RED HAT SUMMIT

BOSTON, MA
JUNE 23-26, 2015

OPENSHIFT @Amadeus

Switching to a containerized application platform

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Amadeus in a few words

Amadeus is a technology company dedicated to the
global travel industry.

We are present in **195 countries**
with a worldwide team of more than 12,000 people.

Our solutions help improve the
business performance
of travel agencies, corporations, airlines,
airports, hotels, railways and more.

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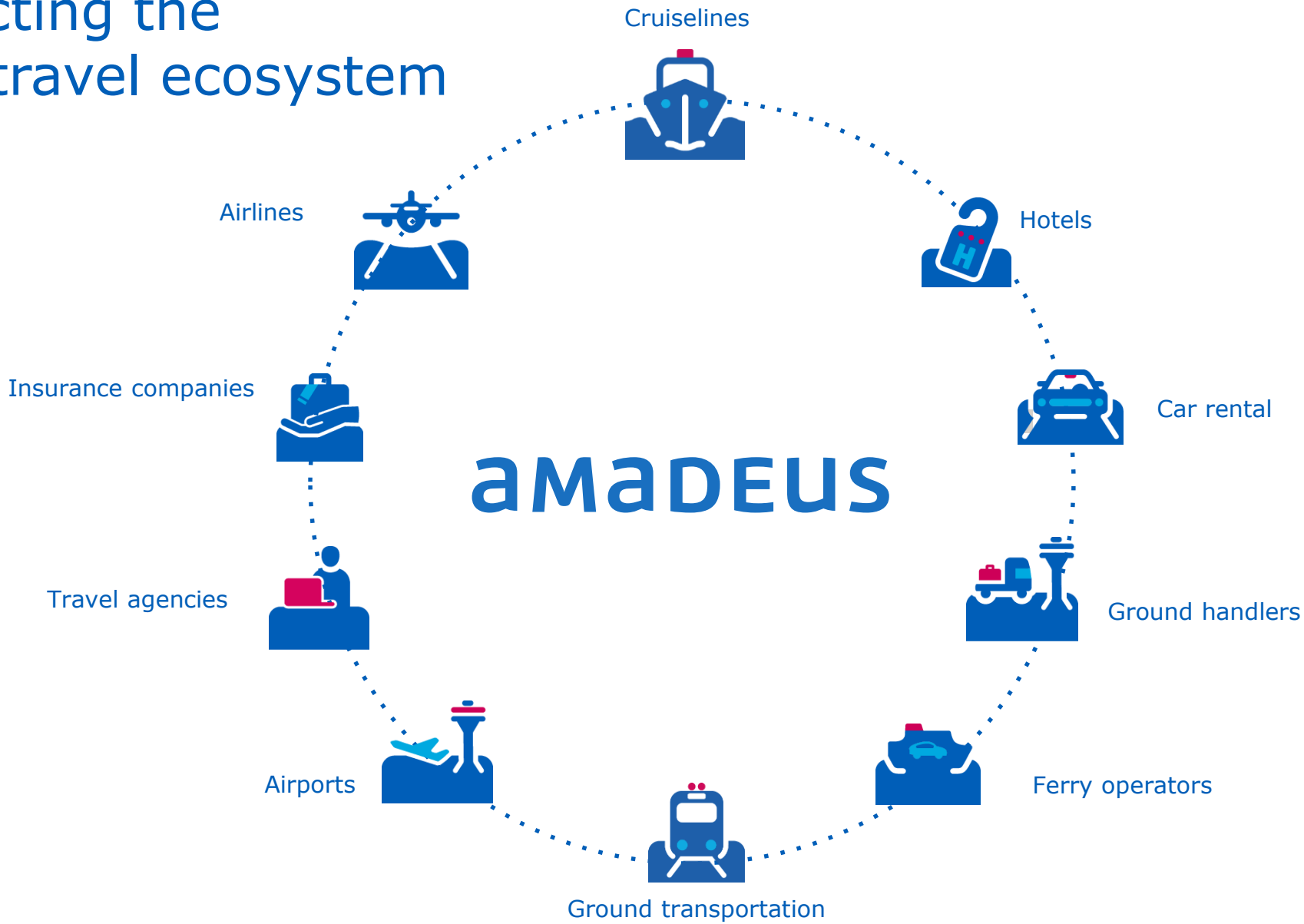
Connecting the entire travel ecosystem



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Supporting the entire traveller life cycle

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Robust global operations

1.6+
billion
data requests processed per day

525+
million
travel agency bookings processed in 2014

695+
million
Passengers Boarded (PBs) in 2014

95%
of the world's scheduled network airline seats

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Amadeus Constraints

High consistency & low response times

_ Reservation Record / Content Provider Inventory

_ Updated:

- From all around the world
- Concurrent updates
- By several systems (airlines, hotels, travel agency, etc…)

_ Need for:

- Very high-consistency: transaction based
- Low response times

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Amadeus Constraints

High volume

December 2014 (customer + internal traffic):

- At peak: **~210 000 queries per second**
- Average: **~145 000 queries per second**

Thousands (and thousands) of application servers

100+ TB of compressed data logged every day

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Amadeus System

Where we are

_ Large distributed system (SOA)
- 5000+ “micro” services

_ One data-center + disaster-recovery sites

_ Thousands of servers
- x86-64 Linux servers
- Pre-configured upfront for specific tasks
- N+x model as servers can’t be replaced quickly
- Roles cannot be changed

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Amadeus System

Where we were

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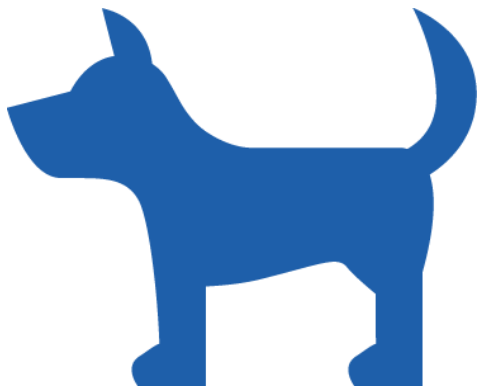
- x8
- Pr
- N
- R

Despite the number of servers largely managed as pets



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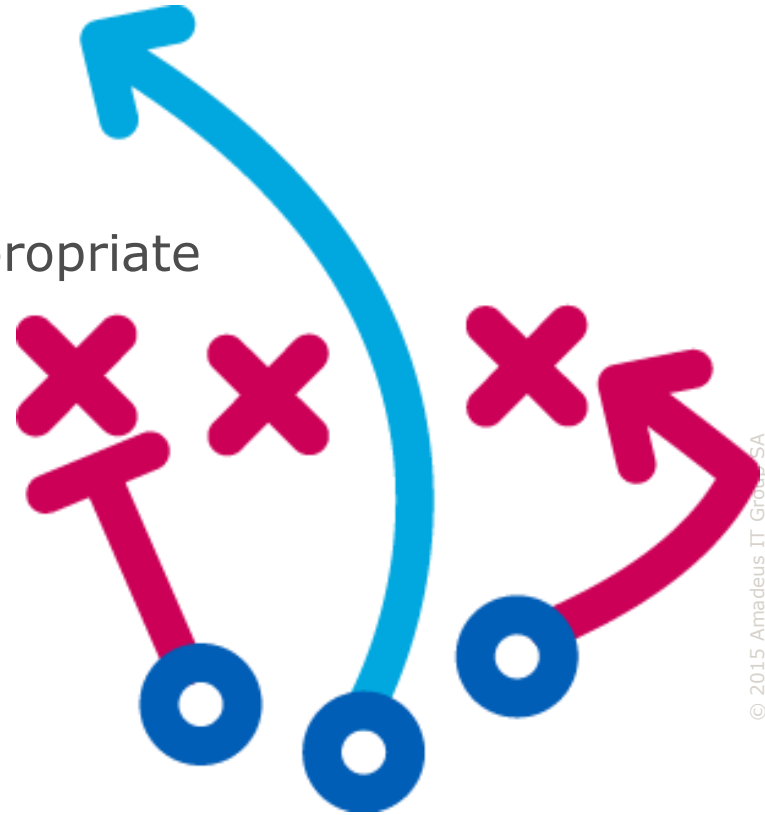
Amadeus System

