To process and clean the raw results, the output was redirected into a text file and parsed using a combination of grep, cut, and sort commands in Kali Linux. This step extracted the domain names from the output file and presented them in a **sorted, unique list** for clarity and analysis (Figure 46). However, the initial list contained IP-style hostnames and PTR records. To refine the results, a regular expression with grep -vE was applied to remove irrelevant entries. This produced a concise and **actionable set of unique domains** associated with the same range, including domains such as **buyer27.buyerads.com, hecticate.com, li1011-145.members.linode.com, and sistema.hipertrade.com.br** (Figure 47).

This multi-step process demonstrates how **fierce, combined with command-line filtering techniques, can enhance domain intelligence efforts by uncovering related domains and shared infrastructure within a target's IP range**.

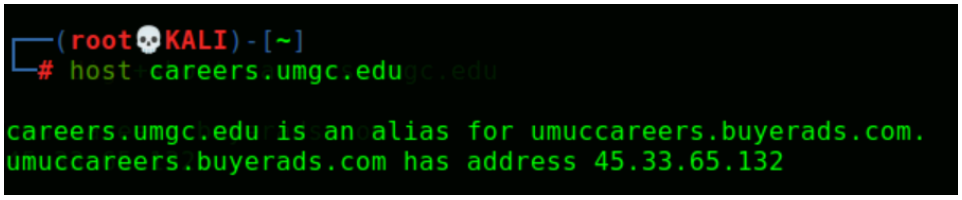


Figure 44: *Resolution of careers.umgc.edu alias to umuccareers.buyerads.com using host command.*

Source: *Output from Kali Linux terminal.*

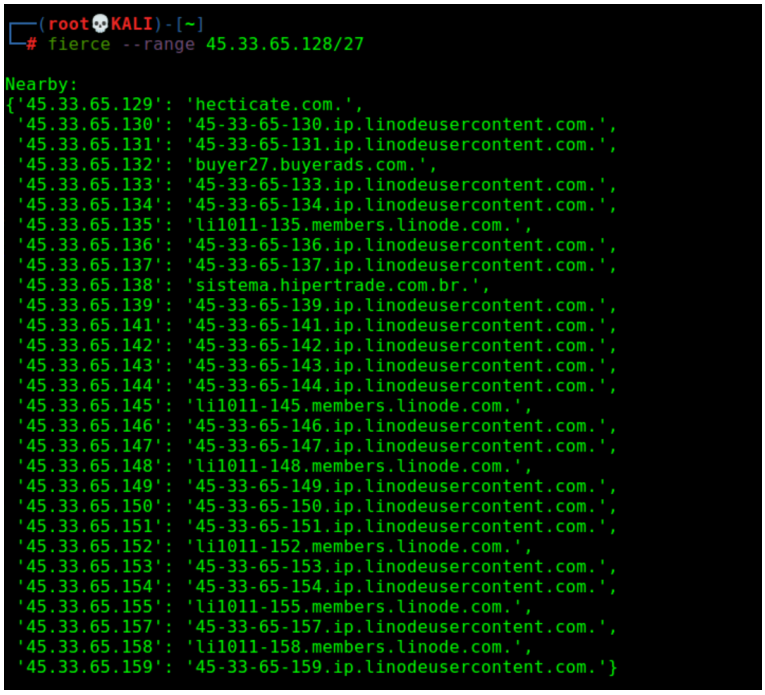


Figure 45: *Nearby domains discovered using the command fierce --range 45.33.65.128/27.*

Source*: Output from Kali Linux terminal.*

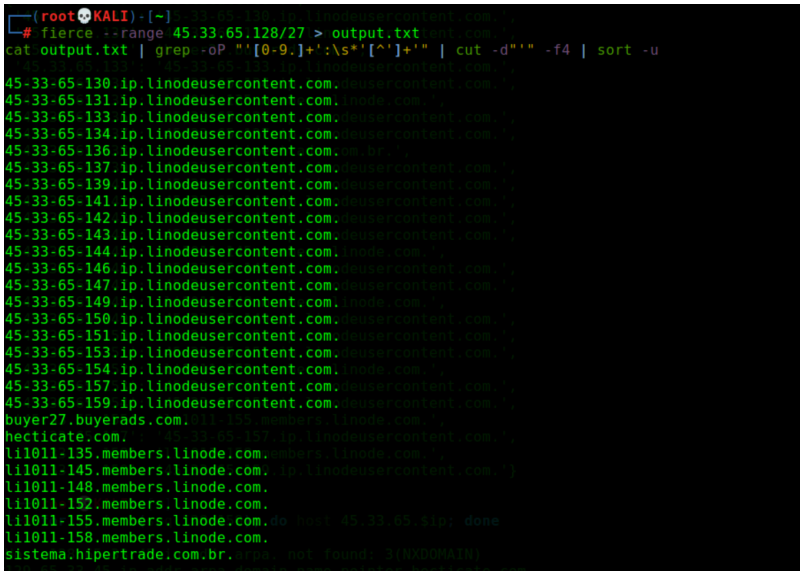


Figure 46: *Processed output redirected to file and filtered with grep, cut, and sort for unique domain extraction.*

Source: *Output from Kali Linux terminal.*

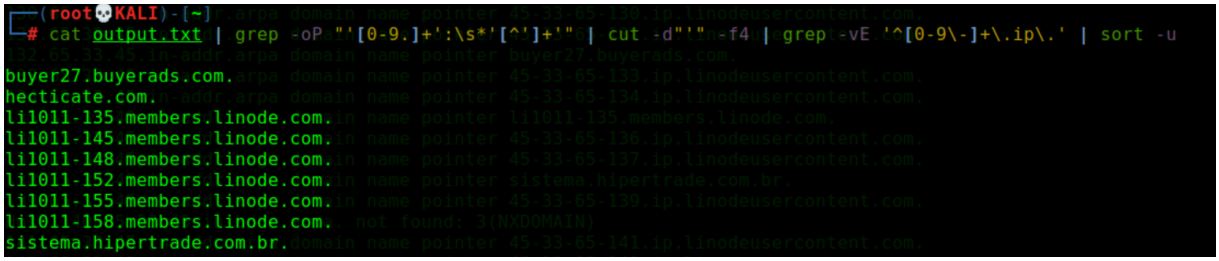


Figure 47: *Refined domain list using regular expression filtering with grep -vE to remove IP-style hostnames.*

Source: *Output from Kali Linux terminal.*

As part of the threat intelligence analysis for the subdomain **phones.umgc.edu**, the first step involved using the host command to resolve the domain to its underlying infrastructure. The results showed that phones.umgc.edu is an alias (CNAME) for **s3-website-us-east-1.amazonaws.com**, which in turn resolved to multiple IP addresses within Amazon Web Services (AWS) infrastructure (Figure 48). This mapping indicates the subdomain is hosted on AWS's cloud platform, highlighting potential dependencies on third-party services.

After resolving the IP address, a proximity scan was performed to uncover nearby domains within the same network block. Using the **fierce** tool with the /27 subnet range, the command fierce --range 52.217.8.160/27 > output.txt was executed, followed by a post-processing pipeline with grep, cut, and sort to filter and extract meaningful domain

names. This process uncovered several nearby AWS-hosted domains, including **s3-1.amazonaws.com**, **s3-l-w.amazonaws.com**, **s3-external-1.amazonaws.com**, **s3-external-1-w.amazonaws.com**, **s3-fips-r-w.us-east-1.amazonaws.com**, **s3-us-east-1-r-w.amazonaws.com**, and **s3-website-us-east-1.amazonaws.com** (Figure 49).

These findings demonstrate how subdomain reconnaissance and proximity scanning can provide valuable insight into external infrastructure dependencies and potential attack surfaces for further investigation.

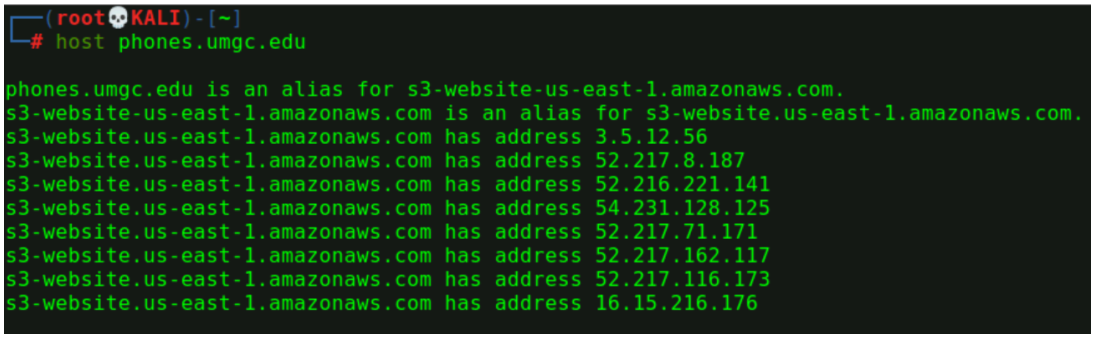


Figure 48: *Output of the host phones.umgc.edu command showing alias resolution to AWS S3 infrastructure.*

Source: *Executed in Kali Linux terminal.*

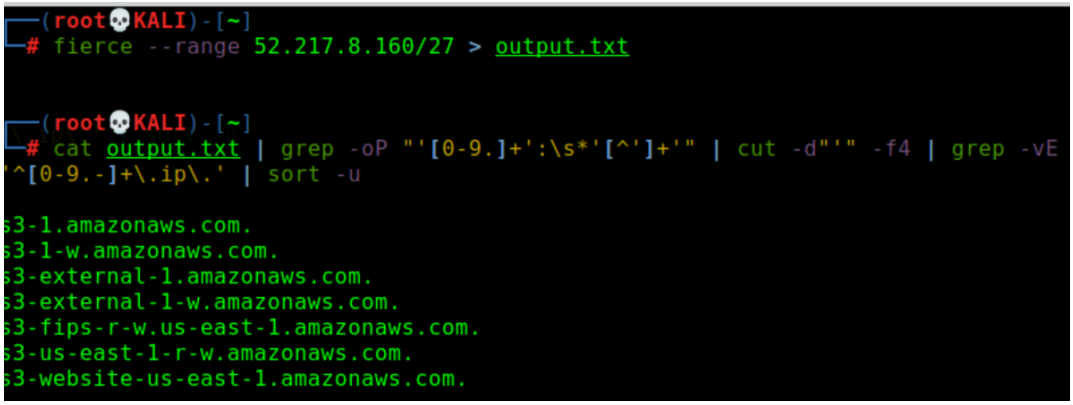


Figure 49: *Output of fierce --range 52.217.8.160/27 with filtering to identify nearby AWS-hosted domains.*

Source: *Executed in Kali Linux terminal.*

The **Start of Authority (SOA) record** for the domain **umgc.edu** was identified during DNS reconnaissance. The SOA record specifies the authoritative nameserver responsible for the domain and provides the IPv4 address associated with it. The analysis revealed that the SOA for umgc.edu is managed by **ns-1246.awsdns-27.org**, with the corresponding IPv4 address **205.251.196.222**.

To obtain this information, the **fierce** tool was executed with the command fierce --domain umgc.edu, which successfully enumerated the SOA record and its associated details. This finding highlights the authoritative infrastructure behind the domain, offering insight into the hosting and DNS management environment.

Figure 50: *Output of the fierce --domain umgc.edu command showing SOA record resolution.*

Source: *Executed in Kali Linux terminal.*

The IPv4 address associated with the subdomain **asia.umgc.edu** was identified as **151.101.131.10**. This resolution was achieved using the **fierce** tool to enumerate subdomains of umgc.edu, with the output filtered through the grep command to isolate

the Asia-specific entry. By targeting the results in this manner, the enumeration process effectively revealed the resolved IP address directly tied to asia.umgc.edu.

This finding provides insight into the global infrastructure supporting umgc.edu, as the Asia subdomain reflects distributed hosting and potential regional services. Such intelligence is valuable for assessing attack surfaces across geographic deployments of the organization's domain.

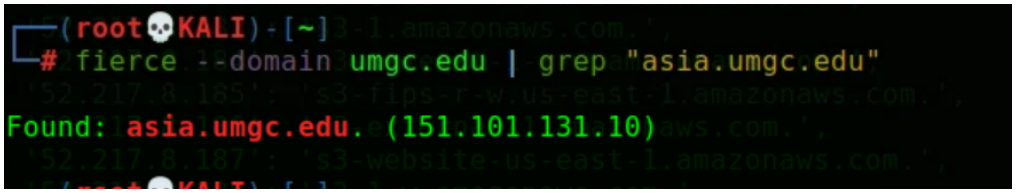


Figure 51: *Output of fierce --domain umgc.edu with grep filter showing asia.umgc.edu resolution*

Source: *Executed in Kali Linux terminal.*

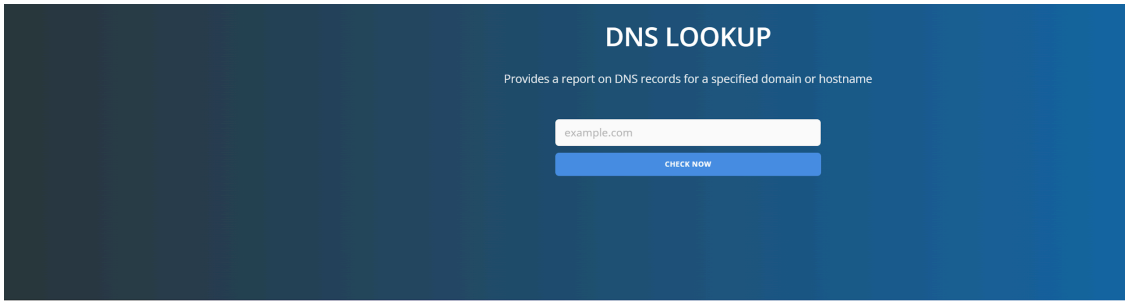
OSINT

Open Source Intelligence (OSINT) tools enable cybersecurity analysts to gather and analyze publicly accessible information such as DNS data, domain ownership, technology stacks, and IP footprints to uncover potential threats, map an organization's digital presence, and enrich intelligence without direct network intrusion (Northland Controls, n.d.). By leveraging platforms like osint.sh alongside Kali based tools, analysts gain deeper visibility into adversary infrastructure, accelerating early threat detection and proactive threat hunting efforts. These capabilities make OSINT indispensable in building timely, cost-effective, and context rich threat intelligence.

The DNS lookup tool on **osint.sh** was used to query the authoritative name servers (NS) for the domain **umgc.edu**. The results returned four NS records, which aligned with those discovered earlier using Kali Linux tools. The identified name servers are:

- **ns-1246.awsdns-27.org**
- **ns-412.awsdns-51.com**
- **ns-1863.awsdns-40.co.uk**
- **ns-758.awsdns-30.net**

This consistency between OSINT-based lookup and active Kali-based enumeration validates the accuracy of the domain's DNS infrastructure mapping. Identifying these authoritative name servers is critical in threat intelligence, as they play a vital role in directing traffic for the domain and can reveal potential misconfigurations or dependencies on third-party DNS hosting.



