Scaling Up!
Automated Attack Surface Discovery With **Intrigue Core**

NahamCon - June 2020

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Intrigue

Hi, I’m Jonathan Cran

- Human Hacker / Builder
- Head of Research @ Kenna Security, Risk Based VM
- Founder of Intrigue.io - Attack Surface Monitoring
- Formerly… Bugcrowd, Rapid7, Pwnie Express

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WorkingPoint
THE ONLINE SMALL BUSINESS MANAGEMENT SOLUTION
• BOOKKEEPING
• INVOICING
• FINANCIAL REPORTING
Wranggle
wynd
WYSADA
PX
WU
LOWE'S
WORKSOFT
woto
Jobing.com
IBM
cisco Webex
WorkIndia
Kroger
FedEx
WORLD WIDE LAND TRANSFER
CISCO
Hard Stuff Done Right™
WWF
usbank
WYNDHAM
CANOPY partners
WHP
WORLDPLAY VIDEO PLATFORM
WorldVentures
Citizens Bank
Edward Jones
> START HERE <
FCA FIAT CHRYSLER AUTOMOBILES OFFICIAL
WORKWAVE AN IFS COMPANY
Flippa
GM
DISCOVER
HARRIS
WPS HEALTH INSURANCE
wywy
bizible a Marketo company
Toll Brothers AMERICA'S LUXURY HOME BUILDER
Worldwide Facilities, LLC
worksteady
FRONTIER
World Lifestyle
WOW.lk
intel
DG
X1


Intrigue Ident
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Application and Network Fingeprinting With Ident

- **Application Fingerprinting**
  - Over 700 Unique Fingerprints
  - Mappable to CVEs
- **Network Fingerprinting**
  - With the integration of Recog, ~4000+
  - Telnet, SSH, SNMP, SMTP, FTP

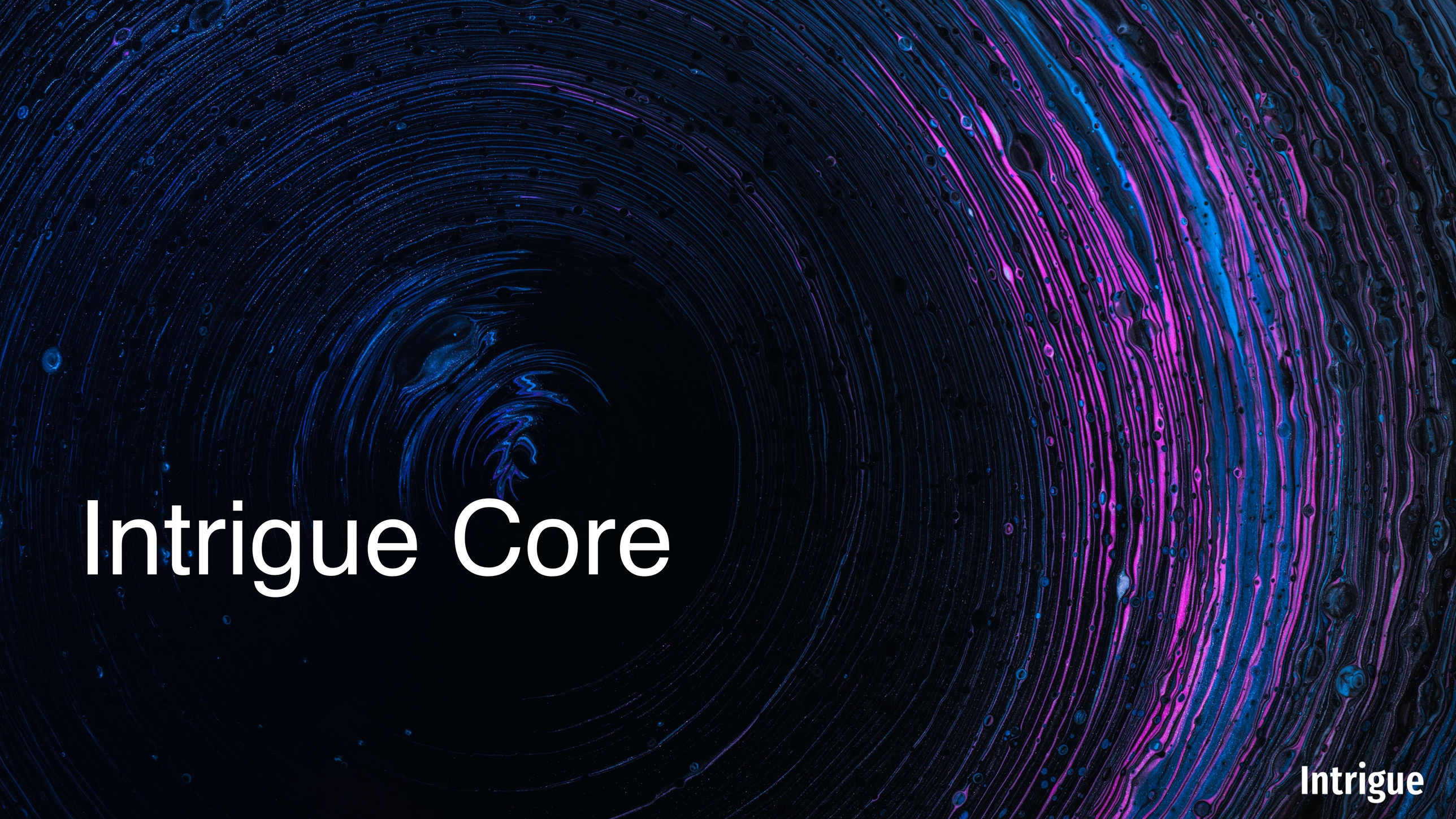
- **Techniques**
  - FTP Banner
  - HTTP cookies
  - HTTP headers
  - HTTP body
  - HTTP title
  - HTTP generator tag
  - SMTP Banner
  - SNMP Banner
  - SSH BAnner
  - TELNET Banner

Intrigue

```
{
  :type => "fingerprint",
  :category => "application",
  :tags => ["Web Server"],
  :vendor => "Acme",
  :product => "Micro Httpd",
  :references => [ "https://acme.com/software/micro_httpd/" ],
  :version => nil,
  :match_type => :content_headers,
  :match_content => /server: micro_httpd/i,
  :match_details => "server header",
  :hide => false,
  :paths => ["#{url}"],
  :inference => false
}
```

