Entwicklung und Betrieb von Microservices mit Red Hat OpenShift

18. April 2018, Nürnberg

Markus Lohn

esentri

- Head of Technology Consulting @ esentri
- Experte für SOA/Integration und Java EE-Technologien
- mehr als 15 Jahre Projekt- und Softwareentwicklungs-erfahrung

Kontakt:

- Email: markus.lohn@esentri.com
- Blog: http://blog.esentri.com
- Twitter: https://twitter.com/MarkusLohn

ORACLE ACE Associate

THE Open GROUP TOGAF® 9 Certified

CPSA-F iSAQB certified

Microservices

Developing a single application as:

- a suite of **small services**
- each running in its **own process / owns it‘s data**
- communicating with **lightweight mechanisms**

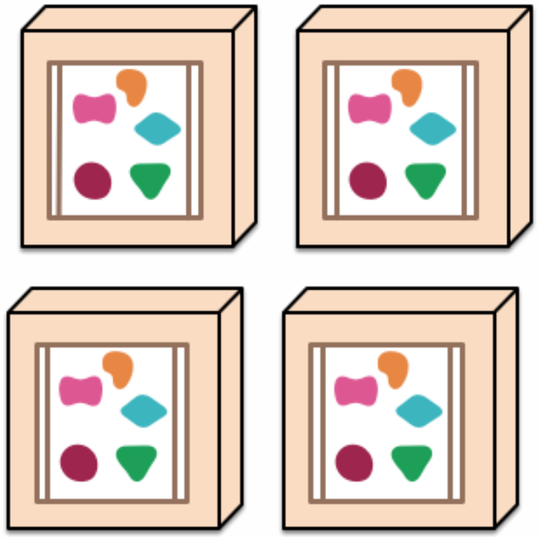
(Definition: M. Fowler / J. Lewis)

https://martinfowler.com/articles/microservices.html

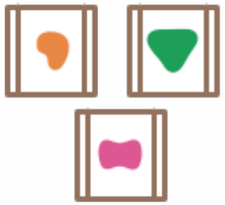
Monoliths and Microservices

A monolithic application puts all its functionality into a single process...

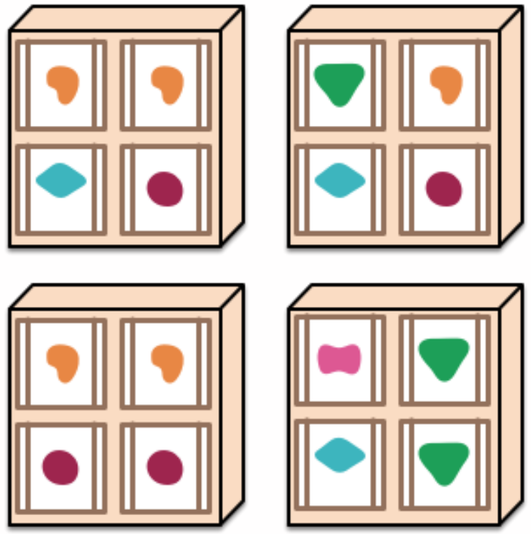
... and scales by replicating the monolith on multiple servers



A microservices architecture puts each element of functionality into a separate service...



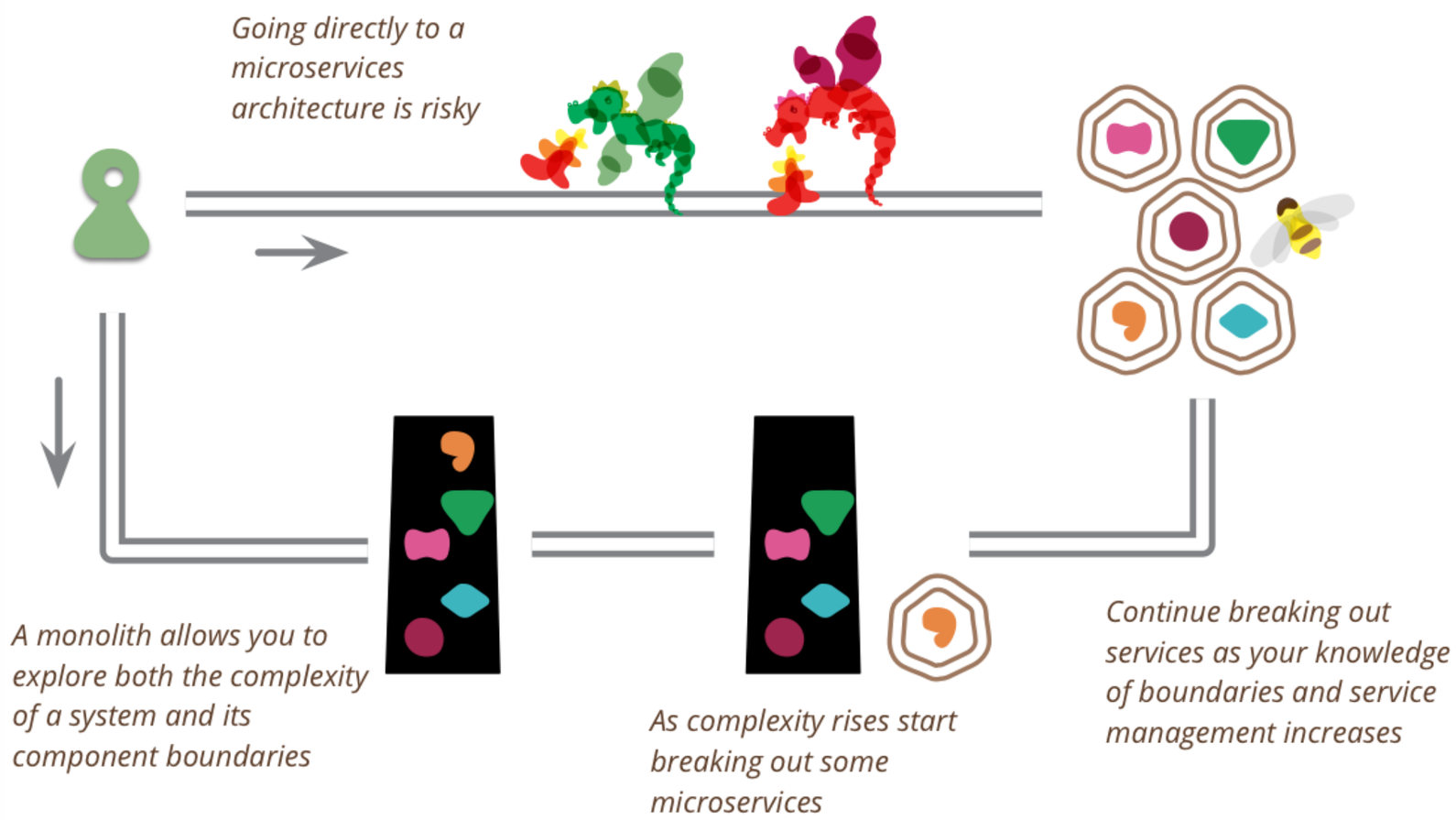
... and scales by distributing these services across servers, replicating as needed.



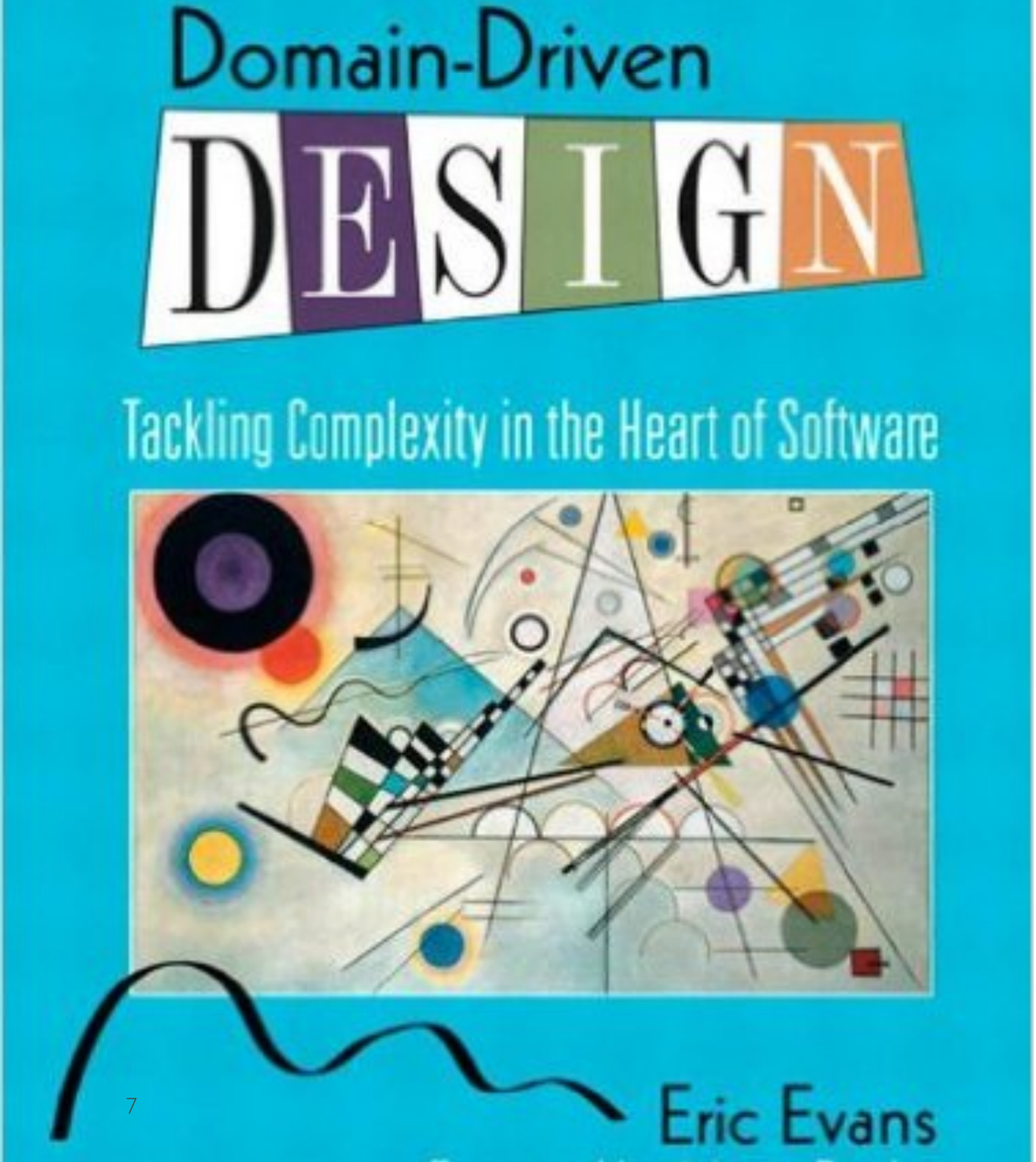
Bildquelle: Microservices - https://martinfowler.com/articles/microservices.html

Wie baue ich Microservices?

