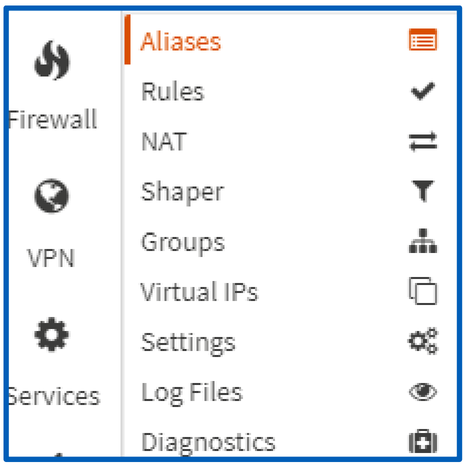
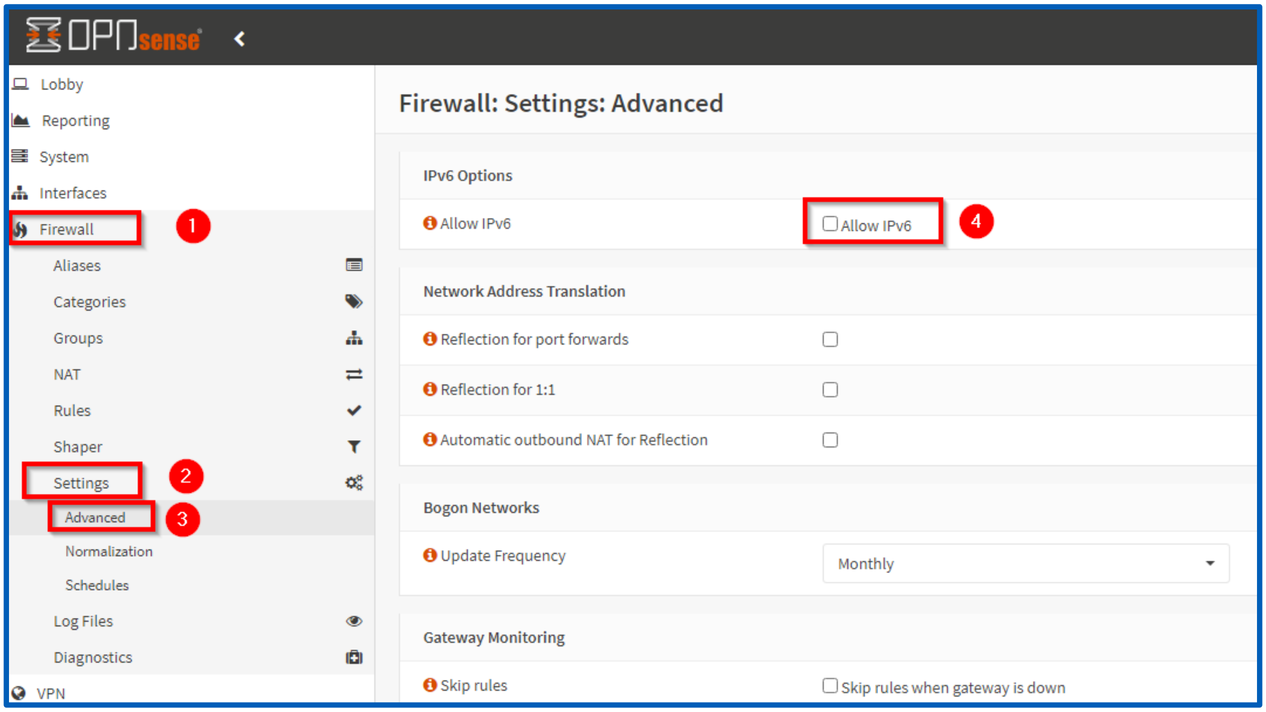
# OPNsense Firewall: Blocking IP's, Ports, and Protocols

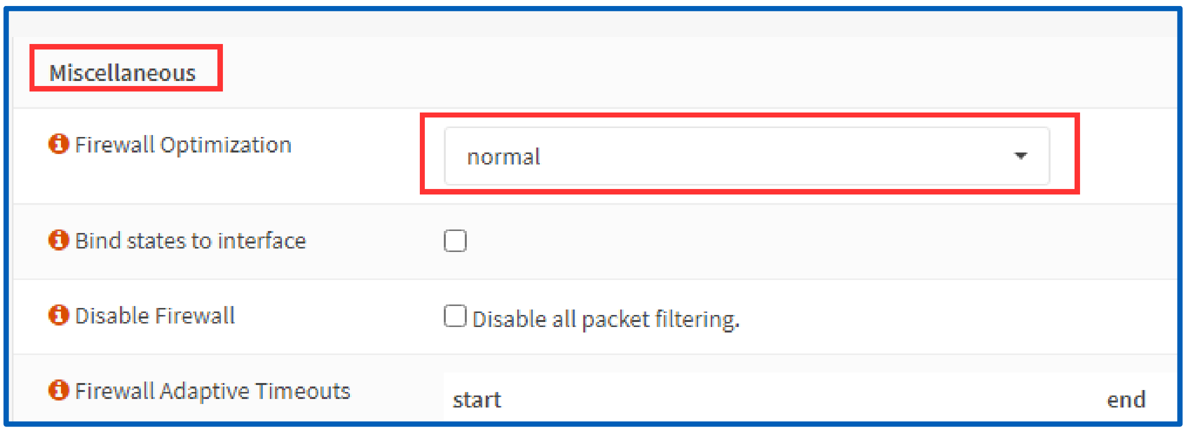
In this project, I explored the OPNsense firewall, a tool crucial for network security. The focus was on understanding and implementing firewall rules and aliases to manage and secure networks effectively. The goal was to grasp practical insights into blocking specific IPs, protocols, and ports while optimizing organizational efficiency through alias usage.

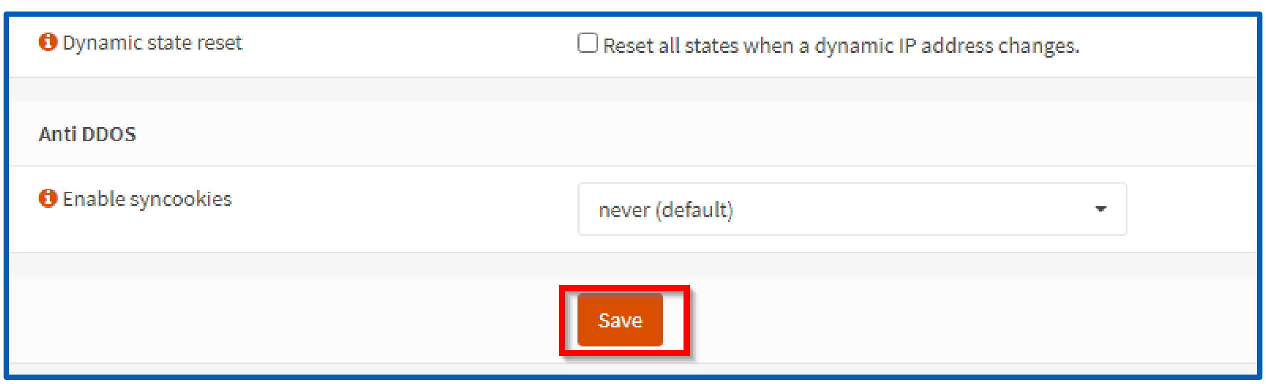
Beginning with the firewall interface overview, I navigated to the firewall tab on the left-hand side of OPNsense. This section encompasses various options, with a focus on Aliases, Rules, Settings, and Log Files for this module.




Before delving into specific settings, I went into Settings > Advanced to disable IPv6, ensuring a streamlined configuration. The process involved turning off Allow IPv6 and adjusting Firewall Optimization under Miscellaneous to the normal setting. These configurations were saved to implement the changes.


OPNsense
Lobby
Reporting
System
Interfaces
Firewall
1
Aliases
Categories
Groups
NAT
Rules
Shaper
Settings
2
Advanced
3
Normalization
Schedules
Log Files
Diagnostics
VPN
Firewall: Settings: Advanced
IPv6 Options
Allow IPv6
Allow IPv6
4
Network Address Translation
Reflection for port forwards
Reflection for 1:1
Automatic outbound NAT for Reflection
Bogon Networks
Update Frequency
Monthly
Gateway Monitoring
Skip rules
Skip rules when gateway is down

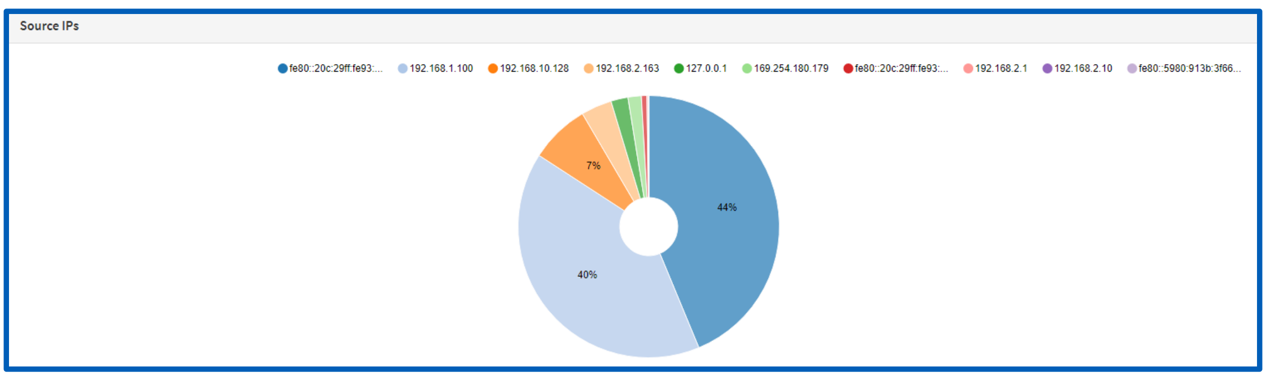

Miscellaneous
Firewall Optimization
normal
Bind states to interface
Disable Firewall
Disable all packet filtering.
Firewall Adaptive Timeouts
start
end


Dynamic state reset
Reset all states when a dynamic IP address changes.
Anti DDOS
Enable syncookies
never (default)
Save

In the second part, I focused on configuring aliases, an essential aspect of firewall management. Aliases allow for the grouping of IP addresses, networks, and ports under a single, easy-to-reference name. This simplifies rule creation and management.

Moving on to real-time monitoring, I accessed Log Files > Live View to gain insights into the firewall's current activities. This provided a dynamic view of the firewall's actions, offering valuable feedback.


Additionally, the Overview section provided a graphical representation of firewall activity.