No	Type	Records	TTL
1	NS	ns-1246.awsdns-27.org.	21600
2	NS	ns-412.awsdns-51.com.	21600
3	NS	ns-1863.awsdns-40.co.uk.	21600
4	NS	ns-758.awsdns-30.net.	21600

Figure 52*: DNS lookup results from osint.sh showing authoritative NS records for umgc.edu*

Source: *Output from osint.sh DNS Lookup tool.*

The DNS lookup tool on **osint.sh** identified the IPv4 addresses associated with the **A records** for the domain **umgc.edu**. These results are consistent with those obtained using the *dnsrecon* tool in Kali Linux, thereby validating the enumeration findings across different platforms. The four IPv4 addresses resolved for umgc.edu are:

- **151.101.131.10**
- **151.101.3.10**
- **151.101.195.10**
- **151.101.67.10**

These A records represent the domain's primary endpoints and are critical in mapping the infrastructure that supports its web services. From a cybersecurity perspective, confirming these IPs provides insight into the domain's hosting environment and can assist in identifying potential exposure points during reconnaissance.

No	Type	Records	TTL
1	A	151.101.131.10 umgc.edu. Fastly, Inc., United States	60
2	A	151.101.3.10 umgc.edu. Fastly, Inc., United States	60
3	A	151.101.195.10 umgc.edu. Fastly, Inc., United States	60
4	A	151.101.67.10 umgc.edu. Fastly, Inc., United States	60

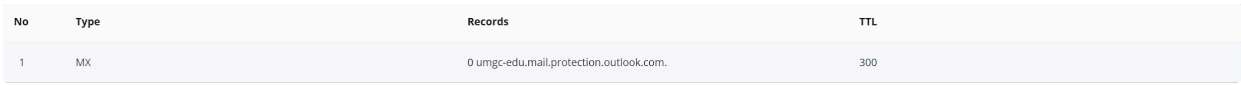
Figure 53: *DNS lookup results from osint.sh showing A records for umgc.edu*

Source: *Output from the DNS Lookup tool on osint.sh for the domain umgc.edu.*

Using the **DNS Lookup tool** on the **osint.sh** platform, the analysis revealed only one **MX (Mail Exchange) record** associated with the domain **umgc.edu**. The identified record is:

- **0 umgc-edu.mail.protection.outlook.com**

This indicates that inbound email traffic for the umgc.edu domain is routed through Microsoft Outlook's mail protection service, a common setup for organizations leveraging Microsoft 365 for secure email handling. Identifying MX records is significant in cybersecurity assessments, as it helps determine potential exposure points for phishing, spoofing, or misconfigured mail servers.



No	Type	Records	TTL
1	MX	0 umgc-edu.mail.protection.outlook.com.	300

Figure 54: *DNS lookup results from osint.sh showing MX record for umgc.edu*

Source: *Output from the DNS Lookup tool on osint.sh for the domain umgc.edu.*

From the **osint.sh** platform, a **TXT record** was identified for the domain **umgc.edu**, which contains a **DocuSign verification ID**. TXT records are often used for domain ownership verification, email security configurations (SPF, DKIM, DMARC), and third-party service integrations. In this case, the discovered record reveals that the organization is using DocuSign for trusted electronic document workflows.

The specific TXT record discovered was:

- **docusign=b8294918-7886-4f86-93a1-c5d6f1a30d4a**

This finding highlights how external integrations, such as DocuSign, can leave recognizable footprints in public DNS records, which may be leveraged during reconnaissance to identify technologies in use within an organization.

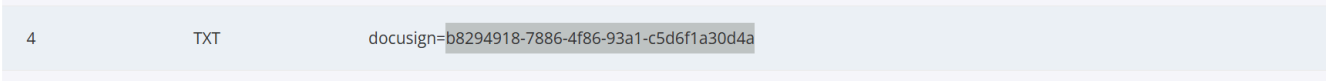


Figure 55: *DNS lookup results from osint.sh showing TXT record for umgc.edu*

Source: *Output from the DNS Lookup tool on osint.sh website.*

To validate the finding, the command **dnsrecon -d umgc.edu** was executed in Kali Linux. The output confirmed the presence of the **same DocuSign TXT record** (docusign=b8294918-7886-4f86-93a1-c5d6f1a30d4a), verifying consistency with the earlier osint.sh results.

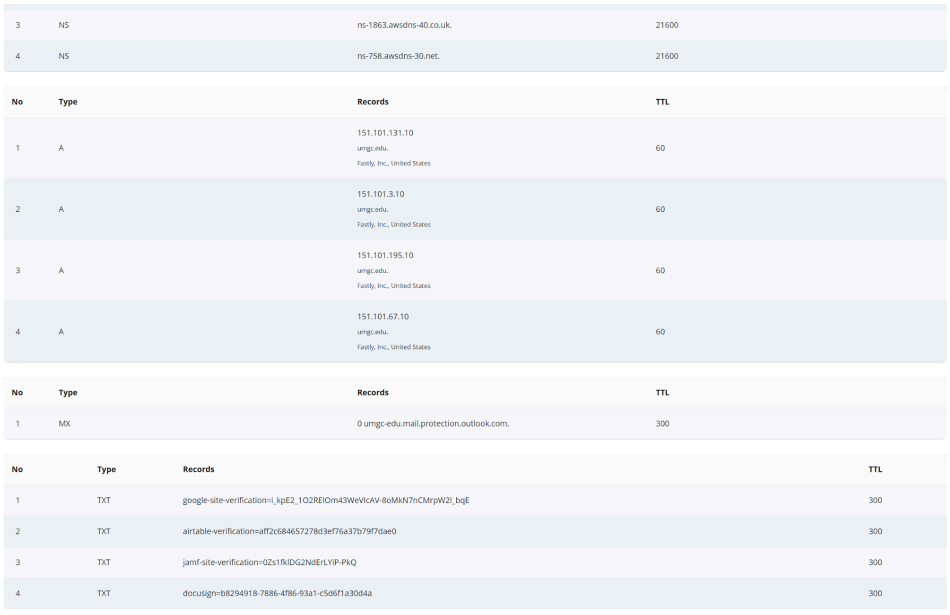
Figure 56: *Dnsrecon output showing DocuSign TXT record for umgc.edu.*

Source: *Output from dnsrecon -d umgc.edu in Kali Linux.*

The **Time-To-Live (TTL)** values for the *umgc.edu* domain records vary by record type, reflecting their intended stability and update frequency:

- **NS (Name Server) records:** 21,600 seconds – A high TTL ensures stability since authoritative name servers rarely change. Longer caching reduces DNS query load and improves overall resolution efficiency.
- **A (Address) records:** 60 seconds – A short TTL allows rapid IP switching, particularly useful when records are managed by CDNs or load balancers such as Fastly, enabling quick adaptation to traffic changes.
- **TXT (Text) records:** 300 seconds – A moderate TTL provides flexibility to update records like SPF, DKIM, or domain verification values while still offering reasonable caching.

This variation in TTL values provides a balance between performance, reliability, and agility, ensuring DNS responses remain both efficient and adaptable to operational requirements (Cloudflare, n.d.; ICANN, n.d.).



3	NS	ns-1863.awsdns-40.co.uk.	21600
4	NS	ns-758.awsdns-30.net.	21600

No	Type	Records	TTL
1	A	151.101.131.10 umgc.edu. Fastly, Inc., United States	60
2	A	151.101.3.10 umgc.edu. Fastly, Inc., United States	60
3	A	151.101.195.10 umgc.edu. Fastly, Inc., United States	60
4	A	151.101.67.10 umgc.edu. Fastly, Inc., United States	60

No	Type	Records	TTL
1	MX	0 umgc-edu.mail.protection.outlook.com.	300

No	Type	Records	TTL
1	TXT	google-site-verification=i_kpE2_1O2RElOm43WeVlcAV-8oMkN7nCMrpW2l_bqE	300
2	TXT	airtable-verification=aff2c684657278d3ef76a37b79f7dae0	300
3	TXT	jamf-site-verification=0Zs1fkIDG2NdErLYiP-PkQ	300
4	TXT	docusign=b8294918-7886-4f86-93a1-c5d6f1a30d4a	300

Figure 57: *DNS Lookup results for umgc.edu showing TTL values*

Source: *Output from the DNS Lookup tool on the osint.sh website.*

The server-side language discovered for **learn.umgc.edu** is **Java**.

The client-side language discovered is **JavaScript**.

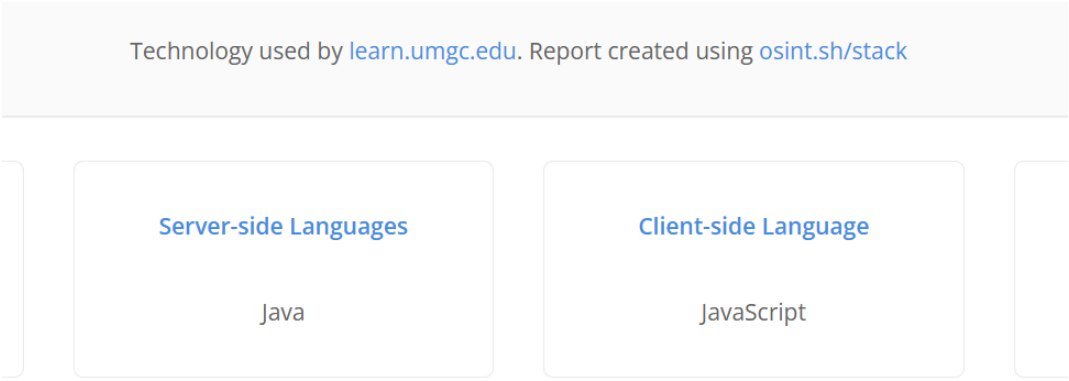


Figure 58: *Technology stack identified for learn.umgc.edu, showing Java as the server-side language and JavaScript as the client-side language.*

Source: *Output from the Technology Lookup tool on the osint.sh website.*

A total of **92 subdomains** were discovered for the domain umgc.edu using the Subdomain Finder tool on osint.sh.

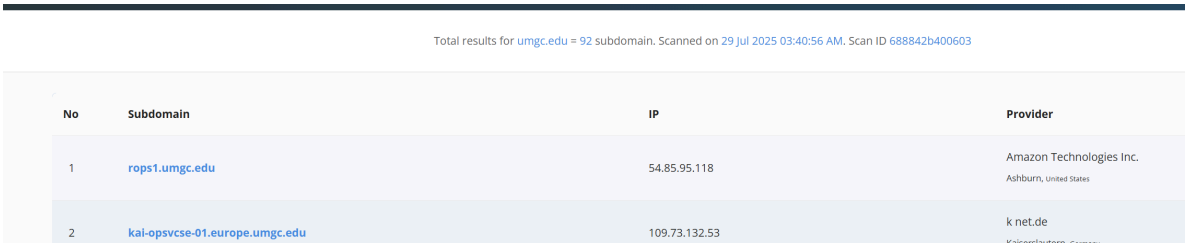


Figure 59: *Discovery of 92 subdomains for the umgc.edu domain using the Subdomain Finder tool on osint.sh*

Source: *Output from the Subdomain Finder tool on the osint.sh website.*

Identifying the hosting provider for subdomains such as **asia.umgc.edu** is a critical part of threat intelligence and risk assessment. In this case, the subdomain is hosted by **Fastly, Inc., located in San Francisco, United States** (Figure 60). Knowing the provider helps analysts understand the security posture, geographic distribution, and potential third-party dependencies of an organization's infrastructure. It also highlights reliance on cloud/CDN providers, which may impact availability, compliance, and vulnerability management.

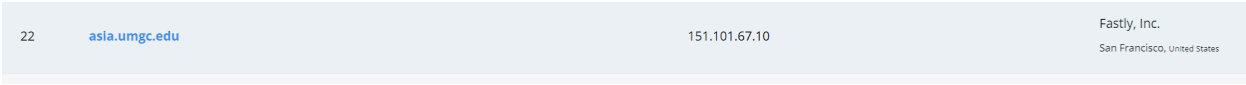


Figure 60: *Provider details for the subdomain asia.umgc.edu showing hosting by Fastly, Inc., San Francisco, United States.*

Source: *Output from the Subdomain Finder tool on the osint.sh website.*

IP GEO

The IP GEO Location Lookup tool was used to determine the approximate geographic locations of selected **umgc.edu** subdomains. This method helps identify the physical hosting regions of online infrastructure, which is valuable for understanding geographic distribution and potential compliance or risk considerations.

For the three subdomains analyzed, the following latitude and longitude values were identified:

- **europe.umgc.edu** – Latitude: **37.77712**, Longitude: **122.41964**
- **careers.umgc.edu** – Latitude: **40.80849**, Longitude: **74.46444**

- **content.umgc.edu** – Latitude: **39.05232**, Longitude: **77.48270**

These results highlight that the subdomains are hosted across different geographic regions, underscoring the distributed nature of the university's digital presence.

IP GEO Mapping Results:

To further validate the IP GEO lookup results, the identified latitude and longitude values were mapped using **Google Maps**. This helped pinpoint the physical locations associated with the umgc.edu subdomains: **europe.umgc.edu, careers.umgc.edu, and content.umgc.edu**.

- **europe.umgc.edu** mapped to **San Francisco, California**.
- **careers.umgc.edu** mapped to **Hanover, New Jersey**, with **Morristown** as the closest visible city.
- **content.umgc.edu** mapped to **Ashburn, Virginia**, a well-known hub for data centers.

