Quick Introduction to OpenNMS

linuxconf.au– 7 Sept 2017

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History

- OpenNMS was started in the Summer of 1999
- First Code Contributed to Sourceforge on 30 March 2000
- Maintained by Oculan until May, 2002
- Maintained by the OpenNMS Group since September, 2004

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OpenNMS is the world's first enterprise-grade network management application platform developed under the open source model.

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world's first

• NetSaint	2000-01-10	1323
• OpenNMS	2000-03-30	4141
• Zabbix	2001-03-23	23494
• Nagios	2001-05-03	26589
• RRDTool	2003-01-13	71544
• Groundwork	2006-02-21	160654
• ZenOSS	2006-03-20	163126
• Hyperic	2006-07-17	172556

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enterprise-grade

OpenNMS was designed from Day One to monitor tens if not hundreds of thousands of devices. Current work is focused on removing those constraints to allow for millions of devices and billions of metrics.

That scalability comes in a number of forms:

- Discrete devices (hundreds of thousands)
- Performance metrics (millions)
- Events per second (thousands)
- Remote monitors (thousands)

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application platform

While OpenNMS works “out of the box”, it really starts to shine when you customize it. It is highly configurable and offers a myriad of ways to integrate with other systems.

- Full-featured ReST Interface for both configuration and queries, forms the basis for OpenNMS Compass
- Device and event information stored in a database
- Notification system can execute arbitrary commands
- Built-in integration includes
  - RANCID configuration management
  - DNS for provisioning
  - Trouble Ticketing API (RT, Jira, OTRS, Remedy, etc.)

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open source

Fully 100% of the OpenNMS source code is available under an Open Source license (as defined by the Open Source Initiative).

The main application is published under the AGPLv3, with various subsystems such as Newts published under more permissive licenses such as the Apache License.

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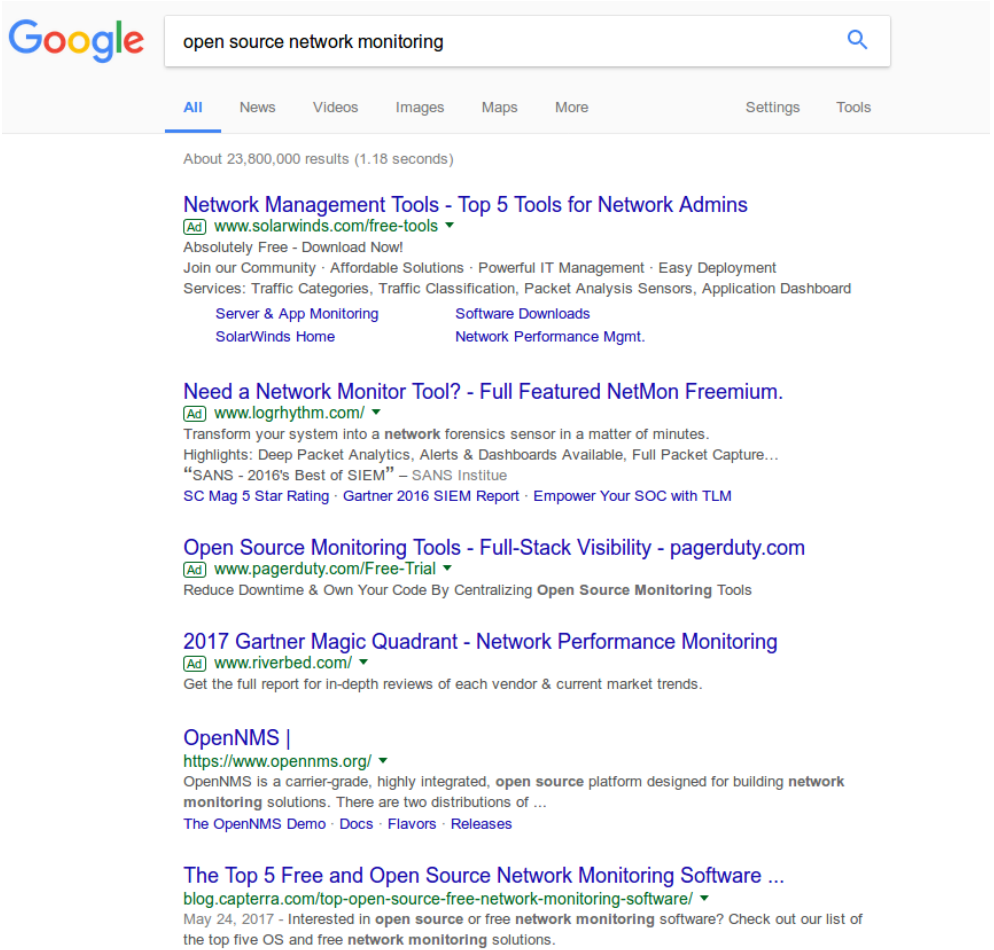
It's the Community