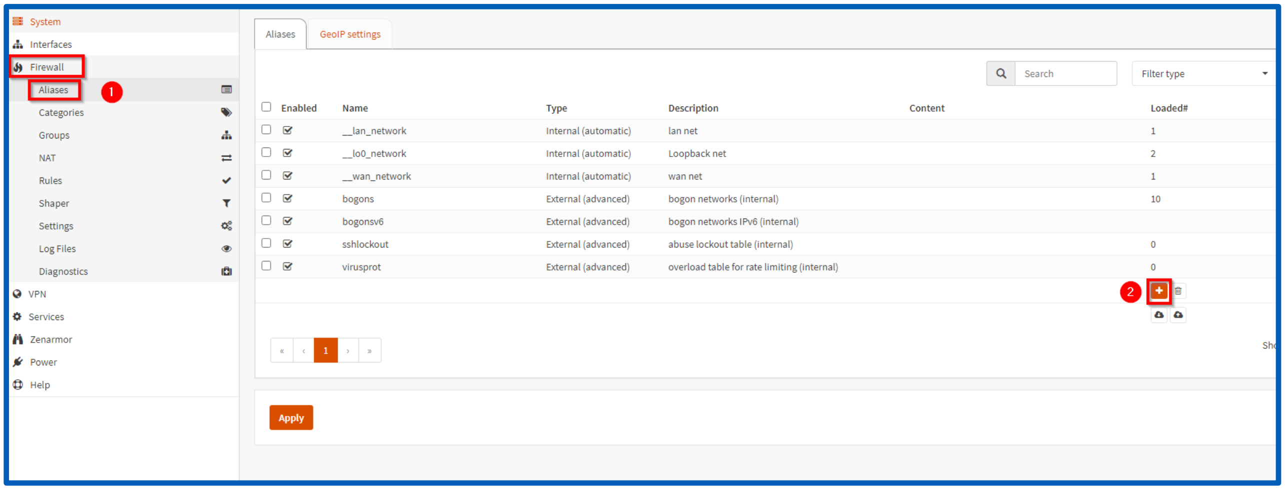



## Part 2 - Configure Aliases

Aliases play a pivotal role in organizing and simplifying administration tasks. They serve as placeholders for actual hosts, networks, or ports, allowing for streamlined management. In this demonstration, I meticulously configured aliases for the three devices on the network: Firewall, PC1, and PC2. This strategic use of aliases reduces the need to manually input IP addresses for each rule, enhancing efficiency.

I navigated to the Firewall section and accessed Aliases, an essential step to manage and organize entities effectively.

To create a new Alias, I clicked the plus sign, initiating the process of defining a placeholder for various network entities.

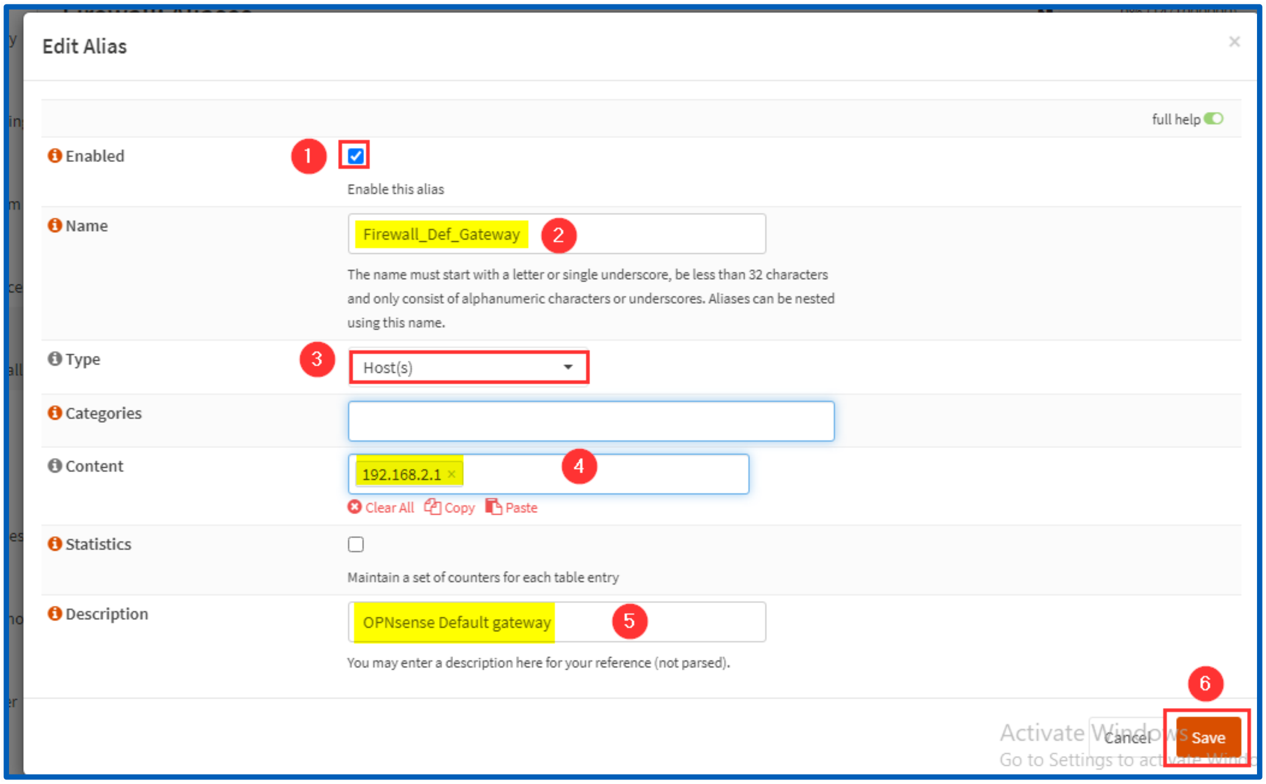



Make sure to check the IP address first by running ipconfig. For my case, it is 192.168.2.11. Before creating the Alias for PC1, I verified its IP address by running 'ipconfig,' noting it as 192.168.2.11.

I created an Alias for the firewall by entering the following:

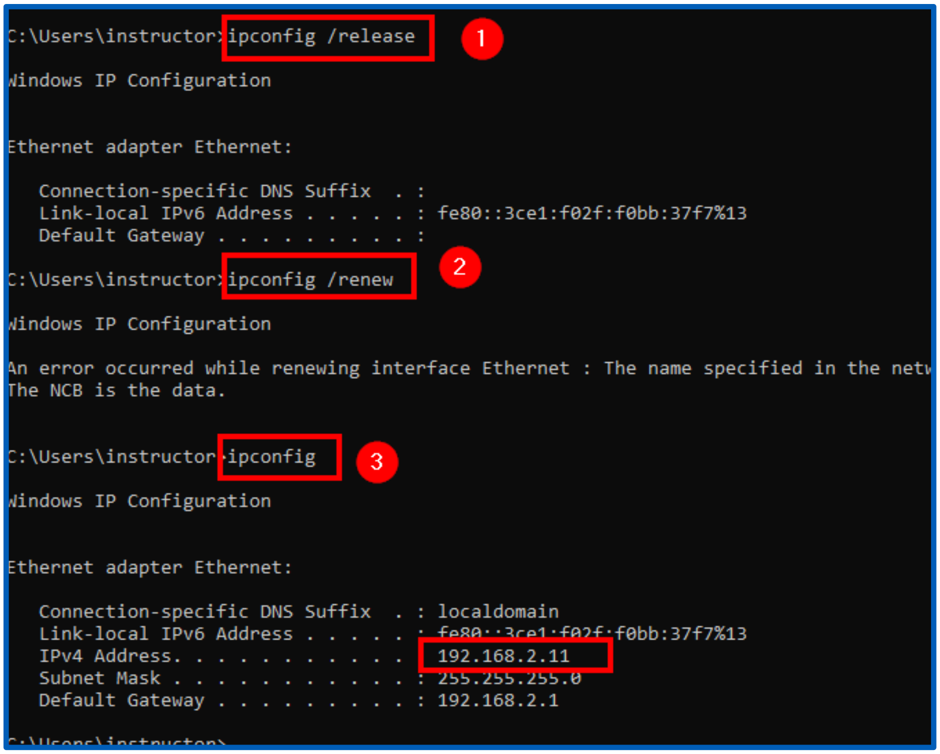
**Name: Firewall_Def_Gateway.**
**Type: Host(s).**
**Content: 192.168.2.1**
**Description: OPNsense Default Gateway.**
**Click Save.**

I created an Alias named "**Firewall_Def_Gateway**" representing the OPNsense Default Gateway, specifying its type, content, and providing a description for clarity.

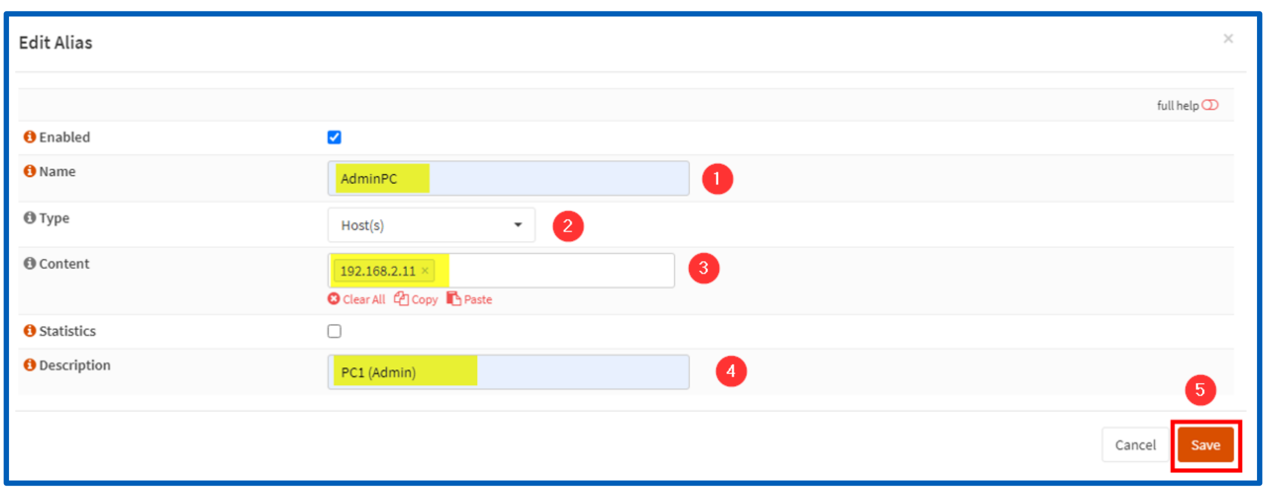



I replicated the process to create an Alias named "AdminPC" for PC1, ensuring efficient management by using aliases rather than individual IP addresses.

Make sure to check the IP address first by running ipconfig. For my case, it is 192.168.2.11. Before creating the Alias for PC1, I verified its IP address by running 'ipconfig,' noting it as 192.168.2.11.




