DATA MINING TOR, SOCIAL NETWORKS, OSINT WITH AIL PROJECT

E.102

CIRCL COMPUTER INCIDENT RESPONSE CENTER LUXEMBOURG

MISP PROJECT https://www.misp-project.org/

MISP
Threat Sharing

MARCH 29, 2022 - VO.7

INTRODUCTION

CONCEPTS - DEEP WEB

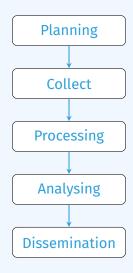
- **Deep Web** is the part of World Wide Web not indexed or directly accessible by standard web search-engines;
- This can be content hidden from **crawlers** by requiring a specific access and this can includes private social media, password-protected forums or content protected by different measures such as paywalls or specific security interface to access the information;
- A large portion of content accessible via Internet is part of the deep web¹.

¹also called invisible web, hidden web or non-indexed web

CONCEPTS - DARKNET

- **Darknet** is an overlay network running on top of Internet requiring specific software to access the network and its services;
- Tor, I2P and Freenet are the most commonly used ones. Many are used for hidden services access and some for proxy access to the Internet;
- There are **legitimate use-cases** for such network but also many **illegal or criminal usage**.

LIFECYCLE OF COLLECTION AND ANALYSIS



COLLECTING, PROCESSING AND ANALYSING CONTENT - WEB PAGES

- Building a search engine on the web is a challenging task because:
 - ► it has to crawl webpages,
 - it has to to make sense of unstructured data,
 - it has to **index** these data,
 - it has to provide a way to retrieve data and structure data (e.g. correlation).
- Doing so on Tor is even more challenging because:
 - services don't always want to be found,
 - parts of the dataset have to be discarded.
- in each case, it requires a lot of bandwidth, storage and computing power.

COLLECTING, PROCESSING AND ANALYSING CONTENT - STRUCTURED DATA

- Some data are structured and are easy to process:
 - metadata!
 - ► API responses.
- Some even provide cryptographic evidences:
 - authentication mechanisms between peers,
 - OpenGPG can leak a lot of metadata
 - key ids,
 - subject of email in thunderbird,
 - ► Bitcoin's Blockchain is public,
 - pivoting on these data with external sources yields interesting results.

AIL DESIGN OBJECTIVES

OBJECTIVES OF THE SESSION

- Show how to use and extend an open source tool to monitor web pages, pastes, forums and hidden services
- Explain challenges and the design of the AIL open source framework
- Review different collection mechanisms and sources
- Learn how to create new modules
- Learn how to use, install and start AIL
- Supporting investigation using the AIL framework and including it in cyber threat intelligence lifecycle

AIL FRAMEWORK

FROM A REQUIREMENT TO A SOLUTION: AIL FRAMEWORK

History:

- AIL initially started as an **internship project** (2014) to evaluate the feasibility to automate the analysis of (un)structured information to find leaks.
- In 2019, AIL framework is an **open source software** in Python. The software is actively used (and maintained) by CIRCL and many organisations.
- In 2020, AIL framework is now a complete project called **ail project**².

²https://github.com/ail-project/

CAPABILITIES OVERVIEW

COMMON USAGE

- Check if mail/password/other sensitive information (terms tracked) leaked
- **Detect** reconnaissance of your infrastructure
- **Search** for leaks inside an archive
- Monitor and crawl websites

SUPPORT CERT/CSIRTS AND LAW ENFORCEMENT ACTIVITIES

- Proactive investigation: leaks detection
 - ► List of emails and passwords
 - ► Leaked database
 - AWS Keys
 - ► Credit-cards
 - ► PGP private keys
 - Certificate private keys
- Feed Passive DNS or any passive collection system
- CVE and PoC of vulnerabilities most used by attackers

SUPPORT CERT/CSIRTS AND LAW ENFORCEMENT ACTIVITIES

- Website monitoring
 - monitor booters
 - Detect encoded exploits (WebShell, malware encoded in Base64...)
 - ► SQL injections
- Automatic and manual submission to threat sharing and incident response platforms
 - ► MISP
 - ► TheHive
- Term/Regex/Yara monitoring for local companies/government

Sources of Leaks: Paste Monitoring

- Example: https://gist.github.com/
 - ► Easily storing and sharing text online
 - Used by programmers and legitimate users
 - \rightarrow Source code & information about configurations

Sources of Leaks: Paste monitoring

- Example: https://gist.github.com/
 - ► Easily storing and sharing text online
 - Used by programmers and legitimate users
 - → Source code & information about configurations
- Abused by attackers to store:
 - ► List of vulnerable/compromised sites
 - ► Software vulnerabilities (e.g. exploits)
 - Database dumps
 - \rightarrow User data
 - \rightarrow Credentials
 - → Credit card details
 - ► More and more ...

