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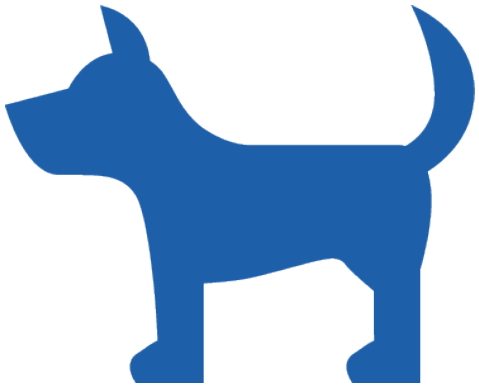
Next Generation Containerized Application Platform

From a collection of servers to the cloud

Polo-Francois Poli
Cloud & Application Services

Server Management

Cattle vs Pets



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Server Management

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

Automation

Application centric deployment

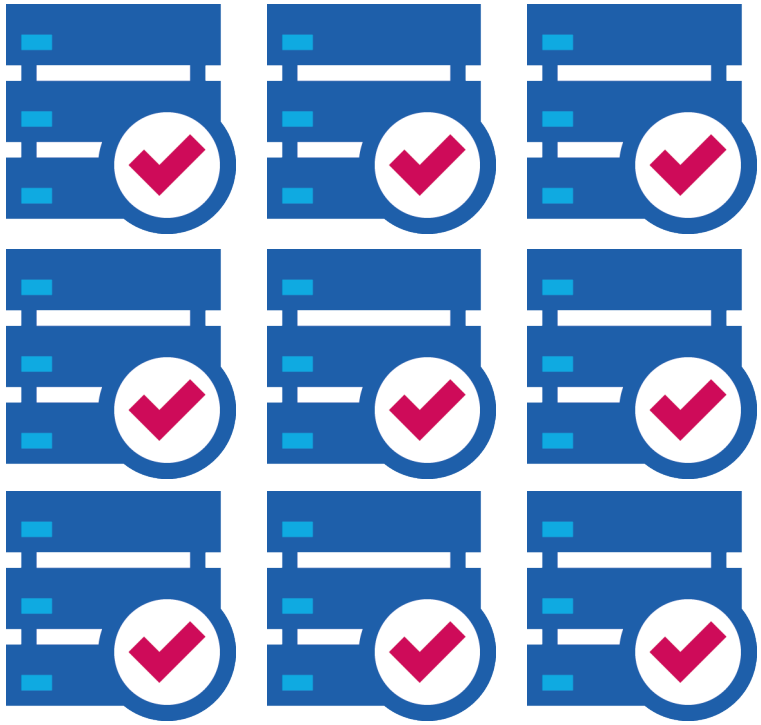
- Deploy the application **as a whole**
  - With **all** its dependencies

- Reproducibility
- Technology agnostic
- Homogeneity
- Simplify operations

Automation

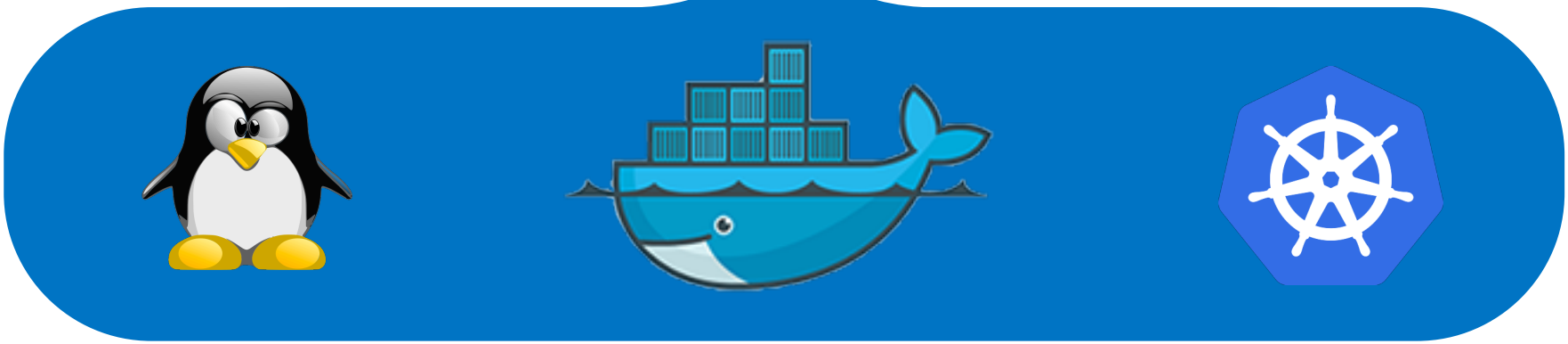
Instances anywhere

- Manage a cluster **as a whole**
  - Any task on any server
  - Start tasks in the cluster



Let the system manage machines and assign tasks to machine automatically

Technological Stack



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OPENSHIFT

Open-Source

- Linux container technology
- Container image format

kubernetes by Google

- Orchestration of Docker containers
- Cluster management

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Linux Containers

Kernel features only

cgroups (Control Groups)

- Limit, account isolate resource usage
- CPU, Memory, Disk I/O, Network
- Think ‘ulimit’ for group of processes

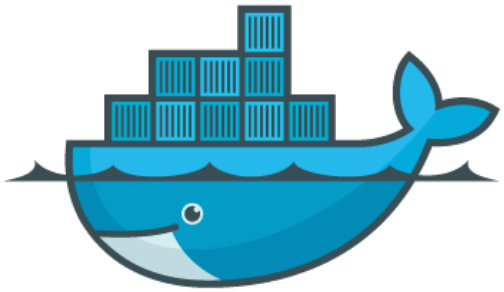
Kernel namespaces

- pid (processes)
- net (network interfaces, routing...)
- ipc (System V IPC)
- mnt (mount points, filesystems)
- uts (hostname)
- user (UIDs)

Docker Linux Containers

Image Format

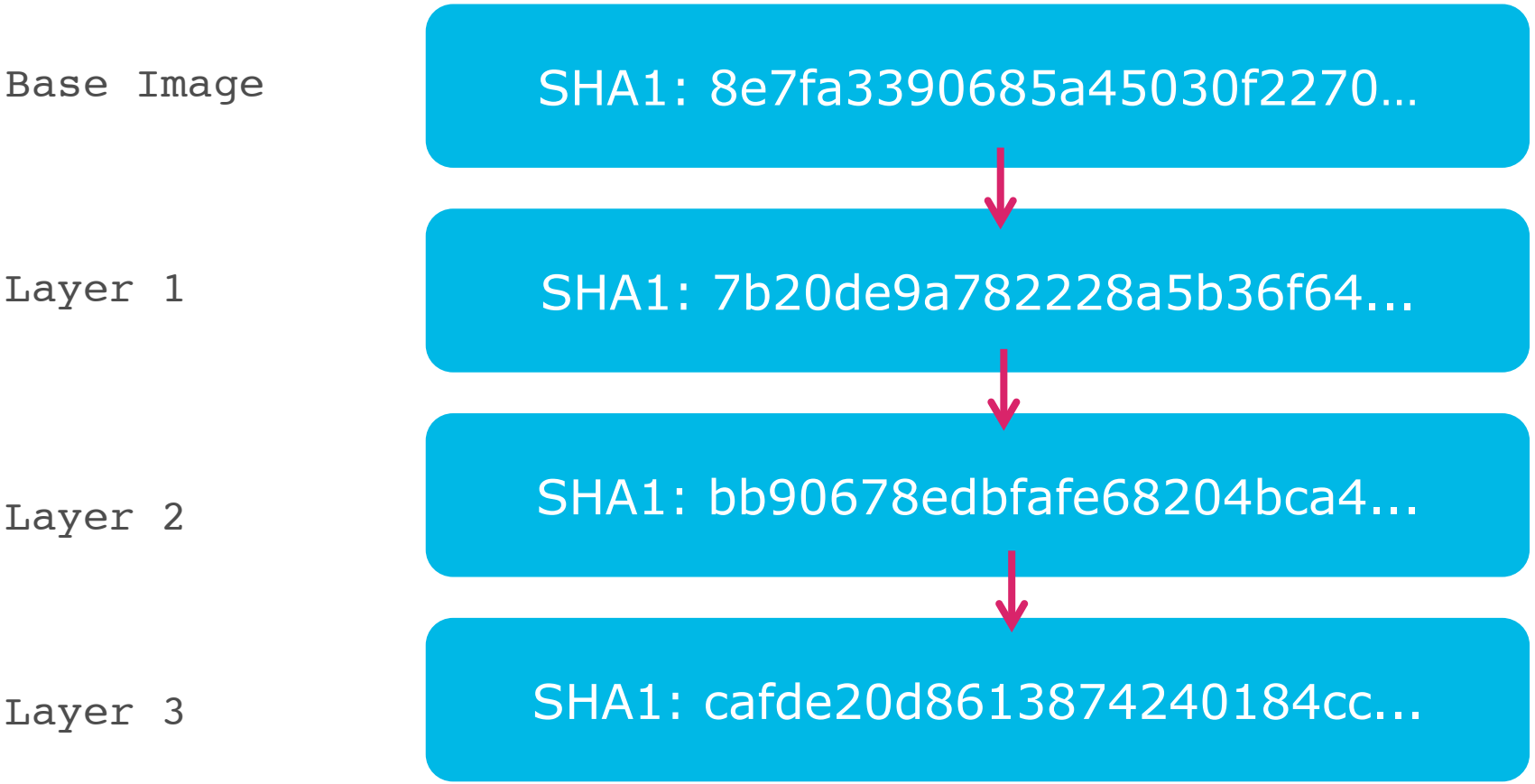
- Kernel front-end
  - Docker daemon & client
  - Easily create containers



- Container Images
  - Present a filesystem to the container
  - Build, version, deploy images

Docker Image format

Tree structure



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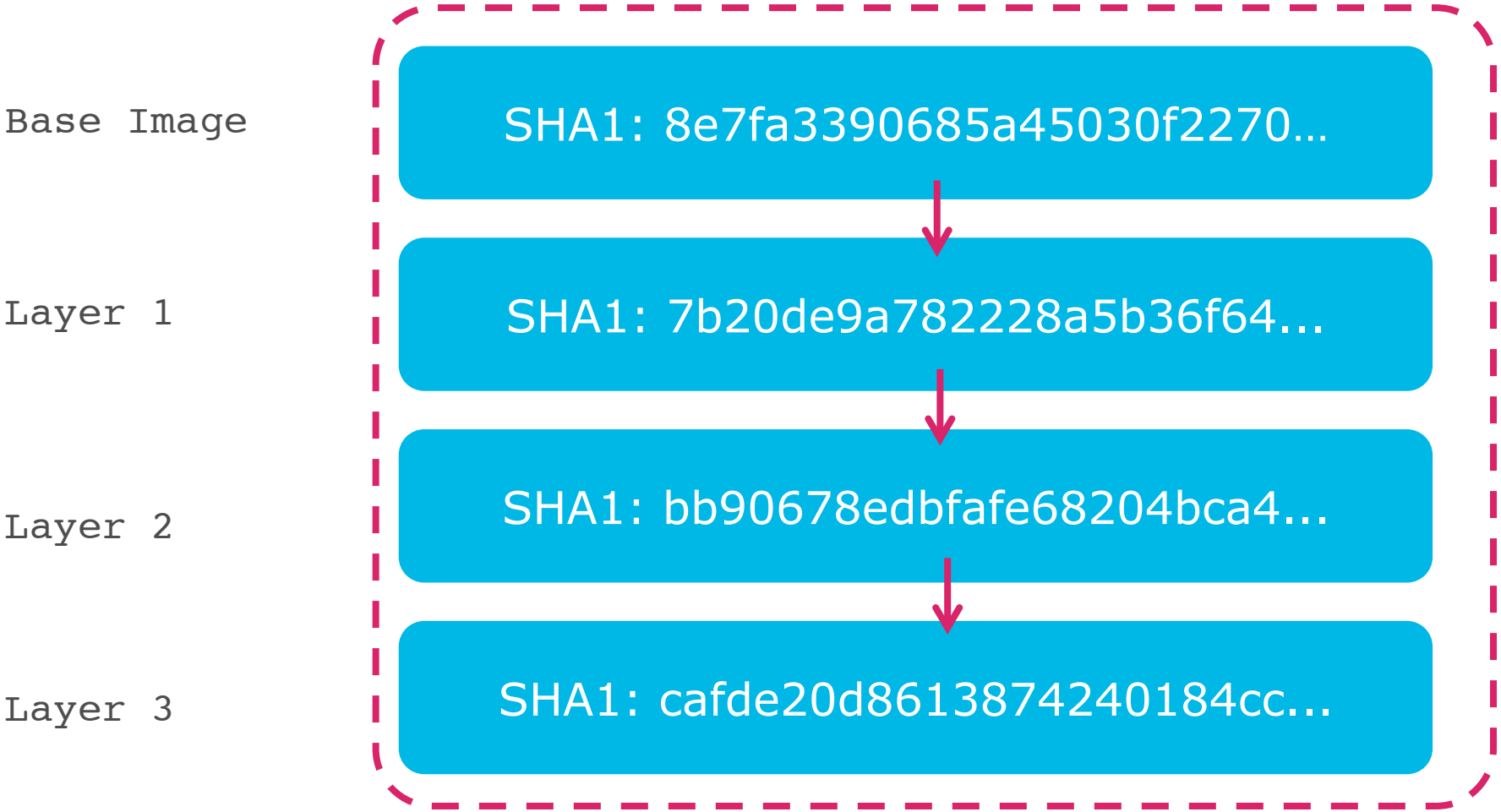
Docker Image format

