

Hewlett Packard Enterprise

# UNIFICATION OF ALERTING ENGINES FOR MONITORING IN SYSTEM MANAGEMENT

CUG – 2024

Technical Session – 6A (May 9)

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### AGENDA

**DESIGN – EXISTING AND NEW** 

**BACKGROUND & OVERVIEW** 

**ALERTS COVERAGE** 

**CLI – ALERTING SERVICE MANAGEABILITY** 

**CUSTOM ALERT RULE OPERATIONS – OPENSEARCH, GRAFANA** 

**ALERTS VISUALIZATION – CLI, GRAFANA** 

**ALERTS OPERATIONS CLI – QUERY & SILENCE** 

**ROUTING - EMAIL, SLACK, OPENSEARCH** 

**DEPLOYMENT EXPERIENCE - AURORA** 

CUSTOM ALERT RULE (YML) – OPENSEARCH, GRAFANA

**FUTURE WORK** 

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# **PROBLEM STATEMENT**

- The system management monitoring stack, collects different types of telemetry from various system components and stores events and logs in OpenSearch database and metrics in Timescale database.
- With lot more data being collected , what are we going to do?





• We believe, Alerting plays a vital role for any of the HPC system management and monitoring team.



## INTRODUCTION

- Alerting service has been implemented by defining the rules to generate alerts for the various components in the HPC systems
- The existing alerting service does not satisfy customer needs, so a new improved unified alerting was proposed and implemented. ( in HPCM)
- Alerting service comprises of rule engines where the alert rules are defined to query data from required data source and alerts are generated once the given condition met. Generated alerts are forwarded to the endpoint for the user reporting and visualisation.

### MONITORING ARCHITECTURE



I AlOps

## **EXISTING (LEGACY) ALERTING SETUP**



# UNIFIED ALERTING SETUP FRAMEWORK



# **BACKGROUND (HPCM MONITORING)**

### Existing (Legacy) Alerting setup

- Rule engine ElastAlert
- Endpoint Alerta
- Reporting & Visualization CLI & Grafana
- Notification Email
- Database support OpenSearch

### Cons:

- Elastalert supports OpenSearch but not Timescale
- Single rule engine
- Lacks query performance with high rate of telemetry
- Critical alerts are being missed
- Not user friendly Learning Elastalert rule definition to create custom alert rules is very difficult
- Alerts lifecycle management is tough with Alerta



OpenSearch DB - events & logs Timescale DB - telemetry metrics

### **New Alerting setup**

- Rule engines
  - $\checkmark$  OpenSearch Alerting
  - ✓ Grafana Alerting
  - ✓ Prometheus
- Endpoint Alertmanager
- Reporting & Visualization CLI & Grafana & Alertmanager
- Notification Email, Slack, OpenSearch
- Database support OpenSearch, Timescale

### Pros:

- Support for all kinds of Databases.
- Multiple rule engines.
- Improved and faster query performance with high rate of telemetry
- No misses of alerts
- User friendly Simple yaml based framework to define custom alert rules and CLI to manage.
- Alerts lifecycle management is easy with Alertmanager.

## **ALERTS COVERAGE**

Alert Group Name	Component/Coverage	Events / Metrics / Scenarios
iml	Integrated management log (OS)	IML critical and warning events
cooldev	Cooling devices (OS, TS)	<ul> <li>CDU critical and warning log events</li> <li>Telemetry metrics: <ul> <li>Operating pressure range (supply/return)</li> <li>Primary Facility Flow</li> <li>Temperature and etc.</li> </ul> </li> </ul>
redfish	Cray hardware (OS)	<ul> <li>Redfish hardware critical and warning events:</li> <li>Switch link events</li> <li>Switch hardware telemetry</li> <li>CMMs</li> <li>nCs</li> <li>CrayAlerts, OpenBMC,</li> </ul>
gpu	AMD GPU (TS)	Telemetry metrics: • Power • Temperature

# ALERTS COVERAGE (CONT..)

Alert Group Name	Component/Coverage	Events / Metrics / Scenarios
syslog	Syslog log files (OS)	Syslog priorities: • 0,1 (critical), • 2,3 (warning) Syslog identifiers: • kernel • systemd • bladmond • cinstallman
native	Native monitoring (OS)	Warning events: • login_alert • root_fs_used • reboot_alert • mce_alert • memlog_alert

# ALERTS COVERAGE (CONT..)

Alert Group Name	Component/Coverage	Events / Metrics / Scenarios
node_status	Compute nodes (OS)	Node down events
rasdameon	Rasdaemon logs (OS)	Rasdaemon warning events
wlm	WorkLoad Managers (SLURM, PBS) (OS)	<ul> <li>SLURM/PBS node down events</li> <li>PBS jobsteps events</li> </ul>
sim	Service Infrastructure Monitor ( Sys Management monitoring stack/services) (Prometheus)	<ul> <li>Monitoring components Critical and warning events:         <ul> <li>KafkaConnectJVMMemoryUsage</li> <li>ElasticsearchClusterStatus</li> <li>InstanceDown</li> <li>HostOutOfDiskSpace</li> <li>ZookeeperNodeCount</li> <li>KafkaTopicsReplicas</li> <li>KafkaBrokerCount</li> <li>FlexFabricifOperStatusDown</li> </ul> </li> </ul>

# **ALERTS COVERAGE - SLINGSHOT SWITCH**

### <u>Health events (OS)</u>

- Traffic
  - DisconnectedGroups
  - DisconnectedMulticastGroups
  - FabricLinks
  - IntraGroupConnectivity
  - RedundantLink
  - RoutingInitialization
  - RoutingInitialization
- Configuration
  - FabricPolicy
  - ShastaAuthToken
  - Storage
  - SwitchFirmware
  - SwitchPolicy
  - SwitchState
- Runtime
  - AGENT\_SERVICE
  - RoutingState
  - TELEMETRY-DESIRED
  - VlanState
- Security
  - SwitchRedfishAuthentication

### <u>Port error events (OS)</u>

- pcs\_corrected\_cw
- pcs\_uncorrected\_cw
- pcs\_llr\_replay
- ibuf\_full
- ageq\_stall\_obuf
- ageq\_stall\_ibuf\_vc\_0[0-3]

### Switch redfish cray events (OS)

- hsnlinkflapdetected
- hsntransceiverremoved
- hsntransceiverinstalled
- hsntransceivermgmterror
- hsntransceiverepo
- hsnlinkupdetected
- hsnlinkdowndetected
- hsnlinkerrordetected
- hsnmultibiterrordetected
- hsnsbmfwloadfailuredetected

