

# Java Microservices on Oracle Cloud

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Cloud Solution Architect, Oracle

## Safe Harbor

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# Agenda

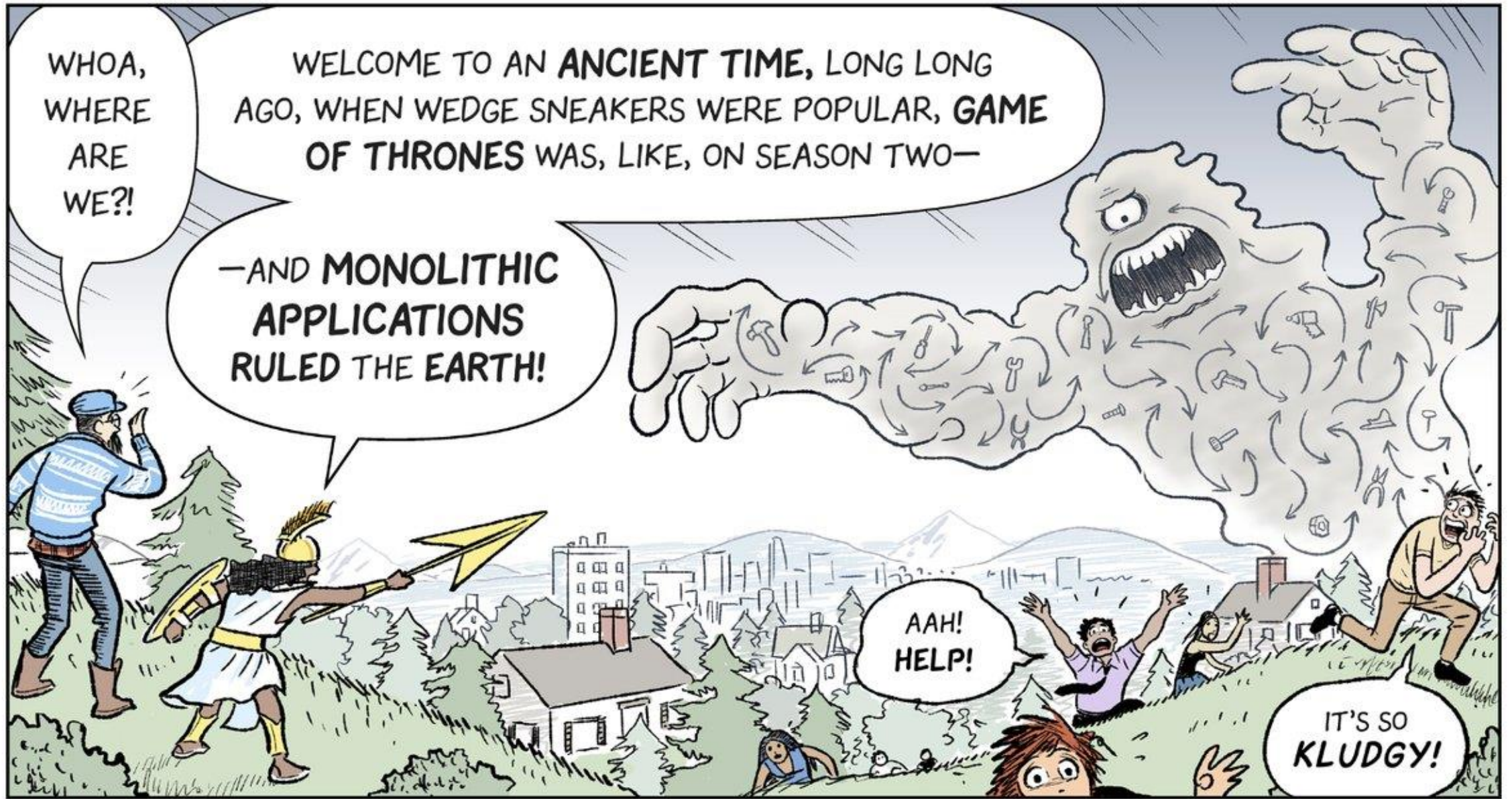
Concepts: Monolithic vs. Microservices, Containers, Kubernetes

Trends: Automation, APIs, Cloud

Building Java apps on Oracle Developer Cloud

Running Java apps on OCI Container Clusters

Demo



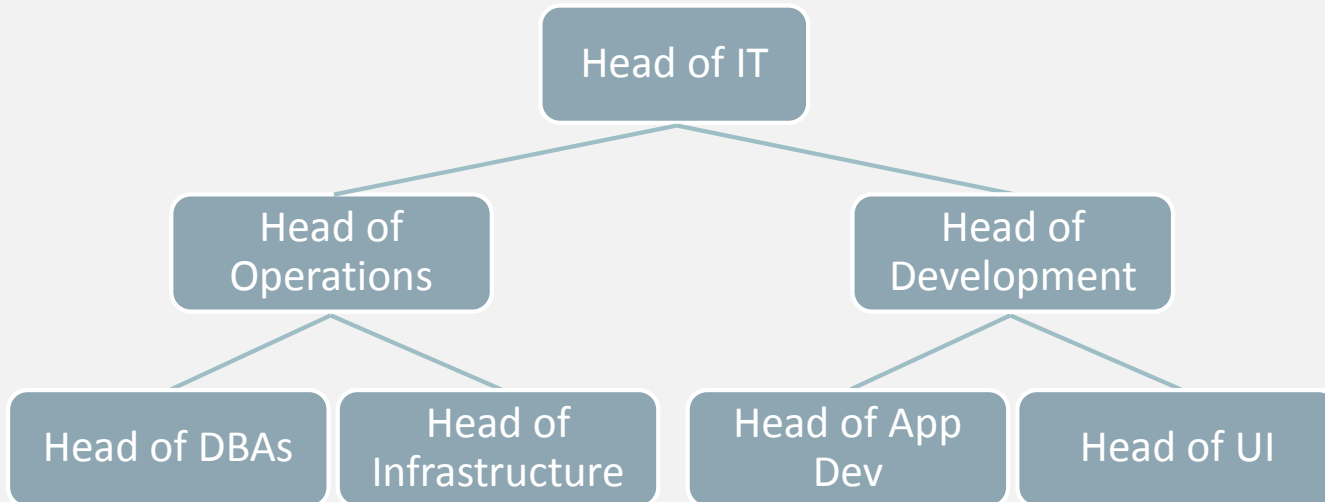
Source: <https://cloud.google.com/kubernetes-engine/kubernetes-comic/>



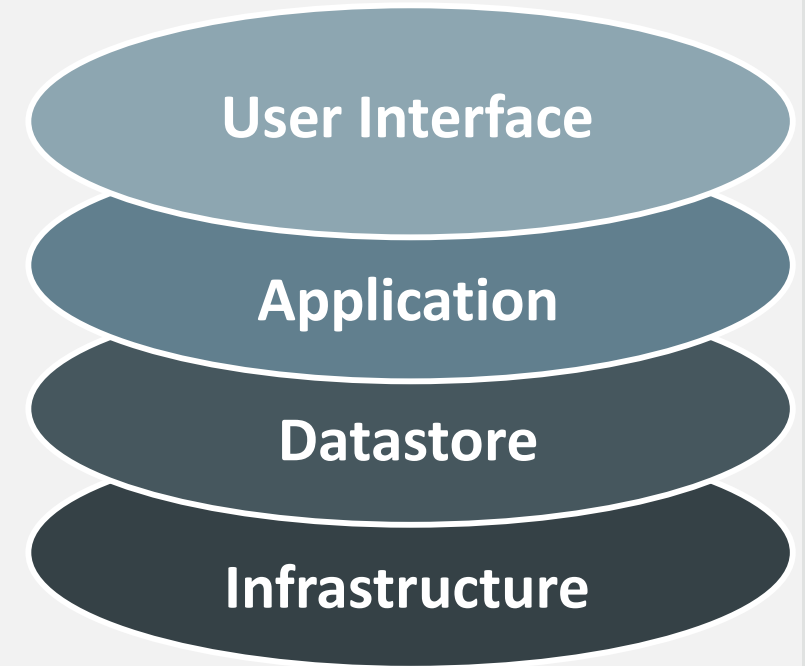
# Horizontally Tiered Enterprises == Horizontally Tiered Apps

Conway's Law: Software reflects the structure of the organization that produced it

## Typical Enterprise Organization Structure



## Resulting Software



Multitier (Monolith) Architecture

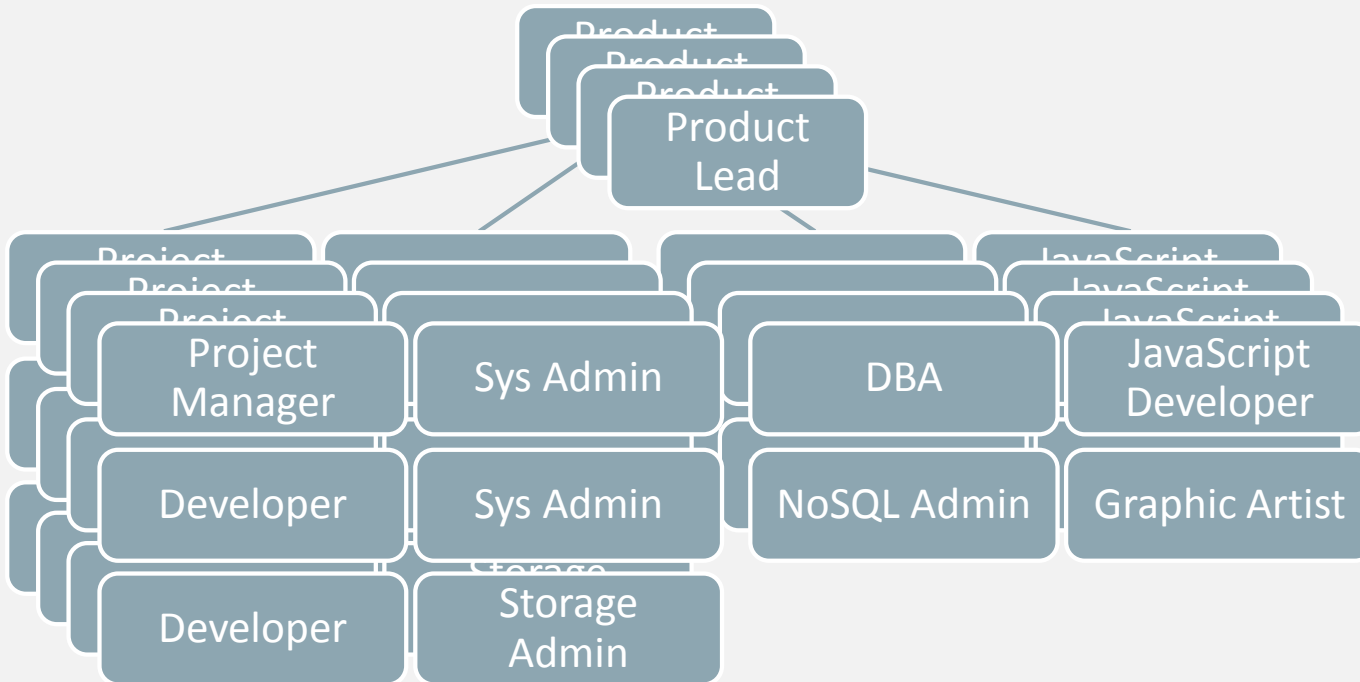


Source: <https://cloud.google.com/kubernetes-engine/kubernetes-comic/>

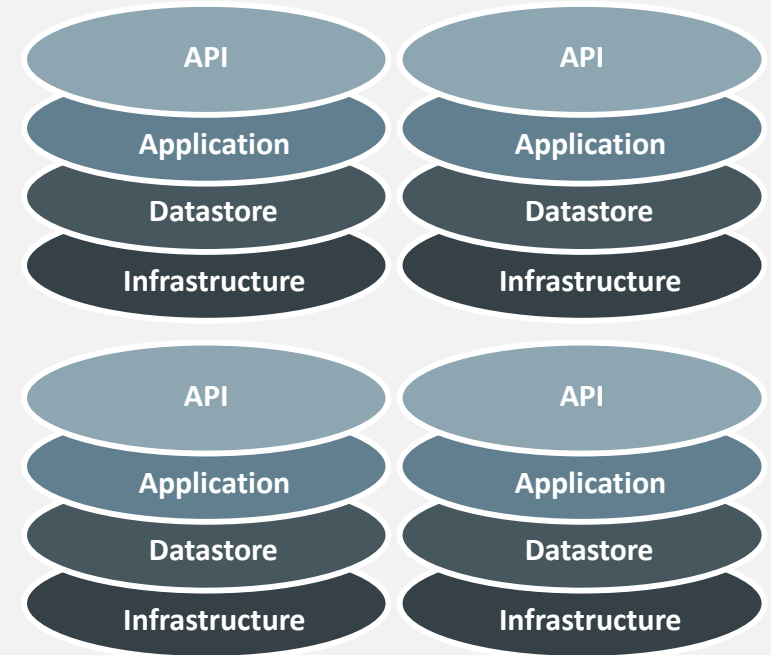
# Re-structure Your Organization – Put Conway’s Law to Work

