

Computer Monitoring with Prometheus & Grafana

Brad Davis, Enikoe Bihari, Eliana Purcell
HPC Academy 2018

August 14, 2018

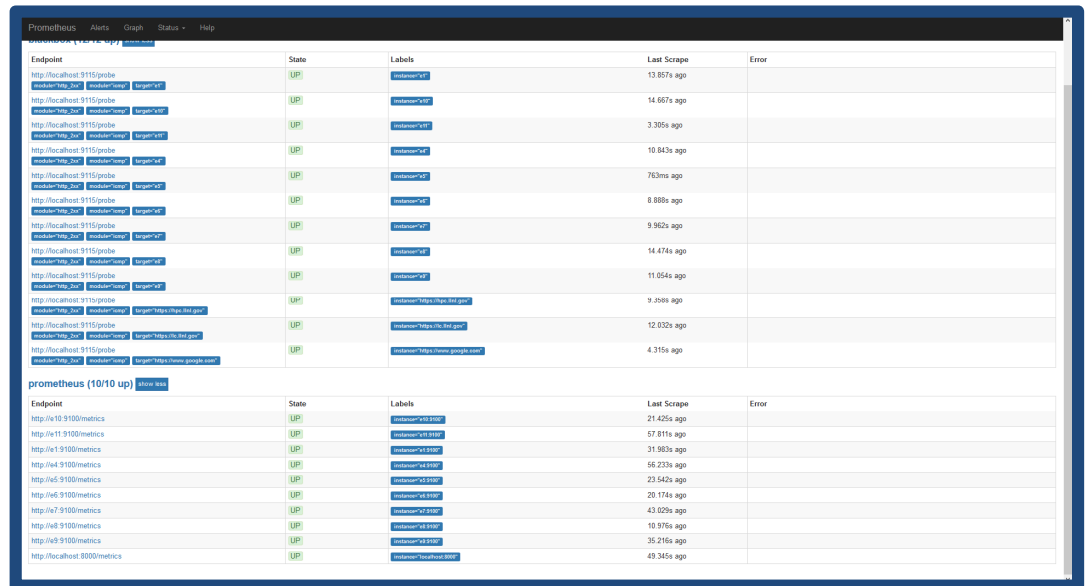


LLNL-PRES-XXXXXX

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

Prometheus

- Computer monitoring database software that stores data received from various exporters

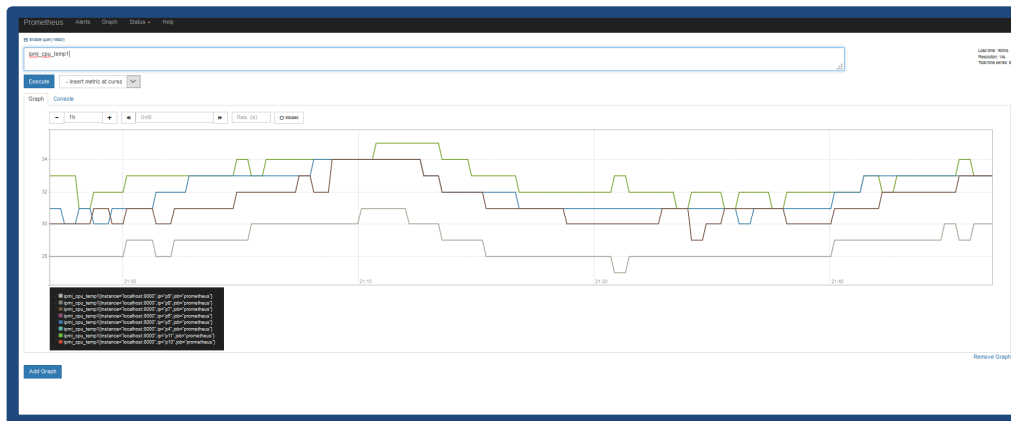


The screenshot shows the Prometheus web interface with a table of endpoints. The table has columns for Endpoint, State, Labels, Last Scrape, and Error. The endpoints are listed in two sections: 'prometheus (10/10 up)' and 'prometheus (10/10 up)'. The first section lists endpoints for various Prometheus instances, and the second section lists endpoints for various Prometheus instances.