Entwurf einer Microservice-Architektur



Bildquelle: MonolithFirst - https://martinfowler.com/bliki/MonolithFirst.html



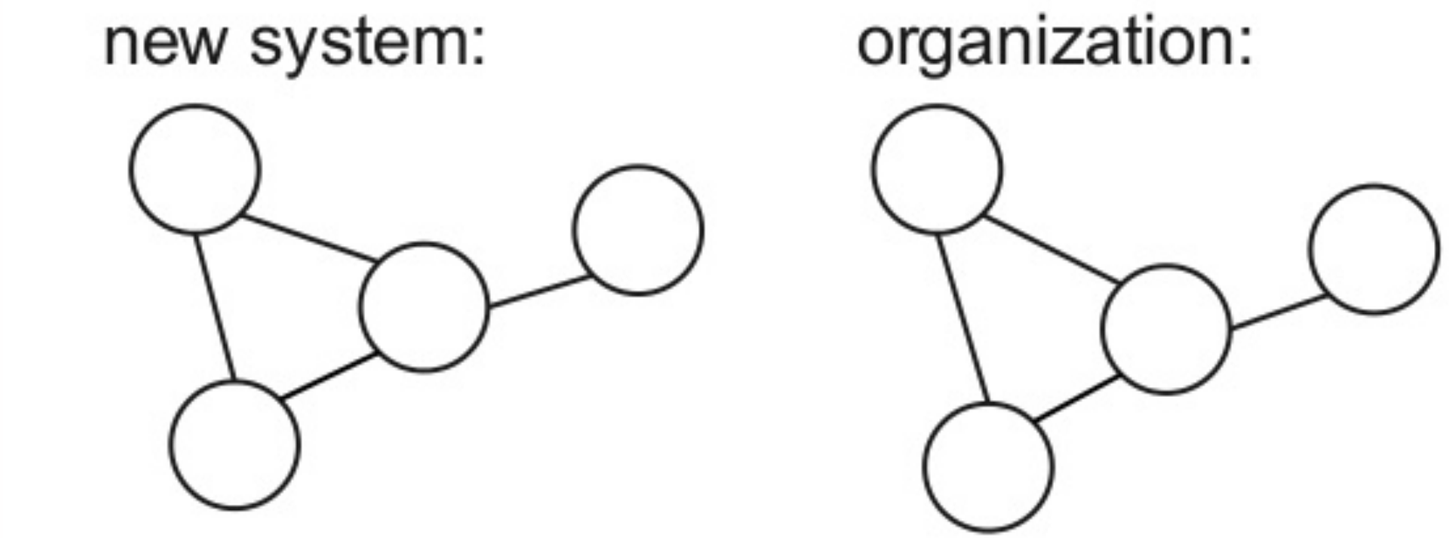
Orientierung an der Fachlichkeit

siehe "Bounded Context"
im Buch von Eric Evans
zum Domain-Driven Design.

veröffentlicht 2003

Das A-Team

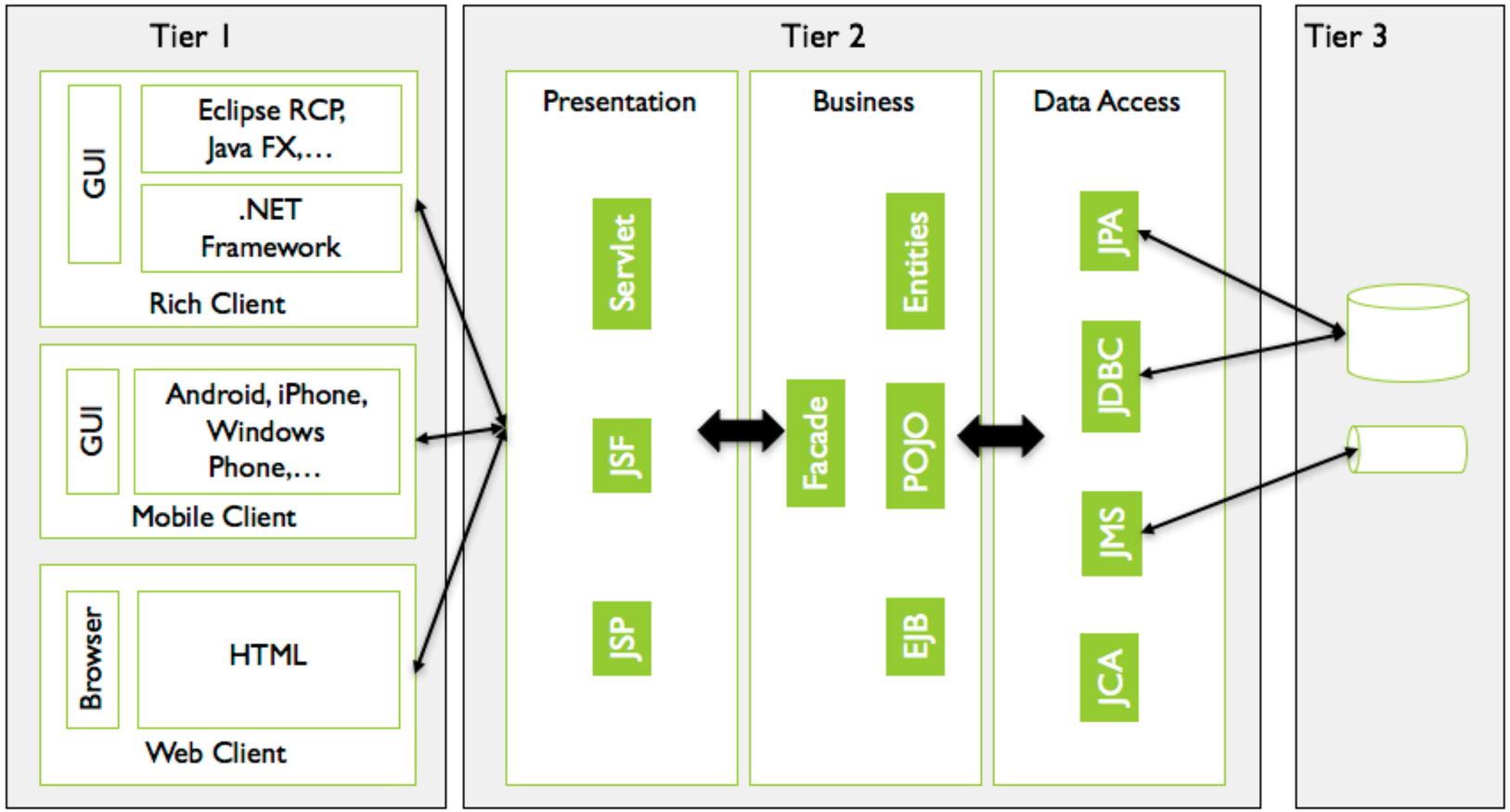
conway's law



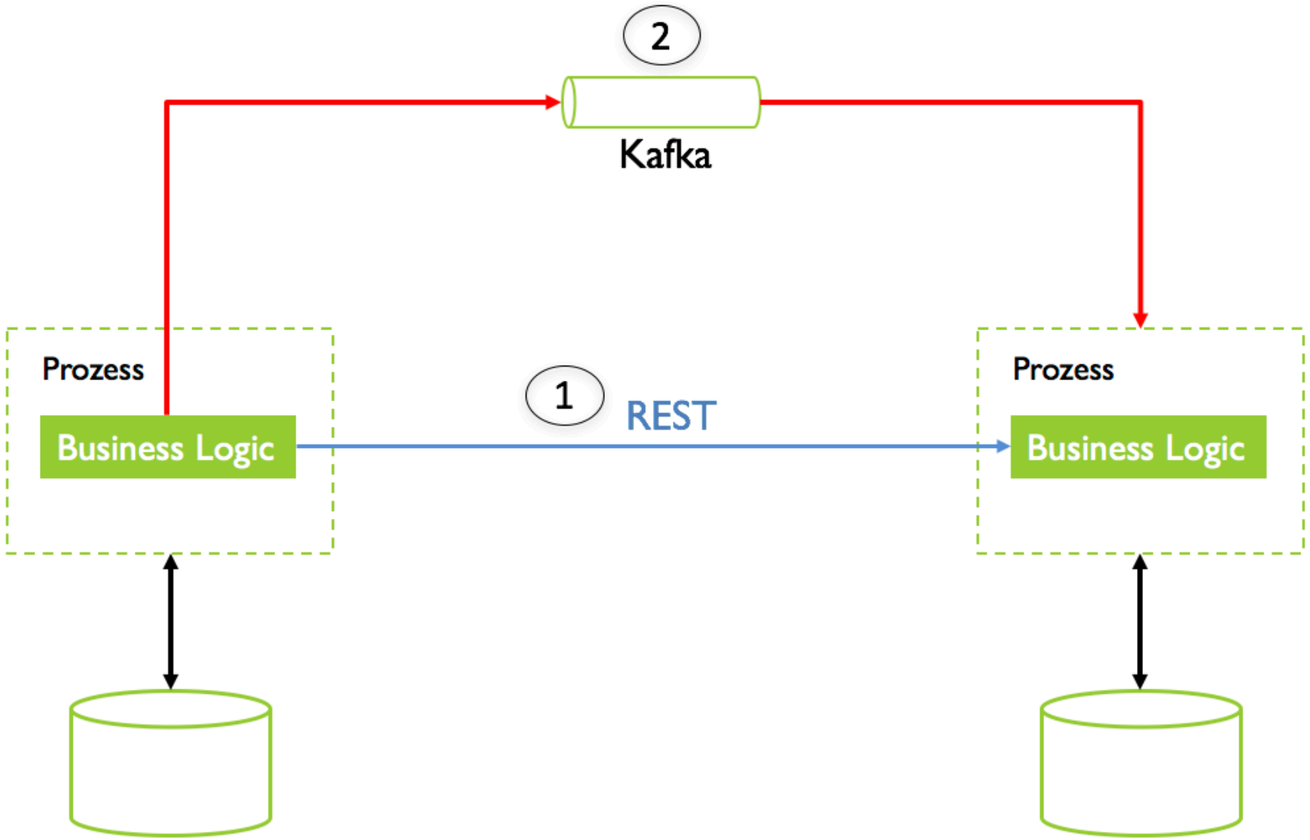
"Any organization that designs a system … will inevitably produce a design whose structure is a copy of the organization's communication structure." – Conway's Law

M. E. Conway: How Do Committees Invent?; Bd. Datamation magazine, 1968.

N-Tier Architekturen



Kommunikation und Kosten?



