RANSOMWARE INVESTIGATION (OSINT AND HUNTING) – OVERVIEW PT1

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What is Ransomware?

- Ransomware is malware that employs encryption to hold a victim’s information at ransom. A user or organization’s critical data is encrypted so that they cannot access files, databases, or applications. A ransom is then demanded to provide access. Ransomware is often designed to spread across a network and target database and file servers, and can thus quickly paralyze an entire organization. It is a growing threat, generating billions of dollars in payments to cybercriminals and inflicting significant damage and expenses for businesses and governmental organizations.

Types of Ransomware

Common Types of Ransomware Attacks

1. Crypto ransomware
2. Locker ransomware
3. Scareware
4. Ransomware as a Service (RaaS)
5. Doxware/Leakware

Types of Ransomware

1. Crypto ransomware

- The goal of crypto ransomware is to hack and encrypt the sensitive files located on the victim’s computer, such as documents, pictures, or videos. While cybercriminals withhold access to these files, they don’t go as far as interfering with basic computer functions like other types of ransomware. Hackers want to create a sense of panic within the user by allowing them to see their files without the ability to open their information.

2. Locker ransomware

- Locker ransomware is unique in that it solely aims to lock victims out of their computers. Hackers do this by disabling all basic computer functions with an exception for minor mouse and keyboard capabilities. Leaving the mouse and keyboard somewhat operable lets the user fulfill the demands of the cybercriminal to gain access back into their device.
- A common trend with locker ransomware is that it generally doesn’t target specific files. So, the likelihood of data destruction is lower compared to other types of ransomware attacks. However, there are no guarantees when dealing with cybercriminal masterminds.

Types of Ransomware

3. Scareware

- Scareware is a malicious software created to make false claims about viruses infecting a user's computer or device. A payment is typically requested from the owner to solve the falsified issues. While some types of scareware can lock a user out of their device, others will only go as far as flooding the screen with countless pop-ups to overwhelm the user.

4. Ransomware as a Service (RaaS)

- Ransomware as a Service (RaaS) is a dark web business model created to help ransomware hackers streamline their attacks. Developers created this software to automatically carry out all aspects of a ransomware attack for the cyberthief, from sending out the ransomware to collecting payments and restoring user access.

5. Doxware or leakware

- Doxware, also known as leakware, threatens the distribution of sensitive data online, targeting people and businesses alike. Since hackers know people, and especially businesses, will do almost anything to prevent confidential and personal data from falling into the wrong hands, they often demand compensation to prevent its release.

Ransomware Report

Ransomware in 2022

https://www.blackfog.com/the-state-of-ransomware-in-2022/

https://therecord.media/ransomware-tracker-the-latest-figures/

https://www.trendmicro.com/vinfo/us/security/news/ransomware-by-the-numbers/lockbit-conti-and-blackcat-lead-pack-amid-rise-in-active-raas-and-extortion-groups-ransomware-in-q1-2022

Commons Ransomware

- Cerber
- Bad Rabbit
- CryptoWall
- Crysis
- LockerGoga
- LeChiffre
- Petya
- NotPetya
- KeRanger
- Jigsaw
- GoldenEye
- CTB-Locker
- Maze
- Locky
- WannaCry
- ZCryptor
- TorrentLocker
- TeslaCrypt
- Spider
- Ryuk

INVESTIGATION RANSOMWARE

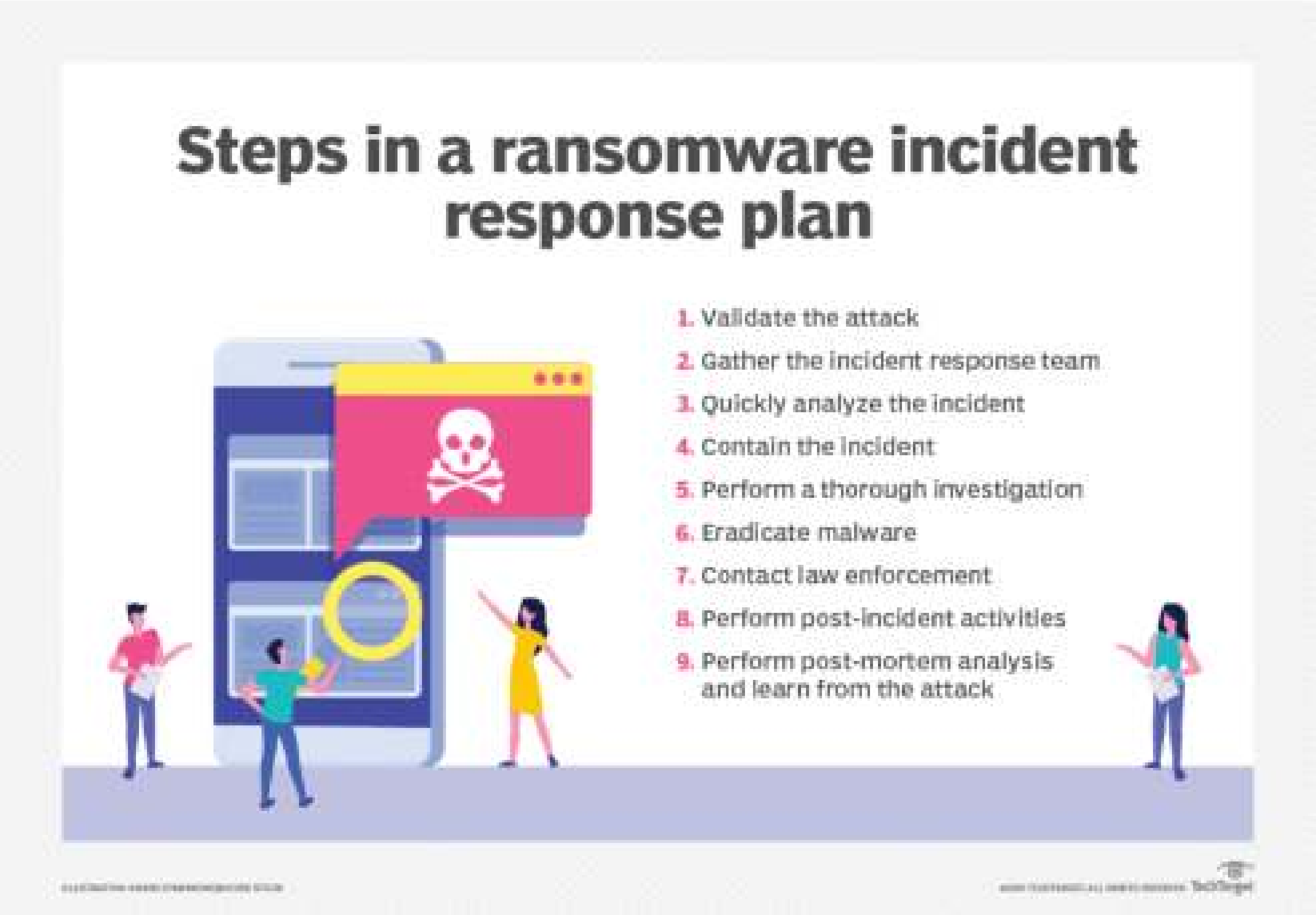
APT Groups

- Groups are sets of related intrusion activity that are tracked by a common name in the security community. Analysts track clusters of activities using various analytic methodologies and terms such as threat groups, activity groups, threat actors, intrusion sets, and campaigns. Some groups have multiple names associated with similar activities due to various organizations tracking similar activities by different names. Organizations' group definitions may partially overlap with groups designated by other organizations and may disagree on specific activity.

APT Groups – List and Report

- https://attack.mitre.org/groups/
- https://www.mandiant.com/resources/insights/apt-groups
- https://cybersophia.net/cyber-threat-intel/advanced-persistent-threat-apt-groups/
- https://adversary.crowdstrike.com/en-US/?L=32
- https://www.crowdstrike.com/resources/reports/global-threat-report/

RANSOMWARE INCIDENT RESPONSE

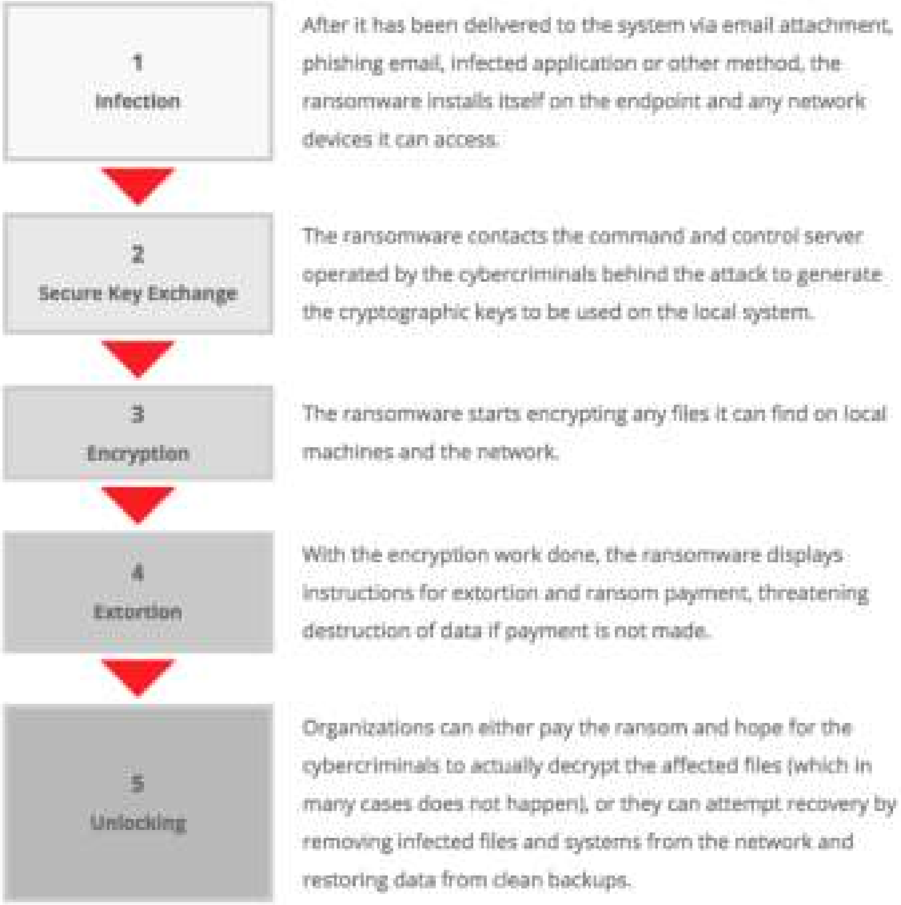


Steps in a ransomware incident response plan

1. Validate the attack
2. Gather the incident response team
3. Quickly analyze the incident
4. Contain the incident
5. Perform a thorough investigation
6. Eradicate malware
7. Contact law enforcement
8. Perform post-incident activities
9. Perform post-mortem analysis and learn from the attack

[illegible] [illegible] TechTarget

Ransomware Process



1
Infection

After it has been delivered to the system via email attachment, phishing email, infected application or other method, the ransomware installs itself on the endpoint and any network devices it can access.

2
Secure Key Exchange

The ransomware contacts the command and control server operated by the cybercriminals behind the attack to generate the cryptographic keys to be used on the local system.

3
Encryption

The ransomware starts encrypting any files it can find on local machines and the network.

