Next Generation Data Center

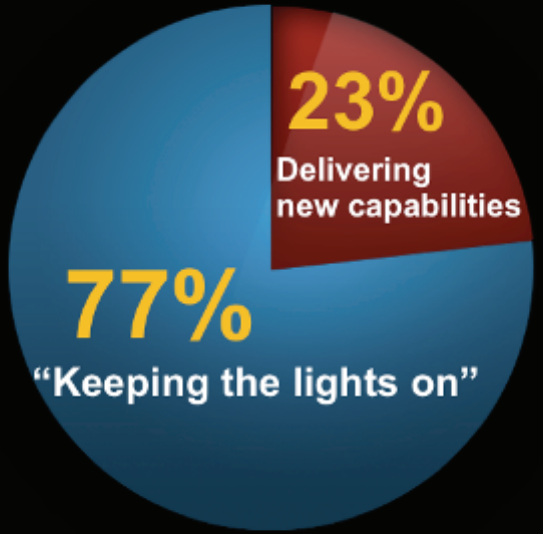
Optimized & Automated Infrastructure

Christopher (Pet) Syling
ASEAN Data Center Business Manager
Cisco Systems, Inc.

Traditional Architecture Impact

Operations & Maintenance Now ~80% of IT Budgets and Growing

New Approach in IT Infrastructure



Too much complexity.
Too hard to change.

The business
is frustrated.
IT is frustrated.

New approach /
transformation
is required.