WHY SO MANY LEAKS?

- Economical interests (e.g. Adversaries promoting services)
- Ransom model (e.g. To publicly pressure the victims)
- Political motives (e.g. Adversaries showing off)
- Collaboration (e.g. Criminals need to collaborate)
- Operational infrastructure (e.g. malware exfiltrating information on a pastie website)
- Mistakes and errors

ARE LEAKS FREQUENT?

Yes! and we have to deal with this as a CSIRT.

- Contacting companies or organisations who did specific accidental leaks
- Discussing with media about specific case of leaks and how to make it more practical/factual for everyone
- Evaluating the economical market for cyber criminals (e.g. DDoS booters³ or reselling personal information reality versus media coverage)
- Analysing collateral effects of malware, software vulnerabilities or exfiltration
 - \rightarrow And it's important to detect them automatically.

³https://github.com/D4-project/

PASTE MONITORING AT CIRCL: STATISTICS

- Monitored paste sites: 27
 - ▶ gist.github.com
 - ▶ ideone.com
 - **...**

| | 2016 | 2017 | 08.2018 |
|------------------|------------|------------|------------|
| Collected pastes | 18,565,124 | 19,145,300 | 11,591,987 |
| Incidents | 244 | 266 | 208 |

Table: Pastes collected and incident⁴ raised by CIRCL

⁴http://www.circl.lu/pub/tr-46

CURRENT CAPABILITIES

AIL FRAMEWORK: CURRENT CAPABILITIES

- Extending AIL to add a new analysis module can be done in 50 lines of Python
- The framework **supports multi-processors/cores by default**. Any analysis module can be started multiple times to support faster processing during peak times or bulk import
- Multiple concurrent data input
- Tor Crawler (handle cookies authentication)

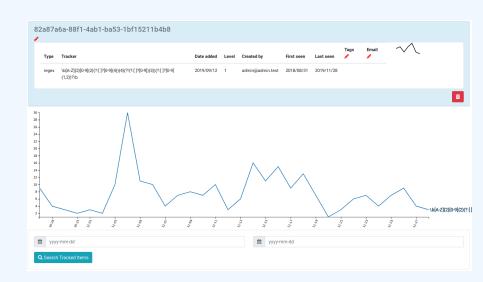
AIL FRAMEWORK: CURRENT FEATURES

- Extracting credit cards numbers, credentials, phone numbers, ...
- Extracting and validating potential hostnames
- Keeps track of duplicates
- Submission to threat sharing and incident response platform (MISP and TheHive)
- Full-text indexer to index unstructured information
- Tagging for classification and searches
- Terms, sets, regex and YARA tracking and occurences
- Archives, files and raw submission from the UI
- PGP, Cryptocurrency, Decoded (Base64, ...) and username Correlation
- And many more

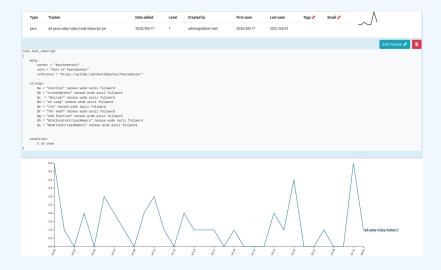
TERMS TRACKER

- Search and monitor specific keywords/patterns
 - ► Automatic Tagging
 - ► Email Notifications
- Track Term
 - ► ddos
- Track Set
 - booter,ddos,stresser;2
- Track Regex
 - ► circl\.lu
- YARA rules
 - https://github.com/ail-project/ail-yara-rules

