



Assignment 1: T-Pot: A Multi-Honeypot Platform

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Abstract

A honeypot is a bait or fake production machine / virtual machine that is configured with vulnerable services which are placed outside or inside of the network.

In computer security terms, honeypots are basically a bait for hackers. It's a baited system that lures all sort of attackers from around the world and make them perform their attacks against it. Honeypots are quite helpful in the computer security space as for some companies who decide to create honeypots, they can set them up and be able to protect their main machines as attackers will focus on their pots instead of where the sensitive data is being stored.

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1. Introduction

Honeypot is a security mechanism which is setup to detect any suspicious activities coming from attackers located all around the world, it is a way of gathering all sort of tactics which attackers can use, this can be highly beneficial as for a company, they can patch all these methods and be able to avoid all these attacks before the hackers reaches them.

In this assignment the task that was given out was to research and deploy a T-Pot within a cloud and leave it running and gather all attacker's data for an entire month.

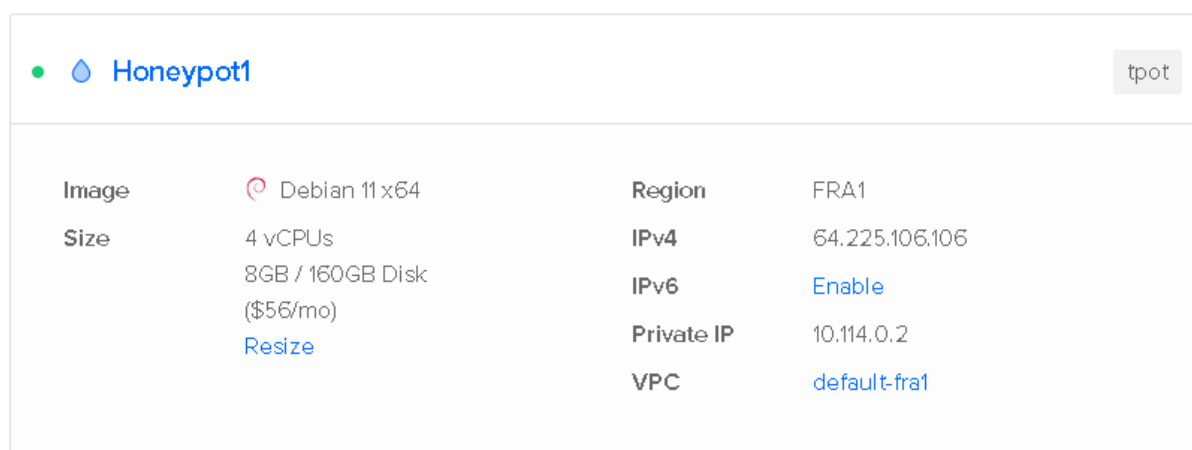
1.1 Droplet (T-Pot) Setups

To launch the T-Pots, a cloud had to be chosen to go with, the cloud which was selected in throughout this assignment was DigitalOcean. DigitalOcean was selected as it was recommended in the brief, it also offered \$200 free credits to use instead of paying out of our own pockets.

When the droplets were setup, they had to be selected to different zones around the world to see which area gets attacked more. The final decision was launching a T-Pot in Frankfurt, Bangalore and New York as they were extremely set apart from each other which will also lead the results to be more accurate.

1.1.1 Frankfurt T-Pot Droplet

A Frankfurt droplet was created, and T-Pot was manually installed on it, here are some images to show the details of the created droplet.



The screenshot shows the configuration details for a DigitalOcean droplet named 'Honeypot1'. The configuration is as follows:

Image	Debian 11 x64	Region	FRA1
Size	4 vCPUs 8GB / 160GB Disk (\$56/mo) Resize	IPv4	64.225.106.106
		IPv6	Enable
		Private IP	10.114.0.2
		VPC	default-fra1

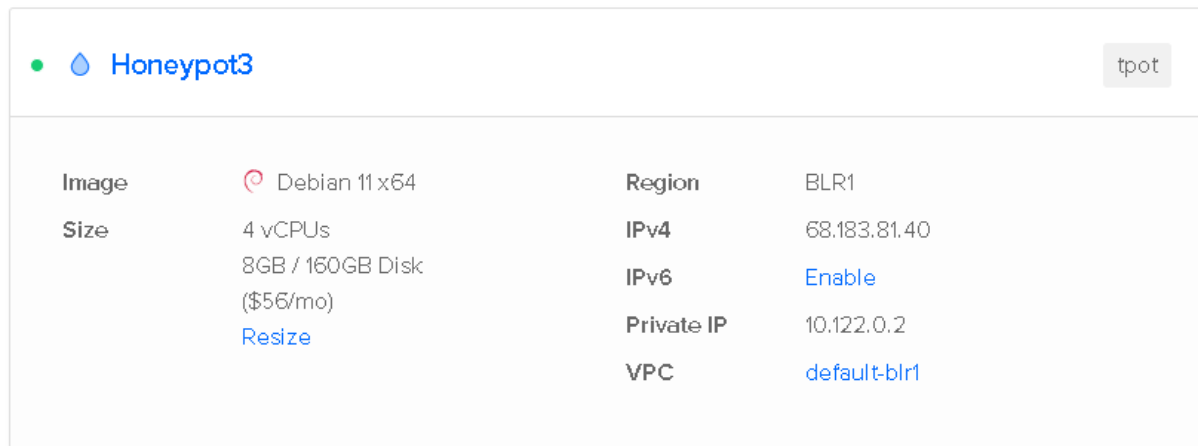
Figure 1 Honeypot1 Frankfurt

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These were the specifications that were selected as it was recommended in the original T-Pot GitHub, if you decided to go with a lower spec system, the T-Pots will load insanely slow and won't function properly.

1.1.2 Bangalore T-Pot Droplet



Honeypot3 tpot			
Image	Debian 11 x64	Region	BLR1
Size	4 vCPUs 8GB / 160GB Disk (\$56/mo) Resize	IPv4	68.183.81.40
		IPv6	Enable
		Private IP	10.122.0.2
		VPC	default-blr1

Figure 2 Honeypot3 Bangalore

It was also a requirement to launch the droplet with an Operating System of Debian 11 x64 as it was recommended on their GitHub. Debian 12 was tested and unfortunately it couldn't install as its missing framework.

Requirements to create the ISO image:

- Debian 11 as host system (others *may* work, but *remain* untested)

Figure 3 Operating System Requirement

1.1.3 New York T-Pot Droplet

Finally, here is the information to the final droplet located in New York.

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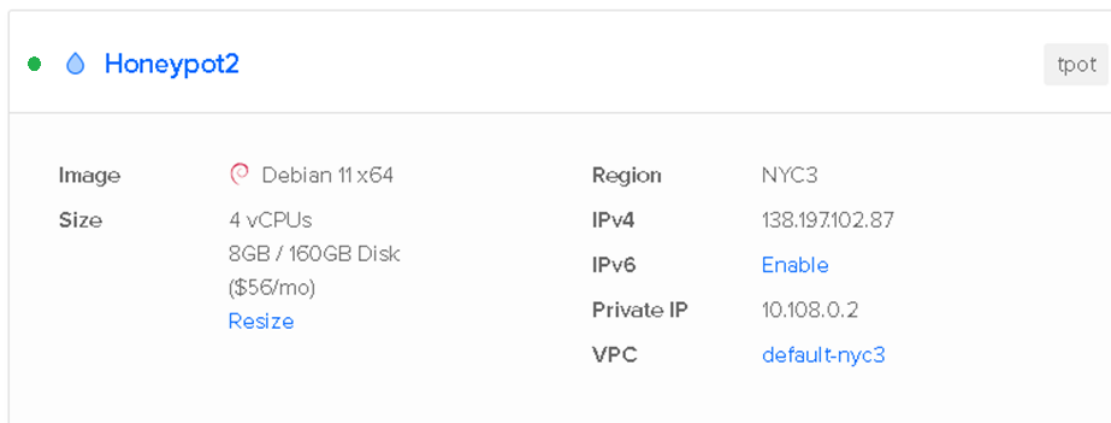


Figure 4 Honeypot2 New York

Droplet	Locations	IPV4
Honeypot1	Frankfurt (Germany)	64.225.106.106
Honeypot2	New York (United States)	138.197.102.87
Honeypot3	Bangalore (India)	68.183.81.40

2. Which Honeypots were used

T-Pot is an all-in-one multi-Honeypot Platform, so instead of installing individually each honeypot onto a machine, all you need is to download T-Pot from its GitHub page and it comes along with all honeypots included then you can manually edit the `tpot.yml` file and choose which honeypot services you want running and not.

