FIM – File Integrity Monitoring (Windows & Linux)

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File Integrity Monitoring (FIM) is a critical component of cybersecurity that ensures the integrity of files and directories on a system. Wazuh, an open-source security monitoring platform, offers robust FIM capabilities to detect unauthorized changes to files and directories, helping organizations maintain the security and compliance of their systems.

1. Real-time Monitoring: Wazuh continuously monitors file systems in real-time, detecting any modifications, additions, or deletions to files and directories.

2. Hash-based Verification: Wazuh calculates cryptographic hashes (such as MD5, SHA-1, SHA-256) of files and compares them with predefined baseline values to identify any discrepancies indicative of tampering.

3. Customizable Policies: Wazuh allows users to define custom policies based on their specific security requirements, enabling tailored monitoring and alerting for critical files and directories.

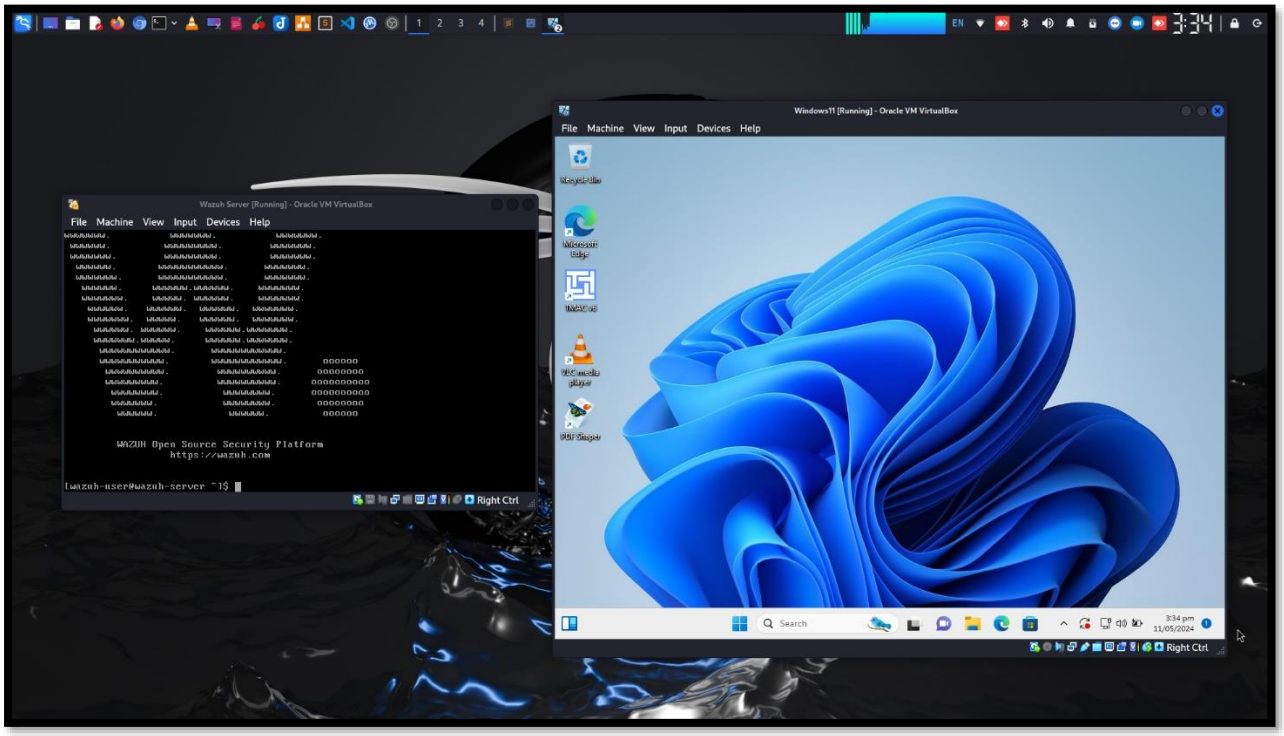
4. Alerting and Response: Upon detecting unauthorized changes, Wazuh generates alerts and notifications in real-time, enabling prompt response to potential security incidents. These alerts can be integrated with SIEM platforms for centralized monitoring and analysis.

5. Centralized Management: Wazuh provides centralized management capabilities through its management server, facilitating the configuration, deployment, and monitoring of FIM agents across multiple endpoints.

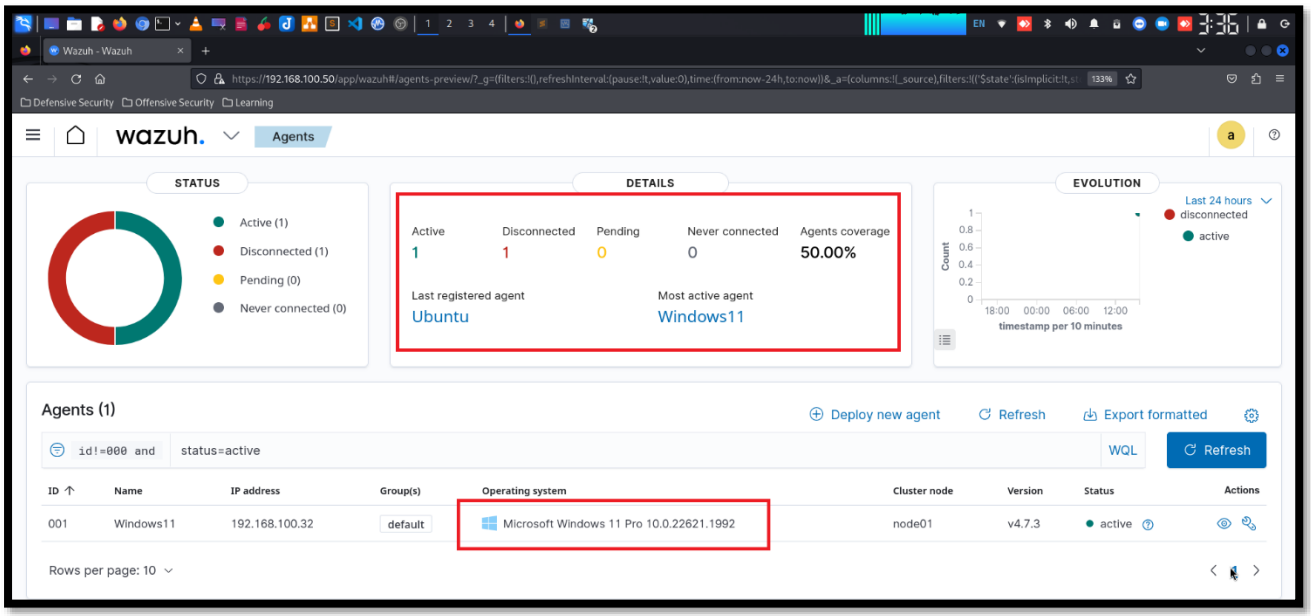
6. Compliance Auditing: Wazuh FIM assists organizations in meeting compliance requirements by providing detailed audit trails and reports of file system activity, helping demonstrate adherence to regulatory standards such as PCI DSS, HIPAA, GDPR, and more.

7. Scalability and Flexibility: Wazuh FIM is highly scalable and adaptable, suitable for environments ranging from small businesses to large enterprises, on-premises or in the cloud.

In my SOC lab environment Wazuh Server and Windows11-agent is running.