Tree structure



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Docker Image format

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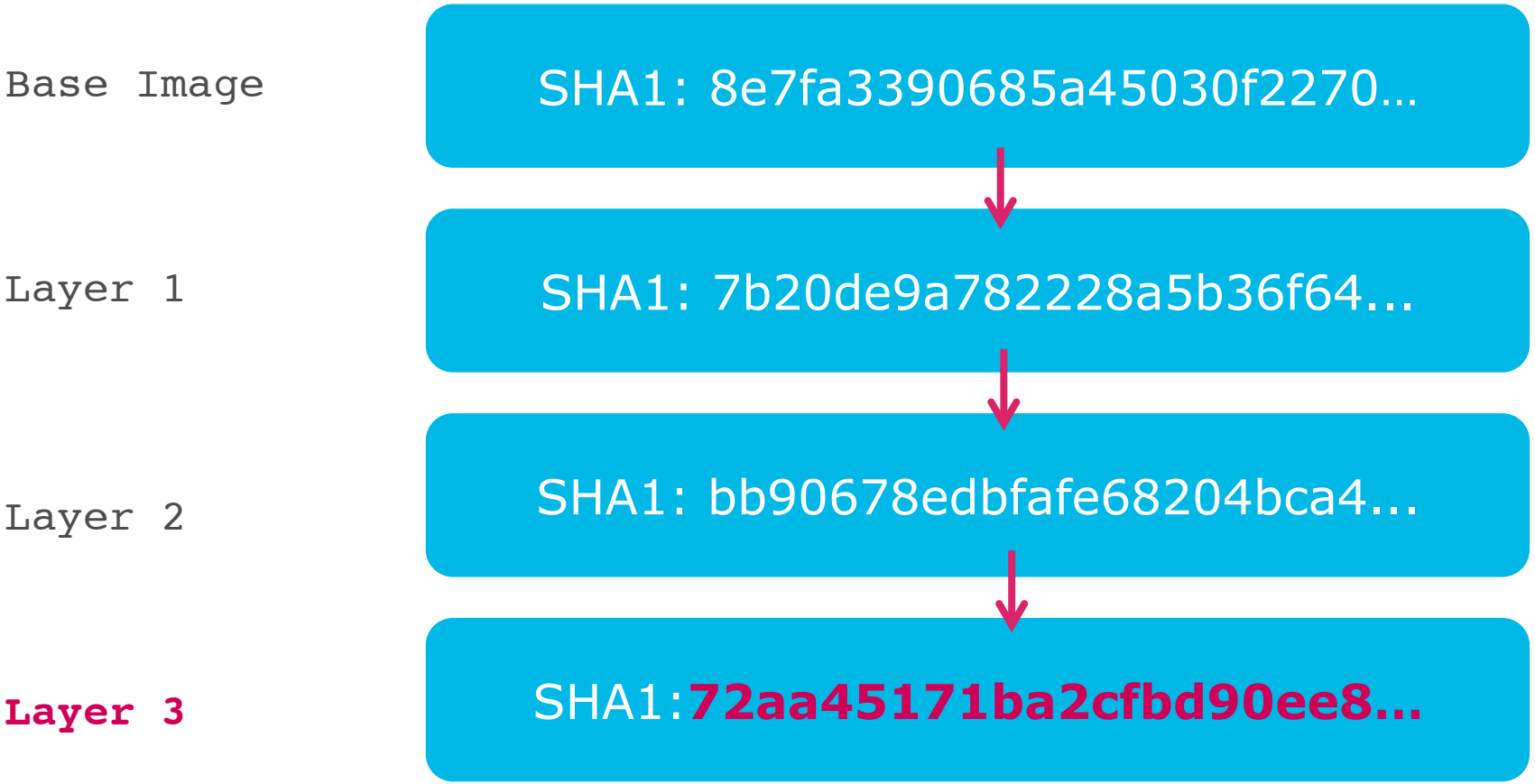

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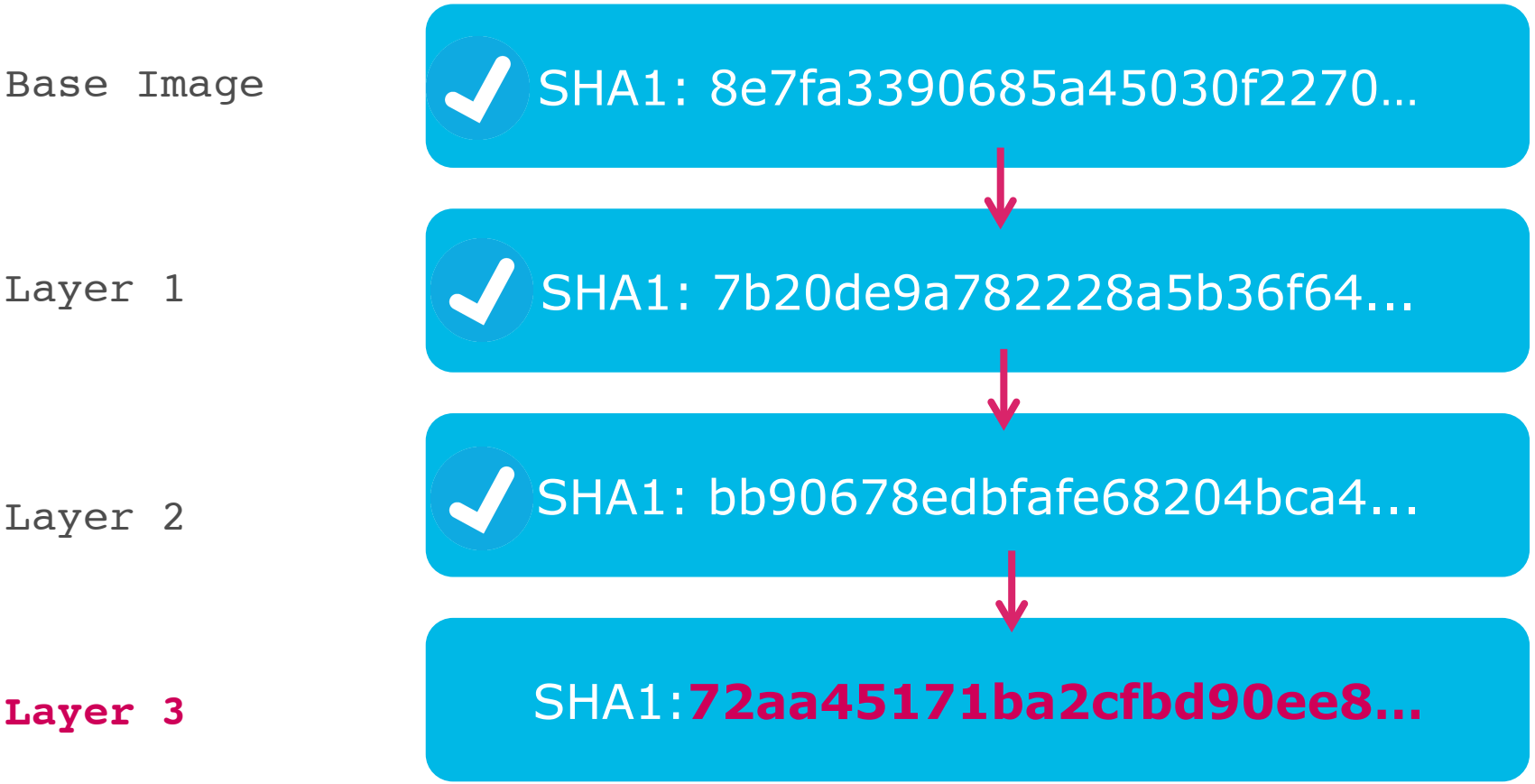

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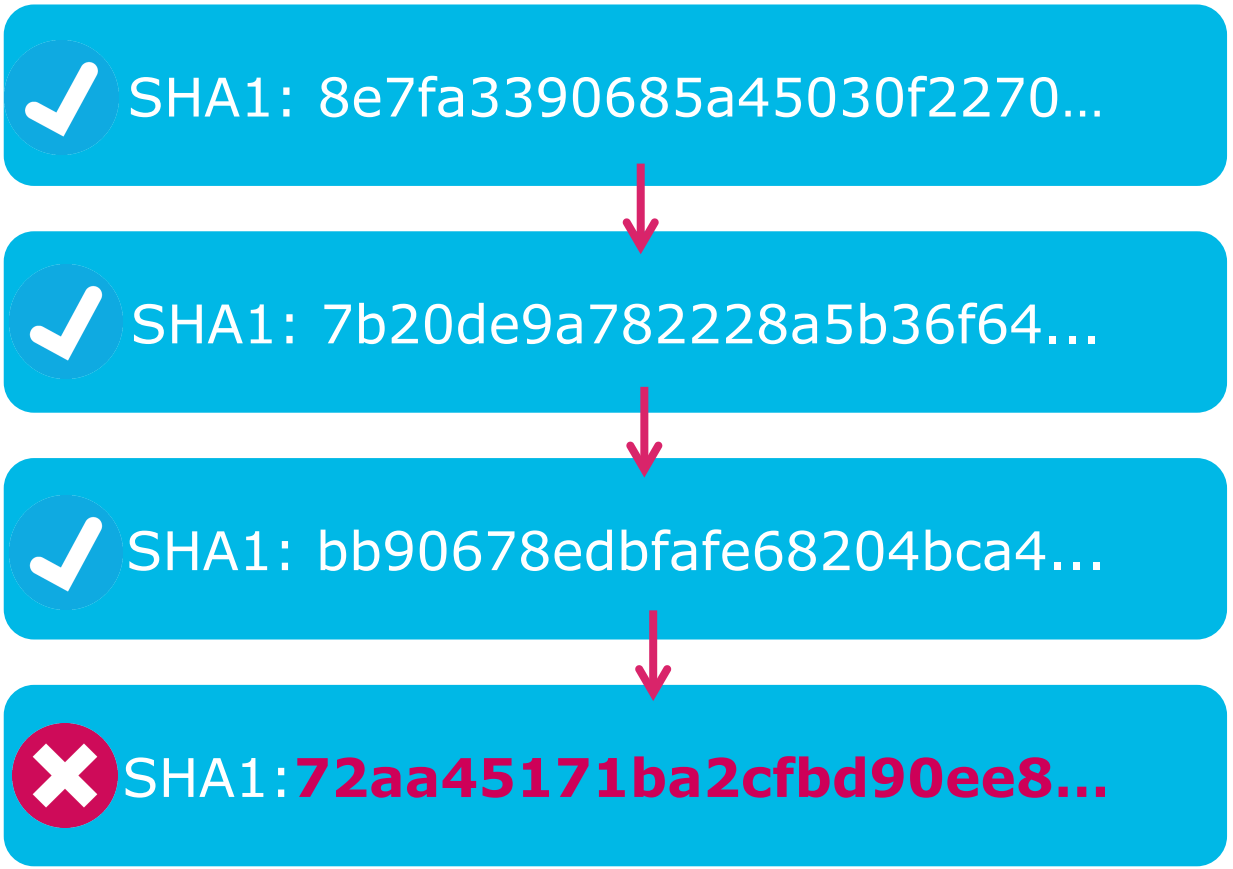