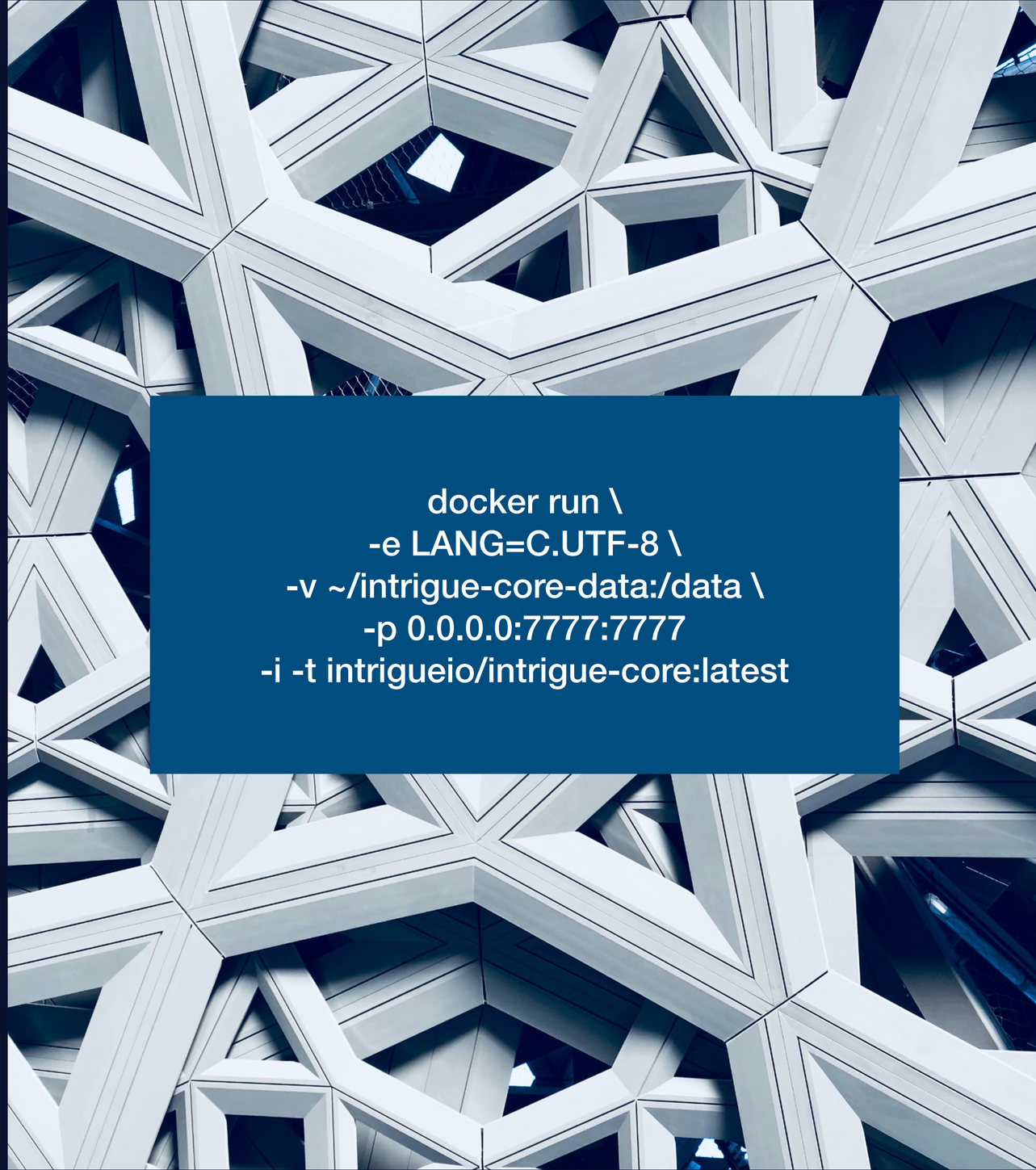
```
{
  :type => "fingerprint",
  :category => "application",
  :tags => ["Productivity","COTS", "Mail Server", "Email"],
  :vendor => "Microsoft",
  :product =>"Exchange Server",
  :references => ["https://bit.ly/2k4Yoot"],
  :match_details =>"OWA version -> Exchange server inference (headers)",
  :version => nil,
  :match_type => :content_headers,
  :match_content =>  /x-owa-version/i,
  :dynamic_version => lambda { |x|

    version_string = _first_body_capture(x, /href=\"\/owa\/auth\/([\d\.]+)\/themes\/resources\/favicon.ico/)
    version_string = _first_body_capture(x, /href=\"\/owa\/([\d\.]+)\/themes\/resources\/favicon.ico/) unless version_s

    owa_to_exchange_version(version_string)[:version]
  },
  :dynamic_update => lambda { |x|

    update_string = _first_body_capture(x, /href=\"\/owa\/auth\/([\d\.]+)\/themes\/resources\/favicon.ico/)
    update_string = _first_body_capture(x, /href=\"\/owa\/([\d\.]+)\/themes\/resources\/favicon.ico/) unless update_str

    owa_to_exchange_version(update_string)[:update]
  },
  :paths => ["#{url}"],
  :inference => true # TODO - not specific enough yet
},
```

```
[jcran ident master [20200612]$ docker run -it intrigueio/intrigue-ident -u https://nahamcon.splashthat.com
Unable to find image 'intrigueio/intrigue-ident:latest' locally
latest: Pulling from intrigueio/intrigue-ident
de6fe37eab5f: Pull complete
f66893d8fbf1: Pull complete
7b6461338a29: Pull complete
a43a91ff682a: Pull complete
cb5564fb45d1: Pull complete
Digest: sha256:97dac5a5c0d4ff2f3f91f3c8c6bb1702bc8374161321d9c5ae5c313d436707dc
Status: Downloaded newer image for intrigueio/intrigue-ident:latest
Fingerprint:
 - Varnish-Cache Varnish   - Varnish Proxy (CPE: cpe:2.3:a:varnish-cache:varnish::) (Tags: ["Web Server", "Cache"])
 - Google Analytics   - load string (CPE: cpe:2.3:s:google:analytics::) (Tags: ["Marketing", "Javascript"]) (Hide: f
 - Nginx Nginx   - Nginx (no version) (CPE: cpe:2.3:a:nginx:nginx::) (Tags: ["Web Server"]) (Hide: false)
jcran ident master [20200612]$
```


Intrigue Core
Intrigue

What Is Intrigue Core?

- **Automation Framework and Orchestration Engine**
- **Scriptable internally or via API**
- **Distributed via Docker**
- **Powers data collection for intrigue.io**



```
docker run \
-e LANG=C.UTF-8 \
-v ~/intrigue-core-data:/data \
-p 0.0.0.0:7777:7777
-i -t intrigueio/intrigue-core:latest
```

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Key Features & Capabilities

- Simple Web interface and API
- Web & Service Fingerprinting
- Web Spidering
- Vulnerability Inference
- Vulnerability Checking
- Automated Web Screenshots
- Metadata parsing
- Integrations to most open data providers
- Notifications & Alerting
- Export to JSON / etc
- Exposure Analysis
- Geolocation
- Threat X-references
- Network & Cloud Provider Determination

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Core Entities

- NetworkService
- Credential
- WebAccount
- GithubAccount
- GithubRepository
- IpAddress
- AwsS3Bucket
- Info
- FileHash
- Uri
- AwsIAMAccount
- EmailAddress
- Nameserver
- AutonomousSystem
- DnsRecord
- NetBlock
- SoftwarePackage
- Organization
- PhoneNumber
- AwsRegion
- PhysicalLocation
- AwsCredential
- AnalyticsId
- Person
- Domain
- SslCertificate

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Core Discovery Techniques

AWS S3 Brute

AWS S3 Put File

Apache 'Server Status' Parser

DNS Cache Snoop

DNS DKIM Lookup

DNS MX Lookup

DNS Morph

DNS NSEC record walk

DNS Permute

DNS SPF Recursive Lookup

DNS Service Record Bruteforce

DNS Subdomain Bruteforce

DNS Zone Transfer

Email Brute Gmail GLXU

Email Harvester

Email Validate via MailboxLayer

Enumerate Nameservers

Enumerate an FTP server

Geolocate IP Address

Gitrob

Import ARIN IPv4 Ranges

Import AWS IPv4 Ranges

Import CVEs from NVD (JSON)

Import Data File

Import Domains from Domainlists

Import Latest Pulses from Alienvault OTX

Import Shodan JSON

Import Umbrella Top Domains

Import Umbrella Top Sites

Masscan Scan

NetBlock Expand

Nmap Scan

Phone Number Lookup

Rdpscan Scan

SNMP Walk

SaaS Google Calendar Check

SaaS Google Groups Check

SaaS Jira Check

SaaS Trello Check

Scrape PublicWWW

TCP Bind And Collect

URI Analyze Target

URI Brute (List)

URI Brute Common Content

URI Brute Focused Content

URI Bruteforce

URI Bruteforce Credentials

URI Check HTTP/2 Support

URI Check Security Headers

URI Check Subdomain Hijack

URI Enumerate JS

URI Extract Metadata

URI Gather Linked Content

URI Gather Robots.txt

URI Gather SSL Certificate

URI Gather Sitemap (sitemap.xml)

URI Gather Well-Known Files (RFC5785)

URI Screenshot

URI Spider

URI Youtube Metadata

Web Account Check

Whois Lookup

Wordpress Enumerate Plugins

Wordpress Enumerate Users

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Core Dataset Integrations

AWS EC2 Gather Instances

AWS IAM Gather Accounts

Search Alienvault OTX

Search Alienvault OTX Hashes

Search Alienvault OTX Related Hostnames

Search BGP

Search BinaryEdge

Search BinaryEdge Risk Score

Search BinaryEdge Torrent

Search Bing

Search Bing Organization Name to Domains

Search BuiltWith

Search CRT

Search Censys.io

Search CertSpotter

Search CleanBrowsing DNS

Search Comodo DNS

Search DeHashed

Search EDGAR

DNS Search Sonar

Search Github

Search Github Code

Search Grayhat Warfare

Search Have I Been Pwned (HIBP)

