Security event analysis using Wazuh

Roozah Khan

As a Security Information and Event Management (SIEM) system, Wazuh's capability is not limited to host-based agent monitoring. You can also let other applications, such as pfSense, to forward all security logs to Wazuh, and analyze them all in the same interface.

In the last lab, we will configure pfSense to forward its firewall log to Wazuh and visualize it.

1. Config pfSense to send remote log.

As a firewall, pfSense is able to store various logs related to the filtering events. Such logs can either be stored locally, or, more commonly, be sent to a remote server that stores and analyzes log files. To enable this, log into pfSense, and select "Status → System Logs" menu.

You will be brought to system log configuration page. Select "Settings" tab, scroll all the way down till you see the "Remote Logging Options" section.

Check "send log messages to remote syslog server".

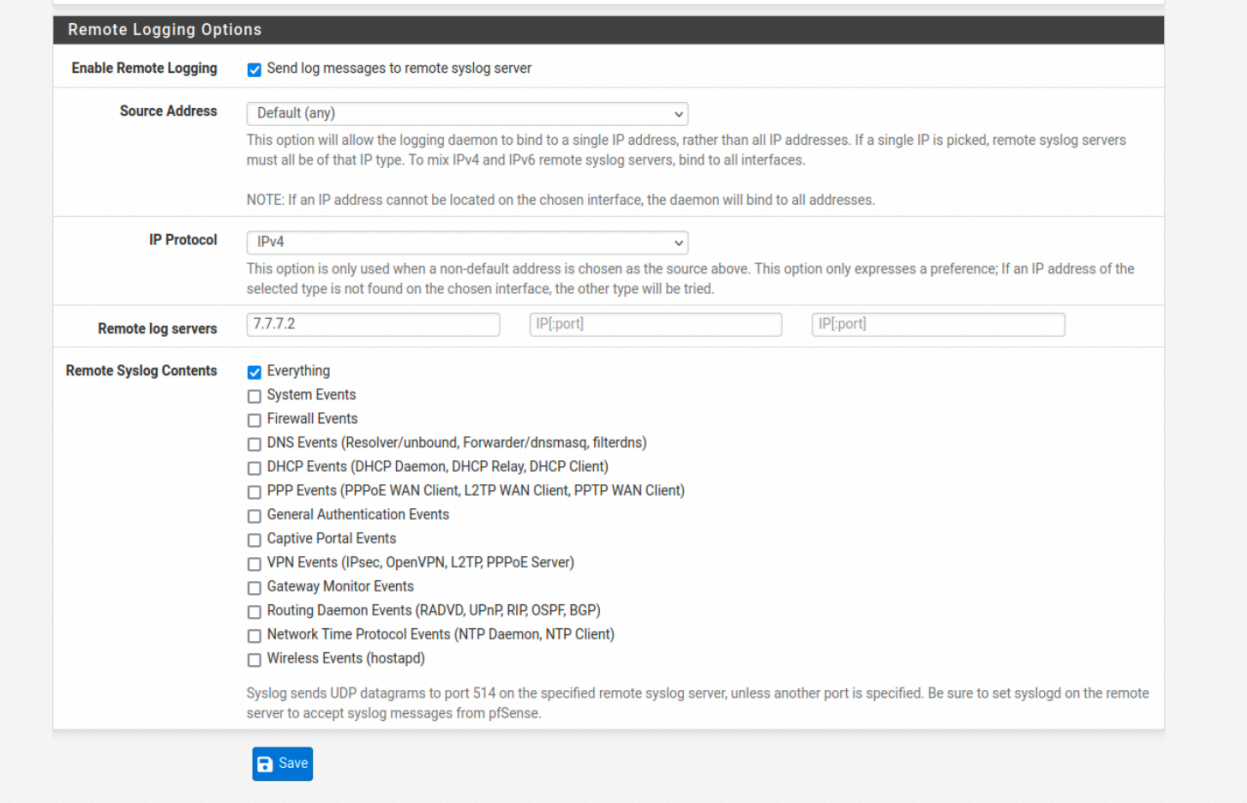
Chose IPv4 protocol.

Set remote log server IP to be 7.7.7.2, that is, the Wazuh manager. Leave the port empty, which will use the default port UDP/514.

Check "everything" in "remote syslog contents" to send all logs to the Wazuh manager.

Save the settings.