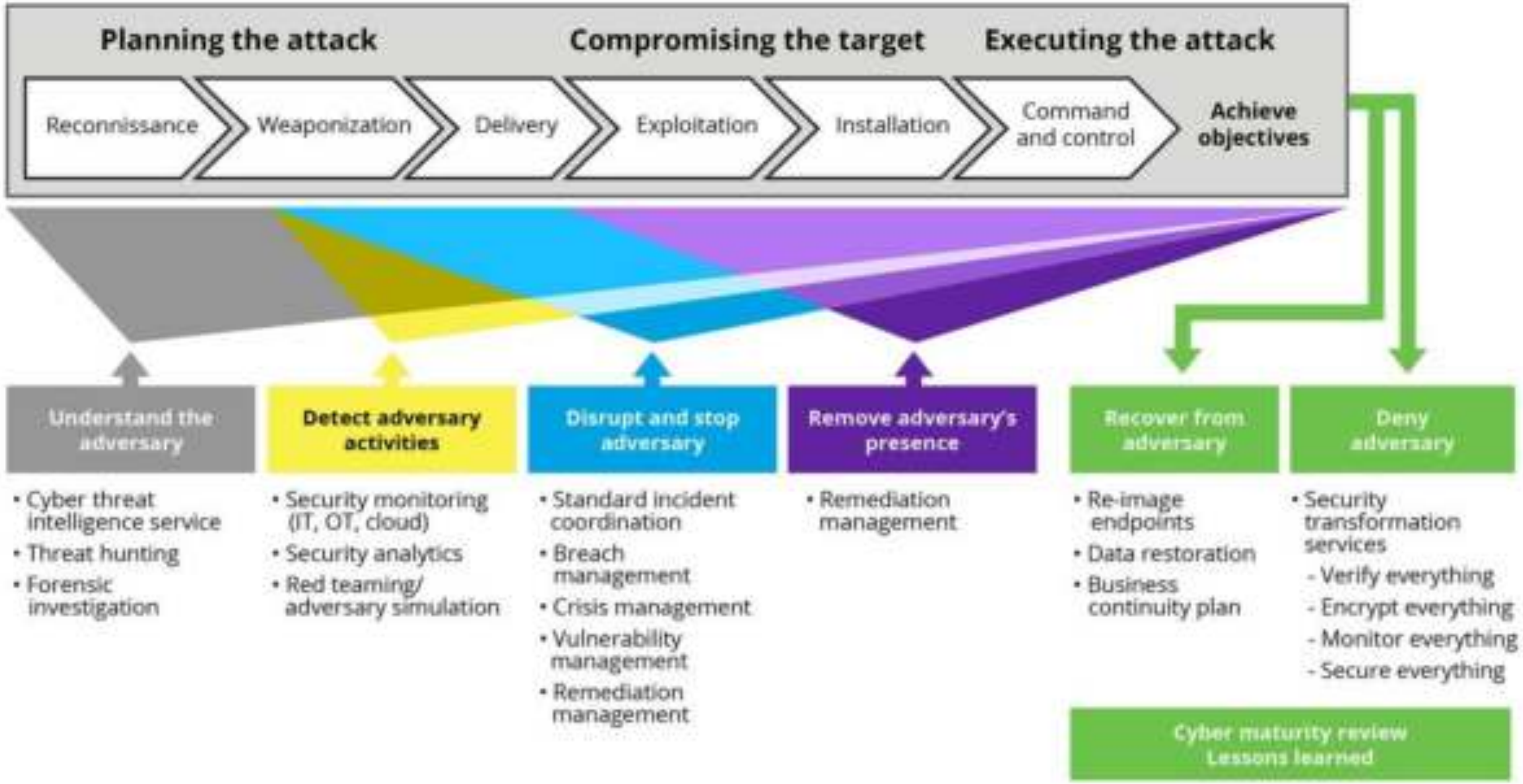
4
Extortion

With the encryption work done, the ransomware displays instructions for extortion and ransom payment, threatening destruction of data if payment is not made.

5
Unlocking

Organizations can either pay the ransom and hope for the cybercriminals to actually decrypt the affected files (which in many cases does not happen), or they can attempt recovery by removing infected files and systems from the network and restoring data from clean backups.

Ransomware Attack and Recovery



Understand the adversary

- Cyber threat intelligence service
- Threat hunting
- Forensic investigation

Detect adversary activities

- Security monitoring (IT, OT, cloud)
- Security analytics
- Red teaming/ adversary simulation

Disrupt and stop adversary

- Standard incident coordination
- Breach management
- Crisis management
- Vulnerability management
- Remediation management

Remove adversary's presence

- Remediation management

Recover from adversary

- Re-image endpoints
- Data restoration
- Business continuity plan

Deny adversary

- Security transformation services
  - Verify everything
  - Encrypt everything
  - Monitor everything
  - Secure everything

Cyber maturity review
Lessons learned

OSINT – What is?

- By gathering publicly available sources of information about a particular target an attacker – or friendly penetration tester – can profile a potential victim to better understand its characteristics and to narrow down the search area for possible vulnerabilities. Without actively engaging the target, the attacker can use the intelligence produced to build a threat model and develop a plan of attack. Targeted cyber attacks, like military attacks, begin with reconnaissance, and the first stage of digital reconnaissance is passively acquiring intelligence without alerting the target.

- Gathering OSINT on yourself or your business is also a great way to understand what information you are gifting potential attackers. Once you are aware of what kind of intel can be gathered about you from public sources, you can use this to help you or your security team develop better defensive strategies. What vulnerabilities does your public information expose? What can an attacker learn that they might leverage in a social engineering or phishing attack?

OSINT Framework – What is?

- Gathering information from a vast range of sources is a time consuming job, but there are many tools to make intelligence gathering simpler. While you may have heard of tools like Shodan and port scanners like Nmap and Zenmap, the full range of tools is vast. Fortunately, security researchers themselves have begun to document the tools available.

- A great place to start is the OSINT Framework put together by Justin Nordine. The framework provides links to a large collection of resources for a huge variety of tasks from harvesting email addresses to searching social media or the dark web.

Malware Database

- https://github.com/Endermanch/MalwareDatabase
- https://github.com/Pyran1/MalwareDatabase
- https://github.com/acastillorobles77/MalwareDatabase
- https://github.com/sophos/SOREL-20M
- https://virusshare.com/
- https://labs.inquest.net/
- https://bazaar.abuse.ch/
- https://www.hybrid-analysis.com/
- https://urlhaus.abuse.ch/
- https://beta.virusbay.io/
- https://www.virustotal.com/

Malware Samples

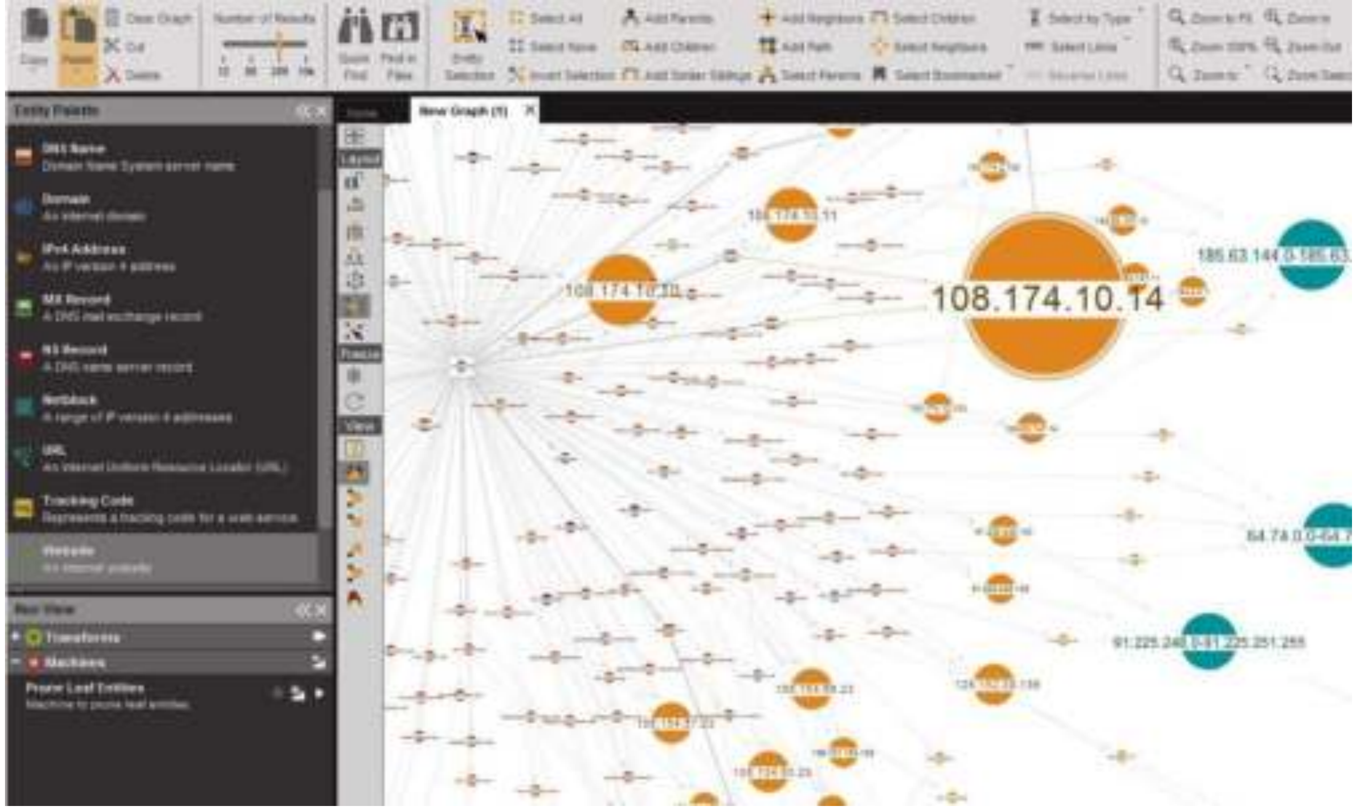
- https://github.com/jstrosch/malware-samples
- https://github.com/fabrimagic72/malware-samples
- https://github.com/ytisf/theZoo
- https://github.com/mstfknn/malware-sample-library

Create Lab

- Install Windows 7 and 10
- Install Linux or preference Kali Linux
- https://www.sentinelone.com/labs/building-a-custom-malware-analysis-lab-environment/
- https://www.youtube.com/watch?v=GE_aSVq8ZnQ
- https://www.youtube.com/watch?v=fLJifLf_fRE
- https://www.youtube.com/watch?v=bBvOiADXjEQ

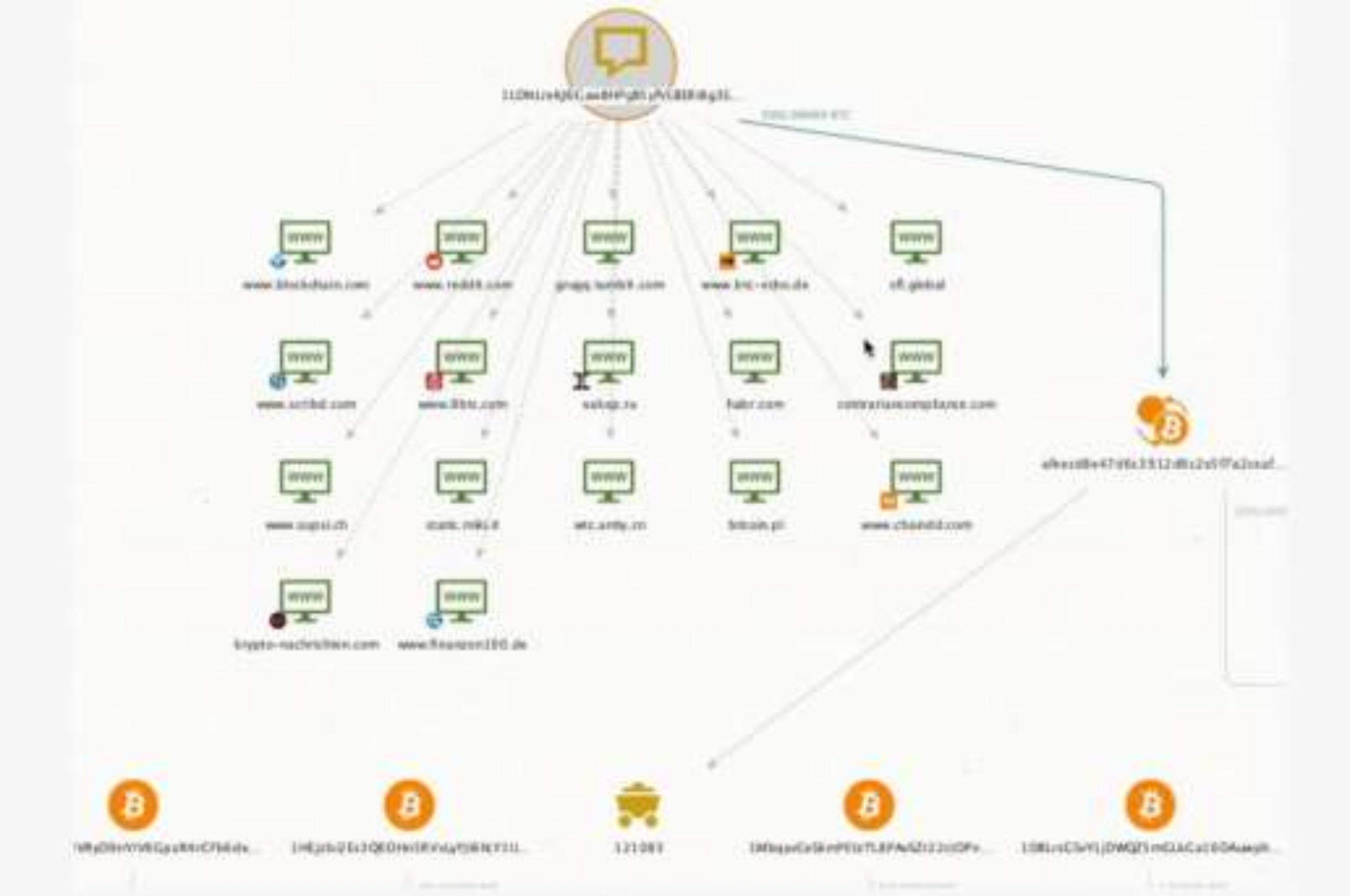
OSINT – Maltegoce Transforms

- Intezer Analyze Transforms for Maltego;
- Abuse.ch URLhaus;
- AbuseIPDB;
- ATII Hades Darkweb;
- Virus Total Premium;
- Cybersixgill;
- Att&ck MISP;
- Threat Crowd;
- Shodan;
- Crowdstrike Intel;
- Recorded Future;
- Hyas insight;
- Flashpoint;
- Hybrid Analysis;
- Threat Miner;
- Blockchain.info
- Cipher Trace;
- Tatum Blockchain;



OSINT – Maltegoce Cryptocurrency 1

Blockchain.com (formerly Blockchain.info) is a provider of cryptocurrency blockchain explorer services. It’s a platform that offers ways to buy, hold, and use cryptocurrency. It creates a financial system for the internet that empowers anyone in the world to control their money. Over 50+ million customers have signed up to use the Blockchain.com platform. It’s a fast and easy way to buy bitcoin, trade crypto, send, receive, secure, and borrow digital currencies.

