CIRCL
Computer Incident
Response Center
Luxembourg

ail project

# AIL Project - Practical and Efficient Data-Mining of Chats, Suspicious Websites, Forums and Tor Hidden-Services

CIRCL - Virtual Summer School 2025

🏠 https://ail-project.org/

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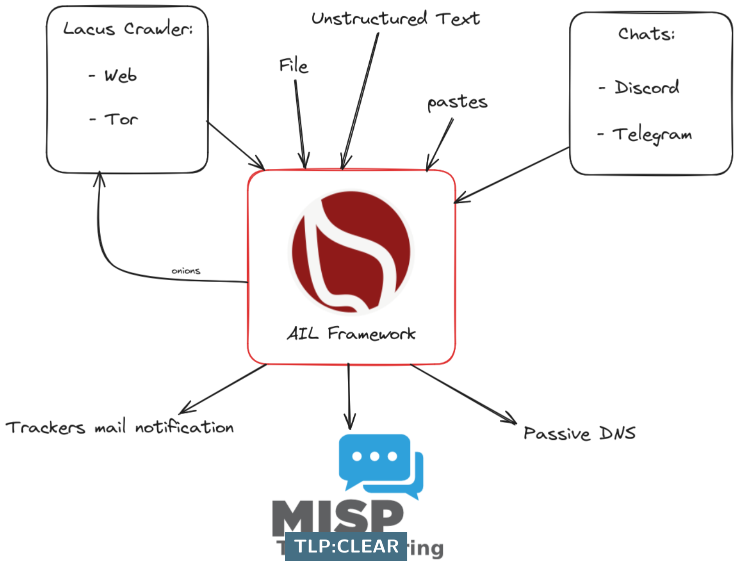
# Background

- Over the past years, CIRCL has developed the AIL project[1] to fulfill our needs at CIRCL in intelligence gathering and analysis.
- AIL features an extensible Python-based framework for the **analysis of unstructured information**, collected either through an advanced crawler manager or from various feeders, including social networks and custom feeders.
- The AIL Project is an **open-source** framework[2] comprising various modules designed for the **collection, crawling, digging, and analysis of unstructured data**.
- ail project

[1] https://www.ail-project.org/

[2] https://github.com/ail-project

# High Level Overview



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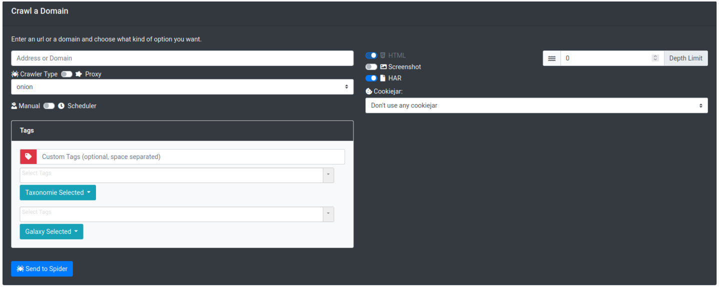
# *Collection* - automate crawling

- Crawling can be a challenging task, for example, gathering all the blog posts from ransomware groups[3], which can be demanding for an analyst.
- AIL offers a crawling feature that can **initiate regular crawls using a standard spawned browser**.



Crawl a Domain

Enter an url or a domain and choose what kind of option you want.