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Docker Image format

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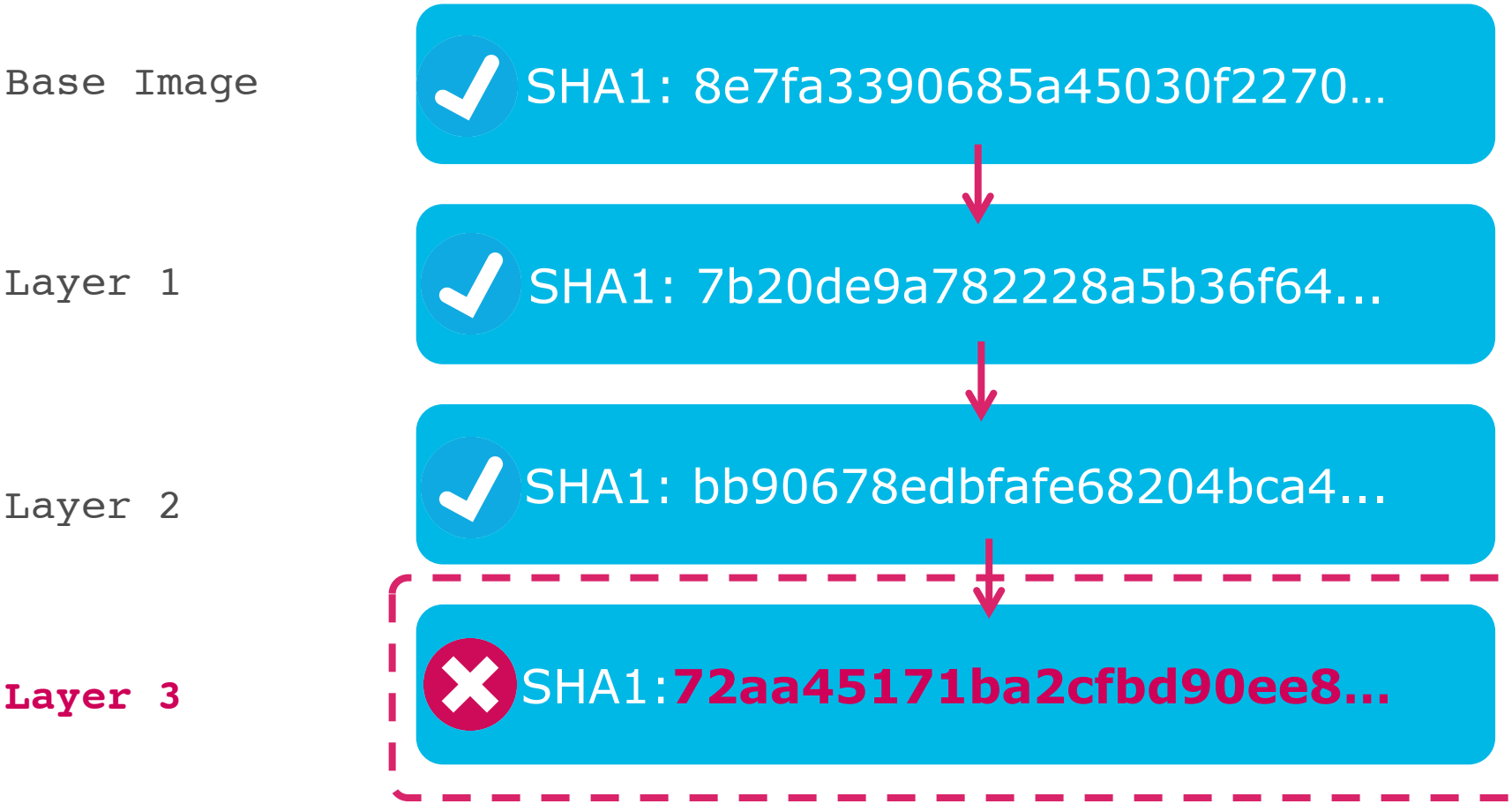

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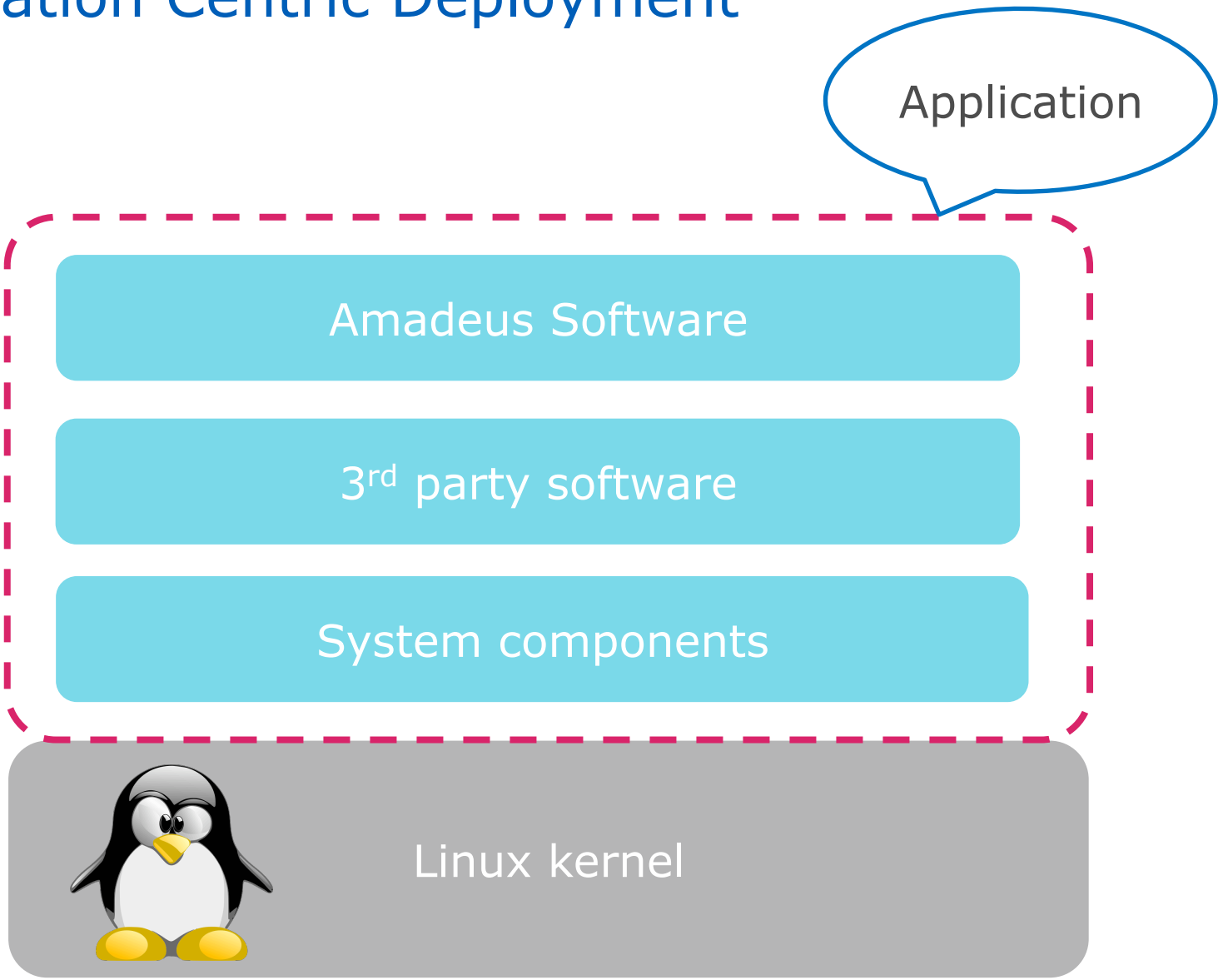
Application Centric Deployment



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Application Centric Deployment

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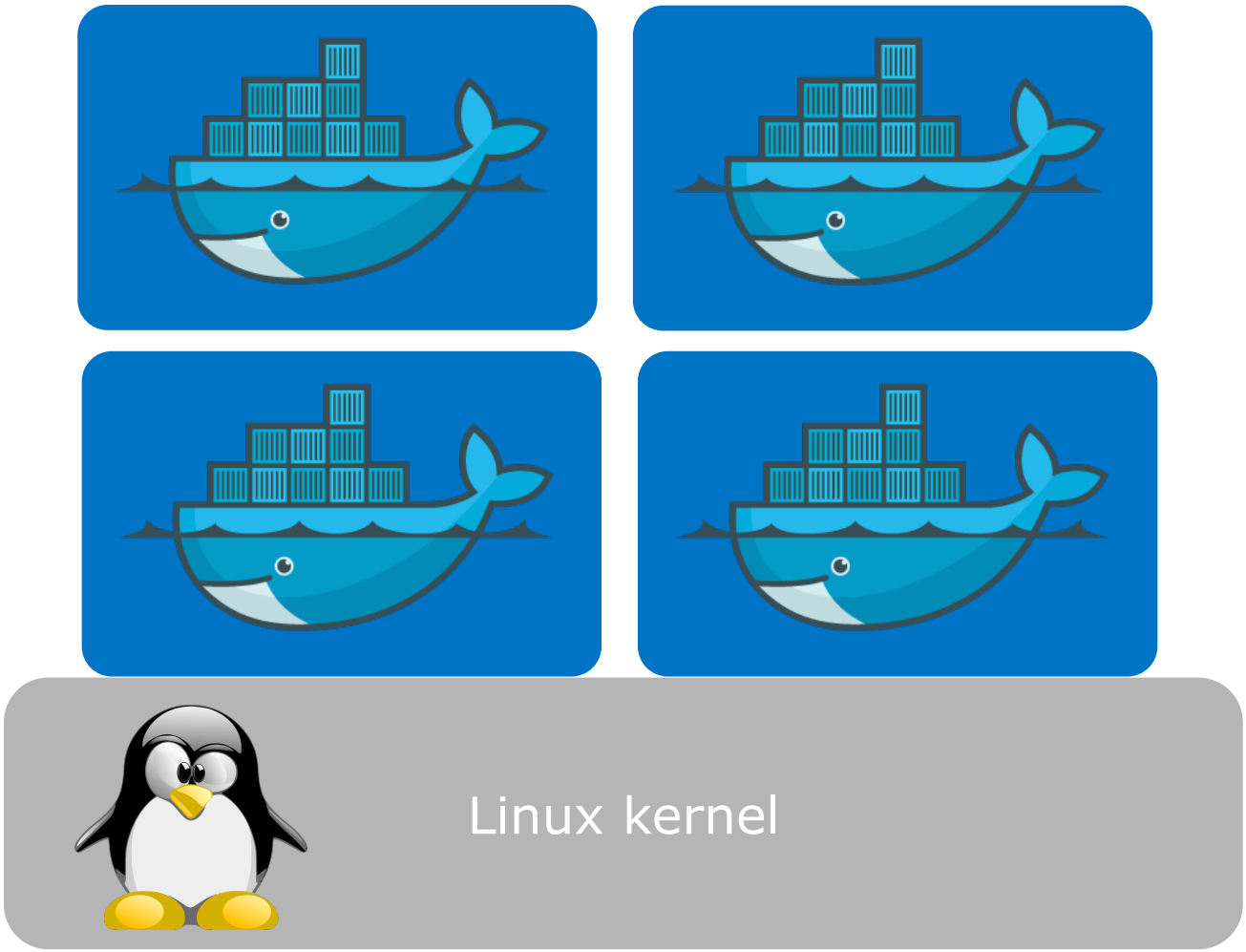

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Kubernetes

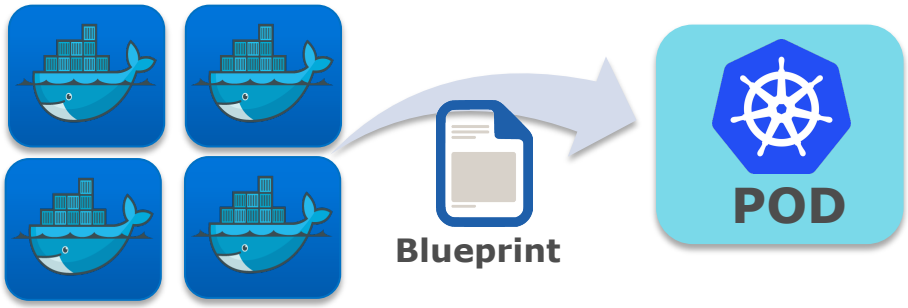
"Manage a cluster of Linux containers as a single system"

