



TURN IT UP

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The bridge to possible



Reap the Benefits, Avoid the Pitfalls

Successfully Deploy Multi-Cloud and Cloud-Native in SP

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BRKSPG-2037

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Optimize Multi-Cloud

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Multi-Cloud Challenges



On-Prem Cloud

“Good Multi-Cloud starts at home”

Challenges

Operations, Agility, Scalability
Global Reach



Public Cloud

“Take control”

Challenges

Risk of lock-in, Cost,
GDPR, Security,
Performance, Proximity to end-users



Application Experience

“Follow business needs”

Challenges

Security, Performance
Organizational Boundaries

Cloud Native and Multi-Cloud in the SP

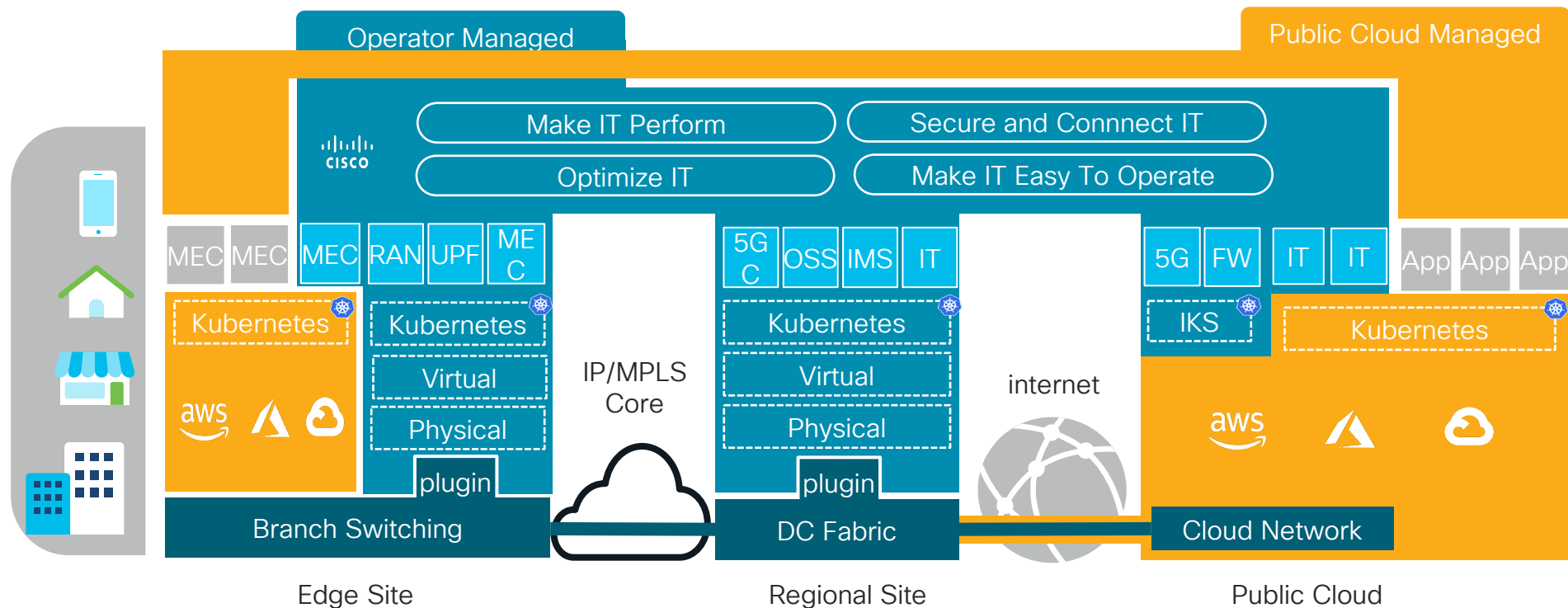
Key Taxonomy

- **Hybrid cloud** is a composition of a public cloud and a private environment, such as a private cloud or on-premises resources ([Wikipedia](#)).
- **Multi-Cloud**: Multi-Cloud is the use of multiple cloud services (storage, VM's) in a single heterogeneous architecture. ([Wikipedia](#)). A typical multi-cloud spans multiple public and private clouds.
- **Cloud Native** technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach([CNCF Definition](#))

Service Provider Use-Cases

- SP **Internal IT** infrastructure and **SP Private Cloud**
- **Business to Business** (B2B) Cloud
 - IaaS/Public Cloud
 - Mobile Edge Computing
- Cloud Native **Network Functions** and **Backend Applications**