Name: AdminPC
Type: Host(s)
Content: 192.168.2.11
Description: PC1 (Admin)

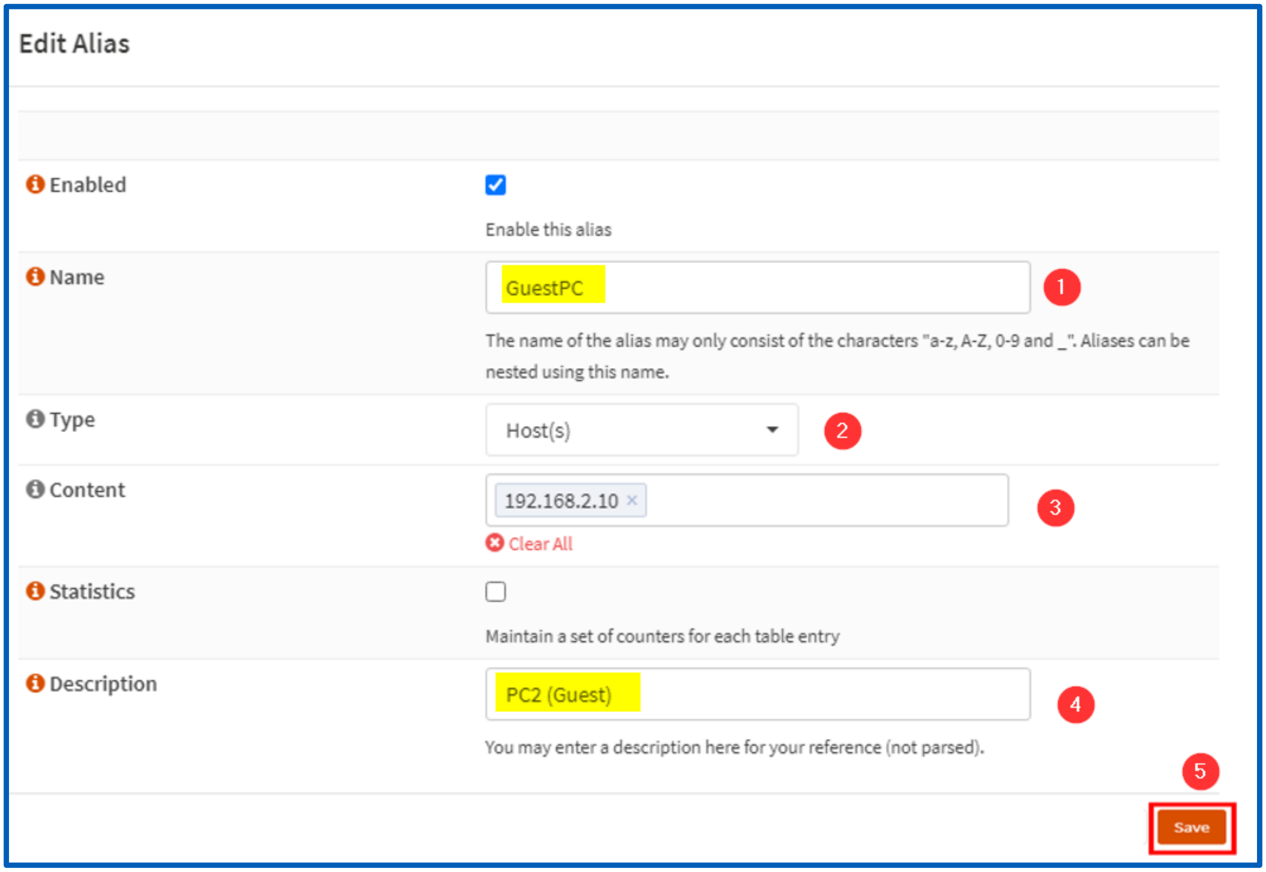


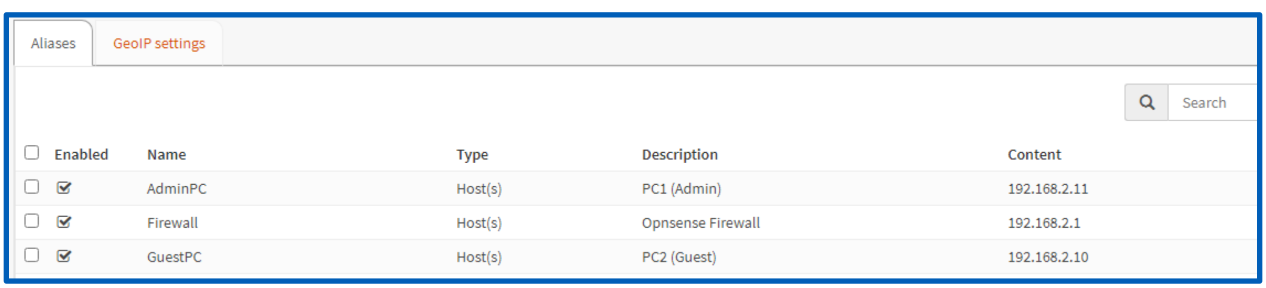

I established the "AdminPC" Alias with the corresponding details.

Following a similar approach, I created an Alias named "GuestPC" for PC2, obtaining its IP address as 192.168.2.10.

**Name: GuestPC**
**Type: Host(s)**
**Content: 192.168.2.10**
**Description: PC1 (Admin)**

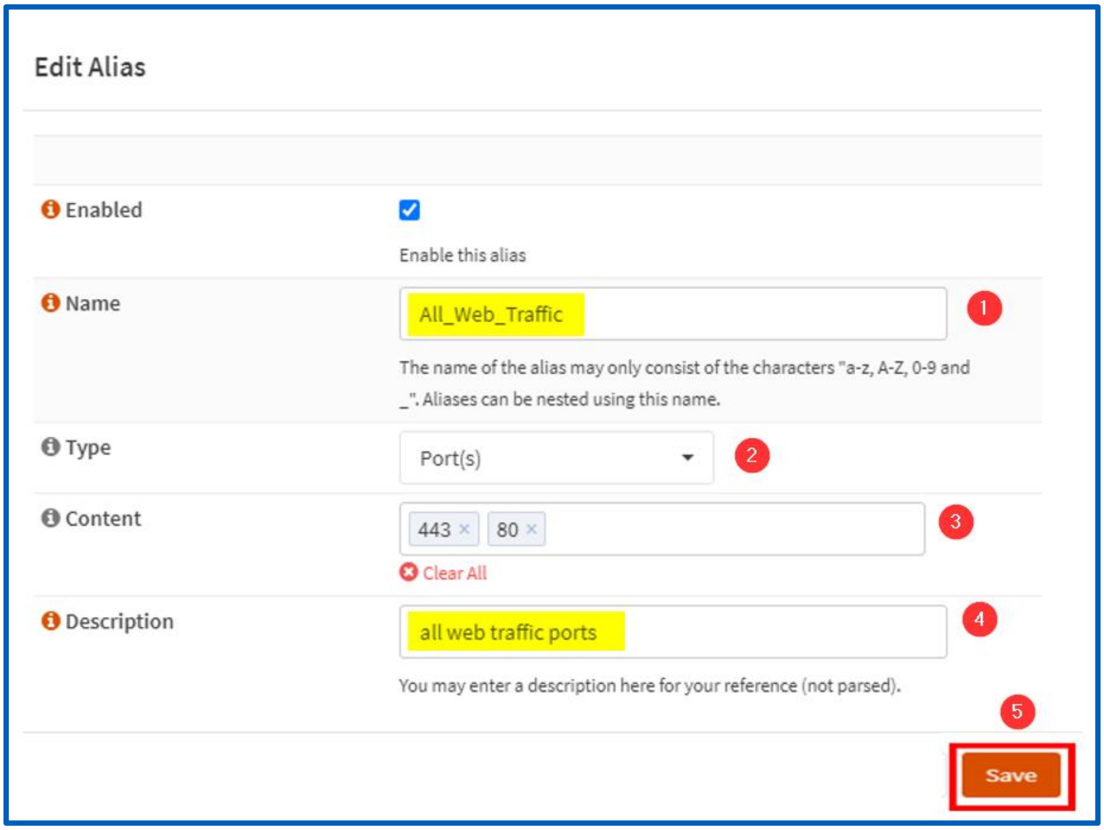
I configured the "GuestPC" Alias with the relevant details.



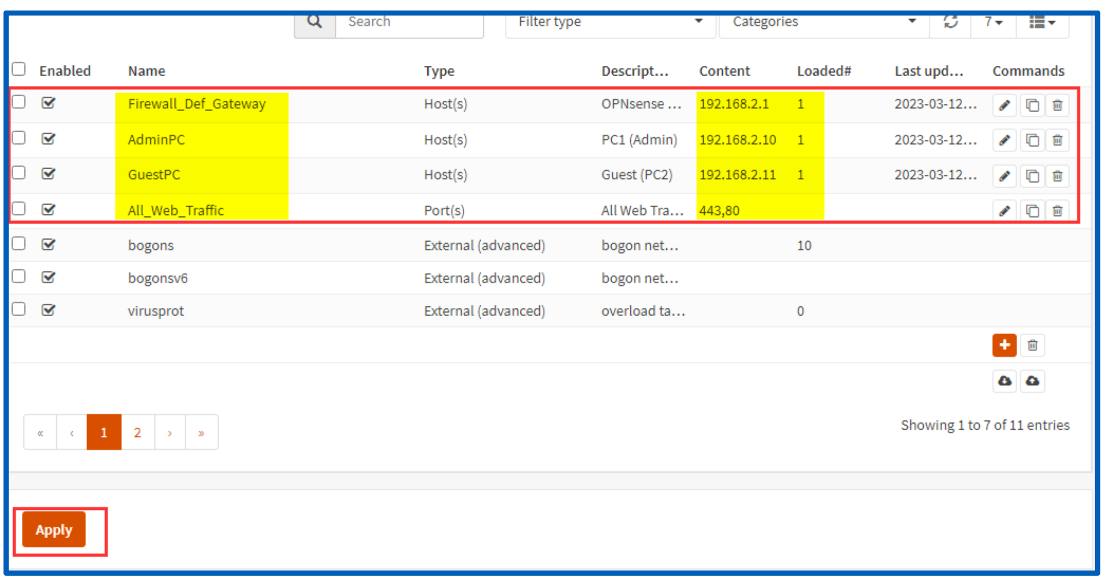




To efficiently manage web traffic, I created a port alias to simplify rule creation for HTTP and HTTPS.

**This time, we will add an alias for all web traffic, so that we will not have to make separate rules for HTTP and HTTPS every time:** I created an Alias encompassing all web traffic, streamlining rule creation for both HTTP and HTTPS.




I applied the changes, ensuring the new aliases are active.

