



~ % whoami

Ronny Trommer

University of Applied Sciences in Fulda  
Telecommunication

Co-founder OpenNMS Foundation Europe e.V.

Freifunker and visit Hackerspaces

# ~ % locate

fulda

Fulda  
Germany

Sunny · 61°F  
3:11 PM

SAVE NEARBY SHARE

Photos Photo Sphere

Quick facts

Fulda is a city in Hesse, Germany; it is located on the river Fulda and is the administrative seat of the Fulda district. In 1990, the town hosted the 30th Hessentag state festival. [Wikipedia](#)

Population: 64,008 (Jun 30, 2009)

Area: 40.17 mi<sup>2</sup>

Dialling codes: 0661

Sign in

Fulda

Germany

Netherlands

Belgium

Luxembourg

Switzerland

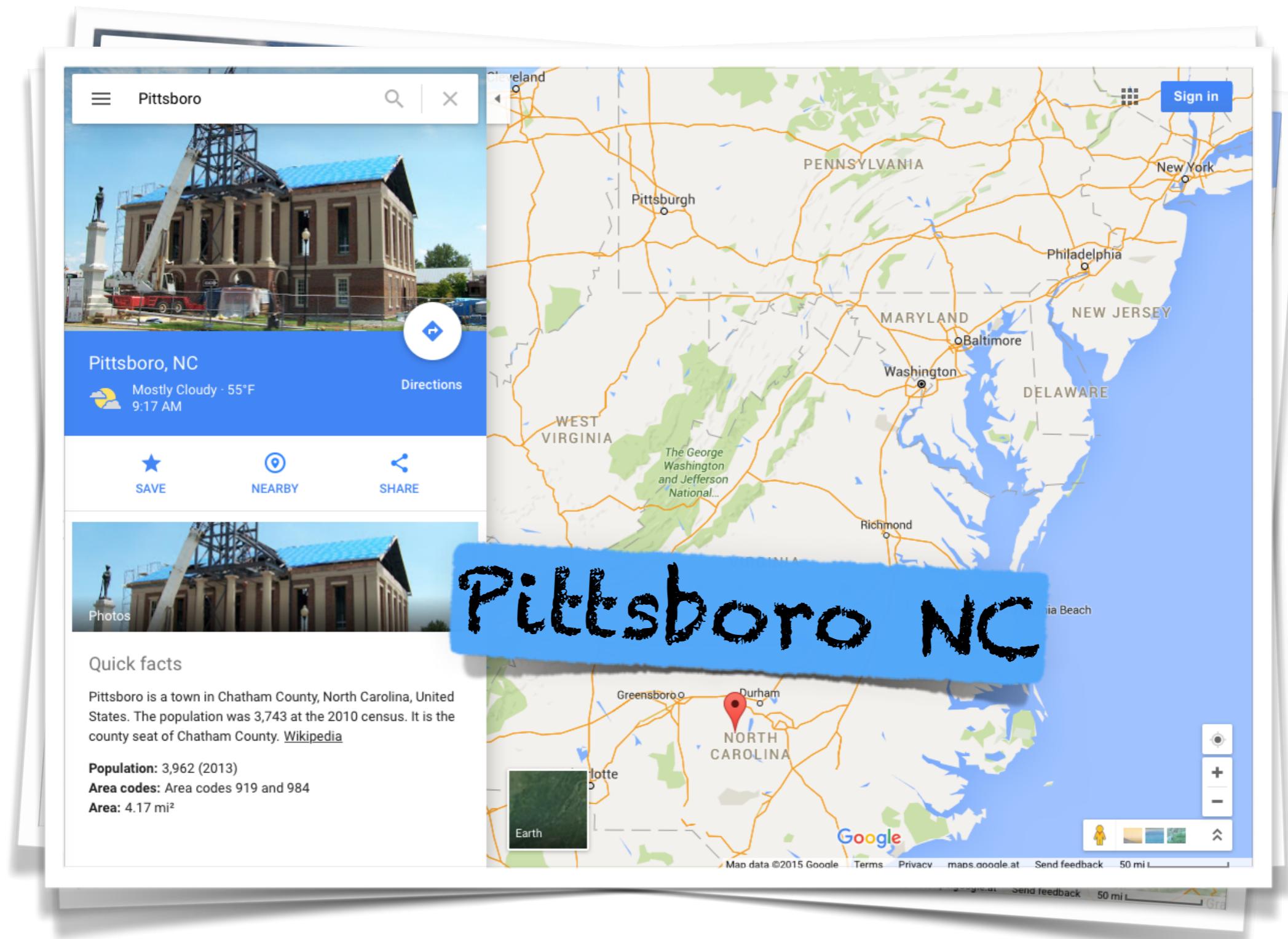
Austria

Map data ©2015 GeoBasis-DE/BKG (©2009), Google Terms Privacy maps.google.at Send feedback 50 mi

# ~ % locate



# ~ % locate



# What is OpenNMS?

# What is OpenNMS?

**World's first enterprise grade network management platform** developed under the **open source** model.

- *Tarus Balog*

SourceForge registered  
2000



*Free as in Freedom*



<https://github.com/openhums>

Debian 8

Ubuntu 14.04 LTS

CentOS 7.1 / RHEL 7

Windows 2012 Server

Debian 8

Ubuntu 14.04 LTS

CentOS 7.1 / RHEL 7

Windows 2012 Server



Like Fedora

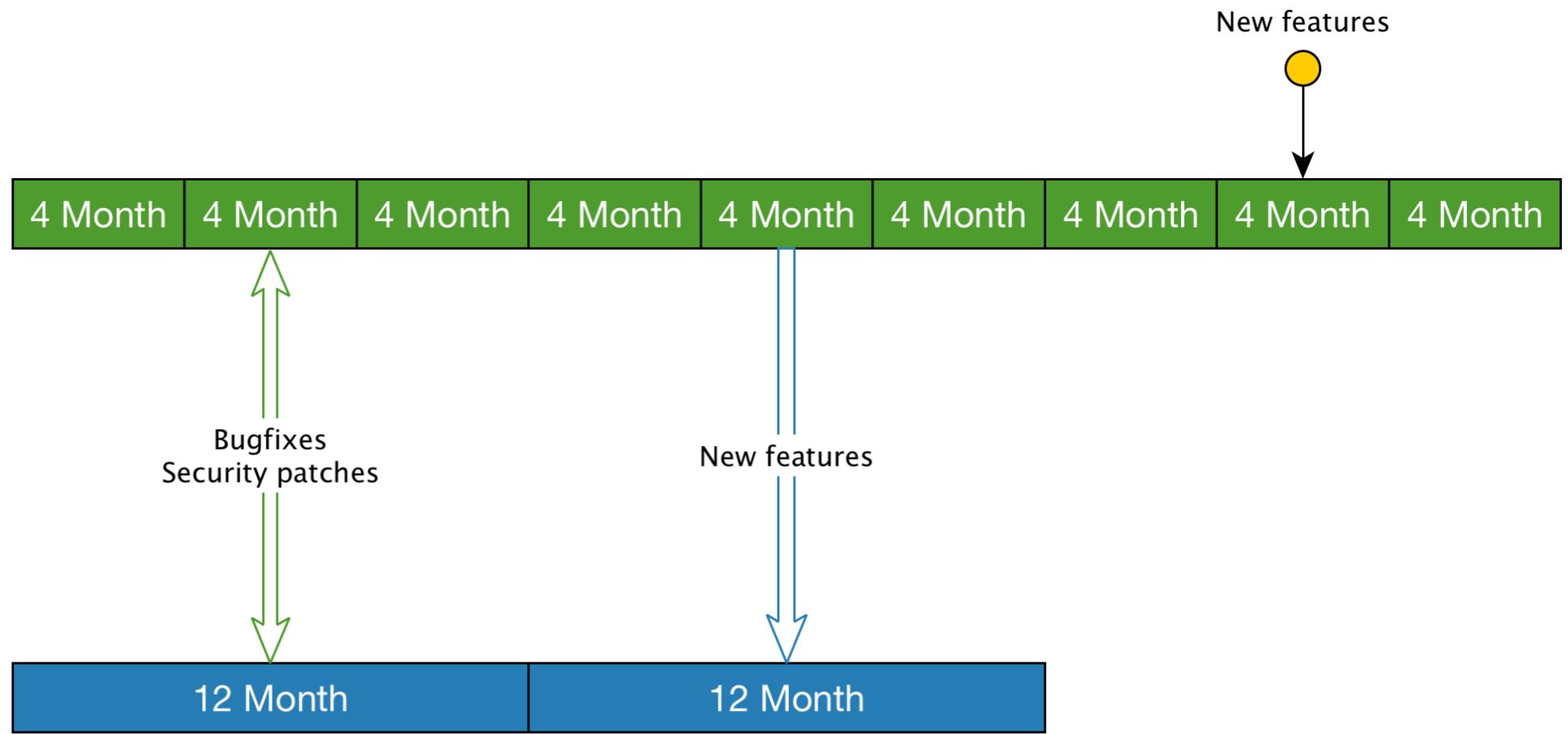
release early  
release often

community  
support

Like RHEL

Subscription

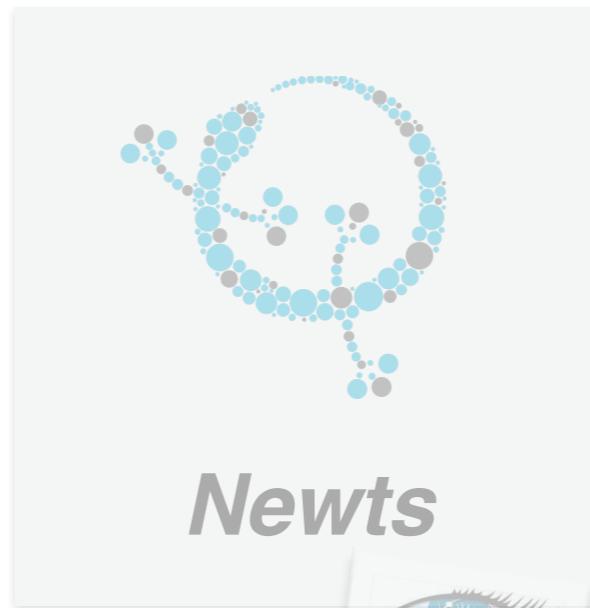
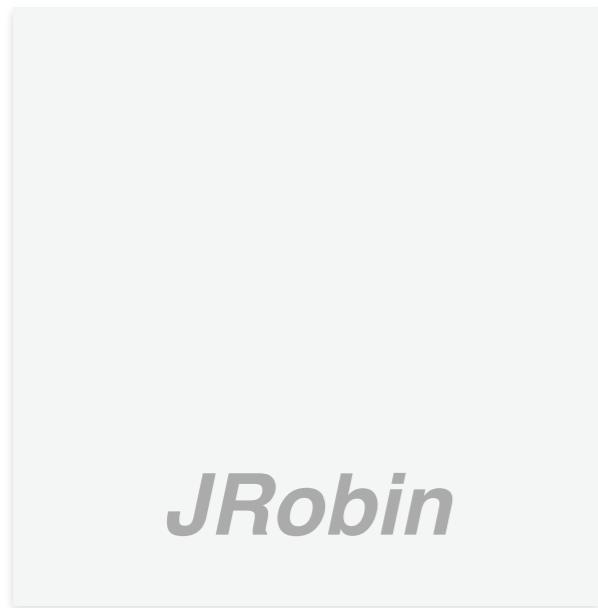
commercial  
support