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The Four Main Areas of OpenNMS

- Event and Notification Management: Generate, receive, enhance, reduce and correlate various network alerts and feed them to a robust notification system.
- Provisioning: Both Automated Discovery and Directed Discovery.
- Service Assurance: Is a particular network service reachable and available?
- Performance Data Collection: Gather numeric data from across the network for display, trending and thresholding

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Event and Notification Management

- OpenNMS can receive events from various sources: SNMP, syslog, TL/1, custom events
- Events can be exported to Elasticsearch
- Events can be enhanced to include external information
- Events can create notifications
- Events can be turned into alarms
  - Alarms can be reduced to remove duplicates
  - Correlation can be performed via automations or Drools rules
- Alarms can integrated with Trouble Ticketing systems

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Event Translator

6982188	**Normal**	Aug 24, 2017 3:04:02 PM	apxncdr01.internal.opennms.com	172.20.1.1
		uei.opennms.org/translator/traps/SNMP_Link_Up Edit notifications for event		
		Agent Interface Up (linkUp Trap) on interface index:517; ifDescr:ge-0/0/2; ifName:ge-0/0/2; IfAlias:VPN01		
6982187	**Minor**	Aug 24, 2017 3:03:56 PM	apxncdr01.internal.opennms.com	172.20.1.1
		uei.opennms.org/translator/traps/SNMP_Link_Down Edit notifications for event		
		Agent Interface Down (linkDown Trap) on interface index:517; ifDescr: ge-0/0/2; ifName:ge-0/0/2; ifAlias:VPN01		

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Notifications

- Events can create notifications, a “poor man’s trouble ticket”
- A number of actions can be performed, such as:
  - Send an e-mail
  - Send an SMS
  - Contact via PagerDuty
- Notifications can be escalated
- Any command that can be run from the OpenNMS server can be used in notifications.

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Alarms

- Events are like logs, alarms are used for workflow
- Alarms can reduce multiple similar events into one alarm
- Automations can act on alarms to escalate or clear them
- Complex business rules implemented using Drools
- Alarms can have “sticky” and “journal” notes
- There is an API to interface with common Trouble Ticketing software such as Remedy, RT, OTRS and Jira.

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Provisioning

- OpenNMS can automatically scan your network for devices
- For large networks, this can be impractical
- The provisioning system provides several ways to add devices:
  - WebUI
  - XML file import
  - ReST API
- Multi-threaded discovery processes handles large devices