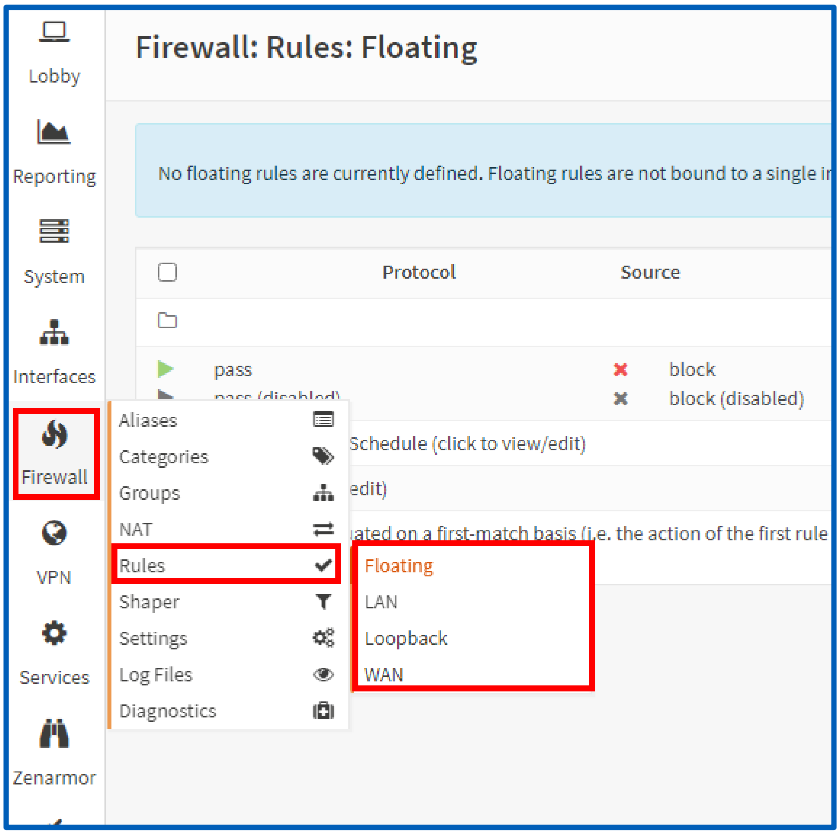


I emphasized the significance of aliases in simplifying configurations and enhancing organization.

With the aliases established, I proceeded to configure rules, leveraging the organized and simplified structure provided by aliases.

**Part 3 - Rules: Blocking IP's**

I navigated to the Firewall tab and accessed the Rules section.



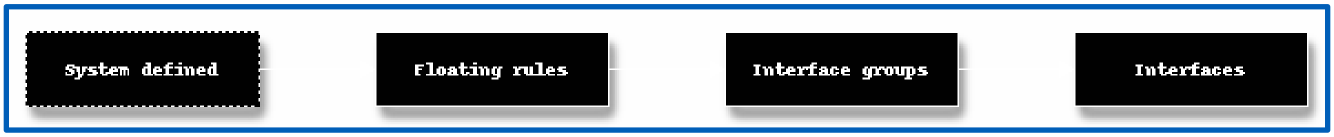

**Priority: The firewall will go from top to bottom when reading rules; the rules on top will have the highest priority:** Understanding the significance of rule priority, I ensured a top-to-bottom approach for effective rule processing.

**From top to bottom, the priority is as follows:**

1. **System Rules:**
   - I acknowledged the existence of OPNsense's built-in rules, realizing their unchangeable and highest-priority nature.
2. **Floating:**

- Emphasizing the versatility of floating rules, I considered their priority over interface-specific rules.

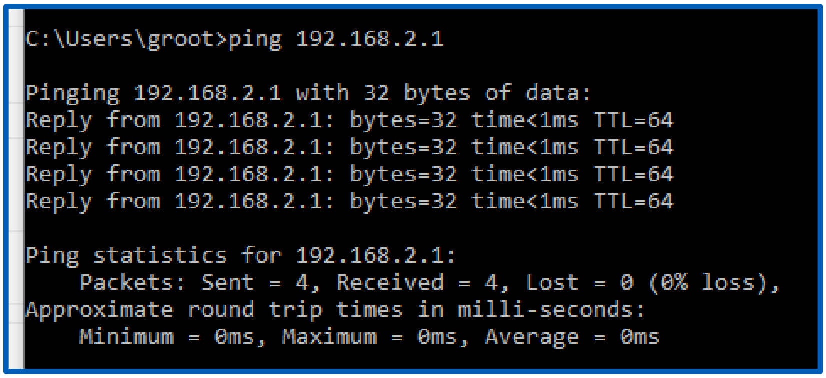
3. **Interface Group:**
    - I highlighted the importance of grouping interface rules for efficient management.
4. **Interfaces:**
    - Acknowledging individual interface rules, I stressed their lower priority but specificity.

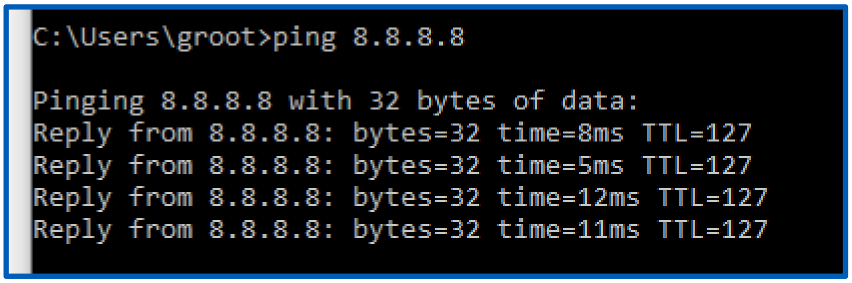



**Blocking IP’s:**

In this phase, I created a LAN rule to prevent PC2 communication and ensured that PC2 could ping the firewall and access the internet.

Before proceeding with rule configurations, I initiated a series of ping tests from PC2 to both the firewall (192.168.2.1) and an external server (8.8.8.8, representing Google's DNS server). This step aimed to confirm PC2's current connectivity status.



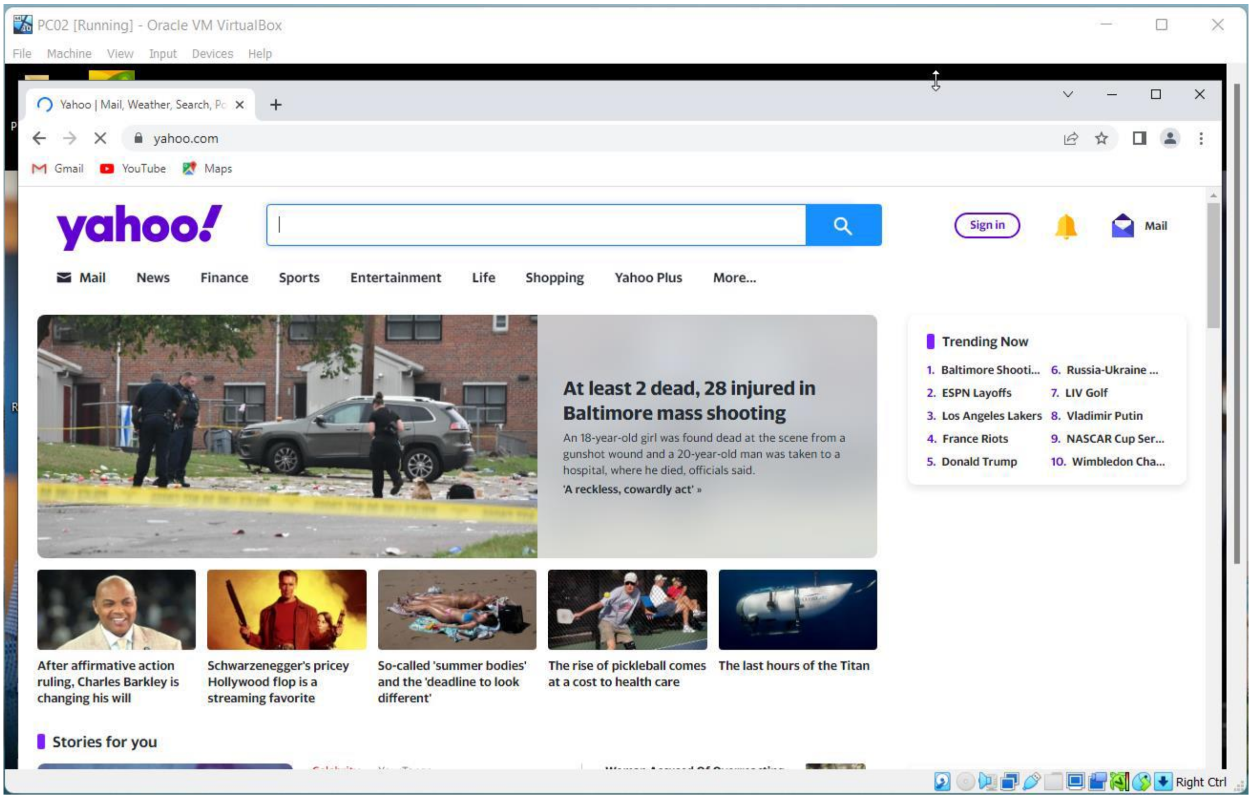
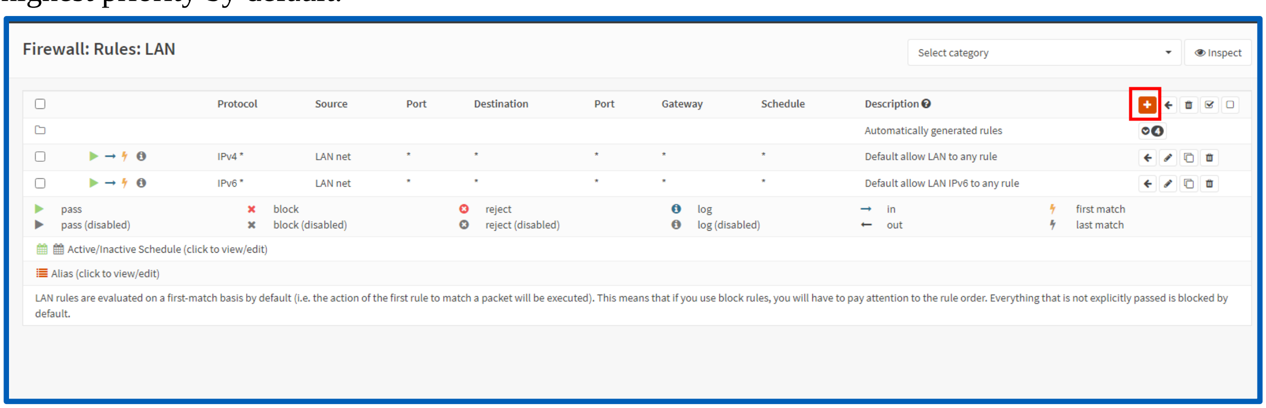



**Figure: A verification window showing PC2 can access the internet on the browser**

With the successful ping tests confirming PC2's connectivity, I navigated to PC1's OPNsense firewall settings and accessed the Rules section specifically for the LAN interface.

I observed the presence of automatically generated rules on the upper right, representing system rules. By clicking on the arrow next to "4," I could view these rules. These system rules have the highest priority by default.