Search Hunter.io

Search OpenCorporates

Search OpenDNS

Search Phishtank

Search Project Honeypot

Search Pulsedive

Search Quad9 DNS

Search Robtex

Search Shodan

Search SpyOnWeb

Search Sublist3r

Search ThreatCrowd

Search Towerdata

Search ViewDNS (Reverse Whois)

Search VirusTotal

Search Whoisology

Search Yandex DNS

Security Trails Historical DNS Lookup

Security Trails Historical WHOIS

Security Trails Nameserver Search

Security Trails Subdomain Search

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Scaling Data Collection

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Core Automated Scoping

- Automated scoping enables intelligent iteration
- Rule-based
  - 👍 Anything the user scopes in
  - 👍 Anything explicitly requested at the time of task creation
  - 👍 Per-entity scoping rules

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Machines

- Machines are automation that enable entity-level decisions
- Machines are (usually) recursive and build a “graph”
- Can be Active or Passive
- Designed with a collection purpose in mind

- Example:
  - **Domain**
    - Sub-brute
    - Check Project Sonar
  - **Ip Address**
    - Nmap Scan
  - NetworkService
    - Grab Banner

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Core Entity Enrichment and Normalization

- Enrichment ensures we can automate without overwhelming complexity
- Example:
  - Domain
    - Look it up, Grab SOA (if available)
      - Grab MX, NS, TXT, etc
    - Resolve to an IP (which creates an entity and starts enrichment)

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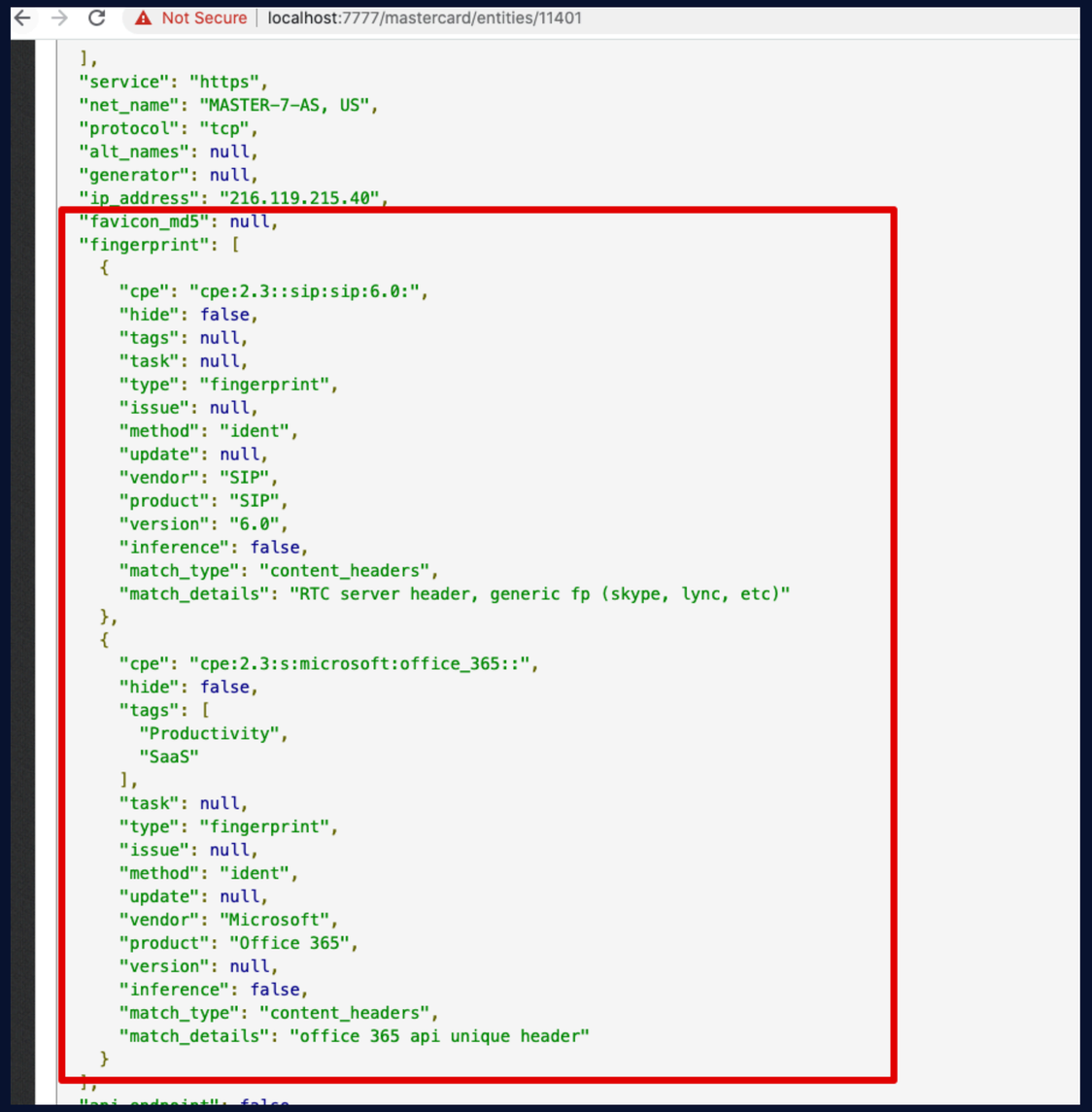
Core Vulnerability Inference

- Ident Fingerprints are correlated to NVD
- Converted to CPEs
- Version-based vulnerability inference
- Command line or as a library



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Scaling Data Analysis

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Taking Analysis To the Next Level With ElasticSearch

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aws.amazon.com/elasticsearch-service/

daily goodtogreat START N4T PRINCIPLES GOALS JOURNAL Inspiration Jessica learn financial SMART DECISIONS Mental Models MungerOS feedly health health

Contact Sales Support English My Account Create an AWS Account

lucts Solutions Pricing Documentation Learn Partner Network AWS Marketplace Customer Enablement Events Explore More

Amazon Elasticsearch Service Overview Features Pricing Getting Started Resources FAQs The ELK Stack

Amazon Elasticsearch Service

Fully managed, scalable, and secure Elasticsearch service

Get started

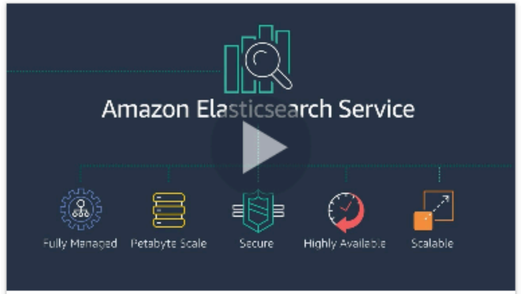
TECH TALK

Deep Dive into UltraWarm for Amazon Elasticsearch Service

Learn about this new low-cost storage tier, UltraWarm for Amazon Elasticsearch Service is generally available.

Register now »

Amazon Elasticsearch Service is a fully managed service that makes it easy for you to deploy, secure, and run Elasticsearch cost effectively at scale. You can build, monitor, and troubleshoot your applications using the tools you love, at the scale you need. The service provides support for open source Elasticsearch APIs, managed Kibana, integration with Logstash and other AWS services, and built-in alerting and SQL querying. Amazon Elasticsearch Service lets you pay only for what you use – there are no upfront costs or usage requirements. With Amazon Elasticsearch Service, you get the ELK stack you need, without the operational overhead.



