MuleSoft

Anypoint Platform Deployment Architecture

Runtime Plane Guidebook v 3.0

September 2022

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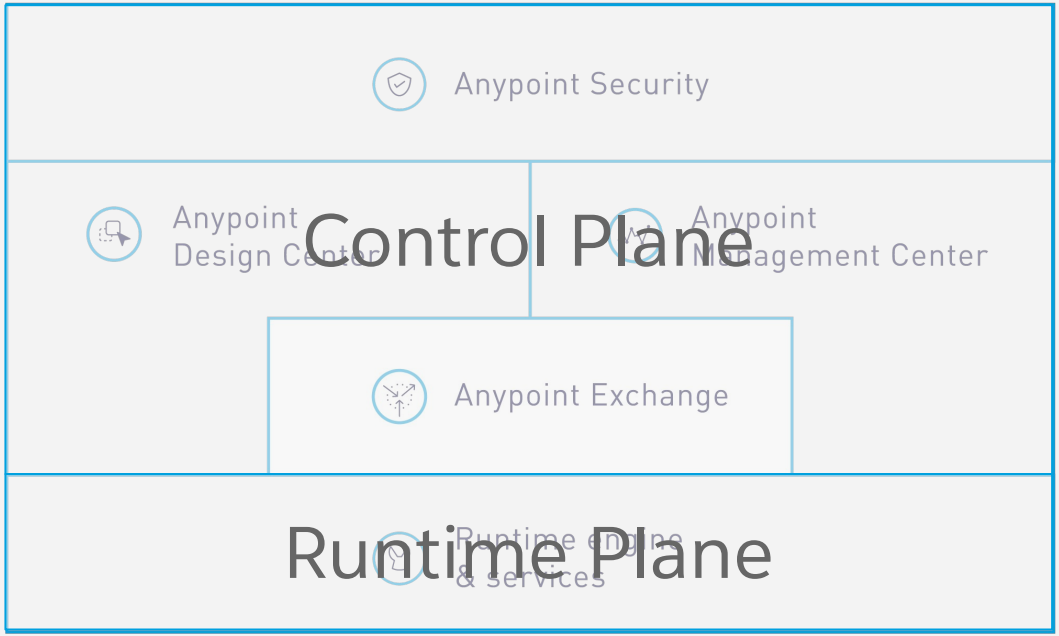
MuleSoft

Terminology

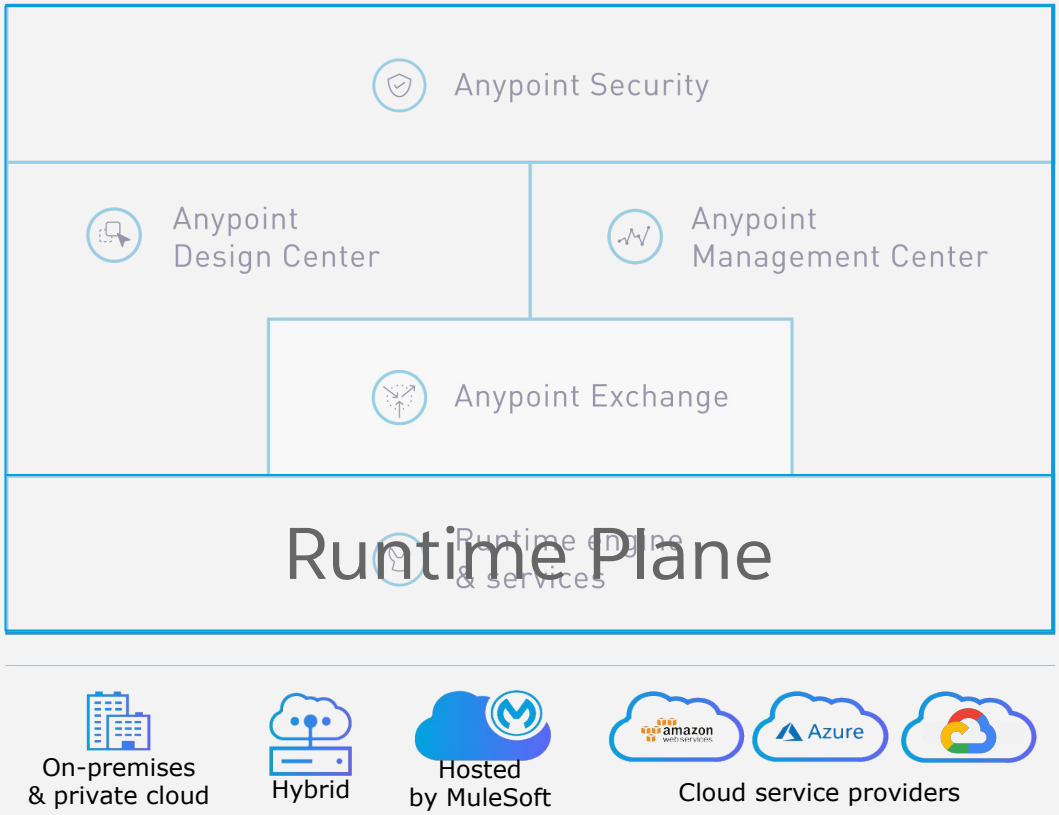
MuleSoft's Anypoint Platform

Deployment Architecture



MuleSoft's Anypoint Platform

Deployment Architecture: Runtime Plane



Deployment Options

Cost of Ownership

Managed by MuleSoft

MuleSoft provides hosting services for the Anypoint Platform including patching and provisioning of software and uptime based on contractual SLAs, where the hosting environment is Amazon Web Services (AWS).

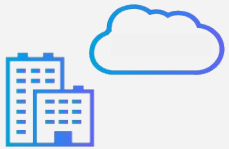
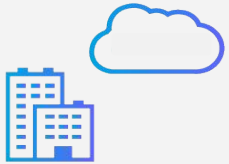
Managed by the Customer (Data center)

MuleSoft provides software componentry of the Anypoint Platform. The customer is responsible for patching and provision and managing internal uptime SLAs, where the hosting environment is the customer's data center.

Managed by the Customer (3rd party Cloud)

MuleSoft provides software componentry of the Anypoint Platform. The customer is responsible for patching and provision and managing internal uptime SLAs, where the hosting environment is a 3rd Party Cloud (e.g. AWS, Azure, Google) the customer has contracted with for hosting services.

Deployment Models

	CloudHub (Commercial/GovCloud)	Hybrid (Commercial/GovCloud)	On-premise (Private Cloud Edition)
Control Plane			
Runtime Plane			


Managed by MuleSoft


Managed by the Customer (Data center)


Managed by the Customer (3rd party Cloud)

MuleSoft

CloudHub

Runtime Plane Deployment Architecture

Deployment Models

Cloud

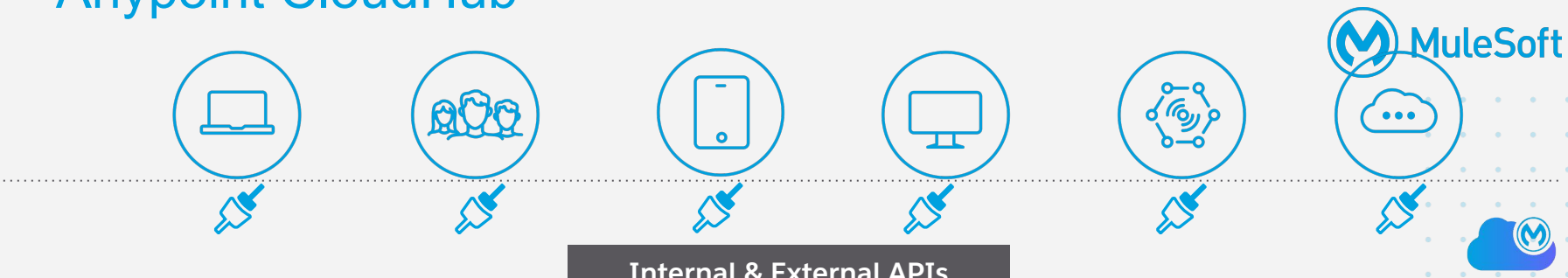
	CloudHub (Commercial/GovCloud)	Hybrid (Commercial/GovCloud)	On-premise (Private Cloud Edition)
Control Plane			
Runtime Plane			

 Managed by MuleSoft

 Managed by the Customer (Data center)

 Managed by the Customer (3rd party Cloud)

Anypoint CloudHub



Internal & External APIs

Anypoint Platform
API-led connectivity for microservices

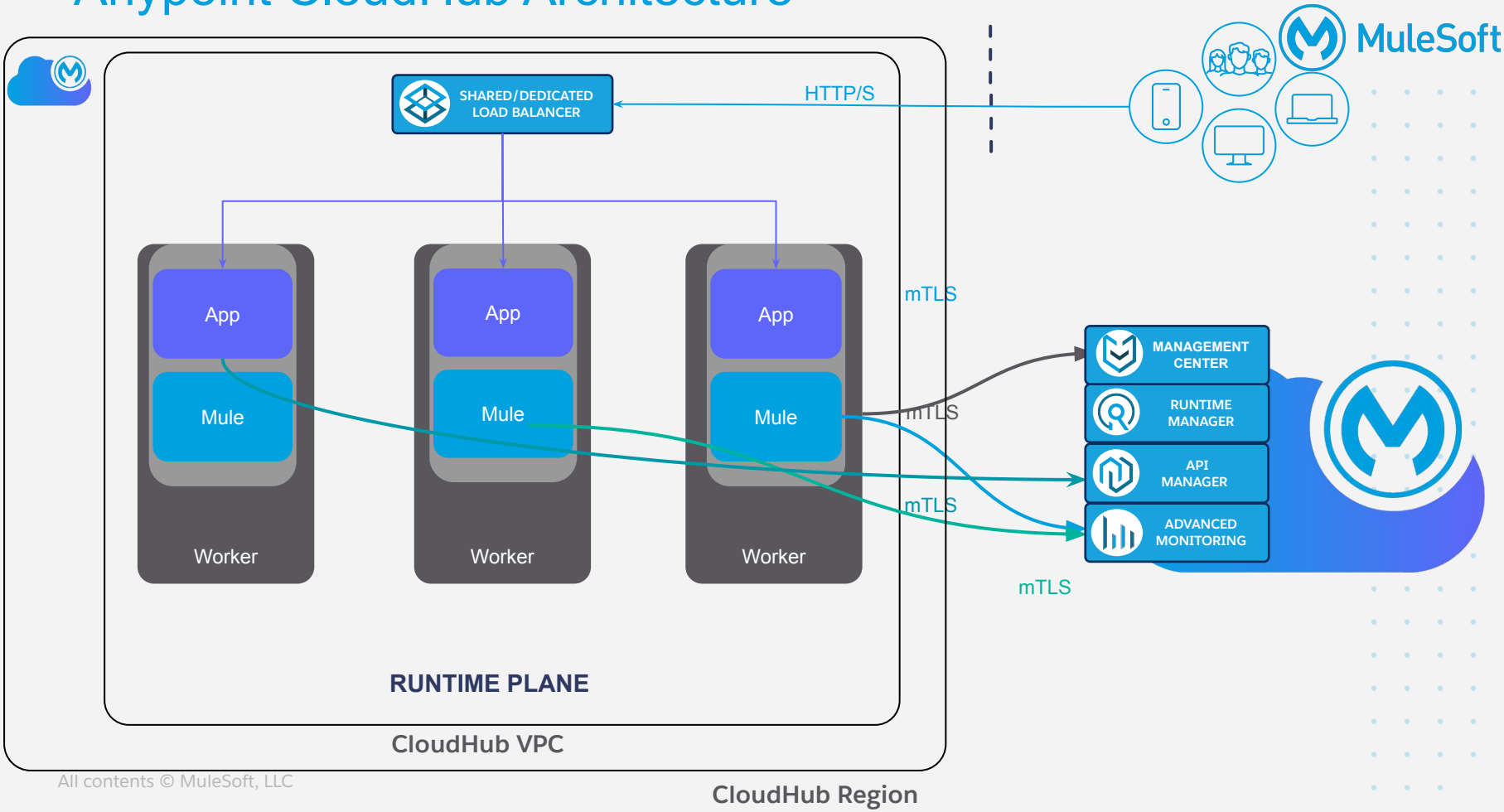
MANAGEMENT CENTER
ACCESS MANAGEMENT
RUNTIME MANAGER
VISUALIZER
ADVANCE MONITORING
EXCHANGE
API ANALYTICS
DESIGN CENTER
API DESIGNER
PARTNER MANAGER`