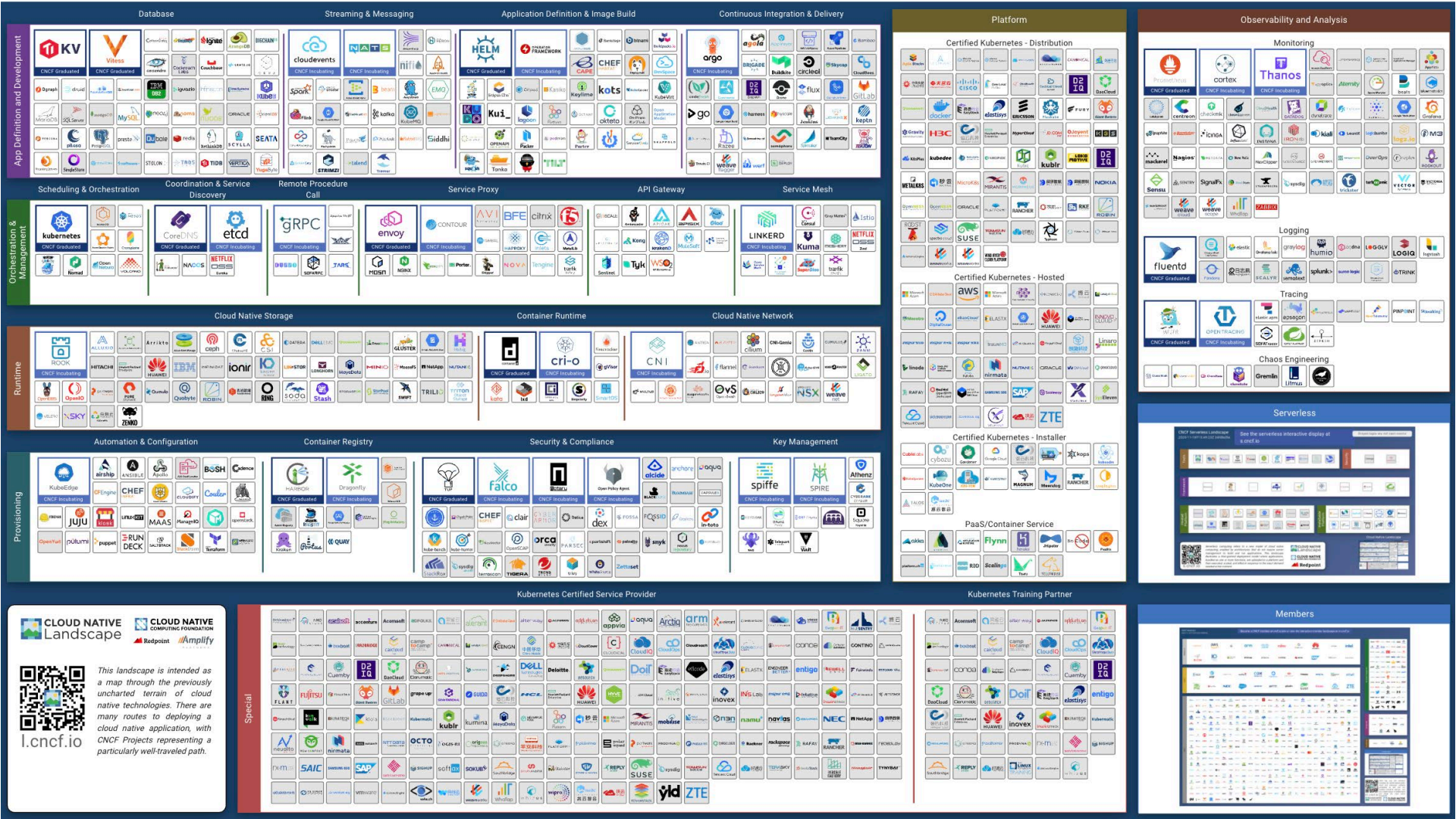
The opportunity: Multi-Cloud solution



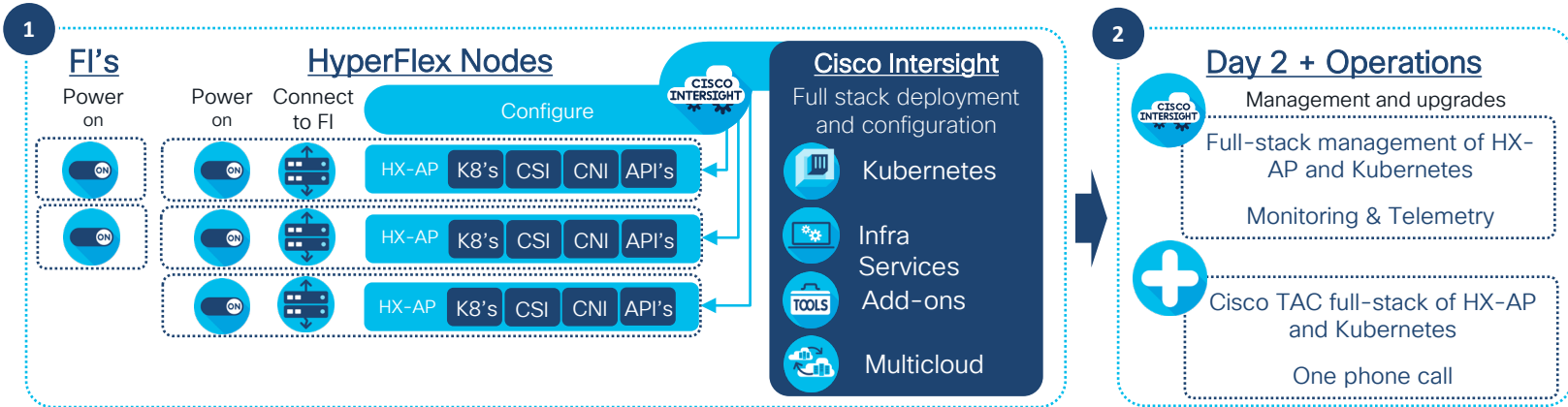
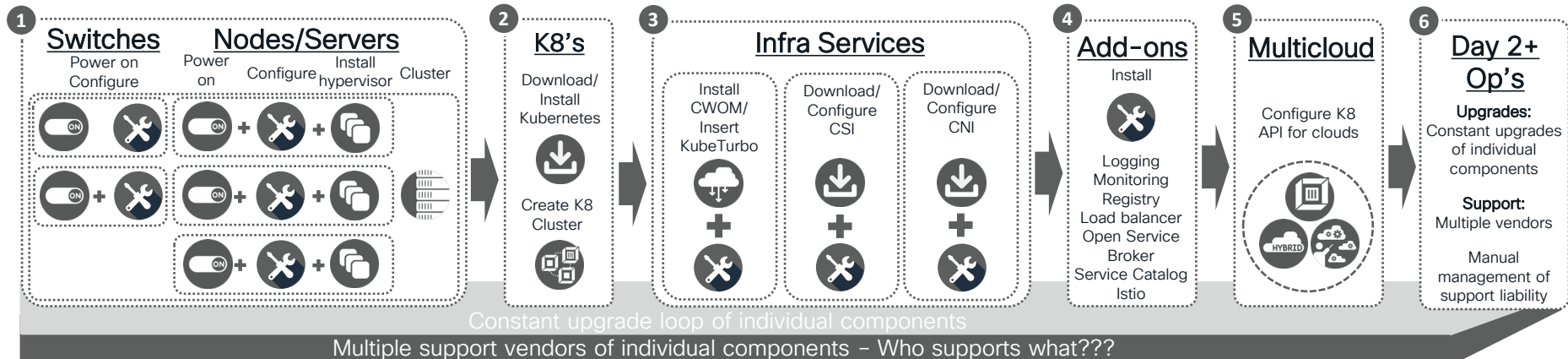
Build Your Own Cloud- Native Environment

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DIY vs. Intersight Workload Engine for Containers