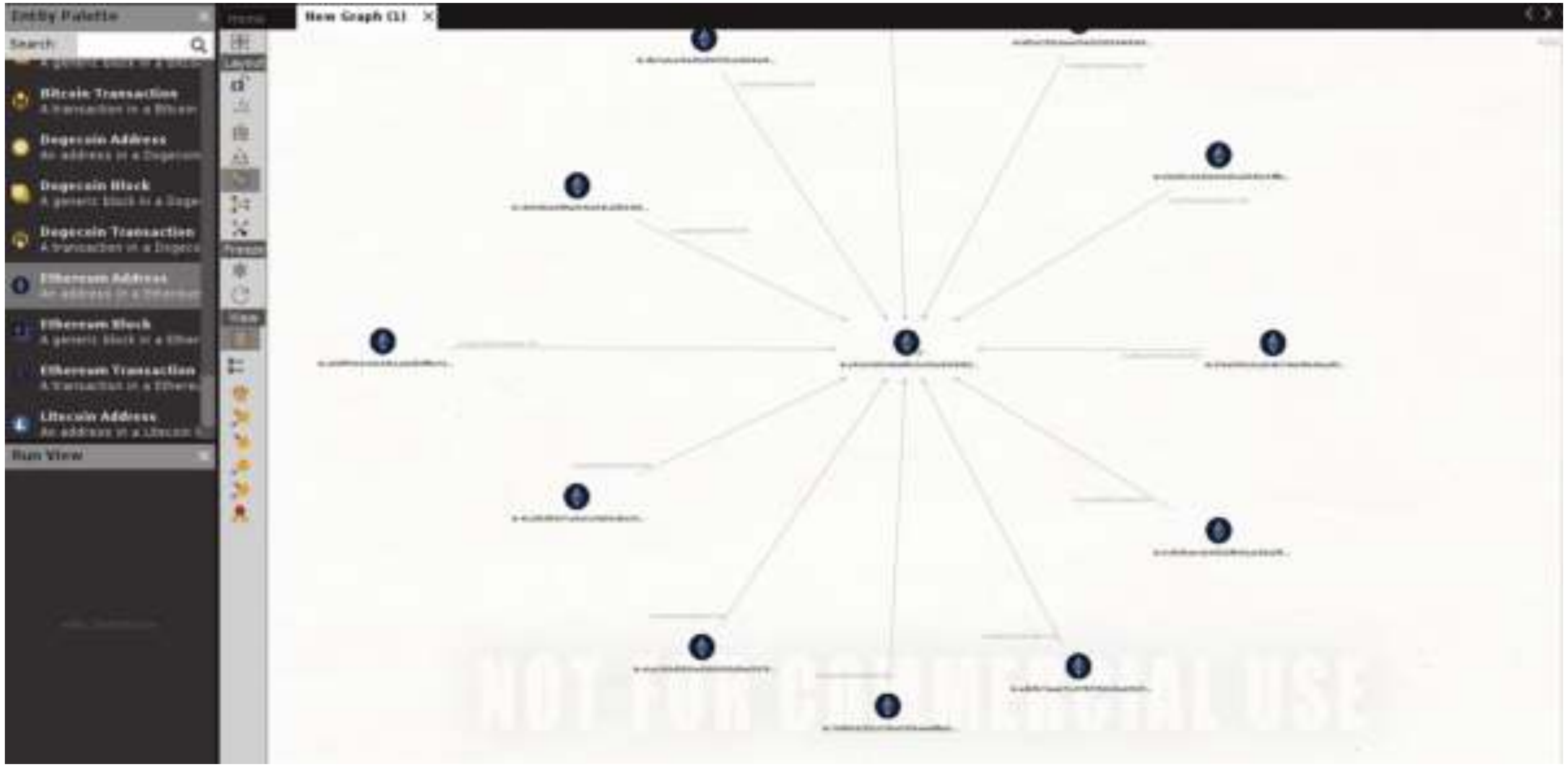


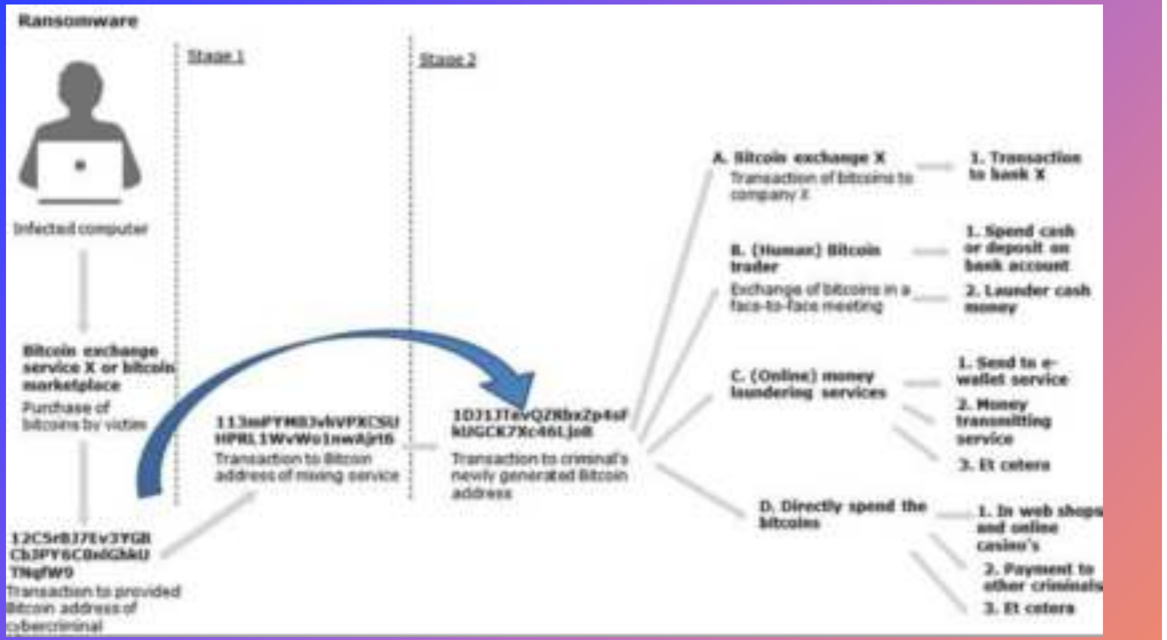
OSINT – Maltegoce Cryptocurrency 2

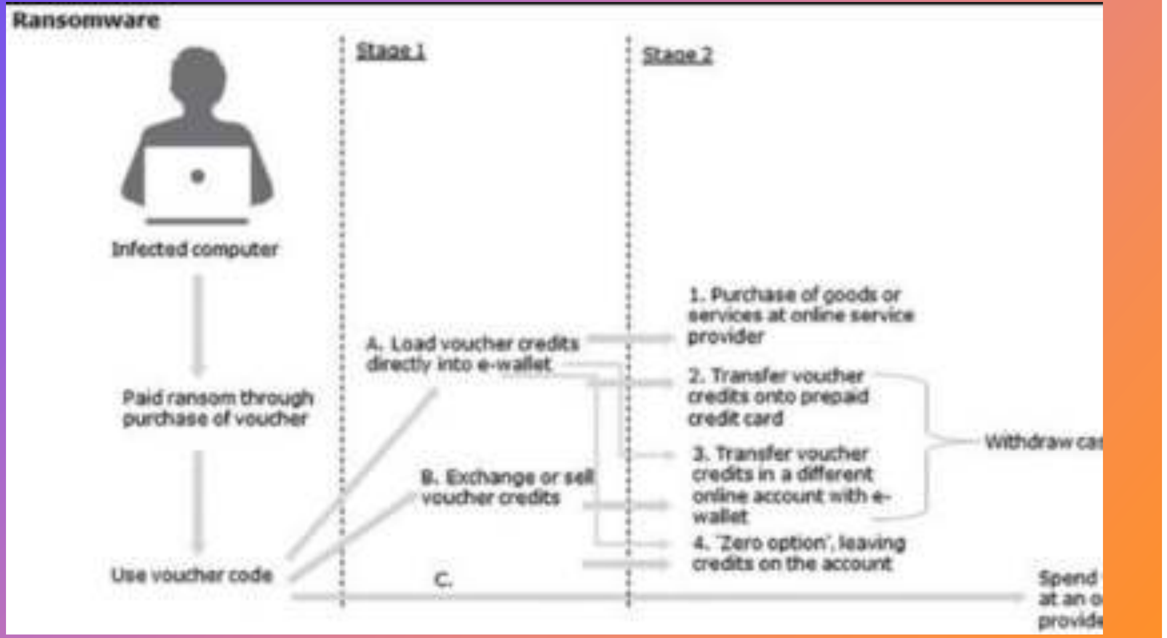
https://sociallinks.io/webinars/analysing-cryptocurrencies-and-investigating-blockchains

https://www.youtube.com/watch?v=A7XhEvAgYz4

https://alphasec.io/how-to-visualize-ethereum-transactions-using-maltego/




Ransomware
Stage 1
Stage 2
Infected computer
Bitcoin exchange service X or bitcoin marketplace
Purchase of bitcoins by victim
12CSrBJ7Ev3YGB Cb3PY6CBwGhkU TNgfW9
Transaction to provided Bitcoin address of cybercriminal
113mPYMB3vhVPXCSU HPRL1WvWo1nwAjrt6
Transaction to Bitcoin address of mixing service
1DJ1JTevQZRbxZp4sf kUGCK7Xc46LjoB
Transaction to criminal's newly generated Bitcoin address
A. Bitcoin exchange X
Transaction of bitcoins to company X
1. Transaction to bank X
B. (Human) Bitcoin trader
Exchange of bitcoins in a face-to-face meeting
1. Spend cash or deposit on bank account
2. Launder cash money
C. (Online) money laundering services
1. Send to e-wallet service
2. Money transmitting service
3. Et cetera
D. Directly spend the bitcoins
1. In web shops and online casino's
2. Payment to other criminals
3. Et cetera


Ransomware
Stage 1
Stage 2
Infected computer
Paid ransom through purchase of voucher
Use voucher code
A. Load voucher credits directly into e-wallet
B. Exchange or sell voucher credits
C.
1. Purchase of goods or services at online service provider
2. Transfer voucher credits onto prepaid credit card
3. Transfer voucher credits in a different online account with e-wallet
4. 'Zero option', leaving credits on the account
Withdraw cas
Spend
at an o
provide

Model for the Money laudering of Ransomware

- Anonymity: Bitcoin provides anonymity when payments are received and when they are cashed out. That's because bitcoin accounts and money transfers are difficult to trace and depend largely on the cybercriminal being sloppy with operations security.
- Global Currency: Hackers typically prey on out-of-country targets and need a fast, untraceable method to transfer funds across nations without worrying about account freezes. Bitcoin is used as a global currency because you don't need to worry about the exchange rates between your home country's currency and US dollars.
- Ease of Payments: In the past, hackers used to rely on gift cards for payment. This was troublesome on many levels — for instance, gift cards can't be used globally, and criminals needed to come up with a mailing addresses that can't be traced. Bitcoin and the higher profile of cryptocurrency have contributed to the rise in ransomware, as well as hackers' ability to use extortion to elicit payments. One example occurred after the Ashley Madison website breach, when hackers threatened some users with a bitcoin ransom or have their identities revealed as adulterers. Another tactic involved using malicious emails to threaten a distributed denial-of-service attack on an organization's network unless a bitcoin payment was made.

Analyzing Wallet Addresses using Blockchain Explorers

- In cryptocurrency investigations, blockchain ledgers play a significant role. To render it simpler to comprehend and make sense of the information, investigators use Wallet explorers to conduct analysis on wallet addresses and transactions.
- Transaction analysis is crucial in cryptocurrency investigations since it not merely permits investigators to follow the money, but also determine the source and what sort of tools the suspect employed
- One of the more known Explorers is Blockchain.com. It allows us to look up the wallet address and see all of its past transactions. It also shows how much currency it currently holds. Blockchain transactions are simple to track in the case of public ledgers like Bitcoin or Ethereum.
- WalletExplorer
- BitcoinWho'sWho
- BitcoinAbuse
- IntelX

Wallet explorers usually update in real-time with the details of each transaction, comprising of:

- Hash: The transaction ID which serves as a way to look up a particular transaction on the blockchain. (Not to be confused with Cryptographic Hashes)
- From/To: The sender's address and the recipient's address.
- Time Stamp: Each block includes the precise time for when the transaction entered the blockchain. Thus, the time the block was mined.
- Actual Cost/Fee: The price of the transaction.
- Transaction Receipt Status: Confirmation of the transaction's status.
- Value: How much cryptocurrency was sent and the equivalent USD value.

