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KUBERNETES FOR JAVA DEVELOPERS

From Zero to RasPi Kubernetes Cluster in 60 minutes

Dr. Roland Huß, Red Hat, @ro14nd

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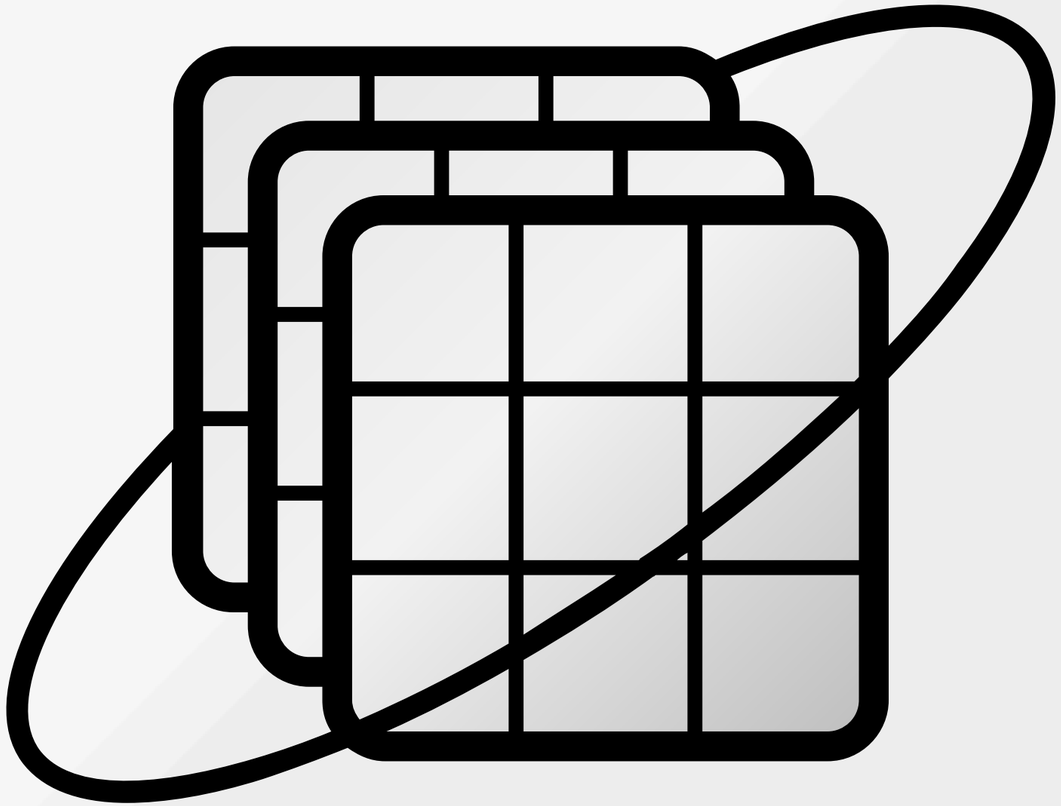

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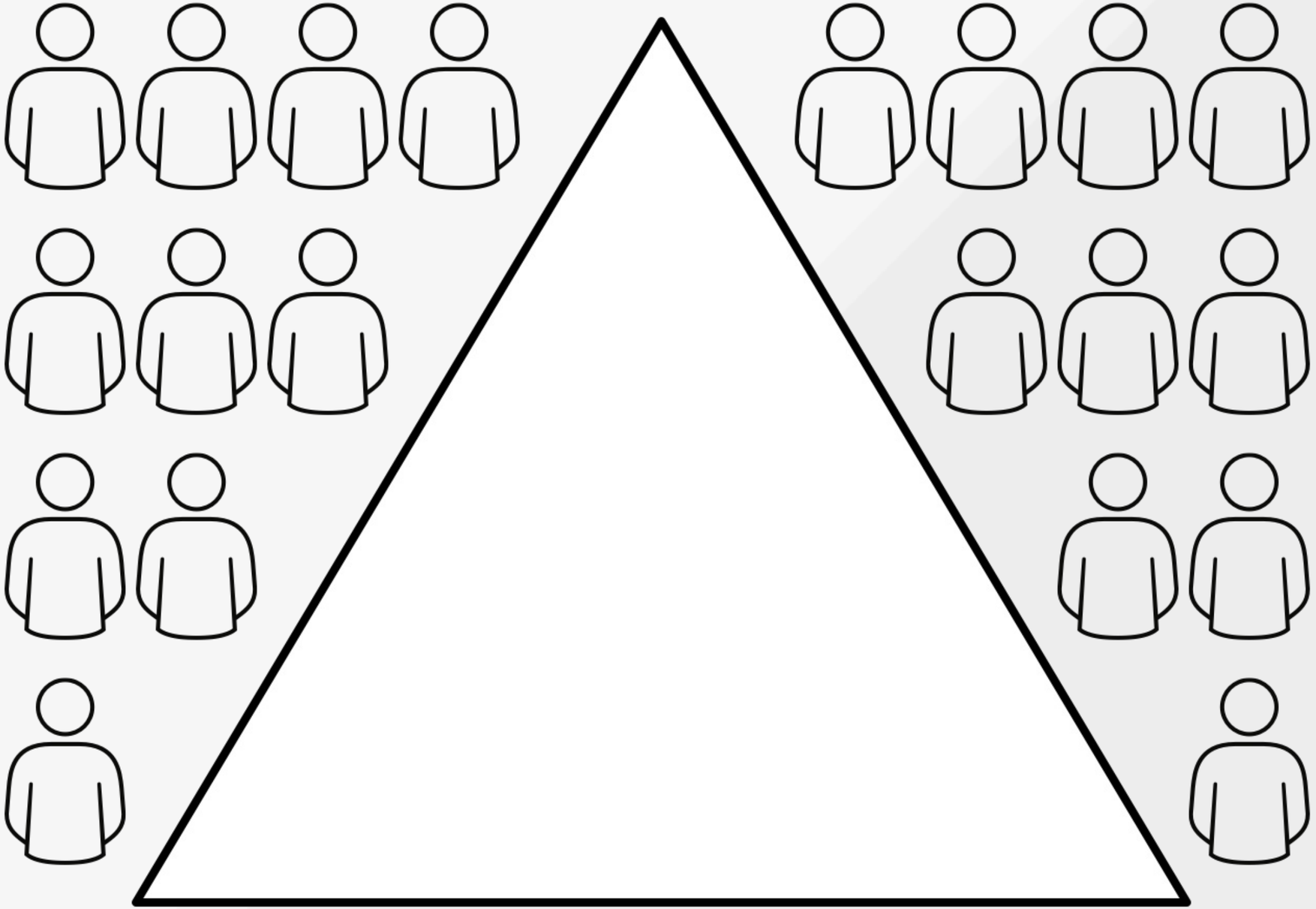

