splunk> .conf2017

Monitoring Docker Containers with Splunk

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Forward-Looking Statements

During the course of this presentation, we may make forward-looking statements regarding future events or the expected performance of the company. We caution you that such statements reflect our current expectations and estimates based on factors currently known to us and that actual events or results could differ materially. For important factors that may cause actual results to differ from those contained in our forward-looking statements, please review our filings with the SEC.

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Who I am

Marc Chéné

- Product Manager, Engineer, APMer
- Dad/ super fan/ coach to 3, loves skiing, golfing, music and a good drink

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Agenda

- Monitoring Options
- Analytical Insight – Tips & Tricks
- The World of Metrics
- (coming soon!) Docker Moby - v2 logging Plugin

Monitoring Options

logs, events and perf stats

Splunk and Docker – At A Glance

Visibility in your Container Environments

Splunk Logging Driver for Docker

- Built into Docker – no extra software required
- Insight into container and apps running in containers

Docker Universal Control Plane

- Insight into administration, changes, and composition

Monitoring for your Cloud Environments

Deep Visibility in Amazon Web Services (AWS) and in EC2 Container Services (ECS)

Splunk provides support for Google Cloud Platform (GCP)

Delivering Splunk as Containers

Make getting Splunk as easy as a single Docker pull command from the Docker Hub/Store

Forwarders and Splunk Enterprise pre-configured to collect machine data from Container Host and Docker API

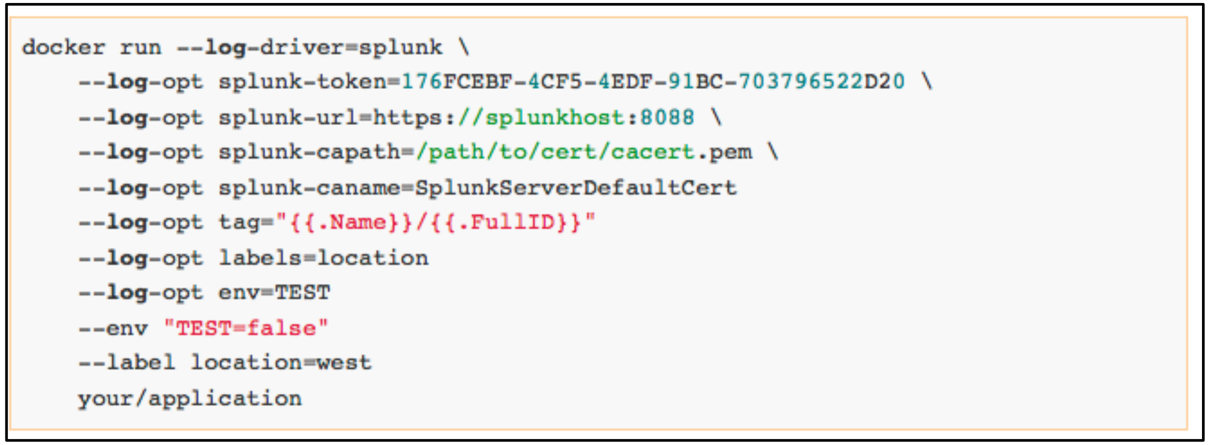
Splunk Collection Options for Docker

- Docker Native Logging – Splunk logging driver, Syslog, JSON, AWS CloudWatch, etc.
- Forwarders – App Logs, Syslog UDP forwarding, Performance, etc.
- Logging libraries in .NET, Java and node.js
- Custom (e.g., Kafka with HTTP Event Collector)
- Cloud – AWS, GCP, Azure

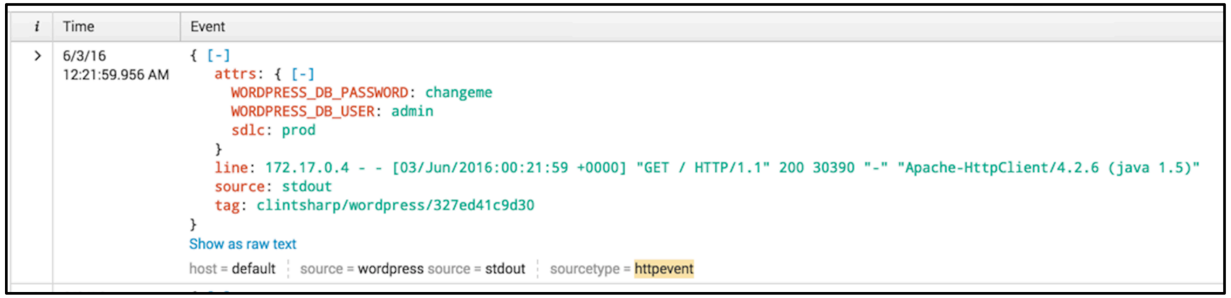
Use the option that is right for you!

