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**REMOTE SYSTEM MANAGER 2001
[RESYSM2001]**

by

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Abstrak

Antara rangkaian setempat *Ethernet* merupakan asas kepada system komunikasi pelanggan-pelayan. Sejak kemunculannya pada tahun 1973, ia telah menjadi maju sehingga boleh menghubungkan berjuta-juta computer di seluruh dunia, yang juga dikenali sebagai *World Wide Web*. Antara rangkaian dalam kampus adalah sambungan generasi antara rangkaian setempat. Universiti Malaysia Sarawak (UNIMAS), sebuah universiti bersaiz sederhana, dihubungkan di seluruh kampus menggunakan *Asynchronous Transfer Mode* (ATM) dan antara rangkaian setempat *Ethernet*.

Remote System Manager 2001 (RESYSM2001) ialah sebuah sistem yang mudah digunakan untuk mengawasi penggunaan komputer di dalam makmal komputer milik Fakulti Teknologi Maklumat. Di antara objektif sistem ini termasuklah mengawasi penggunaan komputer bagi para pelajar dan menyediakan kemudahan pertolongan secara '*dalam talian*' jika perlu. Adalah diharapkan bahawa prototaip ini dapat digunakan oleh fakulti dengan berkesan.

Abstract

Ethernet Local Area Network (LAN) forms the foundation of the client-server communication. Since its emergence in 1973, it has advanced into a massive connection of computers, which we now know as the World Wide Web. Campus area network is a generation of LAN. Universiti Malaysia Sarawak, (UNIMAS), a medium size university, is interconnected around the campus using Asynchronous Transfer Mode (ATM) backbone and Ethernet LAN. With the increasing demand for knowledge, the Internet has become the major means for data communication worldwide.

Remote System Manager 2001 (RESYSM2001) is a simple to use system to monitor the usage of computing facilities in Faculty of Information Technology's Computer Lab (FIT Lab). Its objectives are to help the system administrator in the lab to manage the student access and provide on-line help if needed. It is hoped that this prototype can be used accordingly by the faculty.

CHAPTER 1

INTRODUCTION

1.1 Overview

Local Area Network (LAN) is a data communication system that allows a number of independent devices to communicate directly with each other in a limited geographic area (Forouzan, 1998). Origin of LAN started with Ethernet (IEEE standard 802.3), a local area network technology that transmits information between computers at speeds of 10/100 million bits per second (Mbps) using the Carrier Sensing Multiple Access with Collision Detection (CSMA/CD) media access protocol across twisted-pair coaxial cable (Spurgeon, 1993). Founded in 1973 by Metcalfe and Boggs of the Xerox Palo Alto Research Center (PARC), this experimental Ethernet that interconnected Xerox Alto computers and laser printers at a data transmission rate of 2.94 Mbps (Techfest, 1999) has evolved and expanded to which the current latest is the 10 Gigabit Ethernet LAN (IEEE standard 802.3ae), which is still not ratified (Gigabit Ethernet Alliance, 2001). Openness, combined with the ease of use and robustness of the Ethernet system, resulted in a large Ethernet market and is the reason Ethernet is so widely implemented in the computer industry (Spurgeon, 1993).

Campus area network is a generation of LAN. Defined as an interconnection of many LAN (Webopedia, 2001), this technology is widely used in campus area environment, hence the name. Universiti Malaysia Sarawak (UNIMAS) campus network consists of different faculty LANs interconnected through a fiber optic ATM network backbone. Figure 1.1 summarizes UNIMAS' campus network.

