Monoliths to microservices: App Transformation

Hands-on Technical Workshop

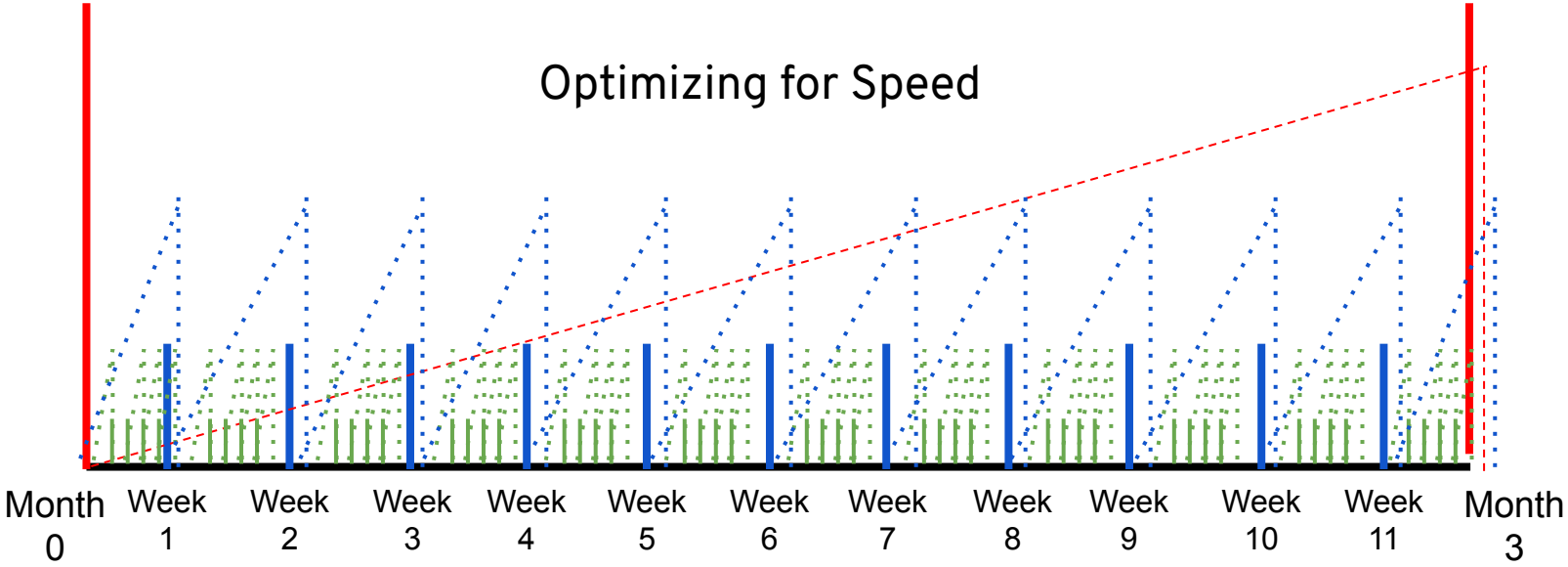
Part 3: Monoliths to microservices with MicroProfile & Spring Boot

Why monolith to microservices

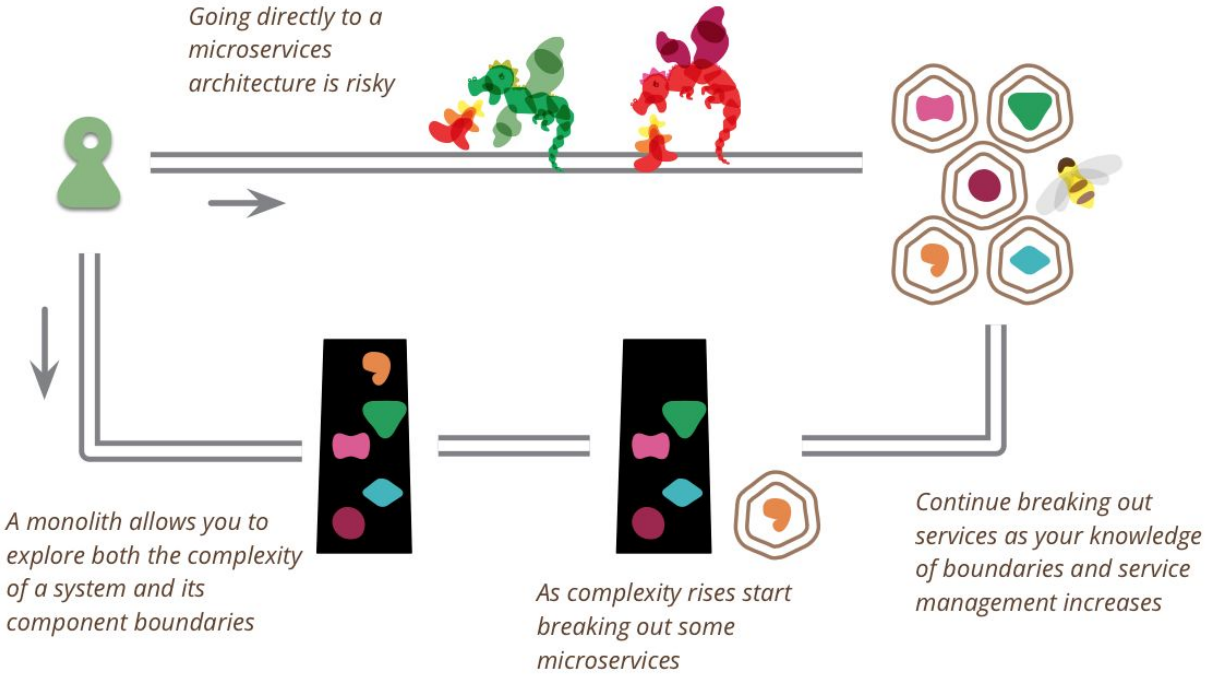
Break things down (organizations, teams, IT systems, etc) down into smaller pieces for greater parallelization and autonomy and focus on reducing time to value.