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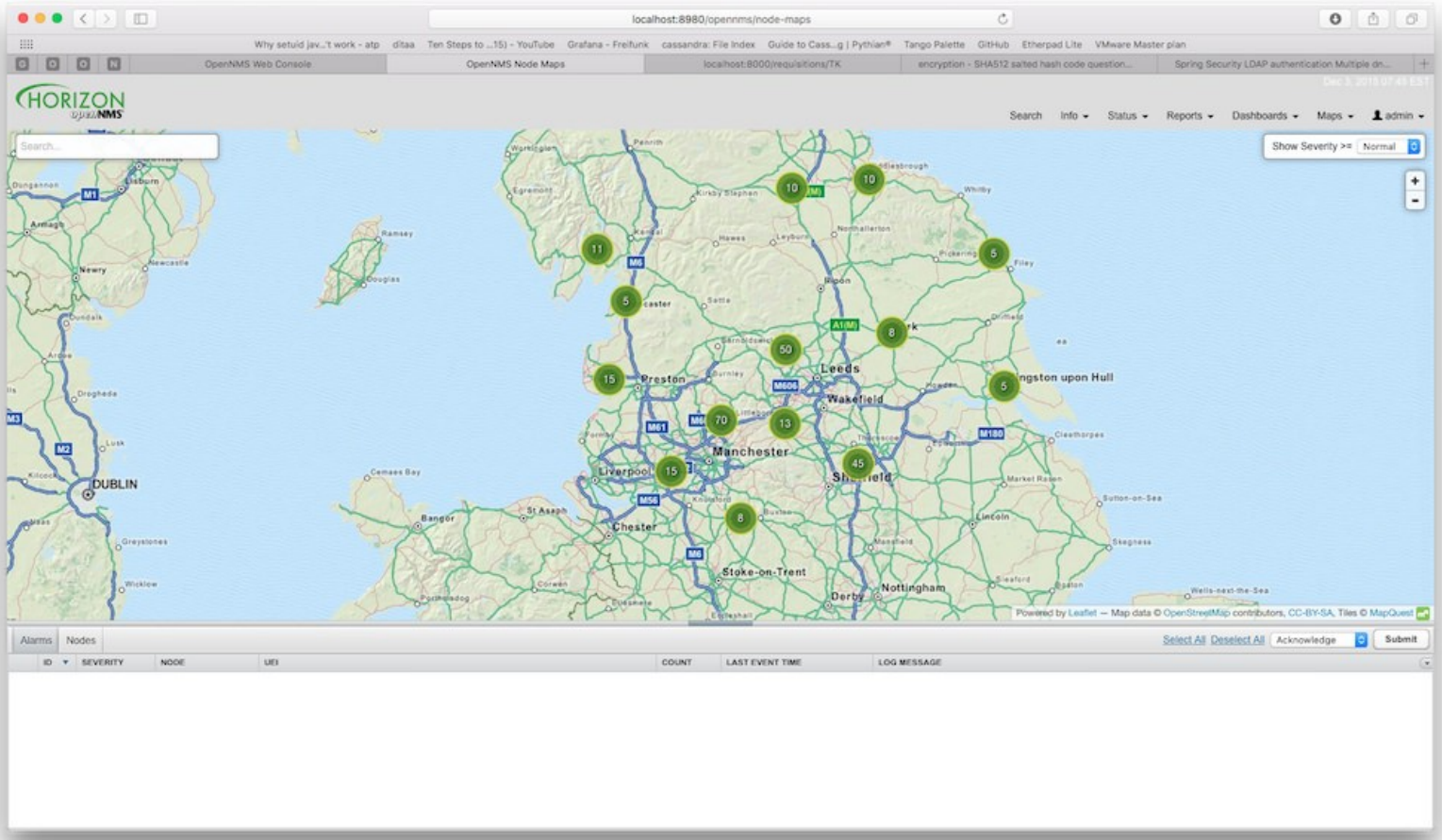
Geographical Map



Service Assurance

- OpenNMS performs synthetic transactions to test the availability of services
- Built-in monitors range in complexity from the ICMP and TCP monitors up to the Page Sequence and Selenium Monitors
- There is a unique “downtime model” to manage transient errors
- Services that can’t be actively polled can be monitored via the Passive Status Keeper
- The Remote Poller tests services from the point of view of remote locations
- You can create service hierarchies to mange business services