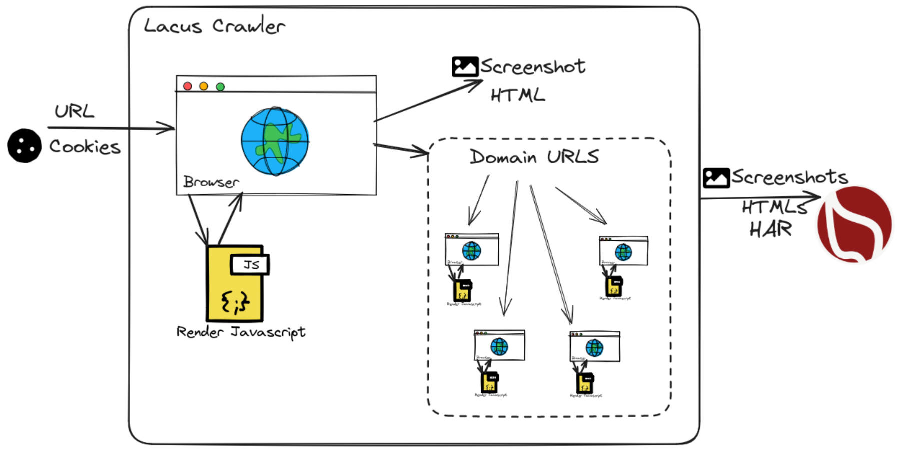
onion

Cookiejar: Don't use any cookiejar

Depth Limit: 0

[3] https://www.ransomlook.io/

# *Collection* - **Lacus Crawler**[4]



[4] https://github.com/ail-project/lacus

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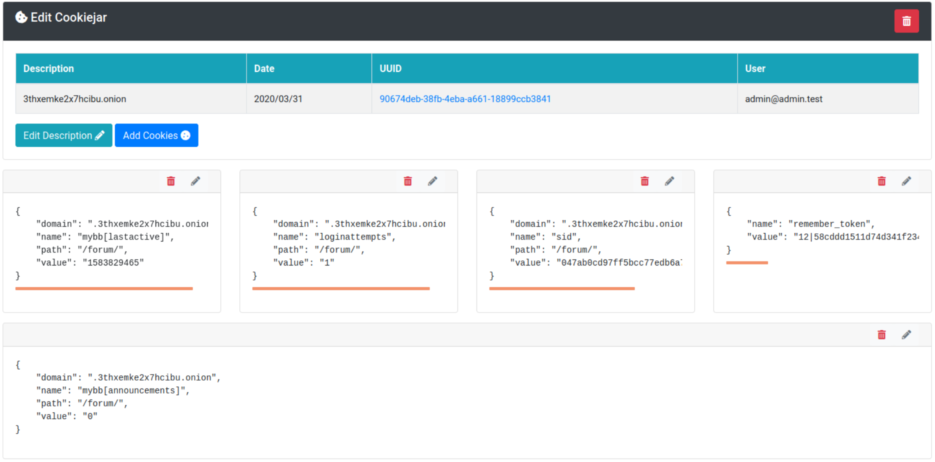
# Crawler: Cookiejar

Use your cookies to login and bypass captcha



| Description | Date | UUID | User |
|---|---|---|---|
| 3thxemke2x7hcibu.onion | 2020/03/31 | 90674deb-38fb-4eba-a661-18899ccb3841 | admin@admin.test |

```
{
    "domain": ".3thxemke2x7hcibu.onio
    "name": "mybb[lastactive]",
    "path": "/forum/",
    "value": "1583829465"
}
```

```
{
    "domain": ".3thxemke2x7hcibu.onio
    "name": "loginattempts",
    "path": "/forum/",
    "value": "1"
}
```

```
{
    "domain": ".3thxemke2x7hcibu.onio
    "name": "sid",
    "path": "/forum/",
    "value": "047ab0cd97ff5bcc77edb6a
}
```

```
{
    "name": "remember_token",
    "value": "12|58cddd1511d74d341f23
}
```

```
{
    "domain": ".3thxemke2x7hcibu.onion",
    "name": "mybb[announcements]",
    "path": "/forum/",
    "value": "0"
}
```

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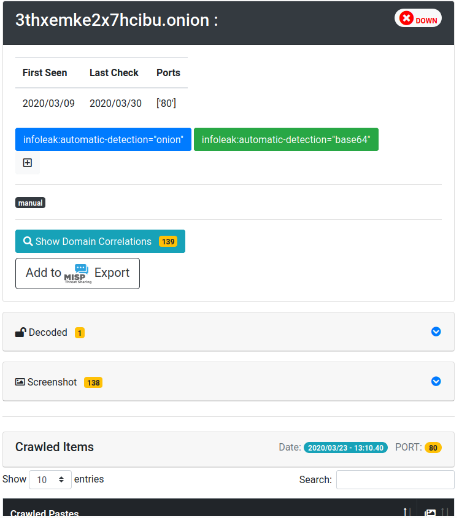
# Crawler: Cookiejar



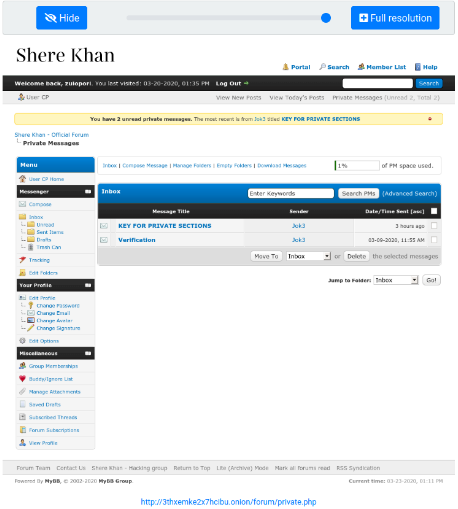
## 3thxemke2x7hcibu.onion :

| First Seen | Last Check | Ports |
|---|---|---|
| 2020/03/09 | 2020/03/30 | ['80'] |

infoleak:automatic-detection="onion" infoleak:automatic-detection="base64"

manual
Show Domain Correlations 139
Add to MISP Threat Sharing Export
Decoded 1
Screenshot 138

Crawled Items — Date: 2020/03/23 - 13:10.40 PORT: 80



Shere Khan

Welcome back, zulopori. You last visited: 03-20-2020, 01:35 PM Log Out

Private Messages (Unread 2, Total 2)

You have 2 unread private messages. The most recent is from Jok3 titled KEY FOR PRIVATE SECTIONS

Shere Khan - Official Forum
└ Private Messages

1% of PM space used.