Intersight Kubernetes Service on Multi-Cloud

Server Firmware and Fabric Management

HyperFlex Cluster Management
install, upgrade, expand

Kubernetes Node Virtual Machine Management
create, start, stop, move, delete

Kubernetes Cluster Management



Onboard CNF
Via **REST-API**



K8s Tenant Cluster 1

Master Node VM Worker Node VM

K8s Tenant Cluster 2

Master Node Bare Metal Worker Node Bare Metal

K8s Tenant Cluster 3

Master Node VM Worker Node VM

K8s Tenant Cluster 3

Master Node VM Worker Node VM

Intersight Workload Engine

HyperFlex Data Platform

Intersight Workload Engine

HyperFlex Data Platform

VMware ESXi

CSI (HyperFlex, VMware)



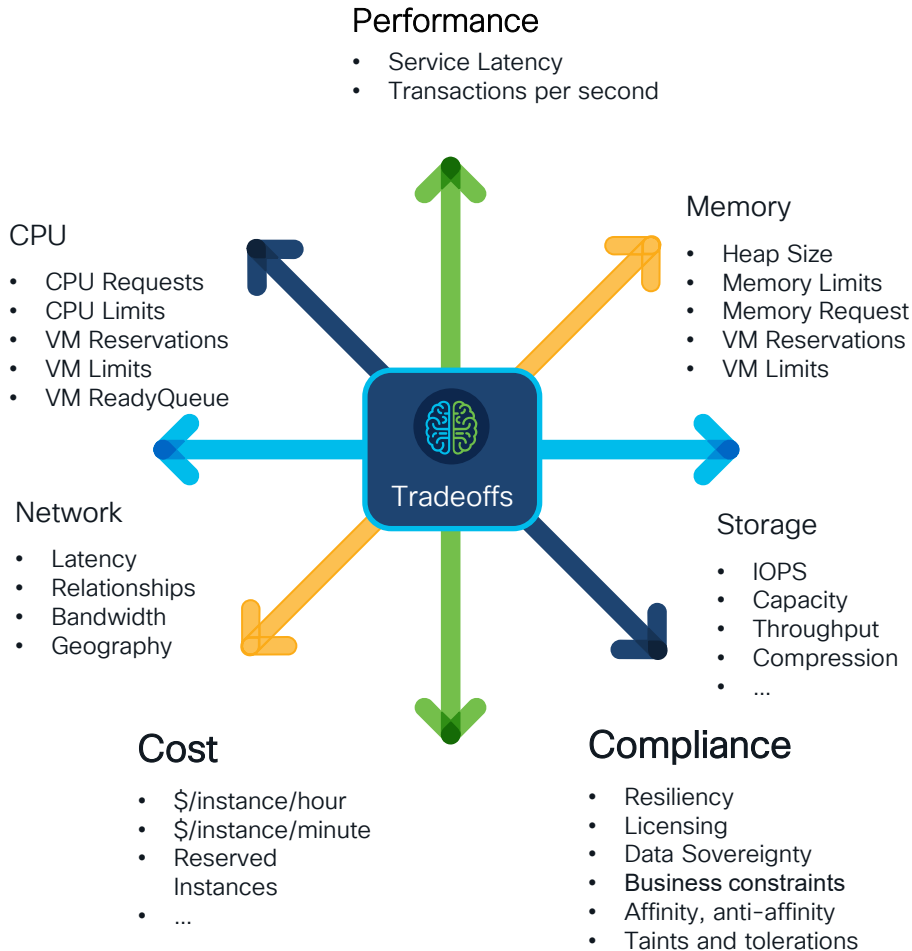
Public Clouds



Optimization of assets is a best practice in every industry

Workload Optimization & Performance Assurance

- Navigate multiple tradeoffs
- Operate in real time
- Self-managing

- 
- Initial Workload Placement
 - Increase Resources
 - Decrease Resources
 - Move Workload
 - Retire Resources

Performance

- Service Latency
- Transactions per second

Memory

- Heap Size
- Memory Limits
- Memory Request
- VM Reservations
- VM Limits

Storage

- IOPS
- Capacity
- Throughput
- Compression
- ...

Compliance

- Resiliency
- Licensing
- Data Sovereignty
- Business constraints
- Affinity, anti-affinity
- Taints and tolerations

Cost

- \$/instance/hour
- \$/instance/minute
- Reserved Instances
- ...

CPU

- CPU Requests
- CPU Limits
- VM Reservations
- VM Limits
- VM ReadyQueue

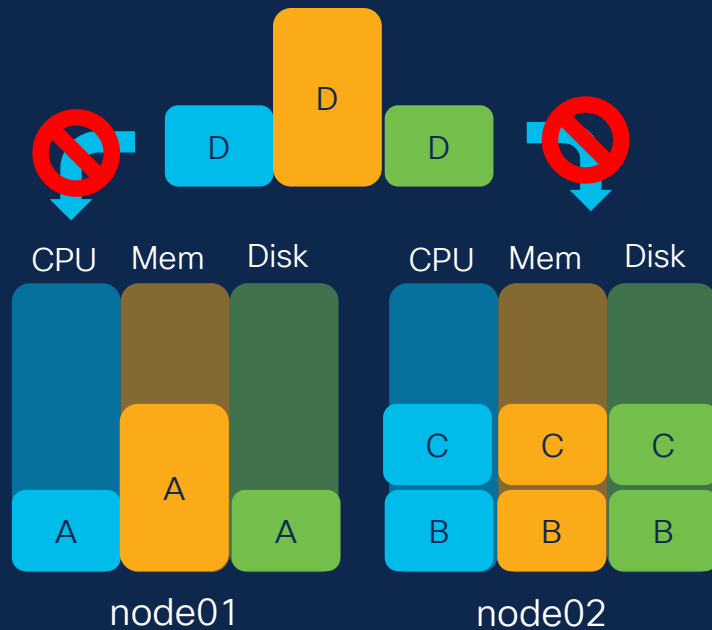
Network

- Latency
- Relationships
- Bandwidth
- Geography

Kubernetes Takes Care of Itself Until ...