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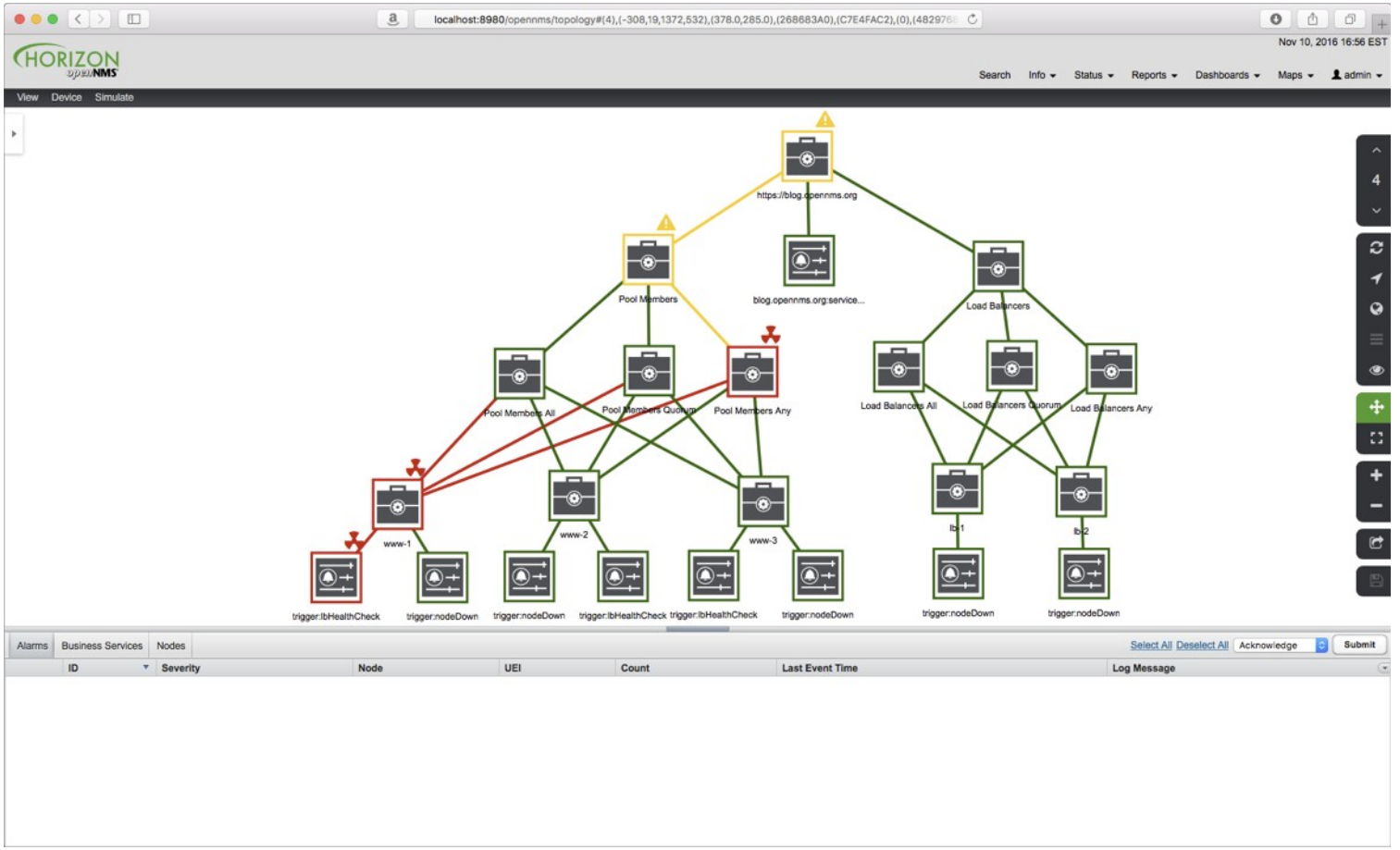
Business Service Monitor



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Data Collection

- OpenNMS can collect data from numerous sources, such as SNMP, HTTP, XML, JSON, JDBC, vSphere etc.
- The data can be stored, graphed, checked for thresholds and trends can be calculated
- Virtually unlimited scale using storage via Newts running on Cassandra or ScyllaDB
- Integration with external tools such as Graphite and Grafana