TERMS TRACKER



YARA TRACKER



TERMS TRACKER - PRACTICAL PART

■ Create and test your own tracker



RECON AND INTELLIGENCE GATHERING TOOLS

Attacker also share informations

- Recon tools detected: 94
 - sqlmap
 - dnscan
 - whois
 - msfconsole (metasploit)
 - ► dnmap
 - nmap
 - **...**

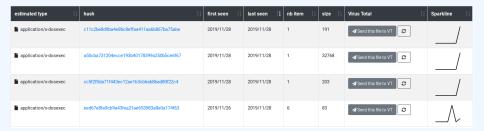
RECON AND INTELLIGENCE GATHERING TOOLS

```
Hostname
             www.pabloquintanilla.cl
                                                 TSP
                                                        Wix.com Itd.
Continent
             North America
                                   Flag
US
Country
             United States
                                  Country Code
                                                 US
Region Unknown
                            Local time 19 Nov 2019 07:59 CST
City
                            Postal Code
                                        Unknown
      Unknown
TP Address
             185.230.60.195
                                  Latitude
                                                 37.751
                    Longitude
                                   -97.822
> www.pabloguintanilla.cl
Server:
             38.132.106.139
Address:
             38.132.106.139#53
Non-authoritative answer:
www.pabloquintanilla.cl canonical name = www192.wixdns.net.
                    canonical name = balancer.wixdns.net.
www192.wixdns.net
Name: balancer.wixdns.net
Address: 185,230,60,211
Domain name: pabloquintanilla.cl
Registrant name: SERGIO TORO
Registrant organisation:
Registrar name: NIC Chile
Registrar URL: https://www.nic.cl
Creation date: 2018-11-21 14:34:34 CLST
```

DECODER

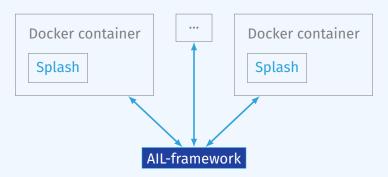
- Search for encoded strings
 - ► Base64
 - ► Hexadecimal
 - Binary
- Guess Mime-type
- Correlate paste with decoded items

DECODER:



CRAWLER

- Crawlers are used to navigate on regular website as well as .onion addresses (via automatic extraction of urls or manual submission)
- Splash ("scriptable" browser) is rending the pages (including javascript) and produce screenshots (HAR archive too)



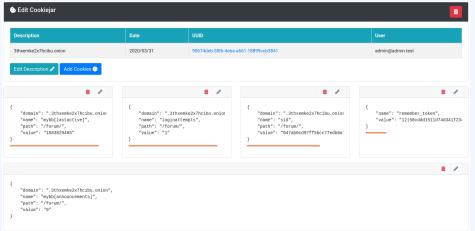
CRAWLER

How a domain is crawled by default

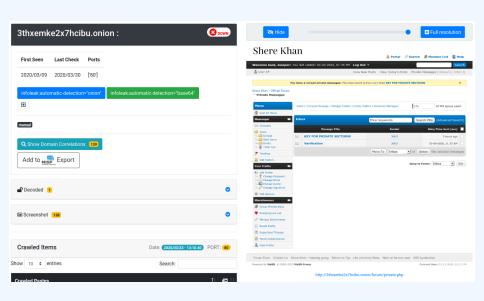
- 1. Fetch the first url
- 2. Render javascript (webkit browser)
- 3. Extract all urls
- 4. Filter url: keep all url of this domain
- 5. crawl next url (max depth = 1)

CRAWLER: COOKIEJAR

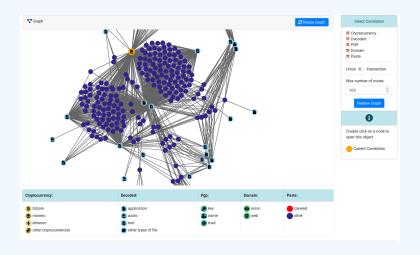
Use your cookies to login and bypass captcha



CRAWLER: COOKIEJAR

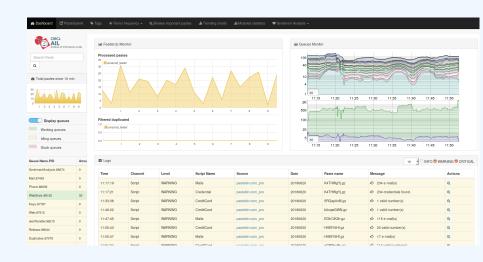


CORRELATIONS AND RELATIONSHIP



LIVE DEMO!