_Cluster

- Compute resources
- Virtual or physical machines

_Pods

- Collocated group of containers
- Smallest deployment unit
- **Scheduling and scaling unit**



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Kubernetes & Pods

Pods placement is automatic, resource based and decided by Kubernetes

Service discovery is used to know what is running where

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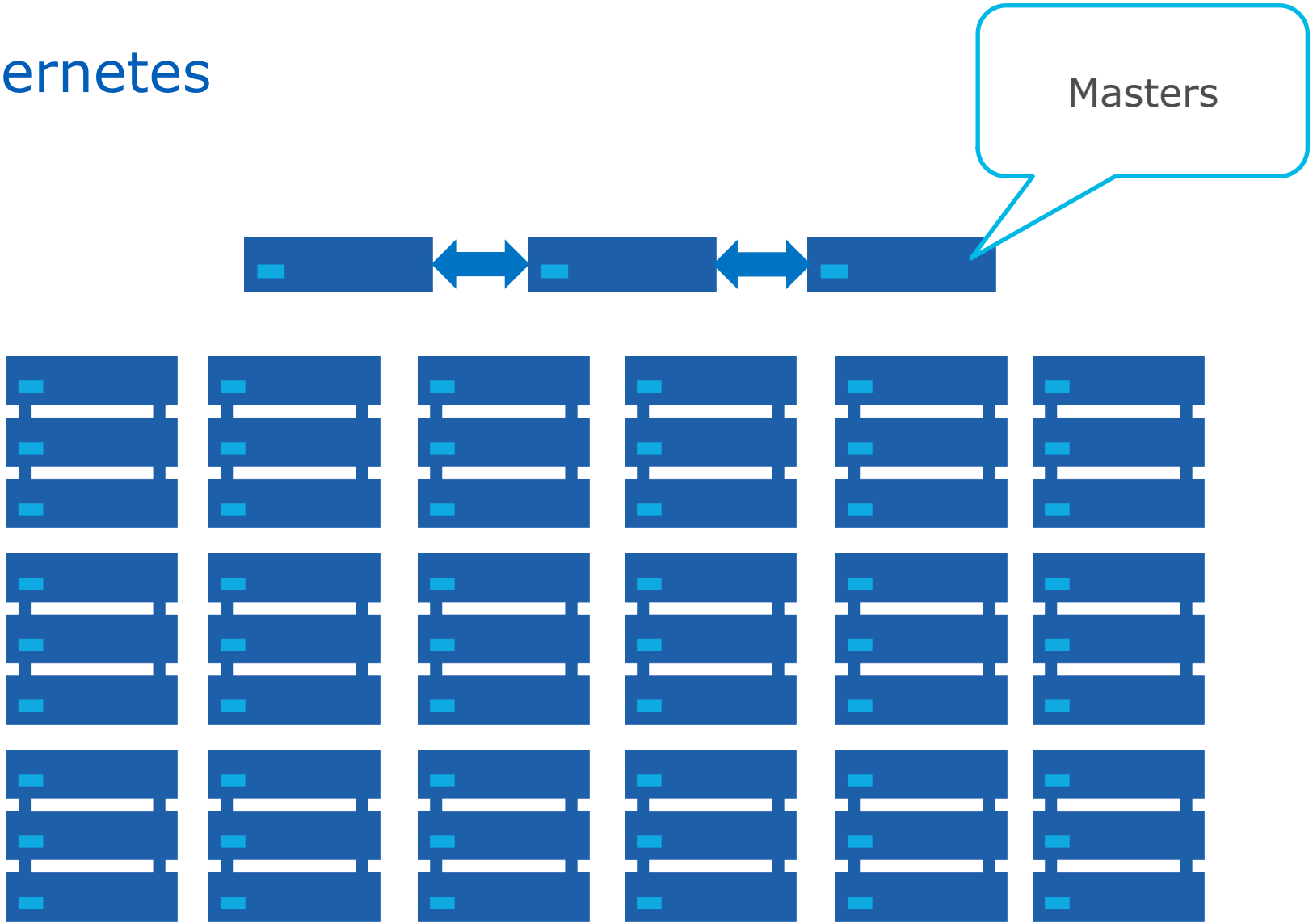
Kubernetes



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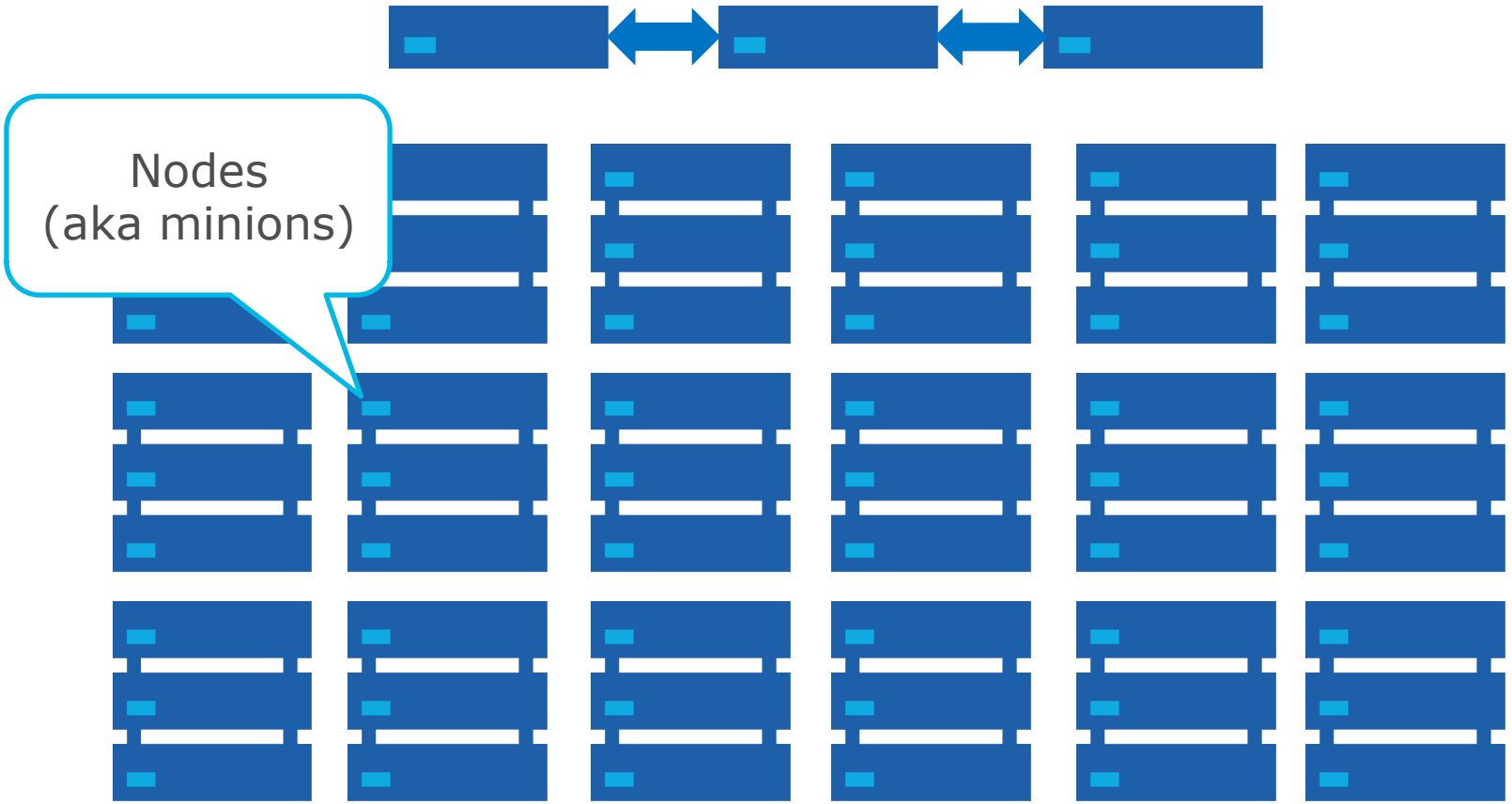
Kubernetes



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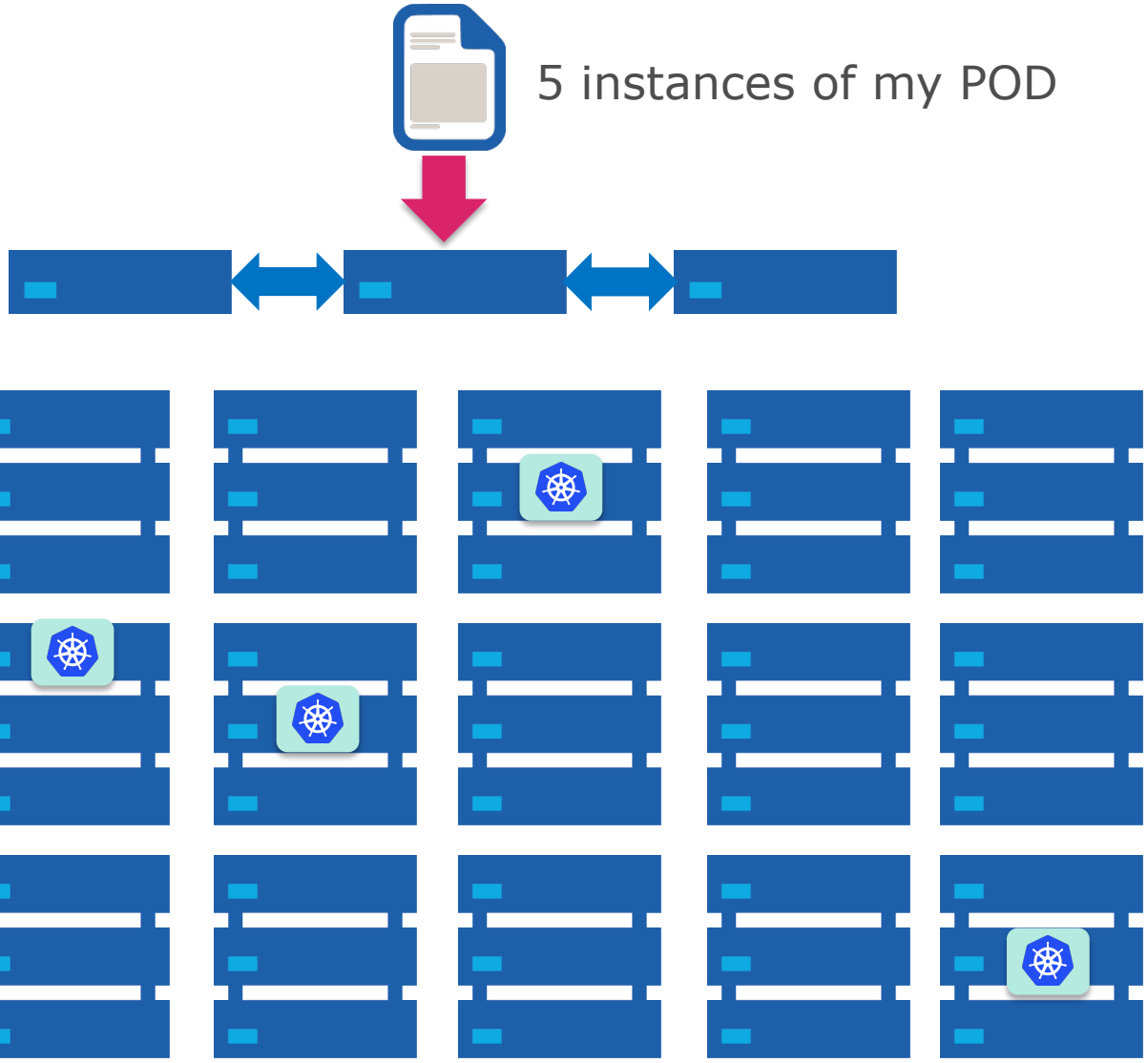