2.1 Suricata Honeypot

Suricata is an open-source Network IDS (Intrusion Detection and Prevention System) and a Network Security Monitoring Engine. Its focus is to monitor network traffic for any suspicious activities and attacks, it provides real-time alerts and prevention options.

2.2 Cowrie Honeypot

Cowrie is a recommended honeypot to be used as its purpose is to track SSH and Telnet, it also logs brute force attacks and shell activities by attackers.

2.3 Dionaea Honeypot

Dionaea honeypot is an embedded python script that used libemu to be able to detect shellcodes, supporting ipv6 and tls.

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2.4 Ddospot Honeypot

DDoSPot is a honeypot that can track and monitor DDOS (Distributed Denial of Service) attacks.

3. Analysis of gathered data

In this section, all the data that has been gathered over the space of one month will be published here, it will highlight the main data such as which countries attacked most, top attacking IP, different types of credentials used for the attempted logins better said brute force attacks, which honeypot performed best, the remaining data will be displayed further in this document.

3.1 Total Attacks towards each droplet

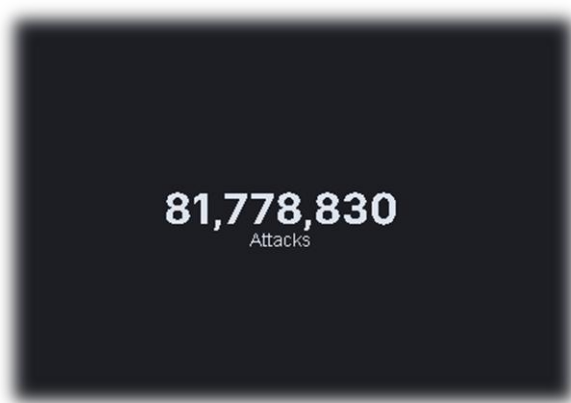


Figure 5 Total Attacks towards Bangalore

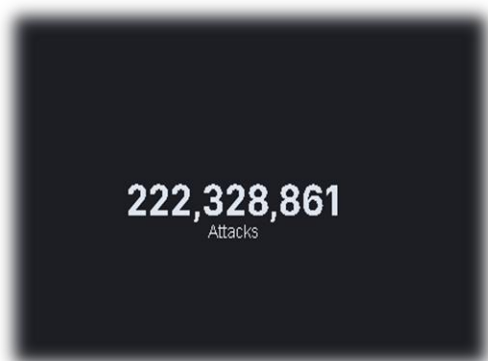


Figure 6 Total Attacks towards New York

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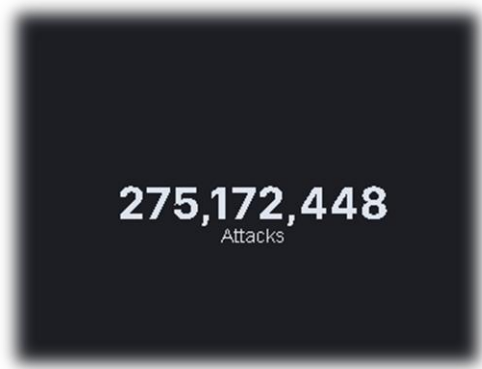


Figure 7 Total Attacks towards Frankfurt

After one month has passed, it shows that Frankfurt was the droplet which got attacked the most compared to the others, the reason for this is only in relation with the traffic patterns whereas some regions may experience higher levels of scanning and attempts of attacks due to the concentration of attackers or automated bots. Another reason could be that automated bots have some set IP ranges for vulnerabilities, so that means that it possibly detected more threats on the Frankfurt IP compared to Bangalore and New York.

3.2 Top Country Attacks

Bangalore

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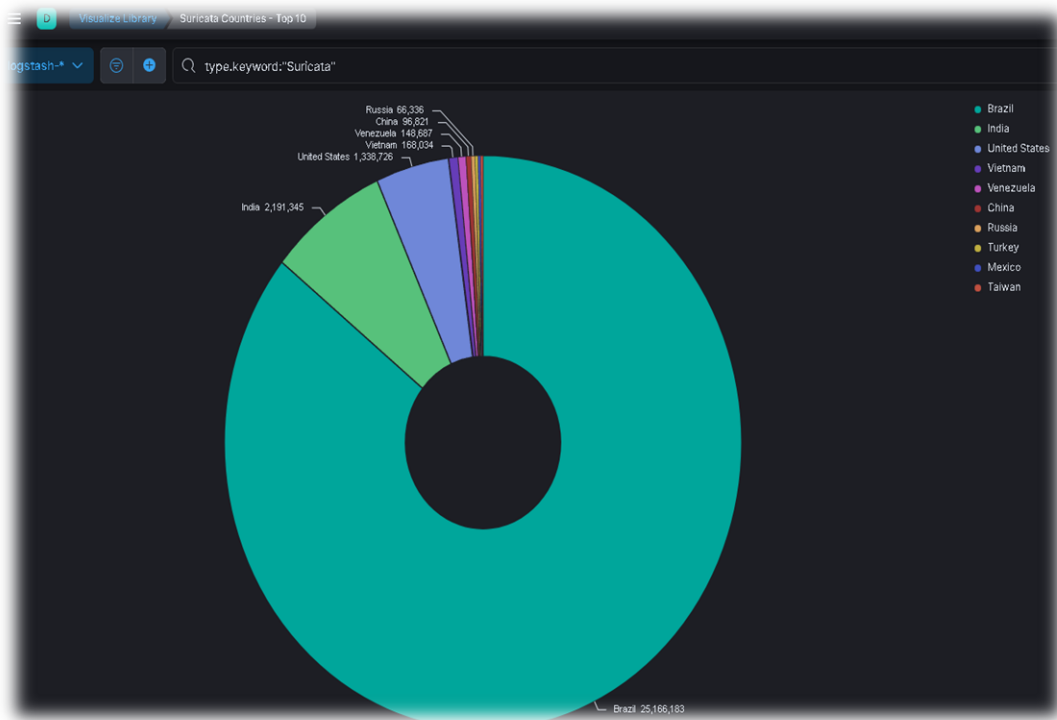


Figure 8 Top Country Attacks Bangalore

New York



Figure 9 Top Country Attacks New York

Frankfurt

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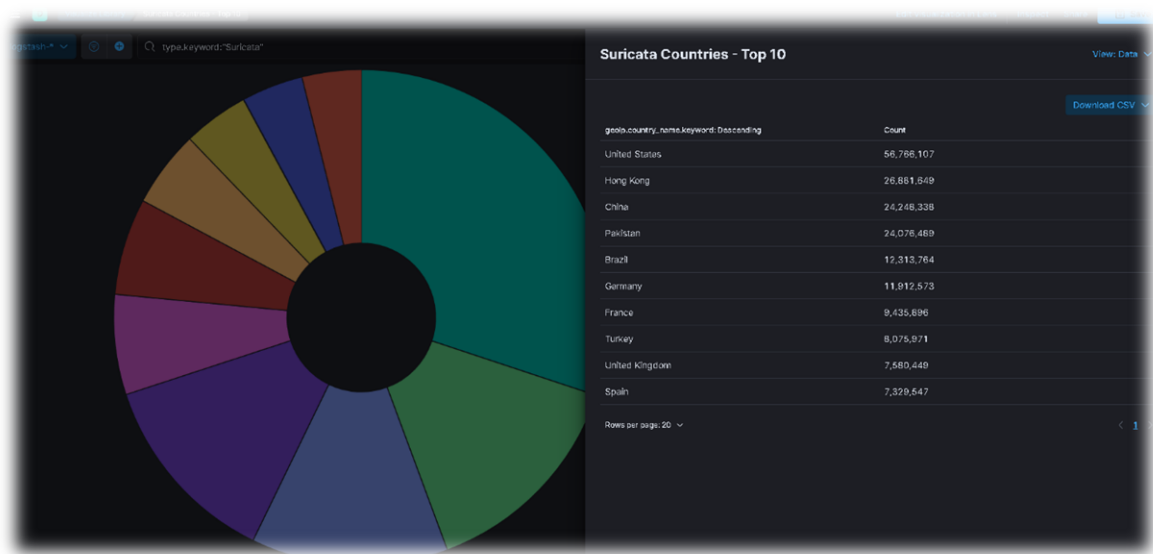


Figure 10 Top Country Attacks Frankfurt

Country	Number of Attacks
United States	97,640,604
Pakistan	65,148,072
Brazil	50,754,969
China	32,527,107
Hong Kong	26,816,649

