Cisco Tech Club Days

Cisco Compute Hyperconverged with Nutanix

Miloš Pavlík
Cisco TSA

The cloud operating model

Where is the best location to deploy my application?
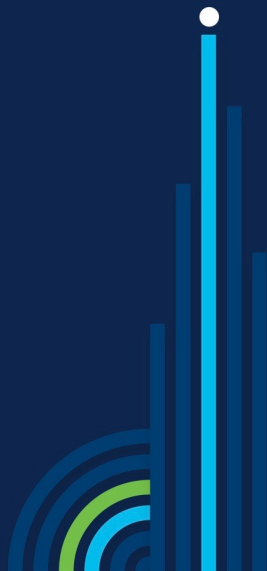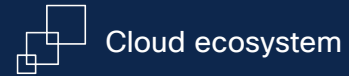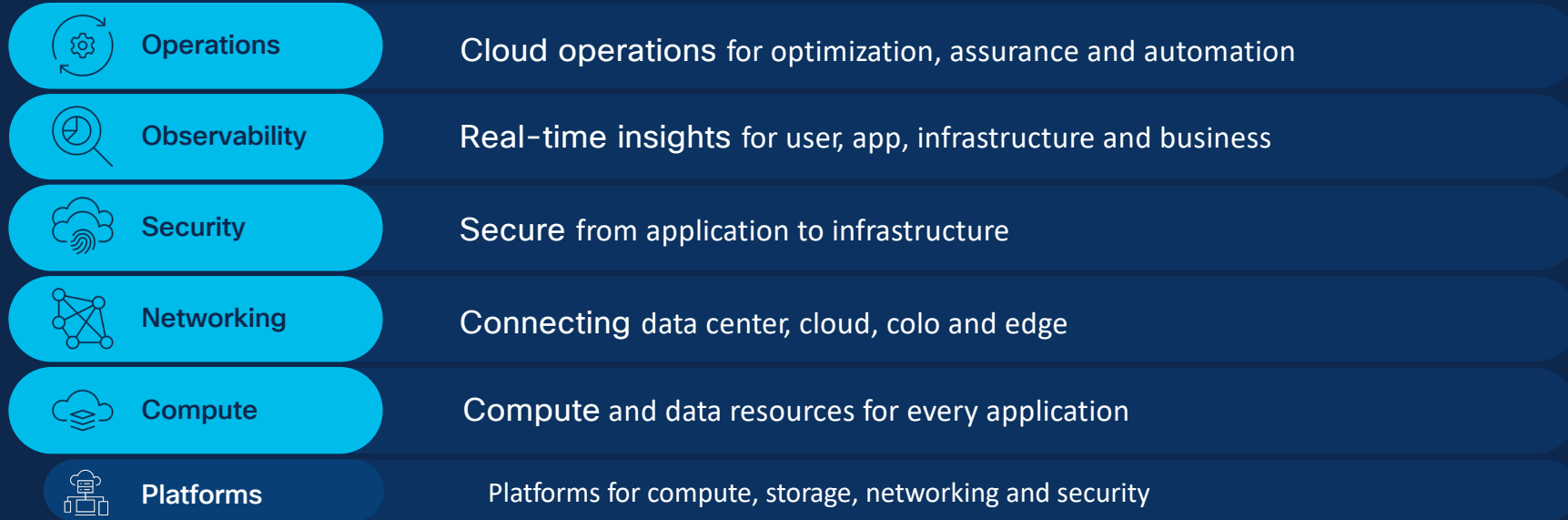
Data center —————— Edge —————— Colocation —————— Public cloud

Building clouds

Cloud ecosystem

Everything -as-code

Operations	Cloud operations for optimization, assurance and automation
Observability	Real-time insights for user, app, infrastructure and business
Security	Secure from application to infrastructure
Networking	Connecting data center, cloud, colo and edge
Compute	Compute and data resources for every application
Platforms	Platforms for compute, storage, networking and security

Sustainability

AI/ML strategy

Data center   Edge   Colocation   Public cloud

Compute and Networking

Common cloud experience
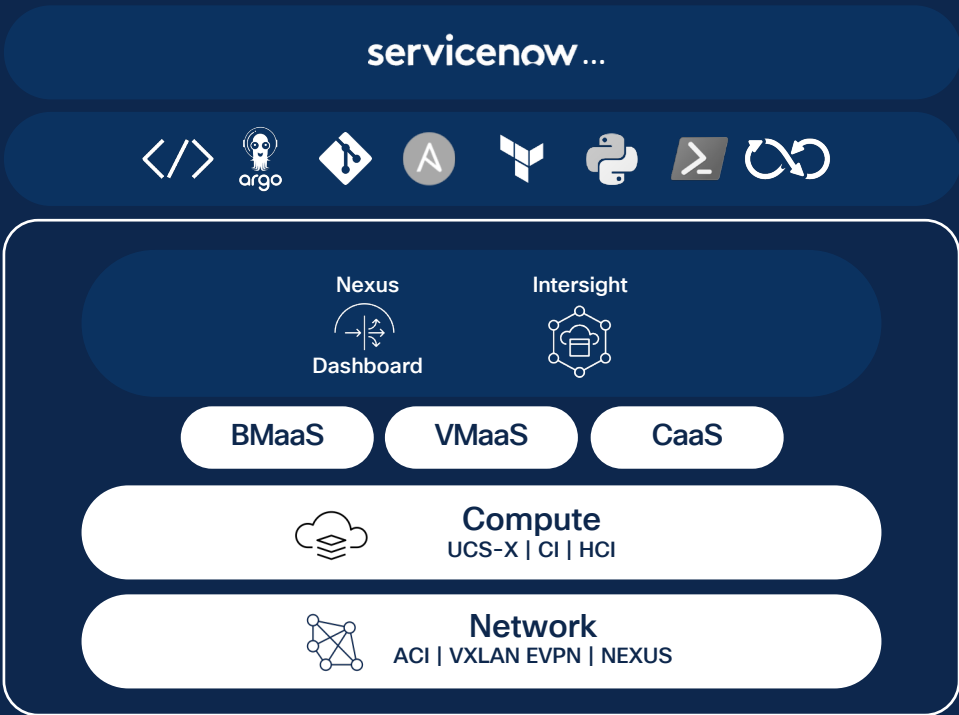
	IT Service Management / Operations	
servicenow.		servicenow.

Automation

Operations

Nexus
Dashboard

Intersight

Services

BMaaS   VMaaS   CaaS

BMaaS   VMaaS   CaaS   XaaS

Infrastructure

Compute
UCS-X | CI | HCI

Compute

Network
ACI | VXLAN EVPN | NEXUS

Network

Data center   **Edge**   **Colocation**   **Public cloud**

Compute and Networking

Hybrid cloud experience

Developer
(Chief Consumer)

Business | ITOps
FinOps | SecOps

servicenow.

Operations

Services

Infrastructure

Nexus   Intersight

Dashboard

BMaaS   VMaaS   CaaS

Compute
UCS-X | CI | HCI

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BMaaS   VMaaS   CaaS   XaaS

Compute

Network

Data center   **Edge**   **Colocation**   **Public cloud**

Compute and Networking

Hybrid cloud experience

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servicenow...

Operations

Services

| Nexus | Intersight |
| Dashboard | |

BMaaS | VMaaS | CaaS

Compute
UCS-X | CI | HCI

Workload Optimizer

Network
ACI | VXLAN EVPN | NEXUS

BMaaS | VMaaS | CaaS | XaaS
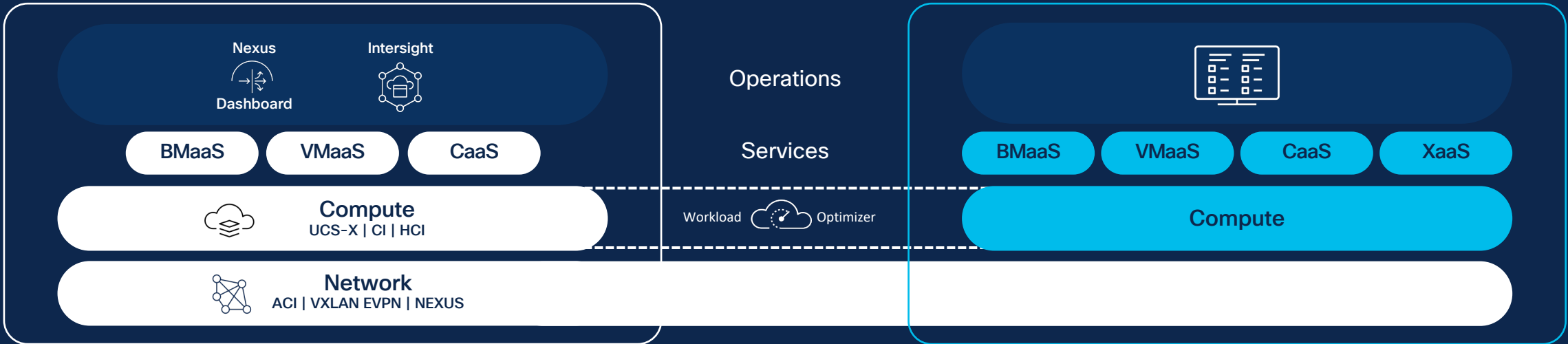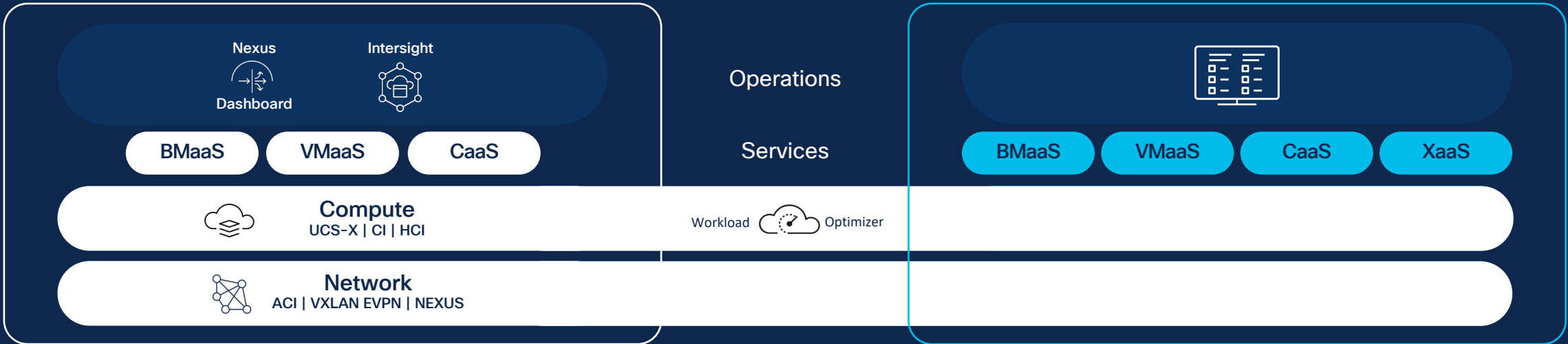
Compute