Innovation: Changes Lives

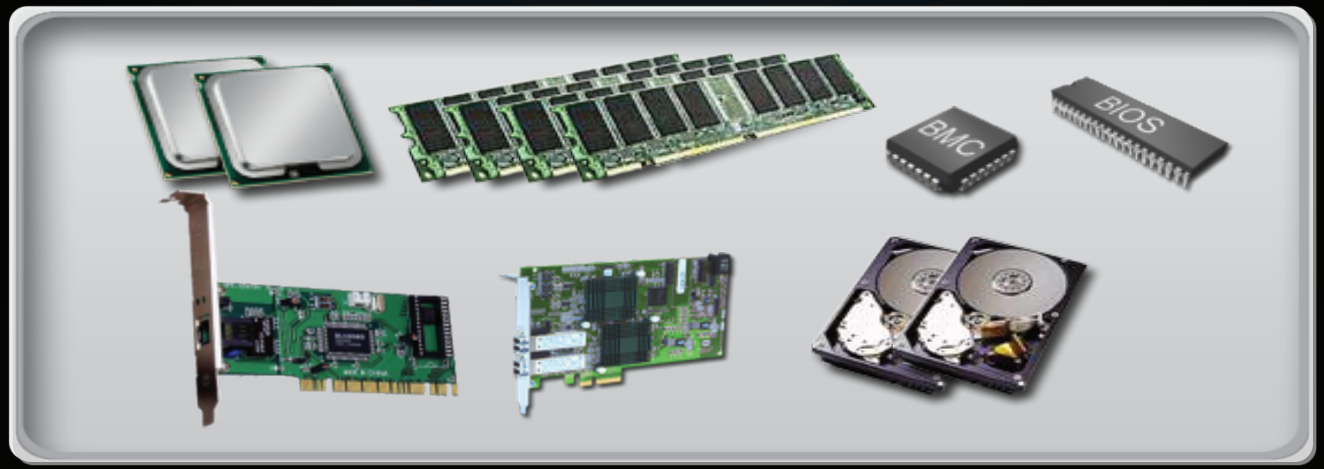
From these …

Isolated, Unshared Resources

To this …

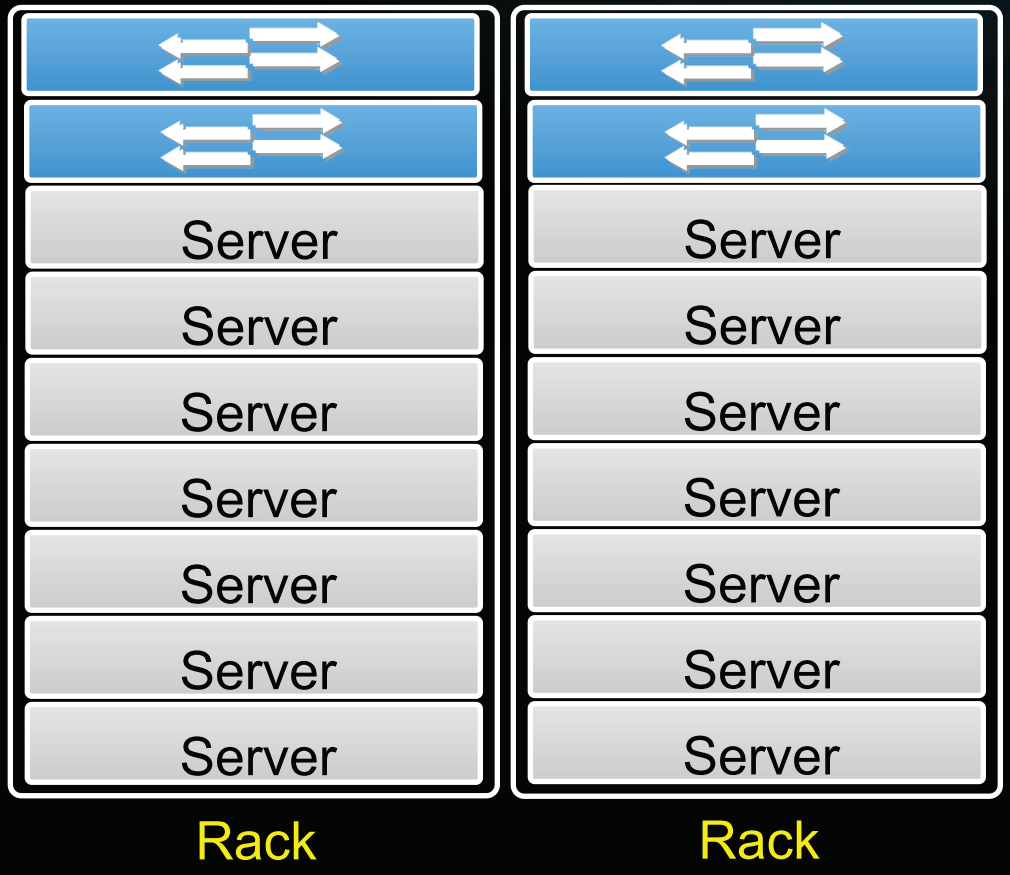
Efficient and Simplified

Computing Architecture



Server Deployment Architecture

Rack Mount Servers



First generation

- Rack-optimized
- Top of Rack or End of Row switches
- Cables

Benefits

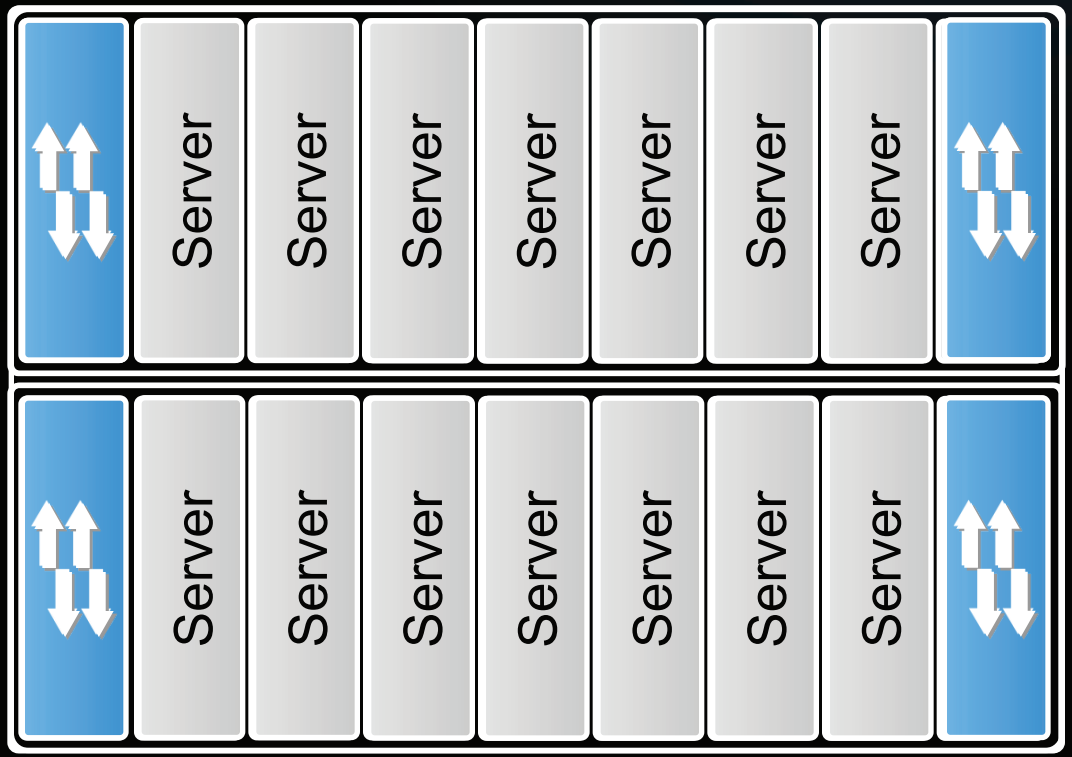
- Space utilization
- Highly flexible

Weakness

- Cabling
- Serviceability
- Power efficiency

Server Deployment Architecture

Blade Servers



Second generation

- Blade servers
- Integrated switches
- Fixed backplane

Benefits

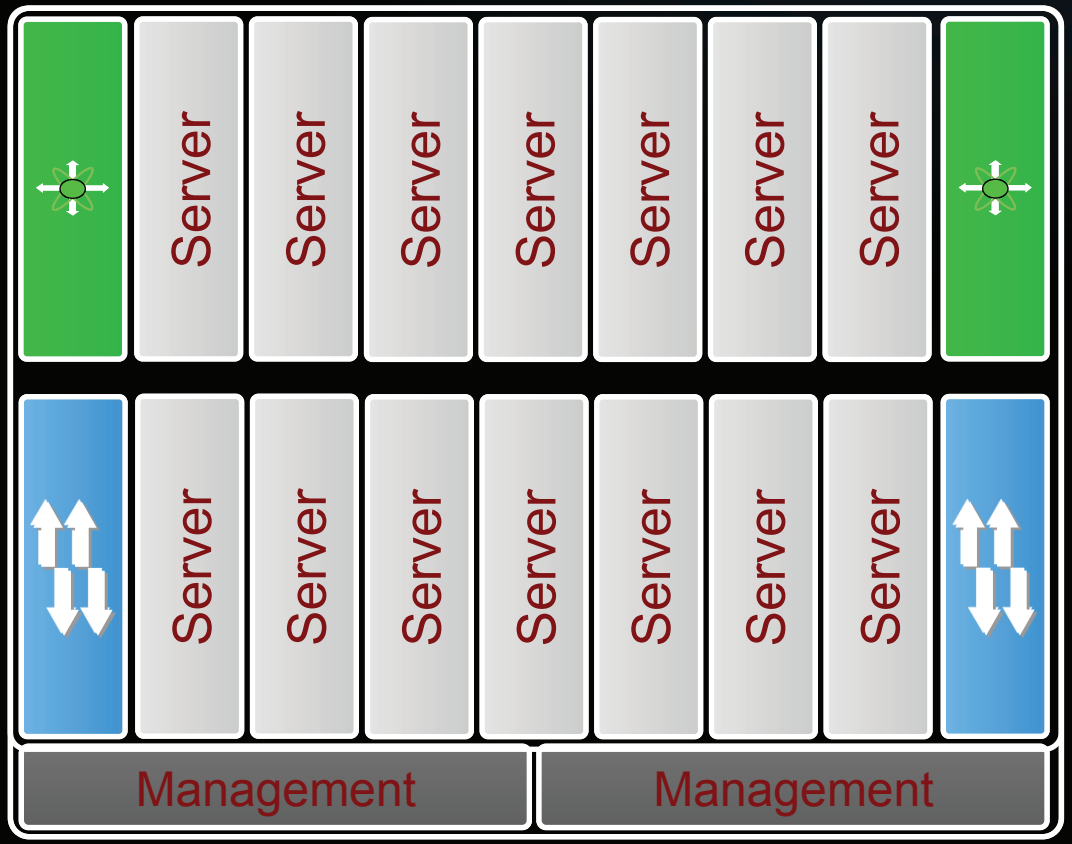
- Better space utilization
- Cable aggregation
- Power efficiency

Weakness

- I/O flexibility
- Aggregate management
- Large chassis needed to amortize switch/mgmt costs

Blade Server Management

Legacy System Architecture



Chassis Management

- New management layer

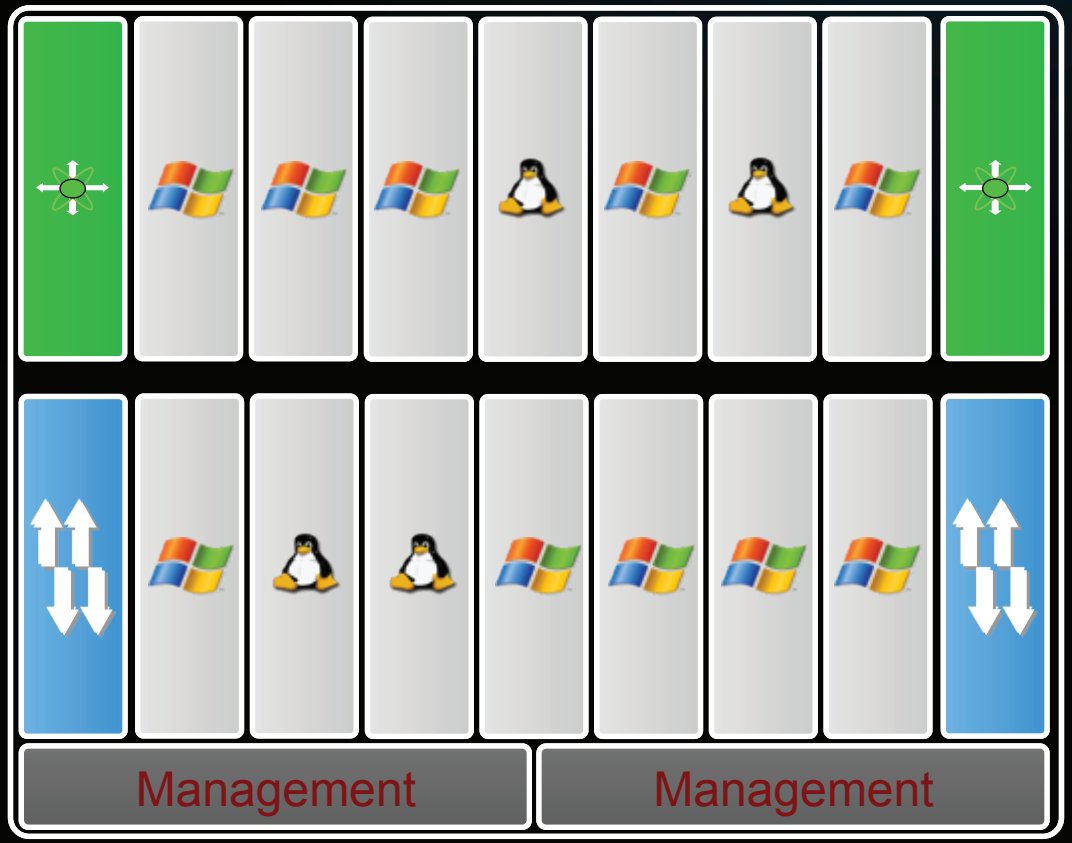
Benefits

- Consistency in chassis
- Shared chassis infrastructure monitoring

Weakness

- Additional management overhead
- Additional cost overhead
- Need chassis aggregation management
- Artificial aggregation point