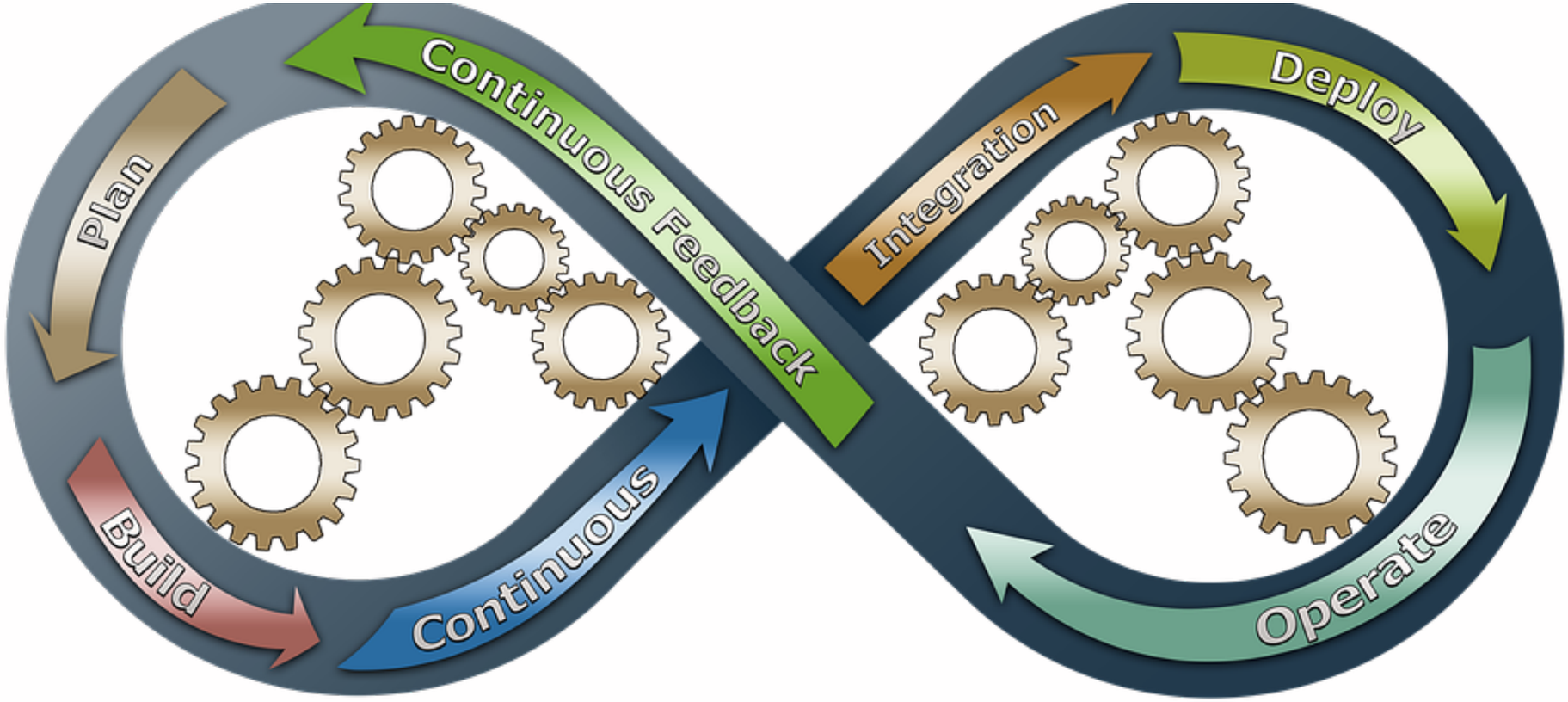
Netzwerkinfrastruktur

wird immer besser...

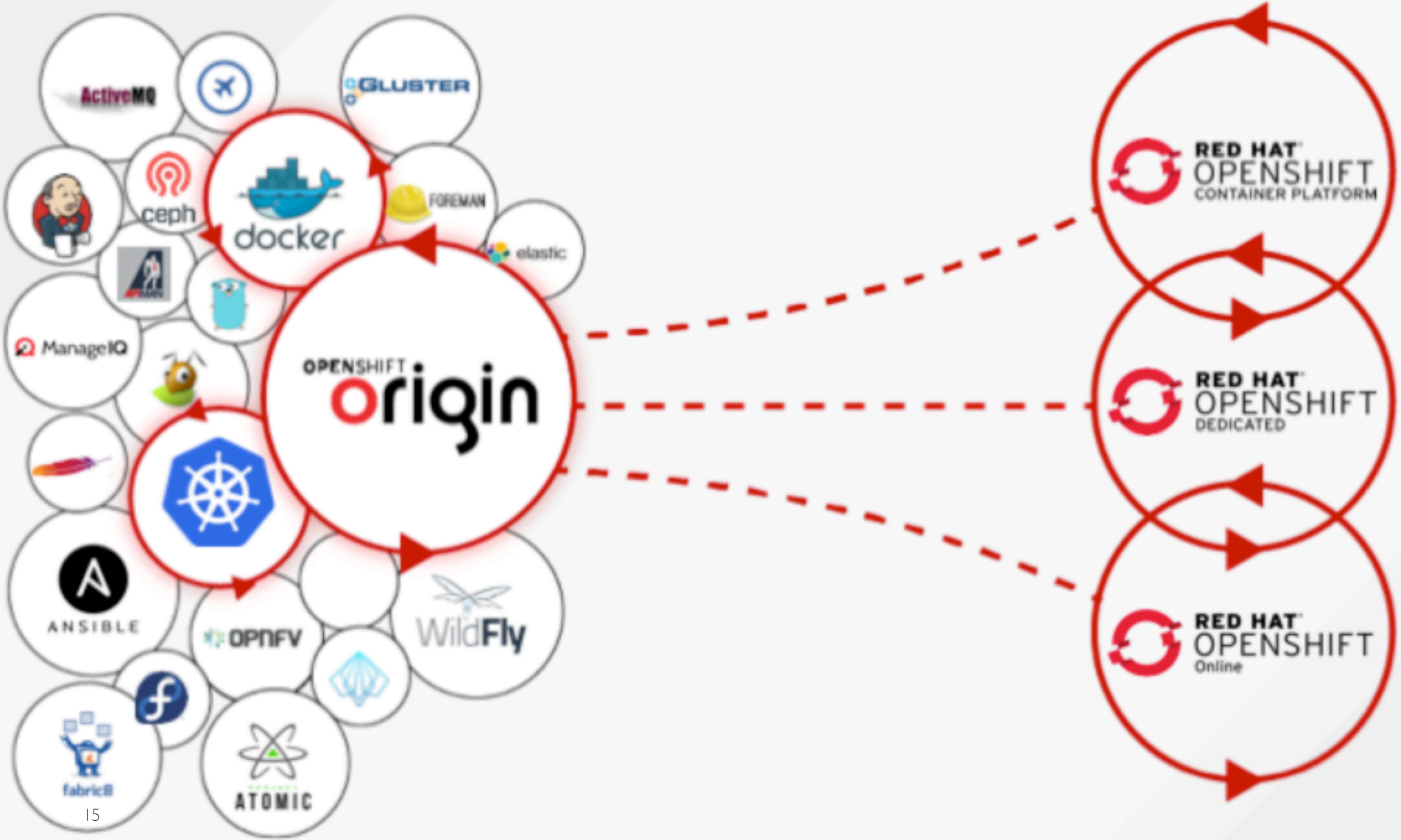
...
Networks are now radically faster, common deployments have moved from 1GBit to 10GBit and now 25GBit, and software protocols are far more efficient.
...
A decade later, encodings that are at least an order of magnitude more efficient over 25Gbit networks—meaning that the cost of communication is reduced by more than two orders of magnitude. In other words, it's possible to send **100 to 1000** messages between services in the same amount of time as communicating and processing one message **would take a decade ago**. This is a key enabler for the move away from monolithic applications.
...

https://read.acloud.guru/evolution-of-business-logic-from-monoliths-through-microservices-to-functions-ff464b95a44d


Komplexität

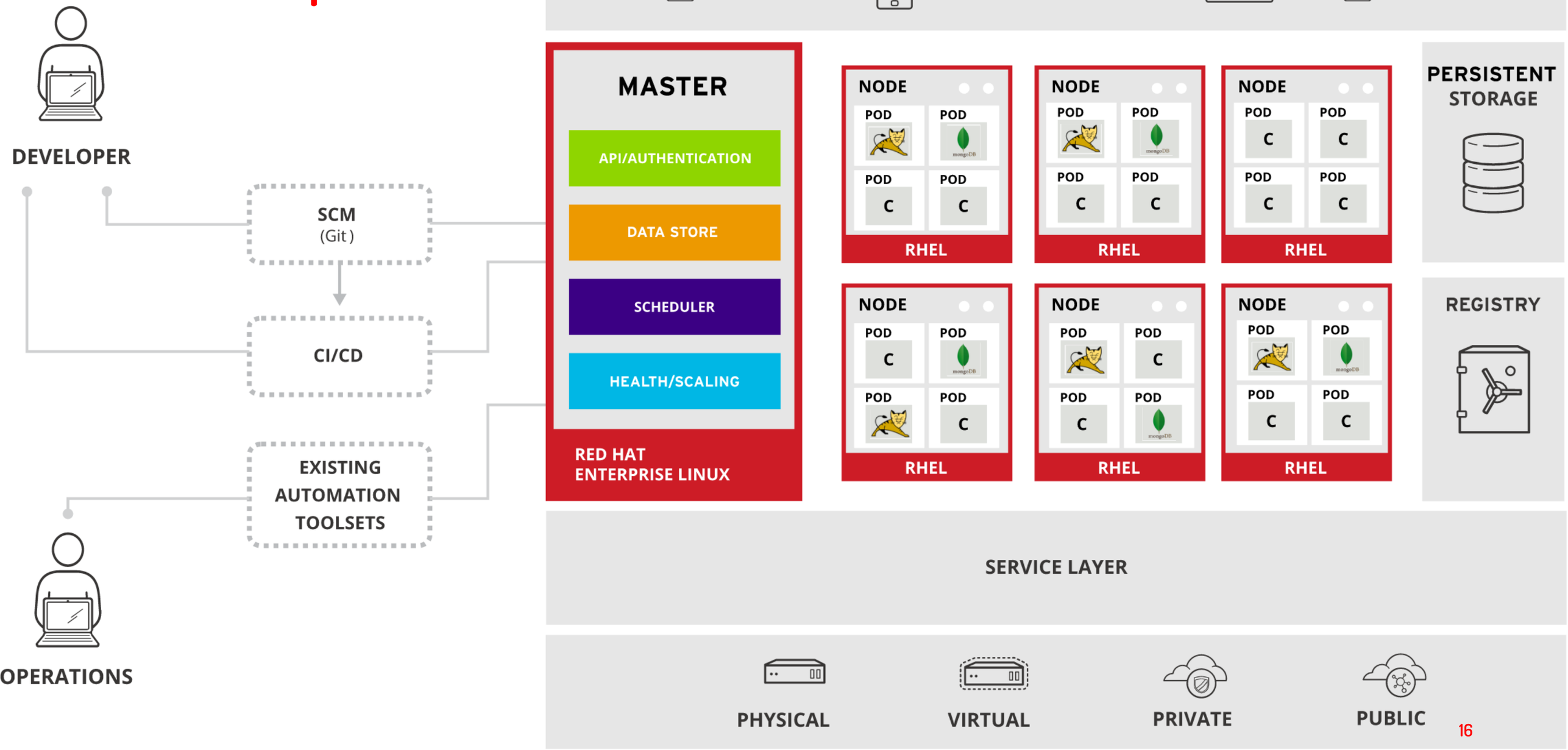


Microservice Runtime


ActiveMQ
GLUSTER
ceph
docker
FOREMAN
elastic
ManageIQ
OPENSHIFT
origin
ANSIBLE
OPNFV
WildFly
fabric8
ATOMIC
RED HAT
OPENSHIFT
CONTAINER PLATFORM
RED HAT
OPENSHIFT
DEDICATED
RED HAT
OPENSHIFT
Online