IoCs Ransomware

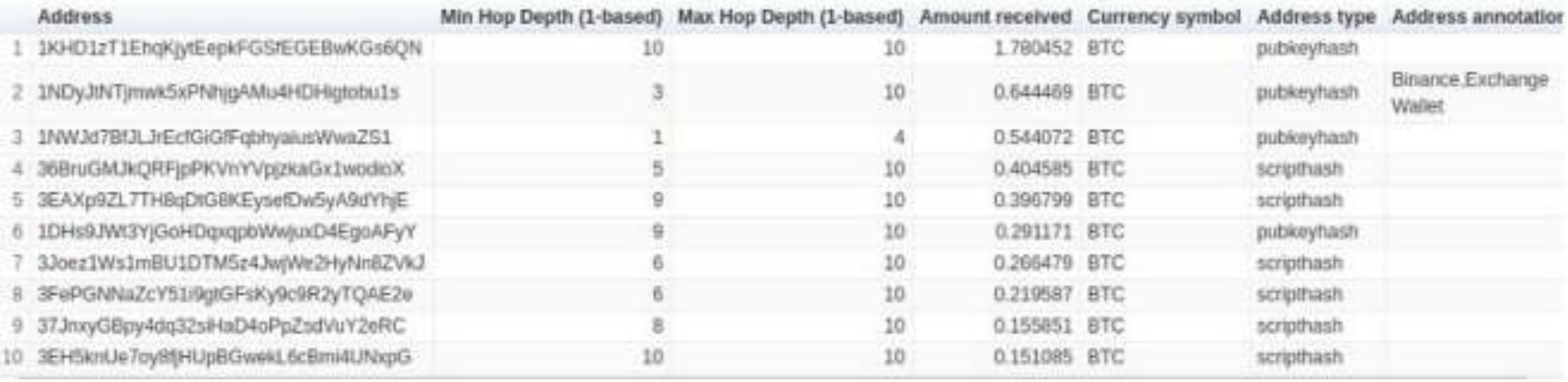
- Indicators of compromise (IoCs) are clues and evidence of a data breach in the form of digital breadcrumbs. These indicators can tell us whether a cyberattack has occurred, who was behind them and what tools may have been used. This information is generally obtained from software, including anti-malware and antivirus systems.
- Some of the most common IoCs to watch for are:

1. Unusual traffic patterns between internal systems
2. Unusual usage patterns for privileged accounts
3. Administrative access to your network from unsuspected geographical locations
4. A spike in database read volumes
5. A high rate of authentication attempts and failures
6. Unusual configuration changes
7. C2 Servers Ips
8. Ethereum or Bitcoin Wallets
9. Hashes File

https://www.packetlabs.net/posts/indicators-of-compromise-ioc/

Example IoCS Ransomwar: https://github.com/sophoslabs/IoCs/blob/master/Ransomware-Ryuk.csv

Wallet trace transactions

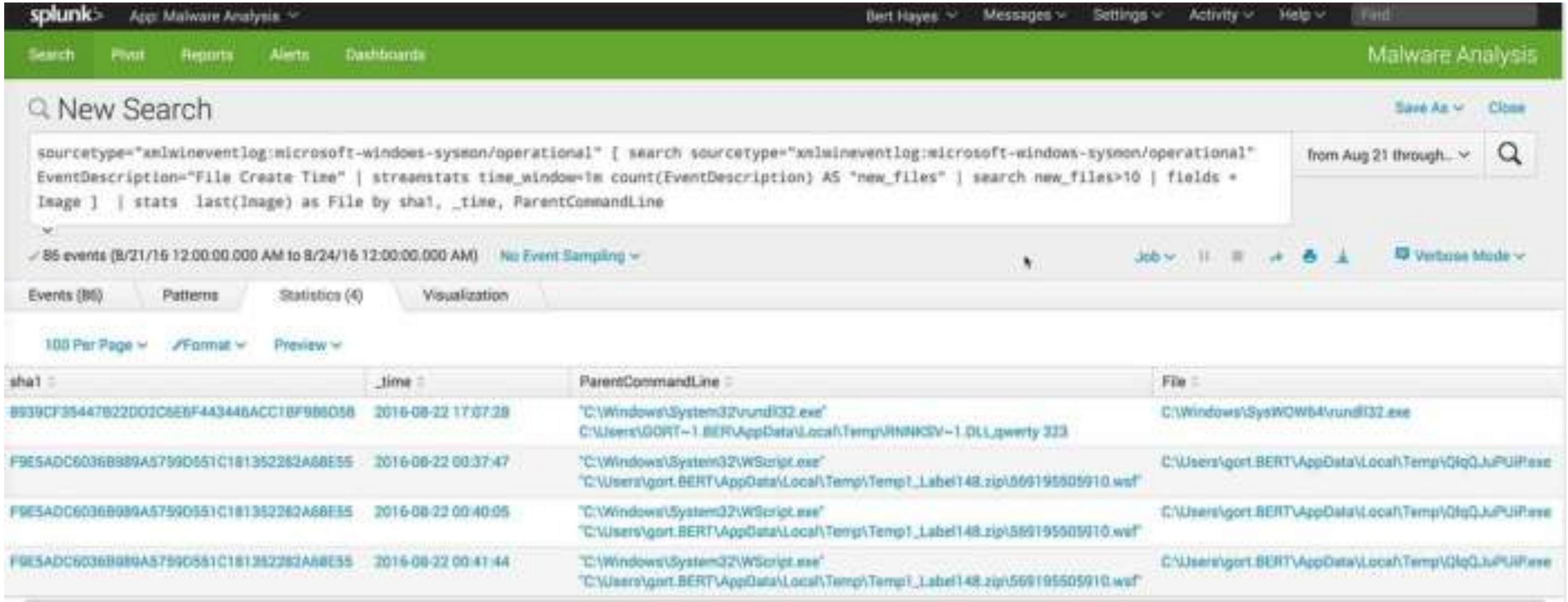


	Address	Min Hop Depth (1-based)	Max Hop Depth (1-based)	Amount received	Currency symbol	Address type	Address annotatior
1	1KHD1zT1EhqKjytEepkFGSfEGEBwKGs6QN	10	10	1.780452	BTC	pubkeyhash	
2	1NDyJtNTjmwk5xPNhjgAMu4HDHigtobu1s	3	10	0.644469	BTC	pubkeyhash	Binance.Exchange Wallet
3	1NWJd7BfJLJrEcfGiGfFqbhyaiusWwaZS1	1	4	0.544072	BTC	pubkeyhash	
4	36BruGMJkQRFjpPKVnYVpjzkaGx1wodioX	5	10	0.404585	BTC	scripthash	
5	3EAXp9ZL7TH8qDtG8KEysefDw5yA9dYhjE	9	10	0.396799	BTC	scripthash	
6	1DHs9JWt3YjGoHDqxqpbWwjuxD4EgoAFyY	9	10	0.291171	BTC	pubkeyhash	
7	3Joez1Ws1mBU1DTM5z4JwjWe2HyNn8ZVkJ	6	10	0.266479	BTC	scripthash	
8	3FePGNNaZcY51i9gtGFsKy9c9R2yTQAE2e	6	10	0.219587	BTC	scripthash	
9	37JnxyGBpy4dq32siHaD4oPpZsdVuY2eRC	8	10	0.155851	BTC	scripthash	
10	3EH5knUe7oy8fjHUpBGwekL6cBmi4UNxpG	10	10	0.151085	BTC	scripthash	

Visual tools are beneficial when investigating addresses and transactions. Using Coinpath® technology, anyone can build visual tools to understand the money flow. We have built one on our Bitquery explorer. You can visualize all the incoming and outgoing transactions from the hacker’s address here.

Today, bitcoin blockchain confirms ~10 million transactions every month. All these transactions are visible on the bitcoin blockchain. However, the blockchain only store addresses, public keys, and not real-world identities. Therefore, Virtual asset service providers (VASP) are the primary way to link real-world identities with bitcoin transactions. For example, VASPs such as Exchanges, wallets, custodians provide cryptocurrency services to retail users and businesses. Most of these services implement KYC (Know-your-customer) solutions. Therefore, linking real-world identity with bitcoin addresses and transactions.

SIEM Splunk Investigation



```
sourcetype="xmlwineventlog:microsoft-windows-sysmon/operational" [ search sourcetype="xmlwineventlog:microsoft-windows-sysmon/operational"
EventDescription="File Create Time" | streamstats time_window=1m count(EventDescription) AS "new_files" | search new_files>10 | fields +
Image ]  | stats  last(Image) as File by sha1, _time, ParentCommandLine
```

✓ 86 events (8/21/16 12:00:00.000 AM to 8/24/16 12:00:00.000 AM) No Event Sampling

sha1	_time	ParentCommandLine	File
B939CF35447B22DD2C6E6F443446ACC1BF986D58	2016-08-22 17:07:28	"C:\Windows\System32\rundll32.exe" C:\Users\GORT~1.BER\AppData\Local\Temp\RNNKSV~1.DLL,qwerty 323	C:\Windows\SysWOW64\rundll32.exe
F9E5ADC6036B989A5759D551C181352282A68E55	2016-08-22 00:37:47	"C:\Windows\System32\WScript.exe" "C:\Users\gort.BERT\AppData\Local\Temp\Temp1_Label148.zip\569195505910.wsf"	C:\Users\gort.BERT\AppData\Local\Temp\QlqQJuPUiP.exe
F9E5ADC6036B989A5759D551C181352282A68E55	2016-08-22 00:40:05	"C:\Windows\System32\WScript.exe" "C:\Users\gort.BERT\AppData\Local\Temp\Temp1_Label148.zip\569195505910.wsf"	C:\Users\gort.BERT\AppData\Local\Temp\QlqQJuPUiP.exe
F9E5ADC6036B989A5759D551C181352282A68E55	2016-08-22 00:41:44	"C:\Windows\System32\WScript.exe" "C:\Users\gort.BERT\AppData\Local\Temp\Temp1_Label148.zip\569195505910.wsf"	C:\Users\gort.BERT\AppData\Local\Temp\QlqQJuPUiP.exe

https://www.splunk.com/en_us/blog/industries/detecting-ransomware-attacks-with-splunk.html

Capturing Windows Memory Using Winpmem

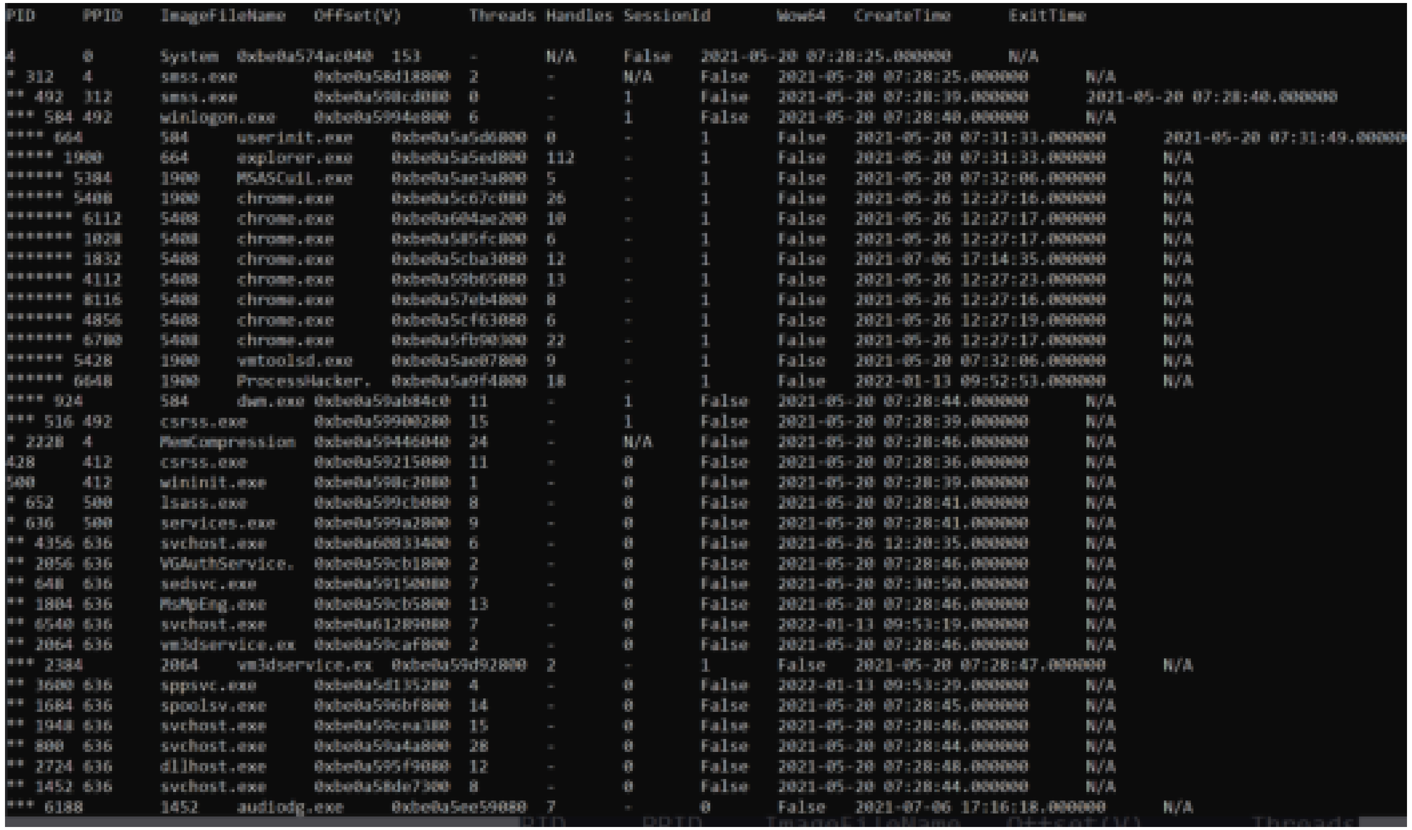
- Winpmem is a part of the Pmem Suite, a suite of memory acquisition tools for Windows, Linux, and Mac OS. You can download the latest release of winpmem from here: https://github.com/Velocidex/c-aff4/releases.
- Run Winpmem
- First, after I staged my malicious activity, I downloaded winpmem 3.3 RC3 onto the victim Windows machine. From there, I opened a command-line terminal and executed the program:
- C:\ winpmem_v3.3.rc3.exe --output memdump.raw --format raw --volume_
- The --output mem.raw option was used to name the output as memdump.raw. The --format raw and --volume_format raw options were used to output the memory in raw format (as opposed to something like aff4). After several minutes, the memory dump finished. I then transferred the raw memory file, memdump.raw, to my Kali machine.
- https://blog.cyberhacktics.com/memory-forensics-on-windows-10-with-volatility/
- https://github.com/Velocidex/c-aff4/releases