Build small product-focused teams – strict one team to one service mapping

## DevOps Organization Structure



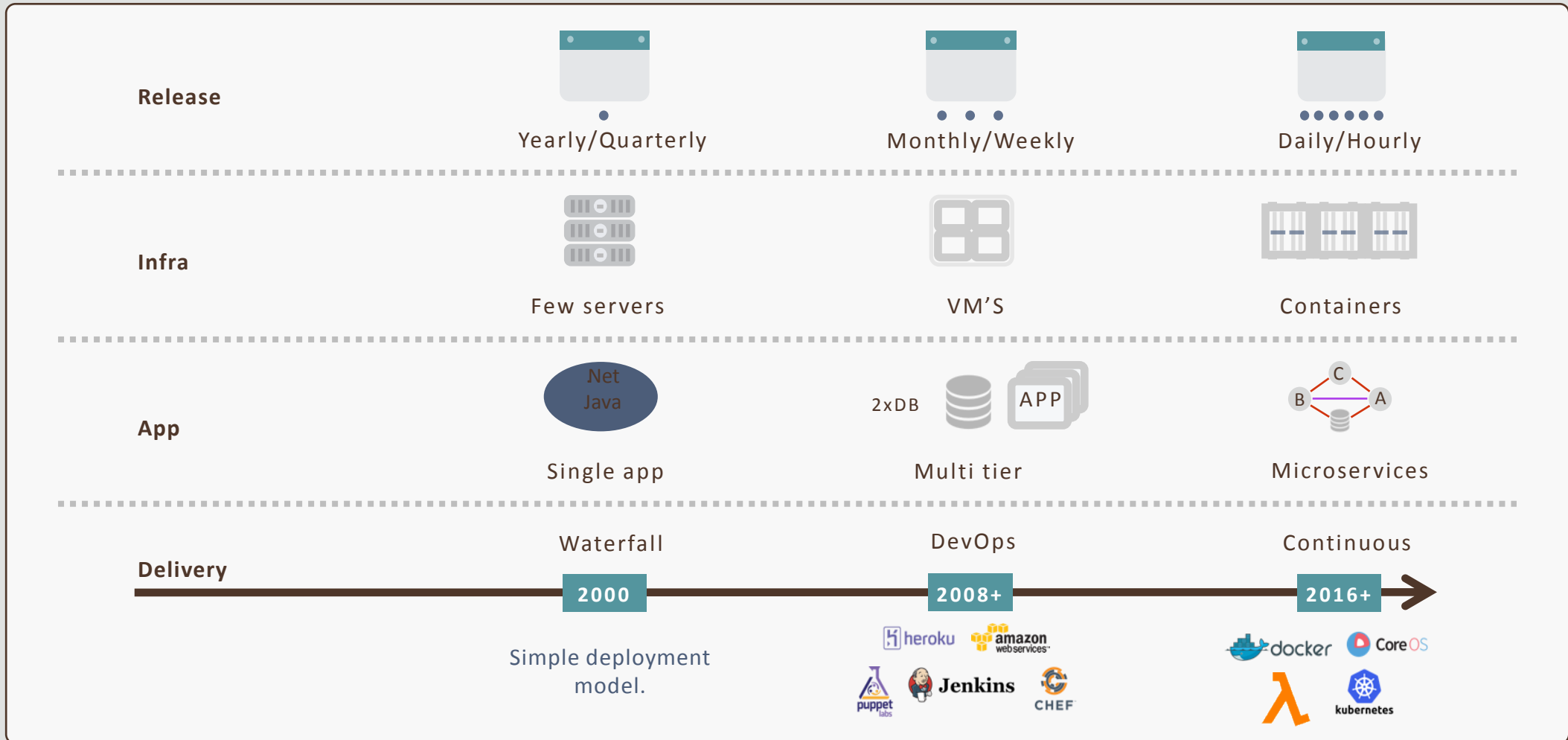
## Resulting Software



(Micro)Services Architecture

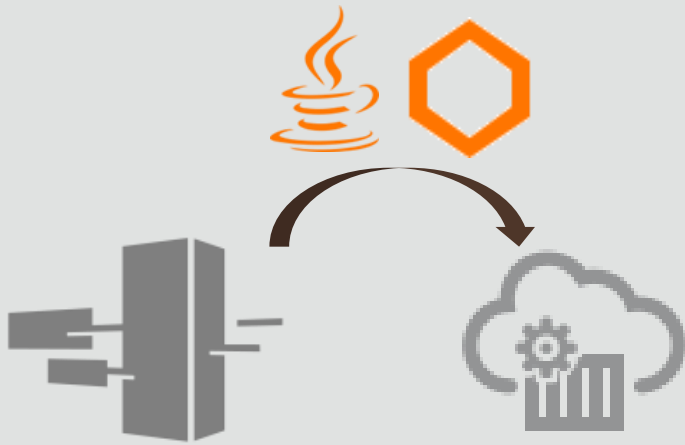
# Modern Development in Context

The Last 15 Years has been about driving increased development velocity





# Java applications on Oracle Cloud



## Migrate Existing Apps to Cloud

- “rehosting” of existing apps to cloud
- Container ready apps
- Cloud benefits
- Connect to other Cloud services