### Slingshot Switch Down events (OS)

EC BADCON NS

EC\_TRNSNT\_S

EC\_TRS\_S

EC\_SFTWR

EC\_TRNSNT\_NS

SBL\_ASYNC\_ALERT\_LINK\_DOWN

### Rosetta ASIC Error events (OS)

•

•

•

•

- EC\_CRIT
- EC\_UNCOR\_S
- EC\_UNCOR\_NS
- EC\_COR
- EC\_DEGRD\_NS
   EC\_TRS\_NS
   EC\_INFO
- EC\_BADCON\_S

### <u>Congestion events (TS)</u>

- rx Pause Percent
- tx Pause Percent

### <u>Cassini events (OS)</u>

- EC\_UNCOR\_NS SBL\_ASYNC\_ALERT\_SERDES\_FW\_ CORRUPTION
- EC\_UNCOR\_S
- EC\_CRI
- EC\_BADCON\_NS CXI\_EVENT\_LINK\_DOWN
- EC\_BADCON\_S
   CXI\_EVENT\_LINK\_UP
- EC\_COR
- Note: OS OpenSearch, TS Timescale

Notes: Description about the events can be found in Slingshot documentation.

By default, All the Critical and Warning events are generated as alerts.

# **CLI – MANAGING ALERTING**

# cm monitoring alerting enable
# cm monitoring alerting disable
# cm monitoring alerting status

### Notes:

- This will enable/disable the alert rules available by default in the alerting service.
- The corresponding operations command can be used to enable/disable custom rule created by user for their own requirements.

### For more info:

# cm monitoring alerting -h

[rool\_condition]# cm monitoring alerting status Alerting is enabled.

Dependent serv	ices status:					
	service st	tatus				
		api status				
opensearch	OK	OK (200)				
grafana-server	OK	OK (200)				
alertmanager	OK	OK (200)				
Alert Rules Sta	atus:					
			datasource			
			1	state		
			1	1	alert-group	
				i		notification
CDU Alert			0S	Enabled	cooldev	None
IML Alert			0S	Enabled	iml	None
Rasdaemon Alert	t		0S	Enabled	rasdaemon	None
Syslog Alert			0S	Enabled	syslog	None
Hardware Alert			0S	Enabled	redfish,switch	None
Native Alert			05	Enabled	native	None
Node Down			05	Enabled	node_status	None
Node UP			0S	Enabled	node_status	None
PBS jobsteps A	lert		0S	Disabled	wlm	None
PBS Alert			0S	Disabled	wlm	None
Slingshot Cass	ini Alert		0S	Enabled	switch	None
Slingshot Healt	th Alert		0S	Enabled	switch	None
Slingshot Rose	tta Alert		0S	Enabled	switch	None
Slingshot Swite	ch Down		0S	Enabled	switch	None
Slingshot Swite	ch Up		0S	Enabled	switch	None
SLURM Alert			0S	Disabled	wln	None
primary_facilit	ty_flow_critic	cal	TS	Enabled	cooldev	None
primary_facili	ty_flow_warnir	ng	TS	Enabled	cooldev	None
primary_facili	ty_return_wate	er_pressure_critical	TS	Enabled	cooldev	None
primary_facili	ty_return_wate	er_pressure_warning	TS	Enabled	cooldev	None
primary_facili	ty_supply_wate	er_pressure_critical	TS	Enabled	cooldev	None
primary_facili	ty_supply_wate	er_pressure_warning	TS	Enabled	cooldev	None
secondary_cabir	net_return_wat	ter_pressure_critical	TS	Enabled	cooldev	None
secondary_cabin	net_return_wat	ter_pressure_warning	TS	Enabled	cooldev	None
secondary_cabin	net_supply_wat	ter_pressure_critical	TS	Enabled	cooldev	None
secondary_cabin	net_supply_wat	ter_pressure_warning	TS	Enabled	cooldev	None
secondary_cabin	net_supply_wat	ter_temperature_critical	TS	Enabled	cooldev	None
amd_gpu_power_c	critical		TS	Disabled	gpu	None
amd_gpu_tempera	ature_critical	L	TS	Disabled	gpu	None
slingshot_conge	estion_rxPause	ePercent	TS	Enabled	switch	None
slingshot conge	estion txPause	Percent	TS	Enabled	switch	None

Note: Datasource - OS-Opensearch and TS-Timescale.

Notification: Email - Routed the alerts for the alert group of the rule to Email. OS-Routed the alerts of the rule to OS

# **CUSTOM ALERT RULE OPERATIONS**

### **OPENSEARCH ALERT RULE**

To enable opensearch alert-rule

# cm monitoring alerting opensearch --enable-rule <rule-yml-file-path>

To disable opensearch alert-rule

# cm monitoring alerting opensearch --disable-rule <rule-name>

### **GRAFANA ALERT RULE**

To enable grafana alert-rule

# cm monitoring alerting grafana --enable-rule <rule-yml-file-path>

To disable grafana alert-rule

# cm monitoring alerting grafana --disable-rule <rule-name>

yml/yaml file must be created for the required scenarios to define an alert rule

For more info:

- # cm monitoring alerting -h
- # cm monitoring alerting opensearch -h
- # cm monitoring alerting grafana -h

# **ALERTS VISUALIZATION – CLI**

- To display alerts summary:
  - # cm health alertman -s
- To display the list of supported alert groups:
  - # cm health alertman -g
- To display alerts summary of the specific alert group:
  - # cm health alertman <alert-group>
  - # cm health alertman cooldev
- To display the detailed alerts information of the specific alert group and from specific node/device:
  - # cm health alertman <alert-group> -d <node-name>
  - # cm health alertman cooldev -d x4001cdu
- To display the list of supported alertmanager command operations:
  - # cm health alertman -c
- For more info use:
- # cm health alertman -h

# **ALERTMANAGER – QUERY OPERATIONS**

# cm health alertman query

### **Filter options:**

# cm health alertman query -f KEY=VALUE

Supported filter keys: ['alertname', 'group', 'severity', 'resource'] Filter value for the key should be within single quotes. Regex string value should always start with ~. Eg: alertname='~Instance.\*'

### Eg:

- severity='warning' or severity='critical'
- alertname='Syslog Priority 3 Event'
- alertname='~Sling.\*' or alertname='~.\*Down'
- group='cooldev' or group='switch'
- resource='opensearch' or resource='grafana'

To dump the active alerts into a csv file: # cm health alertman query -f group=cooldev --csv

For more info use:

# cm health alertman query -h

# **ALERTMANAGER – SILENCE OPERATIONS**

Silence operations helps to silence the alerts based on group for the given duration. During that, alerts from the corresponding group will not be raised.

