




Monitoring at Scale with Open Source

AusNOG – 7 Sept 2017

Tarus Balog
tarus@opennms.org

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



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



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



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)



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.)

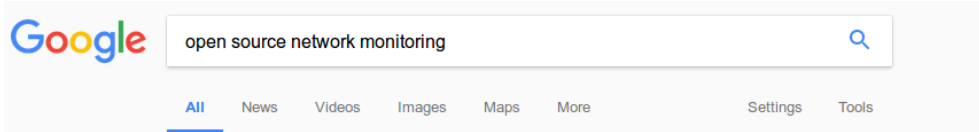


open source

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.

It's the Community



About 23,800,000 results (1.18 seconds)

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OpenNMS |

<https://www.opennms.org/>

OpenNMS is a carrier-grade, highly integrated, open source platform designed for building network monitoring solutions. There are two distributions of ...

[The OpenNMS Demo](#) · [Docs](#) · [Flavors](#) · [Releases](#)

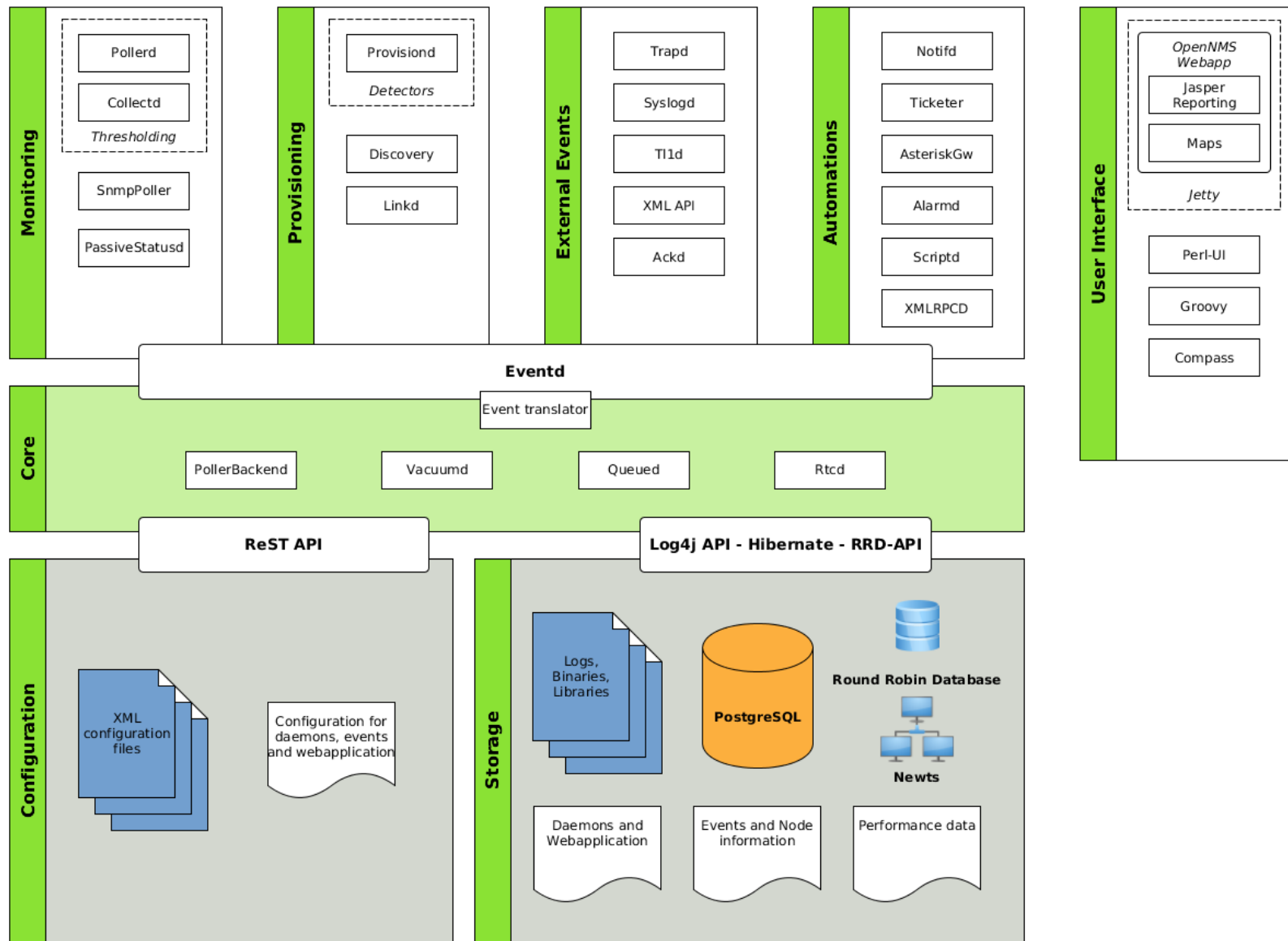
The Top 5 Free and Open Source Network Monitoring Software ...

blog.captterra.com/top-open-source-free-network-monitoring-software/

May 24, 2017 - Interested in open source or free network monitoring software? Check out our list of the top five OS and free network monitoring solutions.

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



Event and Notification Management

- OpenNMS can receive events from various sources: SNMP, syslog, TL/1, custom events
- Events can be enhanced to include external information
- Events can be exported to Elasticsearch
- 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 be integrated with Trouble Ticketing systems

OpenNMS Events

6991966	Normal ⊕ ⊖	Aug 31, 2017 10:11:37 AM 📄 📄	ike.internal.opennms.com	172.20.1.25 ⊕ ⊖	SNMP ⊕ ⊖
uei.opennms.org/nodes/dataCollectionSucceeded ⊕ ⊖ Edit notifications for event					
SNMP data collection on interface 172.20.1.25 previously failed and has been restored.					
6991960	Normal ⊕ ⊖	Aug 31, 2017 10:07:10 AM 📄 📄	ike.internal.opennms.com		
uei.opennms.org/nodes/nodeUp ⊕ ⊖ Edit notifications for event					
Node ike.internal.opennms.com is up.					
6991953	Major ⊕ ⊖	Aug 31, 2017 9:56:51 AM 📄 📄	ike.internal.opennms.com		
uei.opennms.org/nodes/nodeDown ⊕ ⊖ Edit notifications for event					
Node ike.internal.opennms.com is down.					
6991952	Minor ⊕ ⊖	Aug 31, 2017 9:55:54 AM 📄 📄	ike.internal.opennms.com	172.20.1.25 ⊕ ⊖	SNMP ⊕ ⊖
uei.opennms.org/nodes/dataCollectionFailed ⊕ ⊖ Edit notifications for event					
SNMP data collection on interface 172.20.1.25 failed with 'Timeout retrieving SnmpCollectors for 172.20.1.25 for /172.20.1.25: SnmpCollectors for 172.20.1.25: snmpTimeoutError for: /172.20.1.25'.					

SNMP Traps

[Home](#) / [Events](#) / [Event 6988079](#)

Event 6988079

Severity	Warning	Node	mrtwig.internal.opennms.com
Time	Aug 29, 2017 12:20:53 AM	Interface	172.20.1.8
Service			
UEI	uei.opennms.org/IETF/Bridge/traps/topologyChange		

Log Message

Bridge MIB: Topology Change.

Description

A topologyChange trap is sent by a bridge when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a newRoot trap is sent for the same transition. Implementation of this trap is optional.

Operator Instructions

No instructions available.

Syslog Events

Event 6992380

Severity	Normal	Node	
Time	Aug 31, 2017 12:16:24 PM	Interface	127.0.0.1
Service			
UEI	uei.opennms.org/syslogd/authpriv/Notice		

Log Message

An OpenNMS Event has been received as a Syslog Message

Message: pam_unix(su-l:auth): authentication failure; logname=tarus uid=18600004 euid=0 tty=pts/0 ruser=tarus rhost= user=root

Description

The interface 127.0.0.1 generated a Syslog Message.