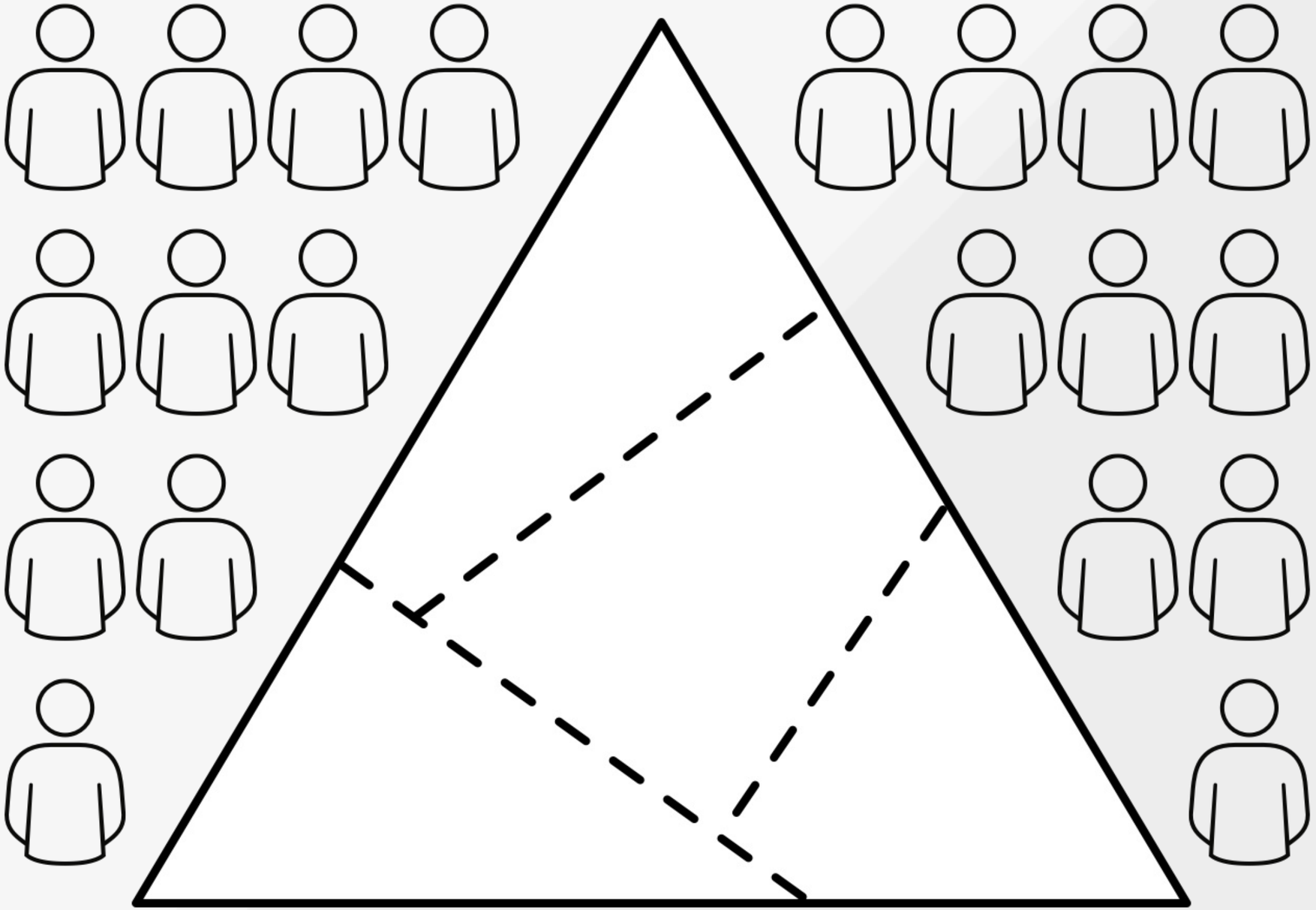

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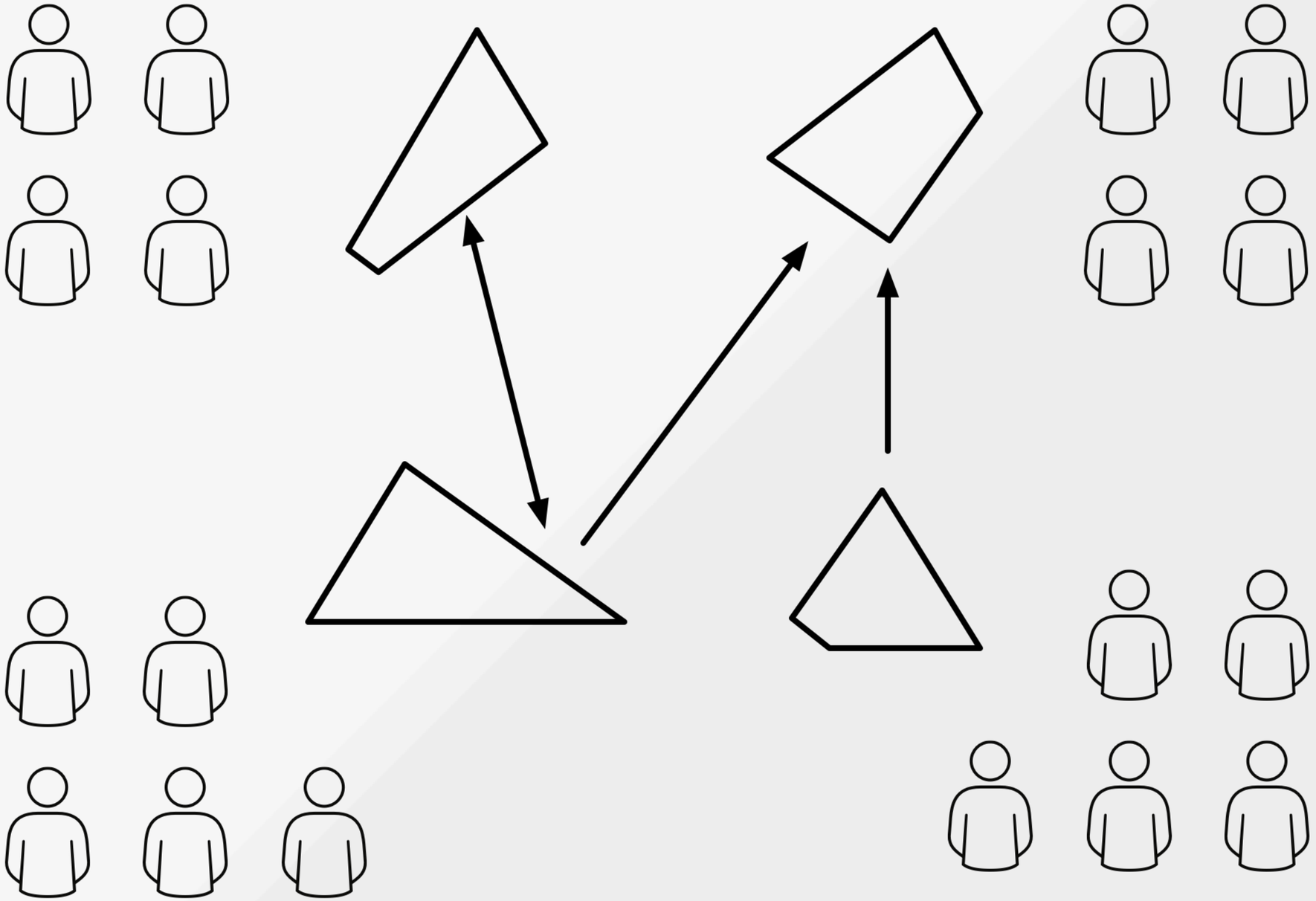