### # cm health alertman silence

### • To add Silence for the alert-group

# cm health alertman silence add -g iml -d 5m -c "test"

### • To query active silences

- # cm health alertman silence query
- # cm health alertman silence query -g iml
- # cm health alertman silence query -w 10m

### • To query expired silences

# cm health alertman silence query -e

### • To expire the active silence

# cm health alertman silence expire -i id1

For more info:

```
# cm health alertman silence -h
```

# ALERTMAN CLI SNAPSHOTS - SUMMARY OF ALERTS

# cm health alertman -s

Alert Status | Count | Critical | 2 | Warnings | 3222 | Active | 3224 |

Group	Severity	Alerts
iml cooldev switch redfish syslog wlm node_status native rasdaemon sim	ok warning critical warning ok warning warning ok warning	critical : 0, warning : 0 critical : 0, warning : 5 critical : 0, warning : 4 critical : 2, warning : 5 critical : 0, warning : 3198 critical : 0, warning : 0 critical : 0, warning : 2 critical : 0, warning : 5 critical : 0, warning : 5 critical : 0, warning : 5

### ALERTMAN CLI SNAPSHOTS – SUMMARY OF ALERTS PER GROUP

:~ # cm health alertman switch

<pre># cm health alertman <group name=""></group></pre>	
	switch   Severity   Summary
	10.176.0.3   warning   HsnLinkFlapDetected:1
	10.176.0.4   warning   HsnLinkFlapDetected:2
	10.176.0.5   warning   HsnLinkFlapDetected:2
	10.176.0.6   warning   HsnLinkFlapDetected:2
To get group_name:	bardpeak001   critical   Slingshot Cassini Asic Event:11, Slingshot Cassini SB
<b>Use</b> # cm health alertman -q	bardpeak002   warning   Slingshot Cassini SBL Event:4
	parrypeak001   warning   Slingshot Cassini SBL Event:4
	parrypeak002   warning   Slingshot Cassini SBL Event:4
	x9000c1r3j1p0   critical   LinkErrors.PortNotConnectedToExpectedFabricPort:1

~]# cm health alertman syslog

syslog	Severity	Summary
leader2	warning	Syslog Priority 2 Event:1436, Syslog Priority 3 Event:4
ecb001	warning	Syslog Priority 3 Event:1088
x3000c0s33b1n0	warning	Syslog Priority 3 Event:10, Syslog Priority 1 Event:1
leader3	warning	Syslog Priority 2 Event:311, Syslog Priority 3 Event:4
others	warning	Syslog Priority 2 Event:1
leader1	warning	Syslog Priority 3 Event:4

//# cm health alertman redfish							
redfish	Severity	Summary					
10.176.0.14     10.176.0.7     10.176.0.8	warning warning critical	NonFatalUefiError:2, ResourceErrorsDetected:2   ResourceErrorsDetected:1   HardwareFatalFaultDetected:1					

Event:4

### ALERTMAN CLI SNAPSHOTS – ALERTS FROM A DEVICE OF A GROUP

### # cm health alertman <group name> -d <node name>

+	+	+	+	+	+
ID	Severity	Resource	Event	Text	Last Received
0b84893286d45340	warning	opensearch	NonFatalUefiErr   or	CrayUefi.UEFI error detected on node 0: Major error code 0xC103000F	2023-09-04T13:07:31.967-05:00
9615c9413f127bd6	warning	opensearch	NonFatalUefiErr   or 	CrayUefi.UEFI error detected on node 0: Major error code 0xC1030001	2023-09-04T13:17:31.834-05:00
daf134cace55e207	warning	opensearch	ResourceErrorsD   etected   	ResourceEvent.The resource property C_CNTR_HNI_PCS_FECL_ERRORS_3 Metric has detected errors of type SensorReadError.	2023-09-04T18:57:32.472-05:00
94e033f45b6625e5	warning	opensearch	ResourceErrorsD etected	ResourceEvent.The resource property C_CNTR_HNI_PCS_FECL_ERRORS_6 Metric has detected errors of type SensorReadError.	2023-09-05T00:22:31.819-05:00

~]# cm health alertman redfish -d 10.176.0.14

~]# cm health alertman redfish -d 10.176.0.8

+   ID +	+   Severity +	+   Resource +			Last Received
79ae35586c61a53d	critical	opensearch	HardwareFatalFa   ultDetected 	CrayAlerts.The 12V_HSS ECB Voltage resource has detected a near fatal fault indicating that it went below its allowed operating conditions.	2023-09-04T19:47:31.823-05:00

### **ALERTMAN CLI SNAPSHOTS – QUERY OPERATIONS**

### # cm health alertman query -f

: # cm health alertman query -f group="cooldev" severity='critical'

+	Severity	AlertName	   Resource	   Group	   Node 	   Event		Last Received
0346bac1e89e68c8	critical critical	primary_facility_flow_critical secondary_cabinet_supply_water_pressure_critical	grafana grafana	cooldev	x9000cdu x9000cdu	<pre>primary_facilit y_flow_critical value exceeded warning threshold secondary_cabin et_supply_water _pressure_criti cal value exceeded critical</pre>	<pre>primary_facility_flow_critical value exceeded the actual threshold (&gt;260) or (&lt;230) gpm. Current reading is 4.7 for host x9000cdu secondary_cabinet_supply_water _pressure_critical value exceeded the actual threshold values (&gt;60) or (&lt;30) psi. Current reading is 28.5 for host x9000cdu</pre>	2024-01-08T06:15:34.307Z 2024-01-08T06:15:32.001Z
dcfbe1c3d12af3ca	critical	secondary_cabinet_return_water_pressure_critical	grafana	cooldev	x9000cdu	threshold   secondary_cabin   et_return_water   _pressure_criti   cal value   exceeded lower   Threshold	secondary_cabinet_return_water _pressure_critical value exceeded lower Threshold 10 psi. Current reading is 27.75 for host x9000cdu	2024-01-08T06:15:35.842Z
fec03cf6b42f68b8	critical	primary_facility_return_water_pressure_critical	grafana	cooldev	x9000cdu	<pre>primary_facilit y_return_water_ pressure_critic al value exceeded the lower threshold</pre>	primary_facility_return_water_ pressure_critical value exceeded the lower Threshold 10 psi. Current reading is 22.45 for host x9000cdu	2024-01-08T06:15:35.080Z