Node ID: 0

Host: Unknown

Interface: 127.0.0.1

Message: pam_unix(su-l:auth): authentication failure; logname=tarus uid=18600004 euid=0 tty=pts/0 ruser=tarus rhost= user=root

Process: su

PID: 3320

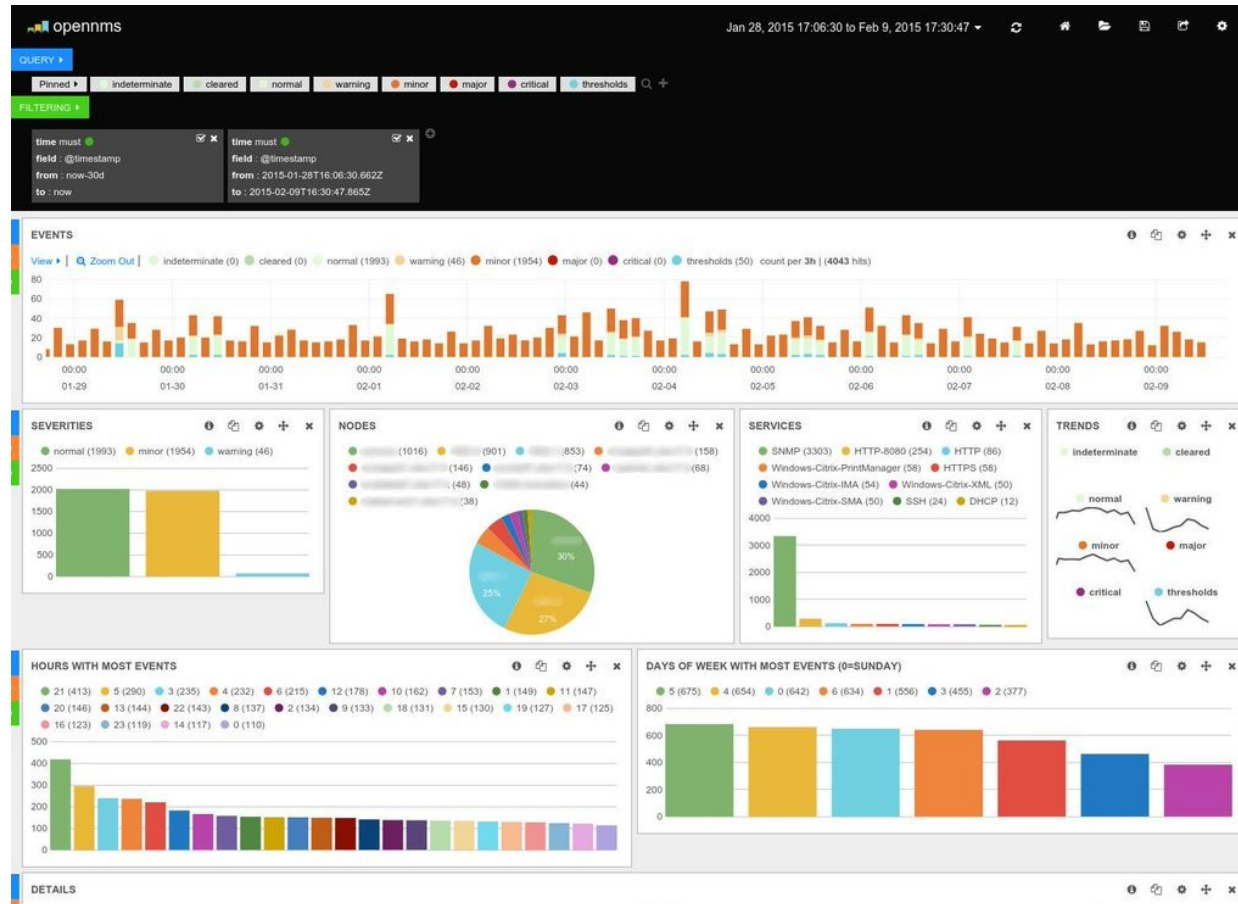
Custom Events

6991339	Normal <input type="checkbox"/> <input type="checkbox"/>	Aug 31, 2017 1:02:38 AM <input type="checkbox"/> <input type="checkbox"/>	sync.opennms.com
<hr/>			
uei.opennms.org/internal/backup/backupCompleted <input type="checkbox"/> <input type="checkbox"/> Edit notifications for event			
<hr/>			
TOG Event: Backup process completed on sync.opennms.com.			
6991328	Normal <input type="checkbox"/> <input type="checkbox"/>	Aug 31, 2017 1:00:04 AM <input type="checkbox"/> <input type="checkbox"/>	sync.opennms.com
<hr/>			
uei.opennms.org/internal/backup/backupStarted <input type="checkbox"/> <input type="checkbox"/> Edit notifications for event			
<hr/>			
TOG Event: Backup process started on sync.opennms.com.			

Event Translator

6982188	Normal ⊕ ⊖	Aug 24, 2017 3:04:02 PM 📄 📄	apxnldr01.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 📄 📄	apxnldr01.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				

Elasticsearch



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.

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.

Event Reduction

Ack	ID	Severity	Node	Interface	Service	Count	Last Event Time	First Event Time	
<input type="checkbox"/>	11283	Warning [+] [-]	PDU-G01L [+] [-]	10.123.7.18 [+] [-]		9720	12/17/06 6:29:55 AM [<] [>]	10/20/06 1:33:36 AM [<] [>]	
			Ackd:	Ackd Time:			UEI: uei.opennms.org/generic/traps/SNMP_Authen_Failure [+] [-]		
			Incorrect Community Name (authenticationFailure Trap) enterprise:.1.3.6.1.4.1.318 (.1.3.6.1.4.1.318) args(1):.1.3.6.1.4.1.318.2.3.3.0=""						
<input type="checkbox"/>	4762	Minor [+] [-]	tasrvad01.bos3 [+] [-]	10.24.1.10 [+] [-]	SNMP [+] [-]	2866	12/17/06 11:21:23 AM [<] [>]	9/5/06 6:26:23 PM [<] [>]	
			Ackd:	Ackd Time:			UEI: uei.opennms.org/nodes/dataCollectionFailed [+] [-]		
			SNMP data collection on interface 10.24.1.10 failed.						
<input type="checkbox"/>	5379	Normal [+] [-]	tasrvad01.bos3 [+] [-]	10.24.1.10 [+] [-]	SNMP [+] [-]	2852	12/17/06 11:11:17 AM [<] [>]	9/6/06 5:54:57 PM [<] [>]	
			Ackd:	Ackd Time:			UEI: uei.opennms.org/nodes/dataCollectionSucceeded [+] [-]		
			SNMP data collection on interface 10.24.1.10 previously failed and has been restored.						
<input type="checkbox"/>	4744	Minor [+] [-]	tasrvsr01c02.bos3 [+] [-]	10.24.1.14 [+] [-]	SNMP [+] [-]	1441	12/15/06 11:28:08 PM [<] [>]	9/5/06 6:26:18 PM [<] [>]	
			Ackd:	Ackd Time:			UEI: uei.opennms.org/nodes/dataCollectionFailed [+] [-]		
			SNMP data collection on interface 10.24.1.14 failed.						
<input type="checkbox"/>	4825	Normal [+] [-]	tasrvsr01c02.bos3 [+] [-]	10.24.1.14 [+] [-]	SNMP [+] [-]	1429	12/15/06 11:43:18 PM [<] [>]	9/5/06 6:36:39 PM [<] [>]	
			Ackd:	Ackd Time:			UEI: uei.opennms.org/nodes/dataCollectionSucceeded [+] [-]		
			SNMP data collection on interface 10.24.1.14 previously failed and has been restored.						

Automation Example

▼ ID					
Ack	Severity	Node	Count	Last Event Time	Log Msg
<input type="checkbox"/>	3	localhost ⊕ ⊖	1	Dec 5, 2016 3:42:31 AM 📄 📄	HTTP outage identified on interface 127.0.0.1 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.

Resolve the Alarm

▼ ID					
Ack	Severity	Node	Count	Last Event Time	Log Msg
<input type="checkbox"/>	4	localhost ⊕ ⊖	1	Dec 5, 2016 3:43:31 AM 📄 📄	The HTTP outage on interface 127.0.0.1 has been cleared. Service is restored.
<input type="checkbox"/>	3	localhost ⊕ ⊖	1	Dec 5, 2016 3:42:31 AM 📄 📄	HTTP outage identified on interface 127.0.0.1 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.

