THIN CLIENT IMPLEMENTATION TOWARDS TOTAL COST OF OWNERSHIP: CASE STUDY ON SEKOLAH MENENGAH KEBANGSAAN TARCISIAN CONVENT SCHOOL

A thesis submitted to the Faculty of Information Technology in partial fulfillment of the requirements for the degree Master of Science (Information Technology), Universiti Utara Malaysia

By

LIM SWEE BENG

JABATAN HAL EHWAL AKADEMIK
(*Department of Academic Affairs*)
Universiti Utara Malaysia

PERAKUAN KERJA KERTAS PROJEK
(Certificate of Project Paper)

Saya, yang bertandatangan, memperakukan bahawa
(I, the undersigned, certify that)

LIM SWEE BENG

calon untuk Ijazah
(candidate for the degree of) **MSc. (IT)**

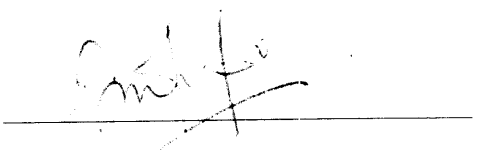
telah mengemukakan kertas projek yang bertajuk
(has presented his/her project paper of the following title)

THIN CLIENT IMPLEMENTATION TOWARDS TOTAL COST OF OWNERSHIP: CASE STUDY ON SEKOLAH MENENGAH KEBANGSAAN (SMK) TARCISIAN CONVENT SCHOOL

seperti yang tercatat di muka surat tajuk dan kulit kertas projek
(as it appears on the title page and front cover of project paper)

bahawa kertas projek tersebut boleh diterima dari segi bentuk serta kandungan dan meliputi bidang ilmu dengan memuaskan.
(that the project paper acceptable in form and content, and that a satisfactory knowledge of the filed is covered by the project paper).

Nama Penyelia Utama
(Name of Main Supervisor): **MR. FAZLI AZZALI**

Tandatangan
(Signature) : 

Tarikh
(Date) : 23/10/05

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor(s) or, in their absence by the Dean of the Graduate School. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to

Dean of Faculty of Information Technology

Universiti Utara Malaysia

06010 UUM Sintok

Kedah Darul Aman.

ABSTRACT

The schools' computer lab require backward compatibility, cost-effective use of existing provision because the schools can not afford to keep upgrading computer equipment at rates prescribed by vendors. Thin client is the solution of frustration with the growing total cost of ownership of personal computers. This study intended to help plan and prepare to deploy thin clients in Sekolah Menengah Kebangsaan (SMK) Tarcisian Convent School. It advocates the concept of K12 Linux Terminal Server Project (LTSP), and describes how the school may reduce total cost of ownership while preserving good interactive performance. It also described the experience gained while deploying thin client at SMK Tarcisian Convent School. This report highlights the benefits of deploying thin client as demonstrated from the evaluation feedback and analysis of SMK Tarcisian Convent School. The report examines the estimated return on investment for SMK Tarcisian Convent School and represents the aggregate, composite findings derived from the evaluation and analysis process.

ACKNOWLEDGEMENTS

I would like to thanks to my supervisor, En. Fazli Azzali for his guidance, knowledge sharing and consistence support during my thesis project cycle.

Secondly, I would like to thanks SMK Tarcisian Convent school management for allowing me to carry out thin client case study on their school.

Lastly, I would like to thanks my wife and daughter for their support and love which enable me to complete this project thesis.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

The current paradigm for technology expenditures in schools is too often focused on the simplest and most evident cost of technology: initial purchases of hardware and software. The costs of supporting and administering the technology and its related infrastructure on going basic are often overlooked. This cost-induced myopia can result in crisis periods when districts realize that their technology is growing hopelessly outdated and the costs of maintaining, upgrading, and replacing computer equipment have become prohibitive. Thin client is a diskless workstation that can boot remotely but able to run applications like a normal Personal Computer (PC). It is the initiative to the exclusive category of technology having clear value propositions, both in terms of cost savings and increased schools end-user productivity. The concept behind thin client is sounded very simple: why put expensive, high-maintenance PCs on every school desktop when the school can have the same functionality via a thin client with no moving parts.