### **ALERTMAN CLI SNAPSHOTS – QUERY OPERATIONS**

#cm health alertman query -f

#" cm health alertman query -f severity='critical' alertname='~Slingshot\*'

ID	Severity	AlertName	Resource	Group	Node	Event	Text	Last Received
63b636f5ed2f0e1f	critical	Slingshot Rosetta Critical Event	opensearch	switch	x9000c3r5b   0 	x9000c3r5j4p0:6 - Asic:mcast_em pty_route_edge	EC UNCOR NS:Detected Rosetta ASIC Error with flag mcast_empty_route_edge on the block_frf_of_port x9000c3r5i4n0:6	2024-01-22T06:12:31.640-06:00
e966111af832d627	critical	Slingshot Rosetta Critical Event	opensearch	switch	x9000c3r1b   0 	x9000c3r1j10p0: 12 - Asic:mcast _empty_route_ed ge	EC_UNCOR_NS:Detected Rosetta ASIC Error with flag mcast_empty_route_edge on the block frf of port x9000c3r1j10p0:12	2024-01-22T06:12:31.637-06:00

# **ALERTS VISUALIZATION – GRAFANA**

¥		o, obaron or jump com				• • • • •	
Home > Dashboards > A	erts 🕁 😪				III Add 🗸 🚡 🕸	② Last 6 hours 🗸 🔾 🍾	^
Total Active Alerts	: Total Active Critical	Alerts		Total Active Warning Alerts		Refresh dashboard	
	8	2		6			
Active Alerts							
Time	SeverityValue alert_event	alertname	dashboard	datasource	group	severity	
2023-09-26 16:51:41.445	1 vnode_name=blancapeak001,	PBS Node Unknown Event	Alerts	opensearch	wim	critical	
2023-09-26 16:56:40.743	2 host_name=ecb001, syslog_i	Syslog Priority 3 Event	Alerts	opensearch	syslog	warning	
2023-09-26 17:06:40.738	2 host_name=ecb001, syslog_i	Syslog Priority 3 Event	Alerts	opensearch	syslog	warning	
2023-09-26 17:01:40.701	2 host_name=ecb001, syslog_i	Syslog Priority 3 Event	Alerts	opensearch	syslog	warning	
2023-09-26 17:11:40.855	2 host_name=ecb001, syslog_i	Syslog Priority 3 Event	Alerts	opensearch	syslog	warning	
2023-09-26 17:16:40.746	2 host_name=ecb001, syslog_i	Syslog Priority 3 Event	Alerts	opensearch	syslog	warning	
Silenced Alerts							
Time	SeverityValue alert_event	alertname	dashboard	datasource	group	severity	
2023-09-26 17:01:40	1 ClientIP=172.24.0.9, MessageArgs=[	Chassis Hardware Critical Even	Alerts	opensearch	redfish	critical	

# **GRAFANA – SLINGSHOT ALERTS VISUALIZATION**

<b>\$</b>				Q Search or jump	o to 📼	ctrl+k					+ ~	?	Ŵ	0
Home > Dashboards	s > Slings	shot Alerts	ት		ılı <b>i</b> A	vdd ~ 🖪	) @	🕘 La	ist 5 minute	s ~	Q	G	~	^
Total Active Alerts			Total Active	Critical Alerts		Total Act	ive Warı	ning Aler	ts		Refres	n dasht	board	
J								0						
Active Alerts														
Time	Seve a	alert_event							alertnam	e				
2023-09-04 23:45:43	2 \$	Switch=x900	0c1r7b0, Ca	tegory=EC_BADCO	N_NS, PortNam	ne=x9000c	:1r7j16p	0, PortN.	. Slingsho	t Rose	etta Wa	rning	Event	
2023-09-04 23:45:43	2 \$	Switch=x900	)0c1r5b0, Ca	tegory=EC_BADCO	N_NS, PortNan	ne=x9000c	:1r5j14p	1, PortN	. Slingsho	t Rose	etta Wa	rning	Event	
2023-09-04 23:45:43	2 \$	Switch=x900	)0c1r3b0, Ca	tegory=EC_BADCO	N_NS, PortNan	ne=x9000c	:1r3j20p	0, PortN	Slingsho	t Rose	etta Wa	rning	Event	
2023-09-04 22:42:31	2 (	ClientIP=172	.23.0.10, Mes	sage=The link j20p	o1 has experien	ced a link t	flap eve	nt betwe	Slingsho	t Harc	ware V	Varnin	g Eve	nt
2023-09-05 14:00:42	2 1	fields_Locati	on=http://172	2.23.100.19:8000/fa	bric/agents/x9	000c3r3b(	), fields <u>.</u>	Physical	Slingsho	t Heal	th Warı	ning E	vent	

# **ROUTING - EMAIL , SLACK**

- Pre-requisites:
  - SMTP address
  - SMTP Port
  - Valid Email address (recipients)

Note: We have grouped the alerts via 'group' name i.e alerts from same group firing at a time will be alerted in the same email.

```
To enable email routing for an alert group:
```

```
# cm monitoring alerting route email --from sender addr --to
recipient_addr [recipient_addr ...] \ --smtp host:port --alert-
group group_name
```

To disable email routing for an alert group:

```
# cm monitoring alerting unroute email --alert-group group_name
```

```
To list all the alert-groups:
# cm health alertman -g
```

For more info: # cm monitoring alerting unroute email -h # cm monitoring alerting route email -h

Note: We can create an email address for the slack channel and enable notifications to be received in slack via same commands

### **ROUTING - EMAIL**

### Cluster Health Monitoring Alerts

N O no-one@hpe.com <no-one@hpe.com> To: Thursday, 28 September 2023 at 5:54 PM

Alert Name : Slingshot Health Critical Event

Details:

alert_event	alertname	dashboard	datasource	group	severity
fields_Location=x3000c0r42j1p0, fields_PhysicalContext=LinkErrors.PortNotConnectedToExpectedFabricPort, fields_Value=Recommend:	Slingshot				
Ensure the fabric port is cabled correctly or the topology template and PT-PT file is correct ; Cause: The port is not connected to expected	Health	SlingshotAlerts	opensearch	switch	critical
fabric port, fields_PhysicalSubContext=CRITICAL	Critical Event				