Where we are going

- Closer to our customers
  - Reduce the latency
- Remote operations
  - Install appliances within customer premises when appropriate
- Multiple data-centers / cloud capability
- Evolve our data-center model
  - Better use of resources
  - Flexibility/Agility
  - Higher availability



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Amadeus System

Where we are going

- Clos
  - R
- Rem
  - In
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- Evol
  - B
  - Fl
  - Hi

Paradigm Shift

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Application Centric Deployment

- Deploy the application **as a whole**
  - With **all** its dependencies

- Reproducibility
- Homogeneity
- Technology agnostic
- Simplify operations

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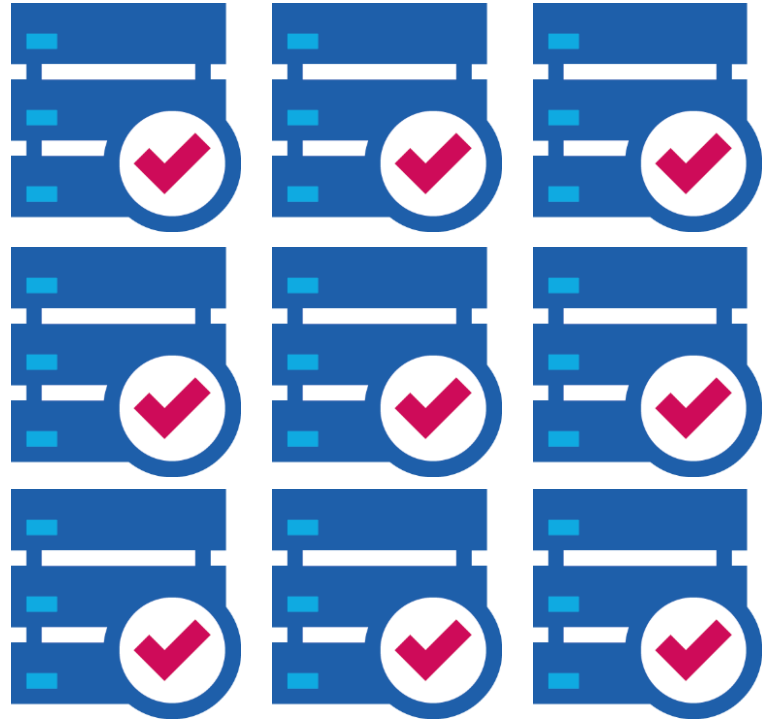
Automated Scheduling

- Manage a cluster **as a whole**

  - Any task on any server
  - Start tasks in the cluster

Decouple **what** should run
from **where** it should run



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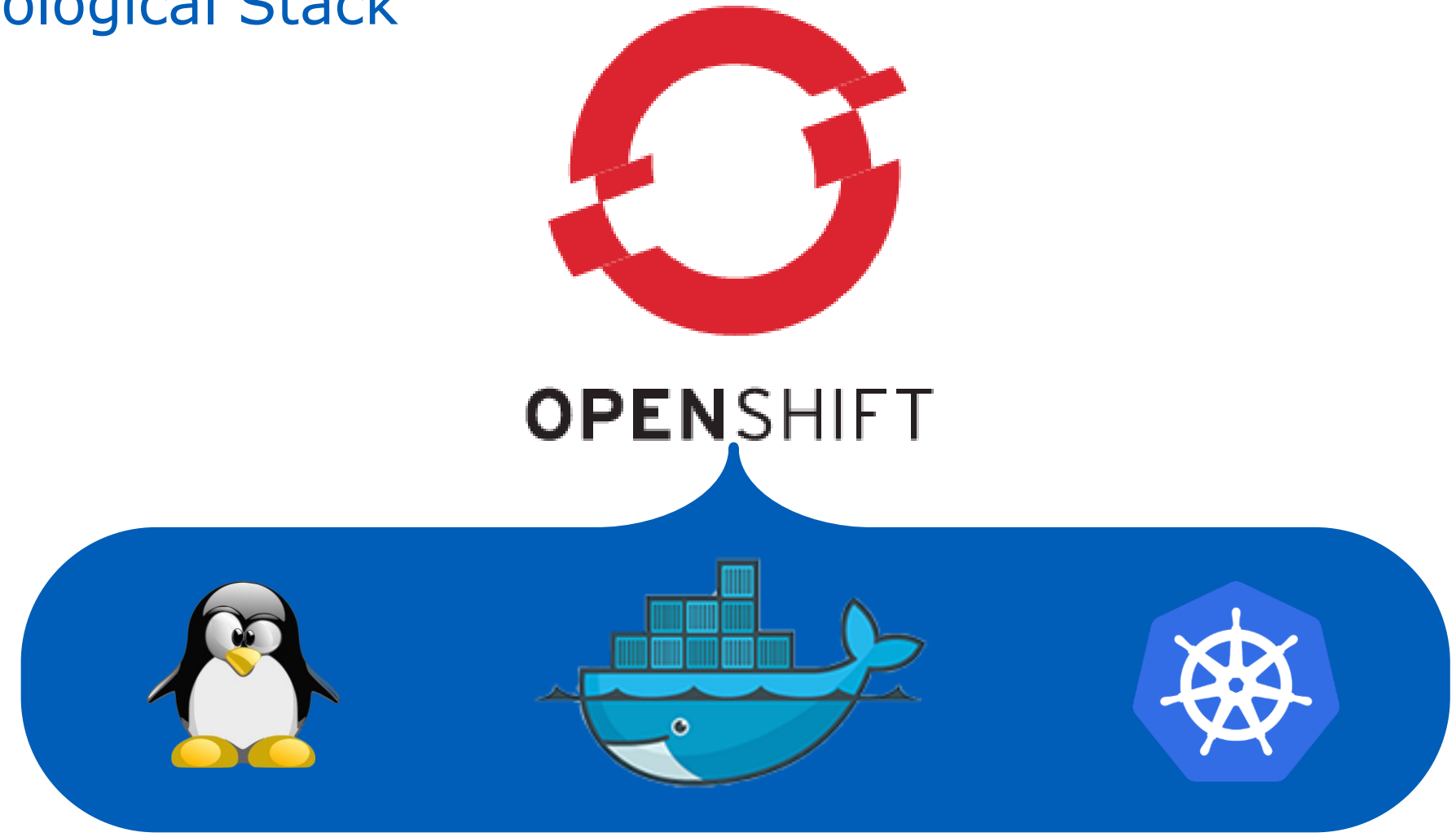
Technological Stack



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Technological Stack: **OPEN**SHIFT

Docker + Kubernetes

- Linux Container Technology
- Container image format
- Easy deployment

kubernetes by Google

- Orchestration of Linux containers
- “Manage a cluster of Linux containers as a single system”
- Automatic placement, self-healing

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Partnership

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Partnership with Redhat

- Started a year ago
- Software engineers
  - From Amadeus embedded in Redhat teams
  - From Redhat embedded in Amadeus teams
- Open Source contributions