“Failed Scheduling No nodes are available that match all of the following predicates:: Insufficient CPU”

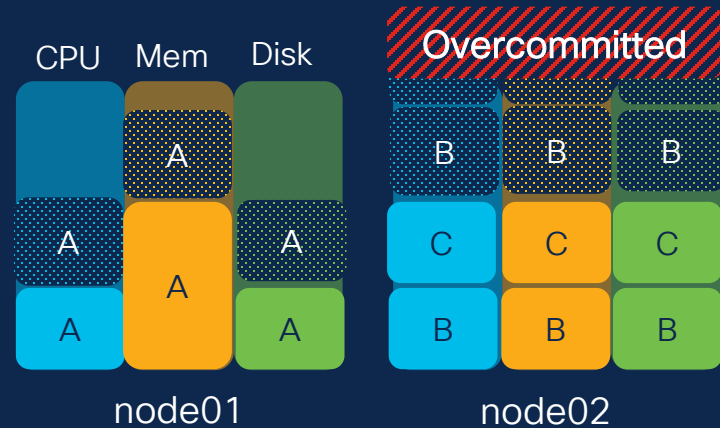
- Resource Fragmentation
- Node CPU congestion
- Noisy Neighbor



Kubernetes Takes Care of Itself Until ...

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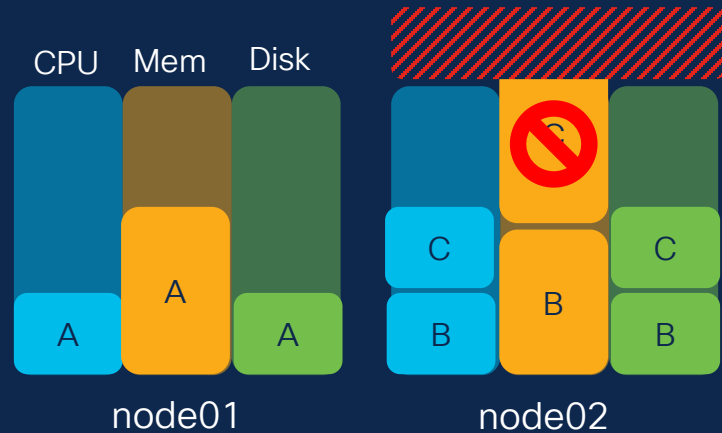
- *Resource Fragmentation*
- *Node CPU congestion*
- *Noisy Neighbor*



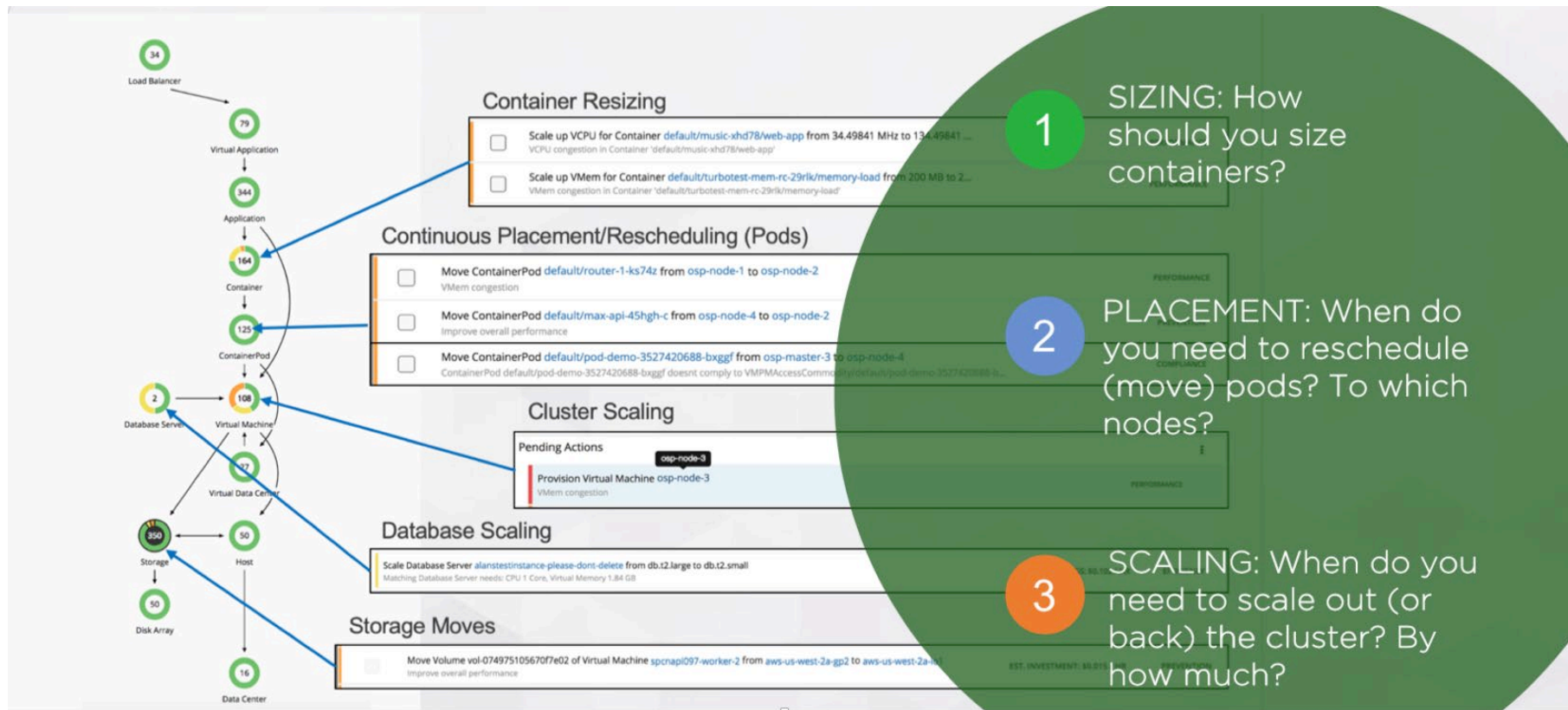
Kubernetes Takes Care of Itself Until ...

“Failed Scheduling No nodes are available that match all of the following predicates:: Insufficient CPU”

- *Resource Fragmentation*
- *Node CPU congestion*
- *Noisy Neighbor*



Kubernetes Performance Assurance



Three Rules of Kubernetes Networking

- Every POD should have an IP address
- Every POD should be able to communicate with every other POD in the same node
- Every POD should be able to communicate with every other POD on other nodes without NAT.

How is network connectivity implemented?

It is up to the CNI....

Services can be exposed on cluster node ports.

How is load balancing to K8s nodes achieved

External load balancer implemented by K8s provider (GKE, AKS, ACF, ...)

How is network segmentation implemented?

