Day 2 Operations of Cloud-Native Systems

NEXTCON
CLOUD+DATA

Elizabeth K. Joseph, @pleia2

MESOSPHERE

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

Day 2 Operations

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

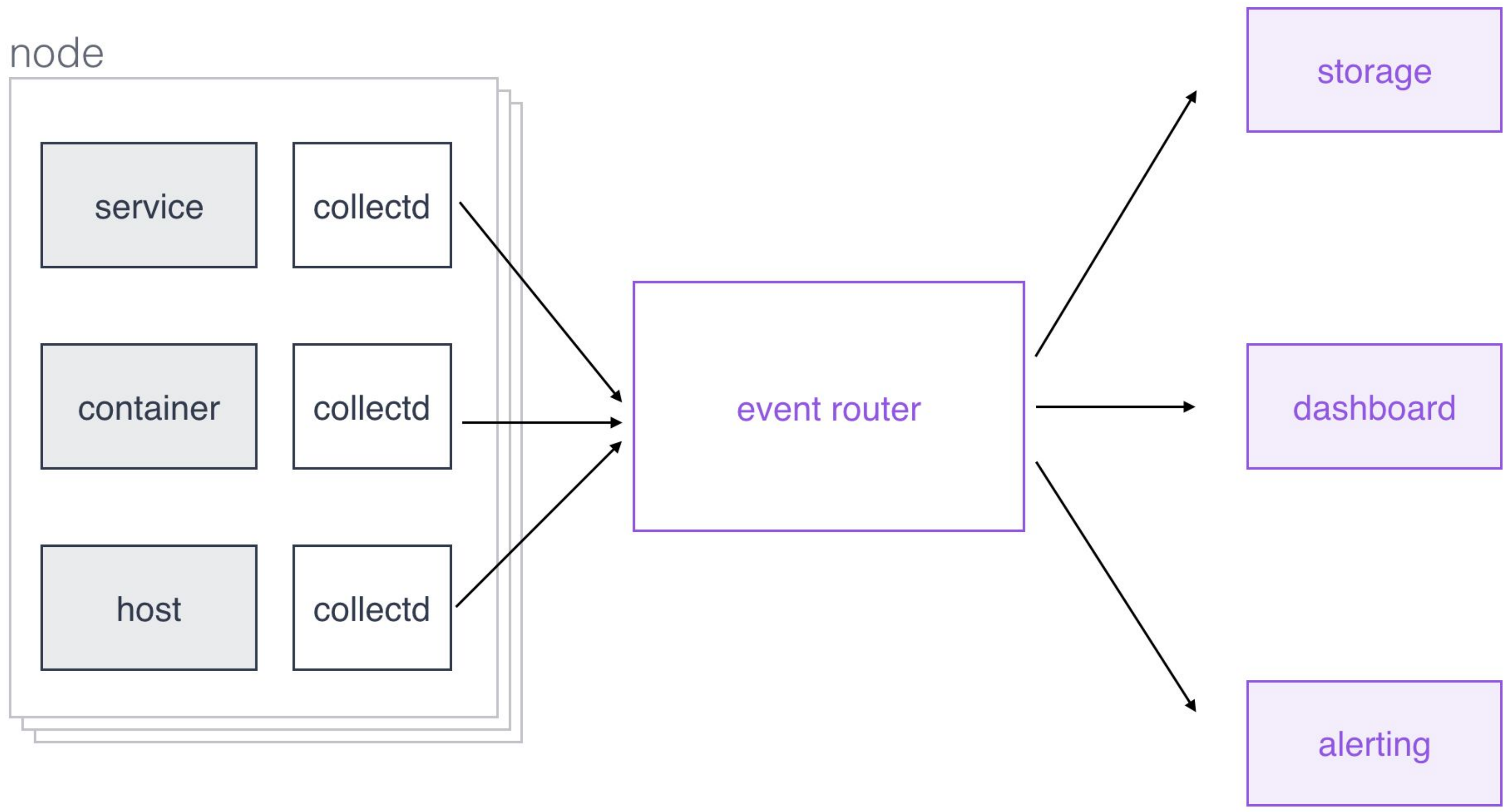
- Cluster Upgrades
- Cluster Resizing
- Capacity Planning
- User & Package Management
- Networking Policies
- Auditing
- Backups & Disaster Recovery

