

**Project Report**

**Firewall Implementation**

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# Project Report

This report is to acknowledge that the project report titled **"Firewall Implementation"** has met the required standards for submission as a semester project for the completion of the 1st semester of the Bachelor of Science in Cyber Security at Air University in Islamabad.

# Semester Project Report

## 1. Introduction:

## The purpose of this project is to design and implement a firewall program that regulates network traffic based on specified rules. The objectives include thinking creatively about computational tasks, enhancing programming skills, gaining a better understanding of security concepts, and practicing teamwork skills. This report outlines the implementation details, design choices, and the structure of the firewall program.

## 2. Project Requirements:

## The firewall program is designed to read rules from a file and process network traffic based on these rules. The rules are specified in a particular format, including rule number, applied condition (source, destination, or protocol), IP address, and decision (allow or deny). The program takes two input files: one containing rules and the other containing network traffic data. The rules are applied sequentially, and the decision for each data packet is recorded in an output file named result.dat.

## 3. Implementation Details

## 3.1 Rule File Parsing

## The program reads the rule file and parses each rule line to extract relevant information such as rule number, applied condition, IP address or protocol, and decision. This information is stored in a data structure for easy access during the processing of network traffic.

## 3.2 Traffic Data Processing

## The program reads the network traffic file, extracts each data packet, and applies the rules sequentially. For each data packet, it checks against the rules to determine if the packet should be allowed or denied. The decision is recorded along with the rule number that was applied.

## Output Generation

## The program generates an output file (result.dat) containing the decisions for each data packet. Each decision is presented on a new line, showing the source IP address, destination IP address, protocol, decision (allow or deny), and the rule number that was applied.

## 4. Code Structure:

## The code is organized into functions, each serving a specific purpose:

## Rule File Parsing Functions: Responsible for reading and parsing the rule file.

## Traffic Data Processing Functions: Handle the processing of network traffic data

## Rule Application Function: Apply the rules on the network traffic data.

## Output Generation Function: Writes the decisions to the output file.

## 5. Team Collaboration:

## The project encourages teamwork, with each team member assigned specific responsibilities. Regular communication and collaboration ensure a cohesive implementation of the firewall program.

## 6. Conclusion:

## This project provides a hands-on experience in implementing a firewall program, reinforcing programming skills and deepening understanding of security concepts. The sequential rule application and decision recording mechanism contribute to the efficiency and accuracy of the firewall program.

## By successfully completing this project, the team members gain valuable insights into network security, programming, and teamwork skills, preparing them for real-world challenges in the field of information technology.

## Top of Form