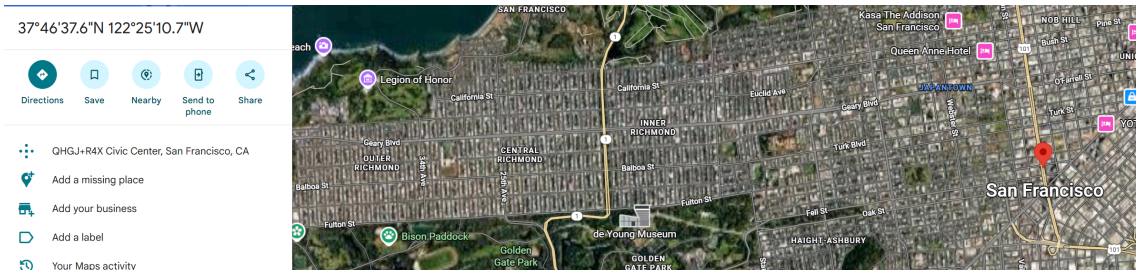


Figure 61: *Google Maps location result for europe.umgc.edu showing San Francisco, CA.*

Source: *Screenshot taken from Google Maps on July 29, 2025.*

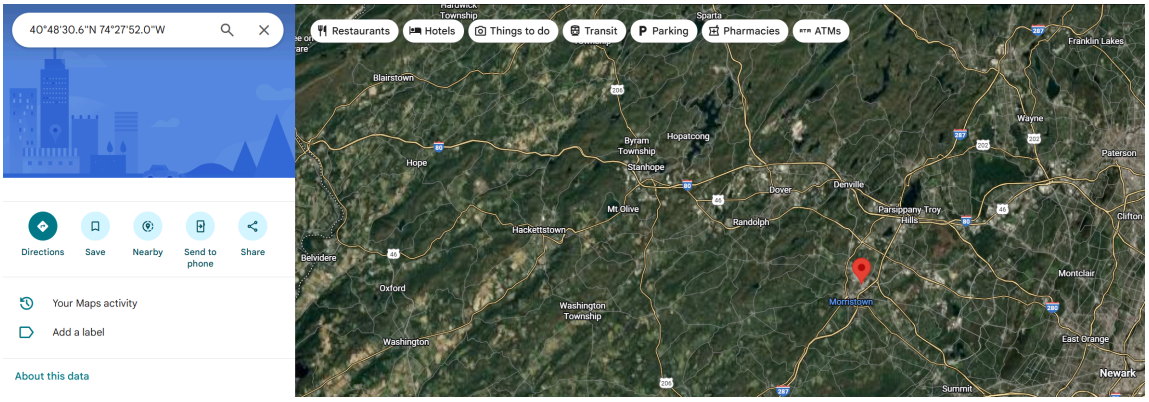


Figure 62: *Google Maps location result for careers.umgc.edu showing Hanover, NJ (near Morristown).*

Source*: Screenshot taken from Google Maps on July 29, 2025.*

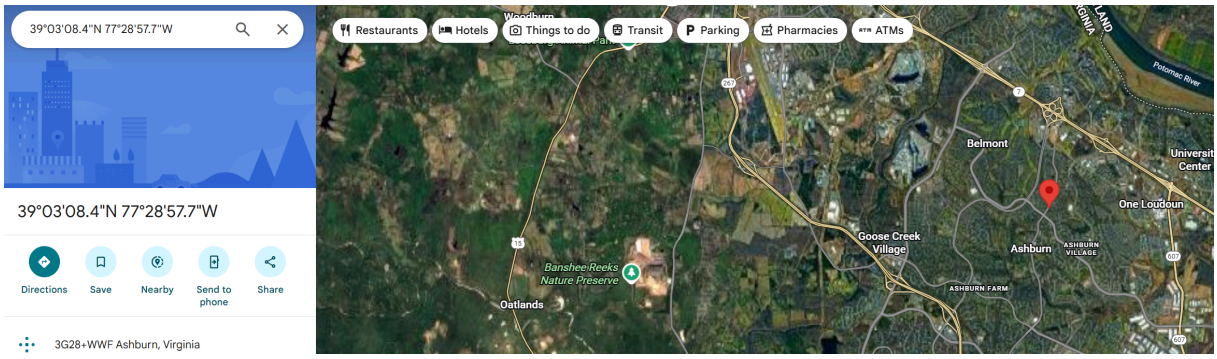


Figure 63: *Google Maps location result for content.umgc.edu showing Ashburn, VA.*

Source: *Screenshot taken from Google Maps on July 29, 2025.*

VirusTotal

VirusTotal in Threat Intelligence:

VirusTotal is a cloud-based threat intelligence platform that allows cybersecurity analysts to scan and analyze suspicious files, IP addresses, domains, and URLs using multiple antivirus engines and reputation services. It provides valuable insights into potential threats by aggregating data from over 70 security vendors, making it a critical resource for malware detection, indicator of compromise (IOC) identification, and incident response. Its ability to correlate file behavior and detect malicious artifacts supports proactive threat hunting and enhances situational awareness in security operations (VirusTotal, n.d.).

The IP address 206.123.128.45 was investigated using both **Cisco Talos** and **VirusTotal** threat intelligence platforms to assess its reputation and potential malicious activity.

Cisco Talos identified the IP as being involved in **email-based malware distribution**, as shown in the geographic visualization (Screenshot 1). The map highlights the distribution of email threats, with the analyzed IP associated with a volume of **7.5 malware emails** within the last 24 hours, suggesting active participation in a spam or phishing campaign.

VirusTotal confirmed this threat intelligence. Three out of ninety-four security vendors flagged the IP address as **malicious**, with tags including "MalwareURL" and "Suspicious" from trusted sources like Abusix and SOCRadar (Screenshot 2). This supports Talos' categorization of the IP as a security threat.

Further, the **Relations tab** in VirusTotal (Screenshot 3) revealed that this IP address is referenced in multiple **malicious email files** such as Temp[208].eml,

Temp[131].eml, and Quotation Air_Sea #Electronics.eml. These emails were scanned on July 29, 2025, and showed detection rates ranging from **6/63 to 33/63**, indicating widespread detection by antivirus engines. This evidence strongly associates the IP with malware-laden spam campaigns rather than legitimate use.

While the IP is not currently linked to an active malicious URL, its inclusion in numerous malicious email attachments and its detection by multiple security engines classify it as a threat source and a potential Command-and-Control (C2) or distribution node.

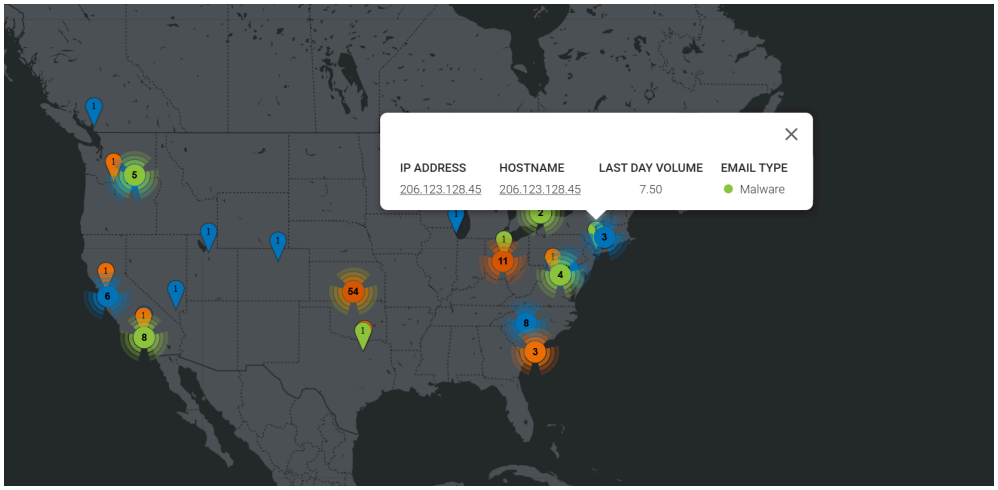


Figure 64: *Cisco Talos Intelligence Map displaying malware email activity for IP address 206.123.128.45.*

Source: *Cisco Talos Intelligence –* [*https://talosintelligence.com*](https://talosintelligence.com)

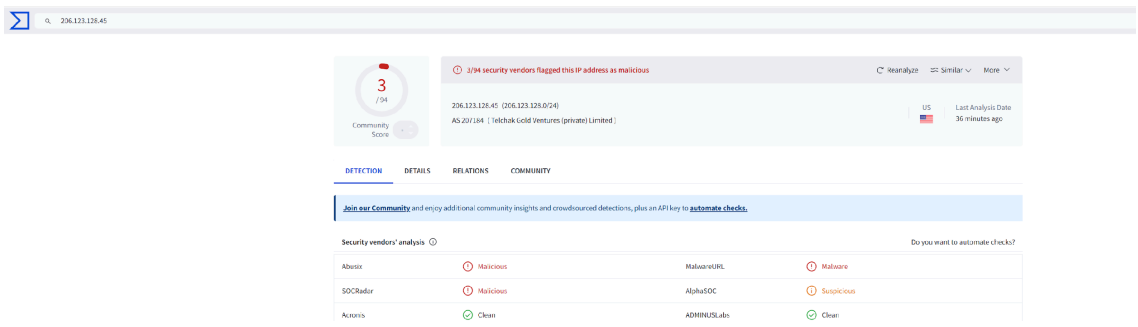


Figure 65: *VirusTotal IP reputation analysis showing 3/94 security vendors flagging IP 206.123.128.45 as malicious.*

Source: *VirusTotal – https://www.virustotal.com*

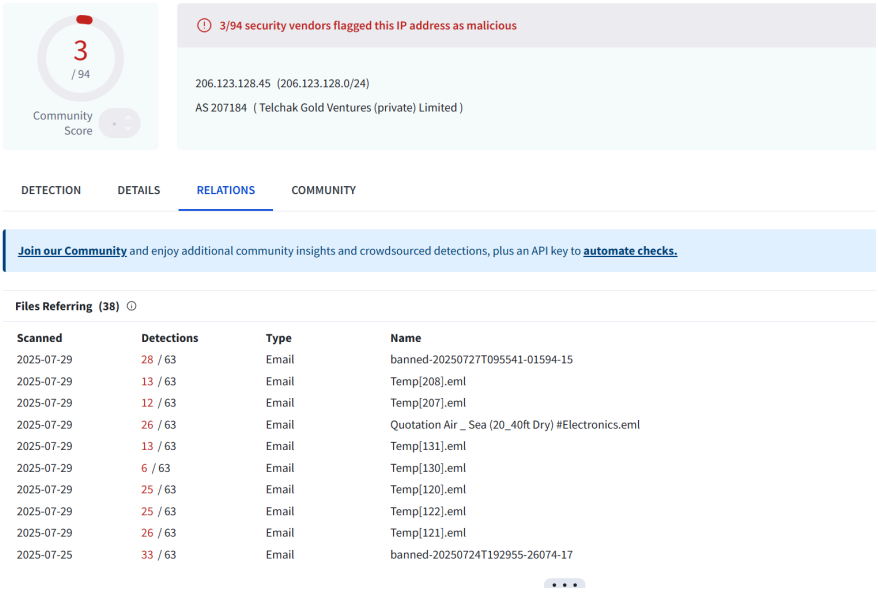


Figure 66: *VirusTotal Relations tab presenting email samples linked to IP 206.123.128.45 along with detection counts.*

Source: *VirusTotal – https://www.virustotal.com*

A harmless text file named *virustotal file.txt* was selected for testing, containing no sensitive data. The File Hash Online Calculator was used to generate its SHA-256 hash value: **db4067cec62c58bf8b2f8982071e77c082da9e00924bf3631f3b024fa54e7d7e** (Figure 67).

The generated hash was then submitted to VirusTotal for threat intelligence analysis. The results (Figure 68) confirmed that none of the 59 security vendors flagged

the file as malicious. This outcome was expected since the file was a plain text test file with no executable code or harmful content.

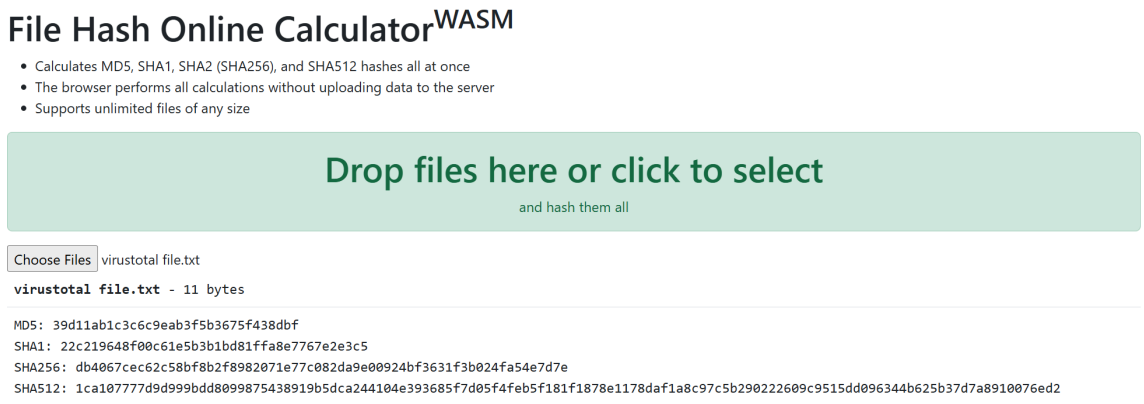


Figure 67: File hash generation using the File Hash Online Calculator.

Source: *Output from File Hash Online Calculator.*

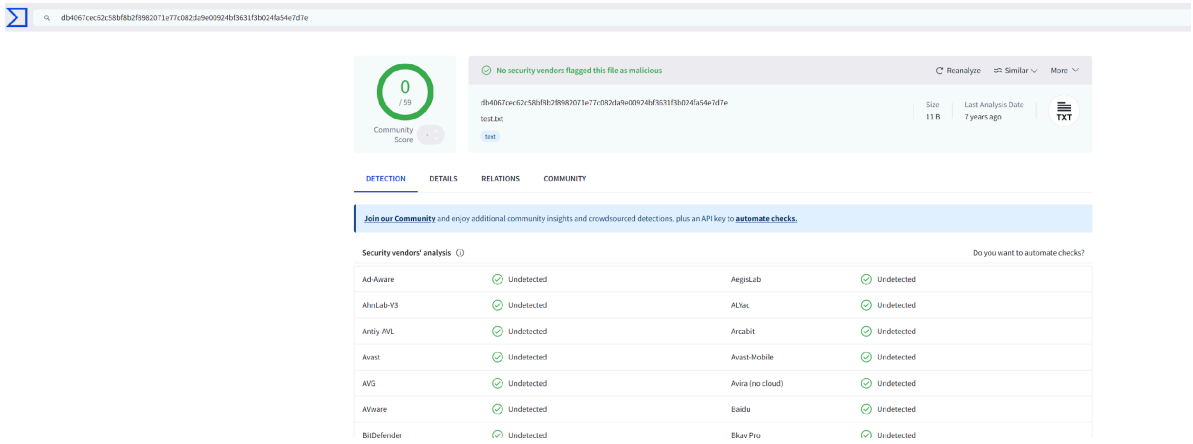


Figure 68: VirusTotal scan results showing no detections for the submitted SHA-256 hash.

Source: *Output from VirusTotal –* [*https://www.virustotal.com*](https://www.virustotal.com)

To perform domain analysis, three domains were selected: **google.com**, **microsoft.com**, and **umgc.edu**, and submitted each to VirusTotal for inspection. VirusTotal aggregates intelligence from multiple vendors and provides reputation scores, categories, DNS data, and popularity metrics for domains (VirusTotal, n.d.).

Google.com

The domain google.com was flagged clean by all security vendors. It is categorized under search engines & portals, telephony, and top-1K websites. The popularity rankings from sources like Cloudflare Radar, Cisco Umbrella, and Majestic all ranked Google as the top domain , indicating its massive global presence and trustworthiness.