Inbox

| Message Title | Sender | Date/Time Sent [asc] |
|---|---|---|
| KEY FOR PRIVATE SECTIONS | Jok3 | 3 hours ago |
| Verification | Jok3 | 03-09-2020, 11:55 AM |

Move To Inbox or Delete the selected messages
Jump to Folder: Inbox Go!
Forum Team Contact Us Shere Khan - Hacking group Return to Top Lite (Archive) Mode Mark all forums read RSS Syndication

Powered By MyBB, © 2002-2020 MyBB Group.

Current time: 03-23-2020, 01:11 PM

http://3thxemke2x7hcibu.onion/forum/private.php

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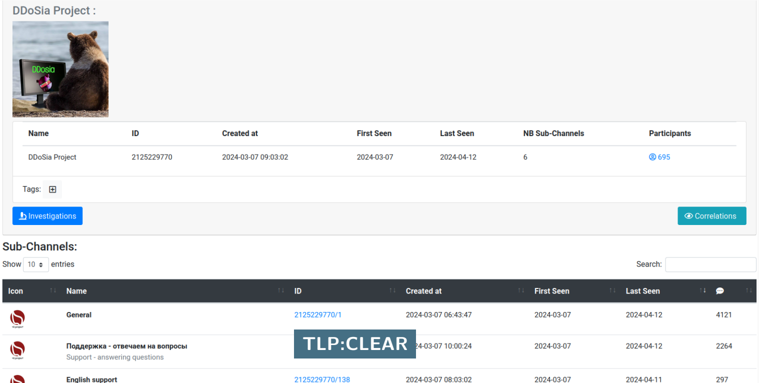
# Collection - Automate Collection

- Collecting data from various chat sources can be a **tedious task for analysts**.
- AIL offers a set of feeders (e.g., Telegram, Discord) that can be used to subscribe to chat channels.
- All the **collected messages are then processed and analyzed** within AIL's *processing* and *analysis* stages.



DDoSia Project :

| Name | ID | Created at | First Seen | Last Seen | NB Sub-Channels | Participants |
|---|---|---|---|---|---|---|
| DDoSia Project | 2125229770 | 2024-03-07 09:03:02 | 2024-03-07 | 2024-04-12 | 6 | 695 |

Tags: ⊞

Sub-Channels:

Show 10 entries

Search:

| Icon | Name | ID | Created at | First Seen | Last Seen | 💬 |
|---|---|---|---|---|---|---|
| | General | 2125229770/1 | 2024-03-07 06:43:47 | 2024-03-07 | 2024-04-12 | 4121 |
| | Поддержка - отвечаем на вопросы<br>Support - answering questions | | 24-03-07 10:00:24 | 2024-03-07 | 2024-04-12 | 2264 |
| | English support | 2125229770/138 | 2024-03-07 08:03:02 | 2024-03-07 | 2024-04-11 | 297 |

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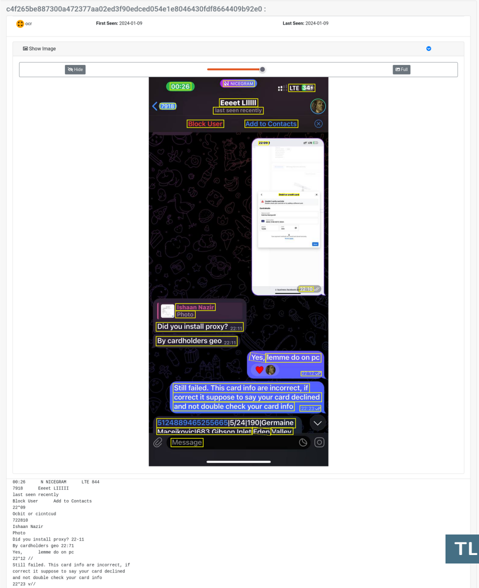
# OCR: Optical Character Recognition



c4f265be887300a472377aa02ed3f90edced054e1e8046430fdf8664409b92e0 :

ocr **First Seen:** 2024-01-09 **Last Seen:** 2024-01-09

```
00:26      N NICEGRAM      LTE 844
7918      Eeeet LIIIII
last seen recently
Block User      Add to Contacts
22*09
Ocbit or cicntcud
722810
Ishaan Nazir
Photo
Did you install proxy? 22-11
By cardholders geo 22:71
Yes,      lemme do on pc
22*12 //
Still failed. This card info are incorrect, if
correct it suppose to say your card declined
and not double check your card info
22*23 v//
```

- Threat actors are often verbose and frequently **share extensive details in private channels**.
- Many messages contain screenshots and images.
- Text detection and extraction are performed across 80+ languages using a CRNN (Convolutional Recurrent Neural Network).
- **Enables keyword-based matching and detection.**