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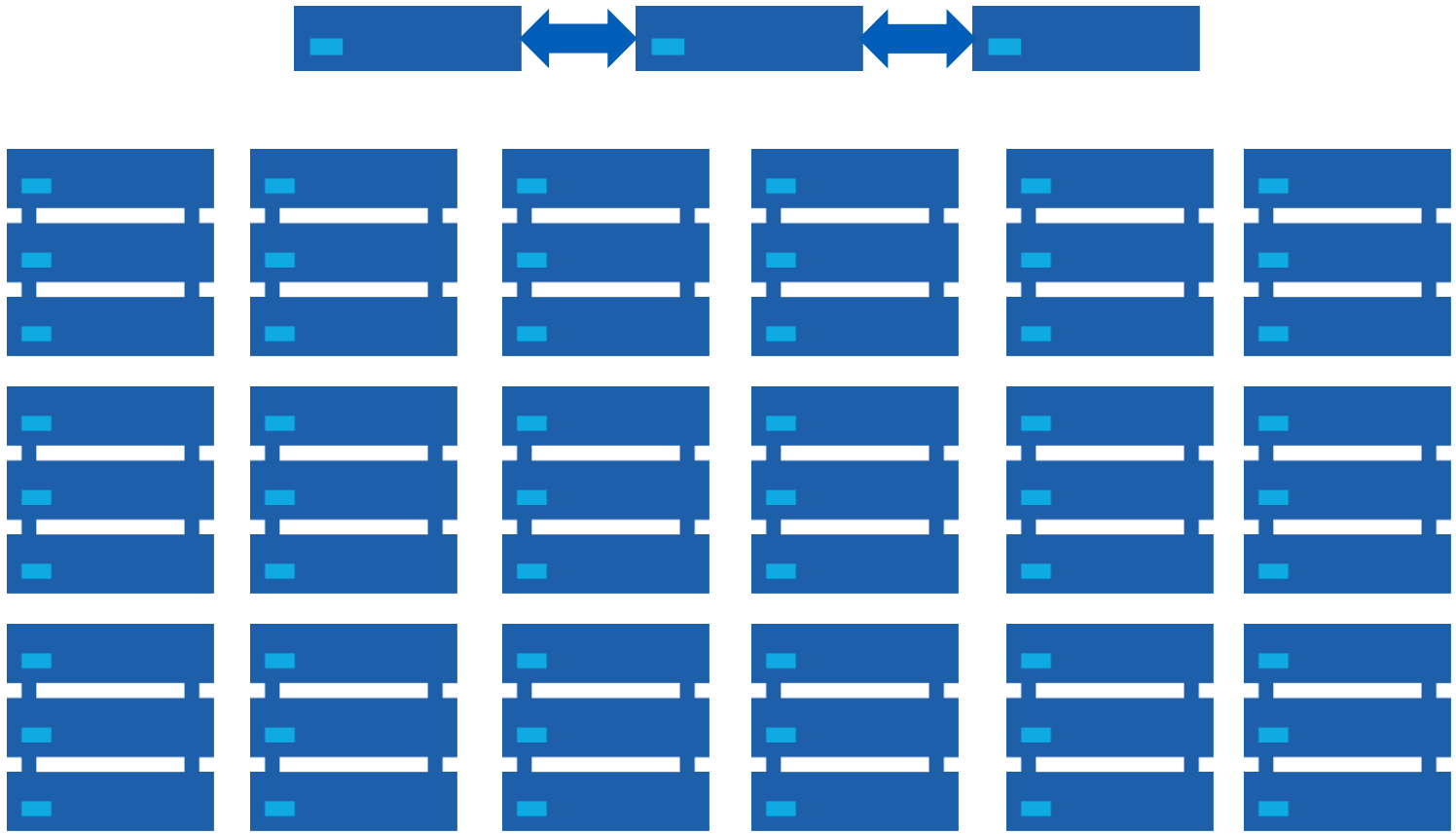
OPENSHIFT v3



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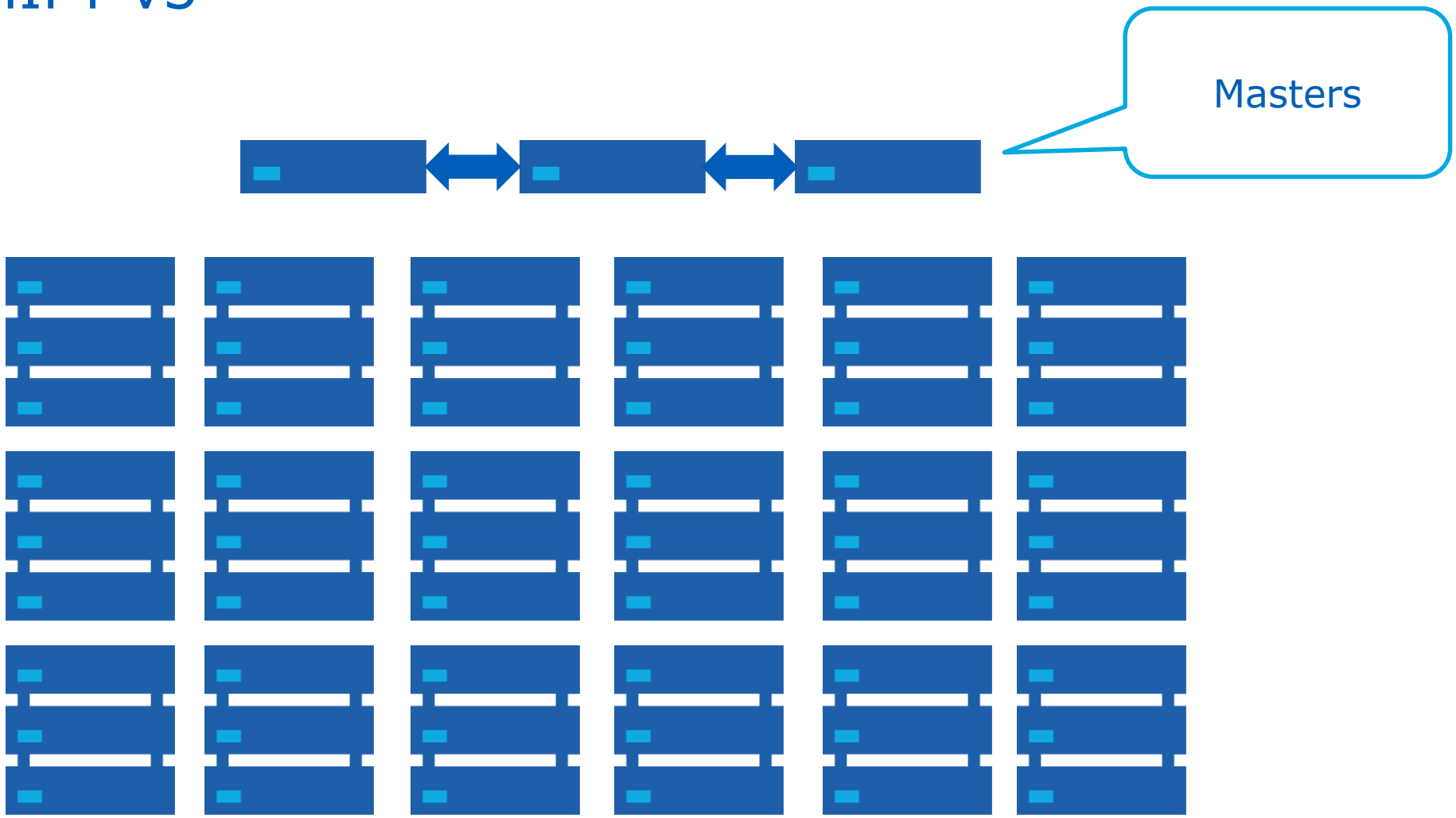
OPENSHIFT v3



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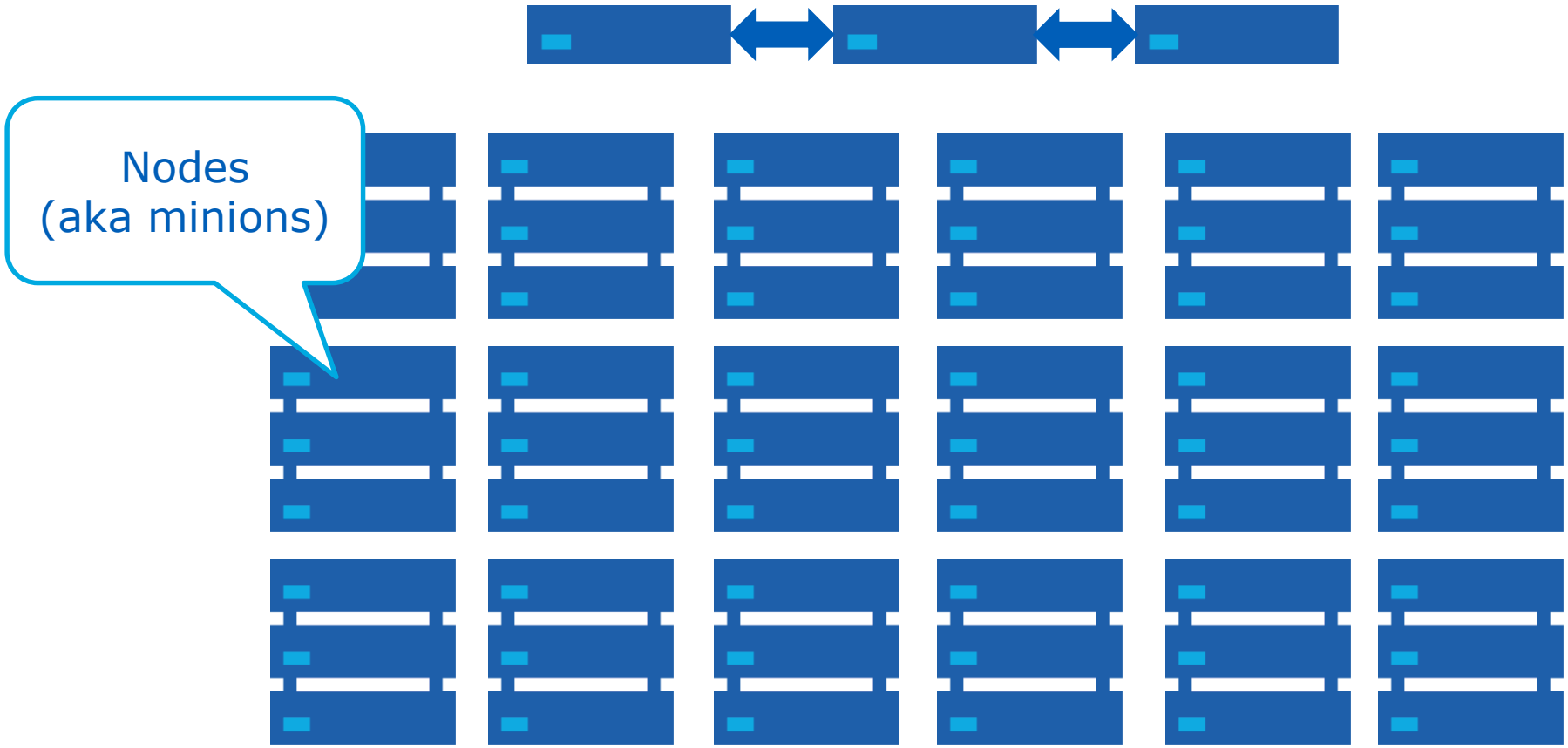