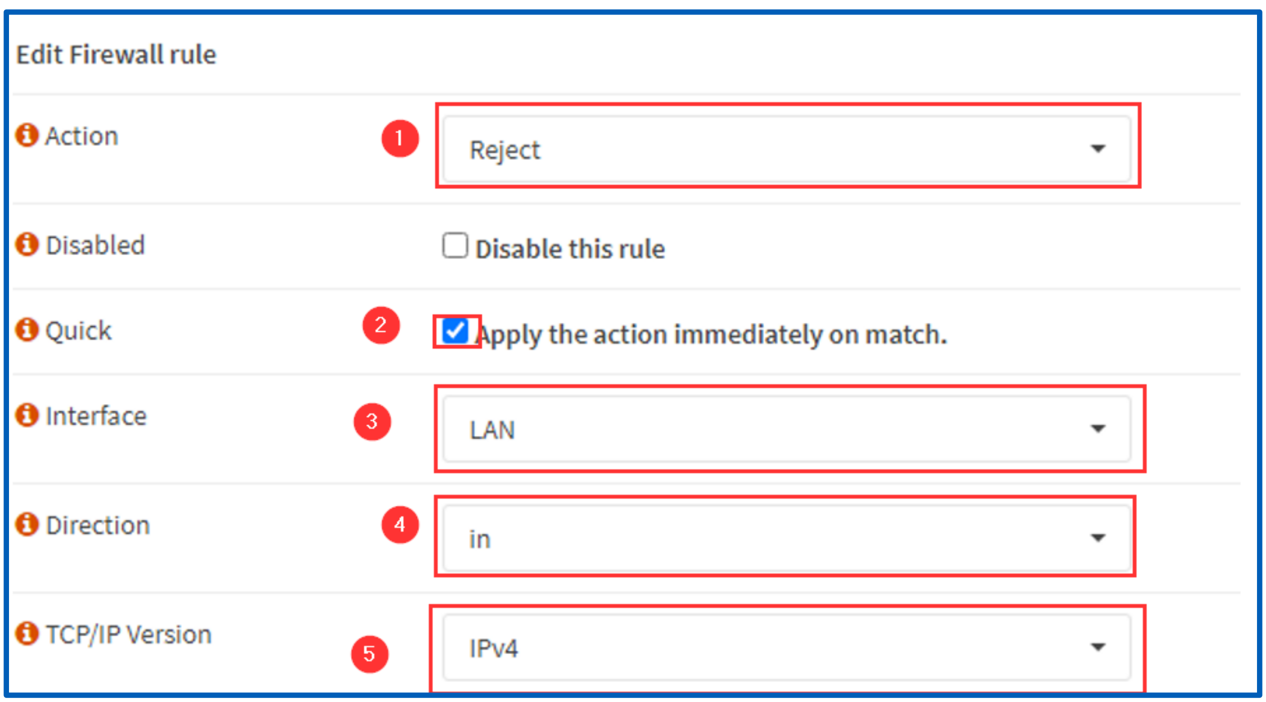

I acknowledged the existence of default rules allowing all LAN traffic. While these rules can be deleted, they are initially in place to ensure basic connectivity. It's important to note that OPNsense follows a default deny-all philosophy, meaning that without specific rules, all traffic is denied at the system level. I emphasized a security-oriented approach, suggesting that focusing on essential allowed traffic is more effective than trying to block specific "bad" things. This philosophy aligns with a well-configured network that employs aliases to allow only necessary traffic while blocking everything else by default.

This groundwork of connectivity verification and understanding default rules sets the stage for configuring specific rules to control traffic effectively.

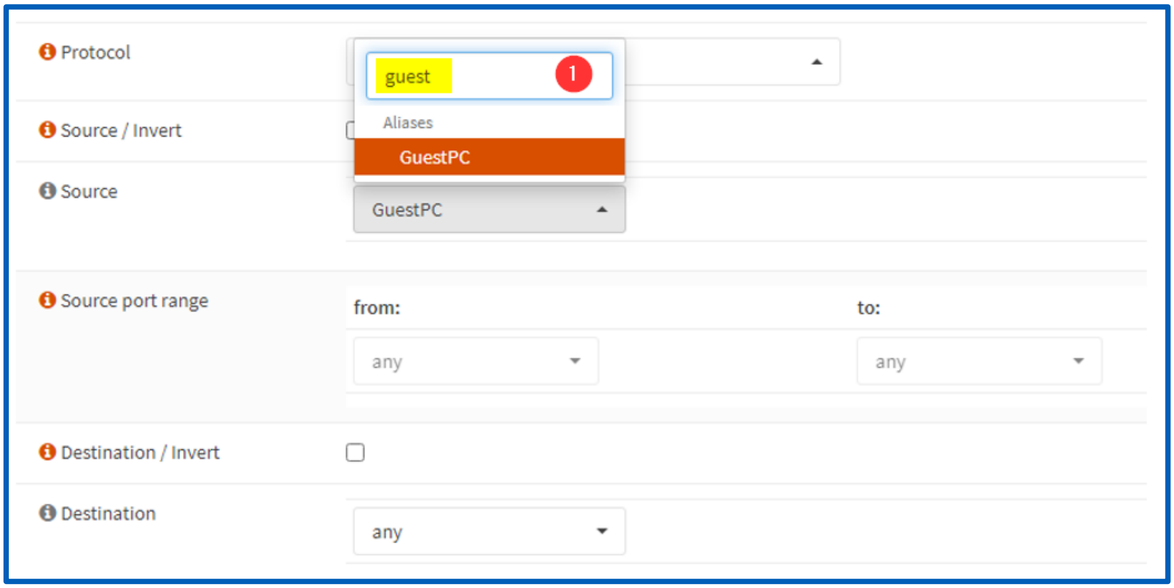
To implement a rule for blocking PC2, I opted for the "**Reject**" action instead of "Block." This choice was deliberate, as the "Reject" action allows us to observe detailed logs of the blocked packets, providing transparency and insights into the traffic handling.

I set the direction of the rule to "in" since the pings from PC2 were considered incoming traffic to the firewall interface.


Ensuring compatibility with the IPv4 protocol, I specified this parameter in the rule configuration.

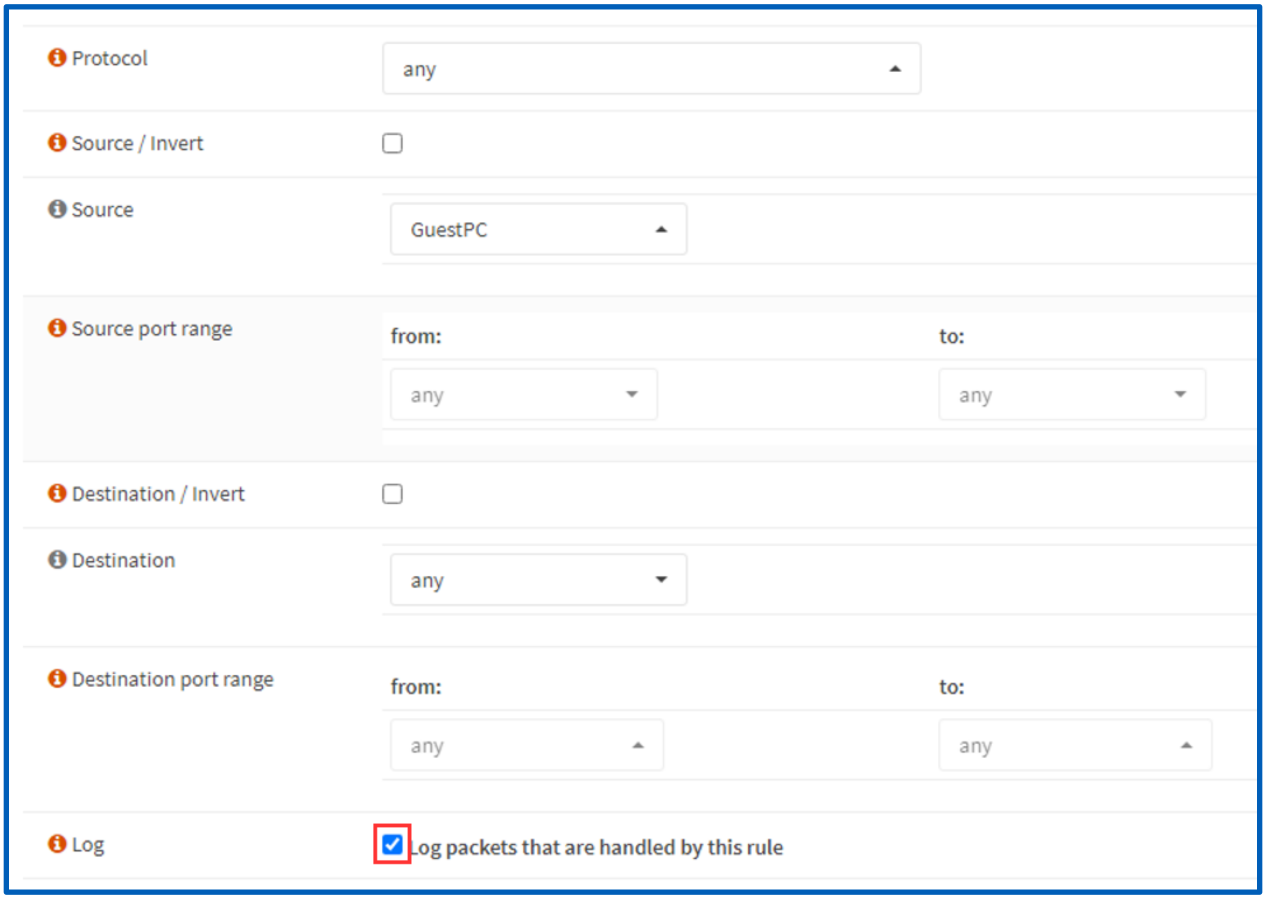


When defining the source for the rule, I utilized the alias functionality. Specifically, I searched for and selected the "guests" alias, streamlining the rule configuration process by referencing the pre-established alias for PC2.



