

An Enhanced Proxy Server for Better Performance & Security of Network for Academics

Rahul Dangi, Varun Kumar Jha, Manoj Choudhary, Prof. Devendra Bhavsar

Abstract— The quick development of Internet technology and the accessibility of expansive excitement assets in the World Wide Web (WWW) pulling in students to invest more energy in it as opposed to education. On the opposite side, malicious attacks from outer sources additionally expanding to take data of educational organizations. The proxy server is a definitive security to limit students from viewing illicit and wrong substance, just as the user-authentication procedure in the proxy server, can decrease the malicious attacks. This paper will portray a few functionalities for an academic proxy server. It will likewise depict the upgrades that should be possible over the traditional proxy servers. On the reasonable side, it will depict the GUI based proxy server implemented with multi-threading and multi-functionality.

Keywords: Proxy Server, Bandwidth Management, Cache Management,

I. INTRODUCTION

As of late, Internet administrations wind up well known among the adolescent and youngsters who in a flash expanded the quantity of online clients as a result of web-based social networking sites like Facebook, Twitter and online video streaming website like YouTube. It additionally expands the danger to security to educational organizations due to expanded malicious content on such sites. Giving system security to universities or some other educational organizations with appropriate data transfer capacity and controlled access isn't a simple undertaking for a network administrator. Each new client in the system is expanding time complexity and support multifaceted nature to the system. This isn't the main issue which is looked by such organizations with many students and having a major foundation with great sum resources in it. Some different issues educational organizations confront are:

1. Consistently, proxy server confronts some high peak time intervals which over-burdens the server and decline the execution of the system [1].
2. The proxy server needs to do client validation to monitor the web activities of staffs and students and give satisfactory access to each dependent on need.
3. The proxy server requires to do content-filtering, Uniform Resource Locator (URL) filtering, client blocking, bandwidth management for administrator, faculty and student. Furthermore, giving security against viruses and malware [2].
4. Proxy server needs to increase the response time even with a more prominent number of functionalities.

A. Proxy Server

Proxy server, at times known as an intermediary is a mix of hardware platforms and programming application which goes about as a mediator for requests from clients looking for resources from different servers. It goes about as an application and gives bigger number functionalities because of its execution on Layer 7 (Application Layer) of International Organization for Standardization (ISO)/Open System Interconnection (OSI) model. So, it can be implemented to work with multiple protocols simultaneously using multithreading. Notwithstanding application proxies like HTTP Proxy, Secure Sockets Layer (SSL) Proxy and File Transfer Protocol (FTP) Proxy, there is likewise SOCKets (SOCK) protocol proxy which works on Layer 5 (Session Layer) of ISO/OSI model. It routes packets among client and server utilizing the proxy server without the information of application layer protocol. SOCKS5 gives the functionality of user authentication so just approved clients to gain admittance to the server [1]. Elvin Smith and Jose Robles categorized proxy server in essentially two unique categories dependent on their usefulness [3].

1. Transparent Proxy Server: Transparent proxy server forward client request to the server without concealing any data from headers.
2. Anonymous Proxy Server: Anonymous proxy server changes the header information of client request and enables the client to surf on web anonymously.

However, based on proxy server architecture, it very well may be sorted into two categories:

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1. Forward Proxy: In the forward proxy, network comprise of a few clients and switches/routers, the system traffic from switches and routers are sent to the proxy server. For the most part, it is utilized in internal network to communicate with servers.

2. Reverse Proxy: Reverse proxy is executed by server administrator to give an additional dimension of security to site or web servers. The site has a few web servers behind the reverse proxy server.

II. USE OF PROXY SERVER

Proxy server can be used by network administrators in academic institution, start-up and businesses

1. Gives security from external attacks by client authentication through logging portals which requires a login id and secret key to get to the server [1][3].

2. Adequate and controlled access to web content to its client using content-filtering, URL filtering and content restrictions.

3. It can communicate with daemon based and Internet Content Adaptation Protocol (ICAP) based antivirus to give security against viruses and malware [3].

4. Increment network effectiveness, response time and decline latency using cache management system known as cache proxy and it is additionally a one of an extraordinary factor to expand the performance of system using an proxy server [6][11].

5. Web monitoring by chronicle logs of each client request for which incorporates specifying about web domain, hostname, port, protocol, OS and so forth.

III. RELATED WORK

A RAM-based proxy server model which enhances the response time of proxy server by storing cache in RAM as opposed to disk. Kin Yeung Wong and Ka Chon Lai depicted a few advantages of utilizing RAM as primary memory for storing cache files and saved it to disk for backup [9]. An educational HTTP proxy server which implements full support for standard HTTP/1.0 i.e. methods GET, POST and HEAD [5]. It is multithreaded programming to serve various demands in the meantime. Mr S.V. Gumaste is increasingly centered around cache management using disk and replacement algorithms like List Recently Used (LRU). His investigation indicated 21% to 39% hit ratio for a huge association and 40% to 70% for medium associations for cache management. The examination demonstrated the significance of caching over spending money over higher bandwidth lower latency and accomplished 69% HITS for least configured system as a proxy (Squid proxy server) [2]. Bassa, an proxy server by University of Colombo School of Computing, Sri Lanka stored cache and logs in Relational

Database Management System (RDBMS) to make server proficient [7].

