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How to Choose the Right Proxy Architecture for Microservices-Based Application Delivery

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As an active member of the Cloud Native Computing Foundation, Citrix is proud to present this webinar with the support of and in association with CNCF

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Agenda

- Importance of choosing the right architecture
- Quick recap of L4 & L7 load balancing
- 4 architecture options
- Deep dive into each architecture: 7 attributes
- Citrix solution at a glance

Your Presenters

Pankaj Gupta

Senior Director
Cloud Native Application Delivery @Citrix

A cloud native evangelist, Pankaj advises on product and go-to-market strategies for Citrix application delivery solutions.

Mikko Disini

Director
Cloud Native Application Delivery @Citrix

Mikko leads cloud native product management for Citrix ADC with a focus on production-grade application delivery solutions.

Challenges of Choosing the Right Proxy Architecture

How do you make the best decision for an existing or new business-critical application when you must consider:

- Each stakeholder has unique needs and evaluation criteria: e.g., developer, platform team, networking team, DevOps, SecOps, SRE, app owner
- Load balancing for north-south and east-west (inter microservices) traffic
- The tradeoff between benefits and complexity
- Architectures are complex
- Rapid pace of technology and open source innovation

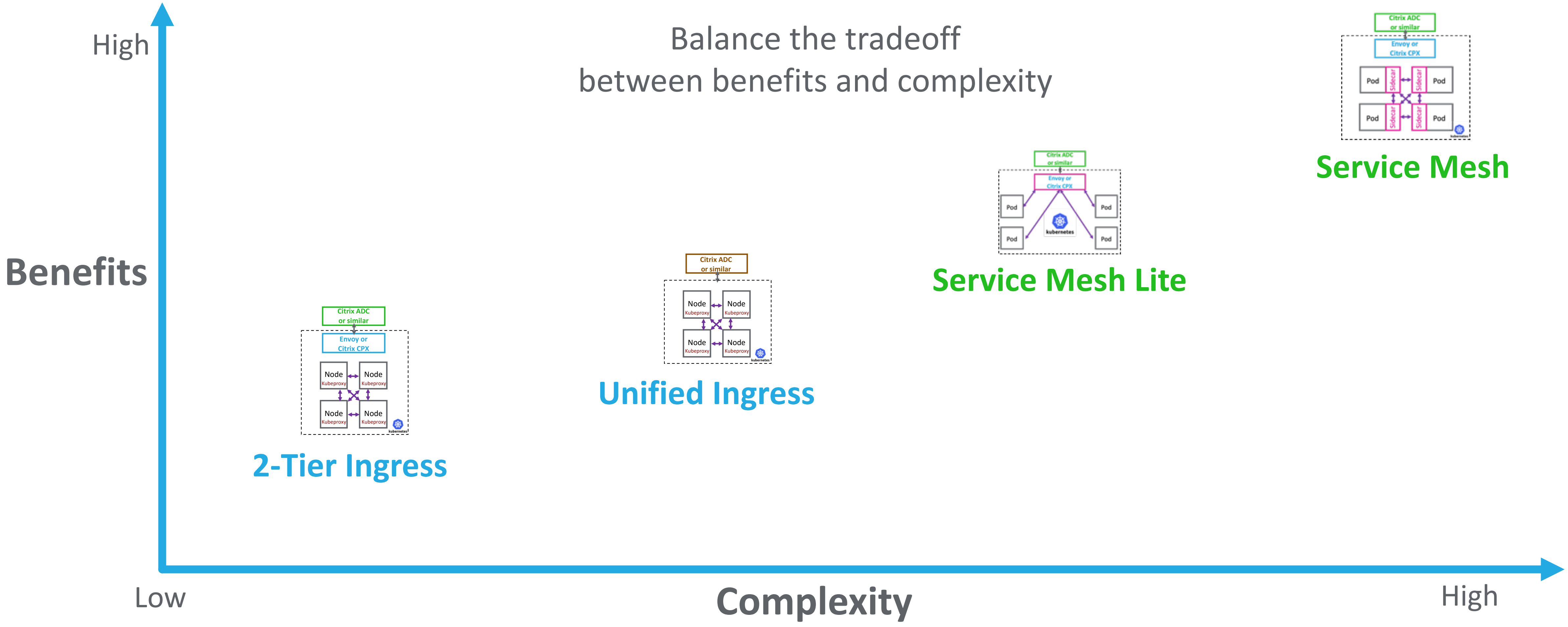
Recap: L4 vs L7 Load Balancing / Traffic Management

