



OpenShift Security & *The usage of existing PKI Infrastructures*

Stronger Platform Security

Defense in Depth



CONTROL
Application Security

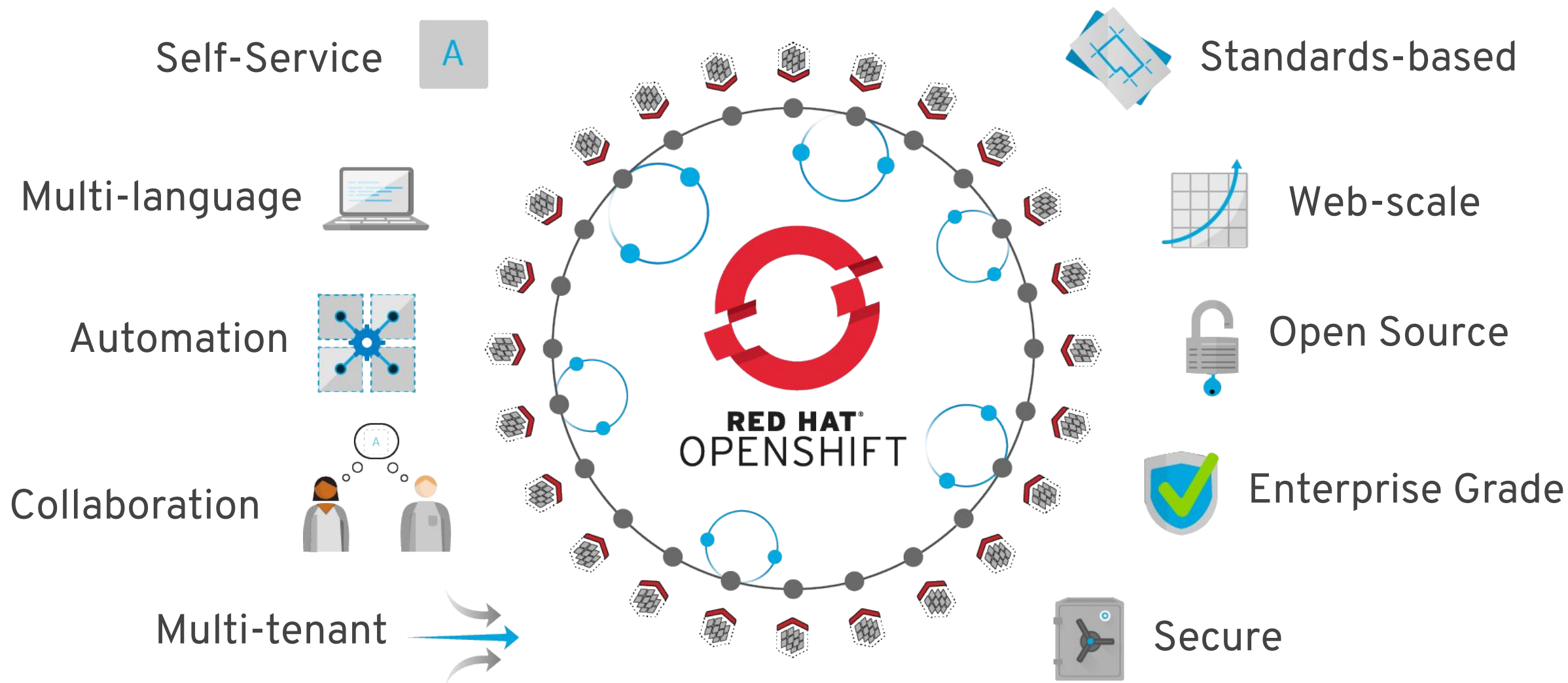


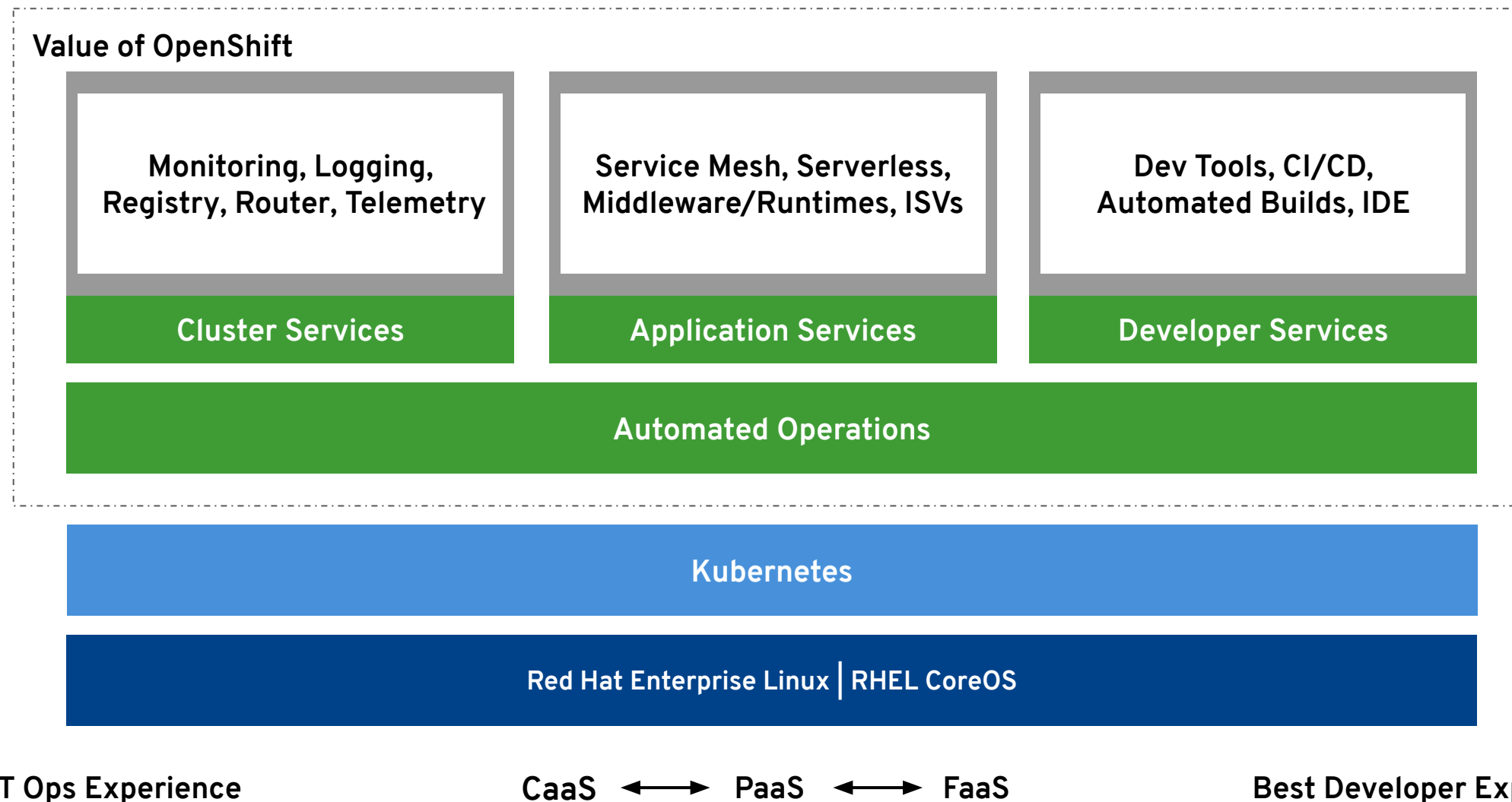
DEFEND
Infrastructure

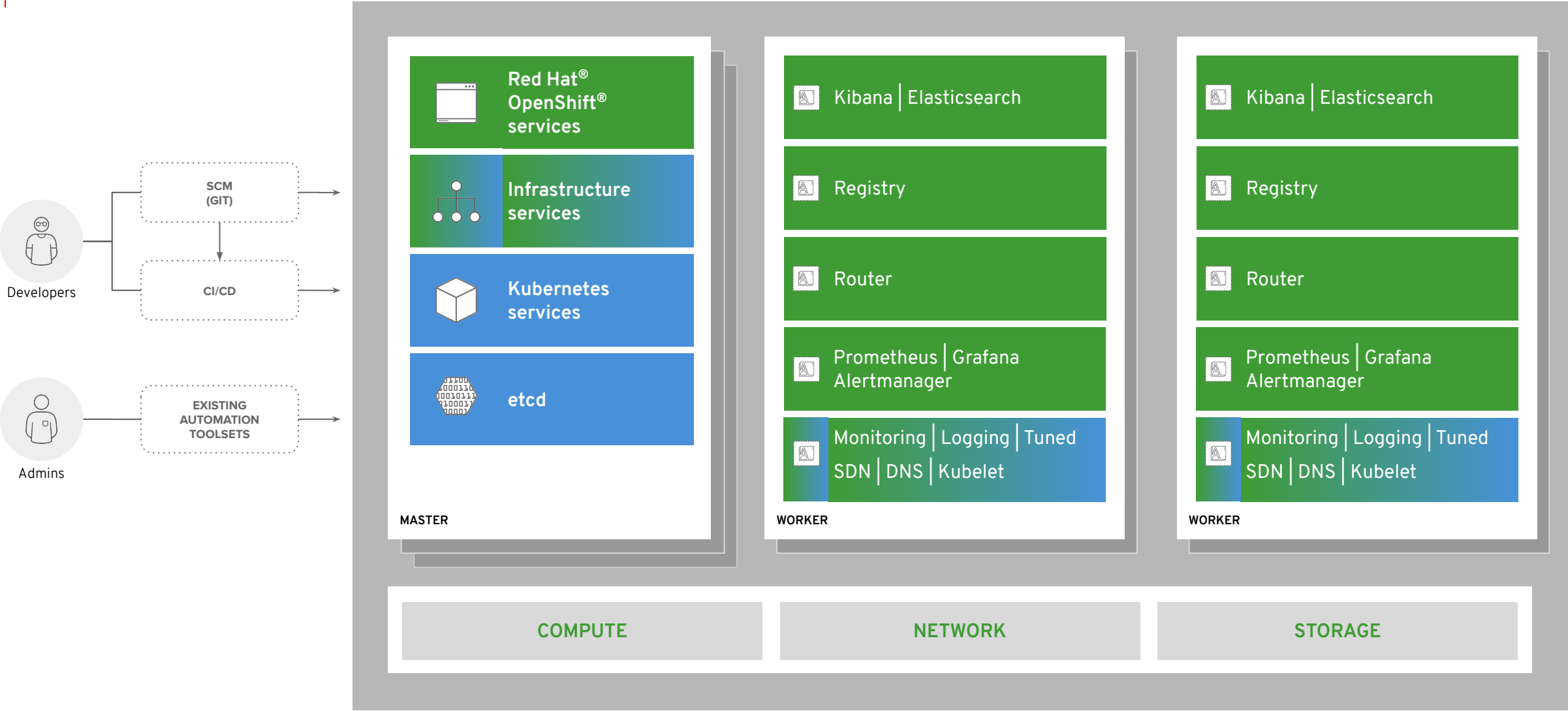


EXTEND

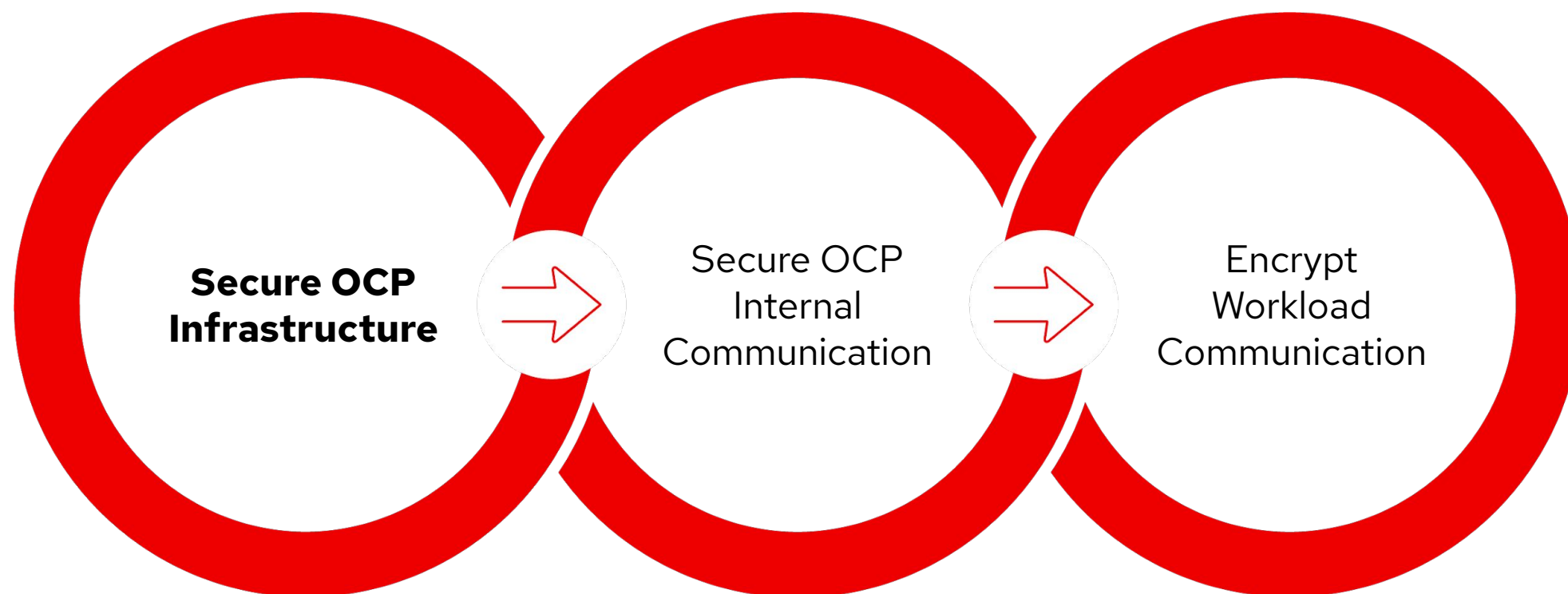
- [FIPS Compliance](#)
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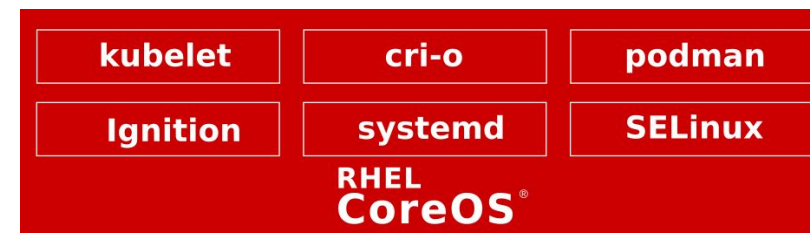
PKI in OpenShift



Red Hat Enterprise Linux CoreOS

4.3 Image Availability: (* = new)