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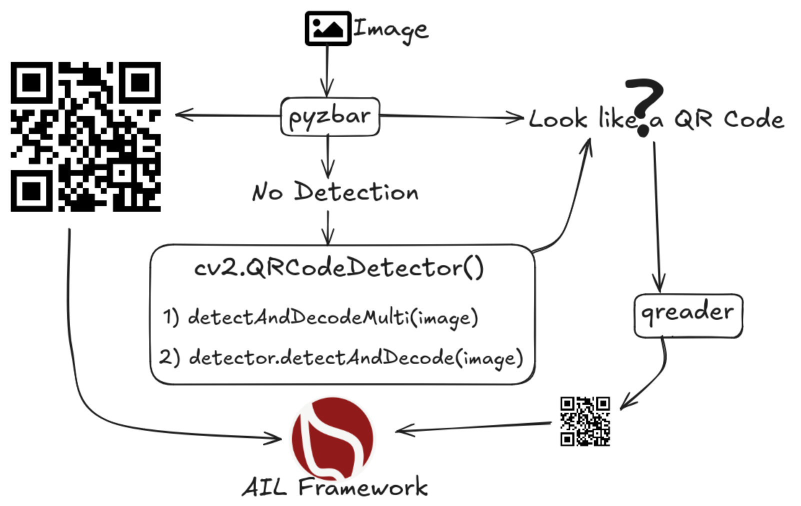
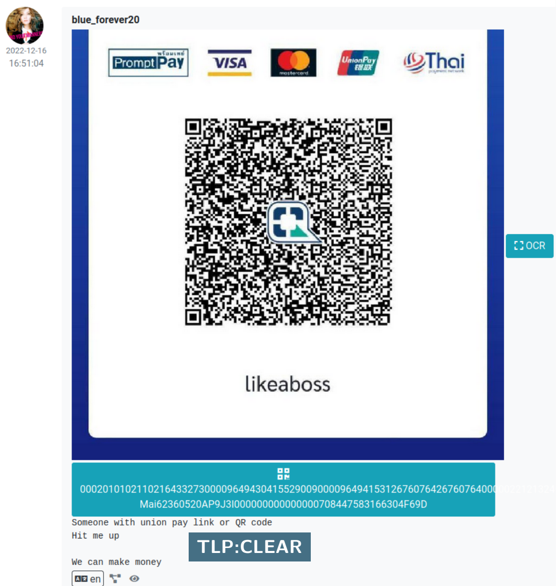
# QR Code Extractor



# QR Codes



blue_forever20

2022-12-16
16:51:04

0002010102110216433273000096494304155290090000096494153126760764267607640000022121324
Mai62360520AP9J3I0000000000000000708447583166304F69D

```
Someone with union pay link or QR code
Hit me up

We can make money
```

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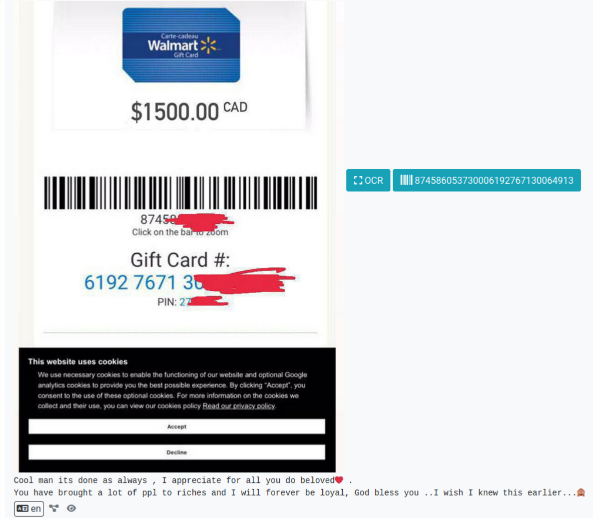
# Bar Codes



$1500.00 CAD

8745[redacted]
Click on the bar to zoom

Gift Card #:
6192 7671 3[redacted]
PIN: 27[redacted]

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87458605373000619276713006491 3

```
Cool man its done as always , I appreciate for all you do beloved❤️ .
You have brought a lot of ppl to riches and I will forever be loyal, God bless you ..I wish I knew this earlier...🙈
```

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# AIL Framework: Features

- Extracting **credit card numbers, credentials, phone numbers, . . .**
- Extracting and validating potential **hostnames**
- Submission to threat sharing and incident response platforms (**MISP** and **FlowIntel**[5])
- **Tagging**[6] for classification and searches
- Terms, sets, regex, and YARA **tracking, occurrences, and history**
- Archives, files, and raw **submission** from the UI
- Correlation engine based on PGP ID, cryptocurrencies, decoded (Base64, . . . ), usernames, cookie names, and many selectors to find relationships
- And many more

[5] https://github.com/flowintel/flowintel

[6] Relying on MISP taxonomies and galaxy

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# Live Trackers & Retro Hunt

- Search and monitor specific keywords/patterns
  - Automatic tagging
  - Email/webhook notifications
- Track Word
  - ddos
- Track Set
  - booter, ddos, stresser; 2
- Track Regex
  - circl\lu
- **YARA rules**
  - `https://github.com/ail-project/ail-yara-rules`