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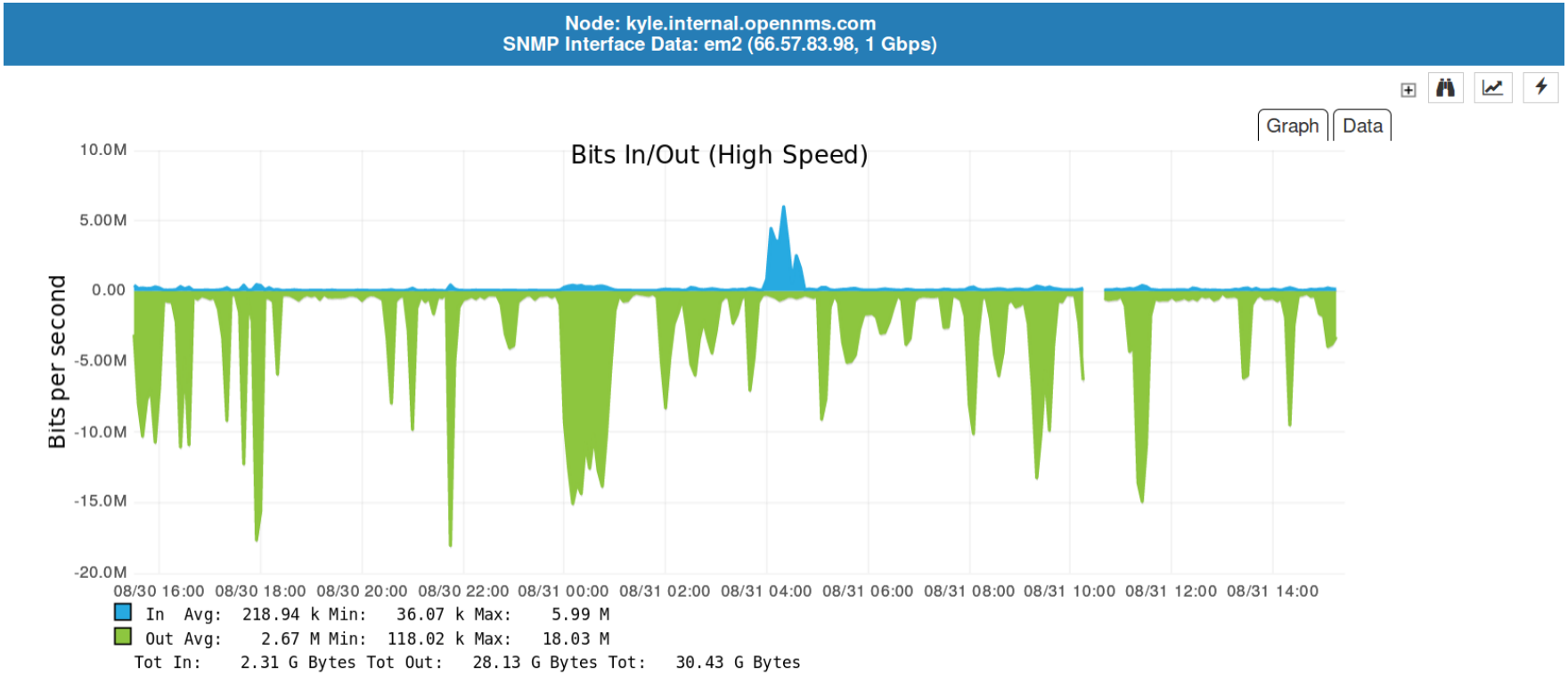
SNMP Data Collection