- OpenStack
- GCP
- Azure
- Amazon
- vSphere
- Bare Metal (unified x86_64 image)*
- IBM Z (DASD & FCP via z-stream)*



FIPS mode support:

- Enforces FIPS validated ciphers for node-level cryptography
- Configurable at install/provisioning

Network Bound Disk Encryption:

- Provides encryption for local storage
- Addresses disk/image theft
- Platform/cloud agnostic implementation
- TPM/vTPM (v2) and Tang endpoints for automatic decryption

Kmods via containers:

- A framework to build and load 3rd party kmods
- Viable for drivers unsuitable for the SRO

OpenShift 4 Fips 140-2 Compliant Cluster

FIPS ready Services

- When built with RHEL 7 base image

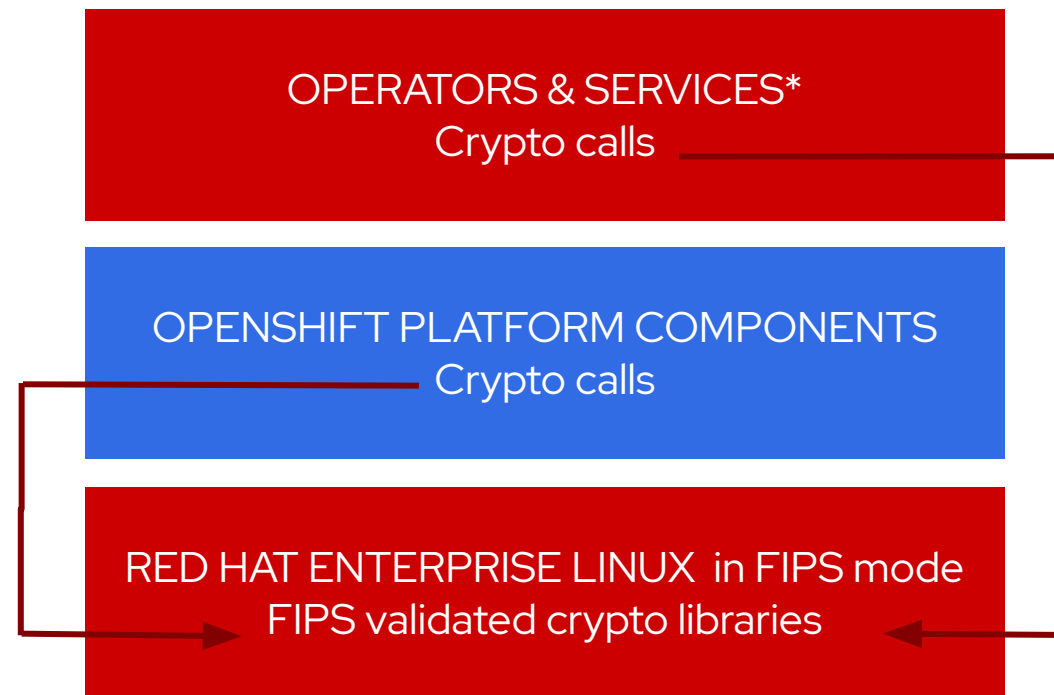
OpenShift calls FIPS validated crypto

- When running on RHEL in FIPS mode, OpenShift components bypass go cryptographic routines and call into a RHEL FIPS 140-2 validated cryptographic library
- This feature is specific to binaries built with the RHEL go compiler and running on RHEL

RHEL CoreOS FIPS mode

- Configure at install to enforce FIPS validated ciphers for node-level cryptography

