Deploying Spring Boot Apps on Kubernetes

Thomas Risberg, Pivotal

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About Me

Thomas Risberg (@trisberg)

- Member of the Spring engineering team at Pivotal

- Contributing to Pivotal Riff Project and Spring Cloud Data Flow

- Joined the Spring Framework open source project in 2003 working on JDBC support

Two Hot Technologies

https://trends.google.com/trends/explore?q=kubernetes,spring%20boot

Pair programming with Spring Team

Pairing with Google Engineering Team?

> *Kubernetes builds upon 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community.*
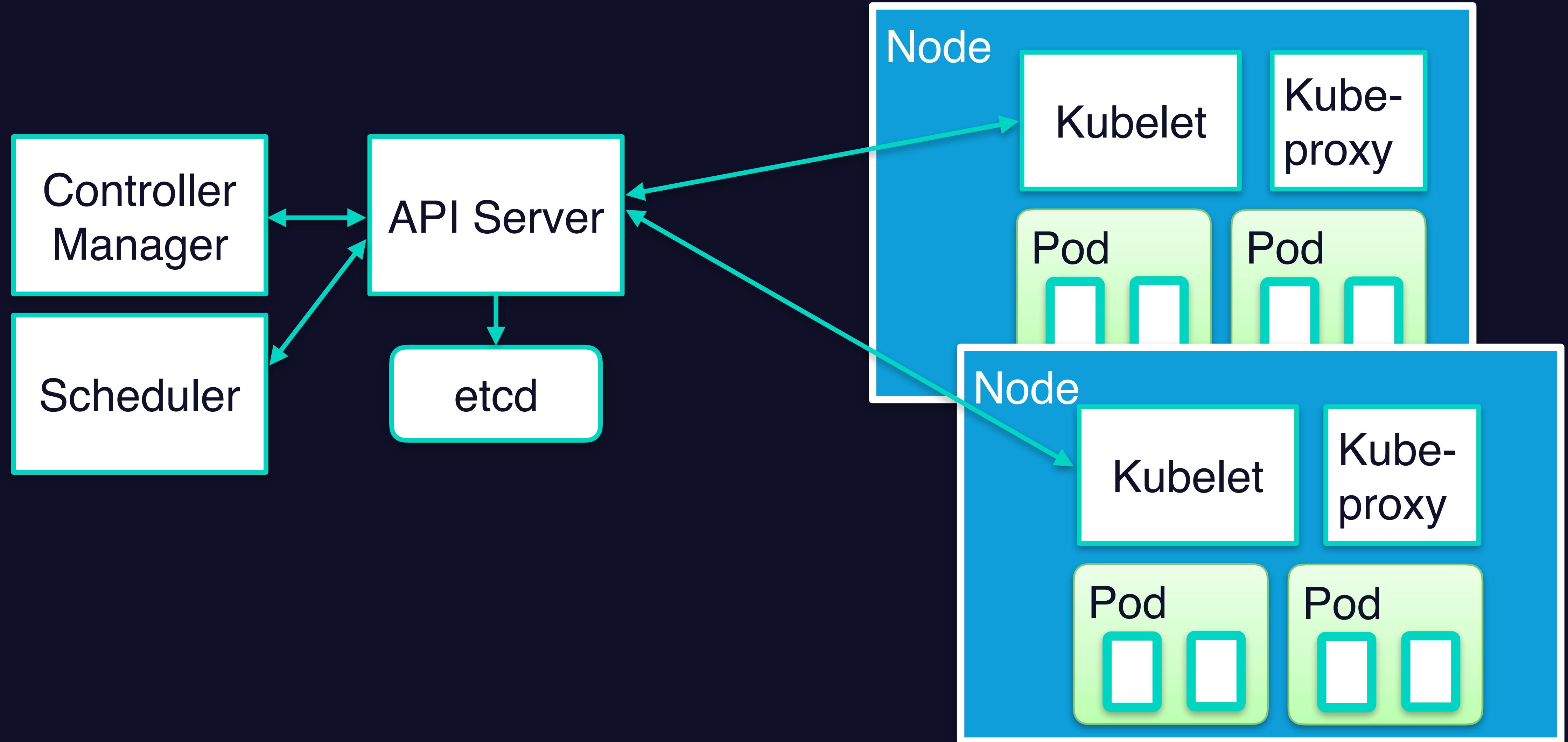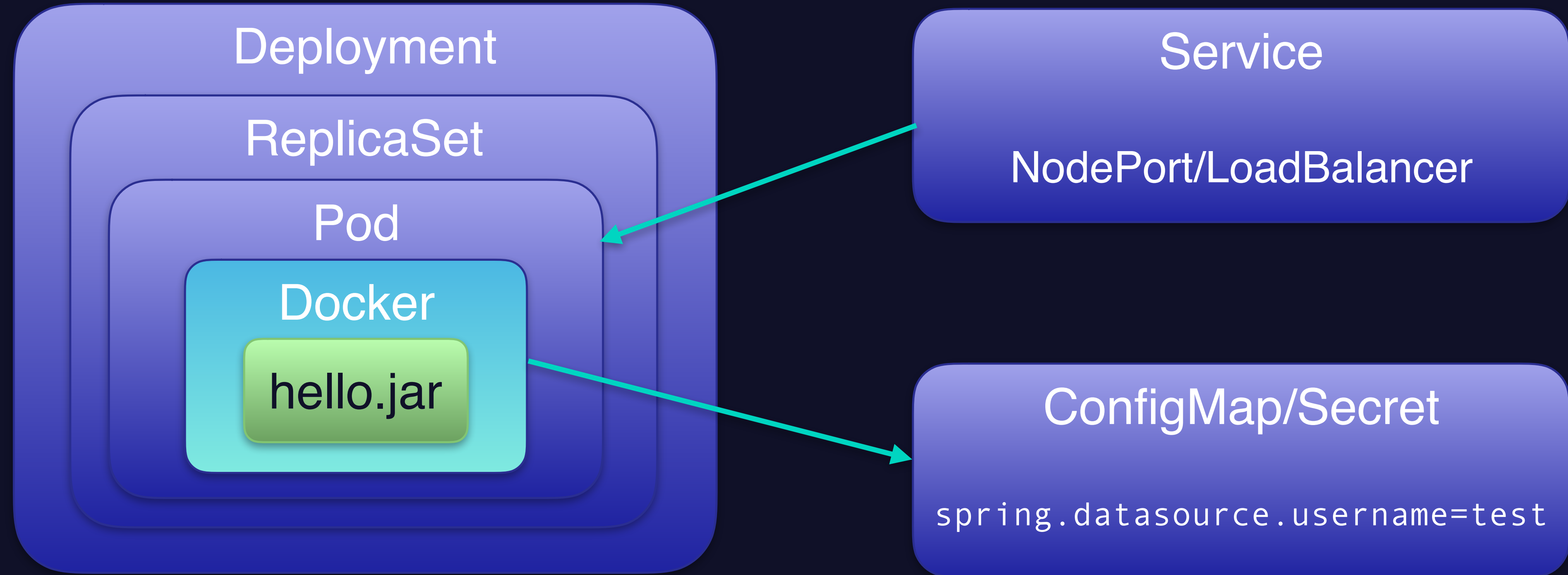
https://kubernetes.io/