Data center   **Edge**   **Colocation**   **Public cloud**
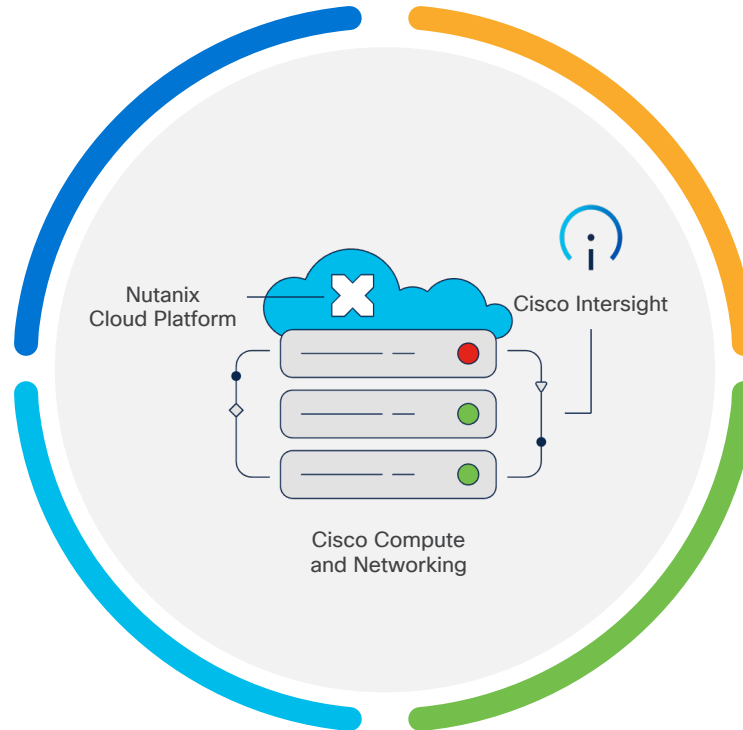
Cisco Compute Hyperconverged with Nutanix

A unique-to-the-market, 360-degree partnership

Strategy

Complete roadmap leveraging the strengths of both companies in service of our customers

Engineering

Built, managed, and supported holistically for a seamless end-to-end experience

Nutanix Cloud Platform

Cisco Intersight

Cisco Compute and Networking

Go to market

Combined, expert sales teams and buying process focused on simplifying the customer experience

Support

A joint augmented support model built for information-sharing to ensure our customers' success
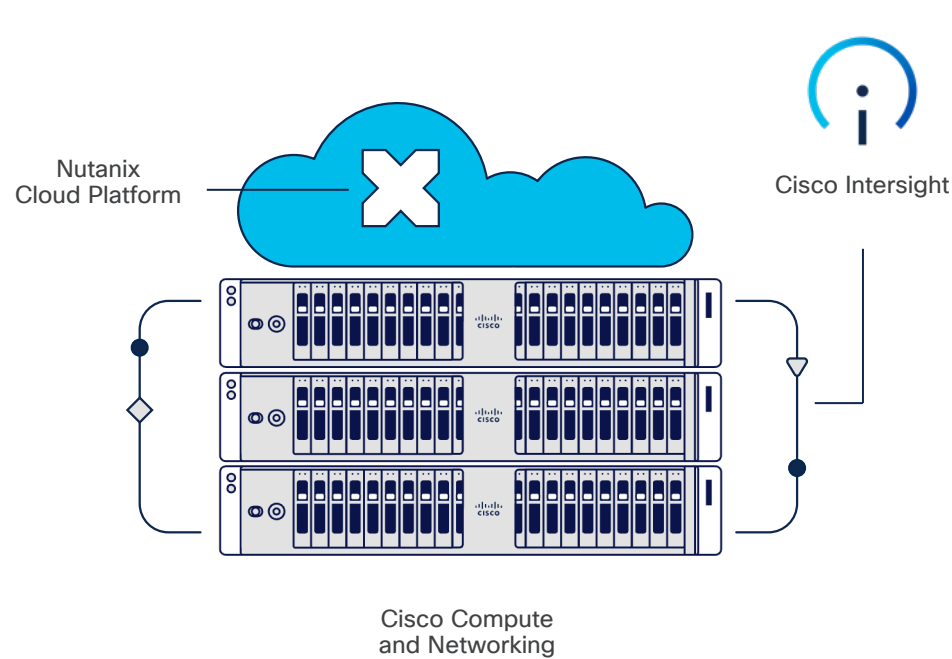
Operate at scale	More choice and flexibility	End-to-end security	Comprehensive support	Easy to buy

Cisco **Compute**

Cisco Compute Hyperconverged with Nutanix

Holistically built, managed, and supported by Cisco and Nutanix to eliminate complexity

Nutanix Cloud Platform

Cisco Intersight

Cisco Compute and Networking

Simplify and scale with cloud operations

Eliminate complexity with better visibility, control, and consistency across highly distributed environments

Accelerate IT transformation with more choice

Effortlessly address modern apps and use cases with flexible deployment options, latest technologies, and multicloud connectivity

Fortified hyperconverged solution

Keep systems running with augmented support, resiliency, and security capabilities

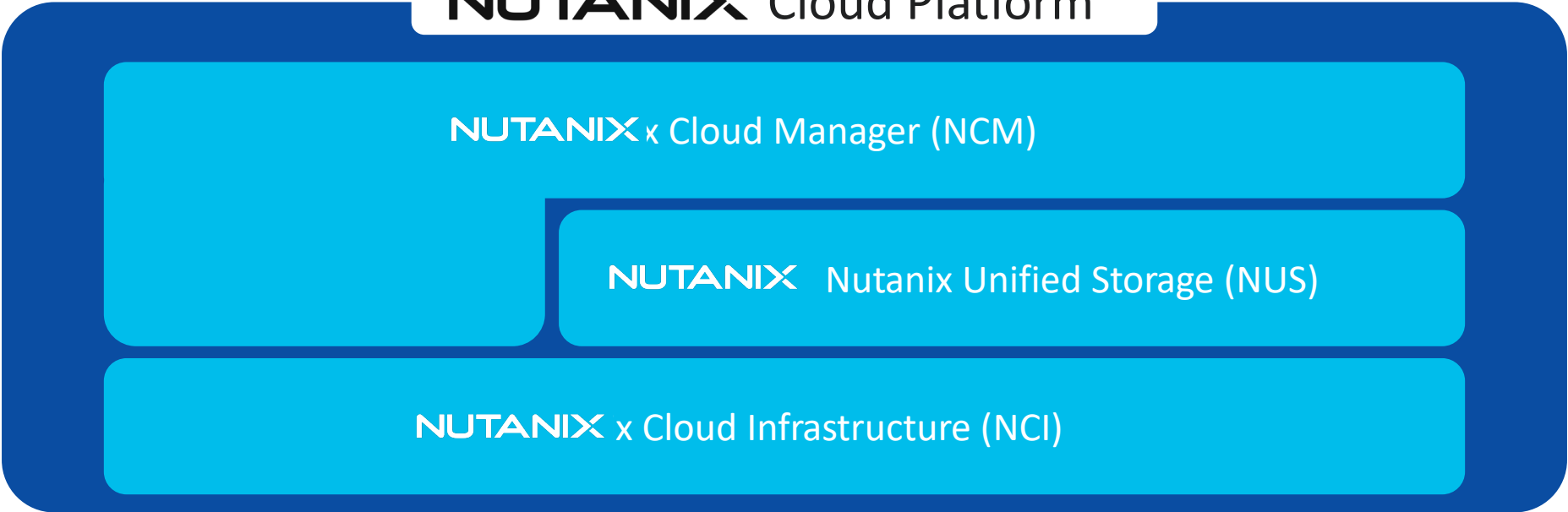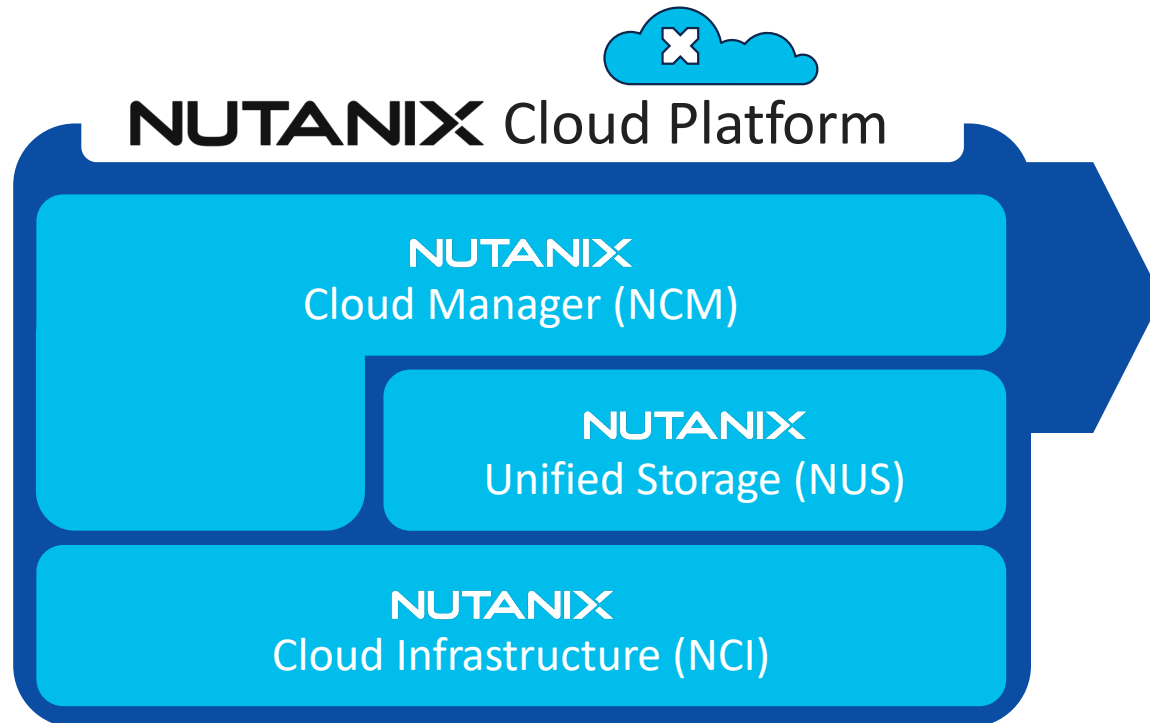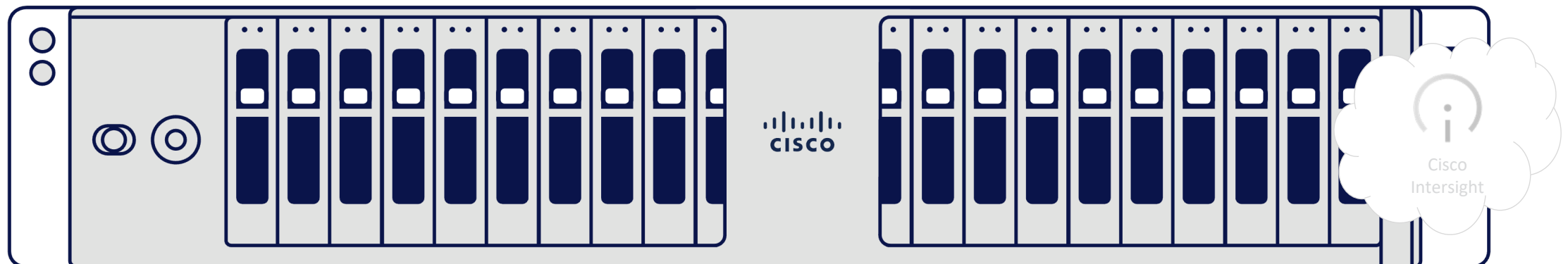| Operate at scale | More choice and flexibility | End-to-end security | Comprehensive support | Easy to buy |