Provide a screenshot showing your configuration of remote log in pfsense. – screenshot 1.



2. Config Wazuh to accept remote log.

Now that the pfSense is sending log files to Wazuh, we next need to config Wazuh to accept it.

From Wazuh manager, open `/var/ossec/etc/ossec.conf`.

Find the section <remote> and make sure it has the following configuration.

```
<remote>
    <connection>syslog</connection>
    <port>514</port>
    <protocol>udp</protocol>
    <allowed-ips>7.7.7.0/28</allowed-ips>
  </remote>
```

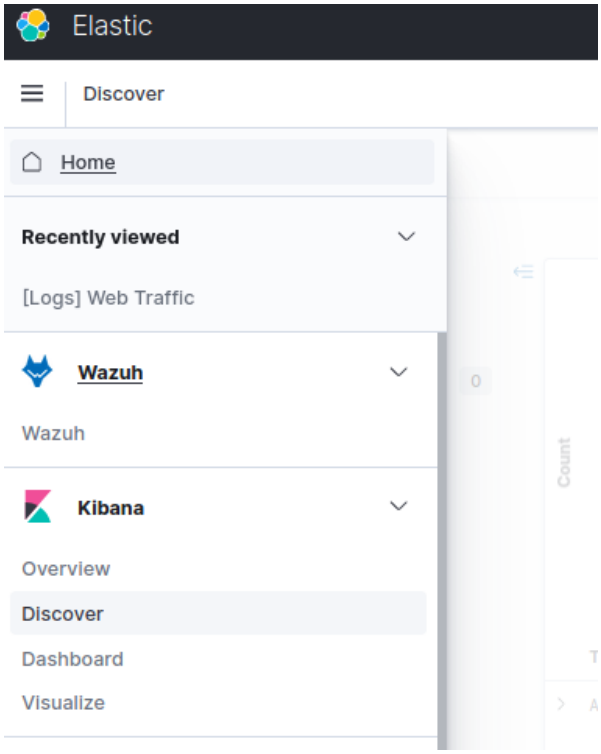
After the modification, save the file, and restart wazhu manager by `systemctl restart wazuh-manager`.

This finishes the configuration on both pfsense and wazuh.

3. Verify the remote log is working.

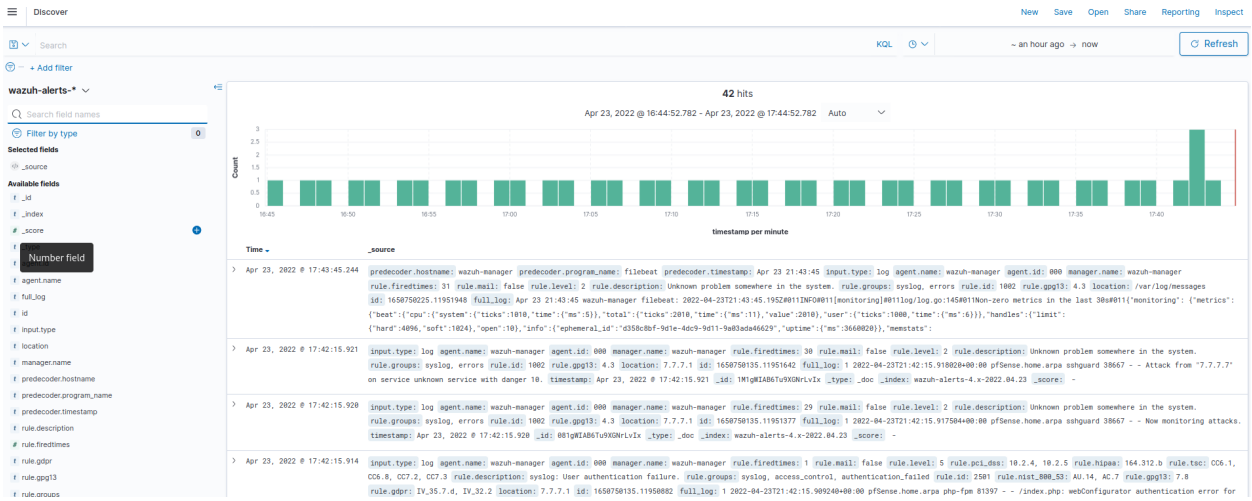
Log out of the pfsense graphical interface. Re-login with an incorrect password. And then login with the correct password. This will trigger an “authentication failure” event on pfsense, and such event should be forwarded to wazuh.