Alert Name : Slingshot Health Warning Event

Details:

alert_event	alertname	dashboard	datasource	group	severity
fields_Location=x9000c1r5j101p0, fields_PhysicalContext=PortErrorEvent.pcs_uncorrected_cw, fields_Value=Recommend: Error rate	Slingshot				
exceeds warning threshold, monitor the state of this link ; Cause: x9000c1r5j101p0 reported 507.21 pcs_uncorrected_cw's per second.,	Health	SlingshotAlerts	opensearch	switch	warning
fields_PhysicalSubContext=WARNING	Warning Event				

### **ROUTING - SLACK**

Search Hewlett Packard Enterprise											Ċ
slack-alerting ~										G - G	Canvas
Add a bookmark											
💛 Email 🔻				November 7	th. 202	23 ~					
From <no-one@hpe.com To email Subject Cluster Health Mo Date Nov 7th, 2023 Alert Name : Slingshot Conge Details:</no-one@hpe.com 	nitoring Alerts gestion rxPausePercent stion rxPausePercent value	e exceeded ]	Threshold								
alert_rule_uid	alertname	dashboar d	dataso urce	grafana_f older	grou p	hostnam e	port	rule	sever ity		
slingshot_congestion_rxP ausePercent	Slingshot Congestion rxPausePercent	Slingshot Alerts	grafana	timescale- alerts	swit ch	x9000c1r 7b0	x9000c1r7b 0j64p0	slingshot_congestion_rxP ausePercent	critic al		
Alert Name : Slingshot Con Summary: Slingshot Conge Details:	gestion rxPausePercent stion rxPausePercent value	exceeded 7	Fhreshold	l							
alert_rule_uid	alertname	dashboar d	dataso urce	grafana_f older	grou p	hostnam e	port	rule	sever ity		
slingshot_congestion_rxP ausePercent	Slingshot Congestion rxPausePercent	Slingshot Alerts	grafana	timescale- alerts	swit ch	x9000c1r 7b0	x9000c1r7b 0j64p1	slingshot_congestion_rxP ausePercent	critic al		

# **ROUTING - OPENSEARCH**

We can configure unified alerting to write alerts to the Kafka topic called alerts and to store the alerts in OpenSearch index called alerts-\*

### Use the following command to start sending alerts to OpenSearch:

cm monitoring alerting route
opensearch --alert-rule <rule-name>

### ✓ To stop sending alerts to the Slack channel, enter the following command:

cm monitoring alerting unroute
opensearch --alert-rule<rule-name>

Note: To list all the alert-rule use '*cm monitoring alerting status*'. This will list the rule and show the enabled notifications for each rule.

```
"took" : 0,
"timed_out" : false,
"_shards" : {
  "total" : 3.
  "successful" : 3,
  "skipped" : 0,
  "failed" : 0
},
"hits" : {
  "total" : {
    "value" : 496,
    "relation" : "ea'
  },
  "max_score" : 1.0,
  "hits" : [
      "_index" : "alerts-2023.12.19",
      "_id" : "7Bc8q4wBR0usWsLmAl3F",
      "_score" : 1.0,
      "_source" : {
        "severity" : "warning",
        "fields_PhysicalSubContext" : "WARNING",
        "fields_Location" : "x9000c3r5j105p1",
        "@version" : "1",
        "group" : "switch",
        "fields_PhysicalContext" : "PortErrorEvent.pcs_uncorrected_cw",
        "fields_Value" : "Recommend: Error rate exceeds warning threshold",
        "datasource" : "opensearch",
        "dashboard" : "SlingshotAlerts",
        "alertname" : "Slingshot Health Warning Event",
        "@timestamp" : "2023-12-19T17:59:57.278008839Z"
```

### For more info:

```
# cm monitoring alerting unroute opensearch -h
# cm monitoring alerting route opensearch -h
```

28



### ALERTING DEPLOYMENT – AURORA STORY (HPCM 1.10)

- Enabled Unified Alerting setup with custom scenarios rules defined by Argonne/Intel.
- CLI reporting Live Alerts
- Live Alerts dashboard
- Email notification:
  - Alerts are grouped by group name.
  - Email routing has been enabled per group wise and also severity wise.
  - Better templating of alerts in email for improved reporting.
- Alerts persistence:
  - Argonne wants to view the history/trend of alerts based on severity/metrics/hosts.
  - Grafana dashboards are available to visualize the history of alerts with filter options.



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<sup>1</sup>30

l Last Received

 I will cause an emergency power
 I

 I off (EPO) +o ovoi طالط کوسی کی Copyright 2024 HEWLETT PACKARD ENTERPRISE

2024-03-28T17:16:59.101Z

# CONT..

+--

Group	Severity   Al	erts 		
<pre>cooldev   iml   native   native   node_status   rasdaemon   redfish   sim   syslog   switch   wlm   thermtrip   lepo   leak   others   </pre>	critical   cr ok   cr ok   cr ok   cr ok   cr ok   cr ok   cr ok   cr ok   cr ok   cr critical   cr critical   cr ok   cr ok   cr	itical : 135, war itical : 0, war itical : 47, war itical : 47, war itical : 0, war itical : 0, war itical : 2, war itical : 2, war itical : 0, war	warning : 37   rning : 0   rning : 1   rning : 0   rning : 0	
+	# cm he	alth alertman f	thermtrip	+
10.115.138.92   10.115.175.41   10.115.171.19   10.115.168.23	l critical   c critical   c critical   0   critical   1   critical	CPUThermalTri CPUThermalTri PCHThermalTri CPUThermalTri	p:1, PCHThermalTri p:1, PCHThermalTri p:1 p:1, PCHThermalTri	+ p:1   p:1   p:1   +
	# cm he	alth alertman e	еро	
   epo	Severity	Summary		
10.115.175.33   10.115.189.14	9   critical   9   critical	HardwareEmerge HardwareEmerge	encyPowerOffDetect encyPowerOffDetect	ed:1   ed:1   +
	# cm he	alth alertman e	epo -d 10.115.189.	149
ID	Severity	l Resource	l Event	l Text
d1aca2f49110e	2f9   critical	l opensearch	2024-03-   28T17:16:33.000	CrayAlerts.The hardware   resource x4518c3r1b0 caused or

ΙZ



### DASHBOARDS

2024-03-28 12:47:30

2024-03-28 12:46:35

2024-03-28 12:45:39

supply\_filter\_b\_differential\_pressure\_critical

primary\_facility\_flow\_warning

secondary\_system\_differential\_pressure\_warni...

x4302cdu

x4415cdu

x4120cdu

critical

warning

warning



- supply\_filter\_b\_differential\_pressure\_critical value exceeded the actual critical threshold (>3.5) psi. Current reading is 0 for host x4302cdu
- secondary\_system\_differential\_pressure\_warning value lies between the actual warning threshold values (22.5 to 24) or (18 to 19.5) psi. Current re
- primary\_facility\_flow\_warning value lies between the actual warning threshold (255 to 260) or (230 to 235) gpm. Current reading is 254.7 for host

# LET'S SEE CUSTOM ALERT RULE - GRAFANA ALERTING....

1. Understand the scenario on which you want to get alerted

I want to get alerted when the cooling device temperature crosses certain threshold.

