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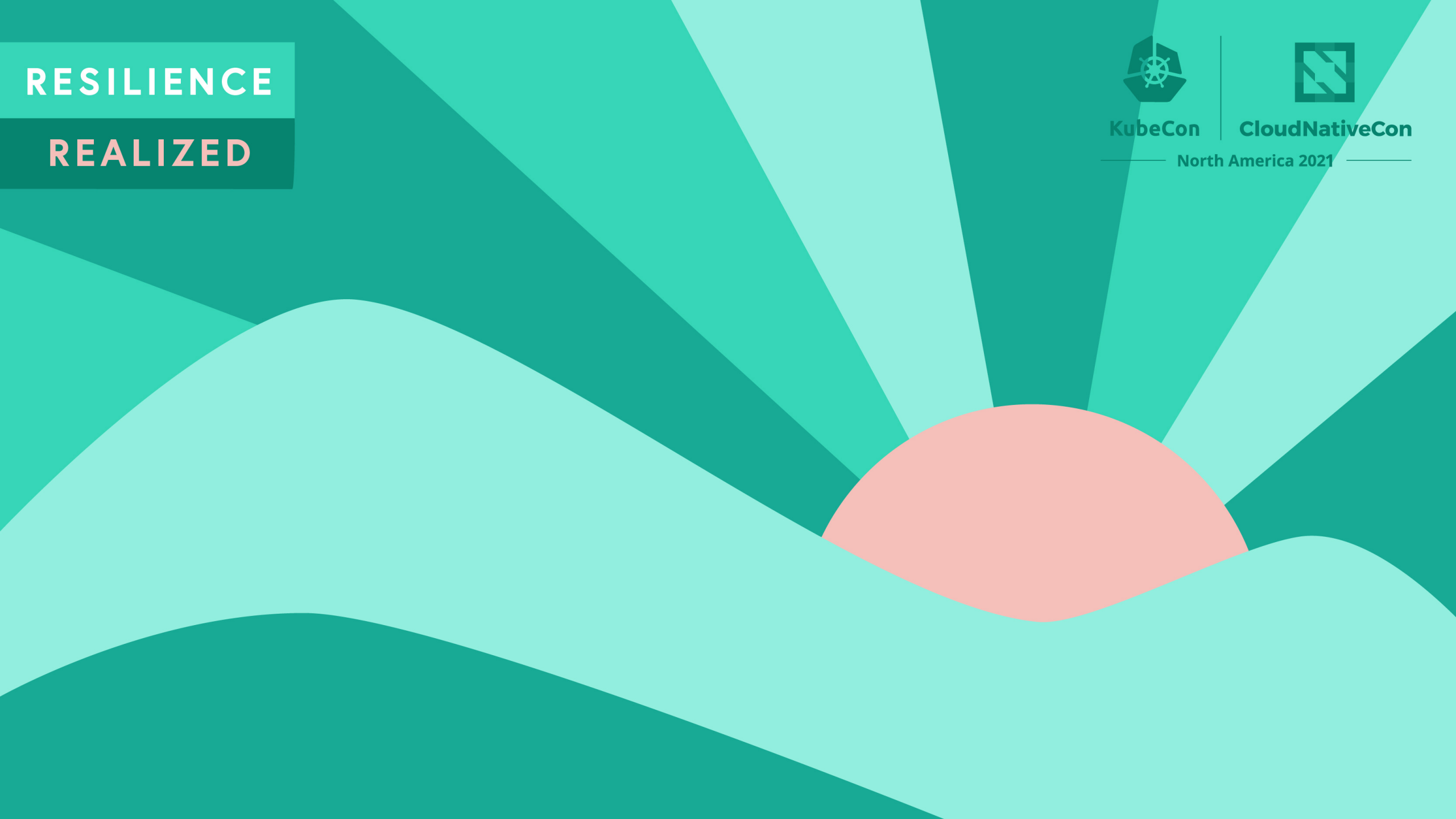


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Untangling the Multi-Cloud Identity and Access Problem With SPIFFE Tornjak

Brandon Lum (@lumjjb), IBM
Mariusz Sabath (@mrsabath), IBM

Introduction

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IBM Research
CNCF TAG-Security

@lumjjb

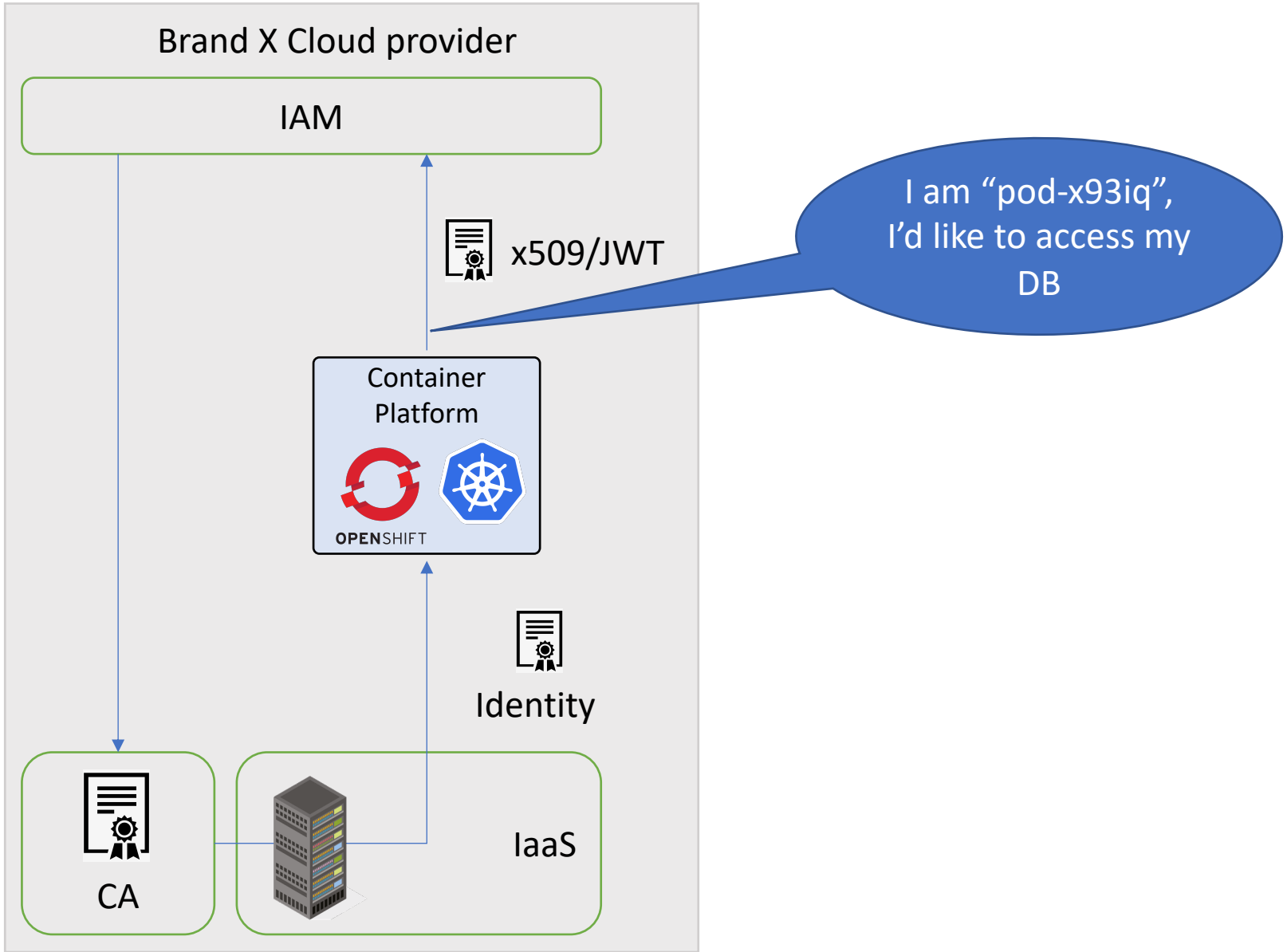
Mariusz Sabath
IBM Research

@mrsabath

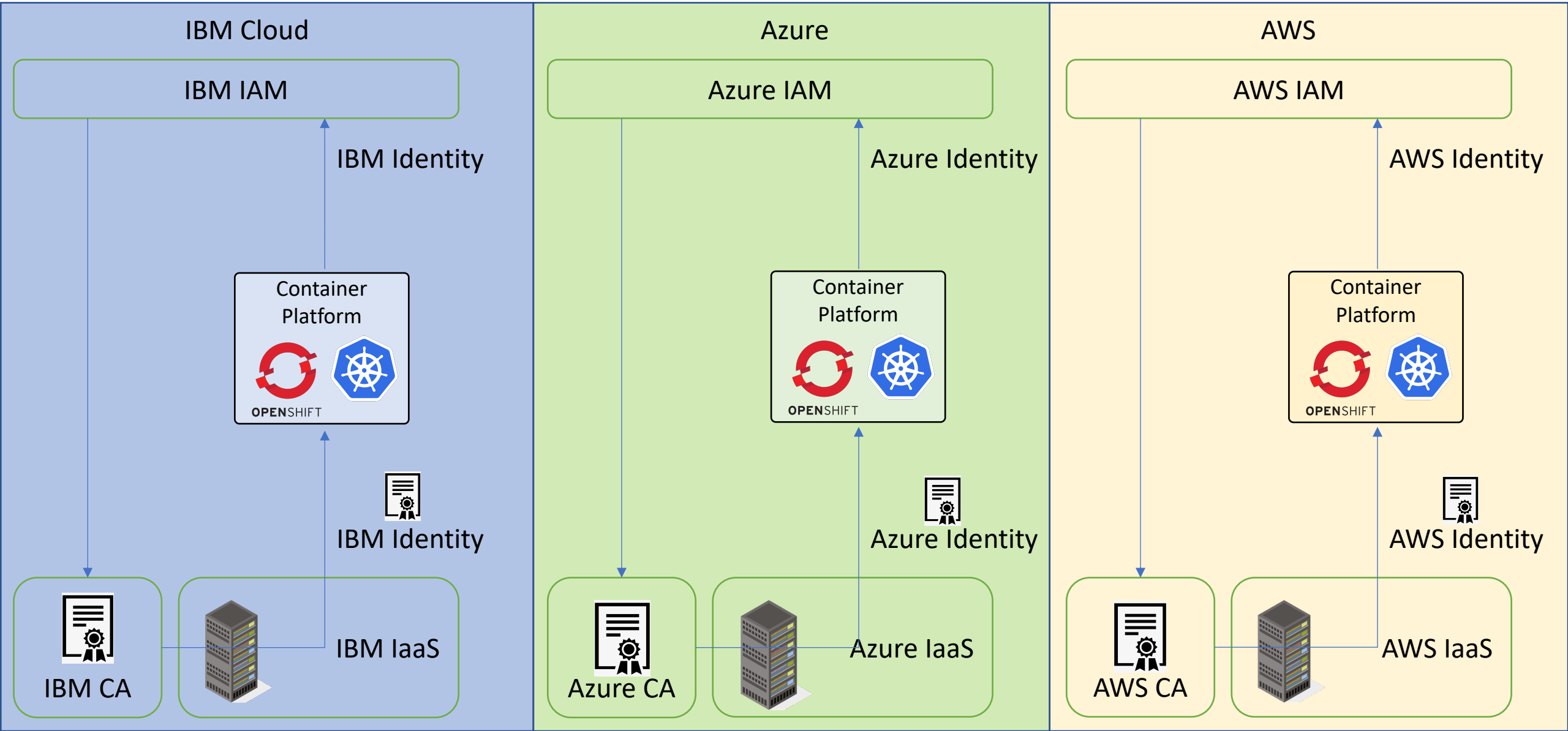
Overview

- Workload Identity
- The Multi Cloud access problem
- Solutions – with more problems!
- Universal/Organization-wide Workload Identity