	L4	L7
Load Balancing	Basic load balancing • Based on IP address & port only HTTP/S blind No content (payload) rewrite & switching: Inability to change anything on the wire	Advanced load balancing • Based on URL – images, text, video • Based on client information – browser, OS, device, language Takes advantage of the HTTP/S packet info. Designed for apps of today & tomorrow Supports content rewriting: Apps with hard-coded URLs, mergers & acquisitions, publishing internal URLs, misconfigured apps, respond to malicious traffic. Can parse the payload and apply changes; allows making smarter content optimization and security decisions like app firewalling along with doing proxy
Session Persistence	Very limited: Only based on client IP address	Advanced session persistence for better user experience Can use cookies – identify users to provide persistent experience Better experience for stateful applications
Resource Monitoring	Health checking limited to Ping and TCP handshake only	Advanced customizable health checks Application-level visibility for better observability and load balancing decisions Enables circuit-breaking capabilities
App Security	Very limited due to just IP address and port visibility Lacks deep packet inspection	Advanced protection due to deep packet inspection Examples: web application firewall, L7 DoS protection, application stack vulnerabilities based on signature analysis, anomaly detection

Architecture Choices for Microservices-Based Applications

Move to cloud native at your pace

Balance the tradeoff
between benefits and complexity



2-Tier Ingress

Unified Ingress

Service Mesh Lite

Service Mesh

Diverse Stakeholders Have Unique Needs

DevOps

Faster release & deployment cycles
CI/CD & automation
Canary & progressive rollout

Developers

User experience
Troubleshooting
Microservice discovery & routing

Platform Team

Platform governance
Operational efficiency
Developer agility

SRE

Application availability
Observability
Incident response
Postmortems

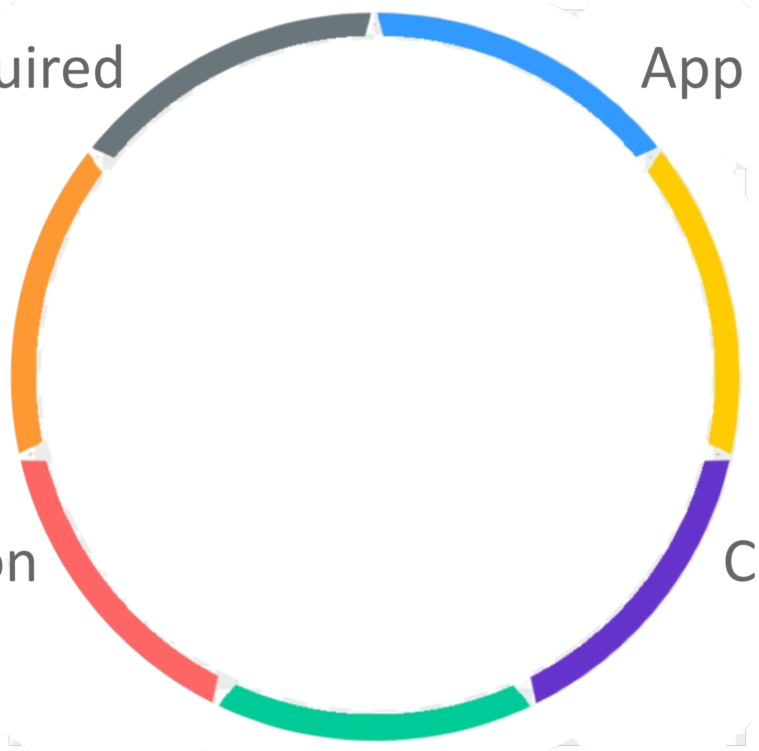
NetOps

Network policy & compliance
Manage, control & monitor network
Resources & capacity planning (visibility)

DevSecOps

Application & infrastructure security
Container security & API gateways
Automation

7 Key Attributes to Evaluate



IT Skill Sets Required

App Security

Istio: Unified Control Plane

Observability

Open Source Tools Integration

Continuous Deployment

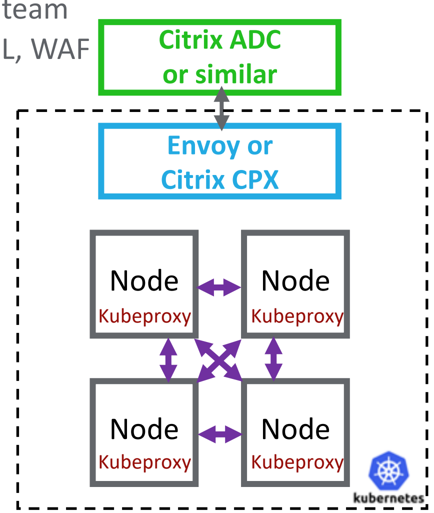
Scale and Performance

2-Tier Ingress: Simplest and Quickest to Production

For both cloud native novices & experts

2-Tier Ingress

- Managed by networking team
- N-S L4 load balancing, SSL, WAF
- Citrix ADC or similar



