Monitoring and Data-Driven Decisions with Prometheus and SUSE Manager

How monitoring of dynamic environments can be made easier with SUSE Manager, Prometheus and Grafana

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Observability

“...a measure of how well internal states of a system can be inferred from knowledge of its external outputs.”

- Metrics
- Logging
- Distributed tracing
Observability

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- Metrics
- Logging
- Distributed tracing

If systems don’t adequately externalize their state, monitoring will fall short.
Monitoring – Metrics

Main data source for Alerting and Visualization:

• Starting point for troubleshooting
  • “Something looks wrong on this dashboard"

• Used as Service Level Indicators

• How available are we to the outside world?

• What are our customers experiencing?
Monitoring – Metrics

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Good metrics help to eliminate hypotheses before you investigate them.
Prometheus and Grafana
About Prometheus

• Originally built at SoundCloud
• Has its own time-series database
• Data collection via pull model over HTTP
• Targets are set via static configuration or service discovery
• Metrics have a name, a set of labels, a timestamp and a value
Exposing Metrics

• Each application/system we want to monitor must expose metrics

• Instrumentation vs Exporters

• When the metrics endpoint is embedded into an existing application, it's referred to as instrumentation. When it is part of a stand-alone process, we call it an Exporter.

• Extensive list of Prometheus exporters
  • [https://prometheus.io/docs/instrumenting/exporters/](https://prometheus.io/docs/instrumenting/exporters/)

• Node exporter is one of the most widely used

• Easy to build your own exporters

• You can monitor almost anything
Blackbox Monitoring

- Enables probing of endpoints over HTTP(s), DNS, TCP and ICMP
- Blackbox exporter is a helper daemon that can accept commands from Prometheus
- Preferred method to monitor services from the outside
- Can easily measure service latency
- Transparent integration with Prometheus
- The blackbox daemon is yet another scrape target
- Can be useful when you have no access to client internals
- But should not be used as a replacement for proper instrumentation
Querying Metrics

• Prometheus has its own query language – PromQL
• PromQL is a functional expression language
• Easily filter multi-dimensional time-series
• Example: HTTP internal server errors per second… an hour ago
  • rate(api_http_requests_total{status=500}[5m] offset 1h)
• Regex matching
  • up{instance=~"web-server-.*"} == 0
• Used in all interactions with Prometheus (visualization, alerts)
Alerts

- Prometheus has its own alerting system – Alert Manager
- Takes care of deduplicating, grouping, and routing
- Alerting rules are written in PromQL
- Supports HA setups
- Integration with email, PagerDuty and OpsGenie
- HTTP API and CLI tool: amtool
- Can be “plugged” into your existing scripts
Grafana

- Used to query and visualize metrics
- Works with Prometheus, but not only…
- Grafana supports multiple backends
- It is possible to combine data from different sources in the same dashboard
- Fully customizable
- Each panel has a wide variety of styling and formatting options
- Supports templates
- Collection of add-ons and pre-built dashboards
Putting the Pieces Together
How to Get Started

• Which Prometheus components will I need?
• How can I configure my clients to expose metrics?
• What can be automated?
• How do I get started with building graphics?
• And, what should I monitor?
Building Blocks

- Packaged Prometheus, Grafana and exporters
- Integration with SUSE Manager
- Monitoring best practices
- Future vision
SUSE Manager
What Is SUSE Manager?

• Systems and infrastructure management (on-prem or cloud)
• Based on Spacewalk in the past, now forked into Uyuni:
  • https://www.uyuni-project.org/
• Backend based on Salt Open
• Management of diverse client architectures and OSs
• Scalability is an ongoing challenge
SUSE Manager Meets Monitoring

Set up and automate Prometheus monitoring with SUSE Manager

• Packages will be provided via official channels:
  • Main packages (Prometheus, Grafana) from SUSE Manager channels
  • Specific metrics exporters alongside the respective applications
• Enable exporters on managed clients using Salt Formulas
• Group systems to define data exporter templates
• Integration with Prometheus service discovery
SUSE Manager Meets Monitoring

Self-monitoring of SUSE Manager Server and Proxy

- Easily enable monitoring of SUSE Manager Server
- Pre-installed exporters can expose metrics about:
  - Hardware
  - Java virtual machines
  - Apache and PostgreSQL
  - SUSE Manager’s internals
- SUSE Manager Proxy to be monitored via squid exporter
SUSE Manager Meets Monitoring

Coming next...

- Provisioning of Prometheus and Grafana servers
- Integration with existing Prometheus setups
- Closing the monitoring loop
  - Automatically enable monitoring during client onboarding
  - Alert templates by system group and integration with AlertManager
  - Fully automated integration with Prometheus service discovery
  - Optional encryption and authentication on the metrics endpoints
  - Automatic provisioning of Grafana dashboard templates
Researching

Grafana Loki: Prometheus-inspired logging
Common monitoring building blocks for SUSE products
Grafana add-on development
Live Demo
Live Demo

- SUSE Manager self-monitoring
- Install and enable exporters on managed clients
- Integration with Prometheus service discovery
- Grafana dashboards
- Alerts
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