Troubleshooting

- Debugging
  - Services
  - System
- Tracing
- Chaos engineering

METRICS & MONITORING

METRICS CONCEPTS



METRICS TOOLCHAIN

- local scraping:
    a. collectd
    b. cAdvisor
- event router:
    a. fluentd
    b. Flume
    c. Kafka
    d. logstash
    e. Riemann

METRICS TOOLCHAIN

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

METRICS TOOLCHAIN

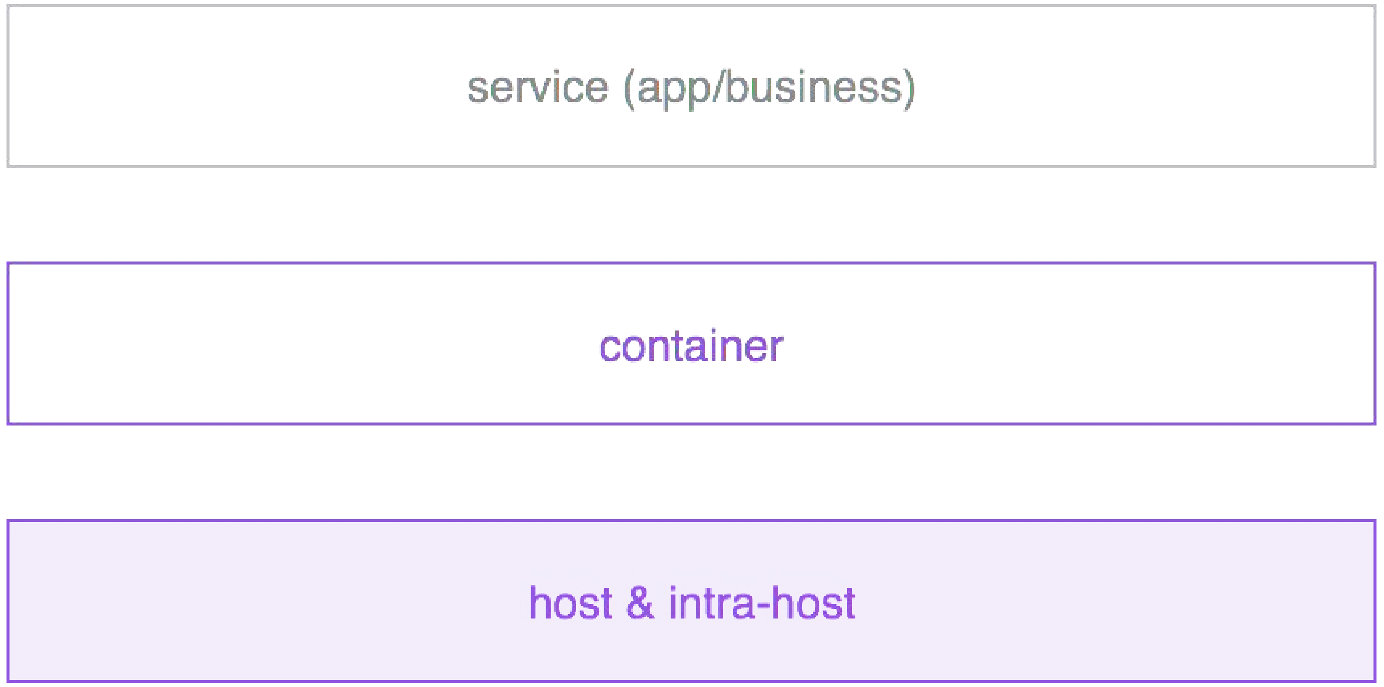
- dashboard:
  a. D3
  b. Grafana
  c. signal fx
- alerting:
  a. BigPanda
  b. PagerDuty
  c. signal fx
  d. VictorOps

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



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
  a. ELK stack log shipping
  b. 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)