## Container Native App Development

- Born-in-the-cloud apps
- Broad technology choice
- Light-weight, microservices

# Major technological factors

Open Source &  
Polyglot  
Microservices



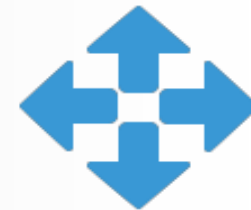
Containerized  
Applications



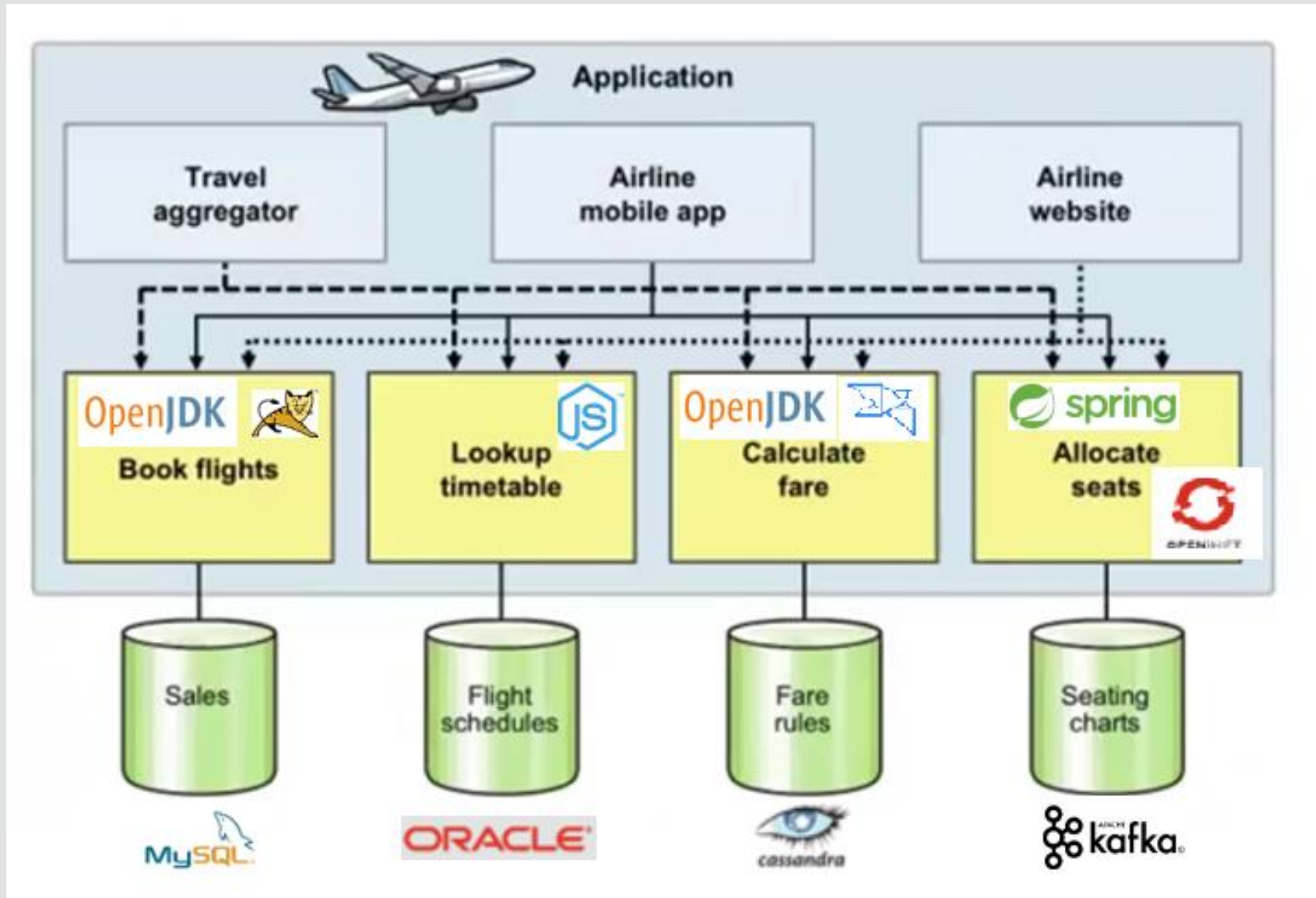
DevOps &  
Provisioning Tools



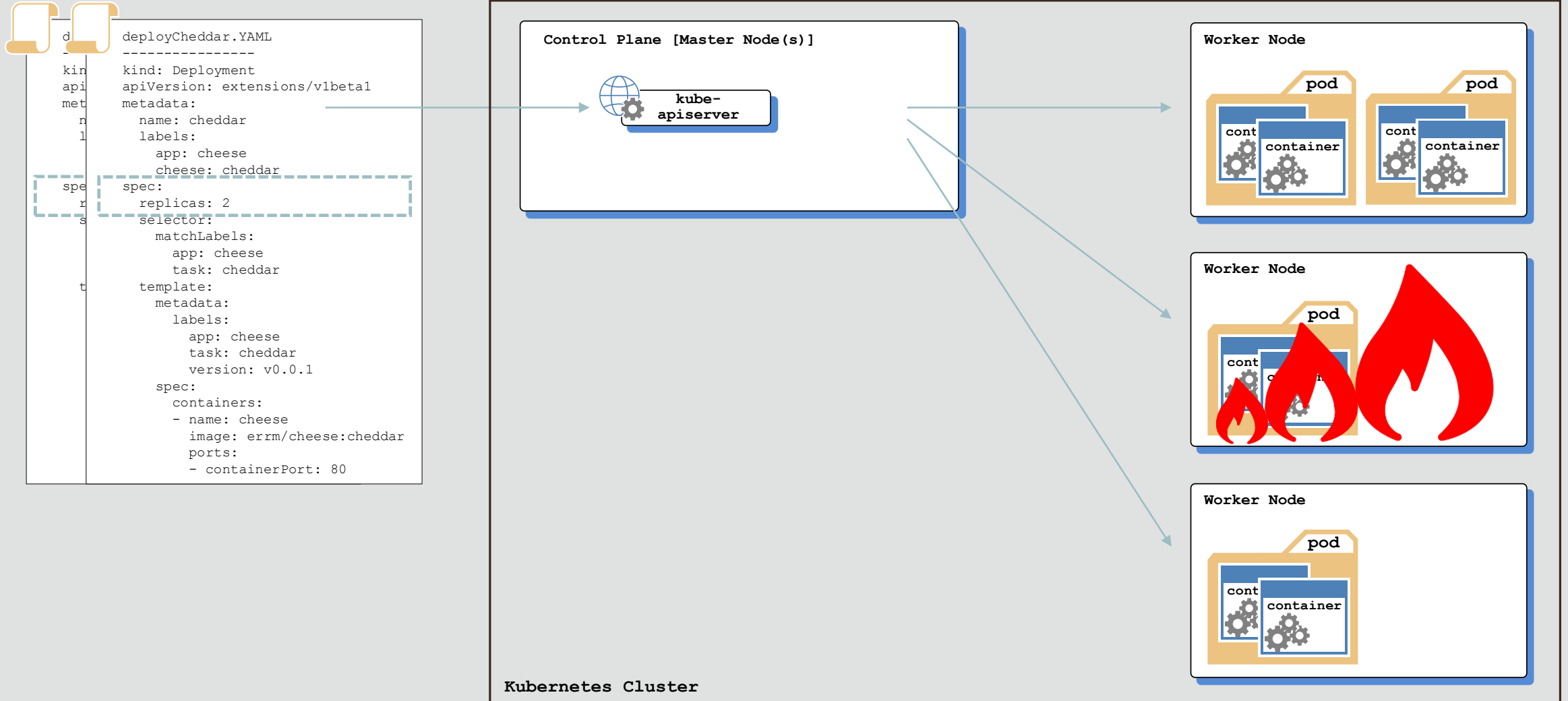
Cloud Elasticity &  
On Demand Scaling



# Microservices



# Kubernetes – In Motion



# Cloud Native

## Why Cloud Native?

Technologies “to build and run scalable apps in public, private and hybrid clouds”

- ✓ Enable agile deployment
- ✓ Use and scale resources more efficiently
- ✓ Modernize with portable apps, reduce lock-in
- ✓ Use preferred languages / frameworks
- Examples:
  - Light-weight containers for microservices
  - Automation with infrastructure as code (IaC)
  - Streaming for real-time data processing
  - Functions (Fn Project) for serverless apps

## Cloud Native Tools



**Docker** is the de-facto technology to create, manage and run containers



**Kubernetes** is the leading solution for container orchestration



**Terraform** is an infrastructure-as-code tool to provision and update resources

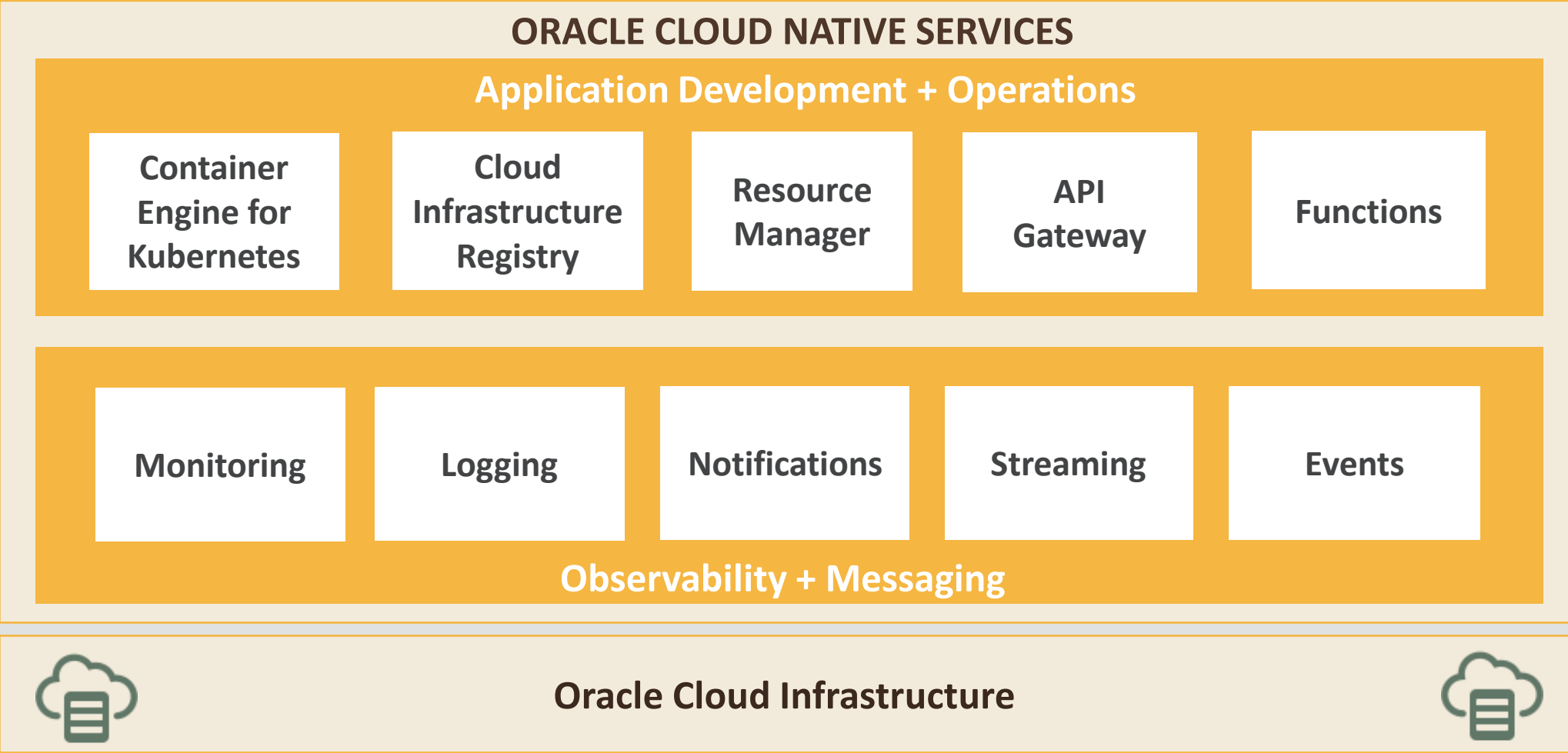


**Fn Project** is an Oracle-led serverless framework that can run anywhere



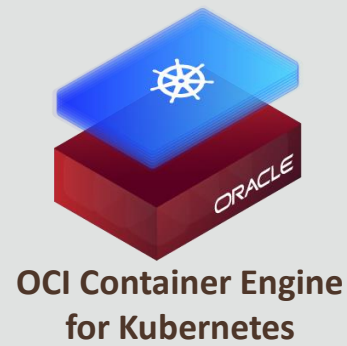
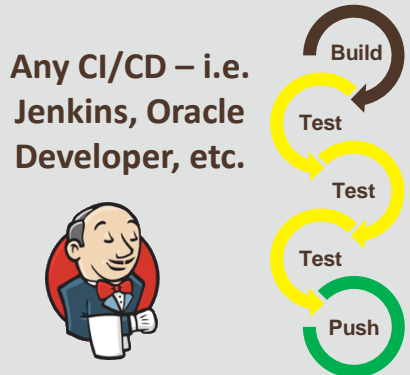
**Helidon.io** is a – framework for Java Microservices

# Oracle Cloud Native Services



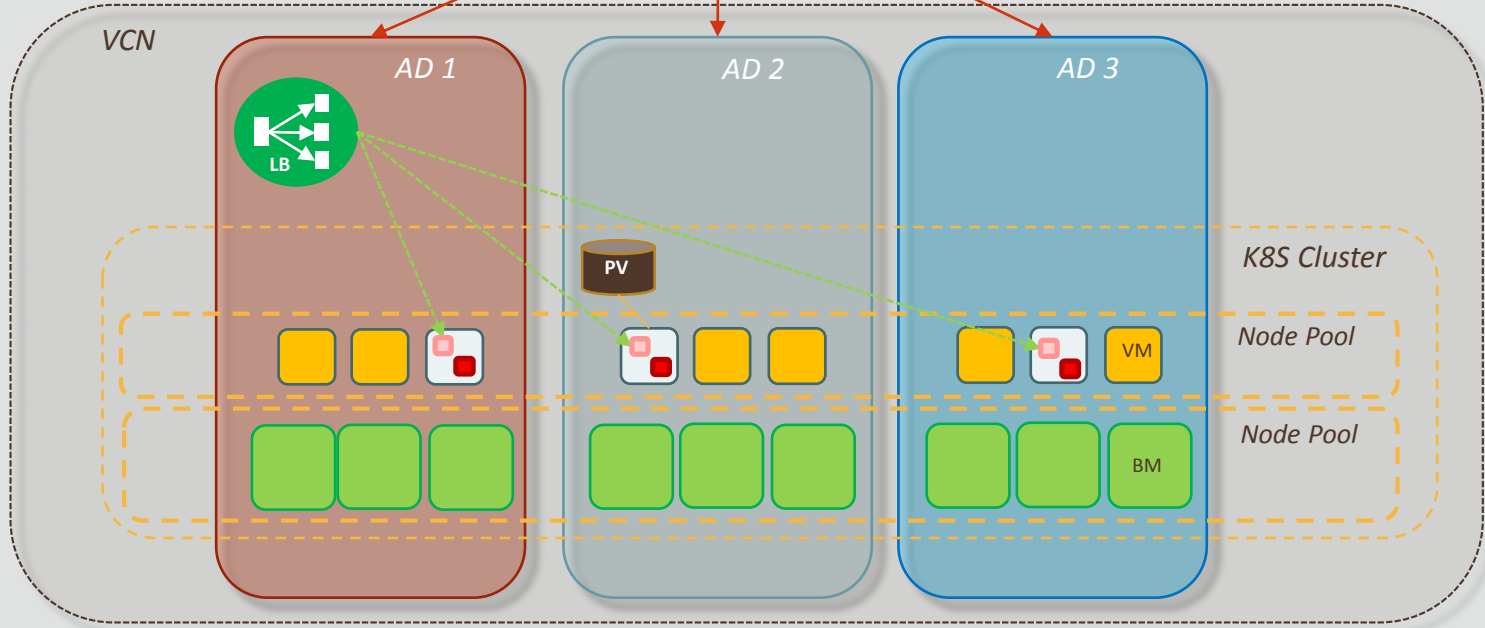
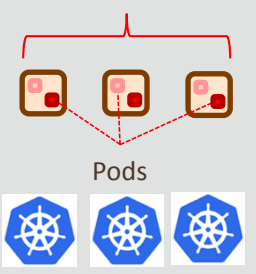
# Container Application Life Cycle (OKE)