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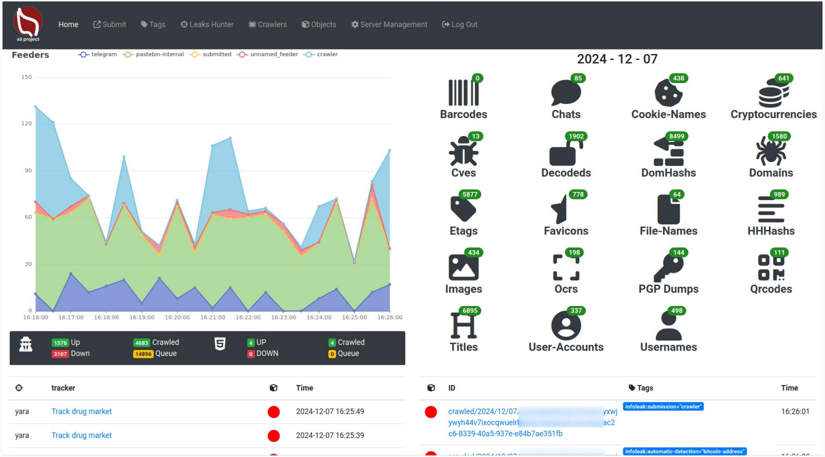
# Live Demo

# Dashboard



2024 - 12 - 07

| | | | |
|---|---|---|---|
| 0 Barcodes | 85 Chats | 438 Cookie-Names | 641 Cryptocurrencies |
| 13 Cves | 1902 Decodeds | 8499 DomHashs | 1580 Domains |
| 5877 Etags | 778 Favicons | 64 File-Names | 989 HHHashs |
| 434 Images | 198 Ocrs | 144 PGP Dumps | 111 Qrcodes |
| 6895 Titles | 337 User-Accounts | 498 Usernames | |

1576 Up
3107 Down
4683 Crawled
14896 Queue
4 UP
0 DOWN
4 Crawled
0 Queue

| | tracker | | Time |
|---|---|---|---|
| yara | Track drug market | ● | 2024-12-07 16:25:49 |
| yara | Track drug market | ● | 2024-12-07 16:25:39 |

| | ID | Tags | Time |
|---|---|---|---|
| ● | crawled/2024/12/07/[redacted]yxwj ywyh44v7ixocqwuelr[redacted]ac2 c6-8339-40a5-937e-e84b7ae351fb | infoleak:submission="crawler" | 16:26:01 |
| ● | | infoleak:automatic-detection="bitcoin-address" | |

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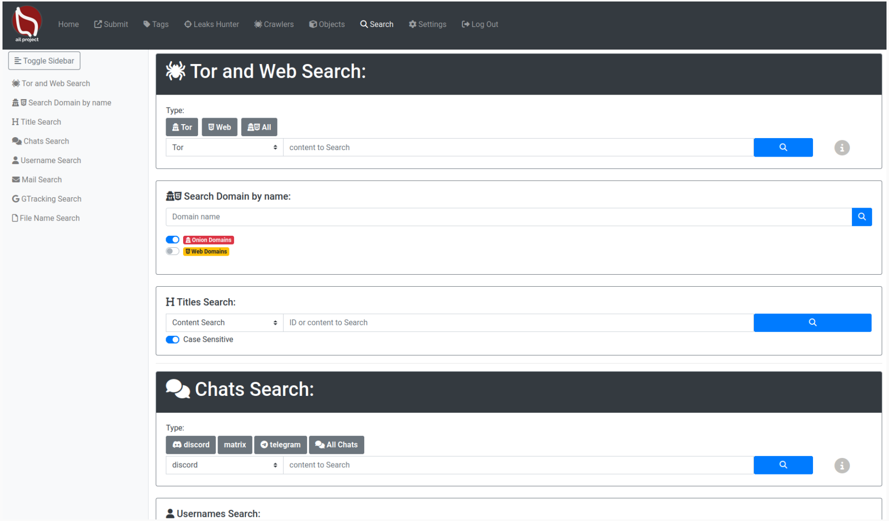
# Search



## Tor and Web Search:

Type:

