Setup Wazuh
Open Source SIEM

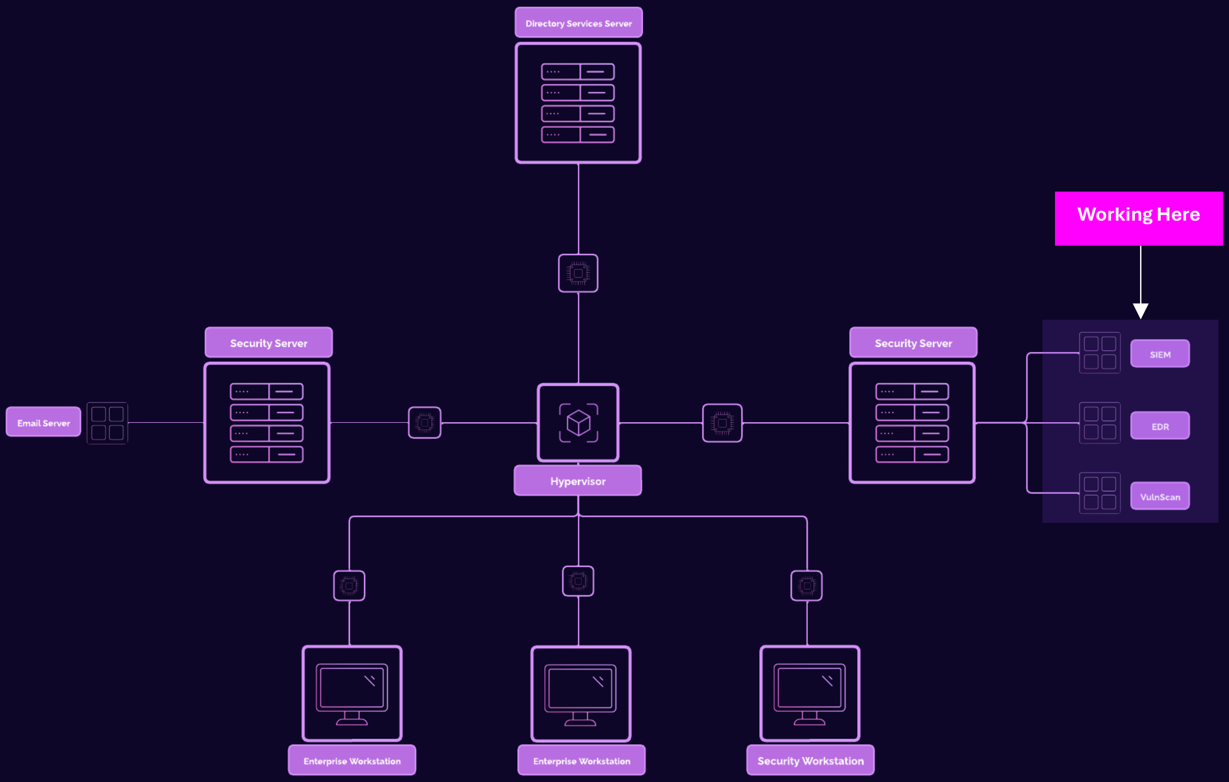
>projectsecurity_

Table of Contents

Prerequisites

- Virtualbox installed.
- Virtual Machine `[project-x-security-svr]` has been provisioned, configured, and fully setup.
- Virtual Machines Installed & Configured:
  - `[project-x-win-client]`
  - `[project-x-linux-client]`
  - `[project-x-sec-work]`
- Windows Server 2025 with Active Directory Domain Services (ADDS) configured and running in the background.

Network Topology



Working Here

Wazuh Overview

Overview

Wazuh is an open-source platform that provides extended detection response (XDR) and System Information and Event Management (SIEM) to protect cloud, container, and server workloads. Wazuh comes with an array of capabilities including log data analytics, intrusion and malware detection, file integrity monitoring, configuration assessment, vulnerability detection, and support for regulatory compliance.

- **Extended Detection Response (XDR):** XDR is a defensive approach that integrates data and insights from multiple security layers. Data is collected and aggregated into a unified platform from data sources such as workstations, servers, cloud environments, and network traffic. XDR provides improved detection, investigation, and response to threats by centralizing all data to identify patterns, trends, and analyze malicious activity. In the context of Wazuh, there are many capabilities and features which enable XDR including multi-source data collection, threat detection, intrusion detection, incident investigation, and file integrity monitoring (FIM).
- **System Information and Event Management (SIEM):** Refers to a system that combines log management, threat detection, and incident response to help organizations monitor and secure their IT environments. Wazuh acts as a SIEM solution by collecting and analyzing security data from multiple sources, detecting threats in real time, and facilitating efficient incident response.

Wazuh relies on an agent-based ecosystem. Software agents are deployed to workstations, servers, containers, and virtual machines which send data to Wazuh's server for processing, aggregation, and visualization of security-relevant information.

There are three main components that make up the Wazuh ecosystem (copied from Wazuh's documentation):

- **Wazuh Indexer:** A highly scalable, full-text search and analytics engine. This central component indexes and stores alerts generated by the Wazuh server.
- **Wazuh Server:** Analyzes data received from the agents. It processes it through decoders and rules, using threat intelligence to look for well-known indicators of compromise (IOCs). A single server can analyze data from hundreds or thousands of agents, and scale horizontally when set up as a cluster. This central component is also used to manage the agents, configuring and upgrading them remotely when necessary.