Volatility Ransomware

- Identifying Malicious Processes (**python3 vol.py -f <filename> pslist)**
- Below are the keys headers from ‘pslist’ that you will need to understand when you begin using the tool:
  - PID - Process ID number
  - PPID - Parent process ID number
  - ImageFileName - Name of the running process
  - Offset - Hexadecimal value representing the location in memory the process is running
  - CreateTime - Time process started
  - ExitTime - Time process ended

https://book.hacktricks.xyz/generic-methodologies-and-resources/basic-forensic-methodology/memory-dump-analysis/volatility-examples#installation
https://github.com/volatilityfoundation/volatility/wiki/

Volatility Ransomware 2

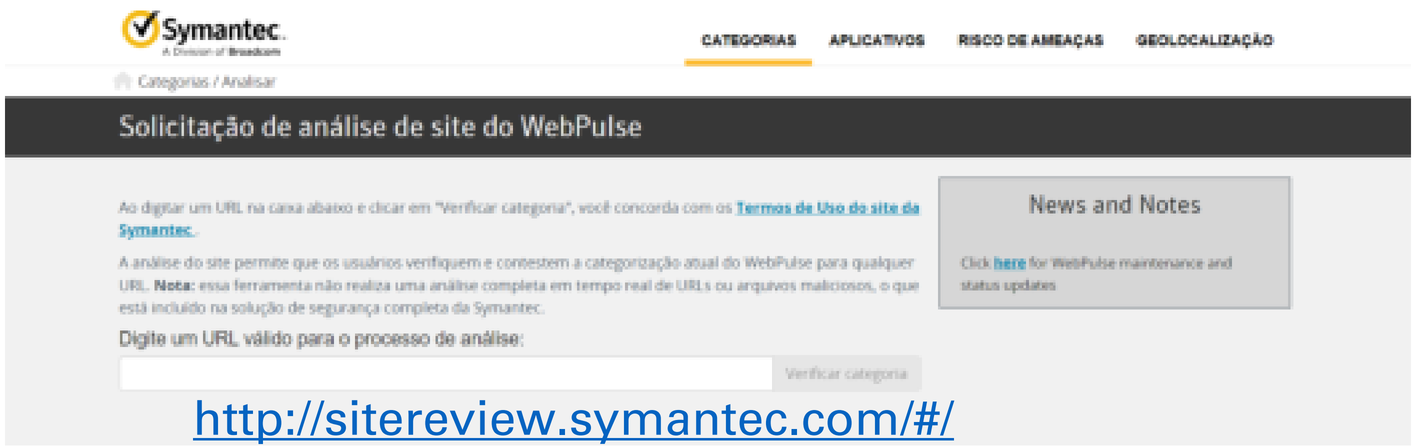


```
PID     PPID    ImageFileName   Offset(V)       Threads Handles SessionId       Wow64   CreateTime      ExitTime

4       0       System  0xbe0a574ac040  153     -       N/A     False   2021-05-20 07:28:25.000000      N/A
* 312   4       smss.exe        0xbe0a58d18000  2       -       N/A     False   2021-05-20 07:28:25.000000      N/A
** 492  312     smss.exe        0xbe0a598cd000  0       -       1       False   2021-05-20 07:28:39.000000      2021-05-20 07:28:40.000000
*** 584 492     winlogon.exe    0xbe0a5994e000  6       -       1       False   2021-05-20 07:28:40.000000      N/A
**** 664        584     userinit.exe    0xbe0a5a5d6000  0       -       1       False   2021-05-20 07:31:33.000000      2021-05-20 07:31:49.000000
***** 1900      664     explorer.exe    0xbe0a5a5ed000  112     -       1       False   2021-05-20 07:31:33.000000      N/A
****** 5384     1900    MSASCuiL.exe    0xbe0a5ae3a000  5       -       1       False   2021-05-20 07:32:06.000000      N/A
****** 5408     1900    chrome.exe      0xbe0a5c67c080  26      -       1       False   2021-05-26 12:27:16.000000      N/A
******* 6112    5408    chrome.exe      0xbe0a604ae200  10      -       1       False   2021-05-26 12:27:17.000000      N/A
******* 1028    5408    chrome.exe      0xbe0a585fc000  6       -       1       False   2021-05-26 12:27:17.000000      N/A
******* 1832    5408    chrome.exe      0xbe0a5cba3080  12      -       1       False   2021-07-06 17:14:35.000000      N/A
******* 4112    5408    chrome.exe      0xbe0a59b65080  13      -       1       False   2021-05-26 12:27:23.000000      N/A
******* 8116    5408    chrome.exe      0xbe0a57eb4000  8       -       1       False   2021-05-26 12:27:16.000000      N/A
******* 4856    5408    chrome.exe      0xbe0a5cf63080  6       -       1       False   2021-05-26 12:27:19.000000      N/A
******* 6700    5408    chrome.exe      0xbe0a5fb90300  22      -       1       False   2021-05-26 12:27:17.000000      N/A
****** 5428     1900    vmtoolsd.exe    0xbe0a5ae07000  9       -       1       False   2021-05-20 07:32:06.000000      N/A
****** 6648     1900    ProcessHacker.  0xbe0a5a9f4000  18      -       1       False   2022-01-13 09:52:53.000000      N/A
**** 924        584     dwm.exe 0xbe0a59ab84c0  11      -       1       False   2021-05-20 07:28:44.000000      N/A
*** 516 492     csrss.exe       0xbe0a59900280  15      -       1       False   2021-05-20 07:28:39.000000      N/A
* 2228  4       MemCompression  0xbe0a59446040  24      -       N/A     False   2021-05-20 07:28:46.000000      N/A
428     412     csrss.exe       0xbe0a59215080  11      -       0       False   2021-05-20 07:28:36.000000      N/A
500     412     wininit.exe     0xbe0a598c2080  1       -       0       False   2021-05-20 07:28:39.000000      N/A
* 652   500     lsass.exe       0xbe0a599cb080  8       -       0       False   2021-05-20 07:28:41.000000      N/A
* 636   500     services.exe    0xbe0a599a2000  9       -       0       False   2021-05-20 07:28:41.000000      N/A
** 4356 636     svchost.exe     0xbe0a60833400  6       -       0       False   2021-05-26 12:20:35.000000      N/A
** 2056 636     VGAuthService.  0xbe0a59cb1800  2       -       0       False   2021-05-20 07:28:46.000000      N/A
** 648  636     sedsvc.exe      0xbe0a59150080  7       -       0       False   2021-05-20 07:30:50.000000      N/A
** 1804 636     MsMpEng.exe     0xbe0a59cb5800  13      -       0       False   2021-05-20 07:28:46.000000      N/A
** 6540 636     svchost.exe     0xbe0a61289080  7       -       0       False   2022-01-13 09:53:19.000000      N/A
** 2064 636     vm3dservice.ex  0xbe0a59caf000  2       -       0       False   2021-05-20 07:28:46.000000      N/A
*** 2384        2064    vm3dservice.ex  0xbe0a59d92800  2       -       1       False   2021-05-20 07:28:47.000000      N/A
** 3600 636     sppsvc.exe      0xbe0a5d135280  4       -       0       False   2022-01-13 09:53:29.000000      N/A
** 1684 636     spoolsv.exe     0xbe0a596bf800  14      -       0       False   2021-05-20 07:28:45.000000      N/A
** 1948 636     svchost.exe     0xbe0a59cea380  15      -       0       False   2021-05-20 07:28:46.000000      N/A
** 800  636     svchost.exe     0xbe0a59a4a000  28      -       0       False   2021-05-20 07:28:44.000000      N/A
** 2724 636     dllhost.exe     0xbe0a595f9080  12      -       0       False   2021-05-20 07:28:48.000000      N/A
** 1452 636     svchost.exe     0xbe0a58de7300  8       -       0       False   2021-05-20 07:28:44.000000      N/A
*** 6188        1452    audiodg.exe     0xbe0a5ee59080  7       -       0       False   2021-07-06 17:16:18.000000      N/A
```

- Using ‘pstree’ is a great way to spot these malicious processes masquerading as legitimate Windows processes. (**python3 vol.py -f <filename> pstree)**

Volatility Ransomware 3



Solicitação de análise de site do WebPulse

Ao digitar um URL na caixa abaixo e clicar em "Verificar categoria", você concorda com os Termos de Uso do site da Symantec.

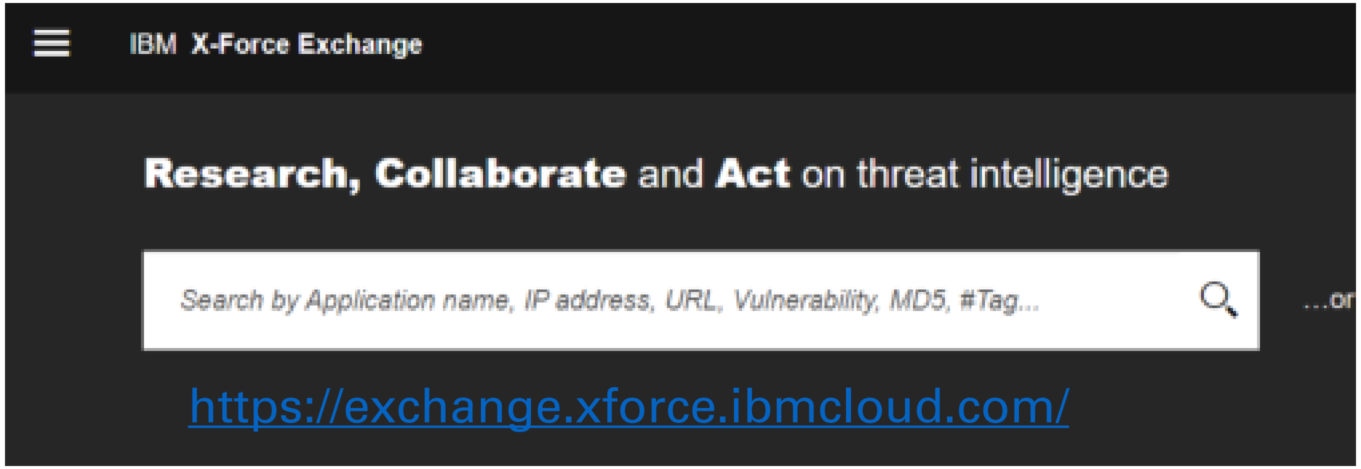
A análise do site permite que os usuários verifiquem e contestem a categorização atual do WebPulse para qualquer URL. **Nota:** essa ferramenta não realiza uma análise completa em tempo real de URLs ou arquivos maliciosos, o que está incluído na solução de segurança completa da Symantec.