Microsoft.com

Similar to Google, microsoft.com was also reported clean across all vendor engines. It was categorized under information technology, moderate forums, and collaboration-office. While still highly ranked, Microsoft had a Cloudflare Radar position of 200 and a majestic rank of 7. This suggests strong credibility, but slightly lower global DNS visibility compared to Google.

UMGC.edu

The domain umgc.edu was also found to be clean. It falls under the educational institutions category. However, its popularity rankings were significantly lower, Majestic ranked it at 15163, and Cisco Umbrella placed it at 164191. These rankings align with the domain’s nature as a university-specific website rather than a globally used service.

Comparison and Contrast Based on Categories and Popularity Scores

The three domains analyzed were **google.com**, **microsoft.com**, and **umgc.edu**, which demonstrated distinct categorizations and popularity rankings reflective of their organizational functions and online reach.

Google.com is categorized under “telephony,” “search engines & portals,” and “top 1K” by multiple vendors including alphaMountain.ai and Sophos, which aligns with its core functionality as a global search engine. It ranks **no 1 across all five popularity sources** (Cloudflare Radar, Cisco Umbrella, Majestic, Statvoo, and Alexa), indicating exceptionally high visibility and web traffic.

Microsoft.com is labeled under “information technology,” “moderated forums,” and “collaboration - office.” While these categories are appropriate, it’s notable that **Cloudflare ranks it at position 200**, and the other sources range from position 2 (Cisco Umbrella) to 24 (Alexa/Statvoo), reflecting moderately high but not universal dominance like Google.

In contrast, **umgc.edu** is consistently categorized as “education” or “educational institutions” by all vendors, which is accurate for an academic site. However, its popularity scores are lower, ranking **#100,000 on Cloudflare**, and beyond **#15,000 on other trackers**. This comparison shows how category tagging helps identify a domain’s purpose and use case, while popularity scores offer a quantifiable view of its reputation, accessibility, and visibility in the global web ecosystem.

Domain	Categories (Selected Vendors)	Popularity Rankings (Top Positions)
google.com	- Telephony (alphaMountain.ai) - Search Engines & Portals (Xcitium, Sophos) - Misc	- Cloudflare Radar: 1 - Cisco Umbrella: 1 - Majestic: 1 - Alexa: 1 - Statvoo: 1
microsoft.com	- Business/Economy, Information Technology (alphaMountain.ai) - Collaboration - Office - Moderated Forums (Xcitium) - Misc	- Cloudflare Radar: 200 - Cisco Umbrella: 2 - Majestic: 7 - Alexa: 24 - Statvoo: 24
umgc.edu	- Education (BitDefender,	- Cloudflare Radar: 100000

	Sophos, Forcepoint ThreatSeeker)	- Cisco Umbrella: 164191 - Majestic: 15163 - Alexa: 19827 - Statvoo: 19227

In **VirusTotal**, the *Relations* tab for the domain **umgc.edu** shows a total of **269 subdomains**. These include various internal services, web portals, test environments, and mail systems associated with the university. VirusTotal compiles this data from numerous security vendors and historical DNS scans, resulting in a comprehensive list of known subdomains over time.

In comparison, when analyzing **umgc.edu** using the **Maltego Community Edition**, I used the transform:

➡ **[DNS from Domain]**

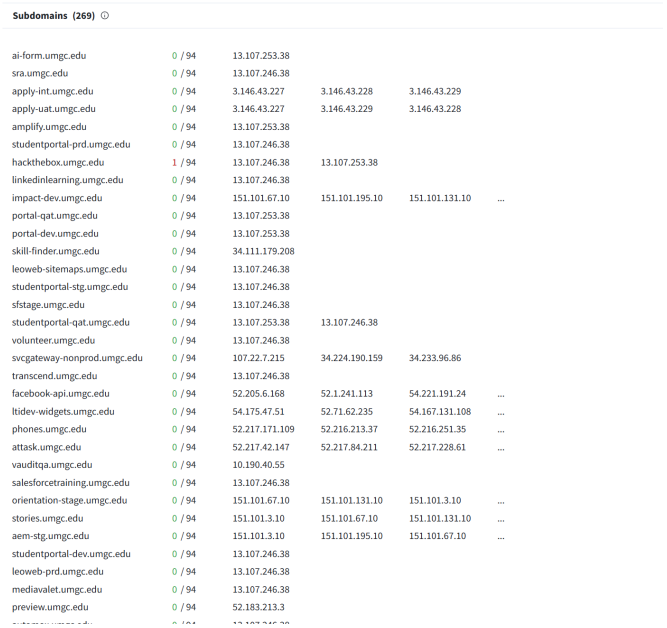
This transform has returned **53 subdomains**, which is significantly fewer than Virus Total's 269.

The disparity occurs because Maltego's free edition relies on real time and publicly visible DNS records. It does not have access to Virus Total's extensive database of passive DNS records and third-party data sources, which explains the limited results.

In summary:

- **VirusTotal** listed: **269 subdomains.**
- **Maltego (DNS from Domain transform)** listed: **53 subdomains.**

This demonstrates that while Maltego is excellent for visual analysis and entity mapping, platforms like VirusTotal provide more comprehensive subdomain intelligence for a domain.



Subdomains (269)

ai-form.umgc.edu	0 / 94	13.107.253.38			
sra.umgc.edu	0 / 94	13.107.246.38			
apply-int.umgc.edu	0 / 94	3.146.43.227	3.146.43.228	3.146.43.229	
apply-uat.umgc.edu	0 / 94	3.146.43.227	3.146.43.229	3.146.43.228	
amplify.umgc.edu	0 / 94	13.107.253.38			
studentportal-prd.umgc.edu	0 / 94	13.107.246.38			
hackthebox.umgc.edu	1 / 94	13.107.246.38	13.107.253.38		
linkedinlearning.umgc.edu	0 / 94	13.107.246.38			
impact-dev.umgc.edu	0 / 94	151.101.67.10	151.101.195.10	151.101.131.10	...
portal-qat.umgc.edu	0 / 94	13.107.253.38			
portal-dev.umgc.edu	0 / 94	13.107.253.38			
skill-finder.umgc.edu	0 / 94	34.111.179.208			
leoweb-sitemaps.umgc.edu	0 / 94	13.107.246.38			
studentportal-stg.umgc.edu	0 / 94	13.107.246.38			
sfstage.umgc.edu	0 / 94	13.107.246.38			
studentportal-qat.umgc.edu	0 / 94	13.107.253.38	13.107.246.38		
volunteer.umgc.edu	0 / 94	13.107.246.38			
svcgateway-nonprod.umgc.edu	0 / 94	107.22.7.215	34.224.190.159	34.233.96.86	
transcend.umgc.edu	0 / 94	13.107.246.38			
facebook-api.umgc.edu	0 / 94	52.205.6.168	52.1.241.113	54.221.191.24	...
ltidev-widgets.umgc.edu	0 / 94	54.175.47.51	52.71.62.235	54.167.131.108	...
phones.umgc.edu	0 / 94	52.217.171.109	52.216.213.37	52.216.251.35	...
attask.umgc.edu	0 / 94	52.217.42.147	52.217.84.211	52.217.228.61	...
vauditqa.umgc.edu	0 / 94	10.190.40.55			
salesforcetraining.umgc.edu	0 / 94	13.107.246.38			
orientation-stage.umgc.edu	0 / 94	151.101.67.10	151.101.131.10	151.101.3.10	...
stories.umgc.edu	0 / 94	151.101.3.10	151.101.67.10	151.101.131.10	...
aem-stg.umgc.edu	0 / 94	151.101.3.10	151.101.195.10	151.101.67.10	...
studentportal-dev.umgc.edu	0 / 94	13.107.246.38			
leoweb-prd.umgc.edu	0 / 94	13.107.246.38			
mediavalet.umgc.edu	0 / 94	13.107.246.38			
preview.umgc.edu	0 / 94	52.183.213.3			

Figure 69: *Subdomains of umgc.edu discovered using Virus Total Domain Relations.*

Source: *[VirusTotal – Domain Relations]*

Figure 70: *Visualization of umgc.edu subdomains generated in Maltego.*

Source: *Maltego Community Edition*

Google Dorks exercise

Google Dorking, also known as Google hacking, refers to the use of advanced search operators to uncover sensitive information indexed by search engines but not intended for public access. In the context of threat intelligence, it is a powerful technique for open-source intelligence (OSINT) gathering, allowing security analysts to discover exposed files, misconfigured servers, login portals, or even vulnerable systems. Ethical hackers and security researchers use Google Dorks to assess an organization's online footprint and identify weaknesses that adversaries could exploit (Scarfone & Mell, 2007).

Tangier Sound is a body of water located in the **Chesapeake Bay**, between **Maryland** and **Virginia** in the **United States**. The region is bordered by Deal Island, Crisfield, Smith Island, and Tangier Island. Camp Arifjan is in the country of **Kuwait**, in the **Middle East**. These were verified using the using the Google Dork search. Yes, there appears to be a **food court or dining area** inside Camp Arifjan. This was determined from the image and description shown in the Google Maps result for **"Camp ArifjanPX,"** which included a Subway restaurant and a menu board, indicating a food court-style setting within the PX shopping mall at the base.

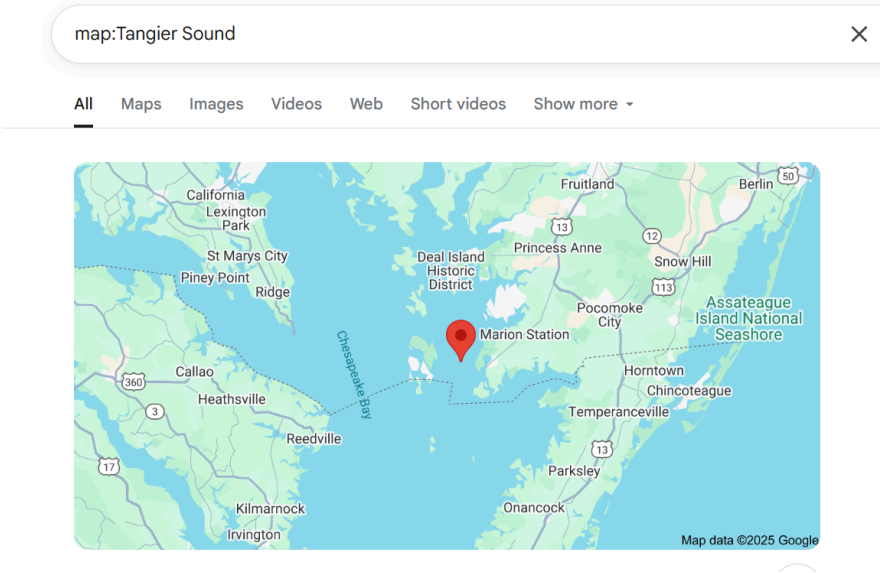


Figure 71: *Map result for Tangier Sound.*

Source: *Google Maps.* [*https://www.google.com/maps*](https://www.google.com/maps)

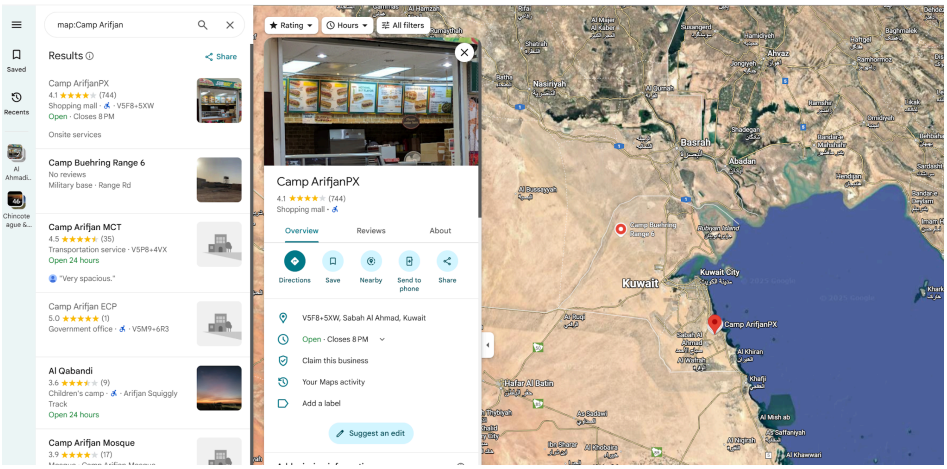


Figure 72: *Map and facility result for Camp ArifjanPX.*

Source: *Google Maps.* [*https://www.google.com/maps*](https://www.google.com/maps)

The Google Dork command **set timer for 10 minutes** was executed in the Google Search bar, which activated Google's built-in timer feature directly within the search results. The timer started at 10:00 minutes and began counting down immediately. A screenshot was taken when the timer displayed **9:57** in progress, and another when the

timer reached **0**, accompanied by an audible alert. This feature highlights how Google Dorks can be used not only for information discovery but also to leverage interactive tools built into search, supporting tasks such as productivity tracking, reminders, or timed assessments.

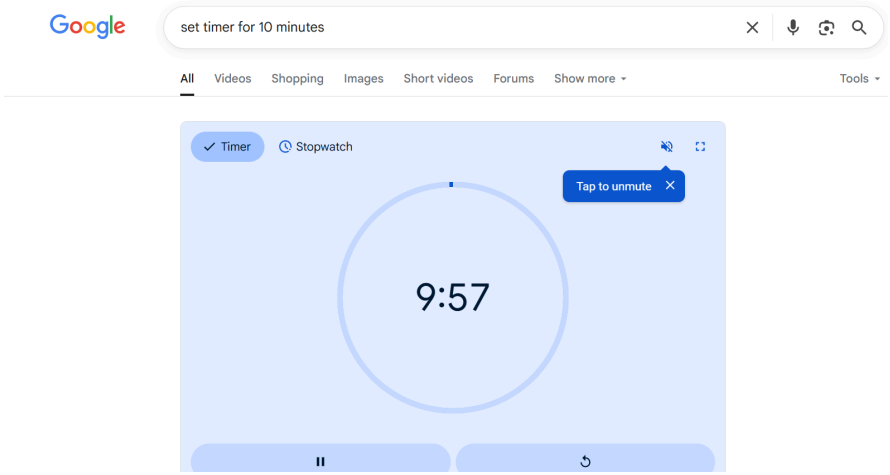


Figure 73: *Google Search timer set to 10 minutes (screenshot showing 9:57).*

Source: *Google Search. https://www.google.com*

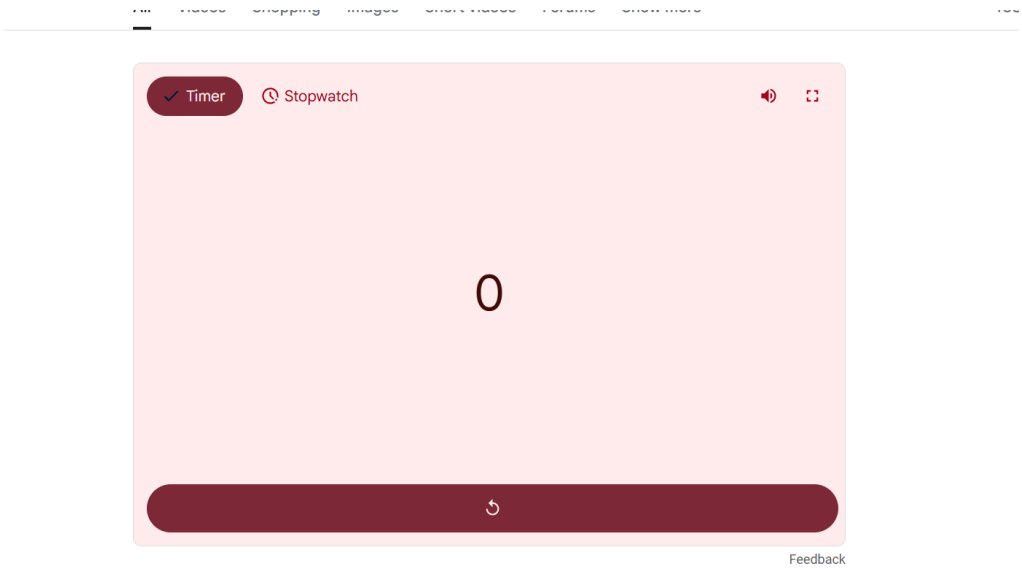


Figure 74: *Google Search timer completion (screenshot showing 0).*

Source: *Google Search. https://www.google.com*

To identify servers still displaying the Apache2 Ubuntu Default Page, the Google Dork command intitle:"Apache2 Ubuntu Default Page: It works" was executed. This query specifically targets web pages with the given HTML <title> tag, making it possible to detect systems that are either misconfigured or not yet secured. The results included publicly accessible servers, such as one associated with the Massachusetts Institute of Technology, along with others running on Ubuntu infrastructure.