By default every POD can communicate to every other POD

Public Cloud Pitfall #1

Controlling
Public Cloud
spend without
breaking the
app.



Automated Performance/Cost Optimization

85 Pending Actions

<input type="checkbox"/>	Move VM to Storage jenkins-docker-x1	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage edge-docker-x4	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage edge-docker-x1	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage edge-docker-x1	SAVINGS: \$0.001 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage rhel-stable-docker-x1	SAVINGS: \$0.001 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage moby-docker-x7	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage splunk-snd-deployment-server-Splunk-m...	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage splunk-snd-indexer2-Splunk-mm-splunk-l...	SAVINGS: \$0.002 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage splunk-snd-universal-forwarder-Splunk-S...	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage atomic-docker-x1	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Move VM to Storage mm67384-east2	INVESTMENT: \$0.009 /h	PERFORMANCE ASSURANCE	>
<input type="checkbox"/>	Scale Database Server m-rds-mmrelaunch-skin	INVESTMENT: \$0.025 /h	EFFICIENCY IMPROVEMENT	>
<input type="checkbox"/>	Scale Virtual Machine CFODWDev1	SAVINGS: \$1.059 /h	EFFICIENCY IMPROVEMENT	>
<input type="checkbox"/>	Scale Virtual Machine CFODWDev3	SAVINGS: \$1.059 /h	EFFICIENCY IMPROVEMENT	>
<input type="checkbox"/>	Scale Virtual Machine CFODWDev2	SAVINGS: \$1.059 /h	EFFICIENCY IMPROVEMENT	>

Increase

Scale-up if workload demand increases to maintain application health

Top Accounts

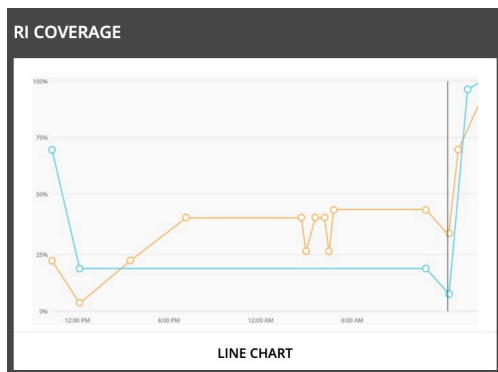
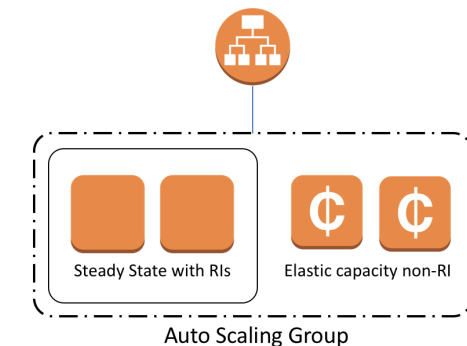
Sort by POTENTIAL SAVINGS ▼

Name	Workloads	Est. Cost ⓘ	Potential Savings	Actions
★ 574786618044 AWS 574786618044	18	N/A	\$546 /mo	41 ACTIONS
★ 700400740775 AWS 700400740775	14	N/A	\$52 /mo	23 ACTIONS
★ 041986056854 AWS 041986056854	1	N/A	\$4.87 /mo	3 ACTIONS
★ 049749227601 AWS 049749227601	3	N/A	\$0 /mo	NO ACTIONS

Reduce

Scale-down based on historical data if workload demand permits it. CWOM will not size-down beyond the peaks the application experiences.

Reserved Instances vs. On-Demand Instances



On Demand Instances

With On-Demand instances, you pay for compute capacity *by the hour or the second* depending on which instances you run. *No longer-term commitments or upfront payments* are needed. You can increase or decrease your compute capacity depending on the demands of your application and only pay the specified per hourly rates for the instance you use.

Reserved Instances

Reserved instances are *often paid upfront* and they have a *term commitment* which is one or three years. Reserved Instances provide you with a *significant discount* (up to 75%) compared to On-Demand instance pricing.

Assess Current Infrastructure

What would happen if we move to Azure

Cloud

Cloud Cost Comparison

	Without CWOM	With CWOM
	Allocation Plan	Consumption Plan
	On-Demand Pricing	On-Demand Pricing
Undersized VMs	182 Out Of 1419	0 Out Of 1419
Oversized VMs	1056 Out Of 1419	0 Out Of 1419
Average VM Cost	\$249/MO	\$223/MO
Existing Cloud Cost	\$16,434/MO	\$14,340/MO
Added Cloud Cost	\$336,462/MO	\$302,200/MO
Total Monthly	\$352,897/MO	\$316,540/MO
Total Yearly	\$4,234,759/YR	\$3,798,479/YR

-\$436,280

In cost avoidance using CWOM's consumption based approach & **On-Demand Pricing**