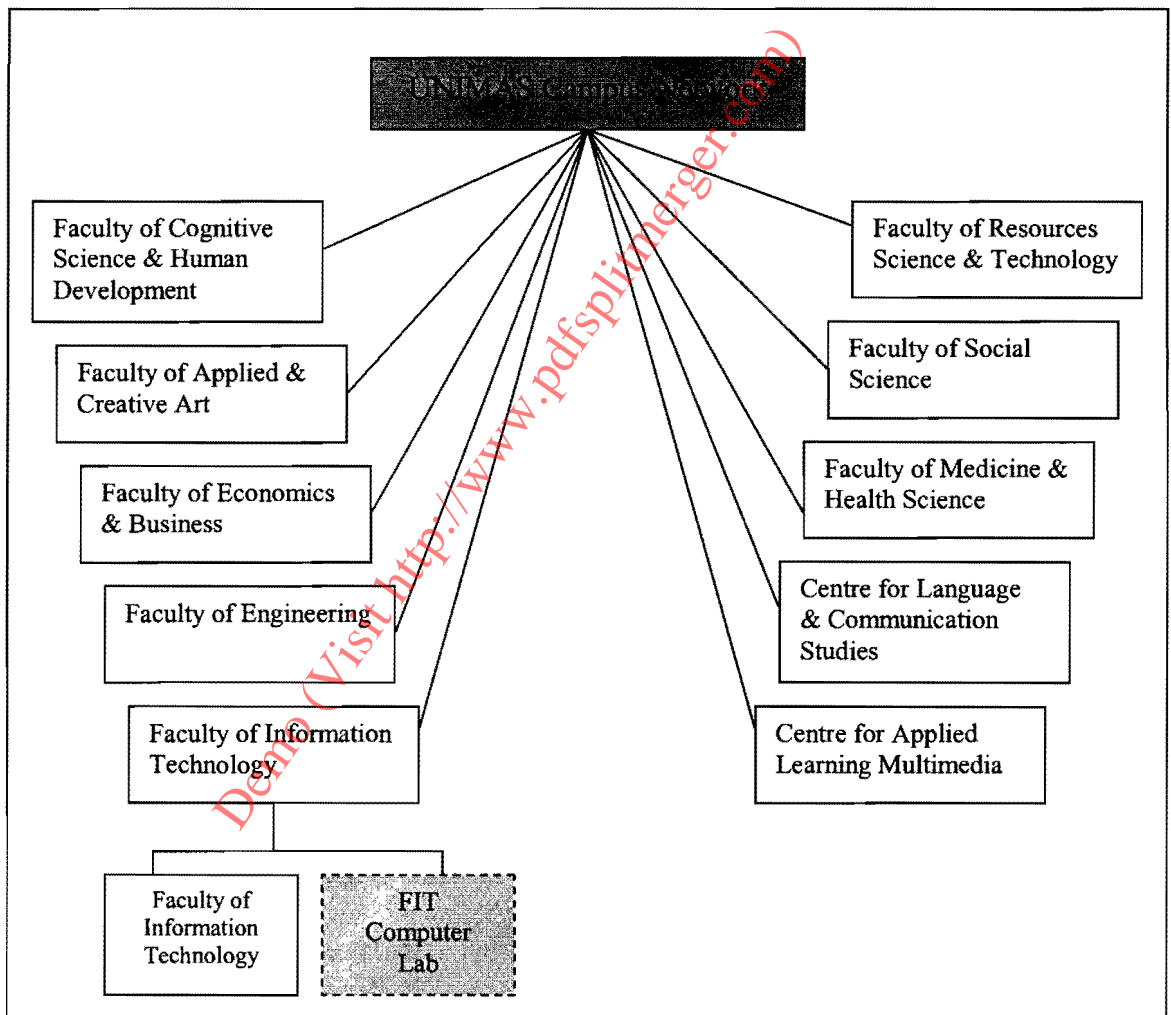


Figure 1.1 UNIMAS campus network

In a global perspective, three areas of network need managing; network, systems and services. System management is defined as *management of a system's resources, such as central processor usage, disk usage, and application processes* (Subramaniam, 2000).

Among the tasks of system management include:

- System administration
- Server management
- User management
- Event monitoring and management
- Service monitoring and control
- Printer management
- Job and task scheduling
- Reporting
- Disk and file administration

For a small office environment, it is a normal task for a system administrator to manage available systems by doing routine checks on each system physically that is going to the computers itself to install, troubleshoot and maintain. However, with the growing number of users as well as the introduction and enhancement of networking technology makes the work of a system administrator more challenging. In a larger environment that might involves the number of computers between 100

and 250 computers connecting to a LAN, a remote system management software will reduce troubleshooting time and avoid mismanaged inventory.

1.2 Problem Statement

System management problem is simulated in UNIMAS environment itself where there are problems in managing computer labs. For this final year project, the scope is limited to UNIMAS Faculty Of Information Technology Computer Lab.

The Faculty of Information Technology Computer Lab (FIT Lab) in UNIMAS houses six computer labs connected to an intranet LAN. Full administration of the LAN network is done by a group of system administrators or SHOP (Students Hand-In Point). Students of UNIMAS particularly Faculty of Information Technology students utilize these computer labs.

Among others, the current problems that reside in the lab management include:

- a) No proper monitoring system to manage the users to the computers; where the system administrators are not able to control or identify between FIT and non-FIT users, thus creating situations like lack of computers for students or even vandalism.

- b) The procedure of troubleshooting when hardware or software problems occur is very long and cumbersome. With the current procedure, the students need to alert the SHOP staff, who will then need to refer to the system administrator in another section of the office.
- c) Paper-based registration into a log book in shop whenever the student want to use the computers in the lab (outside lab hours), creating paper-based and redundant database, which may produce inaccuracy of data.

Based on the problems discussed above, a system management tool that focuses on

- User management
- System administration,

which involves both the system administrators and end-users (the students) need to be developed.

1.3 Project Objectives

The objectives of this project include:

- a) To develop a prototype of system that focuses on system management that remotely monitors the usage of the computers in FIT Lab;
- b) To create faster troubleshooting tool for system administrator; where an end-user can get immediate help online without having to leave his or her computer;
- c) To minimize manual processing operation of getting user usage record and troubleshooting, and to retrieve fast outputs and deliverables of the data.

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1.4 Project Scope And Limitations

1.4.1 Nature Of Project

This project will involve the knowledge of networking as well as database system especially regarding the student lab access module. It is hoped that this prototype will cover both the aspect of a client-server system, where it will need interactivity between both the system administrator and end user, in managing the system of the area.