Cisco **Compute**

Solution Components

Nutanix Cloud Platform (NCP)

NUTANIX Cloud Platform

NUTANIX
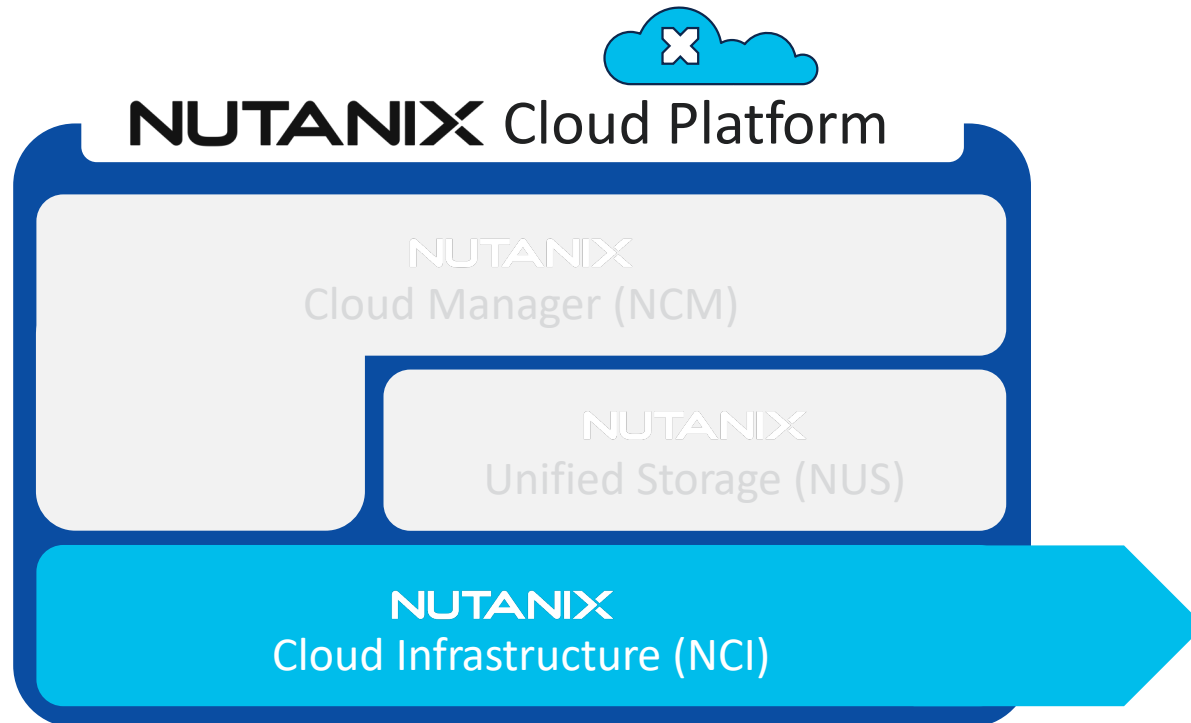Cloud Manager (NCM)

NUTANIX
Unified Storage (NUS)

NUTANIX
Cloud Infrastructure (NCI)

A secure, resilient, and self-healing software platform for building your hybrid multi-cloud infrastructure to support all kinds of workloads and use-cases across public and private clouds

CISCO

Cisco Intersight

Cisco **Compute**

Nutanix Cloud Infrastructure (NCI)

NUTANIX Cloud Platform

NUTANIX
Cloud Manager (NCM)

NUTANIX
Unified Storage (NUS)
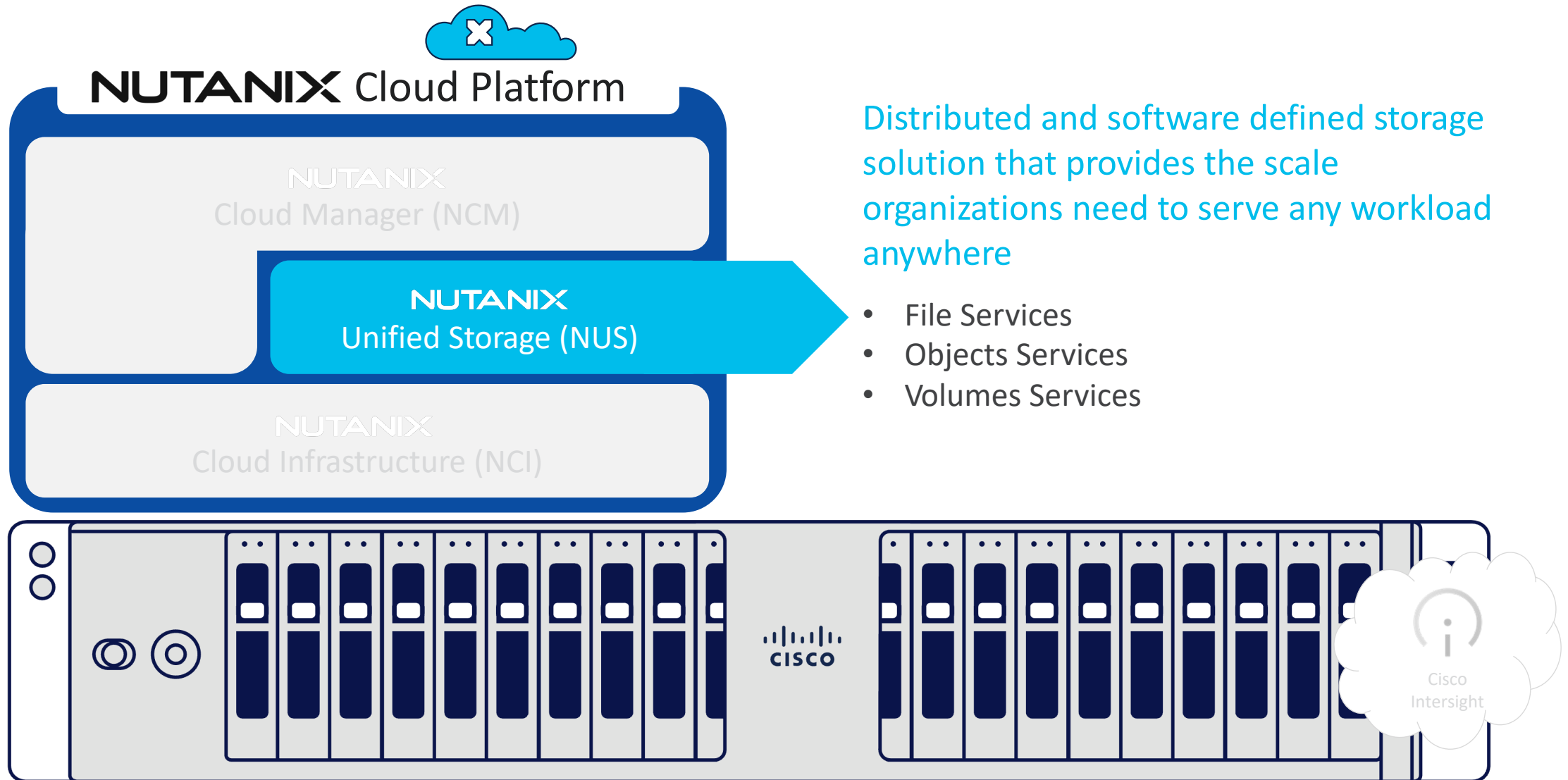
NUTANIX
Cloud Infrastructure (NCI)

Provides a complete software stack to unify your hybrid cloud infrastructure

- Scale-Out Storage
- AHV Hypervisor
- Advanced HCI
- Virtual Networking
- Disaster Recovery
- Container Services
- Data + Network Security

CISCO

Cisco Intersight

Cisco **Compute**

Nutanix Unified Storage (NUS)

NUTANIX Cloud Platform

NUTANIX
Cloud Manager (NCM)

NUTANIX
Unified Storage (NUS)

NUTANIX
Cloud Infrastructure (NCI)

Distributed and software defined storage solution that provides the scale organizations need to serve any workload anywhere