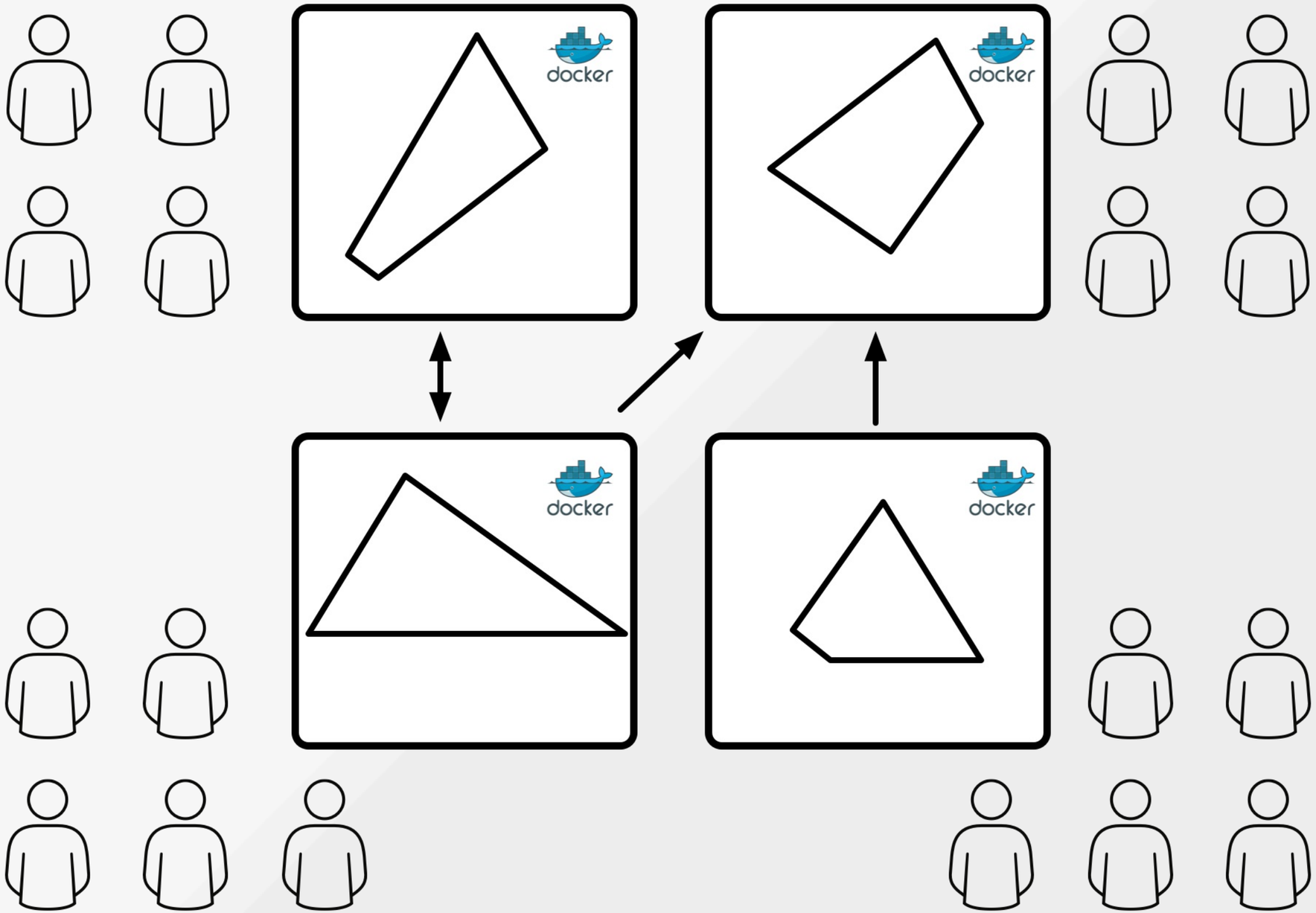

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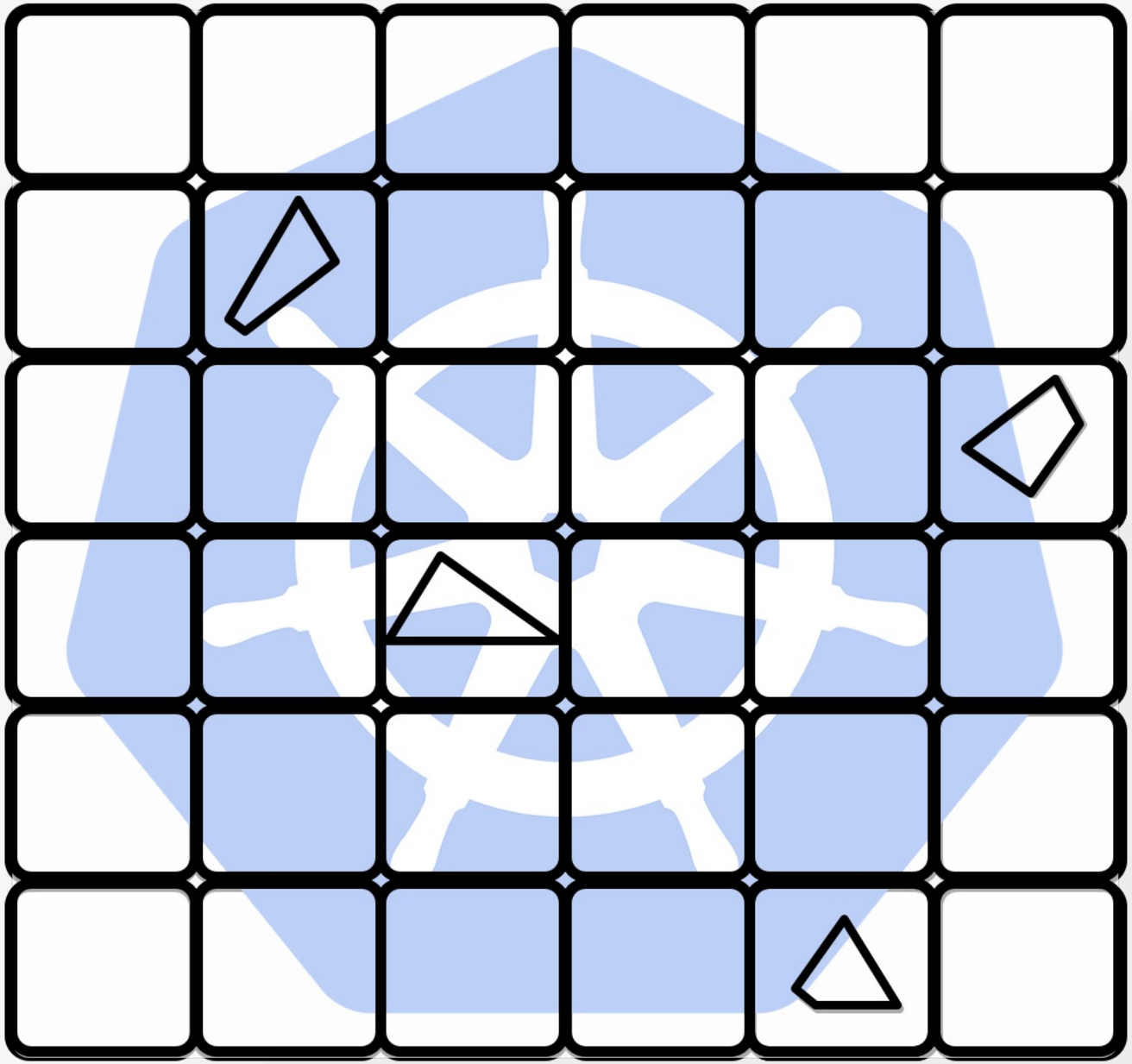