Anatomy of Cloud Workload Identity



Workload Identity in Multi-cloud Scenarios



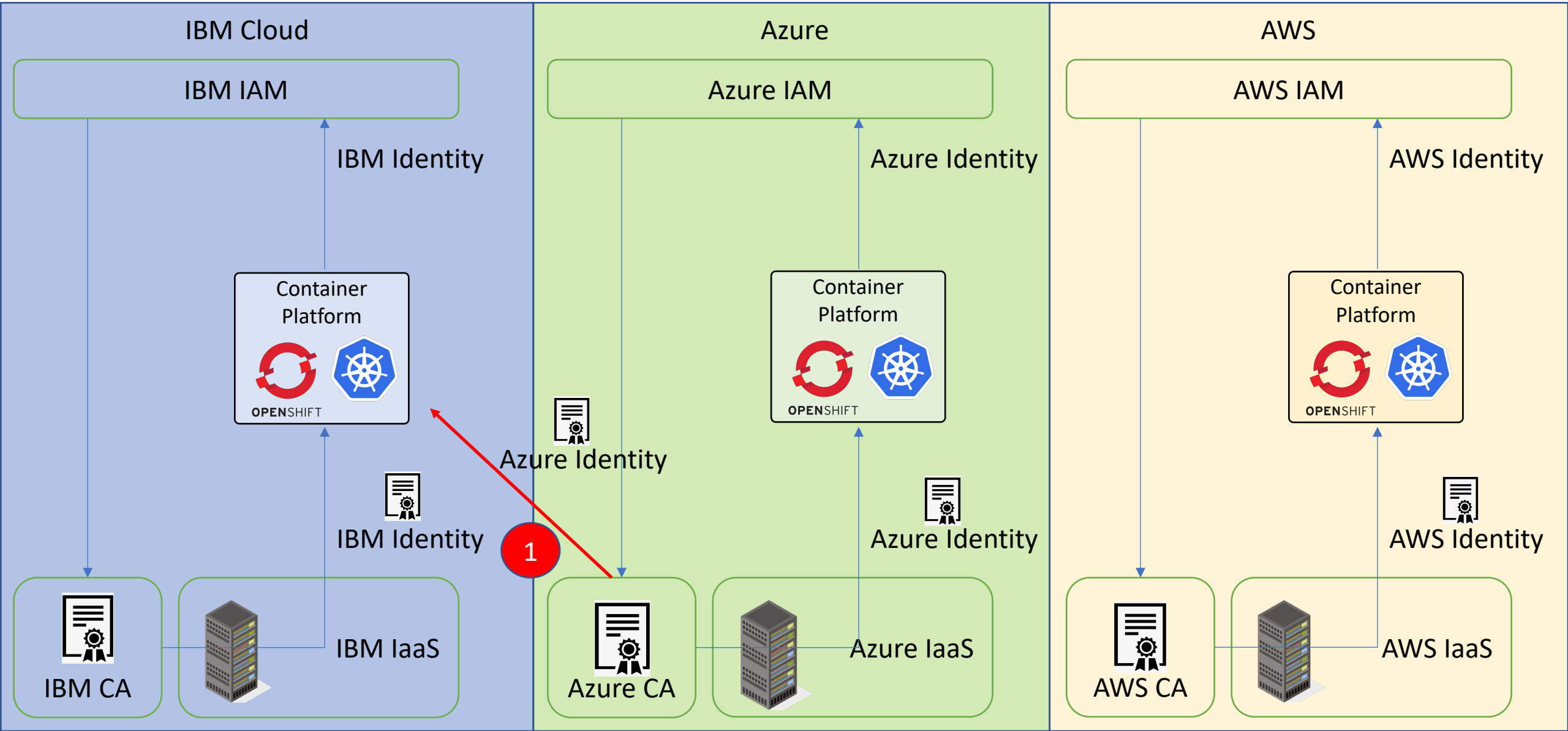
Status Quo

- Today, clouds provide workload identity and policy frameworks within their own domain which allows **strong authentication of workloads**, as well as **access control management**.

- Problem: I want to be able to access resources from one cloud to another, in a secure fashion.

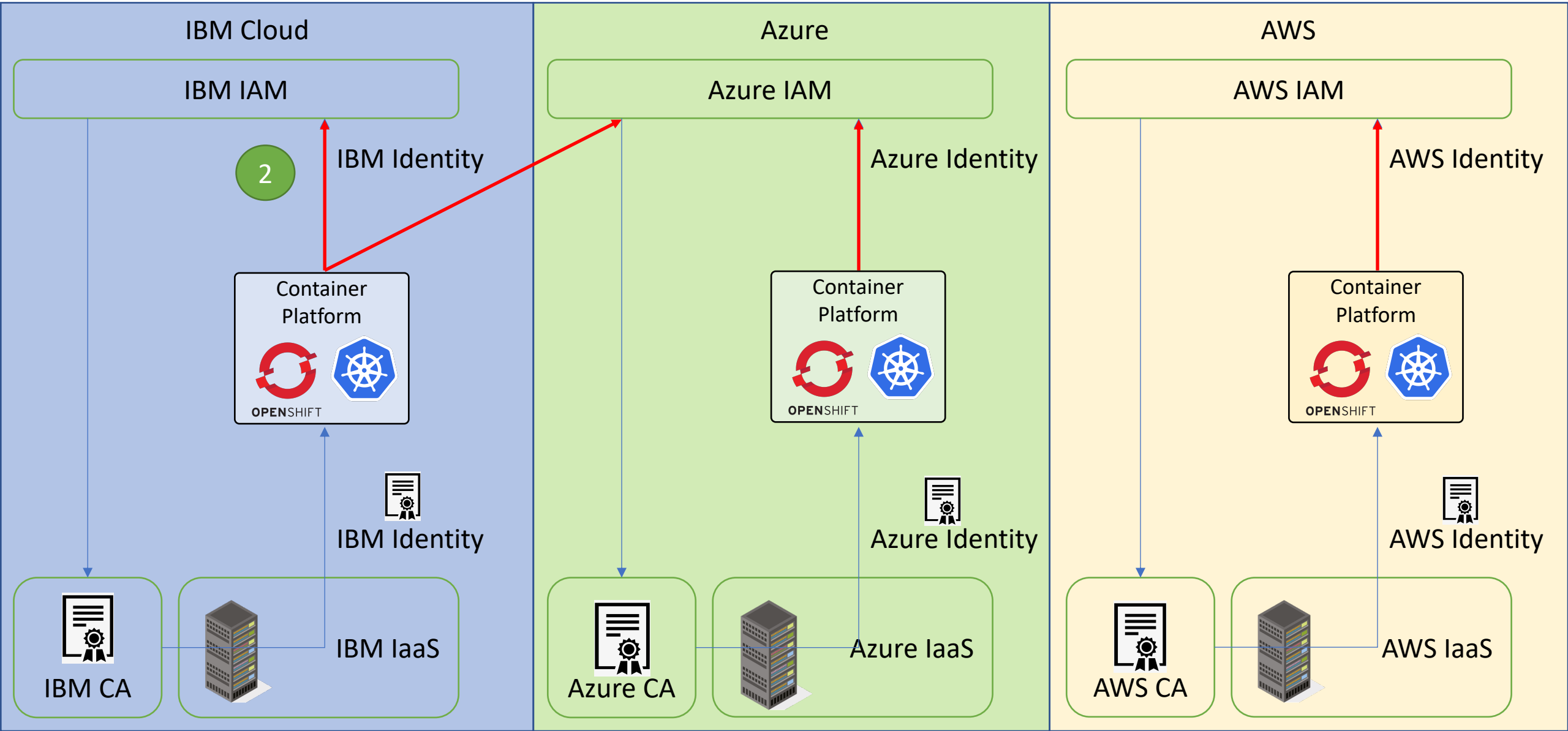
To configure cross cluster access can either:

1. Long-lived credentials (**simple**, **difficult to account blast radius**, **trusted intermediary required**)



To configure cross cluster access can either:

1. Long-lived credentials (**simple**, **difficult to account blast radius**, **trusted intermediary required**)
2. Cloud to cloud federation (**short-lived credentials**)