- **Wazuh Dashboard:** Is the web user interface for data visualization and analysis. It includes out-of-the-box dashboards for threat hunting, regulatory compliance (e.g., PCI DSS, GDPR, CIS, HIPAA, NIST 800-53), detected vulnerable applications, file integrity monitoring data, configuration assessment results, cloud infrastructure monitoring events, and others. It is also used to manage Wazuh configuration and to monitor its status.

We will be using Wazuh as our central hub for security logging, analysis, defense, and remediation while we conduct cyber-attack/defend exercises. Wazuh provides a solid foundation for gathering relevant data while applying remediations. We will be able to actively view and visualize what happens when attackers are able to achieve initial access, lateral movement, elevation of privileges, persistence, and exfiltration.

As part of this project, we will be configuring Wazuh's SIEM, XDR, and File Integrity Monitoring (FIM) modules. The Vulnerability Detection module has a default configuration applied.

Wazuh Agent Deployment

In Wazuh, there are two primary ways to manage and configure agents: centralized configuration via **agent.conf** and local configuration on each agent via **ossec.conf**.

Centralized Configuration (agent.conf)

Configuration changes and centralized management are applied to all agents via the Wazuh manager. The **agent.conf** file is edited on the Wazuh manager to define settings such as log collection rules, configuration changes and active response policies. This is best used for environments with many agents where centralized management is preferred.

👉 This is the configuration style used in this guide.

Local Configuration (ossec.conf)

Allows individual agents to have unique configurations. This offers flexibility for agents with specific requirements and is useful when agents are deployed in standalone environments. The **ossec.conf** file is manually edited on each agent. Manually editing each agent can lead to configuration drift, where configurations are difficult to manage.

When both configurations are utilized, the local and shared configuration changes are merged. However, the last configuration of any setting is read in the **agent.conf** file. The **agent.conf** file will overwrite any conflicting changes between the two. More can be read here for precedence order.

Security Implications

Running an XDR and SIEM services provides significant advantages to monitor, detect, prevent, and respond to security-related activity. Most mainstream XDR and SIEMs work in a similar fashion, providing similar information. Wazuh is not the only tool or solution offered. Since it's free and provides a suite of capabilities, Wazuh was chosen as the security tool in this lab.

Some security implications or enhancements include:

1. Threat Detection

- **Event Correlation:** Wazuh analyzes and correlates log data from a wide range of sources (servers, endpoints, network devices) to detect malicious activities such as brute-force attacks, privilege escalation, and suspicious login attempts. This helps in identifying threats across multiple layers of the IT infrastructure.
- **Real-time Alerts:** Wazuh generates real-time alerts for malicious behavior, such as unauthorized access, potential malware infections, or network anomalies, enabling immediate response. We are going to configure a few alerts in the **Configure a Vulnerable Environment** section.

2. Proactive Defense

- **Intrusion Detection:** Wazuh acts as a host-based intrusion detection system (HIDS), monitoring file integrity, log integrity, and detecting unauthorized changes.
- **Endpoint Visibility:** As a part of its XDR functionality, Wazuh collects and analyzes endpoint data to detect advanced threats like fileless malware, lateral movement, and ransomware activities.

3. Incident Response and Investigation

- **Automated Responses:** Wazuh can be configured to automatically trigger responses (e.g., blocking an IP address or executing scripts to quarantine infected machines), significantly reducing the time between detection and mitigation.
- **Forensics and Data Collection:** By storing logs and system data, Wazuh provides critical information for incident investigation. This allows teams to retrace attack steps, identify attack vectors, and determine the scope of the breach.

4. Centralized Security Management

- **The UI:** Wazuh aggregates data from multiple sources (network, endpoint, and cloud), providing a centralized security management platform. This allows security teams to monitor the health of the entire infrastructure from a single pane of glass, reducing complexity and enhancing situational awareness.

- **Integration with Other Tools:** Wazuh integrates with other security technologies such as threat intelligence feeds, vulnerability scanners, and security orchestration tools, creating a cohesive security ecosystem that strengthens overall defense.

5. Threat Hunting

- **Behavioral Analysis:** With Wazuh's ability to monitor system behavior, security teams can hunt for signs of advanced persistent threats (APTs), exploits, and other sophisticated attack methods by analyzing anomalies in system and network behavior.
- **Custom Rules and Detection:** Wazuh allows the creation of custom detection rules based on unique organizational needs, enabling more targeted threat hunting and response strategies.

💡 This guide is based off Wazuh's official documentation.

Setup Wazuh Indexer + Server

💡 This section is based on Wazuh's QuickStart Guide documentation.

💡 Wazuh recommends a minimum hardware requirement of 4 GB of RAM and 2 CPU cores. If you have the available hardware, feel free to change the RAM and CPU settings in VirtualBox.

👉 A minimum of **55 GBs** of Virtual Disk space is required. Refer to **the Project Overview** for more information on Virtual Machine specifications.

Step 1

Sign into sec-user@secbox:

```
sudo su sec-user
```

Install cURL if it isn't installed already:

```
sudo apt install curl
```

Issue the following command to start the Wazuh installation wizard, the `-i` option ignores minimum system requirements:

```
curl -sO https://packages.wazuh.com/4.9/wazuh-install.sh && sudo
bash ./wazuh-install.sh -a -i
```

Allow the Wazuh Indexer and Server to install, this may take a few minutes.

You will know Wazuh was successfully installed when the output shows the access credentials and a message that confirms the installation was successful.