IV. ACADEMIC PROXY SERVER

Students have the most diverse nature as World Wide Web (WWW) clients. They are getting to various kinds of web contents like educational content, social sites, online video streaming, internet gaming, online trading, Voice over IP (VoIP) services and mobile applications and so on. This should be controlled and filtered or even restricted based on its content type before they utilize those content. Because of the fame of the Internet among students, educational organizations failing to make the students more centred around their education instead of stimulation. The proxy server can't change their attitudes yet limit them to utilize unlawful and wrong substance. The bandwidth control system of the proxy server can compel the students to not utilize the Internet while lectures or classes time.

A. Use of Academic Proxy Server

1. It implements above functionalities of proxy server with a few different features also.

2. Grouping of client should be possible to control their data transfer speed (bandwidth); data usage and web-content accessing permission (Only offer consent to educational content or resources which is affirmed by organization authority). For instance, students might not have authorization to some web-content which can be gotten to by an executive.

3. Automatic bandwidth management according to the class time table for students, according to working hours for staff. For Example, Increase the bandwidth of staff or administrator on working hours and decline the bandwidth for students at the class time and increment it in the free calendar and after classes are finished.

B. Architecture of Academic Proxy Server

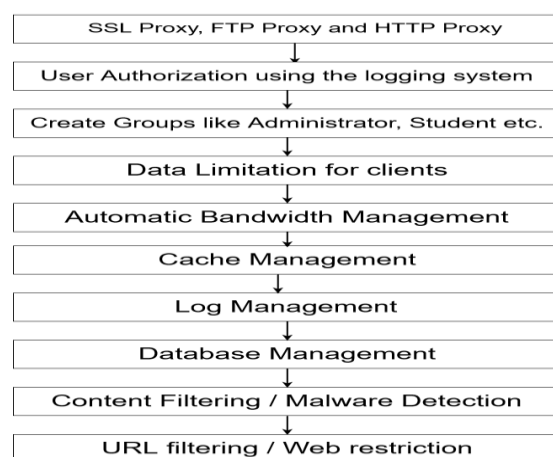


Fig 1. Proxy Server Architecture for Academics

V. POSSIBLE ENHANCEMENTS IN THE CONVENTIONAL PROXY SERVER

1. Cache Management

1.1 Disks are the slowest gadget present in the proxy server. Access time of item from disk-cache can be decreased by using page substitution algorithms to load cache data from disk to RAM [6].

1.2 Prefetching should be possible using algorithms by recognizing peak time interim dependent on past information log and fetch the cache items using a few algorithms like LRU amid an off-peak time (before peak time interim) to limit the network traffic in the peak time interim and increase the performance of the proxy server [4].

1.3 Cache files belong to the same website or domain can be saved in the same folder with the name as website or domain name.

1.4 Hummingbird is a light-weight file system can be used to achieve document request throughput 2.3 to 9.4 times larger than that by the Unix File System. More information on file system found in [14][15].

1.5 The Proxy server can use nesting of hash map, the key will be domain name or link to web content to decrease the time intricacy of getting to things in RAM to $O(1)$ for the most pessimistic scenario.

1.6 The cache can be stored in RAM rather than disks to remove the disk or database accessing time. It will reduce the response time but it will also increase the cost of the server. To overcome the cost problem we can use page replacement algorithms for a large amount of RAM and save data to disk for backup in a particular interval of time. When browser operates at 0.4 request/sec, the disk-based system will operate at 60 requests/sec but the RAM-based system will operate at 350 requests/sec, the study showed by Macau Polytechnic Institute, Macau [9].

2. Security

2.1 Smart algorithms can be intended to limit the likelihood of Denial of Service (DoS) attacks by malevolent outside sources.

3. Bandwidth Management

3.1 Expansive documents (for example DVD ISO pictures) can be lined on the system by giving a offline feature to clients and download the document amid off-peak time interim on the server to serve client on next request [7].

VI. IMPLEMENTATION OF PROXY SERVER – PEROXY

The viable piece of the paper is an implementation of a basic academic proxy server known as Peroxy. Peroxy giving the functionality of implementing a subset of HTTP/1.0 and HTTP/1.1 for example GET method. Peroxy can likewise deal with HTTPs CONNECT request using 'bypass the request to the web server' without accessing to the web-content in spite of the fact that headers have been changed by Peroxy, which makes it working flawlessly with HTTPs connections. Implementation of the proxy server additionally contains the Graphical User Interface (GUI) of software in Java and Netbeans platform, giving a platform-independent feature to the proxy server. Peroxy using forward proxy where router forward the client request to Peroxy. It is working as a anonymous proxy for HTTP and HTTPs both.