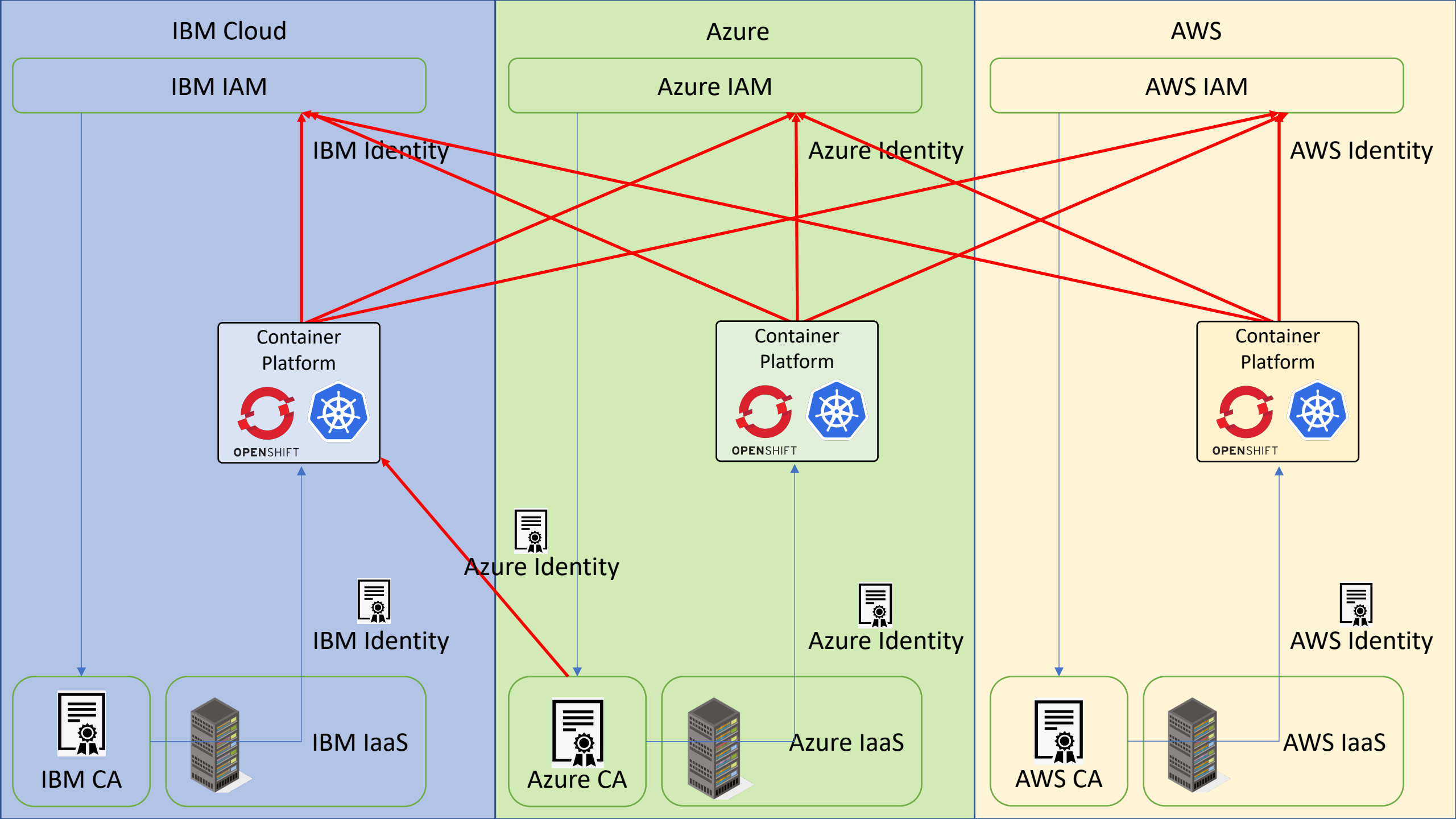
Solutions, and more problems

- I want to be able to access resources from one cloud to another

- Today's Solutions:
  - Most commonly: Naive (and non-secure) Approach: IAM long-term credentials
  - More secure approach: Pair-wise configuration of OIDC federation between all clouds

Solutions, and more problems

- Problems with secure approach
  - Support for this varies between clouds
    - AWS → gcloud easy
    - Gcloud → AWS hard
  - Schemas of identity are not consistent, require custom mapping and maintaining the trust relationship between pair-wise clouds
  - Pair-wise, unmaintainable at scale (quadratic complexity)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Azure IaaS
AWS CA
AWS IaaS

Question?

In our organizations, how do we manage user identities?

(Answer: org. wide/universally)

Why don’t we treat our workload identities the same way?

Universal Workload identity

- For all workloads, there is a single organizational identity scheme
- 1 federation point - “Organization” authority

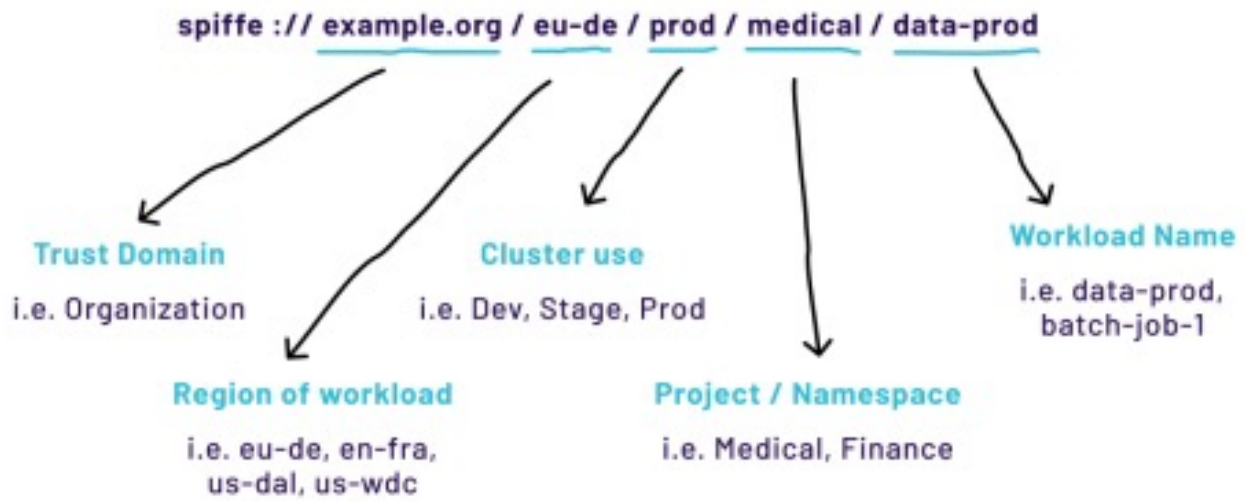
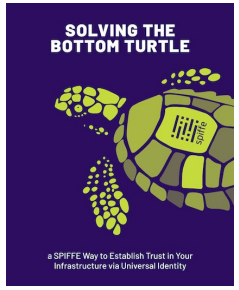
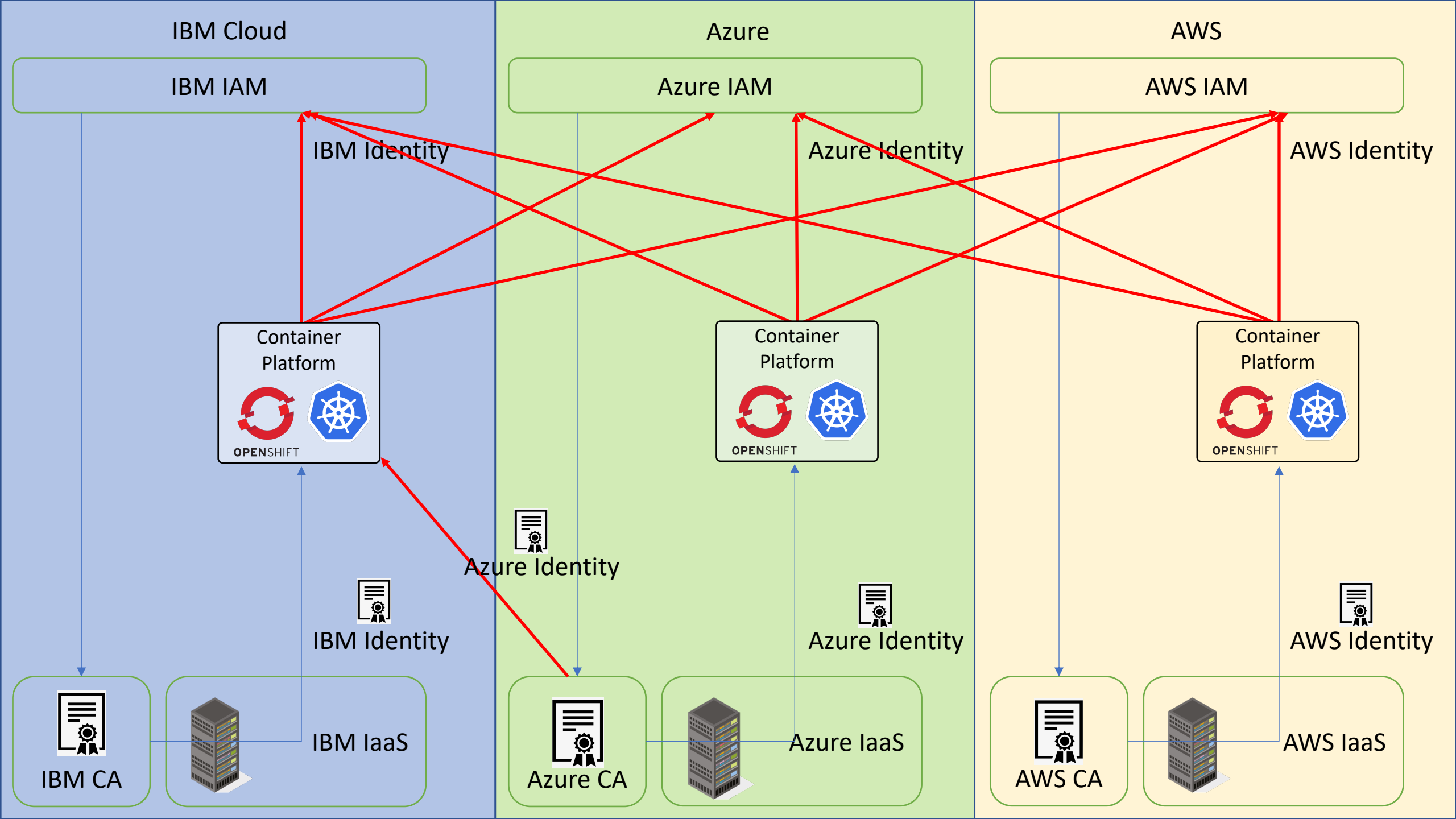


Fig. 8.1: Components of a SPIFFE ID and potential meanings at one organization.