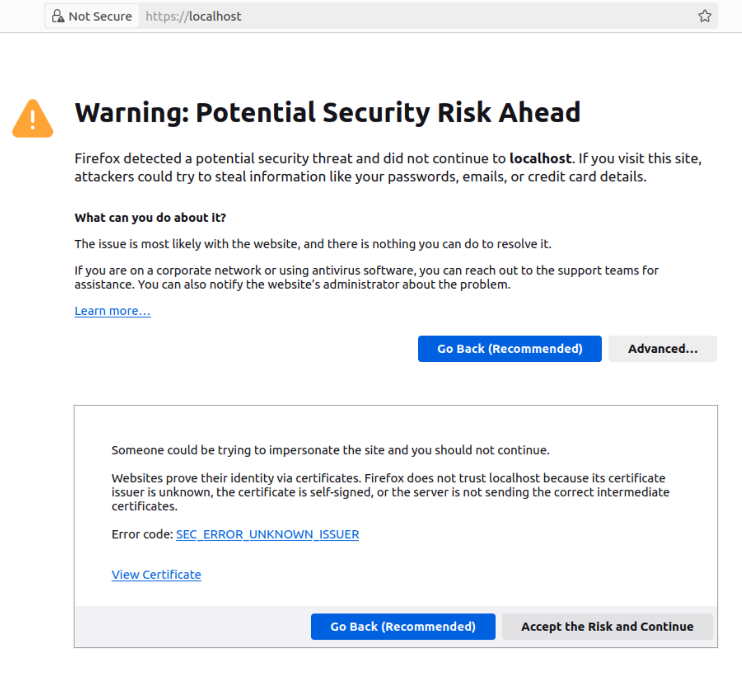
👉 Take note of the Admin password. This will be different for every installation.

💡 You can find the passwords for all the Wazuh indexer and API users in the `wazuh-passwords.txt` file inside the `wazuh-install-files.tar`. To print them, run the following command: `sudo tar -O -xvf wazuh-install-files.tar wazuh-install-files/wazuh-passwords.txt`

Step 2

Login into the Wazuh dashboard by entering the https://localhost in a new browser tab.

Click "Advanced..." → Accept the Risk and Continue.



Warning: Potential Security Risk Ahead

Firefox detected a potential security threat and did not continue to **localhost**. If you visit this site, attackers could try to steal information like your passwords, emails, or credit card details.

What can you do about it?

The issue is most likely with the website, and there is nothing you can do to resolve it.

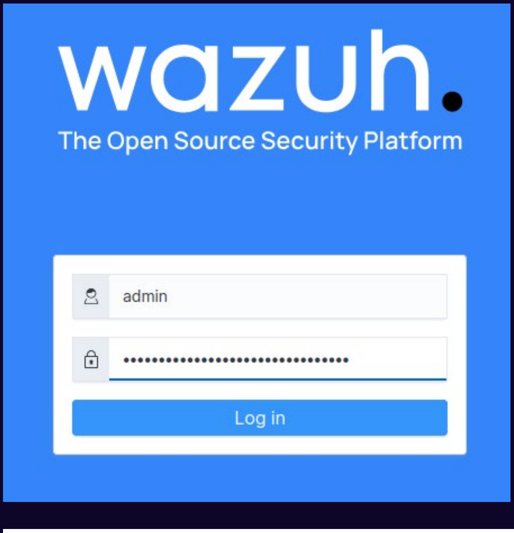
If you are on a corporate network or using antivirus software, you can reach out to the support teams for assistance. You can also notify the website's administrator about the problem.

Someone could be trying to impersonate the site and you should not continue.

Websites prove their identity via certificates. Firefox does not trust localhost because its certificate issuer is unknown, the certificate is self-signed, or the server is not sending the correct intermediate certificates.

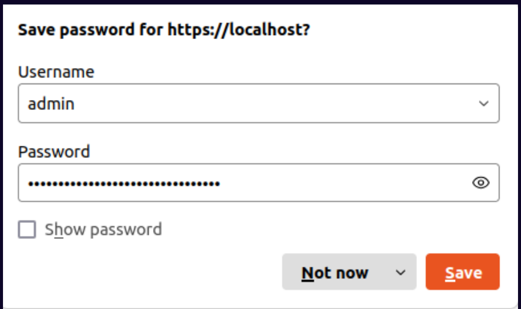
Error code: SEC_ERROR_UNKNOWN_ISSUER

Use the credentials generated to log in. Save the password if you would like.



admin

••••••••••••••••••••••••••••••••



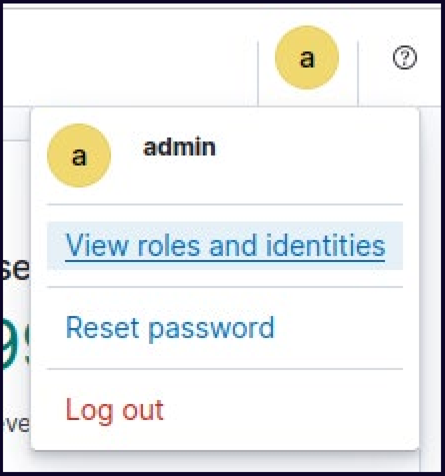
Save password for https://localhost?

Username: admin

Password: ••••••••••••••••••••••••••••••••

□ Show password

You can also choose to reset the password if you would like something more simple.