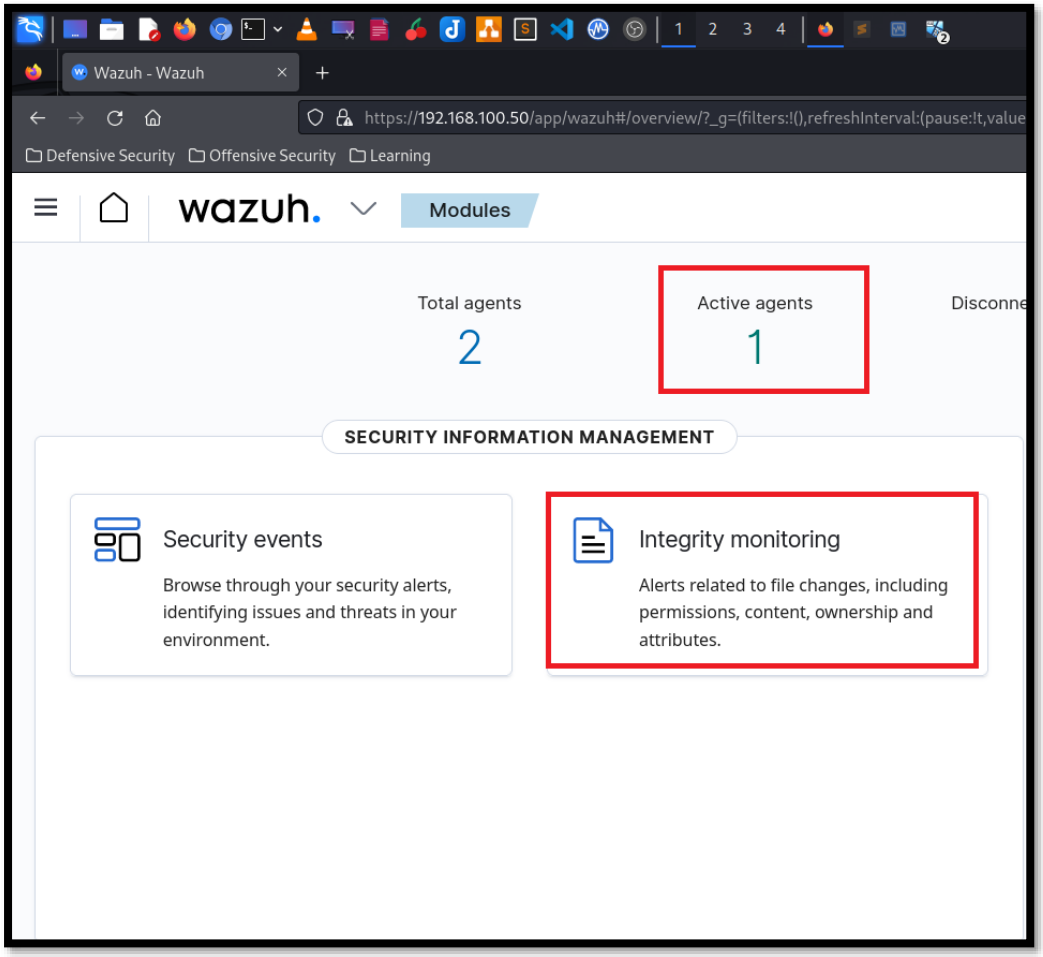


Dashboard of Wazuh Server

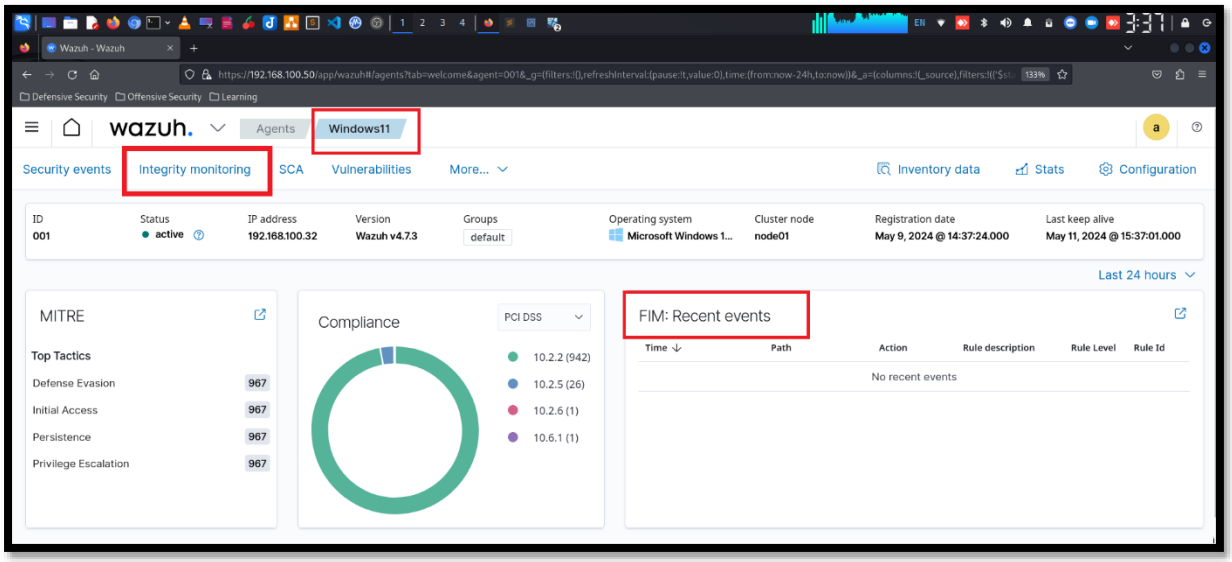


In Wazuh dashboard total agents is 2 and active agents is 1 and Windows 11 agent is active and running.

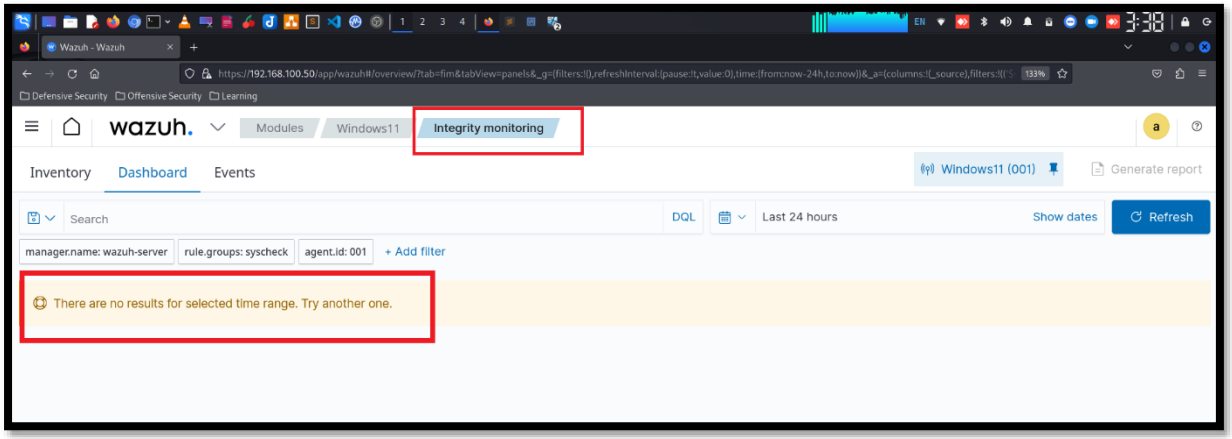
In Wazuh dashboard there is tab or section “SECURITY INFORMATION MANAGEMENT” under this we have “Integrity monitoring”



Select the windows11-agent and see in “FIM: Recent events” there is no data available for now, click on “integrity monitoring”

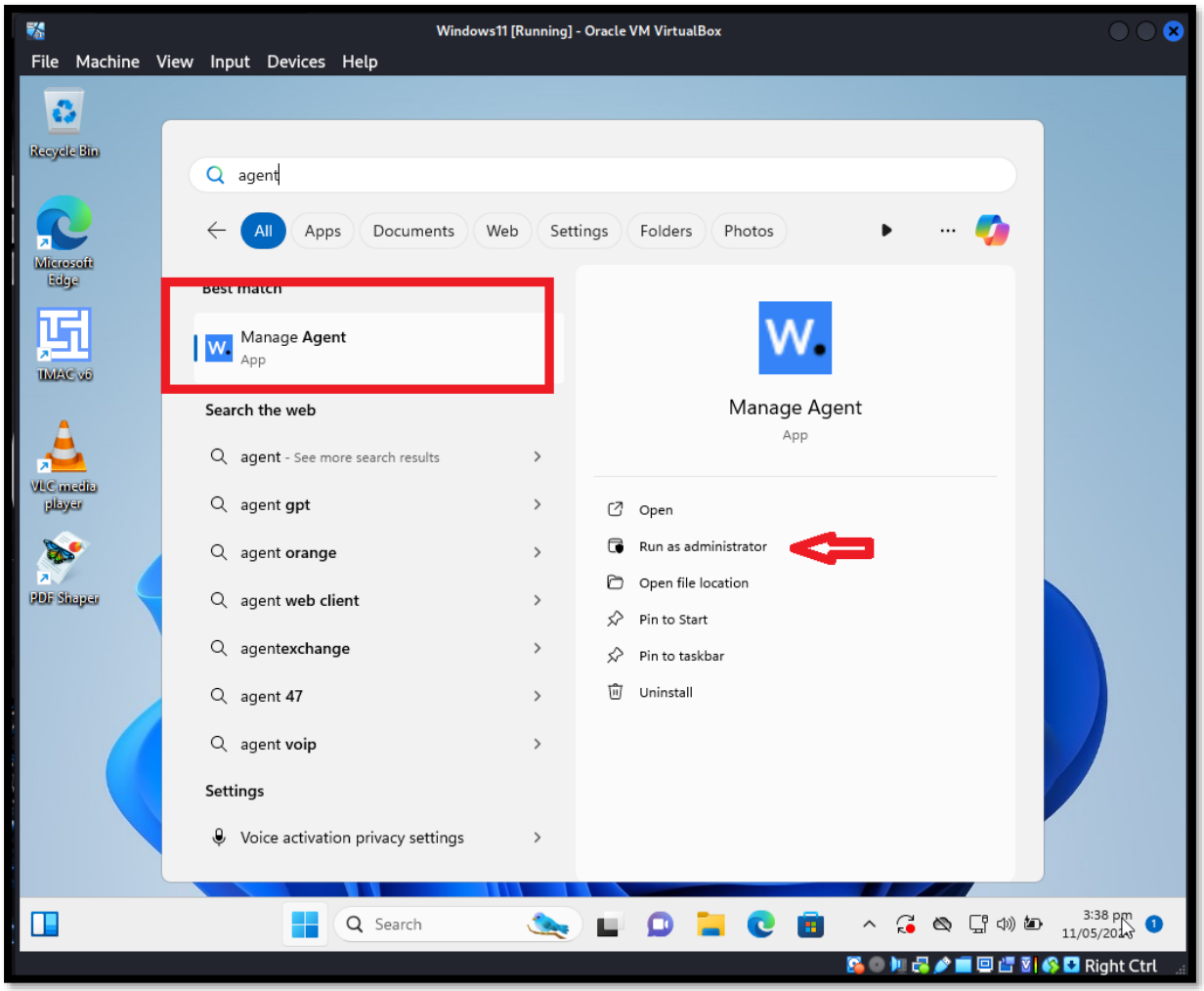


In integrity monitoring tab “There are not results for selected range” because there is no file for integrity monitoring configure.

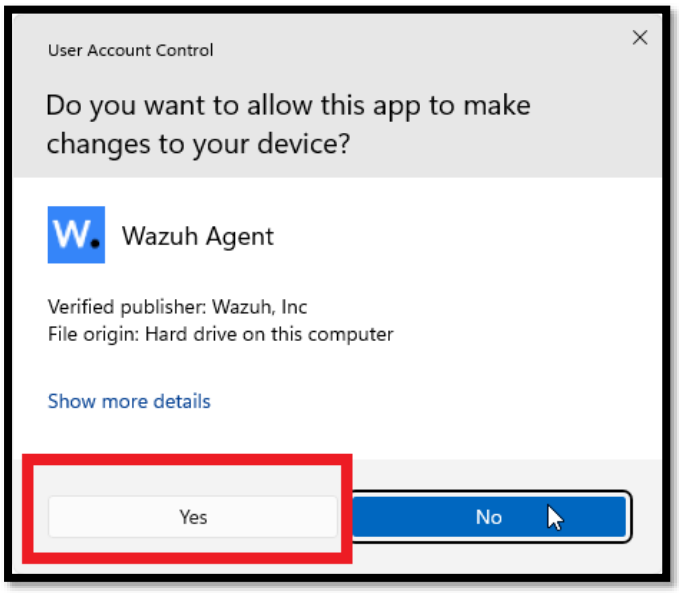


Let’s configure a FIM

Search agent in search menu, select “Manage Agent” and run this as administrator.

