

OpenNMS 101

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<http://www.opennms.org/Training>

Module 5: Alarms



Alarms Implement Workflow

- **Extremely powerful system for**
 - Reducing the number of duplicate events
 - Performing automated actions to manage and control alarms
 - Performing general database activities
- Modeled on systems costing hundreds of thousands of dollars

Event Reduction

Send a uei.class event three times

33	Indeterminate	Dec 5, 2016 3:22:40 AM	uei.class	An event with no matching configuration was received from interface .
32	Indeterminate	Dec 5, 2016 3:22:40 AM	uei.class	An event with no matching configuration was received from interface .
31	Indeterminate	Dec 5, 2016 3:22:39 AM	uei.class	An event with no matching configuration was received from interface .

It gets reduced to one alarm with a count of 3

Results 1-1 of 1

▼ ID	Ack	Severity	Node	Count	Last Event Time	Log Msg
	<input type="checkbox"/>	2		3	Dec 5, 2016 3:22:40 AM	An event with no matching configuration was received from interface .

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.						

Create an Alarm from an Event

```
<event>
  <uei>uei.opennms.org/default/event</uei>
  <event-label>OpenNMS-defined default event: event</event-label>
  <descr>&lt;p>An event with no matching configuration was received
    from interface %interface%. This event included the
    following parameters:
    %parm[all]%%&lt;/p></descr>
  <logmsg dest="logndisplay">An event with no matching configuration
was received from interface %interface%.</logmsg>
  <severity>Indeterminate</severity>
  <alarm-data reduction-key="%uei%:%dpname%:%nodeid%:%interface%"
alarm-type="3"/>
</event>
```



<alarm-data> Elements

- `reduction-key`: a string that uniquely identifies the event. Can use the same `%variables%` as events and notices.
- `alarm-type`: an optional value used in automations.
 - 1) Problem
 - 2) Resolution
 - 3) Unknown
- `clear-key`: an optional value to match an up alarm with the `reduction-key` of a down alarm.



Automations

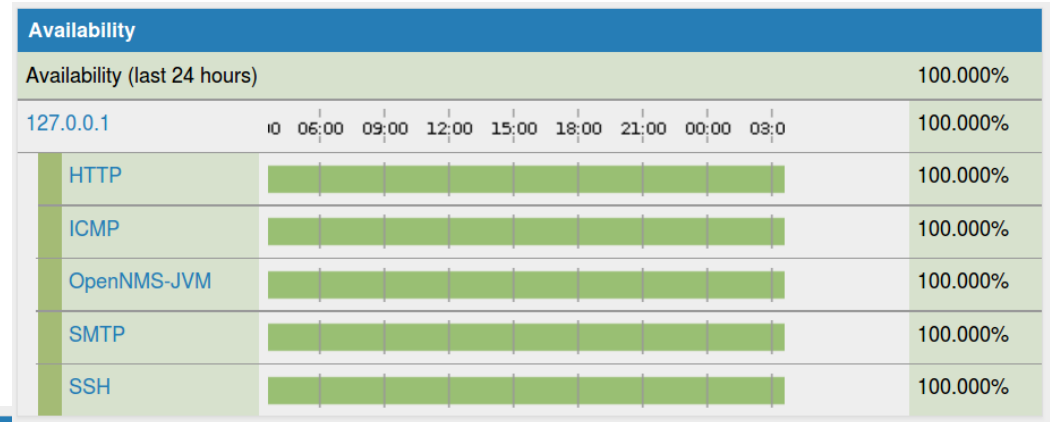
- Automations allow actions to be done to the database, mainly focus on the alarms table.
- For example, the “cosmicClear” automation matches “up” events with “down” events and clears the down event.
- As a demonstration, let’s add the HTTP service to our localhost node and see what happens.

Install a Web Server

- Run

```
yum install httpd
```
- Start the web server

```
systemctl start httpd
```
- Rescan "localhost"



The figure is a table titled "Recent Events" showing a log of system messages. The table has columns for event ID, timestamp, severity, and message. The messages include warnings about HTTP service discovery and forced scans, and normal messages about the OpenNMS Class status.