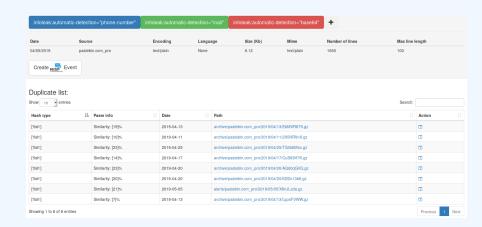
EXAMPLE: DASHBOARD



EXAMPLE: TEXT SEARCH



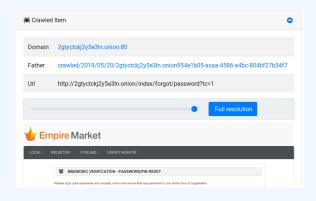
EXAMPLE: ITEMS METADATA (1)



EXAMPLE: ITEMS METADATA (2)



EXAMPLE: ITEMS METADATA (3)



EXAMPLE: BROWSING CONTENT

Content:

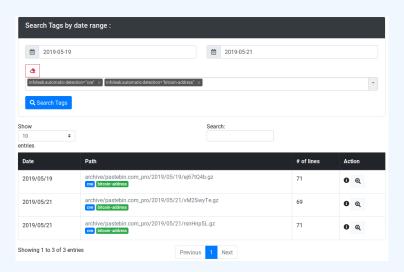
```
http://members2.mofosnetwork.com/access/login/
somosextremos:buddy1990
brazzers_glenn:cocklick
brazzers61:braves01
http://members.naughtyamerica.com/index.php?m=login
gernblanston:3unc2352
Janhuss141200:310575
igetalliwant:1377zeph
pwilks89:mon22key
Bman1551:hockey
MoFos IKnowThatGirl PublicPickUps
http://members2.mofos.com
Chrismagg40884:loganm40
brando1:zzbrando1
aacoen:1q2w3e4r
1rstunkle23:my8self
Bra77ers
http://ma.brazzers.com
qcjensen:qcj21pva
skycsc17:rbcdnd
                                 >| Get Daily Update Fresh Porn Password Here |<
                                           => http://www.erg.io/4mF1
```

EXAMPLE: BROWSING CONTENT

Content:

```
Over 50000+ custom hacked xxx passwords by us! Thousands of free xxx passwords to the hottest paysites!
>| Get Fresh New Premium XXX Site Password Here |<
     http://www.erq.io/4mF1
http://ddfnetwork.com/home.html
eu172936:hCSBaKh
UecwB6zs:159X0$!r#6K78FuU
http://pornxn.stiffia.com/user/login
feldwWek8939:RObluJ8XtB
dabudka:17891789
brajits:brajits1
http://members.pornstarplatinum.com/sblogin/login.php/
gigiriveracom:xxxiav
jayx123:xxxjay69
http://members.vividceleb.com/
Rufio99:fairhaven
ScH1FRv1:102091
Chaos84:HOLE5244
Riptor795:blade7
Dom180:harkonnen
GaggedUK:a1k0chan
http://www.ariellaferrera.com/
```

EXAMPLE: SEARCH BY TAGS



MISP

MISP TAXONOMIES

- **Tagging** is a simple way to attach a classification to an event or anattribute.
- Classification must be globally used to be efficient.
- Provide a set of already defined classifications modeling estimative language
- Taxonomies are implemented in a simple JSON format ⁵.
- Can be easily cherry-picked or extended

⁵https://github.com/MISP/misp-taxonomies

TAXONOMIES USEFUL IN AIL

- infoleak: Information classified as being potential leak.
- estimative-language: Describe quality and credibility of underlying sources, data, and methodologies.
- admiralty-scale: Rank the reliability of a source and the credibility of an information
- **fpf**⁶: Evaluate the degree of identifiability of personal data and the types of pseudonymous data, de-identified data and anonymous data.