Inventory

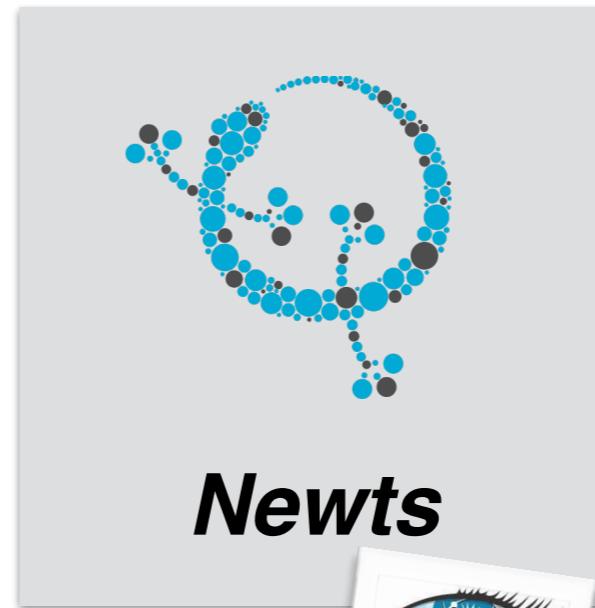
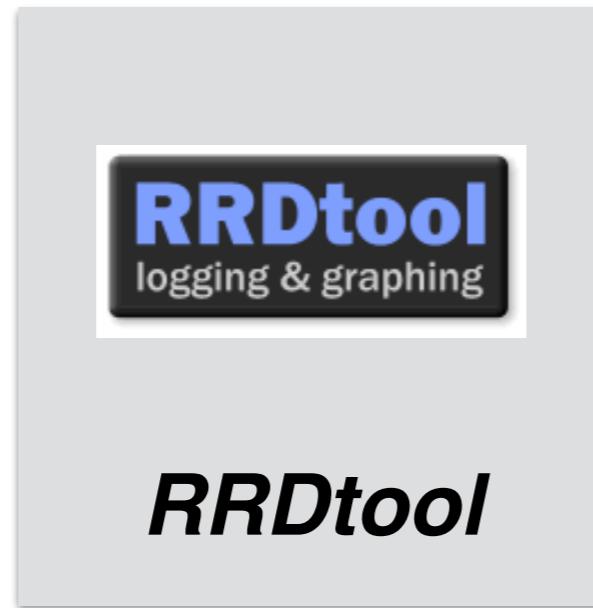
Monitoring Events





Time Series Data

Inventory  
Monitoring Events



Probably you know FCAPS?

Probably you know FCAPS?

Fault

Configuration

Accounting

Performance

Security

Probably you know FCAPS?

