ISC High Performance

REINVENTING HPC

MAY 12 – 16, 2024 | HAMBURG, GERMANY

Introduction to key technologies III: Prometheus

Jonathan Decker
(Georg-August-University Göttingen / GWDG)

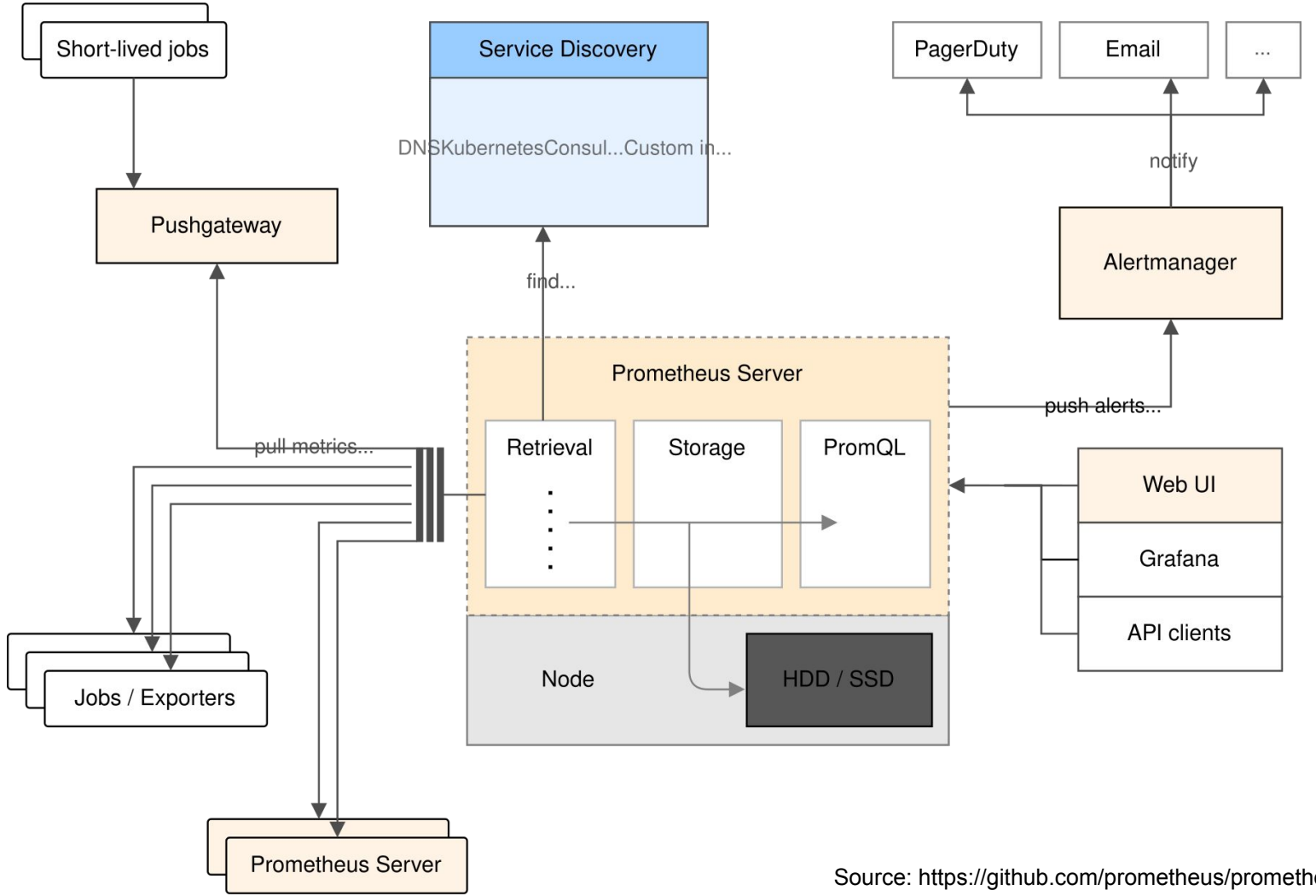
Outline

1. Prometheus Introduction
2. Practical Examples
3. Hands-On

Prometheus Overview

- Monitoring system and time series database
- Fully open source under Apache 2.0
  - Written in Go (mostly)
- CNCF graduated project since 2018
  - Cloud Native Computing Foundation
  - Support from many major companies
- Deployment components
  - Prometheus Server
  - Node Exporter on each client
  - Grafana or other dashboard
  - …