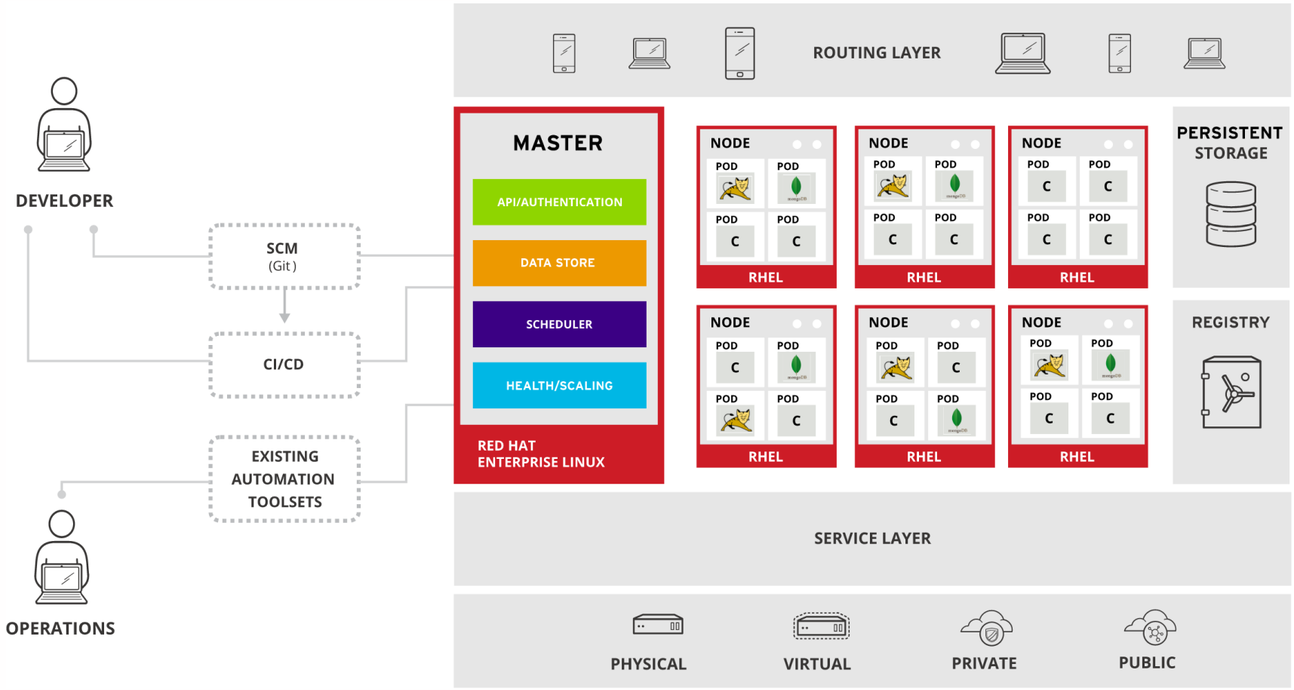
redhat.

Red Hat OpenShift



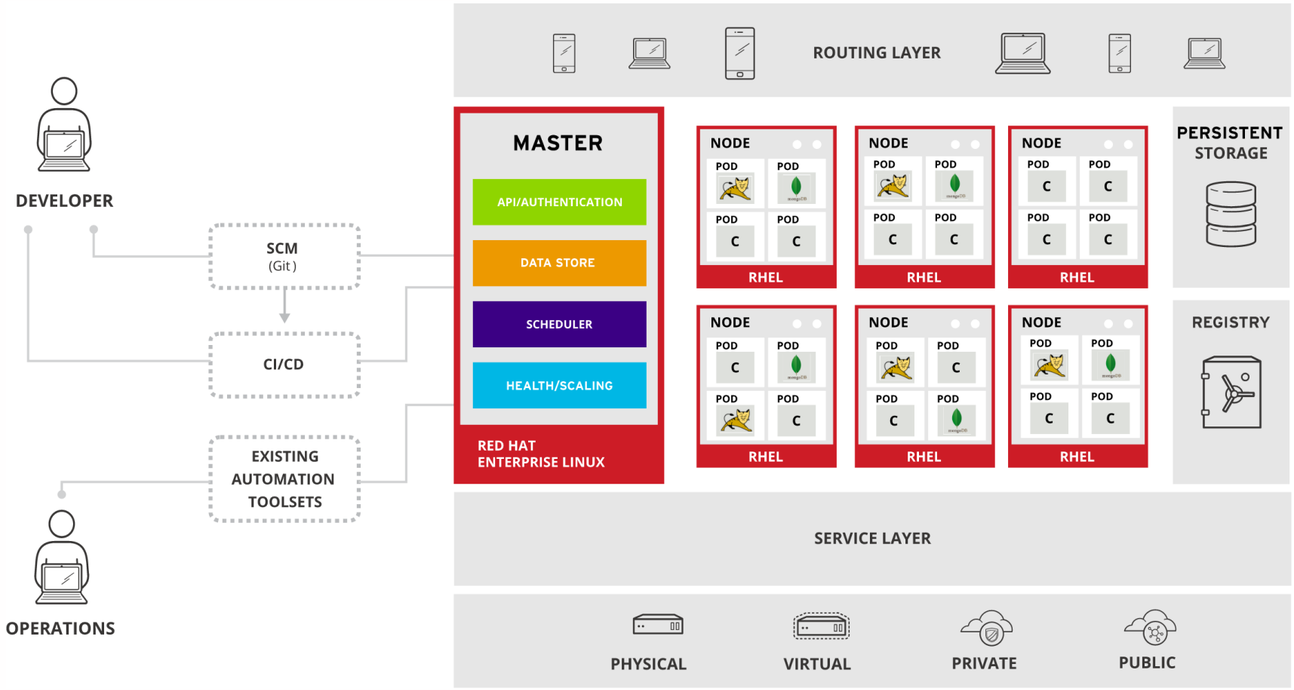
Kubernetes - Master

- API-Server
  - Konfigurationsmanagement für Pods, Services and Replication Controllers
  - Zuweisung von Pods > Nodes und Synchronisation der Konfiguration
- etcd
  - Key-Value Store zum Speichern von Cluster-Daten
- Controller Manager Server
  - Überwacht etcd nach Änderungen an Controller Objekten
  - nutzt API, um die Änderungen zu verteilen und den konfigurierten Zustand herzustellen
- HAProxy
  - benötigt für HA-Konfiguration von mehreren Masters



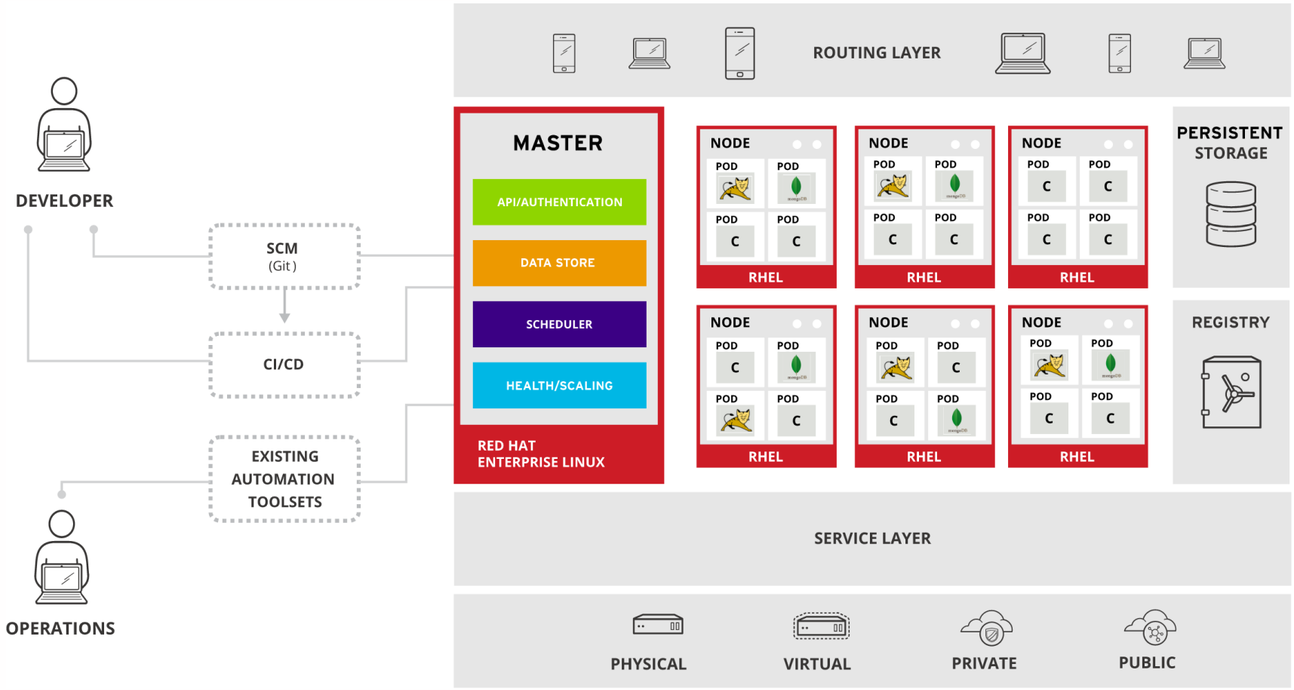
Kubernetes - Nodes

- Kubelet
  - ein Agent auf jedem Node
  - startet und überwacht Container in einem Pod
- Service Proxy
  - Weiterleitung von Netzwerkanfragen
- Container Runtime
  - sorgt für die Ausführung von Containern
  - Support: Docker und andere

