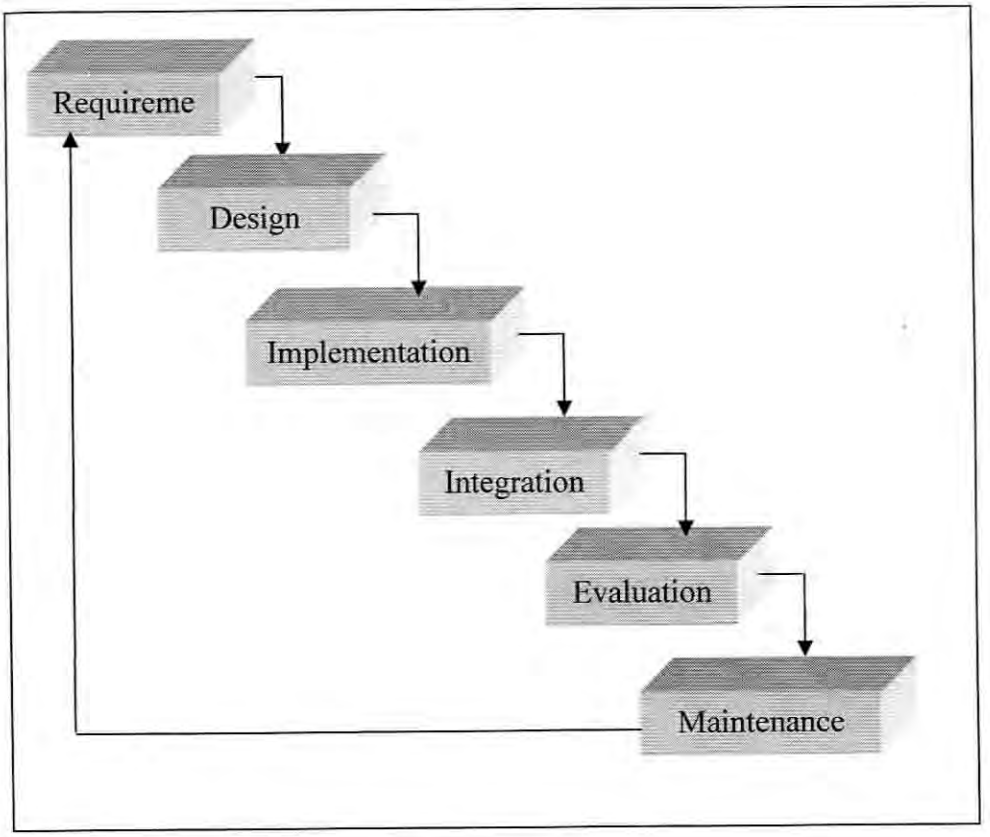

Figure 2.1: The Waterfall Model

The individual phases of a waterfall model are described below:

System Engineering	–	Identify parts of system, component and hardware that are best to implement in software development
Requirement Analysis	–	System requirement need to be defined clearly and requirement gathering become more intensive. The objective is to identify what users would require from the software element of the system
Design	–	Design process determines how best to construct a system that delivers these requirements
Construct	–	The completed design is translated into program code. Construction may utilize different programming

language and database management systems for different part of the system

Testing – The system tested to ensure that is satisfies the user requirement accurately and completely

Installation – Once the system is tested satisfactorily, it is delivered to customer and installed for use

Maintenance – It is most likely that the system will be subject to change during its operating life. If certain aspects of the system may not have been fully implemented , its can be completed during the maintenance phase

2.2.1.2 Spiral Model

The Spiral model is originally created by Boehm. This is an evolutionary software process model that couples the iterative nature of the prototyping with the controlled and systematic aspects of the linear sequential model. It provides the potential for rapid development of incremental versions of the software. During the early iterations, the incremental release might be a paper model or prototype. While in the following iterations, increasingly more complete versions of the engineered system are produced.

Spiral model is divided into a number of framework activities, also called task regions. The spiral model bends the planning, requirements, and design activities of the waterfall back around itself three times to allow these three activities to be injected with activities of evaluation, risk, verification, and planning based on the results of the previous spiral. Typically there are between four regions as show in Figure 2.2.

The resource, timeline and other related information will be defined at the planning task. The risk analysis task required to assess both technical and management risk. The software development here includes the construct, test, install and provide user support. The last task is user evaluation, it is to obtain customer