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Demo

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**Simple Hello
Spring Boot/Kubernetes
app deployment**

https://github.com/trisberg/s1p2017-boot-k8s/blob/master/demo-hello.adoc

Kubernetes Architecture

Kubernetes Resources

Deployment

ReplicaSet

Pod

Docker

hello.jar

Service

NodePort/LoadBalancer

ConfigMap/Secret

`spring.datasource.username=test`

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Building Apps for Kubernetes

https://twitter.com/kelseyhightower/status/903640408613306369

Contracts exposed to the apps by the platform

https://twitter.com/kelseyhightower/status/903643916599046145

Externalized Configuration

- Environment variables
  - Easy to set in `deployment.yaml`
  - Might need to use `SPRING_APPLICATION_JSON` for map based properties
- ConfigMaps and Secrets
  - Can be set using environment or mounted as config files
- Use Spring Cloud Config Server
- Init container can write properties file to shared volume

Demo

Simple REST Repository App as part of a Microservice Architecture

https://github.com/trisberg/s1p2017-boot-k8s/blob/master/demo-actors.adoc

https://github.com/trisberg/s1p2017-boot-k8s/blob/master/demo-microservices.adoc

https://github.com/trisberg/boot-k8s-microservices/tree/s1p2017

Mount ConfigMaps

```yaml
spec:
  containers:
  - name: actors
    image: trisberg/actors:0.0.1-SNAPSHOT
…
    volumeMounts:
    - name: application-config
      mountPath: "/config"
      readOnly: true
  volumes:
  - name: application-config
    configMap:
      name: actors
      items:
      - key: application.yaml
        path: application-kubernetes.yaml
```

```yaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: actors
  labels:
    app: actors
data:
  application.yaml: |-
    security:
      basic:
        enabled: false
    spring:
      datasource:
        url: jdbc:mysql://${MYSQL_SERVICE_HOST}:${MYSQL_SERVICE_PORT}/mysql
        username: root
        password: ${MYSQL_ROOT_PASSWORD}
        driverClassName: com.mysql.jdbc.Driver
        testOnBorrow: true
        validationQuery: "SELECT 1"
```

