A DEVOPS STATE OF MIND

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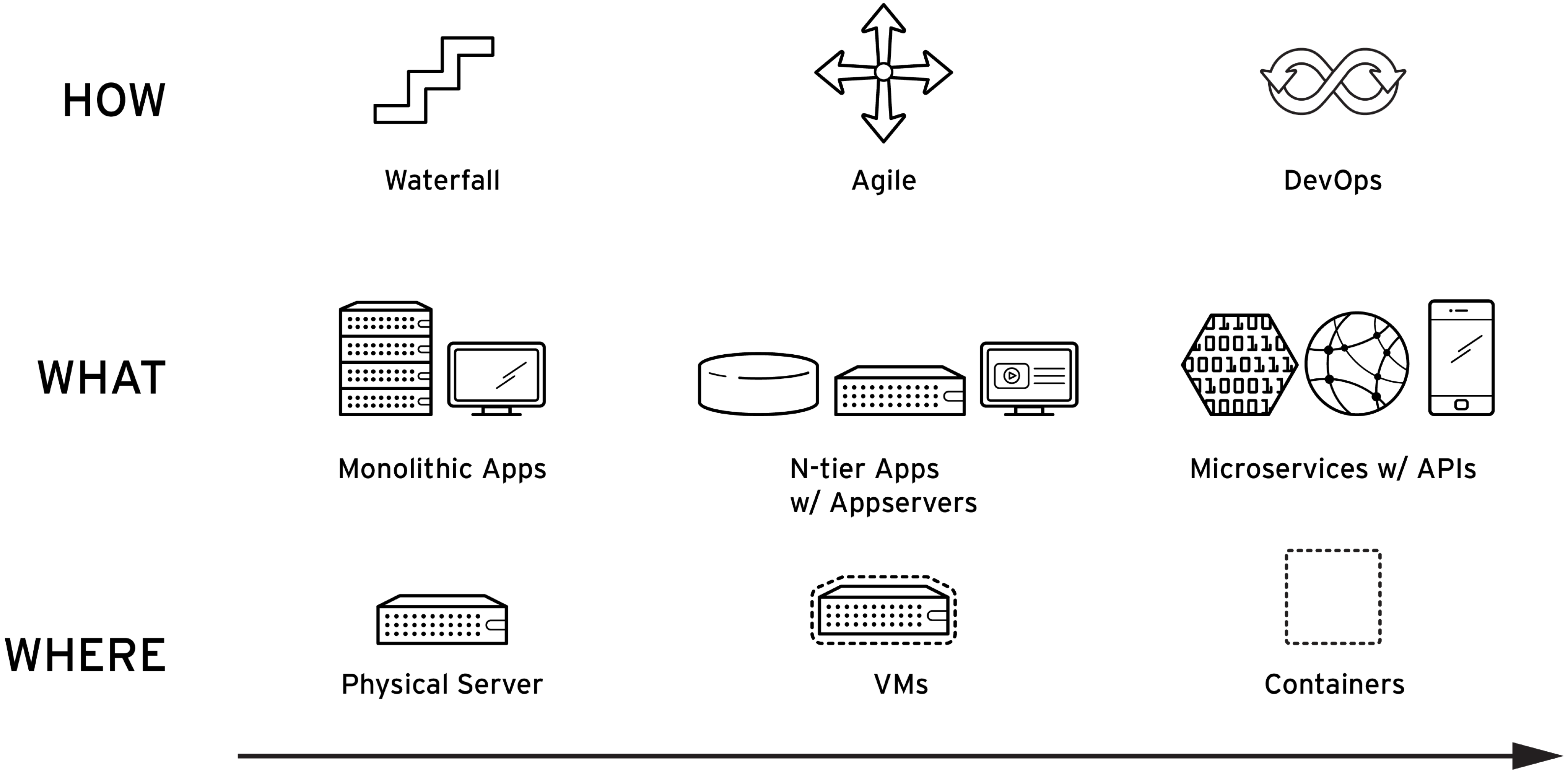
THE NEED FOR SPEED

THE ACCELERATION OF APPLICATION DELIVERY FOR THE BUSINESS



HOW	Waterfall	Agile	DevOps
WHAT	Monolithic Apps	N-tier Apps w/ Appservers	Microservices w/ APIs
WHERE	Physical Server	VMs	Containers

FASTER AND HIGHER QUALITY

> “In short, software is eating the world.”

- Marc Andreessen, Wall Street Journal, August 2011

LEONI
MLN-060RB6
MLN-060RB5
MLN-060RB1
1MLN-060DS1
STÄUBLI

BUT DEMANDS ON I.T. ARE INCREASING AS BUSINESSES ARE REIMAGINED

DreamWorks SKG

Online, Mobile

CISCO

Software Defined Networks

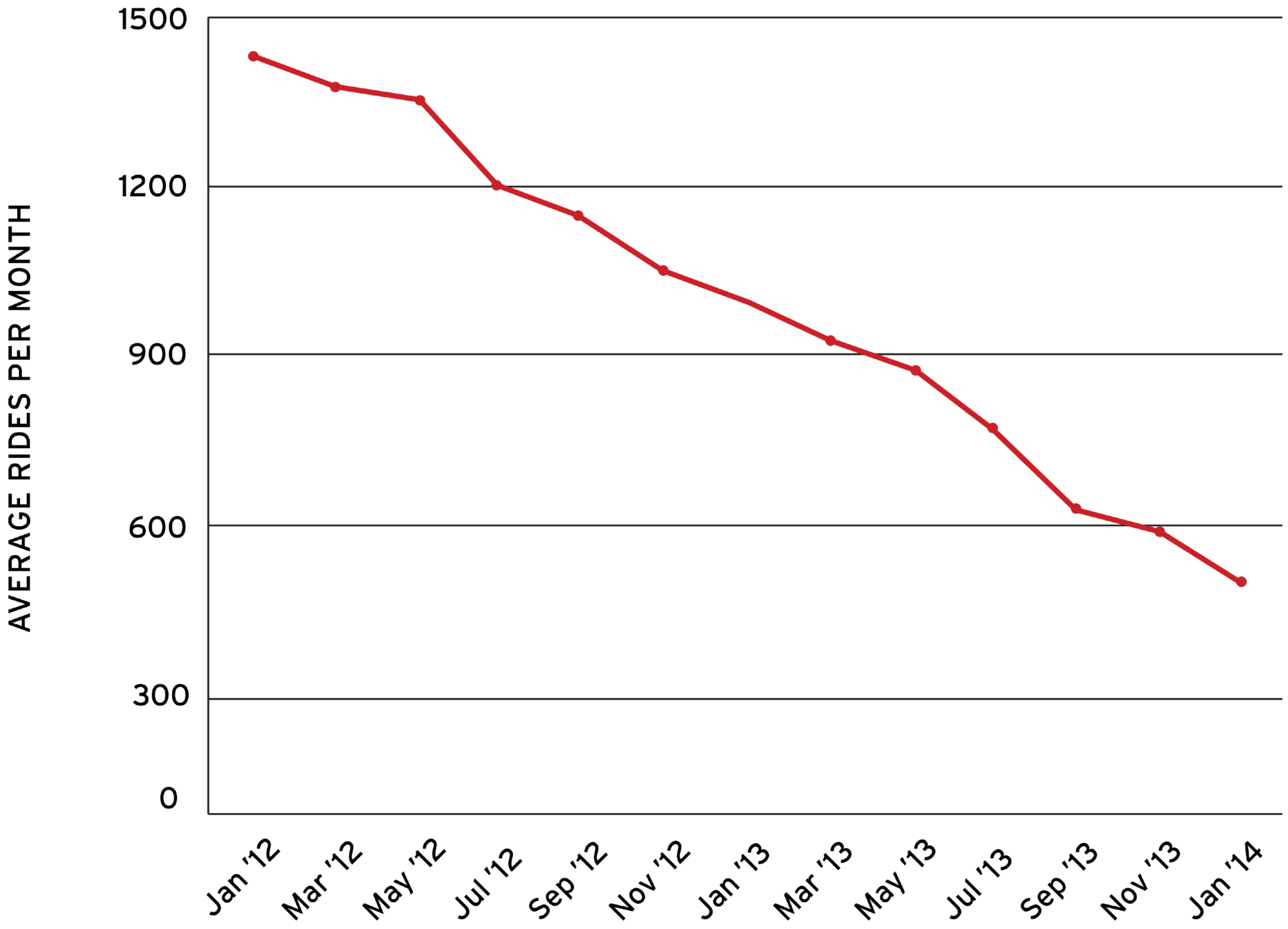
intuit

Desktop to Cloud

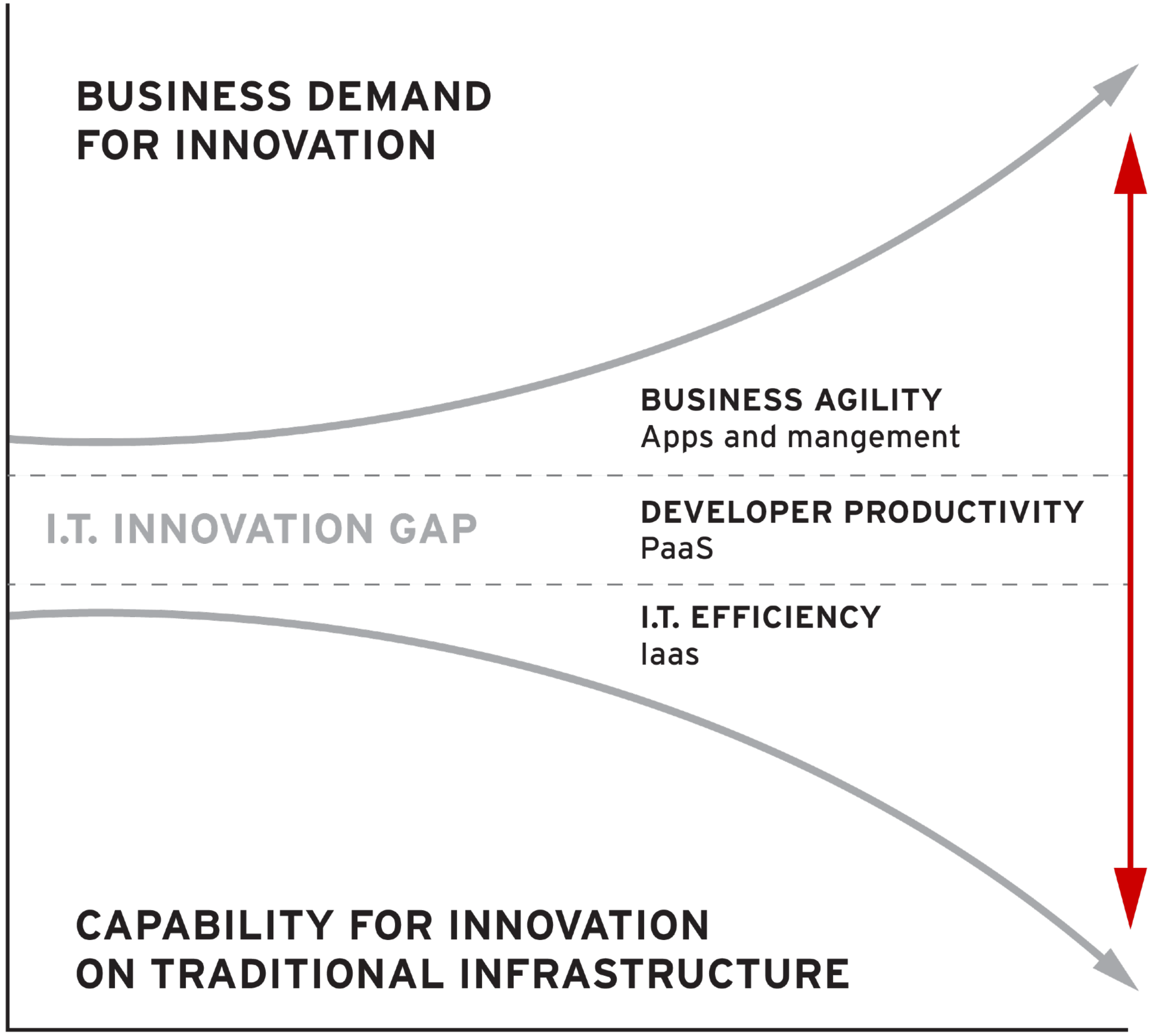
UnionBank

Online, Mobile

UBER, LYFT FALLOUT: TAXI RIDES PLUNGE 65% IN SAN FRANCISCO



CREATES AN I.T. INNOVATION GAP



BUSINESS DEMAND FOR INNOVATION

BUSINESS AGILITY
Apps and mangement

I.T. INNOVATION GAP

DEVELOPER PRODUCTIVITY
PaaS

I.T. EFFICIENCY
Iaas

CAPABILITY FOR INNOVATION ON TRADITIONAL INFRASTRUCTURE

GARTNER
Exploit the new

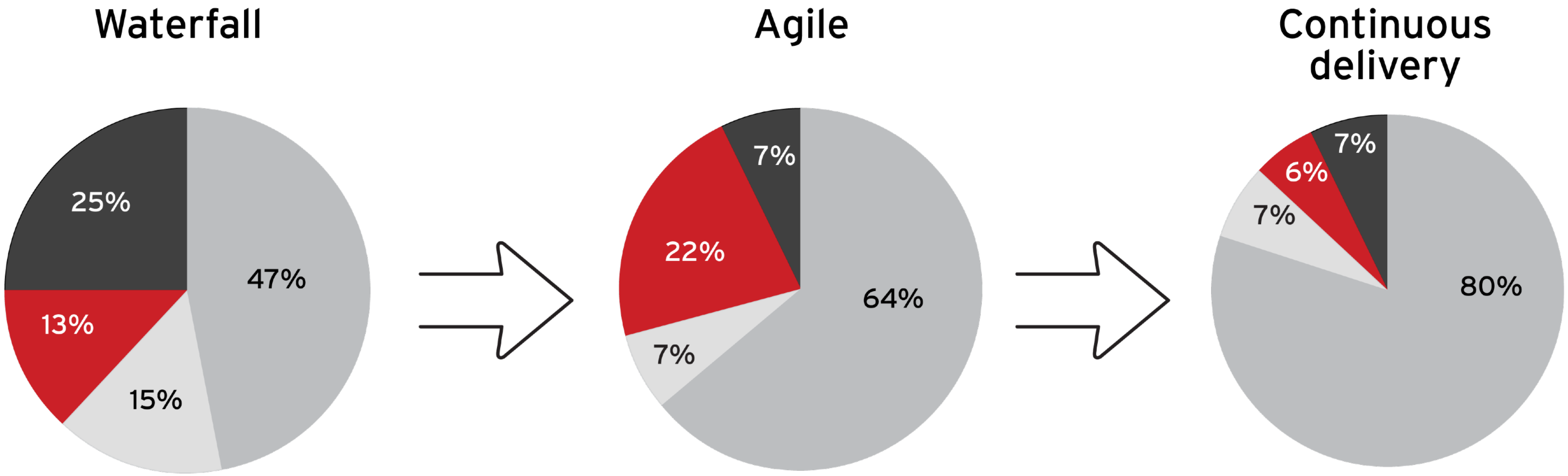
GARTNER
Renovate the core

DELIVERING SOFTWARE TODAY: THE REALITY VS. THE GOAL

BUDGET	TIME	VALUE
45% OVER	**7%** OVER	**56%** LESS

Source: Delivering large-scale IT projects on time, on budget, and on value
McKinsey & Company, October 2012

DEVELOPMENT LIFECYCLE TRENDS



⬛ **Design**
Design and architecture

▨ **Development**
Developement and documentation

⬜ **Test**
Automarket and manual tests

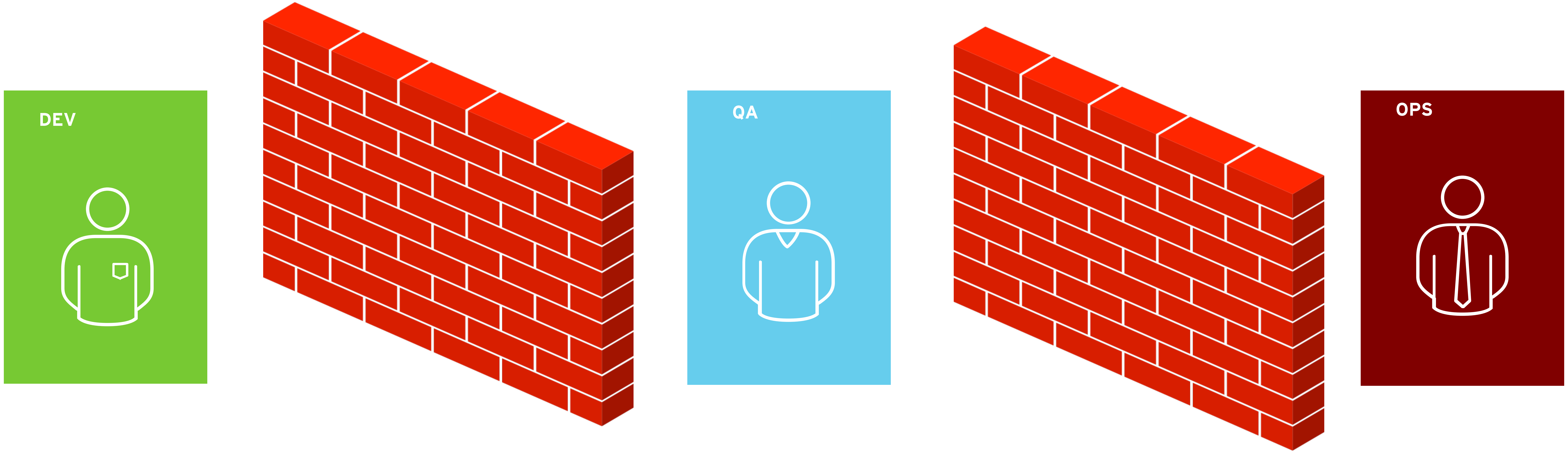
🟥 **Deployment**
Deployment to test and production

More time spent on development

redhat.