2. Identify the data source – OpenSearch / Timescale ( Monitoring Guide can help here)

Since, this is telemetry data the data is available in Timescale DB and we must use Grafana alerting.

# LET'S SEE GRAFANA ALERTING (CONT..)

3. Understand the data format: Metric category Metric name

<pre># cm monitoring   category</pre>	timescaledb	show	categories
aiops			
aiopsft			
aiopsit			
cooldev			
cray			
disk			
ldms			
pcm			
slingshot			

4. Define the alerting condition.

Raise critical alert if the temperature reading falls below 25 degree.

Actuator_2_Feedback_PositioncooldexCDU_Current_Phase_1cooldexCDU_Current_Phase_2cooldexCDU_Current_Phase_3cooldexCDU_Voltage_Phase_1_2cooldexCDU_Voltage_Phase_3_1cooldexCDU_Voltage_Phase_3_1cooldexCDU_Voltage_Phase_3_1cooldexCWV_Valve_Actuator_VoltagecooldexPLC_tormperaturecooldexPLC_toryFD_VoltagecooldexPrimary_Facility_Return_Water_PressurecooldexPrimary_Facility_Supply_Water_TemperaturecooldexPrimary_Facility_Supply_Water_TemperaturecooldexRelative_HumiditycooldexRoom_TemperaturecooldexSecondary_Cabinet_FlowcooldexSecondary_Cabinet_Return_Water_PressurecooldexSecondary_Cabinet_Return_Water_PressurecooldexSecondary_Cabinet_Return_Water_PressurecooldexSecondary_Cabinet_Return_Water_PressurecooldexSecondary_Cabinet_Supply_Water_PressurecooldexSecondary_Cabinet_Supply_Water_PressurecooldexSecondary_Cabinet_Supply_Water_Temperature_2cooldexSecondary_Cabinet_Supply_Water_Temperature_2cooldexSecondary_Cabinet_Supply_Water_Temperature_2cooldexSecondary_Cabinet_Supply_Water_Temperature_2cooldexSecondary_Cabinet_Supply_Water_Temperature_2cooldexSecondary_Cabinet_Supply_Water_TemperaturecooldexSecondary_Cabinet_Supply_Water_Temperature_2cooldexSecondary_Dump_Suction_Pressure_1cooldex <td< th=""><th><pre># cm monitoring timescaledb showmetrics   g:</pre></th><th>rep coolde<sup>.</sup></th></td<>	<pre># cm monitoring timescaledb showmetrics   g:</pre>	rep coolde <sup>.</sup>
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VFD2_RunTime_Energy_Counter   cooldev	VFD2_Pump_Speed	cooldev
	VFD2_RunTime_Energy_Counter	cooldev

# LET'S SEE GRAFANA ALERTING (CONT..)

5. Refer to the given SAMPLE rule file to write the rule YAML file (includes 3 sections: General/Input, Query, trigger conditions)

# **GRAFANA CUSTOM RULE (YML)**

title: <rule title> uid: <rule UID> enabled: <true/false> ruleGroup: <group name> schedule: period: unit: <time unit - s/m> interval: <interval timing>

### Grafana alert rule Information:

- Specify the name and uid for the monitoring alert rule
- Set 'enabled' to true to enable the alert rule by default
- Give a name in 'ruleGroup' to group the similar alert rules
- Use the 'schedule' field to determine how frequently the monitoring rule should run.

35

title: <rule title> uid: <rule UID> enabled: <true/false> ruleGroup: <group name> schedule: period: unit: <time unit - s/m> interval: <interval timing>

title: secondary\_cabinet\_supply\_water\_temperature\_critical uid: secondary\_cabinet\_supply\_water\_temperature\_critical enabled: true ruleGroup: cooldev schedule: period: unit: m interval: 5



# input: query: timescale query reducer: <last/min/max/mean/sum/count>

### **Query Information:**

- Specify the Timescale query to get the time series data metric name and category
- Specify the reducer type to reduce the timeseries range into single.







input: query: timescale query reducer: <last/min/max/mean/sum/count>



# **GRAFANA CUSTOM RULE (YML)**

```
conditions:
    alertcondition:
    threshold:
    match: <lt/gt/within_range/outside_range>
    value: <value in a list: single element list or two element list> Eg: [ 12 ] / [ 10, 12 ]
    #or
    alertcondition:
    math:
        expression: <$B > 60 || $B <30> or <$B > 30 && $B <=40>
errorcondition:
    noDataState: <OK/Alerting/Error>
```

execErrState: <OK/Alerting/Error>

### **Conditions**:

Specify the alert type and condition.

threshold: set the condition type in 'match' and the corresponding value. math: form an expression based on the reduced value and specify.

Specify the error condition.

noDataState: specify the state if no data for given query.

execErrState: specify the state if error occurs while executing given query

# **GRAFANA CUSTOM RULE (YML)**

```
conditions:
 alertcondition:
   threshold:
     match: <lt/gt/within range/outside range>
     value: <value in a list: single element list or two element list> Eg: [ 12 ] / [ 10, 12 ]
 #or
 alertcondition:
   math:
     expression: <$B > 60 || $B <30> or <$B > 30 && $B <=40>
 errorcondition:
                                                                 conditions:
   noDataState: <OK/Alerting/Error>
   execErrState: <OK/Alerting/Error>
```

# Alert Trigger condition information conditions: alertcondition: threshold: match: lt value: [ 25 ] errorcondition: noDataState: OK execErrState: OK

### trigger:

```
annotations:
```

```
description: <"description about the alert">
  summary: <"summary of the alert">
  dashboardUID: <""/"uid">
  PanelID: <""/"uid">
  labels:
  labels:
  datasource: <grafana>
  dashboard: <Alerts/SlingshotAlerts>
```

group: <cooldev/switch/compute/....>
severity: <critical/warning>

**Trigger information:** 

Specify the annotations and labels including alert summary and description and severity.

```
trigger:
annotations:
```

description: <"description about the alert">
 summary: <"summary of the alert">
 dashboardUID: <""/"uid">
 PanelID: <""/"panleid">
 labels:
 determine (methods)

datasource: <grafana>
dashboard: <Alerts/SlingshotAlerts>
group: <cooldev/switch/compute/....>
severity: <critical/warning>

# LET'S SEE GRAFANA ALERTING (CONT..)

### 6. Validate the written rule YAML file and enable it via CLI

# cm monitoring alerting grafana --enable-rule

> /opt/clmgr/alerting/grafana-alerting/alert\_rules/cooldev/secondary\_cabinet\_supply\_water\_temperature\_critical.yml Validating and Enabling grafana rule(s)..