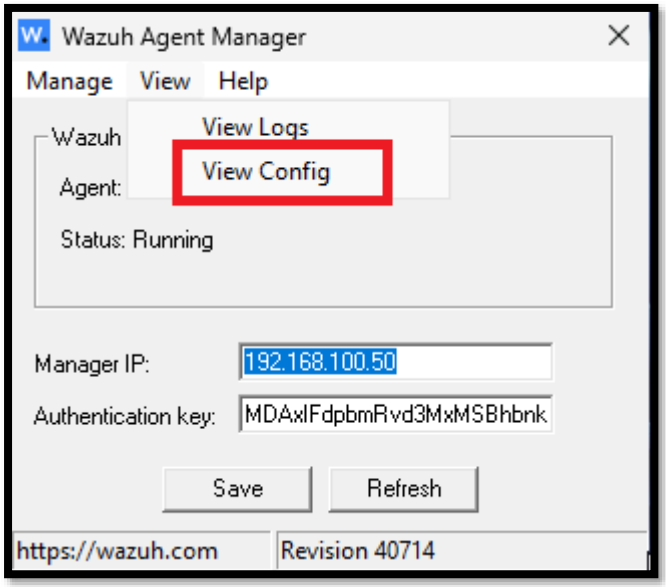


Click on “YES”

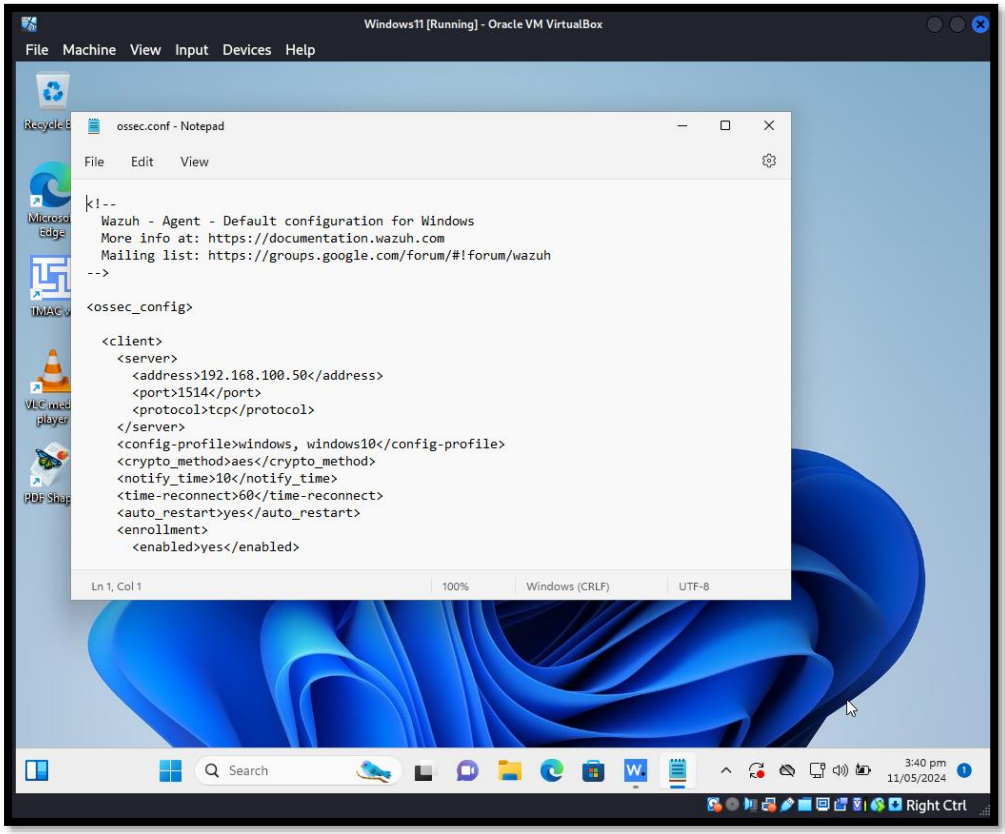


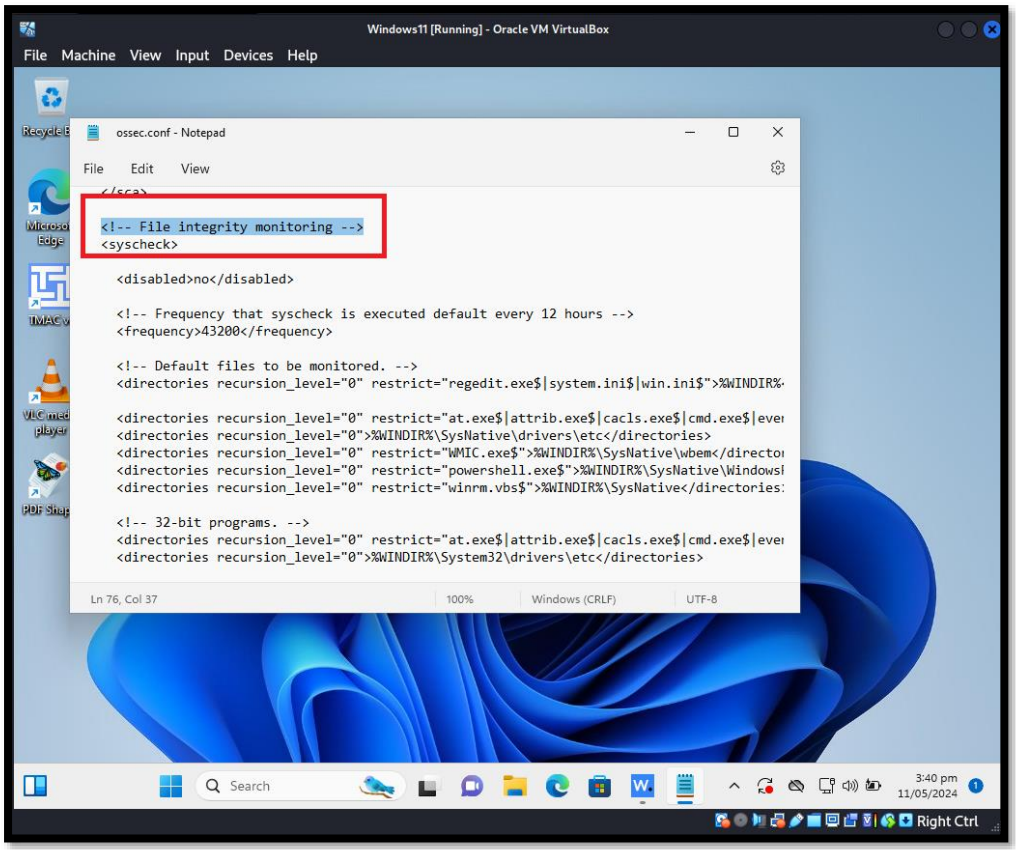
Wazuh Agent Manager is launched

Go to View and select “View Config”

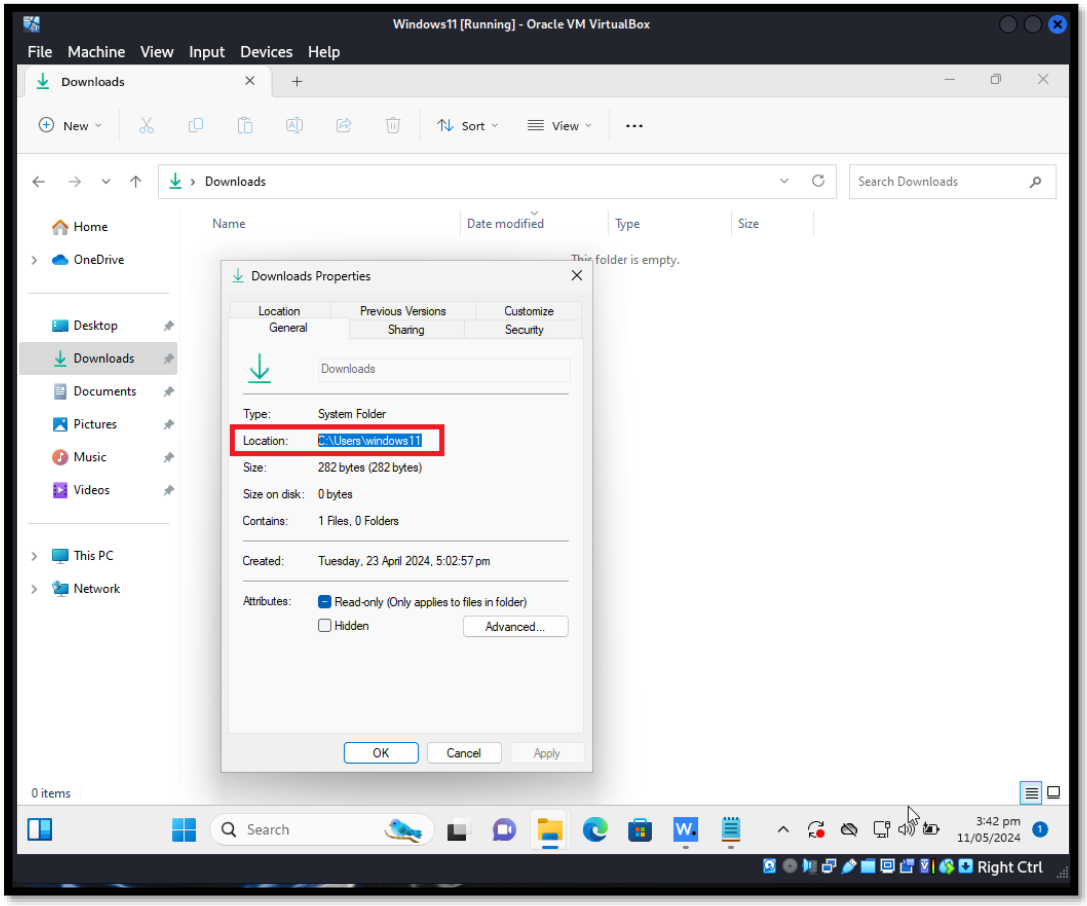


Here is “ossec.conf” file, scroll down a little and you will find “File integrity Monitoring” section. Here is <syscheck> configuration available.