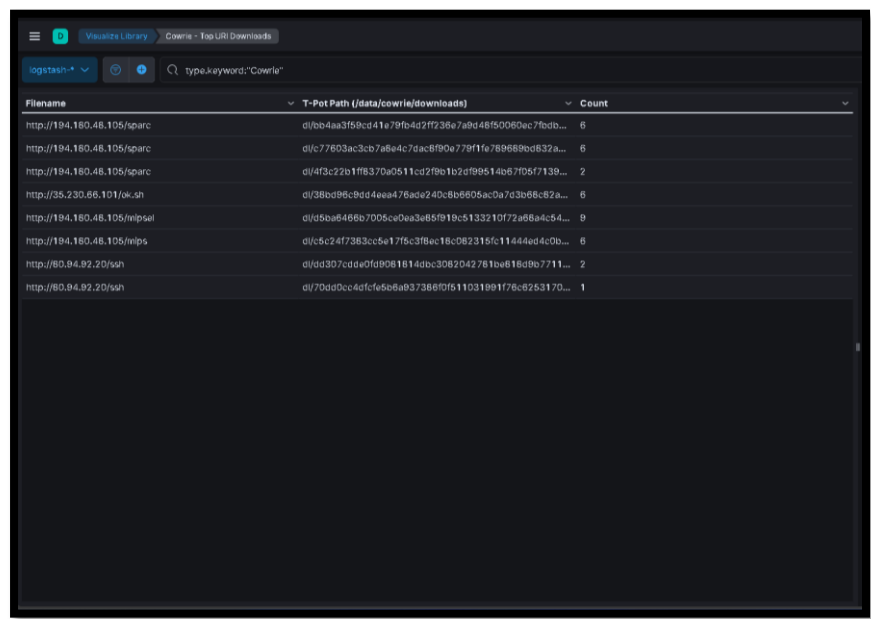
The top country that has attacked the most was America; however, it does not mean that it was America itself as attackers could either have zombies located all around the world or even easier, the attacker could use a VPN on the attacking machines.

3.3 Cowrie Top URL Downloads

Frankfurt

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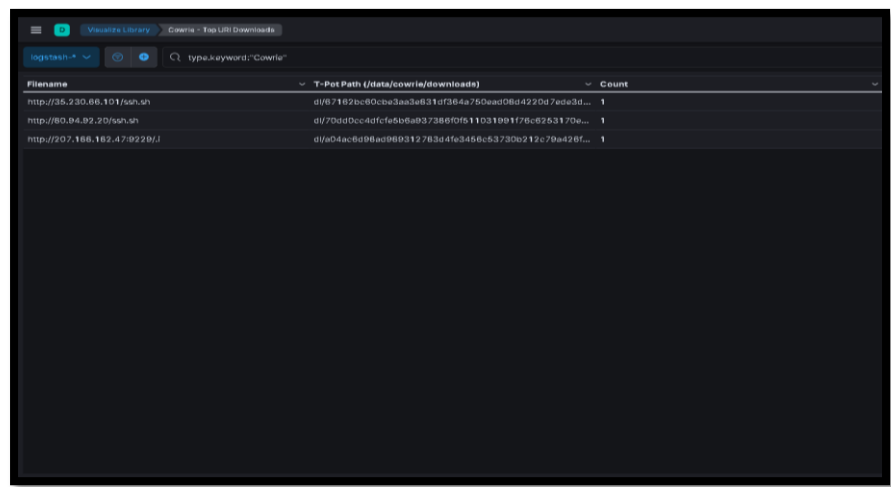


The screenshot shows the T-Pot interface with the 'Cowrie - Top URI Downloads' tab selected. A search bar contains the keyword 'Cowrie'. The table below lists the top 8 download URLs and their counts.

Filename	T-Pot Path (/data/cowrie/downloads)	Count
http://194.180.48.105/sparc	d1/bb4aa3f59cd41e79fb4d2f7236e7a9d48f50060ec7f0db...	6
http://194.180.48.105/sparc	d1/c77803ac3cb7a8e4c7dac6f90e779f1fe789689ed832a...	6
http://194.180.48.105/sparc	d1/4f3c22b1f8370a0511cd2f9e1b2d99514b57f05f7139...	2
http://35.230.66.101/ok.sh	d1/38b096c8dd4ee476ade240c8b6605ac0a7c3b66c82a...	6
http://194.180.48.105/mipsel	d1/d5ba6486b7006ce0aa3e85f919c5133210f72a86a4c54...	9
http://194.180.48.105/mips	d1/c5c24f7383cfe17f6c3f6ec18c082315fc11444ed4c0b...	6
http://80.94.92.20/ssh	d1/qd307cdde0fd9061614dbcc3082042761be816d9e7711...	2
http://80.94.92.20/ssh	d1/70dd0cc4d0cfef5b6a937386f0f511031991f76c6263170...	1

Figure 11 Frankfurt TOP URL

New York



The screenshot shows the T-Pot interface with the 'Cowrie - Top URI Downloads' tab selected. A search bar contains the keyword 'Cowrie'. The table below lists the top 3 download URLs and their counts.

Filename	T-Pot Path (/data/cowrie/downloads)	Count
http://35.230.66.101/ssh.sh	d1/87182bc80c0b3aa3e831d7364a750ead08d4220d7ede3d...	1
http://80.94.92.20/ssh.sh	d1/70dd0cc4d0cfef5b6a937386f0f511031991f76c6263170...	1
http://207.186.182.47/922b/i	d1/a04ac6d98ad980312783d4fe3456c53730b212c79a426f...	1

Figure 12 New York TOP URL

Bangalore

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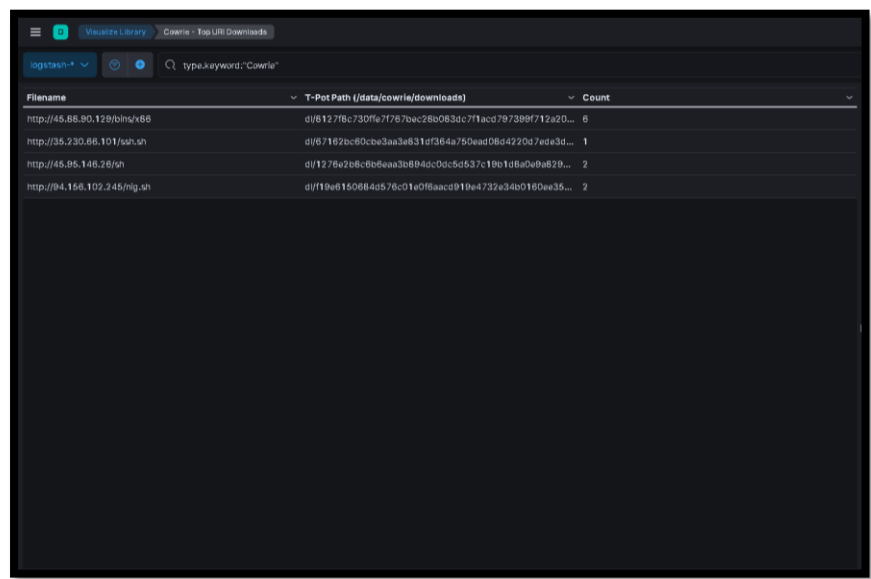


Figure 13 Bangalore TOP URL

The first URL that was taken into investigation with the use of VirusTotal was from Bangalore, the selected URL was <http://45.88.90.129/bins/x86> . This URL was selected as it had the highest count compared to the others.

Here are the results after the URL was entered and scan through VirusTotal:

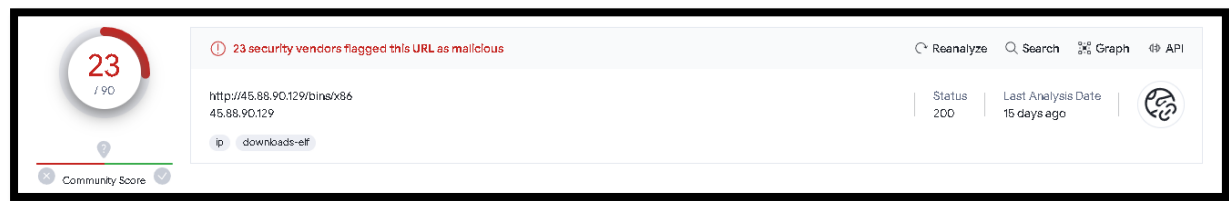


Figure 14 VirusTotal Result

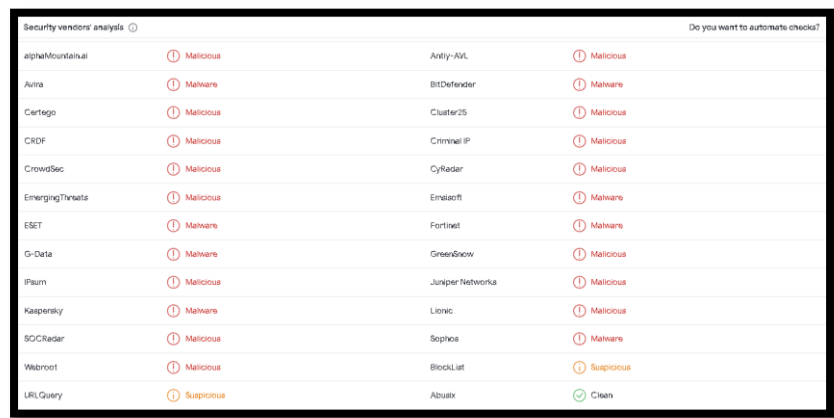


Figure 15 VirusTotal Contained Malware

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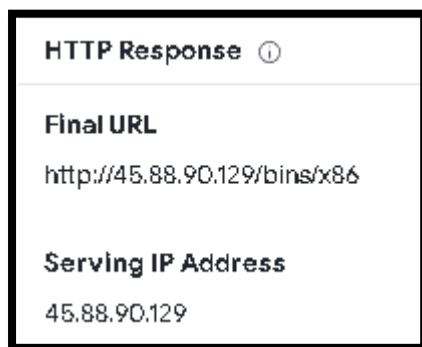


