

Distribution of Internet Filtering Policy Information in UUM

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ABSTRACT

This study proposes a design and implementation of Distribution of Internet Filtering Policy Information in UUM. It explains the system model, and demonstrates how to use various programming tools to know the student/stuff which web-site allowed or disallowed about the block list of system and system have to any suggest from student/stuff for allowed for them to using before this time block and this for some time after that repeated the administer to block for this element of block list dependent security for system ,and system another part demo for administer for view and change any interface of system dependent which is system need to security and publisher the information about block list, category and policy and he have all permission to update or delete or insert all interface of system t. Web server Apech and SQL 2005 that can used to retrieved the web page when it send from database. A requirement analysis of interactive web-base for publisher any rule from system UUM to student/stuff to security. Authorized user can update, delete or insert only view for system from the web page. An analysis of the technique and solution that can be put to use and decide on which solution security suitable for our system. We are testing the demo from the offer all web-site prevent from the system UUM which agree or disagree of student/stuff to implement this project and take the percentage for the developer the system to achievement the security for system

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Table of Acronyms

Acronym	Full name
UUM	University Utara Malaysia
PU	Princeton University
APU	Azusa Pacific University
IF-PolicyDS	Internet Filtering Policy Distribution System
IF	Information Filtering
WAM	Web Access Manager
SSO	Single Sign-On
LDAP	Lightweight Directory Access Protocol
UML	Unified Modeling Language
XML	Extension Markup Language
SVM	Support Vector Machines
TVD	Traffic Virtual Domain
NAC	File Transformation Protocol
IP	Internet Protocol
GPS	Global Positional System
IP-VPN	Internet Protocol Virtual Private Network
ISP	Internet Servers Provider

Chapter 1

Introduction

1.0 Introduction

In most institutions and organizations whether they are from government, private, public, educational (primary, secondary and tertiary), there has been growing needs to create internet filtering policies. The goal of most universities and private companies worldwide in creating web filtering policies, is to improve not only their business, but also to provide high performance security features by making servers traffic control policies and to efficiently track its users (Wall, 2007). Wide growth of the Internet has been concerned towards children safety from viewing harmful images from the internet (Martha, 2007).

Internet filtering is also an issue at school level where most parents are concerned of what types of information their children have accessed to especially from the school labs. As a result, this has brought pressure to the school managements to produce web filtering policies which restrict the access to potential dangerous web sites (Heins, 2005). The internet filtering is used to prevent certain threats or any illegally access to images or videos in an organization. For uninformed employees, they feel that web filtering limits their personal freedom to information and can reduce their satisfaction at work (Desiz, 2000).

The categorization process is similar to the filtering process, which matches data information to the user profiles. The main difference between both systems is that categorization systems do not change, but internet filtering systems are dynamic, i.e. users and user profiles may be frequently changed (Hanani et al, 1999).

The contents of
the thesis is for
internal user
only

REFERENCES

- Al-Shaer, E. & Hamed, H. (2004) "Discovery of Policy Anomalies in Distributed Firewalls," *Proceedings of IEEE INFOCOM'04*.
- Anderson, D.R. (2003) . For children on the internet . University of Massachusetts
Retrieved: July 23, 2009 from
<http://www.aifs.gov.au/institute/pubs/fm2003/fm65/js.pdf>
- Babar, M. A., Winkler, D., & Biffi, S. (2007). *Evaluating of Usefulness and Ease of Use of a Groupware Tool for the Software Architecture Evaluation Process*. Paper Presented at the Empirical Software Engineering and Measurement, 2007. ESEM 2007. First International Symposium Madrid, Spain.
- Beerud, S.: 1994, New A personalized information filtering system. <http://agents.www>
- Beerud, S. (1994) . *New – A personal Information Filtering System*. Retrieved July 18, 2009 from: <http://agents.www.media.mit.edu/groups/agents/paper/newt-thesis>
- Best, J. W., & Kahn, J. V. (2000). *Research in education* (8th ed.). USA: Allyn and Bacon.
- Bethel, E. W., S. Campbell, E. Dart, K. Stockinger, & K. Wu, (2006) . "Accelerating Network Traffic Analysis Using Query-Driven Visualization," *IEEE Symposium on Visual Analytics Science and Technology*, IEEE Computer Society Press.
- Bolstad, M.W . (2004) "Introduction to Bayesian Statistics". Retrieved July 18, 2009 at 5:15am. <http://www.bayesian.org/> for other resources.
- BRM.Thechologies . (2000). BackWeb Pusher Service . Retrieved July 18, 2009 from: <http://www.backweb.com>.
- C . Bizer; R. Cyganiak; et al. (2009). Filtering Information using Context-, Content- and Rating-Based Trust Policies. Freie Universit"at Berlin, Germany. Retrieved: July 18, 2000 from <http://richard.cyganiak.de/2008/papers/triqlp-swpw2005.pdf>
- Chris, L.; Trost, J Gibbs, N ; Beyah, R & Copeland, J. (2005). "Visual Firewall: Real-time Network Security Monitor," *Proceedings of the IEEE Workshops on Visualization for Computer Security*, p. 16, October 26-26,.