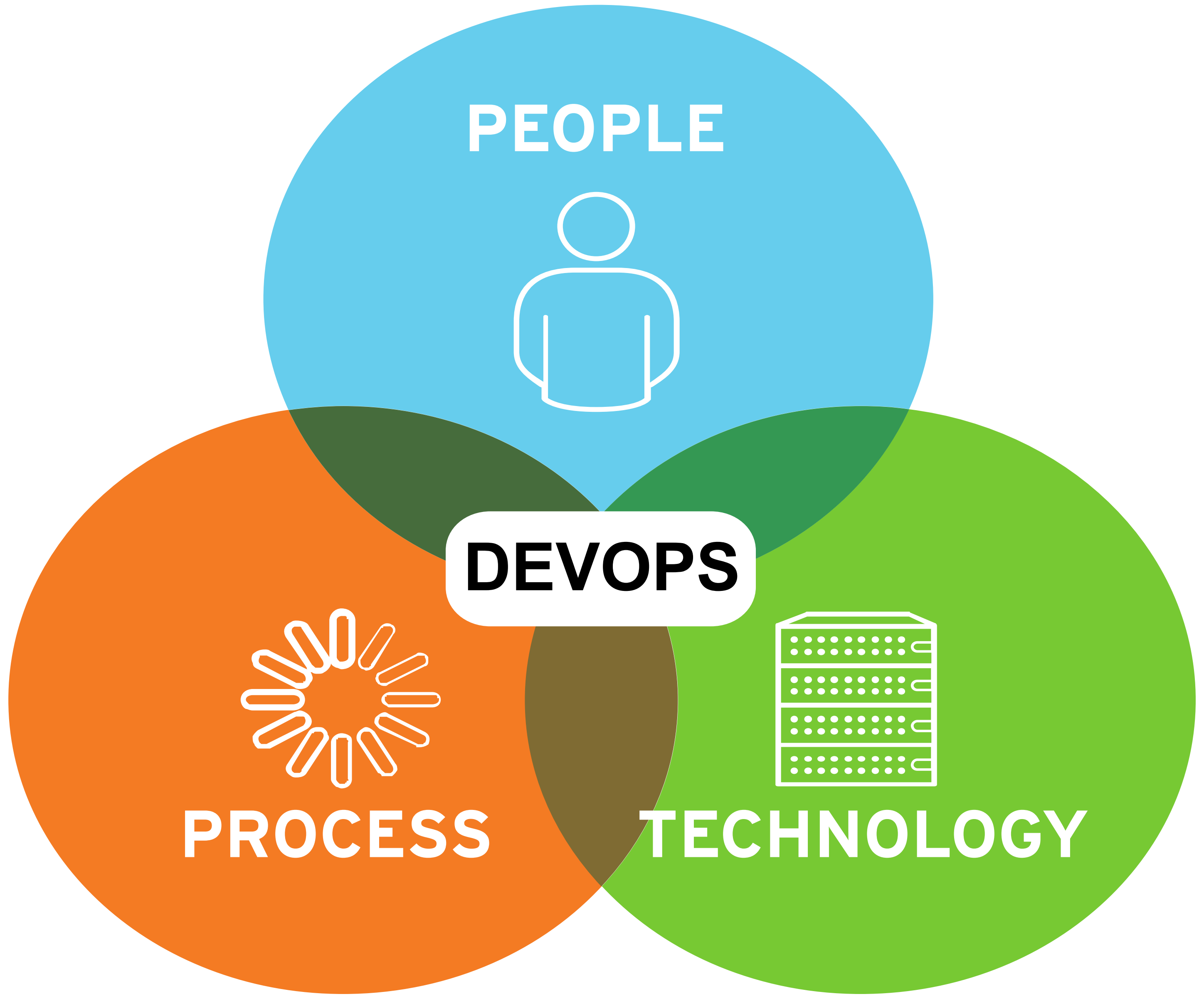
“THROW IT OVER THE WALL”

Walled off people, walled off processes, walled off technologies



WHAT CAN I.T. DO? I.T. CAN TURN OPS AND DEV INTO DEVOPS

“DevOps is a software development method that stresses communication, collaboration and integration between software developers and information technology (IT) professionals.”[1]



Applying many of the principles of Agile software development to the full application lifecycle and incorporating automation and monitoring with just a touch of Lean Manufacturing theory.

COLLABORATION

DEV

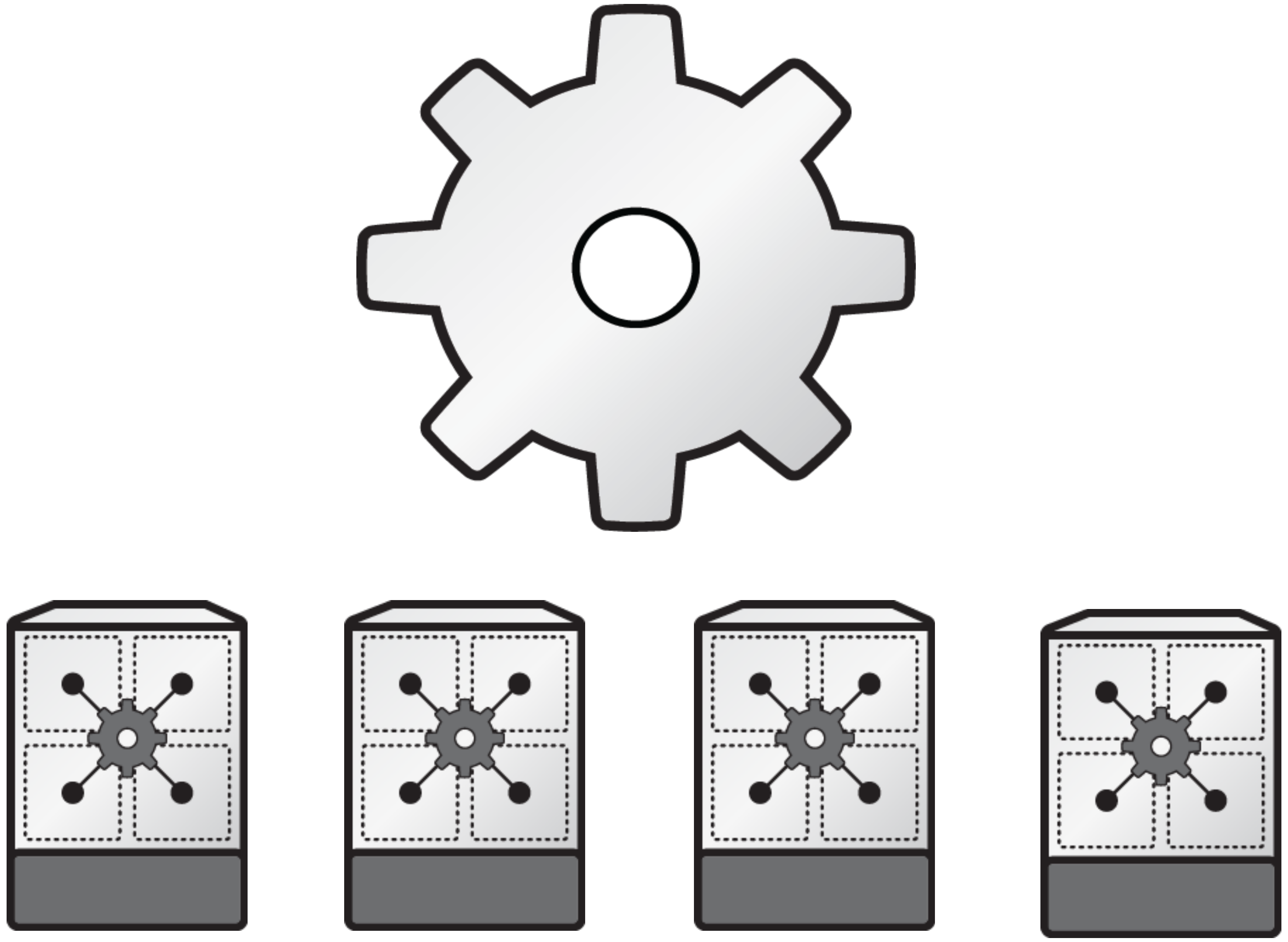
QA

OPS

WHAT ENABLES DEVOPS?

“Configuration in code”

- Standardized environments
- Linux containers
- Automated provisioning

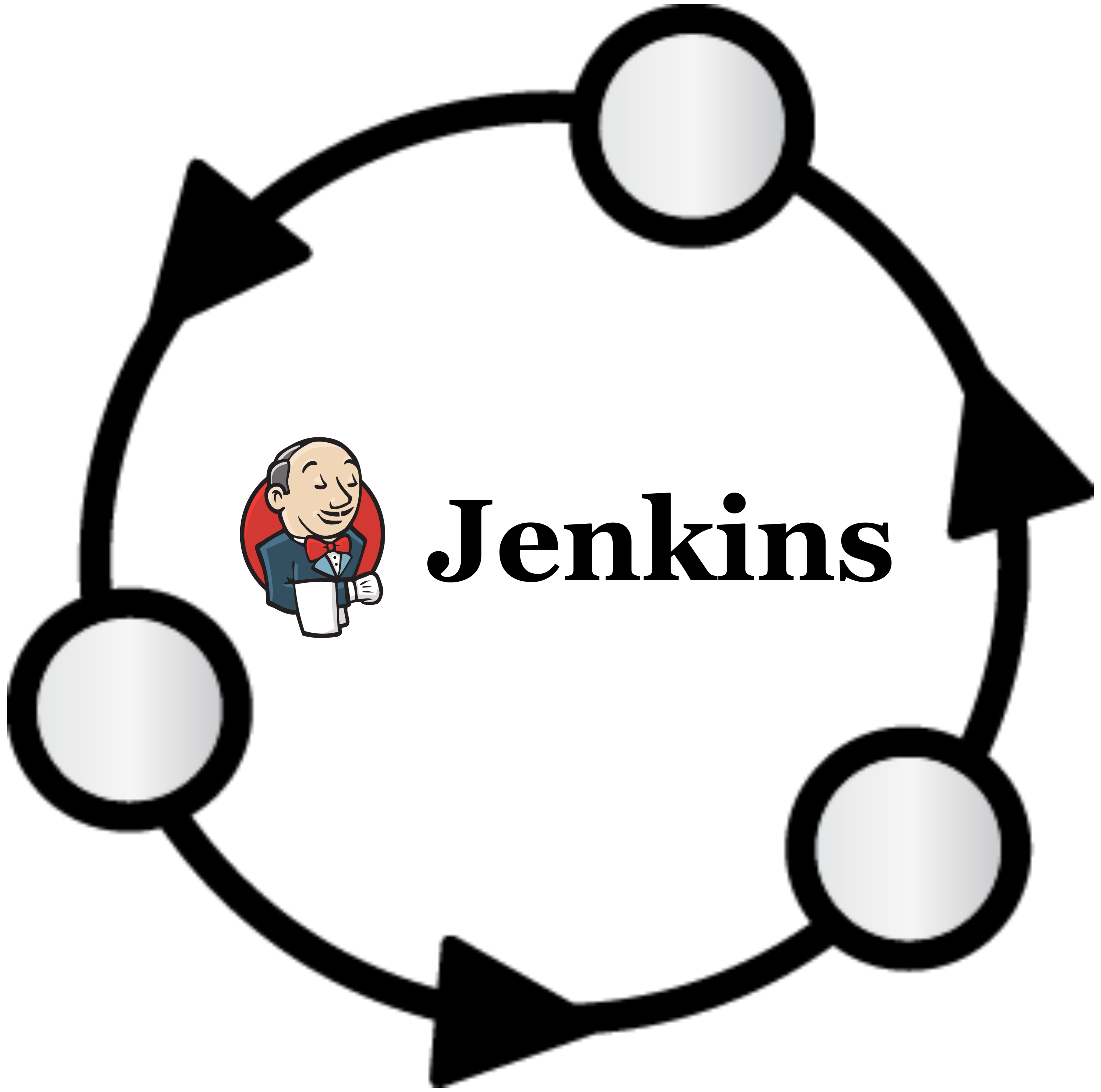


KEY CONCEPT: FAIL FAST AND RECOVER VS. NEVER FAIL

WHAT ENABLES DEVOPS?

CI/CD: Automated testing and deployment

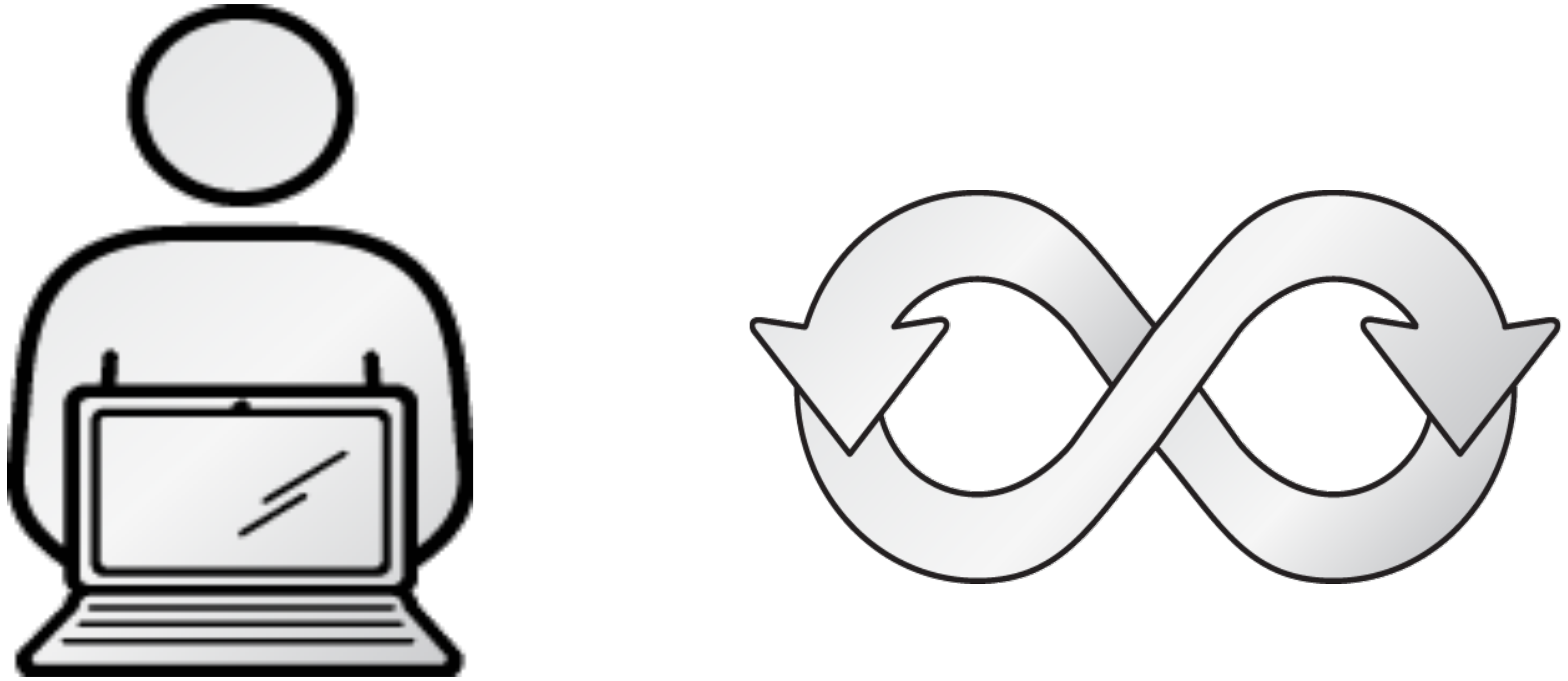
- Continuous integration
- Continuous delivery



KEY CONCEPT: SMALL CHANGES = LESS RISK

WHAT ENABLES DEVOPS?

