Adapting Open-Source NMS to an SDN Reality
16 Mar 2016

JEFF GEHLBACH
THE OPENNMS GROUP, INC
• C-64: 1982
• Linux: 1994
• IP networking: 1999
• Network Management: 2000
• OpenNMS: 2005
• OpenDaylight: 2015
TABLE STAKES

- IP networking basics
- SDN / ODL fundamentals
NETWORK MANAGEMENT: WHAT IS IT?

• FCAPS
  – **Fault** / Configuration / Accounting / **Performance** / Security
• SNMP; limitations of the SMI
  – Simple Network Management Protocol
NETWORK MANAGEMENT HISTORY

• Early proprietary platforms
• Later proprietary offerings

• Early open-source tools
• Later open-source & open-core offerings

• OpenNMS is unique
WHAT OPENNMS IS

• World's First
• Enterprise Grade
• Network Management Platform
• Developed as Open-Source Software
GOALS OF OPENNMS

• To be the de-facto platform for network management. Full stop.

• Two Promises

• Horizon / Meridian
• Provisioning: getting nodes, interfaces, services into and out of the system. Flexible, API-driven life-cycle management; push and pull modes of operation
• Provisioning
• Fault Management: multi-protocol service-assurance polling
• Provisioning
• Fault Management
• Performance Management: multi-protocol metric data collection
FUNCTIONAL AREAS

• Provisioning
• Fault Management
• Performance Management
• Event Management: event-driven platform; intake from without, de-duplication, correlation with JBoss Drools Expert
FUNCTIONAL AREAS

• Provisioning
• Fault Management
• Performance Management
• Event Management
• Topology: Pluggable providers. Link discovery via SNMP for LLDP, CDP, OSPF, IS-IS.
FUNCTIONAL AREAS

- Provisioning
- Fault Management
- Performance Management
- Event Management
- Topology Discovery
- Web UI and ReST API: Overhauled in 2015; Bootstrap, AngularJS, CXF
• Sample data stored in RRD files
• Operations fairly centralized
• Platform runs in monolithic JVM(s)
• Not really controller-aware
• NewTS*†
• Minion*
• Karaf†, Kafka, Spark Streaming
• Increasingly abstract notion of controllers

†Here today  *Developed in house
• Provisioning & Topology
• Fault
• Performance
ODL TOPOLOGY (YANG UI)
ODL TOPOLOGY (STUI)
## ODL Fault Management

### Recent Events

<table>
<thead>
<tr>
<th>Event ID</th>
<th>Timestamp</th>
<th>Severity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>263</td>
<td>2/26/16 14:43:40</td>
<td>Major</td>
<td>Node openflow7 is down.</td>
</tr>
<tr>
<td>271</td>
<td>2/26/16 14:42:37</td>
<td>Normal</td>
<td>The Node with id: 18, ForeignSource: NODEES; ForeignInit:openflow_7 has completed.</td>
</tr>
<tr>
<td>229</td>
<td>2/26/16 14:42:36</td>
<td>Warning</td>
<td>The isAttachedToODLController service has been discovered on interface 127.0.10.7.</td>
</tr>
<tr>
<td>226</td>
<td>2/26/16 14:42:36</td>
<td>Warning</td>
<td>A new node (openflow7) was discovered by OpenNMS.</td>
</tr>
<tr>
<td>222</td>
<td>2/26/16 14:42:36</td>
<td>Warning</td>
<td>Interface 127.0.10.7 has been associated with Node #18.</td>
</tr>
</tbody>
</table>

### Recent Outages

<table>
<thead>
<tr>
<th>Interface</th>
<th>Service</th>
<th>Lost</th>
<th>Regained</th>
<th>Outage</th>
</tr>
</thead>
<tbody>
<tr>
<td>127.0.10.7</td>
<td>isAttachedToODLController</td>
<td>2/26/16 14:43:40</td>
<td>DOWN</td>
<td>5</td>
</tr>
</tbody>
</table>

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### Recent Events

<table>
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<tr>
<th>Event ID</th>
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<tbody>
<tr>
<td>265</td>
<td>2/26/16 14:43:40</td>
<td>Major</td>
<td>Node host.00:00:00:00:00:07 is down.</td>
</tr>
<tr>
<td>276</td>
<td>2/26/16 14:42:37</td>
<td>Normal</td>
<td>The Node with id: 24, ForeignSource: NODEES; ForeignInit:host_00_00_00_00_00_07 has completed.</td>
</tr>
<tr>
<td>250</td>
<td>2/26/16 14:42:37</td>
<td>Warning</td>
<td>The isAttachedToODLController service has been discovered on interface 127.0.20.7.</td>
</tr>
<tr>
<td>248</td>
<td>2/26/16 14:42:36</td>
<td>Warning</td>
<td>Interface 127.0.20.7 has been associated with Node #24.</td>
</tr>
<tr>
<td>247</td>
<td>2/26/16 14:42:36</td>
<td>Warning</td>
<td>A new node (host.00:00:00:00:00:07) was discovered by OpenNMS.</td>
</tr>
</tbody>
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<tbody>
<tr>
<td>127.0.20.7</td>
<td>isAttachedToODLController</td>
<td>2/26/16 14:43:40</td>
<td>DOWN</td>
<td>6</td>
</tr>
</tbody>
</table>
• Whom will this new world serve?
ULF <3 USERS
YOUR TURN

Q&A
• Twitter: @jeffgdotorg
• Freenode: jeffg / #opennms