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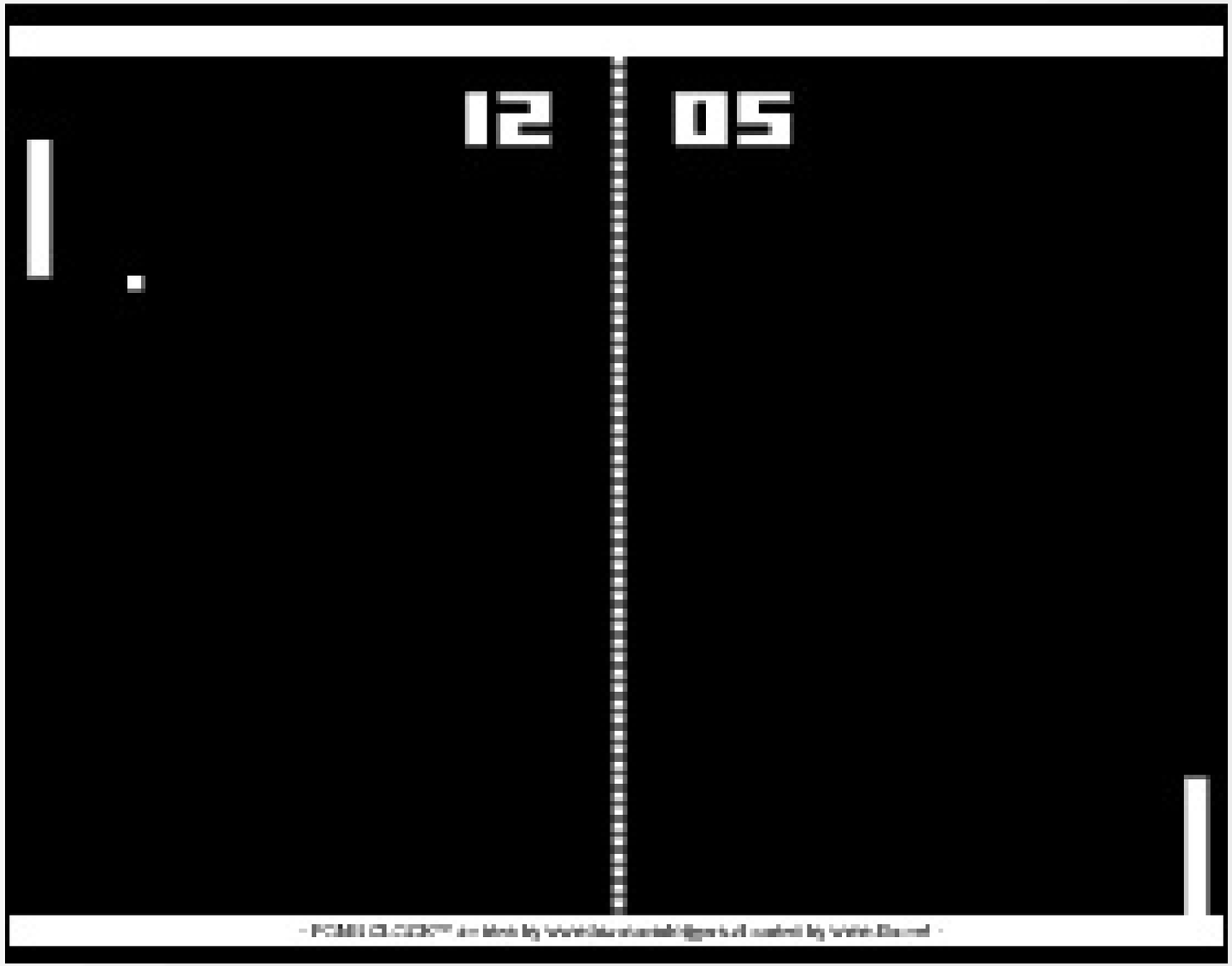