Reducing time to value

Monolith Lifecycle
Fast Moving Monolith
Microservices



Monolith first?



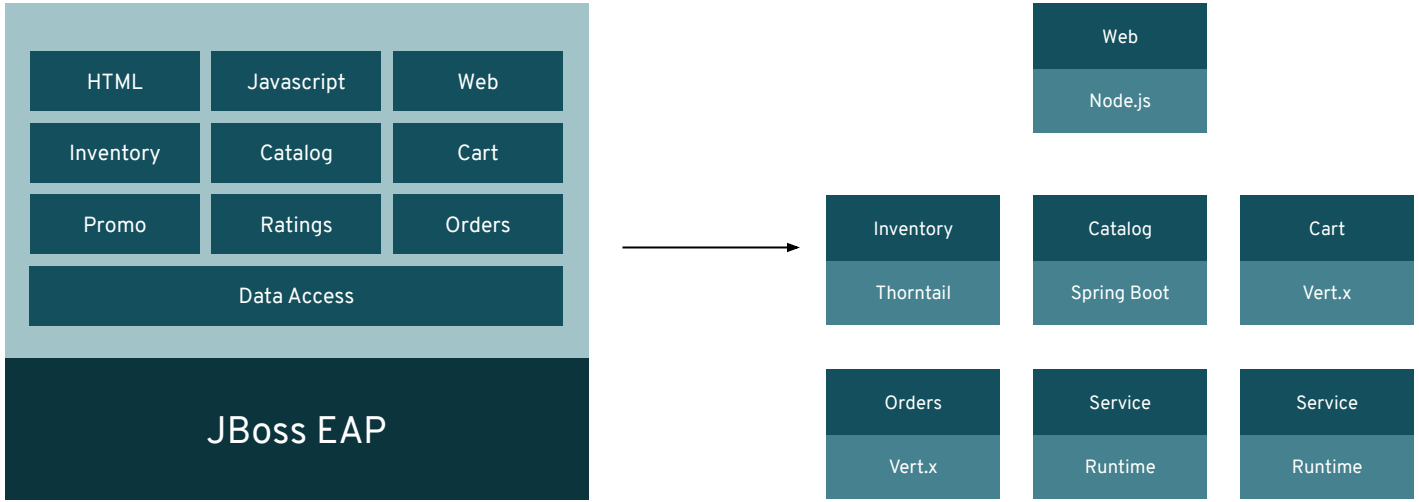
http://martinfowler.com/bliki/MonolithFirst.html