▼ ID					
Ack	Severity	Node	Count	Last Event Time	Log Msg
<input type="checkbox"/>	4	localhost ⊕ ⊖	1	Dec 5, 2016 3:43:31 AM 📄 📄	The HTTP outage on interface 127.0.0.1 has been cleared. Service is restored.
<input type="checkbox"/>	3	localhost ⊕ ⊖	1	Dec 5, 2016 3:42:31 AM 📄 📄	HTTP outage identified on interface 127.0.0.1 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.

Drools

Alarm 764000

Severity	Minor	Node	[REDACTED]
Last Event	Aug 31, 2017 10:11:19 AM	Interface	
First Event	Aug 31, 2017 10:11:19 AM	Service	
Count	1	UEI	uei [REDACTED] /vendor/OpenNMS/Applications/[REDACTED]
Ticket ID	12792866	Ticket State	OPEN
Reduction Key	uei [REDACTED] /vendor/OpenNMS/Applications/[REDACTED] [REDACTED] - Too many error when calling [REDACTED] High.Moderate/Limited		

Log Message

Beacon Alarm: [REDACTED] - Too many error when calling [REDACTED] 10 more failures per hour happened when [REDACTED] occurred on host [REDACTED]
alarmName=[REDACTED] - Too many error when calling [REDACTED] Open=[REDACTED] _urgency=High _impact=Moderate/Limited _ci=[REDACTED] _service=[REDACTED] requisitionName=[REDACTED] Operations=2017-08-31 10:11:20 EDT :: Re-parented event to node 49150 based on hostname [REDACTED]
2017-08-31 10:11:20 EDT :: No scheduled outages, releasing event. 2017-08-31 10:11:20 EDT :: application_enrich:BeaconAlarm :: Enriched description and set log message. node_name=[REDACTED] reductionKey=uei [REDACTED] /vendor/OpenNMS/Applications/[REDACTED] [REDACTED] - Too many error when calling [REDACTED] High.Moderate/Limited applicationRefined=true msg=Beacon Alarm: [REDACTED] - Too many error when calling [REDACTED] 10 more failures per hour happened when [REDACTED] calling [REDACTED] Possible cause: 1. [REDACTED] issue(service down) 2. Unexpected error(LDAP issue, timeout) May check [REDACTED] consult [REDACTED] team which now called [REDACTED]

Description

Beacon Alarm: [REDACTED] - Too many error when calling [REDACTED] 10 more failures per hour happened when [REDACTED] calling [REDACTED] Possible cause: 1. [REDACTED] issue(service down) 2. Unexpected error(LDAP issue, timeout) May check [REDACTED] consult [REDACTED] team which now called [REDACTED]

Event Parameters:

```
alarmName:[REDACTED] - Too many error when calling GuidMapper  
_Open:[REDACTED]  
_urgency:High  
_impact:Moderate/Limited  
_ci:[REDACTED]  
_service:[REDACTED]  
requisitionName:[REDACTED]  
Operations:2017-08-31 10:11:20 EDT :: Re-parented event to node 49150 based on hostname [REDACTED]  
2017-08-31 10:11:20 EDT :: No scheduled outages, releasing event. 2017-08-31 10:11:20 EDT :: application_enrich:BeaconAlarm :: Enriched description and set log message.  
node_name:[REDACTED]  
reductionKey:uei [REDACTED] /vendor/OpenNMS/Applications/[REDACTED] [REDACTED] - Too many error when calling [REDACTED] High.Moderate/Limited  
applicationRefined:true  
msg:Beacon Alarm: [REDACTED] - Too many error when calling [REDACTED] 10 more failures per hour happened when [REDACTED] calling [REDACTED] Possible cause: 1. [REDACTED] issue( service down) 2. Unexpected error( LDAP issue, timeout) May check [REDACTED] ( consult [REDACTED] team which now called [REDACTED] )
```

Sticky Memo

2017-08-31 10:11:21 EDT :: Creating [REDACTED] ticket opened [REDACTED] ticket 12792866 for this event.

Save Delete

Author: Drools Updated: Aug 31, 2017 10:11:30 AM Created: Aug 31, 2017 10:11:21 AM

Journal Memo

Save Delete

Alarm “sticky” and “journal” Notes

Alarm 615990			
Severity	Minor	Node	nms01
Last Event	Aug 31, 2017 2:05:11 PM	Interface	172.20.1.11
First Event	Aug 31, 2017 2:05:11 PM	Service	HTTP
Count	1	UEI	uei.opennms.org/nodes/nodeLostService
Ticket ID	5225	Ticket State	OPEN
Reduction Key	uei.opennms.org/nodes/nodeLostService::243:172.20.1.11:HTTP		

Log Message

HTTP outage identified on interface 172.20.1.11 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.

Description

A HTTP outage was identified on interface 172.20.1.11.
A new Outage record has been created and service level availability calculations will be impacted until this outage is resolved.

Sticky Memo

Opened a ticket and acknowledge this alarm

Save Delete

Author: tarus **Updated:** Aug 31, 2017 2:06:11 PM **Created:** Aug 31, 2017 2:06:11 PM

Journal Memo

When this happens, open a ticket with the Web Operations team.

Save Delete

Author: tarus **Updated:** Aug 31, 2017 2:07:30 PM **Created:** Aug 31, 2017 2:06:12 PM

Trouble Ticket Integration

Alarm 615990			
Severity	Minor	Node	nms01
Last Event	Aug 31, 2017 2:05:11 PM	Interface	172.20.1.11
First Event	Aug 31, 2017 2:05:11 PM	Service	HTTP
Count	1	UEI	uei.opennms.org/nodes/nodeLostService
Ticket ID		Ticket State	CREATE_PENDING
Reduction Key	uei.opennms.org/nodes/nodeLostService::243:172.20.1.11:HTTP		
Log Message			
HTTP outage identified on interface 172.20.1.11 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.			
Description			
A HTTP outage was identified on interface 172.20.1.11.			
A new Outage record has been created and service level availability calculations will be impacted until this outage is resolved.			

Trouble Ticket Integration

Alarm 615990			
Severity	Minor	Node	nms01
Last Event	Aug 31, 2017 2:05:11 PM	Interface	172.20.1.11
First Event	Aug 31, 2017 2:05:11 PM	Service	HTTP
Count	1	UEI	uei.opennms.org/nodes/nodeLostService
Ticket ID	5225	Ticket State	OPEN
Reduction Key	uei.opennms.org/nodes/nodeLostService::243:172.20.1.11:HTTP		
Log Message			
HTTP outage identified on interface 172.20.1.11 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.			
Description			
A HTTP outage was identified on interface 172.20.1.11. A new Outage record has been created and service level availability calculations will be impacted until this outage is resolved.			

Trouble Ticket Integration

^ More about the requestors

<rt@opennms.com>

[User Summary](#)

Comments about this user:
No comment entered about this user

[Active Tickets](#) [Inactive Tickets](#) [All Tickets](#)

This user's 10 highest priority active tickets:

5225	Nobody in particular	HTTP outage identified on interface 172.20.1.11 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.	new
------	----------------------	--	-----

Groups this user belongs to

- *Everyone*
- *Unprivileged*

^ History

Thu Aug 31 14:06:19 2017

opennms (OpenNMS User) - Ticket created

Subject: HTTP outage identified on interface 172.20.1.11 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.

A HTTP outage was identified on interface 172.20.1.11. A new Outage record has been created and service level availability calculations will be impacted until this outage is resolved.