An Open, Fully-Managed Kubernetes Platform & Private Registry



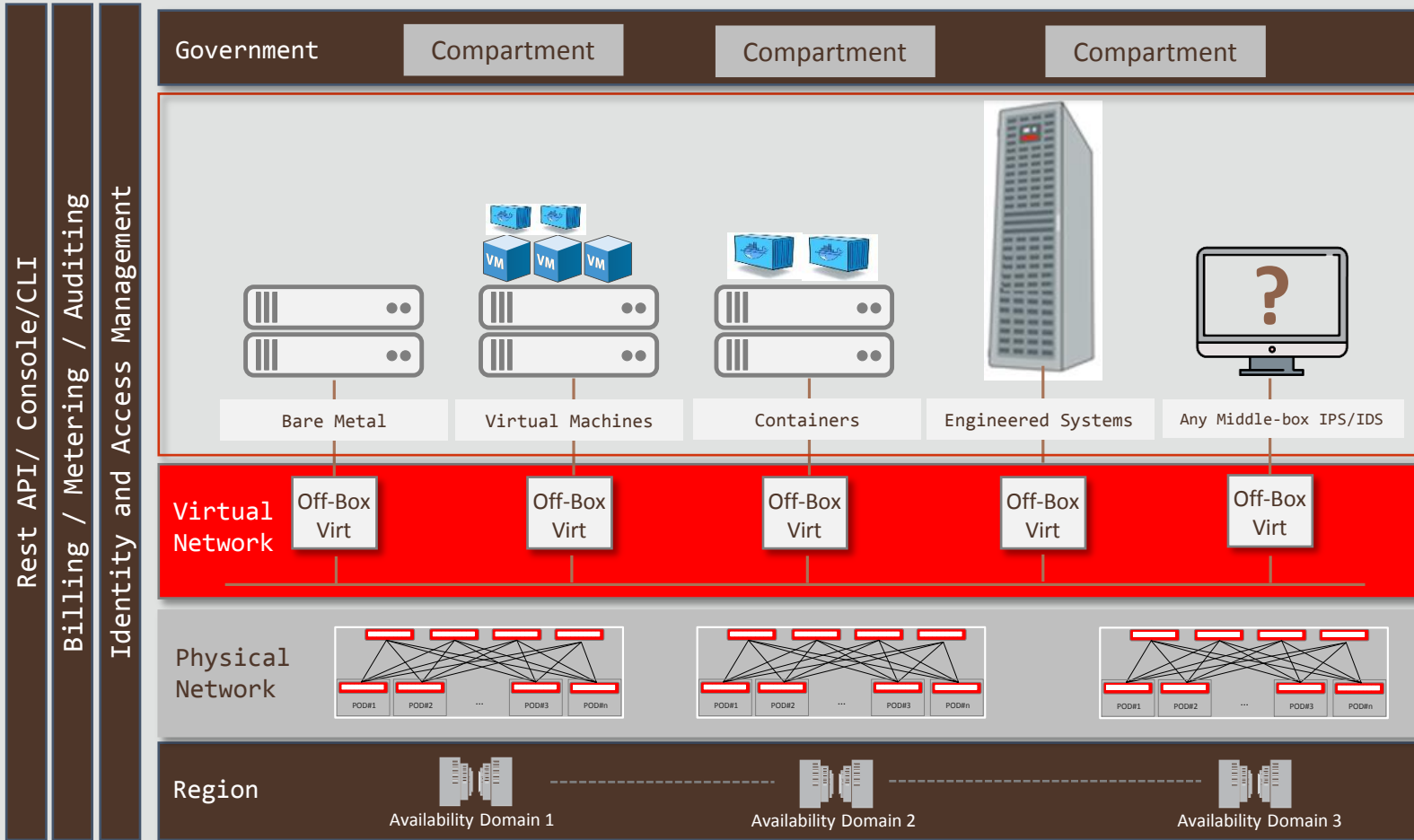
- **Container Native:** Standard Upstream Kubernetes; Fully Managed Lifecycle; Integrated Registry
- **Developer Friendly:** Simple, Streamlined User Interface; REST API; Helm, and DNS Built-in
- **Enterprise Ready:** Oracle Cloud Infrastructure Performance; Highly Available; Secure with OCI Access Controls

Exposed Kubernetes Service



# Oracle Cloud Infrastructure

Dedicated resources and Performance-first approach

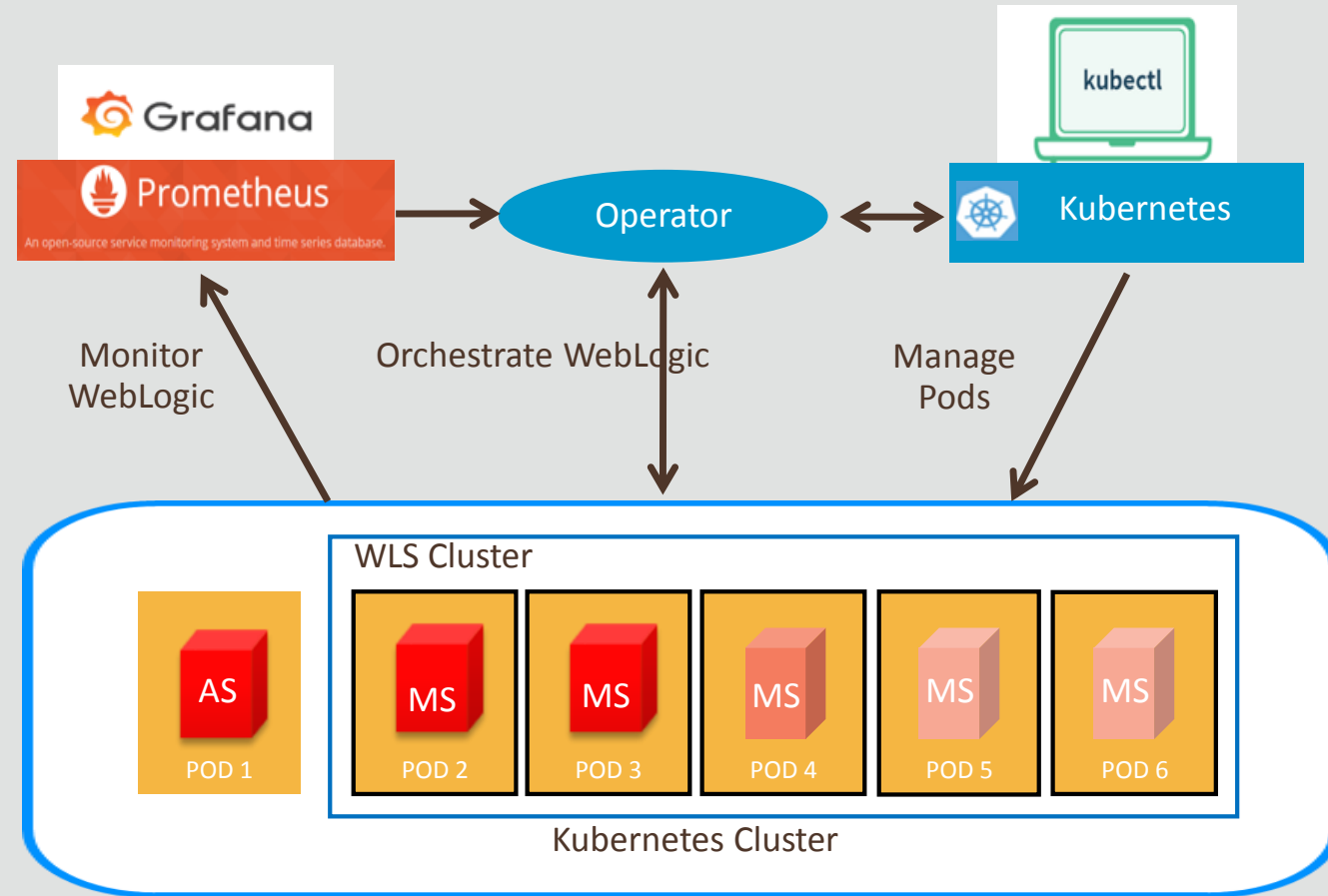


- **Non-oversubscription** CPU and network
- Single or multi-tenant with **same set of APIs**
- **NVMe** flash drives and super-fast SSD block volumes
- **IOPS** that scale **linearly**
- Easier **governance** with Compartments capabilities
- **First Enterprise SLAs** (Availability, Manageability, Performance)



# WebLogic Docker/Kubernetes Support

- Docker images, Dockerfiles, examples
- Helm charts to install the Operator
- Operator WebLogic best practices are followed
- Create overall WebLogic environment through Kubernetes APIs
- Manage a WebLogic domain in Docker image or PV/PVC
- Monitoring (MBean) metrics in Prometheus and Grafana
- Logs managed in the Elasticsearch and interacting with them in Kibana



<https://blogs.oracle.com/weblogicserver/updated-weblogic-kubernetes-support-with-operator-20>



## Helidon MP

JAX-RS

CDI

JSON-P

Cloud  
Integrations

## Helidon SE

Web Server

**Netty**

Config

Security

# Landscape



## Full-Stack

 Spring Boot    Dropwizard

## MicroProfile Based

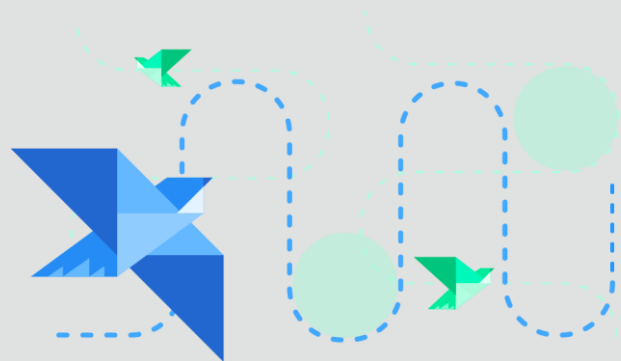
 Open Liberty    payara   **THORNTAIL**    **helidon MP**

## Microframeworks

 **javalin**   *Spark*    MICRONAUT™    **helidon SE**

## helidon SE

- Microframework
- Functional style
- Reactive
- Transparent



## helidon MP

- MicroProfile
- Declarative style
- CDI, JAX-RS, JSON-P



# Helidon SE

```
Routing routing = Routing.builder()
    .get("/hello", (req, res) -> res.send("Hello World"))
    .build();

WebServer.create(routing)
    .start();
```

# Helidon MP

```
@Path("hello")
@ApplicationScoped
public class HelloWorld {
    @GET
    public String hello() {
        return "Hello World";
    }
}
```

```
java -cp ... io.helidon.microprofile.server.Main
```

# Generate The Project

```
mvn archetype:generate
-DinteractiveMode=false \
-DarchetypeGroupId=io.helidon.archetypes \
-DarchetypeArtifactId=helidon-quickstart-mp \
-DarchetypeVersion=1.0.3 \
-DgroupId=io.helidon.examples \
-DartifactId=helidon-quickstart-mp \
-Dpackage=io.helidon.examples.quickstart.mp
```

# Build the Application

```
mvn package
```



# Run the Application

```
java -jar target/helidon-quickstart-mp.jar
```

# Build and Run a Docker Image

```
docker build -t helidon-quickstart-mp
```

```
docker run --rm -p 8080:8080 helidon-quickstart-mp:latest
```

## Dockerfile:

```
FROM openjdk:8-jre-slimRUN  
mkdir /app  
COPY libs /app/libs  
COPY quickstart-mp.jar /appCMD ["java", "-jar", "/app/quickstart-mp.jar"]
```

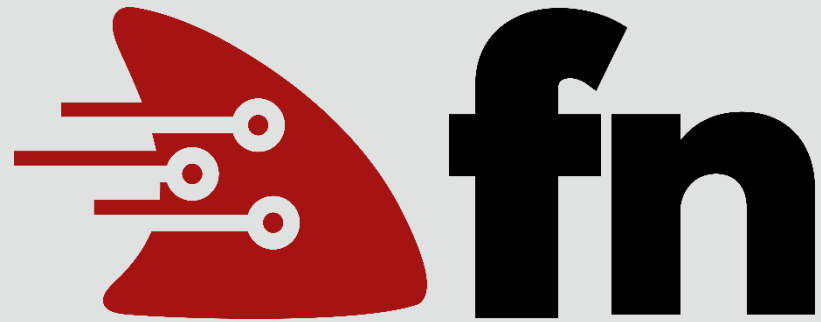
# Deploy the application to Kubernetes

```
kubectl create -f app.yaml
```

app.yaml:

```
kind: Service
apiVersion: v1
metadata:
  name: quickstart-mp
labels:
  app: quickstart-mp
spec:
  type: NodePort
selector:
  app: quickstart-mp
ports:
- port: 8080
  targetPort: 8080
  name: http
---
kind: Deployment
apiVersion: extensions/v1beta1
metadata:
  name: quickstart-mp
spec:
  replicas: 1
  template:
    metadata:
      labels:
        app: quickstart-mp
        version: v1
    spec:
      containers:
      - name: quickstart-mp
        image: quickstart-mp
        imagePullPolicy: IfNotPresent
        ports:
        - containerPort: 8080
```