The bigger picture: the path to cloud-native apps

A DIGITAL DARWINISM

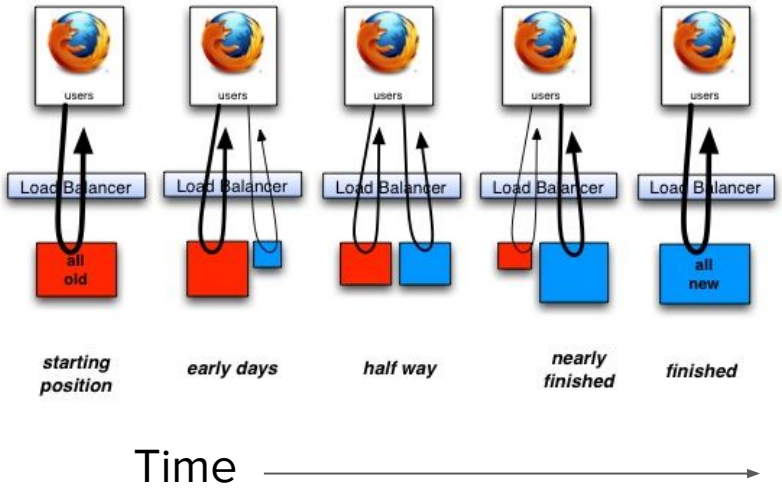
Strangling the monolith

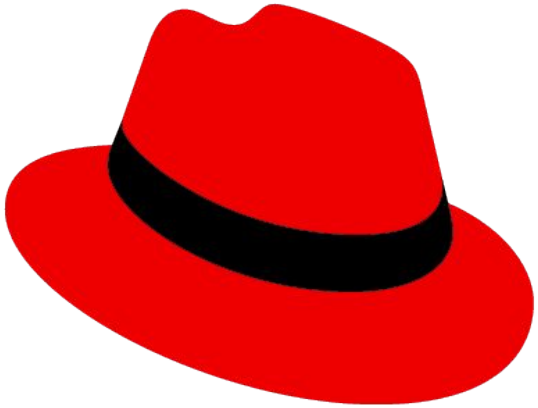
- In this lab, you will begin to ‘strangle’ the coolstore monolith by implementing its services as external microservices, split along business boundaries
- Once implemented, traffic destined to the original monolith’s services will be redirected (via OpenShift software-defined routing) to the new services



Strangling the monolith

- Strangling - **incrementally** replacing functionality in app with something better (cheaper, faster, easier to maintain).
- As functionality is replaced, “dead” parts of monolith can be removed/retired.
- You can also wait for all functionality to be replaced before retiring anything!
- You can optionally include new functionality during strangulation to make it more attractive to business stakeholders.