Adapted from https://spiffe.io/book:

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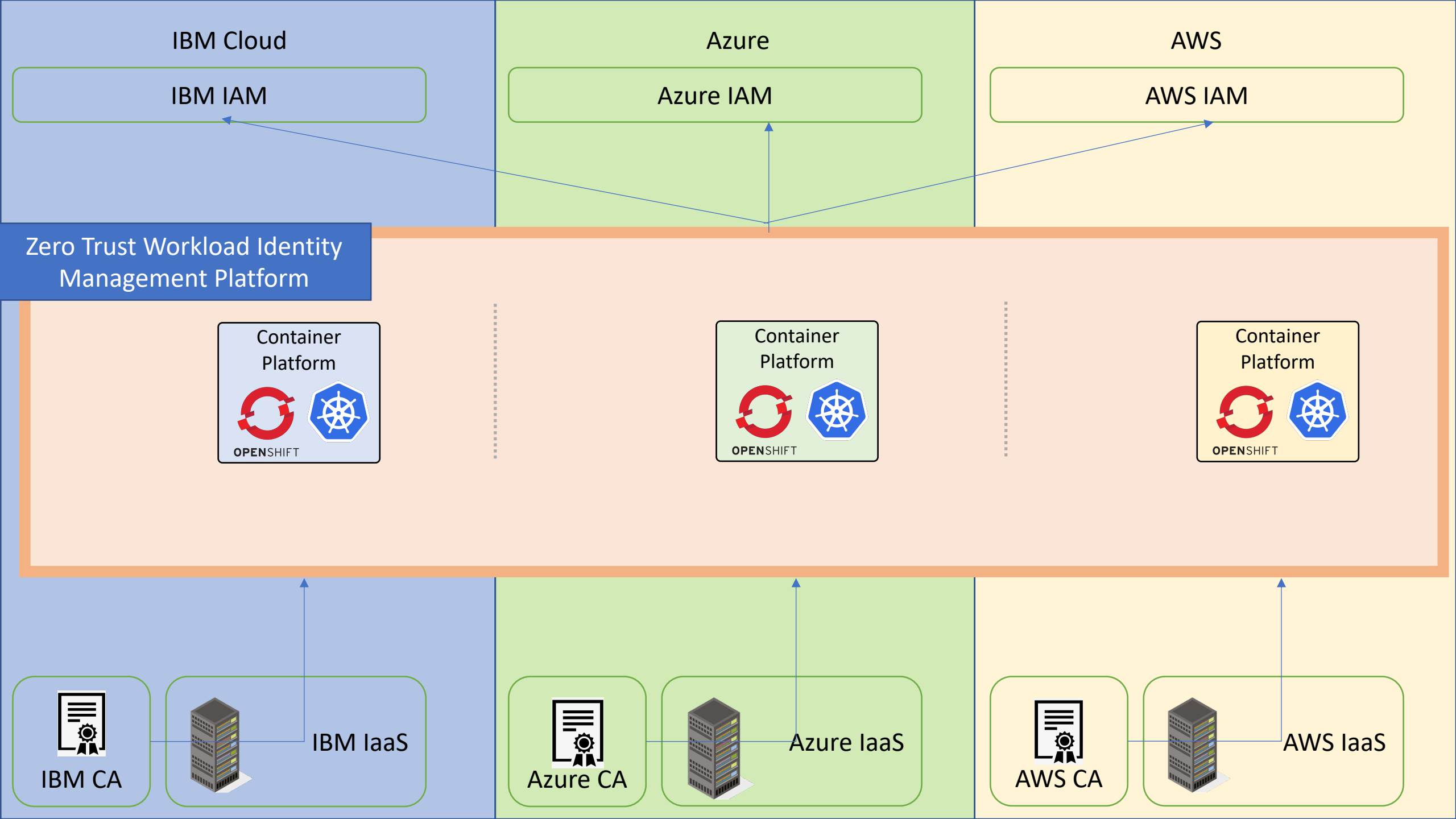
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Zero Trust Workload Identity Management Platform
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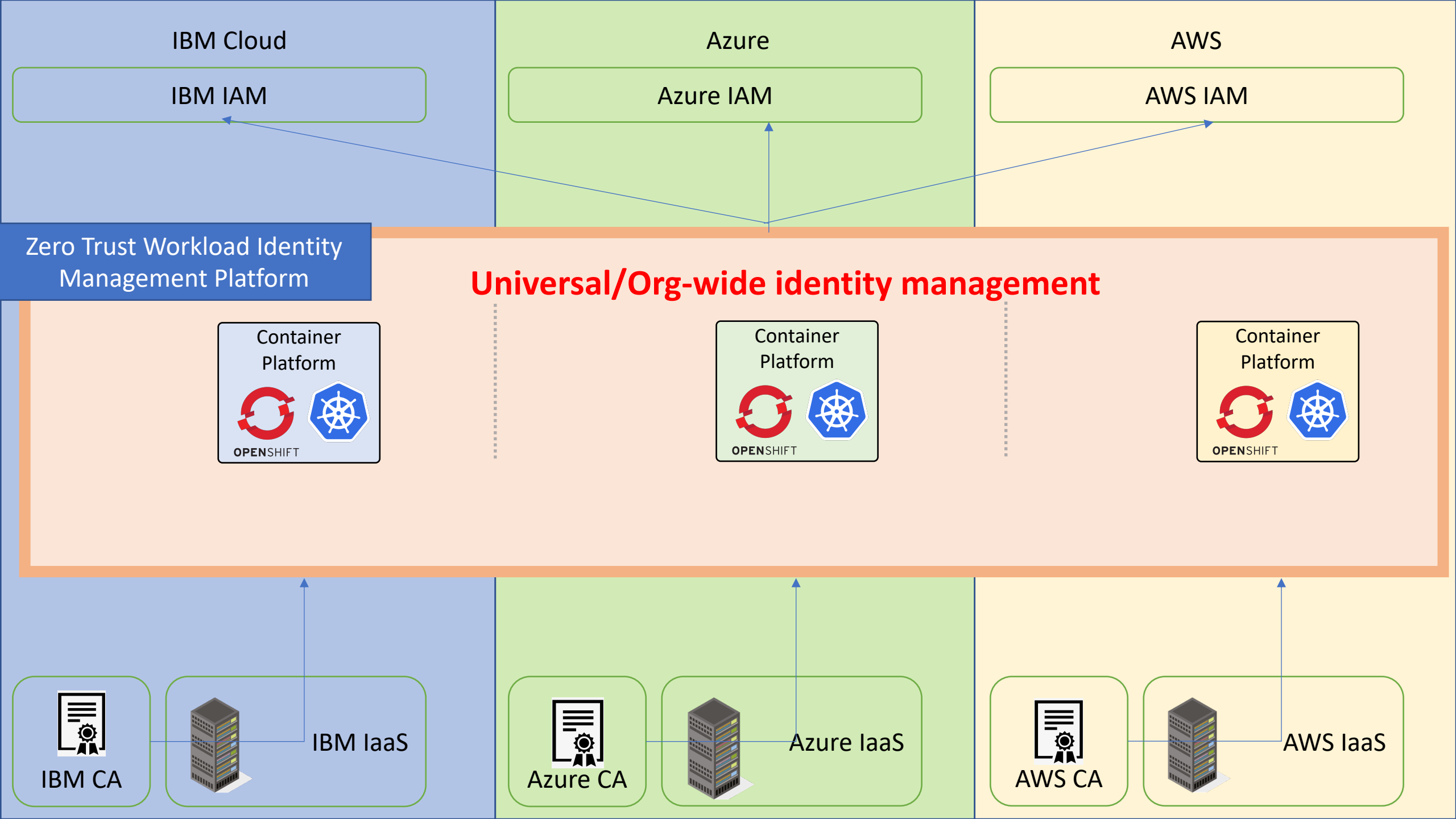
AWS CA
AWS IaaS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Universal/Org-wide identity management
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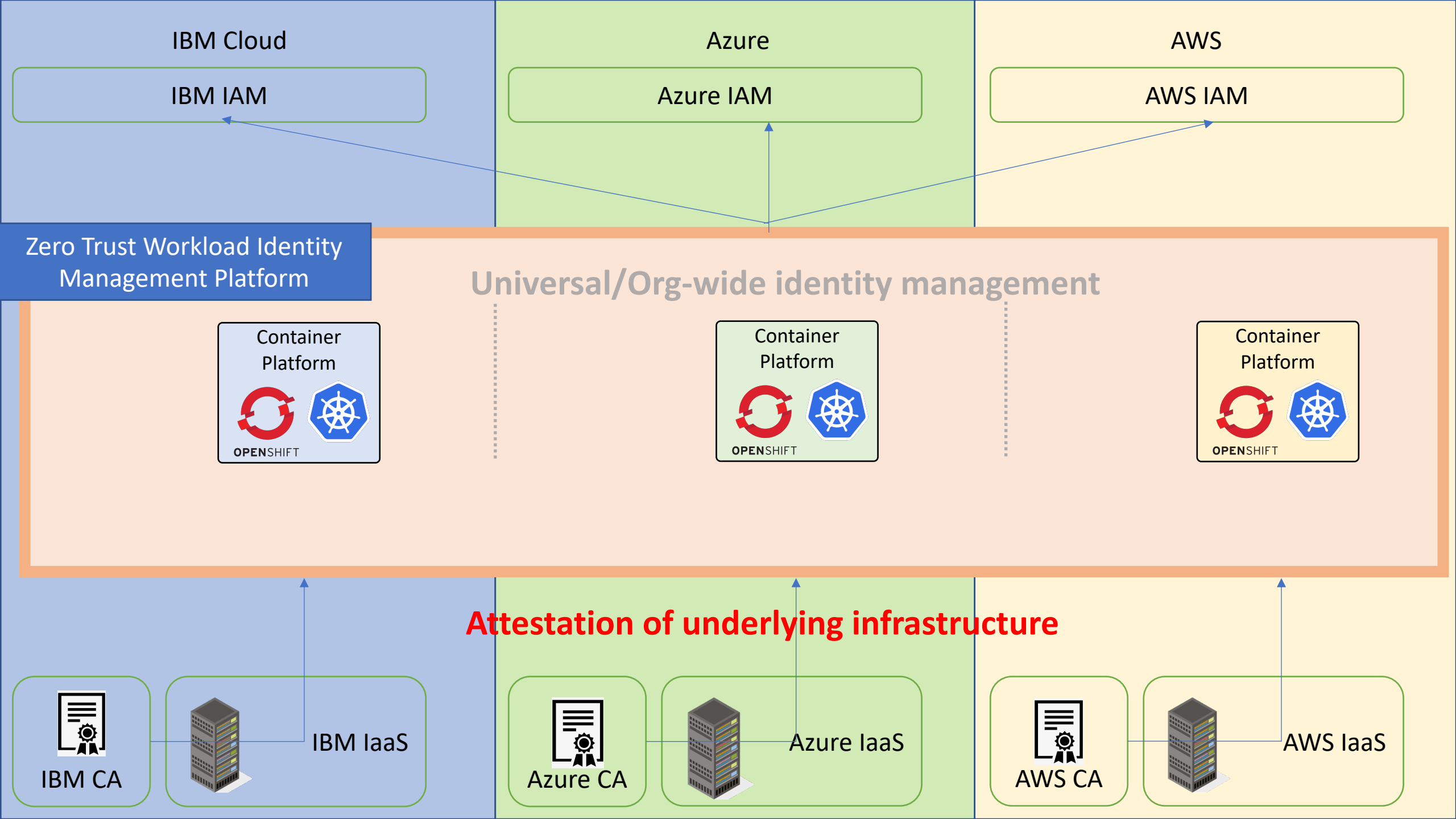
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Universal/Org-wide identity management
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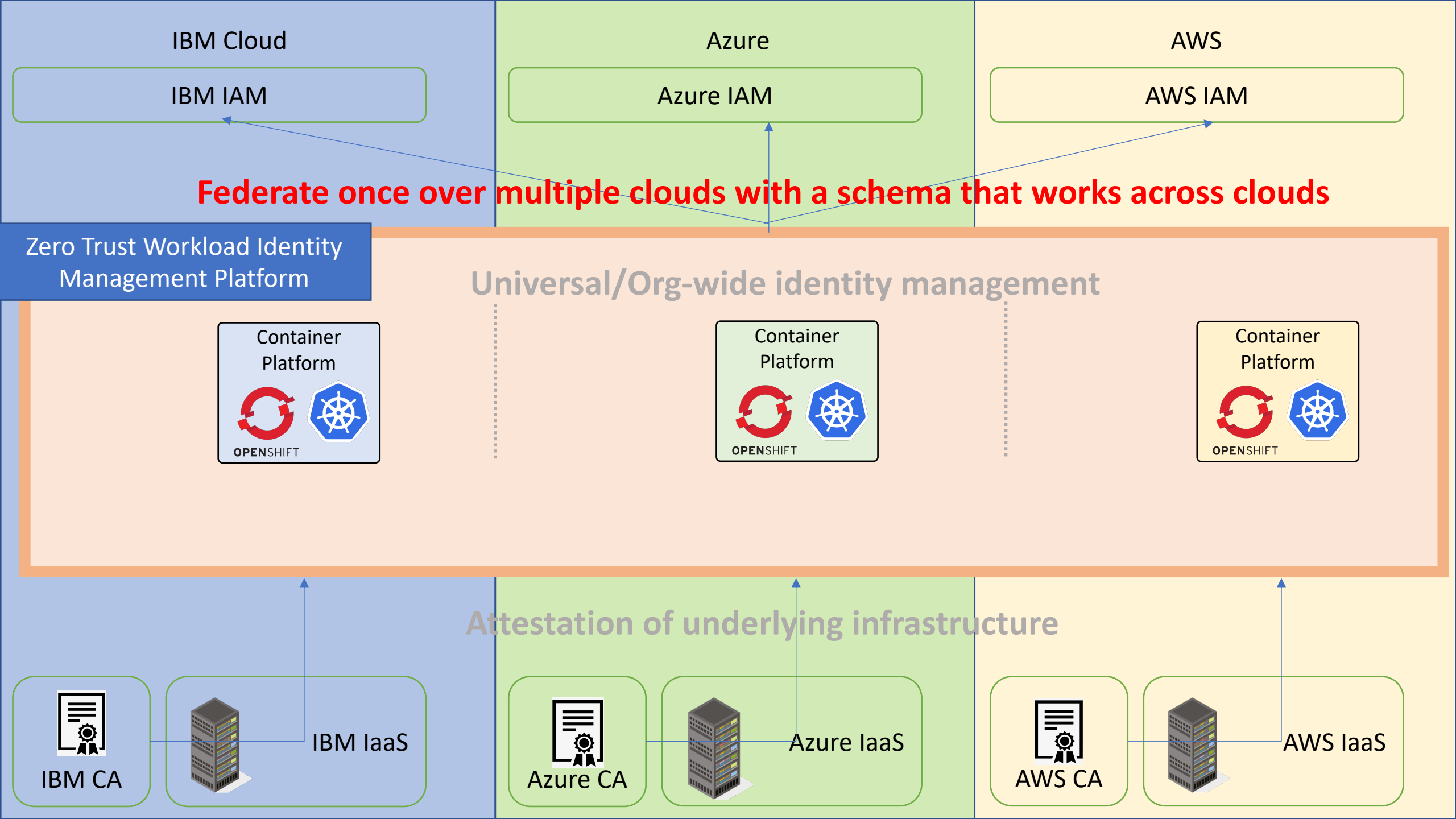
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Azure IAM
AWS IAM
Federate once over multiple clouds with a schema that works across clouds
Zero Trust Workload Identity Management Platform
Universal/Org-wide identity management
Container Platform
OPENSHIFT
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OPENSHIFT
Attestation of underlying infrastructure
IBM CA
IBM IaaS
Azure CA
Azure IaaS
AWS CA
AWS IaaS