In Wazuh, select “Kibana → discover”, as shown in the figure.



On the top, there is a filed to set the interval of events to display. Change it to a reasonable time interval, such as the last hour.

Click “refresh”, you should see many events are displayed, similar to the following figure.



Do a search, with the keyword “authentication”, you should see at least one event with key phases “authentication error …”.

Inspect the event, it shows many details regarding when and where this event happened.

Provide a screenshot showing that you have successfully found this event. Zoom your web browser to make the font larger, and your screenshot should focus on the event and the content should be recognizable. – screenshot 2.

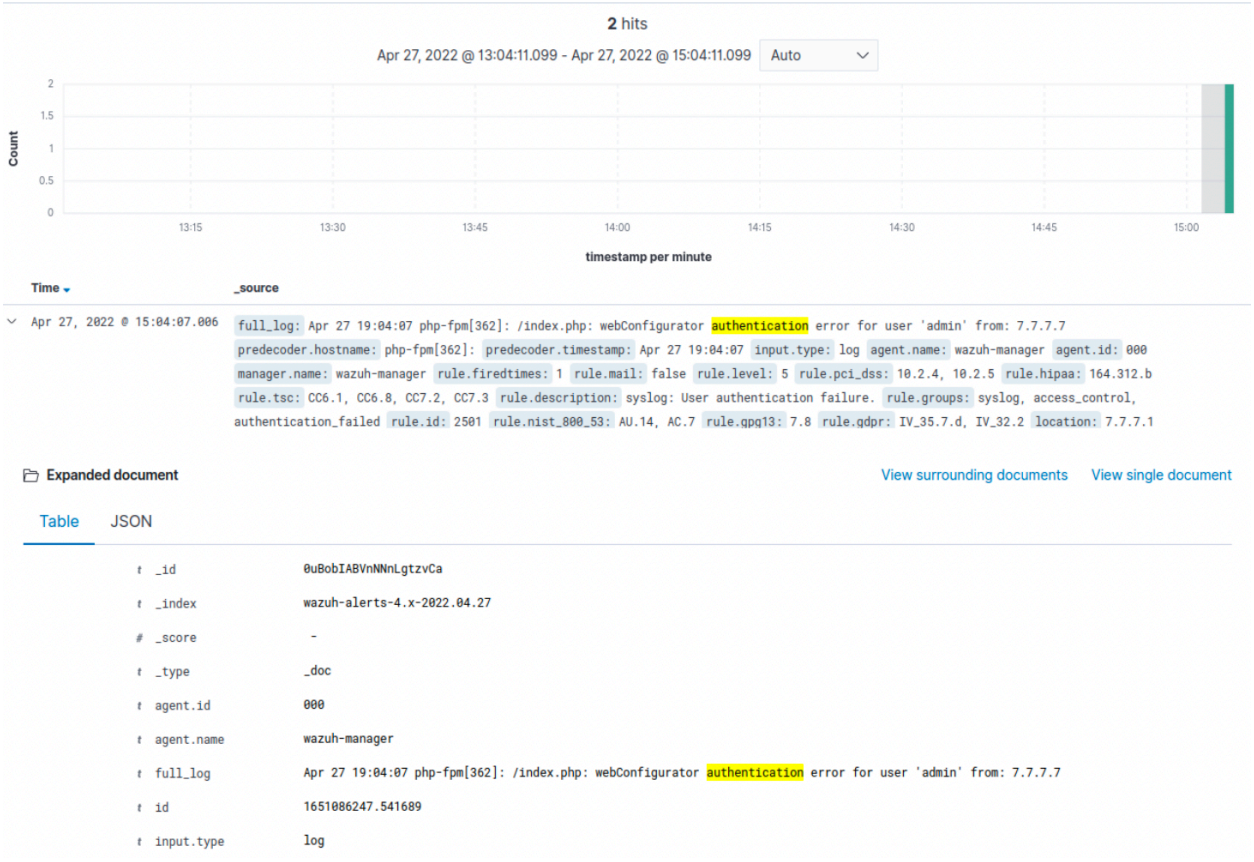
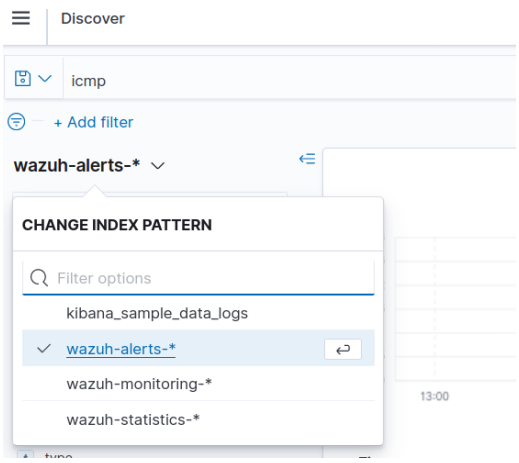