Amazon Elasticsearch Service (2:16)

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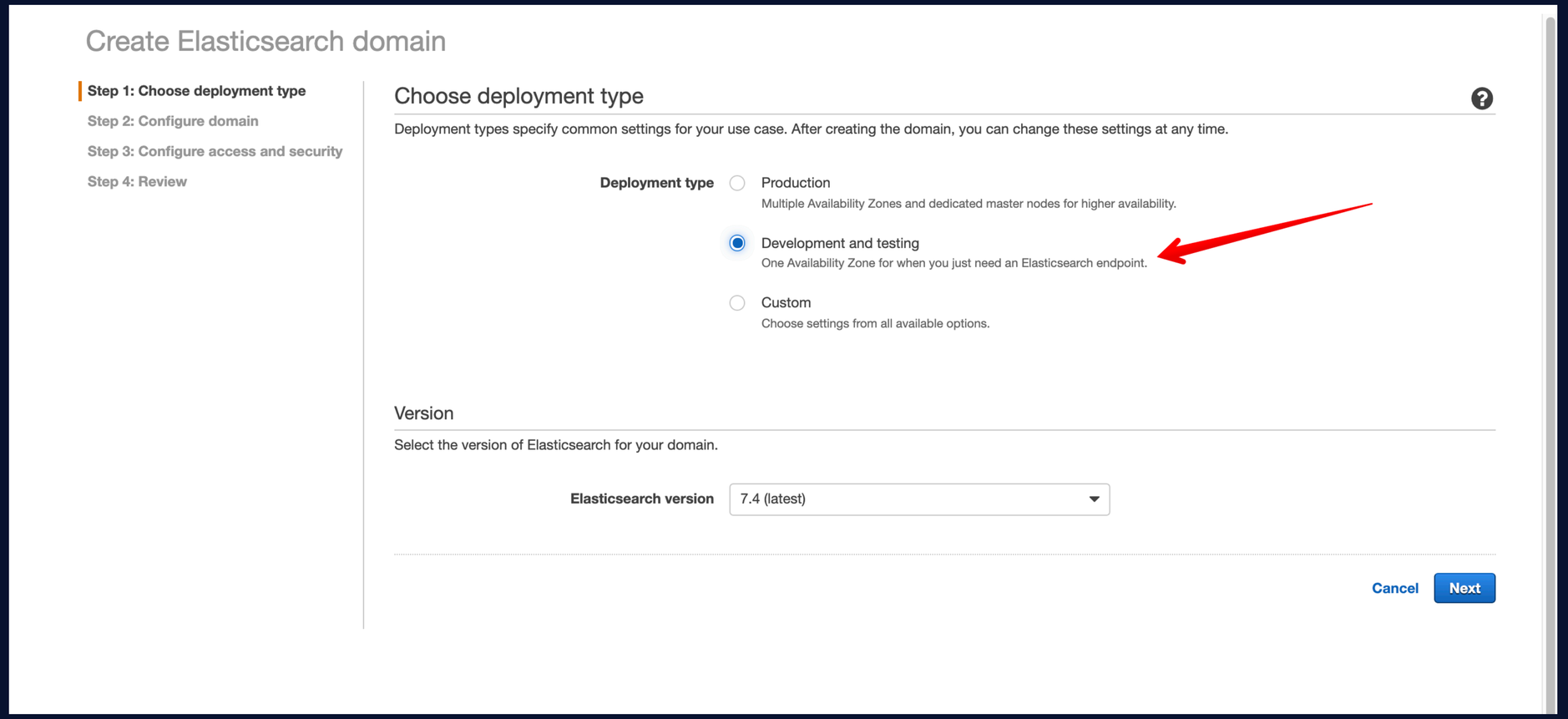
Create Elasticsearch domain
Step 1: Choose deployment type
Step 2: Configure domain
Step 3: Configure access and security
Step 4: Review
Choose deployment type
Deployment types specify common settings for your use case. After creating the domain, you can change these settings at any time.
Deployment type
Production
Multiple Availability Zones and dedicated master nodes for higher availability.
Development and testing
One Availability Zone for when you just need an Elasticsearch endpoint.
Custom
Choose settings from all available options.
Version
Select the version of Elasticsearch for your domain.
Elasticsearch version
7.4 (latest)
Cancel
Next

Intrigue

Create Elasticsearch domain

- Step 1: Choose deployment type
- Step 2: Configure domain
- Step 3: Configure access and security
- Step 4: Review

Configure domain

A domain is the collection of resources needed to run Elasticsearch. The domain name will be part of your domain endpoint.

Elasticsearch domain name *mynewdomain*

The name must start with a lowercase letter and must be between 3 and 28 characters. Valid characters are a-z (lowercase only), 0-9, and - (hyphen).

Data nodes

Select an instance type that corresponds to the compute, memory, and storage needs of your application. Consider the size of your Elasticsearch indices, number of shards and replicas, type of queries, and volume of requests. Learn more

Instance type r5.large.elasticsearch (default)

r5.large.elasticsearch instance type needs EBS storage.

Number of nodes 1

Data nodes storage

Choose a storage type for your data nodes. If you choose the EBS storage type, multiply the EBS storage size per node by the number of data nodes in your cluster to calculate the total storage available to your cluster. Storage settings do not apply to any dedicated master nodes in the cluster.

Data nodes storage type EBS

EBS volume type* General Purpose (SSD)

EBS storage size per node* 10

Total cluster size will be 10 GiB (EBS volume size x Instance count).

Dedicated master nodes

Dedicated master nodes improve the stability of your domain. For production domains, we recommend three.

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Network configuration

Choose internet or VPC access. To enable VPC access, we use private IP addresses from your VPC, which provides an inherent layer of security. You control network access within your VPC using security groups. Optionally, you can add an additional layer of security by applying a restrictive access policy. Internet endpoints are publicly accessible. If you select public access, you should secure your domain with an access policy that only allows specific users or IP addresses to access the domain.

- ○ VPC access (Recommended)
- ◉ Public access

disable for now, we'll use IP to whitelist

Fine–grained access control – powered by Open Distro for Elasticsearch

Fine-grained access control provides numerous features to help you keep your data secure. Features include document-level security, field-level security, read-only Kibana users, and Kibana tenants. Fine-grained access control requires a master user.

Set a master user to an IAM account using an ARN, or store a master user in the Elasticsearch internal database by creating a master username and password. After your domain is set up, you can use Kibana or the REST APIs to configure additional users and permissions. Learn more

- ☐ Enable fine-grained access control

disable this

Amazon Cognito authentication

Enable to use Amazon Cognito authentication for Kibana. Amazon Cognito supports a variety of identity providers for username-password authentication. Learn more

- ☐ Enable Amazon Cognito authentication

Access policy

enter IP address here

Access policies control whether a request is accepted or rejected when it reaches the Amazon Elasticsearch Service domain. If you specify an account, user, or role in this policy, you must sign your requests. Learn more

Custom policy builder allows at most 10 elements. Use a JSON-defined access policy to define a policy with more than 10 elements.

Domain access policy Custom access policy

Allow or deny access by AWS account ID, account ARN, IAM user ARN, IAM role ARN, IPv4 address, or CIDR block.