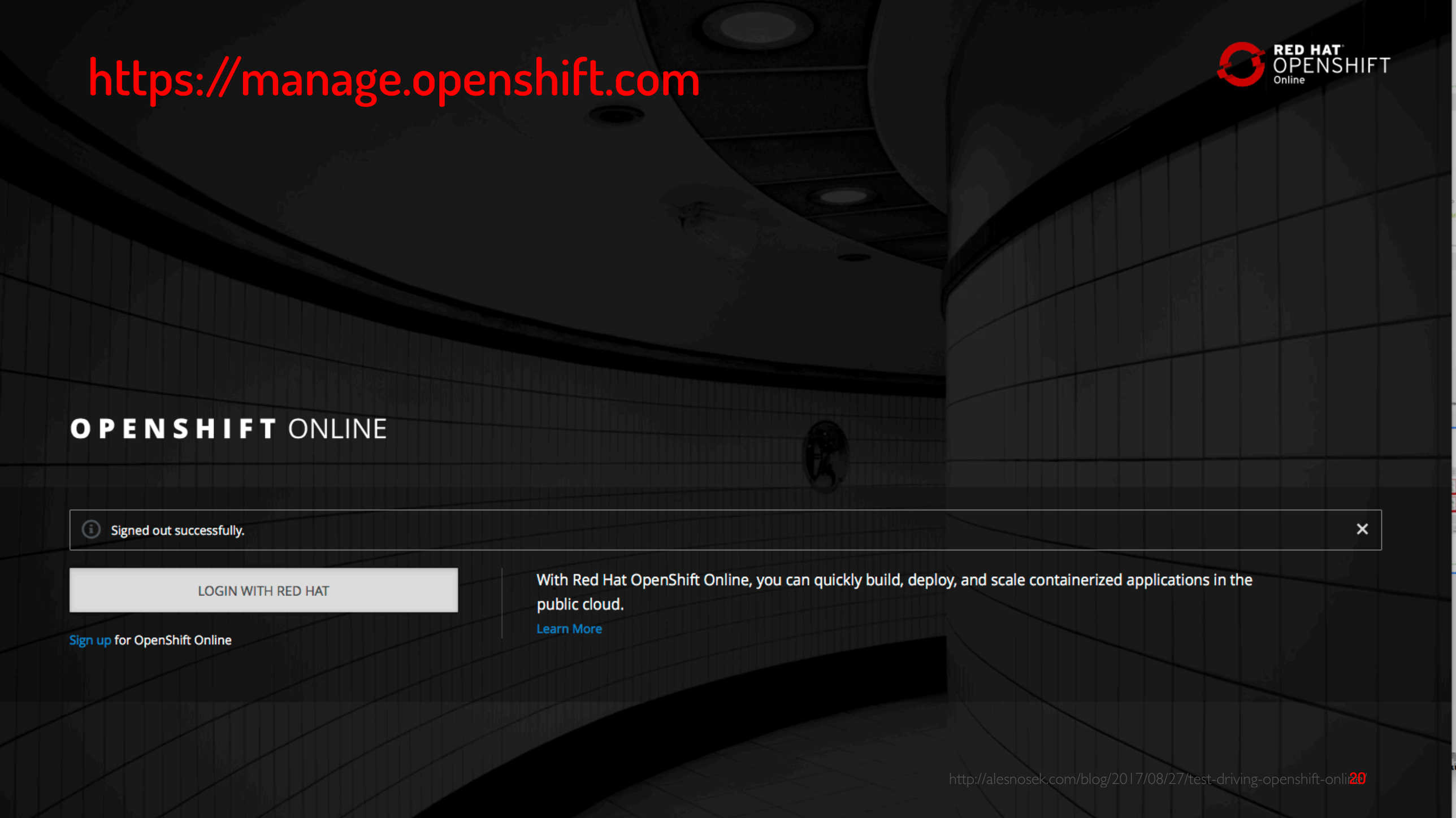


Container Registry

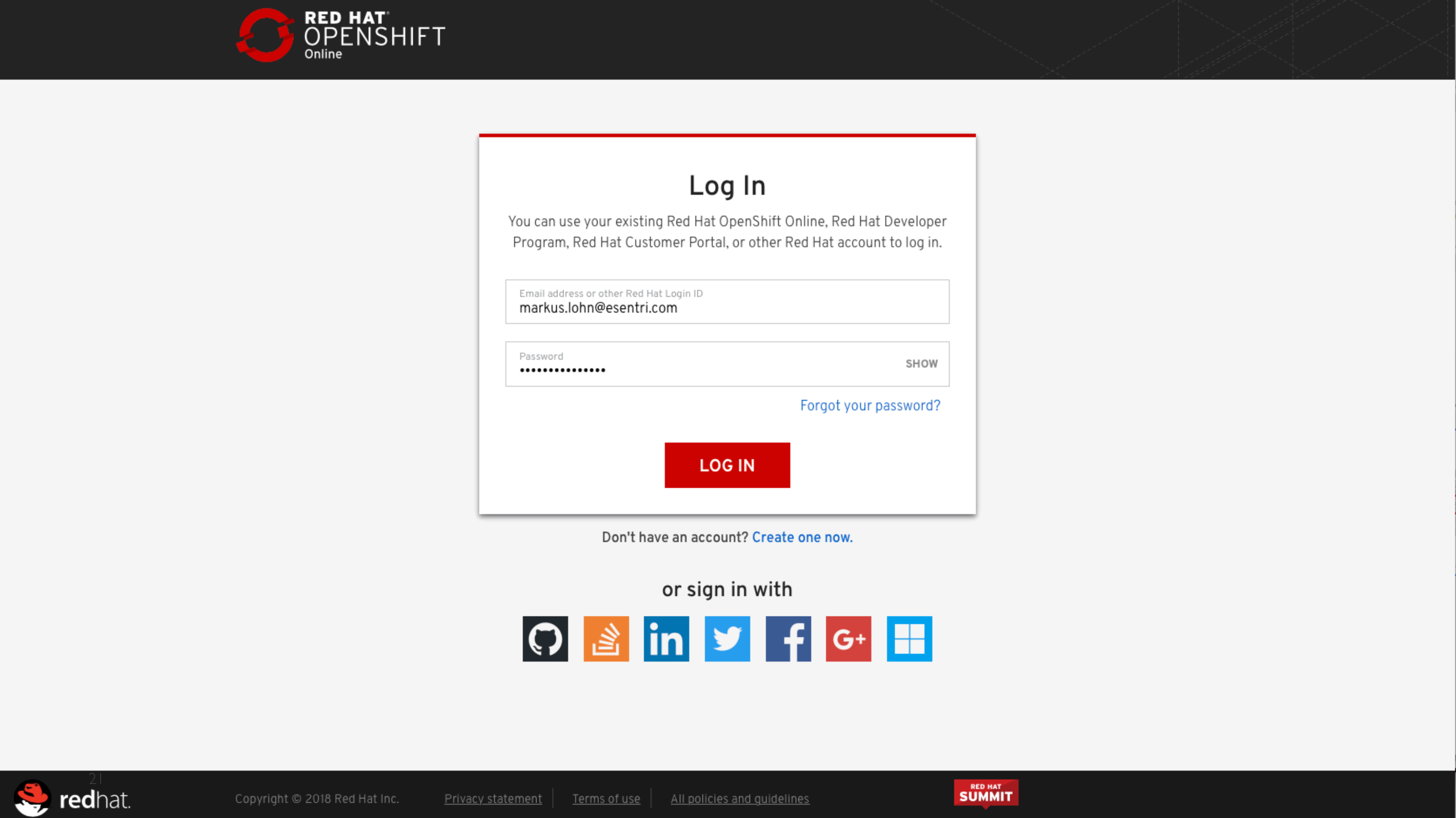
- Management von Container Images
- Integrated OpenShift Registry (OCR)
  - automatisches Provisionieren von neuen oder geänderten Images
- Third Party Registries
  - Docker Hub
  - ...



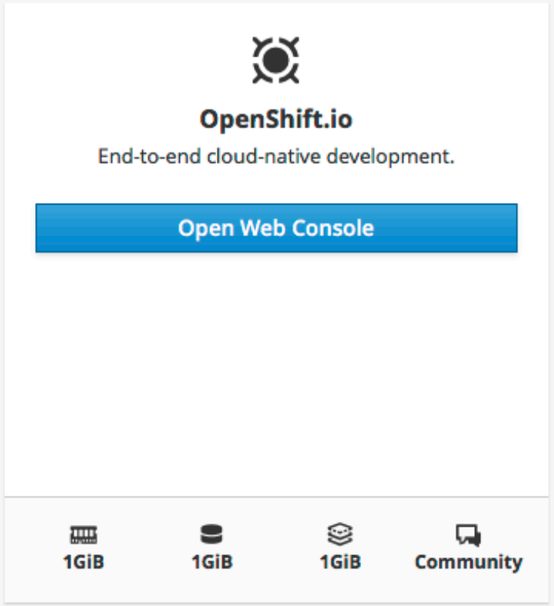
https://manage.openshift.com

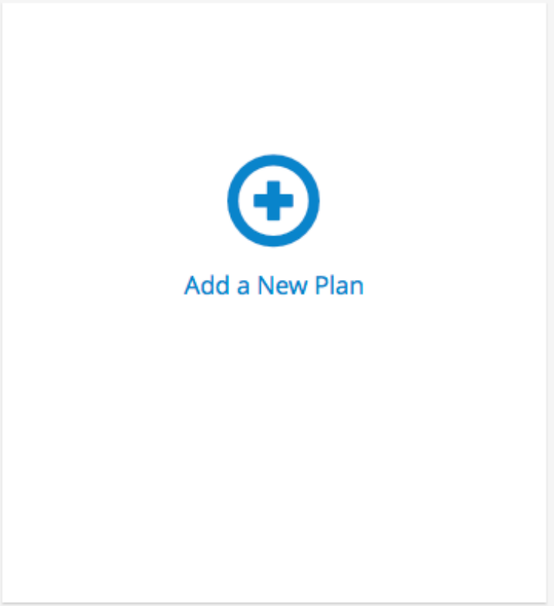


http://alesnosek.com/blog/2017/08/27/test-driving-openshift-online/



Active **Subscriptions**





Plans 1 — Cluster Regions 2 — Confirm 3

Select a Plan

Starter

For individual learning and experimenting.

- 1 Project
- 1GiB Memory Included
- 1GiB Terminating Memory Included
- 1GiB Storage Included
- Resource Hibernation

FREE

Pro

For professional projects and hosting.

