Penetration Test Workshop (CSE3157)

Finding Vulnerabilities with nessus

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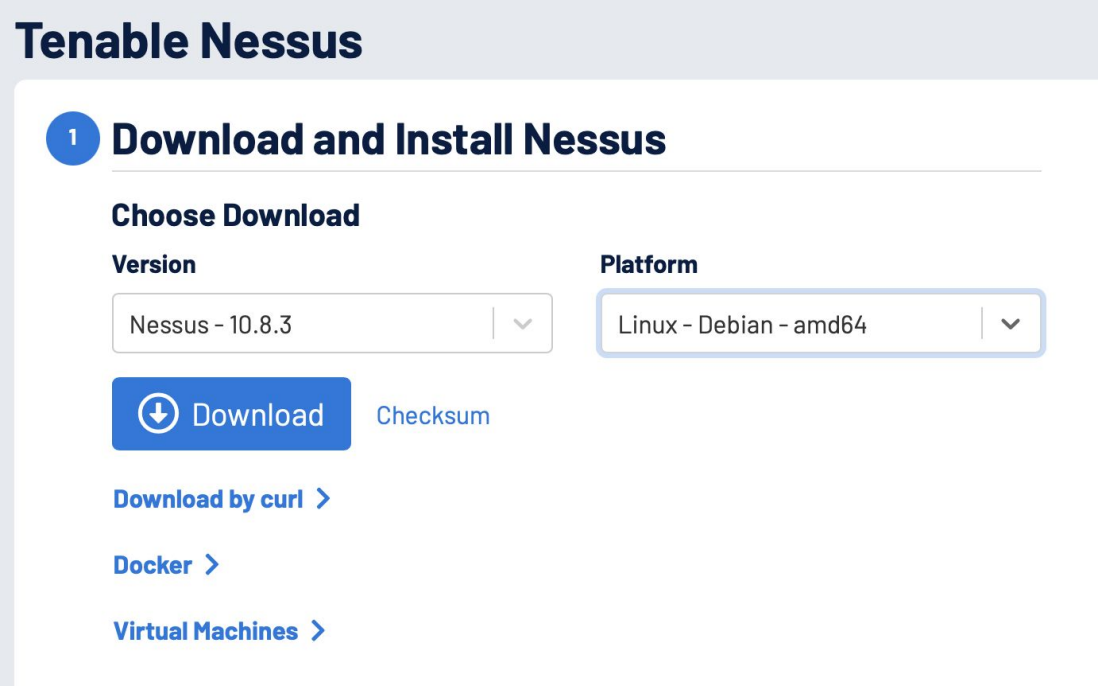
Select version and platform, for your case it should be Linux Debian-amd64 because kali in debian based linux and you have amd processor



Installation and Open

Install

sudo su dpkg -i <nessus_package_name>.deb

open

/bin/systemctl/ start nessusd.service

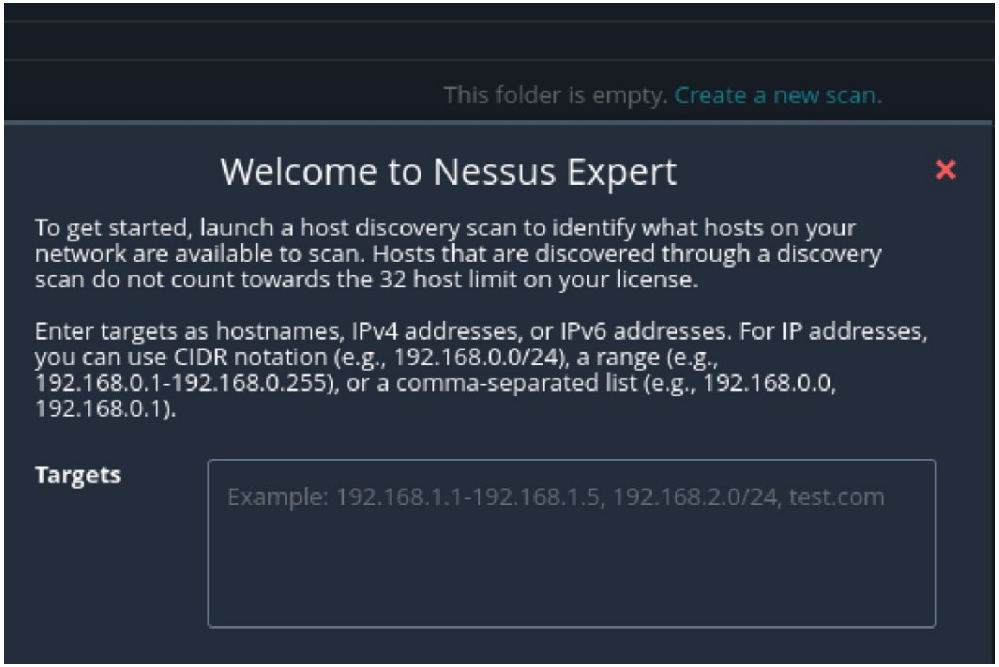
Account Configuration:

Offline

trial version for 7 days

Configure Nessus

- After successful login go to ‘settings’.
- Select ‘update plugins’.
- Click ‘save’.
- Wait until plugins are downloaded. Once the plugin download is done, you should get below message.