-\$761,085

In cost avoidance using CWOM & **Reserved Instance Pricing**

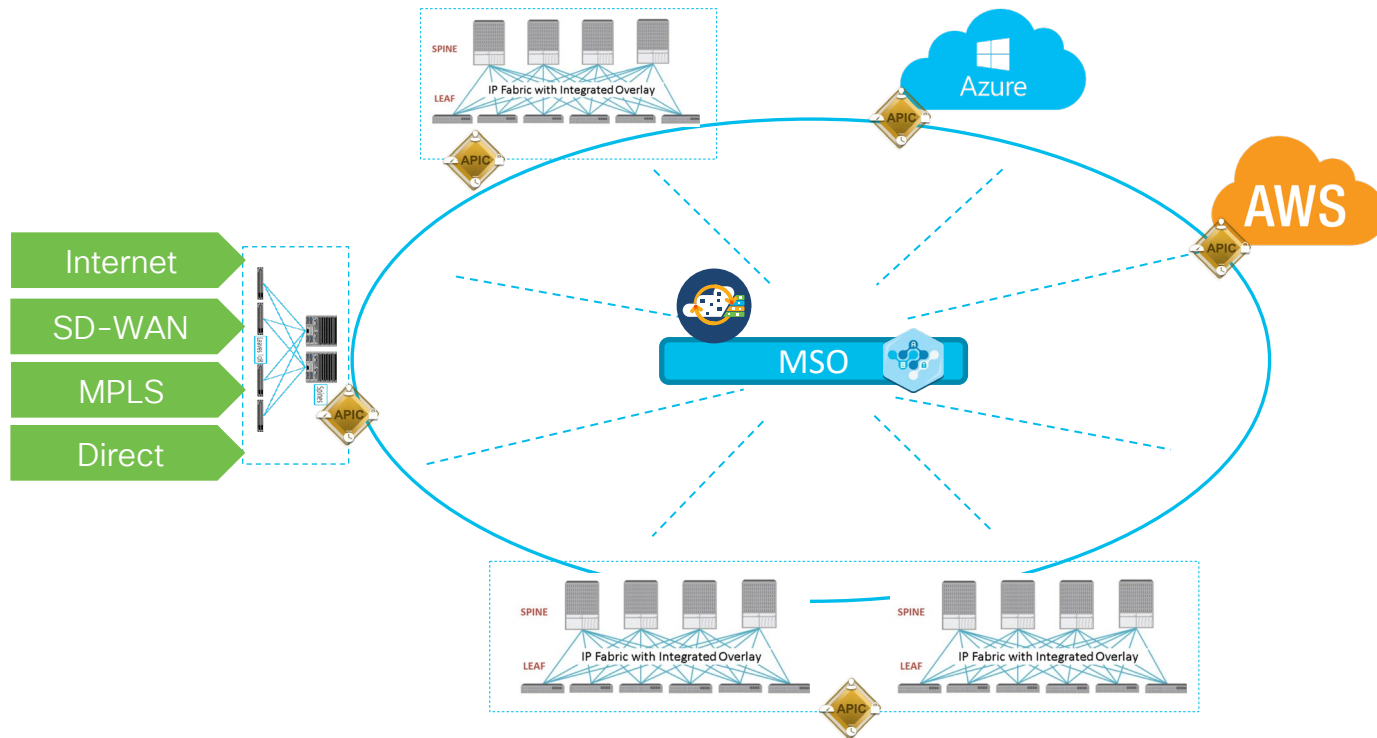


Public Cloud Pitfall #2

Multi-Cloud
Connectivity
According to Best
Practices.

ACI Multicloud Architecture

Multi-Cloud combined with Multi-Site



Application Experience

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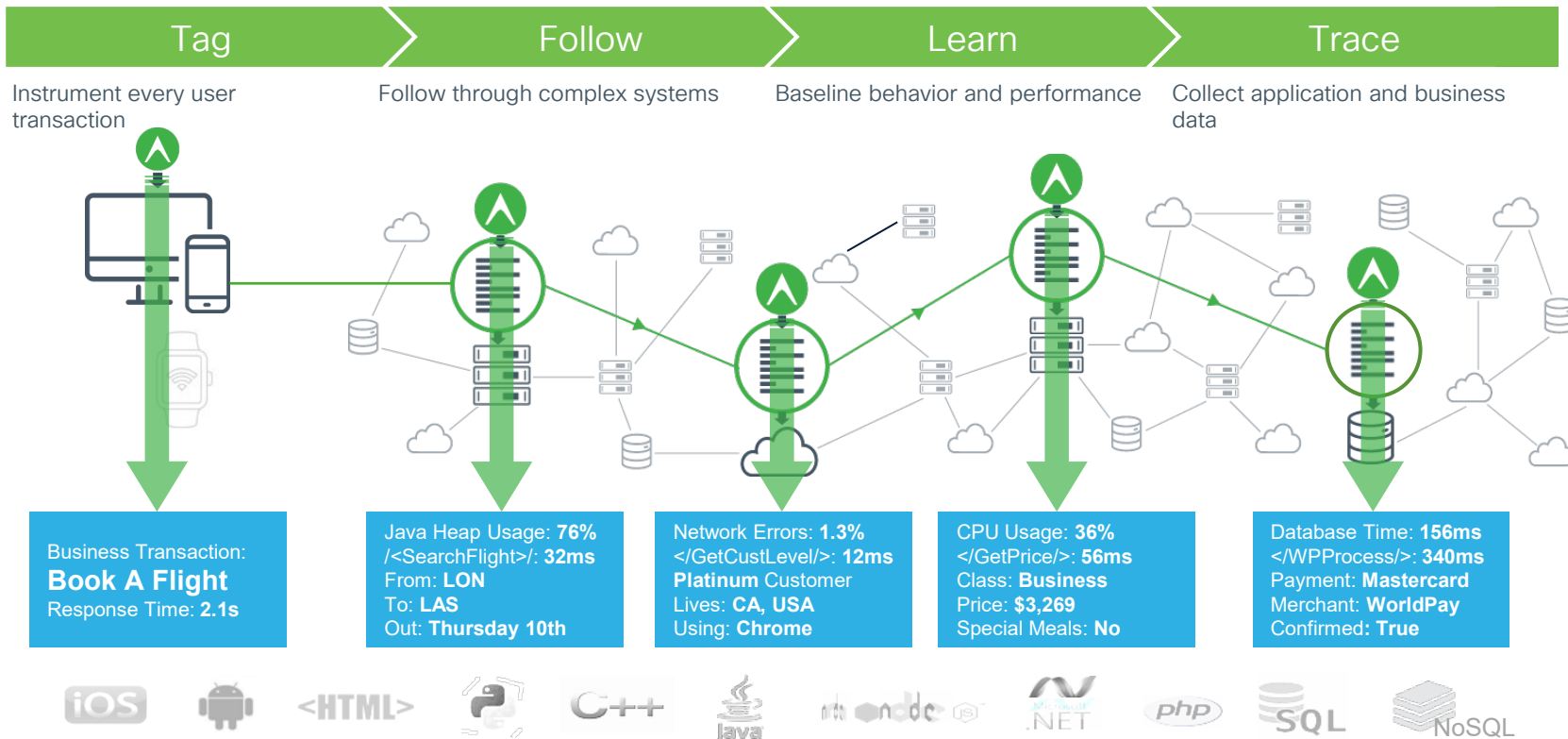


Is it the “code” or the “node”