Fault

Configuration

Accounting

Performance

Security

SNMP Agent

Syslog Agent

JMX Agent

WMI Agent

Pollerd

Trapd

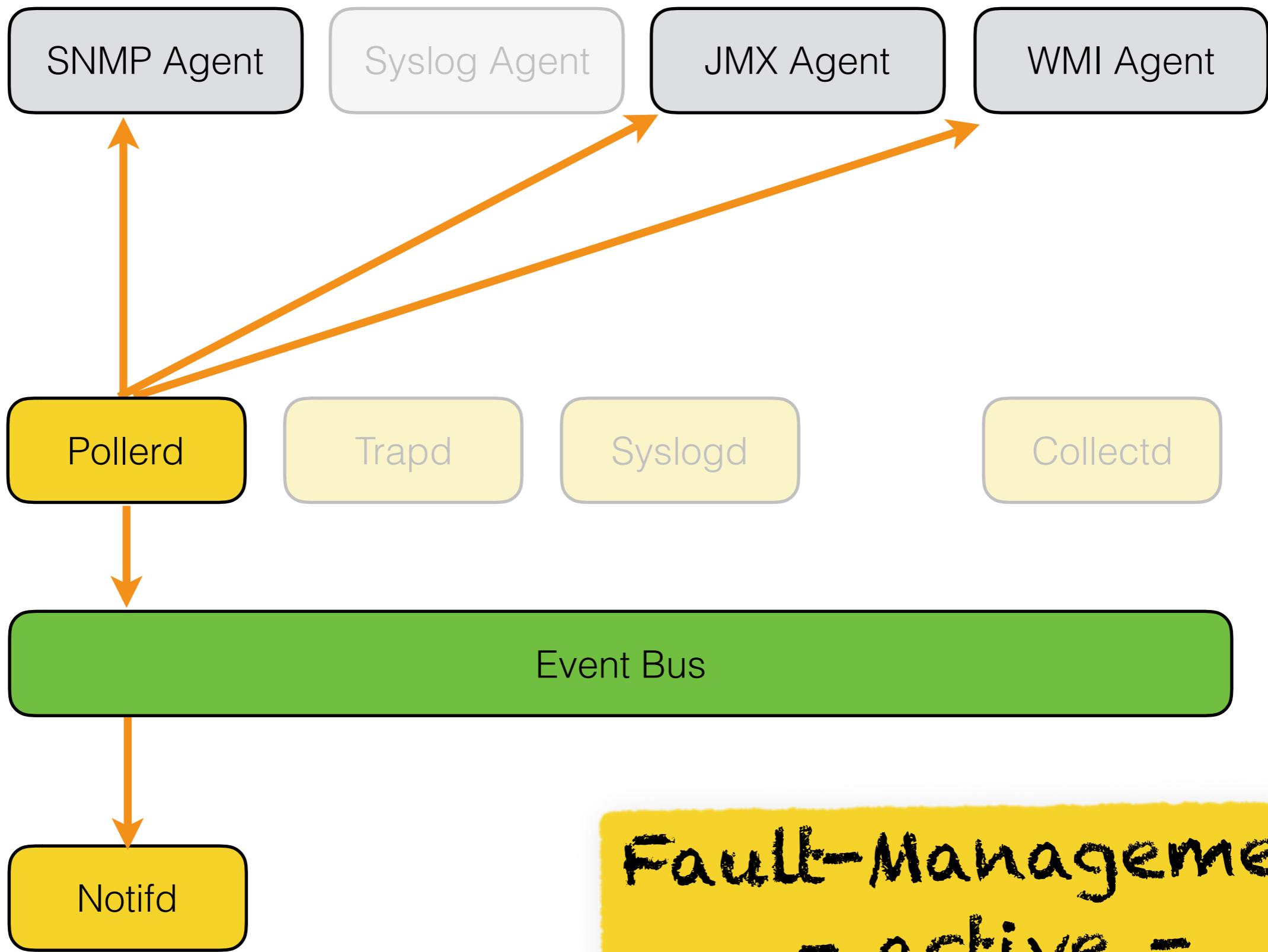
Syslogd

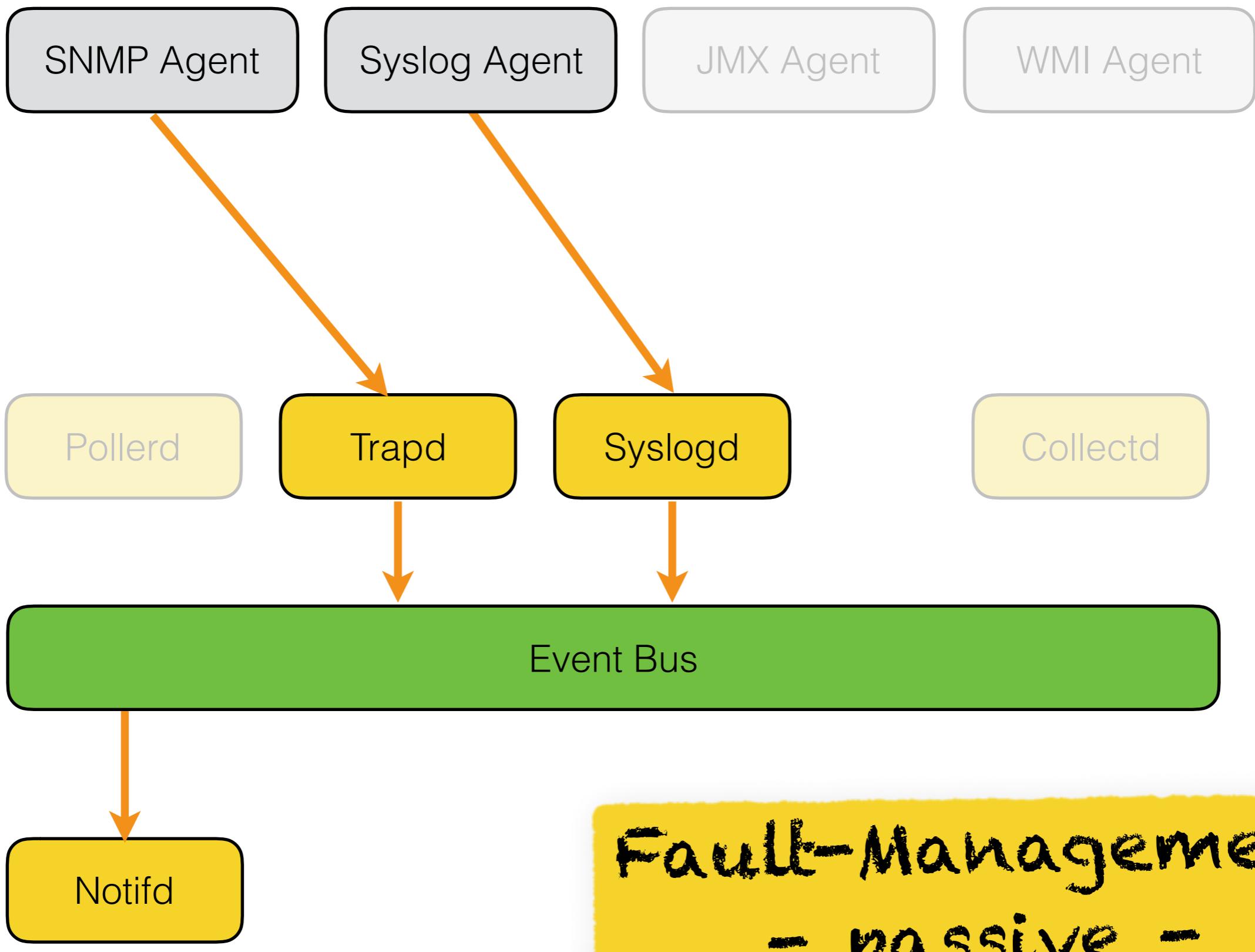
Collectd

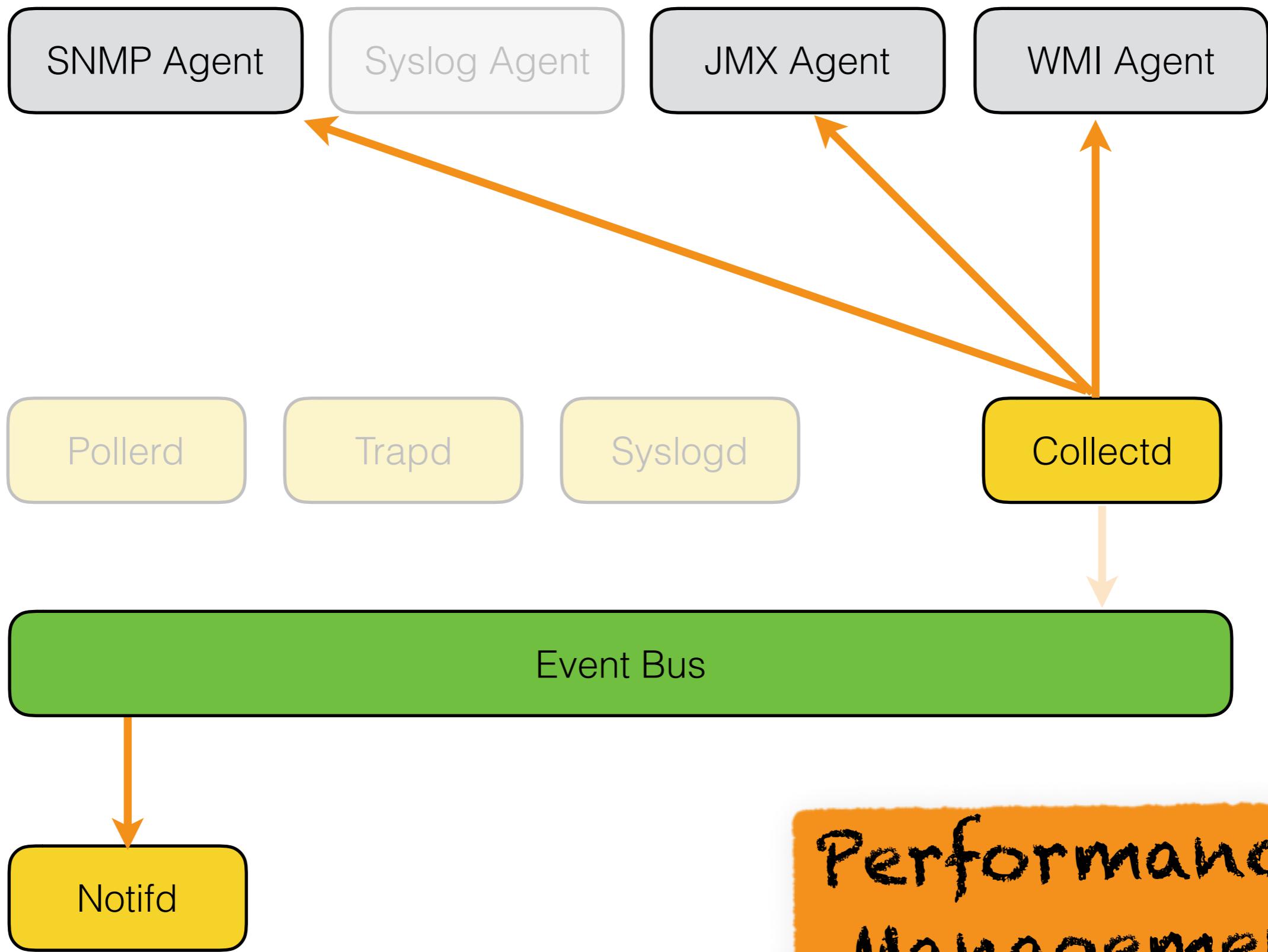
Event Bus

Notifd

Fault-Management  
- active -

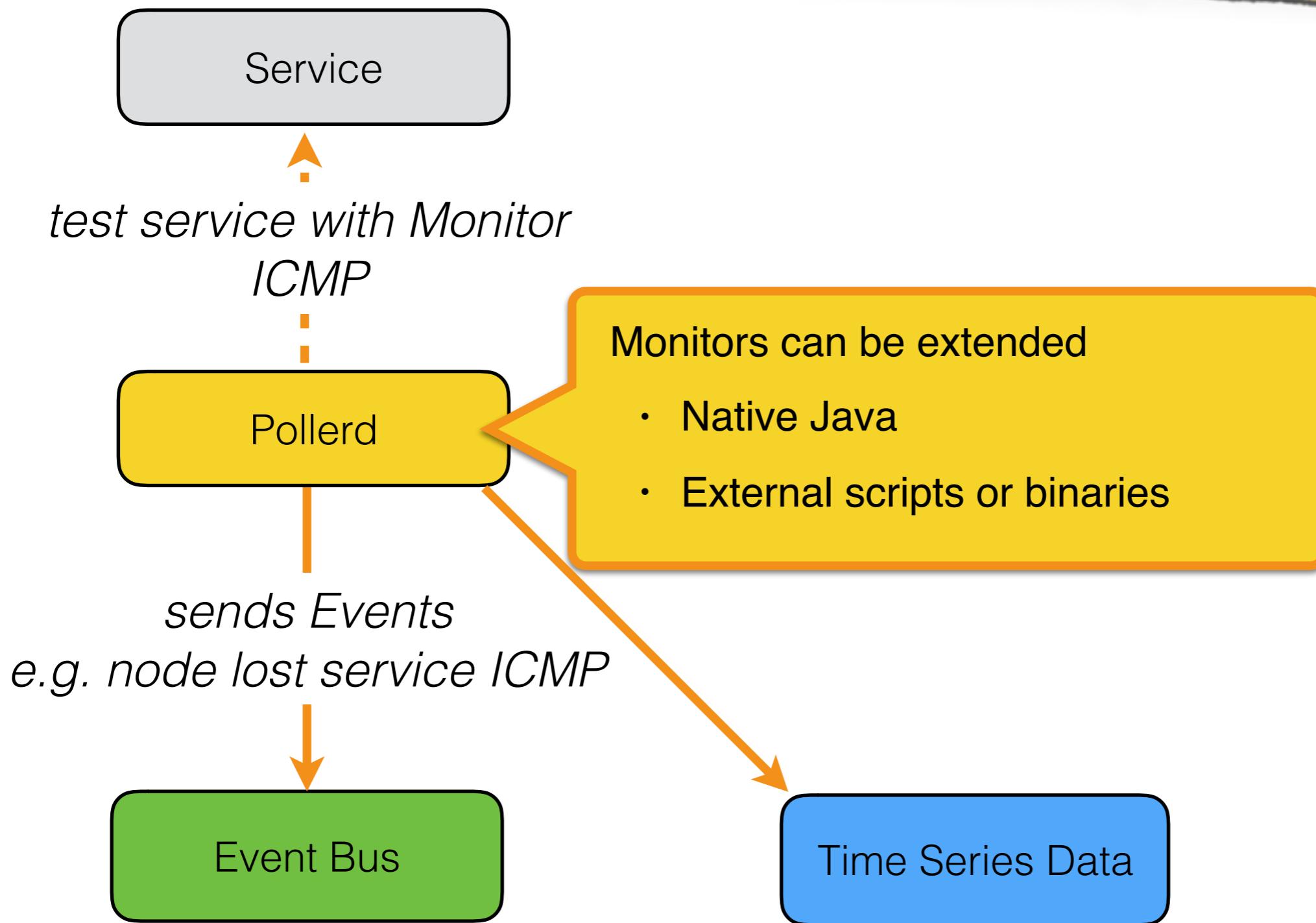






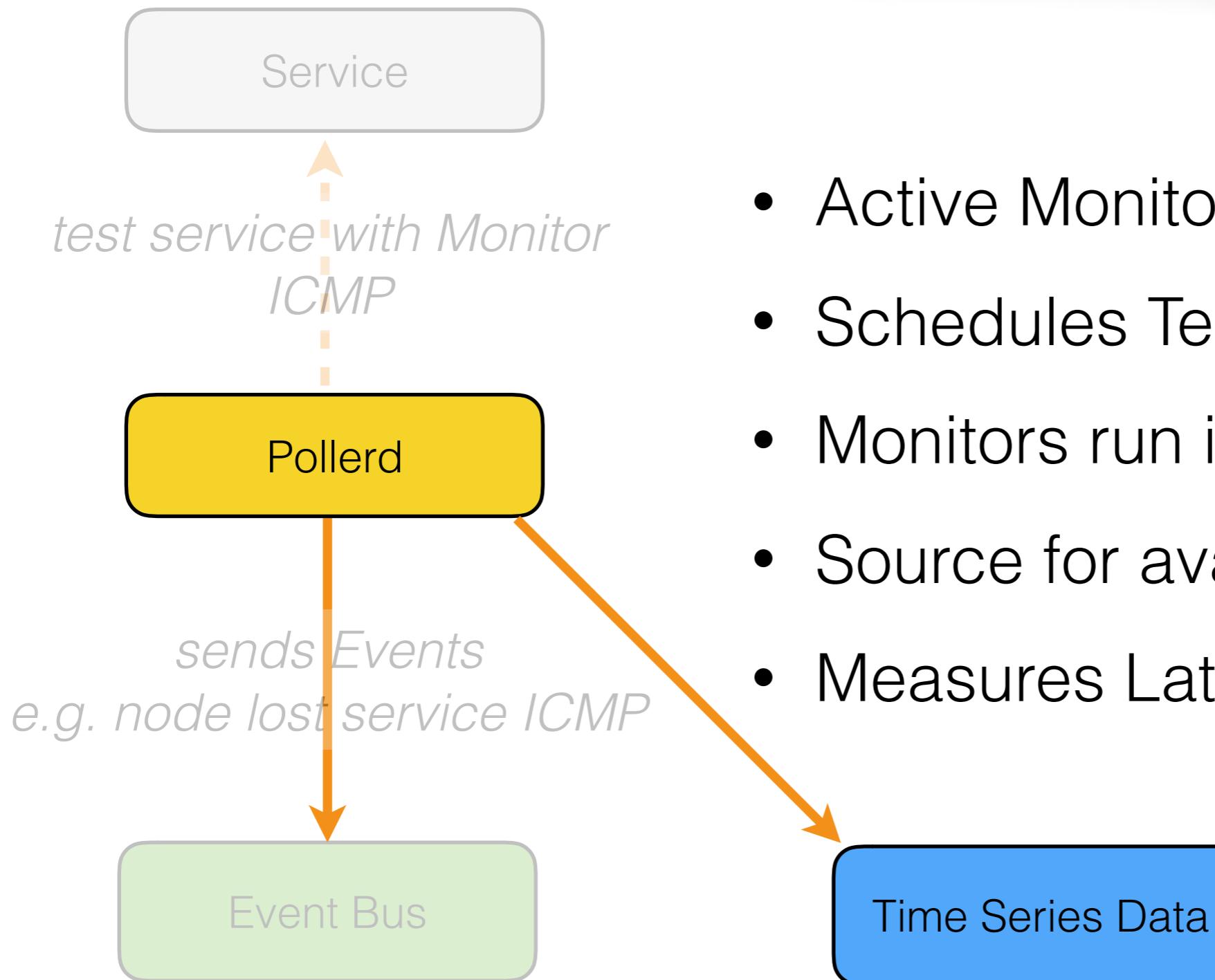
Performance-  
Management

# Fault-Management - active -



# Fault-Management

- active -



- Active Monitoring
- Schedules Tests with Monitors
- Monitors run in a Thread Pool
- Source for availability
- Measures Latency

# Fault-Management

## - active -

Service

Nov 8, 2015 11:40 EST 

Search Info ▾ Status ▾ Reports ▾ Dashboards ▾ Maps ▾ demo ▾

**HORIZON openNMS**

Home / SLM / DNS and DHCP Servers

This category includes all managed interfaces which are running either DNS (name resolution) servers or DHCP servers.

All With outages With availability less than 100%

Nodes	Outages	24hr Availability
cartman.internal.opennms.com	0 of 3	98.008%
connect.opennms.com	0 of 1	100.000%
mcdaniels.internal.opennms.com	0 of 2	98.638%
mrmakay.internal.opennms.com	1 of 2	50.000%
sync.opennms.com	0 of 1	100.000%

Last updated: Sun Nov 08 11:40:42 EST 2015

OpenNMS Copyright © 2002-2015 The OpenNMS Group, Inc. OpenNMS® is a registered trademark of The OpenNMS Group, Inc.