This thesis project starts by reviewing the literature from other studies and implement thin client environment to Sekolah Menengah Kebangsaan (SMK)

The contents of the thesis is for internal user only

a) Running the application locally on client to reduces the load on the server. Some memory intensive application could provide better performance as long the client is powerful enough to handle it.
b) Implement VMware Workstation 5.0 on thin client environment. VMware provide powerful desktop virtualization software for client who want to run Windows OS environment like Windows XP. Additional costs of RM720 need to be include for the purchase of VMware Workstation 5.0 license.

REFERENCES

American Standard Inc. (2005). *Total Cost of Ownership*. Retrieved June 30, 2005, from http://www.trane.com/commercial/financing/tco.asp

Becta. (2004). *Thin Client Networking*. Retrieved June 30, 2005, from http://www.becta.org.uk/subsections/foi/documents/technology_and_education_research/thin_client.pdf

IBM. (1998). *Thin Client Total Cost of Ownership Estimate*. Retrieved September 01, 2005 from http://www.serenity-systems.com/SSI/thintco.htm

Jacqueline, E. (1999). *Total Cost of Ownership*. Retrieved June 30, 2005, from http://www.computerworld.com/hardwaretopics/hardware/story/0,10801,42717,00.html

James, M. (2004). *Linux Terminal Server Project*. Retrieved June 30, 2005, from http://www.ltsp.org

Jerry, G. (1999). Network Computing in The New Thin-Client Age. *netWorker, 3*(1). Retrieved July 10, 2005, from http://portal.acm.org.eserv.uum.edu.my

John, C. (2003). *Reduced cost network computing through the use of thin clients and low cost software*. Retrieved June 25, 2005, from http://ltsp.org/articles/index.php

Julie, S. D., David, S., & Robert, S. L. (2002). Managing your total IT cost of ownership. *Communication of the ACM, 45*(1). Retrieved July 15, 2005 from http://portal.acm.org.eserv.uum.edu.my

Lewis, J. R. (1995). *IBM* Computer Usability Satisfaction Questionaires: Psychometric Evaluation and Instructions for Use. *International Journal of Human-Computer Interaction*. Retrieved June 25, 2005, from http://www.acm.org/~perlman/question.cgi?form=CSUQ&lowval=1&highval=5&lowlab=strongly+dissastified&highlab=strongly+satisfied

Michael, B., & Diane, R. (1994). Prioritization Matrices. *The Memory Jogger II: A Pocket Guide of Tools of Continuous Improvement & Effective Planning* (pp. 105-114). Salem, NH: Goal/QPC

Microsoft. (2005). *Windows XP Embedded*. Retrieved August 10, 2005, from http://www.windowsembeddedkit.com/

Nebula Support Team. (2003). *Total Cost of Ownership (TCO)*. Retrieved June 30, 2005, from http://www.washington.edu/nebula/tco.html

OSTG. (2005). *ROM-o-matic.net for Etherboot version 5.4.1*. Retrieved August 25, 2005, from http://sourceforge.net/projects/etherboot

SourceForge. (2005). *A Remote Desktop Protocol Client*. Retrieved June 30, 2005, from http://www.rdesktop.org/

Steven, J. V. N. (1997). to NC or not to NC?. *netWorker, 1*(1). Retrieved July 10, 2005, from http://portal.acm.org.eserv.uum.edu.my

Tom, B. (2000). *Thinking Thin: The Race for Thin-Client Synchronous E-Learning*. Retrieved August 15, 2005 from http://www.learningcircuits.org/2000/jun2000/barron1.html

VMware. (2005). *VMware Workstation 5*. Retrieved August 20, 2005, from http://www.vmware.com/products/desktop/ws_features.html