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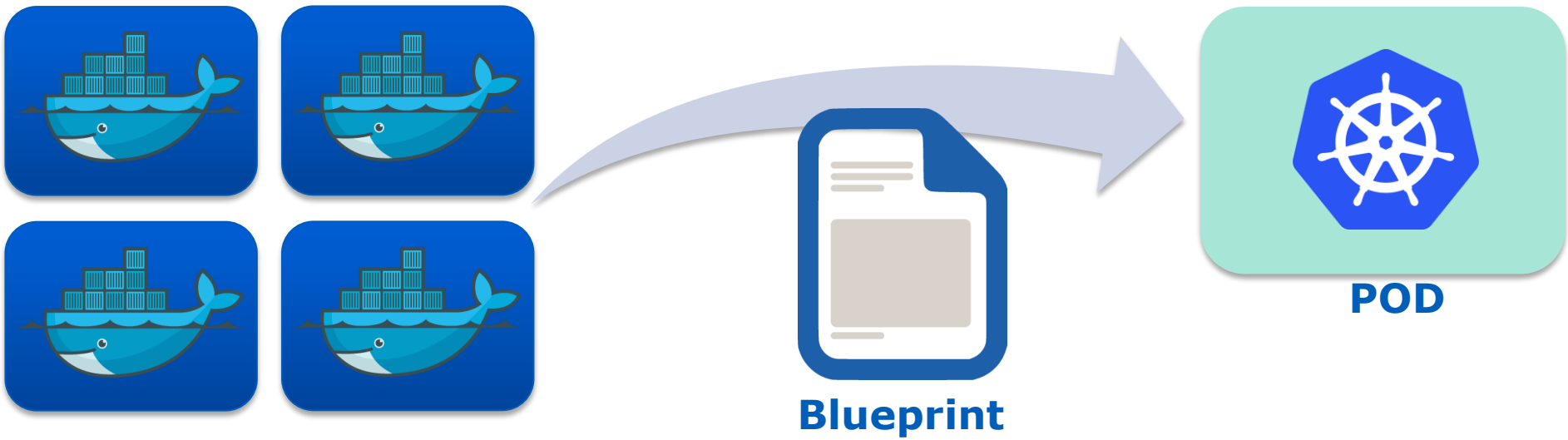
Pods: scheduling and scaling unit



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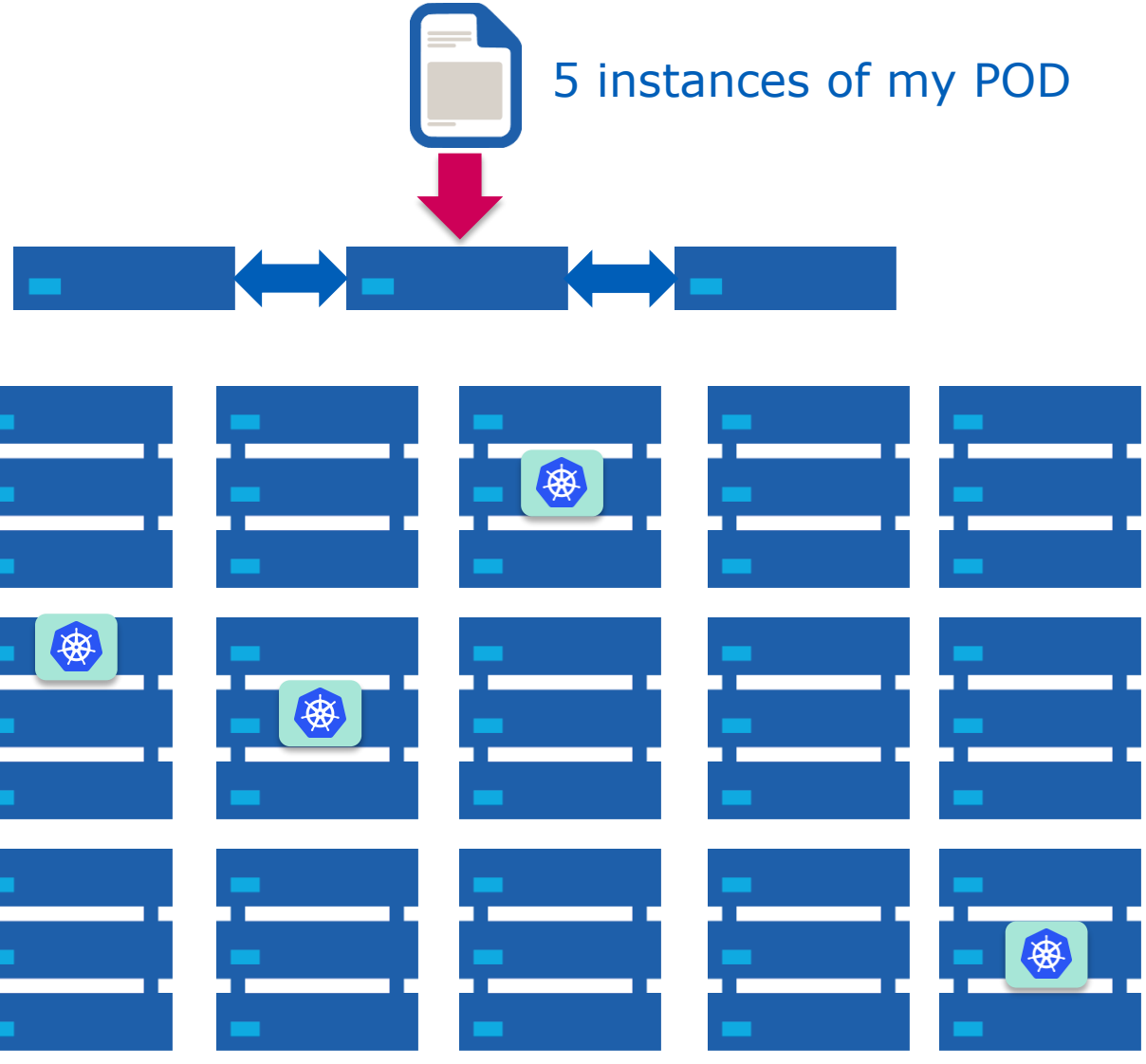

