Computer Monitoring with Prometheus & Grafana

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Prometheus

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

```yaml
global:
  scrape_interval: 15s
rule_files:
  - alert.rules.yml

alerting:
  alertmanagers:
  - static_configs:
      - targets:
        - localhost:9093

scrape_configs:
  - job_name: 'prometheus'
    scrape_interval: 60s
    scrape_timeout: 5s
    static_configs:

  - job_name: 'blackbox'
    metrics_path: /probe
    params: [http_2xx,icmp]
    static_configs:
      - targets: ['https://www.google.com', 'https://hpc.llnl.gov', 'https://lc.llnl.gov', 'e1', 'e4', 'e5', 'e6', 'e7', 'e8', 'e9', 'e10', 'e11']
      - relabel_configs:
        - source_labels: [__address__]
          target_label: __param_target
        - source_labels: [__param_target]
          target_label: instance
          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

A. $\text{sum(irate(node_network_receive_bytes_total(instance="&node")[5m]))}$
   - Legend format: RECEIVED
   - Min step: 15s
   - Resolution: 1/2
   - Format as: Time series

B. $- \text{sum(irate(node_network_transmit_bytes_total(instance="&node")[5m]))}$
   - Legend format: SENT
   - Min step: 15s
   - Resolution: 1/2
   - Format as: Time series

C. Add Query

Graph: 62.7 GB
Drilldowns
Alertmanager Configuration

- 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

```yaml
global:
  smtp_smarthost: 'localhost:25'
  smtp_from: 'alertmanager@smtp.llnl.gov'
  smtp_require_tls: false

route:
  group_by: ['alertname', 'instance', 'severity']
  group_wait: 30s
  group_interval: 5m
  repeat_interval: 3h
  receiver: nickel

receivers:
  - name: 'nickel'
    email_configs:
      - to: 'bihari2@llnl.gov, davis282@llnl.gov, purcell8@llnl.gov'
  - name: 'TeslaMan'
    email_configs:
      - to: 'dixon30@llnl.gov'

inhibit_rules:
  - source_match:
    severity: 'critical'
  - target_match:
    severity: 'page'

41 rule_files:
  - alert.rules.yml

39 alerting:
38 alertmanagers:
37 - static_configs:
36   - targets:
35     - localhost:9093
```

```yaml
1 - name: RAM
2  rules:
3   - alert: low_ram
4     expr: sum(node_memory_MemFree_bytes) / sum(node_memory_MemTotal_bytes) < 0.20
5     for: 1m
6     labels:
7       severity: "page"
8     annotations:
9       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%"
```
Alert Examples

Prometheus

Alerts

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%

Alerts Manager

Message: low Ram page

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

1 alert for alertname=low_ram severity=page

View in AlertManager

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?
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