I want to monitor my Downloads folder files integrity. Copy the path of this folder. You can add folder path what you want to monitor.



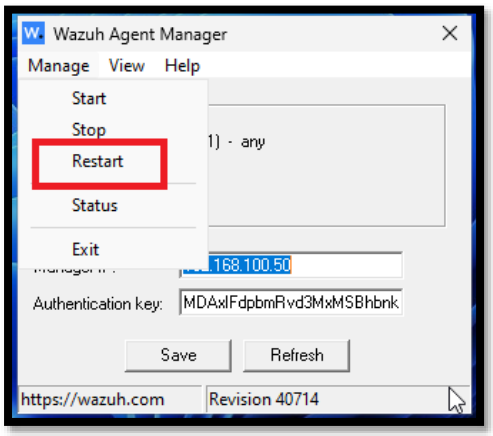
Now we have to add folder to integrity monitoring.

adding line:

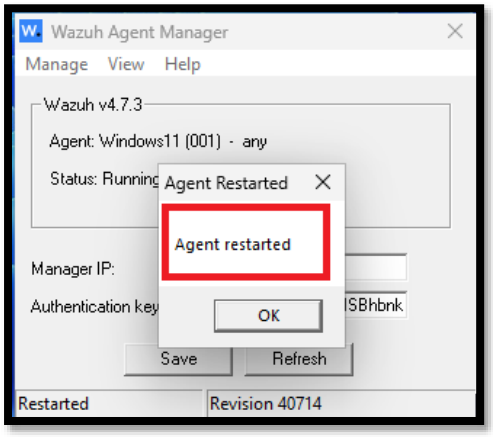
<directories report_changes="yes" check_all="yes" realtime="yes"> Folder Path </directories>

Save the changes and close the "ossec.conf" file

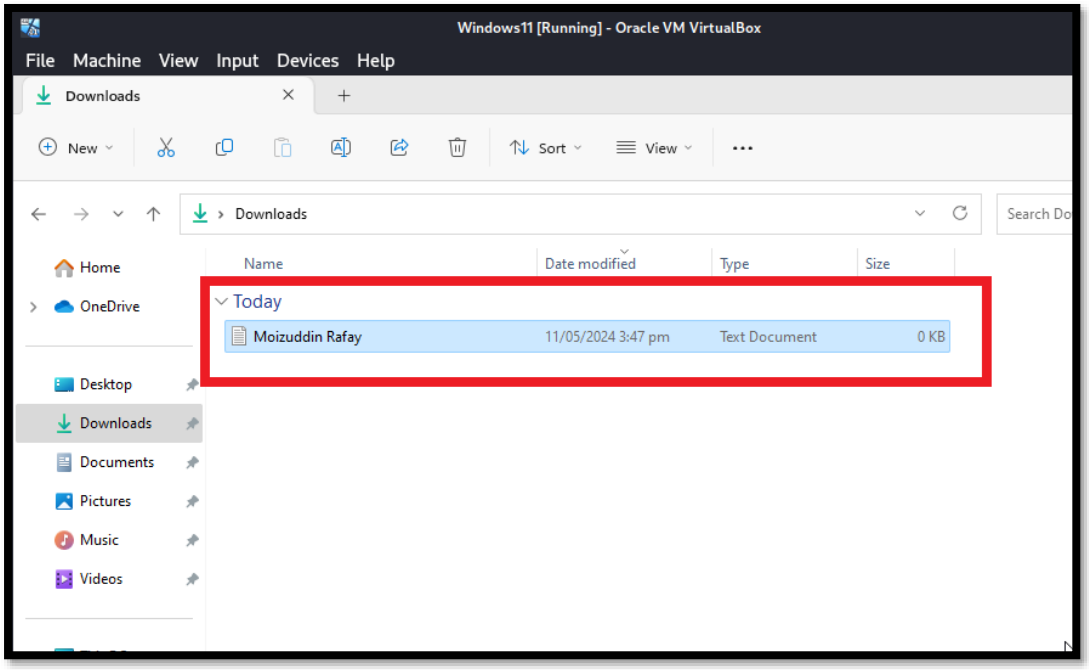
Restart the Wazuh-agent.



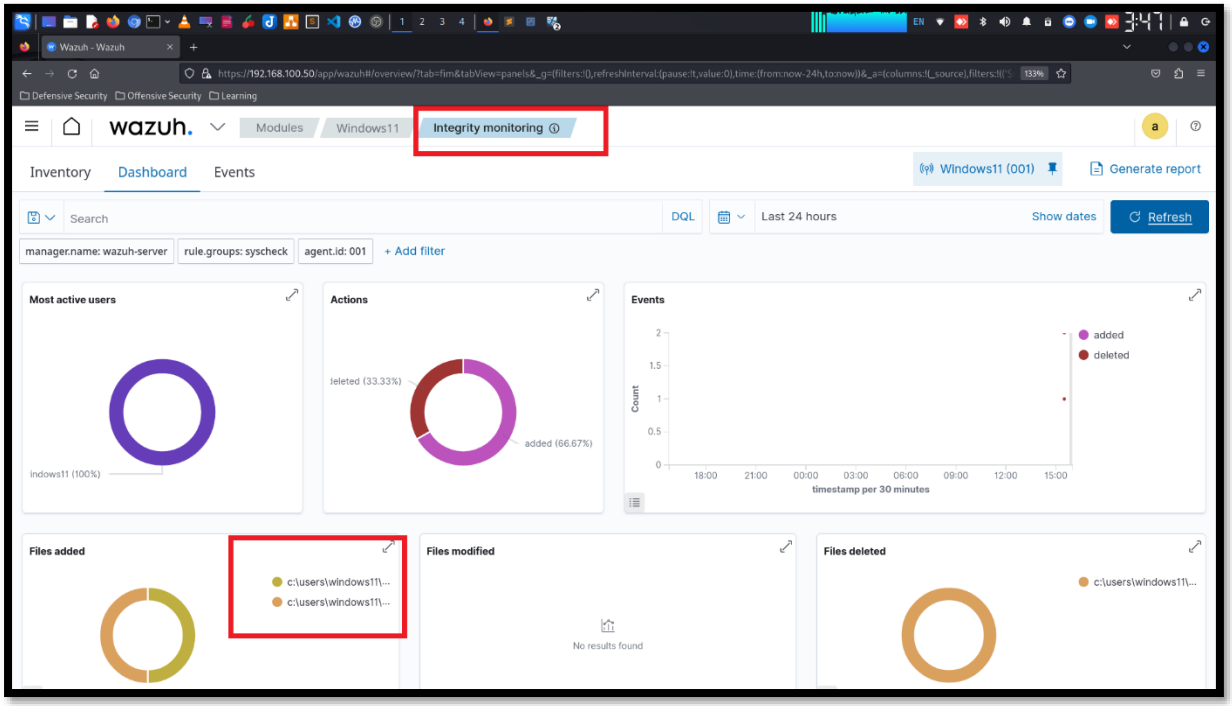
Wazuh-agent restarted.



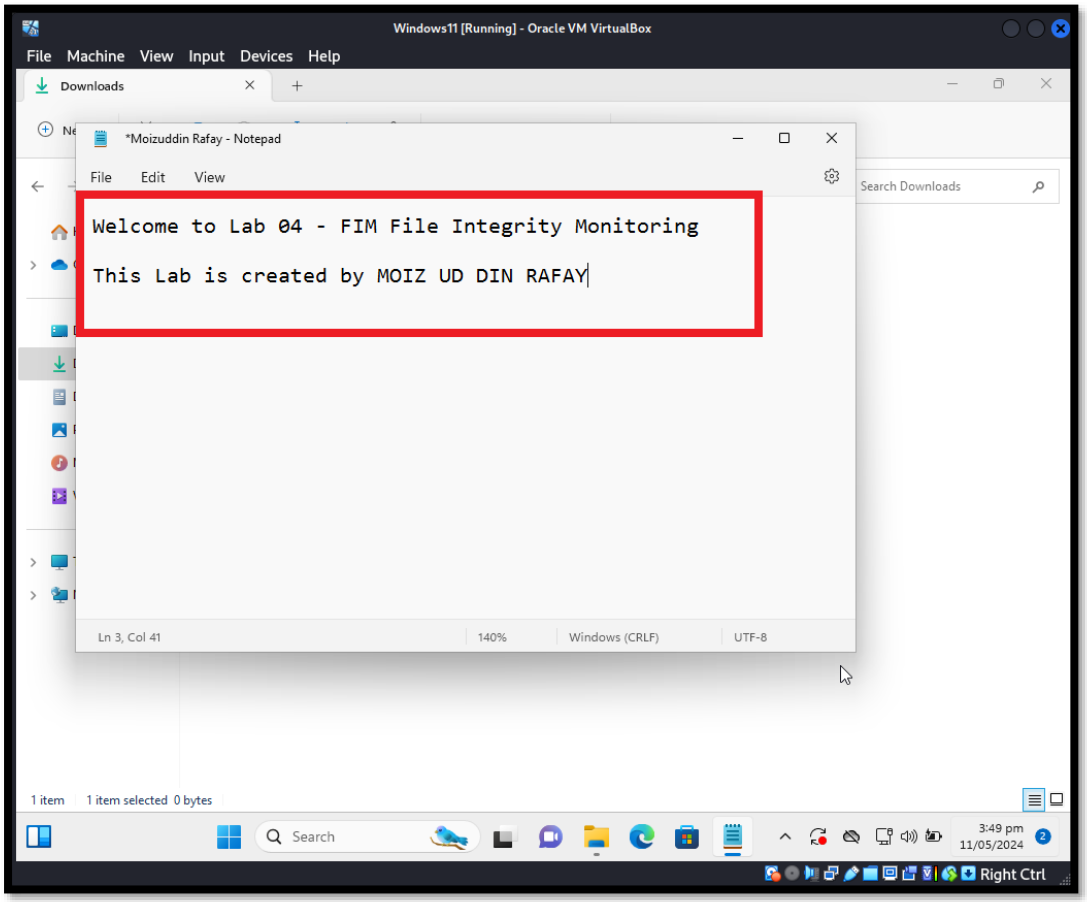
Now create a text file in the folder which is added for monitoring.