IPv4 address | *Enter Principal* | *Select Action* | Remove element

Add element

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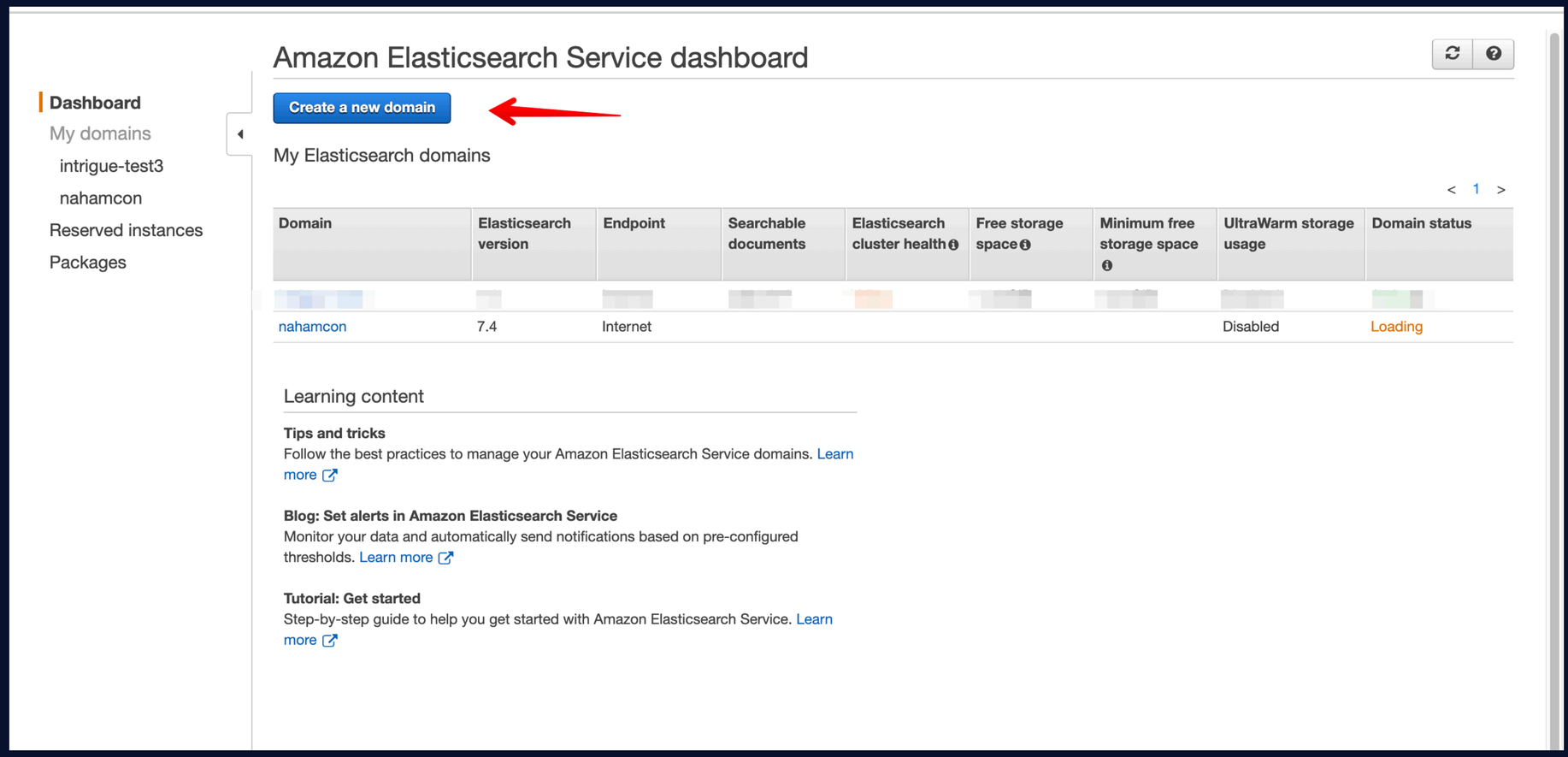
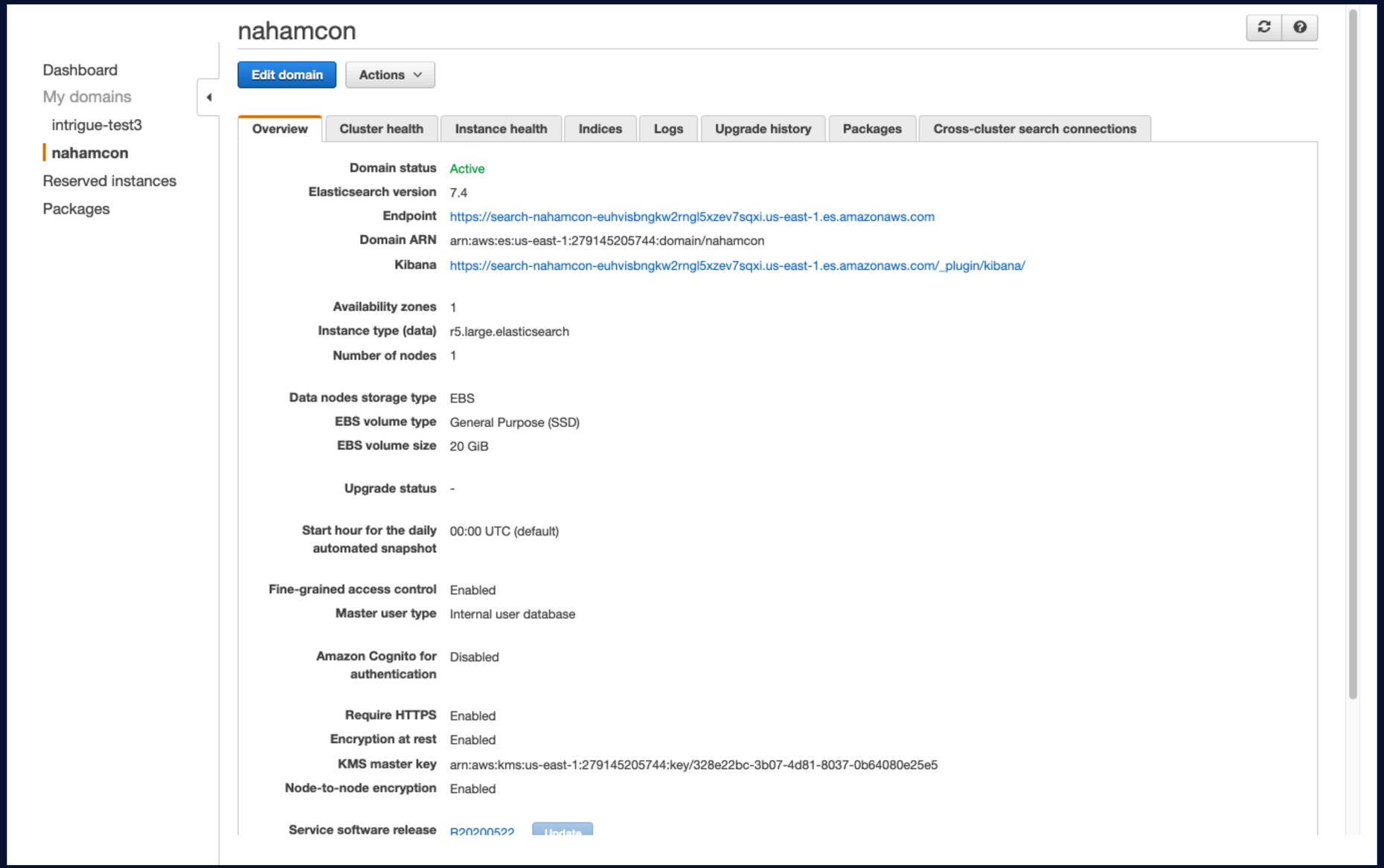

Amazon Elasticsearch Service dashboard
Dashboard
My domains
intrigue-test3
nahamcon
Reserved instances
Packages
Create a new domain
My Elasticsearch domains
< 1 >
Domain
Elasticsearch version
Endpoint
Searchable documents
Elasticsearch cluster health
Free storage space
Minimum free storage space
UltraWarm storage usage
Domain status
nahamcon
7.4
Internet
Disabled
Loading
Learning content
Tips and tricks
Follow the best practices to manage your Amazon Elasticsearch Service domains. Learn more
Blog: Set alerts in Amazon Elasticsearch Service
Monitor your data and automatically send notifications based on pre-configured thresholds. Learn more
Tutorial: Get started
Step-by-step guide to help you get started with Amazon Elasticsearch Service. Learn more

Intrigue


nahamcon
Dashboard
My domains
intrigue-test3
nahamcon
Reserved instances
Packages
Edit domain
Actions
Overview
Cluster health
Instance health
Indices
Logs
Upgrade history
Packages
Cross-cluster search connections
Domain status Active
Elasticsearch version 7.4
Endpoint https://search-nahamcon-euhvisbngkw2rngl5xzev7sqxi.us-east-1.es.amazonaws.com
Domain ARN arn:aws:es:us-east-1:279145205744:domain/nahamcon
Kibana https://search-nahamcon-euhvisbngkw2rngl5xzev7sqxi.us-east-1.es.amazonaws.com/_plugin/kibana/
Availability zones 1
Instance type (data) r5.large.elasticsearch
Number of nodes 1
Data nodes storage type EBS
EBS volume type General Purpose (SSD)
EBS volume size 20 GiB
Upgrade status -
Start hour for the daily automated snapshot 00:00 UTC (default)
Fine-grained access control Enabled
Master user type Internal user database
Amazon Cognito for authentication Disabled
Require HTTPS Enabled
Encryption at rest Enabled
KMS master key arn:aws:kms:us-east-1:279145205744:key/328e22bc-3b07-4d81-8037-0b64080e25e5
Node-to-node encryption Enabled
Service software release