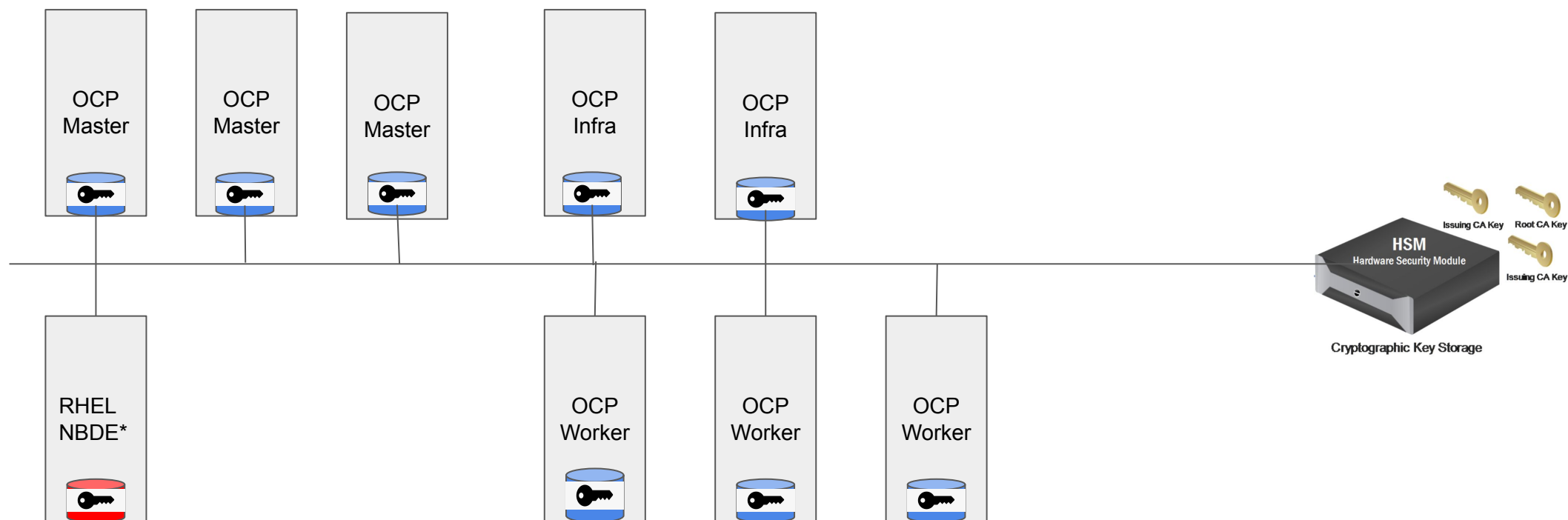
Note: products are not FIPS validated, only libraries.



*When built with RHEL base images

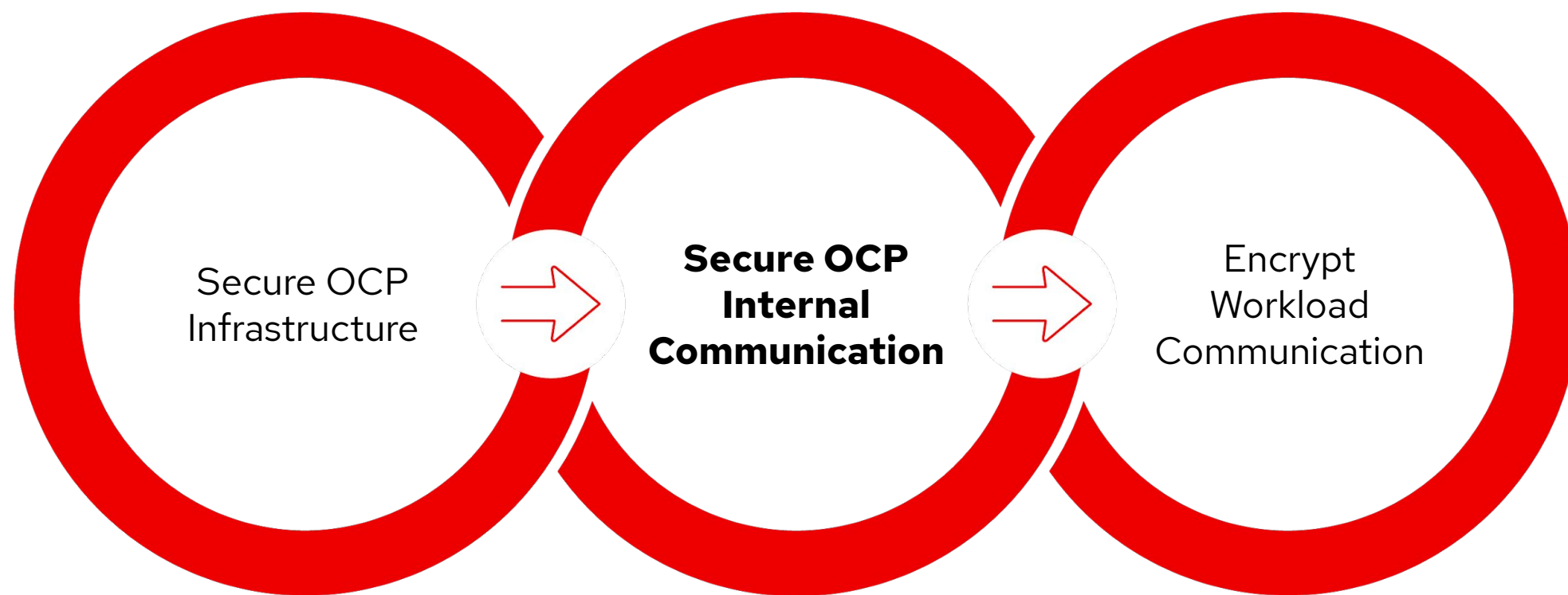
[More about RHEL go and FIPS 140-2](#)

Encrypting the Disk of the OCP Nodes



*Network bound disk encryption ([Clavis & Tang](#))