Table JSON

t _id	0uBobIABVnNNnLgtzvCa
t _index	wazuh-alerts-4.x-2022.04.27
# _score	-
t _type	_doc
t agent.id	000
t agent.name	wazuh-manager
t full_log	Apr 27 19:04:07 php-fpm[362]: /index.php: webConfigurator authentication error for user 'admin' from: 7.7.7.7
t id	1651086247.541689
t input.type	log
t location	7.7.7.1
t manager.name	wazuh-manager
t predecoder.hostname	php-fpm[362]:
t predecoder.timestamp	Apr 27 19:04:07
t rule.description	syslog: User authentication failure.
# rule.firedtimes	1
t rule.gdpr	IV_35.7.d, IV_32.2
t rule.gpg13	7.8
t rule.groups	syslog, access_control, authentication_failed
t rule.hipaa	164.312.b
t rule.id	2501
# rule.level	5
rule.mail	false
t rule.nist_800_53	AU.14, AC.7
t rule.pci_dss	10.2.4, 10.2.5
t rule.tsc	CC6.1, CC6.8, CC7.2, CC7.3
timestamp	Apr 27, 2022 @ 15:04:07.006

4. Wazuh rules and decoders

While Wazuh can receive and accept logs from many applications, it is not going to display all of them in the interface. If you have paid attention to the left side of the “discover” page, you may have found there are “categories” as shown in the following figure.



Actually only the events that are considered “alerts” by wazuh will be displayed. We can create “rules” to tell Wazuh what events should be considered as alerts and be displayed here.

To do this, in Wazuh manager, navigate to `/var/ossec/rulesets/rules`, you should see many pre-configured rules are listed in the folder. Those are the preset rules, once being matched, will trigger an alert in Wazuh.

Open the file 0540-pfsense_rules.xml, and add the following code to the end of file but before the `</group>` tag.

```
<rule id="87703" level="5">
    <match>icmp</match>
    <description>pfSense ping detected.</description>

<group>firewall_block,pci_dss_1.4,gpg13_4.12,hipaa_164.312.a.1,nist_800_53_SC.7,tsc_CC6.7,tsc_CC6.8,</group>
</rule>
```

This rule tells Wazuh if the log contains “icmp” keyword, it will trigger an alert with the given description.

Save the file, and then restart wazuh manager by `systemctl restart wazuh-manager.`

Provide a screenshot showing you have edited the file. – screenshot 3.

5. Verify the rule works properly.

Login into pfsense, create a rule to block ICMP from LAN to WAN, remember to check “log packets that are handled by this rule” in the last section before you save the rule. This rule will block ping from LAN to WAN, and will log such events if it ever happens.

Do a ping from Admin to Server (5.5.5.5). If your rule is set correctly, the Ping should not get through. Wait 2 - 3 seconds, and then terminate the ping.

Login to Wazuh, navigate to Kibana → discover, and then search for keyword “icmp”, you should see several events shows that icmp were dropped.

Provide a screenshot shows you have successfully displayed this event in Wazuh. Zoom your web browser to make the font larger, and your screenshot should focus on the event and the content should be recognizable. – screenshot 4.