- File Services
- Objects Services
- Volumes Services

CISCO

Cisco Intersight

Cisco **Compute**

Nutanix Cloud Manager (NCM)

NUTANIX Cloud Platform

NUTANIX
Cloud Manager (NCM)

NUTANIX
Unified Storage (NUS)

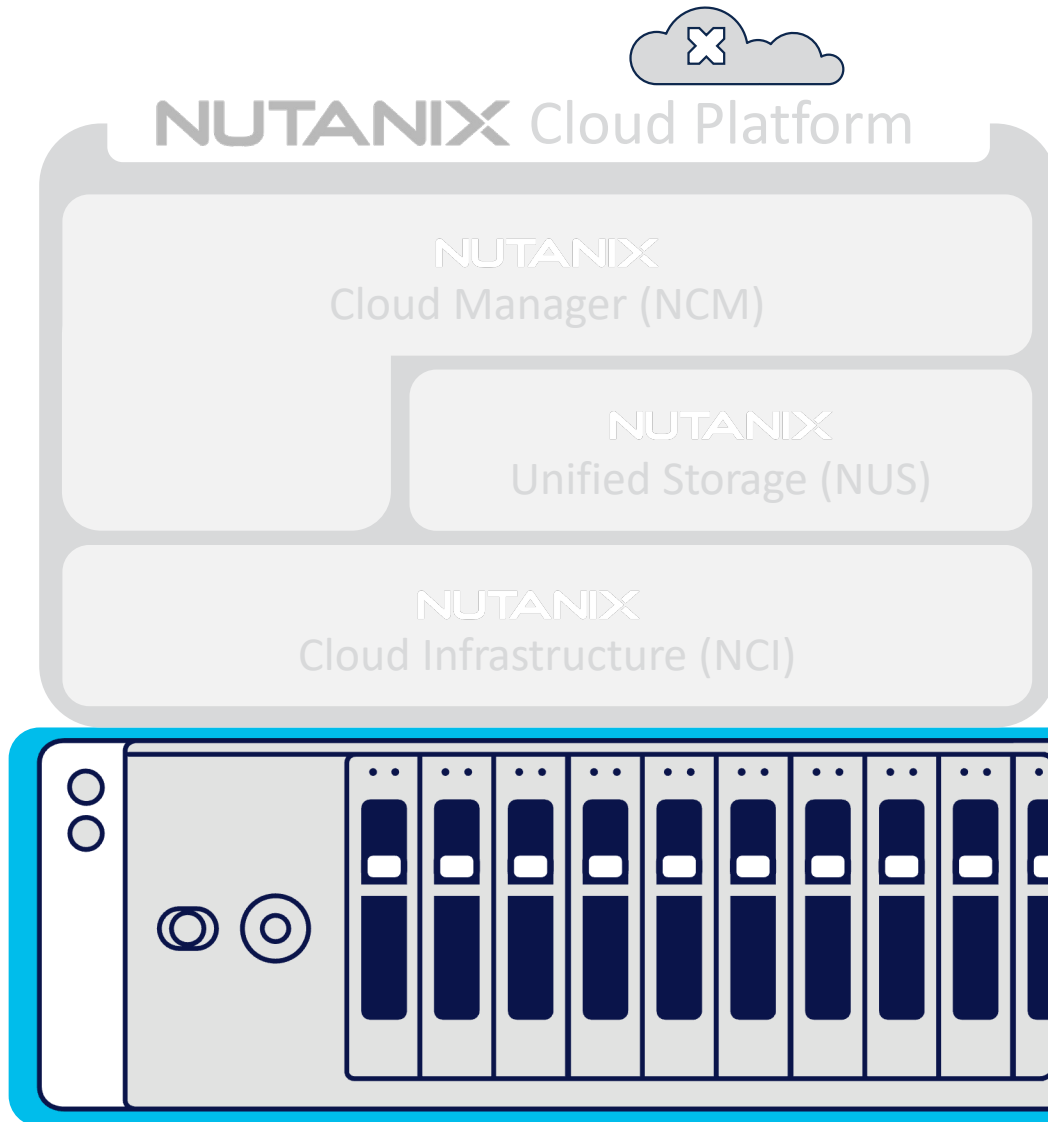NUTANIX
Cloud Infrastructure (NCI)
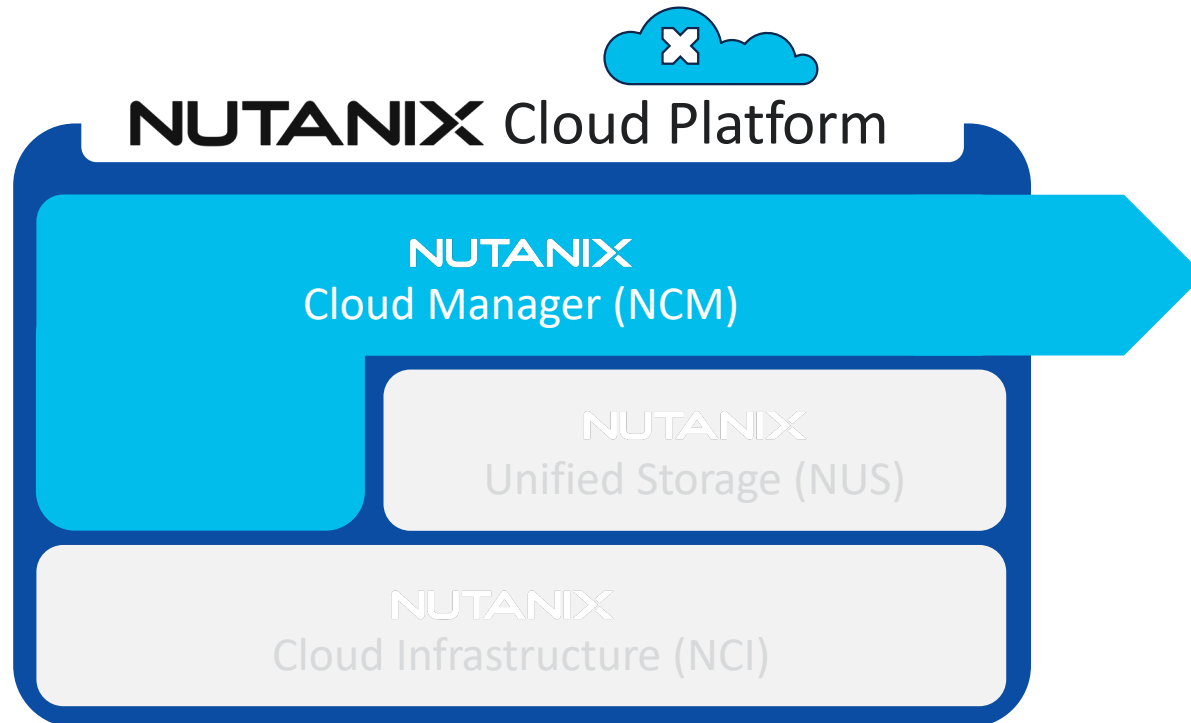
The software control plane for provisioning, operating, automating and governing workloads across clouds

- App Lifecycle Management
- Security Central
- Costs Governance
- Self-Service Infrastructure
- Intelligent Operations

CISCO
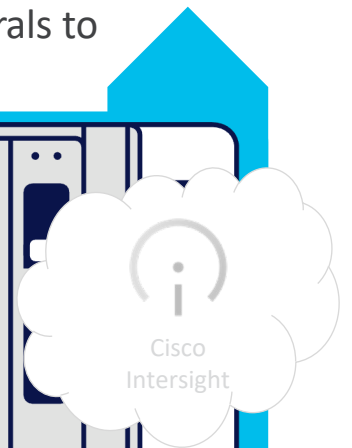
Cisco
Intersight

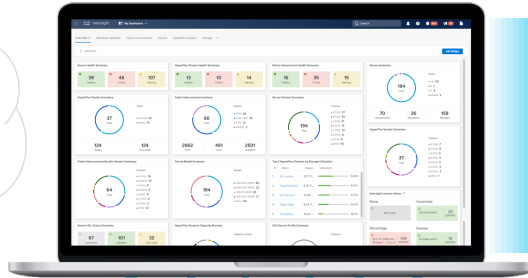Cisco **Compute**

Cisco UCS Compute

Stateless server architecture that combines compute and networking into a single platform to power your applications

- Simplified management
- Complete API programmability
- Stateless configuration through logical policies and profiles
- Multiple form-factors and peripherals to meet customer requirements

Cisco **Compute**

Cisco Intersight

Cisco Intersight

SaaS-based management platform providing global visibility and fleet management for all Cisco Compute Hyperconverged with Nutanix nodes

- Nutanix personality in Intersight

- Connected TAC

- Proactive RMA

- Hardware contract status, EoL notices, security advisories and field notices

- Server Faults/Alerts
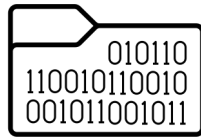
- Basic server management – KVM, cross launch UCSM

Cisco **Compute**

Technical Highlights

Cisco **Compute**

Cisco Compute Hyperconverged with Nutanix Technical Highlights
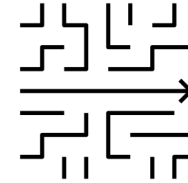
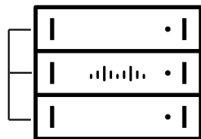**Flexible Options & Scalability**

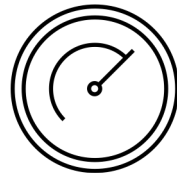**Storage Services**

Business Continuity & Data Protection

Simplified Cluster Operations

Integrated Networking
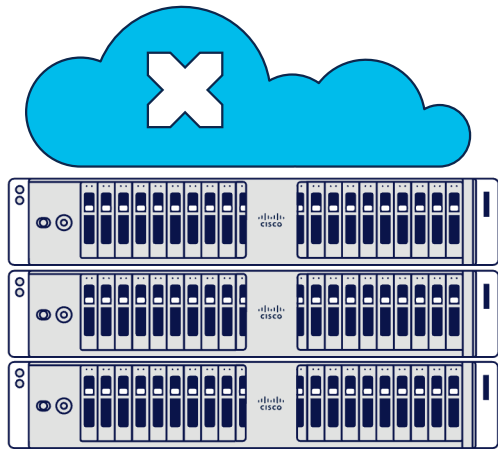
Performance & Optimization
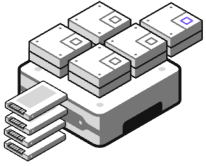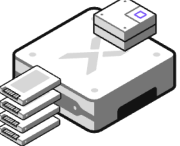
Security & Governance