Deploy Wazuh Agents

Windows [project-x-win-client]

Method 1

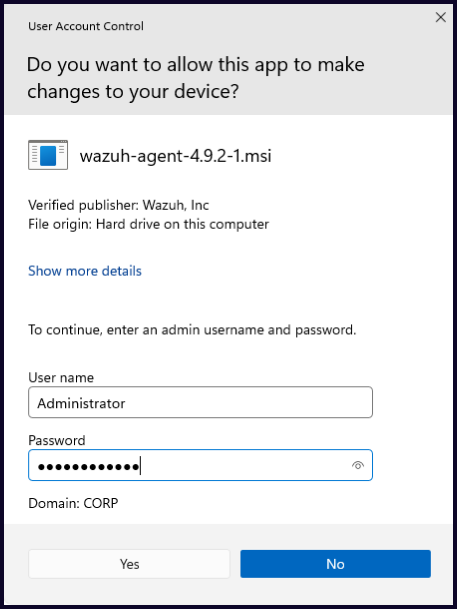
Power on the `[project-x-win-client]` Virtual Machine. Login under the “John Doe” account.

Open a new Microsoft Edge Brower.

Install the Wazuh Windows Installer (https://packages.wazuh.com/4.x/windows/wazuh-agent-4.9.2-1.msi)

Double click the `.msi` file. Accept the License Agreement → “Install”.

Type in Administrator’s username and password.



User Account Control

Do you want to allow this app to make changes to your device?

wazuh-agent-4.9.2-1.msi

Verified publisher: Wazuh, Inc
File origin: Hard drive on this computer

Show more details

To continue, enter an admin username and password.

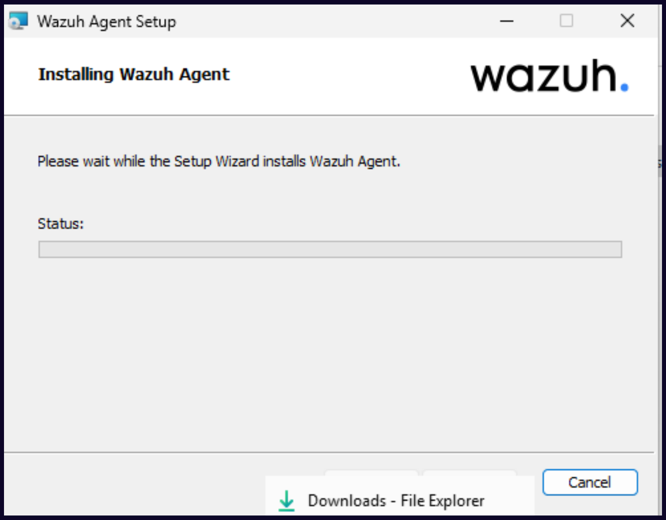
User name: Administrator

Password: ••••••••••••

Domain: CORP

💡 If the Administrator’s password has not been set. Go to the [project-x-dc] VM → Tools → Active Directory Users and Computers → Select the Users Folder → Right-click on Administrator → Reset Password. Set password to @deeboodah1!

Allow the Wazuh agent to install.

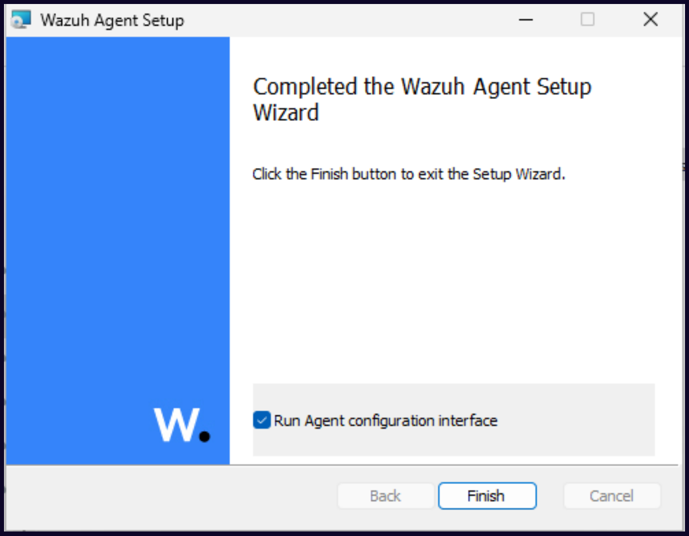


Installing Wazuh Agent

Please wait while the Setup Wizard installs Wazuh Agent.

Status:

Select the checkbox → Re-enter Administrator Username and password.



Completed the Wazuh Agent Setup Wizard

Click the Finish button to exit the Setup Wizard.

☑ Run Agent configuration interface

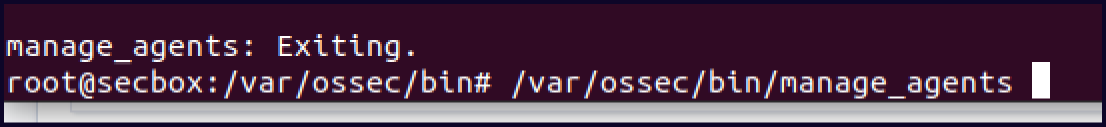
Go to “Terminal”.