CLOUDHUB

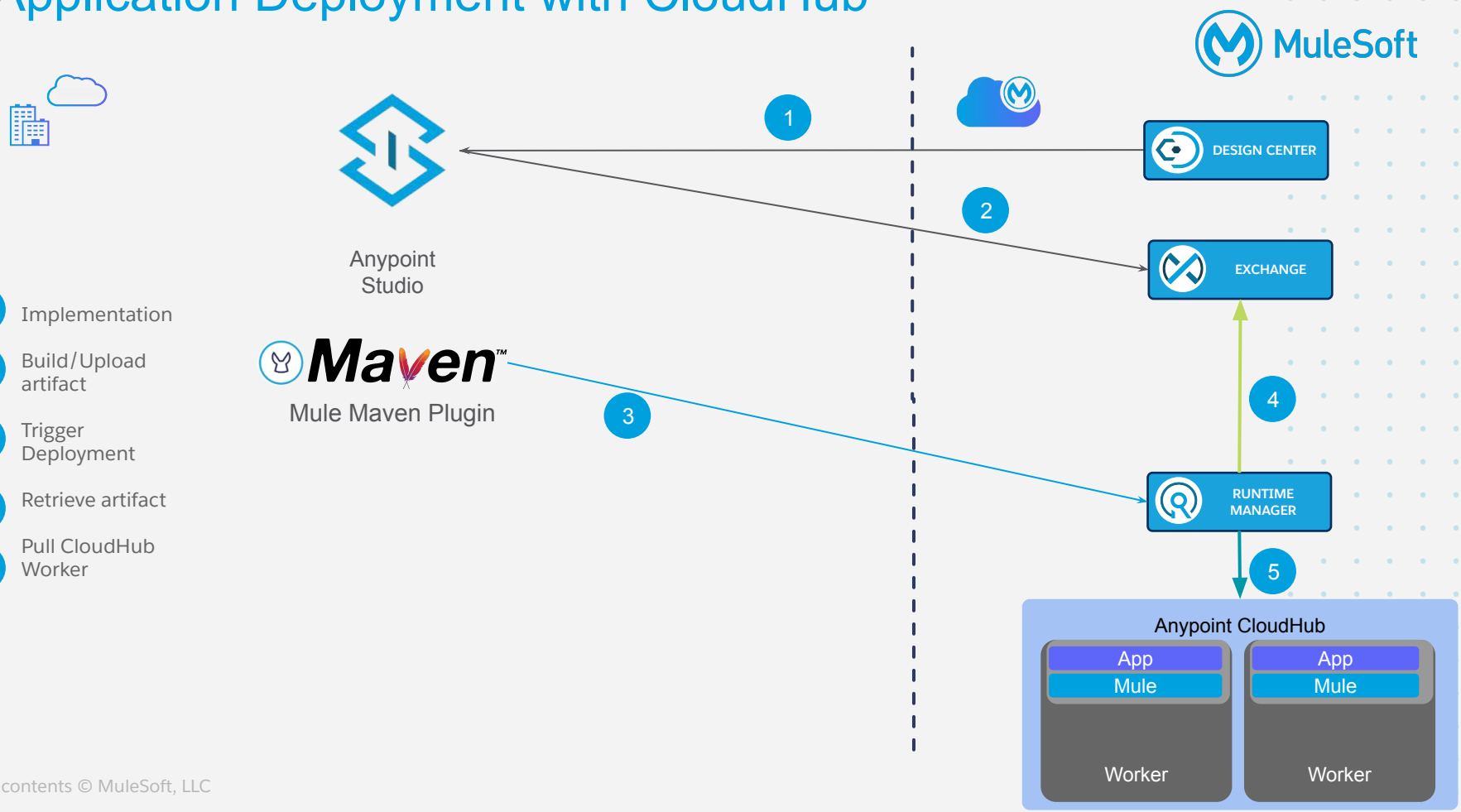
Runtime Plane

App	App	App	App	App	App
Mule	Mule	Mule	Mule	Mule	Mule
Worker	Worker	Worker	Worker	Worker	Worker

