

WEBLOCK GUARDIAN: A Software-Based Access Control Firewall Using Python

Aditi Sathe¹, Tanuja Nagane², Diksha Patil³, Shivani Rane⁴

Department Of Computer Engineering

Dr.D.B.Lokhande¹, Prof.Pooja Waghamare²

Research Guide

Department of Computer Engineering

Swami Vivekanand Institute of Technology, Solapur, Gat No.16/2, Solapur-Barshi Road, A/P.Khed, Taluka-North Solapur. Dist-Solapur Maharashtra India-413255

Abstract

The use of the internet has increased rapidly in recent years, and many users spend a large amount of time on websites such as social media, gaming, and streaming platforms. Sometimes these websites become distractions and may also expose users to harmful or unwanted content. To solve this problem, a software firewall system has been developed using Python programming language.

The main purpose of this project is to block selected websites on a computer system and control internet access. The system works by modifying the hosts file of the operating system so that when a user tries to open a blocked website, the browser cannot access it. The firewall also provides a simple graphical user interface where users can block or unblock websites easily. Websites are organized into different categories such as social media, shopping, gaming, and streaming, which helps in blocking multiple related websites at once.

The system also includes additional features like administrator login, custom website blocking, time-based blocking, and activity logging. Logs of blocked or unblocked websites can also be exported into a PDF file for record purposes.

This project helps in improving productivity, reducing unnecessary internet usage, and protecting users from accessing unwanted websites. The developed firewall system is simple, efficient, and useful for educational institutions, offices, and personal computer use.

Keywords

Python, Software Firewall, Website Blocking, Time-Based Blocking, Hosts File Modification, Tkinter GUI, Internet Access Control, DNS Cache Flushing, Category-Based Filtering, Activity Logging, Administrator Authentication, Custom Website Blocking.

Date of Submission: 20-03-2026

Date of acceptance: 03-04-2026

I. Introduction

The internet is widely used for education, communication, and entertainment. However, excessive use of websites such as social media, gaming, and streaming platforms can cause distractions and reduce productivity. Therefore, controlling access to certain websites is important in schools, colleges, and workplaces.

This project proposes a **Python-based Software Firewall** that helps block unwanted websites on a computer system. The system works by modifying the **hosts file** to prevent access to selected websites. It also provides a **simple graphical user interface (GUI)** for easy management.

The firewall includes features such as **category-based blocking, custom website blocking, time-based blocking, and activity logging**, which help users manage internet usage effectively.

II. Literature Review

Several researchers have developed firewall and web filtering systems to control internet access and improve network security. Traditional firewall systems are used to monitor and filter network traffic to block unauthorized or harmful websites.

Some software-based solutions use **hosts file modification** to block specific websites on a computer system. This method redirects website domains to the local system, preventing the browser from accessing them.

Based on these approaches, this project develops a **Python-based Software Firewall** with features such as website blocking, category-based filtering, and time-based blocking to manage internet usage effectively.

III. Proposed System Architecture

The proposed system is a **Python-based Software Firewall** designed to control access to unwanted websites on a computer system. The architecture of the system consists of several components that work together to manage website blocking and monitoring.

First, the **User Interface (GUI)** allows the administrator to interact with the system. Through this interface, the user can block or unblock websites, select categories, and view activity logs.

Next, the **Authentication Module** verifies the administrator's login credentials to ensure that only authorized users can modify firewall settings.

The **Website Blocking Module** processes the list of websites selected by the user and blocks them by modifying the system's **hosts file**. When a blocked website is accessed, it is redirected to the local system, preventing the browser from opening it.

The **Time-Based Blocking Module** allows websites to be blocked for a specific period of time. After the selected time duration ends, the websites are automatically unblocked.

The **Logging Module** records all activities such as blocking and unblocking websites. These logs can also be exported as a **PDF report** for future reference.

Together, these modules form a simple and effective architecture that helps manage internet access and improve system security.