# Fault-Management

# *test servi*

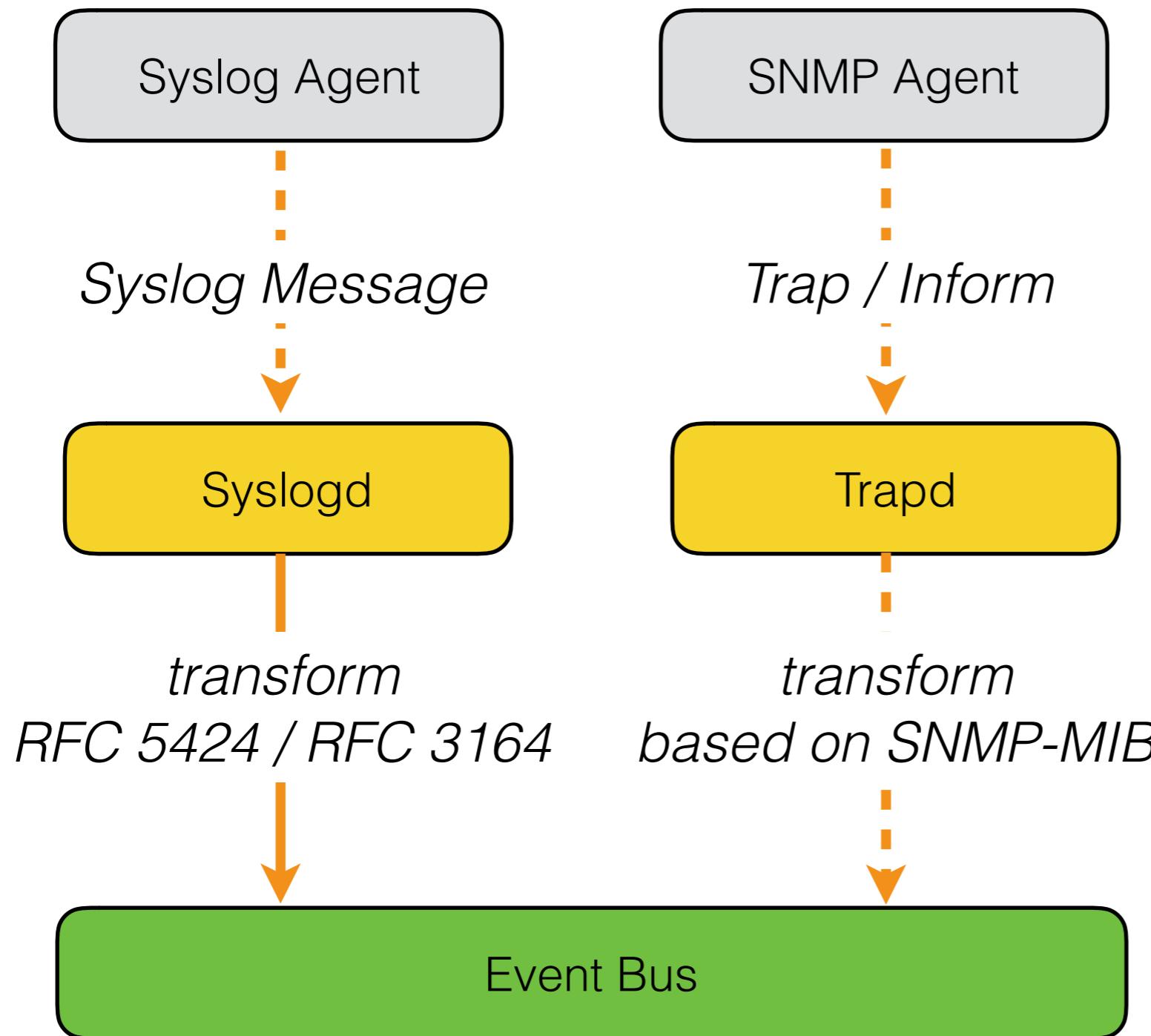
th Monitors  
hread Pool  
ity

sen  
e.g. node /

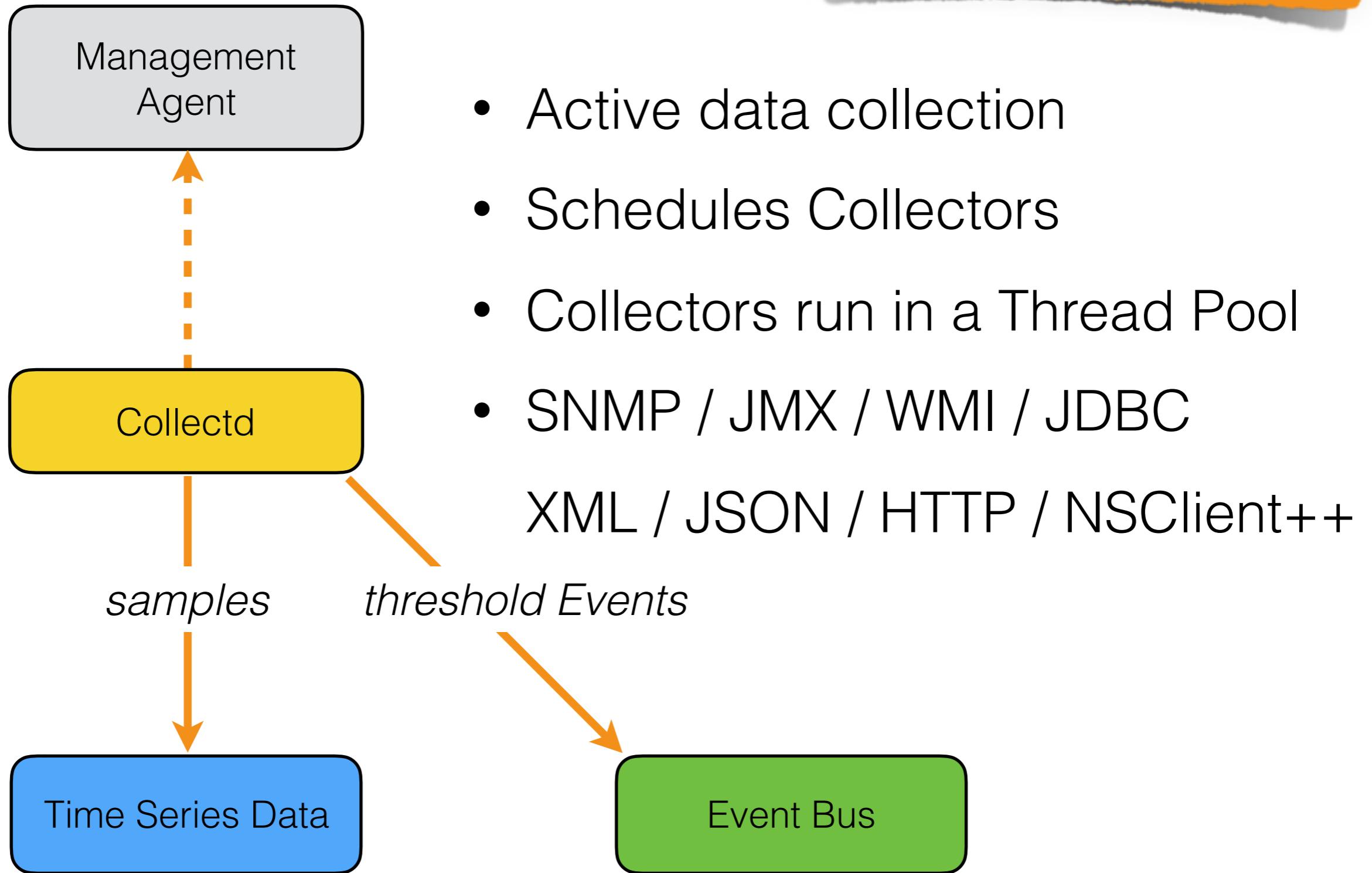
SNMP Attributes								
Name	mcdaniels							
sysObjectID	1.3.6.1.4.1.8072.3.2.10							
Location	Dell Rack, Server Room, The OpenNMS Group, 220 Chatham Business Drive, Pittsboro, NC, 27312, USA, North America, Earth							
Contact	Tarus Balog							
Description	Linux mcdaniels 3.16.0-4-686-pae #1 SMP Debian 3.16.7-ckt11-1+deb8u5 (2015-10-09) i686							
Availability								
Availability (last 24 hours)								98.024%
172.20.1.39	10	15:00	19:00	23:00	03:00	07:00	11:00	97.161%
DNS								100.000%
HTTP								100.000%
ICMP								100.000%
SNMP								100.000%
SSH								100.000%
Update								82.964%
192.168.100.1	10	15:00	19:00	23:00	03:00	07:00	11:00	Not Monitored
2600:5800:f2a2:0000:0000:0000:0023	10	15:00	19:00	23:00	03:00	07:00	11:00	99.319%
DNS								97.275%
HTTP								100.000%
ICMP								100.000%
SSH								100.000%