Global Support

Cisco **Compute**

Flexible Options & Scalability
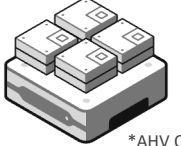
Node Expansion Options

HCI
Adds CPU, memory and disk capacity resources to a cluster
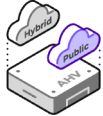
Storage-Only
Adds only disk capacity resources to a cluster

Compute-Only *AHV Only
Adds only CPU and memory resources to a cluster

Hypervisor Options

NUTANIX
AHV Hypervisor
min **3** max **32**

Nodes per Cluster

vmware™
vSphere Hypervisor (ESXi)
min **3** max **48**

NUTANIX
Cloud Infrastructure (NCI)

Max Raw Capacity Per Node **182TB**

✓ Mixed Drive Support

✓ Mixed Node Support

Cisco Compute Hyperconverged Physical Node Types

UCS M7 Coming Soon

C220 M6 All-Flash Node

- Up to 10 x 1.9TB, 3.8TB or 7.6TB SSD disks
- 76TB max raw capacity/node
- 4th Gen VIC @ 10/25GbE
- Dual M.2 SATA SSDs with HW RAID for boot
- Up to 2 CPUs and 4TB Memory

C220 M6 All-NVMe Node

- Up to 10 x 1.9TB, 3.8TB, 7.6TB or 15.3TB NVMe disks
- 153TB max raw capacity/node
- 4th Gen VIC @ 10/25GbE
- Dual M.2 SATA SSDs with HW RAID for boot
- Mandatory 2 CPUs and up to 4TB Memory

C240 M6 All-Flash Node
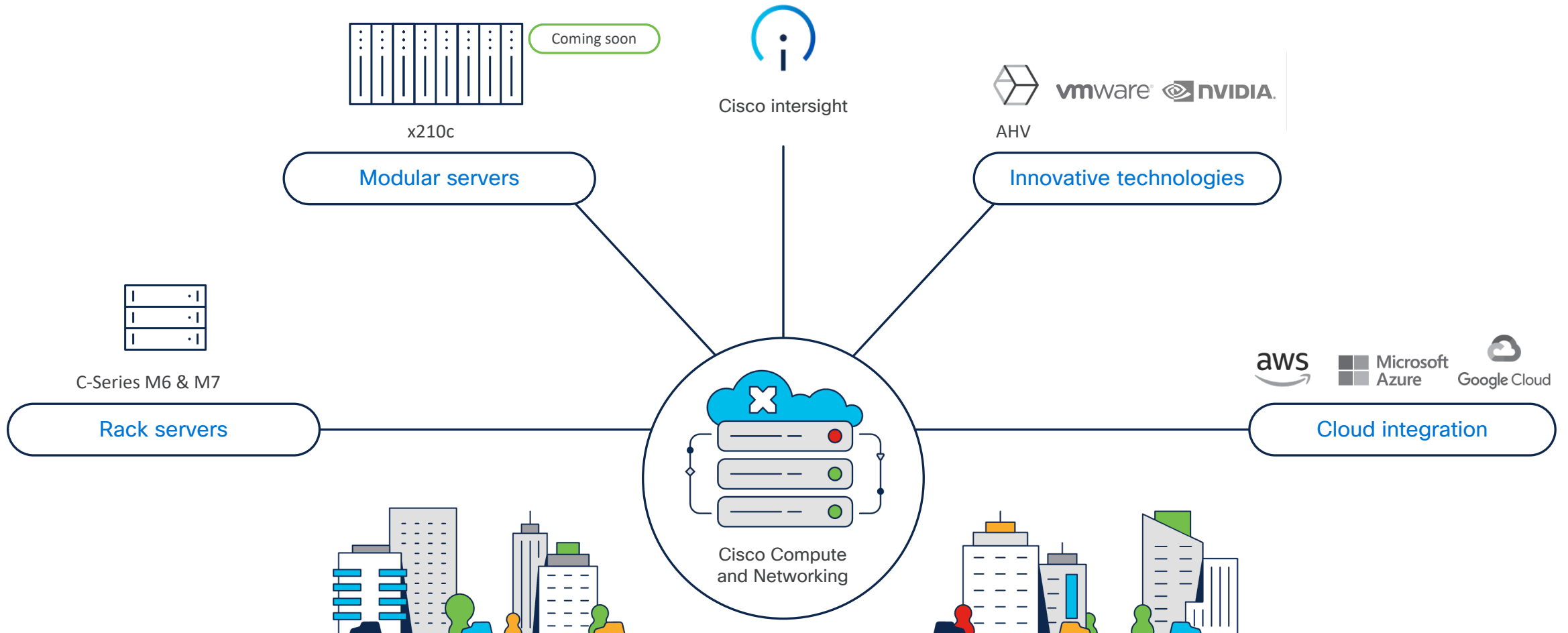
- Up to 24 x 1.9TB, 3.8TB or 7.6TB SSD disks
- 182TB max raw capacity/node
- 4th Gen VIC @10/25GbE
- Dual M.2 SATA SSDs with HW RAID for boot
- Up to 2 CPUs and 8TB Memory

Cisco Compute Hyperconverged with Nutanix

NOTE: See solution documentation for all caveats, limitations and compatibility information

Cisco **Compute**

Accelerate IT transformation with more choice

Storage Services

Cisco Compute
Hyperconverged with Nutanix

One Software-Defined Platform for Apps & Data

DEV

K8s
Self-service storage
provisioning

Objects Browser
Self-service data
management

OPS

Prism Central
Centralized infra.
management

Data Lens
Auditing, analytics,
ransomware protection

Deploy as **hyperconverged**
with apps running on storage

Deploy as
dedicated storage
with independent
app servers

File
Services

Object
Services

Volume
Services

NUTANIX Unified Storage

NUTANIX Cloud Platform
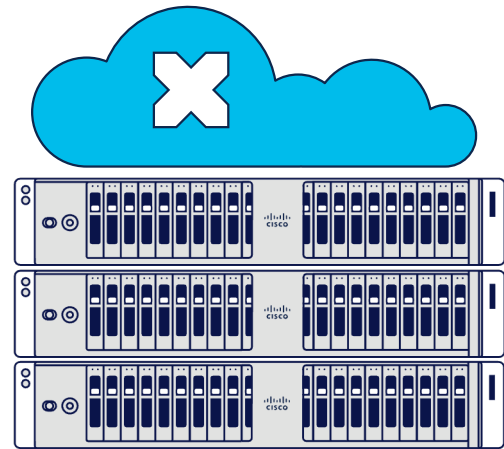
Business Continuity & Data Protection

Cisco Compute
Hyperconverged with Nutanix

Multi-Layered Approach to Protect Your Data & Keep Your Business Running

S/W Techniques

Replication Factor (RF)–2/3 | Erasure Coding | Snapshots

Local Resiliency

CLOUD
- NC2 AWS
- NutanixDRaaS
- MSPDRaaS

SITE
- Multi-site replication
- Metro Availability
- Near-Sync

VM
- VM-level protection
- Ecosystem integration

DATA
- Tunable redundancy
- Transparent consistent checks

NODE
- Node and rack failure resiliency
- Non-disruptive upgrades

HARDWARE
- Self-healing from disk failure
- Redundancy of key components

Geographical Resiliency

S/W Techniques

Snapshots | Replication | Backup | Archival

Cisco **Compute**

Cluster Life-Cycle Operations
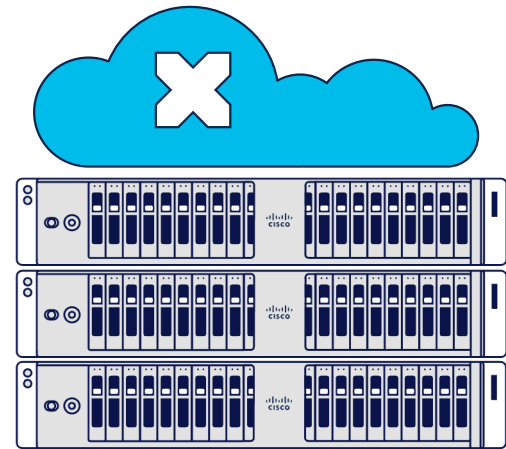
Cisco Compute
Hyperconverged with Nutanix

Integrated & Automated Life-Cycle Operations
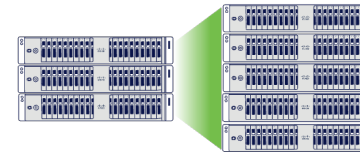
Cluster Installation

with
NUTANIX
Foundation VM

Fully integrated cluster installation automation across Cisco UCS and Nutanix Cloud Infrastructure, driven from Nutanix Foundation.

Operational Summary
- Inventory Cisco UCS servers
- Create Cisco UCS Service Profiles
- Perform hypervisor imaging
- Deploy Nutanix storage controller VM (CVM)
- Create new hypervisor and storage cluster

Cluster Expansion

with
NUTANIX
Prism

Fully integrated cluster expansion automation across Cisco UCS and Nutanix Cloud Infrastructure, driven from Nutanix Prism or Prism Central.