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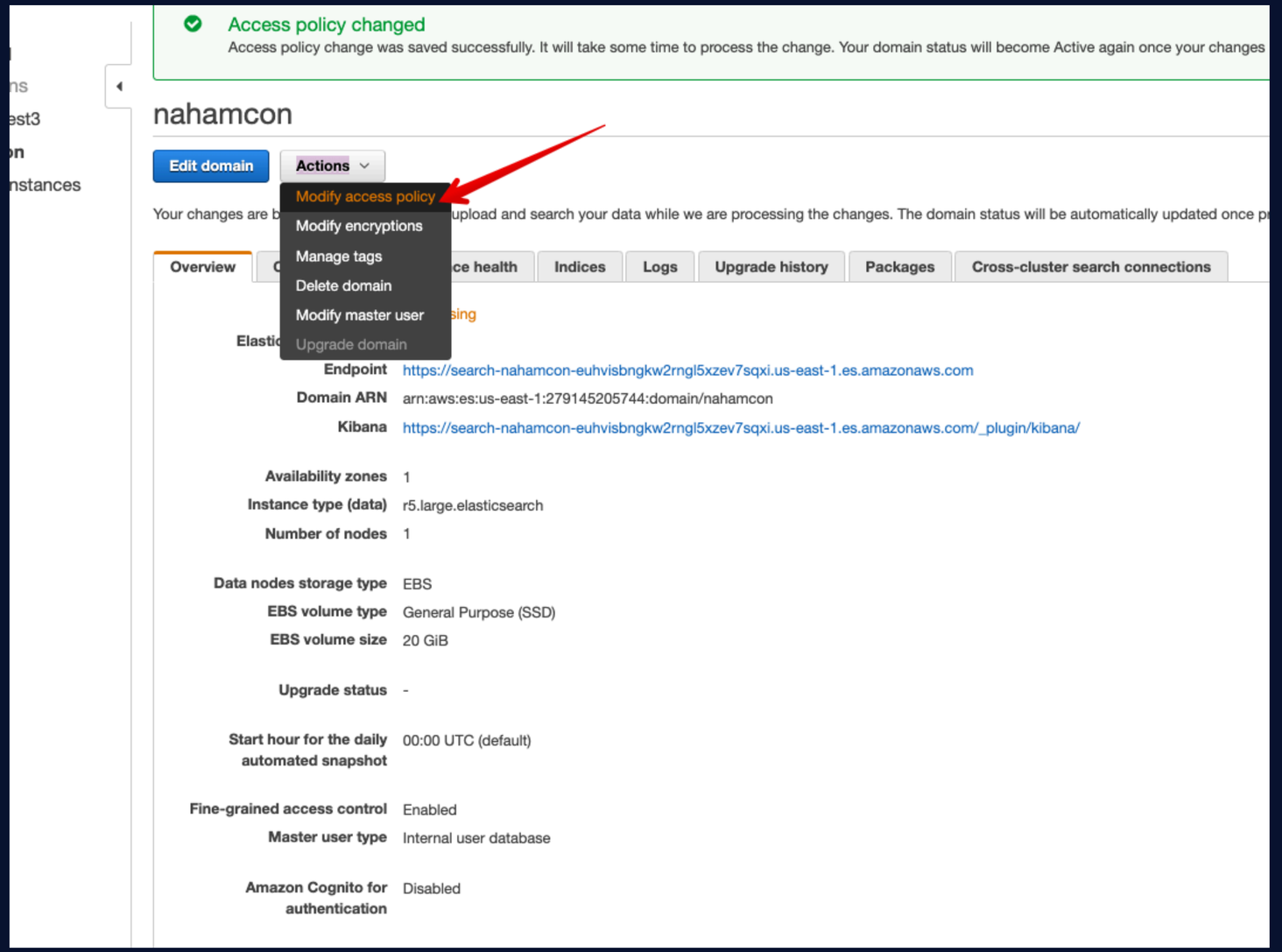
Access policy changed
Access policy change was saved successfully. It will take some time to process the change. Your domain status will become Active again once your changes
nahamcon
Edit domain
Actions
Modify access policy
Modify encryptions
Manage tags
Delete domain
Modify master user
Upgrade domain
Overview
Indices
Logs
Upgrade history
Packages
Cross-cluster search connections
Endpoint
https://search-nahamcon-euhvisbngkw2rngl5xzev7sqxi.us-east-1.es.amazonaws.com
Domain ARN
arn:aws:es:us-east-1:279145205744:domain/nahamcon
Kibana
https://search-nahamcon-euhvisbngkw2rngl5xzev7sqxi.us-east-1.es.amazonaws.com/_plugin/kibana/
Availability zones
1
Instance type (data)
r5.large.elasticsearch
Number of nodes
1
Data nodes storage type
EBS
EBS volume type
General Purpose (SSD)
EBS volume size
20 GiB
Upgrade status
-
Start hour for the daily automated snapshot
00:00 UTC (default)
Fine-grained access control
Enabled
Master user type
Internal user database
Amazon Cognito for authentication
Disabled