- Managed by platform team
- N-S L7 load balancing
- Envoy, Citrix CPX, or similar

North-South App Traffic LB

Green ADC for L4 LB for cloud native; L4-7 LB for monolith apps
Blue ADC for L7 LB and faster change of pace

East-West App Traffic LB

Basic layer 4 load balancing (round robin) by Kubeproxy

App Security	N-S: Excellent protection by green ADC E-W: None; need network policy/segmentation, e.g., Project Calico
Observability	N-S: Excellent, green & blue ADC sees all traffic E-W: Very limited telemetry
Continuous Deployment	N-S: Excellent; advanced traffic control by ADC E-W: Lacks due to Kubeproxy limitations
Scale Performance	N-S: Good for scale out E-W: Use IPVS mode; Iptables mode lacks scalability
Open Source Tools Support	N-S: Excellent; e.g., Prometheus, Spinnaker, EFK E-W: Limited due to Kubeproxy limitations
Istio: Unified Control Plane	N-S: Support via Istio-enabled ADCs E-W: Kubeproxy is not Istio enabled
IT Skill Set Required	Minimal training for platform & networking teams Both teams can move at their own speed

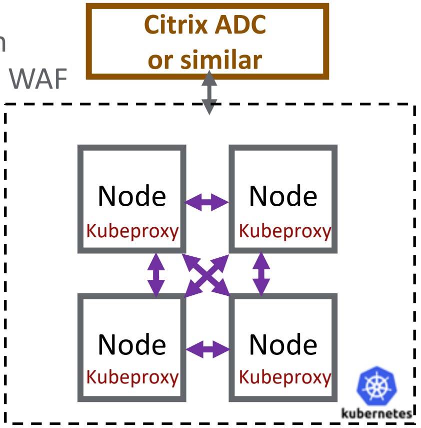
LB = Load Balancing ADC = Application Delivery Controllers

Unified Ingress: Simple for Network-Savvy Platform Teams

Reduce 1 ADC tier and 1 hop latency, suitable for internal apps with option to add WAF/SSL and external apps later

Unified Ingress

- Managed by network-savvy platform/infrastructure team
- N-S L4-7 load balancing, SSL, WAF



North-South App Traffic LB

Brown ADC for L4-7 load balancing for cloud native & monolith apps

East-West App Traffic LB

Basic layer 4 load balancing (round robin) by Kubeproxy

App Security	N-S: Excellent protection by brown ADC E-W: None; Need network policy/segmentation, e.g., Project Calico
Observability	N-S: Excellent; brown ADC sees all traffic E-W: Very limited telemetry
Continuous Deployment	N-S: Excellent; advanced traffic control by ADC E-W: Lacks due to Kubeproxy limitations
Scale Performance	N-S: Good for scale out E-W: Use IPVS mode; Iptables mode lacks scalability
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Istio: Unified Control Plane	N-S: Support via Istio-enabled ADCs E-W: Kubeproxy is not Istio enabled
IT Skill Set Required	*Platform/infrastructure team needs to be network savvy*

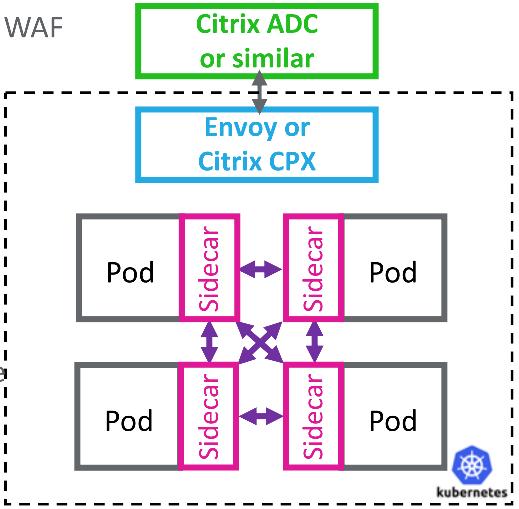
LB = Load Balancing ADC = Application Delivery Controllers

Service Mesh: Best Observability & Security but Complex

Very secure traffic among microservices, fine-grained traffic management, offload some app functions to sidecar

Service Mesh

- Managed by networking team
- N-S L4 load balancing, SSL, WAF
- Citrix ADC or similar