IBM Cloud

IBM IAM

Azure

Azure IAM

AWS

AWS IAM

Federate once over multiple clouds with a schema that works across clouds

Zero Trust Workload Identity Management Platform

Universal/Org-wide identity management

Container Platform

Container Platform

Container Platform


spiffe


SPIRE

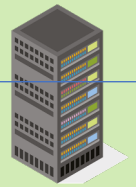

tornjak

Attestation of underlying infrastructure


IBM CA


IBM IaaS


Azure CA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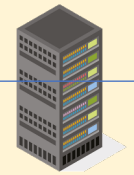

AWS IaaS

Zero Trust workload identity framework

CLOUD NATIVE COMPUTING FOUNDATION

spiffe

- Defines identity format
- Specifies how workloads securely obtain identity

SPIRE

- Implementation of SPIFFE
- Issuance/rotation of x509/JWT
- Provide zero trust attestation of workload & infrastructure
- Provide single point of federation with OIDC discovery

tornjak

- Control plane/UI for SPIRE
- Provides visibility/management for workload identities
- Together with k8s registrar, provides universal workload identity

Trade offer

- **You install:**
  - Zero Trust workload identity framework

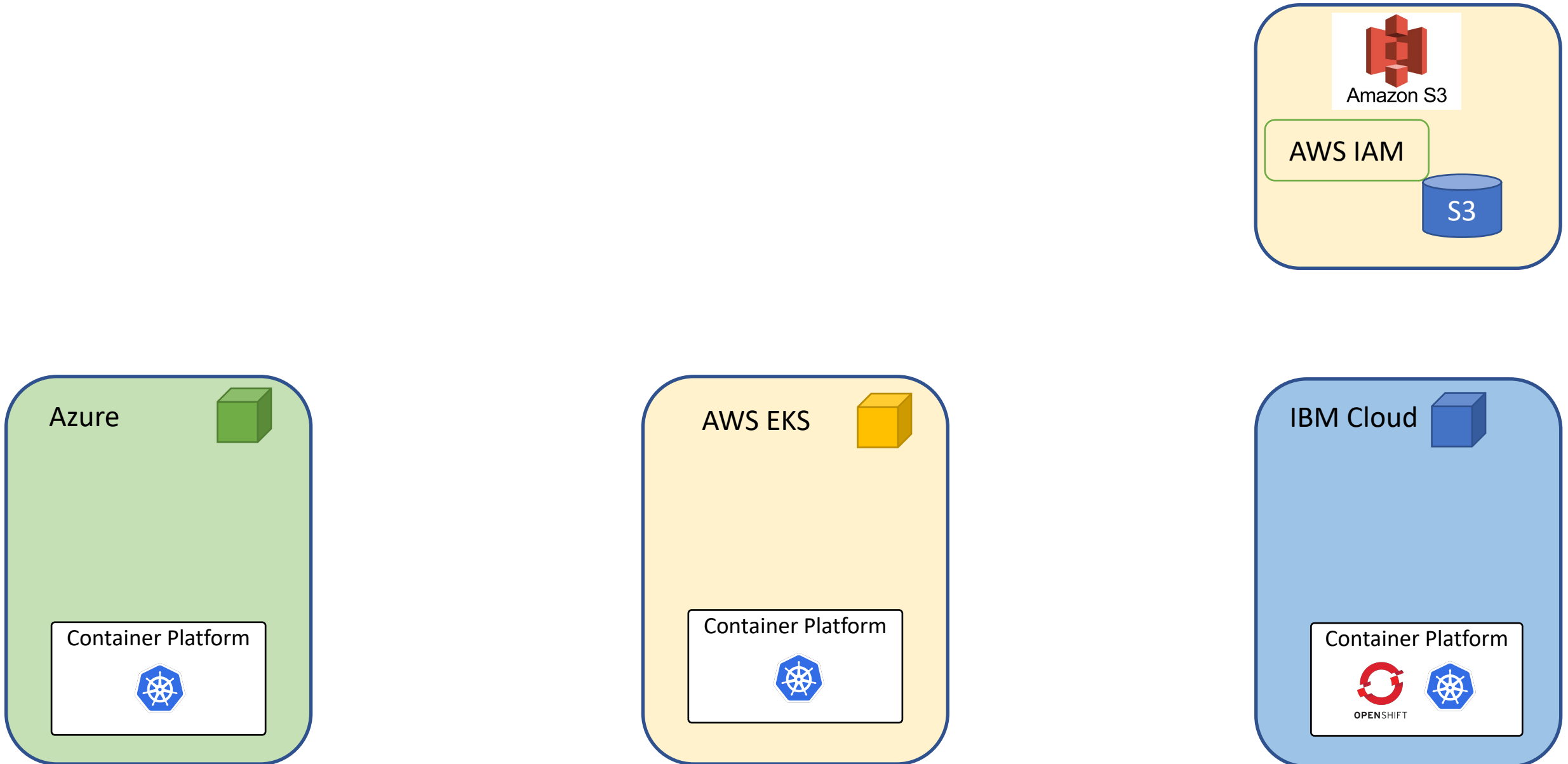
tornjak

SPIRE

spiffe

  - Define organizational workload identity scheme

- **You receive:**
  - Zero Trust infrastructure attestation
  - Single configuration per cloud to federate all cloud access
  - **Centralized management of organization identities/policies to handle multi cloud complexity**
  - **Auditing of workload identities, attestation and policies**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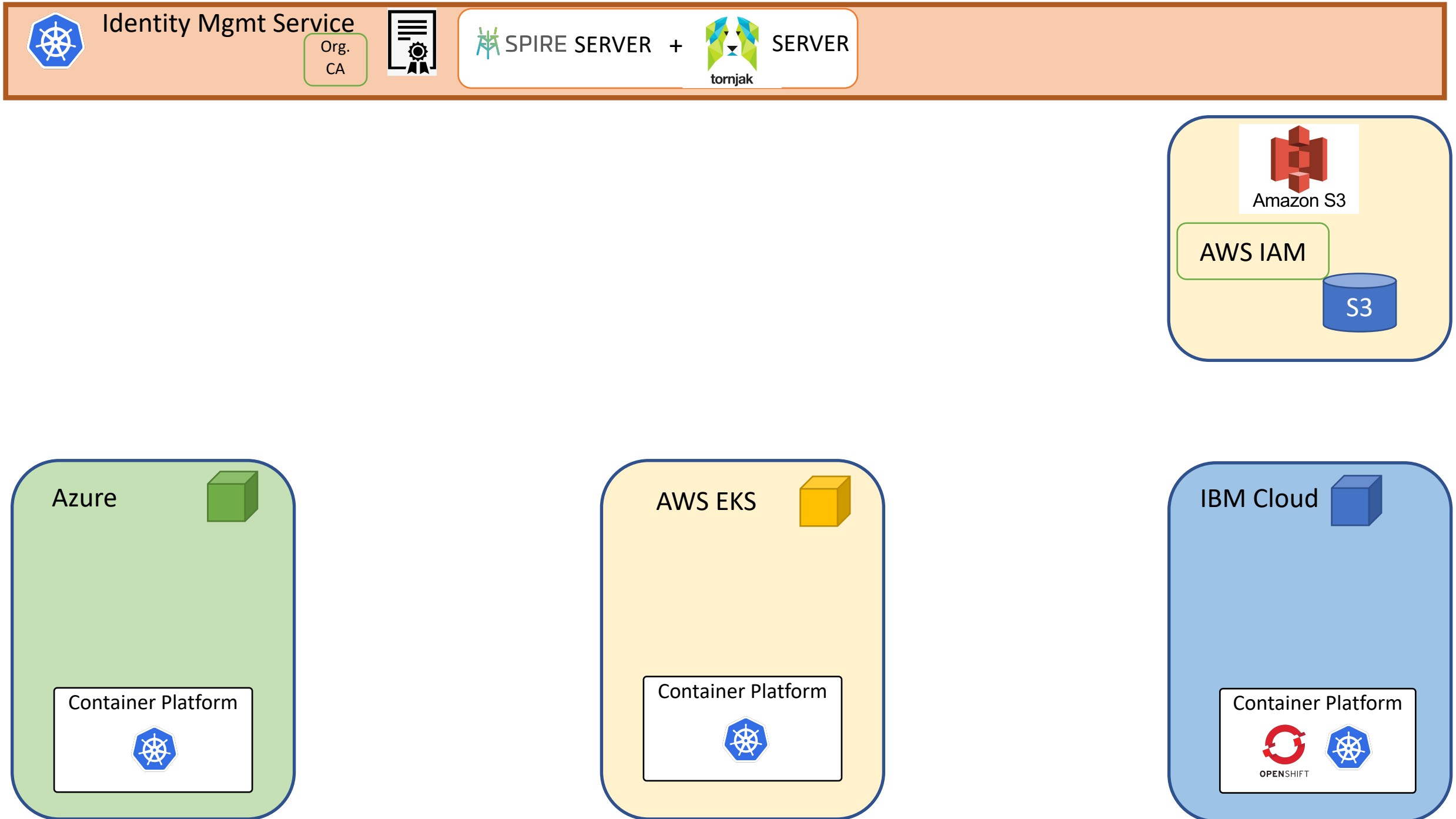
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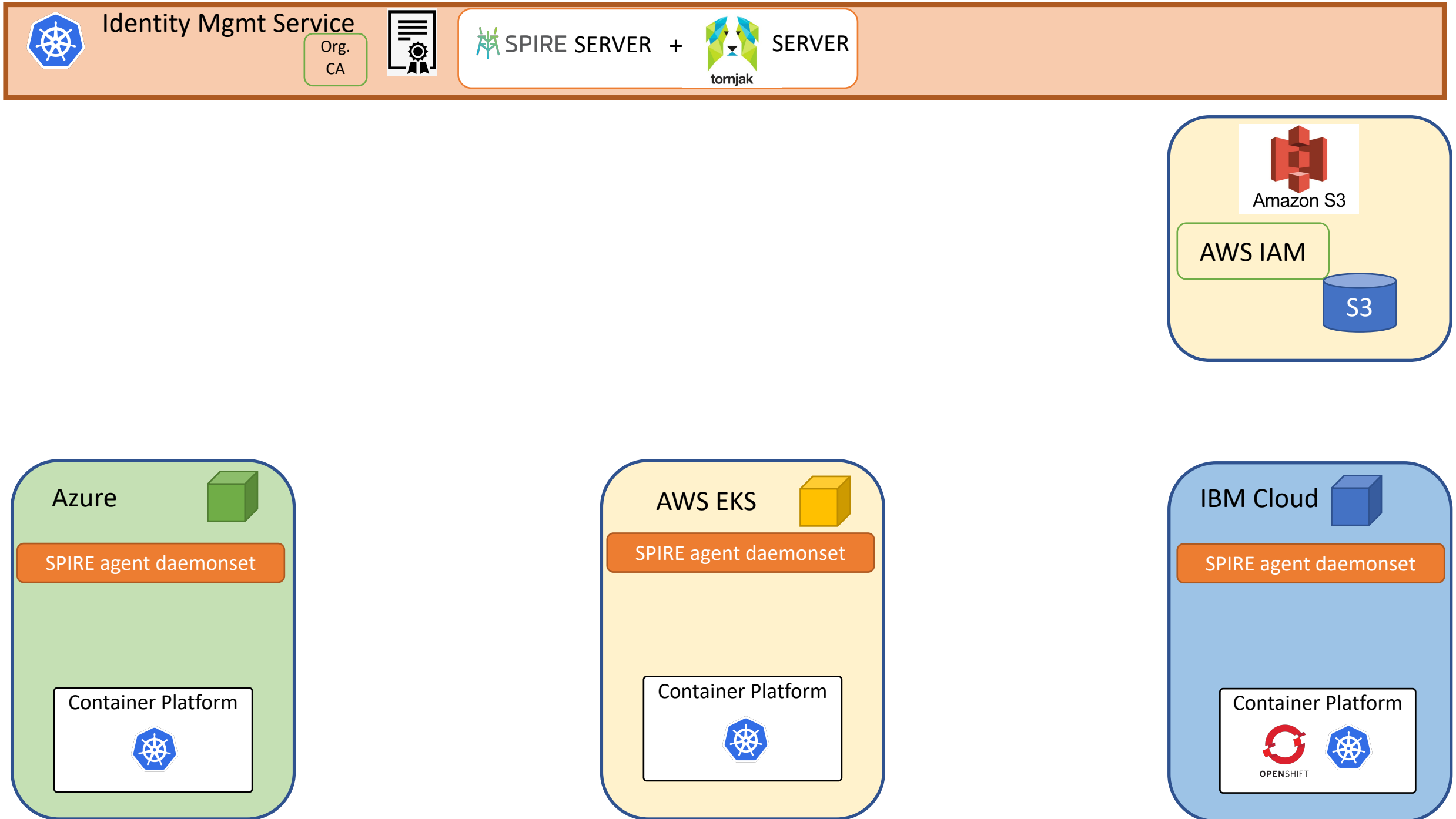
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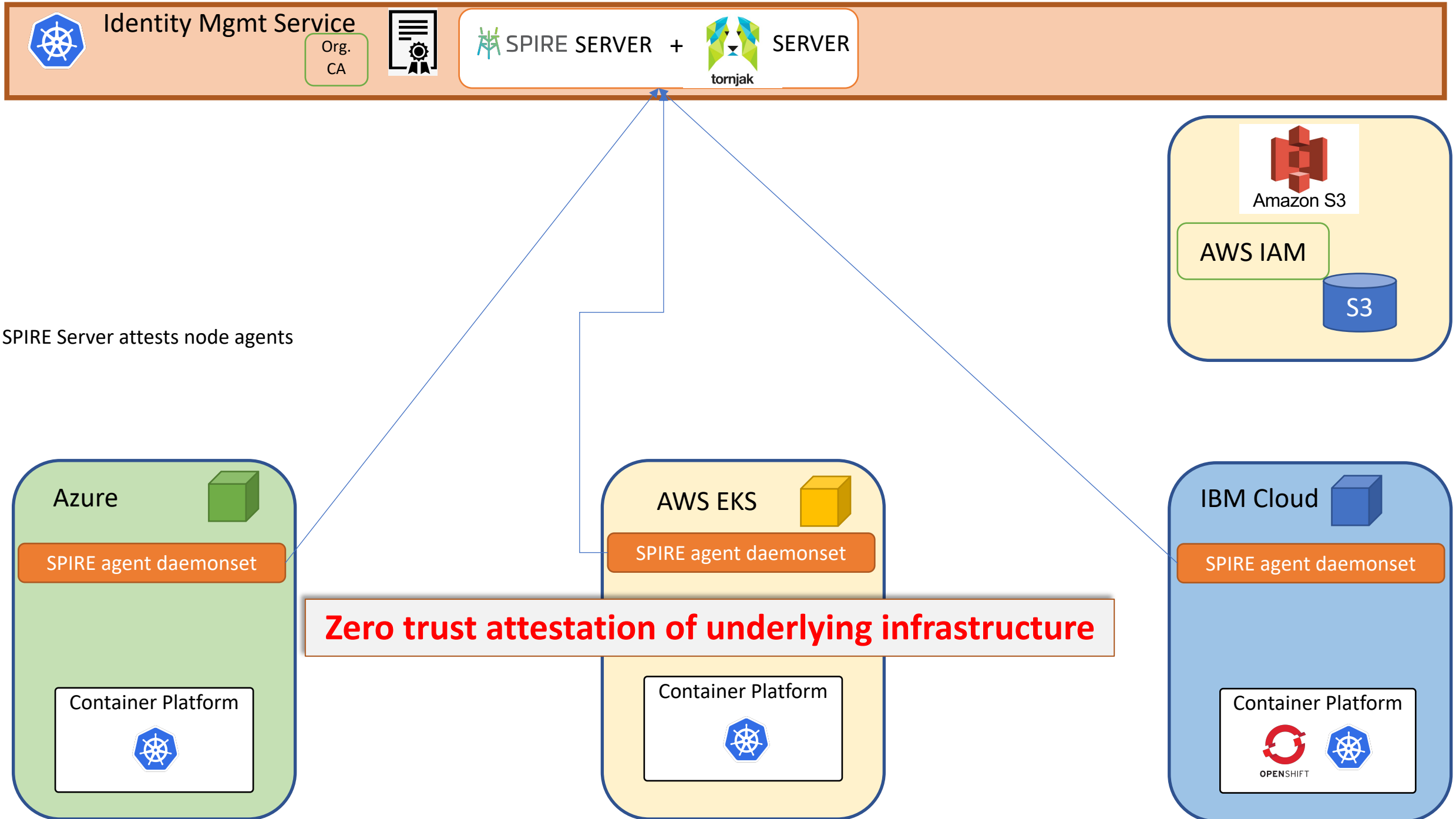
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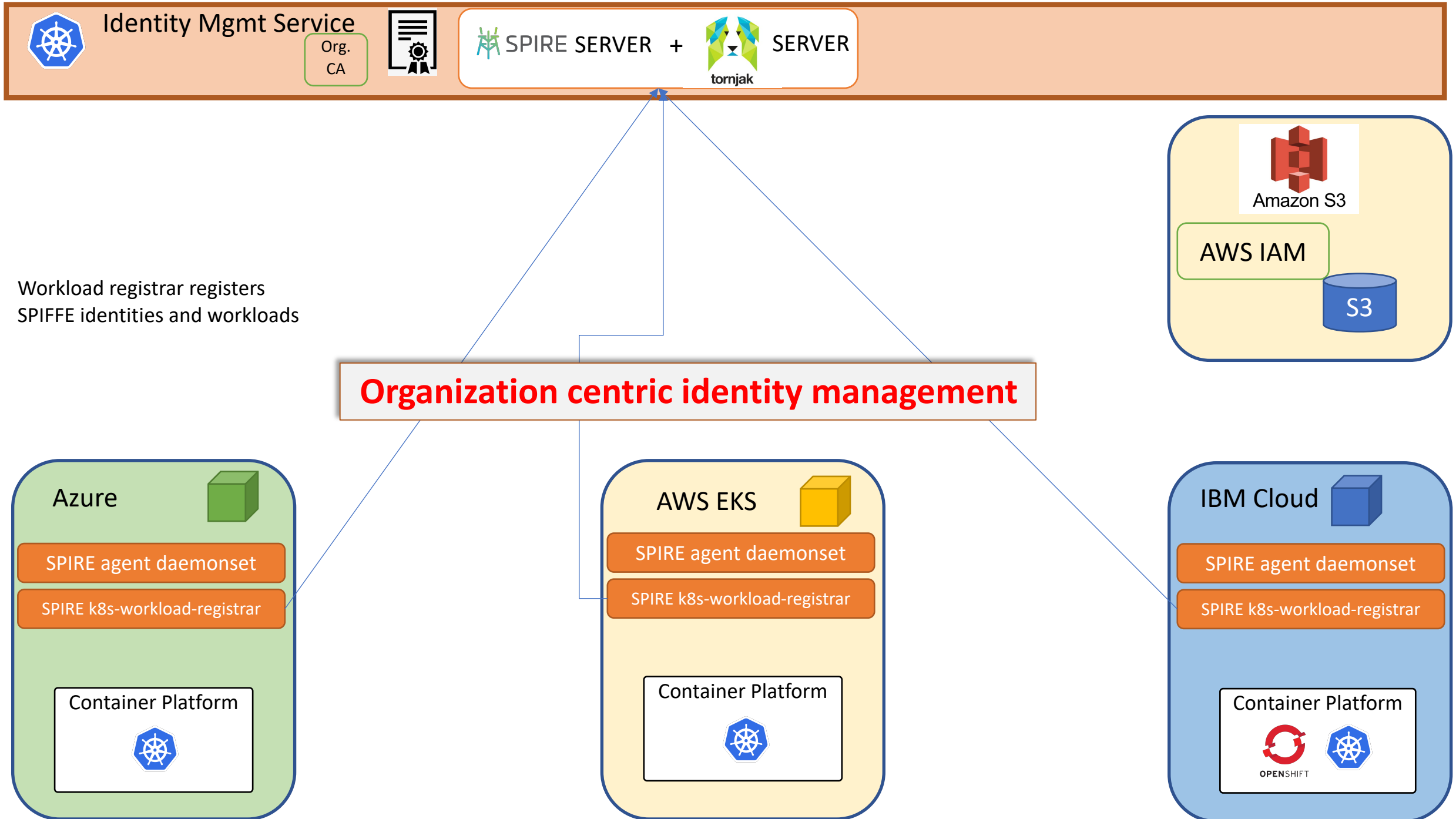
IBM Cloud
SPIRE agent daemonset
Container Platform
OPENSHIFT
Zero trust attestation of underlying infrastructure