Escalate to root account:

```
su root
```

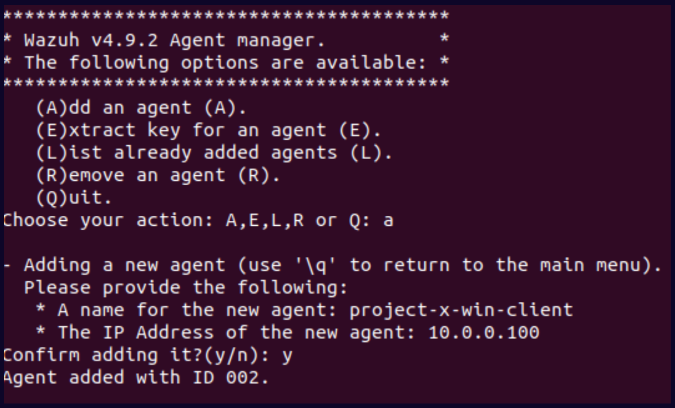
Type:

```
/var/ossec/bin/manage_agents
```



```
manage_agents: Exiting.
root@secbox:/var/ossec/bin# /var/ossec/bin/manage_agents
```

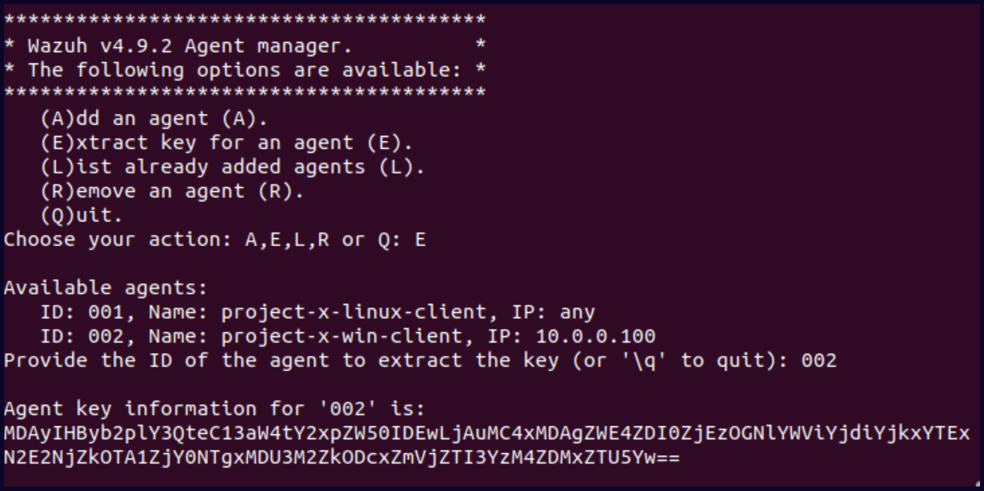
Add new agent with A. Type in the static IP address for `project-x-win-client`.



```
*****************************************
* Wazuh v4.9.2 Agent manager.           *
* The following options are available: *
*****************************************
   (A)dd an agent (A).
   (E)xtract key for an agent (E).
   (L)ist already added agents (L).
   (R)emove an agent (R).
   (Q)uit.
Choose your action: A,E,L,R or Q: a

- Adding a new agent (use '\q' to return to the main menu).
  Please provide the following:
   * A name for the new agent: project-x-win-client
   * The IP Address of the new agent: 10.0.0.100
Confirm adding it?(y/n): y
Agent added with ID 002.
```

Choose “E” to view the agent key. Copy this key.

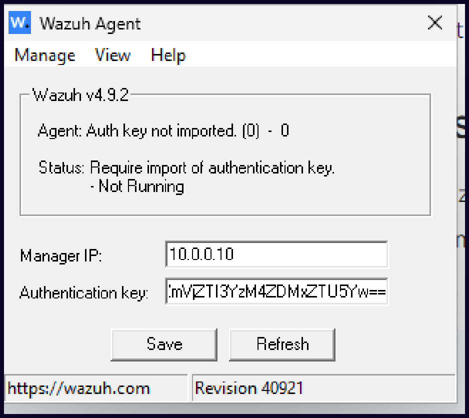


```
*****************************************
* Wazuh v4.9.2 Agent manager.           *
* The following options are available: *
*****************************************
   (A)dd an agent (A).
   (E)xtract key for an agent (E).
   (L)ist already added agents (L).
   (R)emove an agent (R).
   (Q)uit.
Choose your action: A,E,L,R or Q: E

Available agents:
   ID: 001, Name: project-x-linux-client, IP: any
   ID: 002, Name: project-x-win-client, IP: 10.0.0.100
Provide the ID of the agent to extract the key (or '\q' to quit): 002

Agent key information for '002' is:
MDAyIHByb2plY3QteC13aW4tY2xpZW50IDEwLjAuMC4xMDAgZWE4ZDI0ZjEzOGNlYWViYjdiYjkxYTEx
N2E2NjZkOTA1ZjY0NTgxMDU3M2ZkODcxZmVjZTI3YzM4ZDMxZTU5Yw==
```

Navigate back to `project-x-win-client` and add the `project-x-secbox` server’s IP address and the agent authorization key.