Endpoint	State	Labels	Last Scrape	Error
http://localhost:9115/probe	UP	prometheus="1"	13.857s ago	
http://localhost:9115/probe	UP	prometheus="2"	14.667s ago	
http://localhost:9115/probe	UP	prometheus="3"	3.305s ago	
http://localhost:9115/probe	UP	prometheus="4"	10.843s ago	
http://localhost:9115/probe	UP	prometheus="5"	763ms ago	
http://localhost:9115/probe	UP	prometheus="6"	8.888s ago	
http://localhost:9115/probe	UP	prometheus="7"	9.962s ago	
http://localhost:9115/probe	UP	prometheus="8"	14.474s ago	
http://localhost:9115/probe	UP	prometheus="9"	11.054s ago	
http://localhost:9115/probe	UP	prometheus="10"	9.208s ago	
http://localhost:9115/probe	UP	prometheus="11"	12.032s ago	
http://localhost:9115/probe	UP	prometheus="12"	4.315s ago	

prometheus (10/10 up)

Endpoint	State	Labels	Last Scrape	Error
http://10.10.100:9100/metrics	UP	prometheus="13"	21.455s ago	
http://10.11.100:9100/metrics	UP	prometheus="14"	57.911s ago	
http://10.12.100:9100/metrics	UP	prometheus="15"	31.983s ago	
http://10.13.100:9100/metrics	UP	prometheus="16"	16.233s ago	
http://10.14.100:9100/metrics	UP	prometheus="17"	23.542s ago	
http://10.15.100:9100/metrics	UP	prometheus="18"	20.174s ago	
http://10.16.100:9100/metrics	UP	prometheus="19"	43.029s ago	
http://10.17.100:9100/metrics	UP	prometheus="20"	10.976s ago	
http://10.18.100:9100/metrics	UP	prometheus="21"	35.216s ago	
http://localhost:9000/metrics	UP	prometheus="22"	49.345s ago	



Prometheus Configuration

```
1 global:
2   scrape_interval: 15s
3 rule_files:
4   - alert.rules.yml
5
6 alerting:
7   alertmanagers:
8     - static_configs:
9       - targets:
10         - localhost:9093
11
12 scrape_configs:
13
14   - job_name: 'prometheus'
15     scrape_interval: 60s
16     scrape_timeout: 30s
17     static_configs:
18       - targets: ['localhost:8000', 'e1:9100', 'e4:9100', 'e5:9100', 'e6:9100', 'e7:9100', 'e8:9100', 'e9:9100', 'e10:9100', 'e11:9100']
19
20   - job_name: 'blackbox'
21     metrics_path: /probe
22     params:
23       module: [http_2xx, icmp]
24     static_configs:
25       - targets:
26         - https://www.google.com
27         - https://hpc.llnl.gov
28         - https://lc.llnl.gov
29         - e1
30         - e4
31         - e5
32         - e6
33         - e7
34         - e8
35         - e9
36         - e10
37         - e11
38     relabel_configs:
39       - source_labels: [__address__]
40         target_label: __param_target
41       - source_labels: [__param_target]
42         target_label: instance
43       - target_label: __address__
44         replacement: localhost:9115
~
```

Exporters

- Scrape various data from the nodes
 - Node Exporter
 - IPMI Exporter
 - Blackbox Exporter