Log Streaming - Splunk Logging Driver for Docker

- **Secure**—supports TLS/SSL and tokens
- **Simple** – config-based setup and collect data
- **Buffering**
- **Scale** – Based on HTTP Data Collector Based on Splunk HTTP
- **Configurable** - Supports container labels, environment variables



```
docker run --log-driver=splunk \
    --log-opt splunk-token=176FCEBF-4CF5-4EDF-91BC-703796522D20 \
    --log-opt splunk-url=https://splunkhost:8088 \
    --log-opt splunk-capath=/path/to/cert/cacert.pem \
    --log-opt splunk-caname=SplunkServerDefaultCert
    --log-opt tag="{{.Name}}/{{.FullID}}"
    --log-opt labels=location
    --log-opt env=TEST
    --env "TEST=false"
    --label location=west
    your/application
```



i	Time	Event
>	6/3/16 12:21:59.956 AM	see below

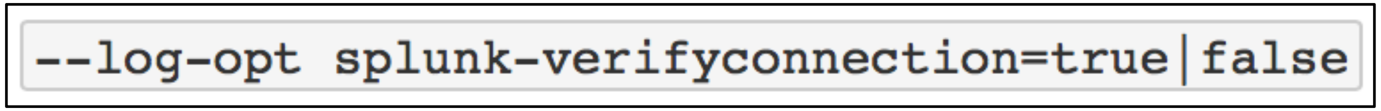
```
{ [-]
   attrs: { [-]
     WORDPRESS_DB_PASSWORD: changeme
     WORDPRESS_DB_USER: admin
     sdlc: prod
   }
   line: 172.17.0.4 - - [03/Jun/2016:00:21:59 +0000] "GET / HTTP/1.1" 200 30390 "-" "Apache-HttpClient/4.2.6 (java 1.5)"
   source: stdout
   tag: clintsharp/wordpress/327ed41c9d30
}
```

Show as raw text

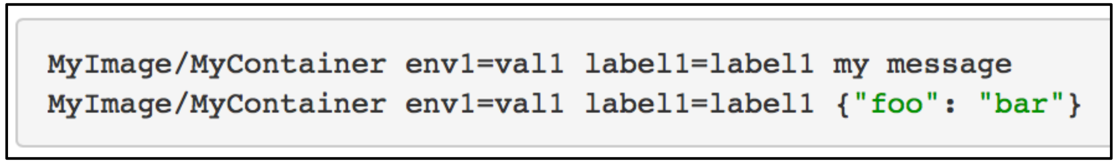
host = default | source = wordpress source = stdout | sourcetype = httpevent

Log Streaming - Splunk Logging Driver for Docker v1.13+

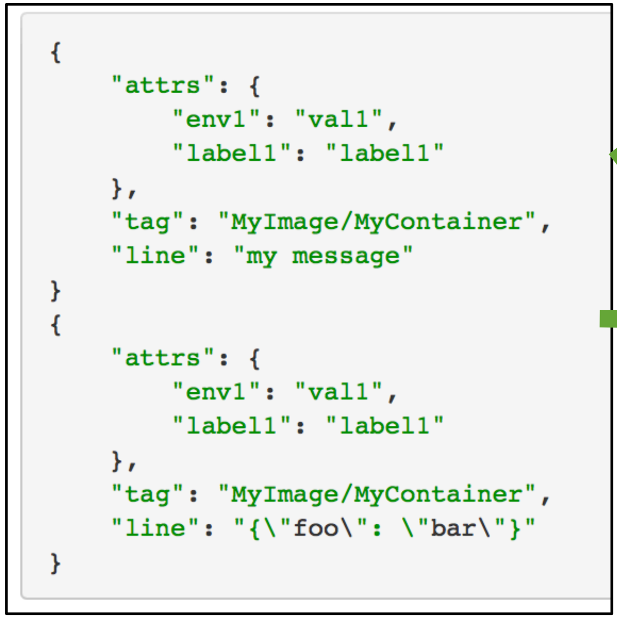
- Skip verification for the valid splunk url
- Raw data collection from the native log driver
- Embedded json format support
- Performance Improvements