# Fault-Management

## - passive -



# Performance Management



# Performance Management

System Object ID

**.1.3.6.1.4.1.9.1.1643**

System Object ID

**.1.3.6.1.4.1.311.3.2.10**

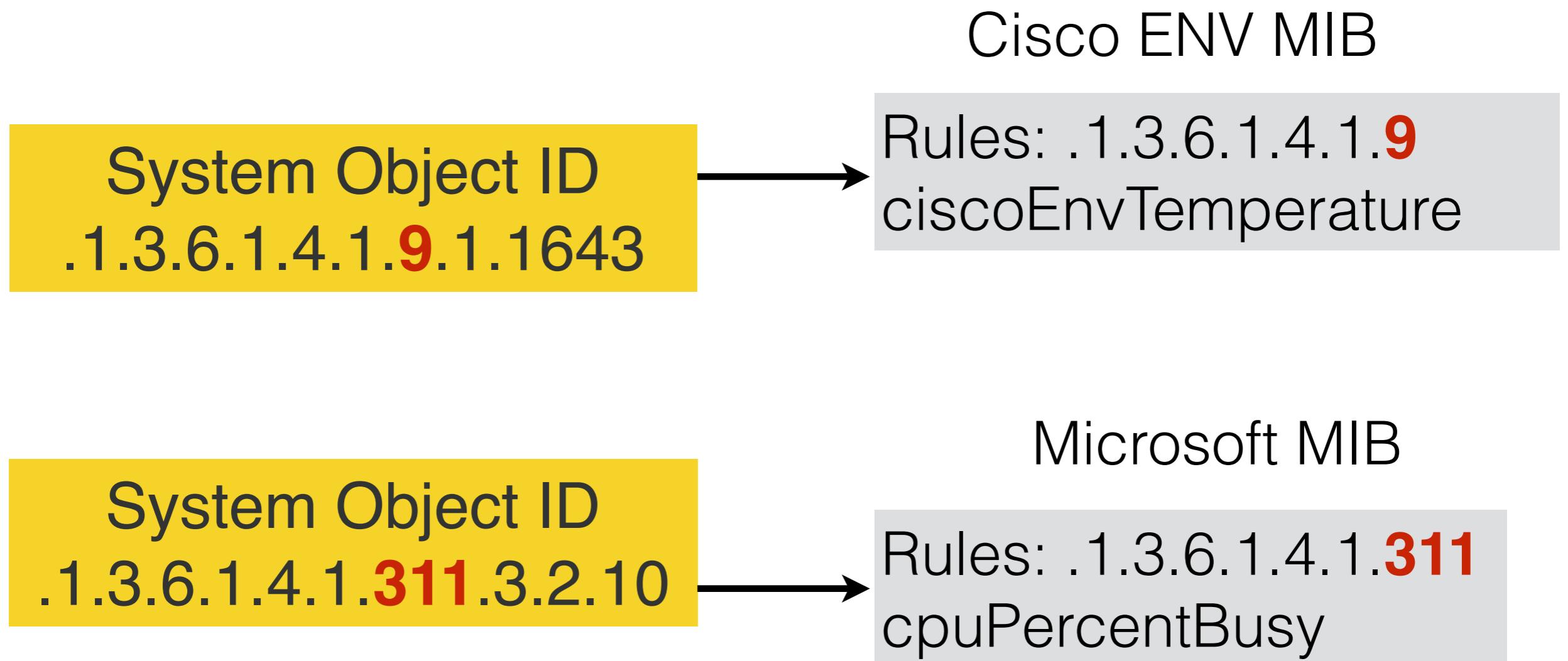
Standard MIB-II

Rules: **.1.3.6.1.4.1**

ifInHcOctets

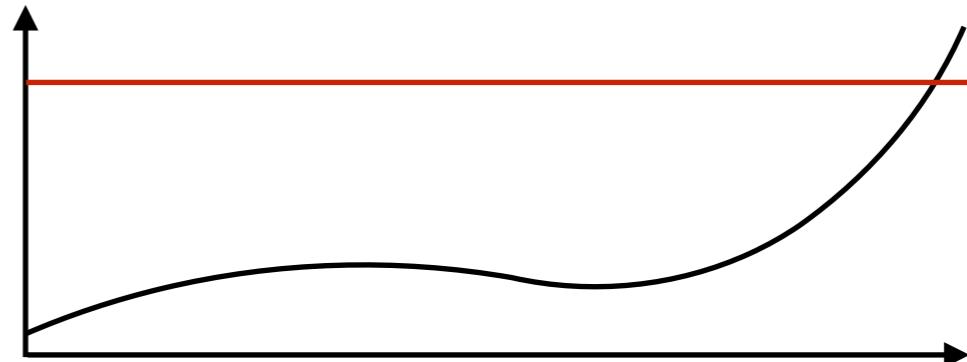
ifOutHcOctets

# Performance Management

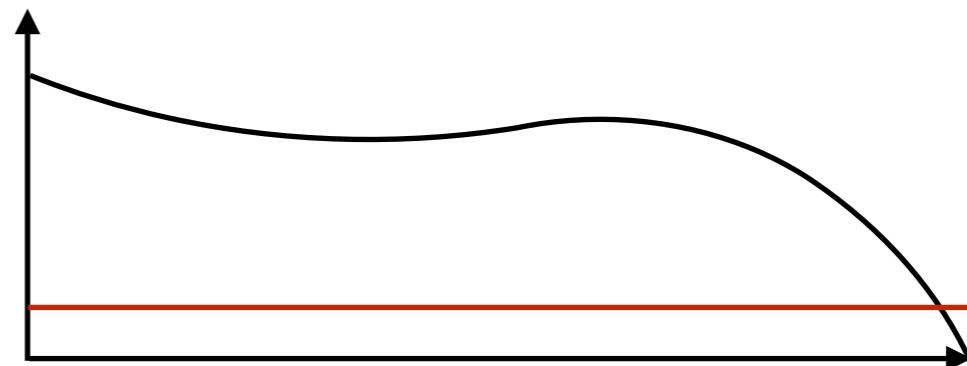


# Performance Management

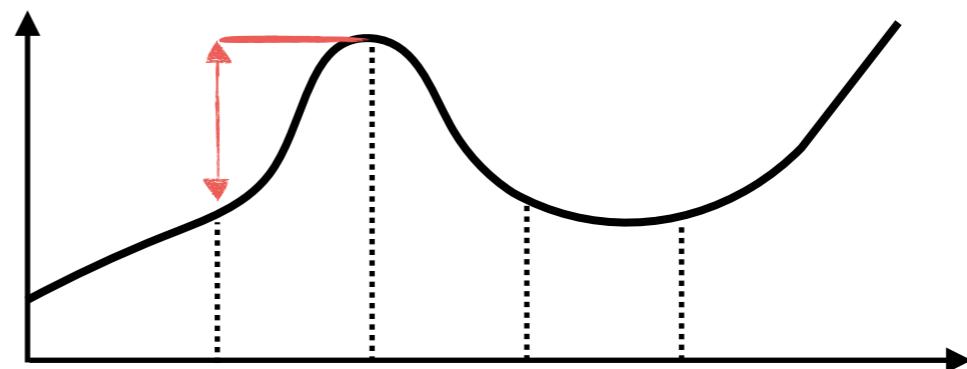
High Threshold



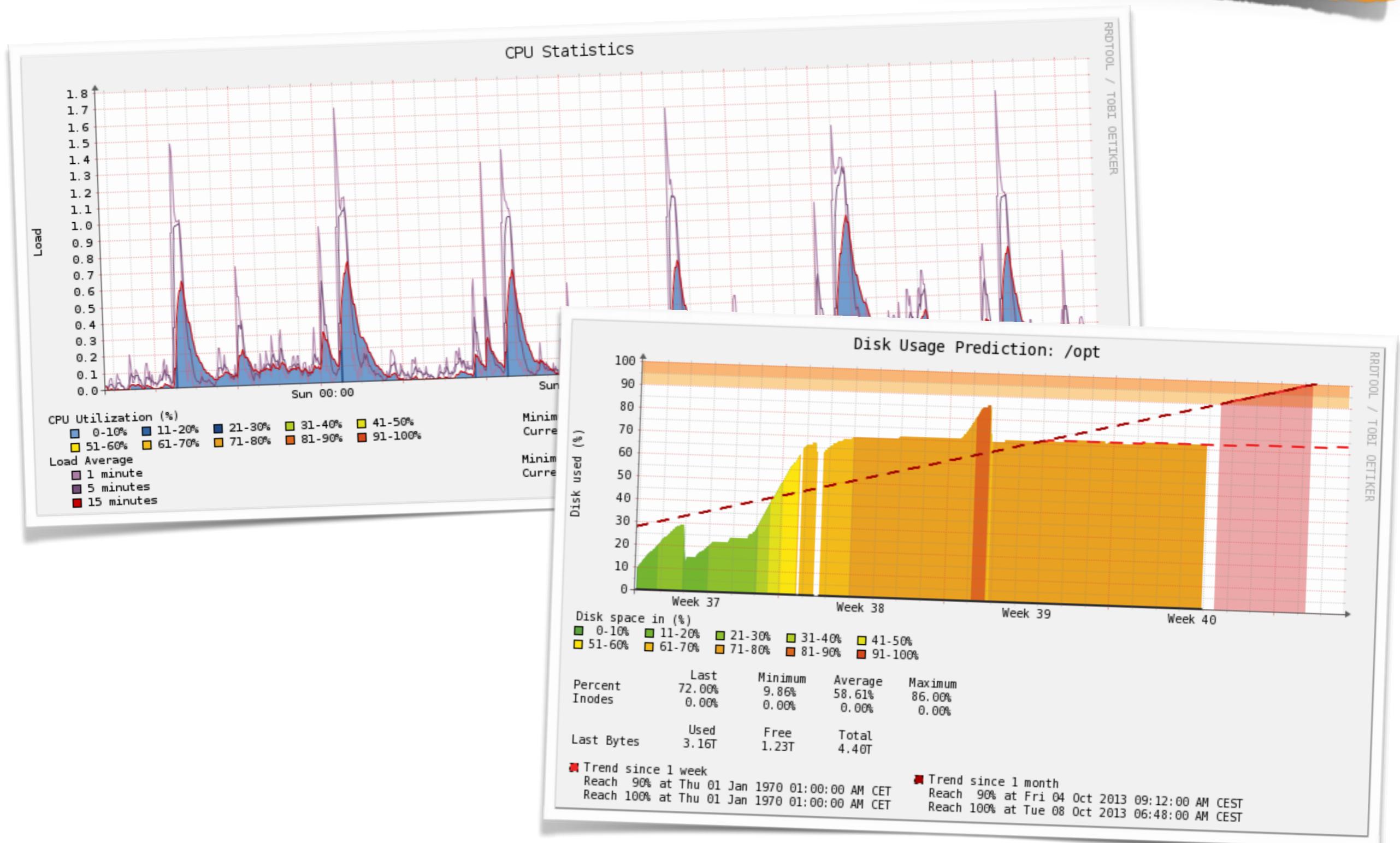
Low Threshold



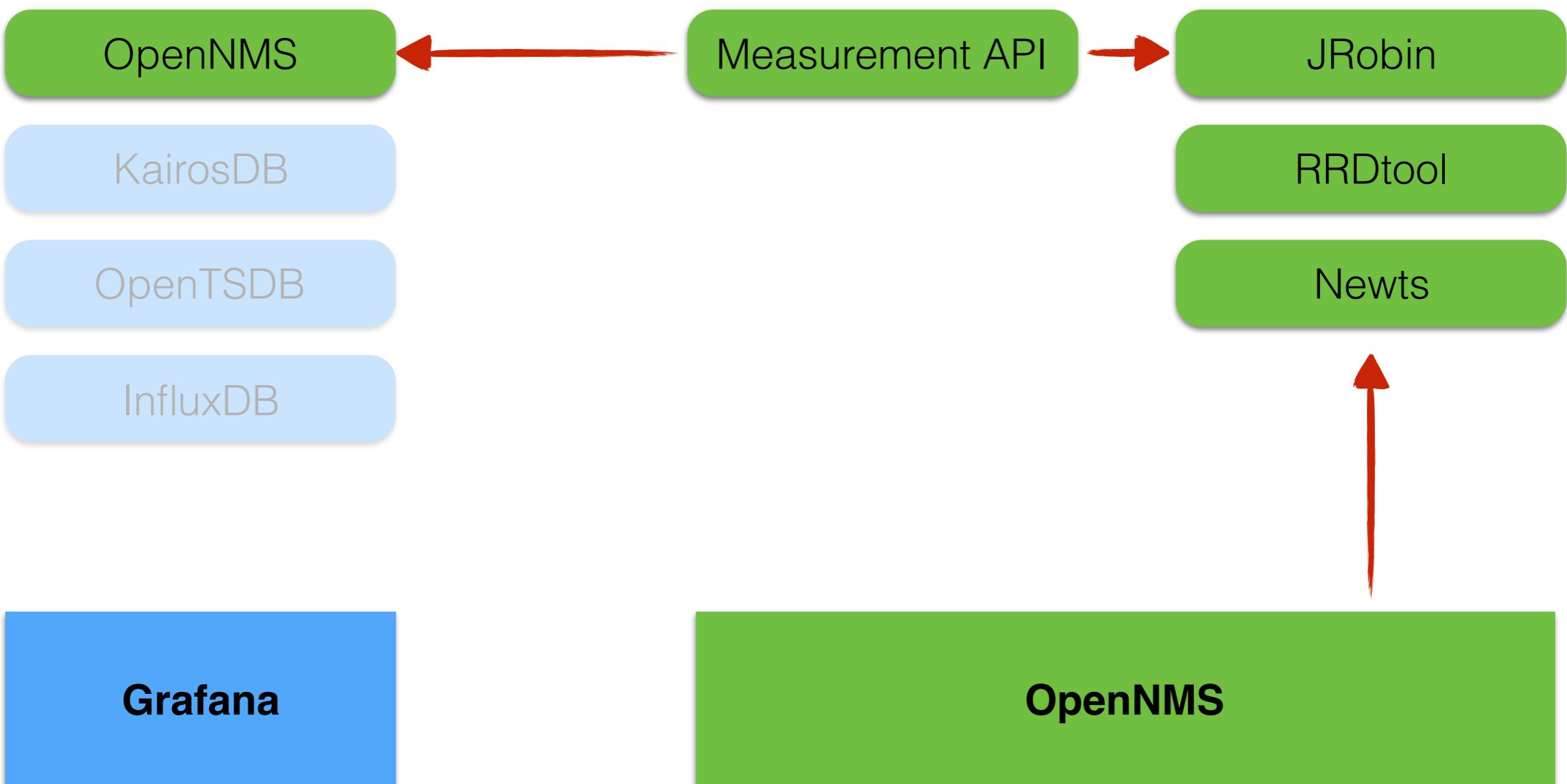
Change Threshold  
relative / absolute

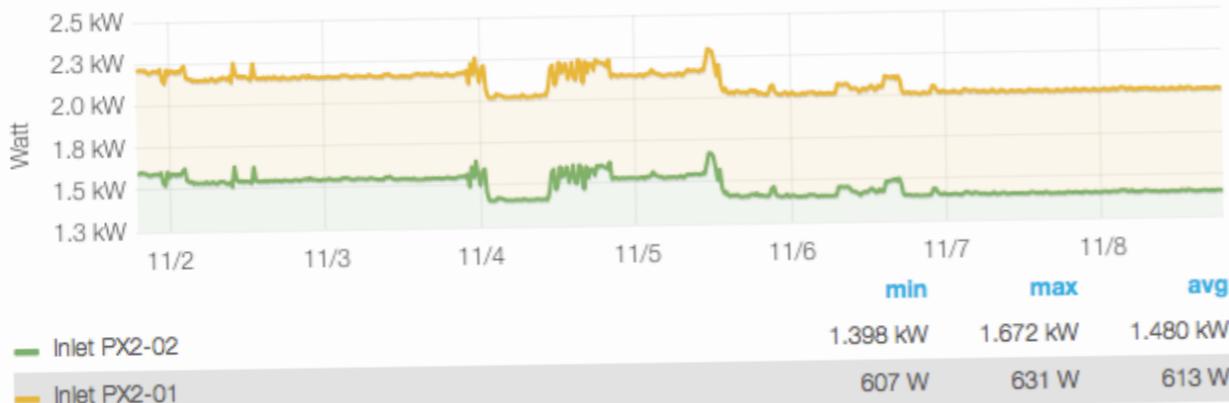
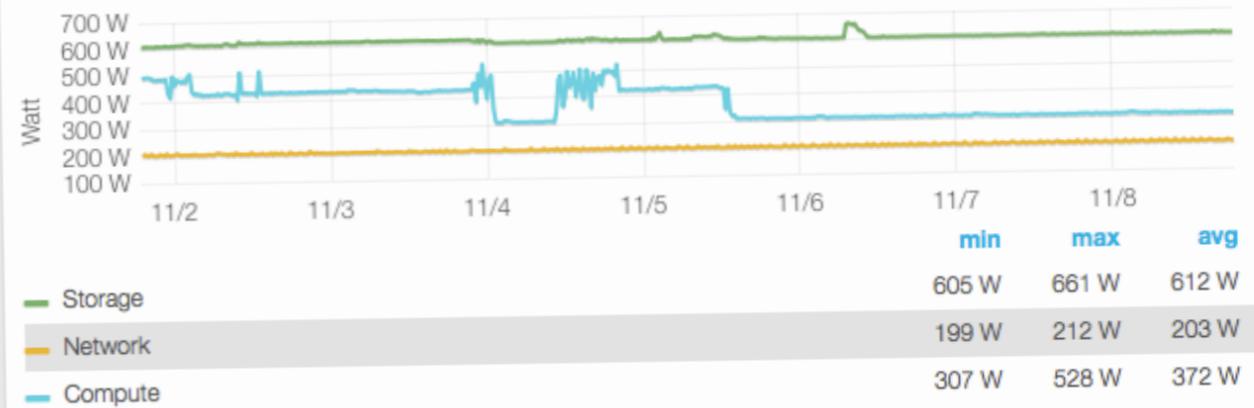
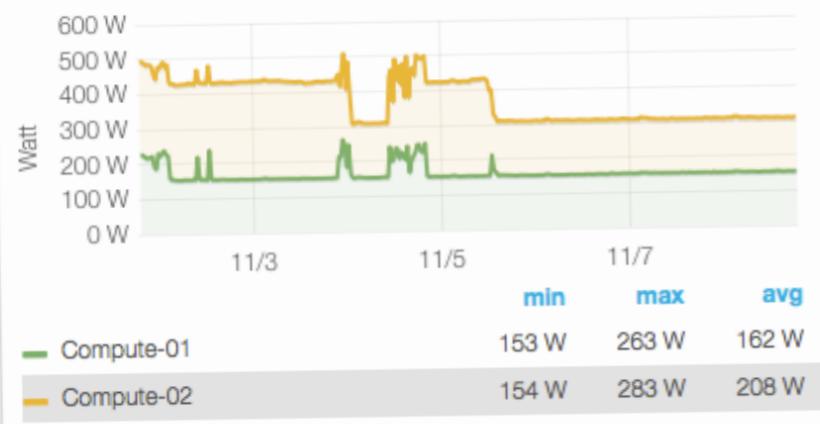
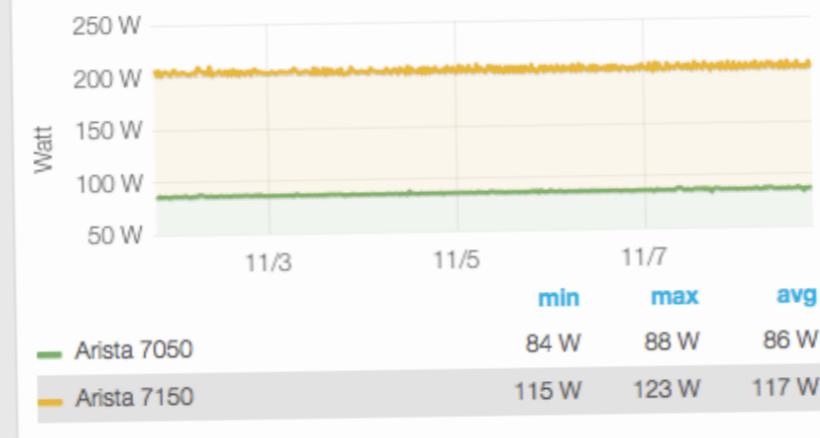
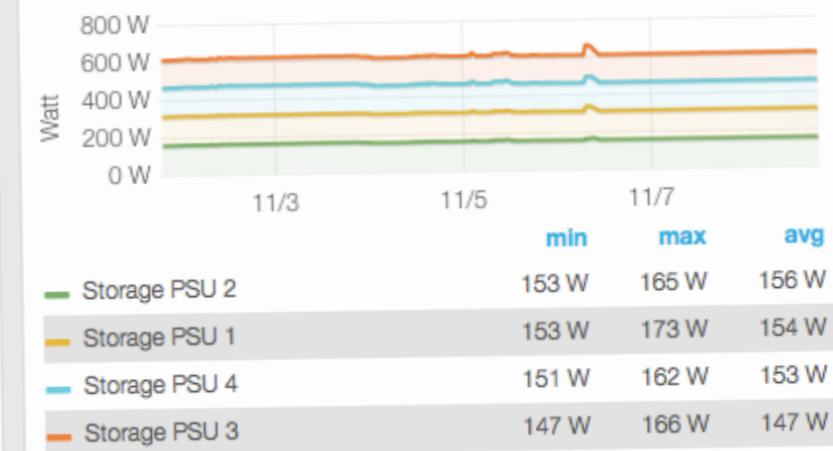
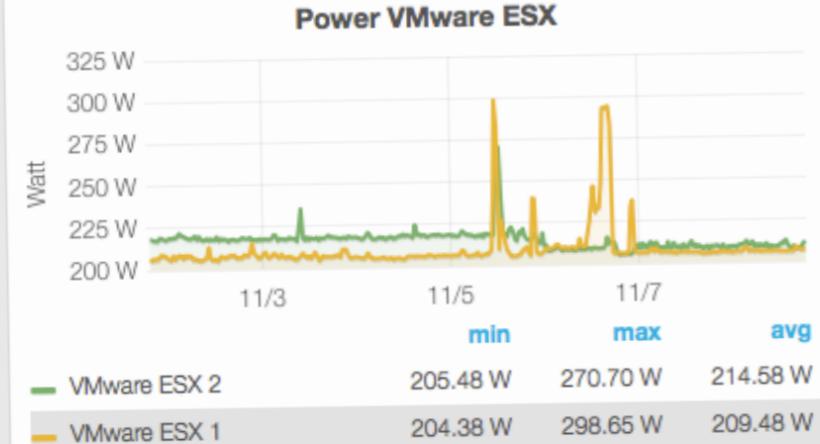
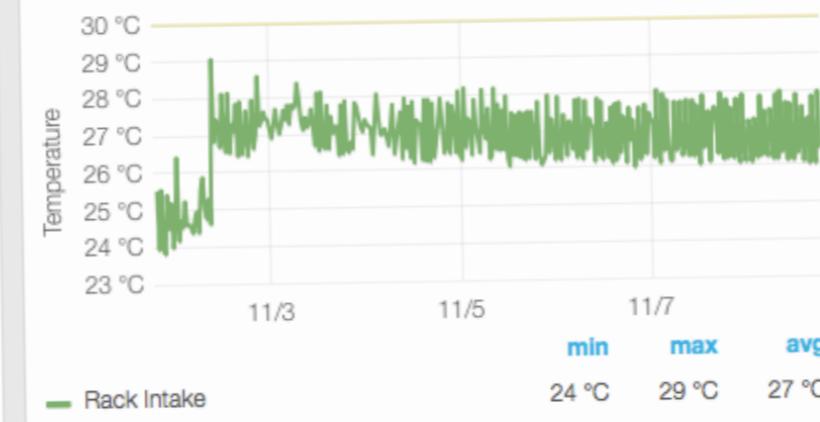


# Performance Management



# Performance Management



**Total Power Rack Research****Power Open Stack****Power Compute****Power Network****Power Storage****Power VMware ESX****Rack Research Environment****Rack Research Environment**



A Bunch Of **Nodes**

**Discover nodes in IP ranges.**

# A Bunch of Nodes

## Auto Discovery

Home / Admin / Discovery / Modi