- 10 Projects
- 2GiB Memory Included
  Up to 48GiB Memory Available
- 2GiB Terminating Memory Included
  Up to 20GiB Terminating Memory Available
- 2GiB Storage Included
  Up to 150GiB Storage Available
- Always On, Unlimited Usage
- Invite Collaborators to Projects
- Supports Custom Domains
- Scheduled Jobs
- Basic Support

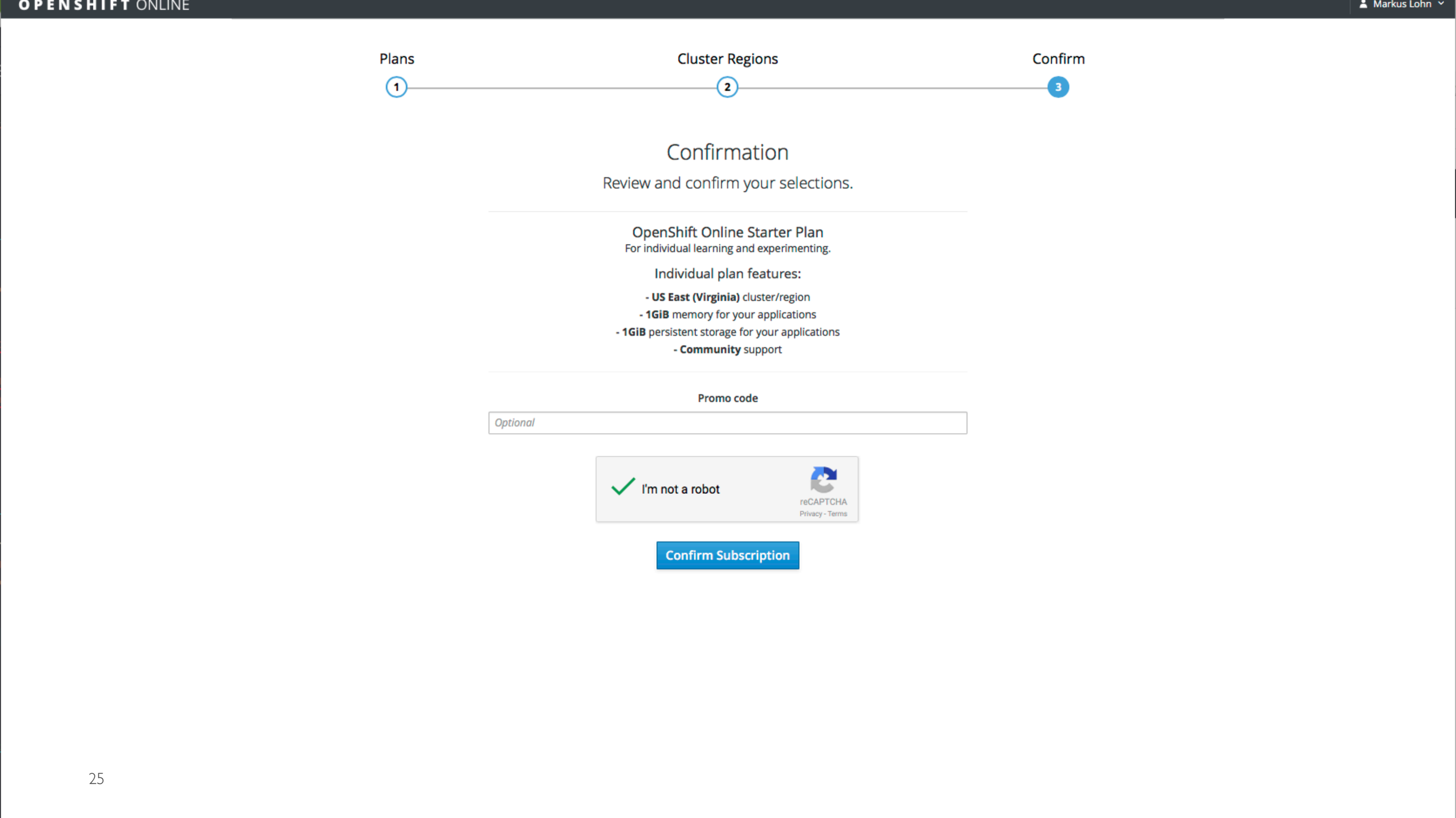
Starting at $50.00/Month

Plans (1) — Cluster Regions (2) — Confirm (3)

Select Your Preferred Cluster/Region

Your OpenShift Online Starter Plan will be provisioned in your preferred cluster/region. If capacity is unavailable, your account will remain queued and will be provisioned when capacity becomes available. An email will be delivered to you upon being provisioned.

- US East (Virginia)
- US West (Oregon)
- Canada (Central)


OPENSHIFT ONLINE
Markus Lohn
Plans
Cluster Regions
Confirm
1
2
3
Confirmation
Review and confirm your selections.
OpenShift Online Starter Plan
For individual learning and experimenting.
Individual plan features:
- US East (Virginia) cluster/region
- 1GiB memory for your applications
- 1GiB persistent storage for your applications
- Community support
Promo code
Optional
I'm not a robot
reCAPTCHA
Privacy - Terms
Confirm Subscription

OPENSHIFT ONLINE

Markus Lohn

Active **Subscriptions**

Your account will be provisioned soon and you will receive a welcome email when it is ready.

Starter: US East (Virginia)

For individual learning and experimenting.

Queued for Provisioning

1GiB 1GiB 1GiB Community

OpenShift.io

End-to-end cloud-native development.

Open Web Console

1GiB 1GiB 1GiB Community

Add a New Plan

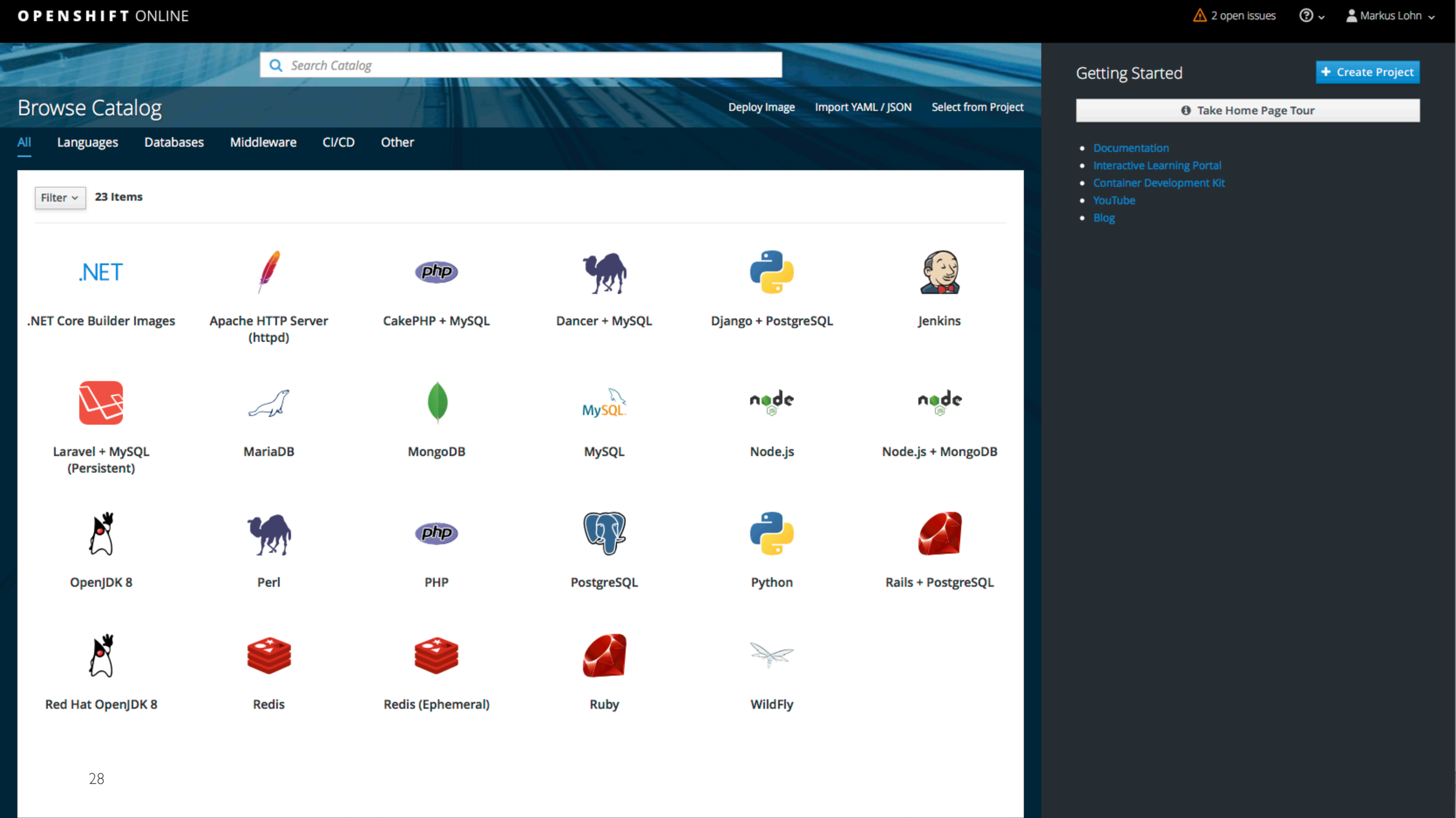
Hi Markus Lohn,

Your OpenShift Online account is ready! You can sign in to the web console with your Red Hat login (markus.lohn@esentri.com) at: https://console.starter-us-east-1.openshift.com/.

Need help? Check out our Help Center.

If you need professional support, consider OpenShift Online Pro.

Thanks,
The OpenShift Team


OPENSHIFT ONLINE
2 open issues
Markus Lohn
Search Catalog
Browse Catalog
Deploy Image
Import YAML / JSON
Select from Project
All
Languages
Databases
Middleware
CI/CD
Other
Filter
23 Items
.NET Core Builder Images
Apache HTTP Server (httpd)
CakePHP + MySQL
Dancer + MySQL
Django + PostgreSQL
Jenkins
Laravel + MySQL (Persistent)
MariaDB
MongoDB
MySQL
Node.js
Node.js + MongoDB
OpenJDK 8
Perl
PHP
PostgreSQL
Python
Rails + PostgreSQL
Red Hat OpenJDK 8
Redis
Redis (Ephemeral)
Ruby
WildFly
Getting Started
Create Project
Take Home Page Tour
Documentation
Interactive Learning Portal
Container Development Kit
YouTube
Blog

OPENSHIFT ONLINE

2 open issues | Markus Lohn

Search Catalog

Browse Catalog

Deploy Image | Import YAML / JSON | Select from Project

All | Languages | Databases | Middleware | CI/CD | Other

Filter | 23 Items

- .NET Core Builder Images
- Apache HTTP Server (httpd)
- CakePHP + MySQL
- Dancer + MySQL
- Django + PostgreSQL
- Jenkins
- Laravel + MySQL (Persistent)
- MariaDB
- MongoDB
- MySQL
- Node.js
- Node.js + MongoDB
- OpenJDK 8
- Perl
- PHP
- PostgreSQL
- Python
- Rails + PostgreSQL
- Red Hat OpenJDK 8
- Redis
- Redis (Ephemeral)
- Ruby
- WildFly

Getting Started

+ Create Project

Create Project

* Name

invision-day-2018

A unique name for the project.