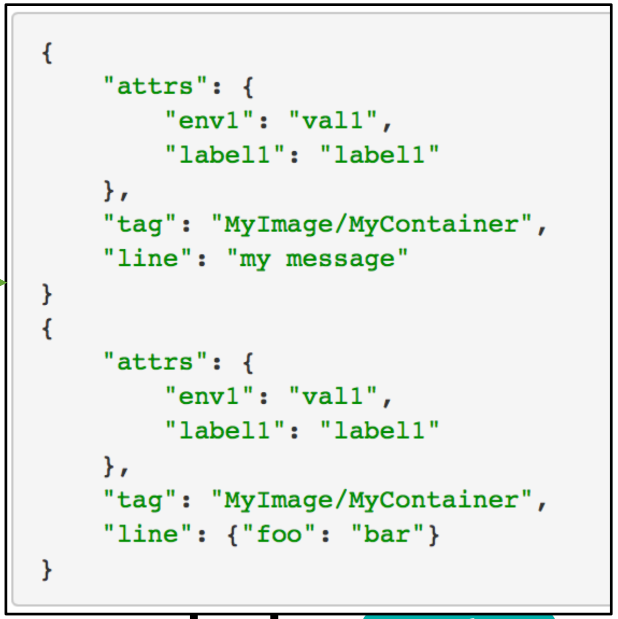
```
--log-opt splunk-verifyconnection=true|false
```



```
MyImage/MyContainer env1=val1 label1=label1 my message
MyImage/MyContainer env1=val1 label1=label1 {"foo": "bar"}
```



```
{
    "attrs": {
        "env1": "val1",
        "label1": "label1"
    },
    "tag": "MyImage/MyContainer",
    "line": "my message"
}
{
    "attrs": {
        "env1": "val1",
        "label1": "label1"
    },
    "tag": "MyImage/MyContainer",
    "line": "{\"foo\": \"bar\"}"
}
```



```
{
    "attrs": {
        "env1": "val1",
        "label1": "label1"
    },
    "tag": "MyImage/MyContainer",
    "line": "my message"
}
{
    "attrs": {
        "env1": "val1",
        "label1": "label1"
    },
    "tag": "MyImage/MyContainer",
    "line": {"foo": "bar"}
}
```

Docker Hub/Store

- Splunk container images available
  - Splunk Enterprise 6.6.3
  - Splunk Universal Forwarder 6.6.3
- Includes configuration and Docker Add-On for container monitoring out-of-the-box

```
docker pull store/splunk/enterprise
docker pull store/splunk/universalforwarder:6.6.3
```

Deep Dive: What's Do We Monitor?

- Docker Hub: https://hub.docker.com/r/splunk/universalforwarder/ tag: 6.5.3-monitor
- GitHub: https://github.com/splunk/docker-itmonitoring
  - Docker logs (ta-dockerlogs_fileinput) under "/host/containers/*/"
    - [a-f0-9]+-json.log
    - config.v2.json
    - hostconfig.json
    - hostname
    - hosts
    - resolv.conf
  - Docker stats (ta-dockerstats)
  - UCP logs (ta-ucplogs-sysloginput)

Demo Monitoring!

Analytical Insight – Tips & Tricks

Analytical Insight – Tips & Tricks

- Sample Docker Compose file
- Correlations
  - Docker SWARM mode
  - Amazon Web Services (AWS)
- Log Options
  - --log-opt tag="{{.Name}}/{{.FullID}}"

The World of Metrics

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Terminology - What is a Measurement?