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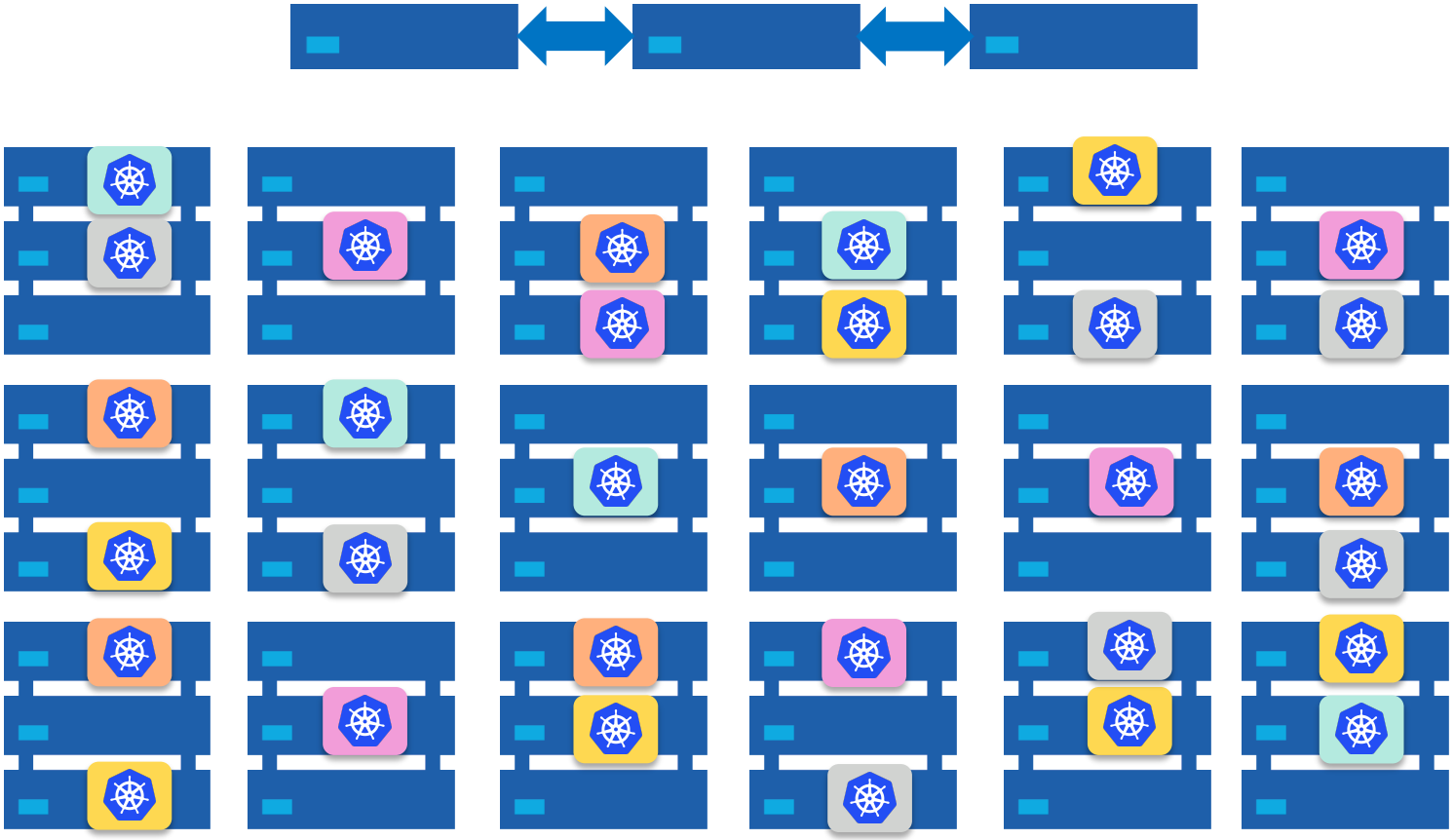

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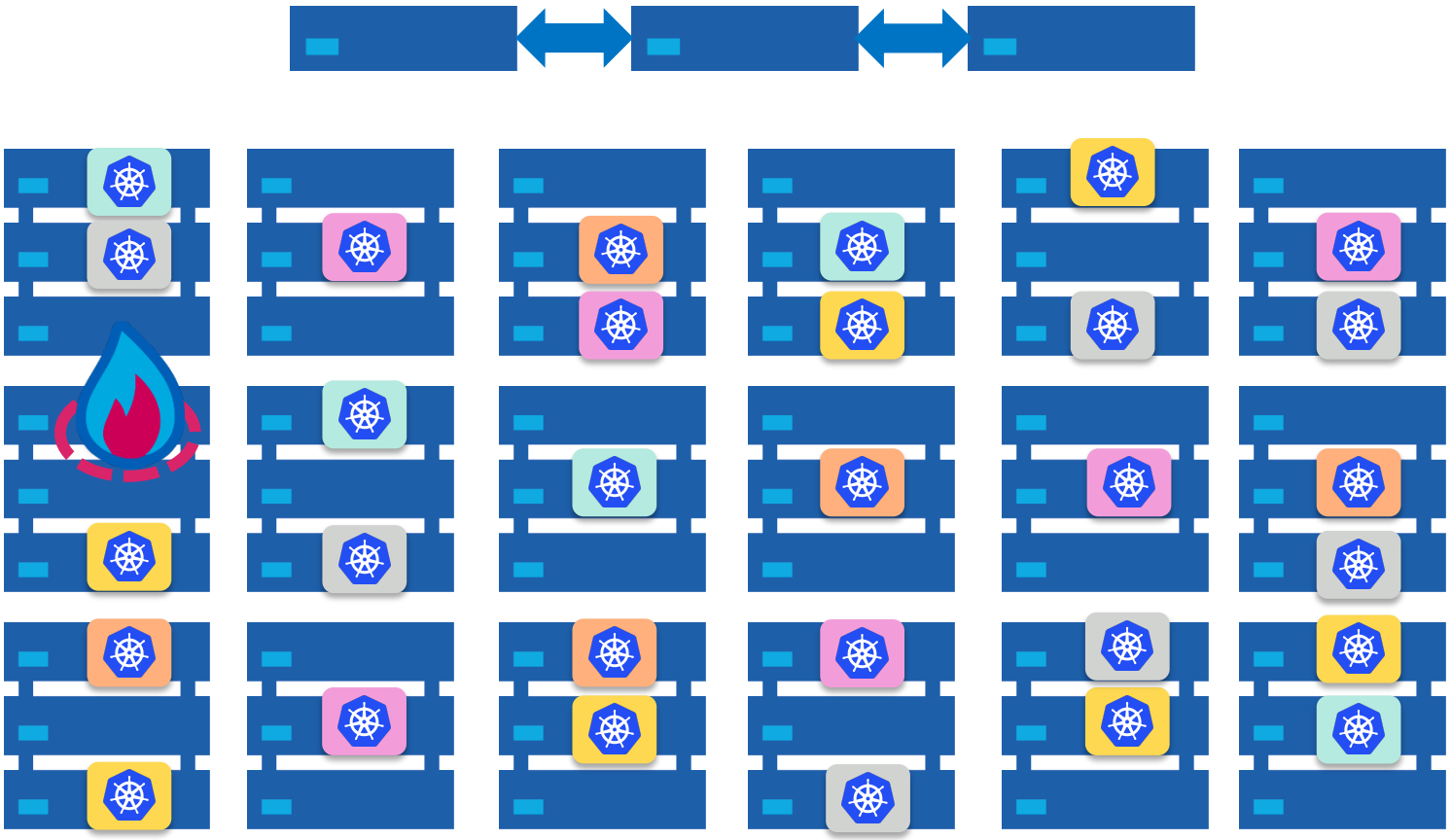
Kubernetes



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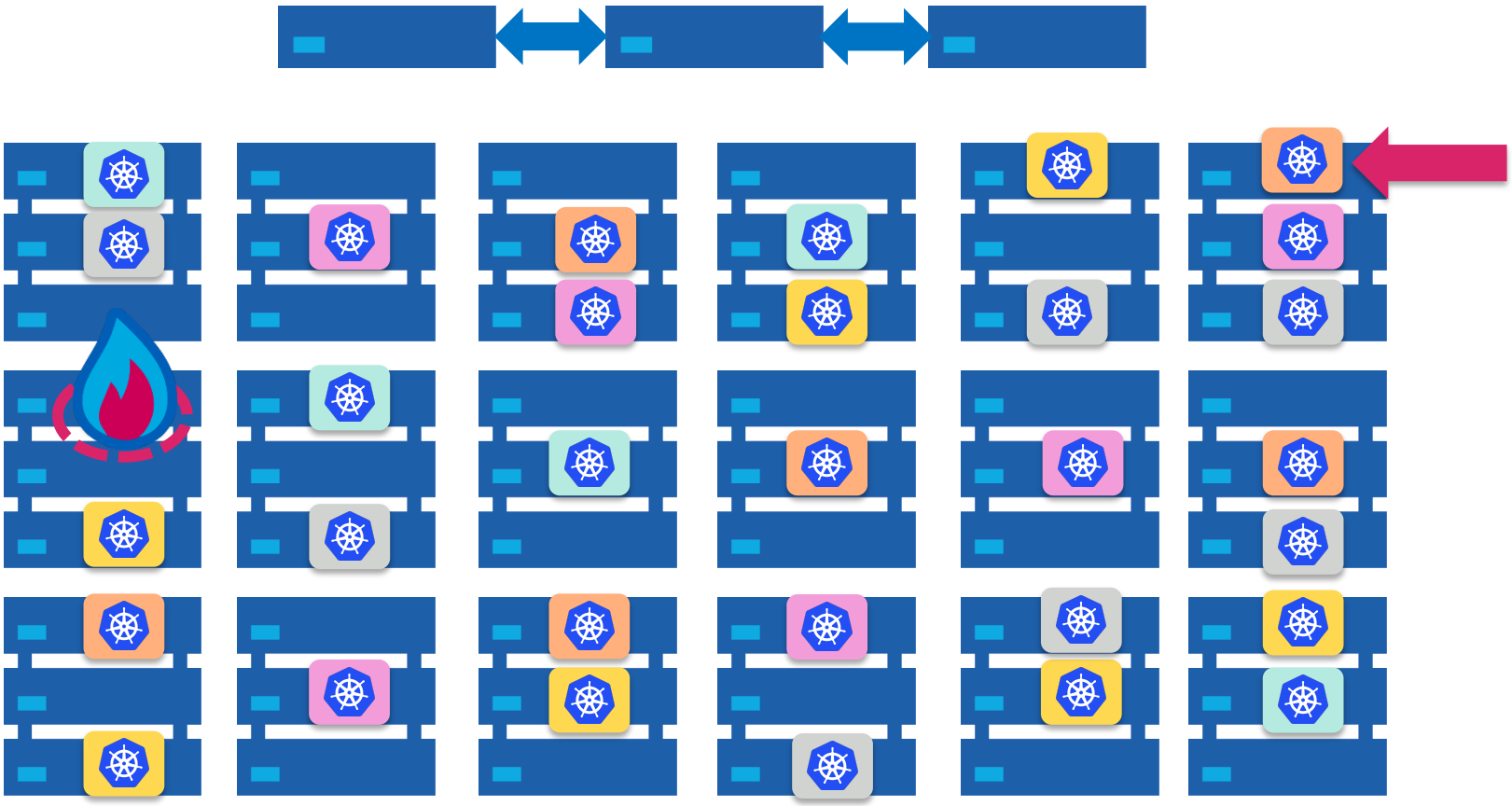
Kubernetes