Successfully enabled the secondary\_cabinet\_supply\_water\_temperature\_critical alert rule in grafana

### If the rule must be disabled:

# cm monitoring alerting grafana --disable-rule secondary\_cabinet\_supply\_water\_temperature\_critical Successfully deleted the secondary\_cabinet\_supply\_water\_temperature\_critical alert rule in grafana



# **CUSTOM RULE PREPARATION : REVISION**

- 1. Understand the scenario on which you want to get alerted
- 2. Identify the data source OpenSearch / Timescale ( Monitoring Guide can help here)
- 3. Understand the data format:

Incase of OpenSearch DB - fields and the corresponding values.

Incase of Timescale DB – metric category and metric name.

- 4. Define the alerting condition based on the fields and values/ metric.
- 5. Refer to the given SAMPLE rule file to write the rule YAML file (includes 3 sections: General/Input, Query, trigger conditions)
- 6. Validate the written rule YAML file and enable it via CLI

# **CUSTOM RULE – PROCEDURE - OPENSEARCH**

1. Understand the scenario on which you want to get alerted

# **1. UNDERSTAND THE SCENARIO ON WHICH YOU WANT TO GET ALERTED**

• Let's consider this example ...

• I wanted to get alerted on the Slingshot switch critical health events.

 Of course, I would be enabling the Slingshot telemetry and monitoring before hand so that data would be available in OpenSearch and Timescale Databases respectively.

# CUSTOM RULE – PROCEDURE (CONT..)

2. Identify the data source – OpenSearch / Timescale ( Monitoring Guide can help here)

# 2. IDENTIFYING THE DATA SOURCE

As per Monitoring guide, Telemetry is being stored into Timescale and events/logs is being stored into OpenSearch Databases respectively.

Since, Slingshot Switch health data are events based, we should be checking from OpenSearch DB.



3. Understand the data format – fields and the values.



## **3. DATA FORMAT**

### # curl -XGET 'http://admin:9200/slingshot\_crayfabrichealth-2024.03.22/\_search?&pretty' -H 'Content-Type: application/json'

# cur	l http	p://a	admin:	9200,	/_cat/i	ndices	grep sl	ingshot	grep he	ealth	sort
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green	open	slir	ngshot	_cray	yfabric	health-2	2024.04.2	23	W3RI	bBRk1Qmy	740QlM_
green	open	slir	ngshot	_cray	yfabric	health-2	2024.04.2	24	LC61	MC3RZT8a	aOECrFI
green	open	slir	ngshot	_cray	fabric	health-2	2024.04.2	25	pZ8v	VVECTS	eEG5Jhs
green	open	slir	ngshot	cray	yfabric	health-2	2024.04.2	26	7UAI	D1dftTBu	uf1lXnU

"\_index": "slingshot\_crayfabrichealth-2024.03.22", "\_id": "T3HeY44BRwra4ArKbyXu", "\_score": 4.0919304, "\_source": { "name": "CrayFabricHealth", "@version": "1", "\_tags": [ {} ], "timestamp": 1711072499, "@timestamp": "2024-03-22T01:55:05.676237717Z", "fields": { "Switch": "x3000c0r42", "ParentalIndex": 2, "Index": 0, "SubIndex": 1, "PhysicalContext": "LinkErrors.PortNotConnectedToExpectedFabricPort". "Timestamp": "2024-03-22T01:54:59.278Z", "Value": "Recommend: Ensure the fabric port is cabled correctly or the topology template and PT-PT file is correct ; Cause: The port is not connected to expected fabric port", "Location": "x3000c0r42j1p0", "DeviceSpecificContext": "", "PhysicalSubContext": "CRITICAL", "SstValue": 0 }, "tags": [ "\_tagsparsefailure" *}*, "\_index": "slingshot\_crayfabrichealth-2024.03.22", "\_id": "UHHeY44BRwra4ArKbyXu", "\_score": 4.0919304, "\_source": { "name" · "CnavEabricHeal+b"

ζ,

# CUSTOM RULE – PROCEDURE (CONT..)

4. Define the alerting condition based on the fields and values.

# **4. ALERTING CONDITION AND FIELDS**

# curl -XGET 'http://admin:9200/slingshot\_crayfabrichealth-2024.03.22/\_search?&pretty' -H 'Content-Type: application/json'

fields.Value holds the event message Fields.PhysicalSubContext holds the severity

Information needed on alert message:

- fields.Location
- fields.PhysicalContext
- fields.Value
- fields.PhysicalSubContext

```
"_index": "slingshot_crayfabrichealth-2024.03.22",
"_id": "T3HeY44BRwra4ArKbyXu",
"_score": 4.0919304,
"_source": {
 "name": "CrayFabricHealth",
 "@version": "1".
  "_tags": [
   {}
  ],
 "timestamp": 1711072499,
  "@timestamp": "2024-03-22T01:55:05.676237717Z",
 "fields": {
    "Switch": "x3000c0r42",
    "ParentalIndex": 2,
    "Index": 0,
    "SubIndex": 1
    "PhysicalContext": "LinkErrors.PortNotConnectedToExpectedFabricPort"
    "Timestamp" · "2024_03_22T01.54.50 2787"
    "Value": "Recommend: Ensure the fabric port is cabled correctly or
     the topology template and PT-PT file is correct; Cause: The port
     is not connected to expected fabric port",
    "Location": "x3000c0r42j1p0",
    "DeviceSpecificContext": "",
   "PhysicalSubContext": "CRITICAL"
   "SstValue": 0
  },
  "taas": [
    "_tagsparsefailure"
"_index": "slingshot_crayfabrichealth-2024.03.22",
"_id": "UHHeY44BRwra4ArKbyXu",
"_score": 4.0919304,
"_source": {
"name" · "CnayEabricHeal+b"
```

5. Refer to the given SAMPLE rule file to write the rule YAML file (includes 3 sections: General/Input, Query, trigger conditions)