Legacy Application Deployment



Application Deployment

- Single application per OS

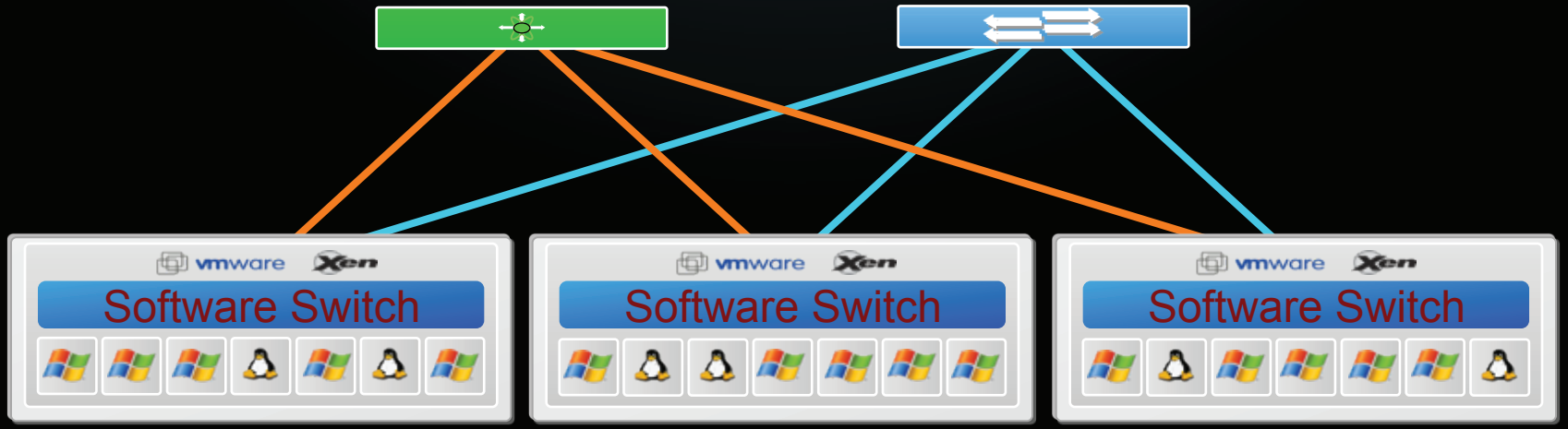
Benefits

- Isolation
- Flexibility
- Simplicity

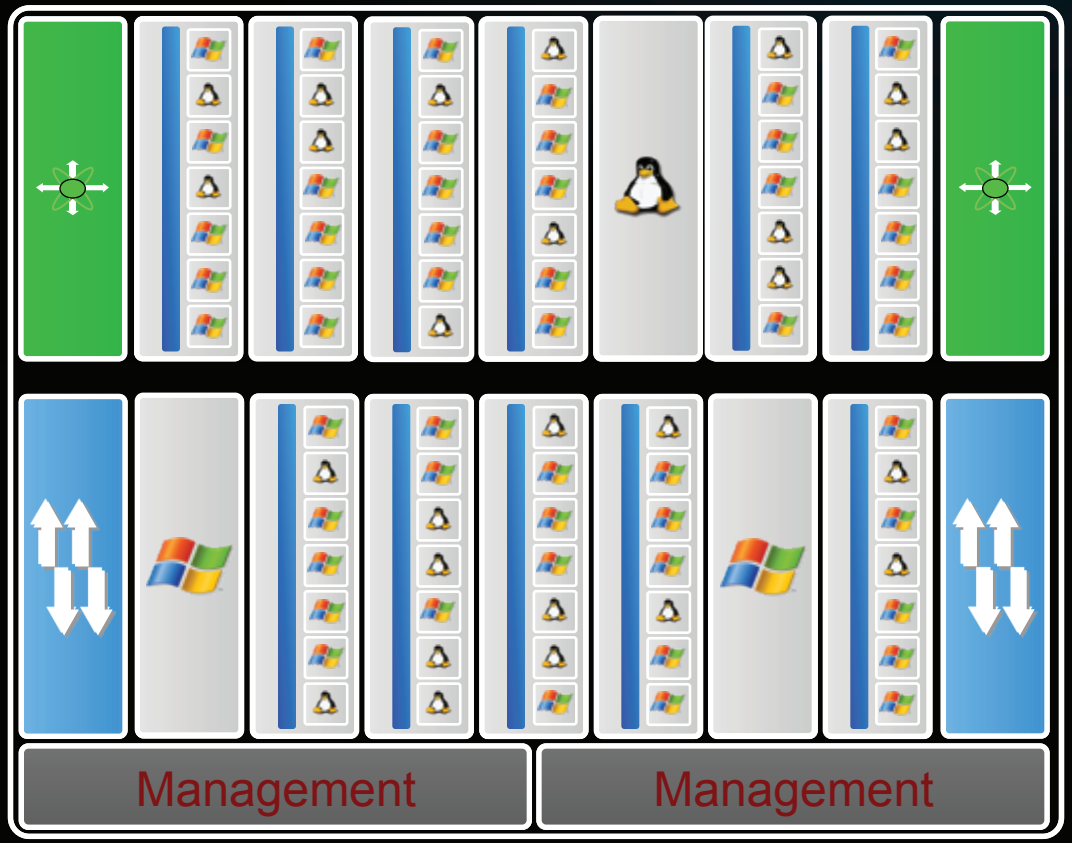
Weakness

- Low utilization
- Power & Cooling
- Server sprawl

Virtualized Application Deployment



Common Virtualization Challenges



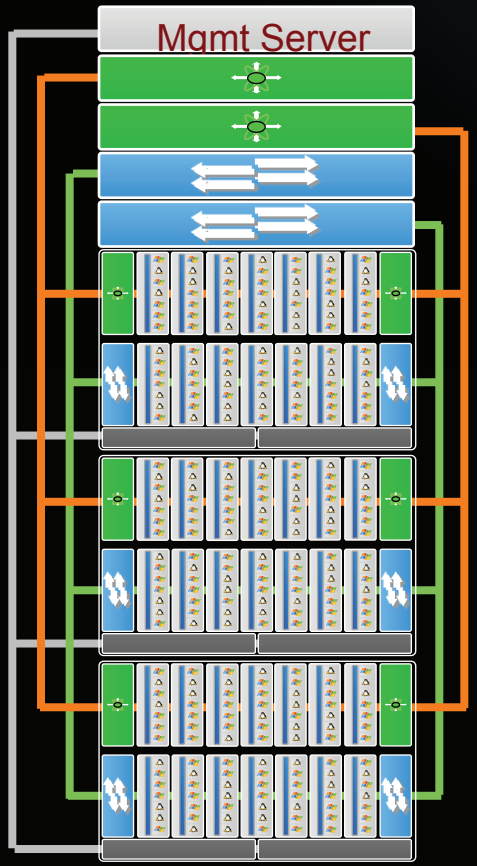
Infrastructure

- Servers & Switches
- Physical & Virtual

Challenges

- Many points of management
- Consistent policies
- Diagnostics
- Training
- Security

Common Virtualization Challenges



Over the past 20 years

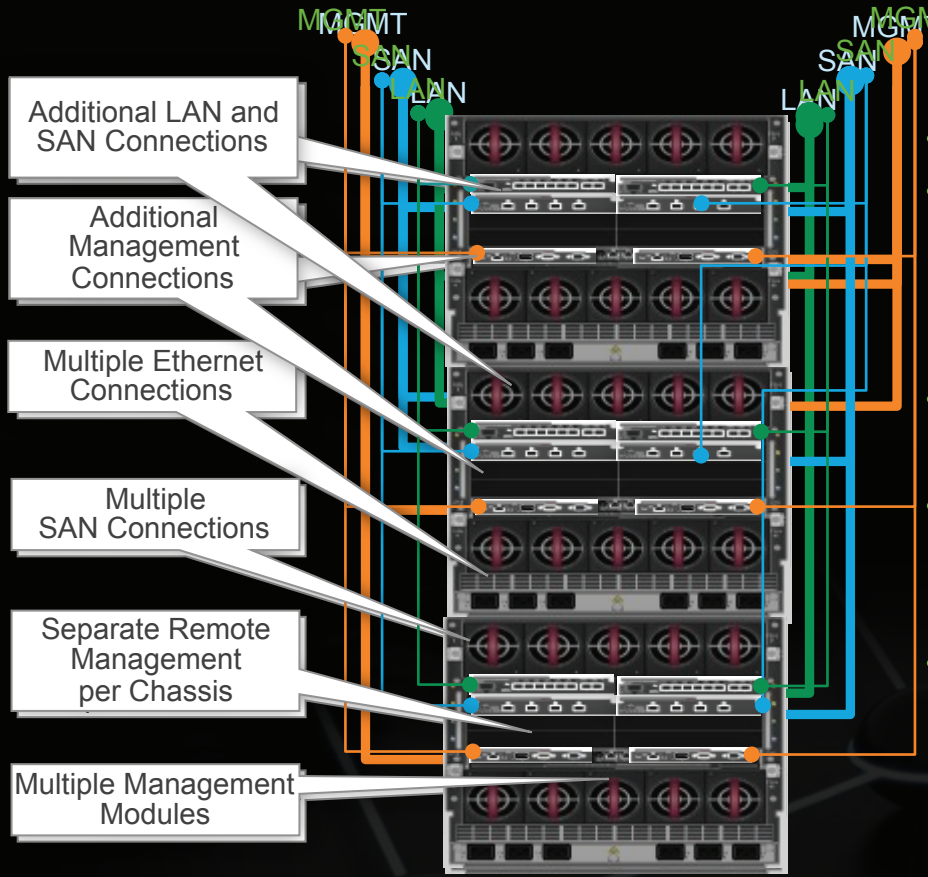
- An evolution of size, not thinking
- More servers & switches than ever
- More switches per server
- Management applied, not integrated

Result

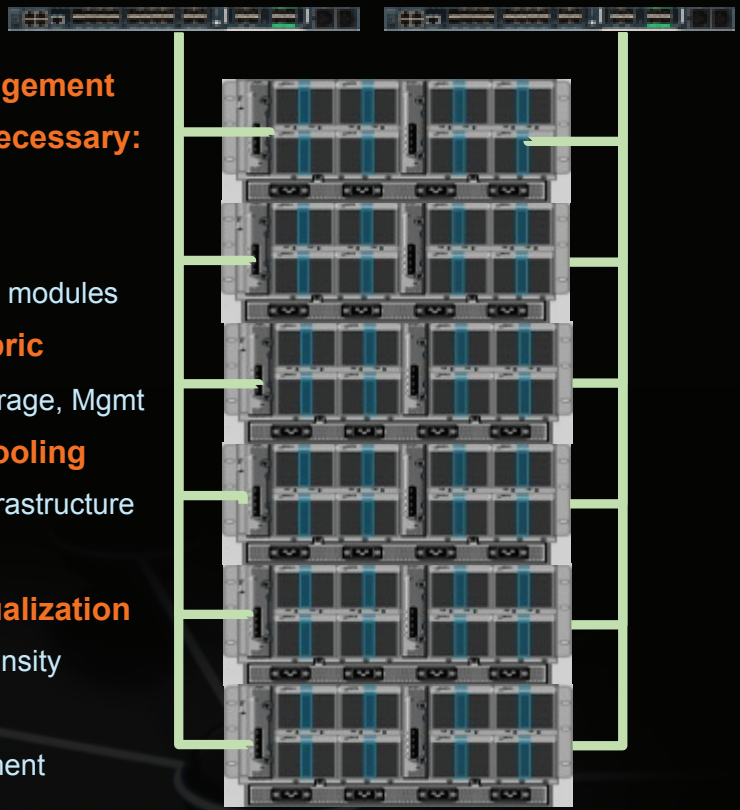
- More points of management
- More difficult to maintain policy coherence
- More difficult to secure
- More difficult to scale

Cisco UCS Server Architecture

The Only Server Designed with Virtualization in Mind



- **Embed management**
- **Remove unnecessary:**
  - Switches
  - Adapters
  - Management modules
- **Unify the Fabric**
  - Network, Storage, Mgmt
- **Power and cooling**
  - 1/3rd less infrastructure
  - Lower power
- **Built for virtualization**
  - Processor density
  - VM/host ratio
  - I/O improvement
  - Extended memory



Simpler Architecture

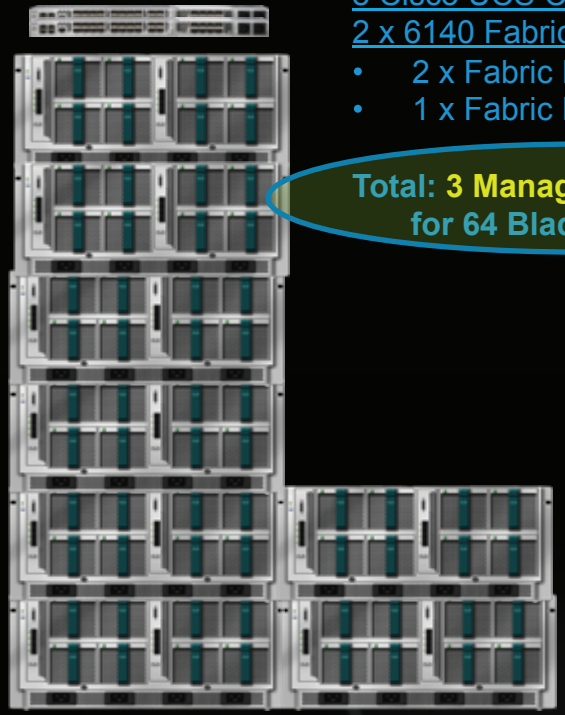
Dynamic Scaling

Traditional approach

Unified approach

Up to 40% cost savings in cabling, fiber, patch cords and labor

What about Managing the Environment?