The discovery of default Apache2 pages is significant from a security perspective. Such findings often indicate servers are in development stages or lack proper access controls. While ethical hackers and penetration testers may use this intelligence to notify administrators and strengthen defenses, malicious actors could view it as an opportunity for exploitation. Early identification of these misconfigurations allows organizations to address potential vulnerabilities before they can be leveraged.

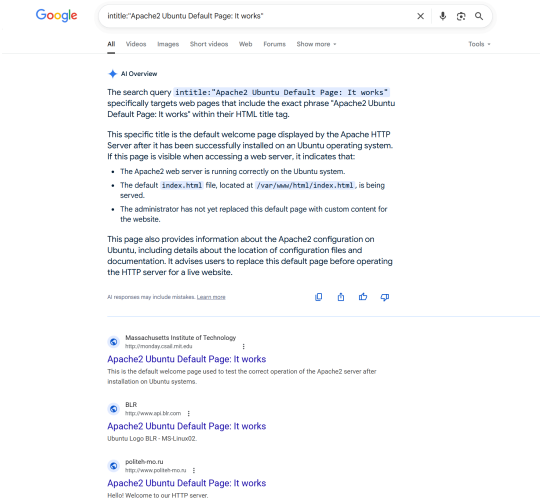


Figure 75: *Google Search results for intitle:"Apache2 Ubuntu Default Page: It works".*

Source: *Google Search. https://www.google.com*

To compare definitions of **Google Dorking**, the command **define: Google Dorking** was executed in Google Search, and results from several cybersecurity-focused sources were reviewed. According to **Imperva (2024)**, Google Dorking is a legitimate technique that leverages advanced search operators to uncover internet information that is not easily accessible through standard queries, often used by security professionals. **Okta (2024)** defines it as a method used by hackers to exploit search engines to identify vulnerabilities by locating exposed systems or sensitive data. Similarly, **Recorded Future (2024)** explains Google Dorks as advanced search techniques that help uncover hidden or specific information, providing cybersecurity analysts with critical intelligence that is otherwise difficult to obtain.

Collectively, these insights describe Google Dorking as the strategic use of specialized Google search operators to locate publicly accessible but sensitive content. This approach has dual relevance, serving ethical hackers and OSINT professionals for proactive defense, while also being misused by malicious actors. Its proper use strengthens cybersecurity posture by identifying weaknesses before they are exploited.

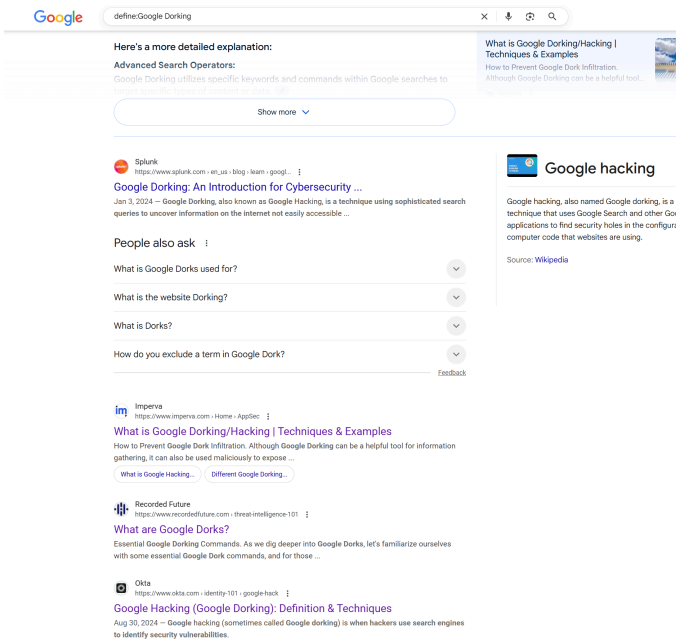


Figure 76: *Google Search results for define:Google Dorking.*

Source: *Google. (2025). Google Search. https://www.google.com*

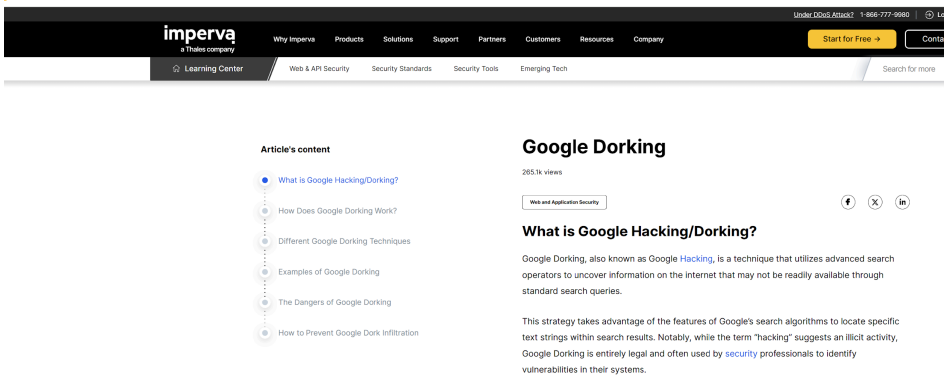


Figure 77: *Imperva definition of Google Dorking.*

Source: *Imperva. (2024). Google Dorking: What is Google Hacking/Dorking?*

[Screenshot]. https://www.imperva.com/learn/application-security/google-dorking/

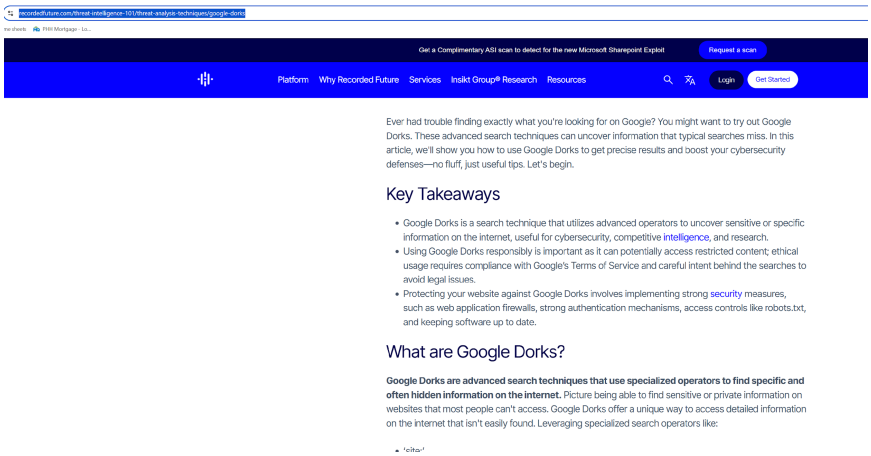


Figure 78: *Recorded Future definition of Google Dorks.*

Source: *Recorded Future. (2024). What are Google Dorks? [Screenshot].* *https://www.recordedfuture.com/threat-intelligence-101/threat-analysis-techniques/google-dorks*

Figure 79: *Okta definition of Google Hacking (Google Dorking).*

Source: *Okta. (2024, August 30). Google Hacking (Google Dorking): Definition & Techniques [Screenshot].* *https://www.okta.com/identity-101/google-hacking/*

To check for the presence of publicly accessible Microsoft Excel (.xlsx) files on the University of Maryland Global Campus (UMGC) domain, the Google Dork query **site:umgc.edu filetype:xlsx** was executed. This query restricts search results to only Excel files hosted on the specified domain. The search produced no results, displaying the message *"did not match any documents."* This outcome suggests that UMGC does not host publicly available Excel files, or such files are intentionally restricted from being indexed by Google. Techniques like this are widely used in open-source intelligence (OSINT) and cybersecurity investigations to identify potentially exposed documents that may hold sensitive data.

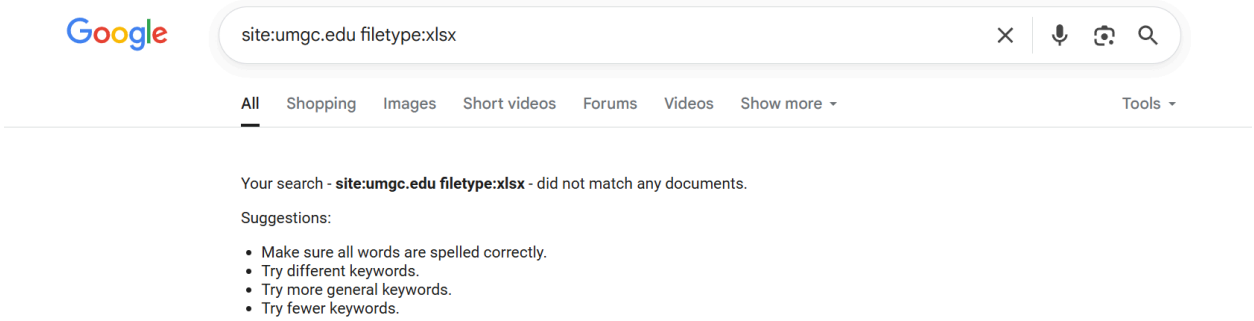


Figure 80: *Google Dork query for Excel files on umgc.edu.*

Source: *Google. (2025). Search results for "site:umgc.edu filetype:xlsx" [Screenshot]. Google Search. https://www.google.com*

Final IOC Analysis

A department requested access to four blocked domains: **mars.umgc.edu**, **linuxhint.com**, **financereports.co**, and **creativebookmark.com**. A comprehensive threat intelligence review was conducted using **Virus Total**, **Cisco Talos Intelligence Center**, and **AlienVault OTX** to determine whether access should be permitted.

The analysis of **mars.umgc.edu** confirmed the domain to be safe across all tools. Virus Total reported a clean status with no detections, Cisco Talos categorized it under *Education* with a favorable web reputation, and AlienVault OTX validated the site as whitelisted without associated threats. Based on these consistent findings, access to mars.umgc.edu is recommended for approval.

The domain **linuxhint.com** also demonstrated a safe profile. Virus Total showed no detections, Cisco Talos classified it under *Computers and Internet* with a favorable reputation, and AlienVault OTX indicated whitelisted status, though it noted historical telemetry. Since there is no evidence of active threats, access to linuxhint.com can be approved, with periodic monitoring advised.

The domain **financereports.co** raised significant concerns. Virus Total flagged it with multiple detections for phishing and malware, including from reputable vendors such as BitDefender and Sophos. Cisco Talos reported a *Neutral* reputation with outdated validation, while AlienVault OTX confirmed recent telemetry and suspicious activity. Given these consistent red flags, access to financereports.co should remain blocked.

The final domain, **creativebookmark.com**, also showed evidence of malicious activity. Virus Total flagged phishing and malware detections, Cisco Talos classified it as *Untrusted* with no defined category, and AlienVault OTX confirmed related malicious pulses. Since all platforms report threats and the domain lacks a trustworthy profile, access to creativebookmark.com should remain blocked.

Conclusion: Based on evidence from multiple intelligence sources, **mars.umgc.edu** and **linuxhint.com** should be approved for access, while **financereports.co** and **creativebookmark.com** should remain blocked due to phishing and malware concerns.

