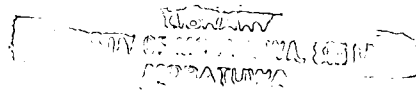


LB/DON/147/04

A Tool to Measure HTTP Performance

THESIS PRESENTED
BY
R. P. DASANAYAKA

SUPERVISED BY
DR. GIHAN DIAS



This thesis was submitted to the Department of Computer Science and Engineering of
the University of Moratuwa-Sri Lanka
in partial fulfilment of the requirements for the
Degree of Master of Science

Department of Computer Science and Engineering,
University of Moratuwa,
Sri Lanka.

UM Thesis call

82432

June 2004

University of Moratuwa



82432

82432

code "04"
code (043)

DECLARATION

The work submitted in this thesis is the result of my own investigations, except where it is otherwise stated.

It has not already been accepted in substance for any degree, and also is not being concurrently submitted for any other degree.

no. Dahmayara

R. P. Dasanayaka,
(Candidate)

Gihan

Dr. Gihan Dias
(Supervisor)



University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk



Dedicated to
my parents
and
teachers
who encouraged me
in my education



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Abstract

The World Wide Web is one of the most popular services on the Internet today. Users of the Internet demand better performance for their web access. In order to meet this requirement, network administrators and engineers try their best to harness the maximum performance from the available resources. High performance for web services can be achieved by using cache-proxies, traffic shifting, mirroring or increasing the available bandwidth.

We have identified a need to compare the effect of performance before and after changing different network parameters.

The objective of this project is to develop a tool that measures and compares HTTP performance under different conditions. This tool also enables the network administrator to conduct the measurements without user involvement.

TCPDUMP was used to capture IP packets transmitted over the broadcast LAN. This capturing process was transparent to users. The captured data was used to identify different web requests, relevant responses and other related statistics. Using these statistics, the tool can regenerate the same web requests, at a later time, under different network conditions and can measure the performance parameters of the network. The tool finally presents a comparison of the performance, so that an administrator can get a quantitative figure of the impact of the changes that he has done.



University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Acknowledgement

I take pleasure in thanking Dr. Gihan Dias, for supervising this project and using his valuable time to instruct and guide me throughout my M.Sc. at the University of Moratuwa and also during the time I wrote this thesis. I would like to thank Dr. R.P. Thilakumara, my external supervisor for his valuable comments.

I would like to express my sincere thanks to Dr. Nalin Wickramarachchi and Dr. Ashok Peiris, Heads of the Department of Computer Science and Engineering, who gave me the permission to use departmental resources for this work. I am grateful to Prof. (Mrs.) N. Rathnayake, Director postgraduate studies for helping me in many ways. Thanks also to Dr. Sanath Jayasena, Research Coordinator of the Department of Computer Science and Engineering for his valuable contribution to my work

I would also like to thank Prof. J.R. Lucas, Head of the Department of Electrical Engineering who helped me to complete my postgraduate studies.

Thanks are also due to Priyantha Pushpakumara, Vishaka Nanayakkara, and Rasika Amarasiri who were at the Research Lab to help and encourage me to complete this project successfully. Their assistance and the friendly environment in the research lab helped me immensely in the completion of this work.

I would also wish to thank all members of the staff of the Department of Computer Science and Engineering and Network Administrators of LEARN who helped me in many ways.



Electronic Theses & Dissertations
www.lib.mrt.ac.lk

I would like to acknowledge the financial support received under the Science and Technology Personnel Development Project SRI (SF) 1535 by the Asian Development Bank to carry out the work described in this thesis. The financial support from the SIDA-IT fund enabled me to present a research paper based on this work at an international conference.

Finally, there were also many other very important people in my life who helped me a good deal. During this period, my family members, especially my wife Nalika and even little Nisal endured everything with infinite patience. Thank you.



Table of Contents

1	Introduction	1
1.1	Objectives	1
1.2	The System developed.....	2
1.3	Outline of the Thesis	2
2	LEARN	3
2.1	Introduction to LEARN.....	3
2.2	LEARN Experience in Web Performance.....	3
2.3	Problems Encountered in Measuring Web Performance	4
3	Protocols and Tools Used	5
3.1	Hypertext Transfer Protocol	5
3.2	The TCP/IP Internet Layering Model	19
3.3	Internet Protocol.....	20
3.4	Packet Sniffers	24
3.5	Case Studies.....	24
4	System Design and Architecture	27
4.1	System Overview	27
5	System Implementation	30
5.1	System components.....	30
5.2	Integration with freeware.....	37
6	Outcome of the System	39
6.1	Results Obtained	39
6.2	Problems Encountered.....	41
7	Conclusion and Recommendations.....	42
7.1	Merits and Drawbacks of the System.....	42
7.2	Future Enhancements	43

Table of Figures

Figure 2.1 - LEARN Traffic Behaviour	4
Figure 3.1 - Proxy/Cache Behaviour I.....	16
Figure 3.2 - Proxy/Cache Behaviour II	17
Figure 3.3 - The TCP/IP Internet Layering	19
Figure 3.4 - Internet Datagram.....	21
Figure 3.5 - Establishing a TCP Connection	22
Figure 3.6 - Closing a TCP Connection	23
Figure 4.1 - System Design of the tool.....	28
Figure 5.1 - interface.pl algorithm in brief.....	31
Figure 5.2 - tracer.pl algorithm in brief.....	32
Figure 5.3 - process-to-regen.pl algorithm in brief.....	33
Figure 5.4 - regen.pl algorithm in brief.....	35
Figure 5.5 - regendetails.pl algorithm in brief.....	36
Figure 6.1 - Squid Performance Comparison	39
Figure 6.2 - Comparison of Data Transfer Speed.	40
Figure 6.3 - Performances vs. Resource Allocation.....	40