1. Peroxy's Network Architecture

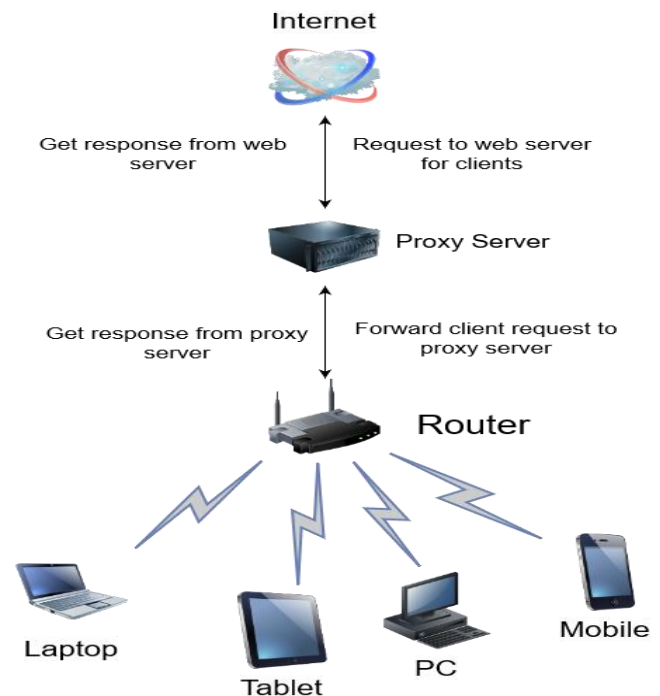


Fig 2. Peroxy server's Network architecture

2. Highlights

2.1 Each request from a browser is considered as a thread so that multiple requests can be processed simultaneously. It likewise implements a thread-expulsion procedure which evacuates the threads when the demand gets fulfilled.

2.2 Peroxy approves the client using a existing database of Ids and Passwords. It additionally bunches them into three classifications: Student, Faculty and Administrator and can allocate different bandwidth and different data limit to the different groups of clients.

2.3 It implemented RAM-based cache management with backup saved in disks.

2.4 Logs of clients get recorded for web monitoring.

2.7 Bandwidth can be set on a group of clients. After configuration, Peroxy itself can adjust bandwidth according to a class time table. By default, it gives the same bandwidth across the 24 hours.



Log Manager - Perxy0/L						
Date Based ▾						
4	September	2018	Del Log	Show Log		
Log Table - (259) log entries						
Website	Request	Connection	Product	Browsers	OS Detail	
wing.mobi.com (43)	http://wing.mobi.com (43)		Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
www.1231001.com	http://www.1231001.com	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
172.15.1.10800	http://172.15.1.10800/buy.html	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
172.15.126.8000	http://172.15.126.8000/buy.html	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
china.cdn.mozilla.net (43)	http://china.cdn.mozilla.net (43)	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
url	http://url		Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
0.1.1	http://0.1.1	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
123.10.0.1	http://123.10.0.1	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
123.10.0.1	http://123.10.0.1	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
www.europt.europa.eu	http://www.europt.europa.eu/ue	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
www.google.cn (43)	http://www.google.cn (43)	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
www.google.cn (43)	http://www.google.cn (43)	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
cn.google.com (43)	http://cn.google.com (43)	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
ads.google.cn (43)	http://ads.google.cn (43)	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
normalize.services.mcafee.com	http://normalize.services.mcafee.com	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
google.gcp	http://google.gcp/gcp/32000000	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
dotaforlife.com	http://dotaforlife.com/dotaforlife.com	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
www.google.cn (43)	http://www.google.cn (43)	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
www.banwenproprograms.com	http://www.banwenproprograms.com	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
a.banwenproprograms.com	http://a.banwenproprograms.com	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
c2sp.google	http://c2sp.google/c2sp/32000000	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
www.google.cn (43)	http://www.google.cn (43)	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
gcp.google.cn (43)	http://gcp.google.cn (43)	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
www.banwenproprograms.com	http://www.banwenproprograms.com	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
e.bmco.com	http://e.bmco.com (43)	keep-alive	Mozilla/5.0	Safari/7.35	(Windows NT 10.0; Win64; x64)	
dotaforlife.com	http://dotaforlife.com/dotaforlife.com	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
dotaforlife.com	http://dotaforlife.com/dotaforlife.com	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	
0.1.1.1001	http://0.1.1.1001	keep-alive	Mozilla/5.0	Firefox/1.0	(Windows NT 10.0; Win64; x64)	

VII. CONCLUSION

This paper has discussed about the job of an proxy server in the educational organization. And furthermore proposed a few enhancements over the traditional proxy servers to make it productive and very responsive. A few sorts of cache saving strategies are likewise portrayed to fit the different types of organizations and a superior method for automatic lowering the bandwidth of students is additionally proposed to utilize that bandwidth for administrator purpose. This paper concentrated on improving cache management system, bandwidth controlling system and network traffic control by user-management and thread-management. Handy

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