Anypoint CloudHub Architecture

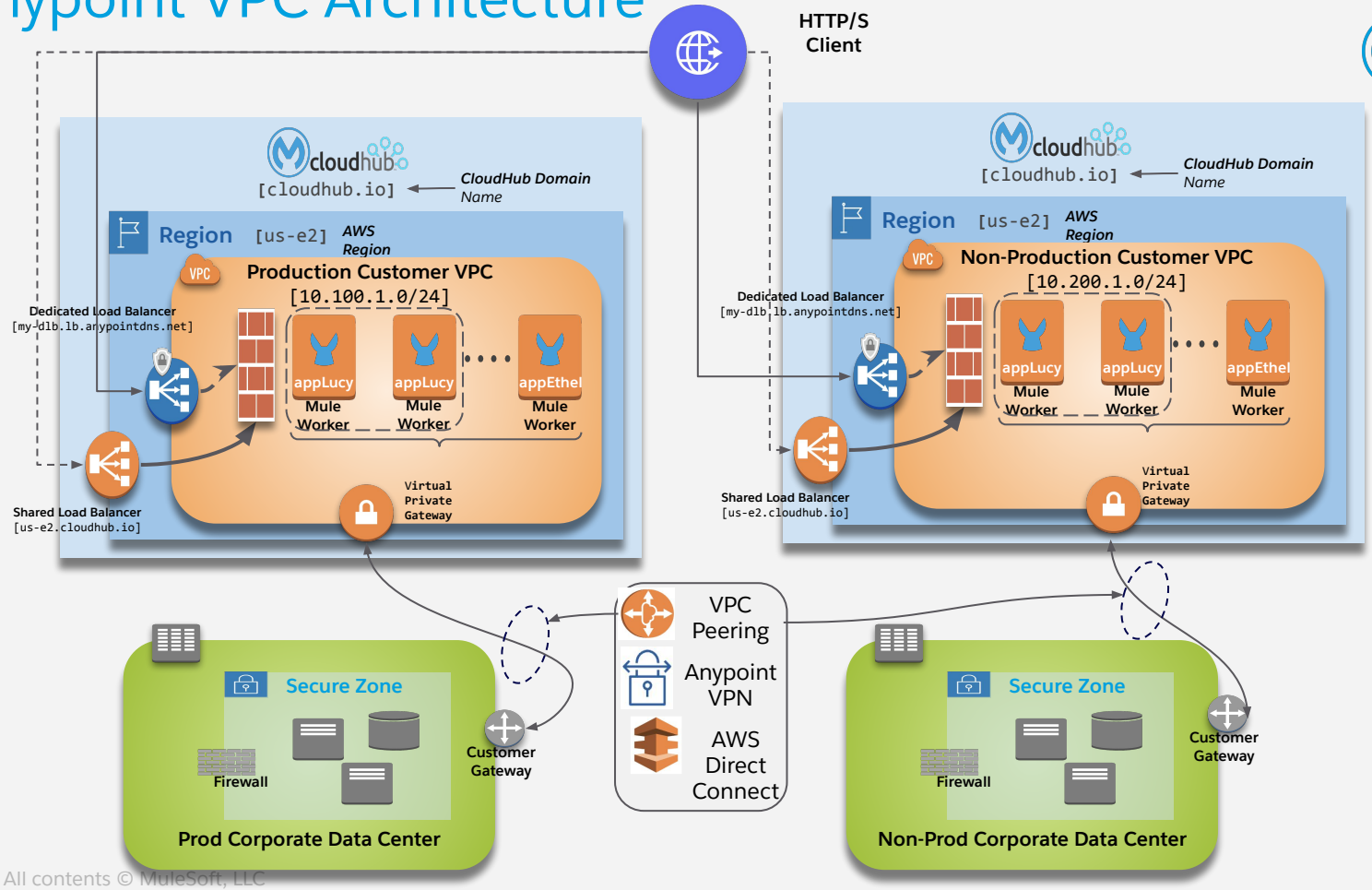


Application Deployment with CloudHub



1. Implementation
2. Build/Upload artifact
3. Trigger Deployment
4. Retrieve artifact
5. Pull CloudHub Worker

Anypoint VPC Architecture



Anypoint CloudHub Deployment

Platform Benefits

Zero infrastructure & configuration

Seamless upgrades

Secure Managed Infrastructure

Built-in observability

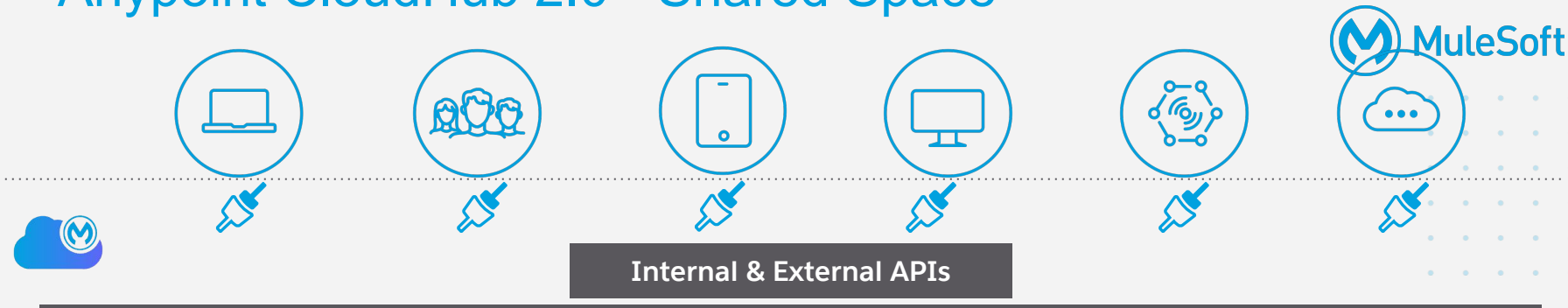
Built-in scalability

MuleSoft

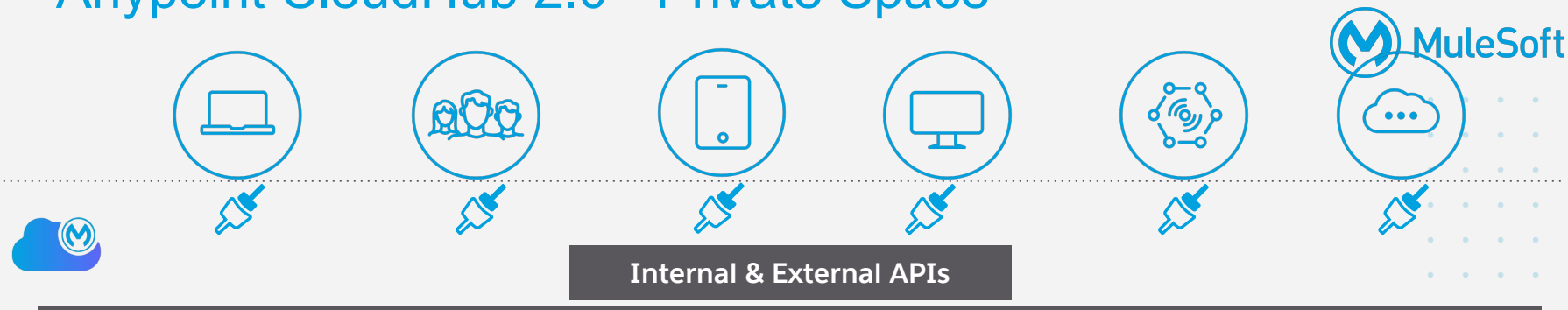
CloudHub 2.0

Runtime Plane Deployment Architecture

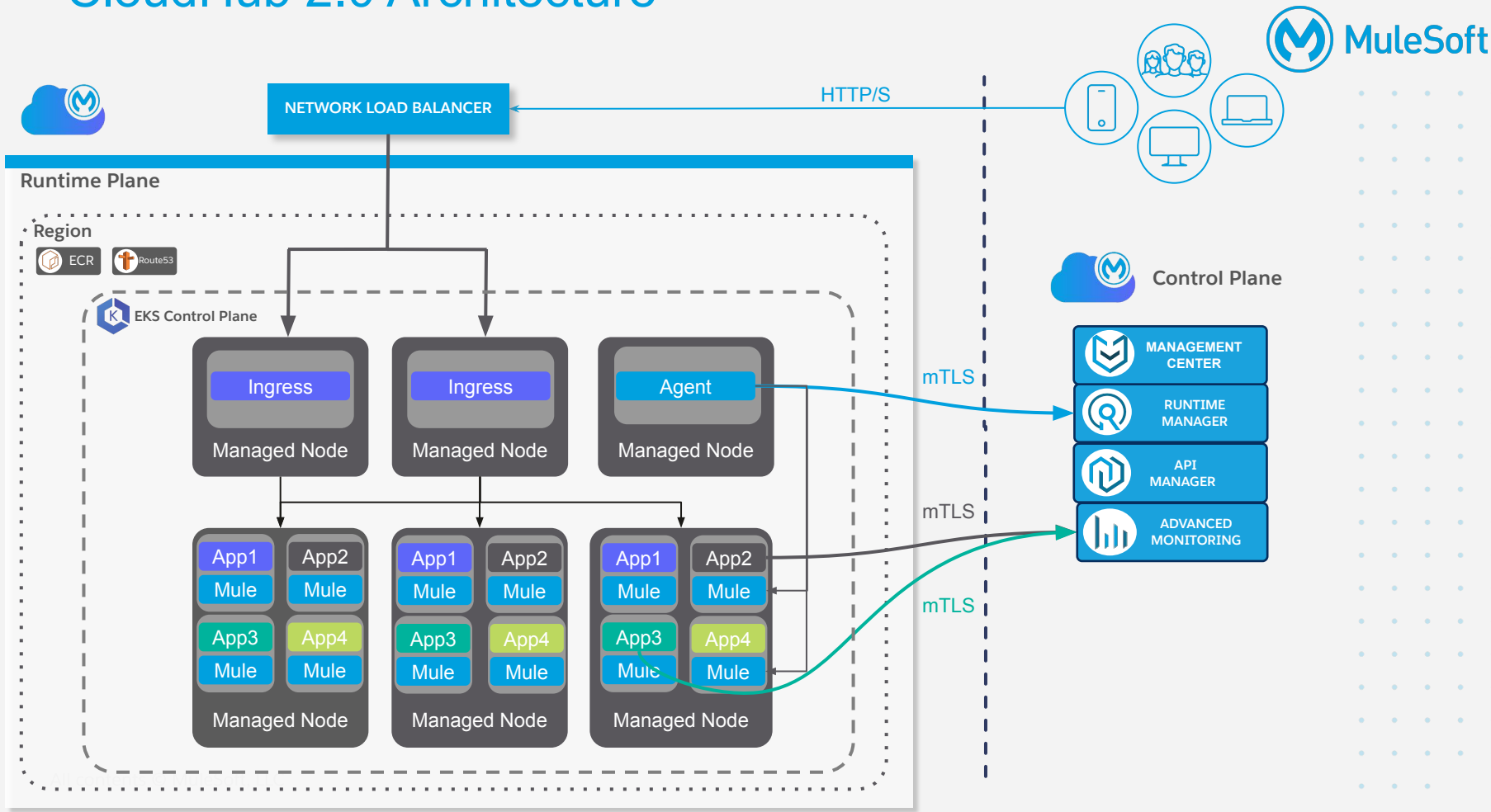
Anypoint CloudHub 2.0 - Shared Space



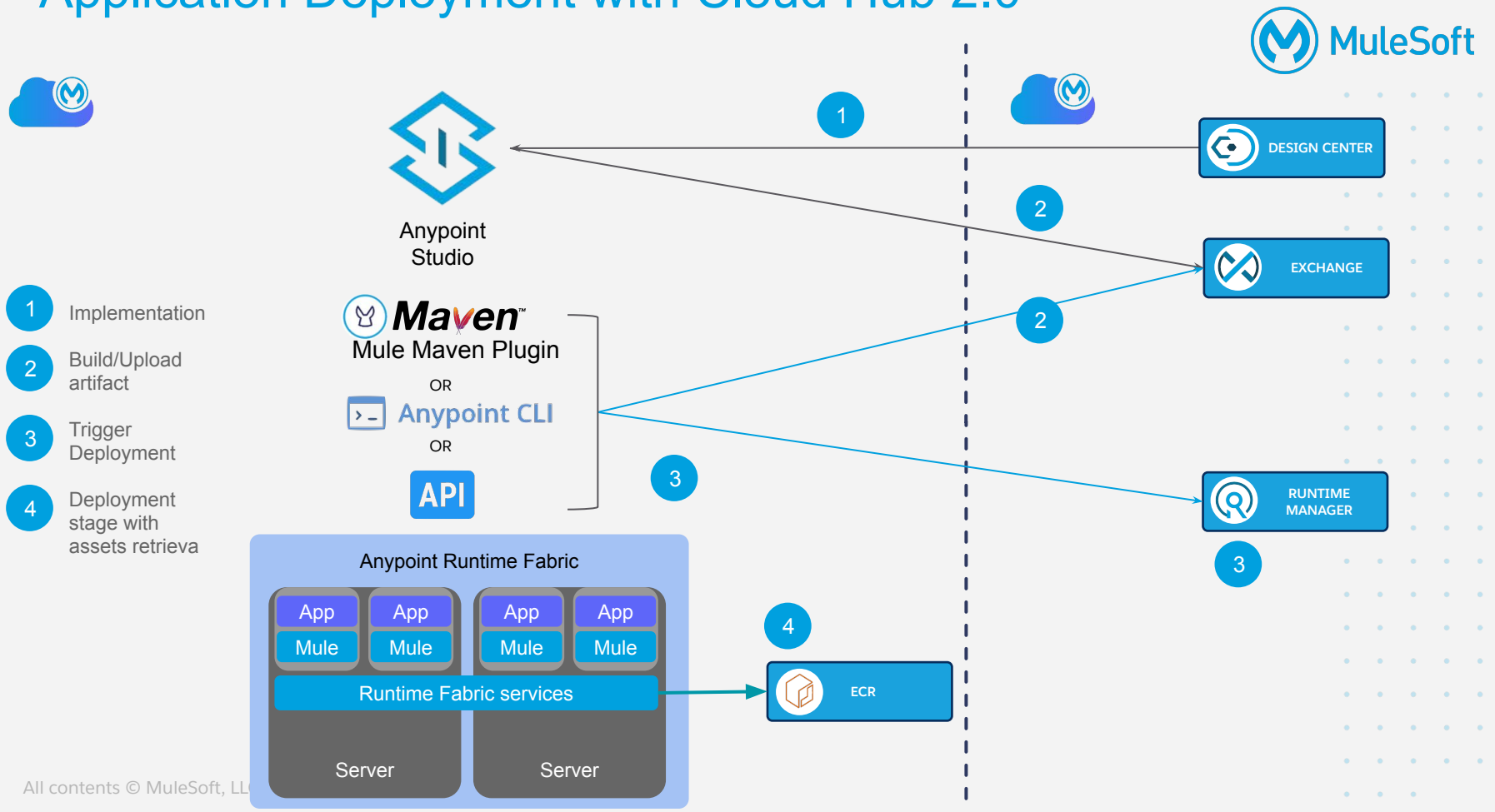
Anypoint CloudHub 2.0 - Private Space



CloudHub 2.0 Architecture



Application Deployment with Cloud Hub 2.0



Anypoint CloudHub 2.0 Deployment

Platform Benefits

Deployable Across 12 Regions Globally

Standard Isolation Boundary

Secure Managed Infrastructure

Encrypts Sensitive Configuration Data at Rest

Dynamically scalability

Key Differences

MuleSoft

	CloudHub 1.0	CloudHub 2.0
Provision/Scaling	Supported	Supported
URL rewriting	Support (DLB)	Supported (app-level)
Load Balancer Logs	Not supported	Supported (download)
Multiple custom endpoints	Partially Supported	Supported
Multiple truststores (client certificates for mutual TLS)	Not supported	Supported
Direct Connect/VPC Peering	Supported (not self-serve)	Not Supported
VPC/VPN/Transit Gateway	Supported	Supported (private spaces)
Outbound firewall rules	Not supported	Supported
Log forwarding	Supported (per app)	Supported (per app)
Custom notifications (CloudHub Connector)	Supported	Not Supported

Terminology Changes

MuleSoft

CH1.0

- VPC - Virtual Private Cluster
- Worker - EC2 Server Instance of an API
- Dedicated Load Balancer

CH 2.0

- Private Space - Private Kubernetes Cluster
- Replica - Container Instance of an API
- Ingress Controller

MuleSoft

Anypoint Mule Runtime Standalone

Runtime Plane Deployment Architecture

Deployment Models

Hybrid

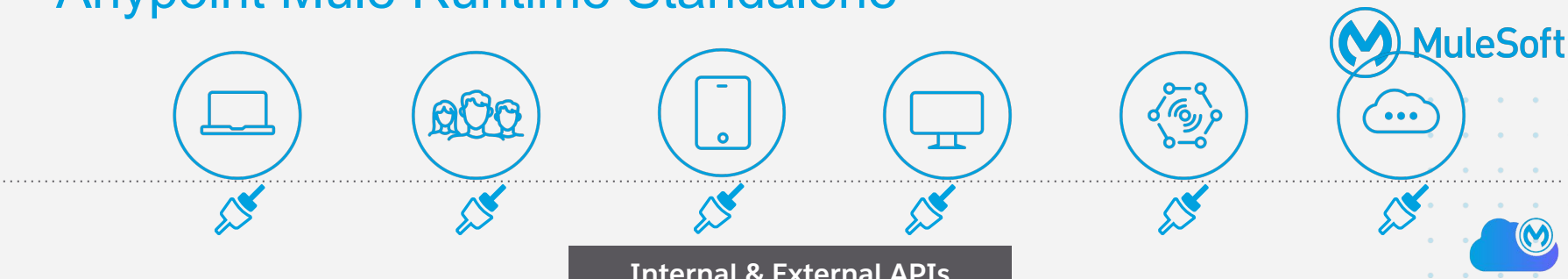
	CloudHub (Commercial/GovCloud)	Hybrid (Commercial/GovCloud)	On-premise (Private Cloud Edition)
Control Plane			
Runtime Plane			

 Managed by MuleSoft

 Managed by the Customer (Data center)

 Managed by the Customer (3rd party Cloud)

Anypoint Mule Runtime Standalone



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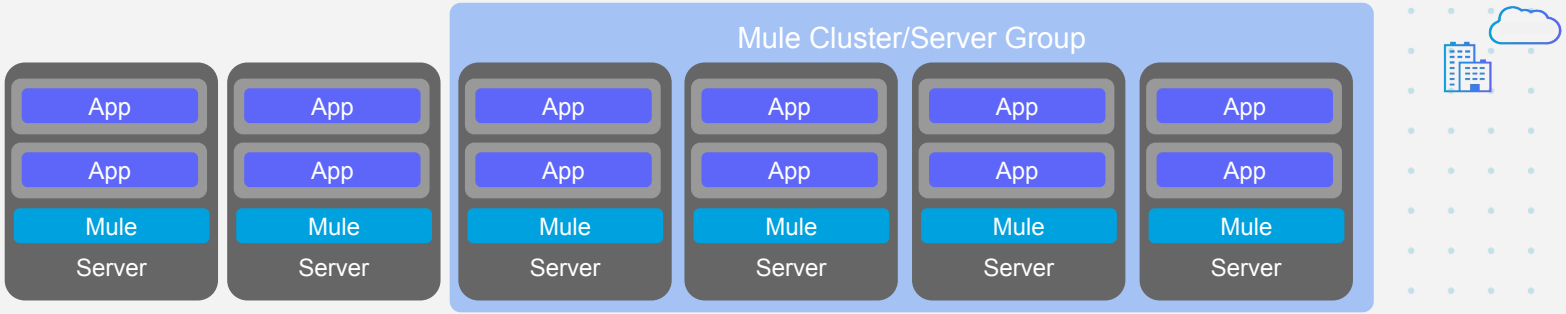
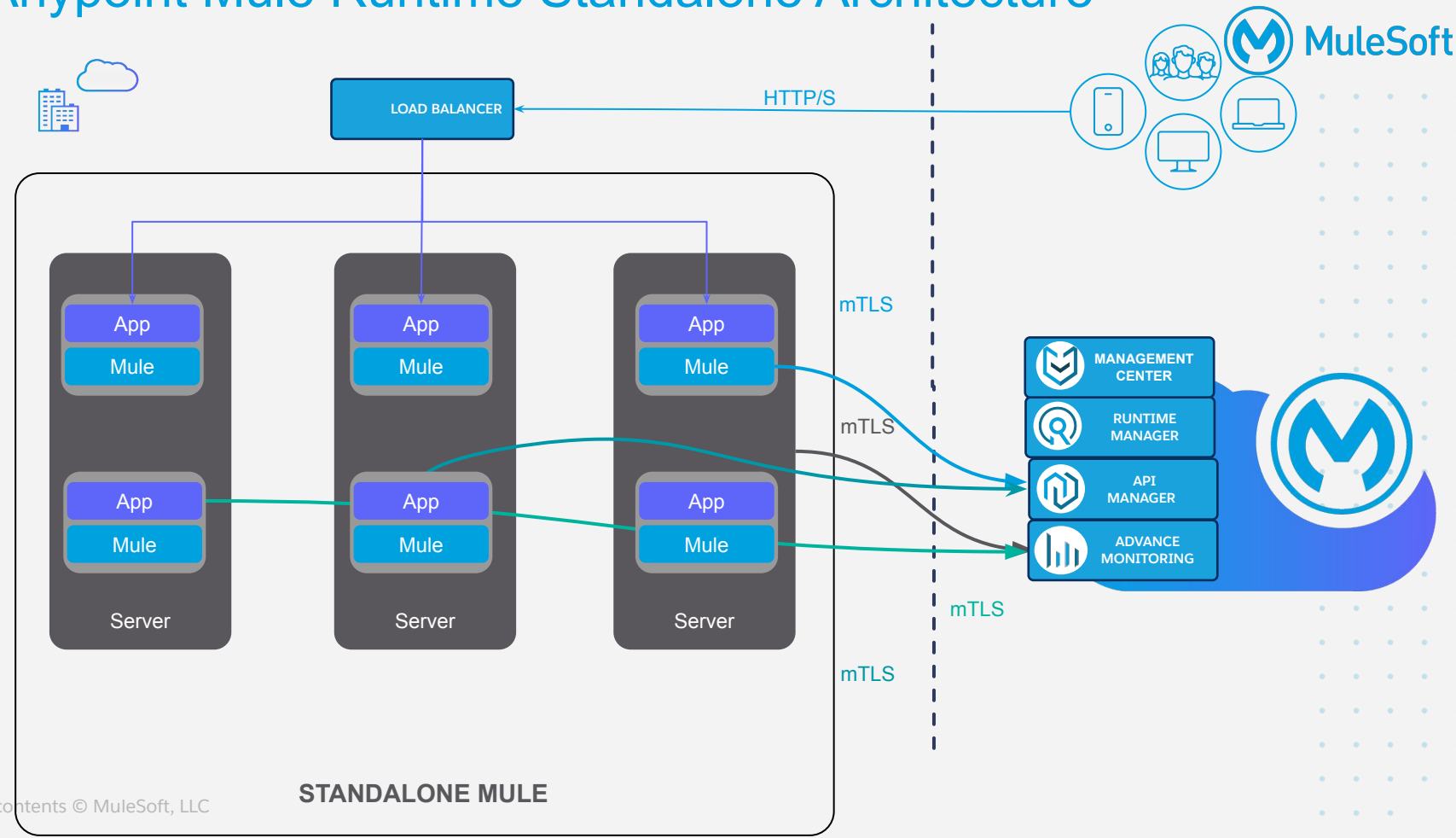
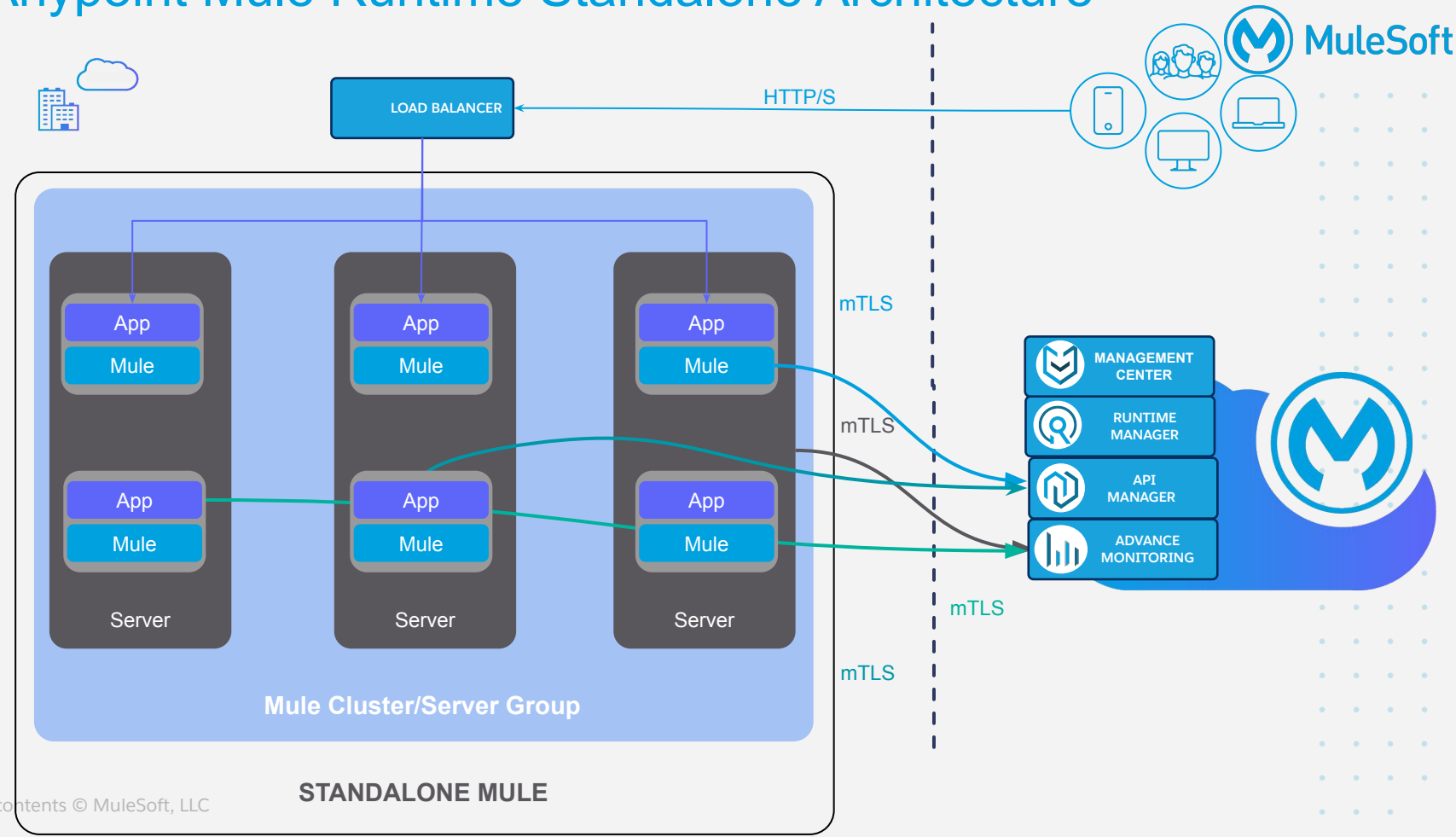