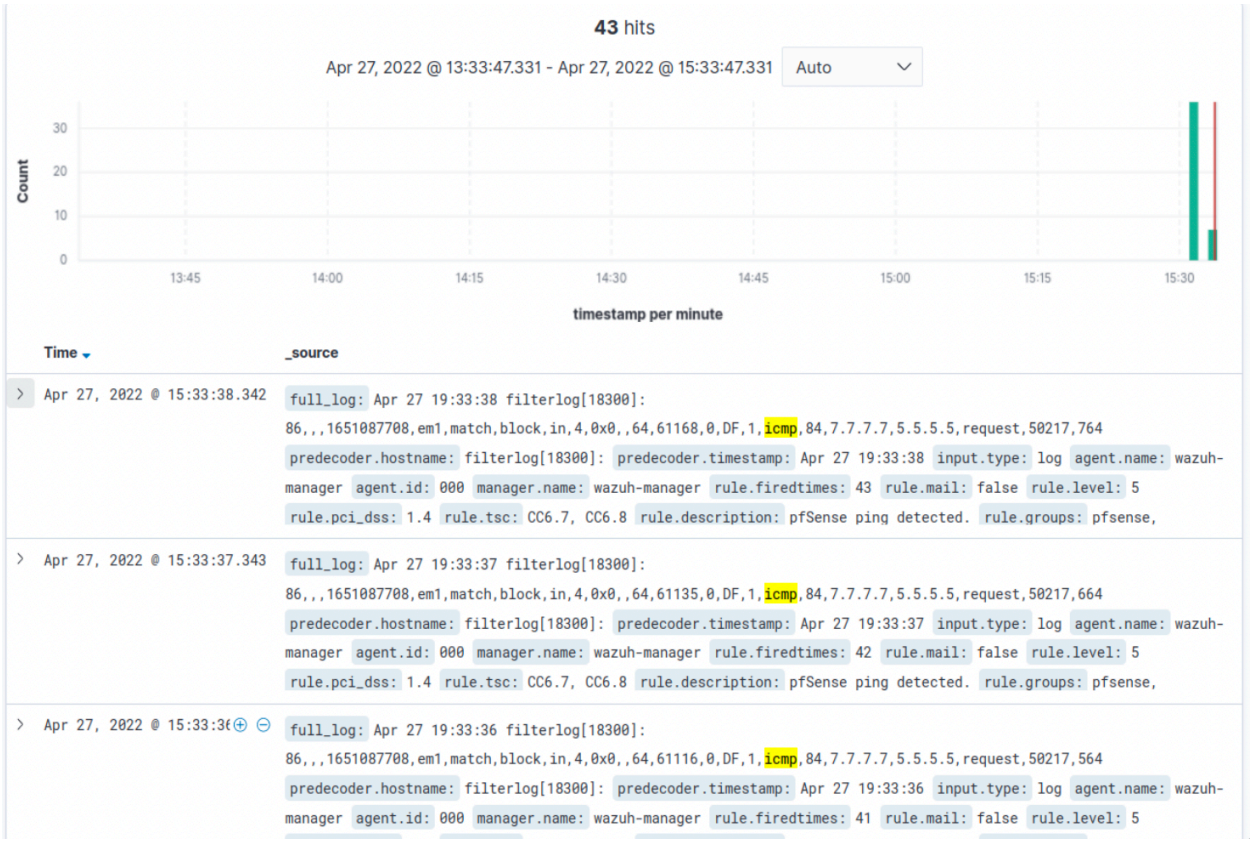
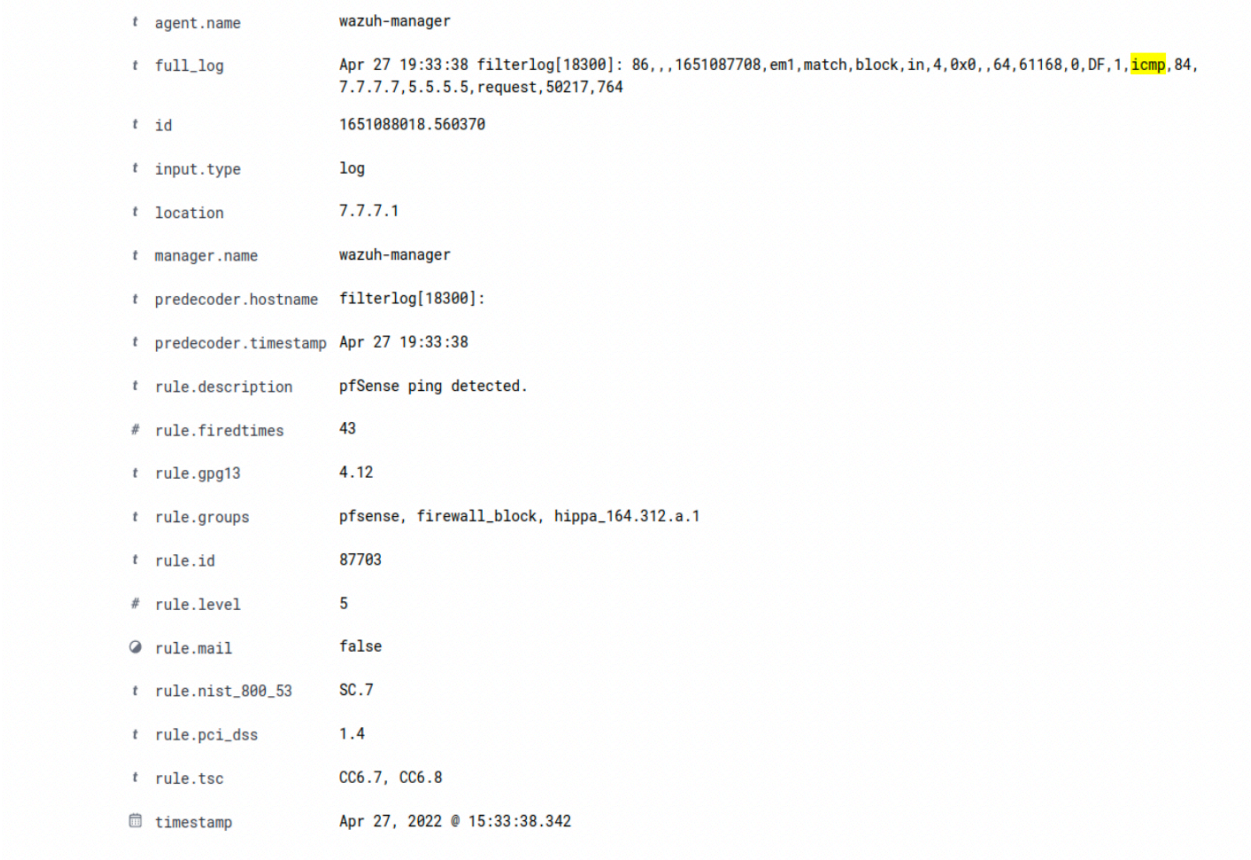