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

Requisitions

Home / Admin / Provisioning Requisitions

Requisitions (11)

Search/Filter Requisitions







































































Refresh

Quick Add Node

Edit Default FS

Reset Default

Add Requisition

Requisition Name	Last Update	Last Import	Nodes Defined	Nodes in Database	Actions
DigitalOceanAPI	31-08-17 05:00:00	31-08-17 05:00:01	20	20	      
Minimal Detectors	17-04-17 01:31:41	17-04-17 01:31:47	1	1	      
NoDetectors	22-05-17 12:56:08	22-05-17 12:56:17	2	2	      
OpenNMS Network Equipment	23-08-17 02:37:42	23-08-17 02:37:58	5	5	      
OpenNMS Phones	17-07-13 01:54:05	13-08-14 03:19:25	1	1	      
OpenNMS Servers	11-08-17 08:53:50	11-08-17 08:53:57	8	8	      
SortovaFarm	23-06-17 08:51:19	23-06-17 08:52:29	2	2	      
SortovaFarm Remotes	18-04-13 08:20:22	24-04-15 10:00:43	3	3	      
Vitality	18-02-13 04:34:30	18-02-13 04:34:32	2	2	      
XenServerAPI	31-08-17 05:05:00	31-08-17 05:05:08	26	26	      

« < 1 2 > »

Requisitions – Node List

Requisition SortovaFarm (2 defined, 2 deployed)



Refresh ▾

Edit Definition

Synchronize

Add Node

Return

Node Label	Foreign ID	Building	City	IP Addresses	# Assets	# Categories	Has Parent	Actions
rabalog.dyndns.org	1316862940820	SortovaFarm	N/A	174. (P)	5	0	No	
sortova.from-nc.com	1316862882736	SortovaFarm	N/A	71. (P)	5	0	No	

Requisitions – Specific Node

Node sortova.from-nc.com at SortovaFarm Use Horizontal Layout Return

Basic Information

Foreign ID
1316862882736 Auto-generate

Node Label
sortova.from-nc.com

Building
SortovaFarm

City
City [optional]

Path Outage

Parent Foreign Source
Parent Foreign Source (leave it blank to use the current requisition)

Parent Foreign ID
Parent Foreign ID (use either this or Parent Node Label)

Parent Node Label
Parent Node Label (use either this or Parent Foreign ID)

IP Interfaces

[+ Add Interface](#)

IP Address	Description	SNMP Primary	Services	Actions
71.	N/A	P	ICMP StrafePing Speed-Test	✎ 🗑

Assets

[+ Add Asset](#)

Name	Value	Actions
zip	27312	✎ 🗑
country	United States	✎ 🗑
state	NC	✎ 🗑
city	Pittsboro	✎ 🗑

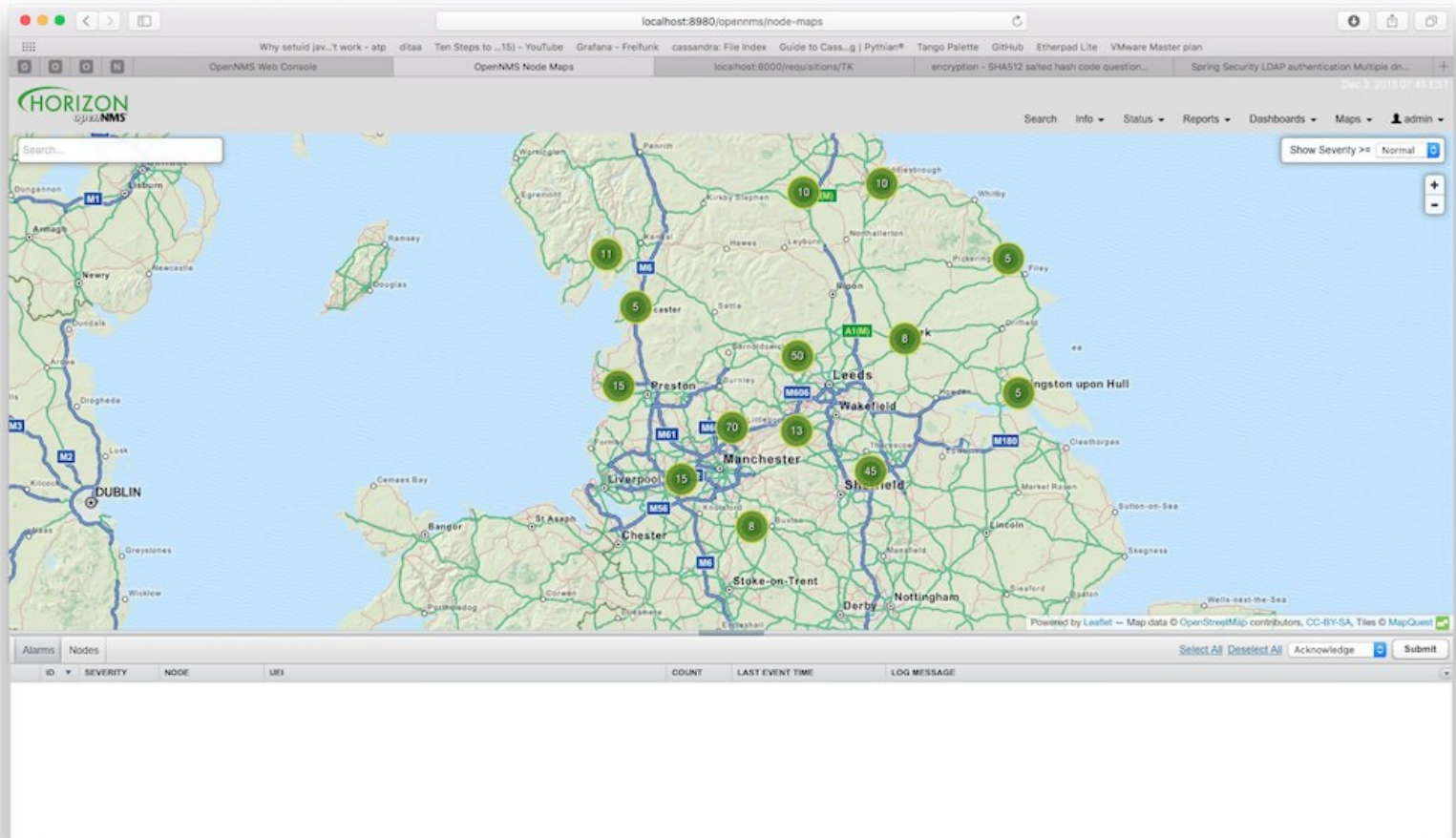
Categories

[+ Add Category](#)

Requisitions – XML

```
<model-import xmlns="http://xmlns.opennms.org/xsd/config/model-import" date-stamp="2017-06-23T08:51:19.772-04:00" foreign-source="SortovaFarm" last-import="2017-06-23T08:52:29.773-04:00">
  <node building="SortovaFarm" foreign-id="1316862940820" node-label="rabalog.dyndns.org">
    <interface descr="eth0" ip-addr="174.x.x.x" status="1" snmp-primary="P">
      <monitored-service service-name="ICMP"/>
    </interface>
    <asset name="zip" value="27205"/>
    <asset name="country" value="United States"/>
    <asset name="state" value="NC"/>
    <asset name="city" value="Asheboro"/>
    <asset name="address1" value="1655 Main Street"/>
  </node>
  <node building="SortovaFarm" foreign-id="1316862882736" node-label="sortova.from-nc.com">
    <interface descr="" ip-addr="71.x.x.x" status="1" snmp-primary="P">
      <monitored-service service-name="ICMP"/>
      <monitored-service service-name="StrafePing"/>
      <monitored-service service-name="Speed-Test"/>
    </interface>
    <asset name="zip" value="27312"/>
    <asset name="country" value="United States"/>
    <asset name="state" value="NC"/>
    <asset name="city" value="Pittsboro"/>
    <asset name="address1" value="115 First Avenue"/>
  </node>
</model-import>
```

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 manage business services

Monitored Services

Availability		
Availability (last 24 hours)		97.535%
172.20.1.25		97.535%
HTTP		97.224%
HTTP-Drinks		Not Monitored
ICMP		98.032%
SNMP		97.775%
SSH		97.827%
StrafePing		Not Monitored
Update		96.816%

Downtime Model

The OpenNMS downtime model is unique:

```
<downtime interval="30000" begin="0" end="300000" />
      <!-- 30s, 0, 5m -->
<downtime interval="300000" begin="300000" end="43200000" />
      <!-- 5m, 5m, 12h -->
<downtime interval="600000" begin="43200000" end="432000000" />
      <!-- 10m, 12h, 5d -->
<downtime begin="432000000" delete="true" />
      <!-- anything after 5 days delete -->
```