IV. Methodology

First, the user logs into the system using the **administrator ID and password**. This ensures that only authorized users can access and control the firewall.

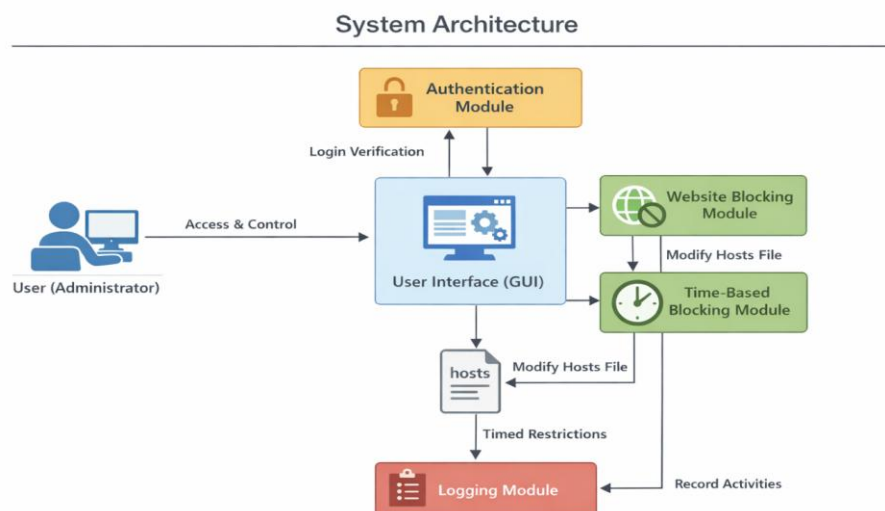
After login, the **graphical user interface (GUI)** appears. From this interface, the user can select websites or categories that need to be blocked. The system also allows users to enter **custom website names** for blocking.

When a website is blocked, the system updates the **hosts file** of the computer. This prevents the browser from opening that website.

The system also provides a **time-based blocking feature**, where websites can be blocked for a specific period of time. After the selected time ends, the websites are automatically unblocked.

All the actions performed by the user are saved in the **activity log**, which can also be exported as a **PDF file** for future reference.

V. System Architecture



VI. Experimental Results

The proposed **Python-based Software Firewall** was tested to check its performance in blocking websites. The system successfully blocked selected websites by modifying the **hosts file**, and the browser was not able to open those websites.

The **category-based blocking** feature allowed multiple websites to be blocked at once. The **time-based blocking** feature also worked properly by blocking websites for a specific time and automatically unblocking them after the time ended.

The **activity logging** feature recorded all blocking and unblocking actions. The results show that the system works effectively in controlling website access and managing internet usage.

VII.Limitations

The proposed software firewall has some limitations. It requires administrator permission to modify the hosts file, which may limit its use for normal users. The firewall blocks only specific websites and cannot protect the system from all types of online threats. Therefore, it provides basic website control but not complete network security.

VIII.Future Work

In the future, the system can be improved by adding more advanced security features. A **stronger security mechanism** can also be added to prevent users from manually editing the hosts file. The system can include **automatic website detection and filtering** to block harmful websites more effectively. In addition, a **mobile or web-based interface** can be developed to allow remote monitoring and control of the firewall. These improvements can make the system more powerful and useful for organizations and institutions.

IX.Conclusion

WEBLOCK GUARDIAN: A Software-Based Access Control Firewall Using Python provides a simple and effective solution for controlling access to unwanted websites. The system blocks selected websites by modifying the hosts file of the operating system, which prevents the browser from opening those websites. The firewall also includes useful features such as **category-based blocking, custom website blocking, time-based blocking, and activity logging**. The graphical user interface makes the system easy to use and manage. Overall, WEBLOCK GUARDIAN helps users control internet usage, reduce distractions, and improve productivity. It can be useful for students, educational institutions, and offices where managing website access is important.