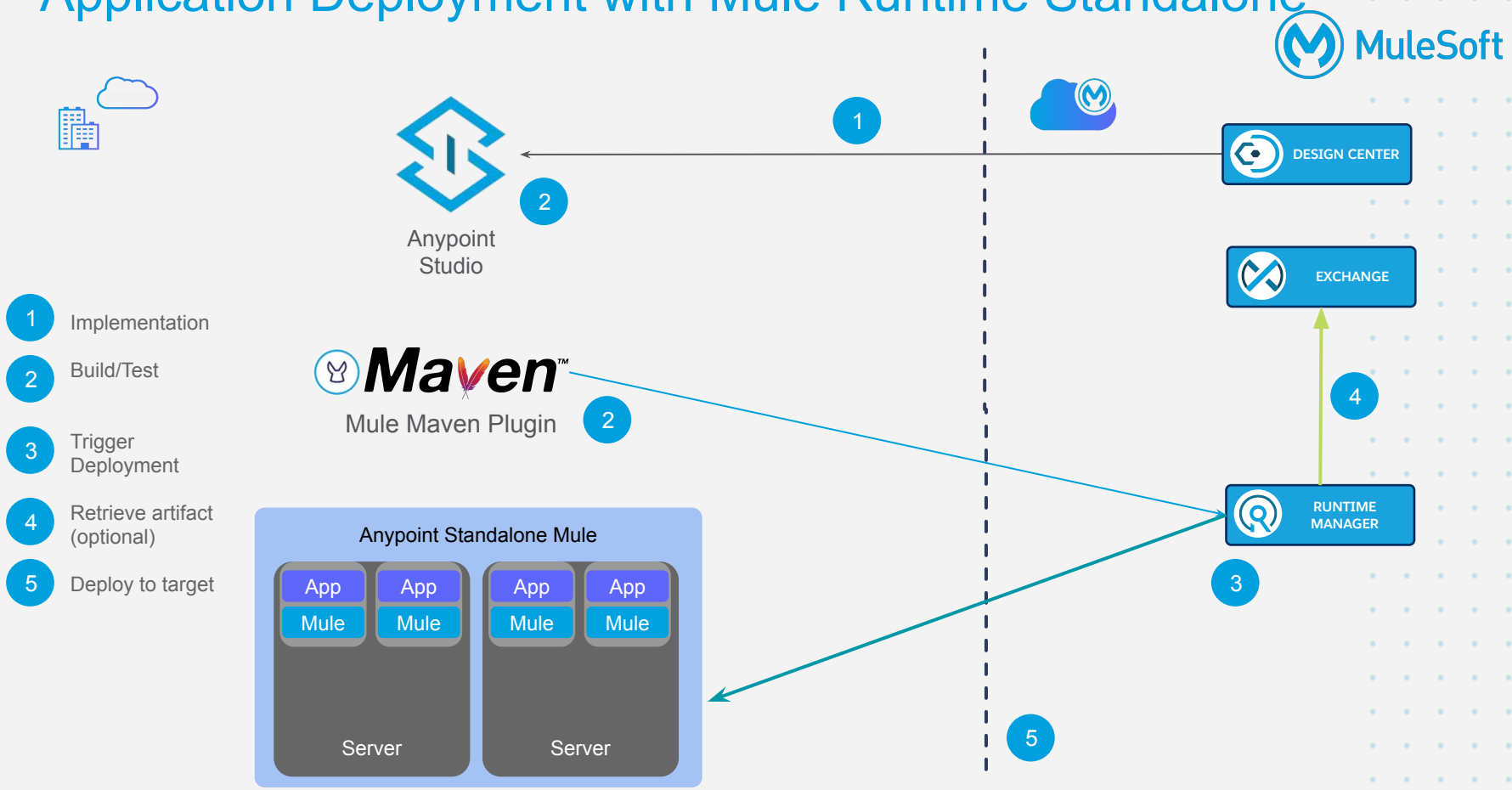
Anypoint Mule Runtime Standalone Architecture



Anypoint Mule Runtime Standalone Architecture



Application Deployment with Mule Runtime Standalone



Mule Runtime Standalone - Platform Benefits

Data Proximity

Container & VM choices

Multi-cloud support

Future proof architecture

Resource & Application Monitoring

MuleSoft

Anypoint Runtime Fabric

Runtime Plane Deployment Architecture

Deployment Models

Hybrid

	Cloud (CloudHub/GovCloud)	Hybrid (CloudHub/GovCloud)	On-premise (Private Cloud Edition)
Control Plane			
Runtime Plane			

 Managed by MuleSoft

 Managed by the Customer (Data center)

 Managed by the Customer (3rd party Cloud)

Runtime Fabric

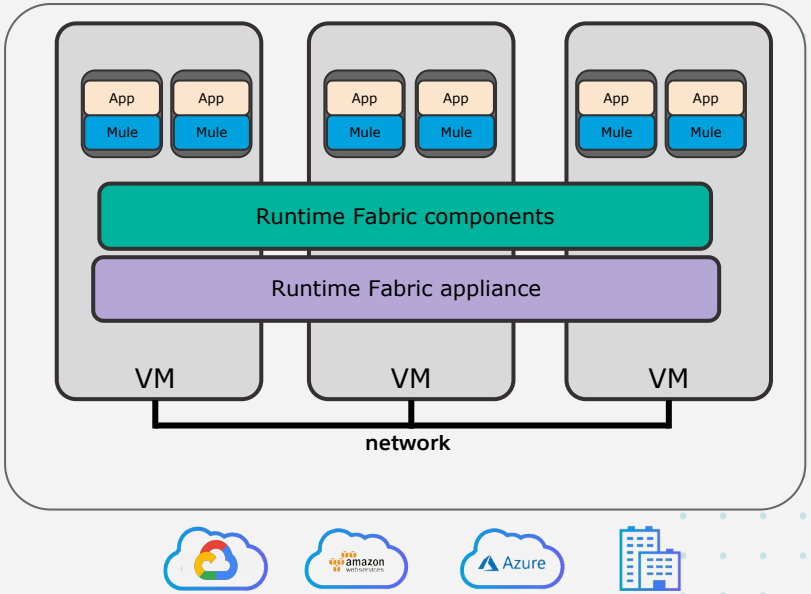
Overview

Runtime Fabric orchestrates and automates the deployment of Mule runtimes into containers in any cloud or on-premises.

BENEFITS

- Deploy consistently across any cloud (Azure, Google & AWS) or data center
- Run multiple runtime versions in the same Runtime Fabric
- Scale horizontally and redeploy w/ zero-downtime
- Easily manage via the control plane hosted by MuleSoft
- No resources required to support or maintain orchestration & automation

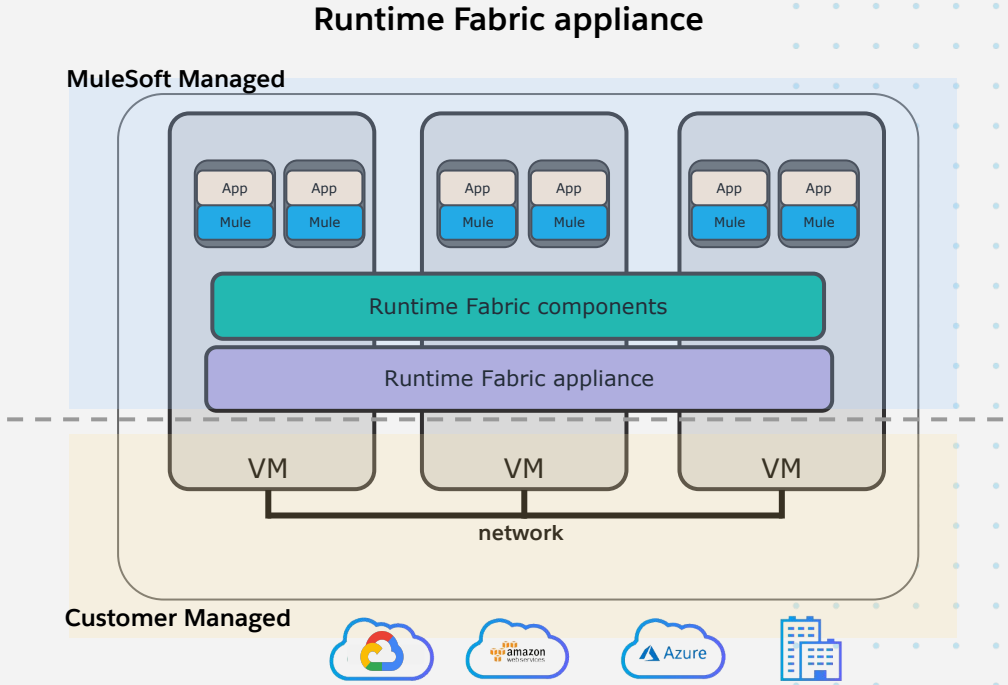
Runtime Fabric appliance



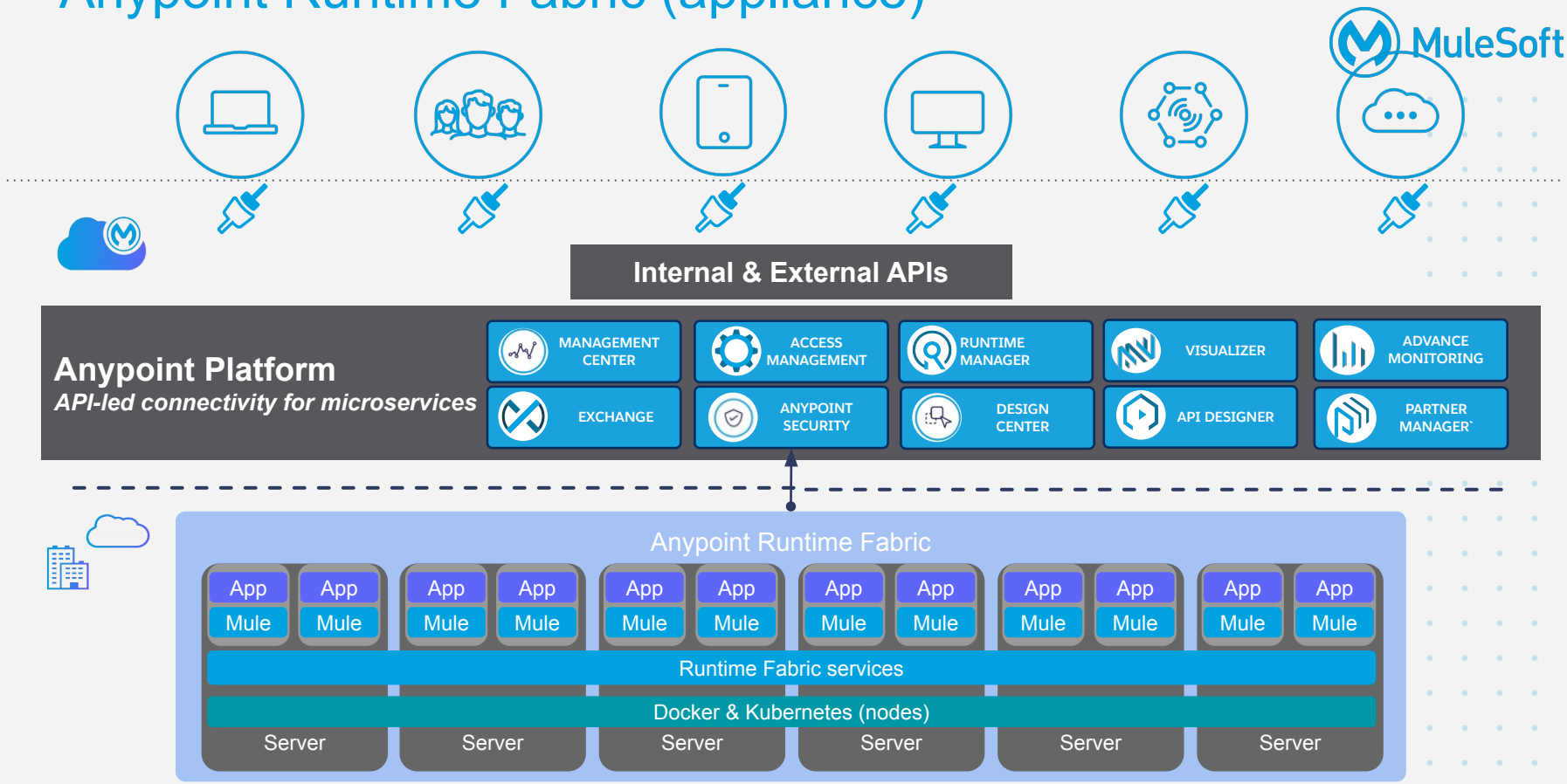
Runtime Fabric (appliance)

Customers bring their own hardware and networking, and install Runtime Fabric on top of it.