Cisco UCS:

8 Cisco UCS Chassis
2 x 6140 Fabric Interconnects

- 2 x Fabric Interconnects
- 1 x Fabric Interconnect cluster

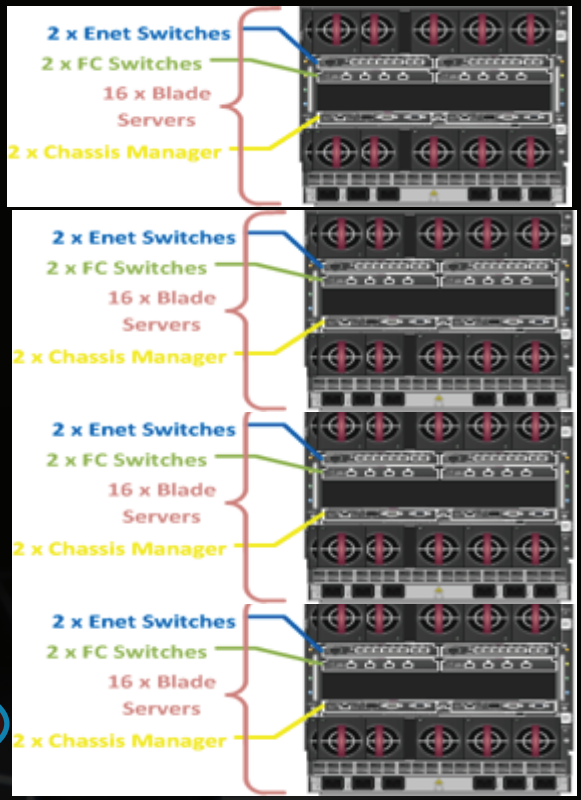
Total: 3 Management IP addresses for 64 Blades

Legacy BladeSystem:

4 x Legacy BladeSystem Enclosures

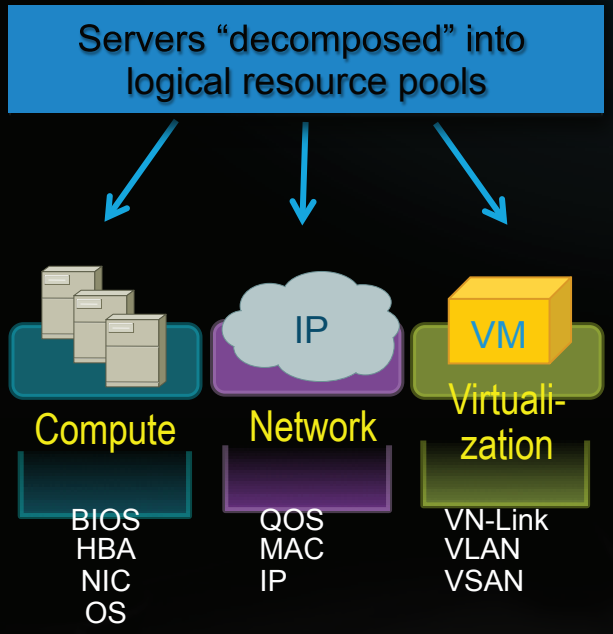
- 8 x Virtual Connect Ethernet switches
- 8 x Virtual Connect FC switches
- 8 x Onboard Administrators
- 4 x Virtual Connect Manager Cluster (Optional but Typical)

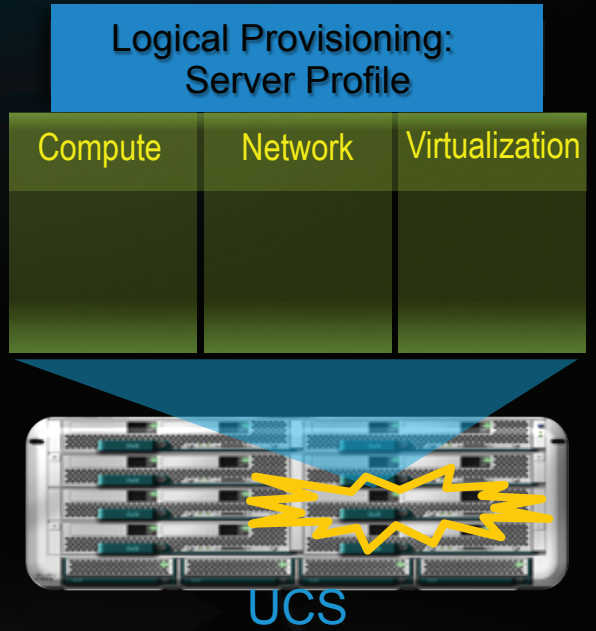
Total: 28 Management IP addresses for 64 Legacy blades



Server Provisioning with Cisco UCS

At least 30x Faster





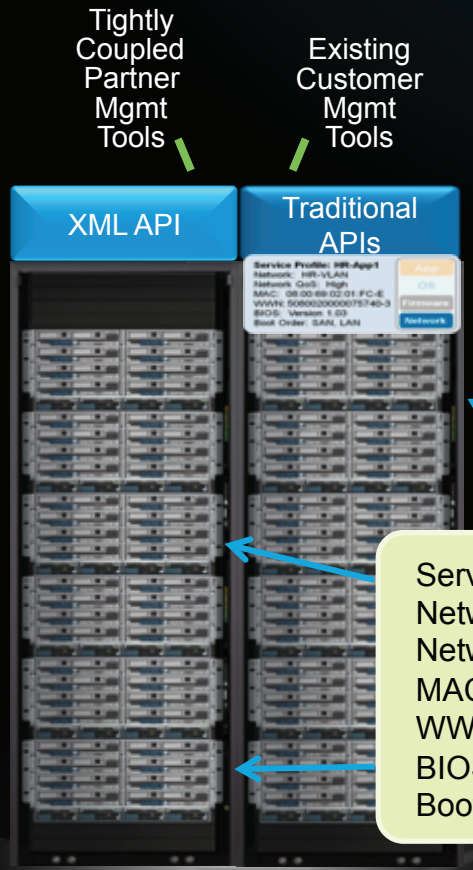
- Virtualized or non-virtualized environments
- Workload allocation or reallocation in *minutes*
- Freedom to design organization *your way*

- Up to 20% lower site costs*
- Up to 15% lower platform costs*
- Up to 35% lower organizational costs*

* Based on modeling and early customer data.

Server Provisioning with Cisco UCS

At least 30x Faster



Unified Management Domain

- Automatic discovery
- Dynamic Provisioning

Building Block for Dynamic Data Center

- Simplify management of infrastructure for ESX clusters and datacenters

One-click configuration of LAN, SAN and firmware parameters

Service Profile: HVD-Win7
Network: Win7-VLAN
Network QoS: High
MAC: 08:00:69:02:01:FC-E
WWN: 5080020000075740-3
BIOS: Version 1.03
Boot Order: SAN, LAN

Cisco Unified Computing System

Integrated Stateless Computing

No Attributes tied to Physical Resource

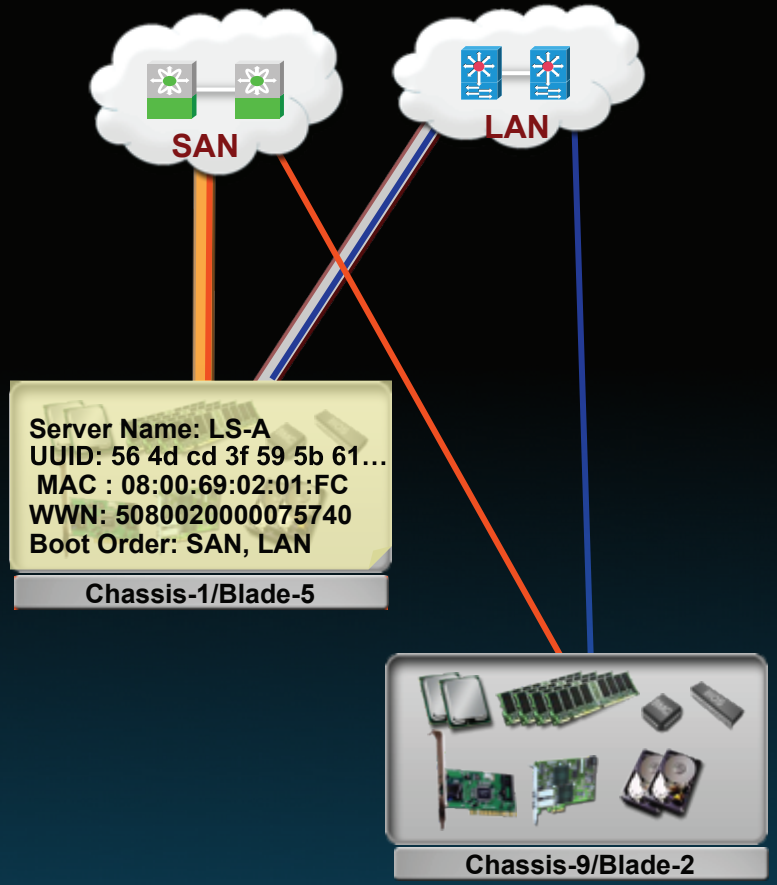
- Not just identity
- Seamless server mobility
- Within interconnect domain