Digite um URL válido para o processo de análise:

News and Notes

Click here for WebPulse maintenance and status updates

http://sitereview.symantec.com/#/



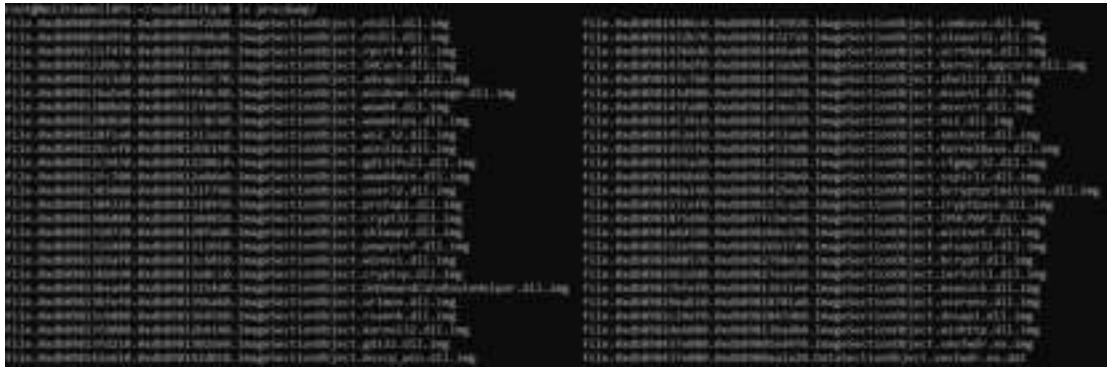
Research, Collaborate and **Act** on threat intelligence

Search by Application name, IP address, URL, Vulnerability, MD5, #Tag...

https://exchange.xforce.ibmcloud.com/

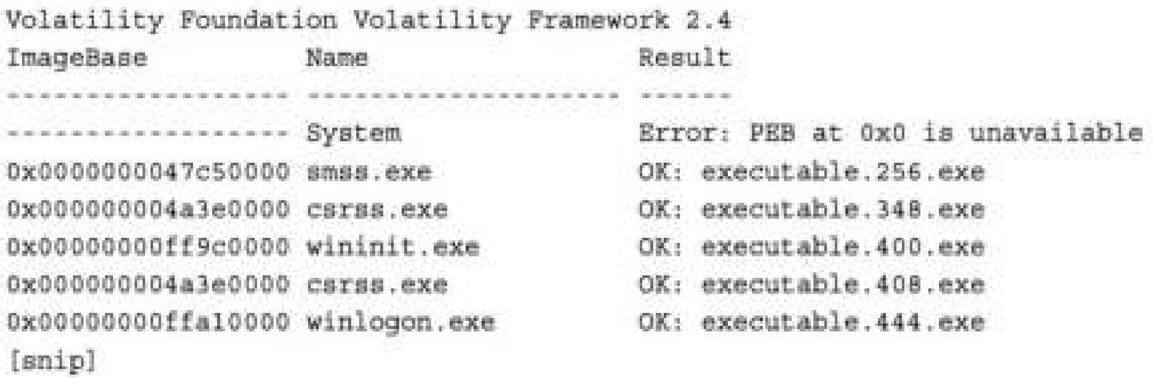
- To view the network connections associated with the RAM dump that is being analyzed use the following command: **(python3 vol.py -f <filename> netscan)**
  - Offset - Location in memory
  - Proto - Network protocol used by process
  - LocalAddr - Source address of network connection
  - LocalPort - Source port of network connection
  - ForeignAddr - Destination address of network connection
  - ForeignPort - Destination address of network connection
  - State - State of network connection i.e. established, closed or listening
  - PID - Process ID of associated process
  - Owner - Account associated with process
  - Created - Time network connection has initiated

Volatility Ransomware 4

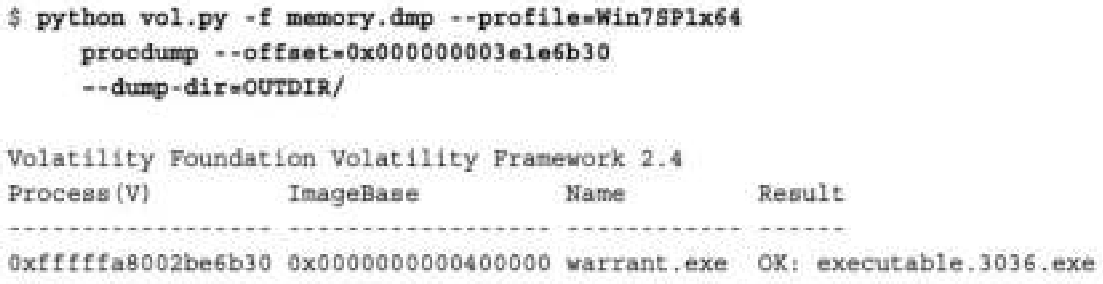


- Using the commands covered in this article should put you in a good position to start identifying potential malware running in memory on a device. Using ‘netscan’ I was able to identify a process named ‘smsfwder.exe’ that was making some malicious network connections to known C2 infrastructure. As part of my investigation using Volatility, I can extract this process for further analysis using a feature called ‘procdump’.
- **python3 vol.py -f <filename> -o <Directory to dump process> dumpfiles –pid <PID>**

Volatility Ransomware 5



```
Volatility Foundation Volatility Framework 2.4
ImageBase          Name                 Result
------------------ -------------------- ------
------------------ System               Error: PEB at 0x0 is unavailable
0x0000000047c50000 smss.exe             OK: executable.256.exe
0x000000004a3e0000 csrss.exe            OK: executable.348.exe
0x00000000ff9c0000 wininit.exe          OK: executable.400.exe
0x000000004a3e0000 csrss.exe            OK: executable.408.exe
0x00000000ffa10000 winlogon.exe         OK: executable.444.exe
[snip]
```

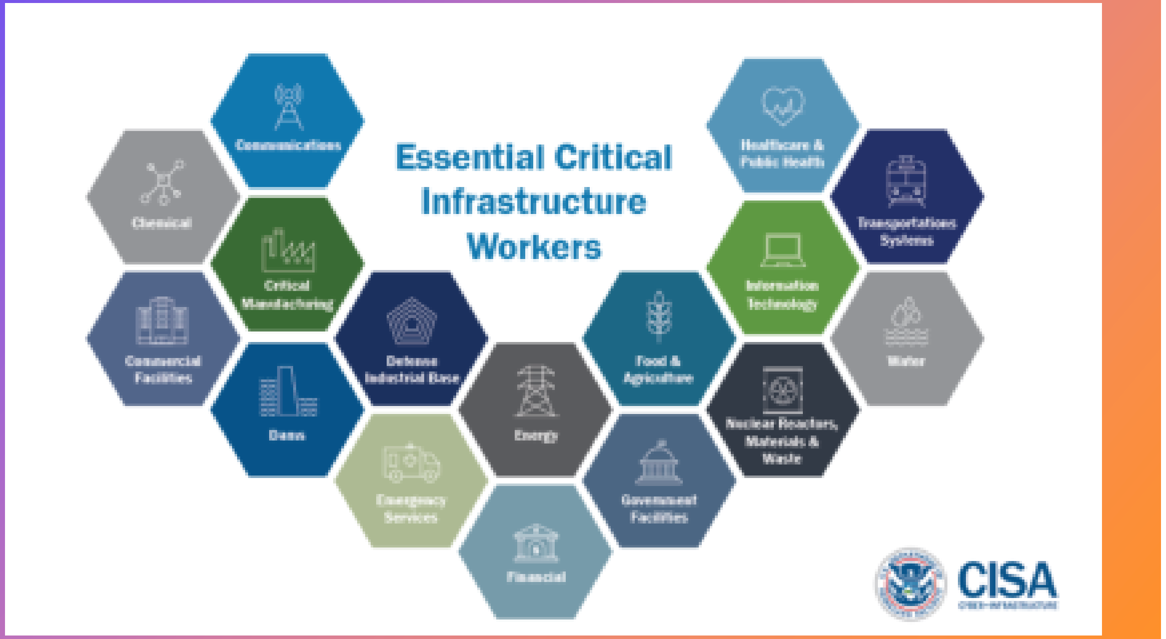


```
$ python vol.py -f memory.dmp --profile=Win7SP1x64
     procdump --offset=0x000000003e1e6b30
     --dump-dir=OUTDIR/

Volatility Foundation Volatility Framework 2.4
Process(V)         ImageBase          Name         Result
------------------ ------------------ ------------ ------
0xfffffa8002be6b30 0x0000000000400000 warrant.exe  OK: executable.3036.exe
```

- To dump a process's executable, use the procdump command. Optionally, pass the --unsafe or -u flags to bypass certain sanity checks used when parsing the PE header. Some malware will intentionally forge size fields in the PE header so that memory dumping tools fail.
- **python3 vol.py -f memory.dmp --profile=Win7SP1x64 procdump --dump-dir=OUTDIR/**
- Upload executable in virus total for analyze

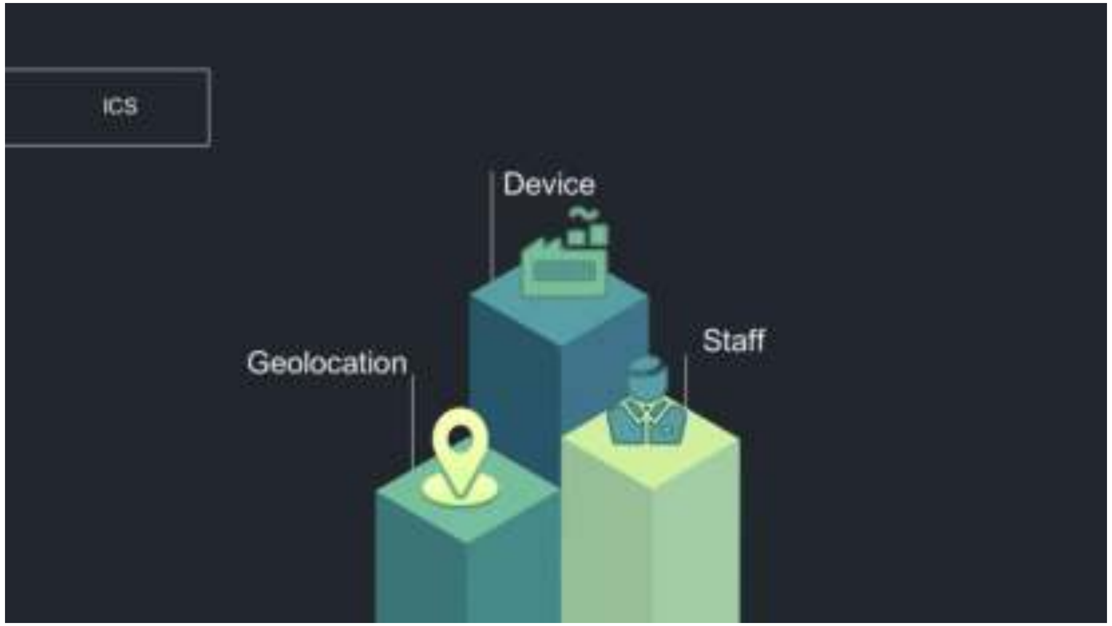
ICS
1
Foreign intelligence services
Espionage
Disruption
2
Insiders
Theft
Vendor risk
3
Criminal groups
Monetary gain
Developing malware
4
Terrorists
Threat national security
Weaken economy
Damage public morale



Essential Critical Infrastructure Workers

- It's perfect moment to remind about MITRE ATTACK for ICS, it describes every step of attack on SCADA/ICS devices.
- https://collaborate.mitre.org/attackics/index.php/Initial_Access
- https://www.offensiveosint.io/offensive-osint-s01e03-intelligence-gathering-on-critical-infrastructure-in-southeast-asia/

Geolocation IP



- A Geolocation OSINT Tool. Offers geolocation information gathering through social networking platforms.
- https://www.geocreepy.com/
- MaxMind is one of the leading providers of IP intelligence and online fraud detection tools. MaxMind provides IP intelligence through their GeoIP brand. Over 5,000 companies use GeoIP data to locate their internet visitors and show them relevant content and ads, enforce digital rights, and efficiently route internet traffic. Businesses can obtain additional insights into their customers' connection speeds, ISPs, and more using GeoIP data.
- https://www.maltego.com/transform-hub/maxmind/
- https://github.com/libresec/geo-ip-maltego

Dark Web Investigation

- Ahmia – one of the oldest and most reliable .onion search engines, accessible both from the darknet and the clearnet.
- Onion Search Engine – for searching onion sites. It comes with browser extensions for Chrome and Firefox. Various supported search options include images, videos, maps and pastes.
- Tor Taxi – a launchpad website with links to multiple different onion domains. It has a handy colour-coded system for displaying websites that are currently down.
- Darkweb Wiki – a somewhat chaotic and not frequently updated list of onion sites – still, a valuable resource.
- Hunchly – provides daily darkweb reports of what onion domains are up / down, in the form of a spreadsheet.
- IACA Darkweb Tools – free resources provided by the International Anti Crime Academy.
- **Reddit communities** – many subreddits dedicated to various aspects of the darkweb can be found, some of which are hit and miss. However, there are 3 that are consistently good and up to date:
- https://www.reddit.com/r/darknet/
- https://www.reddit.com/r/TOR/
- https://www.reddit.com/r/onions/
- **Discord** – an up-and-coming alternative to Reddit for budding online communities and niche topics, Discord already dominates in some aspects. While I have not yet found a publicly available channel worthy of a recommendation, you can darknet-keyword search the available Discord servers.