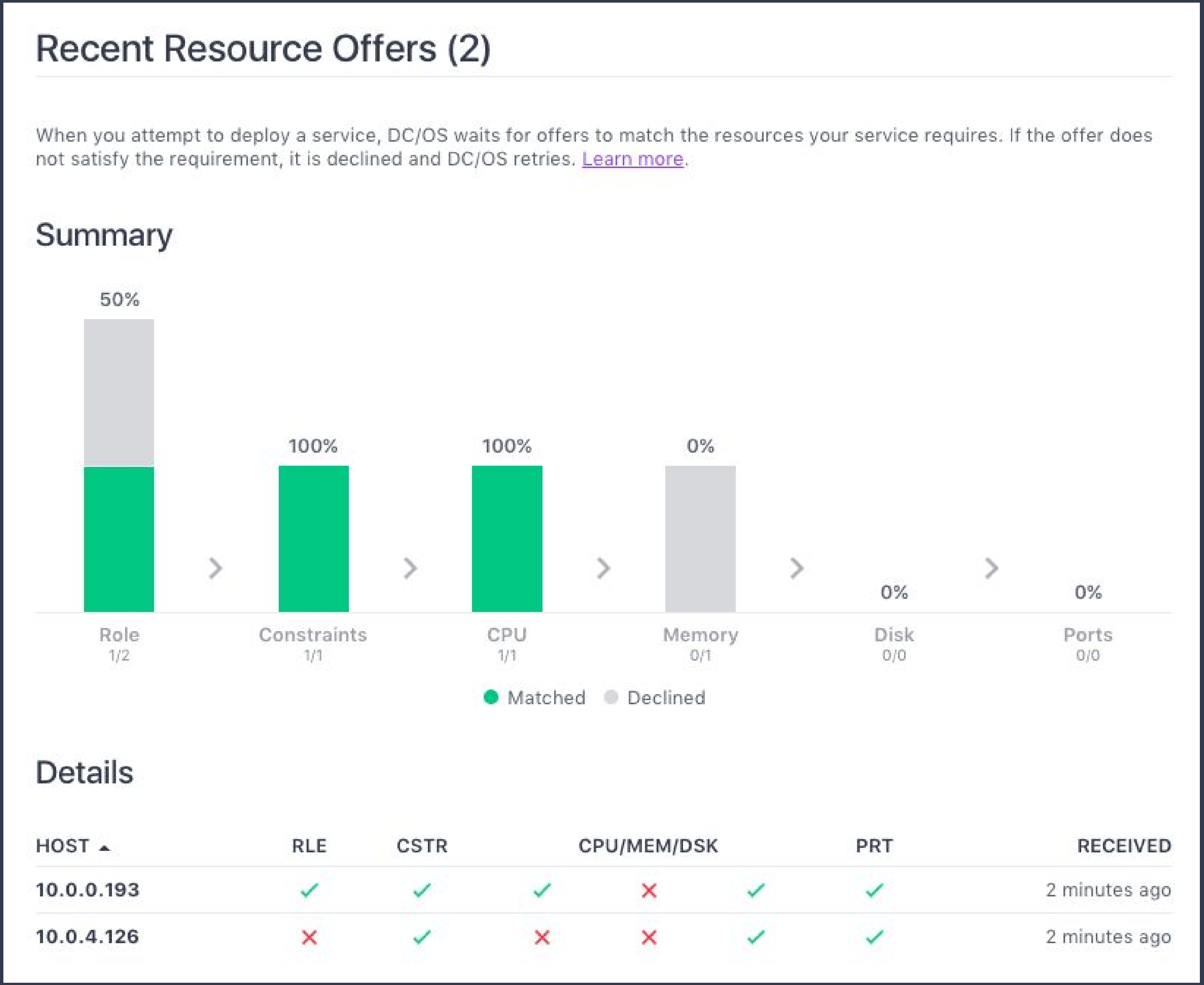
Team communication and tooling for delegating solutions responsibility

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

Debugging 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

Details

HOST ▲	RLE	CSTR	CPU/MEM/DSK			PRT	RECEIVED
10.0.0.193	✓	✓	✓	✗	✓	✓	2 minutes ago
10.0.4.126	✗	✓	✗	✗	✓	✓	2 minutes ago

OTHER TROUBLESHOOTING TECHNIQUES

- 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

Upgrades

Sizing

User and package management

- 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?

Networking

Auditing

Disaster Recovery

- 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?

Build in time

These things can’t be an afterthought when something goes wrong.

Build time into deployment and maintenance plan.

Checklist

Cloud-Native Infrastructure “Must Haves”

- ❏ Metrics collection
- ❏ Centralized logging
- ❏ Debugging tools that cover:
    - ❏ Host
    - ❏ Container
    - ❏ Application
- ❏ Upgrade strategy
- ❏ Backups
- ❏ Disaster recovery

To conclude

Properly managing cloud-native systems is complicated!

- ❑ Ask the right questions
- ❑ Unify and simplify as much as you can
- ❑ Have a checklist of considerations
- ❑ Plan in time to complete everything

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Questions? Feedback?

Elizabeth K. Joseph
Twitter: @pleia2
Email: ejoseph@dcos.io