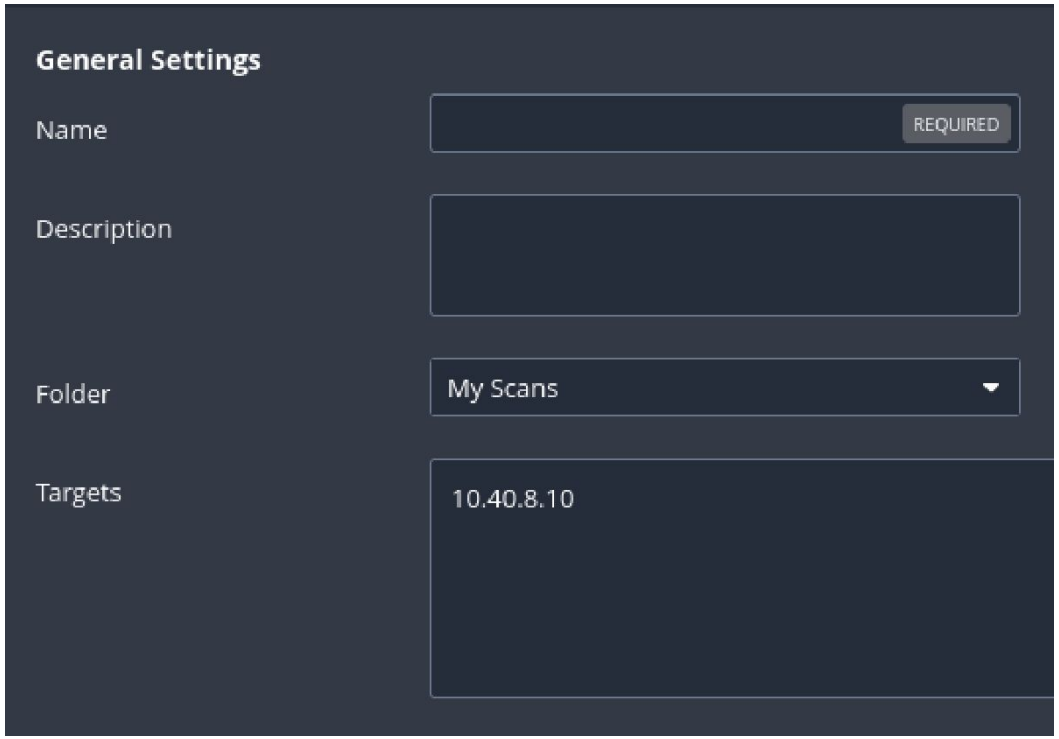
Start Scanning

Step 1: go to 'New Scan'.

Step 2: Select 'Basic Network Scan'.

Step 3: Enter Name Description

Step 4: Enter Target IP.



Analyzing report on target IP

CRITICAL	HIGH	MEDIUM	LOW	INFO
2	13	14	2	34

Vulnerabilities Total: 65

SEVERITY	CVSS V3.0	VPR SCORE	EPSS SCORE	PLUGIN	NAME
CRITICAL	9.8	8.9	0.9743	133845	Apache Tomcat 9.0.0.M1 < 9.0.31 multiple vulnerabilities
CRITICAL	9.8	9.4	0.0004	213078	Apache Tomcat 9.0.0.M1 < 9.0.98 multiple vulnerabilities
HIGH	7.5	6.7	0.0049	132419	Apache Tomcat 9.0.0.M1 < 9.0.30
HIGH	7.5	4.4	0.0096	138098	Apache Tomcat 9.0.0.M1 < 9.0.36
HIGH	7.5	3.6	0.9123	138591	Apache Tomcat 9.0.0.M1 < 9.0.37 multiple vulnerabilities
HIGH	7.5	4.4	0.0029	144050	Apache Tomcat 9.0.0.M1 < 9.0.40 multiple vulnerabilities
HIGH	7.5	5.9	0.002	147164	Apache Tomcat 9.0.0.M1 < 9.0.43 multiple vulnerabilities

Analyzing report on target IP

Based on 3 parameters severity of vulnerabilities can be understood:

1. **CVSSv3 (Common Vulnerability Scoring System v3).**
2. **VPR (Vulnerability Priority Rating).**
3. **EPSS (Exploit Prediction Scoring System)**

Analyzing report on target IP

CVSSv3 (Common Vulnerability Scoring System v3)

- **Purpose:** Measures the **severity** of a vulnerability.
- **Score Range: 0.0 – 10.0** (Higher score = Higher severity).
- **Components:**
  - **Base Score:** Represents the intrinsic qualities of a vulnerability (e.g., attack vector, complexity, etc.).
  - **Temporal Score:** Reflects factors like exploit code availability or remediation efforts.
  - **Environmental Score:** Considers specific security controls or impacts in your environment.