Prometheus



Source: https://github.com/prometheus/prometheus

Core Concepts

Prometheus

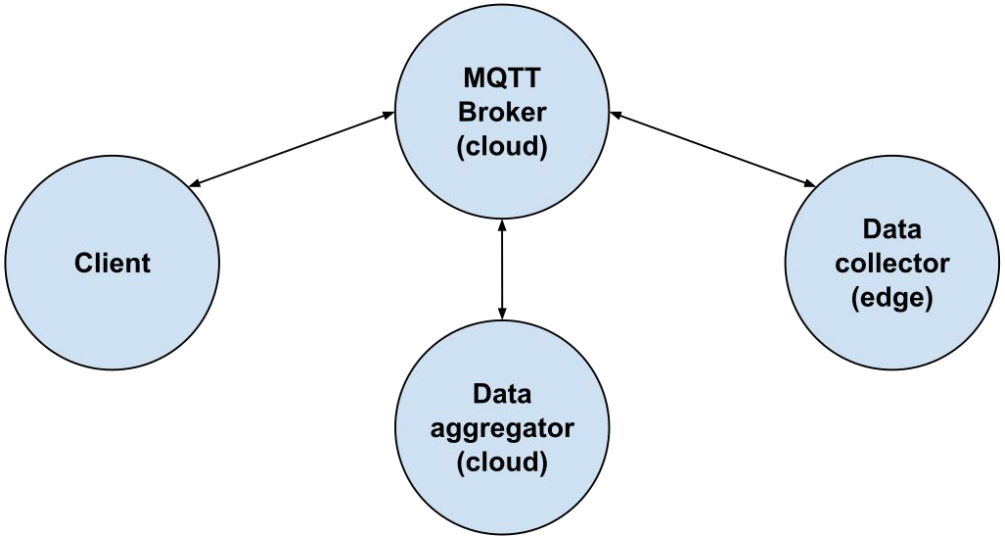
- Pull-based metrics gathering via HTTP
  - Prometheus server needs to discover clients
  - Also supports push-based gathering via gateway
- PromQL specialized query language for Prometheus
- Exporters collect and offer metrics
  - Large number of applications implement exporters
- Service Discovery mechanisms for automatically adding endpoints
  - Integrates well with Kubernetes
- Alerting via alertmanager based on metrics thresholds
- Scaling through hierarchical federation

Practical Examples

- Server resources
  - CPU, RAM, disk, network
- Database performance
  - Query response time, connection pool size, cache hit rate
- Infrastructure metrics
  - Server uptime, IPMI
- Application specific metrics
  - Response time, error rates, request volume
- Alerting
  - Email, Slack, PagerDuty

Hands-on

- Plan
  - Deploy container application
  - Connect client and data collector to MQTT broker
  - Configure Prometheus to collect metrics from client and data collector
  - View application metrics and server metrics via Prometheus



Agenda

14:00 - 14:25	Compute continuum and 1-2 use cases
14:25 - 14:45	Introduction to key technologies I: Containers and container orchestration systems
14:45 - 15:30	Hands-on I: Container building and deployment in homogeneous environments
15:30 - 15:35	Introduction to key technologies II: KubeEdge
15:35 - 16:00	Hands-on II: Container building and deployment in heterogeneous environments
16:00 - 16:30	*Coffee break*
16:30 - 16:45	Introduction to key technologies III: Prometheus
16:45 - 17:45	Hands-on III: Workflow implementation based on prepared components
17:45 - 18:00	Wrap-up