Tor | content to Search

### Search Domain by name:

Domain name

### Titles Search:

Content Search | ID or content to Search

Case Sensitive

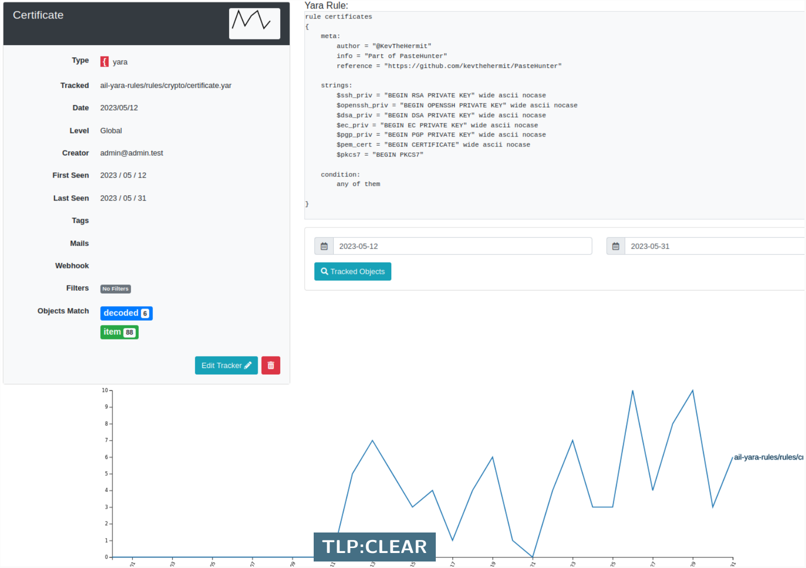
## Chats Search:

Type:

discord | content to Search

### Usernames Search:

# YARA Tracker



Certificate

Type: yara

Tracked: ail-yara-rules/rules/crypto/certificate.yar

Date: 2023/05/12

Level: Global

Creator: admin@admin.test

First Seen: 2023 / 05 / 12

Last Seen: 2023 / 05 / 31

Tags:

Mails:

Webhook:

Filters: No Filters

Objects Match: decoded 6<br>item 88

Yara Rule:

```
rule certificates
{
    meta:
        author = "@KevTheHermit"
        info = "Part of PasteHunter"
        reference = "https://github.com/kevthehermit/PasteHunter"

    strings:
        $ssh_priv = "BEGIN RSA PRIVATE KEY" wide ascii nocase
        $openssh_priv = "BEGIN OPENSSH PRIVATE KEY" wide ascii nocase
        $dsa_priv = "BEGIN DSA PRIVATE KEY" wide ascii nocase
        $ec_priv = "BEGIN EC PRIVATE KEY" wide ascii nocase
        $pgp_priv = "BEGIN PGP PRIVATE KEY" wide ascii nocase
        $pem_cert = "BEGIN CERTIFICATE" wide ascii nocase
        $pkcs7 = "BEGIN PKCS7"

    condition:
        any of them

}
```

2023-05-12

2023-05-31

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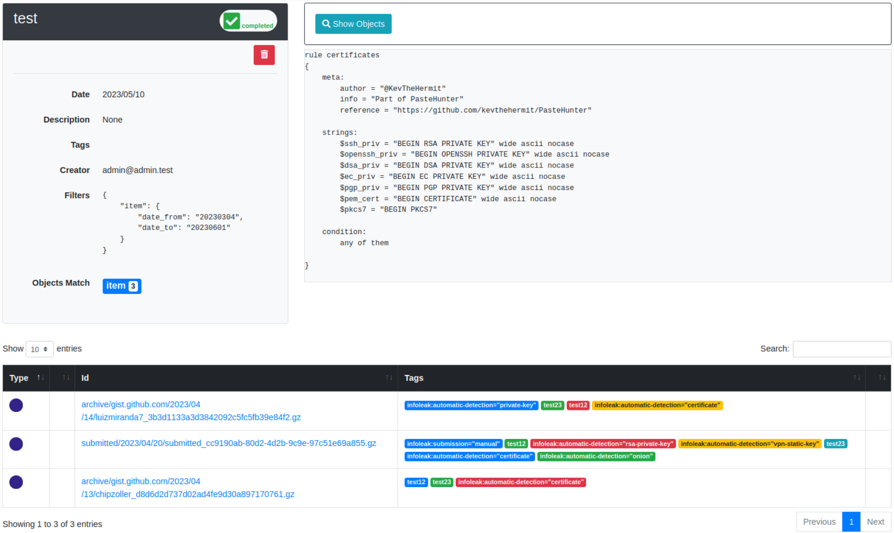
# Retro Hunt



**Date** 2023/05/10

**Description** None

**Tags**

**Creator** admin@admin.test

**Filters**

```
{
    "item": {
        "date_from": "20230304",
        "date_to": "20230601"
    }
}
```

**Objects Match** item 3

```
rule certificates
{
    meta:
        author = "@KevTheHermit"
        info = "Part of PasteHunter"
        reference = "https://github.com/kevthehermit/PasteHunter"

    strings:
        $ssh_priv = "BEGIN RSA PRIVATE KEY" wide ascii nocase
        $openssh_priv = "BEGIN OPENSSH PRIVATE KEY" wide ascii nocase
        $dsa_priv = "BEGIN DSA PRIVATE KEY" wide ascii nocase
        $ec_priv = "BEGIN EC PRIVATE KEY" wide ascii nocase
        $pgp_priv = "BEGIN PGP PRIVATE KEY" wide ascii nocase
        $pem_cert = "BEGIN CERTIFICATE" wide ascii nocase
        $pkcs7 = "BEGIN PKCS7"

    condition:
        any of them

}
```