Continuous innovation
- Developer self-service
- Rapid prototyping

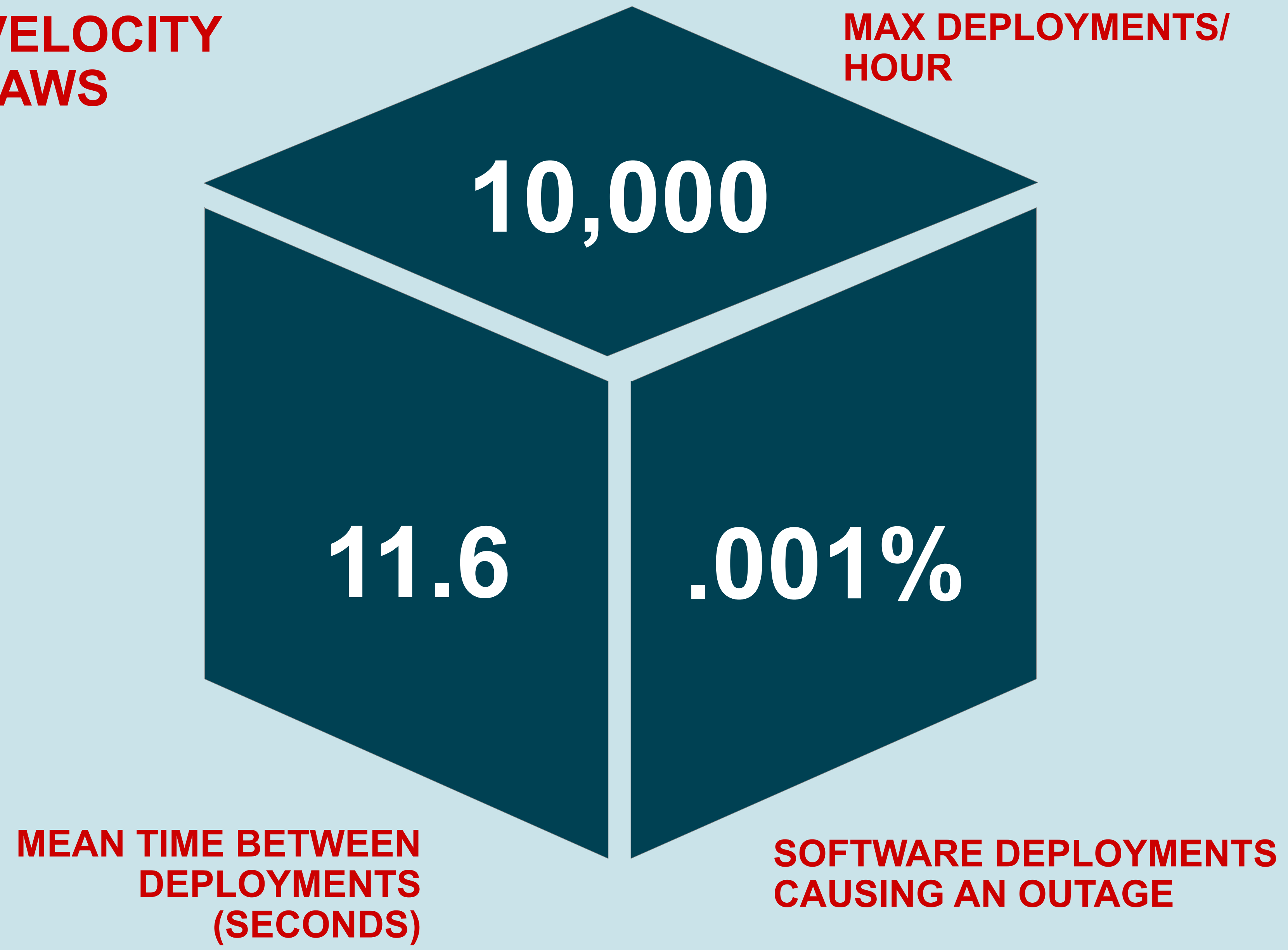


KEY CONCEPT: CULTURE CHANGE = ACCEPTANCE OF FAILURE

ORGANIZATIONS IMPLEMENTING DEVOPS

Better deployment quality	63%
Faster release frequency	63%
Improved process visibility	61%

DEVOPS VALUE
IN ACTION: VELOCITY
AT AMAZON AWS



10,000

MAX DEPLOYMENTS/ HOUR

11.6

MEAN TIME BETWEEN DEPLOYMENTS (SECONDS)

.001%

SOFTWARE DEPLOYMENTS CAUSING AN OUTAGE

Source: 2014 State of DevOps Report
Puppet Labs, IT Revolution Press, ThoughtWorks

ORGANIZATIONS IMPLEMENTING DEVOPS

“**30** innovations to the website deployed each day, … sometimes adding **millions** of dollars in sales”
Forbes, Apr’14

Etsy

“Taking a system that required a **full month** to release new features and turning it into one that pushes out updates **multiple times per day**.”
Wired

in

THREE KEY QUESTIONS FOR I.T. AND BUSINESS

1. How to quickly and reliably deliver new capabilities?
2. What kinds of new apps and services to deliver and support?
3. Where to create and run new apps and services?

DEVOPS IS PART OF A LARGER SHIFT

HOW?	WHAT?	WHERE?
DEVOPS	CLOUD APPS + MICROSERVICES	CONTAINERS

DEVOPS + CLOUD = INDUSTRIALIZE

CRAFTWORK

WORKSHOP

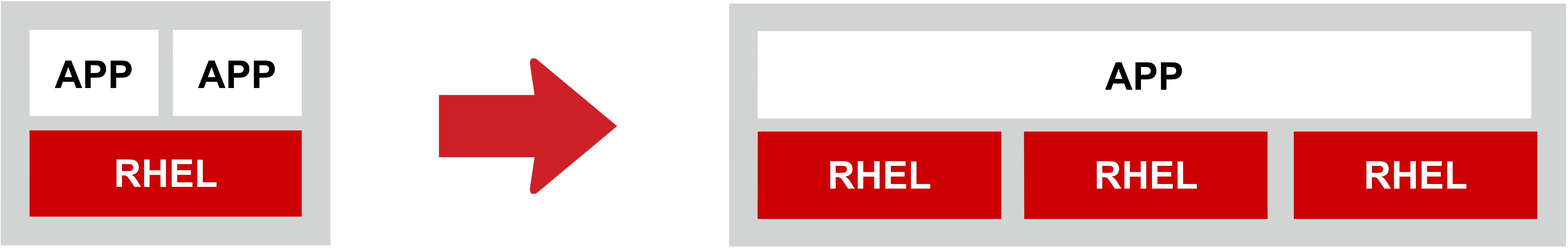
MANUFACTURING
(DEVOPS)

FACTORY
(CLOUD)

THE NEW APPLICATION

- Monolithic app container
- Scale up by adding hardware resources
- Limited scale out through clustering

- Distributed, networked, containerized services
- Scale out by orchestrating services
- *Faster iteration and release*
- *More robust*



SINGLE-HOST APPS

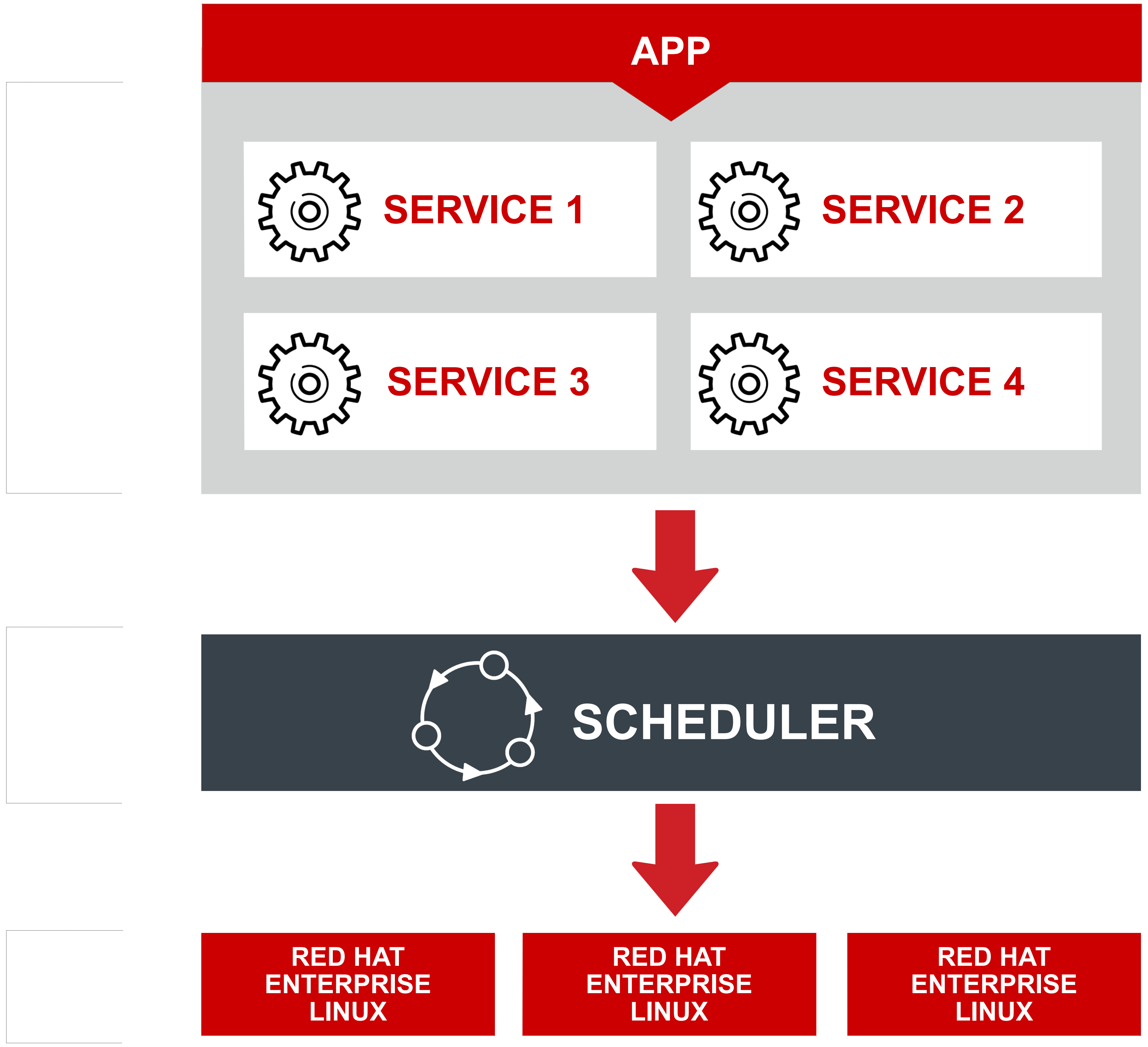
MULTI-HOST APPS

THE NEW OPERATING SYSTEM

Orchestrator (Kubernetes): Model the app across multiple hosts/containers

Scheduler (Kubernetes): Provide service and APIs for placing the app onto resources

Container pool (Red Hat Enterprise Linux/ Docker): Provide resources to run app



CONTAINERS: BUILD, SHIP, RUN

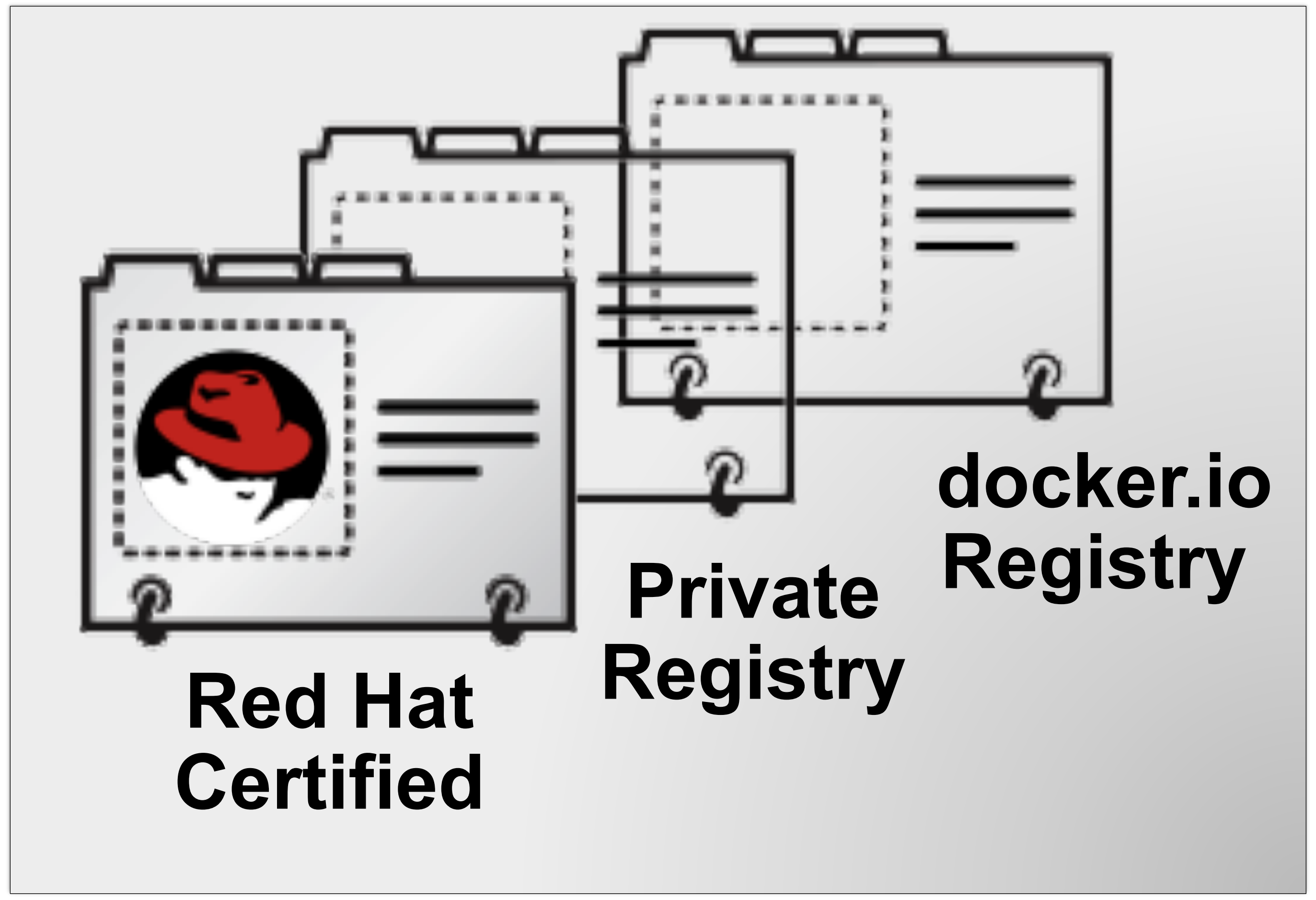
Dockerfile

```
FROM fedora:latest
CMD echo “Hello”
```

Build

“docker build or commit”

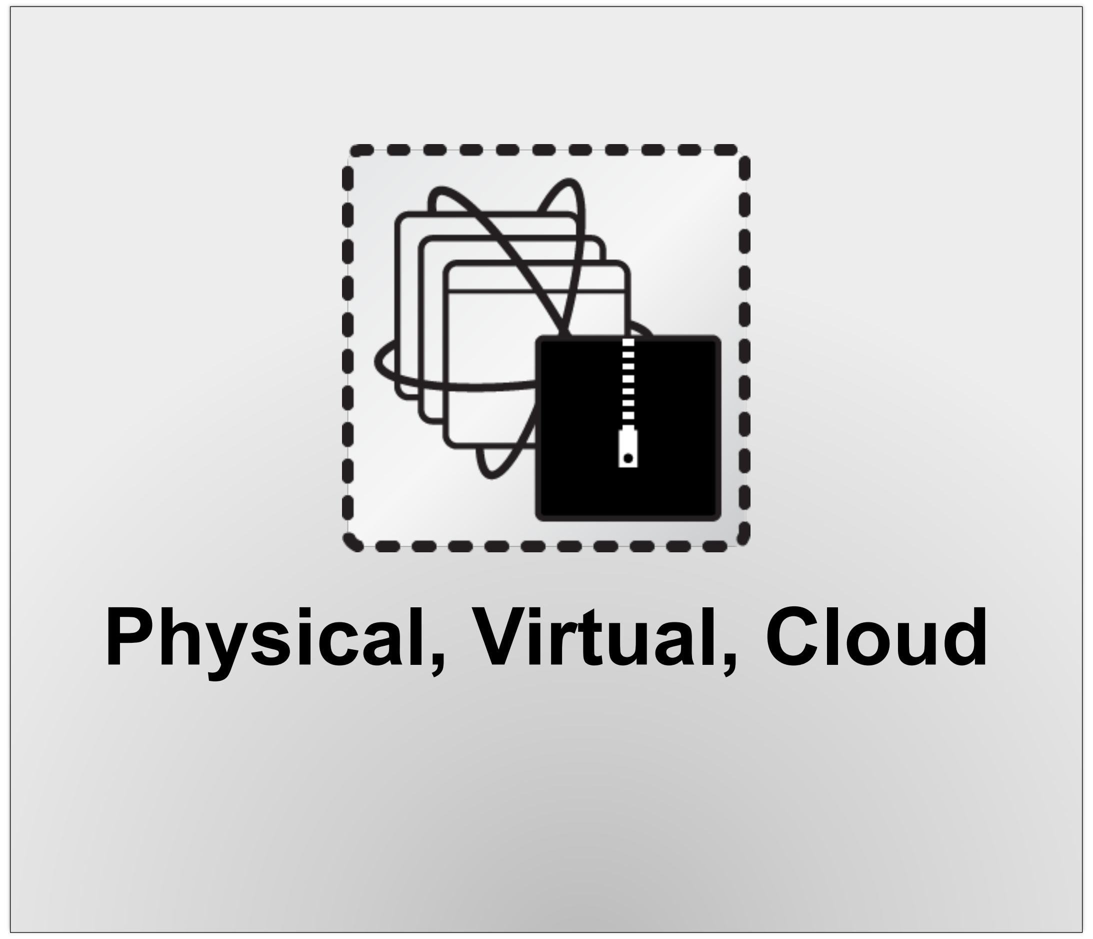
Image



Ship

“docker push or pull
<IMAGE_ID>”