Save and Restart Discovery

General settings

Initial sleep time (sec.): 30    Restart sleep time (hours): 24    Threads: 15    Retries: 1    Timeout (ms.): 2000

Rescan for new devices

IP Address

Add New

http://www.op

Specifics

Discovery | Admin | OpenNMS We...

http://www.open-factory.org/my\_ip\_discovery.txt

Include URLs

Add New

URL

http://www.open-factory.org/my...

74.125.39.99  
74.125.39.103  
74.125.39.104  
74.125.39.105  
74.125.39.106  
74.125.39.147  
216.239.32.10  
216.239.34.10  
216.239.36.10  
216.239.38.10

Include Ranges

Add New

Begin Address

Exclude Ranges

Add New

Begin

172.16.0.10

172.16.0.90

Delete

The screenshot shows the 'Discovery' configuration page in the OpenNMS web interface. It includes sections for 'General settings' (with a circled 'Restart sleep time' set to 24 hours), 'Specifics' (with a link to 'my\_ip\_discovery.txt'), and lists for 'Include URLs' and 'Include Ranges'. A prominent yellow sticky note with the handwritten text 'Rescan for new devices' has a red arrow pointing to the circled 'Restart sleep time' field. The bottom half of the screen displays a list of discovered nodes, including several IP addresses from the 74.125.39.x range and some from the 216.239.x.x range.