Dynamic Provisioning

- Complete infrastructure repurposing
- Integrated with 3rd part tools

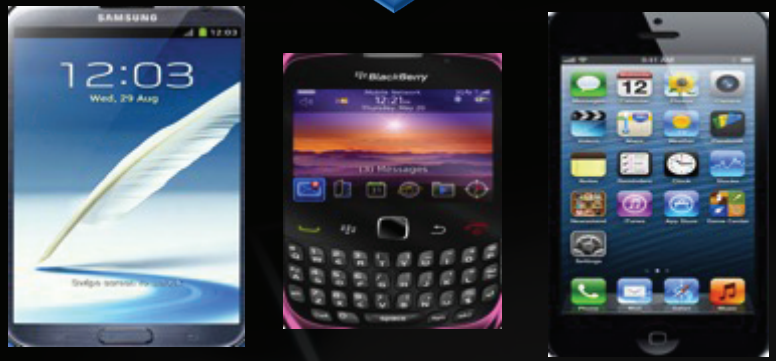
High Availability

- In event of HW failure, a spare UCS Blades can be provisioned immediately



Service Profile Analogy

SIM Card
Identity for a phone



Service Profile
Identity for a server

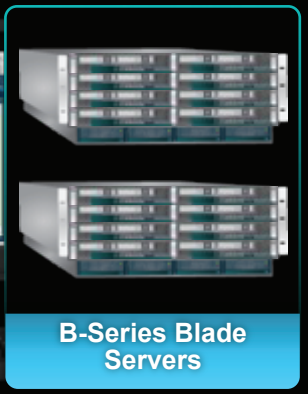
Unified Management

Extending Benefits of UCS Manager to Rack Servers

Unified Management
A Single Unified System
For Blade and Rack Servers

UCS Manager

C-Series Rack Optimized Servers



B-Series Blade Servers

- A major market transformation in unified server management
- Benefits of UCS Manager and Service Profiles brought to rack optimized servers
- New Nexus Fabric Extender reduces cost, increases scale of rack server connectivity within Unified Computing
- Add capacity without complexity

Stateless hardware will change networking

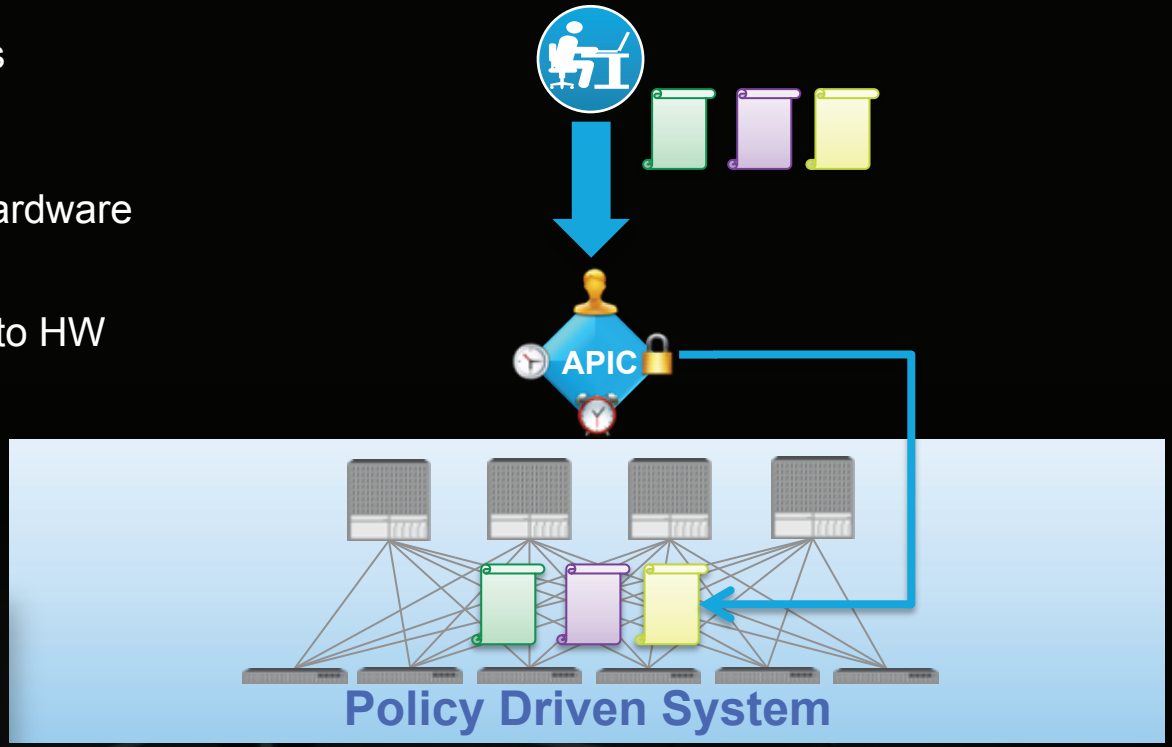
Admin creates policies and profiles

Admin does **NOT** program the hardware

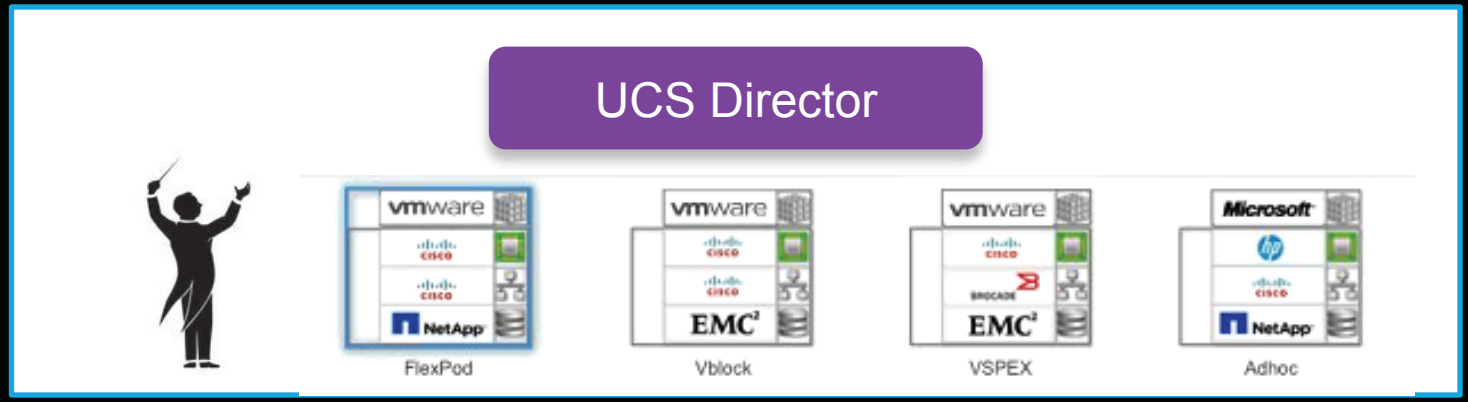
APIC pushes policies and profiles to HW

HW programs itself!

ACI – Application Centric Infrastructure

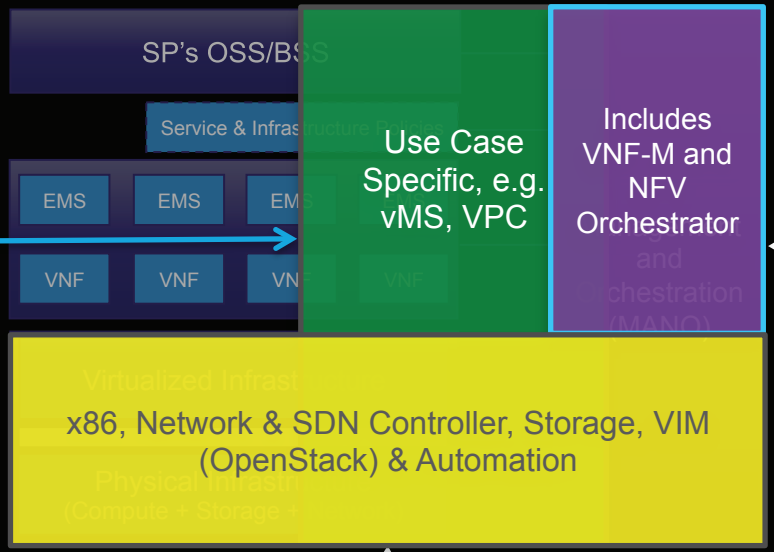


UCS Director



- Acts as orchestra conductor across: compute, network, storage & virtualization
- Replaces manual management of each layer with automated workflows
  Helps to remove silos from IT teams and IT resources
- IT manages data center resources as single “team” with unified management
  Across physical and virtual resources

How SPs are approaching NFV



Use Case Led

- Service driven approach
- Service Agility
- Business outcome desired
- Buying Center – BU/Biz Vertical

Orchestration Led

- Service Elasticity
- Ease of Provisioning; Time to market
- Buying Center – Operations/ Network team