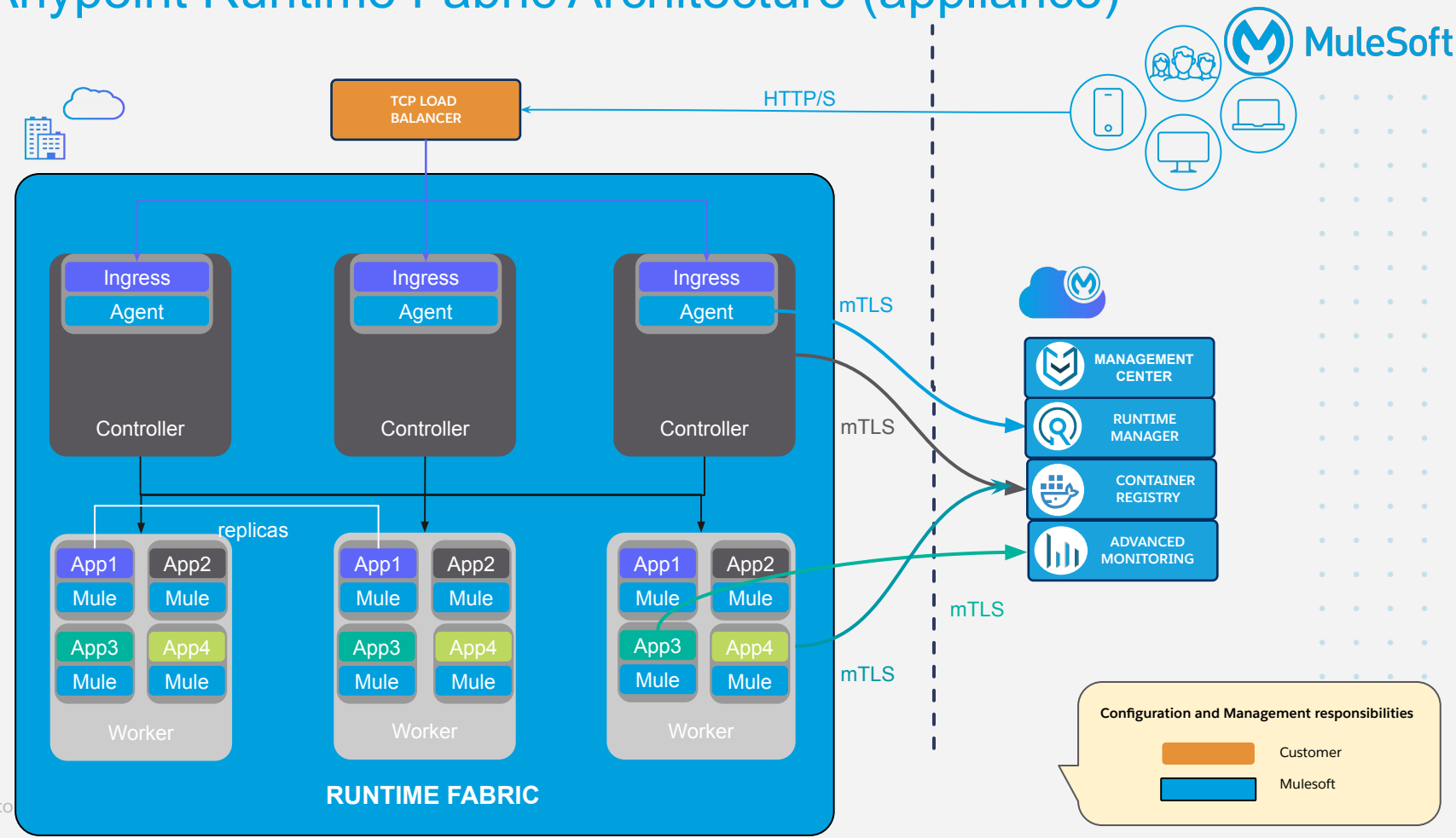
- Self-contained appliance-model
- Customers maintain the infrastructure
- MuleSoft maintains the Kubernetes stack, RTF services and Mule deployments



Anypoint Runtime Fabric (appliance)



Anypoint Runtime Fabric Architecture (appliance)



Anypoint Runtime Fabric - Platform Benefits

Data Proximity as also available on-premise & private cloud

Simplify infrastructure with Docker and Kubernetes

Multi-cloud support

Future proof architecture

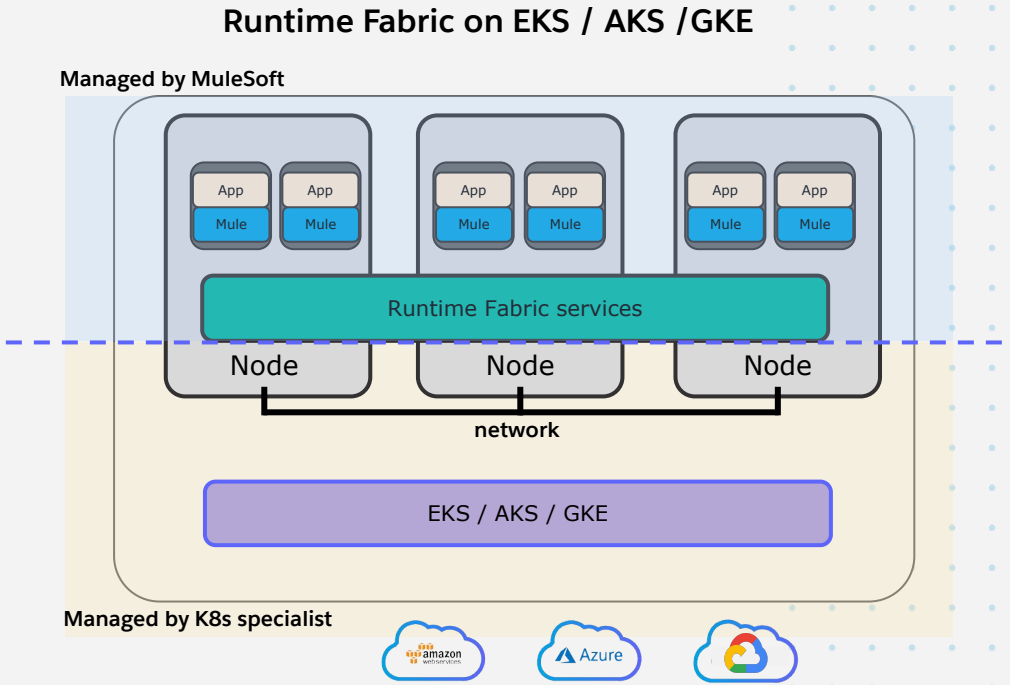
Resource & Application Monitoring

Runtime Fabric on EKS/AKS/GKE

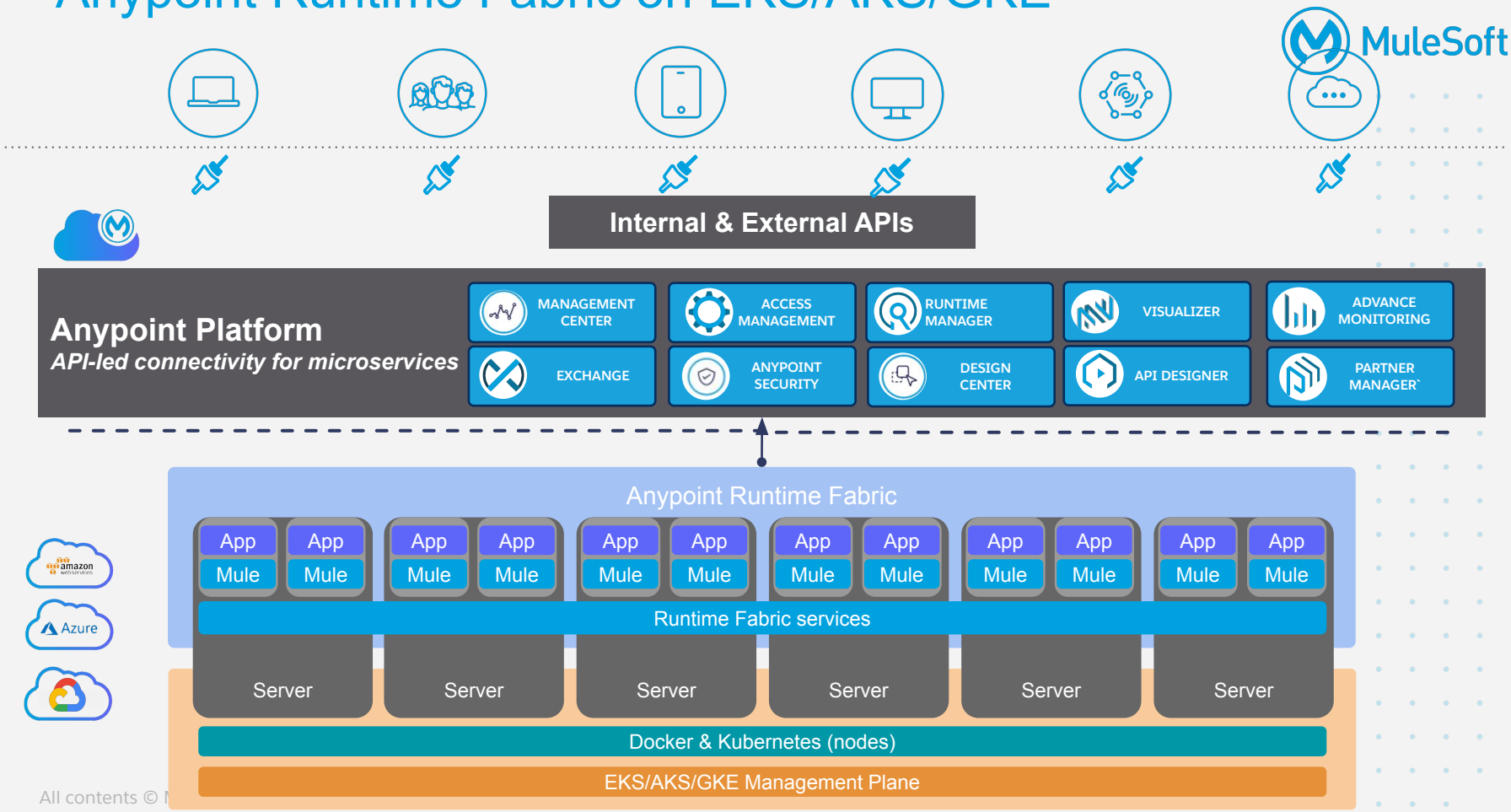
Runtime Fabric is delivered to customers as a package of components that run on top of an existing EKS, AKS, or GKE environment.

Customers bring their own Kubernetes, ingress controller, and external log forwarding and install RTF within it.

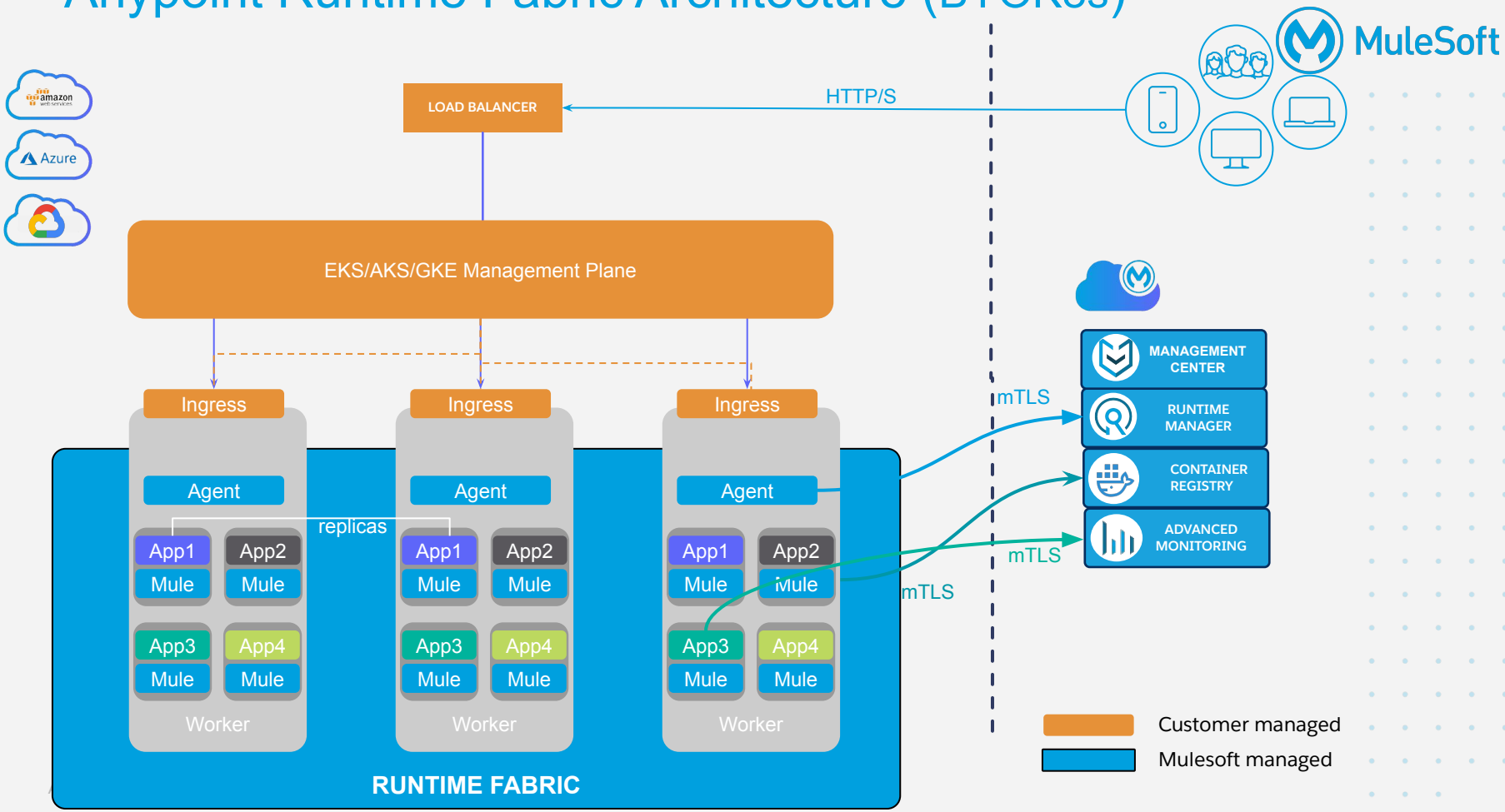
Customers maintain the health of Kubernetes, and MuleSoft maintains the RTF services and Mule deployments.