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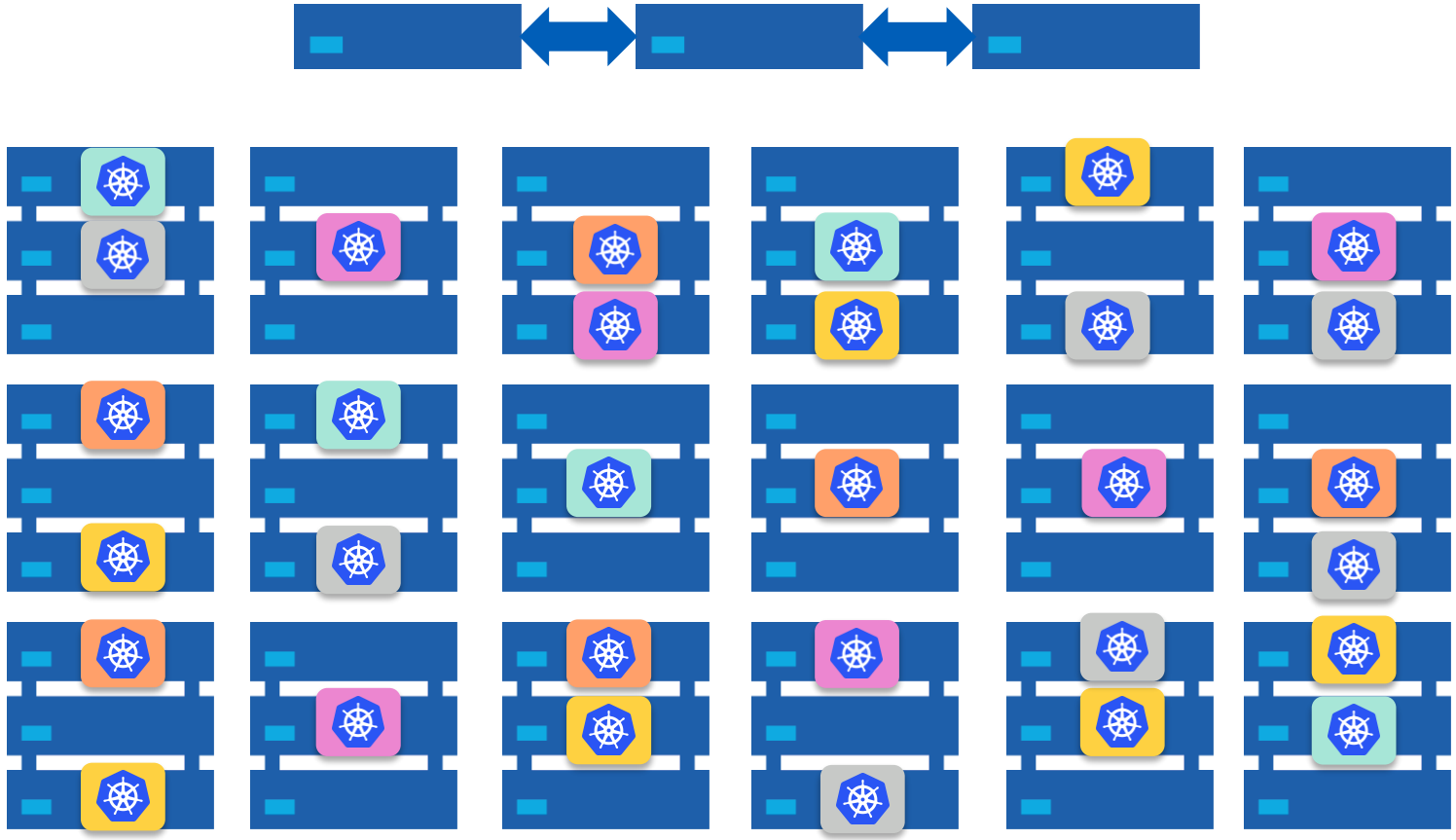

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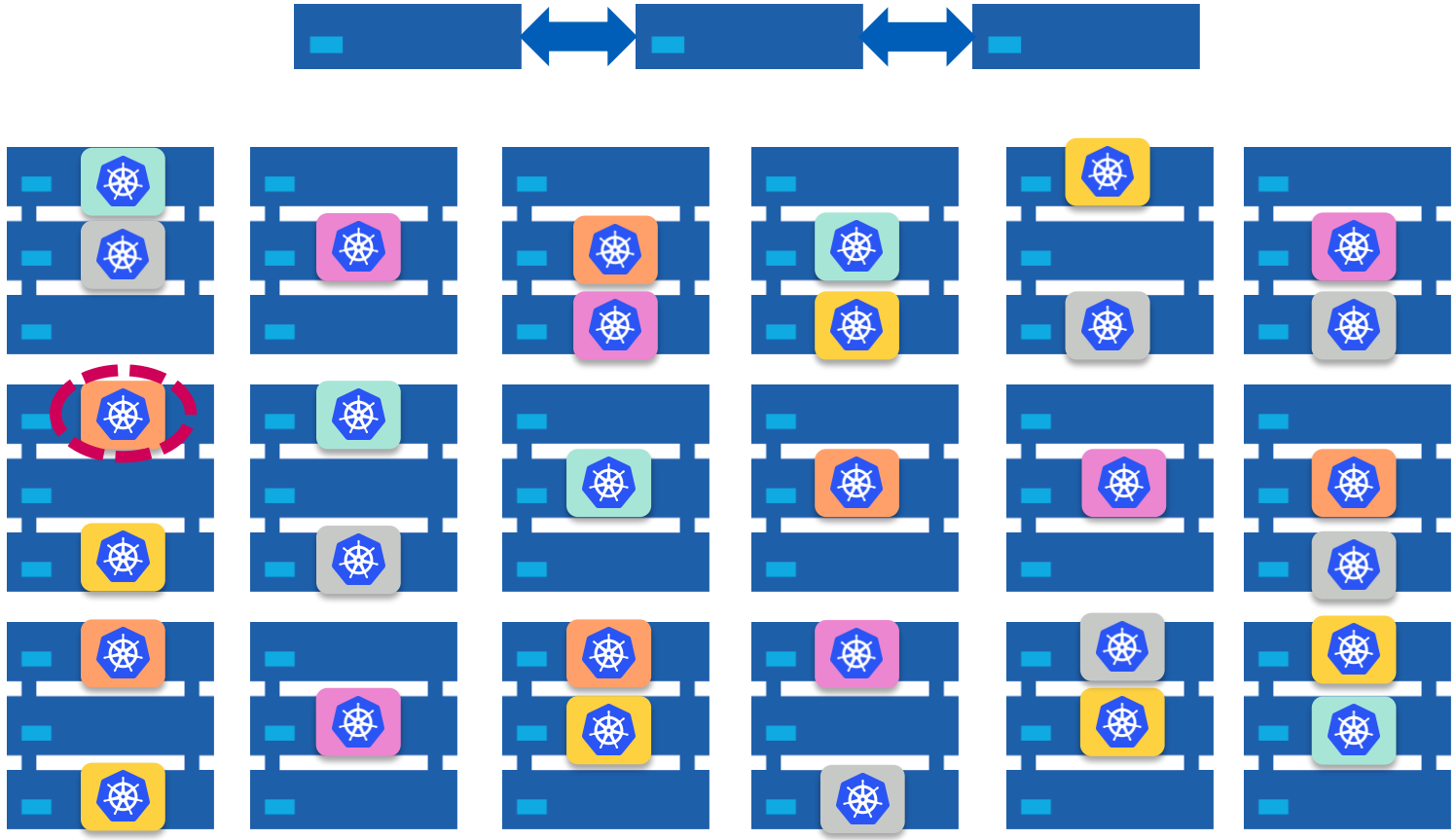