- Managed by platform team
- N-S L7 LB
- Envoy, Citrix CPX, or similar

- Sidecars managed by platform team
- E-W load balancing & more
- Envoy or Citrix CPX as sidecar

North-South App Traffic LB

Green ADC for L4 LB for cloud native; L4-7 LB for monolith apps; Blue ADC for L7 LB and faster change of pace

East-West App Traffic LB

Sidecars for E-W advanced load balancing. Pods communicate via sidecars

App Security	N-S: Excellent protection by green ADC E-W: *Excellent protection by sidecar, policy, rate control, auth, mTLS, API & layer 7 attack protection*
Observability	N-S: Excellent; green & blue ADCs see all traffic E-W: *Excellent; as sidecar sees all the traffic*
Continuous Deployment	N-S: Excellent; advanced traffic control by ADCs E-W: *Excellent; advanced traffic control by sidecar*
Scale Performance	N-S: Good for scale out E-W: *Distributed architecture scalability, sidecar-quality dependent, adds 2-hop latency, more CPU/memory*
Open Source Tools Support	N-S: Excellent; e.g., Prometheus, Spinnaker, EFK E-W: *Excellent; e.g., Prometheus, Spinnaker, EFK*
Istio-Unified Control Plane	N-S: Support via Istio-enabled ADC E-W: *Support via Istio APIs, Istio Mixer bottlenecks.*
IT Skill Set Required	Steep learning curve for platform & networking teams

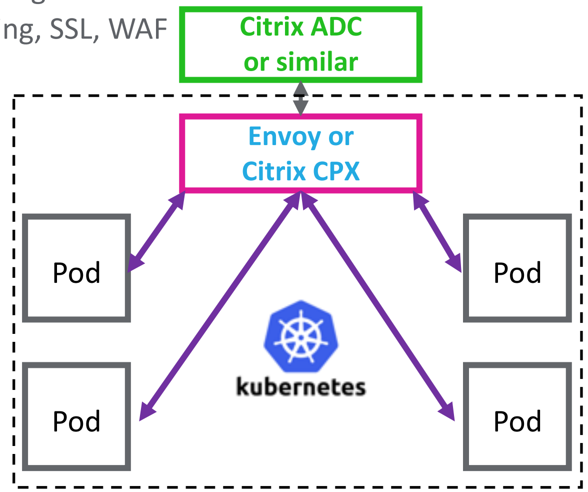
LB = Load Balancing ADC = Application Delivery Controllers

Service Mesh Lite: Service Mesh-Like Benefits & Simpler

Secure traffic among microservices, optional encryption by app, fine-grained traffic management, observability

Service Mesh Lite

- Managed by networking team
- N-S L4-7 load balancing, SSL, WAF
- Citrix ADC or similar



- Managed by platform team
- E-W LB & more
- Envoy, Citrix CPX, or similar

North-South App Traffic LB

Green ADC for L4-7 LB & security for cloud native & monolith apps

East-West App Traffic LB

Purple ADC for E-W advanced load balancing

App Security	N-S: Excellent protection by green ADC E-W: Excellent protection by purple ADC, *optional mTLS*
Observability	N-S: Excellent; green ADC sees all traffic E-W: Excellent; purple ADC sees all traffic
Continuous Deployment	N-S: Excellent; advanced traffic control by ADCs E-W: Excellent; adv. traffic control by purple ADC
Scale Performance	N-S: Good for scale out E-W: *Highly scalable, adds 1-hop latency*
Open Source Tools Support	N-S: Excellent; e.g., Prometheus, Spinnaker, EFK E-W: Excellent; e.g., Prometheus, Spinnaker, EFK
Istio-Unified Control Plane	N-S: Support via Istio-enabled ADC E-W: Support via Istio APIs, Istio Mixer bottlenecks
IT Skill Set Required	*Minimal training for platform & networking teams* *Easy transition from 2-Tier ingress architecture*

LB = Load Balancing ADC = Application Delivery Controllers

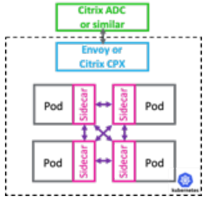
What Will Be Your Architecture Choice?

