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**22Project: Building a Basic Firewall**

**Introduction**

Firewalls are a critical component in network security, acting as a barrier between trusted internal networks and untrusted external networks like the internet. Building a firewall from scratch will allow me to understand the underlying concepts of packet filtering, stateful inspection, and network traffic monitoring.

In this project, I will be creating a basic firewall. The firewall will inspect incoming and outgoing network traffic based on a set of user-defined rules.

**Objectives:**

* Learn the basic concepts of firewalls.
* Build a simple packet filtering system.
* Implement rule-based access control.
* Gain practical knowledge of network security tools like iptables and Python’s socket library.

**Tools and Technologies:**

1. **Operating System**: Linux (Ubuntu/Debian preferred)
2. **Programming Language**: Python
3. **Packet Filtering**: iptables (Linux command line)
4. **Networking Libraries**: Python's socket, subprocess
5. **Firewall Logging**: System log files **(e.g., /var/log/ufw.log)**

**Prerequisites:**

* Basic understanding of networking (IP, TCP, UDP).
* Familiarity with Python.
* Basic knowledge of Linux and its terminal.
* Root or Sudo privileges for running network-related commands like iptables.

**Steps to Build the Firewall:**

**Step 1: Setting Up the Development Environment**

Ensure that your environment has the necessary tools.

1. **Install Python** (if not installed already)

sudo apt update

sudo apt install python3 python3-pip

1. **Install iptables** (usually pre-installed on most Linux distributions)

bash

sudo apt install iptables

1. **Ensure your** **firewall is not blocking essential ports** during development:

bash

sudo ufw allow ssh

sudo ufw enable

1. **Create a folder** for the project:

bash

mkdir firewall\_project

cd firewall\_project