Anypoint Runtime Fabric on EKS/AKS/GKE



Anypoint Runtime Fabric Architecture (BYOK8s)



Anypoint RTF on BOYK8s - Platform Benefits

Data Proximity as available on private clouds

Lower cost. AKS/EKS/GKE replaces the controller nodes

More customizable to your organization environment

Future proof architecture

Resource & Application Monitoring

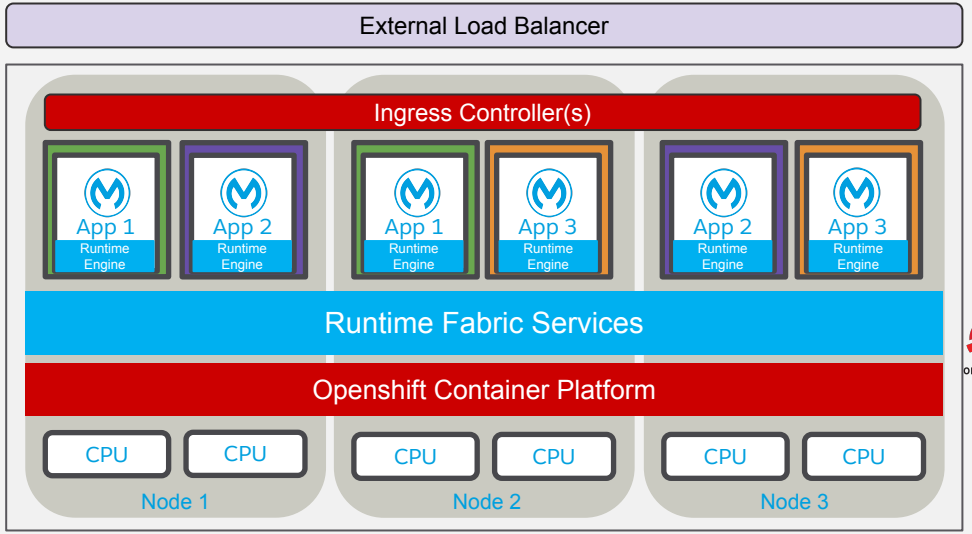
Node autoscaling OOTB

Runtime Fabric on OpenShift

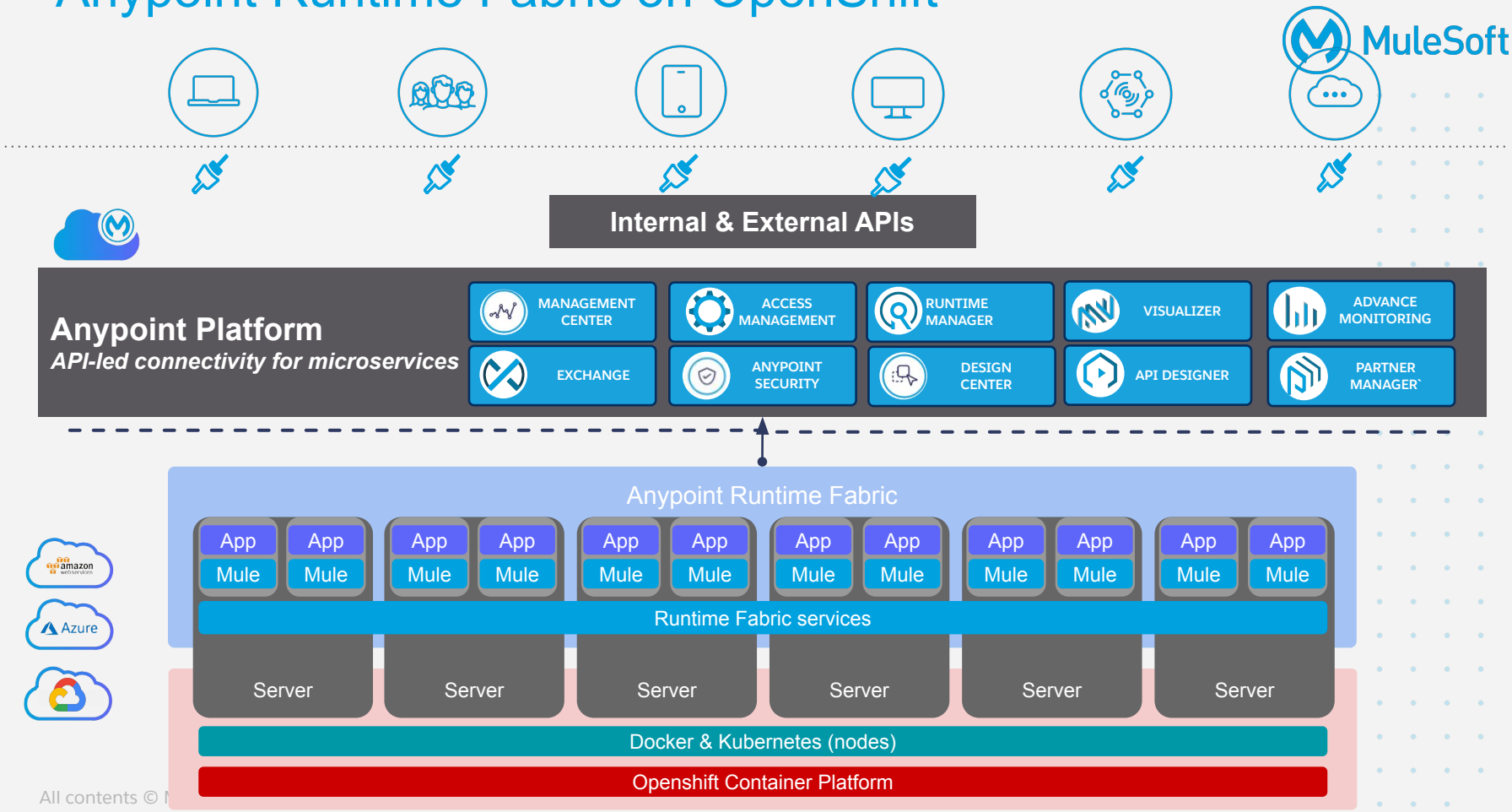
Runtime Fabric is delivered to customers as a package of components that run on top of Red Hat OpenShift environment.

Customers bring their own OpenShift cluster running in their own Data Center or in public clouds like aws or azure, as well as their ingress controller, and external log forwarding and install RTF within it.

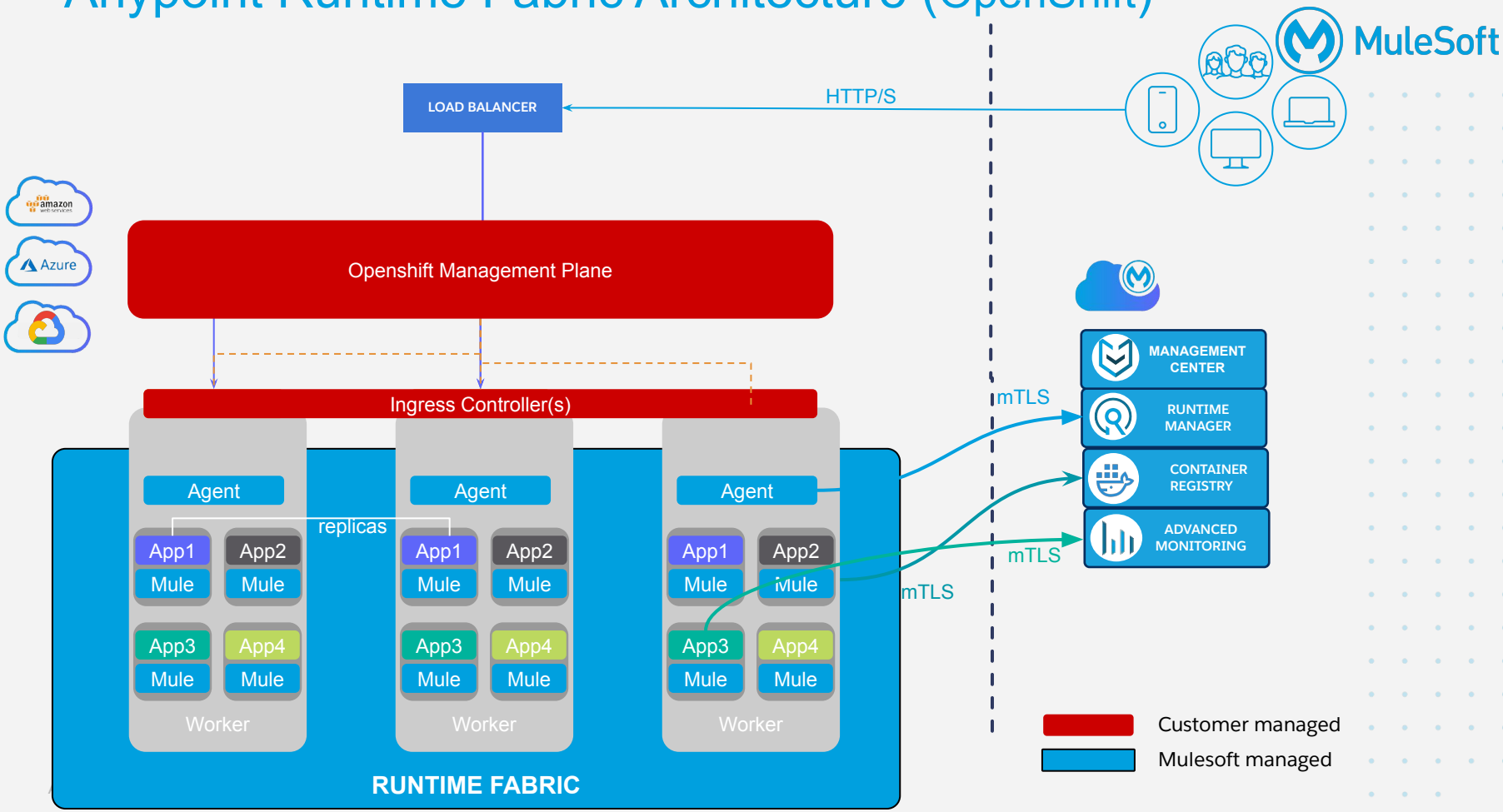
Customers maintain the health of OpenShift, and MuleSoft maintains the RTF services and Mule deployments.