Treated natively as metrics, not log files

ABC.XYZ

Time

Metric Name

`system.cpu.idle`

Measure

numeric data point, different types such as count, gauge, timing, sample, etc

Dimensions

Host (10.1.1.100, web01.splunk.com)

Region (e.g., us-east-1, us-west-1, us-west-2, us-central1)

IntanceTypes (e.g., t2.medium, t2.large, m3.large)

"Splunk provides **ONE** platform to analyze and investigate across **both Logs and Metrics**

Metrics Data Shape

Field	Required	Description
_time	Y	Microseconds since epoch
metric_name	Y	metric name
_value	Y	Value of the metric (numeric values only)
_dims	Y	Dimension names
host	Y	Origination Host
index	Y	Index to store the data
metric_type	N	Counter|Gauge – assume Gauge if not specified.
source	N	the source of the data point, https://docs.splunk.com/Splexicon:Source
sourcetype	Y	Used for defining groupings of metrics and defining input time rules
<fieldA>..<fieldZ>	N	Arbitrary number of dimensions

Key Features

SPL

Metric Store

Ability to ingest and store metric measurements at scale

`mstats`

`tstats` equivalent to query time series from metrics indexes

Metrics Catalog

REST APIs to query lists of ingested metrics and dimensions

Metrics Store

- Based on **splunkd**
- Dedicated Indexes for Metrics and Logs
- Full part of the platform
  - RBAC
  - Clustering
  - Index Management
  - Central Administration
- Optimized for fast time series queries and ingestion of metrics at scale

SPL: `mstats`

mstats

- New SPL command
- Built off of `tstats`, http://docs.splunk.com/Documentation/Splunk/6.6.1/SearchReference/Tstats
- Syntax

  -
    ```
    | mstats <stats-fun>…
     [WHERE index=<mymetricindex> metric_name=<metricname>…]
     [BY <dimension-list> [span=<timespan>] ]
    ```
- Sample
  - Stats:
    ```
    | mstats avg(_value), count(_value)
      WHERE metric_name="*.cpu.percent" by metric_name span=30s
    ```
  - Time Series Visualization:
    ```
    | mstats avg(_value), count(_value)
      WHERE metric_name="*.cpu.percent" by metric_name span=30s
    | timechart first(avg(_value)) as "avg" span=30s by metric_name
    ```

Metrics Catalog: Discovery & Search

- **`GET /services/catalog/metricstore/metrics`**
  - List all metric names

    ```
    curl -k -u admin/pass
    https://localhost:8089/services/catalog/metricstore/metrics
    ```

  - List all metric names that apply to a given dimension name "dc”

    ```
    curl -k -u admin/pass
    https://localhost:8089/services/catalog/metricstore/metrics?dimension=dc
    ```

- **`GET /services/catalog/metricstore/dimensions`**
  - List all dimension names

    ```
    curl -k -u admin/pass
    https://localhost:8089/services/catalog/metricstore/dimensions
    ```

- List all the dimension names that are compatible with a given metric name "mem.free":

  ```
  curl -k -u admin/pass
  https://localhost:8089/services/catalog/metricstore/dimensions?metric=mem.free
  ```

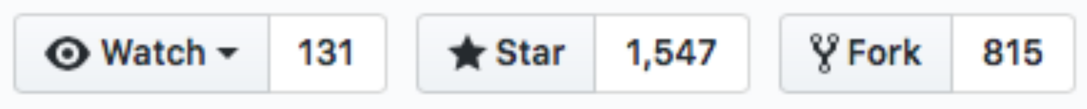
- List all the dimension values for a given dimension name "dc”

  ```
  curl -k -u admin/pass
  https://localhost:8089/services/catalog/metricstore/dimensions/dc/values
  ```

- List all the dimension values for a given dimension name "dc" and metric name "mem.free”