Display Name

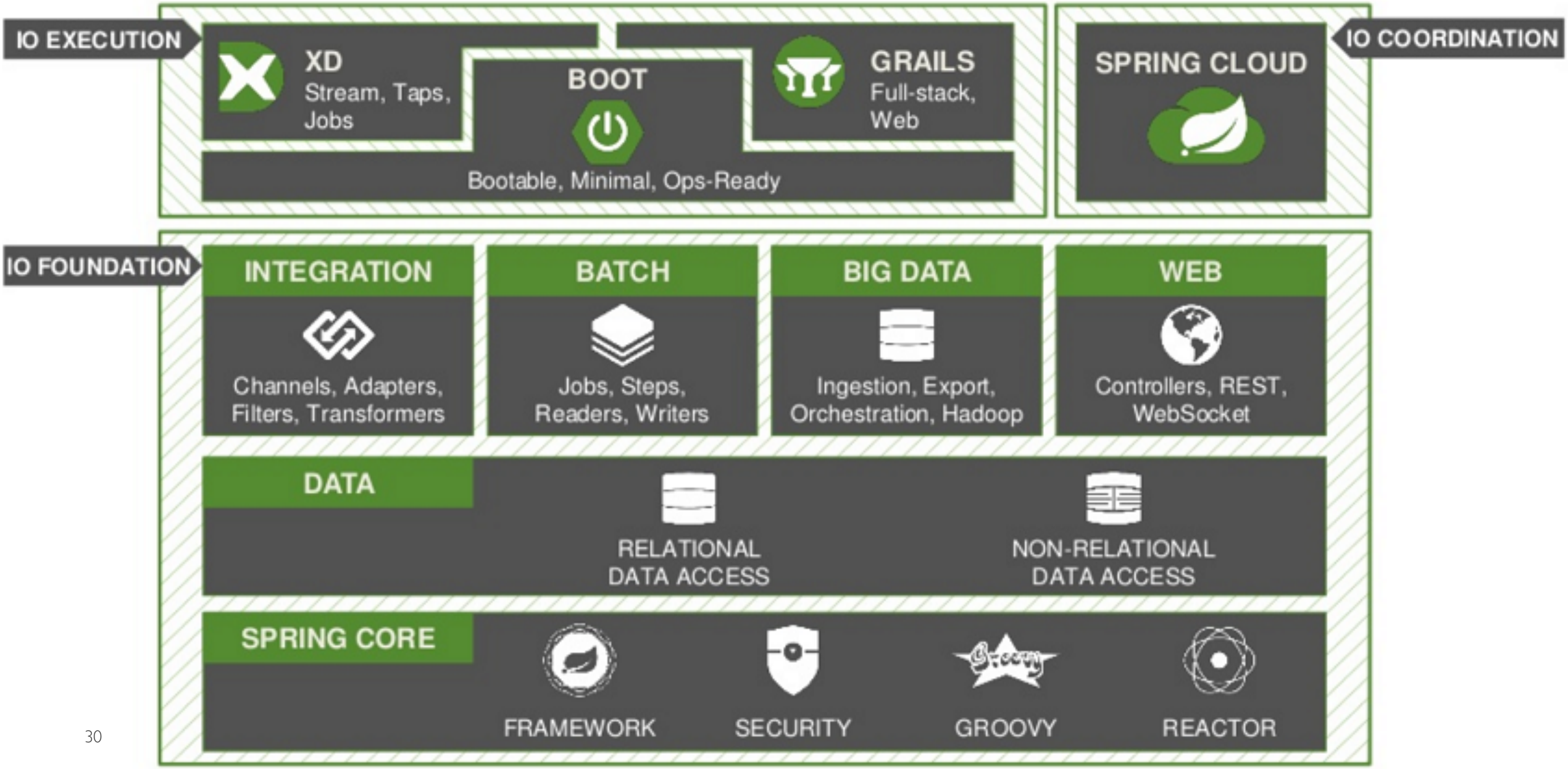
invision-day-2018

Description

Test Project for Invision Day 2018

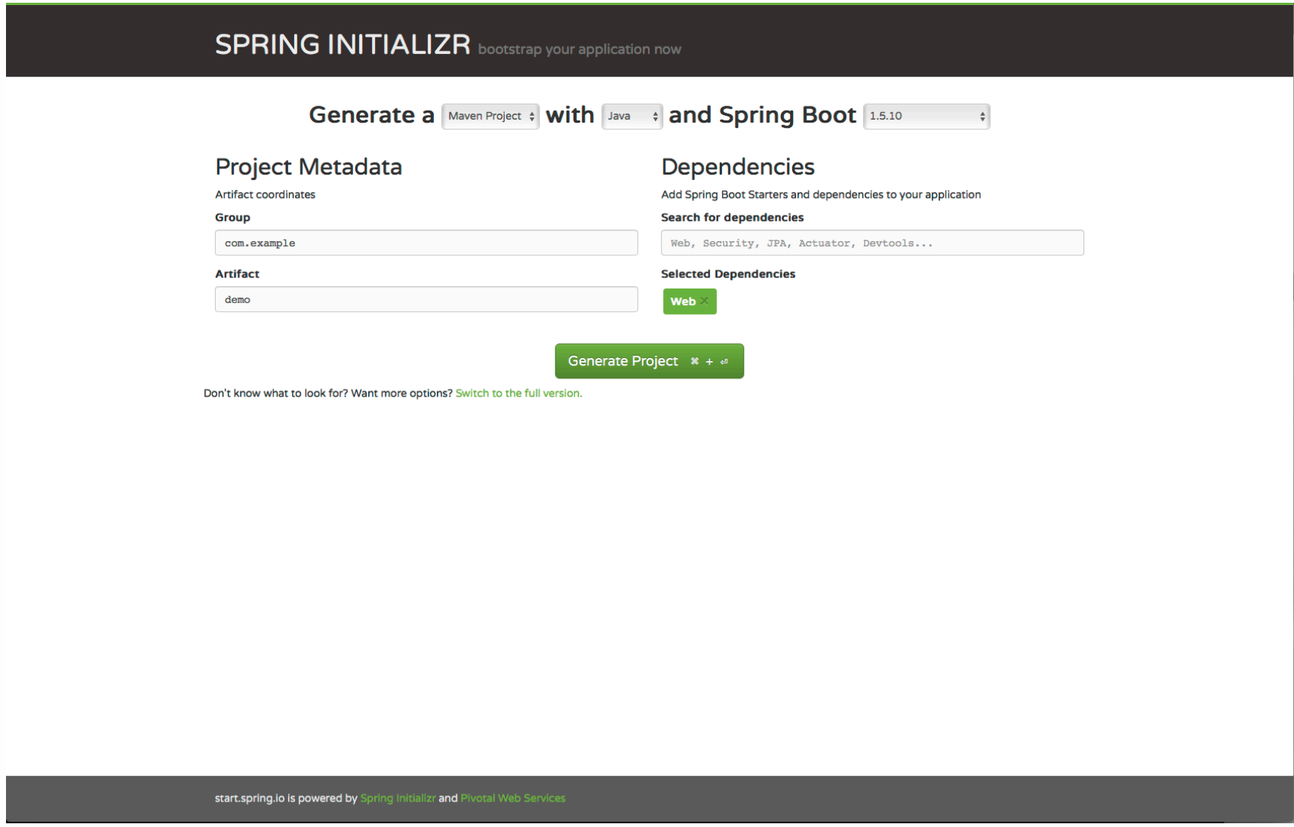
Cancel | Create

Spring IO Platform



Mein erster Microservice...

- Projekt mit Template anlegen http://start.spring.io
- Projekt mit Entwicklungsumgebung öffnen
- Klasse Greetings und Greeting Controller erstellen https://spring.io/guides/gs/rest-service/
- Applikation lokal starten und testen



Mein erster Microservice...

Service starten:

```
mvn spring-boot:run
```

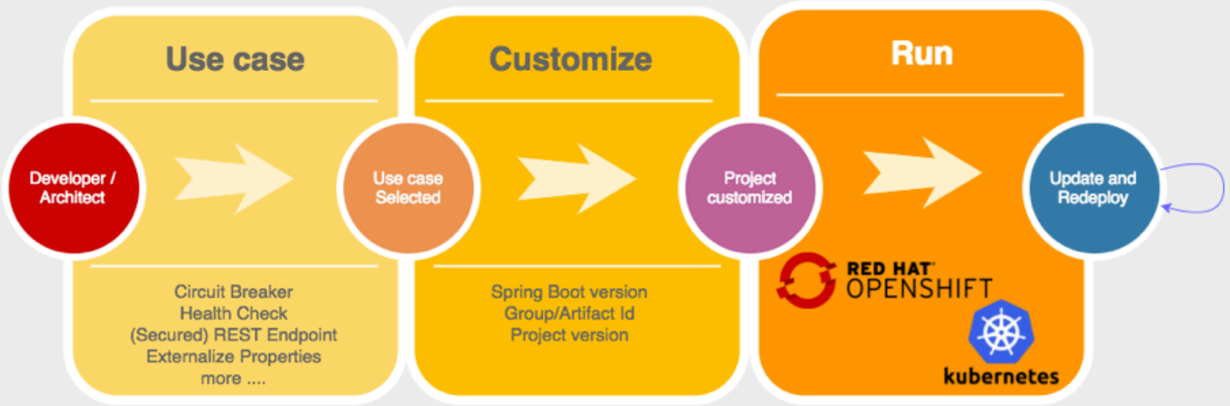
Service aufrufen:

```
curl http://localhost:8080/greeting
```

Snowdrop

Overview | Documentation | Guides | Projects | Blog | Community | About

Bootstrap your Cloud Native Spring Boot application



By clicking on the **Start** button, you will access to the Project generator

Start

RED HAT®
DEVELOPER
PROGRAM

LAUNCH

Continuous application delivery,
built and deployed on OpenShift.

LAUNCH YOUR PROJECT

Supported Runtimes

WildFly SWARM

WildFly Swarm offers an innovative approach to packaging and running Java EE applications by packaging them with just enough of the server runtime to "java -jar" your application.