Dark Web Investigation 2

- **Ahmia** – as mentioned above, but specifically for Tor:
- http://juhanurmihxlp77nkq76byazcldy2hlmovfu2epvl5ankdibsot4csyd.onion
- **Haystak** – the self appointed “darknet’s largest search engine”, with thousands of indexed .onion domains – including some historical ones.
- http://haystak5njsmn2hqkewecpaxetahtwhsbsa64jom2k22z5afxhnpxfid.onion/
- **Kilos** – darknet market search engine allowing to search for vendors, listings, reviews, forums and forum posts. Useful for conducting broad keyword-based searches across multiple darkweb entities.
- http://mlyusr6htlxsyc7t2f4z53wdxh3win7q3qpxcrbam6jf3dmua7tnzuyd.onion/search
- **TOR66** – on top of the standard search, this enables the “fresh onions” and “random onions” matches; tread with caution, these can bring you to some truly random sites.
- http://tor66sewebgixwhcqfnp5inzp5x5uohhdy3kvtnyfxc2e5mxiuh34iid.onion/

Dark Web Investigation 3

- First and foremost, awesome list of tools by Apurv Singh Gautam is available here (but just a caveat, I have not used or tested all of those – yet).
- Onioff – a Python tool for searching .onion URLs.
- Onion Ingestor – for scraping and collecting darkweb intelligence – works with Kibana dashboards.
- Onion Search – tool for scraping .onion URLs from darkweb search engines.
- The Devils Eye – for extracting .onion site links and descriptions without connecting to Tor.
- TorBot – onion crawler, with many additional features still in active development.

Dark Web Investigation 4

- AuCyble
- DarkDotFail
- darktracer_int
- darkowlcyber
- ido_cohen2
- josephfcox
- RansomAlert
- Torproject

Emails Analyzer

- Whenever an email is sent, information is transmitted with that email and the route the email takes across a network is recorded. This information is known as the ‘Extended Header’.

- The extended header can be of great use to the researcher and when used correctly, provides an insight into the sender, their software and hardware and potential recipients.

- The extended header information potentially includes the senders IP address, email client, return address and the route the email has taken to reach its destination. This is useful in identifying and investigating ‘spoof’ or ‘phishing’ emails.

Emails Analyzer - Tools

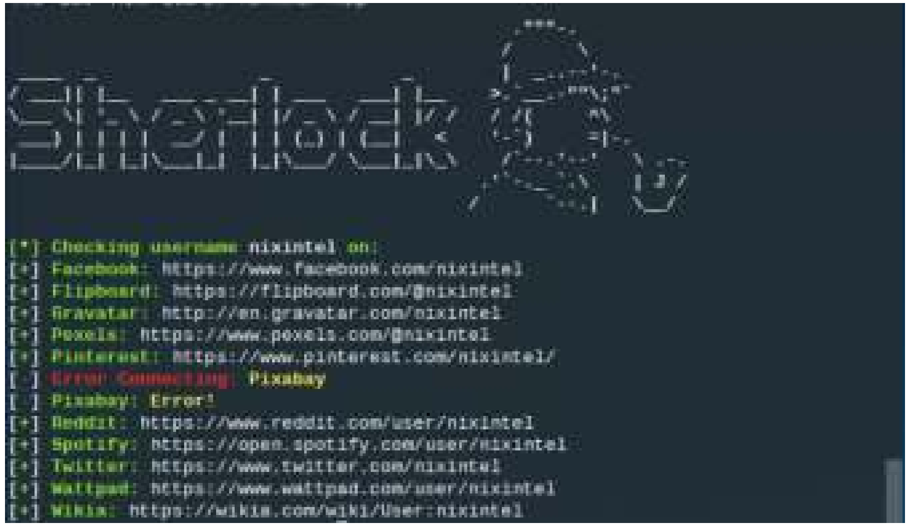
- Google Hacking;

site:organisation.com intext:@organisation.com

site:bbc.co.uk intext:@bbc.co.uk

intext:"boris.johnson.mp@parliament.uk" filetype:pdf

- Sherlock;



```
[*] Checking username nixintel on:
[+] Facebook: https://www.facebook.com/nixintel
[+] Flipboard: https://flipboard.com/@nixintel
[+] Gravatar: http://en.gravatar.com/nixintel
[+] Pexels: https://www.pexels.com/@nixintel
[+] Pinterest: https://www.pinterest.com/nixintel/
[-] Error Connecting: Pixabay
[-] Pixabay: Error!
[+] Reddit: https://www.reddit.com/user/nixintel
[+] Spotify: https://open.spotify.com/user/nixintel
[+] Twitter: https://www.twitter.com/nixintel
[+] Wattpad: https://www.wattpad.com/user/nixintel
[+] Wikia: https://wikia.com/wiki/User:nixintel
```

Emails Analyzer – Tools 2

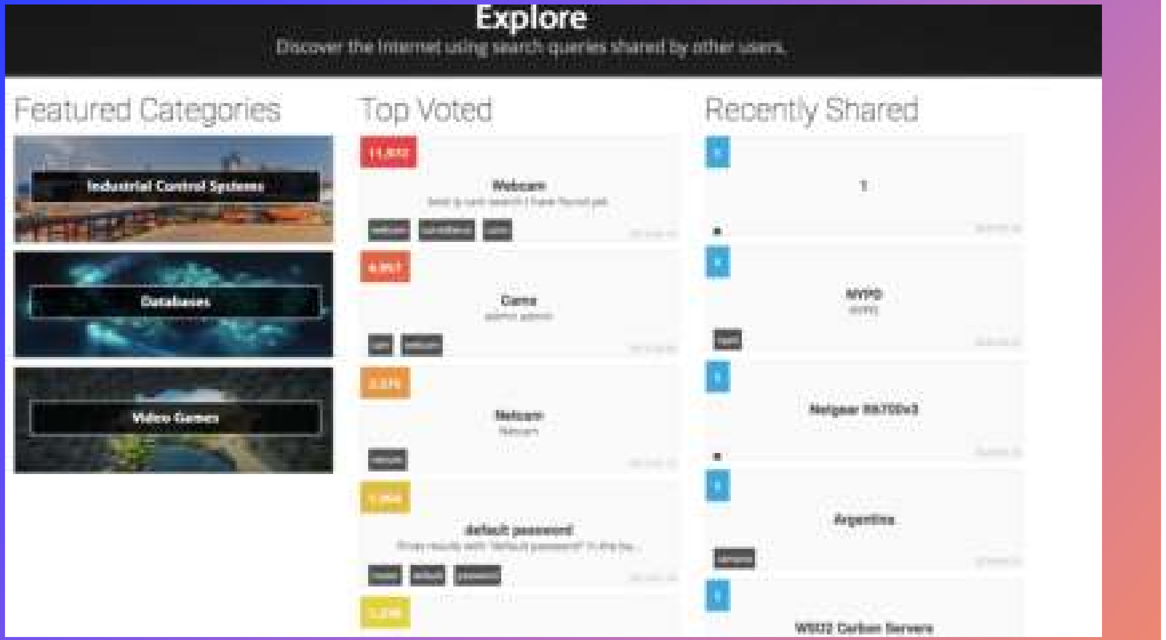
- Pastebin;
- Have I been pwned?
- Emailrep.io;
- Hunter.io;
- Whitepages;
- Twitter;
- Mxtoolbox;
- Spiderfoot;
- ProtOsint;
- https://github.com/bitsofinfo/comms-analyzer-toolbox

Threat Intelligence Platform

- MISP;
- OpenCTI;
- IBM X-Force Exchange;
- ManageEngine;
- Anomali ThreatStream;
- LogRhytm TLM;
- Mandiant Threat Suite;
- Recorded Future;
- Virus Total Intelligence;
- Shodan;

Shodan Malware Hunter

- https://malware-hunter.shodan.io/
- Malware Hunter is a specialized Shodan crawler that explores the Internet looking for command & control (C2s) servers for botnets. It does this by pretending to be an infected client that's reporting back to a C2. Since we don't know where the C2s are located the crawler effectively reports back to every IP on the Internet as if the target IP is a C2. If the crawler gets a positive response from the IP then we know that it's a C2.



Explore

Discover the Internet using search queries shared by other users.

Featured Categories

- Industrial Control Systems
- Databases
- Video Games

Top Voted

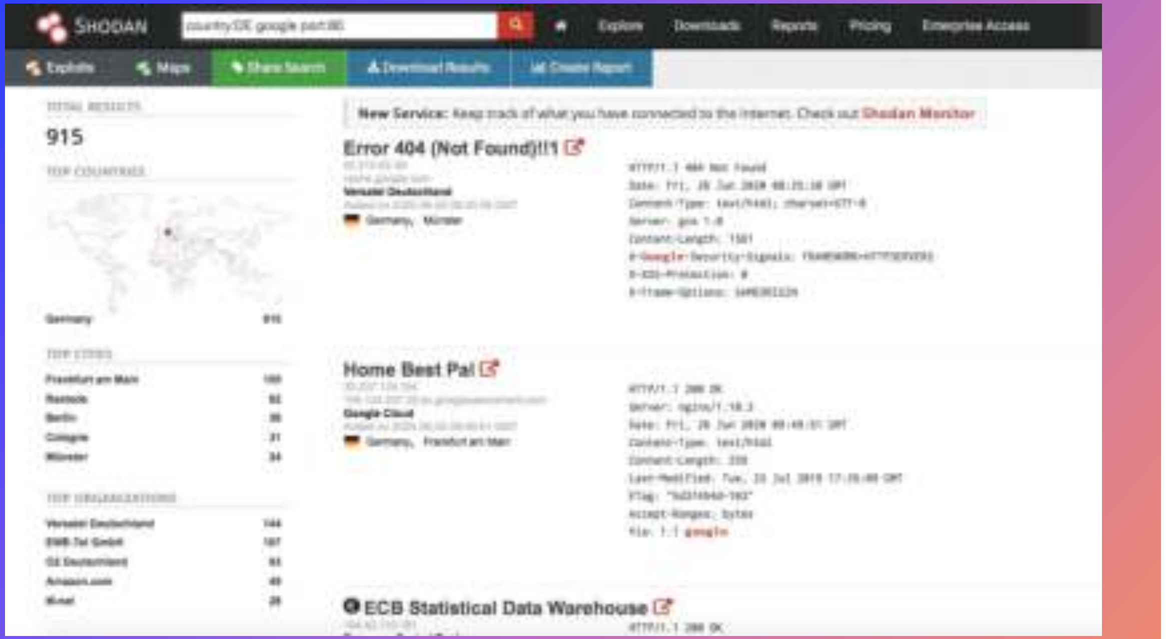
- Webcam
- Cams
- Netcam
- default password

Recently Shared

- 1
- MYPD
- Netgear R6700v3
- Argentina
- WSO2 Carbon Servers

Shodan OSINT

- Shodan is a search engine that lets the user find specific types of computers (webcams, routers, servers, etc.) connected to the internet using a variety of filters. Some have also described it as a search engine of service banners, which are metadata that the server sends back to the client. This can be information about the server software, what options the service supports, a welcome message or anything else that the client can find out before interacting with the server.



TOTAL RESULTS

915

TOP COUNTRIES

Germany	915

TOP CITIES

Frankfurt am Main	100
Rostock	92
Berlin	38
Cologne	31
Münster	34

TOP ORGANIZATIONS

Versatel Deutschland	144
EWE-Tel GmbH	107
O2 Deutschland	93
Amazon.com	49
M-net	28

New Service: Keep track of what you have connected to the Internet. Check out Shodan Monitor

Error 404 (Not Found)!!1

Versatel Deutschland

Germany, Münster

```
HTTP/1.1 404 Not Found
Date: Fri, 26 Jun 2020 08:25:18 GMT
Content-Type: text/html; charset=UTF-8
Server: gws 1.0
Content-Length: 1561
X-Google-Security-Signals: FRAMEWORK=HTTPSERVER2
X-XSS-Protection: 0
X-Frame-Options: SAMEORIGIN
```

Home Best Pal

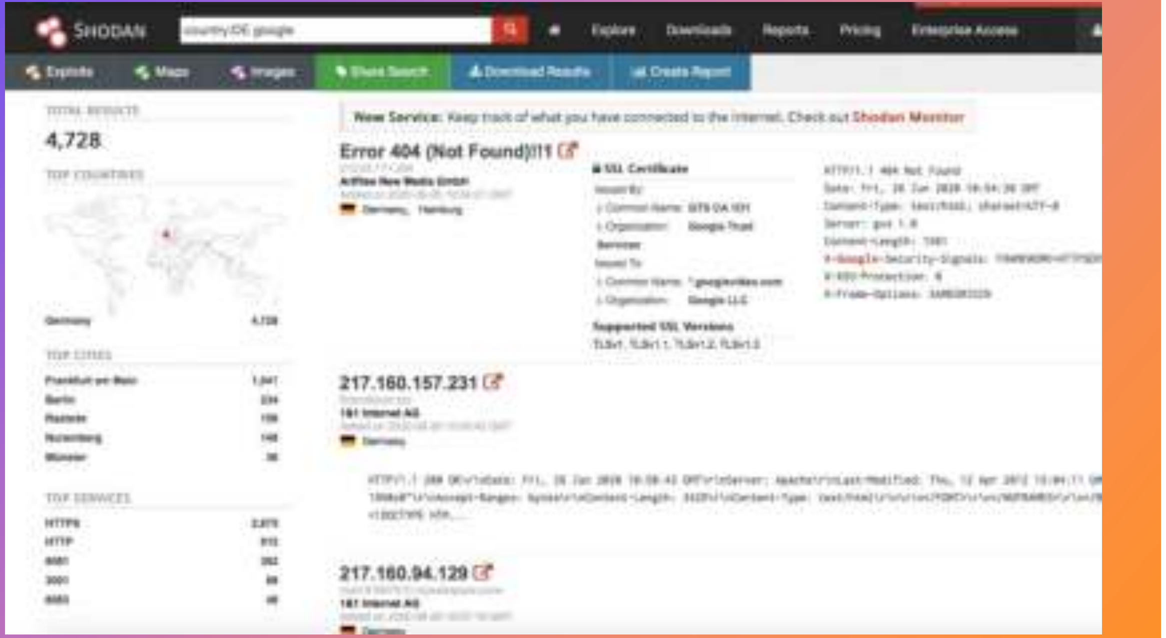
Google Cloud

Germany, Frankfurt am Main

```
HTTP/1.1 200 OK
Server: nginx/1.10.3
Date: Fri, 26 Jun 2020 09:48:51 GMT
Content-Type: text/html
Content-Length: 338
Last-Modified: Tue, 23 Jul 2019 17:26:08 GMT
ETag: "5d374940-152"
Accept-Ranges: bytes
Via: 1.1 google
```