SNMP Agent

HTTP

SMTP

ICMP Interface

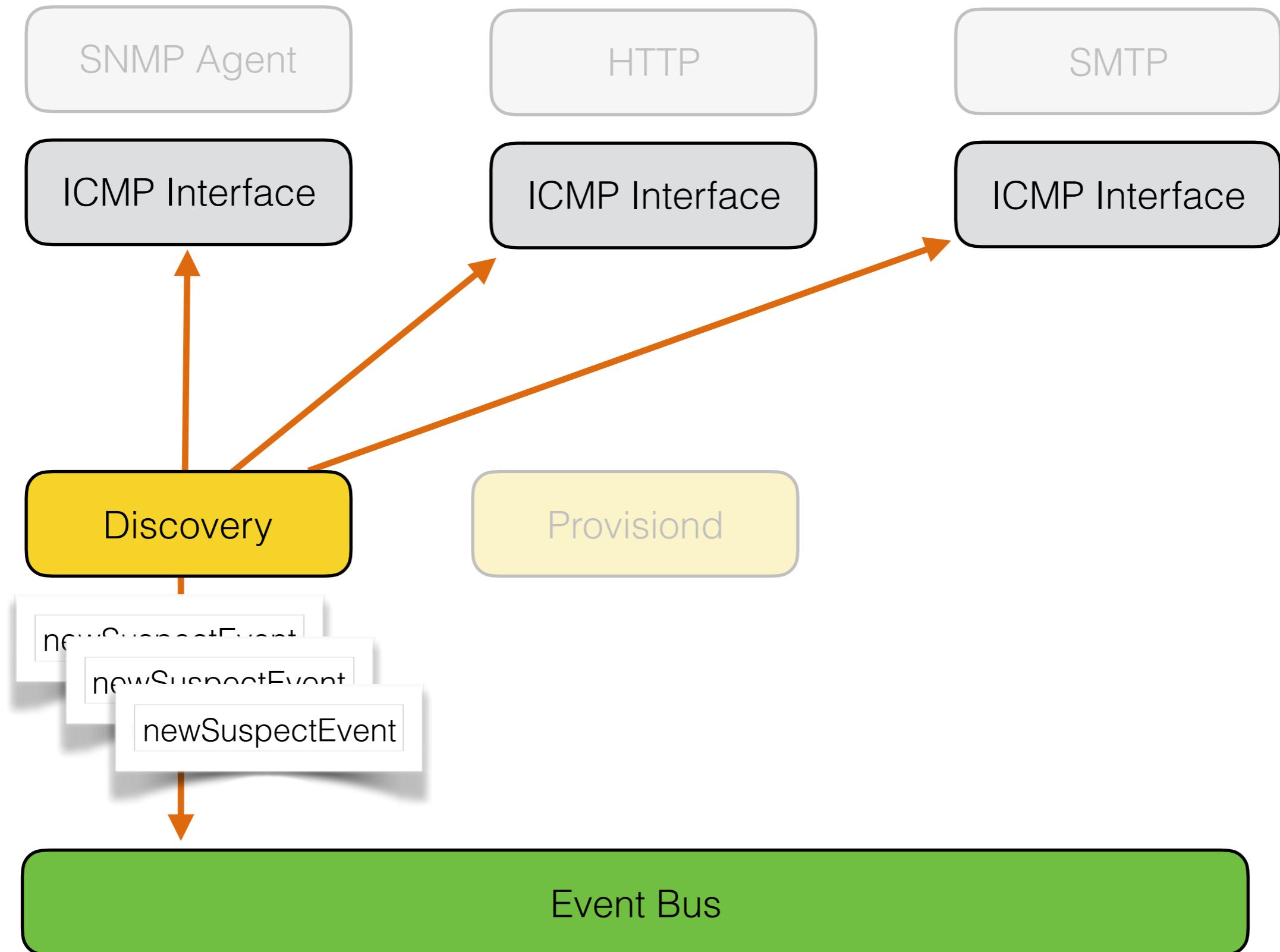
ICMP Interface

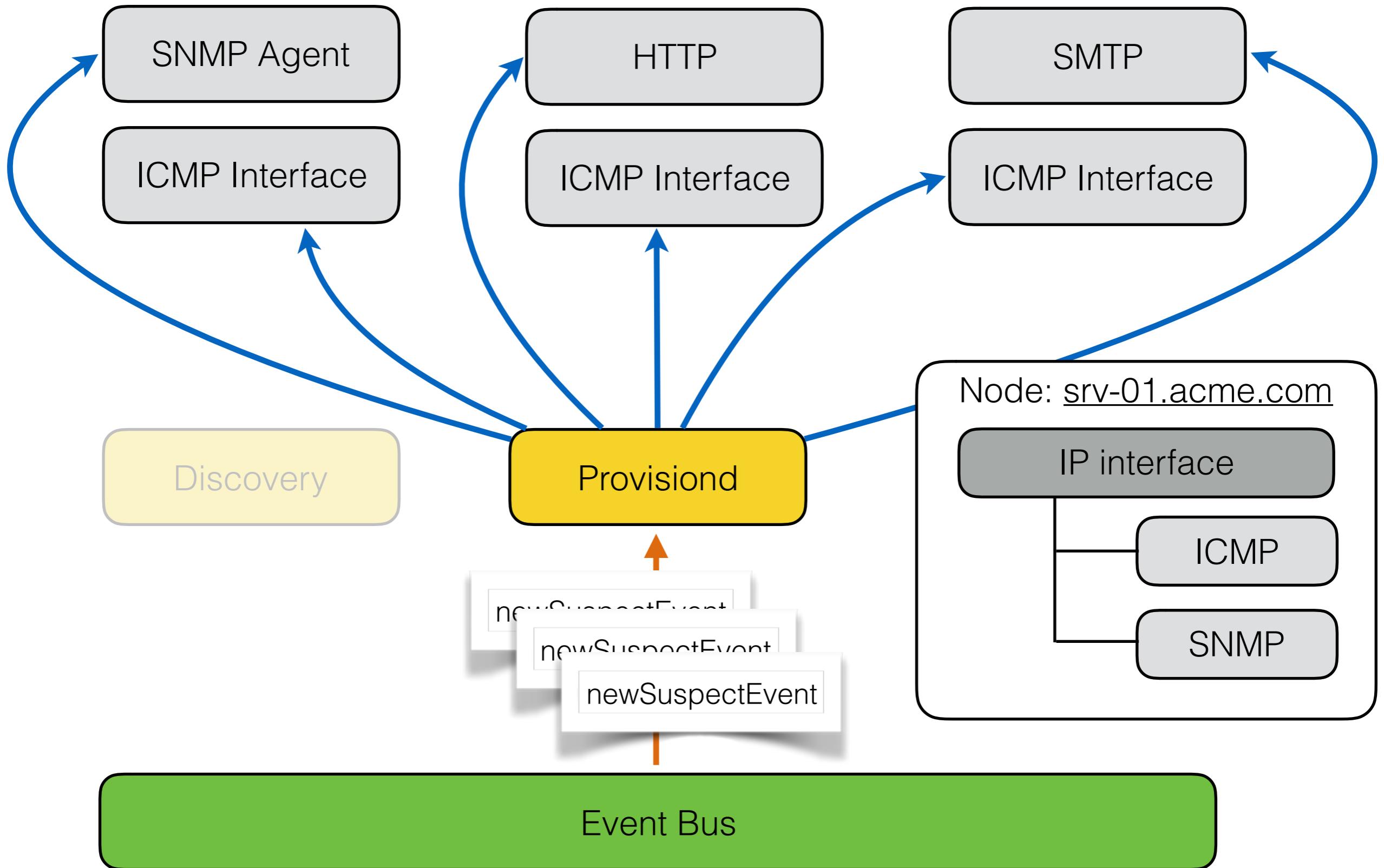
ICMP Interface

Discovery

Provisiond

Event Bus







Home / Search / Node

## Node: mcdaniels.internal.opennms.com

52

[View Events](#) [View Alarms](#) [View Outages](#) [Asset Info](#) [Hardware Info](#) [SSH](#) [HTTP](#) [Resources](#)

Node has no problems.

### SNMP Attributes

Name	mcdaniels
sysObjectID	.1.3.6.1.4.1.8072.3.2.10
Location	Dell Rack, Server Room, The OpenNMS Group, 220 Chatham Business Drive, Pittsboro, NC, 27312, USA, North America, Earth
Contact	Tarus Balog
Description	Linux mcdaniels 3.16.0-4-686-pae #1 SMP Debian 3.16.7-ckt11-1+deb8u5 (2015-10-09) i686

## Node Interfaces

IP Interfaces

Physical Interfaces

Index	SNMP IfDescr	SNMP IfName	SNMP IfAlias	SNMP IfSpeed
1	lo	lo		10000000
2	Broadcom Corporation NetXtreme BCM5703X Gigabit Ethernet	eth0		1000000000
3	Broadcom Corporation NetXtreme BCM5703X Gigabit Ethernet	eth1		0
4	ham0	ham0		10000000
5	virbr1	virbr1		0

Description

Linux mcdaniels 0.0.1  
(2015-10-09) i686

## Node Interfaces

IP Interfaces

## Node Interfaces

IP Interfaces

Physical Interfaces

IP Address	IP Host Name	ifIndex	Mac
172.20.1.39	mcdaniels.internal.opennms.com	2	M
192.168.100.1	192.168.100.1	5	M
2600:5800:f2a2:0000:0000:0000:0023	mcdaniels.internal.opennms.com	2	M

Description

Linux mcdaniels 3.19.0-25-generic  
(2015-10-09) i686



## IP based “monitoring” policy

•	name	unmanaged_loopback	class	org.opennms.netmgt.provision.pers
◦	key	action	value	UNMANAGE
◦	key	matchBehavior	value	ALL_PARAMETERS
◦	key	ipAddress	value	~42\.42\..*



## SNMP data collection policy

- name uplink\_datacollection class org.opennms.netmgt.provision.pers...
  - key action value ENABLE\_COLLECTION
  - key matchBehavior value ALL\_PARAMETERS
  - key ifAlias value ~Uplink.\*



## Node category policy

•	name	category_cisco	class	org.opennms.netmgt.provision.pers
•	◦  key	category	value	Cisco-Systems
•	◦  key	matchBehavior	value	ALL_PARAMETERS
•	◦   key	sysObjectId	value	~\.\1\.\3\.\6\.\1\.\4\.\1\.\9\..\*