Remote monitoring and management system is not a new thing in the market nowadays. But from the result of the research done over these systems, a majority of them focuses on one of the individual modules only. Most of these application software offers a number of functionalities in one product; however, these software comes with a higher cost in terms of price ranging from RM10,000 to RM6 million. In addition, customization is required for the software to work properly in the FIT Lab.

Thus, in this project, it is proposed that a prototype to be build for remote monitoring and management of computers in the FIT Lab.

1.4.2 Scope And Limitations

1.4.2.1 System Scope

The scope of the Remote System Manager 2001 (RESYSM2001) is as below:

1. The system will be developed within the Faculty of Information Technology Lab.
2. There are two types of users for the proposed system, namely the *system administrators* and the *end-users (students)*. The students are limited to FIT registered students only, whereby only those with valid matrices number that are registered in the database can use the computers upon login. Two different types of interface exist for different types of users. The administrator will have the server interface which is exclusive to the administrator only while the student will use the client interface, common to all students.
3. RESYSM2001 is built as prototype model, thus a relatively small database system (MS Access) that can only support a maximum of 10 Megabytes of data storage will be used.

4. Security features include authentication protocol using multilevel access password; one for the administrator and the other for the end-users of the system.

1.4.2.2 System Modules

This client server system will include three major modules:

a) Login Authentication Access

On the client (end-user) side, there will be a pop-up window for login access to use the computer. The window will prompt for User Identification (User ID) and password as well as a start session and a logoff button. This module functions in such a way that it will compare the User ID with the database and will determine whether or not the student is an authorized FIT student. Upon successful login, the student will click on the start button and then logoff when he ends his session. For those who are not authorized to use the system, they will not be able to use the computer.

The same procedure goes for the administrator on the server side. The window will prompt for an identification and password before he can enter the system.

b) Monitoring Of User Computer Usage Activity

On the server side, every time a person logs in, his entry will be automatically stored into a login database for future references. The data collected from user login include time the user start login, time he logs off, total usage time, his user identification, and the computer number he is using.

c) Real-Time Remote Helpdesk

This module functions similarly to the messenger services provided by many service providers in the World Wide Web. The end user is able to get online help from the system administrators by clicking on a help button, which will then opens up a messenger window to generate online chat with the system administrator. With this technique, troubleshooting can be done online.

1.4.2.3 System Limitations

Several factors that might influence the effectiveness of this prototype have been identified:

1. Availability of System Administrator

The availability of system administrators to answer any help request / chat is very important to the success of this system.

2. Unauthorized Login

The system will not be able to stop any unauthorized use of another student's login information.

3. Network Infrastructure

Network availability is crucial for the system to work. If the server is down, the system will face some problems to work correctly.

4. Operating Systems Environment

This prototype will be developed using Microsoft Windows platform operating systems (Windows 98/NT/2000) in an Ethernet LAN (10/100 Mbps) environment. Factors to be taken into consideration include the fact that UNIMAS generally runs on Microsoft's windows operating system platform.

1.5 Overview Of The Next Chapters

This report will be divided into seven chapters. Chapter 1 gives the introduction of the project, which includes a brief overview, project objectives as well as the scopes and limitations. The literature review in Chapter 2 will discuss full analyses of remote system management tools and their implementations in the current market together with a comparison table summary. Methodology in Chapter 3 will cover an elaboration on the methods used to construct the system whereas Chapter 4 explains system design; the information flow and procedure of the system. Details are constructed in a conceptual model design. System implementation in Chapter 5 will explain the system's implementation and main component that makes up RESYSYM2001. Chapter 6 reports on the implementation issue, where evaluation analysis on the system's usability and reliability is discussed. Chapter 7 concludes with project's achievement, future works and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The diversity of Information Technology (IT) systems grouped in a local network, such as server systems, terminal devices, printers and active network components should be capable of being managed and monitored centrally from a suitable point. This is a very complex task, which needs to be supported through the use of a network management tool.

According to Bundesamt für Sicherheit in der Informationstechnik (1999), the following aspects of network management should be considered in particular and represented in a global context:

- Performance measurements for network analysis.
- Responses to error messages from the monitored network components.
- Remote maintenance / remote control, particularly of active network components.
- Generation of trouble tickets and escalation on the occurrence of network problems (links with the system management and user helpdesk or external message communicators such as pagers and facsimile machines can be established via this feature).

- Logging and auditing (online and/or offline).
- Integration of any existing proprietary systems, or systems with different management protocols (e.g. in the area of telecommunications).
- Configuration management of all Information Technology systems in use.
- Distributed access to network management functions. Remote access to network management functions might be necessary for administration or auditing; a particularly careful definition and allocation of access rights is necessary here.

In conclusion, the management tool must allow the implementation of the network management concept.

2.2 Review of Existing Network Management System

It is imperative that an extensive review be done on existing products that have certain features that the proposed system will have. The products and the manufacturer's web address are depicted below:

- ❖ Track-It!® By BlueOcean Software.
- ❖ SupportAbility® by South Wind Designs.
- ❖ Network Support Manager by NetSupport.
- ❖ SolarWinds by SolarWinds.Net.
- ❖ Unicenter TNG® by Computer Associates.