



#### The Open Source Observability Toolkit on Oracle Cloud

#### Mickey Boxell – Oracle Cloud Native Labs

#OracleCloudNative cloudnative.oracle.com

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#### <u>Who am I?</u>

Mickey Boxell Solution Architect, Developer Advocate, etc.

#### **Oracle Cloud Native Labs**

Build customer-deployable cloud native/container native solutions to bridge the gap between Oracle Cloud Infrastructure (OCI) and open source communities. http://cloudnative.oracle.com/

# **Context: An Era of Microservices**

Microservice environments:

- Distributed
- Container-based
- Polyglot
- Highly-scalable
- Ephemeral



### **Context: An Era of Microservices**

New challenges:

• Latency

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- Integration testing
- Pinpointing issues
- Root cause analysis



#### **Observability**

- Designing and operating a more visible system
- Systems experience failure be prepared
- Can you test your system in a realistic way?
- Can you monitor external outputs?
- Have you considered the business impact?



# **Observability**

**External outputs:** 

- Logs: a record of an event that took place at a given time
- Metrics: numeric aggregation of data describing behavior of a component or service measured over time
- Tracing: capturing a request flow of causally-related events in a distributed environment

#### Observability – the SRE Approach

- Site Reliability Engineering (SRE): reliably operating systems and infrastructure at scale
- Service level indicators (SLIs), Service level objectives (SLOs), Service level agreements (SLAs)
- Define metrics that matter most to the business, ideal values for those metrics, and the planned reaction if values aren't met
- Increase mean time to failure (MTTF) decrease mean time to repair (MTTR)

#### **Sample Application**

- Built using the Helidon framework Java libraries for microservice development
- Main.java and RESTful GreetService.java along with app.yaml
- Tracing, health, and metrics instrumented
- Deployed on Kubernetes with sidecar injection enabled



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Helidon Greeting Application v2



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# Logging

- Logs: a record of an event that took place at a given time
- Supported by most libraries
- Disciplined to put meaningful logs into your code
- Aggregate logs to avoid losing them
- Java logging classes and a logging.properties configuration file writing to stdout

#### Logging

- FluentD used to scrape logs, process, and ship them
- Stored in a persistent data store, such as Elasticsearch, distributed analytics engine
- Queried directly or interacted with by means of **Kibana**, a customizable visualization dashboard
- Choose a tool to capture and analyze logs



#### **Metrics**



- Metrics: numeric aggregation of data describing behavior of a component or service measured over time
- Easy to store and model
- Useful to understand typical system behavior
- Supported by most libraries
- Java metrics classes that push data to a /metrics endpoint

#### <u>Metrics</u>

- **Prometheus**, open source systems monitoring toolkit, includes libraries to create in-process samples, tools to scrape data and also send it to the Prometheus time-series database, and also a query language to analyze the data
- Grafana, an open source data visualization tool for monitoring, can be used to aggregate metric data from numerous sources into dashboards that provide a summary view of key metrics

#### **Metrics**



- Oracle Cloud Monitoring Service offers out of the box aggregated metrics for Oracle Cloud Infrastructure resources
- Metrics are available on the Oracle Cloud Console and via API
- We worked with Grafana to expose the Monitoring service as a Grafana data source

# Metrics - Alerting

- Alerts: notifications indicating a human needs to take action in response to something that is either happening or about to happen to improve the situation
- Metrics are well-suited to trigger alerts
- Grafana can be used to create a rule that will trigger an alert when particular conditions are met

# Tracing



- Tracing: capturing a request flow of causally-related events in a distributed environment - visibility into request structure and path Each has a request a global ID - metadata inserted at each step in the flow, referred to as a span, as the ID is passed along
- Distributed tracing systems like Jaeger or Zipkin are used to visualize + inspect traces
- OpenTracing: a language-neutral approach to distributed tracing

#### Service Mesh

- Service Mesh : configurable infrastructure layer for microservice
  - applications used to control east-west traffic between services
- Monitor and control the flow of traffic through your cluster
- Service meshes use the sidecar pattern, the practice of provisioning each pod with a proxy container

#### Service Mesh

- Simplifies tracing: meshes can capture latency, retry, and failure information for each hop in a request
- Istio provides out of the box integrations with a number of open source observability tools: Grafana, Prometheus, Jaeger, and Kiali, and also prepopulate them with helpful dashboards
- **Kiali**: an observability tool for lstio that helps you visualize the relationships between services running in the mesh

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# Key Takeaways



- Observability takes a holistic approach to operations
- Its practices give you maximum visibility into the behavior of a modern distributed system
- Gain insight from logging, metrics, and tracing discover issues, pinpoint their location, and determine a fix
- Proactively test and improve system performance/efficiency
- Recognize impact to the business





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