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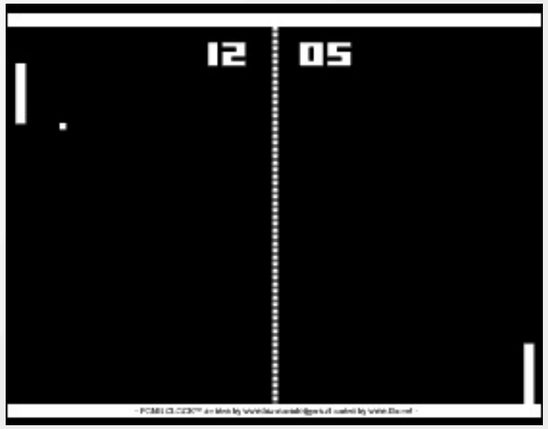
PONG



- Very first sports arcade video game (1972)
- Let's split the dinosaur monolith into two Microservices:
  - **ping** : spring-boot HTTP client
  - **pong** : wildfly-swarm JAX-RS server

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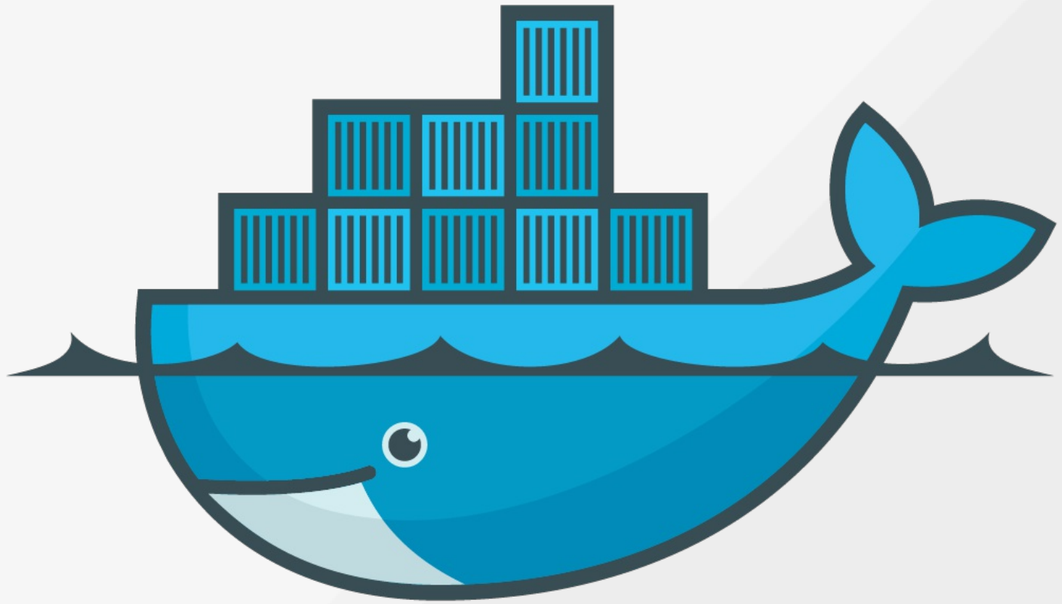
DEMO



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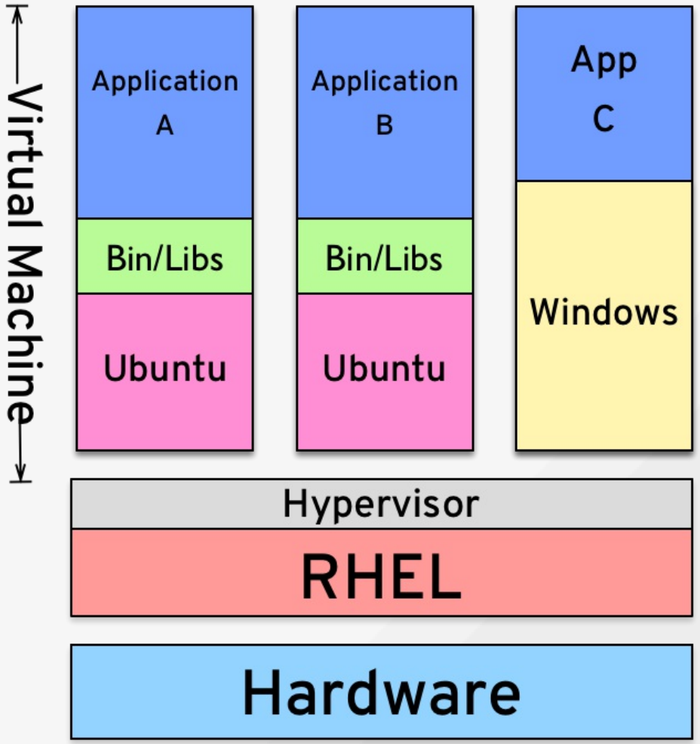
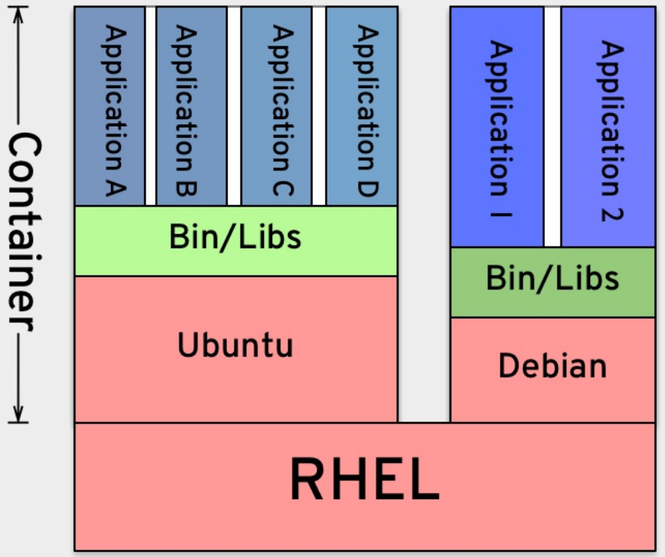
VM VS. CONTAINER

Containers are **isolated**, but share the kernel and (some) files

➔ **lighter** and **faster**





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DOCKERFILE

```
FROM java:alpine-jre-8
RUN apk update
ADD microservice.jar /
EXPOSE 8080
CMD java -jar /microservice.jar
```

Build:

```
docker build -t rhuss/microservice:1.3.1 .
```

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DOCKER-MAVEN-PLUGIN

- Building images within Maven build
- Versioned
- Assembly with dependencies
- No Docker client required

https://github.com/fabric8io/docker-maven-plugin

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KUBERNETES

- Open Source orchestration system for Docker containers
  - Scheduling
  - Horizontal scaling
  - Self-healing
  - Service discovery
  - Automated rollout and rollbacks