Anypoint Runtime Fabric on OpenShift



Anypoint Runtime Fabric Architecture (OpenShift)



Anypoint RTF on OpenShift - Platform Benefits

Data Proximity as available on private clouds

Lower cost. This choice is a natural replacement for RTF Appliance

More customizable to your organization environment

Future proof architecture

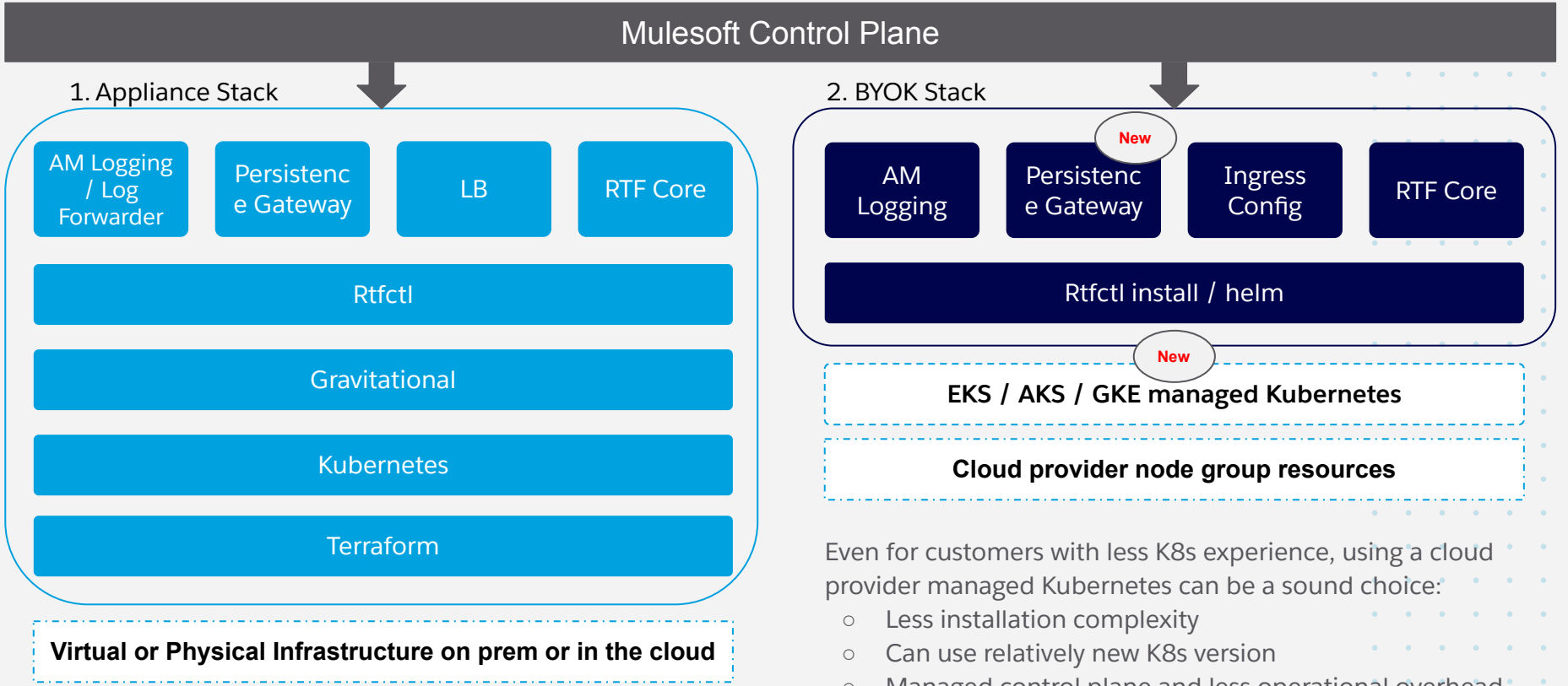
Resources, Security, & Application Monitoring

Node autoscaling OOTB

Key Changes

	RTF on EKS/AKS/GKE	RTF appliance
Support for deploying Mules and API Gateways	Supported.	Supported.
Kubernetes and Docker	Not included; customers bring their own via provisioning EKS/AKS/GKE clusters.	Included.
Support for installing on any Linux distribution	Supported.	RHEL and CentOS only.
Support for node auto-scaling	Supported using **Azure/AWS/GCP settings.** Scale up and down to improve performance & reliability and reduce cost	Not supported OOTB, requires extra effort e.g. gravitational configs
Support for external log forwarding	Customers bring their own external log forwarder.	Included.
Support for internal load balancer	Customers bring their own internal load balancer (called “Ingress Controller”)	Included.
Support for Anypoint Security Edge	Not supported.	Supported.
Ops Center	Not included. Customers can enable similar monitoring and alerting from AWS/Azure/GCP console.	Included.

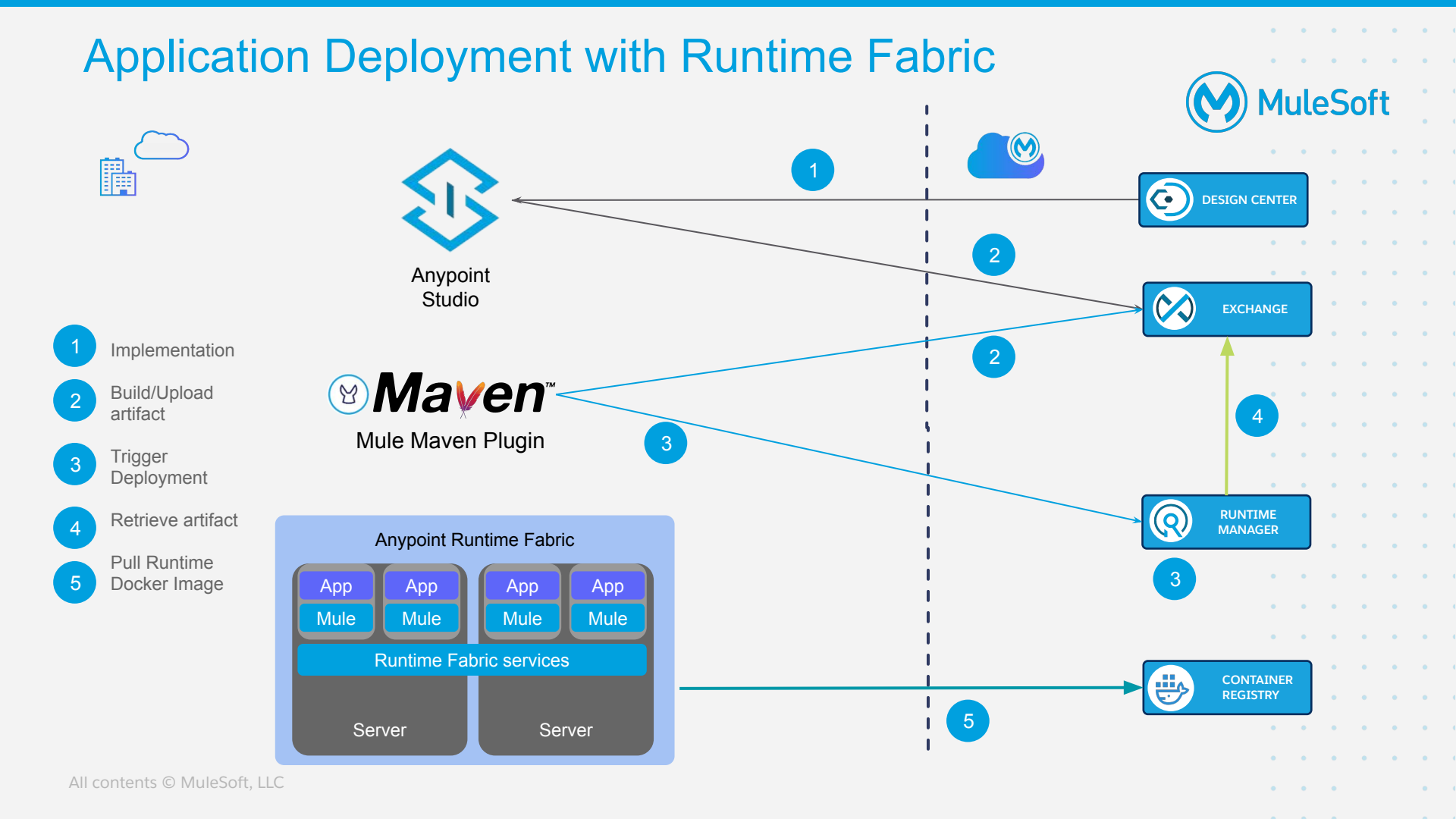
BYOK Effectively Streamlines K8s Operations



Even for customers with less K8s experience, using a cloud provider managed Kubernetes can be a sound choice:

- Less installation complexity
- Can use relatively new K8s version
- Managed control plane and less operational overhead

Application Deployment with Runtime Fabric



Anypoint Runtime Fabric - Where does it fit?

MuleSoft

Existing cloud infrastructure

Customer has an AWS or Azure instance, and can leverage RTF on their infrastructure, in some cases with hybrid cloud.

Ongoing kubernetes initiatives

RTF is built on kubernetes, and is attractive to customers that have kubernetes initiatives within their org.

Need for automation and isolation

Current on-premises deployments are requiring dedicated teams to monitor and orchestrate deployments.

Highly restricted industries

Customers in industries such as finance or government want managed cloud benefits but can only deploy on-premises.

MuleSoft

Anypoint Service Mesh

Runtime Plane Deployment Architecture

Deployment Models

Hybrid

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Runtime Plane			


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Managed by the Customer (3rd party Cloud)

Anypoint Service Mesh

MuleSoft

Internal & External APIs

Anypoint Platform
API-led connectivity for microservices

- MANAGEMENT CENTER
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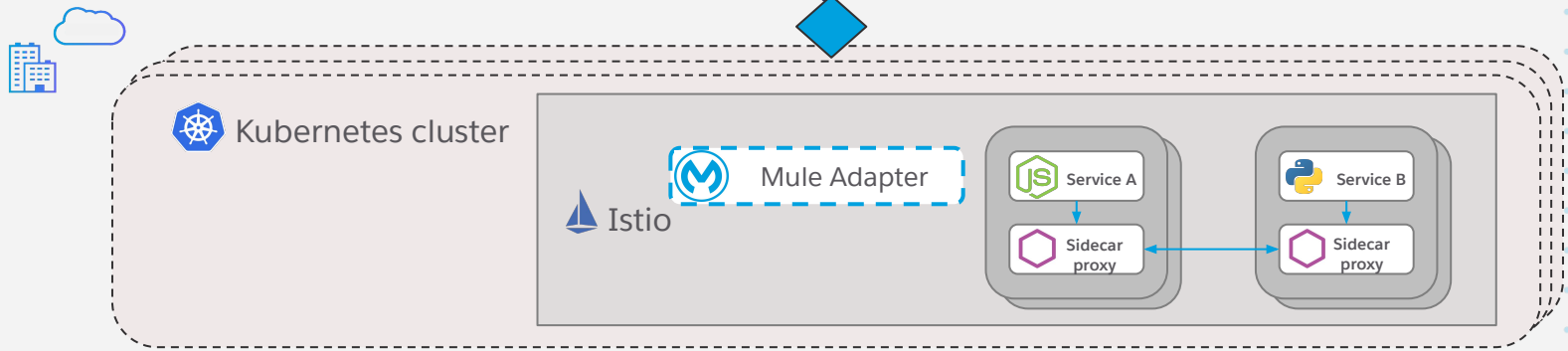
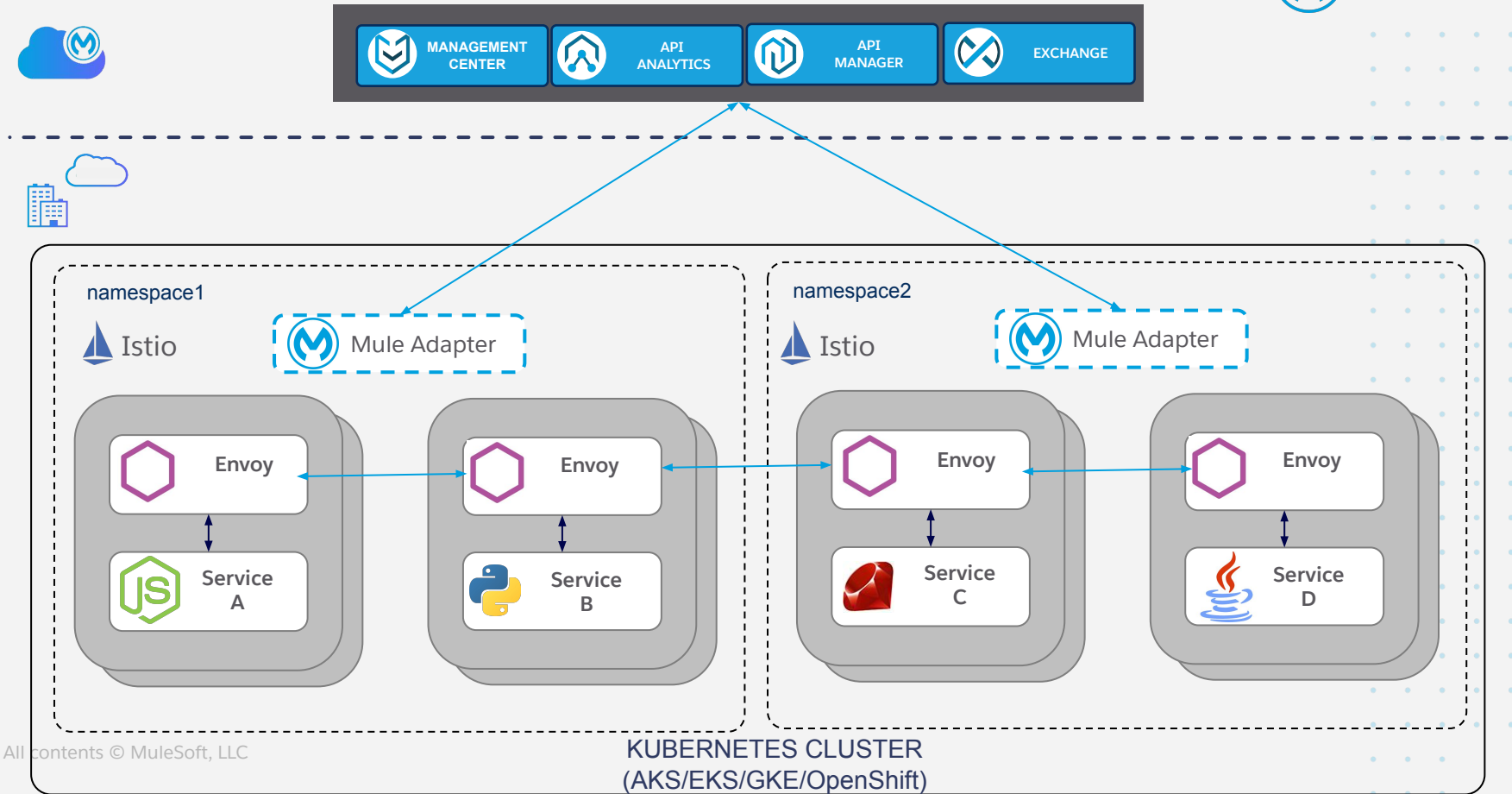
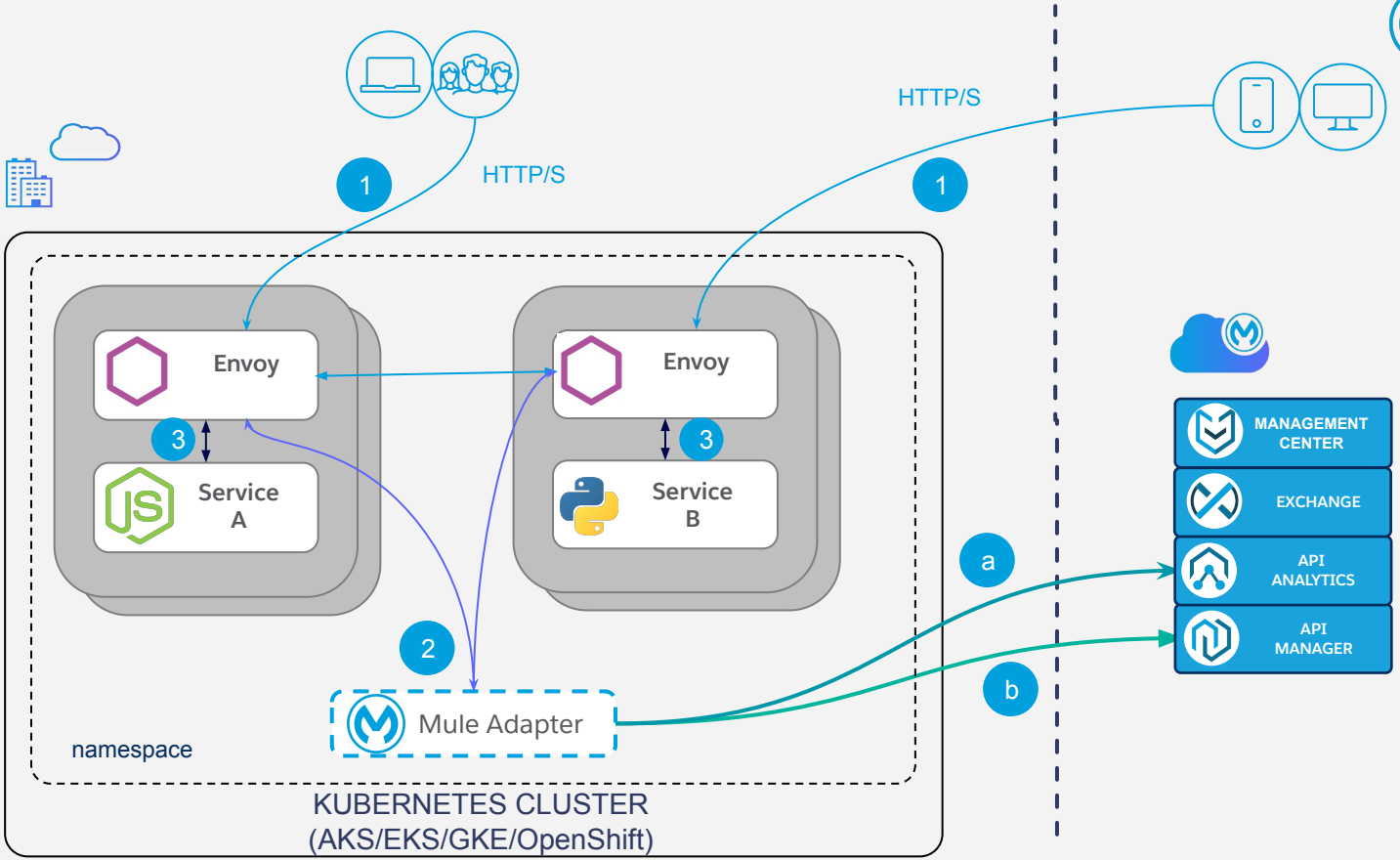
- EXCHANGE
- ANYPOINT SECURITY
- DESIGN CENTER
- API DESIGNER
- PARTNER MANAGER`