- Cristianini, N & Taylor, J. (2000). *An Introduction to Support Vector Machines and Other Kernel-based Learning Methods* / Cambridge University Press.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *International Journal of Human-Computer Interaction*, 7(1), 57-78.
- Deisz, J. (2005). Internet filtering and how it affects security, efficiency and thriving in Norwegian companies. Department of Computer Science and Media Technology. Gjøvik, Gjøvik University College. Master's Thesis. Retrieved: July 19, 2009 from <http://hig.no/content/download/3296/70450/file/Deisz%20-%20Internet%20filtering%20and%20how%20it%20affects%20security,%20effi.pdf>
- ERCI. (1997). Filtering and Collaborative Filtering, European Research Consortium for Informatics and Mathematics. Retrieved: in July 20, 2009 from http://ftp1.de.freebsd.org/Publications/CEUR-WS/Vol-175/37_krug_foafrealm_final.pdf
- eSoft (n.d.) .Web security Active Directory Integration. Retrieved: in July 20, 2009 at 11:15 pm. From: http://www.esoft.com/support_docs/ActiveDirectoryWalkthrough.pdf.
- Giles, G. (2005). Internet Monitoring Software. Eastern North Carolina. Retrieved on Jul 21, 2009 from:
- Hanai, U., Sharpira, B & Shoval, P . (2000). Information Filtering Overview of Issue Research and System. Department of Information Systems Engineering Ben-Gurion University. Beer-sheva 841055 Israel. Retrieved: July 21, 2008 from <https://www.planetpdf.com/forumarchive/4Pages%20from%20problemMDI.pdf>
- Heins, M., Cho, C & Fridman, (2005). Internet Filters. Retrieved on July 23, 2009 from <http://www.fepproject.org/policyreports/filters2.pdf>
- Herzog, A and Shahmehri, N (2007). Usable Set-up of Runtime Security Policies, Dept. of Computer and Information Science Linköping universitet, Sweden. Retrieved July 18, 2009 from: <http://www.ida.liu.se/~almhe/publications/AHz-06.18-1.0.pdf>

- Hitch, C. J., & McKean, R. N. (1960). *The Economics of Defense in the Nuclear Age*: Harvard University Press.
- Hoffer, J. A., George, J., & Valacich, J. (2002). *Modern Systems Analysis and Design*. New Jersey: Prentice Hall.
- http://www.ca.com/files/.../technology_audit_ca_siteminder_web_access.pdf
- http://www.infosecwriters.com/text_resources/pdf/Internet_Monitoring_Software.pdf
- http://www.stpaulsp.kingston.sch.uk/pdfs/Web_Filtering_Policy.pdf
- John,G; Penny Rheingans, W.L. & Anita Komlodi (2005).. “Preserving the Big Picture:Visual Network Traffic Analysis with TNV,,” *Proceedings of the 2005 Workshop on Visualization for Computer Security*, pp. 47-54.
- Juniper (2009). *Web Filtering*. 1194North Mathilda Avenue Sunnyvale 94089 USA. Retrieved: July 23, 2009 from <http://www.juniper.net/us/en/local/pdf/app-notes/3500156-en.pdf>
- Kingston (2007). *Web Filtering Policy*. Retrieved: July 22, 2009 from
- Laudon, K. C., & Laudon, J. P. (1995). *Management Information Systems: Organization and Technology*: Prentice-Hall, Inc. Upper Saddle River, NJ, USA.
- Laudon,K,C &Luadin,J,P.(2000). *Mangement Information System*:Prentice Hall PTR Upper Saddle River,NJ,USA.
- Lewis, J. R. (1995). IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use. *International Journal of Human-Computer Interaction*, 7(1), 57-78.
- Ltd., S. (2007). *Meeting the Challenges of Web Content Filtering*. Retrieved on July 23, 2009 from http://dansguardian.org/downloads/content_filtering_challenges.pdf.
- Management, I. (2008). *CA SiteMinder®Web Access Manager Prepares You for What’s Ahead*.

- McCleary.(1994). Filtering Information Service revolutionary new product or new marketing strategy? Online 4(18),34-42.
- Nidhi, S.(2005). *A Personal Firewall Visualizing Tool*, Thesis (M. Eng.), Massachusetts Institute of Technology, Dept. of Electrical Engineering and Computer Science.
- Nunamaker, J., Chen, M., & Purdin, T. (1991). System Development in Information Systems Research. *Journal of Management Information Systems*, 7(3), 89 –106.
- Rosenberg, R. S. (1999) Filtering the Internet in the USA: Free Speech Denied? *The Fourth ETHICOMP International Conference on the Social and Ethical Impacts of Information and Communication Technologies*, October 6-8, Rome, Italy.
- SecureKnowledge, C. P. s. (2002). "Check Point FireWall-1 Guide." www.websense.com/docs/.../pdfs/FireWall-1ConfigurationGuide.pdf
- Technologies, K. (2005). Kerio WinRoute Firewall 6.
- Technology, A. (2000). Raptor Firewall Raptor PowerVPN VelociRaptor, Axent security means busniess www.sun.com/hardware/.../pdfs/discontinued/manual.velociraptor.pdf
- Tran,T; Al-Shaer, E &Boutaba ,R .(2007).Firewall Security Policy Visualization and Inspection. University of Waterloo, Canada
- Tsuji, K. & Yahagi ,A (2009). Filtering Software in Japanese Public Libraries and their Performance.. Retrieved: July 23, 2009 from <http://a-liep.kc.tsukuba.ac.jp/proceedings/Papers/a12.pdf>
- VOIP (2005). VOIP Security withAccelerated Fortinet's E xtended VOIP Security Architecture
- Wüest, C. (2003). Desktop Firewalls and Intrusion Detection. Retrieved: July 23, 2009 at 6:25am. From: <ftp://ftp.tik.ee.ethz.ch/pub/students/2002-2003-Wi/DA-2003-22.pdf>
- www.mcsit.com/pdf/fortinet/white.../Fortinet_VoIP_WPR1220508.pdf
- www.websense.com/docs/.../pdfs/FireWall-1ConfigurationGuide.pdf

Zaliva, V. (2008). Firewall Policy Modeling, Analysis and Simulation: a Survey
Retrieved: July 23, 2009 from <http://www.crocodile.org/lord/fwpolicy.pdf>