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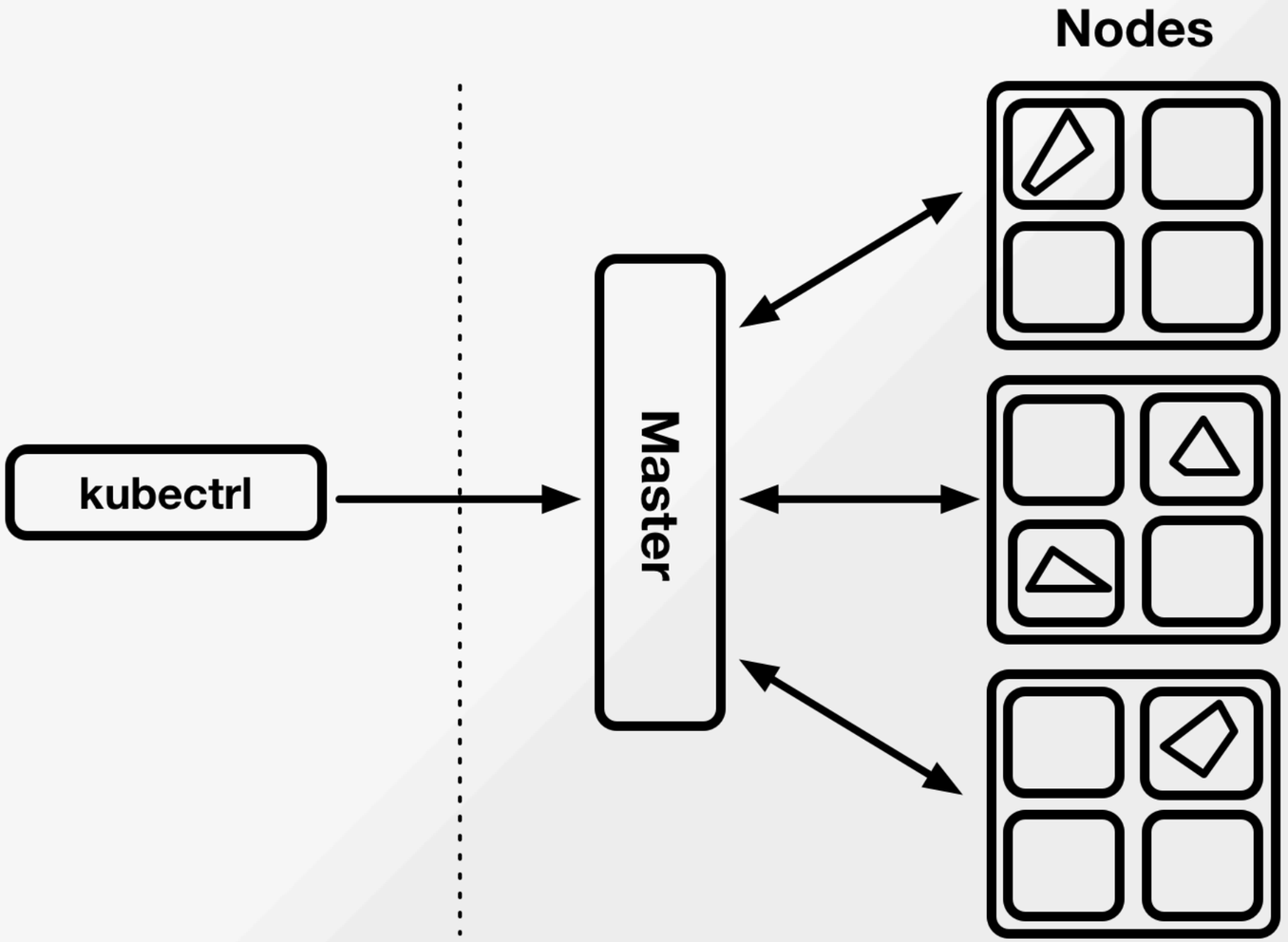
ARCHITECTURE



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RASPI CLUSTER

- 4 Raspberry Pi 3
- Wifi Router
- 6 Port USB charger
- 32 GB SD-Cards
- Costs: ~ 300 €
- Raspian image

Full Story: https://ro14nd.de/kubernetes-on-raspberry-pi3

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ANSIBLE

- Ansible Playbooks for setting up Kubernetes
  - Flannel overlay network
  - SkyDns Addon
- Soon:
  - Registry
  - Ingress Controller (Router)
  - OpenShift

https://github.com/Project31/ansible-kubernetes-openshift-pi3

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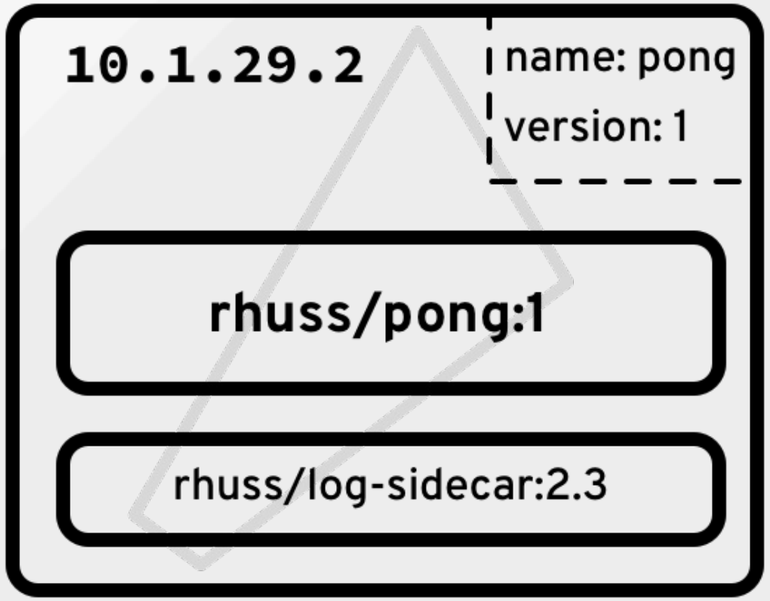
POD

- Kubernetes Atom
- One or more containers sharing:
  - Network space
  - Filesystem
- Ephemeral IP address



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LABELS

- Metadata attachable to every resource object
- Used to categorize stuff
- Important for selectors
- "Freeform"