# Fn—An open source Functions Platform

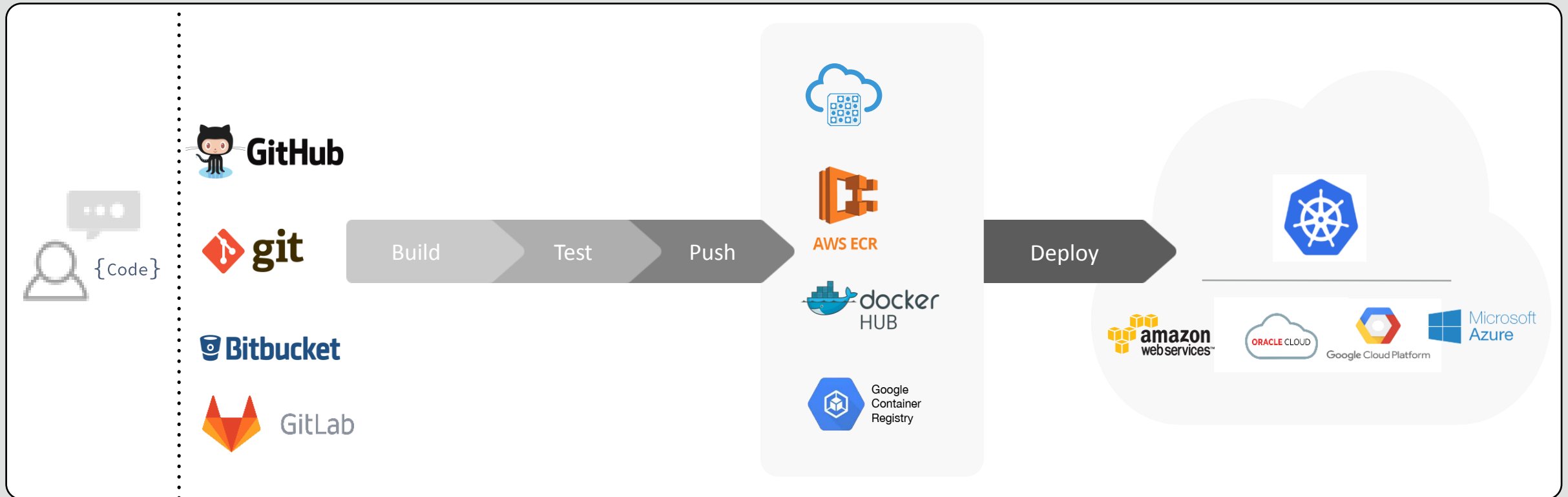


[www.fnproject.io](http://www.fnproject.io)

Functions are packaged as containers—so any container can be deployed as a function

# CI/CD with Oracle Wercker

Deploy to any orchestration tool on any IaaS



mkratky / angular-node-creditscore

Runs

Workflows

Access

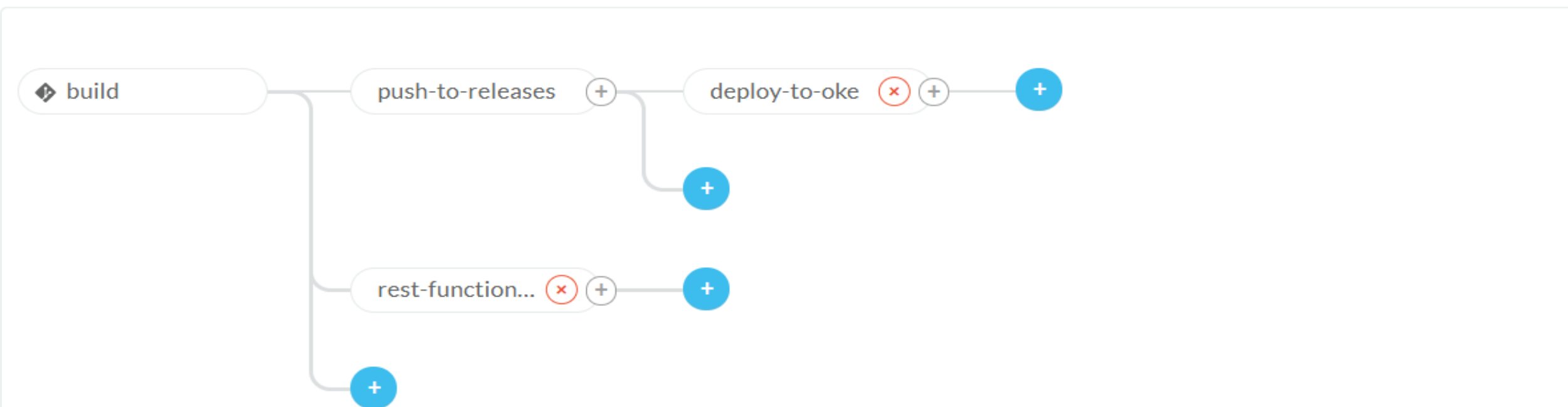
Environment

Options

## Editor

Workflows are a way to [manage automation pipelines](#).

You can use them to chain pipelines together and configure on which git branch they should run



 mkratky / angular-node-creditscore 

 Runs

 Workflows

 Access

 Environment

 Options

## Application environment variables

Settings and passwords defined here will be available to all pipelines

*Key*

*Value*

KUBERNETES\_MASTER

https://c3tkyrygvtg.eu-frankfurt-1.clusters.oci.oraclecloud.com:6443

Delete

KUBERNETES\_TOKEN

*Protected*

Delete

DOCKER\_REGISTRY

https://fra.ocir.io/v2

Delete

DOCKER\_REPO

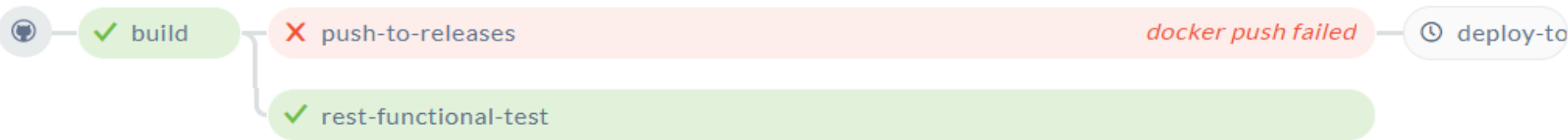
fra.ocir.io/oraseemeaceeociworkshop/mkratky

Delete

# mkratky / angular-node-creditscore

- Runs
- Workflows
- Access
- Environment
- Options

✓ build now
master
build
Actions



## Details

Author mkratky

Branch master

Commit #89eb333

Created 3 days ago

Started 3 days ago

Duration 1 minute, 3 seconds

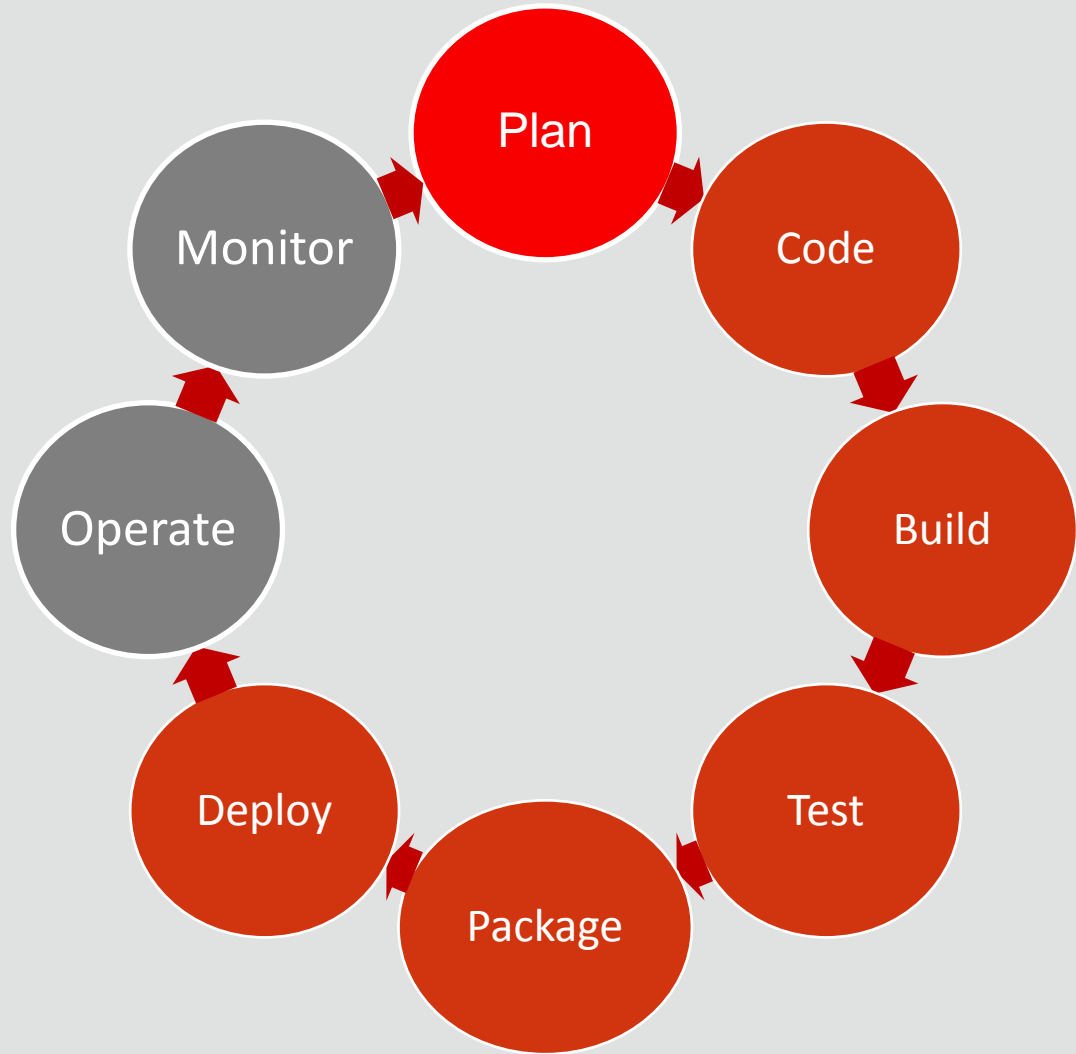
Pipeline [Edit](#)

## Steps

✓ get code	1 second	▼
✓ setup environment	54 seconds	▼
✓ wercker-init	0 seconds	▼