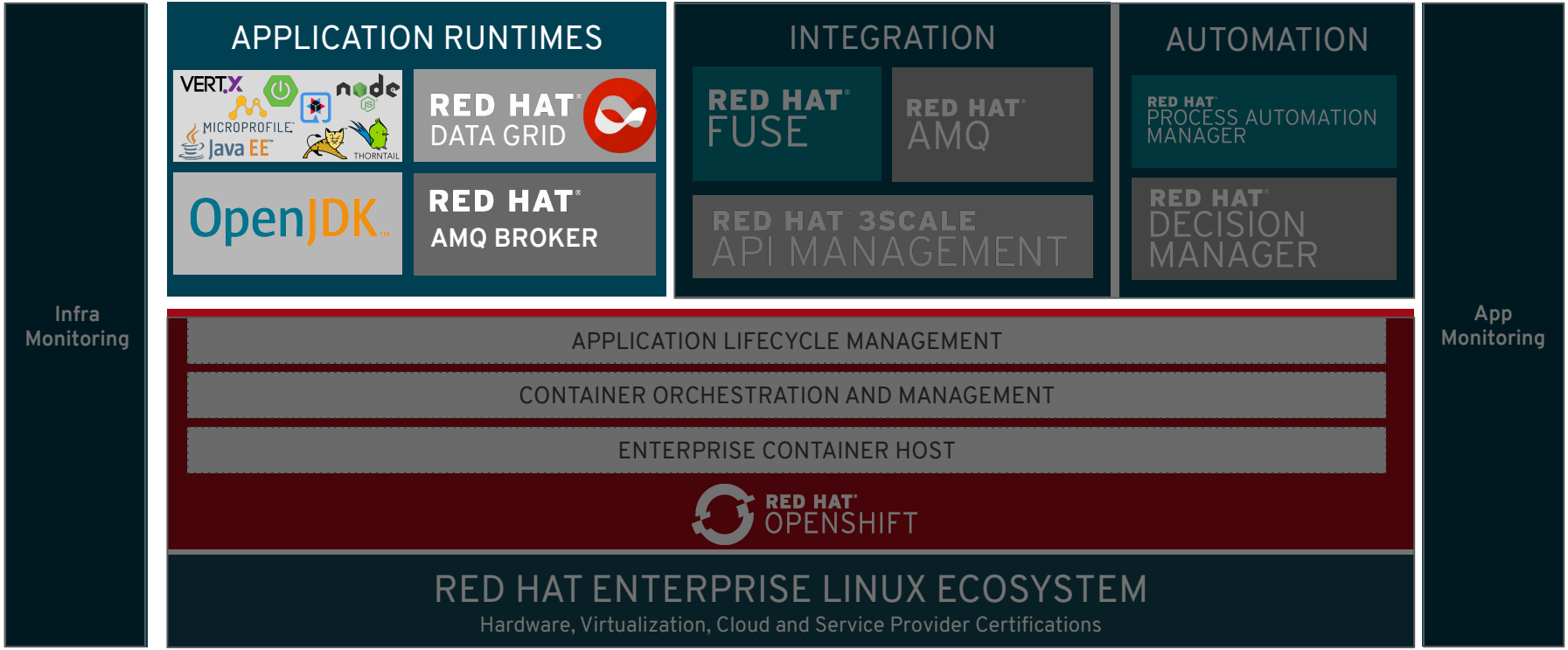




Red Hat Runtimes

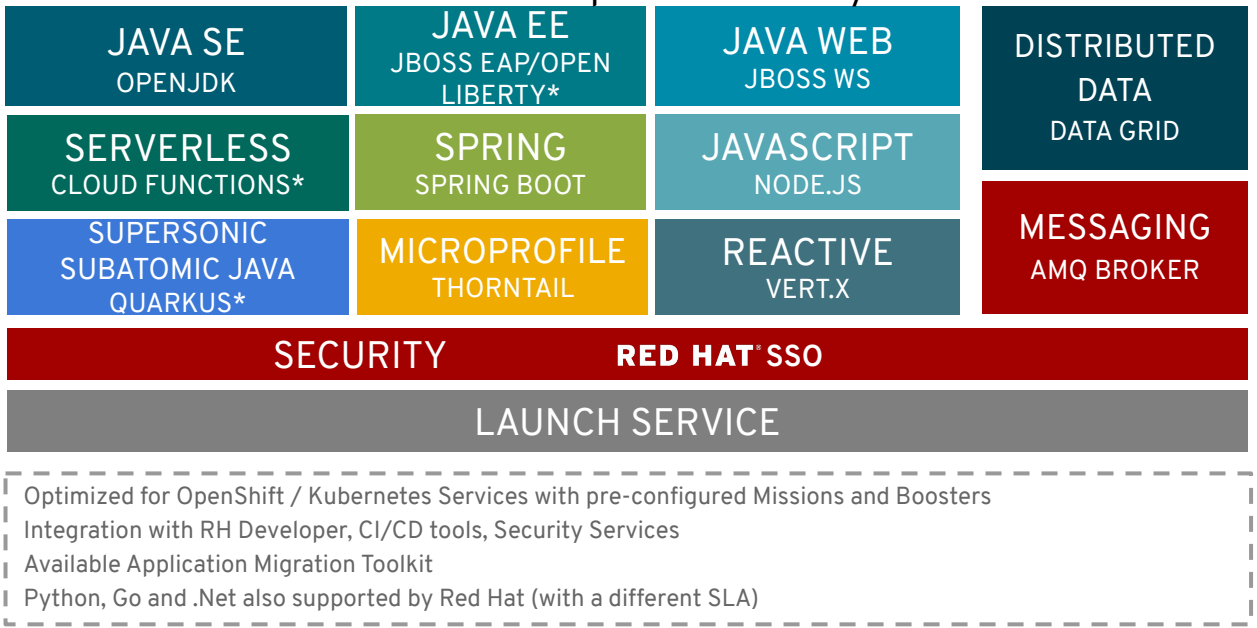
Red Hat platform for the hybrid cloud

OpenShift and Middleware optimized for the cloud



Red Hat Application Runtimes

Non-restrictive development for the hybrid cloud



Facilitate cloud native app development ON THE HYBRID CLOUD:

- ✓ Faster getting started
- ✓ Simplify container dev
- ✓ Automate DevOps
- ✓ Standardize tools/processes
- ✓ Fully supported JDK

Red Hat Runtimes

ENTERPRISE JAVA

Red Hat JBoss Enterprise Application Platform

SERVLET APPS

spring

JAVA MICROSERVICES

THORNTAIL

JAVASCRIPT FLEXIBILITY

node

REACTIVE SYSTEMS

VERT.X

TOMCAT SIMPLICITY

Red Hat JBoss Web Server

Spring

- Microservices for Developers using Spring Framework
- An opinionated approach to building Spring applications
- Historical alternative to Java EE
- Getting started experience
- Spring MVC / DI / Boot most popular