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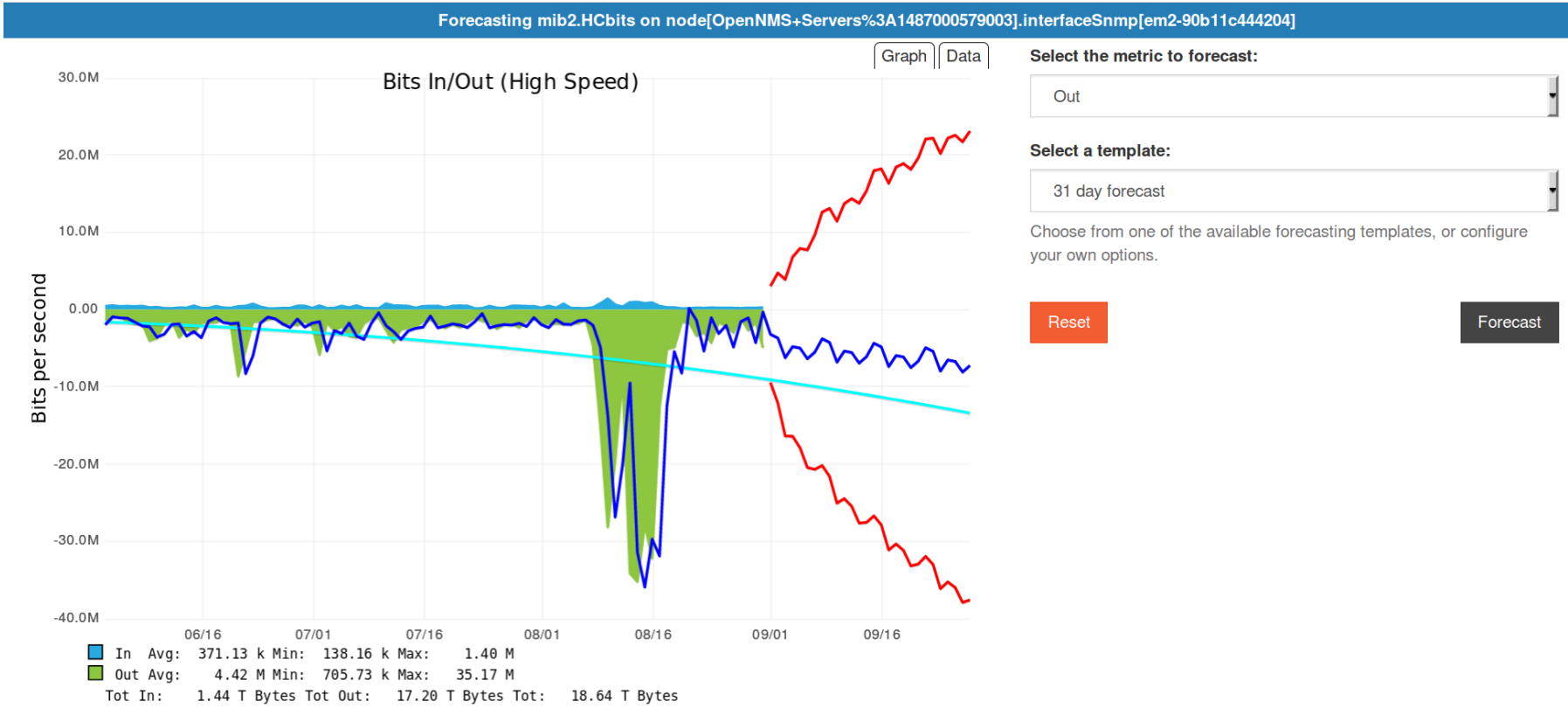
Trending with R



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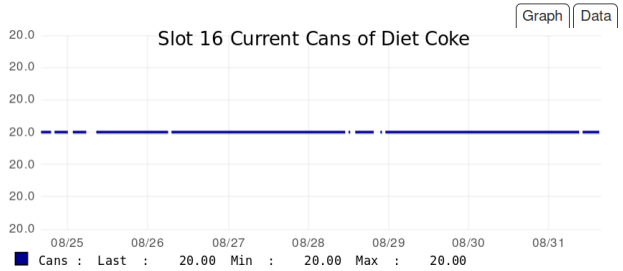
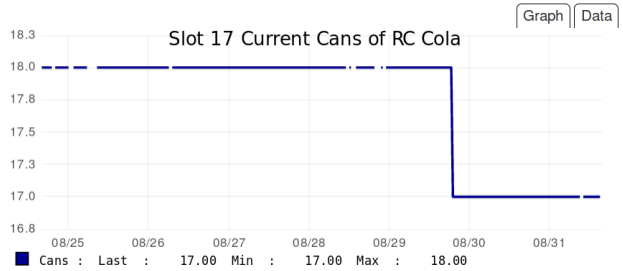
HTTP Data Collection