Wazuh v4.9.2

Agent: Auth key not imported. (0) - 0

Status: Require import of authentication key.
- Not Running

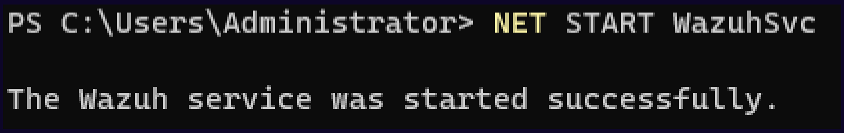
Manager IP: 10.0.0.10

Authentication key: mVjZTI3YzM4ZDMxZTU5Yw==

https://wazuh.com | Revision 40921

Start the Wazuh Agent:

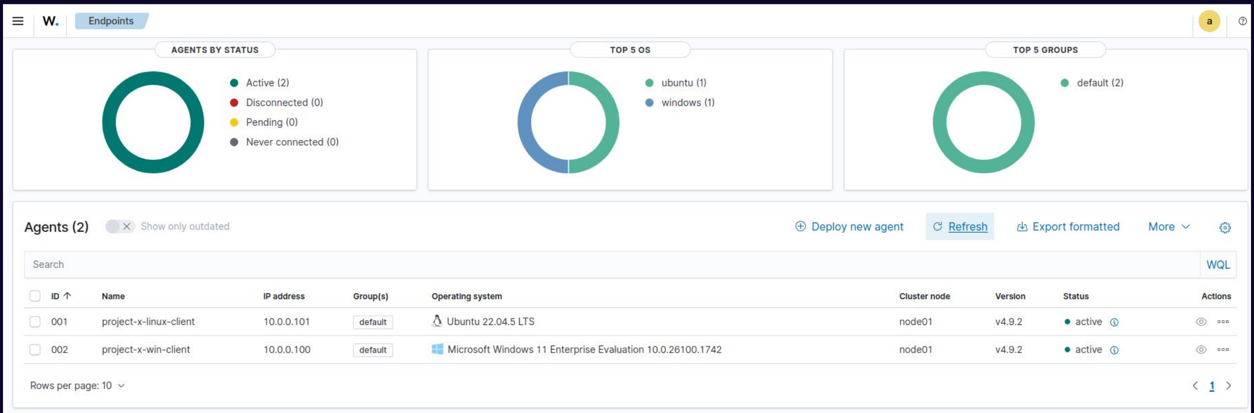
```
NET START WAZUH
```



```
PS C:\Users\Administrator> NET START WazuhSvc

The Wazuh service was started successfully.
```

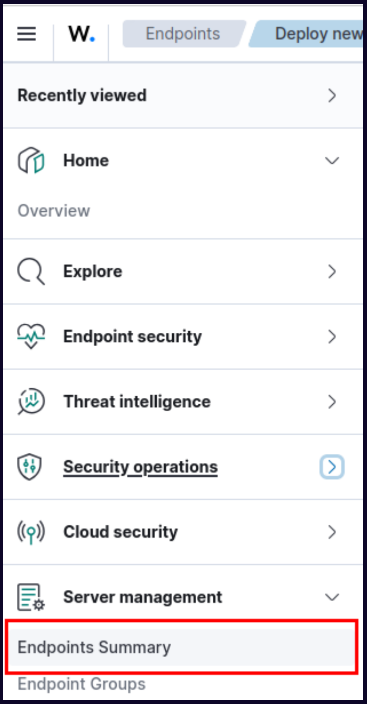
Success!



ID ↑	Name	IP address	Group(s)	Operating system	Cluster node	Version	Status	Actions
001	project-x-linux-client	10.0.0.101	default	Ubuntu 22.04.5 LTS	node01	v4.9.2	● active	
002	project-x-win-client	10.0.0.100	default	Microsoft Windows 11 Enterprise Evaluation 10.0.26100.1742	node01	v4.9.2	● active	

Method 2

Go to “Server Management” → “Endpoint Summary”.



Choose “Deploy new agent”.

Select Windows MSI.

Server Address: 10.0.0.10.

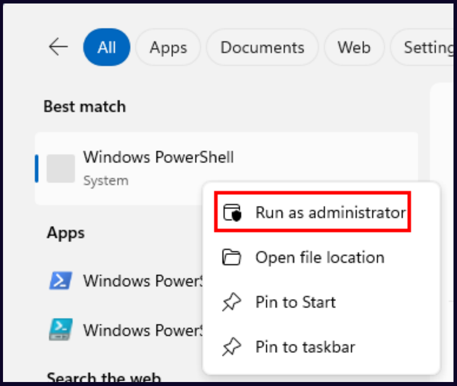
Assign an agent name: project-x-win-client

Groups: default

Copy the command in step 4.

Power on the `[project-x-win-client]` Virtual Machine. Login under the “John Doe” account.

Open new Powershell Session → Right-click “Run as Administrator”.

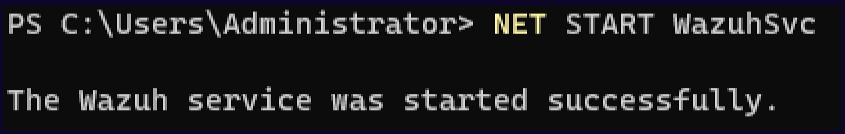


Right-click to paste the command, then run the command:

```
Invoke-WebRequest -Uri
https://packages.wazuh.com/4.x/windows/wazuh-agent-4.9.2-1.msi -
OutFile $env:tmp\wazuh-agent; msiexec.exe /i $env:tmp\wazuh-agent
/q WAZUH_MANAGER='10.0.0.10' WAZUH_AGENT_GROUP='default'
WAZUH_AGENT_NAME='project-x-win-client'
```

Start the Wazuh Agent:

```
NET START WAZUH
```



```
PS C:\Users\Administrator> NET START WazuhSvc

The Wazuh service was started successfully.
```