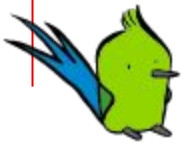
Spring in Red Hat Runtimes

- **It's the same Spring you know and love**
- Tested and Verified by Red Hat QE
  - Spring Boot, Spring Cloud Kubernetes, Ribbon, Hystrix
- Red Hat components fully supported
  - Tomcat, Hibernate, CXF, SSO (Keycloak), Messaging (AMQ), …
- Native Kubernetes/OpenShift integration (Spring Cloud)
  - Service Discovery via k8s (DNS), Ribbon
  - Spring Config via ConfigMap
- Developer Tooling (launch.openshift.io, starters)
- Additional planned support for
  - Transactions (Narayana), Messaging (Rabbit MQ -> AMQ), more

Cloud native support in Spring

- Health Checks (actuator)
- Externalized Config (spring-cloud-kubernetes)
- Client-side discovery / load balancing (Eureka/Kubernetes)
- Circuit Breaking / Bulkheading (Hystrix)
- Logging / Monitoring / Tracing / Metrics
- Secure deployments with Keycloak
- API Documentation (Swagger)

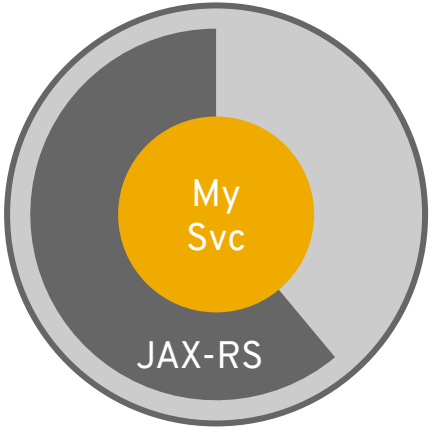
Thorntail



THORNTAIL

Java EE microservices

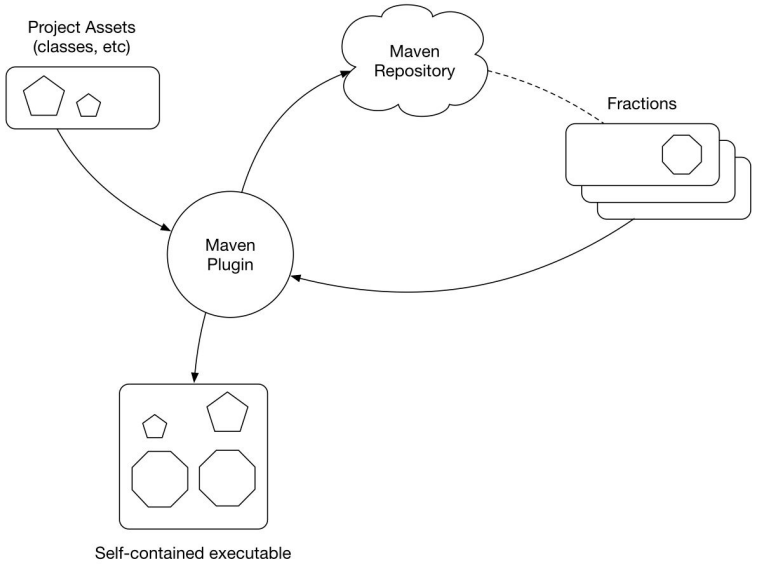
- Leverage Java EE expertise
- Open standard
- Microservices focus
- Optimized for OpenShift
- Super lightweight
- Tooling for Developers
- MicroProfile Implementation




```
$ java -jar my_microservice.jar
```

Thorntail “pieces” - Fractions

- A tangible unit providing a specific piece of functionality
- Embodied in a maven artifact
- To support the compositional aspect in Thorntail
- Provides the “runtime” capabilities
- Means to add API dependencies (e.g. JAX-RS)
- Means to configure the system
  - With reasonable defaults
- Means to discover other components (topology)
- Means to alter deployments (e.g. keycloak)
- Can be auto-detected or explicitly declared



Cloud native support in Thorntail

- Health Checks
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- Logging / Monitoring / Tracing / Metrics
- Secure deployments with Keycloak
- MicroProfile
- API Documentation

THORNTAIL

Build microservices

- Embeddable (Fat Jar)
- Lightweight
- Modular & extensible
- Built from WildFly (Trusted and Reliable)

MICROPROFILE™

RED HAT® OPENSHIFT Application Runtimes

Thorntail and RHOAR

Upstream (Unsupported)

Flyway	JMS	Jolokia
Logstash	Vert.x Integration	Infinispan
Fluentd	Consul	jGroups
Swagger	Spring	