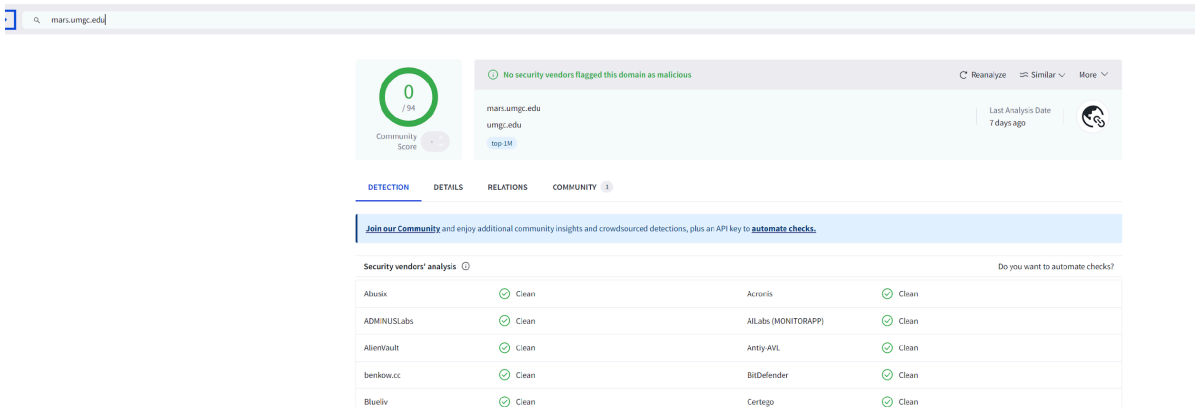


Figure 81: *VirusTotal domain analysis for mars.umgc.edu.*

Source: *VirusTotal. Retrieved from https://www.virustotal.com*

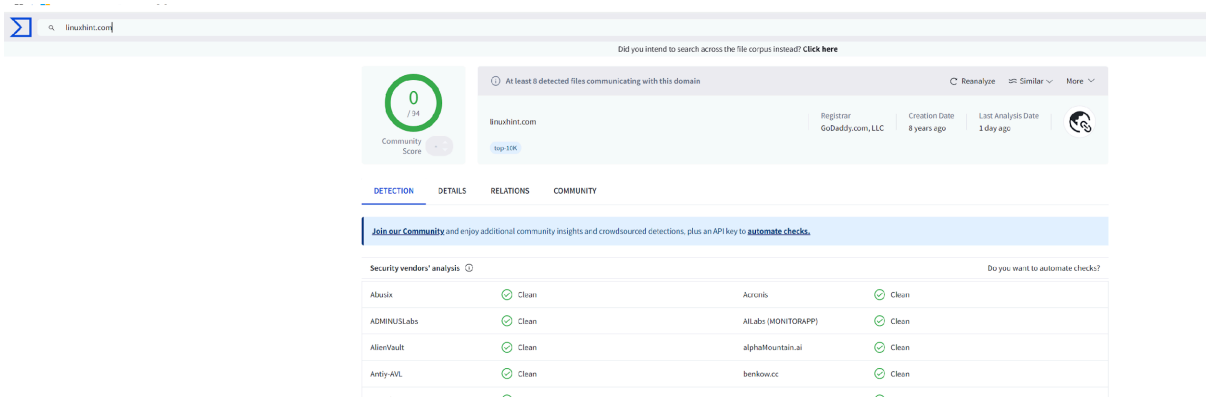


Figure 82: *Cisco Talos Intelligence – mars.umgc.edu domain reputation.*

Source: *Cisco Talos. Retrieved from https://talosintelligence.com*

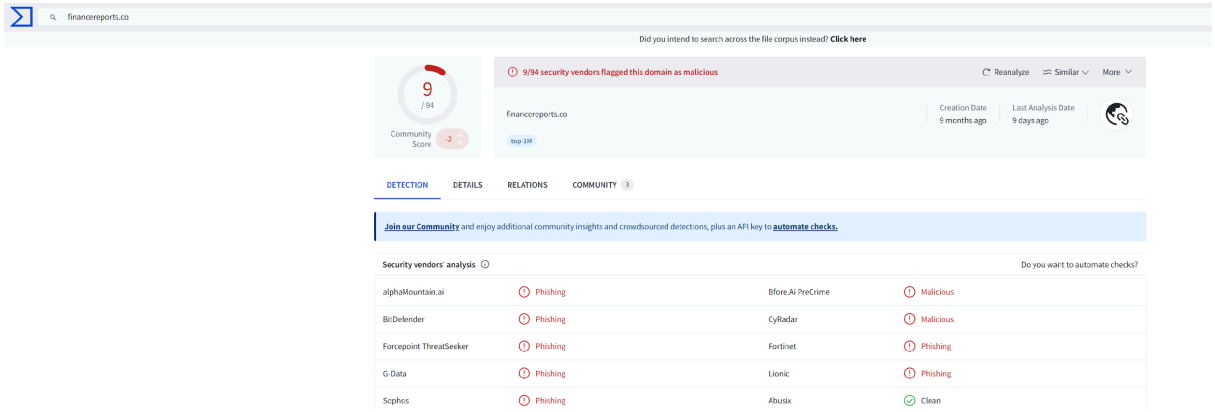


Figure 83: *AlienVault OTX threat analysis for mars.umgc.edu.*

Source: *AlienVault OTX. Retrieved from https://otx.alienvault.com*

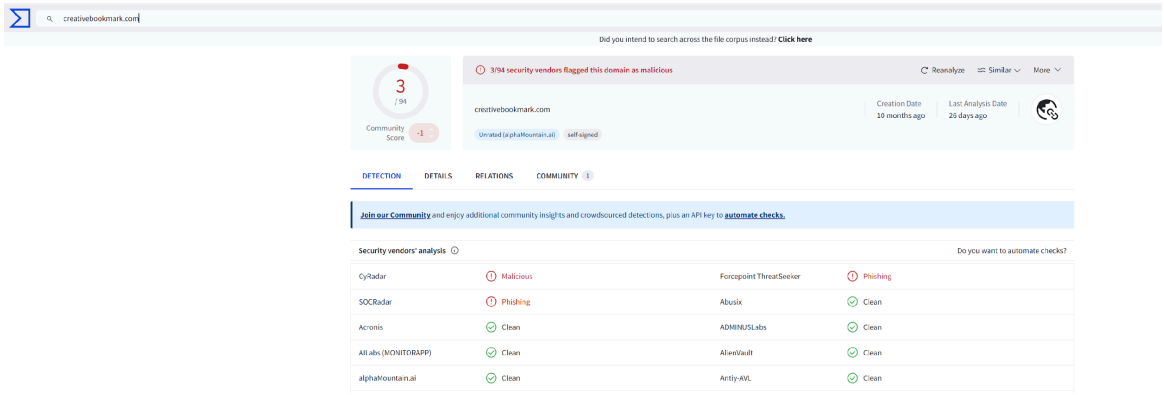


Figure 84: *VirusTotal domain analysis for linuxhint.com.*

Source: *VirusTotal. Retrieved from https://www.virustotal.com*

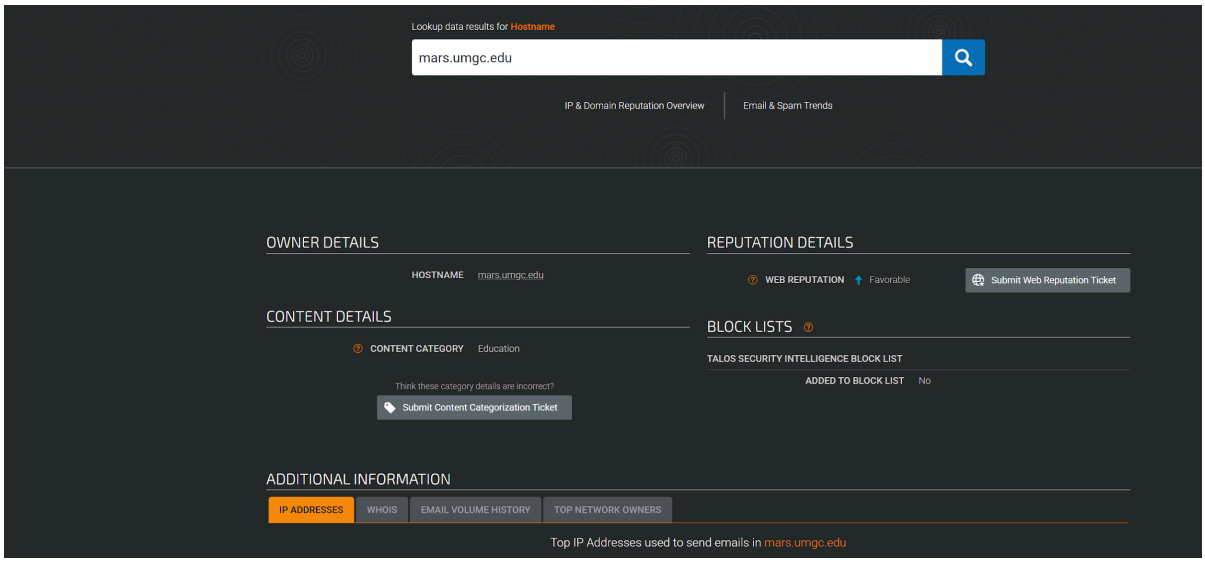


Figure 85: *Cisco Talos Intelligence – linuxhint.com domain reputation.*

Source: *Cisco Talos. Retrieved from https://talosintelligence.com*

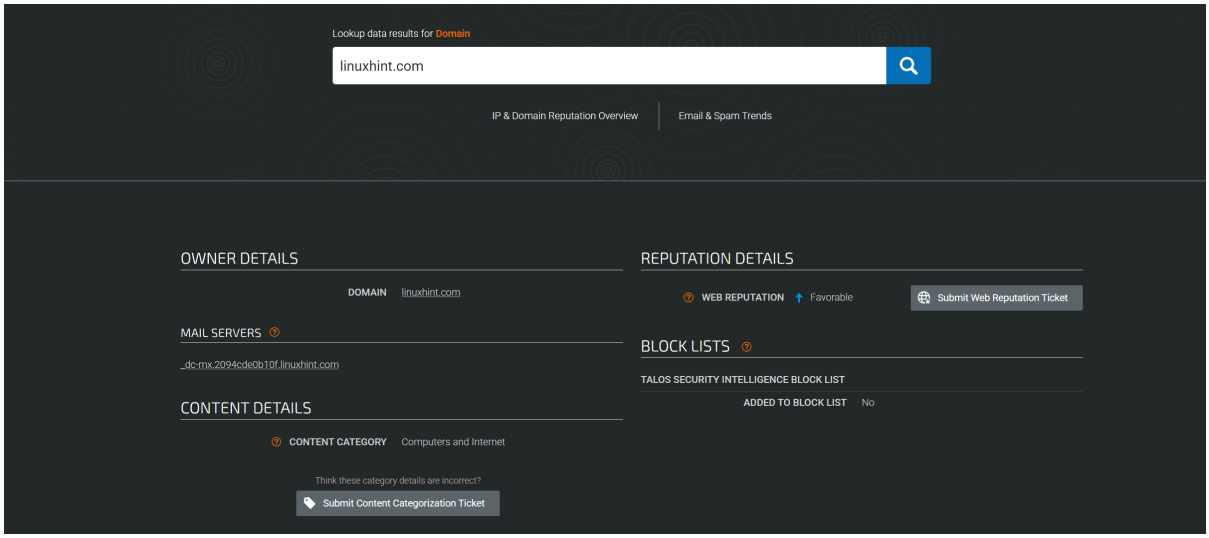


Figure 86: *AlienVault OTX threat analysis for linuxhint.com.*

Source: *AlienVault OTX. Retrieved from https://otx.alienvault.com*

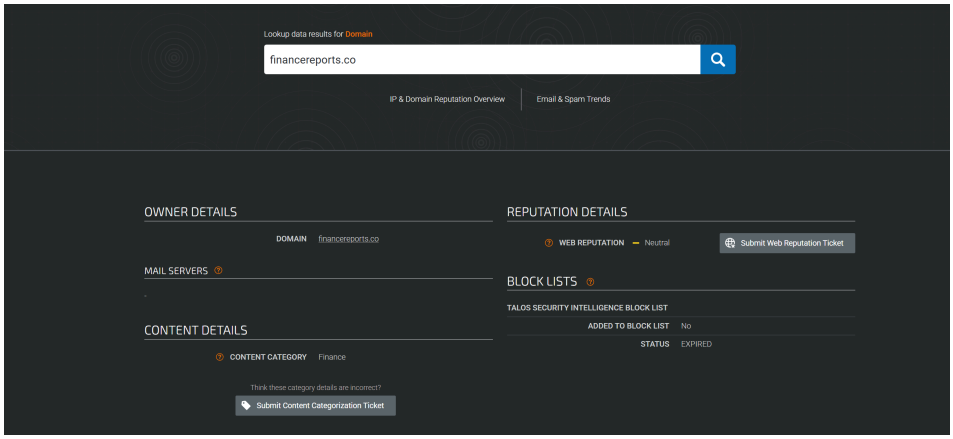


Figure 87: *VirusTotal domain analysis for financereports.co.*

Source: *VirusTotal. Retrieved from https://www.virustotal.com*

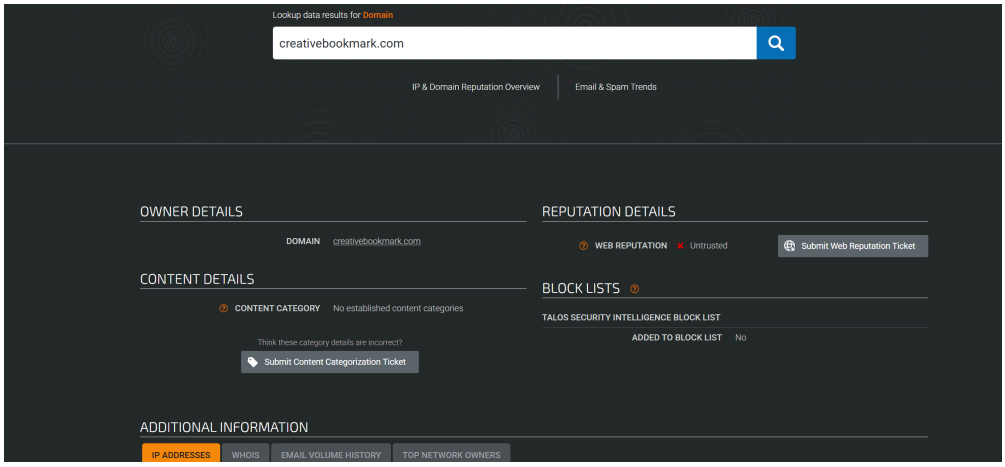


Figure 88: *Cisco Talos Intelligence – financereports.co domain reputation.*

Source: *Cisco Talos. Retrieved from https://talosintelligence.com*

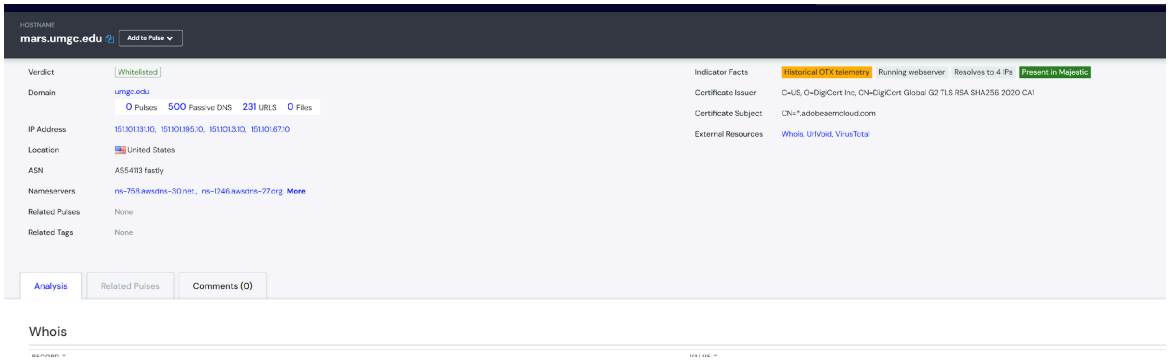


Figure 89: *AlienVault OTX threat analysis for financereports.co.*

Source: *AlienVault OTX. Retrieved from https://otx.alienvault.com*

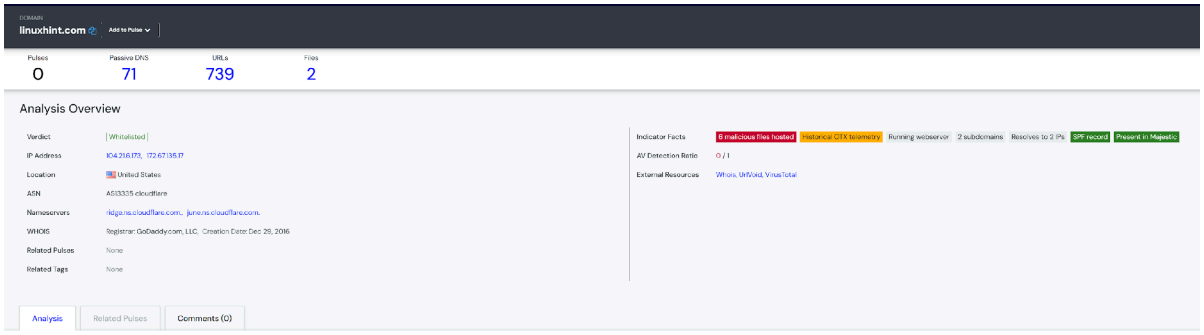


Figure 90: *VirusTotal domain analysis for creativebookmark.com.*

Source: *VirusTotal. Retrieved from https://www.virustotal.com*

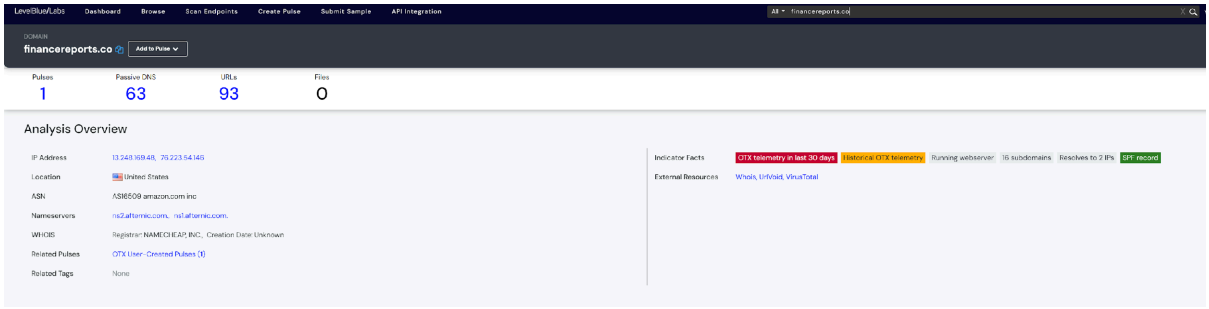


Figure 91: *Cisco Talos Intelligence – creativebookmark.com domain reputation.*

Source: *Cisco Talos. Retrieved from https://talosintelligence.com*

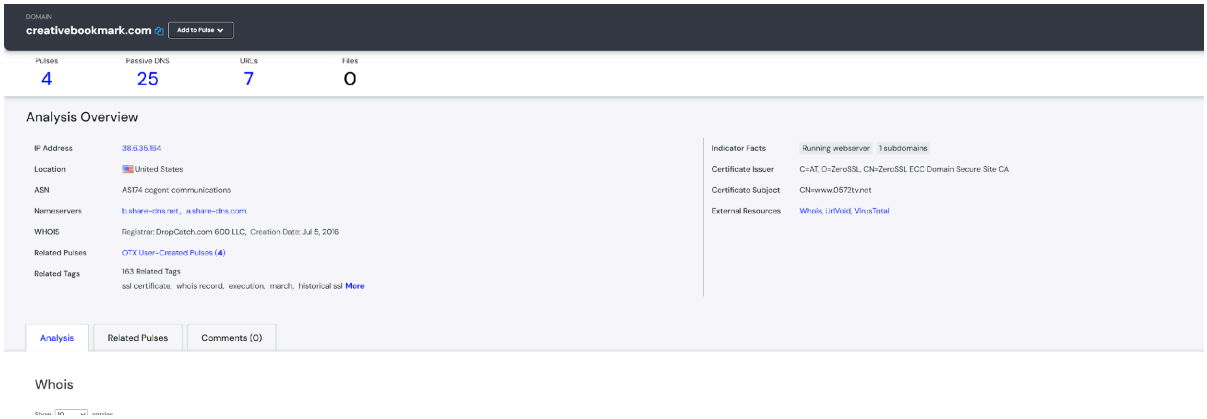


Figure 92: *AlienVault OTX threat analysis for creativebookmark.com.*

Source: *AlienVault OTX. Retrieved from https://otx.alienvault.com*

The file associated with the SHA-256 hash **b4bd56a2aebe3f5e020c5421e01c2d16804c25da673ecb125b074a94581cecfe** was identified as **malicious by 59 of 72 security vendors** on VirusTotal. The detections consistently label them as a **Ryuk or Hermes ransomware variant** (e.g., *Ransomware.Ryuk*, *Generic.Ransom.Hermes.24692503*, *Windows.Ransomware.Ryuk*).

Ryuk ransomware is a severe threat, commonly deployed in **targeted enterprise attacks**, where it encrypts files and renders systems inoperable until ransom demands are met. It is often distributed via **phishing campaigns** or paired with malware such as **Emotet or TrickBot** to facilitate lateral movement and persistence. The association with Hermes suggests added **anti-debugging and evasion capabilities**, making remediation more difficult.

The VirusTotal analysis, last updated **two months ago**, indicates the sample remains **active in the threat landscape**. Given its destructive impact, the file should be **immediately quarantined**, and a **full forensic investigation** should be conducted to assess organizational exposure.

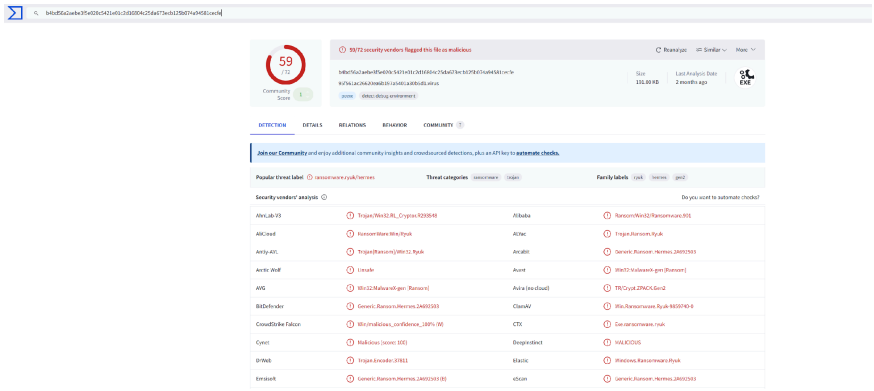


Figure 93: *VirusTotal detection report for file hash b4bd56a2aebe3f5e020c5421e01c2d16804c25da673ecb125b074a94581cecfe.*

Source: *VirusTotal – https://www.virustotal.com*