Figure 16 URL IP Track

After the IP was placed into AbuseIPDB, it showed that the IP was 100% Abuse and was report highly number of times by users. It shows that it comes from a Hosting Provider, this could mean that possibly a system within the Hosting Providers got infected and is now being used as an attacker.

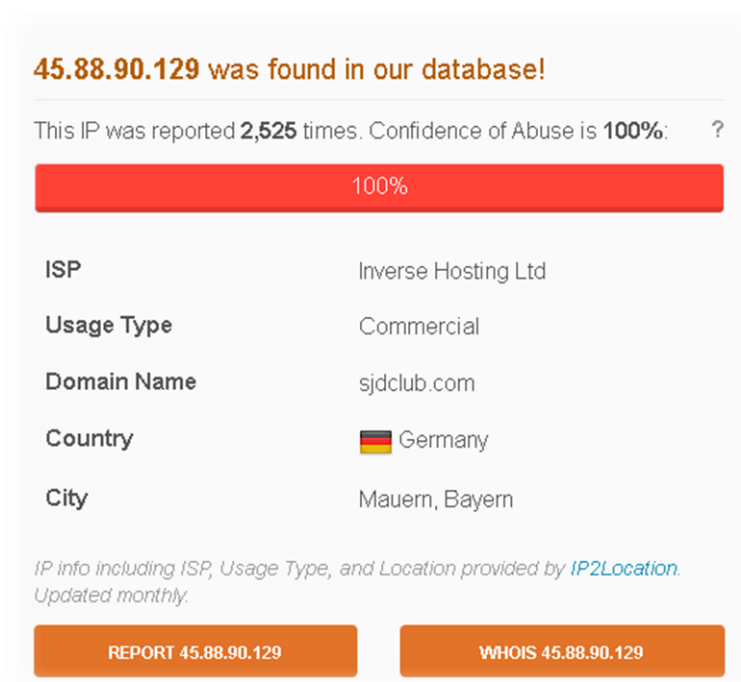


Figure 17 AbuseIPDB Result

Now moving onto the New York URL Download, it only shows 3 URLs and each of them have only a count of 1. The URL which was chosen to investigate through Virus Total was <http://35.230.66.101/ssh.sh> . This URL was chosen as we can see that the attacker included a SSH file in the URL, this means that if the machine runs the URL, it will install a malicious virus which can either allow the attacker to gain control to the machine or even just installing a malicious malware on it. The URL was noted and inserted into Virus Total and here are the results:

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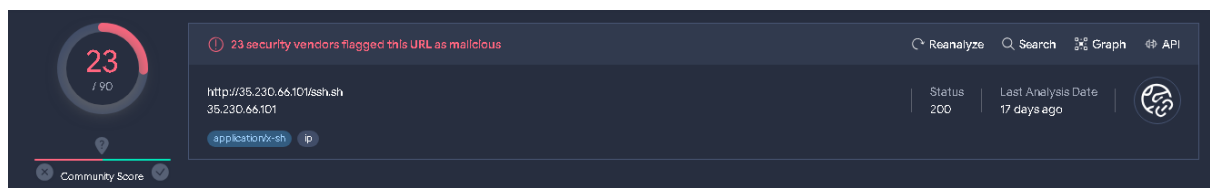


Figure 18 VirusTotal Result NY

Security vendors' analysis		Do you want to automate checks?	
Antiy-AVL	Malicious	Avira	Malware
BitDefender	Malware	Certego	Malicious
CINIS Army	Malicious	Cluster25	Malicious
CMC Threat Intelligence	Malware	CRDF	Malicious
Criminal IP	Malicious	CrowdSec	Malicious
CyRadar	Malicious	EmergingThreats	Malicious
ESET	Malware	Fortinet	Malware
G-Delta	Malware	GreenSnow	Malicious
IPsum	Malicious	Juniper Networks	Malicious
Lionic	Malicious	Lumu	Malicious
SOC Radar	Malicious	Sophos	Malware
Webroot	Malicious	ArcSight Threat Intelligence	Suspicious
BlockList	Suspicious	Abusix	Clean

Figure 19 VirusTotal Malicious Detection

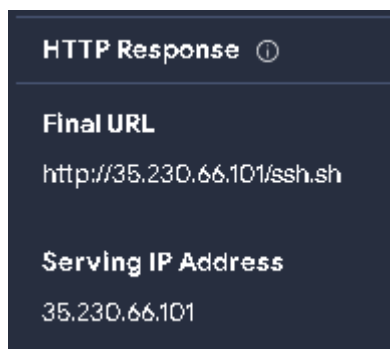


Figure 20 VirusTotal HTTP Response

After checking in the HTTP response, the IP was noted and was then placed into the AbuseIPDB to check if the IP has been reported and where it comes from. Here are the results:

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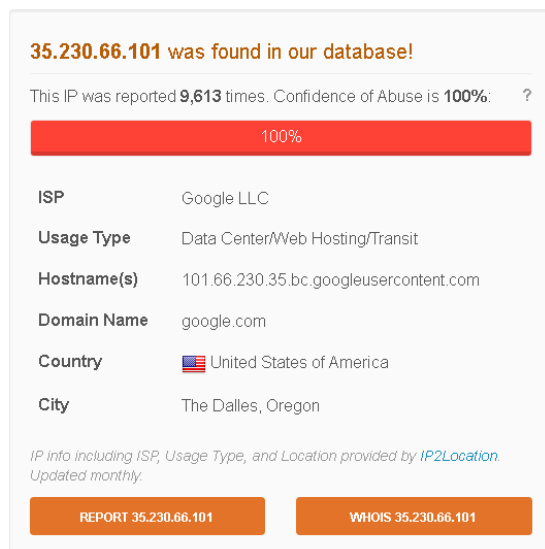


Figure 21 AbuseIPDB

After viewing the information from the IP, we can see that it has been reported 9,613 times from different users and it is currently sitting at 100% abuse, this means that the IP is highly infected and should be ignored. It also shows us where the requests are coming from, it comes from a Hosting Provider that is in Dalles, United States of America.

Now the last machine which will be investigated will be the one from Frankfurt, Germany. The URL that was picked and decided to take an in-depth look at was <http://194.108.48.105/sparc> . This URL was chosen as it had count of 14 which gave an alert that it could be suspicious compared to the others. After implementing the IP into Virus Total, surprisingly the result was completely different to what was expected, here are the results:

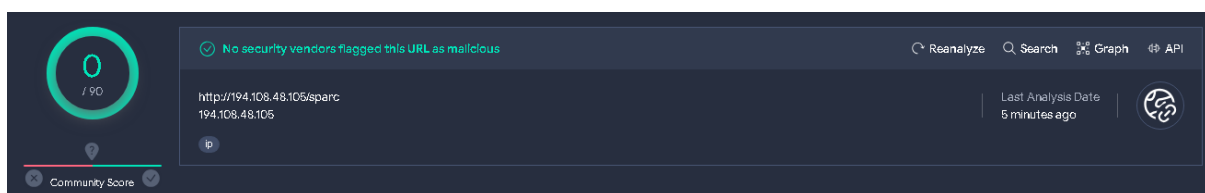


Figure 22 VirusTotal Results

The IP was placed into AbuseIPDB just to clarify that it was recorded by any user for suspicious activity, the results came back clear highlighting that no specific IP was found in their Database. It shows us that the request is coming from T-Mobile located in Czech Republic.