Anypoint Service Mesh Architecture



Anypoint Service Mesh Architecture



Anypoint Service Mesh - Platform Benefits

Extend platform capabilities

Multi-cloud support (EKS/AKS/GKE/OpenShift)

Central application management

Visibility into Enterprise application landscape

MuleSoft

Anypoint Private Cloud Edition (PCE)

Runtime Plane Deployment Architecture

Deployment Models

On-premise

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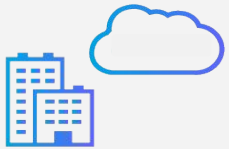
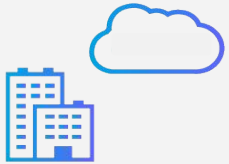
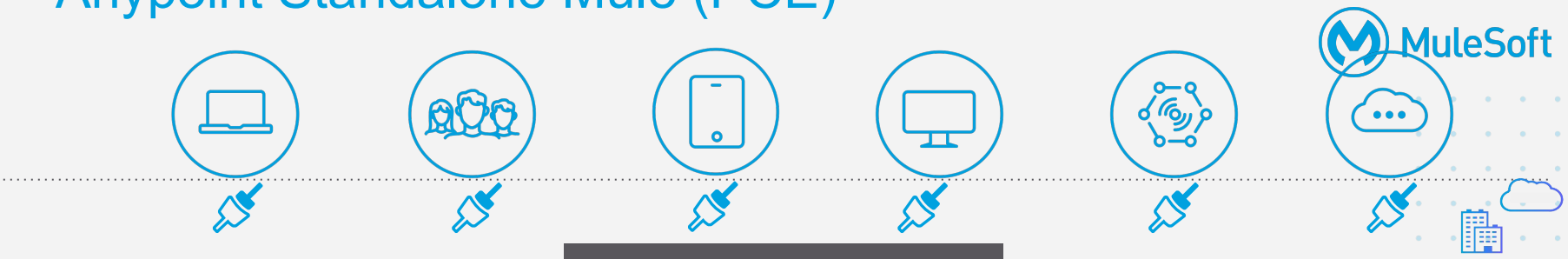
Control Plane			
Runtime Plane			


Managed by MuleSoft


Managed by the Customer (Data center)


Managed by the Customer (3rd party Cloud)

Anypoint Standalone Mule (PCE)



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API-led connectivity for microservices

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Anypoint Standalone Mule

Server	Server	Server	Server	Server	Server
App / Mule	App / Mule	App / Mule	App / Mule	App / Mule	App / Mule
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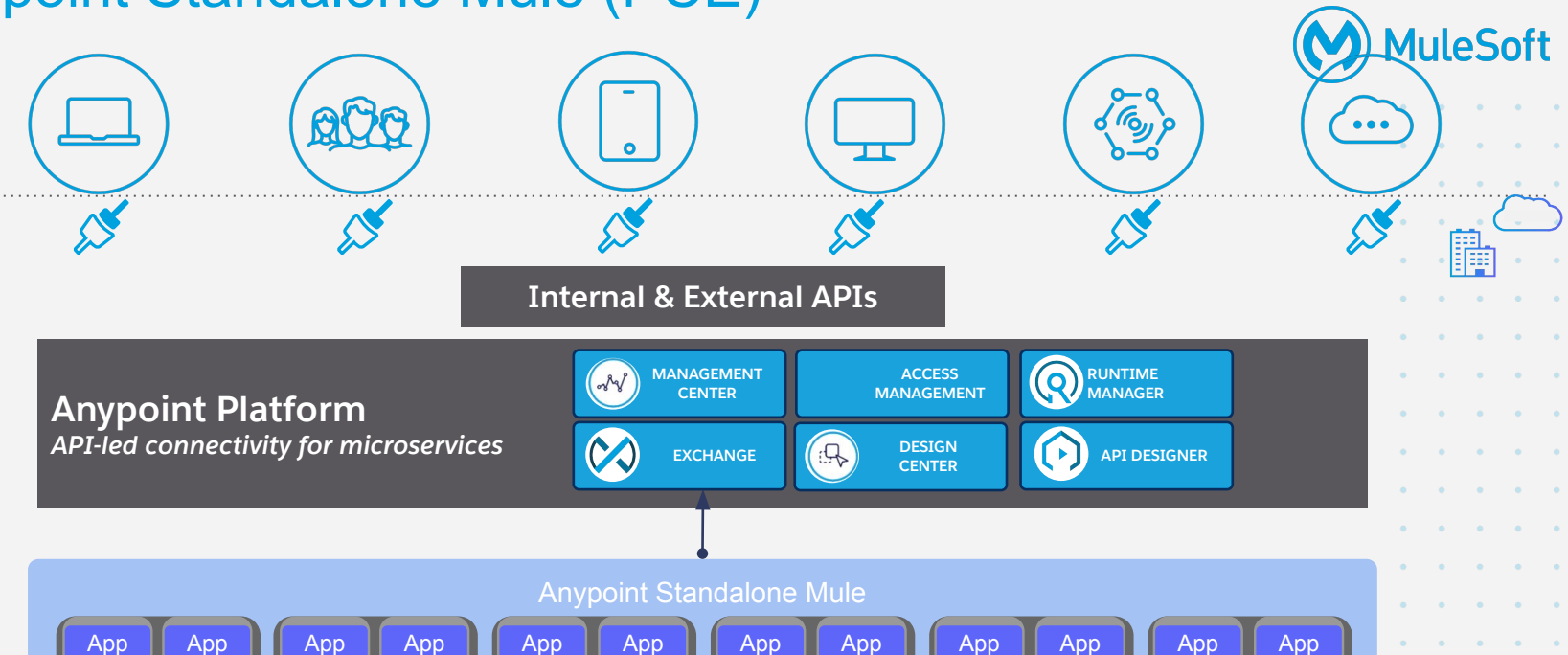

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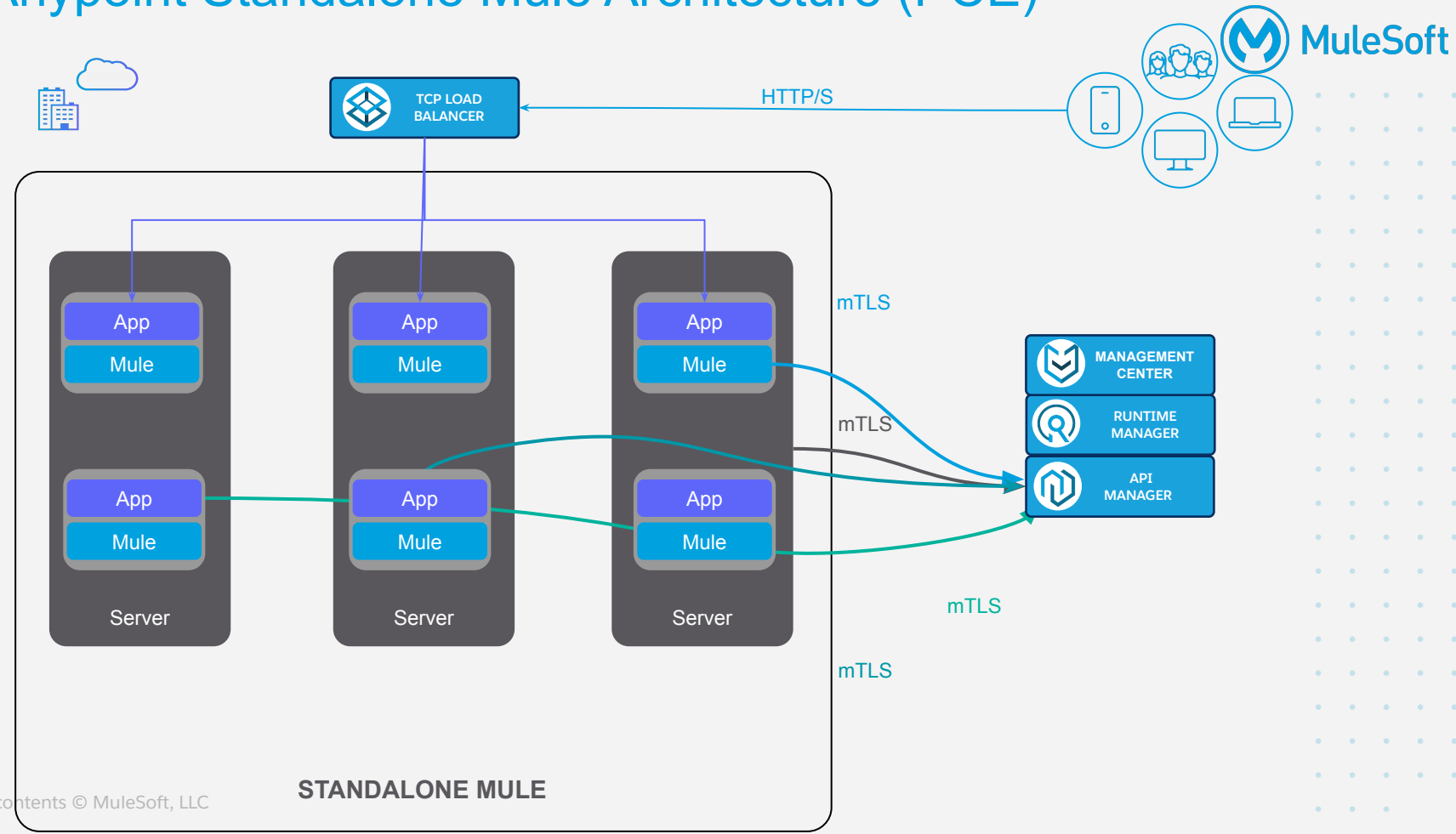
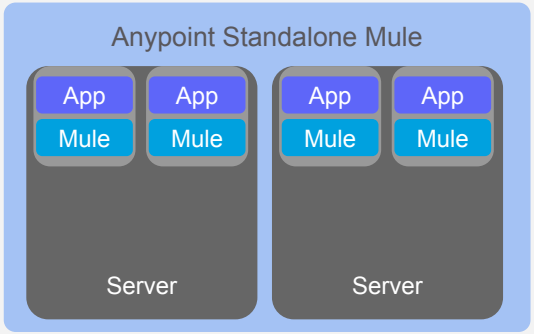


Application Deployment with Standalone Mule (PCE)



1. Implementation
2. Build/Upload artifact
3. Trigger Deployment
4. Retrieve artifact
5. Pull Standalone Mule

Mule Runtime Standalone (PCE) - Platform Benefits

Data Proximity

Container & VM choices

Full control over infrastructure

High Security needs

Resource & Application Monitoring

MuleSoft

Choosing the Right Deployment Option

Deployment Model : Decision Tree