Operational Summary
- Inventory new Cisco UCS servers
- Create Cisco UCS Service Profiles for new nodes
- Perform hypervisor imaging
- Deploy Nutanix storage controller VM (CVM) on new nodes
- Join new nodes to existing hypervisor and storage clusters

Cluster Upgrade
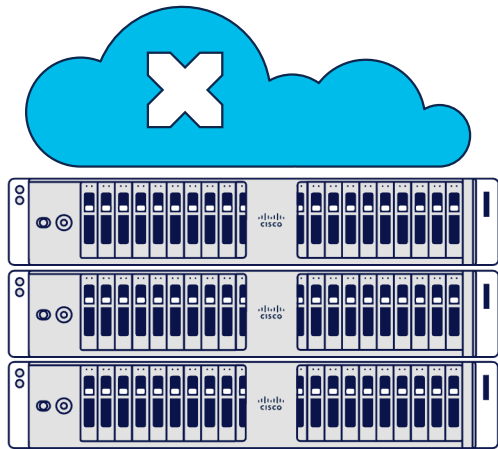
v1.0   v2.0
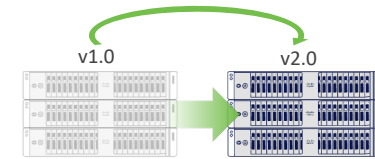
with
NUTANIX
Prism

Fully integrated end-to-end cluster software and firmware upgrades with Nutanix Prism or Prism Central Life Cycle Management (LCM).
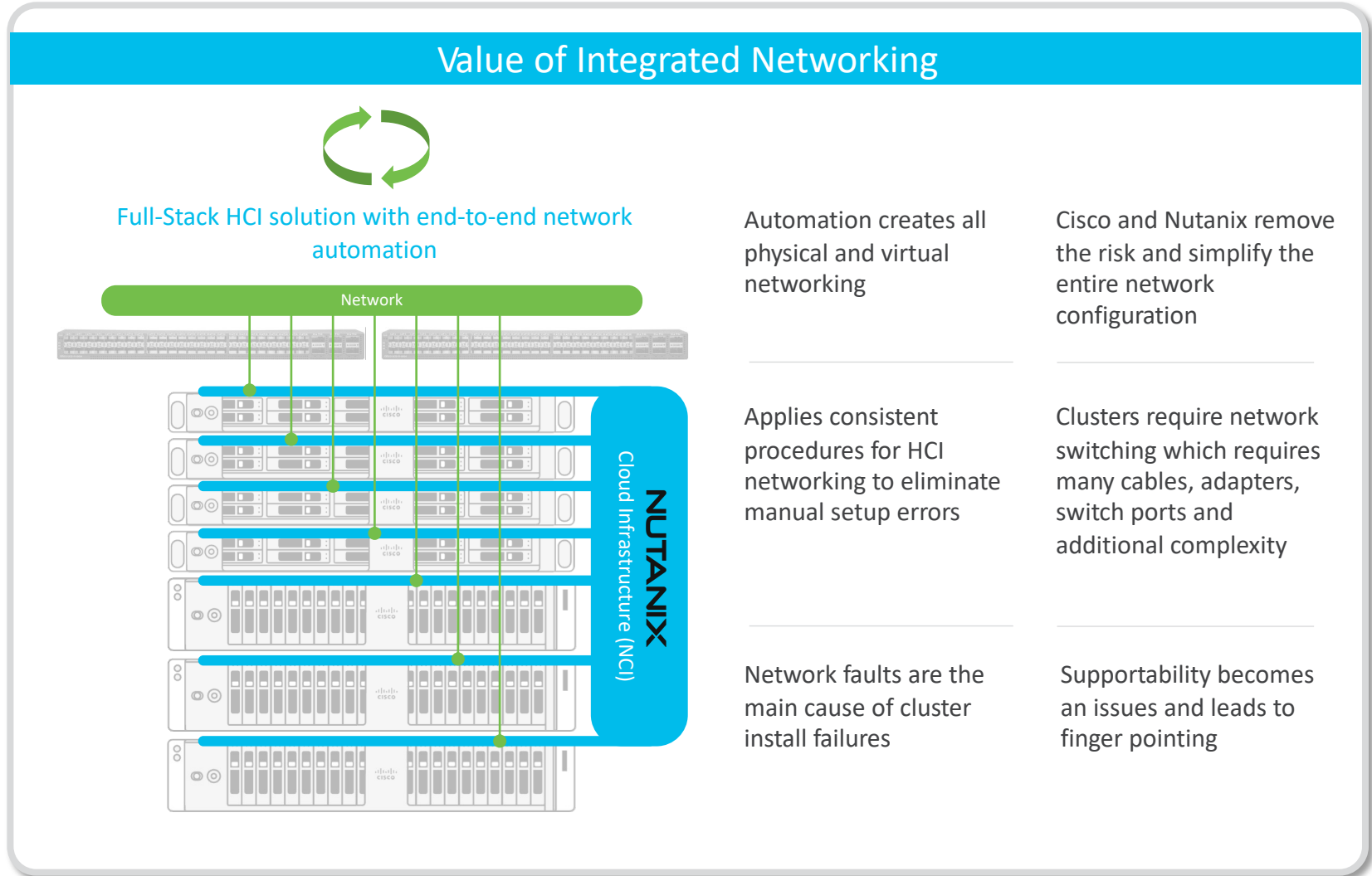
Operational Summary
- Upgrade of Cisco UCS infrastructure and server firmware
- Upgrade of hypervisor software, VMware ESXi and/or Nutanix AHV
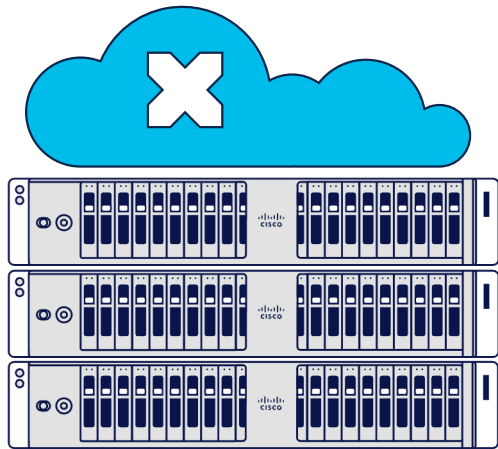- Upgrade of Nutanix Cloud Infrastructure software

Cisco **Compute**

Integrated Networking

Cisco Compute
Hyperconverged with Nutanix

Value of Integrated Networking

Full-Stack HCI solution with end-to-end network automation

Network

NUTANIX
Cloud Infrastructure (NCI)

Automation creates all physical and virtual networking

Cisco and Nutanix remove the risk and simplify the entire network configuration

Applies consistent procedures for HCI networking to eliminate manual setup errors

Clusters require network switching which requires many cables, adapters, switch ports and additional complexity

Network faults are the main cause of cluster install failures

Supportability becomes an issues and leads to finger pointing

Cisco **Compute**

Performance & Optimization

Cisco Compute Hyperconverged with Nutanix

Maximize Read/Write Performance with Data Locality

Writes

VM

vDisk

A   B   C   D

Synchronous replication across cluster based on RF

✓ Less data requests over the network

✓ Better read/write performance

✓ Includes user data and metadata

Reads

VM

vDisk

A   B   C   D

During write operations, VM data is sharded into smaller data blocks and stored directly on the local node hosting the VM. Copies of these data blocks are synchronously replicated to other nodes based on Replication Factor.

During read operations, VM data is read directly from the local node hosting the VM versus traversing the network to retrieve data from remote nodes.

Compression

Inline Compression
Target: Sequential Data

Occurs synchronously as sequential data is written to disk

Post-Process Compression
Target: Random Data

Occurs in the background as cold data is moved to lower performance tiers

Deduplication

The software-driven Elastic Deduplication Engine increases the effective capacity in the disk tier, as well as the utilization of the performance tiers, by eliminating duplicate data.
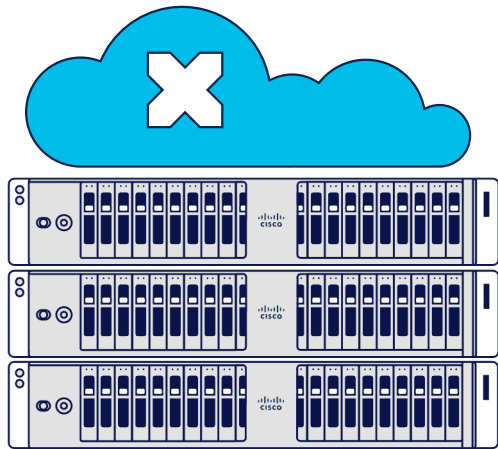
Erasure Coding

data strip

RF2: ▪ ▪ ▪ ▪ + parity

data strip

RF3: ▪ ▪ ▪ ▪ + parity + parity

Strikes a balance between providing availability and reducing storage usage by organizing data into data strips and calculating parity for each strip. Data in each strip can be rebuilt at any time using parity. Support for single or dual parity.
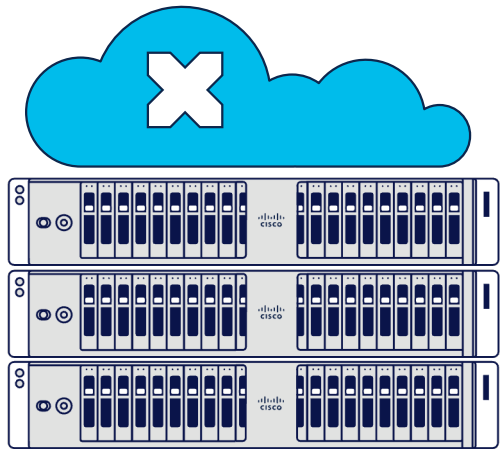
Cisco **Compute**

Security & Governance
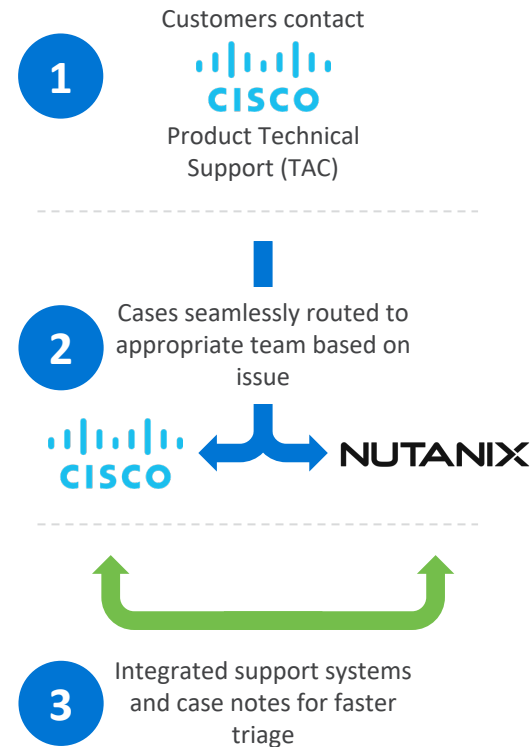

Cisco Compute
Hyperconverged with Nutanix

Secure Data and Network

Security Monitoring
Prism Security Dashboard

Cisco Intersight security advisories

CVE monitoring for AOS clusters and UCS infrastructure

Ransomware Protection
Data Lens: file analytics, anomaly detection, audit trails

Write-Once-Read-Many protection for files and objects

Integrated snapshots, backup and recovery

Secure Networks
Flow network segmentation

Cisco ACI integration

Cisco Secure Firewall Virtual support

Secure Platform

IAM & Security Baseline
MFA via SAML

RBAC and audit logging

Factory applied baselines

Automated security configuration

STIG hardening

Data Protection
Data-in-flight and at-rest encryption (SW & SEDs)