Tested and Verified

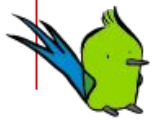
Hystrix | Ribbon | MySQL | Oracle DB

Additional Supported Fractions

Metrics	Health
Configuration	Monitor
Keycloak	Topology

Supported Specifications

Java EE 7 Web Profile | MicroProfile 1.2



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MICROPROFILE™

OPTIMIZING ENTERPRISE JAVA

eclipse

- Defines **open source** Java **microservices** specifications
- Industry Collaboration - Red Hat, IBM, Payara, Tomitribe, London Java Community, SouJava, Oracle, Hazelcast, Fujitsu, SmartBear...
- **Thorntail** is **Red Hat's** implementation
- Minimum footprint for Enterprise Java cloud-native services (v2.0) :

JSON-P 1.1	JSON-B 1.0	Health Check 1.0	JWT Propagation 1.1	Config 1.3	OpenAPI 1.0
CDI 2.0	JAX-RS 2.1	Fault Tolerance 1.1	Metrics 1.1	Open Tracing 1.1	Rest Client 1.0

MICROPROFILE™

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LAB: MONOLITHS TO MICROSERVICES WITH MICROPROFILE AND SPRING BOOT

Lab: Monoliths to microservices with MicroProfile & Spring Boot

GOAL FOR LAB

In this lab you will learn:

- How Red Hat OpenShift and Red Hat OpenShift Application Runtimes (RHOAR) help jumpstart app modernization
- Benefits and challenges of microservices
- How to transform existing monolithic applications to microservices using strangler pattern and 12-factor app patterns.
- Use modern app dev frameworks like Thorntail and Spring Boot to implement microservice applications on OpenShift