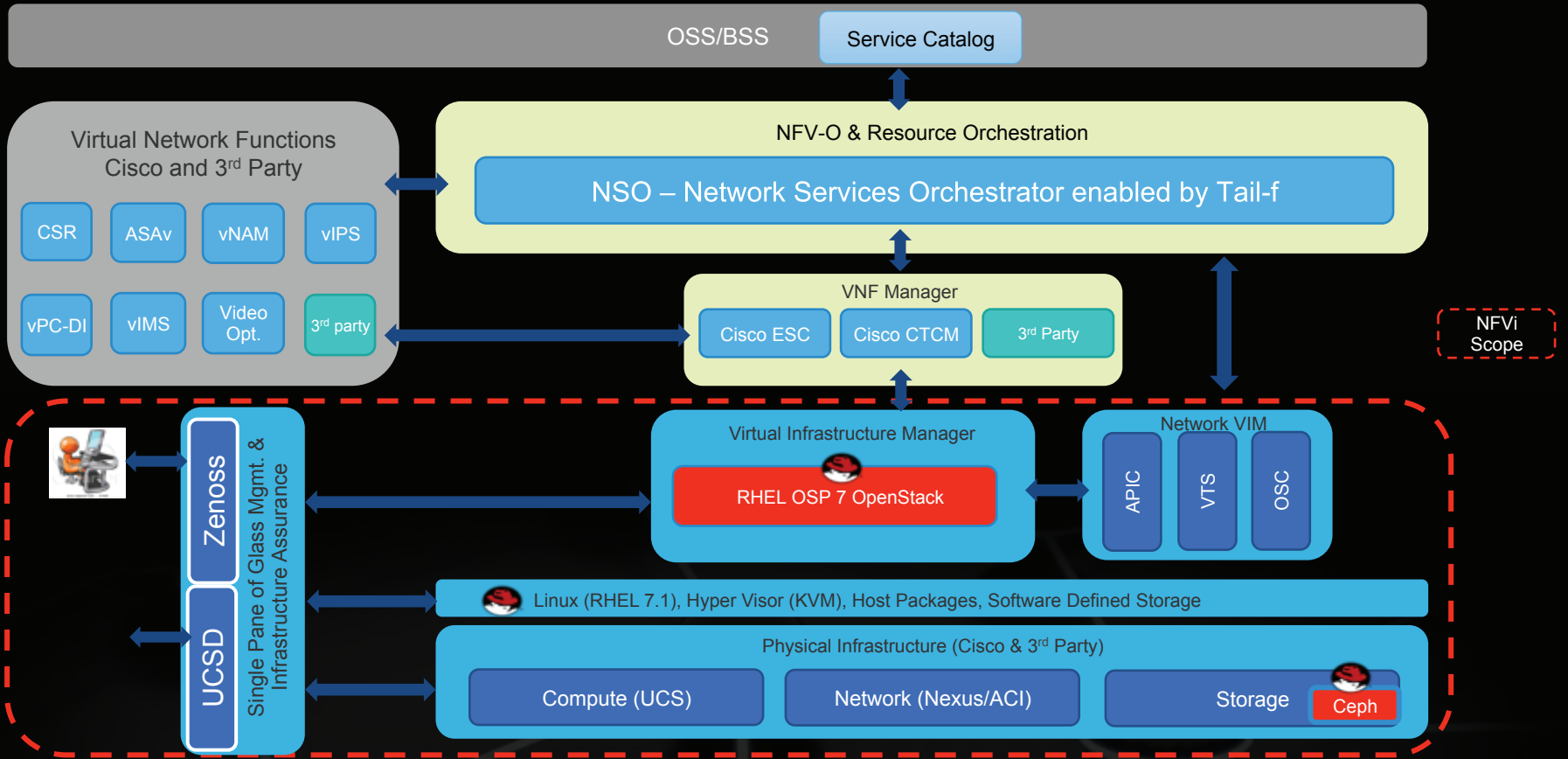
Emerging trend, needs packaging

Infrastructure Led

- Cloudify & Automate DC Infra
- Leverage Opensource
- Virtualize & Simplify
- Buying Center – Network & DC infrastructure team

*Infrastructure led approach aka **NFVI** is gaining prominence!*

Cisco NFVi Architecture



Unified Fabric's SingleConnect Technology

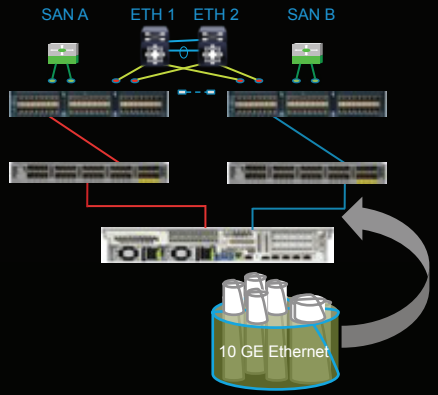
Provides an Efficient Foundation for Growth

SINGLECONNECT TECHNOLOGY

- One connection type for all protocols
- Wire once then manage through software
- Direct SAN access
- Auto-discovery & self-integrating components: network and compute
- Automated I/O bandwidth allocation
- Efficient capacity scaling

Traditional

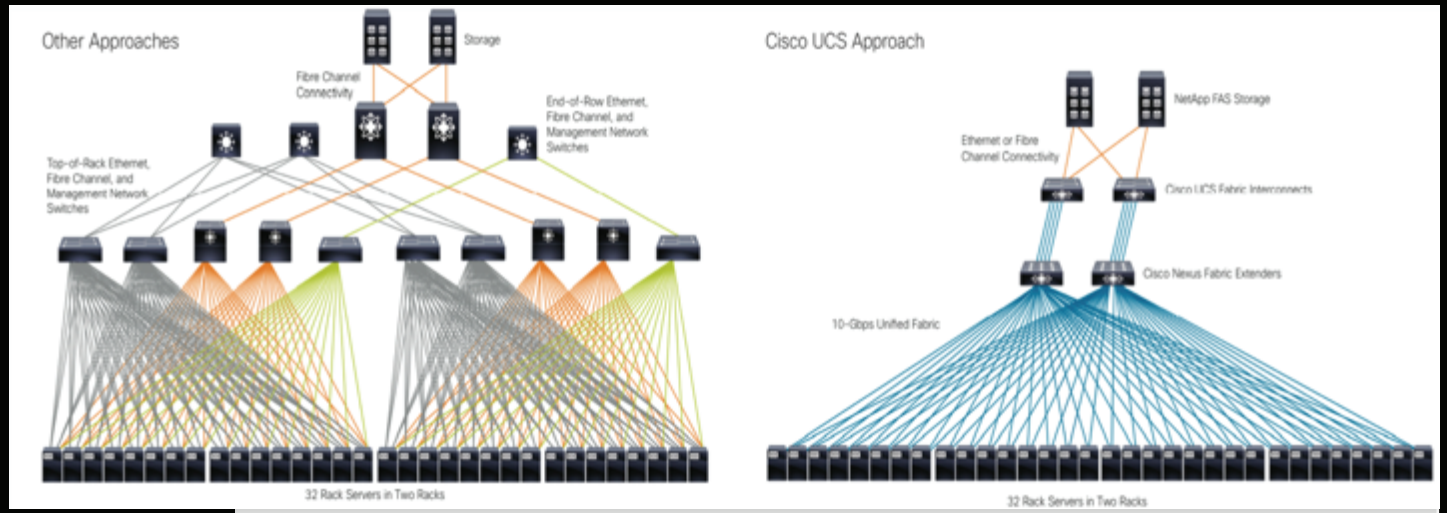
Cisco Unified Fabric



FCOE—Fibre Channel over Ethernet
(LAN/SAN/Management)

As you scale, simplified architecture reduces cost and facilitates growth

Comparing Traditional Architectures to UCS CPA for Big Data



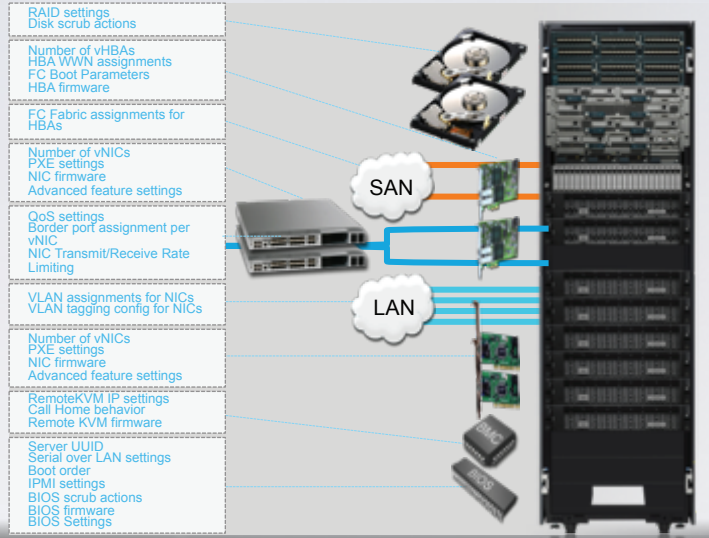
	# CABLES	
	Traditional Approach	With Cisco UCS
At **32** Servers	**180**	**80**
At **64** Servers	**360**	**160**
At **160** Servers	**530-870**	**400**

As your Big Data deployment grows, significant and ongoing savings create a compelling business case

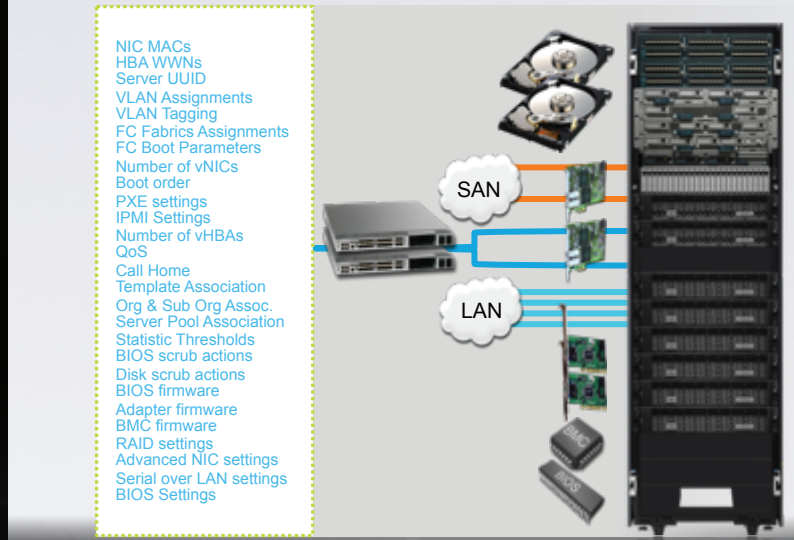
Unified Management

Robust Management Delivers Superior Programmability, Scalability, and Automation for Big Data Deployments