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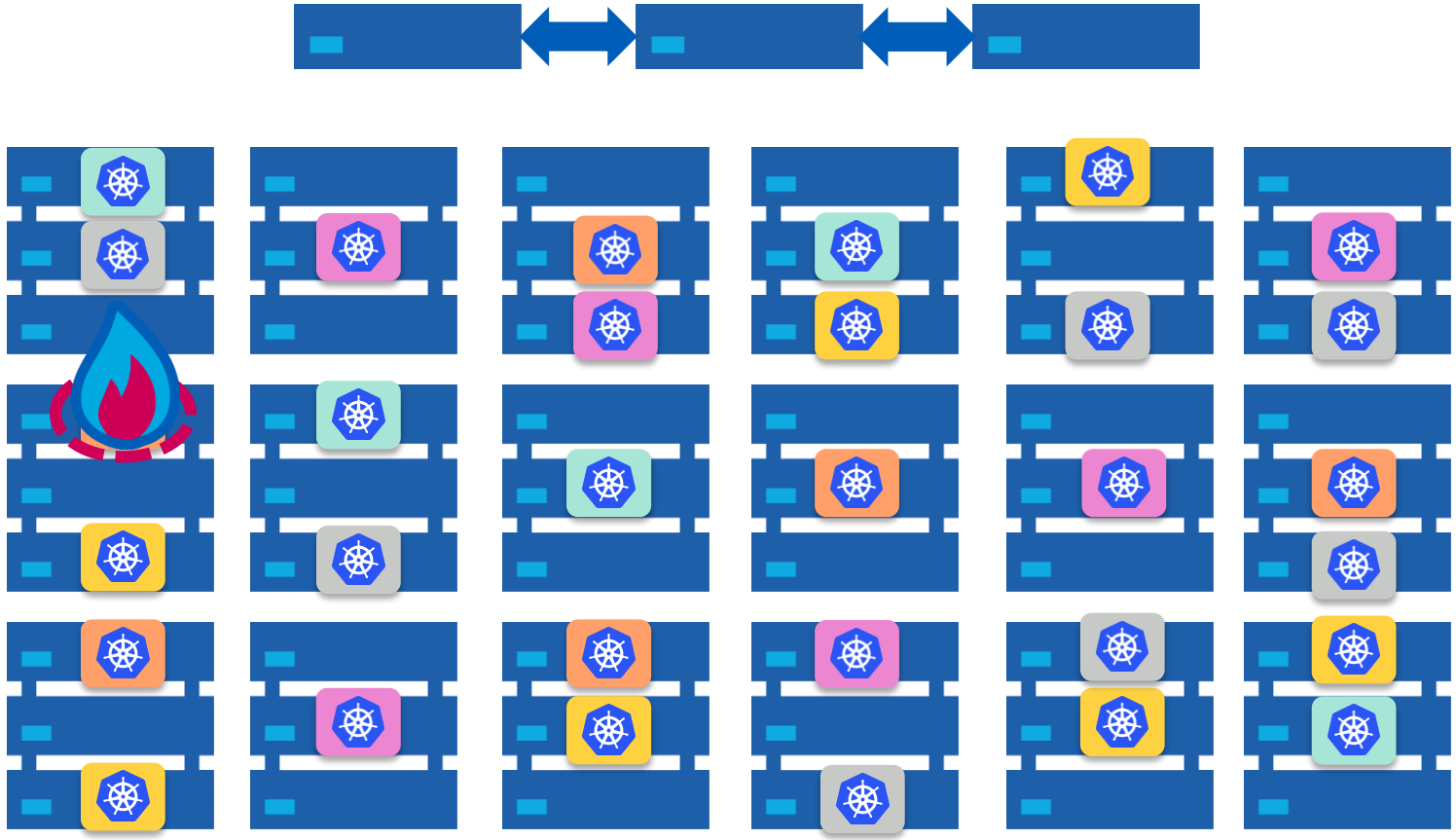
OPENSHIFT v3



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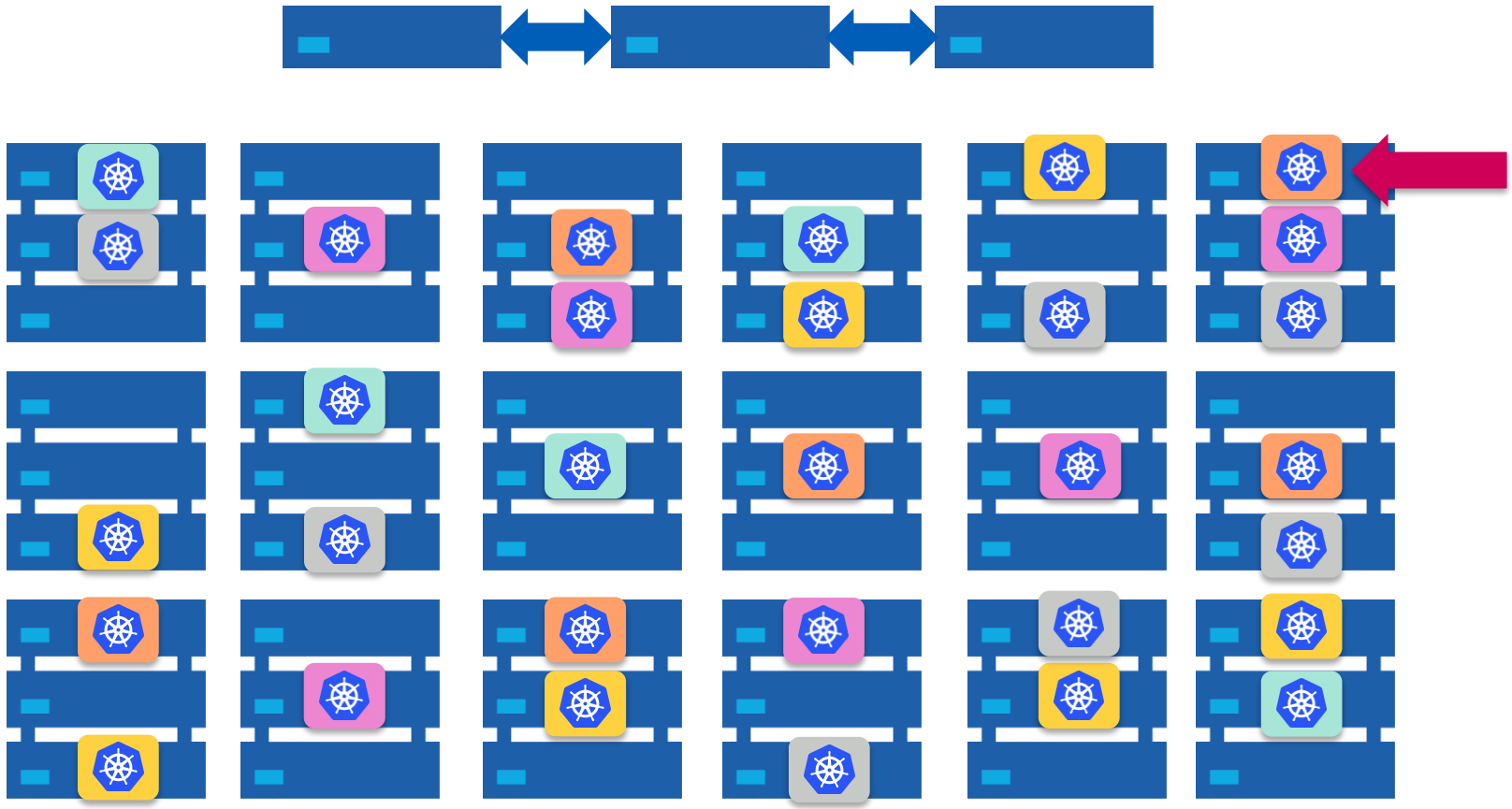
OPENSHIFT v3



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About pods…

Always same content

Always listening on same ports

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About pods…

Always same content

Always listening on same ports

https://github.com/openshift/openshift-sdn

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Pods labeling

- Key/value pairs attached to a pod
- Labels allow for whatever organizations or conventions you want
- Example:
  - “environment” : “CustomerFacingTest”, “environment”: “Production”, etc…
  - “customer”: “X”, “customer”: “Y”

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How to target a service that exists on multiple hosts and can change location ?

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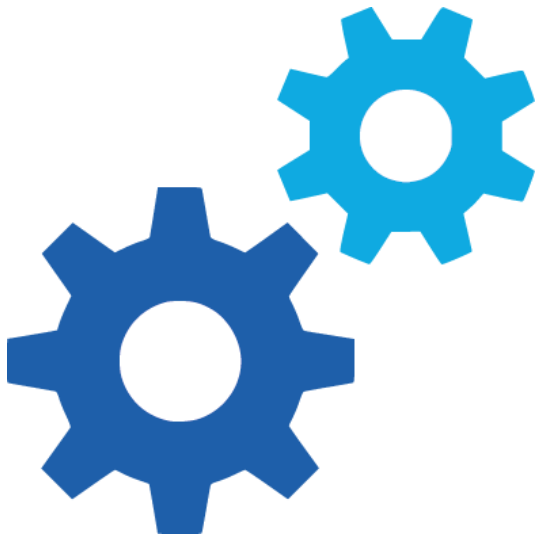
OPENSHIFT Services

- Service represents a group of pods
- List of Ports

```
"ports": [
    {
        "protocol": "TCP"
        "port": 80
    }
]
```

- A way to select the endpoints: **label selectors**
  - Endpoints are loosely coupled with the service

```
"selector": [
    {
        "environment": "production"
        "app": "myGreatApp"
    }
]
```