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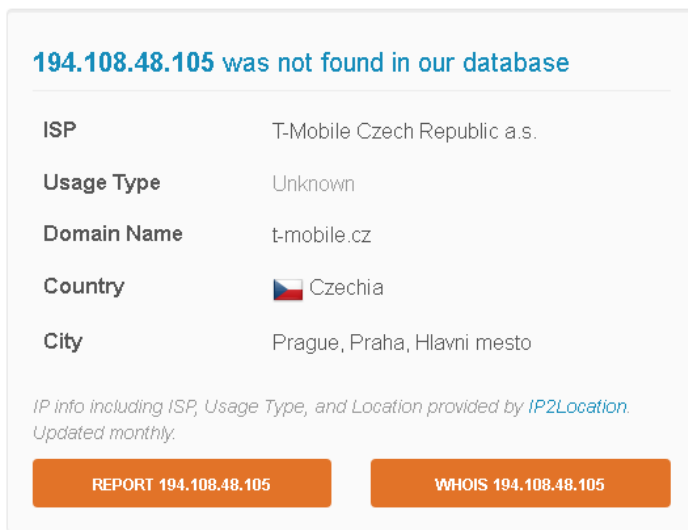


Figure 23 AbuseIPDB Result

3.4 Attacks by Ports

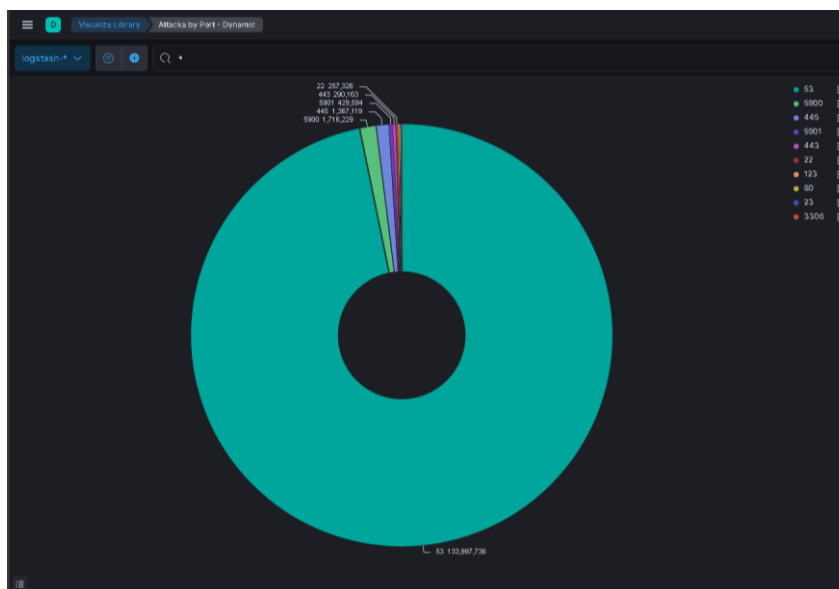


Figure 24 Attacks by Ports Frankfurt

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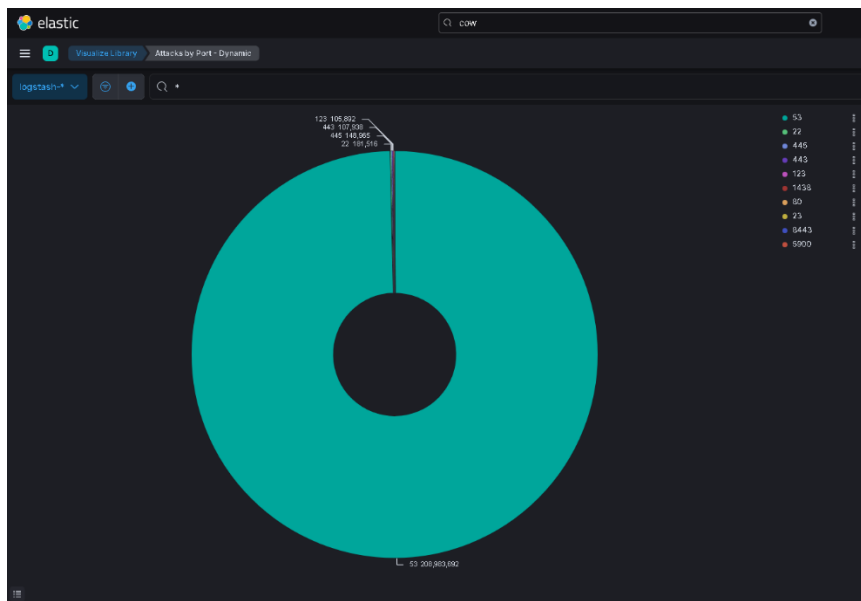


Figure 25 Attacks by Ports New York

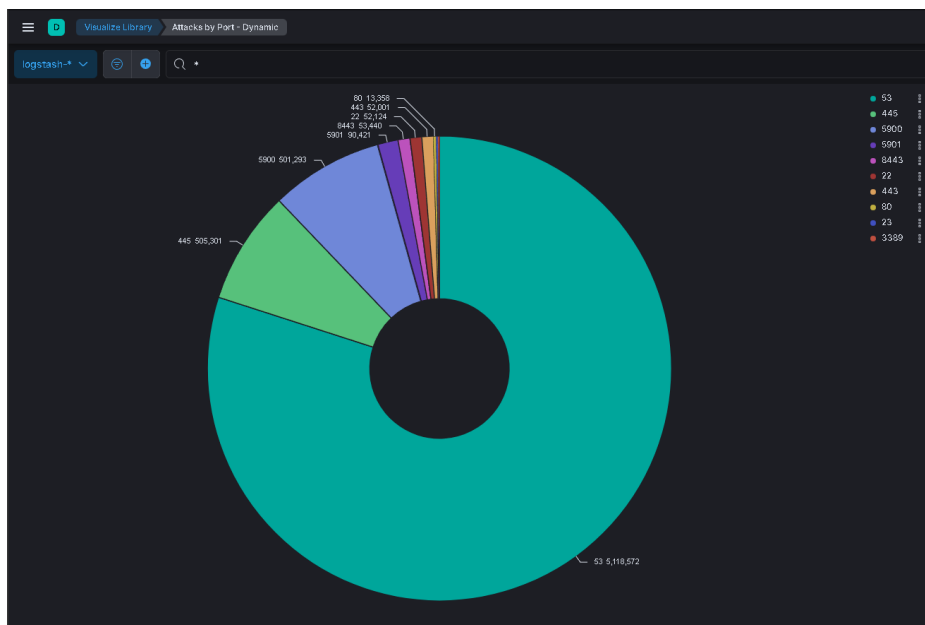


Figure 26 Attacks by Ports Bangalore

After looking at the data gathered for port attacks, it highlights which ports attackers thought might be open and went ahead with attacking them. Here is a quick table showing the top 5 ports that were attacked and what they are used for.

Ports	Used
53	Used for both UDP and TCP communication in DNS
445	Used for SMB (Server Message Block) over TCP

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5900	Used for VNC (Virtual Network Computing)
443	Used for secure web browsing using HTTPS (Hypertext Transfer Protocol Secure) protocol
80	Encrypted HTTP ((Hypertext Transfer Protocol) traffic

The port which was attacked the most was port 53, the only reason for this is because the attacker was attempting to gain access through the port and have the ability to hijack the machine and use it as a zombie, it could also be that an attacker was planning to perform a DDOS Attack.

3.5 Username and Password Attempts

When it comes to Cowrie Honeypot, it was able to track each username and password that has been entered by the attackers in order to try gain access to the machine, this does not mean that the attackers manually entered these credentials, its more likely they attempted a brute force attack as it will complete the attack faster than entering details manually.