Remember to remove the “end” when removing delete

Passive Status Keeper

```
# snmptrap -v 1 -c public 127.0.0.1 .1.3.6.1.4.1.99999.2 \
  localhost 6 1 ' ' .1.3.6.1.4.1.99999.3.1 s 'They be bored'
```

Recent Events				
389	12/6/16 22:00:06	Minor	Class-Mood outage identified on interface 127.0.0.1 with reason code: They be bored.	
388	12/6/16 21:59:51	Normal	Status information for service Class-Mood has been updated.	
387	12/6/16 21:59:51	Warning	OpenNMS Class is moody: They be bored	

<input type="checkbox"/>	59	localhost	1	Dec 6, 2016 10:00:06 PM	Class-Mood outage identified on interface 127.0.0.1 with reason code: They be bored.
--------------------------	----	-----------	---	-------------------------	--

<input type="checkbox"/>	27	389	Minor	Dec 6, 2016 10:00:06 PM	localhost	127.0.0.1	Class-Mood	The Class-Mood service poll on interface localhost (127.0.0.1) on node localhost failed at Tuesday, December 6, 2016 10:00:06 PM EST.
--------------------------	----	-----	-------	-------------------------	-----------	-----------	------------	---

Remote Poller

Locations | Applications Last update: 2017 Aug 31 17:08:59

Tags
[clear selected tags](#)

SortovaFarm USA

SortovaFarm (USA)

Monitors:
1 started
0 stopped
0 disconnected

Services:
0 outages (of 4 services)
0 pollers reporting errors

Map data © [OpenStreetMap](#) contributors under [ODbL](#), [CC BY-SA 2.0](#)

« prev 1-1 of 1 next » -81.45341, 35.99845

Business Service Monitor

The screenshot displays the Horizon OpenNMS Business Service Monitor interface. The top navigation bar includes the Horizon OpenNMS logo, a search bar, and menu items for Info, Status, Reports, Dashboards, Maps, and a user profile for 'admin'. The main area shows a hierarchical tree of services. The root node is 'https://blog.opennms.org', which branches into 'Pool Members' and 'Load Balancers'. 'Pool Members' further branches into 'Pool Members All', 'Pool Members Quorum', and 'Pool Members Any'. 'Load Balancers' branches into 'Load Balancers All', 'Load Balancers Quorum', and 'Load Balancers Any'. Below these are nodes for 'www-1', 'www-2', 'www-3', 'lb-1', and 'lb-2'. The bottom section shows a table of alarms with columns for ID, Severity, Node, UEI, Count, Last Event Time, and Log Message. The table is currently empty.

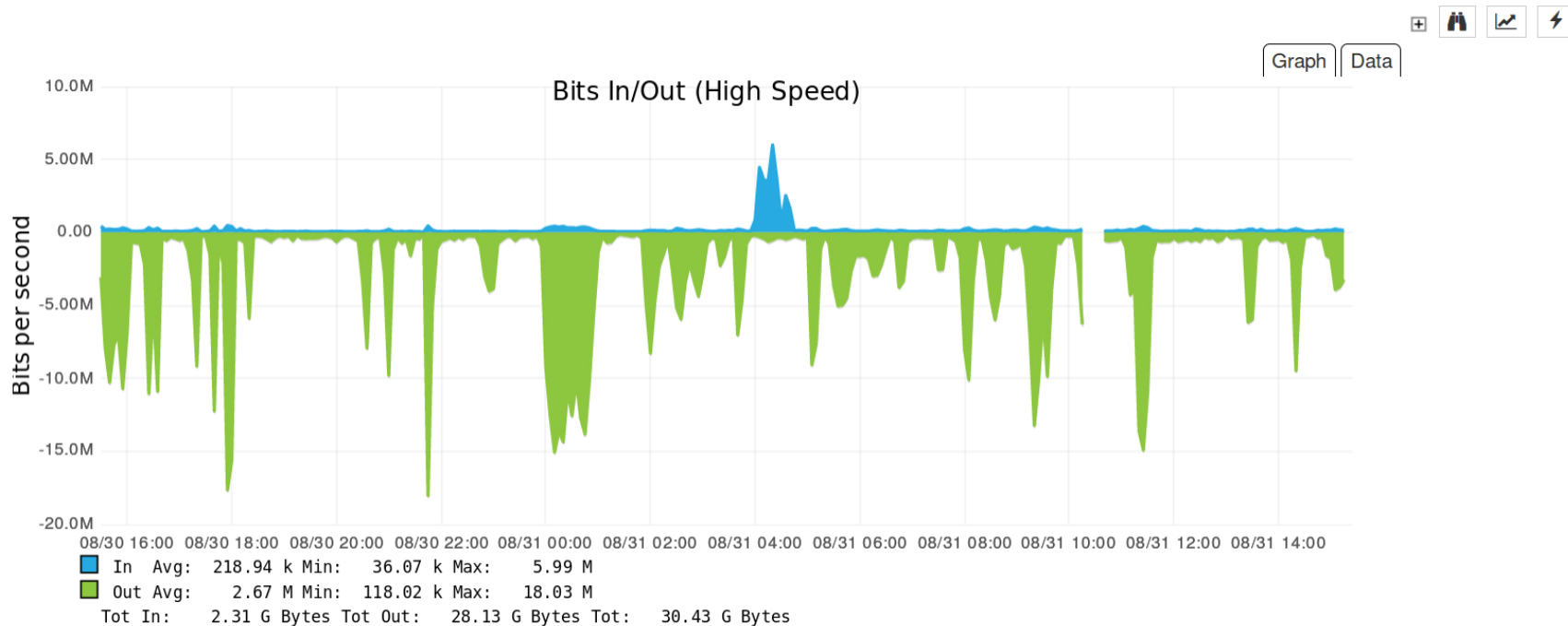
ID	Severity	Node	UEI	Count	Last Event Time	Log Message
----	----------	------	-----	-------	-----------------	-------------

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

SNMP Data Collection

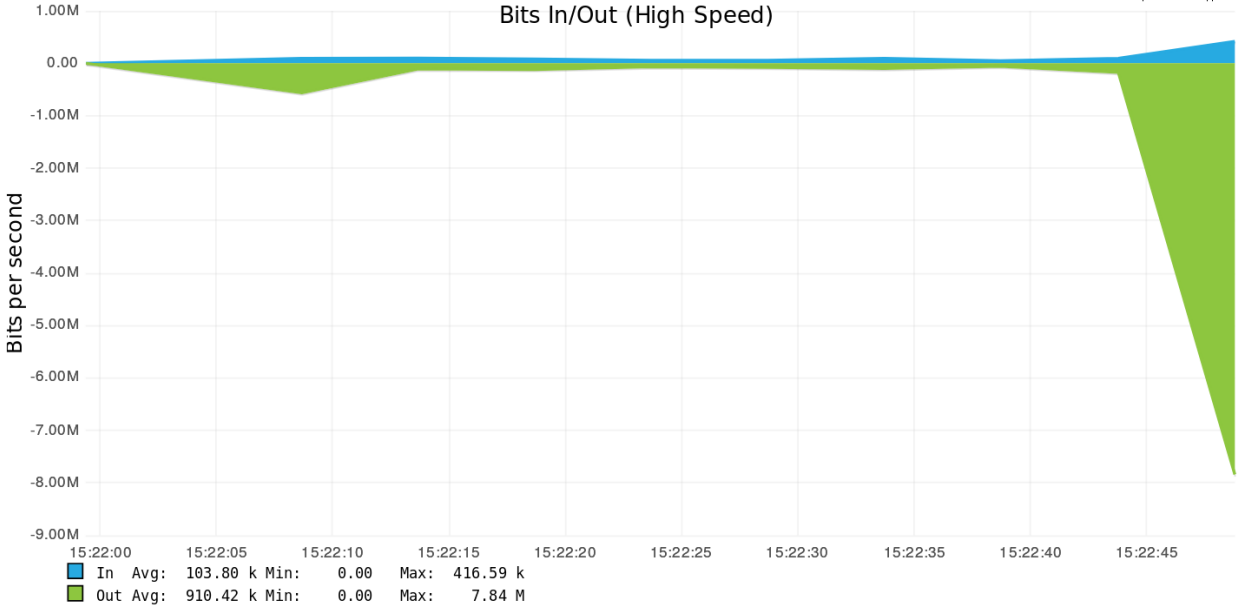
Node: kyle.internal.opennms.com
SNMP Interface Data: em2 (66.57.83.98, 1 Gbps)