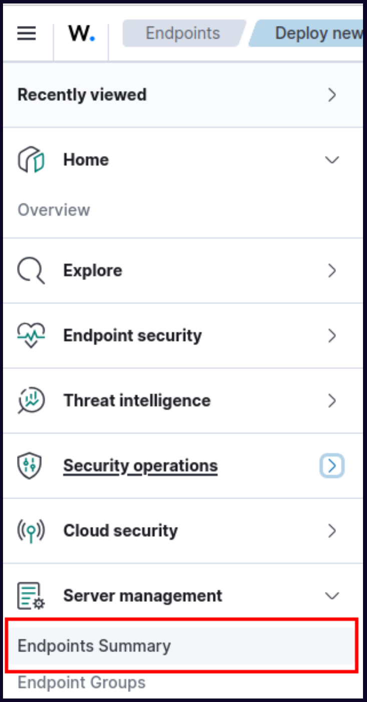
Domain Controller [project-x-dc]

Repeat the above steps. For the WAZUH_AGENT_NAME, change to project-x-dc.

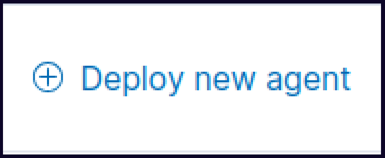
```
Invoke-WebRequest -Uri
https://packages.wazuh.com/4.x/windows/wazuh-agent-4.9.2-1.msi -
OutFile $env:tmp\wazuh-agent; msiexec.exe /i $env:tmp\wazuh-agent
/q WAZUH_MANAGER='10.0.0.10' WAZUH_AGENT_GROUP='default'
WAZUH_AGENT_NAME='project-x-dc'
```

Linux [project-x-linux-client]

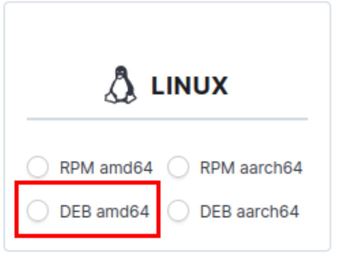
Go to “Server Management” → “Endpoint Summary”.



Choose “Deploy new agent”.



Select DEB amd64.



Server Address: 10.0.0.10.

Assign an agent name: project-x-linux-client

Groups: default

Copy the command in step 4.

Power on the [project-x-win-client] Virtual Machine. Login under the “Administrator” account.

Open a new terminal → enter the command copied from step 4.

```
sudo wget https://packages.wazuh.com/4.x/apt/pool/main/w/wazuh-
agent/wazuh-agent_4.9.2-1_amd64.deb && sudo
WAZUH_MANAGER='10.0.0.10' WAZUH_AGENT_GROUP='default'
WAZUH_AGENT_NAME='project-x-linux-client' dpkg -i ./wazuh-
agent_4.9.2-1_amd64.deb
```

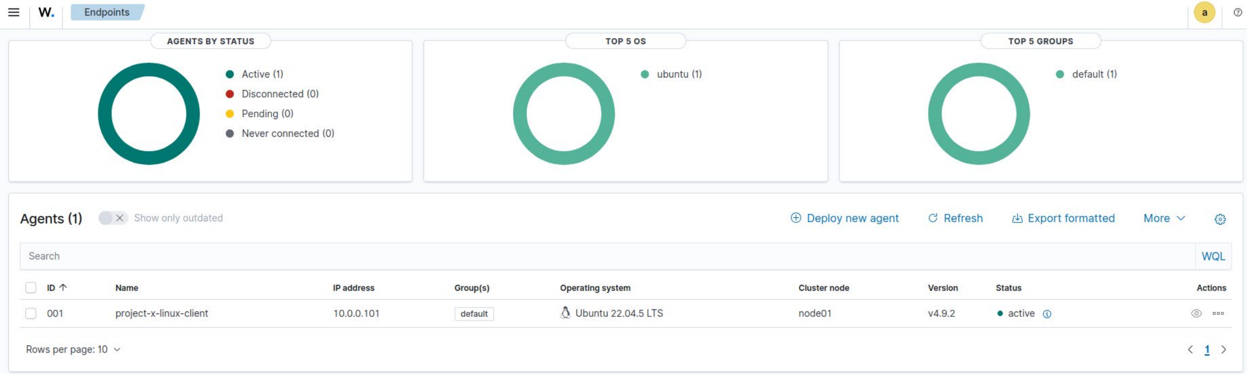
Enter in the following systemctl commands:

```
sudo systemctl daemon-reload
```

```
sudo systemctl enable wazuh-agent
```

```
sudo systemctl start wazuh-agent
```

Success!

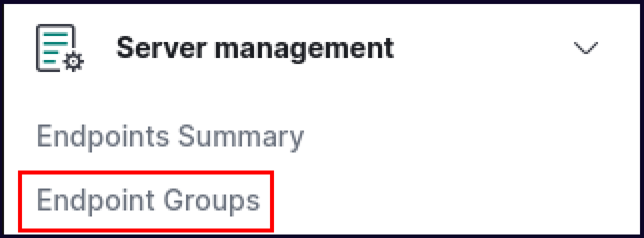


□	ID ↑	Name	IP address	Group(s)	Operating system	Cluster node	Version	Status	Actions
□	001	project-x-linux-client	10.0.0.101	default	Ubuntu 22.04.5 LTS	node01	v4.9.2	● active	

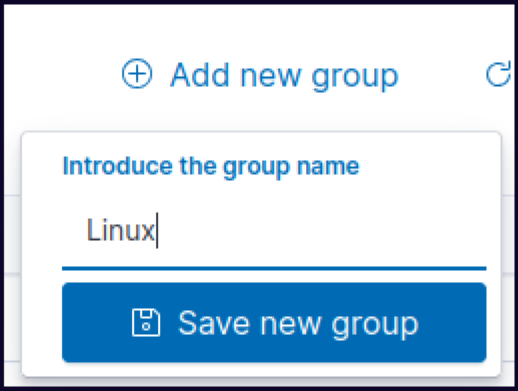
Create Agent Groups

Let’s create two groups based on the operating system type.

