Day 2 Operations of Cloud-Native Systems

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Elizabeth K. Joseph, Developer Advocate

- 15+ years working in open source communities
- 10+ years in Linux systems administration and engineering roles
- Founder of OpenSourceInfra.org
- Author of *The Official Ubuntu Book* and *Common OpenStack Deployments*
Anyone can write a deployment tool.

What’s next?
Cloud-Native Systems

You no longer have a single server with everything running on it.

It’s now a multi-tier system with various owners down the stack:

- Network
- Hardware
- Resource abstraction
- Scheduler
- Container
- Virtual network
- Application
- ...
Unification of tooling

This gets out of hand very quickly

Unification of operations and tracking becomes important

- Reduces resource consumption (multiple monitoring & logging agents, etc)
- Simplifies troubleshooting (tracing a problem through the stack)
- Consolidates view for all parties (from operations to app developers)
DAY 2 OPERATIONS

Metrics and Monitoring
- Collecting metrics
- Downstream processing
  - Alerting
  - Dashboards
  - Storage (long-term retention)

Logging
- Scopes
- Local vs. centralized
- Security considerations
DAY 2 OPERATIONS

Maintenance
- Cluster Upgrades
- Cluster Resizing
- Capacity Planning
- User & Package Management
- Networking Policies
- Auditing
- Backups & Disaster Recovery

Troubleshooting
- Debugging
  - Services
  - System
- Tracing
- Chaos engineering
METRICS & MONITORING
METRICS CONCEPTS

node

- service
- container
- host

collectd

event router

- storage
- dashboard
- alerting
METRICS TOOLCHAIN

- local scraping:
  a. collectd
  b. cAdvisor

- event router:
  a. fluentd
  b. Flume
  c. Kafka
  d. logstash
  e. Riemann
storage:

a. Elasticsearch
b. Graphite
c. InfluxDB
d. KairosDB/Cassandra
e. OpenTSDB/HBase
f. others such as local filesystem, Ceph FS, HDFS, etc.
METRICS TOOLCHAIN

- dashboard:
  
a. D3
  
b. Grafana
  
c. signal fx

- alerting:
  
a. BigPanda
  
b. PagerDuty
  
c. signal fx
  
d. VictorOps

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INTEGRATED METRICS TOOLCHAIN

- Amazon CloudWatch
- AppDynamics
- Azure Monitor
- Circonus
- DataDog
- dcos/metrics
- Ganglia
- Google Stackdriver
- Hawkular
- Icinga
- Librato
- Nagios
- New Relic
- OpsGenie
- Pingdom
- Prometheus
- Ruxit Dynatrace
- Sensu
- Sysdig
- Zabbix
LOGGING
LOGGING
SCOPES

- service (app/business)
- container
- host & intra-host
LOGGING TOOLING EXAMPLES (PRIMITIVES)

- DC/OS logging overview
- Docker logging drivers
- systemd's `journalctl`
LOGGING TOOLING EXAMPLES (INTEGRATED)

- Centralized app logging with fluentd
- DC/OS
  - ELK stack log shipping
  - Splunk
- Graylog
- Loggly
- Papertrail
- Sumo Logic
TROUBLESHOOTING

Incl. examples with DC/OS
Effective troubleshooting

A high level view to discover where the error or failure has occurred (preferably a unified view)

Tooling for tracing an error through the stack (systems, networks, etc)

Team communication and tooling for delegating solutions responsibility
 DEBUGGING 101

- **Services**: typically specific to service, use logging (for example, `dcos task log`) and `dcos node ssh` or `dcos task exec` for per-node investigations

- **System**:
  - Simple diagnostics via `dcos node diagnostics`
  - Comprehensive dump via `clump`
  - Services deployment troubleshooting dashboard
Recent Resource Offers (2)

When you attempt to deploy a service, DC/OS waits for offers to match the resources your service requires. If the offer does not satisfy the requirement, it is declined and DC/OS retries. Learn more.

Summary

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<th>Memory 0/1</th>
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Matched  Declined

Details

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<th>PRT</th>
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</table>
- **Tracing**
  - Idea: identify latency issues and perform root-cause analysis in a distributed setup
  - OpenTracing

- **Chaos Engineering**
  - Idea: proactively break (parts of) the system to understand how it reacts
  - Chaos Monkey
  - DRAX
MAINTENANCE & BEYOND
Overview

- How to install a new version of X?
- When to scale what (service-level vs. nodes)
- Who gets to access/install which services in what way?

- Is everything getting where it needs to be? Does some traffic need priority?
- What services can talk to each other and in which way?
- Who accessed what, when and how?
- How is the continuous operation of the cluster and the services accomplished? What happens when cluster (or critical infra components like ZK) go down?

Upgrades

Sizing

User and package management

Networking

Auditing

Disaster Recovery
Properly managing cloud-native systems is complicated!

- Ask the right questions
- Have a checklist of considerations and plan in time to accomplish everything
- Unify as much as you can
Questions?
Feedback?

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