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Access Secrets in Env Var

```yaml
apiVersion: v1
kind: Secret
metadata:
  name: mysql
  labels:
    app: mysql
data:
  mysql-root-password: eW91cnBhc3N3b3Jk
```

```yaml
env:
- name: SERVER_PORT
  value: '80'
- name: SPRING_PROFILES_ACTIVE
  value: kubernetes
- name: MYSQL_ROOT_PASSWORD
  valueFrom:
    secretKeyRef:
      name: mysql
      key: mysql-root-password
```
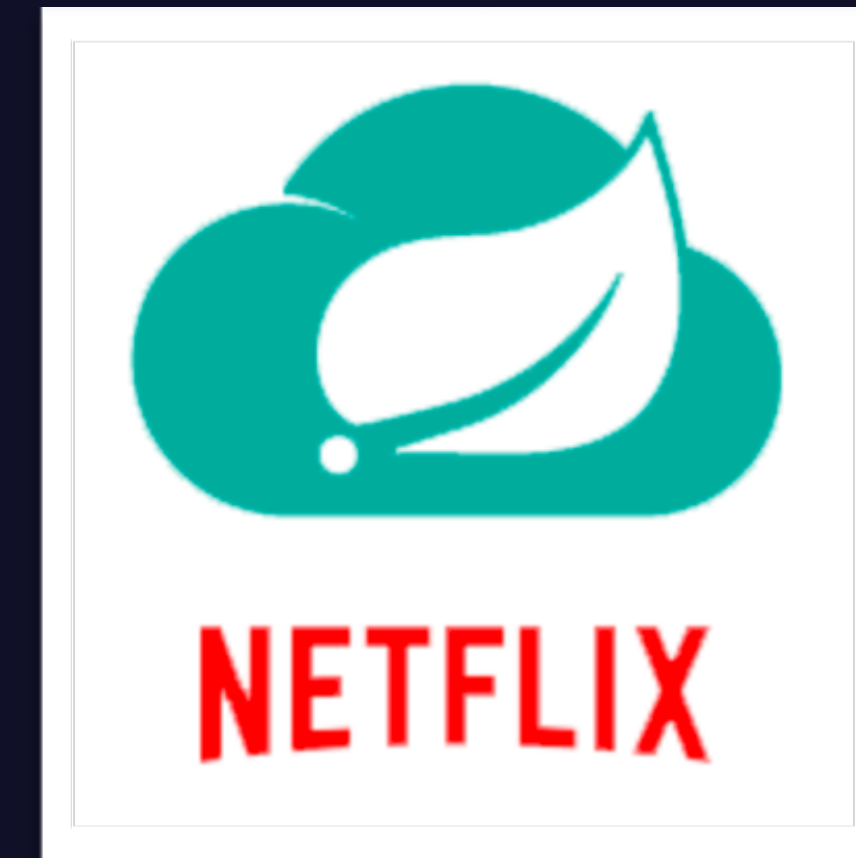
Microservice Architecture Concerns

- Externalized Configuration ✔
  - ConfigMap and Secrets
- Service Discovery ✔
  - DNS, DiscoveryClient
- Circuit-breaker
- Distributed Tracing
- Metrics
- Log aggregation

Microservice Runtime Management

- Circuit-breaker - Netflix Hystrix
- Distributed Tracing - Spring Cloud Sleuth / Zipkin
- Metrics - Spring Boot Actuator / Micrometer

- Service Mesh - Istio
  - load balancing / routing
  - policy enforcement
  - telemetry and reporting

Log Aggregation

- Spring Cloud Sleuth
  - https://cloud.spring.io/spring-cloud-sleuth/
- Stackdriver
  - https://kubernetes.io/docs/tasks/debug-application-cluster/logging-stackdriver/
- Elasticsearch and Kibana
  - https://kubernetes.io/docs/tasks/debug-application-cluster/logging-elasticsearch-kibana/
- Loggly
  - https://www.weave.works/blog/log-aggregation-kubernetes-loggly/

Packaging

- **Helm**
  - The package manager for Kubernetes
  - ‣ https://docs.helm.sh/using_helm/#quickstart-guide
- **KubeApps**
  - Discover & launch great Kubernetes-ready apps
  - ‣ https://kubeapps.com/
- **Example**
  - ‣ https://github.com/trisberg/boot-k8s-microservices/tree/devoxx-2017

Spring Cloud for Kubernetes

- Fabric8 team created `spring-cloud-kubernetes`
  - `DiscoveryClient for Kubernetes`
  - `ConfigMap and Secrets PropertySource`
  - `Ribbon discovery in Kubernetes`
  - `Zipkin discovery in Kubernetes`
  - `and more …`
- Now available in <u>spring-cloud-incubator</u> on GitHub

Learn More. Stay Connected.

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Kubernetes for the Spring Developer - Wednesday 03:20 Room: 2024

https://github.com/spring-cloud-incubator/spring-cloud-kubernetes

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