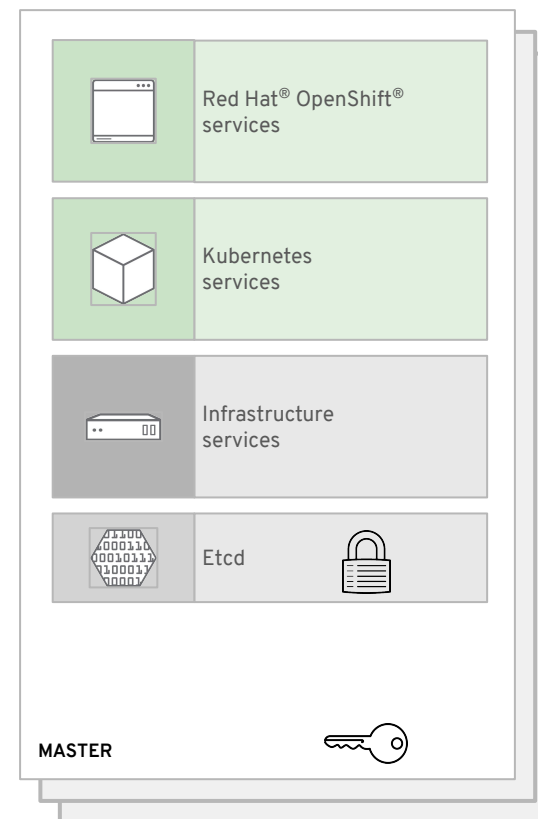
PKI in OpenShift



OpenShift 4 etcd Encryption

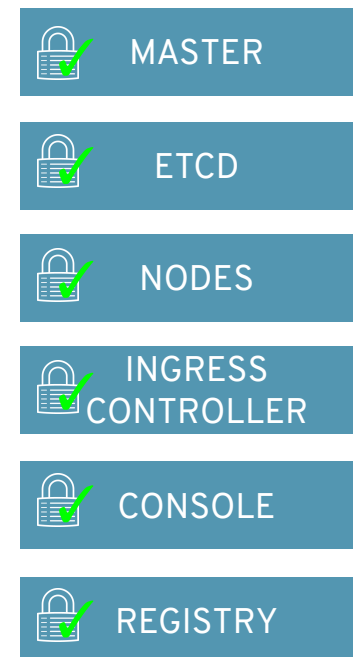
Encrypt secrets, config maps...

- Encryption of the etcd datastore is optional. Once enabled, encryption cannot be disabled.
- The aes-cbc cipher is used.
- Keys are created and automatically rotated by an operator and stored on the master node's file system.
- Keys are available as a secret via the kube API to a cluster admin.
- Assuming a healthy cluster: after enabling encryption, within a day, all relevant items in etcd are encrypted
- Backup: The etcd data store should be backed up separately from the file system with the key.
- Disaster recovery: a backup of both the encrypted etcd data and encryption keys must be available.

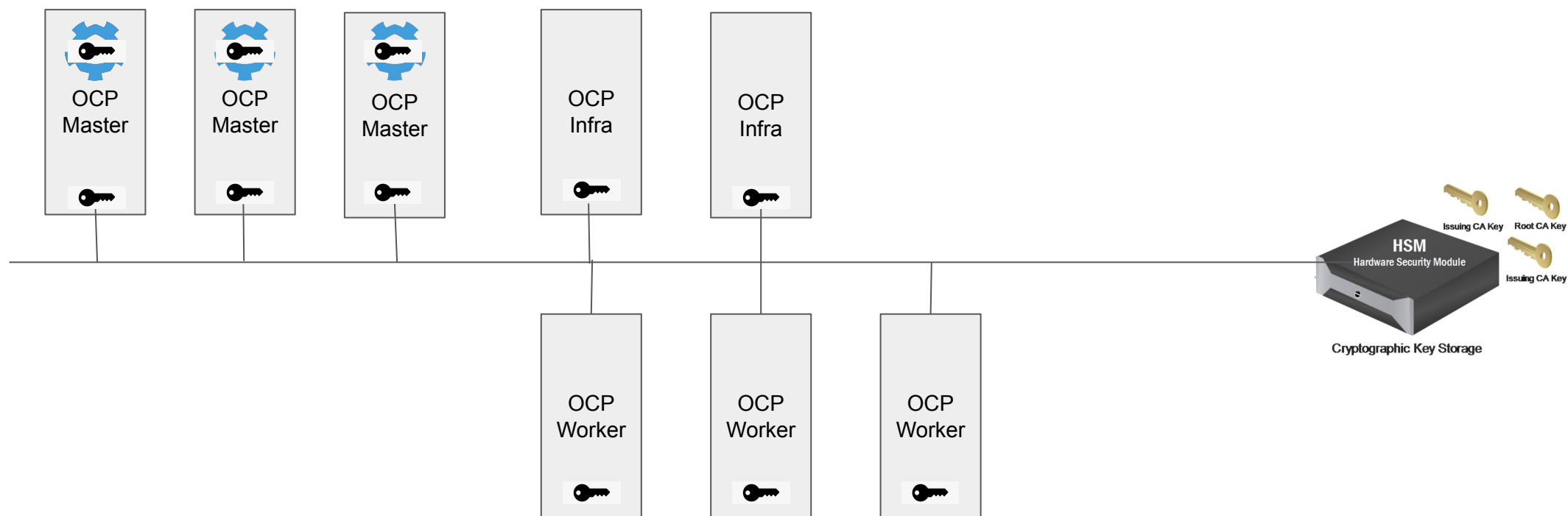


Certificates and Certificate Management

- OpenShift provides its own internal CA
- Certificates are used to provide secure connections to
 - master (APIs) and nodes
 - Ingress controller and registry
 - etcd
- Certificate rotation is automated
- Optionally configure external endpoints to use custom certificates