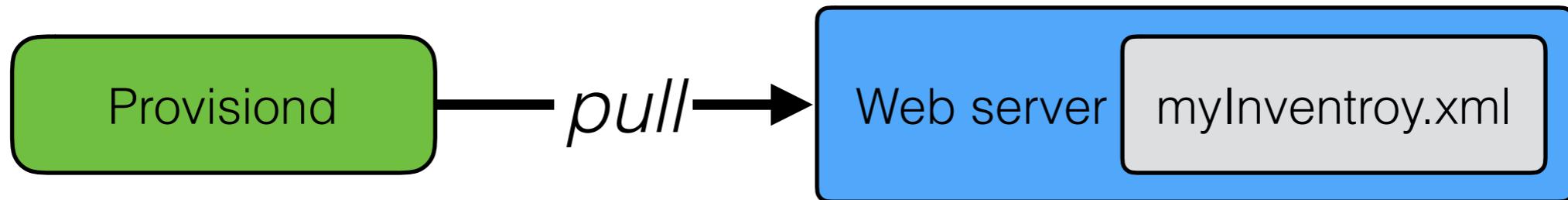
**Import from an existing inventory.**

BetterSource

http://www.open-factory.org/mynodes.xml

Google

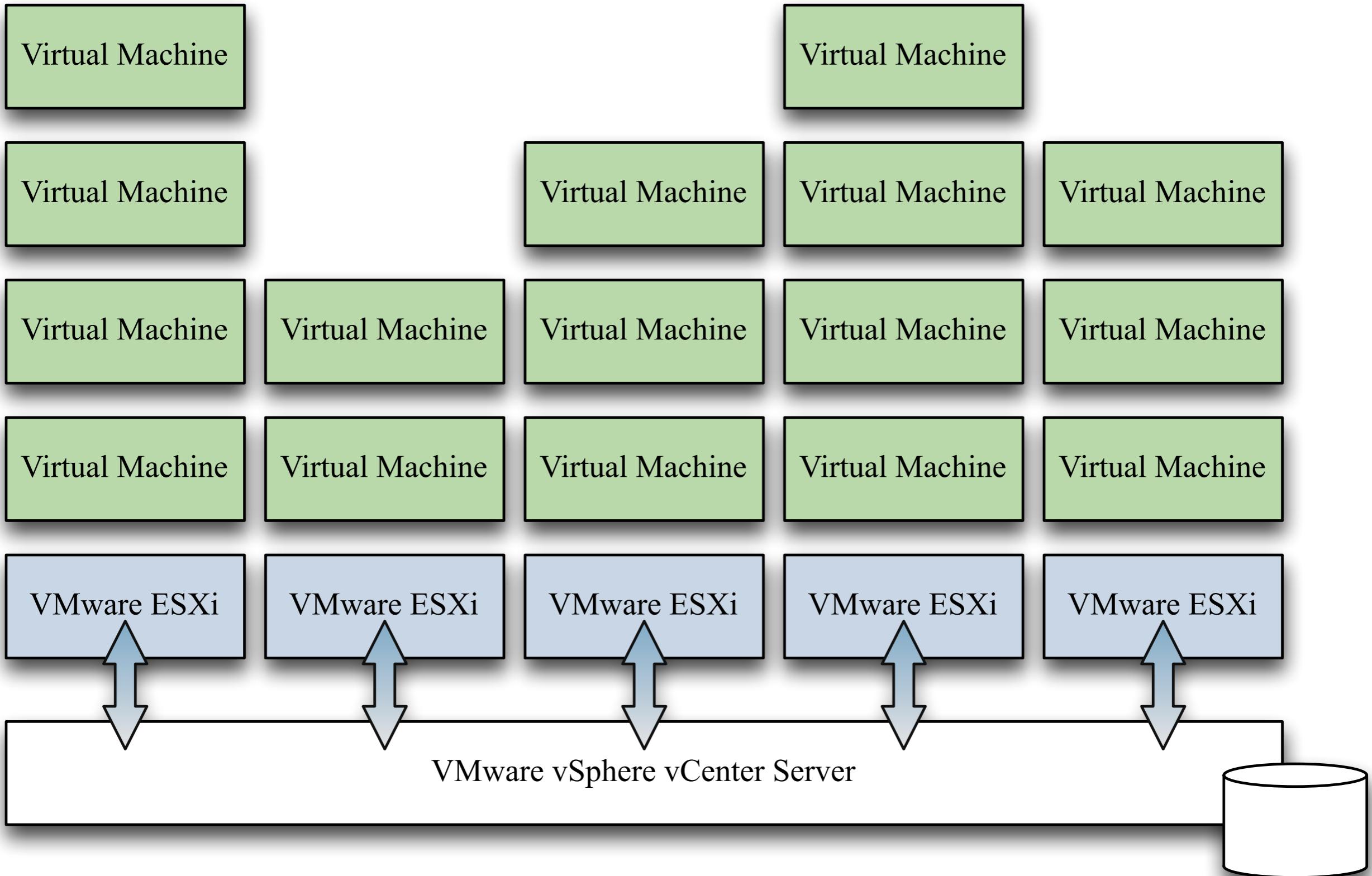
```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <model-import last-import="2010-09-27T20:07:42.497+02:00" foreign-source="MyInventory"
date-stamp="2010-09-29T10:04:23.456+02:00"
xmlns="http://xmlns.opennms.org/xsd/config/model-import">
3   <node node-label="MyNodeB" foreign-id="1285747378071" building="MyInventory">
4     <interface status="1" snmp-primary="P" ip-addr="1.1.1.5" descr="">
5       <monitored-service service-name="SNMP"/>
6       <monitored-service service-name="ICMP"/>
7     </interface>
8     <category name="Routers"/>
9     <asset value="Cisco" name="vendor"/>
10    <asset value="FD1" name="building"/>
11  </node>
12  <node node-label="MyNodeA" foreign-id="1285747351321" building="MyInventory">
13    <interface status="1" snmp-primary="P" ip-addr="1.1.1.1" descr="">
14      <monitored-service service-name="StrafePing"/>
15      <monitored-service service-name="ICMP"/>
16    </interface>
17    <category name="Switches"/>
18    <asset value="FD2" name="building"/>
19    <asset value="HP" name="vendor"/>
20  </node>
21 </model-import>
22
```

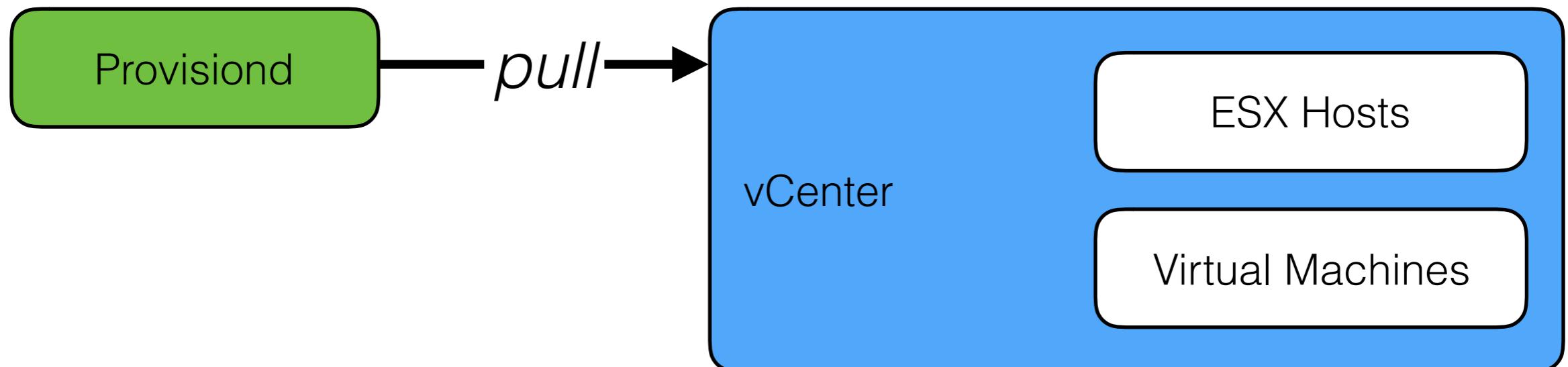


```
1 <requisition-def import-name="my-Inventory" import-url-resource="http://myhost/myInventory.xml">
2   <cron-schedule>0 10 0 * * ? *</cron-schedule>
3 </requisition-def>
4
```

provisionond-configuration.xml

**Import Nodes from VMware.**

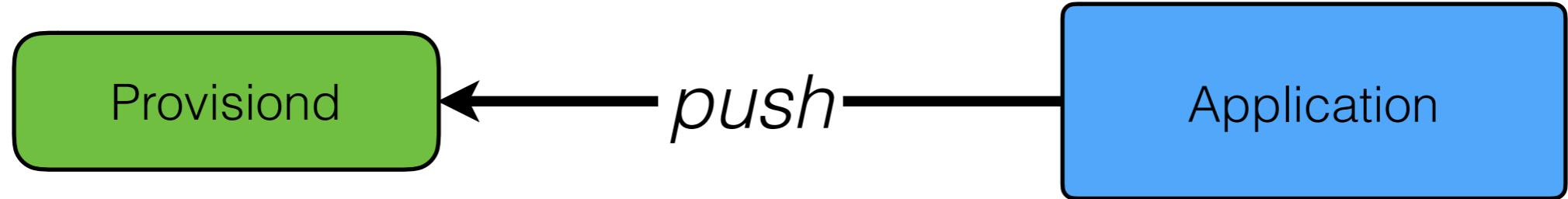




```
1 <requisition-def import-name="my-vCenter-01" import-url-resource="vmware://192.168.10.198">
2   <cron-schedule>0 10 0 * * ? *</cron-schedule>
3 </requisition-def>
4
5 <requisition-def import-name="my-vCenter-02" import-url-resource="vmware://192.168.10.187">
6   <cron-schedule>0 10 0 * * ? *</cron-schedule>
7 </requisition-def>
8
9 <requisition-def import-name="my-vCenter-03" import-url-resource="vmware://192.168.10.123">
10  <cron-schedule>0 10 0 * * ? *</cron-schedule>
11 </requisition-def>
```

~

provisiond-configuration.xml



## POSTs (Adding Data)

Resource	Description
/requisitions	Adds (or replaces) a requisition.
/requisitions/{name}/nodes	Adds (or replaces) a node in the specified requisition. This operation can be very helpful when working with [[Large Requisitions]].
/requisitions/{name}/nodes/{foreignId}/interfaces	Adds (or replaces) an interface for the given node in the specified requisition.
/requisitions/{name}/nodes/{foreignId}/interfaces/{ipAddress}/services	Adds (or replaces) a service on the given interface in the specified requisition.
/requisitions/{name}/nodes/{foreignId}/categories	Adds (or replaces) a category for the given node in the specified requisition.
/requisitions/{name}/nodes/{foreignId}/assets	Adds (or replaces) an asset for the given node in the specified requisition.

[http://docs.opennms.org/opennms/releases/16.0.3/guide-development/guide-development.html#\\_rest\\_api](http://docs.opennms.org/opennms/releases/16.0.3/guide-development/guide-development.html#_rest_api)

# Useful resources

<b>Community Welcome Guide</b>	<a href="http://www.opennms.eu/welcome/">http://www.opennms.eu/welcome/</a>
<b>OpenNMS with Vagrant</b>	<a href="http://www.opennms.org/wiki/OpenNMS_and_Vagrant_with_VirtualBox">http://www.opennms.org/wiki/ OpenNMS and Vagrant with VirtualBox</a>
<b>OpenNMS running in Docker</b>	<a href="https://hub.docker.com/u/opennms/">https://hub.docker.com/u/opennms/</a>
<b>OpenNMS Wiki</b>	<a href="http://www.opennms.org/wiki/Main_Page">http://www.opennms.org/wiki/Main_Page</a>
<b>Issue Tracker</b>	<a href="http://issues.opennms.org">http://issues.opennms.org</a>
<b>Continuous Integration</b>	<a href="http://bamboo.internal.opennms.com:8085/browse/OPENNMS-ONMS/branches">http://bamboo.internal.opennms.com:8085/browse/OPENNMS- ONMS/branches</a>
<b>Mailing Lists</b>	<a href="http://www.opennms.org/wiki/Mailing_lists">http://www.opennms.org/wiki/Mailing_lists</a>