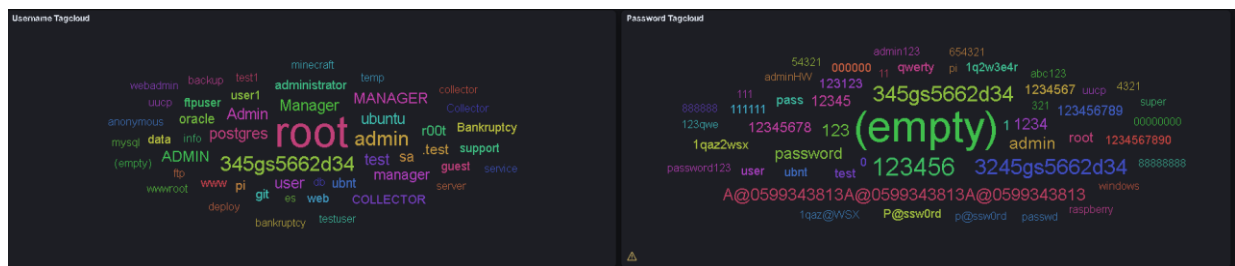


Figure 27 Frankfurt Username & Password

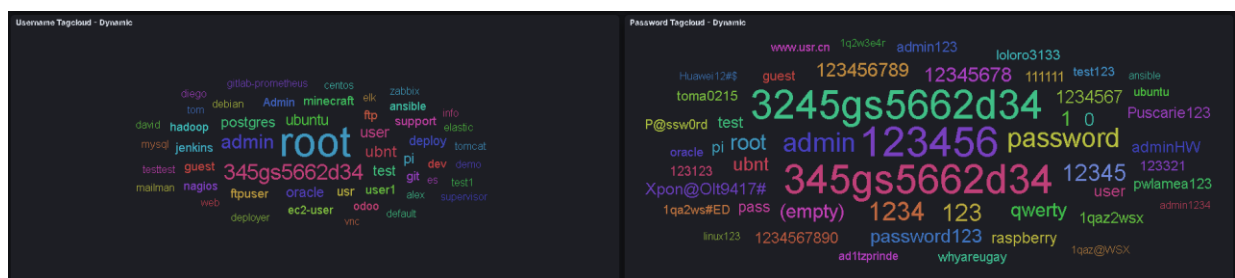


Figure 28 New York Username & Password

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Figure 29 Bangalore U&P

Figure 30 Bangalore U&P

The left portion is the entered usernames, and the right portion is the attempted passwords from attackers. It instantly shows us that “Root” username has been used the most out all as with Cowrie the graphical view gives the information instead of having it counted in numbers of attempts, the same goes for the password, “(empty)” has been tried the most also.

3.6 Suricata CVE – Top 10

Using Suricata, the top CVEs were tracked and noted automatically. CVE stands for “Common Vulnerability and Exposures, it is a system that identifies, names and tracks vulnerabilities which are either in software or hardware systems. Each CVE which is tracked has its own unique identifier for example “CVE-YYYY-NNNN” whereas the “YYYY” indicates the year when the CVE was assigned and the “NNNN” is just the unique identifier. Here is a list of CVEs that were captured throughout the three machines.

CVE ID	Count
CVE-2020-11899	52
CVE-2019-12263 CVE-2019-12261 CVE-2019-12260 CVE-2...	2

Figure 31 Top 10 CVE Frankfurt

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Suricata CVE - Top 10	
CVE ID	Count
CVE-2020-11899	220
CVE-2020-11910	110
CVE-1999-0016	55
CVE-2019-12263 CVE-2019-12261 CVE-2019-12260 CVE-2...	22

Figure 32 Top 10 CVE New York

Suricata CVE - Top 10	
CVE ID	Count
CVE-2020-11899	497
CVE-1999-0016	8

Figure 33 Top 10 CVE Bangalore

Each CVE was noted, the final decision was to take note of the highest counts CVE and get an in-depth information of them as if the count is higher, it means its more achievable than the others. The first CVE which was checked was from Frankfurt with a CVE identifier of "CVE-2020-11899". To find in-depth information in relation to the CVE a website was needed for this, the website that was used was "CVEdetails.com" as it's the most recommended out of all. After scanning the CVE on the website, this is the result:

⚠ CVE-2020-11899 is in the CISA Known Exploited Vulnerabilities Catalog

CISA vulnerability name:
Treck TCP/IP stack Out-of-Bounds Read Vulnerability

CISA required action:
Apply updates per vendor instructions.

CISA description:
The Treck TCP/IP stack contains an IPv6 out-of-bounds read vulnerability.

Added on 2022-03-03 Action due date 2022-03-17

Figure 34 Top CVE Frankfurt

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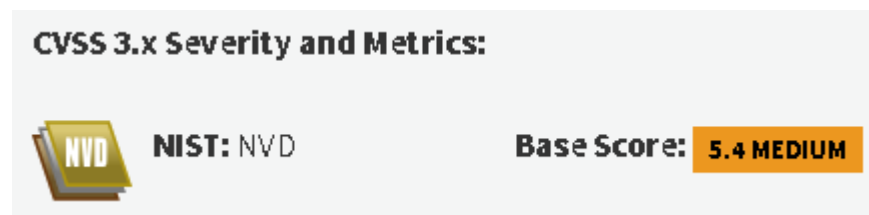


Figure 35 CVSS Score

The final CVSS score was a 5.4, this means that it is a “Medium Severity”, that also means that it is a moderate-risk vulnerabilities that require attention and remediation.

Moving onto the New York machine, the top CVE was again “CVE-2020-11899” so the only option was to get information on the 2nd highest counted CVE which was “CVE-2020-11910”, here are the results gathered from that.

Vulnerability Details : CVE-2020-11910

The Treck TCP/IP stack before 6.0.1.66 has an ICMPv4 Out-of-bounds Read.

Figure 36 Top CVE New York



Figure 37 CVSS Score

We can see that the CVE identifiers are different to each other, but they have similar issues, for the “CVE-2020-11899” the issue is that it has an out of bounds IPv6 whereas for “CVE-2020-11910” it has an out of bounds ICMPv4. It also has a CVSS score of 5.3 which will still be in the same medium severity as the first scanned CVE.

The final machine is the Bangalore machine, the same goes for this machine, it has the same top CVE as the other machines, so the option is to go ahead and take information from the CVE that hasn’t been analysed yet. The CVE that will be chosen will be “CVE-1999-0016”. Here are the following results for the recording of the data:

Vulnerability Details : CVE-1999-0016

Land IP denial of service.

Vulnerability category: Denial of service

Figure 38 Top CVE Bangalore

CVSS scores for CVE-1999-0016					
Base Score	Base Severity	CVSS Vector	Exploitability Score	Impact Score	Source
5.0	MEDIUM	AV:N/AC:L/Au:N/C:N/I:N/A:P	10.0	2.9	nvd@nist.gov

Figure 39 CVSS Score

This CVE is different to the others, this time this website shows us that this specific CVE specifies as a denial of service, it also has a score of 5.0 which will place it in the medium severity.

3.7 Attacks by Honeypots

Here are some screenshots taken after one month of data gathering showing data of attacks by honeypots.

Here are the Bangalore Results:

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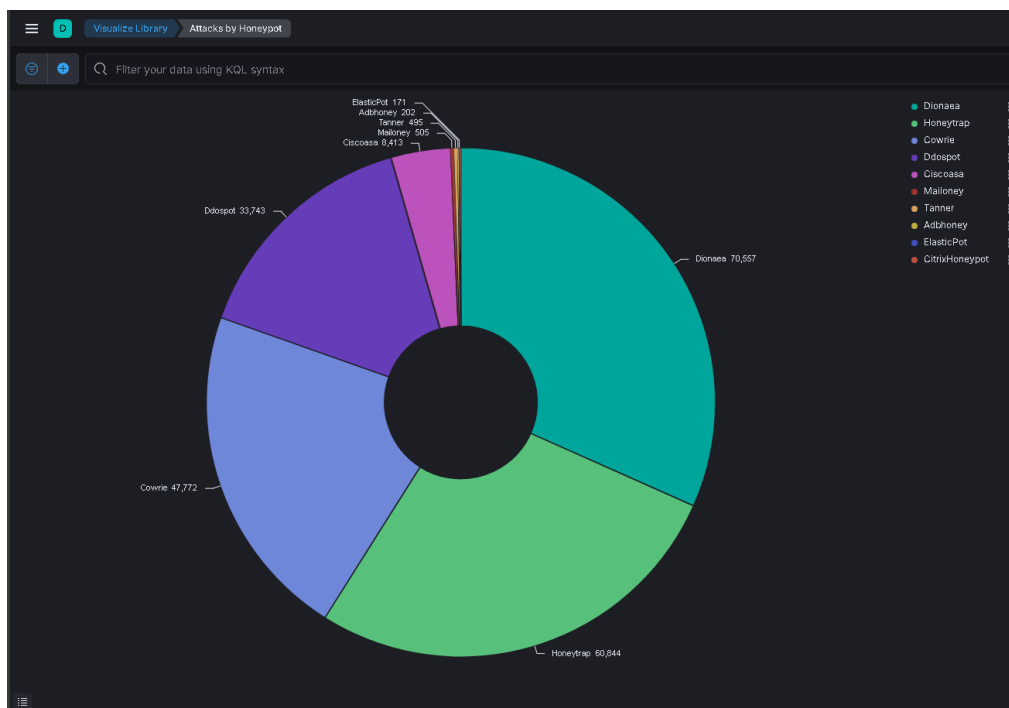


Figure 40 Bangalore Honeypots Attacks

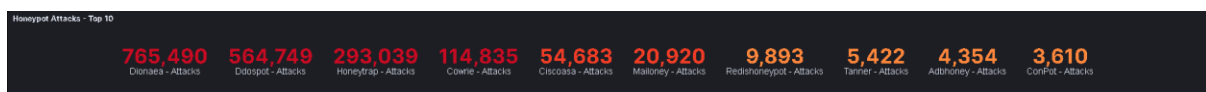


Figure 41 Attacks by Honeypots Bangalore

In these images it shows that Cowrie was the honeypot that gathered the most data from attackers compared to the other honeypots.