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Pods

Always same content

Always listening on same ports

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Pods

Always same content

Always listening on same ports

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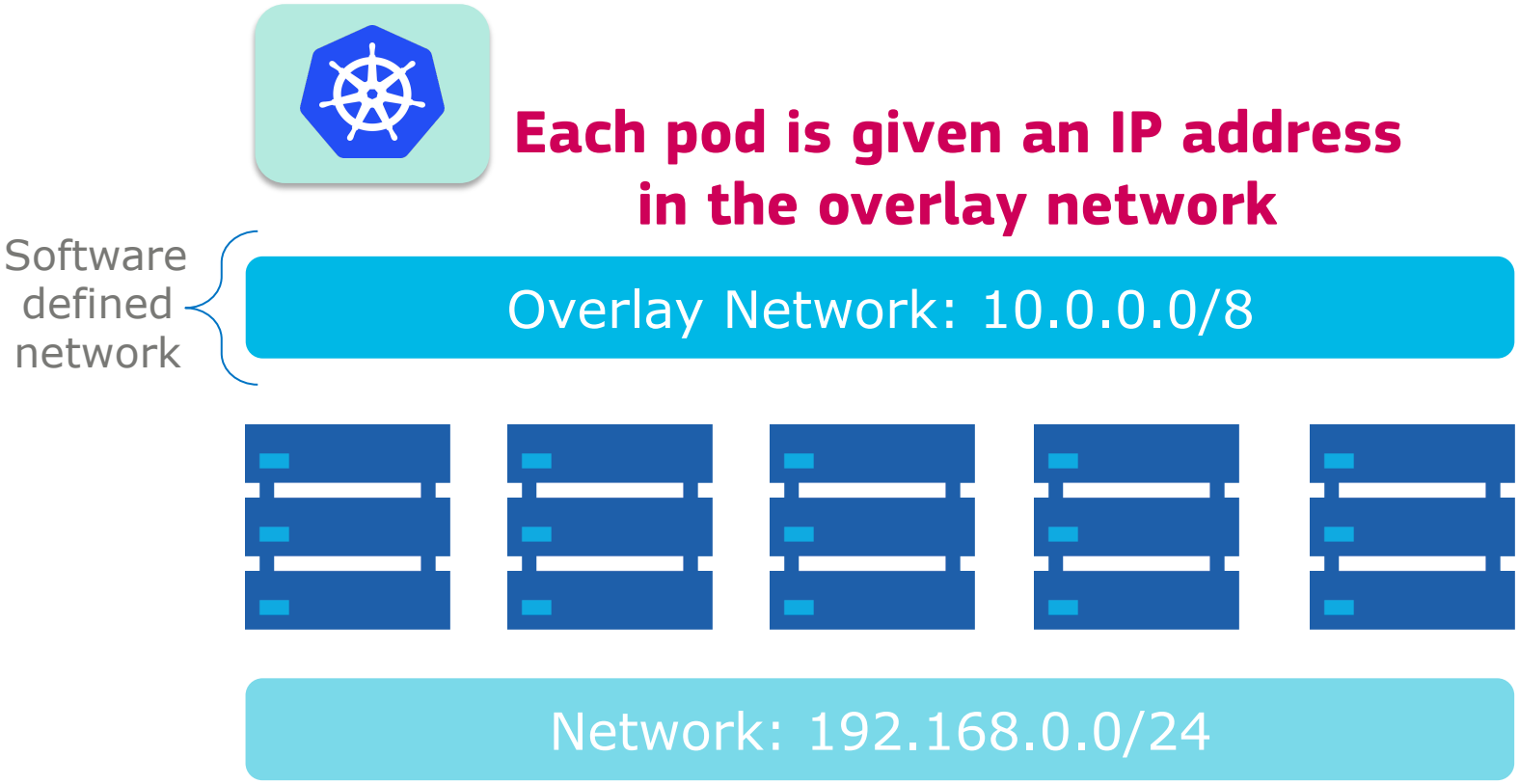
Pod addressing

SDN



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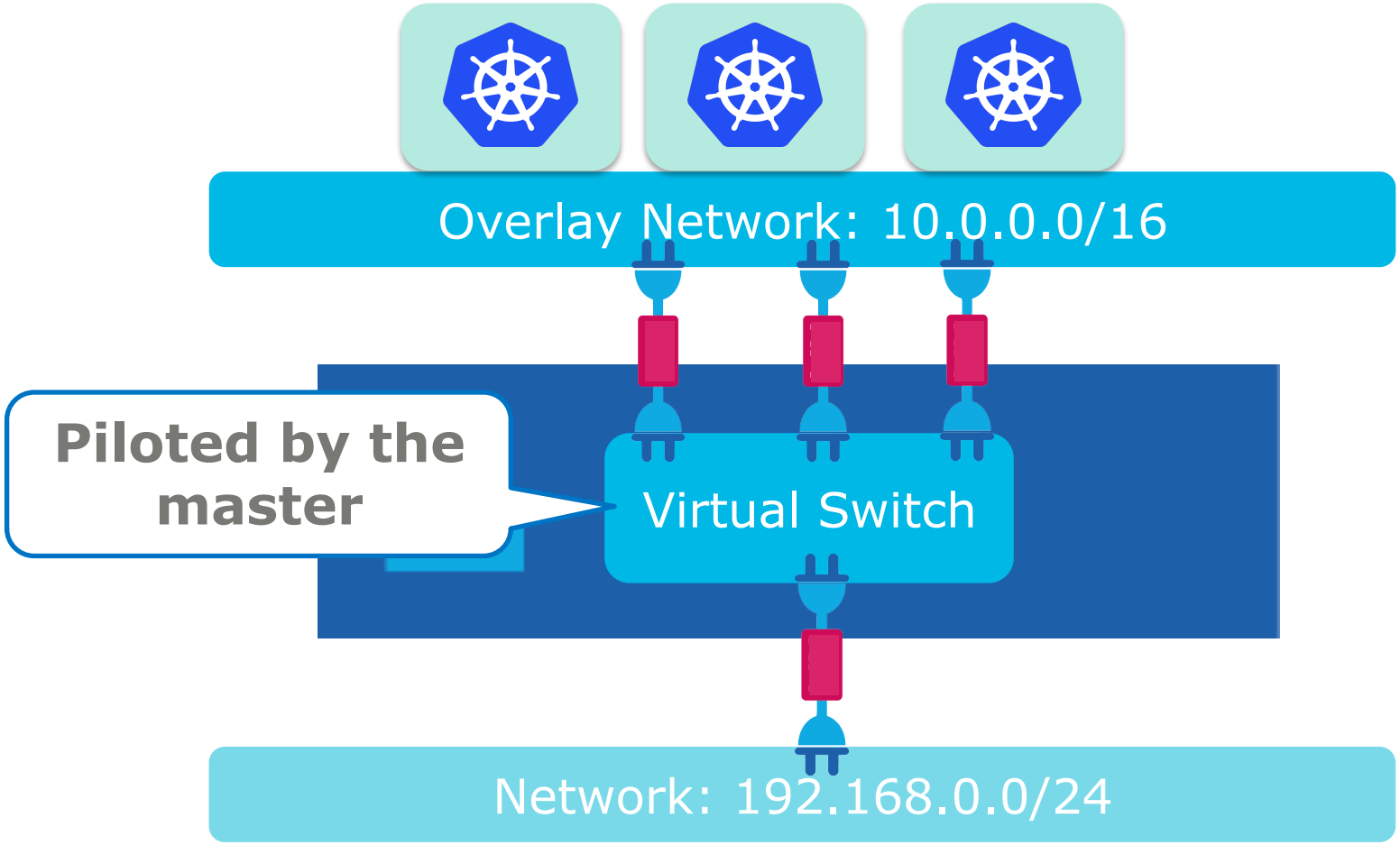
Pod addressing



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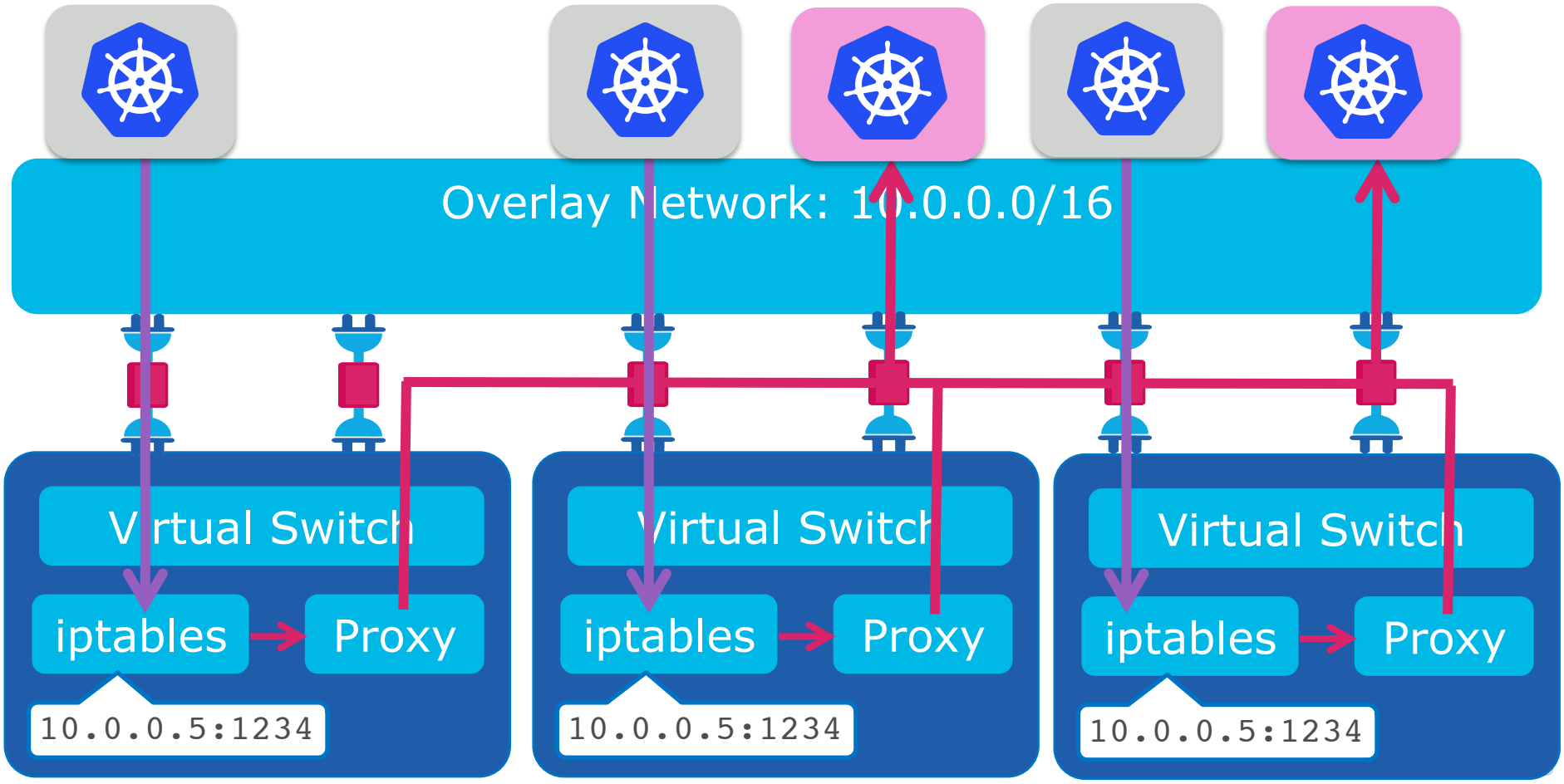
Service addressing