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```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS": "*"
      },
      "Action": "es:*",
      "Resource": "arn:aws:es:us-east-1:279145205744:domain/nahamcon/*",
      "Condition": {
        "IpAddress": {
          "aws:SourceIp": “x.x.x.x”
        }
      }
    }
  ]
}
```

Make sure to whitelist your IP

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Getting Data Into ES

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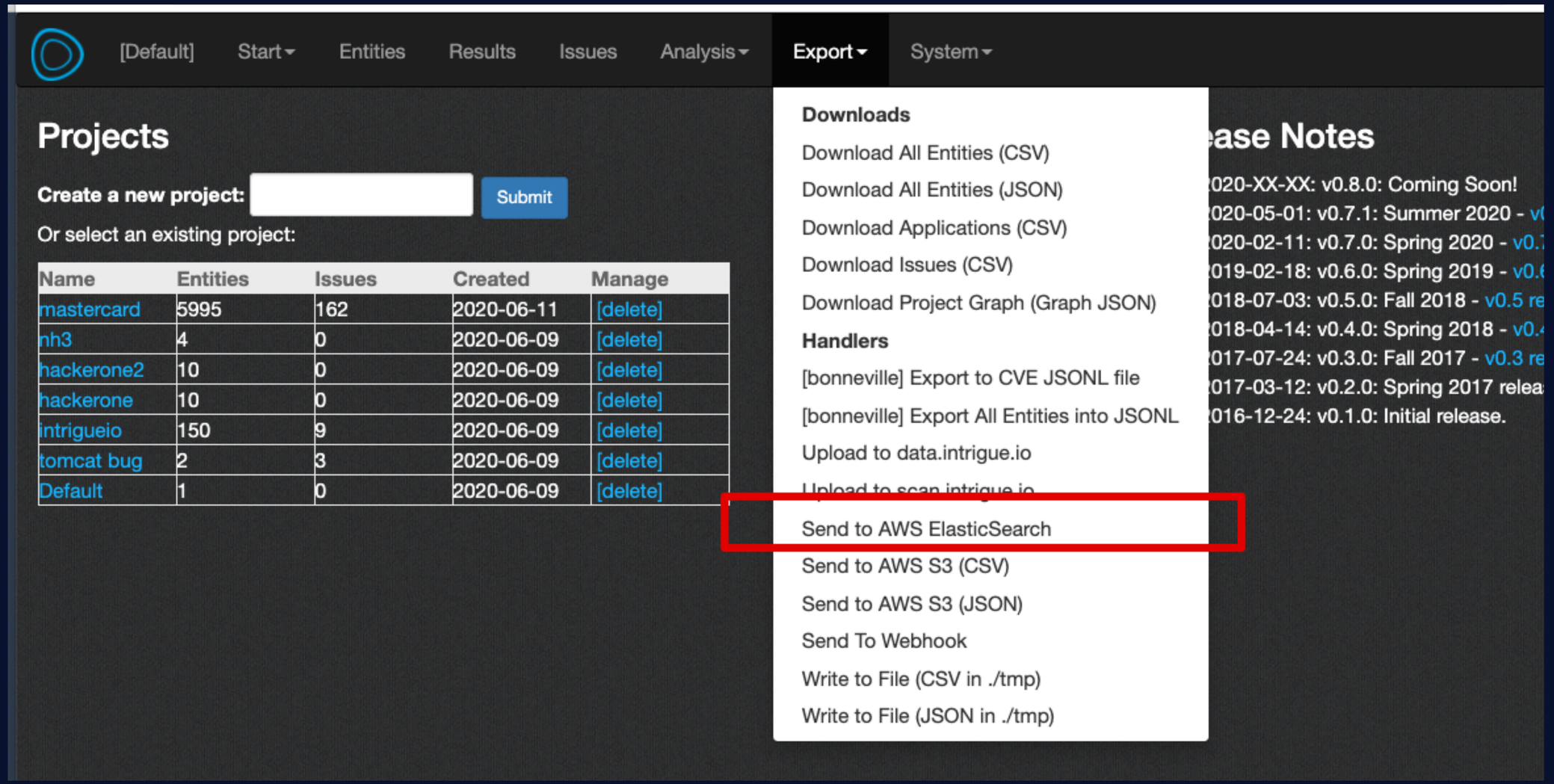
Core Handlers

- **Notifiers, Alerters and Exporters**
- **Configured on individual Task, Machine or Project**
- **Can be configured to run at completion**
- **Handy for building data pipelines**


[Default]
Start
Entities
Results
Issues
Analysis
Export
System
Projects
Create a new project:
Submit
Or select an existing project:
Name Entities Issues Created Manage
mastercard 5995 162 2020-06-11 [delete]
nh3 4 0 2020-06-09 [delete]
hackerone2 10 0 2020-06-09 [delete]
hackerone 10 0 2020-06-09 [delete]
intrigueio 150 9 2020-06-09 [delete]
tomcat bug 2 3 2020-06-09 [delete]
Default 1 0 2020-06-09 [delete]
Downloads
Download All Entities (CSV)
Download All Entities (JSON)
Download Applications (CSV)
Download Issues (CSV)
Download Project Graph (Graph JSON)
Handlers
[bonneville] Export to CVE JSONL file
[bonneville] Export All Entities into JSONL
Upload to data.intrigue.io
Send to AWS ElasticSearch
Send to AWS S3 (CSV)