Frankfurt Results:

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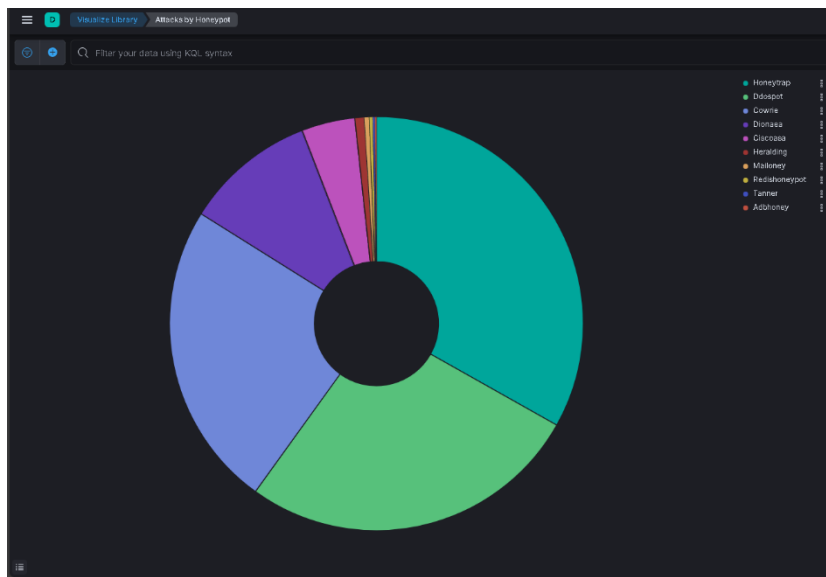


Figure 42 Frankfurt Honeypots Attacks

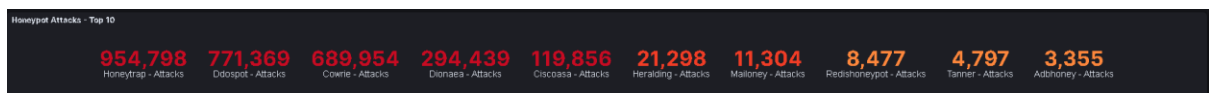


Figure 43 Attacks by Honeypots Frankfurt

For this machine it shows that Honeytrap was the honeypot that gathered most data from attackers compared to the other honeypots.

New York Results:

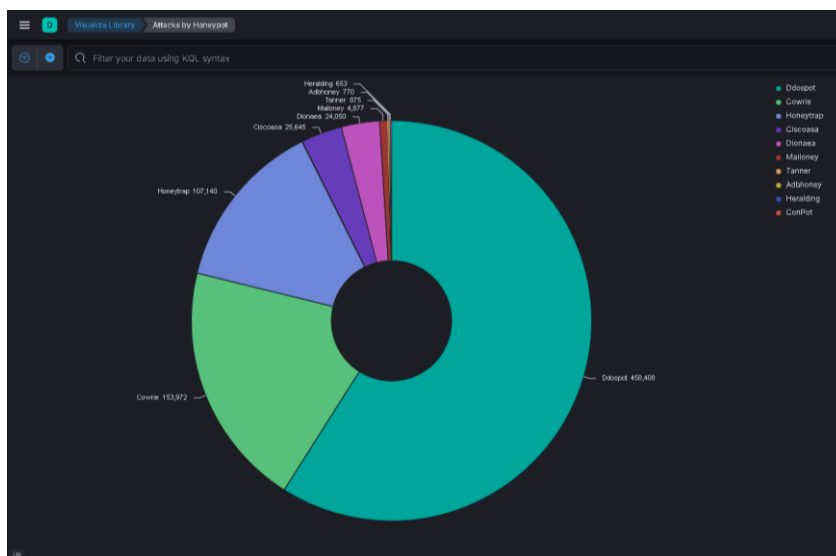


Figure 44 New York Honeypots Attacks

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Figure 45 Attacks by Honeypots New York

Finally in these images it highlights that Ddospot was the honeypot that managed to capture most data from incoming attacks compared to other machines.

3.8 Top IP Attacker

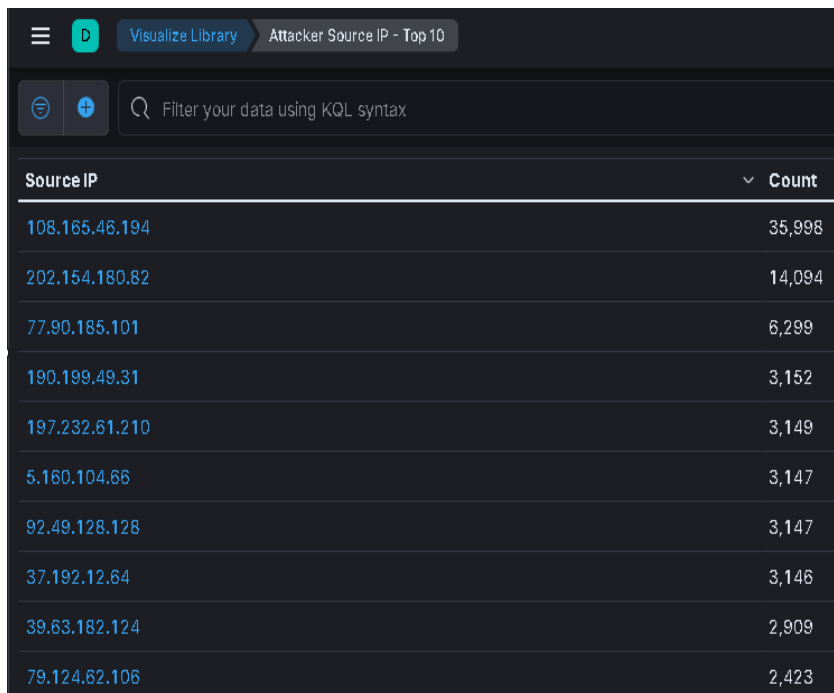
Source IP	Count
108.165.46.194	86,211
165.140.8.185	48,662
164.92.112.64	40,613
137.164.232.38	40,411
77.93.239.114	39,215
161.97.162.61	37,701
92.204.173.27	31,205
178.220.119.180	27,612
45.227.254.26	27,189
143.110.231.26	26,869

Frankfurt

Figure 46 Top IP Attacker Frankfurt

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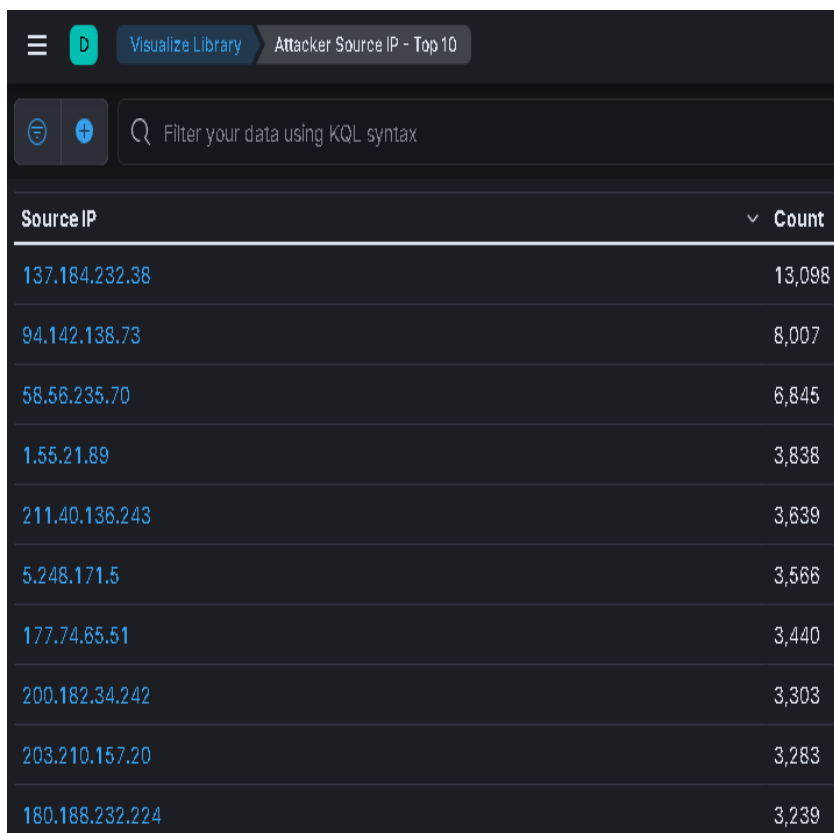