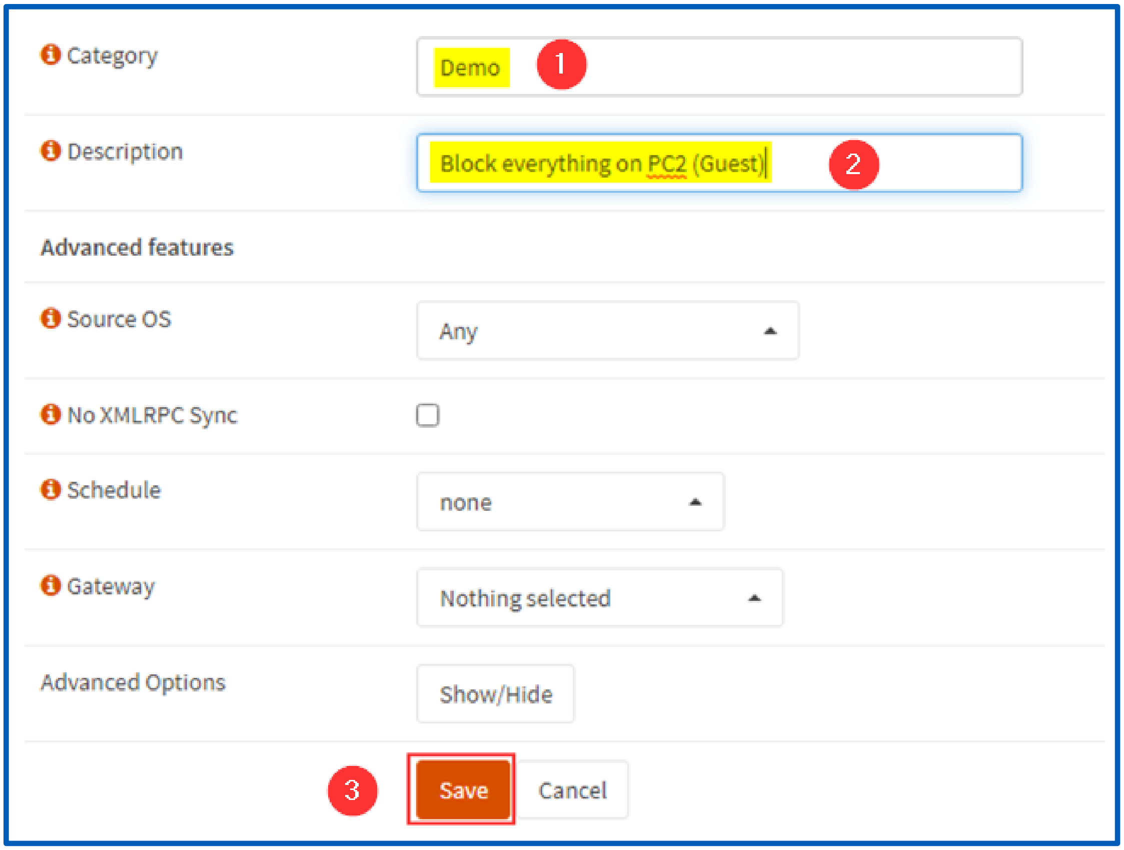

To encompass all other aspects not covered by the specified parameters, I set the remaining configurations to "any," effectively blocking all additional traffic.

To ensure comprehensive logging of packets affected by this rule, I enabled the option to log packets handled by the rule. This step enhances visibility into the firewall's activities and aids in troubleshooting.

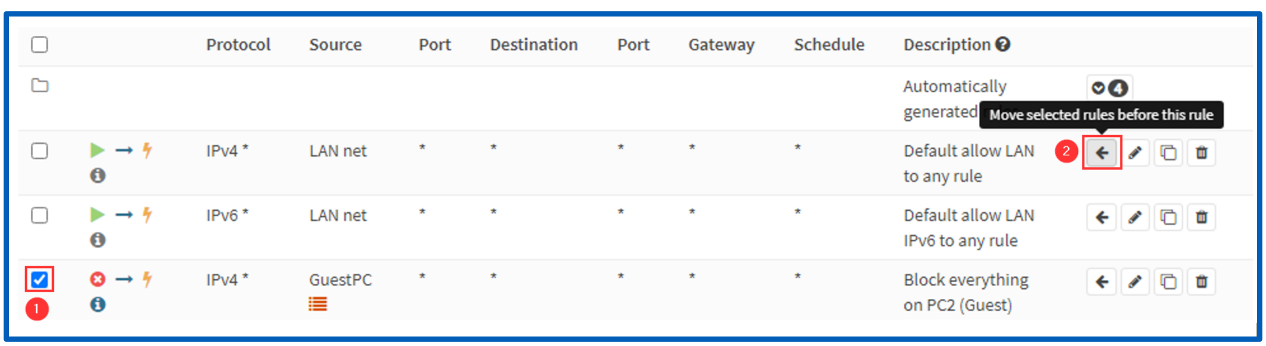



Adhering to best practices, I provided values for both the category and description fields associated with the rule. This organizational approach contributes to a well-structured and easily manageable rule set.

After configuring the rule parameters, I saved the settings to implement the rule within the OPNsense firewall.

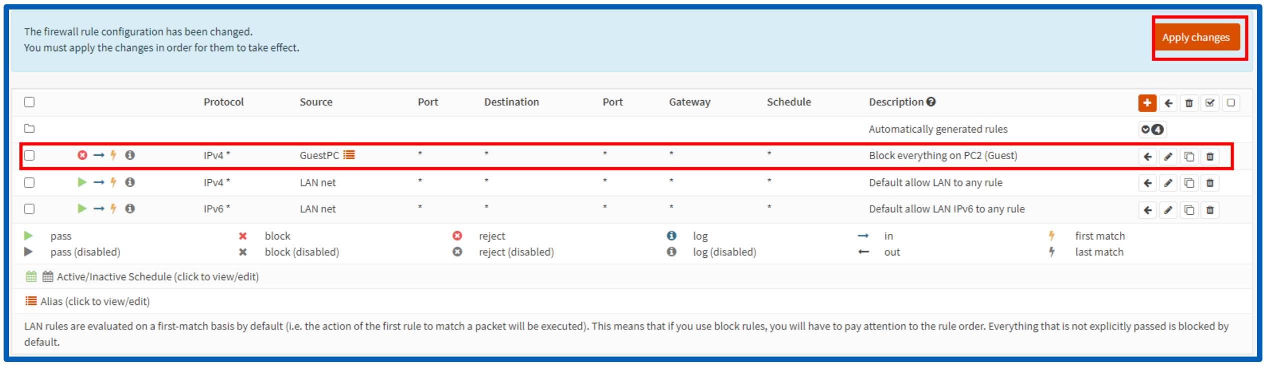



Recognizing the importance of rule priority, I took the necessary step of reordering the rules to ensure that the newly created rule takes precedence over the default "allow all" rules. This proactive adjustment prevents potential conflicts and ensures the effective implementation of the intended block rule.




Utilizing the OPNsense interface, I selected the newly created rule and executed a priority adjustment, moving it ahead of the existing rules. This action ensures that the rule will be applied before other rules in the sequence.

With the rule configurations in place, I initiated the application of changes through the "Apply Changes" function within the OPNsense firewall interface. This step finalizes the rule adjustments and brings the changes into effect.



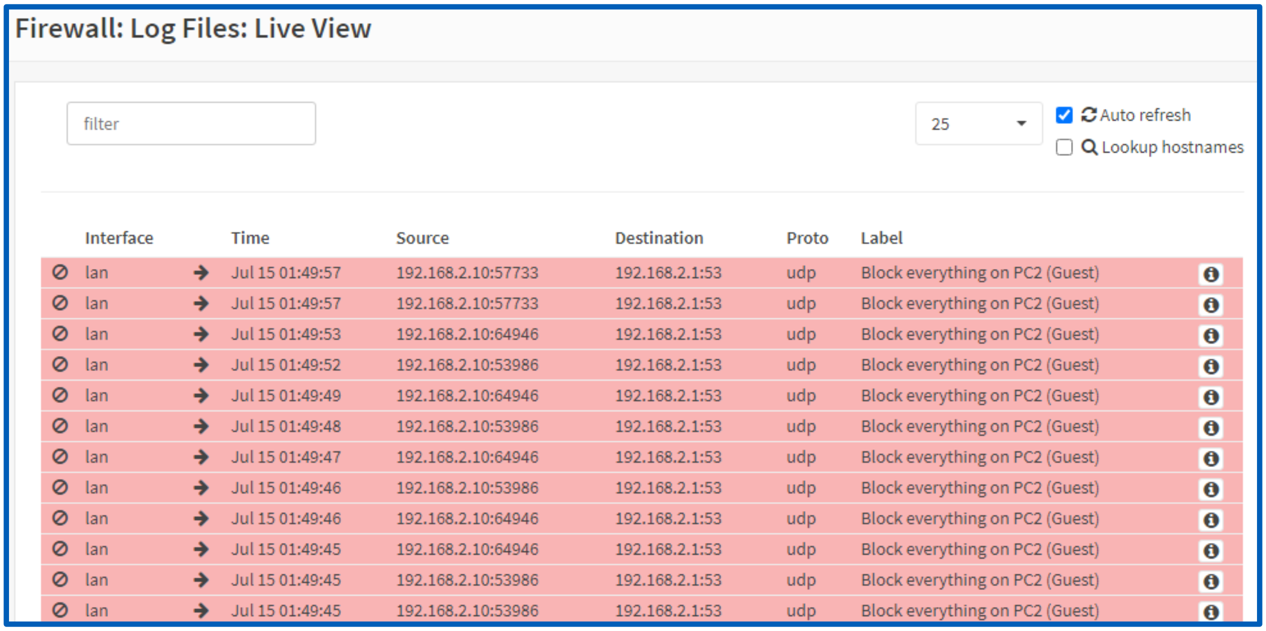

To validate the impact of the rule, I proceeded to PC2 and attempted to ping the firewall and access the internet. This real-world testing provides immediate feedback on the rule's effectiveness in blocking the specified traffic.

Following the testing on PC2, I assessed the outcomes to determine whether the rule successfully prevented ping requests and internet access. This evaluation serves as a crucial verification step for the configured rule.

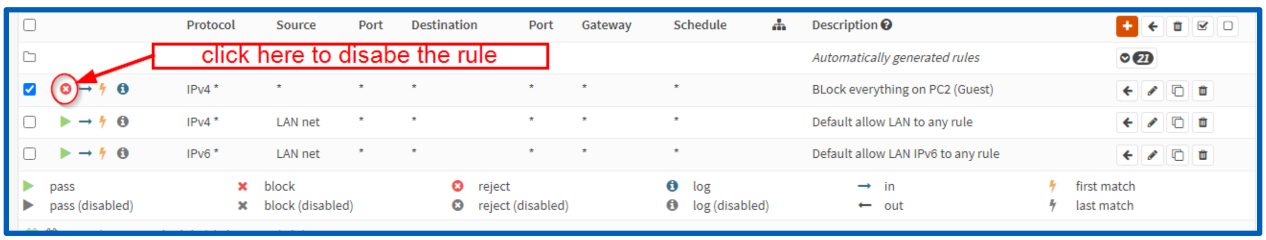
To gain deeper insights into the firewall's behavior and understand the specifics of blocked traffic, I navigated back to the firewall settings and accessed the Log Files section. This step involves reviewing the logs to interpret the recorded events related to the applied rule.

Within the Log Files section, I specifically accessed the Live View feature. This real-time monitoring capability allows for the dynamic observation of firewall activities, providing immediate feedback on traffic events.

Upon examining the Live View, I visually confirmed the active operation of the rule. This verification step reinforces the rule's functionality and confirms that it is actively blocking the designated traffic.