Service “S1”
IP/port: 10.0.0.5:1234



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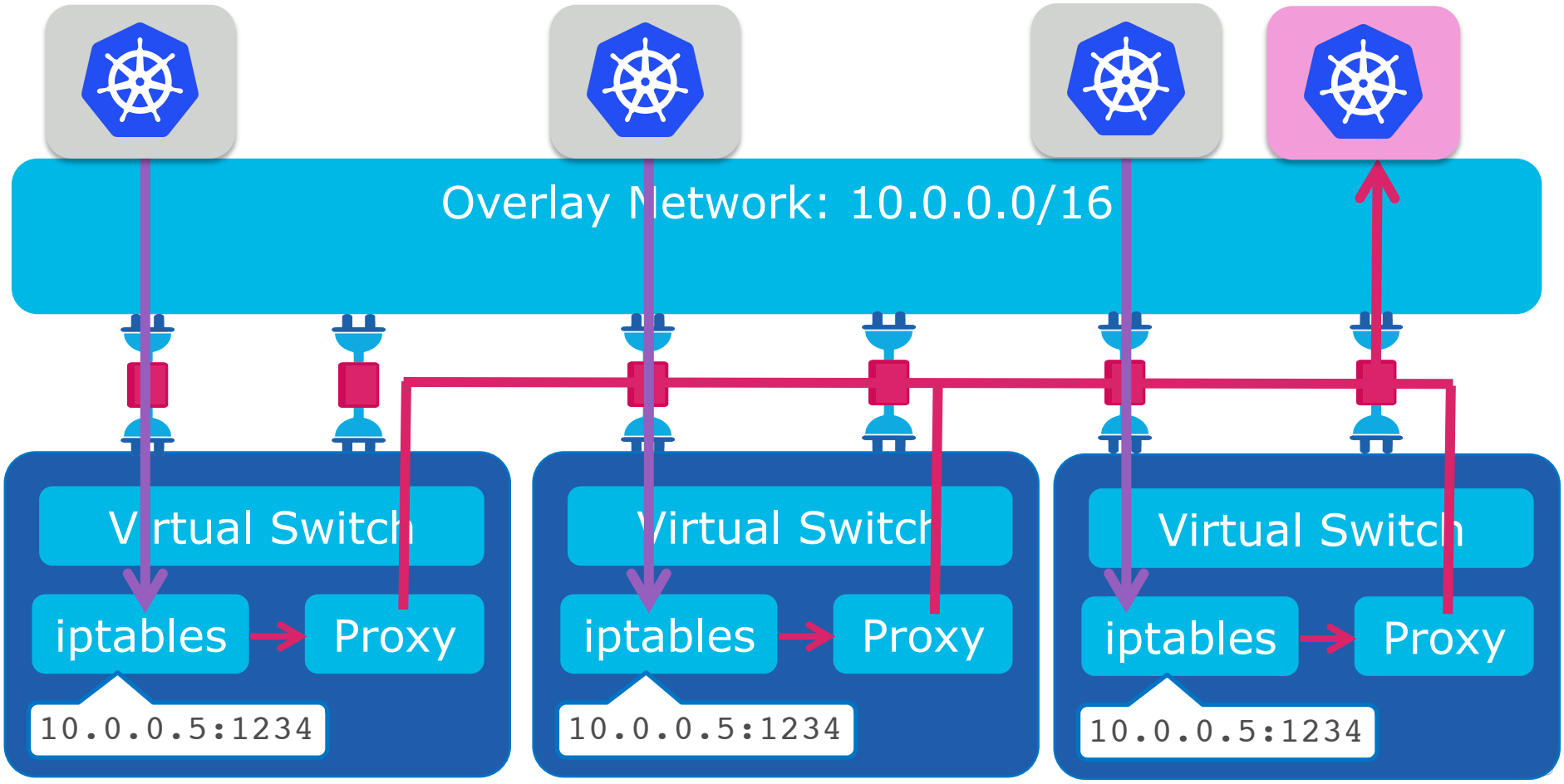

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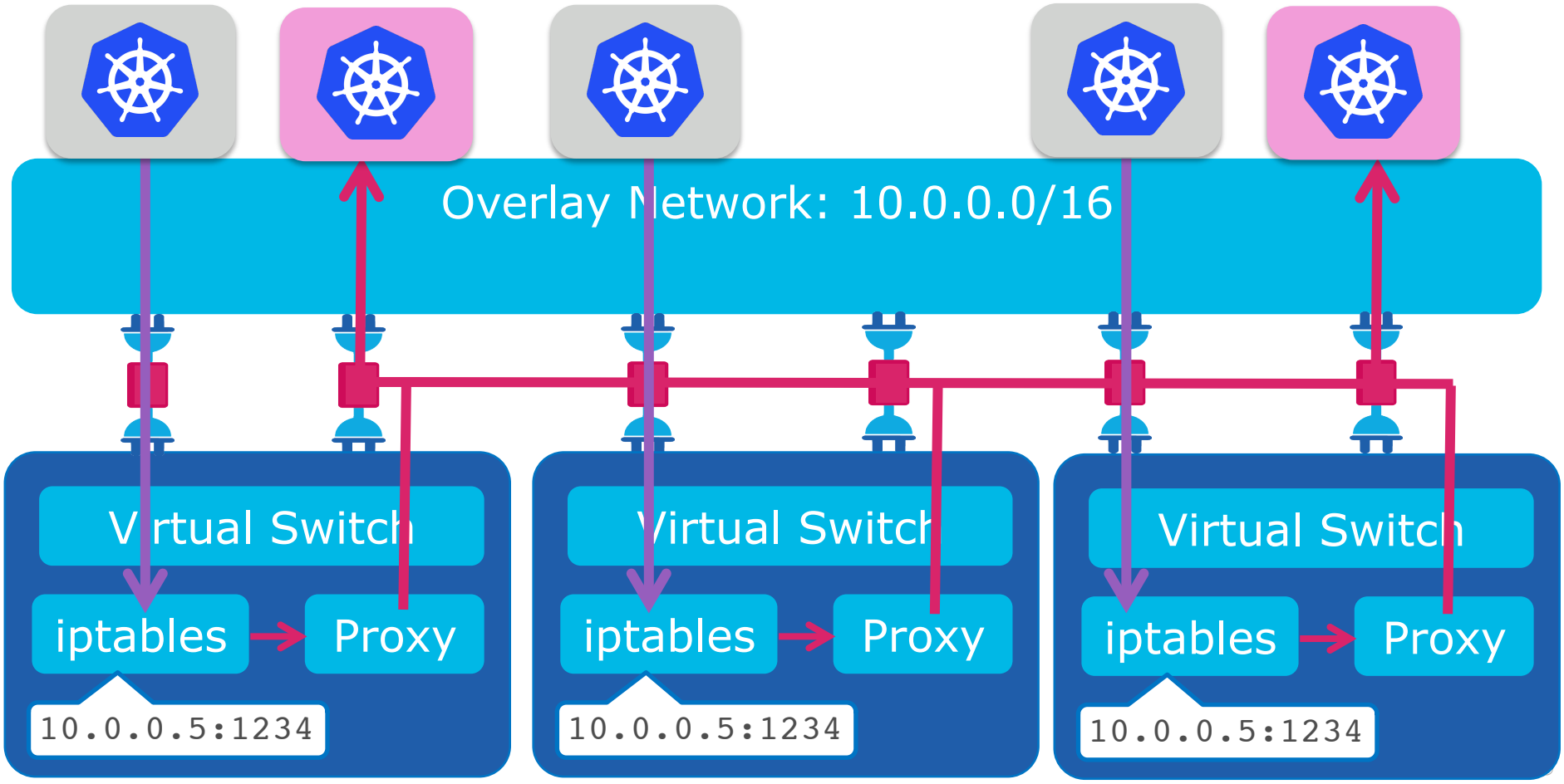

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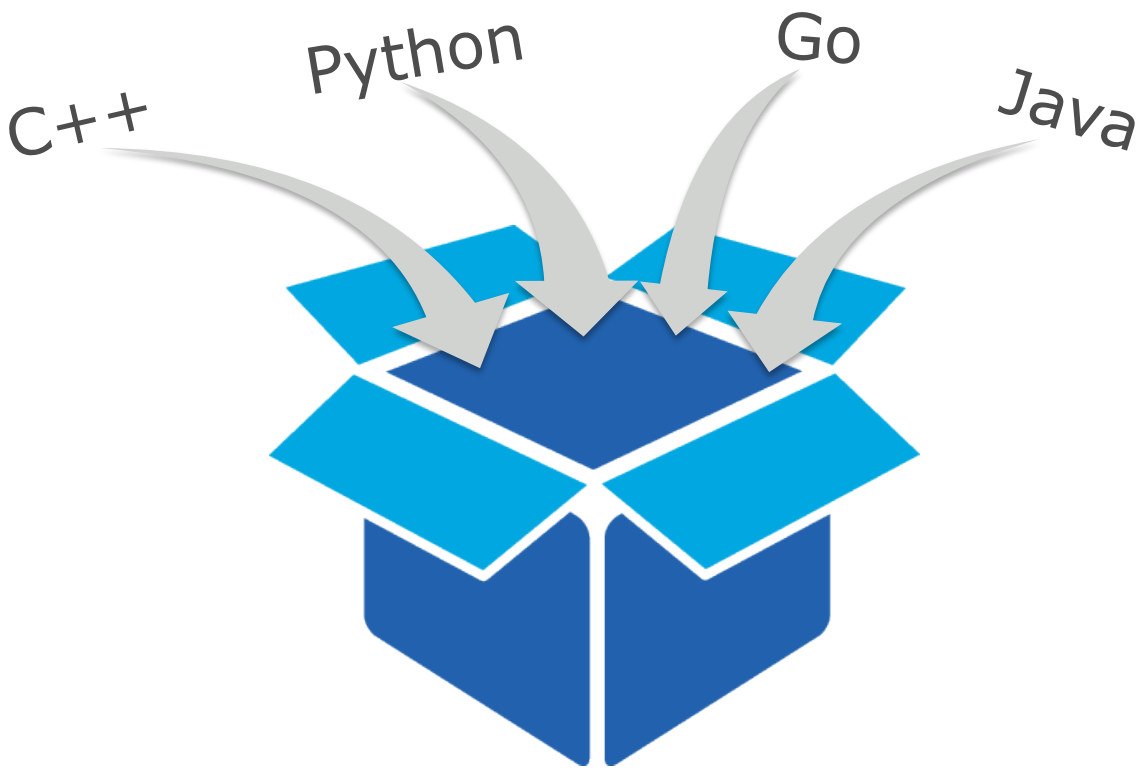
Operational Model

- Homogenization: everything looks the same



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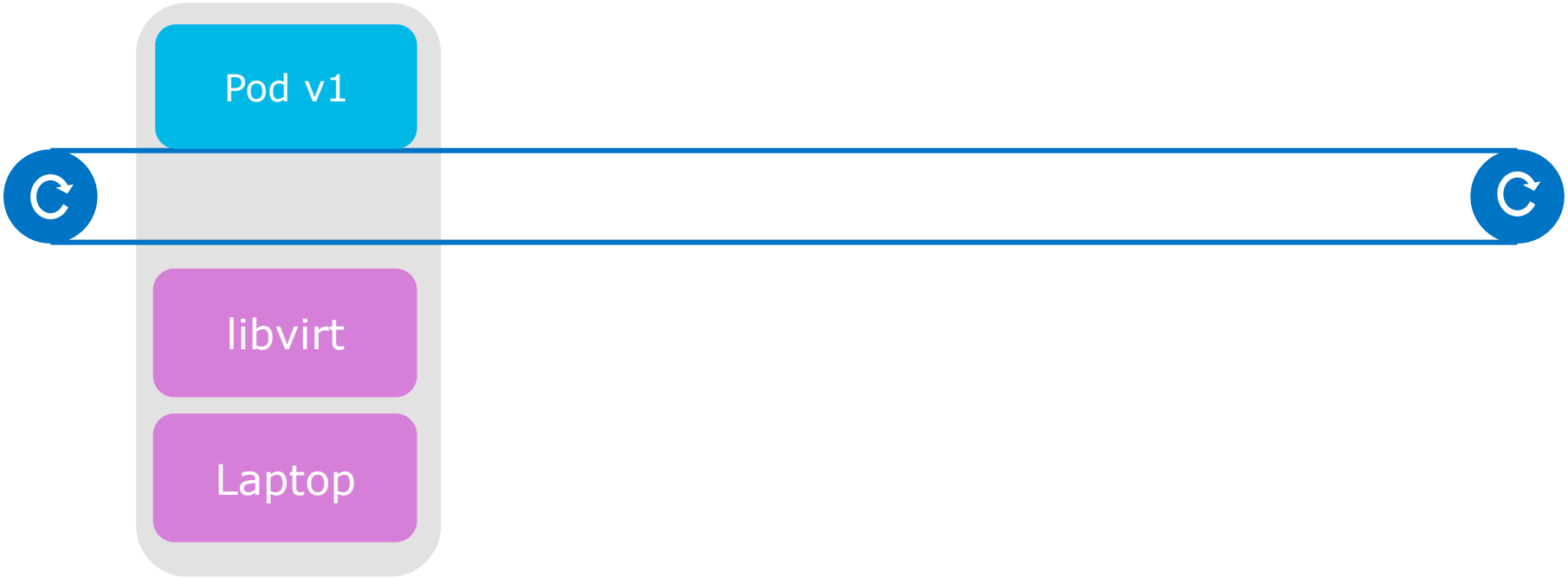
Easy Deployment