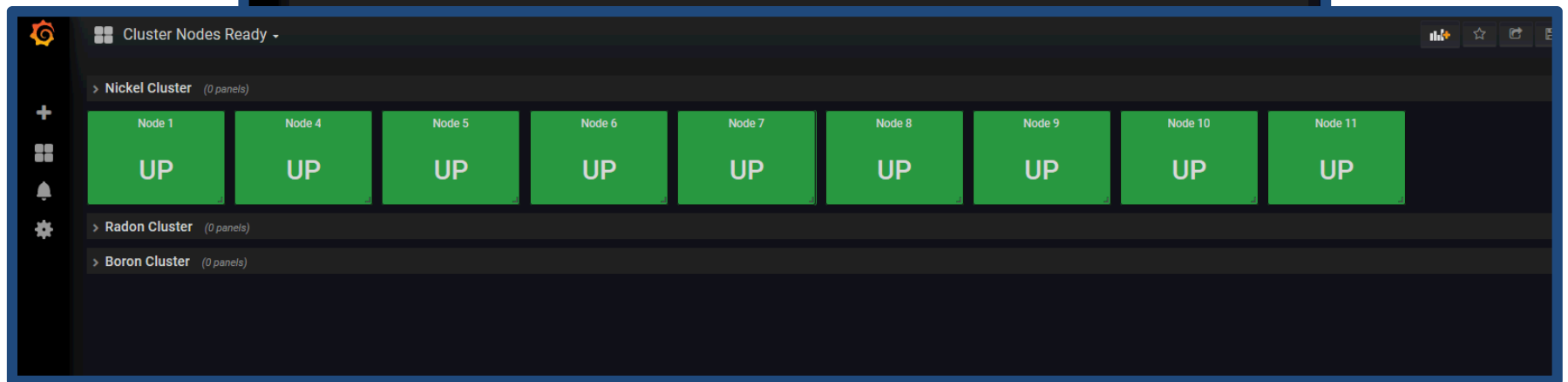
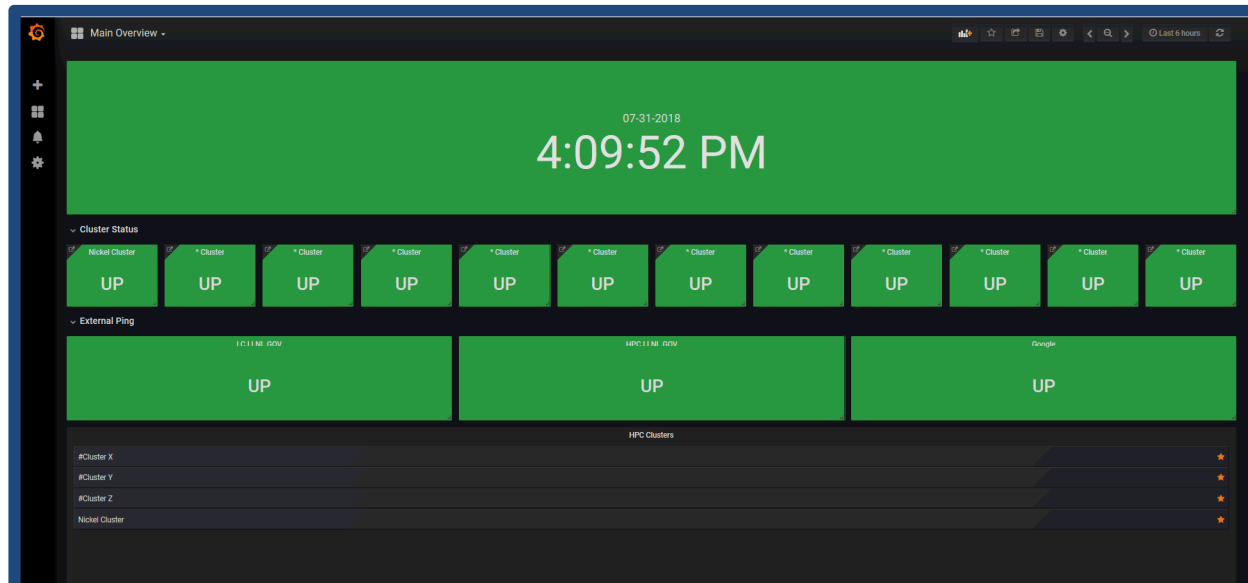