Traditional



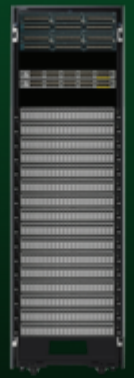
UCS Manager Service Profile



Abstraction of all configuration and identity information into a service profile speeds deployment, reduces errors, lowers costs

Easily Scale Cisco UCS CPA for Big Data

SINGLE RACK
16 Servers



SINGLE DOMAIN
Up to 10 Racks, 160 Servers

MULTIPLE DOMAINS

UCS Manager

UCS Central

The Big Picture: Designed for Massive Scale

Lets You Convert Vast Data Clusters into Powerful Insights

No additional switching for up to 10 racks (160 servers) per UCS domain

UCS Central lets you scale to 10,000 servers

Tackle the Most Complex Workloads with Big Data Clusters Fueled by Hundreds of Servers and Petabytes of Storage

UCSD Express for Big Data:

Integrated, Policy-Based Hadoop Infrastructure Management

1. Subject Matter Expert Define Policies

Hadoop SME | Storage SME | Server SME | Network SME

- Create Infrastructure Profile
- Create Hadoop Profile
- Create Hadoop Application Profile

2. Policies Used to Create Hadoop and Infrastructure Service Profile Templates

Namenode, data node configuration
Configure Hadoop services
Setup heap size and memory buffers
HDFS, MapReduce configuration
Setup other hadoop services

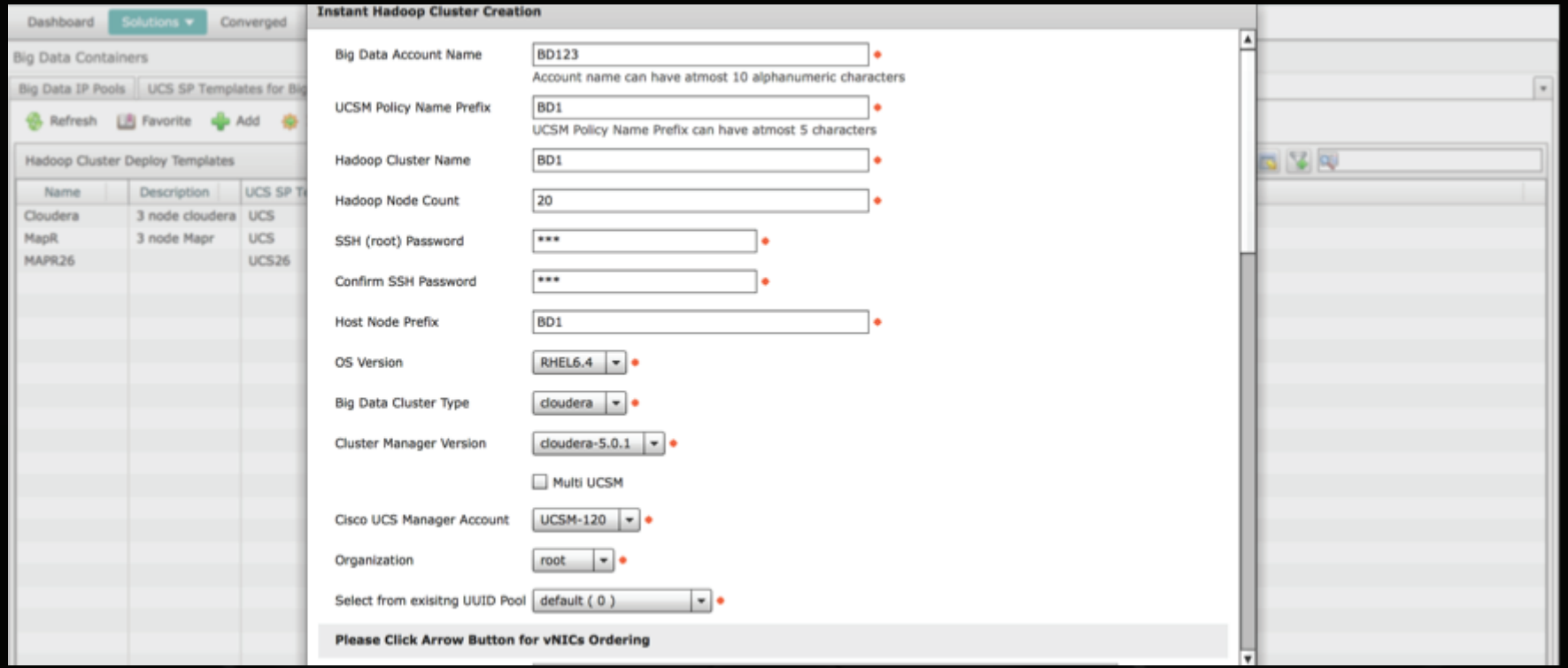
Uplink and server port configuration
Network interface card (NIC) configuration: MAC address, VLAN, and QoS settings;
worldwide names (WWNs),,
and bandwidth constraints;
and firmware revisions

Unique user ID (UUID),
firmware revisions,
and RAID controller settings
Service profile assigned to server, chassis slot, or pool

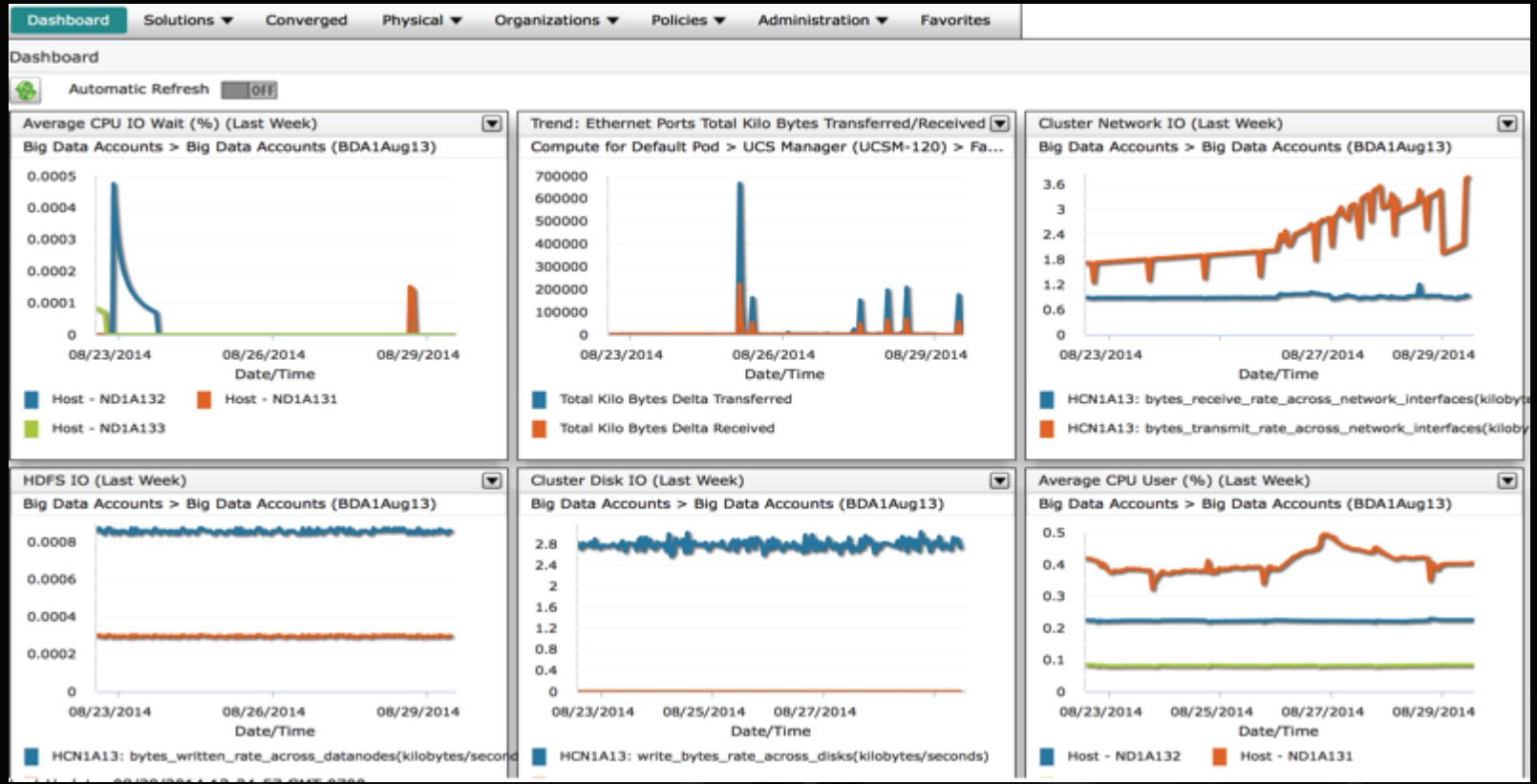
3. Service Profile Templates Create Service Profiles