Near Real-time Graphing (NRTG)

NRTG Graph for mib2.HCbits on node[OpenNMS Servers:1487000579003].interfaceSnmplib[em2-90b11c444204]

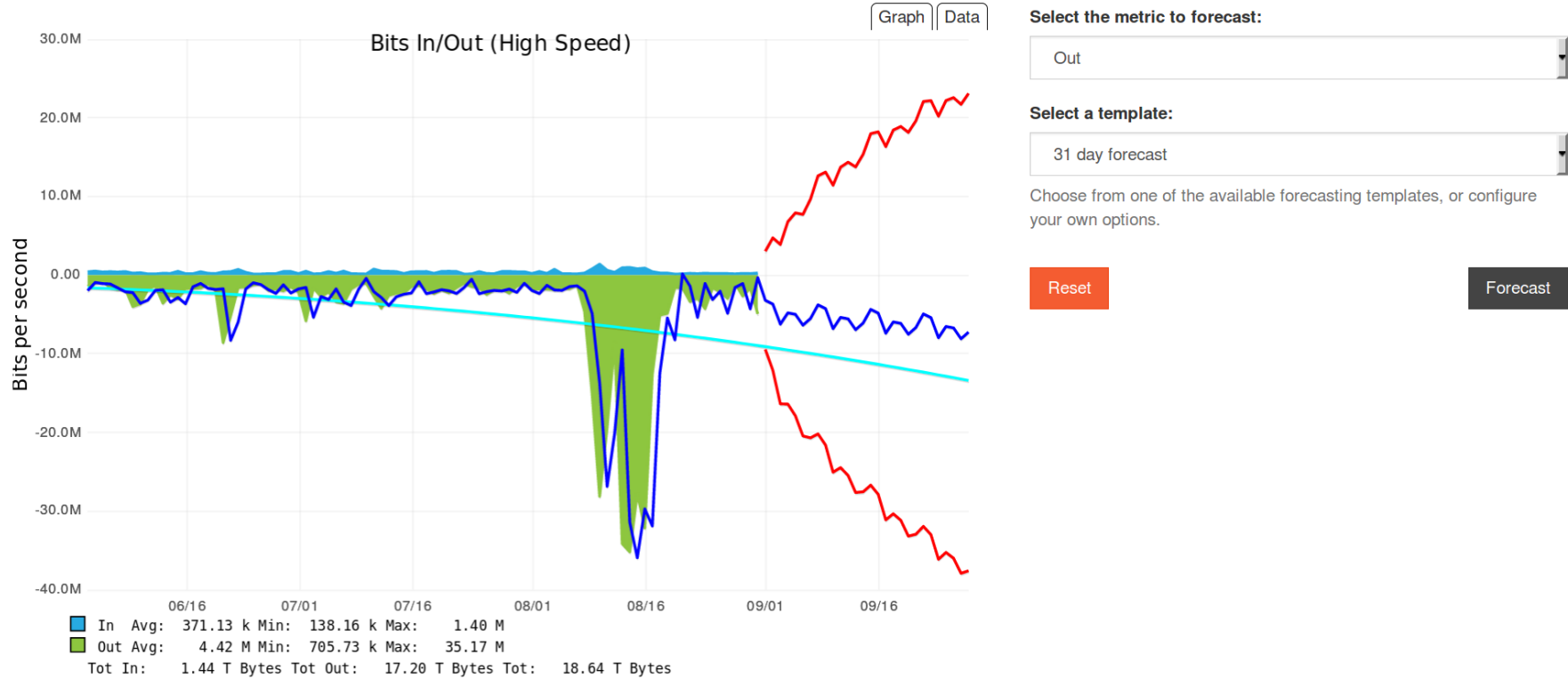
Graph | Data



Interval 5.00s Pause Compress

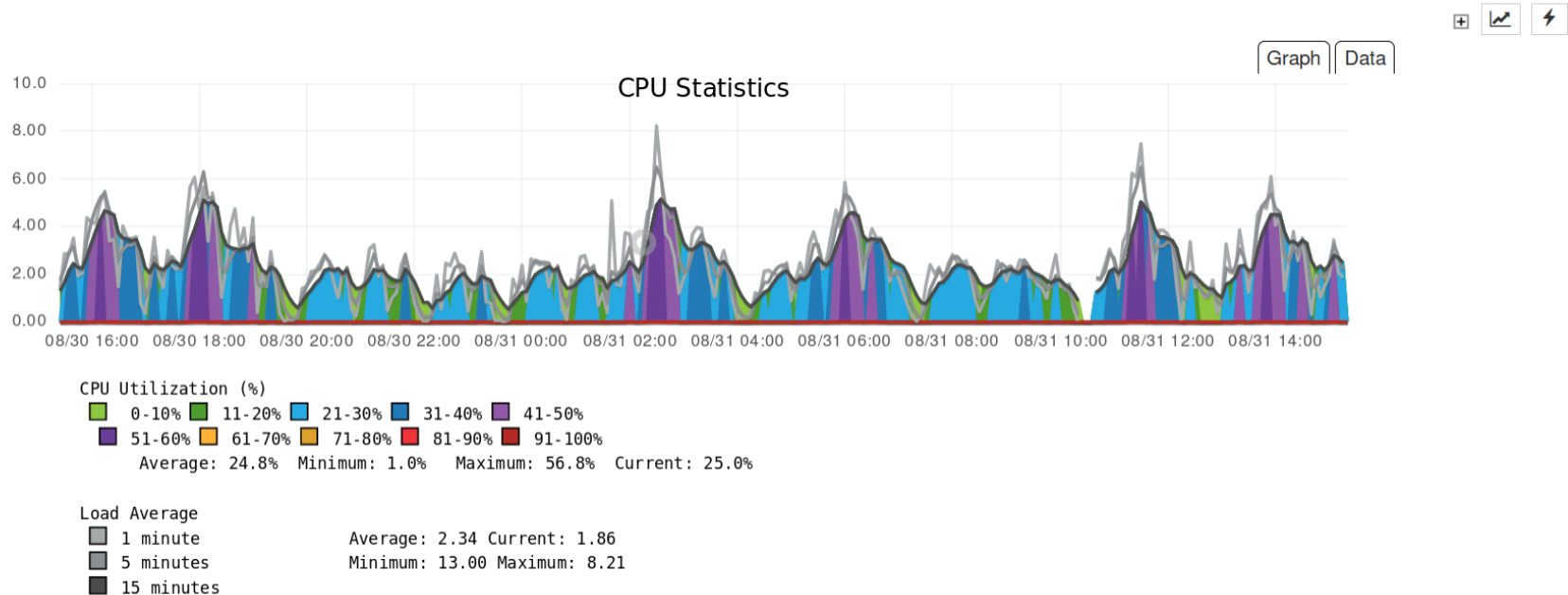
Trending with R

Forecasting mib2.HCbits on node[OpenNMS+Servers%3A1487000579003].interfaceSnmp[em2-90b11c444204]



