Monitoring The Industrial Internet Of Things
A Guide To Application Performance Monitoring In Splunk

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Agenda

• EnerNOC Intro
• Performance Engineering Intro
• Splunk and EnerNOC
• Epiphanies
• Q&A
EnerNOC’s Energy Intelligence Software

- For enterprises: platform and solutions focus on the 3 drivers of energy expense

**How you buy it**
- Budgets and Procurement
- Utility Bill Management (UBM)

**How much you use**
- Visibility and Reporting
- Facility Optimization
- Project Tracking

**When you use it**
- Demand Response
- Demand Management
EnerNOC EIS Platform

Data Streaming and Processing at Scale

3rd party

Utility Partners

Energy Data

Electricity Data (or other commodity)

Weather Data

Demand Response Dispatch

Billing Data

EnerNOC Site Server

4000/1000 Users Daily/Hourly

100 Countries

EnerNOC Hosted Web Servers

EnerNOC Hosted Application Servers

Cloud Hosted Web Servers

Cloud Hosted Application Servers

EnerNOC Database Servers

Cloud Hosted Database Servers

32TB Persisted
About Chris

- Performance Engineering Team Lead @ EnerNOC since 2011

- #1 Goal – Improve customers' experience while ensuring reliable and scalable applications are delivered into production

- Started using Splunk to parse data from web logs in March 2012
  - Self proclaimed winner of the “Best Splunk Index” award at EnerNOC , 3 years in a row

- Fostering a culture of performance at EnerNOC
Team Mission: Ensure Platform Scalability & Stability

“Bet your Business” platform

[Image of a map] + [Image of a person standing] = [Image of a sculpture]
Questions We Want Answers To:

Q: How fast can we reduce energy consumption across all of the buildings in a region?
Q: How quickly can we send Demand Response notifications?
Q: How quickly are we processing device readings into our platform?
Q: Who is using our platform?
Q: How many people logged into each of our applications today?
Q: What did they do after logging in?
Q: How was their experience?
Where Did We Start With Splunk?

• 2012 Splunk POC
  – Web logs forwarded into Splunk for analysis

• 2013 Splunk On-site training
Where Are We Now?
My Splunk Epiphany

• index=server "logged in" | timechart span=10m count
Which Led To:

- `index=web | timechart span=2m dc(userName)`
Which Led To:

- **Cumulative # of Logins Into One of Our Applications**: 2,274
- **Cumulative # Logins Into Another of Our Applications**: 1,709
- **Total # Unique Logins Into Internal Application**: 38
- **# of Unique Users of One of Our Mobile Applications**: 87
Secret Sauce: Instrumentation

- UserId
- Method
- Elapsed time
Epiphany #2

Use Splunk to monitor critical business processes: interval data collection

Challenge:
Our meter data needs to be fresh, accurate, and available to our customers.

• Are we meeting our data collection SLA and can we proactively alert on data latency problems?
• How long does it take for readings to be processed and available to our front end applications?
• Does our data collection process scale?
• What are the interval collection counts, by device type, over time?
Data Collection: From Device To Disk

Device Data Needs To Be Available To Our Front End Apps Quickly
Data Collection Architecture
Performance Budget and Instrumentation Requirements

KPI’s: Start and End timestamps of each component

Interval available to front end apps
Secret Sauce: Instrument the Incoming Data

- Data stream ID
- Device type
- Reading value
- Source timestamp
- Processed timestamp
Data Collection Dashboard
Epiphany #3

Use Splunk to monitor our platform during Demand Response events

Challenge:
When EnerNOC is dispatched by a grid operator, we have to reduce energy consumption across a region...FAST!!!

- How quickly have our devices responded to our control commands?
- How many devices can be curtailed within SLA? Does our platform scale?
- How does today’s performance compare to the past?
Secret Sauce: Monitor Device Workflow States

- Monitoring enhanced to capture device workflow states

```xml
<sample t="768" ts="1465180893993" lb="Polling AWF table for AU states, 2016-06-05 22:33" rm="OK" ng="1" ne="1">  
  <responseData list="true" lang="String">  
  <COUNT(*) AUSM_STATE>
  2827 CURTAILING
  171 CURTAIL_COMPLETE
  2 CURTAIL_EXCEPTION_DETECTED
  </responseData>
</sample>
```
Monitoring Device States During Demand Response Event

KPI’s highlighted in the top row

Count of meters as they progress through all phases of the event

Performance comparison to recent events

Key Takeaway:
Log KPI’s to track performance in Splunk
Epiphany #4:
Use Splunk to monitor Notification Platform Performance

Challenge:
When EnerNOC is dispatched by a grid operator, we have to notify our customers.....FAST!!!

- How long did it take to send out the notifications?
- How many notifications were sent?
- Does our notification process scale? How many can we send within our SLA?
Notification Instrumentation Requirements

First Step: breakdown architecture and identify KPI’s

- Start and end timestamps of each component
- Unique identifier for each notification event (allows us to find the needle in the haystack)
Notification Performance Dashboard

**Key Takeaway:**
Instrument your code and log KPI’s to track performance in Splunk
Key Takeaways

• Use Splunk to visualize performance of your IOT infrastructure
• Breakdown the anatomy of your application & identify the KPI’s
• Instrument your application to capture the KPI’s
• Create Performance Dashboards for critical business processes
Business Benefit

• Promoting a culture of performance:
  • Increased visibility in performance metrics = increased incentive to make apps faster

• Performance monitoring against SLA’s in development and production

• In depth understanding of our limitations/capabilities

• Alerting of performance issues to minimize custom impact
THANK YOU

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