Navigate to “Server management” → “Endpoint Groups”.



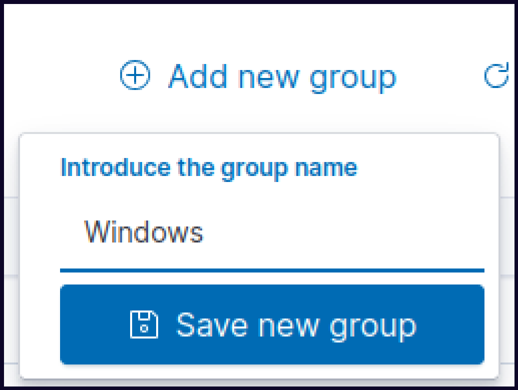
Select “Add new group” → Name the group “Linux”.



Introduce the group name

Linux

Repeat the same steps for Windows.



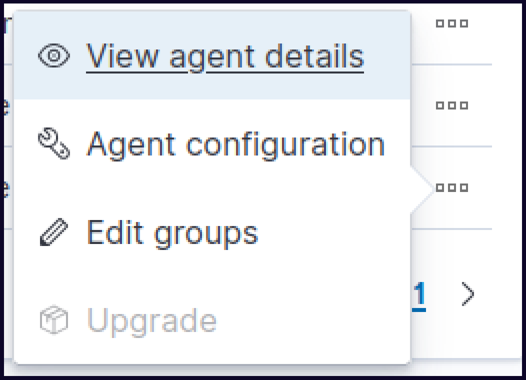
Introduce the group name

Windows

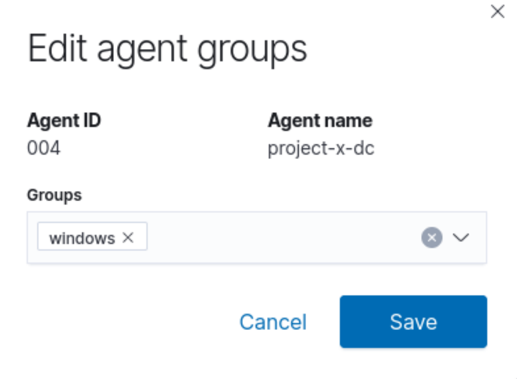
Navigate to “Server management” → “Endpoint Summary”.

Select [project-x-dc] agent.

Select the triple dot icon → “Edit groups”.



Select the “Windows” group.



Edit agent groups

Agent ID
004

Agent name
project-x-dc

Groups
windows ×

Repeat the same steps for [project-x-win-client] and [project-x-linux-client]. Add the Linux client to the Linux group.

Onboard Custom Logs

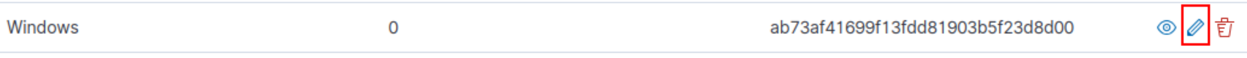
Wazuh offers a variety of default logs that are automatically ingested into the Wazuh indexer. This is a great place to start.

Based on our upcoming Attack/Defend scenario, we aim to expand the types of logs collected by both Linux and Windows agents to gather a more comprehensive dataset of log activity.

Let's edit the *agent.conf* file located in the Linux and Windows Wazuh groups. Configuration statements (XML declarations) will apply to all endpoints in the group.

Windows Group

Navigate to "Server management" → "Endpoint Groups" → Select the Pencil Icon next to the Windows Group. The *agent.conf* editor will appear.



Windows	0	ab73af41699f13fdd81903b5f23d8d00

Add the following to the *agent.conf* file, then select "Save".

```
<agent_config>
  <!-- Shared agent configuration here -->
  <localfile>
    <location>Security</location>
    <log_format>eventchannel</log_format>
  </localfile>
  <localfile>
    <location>Application</location>
    <log_format>eventchannel</log_format>
  </localfile>
```

```
</agent_config>
```

💡 Here we are onboarding the Windows Security and Application Event logs. These are default log sources used to collect host-based activity.

Linux Group

Navigate to “Server management” → “Endpoint Groups” → Select the Pencil Icon next to the Linux Group.

Add the following to the *agent.conf* file, then select “Save”.

```
  <agent_config>
    <localfile>
      <log_format>syslog</log_format>
      <location>/var/log/auth.log</location>
    </localfile>
    <localfile>
      <log_format>syslog</log_format>
      <location>/var/log/secure</location>
    </localfile>
    <localfile>
      <log_format>audit</log_format>
      <location>/var/log/audit/audit.log</location>
    </localfile>
</agent_config>
```

💡 Here we are onboarding /var/log/auth.log /var/log/secure and /var/log/audit/audit.log. These are log sources that can be used to collect host-based activity.

📷 Take Snapshot

👉 There will be additional configurations being made during the “Attack Scenario” sections. Highlighted below are the configurations that are made during the “Attack Scenario”. These can be completed right now or during the Attack Scenario sections.