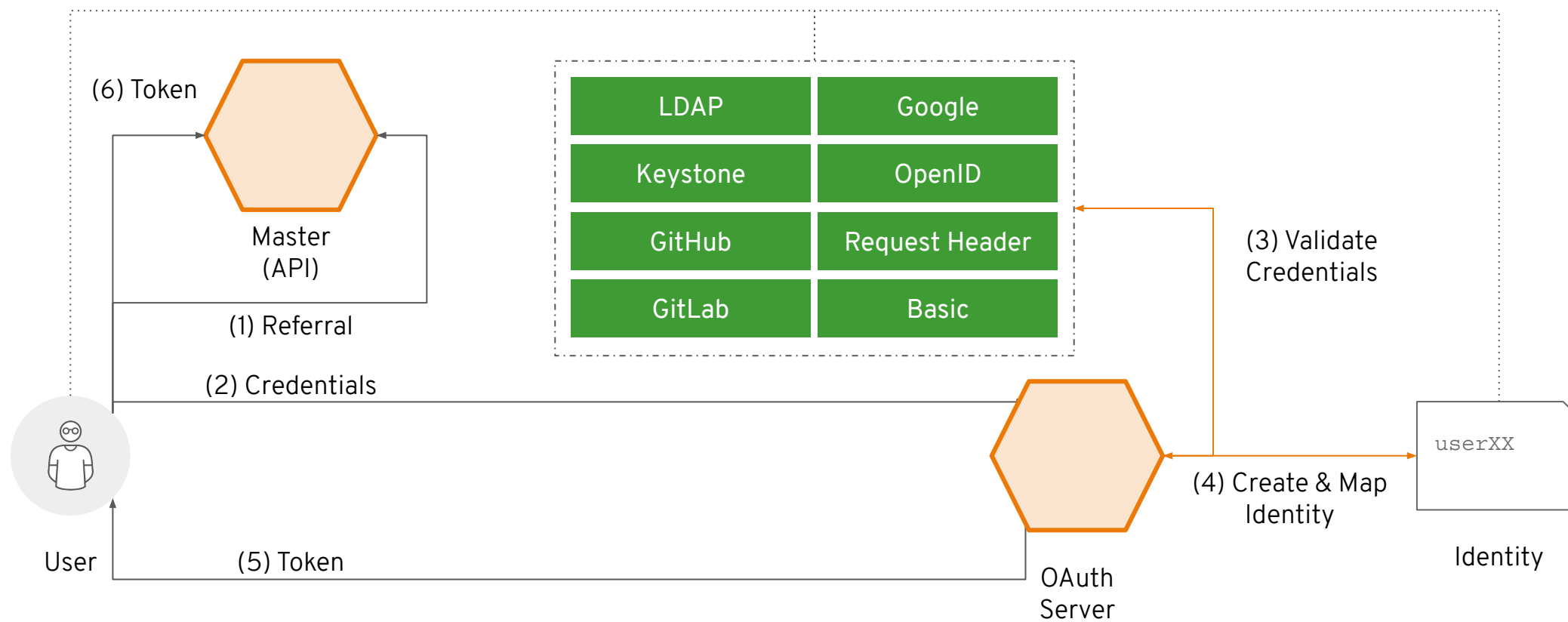


Encrypting the OCP Network traffic and the etcd Database



Identity and Access Management

Identity and Access Management



Fine-Grained RBAC

- Project scope & cluster scope available
- Matches request attributes (verb,object,etc)
- If no roles match, request is denied (deny by default)
- Operator- and user-level roles are defined by default
- Custom roles are supported