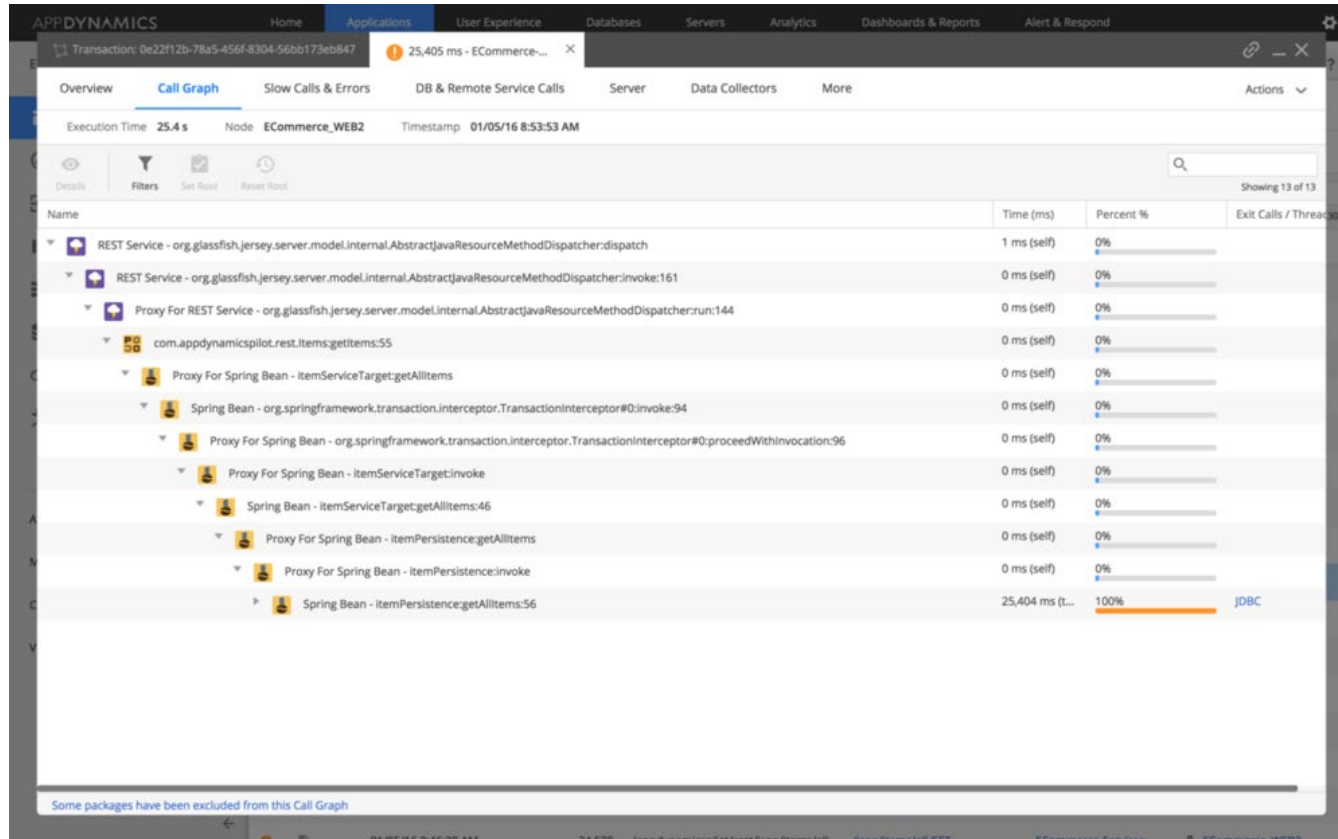
The war room experience: it is impacting the business!!! Is it the network, is it the storage, is it the hypervisor, is something wrong with the code.

Application Performance Management

End-to-end visibility and actions for business transactions



Enable Developers to Use APM





DIRECTV Scores Technology Touchdown with Debut of New APM

CHALLENGES:

- The performance of more than 100 internal and customer-facing applications was key to maintaining the satisfaction of DIRECTV's customers, but developers had not adopted an existing APM solution
- The complex environment behind DIRECTV's entertainment service included 6,000 physical and virtual servers running a mix of Windows, Linux, and HP-UX, as well as applications built using Java, .NET, PHP, and Node.js

SOLUTION:

- AppDynamics provided significant visibility and insight during a test at the start of football season when the website and infrastructure were required to carry unusually heavy loads
- Rolled out AppDynamics to key development teams

RESULTS:

- Faster resolution of performance issues
- Faster code deployments
- Improved cooperation between the development and testing teams

REGION: United States (AMER)



“We’re very comfortable with AppDynamics. We were able to deploy the agent to thousands of application instances with no impact or risk to our production environment.”

Glenn Trattner

Associate Vice President,
Technology, Application Services



Application-Aware Infrastructure

Integration with **Cisco AppDynamics** Application Performance Management (APM)

Results

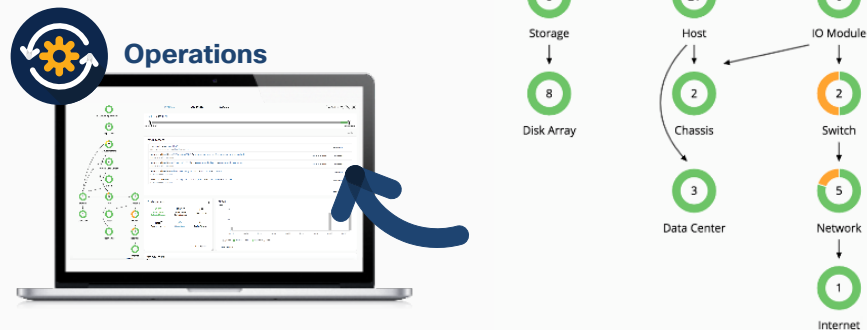
- ✓ Assure application performance
- ✓ On-premises re-sizing automation:
- ✓ **up to 20% utilization increase**
- Cloud compute resizing automation: **30%+ cost savings**