Show 10 entries

Search:

| Type | | Id | Tags | |
|---|---|---|---|---|
| ● | | archive/gist.github.com/2023/04/14/luizmiranda7_3b3d1133a3d3842092c5fc5fb39e84f2.gz | infoleak:automatic-detection="private-key" test23 test12 infoleak:automatic-detection="certificate" | |
| ● | | submitted/2023/04/20/submitted_cc9190ab-80d2-4d2b-9c9e-97c51e69a855.gz | infoleak:submission="manual" test12 infoleak:automatic-detection="rsa-private-key" infoleak:automatic-detection="vpn-static-key" test23 infoleak:automatic-detection="certificate" infoleak:automatic-detection="onion" | |
| ● | | archive/gist.github.com/2023/04/13/chipzoller_d8d6d2d737d02ad4fe9d30a897170761.gz | test12 test23 infoleak:automatic-detection="certificate" | |

Showing 1 to 3 of 3 entries

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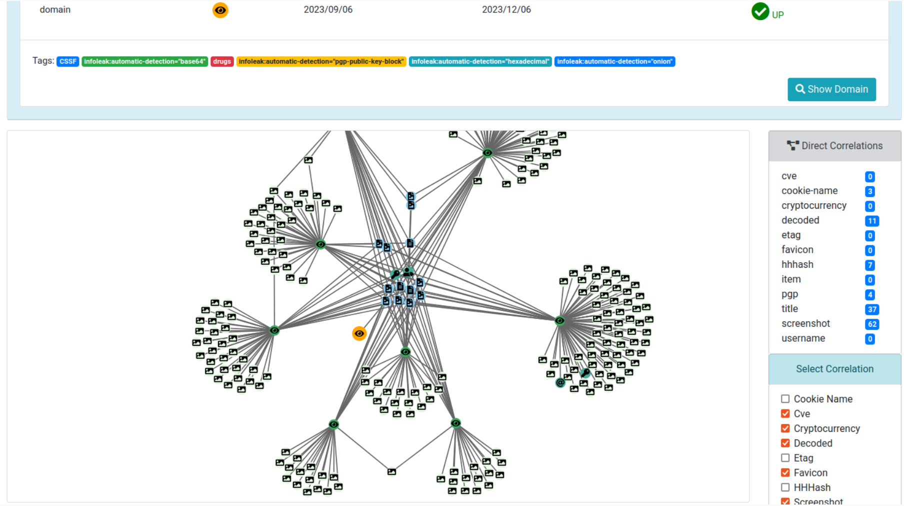
# Correlations and relationship



| | | | |
|---|---|---|---|
| domain | 2023/09/06 | 2023/12/06 | ✓ UP |

Tags: CSSF infoleak:automatic-detection="base64" drugs infoleak:automatic-detection="pgp-public-key-block" infoleak:automatic-detection="hexadecimal" infoleak:automatic-detection="onion"

Direct Correlations

| | |
|---|---|
| cve | 0 |
| cookie-name | 3 |
| cryptocurrency | 0 |
| decoded | 11 |
| etag | 0 |
| favicon | 0 |
| hhhash | 7 |
| item | 0 |
| pgp | 4 |
| title | 37 |
| screenshot | 62 |
| username | 0 |

Select Correlation

- ☐ Cookie Name
- ☑ Cve
- ☑ Cryptocurrency
- ☑ Decoded
- ☐ Etag
- ☑ Favicon
- ☐ HHHash
- ☑ Screenshot

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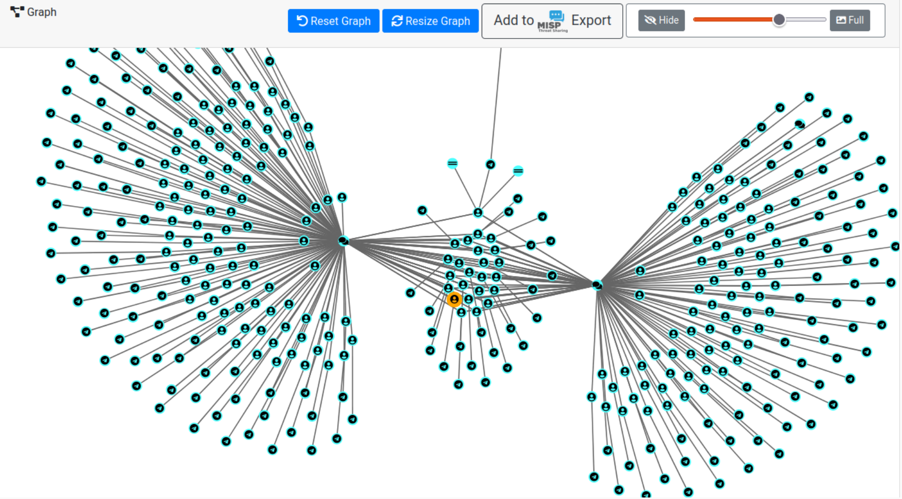
# User Correlation - Common Chats