  ```
  curl -k -u admin/pass
  https://localhost:8089/services/catalog/metricstore/dimensions/dc/values?metric=mem.free
  ```

GDI - Metric Ingestion Protocol: Collectd – Write HTTP plugin



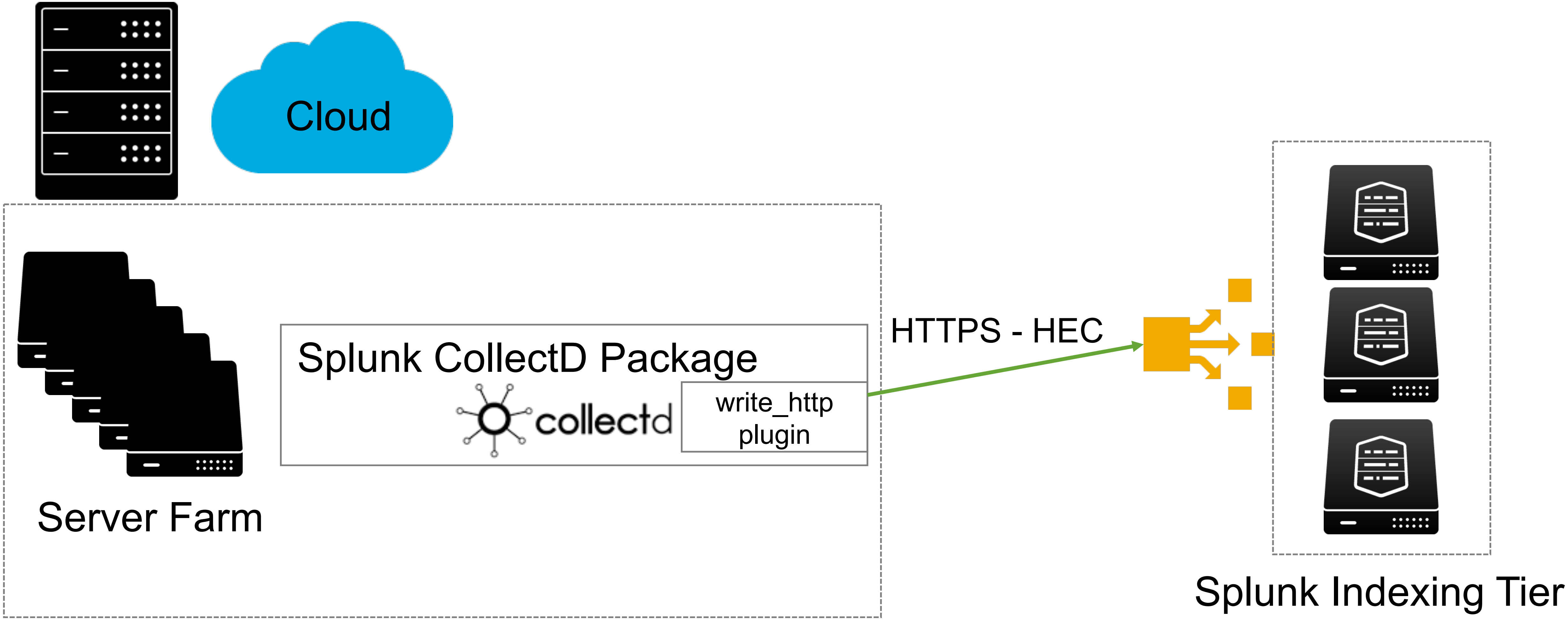
- Collectd, https://collectd.org - ~100 frontend plugins
- Scheduled push interval: 30secs
- # of metrics collected: ~350 (~1M measurements per day per server)
- Enabled plugins configurations, collectd.conf

1. csv
2. cpu
3. df
4. disk
5. Interface
6. irq
7. load
8. Logfile
9. memory
10. Network
11. processes
12. protocols
13. Syslog
14. swap
15. tcpconns
16. thermal
17. ptime

GDI: collectd write_http plugin

- Sample write_http event
  - {"values":[98.9363841194414],"dstypes":["derive"],"dsnames":["value"],"time":1474401106.556,"interval":10.000,"host":"C5819124-66AE-4B28-8E13-914C3961E46C","plugin":"cpu","plugin_instance":"0","type":"cpu","type_instance":"idle"}
- Sample Result
  - metric_name=cpu.idle.value
  - _value=98.9363841194414
  - Host=C5819124-66AE-4B28-8E13-914C3961E46C

GDI Deployment Options: Collectd & HEC



Cloud

Splunk CollectD Package

collectd

write_http plugin

HTTPS - HEC

Server Farm

Splunk Indexing Tier