Learn more

VERT.X

Eclipse Vert.x is a tool-kit for building reactive applications on the JVM.

Learn more

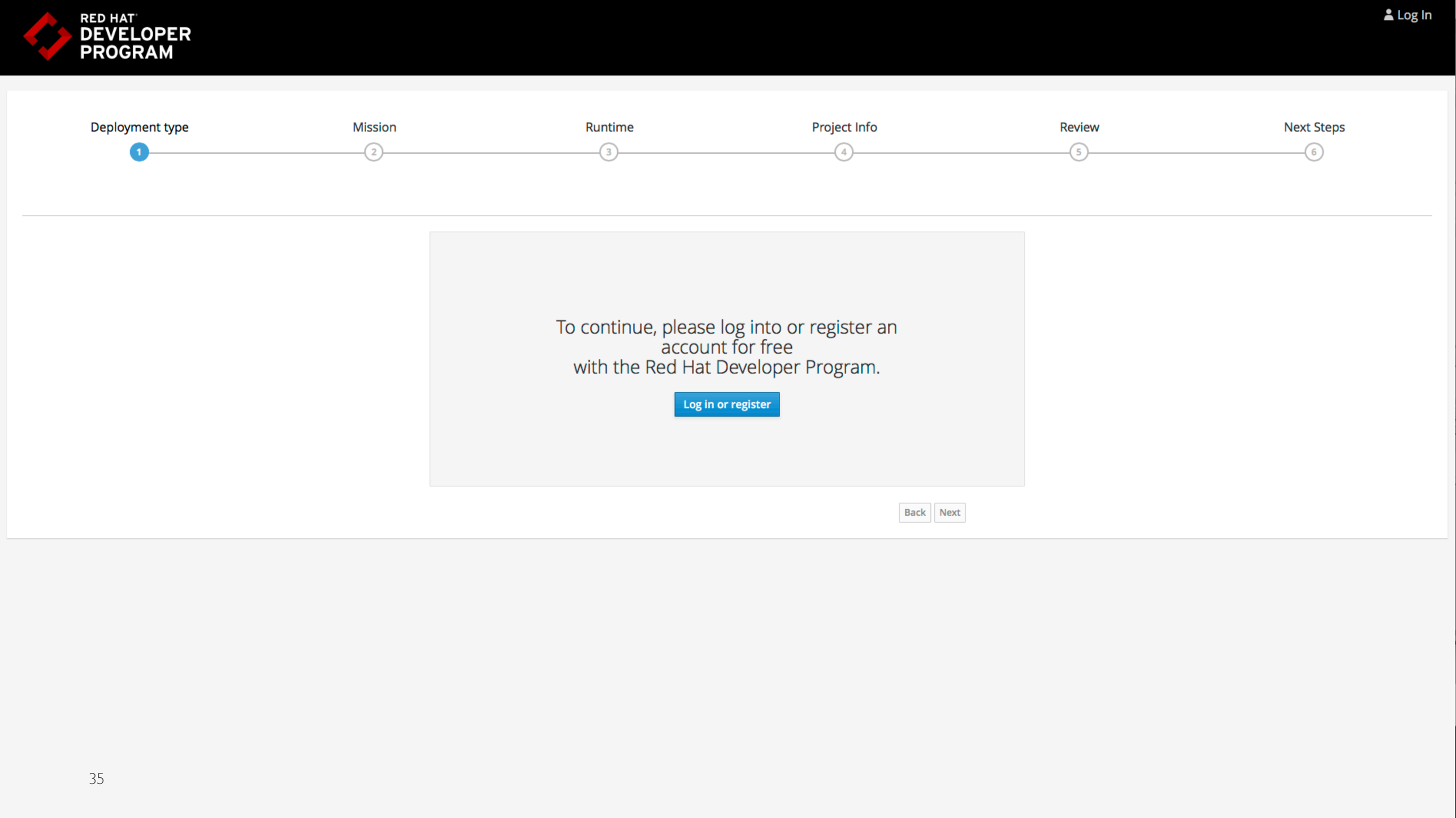
Spring Boot makes it easy to create stand-alone, production-grade Spring based Applications that you can "just run".

Learn more

technology preview

RED HAT®
FUSE

node
JS


RED HAT
DEVELOPER
PROGRAM
Log In
Deployment type
1
Mission
2
Runtime
3
Project Info
4
Review
5
Next Steps
6
To continue, please log into or register an account for free
with the Red Hat Developer Program.
Log in or register
Back
Next

Deployment type (1) — Mission (2) — Runtime (3) — Project Info (4) — Review (5) — Next Steps (6)

More options

Deployment type

Use Continuous Delivery

To launch using OpenShift Online, click the *Use OpenShift Online* button. This will:

- In your GitHub namespace, create a repository containing your new project's code.
- Configure OpenShift Online to build and deploy your code on each push to your repository's master branch.

You must grant **Fabric8 Launcher** access to your GitHub and OpenShift accounts. You only need to do this once for every account.

Grant Access

Use OpenShift Online

Build and run locally

To launch manually, click on *I will build and run locally* and follow the instructions in the project's guide (found linked in the README). This will:

- Scaffold a project based on your chosen runtime
- Allow you to download the project as a ZIP file

I will build and run locally

Mission

Missions are preconfigured, functioning applications that demonstrate a fundamental aspect of modern application development running in an environment similar to production. These can be used as a proof of technology demonstration, a teaching tool, or even a sandbox for understanding how to develop applications.

○ CRUD

Mission proficiency level: **Foundational**.

What the Relational Database Backend Booster Does
The Relational Database Backend booster expands on the REST API Level 0 booster to provide a basic example of performing *create*, *read*, *update* and *delete* (*CRUD*) operations on a PostgreSQL database using a simple HTTP API. *CRUD* operations are the four basic functions of persistent storage, widely used when developing an HTTP API dealing with a database.

○ Circuit Breaker

Mission proficiency level: **Foundational**.

The *Circuit Breaker* Mission demonstrates a generic pattern for reporting the failure of a service and then limiting access to the failed service until it becomes available to handle requests. This helps prevent cascading failure in other services that depend on the failed services for functionality.

○ Externalized Configuration

Mission proficiency level: **Foundational**.

The Externalized Configuration Mission provides a basic example of using a ConfigMap to externalize configuration. *ConfigMap* is an object used by OpenShift to inject configuration data as simple key and value pairs into one or more Linux containers while keeping the containers independent of OpenShift.

○ Health Check

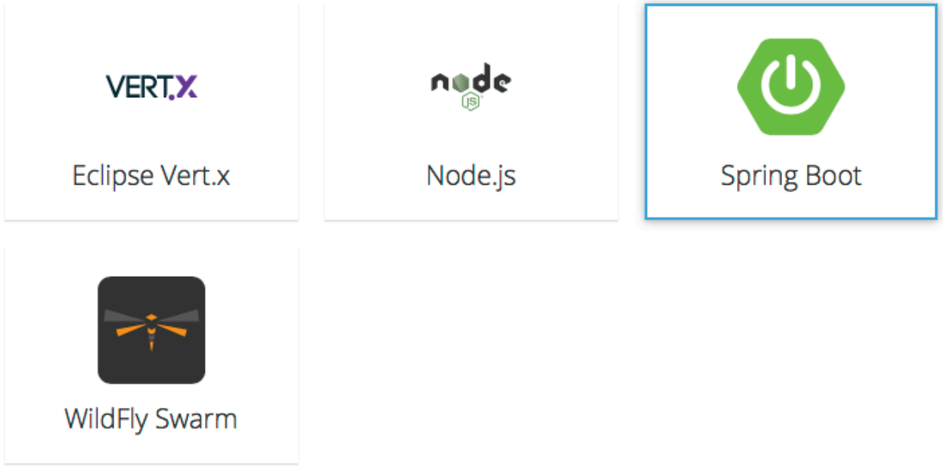
Mission proficiency level: **Foundational**.

When you deploy an application, its important to know if it is available and if it can start handling incoming requests. Implementing the *health check* pattern allows you to monitor the health of an application, which includes if an application is available and whether it is able to service requests.

Deployment type (1) — Mission (2) — Runtime (3) — Project Info (4) — Review (5) — Next Steps (6)

Runtime

We offer a choice of runtime frameworks to best fit your needs. WildFly Swarm delivers a microservices approach to Java EE, Eclipse Vert.x excels at reactive, asynchronous applications, and Spring Boot users may bring their projects to OpenShift as well.



Back Next

Project Info

Runtime Version	1.5.10.RELEASE (Community)
Group Id*	com.esentri.invisionday
Artifact Id*	openshift-greetings
Version*	1.0.0-SNAPSHOT

Back Next

Deployment type (1) — Mission (2) — Runtime (3) — Project Info (4) — Review (5) — Next Steps (6)

Review Summary

Deployment type

ZIP File

Mission

REST API Level 0

Runtime

Spring Boot

Project Info

Runtime Version:	1.5.10.RELEASE (Community)
Group Id:	com.esentri.invisionday
Artifact Id:	openshift-greetings
Version:	1.0.0-SNAPSHOT

Your project is available for download and is ready to build and deploy locally. Refer to the mission details in the Spring Boot Runtime Guide for more information on building, deploying, and interacting with your booster.

Back | Download as ZIP File

Next Steps

Next Steps: Run your booster.

Extract your booster:

```
$ unzip openshift-greetings.zip
$ cd openshift-greetings
```

More details on running and interacting with your booster are available in `README.adoc`.

Start a new Mission

Test vor dem OpenShift Deployment...

Service starten:

```
mvn spring-boot:run
```

Service aufrufen:

```
curl http://localhost:8080/api/greeting?name=Sarah
```

Command Line Tools

With the OpenShift command line interface (CLI), you can create applications and manage OpenShift projects from a terminal. You can download the `oc` client tool using the links below. For more information about downloading and installing it, please refer to the Get Started with the CLI documentation.

Download `oc` :

Linux (64 bits)
Windows
Mac OS X

After downloading and installing it, you can start by logging in. You are currently logged into this console as **markus.lohn@esentri.com**. If you want to log into the CLI using the same session token:

```
oc login https://api.starter-us-west-2.openshift.com --token=<hidden>
```

A token is a form of a password. Do not share your API token. To reveal your token, press the copy to clipboard button and then paste the clipboard contents.

After you login to your account you will get a list of projects that you can switch between:

```
oc project <project-name>
```

If you do not have any existing projects, you can create one:

```
oc new-project <project-name>
```

To show a high level overview of the current project:

```
oc status
```

For other information about the command line tools, check the CLI Reference and Basic CLI Operations.

OpenShift Deployment Basics

```
oc login https://servername:port

oc project invisionday2018

mvn clean fabric8:deploy -Popenshift
```

One more complex Example...

- using Secrets
- using ConfigMaps


thank
you