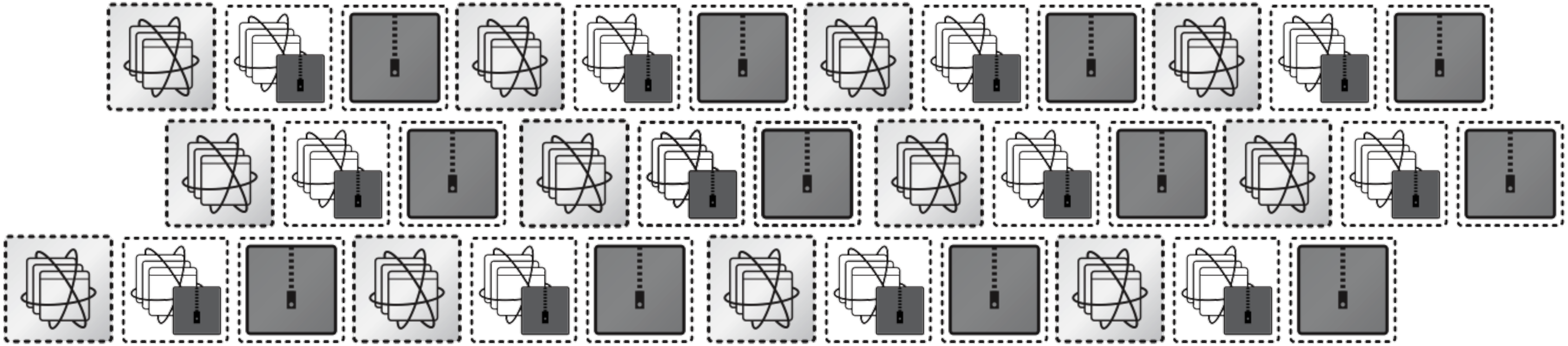
Container



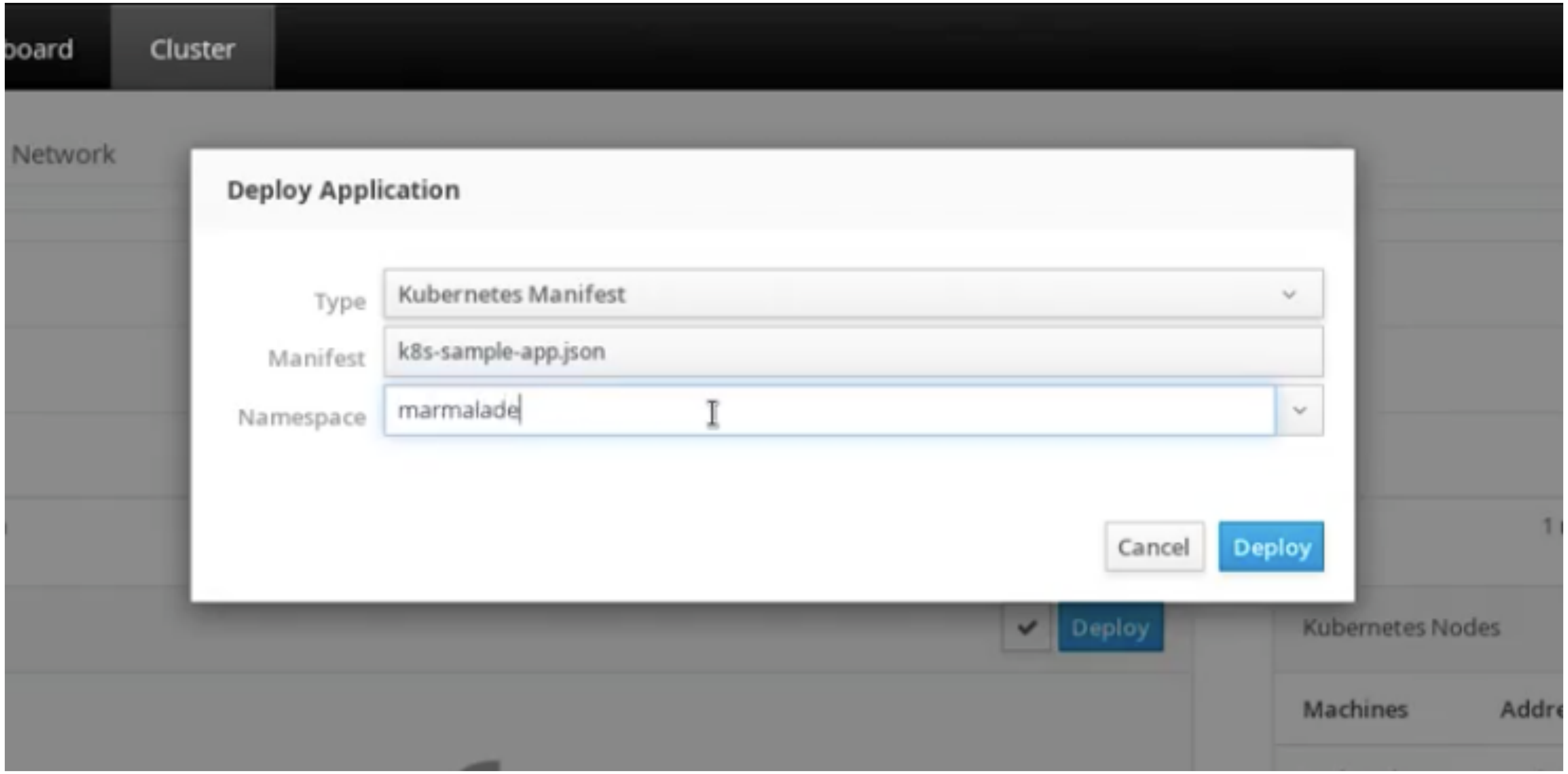
Run

“docker run
<IMAGE_ID>”

kubernetes by Google



KUBERNETES: DEPLOY APPICATION



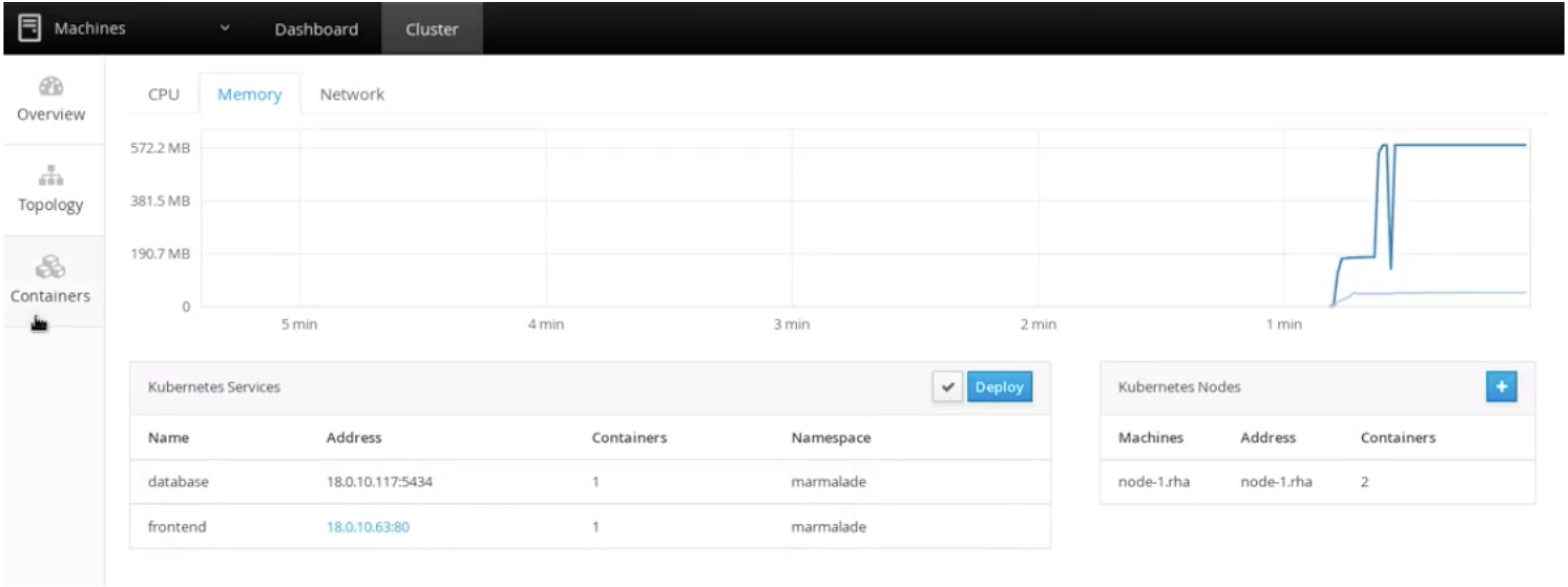
Deploy Application

Type: Kubernetes Manifest

Manifest: k8s-sample-app.json

Namespace: marmalade

KUBERNETES: DEPLOY APPLICATION



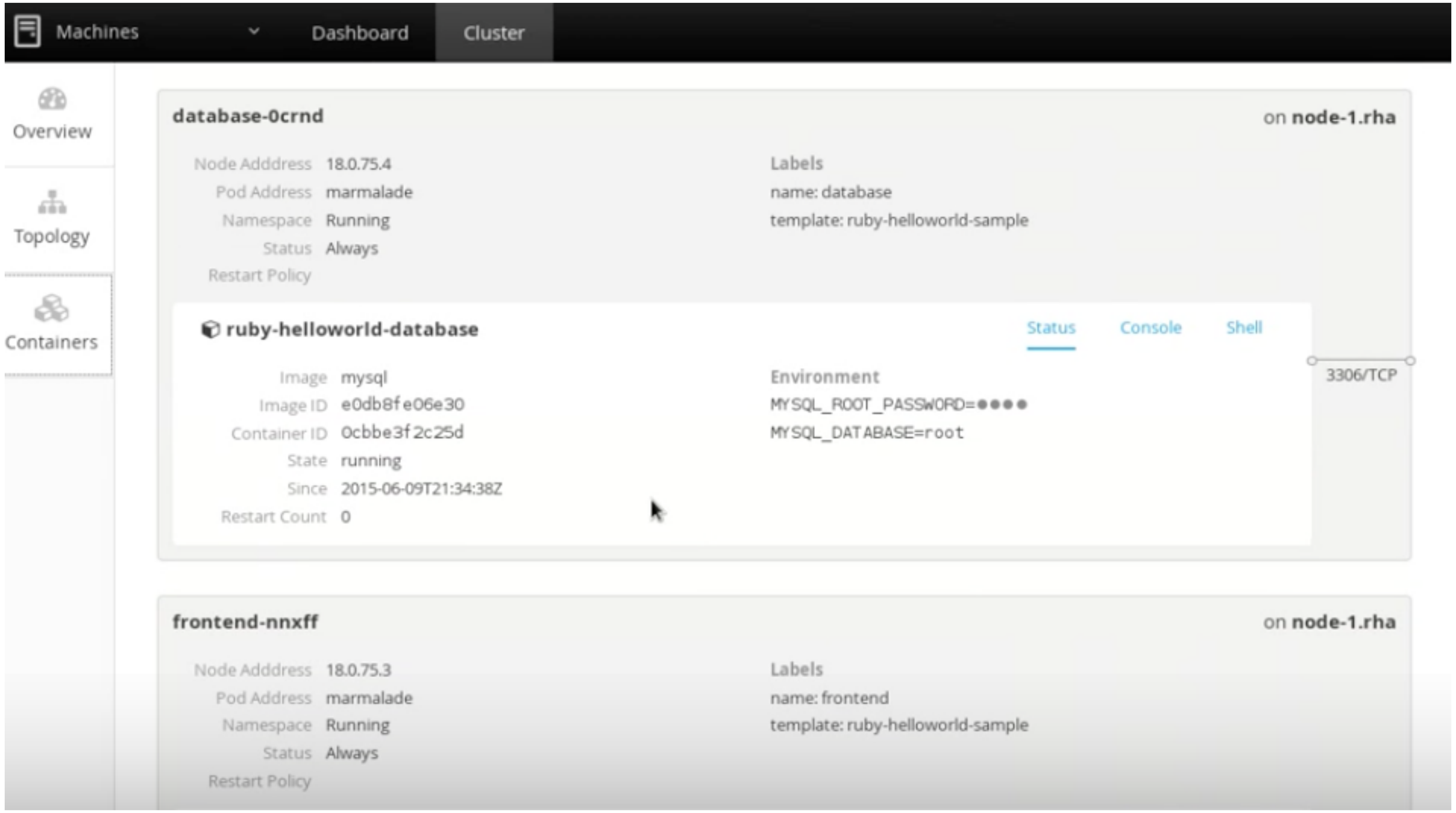
Kubernetes Services

Name	Address	Containers	Namespace
database	18.0.10.117:5434	1	marmalade
frontend	18.0.10.63:80	1	marmalade

Kubernetes Nodes

Machines	Address	Containers
node-1.rha	node-1.rha	2

KUBERNETES: DEPLOY APPLICATION



database-0crnd on **node-1.rha**

Node Adddress 18.0.75.4
Pod Address marmalade
Namespace Running
Status Always
Restart Policy

Labels
name: database
template: ruby-helloworld-sample

ruby-helloworld-database

Image mysql
Image ID e0db8fe06e30
Container ID 0cbbe3f2c25d
State running
Since 2015-06-09T21:34:38Z
Restart Count 0

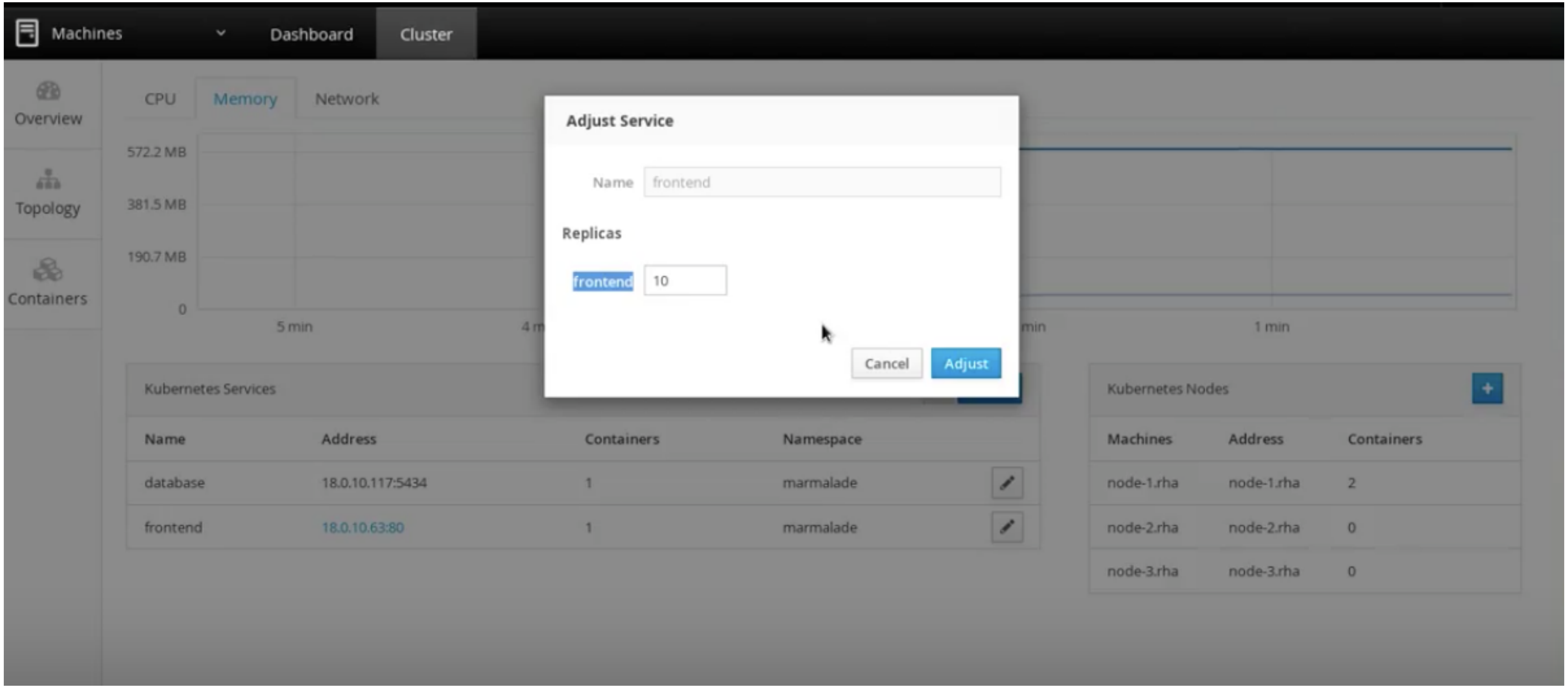
Environment
MYSQL_ROOT_PASSWORD=●●●●
MYSQL_DATABASE=root

frontend-nnxff on **node-1.rha**

Node Adddress 18.0.75.3
Pod Address marmalade
Namespace Running
Status Always
Restart Policy

Labels
name: frontend
template: ruby-helloworld-sample

KUBERNETES: SCALE SERVICE



Adjust Service

Name: frontend

Replicas

frontend: 10

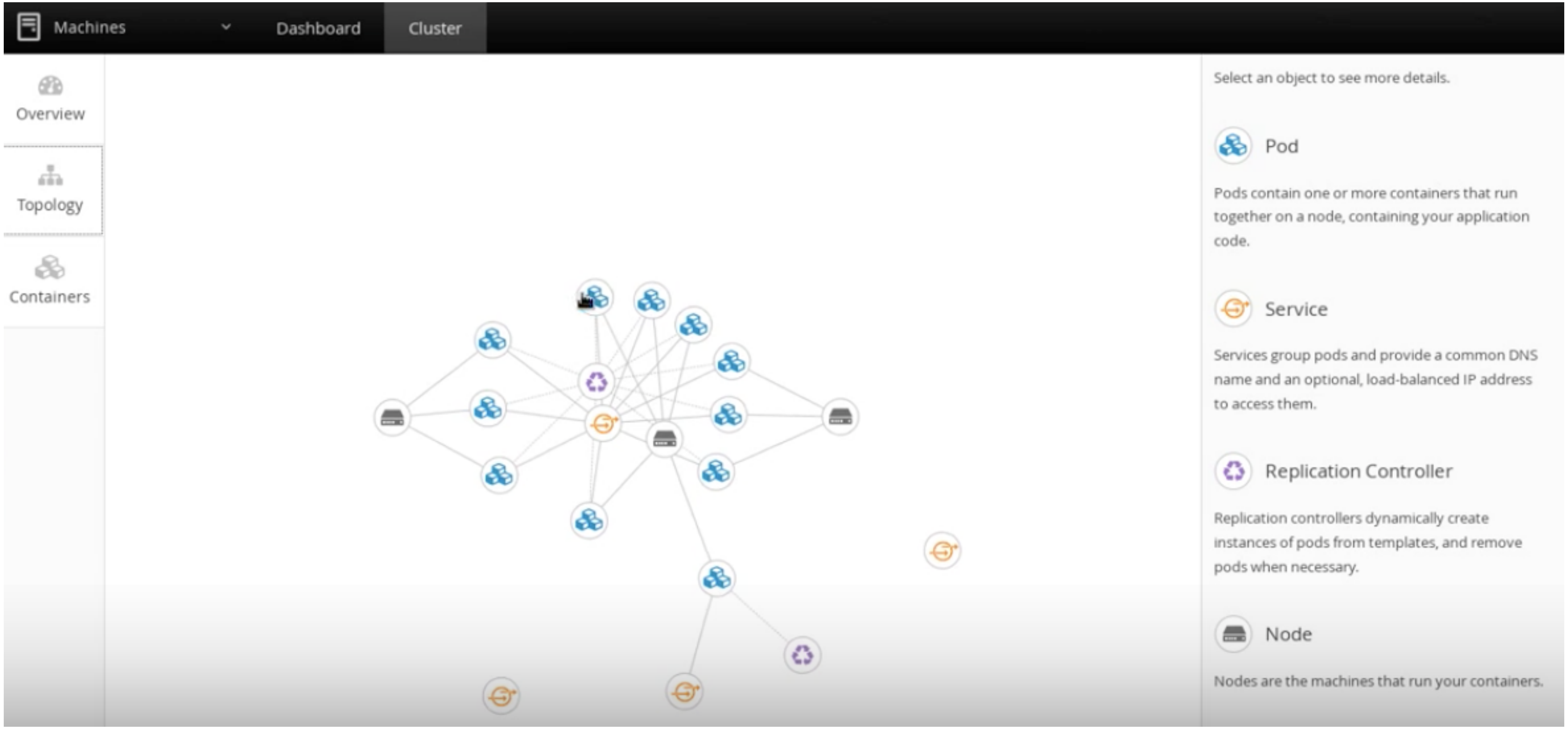
Kubernetes Services

Name	Address	Containers	Namespace
database	18.0.10.117:5434	1	marmalade
frontend	18.0.10.63:80	1	marmalade

Kubernetes Nodes

Machines	Address	Containers
node-1.rha	node-1.rha	2
node-2.rha	node-2.rha	0
node-3.rha	node-3.rha	0

KUBERNETES: SCALE SERVICE



Select an object to see more details.