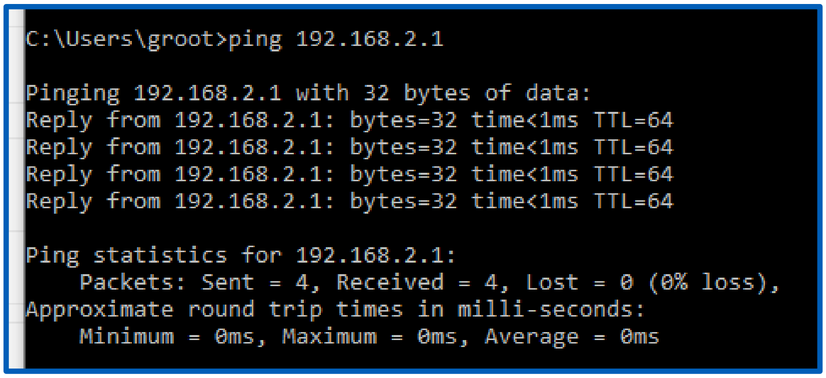

In the interest of testing and experimentation, I opted to disable the rule temporarily. This action allows for the observation of changes in PC2's connectivity when the rule is not in effect.




**Part 3 - Rules: Blocking specific protocols**

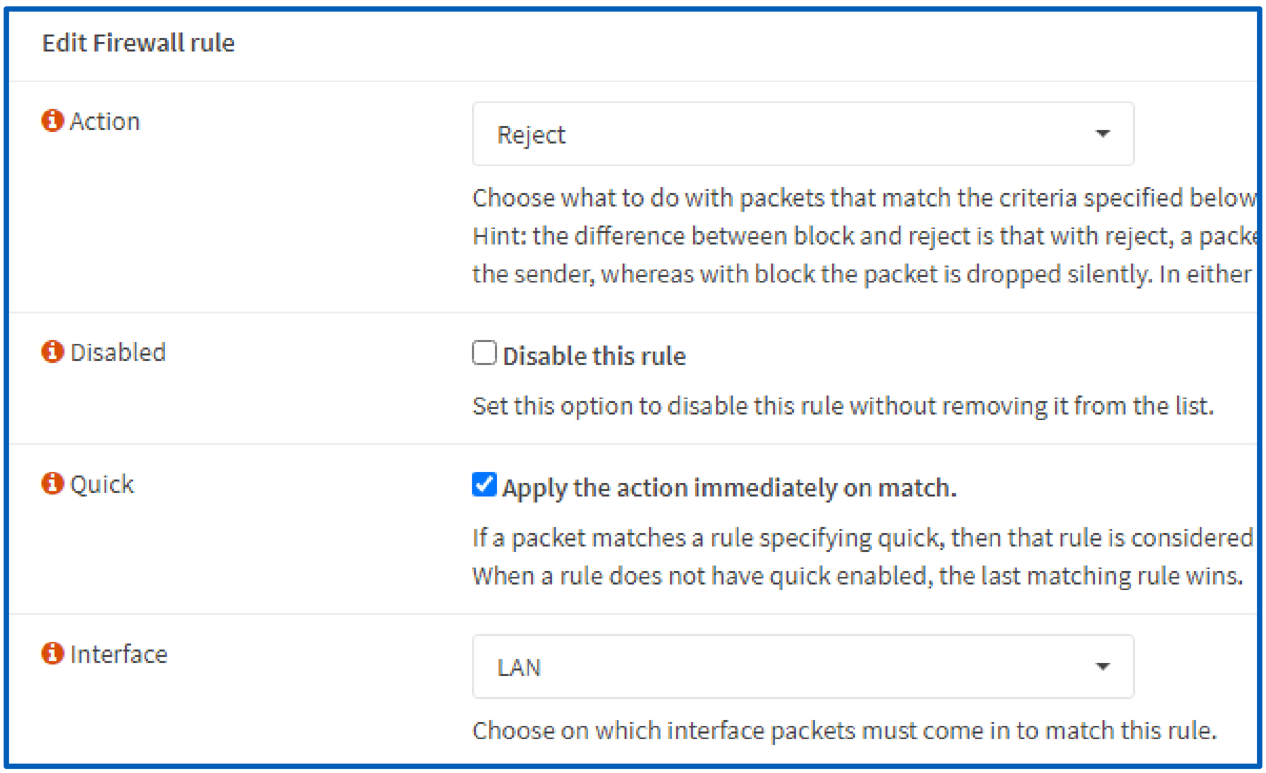
To enforce a rule blocking ICMP traffic from PC2 to the firewall, I navigated to the LAN rules section within the OPNsense firewall interface.

As a prerequisite, I ensured that PC2 could ping the firewall before implementing the rule. This preliminary verification step helps establish a baseline for testing the rule's effectiveness.




Returning to the Firewall Rules page under LAN settings, I prepared to create a new rule to regulate ICMP traffic.

I initiated the rule creation process by clicking the "Add" button, signaling my intent to define a new rule within the LAN rules configuration.

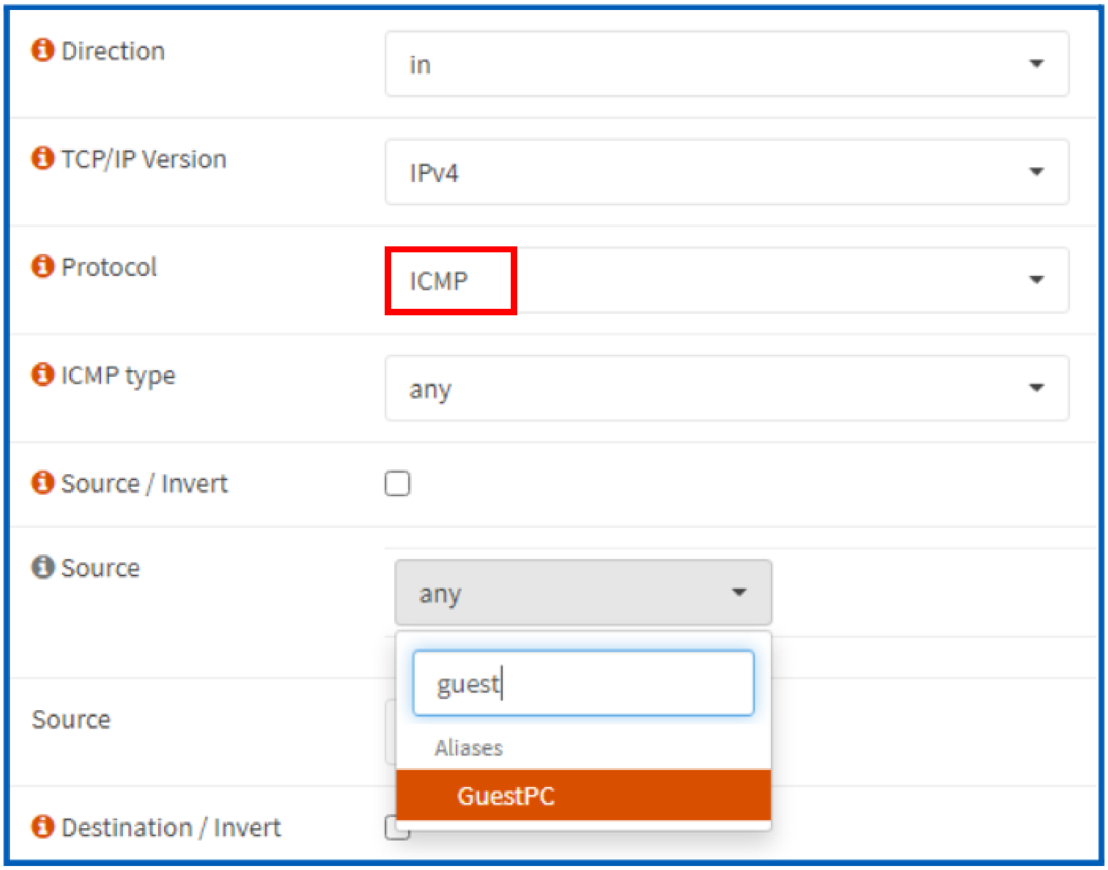



In configuring the rule, I opted for the "Reject" action instead of "Block" to allow for logging of blocked packets. This decision enhances visibility into the rule's impact on ICMP traffic.

Maintaining consistency with the direction of ICMP traffic, I specified the rule to operate on incoming traffic, aligning with the nature of pings directed towards the firewall interface.

In defining the protocol for this rule, I set it specifically for ICMP traffic, targeting the ping functionality.

To streamline the rule configuration, I utilized the GuestPC alias by typing "guest" in the source field, eliminating the need to remember or manually input the IP address for PC2.

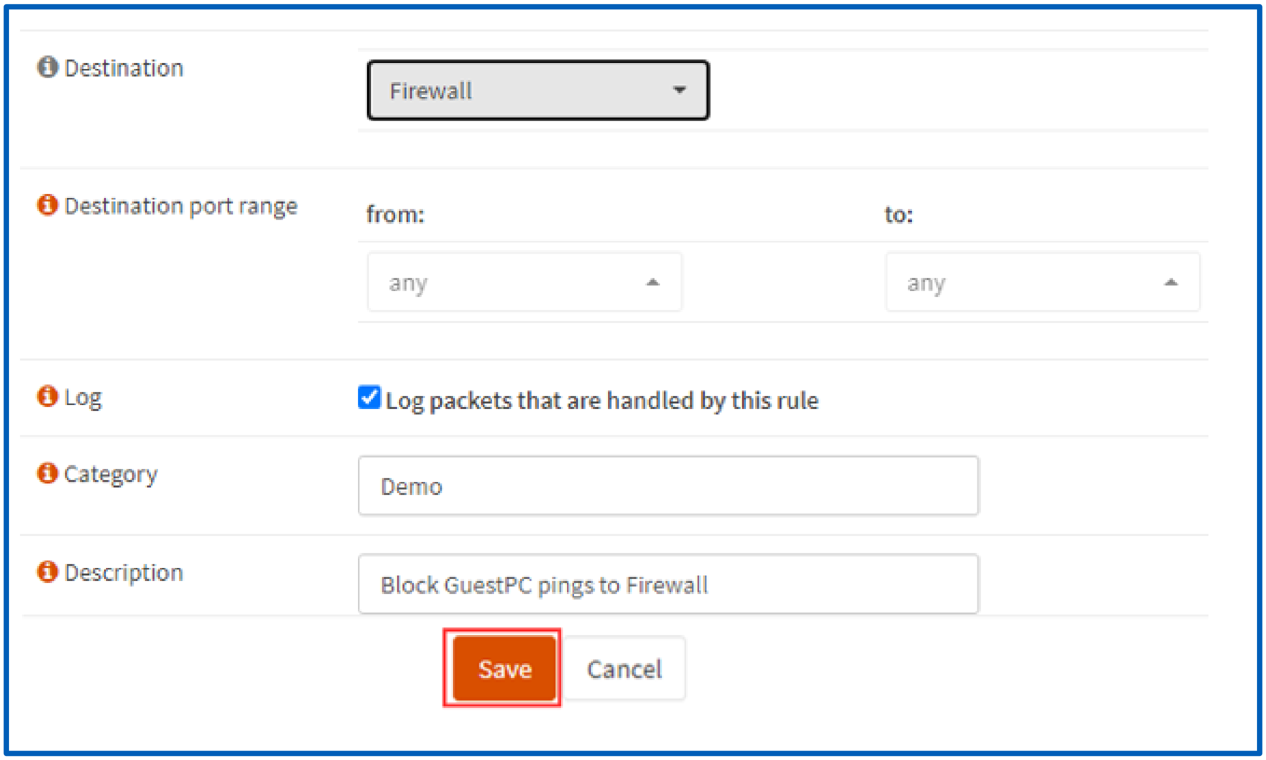



In the destination field, I entered "firewall" to locate and select the alias associated with the firewall. It's noteworthy that an existing alias for the firewall is available by default in the drop-down menu.