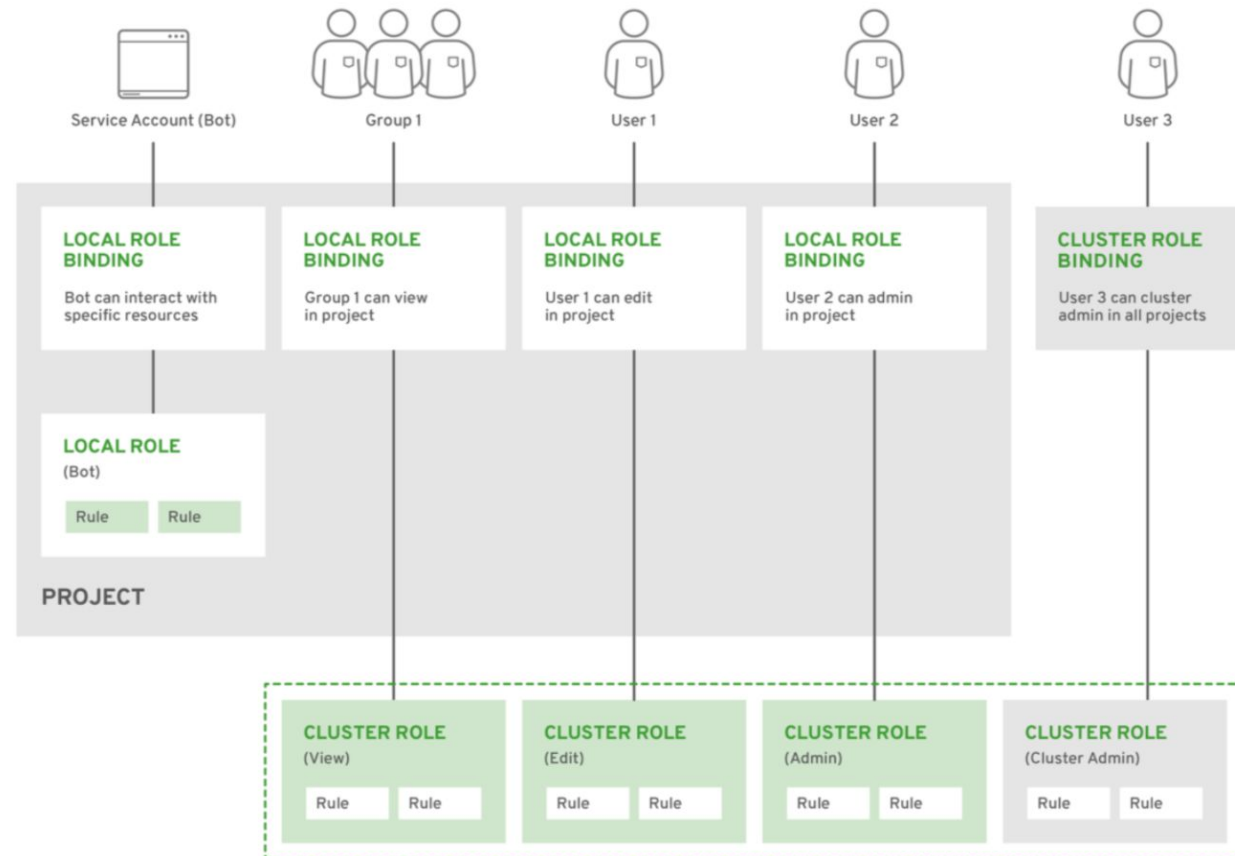
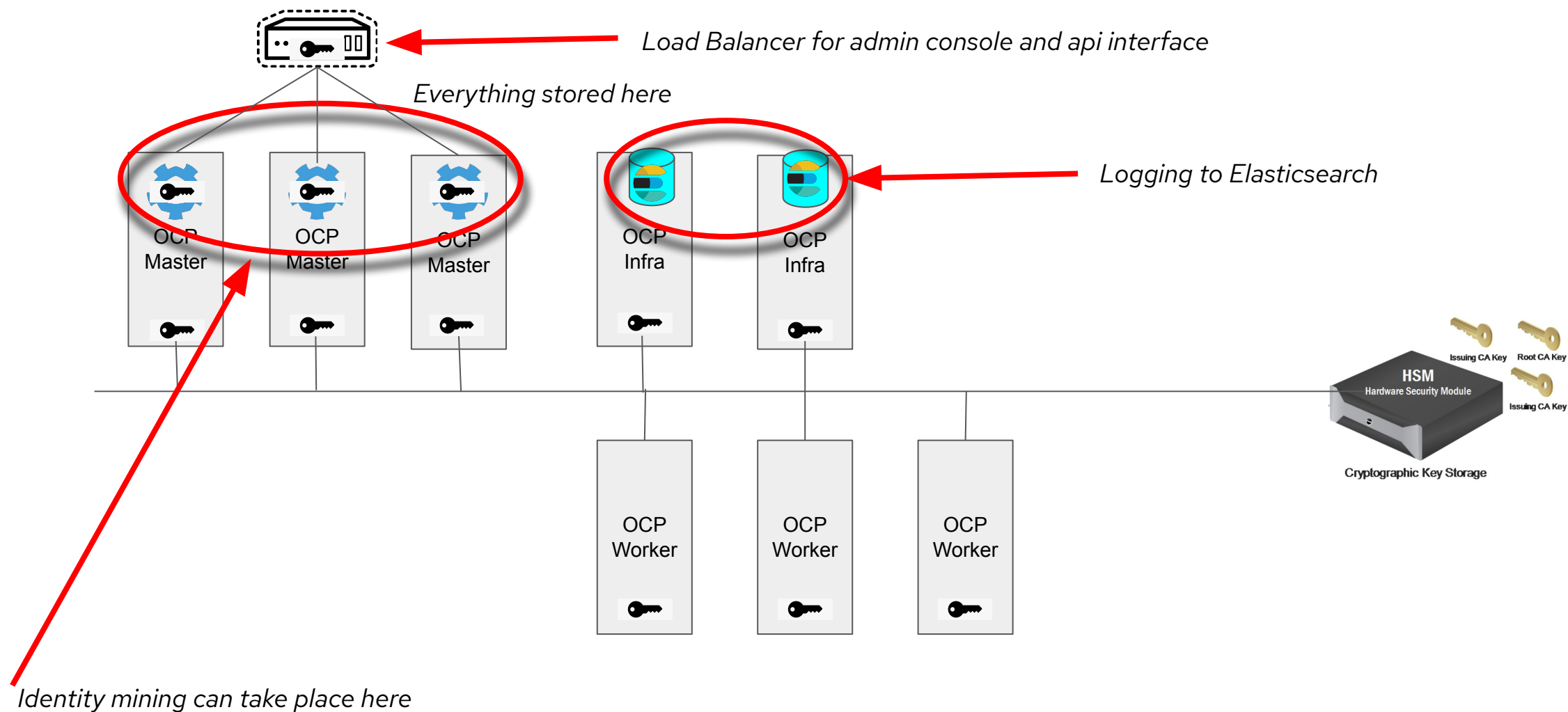
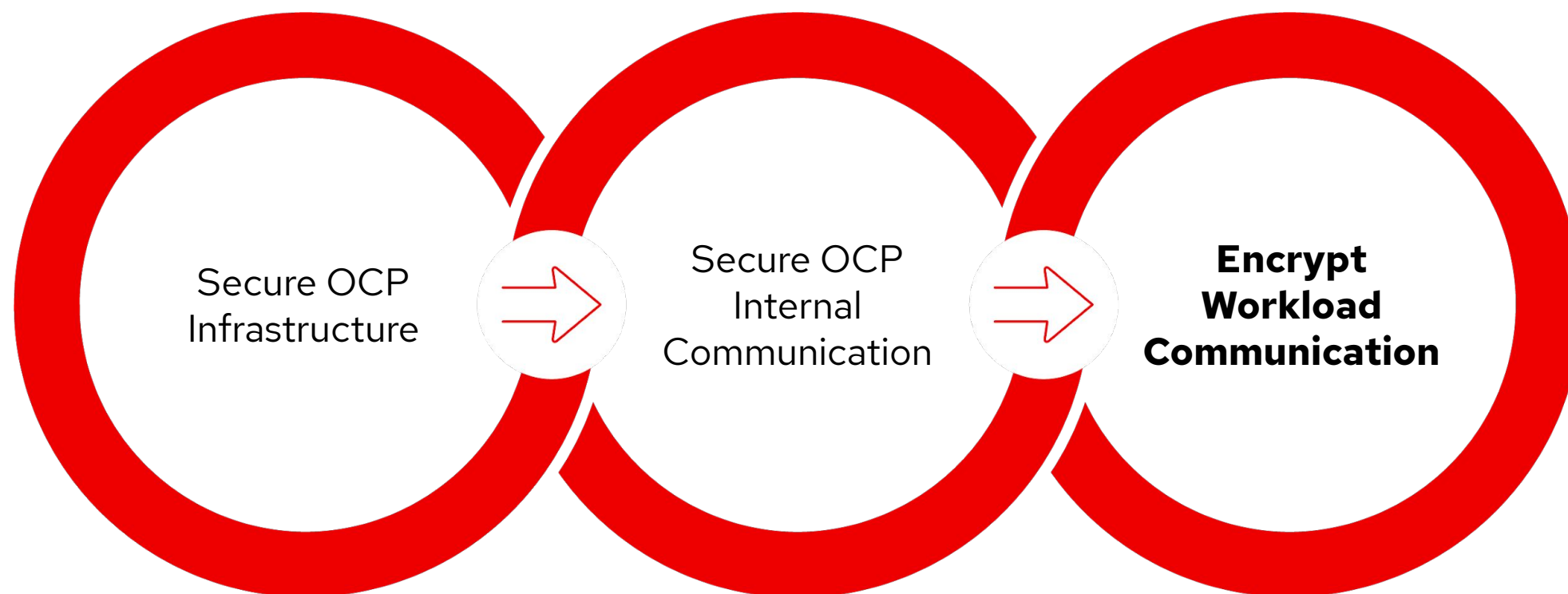