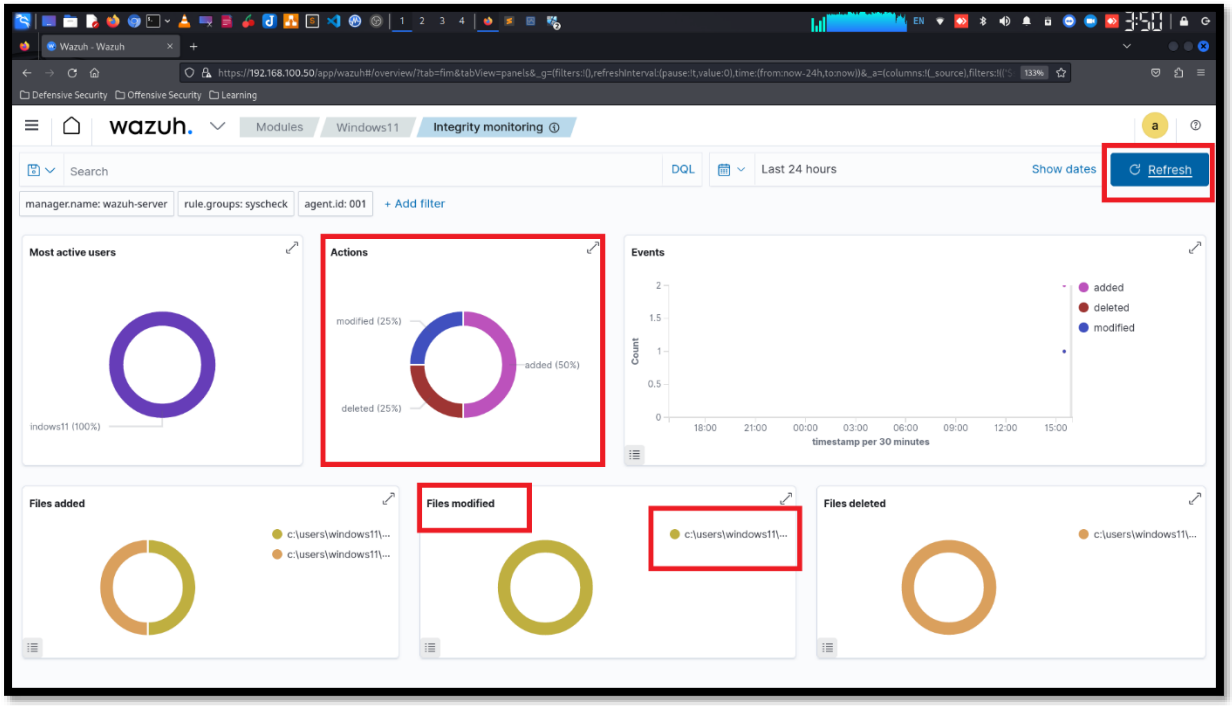
When you create a file, go to Wazuh “Integrity monitoring” tab and reload or refresh the page. Then you will see the results.



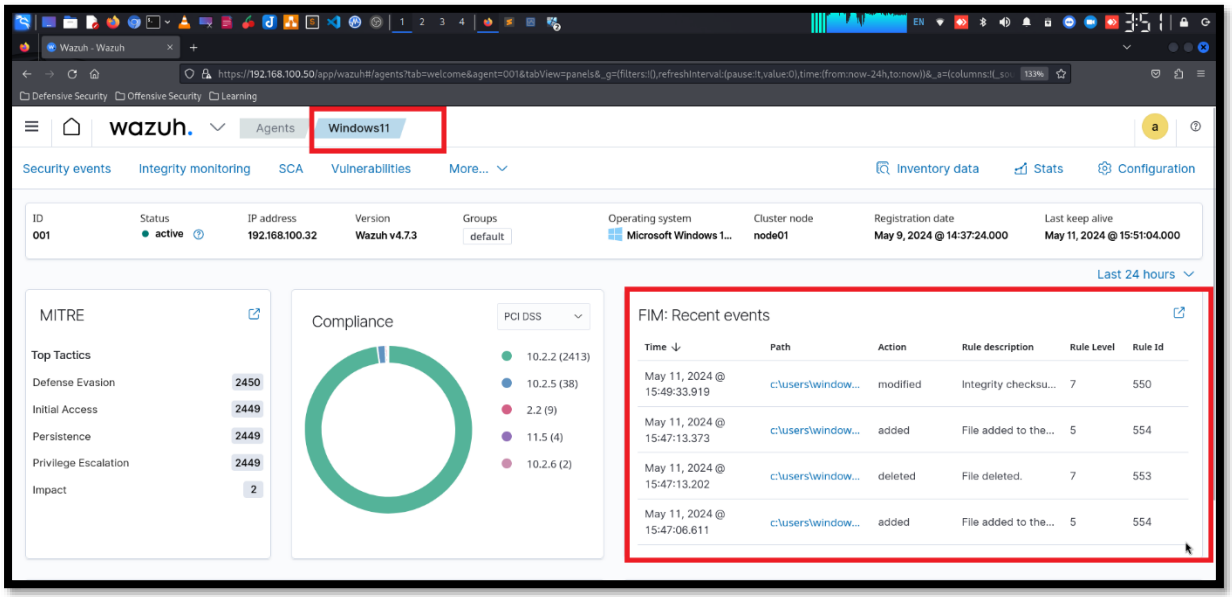
Let’s do some modification in file, I am writing text in this file.



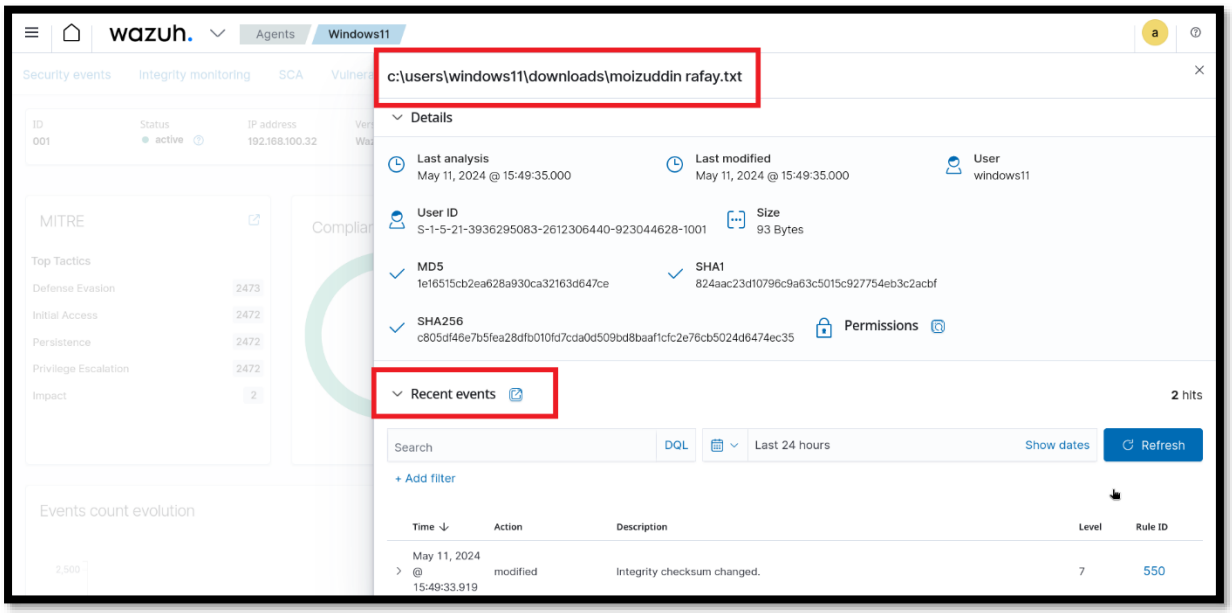
Go again in Wazuh “Integrity monitoring” dashboard and refresh the page. And you will see the new results. File is MODIFIED and hash of file is change.



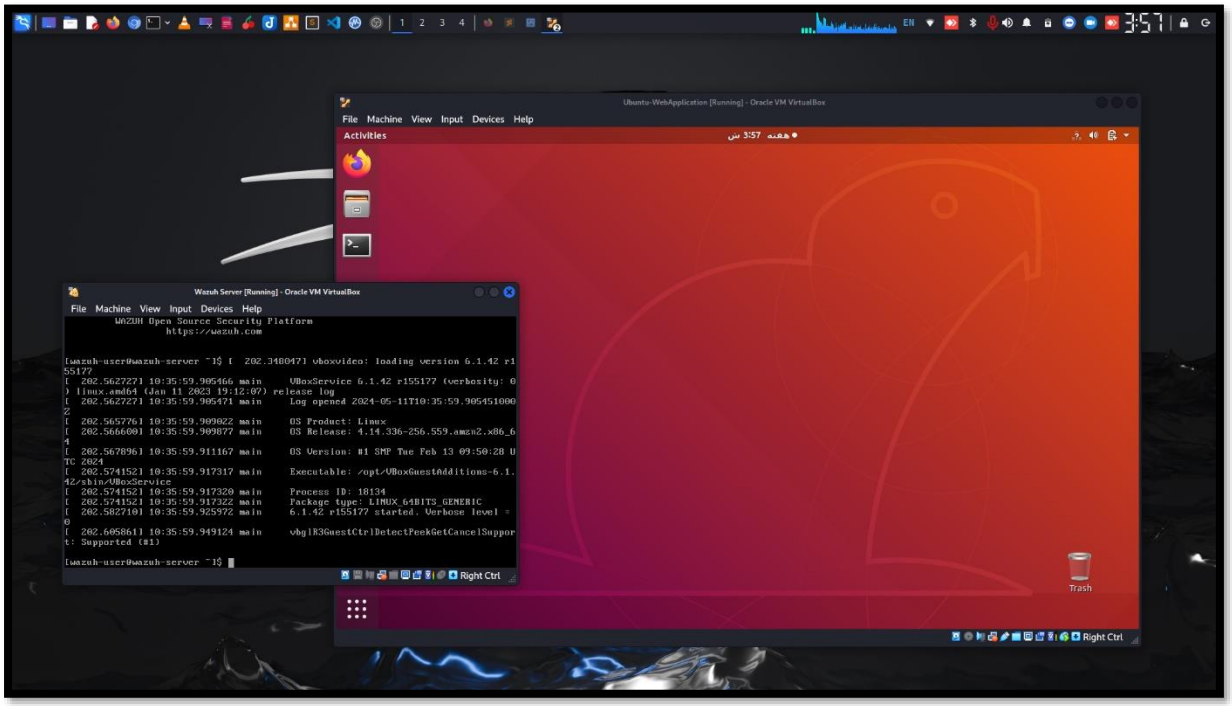
Also you can go back to Windows11-agent and see FIM Record events is available.