Example CVSSv3 Score Breakdown:

- **Low:** 0.1 – 3.9
- **Medium:** 4.0 – 6.9
- **High:** 7.0 – 8.9
- **Critical:** 9.0 – 10.0

Best for understanding the technical impact and exploitability of a vulnerability.

Analyzing report on target IP

2. VPR (Vulnerability Priority Rating)

- **Purpose:** Provides a **dynamic risk score** based on real-world threat intelligence.
- **Score Range: 0.0 – 10.0** (Higher score = Higher risk).
- **Factors Considered:**
  - Age of the vulnerability.
  - Exploit code availability and complexity.
  - Active exploitation in the wild.
  - Popularity among threat actors.

Key Benefit: VPR adjusts over time as new threat intelligence emerges, making it ideal for prioritizing threats that pose immediate risks.

Analyzing report on target IP

3. EPSS (Exploit Prediction Scoring System)

- **Purpose:** Predicts the **likelihood** that a vulnerability will be exploited in the next 30 days.
- **Score Range: 0.0 – 1.0** (Closer to 1 = Higher chance of exploitation).
- **Driven by Data:** Uses machine learning models analyzing data from real-world exploits, threat intelligence feeds, and CVE metadata.

Key Benefit: EPSS is highly effective for understanding the **probability of exploitation**, even for low-severity vulnerabilities.

When to Use Each Score

- **CVSSv3:** For understanding technical severity and potential impact.
- **VPR:** For prioritizing urgent threats that require immediate action.
- **EPSS:** For identifying vulnerabilities that are likely to be exploited soon, regardless of their CVSS score.

Analyzing report on target IP

Vulnerabilities 1 : Apache Tomcat Version 9.0.0.M1 < 9.0.31

(risk level : **Critical**)

Vulnerabilities 2 : SMB Signing (risk level : **Medium**)

Vulnerabilities in apache Tomcat 9.0.0.M1 < 9.0.31

1. CVE-2020-1938 (Ghostcat)

- **Type:** File Inclusion / Directory Traversal
- **CVSSv3 Score: 9.8 (Critical)**
- **Impact:** Allows remote attackers to read or include files on the server by exploiting the **AJP (Apache JServ Protocol)** connector.
- **Affected Component:** AJP Connector enabled by default on port **8009**.

2. CVE-2020-9484

- **Type:** Deserialization of Untrusted Data
- **CVSSv3 Score: 8.1 (High)**
- **Impact:** Allows attackers to execute arbitrary code via crafted data in Apache Tomcat's **PersistentManager** when using **FileStore.**

3. CVE-2019-17563

- **Type:** Improper Handling of Malformed Headers
- **CVSSv3 Score: 7.0 (High)**
- **Impact:** May allow attackers to bypass security filters or access restricted resources.

metasploit script on Tomcat 9.0.0.M1 < 9.0.31

- This information is for **educational** and **authorized penetration testing** only.
- Exploiting systems without permission is **illegal**

use exploit/multi/http/tomcat_ghostcat

SMB Signing not required

When SMB signing is disabled:

- **Man-in-the-Middle (MitM) Attacks:** An attacker can intercept and manipulate SMB traffic without being detected.
- **Session Hijacking:** Attackers can inject malicious payloads or impersonate legitimate users.
- **Data Integrity Risks:** Without SMB signing, data may be modified in transit without the client or server detecting the tampering.

MEDIUM	5.3	1.4	0.1554	152182	Apache Tomcat 9.0.0.M1 < 9.0.48
MEDIUM	5.3	6.7	0.8556	182809	Apache Tomcat 9.0.0.M1 < 9.0.81 multiple vulnerabilities
MEDIUM	5.3	-	-	12085	Apache Tomcat Default Files
MEDIUM	5.3	-	-	57608	SMB Signing not required
MEDIUM	4.3	1.4	0.0012	141446	Apache Tomcat 9.0.0.M1 < 9.0.38
MEDIUM	4.3	2.2	0.0013	173251	Apache Tomcat 9.0.0.M1 < 9.0.72
LOW	3.7	1.4	0.0015	159464	Apache Tomcat 9.0.0.M1 < 9.0.62 Spring4Shell CVE-2021-439

Thank You