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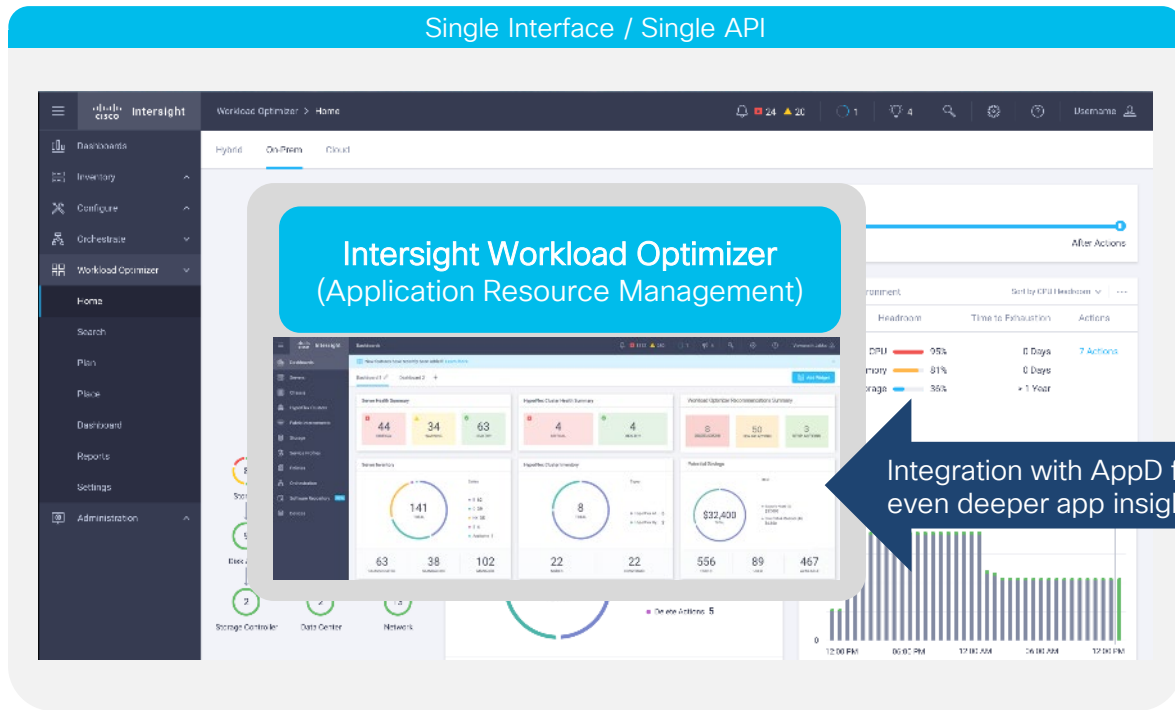


With CWOM, application performance metrics drive better decisions through the infrastructure.

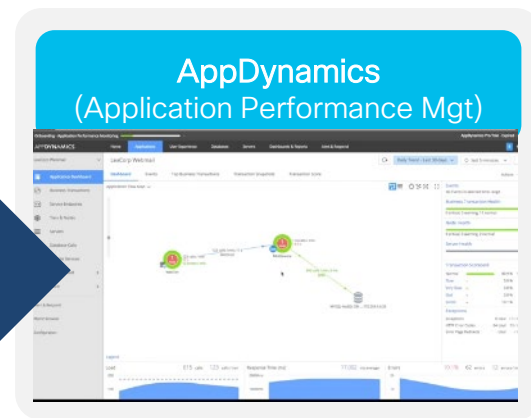


Expanded Intersight capabilities with Intersight Workload Optimizer

Single Interface / Single API



Integration with AppD for even deeper app insights



One More Thing

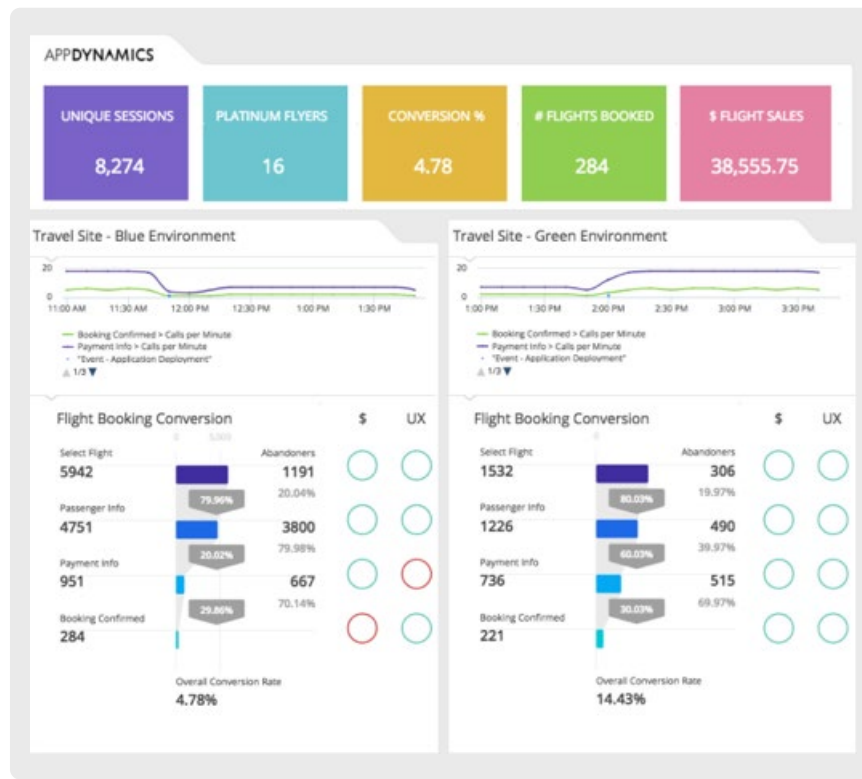
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Correlate Business and Performance

Compare Different
IT Deployments



Focus Efforts on
Business Impacting
Issues

Justify Investments
with Business
Metrics

Real-time
Business Health

Correlated Business and
Performance KPIs

IT & Business
Alignment

To recap



Want to know more?



Application Experience

“Follow business needs”

Accelerate Deployments



Public Cloud

“Take control”

Move to the cloud efficiently.



On-Prem Cloud

“Good Multicloud starts at home”

Optimize Opex and Capex

Secure IT

ACI Network Policy, CNI, Multi-Cloud

Make IT
Perform

App Dynamics (Cluster Agent, Multi-Cloud)

Optimize IT

Intersight Workload Optimization Manager (IWO for Containers and Cloud)

Agile Infra

Intent-Based Data Center Anywhere (Nexus Dashboard, Intersight)

DEMSPG-304 Manage application experience across multi-cloud and cloud native for SP

This demonstration will showcase how application performance monitoring (APM) with AppDynamics and application resource monitoring (ARM) with Intersight Workload Optimizer can be combined to optimize a cloud native application. We will demonstrate full stack monitoring and infrastructure automation.



The bridge to possible

Thank you

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