# CI/CD with Oracle Developer Cloud Service



Track Issues

Agile Project Management

Wikis

Git Repositories

Code Review

Build Frameworks

Orchestration and Dependencies

Build Reports and Notifications

Junit, Selenium, FindBugs

QA Deployments

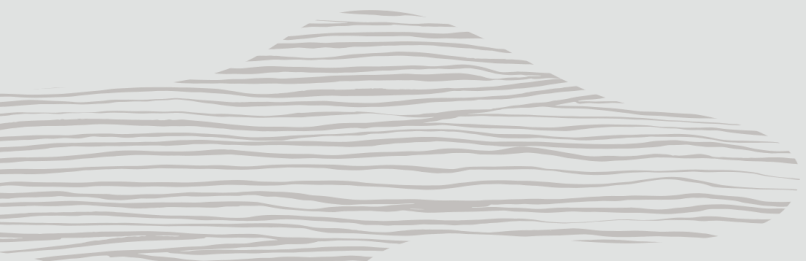
Create packages

Push to Docker Registry

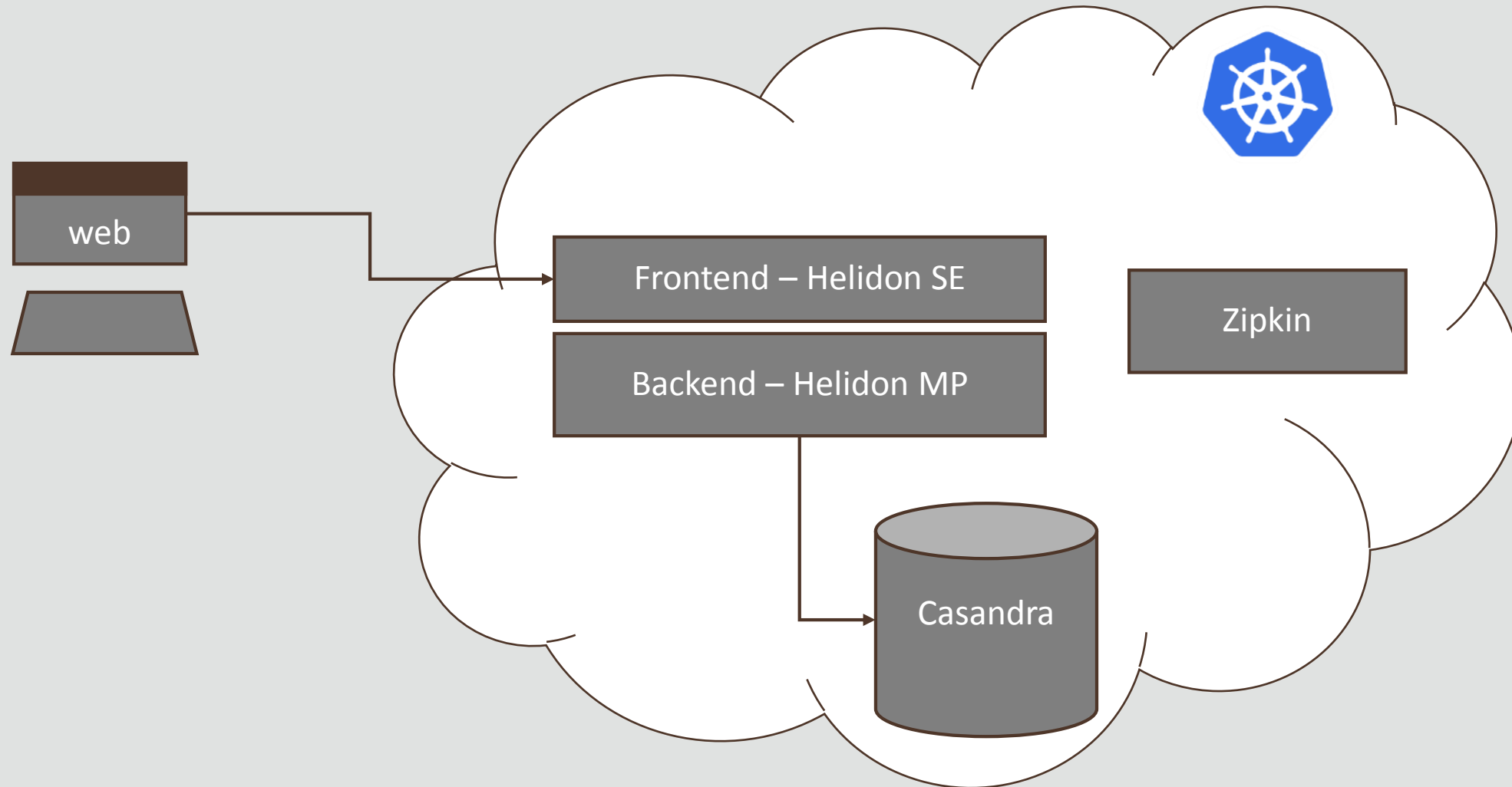


—

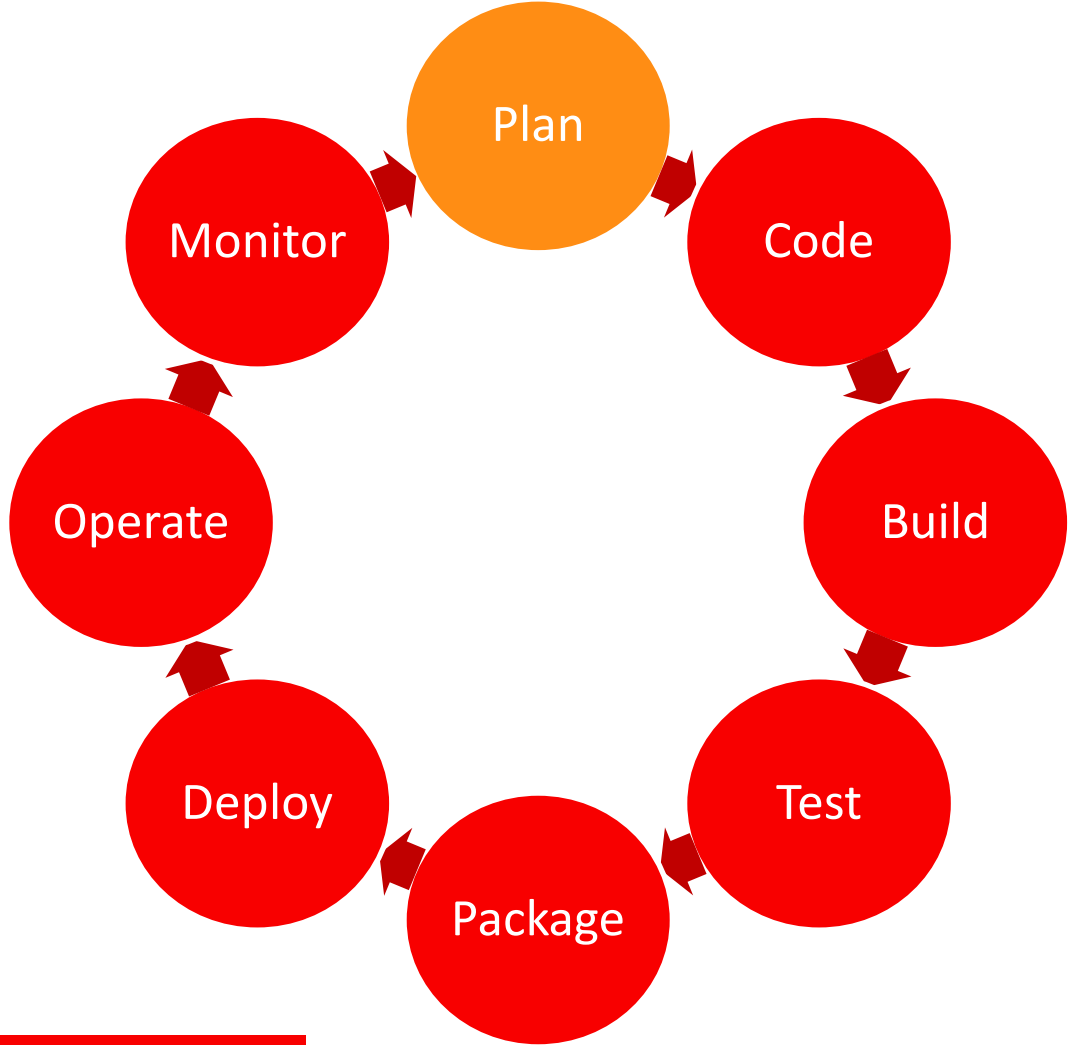
# Demo



# Sample TODO application with Helidon



# Developer Cloud Service



- Track Issues
- Agile Project Management
- Wikis

# Issue Tracking

ORACLE® Developer Cloud Service shay.shmeltzer@oracle.com ?

EmployeeACCS Search Not Available

Home Code Snippets Merge Requests Issues **Agile** Build Deploy Wiki Administration

Team **Backlog** Active Sprints Reports Board

**+ New Sprint**

---

▲ **Rel13Sprint** 3 issues **Edit sprint...**

10/6/2016 2:32 PM • 10/20/2016 2:32 PM 15 0 15

🚩	!!	<b>Defect 3</b>	Add UI test for value validation on Salaries	Shay Shmeltzer	5
🚩	!!	<b>Task 2</b>	Column Title on Employee Table not matching	Shay Shmeltzer	2
🚩	!!	<b>Defect 1</b>	REST API for Employees only returns 20 rows	Dana Singletery	8

**New Issue**

---

**Backlog** 0 issues

The backlog contains no issues.

**New Issue**

# Agile and Sprint Planning

ORACLE® Developer Cloud Service shay.shmeltzer@oracle.com

EmployeeACCS Search Not Available

Home Code Snippets Merge Requests Issues **Agile** Build Deploy Wiki Administration

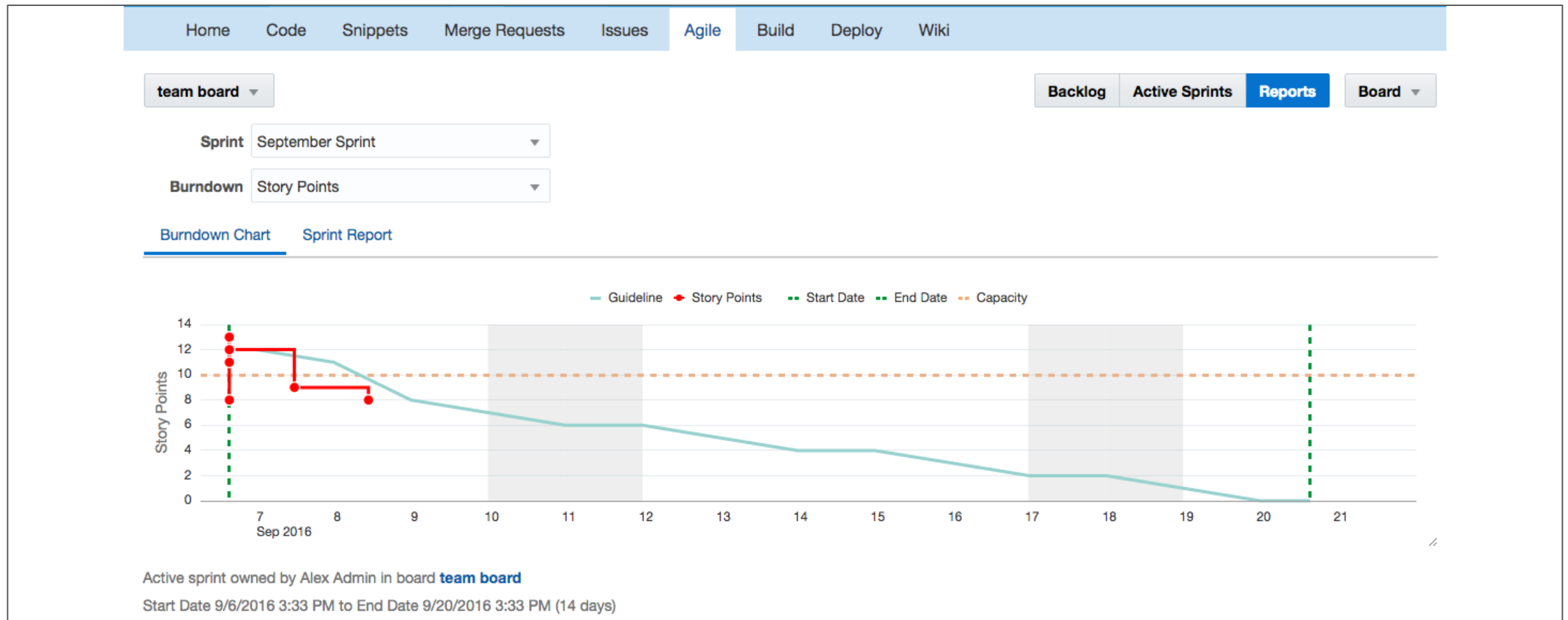
Team Backlog **Active Sprints** Reports Board