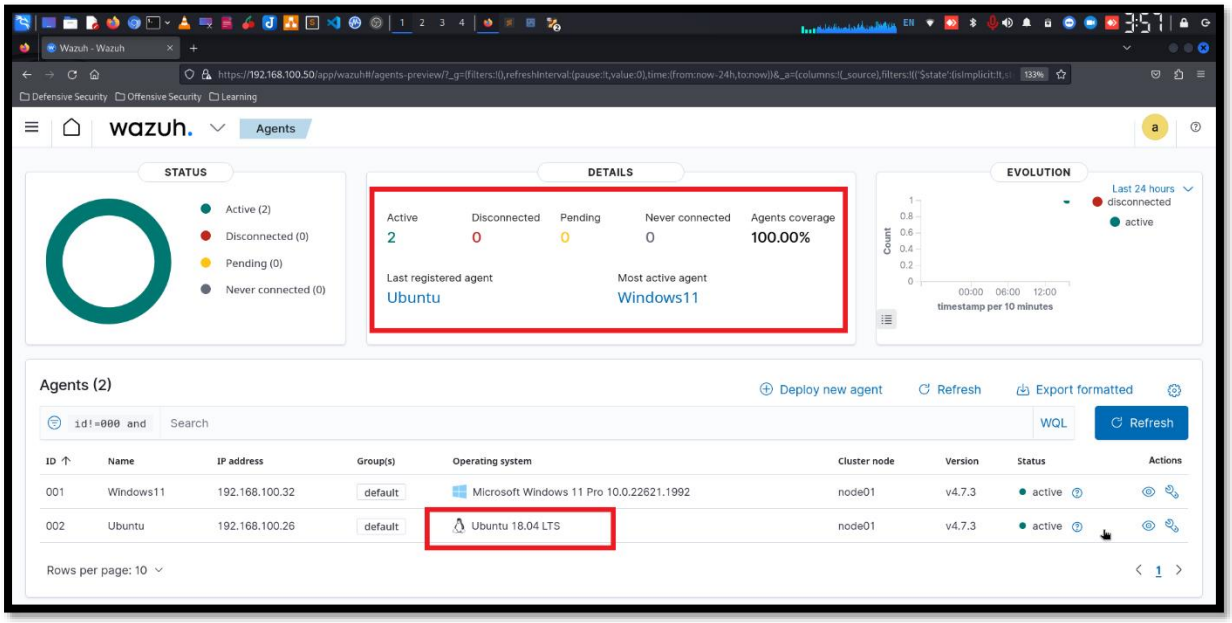
Click on event and see the details.



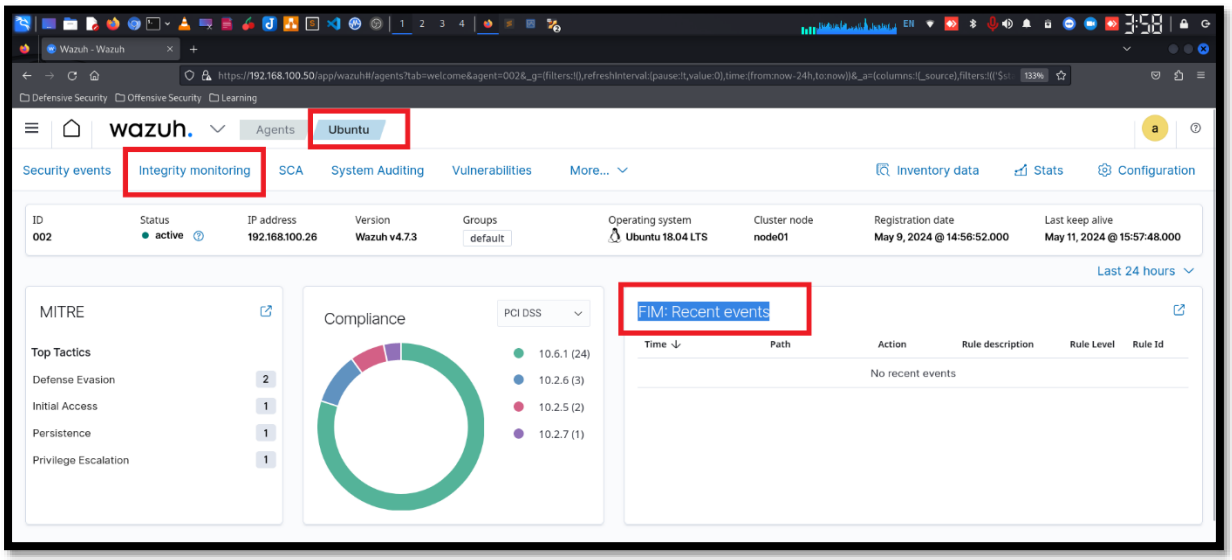
Now I am going to configure FIM in my Ubuntu machine.
Here is my SOC lab environment Wazuh Server or Ubuntu is running.



Go to Wazuh dashboard again and see we have both agent active now.



Select Ubuntu-agent and see there is no FIM data available. Now click on "Integrity monitoring" section.