The screenshot shows the T-Pot interface with the 'Visualize Library' tab selected. The 'Attacker Source IP - Top 10' visualization is displayed as a table. The table has two columns: 'Source IP' and 'Count'. The data is as follows:

Source IP	Count
108.165.46.194	35,998
202.154.180.82	14,094
77.90.185.101	6,299
190.199.49.31	3,152
197.232.61.210	3,149
5.160.104.66	3,147
92.49.128.128	3,147
37.192.12.64	3,146
39.63.182.124	2,909
79.124.62.106	2,423

New York

Figure 47 Top IP Attacker New York



The screenshot shows the T-Pot interface with the 'Visualize Library' tab selected. The 'Attacker Source IP - Top 10' visualization is displayed as a table. The table has two columns: 'Source IP' and 'Count'. The data is as follows:

Source IP	Count
137.184.232.38	13,096
94.142.138.73	8,007
58.56.235.70	6,845
1.55.21.89	3,838
211.40.136.243	3,639
5.248.171.5	3,566
177.74.65.51	3,440
200.182.34.242	3,303
203.210.157.20	3,283
180.188.232.224	3,239

Bangalore

Figure 48 Top IP Attacker Bangalore

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3.9 Attacker AS/N – Top 10

Throughout this section it shows displays the attackers from which field or organization the attack came from, here is some screenshots that show the number of times the attacker sent attacks towards the machine.

Bangalore:

Attacker AS/N - Top 10 - Dynamic		
AS	ASN	Count
45899	VNPT Corp	51,863
58466	CHINANET Guangdong province network	43,002
8048	CANTV Servicios, Venezuela	41,729
4134	Chinanet	39,767
9829	National Internet Backbone	31,511
8151	UNINET	29,872
47331	Turk Telekom	28,663
7552	Viettel Group	27,395
10429	TELEFONICA BRASIL S.A	26,282
3462	Data Communication Business Group	20,989

Figure 49 AS/N Bangalore

Frankfurt:

Attacker AS/N - Top 10 - Dynamic		
AS	ASN	Count
45899	VNPT Corp	30,879
208091	Xhost Internet Solutions Lp	22,083
9299	Philippine Long Distance Telephone Comp...	20,251
12389	Rostelecom	9,497
8452	TE Data	8,141
20207	Gigared S.A.	8,041
24445	Henan Mobile Communications Co.,Ltd	7,683
9541	Cyber Internet Services Pvt Ltd.	7,665
58224	Iran Telecommunication Company PJS	7,465
4134	Chinanet	7,334

Figure 50 AS/N Frankfurt

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New York:

Attacker AS/N - Top 10 - Dynamic		
AS	ASN	Count
3462	Data Communication Business Group	9,331
9829	National Internet Backbone	7,105
45899	VNPT Corp	6,493
47331	Turk Telekom	6,381
12389	Rostelecom	6,365
25019	Saudi Telecom Company JSC	6,359
7552	Viettel Group	4,441
7713	PT Telekomunikasi Indonesia	3,223
13092	Akademski mreza Republike Srbije - AM...	3,212
22884	TOTAL PLAY TELECOMUNICACIONES SA...	3,179

Figure 51 AS/N New York

These screenshots highlight which field or organisations have the highest count of attacks towards the deployed machines.

4.0 Cowrie Command Line Input – Top 10

When it comes to attacking, attackers also perform CLI (Command Line Interface) attacks such as,

- Injection Attacks
- Cross-Site Scripting
- File Upload Vulnerabilities
- Remote Code Execution
- Buffer Overflow
- Malicious Downloads
- Social Engineering
- Exploiting Default Credentials
- API and Web Service Attacks
- Brute Force Attacks

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Here are some screenshots of what commands attackers have inputted in order to try retrieve data from the deployed machines.

Bangalore:

Cowrie Input - Top 10		
Command Line Input	Count	
cd ~; chattr -ia .ssh; lockr -ia .ssh	513	
lockr -ia .ssh	513	
cat /proc/cpuinfo grep name wc -l	486	
cat /proc/cpuinfo grep name head -n 1 awk '{print \$4,\$5,\$6,\$7,...	468	
uname -a	468	
free -m grep Mem awk '{print \$2, \$3, \$4, \$5, \$6, \$7}'	463	
ls -lh \$(which ls)	460	
which ls	460	
crontab -l	457	
cat /proc/cpuinfo grep model grep name wc -l	454	

Figure 52 Command Line Bangalore

Frankfurt:

Cowrie Input - Top 10		
Command Line Input	Count	
cd ~; chattr -ia .ssh; lockr -ia .ssh	1,425	
lockr -ia .ssh	1,425	
cat /proc/cpuinfo grep name wc -l	1,296	
free -m grep Mem awk '{print \$2, \$3, \$4, \$5, \$6, \$7}'	1,249	
cat /proc/cpuinfo grep name head -n 1 awk '{print \$4,\$5,\$6,\$7,...	1,248	
ls -lh \$(which ls)	1,233	
which ls	1,233	
crontab -l	1,223	
w	1,213	
uname -a	1,211	

Figure 53 Command Line Frankfurt

New York:

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The screenshot shows a table titled "Cowrie Input - Top 10" with two columns: "Command Line Input" and "Count". The table lists the top 10 most frequent command line inputs and their respective counts.

Command Line Input	Count
lockr -ia .ssh	588
cd ~; chatter -ia .ssh; lockr -ia .ssh	587
cat /proc/cpuinfo grep name wc -l	538
cat /proc/cpuinfo grep name head -n 1 awk '{print \$4,\$5,\$6,\$7,...	517
free -m grep Mem awk '{print \$2,\$3,\$4,\$5,\$6,\$7}'	517
crontab -l	512
ls -lh \$(which ls)	509
which ls	509
uname -a	506
w	505

Figure 54 Command Line New York

From the screenshots which are displayed, it shows that the command “lockr -ia.ssh” has been executed across all three droplets, this command means that when it is being executed it is trying to lock that specific file in the machine. The next command that has been used across all three droplets was “cd ~; chatter -ia .ssh; lockr -ia .ssh”. This command means that the attacker wants to redirect himself to the home directory and try run that same command again just in a different directory just in case the machine has it set somewhere else.

5. Improvements

Overall, the assignment went perfectly well, the data was gathered correctly and exactly over the space of one month. However, if I somehow must come across something like this one thing that I would change for sure is doing more research about T-Pot itself and the Elastic dashboard / menu itself. The main issue that has been faced was after the month data has been recorded, in the “Discover Options” there was a setting called “Index Lifecycle Policies”, this allowed you adjust the setting of the deleting phase. The default deleting phase was automatically set to thirty days where it was fine for the data gathering but after the one month, the data started to erase bit by bit meaning that the only fix for it was to navigate to the specified area and adjust it from 30 days to over 30 days such as 100 days for example. That would be the only change that would be taken if this assignment was seen again.

6. Conclusion

In summary, the month-long deployment and subsequent analysis of the TPOT honeypot provided a nuanced understanding of a complex cybersecurity environment. The comprehensive dataset captured provided a complete picture of malicious activity, from routine automated scans to more

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advanced attack techniques. This first-hand understanding of potential vulnerabilities provides an opportunity to refine and strengthen your security strategy to ensure robust protection against evolving threats. The analysis process not only identified discernible patterns and trends, but also facilitated refinement of incident response protocols. In the future, insights gained from this work will help us continually optimize our cybersecurity practices and strengthen proactive and adaptive approaches to meeting emerging challenges. This experience highlights the need for continuous vigilance and dynamic defence, which are critical elements in addressing ever-changing cybersecurity threats.

7. Reference

DigitalOcean (2022) 'Simple Cloud Infrastructure for Developers', DigitalOcean, Available at: <https://www.digitalocean.com/> (Accessed: 27 September 2023).

Telekom Security (2018) 'TPOT Community Edition', GitHub, Available at: <https://github.com/telekom-security/tpotce> (Accessed: 27 September 2023).

AbuseIPDB (2016) 'AbuseIPDB - Report IP Addresses Engaged in Malicious Activity', AbuseIPDB, Available at: <https://www.abuseipdb.com/> (Accessed: 20 October 2023).

MITRE Corporation (1999) 'Common Vulnerabilities and Exposures (CVE) - Home', MITRE CVE, Available at: <https://cve.mitre.org/> (Accessed: 30 October 2023).