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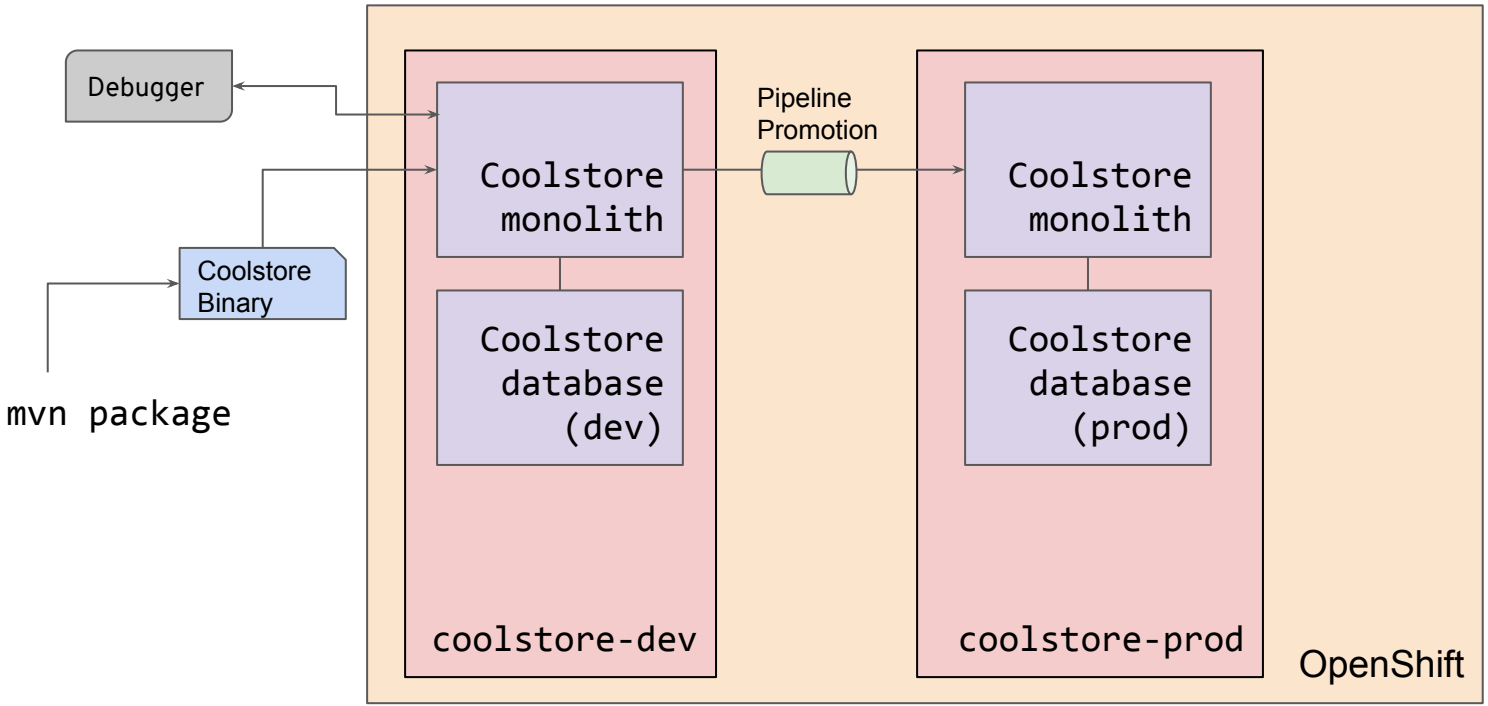
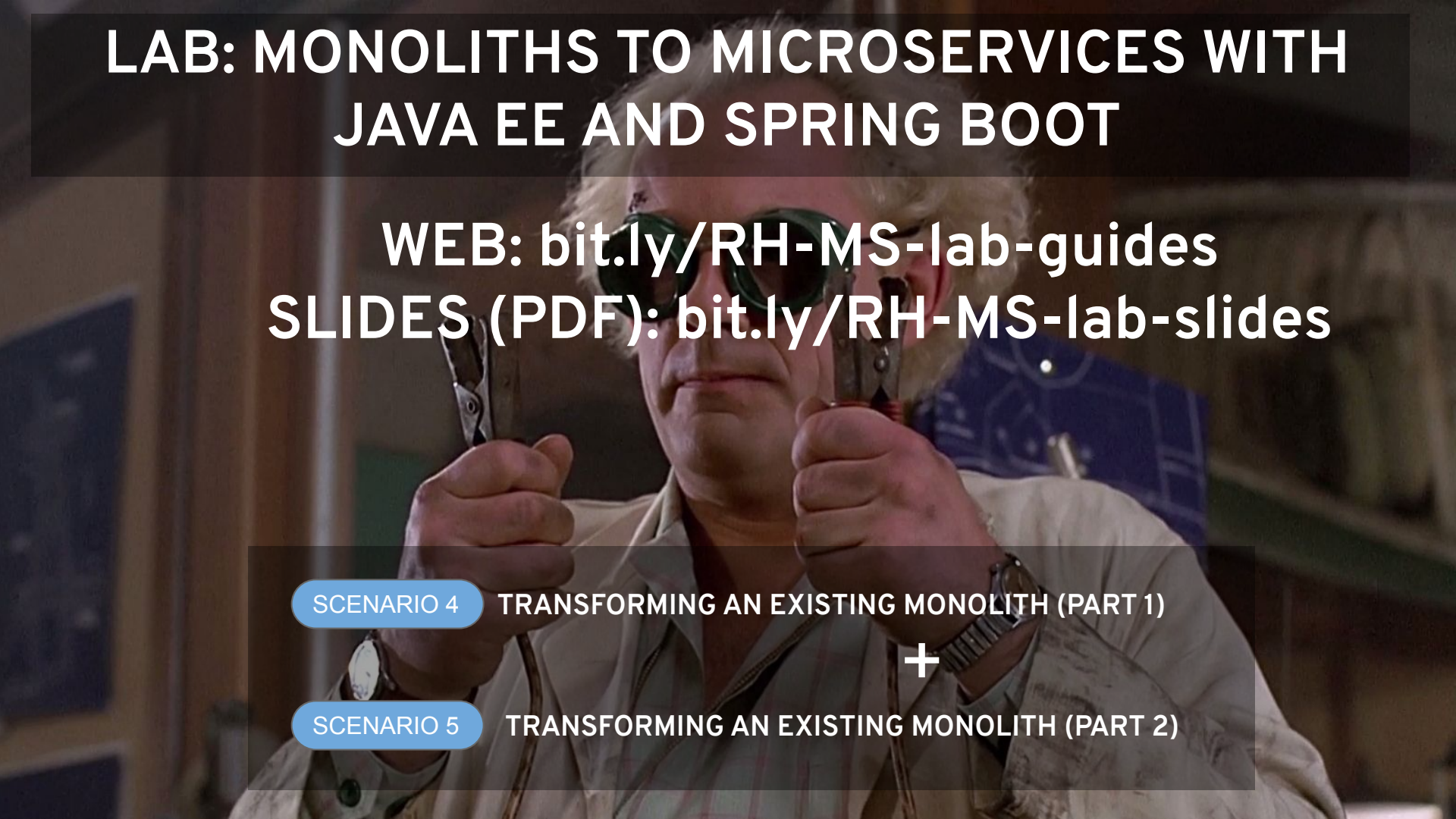
Current state - the monolith