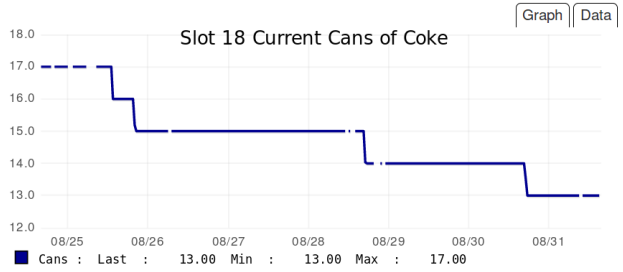
OpenNMS Drink Machine Slot 16
From: Thu Aug 24 15:16:59 EDT 2017 **Node: ike.internal.opennms.com**
To: Thu Aug 31 15:16:59 EDT 2017 **SNMP Node Data: Node-level Performance Data Detail**



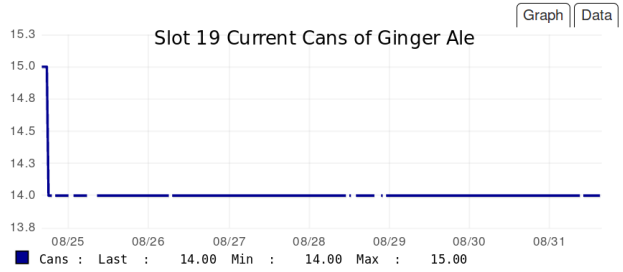
OpenNMS Drink Machine Slot 17
From: Thu Aug 24 15:16:59 EDT 2017 **Node: ike.internal.opennms.com**
To: Thu Aug 31 15:16:59 EDT 2017 **SNMP Node Data: Node-level Performance Data Detail**



OpenNMS Drink Machine Slot 18
From: Thu Aug 24 15:16:59 EDT 2017 **Node: ike.internal.opennms.com**
To: Thu Aug 31 15:16:59 EDT 2017 **SNMP Node Data: Node-level Performance Data Detail**



OpenNMS Drink Machine Slot 19
From: Thu Aug 24 15:16:59 EDT 2017 **Node: ike.internal.opennms.com**
To: Thu Aug 31 15:16:59 EDT 2017 **SNMP Node Data: Node-level Performance Data Detail**



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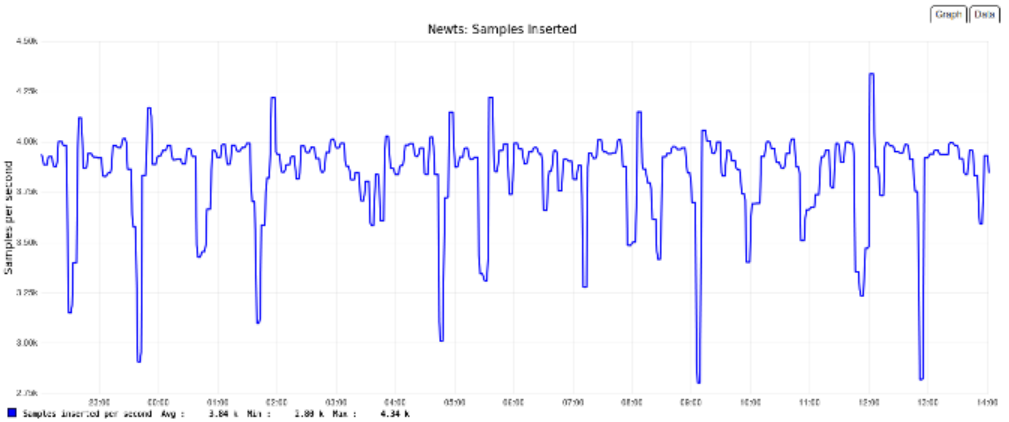
Newts




```
org.opennms.newts.stress.InsertDispatcher.samples
             count = 10512100
         mean rate = 51989.68 events/second
     1-minute rate = 51906.38 events/second
     5-minute rate = 38806.02 events/second
    15-minute rate = 31232.98 events/second
```