Send to AWS S3 (JSON)
Send To Webhook
Write to File (CSV in ./tmp)
Write to File (JSON in ./tmp)
ease Notes
020-XX-XX: v0.8.0: Coming Soon!
020-05-01: v0.7.1: Summer 2020 -
020-02-11: v0.7.0: Spring 2020 -
019-02-18: v0.6.0: Spring 2019 -
018-07-03: v0.5.0: Fall 2018 -
018-04-14: v0.4.0: Spring 2018 -
017-07-24: v0.3.0: Fall 2017 -
017-03-12: v0.2.0: Spring 2017
016-12-24: v0.1.0: Initial release.

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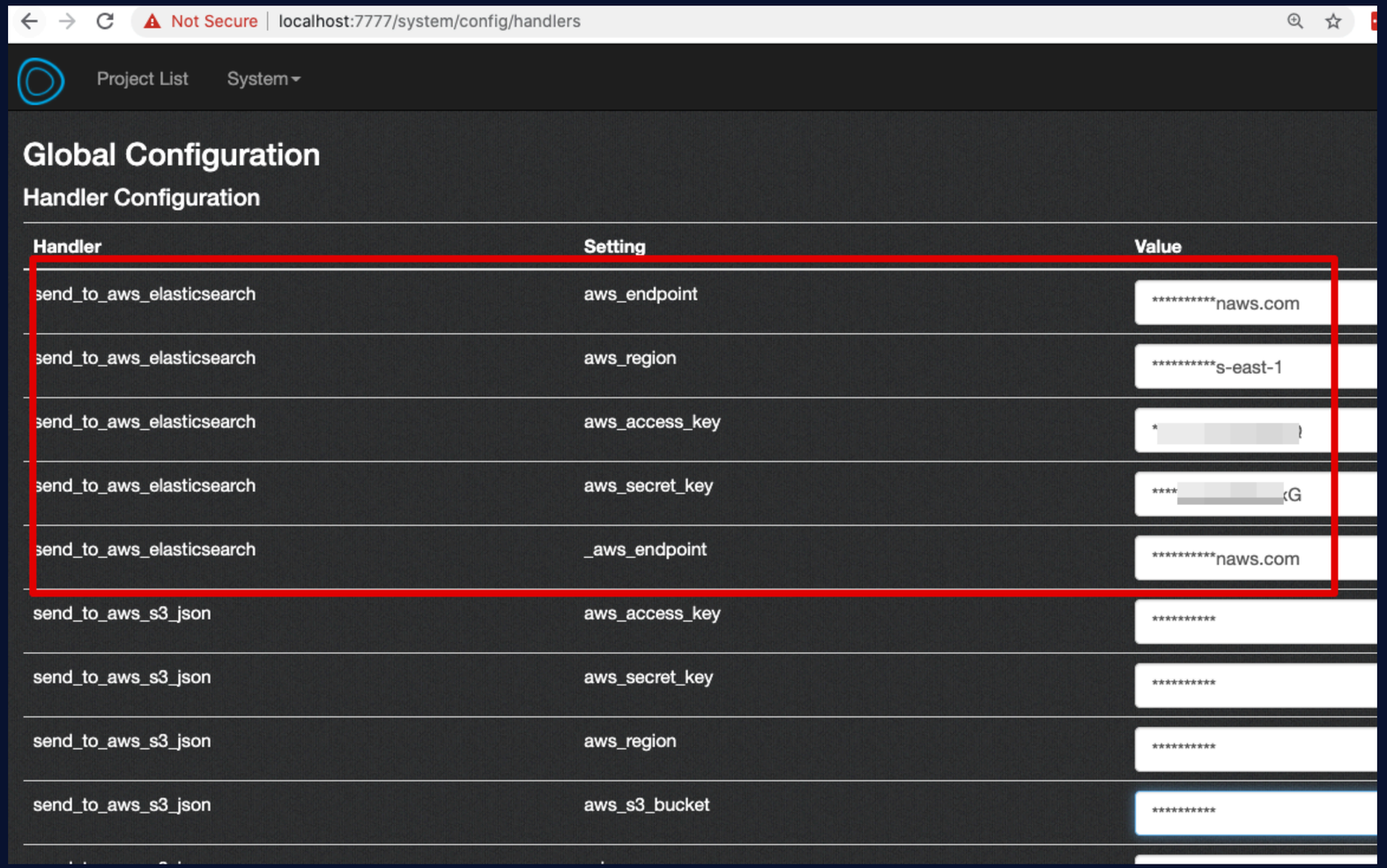
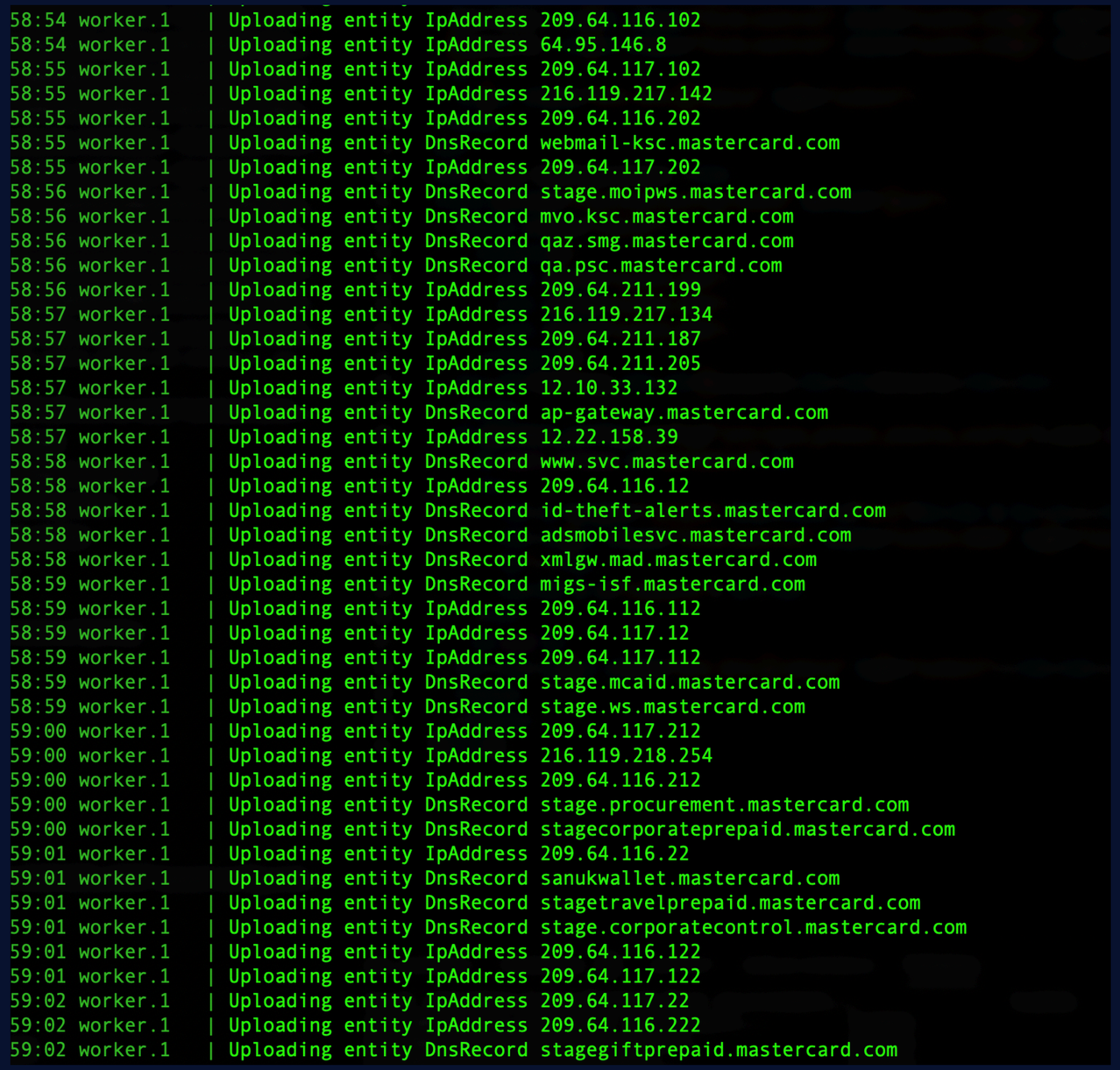

Not Secure
localhost:7777/system/config/handlers
Project List
System
Global Configuration
Handler Configuration
Handler
Setting
Value
send_to_aws_elasticsearch
aws_endpoint
**********naws.com
send_to_aws_elasticsearch
aws_region
**********s-east-1
send_to_aws_elasticsearch
aws_access_key
send_to_aws_elasticsearch
aws_secret_key
send_to_aws_elasticsearch
_aws_endpoint
**********naws.com
send_to_aws_s3_json
aws_access_key
****
send_to_aws_s3_json
aws_secret_key
****
send_to_aws_s3_json
aws_region
****
send_to_aws_s3_json
aws_s3_bucket
****

Intrigue


58:54 worker.1 | Uploading entity IpAddress 209.64.116.102
58:54 worker.1 | Uploading entity IpAddress 64.95.146.8
58:55 worker.1 | Uploading entity IpAddress 209.64.117.102
58:55 worker.1 | Uploading entity IpAddress 216.119.217.142
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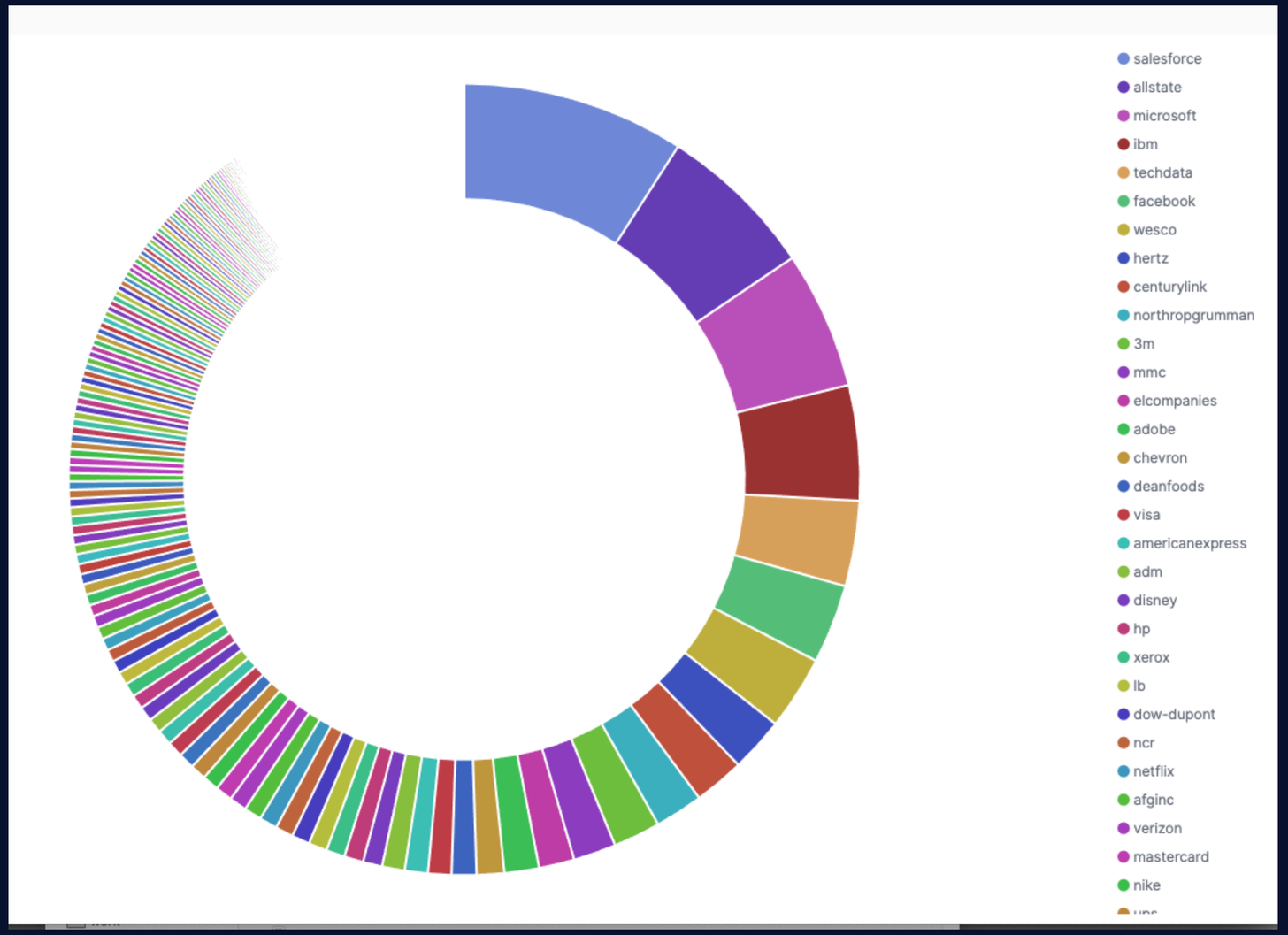
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