⁶Future of Privacy Forum

TAXONOMIES USEFUL IN AIL

- **tor**: Describe Tor network infrastructure.
- **dark-web**: Criminal motivation on the dark web.
- **copine-scale**⁷: Categorise the severity of images of child sex abuse.

⁷Combating Paedophile Information Networks in Europe

THREAT SHARING AND INCIDENT RESPONSE PLATFORMS





Goal: submission to threat sharing and incident response platforms.

THREAT SHARING AND INCIDENT RESPONSE PLATFORMS





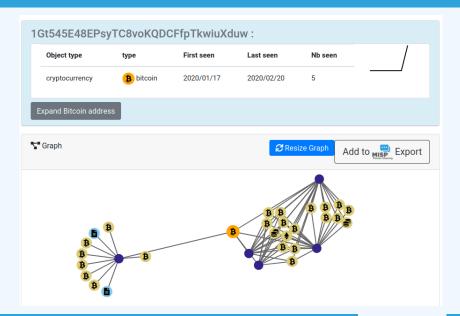


- 1. Use infoleak taxonomy⁸
- 2. Add your own tags
- 3. Export AIL objects to MISP core format
- 4. Download it or Create a MISP Event⁹

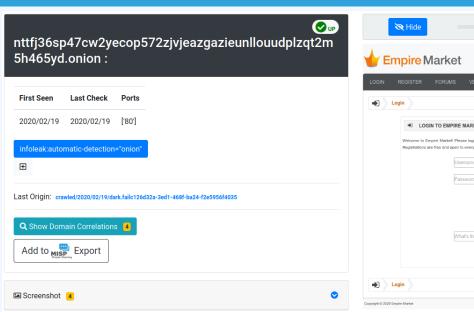
⁸https://www.misp-project.org/taxonomies.html

⁹https://www.misp-standard.org/rfc/misp-standard-core.txt

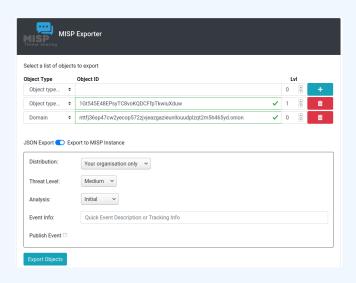
MISP EXPORT



MISP EXPORT



MISP EXPORT



AUTOMATIC SUBMISSION ON TAGS









Update Tags

•

API

AIL exposes a ReST API which can be used to interact with the back-end¹⁰.

■ AIL API is currently covering 60% of the functionality of back-end.

SETTING UP THE FRAMEWORK

SETTING UP AIL-FRAMEWORK FROM SOURCE

Setting up AIL-Framework from source

```
git clone
    https://github.com/ail-project/ail-framework.git
cd AIL-framework
./installing_deps.sh
```

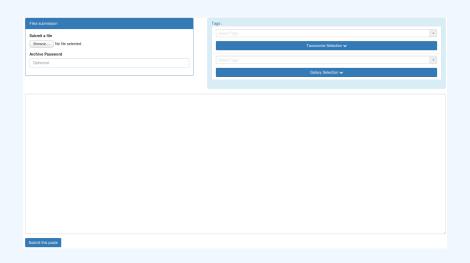
FEEDING THE FRAMEWORK

FEEDING AIL

There are different way to feed AIL with data:

- 1. Setup pystemon and use the custom feeder
 - pystemon will collect items for you
- 2. Use the new JSON Feeder (twitter)
- Feed your own data using the API or the import_dir.py script
- 4. Feed your own file/text using the UI (Submit section)

VIA THE UI (1)



VIA THE UI (2)



FEEDING AIL WITH YOUR OWN DATA - API

FEEDING AIL WITH YOUR OWN DATA - import_dir.py(1)

/!\ requirements:

- Each file to be fed must be of a reasonable size:
 - ► ~ 3 Mb / file is already large
 - ► This is because some modules are doing regex matching
 - ► If you want to feed a large file, better split it in multiple ones

FEEDING AIL WITH YOUR OWN DATA - import_dir.py(2)

- Check your local configuration configs/core.cfg
 - ► In the file configs/core.cfg,
 - ► Add 127.0.0.1:5556 in ZMQ Global
 - ► (should already be set by default)
- Launch import_dir.py with de directory you want to import
 - ▶ import_dir.py -d dir_path