Identity Mgmt Service
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S3
Workload registrar registers
SPIFFE identities and workloads
Organization centric identity management
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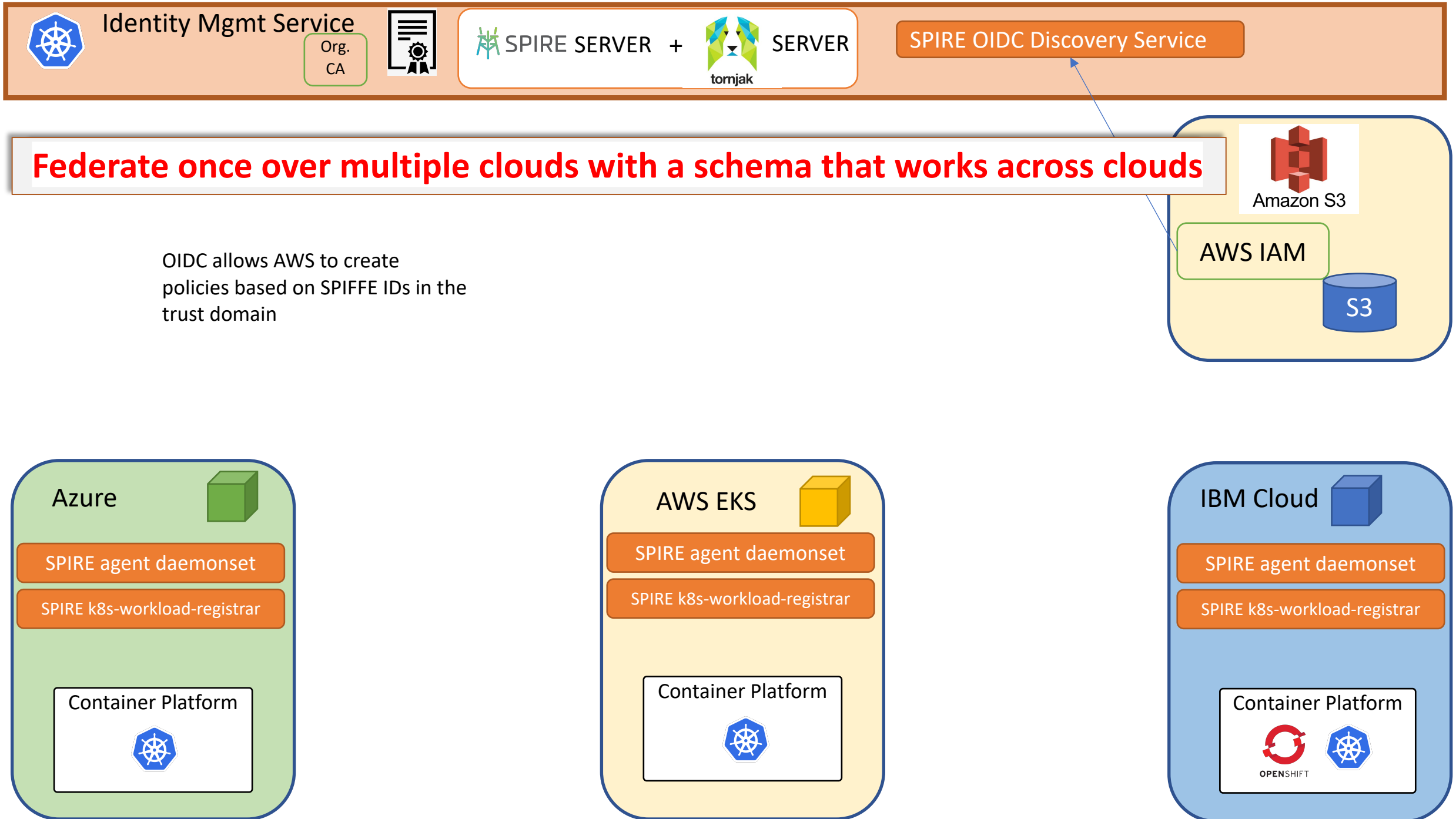
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OIDC allows AWS to create policies based on SPIFFE IDs in the trust domain
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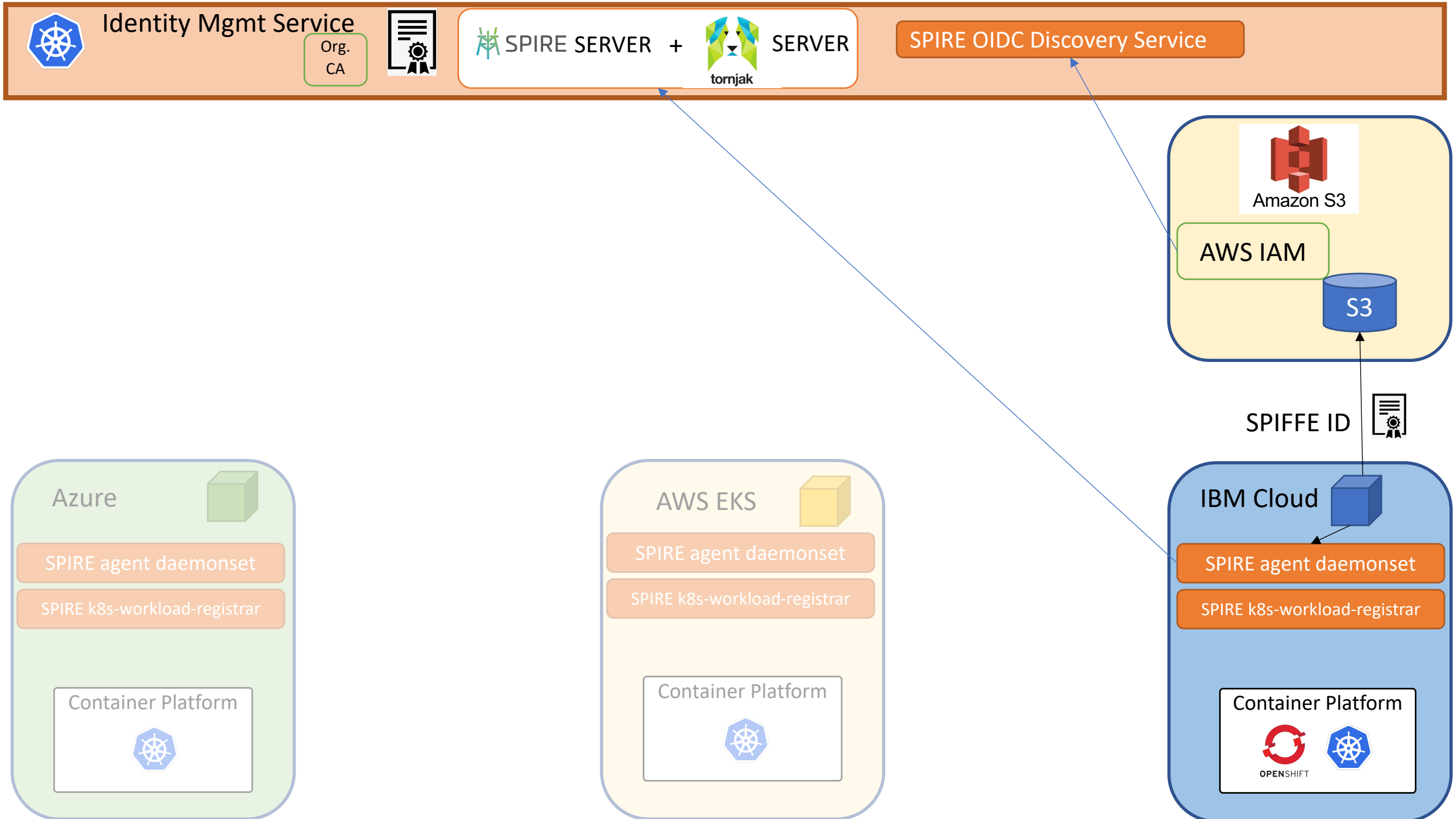
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Container Platform
OPENSHIFT