Pod

Pods contain one or more containers that run together on a node, containing your application code.

Service

Services group pods and provide a common DNS name and an optional, load-balanced IP address to access them.

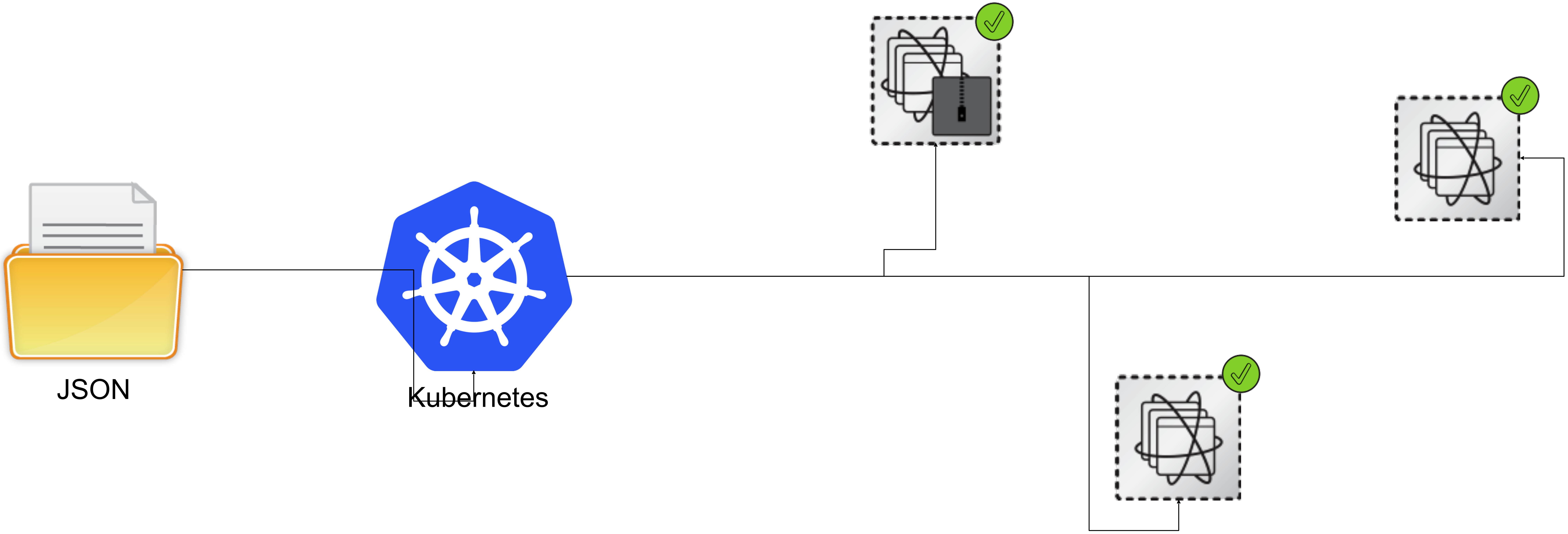
Replication Controller

Replication controllers dynamically create instances of pods from templates, and remove pods when necessary.

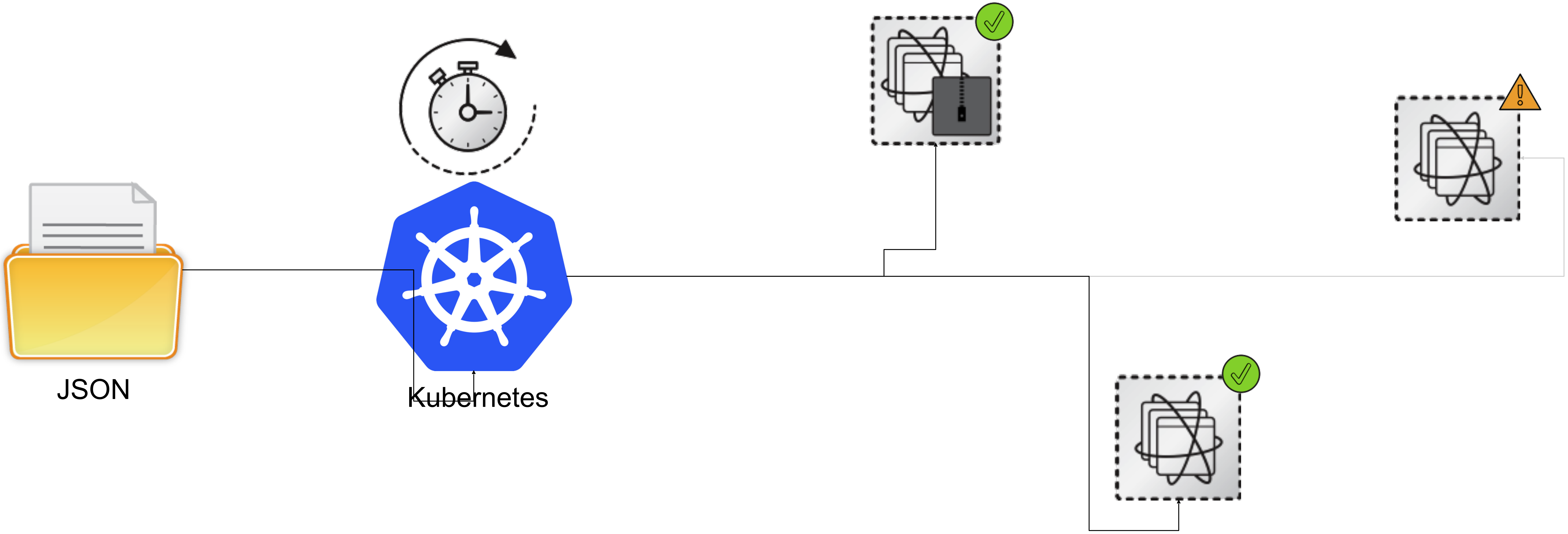
Node

Nodes are the machines that run your containers.