Recent Events			
35	12/5/16 03:37:30	Warning	The HTTP service has been discovered on interface 127.0.0.1.
34	12/5/16 03:37:25	Warning	A services scan has been forced on this node.
30	12/5/16 03:07:50	Normal	<p>OpenNMS Class is Happy! </p>
29	12/5/16 03:07:25	Major	<p>OpenNMS Class is NOT Happy! </p>
28	12/5/16 03:05:09	Normal	<p>OpenNMS Class is Happy! </p>

Automation Demonstration





- Navigate to Status → Alarms → Alarm Summary
- Run





```
systemctl stop httpd
```
- Refresh until the alarm appears

▼ 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

- Run `systemctl start httpd`
- Refresh until the up alarm appears

▼ 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.



So, How'd That Work?

- Automations are configured in the `vacuumd-configuration.xml` file
- An automation consists of:
 - A trigger (optional)
 - An action
 - An event to create (optional)



Some Automations

```
<automation name="cosmicClear" interval="30000" active="true"  
  trigger-name="selectResolvers"  
  action-name="clearProblems" />
```

```
<automation name="cleanUp" interval="60000" active="true"  
  action-name="deletePastClearedAlarms" />
```

```
<automation name="escalation" interval="30000" active="false"  
  trigger-name="selectSuspectAlarms"  
  action-name="escalateAlarm"  
  action-event="eventEscalated" />
```



cosmicClear Trigger

```
<automation name="cosmicClear" interval="30000" active="true"
  trigger-name="selectResolvers"
  action-name="clearProblems" />

<!-- Find all alarms that potentially clear problems -->
<trigger name="selectResolvers" operator=">=" row-count="1" >
  <statement>
    SELECT *, now() AS _ts
    FROM alarms
    WHERE alarmType=2
  </statement>
</trigger>
```



cosmicClear Action

```
<automation name="cosmicClear" interval="30000" active="true"  
  trigger-name="selectResolvers"  
  action-name="clearProblems" />
```

```
<!-- New and optimized version of clearing problems -->  
<action name="clearProblems" >  
  <statement>  
    UPDATE alarms  
      SET severity=2, firstautomationtime =  
COALESCE(firstautomationtime, ${_ts}), lastautomationtime = ${_ts}  
      WHERE alarmType=1  
      AND severity > 2  
      AND lastEventTime <= ${lastEventTime}  
      AND reductionKey = ${clearKey}  
  </statement>  
</action>
```

cleanUp Action

```
<automation name="cleanUp" interval="60000" active="true"
    action-name="deletePastClearedAlarms" />

<!-- ticket state of 3 is closed -->
<action name="deletePastClearedAlarms" >
  <statement>
    DELETE FROM alarms
      WHERE severity <= 3
        AND COALESCE(lastautomationtime, lasteventtime) < now()
- interval '5 minutes'
        AND (alarmacktime IS NULL AND (tticketState IS NULL OR
tticketState = 3))
  </statement>
</action>
```


Adding Notes to Alarms

You can add notes to alarms: Sticky and Journal

Alarm 5			
Severity	Minor	Node	localhost
Last Event	Dec 5, 2016 3:53:31 AM	Interface	127.0.0.1
First Event	Dec 5, 2016 3:53:31 AM	Service	HTTP
Count	1	UEI	uei.opennms.org/nodes/nodeLostService
Ticket ID		Ticket State	
Reduction Key	uei.opennms.org/nodes/nodeLostService::1:127.0.0.1:HTTP		

Log Message

HTTP outage identified on interface 127.0.0.1 with reason code: HTTP connection exception on port: 80: Connection refused/Ports: 80.

Description

A HTTP outage was identified on interface 127.0.0.1.
A new Outage record has been created and service level availability calculations will be impacted until this outage is resolved.

Sticky Memo

Journal Memo

Operator Instructions

No instructions available.

Sticky Notes

Sticky notes are like Post-Its™ - tied to a particular alarm

Sticky Memo

Tarus just made this alarm show up for class. Ignore it.

Save Delete

Author:
admin

Updated:
Dec 5, 2016 3:55:43 AM

Created:
Dec 5, 2016 3:55:30 AM

Journal Notes

Journal notes are tied to all alarms with a particular reduction-key

Journal Memo

When this alarm happens, you can try to correct it by connecting to the system and running "systemctl restart httpd". If that fails, check the logs.