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REPLICATION CONTROLLER

- Responsible for managing **Pods**
- **replicas** : Number of **Pod** copies to keep
- Label selector choose **Pods**
- Holds a template for creating new **Pods**

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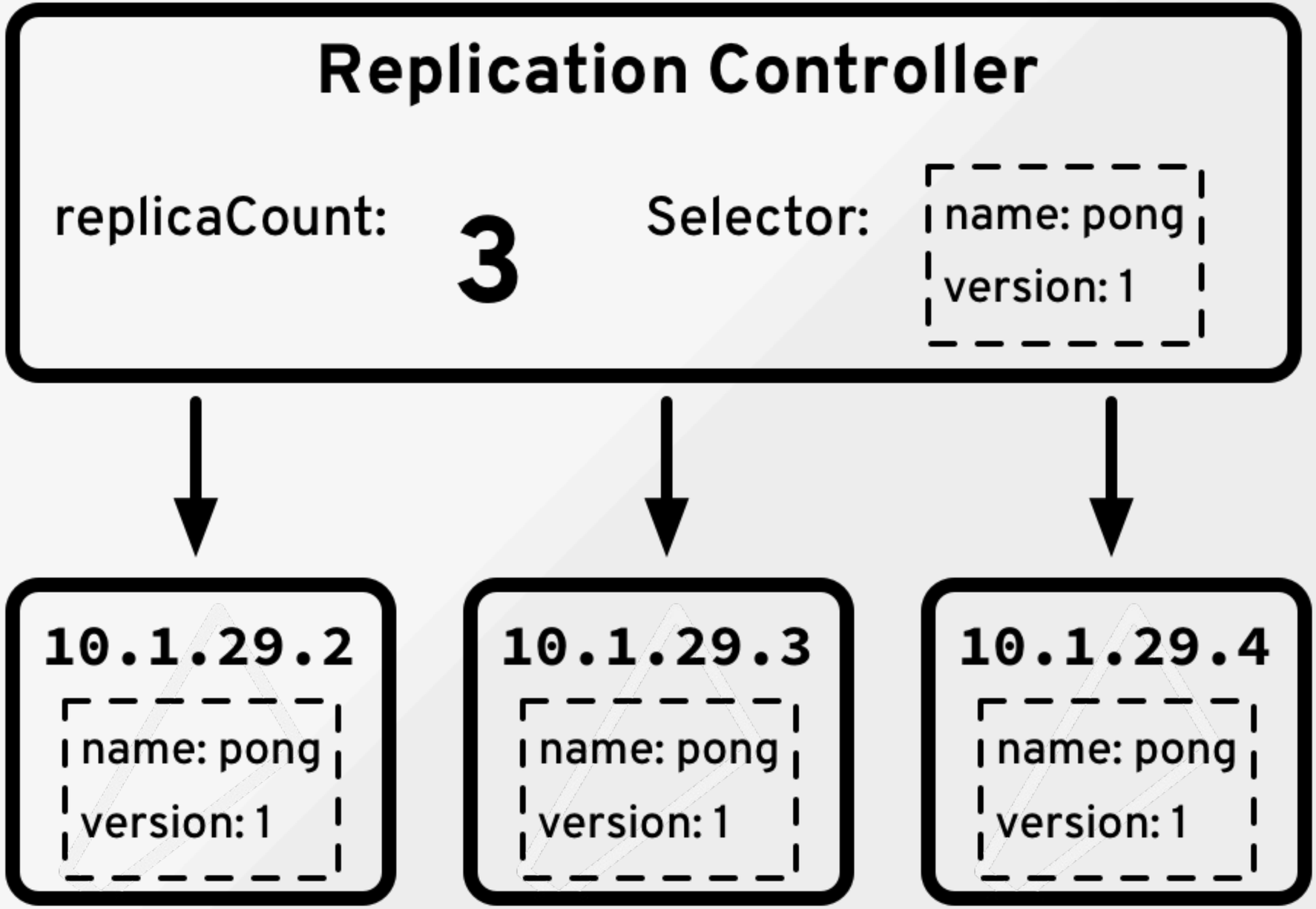
Replication Controller
replicaCount:
3
Selector:
name: pong
version: 1
10.1.29.2
name: pong
version: 1
10.1.29.3
name: pong
version: 1
10.1.29.4
name: pong
version: 1

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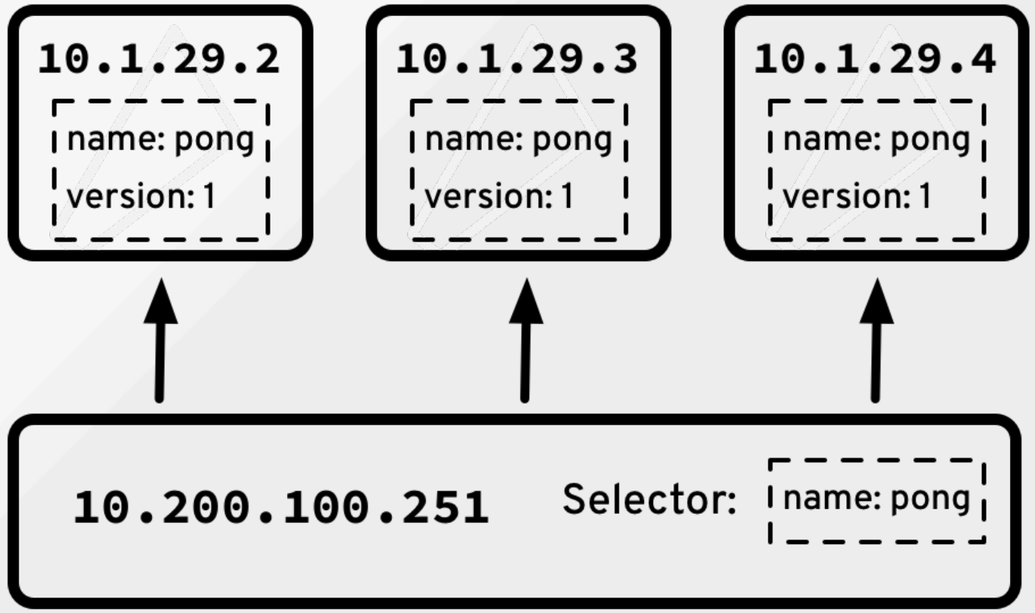
SERVICE

- Proxy for a set of **Pods**
- **Pods** selected by **Label** selector
- Permanent IP address



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ROLLING UPDATE

- kubectl rolling-update
- Downscale of old **replication controller**
- Upscale of new **replication controller**