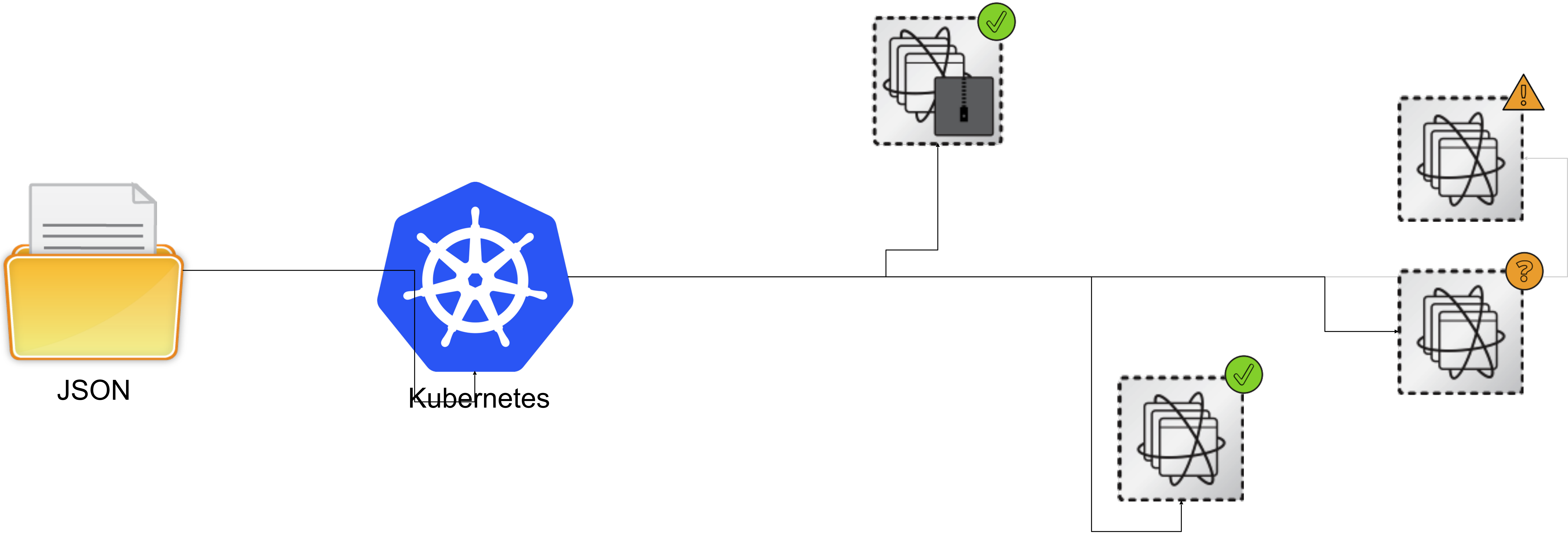
KUBERNETES: HEALTH CHECK



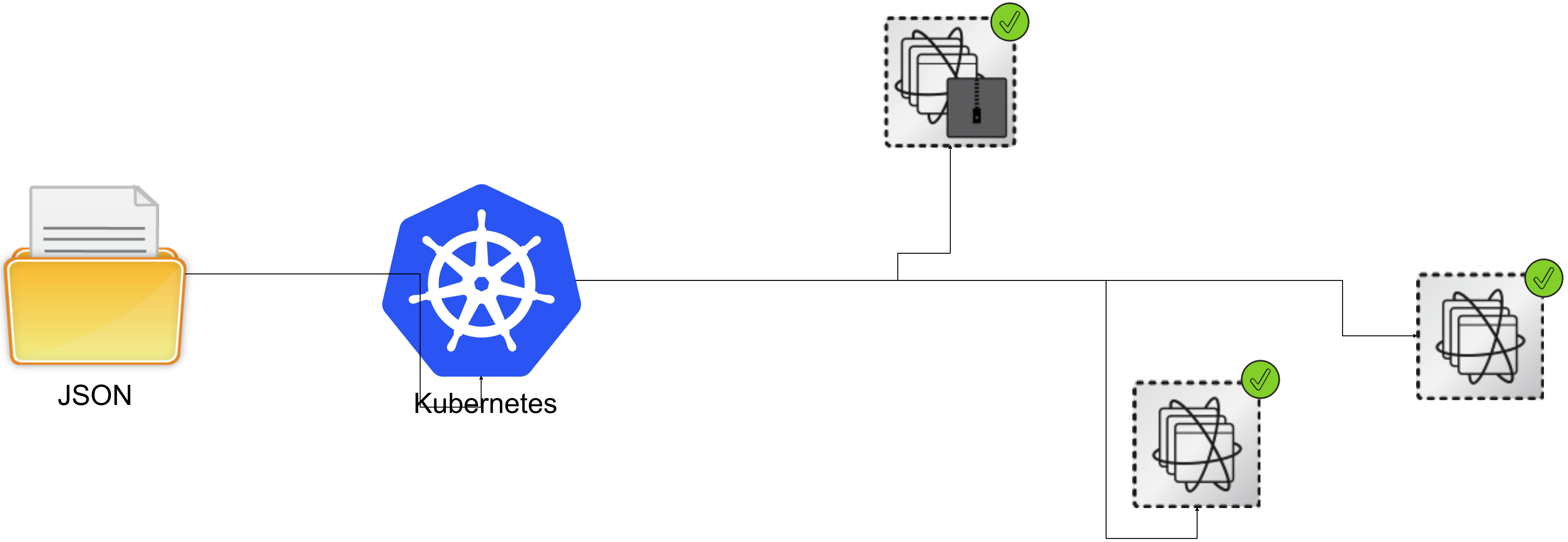
KUBERNETES: HEALTH CHECK



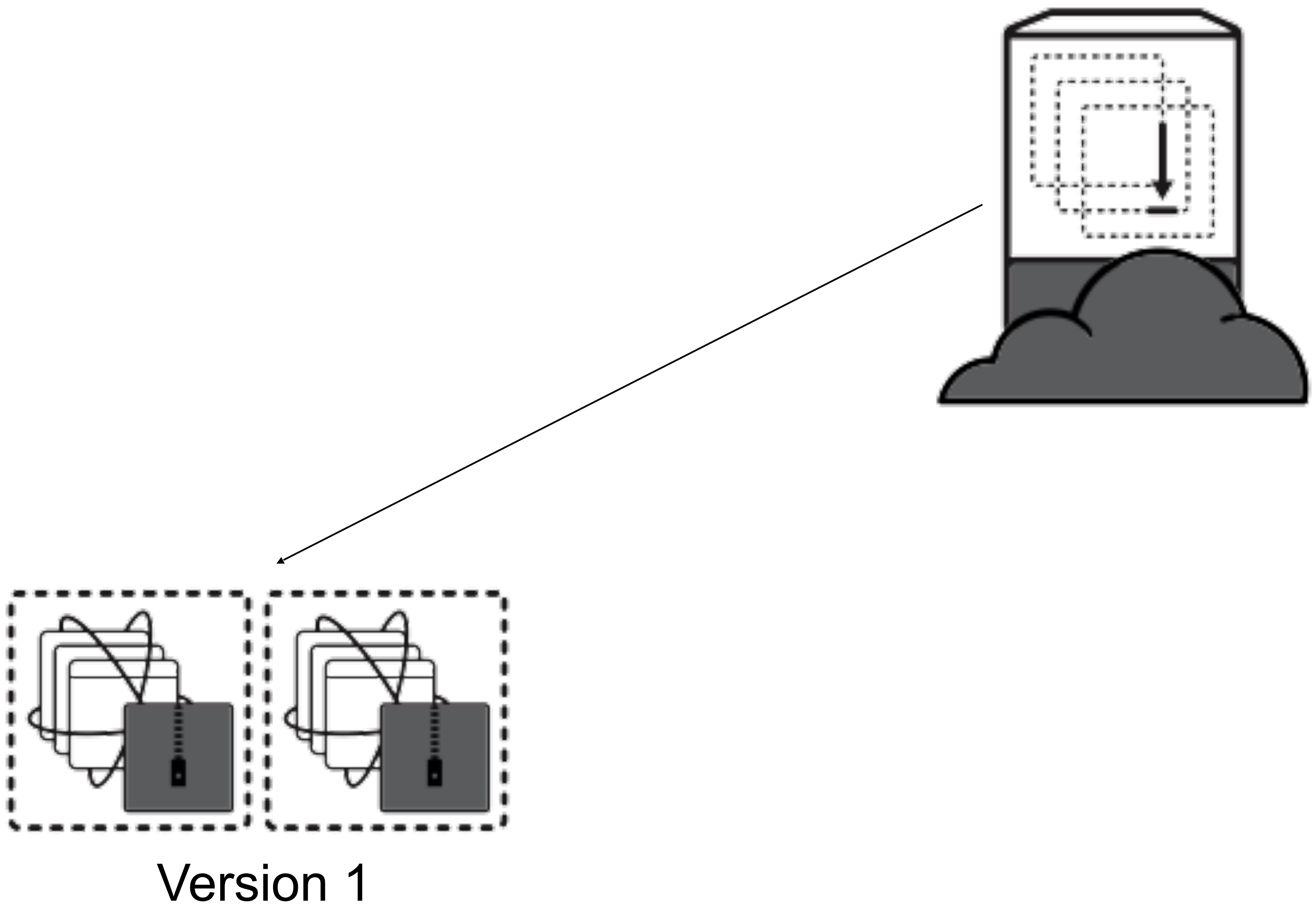
KUBERNETES: HEALTH CHECK



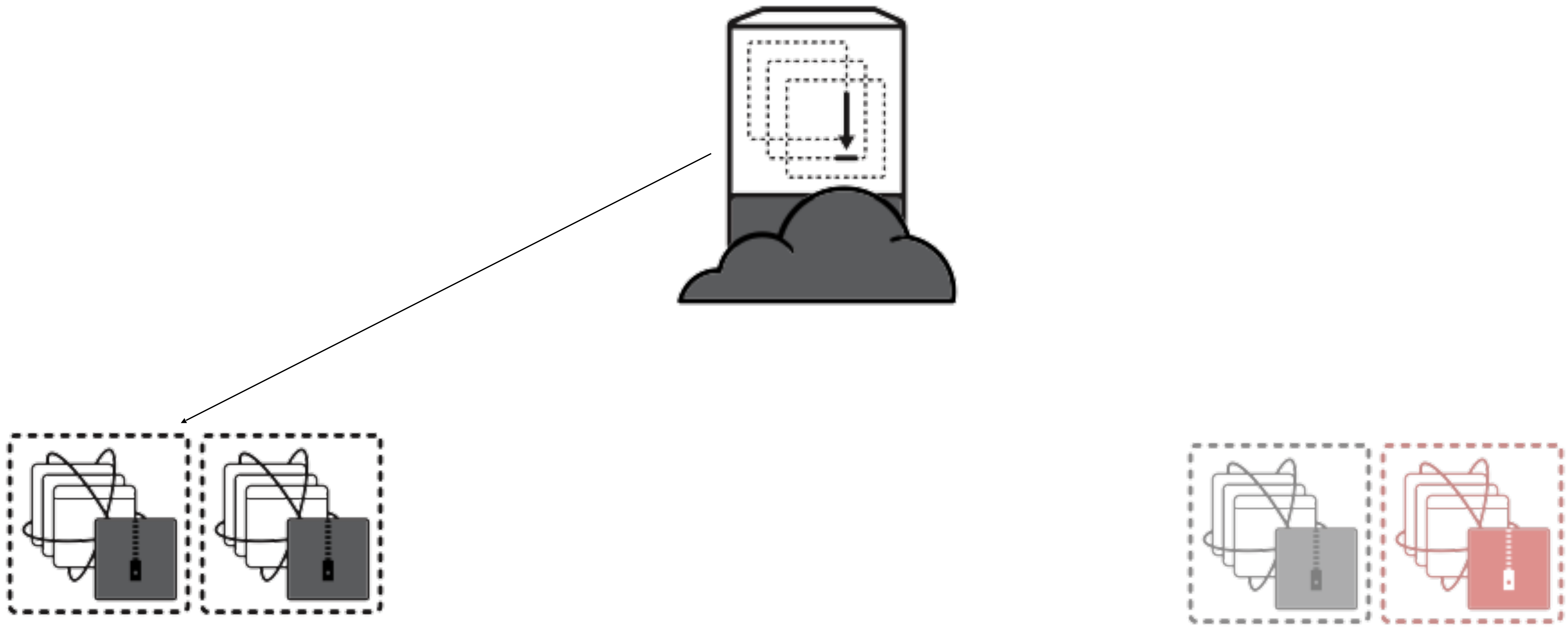
KUBERNETES: HEALTH CHECK



KUBERNETES: DEPLOYMENT



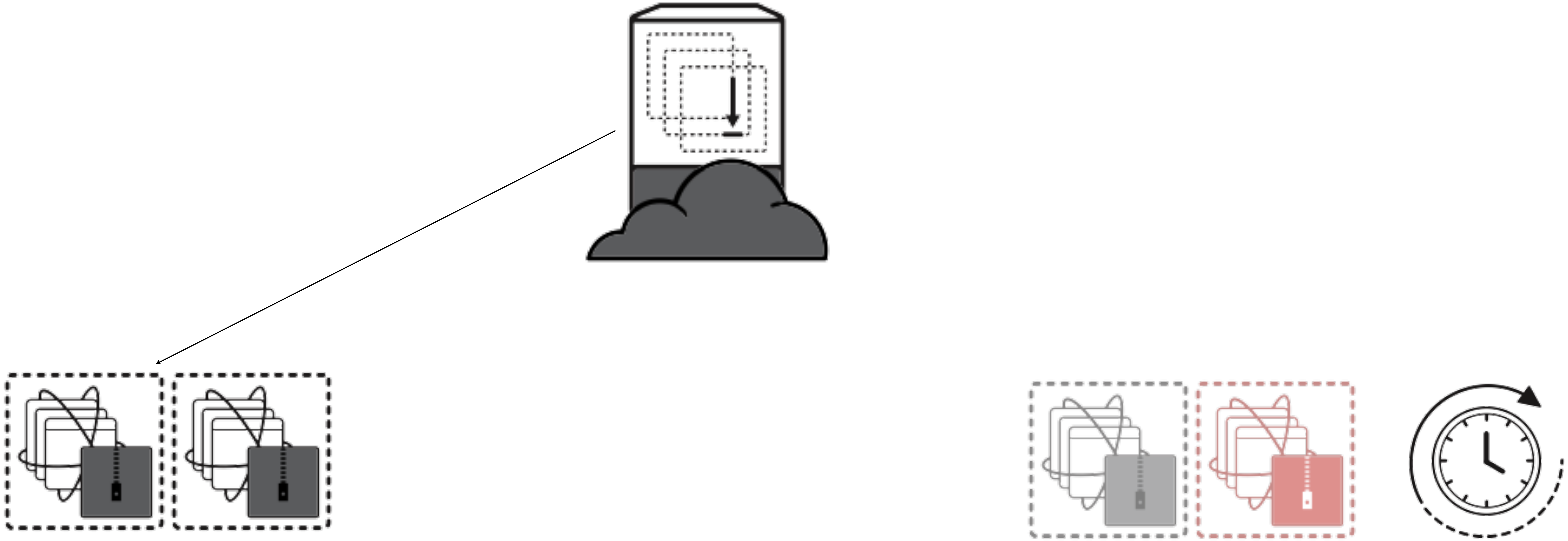
KUBERNETES: DEPLOYMENT



Version 1

Version 1.2

KUBERNETES: DEPLOYMENT

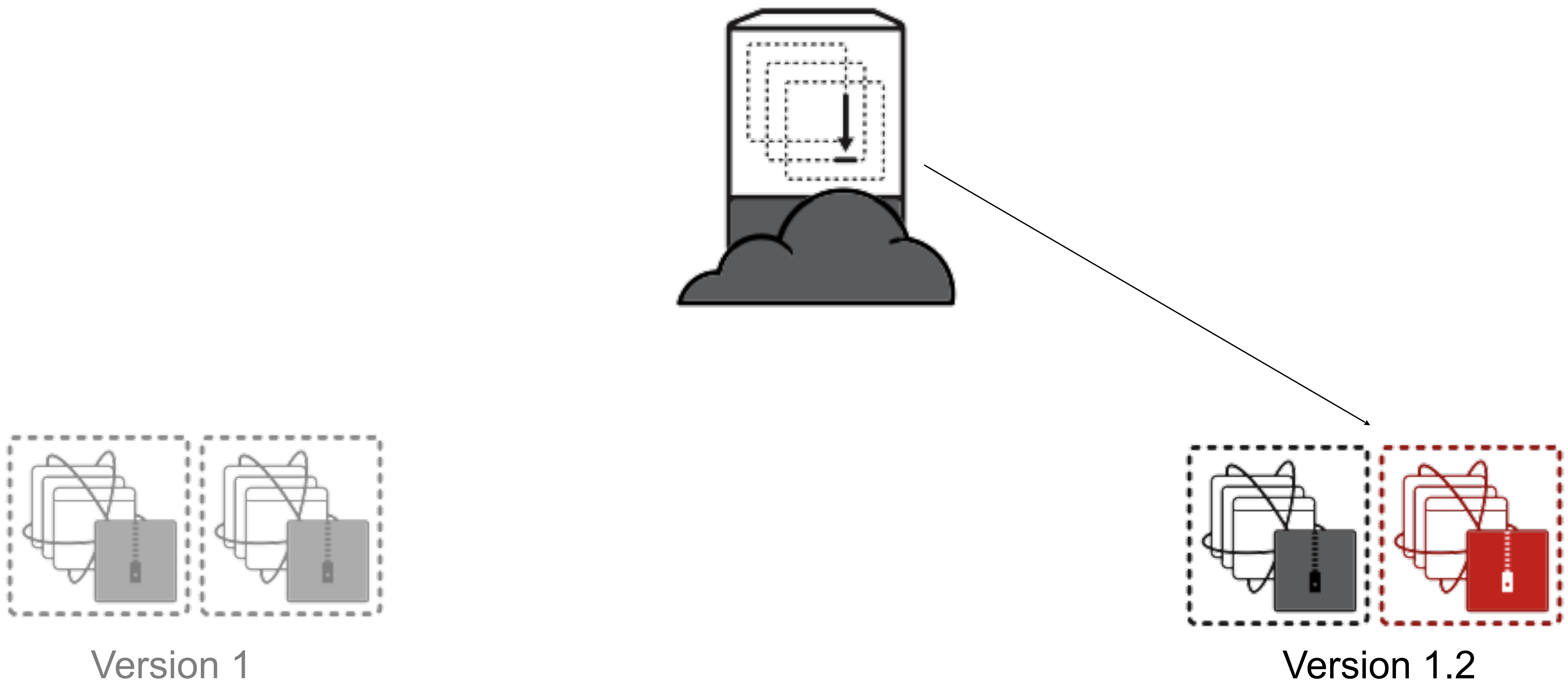


Version 1

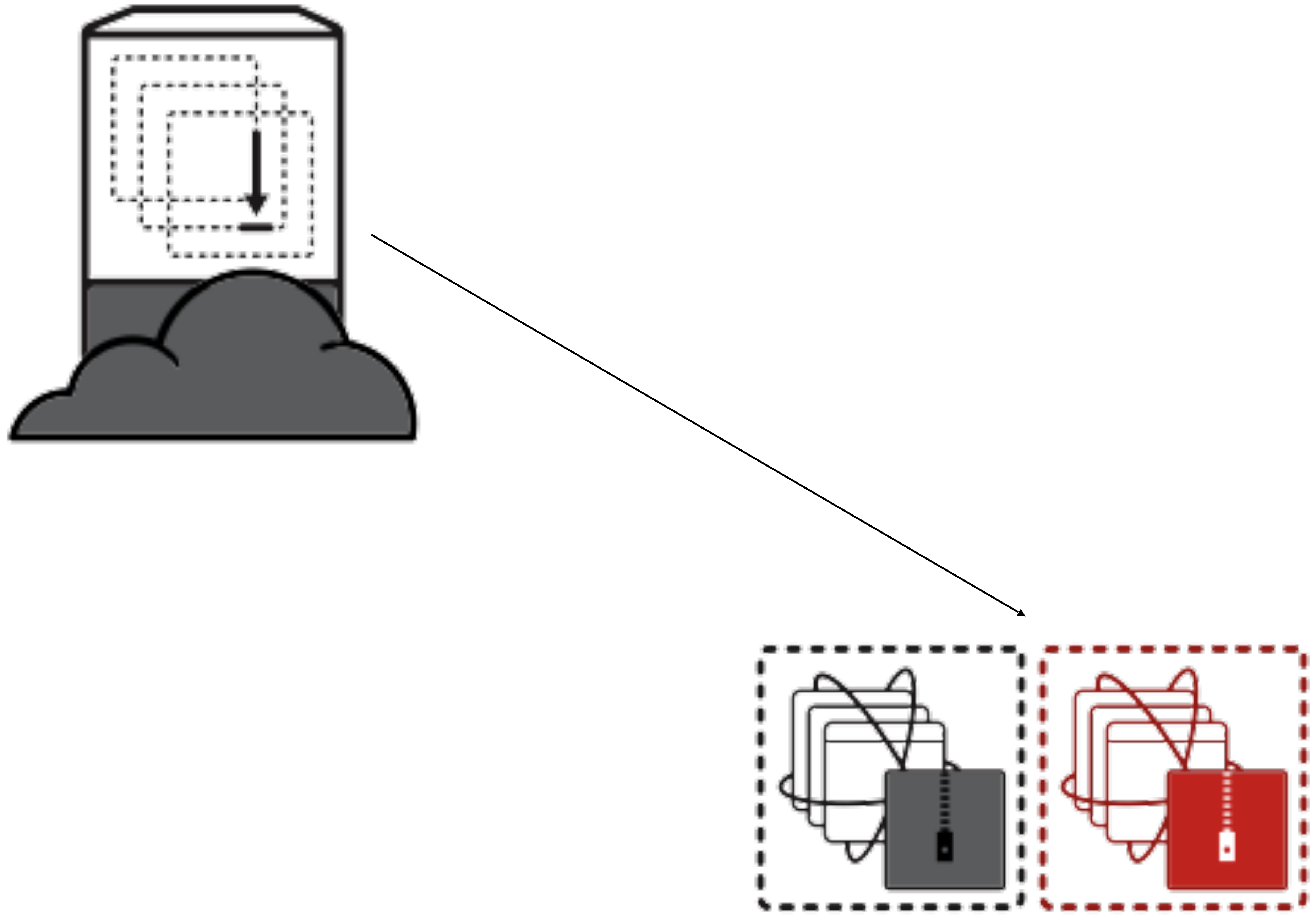
Version 1.2

Tests / CI

KUBERNETES: DEPLOYMENT



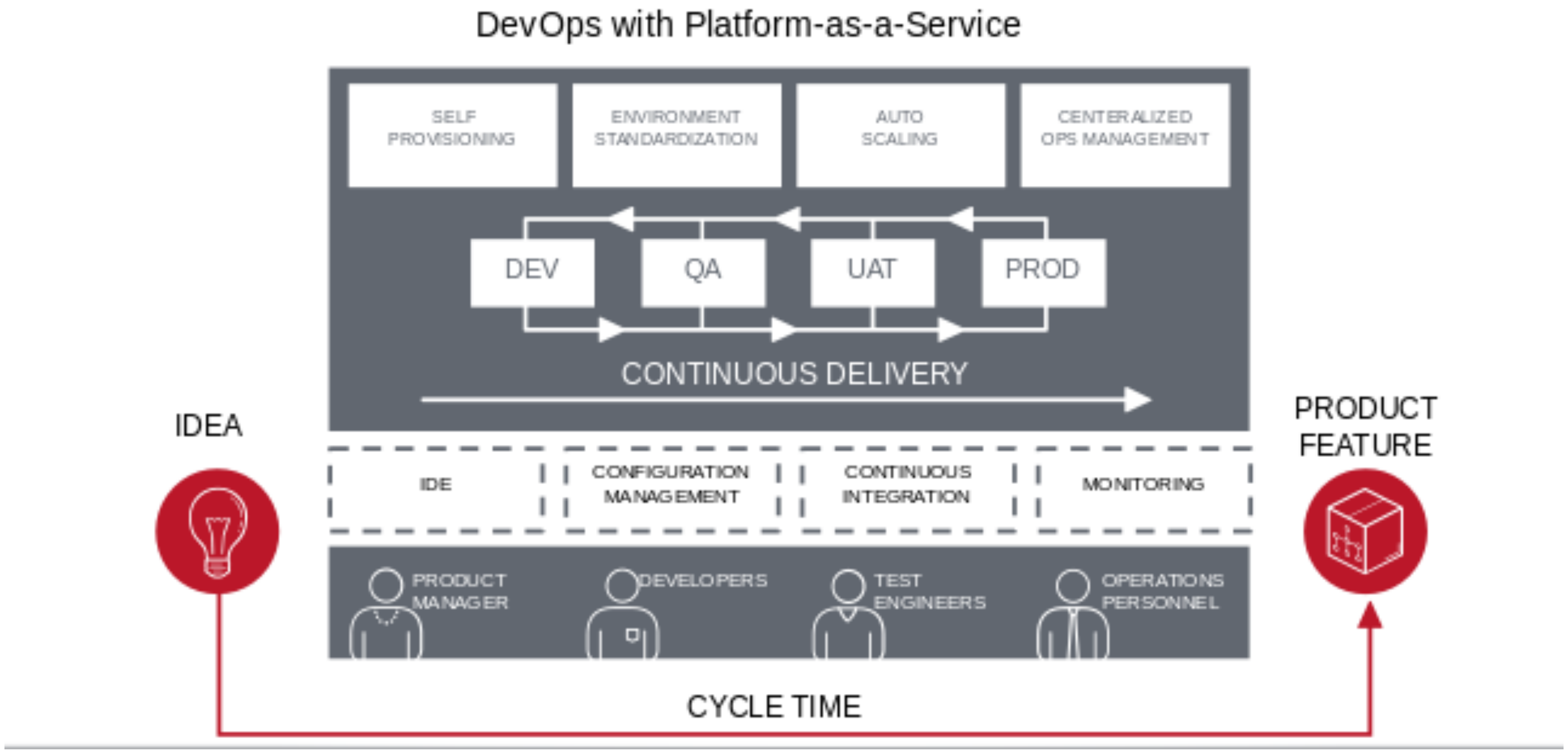
KUBERNETES: DEPLOYMENT



Version 1.2

REDUCE CYCLE TIME FROM IDEA TO FEATURE

DEVOPS WITH PaaS



DEVOPS WORKFLOW

OPS

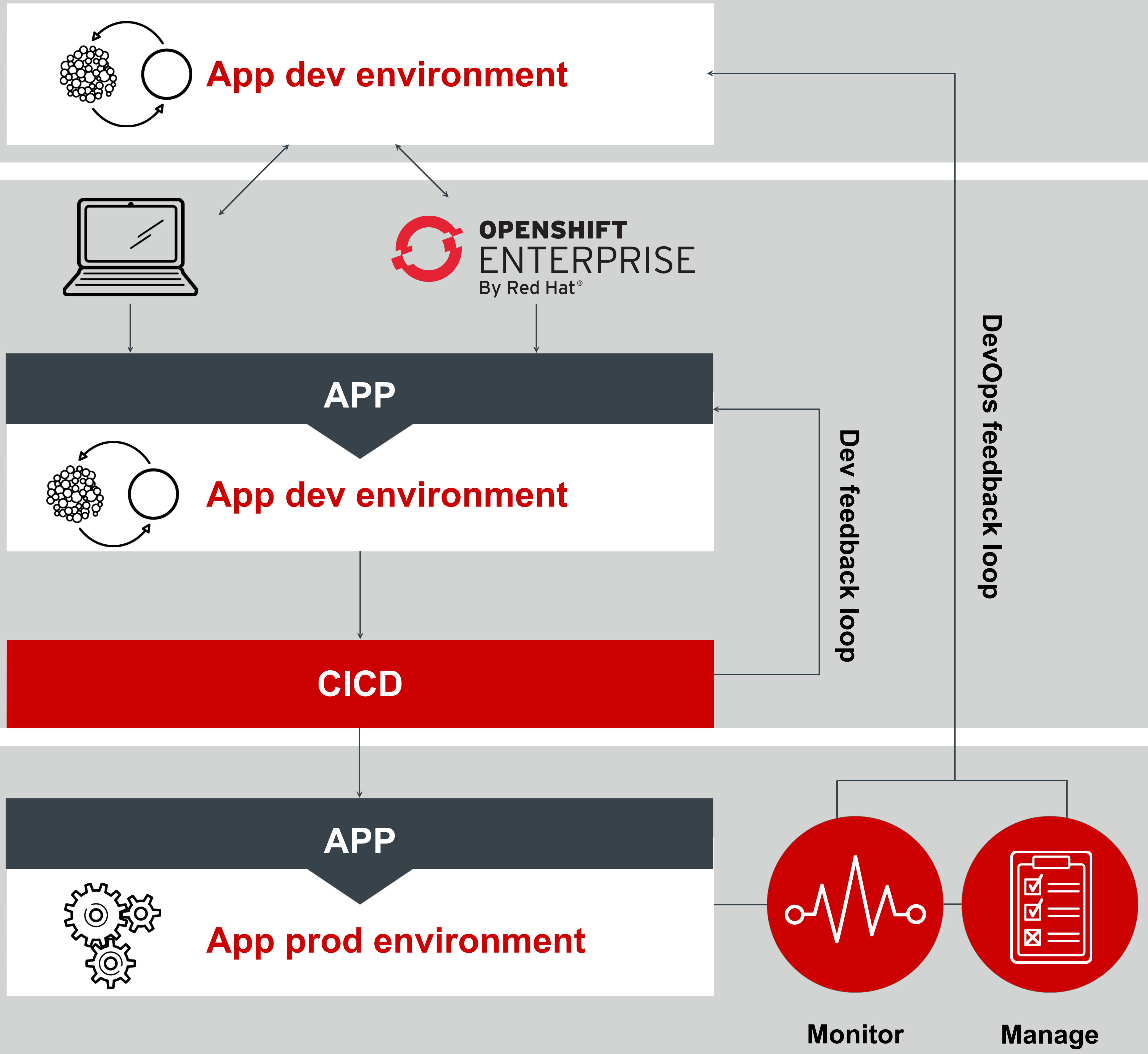
- Create containerized IaaS or PaaS development environment