To ensure comprehensive logging of packets affected by this rule, I activated the option to log packets handled by the rule. Enabling this feature contributes to a detailed understanding of the firewall's actions.

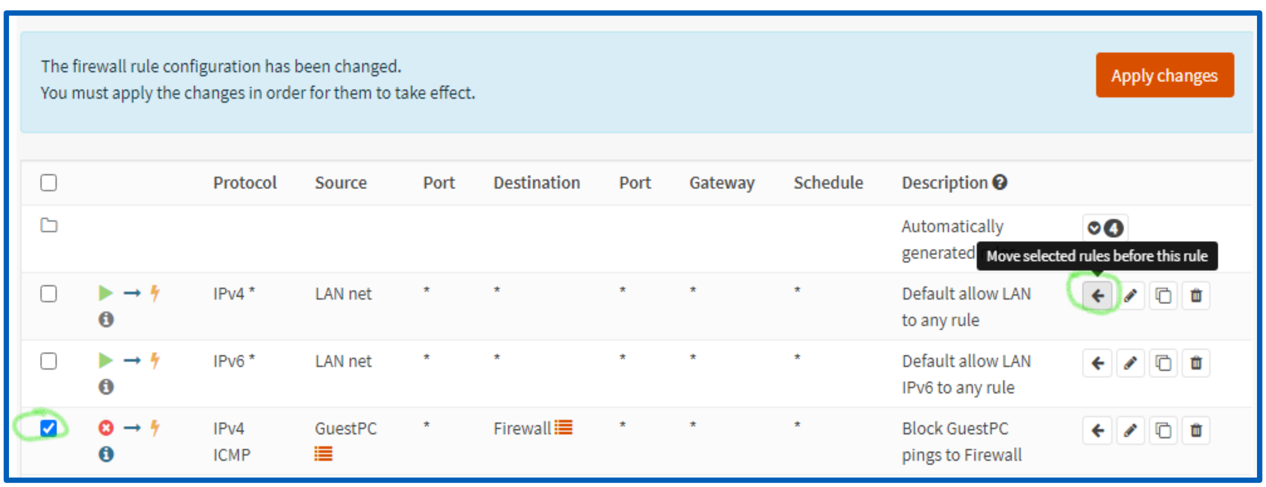
Adhering to best practices, I assigned values to both the category and definition fields, promoting an organized and easily understandable rule set.

After configuring the rule parameters, I saved the settings and applied the changes. This step ensures that the rule becomes active within the firewall.




As part of the testing process, I proceeded to PC2 and attempted to ping the firewall. This step allows for immediate feedback on whether the rule successfully blocks ICMP traffic from PC2.

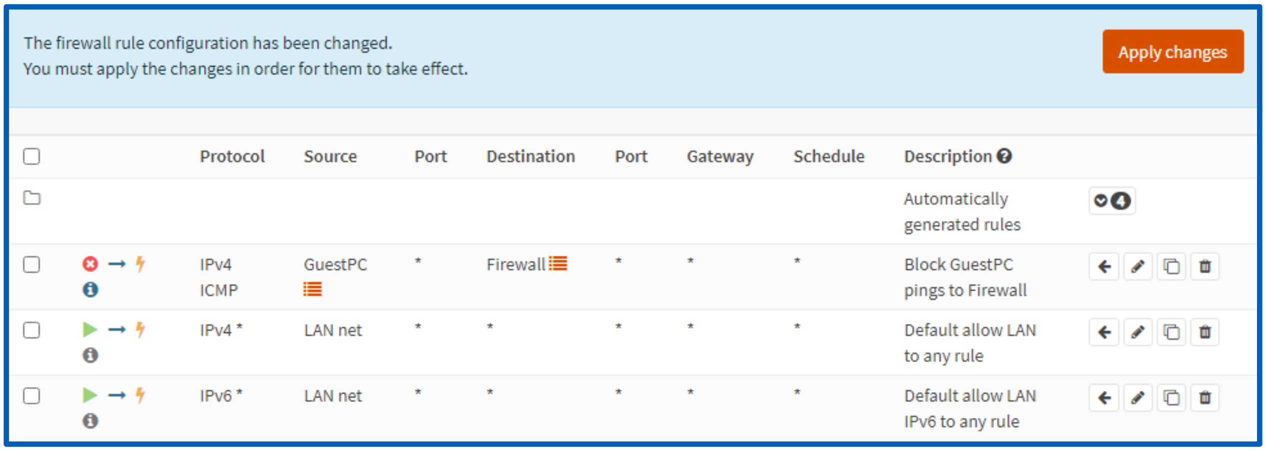
Returning to the firewall rules configuration, I accessed the relevant section to review and manage the rules currently in place.



Recognizing the importance of rule priority, I adjusted the rule sequence to ensure that the ICMP block rule takes precedence over the default "allow all" IPv4 rules. This adjustment is crucial to guarantee the rule's effectiveness.

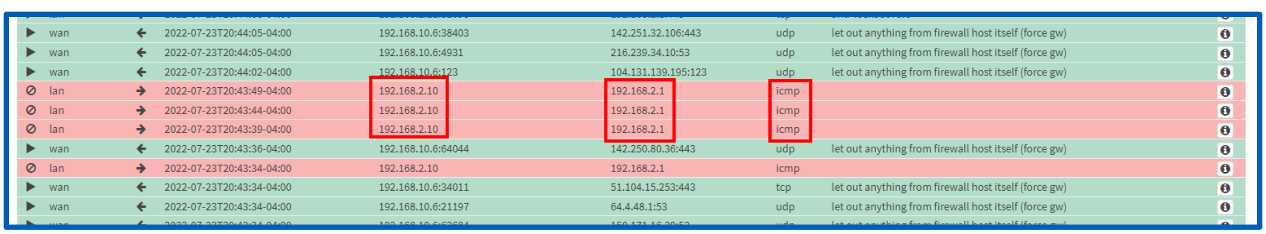
Using the OPNsense interface, I executed the necessary steps to move the ICMP block rule to a position of higher priority, ensuring it is processed before the less restrictive IPv4 allow all rule.

With the rule sequence adjusted, I applied the changes within the OPNsense interface and proceeded to retest PC2's ability to ping the firewall. This iterative testing approach helps verify the rule's functionality.



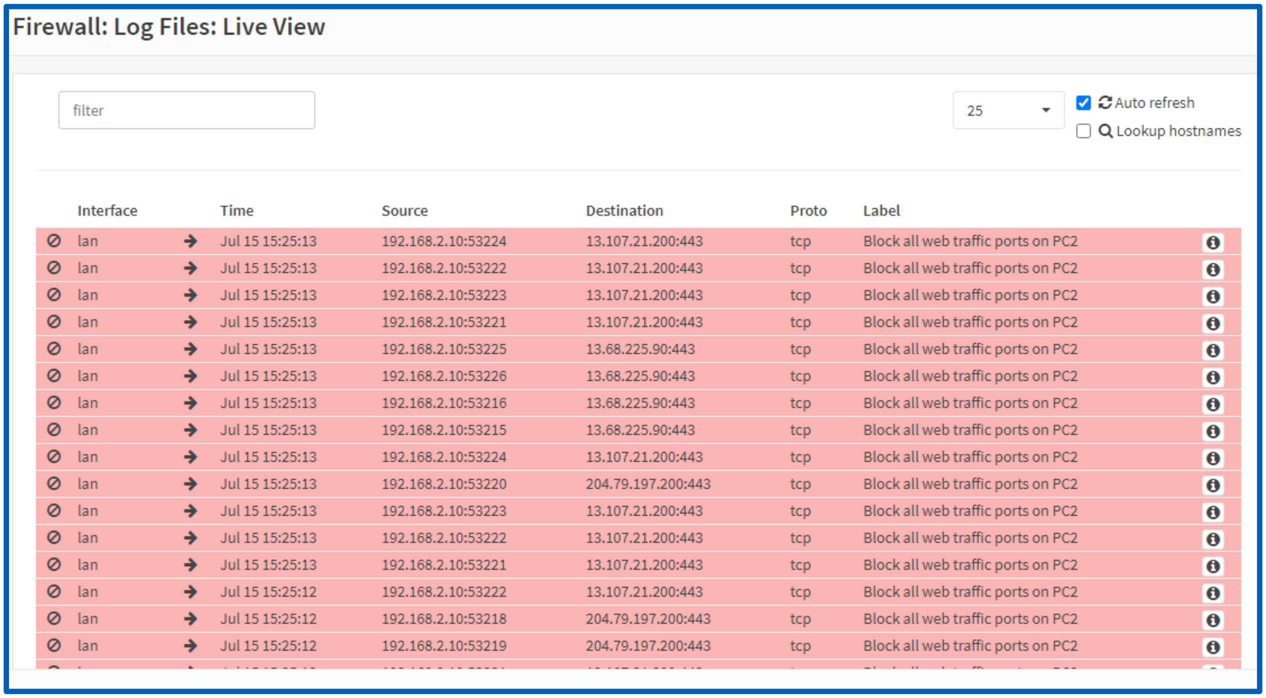

Post-adjustment testing allowed me to assess whether the rule modifications were effective in blocking ICMP traffic from PC2. This step serves as a crucial validation of the rule adjustment.

To gain deeper insights into the firewall's behavior and verify the logging functionality, I navigated to the Log Files section within OPNsense and accessed the Live View feature. This step allows for real-time monitoring and verification of the rule's impact on traffic.




Within the Log Files section, I specifically accessed the Live View feature. This real-time monitoring capability allows for the dynamic observation of firewall activities, providing immediate feedback on traffic events.

Through the Live View, I visually confirmed the active operation of the rule, validating that ICMP traffic from PC2 to the firewall was successfully blocked. This confirmation reinforces the effectiveness of the rule.




## Concluding Remark

By navigating firewall interfaces and implementing rules, I successfully configured and tested various security scenarios. The project covered crucial aspects, including creating aliases and applying rules for enhanced security. The emphasis on real-time verification and log analysis deepened my understanding of the firewall's functionality. As I conclude this project, I've not only applied OPNsense firewall features practically but also gained a foundation for effective network security management in diverse settings.