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OPENSHIFT Services

- Endpoints list maintained by API Server
  - Endpoint = IP address for a pod
- REST API
- Watchable for addition/removal of endpoints
- Add-on: DNS server watching API server
  - Name resolution of services possible

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What **OPEN**SHIFT does for us

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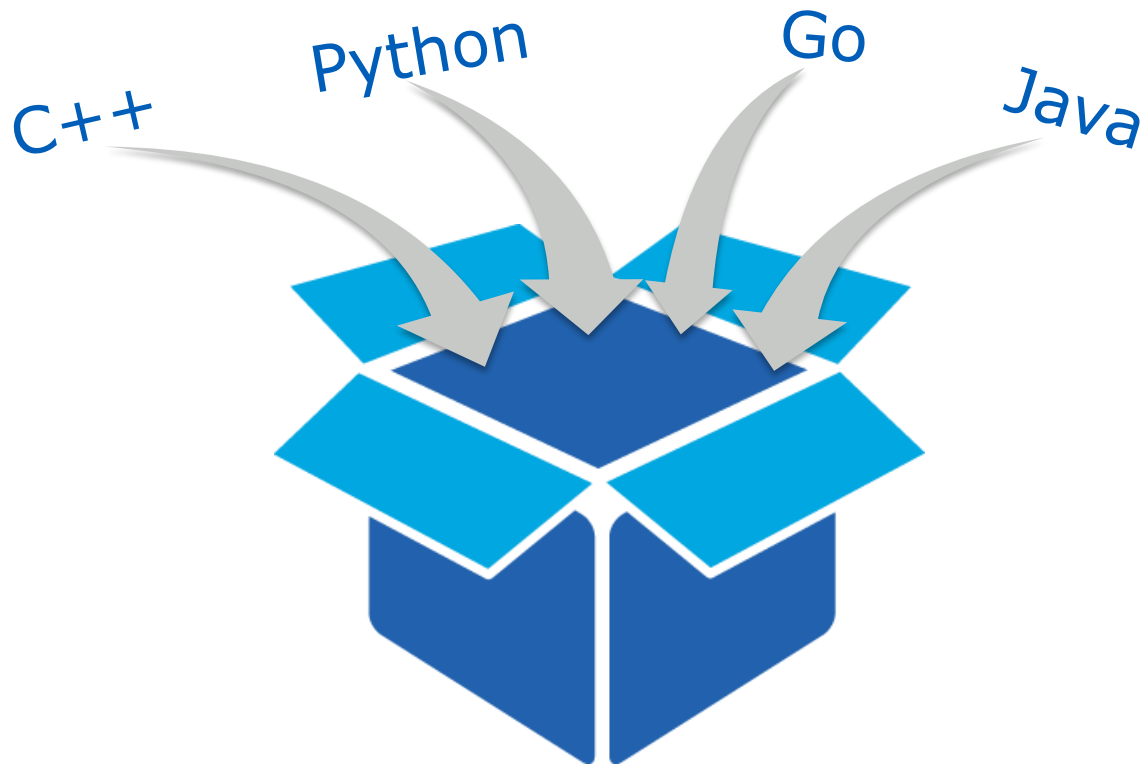
Operational Model

- Homogenization: everything looks the same !



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Designed to Accommodate Constraints

- Not limited to HTTP
- We use our own protocol over TCP
  - Kind of HTTP/2 but before it was invented
- What we needed to keep:
  - Low latency
  - Keeping connection open
  - Multiplexing

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Easy deployment

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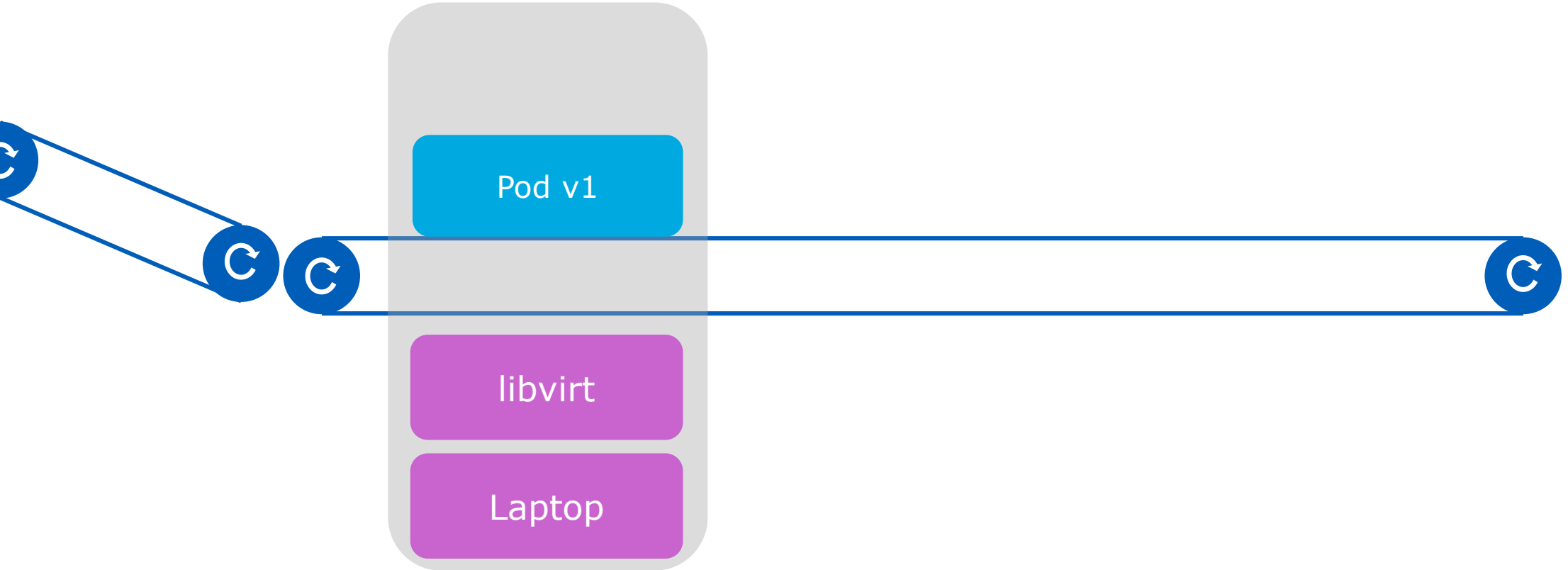
Easy deployment



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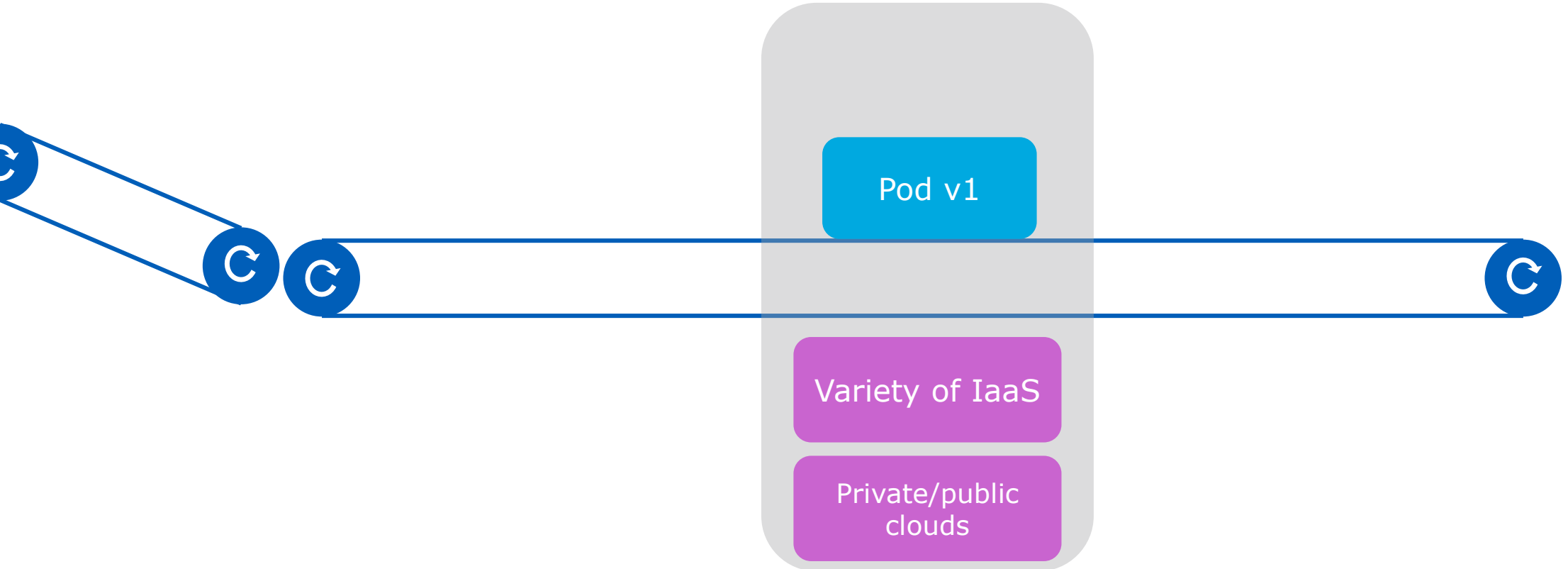
Easy deployment