DEV

- Provision environment locally or at OpenShift by Red Hat
- Write app as containerized microservices cluster and commit changes
- Push changes through CICD and automated testing system to containerized staging

DEV OPS

- Scheduler orchestrates and deploys app
- Monitor and operate app



CUSTOMER CASE STUDY

FINANCIAL SERVICES COMPANY

“It could take 6 weeks to get a single word changed on the web site.”

“It took 2 years after a competitive start-up launch to get a competing product to market.”

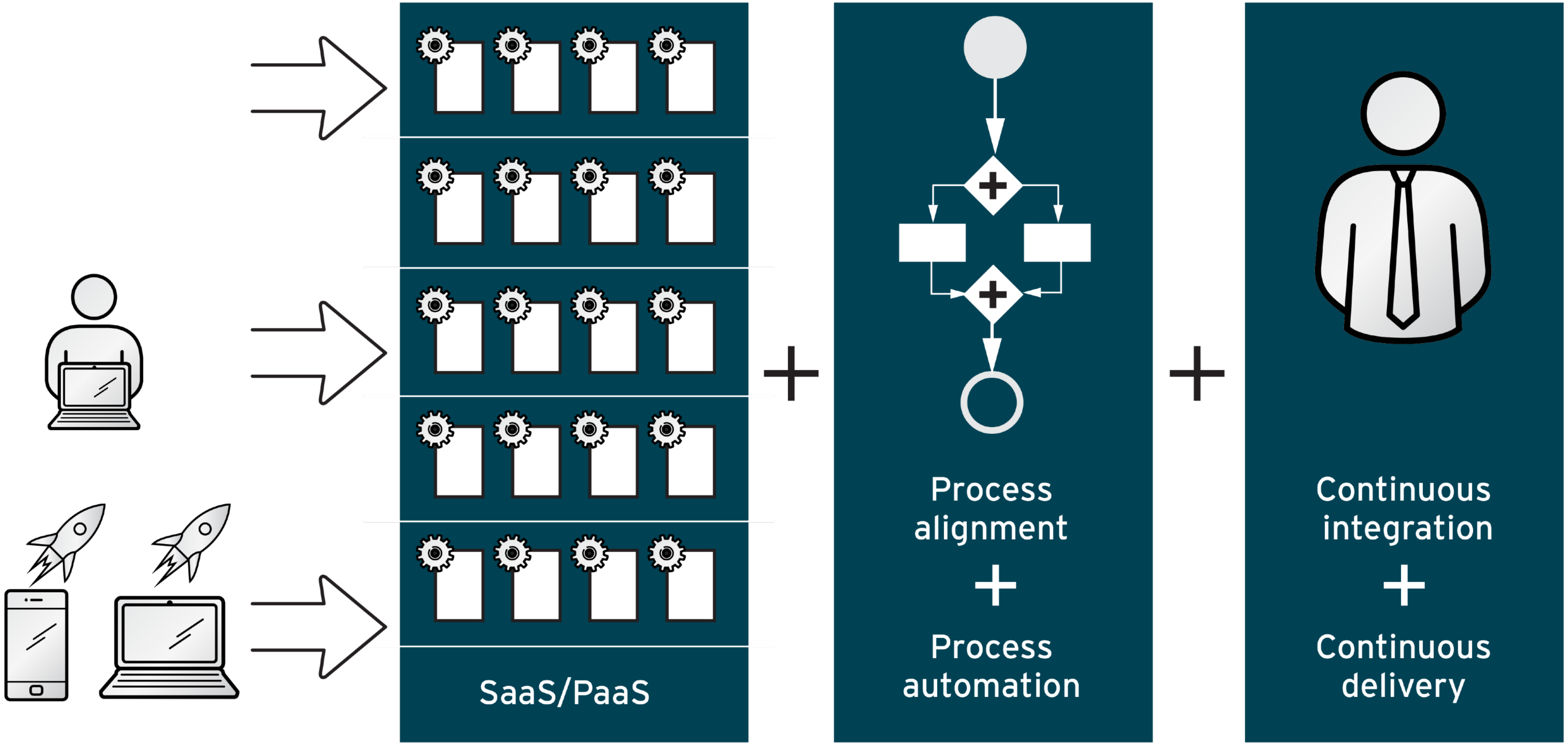
“When developers work in Node.js, they can change the code they’re working on, direct it to run, and see whether it works-in the blink of an eye.”

“The environment, while stable, didn’t use the sexiest technologies, which made recruiting difficult.”

BUSINESS CHALLENGES

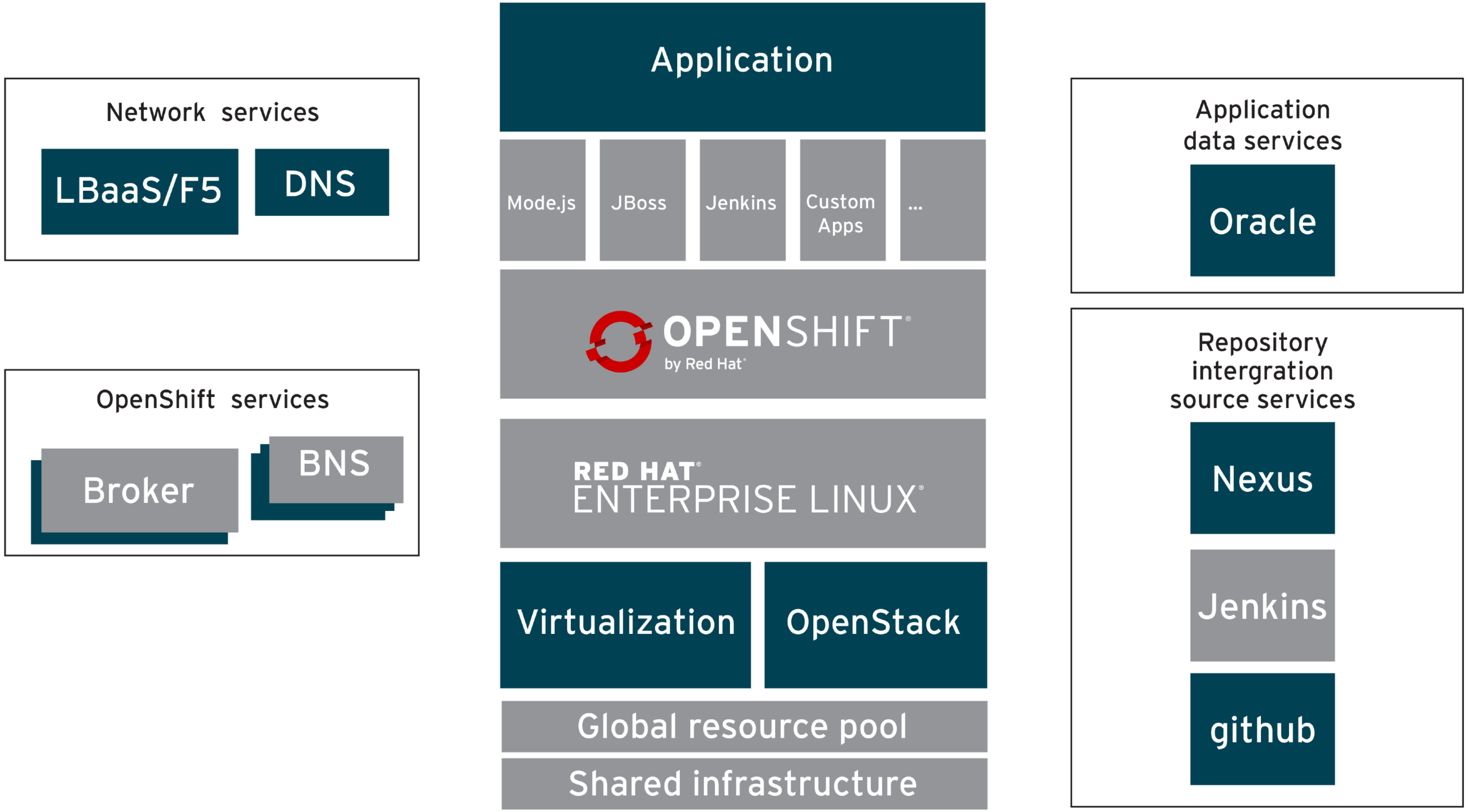
- Growth
- Competition
- Agility
- Predictability
- Recruiting

DEVOPS SOLUTION APPROACH

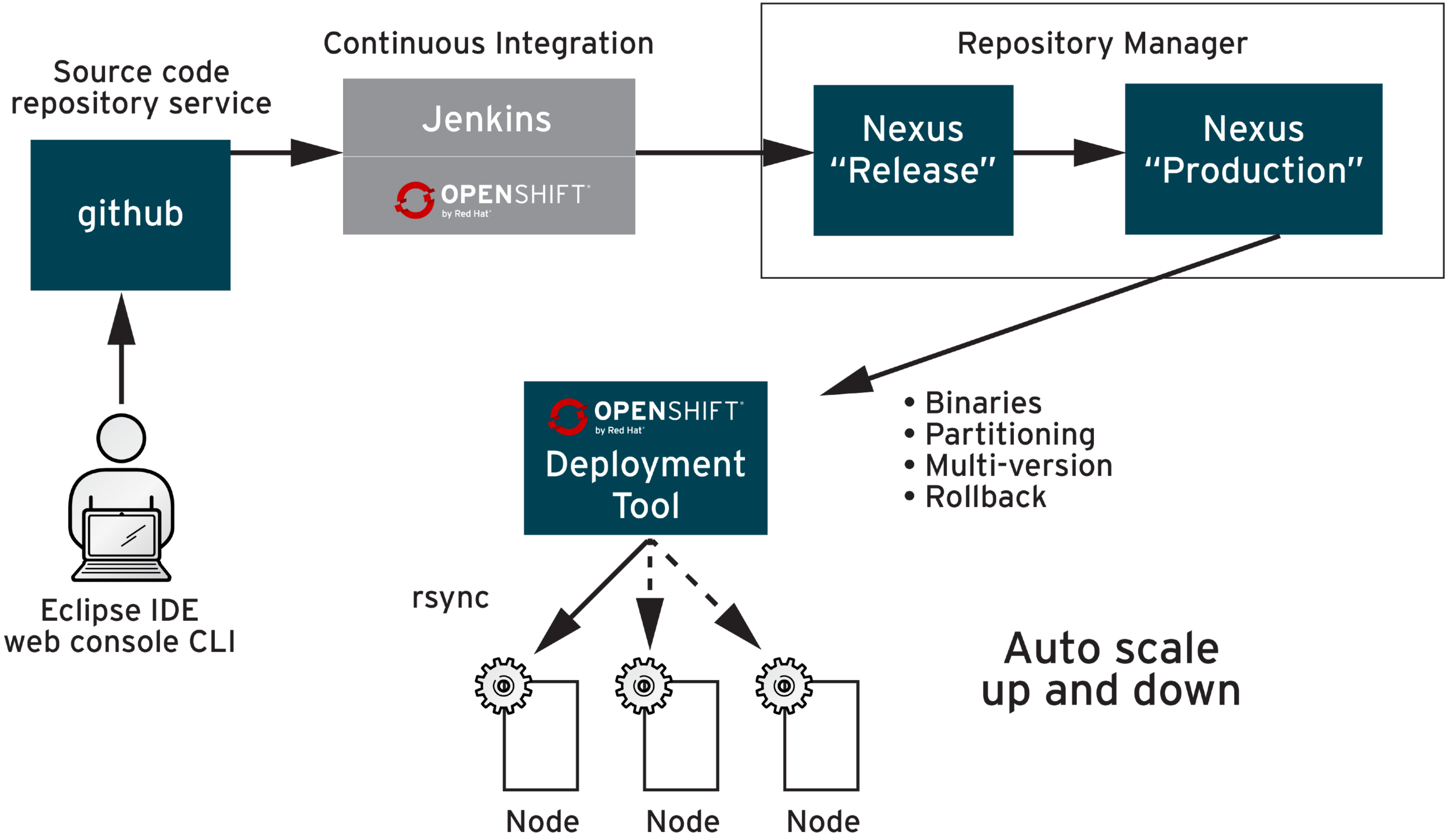


Leverage Automation Technologies Combined with Cloud Architecture

ARCHITECTURE



DEVELOPMENT TO PRODUCTION IN <30 MINUTES



Source code repository service

github

Continuous Integration

Jenkins

OPENSHIFT by Red Hat

Repository Manager

Nexus "Release"

Nexus "Production"