4. Associate Hadoop and Infrastructure Profiles to create Hadoop Clusters

UCSD Express: Instant Hadoop Cluster

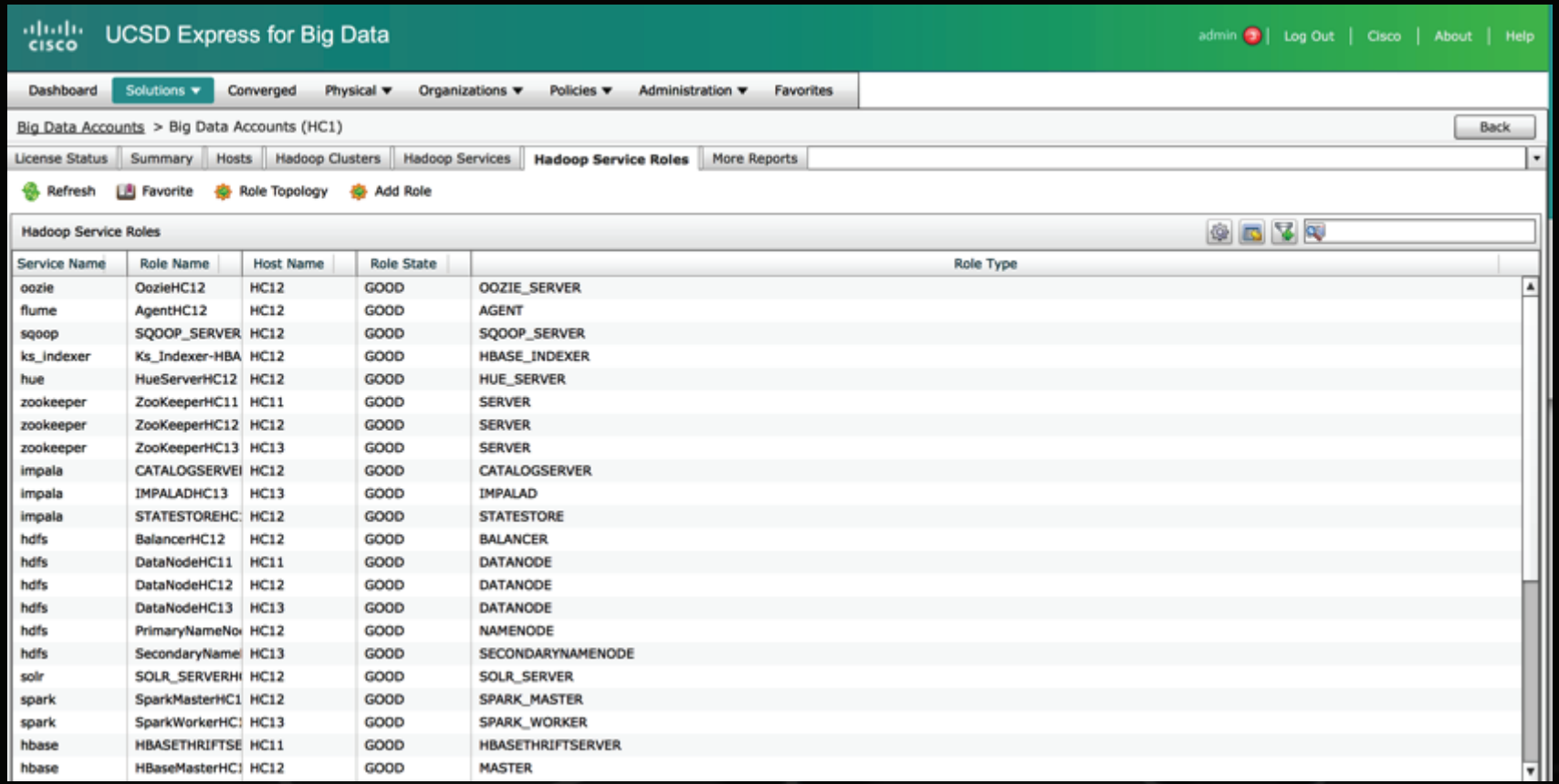


UCSD Express: Unified Hadoop Management

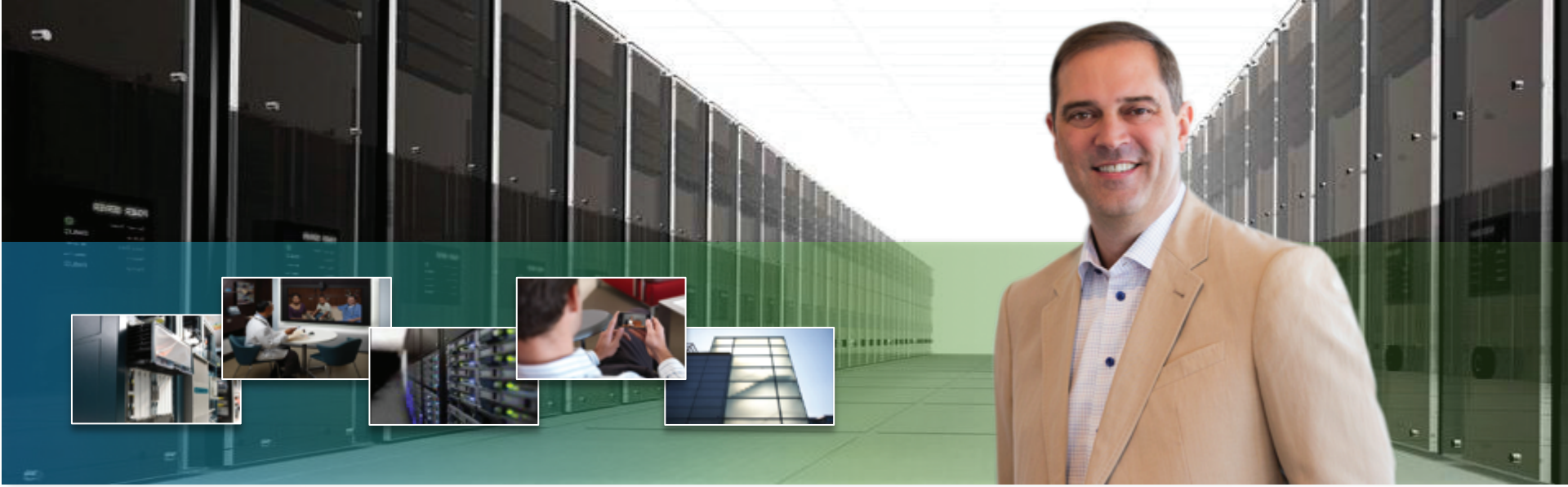


IDH Rest API based Reports (Services)

UCSD Express: Cluster Services



Service Name	Role Name	Host Name	Role State	Role Type
oozie	OozieHC12	HC12	GOOD	OOZIE_SERVER
flume	AgentHC12	HC12	GOOD	AGENT
sqoop	SQOOP_SERVER	HC12	GOOD	SQOOP_SERVER
ks_indexer	Ks_Indexer-HBA	HC12	GOOD	HBASE_INDEXER
hue	HueServerHC12	HC12	GOOD	HUE_SERVER
zookeeper	ZooKeeperHC11	HC11	GOOD	SERVER
zookeeper	ZooKeeperHC12	HC12	GOOD	SERVER
zookeeper	ZooKeeperHC13	HC13	GOOD	SERVER
impala	CATALOGSERVEI	HC12	GOOD	CATALOGSERVER
impala	IMPALADHC13	HC13	GOOD	IMPALAD
impala	STATESTOREHC:	HC12	GOOD	STATESTORE
hdfs	BalancerHC12	HC12	GOOD	BALANCER
hdfs	DataNodeHC11	HC11	GOOD	DATANODE
hdfs	DataNodeHC12	HC12	GOOD	DATANODE
hdfs	DataNodeHC13	HC13	GOOD	DATANODE
hdfs	PrimaryNameNo	HC12	GOOD	NAMENODE
hdfs	SecondaryName	HC13	GOOD	SECONDARYNAMENODE
solr	SOLR_SERVERH	HC12	GOOD	SOLR_SERVER
spark	SparkMasterHC1	HC12	GOOD	SPARK_MASTER
spark	SparkWorkerHC:	HC13	GOOD	SPARK_WORKER
hbase	HBASETHRIFTSE	HC11	GOOD	HBASETHRIFTSERVER
hbase	HBaseMasterHC1	HC12	GOOD	MASTER



Cisco's Data Center Momentum

"For the quarter and full year Cisco's Data Center business segment reported the strongest revenue growth rate. For the fourth quarter Data Center revenue grew 14% from the comparable quarter and for the full year Data Center revenue was up 22%. Innovation in Data Center overall was Cisco's key spotlight for the year. The business segment generated $3.22 billion in revenue which accounted for 7% of revenue for the full year. Demand for Cisco's Unified Computing System fueled revenue growth in the segment overall. Customers sought out Cisco's UCS solutions for their virtualization, server and networking capabilities. The reduced costs for customers of utilizing Cisco's Unified Computing System solutions are also a significant competitive advantage for the company.

Chuck Robbins

August 2015
FY15 Q4 Earnings Announcement

Cisco UCS Leadership and Momentum

- In Q4FY15, Data Center revenue* was **$880M growing 14% Y/Y**
- As of Q4FY15 UCS momentum continues with a revenue run rate of **over $3.5B**
- As of Q4FY15 Cisco UCS has **over 46,500 unique UCS customers** which represents 31% Y/Y growth
- More than **85% of all Fortune 500 customers** have invested in UCS
- As of Q4FY15 have over **22,000 repeat customers** which represents 31% Y/Y growth
- **Over 3,700 Channel Partners are actively selling UCS** worldwide and approximately 2,200 UCS specialized partners
- In CY15 Q2 Cisco is still one of the **Top 5 Server Vendors** based on Worldwide Revenue Share[1]
- **100+ World Record** Performance Benchmarks to date

*Data Center Revenue is defined as Cisco UCS and Nexus 1000V

Source: [1] IDC Worldwide Quarterly Server Tracker, 2015 Q2, August 2015, Vendor Revenue Share
Source: [2] As of Cisco Q4FY15 earnings results Data Center Revenue is defined as Cisco UCS and Nexus 1000V

ACI & Nexus 9000 - Industry Adoption

150+ ACI Customers in Production

4,100+ Nexus 9K and ACI Customers Globally

1000+ ACI Customers

45+ Ecosystem Partners

Thank You