cAdvisor

- Provides container users an understanding of the resource usage and performance characteristics of their running containers
- It is a running daemon that collects, aggregates, processes, and exports information about running containers

DEMO Docker Metrics!

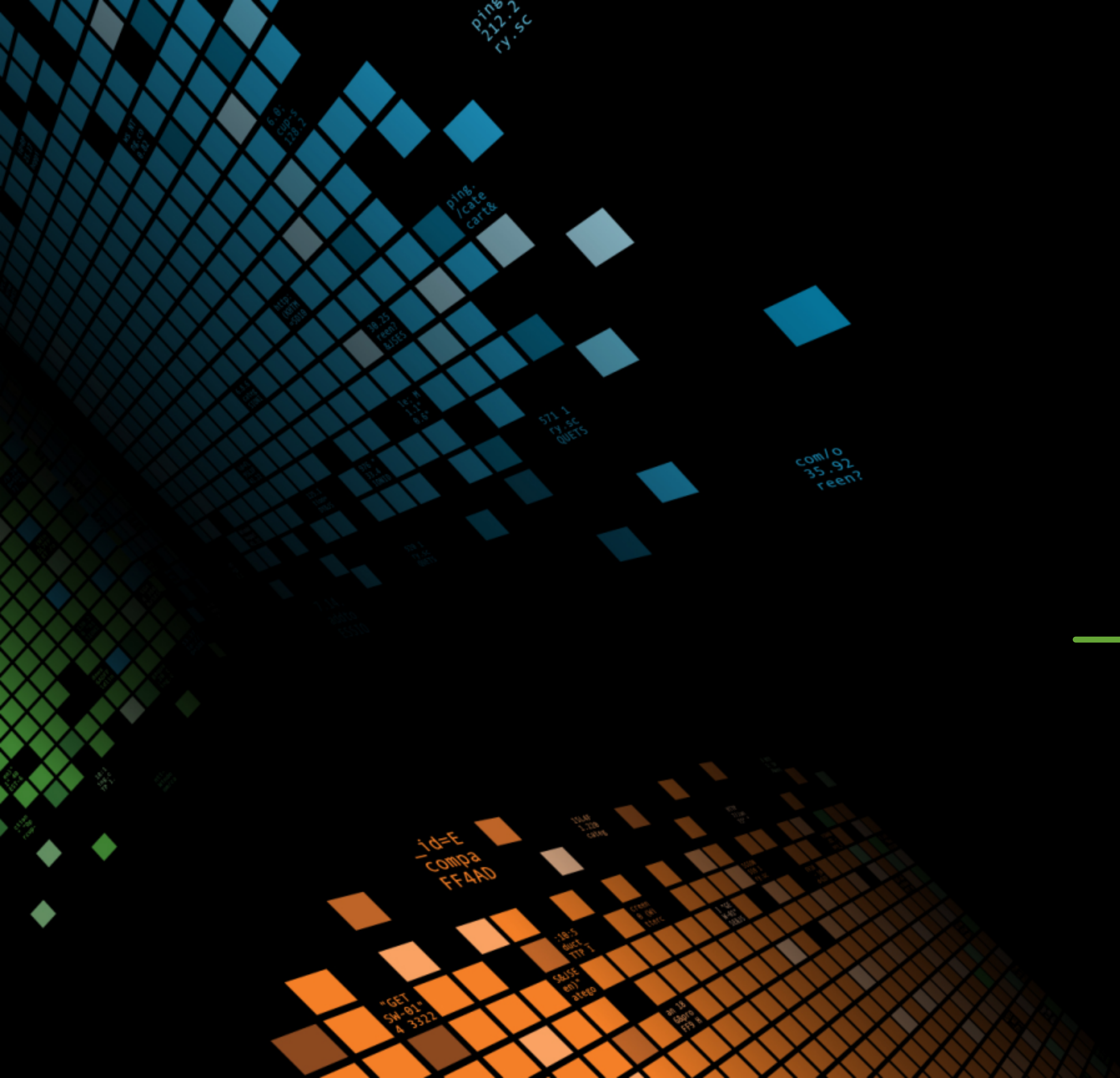
Docker Moby - V2 Logging Plugin

Section subtitle goes here

Docker Moby - v2 logging Plugin

- Docker Hub: https://github.com/splunk/docker-logging-plugin
- Running the logging plugin

```
docker run --log-driver=splunk-log-driver:next \
      --log-opt splunk-token=176FCEBF-4CF5-4EDF-91BC-703796522D20 \
      --log-opt splunk-url=https://splunkhost:8088 \
      --log-opt splunk-capath=/path/to/cert/cacert.pem \
      --log-opt splunk-caname=SplunkServerDefaultCert \
      --log-opt tag="{{.Name}}/{{.FullID}}" \
      --log-opt labels=location \
      --log-opt env=TEST \
      --env "TEST=false" \
      --label location=west \ your/application
```



Demo

Key Takeaways

1. Docker Monitoring – You have options!
2. Analytical Driven Insight
3. Metrics
4. Docker v2 logging API plugin

Thank You

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