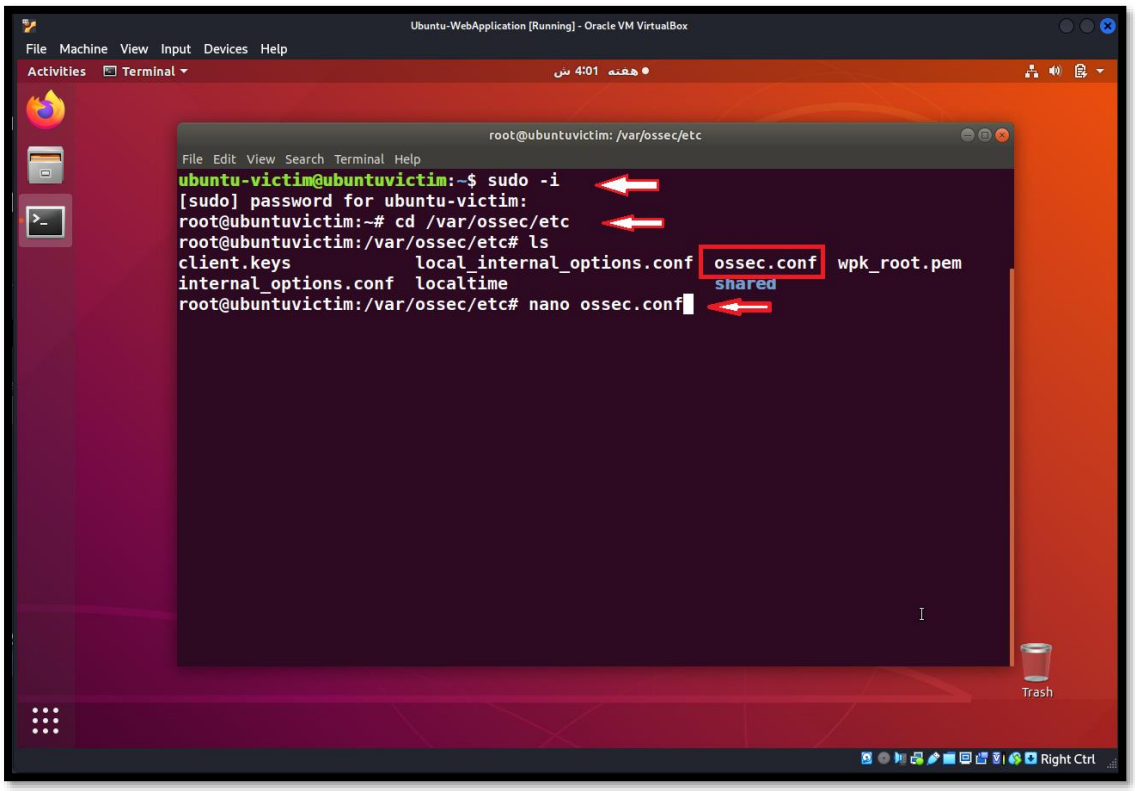


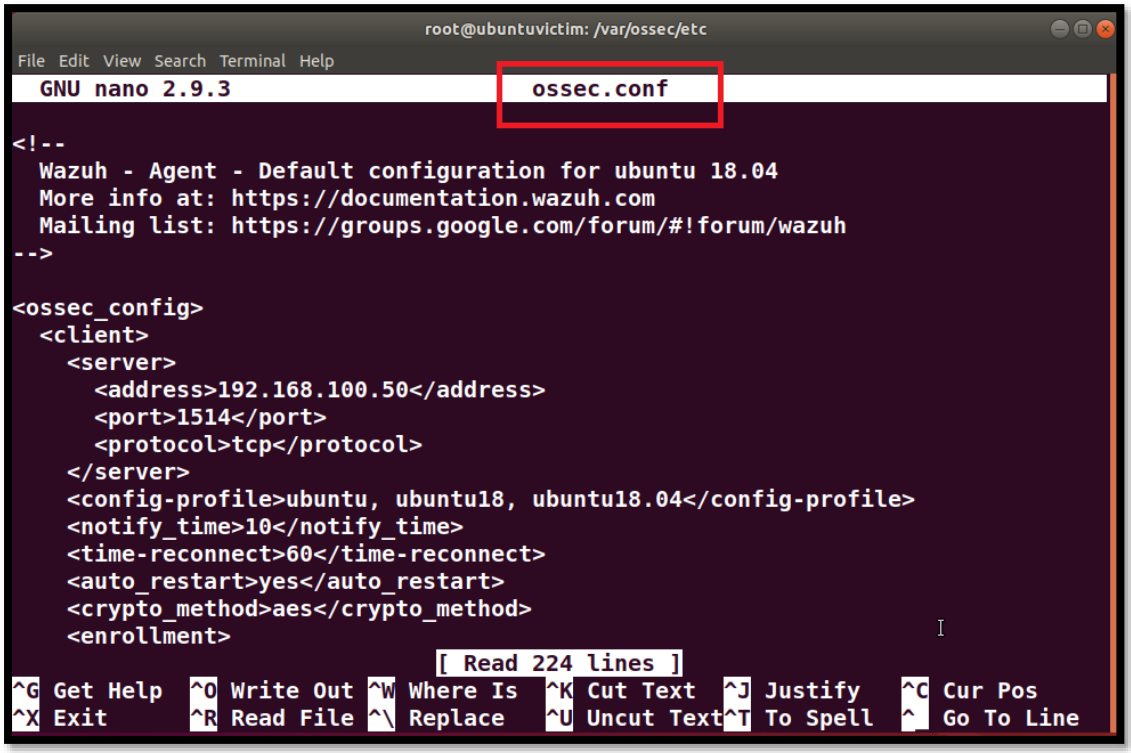
Now I am going to configure FIM in ubuntu machine. For this follow as shown in figure.

sudo -i (enter the root account)

cd /var/ossec/etc (locate the ossec.conf directory)

nano ossec.conf (edit the ossec.conf file)





Now locate the “File Integrity Monitoring”

```
root@ubuntuvictim: /var/ossec/etc
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                    ossec.conf

    <enabled>yes</enabled>
    <scan_on_start>yes</scan_on_start>
    <interval>12h</interval>
    <skip_nfs>yes</skip_nfs>
  </sca>

  <!-- File integrity monitoring -->
  <syscheck>
    <disabled>no</disabled>

    <!-- Frequency that syscheck is executed default every 12 hours -->
    <frequency>43200</frequency>

    <scan_on_start>yes</scan_on_start>

    <!-- Directories to check  (perform all possible verifications) -->
    <directories>/etc,/usr/bin,/usr/sbin</directories>
    <directories>/bin,/sbin,/boot</directories>

^G Get Help   ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos
^X Exit       ^R Read File  ^\ Replace    ^U Uncut Text ^T To Spell   ^_ Go To Line
```

Selecting the path of folder which you want to monitor.

```
ubuntu-victim@ubuntuvictim: ~/Downloads
File  Edit  View  Search  Terminal  Help
ubuntu-victim@ubuntuvictim:~/Downloads$ pwd
/home/ubuntu-victim/Downloads
ubuntu-victim@ubuntuvictim:~/Downloads$
```

Add configuration line here:

<directories check_all=”yes” whodata=”yes”> Path of folder </directories>

If you want to explanation of this configuration do comment I will explain everything.

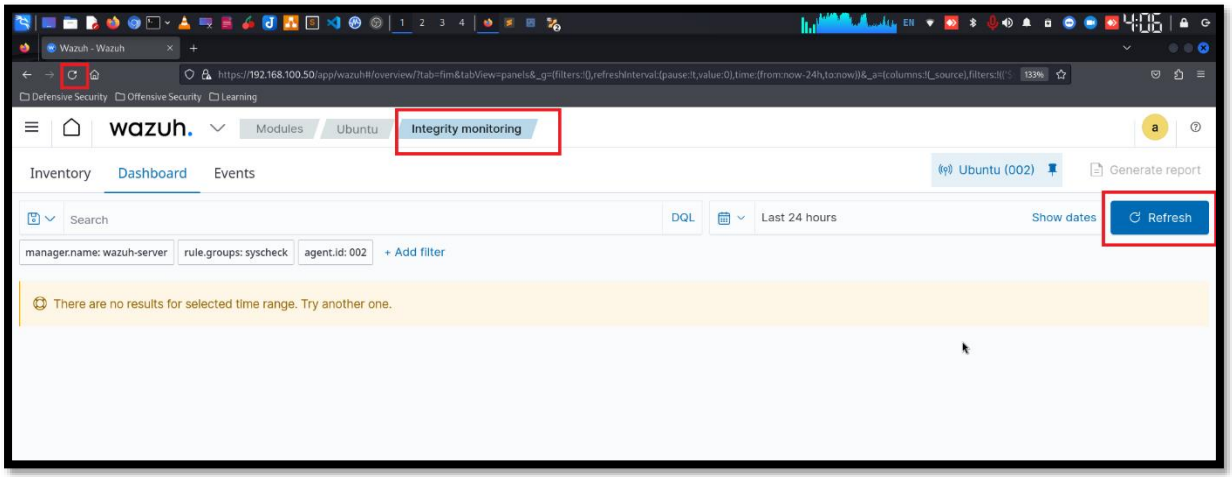
```
root@ubuntuvictim: /var/ossec/etc
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                    ossec.conf                    Modified

    <!-- Frequency that syscheck is executed default every 12 hours -->
    <frequency>43200</frequency>

    <scan_on_start>yes</scan_on_start>

    <!-- Directories to check  (perform all possible verifications) -->
    <directories>/etc,/usr/bin,/usr/sbin</directories>
    <directories>/bin,/sbin,/boot</directories>

        <directories check_all="yes" whodata="yes">/home/ubuntu-victim/Downloads</directories>

    <!-- Files/directories to ignore -->
    <ignore>/etc/mtab</ignore>
    <ignore>/etc/hosts.deny</ignore>
    <ignore>/etc/mail/statistics</ignore>
    <ignore>/etc/random-seed</ignore>
    <ignore>/etc/random.seed</ignore>
    <ignore>/etc/adjtime</ignore>
    <ignore>/etc/httpd/logs</ignore>

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell    ^_ Go To Line
```

Save the changes in “ossec.conf” file and restart the Wazuh-agent.

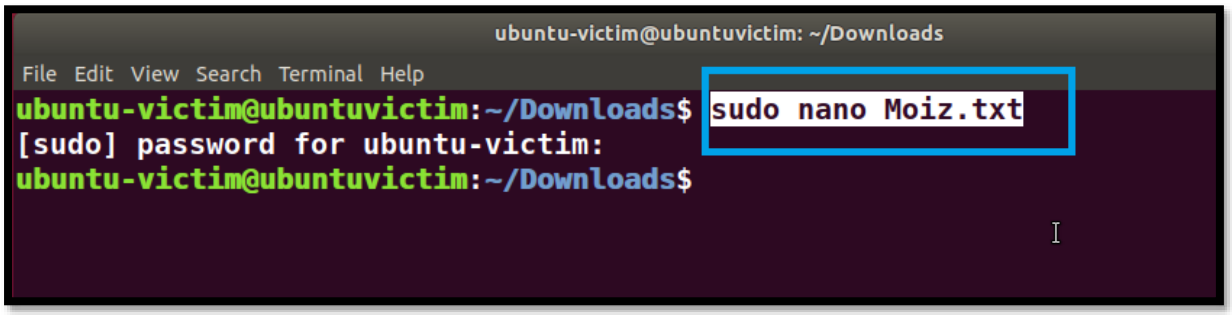
```
root@ubuntuvictim: /var/ossec/etc
File  Edit  View  Search  Terminal  Help
ubuntu-victim@ubuntuvictim:~$ sudo -i
[sudo] password for ubuntu-victim:
root@ubuntuvictim:~# cd /var/ossec/etc
root@ubuntuvictim:/var/ossec/etc# ls
client.keys            local_internal_options.conf  ossec.conf  wpk_root.pem
internal_options.conf  localtime                    shared
root@ubuntuvictim:/var/ossec/etc# nano ossec.conf
root@ubuntuvictim:/var/ossec/etc# systemctl restart wazuh-agent
root@ubuntuvictim:/var/ossec/etc#
```