Figure 12 - Authorization Relationships

Identity Mining and SIAM Mining

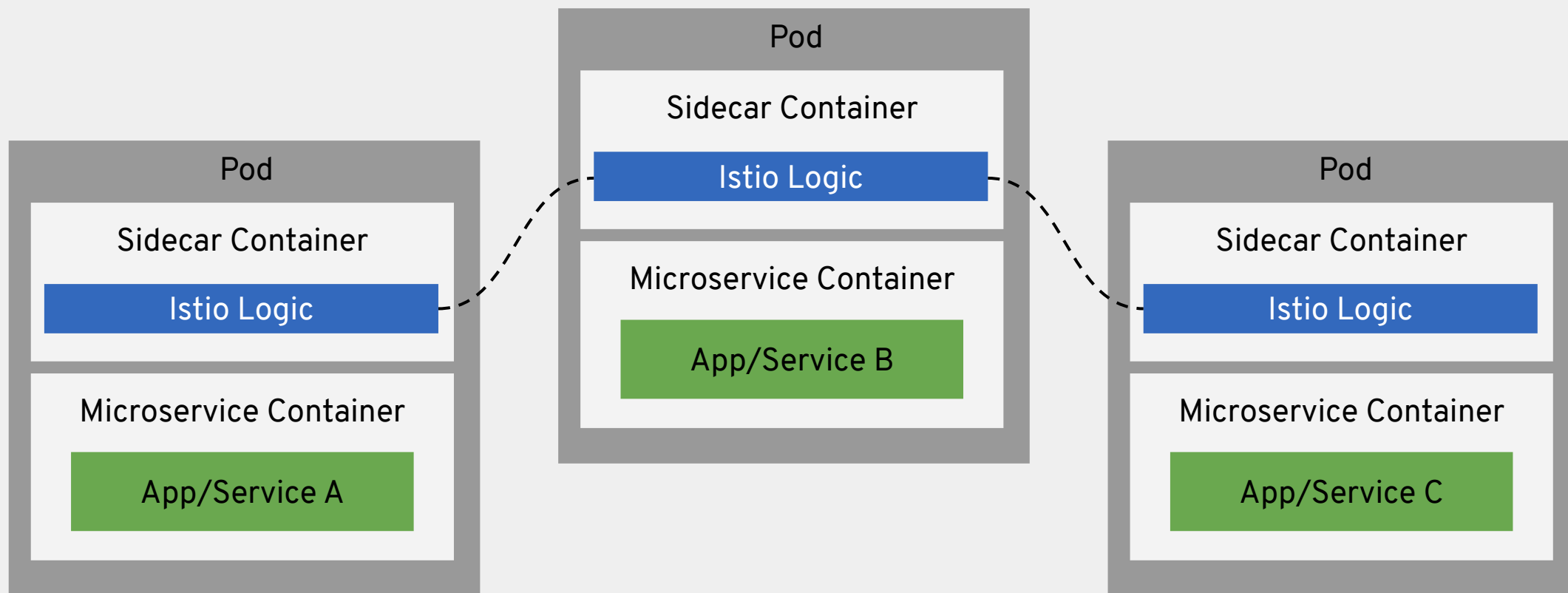


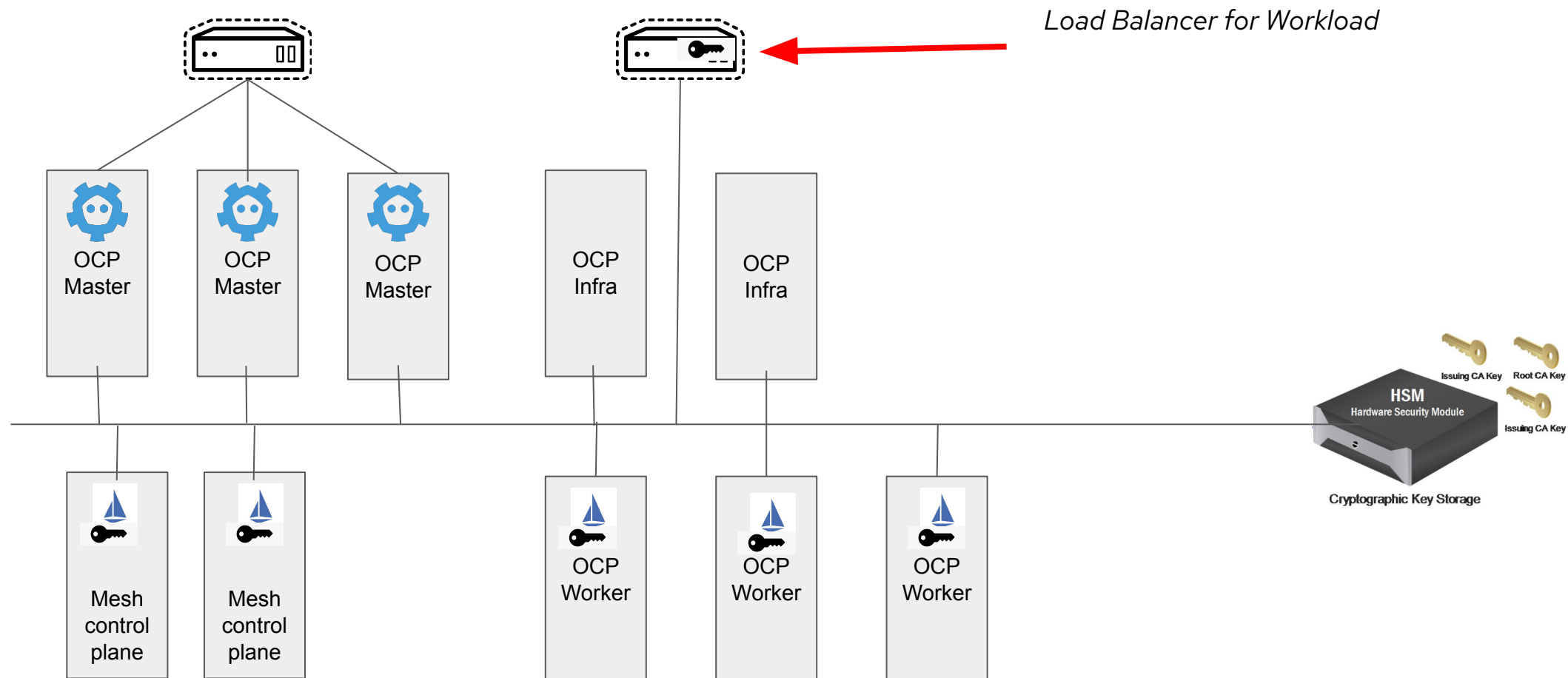
PKI in OpenShift



MICROSERVICES WITH ISTIO

connect, manage, and secure microservices transparently





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Thank you !
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Thank you

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