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VOLUMES

- Distributed storage
- Support types:
  - Local
  - NFS
  - Gluster
  - Ceph
  - …

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MISC FEATURES

- Secrets
- ConfigMaps
- ServiceAccounts
- Health & Liveness Checks
- Ingress

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OPENSHIFT

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OPENSHIFT

- Adds the **BUILD** to Kubernetes
- Developer and Operation Tools
- Infrastructure Services
  - Registry, Router, OAuth2 Security
- Volume Management
- Multi tenancy
- Management UI

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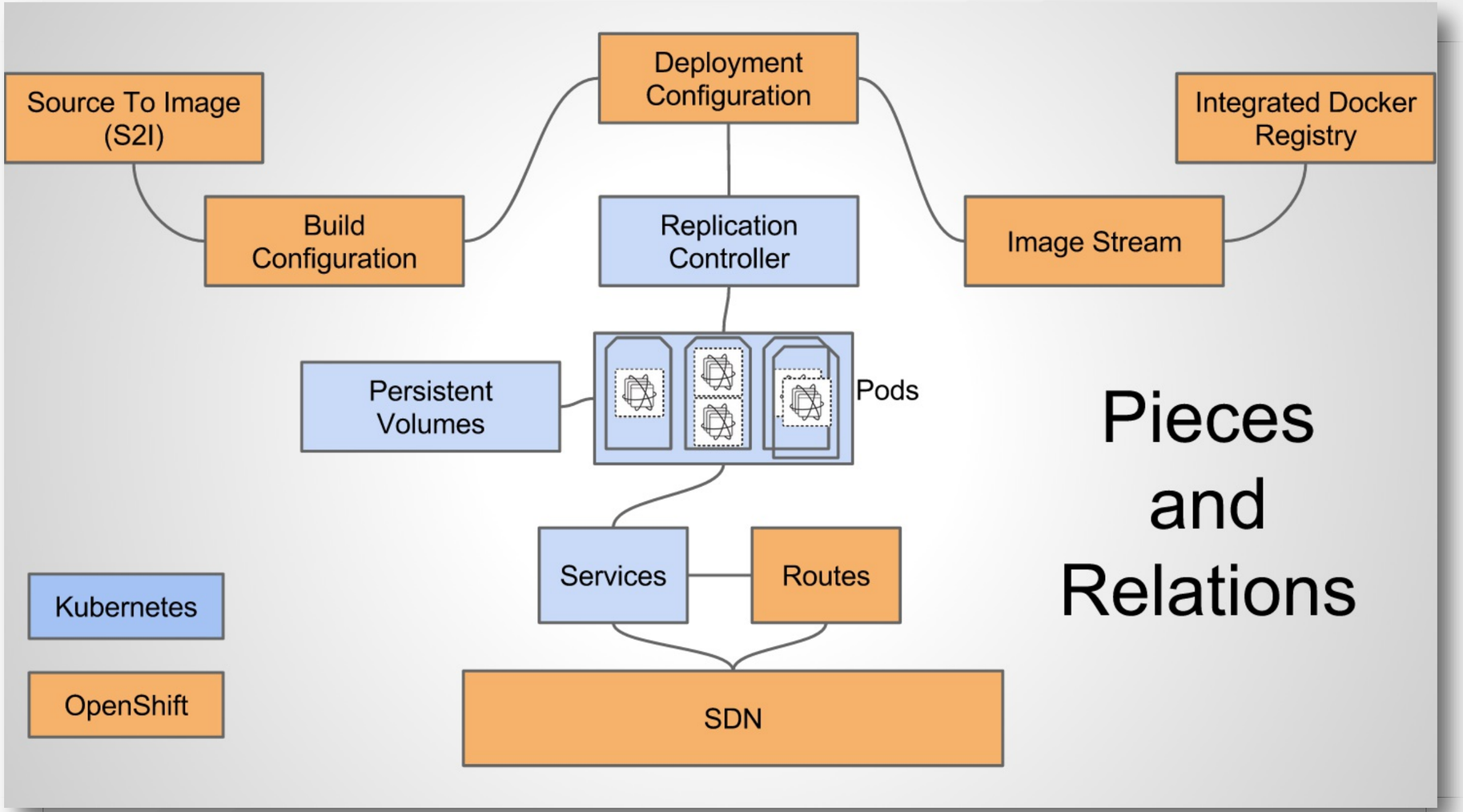
OPENSHIFT EXTRAS



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fabric8

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FABRIC8

- Open Source **Microservices Platform**
- Supports Kubernetes & OpenShift
- Themes:
  - Continous Delivery
  - Management UI
  - Quickstarts
  - iPaaS
  - Tooling

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FABRIC8-MAVEN-PLUGIN

- Embeds docker-maven-plugin
- Creates resource descriptors from plugin configuration
- Support for descriptor templates which can be **enriched**
- https://maven.fabric8.io

mvn package fabric8:build fabric8:deploy

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CONFIGURATION

- Zero Config
  - Opinionated Defaults
  - Limited configuration options
- XML Configuration
  - Restricted configuration syntax
- Resource Fragments
  - Most powerful
  - Verbose

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ZERO CONFIG

- **Generators** for Image generation

```
<build>
  <plugins>
    <plugin>
      <groupid>io.fabric8</groupid>
      <artifactid>fabric8-maven-plugin</artifactid>
      <version>3.1.56</version>
    </plugin>
    <plugin>
      <groupid>org.springframework.boot</groupid>
      <artifactid>spring-boot-maven-plugin</artifactid>
    </plugin>
  </plugins>
 </build>
```

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RESOURCE FRAGMENTS

- Resource fragment

  src/main/fabric8/pong-rc.yml

```
spec:
 replicas: 1
 template:
  spec:
   containers:
   - name: pong
     ports:
     - containerPort: 8080
```

- **Enrichers** add missing pieces

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KUBERNETES & OPENSHIFT

- Kubernetes:
  - Docker builds
  - Deployments
  - Ingress
- OpenShift
  - S2I & Docker Binary Builds
  - DeploymenConfig
  - ImageStream
  - Template

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MISC

fabric8:install	Install local development environment
fabric8:cluster-start	Start minikube or minishift
fabric8:watch	Start minikube or minishift
fabric8:debug	Debug into pods

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WRAP UP

- Docker alone is not enough.
- Kubernetes is a super easy way to use orchestration with enterprise grade features.
- Use fabric8-maven-plugin
- Playing with Raspberry Pis is fun ;-)

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QUESTIONS ?

Blog	https://ro14nd.de
Slides	firefox $(curl -sL bit.ly/k8s-for-java-devs | sh)

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