Sprint: Rel13Sprint -- 10/6/2016 2:32 PM • 10/20/2016 2:32 PM Complete Sprint **Swimlanes** Columns

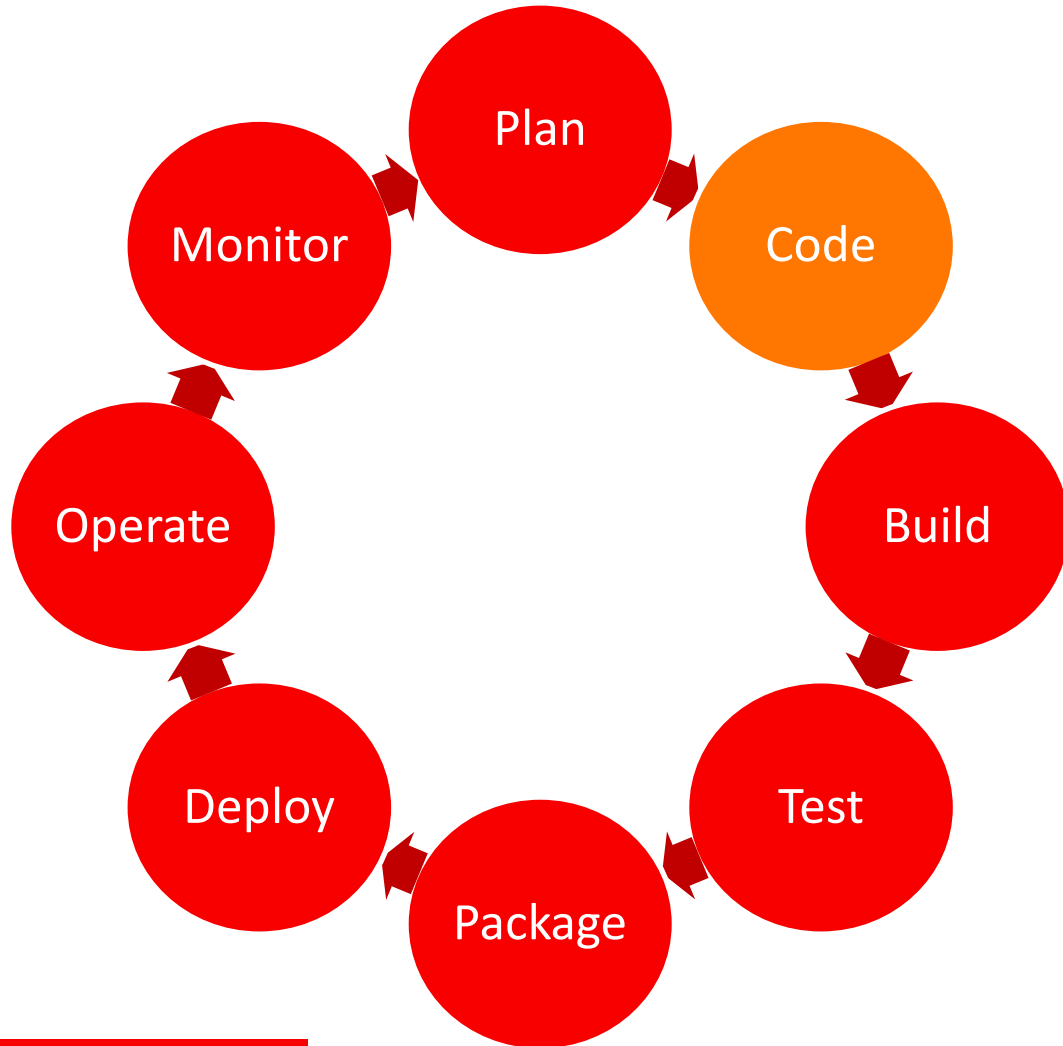
Sort Issues by: Priority Sort Swimlanes by: User Name

To Do ( 2 )	In Progress ( 1 )	Completed ( 0 )
<b>dana.singleterry@oracle.com</b> <b>Defect 1</b> REST API for Employees only returns 20 rows UNCONFIRMED 8		
<b>shay.shmeltzer@oracle.com</b> <b>Defect 3</b> Add UI test for value validation on Salaries UNCONFIRMED 5	<b>Task 2</b> Column Title on Employee Table not matching ASSIGNED 2	

# Agile Reports for Progress Tracking



# Developer Cloud Service



- Git Repositories
- IDE Integration
- Code Review





# helidon-todo-app | Git

helidon-todo-app.git | master

Files | Logs | Refs | Compare

Clone

Click to add description of this repository.

demo-backend	Initial commit   Oracle Cloud Infrastructure Client	April 26, 2019 5:32 PM +0200
demo-frontend	removed duplicate google login dependency   marek.kratky@oracle.com	April 26, 2019 5:58 PM +0200
etc	Initial commit   Oracle Cloud Infrastructure Client	April 26, 2019 5:32 PM +0200
k8s	Initial commit   Oracle Cloud Infrastructure Client	April 26, 2019 5:32 PM +0200
docker-compose.yml	Initial commit   Oracle Cloud Infrastructure Client	April 26, 2019 5:32 PM +0200
kubescrypt.sh	k8s/k8s-deployment.yml   marek.kratky@oracle.com	April 26, 2019 7:07 PM +0200
pom.xml	Initial commit   Oracle Cloud Infrastructure Client	April 26, 2019 5:32 PM +0200
README.md	Initial commit   Oracle Cloud Infrastructure Client	April 26, 2019 5:32 PM +0200

+ File

## README.md

# TODOs Demo Application

If you want to run behind a proxy, you need to configure the following in application.yaml of both services (find appropriate existing google-login provider configuration):

```
providers:  
  - google-login:  
      proxy-host: "proxy_host"
```



helidon-todo-app.git

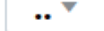
Files Logs Refs Compare

b2e6fca91fbf861af1efbdc5da04c6d1f1a7cd74



f16439d75ae059c6f009f99422bc0fb01939eb28

marek.kratky@oracle.com April 26, 2019 5:57 PM +0200



marek.kratky@oracle.com April 26, 2019 5:58 PM +0200

▶ **google login dependency**

▶ **removed duplicate google login dependency**

Changed Files Commits

pom.xml -4 demo-frontend



Filter



pom.xml -4 demo-frontend

Hide

```

@@ -39,10 +39,6 @@
39 39
40 40     <dependencies>
41 41         <dependency>
42         <groupId>io.helidon.security.providers</groupId>
43         <artifactId>helidon-security-providers-google-login</artifactId>
44         </dependency>
45         <dependency>
46 42         <groupId>io.helidon.common</groupId>
47 43         <artifactId>helidon-common</artifactId>
48 44         </dependency>

```

# Conduct Peer Code Review and Merge Requests

The screenshot displays a web-based code review interface for a project named 'summitADfApp'. The navigation bar includes 'Home', 'Code', 'Merge Requests', 'Issues', 'Build', 'Deploy', 'Wiki', and 'Administration'. The current view is a merge request titled 'hello request | Commit 2b46258' by user 'shay.shmeltzer', committed on April 21, 2015. The commit message is 'updated welcome message to hello'. A diff view for 'index.jsf' in the 'ViewController/public\_html' directory is shown. The diff highlights changes to the 'id' attribute of 'showDetailItem' components. An 'Add Comment' dialog box is overlaid on the diff, containing the text 'Need to use meaningful names for variable' and 'OK' and 'Cancel' buttons.

summitADfApp

Search NOT Available

Home Code Merge Requests Issues Build Deploy Wiki Administration

< | hello request | Commit 2b46258

shay.shmeltzer committed 2b46258 to summitadfapp.git  
April 21 2015 3:37 PM -0700

updated welcome message to hello

+1 -1 index.jsf ViewController/public\_html

+1 -1 index.jsf ViewController/public\_html

@@ -7,7 +7,7 @@

```
7 7         id="pt1">
8 8     <f:facet name="center">
9 9         <af:panelTabbed id="pt2">
10 10         <af:showDetailItem text="Welcome" id="sdi1"/>
11 11         <af:showDetailItem text="Hello" id="sdi1"/>
12 12         <af:showDetailItem text="Summit Management" id="sdi2" disclosed="true">
```

filter

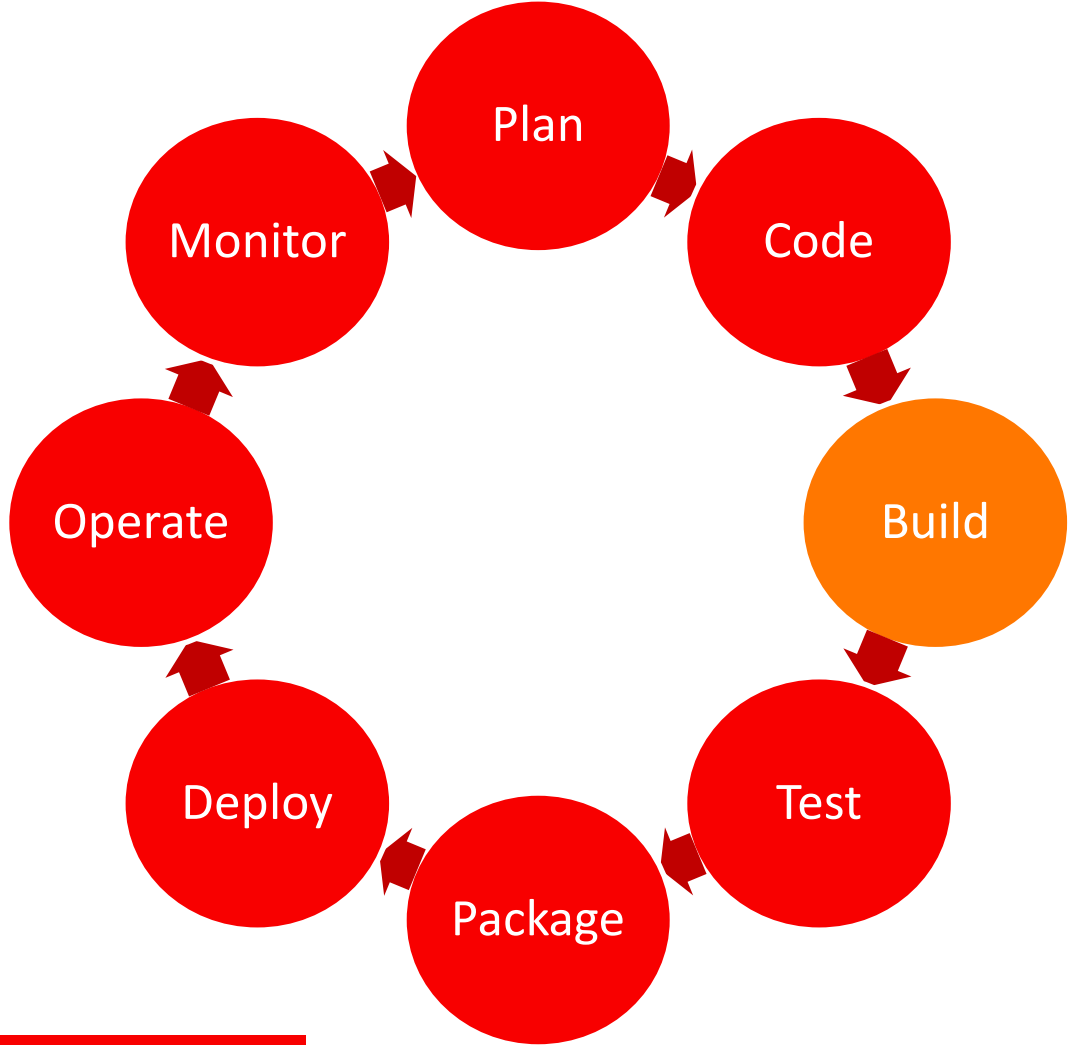
Hide Diff

Add Comment

Need to use meaningful names for variable

OK Cancel

# Developer Cloud Service



- Popular Build Frameworks
- Orchestration and Dependencies
- Build Reports and Notifications