Author: admin	Updated: Dec 5, 2016 3:59:43 AM	Created: Dec 5, 2016 3:59:43 AM
-------------------------	---	---



Exercise #5: Make New Alarms

- Edit the `Class.events.xml` file
- Add alarm data to the “unhappiness” event and set it as Type 1.
- Add alarm data to the “happiness” event and set it to Type 2 and have it resolve the “unhappiness” event
- Reload the event configuration
- Test

Get the new Class.events.xml file and Reload

```
# wget -N https://www.opennms.org/Training/Config/Exercise%205/Class.events.xml

--2016-12-05 04:02:45-- https://www.opennms.org/~tarus/Class/Config/Exercise
%205/Class.events.xml
Resolving www.opennms.org (www.opennms.org)... 104.131.77.90,
2604:a880:800:10::1b1a:7001
Connecting to www.opennms.org (www.opennms.org)|104.131.77.90|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1438 (1.4K) [application/xml]
Saving to: 'Class.events.xml'

100%[=====>] 1,438      --.-K/s   in 0s

2016-12-05 04:02:45 (84.0 MB/s) - 'Class.events.xml' saved [1438/1438]

# send-event.pl uei.opennms.org/internal/reloadDaemonConfig -p 'daemonName Eventd'
```

unhappiness Event with Alarm Data

```
<event>
  <uei>uei.opennms.org/class/unhappiness</uei>
  <event-label>OpenNMS defined event: The OpenNMS Class is not happy</event-label>
  <descr>
    &lt;p&gt;This event is sent when the OpenNMS Class is unhappy.&lt;/p&gt;
    &lt;ul&gt;
      &lt;li&gt;I can't get no&lt;/li&gt;
      &lt;li&gt;I can't get no&lt;/li&gt;
      &lt;li&gt;I can't get no&lt;/li&gt;
      &lt;li&gt;Satisfaction&lt;/li&gt;
    &lt;/ul&gt;
  </descr>
  <logmsg dest='logndisplay'>
    &lt;p&gt;OpenNMS Class is NOT Happy! &lt;/p&gt;
  </logmsg>
  <severity>Major</severity>
  <alarm-data reduction-key="%uei%"
    alarm-type="1"
    auto-clean="false"/>
</event>
```

happiness Event with Alarm Data

```
<event>
  <uei>uei.opennms.org/class/happiness</uei>
  <event-label>OpenNMS defined event: The OpenNMS Class is so happy</event-label>
  <descr>
    &lt;p&gt;This event is sent when the OpenNMS Class is happy.&lt;/p&gt;
    &lt;ul&gt;
      &lt;li&gt;Dance, Everybody Dance!&lt;/li&gt;
      &lt;li&gt;Life is Good!&lt;/li&gt;
      &lt;li&gt;This is Fun!&lt;/li&gt;
    &lt;/ul&gt;
  </descr>
  <logmsg dest='logndisplay'>
    &lt;p&gt;OpenNMS Class is Happy! &lt;/p&gt;
  </logmsg>
  <severity>Normal</severity>
  <alarm-data reduction-key="%uei%"
    alarm-type="2"
    clear-key="uei.opennms.org/class/unhappiness"
    auto-clean="false"/>
</event>
```

Test the Automation

Send the “down” event and watch what happens:

```
send-event.pl uei.opennms.org/class/unhappiness
```

▼ ID					
Ack	Severity	Node	Count	Last Event Time	Log Msg
<input type="checkbox"/>	10	localhost ⊕ ⊖	1	Dec 5, 2016 4:29:45 AM 📄 📄	OpenNMS Class is NOT Happy!

Then send the “up” event and watch what happens:

```
send-event.pl uei.opennms.org/class/happiness
```

▼ ID					
Ack	Severity	Node	Count	Last Event Time	Log Msg
<input type="checkbox"/>	11	localhost ⊕ ⊖	1	Dec 5, 2016 4:30:12 AM 📄 📄	OpenNMS Class is Happy!
<input type="checkbox"/>	10	localhost ⊕ ⊖	1	Dec 5, 2016 4:29:45 AM 📄 📄	OpenNMS Class is NOT Happy!