Table JSON

t	_id	D-CDbIABVnNNnLgt0_F8
t	_index	wazuh-alerts-4.x-2022.04.27
#	_score	-
t	_type	_doc
t	agent.id	000
t	agent.name	wazuh-manager
t	full_log	Apr 27 19:33:38 filterlog[18300]: 86,,,1651087708,em1,match,block,in,4,0x0,,64,61168,0,DF,1,icmp,84,7.7.7.7,5.5.5.5,request,50217,764
t	id	1651088018.560370
t	input.type	log
t	location	7.7.7.1
t	manager.name	wazuh-manager
t	predecoder.hostname	filterlog[18300]:
t	predecoder.timestamp	Apr 27 19:33:38
t	rule.description	pfSense ping detected.
#	rule.firedtimes	43
t	rule.gpg13	4.12
t	rule.groups	pfsense, firewall_block, hippa_164.312.a.1
t	rule.id	87703
#	rule.level	5
◕	rule.mail	false



t	agent.name	wazuh-manager
t	full_log	Apr 27 19:33:38 filterlog[18300]: 86,,,1651087708,em1,match,block,in,4,0x0,,64,61168,0,DF,1,icmp,84,7.7.7.7,5.5.5.5,request,50217,764
t	id	1651088018.560370
t	input.type	log
t	location	7.7.7.1
t	manager.name	wazuh-manager
t	predecoder.hostname	filterlog[18300]:
t	predecoder.timestamp	Apr 27 19:33:38
t	rule.description	pfSense ping detected.
#	rule.firedtimes	43
t	rule.gpg13	4.12
t	rule.groups	pfsense, firewall_block, hippa_164.312.a.1
t	rule.id	87703
#	rule.level	5
◕	rule.mail	false
t	rule.nist_800_53	SC.7
t	rule.pci_dss	1.4
t	rule.tsc	CC6.7, CC6.8
🗓	timestamp	Apr 27, 2022 @ 15:33:38.342

This finishes this lab. Keep in mind that Wazuh is a fairly powerful SIEM that has much more potentials that you have learned in those labs. You can explore more functionalities from its user manual https://documentation.wazuh.com/current/user-manual/overview.html .