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Easy deployment

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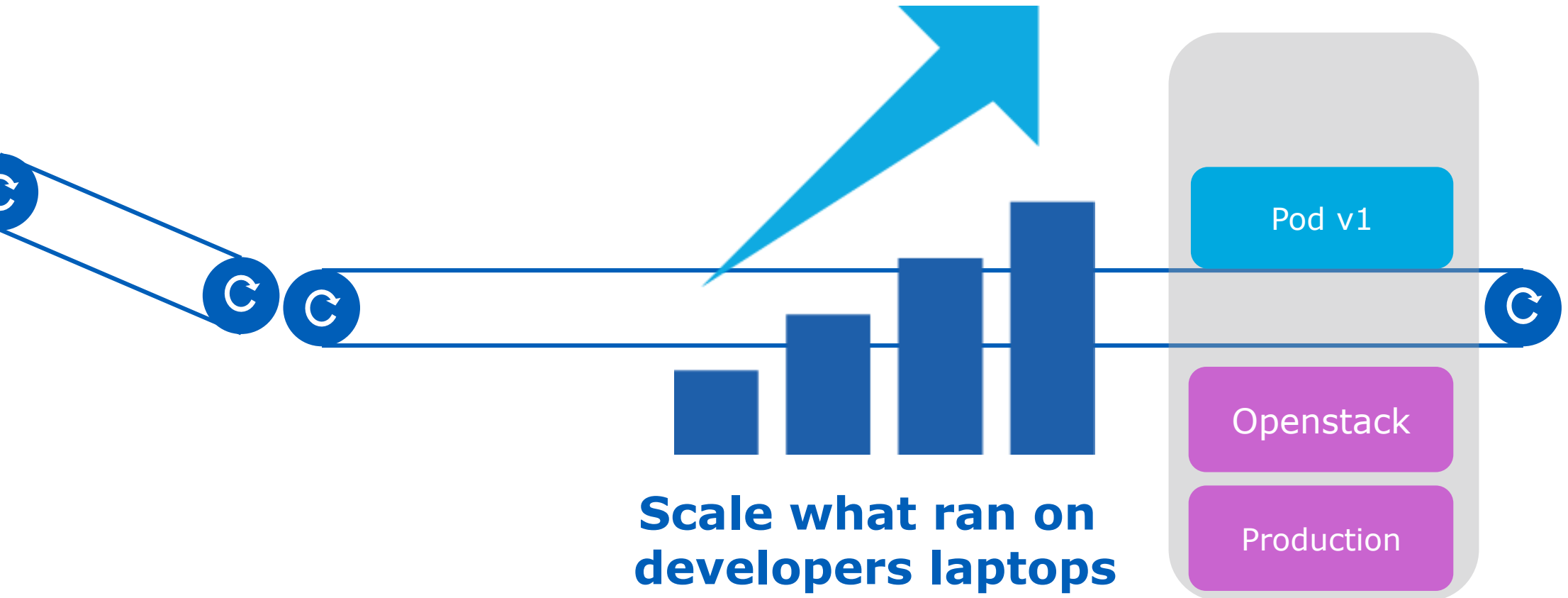
Easy deployment



Scale what ran on developers laptops

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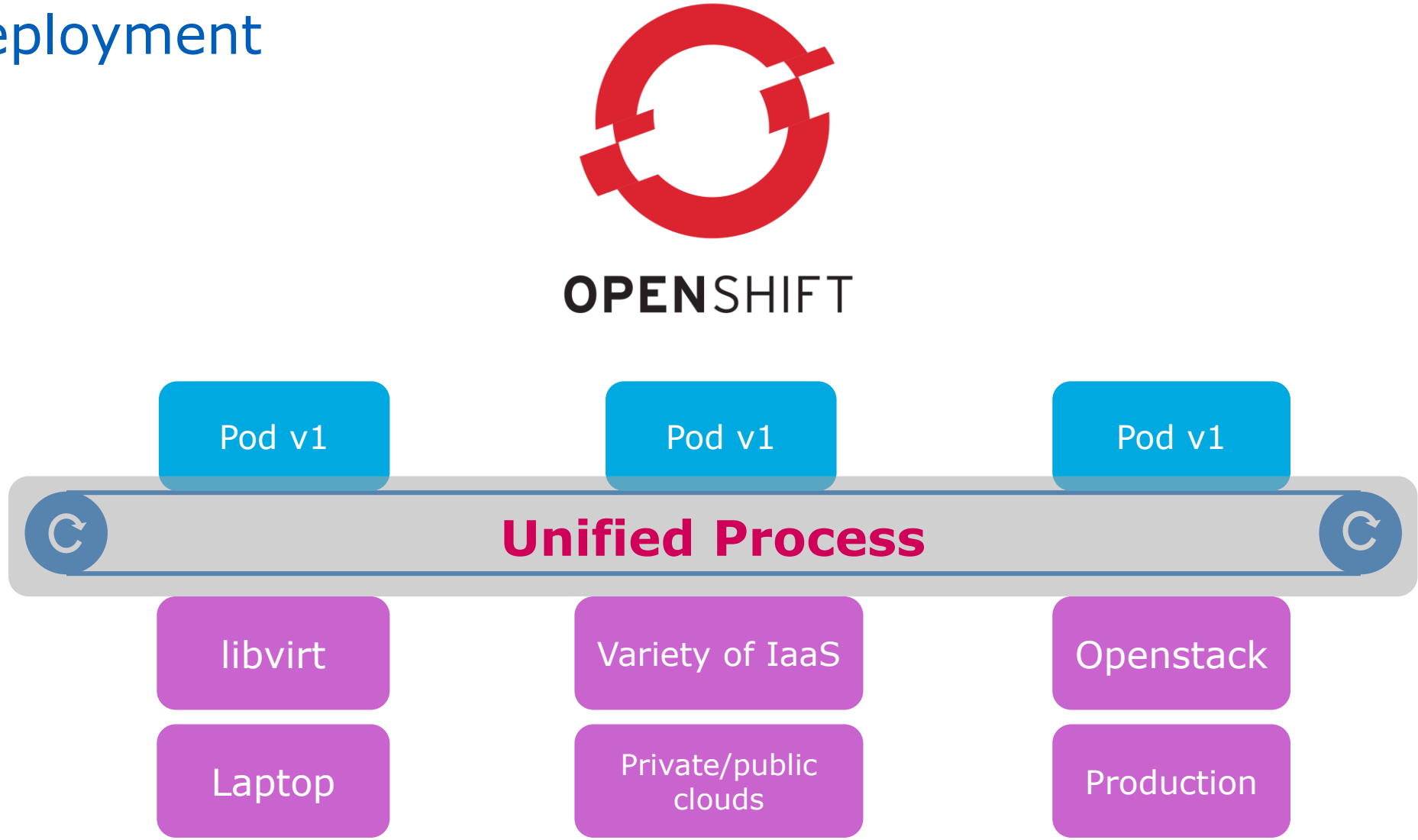
Easy deployment



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To conclude…

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Key takeways

- Building a cloud-ready system with **OPEN**SHIFT
  - Macro-management
  - Self-healing / resiliency
  - Dynamic system
  - Multi-cloud/data-center capability
- Uniform operations
  - Simplification
  - Reduced operational burden
  - Enable transition to DevOps model
- Great collaboration with Red Hat

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Thank you

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