Grafana

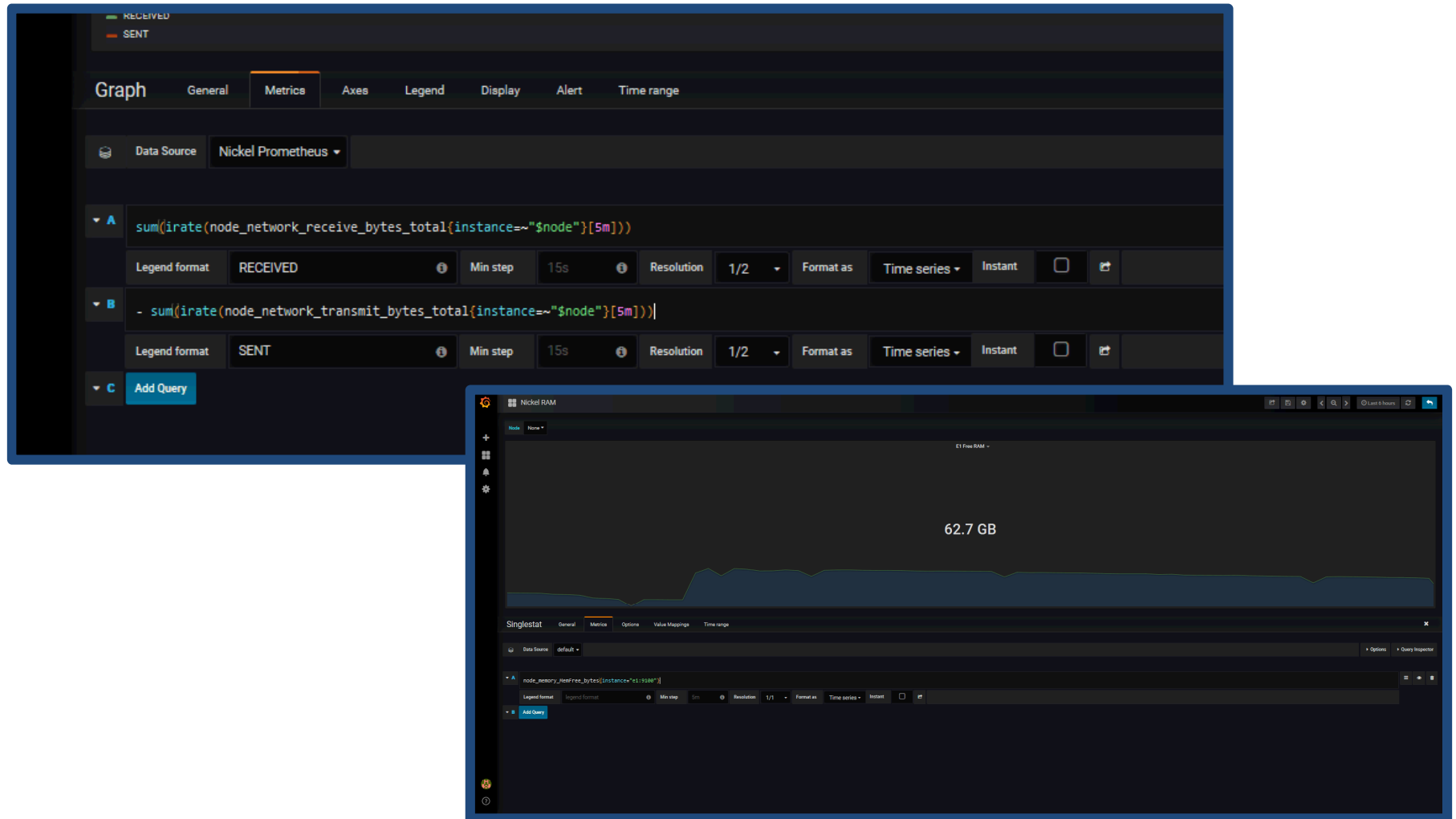
- Grafana is a versatile UI
- Displays the data from Prometheus on dashboards