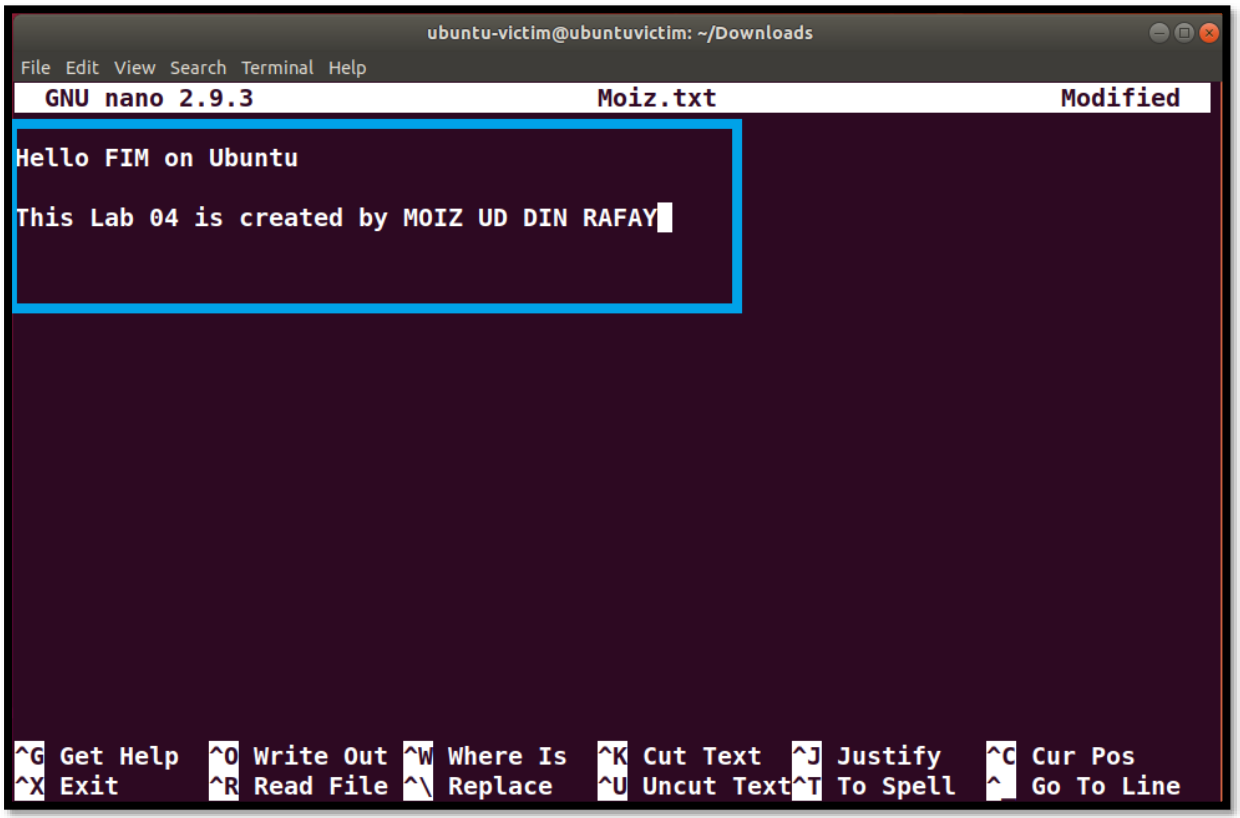
Command: systemctl restart wazuh-agent

Now go to “Integrity monitoring” dashboard and refresh and reload the page.

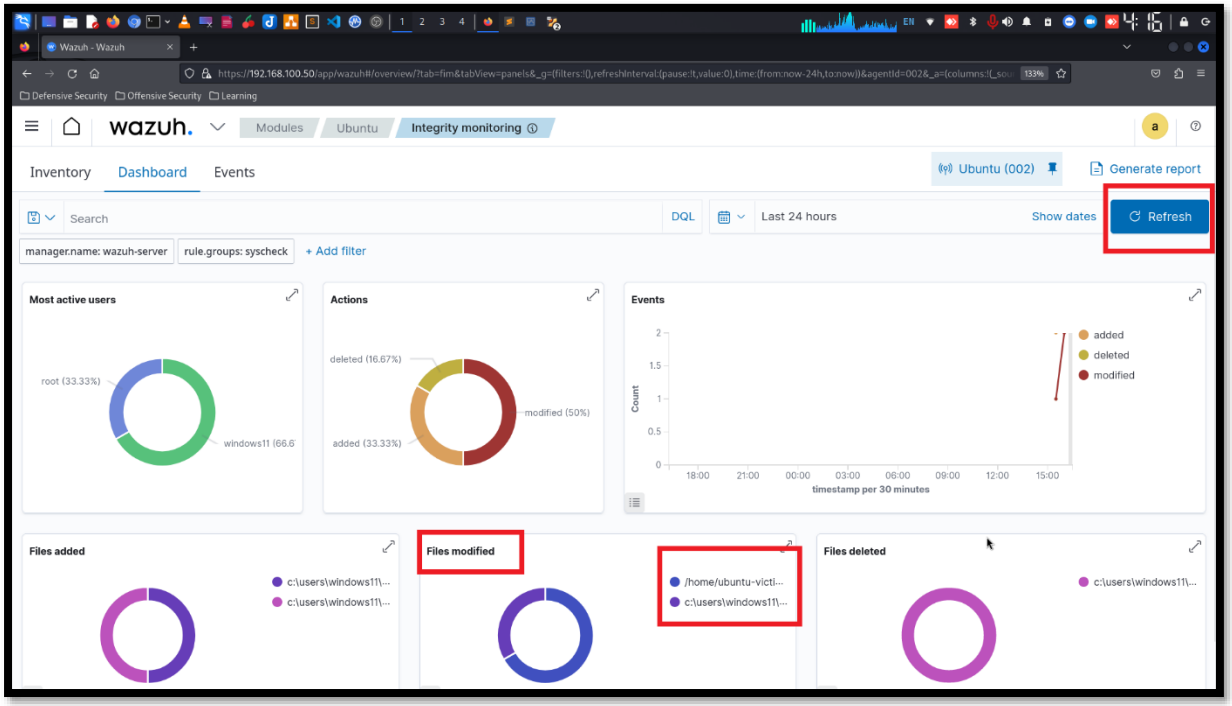


Now create and edit the text file.

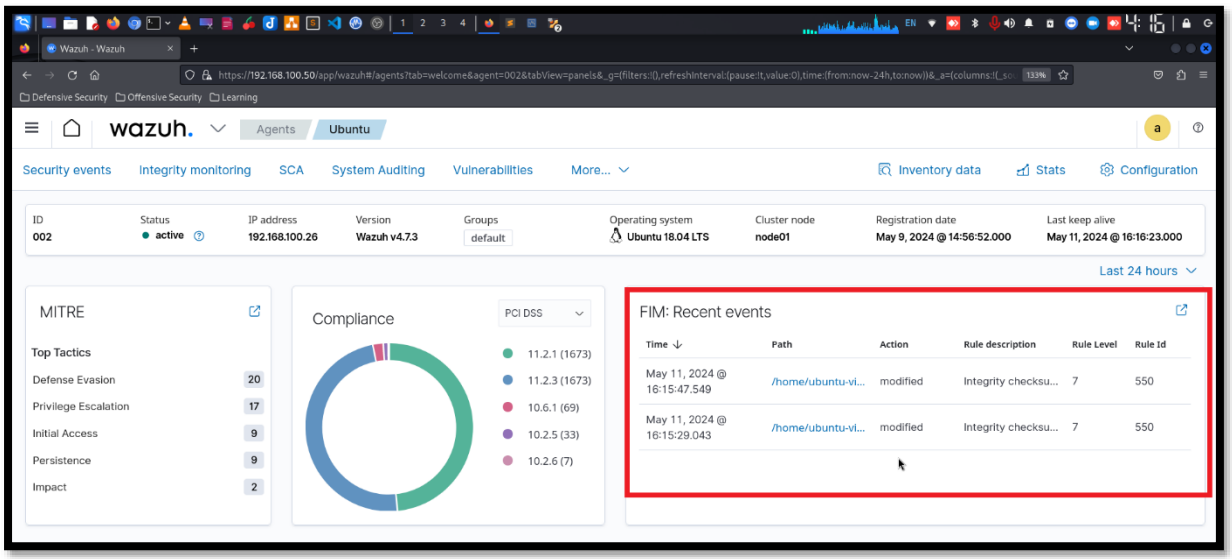




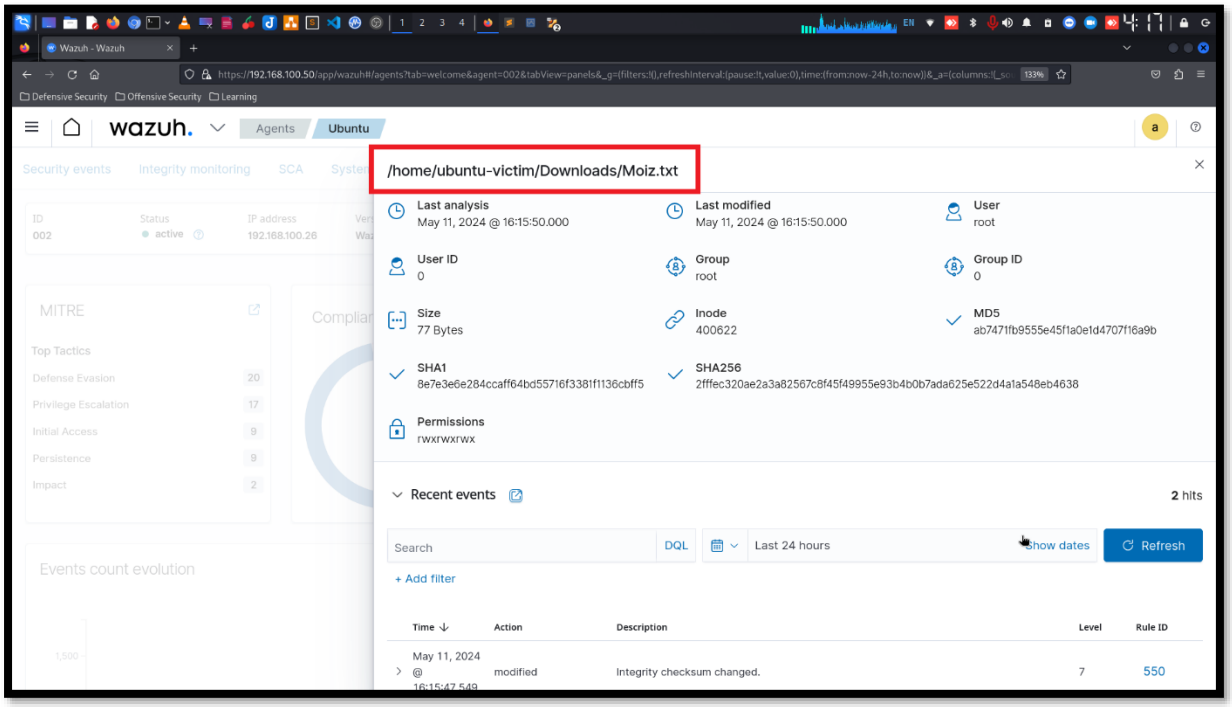
Here is you can see the result in “Integrity monitoring” dashboard. See the highlighted sections.



Now go back in Ubuntu-agent dashboard and see the events in “FIM: Recent events”



Now click on any event and see the details of events.



SUMMARY

In summary, Wazuh File Integrity Monitoring offers a comprehensive solution for detecting and responding to unauthorized changes to files and directories, enhancing the security posture of organizations and helping them maintain compliance with regulatory requirements.