Example of Universal Workload identity

spiffe://<TrustDomain>/region/<Region>/cluster_name/<ClusterName>/ns/<Namespace>/sa/<ServiceAccount>/pod_name/<PodName>

Access Policy for S3 bucket :

- Region must be in the US “us-*”
- Any cluster name
- Namespace is “mission”
- ServiceAccount is “elon-musk”
- PodName starts with “mars-mission”

"spiffe://openshift.space-x.com/region/us-east-1/cluster_name/tsi-kube01/ns/default/sa/elon-musk/pod_name/mars-mission-7874fd667c-72mtp"


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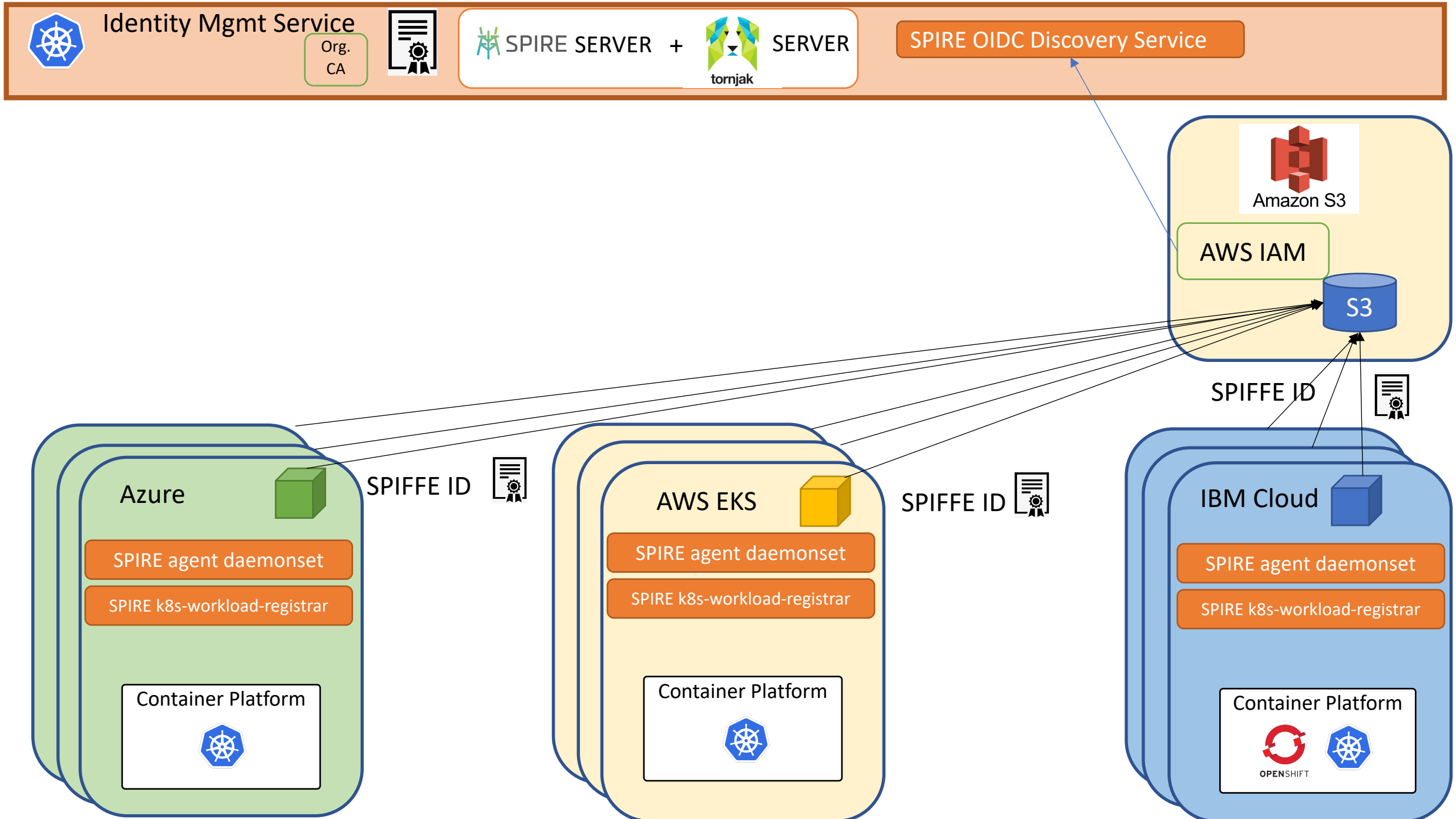
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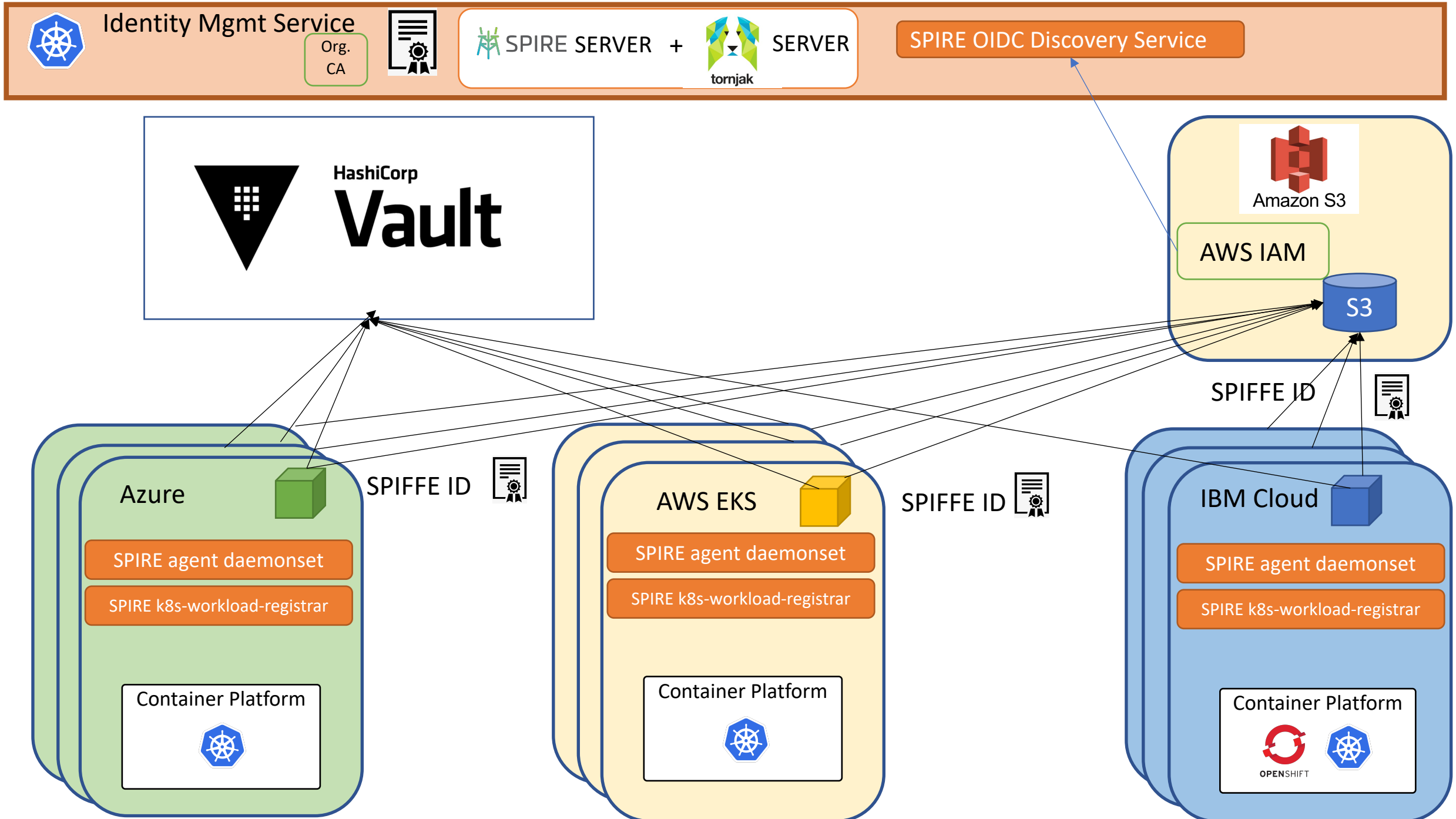
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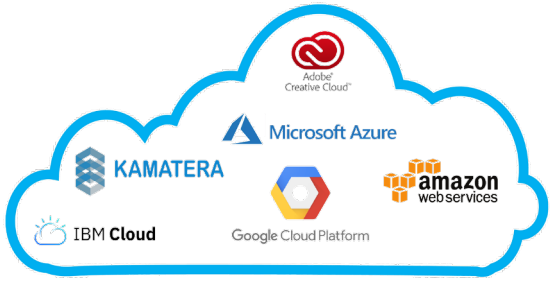
Interface to any IAM, SaaS, etc. via standard OIDC + policy framework



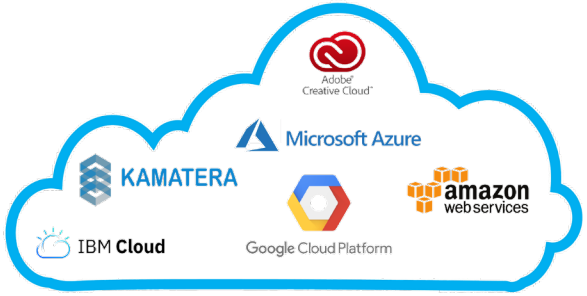
Zero Trust Workload Identity Management Platform

Container Platform

Container Platform

Container Platform

Interface to any cloud provider or attestation service



Call to Action

- Tornjak is now part of the CNCF / SPIFFE community (https://github.com/spiffe/tornjak)

- Tornjak is in active development! Come join us!
  (Looking for >=1 maintainer from another organization)

- Upcoming features in the roadmap
  - Registration RBAC OPA policy integration
  - Log integration – audit your SVID use/provisioning

- Give us feedback! https://github.com/spiffe/tornjak/issues/1
- Demo helm charts available at: https://github.com/IBM/trusted-service-identity
- Demo recordings: https://www.youtube.com/channel/UCmZKFwbge6WrUCP3OPss6mg

Questions?

tornjak

in SPIRE

Start herding your “cattle”

Brandon Lum

IBM Research

@lumjjb

Mariusz Sabath

IBM Research

@mrsabath

“Your shepherd, Louie, has retired. I’m Mr. Smathers. I will be your grazing-resource coördinator and flock welfare-and-security manager.”