LAB: MONOLITHS TO MICROSERVICES WITH JAVA EE AND SPRING BOOT

WEB: bit.ly/RH-MS-lab-guides

SLIDES (PDF): bit.ly/RH-MS-lab-slides



SCENARIO 4 TRANSFORMING AN EXISTING MONOLITH (PART 1)

+

SCENARIO 5 TRANSFORMING AN EXISTING MONOLITH (PART 2)

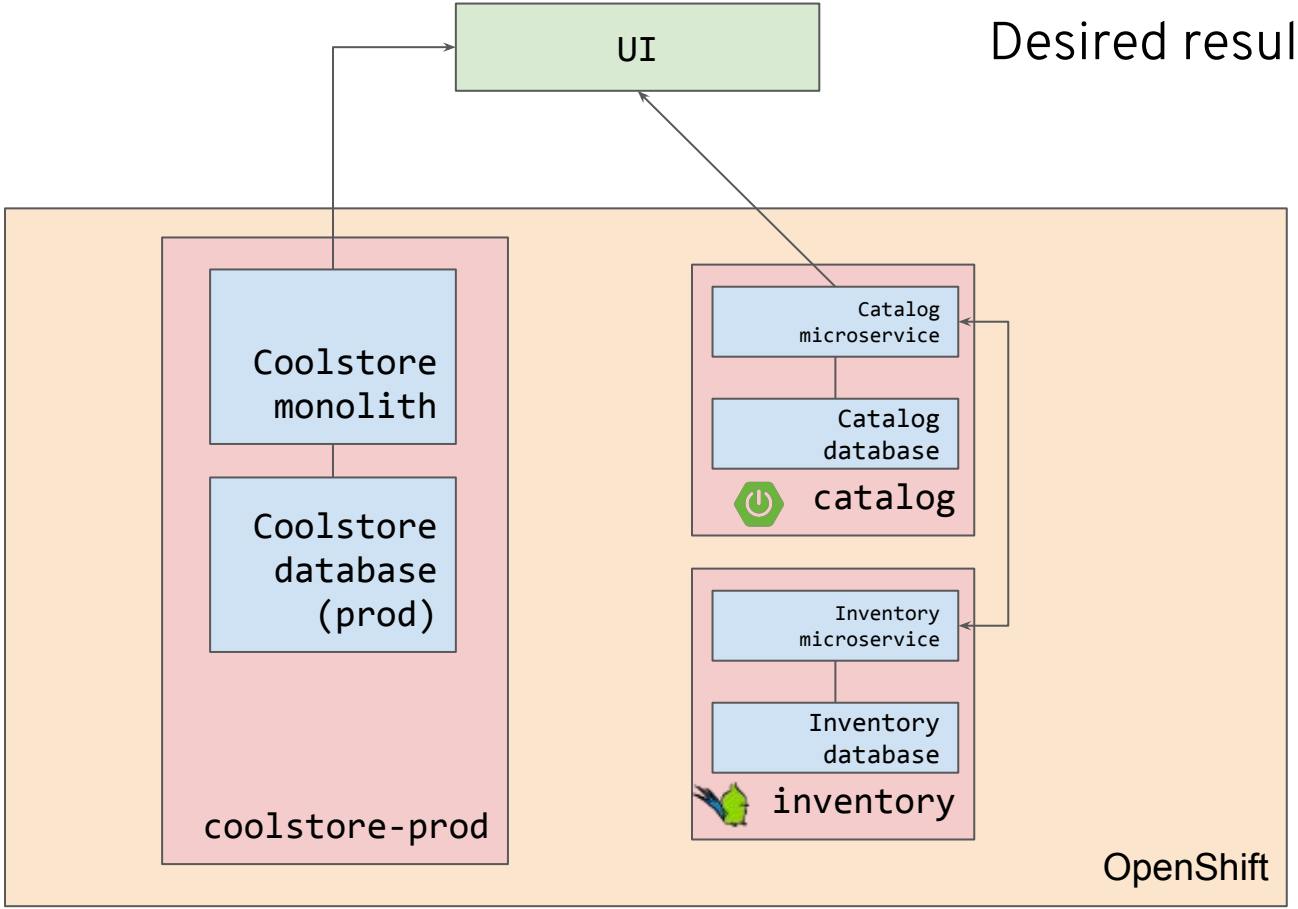
Wrap-up and discussion

Result of lab

In this lab you learned how to:

- Implement a Java EE microservice using Thorntail
- Implement a Java EE microservice using Spring Boot
- Develop container-based testing
- Add microservice concerns like Health checks, externalized configuration and circuit breaking
- Use the strangler pattern to slowly migrate functionality from monolith to microservices

Desired result of lab



Thank you

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