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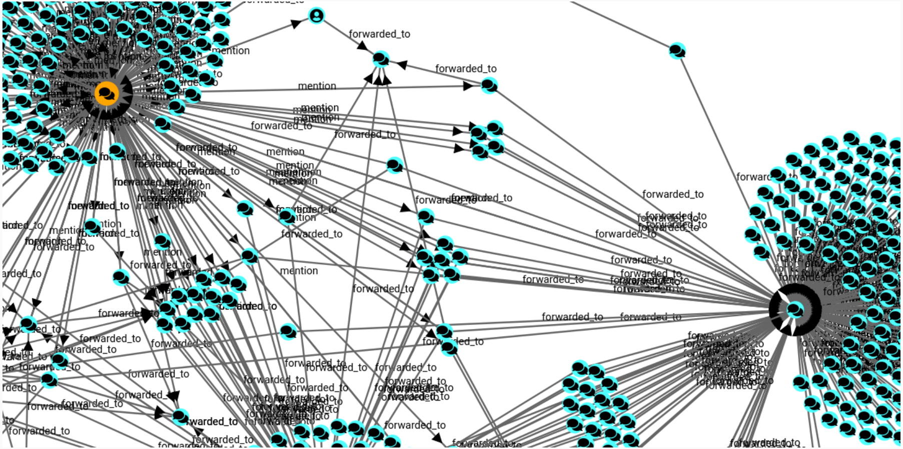
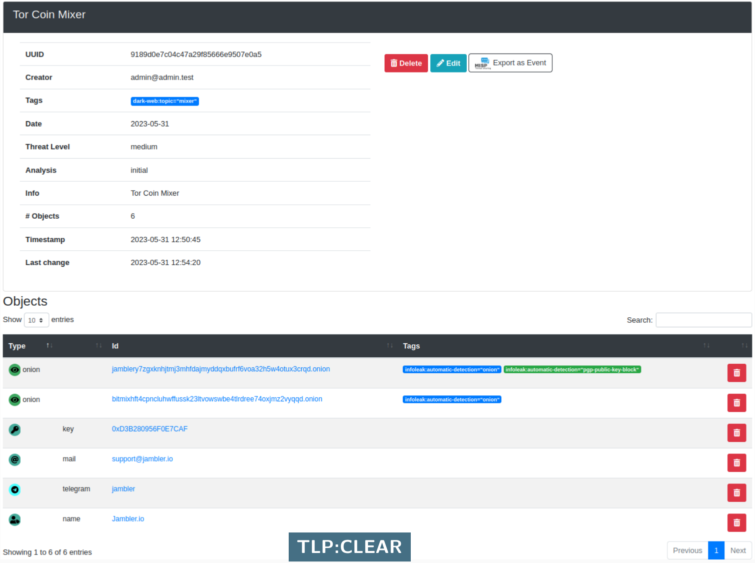
# What are the Relationships Between Chats Group?



# Investigations



Tor Coin Mixer

| | |
|---|---|
| **UUID** | 9189d0e7c04c47a29f85666e9507e0a5 |
| **Creator** | admin@admin.test |
| **Tags** | dark-web:topic="mixer" |
| **Date** | 2023-05-31 |
| **Threat Level** | medium |
| **Analysis** | initial |
| **Info** | Tor Coin Mixer |
| **# Objects** | 6 |
| **Timestamp** | 2023-05-31 12:50:45 |
| **Last change** | 2023-05-31 12:54:20 |

Objects

Show 10 entries

Search:

| Type | | Id | Tags | |
|---|---|---|---|---|
| onion | | jamblery7zgxknhjtmj3mhfdajmyddqxbufrf6voa32h5w4otux3crqd.onion | infoleak:automatic-detection="onion" infoleak:automatic-detection="pgp-public-key-block" | |
| onion | | bitmixhft4cpncluhwffussk23ltvowswbe4tlrdree74oxjmz2vyqqd.onion | infoleak:automatic-detection="onion" | |
| | key | 0xD3B280956F0E7CAF | | |
| | mail | support@jambler.io | | |
| | telegram | jambler | | |
| | name | Jambler.io | | |

Showing 1 to 6 of 6 entries

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# AIL Framework: Extensible 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 inputs**.
- Tor Crawler (handles cookies and authentication).
- Feeders: Discord, Telegram, ...

# Ongoing Developments

- **Mail Search – Next Release**
- **Lacus crawler improvements:** proxy selection, local cache, and cookie state transfer
- **Translate search:** support for searching in other languages
- **Advanced video processing and extraction**
- **MISP export with new correlation types**
- **Automatic geolocation**

# Links

- AIL project website `https://ail-project.org`
- AIL project open source framework `https://github.com/ail-project`
- Training materials `https://github.com/ail-project/ail-training`
- Online chat `https://gitter.im/ail-project/community`

# Thank you for your attention

- AIL project[7] : `https://github.com/ail-project/ail-framework`
- For questions, contact: info@circl.lu

[7] All techniques and indicators mentioned in these slides are implemented in the AIL project, using an instance backed by a three-year dataset collected from Tor hidden services and various social networks.