References

- [1] W. Stallings, *Network Security Essentials: Applications and Standards*, 6th ed. Boston, MA, USA: Pearson, 2017.
- [2] J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 7th ed. Boston, MA, USA: Pearson Education, 2017.
- [3] Python Software Foundation, *Python Documentation*. Available:<https://www.python.org>
- [4] Tkinter Documentation, "Python Graphical User Interface Programming." Available:<https://docs.python.org>
- [5] Microsoft, "Windows Hosts File Documentation." Available:<https://learn.microsoft.com>
- [6] A. S. Tanenbaum and D. J. Wetherall, *Computer Networks*, 5th ed. Boston, MA, USA: Pearson, 2011.
- [7] B. Schneier, *Applied Cryptography: Protocols, Algorithms, and Source Code in C*, 2nd ed. New York, NY, USA: Wiley, 2015.
- [8] S. McClure, J. Scambray, and G. Kurtz, *Hacking Exposed: Network Security Secrets and Solutions*, 7th ed. New York, NY, USA: McGraw-Hill, 2012.
- [9] N. Daswani, C. Kern, and A. Kesavan, *Foundations of Security: What Every Programmer Needs to Know*, Berkeley, CA, USA: Apress, 2007.
- [10] R. Sandhu and P. Samarati, "Access Control: Principles and Practice," *IEEE Communications Magazine*, vol. 32, no. 9, pp. 40–48, 1994.

Bibliography



Name: Aditi Sathe

Department: Diploma in Computer Engineering

Institute: Swami Vivekanand Institute of Technology, Solapur

Email: satheaditi2907@gmail.com

Short Bio:

Aditi Sathe is a diploma student in the Department of Computer Engineering at Swami Vivekanand Institute of Technology, Solapur. Her interests include Networking, Cloud Computing, and Software Testing. In the project **“WEBLOCK GUARDIAN: A Software-Based Access Control Firewall Using Python,”** she contributed to the testing of the system by verifying the functionality of website blocking, time-based blocking, and ensuring that the firewall works correctly. Her work helped in improving the reliability and performance of the project.



Name: Tanuja Nagane

Department: Diploma in Computer Engineering

Institute: Swami Vivekanand Institute of Technology, Solapur

Email: naganetanuja0503@gmail.com

ShortBio:

Tanuja Nagane is a diploma student in the Department of Computer Engineering at Swami Vivekanand Institute of Technology, Solapur. Her interests include Programming, Cybersecurity, and Web Development. She contributed to the development and implementation of the system, including the website blocking mechanism, graphical user interface design, and integration of features such as category-based blocking and time-based blocking in the project **“WEBLOCK GUARDIAN: A Software-Based Access Control Firewall Using Python.”**



Name: Diksha Patil

Department: Diploma in Computer Engineering

Institute: Swami Vivekanand Institute of Technology, Solapur

Email: dpdiksha14@gmail.com

Short Bio:

Diksha Patil is a diploma student in the Department of Computer Engineering at Swami Vivekanand Institute of Technology, Solapur. Her interests include Software Development, System Design, and Networking. In the project **“WEBLOCK GUARDIAN: A Software-Based Access Control Firewall Using Python,”** she contributed to the **system design and architecture** of the firewall. Her work helped in planning the structure of the system and organizing different modules for the proper functioning of the project.



Name: Shivani Rane

Department: Diploma in Computer Engineering

Institute: Swami Vivekanand Institute of Technology, Solapur

Email: raneshivani2005@gmail.com

Short Bio:

Shivani Rane is a diploma student in the Department of Computer Engineering at Swami Vivekanand Institute of Technology, Solapur. Her interests include Programming, Networking, and Software Development. In the project “**WEBLOCK GUARDIAN: A Software-Based Access Control Firewall Using Python,**” she contributed to the **documentation and research work**, including preparing the project report and supporting the development process. Her contribution helped in organizing and presenting the project effectively.