# 5. OPENSEARCH – CUSTOM RULE (YAML)

```
name: <Monitor Name>
monitor_type: <Monitor type>
enabled: <Set true/false>
schedule:
    period:
    unit: <time unit SEC/MINUTES/HOURS>
    interval: <interval timing> _____
```



### **OpenSearch Monitor Information:**

- specify the name for the monitoring alert rule
- choose a monitoring type (per query monitor/per bucket monitor)
- set 'enabled' to true to enable the alert rule by default
- use the 'schedule' field to determine how frequently the monitoring rule should run.

name: <Monitor Name>
monitor\_type: <Monitor type>
enabled: <Set true/false>
schedule:
 period:
 unit: <time unit SEC/MINUTES/HOURS>

interval: <interval timing>

name: Slingshot Health Alert monitor\_type: bucket\_level\_monitor enabled: true schedule: period: unit: MINUTES interval: 5

### input: indices: - <index name OR in regex> . . . query: size: <Optional field <Set value to get the result>> query period: unit: <query time unit SEC/MINUTES/HOURS> interval: <interval timing> dsl query: <Optional field> bool: <filter/should/must not> - <term/terms/match/mathc pharse> <respective/fields and values> . . .

```
aggregation:
<AGGR_NAME>:
<term/avg ..>
...
```

### **OpenSearch Query Information:**

- Specify a list of index names from which to query the data.
- Set the query size (default is 0)
- query period to retrieve the data
- Then compose the DSL query.
- Use aggregation(term/average) to group the data and assign a name to the aggregation.

```
input:
  indices:
    - <index name OR in regex>
    . . .
  query:
    size: <Optional field <Set value to get the result>>
    query period:
      unit: <query time unit SEC/MINUTES/HOURS>
      interval: <interval timing>
    dsl query: <Optional field>
      bool:
        <filter/should/must not>
          - <term/terms/match/mathc pharse>
              <respective/fields and values>
        . . .
    aggregation:
      <AGGR NAME>:
        <term/avg ..>
        . . .
```

# Info about the opensearch query input: indices: - slingshot crayfabrichealth-\* query: size: 1 query period: unit: MINUTES interval: 5 dsl query: bool: filter: - exists: field: fields.Value.keyword aggregation: health: terms: fields: - fields.Location.keyword - fields.PhysicalContext.keyword - fields.Value.keyword - fields.PhysicalSubContext.keyword size: 1000

### **Trigger Information:**

- Define unique trigger names with severity (1-5).
- In conditions, set 'bucket\_path' for bucket variables and 'parent\_bucket\_path' for aggregations.
- Use Painless in the script for complex rules. Under actions, set notification channel and alert template.
- For bucket-level monitors, choose action frequency (per\_alert | per\_execution).

```
triggers:
 - name: <trigger Name>
    severity: <trigger severity>
    condition:
     buckets path:
        < create the bucket variables like >
        doc count: count
        . . .
      parent bucket path: <parent aggregation bucket. <AGGR NAME> >
      script:
        source: < trigger condition like (params.doc count > 0) >
    actions:
      - name: <Action Name>
        message template:
          <add fields in msg template like>
          fieldl : 'valuel'
          field2 : 'value2'
          . . .
        throttle enabled: <enable throttle true/false>
        action execution policy:
          <per_alert, execution>:

    DEDUPED

            – NEW
```

#### triggers:

- name: <trigger Name> severity: <trigger severity> condition: buckets path: < create the bucket variables like > doc count: count parent bucket path: <parent aggregation bucket. <AGGR NAME> > script: source: < trigger condition like (params.doc count > 0) > actions: - name: <Action Name> message template: <add fields in msg template like> fieldl : 'valuel' field2 : 'value2' ... throttle enabled: <enable throttle true/false> action execution policy: <per alert, execution>: DEDUPED – NEW

```
- name: Slingshot Health Critical Event
 severity: 3
 condition:
   buckets path:
      doc count: count
   parent bucket path: health
   script:
      source: params.doc count > 0
   filter:
      include: .*, fields PhysicalSubContext=CRITICAL
 actions:
 - name: Alertmanager
   message template:
      alertname: '{{ctx.trigger.name}}'
      severity: critical
      datasource: opensearch
      group: switch
      dashboard: SlingshotAlerts
      alert event: '{{#ctx.newAlerts}} {{bucket keys}}
                    {{/ctx.newAlerts}}{{#ctx.dedupedAlerts}}
                    {{bucket keys}}
                    {{/ctx.dedupedAlerts}}'
   throttle enabled: false
   action_execution_policy:
     per alert:
      - DEDUPED
      - NEW
```



6. Validate the written rule YAML file and enable it via CLI



# 6. VALIDATE AND ENABLE RULE - OPENSEARCH

# cm monitoring alerting opensearch --enable-rule /opt/clmgr/alerting/opensearch-alerting/alert\_rules/slingshot/slingshot\_health.yml
Validating and Enabling opensearch rule(s)..
Successfully enabled the monitor for alert rule 'Slingshot Health Alert'

If the rule must be disabled:

# cm monitoring alerting opensearch --disable-rule Slingshot Health Alert
Successfully disabled the monitor for alert rule 'Slingshot Health Alert'



Integration into CSM 1.6 (SMA 1.10) and future Sys Management monitoring solutions

Further addition of hardware (PDU, etc.) and software components into alerting.





Improvements on reporting and visualization



Additional features for the customer to integrate custom/own plugin for alerting system



Plugin support for the system admin to take subsequent automated corrective actions based on Alerts.

# THANK YOU

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## **RULE ENGINES - OVERVIEW**

### **OPENSEARCH ALERTING**

Alerting plugin in OpenSearch Dashboards to monitor our data and create alert notifications that trigger when conditions occur in one or more indexes.

- Key Components:
  - Monitor Query, condition
  - Trigger condition
  - Action labels, annotations, channels/contact points



# **RULE ENGINES - OVERVIEW**

## **GRAFANA ALERTING**

- Key Components:
  - Alert rules query, expression, condition
  - Labels/Annotations
  - Notification policy
  - Contact points



### ALERTMANAGER



### AN OVERVIEW OF HOW ALERTMANAGER WORKS :

A service (and software) in charge of collecting, deduplicating and sending notifications for alerts.

Part of the Prometheus ecosystem and therefore Prometheus itself has native support to act as Alertmanager client.

Handles alerts sent by client applications such as the Prometheus server, Grafana Alerting, OpenSearch Alerting.

Takes care of deduplicating, grouping, and routing them to the correct receiver

Helps in routing these alerts to the correct receiver integration such as email, kafka, Slack.