ECB Statistical Data Warehouse

```
HTTP/1.1 200 OK
```



TOTAL RESULTS

4,728

TOP COUNTRIES

Germany	4,728

TOP CITIES

Frankfurt am Main	1,041
Berlin	234
Rostock	158
Nuremberg	148
Münster	36

TOP SERVICES

HTTPS	2,875
HTTP	812
8081	282
3001	88
8443	48

New Service: Keep track of what you have connected to the Internet. Check out Shodan Monitor

Error 404 (Not Found)!!1

Artfiles New Media GmbH

Germany, Hamburg

SSL Certificate

Issued By:

|- Common Name: GTS CA 1O1

|- Organization: Google Trust Services

Issued To:

|- Common Name: *.googlevideo.com

|- Organization: Google LLC

Supported SSL Versions

TLSv1, TLSv1.1, TLSv1.2, TLSv1.3

```
HTTP/1.1 404 Not Found
Date: Fri, 26 Jun 2020 10:54:36 GMT
Content-Type: text/html; charset=UTF-8
Server: gvs 1.0
Content-Length: 1561
X-Google-Security-Signals: FRAMEWORK=HTTPSERVER
X-XSS-Protection: 0
X-Frame-Options: SAMEORIGIN
```

217.160.157.231

1&1 Internet AG

Germany

```
HTTP/1.1 200 OK\r\nDate: Fri, 26 Jun 2020 10:58:42 GMT\r\nServer: Apache\r\nLast-Modified: Thu, 12 Apr 2012 15:04:11 GM
[illegible]
<!DOCTYPE htm...
```

217.160.94.129

1&1 Internet AG

Germany

Shodan OSINT 2

- To select a specific country type: country: <Country Symbol>
- To select specific ports type: port: <Ports_HERE>
- To search for a specifit operating system(OS) type: os: <OS_HERE>

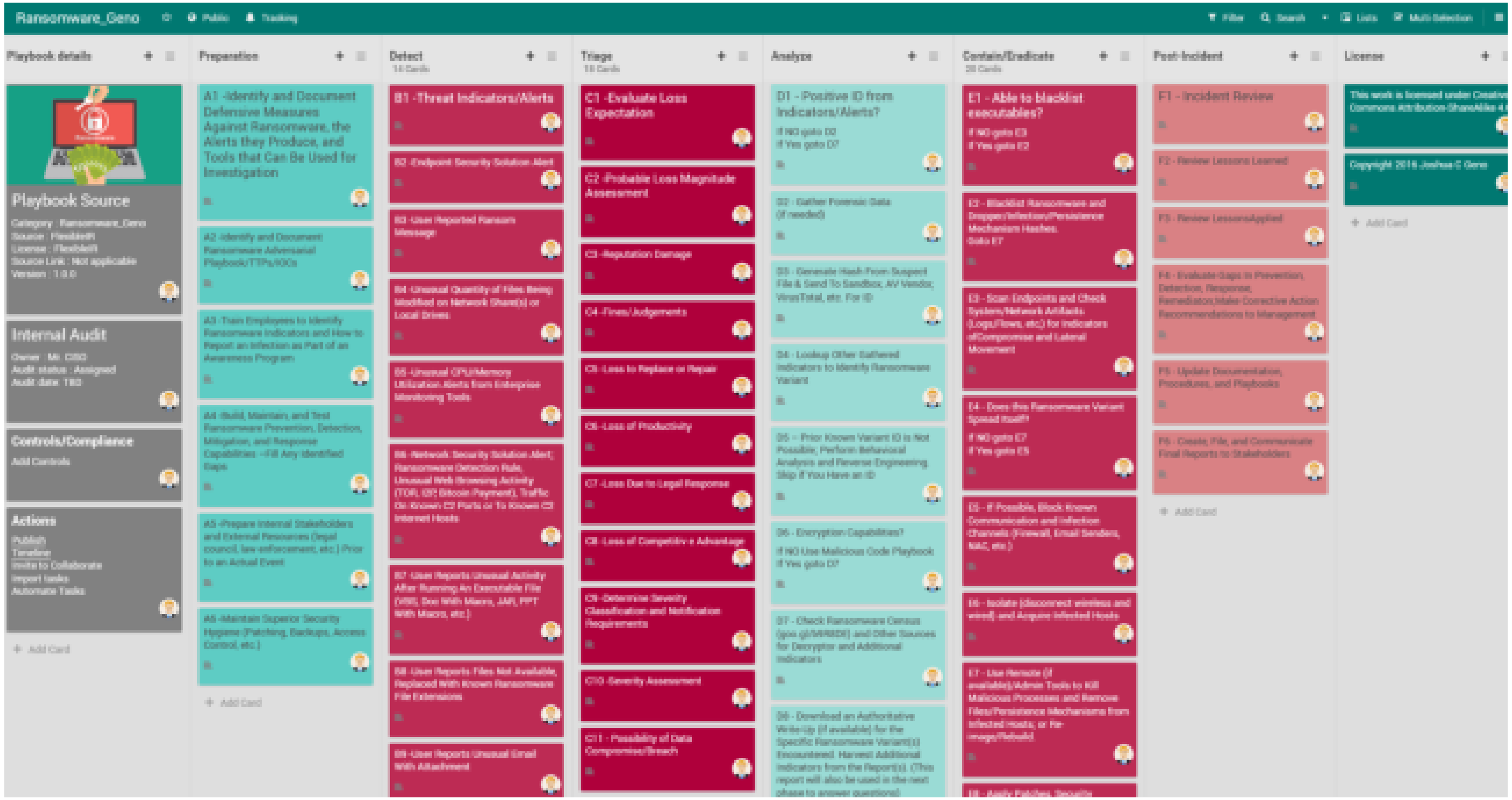
https://www.blueteamsacademy.com/shodan/

Using Maltego to Identify and Investigate on C2 Malware in Your Network

- Maltego has a number of data integrations especially helpful for cybersecurity professionals and threat hunters seeking to identify hidden threats in the organization’s network and trace the origin of said threats. In this tutorial, we will demonstrate how you can use Transforms from ATT&CK - MISP, VirusTotal Public API, and ZETAlytics Massive Passive to acquire threat intel, find hashes related to certain domains and IPs, and uncover threat actor network.
- Step 1: Identify Whether Hashes are False Alerts
- Step 2: Find Out Relevant IP Addresses using MISP Transforms
- Step 3: Investigate on Suspicious IP Addresses using ZETAlytics Transforms
- Step 4: Identify How the Malware Entered the Company Network
- Step 5: Deep-Dive into Malicious Domains to Find the Source of Malware Entry

https://www.maltego.com/blog/identify-c2-malware-and-phishing-threats-with-maltego/

Ransomware Playbook



Ransomware_Geno · Public · Tracking · Filter · Search · Lists · Multi-Selection

Playbook details

Playbook Source
Category : Ransomware_Geno
Source : FlexibleIR
License : FlexibleIR
Source Link : Not applicable
Version : 1.0.0

Internal Audit
Owner : Mr. CISO
Audit status : Assigned
Audit date: TBD

Controls/Compliance
Add Controls

Actions
Publish
Timeline
Invite to Collaborate
Import tasks
Automate Tasks

+ Add Card

Preparation

A1 -Identify and Document Defensive Measures Against Ransomware, the Alerts they Produce, and Tools that Can Be Used for Investigation

A2 -Identify and Document Ransomware Adversarial Playbook/TTPs/IOCs

A3 -Train Employees to Identify Ransomware Indicators and How to Report an Infection as Part of an Awareness Program

A4 -Build, Maintain, and Test Ransomware Prevention, Detection, Mitigation, and Response Capabilities --Fill Any Identified Gaps

A5 -Prepare Internal Stakeholders and External Resources (legal council, law enforcement, etc.) Prior to an Actual Event

A6 -Maintain Superior Security Hygiene (Patching, Backups, Access Control, etc.)

+ Add Card

Detect
14 Cards

B1 -Threat Indicators/Alerts

B2 -Endpoint Security Solution Alert

B3 -User Reported Ransom Message

B4 -Unusual Quantity of Files Being Modified on Network Share(s) or Local Drives

B5 -Unusual CPU/Memory Utilization Alerts from Enterprise Monitoring Tools

B6 -Network Security Solution Alert; Ransomware Detection Rule, Unusual Web Browsing Activity (TOR, I2P, Bitcoin Payment), Traffic On Known C2 Ports or To Known C2 Internet Hosts

B7 -User Reports Unusual Activity After Running An Executable File (VBS, Doc With Macro, JAR, PPT With Macro, etc.)

B8 -User Reports Files Not Available, Replaced With Known Ransomware File Extensions

B9 -User Reports Unusual Email With Attachment

Triage
11 Cards

C1 -Evaluate Loss Expectation

C2 -Probable Loss Magnitude Assessment

C3 -Reputation Damage

C4 -Fines/Judgements

C5 -Loss to Replace or Repair

C6 -Loss of Productivity

C7 -Loss Due to Legal Response

C8 -Loss of Competitive Advantage

C9 -Determine Severity Classification and Notification Requirements

C10 -Severity Assessment

C11 - Possibility of Data Compromise/Breach

Analyze

D1 - Positive ID from Indicators/Alerts?
If NO goto D2
If Yes goto D7

D2 - Gather Forensic Data (if needed)

D3 - Generate Hash From Suspect File & Send To Sandbox, AV Vendor, VirusTotal, etc. For ID

D4 - Lookup Other Gathered Indicators to Identify Ransomware Variant

D5 -- Prior Known Variant ID is Not Possible, Perform Behavioral Analysis and Reverse Engineering Skip if You Have an ID

D6 - Encryption Capabilities?
If NO Use Malicious Code Playbook
If Yes goto D7

D7 - Check Ransomware Census (goo.gl/MRBDE) and Other Sources for Decryptor and Additional Indicators

D8 - Download an Authoritative Write-Up (if available) for the Specific Ransomware Variant(s) Encountered. Harvest Additional Indicators from the Report(s). (This report will also be used in the next phase to answer questions)

Contain/Eradicate
20 Cards

E1 - Able to blacklist executables?
If NO goto E3
If Yes goto E2

E2 - Blacklist Ransomware and Dropper/Infection/Persistence Mechanism Hashes.
Goto E7

E3 - Scan Endpoints and Check System/Network Artifacts (Logs/Flows, etc.) for Indicators ofCompromise and Lateral Movement

E4 - Does this Ransomware Variant Spread Itself?
If NO goto E7
If Yes goto E5

E5 - If Possible, Block Known Communication and Infection Channels (Firewall, Email Senders, NAC, etc.)

E6 - Isolate (disconnect wireless and wired) and Acquire Infected Hosts

E7 - Use Remote (if available)/Admin Tools to Kill Malicious Processes and Remove Files/Persistence Mechanisms from Infected Hosts, or Re-image/Rebuild

E8 - Apply Patches, Security

Post-Incident

F1 - Incident Review

F2 - Review Lessons Learned

F3 - Review LessonsApplied

F4 - Evaluate Gaps In Prevention, Detection, Response, Remediation;Make Corrective Action Recommendations to Management

F5 - Update Documentation, Procedures, and Playbooks

F6 - Create, File, and Communicate Final Reports to Stakeholders

+ Add Card

License

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Copyright 2016 Joshua C Geno

+ Add Card

https://github.com/counteractive/incident-response-plan-template/blob/master/playbooks/playbook-ransomware.md

References

- https://www.trellix.com/en-us/security-awareness/ransomware/what-is-ransomware.html
- https://us.norton.com/internetsecurity-malware-types-of-ransomware.html
- https://h11dfs.com/9-step-ransomware-incident-response-plan/
- https://dxc.com/us/en/insights/perspectives/paper/ransomware-survival-guide---recover-from-an-attack-
- https://www.sentinelone.com/cybersecurity-101/open-source-intelligence-osint/
- https://www.researchgate.net/figure/Model-for-the-money-laundering-of-ransomware-and-cryptoware-profits-via-bitcoins_fig2_343009039
- https://bitquery.io/blog/trace-bitcoin-transaction-and-address
- https://www.secjuice.com/osint-daily-dose-of-malware/