Beyond MVP: Prometheus installation to monitor OpenShift Cluster at Sabre

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Agenda:

- Sabre & Next Generation Platform
- NGP Monitoring - Metrics
  - CMO vs NGP Metrics Stack
  - Self-Serviced Grafana
  - Self-Serviced Prometheus
  - Prometheus/Thanos HA configuration
  - Prometheus/Thanos performance
  - Future work
Sabre....
Who are we?
Global scale and reach

Every minute of every day, Sabre technology powers travel.

62.5M
API Calls via Dev Studio

132K
Flights searched

5.2K
Hotel rooms shopped

Headquarters in Dallas/Fort Worth

Global Development Centers
- Dallas/Fort Worth, Texas
- Krakow, Poland
- Bangalore, India

Sabre Sonic Mobile Concierge
GetThere Mobile Booking
SynXis Property Hub

#redhat #rhsummit
OpenShift at Sabre
Sabre’s technology evolution

Next Generation Platform / System services

- Logging
  - Elasticsearch, Kibana
- Monitoring
  - Prometheus, Thanos, Grafana
- Tracing
  - Jaeger
- Service Mesh
  - Istio
OpenShift Monitoring at Sabre
Where we come from

NGP SaaS metrics vision

● SaaS with multi tenancy (including replacement for existing tools)
● Adhere to Open API standards (e.g. Open Metrics)
● Open Source stack & commoditization
● Aligned with K8S & CNCF & RH vision
● Fully self-serviced (K8S CRDs)
● Participate in the community (GitHub SabreOSS)

In-house on-premise metrics

● Multiple systems, various technologies, developed over years
● Hundreds of heterogeneous applications with custom requirements
  ○ 100 mln incoming (sparse) data points per minute
  ○ 60 mln aggregated (sparse) data points per minute
  ○ 140 mln unique aggregated time series daily
Cluster Monitoring Operator (CMO)

Shipped with the Platform
- provides monitoring of the cluster components
  - ships with set of Alerts
  - ships with set of Dashboards

Monitoring the health of the Cluster
- K8S Nodes
- K8S API server
- Kublets

Exporters
- node exporter
- kube-state-metrics

What it does not provide
- application metrics
- application alerts
- application dashboards
- integration with ServiceNow
CMO vs NGP Metrics stack

CMO installation is effectively immutable
- except integration with SNOW

Custom NGP Prometheus stack for APPs:
- self - service (CRDs)
- multi tenancy (RBAC)

Sabre specific tweaks:
- Prometheus 2.8.1 (performance improvements)
- Customized Prometheus Operator (0.29)
- Customized Grafana image (6.1.1)
Self-serviced Grafana

Sabre specific tweaks:

- Grafana deployment managed manually
  - stateful data (snapshots, sandbox organization)
  - shared db file in HA configuration
  - OAuth (htpasswd-file)

- Multi-tenancy based on Folders & OpenShift RBAC
  - #12948, #10339

- Java based Operator
  - sync users and teams between Grafana and OpenShift
  - upload dashboards accordingly (e.g. tweak id / uid)

- Additional data sources
  - AlertManager, Elastic Search (Logging / Tracing)
Self-serviced Prometheus

Sabre specific tweaks:

- Prometheus 2.8.1 includes all critical tweaks
  - Merge postings (tsdb): #480, #486, #531, ...
  - Slowdown in Web UI: #5139
  - Size based storage retention
- Upgrade procedure
  - Single vs multiple operator instances
- Restore from snapshot procedure
  - PVC snapshot not vs manual procedure
- CRDs
  - Reuse CMO cluster level setup
- Custom operator image
  - CRD error handling: #2273, #380, ...
- Prometheus Web UI is not multi-tenant
  - Delegate alerts view to Grafana
Prometheus/Thanos HA configuration

Sabre specific tweaks:

- Based on Thanos 0.4.0 / master
- Long term storage (multiple years)
  - #957
- Multi-cluster aggregation
  - #454
- Thanos receiver (remote write) by RedHat - #659
  - Short blocks (3-5 min) for sparse metrics
  - Long duration queries (up to 10 minutes)
Prometheus/Thanos performance

- **Standard metrics**
  - Prometheus (tsdb 0.6.1): 10-20M/minute with 16 CPUs / 64 GB RAM
- **Sparse metrics**
  - Prometheus (tsdb 0.6.1): 3M/minute with 16 CPUs / 64 GB RAM
  - Thanos receiver (tsdb 0.6.1): 3M/minute with 16 CPUs / 64 GB RAM
- **5 mln per minute metrics test**
  - Queries over 24h period:
    - Combining 200 time series ~2 sec
    - Combining 1500 time series ~3sec
    - Combining 12k time series ~12sec
  - Queries over “very sparse” dataset
    - Combining 30k time series (15 min period) ~8 sec
    - Combining 2mln time series (5 min period) ~10 min
- **Known limitations:**
  - Thanos: #814
  - TSDB: #561
Future work

Q3&Q4:

- Mainline Sabre specific tweaks to Operators and Tools
  - Open source Grafana operator
- Further improvements in Prometheus / Prometheus Operator
  - #1871 - Skip malformed rules when processing PrometheusRule CRDs
  - #2273 - Prometheus Operator should validate Prometheus Rule expression syntax
- Remove need to use Prometheus / Thanos Web UIs
  - Report Service Monitor status via Events in K8S
- Metrics delivery via asynchronous channels (Kafka)
- Strong(er) multi tenancy separation on TSDB level
  - Prom-label-proxy
- Data science / ML / AI for alerting and forecasting
  - AIOps: Anomaly detection with Prometheus
- Re-evaluate Cortex & M3DB
Our previous mindset was build it, now we’re contributing to it. Will you join in, too?
Questions?
THANK YOU

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