Eclipse IDE
web console CLI

OPENSHIFT by Red Hat

Deployment Tool

- Binaries
- Partitioning
- Multi-version
- Rollback

rsync

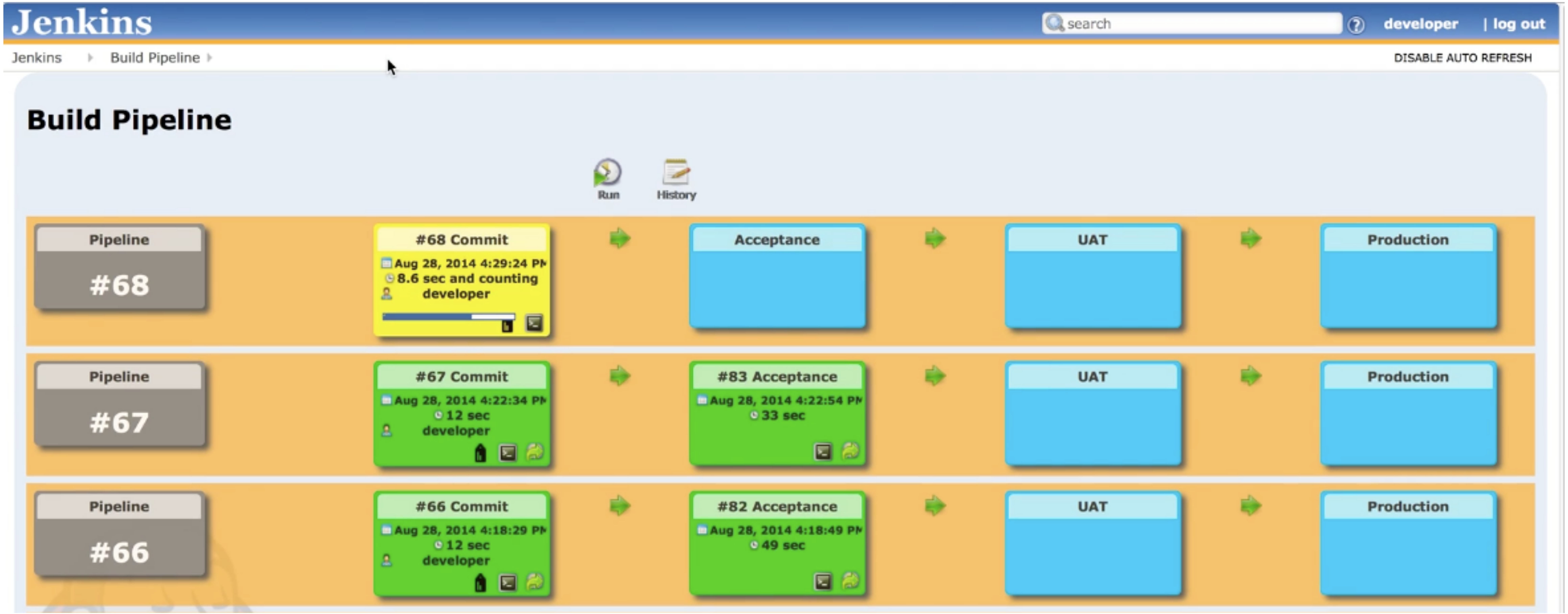
Node

Node

Node

Auto scale
up and down

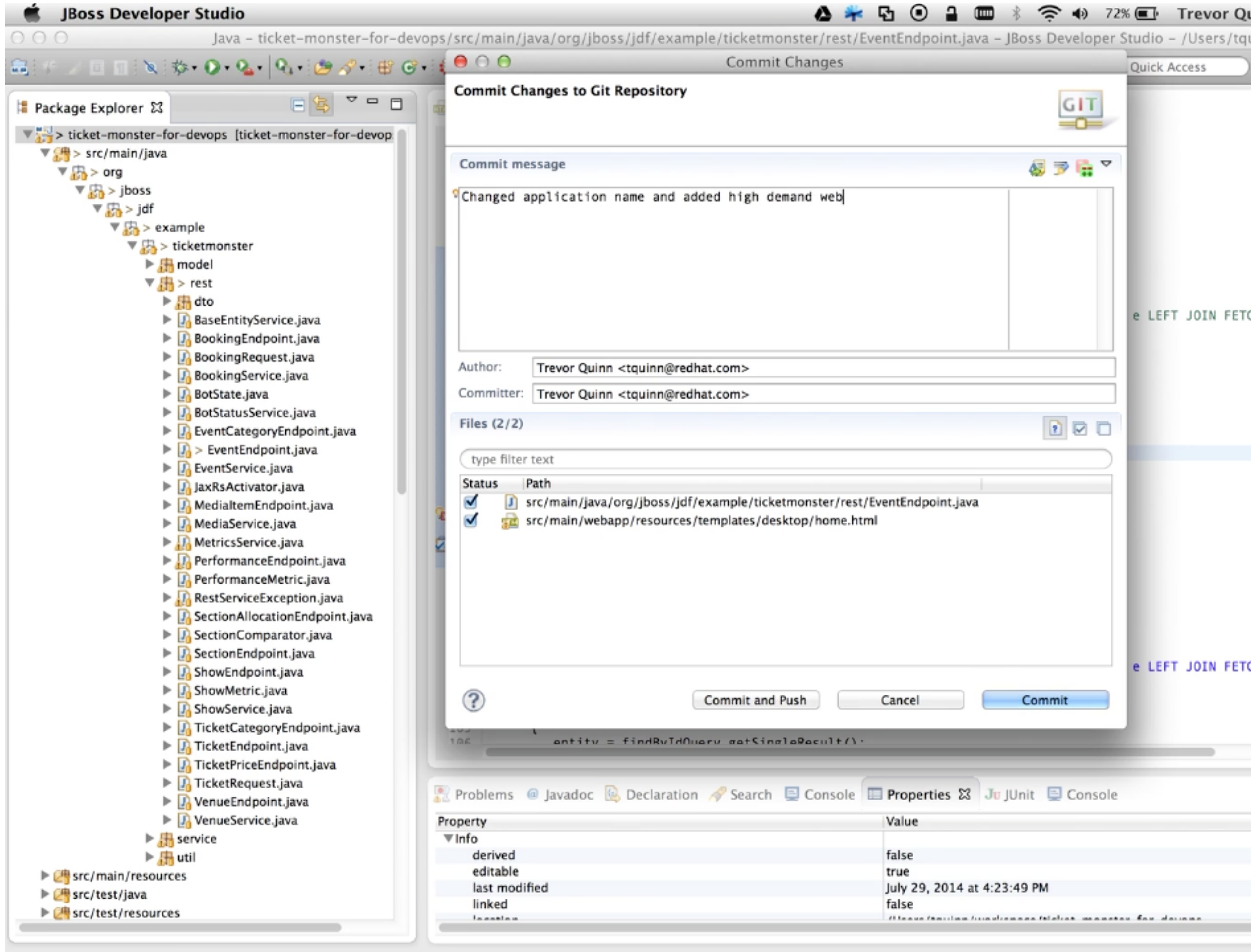
CONTINUOUS INTEGRATION and CONTINUOUS DELIVERY
BUILD PIPELINE



Build Pipeline

Pipeline #68	#68 Commit Aug 28, 2014 4:29:24 PM 8.6 sec and counting developer	Acceptance	UAT	Production
Pipeline #67	#67 Commit Aug 28, 2014 4:22:34 PM 12 sec developer	#83 Acceptance Aug 28, 2014 4:22:54 PM 33 sec	UAT	Production
Pipeline #66	#66 Commit Aug 28, 2014 4:18:29 PM 12 sec developer	#82 Acceptance Aug 28, 2014 4:18:49 PM 49 sec	UAT	Production

CONTINUOUS INTEGRATION and CONTINUOUS DELIVERY BUILD PIPELINE



Commit message:

```
Changed application name and added high demand web
```

Author: Trevor Quinn <tquinn@redhat.com>

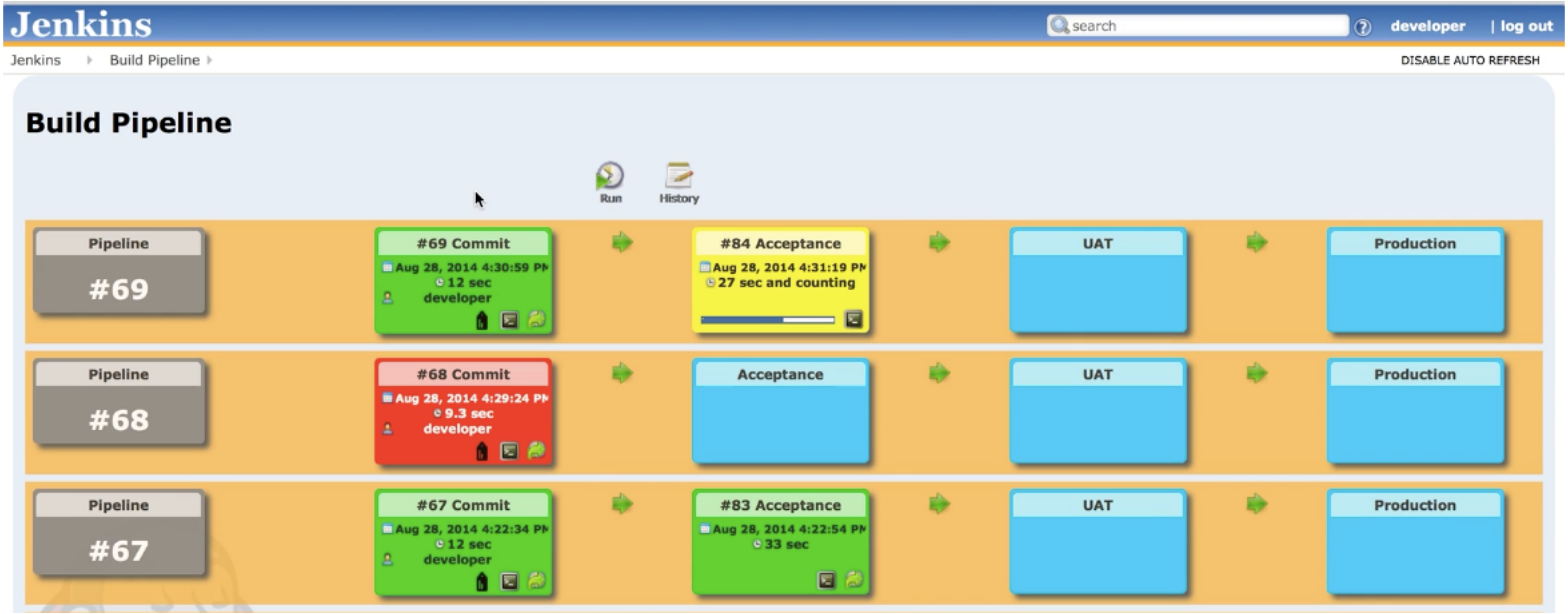
Committer: Trevor Quinn <tquinn@redhat.com>

Status	Path
☑	src/main/java/org/jboss/jdf/example/ticketmonster/rest/EventEndpoint.java
☑	src/main/webapp/resources/templates/desktop/home.html

```
e LEFT JOIN FETC
e LEFT JOIN FETC
entity = findByIdQuery.getSingleResult();
```

Property	Value
Info	
derived	false
editable	true
last modified	July 29, 2014 at 4:23:49 PM
linked	false

CONTINUOUS INTEGRATION and CONTINUOUS DELIVERY
BUILD PIPELINE



Build Pipeline

Pipeline #69	#69 Commit Aug 28, 2014 4:30:59 PM 12 sec developer	#84 Acceptance Aug 28, 2014 4:31:19 PM 27 sec and counting	UAT	Production
Pipeline #68	#68 Commit Aug 28, 2014 4:29:24 PM 9.3 sec developer	Acceptance	UAT	Production
Pipeline #67	#67 Commit Aug 28, 2014 4:22:34 PM 12 sec developer	#83 Acceptance Aug 28, 2014 4:22:54 PM 33 sec	UAT	Production

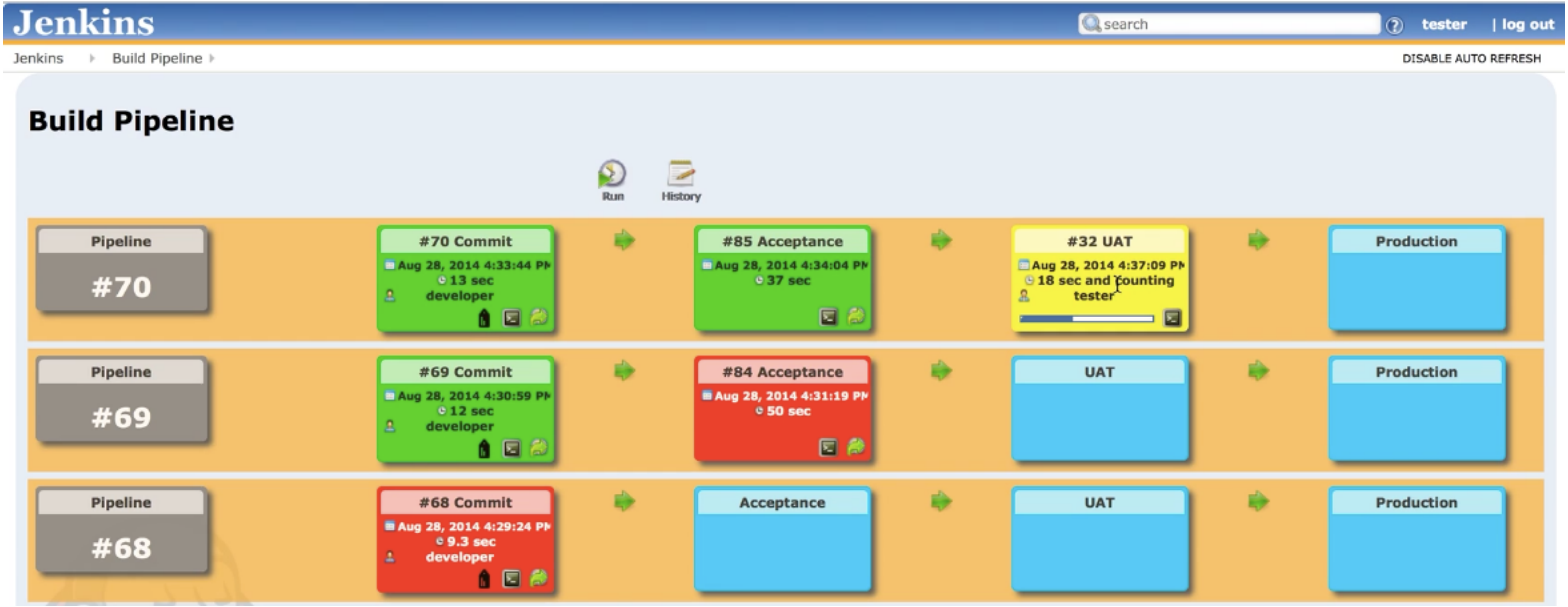
CONTINUOUS INTEGRATION and CONTINUOUS DELIVERY
BUILD PIPELINE

Jenkins
search
developer
| log out
Jenkins
Build Pipeline
DISABLE AUTO REFRESH
Run
History

Build Pipeline

Pipeline	Commit	Acceptance	UAT	Production
Pipeline #69	#69 Commit Aug 28, 2014 4:30:59 PM 12 sec developer	#84 Acceptance Aug 28, 2014 4:31:19 PM 50 sec	UAT	Production
Pipeline #68	#68 Commit Aug 28, 2014 4:29:24 PM 9.3 sec developer	Acceptance	UAT	Production
Pipeline #67	#67 Commit Aug 28, 2014 4:22:34 PM 12 sec developer	#83 Acceptance Aug 28, 2014 4:22:54 PM 33 sec	UAT	Production

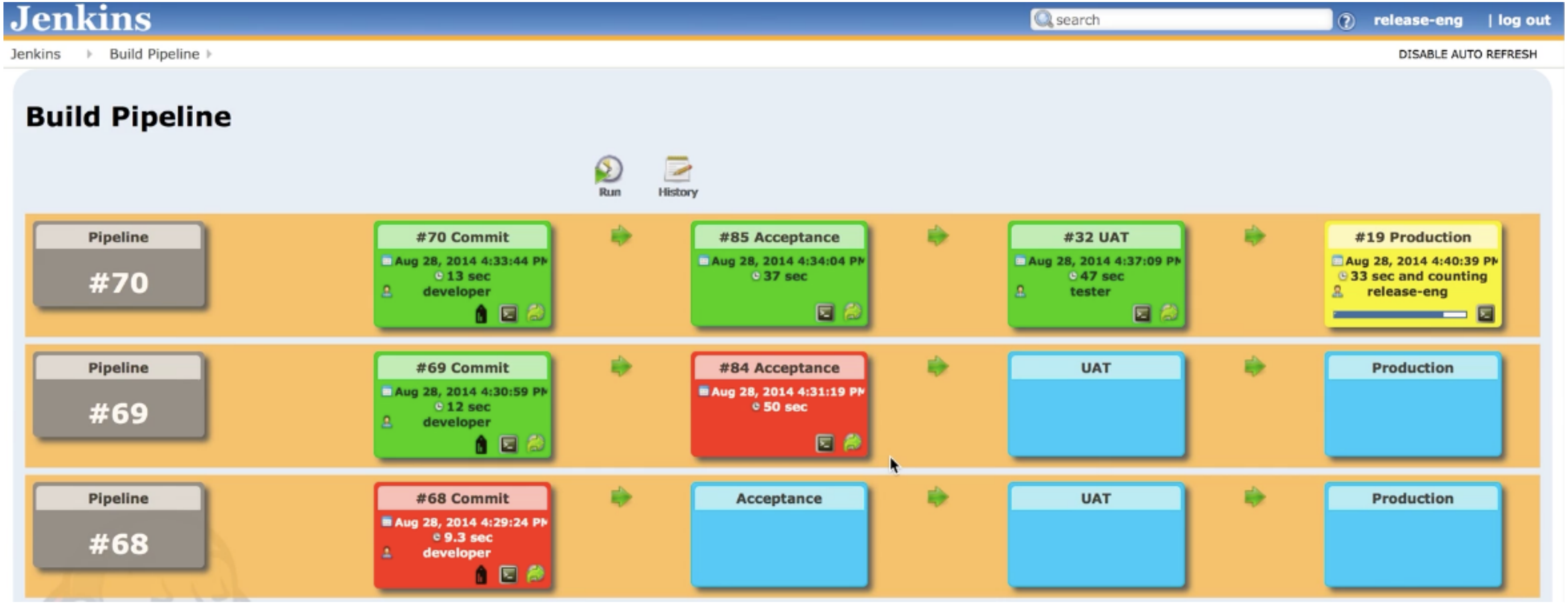
CONTINUOUS INTEGRATION and CONTINUOUS DELIVERY
BUILD PIPELINE



Build Pipeline

Pipeline #70	#70 Commit Aug 28, 2014 4:33:44 PM 13 sec developer	#85 Acceptance Aug 28, 2014 4:34:04 PM 37 sec	#32 UAT Aug 28, 2014 4:37:09 PM 18 sec and counting tester	Production
Pipeline #69	#69 Commit Aug 28, 2014 4:30:59 PM 12 sec developer	#84 Acceptance Aug 28, 2014 4:31:19 PM 50 sec	UAT	Production
Pipeline #68	#68 Commit Aug 28, 2014 4:29:24 PM 9.3 sec developer	Acceptance	UAT	Production

CONTINUOUS INTEGRATION and CONTINUOUS DELIVERY
BUILD PIPELINE



Build Pipeline

Pipeline #70	#70 Commit Aug 28, 2014 4:33:44 PM 13 sec developer	#85 Acceptance Aug 28, 2014 4:34:04 PM 37 sec	#32 UAT Aug 28, 2014 4:37:09 PM 47 sec tester	#19 Production Aug 28, 2014 4:40:39 PM 33 sec and counting release-eng
Pipeline #69	#69 Commit Aug 28, 2014 4:30:59 PM 12 sec developer	#84 Acceptance Aug 28, 2014 4:31:19 PM 50 sec	UAT	Production
Pipeline #68	#68 Commit Aug 28, 2014 4:29:24 PM 9.3 sec developer	Acceptance	UAT	Production

DEVOPS ROI

Improve business agility

Improve developer productivity

Improve business predictability

Improve operational efficiency and costs

DEVOPS METRICS

Deployment Frequency

Change Volume

Lead Time

404
Page not found

Deployment Failure Rate

Mean Time to Recover

99.999

Service Availability

DEVOPS IS PART OF A LARGER SHIFT

HOW?	WHAT?	WHERE?
DEVOPS	CLOUD APPS + MICROSERVICES	CONTAINERS

THANK YOU

Chris Van Tuin
cvantuin@redhat.com

redhat.