Encryption key management

FIPS 140-2 encryption modules

Replication & recovery planning

Compliance
Support compliance of regulatory policies

HIPAA, PCI DSS, NIST, GDPR and more

Certifications: FIPS 140-2, Common Criteria, DoDIN APL

Secure Compute

Trustworthy Platform
Multi-point secure boot and Trust Anchor Module

Prevents malicious FW and BIOS from booting

Authentic HW & FW
Cisco signed FW and immutable HW identity

HW and FW handshakes provide continuous verification of authenticity

Secure Development
Rigorous Cisco Secure Development Lifecycle

Dedicated teams for threat modeling, vuln mgmt., pentesting

Cisco **Compute**

Global Support

Cisco Compute Hyperconverged with Nutanix

Seamless Integrated Support Model

1 Customers contact
CISCO
Product Technical Support (TAC)

2 Cases seamlessly routed to appropriate team based on issue
CISCO ↔ **NUTANIX**

3 Integrated support systems and case notes for faster triage

Case Generation Options

Manual
User Initiated

Automated
NUTANIX Insights
for Hardware & Software Alerts

CISCO Intersight
for Hardware Alerts

Customers can contact TAC to open a case and/or they can have intelligent software do it for them with features such as Proactive RMA

Minimizing Support Burden on Customers

NUTANIX Insights

CISCO Intersight

- In-depth system health checks
- Security advisories and notifications
- Recommendations to remediate problems
- Proactive RMA of faulty components
- Automated log bundle collection
- Audit and correlate historical cluster events such as alerts, discoveries, upgrades, hardware replacement and more via Cluster Timeline
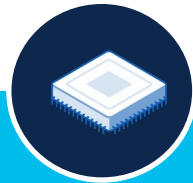
Powering a variety of use-cases

Performance Density ⟵——————————⟶ **Capacity Density**

Coming Soon

Edge Storage
- Remote/branch
- IoT/sensor data

High Performance Storage
- High-perf. file shares (financials)
- EDA workloads
- Media editing
- Databases
- Analytics

Big Data / HPC Storage
- Genomics
- Simulations
- Big data lake
- AI/ML/DL
- HPC

General Purpose Storage
- Home directories
- General file shares
- Healthcare / PACs
- Media streaming
- Backup targets
- GIS/Mapping

Archive Storage
- Video surveillance
- Media repository
- Archive data

Cisco **Compute**

Wide selection of validated workloads

Data Analytics	Data Store	Data Pipeline	AI/ML	Data Sync	File Manage
hadoop	elastic	Spark	DKube	NASUNI	VARONIS
presto	splunk	nifi	ForePaaS an OVHcloud company	ctera	wasabi
VERTICA	CONFLUENT Kafka			PEER	komprise
sas viya	kubernetes			LucidLink	netwrix
snowflake	GitLab			PANZURA	ATEMPO Inspire
dremio					

Surveillance	Healthcare	Data Protection	Archive	Backup	Antivirus
Genetec	Epic	STORWARE BACKUP AND RECOVERY	IBM FileNet	Veritas NetBackup™	Symantec
milestone	MEDITECH	Acronis	rubrik	HYCU	TREND MICRO
SYNECTICS	CHANGE HEALTHCARE	VERITAS	Veritas Enterprise Vault	veeam	McAfee
	IBM Watson	rubrik	Carestream	IBM Spectrum Protect	Bitdefender
	GE Healthcare	COMMVAULT	opentext™	COMMVAULT	OPSWAT
	SECTRA	HYCU	iTernity	arcserve	SOPHOS
	FUJIFILM	veeam		Acronis	F-Secure
		Quest			GLASSWALL
					Nucleus

Cisco Compute

Nutanix and Cisco ACI integration

ACI + Nutanix integration

- ACI + VMware vDS domain has been supported since day1, which provides virtual and physical network automation and VM endpoints visibility in ACI.

- This is the ask to support equivalent functionality for VM endpoints running on Nutanix AHV.

- It's VLAN based only, not VXLAN based, which is same as VMware VMM domain integration

- Note: the following features are not supported in this release:
  - Intra-EPG contract, uSeg EPG, ESG (Nutanix doesn't support PVLAN as of today)
  - Floating L3Out, NetFow.
  - L4-L7 Service Graph with service appliance VMs connected to the Nutanix VMM domain.
  - As of Nutanix AOS version 6.6, ACI leaf switch information is not available on Nutanix Prism GUI even if LLDP information is exchanged. It's categorized as "Unknown Switch" with Data Unavailable. This requires a feature enhancement on Nutanix side.
  - Prism Central manages multiple clusters (This release supports Prism Central managing one Prism Element only)

Recap: Nutanix network options

- Nutanix has two network options:
  - vSS/vDS
    - ACI vDS VMM domain integration is already supported with vDS.
      https://portal.nutanix.com/page/documents/solutions/details?targetId=BP-2052-Cisco-ACI:vsphere-distributed-switch.html
  - **AHV Networking: Open vSwitch based. It provides microsegmentation features too.**
   - **This is the new ask for ACI VMM domain integration.**
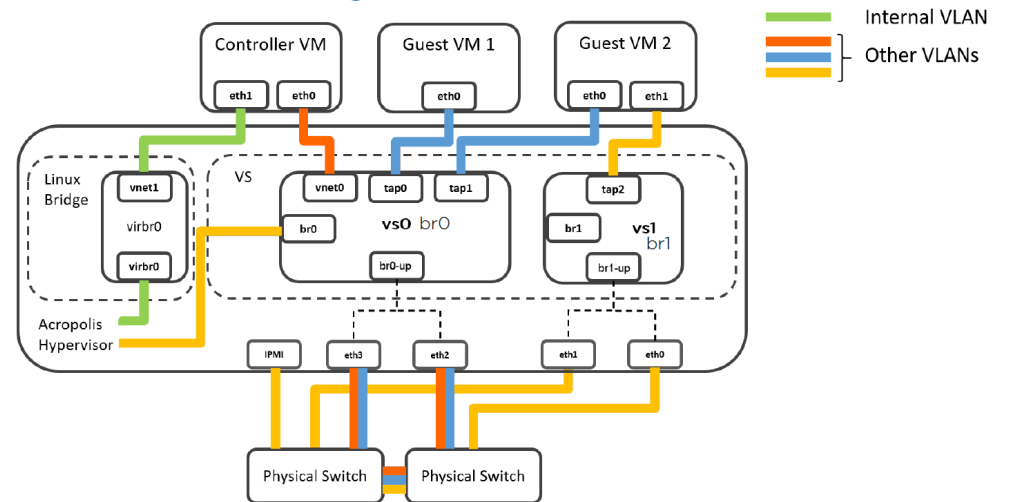
Recap: Nutanix AHV Networking

- AHV uses OVS to manage network between the VMs. Nutanix uses an internal bridge (br0/vs0) for cluster communication. A cluster VLAN is configured on this internal bridge.

- Customers can use the same internal bridge (br0/vs0) or create another internal bridge (br1/vs1 in this example) for user VM traffic.

- A bridge chain (multiple OVS bridges connected in a line) is used for features like micro segmentation in backend..

- APIC rely on Nutanix Prism Element/Prism Central API and doesn't directly program the OVS.

AHV Networking
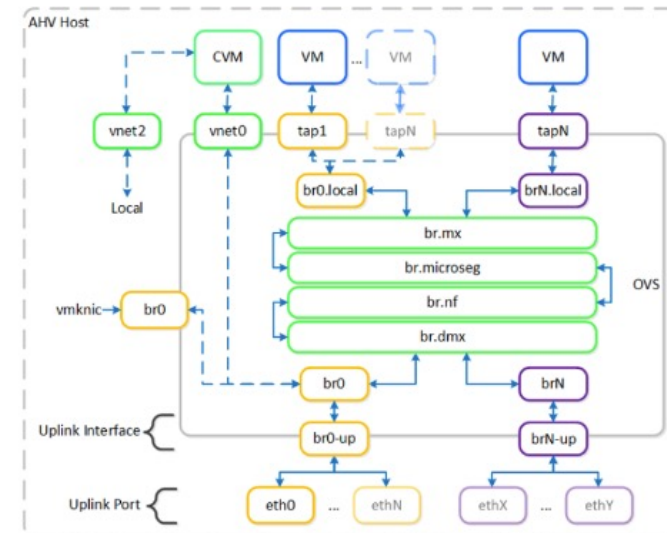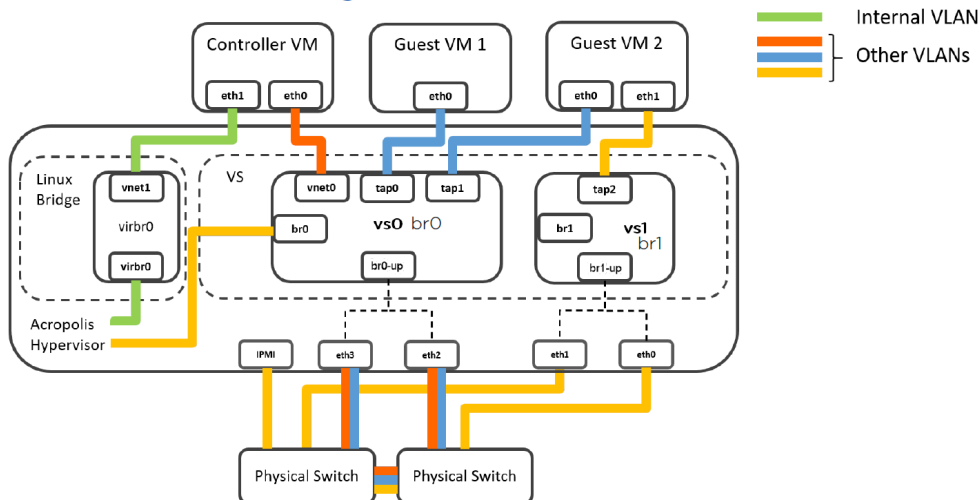
Recap: Nutanix AHV Networking

- Virtual switch across AVH hosts is equivalent to VDS.