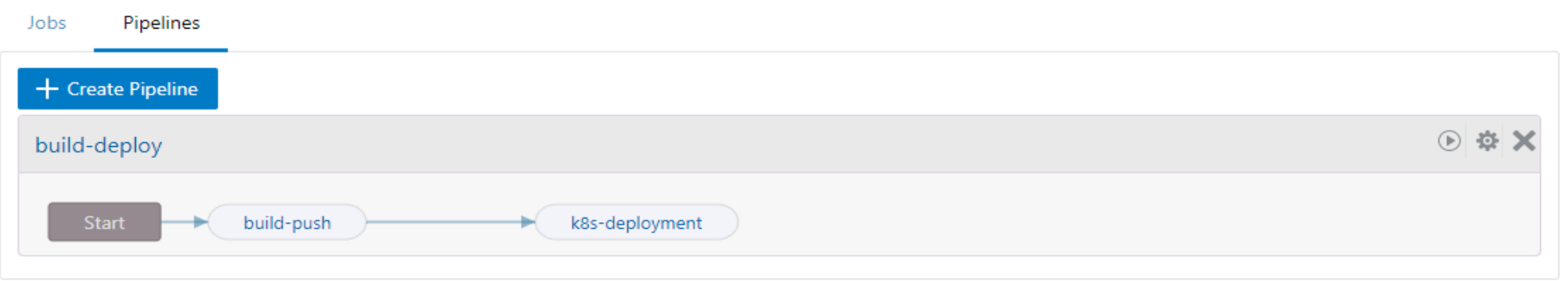
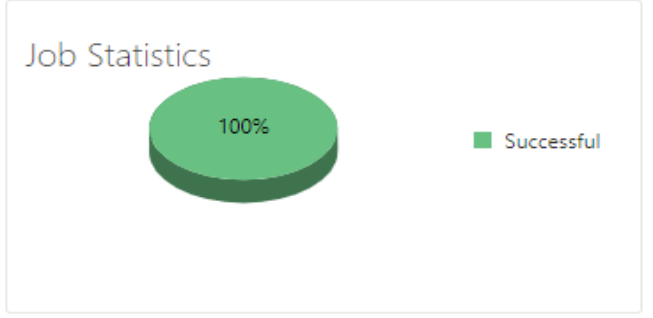


- Organization
- Project Home
- Git
- Merge Requests
- Maven
- Docker
- Releases
- Builds**
- Deployments
- Environments
- Issues
- Boards
- Wiki
- Snippets
- Project Administration

helidon-todo-app ▾ | Builds Search Jobs 🔍

**Build Queue**  
No build in progress

[View Recent Build History](#)



Jobs Overview > **build-push**

Build Now | Configure | Disable | Delete

## Job Details

No description available

- Changes
- Artifacts
- Javadoc
- Tests
- Build Log
- Git Log
- Audit
- SonarQube
- Vulnerabilities

## Notifications

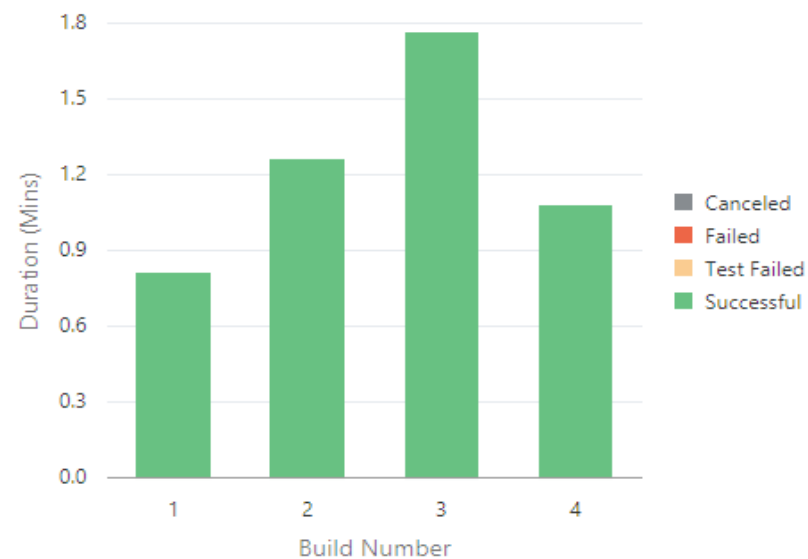
On
  Off

## Build History

Last | Successful | Unsuccessful | Failed | Test Failed

By	Status	Build	Started	Duration	Actions
		#4	Apr 26, 2019 7:09 PM	1 m 5 s	
		#3	Apr 26, 2019 6:14 PM	1 m 46 s	
		#2	Apr 26, 2019 6:11 PM	1 m 16 s	
		#1	Apr 26, 2019 5:52 PM	49 s	

## Build Trend



## Test Result Trend

- Organization
- Project Home
- Git
- Merge Requests
- Maven
- Docker
- Releases
- Builds**
- Deployments
- Environments
- Issues
- Boards
- Wiki
- Snippets
- Project Administration

## Job Configuration

Cancel Save

- Git
- Parameters
- Before Build
- Steps**
- After Build



### Configure Steps

Add Step ▾

#### Maven ✕

Goals

POM File

▶ Advanced Maven Settings

#### Docker login ✕

Docker logout will be performed automatically at the end of all build steps.

Registry Host

[Link External Registry](#)

\* Username

\* Password

#### Docker build ✕

\* Registry Host

\* Image Name

- Storage Classes
- Namespace
  - default ▾
- Overview
- Workloads
  - Cron Jobs
  - Daemon Sets
  - Deployments
  - Jobs
  - Pods
  - Replica Sets
  - Replication Controllers
  - Stateful Sets
- Discovery and Load Balancing
  - Ingresses
  - Services
- Config and Storage
  - Config Maps
  - Persistent Volume Claims
  - Secrets
- Settings

### Services ☰

Name ↕	Labels	Cluster IP	Internal endpoints	External endpoints	Age ↕	
<a href="#">quickstart-mp</a>	app: quickstart-mp	10.96.1.82	quickstart-mp:8080 TCP quickstart-mp:30479 TCP	-	5 minutes	⋮
<a href="#">helidon-todos-frontend</a>	-	10.96.241.38	helidon-todos-frontend:8080 TCP helidon-todos-frontend:30080 TCP	-	2 hours	⋮
<a href="#">helidon-todos-backend</a>	-	10.96.156.41	helidon-todos-backend:8854 TCP helidon-todos-backend:30451 TCP	-	2 hours	⋮
<a href="#">zipkin</a>	-	10.96.14.89	zipkin:9411 TCP zipkin:30011 TCP	-	2 hours	⋮
<a href="#">helidon-todos-cassandra</a>	-	10.96.71.133	helidon-todos-cassandra:9042 TCP helidon-todos-cassandra:30621 TCP	-	2 hours	⋮
<a href="#">atp2</a>	app: atp2	10.96.173.84	atp2:80 TCP atp2:30609 TCP	<a href="#">132.145.238.4:80</a>	2 days	⋮
<a href="#">kubernetes</a>	component: apiserver provider: kubernetes	10.96.0.1	kubernetes:443 TCP	-	a month	⋮



# todos

✓ *What needs to be done?*

Koupit dálniční známky

Výměna airbag směsi

Výměna oleje

3 items left

Double-click to edit a todo  
Helidon implementation of TodoMVC

 Signed in



Investigate system behavior Find a trace View Saved Trace Dependencies

Try Lens UI

Go to trace

Search

Duration: 219.923ms

Services: 2

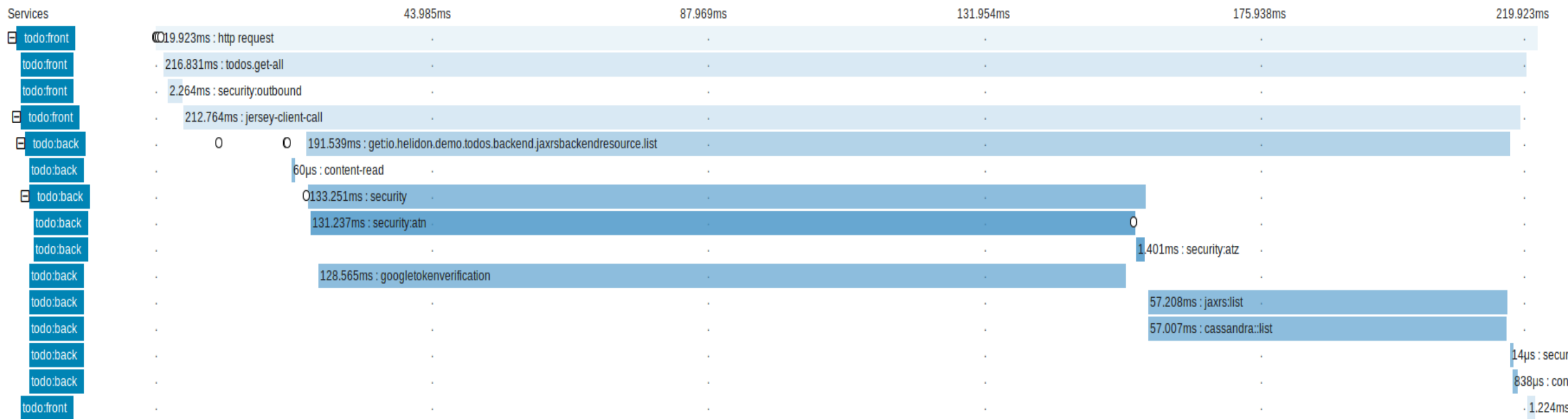
Depth: 5

Total Spans: 15

JSON

Expand All Collapse All

todo:back x10 todo:front x5





# APM - Troubleshooting Across The Stack

**ORACLE** Management Cloud  
Application Performance Monitoring

## Server Request

**/RideShare/checkout**

Type: **SERVLET**  
AppServer: **oemwlsrv.oracleads.com:9001**  
Deployment: **RideShareEar**

**REQUEST RESPONSE TIME**

**463.81** ms avg    Max 923 ms  
↑ <1% prior    Min 188 ms

**TIER AVERAGE RESPONSE**

- External 1.88%
- AppServer 85.7%
- Database 12.42%

**Last Message**  
Ajax Call: checkout Page: Shopping Cart has an average response time (over last hour) of 2124.55 ms; it is greater than expected value of 20.0 ms.

Normal application behavior and expected component and transaction performance are automatically learned by Oracle Management Cloud, ensuring intelligent alerting.

Diagram   Metrics   Links   Callers   Database   Instances

**View Related Logs**

**Tier Time**

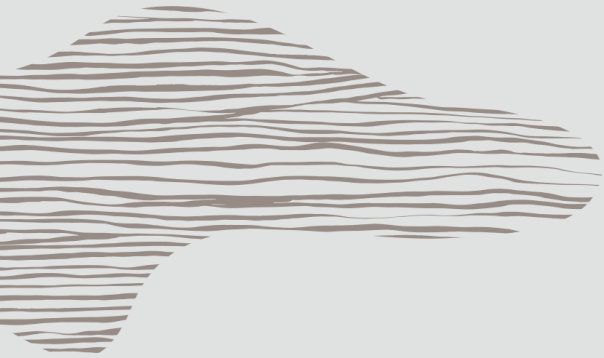
- AppServer 87.38%
- Database 12.62%
- External 0%

Application topologies and cross-tier dependencies are automatically learned and kept up to date by Oracle Management Cloud, ensuring rapid troubleshooting.



# Resources

- <https://oracle.com/cloud-native>
- <https://cloud.oracle.com/tryit>
- <https://slides.mushop.atteam.cloud>
- <https://github.com/oci-quickstart/oci-cloudnative>
- <https://github.com/oracle/cloudtestdrive/blob/master/ATP/readme.md>



Thank You!