SNMP Data Collection

Node: carolina.internal.opennms.com
SNMP Node Data: Node-level Performance Data

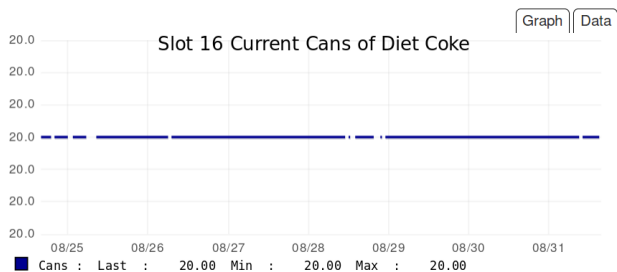


HTTP Data Collection



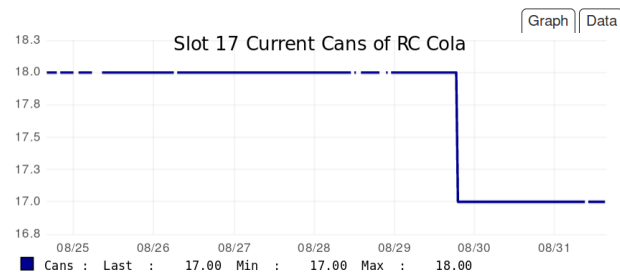
OpenNMS Drink Machine Slot 16
From: Thu Aug 24 15:16:59 EDT 2017
To: Thu Aug 31 15:16:59 EDT 2017

Node: ike.internal.opennms.com
SNMP Node Data: [Node-level Performance Data Detail](#)



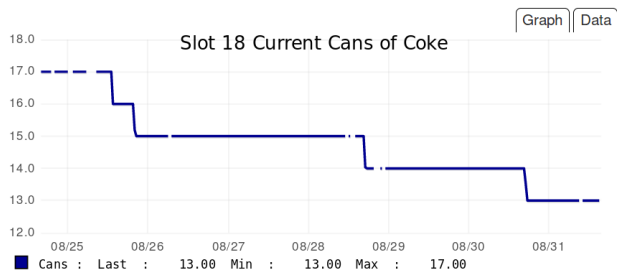
OpenNMS Drink Machine Slot 17
From: Thu Aug 24 15:16:59 EDT 2017
To: Thu Aug 31 15:16:59 EDT 2017

Node: ike.internal.opennms.com
SNMP Node Data: [Node-level Performance Data Detail](#)



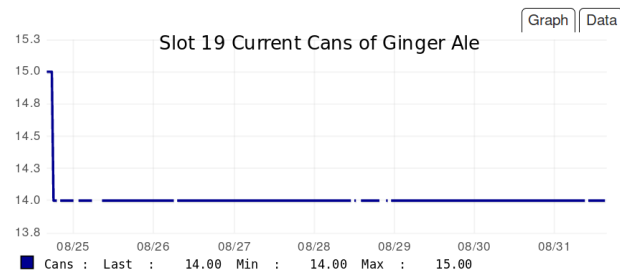
OpenNMS Drink Machine Slot 18
From: Thu Aug 24 15:16:59 EDT 2017
To: Thu Aug 31 15:16:59 EDT 2017

Node: ike.internal.opennms.com
SNMP Node Data: [Node-level Performance Data Detail](#)

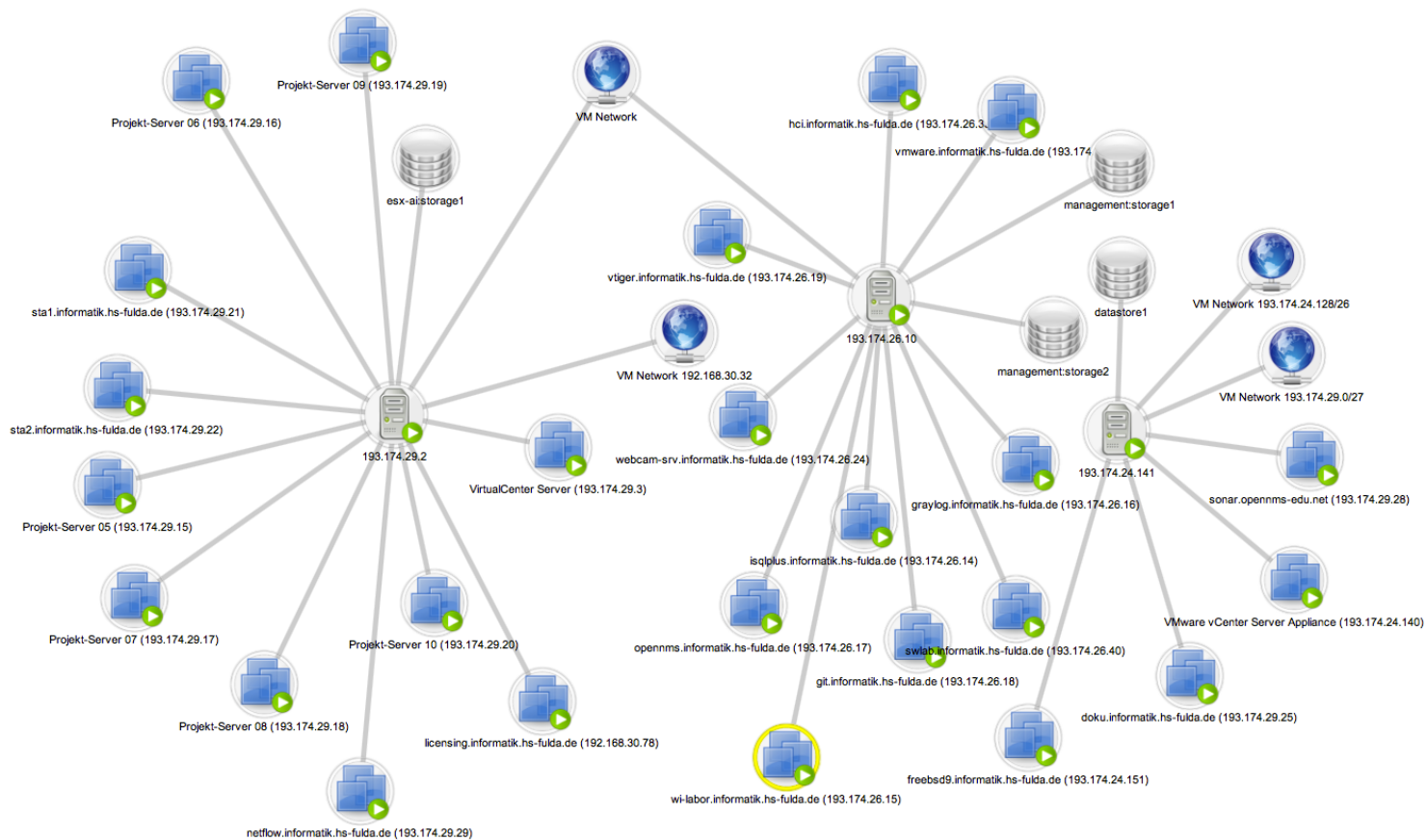


OpenNMS Drink Machine Slot 19
From: Thu Aug 24 15:16:59 EDT 2017
To: Thu Aug 31 15:16:59 EDT 2017

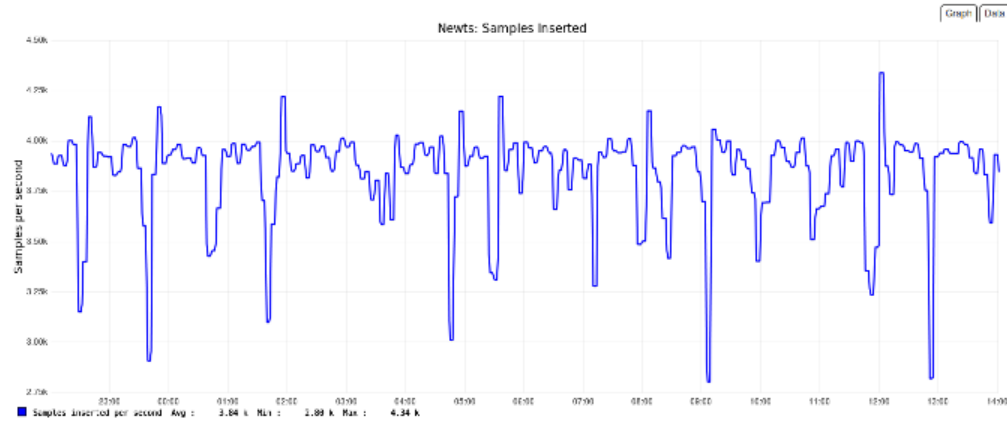
Node: ike.internal.opennms.com
SNMP Node Data: [Node-level Performance Data Detail](#)