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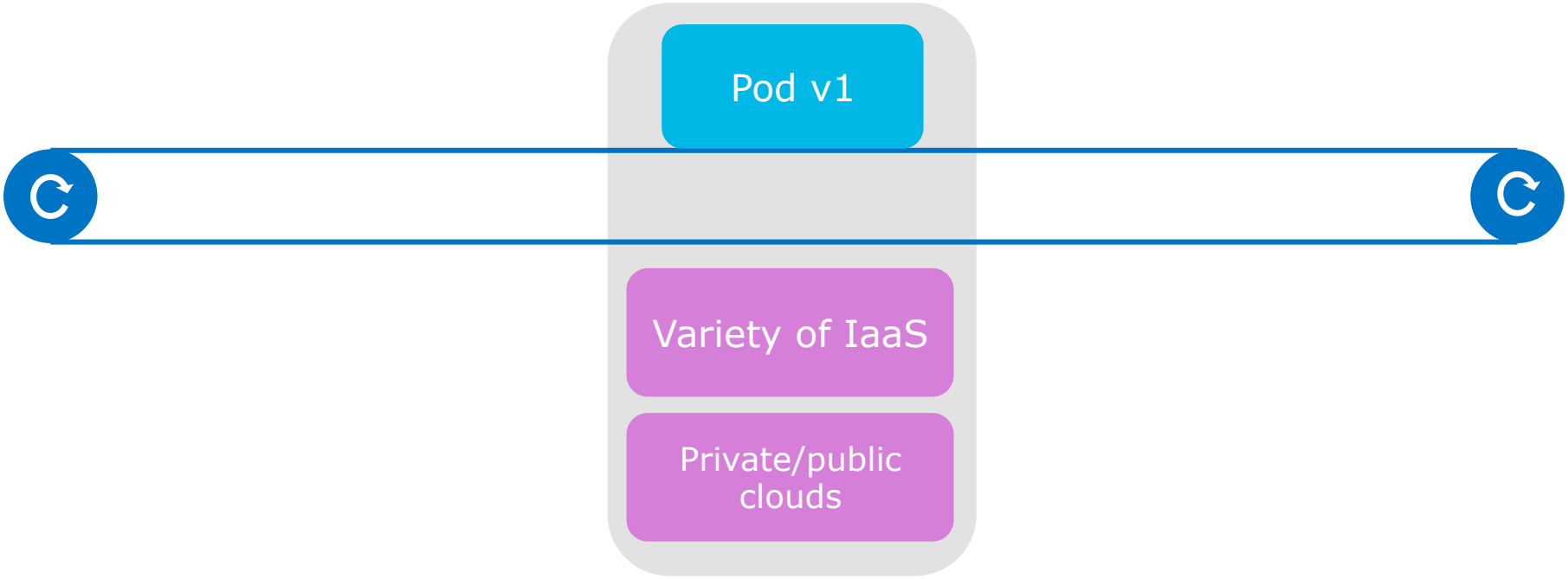

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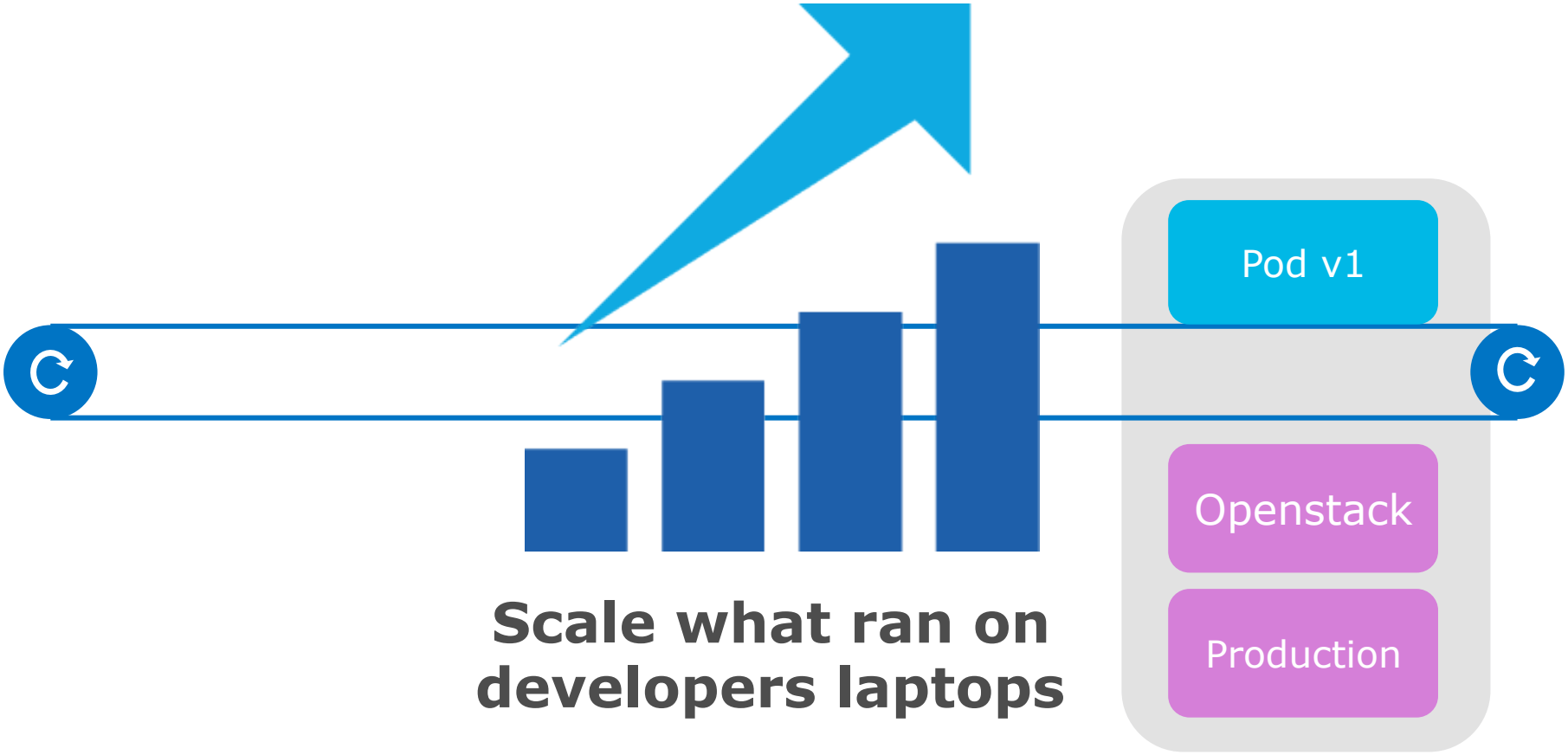

Scale what ran on developers laptops

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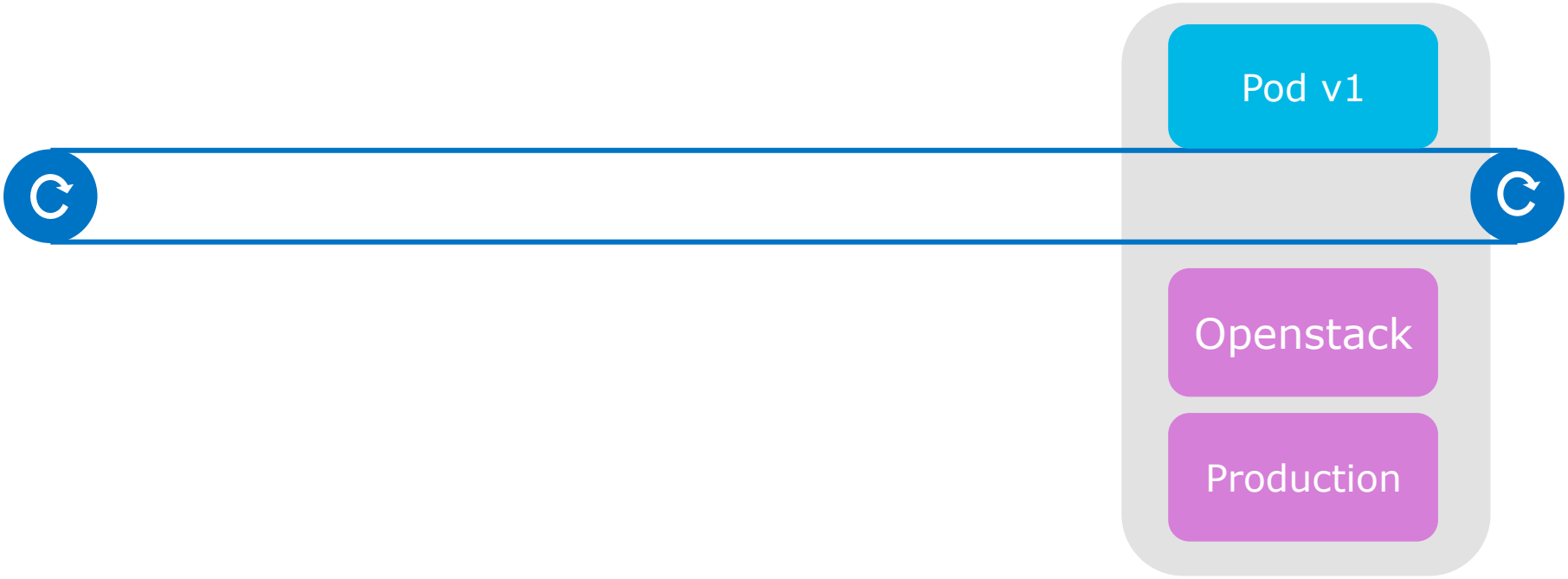
Easy Deployment



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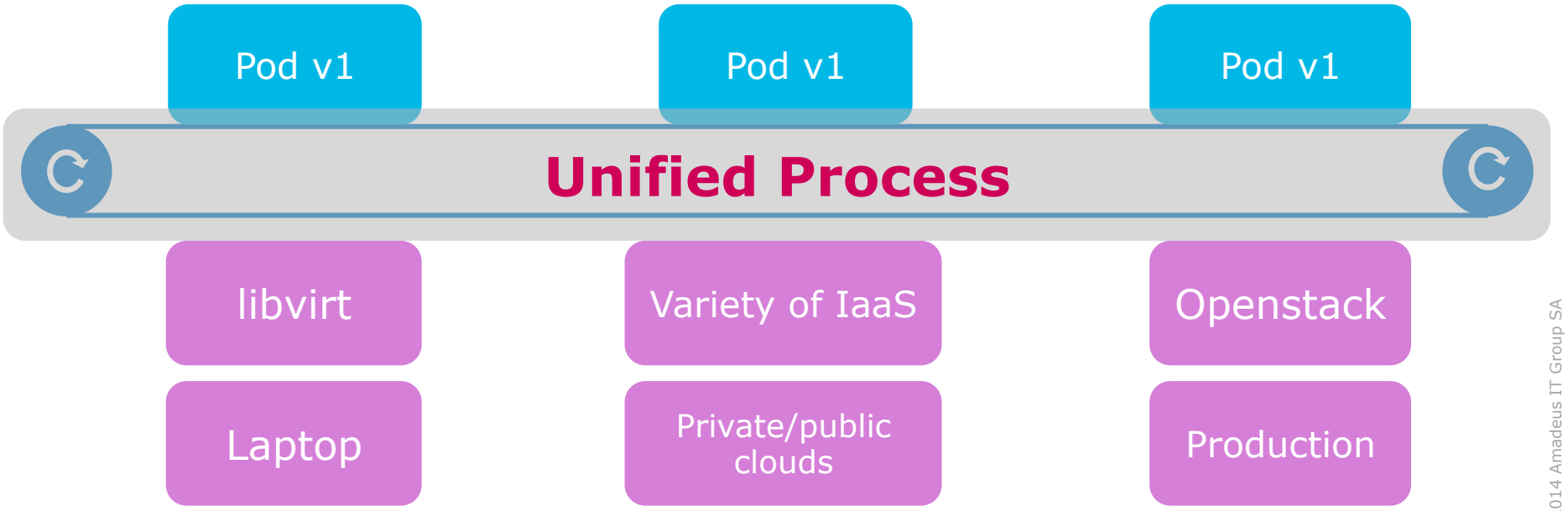

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Key Takeaways

- 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

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Thank you

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