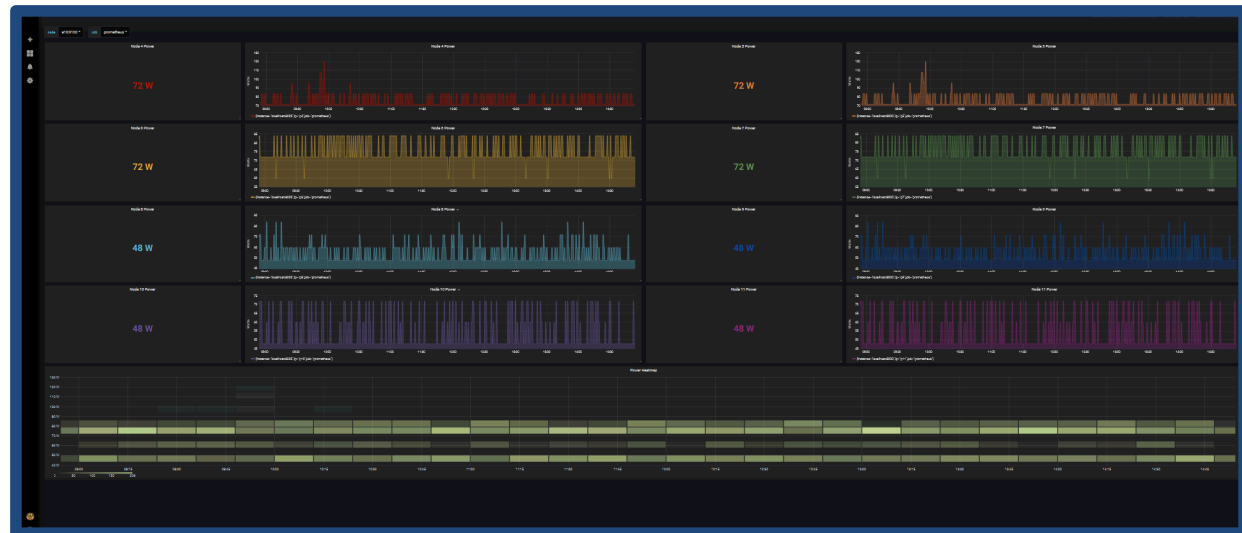
Main Dashboard



Queries



Drilldowns



Alertmanager Configuration

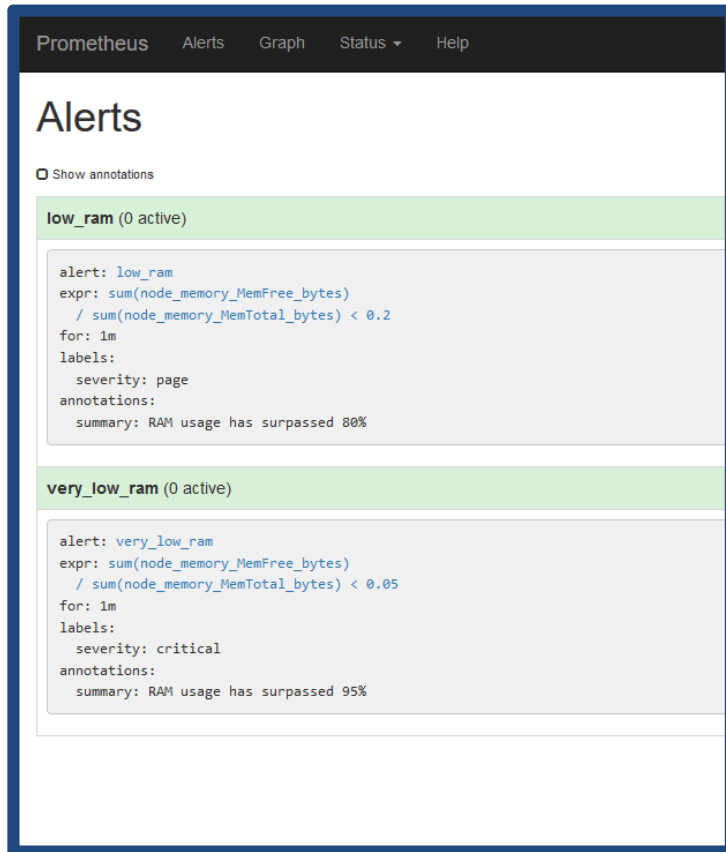
```
1 global:
2   smtp_smarthost: 'localhost:25'
3   smtp_from: 'alertmanager@smtp.llnl.gov'
4   smtp_require_tls: false
5 route:
6   group_by: ['alertname', 'instance', 'severity']
7   group_wait: 30s
8   group_interval: 5m
9   repeat_interval: 3h
10  receiver: nickel
11 routes:
12   - match:
13     severity: critical
14     receiver: TeslaMan
15   inhibit_rules:
16     - source_match:
17       severity: 'critical'
18       target_match:
19         severity: 'page'
20 receivers:
21   - name: 'nickel'
22     email_configs:
23       - to: 'bihari2@llnl.gov, davis282@llnl.gov, purcell8@llnl.gov'
24   - name: 'TeslaMan'
25     email_configs:
26       - to: 'dixon30@llnl.gov'
```

```
41 rule_files:
40   - alert.rules.yml
39
38 alerting:
37   alertmanagers:
36     - static_configs:
35       - targets:
34         - localhost:9093
```

- Alertmanager groups and sends alerts when certain metrics reach a threshold
- Sends alerts over email and Slack to different groups depending on the type of alert

```
1 groups:
2   - name: RAM
3     rules:
4       - alert: low_ram
5         expr: sum(node_memory_MemFree_bytes) / sum(node_memory_MemTotal_bytes) < 0.20
6         for: 1m
7         labels:
8           severity: "page"
9         annotations:
10          summary: "RAM usage has surpassed 80%"
11       - alert: very_low_ram
12         expr: sum(node_memory_MemFree_bytes) / sum(node_memory_MemTotal_bytes) < 0.05
13         for: 1m
14         labels:
15           severity: "critical"
16         annotations:
17          summary: "RAM usage has surpassed 95%"
18
```