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Grafana

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The Goal

"Internet of Things" Scale

Millions of Devices

Billions of Metrics

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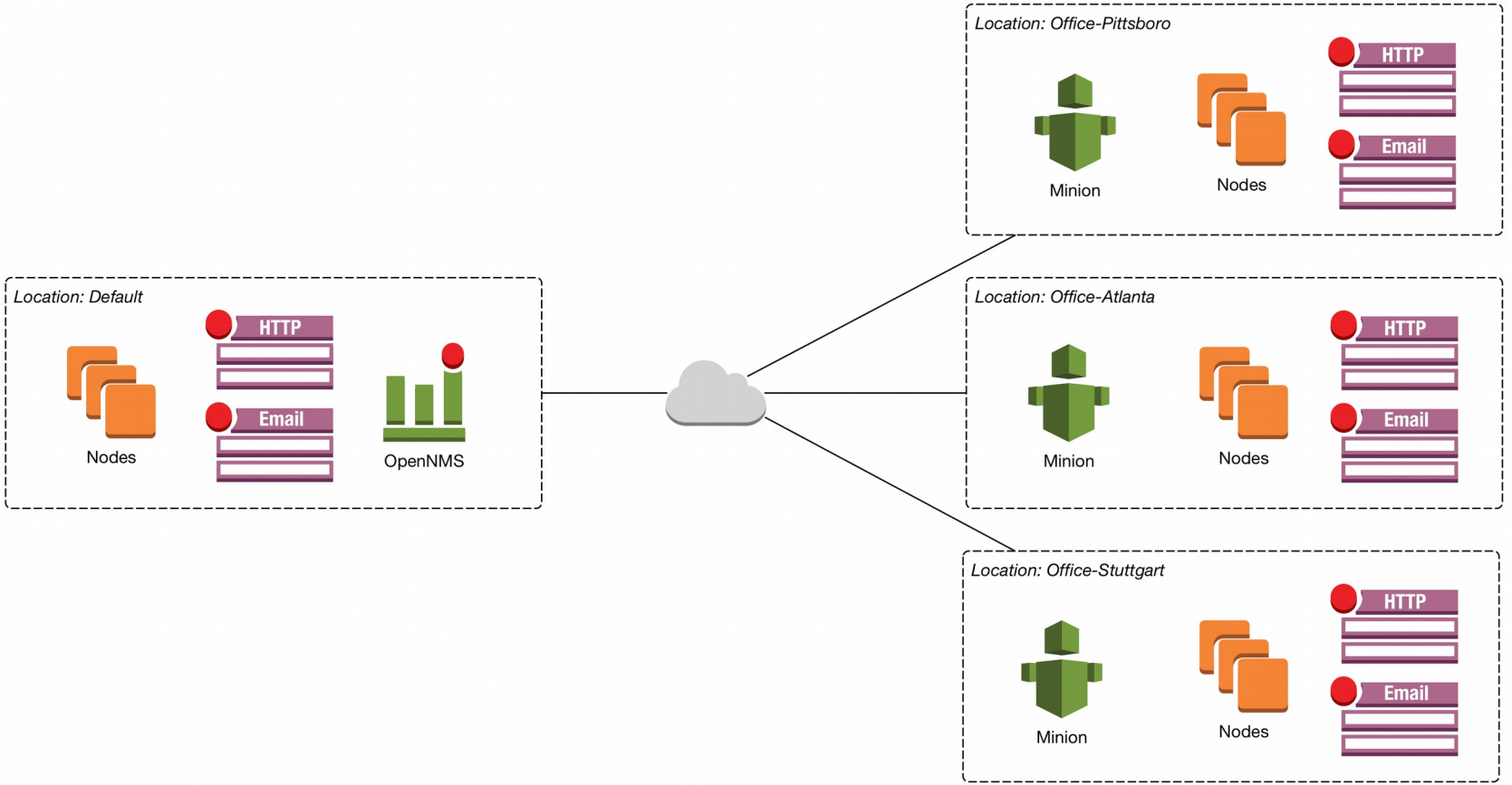
Minion



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Resources

The OpenNMS Project:

- website: https://www.opennms.org
- wiki: https://wiki.opennms.org
- demo: https://demo.opennms.org
- documentations: https://docs.opennms.org
- chat: https://chat.opennms.com
- forum: https://ask.opennms.eu
- video: https://www.youtube.com/user/opennms/

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