Move to cloud native at your pace

Balance the tradeoff
between benefits and complexity

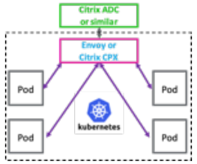
High

Benefits



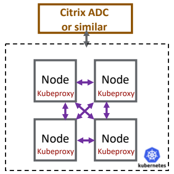
Service Mesh

Best observability &
security but complex



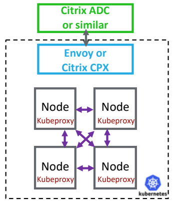
Service Mesh Lite

Service mesh-like
benefits but simpler



Unified Ingress

Simple for network-savvy
platform teams



2-Tier Ingress

Simplest and quickest way
to production

Low

Complexity

High

Citrix Cloud Native Solution Principles

A comprehensive solution addresses all stakeholder needs:

Architecture Flexibility

Move to cloud native at your pace: ingress, service mesh, Istio

Works With Your Environment & Tools

Get apps to production fast with Kubernetes platform & CNCF tools

Performance & Scale

Support large clusters & very dynamic microservices

App & API Security

Extend integrated security to microservices

Actionable Insights

Gain visibility & troubleshoot problems faster

Production-Grade Solution at the Speed of Business

Broadest Open Source Tools & Platforms Integration

Get your apps to production fast with out-of-the-box integration with your preferred open source tools

Google kubernetes | Amazon EKS | Azure Kubernetes Service | RED HAT OPENSHIFT

Prometheus
Monitoring
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Grafana
Data Visualization, Custom Dashboards

HELM
Kubernetes Package Manager
CLOUD NATIVE COMPUTING FOUNDATION

gRPC
Universal RPC Framework
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Spinnaker
Multi-cloud Continuous Delivery, Canary

Istio
Control Plane

elasticsearch
Log Collection, Storage, Search

fluentd
Data Collector For Unified Logging Layer
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kibana
Query UI, Alerting

CNI
Linux Container Network Interface
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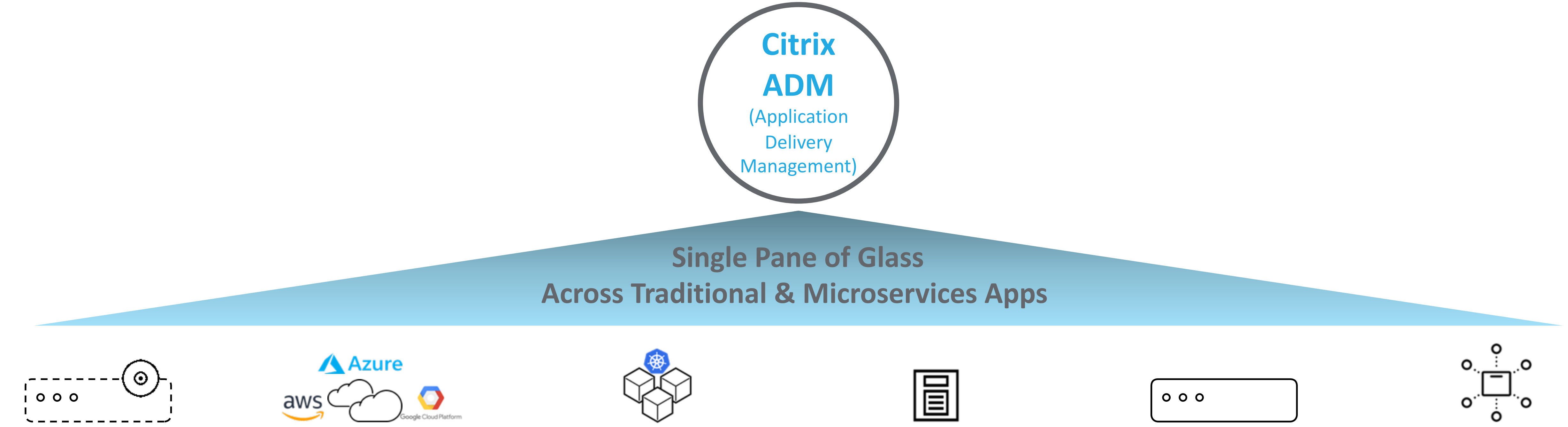
ZIPKIN
Distributed Tracing For Latency Issues

Citrix ADC Portfolio: Built for Hybrid Multi-Cloud

Most Comprehensive, Feature-Rich & Software-Centric Application Delivery Solution



Citrix ADM
(Application Delivery Management)

Single Pane of Glass
Across Traditional & Microservices Apps

Virtual Appliances
DC & Private Cloud, VPX

In Public Cloud
VPX for AWS, Azure, GCP

Containers
Public & Private Cloud, CPX

Bare Metal
Private & Public Cloud, BLX

Hardware Appliances
DC & Private Cloud, MPX

Multi-Tenant
MSP & Private Cloud, SDX

Common Software Code Base
across portfolio for
Operational Consistency and Innovation Velocity

Thank you!

github.com/citrix
www.citrix.com/networking/microservices

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