Alert Examples



Prometheus Alerts Graph Status Help

Alerts

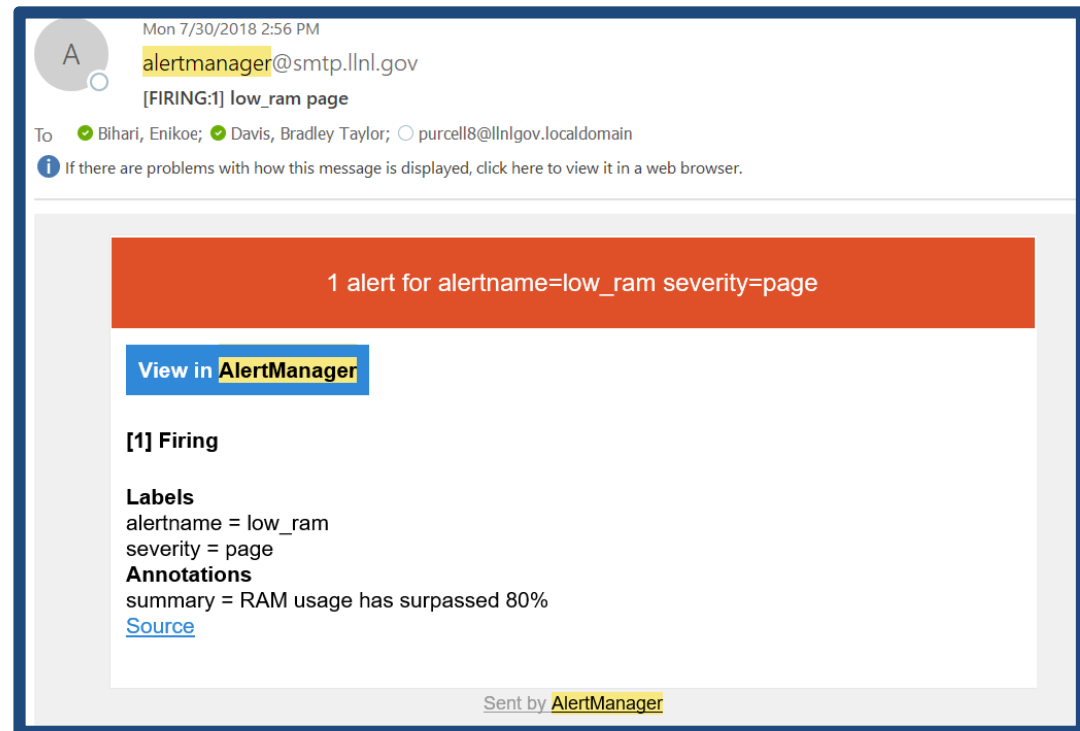
Show annotations

low_ram (0 active)

```
alert: low_ram
expr: sum(node_memory_MemFree_bytes)
      / sum(node_memory_MemTotal_bytes) < 0.2
for: 1m
labels:
  severity: page
annotations:
  summary: RAM usage has surpassed 80%
```

very_low_ram (0 active)

```
alert: very_low_ram
expr: sum(node_memory_MemFree_bytes)
      / sum(node_memory_MemTotal_bytes) < 0.05
for: 1m
labels:
  severity: critical
annotations:
  summary: RAM usage has surpassed 95%
```



Mon 7/30/2018 2:56 PM
alertmanager@smtp.llnl.gov
[FIRING:1] low_ram page

To: Bihari, Enikoe; Davis, Bradley Taylor; purcell8@llnl.gov.localdomain

If there are problems with how this message is displayed, click here to view it in a web browser.

1 alert for alertname=low_ram severity=page

[View in AlertManager](#)

[1] Firing

Labels
alertname = low_ram
severity = page

Annotations
summary = RAM usage has surpassed 80%

[Source](#)

Sent by [AlertManager](#)

Scalability With Ansible

- Automated the installation and configuration of Prometheus, Grafana, etc. with Ansible
- Allows for scalability for future use



Questions?



Disclaimer

This document was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor Lawrence Livermore National Security, LLC, nor any of their employees makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or Lawrence Livermore National Security, LLC. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or Lawrence Livermore National Security, LLC, and shall not be used for advertising or product endorsement purposes.