- Virtual Switch has "subnets" that are equivalent to VMware "port-groups".

- VM NIC is attached to a subnet (port-group)

Switch information based on LLDP (Nutanix doesn't support CDP)

Recap: VDS workflow

APIC Admin

2-1: Associate EPGs to the VMM domain

ACI Policy

EPG Web

EPG App

EPG DB

Consumer Provider Consumer Provider

Contract Web-to-App

Contract App-to-Web

1-1: Create a VMware VMM domain
APIC admin configures vCenter IP and credential information

2-2: Push policy to ACI fabric and automatically creates port-groups for the EPGs

ACI Fabric

1-2: Create a VMware Distributed Virtual Switch
Then, Server admin attaches physical NIC (vmnic) to the DVS

3-2: If it's "On-demand", policy is programmed on ACI leaf nodes based on LLDP/CDP and VM attachment information.

2-3: Create port-groups

vCenter

Server Admin

3-1: Instantiate VMs. Attach VM NIC to port-group

VMware Distributed Virtual Switch

VM VM VM

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Nutanix VMM Workflow

APIC Admin

2-1: Associate EPGs to the VMM domain

ACI Policy

EPG Web

EPG App

EPG DB

Consumer   Provider   Consumer   Provider

Contract Web-to-App

Contract App-to-Web

1-1: Create a Nutanix VMM domain
APIC admin configures Nutanix IP and credential information

2-2: Push policy to ACI fabric and automatically creates Subnets for the EPGs
Create Subnets and categories on Nutanix corresponding to the EPGs

ACI Fabric

1-2: Create a Virtual Switch
APIC uses Nutanix API to create a new virtual switch if needed.
(If the virtual switch name is same with the existing virtual switch, APIC doesn't create a new one)

1-3: Assign host links to the virtual switch
Server admin attaches physical NIC to the virtual switch
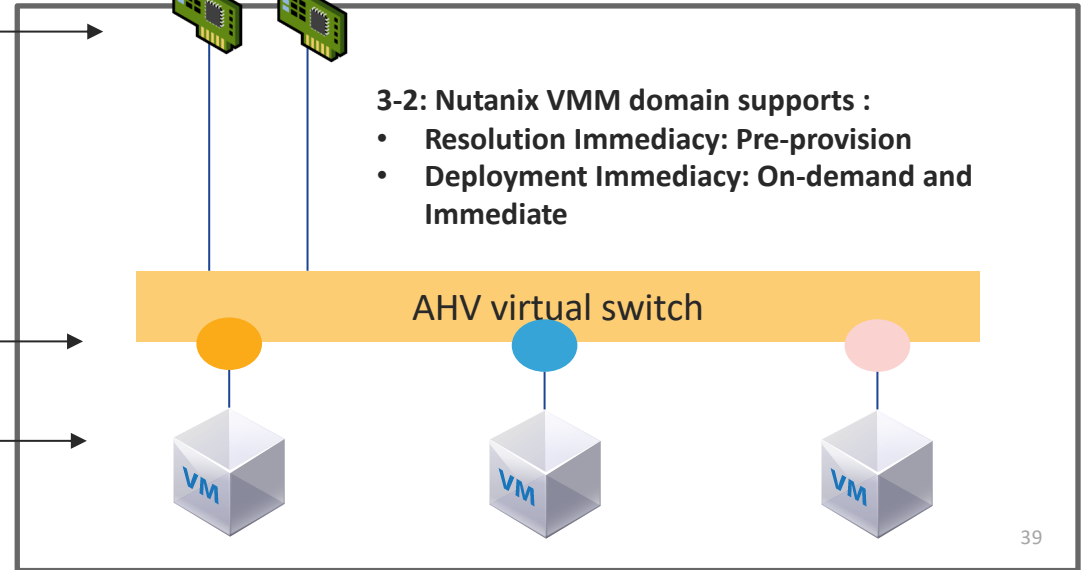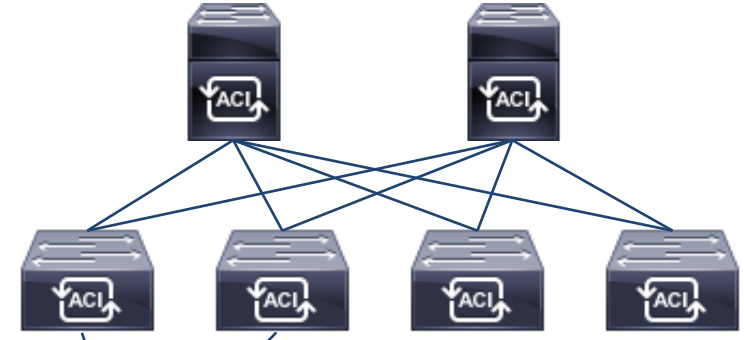
3-2: Nutanix VMM domain supports :
- **Resolution Immediacy: Pre-provision**
- **Deployment Immediacy: On-demand and Immediate**

AHV virtual switch
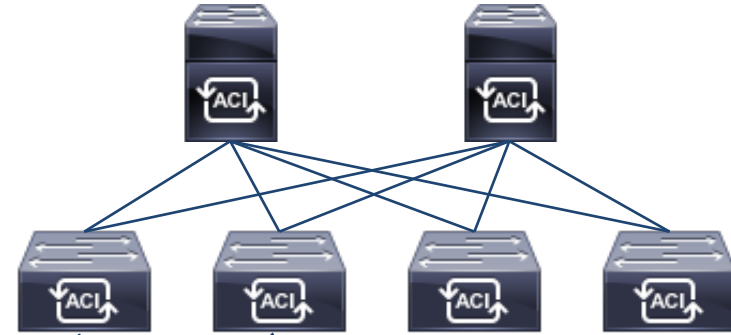
Server Admin

Nutanix Prism

3-1: Instantiate VMs, attach VM NIC to a subnet

VM   VM   VM

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Nutanix VMM Workflow (Intra-EPG isolation)

APIC Admin

4-1: Enable intra-EPG isolation

ACI Policy

ACI Fabric

EPG Web

EPG App

EPG DB

Consumer   Provider   Consumer   Provider

Contract Web-to-App

Contract App-to-Web
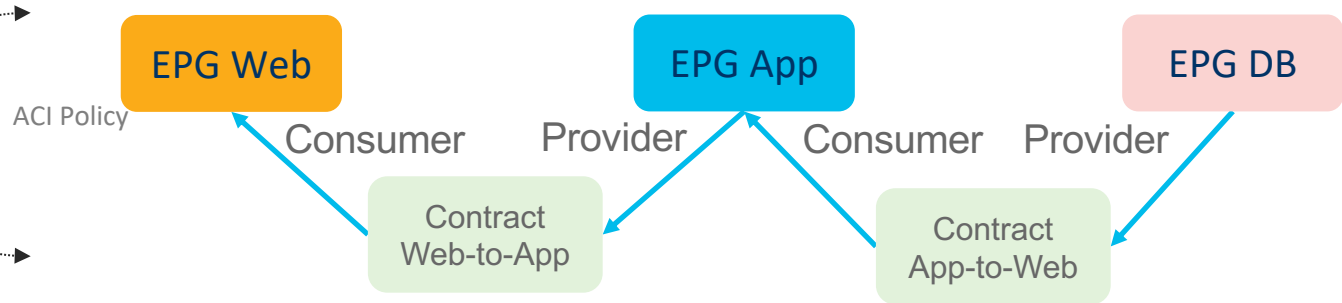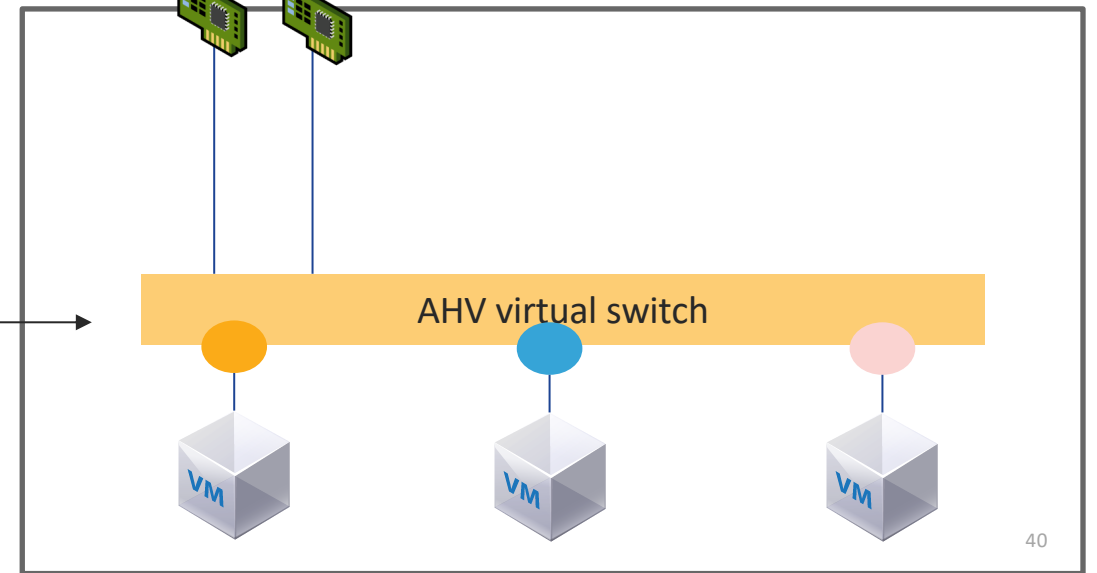
4-2: Create service policy for intra EPG isolation on Nutanix
Network Security Polices are specified using EPG categories

Server Admin

Nutanix Prism
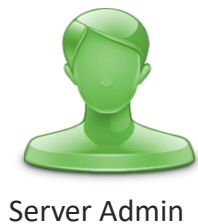
5-1: Nutanix Admin configures category
Configure VMs' category to enforce Security Policies

AHV virtual switch

VM   VM   VM

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The bridge to possible