The file associated with the SHA-256 hash **d893a28a885344f46e74f3131d5ae3b3ecd2f5d29571afb124f556db86da40f3** was identified as **malicious by 56 of 72 security vendors** on VirusTotal. The primary

detection label is **Trojan.AutoIT.MalIT**, a malware family linked to AutoIt-based malicious scripts.

Detection results from trusted security vendors including **Kaspersky, AVG, BitDefender, and Microsoft**, confirm this file as a high-risk Trojan, with tags such as *autoit*, *malit*, and *multiverse*. These indicators suggest a **modular structure** capable of executing multi-stage payloads or employing obfuscation techniques to evade defenses. Additional behavioral markers, including **sandbox evasion, persistence, and anti-debugging tactics**, reinforce its classification as an advanced and adaptable threat.

The analysis, performed **one month ago**, highlights that this malware remains an **active risk** in the threat landscape. Given its ability to persist undetected and deliver multi-stage attacks, this file should be **immediately quarantined**, and systems exposed to it should undergo a **comprehensive forensic review** to prevent potential compromise.

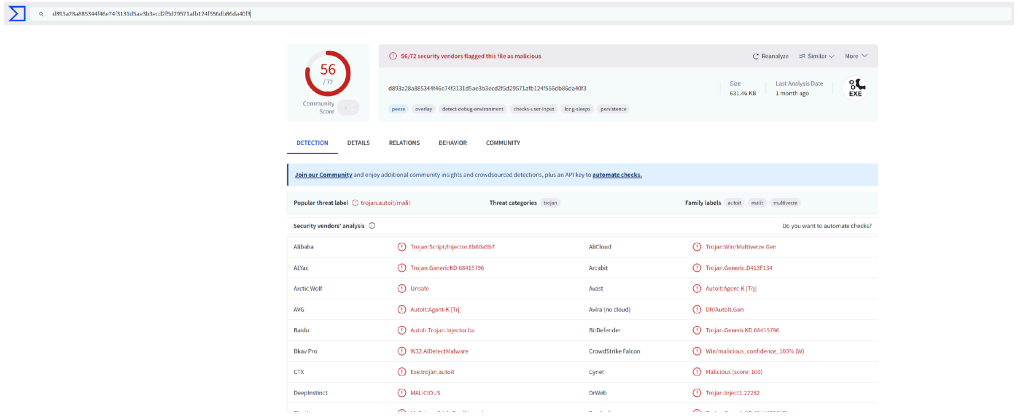


Figure 94: *VirusTotal detection report for file hash d893a28a885344f46e74f3131d5ae3b3ecd2f5d29571afb124f556db86da40f3.*

Source: *VirusTotal – https://www.virustotal.com*

The file associated with the SHA-256 hash **5dc84570905973f2719578179596e36b4e29f2343ca360aeff730aacf7e37ed0** was flagged as **malicious by 30 of 72 security vendors** on VirusTotal. The most common detection label is **Adware.AmyBar/DNRHZ**, categorized as **adware, trojan, and potentially unwanted application (PUA)**.

Multiple vendors—including **Avira, Bkav Pro, CTX, and DrWeb**—identified the file as part of the *AmyBar* or *Adware.Bho.3907* family. Microsoft flagged it as **PUA:Win32/Bitrepreg.B**, while ESET-NOD32 classified it as a **Win32/Adware.Toolbar.Amy variant**. The file type is a **.DLL**, and its behavior tags include **detect-debug-environment** and **overlay**, both of which are indicators of evasion tactics designed to bypass analysis and detection.

This adware family is known to alter browser configurations, install unwanted toolbars, and potentially expose systems to additional malware through secondary payloads. The last analysis date, recorded **three months ago**, highlights its ongoing relevance. Given its potential to compromise **privacy, system integrity, and user security**, this file should be **immediately quarantined**, and any affected systems should undergo remediation.

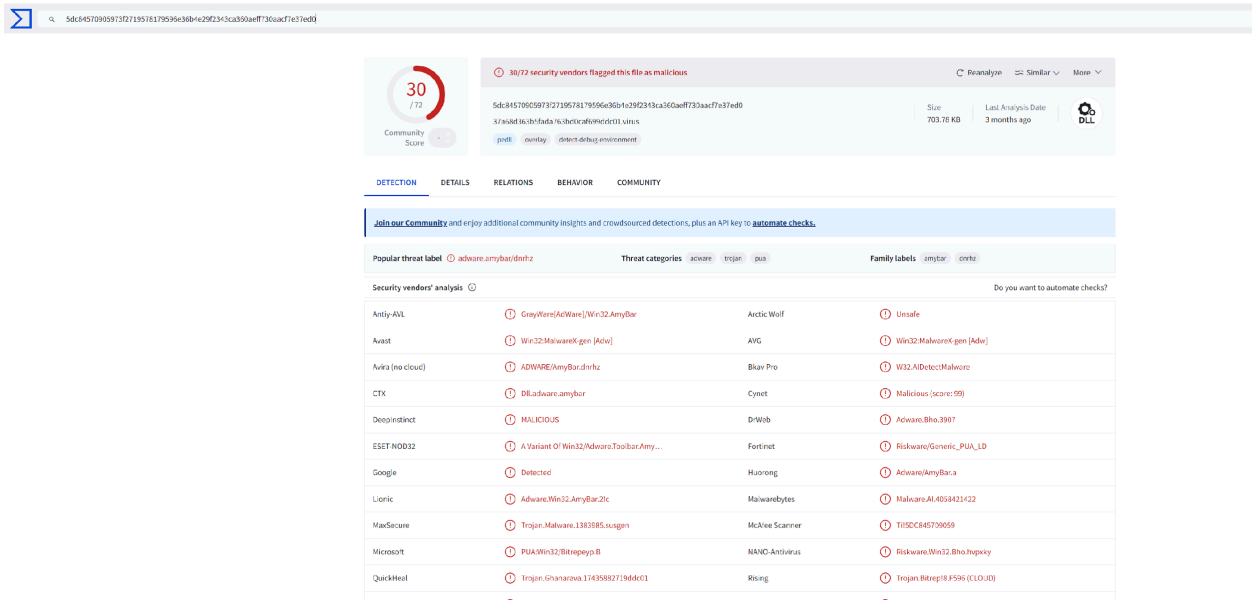


Figure 95: *VirusTotal detection report for file hash 5dc84570905973f2719578179596e36b4e29f2343ca360aeff730aacf7e37ed0.*

Source: *VirusTotal –* [*https://www.virustotal.com*](https://www.virustotal.com)

The files associated with the SHA-256 hashes **D94BB76D6A8FBA54D6579A6265F6EAE66E905B8667D1B33080D28A2F7D068C0D** and **456A194F501984067435393729294ECC02E75973C011F1E765EEB3FC6C23CBE4** were analyzed on VirusTotal, and **no malicious detections** were reported by any security vendors. This indicates that both files are currently considered **safe for routine use**.

While no threats were identified, it is recommended that these files remain under **periodic reevaluation**. The evolving threat landscape means that previously benign files may later be weaponized or flagged as suspicious by updated detection engines. Maintaining them on a **watchlist** ensures proactive monitoring against any emerging risks.