VMWare



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
```

Grafana



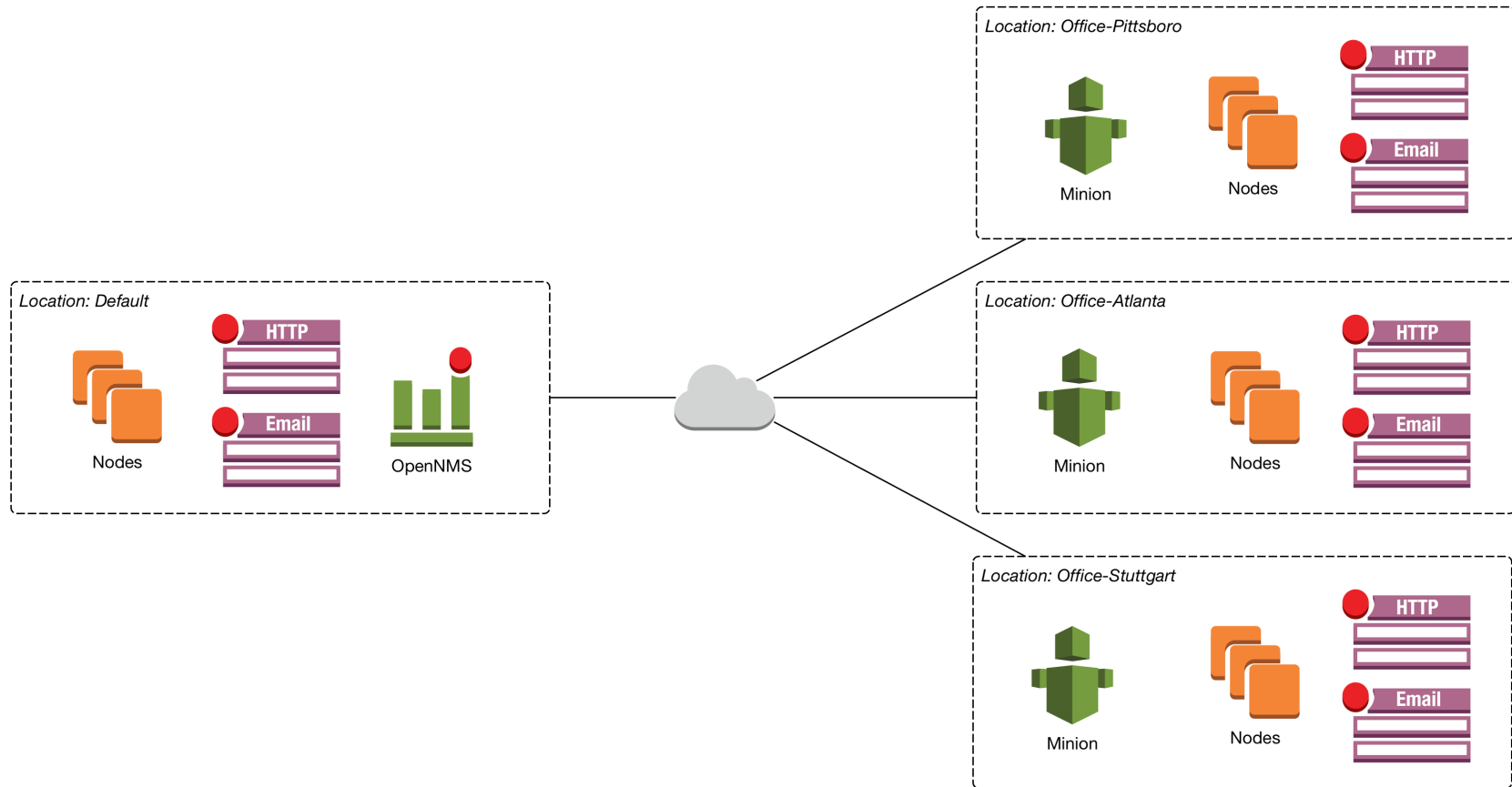
The Goal

“Internet of Things” Scale

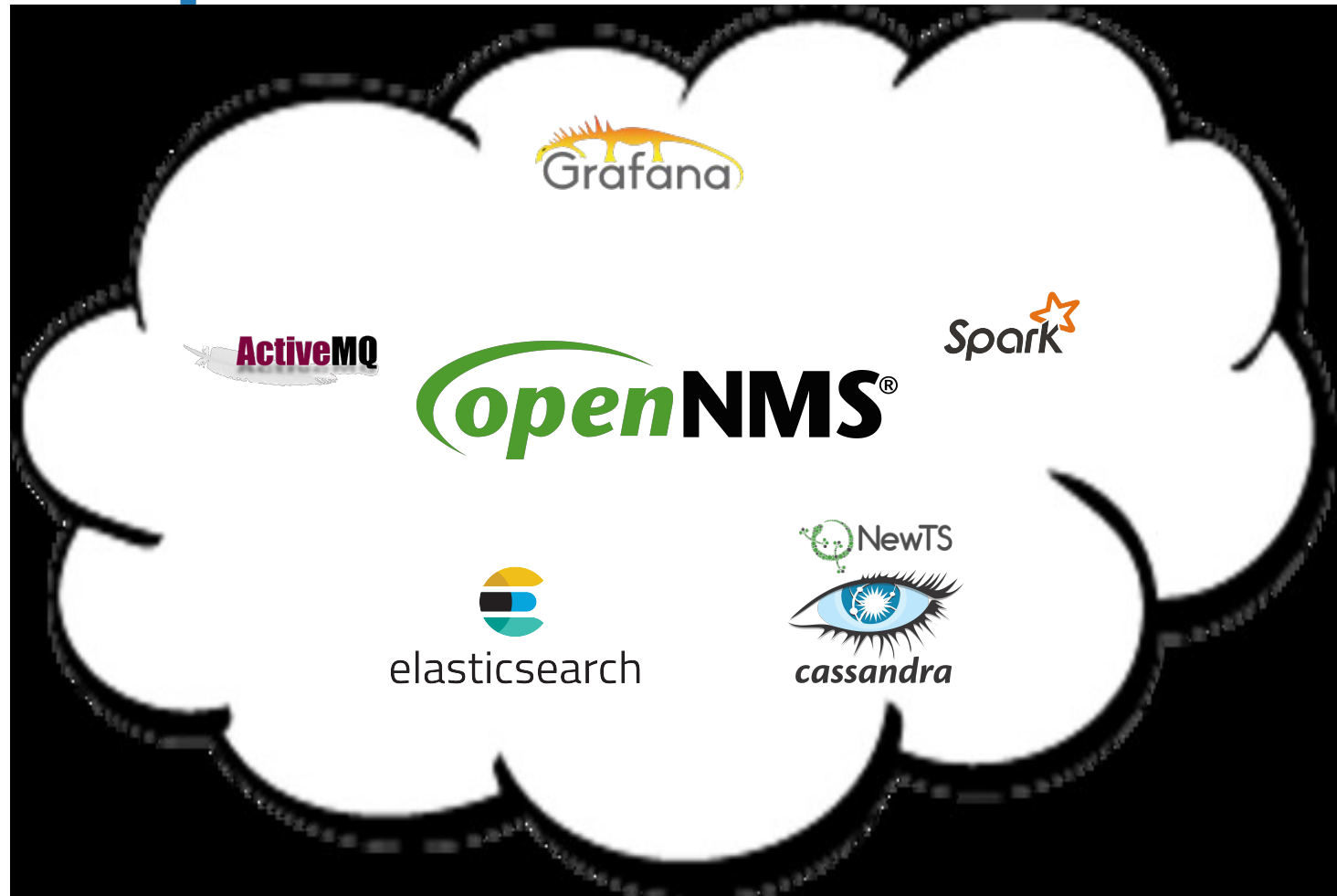
Millions of Devices

Billions of Metrics

Minion



OpenNMS in the Cloud



Resources

The OpenNMS Project:

- website: <https://www.opennms.org>
- wiki: <https://wiki.opennms.org>
- demo: <https://demo.opennms.org>
- chat: <https://chat.opennms.com>
- forum: <http://ask.opennms.eu>