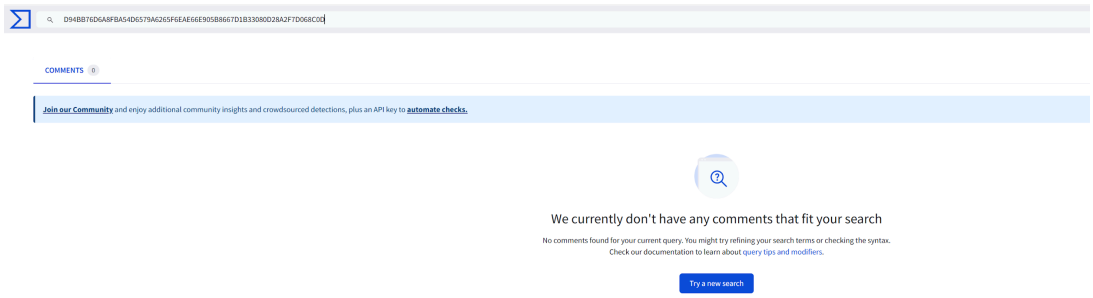


Figure 96: *VirusTotal analysis result for file hash D94BB76D6A8FBA54D6579A6265F6EAE66E905B8667D1B33080D28A2F7D068C0D.*

Source: *VirusTotal*

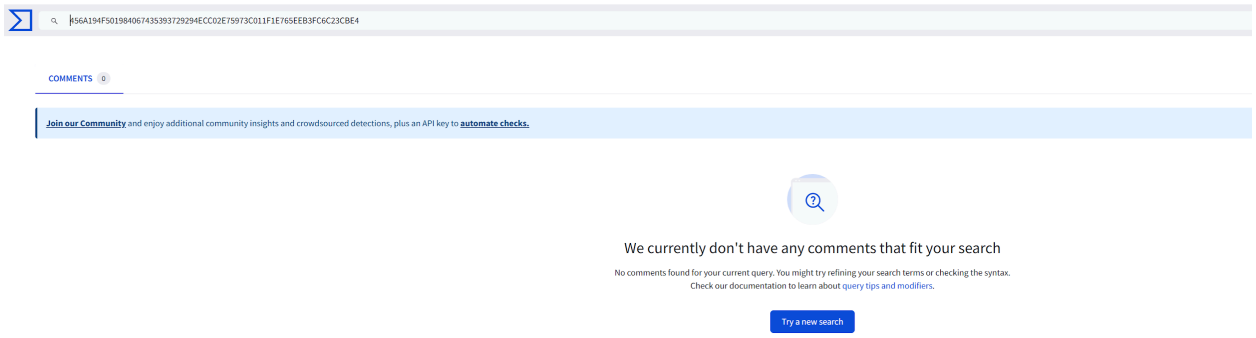


Figure 97:*VirusTotal analysis result for file hash 456A194F50198406743539372929 4ECC02E75973C011F1E765EEB3FC6C23CBE4.*

Source: *VirusTotal*

To verify the integrity and safety of the organization's documents, SHA-256 hashes were generated for three files and subsequently analyzed using VirusTotal to detect any potential malware threats.

- The first file, **2022-2023catalog.pdf**, produced the SHA-256 hash d391a0bd202f075c9725bfa21422fa6ca378caa234bba743cf75012593b8ec93. Upon scanning this hash with VirusTotal, the file was found to be clean with **zero security vendors flagging it as malicious**.
- The second file, **courseplanner.pdf**, had a generated hash of 9ed6d10aece6f0b9a3289f440003c4734ea931e2577cf05354a984437a092de3. Like the first file, it was also scanned by VirusTotal, and **no malicious activity was detected** by any of the 64 antivirus engines.
- Finally, the **samplecoverletter.pdf** file resulted in the SHA-256 hash b59633e1a54a06ff7c5cfa8dd7efa3217a1db9c6610fa8f9b857920a7e10c02f. This hash was also submitted to VirusTotal and received a **clean report**, with **zero detections** across all participating security vendors. Based on this thorough analysis, all three files are confirmed safe and pose no malware threat, ensuring secure distribution and verification across the organization's systems.

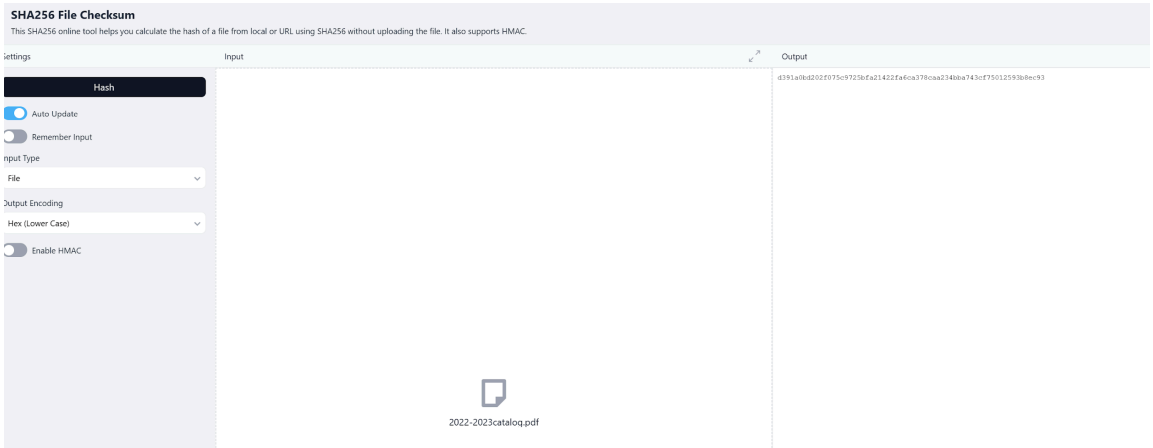


Figure 98:*SHA-256 hash generation for 2022-2023catalog.pdf using OnlineHashCrack SHA256 Generator.*

Source: *OnlineHashCrack SHA256 Generator*

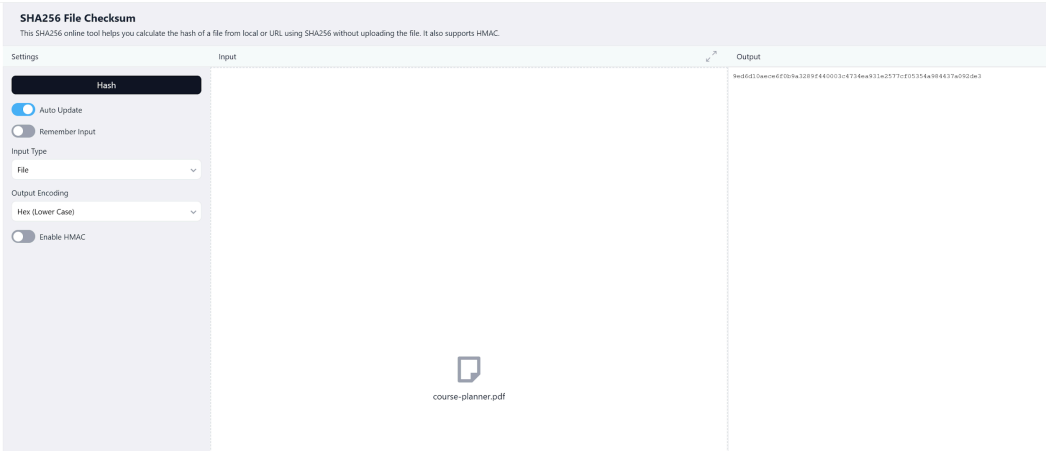


Figure 99: *SHA-256 hash generation for courseplanner.pdf using OnlineHashCrack SHA256 Generator.*

Source: *OnlineHashCrack SHA256 Generator*

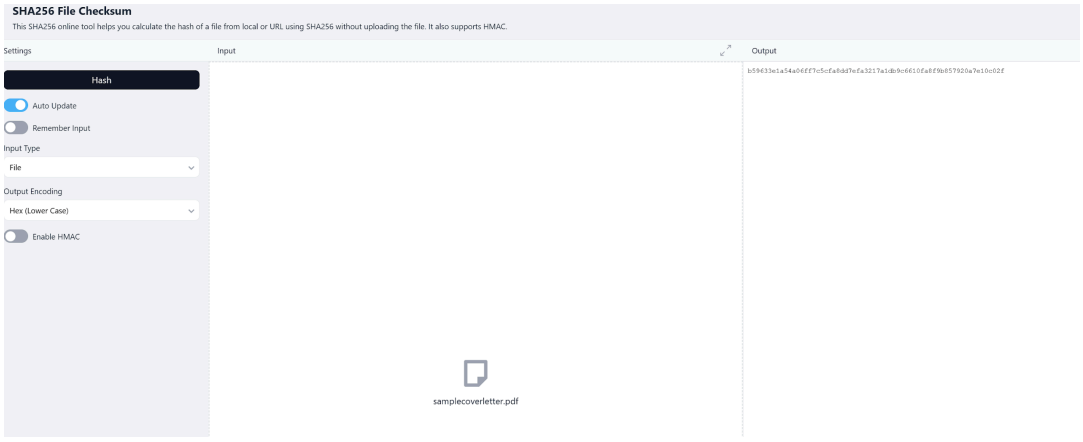


Figure 100: *SHA-256 hash generation for samplecoverletter.pdf using OnlineHashCrack SHA256 Generator.*

Source: *OnlineHashCrack SHA256 Generator*

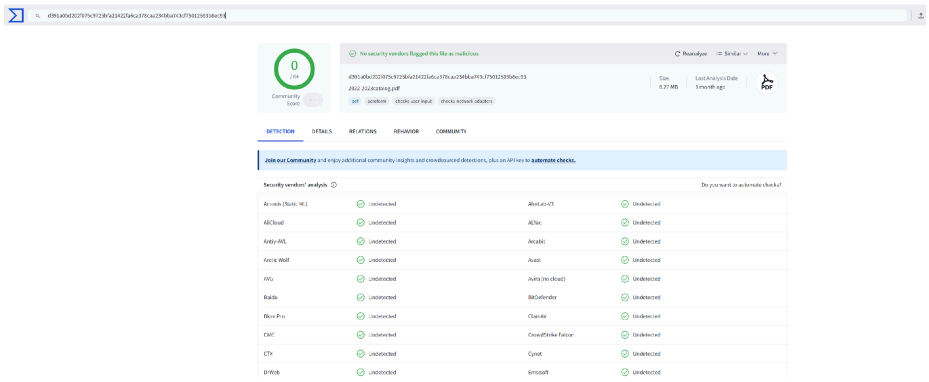


Figure 101: *VirusTotal scan results for 2022-2023catalog.pdf showing no detections.*

Source: *VirusTotal*

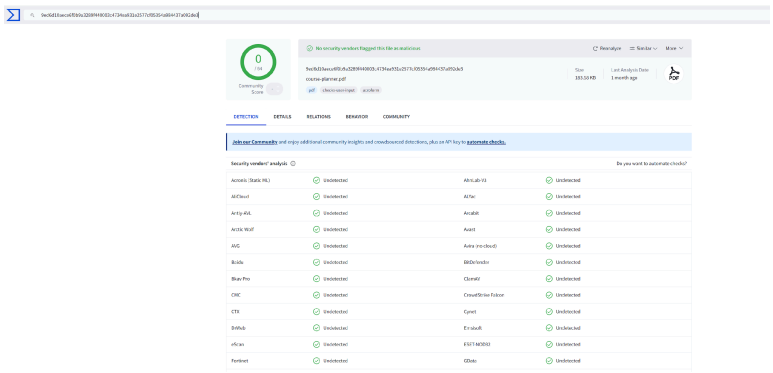


Figure 102: *VirusTotal scan results for courseplanner.pdf showing no detections.*

Source: *VirusTotal*

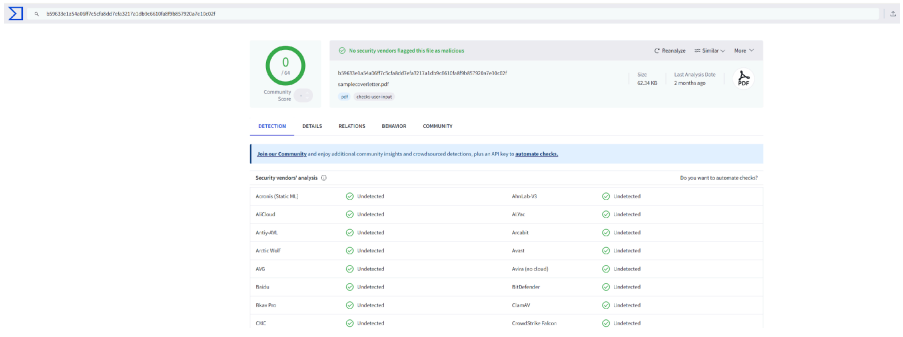


Figure 103*: VirusTotal scan results for samplecoverletter.pdf showing no detections.*

Source: *VirusTotal*

Summary

Throughout this project, a wide range of open source threat intelligence tools and techniques were applied, each providing distinct strengths in identifying, validating, and contextualizing Indicators of Compromise (IOCs). Tools such as Virus Total and Cisco Talos enabled foundational file and domain-based threat analysis, supporting rapid identification of malware through hash lookups and domain categorizations. Virus Total's multi-engine scanning and accessible interface proved particularly effective in validating suspicious files. However, its reliance on known threats limits effectiveness against novel or obfuscated malware, making it unsuitable for zero-day detection. Cisco Talos, while rich in research insights and reputation data, offered less flexibility for large scale API-driven analysis in its free tier.

AlienVault OTX added value by providing community driven intelligence feeds that enriched IOC context with peer sourced threat pulses. Its ability to correlate and share threat data across organizations is a key advantage for SOC teams monitoring emerging threats. Nevertheless, reliance on community input can introduce false positives or unverified claims, requiring human validation to filter noise. Maltego further strengthened investigative workflows by enabling visual correlation of domains, IP addresses, and organizational relationships. The platform's graphical mapping enhanced understanding of complex entity connections, though its steep learning curve and partial reliance on third party integrations limited efficiency in time sensitive scenarios.

Reconnaissance tools available in Kali Linux, including Nmap, dnsenum, dnsrecon, dnsmap, and fierce, proved critical in surface level and in depth enumeration

of network infrastructure. Nmap remains an industry standard for its customizable port scanning and scripting capabilities but can be noisy and easily detected by intrusion detection systems. DNS enumeration tools such as dnsrecon and fierce were particularly effective in uncovering subdomains and misconfigured servers, contributing to asset discovery. Despite these strengths, the absence of modern GUIs and reporting functionality means these tools often require manual log parsing and interpretation. Their command line orientation provides flexibility for advanced users but may limit accessibility for non-technical analysts.

In parallel, OSINT techniques such as Google Dorks highlighted the risk of publicly exposed sensitive data. While simple, this method underscored how improperly secured or misclassified information can serve as an entry point for attackers. The ability to creatively leverage search operators makes this technique invaluable during passive reconnaissance, but its effectiveness depends heavily on analyst expertise. Correlation with structured platforms such as Virus Total or Maltego provided the necessary contextual analysis to strengthen findings and reduce ambiguity.

Looking forward, the breadth of tools used underscores the importance of integrating multiple data sources to create a holistic threat picture. Commercial platforms such as Recorded Future, Anomali, or ThreatConnect represent the next step in scaling enterprise capabilities. These solutions offer enriched feeds, real-time alerting, machine learning-driven noise reduction, and SIEM integration, enabling more efficient triage and deeper historical analysis (Paganini, 2023). While open-source platforms

remain indispensable for enrichment and initial analysis, enterprise-grade solutions reduce analyst fatigue and streamline workflows.

Each tool served a distinct role within the investigative lifecycle, from domain and file analysis to infrastructure mapping. No single solution provided comprehensive coverage; however, layering tools, validating results, and automating workflows produced stronger resilience against modern cyber threats. For organizations seeking to balance agility with accuracy, adopting a hybrid ecosystem leveraging OSINT for enrichment and commercial platforms for decision making represents the most strategic path forward.

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